SuperMAG and relationship to INTERMAGNET & miscellaneous

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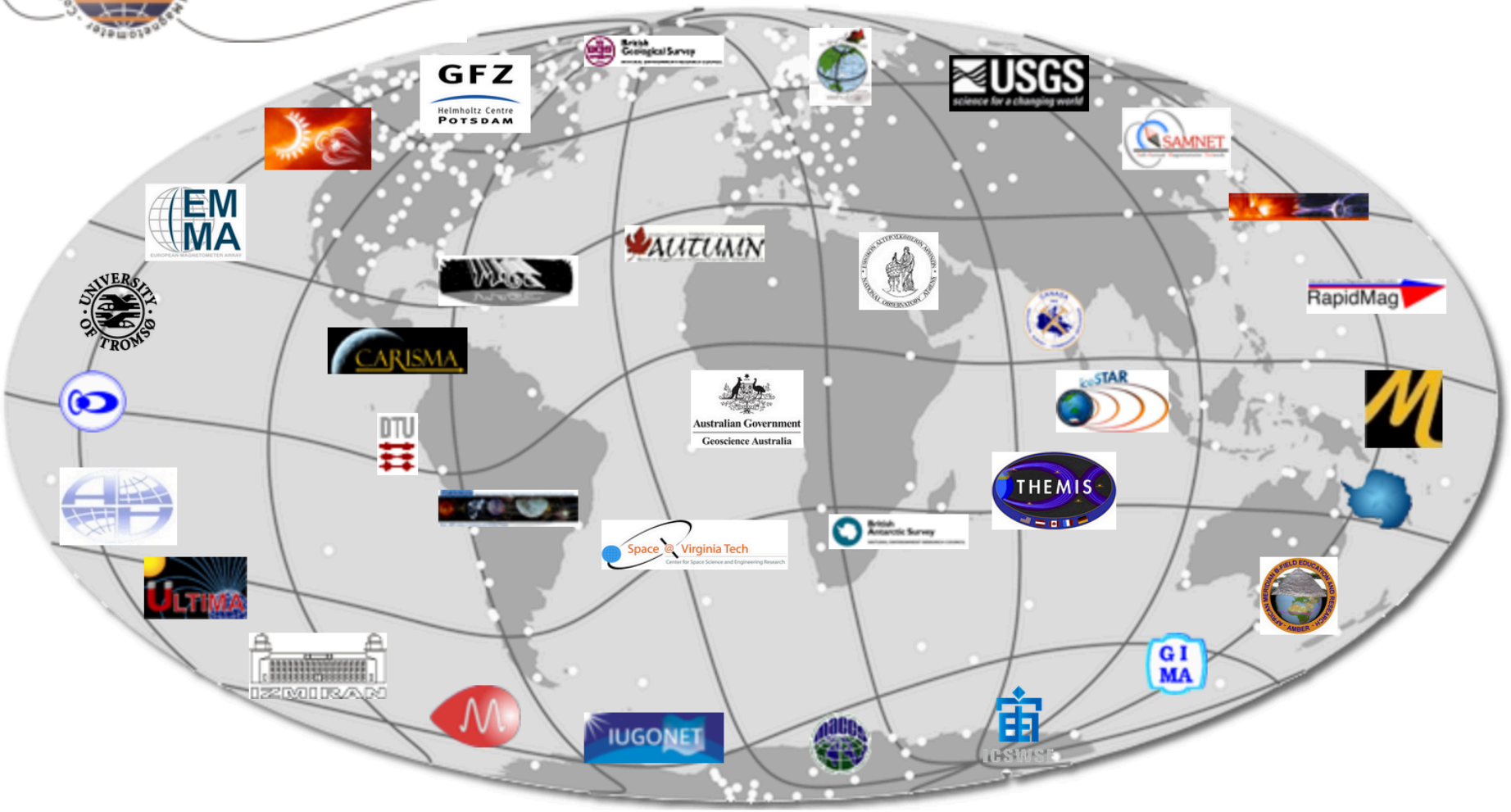
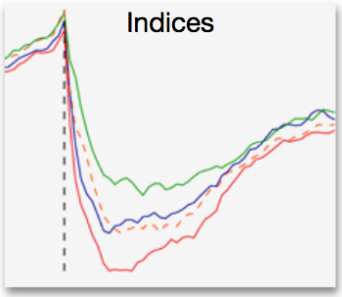
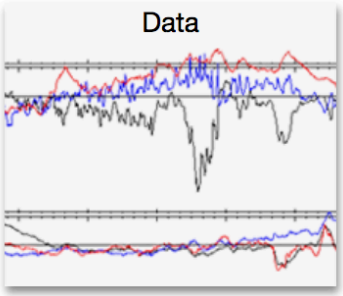
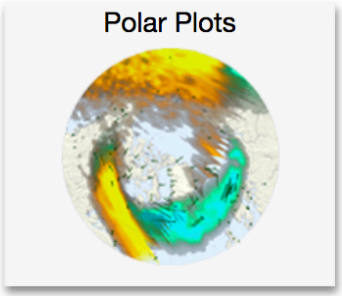
SuperMAG

