

The NERC logo consists of the letters "NERC" in a bold, black, sans-serif font. Below the letters is a horizontal blue bar that extends to the right, underlining the text.

NORTH AMERICAN ELECTRIC
RELIABILITY CORPORATION

May 2024 Geomagnetic Disturbance Event

NERC Review Plan

June 25, 2024

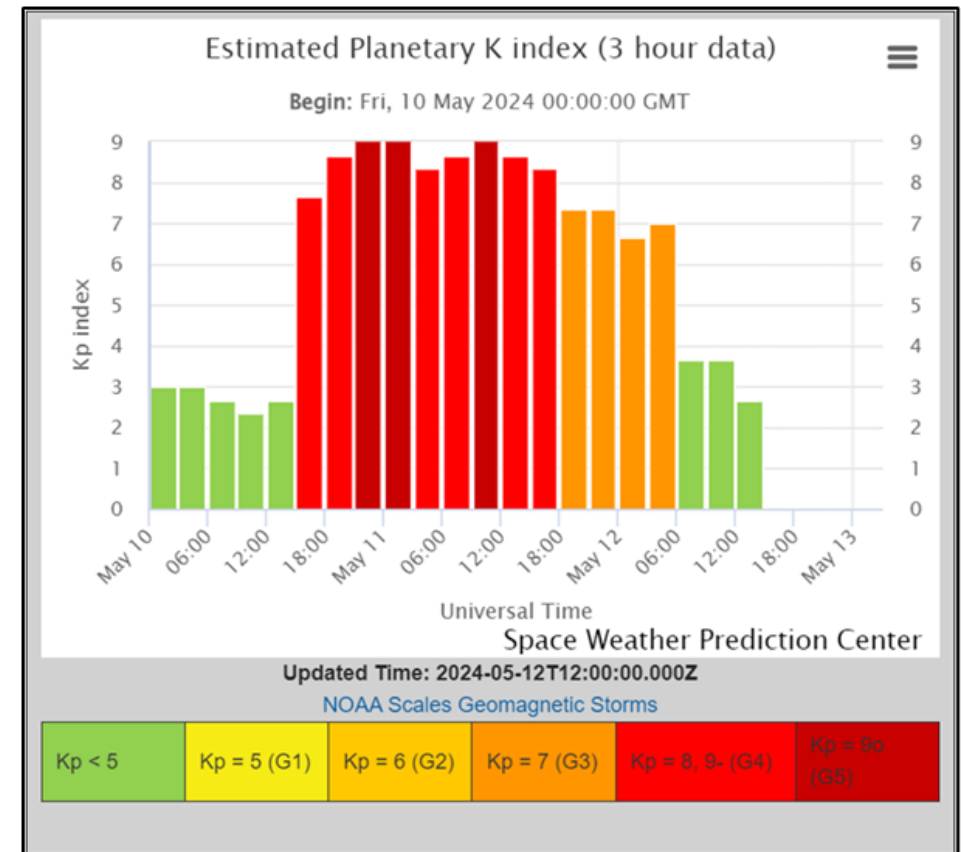
RELIABILITY | RESILIENCE | SECURITY

- Observations from the May 10-12 GMD Event
- Overview of NERC's GMD Event Review Plan

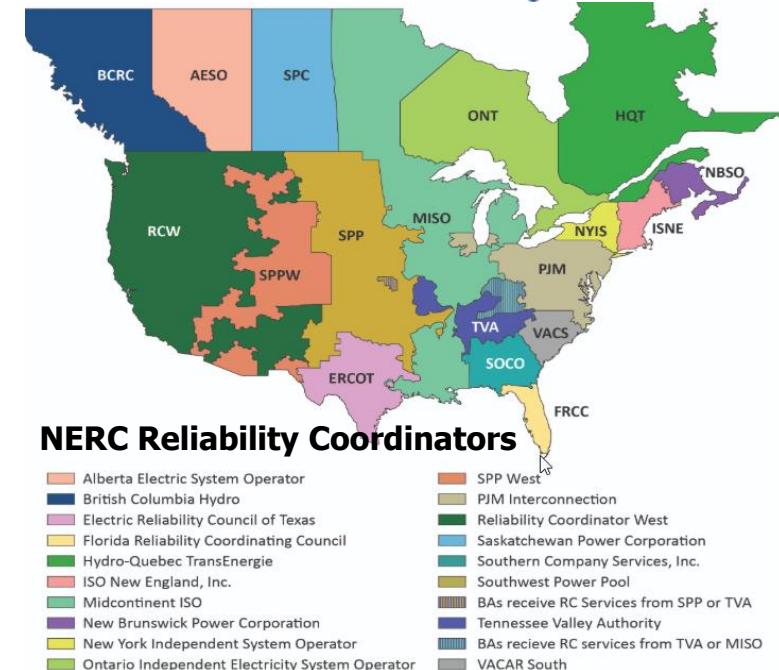
The bulk power system (BPS) remained stable and largely unaffected in the presence of a strong to extreme geomagnetic disturbance (GMD) throughout the weekend of May 10

