



FAA
**Commercial Space
Transportation**

A photograph of a Space Shuttle launching from the launch pad. The shuttle is white with red and black stripes on the external tank and solid rocket boosters. A large plume of fire and white smoke is visible at the base of the shuttle. The launch pad structure is visible in the background under a cloudy sky.

Quarterly Launch Report

3rd Quarter 2006

Featuring Launch Results from the 2nd Quarter 2006
and Forecasts for the 3rd and 4th Quarters 2006.

Introduction

The Third Quarter 2006 Quarterly Launch Report features launch results from the second quarter of 2006 (April-June 2006) and forecasts for the third quarter of 2006 (July-September 2006) and the fourth quarter of 2006 (October-December 2006). This report contains information on worldwide commercial, civil, and military orbital and commercial suborbital space launch events. Projected launches have been identified from open sources, including industry references, company manifests, periodicals, and government sources. Projected launches are subject to change.

This report highlights commercial launch activities, classifying commercial launches as one or both of the following:

- *Internationally-competed launch events (i.e., launch opportunities considered available in principle to competitors in the international launch services market)*
- *Any launches licensed by the Office of Commercial Space Transportation of the Federal Aviation Administration under 49 United States Code Subtitle IX, Chapter 701 (formerly the Commercial Space Launch Act)*

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Cover (photo courtesy of Boeing Launch Services, copyright © 2006): On May 24, 2006, a Boeing Launch Services Delta IV vehicle lifts off from Cape Canaveral Air Force Station carrying the GOES 13 meteorological satellite (formerly named GOES N) operated by the National Oceanic and Atmospheric Administration (NOAA).

Second Quarter 2006 Highlights

In early April, Space Adventures, the space tourism company, announced that another tourist had signed up for a trip to the International Space Station (ISS) aboard a Soyuz spacecraft. If his medical exam and other pre-launch procedures go as planned, Charles Simonyi, the creator of the Microsoft Word and Excel programs, will join Dennis Tito, Mark Shuttleworth, and Gregory Olsen as a private citizen who has flown aboard the ISS. Japanese businessman Daisuke Enomoto had been set to fly to the ISS on September 14, 2006 as the fourth space tourist. However, Enomoto has been at least temporarily sidelined for medical reasons, and will be replaced by Iranian-American entrepreneur Anousheh Ansari (who co-sponsored the Ansari X Prize). Simonyi is expected to fly on a subsequent Soyuz flight that has yet to be determined.

On April 5, Elon Musk, the founder and CEO of Space Exploration Technologies (SpaceX), cited human error as the cause of the failure of the maiden launch of the Falcon 1 vehicle. SpaceX concluded that a launchpad technician had failed to properly tighten a fuel pipe fitting prior to launch, causing the liquid propellant to leak in flight. Despite the failure, Canada's MacDonald Dettwiler & Associates announced plans to launch their Cassiope satellite aboard another of SpaceX's boosters currently under development: the heavier-lift Falcon 9, slated to begin service in 2008.

In late April, the Russian TV station Guberniya reported that the Svobodny launch center in Amur, Siberia, will likely be closed. The launch site has deployed only five satellites in the past decade.

On April 26, International Launch Services (ILS) issued a statement reporting the results of the Russian State Commission's investigation into the cause of the February 28, 2006 failure of a Proton M carrying the payload Arabsat 4A. The commission found that a "foreign particle" blocking the nozzle of the Breeze M upper stage's oxidizer hydraulic pump caused a premature burn shutdown that left Arabsat 4A stranded in a highly elliptical orbit rather than the desired geosynchronous (GEO) orbit. The Proton M has since returned to commercial flight, successfully placing the payload Hot Bird 8 in GEO on August 5.

On May 8, Lockheed Martin announced it had been awarded a 20-month, \$2.5 million initial contract to study and propose a hybrid launch vehicle for the US Air Force (USAF) as part of the Operationally Responsive Space (ORS) initiative. The vehicle would be designed to launch to low Earth orbit (LEO) with a 24- to 48-hour turnaround time. It would feature a reusable first stage and expendable upper stages.

In May, Sea Launch announced it had been awarded another contract to launch a satellite aboard a Zenit 3SLB "Land Launch" vehicle from Baikonur Cosmodrome, Kazakhstan. The Zenit 3SLB is expected to carry Asiasat 5 to GEO in 2008.

In early June, the Moscow Institute of Thermal Technology revealed it was in discussions with its counterpart organization in Kazakhstan to develop the "Ishim" air-launch system, which would use a MiG-31 carrier aircraft to deploy a rocket at a given altitude. The Ishim rocket would carry payloads weighing up to 160 kilograms (350 pounds) to an orbit of up to 500 kilometers (310 miles).

