

# State of the Space Weather Prediction Center 2013

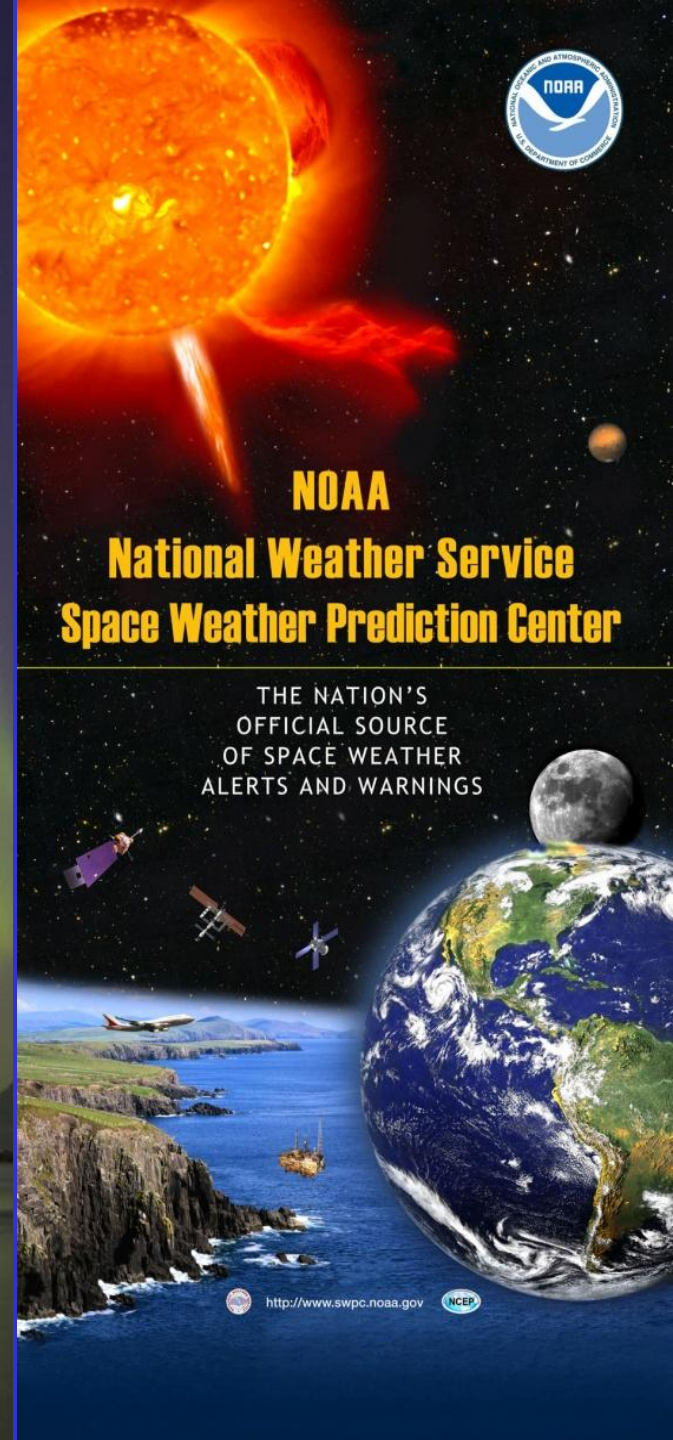
**Brent Gordon**

**Acting Director**

**NOAA Space Weather Prediction Center**

Space Weather Workshop

16 Apr 2013





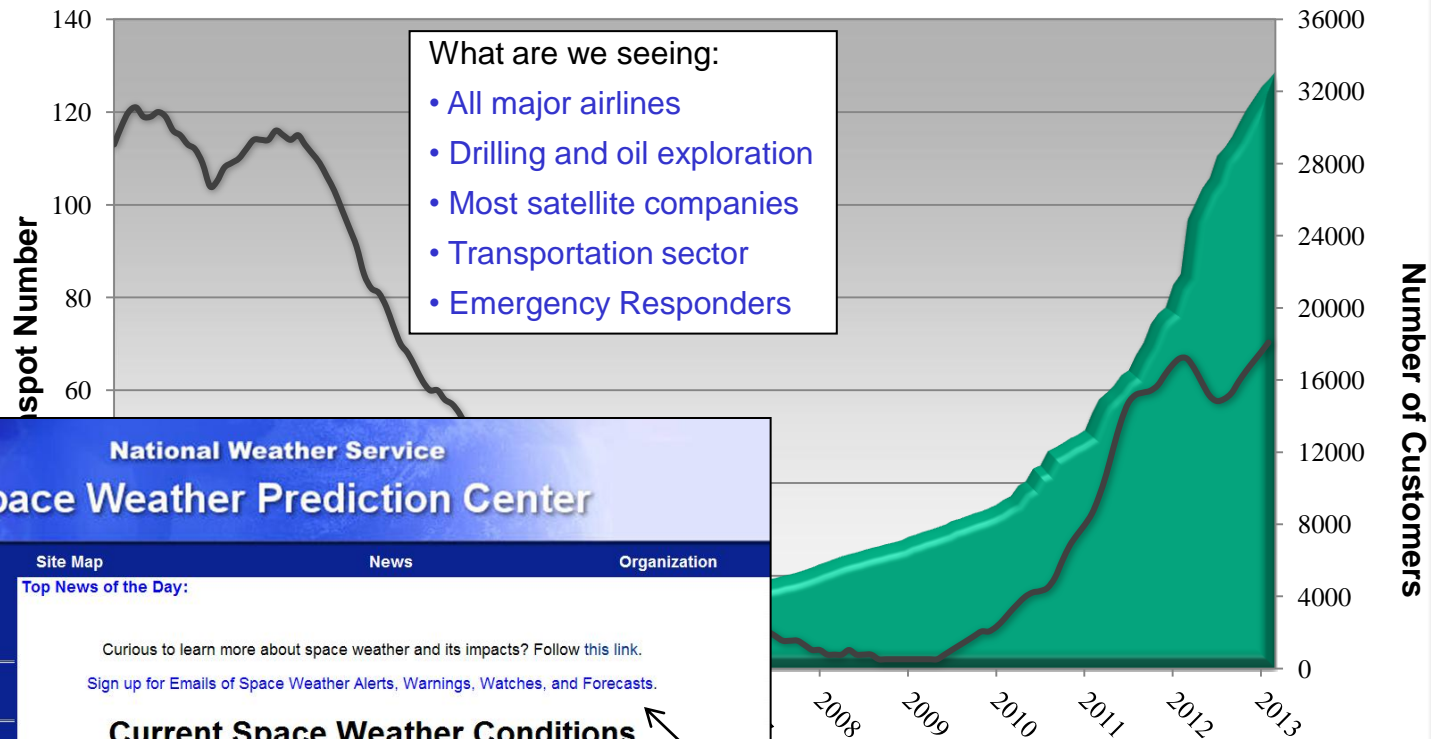
# Overview



- Customer Growth
- Space Weather Update
- SWPC Director Status
- SWPC Budget Situation
- New Forecast and Discussion Products
- AWIPS
- Satellites
- Testbed Status
- Small Business Innovative Research
- International Partnerships
- Web Page Update

# Customer Subscriptions Skyrocket...

## Customer Growth SWPC Product Subscription Service



**National Weather Service**  
**Space Weather Prediction Center**

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NCEP Quarterly Newsletter

SWPC Home Page

Current Conditions  
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Today's Space Wx  
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Space Wx Models  
Solar/Geo. Indices  
Measurements

Support Services  
About Us  
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Education/Outreach  
Customer Services

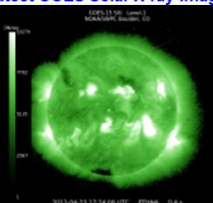
Top News of the Day:

Curious to learn more about space weather and its impacts? Follow this link.  
[Sign up for Emails of Space Weather Alerts, Warnings, Watches, and Forecasts.](#)

**Current Space Weather Conditions**

----- Satellite Displays -----   Popular Pages -----

**Latest GOES Solar X-ray Image**



**NOAA Scales Activity**

NOAA Scale	Range 1 (minor) to 5 (extreme)	Past 24 hours	Current
Geomagnetic Storms *		none	none
Solar Radiation Storms		none	none
Radio Blackouts		none	none

