Solar Shield: Update and Path Forward

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Background

- If you are interested in forecasting GIC, you need to capture the physics of near-space electric current systems.

Background

• The key idea of our research-based GIC forecasting project(s) is to utilize the latest greatest space science modeling capacity available at Community Coordinated Modeling Center (CCMC).

We thank all the organizations having their models hosted at CCMC ➔ critical for these types of efforts
“Old” Solar Shield project

• NASA-EPRI-ERM project supported by NASA Applied Sciences Program 2007-2010.

• Check [http://ccmc.gsfc.nasa.gov/Solar_Shield](http://ccmc.gsfc.nasa.gov/Solar_Shield) for details and documentation.
% Level 2 GIC forecast produced by REALTIMEGIC_LEVEL2
%
% The format of the data is as follows:
% 0 0 0 0 0 0 lat1 lon1 lat2 lon2  ...
% yy1 mm1 dd1 hh1 mi1 ss1 GIC1 0 GIC2 0  ...
% yy1 mm1 dd1 hh1 mi1 ss1 GIC1 0 GIC2 0  ...
% ............................................................
% ............................................................
% ............................................................
% ............................................................
% 0 0 0 0 0 0 53.16 -99.29 45.39 -68.53
2008 03 19 11 02 31 -0.11  0.00  0.13  0.00
2008 03 19 11 04 31  0.02  0.00  0.03  0.00
2008 03 19 11 06 31 -0.02  0.00  0.04  0.00
2008 03 19 11 08 31  0.00  0.00  0.01  0.00
2008 03 19 11 10 31  0.01  0.00 -0.03  0.00
2008 03 19 11 12 31  0.00  0.00  0.02  0.00
2008 03 19 11 14 31  0.02  0.00  0.04  0.00
2008 03 19 11 16 31 -0.00  0.00 -0.05  0.00
2008 03 19 11 18 31 -0.01  0.00 -0.07  0.00
2008 03 19 11 20 31  0.03  0.00  0.00  0.00
2008 03 19 11 22 31  0.00  0.00  0.00  0.00
What was missing?

• Only high-latitude locations addressed in Level 2.

• Low “technological/applications readiness level.” (TRL/ARL 4-5)

We want to address these two + plan for transition to ops in the “Extended” Solar Shield project.
“Extended” Solar Shield project

• DHS Science & Technology (S&T) sponsored NASA-EPRI-ERM-NOAA project 2014-2016.

• Official start date of the project was May 15, 2014.

• Progress so far:
  – End-user requirements document developed in collaboration with the industry. Available at ccmc.gsfc.nasa.gov/Solar_Shield.
  – System integration completed and real-time modeling, initial display capacity established.
End-user requirements document – available at ccmc.gsfc.nasa.gov/Solar_Shield
Real-time computations

Real-time displays and numerical data available at iswa.gsfc.nasa.gov
Final display designs

Level 1 (long lead-time) forecast display design

Level 2 (short lead-time) forecast display design
Next steps

• Complete Solar Shield display development.

• Real-time geoelectric field predictions are being tailored for the 6 selected EPRI SUNBURST station locations.
  – Both 1D USGS ground models and USArray 3D impedance tensors are used.

• V&V, V&V, V&V.

• Transition to ops plan.
Summary

• We at NASA GSFC are working with DHS S&T, NOAA, EPRI and ERM to develop the next generation prototype “Extended Solar Shield” GIC forecasting system.

• Stay tuned for updates!