

Space Weather Proving Ground **SUVI Thematic Maps**

**GOES-R Satellite Proving Ground and
User Readiness Meeting
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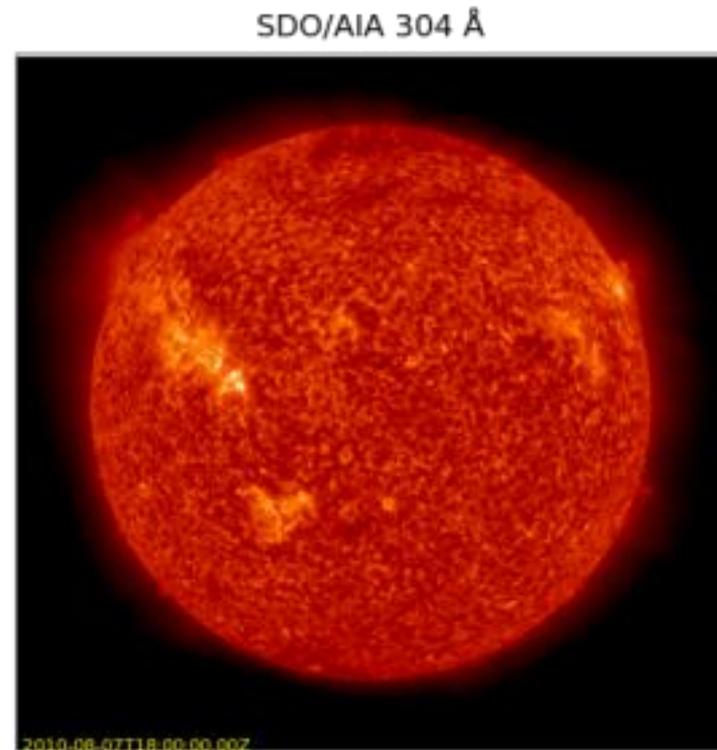
and

