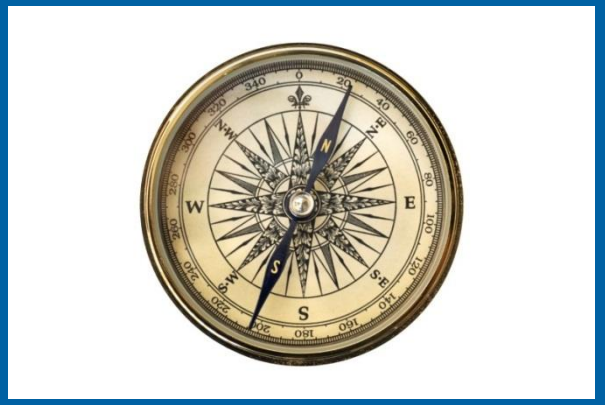
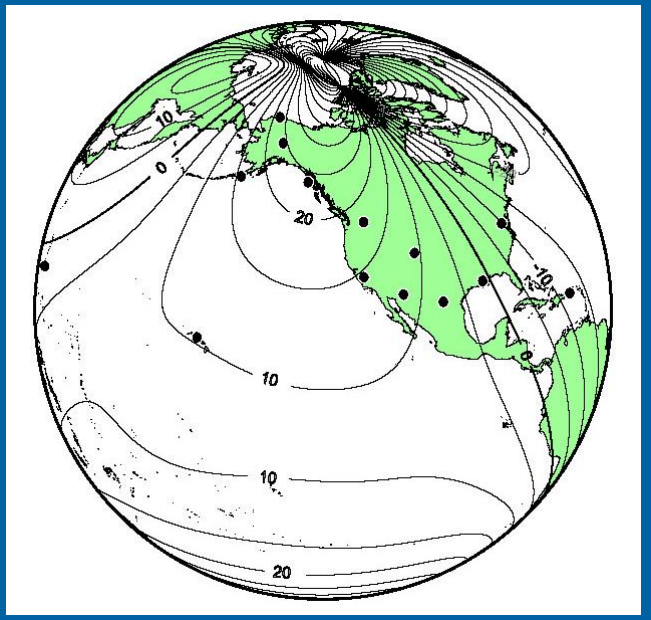
USGS
science for a changing world



US Geological Survey Geomagnetism Program Product Status

CA Finn, JL Gannon, JJ Love, DC Stewart, EA McWhirter, HA Simpson
USGS Geomagnetism Program

Space Weather Workshop, Apr 26, 2012



U.S. Department of the Interior
U.S. Geological Survey

Overview

- Mission of the USGS Geomagnetism Program
- Real-Time System Redesign
- Ground Conductivity Model Project
- Current and Planned USGS Products

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Mission of USGS Geomagnetism Program

- Monitor Earth's magnetic field using ground-based magnetic observatories
- Provide continuous, high temporal resolution, accurate data recording magnetic-field variations in real-time and covering long timescales
- Disseminate magnetic data to governmental, academic, and private institutions, NOAA, USAF, NASA
- Conduct research for scientific understanding and hazard mitigation

- 110 year history
- 14 observatories, all collecting 1-second data in real-time
- 12 full-time operational staff,
  3 research staff
- Member of INTERMAGNET

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Real-Time System Redesign

- Virtualization - facilitates backup and automatic failover
- Centralization and modularization of components - all processes access data through a defined interface, allowing changes in algorithms that do not affect data I/O
- Better access to data and products - through http and interactive download utilities
- Automated process monitoring - triggers tiered response from IT, off-hours support, and project specialists

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Regional Ground Conductivity Models

- Collaboration between USGS, NERC, EPRI, NRCan, NASA, and USGS Minerals/Energy Program
- Primary objective: Compile 1-D models of earth structure for all physiographic regions of the continental US
- These 1-D models of earth's resistivity can be used to calculate the geo-electric field that drives Geomagnetically-Induced Currents (GICs)

