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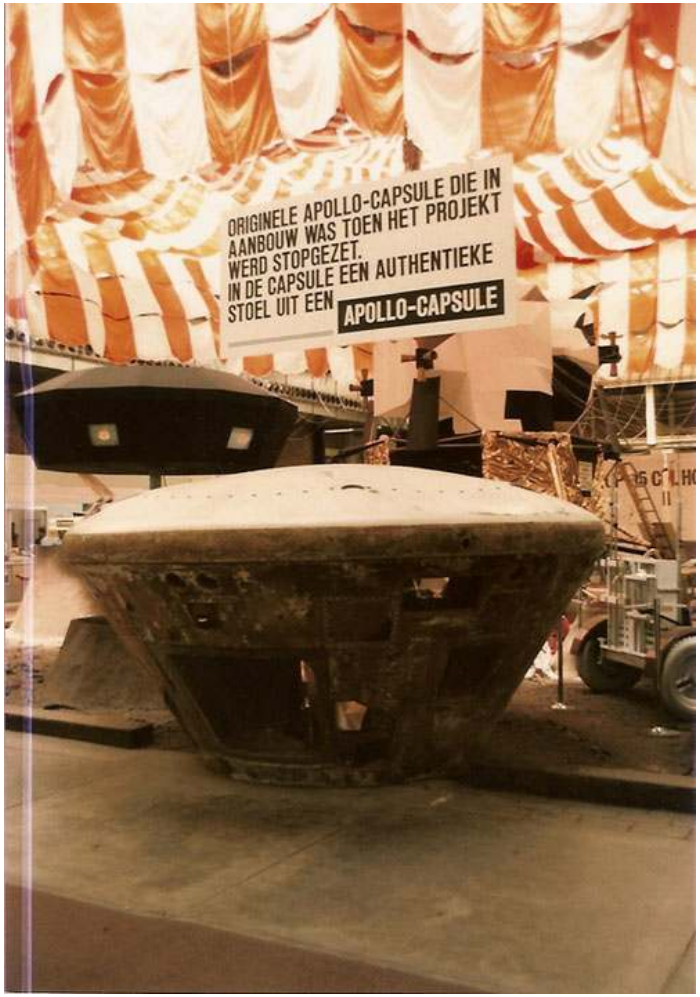

In this issue:

Dream Chaser Cargo System

This might be the Apollo CSM-115A. Displayed at the Space 86 exhibition, the sign says in Dutch: "Original Apollo capsule which was under construction when the project was cancelled. Inside the capsule an authentic chair from an Apollo capsule. (Source: via Wikipedia).

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The *Tiros Space Information (TSI) - News Bulletin* is published to promote the scientific exploration and commercial application of space through the dissemination of current news and historical facts.
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Calling card...

Some of you may know that I have a Dutch background so it should come to no surprise that I have some Dutch language books on my bookshelf. These include two space books written by a Chriet Titulaer. Titulaer was 'active' in the late seventies and early eighties and has been quiet since then, as far as space is concerned. Anyway, the other day I just wondered what had happened to him and found his bio in Wikipedia.
The astonishing thing in this biography was the following quote:

> *"After the Apollo program was axed in the early '70s Titulaer visited the Rockwell factory and saw one of the unfinished Apollo capsules standing there which had been under construction for one of the cancelled flights at a cost of US$10 million. Jokingly he said he would buy it for $1 and to his surprise the Rockwell representative accepted his offer and held him to the purchase. Martin Schröder, president of [the Dutch charter airliner] Martinair, who was also there said he would stick it in the back of his Boeing 747. The capsule didn't fit through the plane's doors so Titulaer had it shipped to the Netherlands. There it stood in the backyard of his house as a garden ornament for many years until a Japanese gentleman rang his doorbell and offered to buy the capsule for 30,000 Dutch guilders, which Titulaer accepted."*

Elsewhere I found a picture of an Apollo spacecraft on display somewhere in The Netherlands in 1986.
As far as I can determine, again from Wikipedia, the only Apollo spacecraft for which the current location is not known, is CSM-115A that was to be flown as Apollo-20 and, after the cancellation of that flight, was kept in reserve for a Skylab flight.

What puzzles me, however, that such a large piece of hardware has not been noticed by space historians, including NASA, be it when it was moved to The Netherlands, in Titulaer's back yard, on display in 1986 or wherever the Japanese gentleman took it.

Jos Heyman

SES-14, -15 and -16

SES has booked Falcon 9 launch vehicles for its SES-14 and -16 communications satellites to be launched in 2017. SES-14 is being built by Airbus whereas SES-16 is begin built by Orbital ATK.
The Boeing built SES-15 will be launched by an Ariane 5 in mid-2017.

ISS

Russia has committed itself to take part in the International Space Station until 2024.
After that it intends to detach the Russian modules and establish its own space station in low-Earth orbit. The new space station would be completed by 2028 and will be used as a base for lunar exploration, including crewed lunar missions by 2030.
Meanwhile, NASA has indicated that it has (as yet?) no back-up plan for ISS operations should Russia withdraw from joint operations.

RD-180, Delta 4 and NGLS

The US Congress has passed a law that prohibits the US Air Force to have launch service providers use launch vehicles fitted with Russian made rocket engines for its military launches from 2019 onwards. This puts a strain on the development of a new US built rocket engine which most likely will not be available by 2019. And even if it is, it may take some time for it to be certified for Air Force use.

