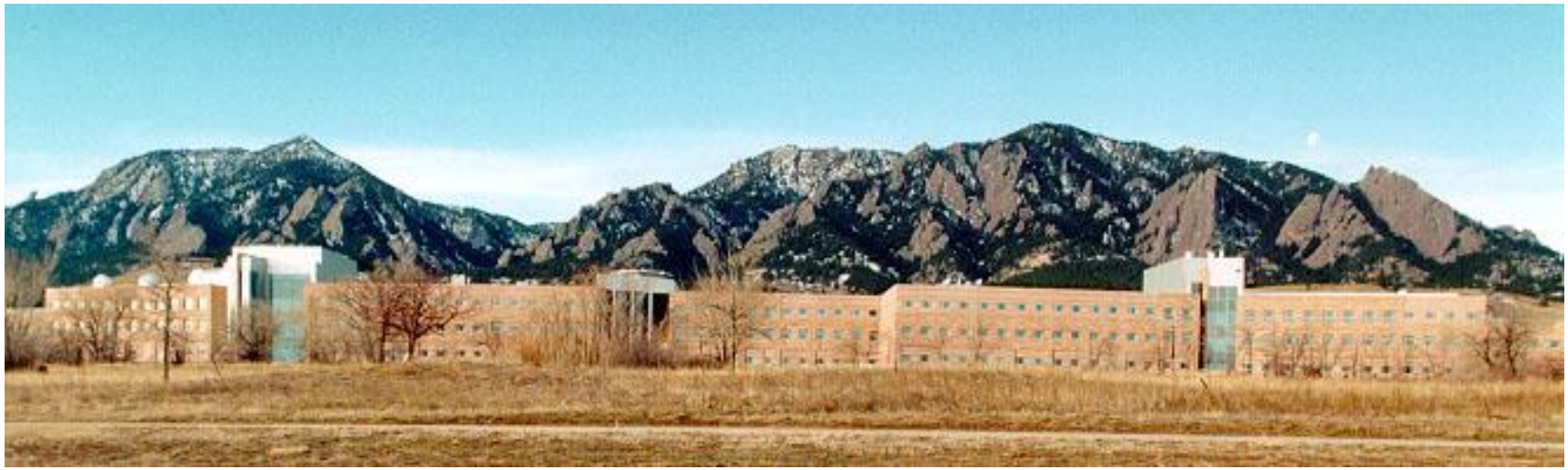


STP Quarterly Review

30 Apr 2013

2QFY13

William Denig

Solar & Terrestrial Physics Division

NOAA/NESDIS/NGDC

303 497-6323

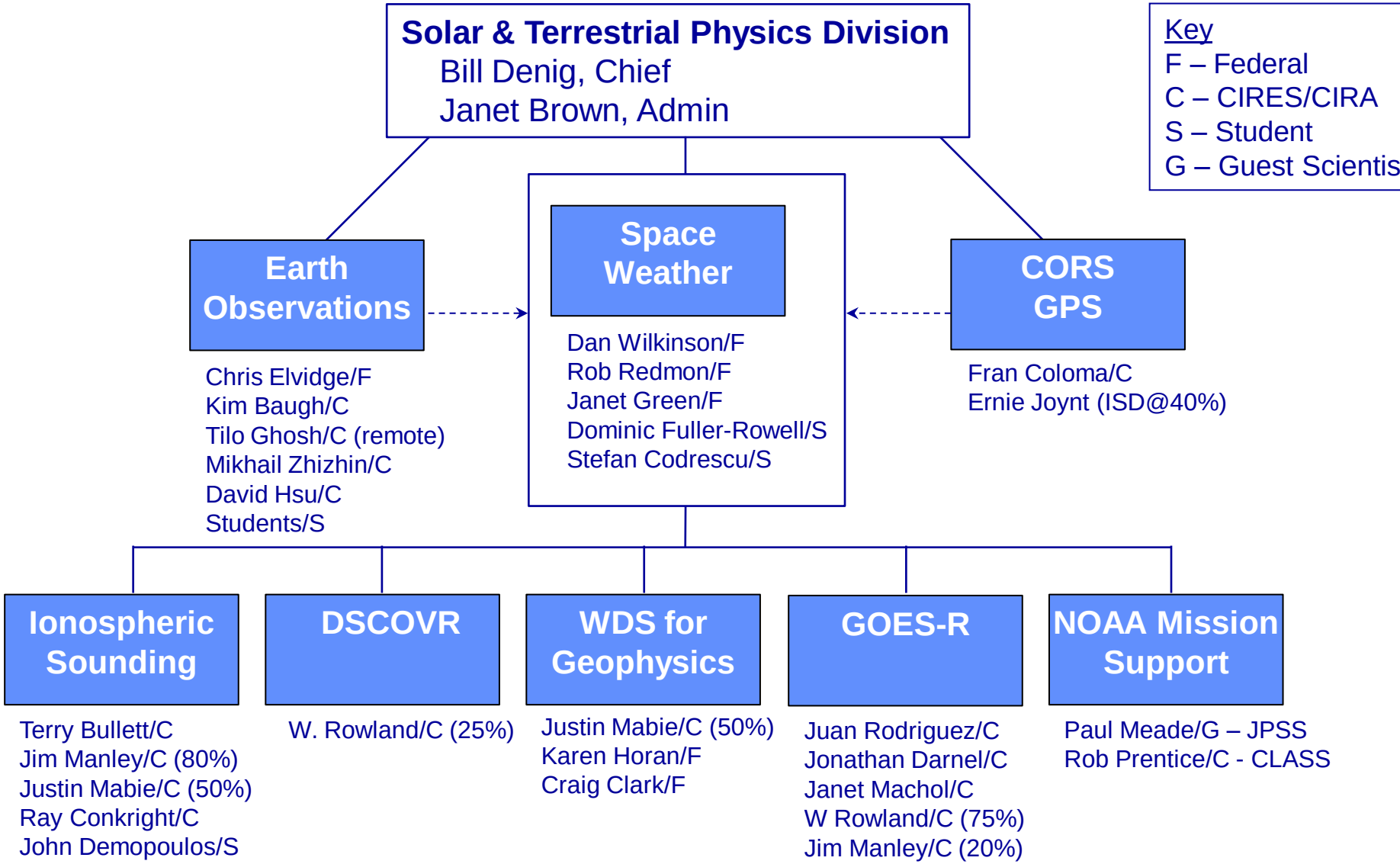
William.Denig@noaa.gov

OUTLINE

Solar & Terrestrial Physics Division

- **STP Division Overview**
- **Milestones & Performance Measures**
- **Accomplishments & Updates**
- **Issues & Summary**

STP Division Overview
Personnel



STP Division Overview
Personnel Changes

- Gains
  - None
- Losses
  - Anu Sundaravel – No participation at this time; interested in future work
- Reassignments
  - William Rowland – Selected as the GOES-R/DSCOVR Systems Engineer
- Inbound
  - Kris Woyna, Agile programmer (start date: 01 May 13)
- Vacancies
  - GOES-R Solar Physicist / Federal (critical need) – resources pending approval
  - GOES-R/DSCOVR Magnetometer Scientist / CIRES – PD approved
  - SPADES Developer – May be current ISD resource – funds available
  - SPIDR Student (proposed) – funds dependent on OD wish-list

STP Division Overview
Balance Sheet – FY13

Income

	FY12 Carryovers	FY13 Income	Total	
Base Allocation (actual)		$888,794	$888,794	
NASA ROSAS (Green)		$77,474	$77,474	
NASA KNIPP (Redmon)		$20,000	$20,000	
SPSRB (Redmon)		$64,400	$64,400	
GOES-R (PN76)		$137,500	$137,500	
GOES-R (PN77)		$509,620	$509,620	
GOES-R (Cal/Val)		$300,000	$300,000	
DSCOVR Data Stewardship		$244,000	$244,000	
OD Wish List				
NASIC		$100,000	$100,000	
JPSS Imagery Team		$75,000	$75,000	
JPSS Proving Ground		$145,000	$145,000	
World Bank		$73,000	$73,000	
NTL Data Sales	$56,000	$35,000	$91,000	
MAFFIN		$18,000	$18,000	
McMurdo (DMSP)		$56,000	$56,000	
CORS		$208,000	$208,000	
Total Income	$56,000	$2,951,788	$3,007,788	**$3,007,788**

70% of funding is from external sources

Expenses

	FY12 Paybacks	FY13 Expenses	Total	
Salaries		$2,453,458	$2,453,458	
Fed Travel		$41,000	$41,000	
CIRES Travel		$37,489	$37,489	
ISD Support		$135,773	$135,773	
Miscellaneous		$117,288	$117,288	
OD overhead		$202,139	$202,139	
FY14 Forward Funded				
Total Expenses		$2,987,147	$2,987,147	**$2,987,147**

Balance Sheet

	Net FY12	Net FY13	Net	
Balance Sheet	$56,000	-$35,359	$20,641	**$20,641**
			As of 29 Apr 13	

