



U. S. Department
of Transportation
**Federal Aviation
Administration**

Semi-Annual Launch Report Second Half of Fiscal Year 2011

Reviewing Launch Results from the 2nd and 3rd Quarter 2011, and
Forecasting Launches for the 4th Quarter 2011 and 1st Quarter 2012

**Semi-Annual Launch Report
Second Half of Fiscal Year 2011**

About the Office of Commercial Space Transportation

The Federal Aviation Administration's Office of Commercial Space Transportation (FAA/AST) licenses and regulates U.S. commercial space launch and reentry activity, as well as the operation of non-federal launch and reentry sites, as authorized by Executive Order 12465 and Title 51 United States Code, Subtitle V, Chapter 509 (formerly the Commercial Space Launch Act).

FAA/AST's mission is to ensure public health and safety and the safety of property while protecting the national security and foreign policy interests of the United States during commercial launch and reentry operations. In addition, FAA/AST is directed to encourage, facilitate, and promote commercial space launches and reentries. Additional information concerning commercial space transportation can be found on FAA/AST's web site at http://www.faa.gov/about/office_org/headquarters_offices/ast/.

Cover photo courtesy of Sea Launch, Copyright © 2011.
Liftoff of the Sea Launch Zenit 3SL on September 24, 2011, carrying Eutelsat's Atlantic Bird 7 communications satellite. Sea Launch and Eutelsat logos removed to conform with FAA publication requirements.

NOTICE

Use of trade names or names of manufacturers in this document does not constitute an official endorsement of such products or manufacturers, either expressed or implied, by the Federal Aviation Administration.

CONTENTS

| | |
|--|----|
| Introduction | 1 |
| Significant Events | 2 |
| Total Launches by Country | 4 |
| Vehicle Use..... | 5 |
| Commercial Launch Events by Country | 6 |
| Commercial vs. Non-Commercial Launch Events..... | 6 |
| Commercial Orbital vs. Commercial Suborbital Launch Events..... | 7 |
| Launch Successes vs. Failures..... | 7 |
| Payload Use | 8 |
| Payload Mass Class..... | 8 |
| Commercial Launch Trends | 9 |
| Commercial Launch History | 10 |
| Appendix A: April 2011 - September 2011 Launch Events | 11 |
| Appendix B: October 2011 - March 2012 Projected Launch Events..... | 13 |
| Appendix C: Definitions..... | 17 |

Introduction

The *Semi-Annual Launch Report: Second Half of Fiscal Year 2011* features launch results from April 2011 through September 2011 and forecasts the period of October 2011 through March 2012. This report contains information on worldwide commercial, civil, and military orbital and commercial suborbital space launch events. There have been no commercial suborbital launches in the past six months. There are no projected commercial suborbital launches planned before March 2012. The launches projected for the next six months, in this report, are based on manifests published by government and commercial organizations. The actual number of launches will likely be lower, due to various technical and fiscal factors.

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

- Internationally competed launch events; that is, launch opportunities considered available in principle to competitors in the international launch services market.
- Any launches licensed by the Federal Aviation Administration (FAA) Office of Commercial Space Transportation (AST) under Title 51 United States Code, Subtitle V, Chapter 509 (formerly the Commercial Space Launch Act).

For fiscal year 2011 and previous years, the FAA published this report on a half-year schedule following a fiscal year calendar, with reports published in April and October. For 2012, the *Semi-Annual Launch Report* will transition to a calendar year schedule. A new abbreviated Quarterly Launch Report will be published in April, with a larger mid-year Launch Report published in July, followed by another abbreviated Quarterly Launch Report in October. The *Year in Review* will continue to be published in January.

Significant Events

Final Launch of Space Shuttle Endeavour

On May 16, 2011, NASA's Space Shuttle Endeavour performed its final lift-off from Kennedy Space Center. The STS-134 mission included six crewmembers to deliver the Alpha Magnetic Spectrometer-2, Express Logistics Carrier-3, a high-pressure gas tank, and additional spare parts for the Dextre robotic helper to the space station. Space Shuttle Endeavour will retire to the California Space Center in Los Angeles, California.

Final Launch of Space Shuttle Atlantis

On July 8, 2011, NASA's Space Shuttle Atlantis performed its final lift-off from Kennedy Space Center for NASA's 135th and final Space Shuttle mission. The STS-135 mission included four crewmembers and carried a cargo module with supplies for the space station. The final flight was added as a cargo hauling mission using the final, spare External Tank. Space Shuttle Atlantis will retire to the Kennedy Space Center Visitor's Complex in Florida.

Proton M Launches SES-3 and KazSat 2

On July 15, 2011, the Russian Proton M launch vehicle launched the SES-3 and KazSat 2 communications satellites into geostationary orbits (GEO). This was the first shared payload mission on a Proton M for International Launch Services.

Failure of Proton M Launching Express AM4

On August 17, 2011, the Russian Proton M launch vehicle failed to launch the Russian Express AM4 communications satellite into GEO. The Briz-M upper stage failed to deploy the satellite after it was reported to have lost all power at the time during, or shortly after, the fourth burn. An error in the sequencing of the Briz-M guidance system operation was responsible for the failure.

Failure of Long March 2C Launching Shijian 11-04

On August 18, 2011, the Chinese Long March 2C launch vehicle failed to launch the Shijian 11-04 scientific satellite into a sun-synchronous orbit. The China Aerospace Science and Technology Corporation announced that the failure was caused by a malfunction of a connection between a servo mechanism and one of four swiveling vernier engines used to steer the second stage. The problem caused the stage to fly out of control during the second stage burn.

**Failure of Soyuz U
Launching Progress
M-12M (ISS-44P)**

On August 24, 2011, the Russian Soyuz U launch vehicle failed to deliver the Progress M-12M space station cargo ship to orbit. Russian Federal Space officials stated that a malfunctioning gas generator caused the failure, where the fuel supply to the gas generator was restricted due to a production defect. Debris from the upper stage and payload were located in the Altai Region of southern Siberia. This is the first known failure of a Progress cargo spacecraft.

**Sea Launch Returns to
Business with Atlantic
Bird 7 Launch**

After ending a two-year Chapter 11 reorganization, Sea Launch returned to business on September 24, 2011, with the Zenit 3SL launch vehicle launching Eutelsat's Atlantic Bird 7 communications satellite into GEO.

Total Launches by Country

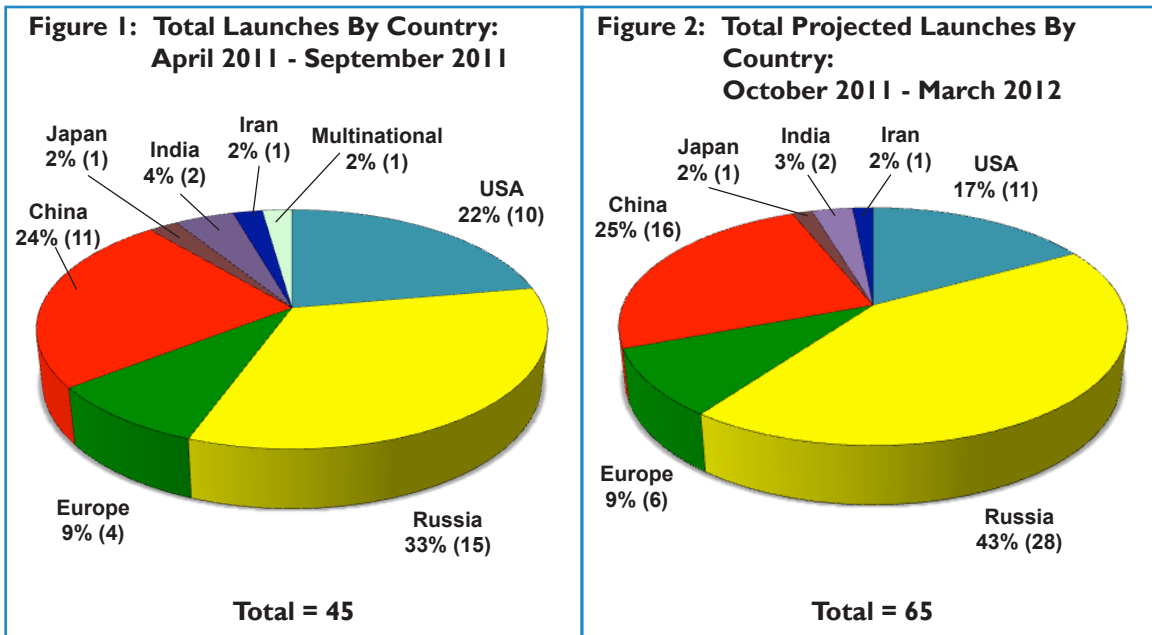


Figure 1 shows the total number of orbital launches by each country and the relative percentage of launches for each country from April 2011 through September 2011. **Figure 2** projects this information for the period of October 2011 through March 2012. Launches are grouped by the country in which the primary vehicle manufacturer is based.