The only current launch vehicle fitted with a Russian made engine (RD-180) is the Atlas 5. This problem does not exist for the all American powered Delta 4 but this launch vehicle is considered less effective and is more expensive.

The two replacement engines being developed are the Blue Origin's BE-4, which will be fuelled by liquid natural gas, and the Aerojet-Rocketdyne's AR-1, which will be fuelled by kerosene, like the RD-180.
The BE-4 is the furthest developed and is expected to fly for the first time in 2019, but its different fuel requires an adaptation of the Atlas core stage. The AR-1 does not have that problem but indications are it will not be ready by 2019.

In a related move, United Launch Alliance (ULA), which uses the Atlas 5 and Delta 4 launch vehicles, has announced that it plans to phase out the Delta 4 launch vehicle by 2018 except for the Delta 4 Heavy. The Delta 4 Heavy differs from other versions in that it has three core stages in a side-by-side configuration.

Eventually even the Delta 4 Heavy and the Atlas 5 will be replaced by the Next Generation Launch System (NGLS) which will have either the BE-4 or the AR-1 as its main engine.
ULA has asked members of the public to name the NGLS.

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Satellite Update

Launches in February 2015

Int.Des.	Name	Launch date	Launch vehicle	Country	Notes
2015 004A	IGS Radar-Spare	1-Feb-2015	H 2A-202	Japan	Military
2015 005A	Inmarsat 5-2	1-Feb-2015	Proton M/Briz M	Inmarsat	Maritime comm.
2015 006A	Fajr	1-Feb-2015	Safir 1B	Iran	Earth observation
1998 067FM	AESP-14	5-Feb-2015	---	Brazil	Released from ISS
sub-orbital	IXV	11-Feb-2015	Vega	ESA	Re-entry test
---	AVUM VV04	11-Feb-2015	Vega	ESA	Technology
2015 007A	DSCOVR	11-Feb-2015	Falcon 9 v.1.1	USA	Earth observation
2015 008A	Progress M-26M	17-Feb-2015	Soyuz U	Russia	Cargo transfer
2015 009A	Kosmos-2503	27-Feb-2015	Soyuz 2-1A	Russia	Topographical
1998 067FN	Flock 1b-27	27-Feb-2015	ISS	USA	Earth observation
1998 067FP	Flock 1b-28	27-Feb-2015	ISS	USA	Earth observation

Other updates

Int. Des.	Name	Notes
1995 015A	DMSP F-13	Exploded 3 February 2015
1998 067EX	Flock 1b-26	Re-entered 1 February 2015
2012 006J	UniCubeSat GG	Re-entered 16 February 2015
2013 064E	KySat-2	Re-entered 14February 215
2014 044A	ATV-5	Undocked on 14 February 2015 and re-entered the next day
2015 001A	Dragon CRS-5	Undocked on 10 February 2015 and re-entered the next day
---	Flock 1b-03	Returned to Earth on 10 February 2015 on board of Dragon CRS-5
---	Flock 1b-04	Returned to Earth on 10 February 2015 on board of Dragon CRS-5
---	Flock 1b-13	Returned to Earth on 10 February 2015 on board of Dragon CRS-5
---	Flock 1b-14	Returned to Earth on 10 February 2015 on board of Dragon CRS-5
---	Flock 1b-19	Returned to Earth on 10 February 2015 on board of Dragon CRS-5
---	Flock 1b-20	Returned to Earth on 10 February 2015 on board of Dragon CRS-5
2015 006A	Fajr	Re-entered 26 February 2015

DMSP F-13

It appears that DMSP F-13, a military weather satellite launched on 24 March 1995, exploded on 3 February 2015 due to a battery failure, resulting in more than 43 pieces of debris.
The satellite had been retired in 2006.

Bars-M

On 27 February 2015 Russia launched the first satellite in the Bars M series from Plesetsk. Identified as Kosmos-2503, this series of topographical satellites will succeed the Yantar-1KFT or Kometa series.
The satellite uses a platform developed specifically for the series by TsSKB Progress and carries a Karat imaging payload and a dual altimeter instrument to deliver topographic imagery, stereo images, altimeter data and high-resolution images with a ground resolution around one meter.
The spacecraft is based on the Bars (17F112) electro-optical area surveillance satellite which was cancelled in favour of the Bars M development.

Yamal-601

Gazprom Space Systems' Yamal-601 communications satellite will be launched in 2018 with a Proton M/Briz M launch vehicle.

Dragon and Cygnus

NASA ordered three Space X Dragon and one orbital ATK Cygnus spacecraft for cargo flights to ISS during 2017. This is in addition to the 12 Dragon and 8 Cygnus spacecraft already ordered for use until 2016.

Kosmos-2101 to 2500 (part 3)

By Jos Heyman

The following table lists those Kosmos satellites in the -2102 to -2500 range that have been associated with programmes discussed in detail in the articles in the February 1990 to January 1991 issues of the News Bulletin.

