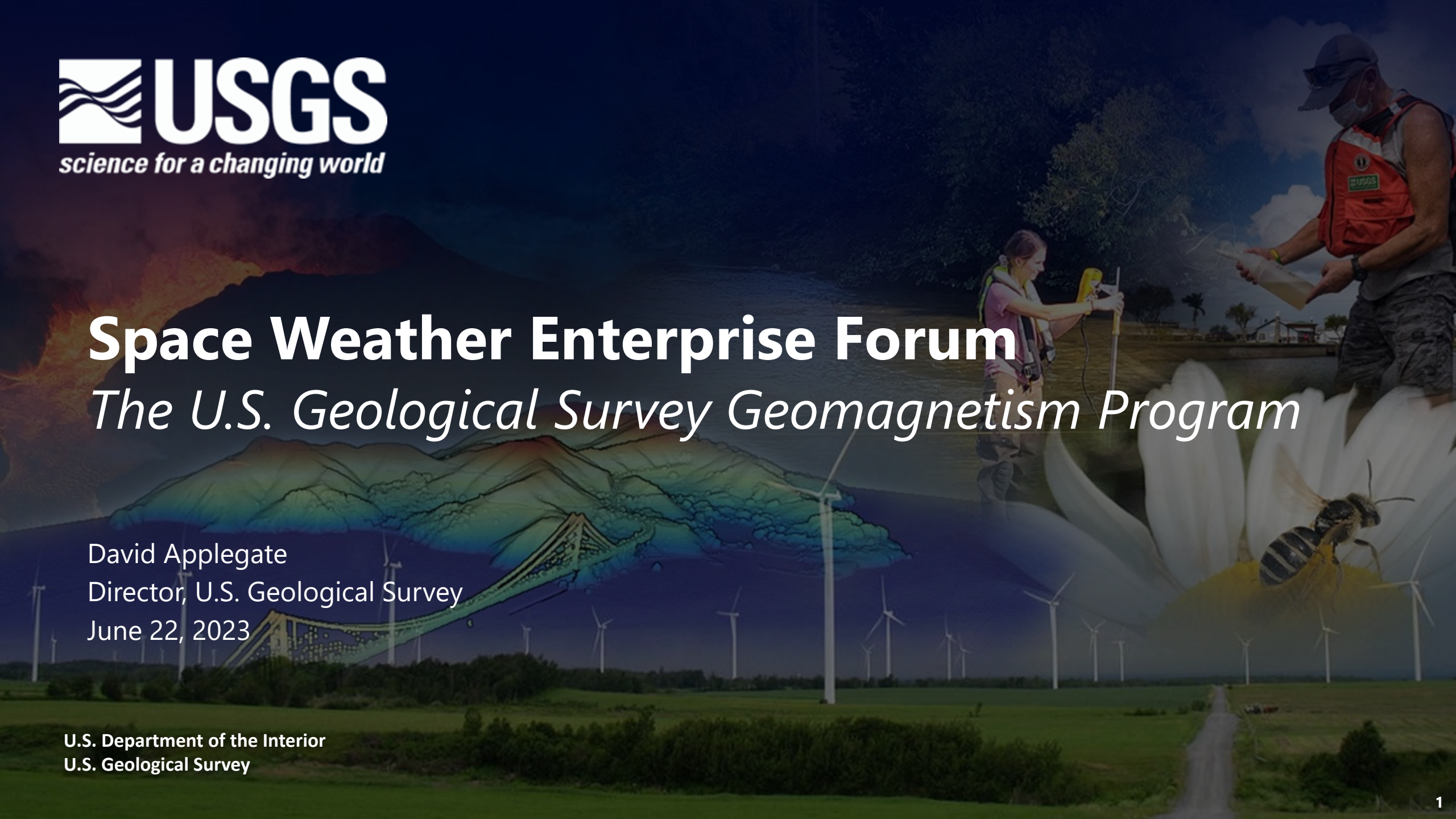

USGS
science for a changing world

Space Weather Enterprise Forum

The U.S. Geological Survey Geomagnetism Program

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

USGS Mission and Vision

The **USGS mission** is to monitor, analyze and predict current and evolving dynamics of complex human and natural Earth system interactions and to deliver actionable information at scales and timeframes relevant to decision makers.

Vision Statement: Lead the Nation in 21st-century integrated research, assessments, and prediction of natural resources and processes to meet society's needs.