STP Division Overview
Agreements – Status

Agreements

Scope	Team	Type	Partner	NOAA Legal	DOC Legal	NGDC Signed	Partner Signed	Start	End	Status	
CORS Support	CORS	AGR	NGS	n/a	n/a	X	X	10/01/2003	09/30/2013	G	*To be renewed*
SWx Climatology	SWX	MOU	AFCCC	X	X	X	X	05/27/2004	10/01/2014	G	In place - no FY13 activity
GPS Data (CORS)	SWX	MOA	Multi	n/a	n/a	X	X	09/20/2004	TBD	G	*Biannual Review - waiting on NGS*
~~DMSP Archive~~	~~NTL~~	~~MOA~~	~~DMSP~~	~~X~~	~~X~~	~~X~~	~~X~~	~~05/30/2007~~	~~09-30/2009~~	~~Y~~	*No longer tracking*
Ionosonde Sites	SWX	IA	USGS	X	X	X	X	04/03/2009	04/03/2013	Y	*Expired - renew?*
ViRBO	SWX	MOA	NASA	X	X	X	X	04/15/2009	n/a	G	In place - no FY13 activity
SEM-N - AFRL	SWX	MOA	AFRL	X	X	X	X	05/11/2009	05/11/2014	G	In place - DWSS cancelled
Nighttime Lights	SWX	MOU	DOE	X	X	X	X	08/12/2009	08/12/2013	G	In place - nothing to report
NASIC	NTL	MOU	NASIC	X	X	X	X	03/09/2011	01/30/2015	G	In place - nothing to report
Gas Flaring	NTL	SA	WBank	X	X	X	X	05/22/2012	06/30/2013	G	In place - nothing to report
Global CO2	NTL	AGR	NASA	n/a	n/a	n/a	n/a	07/29/2011	09/30/2012	G	*To be renewed*
SEM-N Algorithms	SEG	MOU	SMC	X	X	X	X	08/01/2011	07/31/2013	G	In place - DWSS cancelled

As of 29 Apr 2013

G	No Action Needed
Y	Watch Item
R	Action Required

STP Division Overview
GOES Spacecraft/Instrument Status

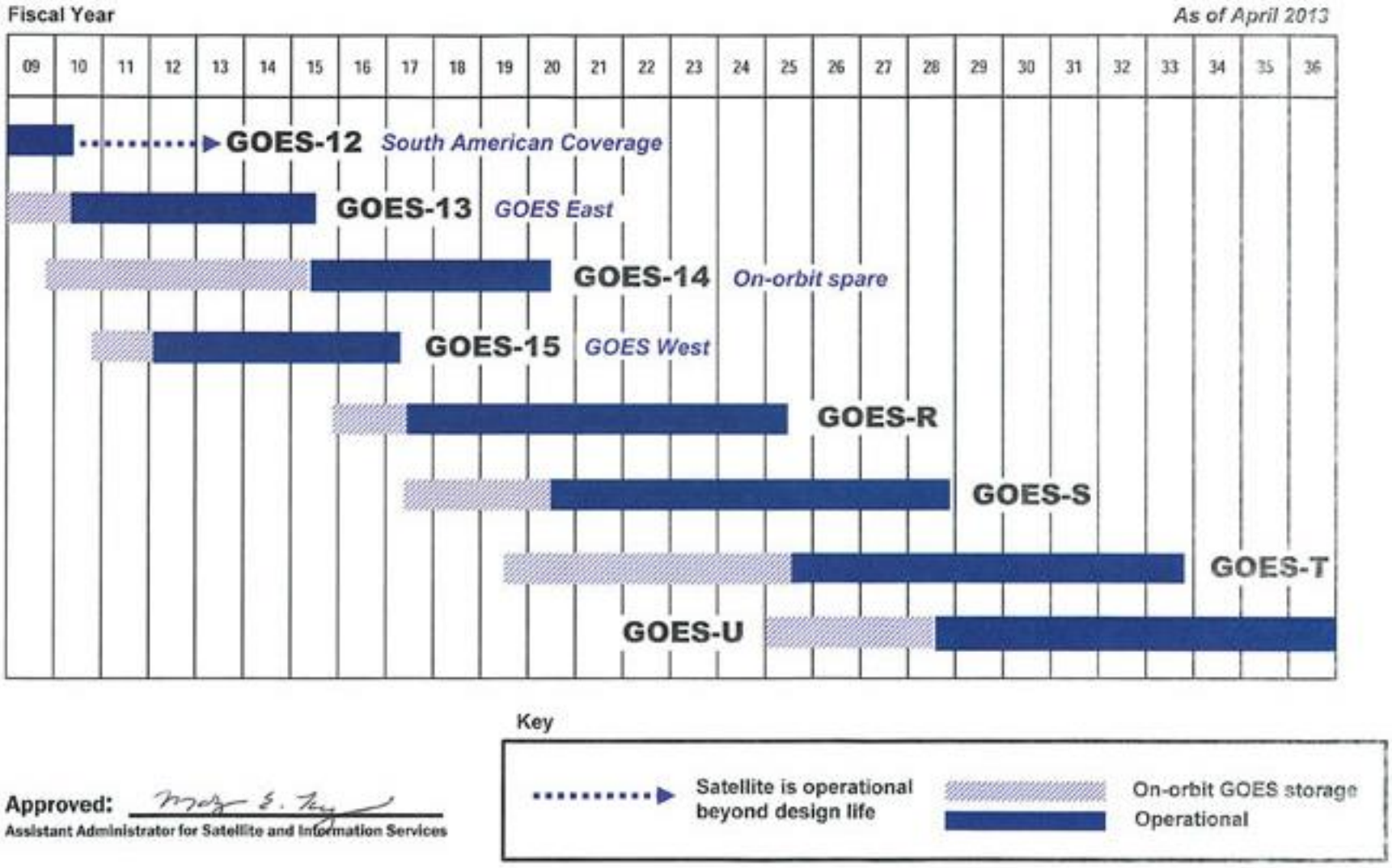
Spacecraft	Series	Operational Status	Status	Magnet1	Magnet2	Magnetometer 1	Magnetometer 2	MAG	XRS	XRS-EUV	EXIS	EPS	HEPAD	SEISS	XRP	SXI	SUVI
GOES 12	GOES I-M	South America	G	G	G				R			Y	G		R	R	
GOES 13	GOES N-O-P	Operational East	G			G	G			Y		G	G			Y	
GOES 14	GOES N-O-P	Standby	G			G	G			G		G	G			G	
GOES 15	GOES N-O-P	Operational West	G			G	G			G		G	G			G	
GOES R	GOES R	Acquisition						ACQ			ACQ			ACQ			ACQ
GOES S	GOES R	Acquisition						ACQ			ACQ			ACQ			ACQ
GOES T	GOES R	Acquisition						ACQ			ACQ			ACQ			ACQ
GOES U	GOES R	Acquisition						ACQ			ACQ			ACQ			ACQ

As of: 29 Apr 2013

Operational (or capable of)	G
Operational with limitations (or Standby)	Y
Operational with Degraded Performance	O
Not Operational	R
Acquisition	ACQ

Note: SWPC operations use GOES-15 SEM & SXI, GOES-14 SEM & SXI, GOES-13 SEM (no XRS). SWPC stopped processing POES data on 01Jan13 – Routine processing of POES/MetOp data is in place (Thanks Janet and Ken T.)

STP Division Overview
Continuity of GEO Measurements



STP Division Overview

STP Annual Data Ingest[1] – 2QFY13

	CY11 GB	CY12 GB	CY13 YTD
GOES SEM	71	80	22
GOES SXI	1,731	1899	645
POES SEM	29	29	2[2]
DMSP OLS	5,130	5,020	1,380
CORS GPS	24,456	25,611	6,636
Ionosonde	900	907[2]	336[3]

[1]Uncompressed data volumes
[2]Unprocessed POES data
[3]Does not include VIPIR (29 TB)

