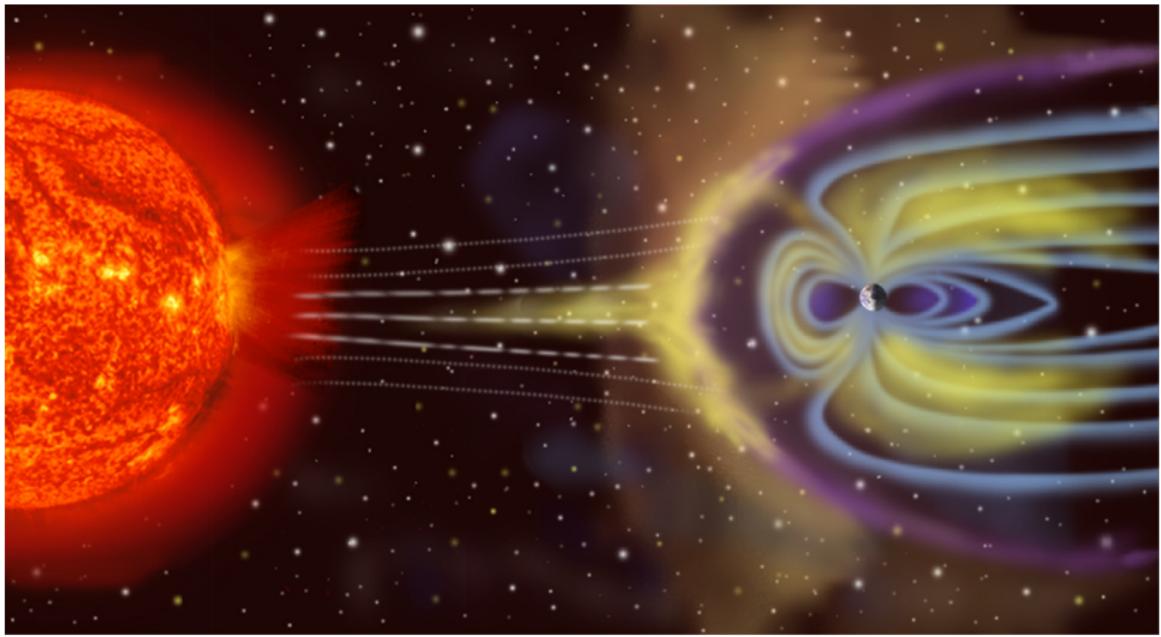


The EISCAT 3D project: Nordic Network Challenge



NORDIC E-INFRASTRUCTURE COLLABORATION

Solar wind and magnetosphere



Current EISCAT radars

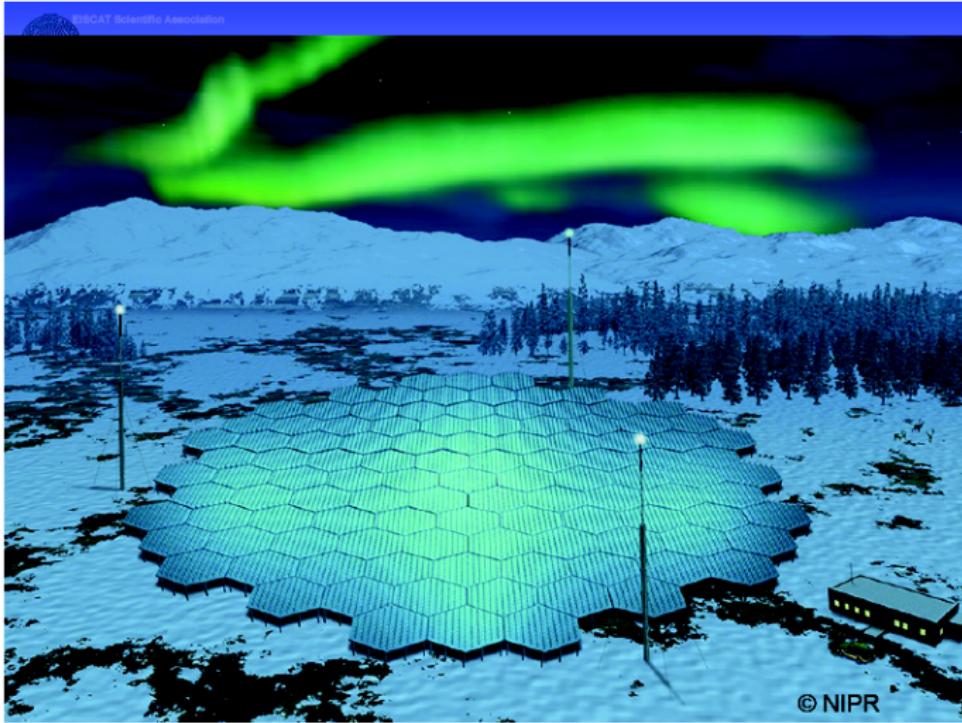


- Campaign operation using to fixed schedules.
- Oldest system since 1981.
- Dataset since 1981
 $< 100 \text{ TB}$.

NASA via Wikimedia Commons, EISCAT

European Incoherent Scatter Scientific Association (**EISCAT**)