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

Vehicle Use

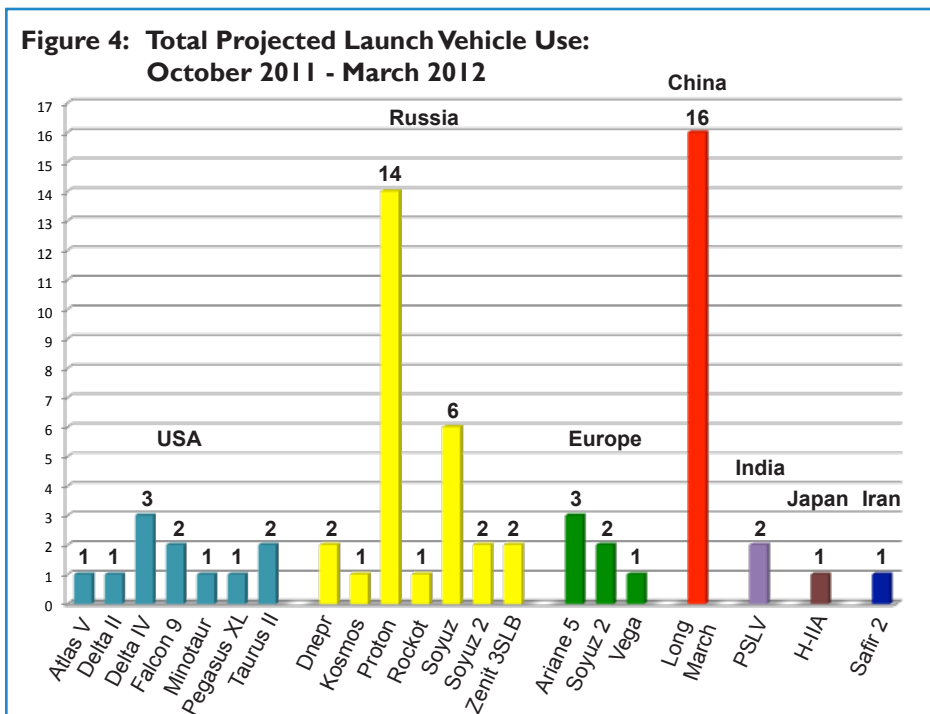
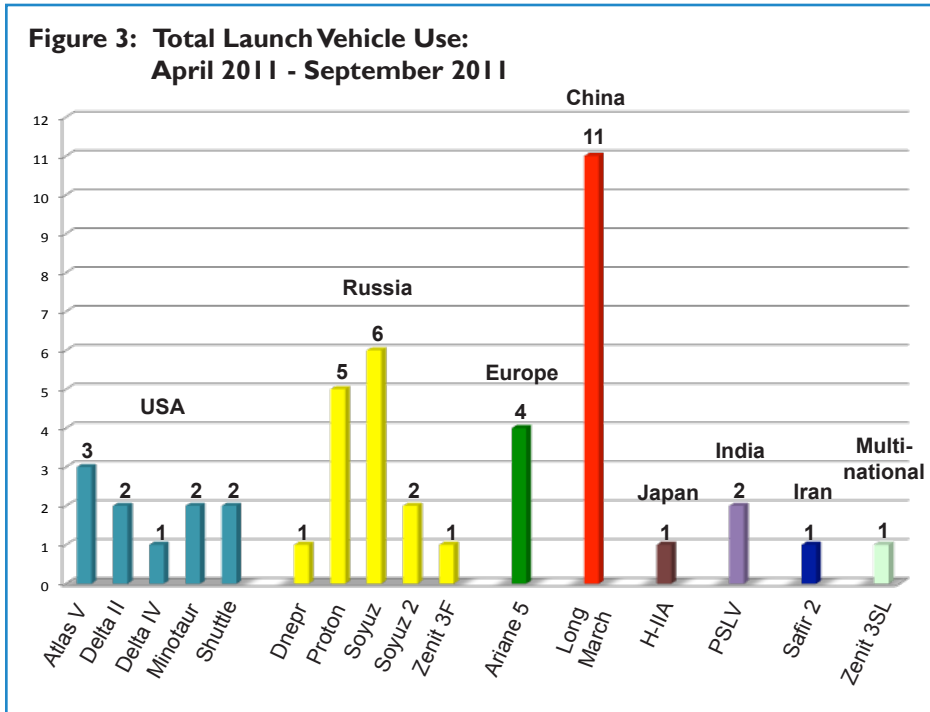


Figure 3 shows the total number of orbital launches of each launch vehicle from April 2011 through September 2011. **Figure 4** projects this information for the period of October 2011 through March 2012.

Commercial Launch Events by Country

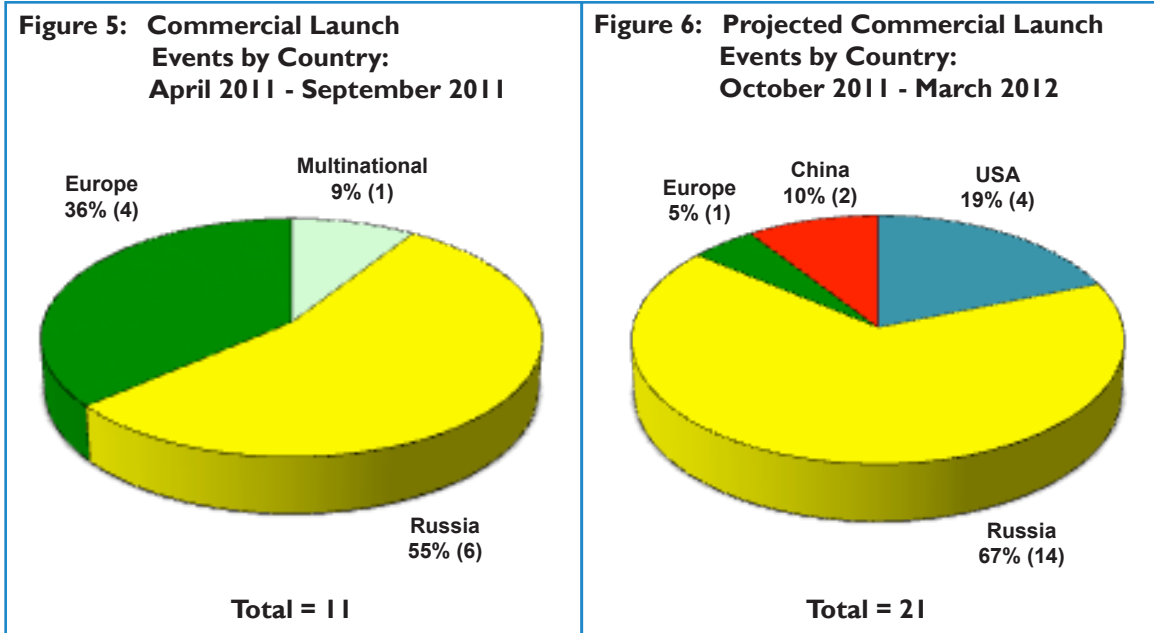


Figure 5 shows all commercial orbital launch events from April 2011 through September 2011. Figure 6 projects this information for the period of October 2011 through March 2012.