OUTLINE

Solar & Terrestrial Physics Division

STP Division Overview

Milestones & Performance Measures

Accomplishments & Updates

Issues & Summary

Milestones & Performance Measures

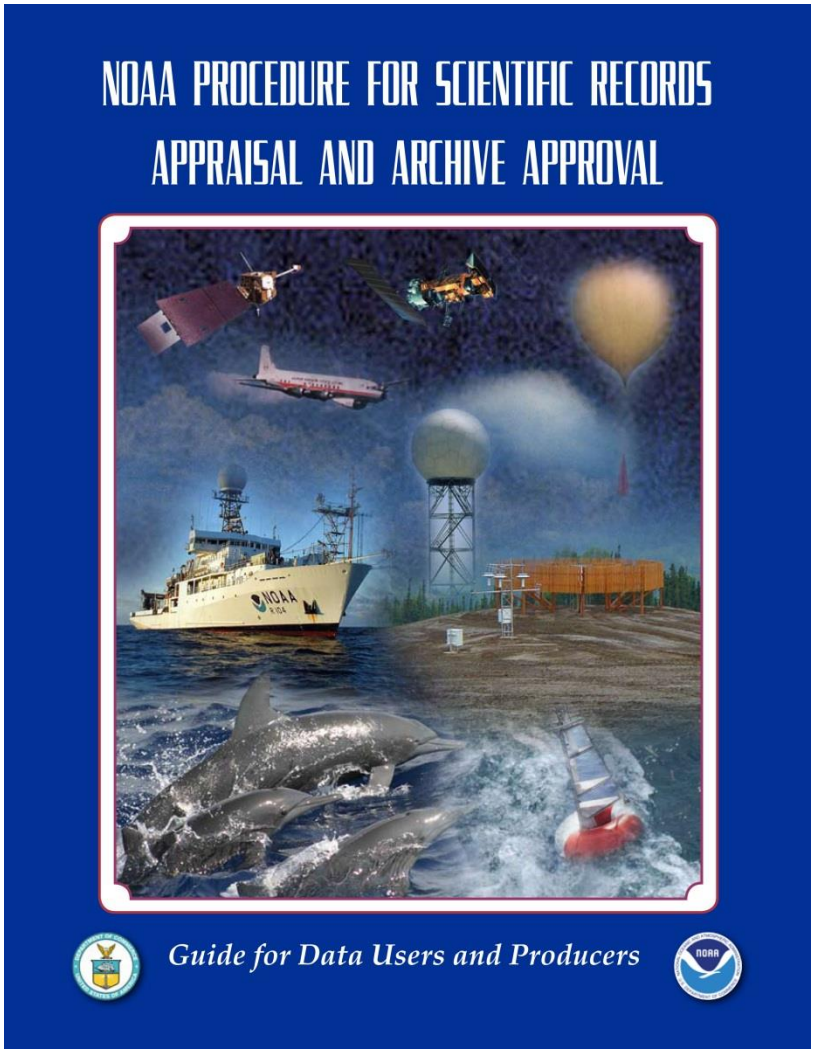
FY13 STP Milestones

FY13 Milestones		+--------FY13--------+			
Space Weather Program		Q1	Q2	Q3	Q4
Spacecraft Charging	Host technical workshop on the release of the next generation radiation belt models referred to as AP9/AE9 (Green/1QFY13)	C			
PeEPS	Demonstrate at the American Geophysical Union 2012 Fall Meeting new capabilites for the social media utility referred to People Empowered ProductS (Green-Redmon/1QFY13)	C			
DMSP SWx	Develop an 11-year database of calibrated precipitating electron and ion fluxes from the Defense Meteorological Satellite Program Special Sensor Electron and Ion Spectrometer (Redmon/3QFY13)			G	
World Data Service					
Monthly Bulletins	Resume monthly production of the NOAA/NGDC Geomagnetic Indices Bulletin and Solar Indices Bulletin (Mabie-Clark/1QFY13)	C			
Ionosonde Data Services					
Ionosonde Installation	Promote scientific research within Africa by installing a new-generation, advanced research ionospheric sounder at Maseno University on the equator near Kisumu, Kenya (1QFY13/Bullett/1QFY13)	C			
GOES-R Program Support					
GOES-R Cal/Val	Identify and complete key tasks for GOES-R space weather calibration-validation [vice Shouldis/1QFY13]	C			
GOES-R RR/AR	Complete Critical Design Reviews for selected Level 2+ ground-processing algorithms for the GOES-R space weather sensors (vice Shouldis/3QFY13)			G	
DSCOVR Program Support					
DSCOVR RTA	Prepare and submit to the NGDC Data Manager a Request To Archive (RTA) for space environmental data from the NOAA Deep Space Climate Observatory (DSCOVR) mission (Denig/1QFY13)	C			
DSCOVR CONOPS	Prepare a high-level CONcept of Operations (CONOPS) for the Archive, Access, and Assessment (AAA) of solar wind data from the Deep Space Climate Observatory (DSCOVR) mission (Denig/1QFY13)	C			
DSCOVR SA	Draft an initial Submission Agreement (SA) for acquiring processed Deep Space Climate Observatory (DSCOVR) data received from the NWS Space Weather Prediction Center (Denig/2QFY13)		C		
SPADES	Develop key functional elements of the Satellite Product Analysis and Distribution Enterprise System (SPADES) to support the Deep Space Climarte Observatory (DSCOVR) mission (Rowland/3QFY13)			G	
DSCOVR ICD	Prepare a draft Interface Control Document (ICD) for the the NGDC-to-archive interface for the Deep Space Climate Observatory (DSCOVR) mission data (Rowland/4QFY13)				G
Earth Observations					
VIIRS Gas Flares	Use Soumi National Polar Partnership (S-NPP) Visible Infrared Imaging Radiometer Suite (VIIRS) data to produce a global map of detected gas flares ranked from largest to smallest (Elvidge/4QFY13)				G
VIIRS Nighttime Lights	Create a global cloud-free composite map of nightime lights derived from Soumi National Polar Partnership (S-NPP) Visible Infrared Imaging Radiometer Suite (VIIRS)S data (Elvidge/4QFY13)				G

As of 29 Apr 13

★ ***Deferred from 1QFY13 pending receipt of funds – now received***

Milestones & Performance Measures
DSCOVR RTA



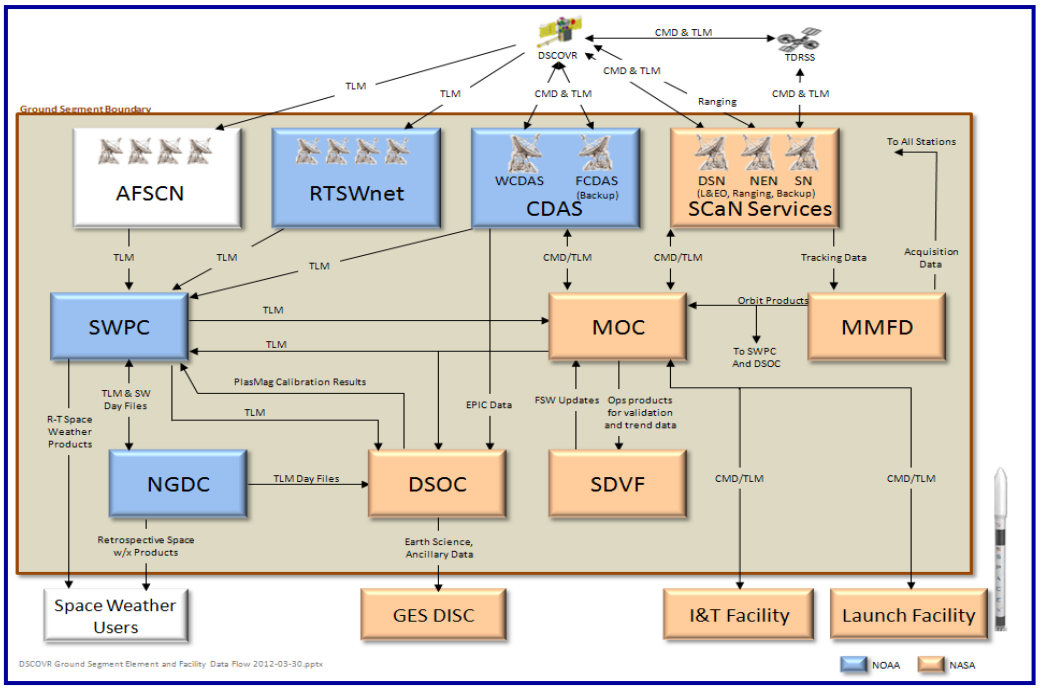
Milestone: Prepare and submit to the NGDC Data Manager a Request To Archive (RTA) for space environmental data from the NOAA Deep Space Climate Observatory (DSCOVR) mission (TBD/1QFY13)

Status: Completed – RTA for DSCOVR approved 08 Feb 13

Milestones & Performance Measures
DSCOVR CONOPS

Milestone: Prepare a high-level CONcept of Operations (CONOPS) for the Archive, Access, and Assessment (AAA) of solar wind data from the Deep Space Climate Observatory (DSCOVR) mission (TBD/1QFY13)

Status: Completed – Ground system CONOPS for DSCOVR presented at the System Requirements Review. Specifics for the NGDC segment were included at the SRR. Additional slide presented later.



Milestones & Performance Measures

DSCOVR Submission Agreement

Milestone: Draft an initial Submission Agreement (SA) for acquiring processed Deep Space Climate Observatory (DSCOVR) data from the NWS Space Weather Prediction Center (TBD/2QFY13)

Status: Completed – Submission for DSCOVR data prepared in coordination with SWPC. Submitted 29 Mar 13.

SUBMISSION AGREEMENT
BETWEEN
THE SPACE WEATHER PREDICTION CENTER
AND
THE NATIONAL GEOPHYSICAL DATA CENTER
FOR DEEP SPACE CLIMATE OBSERVATORY (DSCOVR) SPACE WEATHER DATA

2013-03-29

Introduction

This document represents the agreement that the Space Weather Prediction Center (NWS>NCEP>SWPC) (the "Provider") and the National Geophysical Data Center (NGDC) (the "Archive") have reached for submitting the Provider's data, Deep Space Climate Observatory (DSCOVR) Space Weather Data, to the Archive for long-term preservation. It represents a joint effort between the Provider and the Archive to accurately document the agreement and the expectations between the two groups.

In order to ensure that the quality and integrity of the archived data is not compromised, the Provider and the Archive agree to maintain this agreement with accurate and up-to-date information through the life of the data submission.

DSCOVR is an operational environmental satellite that will monitor the solar wind and interplanetary magnetic field at the sun-earth L1 Lagrangian point. The real-time data will provide SWPC with an approximate 45 minute forecast of hazardous space weather conditions at earth. DSCOVR has a planned launch in 1QFY15 with an on-orbit lifetime through FY19. Datasets to be provided are raw observatory telemetry data, Level 1 data, processed (Level 2+) space weather products, and associated Metadata (file) and Support Items (documents, reports, etc). Total daily electronic volume is estimated to be on the order of 3 GB [TBD].

Contacts

Persons included in all communications regarding the data submission.