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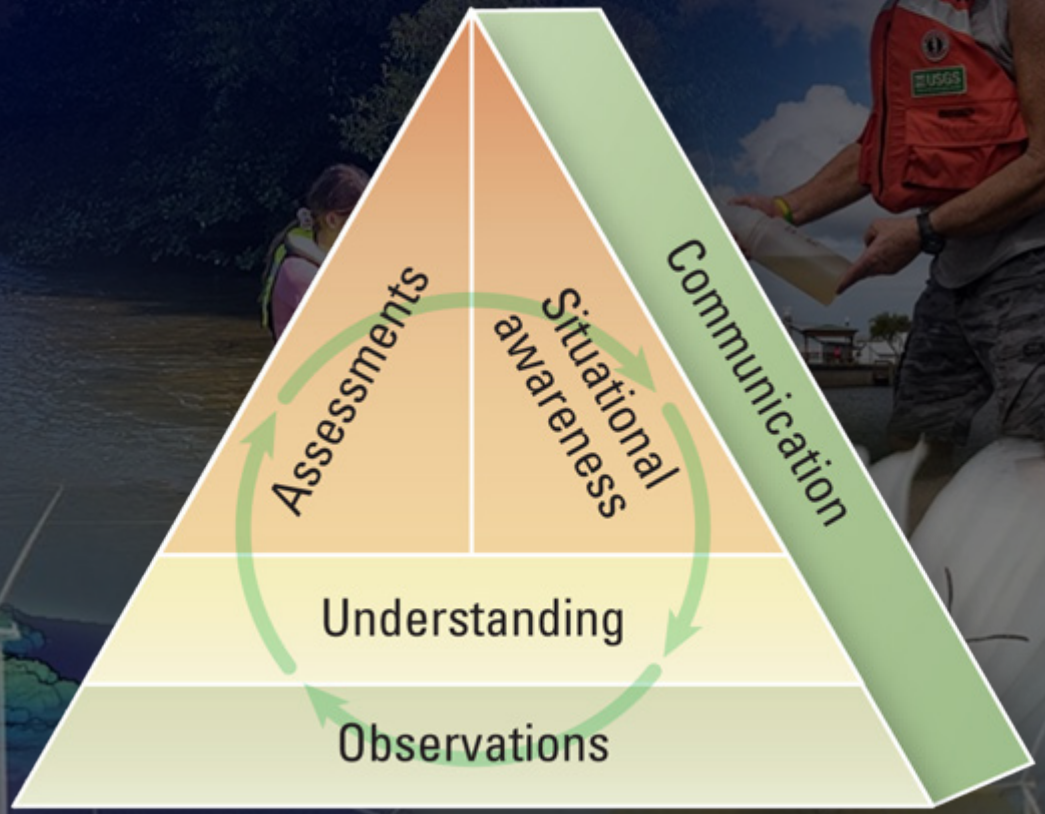
USGS Hazard Roles and Responsibilities

- Responsible for providing assessments and alerting for earthquakes, volcanic eruptions, and landslides
- Seismic networks support NOAA's tsunami warnings
- Streamgages and storm surge monitors support NOAA's flood and severe weather (including hurricane) warnings
- Coastal and marine geologic surveys and research support assessments of earthquake and tsunami hazards, and coastal impacts from storms, hurricanes and sea-level rise
- Geomagnetic observatories support NOAA and US Air Force 557th Weather Wing geomagnetic storm forecasts
- USGS has key role in tracking chemical and biological threats, in particular zoonotic diseases
- Geospatial information supports response operations for wildfire and many other disaster types



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Geomagnetism Program Objectives

01

To monitor the Earth's magnetic field at ground-based magnetic observatories.

02

To report magnetic field data with high accuracy, resolution, and reliability.

03

To research and evaluate geomagnetic hazards.

The work of the USGS Geomagnetism Program is mandated by Congress and the President, and incorporated into Department of the Interior and USGS plans

- The Promoting Research and Observations of Space Weather to Improve the Forecasting of Tomorrow (PROSWIFT) Act that was signed into law on October 21, 2020.
- Executive Order (13744) on space weather signed on October 13, 2016.
- Executive Order (13865) on electromagnetic pulses signed by the President on March 26, 2019.
- National Science and Technology Council's Space Weather Operations, Response, and Mitigation (SWORM) Working Group: National Space Weather Strategy and Action Plan (2019).
- Department of the Interior (DOI) Strategic Plan (2018).
- USGS Natural Hazards Science Strategy (2013).
- DOI Mission Essential Function #3-10 - Provide geomagnetic data to partner federal agencies in support of space weather monitoring and warning capabilities

