



EISCAT: A Multinational Scientific Association for Upper Atmosphere Research

Craig Heinselman

EISCAT Scientific Association



EISCAT

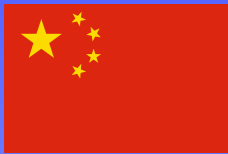
- Originally: European Incoherent SCATter.
- Since 1975.
- Operates 3 ISRs.
- Locations: Tromsø (NO), Kiruna (SE), Sodankylä (FI), Longyearbyen (Svalbard).
- Founding members: UK, DE, FR, NO, SE, FI.
- Members (2014): UK, NO, SE, FI, JP, CN (+RU, FR, (UA)).
- August 2011: 30 years of measurements.



Photo: Thomas Ulich.



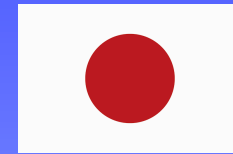
EISCAT Associates/Affiliates



CRIRP, PRC



Suomen Akatemia,
Finland*



NIPR/STEL, Japan



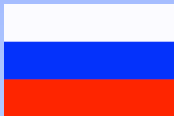
Forskningsrådet,
Norway*



Vetenskapsrådet,
Sweden*



NERC, U.K.



AARI, Russia



IRA, Ukraine



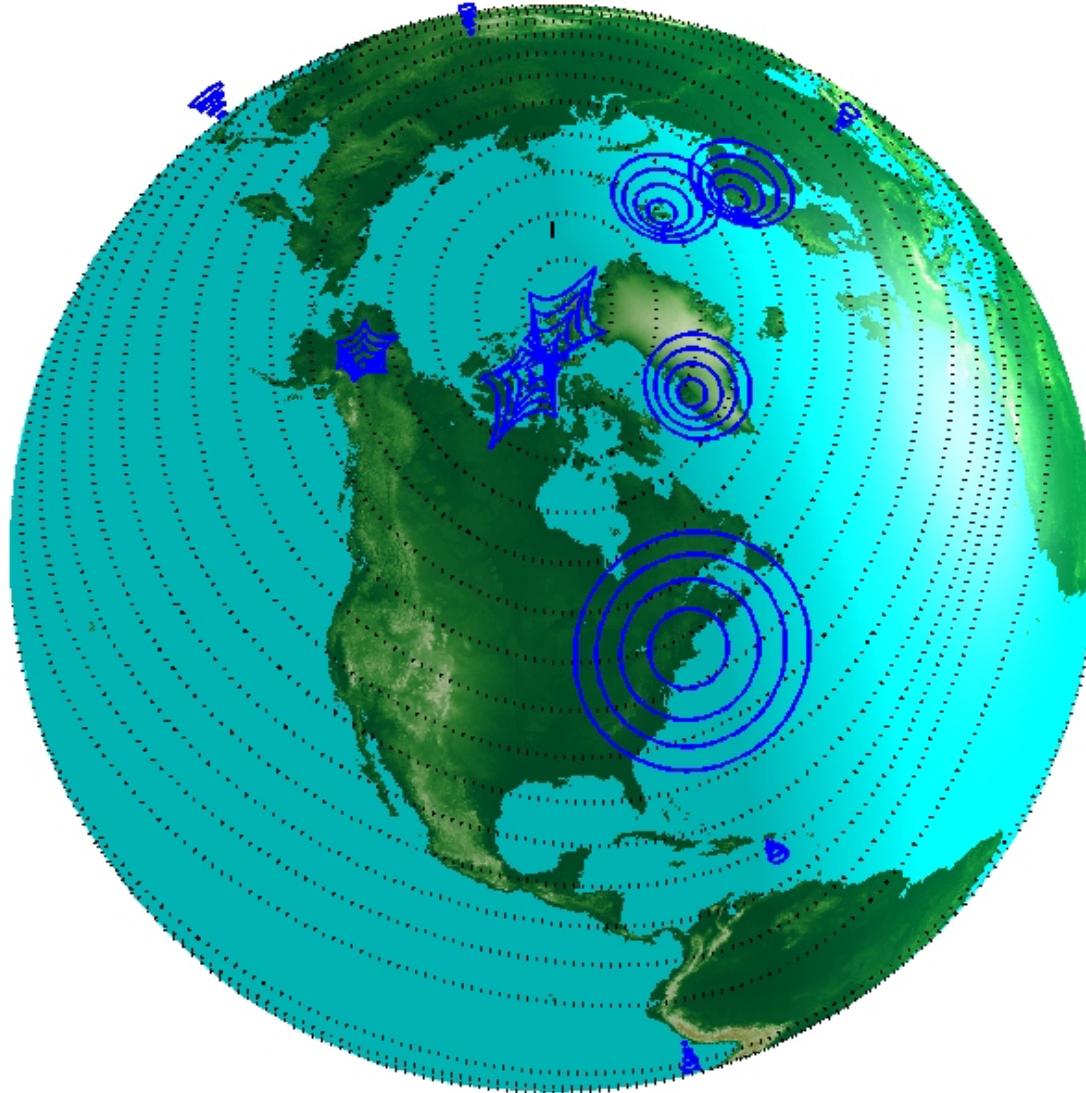
IRAP, France

* EISCAT host countries



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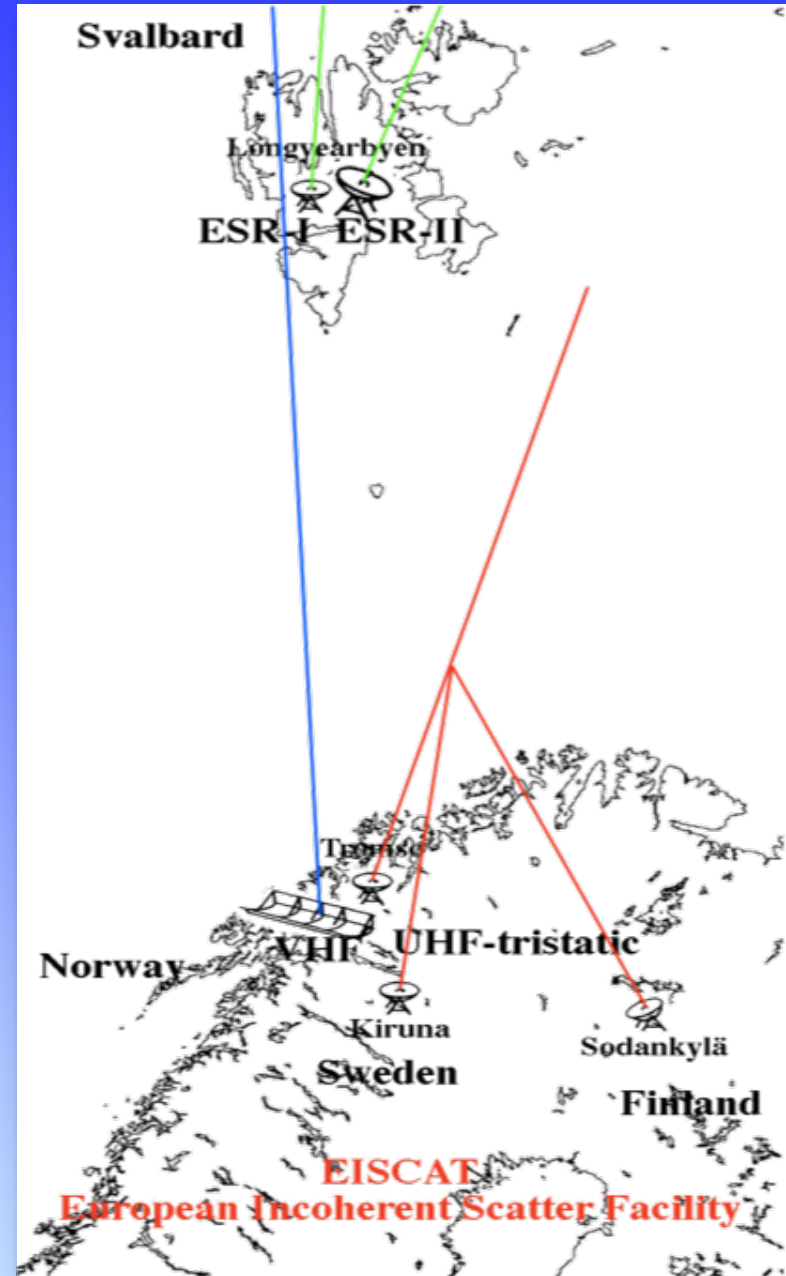
EISCAT & Other ISRs





Current EISCAT installations in Northern Scandinavia and Finland

Unique: tristatic IS radar!