EISCAT_3D Project



Arrays of 9919 antennas. VHF 233 MHz. Solid state amplifiers.
Up to 100 simultaneous beams. 60° zenith angle

EISCAT_3D Project



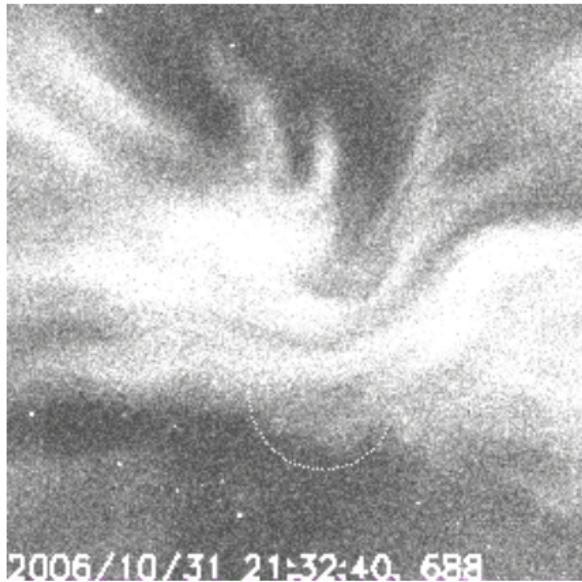
Phase 1: One core station, two remote receiver sites.
Remote control and data access

A “typical” aurora...



EISCAT_3D Kick-off, Tromsø, September 2017

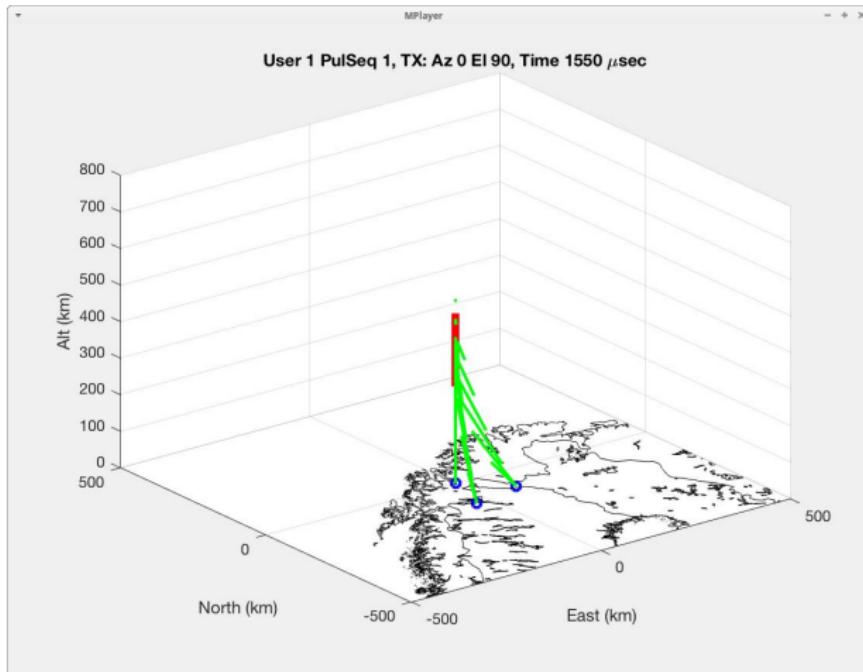
Why EISCAT_3D?