Commercial vs. Non-Commercial Launch Events

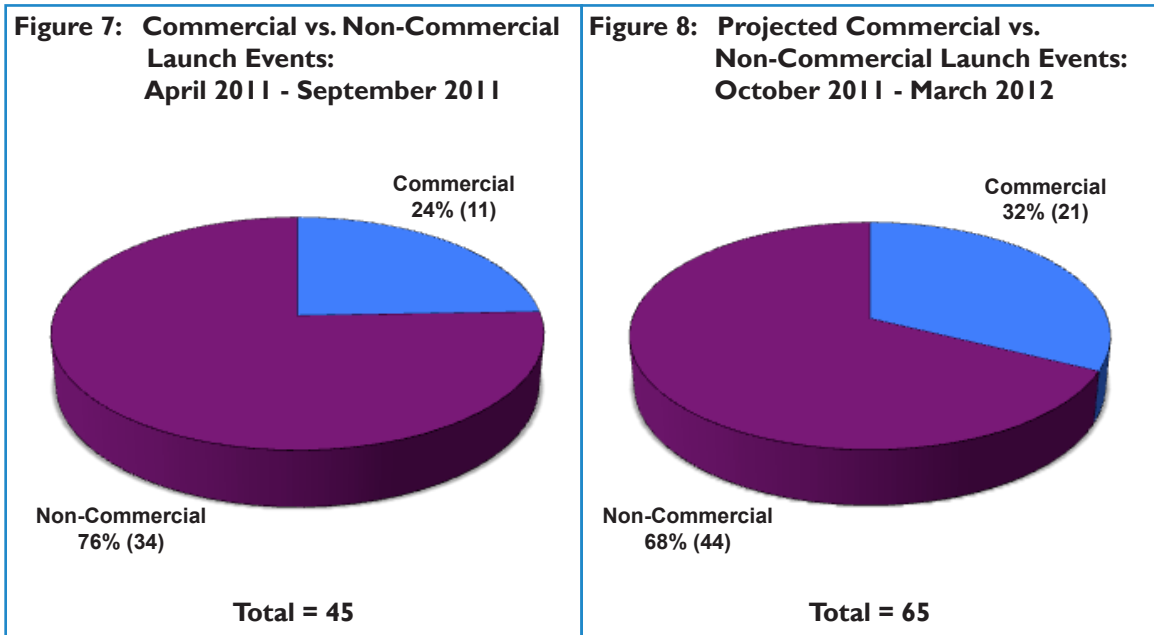


Figure 7 shows commercial vs. non-commercial orbital launch events from April 2011 through September 2011. Figure 8 projects this information for the period of October 2011 through March 2012.

Commercial Orbital vs. Commercial Suborbital Launch Events

There were no commercial suborbital launch events from April 2011 through September 2011; all 11 commercial launches were orbital. There are no projected commercial suborbital launch events for October 2011 through March 2012; all 21 projected commercial launches are orbital.

Launch Successes vs. Failures



Figure 9 shows orbital launch successes and failures from April 2011 through September 2011. From April 2011 to September 2011 there were three launch failures. See the Significant Events section for details on the Long March 2C, Proton M, and Soyuz U launch failures. From September 2010 to April 2011 there were four launch failures.

Payload Use (Orbital Launches Only)

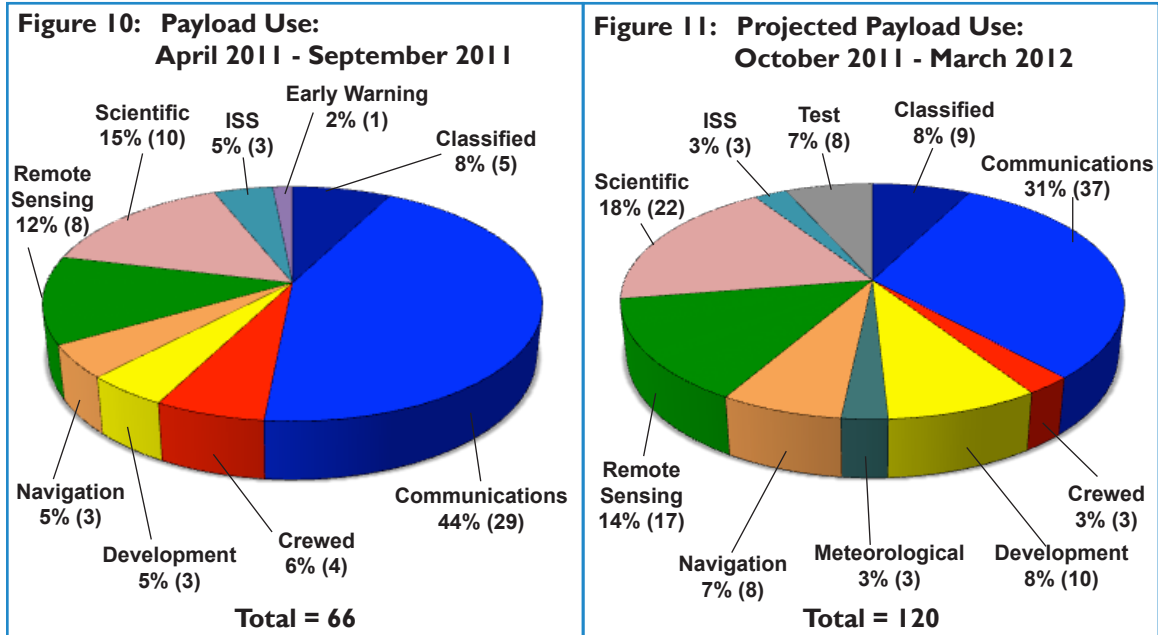


Figure 10 shows actual payload use (commercial and government) from April 2011 through September 2011. Figure 11 projects this information for the period of October 2011 through March 2012. The total number of payloads launched may not equal the total number of launches, due to multiple manifesting (the launching of more than one payload by a single launch vehicle).

Payload Mass Class (Orbital Launches Only)

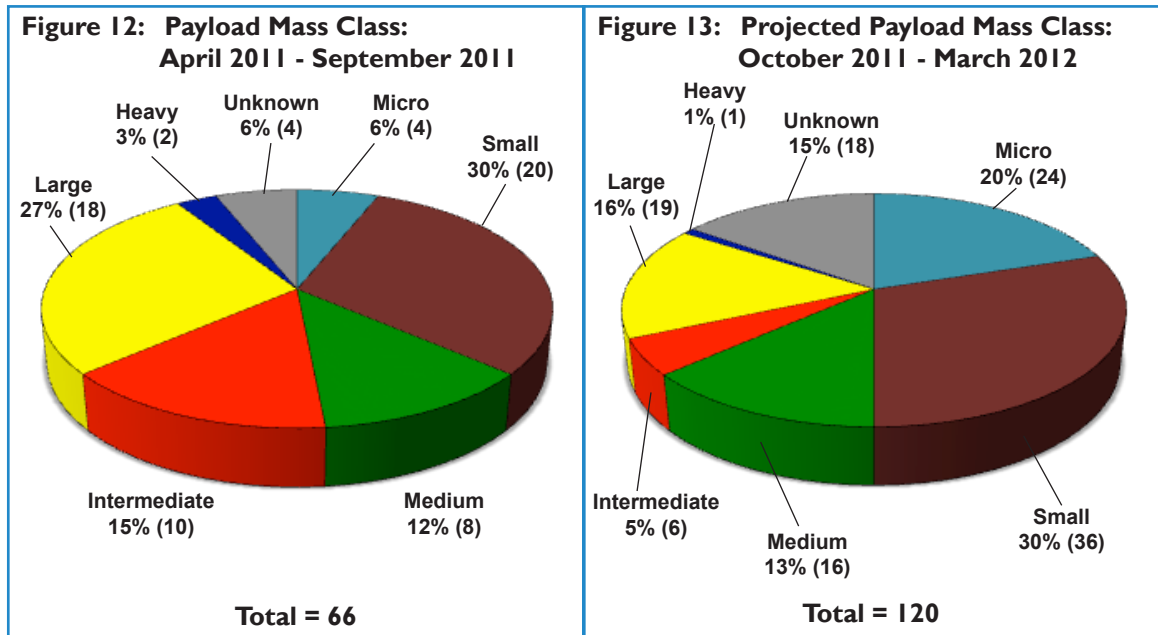


Figure 12 shows actual payloads by mass class (commercial and government) from April 2011 through September 2011. Figure 13 projects this information for the period of October 2011 through March 2012. The total number of payloads launched may not equal the total number of launches, due to multiple manifesting.

