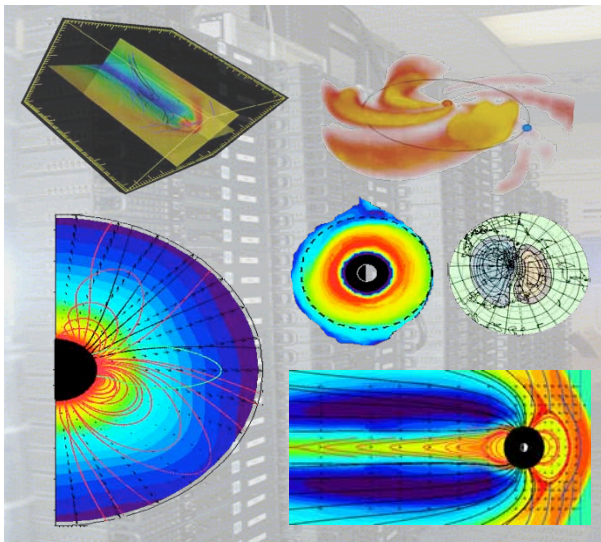


Space Weather Products at the Community Coordinated Modeling Center

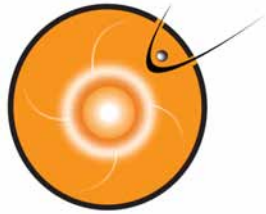
M Hesse, M. Kuznetsova, A. Pulkkinen,
M. Maddox, L. Rastaetter, D. Berrios, and
P. MacNeice



CCMC and SWL

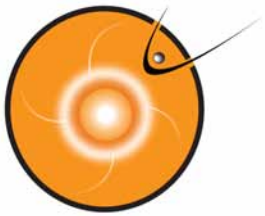
NASA Goddard Space Flight Center



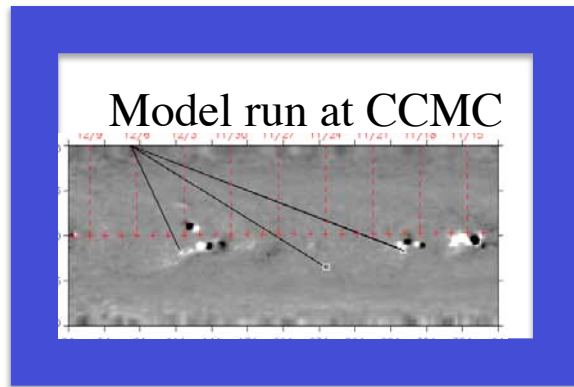


Opportunities: Model Development

- Rapid model development schedule continually produces new capabilities
- Real-time calculations produce valuable space weather information
- SWx information and tools can be made available on-line
- New, innovative dissemination technologies, e.g., Google-Earth-based