- Reliability Coordinators (RC) followed space weather conditions and vigilantly monitored BPS
- Operators postured the system for reliability
- Limited impacts were observed areas
- SWPC initiated multiple Reliability Coordinator Hotline telephone calls to keep system operators informed of conditions

This major storm presents an opportunity to deepen understanding of GMD events



- SWPC initiated voice notification to RCs using NERC hotline 6 hours prior to onset of GMD event
- **Early notification provided operators with time to effectively posture the system**
- Actions taken by system operators:
 - Implementing GMD Operating Procedures and 'Conservative Operations' protocols
 - Scheduling additional generation for contingencies
 - Cancellation of some maintenance on transmission lines
 - Increased monitoring of system geomagnetically-induced currents (GICs) and equipment



Space Weather Prediction Center
RELIABILITY | RESILIENCE | SECURITY

- Operation of the interconnected transmission system was largely unaffected
- Areas observing impacts to power system equipment were mostly in the U.S. Northeast, mid-Atlantic, and Western Canada
- Reports of impact included:
 - GIC and harmonic current alarming, triggering operating actions to protect transformers and other equipment
 - GIC levels exceeding thresholds for normal generator step-up transformer (GSU) operations, resulting in controlling actions (reduced generator output power)
 - Power transformer top-oil high temperature alarms resulting in operator monitoring or system reconfiguration
 - Tripping of a harmonic filter on a high voltage transmission line
 - Voltage oscillations at a solar photovoltaic (PV) generating unit and battery bank
 - Elevated GIC and harmonic levels in many parts of North America

- Objectives
- Participants
- Data and Information Sources
- Schedule

The screenshot displays the NERC website's navigation structure. The top navigation bar includes links for About NERC, Career Opportunities, Governance, Committees, Program Areas & Departments, Standards, Initiatives, and Reports. The left sidebar lists various program areas, with 'Event Analysis' highlighted by a red arrow. The main content area is titled 'Geomagnetic Disturbance Data' and provides information about NERC's GMD data collection program. A red box highlights the link 'May 2024 GMD Event Review Plan' in the 'Key Links' section.

About NERC **Career Opportunities** **Governance** **Committees** **Program Areas & Departments** **Standards** **Initiatives** **Reports**

Event Analysis
Event Analysis
Lessons Learned
Event Reports
EA Program
Human Performance
Interregional Transfer Capability Study (ITCS)
Modeling Assessments
Reliability Assessments
Performance Analysis
Section 1600 Data Requests
Reliability Indicators
Demand Response Availability Data System (DADS)
Generating Availability Data System (GADS)

Home > Program Areas & Departments > Event Analysis, Reliability Assessment, and Performance Analysis > Geomagnetic Disturbance Data (GMD)

Geomagnetic Disturbance Data

NERC's GMD data collection program supports ongoing research and analysis of GMD risk. GMD events are caused by the ejection of charged material from the sun and the interaction of this material with space around the earth (atmosphere and magnetosphere). The resulting disturbances in earth's magnetic field have the potential to disrupt operations or cause damage to critical infrastructure, including power systems. Extremely strong GMD events, though rare, can induce strong quasi-dc currents in the electric power grid that could affect system voltages, relay and protection system performance, and the operation and health of some large power transformers.

