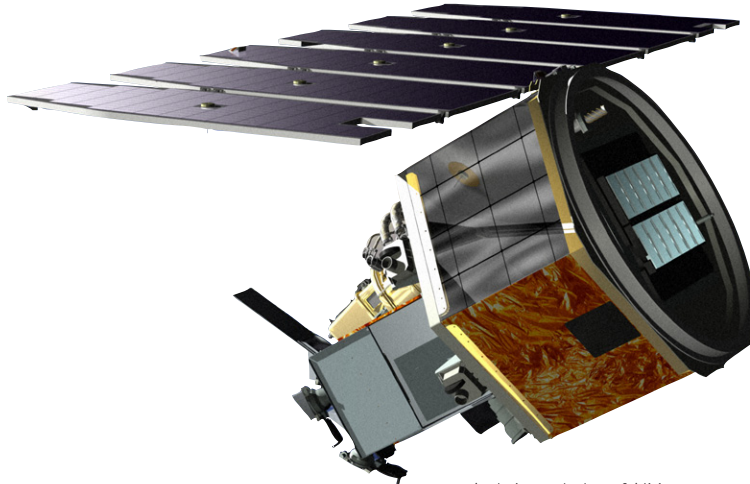




AIM

Aeronomy of Ice in the Mesosphere



Artist's rendering of AIM

Mission Description

The Aeronomy of Ice in the Mesosphere (AIM) mission is focused on the study of Polar Mesospheric Clouds (PMCs) that form about 50 miles above the Earth's surface in the summer months, primarily in the polar regions. The AIM observatory will measure PMCs and the thermal, chemical and dynamic environment in which they form in order to determine the connection between PMCs and the meteorology of the polar mesosphere. This connection is valuable because the increased appearance of noctilucent, or night shining clouds (NLCs), which are a manifestation of PMCs, has been suggested as an indicator of global climate change. Through these measurements the team will address questions including:

- Why do noctilucent clouds form and vary?
- Why have noctilucent clouds been occurring closer to the equator?
- Why have noctilucent clouds been getting brighter and denser?
- Are noctilucent clouds nature's harbinger of global change in the upper atmosphere?

Orbital Sciences Corporation, under contract to a university team led by Hampton University, provided the AIM spacecraft bus, instrument integration, satellite environmental test campaign and launch operations.

Noctilucent Clouds

First sighted in 1885 in Northern high latitudes, noctilucent, or night shining clouds occur in the summer in the mesosphere, which is the coldest part of the atmosphere. Cloud formation is possibly hastened by increasing amounts of carbon dioxide in the atmosphere. While CO₂ is thought to contribute to global warming on Earth, it actually cools the high atmosphere. In recent years, noctilucent clouds have begun appearing closer to the equator.

QUICK FACTS:

Noctilucent or "night-shining" clouds were first seen in 1885 about two years after the powerful eruption of Krakatoa in Indonesia, which hurled plumes of ash high into Earth's atmosphere.

Crews aboard the International Space Station routinely witness noctilucent clouds when flying over Australia and the tip of South America.

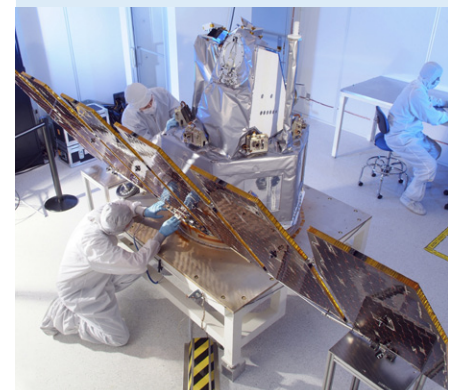
Mission:

NASA Small Explorers (SMEX) program

Customer:

Hampton University - Hampton, VA

University of Colorado/LASP - Boulder, CO



AIM in Orbital's Satellite Manufacturing Facility

Specifications and Salient Features

Performance

Orbit:	600 km, sun-synchronous, 97.8° inclination
Power:	335 W (Orbit Average)
Mass:	199 kg (441 lb.)
Stabilization:	3-axis, zero momentum
Communications:	S-band via NASA's Space/Ground Network and TDRSS
Solar Arrays:	Fixed, GaAs
Mission Life:	26 months
Status:	Baseline mission complete, currently in extended mission operations

Instruments

Solar Occultation for Ice Experiment (SOFIE)

An eight-channel differential absorption radiometer that will measure the vertical distribution of PMCs, particle sizes, and the thermal and chemical environment of the clouds.

Cloud Imaging and Particle Size (CIPS)

Will image the horizontal distribution of PMCs and the sizes of particles within them.

Cosmic Dust Experiment (CDE)

Will detect cosmic dust particles entering the atmosphere that possibly lead to cloud formation.

Launch

Vehicle:	Pegasus® XL
Site:	Vandenberg Air Force Base, CA
Date:	April 25, 2007

Pegasus Launch Vehicle

Orbital's Pegasus launch vehicle is an air-launched, internally guided, three-stage solid rocket capable of launching up to 1,000 pounds to low-Earth orbit (LEO). Pegasus is mated to its L-1011 carrier aircraft and dropped at approximately 40,000 feet. The vehicle free falls for approximately five seconds, with its delta wing providing lift, before firing its first stage rocket motor. The duration of a typical flight, from drop to insertion into orbit is a little over ten minutes. Pegasus has conducted 40 missions, launching more than 80 satellites from six separate sites worldwide.



Noctilucent cloud image taken over Kustavi, Finland.

Key Mission Partners

Hampton University Center for Atmospheric Sciences

Hampton University, Hampton, VA – Principal Investigator: James M. Russell III, Co-Director, Center for Atmospheric Sciences; Mission and Science Team Management

Virginia Polytechnic Institute and State University

Blacksburg, VA – Deputy Principal Investigator: Dr. Scott M. Bailey; Assist Mission and Science Team Management

Laboratory for Atmospheric and Space Physics (LASP)

University of Colorado, Boulder, CO – Mission Operations, Instrument Development and Data Analysis

Space Dynamics Laboratory (SDL)

Utah State University, Logan, UT – Instrument Development and Data Analysis

Orbital Sciences Corporation

Dulles, VA; Chandler, AZ; Vandenberg Air Force Base, CA – Spacecraft Bus Development; Satellite Integration and Test; Launch Vehicle Integration and Flight Operations Support; and Pegasus Launch Vehicle

GATS Inc

Newport News, VA – Ground Data System Management and Data Analysis

George Mason University, Naval Research Laboratory, St. Cloud State University, British Antarctic Survey

Science and Measurement Objectives