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EISCAT Mainland Radars

Tromsø, Norway



Kiruna, Sweden



Sodankylä, Finland



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Multistatic now VHF



Kiruna, Sweden



KAIRA, Kilpisjärvi,
Finland



Tri-static Data

Kiruna

Sodankylä

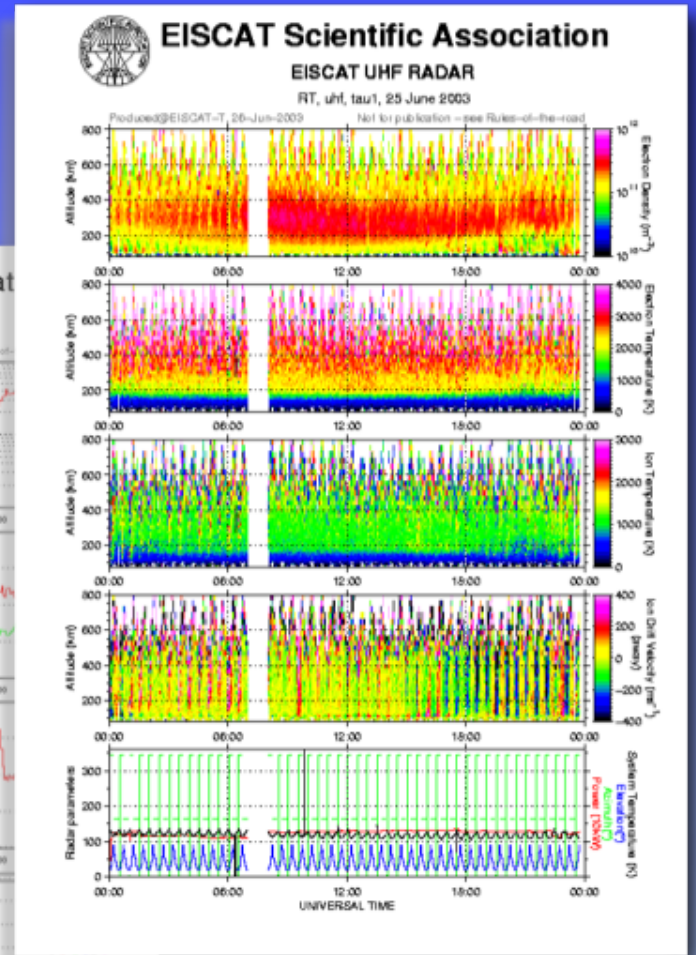
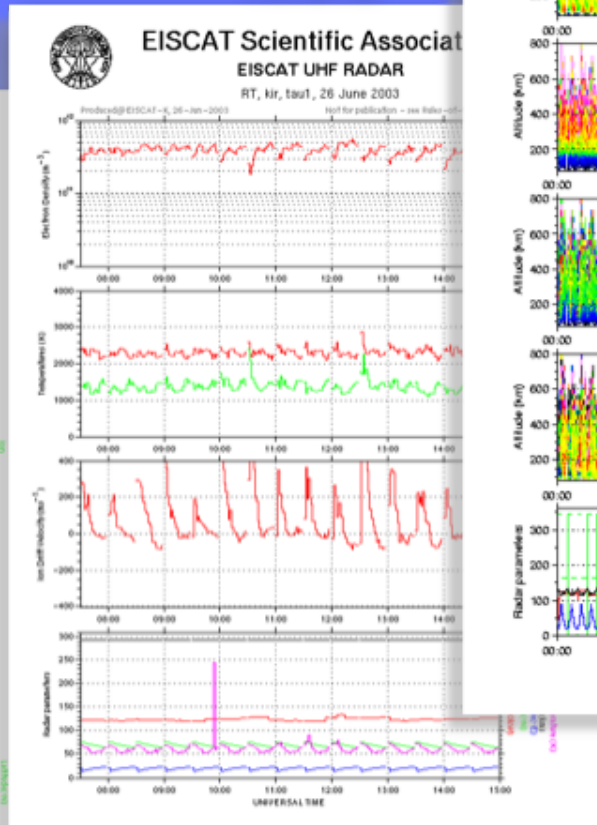
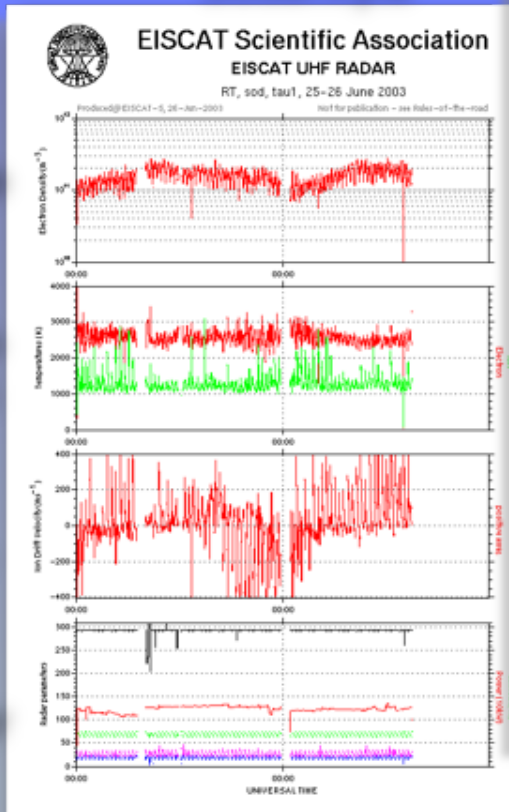
Ne

