MISSION OVERVIEW

SLC-3
VAFB, CA

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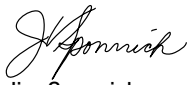
United Launch Alliance (ULA) is proud to be a part of the launch of the nineteenth mission for the Defense Meteorological Satellite Program (DMSP-19) with the U.S. Air Force (USAF) Defense Weather Systems Directorate and the Launch Systems Directorate.

DMSP satellites provide strategic and tactical weather prediction, which aids the U.S. military in planning operations at sea, on land, and in the air. The satellites are equipped with a sophisticated sensor suite capable of imaging cloud cover in visible and infrared light and measuring precipitation, surface temperature, and soil moisture. The DMSP spacecraft can collect this specialized global meteorological, oceanographic, and solar-geophysical information in all weather conditions. The current constellation is comprised of six spacecraft in sun-synchronous, near-polar orbits. Two of these are considered the primary spacecraft, two are secondary back-ups, and the remaining two are used for tactical purposes.

The ULA team is focused on attaining Perfect Product Delivery for the DMSP-19 mission, which includes a relentless focus on mission success (the perfect product) and also excellence and continuous improvement in meeting all of the needs of our customers (the perfect delivery).

My thanks to the entire ULA and DMSP-19 team for their dedication in bringing this mission to launch, and to the USAF for selecting Atlas V for this important mission.

Go Atlas, Go Centaur, Go DMSP-19!



Jim Sponnick
Vice President, Atlas and Delta Programs

DMSP-19 SATELLITE | Overview

DMSP is a space- and ground-based system used to collect and disseminate timely global environmental data to the Department of Defense and other governmental agencies. This environmental data consists of visible and infrared cloud cover and other specialized meteorological, oceanographic, and solar-geophysical information required to support the war fighter. DMSP satellites "see" environmental features such as clouds, bodies of water, snow, fire, and pollution in the visual and infrared spectra. The data can be used to determine cloud type and height, land and surface water temperatures, water currents, ocean surface features, ice, and snow. DMSP data are processed on the ground, interpreted by meteorologists, and ultimately used in planning and conducting U.S. military operations worldwide.

Each satellite has an orbital period of about 101 minutes and crosses any point on the Earth up to twice a day, thus providing nearly complete global coverage of clouds every six hours. The visible and infrared sensors collect images of global cloud distribution across a 3,000-km swath during both daytime and nighttime conditions. The coverage of the microwave imager and sounders are one-half the visible and infrared sensors coverage. They cover the polar regions above 60 degrees twice daily and the equatorial region once daily.

The DMSP is composed of the space segment; the command, control, and communications segment (C3S); and the user segment. The principal function of the space segment is to continually acquire environmental data through its satellite sensors. Mission data downlinks include stored data and real-time transmissions. Raw sensor data are stored onboard the satellite for delayed transmission to the C3S. Subsequently, the data are relayed to strategic elements of the user segment for ground processing into environmental data records and analysis. Raw data can also be transmitted directly from the space segment to tactical elements of the user segment for ground processing and analysis.