#	Int.des	Launch	Type
2101	1990 087A	1-Oct-1990	Don
2102	1990 092A	16-Oct-1990	Yantar 4K2
2103	1990 096A	14-Nov-1990	US-P
2104	1990 098A	16-Nov-1990	Zenit 8
2105	1990 099A	20-Nov-1990	Oko
2106	1990 104A	28-Nov-1990	Taifun 2
2107	1990 108A	4-Dec-1990	US-P
2108	1990 109A	4-Dec-1990	Yantar 4K2
2109	1990 110A	8-Dec-1990	Glonass
2110	1990 110B	8-Dec-1990	Glonass
2111	1990 110C	8-Dec-1990	Glonass
2112	1990 111A	10-Dec-1990	Strela 2
2113	1990 113A	21-Dec-1990	Yantar 4KS1
2114	1990 114A	22-Dec-1990	Strela 3
2115	1990 114B	22-Dec-1990	Strela 3
2116	1990 114C	22-Dec-1990	Strela 3
2117	1990 114D	22-Dec-1990	Strela 3
2118	1990 114E	22-Dec-1990	Strela 3
2119	1990 114F	22-Dec-1990	Strela 3
2120	1990 115A	26-Dec-1990	Zenit 8
2121	1991 004A	17-Jan-1991	Zenit 8
2122	1991 005A	18-Jan-1991	US-P
2123	1991 007A	5-Feb-1991	Tsikada
2124	1991 008A	7-Feb-1991	Yantar 4K2
2125	1991 009A	12-Feb-1991	Strela 1M
2126	1991 009B	12-Feb-1991	Strela 1M
2127	1991 009C	12-Feb-1991	Strela 1M
2128	1991 009D	12-Feb-1991	Strela 1M
2129	1991 009E	12-Feb-1991	Strela 1M
2130	1991 009F	12-Feb-1991	Strela 1M
2131	1991 009G	12-Feb-1991	Strela 1M
2132	1991 009H	12-Feb-1991	Strela 1M
2133	1991 010A	14-Feb-1991	Prognoz
2134	1991 011A	15-Feb-1991	Kometa
2135	1991 013A	26-Feb-1991	Parus
2136	1991 016A	6-Mar-1991	Zenit 8
2137	1991 021A	19-Mar-1991	Yug
2138	1991 023A	26-Mar-1991	Yantar 4K2
2139	1991 025A	4-Apr-1991	Glonass
2140	1991 025B	4-Apr-1991	Glonass
2141	1991 025C	4-Apr-1991	Glonass
2142	1991 029A	16-Apr-1991	Parus
2143	1991 033A	16-May-1991	Strela 3
2144	1991 033B	16-May-1991	Strela 3
2145	1991 033C	16-May-1991	Strela 3
2146	1991 033D	16-May-1991	Strela 3
2147	1991 033E	16-May-1991	Strela 3
2148	1991 033F	16-May-1991	Strela 3
2149	1991 036A	24-May-1991	Yantar 4K2
2150	1991 041A	11-Jun-1991	Strela 2
2151	1991 042A	13-Jun-1991	Tselina D
2152	1991 048A	9-Jul-1991	Zenit 8
2154	1991 059A	22-Aug-1991	Parus
2155	1991 064A	14-Sep-1991	Prognoz
2156	1991 066A	19-Sep-1991	Yantar 4K2
2157	1991 068A	28-Sep-1991	Strela 3
2158	1991 068B	28-Sep-1991	Strela 3
2159	1991 068C	28-Sep-1991	Strela 3
2160	1991 068D	28-Sep-1991	Strela 3
2161	1991 068E	28-Sep-1991	Strela 3
2162	1991 068F	28-Sep-1991	Strela 3
2163	1991 071A	9-Oct-1991	Don
2164	1991 072A	10-Oct-1991	Yug
2165	1991 077A	12-Nov-1991	Strela 3
2166	1991 077B	12-Nov-1991	Strela 3
2167	1991 077C	12-Nov-1991	Strela 3
2168	1991 077D	12-Nov-1991	Strela 3
2169	1991 077E	12-Nov-1991	Strela 3
2170	1991 077F	12-Nov-1991	Strela 3
2171	1991 078A	20-Nov-1991	Yantar 4K2
2172	1991 079A	22-Nov-1991	Potek
2173	1991 081A	27-Nov-1991	Parus
2174	1991 085A	17-Dec-1991	Kometa
2175	1992 001A	21-Jan-1992	Yantar 4K2
2176	1992 003A	24-Jan-1992	Oko
2177	1992 005A	29-Jan-1992	Glonass
2178	1992 005B	29-Jan-1992	Glonass
2179	1992 005C	29-Jan-1992	Glonass
2180	1992 008A	17-Feb-1992	Parus
2181	1992 012A	9-Mar-1992	Tsikada
2182	1992 016A	1-Apr-1992	Yantar 4K2
2263	1993 059A	16-Sep-1993	Tselina 2
2264	1993 060A	17-Sep-1993	US-P
2265	1993 067A	26-Oct-1993	Yug
2266	1993 070A	2-Nov-1993	Parus
2268	1994 011A	12-Feb-1994	Strela 3
2269	1994 011B	12-Feb-1994	Strela 3
2270	1994 011C	12-Feb-1994	Strela 3
2271	1994 011D	12-Feb-1994	Strela 3
2272	1994 011E	12-Feb-1994	Strela 3
2273	1994 011F	12-Feb-1994	Strela 3
2274	1994 018A	17-Mar-1994	Yantar 4K2
2275	1994 021C	11-Apr-1994	Glonass
2276	1994 021A	11-Apr-1994	Glonass
2277	1994 021B	11-Apr-1994	Glonass
2278	1994 023A	23-Apr-1994	Tselina 2
2279	1994 024A	26-Apr-1994	Parus
2281	1994 032A	7-Jun-1994	Zenit 8
2282	1994 038A	7-Jul-1994	Prognoz
2283	1994 042A	20-Jul-1994	Yantar 4K2
2284	1994 044A	29-Jul-1994	Kometa
2286	1994 048A	5-Aug-1994	Oko
2287	1994 050A	11-Aug-1994	Glonass
2288	1994 050C	11-Aug-1994	Glonass
2289	1994 050B	11-Aug-1994	Glonass
2291	1994 060A	21-Sep-1994	Potek
2292	1994 061A	27-Sep-1994	Vektor
2293	1994 072A	2-Nov-1994	US-P
2294	1994 076C	20-Nov-1994	Glonass
2295	1994 076A	20-Nov-1994	Glonass
2296	1994 076B	20-Nov-1994	Glonass
2297	1994 077A	24-Nov-1994	Tselina 2
2298	1994 083A	20-Dec-1994	Strela 2
2299	1994 086A	28-Dec-1994	Strela 3
2300	1994 086B	28-Dec-1994	Strela 3
2301	1994 086C	28-Dec-1994	Strela 3
2302	1994 086D	28-Dec-1994	Strela 3
2303	1994 086E	28-Dec-1994	Strela 3
2304	1994 086F	28-Dec-1994	Strela 3
2306	1995 008A	2-Mar-1995	Taifun 2
2307	1995 009A	7-Mar-1995	Glonass
2308	1995 009B	7-Mar-1995	Glonass
2309	1995 009C	7-Mar-1995	Glonass
2310	1995 012A	22-Mar-1995	Parus
2311	1995 014A	22-Mar-1995	Yantar 4K2
2312	1995 026A	24-May-1995	Oko
2313	1995 028A	8-Jun-1995	US-P
2314	1995 031A	28-Jun-1995	Yantar 4K2
2316	1995 037A	24-Jul-1995	Glonass
2317	1995 037B	24-Jul-1995	Glonass
2318	1995 037C	24-Jul-1995	Glonass
2319	1995 045A	30-Aug-1995	Potek
2321	1995 052A	6-Oct-1995	Parus
2322	1995 058A	31-Oct-1995	Tselina 2
2323	1995 068C	14-Dec-1995	Glonass
2324	1995 068B	14-Dec-1995	Glonass
2325	1995 068A	14-Dec-1995	Glonass
2326	1995 071A	20-Dec-1995	US-P
2327	1996 004A	16-Jan-1996	Parus
2328	1996 009D	19-Feb-1996	Strela 3
2329	1996 009E	19-Feb-1996	Strela 3
2330	1996 009F	19-Feb-1996	Strela 3
2331	1996 016A	14-Mar-1996	Yantar 4K2
2332	1996 025A	24-Apr-1996	Yug
2333	1996 051A	4-Sep-1996	Tselina 2
2334	1996 052A	5-Sep-1996	Parus
2335	1996 069A	11-Dec-1996	US-P
2336	1996 071A	20-Dec-1996	Parus
2337	1997 006A	14-Feb-1997	Strela 3
2338	1997 006B	14-Feb-1997	Strela 3
2339	1997 006C	14-Feb-1997	Strela 3
2340	1997 015A	9-Apr-1997	Oko
2341	1997 017A	17-Apr-1997	Parus
2342	1997 022A	14-May-1997	Oko
2343	1997 024A	15-May-1997	Don
2345	1997 041A	14-Aug-1997	Prognoz
2346	1997 052A	23-Sep-1997	Parus
2347	1997 079A	9-Dec-1997	US-P
2348	1997 080A	15-Dec-1997	Yantar 4K2
2349	1998 009A	17-Feb-1998	Kometa
2350	1998 025A	29-Apr-1998	Prognoz
2351	1998 027A	7-May-1998	Oko