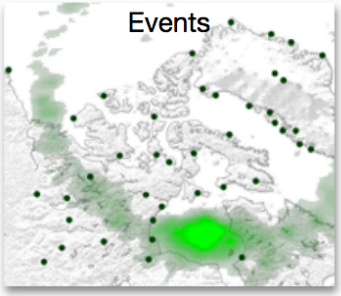

GFZ
Helmholtz Centre
POTSDAM
USGS
science for a changing world
SAMNET
EM
MA
AUTUMN
RapidMag
CARISMA
UNIVERSITY OF TROMSØ
DTU
Australian Government
Geoscience Australia
THEMIS
Space @ Virginia Tech
ULTIMA
IZMIRAN
IUGONET
GIMA


Indices

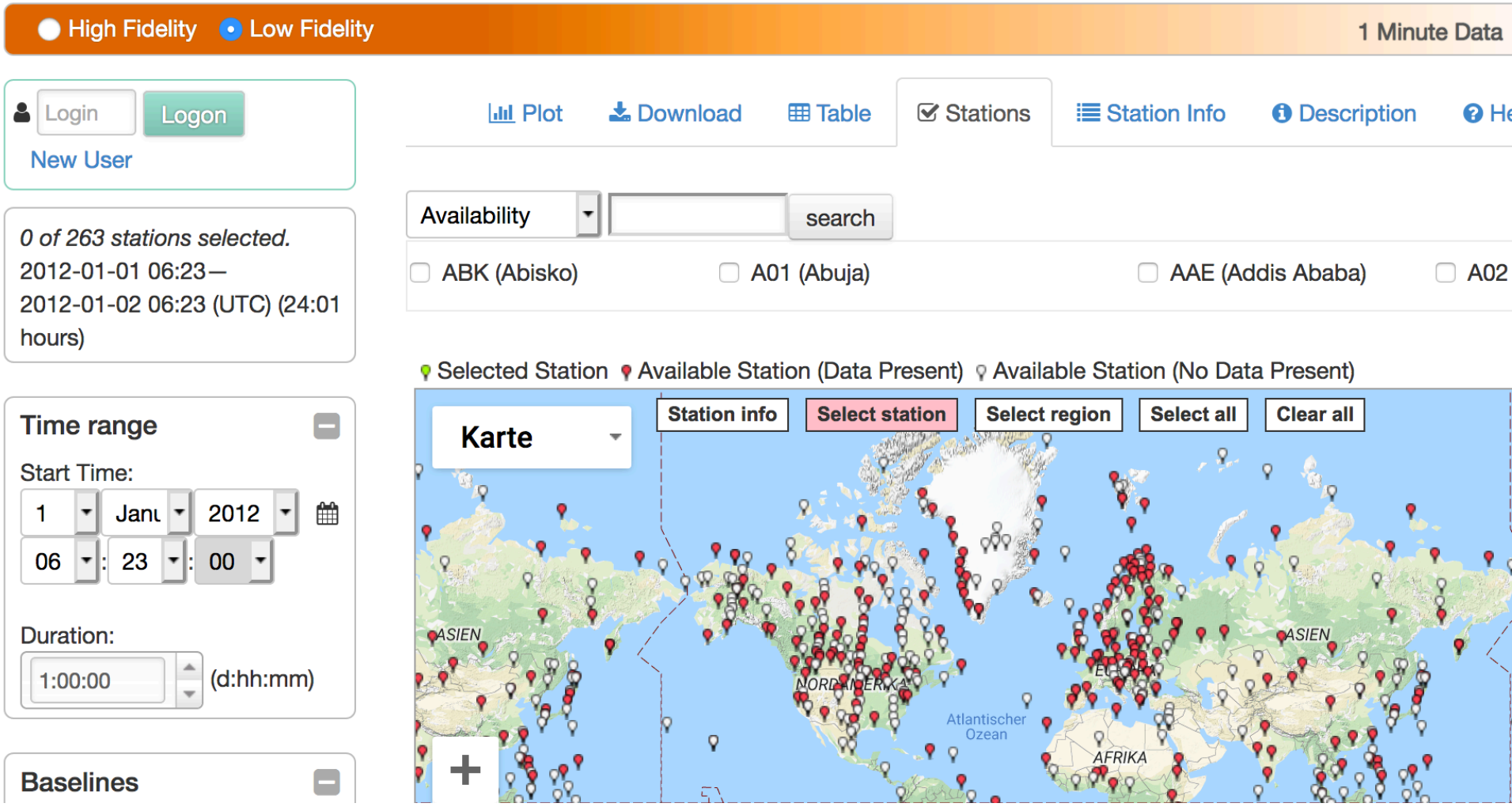

Data


Polar Plots

