NOAA
National Weather Service

NOAA Space Weather Prediction Center Update

2018 Space Weather Workshop

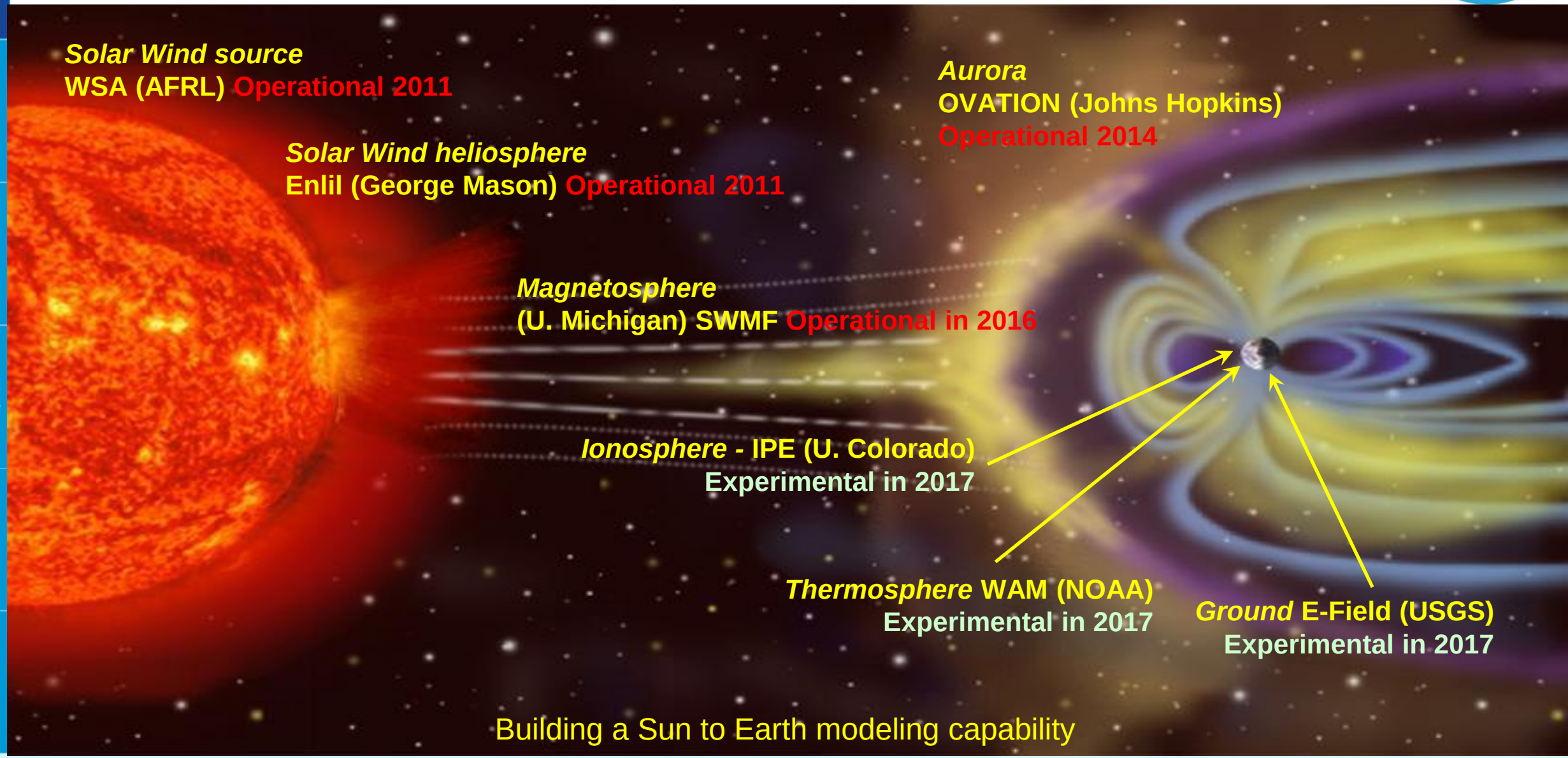
Brent Gordon

17 April 2018

Progress and Partnerships

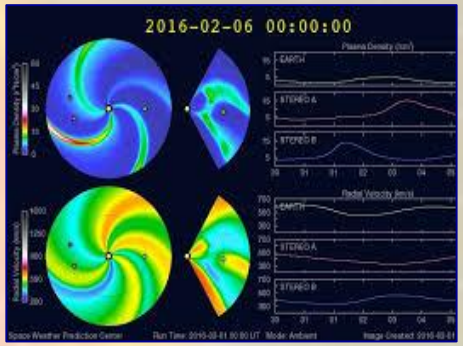
- Just like the vast area of space we try to predict, the number of items on our to-do list are equally vast – We can not do it alone!
- We can not claim sole ownership for the progress we have made over the past year.
- Many have helped us this year, and many more have helped us long before we started!