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Key Topics

- Active member of Space Weather Operations, Research, and Monitoring Interagency Working Group (SWORM; jointly led by OSTP, DHS-CISA, and NOAA)
- Responsibilities under National Space Weather Strategy & Action Plan
- Geomagnetic Observatory Expansion
- Magnetotelluric Survey (projected completion summer 2024)
- Targeted Research

Space Weather Strategy & Action Plan

DOI is a lead agency in the following:

1.1.3 - Develop and publish more rigorous space weather benchmarks for each of the five benchmarks phenomena.

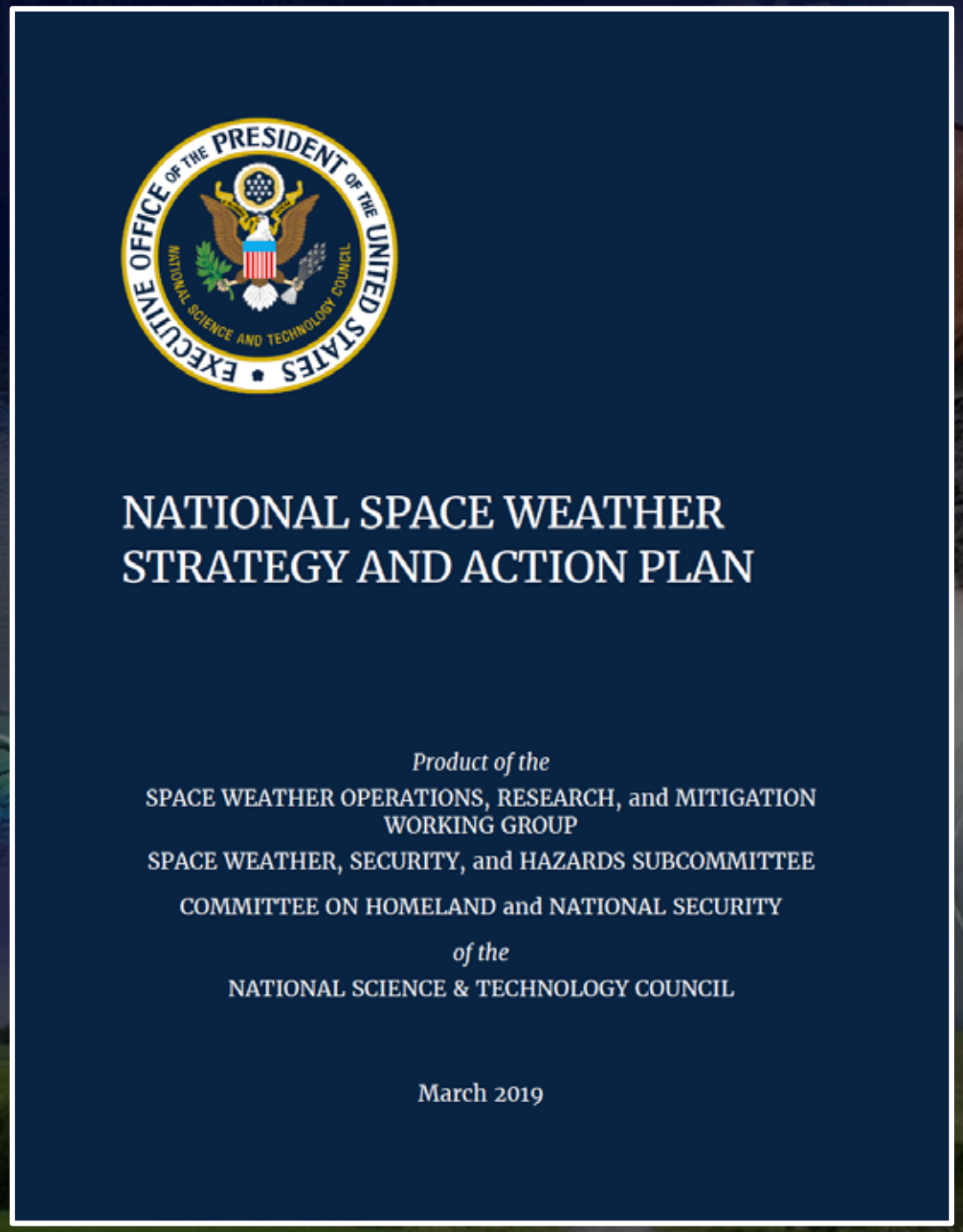
1.3.9 - DOI will complete the magnetotelluric (MT) surveys of the United States.

