Soyuz-U-PVB

Part of R-7 Family

Russian orbital launch vehicle. Version of Soyuz-U with safety modifications to prevent and resist fires in all stages and the upper stage avionics compartment. These were incorporated as a result of the 18 March 1980 disaster at Plesetsk, when the launch vehicle exploded, killing 18 and putting the pad out of commission for three years.

Status: Active. *First Launch*: 1984-03-21. *Last Launch*: 2012-10-31. *Number*: 345 .

The disaster review board requested changes to equipment and procedures, especially as regarded liquid oxygen handling. Reportedly the explosion occurred during the fuelling of the Block E upper stage, and was due to hydrogen peroxide being present in a lox line filter and a confusion between fuel and lox lines.

Country: Russia. *Spacecraft*: Chibis-M, Oscar, Bion, Zenit-6U, Yantar-4K1, Resurs F1-17F41, Yantar-1KFT, Yantar-4KS1, Zenit-8, Foton, Soyuz TM, Resurs F1-14F40, Resurs F2, Resurs F1-14F43, Pion, Orlets-1, Progress M, GFZ-1, Inspector, PS Model, Mirka, YES, Resurs F1M, Globalstar, Progress M1, IRDT, Cluster 2, Progress M-SO, Nanosputnik. *Launch Sites*: Baikonur LC1, Baikonur LC31, Plesetsk LC41/1, Plesetsk LC43/4, Plesetsk LC43/3, Plesetsk LC16/2.

1984 March 21 - . 11:05 GMT - . *Launch Site*: Plesetsk. *Launch Complex*: Plesetsk LC43/4. *LV Family*: R-7. *Launch Vehicle*: Soyuz-U-PVB.

- **Cosmos 1545** - . *Mass*: 6,300 kg (13,800 lb). *Nation*: Russia. *Agency*: MOM. *Class*: Surveillance. *Type*: Military surveillance satellite. *Spacecraft Bus*: Vostok. *Spacecraft*: Zenit-6U. *Duration*: 15.00 days. *Decay Date*: 1984-04-05 . *USAF Sat Cat*: 14849 . *COSPAR*: 1984-030A. *Apogee*: 367 km (228 mi). *Perigee*: 193 km (119 mi). *Inclination*: 72.9000 deg. *Period*: 90.10 min. Photo surveillance; returned film capsule..

1986 January 8 - . 11:25 GMT - . *Launch Site*: Plesetsk. *LV Family*: R-7. *Launch Vehicle*: Soyuz-U-PVB.

- **Cosmos 1715** - . *Mass*: 6,300 kg (13,800 lb). *Nation*: Russia. *Agency*: MOM. *Class*: Earth. *Type*: Earth resources satellite. *Spacecraft Bus*: Vostok. *Spacecraft*: Zenit-8. *Duration*: 14.00 days. *Decay Date*: 1986-01-22 . *USAF Sat Cat*: 16447 . *COSPAR*: 1986-001A. *Apogee*: 288 km (178 mi). *Perigee*: 192 km (119 mi). *Inclination*:

72.8000 deg. *Period*: 89.30 min. Military cartographic satellite; returned film capsule..

1986 January 15 - . 14:20 GMT - . *Launch Site*: Plesetsk. *LV Family*: R-7. *Launch Vehicle*: Soyuz-U-PVB.

- **Cosmos 1724** - . *Mass*: 6,600 kg (14,500 lb). *Nation*: Russia. *Agency*: MOM. *Class*: Surveillance. *Type*: Military surveillance satellite. *Spacecraft Bus*: Yantar. *Spacecraft*: Yantar-4K1. *Duration*: 59.00 days. *Decay Date*: 1986-03-15 . *USAF Sat Cat*: 16490 . *COSPAR*: 1986-004A. *Apogee*: 330 km (200 mi). *Perigee*: 167 km (103 mi). *Inclination*: 67.1000 deg. *Period*: 89.50 min. High resolution photo reconnaissance; returned film in two small SpK capsules during the mission and with the main capsule at completion of the mission..

1986 January 28 - . 08:35 GMT - . *Launch Site*: Baikonur. *Launch Complex*: Baikonur LC1. *Launch Pad*: LC1 or LC31. *LV Family*: R-7. *Launch Vehicle*: Soyuz-U-PVB.

- **Cosmos 1728** - . *Mass*: 6,300 kg (13,800 lb). *Nation*: Russia. *Agency*: MOM. *Class*: Earth. *Type*: Earth resources satellite. *Spacecraft Bus*: Vostok. *Spacecraft*: Zenit-8. *Duration*: 14.00 days. *Decay Date*: 1986-02-11 . *USAF Sat Cat*: 16512 . *COSPAR*: 1986-009A. *Apogee*: 278 km (172 mi). *Perigee*: 204 km (126 mi). *Inclination*: 70.0000 deg. *Period*: 89.30 min. Military cartographic satellite; returned film capsule..

1986 February 4 - . 11:15 GMT - . *Launch Site*: Plesetsk. *LV Family*: R-7. *Launch Vehicle*: Soyuz-U-PVB.

- **Cosmos 1730** - . *Mass*: 6,300 kg (13,800 lb). *Nation*: Russia. *Agency*: MOM. *Class*: Earth. *Type*: Earth resources satellite. *Spacecraft Bus*: Vostok. *Spacecraft*: Zenit-8. *Duration*: 9.00 days. *Decay Date*: 1986-02-13 . *USAF Sat Cat*: 16540 . *COSPAR*: 1986-012A. *Apogee*: 303 km (188 mi). *Perigee*: 191 km (118 mi). *Inclination*: 72.9000 deg. *Period*: 89.50 min. Military cartographic satellite; returned film capsule..

1986 February 7 - . 08:45 GMT - . *Launch Site*: Baikonur. *Launch Complex*: Baikonur LC1. *Launch Pad*: LC1 or LC31. *LV Family*: R-7. *Launch Vehicle*: Soyuz-U-PVB.

- **Cosmos 1731** - . *Mass*: 6,600 kg (14,500 lb). *Nation*: Russia. *Agency*: MOM. *Class*: Surveillance. *Type*: Military surveillance satellite. *Spacecraft Bus*: Yantar. *Spacecraft*: Yantar-4KS1. *Duration*: 238.00 days. *Decay Date*: 1986-10-03 . *USAF Sat Cat*: 16589 . *COSPAR*: 1986-013A. *Apogee*: 263 km (163 mi). *Perigee*: 233 km (144 mi). *Inclination*: 64.7000 deg. *Period*: 89.50 min. Photo/digital surveillance..

1986 February 26 - . 13:40 GMT - . *Launch Site*: Plesetsk. *LV Family*: R-7. *Launch Vehicle*: Soyuz-U-PVB.

- **Cosmos 1734** - . *Mass*: 6,600 kg (14,500 lb). *Nation*: Russia. *Agency*: MOM. *Class*: Surveillance. *Type*: Military surveillance satellite. *Spacecraft Bus*: Yantar. *Spacecraft*: Yantar-4K1. *Duration*: 59.00 days. *Decay Date*: 1986-04-26 . *USAF Sat Cat*: 16618 . *COSPAR*: 1986-020A. *Apogee*: 343 km (213 mi). *Perigee*: 165 km (102 mi). *Inclination*: 67.1000 deg. *Period*: 89.60 min. High resolution photo reconnaissance; returned film in two small SpK capsules during the mission and with the main capsule at completion of the mission..

1986 March 26 - . *Launch Site*: Baikonur. *Launch Complex*: Baikonur LC1. *Launch Pad*: LC1 or LC31. *LV Family*: R-7. *Launch Vehicle*: Soyuz-U-PVB. *FAILURE*: Failure. *Failed Stage*: U.

- **Zenit-8** - . *Mass*: 6,300 kg (13,800 lb). *Nation*: Russia. *Agency*: UNKS. *Spacecraft Bus*: Vostok. *Spacecraft*: Zenit-8. Military cartographic mission..

1986 April 9 - . 08:00 GMT - . *Launch Site*: Baikonur. *Launch Complex*: Baikonur LC1. *Launch Pad*: LC1 or LC31. *LV Family*: R-7. *Launch Vehicle*: Soyuz-U-PVB.

- **Cosmos 1739** - . *Mass*: 6,600 kg (14,500 lb). *Nation*: Russia. *Agency*: MOM. *Class*: Surveillance. *Type*: Military surveillance satellite. *Spacecraft Bus*: Yantar. *Spacecraft*: Yantar-4K1. *Duration*: 59.00 days. *Decay Date*: 1986-06-07 . *USAF Sat Cat*: 16677 . *COSPAR*: 1986-028A. *Apogee*: 326 km (202 mi). *Perigee*: 171 km (106 mi). *Inclination*: 64.9000 deg. *Period*: 89.50 min. High resolution photo reconnaissance; returned film in two small SpK capsules during the mission and with the main capsule at completion of the mission..

1986 April 15 - . 11:40 GMT - . *Launch Site*: Plesetsk. *LV Family*: R-7. *Launch Vehicle*: Soyuz-U-PVB.

- **Cosmos 1740** - . *Mass*: 6,300 kg (13,800 lb). *Nation*: Russia. *Agency*: MOM. *Class*: Earth. *Type*: Earth resources satellite. *Spacecraft Bus*: Vostok. *Spacecraft*: Zenit-8. *Duration*: 13.00 days. *Decay Date*: 1986-04-28 . *USAF Sat Cat*: 16679 . *COSPAR*: 1986-029A. *Apogee*: 362 km (224 mi). *Perigee*: 193 km (119 mi). *Inclination*: 72.9000 deg. *Period*: 90.10 min. Military cartographic satellite; returned film capsule..

1986 May 14 - . 12:40 GMT - . *Launch Site*: Plesetsk. *LV Family*: R-7. *Launch Vehicle*: Soyuz-U-PVB.

- **Cosmos 1742** - . *Mass*: 6,300 kg (13,800 lb). *Nation*: Russia. *Agency*: MOM. *Class*: Earth. *Type*: Earth resources satellite. *Spacecraft Bus*: Vostok. *Spacecraft*: Zenit-8. *Duration*: 14.00 days. *Decay Date*: 1986-05-28 . *USAF Sat Cat*: 16717 . *COSPAR*: 1986-033A. *Apogee*: 358 km (222 mi). *Perigee*: 194 km (120 mi). *Inclination*: 72.8000 deg. *Period*: 90.00 min. Military cartographic satellite; returned film capsule..

1986 May 21 - . 16:30 GMT - . *Launch Site*: Plesetsk. *Launch Complex*: Plesetsk LC41/1. *LV Family*: R-7. *Launch Vehicle*: Soyuz-U-PVB.

- **Cosmos 1744 / Foton 2** - . *Payload*: Foton s/n 2L. *Mass*: 6,200 kg (13,600 lb). *Nation*: Russia. *Agency*: MOM. *Class*: Materials. *Type*: Materials science satellite. *Spacecraft Bus*: Vostok. *Spacecraft*: Foton. *Duration*: 13.19 days. *Decay Date*: 1986-06-04 . *USAF Sat Cat*: 16724 . *COSPAR*: 1986-036A. *Apogee*: 371 km (230 mi). *Perigee*: 217 km (134 mi). *Inclination*: 62.8000 deg. *Period*: 90.40 min. 216 orbits. Materials processing experiments. Continuation of research on materials science in space..

1986 May 28 - . 07:50 GMT - . *Launch Site*: Plesetsk. *Launch Complex*: Plesetsk LC43/4. *LV Family*: R-7. *Launch Vehicle*: Soyuz-U-PVB.

- **Cosmos 1746** - . *Mass*: 6,300 kg (13,800 lb). *Nation*: Russia. *Agency*: MOM. *Program*: Resurs. *Class*: Earth. *Type*: Earth resources satellite. *Spacecraft Bus*: Vostok. *Spacecraft*: Resurs F1-17F41. *Duration*: 14.00 days. *Decay Date*: 1986-06-11 . *USAF Sat Cat*: 16737 . *COSPAR*: 1986-040A. *Apogee*: 277 km (172 mi). *Perigee*: 176 km (109 mi). *Inclination*: 82.4000 deg. *Period*: 89.00 min. Investigation of the natural resources of the earth in the interests of various branches of the national economy of the USSR and international cooperation. .

1986 May 29 - . 09:20 GMT - . *Launch Site*: Baikonur. *Launch Complex*: Baikonur LC1. *Launch Pad*: LC1 or LC31. *LV Family*: R-7. *Launch Vehicle*: Soyuz-U-PVB.

- **Cosmos 1747** - . *Mass*: 6,300 kg (13,800 lb). *Nation*: Russia. *Agency*: MOM. *Class*: Earth. *Type*: Earth resources satellite. *Spacecraft Bus*: Vostok. *Spacecraft*: Zenit-8. *Duration*: 14.00 days. *Decay Date*: 1986-06-12 . *USAF Sat Cat*: 16745 . *COSPAR*: 1986-041A. *Apogee*: 389 km (241 mi). *Perigee*: 204 km (126 mi). *Inclination*: 70.3000 deg. *Period*: 90.50 min. Military cartographic satellite; returned film capsule..

1986 June 6 - . 12:40 GMT - . *Launch Site*: Baikonur. *Launch Complex*: Baikonur LC1. *Launch Pad*: LC1 or LC31. *LV Family*: R-7. *Launch Vehicle*: Soyuz-U-PVB.

- **Cosmos 1756** - . *Mass*: 6,600 kg (14,500 lb). *Nation*: Russia. *Agency*: MOM. *Class*: Surveillance. *Type*: Military surveillance satellite. *Spacecraft Bus*: Yantar. *Spacecraft*: Yantar-4K1. *Duration*: 59.00 days. *Decay Date*: 1986-08-04 . *USAF Sat Cat*: 16767 . *COSPAR*: 1986-043A. *Apogee*: 268 km (166 mi). *Perigee*: 172 km (106 mi). *Inclination*: 64.9000 deg. *Period*: 88.90 min. High resolution photo reconnaissance; returned film in two small SpK capsules during the mission and with the main capsule at completion of the mission..

1986 June 11 - . 07:45 GMT - . *Launch Site*: Plesetsk. *LV Family*: R-7. *Launch Vehicle*: Soyuz-U-PVB.

- **Cosmos 1757** - . *Payload*: Zenit-8 / Oblik no. 2. *Mass*: 6,300 kg (13,800 lb). *Nation*: Russia. *Agency*: MOM. *Class*: Earth. *Type*: Earth resources satellite. *Spacecraft Bus*: Vostok. *Spacecraft*: Zenit-8. *Duration*: 14.00 days. *Decay Date*: 1986-06-25 . *USAF Sat Cat*: 16772 . *COSPAR*: 1986-045A. *Apogee*: 220 km (130 mi). *Perigee*: 176 km (109 mi). *Inclination*: 82.3000 deg. *Period*: 88.50 min. Military cartographic satellite; returned film capsule. Also investigation of the natural resources of the earth in the interests of various branches of the national economy of the USSR and international cooperation..

1986 June 19 - . 10:30 GMT - . *Launch Site*: Baikonur. *Launch Complex*: Baikonur LC1. *Launch Pad*: LC1 or LC31. *LV Family*: R-7. *Launch Vehicle*: Soyuz-U-PVB.

- **Cosmos 1760** - . *Mass*: 6,300 kg (13,800 lb). *Nation*: Russia. *Agency*: MOM. *Class*: Earth. *Type*: Earth resources satellite. *Spacecraft Bus*: Vostok. *Spacecraft*: Zenit-8. *Duration*: 14.00 days. *Decay Date*: 1986-07-03 . *USAF Sat Cat*: 16800 . *COSPAR*: 1986-048A. *Apogee*: 412 km (256 mi). *Perigee*: 348 km (216 mi). *Inclination*: 70.0000 deg. *Period*: 92.20 min. Military cartographic satellite; returned film capsule..

1986 July 10 - . 08:00 GMT - . *Launch Site*: Plesetsk. *Launch Complex*: Plesetsk LC16/2. *LV Family*: R-7. *Launch Vehicle*: Soyuz-U-PVB.

- **Cosmos 1762** - . *Mass*: 6,300 kg (13,800 lb). *Nation*: Russia. *Agency*: MOM. *Program*: Resurs. *Class*: Earth. *Type*: Earth resources satellite. *Spacecraft Bus*: Vostok. *Spacecraft*: Resurs F1-14F40. *Duration*: 8.00 days. *Decay Date*: 1986-07-24 . *USAF Sat Cat*: 16855 . *COSPAR*: 1986-051A. *Apogee*: 263 km (163 mi). *Perigee*: 177 km (109 mi). *Inclination*: 82.5000 deg. *Period*: 88.90 min. Investigation of the natural resources of the earth in the interests of various branches of the national economy of the USSR and international cooperation. .

1986 July 17 - . 12:30 GMT - . *Launch Site*: Baikonur. *Launch Complex*: Baikonur LC1. *Launch Pad*: LC1 or LC31. *LV Family*: R-7. *Launch Vehicle*: Soyuz-U-PVB.

- **Cosmos 1764** - . *Mass*: 6,600 kg (14,500 lb). *Nation*: Russia. *Agency*: MOM. *Class*: Surveillance. *Type*: Military surveillance satellite. *Spacecraft Bus*: Yantar. *Spacecraft*: Yantar-4K1. *Duration*: 56.00 days. *Decay Date*: 1986-09-11 . *USAF Sat Cat*: 16861 . *COSPAR*: 1986-053A. *Apogee*: 339 km (210 mi). *Perigee*: 171 km (106 mi). *Inclination*: 64.9000 deg. *Period*: 89.60 min. High resolution photo reconnaissance; returned film in two small SpK capsules during the mission and with the main capsule at completion of the mission..

1986 July 24 - . 12:30 GMT - . *Launch Site*: Plesetsk. *LV Family*: R-7. *Launch Vehicle*: Soyuz-U-PVB.

- **Cosmos 1765** - . *Mass*: 6,300 kg (13,800 lb). *Nation*: Russia. *Agency*: MOM. *Class*:

Earth. *Type*: Earth resources satellite. *Spacecraft Bus*: Vostok. *Spacecraft*: Zenit-8. *Duration*: 14.00 days. *Decay Date*: 1986-08-07 . *USAF Sat Cat*: 16874 . *COSPAR*: 1986-054A. *Apogee*: 367 km (228 mi). *Perigee*: 189 km (117 mi). *Inclination*: 72.9000 deg. *Period*: 90.10 min. Military cartographic satellite; returned film capsule..

1986 August 2 - . 09:20 GMT - . *Launch Site*: Plesetsk. *Launch Complex*: Plesetsk LC16/2. *LV Family*: R-7. *Launch Vehicle*: Soyuz-U-PVB.

- **Cosmos 1768** - . *Mass*: 6,300 kg (13,800 lb). *Nation*: Russia. *Agency*: MOM. *Program*: Resurs. *Class*: Earth. *Type*: Earth resources satellite. *Spacecraft Bus*: Vostok. *Spacecraft*: Resurs F1-14F40. *Duration*: 14.00 days. *Decay Date*: 1986-08-16 . *USAF Sat Cat*: 16890 . *COSPAR*: 1986-058A. *Apogee*: 273 km (169 mi). *Perigee*: 180 km (110 mi). *Inclination*: 82.6000 deg. *Period*: 89.00 min. Investigation of the natural resources of the earth in the interests of various branches of the national economy of the USSR and international cooperation. .

1986 August 6 - . 13:30 GMT - . *Launch Site*: Baikonur. *Launch Complex*: Baikonur LC1. *Launch Pad*: LC1 or LC31. *LV Family*: R-7. *Launch Vehicle*: Soyuz-U-PVB.

- **Cosmos 1770** - . *Mass*: 6,600 kg (14,500 lb). *Nation*: Russia. *Agency*: MOM. *Class*: Surveillance. *Type*: Military surveillance satellite. *Spacecraft Bus*: Yantar. *Spacecraft*: Yantar-4KS1. *Duration*: 180.00 days. *Decay Date*: 1987-02-02 . *USAF Sat Cat*: 16897 . *COSPAR*: 1986-060A. *Apogee*: 292 km (181 mi). *Perigee*: 234 km (145 mi). *Inclination*: 64.7000 deg. *Period*: 89.80 min. Photo/digital surveillance..

1986 August 21 - . 11:04 GMT - . *Launch Site*: Plesetsk. *LV Family*: R-7. *Launch Vehicle*: Soyuz-U-PVB.

- **Cosmos 1772** - . *Mass*: 6,300 kg (13,800 lb). *Nation*: Russia. *Agency*: MOM. *Class*: Earth. *Type*: Earth resources satellite. *Spacecraft Bus*: Vostok. *Spacecraft*: Zenit-8. *Duration*: 13.00 days. *Decay Date*: 1986-09-03 . *USAF Sat Cat*: 16918 . *COSPAR*: 1986-063A. *Apogee*: 338 km (210 mi). *Perigee*: 195 km (121 mi). *Inclination*: 72.9000 deg. *Period*: 89.90 min. Military cartographic satellite; returned film capsule..

1986 August 27 - . 11:40 GMT - . *Launch Site*: Baikonur. *Launch Complex*: Baikonur LC1. *Launch Pad*: LC1 or LC31. *LV Family*: R-7. *Launch Vehicle*: Soyuz-U-PVB.

- **Cosmos 1773** - . *Mass*: 6,600 kg (14,500 lb). *Nation*: Russia. *Agency*: MOM. *Class*: Surveillance. *Type*: Military surveillance satellite. *Spacecraft Bus*: Yantar. *Spacecraft*: Yantar-4K1. *Duration*: 55.00 days. *Decay Date*: 1986-10-21 . *USAF Sat Cat*: 16920 . *COSPAR*: 1986-064A. *Apogee*: 339 km (210 mi). *Perigee*: 171 km (106 mi). *Inclination*: 64.9000 deg. *Period*: 89.60 min. High resolution photo reconnaissance; returned film in two small SpK capsules during the mission and

with the main capsule at completion of the mission..

1986 September 3 - . 07:59 GMT - . *Launch Site*: Baikonur. *Launch Complex*: Baikonur LC1. *Launch Pad*: LC1 or LC31. *LV Family*: R-7. *Launch Vehicle*: Soyuz-U-PVB.

- **Cosmos 1775** - . *Mass*: 6,300 kg (13,800 lb). *Nation*: Russia. *Agency*: MOM. *Class*: Earth. *Type*: Earth resources satellite. *Spacecraft Bus*: Vostok. *Spacecraft*: Zenit-8. *Duration*: 14.00 days. *Decay Date*: 1986-09-17 . *USAF Sat Cat*: 16926 . *COSPAR*: 1986-066A. *Apogee*: 412 km (256 mi). *Perigee*: 345 km (214 mi). *Inclination*: 70.4000 deg. *Period*: 92.10 min. Military cartographic satellite; returned film capsule..

1986 September 17 - . 07:59 GMT - . *Launch Site*: Baikonur. *Launch Complex*: Baikonur LC1. *Launch Pad*: LC1 or LC31. *LV Family*: R-7. *Launch Vehicle*: Soyuz-U-PVB.

- **Cosmos 1781** - . *Mass*: 6,300 kg (13,800 lb). *Nation*: Russia. *Agency*: MOM. *Class*: Earth. *Type*: Earth resources satellite. *Spacecraft Bus*: Vostok. *Spacecraft*: Zenit-8. *Duration*: 14.00 days. *Decay Date*: 1986-10-01 . *USAF Sat Cat*: 16966 . *COSPAR*: 1986-072A. *Apogee*: 379 km (235 mi). *Perigee*: 203 km (126 mi). *Inclination*: 70.4000 deg. *Period*: 90.40 min. Military cartographic satellite; returned film capsule..

1986 October 6 - . 07:40 GMT - . *Launch Site*: Baikonur. *Launch Complex*: Baikonur LC1. *Launch Pad*: LC1 or LC31. *LV Family*: R-7. *Launch Vehicle*: Soyuz-U-PVB.

- **Cosmos 1784** - . *Payload*: Yantar-1KFT no. 6. *Mass*: 6,600 kg (14,500 lb). *Nation*: Russia. *Agency*: MOM. *Class*: Surveillance. *Type*: Cartographic satellite. *Spacecraft Bus*: Yantar. *Spacecraft*: Yantar-1KFT. *Duration*: 36.00 days. *Decay Date*: 1986-11-11 . *USAF Sat Cat*: 17003 . *COSPAR*: 1986-077A. *Apogee*: 283 km (175 mi). *Perigee*: 190 km (110 mi). *Inclination*: 64.8000 deg. *Period*: 89.20 min. Military topographic / cartographic satellite..

1986 October 22 - . 09:00 GMT - . *Launch Site*: Baikonur. *Launch Complex*: Baikonur LC1. *Launch Pad*: LC1 or LC31. *LV Family*: R-7. *Launch Vehicle*: Soyuz-U-PVB.

- **Cosmos 1787** - . *Mass*: 6,300 kg (13,800 lb). *Nation*: Russia. *Agency*: MOM. *Class*: Earth. *Type*: Earth resources satellite. *Spacecraft Bus*: Vostok. *Spacecraft*: Zenit-8. *Duration*: 13.00 days. *Decay Date*: 1986-11-04 . *USAF Sat Cat*: 17044 . *COSPAR*: 1986-081A. *Apogee*: 262 km (162 mi). *Perigee*: 211 km (131 mi). *Inclination*: 70.0000 deg. *Period*: 89.20 min. Military cartographic satellite; returned film capsule..

1986 October 31 - . 08:00 GMT - . *Launch Site*: Plesetsk. *Launch Complex*: Plesetsk LC16/2. *LV Family*: R-7. *Launch Vehicle*: Soyuz-U-PVB.

- **Cosmos 1789** - . *Mass*: 6,300 kg (13,800 lb). *Nation*: Russia. *Agency*: MOM. *Program*: Resurs. *Class*: Earth. *Type*: Earth resources satellite. *Spacecraft Bus*: Vostok. *Spacecraft*: Resurs F1-14F40. *Duration*: 14.00 days. *Decay Date*: 1986-11-14 . *USAF Sat Cat*: 17054 . *COSPAR*: 1986-084A. *Apogee*: 272 km (169 mi). *Perigee*: 178 km (110 mi). *Inclination*: 82.6000 deg. *Period*: 89.00 min. Investigation of the natural resources of the earth in the interests of various branches of the national economy of the USSR and international cooperation. .

1986 November 4 - . 11:50 GMT - . *Launch Site*: Plesetsk. *LV Family*: R-7. *Launch Vehicle*: Soyuz-U-PVB.

- **Cosmos 1790** - . *Mass*: 6,300 kg (13,800 lb). *Nation*: Russia. *Agency*: MOM. *Class*: Earth. *Type*: Earth resources satellite. *Spacecraft Bus*: Vostok. *Spacecraft*: Zenit-8. *Duration*: 14.00 days. *Decay Date*: 1986-11-18 . *USAF Sat Cat*: 17056 . *COSPAR*: 1986-085A. *Apogee*: 286 km (177 mi). *Perigee*: 191 km (118 mi). *Inclination*: 72.9000 deg. *Period*: 89.30 min. Military cartographic satellite; returned film capsule..

1986 November 13 - . 10:59 GMT - . *Launch Site*: Baikonur. *Launch Complex*: Baikonur LC1. *Launch Pad*: LC1 or LC31. *LV Family*: R-7. *Launch Vehicle*: Soyuz-U-PVB.

- **Cosmos 1792** - . *Mass*: 6,600 kg (14,500 lb). *Nation*: Russia. *Agency*: MOM. *Class*: Surveillance. *Type*: Military surveillance satellite. *Spacecraft Bus*: Yantar. *Spacecraft*: Yantar-4K1. *Duration*: 53.00 days. *Decay Date*: 1987-01-05 . *USAF Sat Cat*: 17068 . *COSPAR*: 1986-087A. *Apogee*: 309 km (192 mi). *Perigee*: 184 km (114 mi). *Inclination*: 64.9000 deg. *Period*: 89.40 min. High resolution photo reconnaissance; returned film in two small SpK capsules during the mission and with the main capsule at completion of the mission..

1986 December 4 - . 10:10 GMT - . *Launch Site*: Baikonur. *Launch Complex*: Baikonur LC1. *Launch Pad*: LC1 or LC31. *LV Family*: R-7. *Launch Vehicle*: Soyuz-U-PVB.

- **Cosmos 1804** - . *Mass*: 6,300 kg (13,800 lb). *Nation*: Russia. *Agency*: MOM. *Class*: Earth. *Type*: Earth resources satellite. *Spacecraft Bus*: Vostok. *Spacecraft*: Zenit-8. *Duration*: 14.00 days. *Decay Date*: 1986-12-18 . *USAF Sat Cat*: 17179 . *COSPAR*: 1986-095A. *Apogee*: 421 km (261 mi). *Perigee*: 198 km (123 mi). *Inclination*: 70.0000 deg. *Period*: 90.70 min. Military cartographic satellite; returned film capsule..

1986 December 16 - . 14:00 GMT - . *Launch Site*: Plesetsk. *LV Family*: R-7. *Launch Vehicle*: Soyuz-U-PVB.

- **Cosmos 1807** - . *Mass*: 6,600 kg (14,500 lb). *Nation*: Russia. *Agency*: MOM. *Class*: Surveillance. *Type*: Military surveillance satellite. *Spacecraft Bus*: Yantar. *Spacecraft*: Yantar-4K1. *Duration*: 38.00 days. *Decay Date*: 1987-01-23 . *USAF Sat*

Cat: 17217 . *COSPAR*: 1986-099A. *Apogee*: 366 km (227 mi). *Perigee*: 165 km (102 mi). *Inclination*: 67.1000 deg. *Period*: 89.80 min. High resolution photo reconnaissance; returned film in two small SpK capsules during the mission and with the main capsule at completion of the mission..

1986 December 26 - . 11:00 GMT - . *Launch Site*: Baikonur. *Launch Complex*: Baikonur LC1. *Launch Pad*: LC1 or LC31. *LV Family*: R-7. *Launch Vehicle*: Soyuz-U-PVB.

- **Cosmos 1810** - . *Mass*: 6,600 kg (14,500 lb). *Nation*: Russia. *Agency*: MOM. *Class*: Surveillance. *Type*: Military surveillance satellite. *Spacecraft Bus*: Yantar. *Spacecraft*: Yantar-4KS1. *Duration*: 259.00 days. *Decay Date*: 1987-09-11 . *USAF Sat Cat*: 17262 . *COSPAR*: 1986-102A. *Apogee*: 275 km (170 mi). *Perigee*: 224 km (139 mi). *Inclination*: 64.7000 deg. *Period*: 89.50 min. Photo/digital surveillance..

1987 January 9 - . 12:38 GMT - . *Launch Site*: Baikonur. *Launch Complex*: Baikonur LC1. *Launch Pad*: LC1 or LC31. *LV Family*: R-7. *Launch Vehicle*: Soyuz-U-PVB.

- **Cosmos 1811** - . *Mass*: 6,600 kg (14,500 lb). *Nation*: Russia. *Agency*: MOM. *Class*: Surveillance. *Type*: Military surveillance satellite. *Spacecraft Bus*: Yantar. *Spacecraft*: Yantar-4K1. *Duration*: 35.00 days. *Decay Date*: 1987-02-13 . *USAF Sat Cat*: 17292 . *COSPAR*: 1987-002A. *Apogee*: 345 km (214 mi). *Perigee*: 169 km (105 mi). *Inclination*: 64.9000 deg. *Period*: 89.70 min. High resolution photo reconnaissance; returned film in two small SpK capsules during the mission and with the main capsule at completion of the mission..

1987 January 15 - . 11:20 GMT - . *Launch Site*: Plesetsk. *LV Family*: R-7. *Launch Vehicle*: Soyuz-U-PVB.

- **Cosmos 1813** - . *Mass*: 6,300 kg (13,800 lb). *Nation*: Russia. *Agency*: MOM. *Class*: Earth. *Type*: Earth resources satellite. *Spacecraft Bus*: Vostok. *Spacecraft*: Zenit-8. *Decay Date*: 1989-03-13 . *USAF Sat Cat*: 17297 . *COSPAR*: 1987-004A. *Apogee*: 397 km (246 mi). *Perigee*: 347 km (215 mi). *Inclination*: 72.8000 deg. *Period*: 92.00 min. Military cartographic satellite; reentry capsule destroyed in orbit..

1987 February 7 - . 10:30 GMT - . *Launch Site*: Plesetsk. *LV Family*: R-7. *Launch Vehicle*: Soyuz-U-PVB.

- **Cosmos 1819** - . *Mass*: 6,300 kg (13,800 lb). *Nation*: Russia. *Agency*: MOM. *Class*: Earth. *Type*: Earth resources satellite. *Spacecraft Bus*: Vostok. *Spacecraft*: Zenit-8. *Duration*: 11.00 days. *Decay Date*: 1987-02-18 . *USAF Sat Cat*: 17484 . *COSPAR*: 1987-014A. *Apogee*: 227 km (141 mi). *Perigee*: 188 km (116 mi). *Inclination*: 72.8000 deg. *Period*: 88.70 min. Military cartographic satellite; returned film capsule..

1987 February 19 - . 10:15 GMT - . *Launch Site*: Plesetsk. *LV Family*: R-7. *Launch*

Vehicle: Soyuz-U-PVB.

- **Cosmos 1822** - . *Mass*: 6,300 kg (13,800 lb). *Nation*: Russia. *Agency*: MOM. *Class*: Earth. *Type*: Earth resources satellite. *Spacecraft Bus*: Vostok. *Spacecraft*: Zenit-8. *Duration*: 14.00 days. *Decay Date*: 1987-03-05 . *USAF Sat Cat*: 17533 . *COSPAR*: 1987-019A. *Apogee*: 303 km (188 mi). *Perigee*: 190 km (110 mi). *Inclination*: 72.9000 deg. *Period*: 89.40 min. Military cartographic satellite; returned film capsule..

1987 February 26 - . 13:30 GMT - . *Launch Site*: Plesetsk. *LV Family*: R-7. *Launch Vehicle*: Soyuz-U-PVB.

- **Cosmos 1824** - . *Mass*: 6,600 kg (14,500 lb). *Nation*: Russia. *Agency*: MOM. *Class*: Surveillance. *Type*: Military surveillance satellite. *Spacecraft Bus*: Yantar. *Spacecraft*: Yantar-4K1. *Duration*: 55.00 days. *Decay Date*: 1987-04-22 . *USAF Sat Cat*: 17559 . *COSPAR*: 1987-021A. *Apogee*: 352 km (218 mi). *Perigee*: 162 km (100 mi). *Inclination*: 67.2000 deg. *Period*: 89.70 min. High resolution photo reconnaissance; returned film in two small SpK capsules during the mission and with the main capsule at completion of the mission..

1987 March 11 - . 10:25 GMT - . *Launch Site*: Plesetsk. *LV Family*: R-7. *Launch Vehicle*: Soyuz-U-PVB.

- **Cosmos 1826** - . *Mass*: 6,300 kg (13,800 lb). *Nation*: Russia. *Agency*: MOM. *Class*: Earth. *Type*: Earth resources satellite. *Spacecraft Bus*: Vostok. *Spacecraft*: Zenit-8. *Duration*: 14.00 days. *Decay Date*: 1987-03-25 . *USAF Sat Cat*: 17577 . *COSPAR*: 1987-025A. *Apogee*: 374 km (232 mi). *Perigee*: 191 km (118 mi). *Inclination*: 72.9000 deg. *Period*: 90.20 min. Military cartographic satellite; returned film capsule..

1987 April 9 - . 11:44 GMT - . *Launch Site*: Baikonur. *Launch Complex*: Baikonur LC1. *Launch Pad*: LC1 or LC31. *LV Family*: R-7. *Launch Vehicle*: Soyuz-U-PVB.

- **Cosmos 1835** - . *Mass*: 6,600 kg (14,500 lb). *Nation*: Russia. *Agency*: MOM. *Class*: Surveillance. *Type*: Military surveillance satellite. *Spacecraft Bus*: Yantar. *Spacecraft*: Yantar-4K1. *Duration*: 56.00 days. *Decay Date*: 1987-06-04 . *USAF Sat Cat*: 17849 . *COSPAR*: 1987-032A. *Apogee*: 343 km (213 mi). *Perigee*: 170 km (100 mi). *Inclination*: 64.8000 deg. *Period*: 89.60 min. High resolution photo reconnaissance; returned film in two small SpK capsules during the mission and with the main capsule at completion of the mission..

1987 April 16 - . 06:18 GMT - . *Launch Site*: Baikonur. *Launch Complex*: Baikonur LC1. *Launch Pad*: LC1 or LC31. *LV Family*: R-7. *Launch Vehicle*: Soyuz-U-PVB.

- **Cosmos 1836** - . *Mass*: 6,600 kg (14,500 lb). *Nation*: Russia. *Agency*: MOM. *Class*:

Surveillance. *Type*: Military surveillance satellite. *Spacecraft Bus*: Yantar. *Spacecraft*: Yantar-4KS1. *Duration*: 230.00 days. *Decay Date*: 1987-12-02 . *USAF Sat Cat*: 17876 . *COSPAR*: 1987-033A. *Apogee*: 289 km (179 mi). *Perigee*: 236 km (146 mi). *Inclination*: 64.8000 deg. *Period*: 89.80 min. Photo/digital surveillance..

1987 April 22 - . 09:10 GMT - . *Launch Site*: Plesetsk. *LV Family*: R-7. *Launch Vehicle*: Soyuz-U-PVB.

- **Cosmos 1837** - . *Mass*: 6,300 kg (13,800 lb). *Nation*: Russia. *Agency*: MOM. *Class*: Earth. *Type*: Earth resources satellite. *Spacecraft Bus*: Vostok. *Spacecraft*: Zenit-8. *Duration*: 6.00 days. *Decay Date*: 1987-04-28 . *USAF Sat Cat*: 17880 . *COSPAR*: 1987-035A. *Apogee*: 227 km (141 mi). *Perigee*: 174 km (108 mi). *Inclination*: 82.2000 deg. *Period*: 88.50 min. Military cartographic satellite; returned film capsule..

1987 April 24 - . 16:59 GMT - . *Launch Site*: Plesetsk. *Launch Complex*: Plesetsk LC41/1. *LV Family*: R-7. *Launch Vehicle*: Soyuz-U-PVB.

- **Cosmos 1841 / Foton 3** - . *Payload*: Foton s/n 3L. *Mass*: 6,300 kg (13,800 lb). *Nation*: Russia. *Agency*: MOM. *Class*: Materials. *Type*: Materials science satellite. *Spacecraft Bus*: Vostok. *Spacecraft*: Foton. *Duration*: 13.17 days. *Decay Date*: 1987-05-08 . *USAF Sat Cat*: 17907 . *COSPAR*: 1987-037A. *Apogee*: 380 km (230 mi). *Perigee*: 217 km (134 mi). *Inclination*: 62.9000 deg. *Period*: 90.50 min. Materials processing tests. Conduct of experiments on the production of semi-conducting materials and super-pure biological preparations in micro-gravity. .

1987 May 5 - . 09:15 GMT - . *Launch Site*: Baikonur. *Launch Complex*: Baikonur LC1. *Launch Pad*: LC1 or LC31. *LV Family*: R-7. *Launch Vehicle*: Soyuz-U-PVB.

- **Cosmos 1843** - . *Mass*: 6,300 kg (13,800 lb). *Nation*: Russia. *Agency*: MOM. *Class*: Earth. *Type*: Earth resources satellite. *Spacecraft Bus*: Vostok. *Spacecraft*: Zenit-8. *Duration*: 14.00 days. *Decay Date*: 1987-05-19 . *USAF Sat Cat*: 17940 . *COSPAR*: 1987-039A. *Apogee*: 285 km (177 mi). *Perigee*: 202 km (125 mi). *Inclination*: 70.4000 deg. *Period*: 89.40 min. Military cartographic satellite; returned film capsule..

1987 May 13 - . 06:00 GMT - . *Launch Site*: Baikonur. *Launch Complex*: Baikonur LC1. *Launch Pad*: LC1 or LC31. *LV Family*: R-7. *Launch Vehicle*: Soyuz-U-PVB.

- **Cosmos 1845** - . *Mass*: 6,300 kg (13,800 lb). *Nation*: Russia. *Agency*: MOM. *Class*: Earth. *Type*: Earth resources satellite. *Spacecraft Bus*: Vostok. *Spacecraft*: Zenit-8. *Duration*: 14.00 days. *Decay Date*: 1987-05-27 . *USAF Sat Cat*: 17975 . *COSPAR*: 1987-042A. *Apogee*: 373 km (231 mi). *Perigee*: 205 km (127 mi). *Inclination*: 70.4000 deg. *Period*: 90.30 min. Military cartographic satellite; returned film capsule..

1987 May 21 - . 07:44 GMT - . *Launch Site*: Plesetsk. *Launch Complex*: Plesetsk LC43/4. *LV Family*: R-7. *Launch Vehicle*: Soyuz-U-PVB.

- **Cosmos 1846** - . *Mass*: 6,300 kg (13,800 lb). *Nation*: Russia. *Agency*: MOM. *Program*: Resurs. *Class*: Earth. *Type*: Earth resources satellite. *Spacecraft Bus*: Vostok. *Spacecraft*: Resurs F1-14F40. *Duration*: 14.00 days. *Decay Date*: 1987-06-04 . *USAF Sat Cat*: 18004 . *COSPAR*: 1987-045A. *Apogee*: 283 km (175 mi). *Perigee*: 178 km (110 mi). *Inclination*: 82.3000 deg. *Period*: 89.10 min. Investigation of the natural resources of the earth in the interests of various branches of the national economy of the USSR and international cooperation. .

1987 May 26 - . 13:39 GMT - . *Launch Site*: Plesetsk. *LV Family*: R-7. *Launch Vehicle*: Soyuz-U-PVB.

- **Cosmos 1847** - . *Mass*: 6,600 kg (14,500 lb). *Nation*: Russia. *Agency*: MOM. *Class*: Surveillance. *Type*: Military surveillance satellite. *Spacecraft Bus*: Yantar. *Spacecraft*: Yantar-4K1. *Duration*: 57.00 days. *Decay Date*: 1987-07-22 . *USAF Sat Cat*: 18011 . *COSPAR*: 1987-046A. *Apogee*: 315 km (195 mi). *Perigee*: 175 km (108 mi). *Inclination*: 67.1000 deg. *Period*: 89.40 min. High resolution photo reconnaissance; returned film in two small SpK capsules during the mission and with the main capsule at completion of the mission..

1987 May 28 - . 12:44 GMT - . *Launch Site*: Plesetsk. *LV Family*: R-7. *Launch Vehicle*: Soyuz-U-PVB.

- **Cosmos 1848** - . *Mass*: 6,300 kg (13,800 lb). *Nation*: Russia. *Agency*: MOM. *Class*: Earth. *Type*: Earth resources satellite. *Spacecraft Bus*: Vostok. *Spacecraft*: Zenit-8. *Duration*: 14.00 days. *Decay Date*: 1987-06-11 . *USAF Sat Cat*: 18017 . *COSPAR*: 1987-047A. *Apogee*: 368 km (228 mi). *Perigee*: 191 km (118 mi). *Inclination*: 72.9000 deg. *Period*: 90.10 min. Military cartographic satellite; returned film capsule..

1987 June 18 - . 07:24 GMT - . *Launch Site*: Plesetsk. *Launch Complex*: Plesetsk LC43/3. *LV Family*: R-7. *Launch Vehicle*: Soyuz-U-PVB. *FAILURE*: Booster exploded on pad.. *Failed Stage*: 0.

- **Resurs-F1 14F40** - . *Payload*: Resurs-F1 14F40 No. 105. *Mass*: 6,300 kg (13,800 lb). *Nation*: Russia. *Agency*: UNKS. *Program*: Resurs. *Spacecraft Bus*: Vostok. *Spacecraft*: Resurs F1-14F40. Pad was badly damaged and not put back into service until December 1988..

1987 July 4 - . 12:25 GMT - . *Launch Site*: Plesetsk. *LV Family*: R-7. *Launch Vehicle*: Soyuz-U-PVB.

- **Cosmos 1863** - . *Mass*: 6,300 kg (13,800 lb). *Nation*: Russia. *Agency*: MOM. *Class*:

Earth. *Type*: Earth resources satellite. *Spacecraft Bus*: Vostok. *Spacecraft*: Zenit-8. *Duration*: 14.00 days. *Decay Date*: 1987-07-18 . *USAF Sat Cat*: 18155 . *COSPAR*: 1987-056A. *Apogee*: 417 km (259 mi). *Perigee*: 358 km (222 mi). *Inclination*: 72.9000 deg. *Period*: 92.30 min. Military cartographic satellite; returned film capsule..

1987 July 8 - . 10:59 GMT - . *Launch Site*: Baikonur. *Launch Complex*: Baikonur LC1. *Launch Pad*: LC1 or LC31. *LV Family*: R-7. *Launch Vehicle*: Soyuz-U-PVB.

- **Cosmos 1865** - . *Payload*: Yantar-1KFT no. 7. *Mass*: 6,600 kg (14,500 lb). *Nation*: Russia. *Agency*: MOM. *Class*: Surveillance. *Type*: Cartographic satellite. *Spacecraft Bus*: Yantar. *Spacecraft*: Yantar-1KFT. *Duration*: 37.00 days. *Decay Date*: 1987-08-14 . *USAF Sat Cat*: 18162 . *COSPAR*: 1987-058A. *Apogee*: 297 km (184 mi). *Perigee*: 192 km (119 mi). *Inclination*: 64.8000 deg. *Period*: 89.40 min. Military topographic / cartographic satellite..

1987 July 9 - . 16:10 GMT - . *Launch Site*: Plesetsk. *LV Family*: R-7. *Launch Vehicle*: Soyuz-U-PVB.

- **Cosmos 1866** - . *Mass*: 6,600 kg (14,500 lb). *Nation*: Russia. *Agency*: MOM. *Class*: Surveillance. *Type*: Military surveillance satellite. *Spacecraft Bus*: Yantar. *Spacecraft*: Yantar-4K1. *Duration*: 17.00 days. *Decay Date*: 1987-08-31 . *USAF Sat Cat*: 18184 . *COSPAR*: 1987-059A. *Apogee*: 769 km (477 mi). *Perigee*: 223 km (138 mi). *Inclination*: 67.2000 deg. *Period*: 94.50 min. High resolution photo reconnaissance. Engine failure prematurely depleted fuel supply. Blown up in orbit on July 26..

1987 August 19 - . 06:59 GMT - . *Launch Site*: Plesetsk. *LV Family*: R-7. *Launch Vehicle*: Soyuz-U-PVB.

- **Cosmos 1872** - . *Mass*: 6,300 kg (13,800 lb). *Nation*: Russia. *Agency*: MOM. *Class*: Earth. *Type*: Earth resources satellite. *Spacecraft Bus*: Vostok. *Spacecraft*: Zenit-8. *Duration*: 11.00 days. *Decay Date*: 1987-08-30 . *USAF Sat Cat*: 18314 . *COSPAR*: 1987-069A. *Apogee*: 299 km (185 mi). *Perigee*: 196 km (121 mi). *Inclination*: 72.9000 deg. *Period*: 89.60 min. Military cartographic satellite; returned film capsule..

