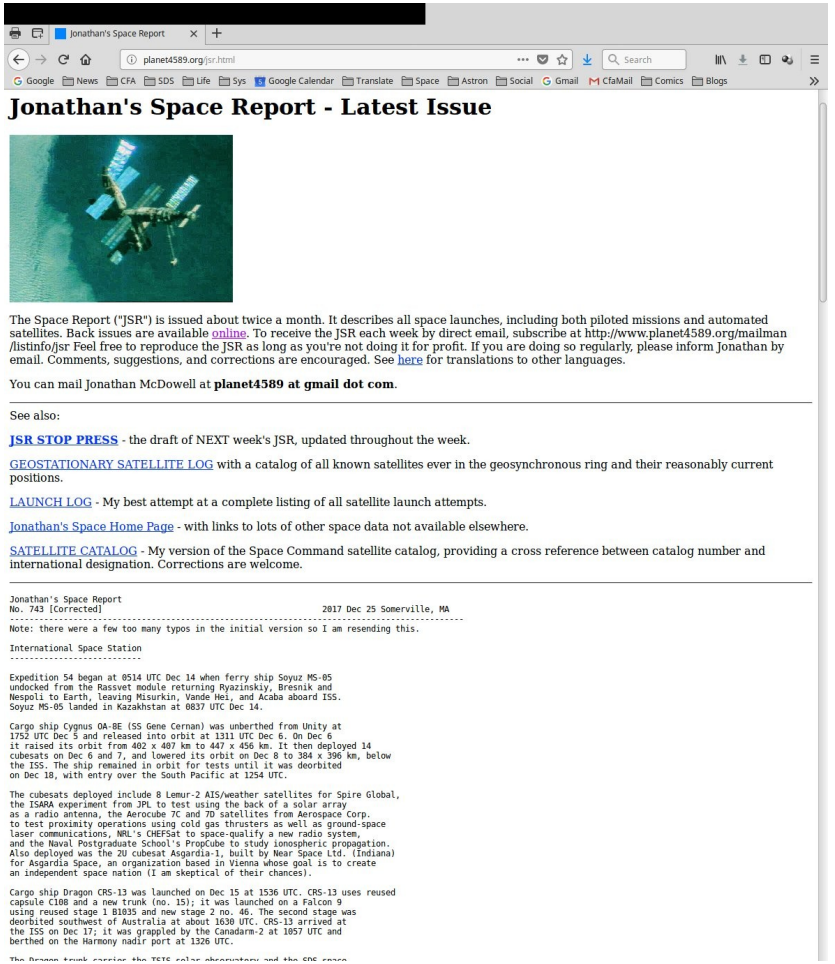
Chronicling the Space Age
Jonathan's Space Report and the Space Database

Jonathan McDowell

JSR: Technical chronicle of the space age since 1989
- started out weekly, now more like monthly (I got busier)
- covers worldwide satellite launches
- latest updates at http://planet4589.org/



Jonathan's Space Report

planet4589.org/jsr.html

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Jonathan's Space Report - Latest Issue

The Space Report ("JSR") is issued about twice a month. It describes all space launches, including both piloted missions and automated satellites. Back issues are available online. To receive the JSR each week by direct email, subscribe at http://www.planet4589.org/mailman/listinfo/jsr Feel free to reproduce the JSR as long as you're not doing it for profit. If you are doing so regularly, please inform Jonathan by email. Comments, suggestions, and corrections are encouraged. See here for translations to other languages.

You can mail Jonathan McDowell at **planet4589 at gmail dot com**.

See also:

JSR STOP PRESS - the draft of NEXT week's JSR, updated throughout the week.

GEOSTATIONARY SATELLITE LOG with a catalog of all known satellites ever in the geosynchronous ring and their reasonably current positions.

LAUNCH LOG - My best attempt at a complete listing of all satellite launch attempts.

Jonathan's Space Home Page - with links to lots of other space data not available elsewhere.

SATELLITE CATALOG - My version of the Space Command satellite catalog, providing a cross reference between catalog number and international designation. Corrections are welcome.

Jonathan's Space Report
No. 743 [Corrected] 2017 Dec 25 Somerville, MA

Note: there were a few too many typos in the initial version so I am resending this.

International Space Station

Expedition 54 began at 0514 UTC Dec 14 when ferry ship Soyuz MS-05 undocked from the Rassvet module returning Ryazinskiy, Bresnik and Nespoli to Earth, leaving Misurkin, Vande Hei, and Acaba aboard ISS. Soyuz MS-05 landed in Kazakhstan at 0837 UTC Dec 14.

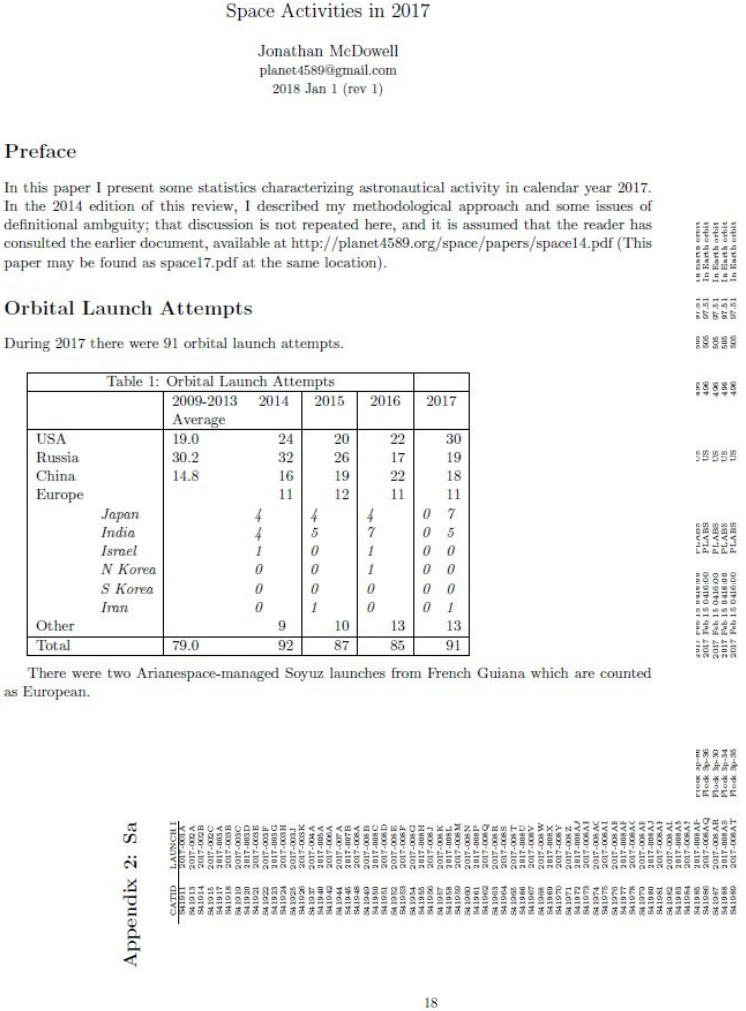
Cargo ship Cygnus OA-8E (SS Gene Cernan) was unberthed from Unity at 1752 UTC Dec 5 and released into orbit at 1311 UTC Dec 6. On Dec 6 it raised its orbit from 402 x 407 km to 447 x 456 km. It then deployed 14 cubesats on Dec 6 and 7, and lowered its orbit on Dec 8 to 384 x 396 km, below the ISS. The ship remained in orbit for tests until it was deorbited on Dec 18, with entry over the South Pacific at 1254 UTC.

The cubesats deployed include 8 Lemur-2 AIS/weather satellites for Spire Global, the ISARA experiment from JPL to test using the back of a solar array as a radio antenna, the Aerocube 7C and 7D satellites from Aerospace Corp. to test proximity operations using cold gas thrusters as well as ground-space laser communications, NRL's CHEFSat to space-qualify a new radio system, and the Naval Postgraduate School's PropCube to study ionospheric propagation. Also deployed was the 2U cubesat Asgardia-1, built by Near Space Ltd. (Indiana) for Asgardia Space, an organization based in Vienna whose goal is to create an independent space nation (I am skeptical of their chances).

Cargo ship Dragon CRS-13 was launched on Dec 15 at 1536 UTC. CRS-13 uses reused capsule C108 and a new trunk (no. 15); it was launched on a Falcon 9 using reused stage 1 B1035 and new stage 2 no. 46. The second stage was deorbited southwest of Australia at about 1630 UTC. CRS-13 arrived at the ISS on Dec 17; it was grappled by the Canadarm-2 at 1057 UTC and berthed on the Harmony nadir port at 1326 UTC.

The Dragon trunk carries the TSIS solar observatory and the SDS space

New (since 2014)
Annual summary of space activities



Space Activities in 2017

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2018 Jan 1 (rev 1)

Preface

In this paper I present some statistics characterizing astronautical activity in calendar year 2017. In the 2014 edition of this review, I described my methodological approach and some issues of definitional ambguity; that discussion is not repeated here, and it is assumed that the reader has consulted the earlier document, available at http://planet4589.org/space/papers/space14.pdf (This paper may be found as space17.pdf at the same location).

Orbital Launch Attempts

During 2017 there were 91 orbital launch attempts.

Table 1: Orbital Launch Attempts

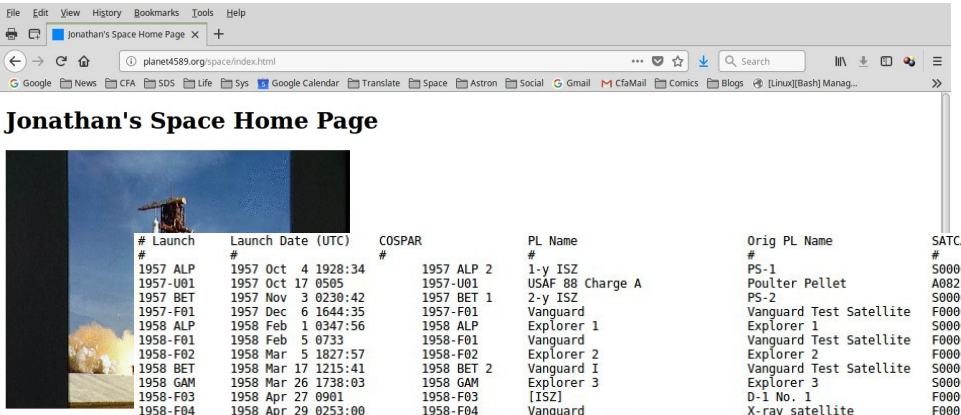
	2009-2013 Average	2014	2015	2016	2017
USA	19.0	24	20	22	30
Russia	30.2	32	26	17	19
China	14.8	16	19	22	18
Europe		11	12	11	11
Japan		*4*	*4*	*4*	*0* 7
India		*4*	*5*	*7*	*0* *5*
Israel		*1*	*0*	*1*	*0* *0*
N Korea		*0*	*0*	*1*	*0* *0*
S Korea		*0*	*0*	*0*	*0* *0*
Iran		*0*	*1*	*0*	*0* *1*
Other		9	10	13	13
Total	79.0	92	87	85	91

There were two Arianespace-managed Soyuz launches from French Guiana which are counted as European.