Commercial Launch Trends (Orbital Launches Only)

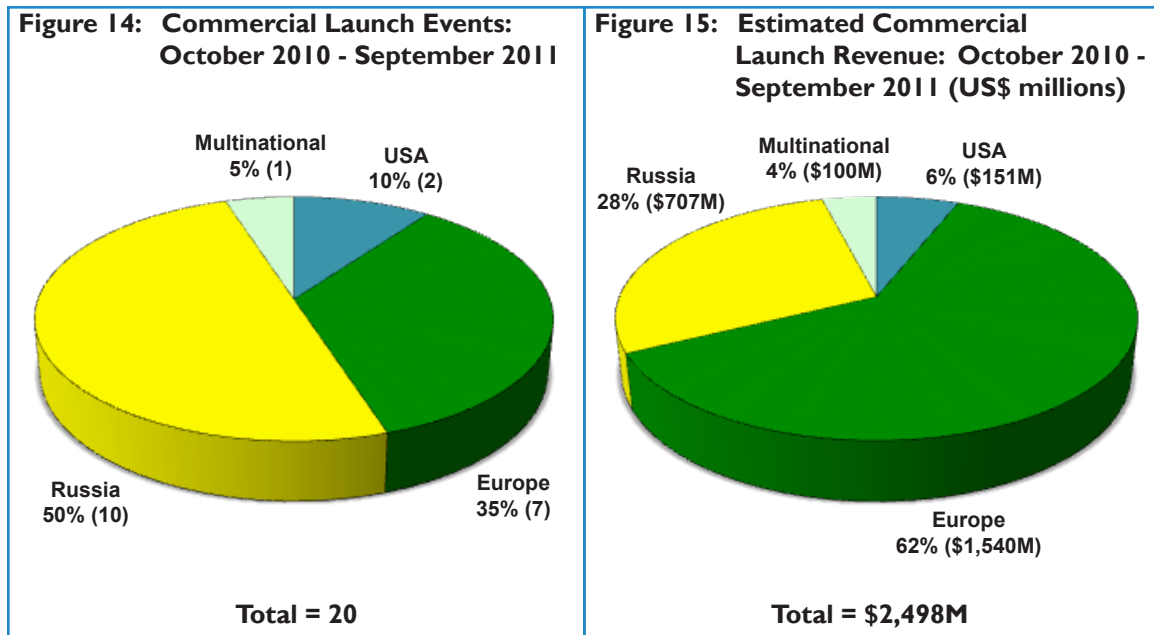


Figure 14 shows commercial orbital launch events from October 2010 through September 2011 by country. **Figure 15** shows estimated commercial launch revenue for orbital launches for the period of October 2010 through September 2011 by country. Compared to the previous 12 months (October 2009 – September 2010), this launch period had one fewer commercial launch. Over the past 12 months, compared to the previous 12 months, only Europe increased their number of commercial launches. The United States had two fewer commercial launches and Russia had one fewer. Multinational launches stayed the same.

Commercial Launch Trends (Suborbital Launches and Experimental Permits)

There were no FAA-licensed commercial suborbital launch events (or their international equivalents) in the last 12 months (October 2010 – September 2011). There were no FAA-licensed commercial suborbital launches from October 2009 through September 2010.

There were two FAA Experimental Permit flights in the last 12 months (October 2010 – September 2011). There were no FAA Experimental Permit flights from October 2009 through September 2010.

| Flight Date | Operator | Vehicle | Launch Site |
|-------------|-------------|---------|-------------|
| 06-May-11 | Blue Origin | PM-2 | West Texas |
| 24-Aug-11 | Blue Origin | PM-2 | West Texas |

FAA Experimental Permit flights (October 2010 - September 2011)

Commercial Launch History

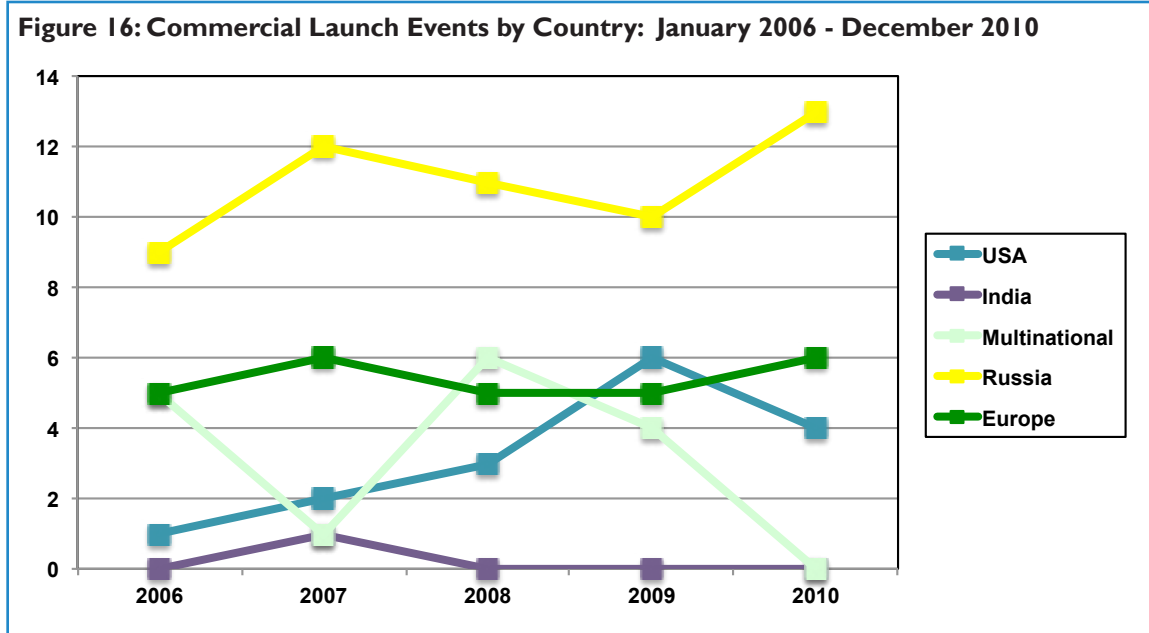


Figure 16 shows commercial launch events by country for the last five full calendar years.

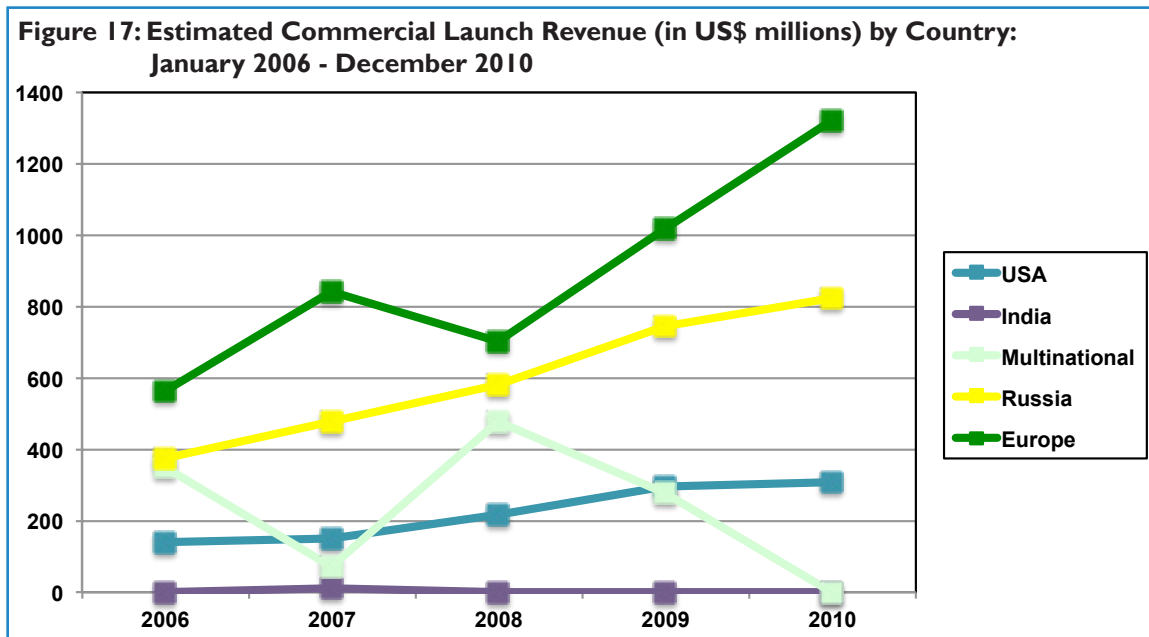


Figure 17 shows estimated commercial launch revenue by country for the last five full calendar years.

