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 invited 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.

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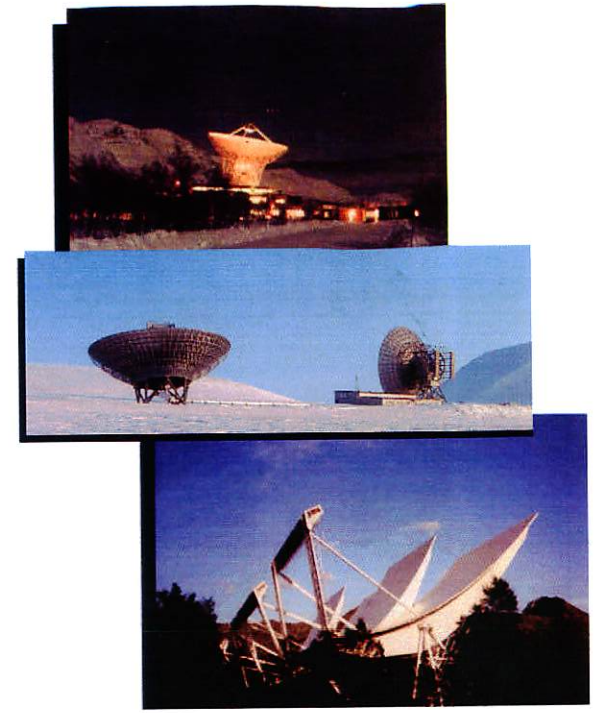


EISCAT SCIENTIFIC ASSOCIATION

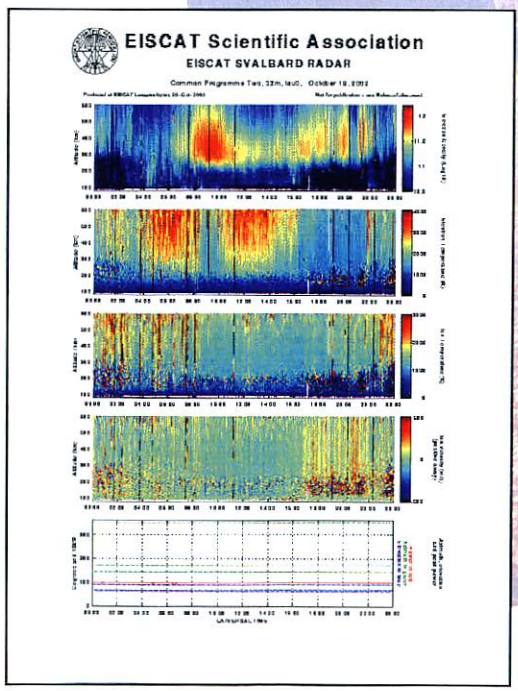
Unrivalled expertise in Incoherent Scatter

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 is the most recent addition to 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 in real-time, 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.

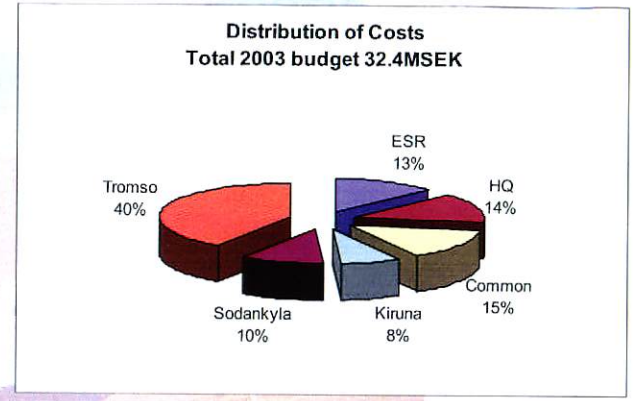
Future Developments

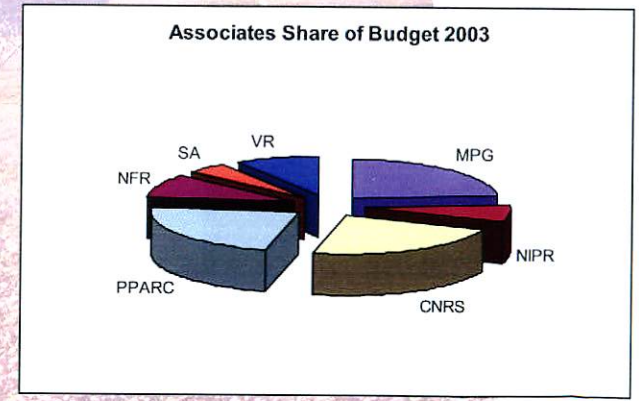
The $\mathcal{E}'$ (E PRIME) initiative envisages three phases of future operations and development.