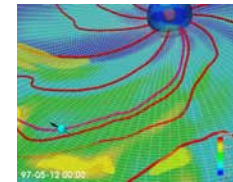


Forecasting Agency Support

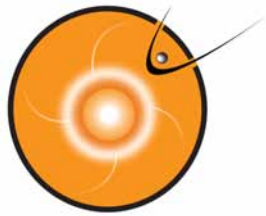


Tool used at AFWA,
SWPC, ...
Customer feedback

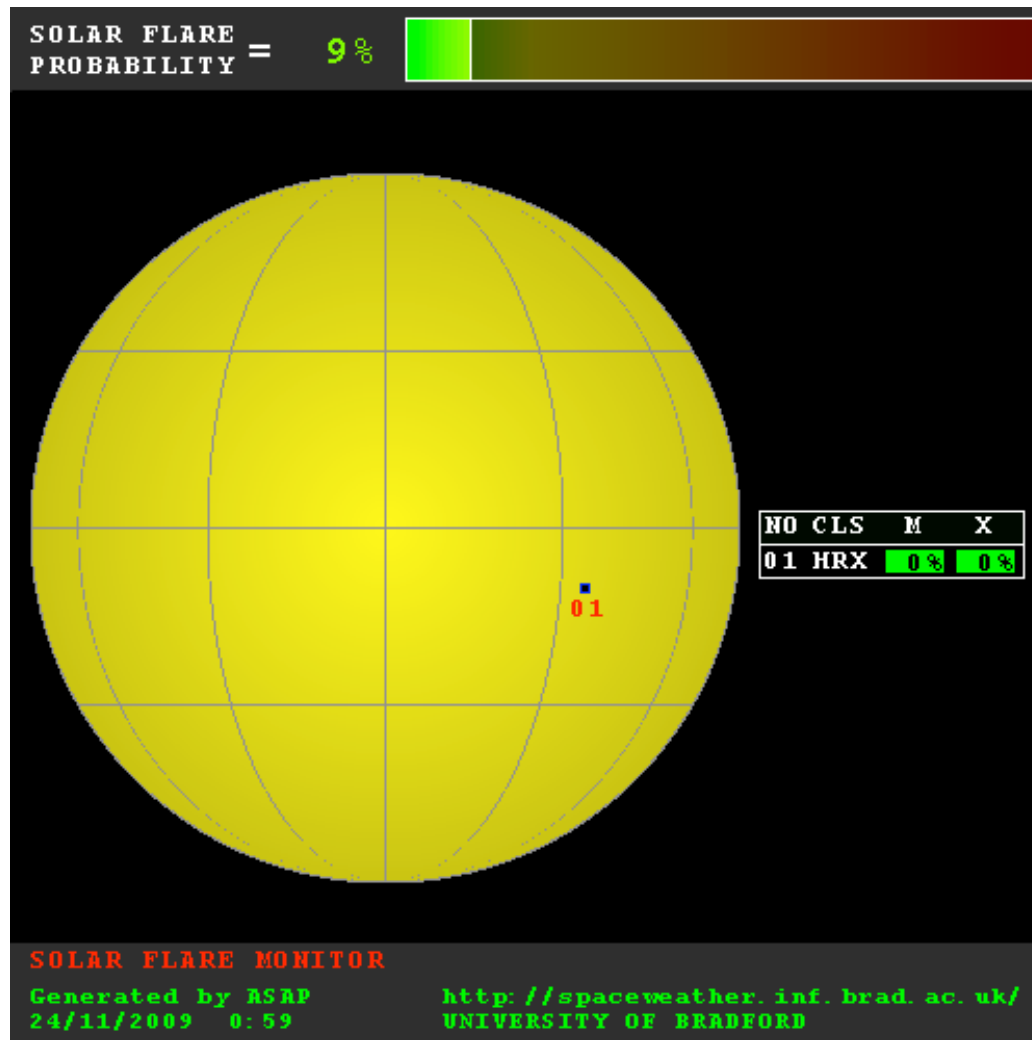
