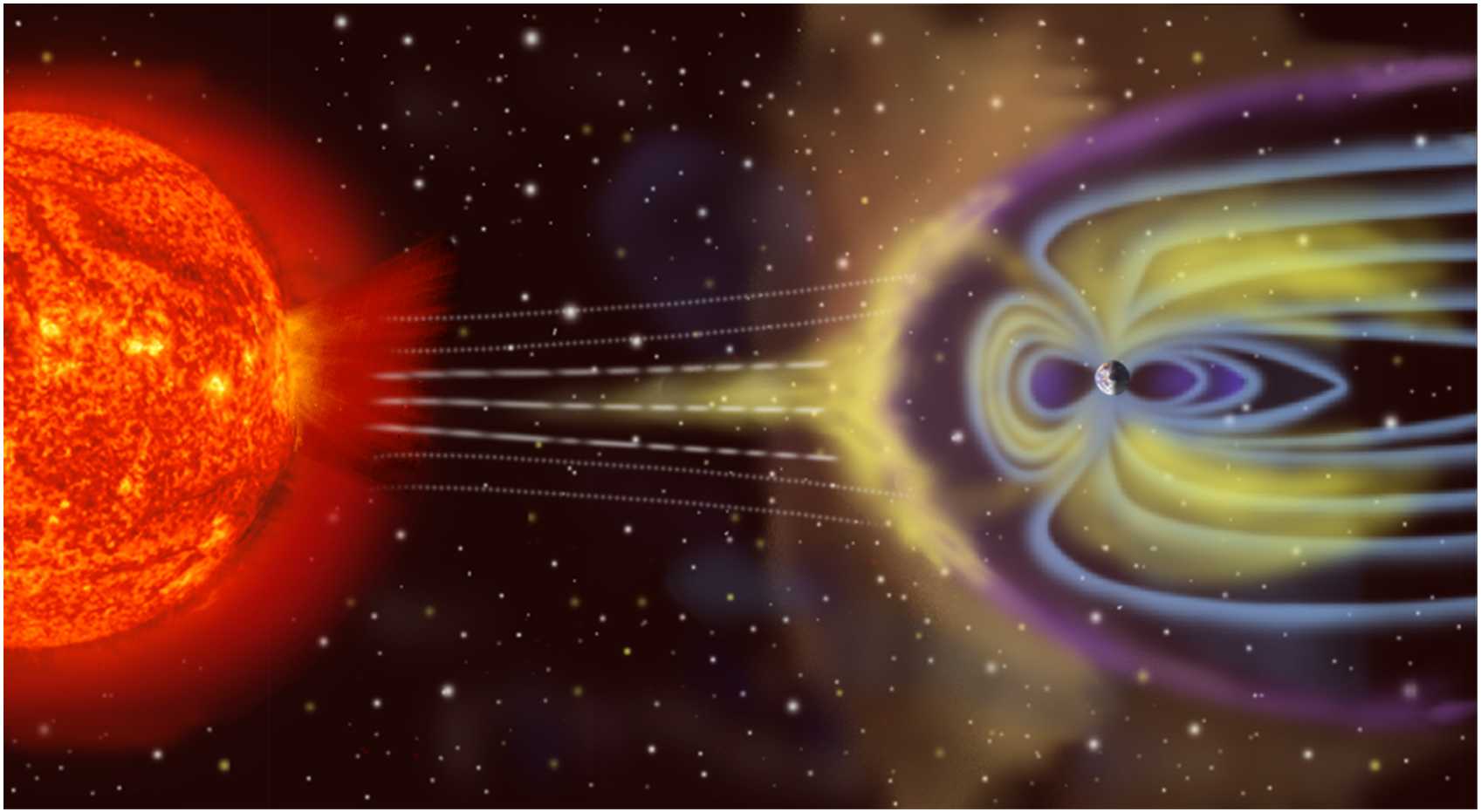
The EISCAT_3D project: Nordic Network Challenge