Provider Contacts

Point of Contact, SWPC/DSCOVR Program Manager	SWPC/DSCOVR Responsible Scientist
Doug Biesecker	Alysha Reinard
NOAA/NWS/SWPC	NOAA/NWS/SWPC
Scientist (Federal)	CIRES Research Associate
303-497-4474	303-497-4748
doug.biesecker@noaa.gov	alysha.reinard@noaa.gov
Working hours	Working hours

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Milestones & Performance Measures

FY13 Performance Measures

Space Weather Metric

Goal	Objective	Performance Measure	POC	1QFY13	2QFY13	3QFY13	4QFY13
Weather-Ready Nation (NWS)	A More Productive and Eficient Economy Through Environmental Information Relevant to Key Sectors of the U.S. Economy	Maintain a greater than 97% (2-sigma, cumulative distribution) of available Space Environment Monitor (SEM) data from the Geostationary Operational Environmental Satellites (GOES) archived on an annual basis	Wilkinson	100%	100%		

Ionosonde

Goal	Objective	Performance Measure	POC	1QFY13	2QFY13	3QFY13	4QFY13
Weather-Ready Nation (NWS)	Resilient Coastal Communities That Can Adapt To The Impacts Of Hazards And Climate Change	Acquire, process and disseminate > 97% (2-sigma, cumulative distribution) of available real-time ionosonde data within 1 hour [TBD] of receipt	Bullett	100%	100%		

Nightime Lights Metric

Goal	Objective	Performance Measure	POC	1QFY13	2QFY13	3QFY13	4QFY13
Climate Adaptation and Mitigation (CS)	Improved Scientific Understanding of the Changing Climate System and Its Impacts	Acquire, process and disseminate >97% (2-sigma, cumulative distribution) of available real-time nighttime lights imagery within 3 hours of receipt	Elvidge	100%	100%		

CORS

Goal	Objective	Performance Measure	POC	1QFY13	2QFY13	3QFY13	4QFY13
Resilient Coastal Communities and Economics (NOS)	Resilient Coastal Communities That Can Adapt To The Impacts Of Hazards And Climate Change	Provide a >97% (2-sigma, cumulative distribution) availability for CORS near-real-time data to the NWS Space Weather Prediction Center (SWPC) as per the '4-way' Memorandum of Agreement and subject to normal business-hour response times.	Coloma	100%	100%		

As of 25 Apr 13

Greater than 99% (3-sigma) Cumulative Distribution

Greater than 97% (2-sigma) Cumulative Distribution

Greater than 84% (1-sigma) Cumulative Distribution

Below 84.1% (1-sigma) Cumulative Distribution

OUTLINE
Solar & Terrestrial Physics Division

STP Division Overview

Milestones & Performance Measures

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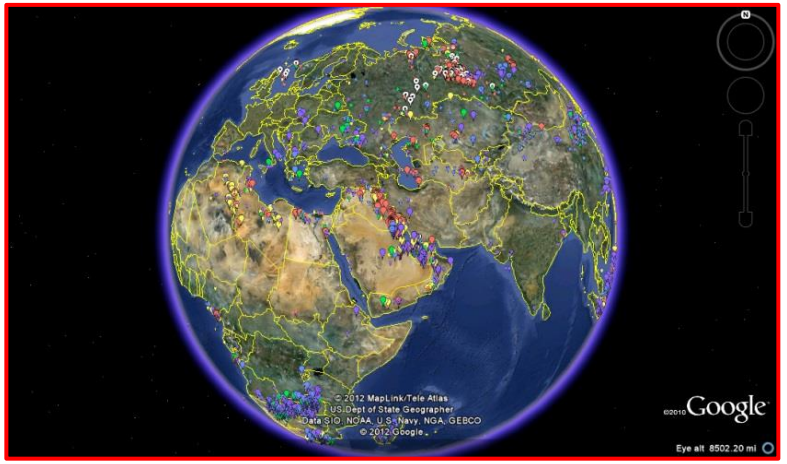
Accomplishments & Updates

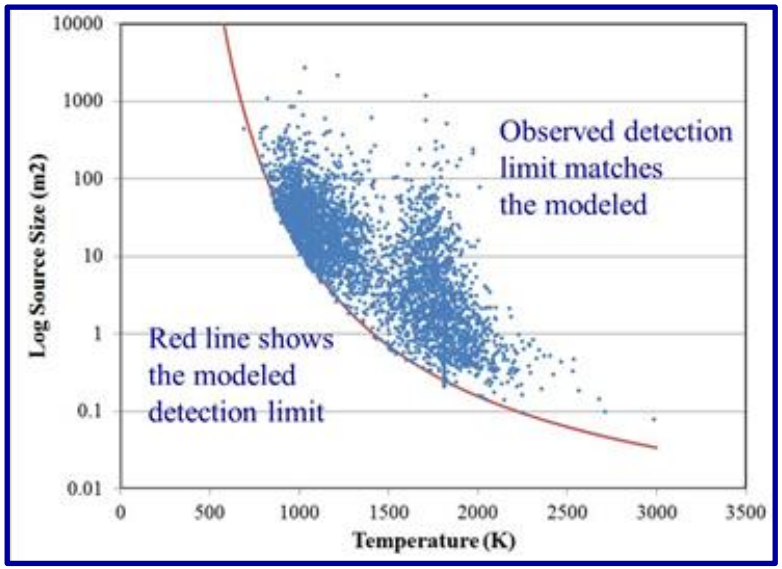
VIIRS Nightfire Detection – Gas Flaring

EOG has developed a capability to estimate CO_2 emission volumes from gas flares worldwide using data from the Visible Infrared Imaging Radiometer Suite (VIIRS) on the S-NPP spacecraft.

Constituents: World Bank Global Gas Flaring Reduction Initiative, California Air Resources Board and NOAA's Carbon Tracker Program.

- Top Right: NGDC's Nightfire Service provides data on combustion sources detected at night.
- Bottom Right: VIIRS nightfire modeled detection limits match observations.

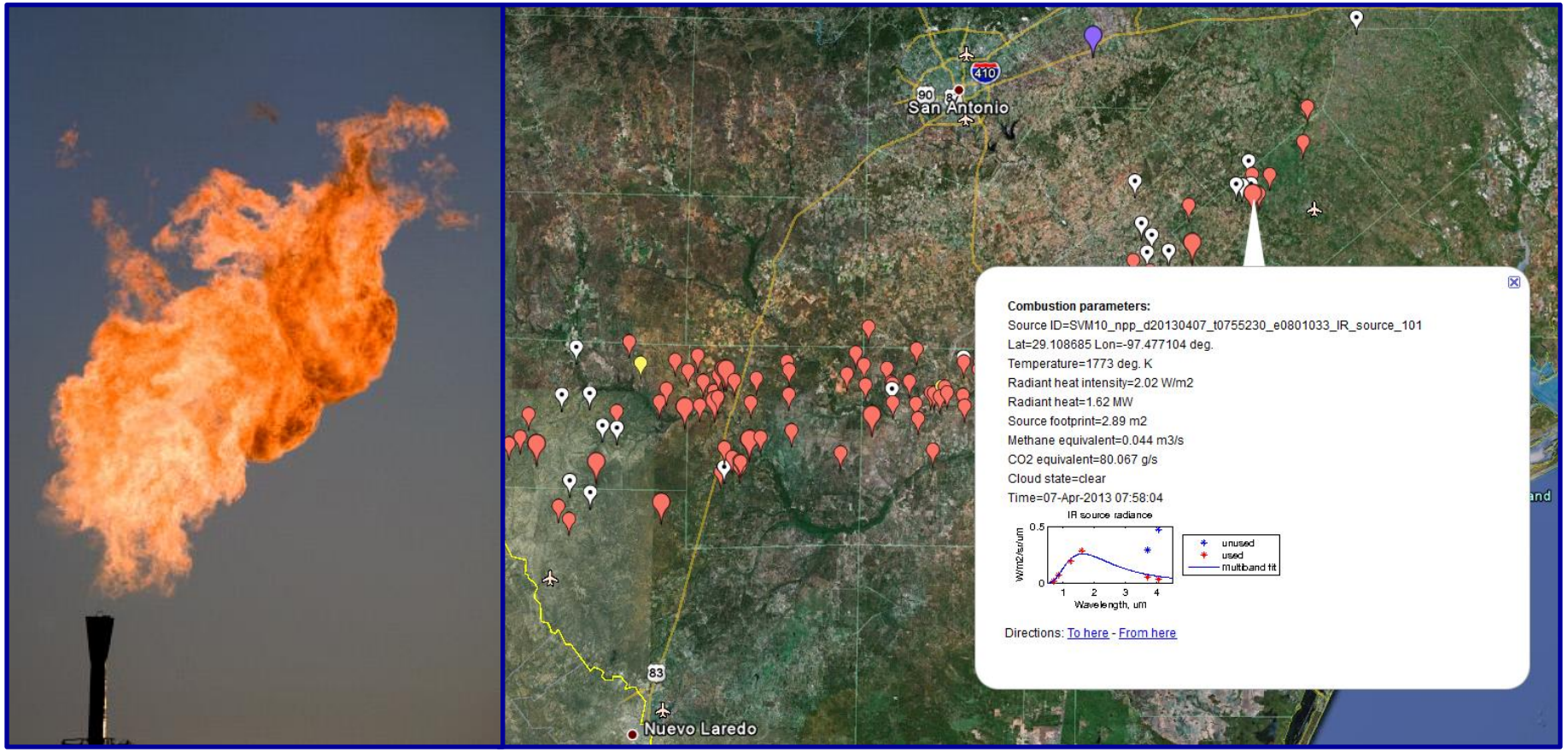




Accomplishments & Updates

VIIRS – Estimating Gas Emissions in Flares

VIIRS Nightfire – Methane combustion rate (cubic meters per second) and CO_2 emissions (grams/second) are estimated based on VIIRS observed radiant heat.