Te

Ti

v

par



Tromsø

Ne

Te

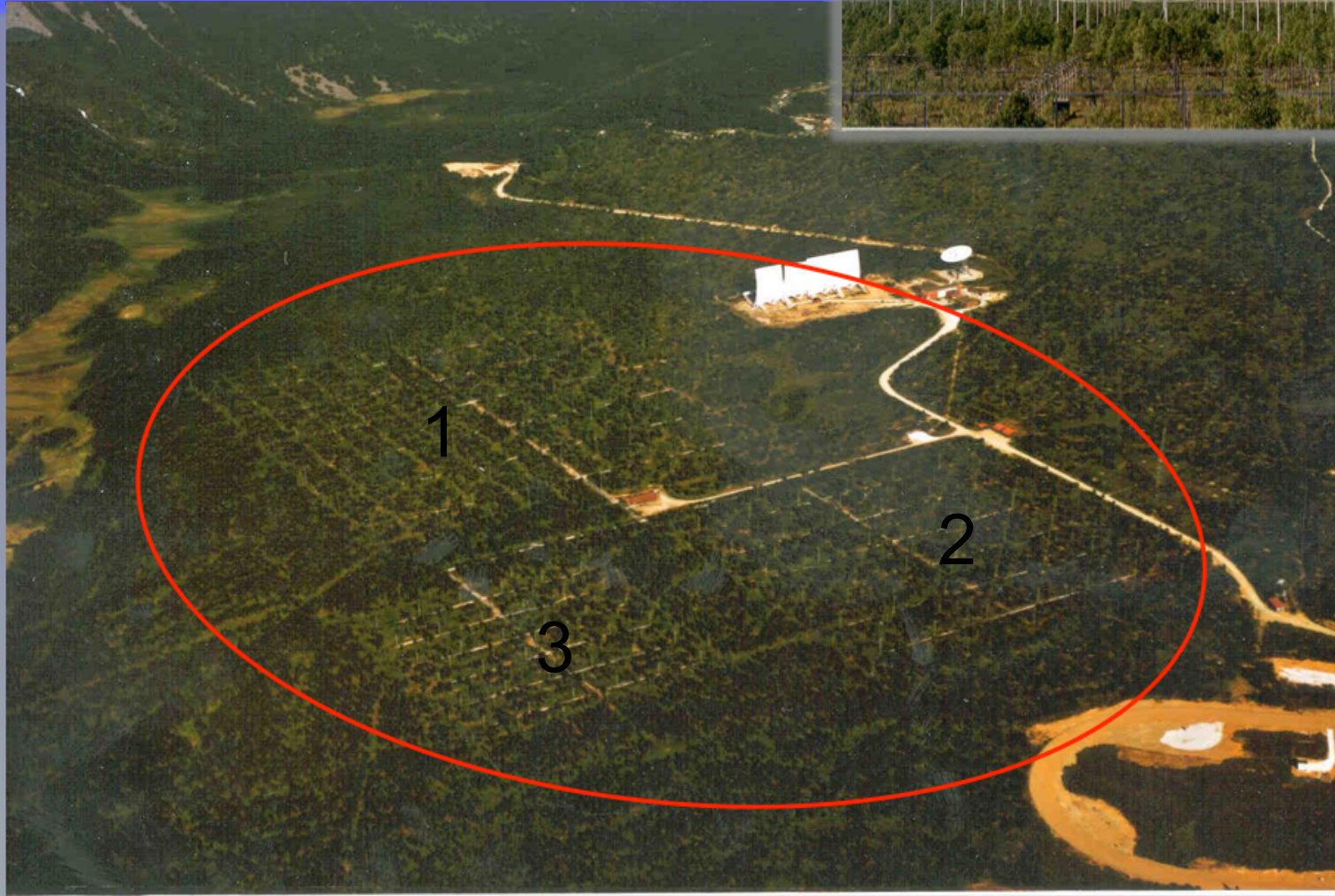
Ti

v

par



Ionospheric Heater 4-8 MHz





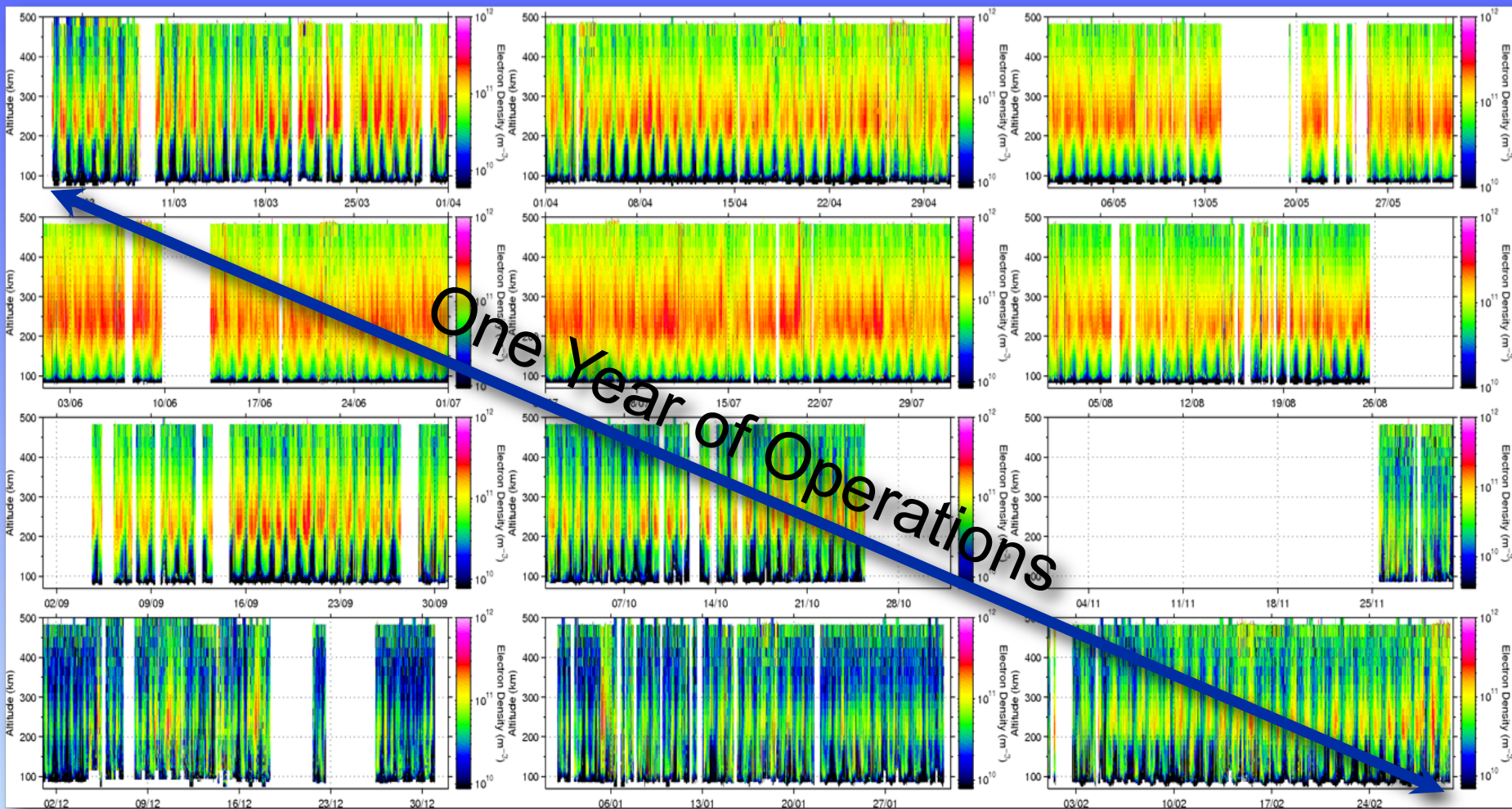
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EISCAT Svalbard Radar



