JOHNS HOPKINS
APPLIED PHYSICS LABORATORY

SuperMAG

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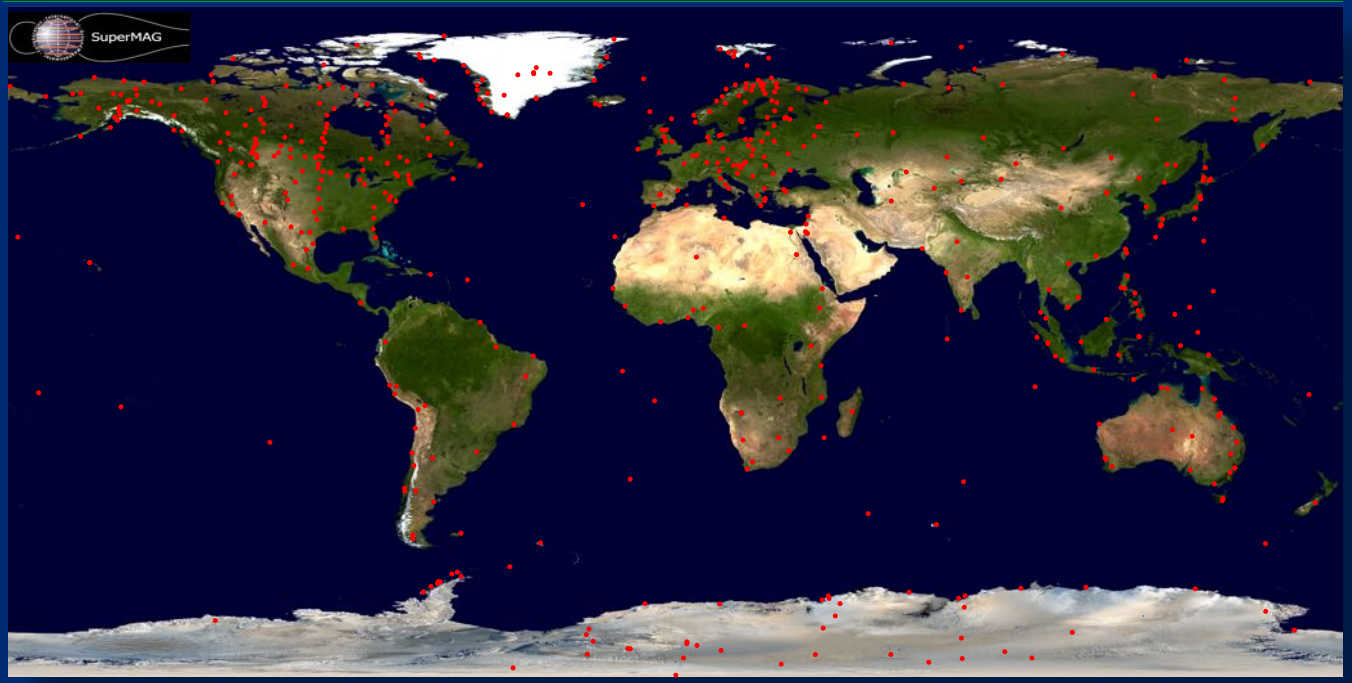
SuperMAG - Overview

- SuperMAG provides access to ground based magnetometer data
  - 49 years of data from 1969-2018
  - 487 ground stations
  - 36 contributors