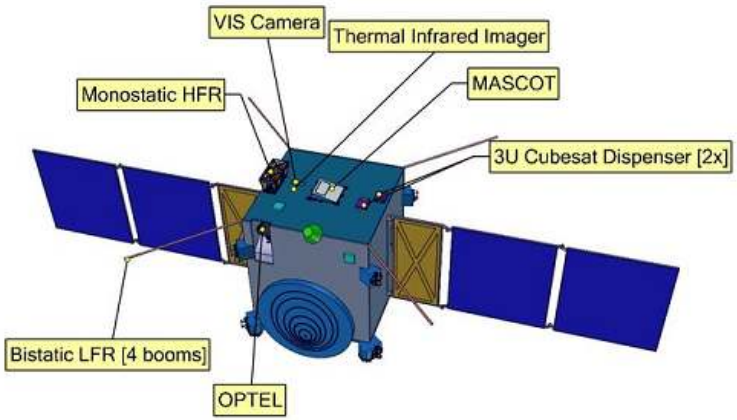
2184	1992 020A	15-Apr-1992	Parus
2185	1992 025A	29-Apr-1992	Kometa
2186	1992 029A	28-May-1992	Yantar 4K2
2187	1992 030A	3-Jun-1992	Strela 1M
2188	1992 030B	3-Jun-1992	Strela 1M
2189	1992 030C	3-Jun-1992	Strela 1M
2190	1992 030D	3-Jun-1992	Strela 1M
2191	1992 030E	3-Jun-1992	Strela 1M
2192	1992 030F	3-Jun-1992	Strela 1M
2193	1992 030G	3-Jun-1992	Strela 1M
2194	1992 030H	3-Jun-1992	Strela 1M
2195	1992 036A	1-Jul-1992	Parus
2196	1992 040A	8-Jul-1992	Oko
2197	1992 042A	13-Jul-1992	Strela 3
2198	1992 042B	13-Jul-1992	Strela 3
2200	1992 042D	13-Jul-1992	Strela 3
2202	1992 042F	13-Jul-1992	Strela 3
2203	1992 045A	24-Jul-1992	Yantar 4K2
2204	1992 047B	30-Jul-1992	Glonass
2205	1992 047C	30-Jul-1992	Glonass
2206	1992 047A	30-Jul-1992	Glonass
2207	1992 048A	30-Jul-1992	Zenit 8
2208	1992 053A	12-Aug-1992	Strela 2
2209	1992 059A	10-Sep-1992	Oko
2210	1992 062A	22-Sep-1992	Yantar 4K2
2211	1992 068A	20-Oct-1992	Strela 3
2212	1992 068B	20-Oct-1992	Strela 3
2213	1992 068C	20-Oct-1992	Strela 3
2214	1992 068D	20-Oct-1992	Strela 3
2215	1992 068E	20-Oct-1992	Strela 3
2216	1992 068F	20-Oct-1992	Strela 3
2217	1992 069A	21-Oct-1992	Oko
2218	1992 073A	29-Oct-1992	Parus
2219	1992 076A	17-Nov-1992	Tselina 2
2220	1992 077A	20-Nov-1992	Yantar 4K2
2221	1992 080A	24-Nov-1992	Tselina D
2222	1992 081A	25-Nov-1992	Oko
2224	1992 088A	17-Dec-1992	Prognoz
2225	1992 091A	22-Dec-1992	Don
2226	1992 092A	22-Dec-1992	Geo IK
2227	1992 093A	25-Dec-1992	Tselina 2
2228	1992 094A	25-Dec-1992	Tselina D
2229	1992 095A	29-Dec-1992	Bion
2230	1993 001A	12-Jan-1993	Tsikada
2231	1993 004A	19-Jan-1993	Yantar 4K2
2352	1998 036A	15-Jun-1998	Strela 3
2353	1998 036B	15-Jun-1998	Strela 3
2354	1998 036C	15-Jun-1998	Strela 3
2355	1998 036D	15-Jun-1998	Strela 3
2356	1998 036E	15-Jun-1998	Strela 3
2357	1998 036F	15-Jun-1998	Strela 3
2358	1998 038A	24-Jun-1998	Yantar 4K2
2360	1998 045A	28-Jul-1998	Tselina 2
2361	1998 076A	24-Dec-1998	Parus
2362	1998 077C	30-Dec-1998	Glonass
2363	1998 077B	30-Dec-1998	Glonass
2364	1998 077A	30-Dec-1998	Glonass
2365	1999 044A	18-Aug-1999	Yantar 4K2
2366	1999 045A	26-Aug-1999	Parus
2367	1999 072A	26-Dec-1999	US-P
2368	1999 073A	27-Dec-1999	Oko
2369	2000 006A	3-Feb-2000	Tselina 2
2371	2000 036A	5-Jul-2000	Potek
2373	2000 058A	29-Sep-2000	Kometa
2374	2000 063C	13-Oct-2000	Glonass
2375	2000 063A	13-Oct-2000	Glonass
2376	2000 063B	13-Oct-2000	Glonass
2377	2001 022A	29-May-2001	Yantar 4K2
2378	2001 023A	8-Jun-2001	Parus
2379	2001 037A	24-Aug-2001	Prognoz
2380	2001 053C	1-Dec-2001	Glonass
2381	2001 053B	1-Dec-2001	Glonass
2383	2001 057A	21-Dec-2001	US-P
2384	2001 058A	28-Dec-2001	Strela 3
2385	2001 058B	28-Dec-2001	Strela 3