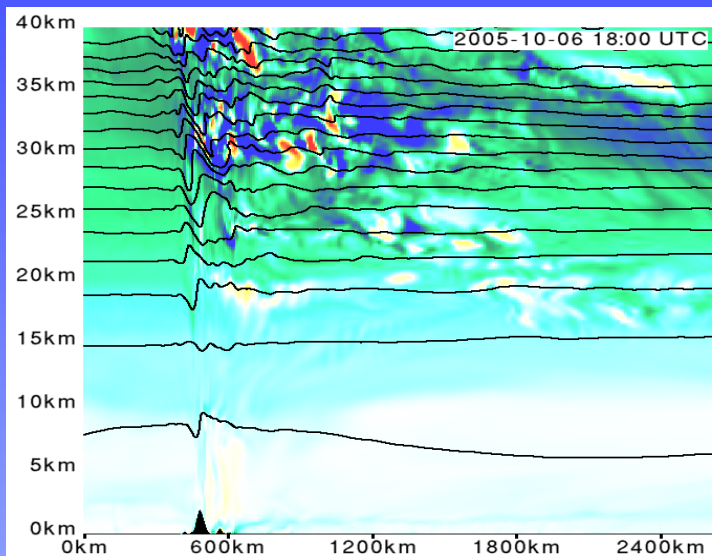


EISCAT Svalbard Radar

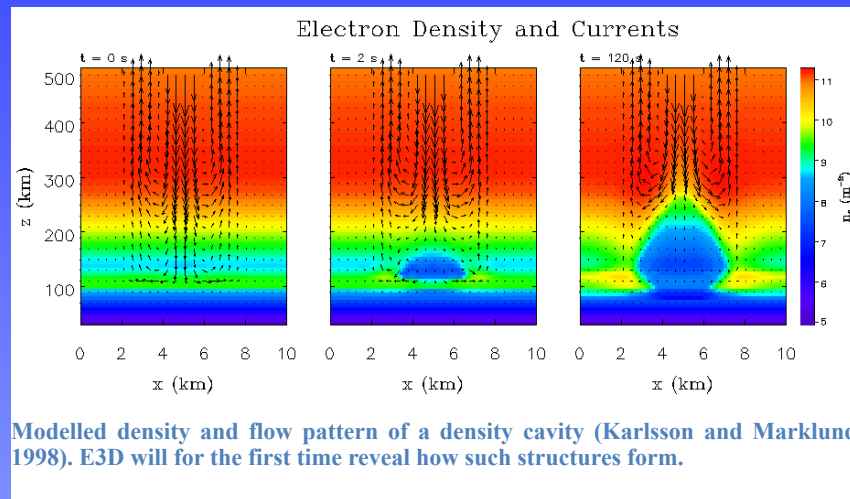




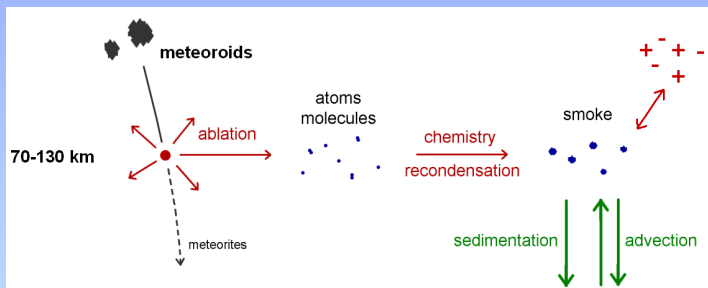
Diverse Science Topics



Model of a mountain wave breaking in the stratosphere. The contours show the flow of air (from left to right) across the mountains and the color scale shows potential vorticity. E3D will be the only radar in the world able to study vorticity structures in the lee of a major mountain chain.



Modelled density and flow pattern of a density cavity (Karlsson and Marklund, 1998). E3D will for the first time reveal how such structures form.



Schematic of the fate of meteoric material in the mesosphere (adapted from Gumbel et al. 2005).



Kiruna 2013-08-30

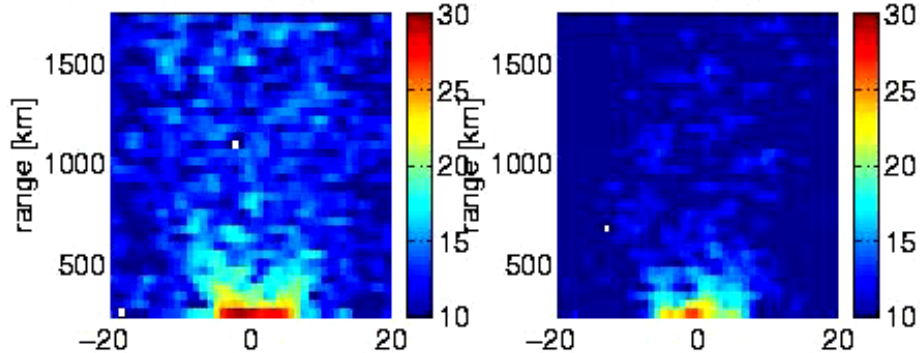


Diverse Science Topics

2003-01-26 @ 065300.40

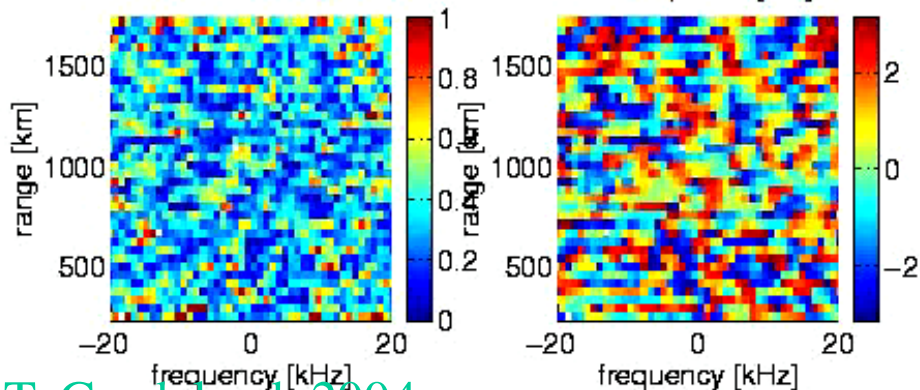
power spectra [dB], 42m ant

power spectra [dB], 32m ant



coherence

cross-phase [rad]



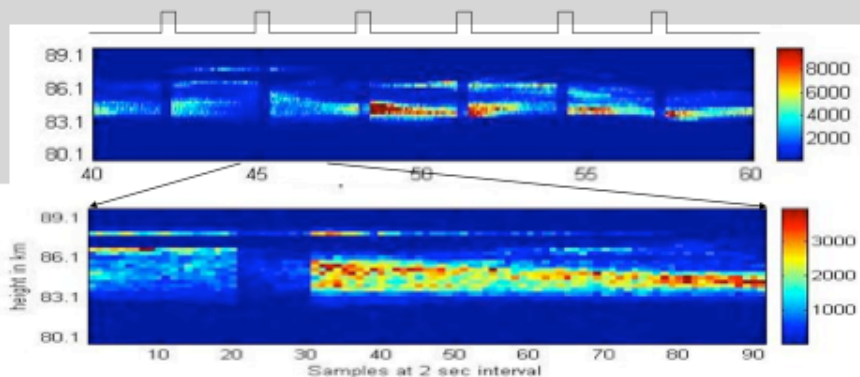
T. Grydeland, 2004



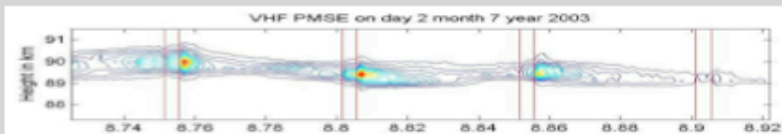


EISCAT highlights

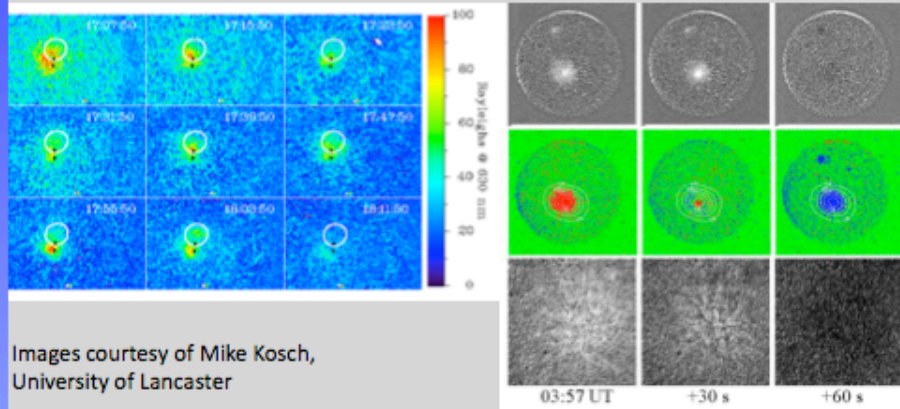
Modulation of Polar Mesospheric Summer Echoes



Overshoot effect – Lower dust density, or larger dust grains ??