Appendix A: April 2011 - September 2011 Launch Events

| Date | Vehicle | Site | Payload(s) | Orbit | Operator | Manufacturer | Use | Vehicle Price | | L | M |
|-----------|-------------------|-------------------------|--------------------------|---------------------|---|--------------------------------------|----------------|---------------|--|---|---|
| | | | | | | | | | | | |
| 04-Apr-11 | Soyuz | Baikonur | Soyuz TMA-21 (ISS-26S) | LEO | Roscosmos | RSC Energia | ISS Crewed | | | S | S |
| 10-Apr-11 | Long March 3A | Xichang | Beidou 2-IGS 3 | GEO | People's Liberation Army | CAST | Navigation | | | S | S |
| 14-Apr-11 | Atlas V 411 | VAFB | NRO L-34 (NOSS 3-6A) | SSO | NRO | Lockheed Martin Corp. | Classified | | | S | S |
| | | | NRO L-34 (NOSS 3-6B) | SSO | NRO | Lockheed Martin Corp. | Classified | | | S | S |
| 20-Apr-11 | PSLV | Satish Dhawan | Resourcesat 2 | SSO | Space Imaging EOSAT/ANTIX | ISRO | Remote Sensing | | | S | S |
| | | | Youthsat | SSO | Bauman Moscow State Technical University | ISRO | Scientific | | | S | S |
| | | | X-Sat | SSO | Center for Research in Satellite Technologies | Nanyang Technical University | Remote Sensing | | | S | S |
| 22-Apr-11 | V | Ariane 5 ECA | Kourou | * Yahsat 1A | GEO | Yah Satellite Communications Company | Communications | \$220M | | S | S |
| | | | | * Intelsat New Dawn | GEO | Intelsat | Communications | | | S | S |
| 27-Apr-11 | Soyuz | Baikonur | Progress M-10M (ISS-42P) | LEO | Roscosmos | RSC Energia | ISS Cargo | | | S | S |
| 04-May-11 | Soyuz 2-1A | Baikonur | Meridian 4 | ELI | Russian Space Forces | Reshetnev Company | Communications | | | S | S |
| 07-May-11 | Atlas V 401 | CCAFS | SBIRS GEO 1 | GEO | U.S. Air Force | Lockheed Martin Corp. | Early Warning | | | S | S |
| 16-May-11 | Shuttle Endeavour | KSC | STS 134 | LEO | NASA | Rockwell International | ISS Crewed | | | S | S |
| 20-May-11 | V | Proton M | Baikonur | * Telstar 14R | GEO | Telesat | Communications | \$85M | | S | S |
| 20-May-11 | V | Ariane V ECA | Kourou | * Insat 4G/GSAT-8 | GEO | ISRO | Communications | \$220M | | S | S |
| | | | | * ST 2 | GEO | Singapore Telecom | Communications | | | S | S |
| 07-Jun-11 | Soyuz | Baikonur | Soyuz TMA-02M (ISS-27S) | LEO | Roscosmos | RSC Energia | ISS Crewed | | | S | S |
| 10-Jun-11 | Delta II 7320 | VAFB | SAC-D/Aquarius | SSO | CONAE | INVAP | Remote Sensing | | | S | S |
| 15-Jun-11 | Safir 2 | Semnan Province | Rasad 1 | LEO | Malek Ashtar University | Malek Ashtar University | Remote Sensing | | | S | S |
| 20-Jun-11 | Long March 3B | Xichang | * Chinasat 10 | GEO | China Direct Broadcast Satellite Co., Ltd. | Dongfanghong Satellite Co. | Communications | | | S | S |
| 21-Jun-11 | Soyuz | Baikonur | Progress M-11M (ISS-43P) | LEO | Roscosmos | RSC Energia | ISS Cargo | | | S | S |
| 27-Jun-11 | Soyuz | Plesetsk | Cosmos 2472 | LEO | Russian Space Forces | RSC Energia | Classified | | | S | S |
| 29-Jun-11 | Minotaur 1 | Wallops Flight Facility | ORS 1 | LEO | U.S. Air Force | Goodrich ISR Systems | Classified | | | S | S |
| 06-Jul-11 | Long March 2C | Jiuquan | Shijian 11-03 | SSO | CAST | Dongfanghong Satellite Co. | Scientific | | | S | S |
| 08-Jul-11 | Shuttle Atlantis | KSC | STS 135 | LEO | NASA | Rockwell International | ISS Crewed | | | S | S |
| 11-Jul-11 | Long March 3C | Xichang | Tianlian 1B | GEO | CAST | CAST | Communications | | | S | S |
| 13-Jul-11 | V | Soyuz 2-1A | Baikonur | * Globalstar II-7 | LEO | Globalstar, Inc. | Communications | \$50M | | S | S |
| | | | | * Globalstar II-8 | LEO | Globalstar, Inc. | Communications | | | S | S |
| | | | | * Globalstar II-9 | LEO | Globalstar, Inc. | Communications | | | S | S |
| | | | | * Globalstar II-10 | LEO | Globalstar, Inc. | Communications | | | S | S |
| | | | | * Globalstar II-11 | LEO | Globalstar, Inc. | Communications | | | S | S |
| | | | | * Globalstar II-12 | LEO | Globalstar, Inc. | Communications | | | S | S |
| 15-Jul-11 | V | Proton M | Baikonur | * SES-3 | GEO | SES World Skies | Communications | \$85M | | S | S |
| | | | | * KazSat 2 | GEO | JSC Kazsat | Communications | | | S | S |

V Denotes commercial launch, defined as a launch that is internationally competed or FAA-licensed, or privately financed launch activity. 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.

L and M refer to the outcome of the Launch and Mission: S=Success, P=Partial Success, F=Failure.

Notes: All prices are estimates.

All launch dates are as of September 30, 2011, and are based on local time at the launch site.

See Appendix C for definitions of payload orbits.

Appendix A (Continued)