Through the GMD data collection program, NERC is collecting GIC and magnetometer data from reporting entities for designated strong GMD events ($Kp = 7$ and

GMD News
Subscribe to the GMD Distribution List
Please include "Please add me to the GMD Distribution List" in the subject line.

Key Links
GMD Training
GMD - Section 1600 Data Request
GMD User Guide
GMD Event Data Download Guide
May 2024 GMD Event Review Plan

Data and observations can improve GMD Vulnerability Assessments and mitigations

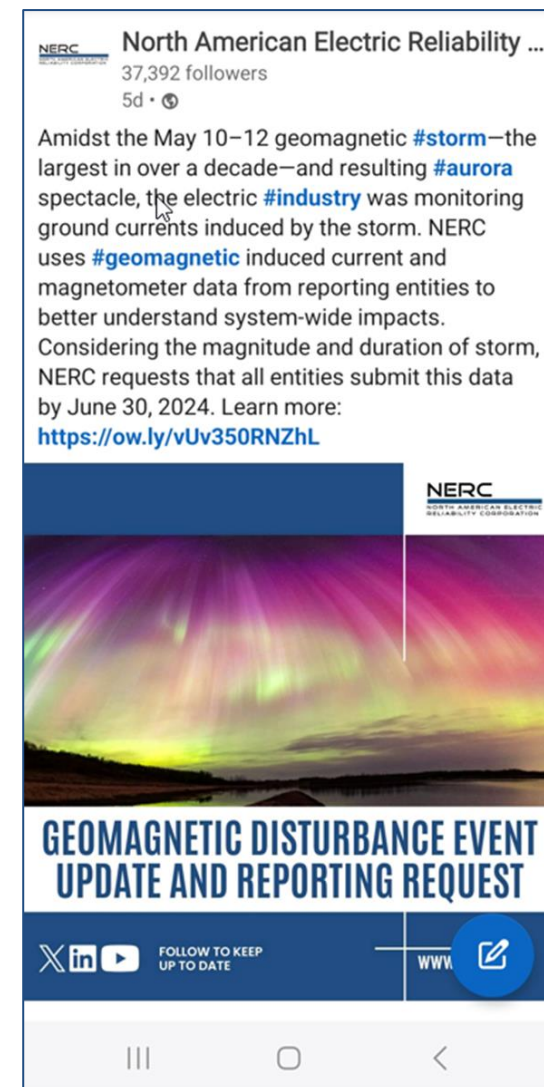
Focus Areas

- **Impact of GIC-related harmonics on the BPS:** *How did harmonics affect BPS equipment? What levels of harmonic distortion were observed? What levels are predicted?*
- **Transformer thermal impacts:** *What effect did GIC levels have on transformer heating?*
- **GMD Benchmarks:** *How did peak geoelectric fields and magnetic field signature compare to the Benchmark GMD Event in TPL-007?*
- **GIC Model Validation:** *Did GIC models provide reasonable estimates of GIC?*
- **GMD Operations Best Practices:** *What operating actions were taken? How can operator situational awareness be better supported?*

- Transmission Planners and Planning Coordinators that conduct GMD Vulnerability Assessments
- Reliability Coordinators, Transmission Operators, Generator Operators and other system operators familiar with the GMD Operating Procedure
- Transmission Owners, Generator Owners, and other registered entities with expertise in GMD effects on BPS equipment or operations
- Electric Power Research Institute (EPRI)
- Space Weather Centers in U.S. and Canada
- SMEs from equipment vendors and manufacturers

