The International Heliophysical Year

What happens with the poles?

As a part of the International Year of Planet Earth the International Heliophysical Year started the first day of March. The project will focus on the interaction between the Earth's atmosphere and outflow from the Sun and interstellar sources.

The EISCAT-antenna at Svalbard playing a key role in IHY. Photo: Nordicspace

Institutes worldwide participate in the project, but quite naturally, institutes close to the high hemispheres will be the most active. With regard to Norway the activities are coordinated by the Department of Physics and Technology, University of Bergen.
"The Sun is not only a bright ball", says Professor Nikolai Østgaard at the University, "the whole time she hurls matter towards us on Earth, and the atmosphere around Earth reacts to this at different chases". "People on Earth", says Nikolai, "are interested in understanding the weather in space, much the same way we understand the weather on Earth".

Professor Nikolai Østgaard and Pål Brekke at the Norwegian Space Centre are the national coordinators for the Norwegian part of the IHY-programme. Much of that is focussed around the phenomena in the upper atmosphere that is common for the northern and southern hemisphere, as well as phenomena that happen simultaneously.

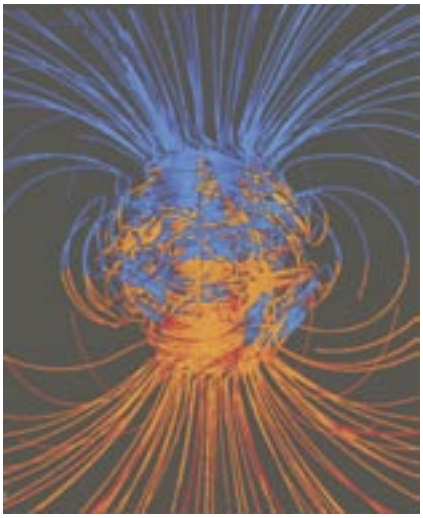
When the solar wind hits the Earth's magnetosphere, which creates a shield against the particles in the solar wind. However, this is not a 'water-proof' shield, and like rain through a leaking roof, some particles will enter the Earth's magnetosphere. Ultimateley these particle will interact with the upper atmosphere, the energy will be changed to light. Because these particles follow the magnetic field-lines between north and south they create an oval around the southern and northern magnetic pole, known as the auroral ovals. Thus, one would therefore assume that the northern and southern light will shine simultaneously, both in time and appearances. However, the axis of rotation has an angle in relation to the Sun, and in addition, the magnetic poles have an angle in relation to the geographical poles, so the system is not completely symmetric. For this reason, it is not necessarily so that north and south react simultaneously to the solar wind. Research into these matters will found much of the basis for the Norwegia researchers during the International Heliospheric Year.

Heliophysical: A broadening of the concept "geophysical," extending the connections from the Earth to the Sun & interplanetary space.

Must of the knowledge concerning the Aurora comes from the northern hemisphere, from the south the measurements are more sparse. Some of the intention with the research programmes is therefore to collect the measurements and utilise those the best way possible.

In this programme, data from space will be applied where satellites with cameras can see both poles, but one is very lucky if interesting phenomena happen at the same time as a satellite passes each pole. From the ground one can follow the phenomena more continuously, and with better resolutions, but it might be difficult to define what one has seen. Here the satellite provides a global picture. Coordinating the two methods will therefore provide the best result. The work will also include organising the data so most of the scientific community can utilise them properly.

One is in particular interested in coordinating data from magnetometer measurements. When aurora is spotted, strong electrical currents in the atmosphere and these currents provide magnetic fields. Because of this one can use magnetic measurements to try to understand what happens. These measurements can be combined with data from satellites that



Not complete symmetry in the the Earth's magnetic fields.

measure the solar wind, and cameras at the ground that can see from horizon to horizon.

IHY' most important goal is to take a vigorous pull in collecting data, and the Nordic contribution is mainly focused around the EISCAT radars. Three large antennas, placed in Tromsø, Kiruna and Sodankyla study the interaction between the Sun and the Earth through disturbing in the upper atmosphere. In addition, a radar is placed on Svalbard, ideally placed to study aurora on the day side of the Earth. It is an advantage because this side will be the first to take notice of changes in the solar wind.

This radar system is both very sophisticated as well as relatively expensive to use, and as mentioned earlier, generally used over short periods of time. Through extraordinary funds this year through the Norwgian IPY program it is made possible to continuously run the Svalbard ESICAT radar for a whole year, an offer the international research community will greatly benefit from. These EISCAT measurements can also be combined with measurements from corresponding radar systems on the American continent with optical measurements, and measurements of radio noise. Together they provide a detailed picture of how the energy from the Sun is spread in the atmosphere.

The International Heliophysical Year (IHY)

On the 50th anniversary of the International Geophysical Year (IGY), the 2007 IHY activities will build on the success of IGY 1957 and previous International Polar Years by continuing its legacy of system-wide studies of the extended heliophysical domain. However, the researchers now extend the global studies out into the Heliosphere and incorporate the drivers of geophysical change into the global system. With the approach to the "new frontier" of the heliopause and interstellar space, the heritage clearly extends back to previous International Years.

IHY's priorities are set via its three primary objectives.

The first objective,
"Advancing our understanding of the heliophysical processes that govern the Sun, Earth and Heliosphere," focuses on the scientific activities.

The second objective,
"Continuing the tradition of international research and advancing the legacy on the 50th anniversary of the International Geophysical Year," refers to the commitment to preserve the history and legacy of thr IGY and our cooperation with other IGY anniversary programmes.

The third objective,
"Demonstrating the beauty, relevance and significance of space and earth science to the world" reminds the tremendous opportunity in 2007-8 for outreach and education.

Norwegian IPY-ICESTAR

IPY-ICSTAR is a Norwegian research project under the umbrella at ICESTAR/IHY Interhemispherical Conjuacy in Geospace Phenomena and their Heliospheric Drivers, and started March 1. At the same time the ongoing whole year measurement by the Svalbard EISCAT radar starts.

A simple aurora prediction system has been developed, tailored for the public. The project is a collaboration with universities and a commercial weather prediction centre. For the scientific community forecasting the aurora is nothing new, in particular for planning observations and sounding rocket launches. However, by adding prediction of weather and clear sky it will provide a useful tool for aurora hunters and tourists. Furthermore, awareness of the aurora and the Sun-Earth connection topic is also a main driver for this project.

IHY Norway Introduces the Space Suitcase!

In a novel approach to introducing heliophysics to high school classes, IHY Norway has developed the "Space Suitcase" or "Space Box" project encompassed in a suitcase. The suitcase will consist of the following instruments:

Cosmic ray detector
Magnetometer
VLF receiver
A simple all-sky camera
Sun-spotter, and
a laptop, with software to display data.

This suitcase can be lent out to high school classes after providing some instruction on its operation. Following a month or so, of using this suitcase, the high school students (and teacher) are asked to give a presentation about their research and the resultant findings. The Space Suitcase is then circulated to another school. For more information, contact Prof. Nikolai Ostgaard (Nikolai.Ostgaard@ift.uib.no) or Assoc. Kjartan Olafsson (Kjartan.Olafsson@ift.uib.no).