In the first phase, covering approximately the years 2003 and 2004, the data production rate of the Incoherent Scatter Radars should be increased, exploiting the new hardware and software capabilities of the systems, to address demands for both higher quality data with improved temporal resolution as well as more predictable and more continuous data availability. At the same time, the Association should implement data assimilation strategies and systems to allow effective data handling facilities to be made available to the operators of other major and minor facilities relevant to the high latitude studies (including modellers and forecasters).

In the second phase, the requirement to upgrade or replace the mainland radar systems to support the demands for improved spatial resolution, as well as near-continuous operation, coincide with the development of a new EISCAT Agreement which will carry the Association into the future. This is an ideal opportunity for new Associates to join the EISCAT community, and for existing Associates to renew their commitment, further capitalizing on their existing investments in people, techniques and equipment embodied in the present Association. The upgrading/replacement of the mainland systems requires substantial financial investment (~60M€ over four to five years) which will maintain the newly reconstituted Association at the forefront of ionospheric and magnetospheric research for many years.

The third phase will see the Association bring the upgraded facilities on line and expand both its research and monitoring activities in line with their enhanced capabilities.





Photos: Tony van Eyken, Cesar La Hoz

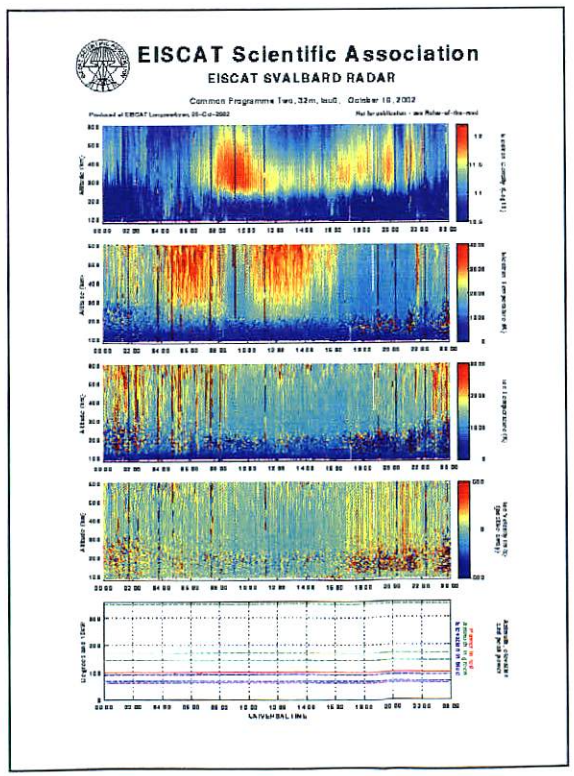
EISCAT is an International Association supported by Finland (SA), France (CNRS), the Federal Republic of Germany (MPG), Japan (NIPR) Norway (NFR), Sweden (VR) and the United Kingdom (PPARC)