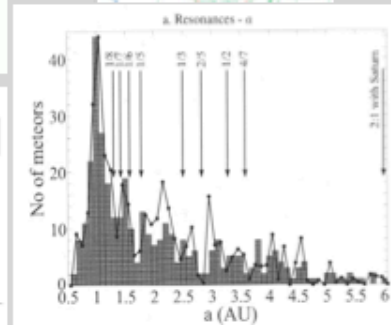
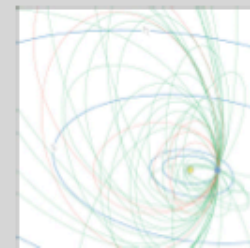
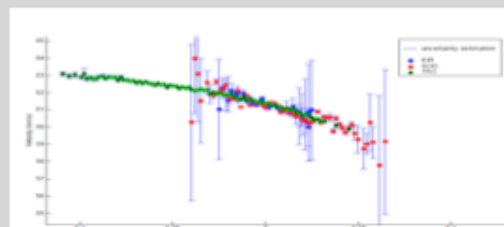
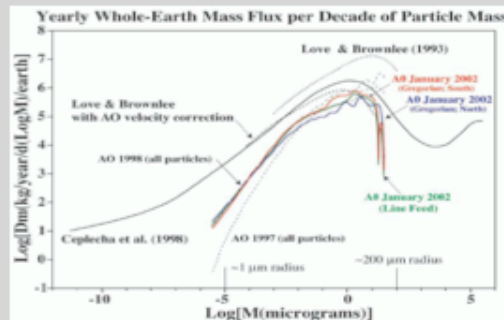
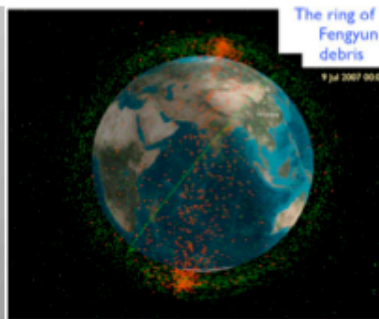
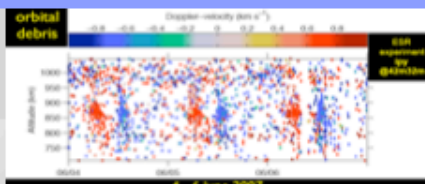
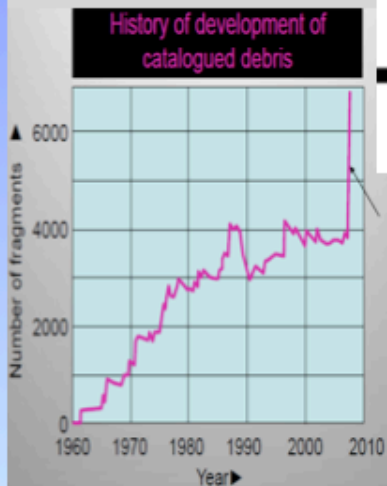
Artificial Auroras