Model run at forecasting
centers

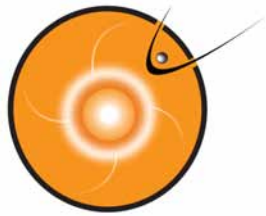


folds tool development and operator education into process

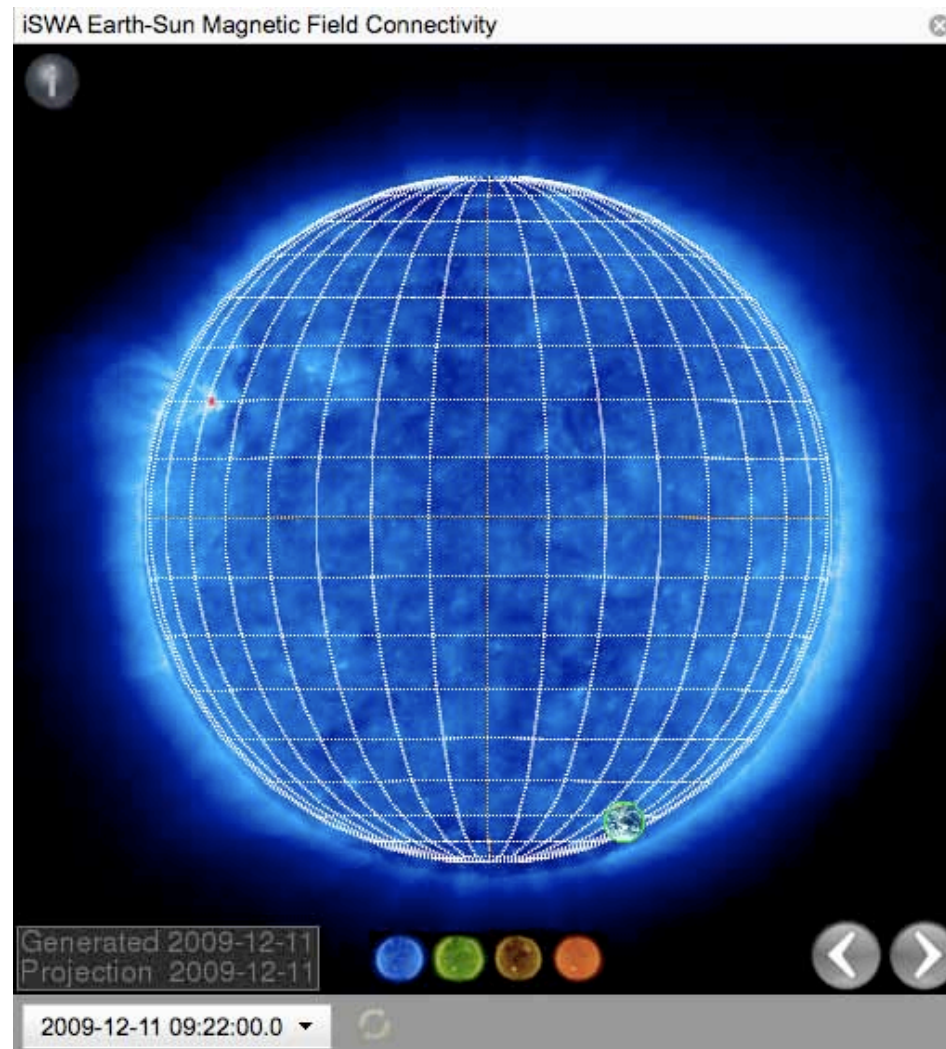