Appendix 2: Sa

planet4589.org website

- Definitive database of spaceflight history
Examples



Orbital launch list

Satellite catalog

# Launch	Launch Date (UTC)	COSPAR	PL Name	Orig PL Name	SATCAT	LV Type	LV S/N	Site	Suc	Ref
#	#	#	#	#	#	#	#	#	#	#
1957 ALP	1957 Oct 4 1928:34	1957 ALP 2	1-y ISZ	PS-1	S00002	Sputnik 8K71PS	M1-PS	NIIP-5 LC1	S	Energiya
1957-U01	1957 Oct 17 0505	1957-U01	USAF 88 Charge A	Poulter Pellet	A08258	Aerobee	USAF 88	HADC A	S	EngSci1.58
1957 BET	1957 Nov 3 0230:42	1957 BET 1	2-y ISZ	PS-2	S00003	Sputnik 8K71PS	M1-2PS	NIIP-5 LC1	S	Grahn-WWW
1957-F01	1957 Dec 6 1644:35	1957-F01	Vanguard	Vanguard Test Satellite	F00002	Vanguard	TV-3	CC LC18A	F	Vang-ER9948
1958 ALP	1958 Feb 1 0347:56	1958 ALP	Explorer 1	Explorer 1	S00004	Jupiter C	RS-29 UE	CC LC26A	S	JunoFam
1958-F01	1958 Feb 5 0733	1958-F01	Vanguard	Vanguard Test Satellite	F00004	Vanguard	TV-3BU	CC LC18A	F	Vang-ER9955
1958-F02	1958 Mar 5 1827:57	1958-F02	Explorer 2	Explorer 2	F00006	Jupiter C	RS/CC-26 UV	CC LC26A	F	JunoFam
1958 BET	1958 Mar 17 1215:41	1958 BET 2	Vanguard I	Vanguard Test Satellite	S00005	Vanguard	TV-4	CC LC18A	S	SP-4202
1958 GAM	1958 Mar 26 1738:03	1958 GAM	Explorer 3	Explorer 3	S00006	Jupiter C	RS-24 UT	CC LC5	S	JunoFam
1958-F03	1958 Apr 27 0901	1958-F03	[ISZ]	D-1 No. 1	F00008	Sputnik 8A91	B1-2	NIIP-5 LC1	F	NezavB
1958-F04	1958 Apr 29 0253:00	1958-F04	Vanguard	X-ray satellite	F00011	Vanguard	TV-5	CC LC18A	F	Vang-ER10300
1958 DEL	1958 May 15 0700:35	1958 DEL 2	3-y Sovetskiy ISZ	D-1 No. 2	S00008	Sputnik 8A91	B1-1	NIIP-5 LC1	S	NezavB
1958-F05	1958 May 28 0346:20	1958-F05	Vanguard	Lyman Alpha satellite	F00013	Vanguard	SLV-1	CC LC18A	F	Vang-ER10301
1958-F06	1958 Jun 26	S023633	1995-039B	11S510		11S510	RVSNR	1995 Aug 2 Reentered	1996 Apr 14	1995 Sep 1 LEO/I	94.27	232 x 735 x
1958-F07	1958 Jul 25	S023634	1995-039C	BOZ		BOZ	RVSNR	1995 Aug 2 Reentered	1995 Nov 24	1995 Sep 1 LEO/I	93.96	205 x 732 x
1958 EPS	1958 Jul 26	S023635	1995-039D	Blok SO-L		Blok SO-L No. 71634-805	RVSNR	1995 Aug 2 Deep Space	1995 Aug 3	1997 Apr 9 DSO	5498.19	17150 x 176474 x
1958-F08	1958 Aug 12	S023636	1995-040A	PAS 4		Panamsat K3	PAN	1995 Aug 3 In Earth orbit		1995 Sep 21 GEO/D	1434.45	35726 x 35783 x
1958-F09	1958 Aug 17	S023637	1995-040B	Ariane H10-3 V76		Ariane H10-3 S/N T448 (1	AE	1995 Aug 3 In Earth orbit		1995 Sep 4 GTO	659.35	617 x 36815 x
1958-F10	1958 Aug 22	S023638	1995-039E	Ullage rocket		Ullage rocket	RVSNR	1995 Aug 2 Reentered	1995 Aug 21	1995 Aug 10 LEO/I	93.63	227 x 678 x
1958-F11	1958 Aug 24	S023639	1995-041A	Mugunghwa 1		Koreasat 1	KTEL	1995 Aug 5 In Earth orbit		1995 Sep 4 GEO/S	1436.01	35777 x 35793 x
1958-F12	1958 Aug 25	S023640	1995-041B	Delta 228		Delta SSPS AJ10-118K	MDC	1995 Aug 5 In Earth orbit		1995 Sep 4 LEO/I	108.45	937 x 1374 x
1958-F13	1958 Aug 26	S023641	1995-041C	Star 48B		Star 48B	MDC	1995 Aug 5 In Earth orbit		1995 Sep 5 HEO	532.52	1370 x 29400 x
1958-F14	1958 Aug 28	S023642	1995-042A	Molniya-3		Molniya-3 No. 59	VKS/GPKS	1995 Aug 9 In Earth orbit		1995 Sep 8 HEO/M	717.92	448 x 39914 x
1958-F15	1958 Sep 23	S023643	1995-042B	11S510		11S510	RVSNR	1995 Aug 9 Reentered	1995 Sep 5	1995 Aug 16 LEO/I	90.20	204 x 365 x
1958-U01	1958 Sep 26	S023644	1995-042C	BOZ		BOZ	RVSNR	1995 Aug 9 Reentered	1995 Aug 25	1995 Aug 16 LEO/I	90.09	175 x 382 x
1958 ETA	1958 Oct 11	S023645	1995-042D	Blok-ML		Blok-ML	RVSNR	1995 Aug 9 In Earth orbit		1995 Sep 8 HEO/M	735.04	517 x 40686 x
1958-F17	1958 Oct 11	S023646	1995-039F	Magion-4		Magion-4	CZ	1995 Aug 2 Deep Space	1995 Aug 3	1996 Oct 31 DSO	5469.20	14776 x 178121 x
1958-F18	1958 Oct 23	S023647	1981-038C	deb USAF satellite		-	USAF	1981 Apr 24 In Earth orbit		1995 Apr 1 HEO/M	690.49	1000 x 38000 x
1958-F19	1958 Nov 8	S023648	1995-038C	IABS-5?		IABS	USAF	1995 Jul 31 In Earth orbit		1995 Aug 5 GEO/D	1431.67	35600 x 35800 x
1958-F20	1958 Dec 4	S023649	1995-043A	JCSAT 3		JCSAT 3	JSAT	1995 Aug 29 In Earth orbit		1995 Sep 30 GEO/S	1435.96	35740 x 35828 x
1958 THE	1958 Dec 6	S023650	1995-017E	deb Orbcomm FM1		-	ORBC	1995 Apr 3 Reentered	2000 Aug 19	1995 Sep 5 LEO/I	99.58	729 x 747 x
1958 ZET	1958 Dec 18	S023651	1995-044A	N-STAR a		N-STAR a	NTT	1995 Aug 29 In Earth orbit		1995 Oct 4 GEO/S	1436.16	35780 x 35795 x
1959 MU	1959 Jan 2	S023652	1995-044B	Ariane H10-3 V77		Ariane H10-3 S/N T449	AE	1995 Aug 29 Reentered	1996 Jan 13	1995 Oct 7 GTO	624.06	129 x 35496 x
1959 ALP	1959 Feb 17	S023653	1995-045A	Kosmos-2319		Geizer No. 20L	VKS	1995 Aug 30 In Earth orbit		1995 Sep 29 GEO/S	1436.04	35745 x 35826 x
1959 BET	1959 Feb 28	S023654	1995-045B	8S812		8S812	RVSNR	1995 Aug 30 Reentered	1995 Sep 3	1995 Sep 1 LEO/I	88.12	179 x 184 x
1959 NU	1959 Mar 3	S023655	1995-045C	Perekhodnik		Sredniy perekhodnik	RVSNR	1995 Aug 30 Reentered	1995 Aug 31	1995 Aug 30 LEO/I	88.48	193 x 205 x
1959 GAM	1959 Apr 13	S023656	1995-045D	Blok DM2 No. 78L		11S861 No. 78L	RVSNR	1995 Aug 30 In Earth orbit		1995 Oct 12 GEO/D	1438.23	35746 x 35910 x
		S023657	1995-046A	Sich-1		Okean-O1 No. 8/NKhM 10	NKAU	1995 Aug 31 In Earth orbit		1995 Oct 1 LEO/I	97.71	630 x 669 x
1959-F01	1959 Apr 14	S023658	1995-043B	Centaur AC-117		Centaur IIA(1N) AC-117	LM	1995 Aug 29 Reentered	1996 Feb 12	1995 Nov 29 VHEO	1639.60	219 x 79144 x
1959-F02	1959 Jun 3	S023659	1995-046C	S5M		S5M	VKS	1995 Aug 31 In Earth orbit		1995 Sep 30 LEO/I	97.70	630 x 667 x
		S023660	1995-045E	SOZ		SOZ	RVSNR	1995 Aug 30 Reentered	1996 Jun 6	1995 Sep 29 GTO	634.17	259 x 35887 x
1959-F06	1959 Jun 18	S023661	1995-045F	SOZ		SOZ	RVSNR	1995 Aug 30 Reentered	2002 May 8	1995 Sep 30 GTO	635.41	317 x 35893 x
1959-F03	1959 Jun 22	S023662	1986-017JK	Garbage bag		-	FKA	1986 Feb 19 Reentered	1996 Feb 7	1995 Aug 31 LEO/I	92.37	390 x 392 x
1959-U01	1959 Jun 25	S023663	1995-045G	deb Proton		-	RVSNR	1995 Aug 30 Reentered	1996 Sep 7	1995 Oct 6 LEO/I	90.35	184 x 399 x
		S023664	1995-045H	deb Proton (error?)		-	RVSNR	1995 Aug 30 Reentered	1995 Sep 2	1995 Sep 1 LEO/I	92.00	193 x 553 x
1959-F05	1959 Jul 16	S023665	1995-047A	Soyuz TM-22		Soyuz 7K-STM No. 71	FKA	1995 Sep 3 Landed	1996 Feb 29	1995 Oct 3 LEO/I	92.43	392 x 396 x
1959 DEL	1959 Aug 7	S023666	1995-047B	11S510		11S510	RVSNR	1995 Sep 3 Reentered	1995 Sep 6	1995 Sep 5 LEO/I	88.11	178 x 184 x
1959 EPS	1959 Aug 13	S023667	1995-048A	Endeavour (STS-69)		OV-105	NASA	1995 Sep 7 Landed	1995 Sep 18	1995 Sep 9 LEO/I	92.00	369 x 377 x
		S023668	1995-048B	Spartan 201		Spartan 201	NASA	1995 Sep 7 Landed Att	1995 Sep 18	1995 Sep 9 LEO/I	92.05	369 x 382 x
1959-F07	1959 Aug 15	S023669	1995-048C	Wake Shield Facility		WSF	SII	1995 Sep 7 Landed Att	1995 Sep 18	1995 Sep 11 LEO/I	92.56	396 x 404 x
1959 ZET	1959 Aug 19	S023670	1995-049A	Telstar 402R		Telstar 402R	ATT	1995 Sep 24 In Earth orbit		1995 Oct 24 GEO/S	1436.06	35758 x 35813 x
		S023671	1995-049B	Ariane H10-3 V78		Ariane H10-3 S/N T450	AE	1995 Sep 24 In Earth orbit		1995 Oct 24 GTO	656.16	399 x 36871 x
1959 XI	1959 Sep 12	S023672	1995-050A	Resurs-F2		Resurs-F2 17F42 No. 10	MVD	1995 Sep 26 Landed	1995 Oct 26	1995 Oct 3 LEO/I	89.13	228 x 235 x
1959-F08	1959 Sep 17	S023673	1995-050B	11S510		11S510	RVSNR	1995 Sep 26 Reentered	1995 Sep 29	1995 Sep 28 LEO/I	88.25	169 x 207 x
1959 ETA	1959 Sep 18	S023674	1995-051A	Kosmos-2320		Neman	VKS	1995 Sep 29 Deorbited	1996 Sep 28	1995 Oct 29 LEO/I	89.75	238 x 287 x
1959 THE	1959 Oct 4	S023675	1995-051B	11S510		11S510	RVSNR	1995 Sep 29 Reentered	1995 Oct 3	1995 Oct 1 LEO/I	88.54	170 x 235 x
1959 IOT	1959 Oct 13	S023676	1995-052A	Kosmos-2321		Parus	VMFR	1995 Oct 6 Reentered	1997 Aug 21	1995 Nov 5 LEO/I	94.95	258 x 775 x
1959 KAP	1959 Nov 7											
1959 LAM	1959 Nov 20											
1959-F09	1959 Nov 26											