1987 September 3 - . 10:25 GMT - . *Launch Site*: Plesetsk. *LV Family*: R-7. *Launch Vehicle*: Soyuz-U-PVB.

- **Cosmos 1874** - . *Mass*: 6,300 kg (13,800 lb). *Nation*: Russia. *Agency*: MOM. *Class*: Earth. *Type*: Earth resources satellite. *Spacecraft Bus*: Vostok. *Spacecraft*: Zenit-8. *Duration*: 14.00 days. *Decay Date*: 1987-09-17 . *USAF Sat Cat*: 18326 . *COSPAR*: 1987-072A. *Apogee*: 284 km (176 mi). *Perigee*: 223 km (138 mi). *Inclination*: 72.9000 deg. *Period*: 89.60 min. Military cartographic satellite; returned film

capsule..

1987 September 11 - . 02:06 GMT - . *Launch Site*: Baikonur. *Launch Complex*: Baikonur LC1. *Launch Pad*: LC1 or LC31. *LV Family*: R-7. *Launch Vehicle*: Soyuz-U-PVB.

- **Cosmos 1881** - . *Mass*: 6,600 kg (14,500 lb). *Nation*: Russia. *Agency*: MOM. *Class*: Surveillance. *Type*: Military surveillance satellite. *Spacecraft Bus*: Yantar. *Spacecraft*: Yantar-4KS1. *Duration*: 201.00 days. *Decay Date*: 1988-03-30 . *USAF Sat Cat*: 18343 . *COSPAR*: 1987-076A. *Apogee*: 294 km (182 mi). *Perigee*: 228 km (141 mi). *Inclination*: 64.7000 deg. *Period*: 89.70 min. Photo/digital surveillance..

1987 September 15 - . 10:30 GMT - . *Launch Site*: Plesetsk. *Launch Complex*: Plesetsk LC43/4. *LV Family*: R-7. *Launch Vehicle*: Soyuz-U-PVB.

- **Cosmos 1882** - . *Mass*: 6,300 kg (13,800 lb). *Nation*: Russia. *Agency*: MOM. *Program*: Resurs. *Class*: Earth. *Type*: Earth resources satellite. *Spacecraft Bus*: Vostok. *Spacecraft*: Resurs F1-14F40. *Duration*: 21.00 days. *Decay Date*: 1987-10-06 . *USAF Sat Cat*: 18348 . *COSPAR*: 1987-077A. *Apogee*: 269 km (167 mi). *Perigee*: 253 km (157 mi). *Inclination*: 82.3000 deg. *Period*: 89.70 min. Investigation of the natural resources of the earth in the interests of various branches of the national economy of the USSR and international cooperation. .

1987 September 17 - . 14:59 GMT - . *Launch Site*: Plesetsk. *LV Family*: R-7. *Launch Vehicle*: Soyuz-U-PVB.

- **Cosmos 1886** - . *Mass*: 6,600 kg (14,500 lb). *Nation*: Russia. *Agency*: MOM. *Class*: Surveillance. *Type*: Military surveillance satellite. *Spacecraft Bus*: Yantar. *Spacecraft*: Yantar-4K1. *Duration*: 46.00 days. *Decay Date*: 1987-11-02 . *USAF Sat Cat*: 18366 . *COSPAR*: 1987-081A. *Apogee*: 321 km (199 mi). *Perigee*: 170 km (100 mi). *Inclination*: 67.1000 deg. *Period*: 89.40 min. High resolution photo reconnaissance; returned film in two small SpK capsules during the mission and with the main capsule at completion of the mission..

1987 September 29 - . 12:50 GMT - . *Launch Site*: Plesetsk. *Launch Complex*: Plesetsk LC41/1. *LV Family*: R-7. *Launch Vehicle*: Soyuz-U-PVB.

- **Cosmos 1887** - . *Payload*: Bion no. 8. *Mass*: 6,000 kg (13,200 lb). *Nation*: Russia. *Agency*: MOM. *Class*: Biology. *Type*: Biology satellite. *Spacecraft Bus*: Vostok. *Spacecraft*: Bion. *Duration*: 13.00 days. *Decay Date*: 1987-10-12 . *USAF Sat Cat*: 18380 . *COSPAR*: 1987-083A. *Apogee*: 382 km (237 mi). *Perigee*: 214 km (132 mi). *Inclination*: 62.8000 deg. *Period*: 90.50 min. Biological research. Carried monkeys Drema and Erosha. Continued investigations of the influence of space flight factors on living organisms and radiation physics research. Capsule recovered 62 deg 47 min N, 112 deg 26 min E (?).. *Additional Details*: here....

1987 October 9 - . 08:30 GMT - . *Launch Site*: Baikonur. *Launch Complex*: Baikonur LC1. *Launch Pad*: LC1 or LC31. *LV Family*: R-7. *Launch Vehicle*: Soyuz-U-PVB.

- **Cosmos 1889** - . *Mass*: 6,300 kg (13,800 lb). *Nation*: Russia. *Agency*: MOM. *Class*: Earth. *Type*: Earth resources satellite. *Spacecraft Bus*: Vostok. *Spacecraft*: Zenit-8. *Duration*: 14.00 days. *Decay Date*: 1987-10-23 . *USAF Sat Cat*: 18394 . *COSPAR*: 1987-085A. *Apogee*: 371 km (230 mi). *Perigee*: 204 km (126 mi). *Inclination*: 70.0000 deg. *Period*: 90.30 min. Military cartographic satellite; returned film capsule..

1987 October 22 - . 14:25 GMT - . *Launch Site*: Plesetsk. *LV Family*: R-7. *Launch Vehicle*: Soyuz-U-PVB.

- **Cosmos 1893** - . *Mass*: 6,600 kg (14,500 lb). *Nation*: Russia. *Agency*: MOM. *Class*: Surveillance. *Type*: Military surveillance satellite. *Spacecraft Bus*: Yantar. *Spacecraft*: Yantar-4K1. *Duration*: 55.00 days. *Decay Date*: 1987-12-16 . *USAF Sat Cat*: 18432 . *COSPAR*: 1987-089A. *Apogee*: 323 km (200 mi). *Perigee*: 162 km (100 mi). *Inclination*: 67.2000 deg. *Period*: 89.40 min. High resolution photo reconnaissance; returned film in two small SpK capsules during the mission and with the main capsule at completion of the mission..

1987 November 11 - . 09:04 GMT - . *Launch Site*: Baikonur. *Launch Complex*: Baikonur LC1. *Launch Pad*: LC1 or LC31. *LV Family*: R-7. *Launch Vehicle*: Soyuz-U-PVB.

- **Cosmos 1895** - . *Mass*: 6,300 kg (13,800 lb). *Nation*: Russia. *Agency*: MOM. *Class*: Earth. *Type*: Earth resources satellite. *Spacecraft Bus*: Vostok. *Spacecraft*: Zenit-8. *Duration*: 15.00 days. *Decay Date*: 1987-11-26 . *USAF Sat Cat*: 18491 . *COSPAR*: 1987-092A. *Apogee*: 283 km (175 mi). *Perigee*: 224 km (139 mi). *Inclination*: 70.4000 deg. *Period*: 89.60 min. Military cartographic satellite; returned film capsule..

1987 November 14 - . 09:29 GMT - . *Launch Site*: Baikonur. *Launch Complex*: Baikonur LC1. *Launch Pad*: LC1 or LC31. *LV Family*: R-7. *Launch Vehicle*: Soyuz-U-PVB.

- **Cosmos 1896** - . *Payload*: Yantar-1KFT no. 8. *Mass*: 6,600 kg (14,500 lb). *Nation*: Russia. *Agency*: MOM. *Class*: Surveillance. *Type*: Cartographic satellite. *Spacecraft Bus*: Yantar. *Spacecraft*: Yantar-1KFT. *Duration*: 41.00 days. *Decay Date*: 1987-12-25 . *USAF Sat Cat*: 18535 . *COSPAR*: 1987-093A. *Apogee*: 263 km (163 mi). *Perigee*: 206 km (128 mi). *Inclination*: 64.8000 deg. *Period*: 89.20 min. Military topographic / cartographic satellite..

1987 December 7 - . 08:50 GMT - . *Launch Site*: Baikonur. *Launch Complex*: Baikonur LC1. *Launch Pad*: LC1 or LC31. *LV Family*: R-7. *Launch Vehicle*: Soyuz-U-PVB.

- **Cosmos 1899** - . *Mass*: 6,300 kg (13,800 lb). *Nation*: Russia. *Agency*: MOM. *Class*:

Earth. *Type*: Earth resources satellite. *Spacecraft Bus*: Vostok. *Spacecraft*: Zenit-8. *Duration*: 14.00 days. *Decay Date*: 1987-12-21 . *USAF Sat Cat*: 18625 . *COSPAR*: 1987-099A. *Apogee*: 277 km (172 mi). *Perigee*: 225 km (139 mi). *Inclination*: 70.4000 deg. *Period*: 89.50 min. Military cartographic satellite; returned film capsule..

1987 December 14 - . 11:29 GMT - . *Launch Site*: Baikonur. *Launch Complex*: Baikonur LC1. *Launch Pad*: LC1 or LC31. *LV Family*: R-7. *Launch Vehicle*: Soyuz-U-PVB.

- **Cosmos 1901** - . *Mass*: 6,600 kg (14,500 lb). *Nation*: Russia. *Agency*: MOM. *Class*: Surveillance. *Type*: Military surveillance satellite. *Spacecraft Bus*: Yantar. *Spacecraft*: Yantar-4K1. *Duration*: 51.00 days. *Decay Date*: 1988-02-03 . *USAF Sat Cat*: 18666 . *COSPAR*: 1987-102A. *Apogee*: 343 km (213 mi). *Perigee*: 172 km (106 mi). *Inclination*: 64.9000 deg. *Period*: 89.70 min. High resolution photo reconnaissance; returned film in two small SpK capsules during the mission and with the main capsule at completion of the mission..

1987 December 25 - . 08:45 GMT - . *Launch Site*: Baikonur. *Launch Complex*: Baikonur LC1. *Launch Pad*: LC1 or LC31. *LV Family*: R-7. *Launch Vehicle*: Soyuz-U-PVB.

- **Cosmos 1905** - . *Mass*: 6,300 kg (13,800 lb). *Nation*: Russia. *Agency*: MOM. *Class*: Earth. *Type*: Earth resources satellite. *Spacecraft Bus*: Vostok. *Spacecraft*: Zenit-8. *Duration*: 14.00 days. *Decay Date*: 1988-01-08 . *USAF Sat Cat*: 18711 . *COSPAR*: 1987-107A. *Apogee*: 277 km (172 mi). *Perigee*: 226 km (140 mi). *Inclination*: 70.4000 deg. *Period*: 89.50 min. Military cartographic satellite; returned film capsule..

1987 December 26 - . 11:30 GMT - . *Launch Site*: Plesetsk. *Launch Complex*: Plesetsk LC16/2. *LV Family*: R-7. *Launch Vehicle*: Soyuz-U-PVB.

- **Cosmos 1906** - . *Payload*: Resurs F2 s/n 1. *Mass*: 6,300 kg (13,800 lb). *Nation*: Russia. *Agency*: MOM. *Program*: Resurs. *Class*: Earth. *Type*: Earth resources satellite. *Spacecraft Bus*: Vostok. *Spacecraft*: Resurs F2. *Duration*: 65.00 days. *Decay Date*: 1988-02-29 . *USAF Sat Cat*: 18713 . *COSPAR*: 1987-108A. *Apogee*: 273 km (169 mi). *Perigee*: 253 km (157 mi). *Inclination*: 82.6000 deg. *Period*: 89.80 min. Also performed earth resources tasks. Investigation of the natural resources of the earth in the interests of various branches of the national economy of the USSR and international cooperation. .

1987 December 29 - . 11:40 GMT - . *Launch Site*: Plesetsk. *LV Family*: R-7. *Launch Vehicle*: Soyuz-U-PVB.

- **Cosmos 1907** - . *Mass*: 6,300 kg (13,800 lb). *Nation*: Russia. *Agency*: MOM. *Class*: Earth. *Type*: Earth resources satellite. *Spacecraft Bus*: Vostok. *Spacecraft*: Zenit-8. *Duration*: 14.00 days. *Decay Date*: 1988-01-12 . *USAF Sat Cat*: 18720 . *COSPAR*:

1987-110A. *Apogee*: 412 km (256 mi). *Perigee*: 353 km (219 mi). *Inclination*: 72.8000 deg. *Period*: 92.20 min. Military cartographic satellite; returned film capsule..

1988 January 26 - . 11:20 GMT - . *Launch Site*: Plesetsk. *LV Family*: R-7. *Launch Vehicle*: Soyuz-U-PVB.

- **Cosmos 1915** - . *Mass*: 6,300 kg (13,800 lb). *Nation*: Russia. *Agency*: MOM. *Class*: Earth. *Type*: Earth resources satellite. *Spacecraft Bus*: Vostok. *Spacecraft*: Zenit-8. *Duration*: 14.00 days. *Decay Date*: 1988-02-09 . *USAF Sat Cat*: 18809 . *COSPAR*: 1988-004A. *Apogee*: 372 km (231 mi). *Perigee*: 190 km (110 mi). *Inclination*: 73.0000 deg. *Period*: 90.20 min. Military cartographic satellite; returned film capsule..

1988 February 3 - . 12:15 GMT - . *Launch Site*: Baikonur. *Launch Complex*: Baikonur LC1. *Launch Pad*: LC1 or LC31. *LV Family*: R-7. *Launch Vehicle*: Soyuz-U-PVB.

- **Cosmos 1916** - . *Mass*: 6,600 kg (14,500 lb). *Nation*: Russia. *Agency*: MOM. *Class*: Surveillance. *Type*: Military surveillance satellite. *Spacecraft Bus*: Yantar. *Spacecraft*: Yantar-4K1. *Duration*: 24.00 days. *Decay Date*: 1988-02-29 . *USAF Sat Cat*: 18823 . *COSPAR*: 1988-007A. *Apogee*: 352 km (218 mi). *Perigee*: 168 km (104 mi). *Inclination*: 64.9000 deg. *Period*: 89.70 min. High resolution photo reconnaissance. Spacecraft failed. Blown up in orbit on February 27..

1988 February 18 - . 09:50 GMT - . *Launch Site*: Plesetsk. *Launch Complex*: Plesetsk LC16/2. *LV Family*: R-7. *Launch Vehicle*: Soyuz-U-PVB.

- **Cosmos 1920** - . *Mass*: 6,300 kg (13,800 lb). *Nation*: Russia. *Agency*: MOM. *Program*: Resurs. *Class*: Earth. *Type*: Earth resources satellite. *Spacecraft Bus*: Vostok. *Spacecraft*: Resurs F1-14F40. *Duration*: 20.00 days. *Decay Date*: 1988-03-09 . *USAF Sat Cat*: 18860 . *COSPAR*: 1988-010A. *Apogee*: 232 km (144 mi). *Perigee*: 185 km (114 mi). *Inclination*: 82.6000 deg. *Period*: 88.70 min. Investigation of the natural resources of the earth in the interests of various branches of the national economy of the USSR and international cooperation. .

1988 February 19 - . 08:00 GMT - . *Launch Site*: Baikonur. *Launch Complex*: Baikonur LC1. *Launch Pad*: LC1 or LC31. *LV Family*: R-7. *Launch Vehicle*: Soyuz-U-PVB.

- **Cosmos 1921** - . *Mass*: 6,300 kg (13,800 lb). *Nation*: Russia. *Agency*: MOM. *Class*: Earth. *Type*: Earth resources satellite. *Spacecraft Bus*: Vostok. *Spacecraft*: Zenit-8. *Duration*: 14.00 days. *Decay Date*: 1988-03-04 . *USAF Sat Cat*: 18875 . *COSPAR*: 1988-011A. *Apogee*: 375 km (233 mi). *Perigee*: 202 km (125 mi). *Inclination*: 70.0000 deg. *Period*: 90.30 min. Military cartographic satellite; returned film capsule..

1988 March 10 - . 10:30 GMT - . *Launch Site*: Plesetsk. *LV Family*: R-7. *Launch Vehicle*: Soyuz-U-PVB.

- **Cosmos 1923** - . *Mass*: 6,300 kg (13,800 lb). *Nation*: Russia. *Agency*: MOM. *Class*: Earth. *Type*: Earth resources satellite. *Spacecraft Bus*: Vostok. *Spacecraft*: Zenit-8. *Duration*: 12.00 days. *Decay Date*: 1988-03-22 . *USAF Sat Cat*: 18931 . *COSPAR*: 1988-015A. *Apogee*: 302 km (187 mi). *Perigee*: 190 km (110 mi). *Inclination*: 72.9000 deg. *Period*: 89.40 min. Military cartographic satellite; returned film capsule..

1988 March 24 - . 14:10 GMT - . *Launch Site*: Plesetsk. *LV Family*: R-7. *Launch Vehicle*: Soyuz-U-PVB.

- **Cosmos 1935** - . *Mass*: 6,600 kg (14,500 lb). *Nation*: Russia. *Agency*: MOM. *Class*: Surveillance. *Type*: Military surveillance satellite. *Spacecraft Bus*: Yantar. *Spacecraft*: Yantar-4K1. *Duration*: 15.00 days. *Decay Date*: 1988-04-08 . *USAF Sat Cat*: 19011 . *COSPAR*: 1988-025A. *Apogee*: 330 km (200 mi). *Perigee*: 166 km (103 mi). *Inclination*: 67.2000 deg. *Period*: 89.50 min. High resolution photo reconnaissance; returned film in two small SpK capsules during the mission and with the main capsule at completion of the mission..

1988 March 30 - . 12:00 GMT - . *Launch Site*: Baikonur. *Launch Complex*: Baikonur LC1. *Launch Pad*: LC1 or LC31. *LV Family*: R-7. *Launch Vehicle*: Soyuz-U-PVB.

- **Cosmos 1936** - . *Mass*: 6,600 kg (14,500 lb). *Nation*: Russia. *Agency*: MOM. *Class*: Surveillance. *Type*: Military surveillance satellite. *Spacecraft Bus*: Yantar. *Spacecraft*: Yantar-4KS1. *Duration*: 49.00 days. *Decay Date*: 1988-05-18 . *USAF Sat Cat*: 19015 . *COSPAR*: 1988-027A. *Apogee*: 266 km (165 mi). *Perigee*: 182 km (113 mi). *Inclination*: 64.8000 deg. *Period*: 89.00 min. Photo/digital surveillance..

1988 April 11 - . 11:15 GMT - . *Launch Site*: Plesetsk. *LV Family*: R-7. *Launch Vehicle*: Soyuz-U-PVB.

- **Cosmos 1938** - . *Mass*: 6,300 kg (13,800 lb). *Nation*: Russia. *Agency*: MOM. *Class*: Earth. *Type*: Earth resources satellite. *Spacecraft Bus*: Vostok. *Spacecraft*: Zenit-8. *Duration*: 14.00 days. *Decay Date*: 1988-04-25 . *USAF Sat Cat*: 19041 . *COSPAR*: 1988-030A. *Apogee*: 287 km (178 mi). *Perigee*: 194 km (120 mi). *Inclination*: 72.9000 deg. *Period*: 89.30 min. Military cartographic satellite; returned film capsule..

1988 April 14 - . 17:00 GMT - . *Launch Site*: Plesetsk. *Launch Complex*: Plesetsk LC41/1. *LV Family*: R-7. *Launch Vehicle*: Soyuz-U-PVB.

- **Foton 4** - . *Payload*: Foton s/n 4L. *Mass*: 6,200 kg (13,600 lb). *Nation*: Russia. *Agency*: MOM. *Class*: Materials. *Type*: Materials science satellite. *Spacecraft Bus*:

Vostok. *Spacecraft*: Foton. *Duration*: 13.62 days. *Decay Date*: 1988-04-28 . *USAF Sat Cat*: 19043 . *COSPAR*: 1988-031A. *Apogee*: 372 km (231 mi). *Perigee*: 215 km (133 mi). *Inclination*: 62.8000 deg. *Period*: 90.40 min. 218 orbits. Materials processing experiments; extremely pure and semiconductor materials. Research in material science in space (production of semiconductor materials with improved properties and very pure biologically active substances).

1988 April 27 - . 09:10 GMT - . *Launch Site*: Baikonur. *Launch Complex*: Baikonur LC1. *Launch Pad*: LC1 or LC31. *LV Family*: R-7. *Launch Vehicle*: Soyuz-U-PVB.

- **Cosmos 1941** - . *Mass*: 6,300 kg (13,800 lb). *Nation*: Russia. *Agency*: MOM. *Class*: Earth. *Type*: Earth resources satellite. *Spacecraft Bus*: Vostok. *Spacecraft*: Zenit-8. *Duration*: 14.00 days. *Decay Date*: 1988-05-11 . *USAF Sat Cat*: 19079 . *COSPAR*: 1988-035A. *Apogee*: 266 km (165 mi). *Perigee*: 205 km (127 mi). *Inclination*: 70.3000 deg. *Period*: 89.20 min. Military cartographic satellite; returned film capsule..

1988 May 12 - . 14:40 GMT - . *Launch Site*: Plesetsk. *LV Family*: R-7. *Launch Vehicle*: Soyuz-U-PVB.

- **Cosmos 1942** - . *Mass*: 6,600 kg (14,500 lb). *Nation*: Russia. *Agency*: MOM. *Class*: Surveillance. *Type*: Military surveillance satellite. *Spacecraft Bus*: Yantar. *Spacecraft*: Yantar-4K1. *Duration*: 53.00 days. *Decay Date*: 1988-07-04 . *USAF Sat Cat*: 19115 . *COSPAR*: 1988-037A. *Apogee*: 356 km (221 mi). *Perigee*: 166 km (103 mi). *Inclination*: 67.1000 deg. *Period*: 89.70 min.

1988 May 18 - . 10:30 GMT - . *Launch Site*: Baikonur. *Launch Complex*: Baikonur LC1. *Launch Pad*: LC1 or LC31. *LV Family*: R-7. *Launch Vehicle*: Soyuz-U-PVB.

- **Cosmos 1944** - . *Payload*: Yantar-1KFT no. 9. *Mass*: 6,600 kg (14,500 lb). *Nation*: Russia. *Agency*: MOM. *Class*: Surveillance. *Type*: Cartographic satellite. *Spacecraft Bus*: Yantar. *Spacecraft*: Yantar-1KFT. *Duration*: 36.00 days. *Decay Date*: 1988-06-23 . *USAF Sat Cat*: 19123 . *COSPAR*: 1988-041A. *Apogee*: 288 km (178 mi). *Perigee*: 196 km (121 mi). *Inclination*: 64.8000 deg. *Period*: 89.30 min. Military topographic / cartographic satellite..

1988 May 19 - . 09:15 GMT - . *Launch Site*: Baikonur. *Launch Complex*: Baikonur LC1. *Launch Pad*: LC1 or LC31. *LV Family*: R-7. *Launch Vehicle*: Soyuz-U-PVB.

- **Cosmos 1945** - . *Mass*: 6,300 kg (13,800 lb). *Nation*: Russia. *Agency*: MOM. *Class*: Earth. *Type*: Earth resources satellite. *Spacecraft Bus*: Vostok. *Spacecraft*: Zenit-8. *Duration*: 12.00 days. *Decay Date*: 1988-05-31 . *USAF Sat Cat*: 19131 . *COSPAR*: 1988-042A. *Apogee*: 364 km (226 mi). *Perigee*: 204 km (126 mi). *Inclination*: 70.4000 deg. *Period*: 90.20 min. Military cartographic satellite; returned film capsule..

1988 May 31 - . 07:45 GMT - . *Launch Site*: Plesetsk. *Launch Complex*: Plesetsk LC41/1. *LV Family*: R-7. *Launch Vehicle*: Soyuz-U-PVB.

- **Cosmos 1951** - . *Mass*: 6,300 kg (13,800 lb). *Nation*: Russia. *Agency*: MOM. *Program*: Resurs. *Class*: Earth. *Type*: Earth resources satellite. *Spacecraft Bus*: Vostok. *Spacecraft*: Resurs F1-14F43. *Duration*: 14.00 days. *Decay Date*: 1988-06-14 . *USAF Sat Cat*: 19197 . *COSPAR*: 1988-047A. *Apogee*: 241 km (149 mi). *Perigee*: 173 km (107 mi). *Inclination*: 82.3000 deg. *Period*: 88.60 min. Investigation of the natural resources of the earth in the interests of various branches of the national economy of the USSR and international cooperation. .

1988 June 11 - . 10:00 GMT - . *Launch Site*: Baikonur. *Launch Complex*: Baikonur LC1. *Launch Pad*: LC1 or LC31. *LV Family*: R-7. *Launch Vehicle*: Soyuz-U-PVB.

- **Cosmos 1952** - . *Mass*: 6,300 kg (13,800 lb). *Nation*: Russia. *Agency*: MOM. *Class*: Earth. *Type*: Earth resources satellite. *Spacecraft Bus*: Vostok. *Spacecraft*: Zenit-8. *Duration*: 14.00 days. *Decay Date*: 1988-06-25 . *USAF Sat Cat*: 19206 . *COSPAR*: 1988-049A. *Apogee*: 269 km (167 mi). *Perigee*: 204 km (126 mi). *Inclination*: 70.0000 deg. *Period*: 89.20 min. Military cartographic satellite; returned film capsule..

1988 June 22 - . 13:00 GMT - . *Launch Site*: Baikonur. *Launch Complex*: Baikonur LC1. *Launch Pad*: LC1 or LC31. *LV Family*: R-7. *Launch Vehicle*: Soyuz-U-PVB.

- **Cosmos 1955** - . *Mass*: 6,600 kg (14,500 lb). *Nation*: Russia. *Agency*: MOM. *Class*: Surveillance. *Type*: Military surveillance satellite. *Spacecraft Bus*: Yantar. *Spacecraft*: Yantar-4K1. *Duration*: 59.00 days. *Decay Date*: 1988-08-20 . *USAF Sat Cat*: 19258 . *COSPAR*: 1988-054A. *Apogee*: 357 km (221 mi). *Perigee*: 171 km (106 mi). *Inclination*: 64.8000 deg. *Period*: 89.80 min. High resolution photo reconnaissance; returned film in two small SpK capsules during the mission and with the main capsule at completion of the mission..

1988 June 23 - . 07:45 GMT - . *Launch Site*: Plesetsk. *LV Family*: R-7. *Launch Vehicle*: Soyuz-U-PVB.

- **Cosmos 1956** - . *Mass*: 6,300 kg (13,800 lb). *Nation*: Russia. *Agency*: MOM. *Class*: Earth. *Type*: Earth resources satellite. *Spacecraft Bus*: Vostok. *Spacecraft*: Zenit-8. *Duration*: 14.00 days. *Decay Date*: 1988-07-07 . *USAF Sat Cat*: 19263 . *COSPAR*: 1988-055A. *Apogee*: 234 km (145 mi). *Perigee*: 180 km (110 mi). *Inclination*: 82.3000 deg. *Period*: 88.60 min. Military cartographic satellite; returned film capsule..

1988 July 7 - . 08:05 GMT - . *Launch Site*: Plesetsk. *Launch Complex*: Plesetsk LC16/2. *LV Family*: R-7. *Launch Vehicle*: Soyuz-U-PVB.

- **Cosmos 1957** - . *Payload*: Resurs-F1 14F43 s/n 29. *Mass*: 6,300 kg (13,800 lb). *Nation*: Russia. *Agency*: MOM. *Program*: Resurs. *Class*: Earth. *Type*: Earth resources satellite. *Spacecraft Bus*: Vostok. *Spacecraft*: Resurs F1-14F43. *Decay Date*: 1988-07-21 . *USAF Sat Cat*: 19276 . *COSPAR*: 1988-057A. *Apogee*: 225 km (139 mi). *Perigee*: 179 km (111 mi). *Inclination*: 82.6000 deg. *Period*: 88.50 min. Investigation of the natural resources of the earth in the interests of various branches of the national economy of the USSR and international cooperation. .

1988 July 9 - . *Launch Site*: Baikonur. *Launch Complex*: Baikonur LC1. *Launch Pad*: LC1 or LC31. *LV Family*: R-7. *Launch Vehicle*: Soyuz-U-PVB. *FAILURE*: Failure. *Failed Stage*: U.

- **Yantar-4KS1** - . *Mass*: 6,620 kg (14,590 lb). *Nation*: Russia. *Agency*: UNKS. *Spacecraft Bus*: Yantar. *Spacecraft*: Yantar-4KS1.

1988 July 27 - . 09:05 GMT - . *Launch Site*: Plesetsk. *Launch Complex*: Plesetsk LC43/4. *LV Family*: R-7. *Launch Vehicle*: Soyuz-U-PVB. *FAILURE*: Failure. *Failed Stage*: U.

- **Resurs-F1 14F43** - . *Payload*: Resurs-F1 14F43 No. 30. *Mass*: 6,300 kg (13,800 lb). *Nation*: Russia. *Agency*: UNKS. *Program*: Resurs. *Spacecraft Bus*: Vostok. *Spacecraft*: Resurs F1-14F43.

1988 August 8 - . 09:25 GMT - . *Launch Site*: Baikonur. *Launch Complex*: Baikonur LC1. *Launch Pad*: LC1 or LC31. *LV Family*: R-7. *Launch Vehicle*: Soyuz-U-PVB.

- **Cosmos 1962** - . *Mass*: 6,300 kg (13,800 lb). *Nation*: Russia. *Agency*: MOM. *Class*: Earth. *Type*: Earth resources satellite. *Spacecraft Bus*: Vostok. *Spacecraft*: Zenit-8. *Duration*: 14.00 days. *Decay Date*: 1988-08-22 . *USAF Sat Cat*: 19372 . *COSPAR*: 1988-068A. *Apogee*: 265 km (164 mi). *Perigee*: 205 km (127 mi). *Inclination*: 70.0000 deg. *Period*: 89.20 min. Military cartographic satellite; returned film capsule..

1988 August 16 - . 13:00 GMT - . *Launch Site*: Baikonur. *Launch Complex*: Baikonur LC1. *Launch Pad*: LC1 or LC31. *LV Family*: R-7. *Launch Vehicle*: Soyuz-U-PVB.

- **Cosmos 1963** - . *Mass*: 6,600 kg (14,500 lb). *Nation*: Russia. *Agency*: MOM. *Class*: Surveillance. *Type*: Military surveillance satellite. *Spacecraft Bus*: Yantar. *Spacecraft*: Yantar-4K1. *Duration*: 47.00 days. *Decay Date*: 1988-10-02 . *USAF Sat Cat*: 19384 . *COSPAR*: 1988-070A. *Apogee*: 350 km (210 mi). *Perigee*: 176 km (109 mi). *Inclination*: 64.8000 deg. *Period*: 89.80 min. High resolution photo reconnaissance; returned film in two small SpK capsules during the mission and with the main capsule at completion of the mission..

1988 August 23 - . 09:20 GMT - . *Launch Site*: Baikonur. *Launch Complex*: Baikonur LC1. *Launch Pad*: LC1 or LC31. *LV Family*: R-7. *Launch Vehicle*: Soyuz-U-PVB.

- **Cosmos 1964** - . *Mass*: 6,300 kg (13,800 lb). *Nation*: Russia. *Agency*: MOM. *Class*: Earth. *Type*: Earth resources satellite. *Spacecraft Bus*: Vostok. *Spacecraft*: Zenit-8. *Duration*: 15.00 days. *Decay Date*: 1988-09-07 . *USAF Sat Cat*: 19412 . *COSPAR*: 1988-072A. *Apogee*: 271 km (168 mi). *Perigee*: 206 km (128 mi). *Inclination*: 70.0000 deg. *Period*: 89.30 min. Military cartographic satellite; returned film capsule..

1988 August 23 - . 11:15 GMT - . *Launch Site*: Plesetsk. *Launch Complex*: Plesetsk LC41/1. *LV Family*: R-7. *Launch Vehicle*: Soyuz-U-PVB.

- **Cosmos 1965** - . *Mass*: 6,300 kg (13,800 lb). *Nation*: Russia. *Agency*: MOM. *Program*: Resurs. *Class*: Earth. *Type*: Earth resources satellite. *Spacecraft Bus*: Vostok. *Spacecraft*: Resurs F2. *Duration*: 30.00 days. *Decay Date*: 1988-09-22 . *USAF Sat Cat*: 19414 . *COSPAR*: 1988-073A. *Apogee*: 228 km (141 mi). *Perigee*: 179 km (111 mi). *Inclination*: 82.3000 deg. *Period*: 88.60 min. Investigation of the natural resources of the earth in the interests of various branches of the national economy of the USSR and international cooperation. .

1988 September 6 - . 07:30 GMT - . *Launch Site*: Plesetsk. *LV Family*: R-7. *Launch Vehicle*: Soyuz-U-PVB.

- **Cosmos 1967** - . *Mass*: 6,300 kg (13,800 lb). *Nation*: Russia. *Agency*: MOM. *Class*: Earth. *Type*: Earth resources satellite. *Spacecraft Bus*: Vostok. *Spacecraft*: Zenit-8. *Duration*: 9.00 days. *Decay Date*: 1988-09-15 . *USAF Sat Cat*: 19462 . *COSPAR*: 1988-079A. *Apogee*: 380 km (230 mi). *Perigee*: 191 km (118 mi). *Inclination*: 72.9000 deg. *Period*: 90.20 min. Military cartographic satellite; returned film capsule..

1988 September 9 - . 10:40 GMT - . *Launch Site*: Plesetsk. *Launch Complex*: Plesetsk LC41/1. *LV Family*: R-7. *Launch Vehicle*: Soyuz-U-PVB.

- **Cosmos 1968** - . *Mass*: 6,300 kg (13,800 lb). *Nation*: Russia. *Agency*: MOM. *Program*: Resurs. *Class*: Earth. *Type*: Earth resources satellite. *Spacecraft Bus*: Vostok. *Spacecraft*: Resurs F1-14F43. *Duration*: 14.00 days. *Decay Date*: 1988-09-23 . *USAF Sat Cat*: 19488 . *COSPAR*: 1988-082A. *Apogee*: 230 km (140 mi). *Perigee*: 177 km (109 mi). *Inclination*: 82.3000 deg. *Period*: 88.60 min. Investigation of the natural resources of the earth in the interests of various branches of the national economy of the USSR and international cooperation. .

1988 September 15 - . 15:00 GMT - . *Launch Site*: Plesetsk. *LV Family*: R-7. *Launch Vehicle*: Soyuz-U-PVB.

- **Cosmos 1969** - . *Mass*: 6,600 kg (14,500 lb). *Nation*: Russia. *Agency*: MOM. *Class*: Surveillance. *Type*: Military surveillance satellite. *Spacecraft Bus*: Yantar. *Spacecraft*: Yantar-4K1. *Duration*: 59.00 days. *Decay Date*: 1988-11-13 . *USAF Sat*

Cat: 19495 . *COSPAR*: 1988-084A. *Apogee*: 344 km (213 mi). *Perigee*: 165 km (102 mi). *Inclination*: 67.1000 deg. *Period*: 89.60 min. High resolution photo reconnaissance; returned film in two small SpK capsules during the mission and with the main capsule at completion of the mission..

1988 September 22 - . 10:20 GMT - . *Launch Site*: Plesetsk. *LV Family*: R-7. *Launch Vehicle*: Soyuz-U-PVB.

- **Cosmos 1973** - . *Mass*: 6,300 kg (13,800 lb). *Nation*: Russia. *Agency*: MOM. *Class*: Earth. *Type*: Earth resources satellite. *Spacecraft Bus*: Vostok. *Spacecraft*: Zenit-8. *Duration*: 18.00 days. *Decay Date*: 1988-10-10 . *USAF Sat Cat*: 19521 . *COSPAR*: 1988-088A. *Apogee*: 359 km (223 mi). *Perigee*: 192 km (119 mi). *Inclination*: 72.8000 deg. *Period*: 90.00 min. Military cartographic satellite; returned film capsule..

1988 October 13 - . 11:19 GMT - . *Launch Site*: Plesetsk. *LV Family*: R-7. *Launch Vehicle*: Soyuz-U-PVB.

- **Cosmos 1976** - . *Mass*: 6,300 kg (13,800 lb). *Nation*: Russia. *Agency*: MOM. *Class*: Earth. *Type*: Earth resources satellite. *Spacecraft Bus*: Vostok. *Spacecraft*: Zenit-8. *Duration*: 14.00 days. *Decay Date*: 1988-10-27 . *USAF Sat Cat*: 19582 . *COSPAR*: 1988-094A. *Apogee*: 366 km (227 mi). *Perigee*: 190 km (110 mi). *Inclination*: 72.9000 deg. *Period*: 90.10 min. Military cartographic satellite; returned film capsule..

1988 October 27 - . 11:31 GMT - . *Launch Site*: Plesetsk. *LV Family*: R-7. *Launch Vehicle*: Soyuz-U-PVB.

- **Cosmos 1978** - . *Mass*: 6,300 kg (13,800 lb). *Nation*: Russia. *Agency*: MOM. *Class*: Earth. *Type*: Earth resources satellite. *Spacecraft Bus*: Vostok. *Spacecraft*: Zenit-8. *Duration*: 14.00 days. *Decay Date*: 1988-11-10 . *USAF Sat Cat*: 19612 . *COSPAR*: 1988-097A. *Apogee*: 364 km (226 mi). *Perigee*: 190 km (110 mi). *Inclination*: 72.9000 deg. *Period*: 90.10 min. Military cartographic satellite; returned film capsule..

1988 November 11 - . *Launch Site*: Baikonur. *Launch Complex*: Baikonur LC1. *Launch Pad*: LC1 or LC31. *LV Family*: R-7. *Launch Vehicle*: Soyuz-U-PVB. *FAILURE*: Failure. *Failed Stage*: U.

- **Yantar-4KS1** - . *Mass*: 6,620 kg (14,590 lb). *Nation*: Russia. *Agency*: UNKS. *Spacecraft Bus*: Yantar. *Spacecraft*: Yantar-4KS1.

1988 November 24 - . 14:50 GMT - . *Launch Site*: Plesetsk. *LV Family*: R-7. *Launch Vehicle*: Soyuz-U-PVB.

- **Cosmos 1981** - . *Mass*: 6,300 kg (13,800 lb). *Nation*: Russia. *Agency*: MOM. *Class*: Earth. *Type*: Earth resources satellite. *Spacecraft Bus*: Vostok. *Spacecraft*: Zenit-8. *Duration*: 14.00 days. *Decay Date*: 1988-12-08 . *USAF Sat Cat*: 19651 . *COSPAR*: 1988-103A. *Apogee*: 353 km (219 mi). *Perigee*: 237 km (147 mi). *Inclination*: 62.8000 deg. *Period*: 90.40 min. Military cartographic satellite; returned film capsule..

1988 November 30 - . 09:00 GMT - . *Launch Site*: Baikonur. *Launch Complex*: Baikonur LC1. *Launch Pad*: LC1 or LC31. *LV Family*: R-7. *Launch Vehicle*: Soyuz-U-PVB.

- **Cosmos 1982** - . *Mass*: 6,300 kg (13,800 lb). *Nation*: Russia. *Agency*: MOM. *Class*: Earth. *Type*: Earth resources satellite. *Spacecraft Bus*: Vostok. *Spacecraft*: Zenit-8. *Duration*: 14.00 days. *Decay Date*: 1988-12-14 . *USAF Sat Cat*: 19662 . *COSPAR*: 1988-105A. *Apogee*: 377 km (234 mi). *Perigee*: 204 km (126 mi). *Inclination*: 70.0000 deg. *Period*: 90.30 min. Military cartographic satellite; returned film capsule..

1988 December 8 - . 14:50 GMT - . *Launch Site*: Plesetsk. *LV Family*: R-7. *Launch Vehicle*: Soyuz-U-PVB.

- **Cosmos 1983** - . *Mass*: 6,300 kg (13,800 lb). *Nation*: Russia. *Agency*: MOM. *Class*: Earth. *Type*: Earth resources satellite. *Spacecraft Bus*: Vostok. *Spacecraft*: Zenit-8. *Duration*: 14.00 days. *Decay Date*: 1988-12-22 . *USAF Sat Cat*: 19672 . *COSPAR*: 1988-107A. *Apogee*: 256 km (159 mi). *Perigee*: 243 km (150 mi). *Inclination*: 62.8000 deg. *Period*: 89.50 min. Military cartographic satellite; returned film capsule..

1988 December 16 - . 19:00 GMT - . *Launch Site*: Plesetsk. *LV Family*: R-7. *Launch Vehicle*: Soyuz-U-PVB.

- **Cosmos 1984** - . *Mass*: 6,600 kg (14,500 lb). *Nation*: Russia. *Agency*: MOM. *Class*: Surveillance. *Type*: Military surveillance satellite. *Spacecraft Bus*: Yantar. *Spacecraft*: Yantar-4K1. *Duration*: 59.00 days. *Decay Date*: 1989-02-13 . *USAF Sat Cat*: 19705 . *COSPAR*: 1988-110A. *Apogee*: 323 km (200 mi). *Perigee*: 186 km (115 mi). *Inclination*: 62.8000 deg. *Period*: 89.60 min. High resolution photo reconnaissance; returned film in two small SpK capsules during the mission and with the main capsule at completion of the mission..

1988 December 29 - . 10:00 GMT - . *Launch Site*: Baikonur. *Launch Complex*: Baikonur LC1. *Launch Pad*: LC1 or LC31. *LV Family*: R-7. *Launch Vehicle*: Soyuz-U-PVB.

- **Cosmos 1986** - . *Payload*: Yantar-1KFT no. 10. *Mass*: 6,600 kg (14,500 lb). *Nation*: Russia. *Agency*: MOM. *Class*: Surveillance. *Type*: Cartographic satellite. *Spacecraft Bus*: Yantar. *Spacecraft*: Yantar-1KFT. *Duration*: 44.00 days. *Decay Date*: 1989-02-11 . *USAF Sat Cat*: 19734 . *COSPAR*: 1988-116A. *Apogee*: 289 km (179 mi).

Perigee: 193 km (119 mi). *Inclination*: 64.8000 deg. *Period*: 89.30 min. Topographic mapping for the Army General Staff..

1989 January 12 - . 11:29 GMT - . *Launch Site*: Plesetsk. *Launch Complex*: Plesetsk LC16/2. *LV Family*: R-7. *Launch Vehicle*: Soyuz-U-PVB.

- **Cosmos 1990** - . *Mass*: 6,300 kg (13,800 lb). *Nation*: Russia. *Agency*: MOM. *Program*: Resurs. *Class*: Earth. *Type*: Earth resources satellite. *Spacecraft Bus*: Vostok. *Spacecraft*: Resurs F2. *Duration*: 30.00 days. *Decay Date*: 1989-02-11 . *USAF Sat Cat*: 19756 . *COSPAR*: 1989-002A. *Apogee*: 227 km (141 mi). *Perigee*: 177 km (109 mi). *Inclination*: 82.6000 deg. *Period*: 88.50 min.

  Investigation of the natural resources of the earth in the interests of the national economy of the USSR and international cooperation; survey of seismically active regions of the country, including the Armenian SSR, in the interests of industrial and non -industrial construction.

1989 January 18 - . 08:20 GMT - . *Launch Site*: Baikonur. *Launch Complex*: Baikonur LC1. *Launch Pad*: LC1 or LC31. *LV Family*: R-7. *Launch Vehicle*: Soyuz-U-PVB.

- **Cosmos 1991** - . *Mass*: 6,300 kg (13,800 lb). *Nation*: Russia. *Agency*: MOM. *Class*: Earth. *Type*: Earth resources satellite. *Spacecraft Bus*: Vostok. *Spacecraft*: Zenit-8. *Duration*: 14.00 days. *Decay Date*: 1989-02-01 . *USAF Sat Cat*: 19758 . *COSPAR*: 1989-003A. *Apogee*: 375 km (233 mi). *Perigee*: 204 km (126 mi). *Inclination*: 70.0000 deg. *Period*: 90.30 min. Military cartographic satellite; returned film capsule..

1989 January 28 - . 12:30 GMT - . *Launch Site*: Baikonur. *Launch Complex*: Baikonur LC1. *Launch Pad*: LC1 or LC31. *LV Family*: R-7. *Launch Vehicle*: Soyuz-U-PVB.

- **Cosmos 1993** - . *Mass*: 6,600 kg (14,500 lb). *Nation*: Russia. *Agency*: MOM. *Class*: Surveillance. *Type*: Military surveillance satellite. *Spacecraft Bus*: Yantar. *Spacecraft*: Yantar-4K1. *Duration*: 58.00 days. *Decay Date*: 1989-03-27 . *USAF Sat Cat*: 19774 . *COSPAR*: 1989-007A. *Apogee*: 347 km (215 mi). *Perigee*: 171 km (106 mi). *Inclination*: 64.8000 deg. *Period*: 89.70 min. High resolution photo reconnaissance; returned film in two small SpK capsules during the mission and with the main capsule at completion of the mission..

1989 February 10 - . 16:55 GMT - . *Launch Site*: Plesetsk. *LV Family*: R-7. *Launch Vehicle*: Soyuz-U-PVB.

- **Cosmos 2000** - . *Mass*: 6,300 kg (13,800 lb). *Nation*: Russia. *Agency*: MOM. *Program*: Resurs. *Class*: Earth. *Type*: Earth resources satellite. *Spacecraft Bus*: Vostok. *Spacecraft*: Resurs F2. *Duration*: 20.00 days. *Decay Date*: 1989-03-02 . *USAF Sat Cat*: 19792 . *COSPAR*: 1989-010A. *Apogee*: 243 km (150 mi). *Perigee*: 175

km (108 mi). *Inclination*: 82.3000 deg. *Period*: 88.70 min.

Investigation of the natural resources of the Earth in the interests of various branches of the Soviet economy and international cooperation; space-based survey of the central part of Antarctica for purposes of mapping inaccessible regions of that continent.

1989 February 17 - . 14:59 GMT - . *Launch Site*: Plesetsk. *LV Family*: R-7. *Launch Vehicle*: Soyuz-U-PVB.

- **Cosmos 2003** - . *Mass*: 6,300 kg (13,800 lb). *Nation*: Russia. *Agency*: MOM. *Class*: Earth. *Type*: Earth resources satellite. *Spacecraft Bus*: Vostok. *Spacecraft*: Zenit-8. *Duration*: 14.00 days. *Decay Date*: 1989-03-03 . *USAF Sat Cat*: 19818 . *COSPAR*: 1989-015A. *Apogee*: 255 km (158 mi). *Perigee*: 244 km (151 mi). *Inclination*: 62.8000 deg. *Period*: 89.50 min. Military cartographic satellite; returned film capsule..