2.2.7 - DOI will sustain the existing ground-based geomagnetic monitoring network and enhance the network through the installation of new observatories

2.4.1 Assess the geo-electric monitoring capability and recommend any further augmentation to this capability

2.6.2 Release historical data to improve the development, validation, and testing of models used for characterizing and forecasting space weather events.

2.8.3 - Explore opportunities to leverage international partnerships to sustain baseline operational space-weather-observing capabilities.



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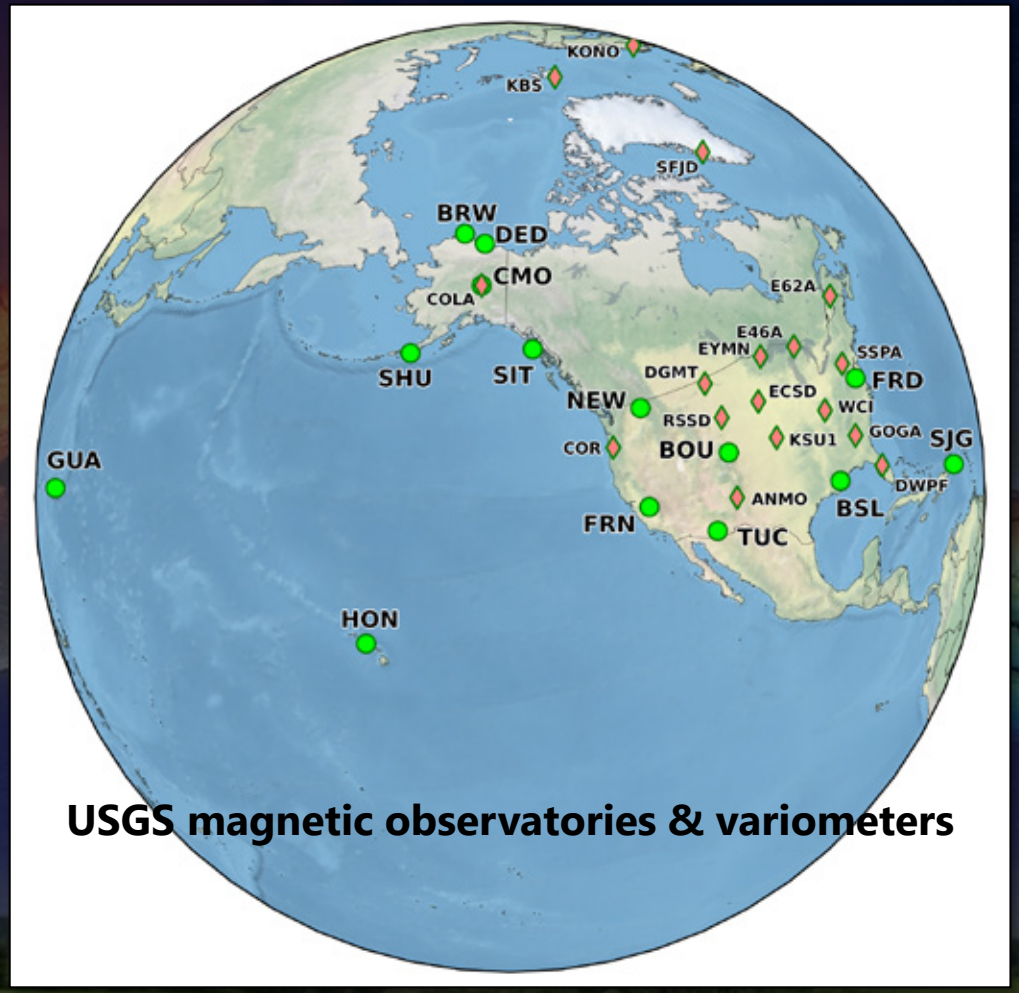
Observatory Operations



USGS magnetic observatories & variometers

- USGS operates 14 magnetic observatories
  - 6 - CONUS
  - 5 - Alaska
  - 1 – Hawaii
  - 1 – Puerto Rico
  - 1 – Guam
- Objective is to provide stable, highly accurate measurements of magnetic field
  - Near real-time
  - Field strength and direction
- USGS also operates 13 variometers (and growing), co-located with EHP/GSN seismic stations.
- Newly appropriated funding is supporting expanded magnetometer footprint in CONUS.
- All of the data from USGS magnetometers are freely available in real-time.