Image Courtesy of Lockheed Martin Corporation

Atlas V DMSP-19

ATLAS V 401 LAUNCH VEHICLE | Overview

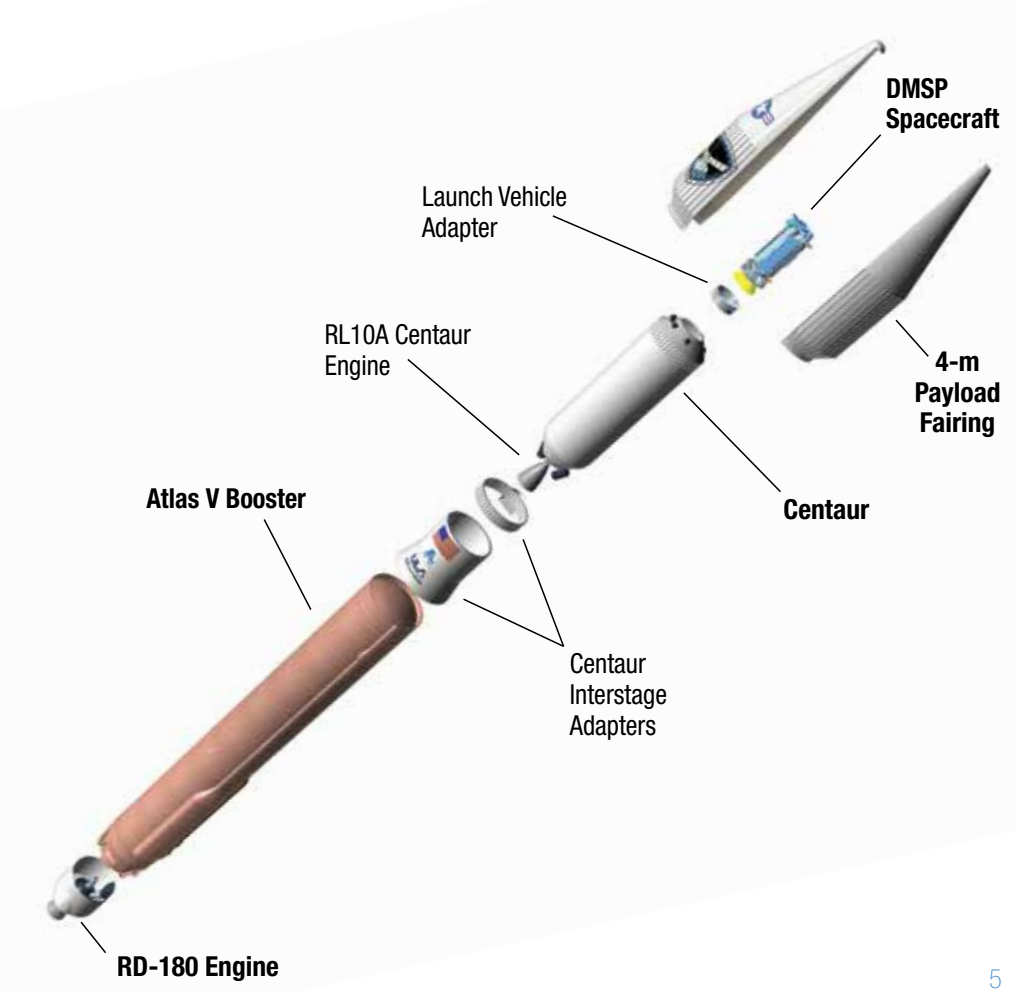
The Atlas V 401 consists of a single Atlas V booster stage, the Centaur upper stage, and a 4-m diameter payload fairing (PLF).

The Atlas V booster is 12.5 ft in diameter and 106.5 ft in length. The booster's tanks are structurally rigid and constructed of isogrid aluminum barrels, spun-formed aluminum domes, and intertank skirts. Atlas booster propulsion is provided by the RD-180 engine system (a single engine with two thrust chambers). The RD-180 burns RP-1 (Rocket Propellant-1 or highly purified kerosene) and liquid oxygen, and delivers 860,200 lb of thrust at sea level. The Atlas V booster is controlled by the Centaur avionics system, which provides guidance, flight control, and vehicle sequencing functions during the booster and Centaur phases of flight.

The Centaur second stage is 10 ft in diameter and 41.5 ft in length. Its propellant tanks are constructed of pressure-stabilized, corrosion resistant stainless steel. Centaur is a liquid hydrogen/liquid oxygen- (cryogenic-) fueled vehicle. It uses a single RL10A-4-2 engine producing 22,300 lb of thrust. The cryogenic tanks are insulated with a combination of helium-purged insulation blankets, radiation shields, and spray-on foam insulation (SOFI). The Centaur forward adapter (CFA) provides the structural mountings for the fault-tolerant avionics system and the structural and electrical interfaces with the spacecraft.