S. Hill, R. Viereck
NOAA/NWS/NCEP/SWPC



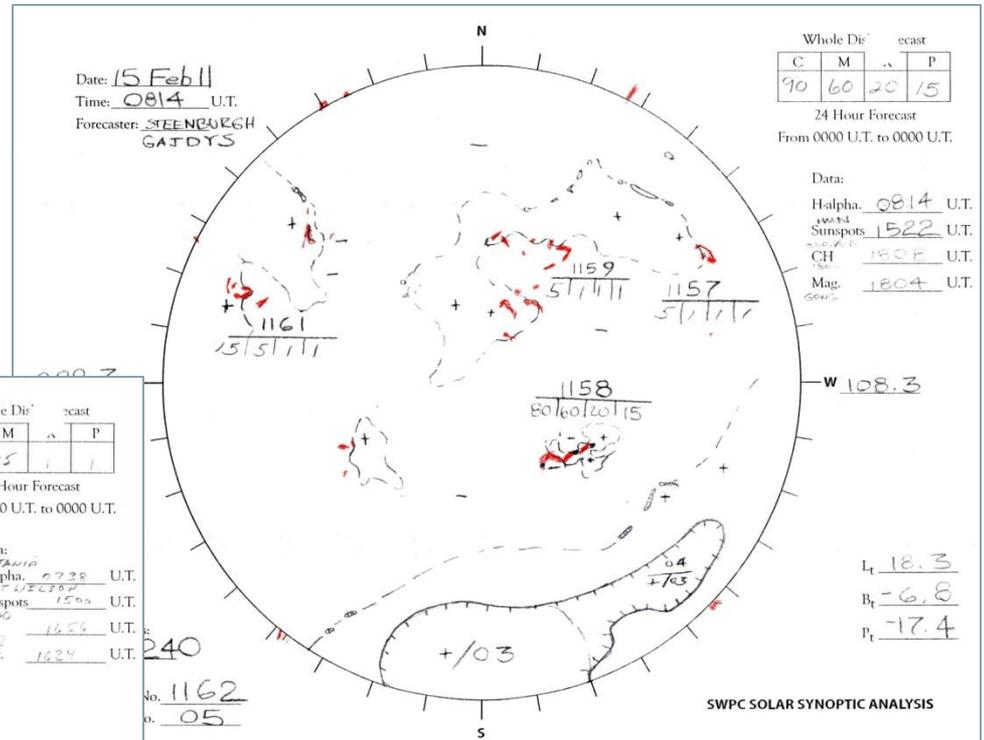
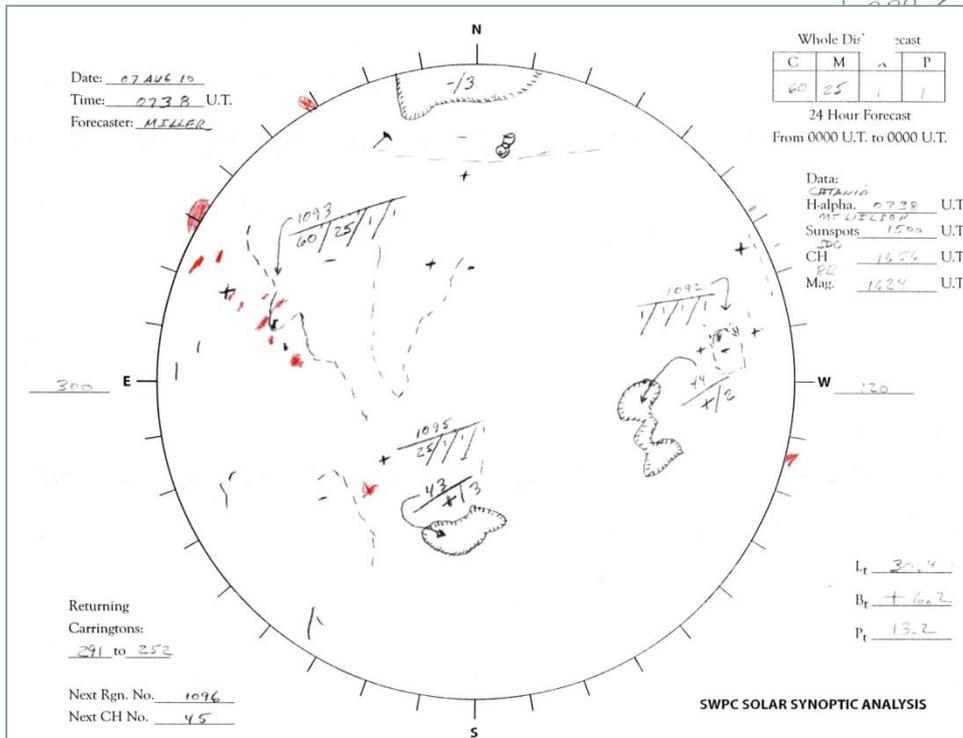
Multispectral Solar Imagery

- Similar to Earth-focused image data, multispectral solar images can help users identify features of scientific or operational interest.
- Solar features visible in SUVI's EUV channels include coronal holes, "quiet" corona, prominences, active regions, and solar flares.
- False-color images to right are SUVI proxy data derived from the Solar Dynamics Observatory Atmospheric Imaging Array (SDO-AIA).



Full-disk Solar Synoptic Charts

SWPC forecasters currently hand-draw daily synoptic charts using a light table, translucent paper, and several different types of solar images to identify different solar features.