JSR Launch Vehicle Database, 2017 Dec 28 Edition

A comprehensive list of suborbital space launches

tgz files: sdb.tar.gz (indexes) and launch.tar.gz (launches)

Straight to the data: LIST OF ALL LAUNCHES BY LV FAMILY

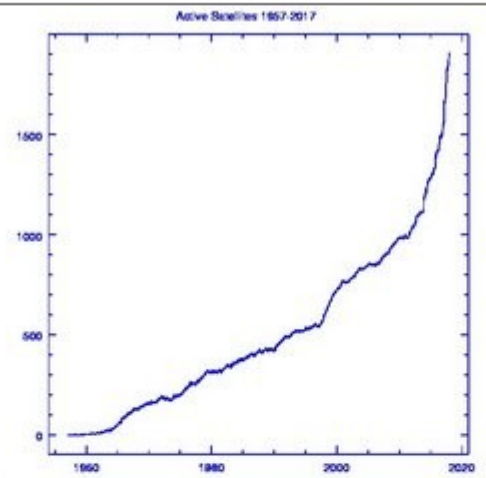
Revised e **Launch List** 950s Soviet missiles from Asif Siddiqi

launch list of 70780 launches. '

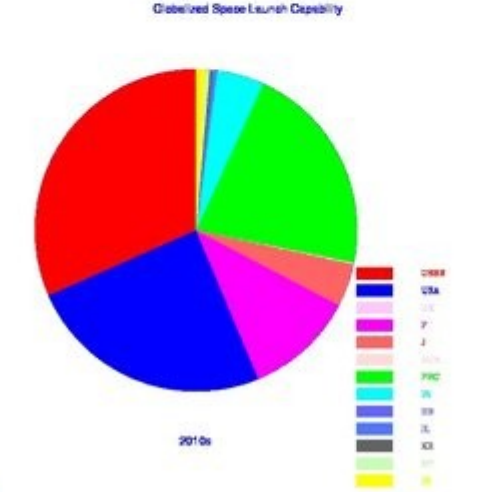
10KS2500
48N6
A-350
AAD
AMROC
ASLV
ATACMS
Abid
AeroHTV
Aerobee
AerobeeB
Agate
Agni3
AlKahir
Alfa
Angara
Apollo.LES
Arcas
ArcasB
Arcon
Ariane
Ariane5
Aries
Arrow2