The spacecraft is encapsulated in the 4-m (14-ft) diameter large payload fairing (LPF). The LPF is a bisector (two-piece shell) fairing consisting of aluminum skin/stringer construction with vertical split-line longerons. The vehicle's height with the PLF is approximately 189 ft.

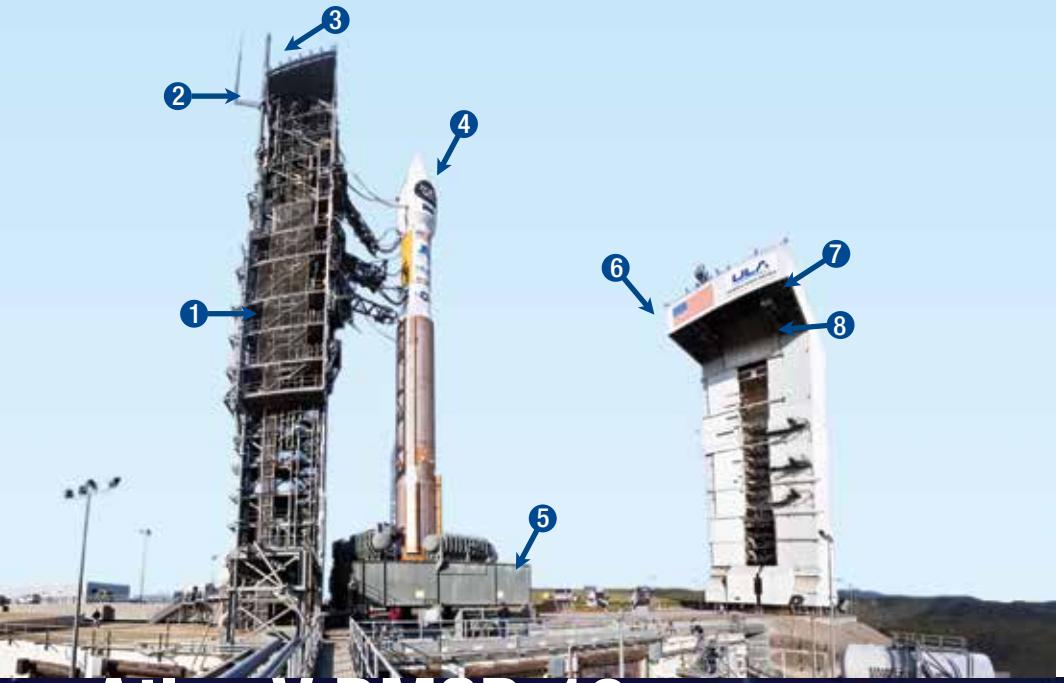
ATLAS V 401 LAUNCH VEHICLE | Expanded View



Atlas V DMSP-19

SPACE LAUNCH COMPLEX 3 (SLC-3) | Overview

1 Umbilical Tower
2 Lightning Mast
3 Hydrogen Vent Stack
4 Launch Vehicle
5 Launch Platform
6 Mobile Service Tower (MST)
7 Bridge Crane Hammerhead
8 Bridge Crane



ATLAS V DMSP-19 | Mission Overview

The DMSP-19 mission will be flown on a near-south trajectory from Space Launch Complex 3 (SLC-3) at Vandenberg Air Force Base (VAFB), CA. The satellite will be released in a nearly-polar, sun-synchronous orbit.

Mission telemetry data will be gathered by the Western Range (VAFB), AFSCN Station on Diego Garcia (REEF), Thule (POGO), and RAF Oakhanger (LION) tracking stations. The orbiting Tracking and Data Relay Satellite (TDRS) constellation will also participate in gathering telemetry data during the DMSP-19 mission.