Flare Monitoring Product (U. Bradford, UK)

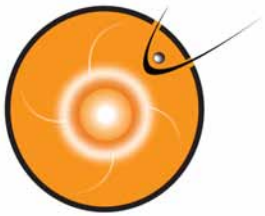




Magnetic Connectivity Product

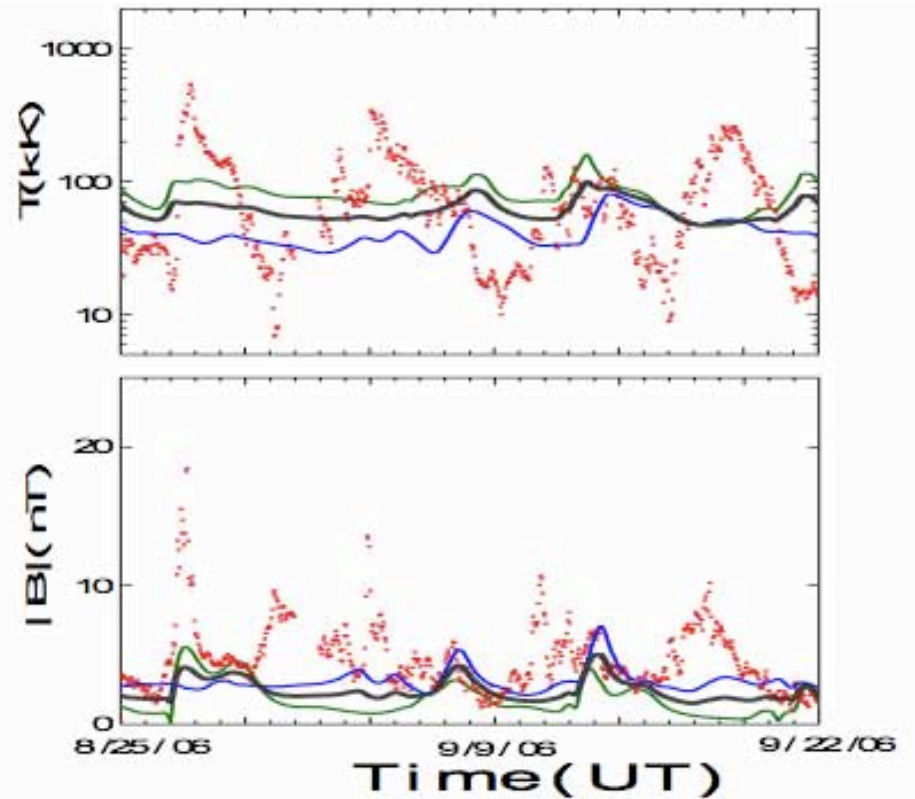
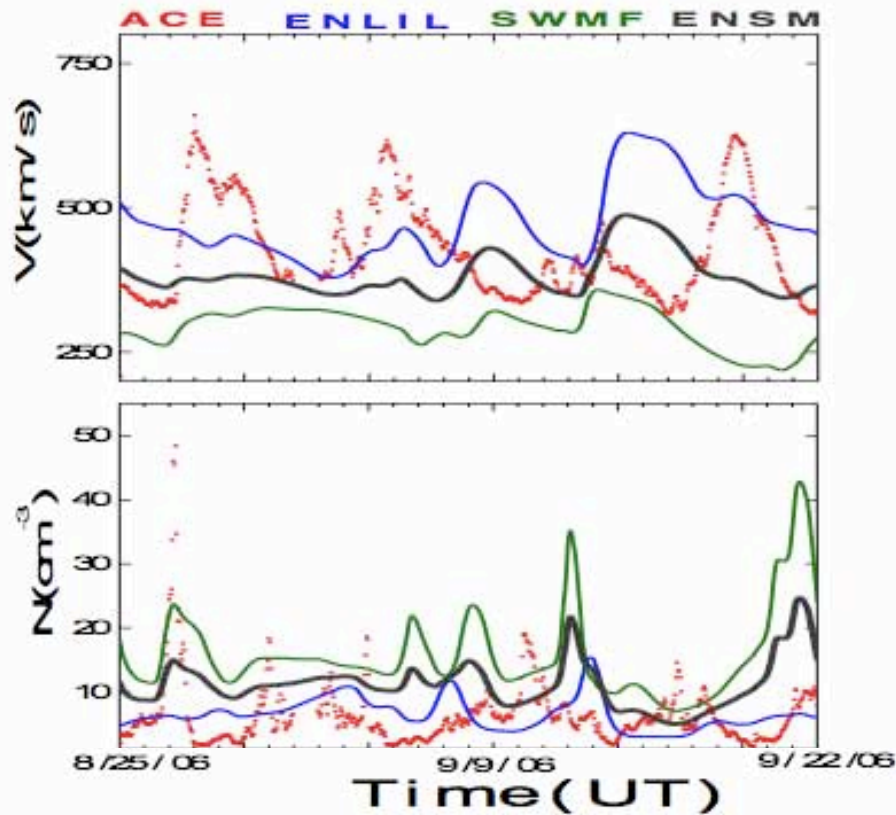