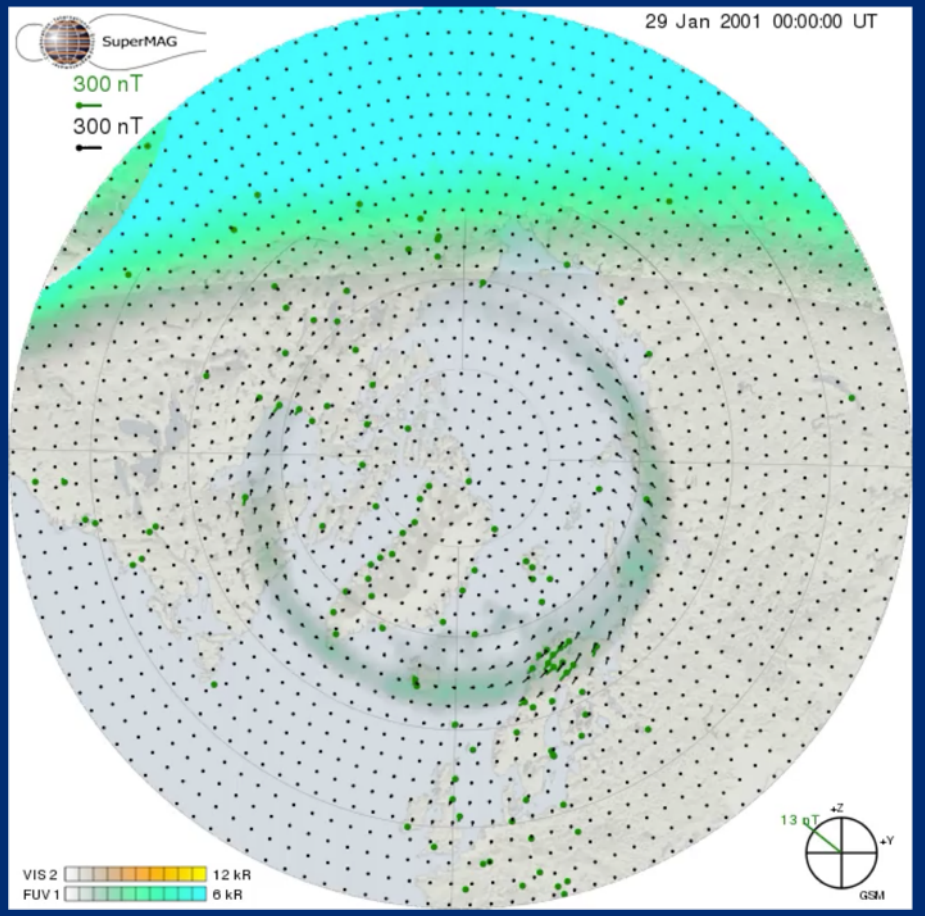


SuperMAG - Overview

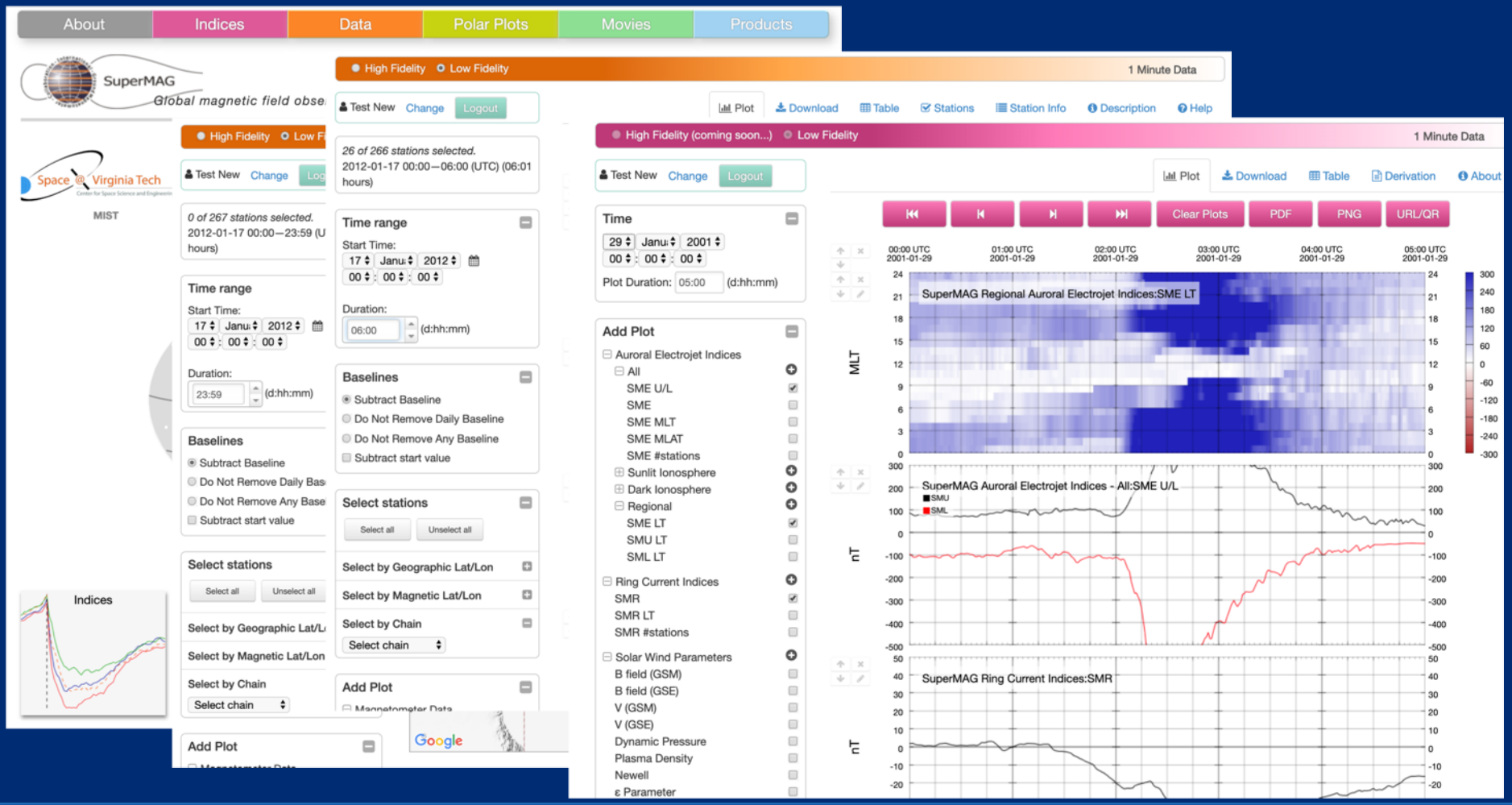
- SuperMAG is not a data provider
  - We do not serve the raw mag data
- SuperMAG is a data curator
  - SuperMAG cleans the data removing abnormalities
  - Baseline subtraction (yearly, daily)
  - Coordinate transformation into NEZ magnetic coordinate system
  - Consistent for all stations
- SuperMAG provides higher level data products
  - Fitted (Gridded) estimates of ground level magnetic field perturbations
  - Geophysical indices (SME,SMR, Solar wind parameters)
  - Derived ULF parameters PC2,PC3,PC4,PC5

SuperMAG – Overview

- SuperMAG has had a huge impact
  - 2000 registered users
  - 100 publications a year
  - 10 thesis per year
  - 3500 active users per month