January 2005

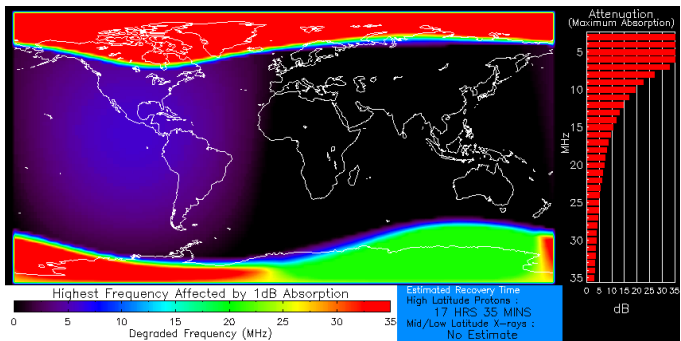
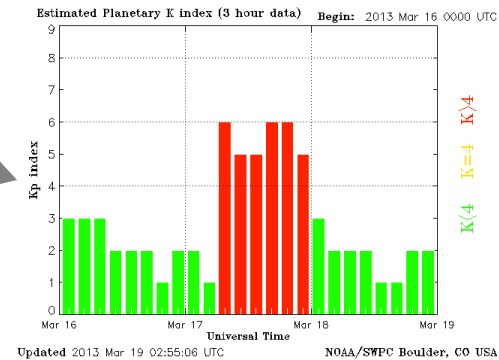
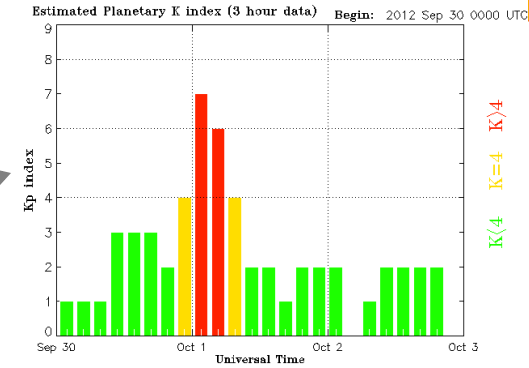
Solar Cycle

Sign up for alerts/warnings

# Space Weather Update

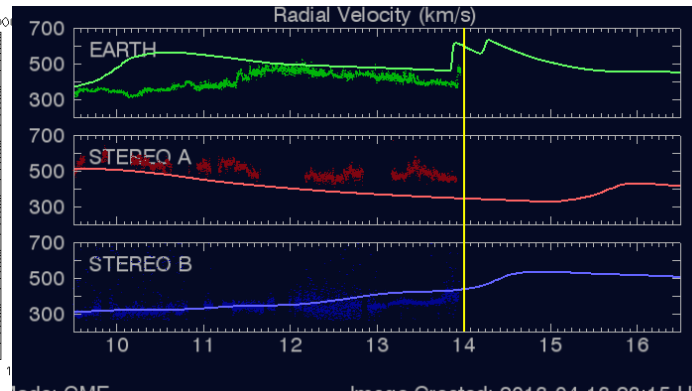
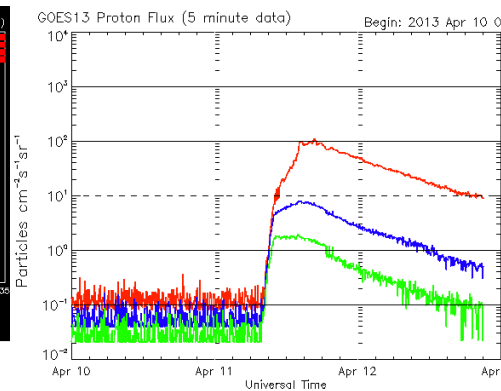


- Quiet start to solar max
- 27 Sept 2012 filament eruption/CME
- 15 March 2013 filament eruption/CME
- 11 April 2013 center disk CME



Normal X-Ray Background  
Product Valid At : 2013-04-11 18:38 UTC

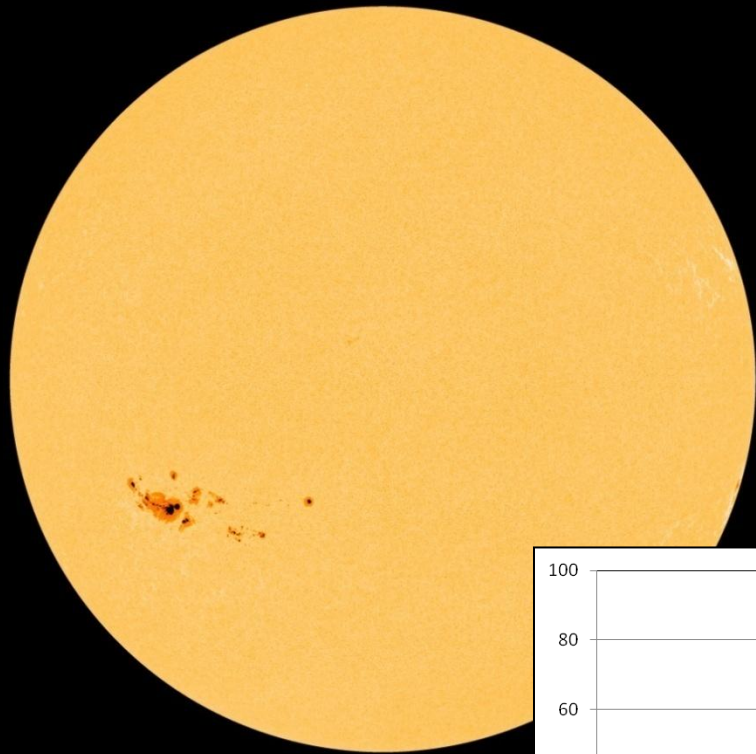
Minor Proton Flux  
NOAA/SWPC Boulder, CO USA



