Solar Storm Risk to the North American Grid

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Surface Electric Fields During Carrington-Level Storms

- Major storms can last for days
- Rapidly varying electric fields induce high amplitude currents along transmission lines
- Large variations along the Atlantic & Gulf Coast
Dominant Power Outage Risk Factors

Outage risk factors include:

- Magnetic latitude
- Coastal proximity
- Ground conductivity
- Transmission line voltage
- Transmission line length
- Transformer construction

Outage scenario by county from a Carrington-level storm simulation
Outage Scenarios from Carrington-Level Storm
Economic Cost

• 20-40 million without power

• Outage durations of 16 days to 1-2 years
  
  • Duration depend largely on the availability of spare replacement transformers and crew
  
  • Failure of a few transformers serving a highly populated area can result in prolonged outage

• Total economic cost for such a scenario is estimated at $0.6-2.6 trillion USD for a single event
  
  • Hurricane Sandy = $68 billion
  
  • Hurricane Katrina = $108 billion
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