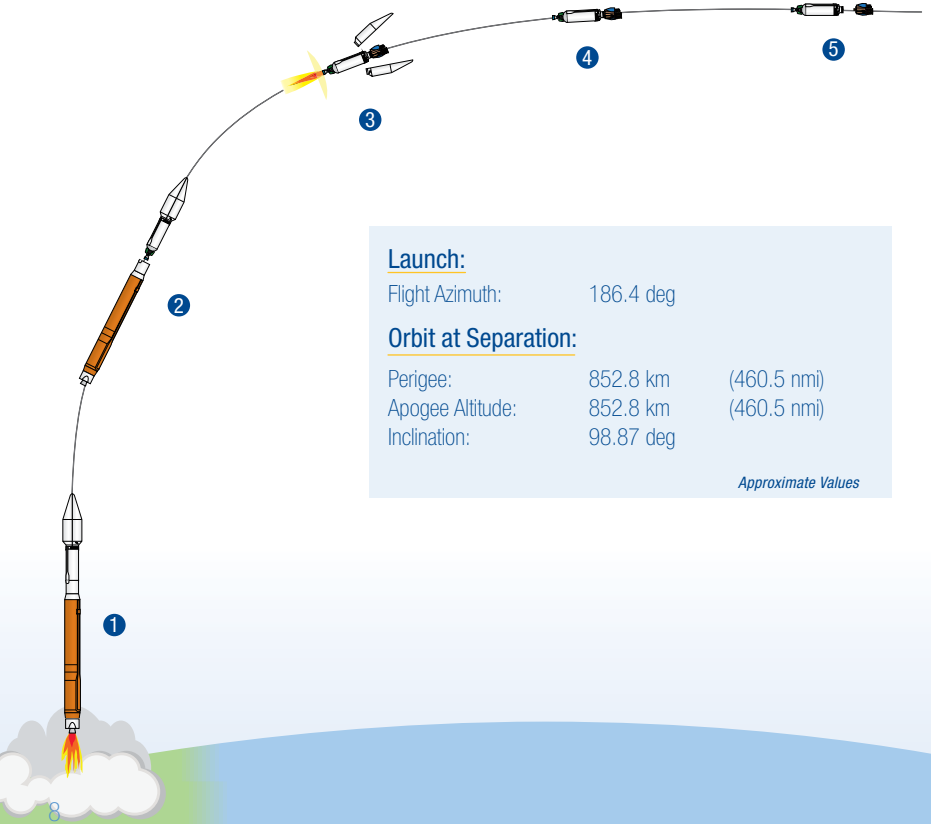
The mission begins with RD-180 engine ignition at approximately T-2.7 seconds. Liftoff occurs at T+1.1 seconds. Shortly after the vehicle clears the pad, it performs its pitch/yaw/roll maneuver.

Booster engine cutoff (BECO) occurs at approximately 244 seconds into the mission. Centaur separation occurs 6 seconds after BECO followed by Centaur main engine start (MES-1). PLF jettison takes place at approximately 8 seconds after Centaur MES-1.

Approximately 16 minutes into the mission, the first Centaur main engine cutoff (MECO-1) occurs, followed by release of the DMSP-19 satellite at approximately 18 minutes after liftoff.

Atlas V DMSP-19

FLIGHT PROFILE | Liftoff to Separation



Launch:

Flight Azimuth: 186.4 deg

Orbit at Separation:

Perigee:	852.8 km	(460.5 nmi)
Apogee Altitude:	852.8 km	(460.5 nmi)
Inclination:	98.87 deg	