http://supermag.jhuap.edu



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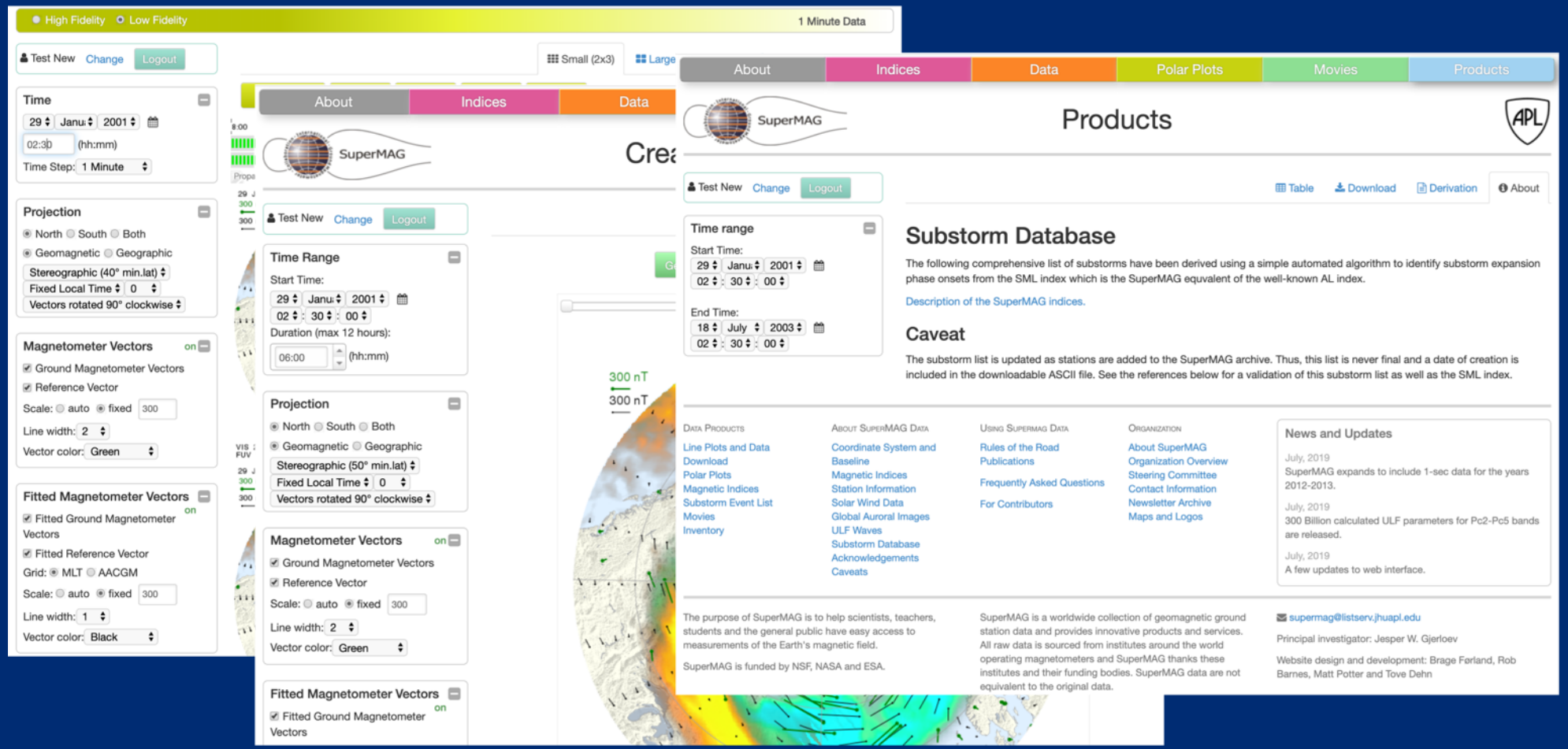