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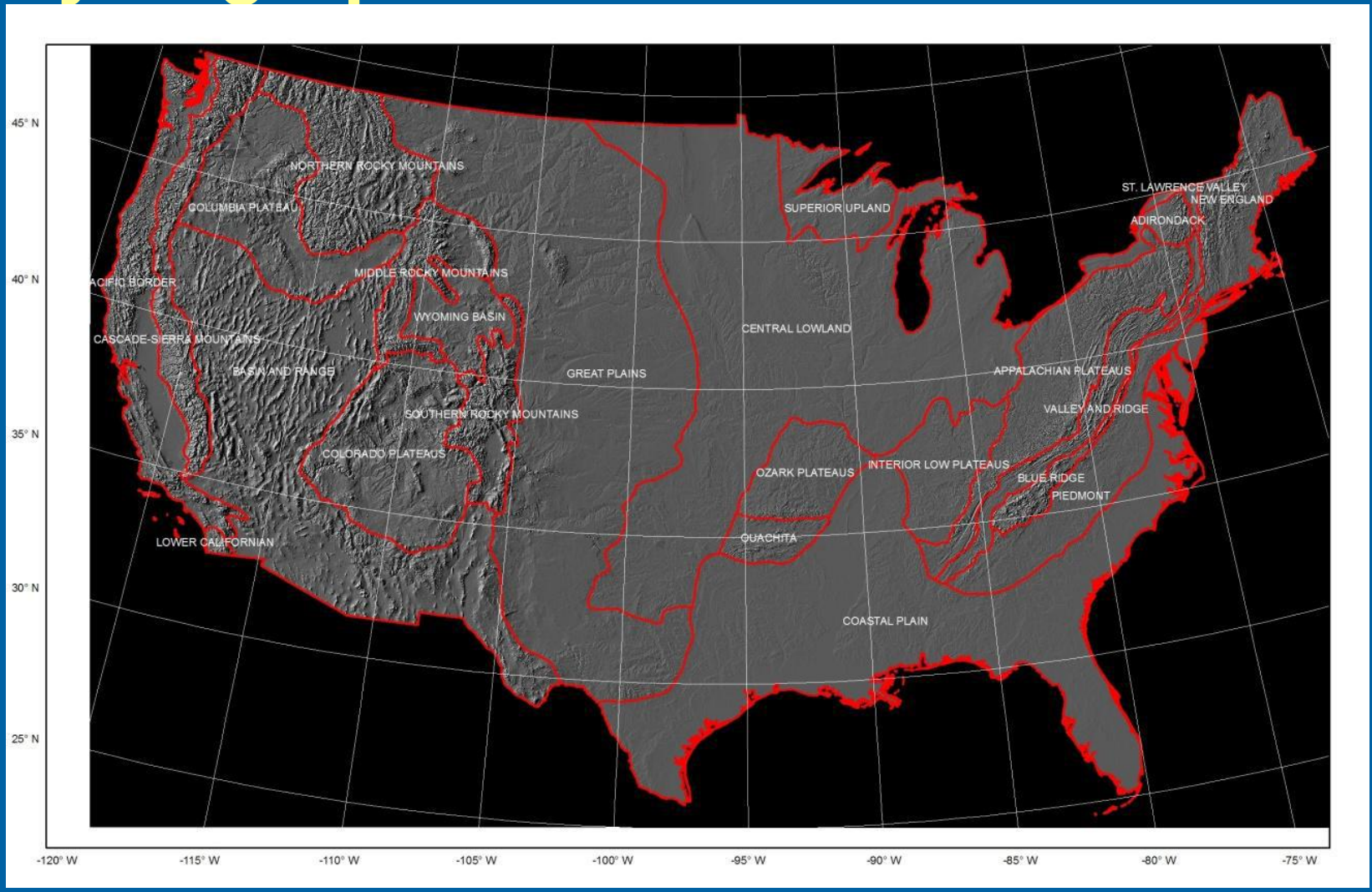
Physiographic Provinces



