Ground Effects Topical Group

SWWT Plenary meeting ROB 2013

Magnus Wik - NeuroSpace

About GETG

- Spokesperson: Magnus Wik (NeuroSpace)
- The Ground Effects Topical Group (GETG):
  - Modelling the occurrence of geomagnetic variations and geoelectric fields during space weather events.
  - Modelling GIC in electric power systems (discrete grounding).
  - Modelling GIC in buried pipeline networks (continuous grounding).
  - Measurements of geomagnetic variations, geoelectric fields and GIC.
  - Development of forecast techniques of geomagnetic storms and GIC based on neural networks and physical models.
  - Risks and hazards from an insurance and social perspective.
  - Analysis and classification of extreme events.
  - Public outreach.

Projects

- IRF (Swedish Institute of Space Physics) and MSB (the Swedish civil contingency agency) have entered a collaboration “Solar storms and space weather” (2012-2014). The goal is to develop improved warnings and forecasts based on solar data and to be available at RWC Sweden. A workshop will be arranged in 2014.

- NeuroSpace is also working directly with IRF to establish a new RWC website within ISES.

- IRF have also started a collaboration with SVK (Swedish National Grid). The purpose is to deliver early warnings of solar storms and possible effects on power systems.

- GIC study, by FMI, for Statnett (Norway) (November 2012 - June 2013)

- BGS has started electric field measurements at three sites in UK. They will provide reference to the modelled electric field.

- Several studies at NRCan, e.g:
  - Effects on geoelectric fields and GIC due to geophysical parameters and power system characteristics.
  - Investigating the application of the Finite Element Method to geoelectric calculations in the case of 1D, 2D or 3D earth conductivity structures.

Projects

- EURISGIC:
  - European power grid model (completed)
  - Ground conductivity map of Europe (completed)
  - Digitisation of magnetometer data (http://www.bgs.ac.uk/data/magnetograms)
  - Digitisation of E-field data from Nagycenk in Hungary (1957-1996)
  - Web application (hazard map of B, dB/dt, E and GIC) (ready but will be updated gradually)
  - GIC demo to be developed (web application)
  - Worst case scenarios (ongoing, ready late 2013)
  - Simulation updates of GUMICS and Solar Shield (mid-2013)
  - Prototype forecast server (http://corona.lund.irf.se:8080/eurisgic/)
  - GIC recordings (5 in North-West Russia, and 1 in Finland)
  - Four peer-reviewed papers during the 2nd year (Adam et al., 2012; Honkonen et al., 2013; Pulkkinen et al., 2012; Viljanen et al., 2012)

- Details about the EURISGIC project and final results will be presented at the GETG meeting and possibly at the fair. In addition, there will be several presentations (poster and oral) as well.

Past and upcoming meetings

- Next GETG meeting will take place at ESWW10. This year it will be dedicated to the final results of the EU/FP7 project EURISGIC.

- The consortium had several presentations at the European Space Weather Week on 5-9 Nov 2012 in Brussels.

- The TIEMS (The International Emergency Management Society) conference focusing on "Solar Activity and Potential Damaging Consequences for Industrial Operations and Critical Infrastructure” was held in Oslo, Norway 22-24 October 2012.

- There have been discussions related to GIC with high-level authorities, for example, at the UK Space Agency and at the Ministry for Foreign Affairs of Finland.

- AGU fall meeting, San Francisco, United States, 3-7 Dec 2012 (FMI)

- 2013 International Critical Infrastructure Protection & Space Weather Workshop, Ottawa, Ontario, Canada 11-12 March 2013 (NRCan)

- Meeting at MSB, Stockholm, Sweden, 28 May, 2013 (IRF)

- Consortium members have given presentations at different occasions such as “EU Science: Global Challenges, Global Collaboration” (European Parliament) and other smaller meetings also outside of the space weather community.

Discussion and Conclusions

- We would still like to include more non-scientists, e.g. from the civil contingency agencies, power engineers and insurance companies, to the GETG.
- But we also have a need for scientists, e.g. solar scientists, doing basic research.
- A possible follow-up of EURISGIC, focusing on technological effects of GIC on power grids, has already been considered.
- It has been discussed that many power operators are interested in nowcasted and forecasted geoelectric fields, in US and Europe. This data can then be used by individual operators for e.g. GIC calculations.
- Discussions are ongoing about the continuation of some parts of EURISGIC into services and applications for e.g. power companies and universities. Funding needed.
- Recent simulation and statistical results from EURISGIC show:
  - Northern Europe, and the British Isles, are the regions with an obvious GIC hazard (sharp boundary at about 55 deg N).
  - However, in rare cases (like the Carrington event) the terminator for large E-fields moves southward indicating that the whole Europe may experience large GIC.
- Therefore, we conclude that GICs can pose a threat to critical infrastructure in all parts of Europe, and not just Northern Europe.

Thank You!

Comments, feedback or suggestions?
e-mail: magnus@neurospace.se

See you at ESWW10