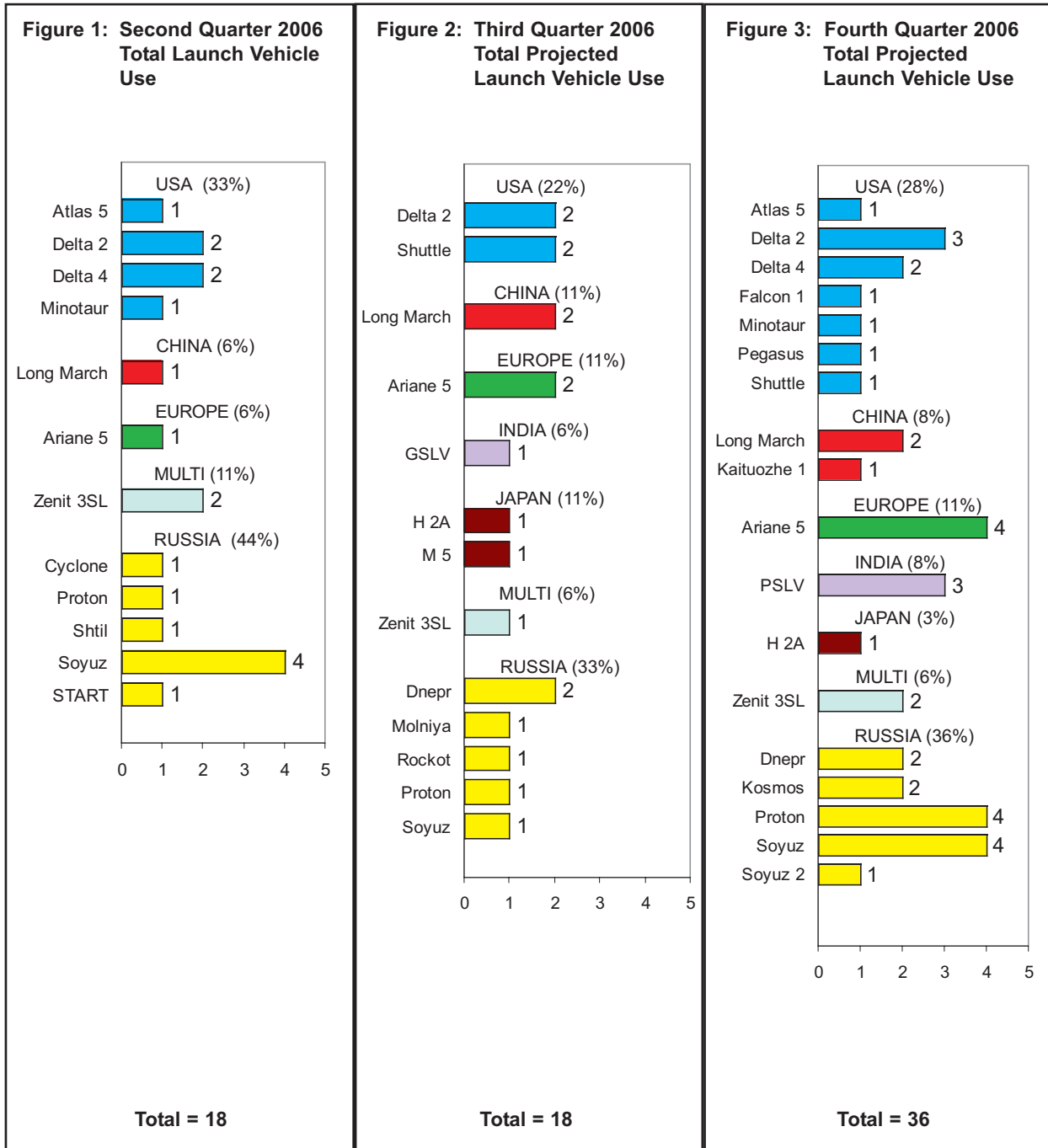
Also in June, Mitsubishi Heavy Industries began construction of its H 2B booster at its factory in Aichi Prefecture. The H 2B is an uprated version of Japan's H 2A booster. The booster, which is designed to be five meters (16 feet) in diameter and 56 meters (184 feet) tall, will feature two first-stage engines and four strap-on boosters. It is designed to have a launch capacity of nearly 9.8 tons (19,600 pounds) to LEO. It is expected to be used for transport of Japanese components to the ISS starting in 2008. The booster is also designed for commercial use.

In late June, China announced plans for a manned flight to the moon in 2024. The world's third nation to accomplish human spaceflight also announced plans to stage eight launches by the end of 2006, which would be a record for China.

On June 26, the 7.5-meter (25-foot) tall Zefiro 23 second-stage motor for the European Space Agency's Vega small launch vehicle was successfully test-fired in Colleferro, Italy. (The Vega booster's third-stage Zefiro 9 motor was successfully fired in a separate test in December 2005.) Vega is designed with a baseline payload capacity of 1,500 kilograms (3,300 pounds) to a 700-kilometer (435-mile) sun-synchronous orbit. The first test flight is scheduled for late 2007.

Vehicle Use

(April 2006 – December 2006)

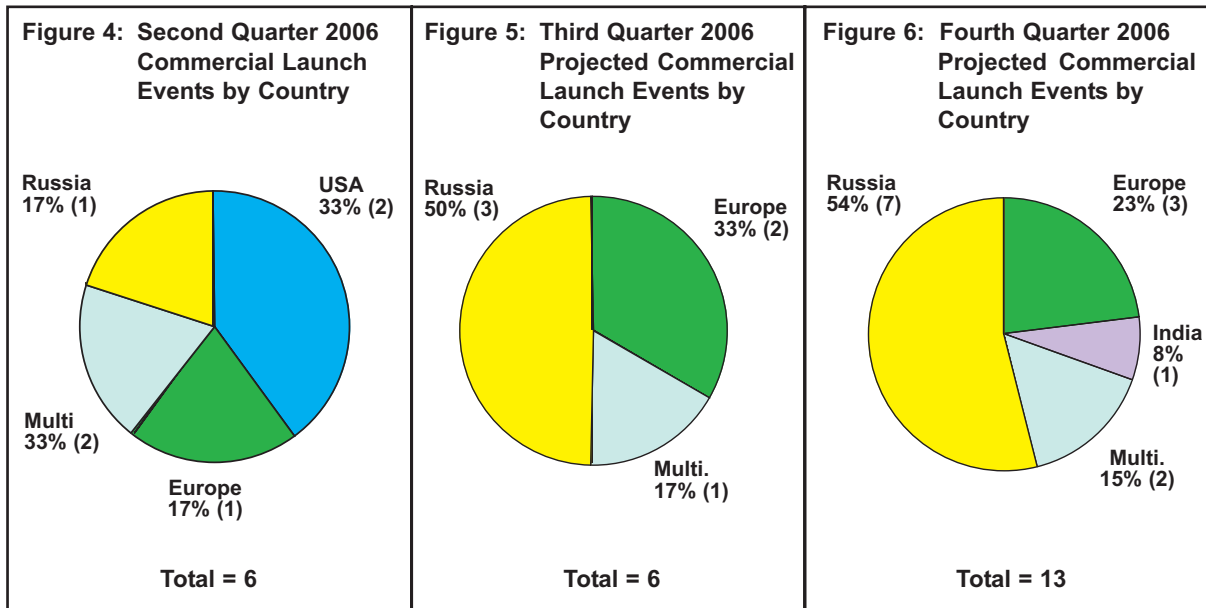


Figures 1-3 show the total number of orbital and suborbital launches (commercial and government) of each launch vehicle and the resulting market share that occurred in the second quarter of 2006, as well as projecting this information for the third quarter of 2006 and fourth quarter of 2006. The launches are grouped by the country in which the primary vehicle manufacturer is based. Exceptions to this grouping are launches performed by Sea Launch, which are designated as multinational.

