FAA
Commercial Space Transportation

Quarterly Launch Report
4th Quarter 2006

Featuring Launch Results from the 3rd Quarter 2006 and Forecasts for the 4th Quarter 2006 and 1st Quarter 2007

Special Report: Waivers of Liability: Are They Enough for Permittees and Licensees?

HQ-038806.indd

Introduction

The Fourth Quarter 2006 Quarterly Launch Report *features launch results from the third quarter of 2006 (July-September 2006) and forecasts for the fourth quarter of 2006 (October-December 2006) and the first quarter of 2007 (January-March 2007). 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*)*

Contents

Cover (photo courtesy of Sea Launch, copyright © 2006): On August 21, 2006, a Sea Launch Zenit 3SL vehicle lifts off from Odyssey Launch Platform in the Pacific Ocean carrying Koreasat 5, a commercial communications satellites operated by Korea Telecom.

Third Quarter 2006 Highlights

On July 10, an Indian Geosynchronous Launch Vehicle (GSLV) carrying the payload Insat 4C veered off course 55 seconds after liftoff from a launch pad at Sriharikota. Following an investigation, in September the Indian Space Research Organization (ISRO) attributed this first GSLV launch failure to a loss of thrust in one of the vehicle's four liquid propellant strap-on boosters caused by a faulty propellant regulator.

On July 12, Russia inaugurated a new spaceport with the launch of a Dnepr rocket from Dombarovskiy, a converted ICBM site located in the south of the country near its border with Kazakhstan. The Dnepr vehicle successfully carried Bigelow Aerospace's Genesis Pathfinder inflatable demonstration mission into low Earth orbit (LEO).

On July 26, a separate Dnepr launch from Baikonur Cosmodrome failed when its engines prematurely terminated 86 seconds into flight, causing the vehicle to crash 25 kilometers (15 miles) downrange. Three small satellites from Russia and Italy and several one-kilogram "CubeSats" were lost.

In July, the Russian space agency Roscosmos announced plans to enhance its commercial competitiveness by streamlining its constituent organizations into 10 integrated departments by 2010 and three or four corporations by 2015. Roscosmos hopes the reorganization will boost productivity by 30 to 40 percent.

Also in July, the European Space Agency (ESA) announced a competition to promote European space tourism business plans. Under the competition, named "Feasibility of European Privately-Funded Vehicles for Commercial Human Space Flight," ESA will award up to three companies with 150,000 euros (about $190,000) to further refine their space tourism enterprises, and will make technical expertise available to those companies. The entry window closed on September 22. Winners are expected to be announced in the fourth quarter of 2006.

Building on the Space Shuttle's return to flight in the summer of 2005, the third quarter of 2006 saw two successful Shuttle missions in relatively quick succession. On July 4, Shuttle Discovery lifted off from the Kennedy Space Center (KSC) carrying supplies, equipment, and new International Space Station (ISS) crewmember Thomas Reiter to the ISS as part of the STS 121 mission. On September 9, Shuttle Atlantis carried solar cells, batteries, and a port-side truss segment to the ISS as part of the STS 115 mission.

On August 5, the Proton Breeze M booster, marketed by International Launch Services (ILS), returned to flight following its failed launch of Arabsat 4A in March 2006. The vehicle successfully deployed Eutelsat's Hot Bird 8 satellite.

In August, Turkey announced plans to establish an active space agency by 2010, with plans to steadily increase funding through 2016. Turkey also plans to begin the training of six astronauts in 2010 with help from NASA.

On August 18, NASA selected two companies from six finalists to provide commercial delivery services to the ISS under the agency's Commercial Orbital Transportation Services (COTS) initiative. The two companies are Rocketplane Kistler (RpK), whose K-1 launch vehicle will now be partially funded under the COTS program with an investment of $207 million, and Space Exploration Technologies (SpaceX), which will receive $278 million in NASA seed money to fund the development and demonstration flight of its Falcon 9 vehicle featuring the Dragon supply capsule.

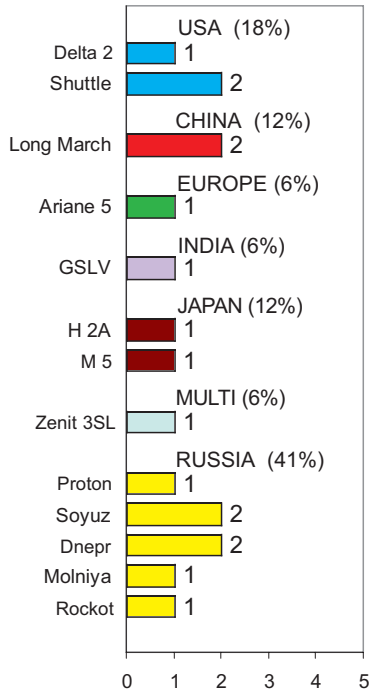
In September, Bigelow Aerospace signed an agreement with Lockheed Martin to study the use of Lockheed's Atlas 5 vehicle. Bigelow is considering using the vehicle to launch human missions to Bigelow's proposed orbital inflatable habitat, the Sundancer, as early as 2009 or 2010. Sundancer would provide 180 cubic meters (590 cubic feet) of habitable volume.

On September 18, a Soyuz rocket launched carrying two replacement ISS crew members along with the fourth—and first female—space tourist, Anousheh Ansari. Ansari went in place of would-be Japanese space tourist Daisuke Enomoto, who was not allowed by Russian doctors to fly after failing a medical exam on August 21. According to press reports, Enomoto may yet fly on a subsequent flight. Meanwhile, the Soyuz mission was successful, and Ansari and her fellow crewmembers safely returned to Earth on September 29.

On September 23, the Japanese Aerospace Exploration Agency (JAXA) launched its final M 5 vehicle, which successfully placed the Hinode (also called Solar B) probe and two microsatellites in a sun-synchronous orbit. The M 5 is slated to be replaced by a less expensive but more versatile vehicle whose design is expected to fuse elements of both the M 5 rocket and its still-operational counterpart, the H 2A booster. JAXA plans to conduct the maiden flight of the new vehicle in 2010.