Launch_Tag	Launch_JD	Launch_Date	LV_Type	Variant	Flight_ID	Flight	Mission	FlightCode	Platform	Launch_Si	Launch_Pad				
1990-028	2447987.30	1990 Apr 5 1910:17	Pegasus	-	001/F1	Pegsat/USA 55 GLOMR	Pegsat	-	NB-52 008	EAFB	RW04/22 -> PAWA	-	-	-	OSC
1991-051	2448455.23	1991 Jul 17 1733:53	Pegasus/HAPS	-	002/F2	Microsat	Microsat 1	-	NB-52 008	EAFB	RW04/22 -> PAWA	-	-	-	OSC
1993-009	2449028.10	1993 Feb 9 1430:34	Pegasus	-	003/F3	SCD-1	Orbcomm OXP	-	NB-52 008	KSC	RW15/33 -> MFWA	-	-	-	OSC
1993-026	2449103.08	1993 Apr 25 1356	Pegasus	-	004/F4	Alexis	Alexis	-	NB-52 008	EAFB	RW04/22 -> PAWA	-	-	-	OSC
1994-029	2449492.21	1994 May 19 1703	Pegasus/HAPS	-	005/F5	STEP 2	STEP 2	-	NB-52 008	EAFB	RW04/22 -> PAWA	-	-	-	OSC
1994-F03	2449531.39	1994 Jun 27 2115	Pegasus XL	-	F6	STEP 1	STEP 1	-	L-1011	V	RW30/12 -> PAWA	38	-	-	OSC
1994-046	2449568.11	1994 Aug 3 1438	Pegasus	-	F7	APEX	APEX	-	NB-52 008	EAFB	RW04/22 -> PAWA	-	-	-	OSC
1995-017	2449811.08	1995 Apr 3 1348	Pegasus H	-	F8	Orbcomm 1/2	Orbcomm FM1	-	L-1011	V	RW30/12 -> PAWA	-	-	-	OSC
1995-F03	2449891.33	1995 Jun 22 1958	Pegasus XL	-	F9	STEP 3	STEP 3	-	L-1011	V	RW30/12 -> PAWA	144	-	-	OSC
1996-014	2450151.56	1996 Mar 9 0133	Pegasus XL	-	F10	REX II	REX II	-	L-1011	V	RW30/12 -> PAWA	-	-	-	OSC
1996-031	2450220.61	1996 May 17 0244	Pegasus H	-	F11	MSTI 3	MSTI 3	-	L-1011	V	RW30/12 -> PAWA	-	-	-	OSC
1996-037	2450266.83	1996 Jul 2 0748	Pegasus XL	-	F12	TOMS-EP	TOMS-EP	-	L-1011	V	RW30/12 -> PAWA	-	-	-	OSC
1996-049	2450316.91	1996 Aug 21 0947:26	Pegasus XL	-	F13	FAST	FAST	-	L-1011	V	RW30/12 -> PAWA	-	-	-	OSC
1996-061	2450392.21	1996 Nov 4 1708:56	Pegasus XL	-	F14	SAC-B/HETE	HETE	-	L-1011	WI	RW04/22? -> DZWI	-	-	-	OSC
1997-018	2450560.00	1997 Apr 21 1159:06	Pegasus XL	-	F15	Minisat-01	Minisat-01	-	L-1011	GANC	RW03/21 -> DZGC	-	-	-	OSC
1997-037	2450662.35	1997 Aug 1 2020	Pegasus XL	-	F16	OrbView-2	Seastar	-	L-1011	V	RW30/12 -> PAWA	-	-	-	OSC
1997-047	2450690.13	1997 Aug 29 1502:22	Pegasus XL	-	019/F17	FORTE	FORTE	-	L-1011	V	RW30/12 -> PAWA	-	-	-	OSC
1997-063	2450744.05	1997 Oct 22 1313	Pegasus XL	-	F18	STEP 4	STEP M4	-	L-1011	WI	RW04/22? -> DZWI	-	-	-	OSC
1997-084	2450806.30	1997 Dec 23 1911:42	Pegasus XL/HAPS	-	F19	Orbcomm A1-A8	Orbcomm FM5	-	L-1011	WI	RW04/22? -> DZWI	-	-	-	OSC
1998-012	2450870.80	1998 Feb 26 0707	Pegasus XL	-	F20	SNOE/T1	SNOE	-	L-1011	V	RW30 -> PAWA	-	-	-	OSC
1998-020	2450905.61	1998 Apr 2 0242:39	Pegasus XL	-	F21	TRACE	TRACE	-	L-1011	V	RW30/12 -> PAWA	-	-	-	OSC
1998-046	2451028.18	1998 Aug 2 1624	Pegasus XL/HAPS	-	F22	Orbcomm B1-B8	Orbcomm FM17	-	L-1011	WI	RW04/22? -> DZWI	-	-	-	OSC
1998-053	2451079.71	1998 Sep 23 0506	Pegasus XL/HAPS	-	F23	Orbcomm C1-C8	Orbcomm FM21	-	L-1011	WI	RW04/22? -> DZWI	-	-	-	OSC
1998-060	2451109.50	1998 Oct 23 0002	Pegasus H	-	F24/P-33	SCD-2	SCD-2	-	L-1011	CC	RW30/12 -> MFWA	-	-	-	OSC
1998-071	2451153.54	1998 Dec 6 0057:54	Pegasus XL	-	F25	SWAS	SWAS	-	L-1011	V	RW30/12 -> PAWA	-	-	-	OSC
1999-011	2451242.62	1999 Mar 5 0256	Pegasus XL	-	F26/M-22	WIRE	WIRE	-	L-1011	V	RW30/12 -> PAWA	-	-	-	OSC
1999-026	2451316.71	1999 May 18 0509:36	Pegasus XL/HAPS	-	F27	TERRIERS/MUBLCOM	TERRIERS	-	L-1011	V	RW30/12 -> PAWA	-	-	-	OSC
1999-065	2451517.29	1999 Dec 4 1853	Pegasus XL/HAPS	-	F28	Orbcomm D1-D7	Orbcomm FM30	-	L-1011	WI	RW22 -> DZWI	-	-	-	OSC
2000-030	2451703.06	2000 Jun 7 1319:30	Pegasus XL	-	F29	TSX-5	TSX-5	-	L-1011	V	RW30/12 -> PAWA	-	-	-	OSC
2000-061	2451826.73	2000 Oct 9 0538:18	Pegasus H	-	F30/P-35	HETE 2	HETE 2	-	L-1011	KMR	RW06/24 -> DZKW	-	-	-	OSC
2001-A01	2452063.36	2001 Jun 2 2043:31	Hyper X	-	1	X-43A	-	-	NB-52 008	EAFB	RW04/22 -> PAWA	7	-	-	OSC
2002-004	2452311.37	2002 Feb 5 2058:12	Pegasus XL	-	F31	HESSI	HESSI	-	L-1011	CC	RW30/12 -> MFWA	-	-	-	OSC
2003-004	2452665.34	2003 Jan 25 2013:35	Pegasus XL	-	F32	SORCE	SORCE	-	L-1011	CC	RW30/12 -> MFWA	-	-	-	OSC
2003-S06	2452677.38	2003 Feb 6 2100	GBI	-	1	Taurus Lite	-	-	-	V	576E	1810	-	-	OSC
2003-017	2452758.00	2003 Apr 28 1159:57	Pegasus XL	-	F33	GALEX	GALEX	-	L-1011	CC	RW30/12 -> MFWA	-	-	-	OSC
2003-030	2452817.29	2003 Jun 26 1853	Pegasus XL	-	F34	Orbview-3	Orbview-3	-	L-1011	V	RW30/12 -> PAWA	-	-	-	OSC
2003-036	2452864.59	2003 Aug 13 0209:33	Pegasus XL	-	F35	Scisat-1	SCISAT-1	-	L-1011	V	RW30/12 -> PAWA	-	-	-	OSC
2003-S39	2452868.25	2003 Aug 16 1800	GBI	-	2	BV-6	-	-	-	V	LF23	1874	-	-	OSC
2004-S06	2453031.60	2004 Jan 27 0223	GBI	-	3	IFT-13b	-	-	-	KMR	Meck 1	272?	-	-	OSC
2004-A03	2453092.42	2004 Mar 27 2159:57	Hyper X	-	2	X-43A	-	-	NB-52 008	EAFB	RW04/22 -> PAWA	29	-	-	OSC
2004-A12	2453326.44	2004 Nov 16 2235	Hyper X	-	3	X-43A	-	-	NB-52 008	EAFB	RW04/22 -> PAWA	33	-	-	OSC
2005-014	2453476.23	2005 Apr 15 1726:50	Pegasus XL/HAPS	-	F36	DART	DART/HAPS	-	L-1011	V	RW30/12 -> PAWA	-	-	-	OSC
2005-S56	2453718.63	2005 Dec 14 0304	GBI	-	4	FT-1	-	-	-	KMR	Meck	1800?	-	-	MDA
2006-008	2453817.09	2006 Mar 22 1403:45	Pegasus XL	-	F37	ST5	Space Technology 5	-	L-1011	V	RW30/12 -> PAWA	-	-	-	OSC
2006-S49	2453980.24	2006 Sep 1 1739	GBI	-	5	GMD FTG-02	-	-	-	V	LF23	1000?	-	-	MDA
2007-015	2454216.35	2007 Apr 25 2026:03	Pegasus XL	-	F38	AIM	AIM	-	L-1011	V	RW30/12 -> PAWA	-	-	-	OSC
2007-S43	2454372.34	2007 Sep 28 2016	GBI	-	6	GMD FTG-03a	-	-	-	V	LF23	1000?	-	-	MDA
2008-017	2454573.21	2008 Apr 16 1702:48	Pegasus XL	-	F39	C/NOFS	C/NOFS	-	L-1011	KMR	RW06/24 -> DZK2	-	-	-	OSC
2008-A06	2454700.88	2008 Aug 22 0910	ALV	-	X-1	HyBolt/SOAREX-6	-	-	-	MARS	Pad 0B	10?	-	-	NAS
2008-051	2454759.24	2008 Oct 19 1747:23	Pegasus XL	-	F40	IBEX	IBEX	-	L-1011	KMR	RW06/24 -> DZK2	-	-	-	OSC
2008-S71	2454806.35	2008 Dec 5 2021	GBI	-	-	GMD FTG-05	-	-	-	V	LF23	1000?	-	-	MDA
2010-S13	2455228.49	2010 Jan 31 2345:05	GBI	-	-	GMD FTG-06	-	-	-	V	LF23	1000?	-	-	MDA
2010-S37	2455354.43	2010 Jun 6 2225	GBI	2	-	BVT-1	-	-	-	V	LF24	300?	-	-	MDA
2010-S77	2455546.34	2010 Dec 15 2003	GBI	-	-	GMD FTG-06a	-	-	-	V	LF23	1000?	-	-	MDA
2012-031	2456092.17	2012 Jun 13 1600:42	Pegasus XL	-	F41	NuSTAR	NuSTAR	-	L-1011	KMR	RW06/24 -> DZK3	-	-	-	OSC
2013-S01	2456319.42	2013 Jan 26 2200:00	GBI	-	-	GMD CTV-01	-	-	-	V	LF23	1000?	-	-	MDA
2013-033	2456471.60	2013 Jun 28 0227:46	Pegasus XL	-	F42	IRIS	IRIS	-	L-1011	V	RW30/12 -> PAWA	-	-	-	OSC
2013-S48	2456479.27	2013 Jul 5 1835	GBI	-	GBI	GMD FTG-07	CE-I EKV	-	-	V	LF23?	1000?	-	-	MDA
2014-S33	2456831.29	2014 Jun 22 1855	GBI	-	GBI	GMD FTG-06b	CE-II EKV	-	-	V	LF23	1000?	-	-	MDA
2015-A09	2457199.50	2015 Jun 26	IRBM-T1	-	Aegis FTO-02E1	Aegis Ashore Target	MBRV-7?	-	C-17	POR28?	-	0?	-	-	MDA
2015-S87	2457366.50	2015 Dec 10	IRBM-T1	-	Aegis FTO-02E1a	FTO-02E1a Target	MBRV-7?	-	C-17	POR28	-	300?	-	-	MDA
2016-S04	2457416.41	2016 Jan 28 2155?	IRBM-T1	-	GMD Target	GMD CTV-02+ Target	-	-	C-17	POR28?	-	300?	-	-	MDA
2016-S05	2457416.41	2016 Jan 28 2157	GBI	-	GBI	GMD CTV-02+	CE-II EKV	-	-	V	LF23	1000?	-	-	MDA
2016-078	2457738.07	2016 Dec 15 1337	Pegasus XL	-	F43	CYGNSS	CYGNSS	-	L-1011	CC	RW13 -> MFWA	-	-	-	OSC

Satellite statistics



PAGE 1



PAGE 2

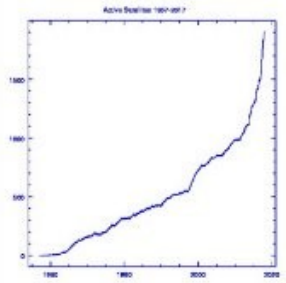
Satellite Catalog

Satellite Launch Data

Satellite statistics, Page 1

Active Payloads

Here is a summary of active satellite payloads versus time.

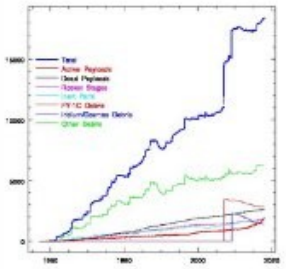


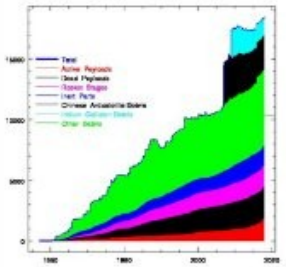
Active Payloads: Annual totals

Space Debris Population

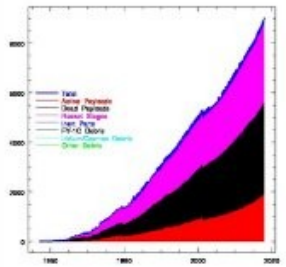
Here I show the cataloged orbiting satellite population. In low orbit, most objects larger than 10 cm
resulting from major disintegrations, collisions or explosion (which I label as ``debris''). The two maj

The data are shown as both individual line graphs and as a cumulative





The mass of individual pieces of debris is not known, but is small com



Launches

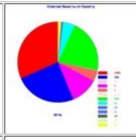
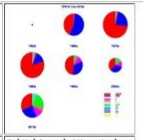
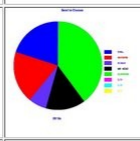
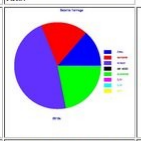
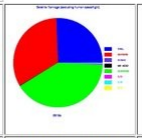
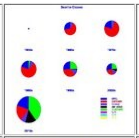
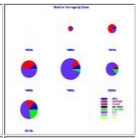
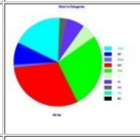
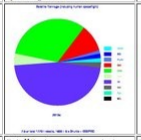
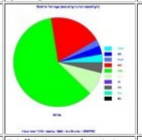
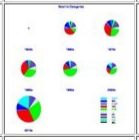
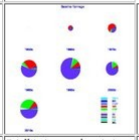
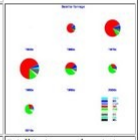
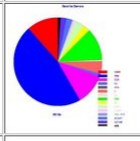
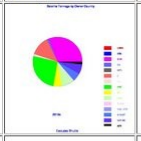
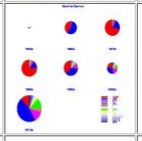
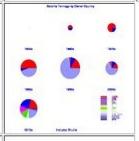
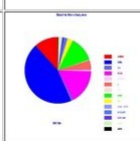
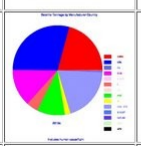
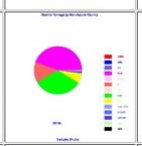
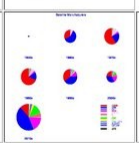
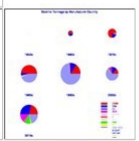
Orbital launches, including Earth orbit and deep space launches. Launch vehicle failures that reache

Note that for 2011, US launches exceed those of China only because the Sea Launch partnership is c

Satellite statistics, Page 2

Orbital Launches

Here we show pie charts of various quantities summed over a decade at a time. Radius of the pie is proportional to the total launch rate. Totals include orbital launch failures.

