**Why TIMED?**

For centuries, scientists have realized that Earth’s natural environment is greatly impacted by the abundance of solar energy striking the Earth from a constantly changing sun. Over the last few years, they have begun to realize that human activities are also playing a role in changing our environment.

By studying portions of Earth’s atmosphere, scientists believe global change is occurring, primarily due to variations in the sun’s cycle and from human-induced changes to the atmosphere by the release of gases such as methane and carbon dioxide.

Despite signs of global change, scientists haven’t had a benchmark against which future changes in Earth’s upper atmosphere can be globally compared, analyzed or predicted because there are still portions of this solar-terrestrial chain, including regions within Earth’s atmosphere, that are poorly understood.

The TIMED (Thermosphere, Ionosphere, Mesosphere, Energetics and Dynamics) mission is studying the influences of the sun and humans on the least explored and understood region of Earth’s atmosphere—the Mesosphere and Lower Thermosphere/Ionosphere (MLTI). The MLTI region is a gateway between Earth’s environment and space, where the sun’s energy is first deposited into Earth’s environment. TIMED is focusing on a portion of this region located approximately 40–110 miles (60–180 kilometers) above the surface.

In a society increasingly dependent on satellite technology and communications, it is vital to understand the variability within this critical region of Earth’s atmosphere so that scientists can predict its effects on communications, satellite tracking, spacecraft lifetimes, degradation of spacecraft materials and the reentry of piloted vehicles. TIMED’s study of space weather is helping scientists better understand the dynamics of this gateway region.

The TIMED spacecraft is the initial mission in NASA’s Solar Terrestrial Probes (STP) Program, part of NASA’s initiative to lower mission costs and provide more frequent access to space to systematically study the sun-Earth system. The mission is sponsored by NASA’s Office of Space Science, Washington, D.C., and is managed by the NASA Goddard Space Flight Center’s STP Program Office, Greenbelt, Md. The Johns Hopkins University Applied Physics Laboratory (APL), in Laurel, Md., designed, built and is operating the spacecraft for NASA. APL is also leading the project’s science effort during the mission.

**Mission Objectives**

A comprehensive global study of the MLTI region has never before been accomplished. Ground-based instruments can only observe a small portion of the upper atmosphere located over an observation site. This region is too high for balloons to reach. Sounding rockets (rockets that fly into the upper atmosphere for just a few minutes before falling back down) can only provide a brief snapshot of the MLTI region’s activity near the rocket.

Other spacecraft have studied portions of the MLTI region, but TIMED is the first mission to obtain a global picture of it, which scientists need to better understand our upper atmosphere. The TIMED mission is establishing a baseline against which future studies of changes within this region can be compared and analyzed.

The TIMED spacecraft is observing this relatively unexplored frontier from its 388-mile (625-kilometer) circular orbit around the Earth. Employing advances in remote-sensing technology, the spacecraft’s instrument suite is working with a worldwide network of ground-based observation sites to obtain an unprecedented set of comprehensive global measurements of the region’s temperature, pressure, wind and chemical composition, along with its energy inputs and outputs.
The four instrument principal investigators (PIs) have direct control of their instruments and experiments, individually processing data and generating products for distribution from Payload Operations Centers located at each of the PI institutions across the country. Data is collected and distributed from the Mission Data Center located at APL in Laurel, Md. Data products are accessible via TIMED’s Web site (www.timed.jhuapl.edu).

TIMED’s innovative operations concept and efficient data management system allow the Mission Operations Center and Payload Operations Centers to operate with one shift per day and to provide rapid turnaround of data products.

**MISSION MANAGEMENT**

**NASAs Headquarters (HQ) & Goddard Space Flight Center (GSFC)**
- Program Executive: Jeffrey Hayes (HQ)
- Program Scientist: Mary Mellott (HQ)
- STP Program Manager: Nicholas Chrissotimos (GSFC)
- Mission Director: Steven Odendahl (GSFC)

**The Johns Hopkins University Applied Physics Laboratory**
- Project Manager: David Grant
- Project Scientist: Jeng-Hwa (Sam) Yee

**Instrument Principal Investigators**
- GUVI: Andrew Christensen, The Aerospace Corporation
- SABER: James Russell III, Hampton University
- SEE: Thomas Woods, University of Colorado
- TIDI: Wilbert Skinner, University of Michigan

For more information, visit the mission Web site at [www.timed.jhuapl.edu](http://www.timed.jhuapl.edu).