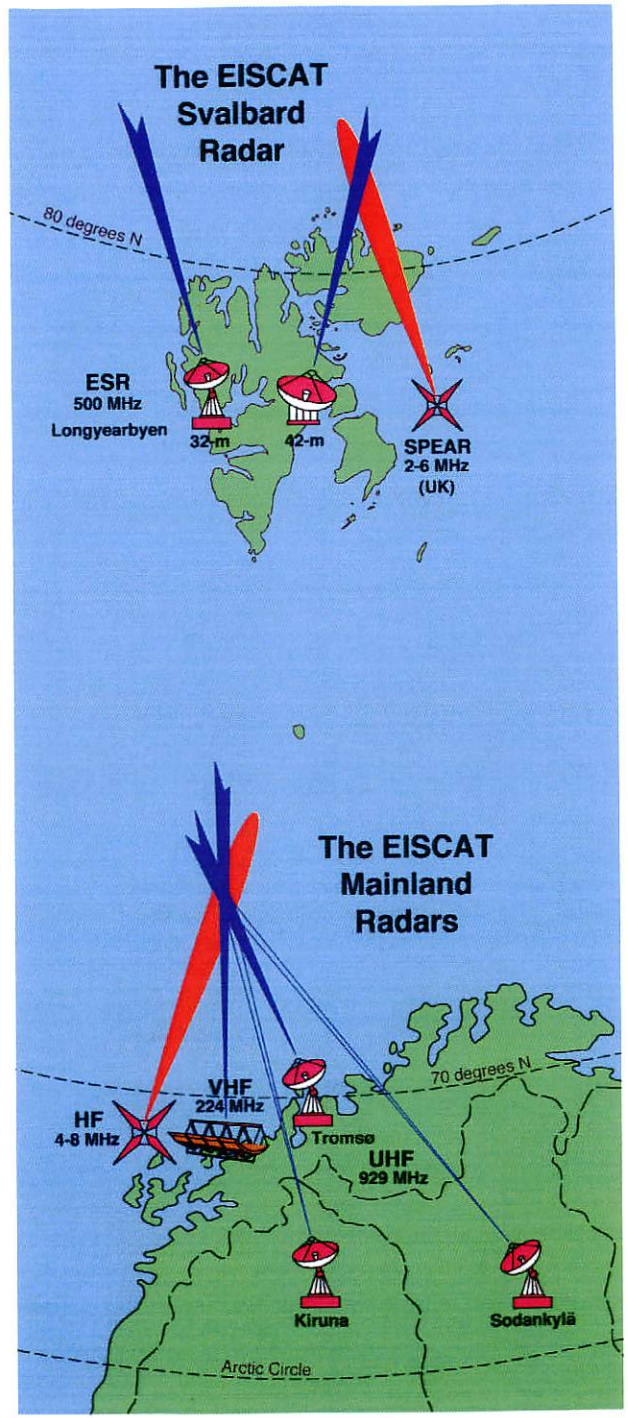
The EISCAT facilities

The facilities of the EISCAT Scientific Association presently comprise the state of the art in incoherent scatter radar. All three EISCAT radars have recently been substantially renovated and upgraded and are in excellent technical condition for addressing the demands of cutting edge, twenty-first century research.

The 500-MHz EISCAT Svalbard Radar is the most recent addition to 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 each year. 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 a newly-constructed ionospheric heating facility (SPEAR).

The mainland radars consist of a 224-MHz radar and a 4 to 8-MHz high power ionospheric heating transmitter at Tromsø (Norway) and a tristatic 929-MHz radar with a transmitter and receiver in Tromsø and additional receivers at Kiruna (Sweden) and Sodankylä (Finland). The tristatic system is unique in the world, and is able to measure full vector ionospheric plasma velocities without the need to integrate