Solar wind and magnetosphere



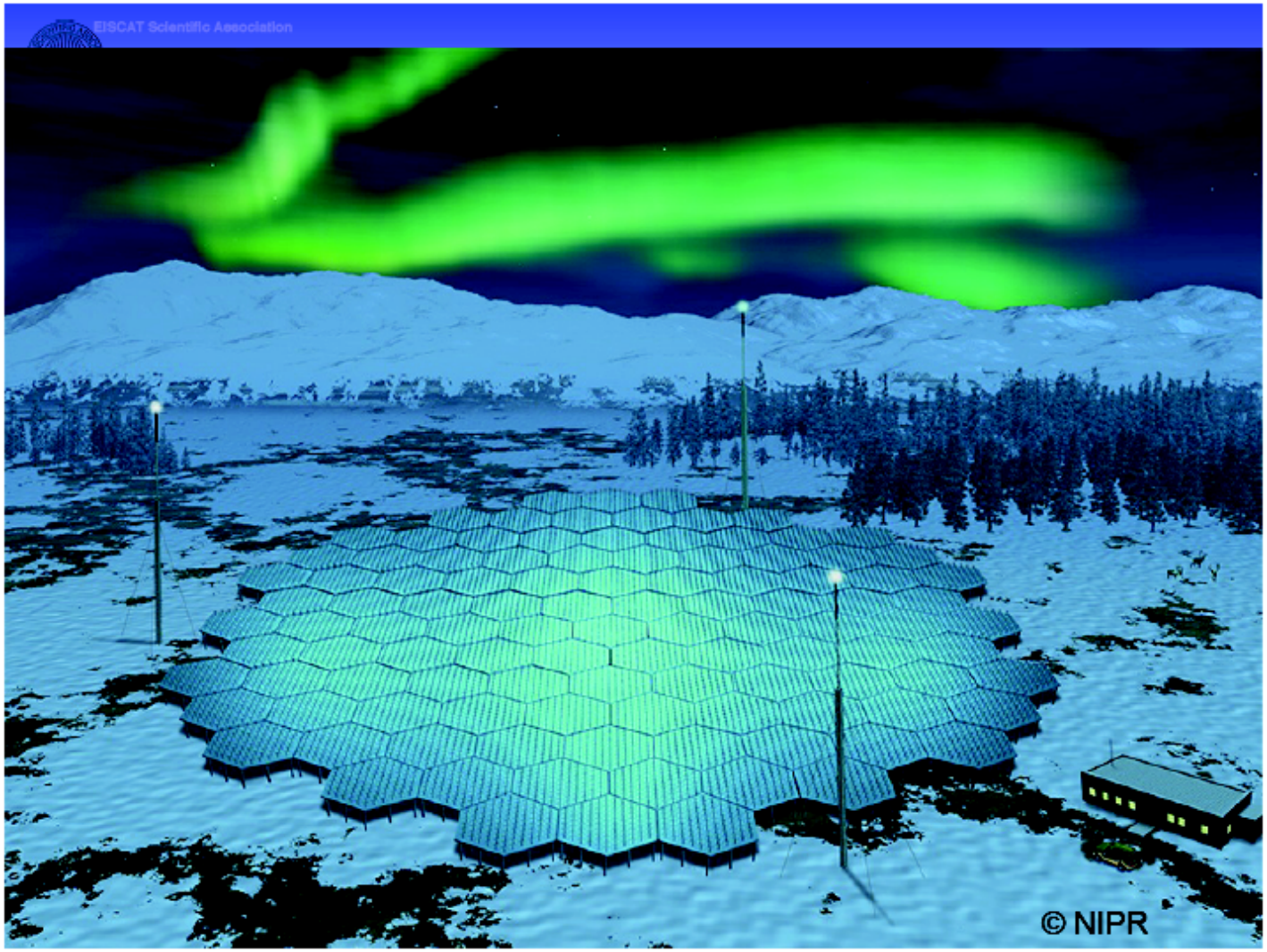
Current EISCAT radars



NASA via Wikimedia Commons, EISCAT

European **I**ncoherent **Scat**ter Scientific Association (**EISCAT**)

EISCAT_3D Project



Phased array radar. Solid state. ms response. 60° zenith angle

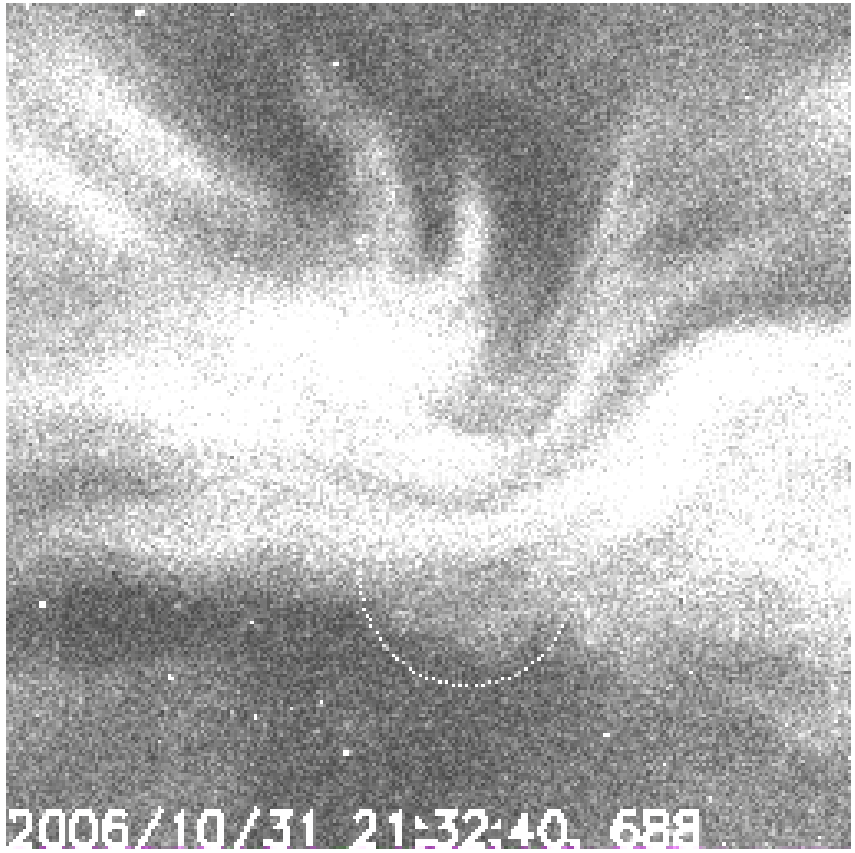
EISCAT_3D Project

Phased array radar. Solid state. ms response. 60° zenith angle

A “typical” aurora...

