

Monitoring Space Weather Effects on the North American Grid

2026 Space Weather Workshop

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The Role of the Electric Reliability Organization (ERO)

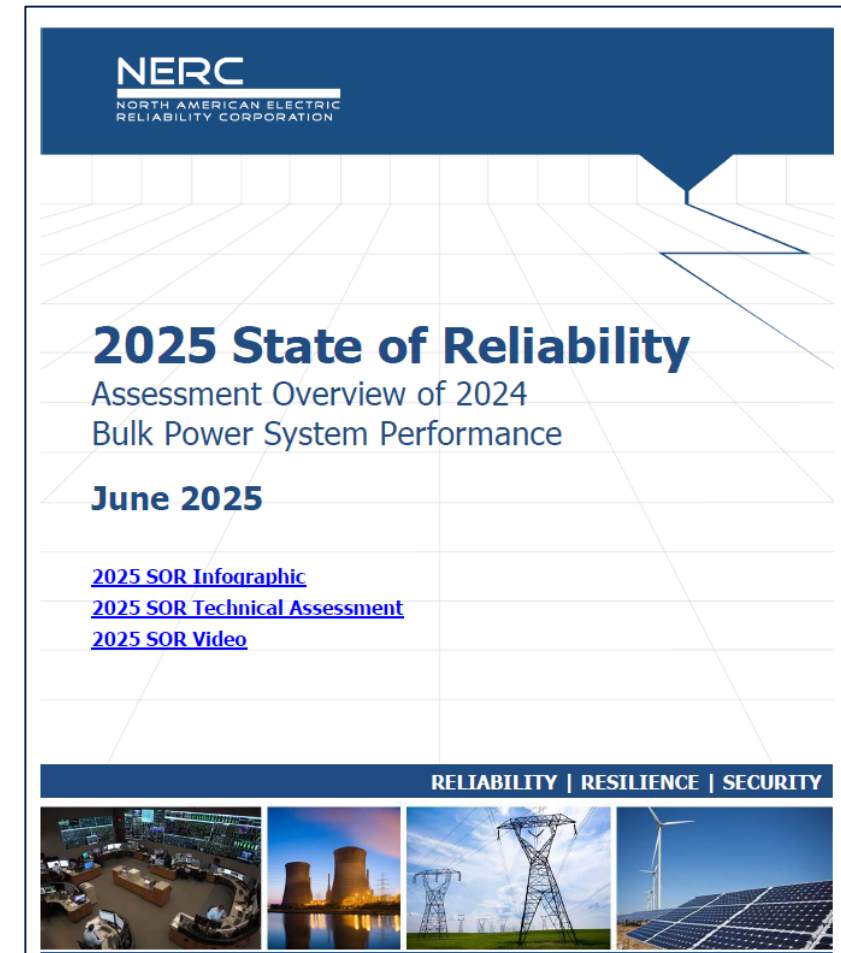
The effective reduction of risks to the reliability and security of the North American bulk power system

- Develop and enforce reliability standards
- Assess current and future reliability of the grid
- Analyze system events and recommend improved practices
- Encourage active participation by all stakeholders
- Accountable to regulators in the United States (Federal Energy Regulatory Commission) and Canada (Canada Energy Regulator and provincial governments)



Rigorous Data Collection and Analysis for Reliability

- NERC data programs are mandatory for U.S. grid owners and operators and cover
 - Transmission Equipment and Generator Outages and Causes
 - Protection and Control System mis-operations
 - Geomagnetic Disturbance Data (GIC Monitors and Magnetometers)
- NERC reviews data with industry to produce annual reliability reports and analyze events impacting the grid
- NERC data sources were used to prepare the [NERC Staff Report of the May 2024 Gannon Storm](#)