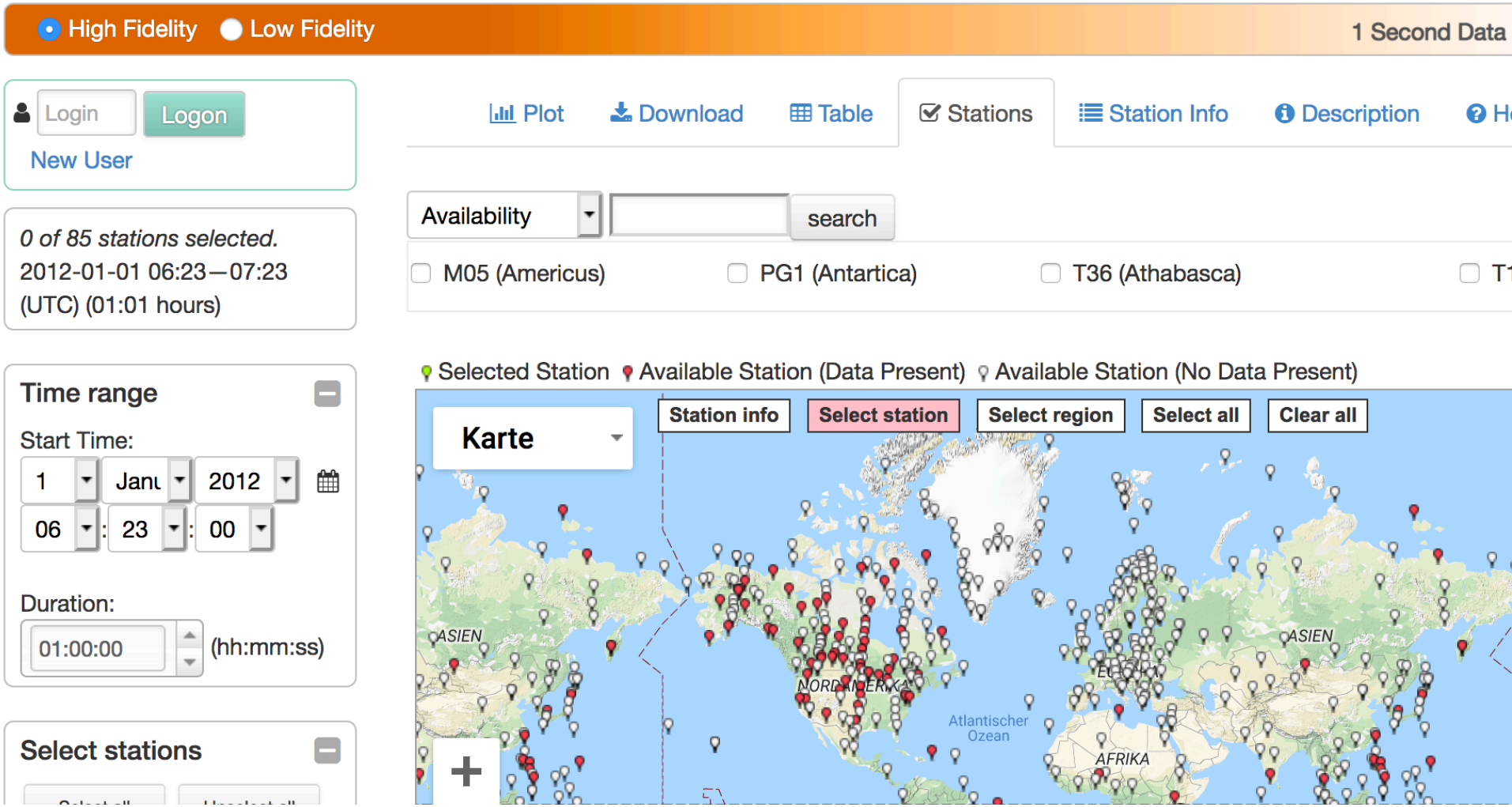
Movies


Events

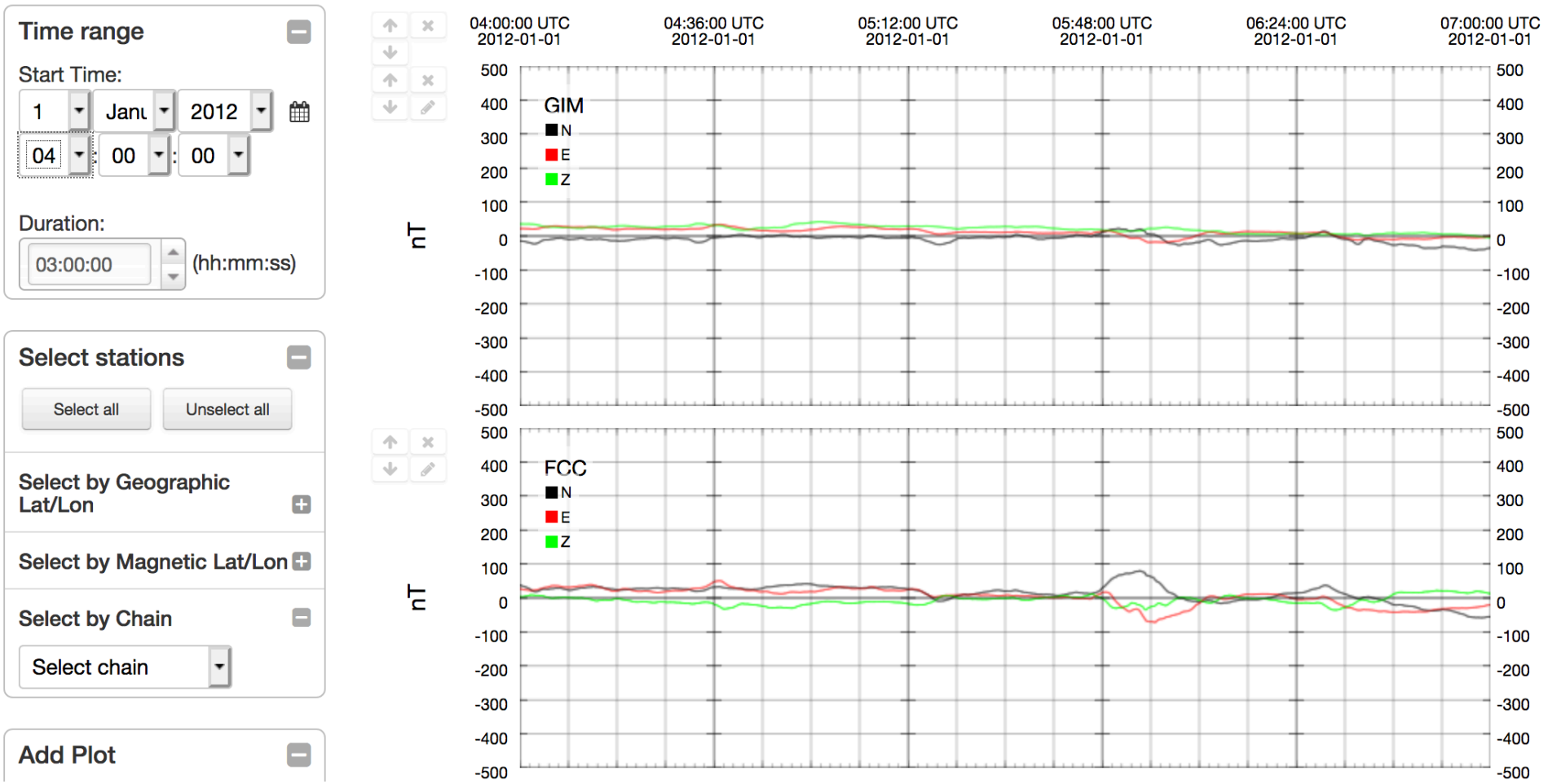
SuperMAG website



launch of 1-second data



data plotting and download



Reflections on SuperMAG I

- data provided SV- or SV+Sq-corrected, but also 'raw' (definitive in case of INTERMAGNET)
- quantity rather than quality (incl. variometer of varying provenance)

- finding magnetometer data for a particular event is easy
- instantaneously comparison with indices is easy
- more a processing tool than a repository (plots, movies)
- integration with other data sets (indices, solar wind, satellite data)

- bulk data download is cumbersome
- searching for events is cumbersome

New SuperMAG Steering Committee

J. Matzka, GFZ, Germany
A. Gerrard, NJIT, USA
J. Gjerloev, APL, USA
M. Johnsen, U. Tromsoe, Norway
I. Mann, U. Alberta, Canada
J. Borovsky, Space Sci Inst, USA
R. Mcgranaghan, JPL, USA
T. Moretto, U. Bergen, Norway
K. Murphy, GSFC, USA
S. Ohtani, APL, USA
A. Thomson, BGS, UK
A. Yoshikawa, Kyushu, Japan