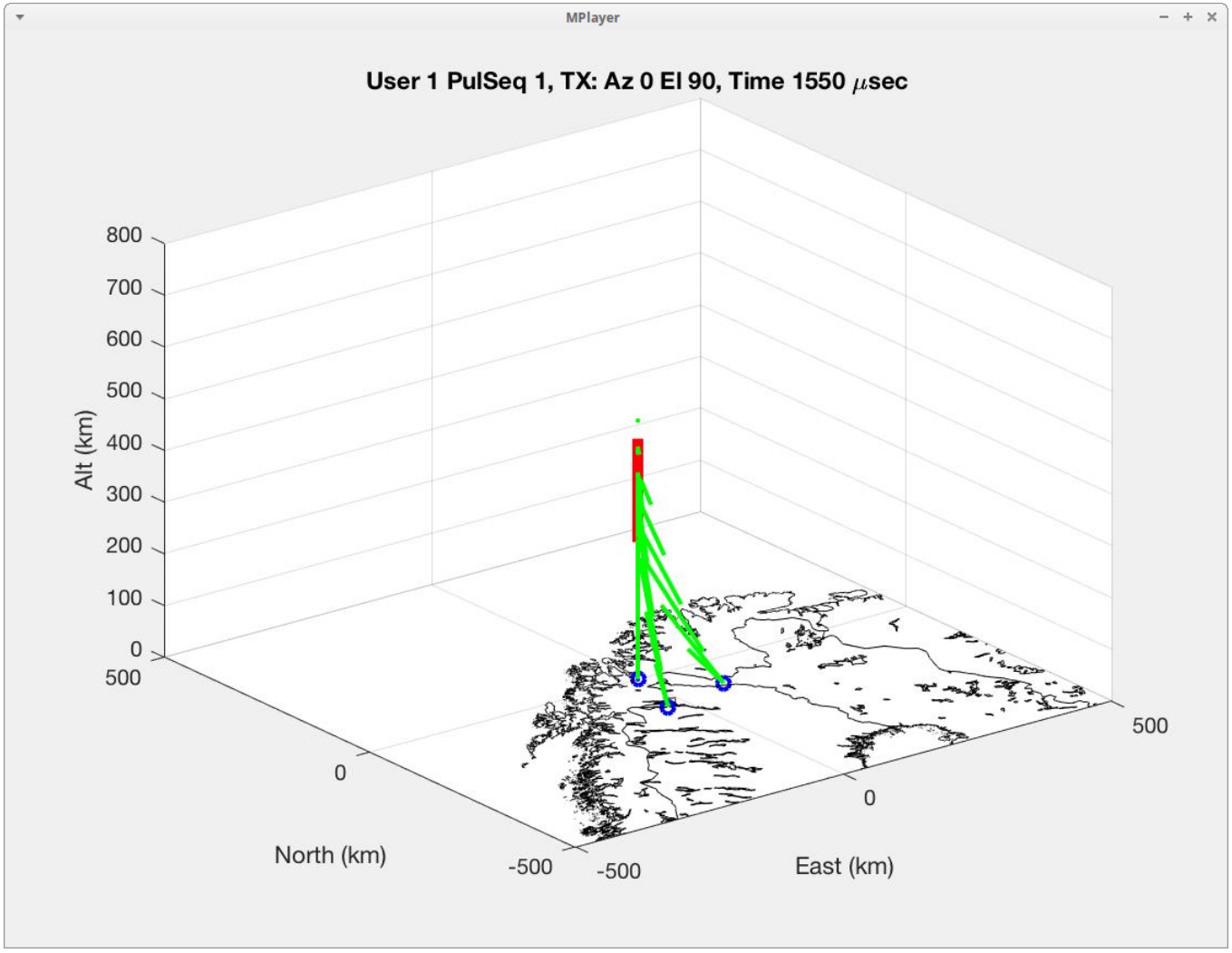
EISCAT_3D Kick-off, September 2017

Why EISCAT_3D?



ASK 3×3 degrees 31 Oct 2006 Hanna Dahlgren, KTH

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/

[2] Page 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	1st stage beam former	4 months*	UDP stream/ HDF5	$\leq$ 0.8 Tb/s
1b	Beam-formed data	2nd 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	$\approx$ 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 (PIDs) 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 **F**indable:
  - 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. (Separate EISCAT_3D metadata catalogue)
  - F4. Metadata specify the data identifier. (EISCAT_3D Data model)
- To be **A**ccessible:
  - 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. (EISCAT_3D Data model)
  - 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)