

TIMED: Precursor to Future Space Weather Missions

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The Thermosphere • Ionosphere • Mesosphere • Energetics • Dynamics (TIMED) satellite is a NASA mission dedicated to the study of the Sun's influence on the upper atmosphere and near-Earth environment. TIMED studies the influences of the sun and humans on the region where Space Weather effects dominate – The Mesosphere, Thermosphere, and Ionosphere – where the sun's energy is first deposited into Earth's environment. The first six years of TIMED operations, during the descending phase of solar cycle 23, have allowed us to look at the temporal evolution of the thermosphere and ionosphere system in a 3D sense – a tremendous leap beyond past capabilities developed from previous missions. We have seen the response of the coupled atmosphere/near-Earth environment to external system drivers from solar maximum to the lowest solar activity level since 1954. TIMED has documented the impacts resulting from varying levels of solar x-ray and EUV radiation, solar flares, geomagnetic storms powered by solar coronal mass ejections, and powerful high-speed solar wind streams. We have, for the first time, traced the transfer of energy, momentum, and mass between the thermosphere/ionosphere and the solar wind and magnetosphere above and the atmosphere below. The lessons learned from TIMED provide the basic understanding needed of the science, measurements required, and implementation approach for future Space Weather monitoring missions.

TIMED was built and is operated and managed by the Johns Hopkins University Applied Physics Laboratory (JHU/APL). JHU/APL also leads the project's science effort and manages the mission's Science Data Center. The spacecraft was launched on Dec. 7, 2001, during solar maximum, and has continued to collect data through the declining phase and into solar minimum. For more information on TIMED, please visit www.timed.jhuapl.edu.