| Date | Vehicle | Site | Payload(s) | Orbit | Operator | Manufacturer | Use | Vehicle Price | L | M | |
|-----------|-----------------------|----------------|-----------------------|-----------------------------|--------------------------|-------------------------------------|----------------------------------|----------------|--------|---|---|
| 15-Jul-11 | PSLV | Satish Dhawan | GSAT 12 | GEO | ISRO | ISRO | Communications | | S | S | |
| 16-Jul-11 | Delta IV Medium+(4.2) | CCAFS | Navstar GPS 2F-02 | MEO | U.S. Air Force | Boeing | Navigation | | S | S | |
| 18-Jul-11 | Zenit 3F | Baikonur | Spektr R | ELI | Roscosmos | NPO Lavotchkin | Scientific | | S | S | |
| 26-Jul-11 | Long March 3A | Xichang | Bei Dou 2-IGS4 | GEO | People's Liberation Army | CAST | Navigation | | S | S | |
| 29-Jul-11 | Long March 2C | Jiuquan | Shijian 11-02 | SSO | CAST | Dongfanghong Satellite Co. | Scientific | | S | S | |
| 05-Aug-11 | Atlas V 551 | CCAFS | Juno | EXT | NASA/JPL | Lockheed Martin Corp. | Scientific | | S | S | |
| 06-Aug-11 | V | Ariane V ECA | Kourou | * Astra 1N | GEO | SES Astra | EADS Astrium | Communications | \$220M | S | S |
| | | | | * BSAT-3c/JCSAT-110R | GEO | Sky Perfect JSAT | Lockheed Martin Corp. | Communications | | | |
| 11-Aug-11 | | Long March 3B | Xichang | * Paksat 1R | GEO | SUPARCO | China Great Wall Industry Corp. | Communications | S | S | |
| 15-Aug-11 | | Long March 4B | Taiyuan | Hai Yang 2A (HY-2A) | SSO | China State Oceanic Administration | CAST | Scientific | S | S | |
| 17-Aug-11 | V | Proton M | Baikonur | * Express AM4 | GEO | Russian Satellite Communication Co. | Khrunichev/Astrium Satellites | Communications | \$85M | F | F |
| 17-Aug-11 | V | Dnepr 1A | Dombarovskiy | Nigeriasat 2 | SSO | NASRDA | Surrey Satellite Technology Ltd. | Remote Sensing | \$12M | S | S |
| | | | | NX | SSO | NASRDA | Surrey Satellite Technology Ltd. | Remote Sensing | | | |
| | | | | Sich 2 | SSO | National Space Agency of Ukraine | NPO Yuzhnoye | Remote Sensing | | | |
| | | | | Edusat | SSO | Italian Space Agency | University of Rome | Scientific | | | |
| | | | | RASAT | SSO | TUBITAK-UZAY | TUBITAK-UZAY | Remote Sensing | | | |
| | | | | Aprizesat 5 | SSO | ExactEarth Ltd. | SpaceQuest Ltd. | Communications | | | |
| | | | | Aprizesat 6 | SSO | ExactEarth Ltd. | SpaceQuest Ltd. | Communications | | | |
| BPA 2 | SSO | Hartron-Arkos | Hartron-Arkos | Development | | | | | | | |
| 18-Aug-11 | | Long March 2C | Jiuquan | Shijian 11-04 | SSO | CAST | Dongfanghong Satellite Co. | Scientific | F | F | |
| 24-Aug-11 | | Soyuz | Baikonur | Progress M-12M (ISS-44P) | LEO | Roscosmos | RSC Energia | ISS Cargo | F | F | |
| 10-Sep-11 | | Delta II 7920H | CCAFS | GRAIL A | EXT | NASA/JPL | Lockheed Martin Corp. | Scientific | S | S | |
| | | | | GRAIL B | EXT | NASA/JPL | Lockheed Martin Corp. | Scientific | | | |
| 18-Sep-11 | | Long March 3B | Xichang | Chinasat 1A | GEO | People's Liberation Army | CAST | Communications | S | S | |
| 20-Sep-11 | | Proton M | Baikonur | Cosmos 2473 (Cosmos Garpun) | GEO | Russian Space Forces | Reshetnev Company | Communications | S | S | |
| 21-Sep-11 | V | Ariane 5 ECA | Kourou | * Arabsat 5C | GEO | Arabsat | EADS Astrium | Communications | \$220M | S | S |
| | | | | * SES-2 (AMC 1R) | GEO | SES World Skies | Orbital Sciences Corp. | Communications | | | |
| 23-Sep-11 | | H IIA | Tanegashima | IGS-4C (Optical) | SSO | Japan Defence Agency | Mitsubishi Electric Corp. | Classified | S | S | |
| 24-Sep-11 | V + | Zenit 3SL | Sea Launch Platform | * Atlantic Bird 7 | GEO | Eutelsat | EADS Astrium | Communications | \$100M | S | S |
| 27-Sep-11 | | Minotaur IV | Kodiak Launch Complex | TacSat 4 | HEO | U.S. Air Force | NRL/APL | Development | S | S | |
| 29-Sep-11 | V | Proton M | Baikonur | * QuetzSat-1 | GEO | QuetzSat | Space Systems/Loral | Communications | \$85M | S | S |
| 29-Sep-11 | | Long March 2F | Jiuquan | Tiangong 1 (TG-1) | LEO | China Aerospace Corp. | CAST | Development | S | S | |

V Denotes commercial launch, defined as a launch that is internationally competed or FAA-licensed, or privately financed launch activity. 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.

L and M refer to the outcome of the Launch and Mission: S=Success, P=Partial Success, F=Failure.

Notes: All prices are estimates.

All launch dates are as of September 30, 2011, and are based on local time at the launch site.

See Appendix C for definitions of payload orbits.

Appendix B: October 2011 - March 2012 Projected Launch Events

| Date | Vehicle | Site | Payload(s) | Orbit | Operator | Manufacturer | Use | Vehicle Price |
|-----------|-----------------|-----------------|--|--------------------------|--|--|--|---------------|
| 02-Oct-11 | Soyuz 2-1B | Plesetsk | Glonass M42 | MEO | Russian Space Forces | Reshetnev Company | Navigation | |
| 06-Oct-11 | V Zenit 3SLB | Baikonur | * Intelsat 18 | GEO | Intelsat | Orbital Sciences Corp. | Communications | \$60M |
| 07-Oct-11 | V Long March 3B | Xichang | * Eutelsat W3C | GEO | Eutelsat | Thales Alenia Space | Communications | \$70M |
| 12-Oct-11 | PSLV | Satish Dhawan | Megha Tropiques SRMSAT Jugnu Vesselsat 1 | LEO SSO LEO TBA | CNES SRM University IIT Kapur Orbcomm | ISRO SRM University ITT Kapur TBA | Remote Sensing Scientific Remote Sensing Communications | |
| 16-Oct-11 | V Proton M | Baikonur | * SES-4 | GEO | SES World Skies | Space Systems/Loral | Communications | \$85M |
| 19-Oct-11 | V Proton M | Baikonur | * ViaSat 1 | GEO | ViaSat | Space Systems/Loral | Communications | \$85M |
| 20-Oct-11 | Soyuz 2 1B | Kourou | Galileo 1 Galileo 2 | MEO MEO | European Space Agency European Space Agency | EADS Astrium EADS Astrium | Navigation Navigation | |
| 27-Oct-11 | Delta II 7920 | VAFB | NPP Lightsail 1 | SSO EXT | NOAA The Planetary Society | Ball Aerospace The Planetary Society | Meteorological Development | |
| 30-Oct-11 | Soyuz | Baikonur | Progress ISS 45P | LEO | Roscosmos | RSC Energia | ISS Cargo | |
| Oct-11 | Long March 2D | Jiuquan | Chuang Xing 1-03 Shiyan Wexing 4 | SSO SSO | Shanghai Academy of Space Technology Dongfanghong Satellite Company | China Academy of Science Harbin Institute of Technology | Communications Scientific | |
| Oct-11 | Long March 3A | Xichang | Bei Dou 2-IGSS (Compass G5) | GEO | People's Liberation Army | CAST | Navigation | |
| Oct-11 | Long March 4B | Xichang | Yaogan 12 | SSO | People's Liberation Army | Shanghai Academy of Space Technology | Remote Sensing | |
| Oct-11 | Safir 2 | Semnan Province | Fajr | LEO | Iranian Ministry of Defense | Iranian Ministry of Defense | Classified | |
| 01-Nov-11 | Long March 2F | Jiuquan | Shenzhou 8 (SZ-8) | LEO | China Aerospace Corp. | CAST | Development | |
| 02-Nov-11 | Proton M | Baikonur | Glonass M43 Glonass M44 Glonass M45 | MEO MEO MEO | Russian Space Forces Russian Space Forces Russian Space Forces | Reshetnev Company Reshetnev Company Reshetnev Company | Navigation Navigation Navigation | |
| 08-Nov-11 | Zenit 3SLB | Baikonur | Phobos-Grunt Yinghuo | EXT EXT | Roscosmos Shanghai Institute of Satellite Engineering | NPO Lavotchkin Shanghai Institute of Satellite Engineering | Scientific Scientific | |
| 14-Nov-11 | Soyuz | Baikonur | Soyuz ISS 28S | LEO | Roscosmos | RSC Energia | ISS Crewed | |
| 25-Nov-11 | Atlas V 541 | CCAFS | MSL | EXT | NASA | NASA/JPL | Scientific | |
| 30-Nov-11 | V + Falcon 9 | CCAFS | * Dragon COTS Demo 2/3 * ORBCOMM 2F1 * ORBCOMM 2F2 | LEO LEO LEO | SpaceX ORBCOMM ORBCOMM | SpaceX Sierra Nevada Corp. Sierra Nevada Corp. | Development Communications Communications | \$56M |
| Nov-11 | Kosmos 3M | Plesetsk | Bissat Thai Phutt Vietnamsat | SSO SSO SSO | Italian Space Agency Mahanakom University of Technology Government of Vietnam | Italian Space Agency Mahanakom University of Technology Surrey Satellite Technology Ltd. | Scientific Remote Sensing Remote Sensing | |
| Nov-11 | PSLV | Satish Dhawan | Risat 1 Venta 1 | SSO LEO | ISRO Government of Latvia | ISRO University of Bremen | Remote Sensing Remote Sensing | |

V Denotes commercial launch, defined as a launch that is internationally competed or FAA-licensed, or privately financed launch activity. 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.

