**Atlas V**

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*This article is about the rocket. For the boat, see Atlas V (boat).*

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| **Atlas V** |
| Launch of an Atlas V 401 carrying the LRO and LCROSSLaunch of an Atlas V 401 carrying the LRO and LCROSS |
|  |
| **Function** | EELV/Medium-heavy launch vehicle |
| **Manufacturer** | United Launch Alliance |
| **Country of origin** | United States |
| **Size** |
| **Height** | 58.3 m (191.2 ft) |
| **Diameter** | 3.81 m (12.49 ft) |
| **Mass** | 334,500 kg (737,400 lb) |
| **Stages** | 2 |
| **Capacity** |
| **Payload to LEO** | 9,370–29,400 kg (20,650–64,820 lb) |
| **Payload toGTO** | 4,750–13,000 kg (10,470–28,660 lb) |
| **Launch history** |
| **Status** | Active |
| **Launch sites** | SLC-41, Cape CanaveralSLC-3E, Vandenberg AFB |
| **Total launches** | 33(**401:** 14, **411:** 3, **421:** 3, **431:** 2)(**501:** 3, **521:** 2, **531:** 2, **541:** 1, **551:** 3) |
| **Successes** | 32(**401:** 13, **411:** 3, **421:** 3, **431:** 2)(**501:** 3, **521:** 2, **531:** 2, **541:** 1, **551:** 3) |
| **Partial failures** | 1 (**401**)  |
| **First flight** | **401:** 21 August 2002**411:** 20 April 2006**421:** 10 October 2007**431:** 11 March 2005**501:** 22 April 2010**521:** 17 July 2003**531:** 14 August 2010**541:** 26 November 2011**551:** 19 January 2006 |
| **Notable payloads** | Mars Reconnaissance OrbiterNew HorizonsLunar Reconnaissance OrbiterSolar Dynamics ObservatoryBoeing X-37BJunoMars Science Laboratory |
| **Boosters (Not Heavy) - Aerojet** |
| **No. boosters** | 1 to 5 (see text) |
| **Engines** | 1 Solid |
| **Thrust** | 1,270 kN (285,500 lbf) |
| **Specific impulse** | 275 seconds |
| **Burn time** | 94 seconds |
| **Fuel** | Solid |
| **Boosters (Atlas V Heavy (5HX) (Proposed)) - Atlas CCB** |
| **No. boosters** | 2 |
| **Engines** | 1 RD-180 (2 nozzles) |
| **Thrust** | 4,152 kN (933,406 lbf) |
| **Specific impulse** | 311 seconds |
| **Burn time** | 253 seconds |
| **Fuel** | RP-1/LOX |
| **First stage - Atlas CCB** |
| **Engines** | 1 RD-180 (2 nozzles) |
| **Thrust** | 4,152 kN (933,400 lbf) |
| **Specific impulse** | 311 seconds |
| **Burn time** | 253 seconds |
| **Fuel** | RP-1/LOX |
| **Second stage (Atlas V XX1) - Centaur** |
| **Engines** | 1 RL10A |
| **Thrust** | 99.2 kN (22,300 lbf) |
| **Specific impulse** | 451 seconds |
| **Burn time** | 842 seconds |
| **Fuel** | LH2/LOX |
| **Second stage (Atlas V XX2) - Centaur** |
| **Engines** | 2 RL10A |
| **Thrust** | 185 kN (41,600 lbf) |
| **Specific impulse** | 449 seconds |
| **Burn time** | 421 seconds |
| **Fuel** | LH2/LOX |

**Atlas V** is an active expendable launch system in the Atlas rocket family. Atlas V was formerly operated by Lockheed Martin, and is now operated by the Lockheed Martin-Boeing joint venture United Launch Alliance. Each Atlas V rocket uses a Russian-built RD-180 engine burning kerosene and liquid oxygen to power its first stage and an American-built RL10 engine burning liquid hydrogen and liquid oxygen to power its Centaur upper stage. The RD-180 engines are provided by RD AMROSS and the RL10 engines by Pratt & Whitney Rocketdyne. Some configurations also use strap-on booster rockets made by Aerojet. The standard payload fairing sizes are 4 or 5 meters in diameter and of various lengths, are made by RUAG Space. Fairings sizes as large as 7.2m in diameter and up to 32.3m in length have been considered. The rocket is assembled in Decatur, Alabama; Harlingen, Texas; San Diego, California; and at United Launch Alliance's headquarters near Denver, Colorado.