Accomplishments & Updates
Calibration Standard for Arecibo

Ionosondes remain the absolute standard against which other ionospheric measuring techniques are calibrated. The Arecibo Observatory is an incoherent scatter radar (Thompson backscatter from ionospheric electrons) operating at a fixed frequency of 430 MHz to measure characteristics of the ionosphere (plasma drift velocities, electron and ion temperatures, electron densities, ion composition and ion-neutral collision frequencies). In spite of the impressive capabilities of incoherent scatter radars, such as the Aricibo, these instruments need to be absolutely calibrated using independent density measurements from a highly reliable ionosonde

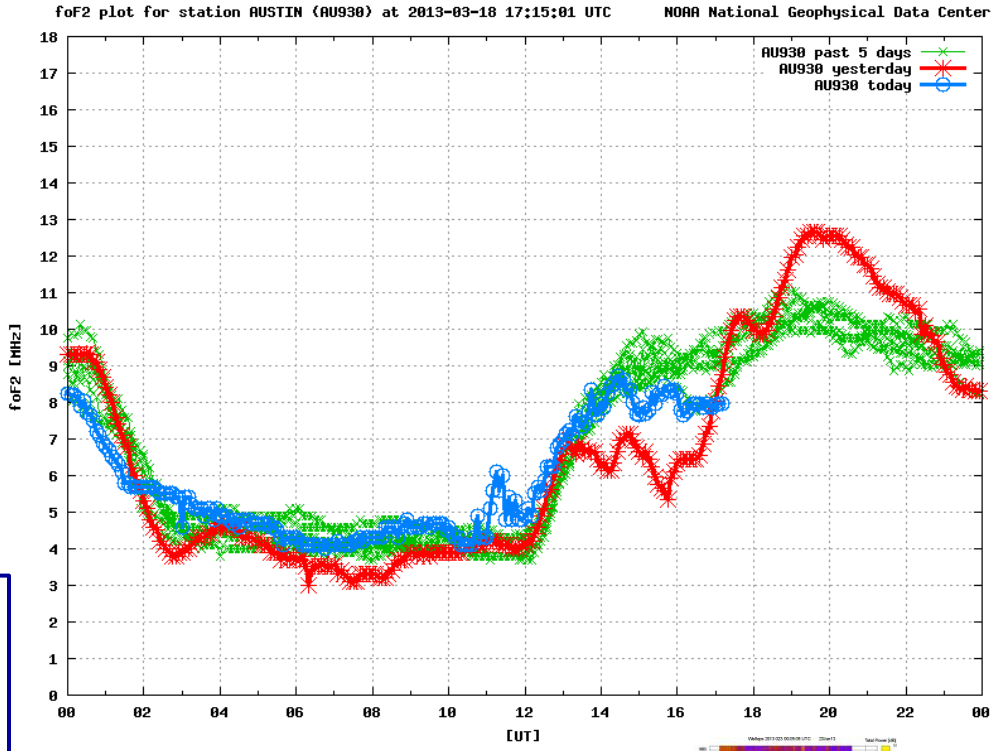
National Astronomy and Ionosphere Center
Arecibo, Puerto Rico

Arecibo Message (1974)
à la Carl Sagan

Accomplishments & Updates

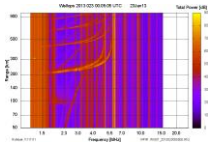
Supporting *Military Auxiliary Radio System*

The Texas Army MARS unit has included one of our in-house displays (Austin, TX) used for monitoring data. This provides users with current trends in ionospheric variations to assist in frequency management by regional communicators and disaster relief organizations. See: https://www.txarmymars.org/resources/solarweather.php



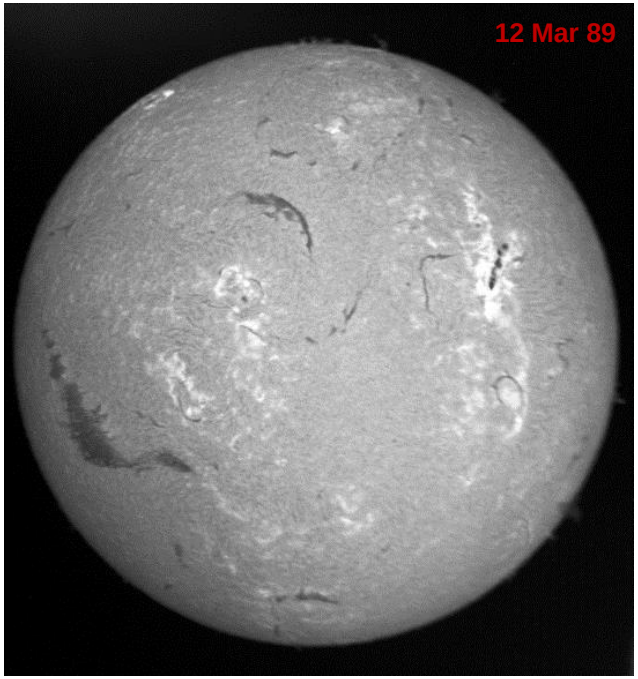
The *Military Auxiliary Radio System* is a DoD sponsored emergency communications program. The program consists of licensed amateur radio operators who provide auxiliary (adjunct) communications on local, national and international levels

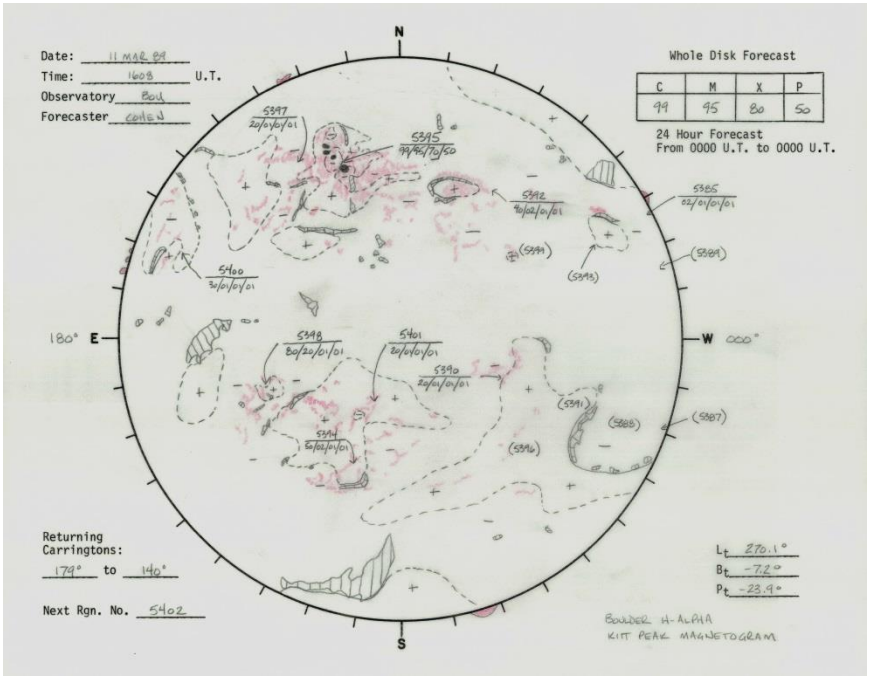
Listen to the ionosphere



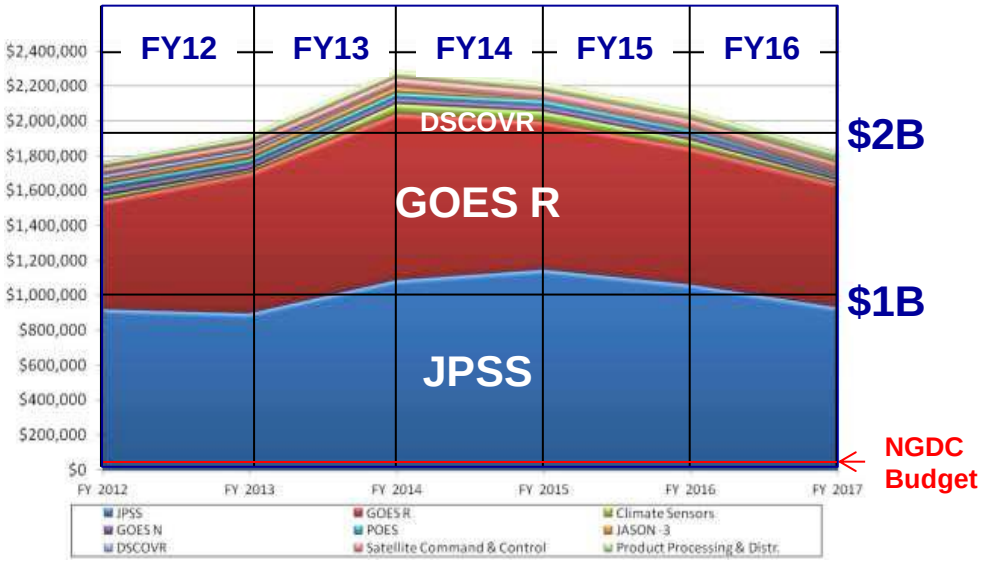
Accomplishments & Updates
Improving the Official Archives

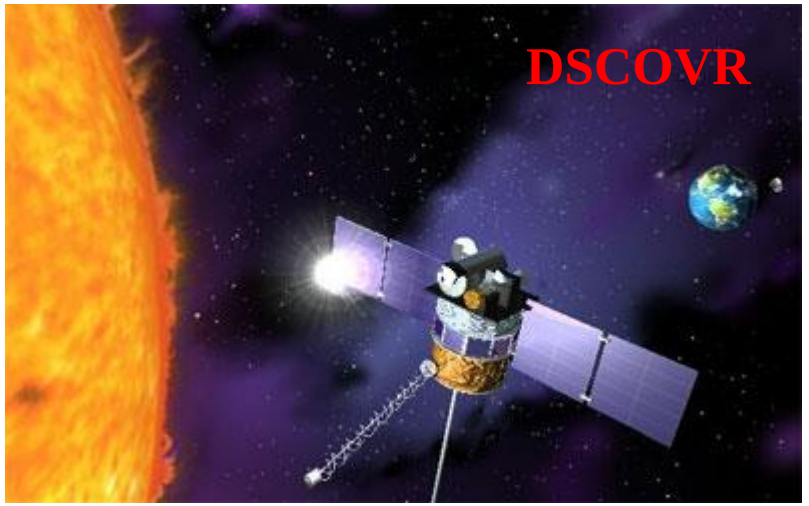
The NGDC archives include a vast assortment of solar images and related data collected as a part of the former World Data Center (WDC) organization, now replaced by the World Data Service (WDS). Karen Horan continues to review the WDC holdings that are now a part of the NGDC official archives. Significant effort has gone into cleaning up the archive with regard to naming conventions, storage hierarchy and removal of redundant data. A related project is underway to update the online holdings and the associated metadata. These efforts will help ensure that as STP moves forward in focusing on NOAA satellite datasets, the datasets managed under the WDC/WDS umbrella will be preserved.