Approximate Values

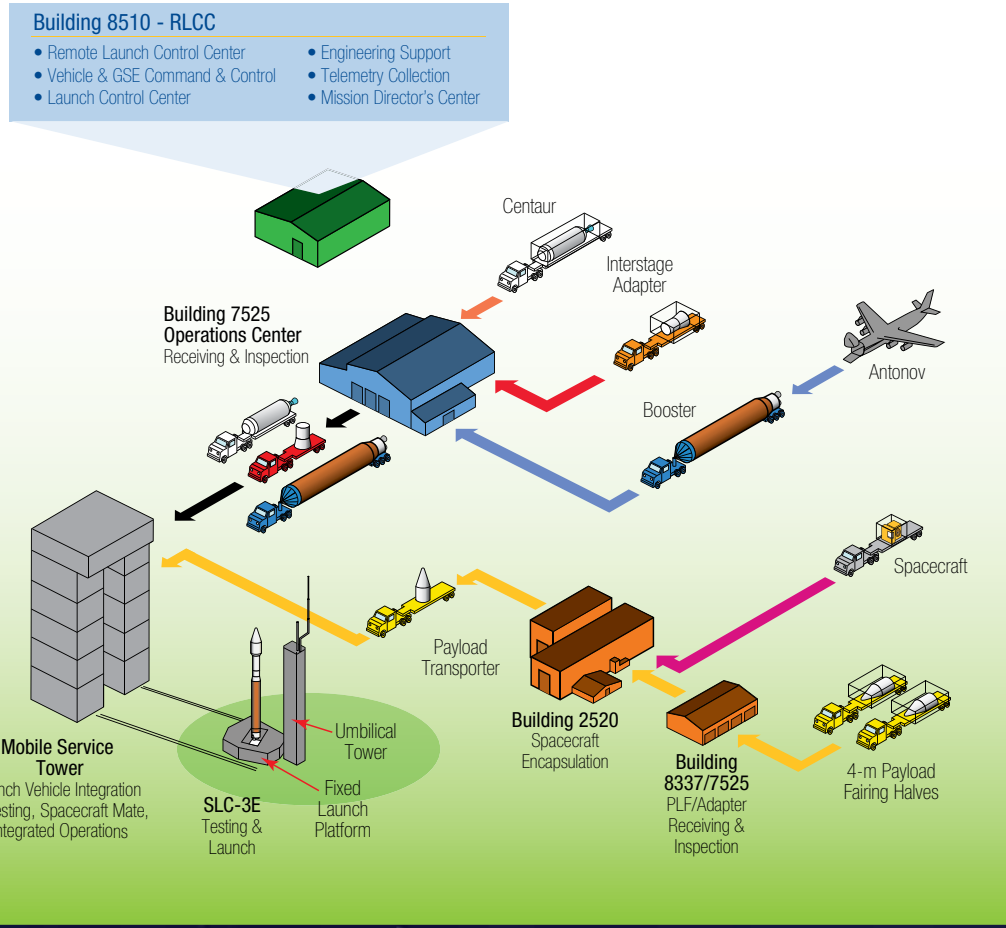
SEQUENCE OF EVENTS | Liftoff to Separation

	Event	Time (seconds)	Time (hr:min:sec)
1	RD-180 Engine Ignition	-2.7	-00:00:02.7
	Liftoff (Thrust to Weight > 1)	1.1	00:00:01.1
	Begin Pitch/Yaw/Roll Maneuver	17.1	00:00:17.1
	Maximum Dynamic Pressure	85.7	00:01:25.7
2	Atlas Booster Engine Cutoff (BECO)	244.6	00:04:04.6
	Atlas Booster/Centaur Separation	250.6	00:04:10.6
3	Centaur First Main Engine Start (MES1)	260.6	00:04:20.6
	Payload Fairing Jettison	268.6	00:04:28.6
4	Centaur First Main Engine Cutoff (MECO1)	939.4	00:15:39.4
5	DMSP-19 Separation	1,108.4	00:18:28.4