In its more than two dozen launches, starting with its maiden launch in August 2002, Atlas V has had a near-perfect success rate. One flight on June 15, 2007, NRO L-30, experienced an upper-stage anomaly when the engine in the vehicle's Centaur upper stage shut down early, leaving the payload—a pair of ocean surveillance satellites—in a lower than intended orbit. However, the customer, the National Reconnaissance Office, categorized the mission as a success.

**History**

The Atlas V is the newest member of the Atlas family. Compared to the Atlas III vehicle, there are numerous changes. Compared to the Atlas II, it is a near-redesign. There was no Atlas IV.

1. The *"1.5 staging"* technique was dropped on the Atlas III, in favor of a more-advanced RD-180 engine.
2. The main-stage diameter increased from 10 feet to 12.5 feet. As with the Atlas III, the different mixture ratio of the engine called for a larger oxygen tank (relative to the fuel tank) compared to western engines and stages.
3. First-stage tanks no longer use stainless steel monocoque "balloon" construction. The tanks are isogrid aluminum and are stable when unpressurized.
4. Use of aluminum, with a higher thermal conductivity than stainless steel, requires insulation for the liquid oxygen. The tanks are covered in a polyurethane-based layer.
5. Accommodation points for parallel stages, both smaller solids and identical liquids, are built into first-stage structures.

The Atlas V was developed by Lockheed Martin Commercial Launch Services as part of the US Air Force Evolved Expendable Launch Vehicle (EELV) program. The term *expendable launch vehicle* means each vehicle is only used once. Launches are from Space Launch Complex 41 at Cape Canaveral Air Force Station and Space Launch Complex 3-E at Vandenberg Air Force Base. Lockheed Martin Commercial Launch Services continues to market the Atlas V to commercial customers worldwide.

The first Atlas V was launched on August 21, 2002, and all subsequent launches have been successful except for the 2007 anomaly. The Atlas V family uses a single-stage Atlas main engine, the Russian RD-180 and the newly developed Common Core Booster (CCB) with up to five Aerojet made strap-on solid rocket boosters. The CCB is 12.5 ft (3.8 m) in diameter by 106.6 ft (32.5 m) long and uses 627,105 lb (284,450 kg) of liquid oxygen and RP-1 rocket fuel propellants. The booster operates for about four minutes, providing about 4 meganewtons (860,000 lbf) of thrust at start, the major part of this thrust, 4.152 meganewtons being provided by Russian RD-180 engine.

The Centaur upper stage uses a pressure stabilized propellant tank design and cryogenic propellants. The Centaur stage for Atlas V is stretched 5.5 ft (1.68 m) and is powered by either one or two Pratt & Whitney RL10A-4-2 engines, each engine developing a thrust of 99.2 kN (22,300 lbf). Operational and reliability upgrades are enabled with the RL10A-4-2 engine configuration. The inertial navigation unit (INU) located on the Centaur provides guidance and navigation for both Atlas and Centaur, and controls both Atlas and Centaur tank pressures and propellant use. The Centaur engines are capable of multiple in-space starts, making possible insertion into low-earth parking orbit, followed by a coast period and then insertion into GTO. A subsequent third burn following a multi-hour coast can permit direct injection of payloads into geostationary orbit. As of 2006[update], the Centaur vehicle had the highest proportion of burnable propellant relative to total mass of any modern hydrogen upper stage and hence can deliver substantial payloads to a high energy state.

Many systems on the Atlas V have been the subject of upgrade and enhancement both prior to the first Atlas V flight and since that time. Work on a new Fault Tolerant Inertial Navigation Unit (FTINU) started in 2001 to enhance mission reliability for Atlas vehicles by replacing the existing non-redundant navigation and computing equipment with a fault tolerant unit. The upgraded FTINU first flew in 2005, and in 2010 a follow-on order for more FTINU units was awarded.

On April 14, 2008, Atlas V lifted its heaviest payload to date into orbit—a 14,625-pound (6,634 kg) telecommunications satellite built by Space Systems/Loral.