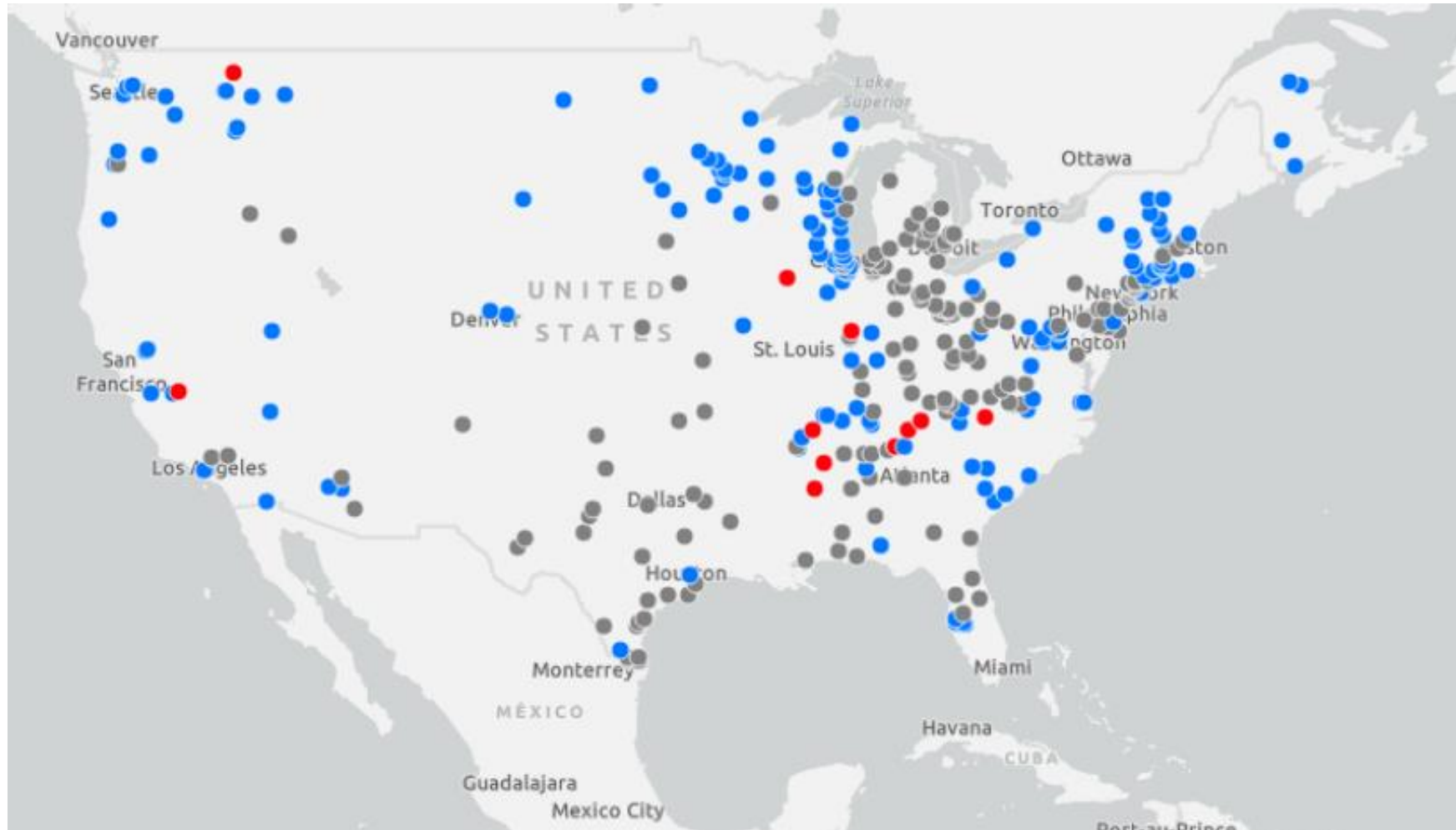
NERC's established data collection programs will support rigorous event review:

- **GMD Data System:** GIC and magnetometer data from entities with monitoring devices
- **Generating Availability Data System (GADS):** Performance and outage data for electric generating equipment
- **Transmission Availability Data System (TADS):** Outage data and causes for transmission equipment, transformers, and AC/DC converters
- **Misoperation Information Data Analysis System (MIDAS):** Protection system operations and misoperations data



GIC, Magnetometer Device Location

Device Type ● GIC ● Mag ● Non-Reporting Device (as of June 1, 2024)



- **June – September** | Event Information Collection and Review
- **October 1 – 2** | Discussion at NERC-EPRI GMD Workshop
- **November – December** | Report preliminary results
- **January (2025)** | Report results and recommendations

A map of North America, including the United States, Canada, and Mexico. A horizontal band of varying shades of blue and grey crosses the center of the map, passing through the United States. The text "Questions and Answers" is overlaid on this band.

Questions and Answers

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