Note: Percentages for these and subsequent figures may not add up to 100 percent due to rounding of individual values.

Commercial Launch Events by Country

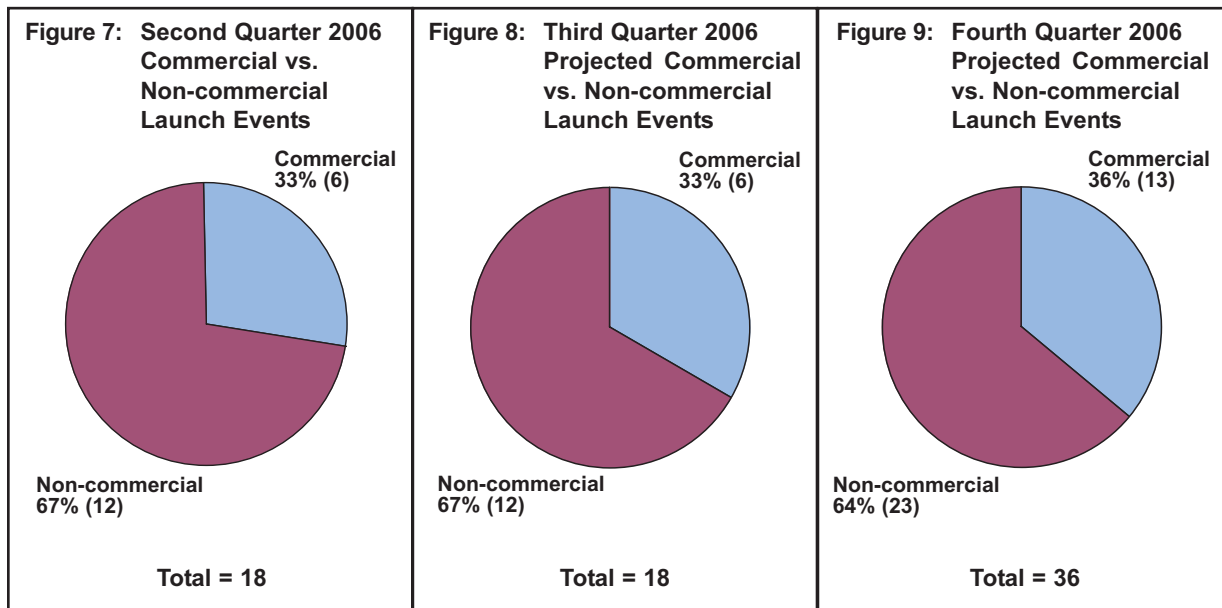
(April 2006 – December 2006)



Figures 4-6 show all commercial orbital and suborbital launch events that occurred in the second quarter of 2006 and that are projected for the third quarter of 2006 and fourth quarter of 2006.

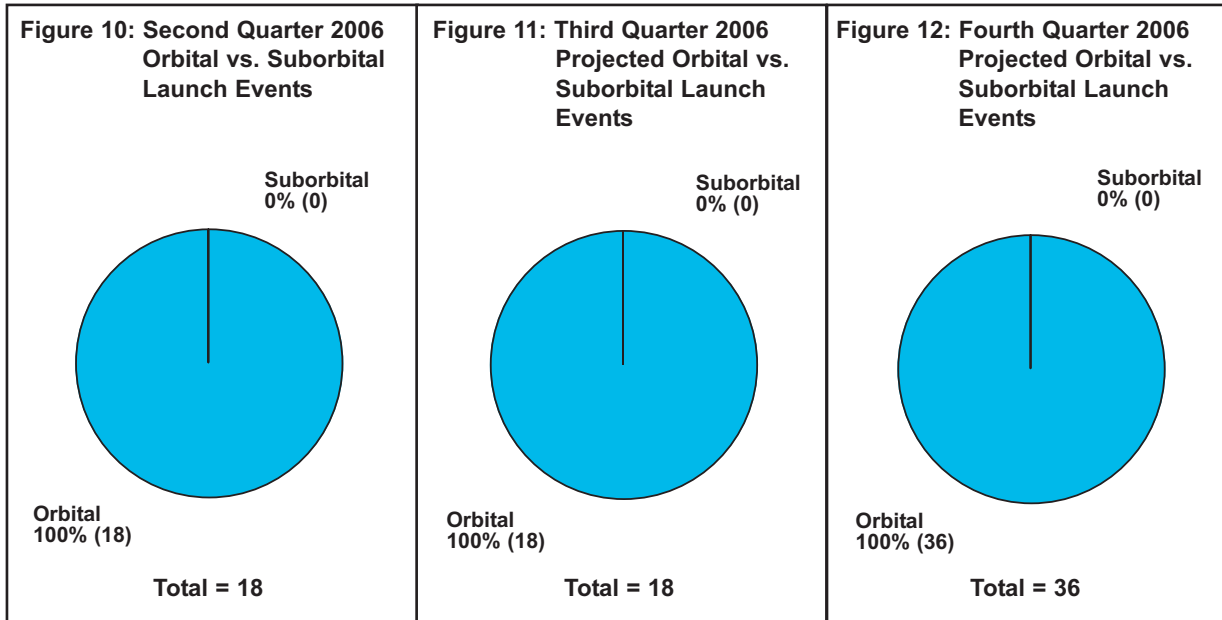
Commercial vs. Non-commercial Launch Events

(January 2006 – September 2006)



Figures 7-9 show commercial vs. non-commercial orbital and suborbital launch events that occurred in the second quarter of 2006 and that are projected for the third quarter of 2006 and fourth quarter of 2006.