2386	2001 058C	28-Dec-2001	Strela 3
2387	2002 008A	25-Feb-2002	Yantar 4K2
2388	2002 017A	1-Apr-2002	Oko
2389	2002 026A	28-May-2002	Parus
2390	2002 036A	8-Jul-2002	Strela 3
2391	2002 036B	8-Jul-2002	Strela 3
2393	2002 059A	24-Dec-2002	Oko
2394	2002 060A	25-Dec-2002	Glonass
2395	2002 060C	25-Dec-2002	Glonass
2396	2002 060B	25-Dec-2002	Glonass
2397	2003 015A	24-Apr-2003	Prognoz
2398	2003 023A	4-Jun-2003	Parus
2399	2003 035A	12-Aug-2003	Don
2400	2003 037A	19-Aug-2003	Strela 3
2401	2003 037B	19-Aug-2003	Strela 3
2232	1993 006A	26-Jan-1993	Oko
2233	1993 008A	9-Feb-1993	Parus
2234	1993 010A	17-Feb-1993	Glonass
2235	1993 010C	17-Feb-1993	Glonass
2236	1993 010B	17-Feb-1993	Glonass
2237	1993 016A	26-Mar-1993	Tselina 2
2238	1993 018A	30-Mar-1993	US-P
2239	1993 020A	1-Apr-1993	Parus
2240	1993 021A	2-Apr-1993	Yantar 4K2
2241	1993 022A	6-Apr-1993	Oko
2242	1993 024A	16-Apr-1993	Tselina D
2243	1993 028A	27-Apr-1993	Kometa
2244	1993 029A	28-Apr-1993	US-P
2245	1993 030A	11-May-1993	Strela 3
2246	1993 030B	11-May-1993	Strela 3
2247	1993 030C	11-May-1993	Strela 3
2248	1993 030D	11-May-1993	Strela 3
2249	1993 030E	11-May-1993	Strela 3
2250	1993 030F	11-May-1993	Strela 3
2251	1993 036A	16-Jun-1993	Strela 2
2252	1993 038A	24-Jun-1993	Strela 3
2253	1993 038B	24-Jun-1993	Strela 3
2254	1993 038C	24-Jun-1993	Strela 3
2255	1993 038D	24-Jun-1993	Strela 3
2256	1993 038E	24-Jun-1993	Strela 3
2257	1993 038F	24-Jun-1993	Strela 3
2258	1993 044A	7-Jul-1993	US-P
2259	1993 045A	14-Jul-1993	Yantar 4K2
2260	1993 047A	22-Jul-1993	Resurs T
2261	1993 051A	10-Aug-1993	Oko
2262	1993 057A	7-Sep-1993	Don
2402	2003 056B	10-Dec-2003	Glonass
2403	2003 056C	10-Dec-2003	Glonass
2405	2004 020A	28-May-2004	US-P
2406	2004 021A	10-Jun-2004	Tselina 2
2407	2004 028A	22-Jul-2004	Parus
2408	2004 037A	23-Sep-2004	Strela 3
2409	2004 037B	23-Sep-2004	Strela 3
2411	2004 053B	26-Dec-2004	Glonass
2412	2004 053C	26-Dec-2004	Glonass
2414	2005 002A	20-Jan-2005	Parus
2415	2005 034A	2-Sep-2005	Kometa
2417	2005 050C	25-Dec-2005	Glonass
2421	2006 026A	25-Jun-2006	US-P
2422	2006 030A	21-Jul-2006	Oko
2423	2006 039A	14-Sep-2006	Don
2428	2007 029A	29-Jun-2007	Tselina 2
2429	2007 038A	11-Sep-2007	Parus
2430	2007 049A	23-Oct-2007	Oko
2437	2008 025B	23-May-2008	Strela 3
2438	2008 025C	23-May-2008	Strela 3
2439	2008 025D	23-May-2008	Strela 3
2440	2008 033A	26-Jun-2008	Prognoz
2446	2008 062A	2-Dec-2008	Oko
2451	2009 036A	6-Jul-2009	Strela 3
2453	2009 036C	6-Jul-2009	Strela 3
2454	2009 039A	21-Jul-2009	Parus
2463	2010 017A	27-Apr-2010	Parus
2467	2010 043B	8-Sep-2010	Strela 3
2469	2010 049A	30-Sep-2010	Oko
2470	2011 005A	1-Feb-2011	Geo IK 2
2479	2012 012A	30-Mar-2012	Oko