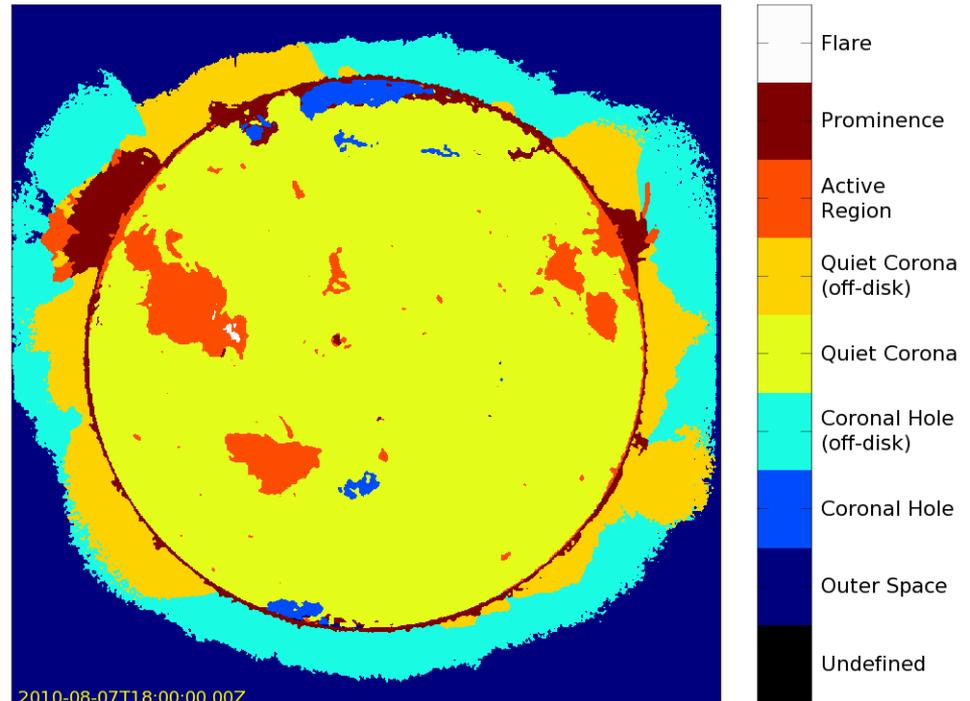


Solar feature identification is labor-intensive, slow (1 chart per day), and can be inconsistent due to varying levels of forecaster training.

SUVI Thematic Maps

- An automated solar pixel classification algorithm has been developed that identifies most of SWPC's desired solar features as often as SUVI can produce a multichannel image set (~2 minute refresh).
- STAR compliant demonstration code, proxy data, ATBDs, and other related documentation will be packaged and delivered mid-summer 2011.
- Sample to right is output from working SUVI Thematic Map algorithm.

Solar Corona MAP Thematic Map



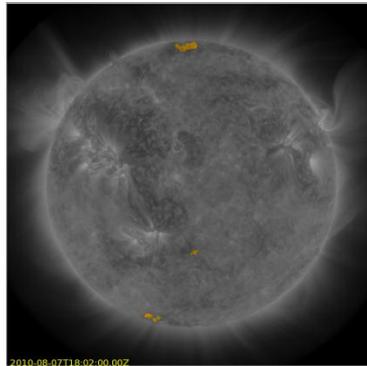
Configure and Train Algorithm

- SWPC forecasters and scientists are already working together to specify solar feature types appropriate for space weather forecasts.
- SWPC forecasters and scientists generate training and test data using Thematic Map utilities developed to augment algorithm.

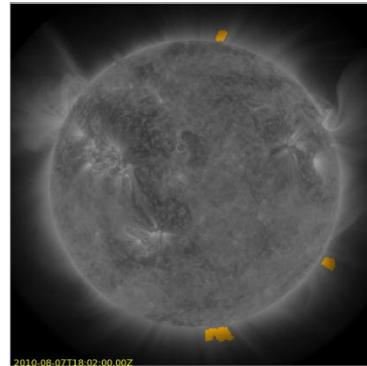
SDO/AIA 171 Å (Outer Space)



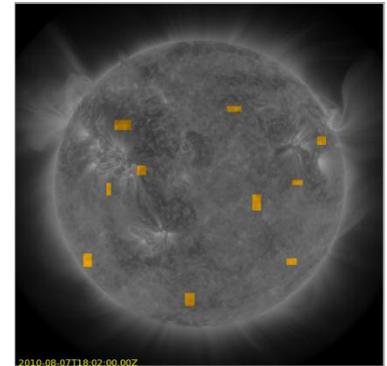
SDO/AIA 171 Å (Coronal Hole)



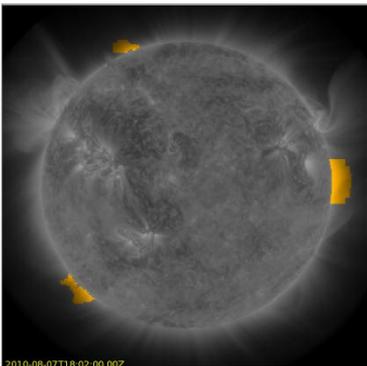
SDO/AIA 171 Å (Coronal Hole (off-disk))



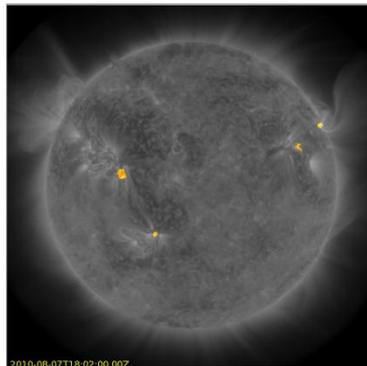
SDO/AIA 171 Å (Quiet Corona)