Orbital vs. Suborbital Launch Events
(April 2006 – December 2006)



Figures 10-12 show orbital vs. suborbital launch events that occurred in the second quarter of 2006 and that are projected for the third quarter of 2006 and fourth quarter of 2006.

Launch Successes vs. Failures
(April 2006 – June 2006)

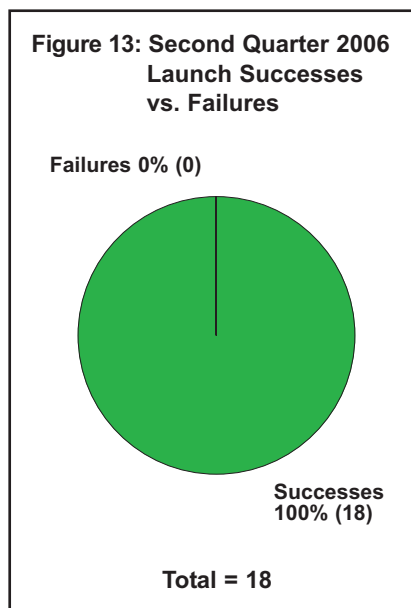
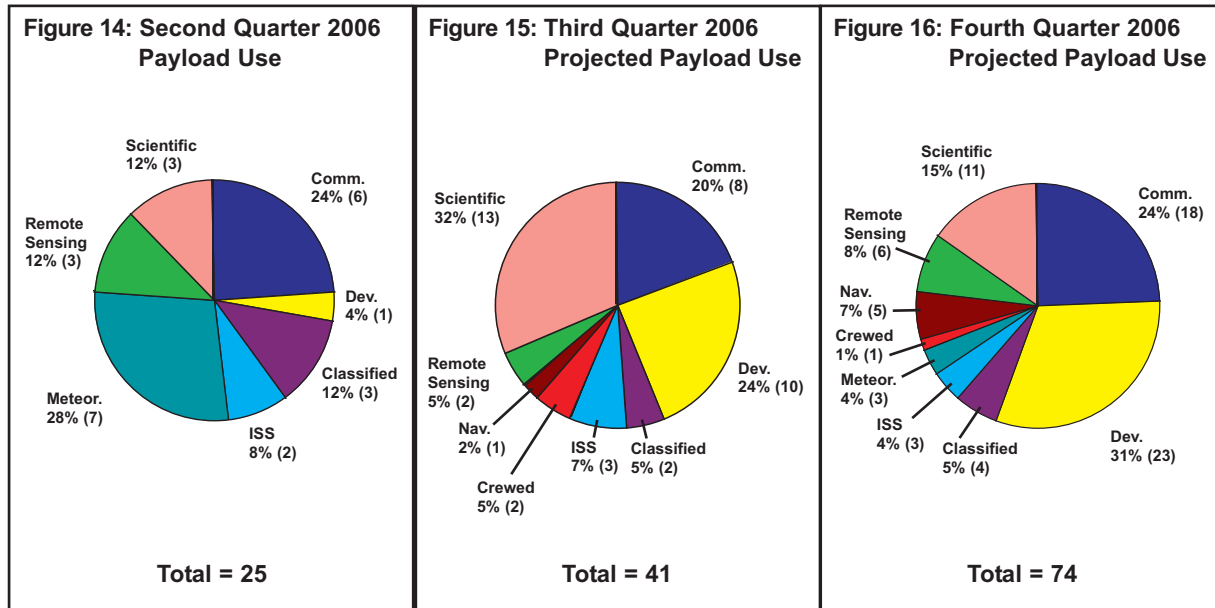


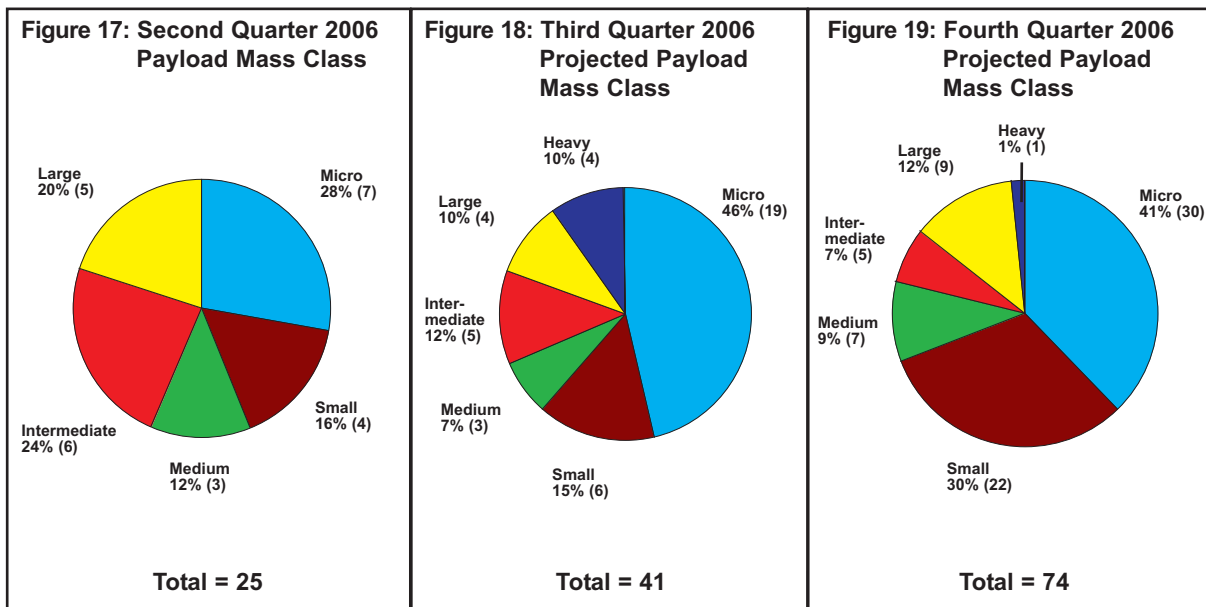
Figure 13 shows orbital and suborbital launch successes vs. failures for the period from April 2006 to June 2006. Partially-successful orbital launch events are those where the launch vehicle fails to deploy its payload to the appropriate orbit, but the payload is able to reach a useable orbit via its own propulsion systems. Cases in which the payload is unable to reach a useable orbit or would use all of its fuel to do so are considered failures.

