

Swedish Institute of Space Physics – Uppsala

With Cluster II's four satellites in space for the fourth year in a row, Cassini in orbit around Saturn, Rosetta on its way to the Comet Churyumov-Gerasimenko and Smart-1 closer and closer to the Moon, the Swedish Institute of Space Physics in Uppsala receives large amounts of scientific data every day. Prof. Mats André, head of the two research programmes at the division in Uppsala, is very pleased with the situation. "All instruments are working well, and they will provide great knowledge about phenomena around the bodies they orbit, or are going to orbit, as well as the almost empty space they pass on their journey", he says.

The satellite group has the overall responsibility for the Electric Field and Wave instrument (EFW) on the four Cluster II spacecrafts. These spacecraft were launched in two pairs during the summer of 2000, and are now giving three-dimensional pictures of the electric fields that surround us.

Cassini was launched back in 1997 and the group participates as Co-Investigators within the Radio and Plasma Wave Science (RPWS). The group has delivered electronic and a sensor with a deployable boom for a Langmuir Probe.

For Rosetta the Satellite Group co-operates with institutes in other Nordic countries, but has the overall responsibility for the Langmuir probe instrument. The instrument will produce detailed observations of the plasma environment around the comet.

Smart-1 is today in orbit around the Moon and onboard the institute is participating in the SPEDE instrument with designing and manufacturing the two electrostatic probes of the instrument.

The Swedish Institute of Space Physics (IRF) has institutes on several locations in Sweden. The activities are divided into five main research programmes, three of which are connected to the activities in Kiruna and two in Uppsala. IRF-Uppsala is together with other closely related institutes, tightly integrated in a very large space research community in Uppsala.

The Satellite Group at the Uppsala Division studies magnetospheric and solar system physics. Experiments are performed using satellites and space

probes to study the space plasma, waves and fields. Topics studied experimentally and theoretically, include generation, propagation, damping of waves, wave-particle interaction, particle acceleration, wave-wave coupling, solitary waves, cavitation and turbulence. The solar Terrestrial Physics Group takes part in space programmes by correlative multipoint measurements using satellite and ground based instruments. Additionally, there is also a close collaboration with departments at Uppsala University, other scientific groups in Sweden and around the world.

Mats André furthermore informs us that the PhD students at the university carry out a very important part of the research activities that are based on satellite data. "However, as both staff and co-workers within the IRF-U as well as university teachers, we are involved in both planning the research activities and the utilisation of data. We also participate in planning special measurements from the satellites and as supervisors for the students. Sometimes I participate in the research activities, but most of what I have mentioned has been carried out by the students themselves".

To our question about issues like education of space researchers, Mats André tells us that the IRF-U and the University of Uppsala in co-operation educate researchers, however, not only space researchers, and that they hope that the researches they educate can contribute with knowledge and experiences that can be widely used. "We hope a doctorate's degree not only provides a basis for a research career for all times, but we hope the experience and knowledge will form the basis for engagement in different professional careers".

"The research we carry out at our institute is in principle basic research", Mats continues, "but the society gets a long line of additional effects. The results from Cluster, for one, are for the most basic knowledge, but to obtain these results it is necessary with a large degree of technological research to develop sensors and instruments for the satellites and to develop the satellites themselves. In many cases it takes cutting edge technology when talking about practical utilisation of Earth. We have, and must continue to have, a good dialogue with the technology community"

"That goes for the results as well. As a starting point it is only a matter of basic knowledge, however, it provides knowledge about the influence of what surrounds us, in addition to how the phenomena far away interact with our surroundings and how it may influence life on Earth. Without the basic research we end up fumbling in the dark", a very engaged Mats André concludes.



*The Ångström laboratory in Uppsala with Swedish Institute of Space Physics and Uppsala Astronomical Observatory.
Photo IRF-U.*



*Analysis of results from Cassini has the highest priority at the institute after the successful orbiting of Saturn
Photo: NASA*