Accomplishments & Updates
NESDIS Investment in Satellites

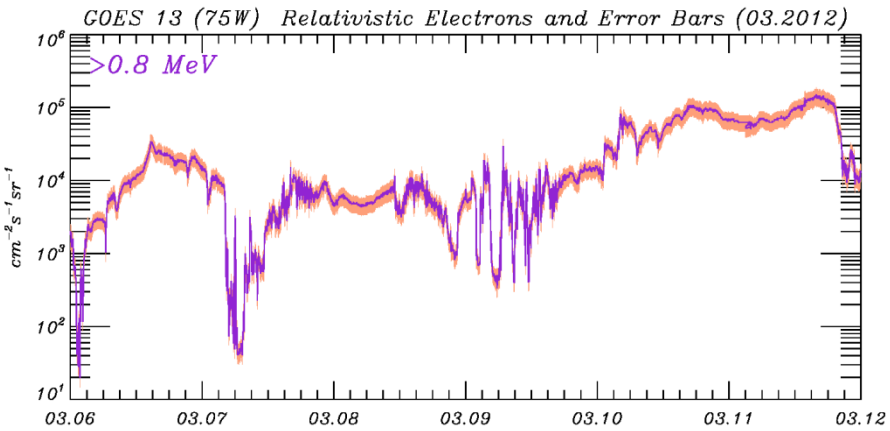




Accomplishments & Updates
GOES-R SEISS L1b Algorithms

NGDC participation in GOES-R Calibration Working Group has led to correction of serious scientific integrity issues in SEISS L1b algorithms

- Level 1b algorithm (counts to fluxes) documented by SEISS vendor in CDRL080
- Detailed review of CDRL080 (monthly telecons) since summer 2011 driven by Ground Segment vendor to resolve serious completeness and scientific integrity issues
- NGDC wrote 5 detailed memos between February and December 2012 identifying scientific integrity issues in Revs A-D of CDRL080 and deriving the correct expressions
- **CDRL080 Rev E (22 Feb 2013) incorporates most of our comments and those of the Ground Segment vendor**
- *Ground Segment vendor is completing coding to Rev B, considering when to upgrade to Rev E (as early as this summer)*



Error bar expressions derived by NGDC in Mar 2012 (like these for GOES-13 electron fluxes) were incorporated correctly into CDRL80 in Dec 2012 (Rev D).

CDRL80 is the SEISS Level 1b Ground Processing Algorithm Document

← Program disconnect corrected (NGDC)

CDRL – Contract Data Requirements List

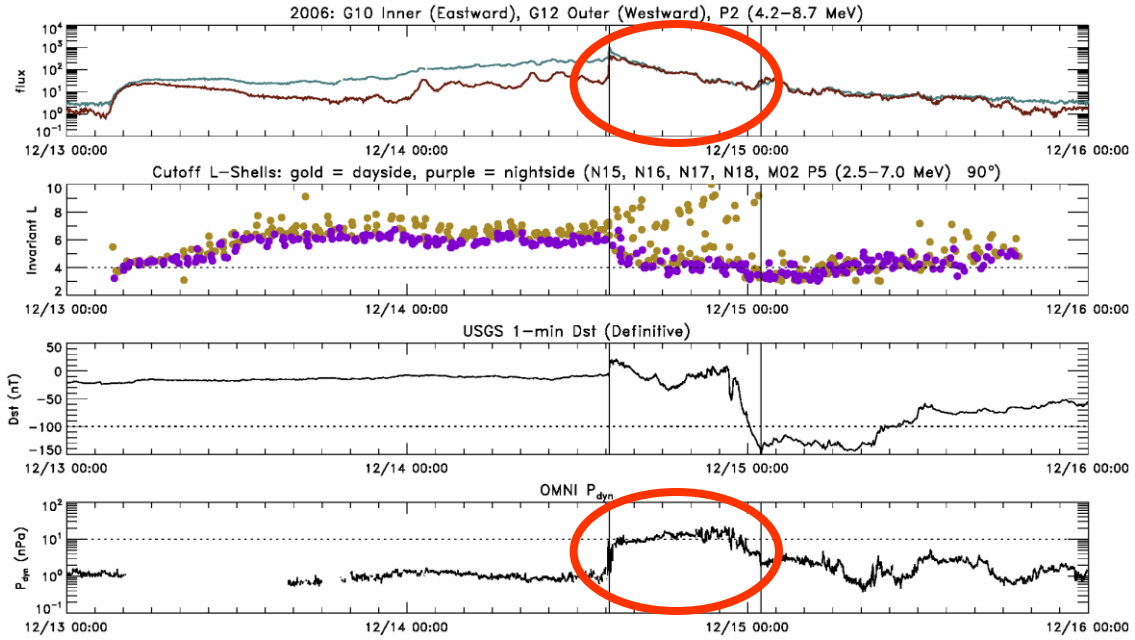
Accomplishments & Updates
Preparing for GOES-R Cal/Val

- Background: Solar proton measurements at different locations in the magnetosphere should measure the same flux if their energies are above the geomagnetic cutoffs
- Goal: Develop procedures for inter-calibrating GOES energetic particle sensors

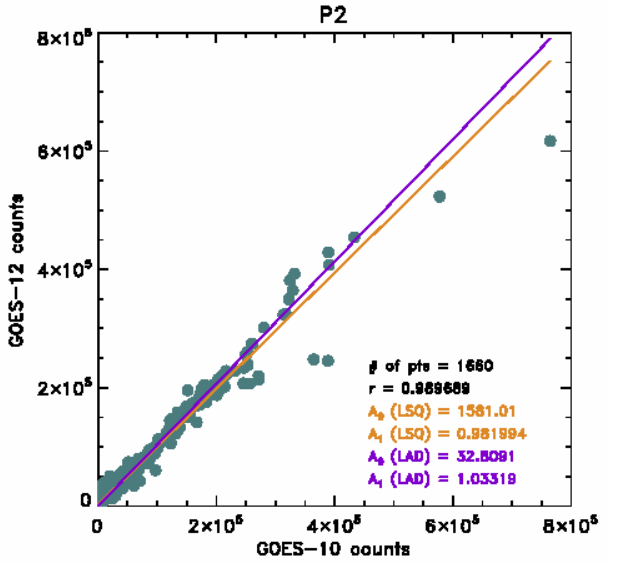
- Use least-absolute-deviation (LAD) linear fits – more robust to outliers than least-squares

  GOES-12 P2 = 1.03(GOES-10 P2) + 32.8*

  ✓ Poster at 2013 Space Weather Workshop (supported by NSF & Hollings Scholarship)
- Procedure to be adapted for GOES-R



GOES 10 & 12 solar proton fluxes during shock of 14 Dec 2006



Inter-calibration of GOES 10 & 12 solar proton channel P2, 2001-2006 (P_{dyn} > 10 nPa, 1660 points)

Accomplishments & Updates
GOES Cal/Val – EUV & X-Rays

Background: Solar EUV and x-ray emissions

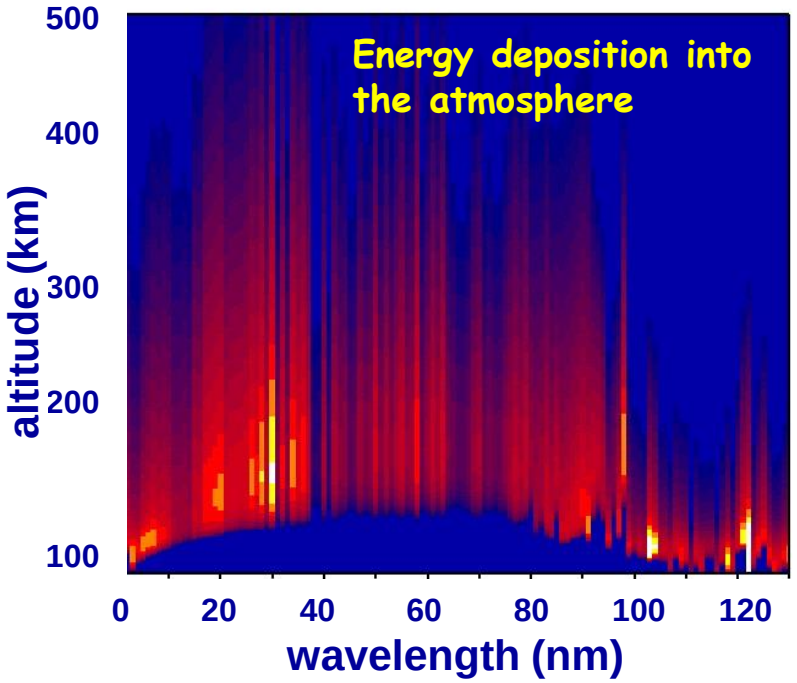
- Cover the wavelength range of 0.05 to 125 nm
- Heat the thermosphere and create the ionosphere
- Have high variability (~x100 variability of TSI)
- Needed for thermospheric / ionospheric models