Payload Use (Orbital Launches Only)
(April 2006 – December 2006)



Figures 14-16 show total payload use (commercial and government), actual for the second quarter of 2006 and projected for the third quarter of 2006 and fourth quarter of 2006. The total number of payloads launched may not equal the total number of launches due to multi-manifesting, i.e., the launching of more than one payload by a single launch vehicle.

Payload Mass Class (Orbital Launches Only)
(April 2006 – December 2006)



Figures 17-19 show total payloads by mass class (commercial and government), actual for the second quarter of 2006 and projected for the third quarter of 2006 and fourth quarter of 2006. The total number of payloads launched may not equal the total number of launches due to multi-manifesting, i.e., the launching of more than one payload by a single launch vehicle. Payload mass classes are defined as Micro: 0 to 91 kilograms (0 to 200 lbs.); Small: 92 to 907 kilograms (201 to 2,000 lbs.); Medium: 908 to 2,268 kilograms (2,001 to 5,000 lbs.); Intermediate: 2,269 to 4,536 kilograms (5,001 to 10,000 lbs.); Large: 4,537 to 9,072 kilograms (10,001 to 20,000 lbs.); and Heavy: over 9,072 kilograms (20,000 lbs.).

Commercial Launch Trends (Orbital Launches Only)
(July 2005 – June 2006)

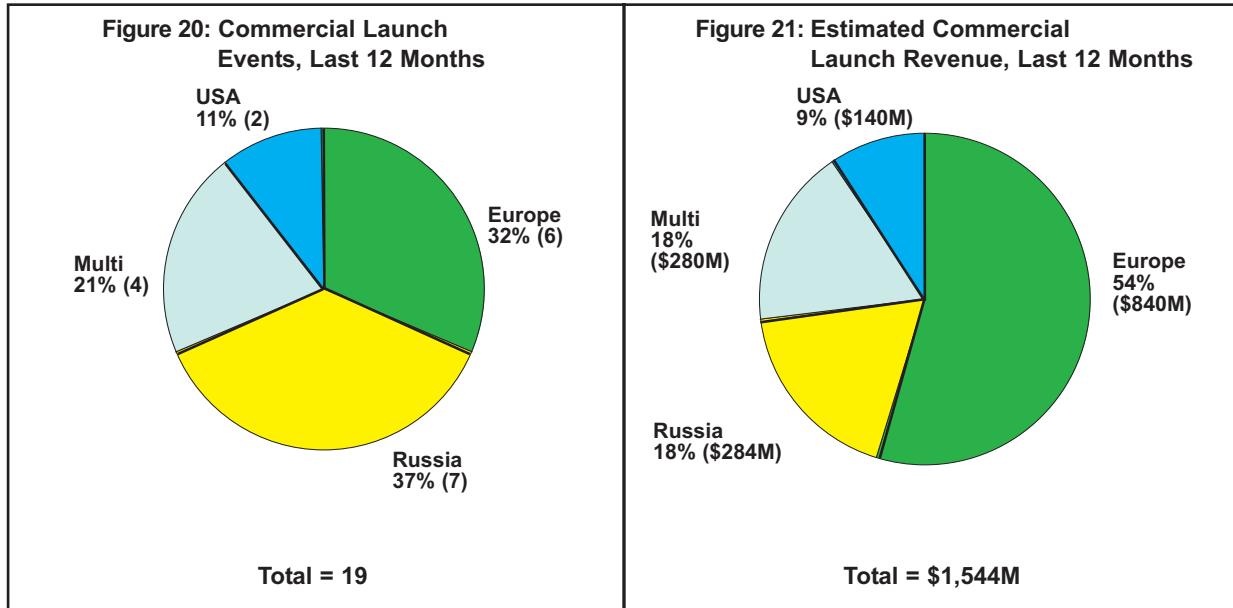


Figure 20 shows commercial orbital launch events for the period of July 2005 to June 2006 by country.

Figure 21 shows estimated commercial launch revenue for orbital launches for the period of July 2005 to June 2006 by country.

Commercial Launch Trends (Suborbital Launches Only)
(July 2005 – June 2006)

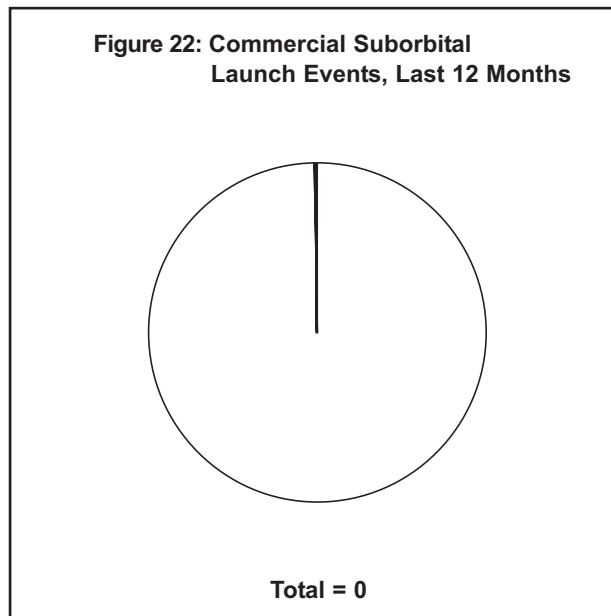


Figure 22 shows commercial suborbital launch events for the period of July 2005 to June 2006 by country.