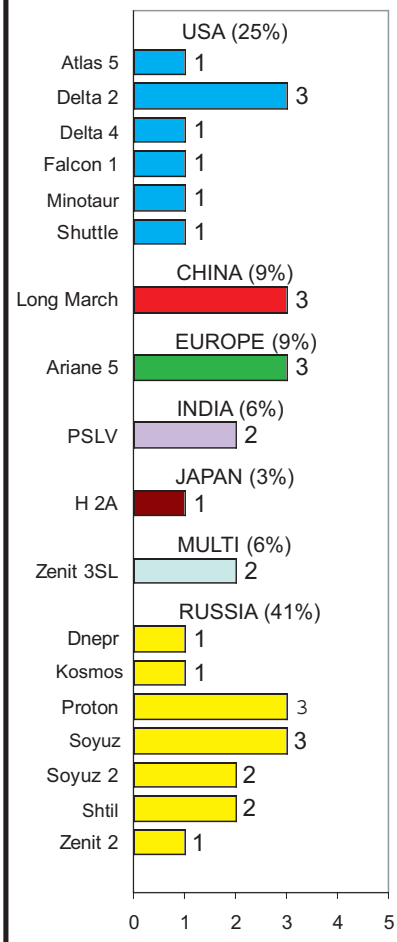
Vehicle Use
(July 2006 – March 2007)

Figure 1: Third Quarter 2006 Total Launch Vehicle Use



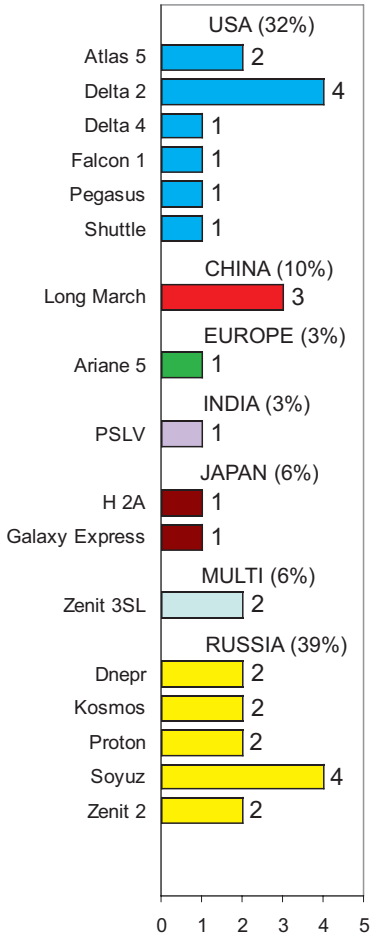
Total = 17

Figure 2: Fourth Quarter 2006 Total Projected Launch Vehicle Use



Total = 32

Figure 3: First Quarter 2007 Total Projected Launch Vehicle Use



Total = 31

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 third quarter of 2006, as well as projecting this information for the fourth quarter of 2006 and first quarter of 2007. 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

(July 2006 – March 2007)

Figure 4: Third Quarter 2006 Commercial Launch Events by Country

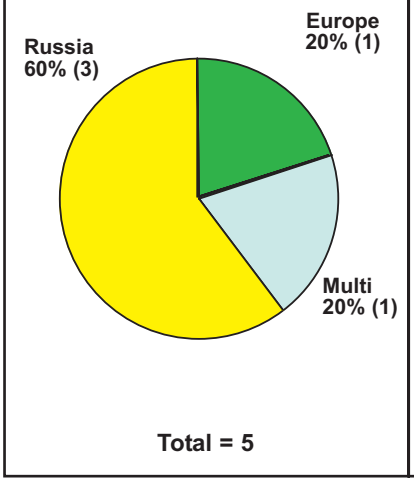


Figure 5: Fourth Quarter 2006 Projected Commercial Launch Events by Country

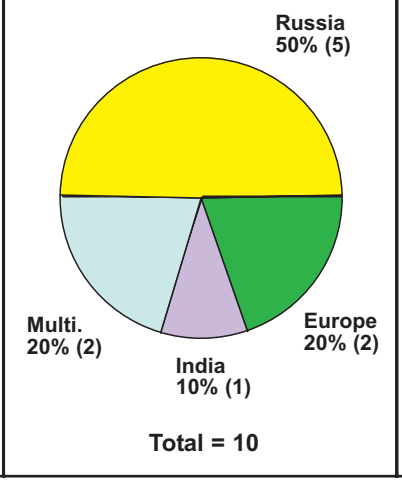
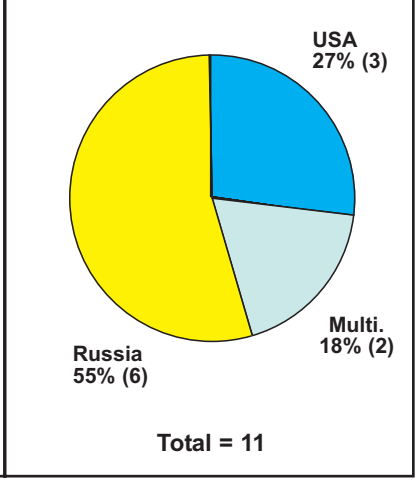


Figure 6: First Quarter 2007 Projected Commercial Launch Events by Country



Figures 4-6 show all *commercial* orbital and suborbital launch events that occurred in the third quarter of 2006 and that are projected for the fourth quarter of 2006 and first quarter of 2007.

Commercial vs. Non-commercial Launch Events

(July 2006 – March 2007)

Figure 7: Third Quarter 2006 Commercial vs. Non-commercial Launch Events

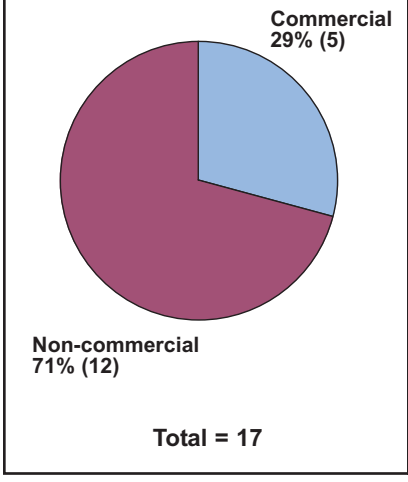


Figure 8: Fourth Quarter 2006 Projected Commercial vs. Non-commercial Launch Events

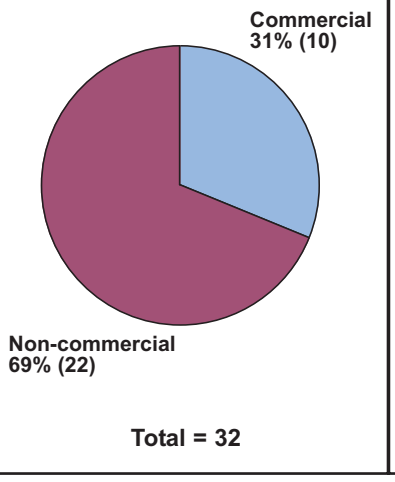
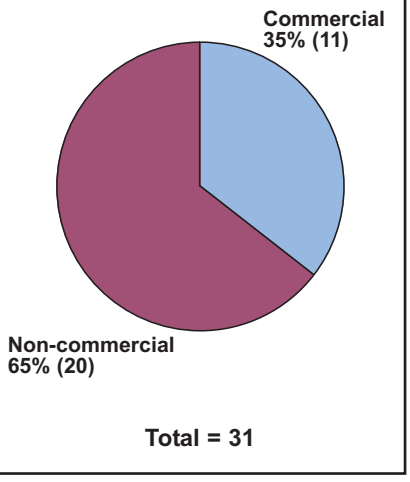


