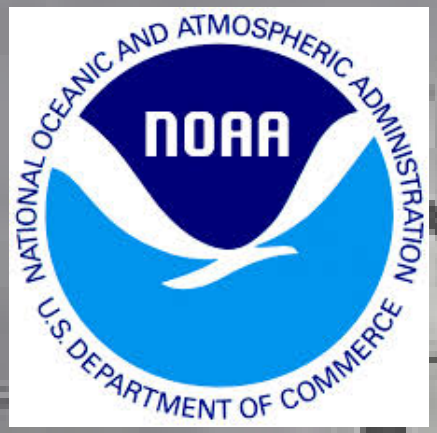




# Space Weather and Power Grid Workshop

*29-30 October, Ispra, Italy, 2013*

# Structure of the event


**Session 1:**
**Awareness, policy action, and international cooperation**

High-level speakers from Europe and the USA discussed strategic and policy issues related to severe space weather and its potential impact on infrastructures. During the discussions a priority need for validated risk and impact assessment was highlighted.

**Session 2:**
**Space weather and GICs**

This session provided an introduction to the solar phenomena that can give rise to GICs on Earth, in particular CMEs, and provided an analysis of GIC occurrences in the UK, Ireland and South Africa. In addition, the EURISGIC initiative for providing a real-time forecasting service for GICs in Europe was presented.

**Session 3:**
**Canadian experience, including a severe event**

Following the space-weather impact on parts of the Canadian power grid in 1989 significant steps were taken to render the grid less vulnerable, such as new developments in modeling, as well as the deployment of a GIC simulator service to automate GIC modeling. Next steps include combining geomagnetic activity forecasts with the GIC simulator, and determining what constitutes a 100-yr geomagnetic storm.

**Session 4:**
**USA experience - NOAA's facilities and their use**

In a video link with NOAA's Space-Weather Prediction Center, NOAA's monitoring and prediction facilities were presented. In addition, the process from CME detection to customer notification of potential impacts was elucidated. A North American electricity operator discussed operational strategies in case of an alert including potential mitigation strategies.

**Session 5:**
**Risk assessment and management**

Discussing more generally the disaster risk management cycle, prevention, preparedness and response aspects were addressed, including the need for benchmark event scenarios for severe space-weather impact. The idea to launch a dedicated exercise to provide a stress test of response capabilities both nationally and internationally was proposed to the workshop participants.

**Session 6:**
**Looking forward: operator requirements and regulation**

The workshop concluded with a discussion of operator and regulatory requirements, as well as with the feasibility of creating a European space-weather forecasting capability. It was also indicated that there is preparedness in industry in some European countries against moderate space weather, but the vulnerability of the power grid with respect to Carrington-type events is unclear and needs to be evaluated. In addition, interdependencies between national grids and other critical infrastructures in case of space-weather impact are not routinely assessed.

# Some conclusions..

- There is an increasing awareness of the space weather threat among operators and regulators and some countries have included it in their national risk assessment programmes as a priority risk to be addressed.
- There is a need for integrated risk assessment to promote policy action. The results of this risk assessment need to be translated into contingency plans to guide response actions.

- The risk of space-weather impact on power-grid components may be underestimated. Even small GICs have been found to cause transformer damage possibly leading to rapid or delayed failure.
- It is expected that during a Carrington-type occurrence the event boundary would move southward towards 40 degrees magnetic latitude. This would encompass a significant part of Europe.
- Currently, loss of GPS capability is not a problem for the power industry as critical transmission-grid systems use atomic clocks as timing backup. With the use of Smart grids and the increased dependence on GPS timing the power industry might be building vulnerability into their systems.

# And finally..

- A severe geomagnetic storm would affect large geographical areas simultaneously and cause ripple effects due to interdependencies between affected critical infrastructures. This requires inter-institutional and possibly international response planning efforts. It might be beneficial to test certain aspects of the response during a dedicated international emergency exercise.
- While there is preparedness in industry against moderate space weather the vulnerability of the power grid with respect to Carrington-type events is inconclusive and needs to be assessed.

# What next?

- The outcome document of the workshop will be released in January 2014
- This workshop provided an opportunity to have a more narrow focus and go into technical details, which perhaps is not possible with a broad audience but was good for this specific audience. We would like to continue this concept and address other sectors during next year. We are planning to address:
  - Space weather & Financial transactions
  - Space weather & Railway

# Contacts


- Emmelie Andersson, Swedish Civil Contingencies Agency: emmelie.andersson@msb.se
- Neil Mitchison, Joint Research Centre: Neil.MITCHISON@ec.europa.eu
- William Murtagh, NOAA: William.murtagh@noaa.gov