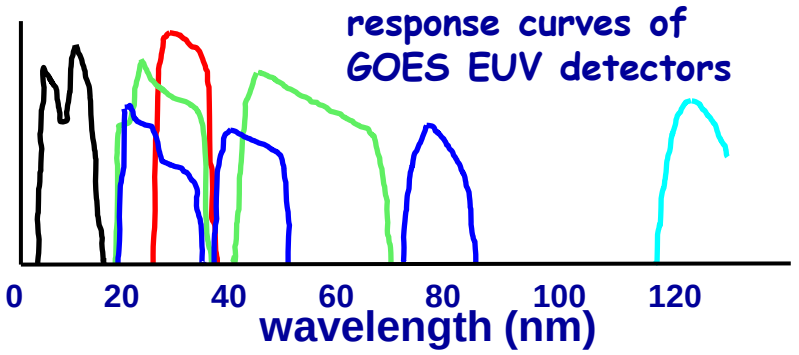
Motivation: Improved XRS-EUVS calibrations

- Most detailed calibration to-date of XRS-EUVS
- Inter-calibration of GOES sensors to other satellites
  - ✓ Quantify sensor degradation and accuracy
- International EUV calibration WG participation
  - ✓ Janet Machol's solicited participation / 15-18 Apr 2013 / Royal Observatory of Belgium – STCE sponsored

Future: What's next?

- Complete XRS-EUVS calibrations; paper/book
- Release improved XRS-EUVS dataset to users
- Prepare long-term merged EUV dataset (participate)
- Use "lessons learned" in GOES-R Cal/Val

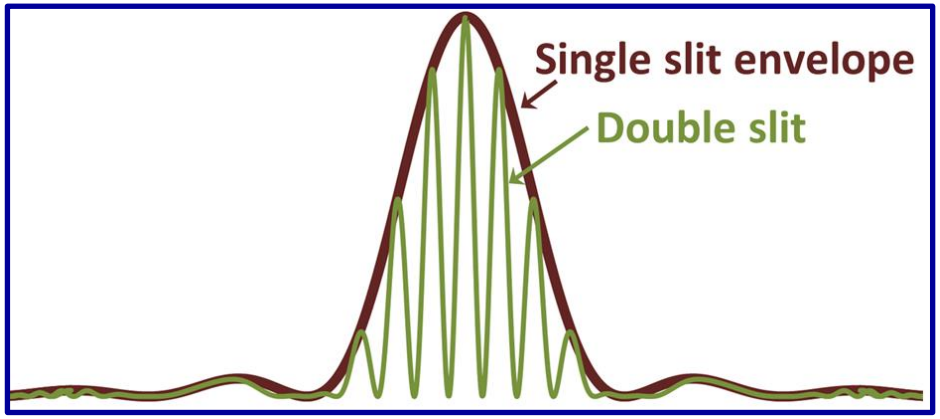




Accomplishments & Updates

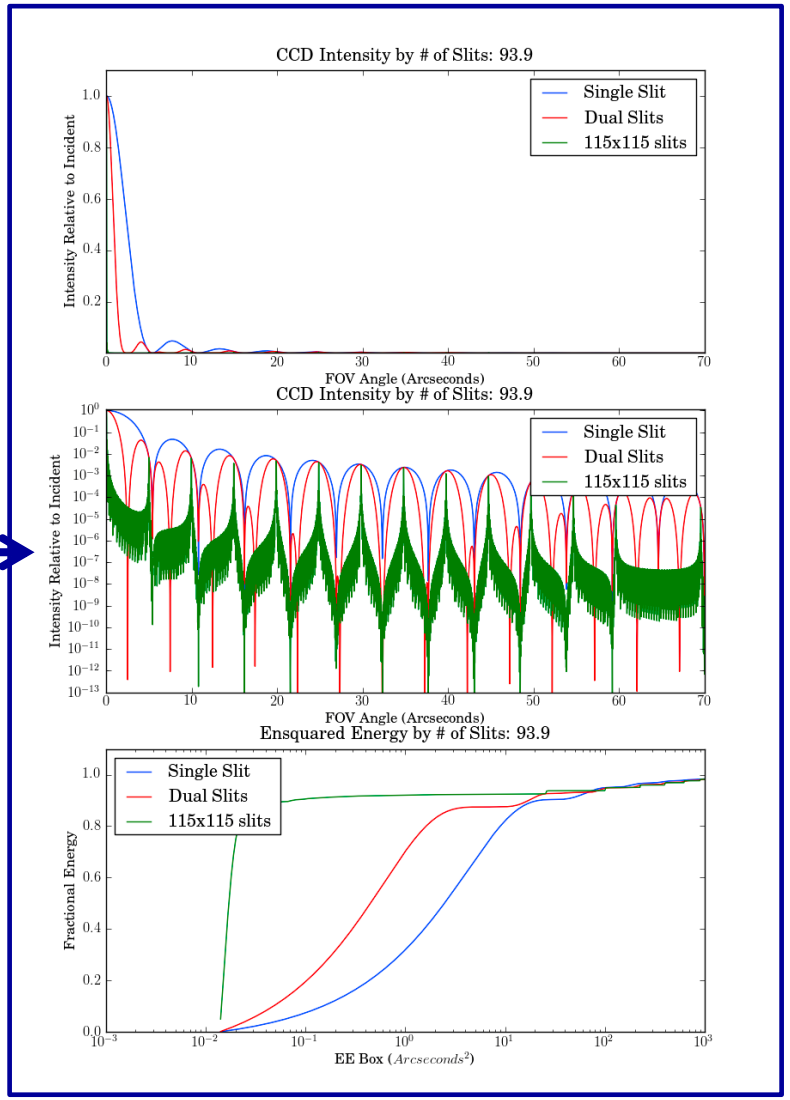
SUVI Filter Diffraction Modeling

As part of the GOES-R Cal/Val activities, NGDC performed validation upon the SUVI vendor's report on the incident diffraction pattern upon the focal plane caused by the supporting filter mesh by the entrance filters. NGDC was able to validate the conclusions of the report although there were discrepancies in the respective model results due to various unknowns/assumptions. The SUVI vendor will be re-releasing the report to address the comments made by NGDC and other contributors.



Physics 101 – Diffraction Pattern

Note logarithmic scale



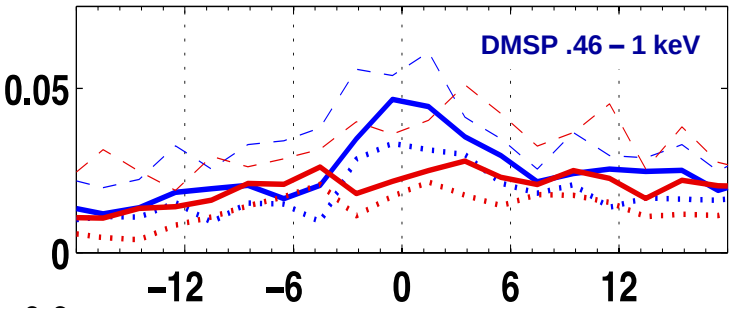
Accomplishments & Updates
Extramural Research

Specifying Upper Atmospheric Energy Input and Neutral Density Perturbations Using Variable Boundary Coordinates

Science Questions:

1. How is energy input partitioned between kinetic and electromagnetic energy and what is coincidence with auroral boundaries?
2. What are the sources of energy deposition for "hot spots" and asymmetries?