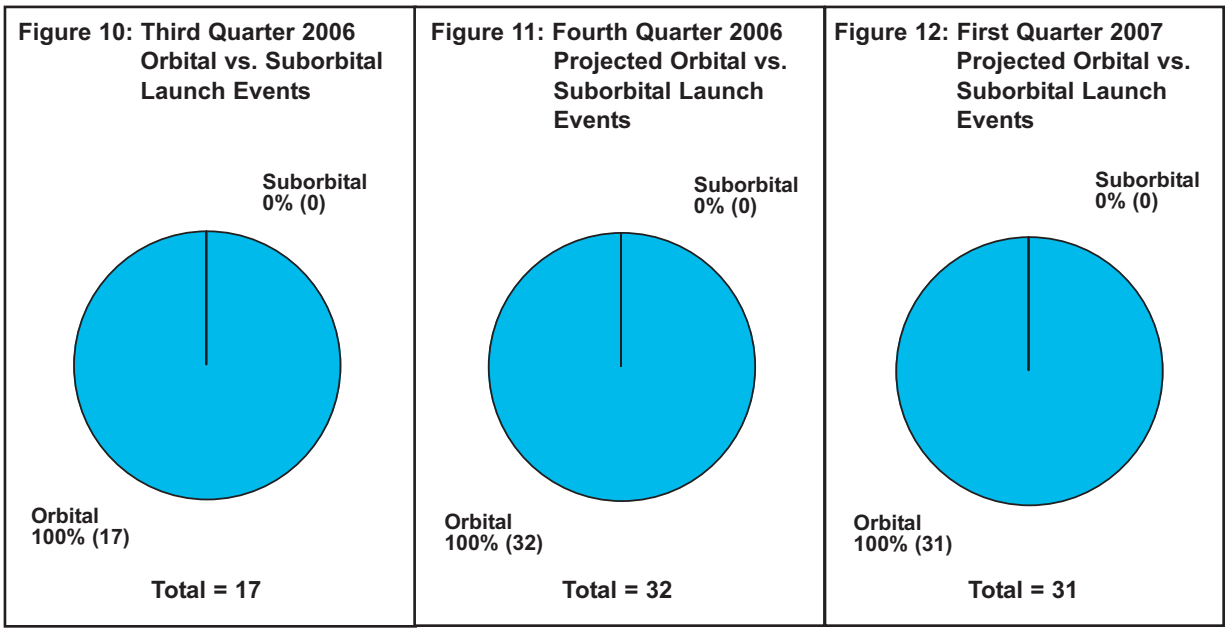
Figure 9: First Quarter 2007 Projected Commercial vs. Non-commercial Launch Events



Figures 7-9 show commercial vs. non-commercial orbital and suborbital launch events that occurred in the third quarter of 2006 and that are projected for the fourth quarter of 2006 and first quarter of 2007.

Orbital vs. Suborbital Launch Events

(July 2006 – March 2007)



Figures 10-12 show orbital vs. suborbital launch events that occurred in the third quarter of 2006 and that are projected for the fourth quarter of 2006 and first quarter of 2007.

Launch Successes vs. Failures

(July 2006 – September 2006)

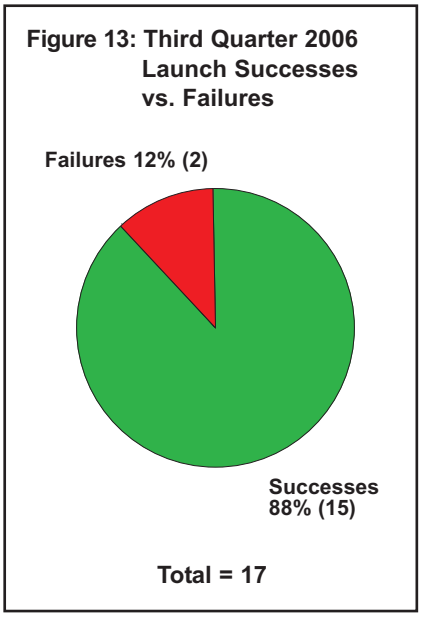
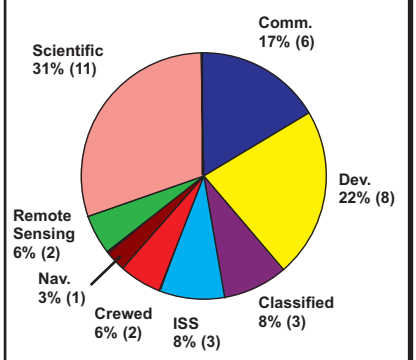


Figure 13 shows orbital and suborbital launch successes vs. failures for the period from July 2006 to September 2006. Partially-successful orbital launch events are those where the launch vehicle fails to deploy its payload to the appropriate orbit, but the payload is able to reach a useable orbit via 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)

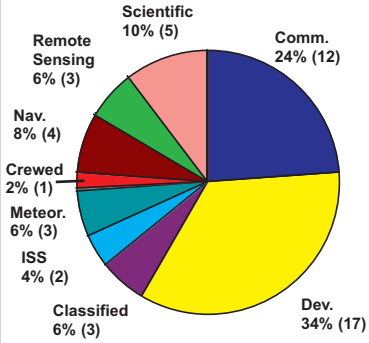
(September 2006 – March 2007)

Figure 14: Third Quarter 2006 Payload Use



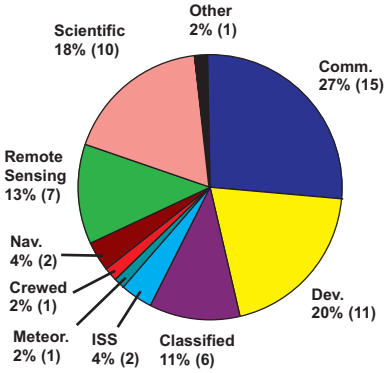
Total = 36

Figure 15: Fourth Quarter 2006 Projected Payload Use



Total = 50

Figure 16: First Quarter 2007 Projected Payload Use



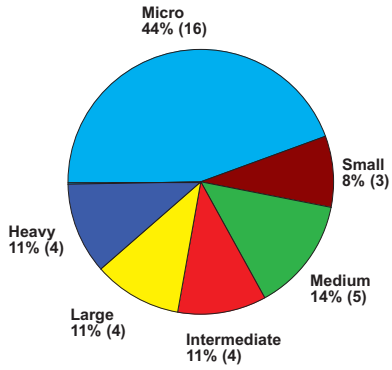
Total = 56

Figures 14-16 show total payload use (commercial and government), actual for the third quarter of 2006 and projected for the fourth quarter of 2006 and first quarter of 2007. 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)

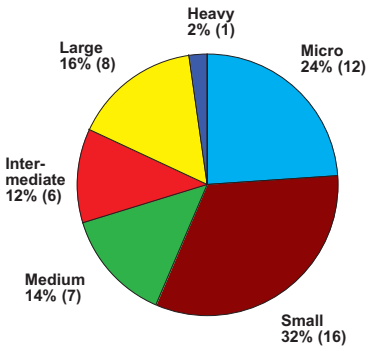
(September 2006 – March 2007)