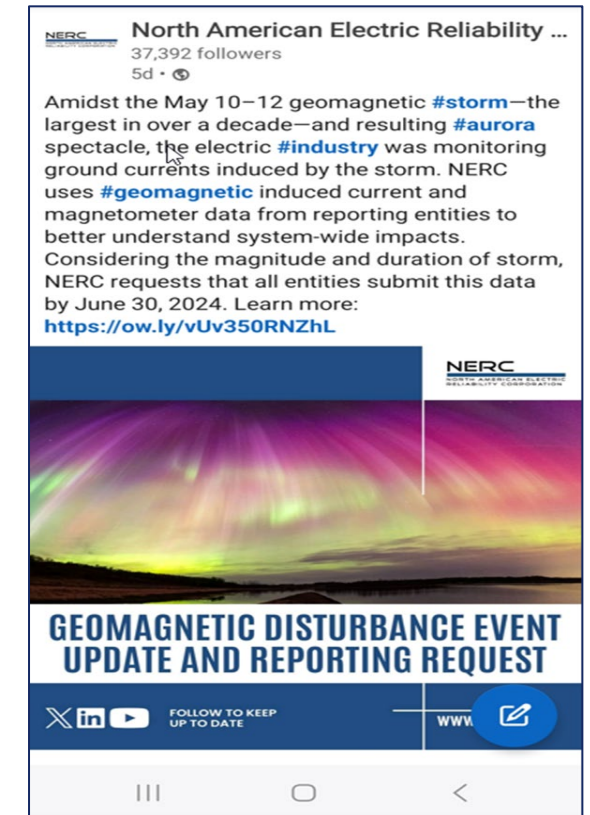
The annual State of Reliability Report is posted on the NERC [website](#)

Results of NERC's Review of the Gannon Storm

The Bulk Power System (BPS) remained stable and served all connected load throughout the three-day event

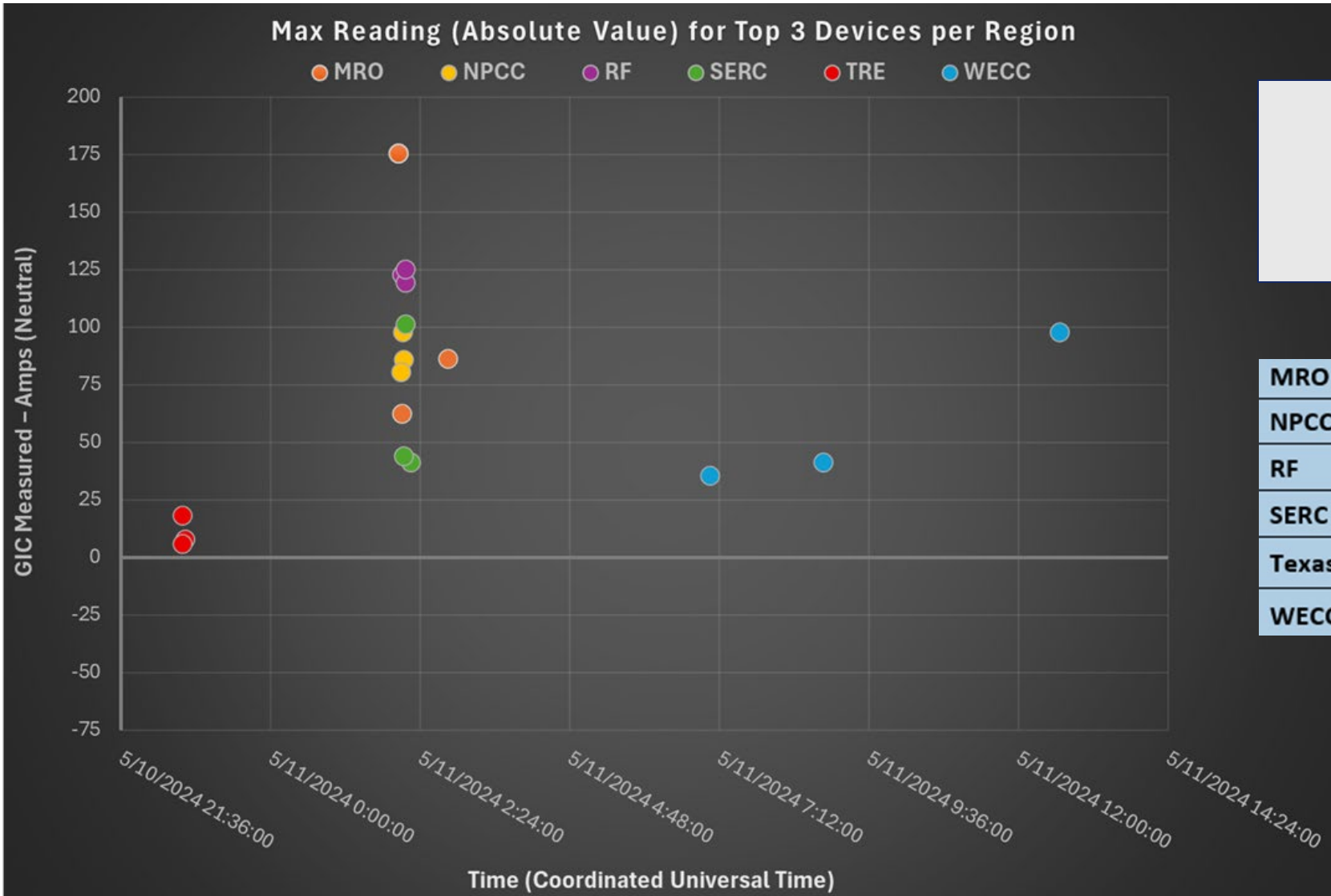
Takeaways from the review:

- **Operator Awareness:** Early notification from Space Weather Prediction Center enabled operators to implement more mitigations and maximize operator awareness
- **Wide-area System Risk:** GICs pose unique risks to system voltages because peaks can occur simultaneously potentially affecting voltages across wide areas
- **Localized Equipment Impacts:** Few outage and degradation reports received in NERC's mandatory equipment data collection
- **Model Validation:** Good correlation observed between GIC measurements and GIC estimates derived from utility models but more areas need to be analyzed



Dr. Jenn Gannon (1978-2024) was a vital contributor to the NERC GMD Task Force and led development of models and methods used by industry

Gannon Storm produced the highest peak GICs of any GMD event in NERC’s database going back to 2013



GIC exceeded 90 Amps (neutral) in 5 of 6 NERC Regions

MRO	Midwest Reliability Organization
NPCC	Northeast Power Coordinating Council
RF	ReliabilityFirst (Mid-Atlantic)
SERC	SERC Reliability Corporation (Southeast)
Texas RE	Texas Reliability Entity
WECC	WECC (Western U.S.)

Gannon Storm | Timeline of Reported Equipment Events



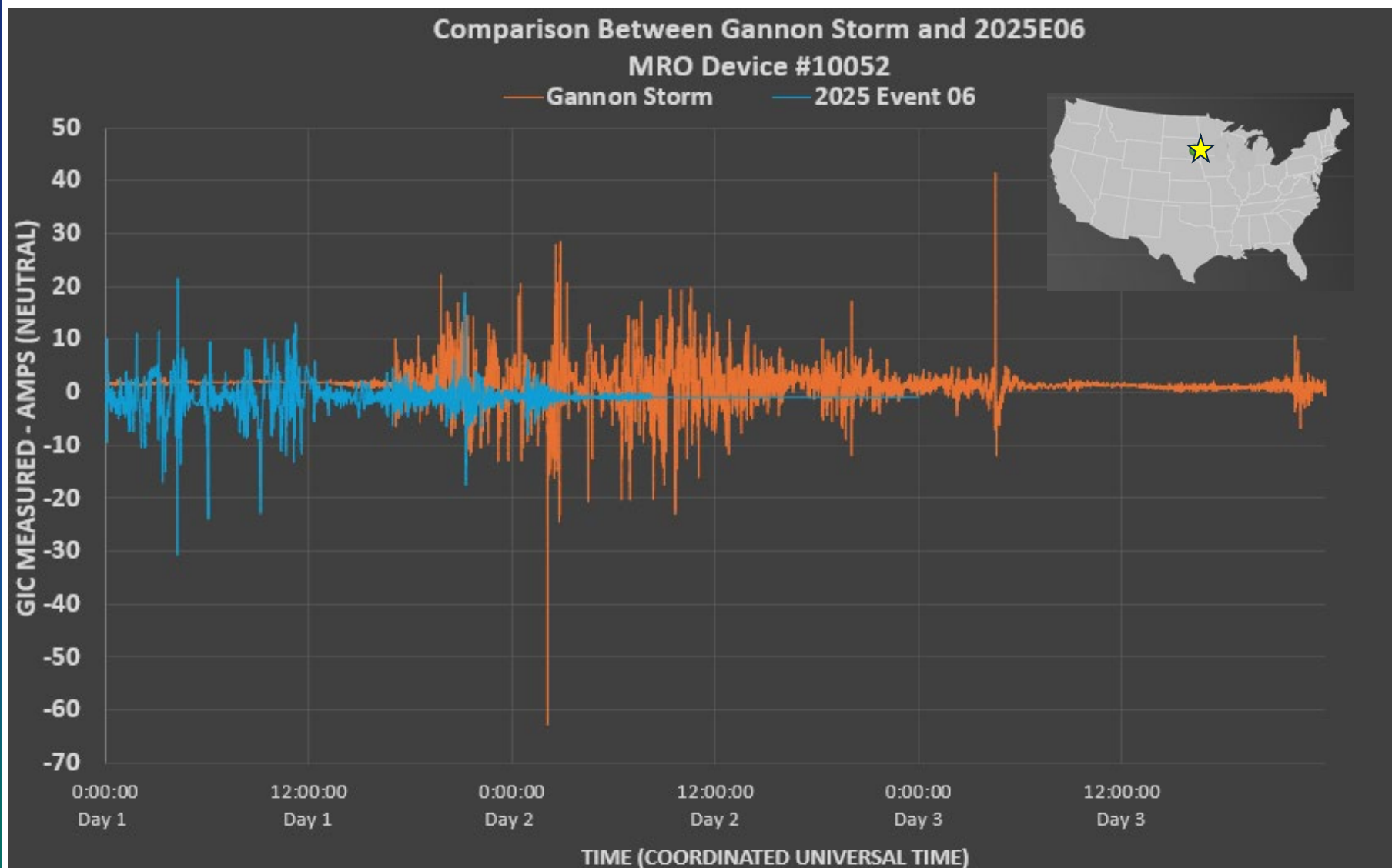
Equipment Event Reports (All Regions)

1. Voltage Support Equipment Outage (Southeast)
2. Generator Output Reduced by Operators (Northeast)
3. Voltage Support Equipment Outage (Mid-Atlantic)
4. Generator Outage (Northeast)
5. Overvoltage Protection Equipment Outage (Midwest)

GIC During Gannon Storm (Midwest) and Equipment Events (All Regions)

A Midwest GIC Monitor Provides a Data Comparison for November 2025 and Gannon Storm

This monitor reported peak GIC in the “Top 3” for the Midwest in Both Events



GMD data collection for events in 2025 is underway

- No GMD-related equipment outages were reported
- Utility GIC data for G3 and stronger events is due to NERC by June 30, 2026

Electric Reliability Programs for GMD Risk Reduction

- NERC's data collection and reliability reporting processes provide regular reviews of grid performance and the effects of all hazards
- GMD data is available for download from NERC's [portal](#)
- Performance analysis, research, and tool development are critical to the effectiveness of GMD reliability standards



A light blue map of the United States is in the background. A vertical line is drawn through the center of the map, passing through the middle of the text.

NERC

Discussion