Images courtesy of Mike Kosch, University of Lancaster

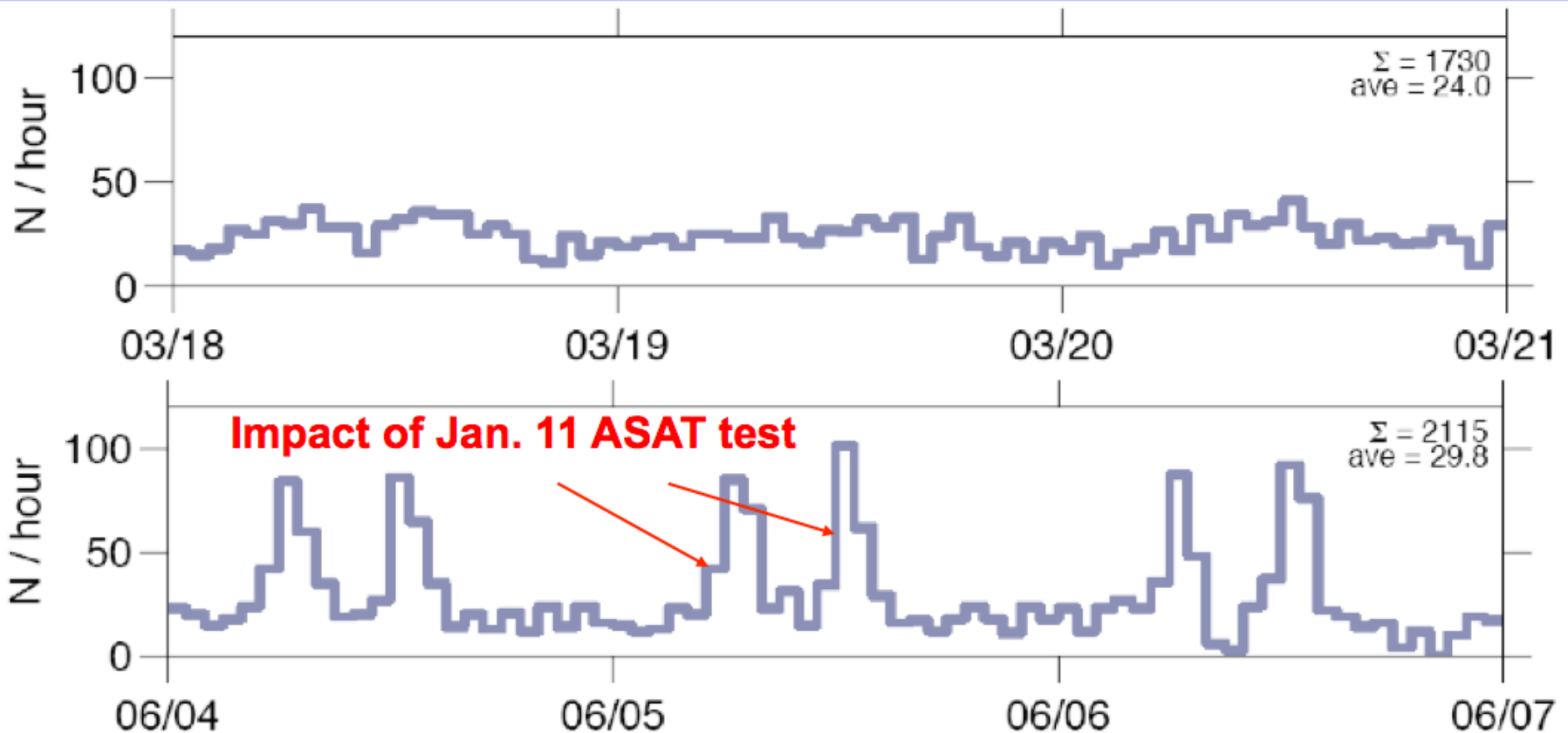
Meteors and Solar System Dust

Space Debris





EISCAT & Space Debris

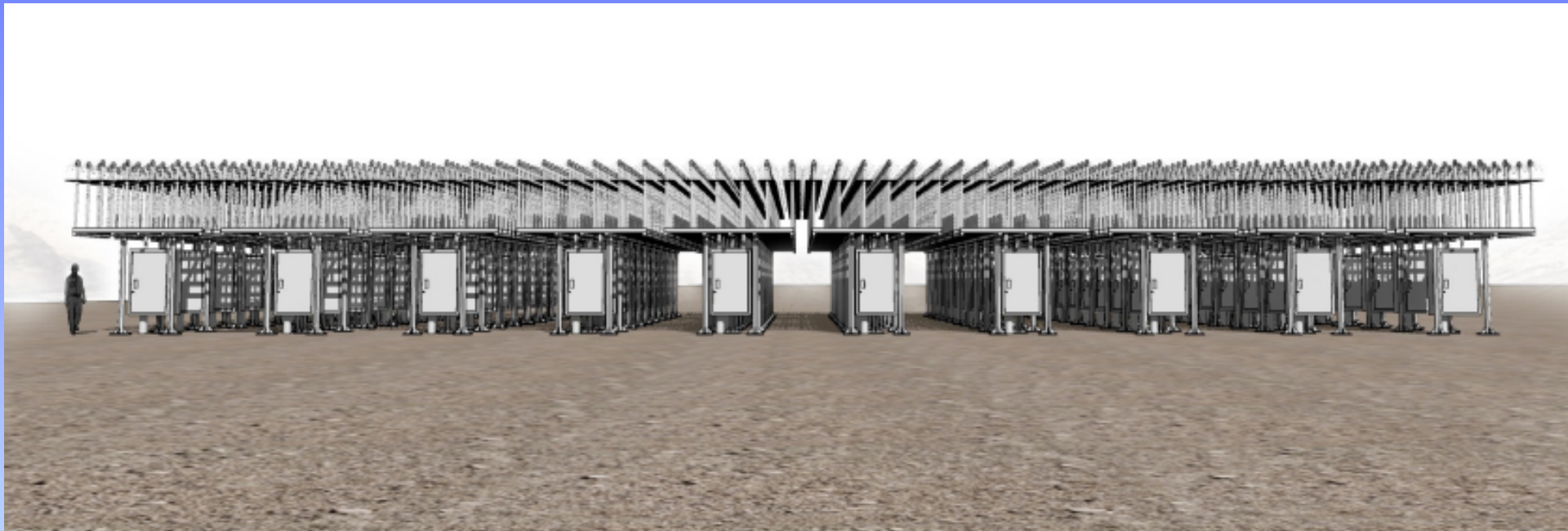


11 Jan 2007, Chinese anti-satellite missile test taking down Fengyun weather satellite.



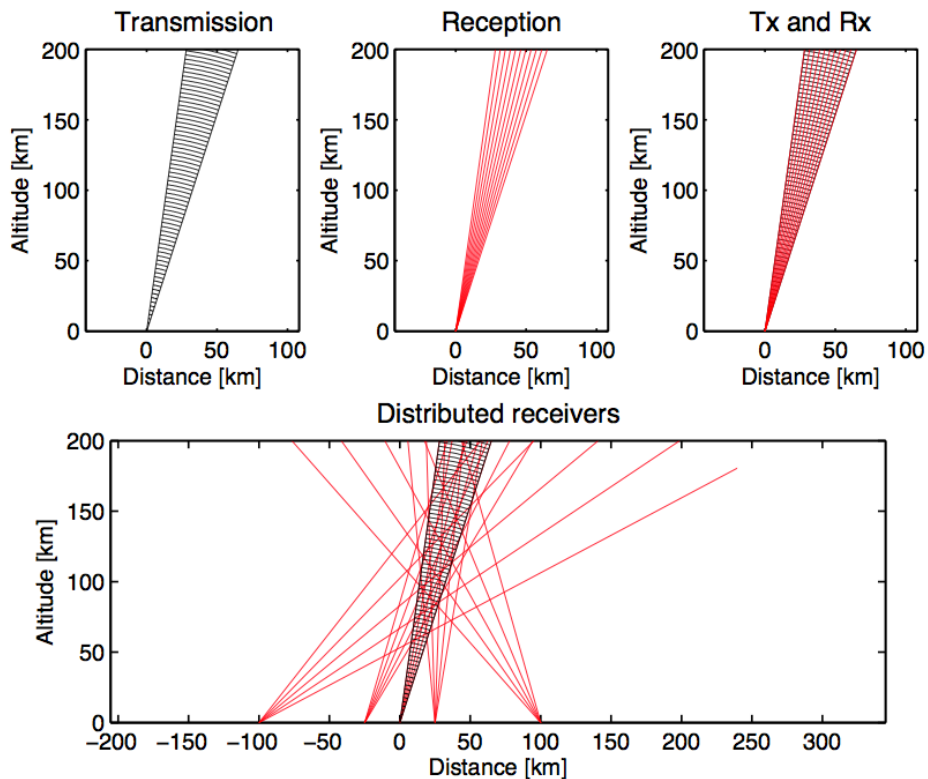
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EISCAT_3D – Reinventing EISCAT