Figure 17: Third Quarter 2006 Payload Mass Class



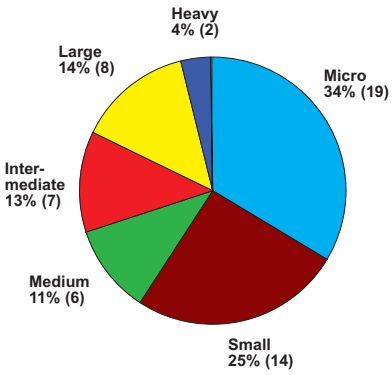
Total = 36

Figure 18: Fourth Quarter 2006 Projected Payload Mass Class



Total = 50

Figure 19: First Quarter 2007 Projected Payload Mass Class

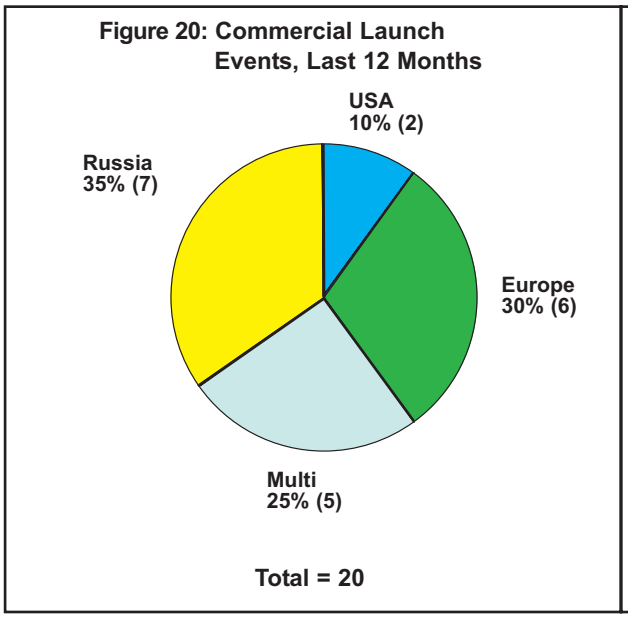


Total = 56

Figures 17-19 show total payloads by mass class (commercial and government), actual for the third quarter of 2006 and projected for the fourth quarter of 2006 and first quarter of 2007. 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)

(October 2005 – September 2006)



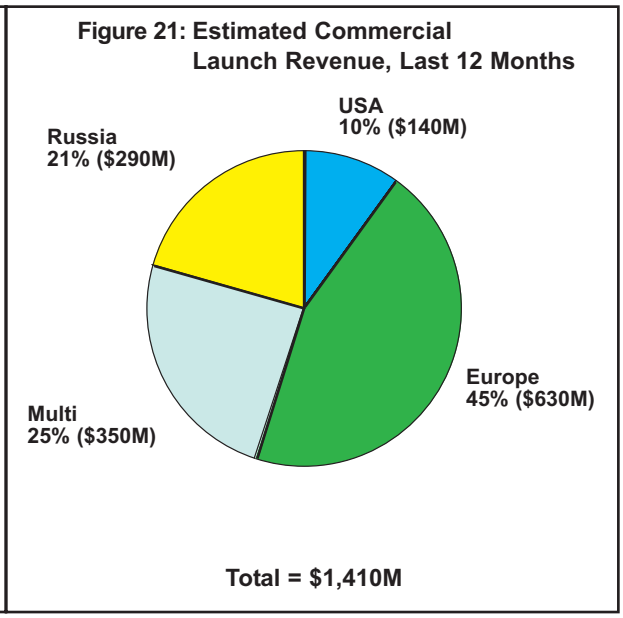


Figure 20 shows commercial orbital launch events for the period of October 2005 to September 2006 by country.

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

Commercial Launch Trends (Suborbital Launches Only)

(October 2005 – September 2006)

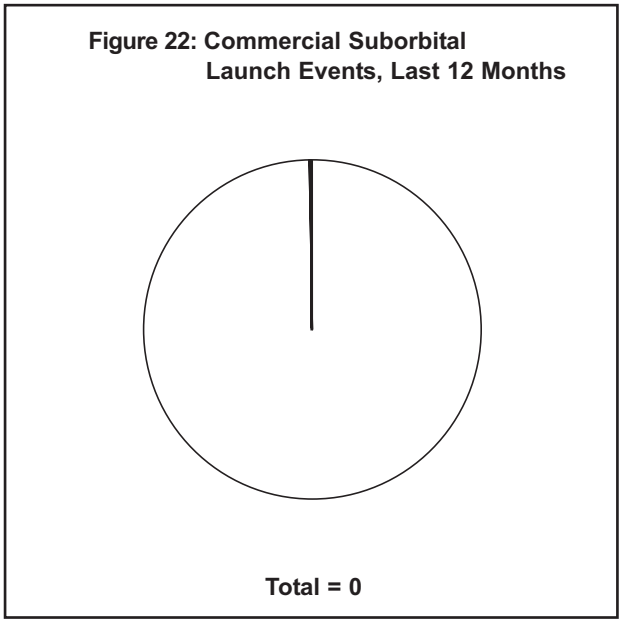


Figure 22 shows commercial suborbital launch events for the period of October 2005 to September 2006 by country.

Commercial Launch History
(January 2001 – December 2005)

Figure 23: Commercial Launch Events by Country, Last Five Years

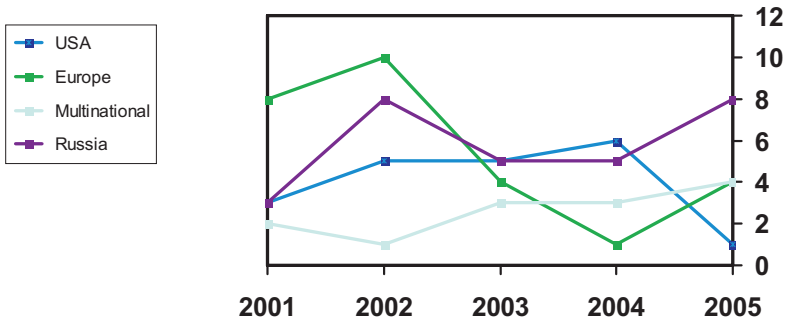


Figure 23 shows commercial launch events by country for the last five full years.

Figure 24: Estimated Commercial Launch Revenue (in $ millions) by Country, Last Five Years

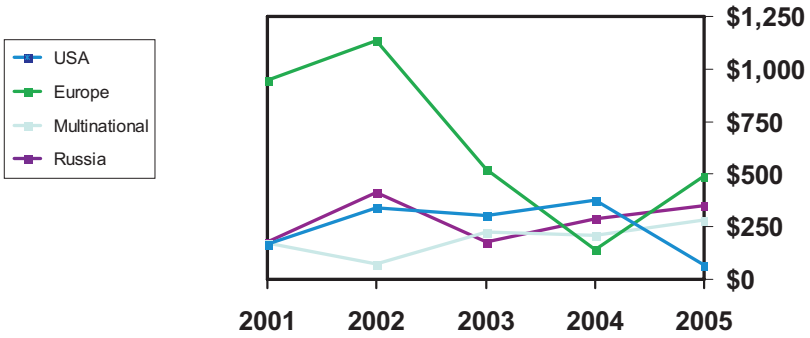


Figure 24 shows estimated commercial launch revenue by country for the last five full years.