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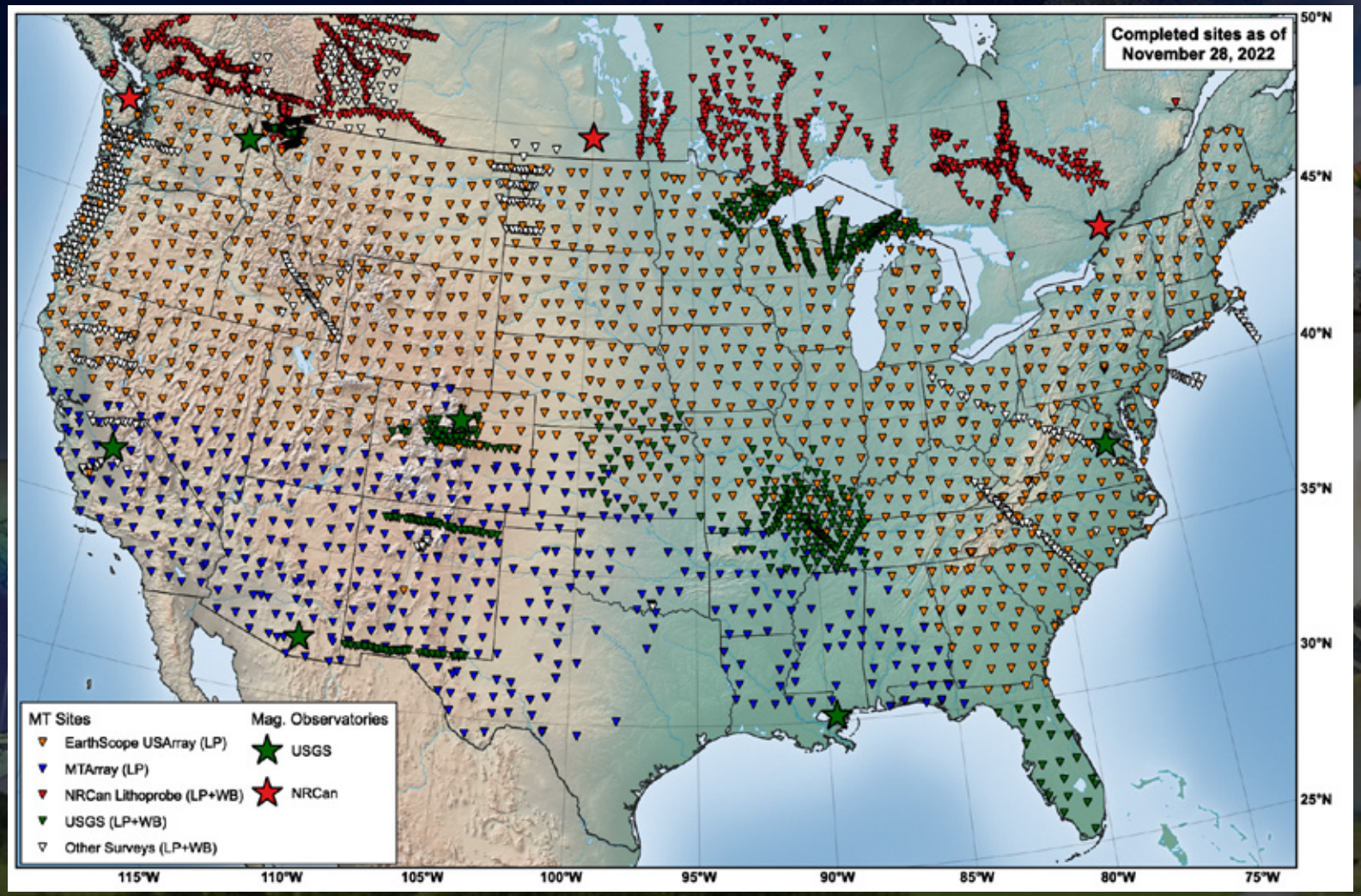
Continuation of magnetotelluric (MT) survey for the contiguous US