NOAA Space Weather Modeling



Building a Sun to Earth modeling capability

SWPC Operational Model Suite

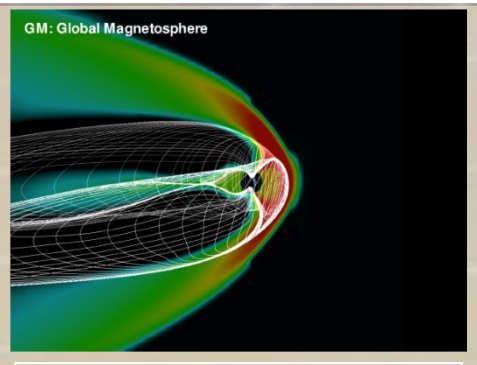


GMU/AFRL WSA-Enlil

Operational since 2011

Next Major upgrade Fall 2018

1. Latest version of models
2. Zero-point corrected GONG maps
3. WSA output files
4. WSA readied for ADAPT
5. Changing CONOPS for on-demand runs vs runs ever two hours



U. Michigan Geospace

Operational since 2016

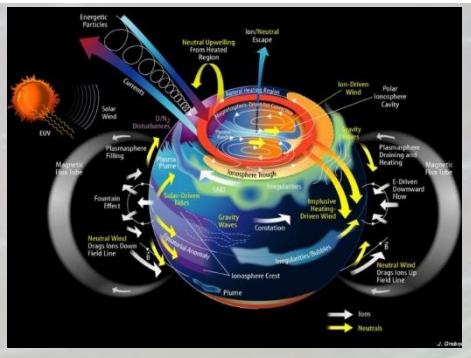
V1.5 Implemented Fall 2017

1. Better auroral zone forecast
2. Gridded output over N. Am.
3. Code robustness

V2.0 coming in 2019

1. Improved Resolution
2. Verification and Validation Process

spaceweather.gov/models



NOAA/U. CO WAM-IPE

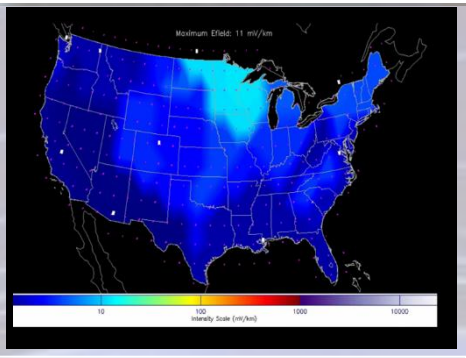
Experimental 2017

4 runs per day on development NOAA supercomputer

1. One way coupled system WAM->IPE
2. Experimental products available on our website

Future Work

1. Two-way coupled
2. Use new NWS Global model
3. Increase resolution



NOAA/NASA/USGS/NSF E-field

Experimental 2017

Real time runs every minute

1. USGS 1D ground conductivity model
2. Working with industry on output format

Future work

1. USGS/NSF 3D ground conductivity model
2. Higher resolution
3. Couple to Geospace

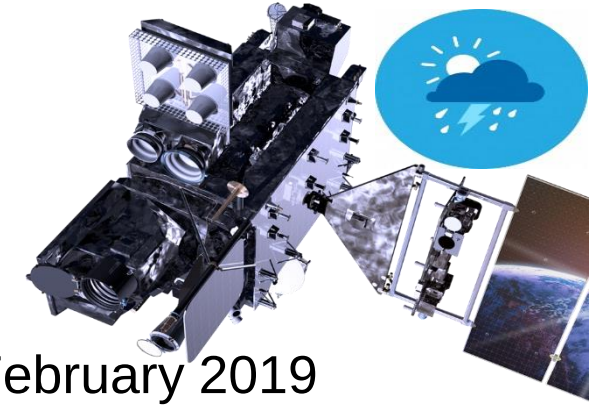
spaceweather.gov/experimental

Note: all models developed with NASA and/or NSF funding at some level.

NOAA-NASA-NSF - Growing Partnership

- GONG – NOAA now supporting the operations and maintenance of the observatories
  - SWPC working with NSF/NSO and NOAA/IDP program to operationalize the processing of the GONG data
- MOA signed in 2016 between SWPC and NASA/CCMC
  - Our two centers are working closely with each other on an evaluation of the ADAPT model for inclusion in the SWPC operational WSA-Enlil model
  - Next topic of mutual interest being explored now
- SWPC assignment to NASA HQ (Terry Onsager) – One year detail
  - Pursuing with NASA the next SWPC employee who will take over in 2019
- Tri-Agency Announcement of Opportunity – NASA-NOAA-NSF
  - AO on improving WSA-Enlil capabilities just closed
  - Announcement of awards expected by late summer/early fall 2018