Waivers of Liability: Are They Enough For Permittees and Licensees?

Introduction

In December 2004, Congress passed the Commercial Space Launch Amendments Act (CSLAA) to provide additional statutory authority for the personal spaceflight industry in the U.S. While public participation will increase potential profits, the liability exposure for certain launch providers is greater than the liability exposure for launch providers of expendable launch vehicles.[1] The CSLAA addresses issues of liability with respect to this new class of individuals seeking astronaut wings not previously contemplated in the Commercial Space Launch Act.

"The CSLAA requires crew and each space flight participant to execute a reciprocal waiver of claims with the FAA…The CSLAA does not require crew and space flight participants to waive claims against each other or against a licensee or permittee."[2] Even though the federal government does not explicitly require it, licensees and permittees can still protect themselves by using contractual waivers. It should be noted that for waivers not required by statute to be effective, specific state statues must be considered in both construction and coverage.

Assumption of Risk

If a spaceflight participant is properly informed of the risks particular to space flight, then the launch provider can be protected for most acts of negligence, according to the legal doctrine of assumption of risk.[3] Assumption of risk occurs when a person voluntarily exposes their self or their property to a known and appreciated danger due to the negligence of another. As a defense, assumption of risk is based on the theory of consent. Consent can be either implied by a party's actions or expressly granted.[4] Permittees and licensees have guidance from the FAA on the information required by the federal government for informed consent (see CSLAA).

An effective way for permittees or licensees to give a space flight participant effective notice is through a liability waiver, also known as an exculpatory clause.[5] A waiver is a voluntary forfeiture of rights to causes of action otherwise available. If a written release or waiver is used, the sufficiency of the language will be examined to varying degrees depending on the jurisdiction to determine whether it will provide a complete bar to recovery in negligence actions. It is important to note that if a waiver is not required by statute, it could be in conflict with public policy and voided. An example of a conflict with public policy is the method a signature was acquired or improper waiver language. Both the nature of the accident and the state where the suit is litigated will determine the effectiveness of even the most well constructed waiver. Finally, it should be noted that a waiver will not protect a launch provider from liability for intentional torts,[6] for willful or wanton misconduct,[7] or for gross negligence.[8]

Waiver Construction

In general, waivers are not looked upon favorably by the courts and will be strictly construed in favor of the waiving party.[9] In order to effectively construct a waiver of liability, it must be conspicuous,[10] readable,[11] unmistakable,[12] unequivocal and clear.[13]

The waiver must be conspicuous in order to protect the party entering into the release from surprise and unknowingly waiving their rights.[14] To be conspicuous, a waiver must state the intent to release the provider from liability for future negligence.[15] No matter how clear the release may be, it will be unenforceable if it is found to be inconspicuous.

The waiver must also be specific in what is being covered.[16] It must effectively notify the space flight participant that they are releasing the permittee or licensee from claims arising from the permittee or licensee's own negligence. Further, the intention of each party must be stated with a high level of particularity for the waiver to be valid.[17]

The protection from liability must be stated in clear and unequivocal terms.[18] The space flight participant must be alerted to the nature and the significance of what is being signed.[19] The particular conduct of the provider, which causes the harm at issue, must be clearly and directly referenced in the waiver language.[20] For liability to be avoided, the negligent behavior must be clearly set out.[21] It must also be clear that it is the intent of the waiver to release the permittee or licensee from liability for the personal injury caused by their negligence.[22] Finally, the waiver language must clearly state the intent to exonerate the would-be licensee or permittee of liability.[23]

Minors

The ability for a parent to waive the rights of a child is not generally allowed.[24] States traditionally provide checks on parental authority to ensure the protection of a child's interest. Further, public policy favors protecting children's rights with respect to contractual obligations.

State-Specific Limitations on Waivers

Judicial tolerance of liability waivers for recreational activities varies by jurisdiction. The most notable differences are: the treatment of minors, the language needed to uphold waivers, the separation of terms, the extent of coverage for claims, and the acts covered.

The limits on waiver effectiveness for states where personal space flight is being contemplated are listed below (states are listed in alphabetical order). This list of limits is by no means exhaustive, but is meant to merely highlight the major differences a licensee or permittee should consider in drafting spaceflight participant liability waivers.

Alaska[25]

- Use of the word negligence is mandatory.

California[26]

- For waivers to be valid they should distinguish between injuries due to negligence and those due to the inherent risks of activity.
- Case law is not clear if the word "negligence" is mandatory to validate a waiver.
- Parents may execute waivers on behalf of a minor child.

Florida[27]

- Waivers release all sponsors or parties even if not named in the waiver.
- Damages of parent's loss of filial consortium is limited to the period of a child's minority.
- Law unclear on whether a parent can waive a minor's rights.

New Mexico[28]

- State has a strong public policy of freedom to contract
- Word negligence does not have to be explicitly referred to, but intent to release liability must be clearly expressed.

Oklahoma[29]

- Public policy does not prohibit waivers, but since they are not favored by law they will be construed against the relying party.
- State Supreme Court stated gross negligence cannot be waived.

Texas[30]

- Waiver will be narrowly construed in favor of the party releasing liability.
- Strict requirement for fair notice.
- Both loss of consortium and wrongful death are derivative of the claim of the injured spouse.
- Case law is unclear on whether gross negligence can be waived.

Virginia[31]

- Public policy forbids releases from liability for personal injury due to future acts of negligence "universally."

Washington[32]

- Waivers will only protect the service provider from those risks contemplated or assumed by the client.
- Parental consortium is an independent cause of action.
- The Supreme Court has stated that Washington courts should use common sense in interpreting waivers.
- Gross negligence or willful and wanton misconduct cannot be covered.
- Parents cannot waiver childrens' rights, but parents can waive their right to recover for the injury to the minor.

Wisconsin[33]

- Supreme Court stated that each waiver case would be decided on its merits under strict scrutiny.
- While wrongful death claims are derivative of claims by injured

parties, loss of consortium is an independent cause of action.
- Waiver signed by the parent on behalf of a minor is enforceable.

Additional Recommendations

While the CSLAA does not explicitly preclude licensee or permittee liability to space flight participants, it does leave open the possibility for state specific regulations to provide such protection. State specific statues designed to limit provider liability in industries that provide entertainment facilities and services for the public are quite effective.[34] It should be noted though that while a state statue can provide liability protection, it is not a perfect solution. Unanticipated scenarios can leave operators exposed to liability. For example, in Derricotte v. United Skates of America[35] the court found that The Roller Skating Rink Safety and Fair Liability Act did not contemplate the fall of a person skating while under the direction and control of a rink employee during a skating lesson. This scenario was thus not within the Act's purview.