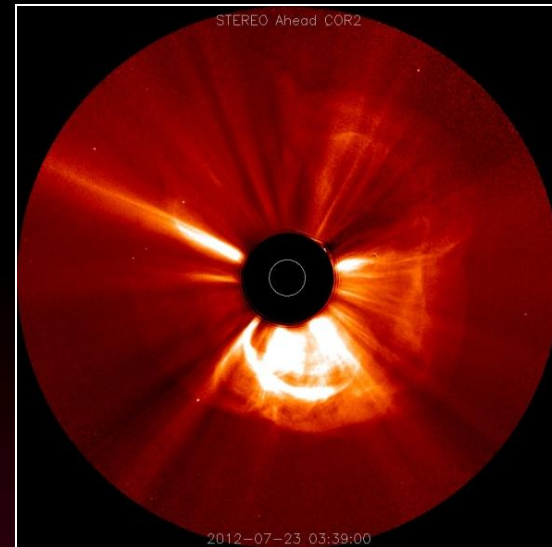


# July 2012 Event

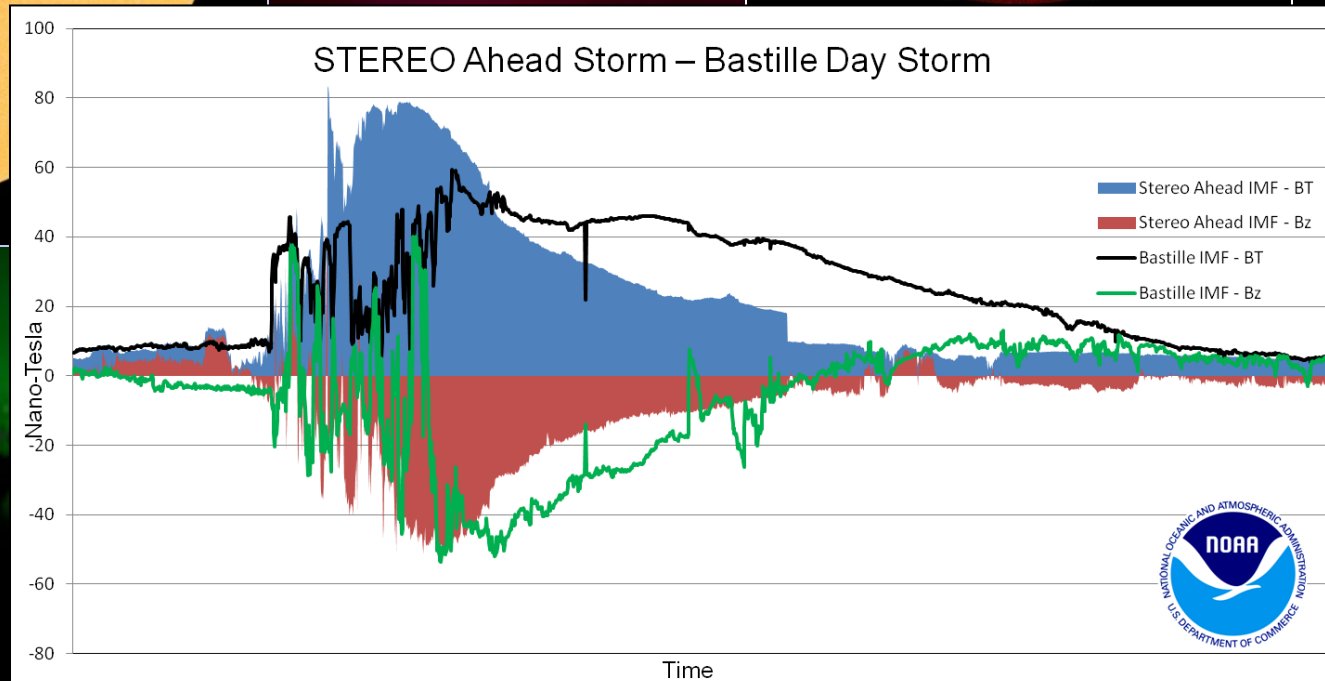
The Sun on July 11th



The Sun on July 23<sup>rd</sup> –  
STEREO AHEAD



Comparison to July 2000





# SWPC Director Status

- Two unsuccessful hiring attempts over the past year
- Dedicated staff at SWPC
  - Keeping the boat moving ahead smartly
- No permanent SWPC director in sight
  - NOAA-level Hiring Freeze
  - New director vacancy at SWPC's parent office

