

NASA instruments document contraction of the boundary between the Earth's ionosphere, space

December 15 2008



The C/NOFS mission gives scientists a new tool for forecasting space weather. The CINDI instrument aboard C/NOFS specifically studies the major elements that influence space weather near Earth's equator. Credit: NASA

(PhysOrg.com) -- Observations made by NASA instruments onboard an Air Force satellite have shown that the boundary between the Earth's upper atmosphere and space has moved to extraordinarily low altitudes. These observations were made by the Coupled Ion Neutral Dynamics Investigation (CINDI) instrument suite, which was launched aboard the U.S. Air Force's Communication/Navigation Outage Forecast System (C/NOFS) satellite on April 16, 2008.

The CINDI suite, which was built under the direction Principal Investigator Rod Heelis of the University of Texas at Dallas, includes

both ion and neutral sensors and makes measurements of the variations in neutral and ion densities and drifts.

CINDI and C/NOFS were designed to study disturbances in Earth's ionosphere that can result in a disruption of navigation and communication signals. The ionosphere is a gaseous envelope of electrically charged particles that surrounds our planet and it is important because Radar, radio waves, and global positioning system signals can be disrupted by ionospheric disturbances.

CINDI's first discovery was, however, that the ionosphere was not where it had been expected to be. During the first months of CINDI operations the transition between the ionosphere and space was found to be at about 260 miles (420 km) altitude during the nighttime, barely rising above 500 miles (800 km) during the day. These altitudes were extraordinarily low compared with the more typical values of 400 miles (640 km) during the nighttime and 600 miles (960 km) during the day.

The height of the ionosphere/space transition is controlled in part by the amount of extreme ultraviolet energy emitted by the Sun and a somewhat contracted ionosphere could have been expected because C/NOFS was launched during a minimum in the 11-year cycle of solar activity. However, the size of the actual contraction caught investigators by surprise. In fact, when they looked back over records of solar activity, they found that C/NOFS had been launched during the quietest solar minimum since the space age began.

This extraordinary circumstance is providing an unparalleled opportunity to study the connection between the interior dynamics of the Sun and the response of the Earth's space environment.

Animation: www.nasa.gov/mpg/296945main_CINDI_ionosphere_512x288.mpg

Source: NASA's Goddard Space Flight Center

Citation: NASA instruments document contraction of the boundary between the Earth's ionosphere, space (2008, December 15) retrieved 13 March 2024 from <https://phys.org/news/2008-12-nasa-instruments-document-boundary-earth.html>

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