EISCAT

Since coming into full operation in the early and mid-1980s, the EISCAT Scientific Association has been the World leader in Incoherent Scatter research. The Association has constructed and operated the World's three premier Incoherent Scatter radars and achieved World leadership in the three critical areas of radar hardware, modulation schemes and data processing.

The huge expertise and capabilities of the Association are ideally poised to make further critical contributions in the areas of fundamental plasma physics, applied Space Weather research, and training and education – all areas of exceptional importance not only to the members of the present Association, but also to the wider scientific community and, indeed, to mankind itself.

Recent extensive updating, involving both radar hardware and software, has positioned the EISCAT Scientific Association as a uniquely capable facility to address the priority research topics in high latitude geophysics. Further possibilities exist, not only to extend and maintain this leadership position to enable the Association to address already identified future priority areas, but also to permit the Association to become the premier data source for continuous, quality, high latitude data.

New and existing Associates are always welcome to join in exploiting the unequalled capabilities of these instruments and the wide range of opportunities they provide for environmental research, geophysics research, and student training.

EISCAT Scientific Association

HEADQUARTERS

EISCAT Scientific Association
Box 164
SE-981 23 KIRUNA, Sweden
Phone +46-980-78700
Fax +46-980-78709
Email: eiscat@eiscat.se

OPERATIONAL SITES

Kiruna

EISCAT
Swedish Institute of Space Physics
Box 812
SE-981 28 KIRUNA, Sweden

Longyearbyen

EISCAT Svalbard Radar
P.O. Box 432
N-9171 LONGYEARBYEN, Norway

Sodankylä

EISCAT
Geophysical Observatory
FIN-99600 SODANKYLÄ, Finland

Tromsø

EISCAT
Ramfjordmoen
N-9027 RAMFJORDBOTN, Norway

EISCAT SCIENTIFIC ASSOCIATION

Unrivalled expertise in Incoherent Scatter

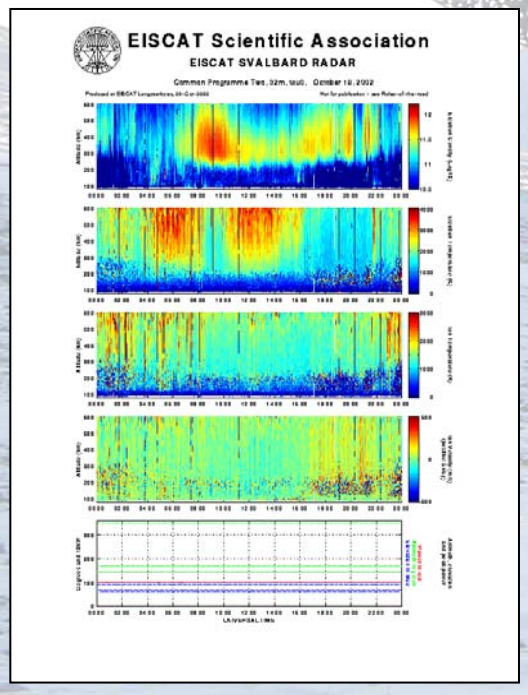
www.eiscat.se

The EISCAT facilities

The facilities of the EISCAT Scientific Association presently comprise the state of the art in global Incoherent Scatter Radars. All three incoherent scatter radars have recently been substantially renovated and upgraded and all are in excellent technical shape to address the demands of cutting edge, twenty-first century research.

The EISCAT Svalbard Radar and a new US radar at Poker Flat, Alaska, are the most recent of the World's incoherent scatter radars. It is built around low maintenance television transmitter technology, and presently delivers in excess of 1500 hours of data of unsurpassed quality and resolution each year (50% above target). The radar is located near the main Svalbard settlement, Longyearbyen, where it benefits not only from excellent supporting infrastructure, transport, and accommodation facilities but also wide opportunities for direct collaboration with many other installed instruments including a wide range of optical systems, two rocket launching facilities, MST and meteor scatter radars, and (presently under construction) an ionospheric heating facility.

The mainland radars are built around a VHF radar at Tromsø (Norway) and a tri-static UHF radar (the World's only such facility able to measure full vector ionospheric plasma velocities without the need to integrate across wide spatial extents) with its transmitter at Tromsø and additional receivers at Kiruna (Sweden) and Sodankylä (Finland). Again, these facilities enjoy access to superb local supporting infrastructure, travel and accommodation facilities and to an even wider range of other locally installed instruments including optical, radio wave, LIDAR, and two major rocket launching facilities. In addition to the two Incoherent Scatter Radars, the EISCAT facilities at Tromsø also include the World's most powerful ionospheric Heater and a research ionosonde. The mainland radars currently deliver close to 2000 data hours per year in the same format and quality as that produced by the radar on Svalbard.