**2007 valve anomaly**

The only anomalous event in the use of the Atlas V launch system occurred June 15, 2007, when the engine in the Centaur upper stage of an Atlas V shut down early, leaving its payload–a pair of NRO L-30 ocean surveillance satellites–in a lower-than-intended orbit. The cause of the anomaly was traced to a leaky valve, which allowed fuel to leak during the coast between the first and second burns. The resulting lack of fuel caused the second burn to terminate 4 seconds early. Replacing the valve led to a delay in the next Atlas V launch.

**GX rocket**

The Atlas V Common Core Booster was to have been used as the first stage of the joint US-Japanese GX rocket, which was scheduled to make its maiden flight in 2012. GX launches would have been from the Atlas V launch complex at Vandenberg AFB, SLC-3E.

In December 2009, Japanese government decided to cancel the GX project.

**Future developments**



An artist's rendering of the Atlas V with a Dream Chaser vehicle

As early as 2006, ULA's predecessor company Lockheed Martin was looking at a human-rated version of the Atlas V. An agreement between Lockheed and Bigelow Aerospace that year was reported that could lead to commercial private trips to low-Earth orbit (LEO).

Beginning in 2010, ULA did design and simulation work to human-rate the Atlas V for carrying passengers. ULA won a 2010 small contract of US$6.7 million in the first phase of the NASA Commercial Crew Development Program (CCDev) to develop an Emergency Detection System (EDS) for human-rating the Atlas V launch vehicle.[21] As of February 2011[update], ULA "is still finishing up work on its $6.7-million award... In December ULA carried out a demonstration of its Emergency Detection System ... The company said it received an extension from NASA until April 2011 'to enable us to finish critical timing analyses tasks' for [the] fault coverage analysis work."

NASA solicited proposals for CCDev phase 2 in October 2010, under which ULA made a proposal for funding to "finish designing a key safety system for potential commercial crew launches on its Atlas and Delta rocket fleet." While NASA's goal is to get astronauts to orbit by 2015, ULA President and CEO Michael Gass has stated "I think we need to stretch our goals to have commercial crew service operating by 2014" and has committed ULA to meet that schedule. Other than the addition of the Emergency Detection System, no major changes are expected to the Atlas V rocket, but ground infrastructure modifications are planned. The most likely candidate for the human-rating is the 402 configuration, with dual RL10 engines on the Centaur upper stage and no solid rocket boosters.

On July 18, 2011 NASA and ULA announced an agreement on the possibility of certifying the Atlas V to NASA's "human-rating" standards. ULA will provide NASA with data on the Atlas V, while NASA will provide ULA with draft human certification requirements. As of July 2011[update] Bigelow Aerospace is still considering the use of a human-rated Atlas V for carrying spaceflight participants to its private space station. Sierra Nevada Corporation (SNC) picked the Atlas V to be the booster for its still in development Dream Chaser crewed spacecraft. The Dream Chaser is designed to be a crewed vertical-takeoff, horizontal-landing (VTHL) lifting-body spaceplane that will be placed into LEO by an Atlas V, and is a proposed CCDev ISS crew transport vehicle.

On August 4, 2011 Boeing announced it would use the Atlas V as the initial launch vehicle for its CST-100 crewed spaceship, intended for both NASA-funded trips to the International Space Station, as well as private trips to the proposed Bigelow Commercial Space Station. A three-flight test program is projected to be completed by 2015, and potentially will certify the Atlas V/CST-100 combination for human-spaceflight operations. The first flight is expected to include an Atlas 5 rocket integrated with an unpiloted CST-100 capsule, to launch from Cape Canaveral's LC-41 in early 2015 into LEO. The second flight is scheduled to be an in-flight launch abort system demonstration in the middle of that year. The test-flight phase is expected to culminate with a crewed mission at the end of 2015, carrying two Boeing test-pilot astronauts into LEO and returning them safely. In August 2012, George Sowers, ULA's vice president for Human Launch Services, stated that if funded the first manned flight of the Atlas V could occur by late 2015.

**Atlas V HLV**

The Atlas V HLV (Heavy Lift Vehicle) would use three Common Core Booster (CCB) stages strapped together to lift a 29,400 kg payload to low Earth orbit. Approximately 95% of the hardware required for the Atlas HLV has already been flown on the Atlas V single core vehicles.

A report, prepared by RAND Corporation for the Office of the Secretary of Defense in 2006, stated that Lockheed Martin had decided not to develop an Atlas V heavy-lift vehicle (HLV). The report recommended for the Air Force and the National Reconnaissance Office to "determine the necessity of an EELV heavy-lift variant, including development of an Atlas V Heavy", and to "resolve the RD-180 issue, including coproduction, Stockpile, or U.S. development of an RD-180 replacement."