Data totals						
Orbital launches	Orbital Launches: by country, 2010s	Orbital Launch Attempts: by country and decade. Size of circle indicates total launch rate.				
Data totals						
Satellites by owner category: numbers and tonnage data	Satellite numbers by owner category, 2010s	Satellites tonnage by owner category, 2010s, with human spaceflight included	Satellites tonnage by owner category, 2010s, with human spaceflight excluded	Satellite numbers by owner category, by decade	Satellite tonnage by owner category, by decade	
Data totals						
Satellites by mission category: numbers and tonnage data	Satellite numbers by mission category, 2010s	Satellite tonnage by mission category, 2010s, with human spaceflight included	Satellite tonnage by mission category, 2010s, with human spaceflight excluded	Satellite numbers by mission category, by decade	Satellite tonnage by mission category, by decade, human spaceflight included	Satellite tonnage by mission category, by decade, human spaceflight excluded
Data totals						
Satellites by owner country/region: numbers and tonnage data	Satellite numbers by owner country/region, 2010s	Satellite tonnage by owner country/region, 2010s	Satellite numbers by owner country/region, by decade	Satellite tonnage by owner country/region, by decade		
Data totals						
Satellites by manufacturer country/region:	Satellite numbers by manufacturer country/region, 2010s	Satellite tonnage by manufacturer country/region,	Satellite tonnage by manufacturer country/region,	Satellite numbers by manufacturer country/region,	Satellite tonnage by manufacturer country/region,	

“I have a big library at home.”

“Oh, like, a couple of bookcases?...”

“Well, it's a bit more than that...”

Bay 1 (Astrophysics) and 2 (Rocket Launches, Shuttle missions)

Bay 2 and 3 (Rocket launches)

Jonathan McDowell's Archive of Astronautics Technical History
Brickbottom Artists Building, Somerville, MA, USA

- Scope: What actually happened in our exploration of outer space?

- What rockets were launched?
- What satellites went into space? What did they do?

My goal is to preserve the technical details of the early space age. What exactly happened on all the early rocket launches and satellite missions?

SIZE: 920 linear feet Space
450 linear feet Astrophysics

What do I do with it?

- Monthly internet newsletter since 1989

- Web site with the comprehensive list of rocket launches and satellites, extracted from info in the collection

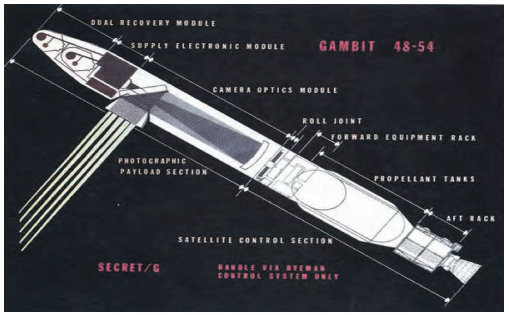
(above two are the ultimate source of much of the spaceflight data in Wikipedia)

- Published articles (if only I had more time)

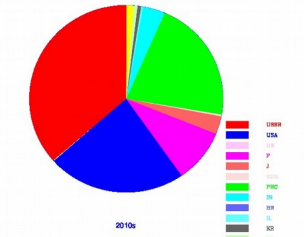
- The Book (someday)

- Answer questions from public, industry, government, media

Some questions I have been asked recently:

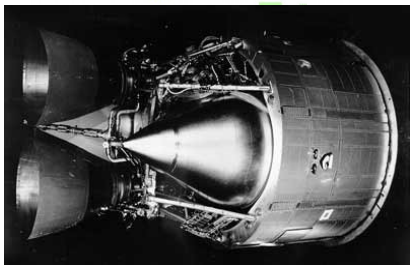


"I'm writing an article on the recently declassified GAMBIT 4352 spy satellite which flew in 1982. What did people figure out at the time?" - academic researcher



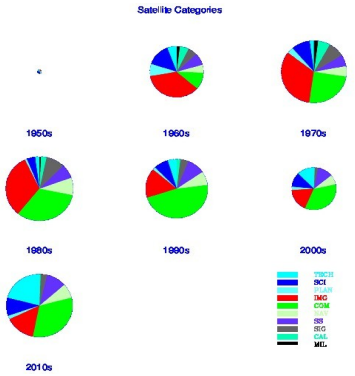
"How many countries have launched satellites?" - journalist

"This Transtage satellite recently disintegrated in orbit; it was launched in 1969. What was its serial number? (so we can call it by its correct name)" - NASA



"What is the difference between Suisei, the 1985 Japanese comet probe, and the Suisei in the name of the new Japanese Mercury mission?" (answer: same transliteration, different Kanji) - me

"What is the fraction of communications satellites now, and back in the 1960s?" - journalist



"Please review this analysis of Chinese space activity in 2014" - US/China Trade Commission

Some media I've talked to recently: BBC, 60 Minutes, io9.com, NPR, …

Collection areas:

Books
- NASA publications — rare, but now mostly available scanned
- European Space Agency — rare
- Astronaut bios — common
- US space program — mostly common
- Russian space program — rare, many Russian language books
- Other space topics — some quite rare; overall collection is extensive but not unique

Journals and magazines
- Trade publications
- Russian magazines
- NASA, ESA periodicals
- British Interplanetary Society

Documents
- Rocket launches — unique collection, uniquely organized
- Organizations and launch sites — unique collection
- US human spaceflight missions — 70% available online, some rare

Problems:

- Government collections (e.g. NASA, NRO) only collect their own stuff, and often lose even that

- Corporate collections (e.g. McDonnell Douglas) often destroyed/lost during mergers

- Academic historians are trained to focus on people and policy. They are usually not interested in robots. Many official histories therefore stop, or at least become highly superficial, once the rocket leaves the pad

- Internal documentation usually extensive during planning phase, but post launch analysis often not well archived, and final fate of a long mission sometimes not well recorded (since team is let go at that point). Bottom line: easier to find what was planned than what really happened

Sources:

Print: Internet
Purchase: Amazon, Abebooks, 2nd hand bookstores
Magazine subscriptions, ebay
Xerox: Academic and observatory libraries

Visit (and xerox): National and institutional archives

- NatArchives, NASA, NRO, Vandenberg Air Force Base, CNES-Toulouse, ISRO- Bangalore, ISAS-Tokyo, UK Science Museum archive, Deutsches Museum, BUAA-Beijing

Acquire data/email/documents:
Contacts in TsUP-Moscow, NASA-Houston, USAF, Aerospace Corporation, etc.
Harassing phone cold calls to relevant space managers/engineers

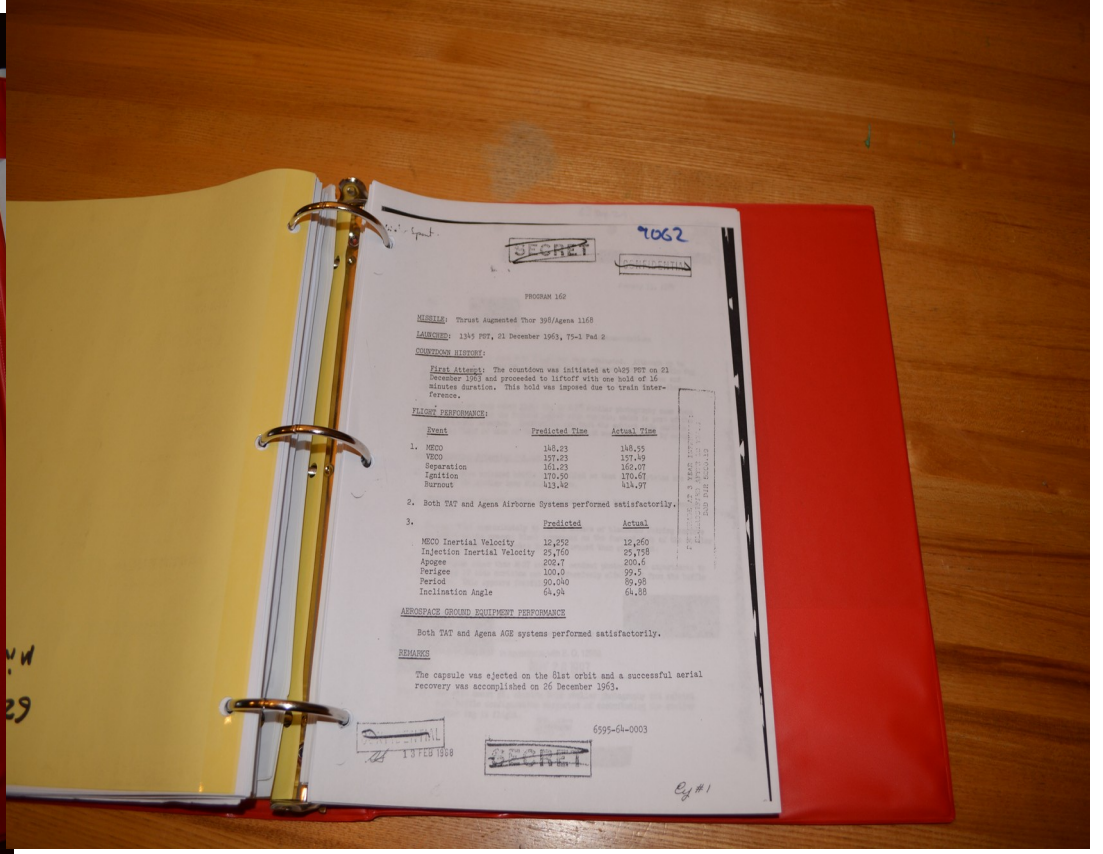
Beg, Borrow, Steal, get donated:
Library discard piles
Program managers' bookshelves (with permission)
Retirees' garages

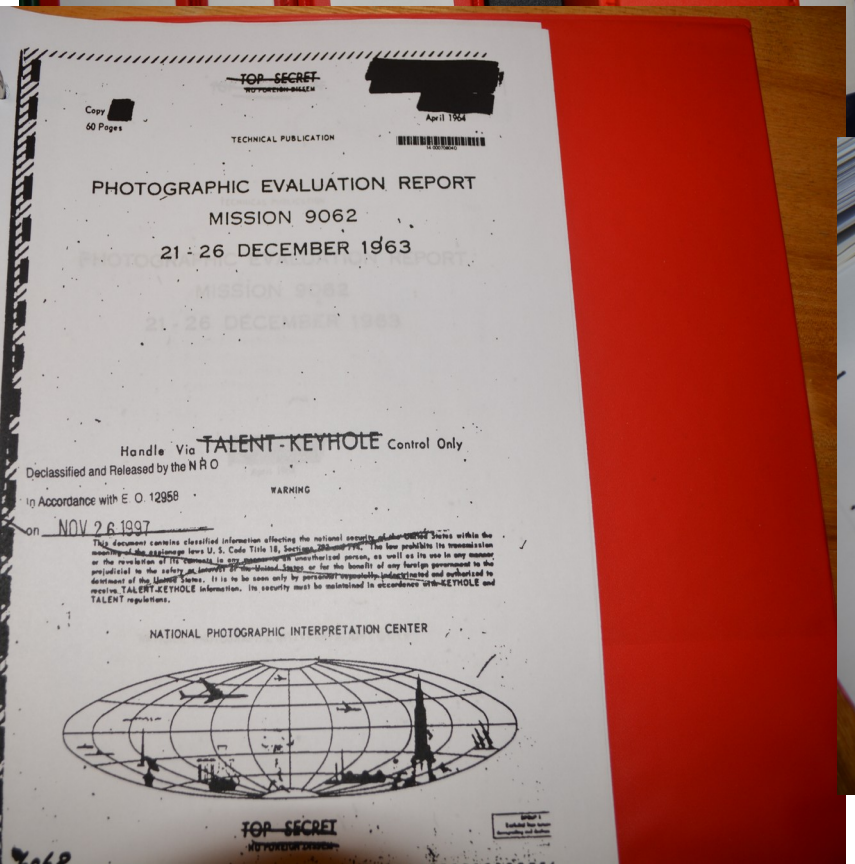
Still collecting:

- Post-launch/post-mission technical reports
- Satellite apogee engine types (almost complete)
- Satellite & upper stage dry masses (for debris studies)
- Trajectories for near-orbital stages (150 > perigee > -1000 km) & launch failures
- Suborbital rocket launch times [74% complete for 28500 launches]
- Orbital launch times [missing 13 failures, approx values for 58 orbital ones, out of 5295 total attempts – 98.6% complete]
- LV and upper stage serial numbers (to give orbiting rocket bodies unique names)
- Drop point locations for air- and sea- launched rockets
- Deorbit locations for actively deorbited spacecraft

THANK YOU!!