# SWPC FY2013 Budget???



- A speed bump
  - After several years of hard work for growth
- Sequestration and rescissions
  - Left many in the US Gov't scrambling
- SWPC now fighting for limited budget with the rest of NOAA and NWS





# New Forecast Products



- Two new products available in December 2012
  - Plain Language Forecast
  - Forecast Discussion
- Available via SWPC Product Subscription Service
  - <https://pss.swpc.noaa.gov>

:Product: 3-Day Forecast  
:Issued: 2013 Apr 12 1230 UTC  
# Prepared by the U.S. Dept. of Commerce, NOAA  
#  
A. NOAA Geomagnetic Activity Observation and Forecast

The greatest observed 3 hr Kp over the past 24 hours (G2 scale levels).  
The greatest expected 3 hr Kp for Apr 12-Apr 14 (G2).

NOAA Kp index breakdown Apr 12-Apr 14 2013

	Apr 12	Apr 13	Apr 14
00-03UT	2	2	6 (G2)
03-06UT	2	3	6 (G2)
06-09UT	1	3	6 (G2)
09-12UT	1	2	5 (G1)
12-15UT	1	2	4
15-18UT	1	4	3
18-21UT	1	5 (G1)	3
21-00UT	1	6 (G2)	3

Rationale: G1 (minor) to G2 (moderate) geomagnetic storms are expected on days 2 and 3 (13-14 Apr) in response to a CME from 11 Apr.

## B. NOAA Solar Radiation Activity Observation and Forecast

Solar radiation, as observed by NOAA GOES-13 over the past 24 hours above S-scale storm level thresholds.

Solar Radiation Storm Forecast for Apr 12-Apr 14 2013

	Apr 12	Apr 13	Apr 14
S1 or greater	99%	30%	10%

Rationale: An S1 (Minor) solar radiation storm is expected on day 3 (14 Apr). There is a chance for an S1 event on day 2 (13 Apr).

## C. NOAA Radio Blackout Activity and Forecast

No radio blackouts were observed over the past 24 hours.

Radio Blackout Forecast for Apr 12-Apr 14 2013

	Apr 12	Apr 13	Apr 14
R1-R2	50%	50%	50%
R3 or greater	15%	15%	15%

Rationale: There is a chance for an R1-R2 radio blackout all three days (12-14 Apr) of the forecast period.

:Product: Forecast Discussion  
:Issued: 2013 Apr 12 1230 UTC  
# Prepared by the U.S. Dept. of Commerce, NOAA, Space Weather Prediction Center  
#  
Solar Activity

.24 hr Summary...  
Solar activity decreased to low levels. Region 1718 (N22W39, Dkc/beta-gamma) was the most active region and produced three low-level C-class flares. It showed gradual spot and penumbra development during the period and maintained a beta-gamma magnetic configuration. Old Region 1713 (N10, L=174), which crossed the west limb yesterday, produced the largest flare of the day, a C4 at 11/2302 UTC. Region 1719 (N10W07, Eai/beta-gamma-delta) showed gradual spot and penumbra development. A magnetic delta structure persisted in the southeast quadrant of the region, but appeared to be weakening. Region 1721 (S19E13, Dao/beta-gamma) showed both a mix of polarities and minor spot growth in its intermediate portion and maintained a beta-gamma magnetic configuration. It produced two optical subflares late in the period. There were no Earth-directed coronal mass ejections (CME) during the period.

.Forecast...  
Solar activity is expected to be low during the period (12 - 14 Apr) with a chance for an M-class flare and a slight chance for an X-class flare.

