



# Geomagnetic Disturbance - GMD

## What is GMD?

Geomagnetic disturbances (GMD), also called geomagnetic storms, are events that arise from natural physical processes on the sun. While the storms can create beautiful aurora in the nighttime sky, they also can disrupt communication and navigation systems and cause harmful geomagnetic induced currents (GICs) in the electric power grid.

## Potential impacts of GMD on electric grid

The geomagnetically induced currents (GIC) can be millions of amperes and have waveforms lasting several minutes to hours. A portion of these very slow varying currents also flow in the bulk electric system because it is a solidly grounded system. The consequences of this current flow primarily stem from these quasi-DC currents flowing through transformer windings. The highest voltage systems are the most affected because their overall resistance is the lowest and they tend to cover longer distances over the earth.

GMD effects can cause protective equipment to mis-operate, equipment failure, voltage collapse and cascading outage.

## Historical Context:

The issue of grid reliability in the event of a threat from GMD has been known for a long time – since at least the 1970s. The most well-known experience of this in North America was the March 13-14, 1989 event which led to the collapse of the Hydro Québec system. It is only in recent years that GMD has gained a higher priority.

GMD is a natural event. Its probability is determined by natural events beyond human control. These probabilities have not changed. What has changed is a growing understanding that our modern society is perilously dependent on the grid and that these natural events can have such severe consequences. What is not agreed is the probability or frequency of these severe events nor the extent of the long term consequences.

## Federal Response

The Federal Energy Regulatory Commission (FERC) in 2013 issued Order No. 779 directing the North American Electric Reliability Corporation (NERC) to implement reliability standards to protect the bulk electric system from instability, uncontrolled separation, or cascading failures from GMD.

In response, NERC issued first-stage reliability standards which mandate operating procedures to mitigate the effects of GMD. The first-stage standards were fully implemented in 2015.

## What ITC is Doing

ITC recognizes the importance of the reliability of the Bulk Electric System, including high impact low frequency threats such as GMD. Our company is participating in advancing the understanding of mitigation for these threats as well as the development of appropriate reliability standards for the grid. ITC will be fully compliant with all NERC Standards including GMD.

## About ITC:

ITC is investing in a 21st century power grid to improve reliability, expand access to markets, lower the overall cost of delivered energy and allow new generating resources to interconnect to our transmission systems.



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