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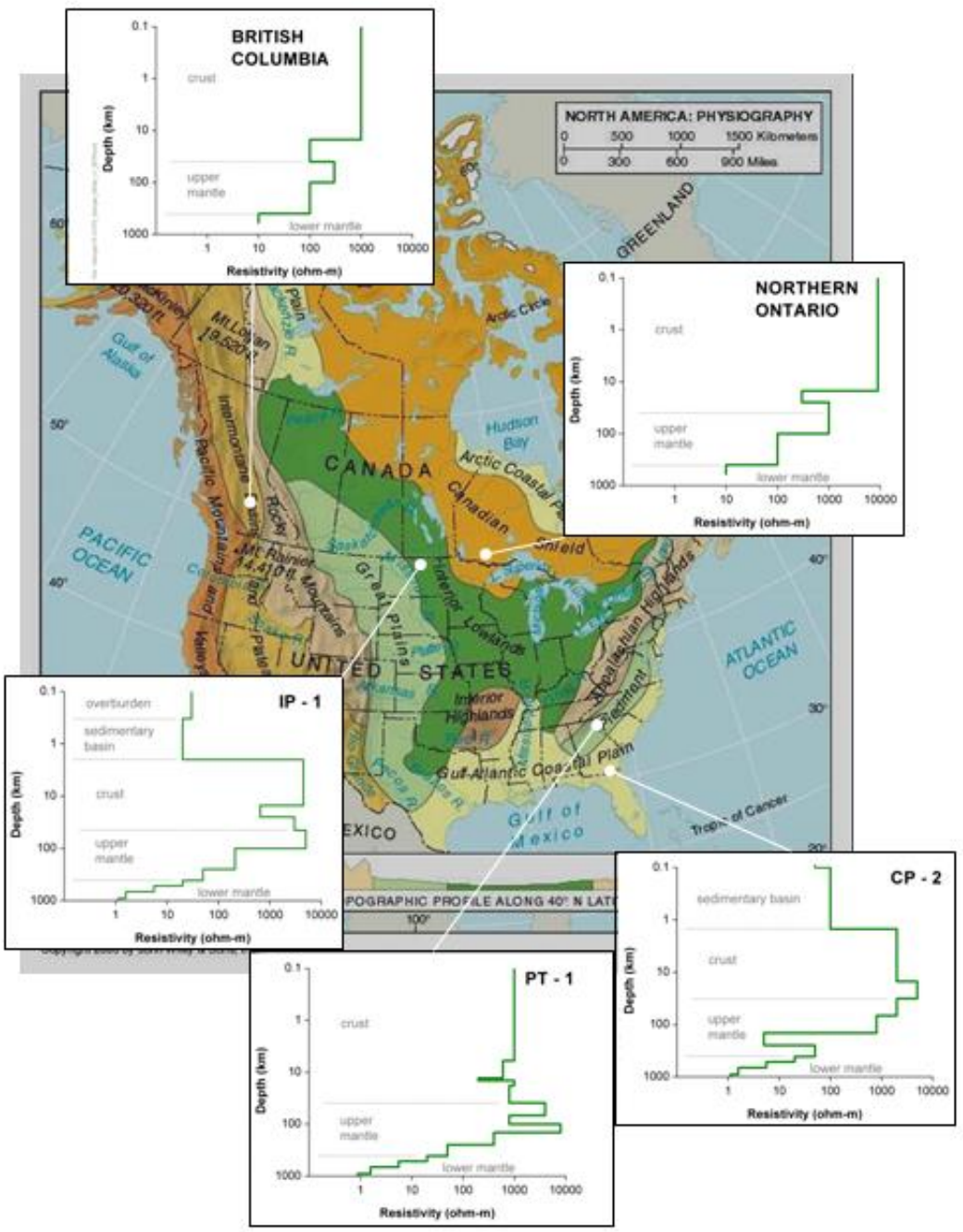
Resultant 1-D models of selected regions



