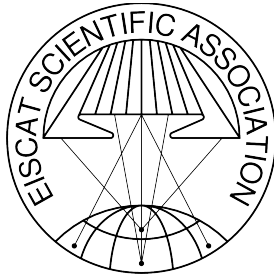


## EISCAT Scientific Association

EISCAT is an international research organisation, undertaking fundamental research into solar-terrestrial physics and atmospheric science. The members of EISCAT are funding agencies from China, Finland, Japan, Norway, Sweden and the United Kingdom, who make long-term commitments to EISCAT based on an annual subscription. Agencies from France, Russia and Ukraine buy radar time on a “pay-per-use” basis.



EISCAT operates three high-power incoherent scatter radars: the VHF radar with a transmitter and receiver in Tromsø (Norway) and additional receivers in Kiruna (Sweden) and Sodankylä (Finland); the UHF radar in Tromsø, and the EISCAT Svalbard Radar (ESR) near Longyearbyen. The earlier UHF receivers in Kiruna and Sodankylä have recently been converted to VHF after they started suffering interference from mobile phone services.



The EISCAT Svalbard Radar.

## EISCAT\_3D Timeline

2005 – 2009: FP6 Design Study (completed)

2010 – 2014: FP7 Preparatory Phase

2014 – 2021: Implementation Phase

2014 – 2016: *Preparation*

2016 – 2019: *Construction (in stages)*

2018 – 2021: *Commission (in stages)*

## Get Involved!

Now is the time to become involved in the EISCAT\_3D project! There are many ways to participate ranging from simply sending us your ideas to joining the working groups through which we are engaging with the scientific community. As an institute you can also help by interacting with your funding agencies, and demonstrate your support by registering as an “Associate Partner” in EISCAT\_3D.

EISCAT invites your comments and suggestions. To get involved, please contact:

EISCAT Scientific Association

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Tel: +46 980 79157

Fax: +46 980 79159

More information available at the EISCAT\_3D project website:

[www.eiscat3d.se](http://www.eiscat3d.se)

and the EISCAT\_3D blog:

[blog.eiscat3d.org](http://blog.eiscat3d.org)

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# EISCAT\_3D

Europe's Next-Generation Radar for  
Atmospheric and Geospace Science



## EISCAT\_3D

EISCAT, with international partners, is preparing to construct the next generation radar to provide comprehensive 3D monitoring of the upper atmosphere and the ionosphere. EISCAT\_3D will consist of multiple phased arrays, using state-of-the-art signal processing and beam-forming techniques to achieve ten times higher temporal and spatial resolution than available from present radars.

In 2008, the European Strategy Forum on Research Infrastructures (ESFRI) added EISCAT\_3D to its roadmap of large-scale European research infrastructures for the next 20–30 years.

ESFRI



Prototype antenna from the EISCAT\_3D Design Study.

EISCAT\_3D is designed for continuous operation, capable of imaging an extended spatial area over northern Scandinavia with multiple beams, interferometric capabilities for small-scale imaging and with real-time access to the extensive data. The highly modular and expandable design includes a central active site with a diameter of few hundred metres, comprising tens of thousands of antennas including smaller outlying arrays for imaging applications. Four smaller receiver sites will be located 50 to 200 km from the central site.



LOFAR station: possible receiver design for EISCAT\_3D.

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EISCAT VHF and UHF radars at Tromsø

## Preparatory Phase

From October 2010, the European Commission is funding the four-year Preparatory Phase to develop the EISCAT\_3D project. The main task is to establish a consortium, which will fund the new research infrastructure and tackle remaining technical questions so that construction can begin once the Preparatory Phase is completed.



The key objectives of the Preparatory Phase are:

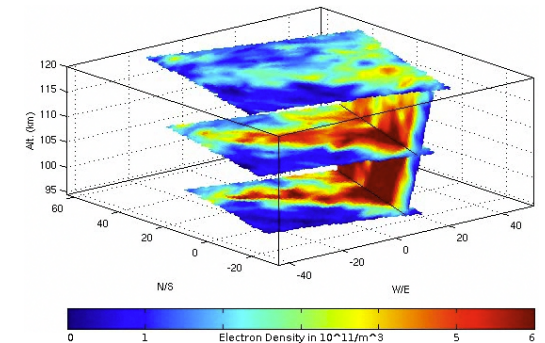
- assembling the consortium to construct and operate the new radar
- finalising the selection of radar sites
- establishing infrastructure requirements and obtaining construction permissions
- completing the designs for signal processing and beam-forming
- developing and testing prototypes of the antennas and transmitters
- completing software for signal processing, imaging and user control
- identifying industrial partners for production of relevant components

## Science Objectives

EISCAT\_3D will be a key facility for many research and operational areas including environmental monitoring, space plasma physics, solar system science and space situational awareness. Its location, within the auroral oval and at the edge of the atmospheric polar vortex, is unique for studying many important atmospheric and geospace processes. In addition, EISCAT\_3D will provide a platform to develop new applications in radar technology, experiment design and data analysis.

Science topics addressed by EISCAT\_3D include:

- influence from natural solar-terrestrial variability on the climate
- long-term changes due to human activity
- coupling between atmospheric layers
- space plasma physics
- measurements of solar wind and the corona
- effects from meteors and energetic particles
- space weather monitoring
- orbit determination of meteors and space debris
- radar mapping of near-Earth objects



Electron density, Poker-Flat Incoherent Scatter Radar (J. Semeter, T. Butler, C. Heinselman, M. Nicholls, J. Kelly, J Atm Sol-Terr Phys., 71, 738–743, 2009).