*ASK 3×3 degrees, EISCAT Tromsø site 31 Oct 2006
Courtesy Hanna Sundberg (formerly Dahlgren), KTH, Stockholm,
Now at Swedish Defence Research Agency*

Instrument now at EISCAT Svalbard site <http://ask1.esr.eiscat.no/>

EISCAT_3D Operation



https://www.eiscat.se/about/eiscat3d/eiscat_3d-operation-illustration/

EISCAT Data

- EISCAT_3D is a project of the EISCAT Scientific Association, therefore:
- Governed by the EISCAT rules ¹
- EISCAT data policy governed by blue book ²(2015)
- Some data for specific experiments “embargoed” for defined period.
- Two redundant Data Centres will store the data products.
- Analysis of data either close to Data Centres or “spare” on-site computing.

¹<https://www.eiscat.se/scientist/document/governing-rules/>

²Page 39 onwards of https://www.eiscat.se/wp-content/uploads/2017/06/BlueBook_Edition2015.pdf



EISCAT Data Levels

Level	Type	Produced by	Storage	Format	Rate
1a	Ring buffer data	1 st stage beam former	4 months*	UDP stream/ HDF5	≤ 0.8 Tb/s
1b	Beam-formed data	2 nd stage beam former	4 months*	HDF5	64 Gb/s
2	Time integrated correlated data	All sites	Archived	HDF5	
3a	Physical parameters	All sites	Archived	HDF5	
3b	3D-voxel parameters	Operations centre	Archived	HDF5	≈ 1 Gb/s
4	Derived geophysical parameters	Users	Users	Publications etc	

- The EISCAT_3D Data Centres will receive, serve and archive all data at levels 2 and 3.
- Data used in research should be given Persistent Identifiers (PIPs) according to a common standard such as DOI, DataCite, or similar, to be unambiguously citable in publications.
- A 4 months period is selected as this is the estimated time required to perform a “real-time” analysis on low-level data.
- A portion of the level 1 data will also be archived permanently, on the order of 1% of the level 1 data rate, e.g. one beam per site and/or bandwidth-limited data.

EISCAT FAIR Data

Strong recommendation to follow ENVRI-FAIR principles

- To be **Findable**:
 - F1. (Meta)data are assigned a globally unique and eternally persistent identifier. ([Anticipated](#))
 - F2. Data are described with rich metadata. ([EISCAT_3D Data model](#))
 - F3. (Meta)data are registered or indexed in a searchable resource. ([Standard Data Management tools](#))
 - F4. Metadata specify the data identifier. ([EISCAT_3D Data model](#))
- To be **Accessible**:
 - A1 (Meta)data are retrievable by their identifier using a standardized communications protocol. ([Use standard metadata catalogue](#))
 - A1.1 The protocol is open, free, and universally implementable. ([EISCAT_3D uses standard Data Management system](#))
 - A1.2 The protocol allows for an authentication and authorization procedure, where necessary. ([EGI checkin implemented](#))
 - A2 Metadata are accessible, even when the data are no longer available. ([EISCAT_3D Data model](#))



EISCAT FAIR Data

Strong recommendation to follow ENVRI-FAIR principles

- To be **I**nteroperable:
 - I1. (Meta)data use a formal, accessible, shared, and broadly applicable language for knowledge representation. (Use standard format, HDF5 etc)
 - I2. (Meta)data use vocabularies that follow FAIR principles.
 - I3. (Meta)data include qualified references to other (meta)data.
- To be **R**e-usable:
 - R1. (Meta)data have a plurality of accurate and relevant attributes.
 - R1.1. (Meta)data are released with a clear and accessible data usage license.
 - R1.2. (Meta)data are associated with their provenance.
 - R1.3. (Meta)data meet domain-relevant community standards.
(ENVRI principles)

Thank you Questions?

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