1989 March 2 - . 18:59 GMT - . *Launch Site*: Plesetsk. *LV Family*: R-7. *Launch Vehicle*: Soyuz-U-PVB.

- **Cosmos 2005** - . *Mass*: 6,600 kg (14,500 lb). *Nation*: Russia. *Agency*: MOM. *Class*: Surveillance. *Type*: Military surveillance satellite. *Spacecraft Bus*: Yantar. *Spacecraft*: Yantar-4K1. *Duration*: 54.00 days. *Decay Date*: 1989-04-25 . *USAF Sat Cat*: 19862 . *COSPAR*: 1989-019A. *Apogee*: 324 km (201 mi). *Perigee*: 188 km (116 mi). *Inclination*: 62.8000 deg. *Period*: 89.60 min. High resolution photo reconnaissance; returned film in two small SpK capsules during the mission and with the main capsule at completion of the mission..

1989 March 16 - . 14:59 GMT - . *Launch Site*: Plesetsk. *LV Family*: R-7. *Launch Vehicle*: Soyuz-U-PVB.

- **Cosmos 2006** - . *Mass*: 6,300 kg (13,800 lb). *Nation*: Russia. *Agency*: MOM. *Class*: Earth. *Type*: Earth resources satellite. *Spacecraft Bus*: Vostok. *Spacecraft*: Zenit-8. *Duration*: 15.00 days. *Decay Date*: 1989-03-31 . *USAF Sat Cat*: 19893 . *COSPAR*: 1989-022A. *Apogee*: 380 km (230 mi). *Perigee*: 240 km (140 mi). *Inclination*: 62.8000 deg. *Period*: 90.70 min. Military cartographic satellite; returned film capsule..

1989 March 23 - . 12:25 GMT - . *Launch Site*: Baikonur. *Launch Complex*: Baikonur LC1. *Launch Pad*: LC1 or LC31. *LV Family*: R-7. *Launch Vehicle*: Soyuz-U-PVB.

- **Cosmos 2007** - . *Mass*: 6,600 kg (14,500 lb). *Nation*: Russia. *Agency*: MOM. *Class*: Surveillance. *Type*: Military surveillance satellite. *Spacecraft Bus*: Yantar. *Spacecraft*: Yantar-4KS1. *Duration*: 180.00 days. *Decay Date*: 1989-09-22 . *USAF Sat Cat*: 19900 . *COSPAR*: 1989-024A. *Apogee*: 262 km (162 mi). *Perigee*: 224 km

(139 mi). *Inclination*: 64.7000 deg. *Period*: 89.40 min. Photo/digital surveillance..

1989 April 6 - . 14:00 GMT - . *Launch Site*: Plesetsk. *LV Family*: R-7. *Launch Vehicle*: Soyuz-U-PVB.

- **Cosmos 2017** - . *Mass*: 6,300 kg (13,800 lb). *Nation*: Russia. *Agency*: MOM. *Class*: Earth. *Type*: Earth resources satellite. *Spacecraft Bus*: Vostok. *Spacecraft*: Zenit-8. *Duration*: 13.00 days. *Decay Date*: 1989-04-19 . *USAF Sat Cat*: 19923 . *COSPAR*: 1989-029A. *Apogee*: 260 km (160 mi). *Perigee*: 244 km (151 mi). *Inclination*: 62.8000 deg. *Period*: 89.60 min. Military cartographic satellite; returned film capsule..

1989 April 20 - . 18:29 GMT - . *Launch Site*: Plesetsk. *LV Family*: R-7. *Launch Vehicle*: Soyuz-U-PVB.

- **Cosmos 2018** - . *Mass*: 6,600 kg (14,500 lb). *Nation*: Russia. *Agency*: MOM. *Class*: Surveillance. *Type*: Military surveillance satellite. *Spacecraft Bus*: Yantar. *Spacecraft*: Yantar-4K1. *Duration*: 60.00 days. *Decay Date*: 1989-06-19 . *USAF Sat Cat*: 19938 . *COSPAR*: 1989-031A. *Apogee*: 327 km (203 mi). *Perigee*: 185 km (114 mi). *Inclination*: 62.9000 deg. *Period*: 89.60 min. High resolution photo reconnaissance; returned film in two small SpK capsules during the mission and with the main capsule at completion of the mission..

1989 April 26 - . 17:00 GMT - . *Launch Site*: Plesetsk. *Launch Complex*: Plesetsk LC41/1. *LV Family*: R-7. *Launch Vehicle*: Soyuz-U-PVB.

- **Foton 5** - . *Payload*: Foton s/n 5L. *Mass*: 6,200 kg (13,600 lb). *Nation*: Russia. *Agency*: MOM. *Class*: Materials. *Type*: Materials science satellite. *Spacecraft Bus*: Vostok. *Spacecraft*: Foton. *Duration*: 14.35 days. *Decay Date*: 1989-05-11 . *USAF Sat Cat*: 19941 . *COSPAR*: 1989-032A. *Apogee*: 377 km (234 mi). *Perigee*: 220 km (130 mi). *Inclination*: 62.8000 deg. *Period*: 90.50 min. 234 orbits. Materials processing. Space materials research (production of enhanced performance semiconductors and especially pure biologically active substances in microgravity conditions). Jointly with France..

1989 May 5 - . 13:00 GMT - . *Launch Site*: Plesetsk. *LV Family*: R-7. *Launch Vehicle*: Soyuz-U-PVB.

- **Cosmos 2019** - . *Mass*: 6,300 kg (13,800 lb). *Nation*: Russia. *Agency*: MOM. *Class*: Earth. *Type*: Earth resources satellite. *Spacecraft Bus*: Vostok. *Spacecraft*: Zenit-8. *Duration*: 13.00 days. *Decay Date*: 1989-05-18 . *USAF Sat Cat*: 19972 . *COSPAR*: 1989-034A. *Apogee*: 256 km (159 mi). *Perigee*: 241 km (149 mi). *Inclination*: 62.9000 deg. *Period*: 89.50 min. Military cartographic satellite; returned film capsule..

1989 May 17 - . 13:00 GMT - . *Launch Site*: Baikonur. *Launch Complex*: Baikonur LC1. *Launch Pad*: LC1 or LC31. *LV Family*: R-7. *Launch Vehicle*: Soyuz-U-PVB.

- **Cosmos 2020** - . *Mass*: 6,600 kg (14,500 lb). *Nation*: Russia. *Agency*: MOM. *Class*: Surveillance. *Type*: Military surveillance satellite. *Spacecraft Bus*: Yantar. *Spacecraft*: Yantar-4K1. *Duration*: 59.00 days. *Decay Date*: 1989-07-15 . *USAF Sat Cat*: 19986 . *COSPAR*: 1989-036A. *Apogee*: 280 km (170 mi). *Perigee*: 178 km (110 mi). *Inclination*: 64.8000 deg. *Period*: 89.10 min. High resolution photo reconnaissance; returned film in two small SpK capsules during the mission and with the main capsule at completion of the mission..

1989 May 24 - . 10:30 GMT - . *Launch Site*: Baikonur. *Launch Complex*: Baikonur LC1. *Launch Pad*: LC1 or LC31. *LV Family*: R-7. *Launch Vehicle*: Soyuz-U-PVB.

- **Cosmos 2021** - . *Payload*: Yantar-1KFT no. 11. *Mass*: 6,600 kg (14,500 lb). *Nation*: Russia. *Agency*: MOM. *Class*: Surveillance. *Type*: Cartographic satellite. *Spacecraft Bus*: Yantar. *Spacecraft*: Yantar-1KFT. *Duration*: 43.00 days. *Decay Date*: 1989-07-06 . *USAF Sat Cat*: 20000 . *COSPAR*: 1989-037A. *Apogee*: 280 km (170 mi). *Perigee*: 204 km (126 mi). *Inclination*: 69.9000 deg. *Period*: 89.40 min. Topographic mapping for the Army General Staff..

1989 May 25 - . 08:50 GMT - . *Launch Site*: Plesetsk. *Launch Complex*: Plesetsk LC43/3. *LV Family*: R-7. *Launch Vehicle*: Soyuz-U-PVB.

- **Resurs F-01** - . *Payload*: Resurs-F1 14F43 s/n 45. *Mass*: 6,300 kg (13,800 lb). *Nation*: Russia. *Agency*: MOM. *Program*: Resurs. *Class*: Earth. *Type*: Earth resources satellite. *Spacecraft Bus*: Vostok. *Spacecraft*: Resurs F1-14F43. *Duration*: 23.00 days. *Decay Date*: 1989-06-17 . *USAF Sat Cat*: 20006 . *COSPAR*: 1989-038A. *Apogee*: 232 km (144 mi). *Perigee*: 174 km (108 mi). *Inclination*: 82.3000 deg. *Period*: 88.60 min.

  Deployed Pion 1 & 2. Resurs-F: Investigation of the natural resources of the earth in the interests of various branches of the Soviet economy and international cooperation. Satellite carries two passive separable 'Pion' probes to investigate upper atmospheric density.

- **Pion** - . *Payload*: Pion-2. *Mass*: 78 kg (171 lb). *Nation*: Russia. *Agency*: MOM. *Class*: Earth. *Type*: Atmosphere satellite. *Spacecraft*: Pion. *Decay Date*: 1989-07-24 . *USAF Sat Cat*: 20060 . *COSPAR*: 1989-038D. *Apogee*: 147 km (91 mi). *Perigee*: 140 km (80 mi). *Inclination*: 82.3000 deg. *Period*: 87.40 min.

  Deployed from Resurs F1 6/9/89; passive atmosphere research. Resurs-F: Investigation of the natural resources of the earth in the interests of various branches of the Soviet economy and international cooperation. Satellite carries two passive separable 'Pion' probes to investigate upper atmospheric density.

- **Pion** - . *Payload*: Pion-1. *Mass*: 78 kg (171 lb). *Nation*: Russia. *Agency*: MOM. *Class*: Earth. *Type*: Atmosphere satellite. *Spacecraft*: Pion. *Decay Date*: 1989-07-23 . *USAF Sat Cat*: 20056 . *COSPAR*: 1989-038C. *Apogee*: 144 km (89 mi). *Perigee*: 132 km (82 mi). *Inclination*: 82.3000 deg. *Period*: 87.30 min.

  Deployed from Resurs F1 6/9/89; passive atmosphere research. Resurs-F: Investigation of the natural resources of the earth in the interests of various branches of the Soviet economy and international cooperation. Satellite carries two passive separable 'Pion' probes to investigate upper atmospheric density.

1989 June 1 - . 12:59 GMT - . *Launch Site*: Plesetsk. *LV Family*: R-7. *Launch Vehicle*: Soyuz-U-PVB.

- **Cosmos 2025** - . *Mass*: 6,300 kg (13,800 lb). *Nation*: Russia. *Agency*: MOM. *Class*: Earth. *Type*: Earth resources satellite. *Spacecraft Bus*: Vostok. *Spacecraft*: Zenit-8. *Duration*: 14.00 days. *Decay Date*: 1989-06-15 . *USAF Sat Cat*: 20035 . *COSPAR*: 1989-040A. *Apogee*: 256 km (159 mi). *Perigee*: 236 km (146 mi). *Inclination*: 62.8000 deg. *Period*: 89.40 min. Military cartographic satellite; returned film capsule..

1989 June 16 - . 09:30 GMT - . *Launch Site*: Baikonur. *Launch Complex*: Baikonur LC1. *Launch Pad*: LC1 or LC31. *LV Family*: R-7. *Launch Vehicle*: Soyuz-U-PVB.

- **Cosmos 2028** - . *Mass*: 6,300 kg (13,800 lb). *Nation*: Russia. *Agency*: MOM. *Class*: Earth. *Type*: Earth resources satellite. *Spacecraft Bus*: Vostok. *Spacecraft*: Zenit-8. *Duration*: 20.00 days. *Decay Date*: 1989-07-06 . *USAF Sat Cat*: 20073 . *COSPAR*: 1989-047A. *Apogee*: 243 km (150 mi). *Perigee*: 204 km (126 mi). *Inclination*: 70.0000 deg. *Period*: 89.00 min. Military cartographic satellite; returned film capsule..

1989 June 27 - . 08:04 GMT - . *Launch Site*: Plesetsk. *Launch Complex*: Plesetsk LC16/2. *LV Family*: R-7. *Launch Vehicle*: Soyuz-U-PVB.

- **Resurs F-02** - . *Payload*: Resurs-F1 14F43 s/n 46. *Mass*: 6,300 kg (13,800 lb). *Nation*: Russia. *Agency*: MOM. *Program*: Resurs. *Class*: Earth. *Type*: Earth resources satellite. *Spacecraft Bus*: Vostok. *Spacecraft*: Resurs F1-14F43. *Duration*: 14.00 days. *Decay Date*: 1989-07-11 . *USAF Sat Cat*: 20095 . *COSPAR*: 1989-049A. *Apogee*: 269 km (167 mi). *Perigee*: 255 km (158 mi). *Inclination*: 82.6000 deg. *Period*: 89.80 min. Investigation of the natural resources of the earth in the interests of various branches of the national economy of the USSR and international cooperation. .

1989 July 5 - . 08:00 GMT - . *Launch Site*: Plesetsk. *LV Family*: R-7. *Launch Vehicle*: Soyuz-U-PVB.

- **Cosmos 2029** - . *Mass*: 6,300 kg (13,800 lb). *Nation*: Russia. *Agency*: MOM. *Class*: Earth. *Type*: Earth resources satellite. *Spacecraft Bus*: Vostok. *Spacecraft*: Zenit-8. *Duration*: 14.00 days. *Decay Date*: 1989-07-19 . *USAF Sat Cat*: 20105 . *COSPAR*: 1989-051A. *Apogee*: 238 km (147 mi). *Perigee*: 178 km (110 mi). *Inclination*: 82.3000 deg. *Period*: 88.70 min. Military cartographic satellite; returned film capsule. Also investigation of the natural resources of the earth in the interests of various branches of the national economy of the USSR and international cooperation..

1989 July 12 - . 15:00 GMT - . *Launch Site*: Plesetsk. *LV Family*: R-7. *Launch Vehicle*: Soyuz-U-PVB.

- **Cosmos 2030** - . *Mass*: 6,600 kg (14,500 lb). *Nation*: Russia. *Agency*: MOM. *Class*: Surveillance. *Type*: Military surveillance satellite. *Spacecraft Bus*: Yantar. *Spacecraft*: Yantar-4K1. *Duration*: 16.00 days. *Decay Date*: 1989-07-29 . *USAF Sat Cat*: 20124 . *COSPAR*: 1989-054A. *Apogee*: 349 km (216 mi). *Perigee*: 162 km (100 mi). *Inclination*: 67.2000 deg. *Period*: 89.60 min. High resolution photo reconnaissance. Spacecraft failed. Blown up in orbit on July 28..

1989 July 18 - . 09:44 GMT - . *Launch Site*: Plesetsk. *Launch Complex*: Plesetsk LC16/2. *LV Family*: R-7. *Launch Vehicle*: Soyuz-U-PVB.

- **Resurs F-03** - . *Payload*: Resurs-F1 14F43 s/n 47. *Mass*: 6,300 kg (13,800 lb). *Nation*: Russia. *Agency*: MOM. *Program*: Resurs. *Class*: Earth. *Type*: Earth resources satellite. *Spacecraft Bus*: Vostok. *Spacecraft*: Resurs F1-14F43. *Duration*: 21.00 days. *Decay Date*: 1989-08-08 . *USAF Sat Cat*: 20134 . *COSPAR*: 1989-055A. *Apogee*: 214 km (132 mi). *Perigee*: 178 km (110 mi). *Inclination*: 82.6000 deg. *Period*: 88.40 min.

  Deployed Pion 3 & 4. Resurs-F: Investigation of the natural resources of the earth in the interests of various branches of the Soviet economy and international cooperation. Satellite carries two passive separable 'Pion' probes to investigate upper atmospheric density.

- **Pion** - . *Payload*: Pion-3. *Mass*: 67 kg (147 lb). *Nation*: Russia. *Agency*: MOM. *Spacecraft*: Pion. *Decay Date*: 1989-09-19 . *USAF Sat Cat*: 20160 . *COSPAR*: 1989-055C. *Apogee*: 271 km (168 mi). *Perigee*: 254 km (157 mi). *Inclination*: 82.5000 deg. *Period*: 89.76 min.

- **Pion** - . *Payload*: Pion-4. *Mass*: 78 kg (171 lb). *Nation*: Russia. *Agency*: MOM. *Class*: Earth. *Type*: Atmosphere satellite. *Spacecraft*: Pion. *Decay Date*: 1989-09-19 . *USAF Sat Cat*: 20161 . *COSPAR*: 1989-055D. *Apogee*: 271 km (168 mi). *Perigee*: 254 km (157 mi). *Inclination*: 82.5000 deg. *Period*: 89.76 min.

  Deployed from Resurs F3 8/7/89; passive atmospheric research. Resurs-F: Investigation of the natural resources of the earth in the interests of various branches

of the Soviet economy and international cooperation. Satellite carries two passive separable 'Pion' probes to investigate upper atmospheric density.

1989 July 18 - . 12:10 GMT - . *Launch Site*: Baikonur. *Launch Complex*: Baikonur LC1. *LV Family*: R-7. *Launch Vehicle*: Soyuz-U-PVB.

- **Cosmos 2031** - . *Payload*: Orlets-1 no. 1. *Mass*: 6,500 kg (14,300 lb). *Nation*: Russia. *Agency*: MOM. *Program*: Orlets. *Class*: Surveillance. *Type*: Military surveillance satellite. *Spacecraft Bus*: Yantar. *Spacecraft*: Orlets-1. *Duration*: 44.00 days. *Decay Date*: 1989-09-15 . *USAF Sat Cat*: 20136 . *COSPAR*: 1989-056A. *Apogee*: 264 km (164 mi). *Perigee*: 211 km (131 mi). *Inclination*: 50.4000 deg. *Period*: 89.30 min. First launch of Orlets-1 long duration film return military reconnaissance satellite. After returning multiple film capsules, the spacecraft was deorbited..

1989 July 20 - . 08:59 GMT - . *Launch Site*: Plesetsk. *LV Family*: R-7. *Launch Vehicle*: Soyuz-U-PVB.

- **Cosmos 2032** - . *Mass*: 6,300 kg (13,800 lb). *Nation*: Russia. *Agency*: MOM. *Class*: Earth. *Type*: Earth resources satellite. *Spacecraft Bus*: Vostok. *Spacecraft*: Zenit-8. *Duration*: 14.00 days. *Decay Date*: 1989-08-03 . *USAF Sat Cat*: 20145 . *COSPAR*: 1989-057A. *Apogee*: 241 km (149 mi). *Perigee*: 179 km (111 mi). *Inclination*: 82.3000 deg. *Period*: 88.70 min. Military cartographic satellite; returned film capsule..

1989 August 2 - . 11:29 GMT - . *Launch Site*: Plesetsk. *LV Family*: R-7. *Launch Vehicle*: Soyuz-U-PVB.

- **Cosmos 2035** - . *Mass*: 6,300 kg (13,800 lb). *Nation*: Russia. *Agency*: MOM. *Class*: Earth. *Type*: Earth resources satellite. *Spacecraft Bus*: Vostok. *Spacecraft*: Zenit-8. *Duration*: 14.00 days. *Decay Date*: 1989-08-16 . *USAF Sat Cat*: 20151 . *COSPAR*: 1989-060A. *Apogee*: 236 km (146 mi). *Perigee*: 176 km (109 mi). *Inclination*: 82.6000 deg. *Period*: 88.60 min. Military cartographic satellite; returned film capsule..

1989 August 15 - . 10:29 GMT - . *Launch Site*: Plesetsk. *Launch Complex*: Plesetsk LC43/4. *LV Family*: R-7. *Launch Vehicle*: Soyuz-U-PVB.

- **Resurs F-04** - . *Payload*: Resurs-F2 17F42 s/n 4. *Mass*: 6,300 kg (13,800 lb). *Nation*: Russia. *Agency*: MOM. *Program*: Resurs. *Class*: Earth. *Type*: Earth resources satellite. *Spacecraft Bus*: Vostok. *Spacecraft*: Resurs F2. *Duration*: 30.00 days. *Decay Date*: 1989-09-14 . *USAF Sat Cat*: 20175 . *COSPAR*: 1989-063A. *Apogee*: 226 km (140 mi). *Perigee*: 178 km (110 mi). *Inclination*: 82.3000 deg. *Period*: 88.50 min. Investigation of the natural resources of the earth in the interests of various branches of the national economy of the USSR and international cooperation. .

1989 August 22 - . 12:59 GMT - . *Launch Site*: Plesetsk. *LV Family*: R-7. *Launch Vehicle*: Soyuz-U-PVB.

- **Cosmos 2036** - . *Mass*: 6,300 kg (13,800 lb). *Nation*: Russia. *Agency*: MOM. *Class*: Earth. *Type*: Earth resources satellite. *Spacecraft Bus*: Vostok. *Spacecraft*: Zenit-8. *Duration*: 14.00 days. *Decay Date*: 1989-09-05 . *USAF Sat Cat*: 20188 . *COSPAR*: 1989-065A. *Apogee*: 259 km (160 mi). *Perigee*: 244 km (151 mi). *Inclination*: 62.8000 deg. *Period*: 89.50 min. Military cartographic satellite; returned film capsule..

1989 September 6 - . 10:49 GMT - . *Launch Site*: Plesetsk. *Launch Complex*: Plesetsk LC43/3. *LV Family*: R-7. *Launch Vehicle*: Soyuz-U-PVB.

- **Resurs F-05** - . *Payload*: Resurs-F1 14F43 s/n 48. *Mass*: 6,300 kg (13,800 lb). *Nation*: Russia. *Agency*: MOM. *Program*: Resurs. *Class*: Earth. *Type*: Earth resources satellite. *Spacecraft Bus*: Vostok. *Spacecraft*: Resurs F1-14F43. *Duration*: 16.00 days. *Decay Date*: 1989-09-22 . *USAF Sat Cat*: 20222 . *COSPAR*: 1989-073A. *Apogee*: 229 km (142 mi). *Perigee*: 176 km (109 mi). *Inclination*: 82.3000 deg. *Period*: 88.60 min.

  Carried W. German microgravity experiment. Investigation of the natural resources of the Earth in the interests of the Soviet economy and international cooperation; and the conduct of biotechnological experiments under a commercial agreement with the firm Interspace (Federal Republic of Germany).

1989 September 15 - . 06:30 GMT - . *Launch Site*: Plesetsk. *Launch Complex*: Plesetsk LC41/1. *LV Family*: R-7. *Launch Vehicle*: Soyuz-U-PVB.

- **Cosmos 2044** - . *Payload*: Bion no. 9. *Mass*: 6,000 kg (13,200 lb). *Nation*: Russia. *Agency*: MOM. *Class*: Biology. *Type*: Biology satellite. *Spacecraft Bus*: Vostok. *Spacecraft*: Bion. *Duration*: 14.00 days. *Decay Date*: 1989-09-29 . *USAF Sat Cat*: 20242 . *COSPAR*: 1989-075A. *Apogee*: 264 km (164 mi). *Perigee*: 203 km (126 mi). *Inclination*: 82.3000 deg. *Period*: 89.20 min.

  29 US/USSR life science experiments conducted on monkeys, insects, plants, fish, rats. Carried monkeys Zhankonya and Zabiyaka. Cosmos 2044 was the seventh Soviet Biosatellite to orbit the Earth with joint U.S./U.S.S.R. experiments onboard. Hungary, the German Democratic Republic, Canada, Poland, Britain, Romania, Czechoslovakia and the European Space Agency also participated in the mission. The joint U.S./U.S.S.R. experiments were conducted on two rhesus monkeys and ten rats that were flown onboard the Biosatellite. The biological payload on the spacecraft also included fish, amphibians, insects, worms, protozoans, cell cultures and plants. Last launch from LC41. *Additional Details*: here....

1989 September 22 - . 08:00 GMT - . *Launch Site*: Baikonur. *Launch Complex*:

Baikonur LC1. *Launch Pad*: LC1 or LC31. *LV Family*: R-7. *Launch Vehicle*: Soyuz-U-PVB.

- **Cosmos 2045** - . *Mass*: 6,300 kg (13,800 lb). *Nation*: Russia. *Agency*: MOM. *Class*: Earth. *Type*: Earth resources satellite. *Spacecraft Bus*: Vostok. *Spacecraft*: Zenit-8. *Duration*: 10.00 days. *Decay Date*: 1989-10-02 . *USAF Sat Cat*: 20244 . *COSPAR*: 1989-076A. *Apogee*: 295 km (183 mi). *Perigee*: 205 km (127 mi). *Inclination*: 70.0000 deg. *Period*: 89.50 min. Military cartographic satellite; returned film capsule..

1989 October 3 - . 14:59 GMT - . *Launch Site*: Plesetsk. *LV Family*: R-7. *Launch Vehicle*: Soyuz-U-PVB.

- **Cosmos 2047** - . *Mass*: 6,600 kg (14,500 lb). *Nation*: Russia. *Agency*: MOM. *Class*: Surveillance. *Type*: Military surveillance satellite. *Spacecraft Bus*: Yantar. *Spacecraft*: Yantar-4K1. *Duration*: 49.00 days. *Decay Date*: 1989-11-21 . *USAF Sat Cat*: 20279 . *COSPAR*: 1989-082A. *Apogee*: 330 km (200 mi). *Perigee*: 165 km (102 mi). *Inclination*: 67.1000 deg. *Period*: 89.50 min. High resolution photo reconnaissance; returned film in two small SpK capsules during the mission and with the main capsule at completion of the mission..

1989 October 17 - . 13:00 GMT - . *Launch Site*: Plesetsk. *LV Family*: R-7. *Launch Vehicle*: Soyuz-U-PVB.

- **Cosmos 2048** - . *Mass*: 6,300 kg (13,800 lb). *Nation*: Russia. *Agency*: MOM. *Class*: Earth. *Type*: Earth resources satellite. *Spacecraft Bus*: Vostok. *Spacecraft*: Zenit-8. *Duration*: 9.00 days. *Decay Date*: 1989-10-26 . *USAF Sat Cat*: 20292 . *COSPAR*: 1989-083A. *Apogee*: 269 km (167 mi). *Perigee*: 253 km (157 mi). *Inclination*: 62.6000 deg. *Period*: 89.70 min. Military cartographic photo-surveillance satellite; also studied fluxes of heavy nuclei..

1989 November 17 - . 10:50 GMT - . *Launch Site*: Baikonur. *Launch Complex*: Baikonur LC1. *Launch Pad*: LC1 or LC31. *LV Family*: R-7. *Launch Vehicle*: Soyuz-U-PVB.

- **Cosmos 2049** - . *Mass*: 6,600 kg (14,500 lb). *Nation*: Russia. *Agency*: MOM. *Class*: Surveillance. *Type*: Military surveillance satellite. *Spacecraft Bus*: Yantar. *Spacecraft*: Yantar-4KS1. *Duration*: 214.00 days. *Decay Date*: 1990-06-19 . *USAF Sat Cat*: 20320 . *COSPAR*: 1989-088A. *Apogee*: 251 km (155 mi). *Perigee*: 232 km (144 mi). *Inclination*: 64.8000 deg. *Period*: 89.30 min. Photo/digital surveillance..

1989 November 30 - . 15:00 GMT - . *Launch Site*: Plesetsk. *LV Family*: R-7. *Launch Vehicle*: Soyuz-U-PVB.

- **Cosmos 2052** - . *Mass*: 6,600 kg (14,500 lb). *Nation*: Russia. *Agency*: MOM. *Class*: Surveillance. *Type*: Military surveillance satellite. *Spacecraft Bus*: Yantar. *Spacecraft*: Yantar-4K1. *Duration*: 55.00 days. *Decay Date*: 1990-01-24 . *USAF Sat*

Cat: 20350 . *COSPAR*: 1989-095A. *Apogee*: 320 km (190 mi). *Perigee*: 174 km (108 mi). *Inclination*: 67.1000 deg. *Period*: 89.50 min. High resolution photo reconnaissance; returned film in two small SpK capsules during the mission and with the main capsule at completion of the mission..

1990 January 17 - . 14:45 GMT - . *Launch Site*: Plesetsk. *LV Family*: R-7. *Launch Vehicle*: Soyuz-U-PVB.

- **Cosmos 2055** - . *Mass*: 6,300 kg (13,800 lb). *Nation*: Russia. *Agency*: MOM. *Class*: Earth. *Type*: Earth resources satellite. *Spacecraft Bus*: Vostok. *Spacecraft*: Zenit-8. *Duration*: 12.00 days. *Decay Date*: 1990-01-29 . *USAF Sat Cat*: 20426 . *COSPAR*: 1990-003A. *Apogee*: 260 km (160 mi). *Perigee*: 248 km (154 mi). *Inclination*: 62.8000 deg. *Period*: 89.60 min. Military cartographic satellite; returned film capsule..

1990 January 25 - . 17:15 GMT - . *Launch Site*: Plesetsk. *LV Family*: R-7. *Launch Vehicle*: Soyuz-U-PVB.

- **Cosmos 2057** - . *Mass*: 6,600 kg (14,500 lb). *Nation*: Russia. *Agency*: MOM. *Class*: Surveillance. *Type*: Military surveillance satellite. *Spacecraft Bus*: Yantar. *Spacecraft*: Yantar-4K1. *Duration*: 53.00 days. *Decay Date*: 1990-03-19 . *USAF Sat Cat*: 20457 . *COSPAR*: 1990-009A. *Apogee*: 330 km (200 mi). *Perigee*: 183 km (113 mi). *Inclination*: 62.8000 deg. *Period*: 89.60 min. High resolution photo reconnaissance; returned film in two small SpK capsules during the mission and with the main capsule at completion of the mission..

1990 March 22 - . 07:20 GMT - . *Launch Site*: Plesetsk. *LV Family*: R-7. *Launch Vehicle*: Soyuz-U-PVB.

- **Cosmos 2062** - . *Mass*: 6,300 kg (13,800 lb). *Nation*: Russia. *Agency*: MOM. *Class*: Earth. *Type*: Earth resources satellite. *Spacecraft Bus*: Vostok. *Spacecraft*: Zenit-8. *Duration*: 14.00 days. *Decay Date*: 1990-04-05 . *USAF Sat Cat*: 20529 . *COSPAR*: 1990-024A. *Apogee*: 221 km (137 mi). *Perigee*: 178 km (110 mi). *Inclination*: 82.3000 deg. *Period*: 88.50 min. Military cartographic satellite; returned film capsule..

1990 April 3 - . 12:02 GMT - . *Launch Site*: Plesetsk. *Launch Complex*: Plesetsk LC43/3. *Launch Pad*: LC43/4. *LV Family*: R-7. *Launch Vehicle*: Soyuz-U-PVB. *FAILURE*: Failure. *Failed Stage*: U.

- **Yantar-4K1** - . *Mass*: 6,600 kg (14,500 lb). *Nation*: Russia. *Agency*: UNKS. *Spacecraft Bus*: Yantar. *Spacecraft*: Yantar-4K1. High resolution photo reconnaissance mission..

1990 April 11 - . 17:00 GMT - . *Launch Site*: Plesetsk. *Launch Complex*: Plesetsk LC43/3.

LV Family: R-7. *Launch Vehicle*: Soyuz-U-PVB.

- **Foton 6** - . *Payload*: Foton s/n 6L. *Mass*: 6,200 kg (13,600 lb). *Nation*: Russia. *Agency*: MOM. *Class*: Materials. *Type*: Materials science satellite. *Spacecraft Bus*: Vostok. *Spacecraft*: Foton. *Duration*: 15.17 days. *Decay Date*: 1990-04-27 . *USAF Sat Cat*: 20566 . *COSPAR*: 1990-032A. *Apogee*: 374 km (232 mi). *Perigee*: 216 km (134 mi). *Inclination*: 62.8000 deg. *Period*: 90.40 min.

  250 orbits. In addition to Russian materials science experiments, Foton 6 carried out the French Gezon experiment using the Russian Zona-4M electric furnace (Foton spacecraft have also flown the Zona 1, Zona 4, Splav 2, and Konstanta 2 electric furnaces as well as the Kashtan electrophoresis unit). Foton 6, which also carried the European Biopan life sciences experiments, was successfully recovered on the 15th day.

1990 April 13 - . 18:53 GMT - . *Launch Site*: Baikonur. *Launch Complex*: Baikonur LC1. *Launch Pad*: LC1 or LC31. *LV Family*: R-7. *Launch Vehicle*: Soyuz-U-PVB.

- **Cosmos 2072** - . *Mass*: 6,600 kg (14,500 lb). *Nation*: Russia. *Agency*: MOM. *Class*: Surveillance. *Type*: Military surveillance satellite. *Spacecraft Bus*: Yantar. *Spacecraft*: Yantar-4KS1. *Duration*: 225.00 days. *Decay Date*: 1990-11-21 . *USAF Sat Cat*: 20568 . *COSPAR*: 1990-033A. *Apogee*: 270 km (160 mi). *Perigee*: 232 km (144 mi). *Inclination*: 64.7000 deg. *Period*: 89.50 min. Photo/digital surveillance..

1990 April 17 - . 08:00 GMT - . *Launch Site*: Plesetsk. *LV Family*: R-7. *Launch Vehicle*: Soyuz-U-PVB.

- **Cosmos 2073** - . *Mass*: 6,300 kg (13,800 lb). *Nation*: Russia. *Agency*: MOM. *Class*: Earth. *Type*: Earth resources satellite. *Spacecraft Bus*: Vostok. *Spacecraft*: Zenit-8. *Duration*: 11.00 days. *Decay Date*: 1990-04-28 . *USAF Sat Cat*: 20573 . *COSPAR*: 1990-035A. *Apogee*: 239 km (148 mi). *Perigee*: 173 km (107 mi). *Inclination*: 82.4000 deg. *Period*: 88.60 min. Military cartographic satellite; returned film capsule..

1990 May 7 - . 18:39 GMT - . *Launch Site*: Plesetsk. *LV Family*: R-7. *Launch Vehicle*: Soyuz-U-PVB.

- **Cosmos 2077** - . *Mass*: 6,600 kg (14,500 lb). *Nation*: Russia. *Agency*: MOM. *Class*: Surveillance. *Type*: Military surveillance satellite. *Spacecraft Bus*: Yantar. *Spacecraft*: Yantar-4K1. *Duration*: 58.00 days. *Decay Date*: 1990-07-04 . *USAF Sat Cat*: 20604 . *COSPAR*: 1990-042A. *Apogee*: 328 km (203 mi). *Perigee*: 182 km (113 mi). *Inclination*: 62.9000 deg. *Period*: 89.60 min. High resolution photo reconnaissance; returned film in two small SpK capsules during the mission and with the main capsule at completion of the mission..

1990 May 15 - . 09:55 GMT - . *Launch Site*: Baikonur. *Launch Complex*: Baikonur LC1. *Launch Pad*: LC1 or LC31. *LV Family*: R-7. *Launch Vehicle*: Soyuz-U-PVB.

- **Cosmos 2078** - . *Payload*: Yantar-1KFT no. 12. *Mass*: 6,600 kg (14,500 lb). *Nation*: Russia. *Agency*: MOM. *Class*: Surveillance. *Type*: Cartographic satellite. *Spacecraft Bus*: Yantar. *Spacecraft*: Yantar-1KFT. *Duration*: 44.00 days. *Decay Date*: 1990-06-28 . *USAF Sat Cat*: 20615 . *COSPAR*: 1990-044A. *Apogee*: 280 km (170 mi). *Perigee*: 196 km (121 mi). *Inclination*: 70.0000 deg. *Period*: 89.30 min. Topographic mapping for the Army General Staff..

1990 May 29 - . 07:19 GMT - . *Launch Site*: Plesetsk. *Launch Complex*: Plesetsk LC43/4. *LV Family*: R-7. *Launch Vehicle*: Soyuz-U-PVB.

- **Resurs F-06** - . *Payload*: Resurs-F1 14F43 s/n 50. *Mass*: 6,300 kg (13,800 lb). *Nation*: Russia. *Agency*: MOM. *Program*: Resurs. *Class*: Earth. *Type*: Earth resources satellite. *Spacecraft Bus*: Vostok. *Spacecraft*: Resurs F1-14F43. *Duration*: 16.00 days. *Decay Date*: 1990-06-14 . *USAF Sat Cat*: 20632 . *COSPAR*: 1990-047A. *Apogee*: 231 km (143 mi). *Perigee*: 175 km (108 mi). *Inclination*: 82.4000 deg. *Period*: 88.60 min.

  Also carried German microgravity experiment. Investigation of the natural resources of the Earth in the interests of various branches of the national economy of the USSR; solution of problems relating to ecology and international cooperation. In accordance with a commercial agreement, apparatus belo nging to the Federal Republic of Germany is also being carried for the purpose of conducting biotechnological experiments.

1990 June 19 - . 08:45 GMT - . *Launch Site*: Plesetsk. *LV Family*: R-7. *Launch Vehicle*: Soyuz-U-PVB.

- **Cosmos 2083** - . *Mass*: 6,300 kg (13,800 lb). *Nation*: Russia. *Agency*: MOM. *Class*: Earth. *Type*: Earth resources satellite. *Spacecraft Bus*: Vostok. *Spacecraft*: Zenit-8. *Duration*: 14.00 days. *Decay Date*: 1990-07-03 . *USAF Sat Cat*: 20657 . *COSPAR*: 1990-053A. *Apogee*: 220 km (130 mi). *Perigee*: 175 km (108 mi). *Inclination*: 82.6000 deg. *Period*: 88.50 min. Military cartographic satellite; returned film capsule..

1990 July 3 - . *Launch Site*: Plesetsk. *Launch Complex*: Plesetsk LC16/2. *LV Family*: R-7. *Launch Vehicle*: Soyuz-U-PVB. *FAILURE*: Failure. *Failed Stage*: U.

- **Yantar-4K1** - . *Mass*: 6,600 kg (14,500 lb). *Nation*: Russia. *Agency*: UNKS. *Spacecraft Bus*: Yantar. *Spacecraft*: Yantar-4K1. High resolution photo reconnaissance mission..

1990 July 17 - . 09:29 GMT - . *Launch Site*: Plesetsk. *Launch Complex*: Plesetsk LC43/3.

LV Family: R-7. *Launch Vehicle*: Soyuz-U-PVB.

- **Resurs F-07** - . *Payload*: Resurs-F2 17F42 s/n 5. *Mass*: 6,300 kg (13,800 lb). *Nation*: Russia. *Agency*: MOM. *Program*: Resurs. *Class*: Earth. *Type*: Earth resources satellite. *Spacecraft Bus*: Vostok. *Spacecraft*: Resurs F2. *Duration*: 30.00 days. *Decay Date*: 1990-08-16 . *USAF Sat Cat*: 20687 . *COSPAR*: 1990-060A. *Apogee*: 236 km (146 mi). *Perigee*: 177 km (109 mi). *Inclination*: 82.3000 deg. *Period*: 88.60 min. Investigation of the natural resources of the Earth in the interests of various branches of the national economy of the USSR; solution of problems relating to ecology and international cooperation. .

1990 July 20 - . 08:40 GMT - . *Launch Site*: Plesetsk. *LV Family*: R-7. *Launch Vehicle*: Soyuz-U-PVB.

- **Cosmos 2086** - . *Mass*: 6,300 kg (13,800 lb). *Nation*: Russia. *Agency*: MOM. *Class*: Earth. *Type*: Earth resources satellite. *Spacecraft Bus*: Vostok. *Spacecraft*: Zenit-8. *Duration*: 14.00 days. *Decay Date*: 1990-08-03 . *USAF Sat Cat*: 20702 . *COSPAR*: 1990-062A. *Apogee*: 220 km (130 mi). *Perigee*: 178 km (110 mi). *Inclination*: 82.3000 deg. *Period*: 88.50 min. Military cartographic satellite; returned film capsule..

1990 August 3 - . 19:45 GMT - . *Launch Site*: Plesetsk. *LV Family*: R-7. *Launch Vehicle*: Soyuz-U-PVB.

- **Cosmos 2089** - . *Mass*: 6,600 kg (14,500 lb). *Nation*: Russia. *Agency*: MOM. *Class*: Surveillance. *Type*: Military surveillance satellite. *Spacecraft Bus*: Yantar. *Spacecraft*: Yantar-4K1. *Duration*: 59.00 days. *Decay Date*: 1990-10-01 . *USAF Sat Cat*: 20732 . *COSPAR*: 1990-069A. *Apogee*: 320 km (190 mi). *Perigee*: 187 km (116 mi). *Inclination*: 62.8000 deg. *Period*: 89.60 min. High resolution photo reconnaissance; returned film in two small SpK capsules during the mission and with the main capsule at completion of the mission..

1990 August 16 - . 09:54 GMT - . *Launch Site*: Plesetsk. *Launch Complex*: Plesetsk LC43/4. *LV Family*: R-7. *Launch Vehicle*: Soyuz-U-PVB.

- **Resurs F-08** - . *Payload*: Resurs-F1 14F43 s/n 49. *Mass*: 6,300 kg (13,800 lb). *Nation*: Russia. *Agency*: MOM. *Program*: Resurs. *Class*: Earth. *Type*: Earth resources satellite. *Spacecraft Bus*: Vostok. *Spacecraft*: Resurs F1-14F43. *Duration*: 16.00 days. *Decay Date*: 1990-09-01 . *USAF Sat Cat*: 20754 . *COSPAR*: 1990-073A. *Apogee*: 229 km (142 mi). *Perigee*: 176 km (109 mi). *Inclination*: 82.3000 deg. *Period*: 88.50 min. Investigation of the natural resources of the Earth in the interests of various branches of the national economy of the USSR; solution of problems relating to ecology and international cooperation. .

1990 August 31 - . 08:00 GMT - . *Launch Site*: Plesetsk. *LV Family*: R-7. *Launch*

Vehicle: Soyuz-U-PVB.

- **Cosmos 2099** - . *Mass*: 6,300 kg (13,800 lb). *Nation*: Russia. *Agency*: MOM. *Class*: Earth. *Type*: Earth resources satellite. *Spacecraft Bus*: Vostok. *Spacecraft*: Zenit-8. *Duration*: 14.00 days. *Decay Date*: 1990-09-14 . *USAF Sat Cat*: 20779 . *COSPAR*: 1990-080A. *Apogee*: 226 km (140 mi). *Perigee*: 175 km (108 mi). *Inclination*: 82.3000 deg. *Period*: 88.50 min. Military cartographic satellite; returned film capsule..

1990 September 7 - . 11:59 GMT - . *Launch Site*: Plesetsk. *Launch Complex*: Plesetsk LC16/2. *LV Family*: R-7. *Launch Vehicle*: Soyuz-U-PVB.

- **Resurs F-09** - . *Payload*: Resurs-F1 14F43 s/n 51. *Mass*: 6,300 kg (13,800 lb). *Nation*: Russia. *Agency*: MOM. *Program*: Resurs. *Class*: Earth. *Type*: Earth resources satellite. *Spacecraft Bus*: Vostok. *Spacecraft*: Resurs F1-14F43. *Duration*: 14.00 days. *Decay Date*: 1990-09-21 . *USAF Sat Cat*: 20794 . *COSPAR*: 1990-082A. *Apogee*: 238 km (147 mi). *Perigee*: 177 km (109 mi). *Inclination*: 82.5000 deg. *Period*: 88.70 min. Carried German microgravity experiment. Investigation of the natural resources of the Earth in the interests of various branches of the national economy of the USSR; solution of problems relating to ecology and international cooperation. .

1990 October 16 - . 19:00 GMT - . *Launch Site*: Plesetsk. *LV Family*: R-7. *Launch Vehicle*: Soyuz-U-PVB.

- **Cosmos 2102** - . *Mass*: 6,600 kg (14,500 lb). *Nation*: Russia. *Agency*: MOM. *Class*: Surveillance. *Type*: Military surveillance satellite. *Spacecraft Bus*: Yantar. *Spacecraft*: Yantar-4K1. *Duration*: 57.00 days. *Decay Date*: 1990-12-12 . *USAF Sat Cat*: 20909 . *COSPAR*: 1990-092A. *Apogee*: 340 km (210 mi). *Perigee*: 184 km (114 mi). *Inclination*: 62.9000 deg. *Period*: 89.80 min. High resolution photo reconnaissance; returned film in two small SpK capsules during the mission and with the main capsule at completion of the mission..

1990 November 16 - . 16:30 GMT - . *Launch Site*: Plesetsk. *LV Family*: R-7. *Launch Vehicle*: Soyuz-U-PVB.

- **Cosmos 2104** - . *Mass*: 6,300 kg (13,800 lb). *Nation*: Russia. *Agency*: MOM. *Class*: Earth. *Type*: Earth resources satellite. *Spacecraft Bus*: Vostok. *Spacecraft*: Zenit-8. *Duration*: 18.00 days. *Decay Date*: 1990-12-04 . *USAF Sat Cat*: 20936 . *COSPAR*: 1990-098A. *Apogee*: 364 km (226 mi). *Perigee*: 240 km (140 mi). *Inclination*: 62.8000 deg. *Period*: 90.60 min. Military cartographic satellite; returned film capsule..

1990 December 4 - . 18:30 GMT - . *Launch Site*: Plesetsk. *LV Family*: R-7. *Launch Vehicle*: Soyuz-U-PVB.

- **Cosmos 2108** - . *Mass*: 6,600 kg (14,500 lb). *Nation*: Russia. *Agency*: MOM. *Class*: Surveillance. *Type*: Military surveillance satellite. *Spacecraft Bus*: Yantar. *Spacecraft*: Yantar-4K1. *Duration*: 55.00 days. *Decay Date*: 1991-01-28 . *USAF Sat Cat*: 21000 . *COSPAR*: 1990-109A. *Apogee*: 289 km (179 mi). *Perigee*: 164 km (101 mi). *Inclination*: 62.8000 deg. *Period*: 89.00 min. High resolution photo reconnaissance; returned film in two small SpK capsules during the mission and with the main capsule at completion of the mission..

1990 December 21 - . 06:20 GMT - . *Launch Site*: Baikonur. *Launch Complex*: Baikonur LC1. *Launch Pad*: LC1 or LC31. *LV Family*: R-7. *Launch Vehicle*: Soyuz-U-PVB.

- **Cosmos 2113** - . *Mass*: 6,600 kg (14,500 lb). *Nation*: Russia. *Agency*: MOM. *Class*: Surveillance. *Type*: Military surveillance satellite. *Spacecraft Bus*: Yantar. *Spacecraft*: Yantar-4KS1. *Duration*: 172.00 days. *Decay Date*: 1991-06-11 . *USAF Sat Cat*: 21026 . *COSPAR*: 1990-113A. *Apogee*: 261 km (162 mi). *Perigee*: 225 km (139 mi). *Inclination*: 64.8000 deg. *Period*: 89.40 min. Photo/digital surveillance..