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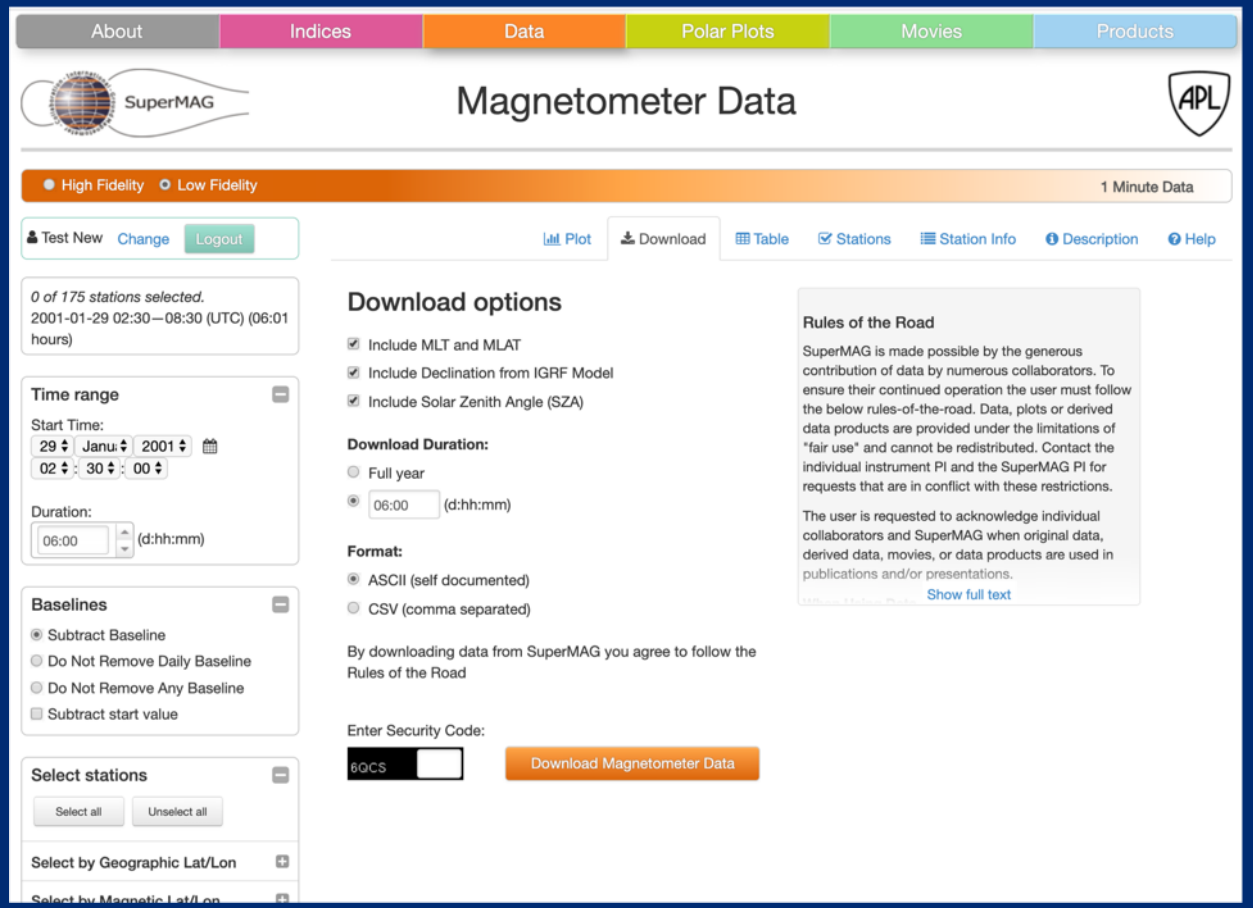

http://supermag.jhuapl.edu

- Hybrid system using a mixture of client and server side software
- Extensive use of HTML5 (JavaScript)
- Based on software from the Van Allen Probes Science Gateway
  - http://rbspgway.jhuapl.edu/
- Runs on stock browsers – does not require any extensions/software downloads
- Server side software does the heavy lifting
- Parallel operations for speed
- What you see is what you get – data downloads reflect what you have plotted.

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- Higher level data products:
  - Geophysical indices derived from SuperMAG data
  - Gridded (Fitted) maps of ground magnetic field pertubations
  - Substorm database derived from SuperMAG observations
  - Publication quality plots, custom movies

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- SuperMAG supports digital download of data
  - ASCII file for indices and magnetometer data
  - netCDF files for fitted data
- Web services interface
  - Custom implementation to fit our unique data set

Lessons learned

- The three click rule
  - If you are more than three clicks from a useful product you've failed
  - User interface must be intuitive
  - Be responsive – web site must provide immediate feedback to users

Lessons Learned

- Versioning of data is important
  - SuperMAG data is reprocessed on a near continuous basis
  - Currently yearly updates are added at the start of the year – this will change
  - SuperMAG has developed a deployment strategy
    - Data is staged on the server (sandbox)
    - Data is versioned and inspected
    - Data is deployed

Lessons Learned

- Attribution is important
  - SuperMAG is dependent on the good will of data providers
    - We have no agency mandate
  - Data providers need to know how and who are using their data
  - Data providers often request consultation and credit when their data is used
    - Co-authorship or citation

Lessons Learned

- SuperMAG “Rules of the Road” clearly state how SuperMAG products should be referenced in publications
- SuperMAG has a simple user registration system for logging purposes
  - Only required for download of plots/movies/data
- We record detailed logs of all activity on the web sit
- Each data provider has a private page on the SuperMAG web site that lists statistics on their data use
- SuperMAG has appointed a steering committee for governance

Going forward

- Implement standard web service interfaces such as HAPI
- Improve download capability to support more data standards
- Build python interface to the data system

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