Dawn

The Dawn spacecraft went into an orbit around the dwarf planet Ceres on 6 March 2015.
The initial orbit had an altitude of 13500 km but that orbit will be adjusted in the coming months through the on-board ion engines, eventually resulting in an polar orbit with an altitude of 370 km.
Dawn was launched on 27 September 2007 and reached Vesta on 15 July 2011. It left Vesta on 4 September 2012.
Over the next 16 months Dawn will examine the composition and terrain of the 1000 km diameter Ceres which is the largest body in the asteroid belt.

AIM + cubesats

ESA has announced it will accommodate two 3U cubesats on the proposed Asteroid Impact Mission (AIM) scheduled for launch in October 2020. It is expected that the cubesats eventually selected, will boost and complement the main mission. In addition it is intended to use the cubesats to test intersatellite communications networking.



AIM will be launched with a Soyuz Fregat and will encounter the Didymos pair of asteroids in June 2022. The Didymos pair consists of a 750 m diameter main body and a 170 m diameter secondary body that orbits the main body.
On reaching the asteroids, which will then be 11 million km from Earth, AIM will enter into a heliocentric co-flying orbit reaching distances of 35 to 10 km from the asteroid.
AIM will observe the asteroid system to derive a high-resolution 3D model and to determine its mass and dynamical state. It will also investigate its surface and shallow sub-surface properties by means of a thermal infrared imager and high-frequency radar.
After some months around the asteroids, the cubesats will be released as well as the German developed Mascot-2 lander.
Other instruments to be carried will be:

- Visual Imaging System (VIS);
- Thermal Imager (TIRI);
- High Frequency Radar (HFR);
- Low Frequency Radar (LFR); and
- Optical Link for Communication (Optel-D).