## Energetic Particle

.24 hr Summary...  
Proton events at greater than 100 MeV and greater than 10 MeV occurred at geosynchronous orbit during the period. The events followed yesterday's M6/3b flare. The greater than 100 MeV event began at 11/0940 UTC, reached a peak of 2 pfu at 11/1400 UTC, and ended at 11/1955 UTC. The greater than 10 MeV proton flux reached the 10 pfu event threshold

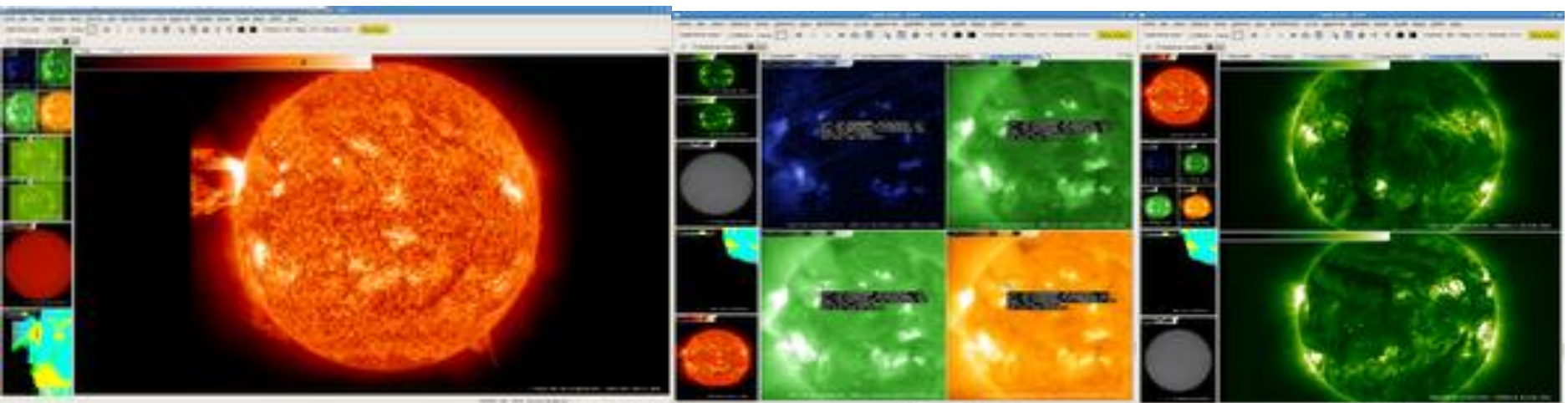




# AWIPS2 – SWPC Forecast Office



- Software migration activities continue
- NWS enterprise solution will free resources to work on model transitions
- Summer 2013 – Initial capabilities available to SWPC forecasters
- Fall 2014 – Replacement of existing system
- UCAR/Unidata to make final software available
  - <http://www.unidata.ucar.edu>





# Satellite News



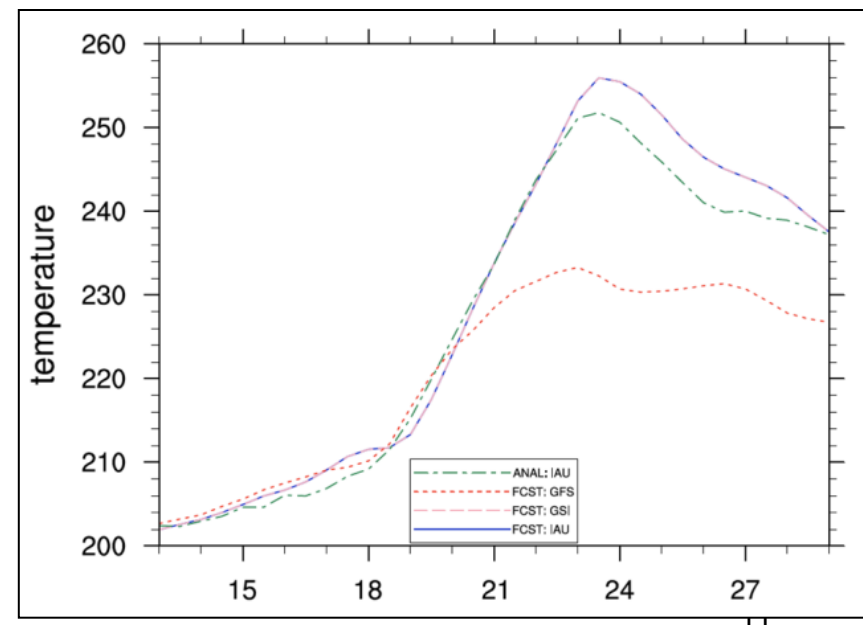
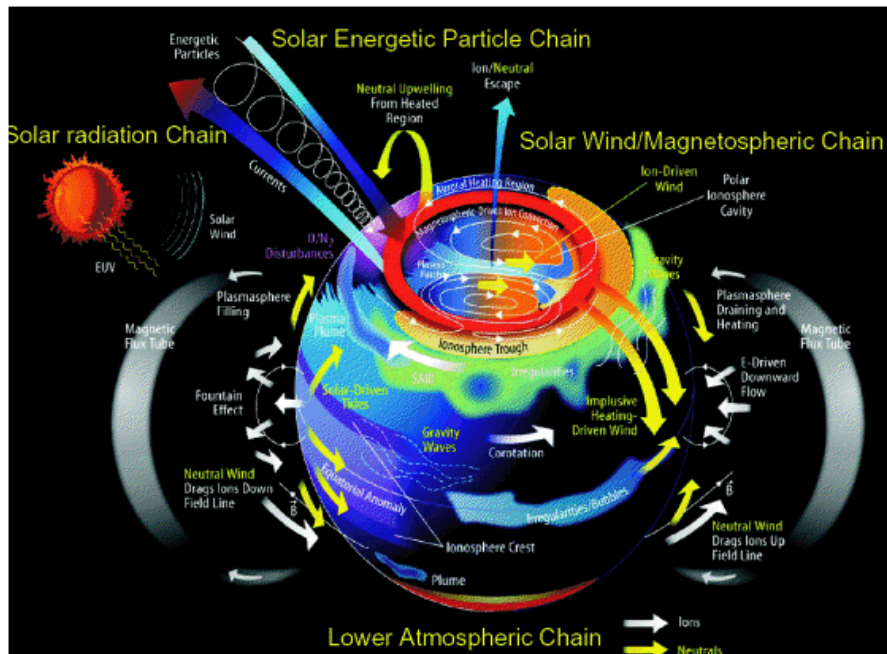
- NOAA GOES
    - GOES 13&15 Operational for Space Weather
      - GOES 14 used during fall eclipse season
      - LASP SDO/EVE XRS Proxy used by SWPC during spring eclipse season
  - DSCOVR
    - Launch Date – November 2014!!
    - SWPC now tasked with ground data acquisition and processing
  - SunJammer
    - Closer than L1 solar sail demo mission
    - Currently co-manifested with DSCOVR Launch
    - NOAA & NASA worked with the UK to secure solar wind instruments
      - Magnetometer (Imperial College) - Plasma detector (University College London)
- (More details on DSCOVR and SunJammer in later sessions)
- Operational Coronagraph
    - NOAA funding studies for continued CCOR development in FY13&14
    - NOAA looking for “free ride” opportunities as well