THOR AGENA 1963 JUL-AUG
THOR AGENA 1001 9058A
THOR AGENA 1963 OCT-DEC
THOR AGENA 1964 JAN-FEB
ECHO. 1004. F
THOR AGENA 1964 JAN
PO'FY. DMSP
THOR AGENA 1964 MAR-
THOR AGENA 1964 JUN
1002
9059A
9060
9061
9062
1003. LMS


SECRET
9062
PROGRAM 162
MISSILE: Thrust Augmented Thor 398/Agena 1168
LAUNCHED: 1345 PST, 21 December 1963, TS-1 Pad 2
COUNTDOWN HISTORY:
First Attempt: The countdown was initiated at 0405 PST on 21 December 1963 and proceeded to liftoff with one hold of 16 minutes duration. This hold was imposed due to train interference.
FLIGHT PERFORMANCE:
Event | Predicted Time | Actual Time
1. MECO 148.23 148.55
VECO 157.23 157.49
Separation 161.23 162.07
Ignition 170.50 170.61
Burnout 413.42 414.97
2. Both TAT and Agena Airborne Systems performed satisfactorily.
3. Predicted Actual
MECO Inertial Velocity 12,252 12,260
Injection Inertial Velocity 25,760 25,758
Apogee 202.7 200.6
Perigee 100.0 99.5
Period 90.040 89.98
Inclination Angle 64.94 64.88
AEROSPACE GROUND EQUIPMENT PERFORMANCE
Both TAT and Agena AGE systems performed satisfactorily.
REMARKS
The capsule was ejected on the 61st orbit and a successful aerial recovery was accomplished on 26 December 1963.
6595-64-0003
SECRET
Cy #1


TOP SECRET
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60 Pages
April 1964
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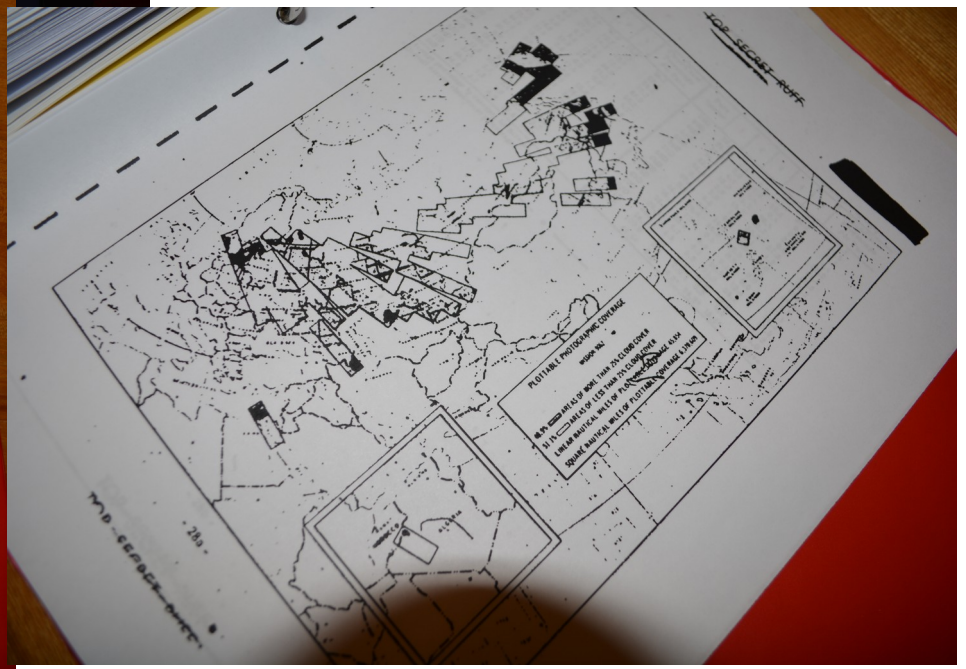
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ВЫНОСЯЩИЕ ИЗ ОГНЯ

В НЕБЕ НАД НАМИ

THE MISSION OF SOYUZ T-10-1

P.S. CLARK
Lee, London

1. INTRODUCTION

On 26 September 1983 the Soviet Union suffered its second manned launch abort in its space programme. In April 1975 there was an abort at altitude, which V.P. Glushko has called Soyuz 18-1 [1]; the 1983 abort will thus be designated here as Soyuz T-10-1, the next manned flight being Soyuz T-10.

2. THE LAUNCH ABORT

In September 1983 Salyut 7 was orbiting the Earth with a two-manned crew launched on Soyuz T-9 in June: V.A. Lyakhov was commander and A.P. Alexandrov was flight engineer. In mid-September this mission was coming to a close, and it was thought that the Soviets might take the opportunity to launch a replacement crew to Salyut, so that it could be permanently manned.

The launch of the intended Soyuz T-10 (the number was later given to the successful launch in February 1984) was scheduled for 19.38 GMT on 26 September, but during the final stages of the countdown a fire broke out in the base of the SL-4 booster. After some delay, the mission was aborted and the shroud tower ignited to carry the Soyuz descent craft and crew away from the inferno. It was revealed at the 1983 IAF Congress by former cosmonaut Konstantin Feoktistov (now a major Salyut designer) that the booster remains burned for 20 hours.

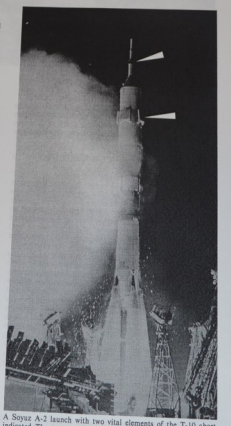
The launch was not announced at the time, but the story broke in the western press within a week. In October 1983 launch abort occurred and that two cosmonauts were involved: V.G. Titov and G.M. Strekalov. Earlier, it had possibly the Soyuz T-7 back-up crew of V.V. Komarenko, V.P. Savinykh and a woman said to be called "Irena."

3. THE SOYUZ T-9 PRESS CONFERENCE

As a result of the abort, the T-9 crew remained in orbit for an extra six weeks or so and returned to Earth on 23 November. In December they held their post-flight press conference, and they discussed the launch failure and its implications; these comments were not carried by the Soviet media.

Two pieces of new information came out concerning the aborted mission:

1. The T-9 crew were intended to hand Salyut 7 over to the intended T-10 crew.
2. The EVA work conducted by the T-9 crew on 1 and 3 November was intended for completion by the T-10 crew. This would have been done before the T-9 crew returned to Earth.



A Soyuz A-2 launch with two vital elements of the T-10 abort indicated. The upper arrow shows the rockets of the escape system; the lower points to the 'petals' that were deployed to slow down the escaped craft. (This picture is from the French/Soviet mission of June 1982).

Novosti

Additionally, the crew of the aborted mission was confirmed as that given above.

Пролетарии всех стран, соединяйтесь!

партия Советского Союза

РАВДА

рального Комитета КПСС

етверг, 9 февраля 1984 года • Цена 4 коп.

Сообщение ТАСС

В полете — «Союз Т-10»

В соответствии с программой исследования космического пространства в мирных целях 8 февраля 1984 года в 15 часов 07 минут московского времени в Советском Союзе осуществлен запуск космического корабля «Союз Т-10», пилотируемого экипажем в составе командира корабля Героя Советского Союза летчика-космонавта СССР полковника Кизима Леонида Денисовича, бортинженера Соловьева Владимира Алексеевича и космонавта-исследователя Атькова Олега Юрьевича.

Программой полета предусматривается стыковка корабля «Союз Т-10» с орбитальной станцией «Салют-7».

На борту комплекса экипажу предстоит выполнить научно-технические и медико-биологические исследования и эксперименты.

Самочувствие космонавтов Кизима, Соловьева и Атькова хорошее. Бортовые системы корабля «Союз Т-10» работают нормально.

ЮБИЛЕИ

25 лет назад впервые в истории космонавтики были осуществлены межорбитальные перелеты с одной космической станции на другую. Выполнили эти уникальные операции космонавты Леонид Кизим и Владимир Соловьёв на корабле «Союз Т-15».

А.Ильин, В.Лындин специально для «Новостей космонавтики»

«Мир» — «Салют-7» и обратно

К 25-летию первого межорбитального перелета

О событиях того времени рассказывает их непосредственный участник – бортинженер корабля «Союз Т-15», а ныне первый заместитель генерального конструктора Ракетно-космической корпорации имени «Энергия» С.П. Королёва, руководитель полета российского сегмента Международной космической станции дважды Герой Советского Союза **Владимир Алексеевич Соловьёв** *(В.С.)*.

В.С.: Программа работ на станции «Салют-7» было не завершена (предыдущим экипажем. – Ред.). Станция продолжала летать с пристыкованным тяжелым грузовым кораблем «Космос-1686», на котором был установлен комплекс «Пион-К» с лазерно-электрон-

еще только готовили к летным испытаниям в беспилотном варианте.

В.С.: Корабль наш был, можно сказать, из «запчастей» собранный. 26 сентября 1983 г. на стартовой позиции загорелась ракета с кораблем «Союз Т», на борту которого находились Владимир Титов и Геннадий Стрекалов. Система аварийного спасения сработала – и космонавты благополучно приземлились. И от этого «Союза» остался спускаемый аппарат – самая сложная часть, ведь на изготовление теплозащиты требуется много времени. Так вот, СА остался и был вполне кондиционным – его и установили на наш «Союз Т-15».