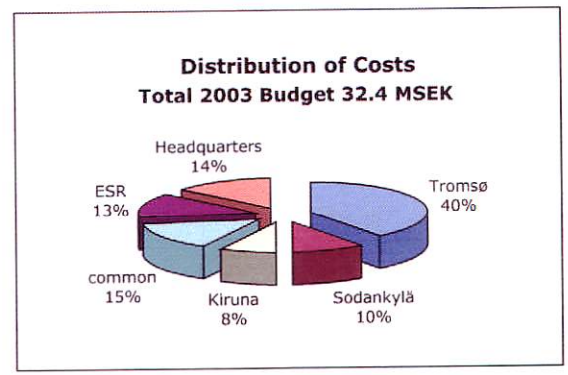


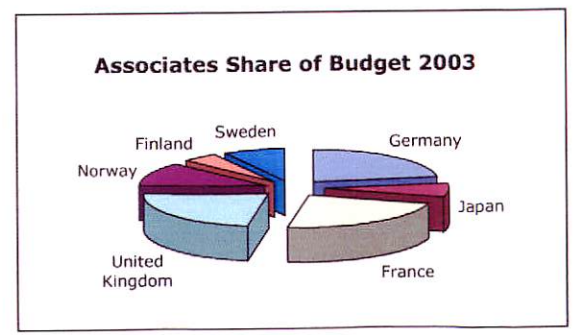


across wide spatial extents. These facilities enjoy access to superb local supporting infrastructure, travel and accommodation facilities and to a wide range of other locally-installed instruments includingoptical, radio, lidar, and two major rocket launching facilities. In addition to the radars, the 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 hours of data per year.

All of the EISCAT radars operate with advanced pulse coding schemes and sophisticated data analysis software. Substantial computing resources allow for rapid processing of data in real time. Raw data samples may also be recorded when required. All data are securely archived and can be accessed via the internet.

Real-time data from virtually all routine operations may be viewed through the Association's WWW servers, with fully-analysed and quality-controlled parameter sets being released within shortly after the end of each operational interval. Special data handling and distribution may be arranged for programmes which require unusually rapid data availability or unique data processing.





Text, figures, and photos:
Tony van Eyken, Brett Isham, Cesar La Hoz

E I S C A T

EISCAT is an international association supported by Finland (SA), France (CNRS), Germany (MPG), Japan (NIPR), Norway (NFR), Sweden (VR,) and the United Kingdom (PPARC).

Since coming into operation in the 1980s, the European Incoherent Scatter (EISCAT) Scientific Association has been on the forefront of atmospheric and space research. The Association has constructed and operates the world's three most modern incoherent scatter radar systems, and has achieved leadership in the areas of radar hardware, transmission schemes, data processing, and scientific results.

Recent extensive upgrades involving both radar hardware and software have positioned EISCAT as a uniquely capable facility for addressing priority research topics in high latitude geophysics, and allowed EISCAT to maintain its position as a premier data source for quality high-latitude data.

The scientists and engineers of the EISCAT community continue to make contributions in areas such as fundamental plasma physics, applied space weather research, and training and education – all areas of importance to the broader scientific community as well as to our modern technological society. Researchers and students are invited to join in exploiting the extensive capabilities of these instruments and the wide range of opportunities they provide for environmental research, geophysics research, and technical training.

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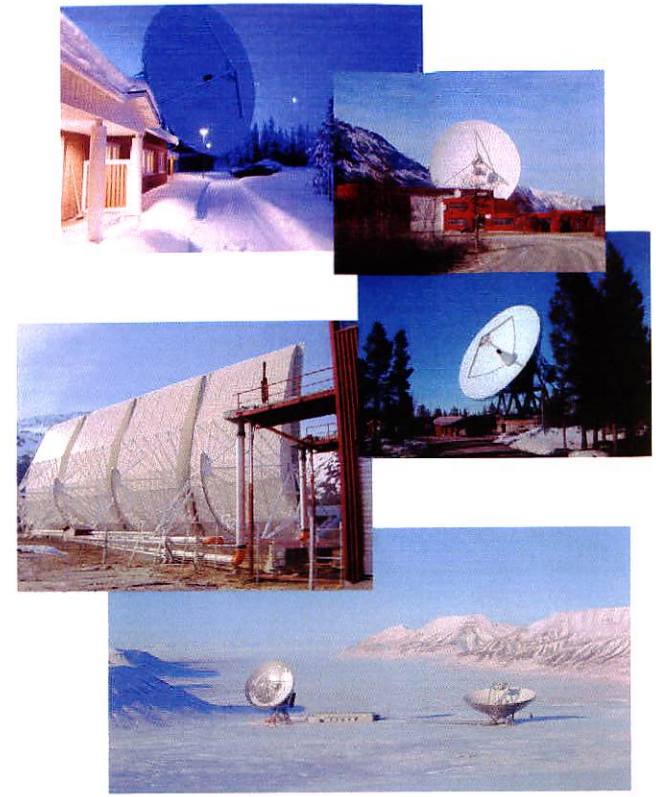

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