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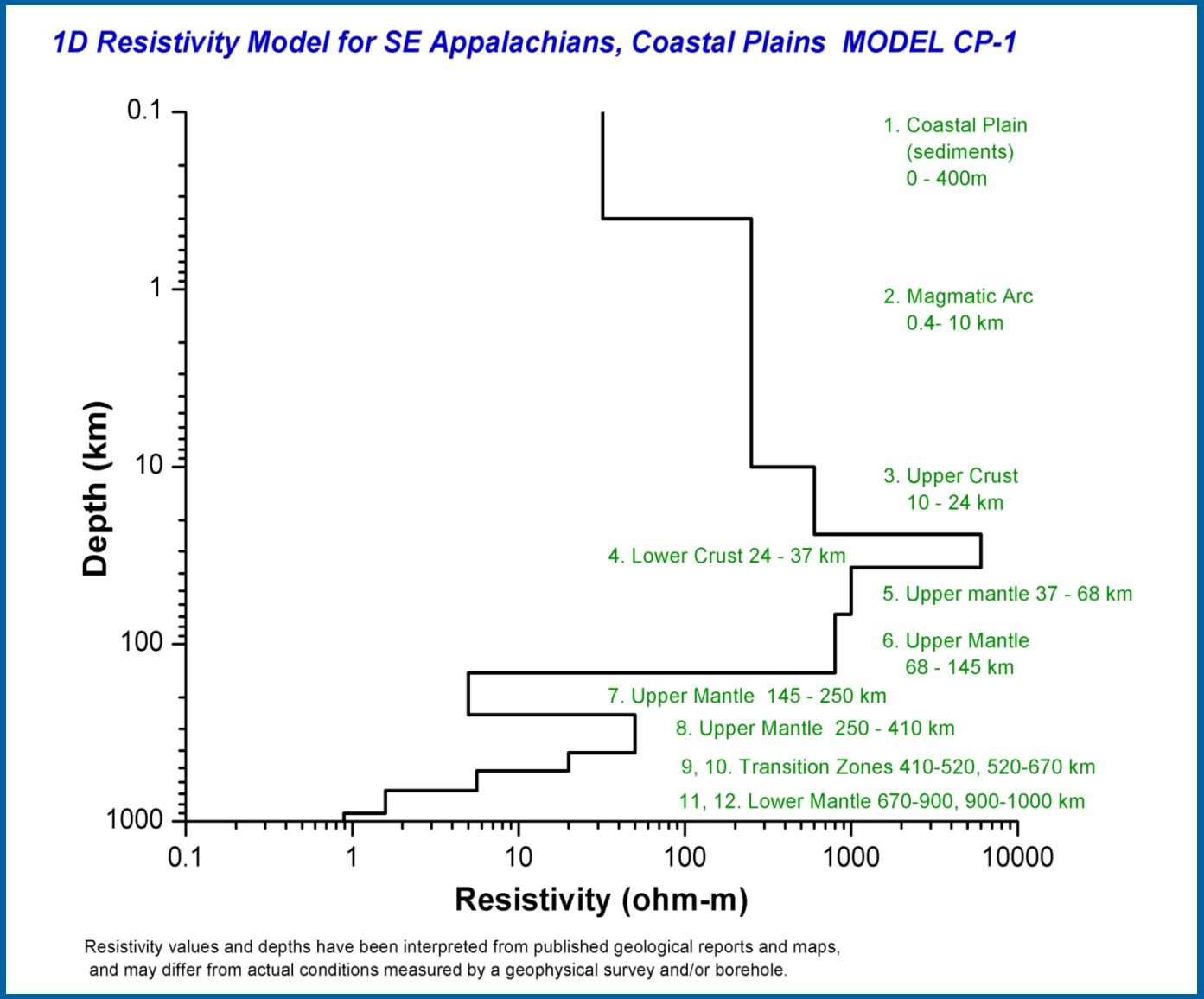