В Центре подготовки космонавтов имени Ю.А. Гагарина уже прошли обучение экипажи для работы на станции «Салют-7», в том числе и по военно-прикладным экспериментам. Но корабль был один!

В.С.: Тогда у Игоря Леонидовича Минюка (он руководил отделом транспортных ко-

Я поехал к Валентину Петровичу, и он рассказал мне про идею перелета с «Мира» на «Салют-7». Потом спросил: «С кем бы вы хотели полететь? У нас две кандидатуры – Кизим и Попов. Вы с Кизимом много летали – не наелись?» Я сказал, что полечу с Кизимом, так как его хорошо знаю и понимаю с полуслова.

Новую орбитальную станцию «Мир» запустили в ночь с 19 на 20 февраля 1986 г. Леонид Кизим и Владимир Соловьёв стали ее первым экипажем. Они стартовали 13 марта 1986 г. и через двое суток прибыли на новую станцию. Их позывной, как и в предыдущем полете, был «Маяк».

В.С.: В этом полете мы все стыковки выполняли вручную. На нашем «Союзе Т-15» стояла старая система стыковки «Игла», а на «Мир» уже установили новую радиотехническую систему «Курс». «Игла» было только со стороны агрегатного отсека, потому что к нему должны были стыковаться

3e PARTIE

TABLEAU CHRONOLOGIQUE DES LANCEMENTS DE FUSEES-SONDES PAR LE C.N.E.S.

N° FU	ENGIN	DATE DE TIR	LIEU	NATURE EXPERIENCE	LABORATOIRE	EXPERIMENTATEURS	COORDONNATEURS
	CENTAURE C 02	6.12.61	REGGAN	EMISSION NA	AERONOMIE	PR. BLAMONT	
	CENTAURE C 06	6.12.61	H.M.G.	EMISSION NA K	AERONOMIE	PR. BLAMONT	
	CENTAURE C 05	9.12.61	REGGAN	EMISSION NA	AERONOMIE	PR. BLAMONT	
	CENTAURE C 07	9.12.61	H.M.G.	EMISSION NA K	AERONOMIE	PR. BLAMONT	
	CENTAURE C 08	9.12.61	H.M.G.	EMISSION NA	AERONOMIE	PR. BLAMONT	
	BELIER B 02	9. 5.62	CERES	TECHNOLOGIQUE	CNET		
	BELIER B 03	15. 5.62	CERES	TECHNOLOGIQUE	CNET		
	BELIER B 04	16. 5.62	CERES	TECHNOLOGIQUE	CNET		
	CENTAURE C 10	18. 5.62	CERES	TECHNOLOGIQUE	CNET		
	VERONIQUE V 39	24. 5.62	H.M.G.	EXPLOSIF	AERONOMIE	PR. BLAMONT	
	CENTAURE C 12	29. 5.62	CERES	EMISSION NA K	AERONOMIE	PR. BLAMONT	
	CENTAURE C 15	29. 5.62	REGGAN	EMISSION NA K	AERONOMIE	PR. BLAMONT	
	CENTAURE C 18	29. 5.62	H.M.G.	EMISSION NA + EXPL.	AERONOMIE	PR. BLAMONT	
	BELIER B 07	29. 5.62	H.M.G.	RADIOACTIVITE	AERONOMIE	PR. BLAMONT	
	VERONIQUE V 38	31. 5.62	H.M.G.	EXPLOSIF	AERONOMIE	PR. BLAMONT	
	VERONIQUE V 41	1. 6.62	H.M.G.	DOUBLE EXPLOSIF	AERONOMIE	PR. BLAMONT	
	VERONIQUE V 42	4. 6.62	H.M.G.	DOUBLE EXPLOSIF	AERONOMIE	PR. BLAMONT	
	CENTAURE C 14	5. 6.62	CERES	EMISSION NA K	AERONOMIE	PR. BLAMONT	
	CENTAURE C 16	5. 6.62	REGGAN	EMISSION NA K	AERONOMIE	PR. BLAMONT	
	CENTAURE C 17	5. 6.62	REGGAN	EMISSION NA K	AERONOMIE	PR. BLAMONT	
	CENTAURE C 19	5. 6.62	H.M.G.	EMISSION NA + EXPL.	AERONOMIE	PR. BLAMONT	
	CENTAURE C 09	5. 6.62	H.M.G.	EMISSION NA K	AERONOMIE	PR. BLAMONT	

4.29GG 63J123

NEWS RELEASE

NATIONAL AERONAUTICS AND SPACE ADMINISTRATION

WALLOPS STATION TELEPHONE: WALLOPS ISLAND, VIRGINIA VALLEY 4-3411 EXTS. 584 and 579

FOR RELEASE: IMMEDIATE
July 23, 1963

Release No. 63-71

SECOND ASTRONOMY EXPERIMENT AT WALLOPS

An experiment carrying instrumentation to measure the intensity of light from the stars was launched by NASA from the Wallops Island, Va., Station at 2:00 a.m. EDT today.

To accomplish its objective, it was necessary to launch the experiment at night when the sun and moon were more than twenty degrees below the horizon. It was also necessary that there be no aurora during the night of launch.

The 238-pound payload was flown on an Aerobee 150A vehicle and reached a peak altitude of 110 statute miles. Impact occurred in the Atlantic Ocean 57 miles from the launch site. No attempt was made to recover the payload. Desired data were telemetered to ground receiving stations during the flight, and will be compared with information obtained from a companion experiment launched early last Friday morning.

The experiment was conducted for NASA's Goddard Space Flight Center, Greenbelt, Md. Theodore P. Stecher was the Goddard Project Scientist, James E. Milligan the Project Manager, and Charles R. Rhodes the Vehicle Manager. Wayne D. Gunter was the Wallops Project Engineer.

- END -

63J123 4.29GG

AN OBSERVATION OF JUPITER IN THE ULTRAVIOLET (IV-12)

by Theodore P. Stecher
(Goddard Space Flight Center
National Aeronautics and Space Administration
Greenbelt, Maryland, U. S. A.)

Résumé. — *On a obtenu un spectre ultraviolet de Jupiter (1700-4000 Å, résolution 55 Å) au moyen d'un dispositif photoélectrique. Cet unique document est présenté comme une réflectivité géométrique, laquelle est ensuite supposée due à la diffusion Rayleigh par l'hydrogène moléculaire. On en déduit une limite supérieure de la quantité d'hydrogène moléculaire présente au-dessus de la couche de nuages d'une atmosphère de 11 km atm.*

Abstract. — *A single photoelectric spectral scan of Jupiter in the ultraviolet is presented in the form of a geometric reflectivity. The reflectivity is then assumed to be due to Rayleigh scattering by molecular hydrogen. An upper limit to the amount of molecular hydrogen above the cloud layer of a 11 km atm. is derived.*

Резюме. — Получен ультрафиолетовый спектр Юпитера (1700-4000 Å, разрешение 55 Å) при посредстве фотоэлектрического устройства. Этот единственный в своем роде документ представлен как геометрическая рефлексивность, которая, затем, предположена являющейся следствием релеевского рассеяния молекулярным водородом. Из этого выведен верхний предел количества молекулярного водорода находящегося над слоем облаков атмосферы в 11 км атм.

A single spectral scan of Jupiter in the ultraviolet was obtained from an Aerobee rocket on July 23, 1963 at 06 h 02 mn U. T. The observation was made with an objective grating stellar spectrometer similar to those described by Stecher and Milligan (1962). The spectral range was from λ 1700 to λ 4000 with 55 Angstrom resolution. The instrument had been calibrated in the laboratory prior to flight so that the absolute flux above the earth's atmosphere was obtained at each point in the spectrum. The accuracy of the flux measurement was primarily determined by the noise in signal which was worse than one would like.

The geometrical reflectivity, p, as a function of wavelength is presented in Figure 1. This was obtained by using the solar flux values given by Tousey (1963) and the appropriate Ephemeris values for the necessary geometry. Jupiter was nearly at quadrature when the observation was made.

If we assume Jupiter has a Rayleigh atmosphere in the ultraviolet above the cloud layer, we may immediately obtain upper limits for the column density of any species if the reflectivity is known in terms of optical depth, τ. Using the tables computed by Coulson, Dave and Sekera (1960), curves in the p-τ plane were constructed by numerical integration. Additional curves were obtained for isotropic scattering from the available X-Y functions given by Mayers (1962) and by Sobuti (1963). These were used to approximate Rayleigh scattering for $\tau > 1$.

The total number of atoms or molecules in a cm² column perpendicular to the cloud layer is now obtained from $\tau = n\sigma$ under the assumption of only one constituent. Here n is the number of atoms or molecules and σ is the Rayleigh scattering cross section per atom or molecule. The Rayleigh scattering cross section for molecular hydrogen is given by Dalgarno and Williams (1962). In Figure 1 three atmospheres of molecular hydrogen are presented each with the assumption of zero reflectivity for the cloud tops. The 27 km. atm. is that of Spinrad and Trafton (1963) obtained from the H_2 quadrupole bands. The 4.6 km. atm. is that of Zabriskie (1962) which is also from the H_2 quadrupole bands. The 10.5 km. atm. is the one that best fits the reflectivity measurements. An all helium atmosphere which would produce the same reflectivity would be about 200 km. atm. and can probably be ruled out by pressure considerations (Spinrad and Trafton, 1963).

The above analysis is based on coherent scattering. In the case of most molecular gases including molecular hydrogen this is known not to be the case. Raman scattering from H_2 is one-

IONOSPHERIC CHEMISTRY

J. C. HOLMES, C. Y. JOHNSON and J. M. YOUNG

E. O. Hulburt Center for Space Research, U.S. Naval Research Laboratory, Washington, D.C., USA

Abstract: Day and night observations of the positive ion composition of the ionosphere between 120 and 230 km were made at White Sands, New Mexico. Certain chemical reactions selected from a list prepared by Nicolet and Swider (1963) were found to be consistent with the experimental observations. Mechanisms for the active production of the night E region are found to be inconsistent with the measurements. An analysis of the day to night decay in the E region suggests that the values of the dissociative recombination coefficients for O_2^+ and NO^+ increase with increasing temperature under those conditions encountered in the ionosphere. It is proposed that simple decay via dissociative recombination may explain the maintenance of the night E region.