L and M refer to the outcome of the Launch and Mission: S=Success, P=Partial Success, F=Failure.

Notes: All prices are estimates.

All launch dates are as of September 30, 2011, and are based on local time at the launch site.

See Appendix C for definitions of payload orbits.

Appendix B (Continued)

| Date | Vehicle | Site | Payload(s) | Orbit | Operator | Manufacturer | Use | Vehicle Price |
|-----------|---------------|--------------|--|--|--|--|--|---------------|
| 10-Dec-11 | V Soyuz 2-1A | Baikonur | * Globalstar II-13 * Globalstar II-14 * Globalstar II-15 * Globalstar II-16 * Globalstar II-17 * Globalstar II-18 | LEO LEO LEO LEO LEO LEO | Globalstar, Inc. Globalstar, Inc. Globalstar, Inc. Globalstar, Inc. Globalstar, Inc. Globalstar, Inc. | Thales Alenia Space Thales Alenia Space Thales Alenia Space Thales Alenia Space Thales Alenia Space Thales Alenia Space | Communications Communications Communications Communications Communications Communications | \$50M |
| 26-Dec-11 | Soyuz | Baikonur | Soyuz ISS 295 | LEO | Roscosmos | RSC Energia | ISS Crewed | |
| Dec-11 | V Proton M | Baikonur | Luch 5A * Amos 5 | GEO GEO | Roscosmos SpaceCom Ltd. | Reshetnev Company Reshetnev Company | Communications Communications | \$85M |
| Dec-11 | Rocket | Plesetsk | Cosmos (Military Gonet 1) Gonets M-03 Gonets M-04 MIR (Yubileyniy 2) | LEO LEO LEO LEO | Russian Space Forces SMOLSAT SMOLSAT Reshetnev Company | Reshetnev Company Reshetnev Company Reshetnev Company Reshetnev Company | Communications Communications Communications Development | |
| Dec-11 | V + Taurus II | Wallops FF | * Taurus II Demo Flight | LEO | Orbital Sciences Corp. | Orbital Sciences Corp. | Test | TBA |
| Dec-11 | Long March 2C | Taiyuan | Huan Jing 1C (HJ-1C) | SSO | China National Space Administration | CAST | Remote Sensing | |
| Dec-11 | Long March 2C | Xichang | Hai Yang 1C | SSO | China State Oceanic Administration | CAST | Scientific | |
| Dec-11 | Long March 2C | Jiuquan | Gokturk 2 | SSO | Turkish Ministry of Defense | Tubitak-Uzay | Classified | |
| Dec-11 | Long March 4B | Xichang | Ziyuan 3 (Ziyuan 1-2C) | SSO | China State Bureau of Surveying & Mapping | CAST | Remote Sensing | |
| Dec-11 | V + Falcon 9 | CCAFS | * Cassiope | GEO | Canadian Space Agency | MDA Corp. | Scientific | \$56M |
| 4Q-11 | Dnepr 1A | Dombarovskiy | Kompsat 5 Mikhail Lomonosov STSAT 3 | LEO LEO LEO | KARI Moscow University KARI | KARI Moscow University KARI | Remote Sensing Scientific Scientific | |
| 4Q-11 | V Proton M | Baikonur | * SkyTerra-2 | GEO | SkyTerra Communications | Boeing | Communications | \$85M |
| 4Q-11 | V Proton M | Baikonur | * Intelsat 23 | GEO | Intelsat | Orbital Sciences Corp. | Communications | \$85M |
| 4Q-11 | V Proton M | Baikonur | * Astra 4B (SES-5) | GEO | SES-Sirius | Space Systems/Loral | Communications | \$85M |
| 4Q-11 | V Proton M | Baikonur | * Yahsat 1B | GEO | Yah Satellite Communications Company | EADS Astrium | Communications | \$85M |
| 4Q-11 | V Proton M | Baikonur | * Sirius FM-6 | ELI | Sirius Satellite Radio Inc. | Space Systems/Loral | Communications | \$85M |
| 4Q-11 | V Proton M | Baikonur | * Asiasat 7 | GEO | Asiasat | Space Systems/Loral | Communications | \$85M |
| 4Q-11 | Long March 2C | Xichang | Hai Yang 1D | SSO | China State Oceanic Administration | Shanghai Institute of Satellite Engineering | Scientific | |
| 4Q-11 | Long March 2D | Jiuquan | Shijian 9 (SJ-9) | LEO | China Aerospace Corp. | CAST | Remote Sensing | |
| 4Q-11 | Long March 2D | Jiuquan | Yaogan 13 | SSO | People's Liberation Army | Shanghai Academy of Space Technology | Classified | |

V Denotes commercial launch, defined as a launch that is internationally competed or FAA-licensed, or privately financed launch activity. 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.

L and M refer to the outcome of the Launch and Mission: S=Success, P=Partial Success, F=Failure.

Notes: All prices are estimates.
All launch dates are as of September 30, 2011, and are based on local time at the launch site.
See Appendix C for definitions of payload orbits.

Appendix B (Continued)

| Date | Vehicle | Site | Payload(s) | Orbit | Operator | Manufacturer | Use | Vehicle Price |
|-----------|-----------------------------|------------------|--|--|---|---|---|---------------|
| 2011 | Dnepr IA | Baikonur | Katsat 1 Almasat 1 Kiwisat UCISat 1 Jaesat Master Jaesat Slave Palamede Saudisat 4 | SSO SSO SSO SSO SSO SSO SSO SSO | Stanford University University of Bologna AMSAT-ZL University of California ASRI ASRI University of Milan Riyadh Space Research Institute | Stanford University University of Bologna AMSAT-ZL University of California ASRI ASRI Carlo Gavazzi Space Riyadh Space Research Institute | Scientific Test Development Test Development Development Development Remote Sensing | |
| 2011 | Long March 3B | Xichang | Compass M3 | MEO | People's Liberation Army | CAST | Navigation | |
| 19-Jan-11 | Delta IV Medium + (5, 4) | CCAFS | WGS 4 | GEO | U.S. Air Force | Boeing | Communications | |
| 26-Jan-11 | Soyuz | Baikonur | Progress ISS 46P | LEO | Roscosmos | RSC Energia | ISS Cargo | |
| Jan-12 | Vega | Kourou | LARES PW-Sat 1 Atmocube Swisscube 2 XaTcobeo UNICubeSat Robusta OUFTI 1 Goliat e-St@r | LEO LEO LEO LEO LEO LEO LEO LEO LEO LEO | European Space Agency Warsaw Polytech University of Trieste Space Center EPFL University of Vigo University of Rome University of Montpellier II University of Liege University of Bucharest Polytechnic University of Turin | TBA Warsaw Polytech University of Trieste Space Center EPFL University of Vigo University of Rome University of Montpellier II University of Liege University of Bucharest Polytechnic University of Turin | Test Development Scientific Scientific Test Scientific Test Communications Remote Sensing Scientific | |
| 03-Feb-12 | Pegasus XL | Kwajalein Island | NuSTAR | LEO | NASA/JPL | Orbital Sciences Corp. | Scientific | |
| 23-Feb-12 | V + Taurus II | Wallops FF | * Cygnus COTS Demo | LEO | Orbital Sciences Corp. | Orbital Sciences Corp. | Development | TBA |
| Feb-12 | Proton M | Plesetsk | Luch 5B Yamal 300K | GEO GEO | Roscosmos Gazprom Space Systems | Reshetnev Company Reshetnev Company | Communications Communications | |
| Feb-12 | Soyuz 2 IA | Kourou | Pleiades HR 1 ELISA 1 ELISA 2 ELISA 3 ELISA 4 SSOT | SSO SSO SSO SSO SSO SSO | CNES French MoD French MoD French MoD French MoD Government of Chile | EADS Astrium EADS Astrium EADS Astrium EADS Astrium EADS Astrium EADS Astrium | Remote Sensing Classified Classified Classified Classified Classified | |
| Feb-12 | H IIA | Tanegashima | GCOM W1 Arirang 3 SDS 4 Horyu 2 | SSO SSO SSO LEO | JAXA KARI JAXA Kyushu Institute of Technology | TBA KARI/EADS Astrium JAXA Kyushu Institute of Technology | Scientific Remote Sensing Development Scientific | |
| Feb-12 | V Proton M | Baikonur | * EuropaSat | GEO | Inmarsat | Thales Alenia Space | Communications | \$85M |
| 05-Mar-12 | Ariane 5 ES-ATV | Kourou | ATV 3 | LEO | European Space Agency | EADS Astrium | ISS Cargo | |
| 28-Mar-12 | Delta IV | Vandenberg AFB | DMSP 5D-3-F20 | SSO | NOAA | Lockheed Martin Corp. | Meteorological | |
| 29-Mar-12 | Delta IV Medium-Plus (5, 2) | Vandenberg AFB | NRO L-25 | SSO | NRO | Classified | Classified | |
| 30-Mar-12 | Soyuz | Baikonur | Soyuz ISS 30S | LEO | Roscosmos | Reshetnev Company | ISS Crewed | |
| Mar-12 | Minotaur V | MARS | LADEE | EXT | NASA | NASA | Scientific | |