Atlas V DMSP-19

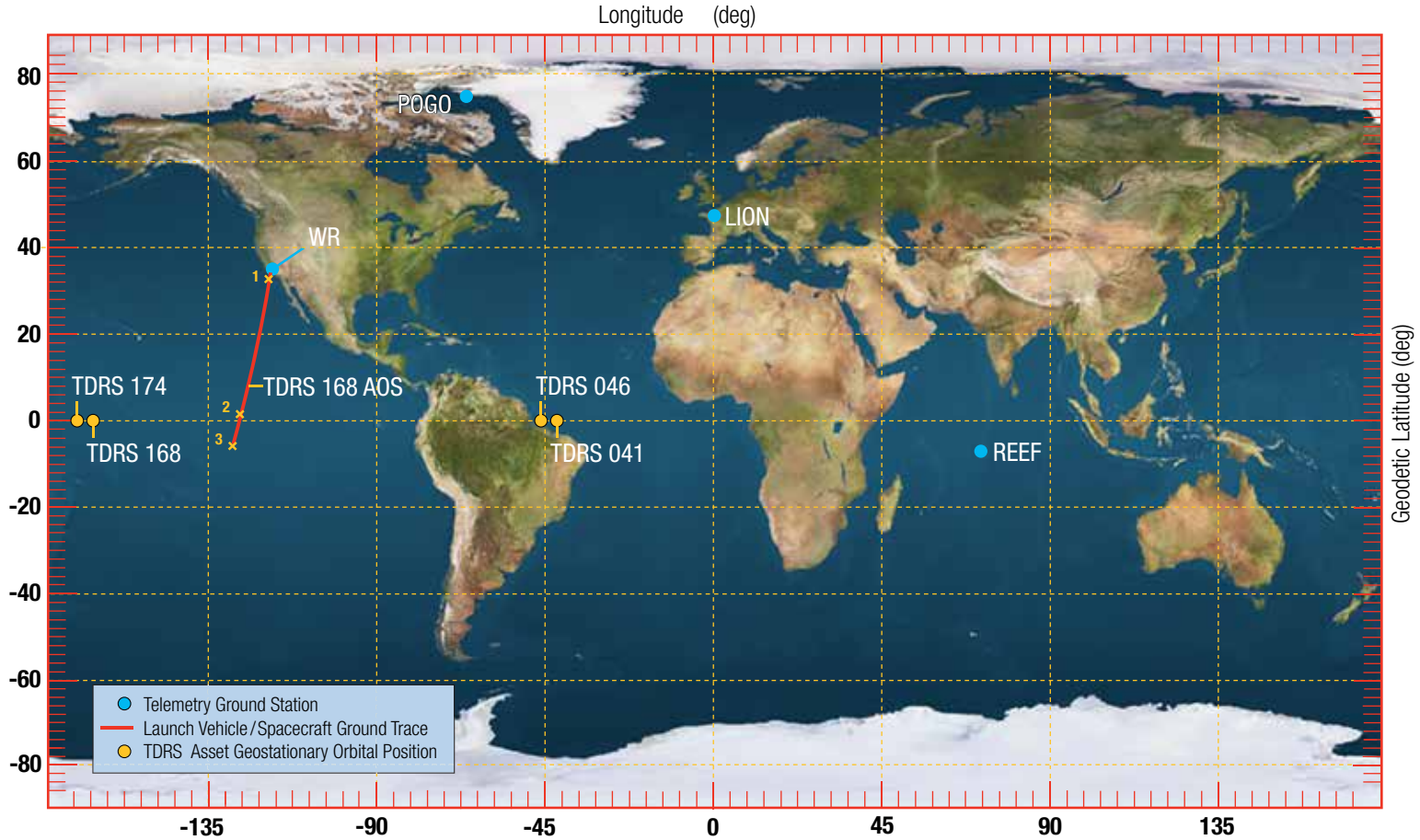
ATLAS V PRODUCTION & LAUNCH | Overview

ATLAS V PROCESSING | Vandenberg



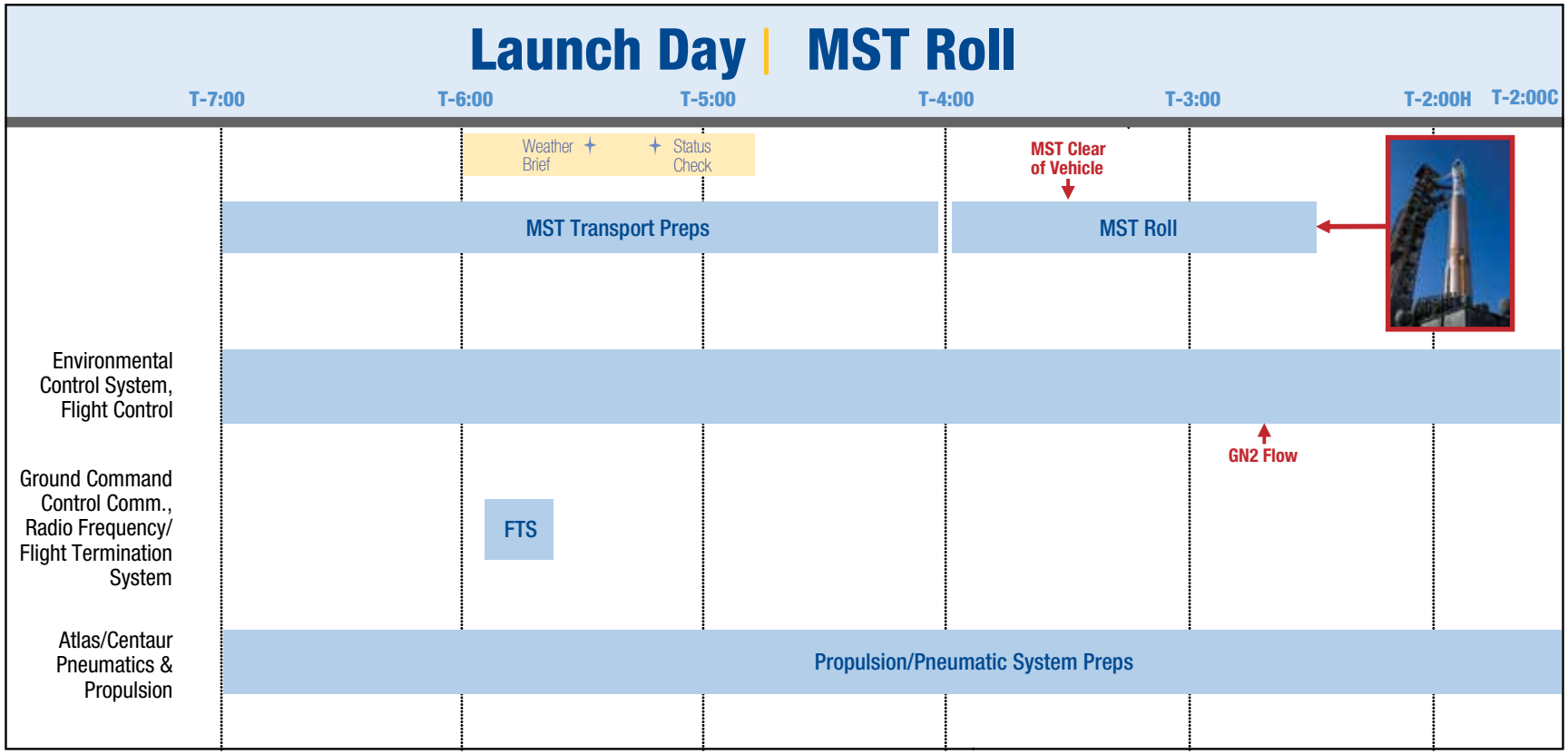