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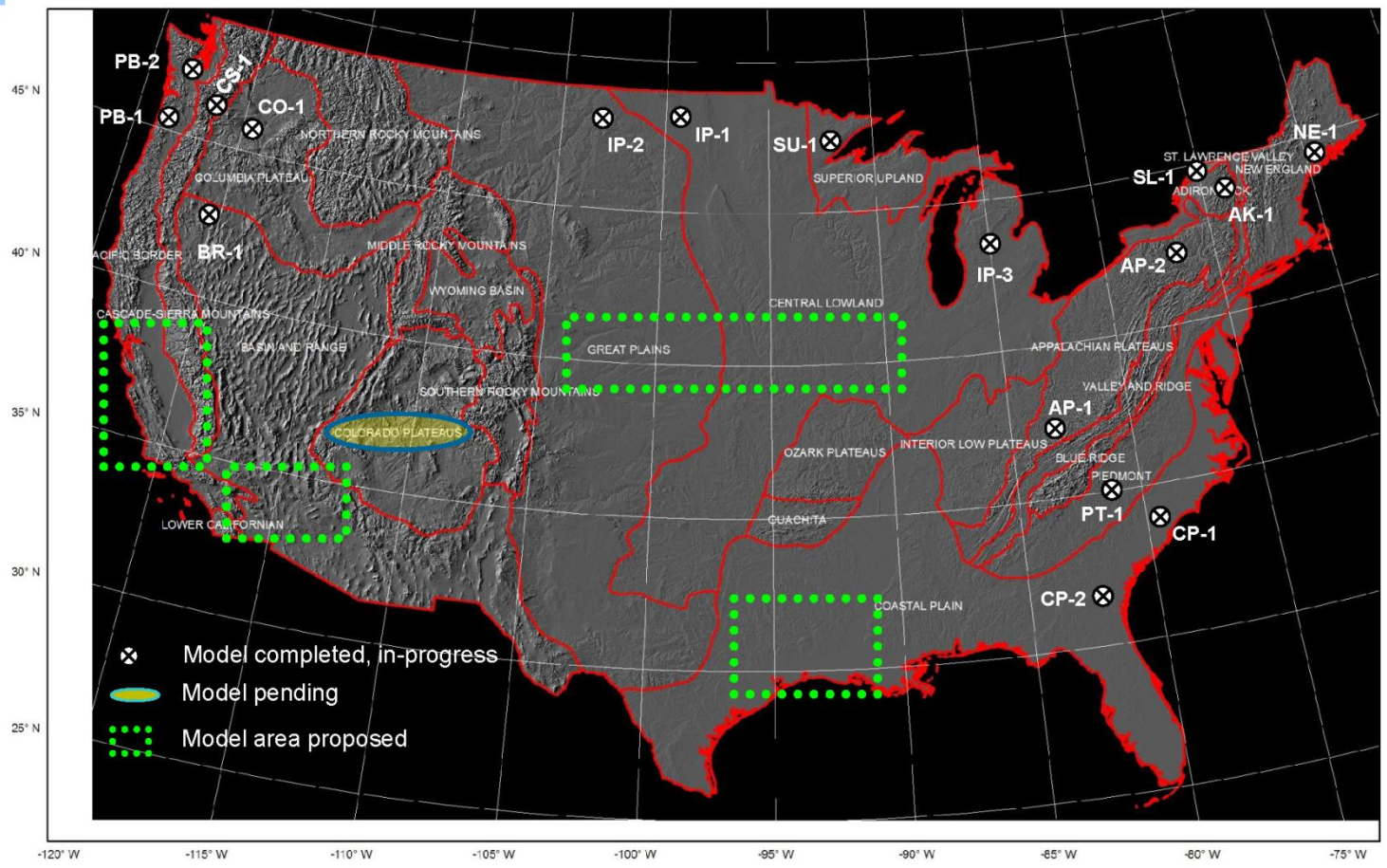
Courtesy of Peter Fernberg

Location of 1D Earth Resistivity Models (completed to date) with respect to Physiographic Regions of the USA – proposed additions



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Courtesy of Peter Fernberg

Next Steps

- All surface impedance calculations are done for all models
- E-field calculations at obsy locations running in real-time
- Validate output
- Use e-fields in regional model to calculate potentials
- New variometer station in US Midwest

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Variometer Station in US Midwest

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Current and Planned USGS Products

- Real-Time Storm-Time Disturbance Index (Dst)

  http://geomag.usgs.gov/dst

- Download Data and Indices:
  - 1-min and 1-sec magnetic field data:

    http://geomag.usgs.gov/data
  - USGS Dst index

    http://geomag.usgs.gov/data/indices
  - Data are updated in near real-time and kept on this site for several months