V Denotes commercial launch, defined as a launch that is internationally competed or FAA-licensed, or privately financed launch activity. 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.

L and M refer to the outcome of the Launch and Mission: S=Success, P=Partial Success, F=Failure.

Notes: All prices are estimates.

All launch dates are as of September 30, 2011, and are based on local time at the launch site.

See Appendix C for definitions of payload orbits.

Appendix B (Continued)

| Date | Vehicle | Site | Payload(s) | Orbit | Operator | Manufacturer | Use | Vehicle Price |
|-------|-----------------|----------|-----------------------------|------------|---|---|----------------------------------|---------------|
| 1Q-12 | V Proton M | Baikonur | * Intelsat 22 | GEO | Intelsat | Boeing Satellite Systems | Communications | \$85M |
| 1Q-12 | V Proton M | Baikonur | * Telkom 3 * Express MD2 | GEO GEO | Telkom Indonesia Russian Satellite Communications Co. | Reshetnev Company Khronichev State Research & Production Space Center | Communications Communications | \$85M |
| 1Q-12 | Ariane 5 ECA | Kourou | GSAT 10 | GEO | ISRO | ISRO | Communications | |
| 1Q-12 | Long March 3B | Xichang | Nigcomsat 1R | GEO | Nigerian Communication Satellite Ltd. | CAST | Communications | |
| 1Q-12 | Long March 3A | Xichang | Feng Yun 2F | GEO | China State Meteorological Administration | Shanghai Institute of Satellite Engineering | Meteorological | |
| 1Q-12 | V Long March 3B | Xichang | * APSTAR 7 | GEO | APT Satellite Holdings | Thales Alenia Space | Communications | \$70M |
| 1Q-12 | V Ariane 5 ECA | Kourou | * Jupiter | GEO | Hughes Network Systems | Space Systems/Loral | Communications | \$220M |
| 1Q-12 | Soyuz | Baikonur | Kanopus B1 | SSO | VNIEM | VNIEM | Remote Sensing | |
| | | | Zond PP | SSO | Roscosmos | NPO Lavotchkin | Scientific | |
| | | | TET-1 | SSO | DLR | Kayser-Threde GmbH | Test | |
| | | | Belka 2 | SSO | National Academy of Sciences of Belarus | RSC Energia | Remote Sensing | |
| | | | ADS-1B | SSO | COM DEV International | Surrey Satellite Technology Ltd. | Scientific | |

V Denotes commercial launch, defined as a launch that is internationally competed or FAA-licensed, or privately financed launch activity. 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.

L and M refer to the outcome of the Launch and Mission: S=Success, P=Partial Success, F=Failure.

Notes: All prices are estimates.

All launch dates are as of September 30, 2011, and are based on local time at the launch site.

See Appendix C for definitions of payload orbits.

Appendix C: Definitions

COMMERCIAL SUBORBITAL OR ORBITAL LAUNCH

A commercial suborbital or orbital launch has one or more of the following characteristics:

- The launch is licensed by FAA/AST.
- The primary payload's launch contract was internationally competed (see definition of internationally competed below). A primary payload is generally defined as the payload with the greatest mass on a launch vehicle for a given launch.
- The launch is privately financed without government support.

LAUNCH FAILURE

The payload did not reach a usable orbit (an orbit where some portion of the mission could be salvaged) or was destroyed as the result of a launch vehicle malfunction.

INTERNATIONALLY COMPETED

An internationally competed launch contract is one in which the launch opportunity was available in principle to any capable launch service provider. An internationally competed launch is considered commercial.

COMMERCIAL PAYLOAD

A commercial payload is described as having one or both of the following characteristics:

- The payload is operated by a private company.
- The payload is funded by the government, but provides satellite service partially or totally through a private or semi-private company. This distinction is usually applied to certain telecommunication satellites whose transponders are partially or totally leased to a variety of organizations, some or all of which generate revenues. Examples are Russia's Express and Ekran series of spacecraft. All other payloads are classified as noncommercial (government civil, government military, or non-profit).

ORBITS

- **Geosynchronous Earth orbit (GSO):** A spacecraft in GSO is synchronized with the Earth's rotation, orbiting once every 24 hours, and appears to an observer on the ground to be stationary in the sky.
- **Geostationary Earth orbit (GEO):** GEO is a broad category used for any circular orbit at an altitude of 35,852 kilometers (22,277 miles) with a low inclination (over the equator).
- **Non-geosynchronous orbit (NGSO):** NGSO satellites are those in orbits other than GEO, including:
 - **Low Earth orbit (LEO):** lowest achievable orbit, about 2,400 kilometers.
 - **Medium Earth orbit (MEO):** 2,400 kilometers to GEO.

- **Elliptical (ELI):** a highly elliptical orbit.
- **External (EXT):** used for trajectories beyond GEO (such as interplanetary trajectories).
- **Sun-synchronous orbit (SSO):** an orbit that passes over the same part of the Earth at roughly the same time each day.

PAYLOAD USE

- **Classified:** Any system whose purpose is officially deemed classified or cannot be officially verified.
- **Communications:** Any systems designed to receive and transmit data for purposes of facilitating communications. These include fixed satellite services, mobile satellite services, military communications, store-and-forward systems, asset tracking, and similar.
- **Crewed:** Any system designed primarily to transport humans into, through, or back from space.
- **Development:** Any system whose purpose is to advance hardware design as part of a research and development program.
- **ISS:** Any system designed primarily to transport cargo into, through, or back from the International Space Station (ISS).
- **Meteorological:** Any system designed to monitor the Earth's weather for forecasting and issuing weather watches and warnings.
- **Navigation:** Any system designed to provide signals for accurate timing, positioning, and navigation.
- **Remote Sensing:** Any civil and commercial system designed to gather data by means of optical (panchromatic, multispectral, or hyperspectral) or radar sensors.
- **Scientific:** Any system designed to gather data about astrophysics, astronomy, biology, cosmology, celestial bodies, physics, and the space environment. This designation also includes systems designed to monitor the Earth, except those systems designed specifically for meteorology.
- **Test:** Any system designed to provide telemetry and data on launch vehicle performance.
- **Unknown:** Any system whose mission is unknown.
- **Other:** Any system whose purpose does not fit in any of the provided categories.

PAYLOAD MASS CLASS

Payloads are divided into the following mass classes based on mass on the ground (not in orbit):

- **Micro:** Up to 91 kg (200 lbs)
- **Small:** 92 to 907 kg (201 to 2,000 lbs)
- **Medium:** 908 to 2,268 kg (2,001 to 5,000 lbs)
- **Intermediate:** 2,269 to 4,536 kg (5,001 to 10,000 lbs)
- **Large:** 4,537 to 9,072 kg (10,001 to 20,000 lbs)
- **Heavy:** Greater than 9,072 kg (20,000 lbs)