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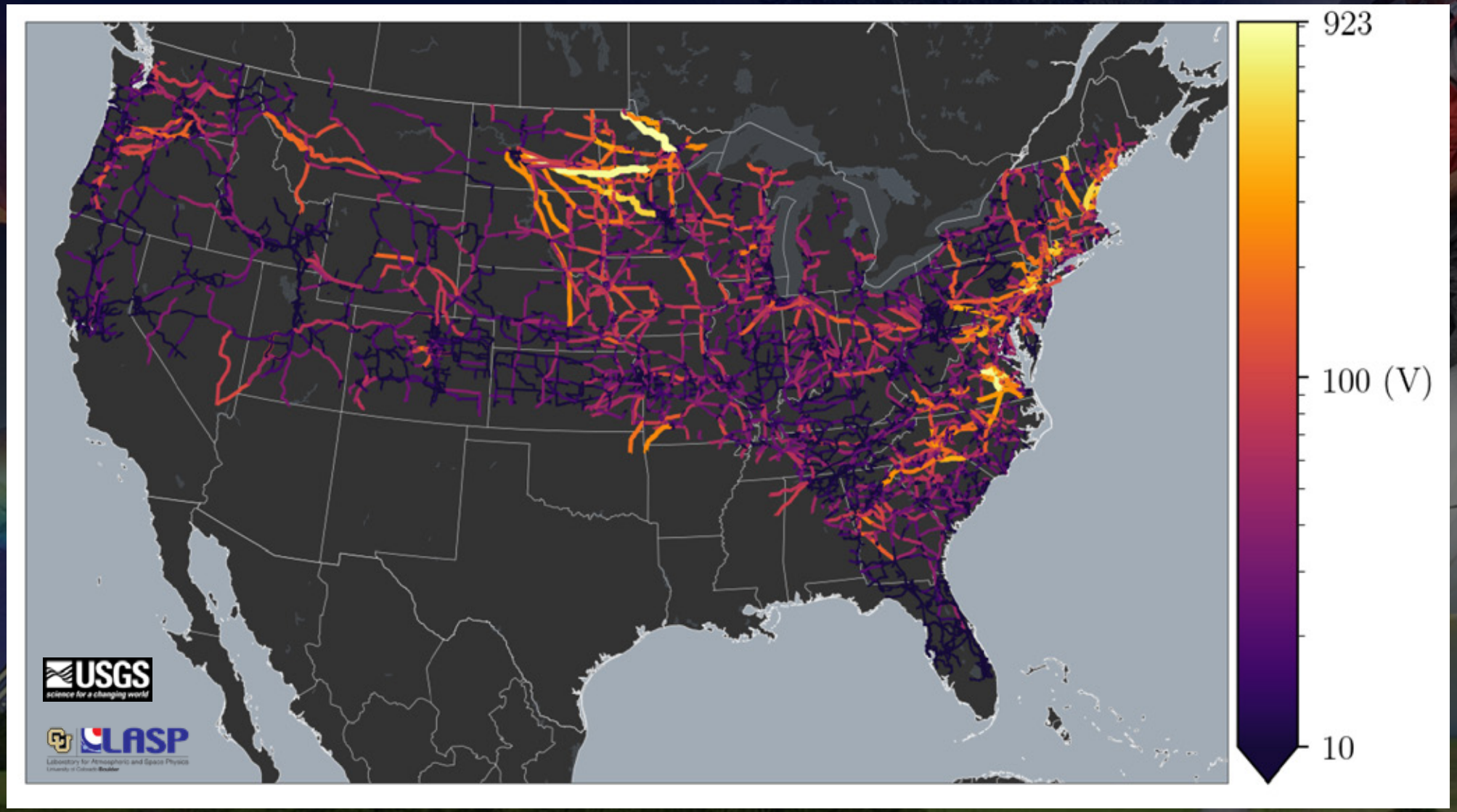
100-Year Voltages on National Power Grid



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Lucas, G. M., Love, J. J., Kelbert, A., Bedrosian, P. A., and Rigler, E. J., 2020, 100-year geoelectric hazard analysis for the United States, Space Weather, doi:10.1002/2019SW002329.

Geomagnetism Program Research

- Historical Magnetic Superstorms
- Geomagnetic Field Mapping
- Earth Conductivity Modeling
- National Impedance Map
- Geoelectric Field Mapping
- Statistical Maps of Geoelectric Hazards
- Electromagnetic-Pulse Hazard Analysis

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Geomagnetism Program Research Plan, 2020–2024

Circular 1469

Questions?

Get more information at

www.usgs.gov/programs/geomagnetism

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