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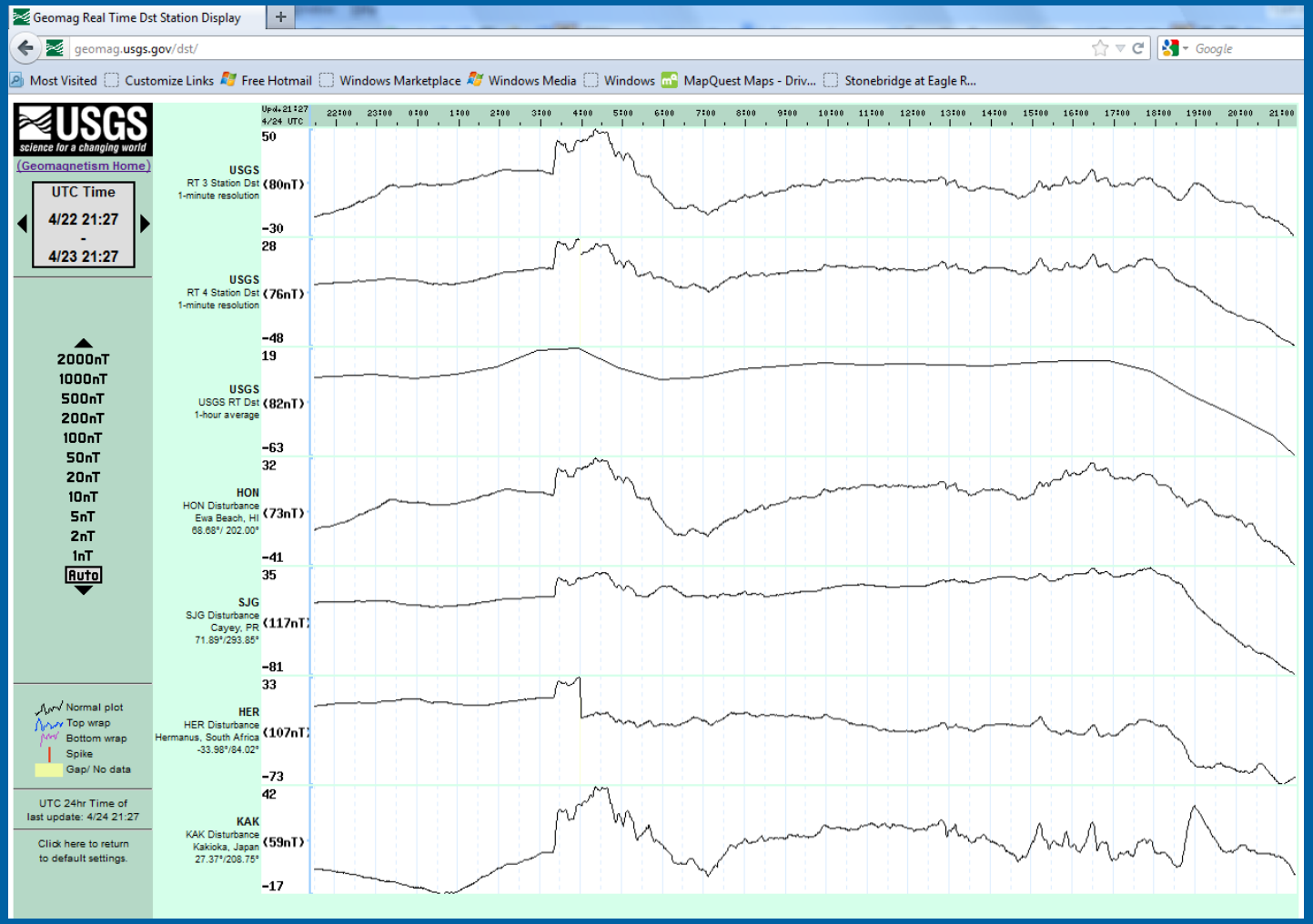
Real-time Storm-Time Disturbance Index (Dst)
geomag.usgs.gov/dst



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Current and Planned Products, cont'd

- Web-based data download utility – soon to be released
- New data products: automatically adjusted and quasi-definitive data

In development:

- Real-time K, AE indices and local disturbance time series
- Geomagnetic and GIC Hazard maps