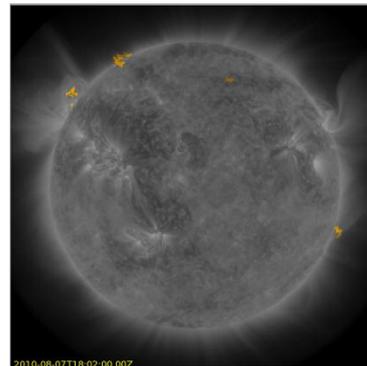
SDO/AIA 171 Å (Quiet Corona (off-disk))



SDO/AIA 171 Å (Active Region)



SDO/AIA 171 Å (Prominence)

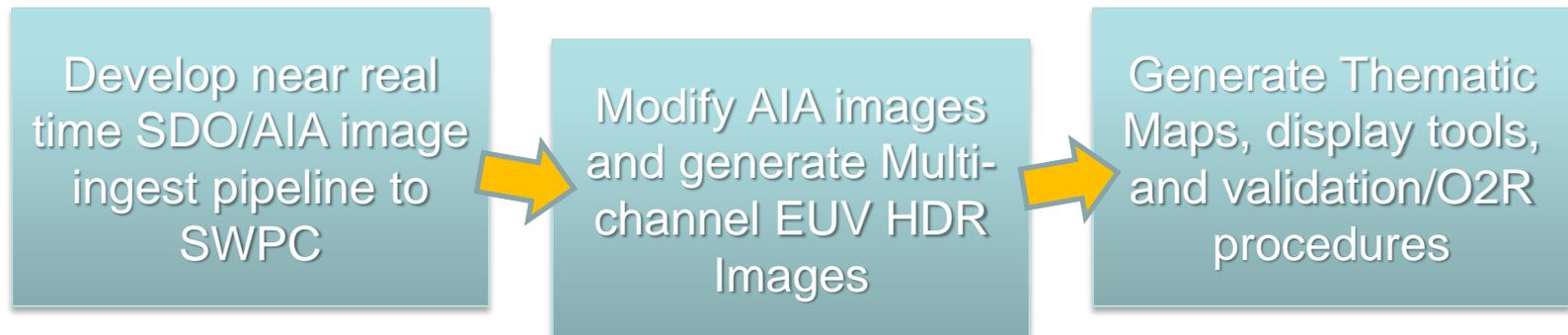


SDO/AIA 171 Å (Flare)



Proving Ground Proposal Summary (1)

- **Purpose:** create GOES-R-like products using near-real-time proxy data and GOES-R space weather product algorithms
- **Scope:**
 - Create infrastructure to ingest near-real time SDO/AIA images
 - modify AIA images to resemble L1b SUVI images;
 - generate high dynamic range composite images for each spectral channel;
 - apply automated solar pixel classification algorithm to multichannel solar images;
 - generate thematic map display tools;
 - tailor algorithms and tools to best meet SWPC's operational needs.



Proving Ground Proposal Summary (2)

- **Customer training:**

- Product capabilities
- Product Interpretation
- Product Limitations

- **Product Validation:**

- Does product match or exceed operational value of current synoptic charts?
- Does product meet new performance requirements for SWx Phase 3 algorithms like solar flare location and coronal hole boundaries?
- Does product demonstrate operational or scientific utility beyond SWPC?

- **Operations to Research (O2R):**

- Determine if solar feature list is adequate, and if additional non-EUV solar images might improve product accuracy and operational utility.
- Periodically update Thematic Map configuration parameters to track changes in instrument performance and solar activity.



Discussion

- The Proving Ground offers an ideal framework for validating and refining the operational utility of SUVI Thematic Maps by building on existing relationships between CIRES SWx participants and NWS/NCEP/SWPC.
- Proposal also validates SUVI HDR Composite Image algorithm, and may be easily extended to test SWx Phase 3 algorithms that depend on Thematic Maps as their primary input.
- An opportunity to parallel terrestrial weather product validation procedures by exploiting NASA scientific assets for proxy data; note however that SDO/AIA is not an operational instrument, has a limited lifetime, and no guarantee of a follow-on.

Presentation Over

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