Observations



- GOES – Currently Operational with GOES 14&15
  - GOES-16 space weather observations expected in operations by February 2019
- GONG – NOAA now supporting the Operations and Maintenance of the Observatories
  - SWPC working with NSF/NSO and NOAA/IDP program to operationalize the processing of the GONG data
- DSCOVR – Supporting SWPC operations and models since 2016
  - Working with NESDIS and NASA on the cause of spurious reboots – 18 since 2015
- Space Weather Follow On + Operational Coronagraph
  - Working with NESDIS and NASA on a 2024 launch
  - More details coming on this tomorrow!
- NOAA Commercial Weather Data Buy Program
  - Showing promise as a replacement to the now canceled COSMIC-2B program

NOAA Use of SBIR

- NOAA Space Weather efforts have tapped into industry via the NOAA Small Business Innovative Research (SBIR) Program
- Current Efforts
  - **North West Research Associates** - Far Side Imaging: Helioseismology to forecast active region development. (Phase 2)
  - **Space Hazards Application LLC** - Product Development for Satellites: Evaluate satellite operators needs and requirements and develop new products to satisfy them. (Phase 2)
  - **US Microwave Labs** - Satellite Ground Systems for Space Weather: Assessment requirements of NOAA for tracking deep space missions such as L1 and L5 (Phase 2)
  - **Atmospheric & Space Technology Research Associates** - GPS Error Products: Assessment of various products for providing the GPS community with products that specify position error. (Phase 1)
  - **Space Environment Technologies** - GPS Error Products: Assessment of various products for providing the GPS community with products that specify position error. (Phase 1)
- Previous Efforts
  - **North West Research Associates** - Solar Flare Forecast Improvement (Completed Phase 2)
  - **Propagation Research Associates** - GPS products for Dual Frequency/ Scintillation (Completed Phase 2)

National Space Weather Strategy and Action Plan

Space Weather Operations, Research, and Communications Subcommittee

- NOAA continues very active involvement in implementation of National Space Weather Action Plan and Executive Order 13744, contributing to leadership and writing teams, and providing expertise
- A concerted effort through SWORM to improve products and services to end users:
  - Coordinating with FEMA on finalizing the Federal operating concept and associated checklist to coordinate Federal assets and activities to respond to notification of space weather events (EO 13744, Action 5f)
  - Working with contractor on comprehensive survey of space-weather data and product requirements needed by user communities to help improve services (Action 5.1.1)
  - NOAA leading development of a satellite-anomaly database to enable the collection and analysis of satellite-anomaly data related to space weather – will aid in anomaly investigations, contribute to scientific understanding of near-Earth space environment, and improve modeling (Action 4.2.8)

More on SWAP implementation in tomorrow morning's session

SWPC - Product Subscription Service

- Our Email/Product Subscription Service is now 13 years old
  - First products issued in 2005
  - 58 available products now
- Over 54K customers today
- During high activity we can send
  ~200K emails an hour
- Having more issues with Spam
  Filters – Especially NOAA's!!!
- We are looking toward using different technology to disseminate our messages
- Experimenting with Twitter today - @NWSSWPC
- Come see our poster this week next door!

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Space Weather Message Code: ALTEF3
Serial Number: 2761
Issue Time: 2018 Apr 13 0859 UTC

CONTINUED ALERT: Electron 2MeV Integral Flux exceeded 1000pfu
Continuation of Serial Number: 2760
Begin Time: 2018 Apr 10 1830 UTC
Yesterday Maximum 2MeV Flux: 25452 pfu

NOAA Space Weather Scale descriptions can be found at
www.swpc.noaa.gov/noaa-scales-explanation

Potential Impacts: Satellite systems may experience significant …
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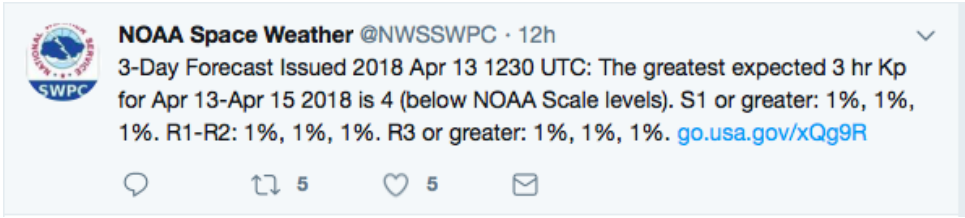

Conclusion

- SWPC is gaining momentum with our modeling and observations capability
- We fully recognize the contribution from outside the walls of SWPC
- The R2O/O2R challenge is real and it is hard
- It can require as much work to bring new technology into operations as it takes to discover that new technology!
- One of our communities next grand challenges is to make the R2O/O2R process effective and efficient