Commercial Launch History
(January 2001 – December 2005)

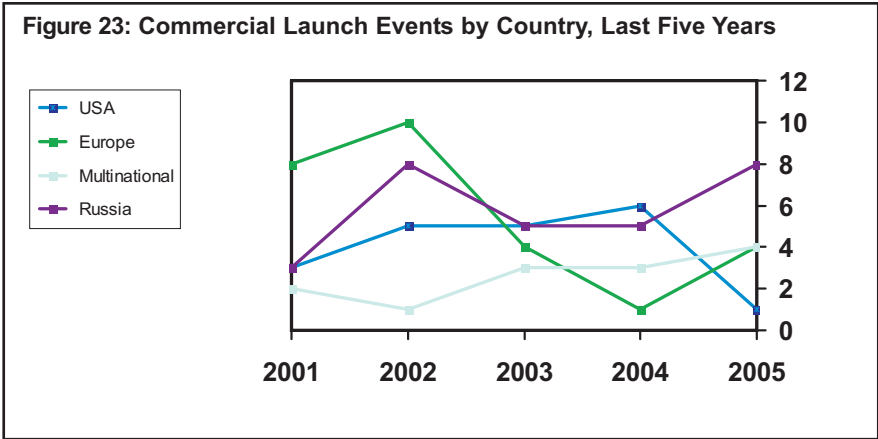


Figure 23 shows commercial launch events by country for the last five full years.

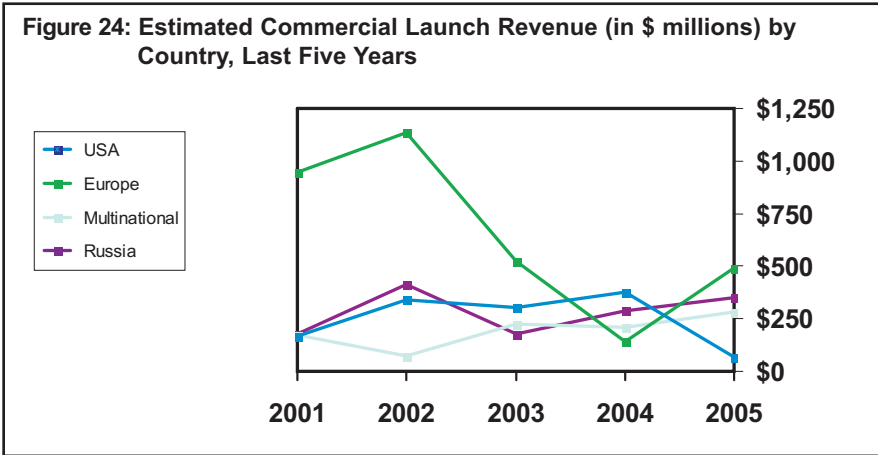


Figure 24 shows estimated commercial launch revenue by country for the last five full years.

Second Quarter 2006 Orbital and Suborbital Launch Events							
Date	Vehicle	Site	Payload or Mission	Operator	Use	Vehicle Price	L M
4/12/2006	√ + Zenit 3SL	Sea Launch (Odyssey Launch Platform)	* JCSAT 9	Japan Satellite Systems (JSAT)	Communications	\$70M	S S
4/14/2006	Minotaur	Vandenberg Air Force Base (VAFB)	Formosat 3 A	Taiwanese National Space Program Office (NSPO)	Meteorological	\$14.5M	S S
			Formosat 3 F	NSPO	Meteorological		S S
			Formosat 3 C	NSPO	Meteorological		S S
			Formosat 3 E	NSPO	Meteorological		S S
			Formosat 3 B	NSPO	Meteorological		S S
			Formosat 3 D	NSPO	Meteorological		S S
4/20/2006	√ + Atlas 5 411	Cape Canaveral Air Force Station (CCAFS)	* Astra 1KR	SES Astra	Communications	\$70M	S S
4/24/2006	Soyuz	Baikonur	Progress ISS 21P	Russian Federal Space Agency (Roscosmos)	ISS	\$40M	S S
4/25/2006	√ START 1	Svobodny	* EROS B	Imagesat International N.V.	Remote Sensing	\$8.5M	S S
4/27/2006	Long March 4B	Taiyuan	Yaogan 1	China National Space Agency (CNSA)	Remote Sensing	\$50M	S S
4/28/2006	Delta 2 7420	VAFB	CloudSat	National Aeronautics and Space Administration (NASA)	Scientific	\$50M	S S
			Calipso	NASA	Scientific		S S
5/3/2006	Soyuz	Plesetsk	Kosmos 2420	Russian MoD	Classified	\$40M	S S
5/24/2006	√ + Delta 4 Medium-Plus (4,2)	CCAFS	GOES 13	National Oceanic and Atmospheric Administration (NOAA)	Meteorological	\$70M	S S
5/25/2006	Shtil	Barents Sea	Kompass 2	Russian Academy of Sciences	Scientific	\$1.5M	S S
5/27/2006	√ Ariane 5 ECA	Kourou	* Thaicom 5	Shin Satellite Public Co.	Communications	\$140M	S S
			* SatMex 6	Satelites Mexicanos S.A. de C.V.	Communications		S S
6/15/2006	Soyuz	Baikonur	Resurs DK 1	TsSKB Progress	Remote Sensing	\$40M	S S
6/17/2006	Proton	Baikonur	KazSat 1	JSC Kazsat	Communications	\$75M	S S
6/18/2006	√ + Zenit 3SL	Odyssey Launch Platform	* Galaxy 16	Pan American Satellite Corporation (Panamsat)	Communications	\$70M	S S
6/21/2006	Delta 2 7925H	CCAFS	MITEX	U.S. Air Force (USAF)	Development	\$50M	S S
6/24/2006	Soyuz	Baikonur	Progress ISS 22P	Roscosmos	ISS	\$40M	S S
6/25/2006	Cyclone 2	Baikonur	Kosmos 2421	Russian Navy	Classified	\$22.5M	S F
6/27/2006	Delta 4 Medium-Plus	VAFB	NRO L-22	DoD	Classified	\$77.5M	S S

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+ Denotes FAA-licensed launch.