input from AFWA

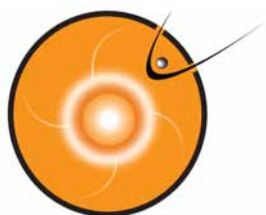


Example: Solar Wind Forecasts

CR 2047



Model: WSA/ENLIL (CISM), SWMF (CSEM)

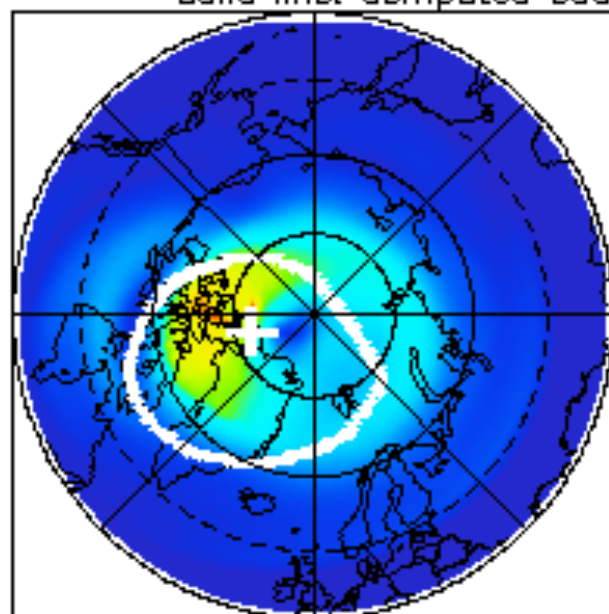


New Product: Hemispheric Heating

Northern Hemisphere

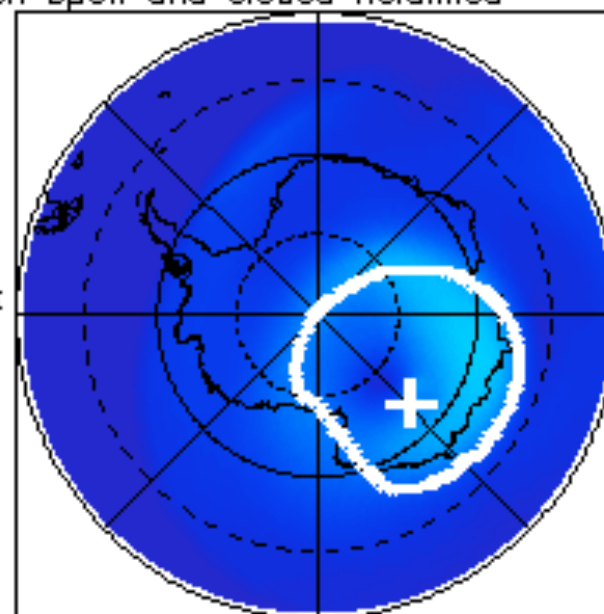
Southern Hemisphere

solid line: computed boundary between open and closed fieldlines



dawn dusk

GLAT=50.0



$W_{diss} \left[\frac{W}{m^2} \right]$

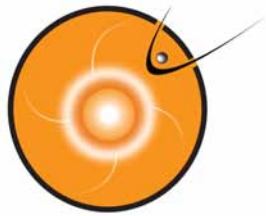
79.3

0.0

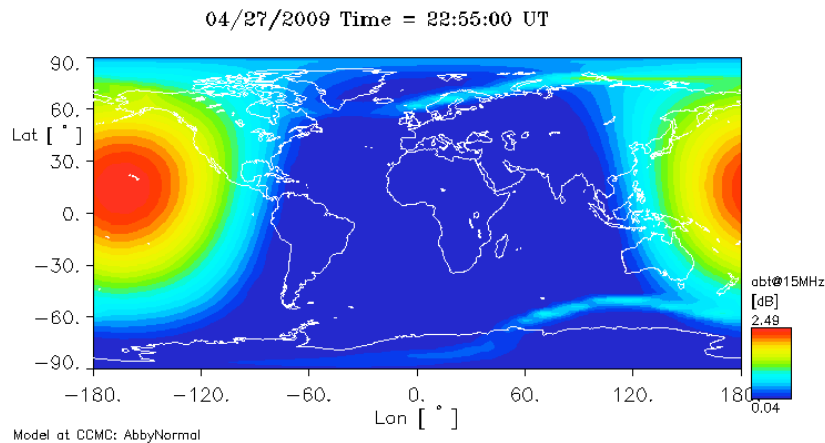
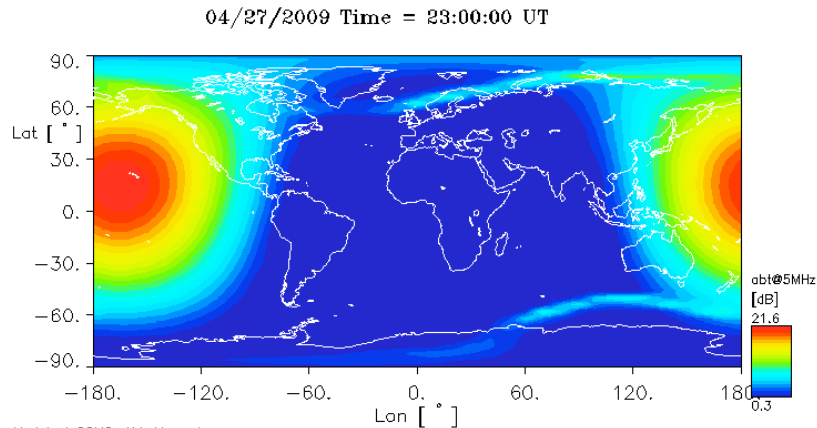
midnight