# SWPC Testbed Update



## IDEA/WAM - Integrated Dynamics in Earth's Atmosphere / Whole Atmosphere Model

- Multiyear project to raise the top of the NCEP Global Model to 600km and introduce ionosphere/plasmasphere data assimilation
- Planned operational on NCEP supercomputers in FY17
- Work showing forecast improvements in terrestrial forecasts





# SWPC Testbed Update



## **Geospace Model**

- Coupling of magnetosphere to terrestrial atmosphere and solar wind
- Will allow for regional specification and forecasts of geomagnetic disturbances on Earth
- NASA/CCMC delivered preliminary report to SWPC on Dec 1, 2012
  - Final report due June 2013
  - SWPC to make model selection by Sept 2013
- Space allocated on new NCEP Supercomputers!

## **WSA-Enlil**

- Operational in SWPC Forecast Office September 2013
- Software shared with UK, Korea, & Australia
  - Now working with them on an ensemble forecast

## **SEAESRT, North American TEC (NATEC), Ovation Aurora**

- All expected in SWPC operations this coming fall
- Check our new web site for these models soon



# NOAA SBIR



## NOAA Small Business Innovation Research Program

- 2012 – SWPC fortunate to have one proposed topic funded
  - Propagation Research Associates, Inc. given Phase-I award in 2012 to investigate models to detect and now-cast scintillation
    - Presentation at SWW Thursday afternoon
  - Propagation Research Associates, Inc. now eligible to compete for a Phase-II award
- 2013 – SWPC topic chosen for consideration
  - Delivering a Solar Flare Forecast Model that Improves Flare Forecast (Timing and Magnitude) Accuracy by 25%





# International Activities

**UK-US Preparedness for Space Weather Hazards** – 26 June 2012 – International Space Innovation Centre, Harwell Oxford – Sir John Beddington

**International round-table on extreme space weather:** Geomagnetic storms, GNSS disruptions and the impact on vital functions in society – September 2012, Stockholm

**2nd Korea Space Weather Conference** – Korean Radio Research Agency – Jeju, Korea

**United Nations Committee on the Peaceful Uses of Outer Space (COPUOS)**  
Space weather is now a regular agenda item in the annual Science and Technology Assembly

**World Meteorological Organization's Inter-Programme Coordination Team on Space Weather** 21 countries and 7 international organizations participating  
- Space weather observations are integrated in the WMO's Implementation Plan for the Evolution of Global Observing Systems