Although the CSLAA does not protect launch providers explicitly from space flight participants' claims of liability, the industry is not defenseless. Properly constructed waivers are now used successfully by other recreational activity industries and can also be used by the personal space flight industry. Further, the opportunity to lobby for state legislative protection is still available. Considering the strong public support enjoyed by the commercial space industry, creating a system of waivers seems to be quite an achievable task.

Endnotes

[1] In the current launch liability system the U.S. government provides additional indemnification for commercial payload launch providers above indemnification requirements.

[2] Human Space Flight Requirements for Crew and Space Flight Participants, 70 Fed Reg. 248 2.A.11 (proposed Dec. 29, 1995).

[3] *Allan v Snow Summit, Inc.* (1996, 4th Dist) 51 Cal App 4th 1358, 59 Cal Rptr 2d 813, 97 CDOS 13, 97 Daily Journal DAR 9.

[4] 65 C.J.S. Negligence § 360 (2006).

[5] Note: The liability waiver by itself does not satisfy the extensive notice requirements of proposed 460.45.

[6] A tort committed by someone acting with general or specific intent. Examples include battery, false imprisonment, and trespass to land.
Black's Law Dictionary (8th ed. 2004).

[7] An intentional act performed with the knowledge that it is likely to result in serious injury or with a wanton and reckless disregard of its probable consequences.
Black's Law Dictionary (8th ed. 2004).

[8] Gross negligence is defined as "A conscious, voluntary act or omission in reckless disregard of a legal duty and of the consequences to another party, who may typically recover exemplary damages."
Black's Law Dictionary (8th ed. 2004).

[9] *Pennsylvania R. Co. v. Gulf Oil Corp.*, 223 A.2d 79 (Del. Super. Ct. 1966)

[10] *Purcell Tire & Rubber Co., Inc. v. Executive Beechcraft, Inc.*, 59 S.W.3d 505 (Mo. 2001); *American Airlines Employees Federal Credit Union v. Martin*, 29 S.W.3d 86, 42 U.C.C. Rep. Serv. 2d 359 (Tex. 2000).

The purpose of the requirement that the release be conspicuous in order to be enforceable is to protect the party entering into the release from surprise and an unknowing waiver of his or her rights. *Littlefield v. Schaefer*, 955 S.W.2d 272, 33 U.C.C. Rep. Serv. 2d 990 (Tex. 1997).

A clear preinjury release is not enforceable if it is inconspicuous. *Vodopest v. MacGregor*, 128 Wash. 2d 840, 913 P.2d 779 (1996).

[11] *Littlefield v. Schaefer*, 955 S.W.2d 272, 33 U.C.C. Rep. Serv. 2d 990 (Tex. 1997)

[12] Purcell Tire & Rubber Co., Inc. v. Executive Beechcraft, Inc., 59 S.W.3d 505 (Mo. 2001).

[13] *College of Notre Dame of Maryland, Inc. v. Morabito Consultants, Inc.*, 132 Md. App. 158, 752 A.2d 265 (2000).

Exculpatory clauses must be clear if exemption from liability is to be enforced. *Vodopest v. MacGregor*, 128 Wash. 2d 840, 913 P.2d 779 (1996).

[14] *Littlefield v. Schaefer*, 955 S.W.2d 272, 33 U.C.C. Rep. Serv. 2d 990 (Tex. 1997).

[15] *Moore v. Hartley Motors, Inc.*, 36 P.3d 628 (Alaska 2001).

Parties seeking to exempt themselves from tort liability must clearly and unequivocally express an intent to limit tort liability within the contract. *Bishop v. GenTec Inc.*, 2002 UT 36, 48 P.3d 218 (Utah 2002).

[16] *Seigneur v. National Fitness Institute, Inc.*, 132 Md. App. 271, 752 A.2d 631 (2000); *Allen v. Dover Co-Recreational Softball League*, 148 N.H. 407, 807 A.2d 1274 (2002).

[17] *Valhal Corp. v. Sullivan Associates, Inc.*, 44 F.3d 195 (3d Cir. 1995) (applying Pennsylvania law).

[18] *Bishop v. GenTec Inc.*, 2002 UT 36, 48 P.3d 218 (Utah 2002).

[19] *Skiing Enterprises, Inc.*, 206 Wis. 2d 76, 557 N.W.2d 60 (1996).

[20] *Empire Lumber Co. v. Thermal-Dynamic Towers, Inc.*, 132 Idaho 295, 971 P.2d 1119 (1998).

[21] *Firstbank of Arkansas v. Keeling*, 312 Ark. 441, 850 S.W.2d 310 (1993).

[22] *Seigneur v. National Fitness Institute, Inc.,* 132 Md. App. 271, 752 A.2d 631 (2000); *Allen v. Dover Co-Recreational Softball League,* 148 N.H. 407, 807 A.2d 1274 (2002).

[23] *Schmidt v. U.S.,* 1996 OK 29, 912 P.2d 871 (Okla. 1996).

The parties are bound by clear and unambiguous language evidencing an intent to extinguish liability. *Kondrad ex rel. McPhail v. Bismarck Park Dist*., 2003 ND 4, 655 N.W.2d 411 (N.D. 2003).

[24] *Dixon v. U.S.,* 197 F. Supp. 798 (W.D. S.C. 1961).

[25] *Wallis v. Princess Cruises, Inc.,* 306 F.3d 827, 2002 A.M.C.

[26] V*ine v. Bear Valley Ski Co*., 13 Cal.Rptr.3d 370; *Sweat v. Big Time Auto Racing, Inc.,* 12 Cal.Rptr.3d 678; *Benedek v. PLC Santa Monica, LLC,* 129 Cal.Rptr.2d 197; *Allan v. Snow Summit, Inc.,* 59 Cal.Rptr.2d 813; *Allabach v. Santa Clara County Fair Assn.,* 54 Cal.Rptr.2d 330; *Guido v. Koopman*, 2 Cal.Rptr.2d 437;

[27] *Shaw v. Premier Health and Fitness Center, Inc.,* 31 Fla. L. Weekly D2390 Fla.App.1.Dist.(2006); *Cain v. Banka*, 31 Fla. L. Weekly D1780 Fla.App.5.Dist.(2006); *Raveson v. Walt Disney World Co.,* 793 So.2d 1171 Fla.App.5.Dist.(2001); *Lantz v. Iron Horse Saloon, Inc.,* 717 So.2d 590 Fla.App.5.Dist.(1998); *Dilallo By and Through Dilallo v. Riding Safely, Inc.,* 687 So.2d 353 Fla.App.4.Dist.(1997); *Torres v. Offshore Professional Tour, Inc.,* 629 So.2d 192 Fla.App.3.Dist.(1993); *Banfield v. Louis,* 589 So.2d 441 Fla.App.4.Dist.(1991)