The lifting capability of the Atlas V HLV is roughly equivalent to the Delta IV Heavy. The latter utilizes RS-68 engines developed and produced domestically by Pratt & Whitney Rocketdyne.

As of February 2008[update], the Atlas V HLV configuration was available to customers 30 months from date of order.

**Atlas Phase 2**

With the merger of Boeing and Lockheed-Martin space operations into United Launch Alliance, the Atlas V program gained access to the tooling and processes for 5-meter-diameter stages, used on Delta IV. At 5 meters, a stage can accept dual RD-180 engines. The proposed heavy-lift vehicle is "Atlas Phase 2" or "PH2". An Atlas V PH2-Heavy (three 5 m stages in parallel; six RD-180s) along with Shuttle-derived, Ares V and Ares V Lite, was considered as a possible heavy lifter for use in future space missions in the Augustine Report. The Atlas PH2 HLV would launch a payload mass of approximately 70 metric tons into an orbit of 28.5 degree-inclination.

**Versions**



An Atlas V 551 with the New Horizons Deep Space Probe launches from Launch Pad 41 in Cape Canaveral

Each Atlas V booster configuration has a three-digit designation, that indicates the features of that configuration. The first digit shows the diameter (in meters) of the payload fairing, and always has a value of '4' or '5'. The second digit indicates the number of solid rocket boosters attached to the base of the rocket, and can range from '0' through '3' with the 4-meter fairing, and '0' through '5' with the 5-meter fairing. The third digit represents the number of engines on the Centaur stage, either '1' or '2'. As of 2009, only the single-engine Centaur (SEC) has been used, and no launches using a dual-engine Centaur (DEC) are currently planned. For example, an Atlas V *552* has a 5-meter fairing, five solid rocket boosters, and two Centaur engines. An Atlas V *431* has a 4-meter fairing, three solid rocket boosters, and a single Centaur engine.

The 4-meter fairing, originally designed for the Atlas II booster, comes in three different lengths, the original 9-meter high version, as well as fairings 10-meters (first flown on the AV-008/Astra 1KR launch) and 11-meters (seen on the AV-004/Inmarsat-4 F1 launch) high. Lockheed Martin had the 5.4-meter (4.57 meters usable) payload fairing for the Atlas V developed and built by RUAG Space (former Oerlikon Space) in Switzerland. The RUAG fairing uses carbon fiber composite construction, based on flight proven hardware from the Ariane 5. Three configurations will be manufactured to support Atlas V. The short (10-meter long) and medium (13-meter long) configurations will be used on the Atlas V 500 series. The 16-meter long configuration will be used on the Atlas V-Heavy. The classic fairing covers only the payload, leaving the Centaur stage exposed to open air. The RUAG fairing encloses the Centaur stage as well as the payload.

**Versions:** List Date: August 30, 2012. Mass to LEO numbers are at an inclination of 28.5 degrees.

| **Version** | **Fairing** | **CCBs** | **SRBs** | **Upper stage** | **Payload to LEO** | **Payload to GTO** | **Launches to date** |
| --- | --- | --- | --- | --- | --- | --- | --- |
| 401 | 4 m | 1 | – | SEC | 9,797 kg | 4,750 kg | 14 |
| 402 | 4 m | 1 | – | DEC | 12,500 kg | – | 0 |
| 411 | 4 m | 1 | 1 | SEC | 12,150 kg | 5,950 kg | 3 |
| 412 | 4 m | 1 | 1 | DEC | - | - | 0 |
| 421 | 4 m | 1 | 2 | SEC | 14,067 kg | 6,890 kg | 3 |
| 431 | 4 m | 1 | 3 | SEC | 15,718 kg | 7,700 kg | 2 |
| 501 | 5.4 m | 1 | – | SEC | 8,123 kg | 3,775 kg | 3 |
| 502 | 5.4 m | 1 | – | DEC | – | – | 0 |
| 511 | 5.4 m | 1 | 1 | SEC | 10,986 kg | 5,250 kg | 0 |
| 512 | 5.4 m | 1 | 1 | DEC | – | – | 0 |
| 521 | 5.4 m | 1 | 2 | SEC | 13,490 kg | 6,475 kg | 2 |
| 522 | 5.4 m | 1 | 2 | DEC | – | – | 0 |
| 531 | 5.4 m | 1 | 3 | SEC | 15,575 kg | 7,475 kg | 2 |
| 532 | 5.4 m | 1 | 3 | DEC | – | – | 0 |
| 541 | 5.4 m | 1 | 4 | SEC | 17,443 kg | 8,290 kg | 1 |
| 542 | 5.4 m | 1 | 4 | DEC | – | – | 0 |
| 551 | 5.4 m | 1 | 5 | SEC | 18,814 kg | 8,900 kg | 3 |
| 552 | 5.4 m | 1 | 5 | DEC | 20,520 kg | – | 0 |
| Heavy (HLV/5H1) | 5.4 m | 3 | – | SEC | – | – | 0 |
| Heavy (HLV DEC/5H2) | 5.4 m | 3 | – | DEC | 29,400 kg | – | 0 |