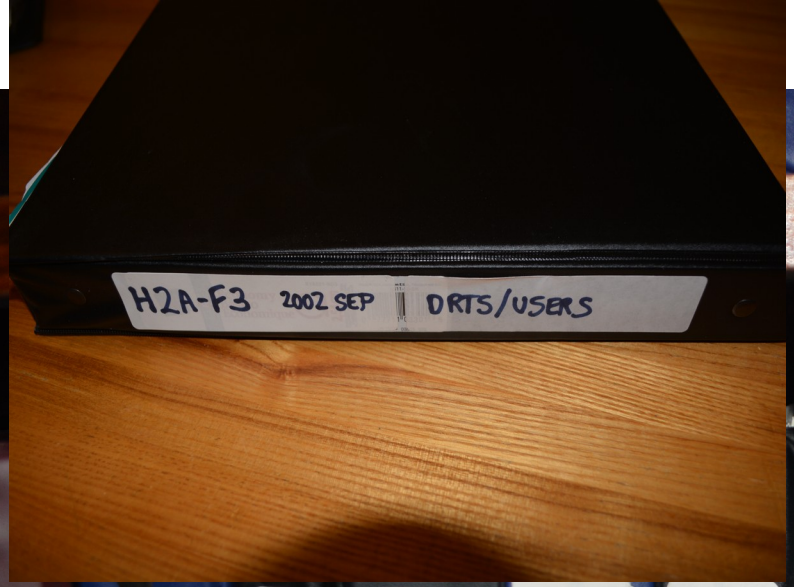
Реэюме: Дневные и ночные наблюдения положительных ионов в ионосфере между 120 и 230 км были выполнены в Уайт Сэнде, Нью Мексико. Было установлено, что некоторые химические реакции и среди них разрежения Николе и Свидером (1963) должны соответствовать экспериментальным наблюдениям. Было показано, что механизмы активного образования ночной области несовместимы с измерениями. Анализ перехода от дневной и ночной области Е дает значения коэффициентов диссоциативной рекомбинации для O_2^+ и NO^+ уменьшающиеся с уменьшением температуры. Предполагается, что подобный переход через диссоциативную рекомбинацию может объяснить сохранение ночной области Е.

1. Introduction

In 1963, two rockets instrumented with Bennett mass spectrometers were flown at White Sands, New Mexico; the first flight took place at 0934 MST on February 15. The mass spectrometers were recovered by parachute, checked in the laboratory and reflown on a second rocket at 0106 MST on 1 August. Ionospheric positive ion composition and density data were obtained for both day and night.

2. Daytime data

Figure 1 shows the result of the daytime flight. The total ion current measured by each spectrometer was normalized to the total electron density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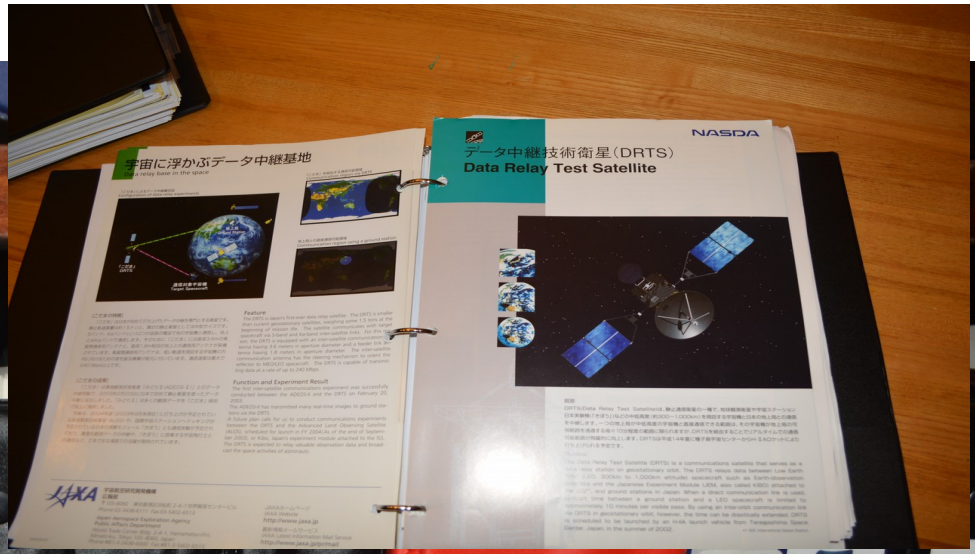
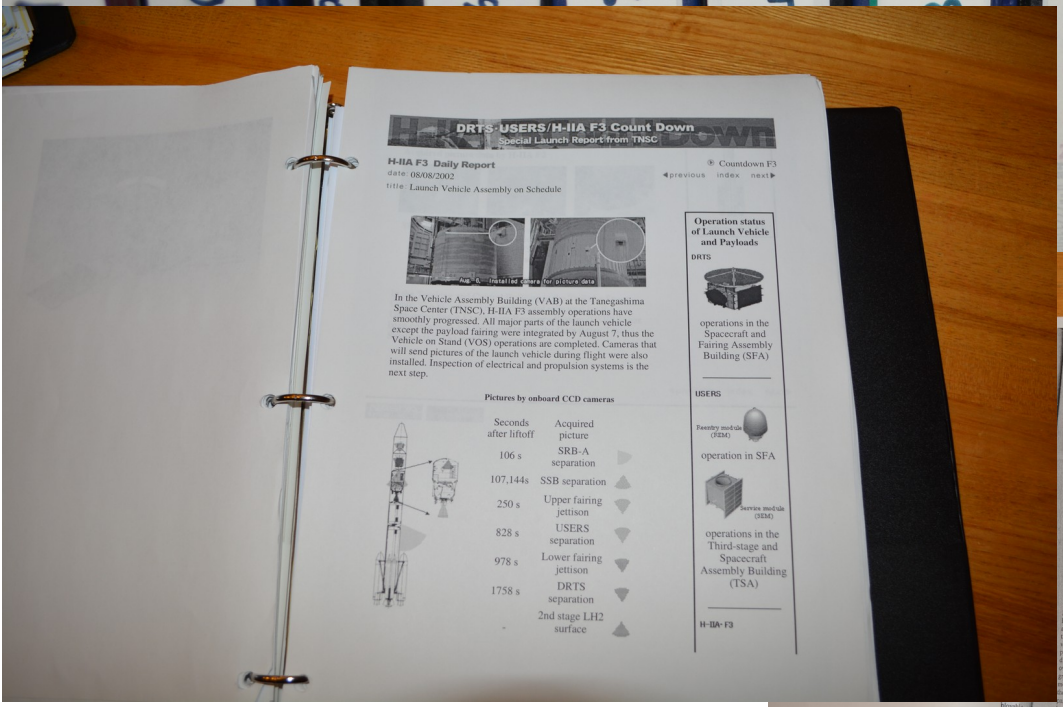
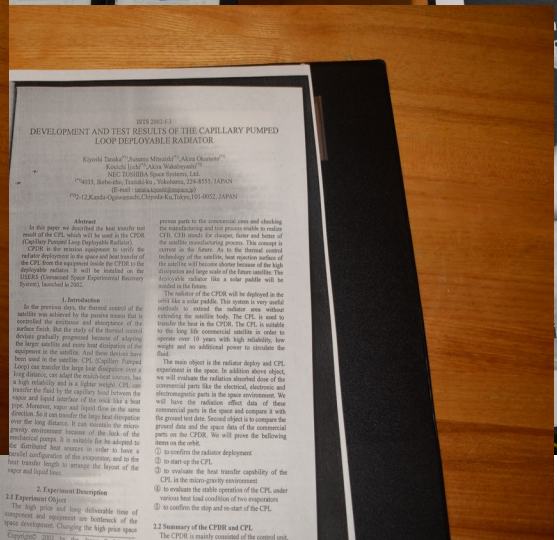
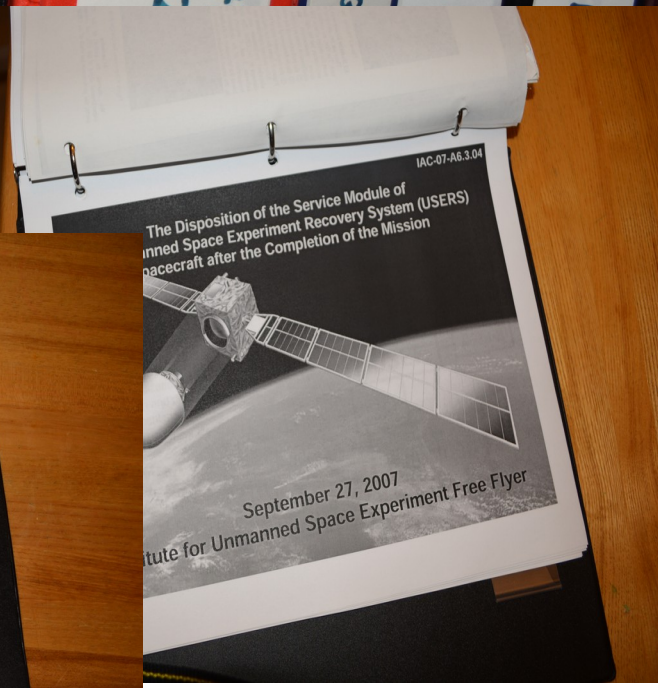

宇宙に浮かぶデータ中継基地
NASDA
データ中継技術衛星（DRTS）
Data Relay Test Satellite
JAXA


H-II-1
H-II-2
H-II-3
H-II-4
H-II-6
H-II
H2A-F1 2001 AUG
H2A-F2 2002 FEB
H2A-F3
H2A-4 ADEOS-
H2A-F5,F6
H2A-8 2006
H2A-7F


DRTS-USERS/H-IIA F3 Count Down
Special Launch Report from TNSC
H-IIA F3 Daily Report
date: 08/08/2002
title: Launch Vehicle Assembly on Schedule
Countdown F3
previous index next
In the Vehicle Assembly Building (VAB) at the Tanegashima Space Center (TNSC), H-IIA F3 assembly operations have smoothly progressed. All major parts of the launch vehicle except the payload fairing were integrated by August 7, thus the Vehicle on Stand (VOS) operations are completed. Cameras that will send pictures of the launch vehicle during flight were also installed. Inspection of electrical and propulsion systems is the next step.
Pictures by onboard CCD cameras
Seconds after liftoff
Acquired picture
106 s SRB-A separation
107,144s SSB separation
250 s Upper fairing jettison
828 s USERS separation
978 s Lower fairing jettison
1758 s DRTS separation
2nd stage LH2 surface
Operation status of Launch Vehicle and Payloads
DRTS
operations in the Spacecraft and Fairing Assembly Building (SFA)
USERS
Reentry module (REM)
operation in SFA
service module (SEM)
operations in the Third-stage and Spacecraft Assembly Building (TSA)
H-IIA F3


ISTS 2002-F3
DEVELOPMENT AND TEST RESULTS OF THE CAPILLARY PUMPED LOOP DEPLOYABLE RADIATOR
Abstract
1. Introduction
2. Experiment Description
2.1 Experiment Object


IAC-07-A6.3.04
The Disposition of the Service Module of
nned Space Experiment Recovery System (USERS)
pacecraft after the Completion of the Mission
September 27, 2007
tute for Unmanned Space Experiment Free Flyer