Atlas V DMSP-19

GROUND TRACE | Liftoff to Separation

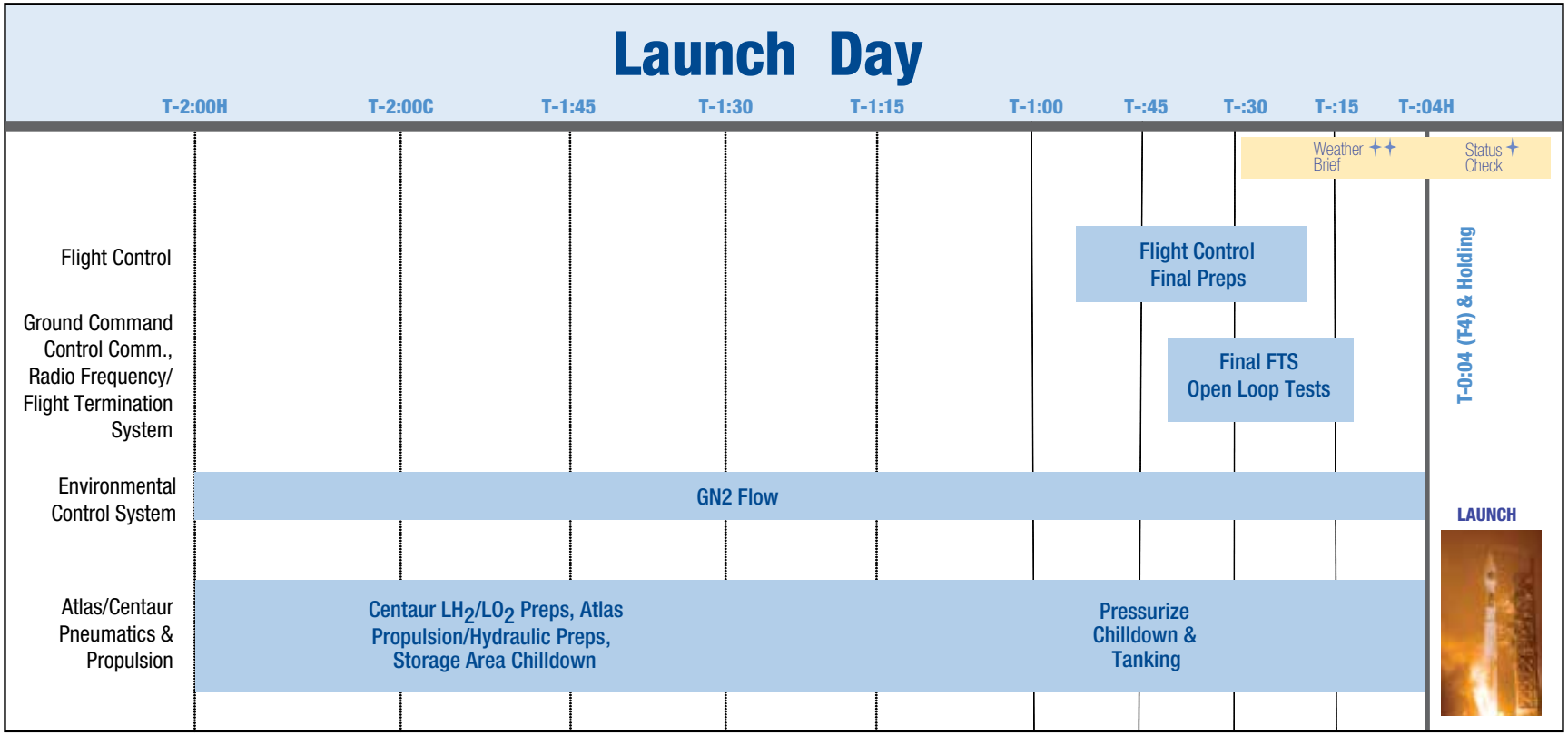


1 = BECO (0:04:04.6) | **2 =** MECO1 (0:15:39.4) | **3 =** DMSP-19 Separation (0:18:28.4)

Atlas V DMSP-19



Atlas V DMSP-19



Atlas V DMSP-19

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