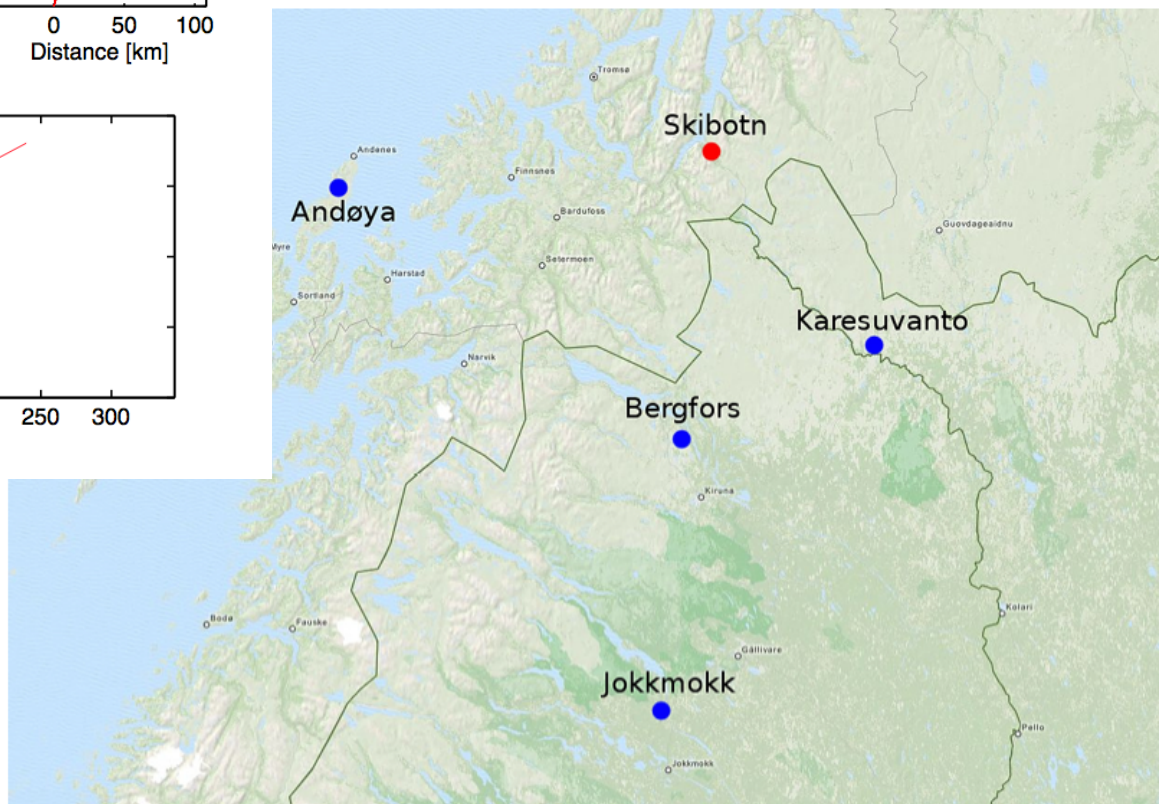




EISCAT_3D



A distributed instrument in northern Europe with 5 stations: 1 Transmit/Receive and 4 Receive-mostly