All three Incoherent Scatter Radars operate with recently introduced advanced pulse coding schemes whose complexity and consequent speed easily exceed the operational capabilities of any other such systems in the World. These ultra-sophisticated codes are perfectly matched by data analysis software embodying the very best mathematical concepts to ensure the efficient recovery of the maximum possible target information, even under extreme and/or marginal conditions. Supporting equipment includes very substantial computing resources allowing very large data processing schemes to be completed sufficiently rapidly to keep up with the incoming real-time data stream. Adequate facilities also exist to record the raw data samples continuously at the maximum sampling rates where post-processing schemes require it. All raw data are securely archived in-house and can be provided to users on a variety of media to suit individual requirements.

Each radar site is equipped with extensive facilities for visiting scientists to allow them to develop, monitor and analyse their own programmes, as well as making use of the existing library of observational programmes.

All processed data can be made available in a timely manner through the Association's WWW servers; real-time data from virtually all routine operations are available on line, with fully analysed and quality controlled parameter sets being released within a few hours of the end of each operational interval. Special data handling and distribution can be arranged where individual programmes may have particular requirements for unusually rapid data availability or unique data processing requirements.

Future Developments

The Association is pursuing a number of goals based on its recently adopted scientific strategy:

To understand the various forms of coupling between the Sun, the terrestrial magnetosphere, ionosphere, and atmosphere of the high-latitude regions, natural and anthropogenic forcing from below, and related plasma physics and dynamics, and to achieve the necessary knowledge, understanding, principals, and techniques which would allow mankind to monitor, predict, and mitigate such processes within the next 30 years.

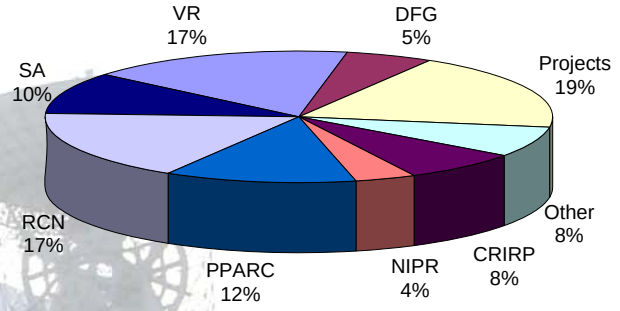
The first goal increases the data production rate of the Incoherent Scatter Radars to support more predictable, and more continuous, data availability. In particular, the EISCAT Svalbard Radar will operate essentially continuously throughout the International Polar year 2007-8 producing the most extensive, and most detailed, dataset describing the polar atmosphere ever collected.

EISCAT is also designing a completely new radar system, targeted specifically at studies of the detailed small-scale plasma interactions which mediate the transfer of energy between the solar wind and the terrestrial environment, having unique capabilities including true three-dimensional imaging of ionospheric targets, and performance approximately ten times better than the existing systems in all significant parameters. The new radar, called EISCAT_3D, is being designed, with European Union support, by a consortium lead by EISCAT and including partners in Norway, Sweden and the United Kingdom. The new system will require substantial financial investment (~80M€ over four to five years) and will maintain the Association at the forefront of ionospheric and magnetospheric research for many years.

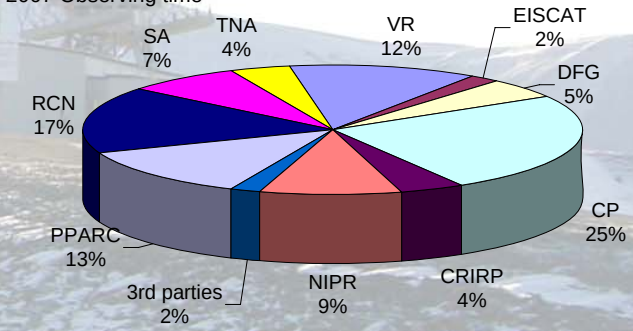
A further important goal is represented by initiatives to provide a firm foundation for data assimilation across the uniquely extensive instrumentation installed in northern Scandinavia. These will provide the basis for improved ionospheric modelling, now- and, eventually, fore-casting, and for the extraction of data products of direct relevance to organisations and systems for which the geo-effectiveness of solar-terrestrial events is significant.

2007 Budget and observing time

30.6MSek/3.3M€/4.2M$/33.8MCNY



2007 Observing time



EISCAT is an International Association supported by China (CRIRP), Finland (SA), France (CNRS, till 2007), Germany (DFG), Japan (NIPR and STEL, Nagoya), Norway (NFR), Sweden (VR), and the United Kingdom (PPARC)