1990 December 26 - . 11:10 GMT - . *Launch Site*: Plesetsk. *LV Family*: R-7. *Launch Vehicle*: Soyuz-U-PVB.

- **Cosmos 2120** - . *Mass*: 6,300 kg (13,800 lb). *Nation*: Russia. *Agency*: MOM. *Class*: Earth. *Type*: Earth resources satellite. *Spacecraft Bus*: Vostok. *Spacecraft*: Zenit-8. *Duration*: 22.00 days. *Decay Date*: 1991-01-17 . *USAF Sat Cat*: 21035 . *COSPAR*: 1990-115A. *Apogee*: 336 km (208 mi). *Perigee*: 231 km (143 mi). *Inclination*: 82.6000 deg. *Period*: 90.20 min. Military cartographic satellite; returned film capsule..

1991 January 17 - . 10:30 GMT - . *Launch Site*: Plesetsk. *Launch Complex*: Plesetsk LC16/2. *LV Family*: R-7. *Launch Vehicle*: Soyuz-U-PVB.

- **Cosmos 2121** - . *Mass*: 6,300 kg (13,800 lb). *Nation*: Russia. *Agency*: MOM. *Class*: Earth. *Type*: Earth resources satellite. *Spacecraft Bus*: Vostok. *Spacecraft*: Zenit-8. *Duration*: 24.00 days. *Decay Date*: 1991-02-10 . *USAF Sat Cat*: 21059 . *COSPAR*: 1991-004A. *Apogee*: 247 km (153 mi). *Perigee*: 165 km (102 mi). *Inclination*: 82.6000 deg. *Period*: 88.60 min. Military cartographic satellite; returned film capsule..

1991 February 7 - . 18:15 GMT - . *Launch Site*: Plesetsk. *Launch Complex*: Plesetsk LC16/2. *LV Family*: R-7. *Launch Vehicle*: Soyuz-U-PVB.

- **Cosmos 2124** - . *Mass*: 6,600 kg (14,500 lb). *Nation*: Russia. *Agency*: MOM. *Class*: Surveillance. *Type*: Military surveillance satellite. *Spacecraft Bus*: Yantar. *Spacecraft*: Yantar-4K1. *Duration*: 59.00 days. *Decay Date*: 1991-04-07 . *USAF Sat Cat*: 21092 . *COSPAR*: 1991-008A. *Apogee*: 316 km (196 mi). *Perigee*: 186 km (115 mi). *Inclination*: 62.8000 deg. *Period*: 89.50 min. High resolution photo

reconnaissance; returned film in two small SpK capsules during the mission and with the main capsule at completion of the mission..

1991 February 15 - . 09:30 GMT - . *Launch Site*: Baikonur. *Launch Complex*: Baikonur LC1. *Launch Pad*: LC1/LC31?. *LV Family*: R-7. *Launch Vehicle*: Soyuz-U-PVB.

- **Cosmos 2134** - . *Payload*: Yantar-1KFT no. 13. *Mass*: 6,600 kg (14,500 lb). *Nation*: Russia. *Agency*: MOM. *Class*: Surveillance. *Type*: Cartographic satellite. *Spacecraft Bus*: Yantar. *Spacecraft*: Yantar-1KFT. *Duration*: 45.00 days. *Decay Date*: 1991-04-01 . *USAF Sat Cat*: 21116 . *COSPAR*: 1991-011A. *Apogee*: 306 km (190 mi). *Perigee*: 190 km (110 mi). *Inclination*: 64.7000 deg. *Period*: 89.50 min. Topographic mapping for the Army General Staff..

1991 March 6 - . 15:30 GMT - . *Launch Site*: Plesetsk. *Launch Complex*: Plesetsk LC16/2. *LV Family*: R-7. *Launch Vehicle*: Soyuz-U-PVB.

- **Cosmos 2136** - . *Mass*: 6,300 kg (13,800 lb). *Nation*: Russia. *Agency*: MOM. *Class*: Earth. *Type*: Earth resources satellite. *Spacecraft Bus*: Vostok. *Spacecraft*: Zenit-8. *Duration*: 14.00 days. *Decay Date*: 1991-03-20 . *USAF Sat Cat*: 21143 . *COSPAR*: 1991-016A. *Apogee*: 314 km (195 mi). *Perigee*: 250 km (150 mi). *Inclination*: 62.8000 deg. *Period*: 90.20 min. Military cartographic satellite; returned film capsule..

1991 March 26 - . 13:45 GMT - . *Launch Site*: Plesetsk. *Launch Complex*: Plesetsk LC16/2. *LV Family*: R-7. *Launch Vehicle*: Soyuz-U-PVB.

- **Cosmos 2138** - . *Mass*: 6,600 kg (14,500 lb). *Nation*: Russia. *Agency*: MOM. *Class*: Surveillance. *Type*: Military surveillance satellite. *Spacecraft Bus*: Yantar. *Spacecraft*: Yantar-4K1. *Duration*: 59.00 days. *Decay Date*: 1991-05-24 . *USAF Sat Cat*: 21203 . *COSPAR*: 1991-023A. *Apogee*: 343 km (213 mi). *Perigee*: 161 km (100 mi). *Inclination*: 67.1000 deg. *Period*: 89.60 min. High resolution photo reconnaissance; returned film in two small SpK capsules during the mission and with the main capsule at completion of the mission..

1991 May 21 - . 09:00 GMT - . *Launch Site*: Plesetsk. *Launch Complex*: Plesetsk LC43/4. *LV Family*: R-7. *Launch Vehicle*: Soyuz-U-PVB.

- **Resurs F-10** - . *Payload*: Resurs-F2 17F42 s/n 6. *Mass*: 6,300 kg (13,800 lb). *Nation*: Russia. *Agency*: MOM. *Program*: Resurs. *Class*: Earth. *Type*: Earth resources satellite. *Spacecraft Bus*: Vostok. *Spacecraft*: Resurs F2. *Duration*: 30.00 days. *Decay Date*: 1991-06-20 . *USAF Sat Cat*: 21313 . *COSPAR*: 1991-035A. *Apogee*: 242 km (150 mi). *Perigee*: 178 km (110 mi). *Inclination*: 82.3000 deg. *Period*: 88.70 min.

  Also carried microgravity experiments. Investigation of the natural resources of the

earth in the interests of the various branches of the national economy of the USSR, and solution of problems relating to the environment and to international cooperation.

1991 May 24 - . 15:29 GMT - . *Launch Site*: Plesetsk. *Launch Complex*: Plesetsk LC43/3. *LV Family*: R-7. *Launch Vehicle*: Soyuz-U-PVB.

- **Cosmos 2149** - . *Mass*: 6,600 kg (14,500 lb). *Nation*: Russia. *Agency*: MOM. *Class*: Surveillance. *Type*: Military surveillance satellite. *Spacecraft Bus*: Yantar. *Spacecraft*: Yantar-4K1. *Duration*: 41.00 days. *Decay Date*: 1991-07-04 . *USAF Sat Cat*: 21315 . *COSPAR*: 1991-036A. *Apogee*: 285 km (177 mi). *Perigee*: 173 km (107 mi). *Inclination*: 67.1000 deg. *Period*: 89.10 min. High resolution photo reconnaissance; returned film in two small SpK capsules during the mission and with the main capsule at completion of the mission..

1991 June 28 - . 08:09 GMT - . *Launch Site*: Plesetsk. *Launch Complex*: Plesetsk LC43/3. *LV Family*: R-7. *Launch Vehicle*: Soyuz-U-PVB.

- **Resurs F-11** - . *Payload*: Resurs-F1 14F43 s/n 52. *Mass*: 6,300 kg (13,800 lb). *Nation*: Russia. *Agency*: MOM. *Program*: Resurs. *Class*: Earth. *Type*: Earth resources satellite. *Spacecraft Bus*: Vostok. *Spacecraft*: Resurs F1-14F43. *Duration*: 23.00 days. *Decay Date*: 1991-07-21 . *USAF Sat Cat*: 21524 . *COSPAR*: 1991-044A. *Apogee*: 268 km (166 mi). *Perigee*: 253 km (157 mi). *Inclination*: 82.3000 deg. *Period*: 89.70 min. Investigation of the natural resources of the Earth in the interests of various branches of the national economy of the USSR; solution of problems relating to ecology and international cooperation. .

1991 July 9 - . 09:40 GMT - . *Launch Site*: Plesetsk. *Launch Complex*: Plesetsk LC43/4. *LV Family*: R-7. *Launch Vehicle*: Soyuz-U-PVB.

- **Cosmos 2152** - . *Mass*: 6,300 kg (13,800 lb). *Nation*: Russia. *Agency*: MOM. *Class*: Earth. *Type*: Earth resources satellite. *Spacecraft Bus*: Vostok. *Spacecraft*: Zenit-8. *Duration*: 14.00 days. *Decay Date*: 1991-07-23 . *USAF Sat Cat*: 21558 . *COSPAR*: 1991-048A. *Apogee*: 234 km (145 mi). *Perigee*: 174 km (108 mi). *Inclination*: 82.4000 deg. *Period*: 88.60 min. Military cartographic satellite; returned film capsule..

1991 July 10 - . 14:00 GMT - . *Launch Site*: Baikonur. *Launch Complex*: Baikonur LC31. *LV Family*: R-7. *Launch Vehicle*: Soyuz-U-PVB.

- **Cosmos 2153** - . *Mass*: 6,600 kg (14,500 lb). *Nation*: Russia. *Agency*: MOM. *Class*: Surveillance. *Type*: Military surveillance satellite. *Spacecraft Bus*: Yantar. *Spacecraft*: Yantar-4KS1. *Duration*: 247.00 days. *Decay Date*: 1992-03-13 . *USAF Sat Cat*: 21560 . *COSPAR*: 1991-049A. *Apogee*: 267 km (165 mi). *Perigee*: 182 km (113 mi). *Inclination*: 64.9000 deg. *Period*: 89.00 min. Photo/digital surveillance..

1991 July 23 - . 09:05 GMT - . *Launch Site*: Plesetsk. *Launch Complex*: Plesetsk LC43/3. *LV Family*: R-7. *Launch Vehicle*: Soyuz-U-PVB.

- **Resurs F-12** - . *Payload*: Resurs-F1 14F43 s/n 53. *Mass*: 6,300 kg (13,800 lb). *Nation*: Russia. *Agency*: MOM. *Program*: Resurs. *Class*: Earth. *Type*: Earth resources satellite. *Spacecraft Bus*: Vostok. *Spacecraft*: Resurs F1-14F43. *Duration*: 16.00 days. *Decay Date*: 1991-08-08 . *USAF Sat Cat*: 21611 . *COSPAR*: 1991-052A. *Apogee*: 230 km (140 mi). *Perigee*: 178 km (110 mi). *Inclination*: 82.4000 deg. *Period*: 88.60 min. Investigation of the natural resources of the earth in the interests of the various branches of the national economy of the USSR, and solution of problems relating to the environment and to international cooperation. .

1991 August 21 - . 10:50 GMT - . *Launch Site*: Plesetsk. *Launch Complex*: Plesetsk LC43/3. *LV Family*: R-7. *Launch Vehicle*: Soyuz-U-PVB.

- **Resurs F-13** - . *Payload*: Resurs-F2 17F42 s/n 7. *Mass*: 6,300 kg (13,800 lb). *Nation*: Russia. *Agency*: MOM. *Program*: Resurs. *Class*: Earth. *Type*: Earth resources satellite. *Spacecraft Bus*: Vostok. *Spacecraft*: Resurs F2. *Duration*: 30.00 days. *Decay Date*: 1991-09-20 . *USAF Sat Cat*: 21664 . *COSPAR*: 1991-058A. *Apogee*: 240 km (140 mi). *Perigee*: 178 km (110 mi). *Inclination*: 82.3000 deg. *Period*: 88.70 min. Investigation of the natural resources of the earth in the interests of the various branches of the national economy of the USSR, and solution of problems relating to the environment and to international cooperation. .

1991 September 19 - . 16:20 GMT - . *Launch Site*: Plesetsk. *Launch Complex*: Plesetsk LC43/3. *LV Family*: R-7. *Launch Vehicle*: Soyuz-U-PVB.

- **Cosmos 2156** - . *Mass*: 6,600 kg (14,500 lb). *Nation*: Russia. *Agency*: MOM. *Class*: Surveillance. *Type*: Military surveillance satellite. *Spacecraft Bus*: Yantar. *Spacecraft*: Yantar-4K1. *Duration*: 59.00 days. *Decay Date*: 1991-11-17 . *USAF Sat Cat*: 21713 . *COSPAR*: 1991-066A. *Apogee*: 345 km (214 mi). *Perigee*: 160 km (90 mi). *Inclination*: 67.1000 deg. *Period*: 89.60 min. High resolution photo reconnaissance; returned film in two small SpK capsules during the mission and with the main capsule at completion of the mission..

1991 October 4 - . 18:10 GMT - . *Launch Site*: Plesetsk. *Launch Complex*: Plesetsk LC43/4. *LV Family*: R-7. *Launch Vehicle*: Soyuz-U-PVB.

- **Foton 7** - . *Payload*: Foton s/n 7L. *Mass*: 6,200 kg (13,600 lb). *Nation*: Russia. *Agency*: MOM. *Class*: Materials. *Type*: Materials science satellite. *Spacecraft Bus*: Vostok. *Spacecraft*: Foton. *Duration*: 15.54 days. *Decay Date*: 1991-10-20 . *USAF Sat Cat*: 21737 . *COSPAR*: 1991-070A. *Apogee*: 394 km (244 mi). *Perigee*: 214 km (132 mi). *Inclination*: 62.8000 deg. *Period*: 90.60 min. Materials research; carried German, French experiments. Continuation of space materials research conducted jointly with Germany and France. .

1991 November 20 - . 19:15 GMT - . *Launch Site*: Plesetsk. *Launch Complex*: Plesetsk LC43/3. *LV Family*: R-7. *Launch Vehicle*: Soyuz-U-PVB.

- **Cosmos 2171** - . *Mass*: 6,600 kg (14,500 lb). *Nation*: Russia. *Agency*: MOM. *Class*: Surveillance. *Type*: Military surveillance satellite. *Spacecraft Bus*: Yantar. *Spacecraft*: Yantar-4K1. *Duration*: 59.00 days. *Decay Date*: 1992-01-17 . *USAF Sat Cat*: 21787 . *COSPAR*: 1991-078A. *Apogee*: 321 km (199 mi). *Perigee*: 187 km (116 mi). *Inclination*: 62.8000 deg. *Period*: 89.60 min. High resolution photo reconnaissance; returned film in two small SpK capsules during the mission and with the main capsule at completion of the mission..

1991 December 17 - . 11:00 GMT - . *Launch Site*: Baikonur. *Launch Complex*: Baikonur LC31. *LV Family*: R-7. *Launch Vehicle*: Soyuz-U-PVB.

- **Cosmos 2174** - . *Payload*: Yantar-1KFT no. 14. *Mass*: 6,600 kg (14,500 lb). *Nation*: Russia. *Agency*: MOM. *Class*: Surveillance. *Type*: Cartographic satellite. *Spacecraft Bus*: Yantar. *Spacecraft*: Yantar-1KFT. *Duration*: 44.00 days. *Decay Date*: 1992-01-30 . *USAF Sat Cat*: 21816 . *COSPAR*: 1991-085A. *Apogee*: 306 km (190 mi). *Perigee*: 193 km (119 mi). *Inclination*: 64.9000 deg. *Period*: 89.50 min. Topographic mapping for the Army General Staff..

1992 January 21 - . 15:00 GMT - . *Launch Site*: Plesetsk. *Launch Complex*: Plesetsk LC43/3. *LV Family*: R-7. *Launch Vehicle*: Soyuz-U-PVB.

- **Cosmos 2175** - . *Mass*: 6,600 kg (14,500 lb). *Nation*: Russia. *Agency*: MOM. *Class*: Surveillance. *Type*: Military surveillance satellite. *Spacecraft Bus*: Yantar. *Spacecraft*: Yantar-4K1. *Duration*: 59.00 days. *Decay Date*: 1992-03-20 . *USAF Sat Cat*: 21844 . *COSPAR*: 1992-001A. *Apogee*: 347 km (215 mi). *Perigee*: 158 km (98 mi). *Inclination*: 67.1000 deg. *Period*: 89.60 min. High resolution photo reconnaissance; returned film in two small SpK capsules during the mission and with the main capsule at completion of the mission..

1992 April 1 - . 14:18 GMT - . *Launch Site*: Plesetsk. *Launch Complex*: Plesetsk LC16/2. *LV Family*: R-7. *Launch Vehicle*: Soyuz-U-PVB.

- **Cosmos 2182** - . *Mass*: 6,600 kg (14,500 lb). *Nation*: Russia. *Agency*: MOM. *Class*: Surveillance. *Type*: Military surveillance satellite. *Spacecraft Bus*: Yantar. *Spacecraft*: Yantar-4K1. *Duration*: 59.00 days. *Decay Date*: 1992-05-30 . *USAF Sat Cat*: 21920 . *COSPAR*: 1992-016A. *Apogee*: 284 km (176 mi). *Perigee*: 166 km (103 mi). *Inclination*: 67.1000 deg. *Period*: 89.00 min. High resolution photo reconnaissance; returned film in two small SpK capsules during the mission and with the main capsule at completion of the mission..

1992 April 8 - . 12:20 GMT - . *Launch Site*: Baikonur. *Launch Complex*: Baikonur LC31. *LV Family*: R-7. *Launch Vehicle*: Soyuz-U-PVB.

- **Cosmos 2183** - . *Mass*: 6,600 kg (14,500 lb). *Nation*: Russia. *Agency*: MOM. *Class*: Surveillance. *Type*: Military surveillance satellite. *Spacecraft Bus*: Yantar. *Spacecraft*: Yantar-4KS1. *Duration*: 314.00 days. *Decay Date*: 1993-02-16 . *USAF Sat Cat*: 21928 . *COSPAR*: 1992-018A. *Apogee*: 289 km (179 mi). *Perigee*: 237 km (147 mi). *Inclination*: 64.9000 deg. *Period*: 89.80 min. Photo/digital surveillance..

1992 April 29 - . 09:00 GMT - . *Launch Site*: Plesetsk. *Launch Complex*: Plesetsk LC43/4. *LV Family*: R-7. *Launch Vehicle*: Soyuz-U-PVB.

- **Resurs F-14** - . *Payload*: Resurs-F2 17F42 s/n 8. *Mass*: 6,300 kg (13,800 lb). *Nation*: Russia. *Agency*: MOM. *Program*: Resurs. *Class*: Earth. *Type*: Earth resources satellite. *Spacecraft Bus*: Vostok. *Spacecraft*: Resurs F2. *Duration*: 30.00 days. *Decay Date*: 1992-05-29 . *USAF Sat Cat*: 21951 . *COSPAR*: 1992-024A. *Apogee*: 230 km (140 mi). *Perigee*: 225 km (139 mi). *Inclination*: 82.1000 deg. *Period*: 89.10 min. Investigation of the natural resources of the Earth for the various branches of the national economy, the solution of environmental problems, and international cooperation. .

1992 April 29 - . 10:10 GMT - . *Launch Site*: Baikonur. *Launch Complex*: Baikonur LC1. *LV Family*: R-7. *Launch Vehicle*: Soyuz-U-PVB.

- **Cosmos 2185** - . *Payload*: Yantar-1KFT no. 15. *Mass*: 6,600 kg (14,500 lb). *Nation*: Russia. *Agency*: MOM. *Class*: Surveillance. *Type*: Cartographic satellite. *Spacecraft Bus*: Yantar. *Spacecraft*: Yantar-1KFT. *Duration*: 43.00 days. *Decay Date*: 1992-06-11 . *USAF Sat Cat*: 21953 . *COSPAR*: 1992-025A. *Apogee*: 274 km (170 mi). *Perigee*: 209 km (129 mi). *Inclination*: 70.0000 deg. *Period*: 89.30 min. Topographic mapping for the Army General Staff..

1992 May 28 - . 19:09 GMT - . *Launch Site*: Plesetsk. *Launch Complex*: Plesetsk LC16/2. *LV Family*: R-7. *Launch Vehicle*: Soyuz-U-PVB.

- **Cosmos 2186** - . *Mass*: 6,600 kg (14,500 lb). *Nation*: Russia. *Agency*: MOM. *Class*: Surveillance. *Type*: Military surveillance satellite. *Spacecraft Bus*: Yantar. *Spacecraft*: Yantar-4K1. *Duration*: 57.00 days. *Decay Date*: 1992-07-24 . *USAF Sat Cat*: 21973 . *COSPAR*: 1992-029A. *Apogee*: 327 km (203 mi). *Perigee*: 187 km (116 mi). *Inclination*: 62.8000 deg. *Period*: 89.70 min. High resolution photo reconnaissance; returned film in two small SpK capsules during the mission and with the main capsule at completion of the mission..

1992 June 23 - . 08:00 GMT - . *Launch Site*: Plesetsk. *Launch Complex*: Plesetsk LC43/3. *LV Family*: R-7. *Launch Vehicle*: Soyuz-U-PVB.

- **Resurs F-15** - . *Payload*: Resurs-F1 14F43 s/n 55. *Mass*: 6,300 kg (13,800 lb). *Nation*: Russia. *Agency*: MOM. *Program*: Resurs. *Class*: Earth. *Type*: Earth resources satellite. *Spacecraft Bus*: Vostok. *Spacecraft*: Resurs F1-14F43. *Duration*:

16.00 days. *Decay Date*: 1992-07-09 . *USAF Sat Cat*: 21998 . *COSPAR*: 1992-033A. *Apogee*: 226 km (140 mi). *Perigee*: 177 km (109 mi). *Inclination*: 82.3000 deg. *Period*: 88.50 min. Capsule reentered 7/9/92. Investigation of the natural resources of the Earth in the interests of the various branches of the national economy. .

1992 July 24 - . 19:40 GMT - . *Launch Site*: Plesetsk. *Launch Complex*: Plesetsk LC43/3. *LV Family*: R-7. *Launch Vehicle*: Soyuz-U-PVB.

- **Cosmos 2203** - . *Mass*: 6,600 kg (14,500 lb). *Nation*: Russia. *Agency*: MOM. *Class*: Surveillance. *Type*: Military surveillance satellite. *Spacecraft Bus*: Yantar. *Spacecraft*: Yantar-4K1. *Duration*: 60.00 days. *Decay Date*: 1992-09-22 . *USAF Sat Cat*: 22052 . *COSPAR*: 1992-045A. *Apogee*: 311 km (193 mi). *Perigee*: 189 km (117 mi). *Inclination*: 62.8000 deg. *Period*: 89.50 min. High resolution photo reconnaissance; returned film in two small SpK capsules during the mission and with the main capsule at completion of the mission..

1992 July 30 - . 11:00 GMT - . *Launch Site*: Plesetsk. *Launch Complex*: Plesetsk LC43/4. *LV Family*: R-7. *Launch Vehicle*: Soyuz-U-PVB.

- **Cosmos 2207** - . *Mass*: 6,300 kg (13,800 lb). *Nation*: Russia. *Agency*: MOM. *Class*: Earth. *Type*: Earth resources satellite. *Spacecraft Bus*: Vostok. *Spacecraft*: Zenit-8. *Duration*: 14.00 days. *Decay Date*: 1992-08-13 . *USAF Sat Cat*: 22062 . *COSPAR*: 1992-048A. *Apogee*: 233 km (144 mi). *Perigee*: 180 km (110 mi). *Inclination*: 82.4000 deg. *Period*: 88.60 min. Military cartographic satellite; returned film capsule..

1992 August 19 - . 10:20 GMT - . *Launch Site*: Plesetsk. *Launch Complex*: Plesetsk LC16/2. *LV Family*: R-7. *Launch Vehicle*: Soyuz-U-PVB.

- **Resurs F-16** - . *Payload*: Resurs-F1 14F43 s/n 54. *Mass*: 6,300 kg (13,800 lb). *Nation*: Russia. *Agency*: MOM. *Program*: Resurs. *Class*: Earth. *Type*: Earth resources satellite. *Spacecraft Bus*: Vostok. *Spacecraft*: Resurs F1-14F43. *Duration*: 16.00 days. *Decay Date*: 1992-09-04 . *USAF Sat Cat*: 22093 . *COSPAR*: 1992-056A. *Apogee*: 226 km (140 mi). *Perigee*: 178 km (110 mi). *Inclination*: 82.6000 deg. *Period*: 88.60 min.

  Carried US Dept. of Defense experiment. Investigation of the natural resources of the Earth in the interests of the various branches of the national economy and solution of problems relating to the environment and to international cooperation (the satellite's equipment included two Pion passive satellites for the investigation of the upper atmosphere).

- **Pion 1** - . *Payload*: Pion-Germes-1. *Mass*: 50 kg (110 lb). *Nation*: Russia. *Agency*: MOM. *Class*: Earth. *Type*: Atmosphere satellite. *Spacecraft*: Pion. *Decay Date*: 1992-09-25 . *USAF Sat Cat*: 22099 . *COSPAR*: 1992-056C. *Apogee*: 229 km (142 mi). *Perigee*: 219 km (136 mi). *Inclination*: 82.6000 deg. *Period*: 89.00 min. Deployed

from Resurs F16; examined how upper atmosphere affects spacecraft reentries. .

- **Pion 2** - . *Payload*: Pion-Germes-2. *Mass*: 50 kg (110 lb). *Nation*: Russia. *Agency*: MOM. *Class*: Earth. *Type*: Atmosphere satellite. *Spacecraft*: Pion. *Decay Date*: 1992-09-24 . *USAF Sat Cat*: 22100 . *COSPAR*: 1992-056D. *Apogee*: 229 km (142 mi). *Perigee*: 218 km (135 mi). *Inclination*: 82.6000 deg. *Period*: 89.00 min. Deployed from Resurs F16; examined how upper atmosphere affects spacecraft reentries. .

1992 September 22 - . 16:10 GMT - . *Launch Site*: Plesetsk. *Launch Complex*: Plesetsk LC16/2. *LV Family*: R-7. *Launch Vehicle*: Soyuz-U-PVB.

- **Cosmos 2210** - . *Mass*: 6,600 kg (14,500 lb). *Nation*: Russia. *Agency*: MOM. *Class*: Surveillance. *Type*: Military surveillance satellite. *Spacecraft Bus*: Yantar. *Spacecraft*: Yantar-4K1. *Duration*: 59.00 days. *Decay Date*: 1992-11-20 . *USAF Sat Cat*: 22133 . *COSPAR*: 1992-062A. *Apogee*: 353 km (219 mi). *Perigee*: 160 km (90 mi). *Inclination*: 67.2000 deg. *Period*: 89.60 min. High resolution photo reconnaissance; returned film in two small SpK capsules during the mission and with the main capsule at completion of the mission..

1992 October 8 - . 19:00 GMT - . *Launch Site*: Plesetsk. *Launch Complex*: Plesetsk LC43/4. *LV Family*: R-7. *Launch Vehicle*: Soyuz-U-PVB.

- **Foton 8** - . *Payload*: Foton s/n 8L. *Mass*: 6,200 kg (13,600 lb). *Nation*: Russia. *Agency*: MOM. *Class*: Materials. *Type*: Materials science satellite. *Spacecraft Bus*: Vostok. *Spacecraft*: Foton. *Duration*: 15.60 days. *Decay Date*: 1992-10-24 . *USAF Sat Cat*: 22173 . *COSPAR*: 1992-065A. *Apogee*: 359 km (223 mi). *Perigee*: 218 km (135 mi). *Inclination*: 62.8000 deg. *Period*: 90.30 min. 250 orbits. Microgravity research. Space materials research (conducted jointly with Germany)..

1992 November 15 - . 21:45 GMT - . *Launch Site*: Plesetsk. *Launch Complex*: Plesetsk LC16/2. *LV Family*: R-7. *Launch Vehicle*: Soyuz-U-PVB.

- **Resurs-500** - . *Mass*: 6,300 kg (13,800 lb). *Nation*: Russia. *Agency*: MOM. *Program*: Resurs. *Class*: Earth. *Type*: Earth resources satellite. *Spacecraft Bus*: Vostok. *Spacecraft*: Resurs F1-14F43. *Duration*: 6.00 days. *Decay Date*: 1992-11-22 . *USAF Sat Cat*: 22217 . *COSPAR*: 1992-075A. *Apogee*: 237 km (147 mi). *Perigee*: 177 km (109 mi). *Inclination*: 82.6000 deg. *Period*: 88.60 min.

  Carried descent module with greetings to American people. Delivery of a humanitarian cargo (messages to the American people, promotional materials of Russian and foreign firms, etc.) to the United States of America in connection with the 500th anniversary of the discovery of America by Columbus.

1992 November 20 - . 15:29 GMT - . *Launch Site*: Plesetsk. *Launch Complex*: Plesetsk LC43/4. *LV Family*: R-7. *Launch Vehicle*: Soyuz-U-PVB.

- **Cosmos 2220** - . *Mass*: 6,600 kg (14,500 lb). *Nation*: Russia. *Agency*: MOM. *Class*: Surveillance. *Type*: Military surveillance satellite. *Spacecraft Bus*: Yantar. *Spacecraft*: Yantar-4K1. *Duration*: 59.00 days. *Decay Date*: 1993-01-18 . *USAF Sat Cat*: 22226 . *COSPAR*: 1992-077A. *Apogee*: 341 km (211 mi). *Perigee*: 164 km (101 mi). *Inclination*: 67.2000 deg. *Period*: 89.60 min. High resolution photo reconnaissance; returned film in two small SpK capsules during the mission and with the main capsule at completion of the mission..

1992 December 9 - . 11:25 GMT - . *Launch Site*: Baikonur. *Launch Complex*: Baikonur LC1. *LV Family*: R-7. *Launch Vehicle*: Soyuz-U-PVB.

- **Cosmos 2223** - . *Mass*: 6,600 kg (14,500 lb). *Nation*: Russia. *Agency*: MOM. *Class*: Surveillance. *Type*: Military surveillance satellite. *Spacecraft Bus*: Yantar. *Spacecraft*: Yantar-4KS1. *Duration*: 372.00 days. *Decay Date*: 1993-12-16 . *USAF Sat Cat*: 22260 . *COSPAR*: 1992-087A. *Apogee*: 271 km (168 mi). *Perigee*: 238 km (147 mi). *Inclination*: 64.6000 deg. *Period*: 89.60 min. Photo/digital surveillance..

1992 December 22 - . 12:00 GMT - . *Launch Site*: Baikonur. *Launch Complex*: Baikonur LC31. *LV Family*: R-7. *Launch Vehicle*: Soyuz-U-PVB.

- **Cosmos 2225** - . *Payload*: Orlets-1 no. 4. *Mass*: 6,500 kg (14,300 lb). *Nation*: Russia. *Agency*: MOM. *Program*: Orlets. *Class*: Surveillance. *Type*: Military surveillance satellite. *Spacecraft Bus*: Yantar. *Spacecraft*: Orlets-1. *Duration*: 58.00 days. *Decay Date*: 1993-02-18 . *USAF Sat Cat*: 22280 . *COSPAR*: 1992-091A. *Apogee*: 313 km (194 mi). *Perigee*: 169 km (105 mi). *Inclination*: 64.9000 deg. *Period*: 89.30 min. Long duration film return military reconnaissance satellite. After returning multiple film capsules, the spacecraft was deorbited..

1992 December 29 - . 13:30 GMT - . *Launch Site*: Plesetsk. *Launch Complex*: Plesetsk LC43/3. *LV Family*: R-7. *Launch Vehicle*: Soyuz-U-PVB.

- **Cosmos 2229** - . *Payload*: Bion no. 10. *Mass*: 6,000 kg (13,200 lb). *Nation*: Russia. *Agency*: MOM. *Class*: Biology. *Type*: Biology satellite. *Spacecraft Bus*: Vostok. *Spacecraft*: Bion. *Duration*: 12.00 days. *Decay Date*: 1993-01-10 . *USAF Sat Cat*: 22300 . *COSPAR*: 1992-095A. *Apogee*: 372 km (231 mi). *Perigee*: 216 km (134 mi). *Inclination*: 62.8000 deg. *Period*: 90.40 min.

  Biological research; carried monkeys Ivasha and Krosha. International study of the adaptation of living organisms to conditions of space flight. After 12 days in Earth orbit, the capsule was recovered 50 deg 46 min N, 73 deg 08 min E, about 100 kilometers north of the city of Karaganda. The Cosmos 2229 mission was also referred to as Bion 10, because it was the tenth in a series of Soviet/Russian unmanned satellites carrying biological experiments. *Additional Details*: here....

1993 January 19 - . 14:49 GMT - . *Launch Site*: Plesetsk. *Launch Complex*: Plesetsk

LC43/3. *LV Family*: R-7. *Launch Vehicle*: Soyuz-U-PVB.

- **Cosmos 2231** - . *Mass*: 6,600 kg (14,500 lb). *Nation*: Russia. *Agency*: MOM. *Class*: Surveillance. *Type*: Military surveillance satellite. *Spacecraft Bus*: Yantar. *Spacecraft*: Yantar-4K1. *Duration*: 65.00 days. *Decay Date*: 1993-03-25 . *USAF Sat Cat*: 22317 . *COSPAR*: 1993-004A. *Apogee*: 342 km (212 mi). *Perigee*: 163 km (101 mi). *Inclination*: 67.2000 deg. *Period*: 89.60 min. High resolution photo reconnaissance; returned film in two small SpK capsules during the mission and with the main capsule at completion of the mission..

1993 April 2 - . 14:30 GMT - . *Launch Site*: Plesetsk. *Launch Complex*: Plesetsk LC16/2. *LV Family*: R-7. *Launch Vehicle*: Soyuz-U-PVB.

- **Cosmos 2240** - . *Mass*: 6,600 kg (14,500 lb). *Nation*: Russia. *Agency*: MOM. *Class*: Surveillance. *Type*: Military surveillance satellite. *Spacecraft Bus*: Yantar. *Spacecraft*: Yantar-4K1. *Duration*: 66.00 days. *Decay Date*: 1993-06-07 . *USAF Sat Cat*: 22592 . *COSPAR*: 1993-021A. *Apogee*: 320 km (190 mi). *Perigee*: 188 km (116 mi). *Inclination*: 62.8000 deg. *Period*: 89.60 min. High resolution photo reconnaissance; returned film in two small SpK capsules during the mission and with the main capsule at completion of the mission..

1993 April 27 - . 10:35 GMT - . *Launch Site*: Baikonur. *Launch Complex*: Baikonur LC31. *LV Family*: R-7. *Launch Vehicle*: Soyuz-U-PVB.

- **Cosmos 2243** - . *Payload*: Yantar-1KFT no. 16. *Mass*: 6,600 kg (14,500 lb). *Nation*: Russia. *Agency*: MOM. *Class*: Surveillance. *Type*: Cartographic satellite. *Spacecraft Bus*: Yantar. *Spacecraft*: Yantar-1KFT. *Duration*: 9.00 days. *Decay Date*: 1993-05-06 . *USAF Sat Cat*: 22641 . *COSPAR*: 1993-028A. *Apogee*: 233 km (144 mi). *Perigee*: 189 km (117 mi). *Inclination*: 70.4000 deg. *Period*: 88.70 min. Topographic mapping for the Army General Staff. Mission normally would have run 44 days..

1993 May 21 - . 09:15 GMT - . *Launch Site*: Plesetsk. *Launch Complex*: Plesetsk LC16/2. *LV Family*: R-7. *Launch Vehicle*: Soyuz-U-PVB.

- **Resurs F-17** - . *Payload*: Resurs-F2 17F42 s/n 9. *Mass*: 6,300 kg (13,800 lb). *Nation*: Russia. *Agency*: MOM. *Program*: Resurs. *Class*: Earth. *Type*: Earth resources satellite. *Spacecraft Bus*: Vostok. *Spacecraft*: Resurs F2. *Duration*: 30.00 days. *Decay Date*: 1993-06-20 . *USAF Sat Cat*: 22663 . *COSPAR*: 1993-033A. *Apogee*: 255 km (158 mi). *Perigee*: 176 km (109 mi). *Inclination*: 82.6000 deg. *Period*: 88.80 min. Investigation of the natural resources of the Earth for the various branches of the national economy, the solution of environmental problems, and international cooperation. .

1993 June 25 - . 08:20 GMT - . *Launch Site*: Plesetsk. *Launch Complex*: Plesetsk LC16/2. *LV Family*: R-7. *Launch Vehicle*: Soyuz-U-PVB.

- **Resurs F-18** - . *Payload*: Resurs-F1 14F43 s/n 57. *Mass*: 6,300 kg (13,800 lb). *Nation*: Russia. *Agency*: MOM. *Program*: Resurs. *Class*: Earth. *Type*: Earth resources satellite. *Spacecraft Bus*: Vostok. *Spacecraft*: Resurs F1-14F43. *Duration*: 17.00 days. *Decay Date*: 1993-07-12 . *USAF Sat Cat*: 22696 . *COSPAR*: 1993-040A. *Apogee*: 240 km (140 mi). *Perigee*: 173 km (107 mi). *Inclination*: 82.6000 deg. *Period*: 88.60 min. Investigation of the natural resources of the Earth in the interests of various branches of the national economy; solution of problems relating to ecology and international cooperation. .

1993 July 14 - . 16:40 GMT - . *Launch Site*: Plesetsk. *Launch Complex*: Plesetsk LC43/3. *LV Family*: R-7. *Launch Vehicle*: Soyuz-U-PVB.

- **Cosmos 2259** - . *Mass*: 6,600 kg (14,500 lb). *Nation*: Russia. *Agency*: MOM. *Class*: Surveillance. *Type*: Military surveillance satellite. *Spacecraft Bus*: Yantar. *Spacecraft*: Yantar-4K1. *Duration*: 11.00 days. *Decay Date*: 1993-07-25 . *USAF Sat Cat*: 22716 . *COSPAR*: 1993-045A. *Apogee*: 349 km (216 mi). *Perigee*: 168 km (104 mi). *Inclination*: 67.1000 deg. *Period*: 89.70 min. High resolution photo reconnaissance; returned film in two small SpK capsules during the mission and with the main capsule at completion of the mission..

1993 July 22 - . 08:45 GMT - . *Launch Site*: Plesetsk. *Launch Complex*: Plesetsk LC43/3. *LV Family*: R-7. *Launch Vehicle*: Soyuz-U-PVB.

- **Cosmos 2260** - . *Payload*: Zenit-8 / Oblik no. 3. *Mass*: 6,300 kg (13,800 lb). *Nation*: Russia. *Agency*: MOM. *Class*: Earth. *Type*: Earth resources satellite. *Spacecraft Bus*: Vostok. *Spacecraft*: Zenit-8. *Duration*: 14.00 days. *Decay Date*: 1993-08-05 . *USAF Sat Cat*: 22721 . *COSPAR*: 1993-047A. *Apogee*: 224 km (139 mi). *Perigee*: 177 km (109 mi). *Inclination*: 82.3000 deg. *Period*: 88.50 min.

  Military cartographic satellite; returned film capsule. Also photography of the earth's surface for the purpose of the natural resource mapping and area monitoring on behalf of various branches of the Russian economy and in the interests of international cooperation. Alternate name: Resurs-T.

1993 August 10 - . 22:23 GMT - . *Launch Site*: Baikonur. *Launch Complex*: Baikonur LC1. *LV Family*: R-7. *Launch Vehicle*: Soyuz-U-PVB.

- **Progress M-19** - . *Payload*: Progress M s/n 219. *Mass*: 7,250 kg (15,980 lb). *Nation*: Russia. *Agency*: MOM. *Program*: Mir. *Class*: Manned. *Type*: Manned logistics spacecraft. *Flight*: Soyuz TM-17. *Spacecraft Bus*: Soyuz. *Spacecraft*: Progress M. *Duration*: 69.08 days. *Completed Operations Date*: 1993-10-20 00:17:41 . *Decay Date*: 1993-10-20 00:17:41 . *USAF Sat Cat*: 22745 . *COSPAR*: 1993-052A. *Apogee*: 223 km (138 mi). *Perigee*: 179 km (111 mi). *Inclination*: 51.8000 deg. *Period*: 88.50 min. Unmanned resupply vessel to Mir. Docked with Mir at the Kvant rear port on 13 Aug 1993 00:00:06 GMT. Undocked on 13 Oct 1993 17:59:06

GMT. Destroyed in reentry on 19 Oct 1993 00:22:14 GMT. Total free-flight time 7.33 days. Total docked time 61.75 days..

- **VBK Raduga** - . *Mass*: 7,450 kg (16,420 lb). *Nation*: Russia. *Agency*: VKS. *Program*: Mir. *Flight*: Soyuz TM-17. *Spacecraft Bus*: Soyuz. *Spacecraft*: Progress M. *COSPAR*: 1993-052xx.

1993 August 24 - . 10:45 GMT - . *Launch Site*: Plesetsk. *Launch Complex*: Plesetsk LC16/2. *LV Family*: R-7. *Launch Vehicle*: Soyuz-U-PVB.

- **Resurs F-19** - . *Payload*: Resurs-F1 14F43 s/n 56. *Mass*: 6,300 kg (13,800 lb). *Nation*: Russia. *Agency*: MOM. *Program*: Resurs. *Class*: Earth. *Type*: Earth resources satellite. *Spacecraft Bus*: Vostok. *Spacecraft*: Resurs F1-14F43. *Duration*: 17.00 days. *Decay Date*: 1993-09-10 . *USAF Sat Cat*: 22777 . *COSPAR*: 1993-053A. *Apogee*: 236 km (146 mi). *Perigee*: 174 km (108 mi). *Inclination*: 82.6000 deg. *Period*: 88.60 min. Investigation of the natural resources of the Earth in the interests of various branches of the national economy; solution of problems relating to ecology and international cooperation. .

1993 October 11 - . 21:33 GMT - . *Launch Site*: Baikonur. *Launch Complex*: Baikonur LC1. *LV Family*: R-7. *Launch Vehicle*: Soyuz-U-PVB.

- **Progress M-20** - . *Payload*: Progress M s/n 220. *Mass*: 7,250 kg (15,980 lb). *Nation*: Russia. *Agency*: MOM. *Program*: Mir. *Class*: Manned. *Type*: Manned logistics spacecraft. *Flight*: Soyuz TM-17. *Spacecraft Bus*: Soyuz. *Spacecraft*: Progress M. *Duration*: 40.48 days. *Decay Date*: 1993-11-21 . *USAF Sat Cat*: 22867 . *COSPAR*: 1993-064A. *Apogee*: 226 km (140 mi). *Perigee*: 187 km (116 mi). *Inclination*: 51.8000 deg. *Period*: 88.60 min.

  Unmanned resupply vessel to Mir, carried a Raduga reentry capsule for return of experimental materials to earth. Docked with Mir on 13 Oct 1993 23:24:46 GMT. Undocked on 21 Nov 1993 02:38:43 GMT. Capsule landed in Kazakhstan on 21 Nov 1993 09:06:00 GMT. Total free-flight time 2.35 days. Total docked time 38.13 days.

- **VBK Raduga** - . *Mass*: 7,450 kg (16,420 lb). *Nation*: Russia. *Agency*: VKS. *Program*: Mir. *Flight*: Soyuz TM-17. *Spacecraft Bus*: Soyuz. *Spacecraft*: Progress M. *COSPAR*: 1993-064xx.

1993 November 5 - . 08:25 GMT - . *Launch Site*: Baikonur. *Launch Complex*: Baikonur LC1. *LV Family*: R-7. *Launch Vehicle*: Soyuz-U-PVB.

- **Cosmos 2267** - . *Mass*: 6,600 kg (14,500 lb). *Nation*: Russia. *Agency*: MOM. *Class*: Surveillance. *Type*: Military surveillance satellite. *Spacecraft Bus*: Yantar. *Spacecraft*: Yantar-4KS1. *Duration*: 418.00 days. *Decay Date*: 1994-12-28 . *USAF Sat Cat*: 22904 . *COSPAR*: 1993-071A. *Apogee*: 281 km (174 mi). *Perigee*: 228 km (141 mi). *Inclination*: 70.4000 deg. *Period*: 89.60 min. Photo/digital surveillance..

1994 January 28 - . 02:12 GMT - . *Launch Site*: Baikonur. *Launch Complex*: Baikonur LC1. *LV Family*: R-7. *Launch Vehicle*: Soyuz-U-PVB.

- **Progress M-21** - . *Payload*: Progress M s/n 221. *Mass*: 7,130 kg (15,710 lb). *Nation*: Russia. *Agency*: MOM. *Program*: Mir. *Class*: Manned. *Type*: Manned logistics spacecraft. *Flight*: Soyuz TM-18, Soyuz TM-18 Mir LD-4. *Spacecraft Bus*: Soyuz. *Spacecraft*: Progress M. *Duration*: 54.13 days. *Completed Operations Date*: 1994-03-21 05:24:50 . *Decay Date*: 1994-03-21 05:24:50 . *USAF Sat Cat*: 22975 . *COSPAR*: 1994-005A. *Apogee*: 236 km (146 mi). *Perigee*: 194 km (120 mi). *Inclination*: 51.6000 deg. *Period*: 88.50 min. Unmanned resupply vessel to Mir. Docked with Mir on 30 Jan 1994 03:56:13 GMT. Undocked on 23 Mar 1994 01:20:29 GMT. Destroyed in reentry on 23 Mar 1994 05:13:00 GMT. Total free-flight time 2.23 days. Total docked time 51.89 days..

1994 March 17 - . 16:30 GMT - . *Launch Site*: Plesetsk. *Launch Complex*: Plesetsk LC43/4. *Launch Pad*: LC43/3. *LV Family*: R-7. *Launch Vehicle*: Soyuz-U-PVB.

- **Cosmos 2274** - . *Mass*: 6,600 kg (14,500 lb). *Nation*: Russia. *Agency*: MOM. *Class*: Surveillance. *Type*: Military surveillance satellite. *Spacecraft Bus*: Yantar. *Spacecraft*: Yantar-4K1. *Duration*: 65.00 days. *Decay Date*: 1994-05-21 . *USAF Sat Cat*: 23033 . *COSPAR*: 1994-018A. *Apogee*: 372 km (231 mi). *Perigee*: 176 km (109 mi). *Inclination*: 67.0000 deg. *Period*: 89.70 min.

  This space object is intended for assignments on behalf of the Ministry of Defense of the Russian Federation. High resolution photo reconnaissance; returned film in two small SpK capsules during the mission and with the main capsule at completion of the mission.

1994 March 22 - . 04:54 GMT - . *Launch Site*: Baikonur. *Launch Complex*: Baikonur LC1. *LV Family*: R-7. *Launch Vehicle*: Soyuz-U-PVB.

- **Progress M-22** - . *Payload*: Progress M s/n 222. *Mass*: 7,103 kg (15,659 lb). *Nation*: Russia. *Agency*: MOM. *Program*: Mir. *Class*: Manned. *Type*: Manned logistics spacecraft. *Flight*: Soyuz TM-18, Soyuz TM-18 Mir LD-4. *Spacecraft Bus*: Soyuz. *Spacecraft*: Progress M. *Duration*: 61.99 days. *Completed Operations Date*: 1994-05-23 04:48:12 . *Decay Date*: 1994-05-23 04:48:12 . *USAF Sat Cat*: 23035 . *COSPAR*: 1994-019A. *Apogee*: 335 km (208 mi). *Perigee*: 260 km (160 mi). *Inclination*: 51.7000 deg. *Period*: 90.20 min.