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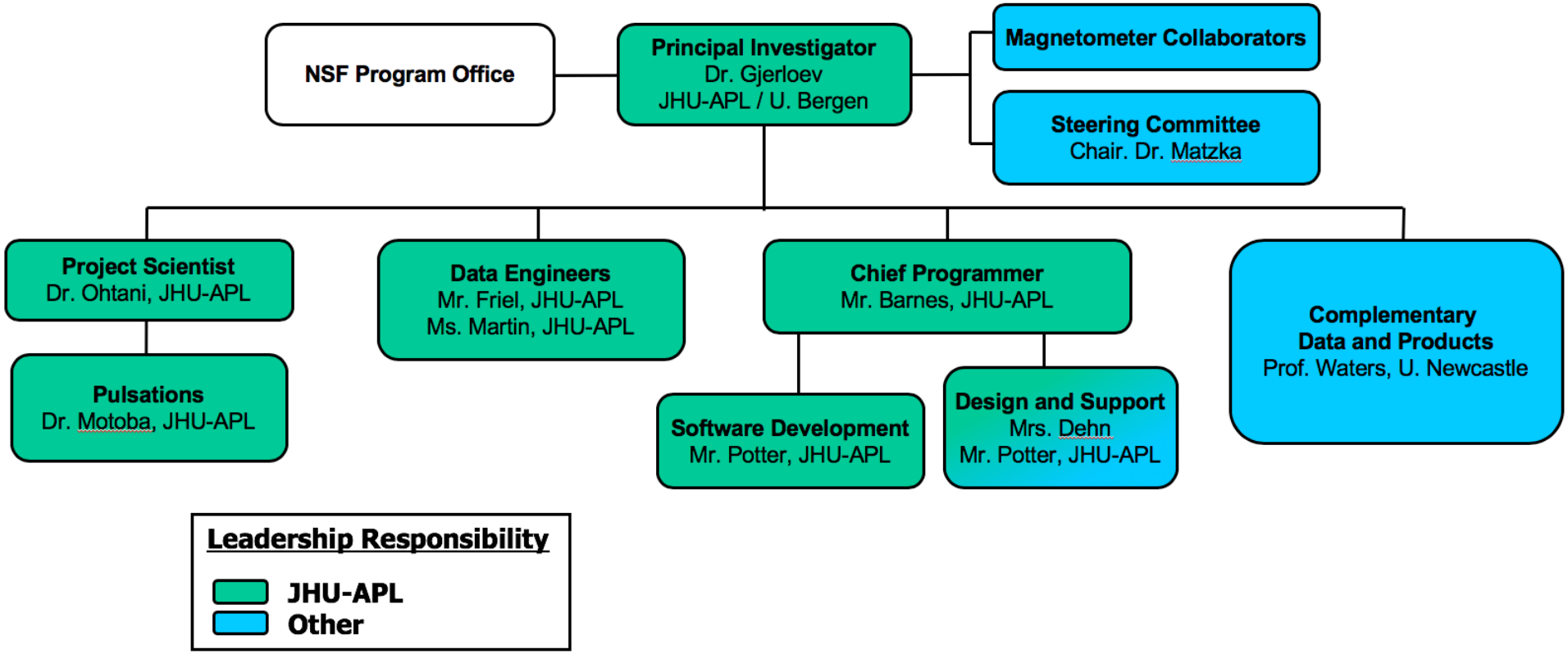
data providers

SuperMAG structure



Reflections on SuperMAG II

- steering committee provides guidance, aim is to be supportive to stakeholders: data providers, users, SuperMAG staff, general community

- large user community

- acts very fast, science-driven

- powerful geomagnetic indices
- 1-second data/products just released
- powerful products in the pipeline

St Helena: inversion of scalar and vector data

Variometer

$\tilde{V} = (\tilde{X}_{var}, \tilde{Y}_{var}, \tilde{Z}_{var})$

Main pillar

$F_{calc,1} = \left\| \tilde{V} + \tilde{G}_1 + \tilde{S}_0 \right\|_2$

$G_1 = (\Delta\tilde{X}_1, \Delta\tilde{Y}_1, \Delta\tilde{Z}_1)$

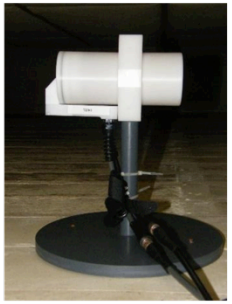
$G_2 = (\Delta\tilde{X}_2, \Delta\tilde{Y}_2, \Delta\tilde{Z}_2)$