[28] *Berlangieri v. Running Elk Corp.,* 48 P.3d 70

[29] *Martin v. A.C.G., Inc.,* 965 P.2d 995; *Manning v. Brannon*, 956 P.2d 156

[30] *Littlefield v. Schaefer*, 955 S.W.2d 858; *Smith v. Golden Triangle Raceway*, 708 S.W.2d 574; *Corpus Christi Speedway v. Morton*, 279 S.W.2d 903

[31] *Hiett v. Lake Barcroft Community Assoc.,* 244 Va. 191, 418 S.E.2d 894 (1992)

[32] *Conradt v. Four Star Promotions, Inc.*, 728 P.2d 617; *Stokes v. Bally's Pacwest, Inc.*, 54 P.3d 161

[33] *Atkins v. Swimwest Family Fitness Center*, 691 N.W.2d 334; *Werdehoff v. General Star Indem. Co.*, 600 N.W.2d 214

[34] See Illinois Equine Activity Liability Act

[35] 350 N.J.Super. 227, 794 A.2d 867 (Apr 16, 2002)

Third Quarter 2006 Orbital and Suborbital Launch Events

Date			Vehicle	Site		Payload or Mission	Operator	Use	Vehicle Price	L	M
7/4/2006			Shuttle Discovery	KSC		STS 121	NASA	Crewed	N/A	S	S
						ISS ULF-1.1	NASA	ISS			S
7/10/2006			GSLV	Satish Dhawan Space Center	*	Insat 4C	ISRO	Communications	$40M	F	F
7/12/2006	√		Dnepr 1	Dombarovskiy	*	Genesis Pathfinder 1	Bigelow Aerospace	Development	$9.5M	S	S
7/21/2006			Molniya	Plesetsk		Kosmos 2422	Russian MoD	Classified	$35M	S	S
7/26/2006			Dnepr 1	Baikonur		BelKA	Belarus National Academy of Sciences	Remote Sensing	$9.5M	F	F
					*	AeroCube 1	The Aerospace Corporation	Development			F
						Baumanets	Bauman Moscow State Technical University	Development			F
						HAUSat 1	Hankuk Aviation University	Scientific			F
						ICEcube 1	Cornell University	Scientific			F
						ICEcube 2	Cornell University	Scientific			F
						ION	University of Illinois	Development			F
						KUTESat	Kansas University	Scientific			F
						Merope	Montana State University	Scientific			F
						Ncube	Norwegian Student Satellite Project	Scientific			F
						Polysat 1	Cal Poly Aerospace Engineering	Development			F
						Polysat 2	Cal Poly Aerospace Engineering	Development			F
						Rincon	University of Arizona at Tucson	Scientific			F
						Sacred	University of Arizona at Tucson	Scientific			F
						SEEDS	Nihon University	Scientific			F
						UniSat 4	University of Rome	Development			F
7/28/2006	√		Rockot	Plesetsk		Kompsat 2	KARI	Remote Sensing	$13.5M	S	S
8/5/2006	√		Proton M	Baikonur	*	Hot Bird 8	Eutelsat	Communications	$70M	S	S
8/11/2006	√		Ariane 5 ECA	Kourou	*	JCSAT 10	JSAT	Communications	$140	S	S
						Syracuse 3B	DGA	Communications			S
8/21/2006	√	+	Zenit 3SL	Odyssey Launch Platform	*	KoreaSat 5	Korea Telecom	Communications	$70M	S	S
9/9/2006			Long March 2C	Jiuquan		Shi Jian 8	China Aerospace Corporation	Scientific	$22.5M	S	S
9/9/2006			Shuttle Atlantis	KSC		STS 115	NASA	Crewed	N/A	S	S
						ISS 12A	NASA	ISS			S
9/11/2006			H 2A 202	Tanegashima		IGS 3A	Japanese Defense Agency	Classified	$85M	S	S
9/13/2006			Long March 3A	Xichang		Zhongxing 22A	Chinese Telecommunications Broadcasting Satellite Corporation	Communications	$50M	S	S
9/14/2006			Soyuz	Baikonur		Kosmos 2423	Russian MoD	Classified	$40M	S	S
9/18/2006			Soyuz	Baikonur		Soyuz ISS 13S	Roscosmos	ISS	$40M	S	S
9/23/2006			M 5	Uchinoura		Hinode	JAXA	Scientific	$50M	S	S
						Hitsat	Hokkaido Space	Development			S
9/25/2006			Delta 2 7925-10	CCAFS		Navstar GPS 2RM-2	USAF	Navigation	$50M	S	S

√ Denotes commercial launch, defined as a launch that is internationally competed or FAA-licensed. For multiple manifested launches, certain secondary payloads whose launches were commercially procured may also constitute a commercial launch.

+ 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.

Fourth Quarter 2006 Projected Orbital and Suborbital Launch Events

Date			Vehicle	Site		Payload or Mission	Operator	Use	Vehicle Price
10/13/2006	√		Ariane 5 ECA	Kourou	*	DirecTV 9S	DirecTV	Communications	$140M
					*	Optus D1	Singtel/Optus	Communications	
						LDREX 2	JAXA	Development	
10/19/2006			Soyuz	Baikonur		Metop A	Eumetsat	Meteorological	$40M
10/23/2006			Soyuz	Baikonur		Progress ISS 23P	Roscosmos	ISS	$40M
10/25/2006			Delta 2 7925H-10L	CCAFS		STEREO A	NASA	Scientific	$50M
						STEREO B	NASA	Scientific	
10/26/2006	√	+	Zenit 3SL	Odyssey Launch Platform	*	XM 4	XM Radio	Communications	$70M
10/2006			Long March 3A	Taiyuan		Fengyun 2D	China Meteorological Administration	Meteorological	$50M
10/2006			Long March 3B	Xichang	*	Sinosat 2	CNSA	Communications	$60M
11/4/2006			Delta 4 Medium	VAFB		DMSP 5D-3-F17	DoD	Meteorological	$70M
11/9/2006	√		Proton M	Baikonur	*	BADR-4	Arabsat	Communications	$70M
11/14/2006			Delta 2 7925-10	CCAFS		Navstar GPS 2RM-3	USAF	Navigation	$50M
11/30/2006	√		Ariane 5 ECA	Kourou	*	AMC 18	SES Americom	Communications	$140M
					*	WildBlue 1	WildBlue Communications	Communications	
11/2006	√		Dnepr 1	Baikonur	*	TerraSAR X	Infoterra	Remote Sensing	$9.5M
11/2006			PSLV	Satish Dhawan Space Center		Cartosat 2	ISRO	Remote Sensing	$20M
						LAPAN-TUBSAT	LPAN	Development	
						SRE 1	ISRO	Development	
12/2/2006			Falcon 1	Kwajalein Island		Falcon Demosat	DARPA	Development	$7M
12/7/2006			Delta 2 7920	VAFB		NRO L-21	NRO	Classified	$50M
12/8/2006			Atlas 5 401	CCAFS		Orbital Express 1A	DARPA	Development	$75M
						Orbital Express 1B	DARPA	Development	
						Space Test Program Satellite 1	USAF	Development	
						FalconSat 3	USAF Academy	Development	
						MEPSI 4A	DARPA	Development	
						MEPSI 4B	DARPA	Development	
						MIDSTAR 1	Naval Postgraduate School	Development	
						NPSAT 1	Naval Postgraduate School	Development	
						CFESat	USAF	Development	
12/8/2006			Shuttle Discovery	KSC		STS 116	NASA	Crewed	N/A
						ANDE	US Naval Academy	Development	
						MARScom	US Navy	Development	
12/11/2006			Minotaur	Wallops Flight Facility		TacSat 2	USAF	Development	$14.5M
12/12/2006	√		Proton M	Baikonur	*	Measat 3	MEASAT	Communications	$70M
12/15/2006			H 2A 204	Tanegashima		ETS 8	JAXA	Communications	$85M
12/15/2006			Shtil	Barents Sea		Sumbandila	University of Stellenbosch	Development	$1.5M
12/16/2006			Zenit 2SLB	Baikonur		Kosmos TBA 2	Russian MoD	Classified	$37.5M
12/19/2006	√		Kosmos 3M	Plesetsk		SAR Lupe 1	German MoD	Classified	$12M
12/20/2006			Soyuz	Baikonur		Progress ISS 24P	Roscosmos	ISS	$40M
12/21/2006	√		Soyuz 2 1B	Baikonur		Corot	CNES	Scientific	TBA
12/25/2006			Proton (SL-12)	Baikonur		Glonass K R4	Russian MoD	Navigation	$72.5M
						Glonass K R5	Russian MoD	Navigation	
						Glonass K R6	Russian MoD	Navigation	
12/25/2006			Shtil	Barents Sea		Kompass 2	Izmiran and Lebedev Physical Institute	Scientific	$1.5M
12/2006			Ariane 5 TBA	Kourou		Skynet 5A	UK MoD	Communications	$100M
12/2006	√		PSLV	Satish Dhawan Space Center		AGILE	ASI	Scientific	$20M
12/2006			Soyuz 2 1A	Plesetsk		Kosmos TBA 3	Russian MoD	Communications	TBA
12/2006	√	+	Zenit 3SL	Odyssey Launch Platform	*	NSS 8	SES New Skies	Communications	$70M
2006			Long March 2C	Taiyuan		Haiyang 1B	China - TBA	Remote Sensing	$22.5M