  Unmanned resupply vessel to Mir. Launched into an initial 192 x 238 x 51.6 km orbit. Docked with Mir on 24 Mar 1994 06:39:37 GMT. Fired its engine around 15 May to raise the orbit of the Mir station from 381 x 400 km to 398 x 399 km. Undocked on 23 May 1994 00:58:38 GMT. Destroyed in reentry on 23 May 1994 04:40:00 GMT. Total free-flight time 2.23 days. Total docked time 59.76 days.

1994 April 28 - . 17:14 GMT - . *Launch Site*: Baikonur. *Launch Complex*: Baikonur LC31. *LV Family*: R-7. *Launch Vehicle*: Soyuz-U-PVB.

- **Cosmos 2280** - . *Mass*: 6,600 kg (14,500 lb). *Nation*: Russia. *Agency*: MOM. *Class*: Surveillance. *Type*: Military surveillance satellite. *Spacecraft Bus*: Yantar. *Spacecraft*: Yantar-4KS1. *Duration*: 316.00 days. *Decay Date*: 1995-03-10 . *USAF Sat Cat*: 23095 . *COSPAR*: 1994-025A. *Apogee*: 283 km (175 mi). *Perigee*: 233 km (144 mi). *Inclination*: 70.4000 deg. *Period*: 89.70 min. Photo/digital surveillance..

1994 June 7 - . 07:20 GMT - . *Launch Site*: Plesetsk. *Launch Complex*: Plesetsk LC16/2. *LV Family*: R-7. *Launch Vehicle*: Soyuz-U-PVB.

- **Cosmos 2281** - . *Payload*: Zenit-8 / Oblik no. 4. *Mass*: 6,300 kg (13,800 lb). *Nation*: Russia. *Agency*: MOM. *Class*: Earth. *Type*: Earth resources satellite. *Spacecraft Bus*: Vostok. *Spacecraft*: Zenit-8. *Duration*: 22.00 days. *Decay Date*: 1994-07-29 . *USAF Sat Cat*: 23119 . *COSPAR*: 1994-032A. *Apogee*: 293 km (182 mi). *Perigee*: 236 km (146 mi). *Inclination*: 82.5000 deg. *Period*: 89.80 min.

  Military cartographic satellite; returned film capsule. Also photography of the earth's surface for the purpose of the natural resource mapping and area monitoring on behalf of various branches of the Russian economy and in the interests of international cooperation. Landed July 29.

1994 June 14 - . 16:05 GMT - . *Launch Site*: Plesetsk. *Launch Complex*: Plesetsk LC43/3. *LV Family*: R-7. *Launch Vehicle*: Soyuz-U-PVB.

- **Foton 9** - . *Payload*: Foton s/n 9. *Mass*: 6,200 kg (13,600 lb). *Nation*: Russia. *Agency*: MOM. *Class*: Materials. *Type*: Materials science satellite. *Spacecraft Bus*: Vostok. *Spacecraft*: Foton. *Duration*: 17.56 days. *Decay Date*: 1994-07-02 . *USAF Sat Cat*: 23122 . *COSPAR*: 1994-033A. *Apogee*: 358 km (222 mi). *Perigee*: 220 km (130 mi). *Inclination*: 62.8000 deg. *Period*: 90.30 min. Microgravity experiments. Landed July 2..

1994 July 20 - . 17:35 GMT - . *Launch Site*: Plesetsk. *Launch Complex*: Plesetsk LC43/4. *Launch Pad*: LC43/3. *LV Family*: R-7. *Launch Vehicle*: Soyuz-U-PVB.

- **Cosmos 2283** - . *Mass*: 6,600 kg (14,500 lb). *Nation*: Russia. *Agency*: MOM. *Class*: Surveillance. *Type*: Military surveillance satellite. *Spacecraft Bus*: Yantar. *Spacecraft*: Yantar-4K1. *Duration*: 71.00 days. *Decay Date*: 1994-09-29 . *USAF Sat Cat*: 23182 . *COSPAR*: 1994-042A. *Apogee*: 313 km (194 mi). *Perigee*: 179 km (111 mi). *Inclination*: 67.1000 deg. *Period*: 89.42 min. High resolution photo reconnaissance; returned film in two small SpK capsules during the mission and with the main capsule at completion of the mission..

1994 July 29 - . 09:30 GMT - . *Launch Site*: Baikonur. *Launch Complex*: Baikonur LC31.

LV Family: R-7. *Launch Vehicle*: Soyuz-U-PVB.

- **Cosmos 2284** - . *Payload*: Yantar-1KFT no. 17. *Mass*: 6,600 kg (14,500 lb). *Nation*: Russia. *Agency*: MOM. *Class*: Surveillance. *Type*: Cartographic satellite. *Spacecraft Bus*: Yantar. *Spacecraft*: Yantar-1KFT. *Duration*: 44.00 days. *Decay Date*: 1994-09-11 . *USAF Sat Cat*: 23187 . *COSPAR*: 1994-044A. *Apogee*: 274 km (170 mi). *Perigee*: 211 km (131 mi). *Inclination*: 70.3000 deg. *Period*: 89.35 min. Topographic mapping for the Army General Staff. Landed September 11 1994..

1994 August 25 - . 14:25 GMT - . *Launch Site*: Baikonur. *Launch Complex*: Baikonur LC1. *LV Family*: R-7. *Launch Vehicle*: Soyuz-U-PVB.

- **Progress M-24** - . *Payload*: Progress M s/n 224. *Mass*: 7,250 kg (15,980 lb). *Nation*: Russia. *Agency*: MOM. *Program*: Mir. *Class*: Manned. *Type*: Manned logistics spacecraft. *Flight*: Soyuz TM-18 Mir LD-4, Soyuz TM-19. *Spacecraft Bus*: Soyuz. *Spacecraft*: Progress M. *Duration*: 40.35 days. *Completed Operations Date*: 1994-10-04 22:41:48 . *Decay Date*: 1994-10-04 22:41:48 . *USAF Sat Cat*: 23215 . *COSPAR*: 1994-052A. *Apogee*: 397 km (246 mi). *Perigee*: 394 km (244 mi). *Inclination*: 51.6000 deg. *Period*: 92.47 min.

  Unmanned resupply vessel to Mir. Failed to dock with Mir on 27 Aug 1994. A second automatic docking attempt on 30 Aug 1994 also failed and the Progress collided with the Kvant module. A third and final attempt, manually controlled by Mir commander Yuriy Malenchenko, was successful on 2 Sep 1994 13:30:28 GMT. The Mir commander and flight engineer, Yuriy Malenchenko and Talgat Musabaev, made a spacewalk on 9 Sep 1994 to inspect the damage to the Kvant module made when the Progress collided with Kvant. Undocked on 4 Oct 1994 18:55:52 GMT, leaving the rear docking port free for Soyuz TM-20. Destroyed in reentry over the Pacific at 38.4 deg S, 137.4 deg W,on 4 Oct 1994 22:43:00 GMT. Total free-flight time 8.12 days. Total docked time 32.23 days.

1994 November 11 - . 07:21 GMT - . *Launch Site*: Baikonur. *Launch Complex*: Baikonur LC1. *LV Family*: R-7. *Launch Vehicle*: Soyuz-U-PVB.

- **Progress M-25** - . *Payload*: Progress M s/n 225. *Mass*: 7,125 kg (15,707 lb). *Nation*: Russia. *Agency*: MOM. *Program*: Mir. *Class*: Manned. *Type*: Manned logistics spacecraft. *Flight*: Soyuz TM-18 Mir LD-4, Soyuz TM-20. *Spacecraft Bus*: Soyuz. *Spacecraft*: Progress M. *Duration*: 97.39 days. *Decay Date*: 1995-02-16 . *USAF Sat Cat*: 23348 . *COSPAR*: 1994-075A. *Apogee*: 394 km (244 mi). *Perigee*: 391 km (242 mi). *Inclination*: 51.6000 deg. *Period*: 92.41 min. Unmanned resupply vessel to Mir. Docked with Mir on 13 Nov 1994 09:04:29 GMT. Undocked on 16 Feb 1995 13:03:00 GMT. Destroyed in reentry on 16 Feb 1995 16:45:00 GMT. Total free-flight time 2.23 days. Total docked time 95.17 days..

1994 December 29 - . 11:30 GMT - . *Launch Site*: Baikonur. *Launch Complex*: Baikonur

LC31. *LV Family*: R-7. *Launch Vehicle*: Soyuz-U-PVB.

- **Cosmos 2305** - . *Mass*: 6,600 kg (14,500 lb). *Nation*: Russia. *Agency*: MOM. *Class*: Surveillance. *Type*: Military surveillance satellite. *Spacecraft Bus*: Yantar. *Spacecraft*: Yantar-4KS1. *Duration*: 354.00 days. *Decay Date*: 1995-12-18 . *USAF Sat Cat*: 23453 . *COSPAR*: 1994-088A. *Apogee*: 288 km (178 mi). *Perigee*: 231 km (143 mi). *Inclination*: 64.9000 deg. *Period*: 89.70 min. Photo/digital surveillance..

1995 February 15 - . 16:48 GMT - . *Launch Site*: Baikonur. *Launch Complex*: Baikonur LC1. *LV Family*: R-7. *Launch Vehicle*: Soyuz-U-PVB.

- **Progress M-26** - . *Payload*: Progress M s/n 226. *Mass*: 7,139 kg (15,738 lb). *Nation*: Russia. *Agency*: MOM. *Program*: Mir. *Class*: Manned. *Type*: Manned logistics spacecraft. *Flight*: Soyuz TM-18 Mir LD-4, Soyuz TM-20. *Spacecraft Bus*: Soyuz. *Spacecraft*: Progress M. *Duration*: 27.56 days. *Completed Operations Date*: 1995-03-15 06:14:32 . *Decay Date*: 1995-03-15 06:14:32 . *USAF Sat Cat*: 23477 . *COSPAR*: 1995-005A. *Apogee*: 396 km (246 mi). *Perigee*: 391 km (242 mi). *Inclination*: 51.6000 deg. *Period*: 92.40 min. Unmanned resupply vessel to Mir. Docked with Mir on 17 Feb 1995 18:21:34 GMT. Undocked on 15 Mar 1995 02:26:38 GMT. Destroyed in reentry over the Pacific Ocean on 15 Mar 1995 06:15:00 GMT. Total free-flight time 2.22 days. Total docked time 25.34 days..

1995 February 16 - . 17:39 GMT - . *Launch Site*: Plesetsk. *Launch Complex*: Plesetsk LC43/4. *Launch Pad*: LC43/4?. *LV Family*: R-7. *Launch Vehicle*: Soyuz-U-PVB.

- **Foton 10** - . *Payload*: Foton s/n 10. *Mass*: 6,300 kg (13,800 lb). *Nation*: Russia. *Agency*: MOM. *Class*: Materials. *Type*: Materials science satellite. *Spacecraft Bus*: Vostok. *Spacecraft*: Foton. *Duration*: 14.62 days. *Decay Date*: 1995-03-03 . *USAF Sat Cat*: 23497 . *COSPAR*: 1995-006A. *Apogee*: 355 km (220 mi). *Perigee*: 218 km (135 mi). *Inclination*: 62.8000 deg. *Period*: 90.30 min. 234 orbits. Carried Russian, French, German micro-gravity experiments. Landed in Russia Mar 3.

1995 March 22 - . 16:44 GMT - . *Launch Site*: Plesetsk. *Launch Complex*: Plesetsk LC43/3. *LV Family*: R-7. *Launch Vehicle*: Soyuz-U-PVB.

- **Cosmos 2311** - . *Mass*: 6,600 kg (14,500 lb). *Nation*: Russia. *Agency*: MOM. *Class*: Surveillance. *Type*: Military surveillance satellite. *Spacecraft Bus*: Yantar. *Spacecraft*: Yantar-4K1. *Duration*: 70.00 days. *Decay Date*: 1995-05-31 . *USAF Sat Cat*: 23530 . *COSPAR*: 1995-014A. *Apogee*: 316 km (196 mi). *Perigee*: 178 km (110 mi). *Inclination*: 67.1000 deg. *Period*: 89.40 min. High resolution photo reconnaissance; returned film in two small SpK capsules during the mission and with the main capsule at completion of the mission..

1995 April 9 - . 19:34 GMT - . *Launch Site*: Baikonur. *Launch Complex*: Baikonur LC1. *LV Family*: R-7. *Launch Vehicle*: Soyuz-U-PVB.

- **Progress M-27** - . *Payload*: Progress M s/n 227. *Mass*: 7,170 kg (15,800 lb). *Nation*: Russia. *Agency*: MOM. *Program*: Mir. *Class*: Manned. *Type*: Manned logistics spacecraft. *Flight*: Soyuz TM-21. *Spacecraft Bus*: Soyuz. *Spacecraft*: Progress M. *Duration*: 43.33 days. *Completed Operations Date*: 1995-05-23 03:27:40 . *Decay Date*: 1995-05-23 03:27:40 . *USAF Sat Cat*: 23555 . *COSPAR*: 1995-020A. *Apogee*: 399 km (247 mi). *Perigee*: 396 km (246 mi). *Inclination*: 51.6000 deg. *Period*: 92.50 min.

  Unmanned resupply vessel to Mir; carried GFZ-1 German sub-satellite to Mir. Docked with Mir on 11 Apr 1995 21:00:44 GMT. Undocked on 22 May 1995 23:42:37 GMT. Destroyed in reentry on 23 May 1995 03:27:52 GMT. Total free-flight time 2.22 days. Total docked time 41.11 days.

- **GFZ-1** - . *Mass*: 20 kg (44 lb). *Nation*: Germany. *Agency*: GFZ. *Program*: Mir. *Class*: Earth. *Type*: Geodetic satellite. *Flight*: Soyuz TM-21. *Spacecraft*: GFZ-1. *Decay Date*: 1999-06-23 . *USAF Sat Cat*: 23558 . *COSPAR*: 1986-017JE. *Apogee*: 387 km (240 mi). *Perigee*: 380 km (230 mi). *Inclination*: 51.6000 deg. Geodetic; carried retroreflectors for ground laser ranging; delivered to Mir on Progress M-27 and deployed from Mir 4/19/95 ..

1995 June 28 - . 18:25 GMT - . *Launch Site*: Plesetsk. *Launch Complex*: Plesetsk LC43/3. *LV Family*: R-7. *Launch Vehicle*: Soyuz-U-PVB.

- **Cosmos 2314** - . *Mass*: 6,600 kg (14,500 lb). *Nation*: Russia. *Agency*: MOM. *Class*: Surveillance. *Type*: Military surveillance satellite. *Spacecraft Bus*: Yantar. *Spacecraft*: Yantar-4K1. *Duration*: 70.00 days. *Decay Date*: 1995-09-06 . *USAF Sat Cat*: 23601 . *COSPAR*: 1995-031A. *Apogee*: 316 km (196 mi). *Perigee*: 175 km (108 mi). *Inclination*: 67.1000 deg. *Period*: 89.40 min. High resolution photo reconnaissance; returned film in two small SpK capsules during the mission and with the main capsule at completion of the mission..

1995 July 20 - . 03:04 GMT - . *Launch Site*: Baikonur. *Launch Complex*: Baikonur LC1. *LV Family*: R-7. *Launch Vehicle*: Soyuz-U-PVB.

- **Progress M-28** - . *Payload*: Progress M s/n 228. *Mass*: 7,125 kg (15,707 lb). *Nation*: Russia. *Agency*: MOM. *Program*: Mir. *Class*: Manned. *Type*: Manned logistics spacecraft. *Flight*: STS-71 Mir EO-19. *Spacecraft Bus*: Soyuz. *Spacecraft*: Progress M. *Duration*: 46.25 days. *Completed Operations Date*: 1995-09-04 08:58:14 . *Decay Date*: 1995-09-04 08:58:14 . *USAF Sat Cat*: 23617 . *COSPAR*: 1995-036A. *Apogee*: 398 km (247 mi). *Perigee*: 393 km (244 mi). *Inclination*: 51.7000 deg. *Period*: 92.50 min.

  Unmanned resupply vessel to Mir. Docked with Mir's front port on 22 Jul 1995 04:39:37 GMT. Undocked on 4 Sep 1995 05:09:53 GMT. Destroyed in reentry on 4 Sep 1995 08:58:55 GMT. Total free-flight time 2.22 days. Total docked time 44.02 days. Two Icons of Saint Anastasia were taken into space aboard the craft and

transferred to the Mir station where they remained for about seven months. They were returned to earth, apparently aboard Soyuz TM-22, and later shown in diffent shrines around the world.

1995 September 26 - . 11:20 GMT - . *Launch Site*: Plesetsk. *Launch Complex*: Plesetsk LC43/4. *LV Family*: R-7. *Launch Vehicle*: Soyuz-U-PVB.

- **Resurs F2 N.10** - . *Payload*: Resurs-F2 s/n 10. *Mass*: 6,300 kg (13,800 lb). *Nation*: Russia. *Agency*: MOM. *Program*: Resurs. *Class*: Earth. *Type*: Earth resources satellite. *Spacecraft Bus*: Vostok. *Spacecraft*: Resurs F2. *Duration*: 30.00 days. *Decay Date*: 1995-10-26 . *USAF Sat Cat*: 23672 . *COSPAR*: 1995-050A. *Apogee*: 277 km (172 mi). *Perigee*: 255 km (158 mi). *Inclination*: 82.3000 deg. *Period*: 89.80 min. Natural resources; photo capsule recovered in Russia on 10/26/95..

1995 September 29 - . 04:25 GMT - . *Launch Site*: Baikonur. *Launch Complex*: Baikonur LC31. *LV Family*: R-7. *Launch Vehicle*: Soyuz-U-PVB.

- **Cosmos 2320** - . *Mass*: 7,000 kg (15,400 lb). *Nation*: Russia. *Agency*: MOM. *Class*: Surveillance. *Type*: Military surveillance satellite. *Spacecraft Bus*: Yantar. *Spacecraft*: Yantar-4KS1. *Duration*: 365.00 days. *Decay Date*: 1996-09-28 . *USAF Sat Cat*: 23674 . *COSPAR*: 1995-051A. *Apogee*: 372 km (231 mi). *Perigee*: 235 km (146 mi). *Inclination*: 64.9000 deg. *Period*: 89.30 min. Photo/digital surveillance..

1995 October 8 - . 18:50 GMT - . *Launch Site*: Baikonur. *Launch Complex*: Baikonur LC1. *LV Family*: R-7. *Launch Vehicle*: Soyuz-U-PVB.

- **Progress M-29** - . *Payload*: Progress M s/n 229. *Mass*: 7,122 kg (15,701 lb). *Nation*: Russia. *Agency*: MOM. *Program*: Mir. *Class*: Manned. *Type*: Manned logistics spacecraft. *Flight*: Soyuz TM-22. *Spacecraft Bus*: Soyuz. *Spacecraft*: Progress M. *Duration*: 71.89 days. *Completed Operations Date*: 1995-12-19 16:15:20 . *Decay Date*: 1995-12-19 16:15:20 . *USAF Sat Cat*: 23678 . *COSPAR*: 1995-053A. *Apogee*: 400 km (240 mi). *Perigee*: 391 km (242 mi). *Inclination*: 51.6000 deg. *Period*: 92.50 min.

  Unmanned resupply vessel to Mir. Launched into an initial 194 x 242 km x 51.7 deg orbit. Docked with Mir's rear of the Kvant module port on 10 Oct 1995 20:32:40 GMT (Soyuz TM-22 was docked to the front port). Undocked on 19 Dec 1995 09:15:05 GMT. Destroyed in reentry on 19 Dec 1995 16:15:00 GMT. Total free-flight time 2.36 days. Total docked time 69.53 days.

1995 December 18 - . 14:31 GMT - . *Launch Site*: Baikonur. *Launch Complex*: Baikonur LC1. *LV Family*: R-7. *Launch Vehicle*: Soyuz-U-PVB.

- **Progress M-30** - . *Payload*: Progress M s/n 230. *Mass*: 7,068 kg (15,582 lb). *Nation*: Russia. *Agency*: MOM. *Program*: Mir. *Class*: Manned. *Type*: Manned

logistics spacecraft. *Flight*: Soyuz TM-22. *Spacecraft Bus*: Soyuz. *Spacecraft*: Progress M. *Duration*: 65.85 days. *Decay Date*: 1996-02-22 . *USAF Sat Cat*: 23744 . *COSPAR*: 1995-070A. *Apogee*: 409 km (254 mi). *Perigee*: 391 km (242 mi). *Inclination*: 51.7000 deg. *Period*: 92.60 min. Unmanned resupply vessel to Mir. Docked with Mir on 20 Dec 1995 16:10:15 GMT. Undocked on 22 Feb 1996 07:30:02 GMT. Destroyed in reentry on 22 Feb 1996 11:02:36 GMT. Total free-flight time 2.22 days. Total docked time 63.64 days..

1996 February 21 - . 12:34 GMT - . *Launch Site*: Baikonur. *Launch Complex*: Baikonur LC1. *LV Family*: R-7. *Launch Vehicle*: Soyuz-U-PVB.

- **Soyuz TM-23** - . *Call Sign*: Skif (Roman-age tribe). *Crew*: Onufrienko, Usachyov. *Backup Crew*: Lazutkin, Tsibliyev. *Payload*: Soyuz TM s/n 72. *Mass*: 7,150 kg (15,760 lb). *Nation*: Russia. *Related Persons*: Lazutkin, Onufrienko, Tsibliyev, Usachyov. *Agency*: MOM. *Program*: Mir. *Class*: Manned. *Type*: Manned spacecraft. *Flight*: Soyuz TM-22, Soyuz TM-23. *Spacecraft Bus*: Soyuz. *Spacecraft*: Soyuz TM. *Duration*: 193.80 days. *Decay Date*: 1996-09-02 . *USAF Sat Cat*: 23798 . *COSPAR*: 1996-011A. *Apogee*: 390 km (240 mi). *Perigee*: 375 km (233 mi). *Inclination*: 51.7000 deg. *Period*: 92.20 min. Mir Expedition EO-21. Soyuz TM-23 docked with Mir at 14:20:35 on February 23..

1996 March 14 - . 17:40 GMT - . *Launch Site*: Plesetsk. *Launch Complex*: Plesetsk LC43/4. *LV Family*: R-7. *Launch Vehicle*: Soyuz-U-PVB.

- **Cosmos 2331** - . *Mass*: 6,600 kg (14,500 lb). *Nation*: Russia. *Agency*: MOM. *Class*: Surveillance. *Type*: Military surveillance satellite. *Spacecraft Bus*: Yantar. *Spacecraft*: Yantar-4K1. *Duration*: 89.00 days. *Decay Date*: 1996-06-11 . *USAF Sat Cat*: 23818 . *COSPAR*: 1996-016A. *Apogee*: 291 km (180 mi). *Perigee*: 159 km (98 mi). *Inclination*: 67.1000 deg. *Period*: 89.00 min. High resolution photo reconnaissance; returned film in two small SpK capsules during the mission and with the main capsule at completion of the mission..

1996 May 5 - . 07:04 GMT - . *Launch Site*: Baikonur. *Launch Complex*: Baikonur LC1. *LV Family*: R-7. *Launch Vehicle*: Soyuz-U-PVB.

- **Progress M-31** - . *Payload*: Progress M s/n 231. *Mass*: 7,140 kg (15,740 lb). *Nation*: Russia. *Agency*: MOM. *Program*: Mir. *Class*: Manned. *Type*: Manned logistics spacecraft. *Flight*: Soyuz TM-23, STS-76 Mir NASA-1. *Spacecraft Bus*: Soyuz. *Spacecraft*: Progress M. *Duration*: 88.56 days. *Completed Operations Date*: 1996-08-01 20:32:45 . *Decay Date*: 1996-08-01 20:32:45 . *USAF Sat Cat*: 23860 . *COSPAR*: 1996-028A. *Apogee*: 390 km (240 mi). *Perigee*: 376 km (233 mi). *Inclination*: 51.7000 deg. *Period*: 92.20 min.

  Unmanned resupply vessel to Mir. Delivered 1,140 kg of fuel and 1,700 kg of cargo to the Mir complex. Docked with Mir on 7 May 1996 08:54:19 GMT. Undocked on 1

Aug 1996 16:44:54 GMT. Destroyed in reentry over the Pacific on 1 Aug 1996 20:33:03 GMT. Total free-flight time 2.23 days. Total docked time 86.33 days.

1996 May 14 - . 08:55 GMT - . *Launch Site*: Baikonur. *Launch Complex*: Baikonur LC31. *LV Family*: R-7. *Launch Vehicle*: Soyuz-U-PVB. *FAILURE*: Shroud broke up at T+49 seconds.. *Failed Stage*: S.

- **Kometa** - . *Payload*: Yantar-1KFT no. 18. *Mass*: 6,600 kg (14,500 lb). *Nation*: Russia. *Agency*: VKS. *Class*: Surveillance. *Type*: Cartographic satellite. *Spacecraft Bus*: Yantar. *Spacecraft*: Yantar-1KFT. Topographic mapping satellite failed to reach orbit..

1996 June 20 - . 18:45 GMT - . *Launch Site*: Plesetsk. *Launch Complex*: Plesetsk LC16/2. *LV Family*: R-7. *Launch Vehicle*: Soyuz-U-PVB. *FAILURE*: Shroud broke up at T+50seconds.. *Failed Stage*: S.

- **Yantar-4K1** - . *Mass*: 6,600 kg (14,500 lb). *Nation*: Russia. *Agency*: VKS. *Class*: Surveillance. *Type*: Military surveillance satellite. *Spacecraft Bus*: Yantar. *Spacecraft*: Yantar-4K1. High resolution photo reconnaissance mission..

1996 July 31 - . 20:00 GMT - . *Launch Site*: Baikonur. *Launch Complex*: Baikonur LC1. *LV Family*: R-7. *Launch Vehicle*: Soyuz-U-PVB.

- **Progress M-32** - . *Payload*: Progress M s/n 232. *Mass*: 7,130 kg (15,710 lb). *Nation*: Russia. *Agency*: MOM. *Program*: Mir. *Class*: Manned. *Type*: Manned logistics spacecraft. *Flight*: Soyuz TM-23, STS-76 Mir NASA-1. *Spacecraft Bus*: Soyuz. *Spacecraft*: Progress M. *Duration*: 96.11 days. *Completed Operations Date*: 1996-11-04 22:47:04 . *Decay Date*: 1996-11-04 22:47:04 . *USAF Sat Cat*: 24071 . *COSPAR*: 1996-043A. *Apogee*: 390 km (240 mi). *Perigee*: 371 km (230 mi). *Inclination*: 51.7000 deg. *Period*: 92.20 min.

  Unmanned resupply vessel to Mir. This was the first successful launch of a Soyuz-U after two failures. Docked with Mir at the forward docking port on 2 Aug 1996 22:03:40 GMT. Undocked on 18 Aug 1996 09:33:45 GMT in order to free up the docking port. By 29 August 1994 Mir was in a 375 x 390 km x 51.6 deg orbit; the Progress M-32 cargo ship, flying separately, was in a 375 x 392 km x 51.6 deg orbit. Redocked with Mir on 3 Sep 1996 09:35:00 GMT at the rear port of the Kvant module. Finally undocked from Mir on 20 Nov 1996 19:51:20 GMT. Destroyed in reentry on 20 Nov 1996 22:42:25 GMT. Total free-flight time 2.20 days. Total docked time 93.91 days.

1996 August 17 - . 13:18 GMT - . *Launch Site*: Baikonur. *Launch Complex*: Baikonur LC1. *LV Family*: R-7. *Launch Vehicle*: Soyuz-U-PVB.

- **Soyuz TM-24** - . *Call Sign*: Fregat (Frigate). *Crew*: Andre-Deshays, Kaleri, Korzun.

Backup Crew: Eyharts, Lazutkin, Tsibliyev. *Payload*: Soyuz TM s/n 73. *Mass*: 7,150 kg (15,760 lb). *Nation*: Russia. *Related Persons*: Andre-Deshays, Eyharts, Kaleri, Korzun, Lazutkin, Tsibliyev. *Agency*: RAKA. *Program*: Mir. *Class*: Manned. *Type*: Manned spacecraft. *Flight*: Soyuz TM-23, Soyuz TM-24, Soyuz TM-24 Cassiopee, STS-76 Mir NASA-1. *Spacecraft Bus*: Soyuz. *Spacecraft*: Soyuz TM. *Duration*: 196.73 days. *Decay Date*: 1997-03-02 . *USAF Sat Cat*: 24280 . *COSPAR*: 1996-047A. *Apogee*: 394 km (244 mi). *Perigee*: 378 km (234 mi). *Inclination*: 51.7000 deg. *Period*: 92.30 min.

Mir Expedition EO-22. Valeriy Korzun and Aleksandr Kaleri of the Russian Space Agency (RKA) Claudie Andre-Deshays of the French space agency CNES. This launch was the first of the Soyuz-U booster with a crew aboard following two launch failures of on unmanned flights. Soyuz docked with Mir's front port at 14:50:21 GMT on August 19; Mir was in a 375 x 390 km x 51.6 deg orbit.

On Feb 7 at 16:28:01 GMT the EO-22 crew and American astronaut Linenger undocked the Soyuz TM-24 ferry from the front docking port, flew it around to the far side of the complex and redocked at the rear Kvant port at 16:51:27 GMT. This cleared the forward port for the arrival of the EO-23 crew, who brought with them German astronaut Reinhold Ewald on Feb 12.

1996 November 19 - . 23:20 GMT - . *Launch Site*: Baikonur. *Launch Complex*: Baikonur LC1. *LV Family*: R-7. *Launch Vehicle*: Soyuz-U-PVB.

- **Progress M-33** - . *Payload*: Progress M s/n 233. *Mass*: 7,190 kg (15,850 lb). *Nation*: Russia. *Agency*: RAKA. *Program*: Mir. *Class*: Manned. *Type*: Manned logistics spacecraft. *Flight*: Soyuz TM-24, STS-79 Mir NASA-2. *Spacecraft Bus*: Soyuz. *Spacecraft*: Progress M. *Duration*: 112.17 days. *Completed Operations Date*: 1997-03-12 03:22:59 . *Decay Date*: 1997-03-12 03:22:59 . *USAF Sat Cat*: 24663 . *COSPAR*: 1996-066A. *Apogee*: 387 km (240 mi). *Perigee*: 361 km (224 mi). *Inclination*: 51.7000 deg. *Period*: 92.00 min.

  Unmanned resupply vessel to Mir. Docked with Mir on 22 Nov 1996 01:01:30 GMT. Undocked on 6 Feb 1997 12:13:53 GMT. Thereafter in independent orbital flight in a 377 x 395 km x 51.65 deg orbit. Failed to redock with Mir on 4 Mar 1996. Destroyed in reentry on 12 Mar 1997 03:23:37 GMT. Total free-flight time 35.70 days. Total docked time 76.47 days.

1996 December 24 - . 13:50 GMT - . *Launch Site*: Plesetsk. *Launch Complex*: Plesetsk LC43/4. *LV Family*: R-7. *Launch Vehicle*: Soyuz-U-PVB.

- **Bion No. 11** - . *Payload*: Bion No. 11. *Mass*: 5,400 kg (11,900 lb). *Nation*: Russia. *Agency*: RAKA. *Class*: Biology. *Type*: Biology satellite. *Spacecraft Bus*: Vostok. *Spacecraft*: Bion. *Duration*: 15.00 days. *Decay Date*: 1997-01-07 . *USAF Sat Cat*: 24701 . *COSPAR*: 1996-073A. *Apogee*: 375 km (233 mi). *Perigee*: 216 km (134 mi). *Inclination*: 62.8000 deg. *Period*: 90.40 min. Biological research. Carried monkeys

Lalik and Multik..

1997 February 10 - . 14:09 GMT - . *Launch Site*: Baikonur. *Launch Complex*: Baikonur LC1. *LV Family*: R-7. *Launch Vehicle*: Soyuz-U-PVB.

- **Soyuz TM-25** - . *Call Sign*: Sirius (Sirius). *Crew*: Ewald, Lazutkin, Tsibliyev. *Backup Crew*: Dezhurov, Padalka, Schlegel. *Payload*: Soyuz TM s/n 74. *Mass*: 7,250 kg (15,980 lb). *Nation*: Russia. *Related Persons*: Dezhurov, Ewald, Lazutkin, Padalka, Schlegel, Tsibliyev. *Agency*: RAKA. *Manufacturer*: Korolev bureau. *Program*: Mir. *Class*: Manned. *Type*: Manned spacecraft. *Flight*: Soyuz TM-24, Soyuz TM-25, Soyuz TM-25 Mir 97, STS-81 Mir NASA-3. *Spacecraft Bus*: Soyuz. *Spacecraft*: Soyuz TM. *Duration*: 184.92 days. *Decay Date*: 1997-08-14 . *USAF Sat Cat*: 24717 . *COSPAR*: 1997-003A. *Apogee*: 392 km (243 mi). *Perigee*: 385 km (239 mi). *Inclination*: 51.7000 deg. *Period*: 92.30 min. Mir Expedition EO-23. Soyuz TM-25 docked with Mir at the forward port on February 12 at 15:51:13 GMT..

1997 April 6 - . 16:04 GMT - . *Launch Site*: Baikonur. *Launch Complex*: Baikonur LC1. *LV Family*: R-7. *Launch Vehicle*: Soyuz-U-PVB.

- **Progress M-34** - . *Payload*: Progress M s/n 234. *Mass*: 7,156 kg (15,776 lb). *Nation*: Russia. *Agency*: RAKA. *Manufacturer*: Korolev bureau. *Program*: Mir. *Class*: Manned. *Type*: Manned logistics spacecraft. *Flight*: Soyuz TM-25, STS-81 Mir NASA-3. *Spacecraft Bus*: Soyuz. *Spacecraft*: Progress M. *Duration*: 86.60 days. *Completed Operations Date*: 1997-07-02 06:31:45 . *Decay Date*: 1997-07-02 06:31:45 . *USAF Sat Cat*: 24757 . *COSPAR*: 1997-014A. *Apogee*: 393 km (244 mi). *Perigee*: 375 km (233 mi). *Inclination*: 51.7000 deg. *Period*: 92.20 min.

  Unmanned resupply vessel to Mir. It carried supplies for the Mir station and repair equipment for Mir's oxygen generators, replacement oxygen-generating 'candles' and a pair of new spacesuits. Docked with Mir at the rear Kvant module port on 8 Apr 1997 17:30:03 GMT. The Mir complex raised its orbit by 5 km on 15 Apr 1997 at 12:00 GMT, using Progress M-34's engine. Undocked on 24 Jun 1997 10:22:50 GMT. It was then used to perform a redocking test using newly developed remote-control procedures which were to replace the automatic system that Russia could no longer afford to buy from Ukraine. At 25 Jun 1997 09:18 GMT Mir commander Tsibliev was remotely commanding the approach of Progress to the Kvant module. This involved guiding the Progress via a television monitor. The Progress was difficult to see against the cloudy earth background at the time of the attempted docking. It went off course and collided with a solar array on the Spektr module and then the module itself. A large hole was made in a solar panel, one of the radiators was buckled, a hole was punched into Spektr's hull, and the module began to depressurize. This was not a slow leak - the crew heard a hissing sound and felt their ears pop. They disconnected the power cables leading from Mir to the main station and closed the hatch on the core module transfer section that led to Spektr. The Spektr module became fully depressurized, remaining docked to Mir with its docking hatch open. The loss of electrical connection between Spektr's solar panels and the main station

cut the available power supply to the station, crippling its operations until later repairs reconnected the electrical lines. Tsibliev was also the pilot on a previous orbital collision, when he banged Soyuz TM-17 into Mir in Jan 1994. After the return of the crew to earth he was found to be to blame for the incident, although the fines assessed were later dismissed. The Progress M-34 cargo ship was backed to a safe distance from the station and was destroyed in reentry on 2 Jul 1997 06:31:50 GMT. Total free-flight time 9.90 days. Total docked time 76.70 days.

1997 May 15 - . 12:10 GMT - . *Launch Site*: Baikonur. *Launch Complex*: Baikonur LC31. *LV Family*: R-7. *Launch Vehicle*: Soyuz-U-PVB.

- **Cosmos 2343** - . *Payload*: Orlets-1 no. 6. *Mass*: 6,500 kg (14,300 lb). *Nation*: Russia. *Agency*: MO. *Manufacturer*: Kozlov bureau. *Program*: Orlets. *Class*: Surveillance. *Type*: Military surveillance satellite. *Spacecraft Bus*: Yantar. *Spacecraft*: Orlets-1. *Duration*: 123.00 days. *Decay Date*: 1997-09-15 . *USAF Sat Cat*: 24805 . *COSPAR*: 1997-024A. *Apogee*: 343 km (213 mi). *Perigee*: 179 km (111 mi). *Inclination*: 64.9000 deg. *Period*: 89.40 min.

  Long duration film return military reconnaissance satellite. After returning multiple film capsules, the spacecraft was deorbited. This satellite provided Russia with the photo reconnaisance capability after a break of 7 1/2 months. This launch came on the 40th anniversary of the first successful launch of the R-7 rocket, from which the Soyuz-U was derived. It was the 250th launch of the Soyuz-U from Baikonur, the 350th launch from Launch Complex 31, and the 666th launch of a Soyuz-U.

1997 July 5 - . 04:11 GMT - . *Launch Site*: Baikonur. *Launch Complex*: Baikonur LC1. *LV Family*: R-7. *Launch Vehicle*: Soyuz-U-PVB.

- **Progress M-35** - . *Payload*: Progress M s/n 235. *Mass*: 7,150 kg (15,760 lb). *Nation*: Russia. *Agency*: RAKA. *Manufacturer*: Korolev bureau. *Program*: Mir. *Class*: Manned. *Type*: Manned logistics spacecraft. *Flight*: Soyuz TM-25, STS-84 Mir NASA-4. *Spacecraft Bus*: Soyuz. *Spacecraft*: Progress M. *Duration*: 82.50 days. *Decay Date*: 1997-10-08 . *USAF Sat Cat*: 24851 . *COSPAR*: 1997-033A. *Apogee*: 391 km (242 mi). *Perigee*: 383 km (237 mi). *Inclination*: 51.7000 deg. *Period*: 92.30 min.

  Unmanned resupply vessel to Mir. Docked with Mir on 7 Jul 1997 05:59:24 GMT. Undocked on 6 Aug 1997 11:46:45 GMT. Redocked with Mir on 18 Aug 1997 12:52:48 GMT. Final undocking on 7 Oct 1997 12:03:49 GMT. Destroyed in reentry on 7 Oct 1997 17:23:00 GMT. Total free-flight time 2.30 days. Total docked time 80.21 days.

1997 August 5 - . 15:35 GMT - . *Launch Site*: Baikonur. *Launch Complex*: Baikonur LC1. *LV Family*: R-7. *Launch Vehicle*: Soyuz-U-PVB.

- **Soyuz TM-26** - . *Call Sign*: Rodnik. *Crew*: Solovyov, Vinogradov. *Backup Crew*: Avdeyev, Padalka. *Payload*: Soyuz TM s/n 75. *Mass*: 7,250 kg (15,980 lb). *Nation*:

Russia. *Related Persons*: Avdeyev, Padalka, Solovyov, Vinogradov. *Agency*: RAKA. *Manufacturer*: Korolev bureau. *Program*: Mir. *Class*: Manned. *Type*: Manned spacecraft. *Flight*: Soyuz TM-25, Soyuz TM-26, STS-84 Mir NASA-4. *Spacecraft Bus*: Soyuz. *Spacecraft*: Soyuz TM. *Duration*: 197.73 days. *Decay Date*: 1998-02-19 . *USAF Sat Cat*: 24886 . *COSPAR*: 1997-038A. *Apogee*: 385 km (239 mi). *Perigee*: 378 km (234 mi). *Inclination*: 51.7000 deg. *Period*: 92.20 min. Mir Expedition EO-24. The Soyuz docked manually at 17:02 GMT August 7. Over the next six months the crew undertook seven internal and external spacewalks to repair the crippled space station..

1997 October 5 - . 15:08 GMT - . *Launch Site*: Baikonur. *Launch Complex*: Baikonur LC1. *LV Family*: R-7. *Launch Vehicle*: Soyuz-U-PVB.

- **Progress M-36** - . *Payload*: Progress M s/n 237. *Mass*: 7,195 kg (15,862 lb). *Nation*: Russia. *Agency*: RAKA. *Manufacturer*: Korolev bureau. *Program*: Mir. *Class*: Manned. *Type*: Manned logistics spacecraft. *Flight*: Soyuz TM-26, STS-84 Mir NASA-4, STS-86, STS-86 Mir NASA-5. *Spacecraft Bus*: Soyuz. *Spacecraft*: Progress M. *Duration*: 74.92 days. *Decay Date*: 1997-12-19 . *USAF Sat Cat*: 25002 . *COSPAR*: 1997-058A. *Apogee*: 390 km (240 mi). *Perigee*: 378 km (234 mi). *Inclination*: 51.7000 deg. *Period*: 92.20 min. Unmanned resupply vessel to Mir. Docked with Mir on 8 Oct 1997 17:07:09 GMT. Undocked on 17 Dec 1997 06:01:53 GMT. Destroyed in reentry on 19 Dec 1997 13:20:01 GMT. Total free-flight time 5.39 days. Total docked time 69.54 days..

- **X-Mir Inspector** - . *Payload*: Inspector. *Nation*: Germany. *Agency*: DASA. *Manufacturer*: Bremen. *Program*: Mir. *Class*: Manned. *Type*: Manned logistics spacecraft. *Flight*: Soyuz TM-26, STS-84 Mir NASA-4, STS-86, STS-86 Mir NASA-5. *Spacecraft*: Inspector. *Decay Date*: 1998-11-02 . *USAF Sat Cat*: 25100 . *COSPAR*: 1997-058D. *Apogee*: 387 km (240 mi). *Perigee*: 377 km (234 mi). *Inclination*: 51.7000 deg. *Period*: 91.10 min.

- **Sputnik-40** - . *Payload*: Spoutnik 40 Ans / RS-17. *Nation*: Russia. *Agency*: RAKA. *Manufacturer*: AFR. *Program*: Oscar. *Class*: Communications. *Type*: Amateur radio communications satellite. *Spacecraft*: PS Model. *Decay Date*: 1998-05-21 . *USAF Sat Cat*: 24958 . *COSPAR*: 1997-058C. *Apogee*: 378 km (234 mi). *Perigee*: 369 km (229 mi). *Inclination*: 51.6000 deg. *Period*: 87.10 min. Subscale model of the first Spuntik, hand-launched by Mir crew during an EVA. Transmitted radio signals..

1997 October 9 - . 17:59 GMT - . *Launch Site*: Plesetsk. *Launch Complex*: Plesetsk LC43/3. *LV Family*: R-7. *Launch Vehicle*: Soyuz-U-PVB.

- **Foton 11** - . *Payload*: Foton s/n 11. *Mass*: 6,190 kg (13,640 lb). *Nation*: Russia. *Agency*: RAKA. *Manufacturer*: Kayser-Threde. *Class*: Materials. *Type*: Materials science satellite. *Spacecraft Bus*: Vostok. *Spacecraft*: Foton. *Duration*: 13.63 days. *Decay Date*: 1997-10-23 . *USAF Sat Cat*: 25006 . *COSPAR*: 1997-060A. *Apogee*: 363 km (225 mi). *Perigee*: 218 km (135 mi). *Inclination*: 62.8000 deg. *Period*: 90.30

min. Microgravity experiments. Landed in Kazakhstan Oct 23..

- **Mirka** - . *Nation*: Germany. *Agency*: DLR. *Manufacturer*: Kayser-Threde. *Class*: Technology. *Type*: Re-entry test vehicle. *Spacecraft*: Mirka. *Decay Date*: 1997-10-23 . *USAF Sat Cat*: 25006 . *COSPAR*: 1997-060xx. *Apogee*: 363 km (225 mi). *Perigee*: 218 km (135 mi). *Inclination*: 62.8000 deg. *Period*: 90.30 min. Landed in Kazakstan Oct 23.

1997 November 18 - . 11:14 GMT - . *Launch Site*: Plesetsk. *LV Family*: R-7. *Launch Vehicle*: Soyuz-U-PVB.

- **Resurs F-1M** - . *Mass*: 6,300 kg (13,800 lb). *Nation*: Russia. *Agency*: RAKA. *Manufacturer*: Kozlov bureau. *Program*: Resurs. *Class*: Earth. *Type*: Earth resources satellite. *Spacecraft Bus*: Vostok. *Spacecraft*: Resurs F1M. *Decay Date*: 1997-12-13 . *USAF Sat Cat*: 25059 . *COSPAR*: 1997-072A. *Apogee*: 238 km (147 mi). *Perigee*: 211 km (131 mi). *Inclination*: 82.3000 deg. *Period*: 89.00 min. Landed in Kazakstan Dec 13..

1997 December 15 - . 15:40 GMT - . *Launch Site*: Plesetsk. *LV Family*: R-7. *Launch Vehicle*: Soyuz-U-PVB.

- **Cosmos 2348** - . *Mass*: 6,600 kg (14,500 lb). *Nation*: Russia. *Agency*: MO. *Manufacturer*: Kozlov bureau. *Class*: Surveillance. *Type*: Military surveillance satellite. *Spacecraft Bus*: Yantar. *Spacecraft*: Yantar-4K1. *Duration*: 120.00 days. *Decay Date*: 1998-04-14 . *USAF Sat Cat*: 25095 . *COSPAR*: 1997-080A. *Apogee*: 361 km (224 mi). *Perigee*: 175 km (108 mi). *Inclination*: 67.1000 deg. *Period*: 89.40 min. High resolution photo reconnaissance; returned film in two small SpK capsules during the mission and with the main capsule at completion of the mission. Landed 14 April 1998..

1997 December 20 - . 08:45 GMT - . *Launch Site*: Baikonur. *Launch Complex*: Baikonur LC1. *LV Family*: R-7. *Launch Vehicle*: Soyuz-U-PVB.

- **Progress M-37** - . *Payload*: Progress M s/n 236. *Mass*: 7,040 kg (15,520 lb). *Nation*: Russia. *Agency*: RAKA. *Manufacturer*: Korolev bureau. *Program*: Mir. *Class*: Manned. *Type*: Manned logistics spacecraft. *Flight*: Soyuz TM-26, STS-86 Mir NASA-5. *Spacecraft Bus*: Soyuz. *Spacecraft*: Progress M. *Duration*: 61.69 days. *Decay Date*: 1998-03-16 . *USAF Sat Cat*: 25102 . *COSPAR*: 1997-081A. *Apogee*: 403 km (250 mi). *Perigee*: 363 km (225 mi). *Inclination*: 51.8000 deg. *Period*: 92.20 min.

