RESEARCH SPOTLIGHT: EARTH'S MAGNETOSPHERE

By: David Smith

Most Embry-Riddle Aeronautical University professors advise students, conduct research, and teach classes. Dr. Katariina Nykyri, of the Department of Physical Sciences, has balanced these tasks since joining ERAU in January of 2007.

The focus of her current research is "analyzing the turbulence in the holes of the Earth's magnetic field," she said.

After writing a proposal to the National Science Foundation, the University of Alaska-Fairbanks alumna undertook the project in June 2007 to study the interaction between solar wind and high-altitude cusp regions. Cusps are funnel-shaped structures in the Earth's magnetic field; cavities, or holes, are sometimes observed at the vicinity of these funnels. These cavities are often filled with high-energy particles and Dr. Nykyri tries to understand the origin of these particles.

Preliminary results have shown that "some local acceleration of the particles in these cavities" exists, Dr. Nykyri said. Spacecraft collected the data and have shown that the magnetic field is very turbulent in these regions. Dr. Nykyri will attempt to determine why.

"Understanding the structure and properties of the cavities," she said, is the second part of the research goals. This includes determining how they form; their size and the origin of the high-energy particles in the cavities. These cavities are formed in space about 50,000 km above the surface of the Earth at high-latitudes, where the interaction between the solar wind and Earth's magnetic field occurs.

Dr. Nykyri began her research as a doctoral student in the summer of 1999 when she examined giant waves produced by Kelvin-Helmholtz instability. Solar wind's interaction with the Earth's magnetosphere creates this instability. The magnetosphere is a region in the solar wind governed by Earth's magnetic field which helps to protect the Earth from high energy, charged particles.

This instability twists the magnetic field and al-lows magnetic field lines to break, enabling solar wind particles to penetrate through the magnetic barrier deeper into the Earth' s magnetosphere.

That discovery opened the door for Dr. Nykyri to share the results nationally through lectures, presentations, and publications. It also created the opportunity to pursue her current work.

"There are many more important questions in space physics," she said. Looking ahead, the culmination of these projects helps in forming a theory of plasma transport and particle acceleration.