The mission is undertaken as part of the international Asteroid Impact and Deflection Assessment (AIDA) mission. The other component of this is NASA's Double Asteroid Redirection Test (DART) probe that will impact the smaller body of the asteroid system. The objective of DART is to investigate to what extent the orbit of this small body is altered by the impact.

Tianzhou-1

In 2016 China hopes to launch the Tianzhou-1 cargo spacecraft with a new CZ 7 launch vehicle and dock it with the Tiangong-2 space station module that will be launched with a CZ 5 launch vehicle earlier that year.
Tianzhou-1 will carry propellants, living necessities for astronauts, research facilities and repair equipment.
All these activities will be leading towards in a permanently crewed space station in 2022.

BitSat

Dunvegan Space Systems (DSS) has signed a contract with Deep Space Industries (DSI) for the construction of 24 3U cubesats for a communications constellation.
Pioneered by Bitcom's Jeff Garzik, Dunvegan plans to have the BitSats keep a complete record of bitcoin's ever-growing blockchain ledger, thus acting as crucial "full nodes" to backup bitcoin's all-important core database at a time when the number of earth-based computers providing this vital storage service has declined.
In addition Dunvegan will also offer BitSats facilities to paying customers who can use it for proprietary data storage solutions and communications services.
The satellites are scheduled for launch late 2015 and early 2016.

Leosat

Leosat is a proposed constellation of 80 to 120 high throughput communications satellites in low-Earth orbit. The services to be provided are not intended for general use but will, instead, concentrate on selected customers providing them with solutions to communications problems that are currently not met. Launches are expected to commence in 2019 or 2020.

Outernet

The US company Outernet has teamed up with Clyde Space to develop a 200 1U cubesat telecommunications constellation to provide low-cost broadband to remote regions of the world.
The cooperation is sponsored by the UK Space Agency that will provide funding through its International Partnership Space Program (IPSP) which funds British companies to work with international partners developing satellite technology.
The satellites with be fitted with deployable solar panels and an Attitude Control System to accurately control satellite pointing. Initially 3 satellites will be built which will be placed in a low-Earth orbit. Initially only three satellites will be built to serve as prototypes.

LauncherOne

Virgin Galactic has announced that it expects the first launch of the LauncherOne by the end of 2016. Ultimately the company expects to conduct 20 to 30 launches each year.

Exoliner and Jupiter

Lockheed Martin, in cooperation with Thales Alenia and MDA Corp. of Canada, has proposed the development of an ISS cargo transfer spacecraft for NASA's Commercial Resupply Services (CRS)-2. The proposal consists of the Exoliner cargo module and the Jupiter re-usable space tug.
For servicing ISS the first two spacecraft would be launched together with an Atlas 5 and berth with ISS. Once undocked from ISS the Exoliner and Jupiter could fly independently for weeks or months to carry out additional missions such as the deployment of small satellites or remote sensing of the Earth.
Eventually the two would meet up with the next Exoliner that would be launched without a Jupiter tug. Using its robotic arm, Jupiter would exchange the two Exoliners, allowing the old one to de-orbit and taking the new one to ISS for docking.
The Exoliner is expected to carry up to 5,000 kg of pressurized cargo and 1,500 kg of unpressurized cargo per mission.
The Jupiter tug is expected to have an unlimited life as it can be serviced and fuelled in orbit. It also can have applications beyond Earth orbit.

Dream Chaser Cargo System

After failing to get a contract for the crewed version of its Dream Chaser spacecraft, Sierra Nevada Corporation (SNC) has now offered the Dream Chaser Cargo System variant for the NASA's Commercial Resupply Services (CRS)-2 contract.

The Dream Chaser Cargo System has a folding-wing which allows it to fit inside existing payload fairings of all major launch vehicles. It is suggested the spacecraft has the ability to exceed all of NASA's cargo requirements for pressurized and unpressurized cargo to ISS, whilst also providing high reusability, allowing it to serve the required number of missions for the full life expectancy of the ISS.

BEAM

Bigelow Aerospace has completed the construction of the first flight model of the Bigelow Expandable Activity Module (BEAM) that will become the first inflatable module to be attached to ISS for a two-year demonstration mission.
The module is 4.4 m long and has a diameter of 3.2 m once it is deployed, providing a volume of 16 m2.
With a launch mass of 1360 kg, it consists of a central rigid cylindrical structure housing spacecraft equipment around which the flexible hull made of Vectran shielding fabric is stowed. It also has a Common Berthing Mechanism (CBM) that allows it to be docked with ISS, as well as a rigid forward bulkhead that provides the mounting structure for two grapple fixtures for the Station's robotic arm to allow the module to be handled in space.

BEAM will be transported to ISS as an external payload on the Dragon CRS-8 mission scheduled for September 2015. It will then be removed by Canadarm2 and moved to the Node 3's CBM after which it will be inflated.

Dnepr

International Space Company (ISC) Kosmotras will continue launches of the Dnepr launch vehicle with five launches planned during 2016/2017. This will be in spite of the Ukrainian moratorium on military-industrial cooperation with Russia imposed in June 2014. It is likely that the launch vehicles concerned have been converted from R-36M missile either before the moratorium was imposed or without Ukrainian involvement.