  Unmanned resupply vessel to Mir. Docked with Mir at the rear Kvant port on 22 Dec 1997 10:22:20 GMT. Undocked on 30 Jan 1998 12:00:00 GMT. Redocked with Mir on 23 Feb 1998 09:42:28 GMT. Final undocking 15 Mar 1998 19:16:01 GMT. Destroyed in reentry on 15 Mar 1998 23:04:00 GMT. Total free-flight time 2.23 days. Total docked time 59.47 days.

1998 January 29 - . 16:33 GMT - . *Launch Site*: Baikonur. *Launch Complex*: Baikonur LC1. *LV Family*: R-7. *Launch Vehicle*: Soyuz-U-PVB.

- **Soyuz TM-27** - . *Call Sign*: Kristall. *Crew*: Budarin, Eyharts, Musabayev. *Backup Crew*: Afanasyev, Haignere, Treshchev. *Payload*: Soyuz TM s/n 76. *Mass*: 7,250 kg (15,980 lb). *Nation*: Russia. *Related Persons*: Afanasyev, Budarin, Eyharts, Haignere, Musabayev, Treshchev. *Agency*: RAKA. *Manufacturer*: Korolev bureau. *Program*: Mir. *Class*: Manned. *Type*: Manned spacecraft. *Flight*: Soyuz TM-26, Soyuz TM-27, Soyuz TM-27 Mir Pegase, STS-86 Mir NASA-5, STS-89, STS-89 Mir NASA-6. *Spacecraft Bus*: Soyuz. *Spacecraft*: Soyuz TM. *Duration*: 207.53 days. *Decay Date*: 1998-08-25 . *USAF Sat Cat*: 25146 . *COSPAR*: 1998-004A. *Apogee*: 373 km (231 mi). *Perigee*: 363 km (225 mi). *Inclination*: 51.7000 deg. *Period*: 91.90 min.

  Soyuz TM-27 carried the Mir EO-25 crew and French astronaut Leopold Eyharts. NASA and the Russian Space Agency had hoped Soyuz TM-27 could dock with Mir while Endeavour was still there, resulting in an on-board crew of 13, a record which would have stood for years or decades. But the French vetoed this, saying the commotion and time wasted would ruin Eyharts Pegase experimental programme. Soyuz TM-27 docked at the Kvant module port at 17:54 GMT on January 31, 1998, less than five hours before Endeavour landed in Florida.

  Solovyov handed over command of Mir to EO-25 commander Musabayev, and the Mir EO-24 crew and Eyharts undocked from the forward port of Mir at 05:52 GMT on February 19 aboard the Soyuz TM-26 for their return home. On February 20, the EO-25 crew and Andy Thomas of the NASA-7 mission boarded Soyuz TM-27 and undocked from the Kvant port at 08:48 GMT. They redocked with the forward port on Mir at 09:32 GMT. This freed up the Kvant port for a test redocking of the Progress M-37 cargo ship, parked in a following orbit with Mir during the crew transfer.

1998 February 17 - . 10:35 GMT - . *Launch Site*: Baikonur. *Launch Complex*: Baikonur LC31. *LV Family*: R-7. *Launch Vehicle*: Soyuz-U-PVB.

- **Cosmos 2349** - . *Payload*: Yantar-1KFT s/n 19. *Mass*: 6,600 kg (14,500 lb). *Nation*: Russia. *Agency*: RAKA. *Manufacturer*: Kozlov bureau. *Class*: Surveillance. *Type*: Cartographic satellite. *Spacecraft Bus*: Yantar. *Spacecraft*: Yantar-1KFT. *Duration*: 44.00 days. *Decay Date*: 1998-04-02 . *USAF Sat Cat*: 25167 . *COSPAR*: 1998-009A. *Apogee*: 327 km (203 mi). *Perigee*: 212 km (131 mi). *Inclination*: 70.4000 deg. *Period*: 89.90 min. Topographic mapping for the Army General Staff. Landed in Kazakhstan April 2 1998..

1998 March 14 - . 22:45 GMT - . *Launch Site*: Baikonur. *Launch Complex*: Baikonur LC1. *LV Family*: R-7. *Launch Vehicle*: Soyuz-U-PVB.

- **Progress M-38** - . *Payload*: Progress M s/n 240. *Mass*: 7,007 kg (15,447 lb).

Nation: Russia. *Agency*: RAKA. *Manufacturer*: Korolev bureau. *Program*: Mir. *Class*: Manned. *Type*: Manned logistics spacecraft. *Flight*: Soyuz TM-27, STS-89 Mir NASA-6. *Spacecraft Bus*: Soyuz. *Spacecraft*: Progress M. *Duration*: 61.05 days. *Decay Date*: 1998-05-15 . *USAF Sat Cat*: 25256 . *COSPAR*: 1998-015A. *Apogee*: 379 km (235 mi). *Perigee*: 372 km (231 mi). *Inclination*: 51.7000 deg. *Period*: 92.10 min.

Progress M-38 was specially modified to carry the second VDU (Vynosnaya Dvigatel'naya Ustanovka, External Engine Unit) propulsion unit. The VDU was mounted externally on a special structure between the cargo module and the service module, replacing the OKD fuel section present on normal Progress vehicles. The crew spacewalks to extract the VDU from Progress and place it on the end of the Sofora boom extending from the Kvant module. The VDU was used to provide attitude control capability for the station. By 03:20 GMT on March 15 1998 Progress M-38 had successfully completed its first two orbital manoeuvres. It replaced Progress M-37 at the docking port on the Kvant module, with a successful docking on March 16 1998 at 22:45 GMT. Undocked May 15 at 1844 UTC, freeing up the docking port on the Kvant module for Progress M-39. Deorbited over Pacific May 15, 1998.

1998 May 14 - . 22:12 GMT - . *Launch Site*: Baikonur. *Launch Complex*: Baikonur LC1. *LV Family*: R-7. *Launch Vehicle*: Soyuz-U-PVB.

- **Progress M-39** - . *Payload*: Progress M s/n 238. *Mass*: 7,450 kg (16,420 lb). *Nation*: Russia. *Agency*: RAKA. *Manufacturer*: Korolev bureau. *Program*: Mir. *Class*: Manned. *Type*: Manned logistics spacecraft. *Flight*: Soyuz TM-27, STS-89 Mir NASA-6. *Spacecraft Bus*: Soyuz. *Spacecraft*: Progress M. *Duration*: 167.08 days. *Decay Date*: 1998-10-29 . *USAF Sat Cat*: 25340 . *COSPAR*: 1998-031A. *Apogee*: 373 km (231 mi). *Perigee*: 360 km (220 mi). *Inclination*: 51.7000 deg. *Period*: 91.90 min. Docked with Mir at the Kvant port at 23:51 GMT on May 16 1998, bringing supplies and scientific experiments to the station. Undocked 09:28 GMT on August 12 1998 in order to clear the port for Soyuz TM-28. Deorbited over Pacific Ocean on October 29, 1998..

1998 June 24 - . 18:29 GMT - . *Launch Site*: Plesetsk. *Launch Complex*: Plesetsk LC43/3. *LV Family*: R-7. *Launch Vehicle*: Soyuz-U-PVB.

- **Cosmos 2358** - . *Mass*: 6,600 kg (14,500 lb). *Nation*: Russia. *Agency*: MO. *Manufacturer*: Kozlov bureau. *Class*: Surveillance. *Type*: Military surveillance satellite. *Spacecraft Bus*: Yantar. *Spacecraft*: Yantar-4K1. *Duration*: 120.00 days. *Decay Date*: 1998-10-22 . *USAF Sat Cat*: 25373 . *COSPAR*: 1998-038A. *Apogee*: 316 km (196 mi). *Perigee*: 167 km (103 mi). *Inclination*: 67.1000 deg. *Period*: 89.30 min. High resolution photo reconnaissance; returned film in two small SpK capsules during the mission and with the main capsule at completion of the mission. Landed October 22, 1998..

1998 June 25 - . 14:00 GMT - . *Launch Site*: Baikonur. *Launch Complex*: Baikonur LC31. *LV Family*: R-7. *Launch Vehicle*: Soyuz-U-PVB.

- **Cosmos 2359** - . *Mass*: 6,620 kg (14,590 lb). *Nation*: Russia. *Agency*: MO. *Manufacturer*: Kozlov bureau. *Class*: Surveillance. *Type*: Military surveillance satellite. *Spacecraft Bus*: Yantar. *Spacecraft*: Yantar-4KS1. *Decay Date*: 1999-07-12 . *USAF Sat Cat*: 25376 . *COSPAR*: 1998-039A. *Apogee*: 300 km (180 mi). *Perigee*: 239 km (148 mi). *Inclination*: 64.9000 deg. *Period*: 89.90 min. Photo/digital surveillance. Entered an initial 170 x 290 km x 64.9 deg initial orbit. It manoeuvred to its operational orbit of 240 x 302 km x 64.9 deg on June 27..

1998 August 13 - . 09:43 GMT - . *Launch Site*: Baikonur. *Launch Complex*: Baikonur LC1. *LV Family*: R-7. *Launch Vehicle*: Soyuz-U-PVB.

- **Soyuz TM-28** - . *Call Sign*: Altair. *Crew*: Avdeyev, Baturin, Padalka. *Backup Crew*: Kaleri, Zalyotin. *Payload*: Soyuz TM s/n 77. *Mass*: 7,250 kg (15,980 lb). *Nation*: Russia. *Related Persons*: Avdeyev, Baturin, Kaleri, Padalka, Zalyotin. *Agency*: RAKA. *Manufacturer*: Korolev bureau. *Program*: Mir. *Class*: Manned. *Type*: Manned spacecraft. *Flight*: Soyuz TM-27, Soyuz TM-28, Soyuz TM-28 Mir EO-26/-27, Soyuz TM-28 Mir EP-4. *Spacecraft Bus*: Soyuz. *Spacecraft*: Soyuz TM. *Duration*: 198.69 days. *Decay Date*: 1999-02-28 . *USAF Sat Cat*: 25429 . *COSPAR*: 1998-047A. *Apogee*: 373 km (231 mi). *Perigee*: 363 km (225 mi). *Inclination*: 51.7000 deg. *Period*: 91.90 min.

  Soyuz TM-28 docked at 10:56 GMT on August 15 with the rear (Kvant) port of the Mir space station, which had been vacated at 09:28 GMT on August 12 by Progress M-39. The EO-25 crew, Musabayev and Budarin, landed with Baturin on Aug 25, leaving the EO-26 crew of Padalka and Avdeyev on the station. As only one final Soyuz mission to Mir was planned, with two of the seats on that Soyuz pre-sold to Slovak and French experimenters, the return crew of Soyuz TM-28 was subject to constant replanning and revision. On February 8, 1999, at 11:23 GMT Padalka and Avdeyev undocked from Mir's -X port in Soyuz TM-28, and redocked at the +X Kvant port at 11:39 GMT, freeing up the front port for the Soyuz TM-29 docking. Finally on February 27, 1999 EO-26 commander Padalka and Slovak cosmonaut Bella undocked Soyuz TM-28 from the Kvant rear docking port at 22:52 GMT, landing in Kazakhstan on February 28 at 02:14 GMT. Avdeyev remained on Mir with the EO-27 crew delivered on Soyuz TM-29, heading for a manned space flight time record.

1998 October 25 - . 04:14 GMT - . *Launch Site*: Baikonur. *Launch Complex*: Baikonur LC1. *LV Family*: R-7. *Launch Vehicle*: Soyuz-U-PVB.

- **Progress M-40** - . *Payload*: Progress M s/n 239. *Mass*: 7,450 kg (16,420 lb). *Nation*: Russia. *Agency*: RAKA. *Manufacturer*: Korolev bureau. *Program*: Mir. *Class*: Manned. *Type*: Manned logistics spacecraft. *Flight*: Soyuz TM-28, Soyuz TM-28 Mir EO-26/-27. *Spacecraft Bus*: Soyuz. *Spacecraft*: Progress M. *Duration*:

103.25 days. *Decay Date*: 1999-02-05 . *USAF Sat Cat*: 25512 . *COSPAR*: 1998-062A. *Apogee*: 360 km (220 mi). *Perigee*: 349 km (216 mi). *Inclination*: 51.6000 deg. *Period*: 91.63 min.

Docked with the rear (+X, Kvant) docking port of the Mir station on October 27. Delivered fuel, dry cargo, and the Znamya-2.5 solar illumination experiment. This was a follow-on to the earlier Znamya-2 experiment on Progress M-15 in 1992. The 25 m diameter Znamya reflector, which would unfold from the nose of the Progress, was to reflect sunlight over a 6 km area onto selected cities. Znamya-2.5 was developed by the Space Regatta Consortium, led by RKK Energia. Energia had long studied such space mirrors as a means of providing lighting to Siberian towns. The project was opposed by environmentalists and astronomers, who feared light pollution. Progress M-40 undocked on February 4, 1999 at 09:59 GMT, but the attempted deployment of the Znamya-2.5 reflector was thwarted when it snagged on a rendezvous system antenna. After two more failed attempts to deploy the antenna the experiment was abandoned. Progress M-40 fired its engines at 10:16 GMT on February 5, braked out of orbit, and burned up over the Pacific Ocean.

- **Spoutnik-41** - . *Nation*: France. *Agency*: ACF, VVS. *Manufacturer*: AFR. *Program*: Oscar. *Class*: Communications. *Type*: Civilian communications satellite. *Spacecraft*: PS Model. *Decay Date*: 1999-01-11 . *USAF Sat Cat*: 25533 . *COSPAR*: 1998-062C. *Apogee*: 318 km (197 mi). *Perigee*: 313 km (194 mi). *Inclination*: 51.7000 deg.

  On a space walk from Mir on November 10, Padalka and Avdeyev hand-launched the Spoutnik-41 amateur-radio mini-satellite at around 19:30 GMT. Spoutnik-41, also designated RS-18, was another scale model of the first satellite, Sputnik 1, launched 41 years ago. It carried a small transmitter and was sponsored by Aero Club de France, AMSAT-France, and the Astronautical Federation of Russia. A similar model was launched in 1997 for the fortieth anniversary of Sputnik. On that occasion, two flight models were carried to Mir but only one was launched. The second Spoutnik-40 flight model was still aboard Mir as of 1998. The second Spoutnik-40 would perhaps be deployed prior to the abandonment of Mir in 1999.

1999 February 9 - . 03:53 GMT - . *Launch Site*: Baikonur. *Launch Complex*: Baikonur LC1. *LV Family*: R-7. *Launch Vehicle*: Soyuz-U-PVB.

- **Globalstar FM36** - . *Mass*: 222 kg (489 lb). *Nation*: USA. *Agency*: Globalstar. *Class*: Communications. *Type*: Civilian communications satellite. *Spacecraft*: Globalstar. *USAF Sat Cat*: 25621 . *COSPAR*: 1999-004A. *Apogee*: 1,421 km (882 mi). *Perigee*: 1,406 km (873 mi). *Inclination*: 52.0000 deg. *Period*: 114.10 min.

  The first launch of the Soyuz- Ikar launch vehicle, selected by Orbcomm after failure of the Zenit launcher. The Ikar upper stage was derived from the Yantar reconnaissance satellite's propulsion module. The Soyuz second stage separated at 8 minutes 48 seconds into flight after placing the Ikar into a 236 km x 884 km x 52.0 deg transfer orbit. The Ikar stage burned at the second apogee passage, at 06:23

GMT, and released the Globalstar satellite at the top of the dispenser into a 915 km x 947 km x 52.0 deg orbit at 07:27 GMT. The three remaining satellites mounted around the side of the dispenser were released into a 903 km x 946 km x 52.0 deg orbit. This was also the first launch carried out by the Starsem organization, a joint venture including Aerospatiale and TsSKB-Progress (the launch vehicle manufacturer). The dispenser was built by Aerospatiale/Aquitaine (Bordeaux).

- **Globalstar FM23** - . *Mass*: 222 kg (489 lb). *Nation*: USA. *Agency*: Globalstar. *Class*: Communications. *Type*: Civilian communications satellite. *Spacecraft*: Globalstar. *USAF Sat Cat*: 25622 . *COSPAR*: 1999-004B. *Apogee*: 1,418 km (881 mi). *Perigee*: 1,414 km (878 mi). *Inclination*: 52.0000 deg. *Period*: 114.10 min.

- **Globalstar FM38** - . *Mass*: 222 kg (489 lb). *Nation*: USA. *Agency*: Globalstar. *Class*: Communications. *Type*: Civilian communications satellite. *Spacecraft*: Globalstar. *USAF Sat Cat*: 25623 . *COSPAR*: 1999-004C. *Apogee*: 1,545 km (960 mi). *Perigee*: 1,541 km (957 mi). *Inclination*: 52.0000 deg. *Period*: 116.90 min.

- **Globalstar FM40** - . *Mass*: 222 kg (489 lb). *Nation*: USA. *Agency*: Globalstar. *Class*: Communications. *Type*: Civilian communications satellite. *Spacecraft*: Globalstar. *USAF Sat Cat*: 25624 . *COSPAR*: 1999-004D. *Apogee*: 1,414 km (878 mi). *Perigee*: 1,413 km (877 mi). *Inclination*: 52.0000 deg. *Period*: 114.10 min.

1999 February 20 - . 04:18 GMT - . *Launch Site*: Baikonur. *Launch Complex*: Baikonur LC1. *LV Family*: R-7. *Launch Vehicle*: Soyuz-U-PVB.

- **Soyuz TM-29** - . *Call Sign*: Derbent. *Crew*: Afanasyev, Bella, Haignere. *Payload*: Soyuz TM s/n 78. *Mass*: 7,250 kg (15,980 lb). *Nation*: Russia. *Related Persons*: Afanasyev, Bella, Haignere. *Agency*: RAKA. *Manufacturer*: Korolev bureau. *Program*: Mir. *Class*: Manned. *Type*: Manned spacecraft. *Flight*: Soyuz TM-28, Soyuz TM-28 Mir EO-26/-27, Soyuz TM-29, Soyuz TM-29 Mir Stefanik. *Spacecraft Bus*: Soyuz. *Spacecraft*: Soyuz TM. *Duration*: 188.85 days. *Decay Date*: 1999-08-28 . *USAF Sat Cat*: 25632 . *COSPAR*: 1999-007A. *Apogee*: 357 km (221 mi). *Perigee*: 341 km (211 mi). *Inclination*: 51.6000 deg. *Period*: 91.52 min.

  Soyuz TM-29 docked with Mir on February 22 at 05:36 GMT. Since two crew seats had been sold (to Slovakia and France), Afansyev was the only Russian cosmonaut aboard. This meant that Russian engineer Avdeyev already aboard Mir would have to accept a double-length assignment. After the February 27 departure of EO-26 crew commander Padalka and Slovak cosmonaut Bella aboard Soyuz TM-28, the new EO-27 Mir crew consisted of Afanasyev as Commander, Avdeyev as Engineer and French cosmonaut Haignere. Follwoing an extended mission and three space walks, the last operational crew aboard Mir prepared to return. The station was powered down and prepared for free drift mode.

1999 March 15 - . 03:06 GMT - . *Launch Site*: Baikonur. *Launch Complex*: Baikonur LC1. *LV Family*: R-7. *Launch Vehicle*: Soyuz-U-PVB.

- **Globalstar M022** - . *Mass*: 222 kg (489 lb). *Nation*: USA. *Agency*: Globalstar. *Class*: Communications. *Type*: Civilian communications satellite. *Spacecraft*: Globalstar. *USAF Sat Cat*: 25649 . *COSPAR*: 1999-012A. *Apogee*: 1,414 km (878 mi). *Perigee*: 1,413 km (877 mi). *Inclination*: 52.0000 deg. *Period*: 114.10 min.

  In the second Soyuz/Ikar launch four Globalstar satellites were delivered with the Ikar upper stage into a 235 km x 899 km x 52.0 degree transfer orbit. The Ikar stage then placed itself and its payload into a 897 km x 950 km x 52.0 degree deployment orbit. Satellite M022 was separated first from the top of the dispenser, followed by ejection of the other three satellites from the sides at 06:37 GMT. After dispensing the satellites, the Ikar deorbited itself on March 16.

- **Globalstar M041** - . *Mass*: 222 kg (489 lb). *Nation*: USA. *Agency*: Globalstar. *Class*: Communications. *Type*: Civilian communications satellite. *Spacecraft*: Globalstar. *USAF Sat Cat*: 25650 . *COSPAR*: 1999-012B. *Apogee*: 1,414 km (878 mi). *Perigee*: 1,413 km (877 mi). *Inclination*: 52.0000 deg. *Period*: 114.10 min.

- **Globalstar M046** - . *Mass*: 222 kg (489 lb). *Nation*: USA. *Agency*: Globalstar. *Class*: Communications. *Type*: Civilian communications satellite. *Spacecraft*: Globalstar. *USAF Sat Cat*: 25651 . *COSPAR*: 1999-012C. *Apogee*: 1,595 km (991 mi). *Perigee*: 1,594 km (990 mi). *Inclination*: 52.0000 deg. *Period*: 118.10 min.

- **Globalstar M037** - . *Mass*: 222 kg (489 lb). *Nation*: USA. *Agency*: Globalstar. *Class*: Communications. *Type*: Civilian communications satellite. *Spacecraft*: Globalstar. *USAF Sat Cat*: 25652 . *COSPAR*: 1999-012D. *Apogee*: 1,414 km (878 mi). *Perigee*: 1,413 km (877 mi). *Inclination*: 52.0000 deg. *Period*: 114.10 min.

1999 April 2 - . 11:28 GMT - . *Launch Site*: Baikonur. *Launch Complex*: Baikonur LC1. *LV Family*: R-7. *Launch Vehicle*: Soyuz-U-PVB.

- **Progress M-41** - . *Payload*: Progress M s/n 241. *Mass*: 7,450 kg (16,420 lb). *Nation*: Russia. *Agency*: RAKA. *Manufacturer*: Korolev bureau. *Program*: Mir. *Class*: Manned. *Type*: Manned logistics spacecraft. *Flight*: Soyuz TM-28 Mir EO-26/-27, Soyuz TM-29. *Spacecraft Bus*: Soyuz. *Spacecraft*: Progress M. *Duration*: 105.99 days. *Decay Date*: 1999-07-17 . *USAF Sat Cat*: 25664 . *COSPAR*: 1999-015A. *Apogee*: 361 km (224 mi). *Perigee*: 336 km (208 mi). *Inclination*: 51.6000 deg. *Period*: 91.51 min.

  Resupply craft docked uneventfully with the Mir complex two days later. It also delivered the Sputnik-99 amateur radio satellite, launched into orbit by hand by the cosmonauts during an EVA on April 16. Still hopeful of finding a backer to pay to keep Mir in space, Progress M-41 began a series of engine burns in late April to raise the orbit of the station. It finally undocked from Mir at 11:20 GMT on July 17 and was deorbited over the Pacific later the same day.

- **Sputnik-99** - . *Nation*: France. *Agency*: AmSat. *Program*: Oscar. *Class*: Communications. *Type*: Amateur radio communications satellite. *Spacecraft*:

OSCAR. *Decay Date*: 1999-07-29 . *USAF Sat Cat*: 25685 . *COSPAR*: 1999-015C. *Apogee*: 400 km (240 mi). *Perigee*: 400 km (240 mi). *Inclination*: 51.6000 deg. Subscale amateur radio model of Sputnik 1. Reentered July 29..

1999 April 15 - . 00:46 GMT - . *Launch Site*: Baikonur. *Launch Complex*: Baikonur LC1. *LV Family*: R-7. *Launch Vehicle*: Soyuz-U-PVB.

- **Globalstar M019** - . *Mass*: 222 kg (489 lb). *Nation*: USA. *Agency*: Globalstar. *Class*: Communications. *Type*: Civilian communications satellite. *Spacecraft*: Globalstar. *USAF Sat Cat*: 25676 . *COSPAR*: 1999-019A. *Apogee*: 1,414 km (878 mi). *Perigee*: 1,413 km (877 mi). *Inclination*: 52.0000 deg. *Period*: 114.10 min.

  The Ikar upper stage entered a 234 km x 900 km transfer orbit, then maneuvered to dispense the four spacecraft into 900 km x 950 km x 52.0 deg parking orbits. The satellite's own thrusters would be used to place them into their 1410 km circular operational orbits. The Ikar stage deorbited itself after one day. The Globalstar satellites, built by Alenia and Loral, are L-band comsats which provide satellite phone service.

- **Globalstar M044** - . *Mass*: 222 kg (489 lb). *Nation*: USA. *Agency*: Globalstar. *Class*: Communications. *Type*: Civilian communications satellite. *Spacecraft*: Globalstar. *USAF Sat Cat*: 25678 . *COSPAR*: 1999-019C. *Apogee*: 1,414 km (878 mi). *Perigee*: 1,413 km (877 mi). *Inclination*: 52.0000 deg. *Period*: 114.10 min.

- **Globalstar M042** - . *Mass*: 222 kg (489 lb). *Nation*: USA. *Agency*: Globalstar. *Class*: Communications. *Type*: Civilian communications satellite. *Spacecraft*: Globalstar. *USAF Sat Cat*: 25677 . *COSPAR*: 1999-019B. *Apogee*: 1,414 km (878 mi). *Perigee*: 1,413 km (877 mi). *Inclination*: 52.0000 deg. *Period*: 114.10 min.

- **Globalstar M045** - . *Mass*: 222 kg (489 lb). *Nation*: USA. *Agency*: Globalstar. *Class*: Communications. *Type*: Civilian communications satellite. *Spacecraft*: Globalstar. *USAF Sat Cat*: 25679 . *COSPAR*: 1999-019D. *Apogee*: 1,586 km (985 mi). *Perigee*: 1,581 km (982 mi). *Inclination*: 52.0000 deg. *Period*: 117.80 min.

1999 July 16 - . 16:37 GMT - . *Launch Site*: Baikonur. *Launch Complex*: Baikonur LC1. *LV Family*: R-7. *Launch Vehicle*: Soyuz-U-PVB.

- **Progress M-42** - . *Payload*: Progress M s/n 242. *Mass*: 7,450 kg (16,420 lb). *Nation*: Russia. *Agency*: RAKA. *Manufacturer*: Korolev bureau. *Program*: Mir. *Class*: Manned. *Type*: Manned logistics spacecraft. *Flight*: Soyuz TM-28 Mir EO-26/-27, Soyuz TM-29. *Spacecraft Bus*: Soyuz. *Spacecraft*: Progress M. *Duration*: 200.57 days. *Decay Date*: 2000-02-04 . *USAF Sat Cat*: 25858 . *COSPAR*: 1999-038A. *Apogee*: 348 km (216 mi). *Perigee*: 340 km (210 mi). *Inclination*: 51.6000 deg. *Period*: 91.42 min.

  Delivered supplies to the crew of the Mir complex. Docked with the Kvant port at

17:53 GMT on July 18. Remained docked to the station after the departure of the last operational crew in September 1999. Undocked on February 2. 2000, to clear the port for Progress M1, at 0311:52 GMT. Deorbited over the Pacific later the same day at 0610:40 UTC with an 8 minute burn.

1999 August 18 - . 18:00 GMT - . *Launch Site*: Plesetsk. *Launch Complex*: Plesetsk LC43/3. *LV Family*: R-7. *Launch Vehicle*: Soyuz-U-PVB.

- **Cosmos 2365** - . *Mass*: 6,600 kg (14,500 lb). *Nation*: Russia. *Agency*: MO. *Manufacturer*: Kozlov bureau. *Class*: Surveillance. *Type*: Military surveillance satellite. *Spacecraft Bus*: Yantar. *Spacecraft*: Yantar-4K1. *Duration*: 119.00 days. *Decay Date*: 1999-12-15 . *USAF Sat Cat*: 25889 . *COSPAR*: 1999-044A. *Apogee*: 338 km (210 mi). *Perigee*: 184 km (114 mi). *Inclination*: 67.1000 deg. *Period*: 89.73 min. High resolution photo reconnaissance; returned film in two small SpK capsules during the mission and with the main capsule at completion of the mission. Landed in Russia on December 15, 1999..

1999 September 9 - . 18:00 GMT - . *Launch Site*: Plesetsk. *Launch Complex*: Plesetsk LC43/4. *LV Family*: R-7. *Launch Vehicle*: Soyuz-U-PVB.

- **Foton 12** - . *Payload*: Foton s/n 12. *Mass*: 6,190 kg (13,640 lb). *Nation*: Russia. *Agency*: RAKA. *Manufacturer*: Kozlov bureau. *Class*: Materials. *Type*: Materials science satellite. *Spacecraft Bus*: Vostok. *Spacecraft*: Foton. *Duration*: 14.64 days. *Decay Date*: 1999-09-24 . *USAF Sat Cat*: 25902 . *COSPAR*: 1999-048A. *Apogee*: 365 km (226 mi). *Perigee*: 215 km (133 mi). *Inclination*: 62.8000 deg. *Period*: 90.30 min. Foton 12 carried European microgravity experiments. The spacecraft's descent module landed on Russian territory at 52.47 deg N 53.83 deg E on September 24, 1999..

1999 September 22 - . 14:33 GMT - . *Launch Site*: Baikonur. *Launch Complex*: Baikonur LC1. *LV Family*: R-7. *Launch Vehicle*: Soyuz-U-PVB.

- **Globalstar 33** - . *Mass*: 222 kg (489 lb). *Nation*: USA. *Agency*: Globalstar. *Class*: Communications. *Type*: Civilian communications satellite. *Spacecraft*: Globalstar. *USAF Sat Cat*: 25907 . *COSPAR*: 1999-049A. *Apogee*: 1,416 km (879 mi). *Perigee*: 1,412 km (877 mi). *Inclination*: 52.0000 deg. *Period*: 114.10 min. The third stage put the complex into a 235 km x 906 km x 51.9 degree transfer orbit. The Ikar upper stage maneouvered, placed the four satellites into their final parking orbit, then made a deorbit burn and re-entered on September 24. .

- **Globalstar 58** - . *Mass*: 222 kg (489 lb). *Nation*: USA. *Agency*: Globalstar. *Class*: Communications. *Type*: Civilian communications satellite. *Spacecraft*: Globalstar. *USAF Sat Cat*: 25910 . *COSPAR*: 1999-049D. *Apogee*: 1,557 km (967 mi). *Perigee*: 1,547 km (961 mi). *Inclination*: 52.0000 deg. *Period*: 117.10 min.

- **Globalstar 50** - . *Mass*: 222 kg (489 lb). *Nation*: USA. *Agency*: Globalstar. *Class*:

Communications. *Type*: Civilian communications satellite. *Spacecraft*: Globalstar. *USAF Sat Cat*: 25908 . *COSPAR*: 1999-049B. *Apogee*: 1,655 km (1,028 mi). *Perigee*: 1,641 km (1,019 mi). *Inclination*: 52.0000 deg. *Period*: 119.30 min.

- **Globalstar 55** - . *Mass*: 222 kg (489 lb). *Nation*: USA. *Agency*: Globalstar. *Class*: Communications. *Type*: Civilian communications satellite. *Spacecraft*: Globalstar. *USAF Sat Cat*: 25909 . *COSPAR*: 1999-049C. *Apogee*: 1,416 km (879 mi). *Perigee*: 1,412 km (877 mi). *Inclination*: 52.0000 deg. *Period*: 114.10 min.

1999 September 28 - . 11:00 GMT - . *Launch Site*: Plesetsk. *Launch Complex*: Plesetsk LC43/4. *LV Family*: R-7. *Launch Vehicle*: Soyuz-U-PVB.

- **Resurs F-1M** - . *Mass*: 6,300 kg (13,800 lb). *Nation*: Russia. *Agency*: RAKA. *Manufacturer*: Kozlov bureau. *Program*: Resurs. *Class*: Earth. *Type*: Earth resources satellite. *Spacecraft Bus*: Vostok. *Spacecraft*: Resurs F1M. *Duration*: 24.00 days. *Decay Date*: 1999-10-22 . *USAF Sat Cat*: 25929 . *COSPAR*: 1999-054A. *Apogee*: 240 km (140 mi). *Perigee*: 214 km (132 mi). *Inclination*: 82.3000 deg. *Period*: 89.00 min. Remote sensing film satellite. Recovered in Russia on October 22, 1999..

1999 October 18 - . 13:22 GMT - . *Launch Site*: Baikonur. *Launch Complex*: Baikonur LC1. *LV Family*: R-7. *Launch Vehicle*: Soyuz-U-PVB.

- **Globalstar 31** - . *Mass*: 222 kg (489 lb). *Nation*: USA. *Agency*: Globalstar. *Class*: Communications. *Type*: Civilian communications satellite. *Spacecraft*: Globalstar. *USAF Sat Cat*: 25943 . *COSPAR*: 1999-058A. *Apogee*: 1,414 km (878 mi). *Perigee*: 1,413 km (877 mi). *Inclination*: 52.0000 deg. *Period*: 114.10 min. At the time of this launch Globalstar began limited service of its satellite telephone system..

- **Globalstar 56** - . *Mass*: 222 kg (489 lb). *Nation*: USA. *Agency*: Globalstar. *Class*: Communications. *Type*: Civilian communications satellite. *Spacecraft*: Globalstar. *USAF Sat Cat*: 25944 . *COSPAR*: 1999-058B. *Apogee*: 1,414 km (878 mi). *Perigee*: 1,413 km (877 mi). *Inclination*: 52.0000 deg. *Period*: 114.10 min.

- **Globalstar 57** - . *Mass*: 222 kg (489 lb). *Nation*: USA. *Agency*: Globalstar. *Class*: Communications. *Type*: Civilian communications satellite. *Spacecraft*: Globalstar. *USAF Sat Cat*: 25945 . *COSPAR*: 1999-058C. *Apogee*: 1,415 km (879 mi). *Perigee*: 1,412 km (877 mi). *Inclination*: 52.0000 deg. *Period*: 114.10 min.

- **Globalstar 59** - . *Mass*: 222 kg (489 lb). *Nation*: USA. *Agency*: Globalstar. *Class*: Communications. *Type*: Civilian communications satellite. *Spacecraft*: Globalstar. *USAF Sat Cat*: 25946 . *COSPAR*: 1999-058D. *Apogee*: 1,415 km (879 mi). *Perigee*: 1,413 km (877 mi). *Inclination*: 52.0000 deg. *Period*: 114.10 min.

1999 November 22 - . 16:20 GMT - . *Launch Site*: Baikonur. *Launch Complex*: Baikonur LC1. *LV Family*: R-7. *Launch Vehicle*: Soyuz-U-PVB.

- **Globalstar 29** - . *Mass*: 222 kg (489 lb). *Nation*: USA. *Agency*: Globalstar. *Class*: Communications. *Type*: Civilian communications satellite. *Spacecraft*: Globalstar. *USAF Sat Cat*: 25961 . *COSPAR*: 1999-062A. *Apogee*: 1,414 km (878 mi). *Perigee*: 1,413 km (877 mi). *Inclination*: 52.0000 deg. *Period*: 114.10 min. Additional launches into Globalstar communications satellite constellation..

- **Globalstar 39** - . *Mass*: 222 kg (489 lb). *Nation*: USA. *Agency*: Globalstar. *Class*: Communications. *Type*: Civilian communications satellite. *Spacecraft*: Globalstar. *USAF Sat Cat*: 25963 . *COSPAR*: 1999-062C. *Apogee*: 1,417 km (880 mi). *Perigee*: 1,410 km (870 mi). *Inclination*: 52.0000 deg. *Period*: 114.10 min.

- **Globalstar 34** - . *Mass*: 222 kg (489 lb). *Nation*: USA. *Agency*: Globalstar. *Class*: Communications. *Type*: Civilian communications satellite. *Spacecraft*: Globalstar. *USAF Sat Cat*: 25962 . *COSPAR*: 1999-062B. *Apogee*: 1,614 km (1,002 mi). *Perigee*: 1,610 km (1,000 mi). *Inclination*: 52.0000 deg. *Period*: 118.50 min.

- **Globalstar 61** - . *Mass*: 222 kg (489 lb). *Nation*: USA. *Agency*: Globalstar. *Class*: Communications. *Type*: Civilian communications satellite. *Spacecraft*: Globalstar. *USAF Sat Cat*: 25964 . *COSPAR*: 1999-062D. *Apogee*: 1,791 km (1,112 mi). *Perigee*: 1,783 km (1,107 mi). *Inclination*: 52.0000 deg. *Period*: 122.40 min.

2000 February 1 - . 06:47 GMT - . *Launch Site*: Baikonur. *Launch Complex*: Baikonur LC1. *LV Family*: R-7. *Launch Vehicle*: Soyuz-U-PVB.

- **Progress M1-1** - . *Payload*: Progress M1 s/n 250. *Mass*: 7,250 kg (15,980 lb). *Nation*: Russia. *Agency*: RAKA. *Manufacturer*: Korolev bureau. *Program*: Mir. *Class*: Manned. *Type*: Manned logistics spacecraft. *Spacecraft Bus*: Soyuz. *Spacecraft*: Progress M1. *Duration*: 85.53 days. *Decay Date*: 2000-04-27 . *USAF Sat Cat*: 26067 . *COSPAR*: 2000-005A. *Apogee*: 348 km (216 mi). *Perigee*: 342 km (212 mi). *Inclination*: 51.6000 deg. *Period*: 91.44 min.

  Progress M1 was a modification of the Progress M for the International Space Station. The first such spacecraft was diverted to raise the orbit of Mir. It docked with the unoccupied Mir space station on February 3 at 0802:20 GMT. Burns of its motor to raise Mir's orbit began on February 5 and continued through February 9. Progress M1-1 undocked at 16:33 GMT on April 26 to clear the docking port for Progress M1-2. It was deorbited over the Pacific at 19:27 GMT the same day.

2000 February 8 - . 23:20 GMT - . *Launch Site*: Baikonur. *Launch Complex*: Baikonur LC31. *LV Family*: R-7. *Launch Vehicle*: Soyuz-U-PVB.

- **IRDT** - . *Mass*: 110 kg (240 lb). *Nation*: Russia. *Agency*: ESA. *Manufacturer*: Lavochkin bureau. *Class*: Technology. *Type*: Re-entry test vehicle. *Spacecraft Bus*: Rescue. *Spacecraft*: IRDT. *COSPAR*: 2000-009x. *Apogee*: 613 km (381 mi). *Perigee*: 580 km (361 mi). *Inclination*: 64.8545 deg. *Period*: 96.53 min.

After four orbits around the Earth the test vehicle was powered by the launcher's upper stage to re-enter the atmosphere for a landing about 1800 km northwest of the launch site. The heat shield was inflated and the IRDT separated from the upper stage. It then passed through the upper atmospheric layers that imposed the highest dynamic pressure, heat flux and acceleration loads onto the system. The IRDT landed inside the predicted area at 54 deg E and 51 deg N near the Kazakhstan border. Unfortunately, a tear occurred in the inflatable shield during descent resulting in a higher velocity and a heavier than expected impact on landing, resulting in some damage to the lower part of the IRDT. The IRDT was collected by helicopter so that the memory unit of the sensor package, with all recorded data, could be analysed. An initial data check confirmed that all experiments in the sensor package worked perfectly.

- **Dummy satellite** - . *Nation*: Russia. *Agency*: Starsem. *Manufacturer*: Lavochkin bureau. *Class*: Technology. *Type*: Navigation technology satellite. *USAF Sat Cat*: 26086 . *COSPAR*: 2000-009A. *Apogee*: 613 km (381 mi). *Perigee*: 580 km (361 mi). *Inclination*: 64.8545 deg. *Period*: 96.53 min. .

2000 March 20 - . 18:28 GMT - . *Launch Site*: Baikonur. *Launch Complex*: Baikonur LC31. *LV Family*: R-7. *Launch Vehicle*: Soyuz-U-PVB.

- **Dumsat** - . *Mass*: 2,382 kg (5,251 lb). *Nation*: Europe. *Agency*: Starsem. *Manufacturer*: Toulouse. *Class*: Technology. *Type*: Navigation technology satellite. *Spacecraft*: Cluster 2. *USAF Sat Cat*: 26106 . *COSPAR*: 2000-015A. *Apogee*: 17,687 km (10,990 mi). *Perigee*: 332 km (206 mi). *Inclination*: 64.7000 deg. *Period*: 316.60 min. Cluster 2 Composite Mock-Up validation flight. Mass model of a pair of Cluster II scientific satellites built by Aerospatiale Matra. Second test launch of the Soyuz-Fregat launch vehicle..

2000 April 4 - . 05:01 GMT - . *Launch Site*: Baikonur. *Launch Complex*: Baikonur LC1. *LV Family*: R-7. *Launch Vehicle*: Soyuz-U-PVB.

- **Soyuz TM-30** - . *Call Sign*: Yenisey. *Crew*: Kaleri, Zalyotin. *Payload*: Soyuz TM s/n 204. *Mass*: 7,250 kg (15,980 lb). *Nation*: Russia. *Related Persons*: Kaleri, Zalyotin. *Agency*: RAKA. *Manufacturer*: Korolev bureau. *Program*: Mir. *Class*: Manned. *Type*: Manned spacecraft. *Flight*: Soyuz TM-30. *Spacecraft Bus*: Soyuz. *Spacecraft*: Soyuz TM. *Duration*: 72.82 days. *Decay Date*: 2000-06-16 . *USAF Sat Cat*: 26116 . *COSPAR*: 2000-018A. *Apogee*: 384 km (238 mi). *Perigee*: 358 km (222 mi). *Inclination*: 51.6000 deg. *Period*: 91.97 min.

  Soyuz TM-30 docked with Mir's forward (-X) port on April 6 at 0631 GMT. Zalyotin and Kaleri reactivated the uninhabited station. Unloading Progress M1-1 and M1-2, they resupplied the station. The Progress spacecraft were also used to raise the station's orbit to 360 x 378 km x 51.6 deg. The orbital plane of Mir was then around 120 degrees away from that of ISS (making transport between the stations impossible, as desired by NASA).

2000 April 25 - . 20:08 GMT - . *Launch Site*: Baikonur. *Launch Complex*: Baikonur LC1. *LV Family*: R-7. *Launch Vehicle*: Soyuz-U-PVB.

- **Progress M1-2** - . *Payload*: Progress M1 s/n 252. *Mass*: 7,280 kg (16,040 lb). *Nation*: Russia. *Agency*: RAKA. *Manufacturer*: Korolev bureau. *Program*: Mir. *Class*: Manned. *Type*: Manned logistics spacecraft. *Flight*: Soyuz TM-30. *Spacecraft Bus*: Soyuz. *Spacecraft*: Progress M1. *Duration*: 173.00 days. *Decay Date*: 2000-10-15 . *USAF Sat Cat*: 26301 . *COSPAR*: 2000-021A. *Apogee*: 380 km (230 mi). *Perigee*: 363 km (225 mi). *Inclination*: 51.6000 deg. *Period*: 91.98 min. Progress M1-2 docked with the rear Kvant port of Mir at 2128 GMT on April 27. Mir's orbit was raised on April 29 in the first of a series of three burns by Progress M1-2. It later undocked and was deorbited over the Pacific on 15 October..

2000 May 3 - . 13:25 GMT - . *Launch Site*: Baikonur. *Launch Complex*: Baikonur LC1. *LV Family*: R-7. *Launch Vehicle*: Soyuz-U-PVB.

- **Cosmos 2370** - . *Payload*: Neman. *Mass*: 6,700 kg (14,700 lb). *Nation*: Russia. *Agency*: MO. *Manufacturer*: Kozlov bureau. *Class*: Surveillance. *Type*: Military surveillance satellite. *Spacecraft Bus*: Yantar. *Spacecraft*: Yantar-4KS1. *Decay Date*: 2001-05-03 . *USAF Sat Cat*: 26354 . *COSPAR*: 2000-023A. *Apogee*: 312 km (194 mi). *Perigee*: 244 km (152 mi). *Inclination*: 64.7252 deg. *Period*: 90.00 min.

  Military Observation. Advanced imaging reconnaissance satellite. Relays digital imagery to earth via geostationary comsats. The last such satellite, Cosmos 2359, reentered in July 1999 after one year in orbit. The Soyuz-U launcher placed it in a 183 x 277 km x 64.8 deg initial orbit; it raised altitude to 240 x 300 km about 24 hr after launch.

2000 July 16 - . 12:39 GMT - . *Launch Site*: Baikonur. *Launch Complex*: Baikonur LC31. *LV Family*: R-7. *Launch Vehicle*: Soyuz-U-PVB.

- **Samba** - . *Payload*: Cluster 2-FM6. *Mass*: 1,200 kg (2,600 lb). *Nation*: Europe. *Agency*: ESA. *Manufacturer*: Friedrichshafen. *Class*: Earth. *Type*: Magnetosphere satellite. *Spacecraft*: Cluster 2. *USAF Sat Cat*: 26410 . *COSPAR*: 2000-041A. *Apogee*: 116,279 km (72,252 mi). *Perigee*: 21,449 km (13,327 mi). *Inclination*: 88.5000 deg. *Period*: 3,423.40 min.

  The first two European Space Agency Cluster II satellites, Samba (FM7) and Salsa (FM6) were launched into an initial 200 km / 64.8 deg circular orbit. The Fregat upper stage then burned once before ejecting the satellites into a 250 x 18072 km x 64.7 deg transfer orbit. Both satellites then used their Astrium (former MBB) S400 liquid engines in a series of four additional burns before reaching their final 16869 x 121098 km x 90.6 deg orbits. Each magnetosphere research satellite deployed four 50-meter wire antennas.

- **Salsa** - . *Mass*: 1,200 kg (2,600 lb). *Nation*: Europe. *Agency*: ESA. *Manufacturer*:

Friedrichshafen. *Class*: Earth. *Type*: Magnetosphere satellite. *Spacecraft*: Cluster 2. *USAF Sat Cat*: 26411 . *COSPAR*: 2000-041B. *Apogee*: 116,294 km (72,261 mi). *Perigee*: 21,430 km (13,310 mi). *Inclination*: 88.6000 deg. *Period*: 3,423.20 min.

2000 August 6 - . 18:26 GMT - . *Launch Site*: Baikonur. *Launch Complex*: Baikonur LC1. *LV Family*: R-7. *Launch Vehicle*: Soyuz-U-PVB.

- **Progress M1-3** - . *Payload*: Progress M1 s/n 251. *Mass*: 7,250 kg (15,980 lb). *Nation*: Russia. *Agency*: RAKA. *Manufacturer*: Korolev bureau. *Program*: ISS. *Class*: Manned. *Type*: Manned logistics spacecraft. *Flight*: STS-106. *Spacecraft Bus*: Soyuz. *Spacecraft*: Progress M1. *Duration*: 86.53 days. *Decay Date*: 2000-11-01 . *USAF Sat Cat*: 26461 . *COSPAR*: 2000-044A. *Apogee*: 362 km (224 mi). *Perigee*: 347 km (215 mi). *Inclination*: 51.5000 deg. *Period*: 91.63 min.

