# Ulysses Flyby of the Sun's North Pole

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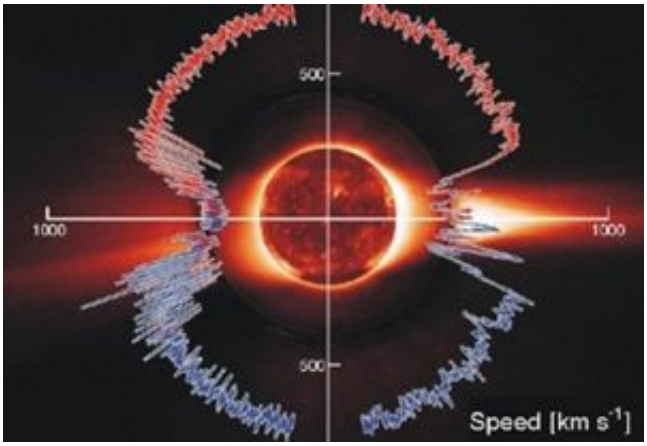


A Ulysses "clock plot" of solar wind speed vs. latitude reveals a high-speed wind blowing from the sun's poles.

Consider it a case of exquisite timing. Just last week, solar physicists announced the beginning of a new solar cycle and now, Jan. 14th, the Ulysses spacecraft is flying over a key region of solar activity--the sun's North Pole.

"This is a wonderful opportunity to examine the sun's North Pole at the onset of a new solar cycle," says Arik Posner, NASA Ulysses program scientist. "We've never done this before."

Launched in Oct. 1990 from the space shuttle Discovery, Ulysses is a joint mission of the European Space Agency and NASA. Unlike other spacecraft, Ulysses is able to fly over the sun's poles, looking down on

regions that are difficult to see from Earth: diagram.

Ulysses has flown over the sun's poles three times before in 1994-95, 2000-01 and 2007. Each flyby revealed something interesting and mysterious, but this one may be most interesting of all.

"Just as Earth's poles are crucial to studies of terrestrial climate change, the sun's poles may be crucial to studies of the solar cycle," explains Ed Smith, Ulysses project scientist at NASA's Jet Propulsion Laboratory.

Many researchers believe the sun's poles are central to the ebb and flow of the solar cycle. Consider the following: When sunspots break up, their decaying magnetic fields are carried toward the poles by vast currents of plasma. This makes the poles a sort of "graveyard for sunspots." Old magnetic fields sink beneath the polar surface two hundred thousand kilometers deep, all the way down to the sun's inner magnetic dynamo. There, dynamo action amplifies the fields for use in future solar cycles.

One big puzzle revealed by previous flybys is the temperature of the sun's poles. In the previous solar cycle, the magnetic north pole was about 80,000 degrees or 8% cooler than the south. Why should there be a difference? No one knows.

The current flyby may help solve the puzzle because it comes less than a year after a similar South Pole flyby in Feb. 2007. Mission scientists will be able to compare temperature measurements, north vs. south, with hardly any gap between them.

Ulysses also discovered the sun's high-speed polar wind. "At the sun's poles, the magnetic field opens up and allows solar atmosphere to stream out at a million miles per hour," says Smith.

By flying around the sun, covering all latitudes in a way that no other

spacecraft can, Ulysses has been able to monitor this polar wind throughout the solar cycle--and it is acting a bit odd.

Posner explains: "Eleven years ago, during a similar 'sea change' between solar cycles, the polar wind spilled down almost all the way to the sun's equator. But this time it is not. The polar wind is bottled up, confined to latitudes above 45 degrees."

Is this a detail of little importance or a major anomaly, signaling new things to come? Again, no one knows, and that's why now is a good time to visit the sun's North Pole. "We'll be monitoring the magnetic field above the north pole to see what it's like during the change of solar cycles."

Source: by Dr. Tony Phillips, Science@NASA