**Atlas V launches**

*For more details on this topic, see List of Atlas V launches.*

List Date: August 30, 2012

| **#** |  |  | **Date and Time(UTC)** | **Type** | **Serial-no.** | **Startplace** | **Payload** | **Type of payload** | **Orbit** | **Outcome** | **Remarks** |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| 1 |  |  | August 21, 2002, 22:05 | 401 | AV-001 | CC LC41 | Hot Bird 6 | Commercial communications satellite | GSO | Success | First Atlas V launch |
| 2 |  |  | May 13, 2003, 22:10 | 401 | AV-002 | CC LC41 | Hellas Sat 2 | Commercial communications satellite | GSO | Success | First satellite for Greece and Cyprus |
| 3 |  |  | July 17, 2003, 23:45 | 521 | AV-003 | CC LC41 | Rainbow 1 | Commercial communications satellite | GSO | Success | First Atlas V 500 launchFirst Atlas V launch with SRBs |
| 4 |  |  | December 17, 2004, 12:07 | 521 | AV-005 | CC LC41 | AMC 16 | Commercial communications satellite | GSO | Success |  |
| 5 |  |  | March 11, 2005, 21:42 | 431 | AV-004 | CC LC41 | Inmarsat 4-F1 | Commercial communications satellite | GSO | Success | First Atlas V 400 launch with SRB |
| 6 |  |  | August 12, 2005, 11:43 | 401 | AV-007 | CC LC41 | Mars Reconnaissance Orbiter | Mars orbiter | Areocentric | Success | First Atlas V launch for NASA |
| 7 |  |  | January 19, 2006, 19:00 | 551 | AV-010 | CC LC41 | New Horizons | Pluto and Kuiper Belt probe | Hyperbolic | Success | Boeing Star 48B third stage used, first Atlas V launch |
| 8 |  |  | April 20, 2006, 20:27 | 411 | AV-008 | CC LC41 | Astra 1KR | Commercial communications satellite | GSO | Success |  |
| 9 |  |  | March 8, 2007, 03:10 | 401 | AV-013 | CC LC41 | Space Test Program-1 | 6 military research satellites | LEO | Success | * First ULA Atlas launch
* First Atlas V night launch
* First three-burn Atlas V mission
* Orbital Express
* FalconSAT-3
 |
| 10 |  |  | June 15, 2007, 15:11 | 401 | AV-009 | CC LC41 | USA-194 (NRO L-30/NOSS-4-3A & B) | Two NRO Reconnaissance satellites | LEO | Partial launch failure (Lower than intended orbit) | First Atlas V flight for the National Reconnaissance Office |
| 11 |  |  | October 11, 2007, 00:22 | 421 | AV-011 | CC LC41 | USA-195 (WGS SV-1) | Military communications satellite | GTO | Success | Valve replacement |
| 12 |  |  | December 10, 2007, 22:05 | 401 | AV-015 | CCAFS SLC-41 | USA-198 (NRO L-24) | NRO reconnaissance satellite | Molniya | Success |  |
| 13 |  |  | March 13, 2008, 10:02 | 411 | AV-006 | VAFB SLC-3E | USA-200 (NRO L-28) | NRO reconnaissance satellite | Molniya | Success | First Atlas V launch from Vandenberg |
| 14 |  |  | April 14, 2008, 20:12 | 421 | AV-014 | CC LC-41 | ICO G1 | Commercial communications satellite | GTO | Success | * Lockheed Martin Commercial Launch Services launch
* Heaviest payload launched by an Atlas until the launch of MUOS-1 in 2012.
* Largest Comsat in the world at time of launch until the launch of TerreStar-1 in 2009.
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| 15 |  |  | April 4, 2009, 00:31 | 421 | AV-016 | CC LC-41 | USA-204 (WGS SV2) | Military communications satellite | GTO | Success |  |