**International Civil Aviation Organization (ICAO)** – Working to develop space weather service requirements for civil aviation



# Web Update

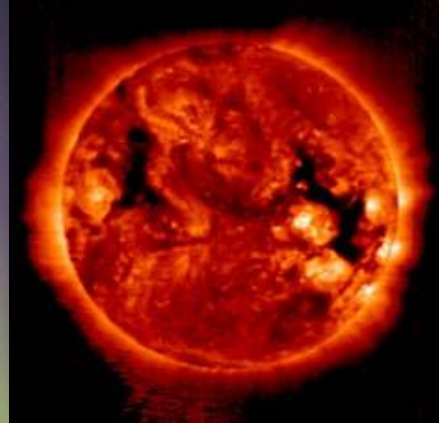
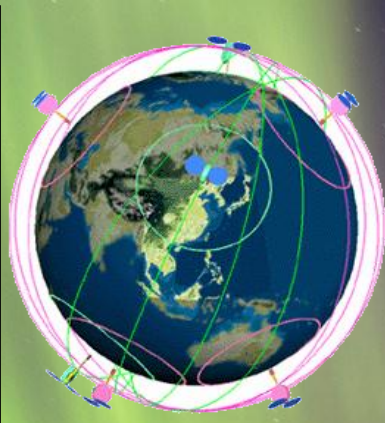
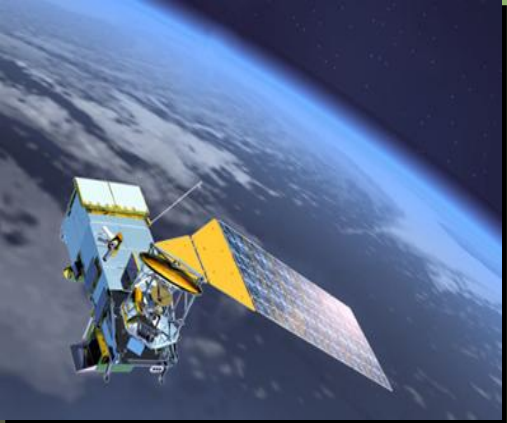


## SWPC Web Update

- Major update of SWPC's web pages ongoing now
- Data driven services vs. static images
- Alpha version to be available in late May
- SWPC will be requesting user feedback at that time
- Final version for public review to be available late Summer 2013

The screenshot displays the SWPC website with the following elements:

- Header:** "SPACE WEATHER PREDICTION CENTER" and "NATIONAL OCEANIC AND ATMOSPHERIC ADMINISTRATION". The date and time are "February 06, 2012 19:35:00 UTC".
- Navigation Bar:** Links for HOME, ABOUT SPACE WEATHER, INTERPRETING SPACE WEATHER, SPACE WEATHER COMMUNITIES, NEWS & FEATURES, and ABOUT SWPC.
- Search Bar:** A search input field with the placeholder "Enter your search term" and a "Search" button.
- Forecast Summary (Today 2013-02-06):**
  - Radio Blackouts (flares): **R5** extreme
  - Radiation Storms (protons): **S3** strong
  - Geomagnetic Storms: **0** none
- Other Data:** Sunspots: 6, CMEs: 1, Solar Wind Speed: 351.6 km/sec, Auroral Activity (above +80°): **LOW** probability.
- Visuals:** A large image of a solar flare with a play button icon in the center.
- Textual Updates:**
  - "A notable CME was observed just west of the solar north pole, beginning at 0624Z. The ejection was clearly associated with a high latitude filament eruption but is not Earth-directed."
  - "Two new, experimental forecast products are now available, the 3-Day Forecast and the Forecast Discussion, both produced twice daily at 0030 and 1230 UTC."
  - "Radio blackouts reaching the R1 levels were observed over the past 24 hours. The largest was at Jan 11 2013 0911 UTC."
  - "The geomagnetic field is expected to remain at quiet levels through 24 Jan. Quiet to unsettled conditions with a slight chance for isolated active periods is expected on 25 Jan due to the onset of CH H55 effects."
- Space Weather Partners:** A section with links for Electric Power, GPS, Satellites, Aviation, Radio Communications, and Media.
- Footer:** Three columns of placeholder text under the headings "The Sun's X-Rays", "Solar Wind", and "The Aurora".



# Global Impact – Global Challenge – Global Response

## Partnering with YOU to:

Provide the *right* information... in the *right* format...  
 at the *right* time... to the *right* people...  
 to make the *right* decisions!