* Denotes a commercial payload, defined as a spacecraft that serves a commercial function or is operated by a commercial entity.

Notes: All prices are estimates, and vary for each commercial launch. Government mission prices may be higher than commercial prices. Ariane 5 payloads are usually multi-manifested, but the pairing of satellites scheduled for each launch is sometimes undisclosed for proprietary reasons until shortly before the launch date.

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Third Quarter 2006 Projected Orbital and Suborbital Launch Events						
Date	Vehicle	Site	Payload or Mission	Operator	Use	Vehicle Price
7/4/2006	Shuttle Discovery	Kennedy Space Center (KSC)	STS 121	NASA	Crewed	N/A
			ISS ULF-1.1	NASA	ISS	
7/10/2006	GSLV	Satish Dhawan Space Center	* Insat 4C	Indian Space Research Organization (ISRO)	Communications	\$40M
7/12/2006	✓ Dnepr 1	Dombrovskiy	* Genesis Pathfinder 1	Bigelow Aerospace	Development	\$9.5M
7/21/2006	Molniya	Plesetsk	Kosmos 2422	Russian MoD	Classified	\$35M
7/26/2006	Dnepr 1	Baikonur	BelKA	National Academy of Sciences of Belarus	Remote Sensing	\$9.5M
			AeroCube 1	The Aerospace Corporation	Development	
			Baumanets	Bauman Moscow State Technical University	Development	
			HAUSat 1	Hankuk Aviation University	Scientific	
			ICEcube 1	Cornell University	Scientific	
			ICEcube 2	Cornell University	Scientific	
			ION	University of Illinois	Development	
			KUTESat	Kansas University	Scientific	
			Merope	Montana State University	Scientific	
			Ncube	Norwegian Student Satellite Project	Scientific	
			PICPoT	Politecnico di Torino	Development	
			Polysat 1	Cal Poly Aero. Engineering	Development	
			Polysat 2	Cal Poly Aero. Engineering	Development	
			Rincon	University of Arizona at Tucson	Scientific	
			Sacred	University of Arizona at Tucson	Scientific	
			SEEDS	Nihon University	Scientific	
			UniSat 4	University of Rome	Development	
			Voyager	University of Hawaii	Development	
7/28/2006	✓ Rocket	Plesetsk	Kompsat 2	Korea Aerospace Research Institute (KARI)	Remote Sensing	\$13.5M
8/5/2006	✓ Proton	Baikonur	* Hot Bird 8	Eutelsat	Communications	\$70M
8/11/2006	✓ Ariane 5 ECA	Kourou	* JCSAT 10	JSAT	Communications	\$140M
			Syracuse 3B	Delegation Generale pour l'Armement (DGA)	Communications	
8/21/2006	✓ + Zenit 3SL	Odyssey Launch Platform	* Koreasat 5	Korea Telecom	Communications	\$70M
8/27/2006	Shuttle Atlantis	KSC	STS 115	NASA	Crewed	N/A
			ISS 12A	NASA	ISS	
9/10/2006	H 2A	Tanegashima	IGS 3A	Japan Defense Agency	Classified	\$85M
9/14/2006	Soyuz	Baikonur	Soyuz ISS 13S	Roscosmos	ISS	\$40M
9/18/2006	Delta 2 7925H-10L	CCAFS	STEREO A	NASA	Scientific	\$50M
			STEREO B	NASA	Scientific	
9/19/2006	✓ Ariane 5G	Kourou	* DirecTV 9S	DirecTV, Inc.	Communications	\$140M
			* Optus D1	Optus Communications Pty. Ltd.	Communications	
			LDREX 2	Japan Aerospace Exploration Agency (JAXA)	Development	
9/21/2006	Delta 2 7925-10	CCAFS	Navstar GPS 2RM-2	USAF	Navigation	\$50M
9/23/2006	M 5	Uchinoura	Solar-B	JAXA	Scientific	\$50M
9/2006	Long March	Jiuquan	Shi Jian 8	Shanghai Academy of Spaceflight Technology	Scientific	\$50M
9/2006	Long March 3B	Xichang	Sinosat 2	CNSA	Communications	\$60M