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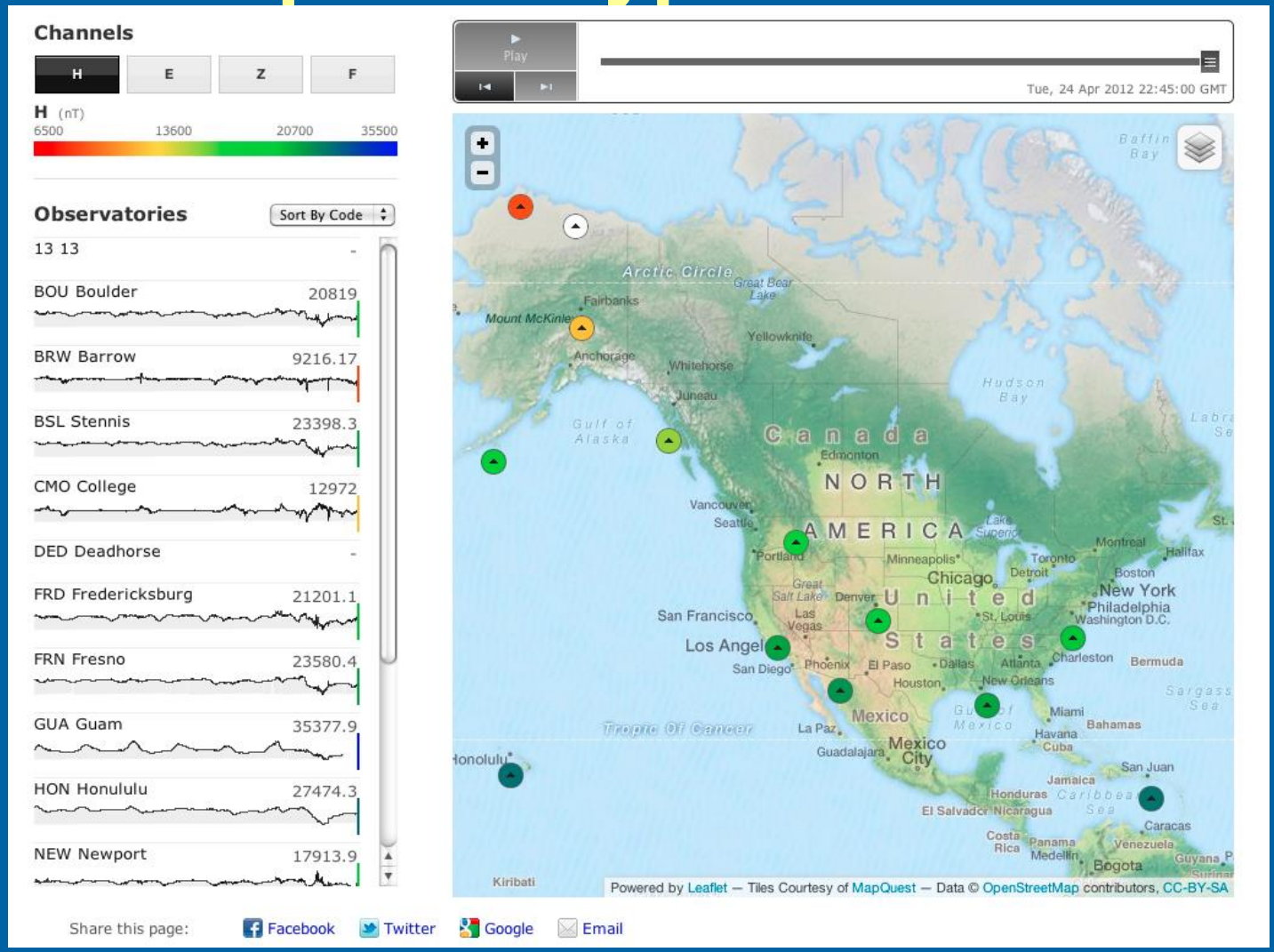
Hazard Map Prototype



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Thank You!

USGS Geomagnetism Program

- geomag.usgs.gov

Intermagnet

- www.intermagnet.org

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