Recording GSM-90

$F_{calc,2} = \left\| \tilde{V} + \tilde{G}_2 + \tilde{S}_0 \right\|_2$

F_{GSM-19}

$\tilde{S}_0 = (S_{\tilde{X}}, S_{\tilde{Y}} = 0, S_{\tilde{Z}})$

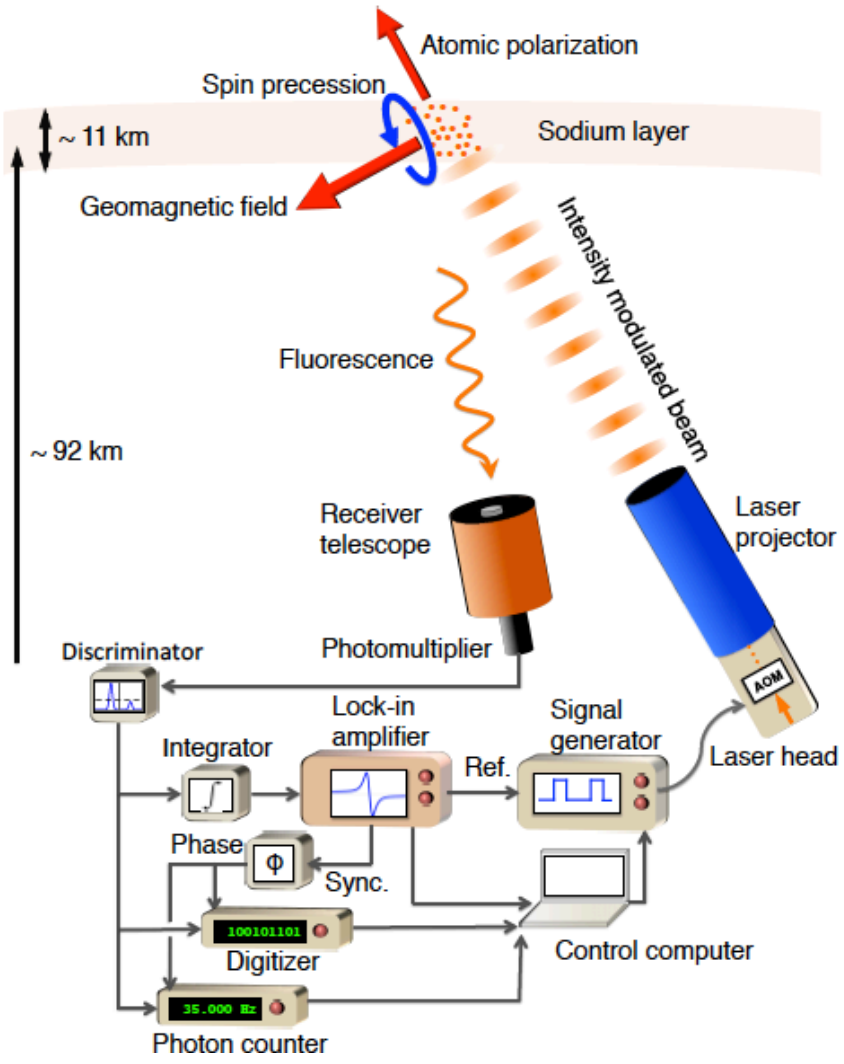


$F_{obs} = \left\| \tilde{V} + \tilde{G}_1 + \tilde{S}_0 \right\|_2 - \left\| \tilde{V} + \tilde{G}_2 + \tilde{S}_0 \right\|_2 + F_{GSM-90}$

F_{GSM-90}

$\left\| \tilde{V} + \tilde{G}_1 + \tilde{S}_0 \right\|_2 - \left\| \tilde{V} + \tilde{G}_2 + \tilde{S}_0 \right\|_2$