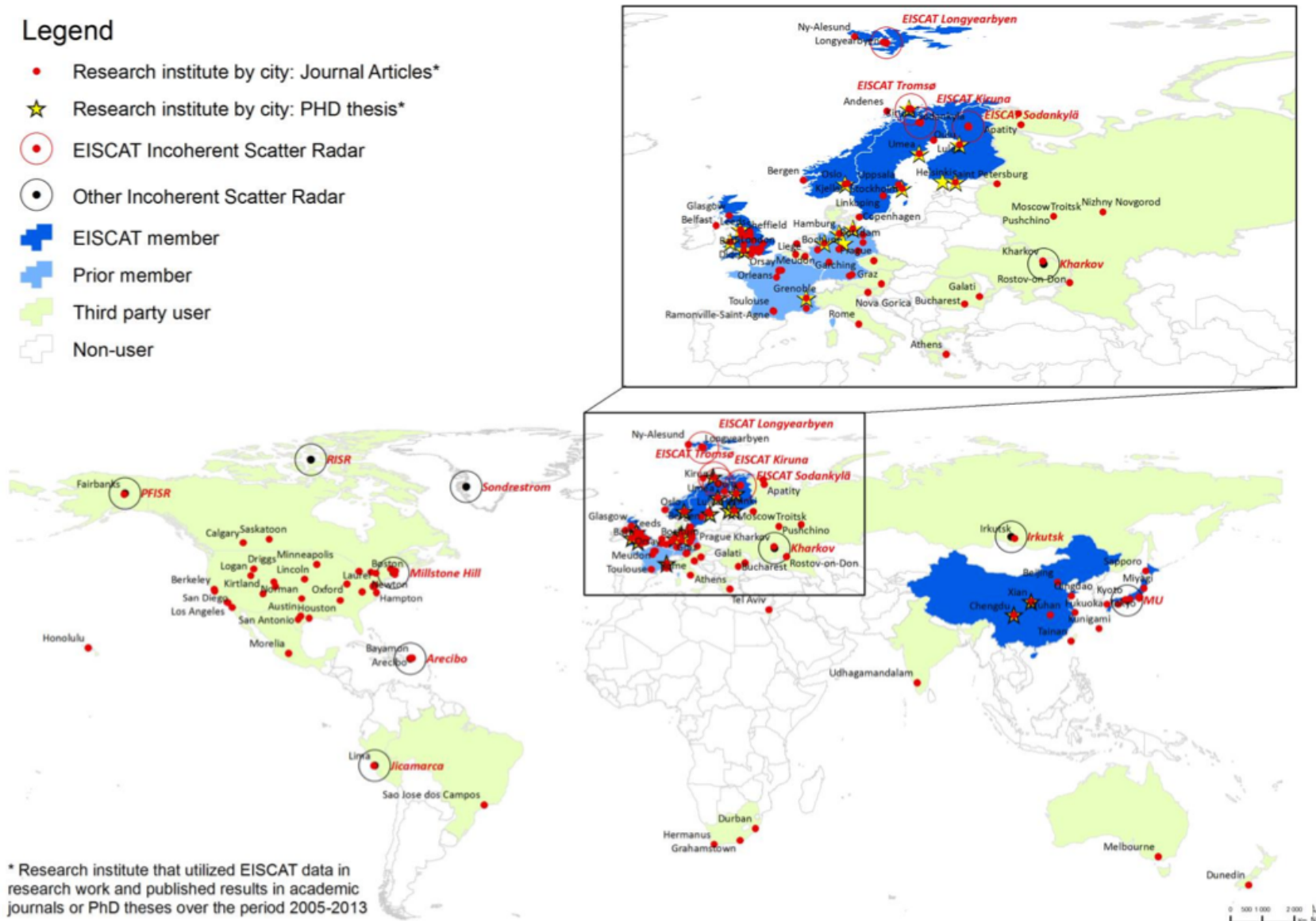


KTH Analysis of 8 Years of EISCAT Publications

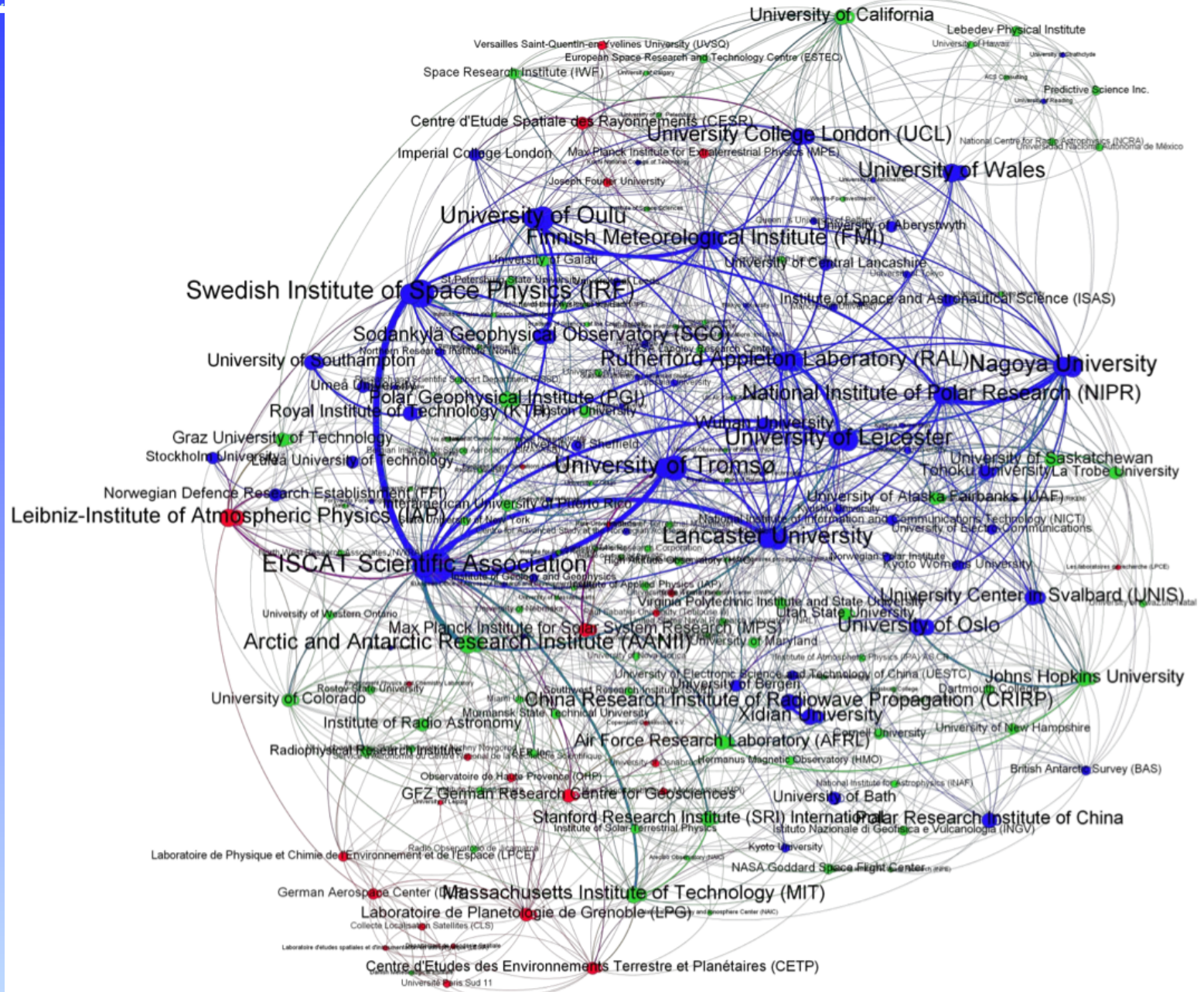
Legend

- Research institute by city: Journal Articles*
- ★ Research institute by city: PHD thesis*
- EISCAT Incoherent Scatter Radar
- Other Incoherent Scatter Radar
- EISCAT member
- Prior member
- Third party user
- Non-user

Figure 4.4. Spatial configuration of scientific work linked to EISCAT 2005-2013

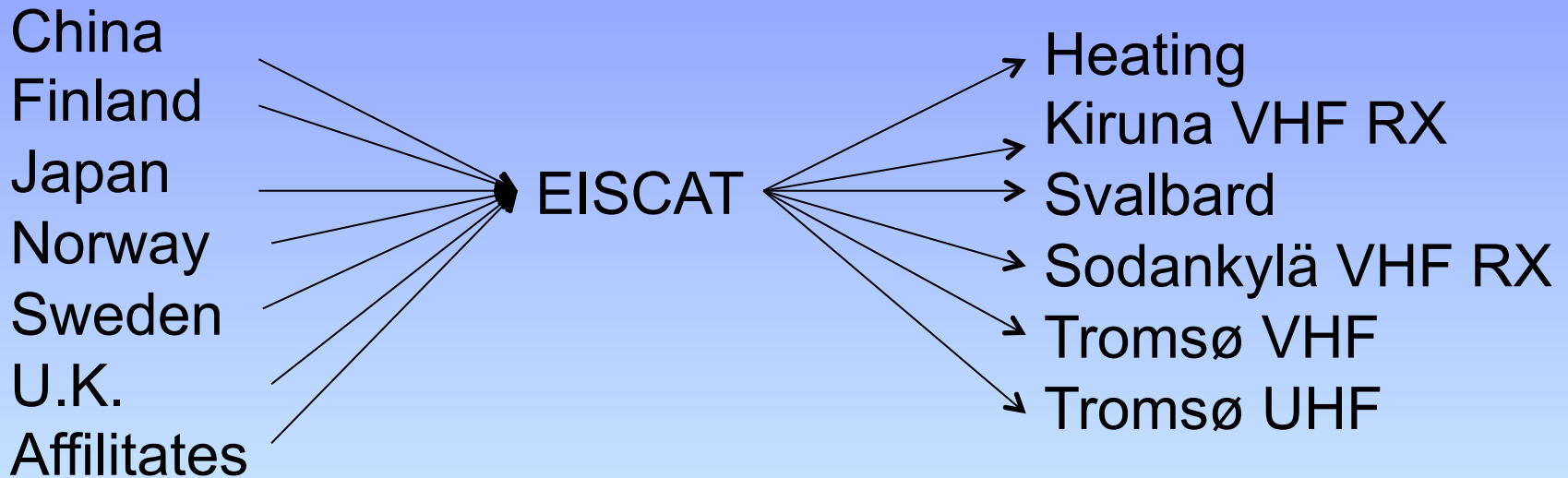
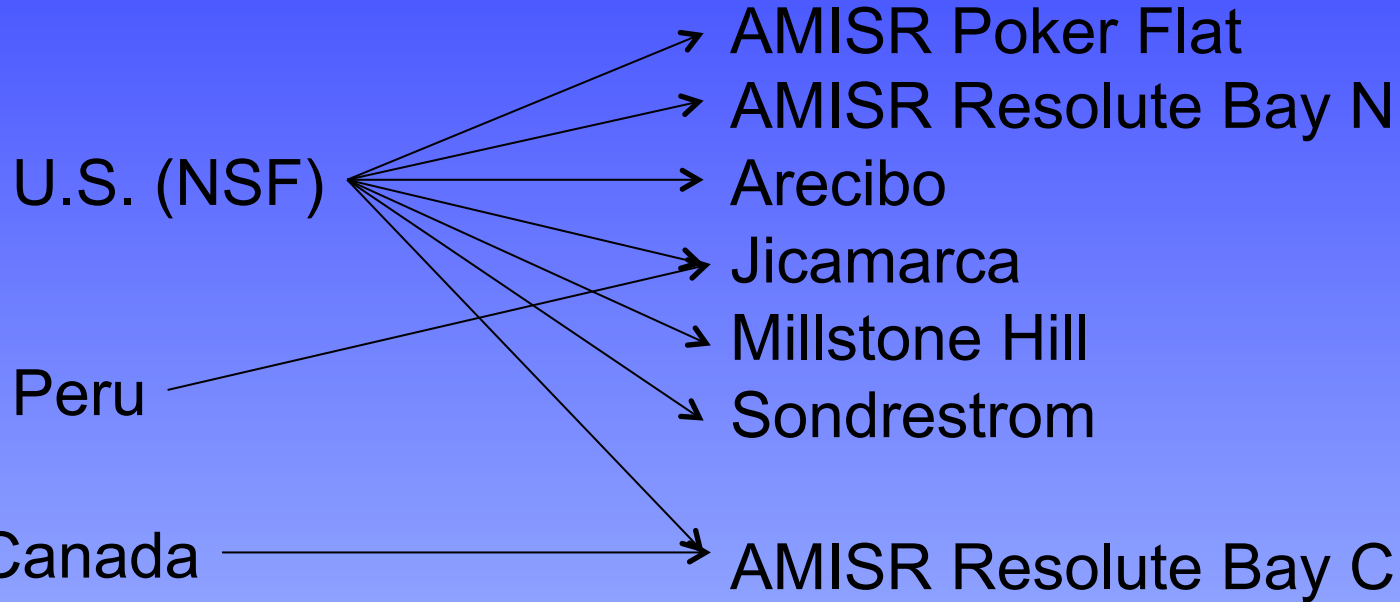


* Research institute that utilized EISCAT data in research work and published results in academic journals or PhD theses over the period 2005-2013





MIMO Funding





You can get Radar Time!

Live in a member nation

Collaborate with someone in a member nation

Become an affiliate institution

EISCAT Peer-Review Programme

EISCAT sets aside 200 hrs of radar time per year (at the moment).

Everyone can apply!

Decisions on basis of merit.

QUESTIONS?