CONTACT: Saralyn Stewart
Cell phone: (512) 694-2320

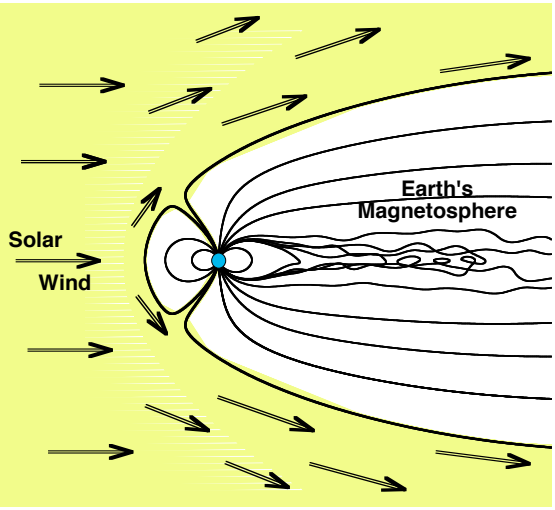
FOR IMMEDIATE RELEASE
Oct. 14, 2005

Research studies turbulence with planetary-scale wind tunnel

Scientists examine how turbulence in the solar wind affects Earth's magnetosphere

DENVER, Colorado, Oct. 24, 2005 – Researchers at Los Alamos National Laboratory are using the solar wind and the Earth's magnetosphere as a planet-sized "wind tunnel" to study the flow properties of plasma, much as engineers use wind tunnels to study airflow when designing aircraft. A recent study has shown that turbulence in the solar wind affects the way the wind interacts with the Earth's magnetosphere, just as turbulence in the air affects airflow around an aircraft.

The solar wind is a high-velocity wind of rarefied, magnetized, ionized gas (known as magnetized plasma) blowing at about one million miles per hour. This magnetized plasma interacts with the Earth's magnetosphere to produce such effects as the aurora, the radiation belts, and magnetic storms. Understanding plasma flow will lead to better predictions of activity in the space environment around the Earth, which can have significant effects on satellites, power grids, and telecommunications.



Solar wind flows around the Earth's magnetic field, like a giant wind tunnel, in which turbulent vortex structures can be measured.

While aeronautical engineers can build wind tunnels to study airflow when designing aircraft, researchers cannot construct wind tunnels in the laboratory to study the flow of magnetized plasma because of the daunting sizes involved.

Instead, researchers at Los Alamos National Laboratory are using the solar wind and the Earth's magnetosphere as their wind tunnel. With the NASA Advanced Composition Explorer spacecraft, located between the Sun and the Earth, measuring the properties of the wind "upstream" and with measurements from a network of ground-based magnetic-field sensors in the northern polar region, these researchers are focusing their study on the effects of turbulence in the wind. Vortices in the solar-wind turbulence come in various sizes, from small ones 300 miles across to big ones more than a million miles across.

Unlike a laboratory wind tunnel where scientists can turn knobs to change the flow, the Los Alamos researchers must wait for nature to change the properties of the flow. The surface of the Sun changes every few hours and so does the plasma wind that it sends out:

faster or slower, hotter or cooler, very turbulent or mildly turbulent. Using data collected over years as nature randomly turns the dials, the Los Alamos team has measured the strength of the turbulence effect on the Earth's magnetosphere.

Through this research, scientists have gained valuable experience in studying plasma behavior and have been able to check the accuracy of their calculations. This research is important if astronomers are to understand the large-scale flows of plasma throughout the universe.

Contact
Joe Borovsky, LANL, cell (505) 412-0630, **jborovsky@lanl.gov**

[BI1.00004] MHD Eddy Viscosity: Testing the Concept with the Solar-Wind/Magnetosphere Coupling Data Base
Abstract: **http://meetings.aps.org/Meeting/DPP05/Event/34484**
October 24, 2005
Monday, 11:00-11:30 am
Invited Session BI1: Space and Astrophysical Plasmas I
Adam's Mark Hotel - Plaza Ballroom ABC