| 16 |  |  | June 18, 2009, 21:32 | 401 | AV-020 | CCAFS SLC-41 | LRO/LCROSS | Lunar exploration | HEO | Success | First Centaur stage to impact on the Moon. |
| 17 |  |  | September 8, 2009, 21:35 | 401 | AV-018 | CCAFS SLC-41 | USA-207 (PAN) | Military communications satellite | GTO | Success |  |
| 18 |  |  | October 18, 2009, 16:12 | 401 | AV-017 | VAFB SLC-3E | USA-210 (DMSP 5D3-F18) | Military weather satellite | LEO | Success |  |
| 19 |  |  | November 23, 2009, 06:55 | 431 | AV-024 | CCAFS SLC-41 | Intelsat 14 | Commercial communications satellite | GTO | Success | LMCLS launch |
| 20 |  |  | February 11, 2010, 15:23 | 401 | AV-021 | CCAFS SLC-41 | SDO | Solar Observatory | GTO | Success |  |
| 21 |  |  | April 22, 2010, 23:52 | 501 | AV-012 | CCAFS SLC-41 | USA-212 (X-37B OTV-1) | Military orbital test vehicle | LEO | Success | A piece of the external fairing did not break up on impact, but washed up on Hilton Head Island.  |
| 22 |  |  | August 14, 2010, 11:07 | 531 | AV-019 | CCAFS SLC-41 | USA-214 (AEHF-1) | Military communications satellite | GTO | Success |  |
| 23 |  |  | September 21, 2010, 04:03 | 501 | AV-025 | VAFB SLC-3E | USA-215 (NRO L-41) | NRO reconnaissance satellite | LEO (SSO)  | Success |  |
| 24 |  |  | March 5, 2011, 22:46 | 501 | AV-026 | CCAFS SLC-41 | USA-226 (X-37B OTV-2) | Military orbital test vehicle | LEO | Success |  |
| 25 |  |  | April 15, 2011, 04:24 | 411 | AV-027 | VAFB SLC-3E | USA-228 (NRO L-34) | NRO reconnaissance satellite | LEO | Success |  |
| 26 |  |  | May 7, 2011, 18:10 | 401 | AV-022 | CCAFS SLC-41 | USA-230 (SBIRS-GEO-1) | Missile Warning satellite | GTO | Success |  |
| 27 |  |  | August 5, 2011, 16:25 | 551 | AV-029 | CCAFS SLC-41 | Juno | Jupiter orbiter | Jovicentric | Success |  |
| 28 |  |  | November 26, 2011, 15:02 | 541 | AV-028 | CCAFS SLC-41 | Mars Science Laboratory | Mars Rover | Hyperbolic | Success | First launch of the 541 configurationCentaur stage to enter orbit around the sun |
| 29 |  |  | February 24, 2012, 22:15 | 551 | AV-030 | CCAFS SLC-41 | MUOS-1 | Military comm.satellite | GTO | Success | \*200th Centaur launch |
| 30 |  |  | May 4, 2012, 18:42 | 531 | AV-031 | CCAFS SLC-41 | USA-235 (AEHF-2) | Military communications satellite | GTO | Success |  |
| 31 |  |  | June 20, 2012, 12:28 | 401 | AV-023 | CCAFS SLC-41 | NROL-38 | NRO reconnaissance satellite | GEO | Success | 50th EELV launch |
| 32 |  |  | August 30, 2012, 08:05 | 401 | AV-032 | CCAFS SLC-41 | RBSP | Van Allen Belts exploration | HEO | Success |  |
| 33 |  |  | September 13, 2012, 21:39 | 401 | AV-033 | VAFB SLC-3E | NROL-36 | NRO reconnaissance satellite |  | Success |  |

For planned launches, see:
List of Atlas launches (2010–2019)

**Photo gallery**

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Core stage of an Atlas V being raised to a vertical position

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X-37B OTV-1 (Orbital Test Vehicle) was the military spaceplane within the April 22, 2010 launch.

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An Atlas V 541 is moved to the launch pad