Mesospheric Sodium Magnetometers

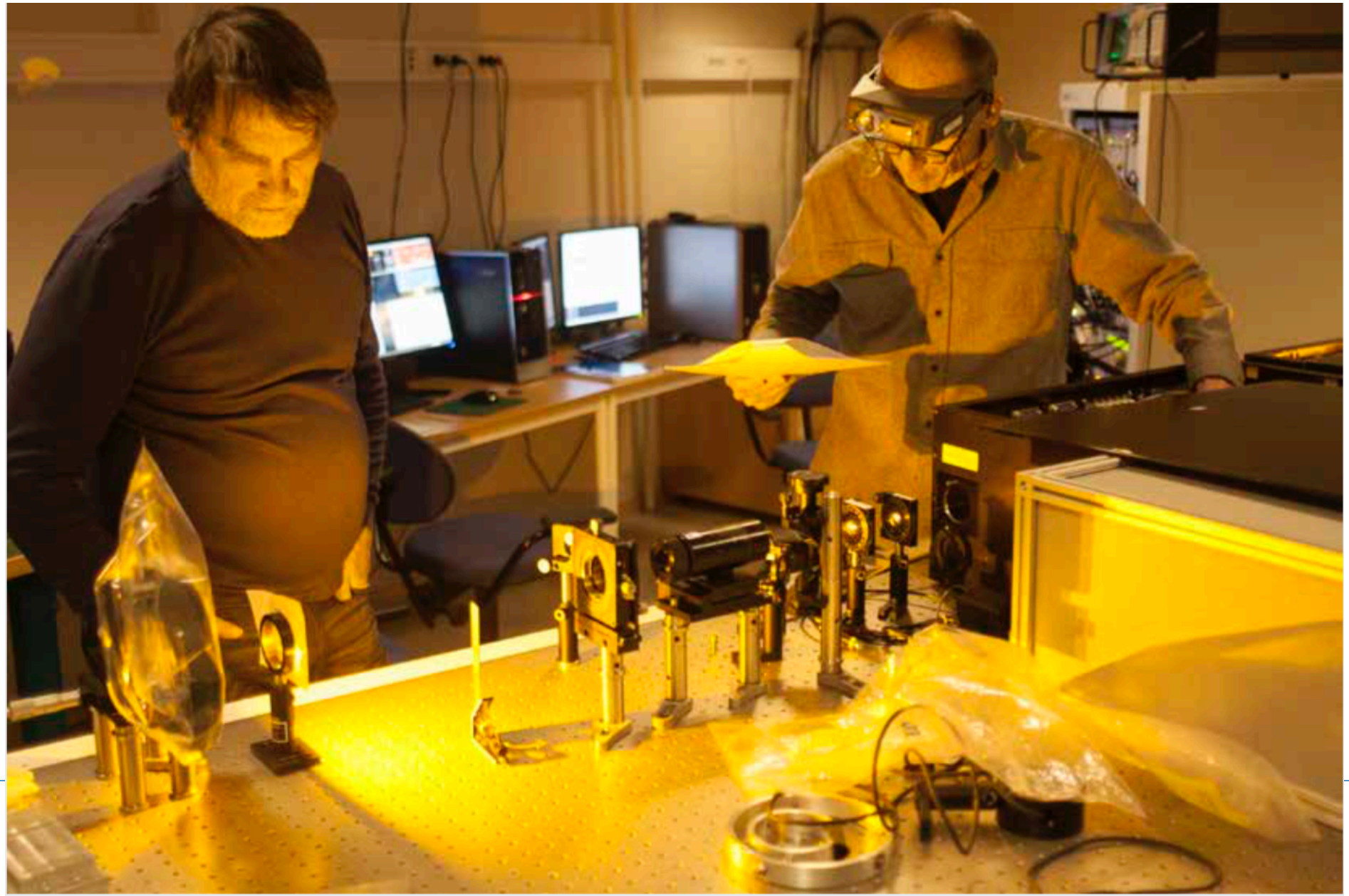


Measurement of scalar field in 90 km height:

- sodium layer
- optically pumped magnetometer
- laser/telescope

Two successful measurements:

- Kane et al. (2016/2018)
- Bustos et al. 2018 (figure)
- 100s nT accuracy, long integration time

Project in Norway, applying the method to auroral zone.

Mesospheric Sodium Magnetometer – first light