noon

Model at CCMC: BATSRUS

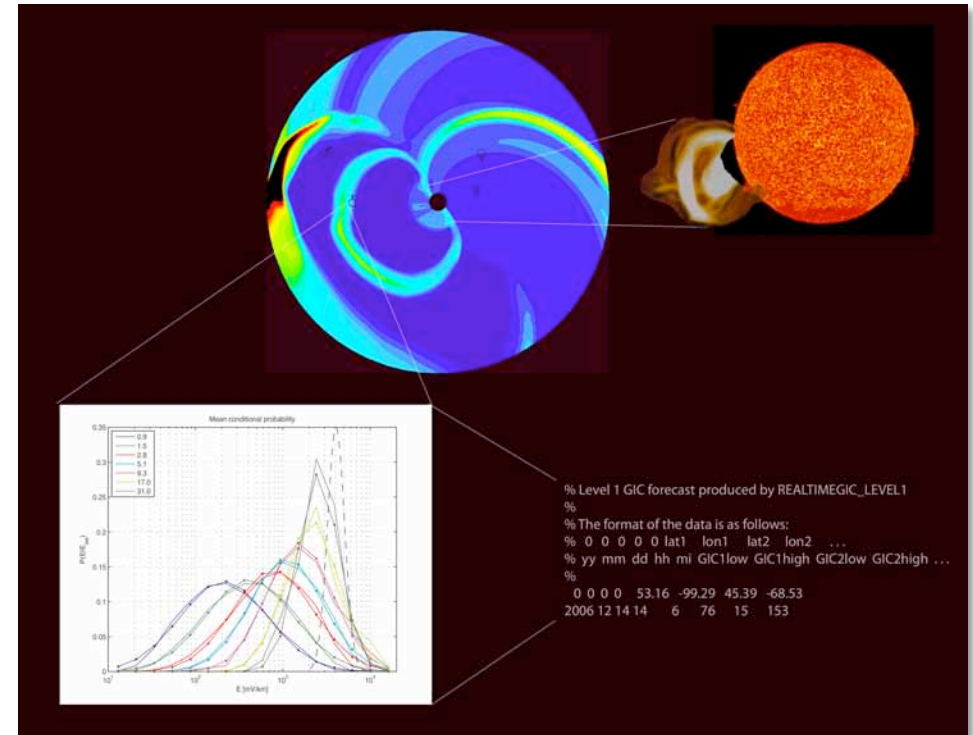


ITM and Ground



HF absorption:
Executing in real-time

Model: AbbyNormal V. Eccles (USU)



GIC Warning:

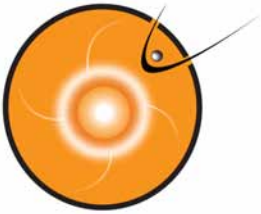
Electric power grid safety

Updated every 4mins

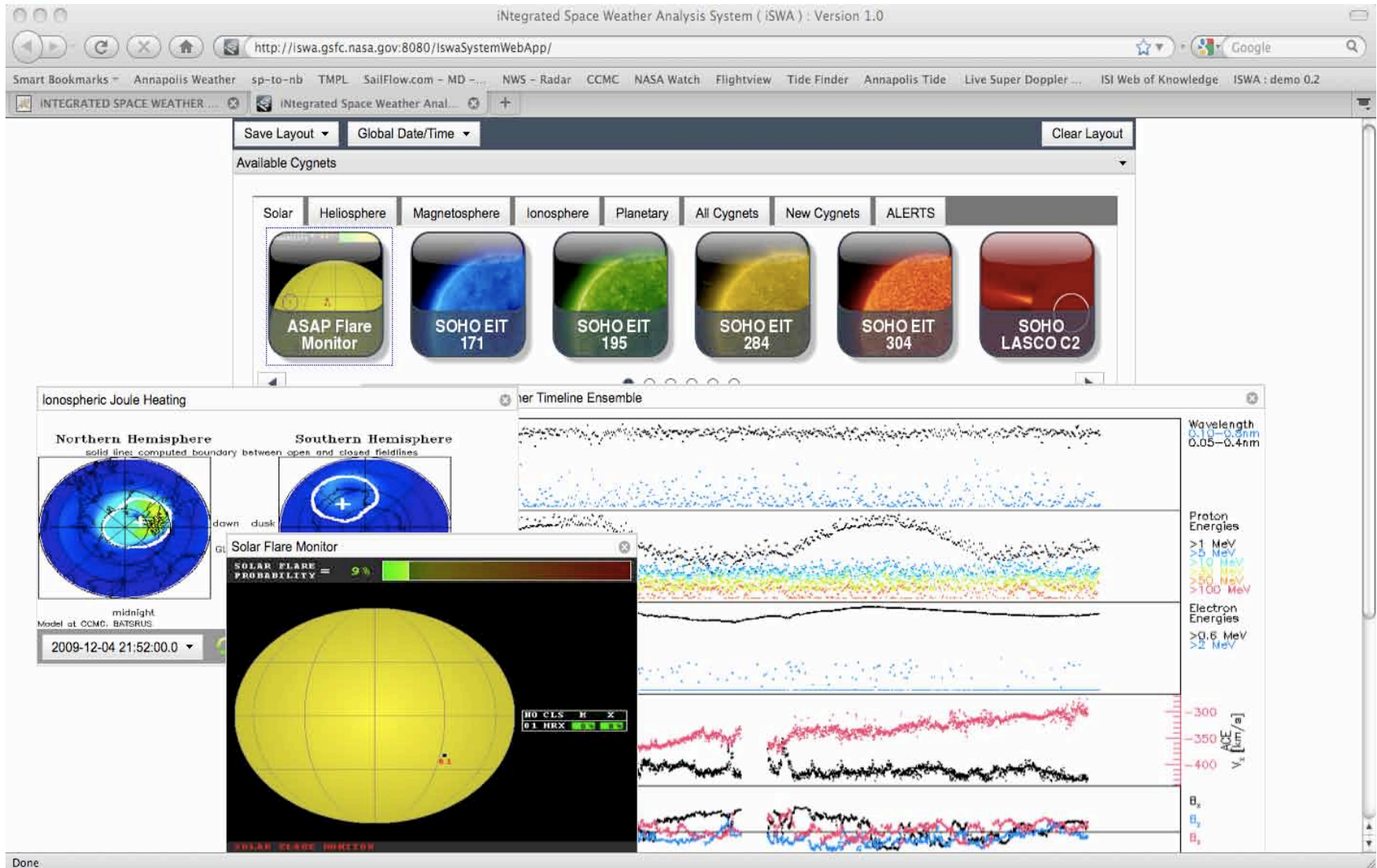
~45min forecast

Different mode for CME events

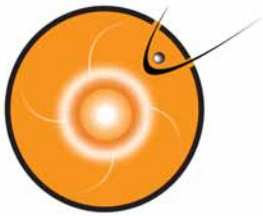
Model: WSA/ENLIL, SWMF, A. Pulkkinen



iSWA



iswa.gsfc.nasa.gov, >120 products!



Innovative dissemination: Google Earth

The screenshot shows the Google Earth application window. The main view is a 3D globe of the Earth with a colorful, semi-transparent overlay representing the auroral oval and associated magnetic field structures. The colors range from blue (low intensity) to red and yellow (high intensity). The overlay is centered over the North Pole and extends across the Arctic region.

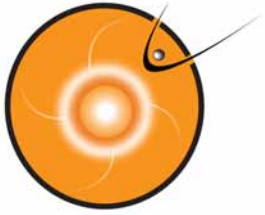
Search Panel: Includes tabs for "Fly To", "Find Businesses", and "Directions". The "Fly to" field contains "e.g., San Francisco".

Places Panel: Shows a list of "Temporary Places". The "CCMC Space Weather" folder is expanded, showing sub-items: "Polar cap", "Auroral (lower) boundary", "Field-aligned currents", "Goelectric field", "East-West component", "North-South component", and "Ionospheric HF signal loss".

Layers Panel: Shows a list of layers including "Primary Database", "Geographic Web", "Roads", "3D Buildings", "Street View", "Borders and Labels", "Traffic", "Weather", "Gallery", "Ocean", "Global Awareness", "Places of Interest", and "Terrain".

Metadata: A small window displays "Polar Cap" data for "2009/12/09 15:52:00 UT". Below it, a color scale legend is shown with values ranging from $3.46E-22$ to $5.27E+07$.

Footer: Includes the text "Data SIO, NOAA, U.S. Navy, NGA, GEBCO", "US Dept of State Geographer", "© 2009 Tele Atlas", "© 2009 Europa Technologies", and the Google logo. The bottom right corner shows "Eye alt 7910.90 mi".



Summary

- CCMC developed a set of (>120) on-line SWx tools
- Tools have been refined through input from AFWA and NASA Mission Operators
- Providing SWx information for NASA's robotic mission operators, and working with NASA's SRAG
- CCMC established close working relation with AFWA
- CCMC providing transition to operation support to NOAA'S SWPC for the WSA/ENLIL (CISM) model combination
- CCMC is leading a geospace model evaluation effort for NOAA/SWPC
- CCMC supporting commercial SWx interests
 - Electric power research institute
 - Space Environment Technologies
- Looking forward to new opportunities for collaborations, including internationally