  Progress M1-3 automatically docked with the International Space Station on August 8 at 20:13 GMT at the rear Zvezda port. The supply ship began refuelling of the station a few days later. It remained attached for offloading of its dry cargo by the STS-106 crew. It later separated from Zvezda's rear port at 0405 GMT November 1 and was deorbited over the Pacific at 0705 GMT.

2000 August 9 - . 11:13 GMT - . *Launch Site*: Baikonur. *Launch Complex*: Baikonur LC31. *LV Family*: R-7. *Launch Vehicle*: Soyuz-U-PVB.

- **Rumba** - . *Mass*: 1,200 kg (2,600 lb). *Nation*: Europe. *Agency*: ESA. *Manufacturer*: Friedrichshafen. *Class*: Earth. *Type*: Magnetosphere satellite. *Spacecraft*: Cluster 2. *USAF Sat Cat*: 26463 . *COSPAR*: 2000-045A. *Apogee*: 116,297 km (72,263 mi). *Perigee*: 21,430 km (13,310 mi). *Inclination*: 88.5000 deg. *Period*: 3,423.30 min.

- **Tango** - . *Mass*: 1,200 kg (2,600 lb). *Nation*: Europe. *Agency*: ESA. *Manufacturer*: Friedrichshafen. *Class*: Earth. *Type*: Magnetosphere satellite. *Spacecraft*: Cluster 2. *USAF Sat Cat*: 26464 . *COSPAR*: 2000-045B. *Apogee*: 116,300 km (72,200 mi). *Perigee*: 21,430 km (13,310 mi). *Inclination*: 88.5000 deg. *Period*: 3,423.40 min.

  Rumba and Tango were the second pair of Cluster II magnetospheric research satellites of the European Space Agency. A series of five burns of the Fregat stage took them from an initial 190 km / 64.8 degree parking orbit to their final 17,200 x 120,600 km orbits inclined 90 degrees to the equator. They then separated from the Fregat and took up operations.

2000 September 29 - . 09:30 GMT - . *Launch Site*: Baikonur. *Launch Complex*: Baikonur LC31. *LV Family*: R-7. *Launch Vehicle*: Soyuz-U-PVB.

- **Cosmos 2373** - . *Mass*: 6,600 kg (14,500 lb). *Nation*: Russia. *Agency*: MO. *Manufacturer*: Kozlov bureau. *Class*: Surveillance. *Type*: Cartographic satellite. *Spacecraft Bus*: Yantar. *Spacecraft*: Yantar-1KFT. *Duration*: 46.56 days. *Decay Date*: 2000-11-14 . *USAF Sat Cat*: 26552 . *COSPAR*: 2000-058A. *Apogee*: 285 km

(177 mi). *Perigee*: 211 km (131 mi). *Inclination*: 70.3000 deg. *Period*: 89.46 min.

Twentieth Kometa cartographic satellite, using the Yantar service module with a Vostok-type reentry vehicle. It was announced as a dual civil-military geodetic mission. After a day it raised its orbit to 211 x 285 km x 70.4 deg. Landed near Orenburg, Russia on November 14. Deorbit burn was probably around 2230 GMT; the Vostok-style sphere landed at 2253 GMT.

2000 October 16 - . 21:27 GMT - . *Launch Site*: Baikonur. *Launch Complex*: Baikonur LC1. *LV Family*: R-7. *Launch Vehicle*: Soyuz-U-PVB.

- **Progress M-43** - . *Payload*: Progress M s/n 243. *Mass*: 6,860 kg (15,120 lb). *Nation*: Russia. *Agency*: RAKA. *Manufacturer*: Korolev bureau. *Program*: Mir. *Class*: Manned. *Type*: Manned logistics spacecraft. *Spacecraft Bus*: Soyuz. *Spacecraft*: Progress M. *Duration*: 101.00 days. *Decay Date*: 2001-01-29 . *USAF Sat Cat*: 26570 . *COSPAR*: 2000-064A. *Apogee*: 228 km (141 mi). *Perigee*: 186 km (115 mi). *Inclination*: 51.6000 deg. *Period*: 88.64 min.

  Mir Servicing flight. Launch delayed from October 15. Progress docked with Mir, primarily to raise its orbit and preserve the option of a MirCorp-financed flight in 2001. However the funding never came through and the decision was taken to deorbit Mir. Progress M-43 undocked at 0519 GMT on January 25 from the +X Kvant port to clear it for Progress M1-5 (which would deorbit the Mir station). On January 29 Progress M-43 was in a 271 x 280 km x 51.6 deg orbit.

2000 October 31 - . 07:52 GMT - . *Launch Site*: Baikonur. *Launch Complex*: Baikonur LC1. *LV Family*: R-7. *Launch Vehicle*: Soyuz-U-PVB.

- **Soyuz TM-31** - . *Call Sign*: Uran. *Crew*: Gidzenko, Krikalyov, Shepherd. *Payload*: Soyuz TM s/n 205. *Mass*: 7,250 kg (15,980 lb). *Nation*: Russia. *Related Persons*: Gidzenko, Krikalyov, Shepherd. *Agency*: RAKA. *Manufacturer*: Korolev bureau. *Program*: ISS. *Class*: Manned. *Type*: Manned spacecraft. *Flight*: Soyuz TM-31. *Spacecraft Bus*: Soyuz. *Spacecraft*: Soyuz TM. *Duration*: 186.91 days. *Decay Date*: 2001-05-06 . *USAF Sat Cat*: 26603 . *COSPAR*: 2000-070A. *Apogee*: 385 km (239 mi). *Perigee*: 378 km (234 mi). *Inclination*: 51.5000 deg. *Period*: 92.18 min.

  Soyuz TM-31 delivered the Expedition One crew to the International Space Station with Gidzenko as the Soyuz crew commander with the call-sign 'Uran'. The spacecraft docked at Zvezda's rear port at 0921 GMT on November 2. The hatch to Zvezda was opened at 1023 GMT. Once aboard ISS, Shepherd became the ISS Commander, with 'Station Alpha' as the ISS callsign. Soyuz TM-31, with Shepherd, Gidzenko and Krikalyov aboard, undocked from the -Y port on Zvezda on February 24, 2001 at 1006 GMT and redocked with the -Z port on Zarya at 1037 GMT. This freed the Zvezda port for a Progress resupply ship. After the departure of the Progress, Soyuz TM-31 undocked from the Zarya nadir port April 18 2001 at 1240 GMT and redocked with the Zvezda aft port at 1301 GMT, leaving clearance for the

Raffaello MPLM module to be berthed at the Unity nadir during the STS-100 mission.

2000 November 16 - . 00:00 GMT - . *Launch Site*: Baikonur. *Launch Complex*: Baikonur LC1. *LV Family*: R-7. *Launch Vehicle*: Soyuz-U-PVB.

- **Progress M1-4** - . *Payload*: Progress M1 s/n 253. *Mass*: 7,250 kg (15,980 lb). *Nation*: Russia. *Agency*: RAKA. *Manufacturer*: Korolev bureau. *Program*: Mir. *Class*: Manned. *Type*: Manned logistics spacecraft. *Flight*: Soyuz TM-31. *Spacecraft Bus*: Soyuz. *Spacecraft*: Progress M1. *Duration*: 84.58 days. *Decay Date*: 2001-02-08 . *USAF Sat Cat*: 26615 . *COSPAR*: 2000-073A. *Apogee*: 363 km (225 mi). *Perigee*: 350 km (210 mi). *Inclination*: 51.6000 deg. *Period*: 91.70 min.

  Progress M1-4 was an unmanned resupply craft that rendezvoused with the International Space Station on November 18. After problems with the automatic system, ISS Expedition 1 crew member Gidzenko took over manual control with the remote TORU system at 0302 GMT. The first docking attempt was aborted when M1-4 was only 5 m from the station at 0309 GMT. On the second attempt docking was successfully achieved at 0348 GMT at Zarya's nadir port. The problem on the first attempt was icing of the TORU system TV camera on the Progress when the spacecraft was in shadow. Progress M1-4 undocked from ISS at 1623 GMT on December 1. Following the mission of STS-97 Progress M1-4 redocked to Zarya's nadir port on December 26 at 1054 GMT. The redocking tested a fix to the software that caused problems in the vehicle's first docking attempt on November 18. Yuri Gidzenko completed the docking manually using the remote control TORU system. Progress M1-4 undocked from Zarya's nadir port for the last time at 1126 GMT on February 8. It was deorbited over the Pacific and reentered at 1350 GMT the same day.

2001 January 24 - . 04:28 GMT - . *Launch Site*: Baikonur. *Launch Complex*: Baikonur LC1. *LV Family*: R-7. *Launch Vehicle*: Soyuz-U-PVB.

- **Progress M1-5** - . *Payload*: Progress M1 s/n 254. *Mass*: 7,300 kg (16,000 lb). *Nation*: Russia. *Agency*: RAKA. *Manufacturer*: Korolev bureau. *Program*: Mir. *Class*: Manned. *Type*: Manned logistics spacecraft. *Spacecraft Bus*: Soyuz. *Spacecraft*: Progress M1. *Duration*: 58.00 days. *Decay Date*: 2001-03-23 . *USAF Sat Cat*: 26688 . *COSPAR*: 2001-003A. *Apogee*: 215 km (133 mi). *Perigee*: 151 km (93 mi). *Inclination*: 51.6000 deg. *Period*: 88.20 min.

  Mir Deorbiting mission. Launch delayed from January 16 and 18. The Mir station had a power failure on January 18, delaying the launch of the Progress cargo ship that was to deorbit it for a few days. Nick-named "Hearse", it was to deliver the 130 tonne Mir station to its cremation over the southern Pacific. Six cosmonauts were on "Hot-Standby" to reach Mir in the event the automatic docking failed. Progress M1-5 carried 2677 kg of fuel. A special three-day fuel-economy approach was be used to keep as much fuel as possibile for the deorbit. Progress M1-5 docked with the +X

Kvant port at 0533 GMT on January 27. It later undocked and was deorbited over the Pacific together with Mir on 23 March.

2001 February 26 - . 08:09 GMT - . *Launch Site*: Baikonur. *Launch Complex*: Baikonur LC1. *LV Family*: R-7. *Launch Vehicle*: Soyuz-U-PVB.

- **Progress M-44** - . *Payload*: Progress M s/n 244. *Mass*: 7,250 kg (15,980 lb). *Nation*: Russia. *Agency*: RAKA. *Manufacturer*: Korolev bureau. *Program*: ISS. *Class*: Manned. *Type*: Manned logistics spacecraft. *Flight*: Soyuz TM-31. *Spacecraft Bus*: Soyuz. *Spacecraft*: Progress M. *Duration*: 49.22 days. *Decay Date*: 2001-04-16 . *USAF Sat Cat*: 26713 . *COSPAR*: 2001-008A. *Apogee*: 393 km (244 mi). *Perigee*: 376 km (233 mi). *Inclination*: 51.6000 deg. *Period*: 92.20 min.

  ISS Servicing flight. Launch delayed from February10/20. Progress M-44 was a Russian, automatic cargo carrier that carried 2.5 tonnes of food, water, fuel, oxygen, and equipment to the International Space Station. In preparation for the docking, the ISS crew repositioned the Soyuz TM-31 escape craft from its port on Zvezda to a port on the Zarya module. Progress M-44 docked with the -Y port on Zvezda at 09:47 UT on 28 February. It undocked from Zvezda's aft port on April 16 at 0848 GMT and was deorbited at 1323 GMT over the Pacific Ocean.

2001 April 28 - . 07:37 GMT - . *Launch Site*: Baikonur. *Launch Complex*: Baikonur LC1. *LV Family*: R-7. *Launch Vehicle*: Soyuz-U-PVB.

- **Soyuz TM-32** - . *Call Sign*: Kristall. *Crew*: Baturin, Musabayev, Tito. *Payload*: Soyuz TM s/n 206. *Mass*: 6,750 kg (14,880 lb). *Nation*: Russia. *Related Persons*: Baturin, Musabayev, Tito. *Agency*: RAKA. *Manufacturer*: Korolev bureau. *Program*: ISS. *Class*: Manned. *Type*: Manned spacecraft. *Flight*: Soyuz TM-32 ISS EP-1. *Spacecraft Bus*: Soyuz. *Spacecraft*: Soyuz TM. *Duration*: 185.89 days. *Decay Date*: 2001-10-31 . *USAF Sat Cat*: 26749 . *COSPAR*: 2001-017A. *Apogee*: 397 km (246 mi). *Perigee*: 385 km (239 mi). *Inclination*: 51.6000 deg. *Period*: 92.40 min.

  Soyuz TM-32 was designated ISS flight 2S by NASA and EP-1 (Visiting Crew 1) by RKK Energia. Soyuz TM-32 was a fresh lifeboat for the station; the Soyuz TM-31 crew themselves would return in Soyuz TM-31, which was at the end of its rated in-space storage tie. Dennis Tito's inclusion in the crew created controversy between NASA and the Russians since he was the first space tourist to fly to ISS. He had originally paid to fly to the Mir station but funds ran out to keep that station in orbit. Soyuz TM-32 docked with the -Z port on Zarya at 0758 GMT on April 30 after Endeavour had departed.. The crew transferred their customized reentry seat liners to Soyuz TM-31, at which point TM-32 became the Station's rescue vehicle. After a six day stay, the Soyuz TM-32 crew returned to earth aboard Soyuz TM-31. The Expedition 3 crew entered Soyuz TM-32) on October 19, 2001 and undocked from the nadir port of Zarya at 1048 GMT, flying it out and then sideways a few meters before approaching the station again to dock with the Pirs nadir port at 1104 GMT. This freed up Zarya for the arrival of a new Soyuz. The docking port at the aft end of

Zvezda was occupied by the Progress M-45 cargo ship.

2001 May 29 - . 17:55 GMT - . *Launch Site*: Plesetsk. *Launch Complex*: Plesetsk LC43/4. *LV Family*: R-7. *Launch Vehicle*: Soyuz-U-PVB.

- **Cosmos 2377** - . *Mass*: 6,500 kg (14,300 lb). *Nation*: Russia. *Agency*: MO. *Manufacturer*: Kozlov bureau. *Class*: Surveillance. *Type*: Military surveillance satellite. *Spacecraft Bus*: Yantar. *Spacecraft*: Yantar-4K1. *Duration*: 131.00 days. *Decay Date*: 2001-10-10 . *USAF Sat Cat*: 26775 . *COSPAR*: 2001-022A. *Apogee*: 261 km (162 mi). *Perigee*: 170 km (100 mi). *Inclination*: 67.1000 deg. *Period*: 88.80 min. The Kobalt-class imaging satellite landed on October 10, 2001 after a four month mission..

2001 August 21 - . 09:23 GMT - . *Launch Site*: Baikonur. *Launch Complex*: Baikonur LC1. *LV Family*: R-7. *Launch Vehicle*: Soyuz-U-PVB.

- **Progress M-45** - . *Payload*: Progress M s/n 245. *Mass*: 7,250 kg (15,980 lb). *Nation*: Russia. *Agency*: RAKA. *Manufacturer*: Korolev bureau. *Program*: ISS. *Class*: Manned. *Type*: Manned logistics spacecraft. *Flight*: STS-105 ISS EO-3. *Spacecraft Bus*: Soyuz. *Spacecraft*: Progress M. *Duration*: 93.50 days. *Decay Date*: 2001-11-22 . *USAF Sat Cat*: 26890 . *COSPAR*: 2001-036A. *Apogee*: 389 km (241 mi). *Perigee*: 376 km (233 mi). *Inclination*: 51.6000 deg. *Period*: 92.20 min.

  ISS Servicing Mission. Launch delayed from July 4 and 24. Progress M-45, 7K-TGM No. 245 (of the older generation series of Progress) docked with the ISS at 0951 GMT on August 23 at the aft Zvezda port vacated by Progress M6-1 a day earlier. It and delivered 2.5 tonnes of fuel, water, oxygen, equipment and spare parts. Progress M-45 undocked on November 22 and was deorbited over the Pacific later the same day.

2001 September 14 - . 23:34 GMT - . *Launch Site*: Baikonur. *Launch Complex*: Baikonur LC1. *LV Family*: R-7. *Launch Vehicle*: Soyuz-U-PVB.

- **Progress M-SO1** - . *Payload*: Progress M-SO1 s/n 301. *Mass*: 6,900 kg (15,200 lb). *Nation*: Russia. *Agency*: RAKA. *Program*: ISS. *Class*: Manned. *Type*: Manned logistics spacecraft. *Flight*: STS-105 ISS EO-3. *Spacecraft Bus*: Soyuz. *Spacecraft*: Progress M-SO. *Duration*: 12.00 days. *Decay Date*: 2001-09-26 . *USAF Sat Cat*: 26908 . *COSPAR*: 2001-041A. *Apogee*: 335 km (208 mi). *Perigee*: 329 km (204 mi). *Inclination*: 51.6000 deg. *Period*: 91.20 min.

  Progress M-SO1 was the designation given to the service module section of a Progress M; the 3900 kg Pirs docking and airlock module for the ISS replaced the standard cargo and fuel sections. It also carried an astronaut chair, a space suit, a small crane, and some equipment for the Zvezda module of the ISS. Progress-M No. 301 was launched into an initial 180 km circular orbit. By September 16 it had maneuvered into a 238 x 264 km orbit; by 0038 GMT on September 17, a 385 x 395

km x 51.6 deg orbit upon rendezvous with the ISS. The Progress began a fly around of the station and lined up with the nadir port on Zvezda. Docking of Pirs with Zvezda came at 0105 GMT on September 17. The Progress M-SO1 later undocked from the Pirs nadir port to leave it free for future dockings. Pirs gave extra clearance from the Station for ships docking underneath Zvezda, and was also used as an airlock for spacewalks using the Russian Orlan EVA suits. Progress M-SO1 service module undocked from the Pirs module at 1536 GMT on September 26 and was deorbited over the Pacific at 2330 GMT the same day.

2001 October 21 - . 08:59 GMT - . *Launch Site*: Baikonur. *Launch Complex*: Baikonur LC1. *LV Family*: R-7. *Launch Vehicle*: Soyuz-U-PVB.

- **Soyuz TM-33** - . *Call Sign*: Derbent. *Crew*: Afanasyev, Andre-Deshays, Kozeyev. *Payload*: Soyuz TM s/n 207. *Mass*: 6,750 kg (14,880 lb). *Nation*: Russia. *Related Persons*: Afanasyev, Andre-Deshays, Kozeyev. *Agency*: RAKA. *Manufacturer*: Korolev bureau. *Program*: ISS. *Class*: Manned. *Type*: Manned spacecraft. *Flight*: Soyuz TM-33 ISS EP-2. *Spacecraft Bus*: Soyuz. *Spacecraft*: Soyuz TM. *Duration*: 195.79 days. *Decay Date*: 2002-05-05 . *USAF Sat Cat*: 26955 . *COSPAR*: 2001-048A. *Apogee*: 397 km (246 mi). *Perigee*: 386 km (239 mi). *Inclination*: 51.6000 deg. *Period*: 92.40 min.

  Soyuz TM-33, an ISS lifeboat, carried two Russian and one French cosmonaut to the International Space Station (ISS). It docked with the ISS at 10:00 UT on 23 October. This new crew spent eight days on the ISS, and returned on the older Soyuz TM-32 at 03:59 UT on 31 October. The new Soyuz was to remain docked as a lifeboat craft for the long-term ISS crew of three (two Russian and one American) astronauts. On May 5, 2002, after a week aboard the station, the visting Soyuz TM-34 crew moved to the old Soyuz TM-33, docked at the Pirs port. They undocked at 0031:08 UTC on May 5, leaving the EO-4 crew of Onufrienko, Walz and Bursch with the new Soyuz TM-34 as their rescue vehicle. Soyuz TM-33 made its deorbit burn at 0257 UTC and landed successfully at 0352 UTC 25 km SE of Arkalyk.

2002 February 25 - . 17:26 GMT - . *Launch Site*: Plesetsk. *Launch Complex*: Plesetsk LC43/3. *LV Family*: R-7. *Launch Vehicle*: Soyuz-U-PVB.

- **Cosmos 2387** - . *Mass*: 6,700 kg (14,700 lb). *Nation*: Russia. *Agency*: KVR. *Class*: Surveillance. *Type*: Military surveillance satellite. *Spacecraft Bus*: Yantar. *Spacecraft*: Yantar-4K1. *Duration*: 122.00 days. *Decay Date*: 2002-06-27 . *USAF Sat Cat*: 27382 . *COSPAR*: 2002-008A. *Apogee*: 297 km (184 mi). *Perigee*: 168 km (104 mi). *Inclination*: 67.1000 deg. *Period*: 89.20 min. The optical reconnaissance satellite carried two small film capsules and a large reentry module. The main recoverable section of Cosmos 2387 landed at about 0230 UTC on June 27..

2002 March 21 - . 20:13 GMT - . *Launch Site*: Baikonur. *Launch Complex*: Baikonur LC1. *LV Family*: R-7. *Launch Vehicle*: Soyuz-U-PVB.

- **Progress M1-8** - . *Payload*: Progress M1 s/n 257. *Mass*: 7,250 kg (15,980 lb). *Nation*: Russia. *Agency*: RAKA. *Manufacturer*: Korolev bureau. *Program*: ISS. *Class*: Manned. *Type*: Manned logistics spacecraft. *Flight*: STS-108 ISS EO-4. *Spacecraft Bus*: Soyuz. *Spacecraft*: Progress M1. *Duration*: 95.67 days. *Decay Date*: 2002-06-25 . *USAF Sat Cat*: 27395 . *COSPAR*: 2002-013A. *Apogee*: 398 km (247 mi). *Perigee*: 379 km (235 mi). *Inclination*: 51.6000 deg. *Period*: 92.30 min.

  ISS Servicing mission. Launch delayed from February 15 and 28. The Progress M1-8 resupply spacecraft was flown on ISS mission 7P. It docked with the Zvezda module on the Station at 2058 UTC on March 24. Progress M1-8 undocked from the Zvezda module at 0826 UTC on June 25. The deorbit burn was at 1135 UTC, lowering its orbit from 379 x 398 km x 51.6 deg to 50 x 398 km. The spacecraft reentered over the Pacific at 1213 UTC with debris impact near 46 S 144 W.

2002 April 25 - . 06:26 GMT - . *Launch Site*: Baikonur. *Launch Complex*: Baikonur LC1. *LV Family*: R-7. *Launch Vehicle*: Soyuz-U-PVB.

- **Soyuz TM-34** - . *Call Sign*: Uran. *Crew*: Gidzenko, Shuttleworth, Vittori. *Payload*: Soyuz TM s/n 208. *Mass*: 6,750 kg (14,880 lb). *Nation*: Russia. *Related Persons*: Gidzenko, Shuttleworth, Vittori. *Agency*: RAKA. *Manufacturer*: Korolev bureau. *Program*: ISS. *Class*: Manned. *Type*: Manned spacecraft. *Flight*: Soyuz TM-34 ISS EP-3. *Spacecraft Bus*: Soyuz. *Spacecraft*: Soyuz TM. *Duration*: 198.73 days. *Decay Date*: 2002-11-10 . *USAF Sat Cat*: 27416 . *COSPAR*: 2002-020A. *Apogee*: 397 km (246 mi). *Perigee*: 387 km (240 mi). *Inclination*: 51.6000 deg. *Period*: 92.40 min.

  Launch delayed from April 10, 22 and 17. Soyuz TM-34 was launched on ISS Mission 4S with Commander Yuri Gidzenko of Rosaviakosmos, Flight Engineer is Roberto Vittori of ESA, and Tourist Mark Shuttleworth, a South African citizen. At 1210 UTC Soyuz TM-34 was in a 242 x 269 km x 51.6 deg orbit. The flight was also referred to as ISS Mission 4S, the EP-3 visiting crew flight, and even as 'Soyuz 4' by NASA. Soyuz TM-34 docked with the nadir port on the Zarya module at 0755 UTC on April 27. The 4S flight docked at the Zarya nadir port on April 27. and the crew would return to Earth in the old TM-33 vehicle, leaving TM-34 as the active ISS rescue vehicle.

2002 June 26 - . 05:36 GMT - . *Launch Site*: Baikonur. *Launch Complex*: Baikonur LC1. *LV Family*: R-7. *Launch Vehicle*: Soyuz-U-PVB.

- **Progress M-46** - . *Payload*: Progress M s/n 246. *Mass*: 7,250 kg (15,980 lb). *Nation*: Russia. *Agency*: RAKA. *Manufacturer*: Korolev bureau. *Program*: ISS. *Class*: Manned. *Type*: Manned logistics spacecraft. *Flight*: STS-111 ISS EO-5. *Spacecraft Bus*: Soyuz. *Spacecraft*: Progress M. *Duration*: 110.00 days. *Decay Date*: 2002-10-14 . *USAF Sat Cat*: 27454 . *COSPAR*: 2002-033A. *Apogee*: 397 km (246 mi). *Perigee*: 387 km (240 mi). *Inclination*: 51.6000 deg. *Period*: 92.40 min.

  Launch delayed from May 21, then moved forward from July 14. Progress M-46 was

launched on ISS mission 8P and docked with the Zvezda module at 0623 UTC on June 29 after carrying out tests of the Kurs rendezvous system on June 28. Seperated from ISS and commanded to destructive re-entry on 14 October 2002.

2002 October 15 - . 18:20 GMT - . *Launch Site*: Plesetsk. *Launch Complex*: Plesetsk LC43/3. *LV Family*: R-7. *Launch Vehicle*: Soyuz-U-PVB. *FAILURE*: Contamination in hydrogen peroxide line of fuel pump system led to explosion of Strap-on D 29 seconds after launch. The rocket crashed near the pad, debris from the explosion killing one soldier.. *Failed Stage*: 0.

- **Foton-M** - . *Payload*: Foton M-1 / Foton 13. *Mass*: 6,425 kg (14,164 lb). *Nation*: Russia. *Agency*: ESA, RAKA. *Manufacturer*: Kozlov bureau. *Class*: Materials. *Type*: Materials science satellite. *Spacecraft Bus*: Vostok. *Spacecraft*: Foton.

  Launch delayed from October 9. Foton-M No. 1 (Foton-13) was an improved version of the Foton materials processing satellite. The 6425 kg satellite carried a variety of microgravity experiments including those of the European Space Agency. The satellite was destroyed in the accident.

2003 February 2 - . 12:59 GMT - . *Launch Site*: Baikonur. *Launch Complex*: Baikonur LC1. *LV Family*: R-7. *Launch Vehicle*: Soyuz-U-PVB.

- **Progress M-47** - . *Payload*: Progress M s/n 247. *Mass*: 7,290 kg (16,070 lb). *Nation*: Russia. *Agency*: RAKA. *Manufacturer*: Korolev bureau. *Program*: ISS. *Class*: Manned. *Type*: Manned logistics spacecraft. *Flight*: STS-113 ISS EO-6. *Spacecraft Bus*: Soyuz. *Spacecraft*: Progress M. *Duration*: 206.00 days. *Decay Date*: 2003-08-28 . *USAF Sat Cat*: 27681 . *COSPAR*: 2003-006A. *Apogee*: 247 km (154 mi). *Perigee*: 195 km (121 mi). *Inclination*: 51.6476 deg. *Period*: 88.77 min.

  Launch delayed from original schedule of January 30, and was made just one day after the Columbia disaster resulted in a suspension of shuttle flights. Docked successfully with the ISS on 14:49 GMT on 4 February 2003. Undocked from Zvezda on August 27 and deorbited later the same day.

2003 June 8 - . 10:34 GMT - . *Launch Site*: Baikonur. *Launch Complex*: Baikonur LC1. *LV Family*: R-7. *Launch Vehicle*: Soyuz-U-PVB.

- **Progress M1-10** - . *Payload*: Progress M1 s/n 259. *Mass*: 7,270 kg (16,020 lb). *Nation*: Russia. *Agency*: RAKA. *Manufacturer*: Korolev bureau. *Program*: ISS. *Class*: Manned. *Type*: Manned logistics spacecraft. *Flight*: Soyuz TMA-2. *Spacecraft Bus*: Soyuz. *Spacecraft*: Progress M1. *Duration*: 117.06 days. *Decay Date*: 2003-10-03 . *USAF Sat Cat*: 27823 . *COSPAR*: 2003-025A. *Apogee*: 341 km (211 mi). *Perigee*: 247 km (153 mi). *Inclination*: 51.6000 deg. *Period*: 90.40 min.

  Resupply of International Space Station. Additional water carried to meet needs of skeleton crew. Successfully docked with the nadir port on Pirs at 1115 GMT on June

11. It undocked from the station on September 4 to clear the port for Soyuz TMA-3 but then unusually spent a month on an autonomous earth observation mission. The deorbit engine ignited at 11:26 GMT on October 3 from a 247 x 340 km x 51.6 deg orbit, reducing the perigee to 69 km. Progress M1-10 reentered the atmosphere over the Pacific at 11:58 GMT and broke up around 12:05 GMT.

2003 August 12 - . 14:20 GMT - . *Launch Site*: Baikonur. *Launch Complex*: Baikonur LC31. *LV Family*: R-7. *Launch Vehicle*: Soyuz-U-PVB.

- **Cosmos 2399** - . *Mass*: 6,750 kg (14,880 lb). *Nation*: Russia. *Agency*: VKS. *Class*: Surveillance. *Type*: Military surveillance satellite. *Spacecraft Bus*: Yantar. *Spacecraft*: Orlets-1. *Decay Date*: 2003-12-09 . *USAF Sat Cat*: 27856 . *COSPAR*: 2003-035A. *Apogee*: 289 km (179 mi). *Perigee*: 180 km (110 mi). *Inclination*: 64.9000 deg. *Period*: 89.20 min.

  Originally to have launched September 2002; June 2003. A Russian newspaper report (Kommersant, 13 August) stated that Cosmos 2399 was a Neman (Yantar-4KS1M) imaging satellite, which used data relay satellites to return CCD imagery rather than physically recovering film. However some Western observors, when Cosmos 2399 raised its perigee on August 14 to 205 km and lowered the apogee to 330 km, believed this was more like the standard operational orbit for an Orlets-1 Don 17F12 film-return capsule imaging satellite. This seemed confirmed when debris was tracked around the satellite later on, which was then said to be due to a failed film capsule recovery attempt. Destroyed in orbit on December 9 after completing its mission.

2003 August 29 - . 01:47 GMT - . *Launch Site*: Baikonur. *Launch Complex*: Baikonur LC1. *LV Family*: R-7. *Launch Vehicle*: Soyuz-U-PVB.

- **Progress M-48** - . *Payload*: Progress M s/n 248. *Mass*: 7,250 kg (15,980 lb). *Nation*: Russia. *Agency*: RAKA. *Program*: ISS. *Class*: Manned. *Type*: Manned logistics spacecraft. *Flight*: Soyuz TMA-2. *Spacecraft Bus*: Soyuz. *Spacecraft*: Progress M. *Duration*: 152.00 days. *Decay Date*: 2004-01-28 . *USAF Sat Cat*: 27873 . *COSPAR*: 2003-039A. *Apogee*: 383 km (237 mi). *Perigee*: 376 km (233 mi). *Inclination*: 51.6000 deg. *Period*: 92.10 min.

  Delayed from July 30, moved up from September 18 and August 30. Docked with the Zvezda module of the ISS on August 31. Undocked from the station at 08:36 GMT on 28 January 2004 after being filled with trash and unneeded equipment. Deorbited and reentered over the Pacific at 13:46 GMT.

2004 January 29 - . 11:58 GMT - . *Launch Site*: Baikonur. *Launch Complex*: Baikonur LC1. *LV Family*: R-7. *Launch Vehicle*: Soyuz-U-PVB.

- **Progress M1-11** - . *Payload*: Progress M1 s/n 260. *Mass*: 7,250 kg (15,980 lb). *Nation*: Russia. *Agency*: RAKA. *Manufacturer*: Korolev bureau. *Program*: ISS.

Class: Manned. *Type*: Manned logistics spacecraft. *Flight*: Soyuz TMA-3. *Spacecraft Bus*: Soyuz. *Spacecraft*: Progress M1. *Duration*: 116.00 days. *Decay Date*: 2004-06-03 . *USAF Sat Cat*: 28142 . *COSPAR*: 2004-002A. *Apogee*: 263 km (163 mi). *Perigee*: 192 km (119 mi). *Inclination*: 51.6500 deg. *Period*: 88.73 min.

ISS resupply, to dock at the Zvezda module of the station 13:15 GMT on 31 January. Launch delayed from November 20, 2003. Payload delivered amounted to 2345 kg and included a new flex hose for the Destiny module's leaky window, replacement parts for the Russian Elektron oxygen-generating unit, a spare Elektron, new Russian Solid Fuel Oxygen Generator candles, batteries for the Zarya and Zvezda modules, gas analyser equipment, updated fire suppression and detection equipment, a new Russian Orlan spacesuit, film, cameras, data cassettes and the Matreshka experiment package for installation on Zvezda's exterior during a spacewalk.

A few days prior to its departure from the ISS, ground controllers fired the Progress M1-11's engines for 11 minutes, boosting the Station's altitude by 3.7 km and adjusting its inclination by one one-hundredth of a degree. Progress M1-11 undocked from the Station at 11:19 GMT on 24 May 2005, clearing the way for the arrival of Progress M-49. It was thereafter commanded to a destructive re-entry over the Pacific Ocean.

2004 May 25 - . 12:34 GMT - . *Launch Site*: Baikonur. *Launch Complex*: Baikonur LC1. *LV Family*: R-7. *Launch Vehicle*: Soyuz-U-PVB.

- **Progress M-49** - . *Payload*: Progress M s/n 249. *Mass*: 7,283 kg (16,056 lb). *Nation*: Russia. *Agency*: RAKA. *Manufacturer*: Korolev bureau. *Program*: ISS. *Class*: Manned. *Type*: Manned logistics spacecraft. *Flight*: Soyuz TMA-4. *Spacecraft Bus*: Soyuz. *Spacecraft*: Progress M. *Duration*: 66.00 days. *Decay Date*: 2004-07-30 . *USAF Sat Cat*: 28261 . *COSPAR*: 2004-019A. *Apogee*: 367 km (228 mi). *Perigee*: 359 km (223 mi). *Inclination*: 51.6000 deg. *Period*: 91.80 min.

  Docked at the aft port of the Zvezda Service Module of the International Space Station on 27 May at 13:55 GMT. Delivered two and a half tons of food, water, fuel, spare parts and supplies. Progress M-49 undocked from the Zvezda module on 30 July 2004 at 7:05 GMT, after having been filled with a tonne of trash. Fincke filmed its departure, and Station exterior cameras captured rare footage of the Progress' fiery re-entry into Earth's atmosphere after it was deorbited.

2004 August 11 - . 05:01 GMT - . *Launch Site*: Baikonur. *Launch Complex*: Baikonur LC1. *LV Family*: R-7. *Launch Vehicle*: Soyuz-U-PVB.

- **Progress M-50** - . *Payload*: Progress M s/n 250. *Mass*: 7,250 kg (15,980 lb). *Nation*: Russia. *Agency*: RAKA. *Manufacturer*: Korolev bureau. *Program*: ISS. *Class*: Manned. *Type*: Manned logistics spacecraft. *Flight*: Soyuz TMA-4. *Spacecraft Bus*: Soyuz. *Spacecraft*: Progress M. *Duration*: 133.73 days. *Decay Date*: 2004-12-23

. *USAF Sat Cat*: 28399 . *COSPAR*: 2004-032A. *Apogee*: 365 km (226 mi). *Perigee*: 358 km (222 mi). *Inclination*: 51.6000 deg. *Period*: 91.80 min. Delayed from July 22 and 28. Docked with the International Space Station at 05:01 GMT on August 14. Undocked from the Zvezda module of the ISS on December 22 at 19:34 GMT and was deorbited over the Pacific at 22:32 GMT..

2004 September 24 - . 16:50 GMT - . *Launch Site*: Plesetsk. *Launch Complex*: Plesetsk LC16/2. *LV Family*: R-7. *Launch Vehicle*: Soyuz-U-PVB.

- **Cosmos 2410** - . *Mass*: 6,700 kg (14,700 lb). *Nation*: Russia. *Agency*: KVR. *Class*: Surveillance. *Type*: Military surveillance satellite. *Spacecraft Bus*: Yantar. *Spacecraft*: Yantar-4K1. *Duration*: 107.00 days. *Decay Date*: 2005-01-09 . *USAF Sat Cat*: 28396 . *COSPAR*: 2004-038A. *Apogee*: 348 km (216 mi). *Perigee*: 208 km (129 mi). *Inclination*: 67.1000 deg. *Period*: 90.10 min.

  Film-return reconnaisance satellite. Maneuvered on October 1 to a 213 x 330 km orbit. Believed to be an improved Yantar-4K1 with a longer lifetime - and given the code name 'Kobalt' previously applied to the defunct Yantar-4K2 system. When re-entry was commanded after only 107 days in orbit, there was speculation that problems had arisen with the satellite. Sources claimed the satellite had some kind of control problem, which was brought under control, and the two smaller film return capsules were successfully returned. But when the control problem reoccurred, it was decided to bring the main re-entry capsule down early. At retrofire, two objects were tracked as having separated from the spacecraft. Russian search teams were unable to locate the capsule after re-entry. Further launches of the satellite were put on hold until a State Commission could determine the causes of the failure.

2004 December 23 - . 22:19 GMT - . *Launch Site*: Baikonur. *Launch Complex*: Baikonur LC1. *LV Family*: R-7. *Launch Vehicle*: Soyuz-U-PVB.

- **Progress M-51** - . *Payload*: Progress M s/n 251. *Mass*: 7,250 kg (15,980 lb). *Nation*: Russia. *Agency*: RAKA. *Manufacturer*: Korolev bureau. *Program*: ISS. *Class*: Manned. *Type*: Manned logistics spacecraft. *Flight*: Soyuz TMA-5. *Spacecraft Bus*: Soyuz. *Spacecraft*: Progress M. *Duration*: 76.00 days. *Decay Date*: 2005-03-09 . *USAF Sat Cat*: 28503 . *COSPAR*: 2004-051A. *Apogee*: 355 km (220 mi). *Perigee*: 316 km (196 mi). *Inclination*: 51.6000 deg. *Period*: 91.20 min.

  Launch delayed from November 24, December 22 . Progress M-51 docked with the Zvezda module of the International Space Station on December 25 at 23:58 GMT, bringing critical food supplies to the EO-10 crew. Press hype during the delays prior to the launch had portrayed the situation as one where failure of the Progress to dock would have required the crew to either return to earth or starve.

  Undocked from at 16:06 GMT on February 27, 2005, in order to clear the port for Progress M-52, which would launch the next day. Progress M-51 lowered its perigee at around 18:30 GMT and remained in orbit for several days. FInally an engine firing

was commanded, bringing it down in a destructive re-entry over the Pacific Ocean on March 9.

2005 February 28 - . 19:09 GMT - . *Launch Site*: Baikonur. *Launch Complex*: Baikonur LC1. *LV Family*: R-7. *Launch Vehicle*: Soyuz-U-PVB.

- **Progress M-52** - . *Payload*: Progress M s/n 252. *Mass*: 7,250 kg (15,980 lb). *Nation*: Russia. *Agency*: RAKA. *Manufacturer*: Kozlov bureau. *Program*: ISS. *Class*: Manned. *Type*: Manned logistics spacecraft. *Flight*: Soyuz TMA-5. *Spacecraft Bus*: Soyuz. *Spacecraft*: Progress M. *Duration*: 107.20 days. *Decay Date*: 2005-06-16 . *USAF Sat Cat*: 28624 . *COSPAR*: 2005-007A. *Apogee*: 360 km (220 mi). *Perigee*: 350 km (210 mi). *Inclination*: 51.6000 deg. *Period*: 91.60 min. Docked with the Zvezda module of the International Space Station at 20:10 GMT on March 2. Undocked at 20:16 GMT on 15 June. Retrofire at 23:16 GMT lowered its perigee to 62 km, and resulting in a destructive re-entry over the Pacific at 23:57 GMT..

- **Nanosputnik** - . *Payload*: TEKh-42 / TNS-0 s/n 1. *Mass*: 5.00 kg (11.00 lb). *Nation*: Russia. *Agency*: RKA. *Program*: ISS. *Class*: Technology. *Type*: Navigation technology satellite. *Flight*: Soyuz TMA-5. *Spacecraft*: Nanosputnik. *Decay Date*: 2005-08-30 . *USAF Sat Cat*: 28547 . *COSPAR*: 2005-007C. *Apogee*: 353 km (219 mi). *Perigee*: 341 km (211 mi). *Inclination*: 51.6000 deg. *Period*: 91.50 min. Nanosatellite delivered by Progress M-52 to the International Space Station. 30 cm long, it was released from during a spacewalk on 28 March 2005..

2005 May 31 - . 12:00 GMT - . *Launch Site*: Baikonur. *Launch Complex*: Baikonur LC1. *LV Family*: R-7. *Launch Vehicle*: Soyuz-U-PVB.

- **Foton M-2** - . *Payload*: Foton 14. *Mass*: 6,535 kg (14,407 lb). *Nation*: Russia. *Agency*: RAKA. *Manufacturer*: Kozlov bureau. *Class*: Materials. *Type*: Materials science satellite. *Spacecraft Bus*: Vostok. *Spacecraft*: Foton. *Decay Date*: 2005-06-16 . *USAF Sat Cat*: 28686 . *COSPAR*: 2005-020A. *Apogee*: 304 km (188 mi). *Perigee*: 262 km (162 mi). *Inclination*: 63.0000 deg. *Period*: 89.93 min.

  Microgravity mission with the experiments being returned to earth after 16 days in a spherical Vostok capsule of the type that first carried Yuri Gagarin into space in 1961. The capsule landed in Kazakhstan at 07:36 GMT on 16 June. For this mission a 385 kg European payload of 39 experiments in fluid physics, biology, material science, meteoritics, radiation dosimetry and exobiology was carried. A further 215 kg of Russian instruments were also flown. Many were experiments were being reflown following loss of Foton-M1 on 15 October 2002. The planned Fotino miniature re-entry capsule experiment was not flown.

  Applied research included heat transfer experiments with the European FluidPac facility, chemical diffusion experiments in the SCCO (Soret Coefficients in Crude Oil), and material science investigations in the Agat and Polizon furnaces. These experiments were expected to contribute to new heat-exchanger designs, more

efficient oil exploration processes, and better semiconductor alloys. The Biopan facility carried life science experiments, including a student seed germination test.

2005 June 16 - . 23:10 GMT - . *Launch Site*: Baikonur. *Launch Complex*: Baikonur LC1. *LV Family*: R-7. *Launch Vehicle*: Soyuz-U-PVB.

- **Progress M-53** - . *Payload*: Progress M s/n 353. *Mass*: 7,250 kg (15,980 lb). *Nation*: Russia. *Agency*: RAKA. *Manufacturer*: Korolev bureau. *Program*: ISS. *Class*: Manned. *Type*: Manned logistics spacecraft. *Flight*: Soyuz TMA-6. *Spacecraft Bus*: Soyuz. *Spacecraft*: Progress M. *Duration*: 82.62 days. *Decay Date*: 2005-09-07 . *USAF Sat Cat*: 28700 . *COSPAR*: 2005-021A. *Apogee*: 353 km (219 mi). *Perigee*: 350 km (210 mi). *Inclination*: 51.6000 deg. *Period*: 91.60 min.

  Delayed from June 10. Space station resupply mission. After a communications failure, ISS Commander Krikalyov took manual remote control used the TORU system to guide Progress M-53 to a docking at the ISS Zvezda module at 00:42 GMT on 19 June. Undocked at 10:26 GMT on 7 September into a 350 km x 351 km orbit. Progress M-53 began retrofire at 13:26 GMT the same day, lowering its perigee to 56 km and thereby ensuring a destructive re-entry into the Pacific Ocean.

2005 September 2 - . 09:50 GMT - . *Launch Site*: Baikonur. *Launch Complex*: Baikonur LC31. *LV Family*: R-7. *Launch Vehicle*: Soyuz-U-PVB.

- **Cosmos 2415** - . *Payload*: Kometa s/n 21. *Mass*: 6,600 kg (14,500 lb). *Nation*: Russia. *Agency*: VKS. *Manufacturer*: Kozlov bureau. *Class*: Surveillance. *Type*: Cartographic satellite. *Spacecraft Bus*: Yantar. *Spacecraft*: Yantar-1KFT. *Duration*: 44.00 days. *Decay Date*: 2005-10-16 . *USAF Sat Cat*: 28841 . *COSPAR*: 2005-034A. *Apogee*: 272 km (169 mi). *Perigee*: 205 km (127 mi). *Inclination*: 64.9000 deg. *Period*: 89.30 min. 1,700th launch of a vehicle derived from the R-7 ICBM put a Kometa-type cartographic satellite into orbit. The surveillance satellite's primary camera and film payload was recovered at 21:44 on 15 or 16 October..

2005 September 8 - . 13:08 GMT - . *Launch Site*: Baikonur. *Launch Complex*: Baikonur LC1. *LV Family*: R-7. *Launch Vehicle*: Soyuz-U-PVB.

- **Progress M-54** - . *Payload*: Progress M s/n 354. *Mass*: 7,250 kg (15,980 lb). *Nation*: Russia. *Agency*: RAKA. *Manufacturer*: Kozlov bureau. *Program*: ISS. *Class*: Manned. *Type*: Manned logistics spacecraft. *Flight*: Soyuz TMA-6. *Spacecraft Bus*: Soyuz. *Spacecraft*: Progress M. *Duration*: 176.00 days. *Decay Date*: 2006-03-03 . *USAF Sat Cat*: 28866 . *COSPAR*: 2005-035A. *Apogee*: 348 km (216 mi). *Perigee*: 347 km (215 mi). *Inclination*: 51.6000 deg. *Period*: 91.50 min. Delayed from August 24. Resupply spacecraft which docked with the ISS Zvezda module at 14:42 GMT on 10 September. Undocked from the Zvezda module on March 3 2006 at 10:06 GMT and fired its engines to reenter over the Pacific at 13:05 GMT..

2005 December 21 - . 18:38 GMT - . *Launch Site*: Baikonur. *Launch Complex*: Baikonur LC1. *LV Family*: R-7. *Launch Vehicle*: Soyuz-U-PVB.

- **Progress M-55** - . *Payload*: Progress M s/n 355. *Mass*: 7,250 kg (15,980 lb). *Nation*: Russia. *Agency*: RAKA. *Manufacturer*: Korolev bureau. *Program*: ISS. *Class*: Manned. *Type*: Manned logistics spacecraft. *Flight*: Soyuz TMA-7. *Spacecraft Bus*: Soyuz. *Spacecraft*: Progress M. *Duration*: 179.96 days. *Decay Date*: 2006-06-19 . *USAF Sat Cat*: 28906 . *COSPAR*: 2005-047A. *Apogee*: 349 km (216 mi). *Perigee*: 336 km (208 mi). *Inclination*: 51.6000 deg. *Period*: 91.40 min. The resupply spacecraft docked with the ISS Pirs module at 19:46 GMT on 23 December. It undocked at 14:06 GMT on June 19, 2006; fired its engines at 17:06 GMT to lower its orbit into the atmosphere; and burned up over the Pacific Ocean at 17:41 GMT..