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Fourth Quarter 2006 Projected Orbital and Suborbital Launch Events						
Date	Vehicle	Site	Payload or Mission	Operator	Use	Vehicle Price
10/7/2006	Soyuz	Baikonur	Metop 1	Eumetsat	Meteorological	\$40M
10/18/2006	Soyuz	Baikonur	Progress ISS 23P	Roscosmos	ISS	\$40M
10/20/2006	Long March 4B	Taiyuan	CBERS/Ziyuan 2B	China Academy of Space Technology (CAST)	Remote Sensing	\$50M
10/31/2006	√ Dnepr 1	Baikonur	* TerraSAR X	Infoterra Ltd.	Remote Sensing	\$9.5M
10/2006	√ + Zenit 3SL	Odyssey Launch Platform	* XM 4	XM Satellite Radio, Inc.	Communications	\$70M
10/2006	PSLV	Satish Dhawan Space Center	TechSAR	Israeli Ministry of Defense (MoD)	Classified	\$20M
10/2006	Long March 3A	Taiyuan	Fengyun 2D	China Meteorological Administration	Meteorological	\$50M
10/2006	√ Ariane 5 ECA	Kourou	* Astra 1L * Galaxy 17	SES Astra Panamsat	Communications Communications	\$140M
11/2/2006	Atlas 5 401	CCAFS	Orbital Express 1A Orbital Express 1B Cibola FalconSat 3 MEPSI 4A MEPSI 4B MIDSTAR 1 NPSAT 1 Space Test Program Satellite 1	DARPA DARPA USAF USAF Academy Defense Advanced Research Projects Agency (DARPA) DARPA Naval Postgraduate School Naval Postgraduate School USAF	Development Development Development Development Development Development Development Development Development	\$75M
11/4/2006	Delta 4 Medium	VAFB	DMSP 5D-3-F17	DoD	Meteorological	\$70M
11/6/2006	√ Proton	Baikonur	* Measat 3	Binariang Satellite Systems Sdn Bhd	Communications	\$70M
11/9/2006	Falcon 1	Kwajalein Island	Falcon Demosat	DARPA	Development	\$6M
11/10/2006	√ Proton	Baikonur	* Arabsat 4B	Arab Satellite Communications Organization (Arabsat)	Communications	\$70M
11/13/2006	Minotaur	Wallops Flight Facility	TacSat 2	USAF	Development	\$11.5M
11/26/2006	√ Proton	Baikonur	* Anik F3	Telesat Canada	Communications	\$70M
11/27/2006	Delta 2 7425	CCAFS	THEMIS 1 THEMIS 5 THEMIS 4 THEMIS 2 THEMIS 3	NASA NASA NASA NASA NASA	Scientific Scientific Scientific Scientific Scientific	\$50M
11/30/2006	Soyuz	Baikonur	GIOVE B	European Space Agency (ESA)	Navigation	\$40M
11/2006	Delta 2 7925-10	CCAFS	Navstar GPS 2RM-3	USAF	Navigation	\$50M
11/2006	√ Ariane 5G	Kourou	Skyнет 5A * Star One C1	British Ministry of Defense (MoD) Embratel	Communications Communications	\$140M
11/2006	H 2A	Tanegashima	ETS 8	JAXA	Communications	\$85M

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Third Quarter 2006 Quarterly Launch Report

Fourth Quarter 2006 Projected Launch Events (Continued)						
Date	Vehicle	Site	Payload or Mission	Operator	Use	Vehicle Price
12/1/2006	✓ + Zenit 3SL	Odyssey Launch Platform	* NSS 8	New Skies Satellites N.V.	Communications	\$70M
12/1/2006	Pegasus XL	VAFB	AIM Explorer	NASA	Scientific	\$16M
12/6/2006	Delta 2 7920	VAFB	NRO L-21	NRO	Classified	\$50M
12/14/2006	Shuttle Discovery	KSC	STS 116	NASA	Crewed	N/A
			ISS 12A.1	NASA	ISS	
12/20/2006	Soyuz	Baikonur	Progress ISS 24P	Roscosmos	ISS	\$40M
12/2006	✓ Kosmos 3M	Plesetsk	SAR Lupe 1	German Ministry of Defense (MoD)	Classified	\$12M
12/2006	✓ PSLV	Satish Dhawan Space Center	AGILE	Italian Space Agency (ASI)	Scientific	\$20M
12/2006	Delta 4 Medium-Plus	VAFB	NRO L-25	National Reconnaissance Office (NRO)	Classified	\$70M
4Q/2006	Kosmos 3M	Baikonur	Vietnamsat	Vietnamese Ministry of Post and Telecommunications	Remote Sensing	\$12M
			Thai-Paht 2	Thai MicroSatellite Co.	Remote Sensing	
4Q/2006	✓ Soyuz 2 1B	Baikonur	Corot	Centre National d'Etudes Spaciales (CNES)	Scientific	\$40M
4Q/2006	✓ Dnepr 1	Baikonur	Egyptosat	Egyptian National Authority for Remote Sensing and Space Sciences	Remote Sensing	\$9.5M
			AeroCube 2	The Aerospace Corporation	Development	
			AKS 1	CNES	Development	
			AKS 2	CNES	Development	
			ALMASat 1	University of Bologna	Development	
			AtmoCube	University of Trieste	Scientific	
			CanX-2	University of Toronto	Development	
			Funsat	University of Florida	Development	
			KatySat 1	Stanford University	Development	
			KiwiSat	Amsat ZL	Communications	
			Mea Huaka'i	University of Hawaii	Scientific	
			Polysat 3	Cal Poly Engineering	Development	
			SaudiComsat 3	Saudi Space Research Institute	Communications	
			SaudiComsat 4	Saudi Space Research Institute	Communications	
			SaudiComsat 5	Saudi Space Research Institute	Communications	
			SaudiComsat 6	Saudi Space Research Institute	Communications	
			SaudiComsat 7	Saudi Space Research Institute	Communications	
			Saudisat 3	Saudi Space Research Institute	Scientific	
			UCISat 1	University of California Irvine	Development	
4Q/2006	PSLV	Satish Dhawan Space Center	Cartosat 2	Indian Space Research Organization (ISRO)	Remote Sensing	\$20M
			SRE 1	ISRO	Development	
			LAPAN-TUBSAT	Indonesia National Institute of Aeronautics and Space (LAPAN)	Development	
2006	✓ Ariane 5G	Kourou	* WildBlue 1	WildBlue Communications, Inc.	Communications	\$140M
2006	Ariane 5G	Kourou	* Insat 4B	ISRO	Communications	\$100M
2006	Proton	Baikonur	Glonass K R4	Russian MoD	Navigation	\$75M
			Glonass K R5	Russian MoD	Navigation	
			Glonass K R6	Russian MoD	Navigation	
2006	Kaituoze 1	Taiyuan	China Microsat TBA	CAST	Development	\$10M

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