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First Quarter 2007 Projected Orbital and Suborbital Launch Events

Date			Vehicle	Site		Payload or Mission	Operator	Use	Vehicle Price
1/20/2007			Delta 2 7925	CCAFS		THEMIS 1	NASA	Scientific	$50M
						THEMIS 2	NASA	Scientific	
						THEMIS 3	NASA	Scientific	
						THEMIS 4	NASA	Scientific	
						THEMIS 5	NASA	Scientific	
1/2007	√		Atlas 5 TBA	CCAFS	*	Inmarsat-4 F3	Inmarsat	Communications	$70M
1/2007	√	+	Delta 2 7925-10	VAFB	*	Worldview 1	DigitalGlobe	Remote Sensing	$50M
1/2007	√		Dnepr 1	Baikonur	*	Genesis Pathfinder 2	Bigelow Aerospace	Development	$9.5M
1/2007			Long March 3A	Xichang		Beidou 2A (Compass 1)	CNSA	Navigation	$50M
1/2007	√		Proton M	Baikonur	*	Anik F3	Telesat Canada	Communications	$70M
1/2007			PSLV	Satish Dhawan Space Center		TechSAR	Israeli MoD	Classified	$20M
2/14/2007	√	+	Delta 2 TBA	VAFB	*	GeoEye 1	GeoEye	Remote Sensing	$50M
2/22/2007			Shuttle Atlantis	KSC		STS 117	NASA	Crewed	N/A
						ISS 13A	NASA	ISS	
2/28/2007			Atlas 5 TBA	CCAFS		NRO L-30	NRO	Classified	$75M
2/2007			Ariane 5G	Kourou	*	Insat 4B	ISRO	Communications	$100M
2/2007	√		Dnepr 1	Baikonur		Egyptsat	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	Communications	
						Mea Huaka'I	University of Hawaii	Scientific	
						SaudiComsat 3	Space Research Institute	Communications	
						SaudiComsat 4	Space Research Institute	Communications	
						SaudiComsat 5	Space Research Institute	Communications	
						SaudiComsat 6	Space Research Institute	Communications	
						SaudiComsat 7	Space Research Institute	Communications	
						Saudisat 3	Space Research Institute	Scientific	
						UCISat 1	University of California Irvine	Development	
2/2007			Galaxy Express	Tanegashima		SERVIS 2	JAXA	Development	TBA
2/2007			Kosmos 3M	Baikonur		Vietnamsat	Vietnamese MPT	Remote Sensing	$12M
						Thai-Paht 2	Thai MicroSatellite Company	Remote Sensing	
2/2007			Proton (SL-12)	Baikonur	*	Express AM33	RSCC	Communications	$72.5M
2/2007			Zenit 2	Baikonur		RadioAstron	Russian Academy of Sciences	Scientific	$37.5M
2/2007	√	+	Zenit 3SL	Odyssey Launch Platform	*	Thuraya 3	Thuraya Satellite Communications Company	Communications	$70M
3/9/2007			Soyuz	Baikonur		Soyuz ISS 14S	Roscosmos	ISS	$40M
3/15/2007			Delta 2 TBA	VAFB		STSS Block 2010 Risk Reduction	Missile Defense Agency	Classified	$50M
3/15/2007			Delta 4 Heavy	CCAFS		DSP 23	USAF	Classified	$155M
3/29/2007			Pegasus XL	VAFB		AIM Explorer	NASA	Scientific	$16M
3/2007	√		Kosmos 3M	Plesetsk		SAR Lupe 3	German MoD	Classified	$12M
3/2007			Long March 3B	Xichang		Nigerian Communications Satellite-1	China Aerospace Corporation	Communications	$60M
3/2007	√		Soyuz	Baikonur		Radarsat 2	MacDonald, Dettwiler, and Associates	Remote Sensing	$40M
3/2007			Zenit 2	Baikonur		Meteor 3M N2	Russian Meteorological Service	Meteorological	$37.5M
1Q/2007			Falcon 1	VAFB		TacSat 1	DoD	Development	$7M
					*	Celestis 5	Celestis	Other	
1Q/2007			H 2A TBA	Tanegashima		IGS 3B	Japanese Defense Agency	Classified	$85M
1Q/2007			Long March 4B	Taiyuan		CBERS/Ziyuan 2B	CAST	Remote Sensing	$50M
1Q/2007	√	+	Soyuz	Baikonur	*	Globalstar Replacement TBA 1	Globalstar	Communications	$40M
1Q/2007			Soyuz	Baikonur		GIOVE B	ESA	Navigation	$40M
1Q/2007	√	+	Zenit 3SL	Odyssey Launch Platform	*	DirecTV 10	DirecTV	Communications	$100M
					*	Spaceway 3	Hughes Communications	Communications	

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