2006 April 24 - . 16:03 GMT - . *Launch Site*: Baikonur. *Launch Complex*: Baikonur LC1. *LV Family*: R-7. *Launch Vehicle*: Soyuz-U-PVB.

- **Progress M-56** - . *Payload*: Progress M s/n 356. *Mass*: 7,250 kg (15,980 lb). *Nation*: Russia. *Agency*: RAKA. *Manufacturer*: Korolev bureau. *Program*: ISS. *Class*: Manned. *Type*: Manned logistics spacecraft. *Flight*: Soyuz TMA-8. *Spacecraft Bus*: Soyuz. *Spacecraft*: Progress M. *Duration*: 157.35 days. *Decay Date*: 2006-09-19 . *USAF Sat Cat*: 29057 . *COSPAR*: 2006-013A. *Apogee*: 349 km (216 mi). *Perigee*: 336 km (208 mi). *Inclination*: 51.6000 deg. *Period*: 91.40 min. Progress M-56 docked at the Zvezda port of the International Space Station on 26 April at 17:41 GMT. It undocked at 00:28 GMT on 29 September and was then commanded to a destructive reentry over the south Pacific Ocean..

2006 May 3 - . 17:38 GMT - . *Launch Site*: Plesetsk. *Launch Complex*: Plesetsk LC16/2. *LV Family*: R-7. *Launch Vehicle*: Soyuz-U-PVB.

- **Cosmos 2420** - . *Payload*: Yantar 4K-2M. *Mass*: 6,700 kg (14,700 lb). *Nation*: Russia. *Agency*: VKS. *Manufacturer*: Kozlov bureau. *Class*: Surveillance. *Type*: Military surveillance radar satellite. *Spacecraft Bus*: Yantar. *Spacecraft*: Yantar-4K1. *Decay Date*: 2006-07-19 . *USAF Sat Cat*: 29111 . *COSPAR*: 2006-017A. *Apogee*: 349 km (216 mi). *Perigee*: 178 km (110 mi). *Inclination*: 67.1000 deg. *Period*: 89.80 min. Imaging reconnaissance satellite, probably the second Kobalt-M satellite, built by the Arsenal factory. The satellite carried small film recovery capsules and one large reentry vehicle, recovered at the end of the mission with the camera and more film..

2006 June 15 - . 08:00 GMT - . *Launch Site*: Baikonur. *Launch Complex*: Baikonur LC1. *LV Family*: R-7. *Launch Vehicle*: Soyuz-U-PVB.

- **Resurs DK-1** - . *Mass*: 7,250 kg (15,980 lb). *Nation*: Russia. *Agency*: RAKA. *Manufacturer*: Kozlov bureau. *Program*: Resurs. *Class*: Earth. *Type*: Earth resources satellite. *Spacecraft Bus*: Yantar. *Spacecraft*: Yantar-4KS1. *USAF Sat Cat*: 29228 . *COSPAR*: 2006-021A. *Apogee*: 585 km (363 mi). *Perigee*: 355 km (220 mi).

Inclination: 69.9000 deg. *Period*: 94.00 min.

Civilian remote sensing satellite with a one-meter-resolution-class Geoton-1 camera payload.that relayed its data to the ground via a digital link. It was based on the Terilen/Neman class military reconnaissance satellite in use since the 1980s, using the Yantar satellite bus.

2006 June 24 - . *Launch Site*: Baikonur. *Launch Complex*: Baikonur LC1. *LV Family*: R-7. *Launch Vehicle*: Soyuz-U-PVB.

- **Progress M-57** - . *Payload*: Progress M s/n 357. *Mass*: 7,250 kg (15,980 lb). *Nation*: Russia. *Agency*: RAKA. *Manufacturer*: Korolev bureau. *Program*: ISS. *Class*: Manned. *Type*: Manned logistics spacecraft. *Flight*: Soyuz TMA-8. *Spacecraft Bus*: Soyuz. *Spacecraft*: Progress M. *Duration*: 207.00 days. *Decay Date*: 2007-01-17 . *USAF Sat Cat*: 29245 . *COSPAR*: 2006-025A. *Apogee*: 349 km (216 mi). *Perigee*: 335 km (208 mi). *Inclination*: 51.6000 deg. *Period*: 91.30 min. The Progress flew International Space Station resupply mission 22P (NASA called the flight Progress 22). It docked at the ISS Pirs port at 16:25 GMT on June 26..

2006 September 14 - . 13:41 GMT - . *Launch Site*: Baikonur. *Launch Complex*: Baikonur LC31. *LV Family*: R-7. *Launch Vehicle*: Soyuz-U-PVB.

- **Cosmos 2423** - . *Mass*: 6,750 kg (14,880 lb). *Nation*: Russia. *Agency*: VKS. *Manufacturer*: Kozlov bureau. *Class*: Surveillance. *Type*: Military surveillance satellite. *Spacecraft Bus*: Yantar. *Spacecraft*: Orlets-1. *Duration*: 64.00 days. *Decay Date*: 2006-11-17 . *USAF Sat Cat*: 29402 . *COSPAR*: 2006-039A. *Apogee*: 306 km (190 mi). *Perigee*: 208 km (129 mi). *Inclination*: 64.9000 deg. *Period*: 89.70 min. Military surveillance; believed to be a derivative of the Orlets-1 multiple-capsule-return reconnaisance sattelite. Destroyed in orbit on November 17 at the end of its mission..

2006 October 23 - . 13:40 GMT - . *Launch Site*: Baikonur. *Launch Complex*: Baikonur LC1. *LV Family*: R-7. *Launch Vehicle*: Soyuz-U-PVB.

- **Progress M-58** - . *Payload*: Progress M s/n 358. *Mass*: 7,250 kg (15,980 lb). *Nation*: Russia. *Agency*: RAKA. *Manufacturer*: Korolev bureau. *Program*: ISS. *Class*: Manned. *Type*: Manned logistics spacecraft. *Flight*: Soyuz TMA-8. *Spacecraft Bus*: Soyuz. *Spacecraft*: Progress M. *Duration*: 155.38 days. *Decay Date*: 2007-03-28 . *USAF Sat Cat*: 29503 . *COSPAR*: 2006-045A. *Apogee*: 351 km (218 mi). *Perigee*: 321 km (199 mi). *Inclination*: 51.6000 deg. *Period*: 91.30 min.

  The Progress docked with the Zvezda module of the ISS at 14:29 GMT on October 26. There were indications that the Kurs rendezvous antenna on the forward docking ring had not retracted correctly, but this proved not to be the case. Hard dock was commanded at 18:06 GMT. Progress M-58 undocked from the Zvezda module on 27 March 2007 at 18:11 GMT and was deorbited at 22:44 GMT.

2007 January 18 - . 02:12 GMT - . *Launch Site*: Baikonur. *Launch Complex*: Baikonur LC1. *LV Family*: R-7. *Launch Vehicle*: Soyuz-U-PVB.

- **Progress M-59** - . *Payload*: Progress M s/n 359. *Mass*: 7,250 kg (15,980 lb). *Nation*: Russia. *Related Persons*: Lopez-Alegria, Tyurin, Williams. *Agency*: RAKA. *Manufacturer*: Korolev bureau. *Program*: ISS. *Class*: Manned. *Type*: Manned logistics spacecraft. *Flight*: Soyuz TMA-9, STS-117 ISS EO-15. *Spacecraft Bus*: Soyuz. *Spacecraft*: Progress M. *Duration*: 195.00 days. *Decay Date*: 2007-08-01 . *USAF Sat Cat*: 29714 . *COSPAR*: 2007-002A. *Apogee*: 351 km (218 mi). *Perigee*: 321 km (199 mi). *Inclination*: 51.6000 deg. *Period*: 91.30 min. Progress docked to the Pirs port of the ISS at 01:59 GMT on 20 January. The cargo craft brought up 780 kg of propellant for the Russian thrusters, 50 kg of oxygen and 1500 kg of spare parts, experiment hardware and life support components..

2007 May 12 - . 03:25 GMT - . *Launch Site*: Baikonur. *Launch Complex*: Baikonur LC1. *LV Family*: R-7. *Launch Vehicle*: Soyuz-U-PVB.

- **Progress M-60** - . *Payload*: Progress M s/n 360. *Mass*: 7,280 kg (16,040 lb). *Nation*: Russia. *Related Persons*: Kotov, Williams, Yurchikhin. *Agency*: RAKA. *Manufacturer*: Korolev bureau. *Program*: ISS. *Class*: Manned. *Type*: Manned logistics spacecraft. *Flight*: Soyuz TMA-10, STS-117 ISS EO-15. *Spacecraft Bus*: Soyuz. *Spacecraft*: Progress M. *Duration*: 136.65 days. *Decay Date*: 2007-09-25 . *USAF Sat Cat*: 31393 . *COSPAR*: 2007-017A. *Apogee*: 341 km (211 mi). *Perigee*: 330 km (200 mi). *Inclination*: 51.6000 deg. *Period*: 91.20 min.

  Space station resupply spacecraft which docked with the Zvezda port of the International Space Station at 05:10 GMT on 15 May. It undocked on 19 September was conducted plasma depletion experiments before being deorbited over the Pacific at 19:01 GMT on 25 September..

2007 June 7 - . 18:00 GMT - . *Launch Site*: Plesetsk. *LV Family*: R-7. *Launch Vehicle*: Soyuz-U-PVB.

- **Cosmos 2427** - . *Mass*: 6,700 kg (14,700 lb). *Nation*: Russia. *Agency*: VKS. *Manufacturer*: Kozlov bureau. *Class*: Surveillance. *Type*: Military surveillance satellite. *Spacecraft Bus*: Yantar. *Spacecraft*: Yantar-4K1. *Duration*: 76.13 days. *Decay Date*: 2007-08-22 . *USAF Sat Cat*: 31595 . *COSPAR*: 2007-022A. *Apogee*: 339 km (210 mi). *Perigee*: 167 km (103 mi). *Inclination*: 67.1000 deg. *Period*: 89.80 min.

  Recoverable capsule military optical reconnaisance satellite. Orbit was raised on 11 June to 182 km x 354 km; decayed until 19 June, when it was lowered to 175 km x 325 km. On 28 June the orbit was raised to 183 km x 348 km; on 5 July to 169 km x 375 km. Landed at 21:00 GMT on 22 August after a 76-day mission.

2007 August 2 - . 17:33 GMT - . *Launch Site*: Baikonur. *Launch Complex*: Baikonur LC1.

LV Family: R-7. *Launch Vehicle*: Soyuz-U-PVB.

- **Progress M-61** - . *Payload*: Progress M s/n 361. *Mass*: 7,200 kg (15,800 lb). *Nation*: Russia. *Agency*: RAKA. *Manufacturer*: Korolev bureau. *Program*: ISS. *Class*: Manned. *Type*: Manned logistics spacecraft. *Flight*: Soyuz TMA-10, STS-117 ISS EO-15. *Spacecraft Bus*: Soyuz. *Spacecraft*: Progress M. *Duration*: 173.00 days. *Decay Date*: 2008-01-22 . *USAF Sat Cat*: 32001 . *COSPAR*: 2007-033A. *Apogee*: 346 km (214 mi). *Perigee*: 334 km (207 mi). *Inclination*: 51.6000 deg. *Period*: 91.30 min.

  International space station resupply; docked with the Pirs module at 18:40 GMT on 5 August. Undocked at 03:59 GMT on 22 December to clear port for Progress M-62 launched the next day. Deorbited over the Pacific on 22 January 2008 after a month of free flight carrying out the Plazma-Progress experiment.

2007 September 14 - . 11:00 GMT - . *Launch Site*: Baikonur. *Launch Complex*: Baikonur LC1. *LV Family*: R-7. *Launch Vehicle*: Soyuz-U-PVB.

- **Foton M-3** - . *Mass*: 6,500 kg (14,300 lb). *Nation*: Russia. *Agency*: RAKA. *Manufacturer*: Kozlov bureau. *Class*: Materials. *Type*: Materials science satellite. *Spacecraft Bus*: Vostok. *Spacecraft*: Foton. *Decay Date*: 2007-09-26 . *USAF Sat Cat*: 32058 . *COSPAR*: 2007-040A. *Apogee*: 280 km (170 mi). *Perigee*: 258 km (160 mi). *Inclination*: 62.9000 deg. *Period*: 89.90 min.

  Recoverable spacecraft derived from the Vostok. Carried Russian and European microgravy, life sciences and technology experiments. After deploying the YES-2 tether on 25 September, Foton M-3 was deorbited at 07:23 GMT on 26 September and successfully landed at 07:58 GMT in Kazakhstan.

- **YES-2** - . *Payload*: Young Engineers Satellite. *Mass*: 5.00 kg (11.00 lb). *Nation*: Europe. *Agency*: ESA. *Manufacturer*: ESTEC. *Class*: Technology. *Type*: Navigation technology satellite. *Spacecraft*: YES. *COSPAR*: 2007-040x.

  YES-2/Fotino space tether for re-entry experiment. The YES-2 tether was deployed from the Nauka module at the front end of Foton at 04:47 on 25 September, and releaed at 07:20 after reaching only 8.5 km of the planned 30 km tether length. The 5 kg Fotino reentry capsule separated from the MASS data support system at the end of the tether at around 07:30. The idea was to toss the Fotino against the direction of orbital motion to push it into a lower orbit and re-entry without the need for a retrorocket. Unfortunately the final outcome of the experiment remained unknown.

2007 December 23 - . 07:12 GMT - . *Launch Site*: Baikonur. *Launch Complex*: Baikonur LC1. *LV Family*: R-7. *Launch Vehicle*: Soyuz-U-PVB.

- **Progress M-62** - . *Payload*: Progress M s/n 362. *Mass*: 7,130 kg (15,710 lb). *Nation*: Russia. *Agency*: RAKA. *Manufacturer*: Korolev bureau. *Program*: ISS.

Class: Manned. *Type*: Manned logistics spacecraft. *Flight*: Soyuz TMA-11, STS-120 ISS EO-16. *Spacecraft Bus*: Soyuz. *Spacecraft*: Progress M. *Duration*: 54.11 days. *Decay Date*: 2008-02-15 . *USAF Sat Cat*: 32391 . *COSPAR*: 2007-064B. *Apogee*: 341 km (211 mi). *Perigee*: 333 km (206 mi). *Inclination*: 51.6000 deg. *Period*: 91.30 min.

Resupply spacecraft that docked with the Pirs port of the International Space Station at 08:14 GMT on 26 December. Undocked on 4 February 2008 at 10:32 GMT and then carried out Earth observations for ten days before being deorbited on 15 February at 09:44 GMT.

2008 February 5 - . 13:03 GMT - . *Launch Site*: Baikonur. *LV Family*: R-7. *Launch Vehicle*: Soyuz-U-PVB.

- **Progress M-63** - . *Payload*: Progress M s/n 363. *Mass*: 7,130 kg (15,710 lb). *Nation*: Russia. *Agency*: RKA. *Program*: ISS. *Class*: Manned. *Type*: Manned logistics spacecraft. *Flight*: Soyuz TMA-11, STS-120 ISS EO-16. *Spacecraft Bus*: Soyuz. *Spacecraft*: Progress M. *Duration*: 61.96 days. *Decay Date*: 2008-04-07 12:00:00 . *USAF Sat Cat*: 32484 . *COSPAR*: 2008-004A. *Apogee*: 339 km (210 mi). *Perigee*: 338 km (210 mi). *Inclination*: 51.6000 deg. *Period*: 91.30 min. Docked with the ISS at the Pirs module on 7 February at 14:38 GMT. Undocked on 7 April at 08:49 GMT and was deorbited over the Pacific later the same day..

2008 May 14 - . 20:23 GMT - . *Launch Site*: Baikonur. *Launch Complex*: Baikonur LC1. *LV Family*: R-7. *Launch Vehicle*: Soyuz-U-PVB.

- **Progress M-64** - . *Payload*: Progress M s/n 364. *Mass*: 7,056 kg (15,555 lb). *Nation*: Russia. *Agency*: RKA. *Program*: ISS. *Class*: Manned. *Type*: Manned logistics spacecraft. *Flight*: Soyuz TMA-12, STS-123 ISS EO-16. *Spacecraft Bus*: Soyuz. *Spacecraft*: Progress M. *Duration*: 137.02 days. *Decay Date*: 2008-09-08 . *USAF Sat Cat*: 32847 . *COSPAR*: 2008-023A. *Apogee*: 343 km (213 mi). *Perigee*: 336 km (208 mi). *Inclination*: 51.6000 deg. *Period*: 91.30 min.

  Unmanned space station resupply mission. Docked with the International Space Station at the Zarya port on 16 May. Undocked on 1 September at 19:47 GMT. It then flew for a week in independent orbit, carrying out the Plazma-Progress experiment. On 8 September at 20:47 GMT it was deorbited to destruction over the Pacific Ocean.

2008 September 10 - . 19:50 GMT - . *Launch Site*: Baikonur. *Launch Complex*: Baikonur LC1. *LV Family*: R-7. *Launch Vehicle*: Soyuz-U-PVB.

- **Progress M-65** - . *Payload*: Progress M s/n 365. *Mass*: 7,100 kg (15,600 lb). *Nation*: Russia. *Agency*: RKA. *Program*: ISS. *Class*: Manned. *Type*: Manned logistics spacecraft. *Flight*: Soyuz TMA-12, STS-124 ISS EO-17. *Spacecraft Bus*: Soyuz. *Spacecraft*: Progress M. *Duration*: 88.00 days. *Decay Date*: 2008-12-07 . *USAF Sat Cat*: 33340 . *COSPAR*: 2008-043A. *Apogee*: 357 km (221 mi). *Perigee*:

348 km (216 mi). *Inclination*: 51.6000 deg. *Period*: 91.60 min.

Docking with the ISS at the Zvezda module was delayed due to NASA Houston operations being curtailed during Hurricane Ike. The resupply spacecraft finally docked at 18:43 GMT on 27 September. It undocked at 16:20 GMT on 14 November, but then flew independently in orbit until 7 December in order to conduct continue ionospheric experiments.

2008 November 14 - . 15:50 GMT - . *Launch Site*: Plesetsk. *Launch Complex*: Plesetsk LC16/2. *LV Family*: R-7. *Launch Vehicle*: Soyuz-U-PVB.

- **Cosmos 2445** - . *Mass*: 6,600 kg (14,500 lb). *Nation*: Russia. *Agency*: KVR. *Class*: Surveillance. *Type*: Military surveillance satellite. *Spacecraft Bus*: Yantar. *Spacecraft*: Yantar-4K1. *Decay Date*: 2009-02-23 . *USAF Sat Cat*: 33439 . *COSPAR*: 2008-058A. *Apogee*: 327 km (203 mi). *Perigee*: 181 km (112 mi). *Inclination*: 67.2000 deg. *Period*: 89.60 min. Recoverable reconnaisance satellite. Launched annually since 2005 with a typical 75 to 100 day mission, with recovery on an interim basis of two film capsules and final deorbiting of the camera and main film magazine..

2008 November 26 - . 12:38 GMT - . *Launch Site*: Baikonur. *Launch Complex*: Baikonur LC1. *LV Family*: R-7. *Launch Vehicle*: Soyuz-U-PVB.

- **Progress M-01M** - . *Payload*: Progress M s/n 401. *Mass*: 7,290 kg (16,070 lb). *Nation*: Russia. *Agency*: RKA. *Program*: ISS. *Class*: Manned. *Type*: Manned logistics spacecraft. *Flight*: Soyuz TMA-13, STS-126 ISS EO-18. *Spacecraft Bus*: Soyuz. *Spacecraft*: Progress M. *Duration*: 74.00 days. *Decay Date*: 2009-02-08 . *USAF Sat Cat*: 33443 . *COSPAR*: 2008-060A. *Apogee*: 362 km (224 mi). *Perigee*: 352 km (218 mi). *Inclination*: 51.6000 deg. *Period*: 91.70 min. ISS resupply spacecraft, a modernized version of Progress with a digital control system, docked at the Pirs port of the station on 30 November..

2009 February 10 - . 05:49 GMT - . *Launch Site*: Baikonur. *Launch Complex*: Baikonur LC31. *LV Family*: R-7. *Launch Vehicle*: Soyuz-U-PVB.

- **Progress M-66** - . *Payload*: Progress M s/n 366. *Mass*: 7,250 kg (15,980 lb). *Nation*: Russia. *Agency*: RKA. *Program*: ISS. *Class*: Manned. *Type*: Manned logistics spacecraft. *Flight*: Soyuz TMA-13, STS-126 ISS EO-18. *Spacecraft Bus*: Soyuz. *Spacecraft*: Progress M. *Duration*: 97.00 days. *Decay Date*: 2009-05-18 . *USAF Sat Cat*: 33593 . *COSPAR*: 2009-006A. *Apogee*: 357 km (221 mi). *Perigee*: 342 km (212 mi). *Inclination*: 51.6000 deg. *Period*: 91.50 min. ISS resupply. Docked with the ISS at 07:18 GMT on 13 February. Undocked at 15:18 on 6 May and destroyed over the Pacific on 18 May..

2009 April 29 - . 16:58 GMT - . *Launch Site*: Plesetsk. *LV Family*: R-7. *Launch Vehicle*:

Soyuz-U-PVB.

- **Cosmos 2450** - . *Mass*: 6,600 kg (14,500 lb). *Nation*: Russia. *Agency*: KVR. *Class*: Surveillance. *Type*: Military surveillance satellite. *Spacecraft Bus*: Yantar. *Spacecraft*: Yantar-4K1. *Duration*: 90.00 days. *Decay Date*: 2009-07-27 . *USAF Sat Cat*: 34871 . *COSPAR*: 2009-022A. *Apogee*: 282 km (175 mi). *Perigee*: 180 km (110 mi). *Inclination*: 67.1000 deg. *Period*: 89.10 min. Return film capsule optical reconnaisance satellite. Landed on 27 July..

2009 May 7 - . 18:37 GMT - . *Launch Site*: Baikonur. *Launch Complex*: Baikonur LC1. *LV Family*: R-7. *Launch Vehicle*: Soyuz-U-PVB.

- **Progress M-02M** - . *Payload*: Progress M s/n 402. *Mass*: 7,120 kg (15,690 lb). *Nation*: Russia. *Agency*: RKA. *Program*: ISS. *Class*: Manned. *Type*: Manned logistics spacecraft. *Flight*: Soyuz TMA-14. *Spacecraft Bus*: Soyuz. *Spacecraft*: Progress M. *Duration*: 67.00 days. *Decay Date*: 2009-07-13 . *USAF Sat Cat*: 34905 . *COSPAR*: 2009-024A. *Apogee*: 348 km (216 mi). *Perigee*: 337 km (209 mi). *Inclination*: 51.6000 deg. *Period*: 91.40 min.

  ISS logistics flight. Docked with the Pirs module of the ISS on 12 May at 19:24. Undocked with ISS on 30 June, conducted scientific experiments, then made a second rendezvous with the ISS at the Zvezda module to test docking systems for the upcoming Mini-Research Module 2. Backed away after getting within 10 m of the station. Retrofire on 13 July followed by burn up over the Pacific at 16:28 GMT.

2009 July 24 - . 10:56 GMT - . *Launch Site*: Baikonur. *Launch Complex*: Baikonur LC1. *LV Family*: R-7. *Launch Vehicle*: Soyuz-U-PVB.

- **Progress M-67** - . *Payload*: Progress M s/n 367. *Mass*: 7,285 kg (16,060 lb). *Nation*: Russia. *Agency*: RKA. *Program*: ISS. *Class*: Manned. *Type*: Manned logistics spacecraft. *Flight*: Soyuz TMA-14, Soyuz TMA-15. *Spacecraft Bus*: Soyuz. *Spacecraft*: Progress M. *Duration*: 65.00 days. *Decay Date*: 2009-09-27 . *USAF Sat Cat*: 35641 . *COSPAR*: 2009-040A. *Apogee*: 354 km (219 mi). *Perigee*: 344 km (213 mi). *Inclination*: 51.6000 deg. *Period*: 91.50 min. Docked at the Zvezda port of the International Space Station at 11:12 GMT on 29 July. Undocked and was deorbited over the Pacific Ocean on 27 September at 09:33 GMT..

2009 October 15 - . 01:14 GMT - . *Launch Site*: Baikonur. *Launch Complex*: Baikonur LC1. *LV Family*: R-7. *Launch Vehicle*: Soyuz-U-PVB.

- **Progress M-03M** - . *Payload*: Progress M s/n 403. *Mass*: 7,200 kg (15,800 lb). *Nation*: Russia. *Agency*: RKA. *Program*: ISS. *Class*: Manned. *Type*: Manned logistics spacecraft. *Flight*: Soyuz TMA-15, Soyuz TMA-16. *Spacecraft Bus*: Soyuz. *Spacecraft*: Progress M. *Duration*: 194.00 days. *Decay Date*: 2010-05-03 . *USAF Sat Cat*: 35948 . *COSPAR*: 2009-056A. *Apogee*: 348 km (216 mi). *Perigee*: 314 km (195 mi). *Inclination*: 51.6000 deg. *Period*: 91.20 min. Docked at the Pirs module of the

International Space Station at 01:41 GMT on 18 October..

2009 November 10 - . 14:22 GMT - . *Launch Site*: Baikonur. *LV Family*: R-7. *Launch Vehicle*: Soyuz-U-PVB.

- **Poisk** - . *Payload*: Progress M s/n 302 / 240GK s/n 2L. *Mass*: 3,670 kg (8,090 lb). *Nation*: Russia. *Agency*: RKA. *Class*: Manned. *Type*: Manned logistics spacecraft. *Spacecraft Bus*: Soyuz. *Spacecraft*: Progress M-SO. *USAF Sat Cat*: 36086 . *COSPAR*: 2009-060A. *Perigee*: 11 km (6 mi).

  Docking/research module for the ISS, consisting of a pressurized Small Research Module and a Progress M service module. Docked at the zenith port of the Zvezda module of the ISS at 15:41 GMT on 12 November. On 8 December at 00:16 GMT the service module separated from Small Research Module, leaving the docking port clear for future spacecraft visiting the ISS. At 04:48 GMT the service module retrofired into a descructive reentry over the Pacific at 05:27 GMT.

2009 November 20 - . 10:44 GMT - . *Launch Site*: Plesetsk. *LV Family*: R-7. *Launch Vehicle*: Soyuz-U-PVB.

- **Cosmos 2455** - . *Payload*: Lotos-S. *Mass*: 6,620 kg (14,590 lb). *Nation*: Russia. *Agency*: KVR. *Class*: Surveillance. *Type*: ELINT. *Spacecraft*: Lotos-S. *USAF Sat Cat*: 36095 . *COSPAR*: 2009-063A. *Apogee*: 908 km (564 mi). *Perigee*: 902 km (560 mi). *Inclination*: 67.2000 deg. *Period*: 103.10 min.

  First Lotos-S electronic intelligence satellite, built by TsSKB-Progress, Samara and KB Arsenal, Saint Petersburg, using the same bus as the Resurs-DK optical remote sensing satellites. Maneuvered from an initial orbit of 199 km x 904 km x 67.2 deg to operational orbit of 903 km x 906 km on 23 November.

2010 February 3 - . 03:45 GMT - . *Launch Site*: Baikonur. *Launch Complex*: Baikonur LC1. *LV Family*: R-7. *Launch Vehicle*: Soyuz-U-PVB.

- **Progress M-04M** - . *Payload*: Progress M s/n 404 / ISS-36P. *Mass*: 7,400 kg (16,300 lb). *Nation*: Russia. *Agency*: RKA. *Program*: ISS. *Class*: Manned. *Type*: Manned logistics spacecraft. *Flight*: Soyuz TMA-16, Soyuz TMA-17. *Spacecraft Bus*: Soyuz. *Spacecraft*: Progress M. *Duration*: 148.42 days. *Decay Date*: 2010-07-01 . *USAF Sat Cat*: 36361 . *COSPAR*: 2010-003A. *Apogee*: 353 km (219 mi). *Perigee*: 346 km (214 mi). *Inclination*: 51.6000 deg. *Period*: 91.50 min. Undocked from the Zvezda module of the ISS on 10 May 2010. Conducted free-flight experiments until deorbited at 13:54 GMT on 1 July..

2010 April 16 - . 15:00 GMT - . *Launch Site*: Plesetsk. *LV Family*: R-7. *Launch Vehicle*: Soyuz-U-PVB.

- **Cosmos 2462** - . *Mass*: 6,900 kg (15,200 lb). *Nation*: Russia. *Agency*: KVR. *Class*: Surveillance. *Type*: Military surveillance satellite. *Spacecraft Bus*: Yantar. *Spacecraft*: Yantar-4K1. *Duration*: 95.76 days. *Decay Date*: 2010-07-21 . *USAF Sat Cat*: 36511 . *COSPAR*: 2010-014A. *Apogee*: 270 km (160 mi). *Perigee*: 180 km (110 mi). *Inclination*: 67.2000 deg. *Period*: 89.00 min. Recoverable optical surveillance satellite. Secondary recoverable film capsules probably recovered on 9 June and 18 July. Main spacecraft reentry vehicle landed at 09:10 GMT on 21 July 2010..

2010 April 28 - . 17:15 GMT - . *Launch Site*: Baikonur. *Launch Complex*: Baikonur LC1. *LV Family*: R-7. *Launch Vehicle*: Soyuz-U-PVB.

- **Progress M-05M** - . *Payload*: Progress M s/n 405 / ISS-37P. *Mass*: 7,400 kg (16,300 lb). *Nation*: Russia. *Agency*: RKA. *Program*: ISS. *Class*: Manned. *Type*: Manned logistics spacecraft. *Flight*: Soyuz TMA-17, Soyuz TMA-18, Soyuz TMA-18. *Spacecraft Bus*: Soyuz. *Spacecraft*: Progress M. *Duration*: 201.00 days. *Decay Date*: 2010-11-15 . *USAF Sat Cat*: 36521 . *COSPAR*: 2010-018A. *Apogee*: 361 km (224 mi). *Perigee*: 350 km (210 mi). *Inclination*: 51.6000 deg. *Period*: 91.60 min. Undocked from the Pirs module of the ISS on 25 October 2010 at 14:22 GMT and was deorbited over the Pacific on 15 November 2010 after three weeks of independent flight..

2010 June 30 - . 15:35 GMT - . *Launch Site*: Baikonur. *Launch Complex*: Baikonur LC1. *LV Family*: R-7. *Launch Vehicle*: Soyuz-U-PVB.

- **Progress M-06M** - . *Payload*: Progress M s/n 406 / ISS-38P. *Mass*: 7,250 kg (15,980 lb). *Nation*: Russia. *Agency*: RKA. *Program*: ISS. *Class*: Manned. *Type*: Manned logistics spacecraft. *Flight*: Soyuz TMA-18, Soyuz TMA-19. *Spacecraft Bus*: Soyuz. *Spacecraft*: Progress M. *Duration*: 67.86 days. *Decay Date*: 2010-07-14 . *USAF Sat Cat*: 36748 . *COSPAR*: 2010-033A. *Apogee*: 361 km (224 mi). *Perigee*: 350 km (210 mi). *Inclination*: 51.6000 deg. *Period*: 91.60 min.

  First docking attempt with the ISS on 2 July aborted due to radio interference. Successfully docked with the ISS at the Zvezda module on 4 July at 16:17 GMT. Undocked from the Zvezda module of the ISS at 11:21 GMT on 31 August 2010. Conducted experiments in free flight until deorbited at 12:13 GMT on 6 September.

2010 September 10 - . 10:22 GMT - . *Launch Site*: Baikonur. *Launch Complex*: Baikonur LC31. *LV Family*: R-7. *Launch Vehicle*: Soyuz-U-PVB.

- **Progress M-07M** - . *Payload*: Progress M s/n 407 / ISS-39P. *Mass*: 7,250 kg (15,980 lb). *Nation*: Russia. *Agency*: RKA. *Program*: ISS. *Class*: Manned. *Type*: Manned logistics spacecraft. *Flight*: Soyuz TMA-18, Soyuz TMA-19. *Spacecraft Bus*: Soyuz. *Spacecraft*: Progress M. *Duration*: 163.00 days. *Decay Date*: 2011-02-20 . *USAF Sat Cat*: 37156 . *COSPAR*: 2010-044A. *Apogee*: 355 km (220 mi). *Perigee*: 350 km (210 mi). *Inclination*: 51.6000 deg. *Period*: 91.60 min. Docked at the Zvezda module of the ISS at 11:58 GMT on 12 September 2010. Undocked from Zvezda on

20 February 2011 at 13:12 GMT and deorbited over the Pacific at 16:12 GMT..

2010 October 27 - . 15:11 GMT - . *Launch Site*: Baikonur. *Launch Complex*: Baikonur LC1. *LV Family*: R-7. *Launch Vehicle*: Soyuz-U-PVB.

- **Progress M-08M** - . *Payload*: Progress M s/n 408 / ISS-40P. *Mass*: 7,250 kg (15,980 lb). *Nation*: Russia. *Agency*: RKA. *Program*: ISS. *Class*: Manned. *Type*: Manned logistics spacecraft. *Flight*: Soyuz TMA-01M, Soyuz TMA-19. *Spacecraft Bus*: Soyuz. *Spacecraft*: Progress M. *Duration*: 88.59 days. *Decay Date*: 2011-01-24 . *USAF Sat Cat*: 37196 . *COSPAR*: 2010-055A. *Apogee*: 355 km (220 mi). *Perigee*: 352 km (218 mi). *Inclination*: 51.6000 deg. *Period*: 91.60 min. Undocked from the Pirs module of the ISS at 00:42 GMT on 24 January 2011 and deorbited over the Pacific at 05:16 GMT the same day..

2011 January 28 - . 01:31 GMT - . *Launch Site*: Baikonur. *Launch Complex*: Baikonur LC1. *LV Family*: R-7. *Launch Vehicle*: Soyuz-U-PVB.

- **Progress M-09M** - . *Payload*: Progress M s/n 409 / ISS-41P. *Mass*: 7,250 kg (15,980 lb). *Nation*: Russia. *Agency*: RKA. *Program*: ISS. *Class*: Manned. *Type*: Manned logistics spacecraft. *Flight*: Soyuz TMA-01M, Soyuz TMA-20. *Spacecraft Bus*: Soyuz. *Spacecraft*: Progress M. *Duration*: 88.00 days. *Decay Date*: 2011-04-26 . *USAF Sat Cat*: 37359 . *COSPAR*: 2011-004A. *Apogee*: 345 km (214 mi). *Perigee*: 270 km (160 mi). *Inclination*: 51.6000 deg. *Period*: 90.70 min. Undocked from the Pirs module of the ISS on 22 April at 11:41 GMT and deorbited over the Pacific on 26 April..

2011 April 27 - . 13:05 GMT - . *Launch Site*: Baikonur. *Launch Complex*: Baikonur LC1. *LV Family*: R-7. *Launch Vehicle*: Soyuz-U-PVB.

- **Progress M-10M** - . *Payload*: Progress M s/n 410 / ISS-42P. *Mass*: 7,250 kg (15,980 lb). *Nation*: Russia. *Agency*: RKA. *Program*: ISS. *Class*: Manned. *Type*: Manned logistics spacecraft. *Flight*: Soyuz TMA-20, Soyuz TMA-21. *Spacecraft Bus*: Soyuz. *Spacecraft*: Progress M. *Duration*: 185.00 days. *Decay Date*: 2011-10-29 . *USAF Sat Cat*: 37396 . *COSPAR*: 2011-017A. *Apogee*: 347 km (215 mi). *Perigee*: 343 km (213 mi). *Inclination*: 51.6000 deg. *Period*: 91.40 min. Docked with the ISS Pirs module at 14:28 GMT on 29 April. Undocked at 09:04 GMT on 29 October. Following retrofire at 12:10 GMT it was destroyed on reentry over the Pacific at 12:48 GMT..

2011 June 21 - . 14:38 GMT - . *Launch Site*: Baikonur. *Launch Complex*: Baikonur LC1. *LV Family*: R-7. *Launch Vehicle*: Soyuz-U-PVB.

- **Progress M-11M** - . *Payload*: Progress M s/n 411 / ISS-43P. *Mass*: 7,250 kg (15,980 lb). *Nation*: Russia. *Agency*: RKA. *Program*: ISS. *Class*: Manned. *Type*: Manned logistics spacecraft. *Flight*: Soyuz TMA-02M, Soyuz TMA-21. *Spacecraft*

Bus: Soyuz. *Spacecraft*: Progress M. *Duration*: 71.79 days. *Decay Date*: 2011-09-01 . *USAF Sat Cat*: 37679 . *COSPAR*: 2011-027A. *Apogee*: 383 km (237 mi). *Perigee*: 343 km (213 mi). *Inclination*: 51.6000 deg. *Period*: 91.80 min.

ISS resupply. Also carried the 40 kg Chibis satellite. Docked with the Zvezda module of the ISS on 23 June at 16:37 GMT. Undocked from Zvezda at 09:38 GMT on 23 August. After several maneuvers to carry out the Radar-4 experiment, deorbited over the Pacific at 09:34 GMT on 1 September.

2011 June 27 - . 16:00 GMT - . *Launch Site*: Plesetsk. *Launch Complex*: Plesetsk LC16/2. *LV Family*: R-7. *Launch Vehicle*: Soyuz-U-PVB.

- **Cosmos 2472** - . *Mass*: 6,700 kg (14,700 lb). *Nation*: Russia. *Class*: Surveillance. *Type*: Military surveillance satellite. *Spacecraft Bus*: Yantar. *Spacecraft*: Yantar-4K1. *Duration*: 191.20 days. *Decay Date*: 2011-10-24 . *USAF Sat Cat*: 37726 . *COSPAR*: 2011-028A. *Apogee*: 338 km (210 mi). *Perigee*: 217 km (134 mi). *Inclination*: 81.4000 deg. *Period*: 88.90 min.

  Optical surveillance satellite. First launch into this inclination since 1994. Probably jettisoned two recoverable film capsules during the mission. Six reboosts during the mission maintained a 210 km x 250 km observation orbit. The main spacecraft landed at 20:48 GMT on 24 October.

2011 August 24 - . 13:00 GMT - . *Launch Site*: Baikonur. *Launch Complex*: Baikonur LC1. *LV Family*: R-7. *Launch Vehicle*: Soyuz-U-PVB. *FAILURE*: Five minutes and 25 seconds into flight, during the burn of the booster's third stage, the engine's gas generator failed and the engine shut down. The upper stage and spacecraft crashed in the Gorno-Altai region.. *Failed Stage*: 3.

- **Progress M-12M** - . *Payload*: Progress M s/n 412 / ISS-44P. *Mass*: 7,250 kg (15,980 lb). *Nation*: Russia. *Agency*: RKA. *Program*: ISS. *Class*: Manned. *Type*: Manned logistics spacecraft. *Flight*: Soyuz TMA-02M, Soyuz TMA-21. *Spacecraft Bus*: Soyuz. *Spacecraft*: Progress M.

  ISS resupply mission. The Progress M failed to reach orbit. Five minutes and 25 seconds into flight, during the burn of the booster's third stage, the engine's gas generator failed and the engine shut down. The upper stage and spacecraft crashed in the Gorno-Altai region of Russia. First ever failure of a Progress spacecraft to dock with a space station in its 135-mission history. The six crew aboard the ISS had sufficient supplies, but the mishap delayed the launch of the Expedition 29 replacement crew until the cause of the failure was understood and the Soyuz launch vehicle cleared again for manned launches. The return to Earth of the first half of the Expedition 28 crew has also delayed to mid-September, meaning the station would be reduced to a three-person crew for a time.

2011 October 30 - . 10:11 GMT - . *Launch Site*: Baikonur. *Launch Complex*: Baikonur

LC1. *LV Family*: R-7. *Launch Vehicle*: Soyuz-U-PVB.

- **Progress M-13M** - . *Payload*: Progress M s/n 413 / ISS-45P. *Mass*: 7,250 kg (15,980 lb). *Nation*: Russia. *Agency*: RKA. *Program*: ISS. *Class*: Manned. *Type*: Manned logistics spacecraft. *Flight*: Soyuz TMA-02M. *Spacecraft Bus*: Soyuz. *Spacecraft*: Progress M. *Duration*: 87.00 days. *Decay Date*: 2012-01-25 . *USAF Sat Cat*: 37857 . *COSPAR*: 2011-062A. *Apogee*: 403 km (250 mi). *Perigee*: 374 km (232 mi). *Inclination*: 51.6000 deg. *Period*: 92.30 min.

  Space station resupply. Docked with the Pirs module of the ISS on 2 November. This restored resupply of the station after the Progress M-12M launch failure and two intermediate successful flights of the Soyuz booster. Also carried the Chibis-M subsatellite.

- **Chibis-M** - . *Mass*: 40 kg (88 lb). *Nation*: Russia. *Class*: Earth. *Type*: Magnetosphere satellite. *Spacecraft*: Chibis-M. *Decay Date*: 2014-10-15 . *USAF Sat Cat*: 38051 . *COSPAR*: 2011-062C. *Apogee*: 502 km (311 mi). *Perigee*: 484 km (300 mi). *Inclination*: 51.6000 deg. *Period*: 94.50 min. Released in low earth orbit from Progress M-13M after separation from ISS. Carried plasma wave experiment..

2012 January 25 - . 23:06 GMT - . *Launch Site*: Baikonur. *Launch Complex*: Baikonur LC1. *LV Family*: R-7. *Launch Vehicle*: Soyuz-U-PVB.

- **Progress M-14M** - . *Payload*: Progress M s/n 414 / ISS-46P. *Mass*: 7,250 kg (15,980 lb). *Nation*: Russia. *Agency*: RKA. *Program*: ISS. *Class*: Manned. *Type*: Manned logistics spacecraft. *Spacecraft Bus*: Soyuz. *Spacecraft*: Progress M. *Duration*: 94.00 days. *Decay Date*: 2012-04-28 . *USAF Sat Cat*: 38073 . *COSPAR*: 2012-004A. *Apogee*: 405 km (251 mi). *Perigee*: 375 km (233 mi). *Inclination*: 51.6000 deg. *Period*: 92.40 min. Docked with the International Space Station at the Pirs module on 28 January at 00:09 GMT. Undocked on 19 April 11:04 GMT to begin nine days of autonomous Radar-Progress ionospheric experiments. Deorbited over the Pacific Ocean on 28 April..

2012 April 20 - . 12:50 GMT - . *Launch Site*: Baikonur. *Launch Complex*: Baikonur LC31. *LV Family*: R-7. *Launch Vehicle*: Soyuz-U-PVB.

- **Progress M-15M** - . *Payload*: Progress M s/n 415 / ISS-47P. *Mass*: 7,250 kg (15,980 lb). *Nation*: Russia. *Agency*: RKA. *Program*: ISS. *Class*: Manned. *Type*: Manned logistics spacecraft. *Spacecraft Bus*: Soyuz. *Spacecraft*: Progress M. *Duration*: 122.00 days. *Decay Date*: 2012-08-20 . *USAF Sat Cat*: 38222 . *COSPAR*: 2012-015A. *Apogee*: 406 km (252 mi). *Perigee*: 392 km (243 mi). *Inclination*: 51.6000 deg. *Period*: 92.50 min.

  Docked at the Pirs module of the International Space Station on 22 April at 14:39 GMT. Undocked and after three weeks of independent flight involving Radar-Progress experiments using thruster burns to study the ionosphere, was deorbited

over the Pacific on 20 August.

2012 May 17 - . 14:05 GMT - . *Launch Site*: Plesetsk. *Launch Complex*: Plesetsk LC16/2. *LV Family*: R-7. *Launch Vehicle*: Soyuz-U-PVB.

- **Cosmos 2480** - . *Payload*: Kobalt-M. *Mass*: 6,700 kg (14,700 lb). *Nation*: Russia. *Class*: Surveillance. *Type*: Military surveillance satellite. *Spacecraft Bus*: Yantar. *Spacecraft*: Yantar-4K1. *Decay Date*: 2012-09-24 . *USAF Sat Cat*: 38335 . *COSPAR*: 2012-024A. *Apogee*: 280 km (170 mi). *Perigee*: 199 km (123 mi). *Inclination*: 81.4000 deg. *Period*: 89.30 min. Kobalt-M film reconnaisance satellite. A deorbit burn on 24 September at 16:39 GMT was followed by separation of the service module and reentry of the pressurized main payload section which contained cameras and film. Landed at 17:03 GMT..

2012 August 1 - . 19:35 GMT - . *Launch Site*: Baikonur. *Launch Complex*: Baikonur LC1. *LV Family*: R-7. *Launch Vehicle*: Soyuz-U-PVB.

- **Progress M-16M** - . *Payload*: Progress M s/n 416 / ISS-48P. *Mass*: 7,250 kg (15,980 lb). *Nation*: Russia. *Agency*: RKA. *Program*: ISS. *Class*: Manned. *Type*: Manned logistics spacecraft. *Spacecraft Bus*: Soyuz. *Spacecraft*: Progress M. *Duration*: 192.00 days. *Decay Date*: 2013-02-09 . *USAF Sat Cat*: 38738 . *COSPAR*: 2012-042A. *Apogee*: 428 km (265 mi). *Perigee*: 403 km (250 mi). *Inclination*: 51.6000 deg. *Period*: 92.90 min. Undocked from the Pirs module at 13:16 GMT on 9 February. Deorbited over the Pacific Ocean at 16:19 GMT with debris impact at 17:05 GMT..

2012 October 31 - . 07:41 GMT - . *Launch Site*: Baikonur. *Launch Complex*: Baikonur LC1. *LV Family*: R-7. *Launch Vehicle*: Soyuz-U-PVB.

- **Progress M-17M** - . *Payload*: Progress M s/n 417 / ISS-49P. *Mass*: 7,250 kg (15,980 lb). *Nation*: Russia. *Agency*: RKA. *Program*: ISS. *Class*: Manned. *Type*: Manned logistics spacecraft. *Spacecraft Bus*: Soyuz. *Spacecraft*: Progress M. *Duration*: 172.00 days. *Decay Date*: 2013-04-21 . *USAF Sat Cat*: 38975 . *COSPAR*: 2012-060A. *Apogee*: 422 km (262 mi). *Perigee*: 401 km (249 mi). *Inclination*: 51.6000 deg. *Period*: 92.80 min.

  Docked with the Zvezda module of the ISS after a quick-rendezvous 5 hour 52 min flight. Undocked from Zvezda at 12:02 GMT on 15 April for independent flight to conduct Radar-Progress ionospheric tests. Retrofire on 21 April on 14:07 GMT lasted 173 seconds, producing a delta-V of 90 m/s. Impacted in the Pacific at 15:02 GMT.

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