PACE

NASA has commenced work on the Pre-Aerosol Clouds and ocean Ecosystem (PACE) mission which will study the Earth's aquatic ecology and chemistry as well as investigate how clouds and aerosols affect Earth's climate.
The spacecraft will be fitted with two instruments:

- Ocean Ecosystem Spectrometer/Radiometer, an ocean colour instrument that will see the colors of the ocean from the ultraviolet to near infrared for more accurate measurements of biological and chemical properties of the oceans; and
- Aerosol/Cloud Polarimeter, a French instrument that will measure clouds and tiny airborne particles like dust, smoke and aerosols in the atmosphere.

The launch is targeted for 2022.

Khalifasat

The Khalifasat Earth observation satellite for the United Arab Emirates will be launched late 2017 or early 2018 with a Japanese H 2A launch vehicle.
The 350 kg satellite which will be built in the United Arab Emirates, will be placed in a polar orbit with an altitude of 600 km. It will be fitted with an imaging sensor with a 1 m resolution in black and white, and a 44 m in color. The imaging system will observe a 12.2-kilometer swath and will be able to swivel 2 degrees off nadir to reduce the time between revisits of a given location.

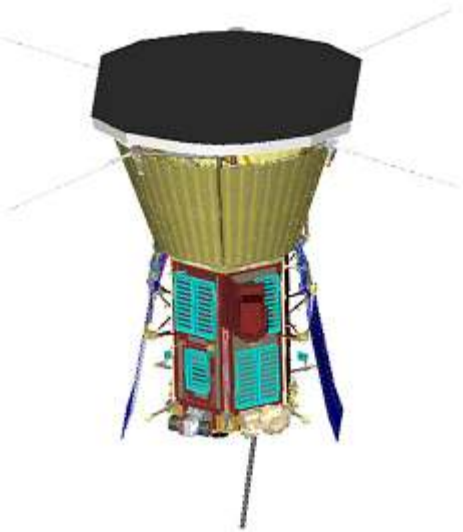
SkySat

Skybox Imaging will have several of its Skybox remote sensing satellites placed in orbit by a Vega launch vehicle in 2016.
Previously two Skybox satellites were launched on a Dnepr on 21 November 2013 and a Soyuz-2-1b/Fregat-M on 8 July 2014. A third prototype satellite will be launched later this year with a PSLV-XL.
Of the remaining twelve, four satellites will be launched in July 2016, another six in September 2016 with the final two in early 2017.

JPSS-2

NASA has awarded the construction of the Joint Polar Satellite System (JPSS)-2 spacecraft to Orbital ATK (formerly Orbital Sciences Corporation with options to purchase the JPPS-3 and -4 spacecraft at a later date.
The satellite will be used by the National Oceanic and Atmospheric Administration (NOAA) to provide critical weather forecasts.
To be launched in 2021 JPSS-2 will carry four instruments: the Visible Infrared Imaging Radiometer Suite (VIIRS), the Cross-track Infrared Sounder (CrIS), the Advanced Technology Microwave Sounder (ATMS) and the Ozone Mapping and Profiler Suite (OMPS).

Solar Probe Plus



NASA has selected the Delta 4 Heavy launch vehicle for the launch of its Solar Probe Plus during a 20 day launch window that starts on 30 July 2018.

After the launch the spacecraft will perform seven fly-bys of Venus to shape its orbit through the inner solar system. Based on a 30 July 2018 launch dates these fly-bys will take place on 27 September 2018, 21 December 2019, 5 July 202, 15 February 2021, 10 October 2021, 15 August 2023 and 31 October 2024 before the spacecraft will make the first closest approach of the Sun on 19 December 2024. It will then settle into an orbit around the Sun of 6 million x 100 million km with an inclination of 3.4°. Over a period of close to seven years it will orbit the Sun 24 times with each orbit lasting 88 days.

The Solar Probe Plus will gather data on the processes that heat the corona and accelerate the solar wind as well as study the streams of charged particles that produce solar wind.
At its closest approach the spacecraft will fly at a speed of 200 km/sec whilst protected by a 12 cm thick carbon-composite heat shield that can withstand up to 2000°C.

The instruments on the 610 kg spacecraft will be:

- the Solar Wind Electrons Alphas and Protons Investigation (SWEAP) to count the electrons, protons and helium ions in the solar wind and measure their properties as well as collection some of these particles in a special Solar Probe Cup for direct analysis;
- the Wide-field Imager for Solar Probe Plus (WISPR), a telescope that will make 3D images of the sun's atmosphere similar to medical CAT scans. The telescope will allow the imaging of clouds and shock waves as they approach and pass the spacecraft;
- the Fields Investigation for Solar Probe Plus (FIELDS), an instrument that will make direct measurements of electric and magnetic fields, radio emissions, and shock waves which course through the sun's atmospheric plasma. It will also register voltage signatures when specks of space dust hit the spacecraft's antenna; and
- the Integrated Science Investigation of the Sun (ISIS) comprising the ISIS EPI-Hi and EPI-Lo instruments to monitor electrons, protons and ions which are accelerated to high energies by shock waves in the sun's atmosphere.