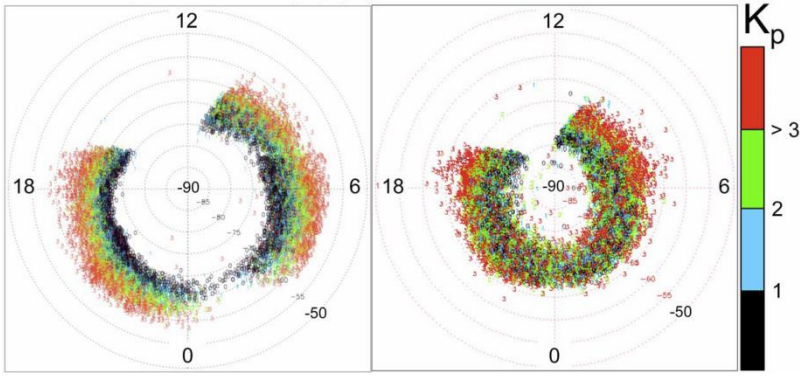
Thermospheric damping response to sheath-enhanced geospace storms



Electron energy flux (mW/m^2) during sheath-enhanced storms (blue solid curve) exceeds that during non-sheath enhanced storms (red). [after Knipp et al., 2013]

Benefits to NGDC:

1. Upgrading the official archive to better serve the research community – improved data stewardship
2. Increasing scientific credibility of NGDC products and support
3. Enhancing external funding[1] from NASA and NSF



Equatorward boundary (left) and poleward boundary (right) locations as a function of geomagnetic index Kp. [after Redmon et al., 2010]

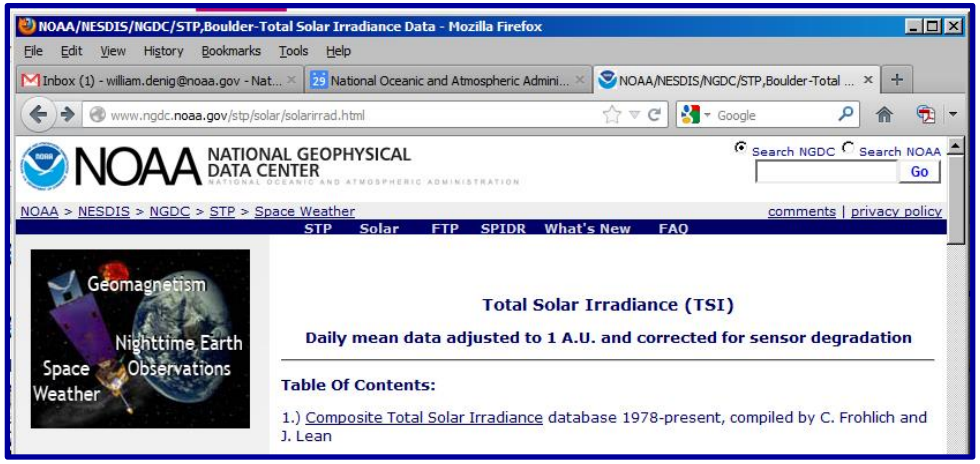
[1]STP is aggressively pursuing external sources of funding

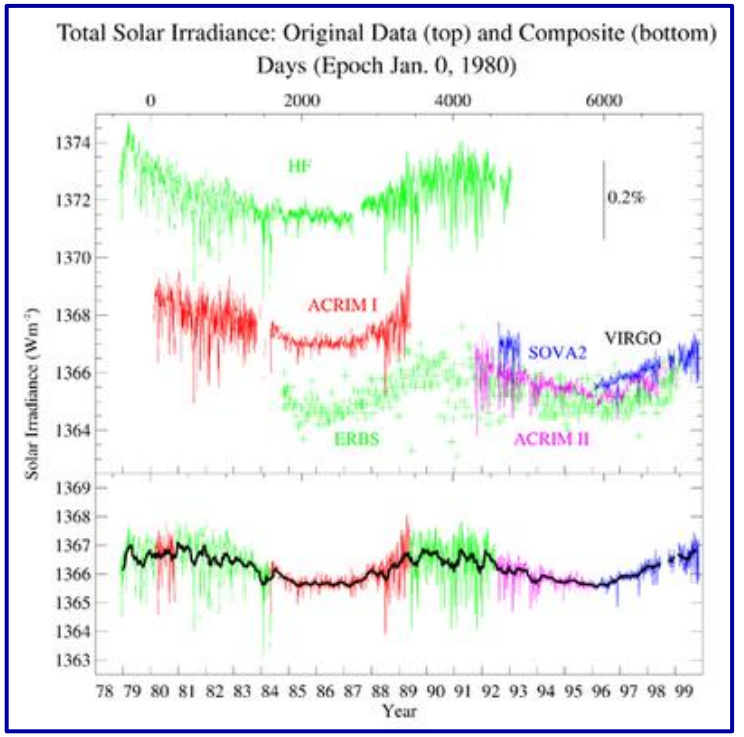
Accomplishments & Updates
Status of TSIS

Background: Measurement of Total Solar Irradiance (TSI) is a component of the JPSS climate monitoring program. Overlapping space-based measurements of TSI are needed to maintain the accuracy of the record – from SORCE to Glory to JPSS/TSIS. Unfortunately the Glory suffered a launch failure resulting in an unacceptable gap.

Mitigation: TSI record gap now mitigated by the availability of a TIM spare sensor for the TSI Calibration Transfer Experiment (TCTE); planned for an STPSat3 launch in Sept 2013.

Why we care: TSI is a NOAA Climate Data Record for which NGDC maintains a web page (woefully out of date). As a part of Janet Machol's efforts with the GOES EUVS and with Solar Spectral Irradiance (SSI) she is looking into updating the NGDC TSI data holdings.

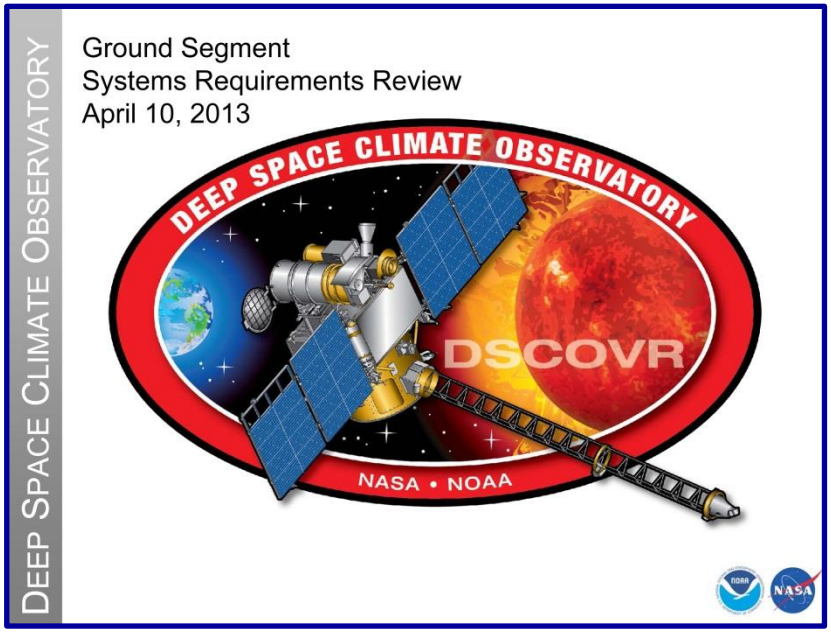


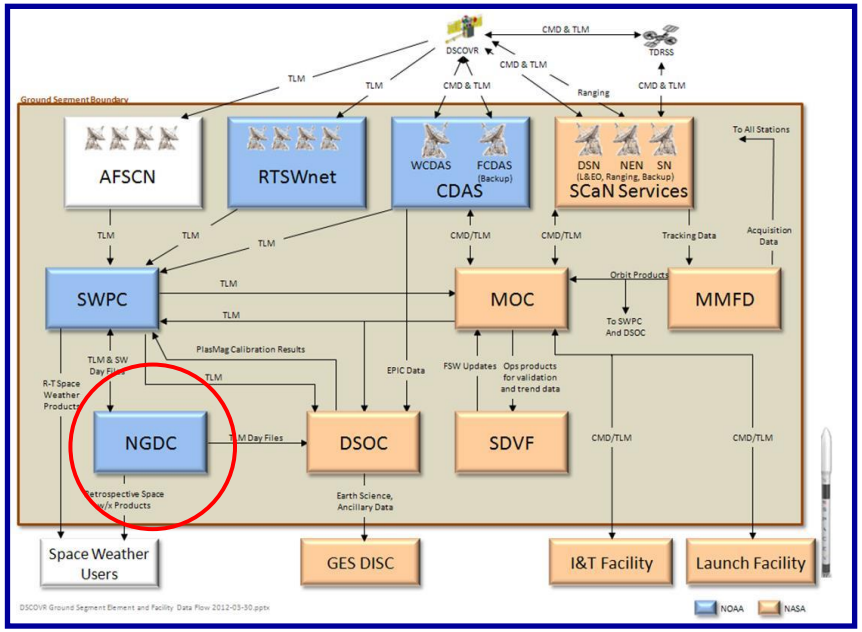


After JPSS-1 the responsibility for TSIS will be transferred to NASA

Accomplishments & Updates
DSCOVR Systems Requirements Review

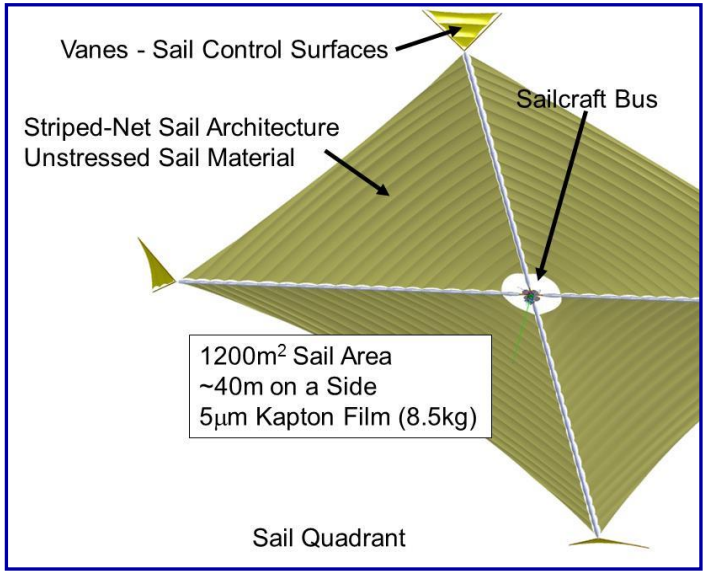
An SRR for the Deep Space Climate Observatory (DSCOVR) was held at GSFC on 10 Apr 2013. This SRR was focused on the DSCOVR Ground System (GS) of which NGDC is a part. DSCOVR is the replacement for the ACE spacecraft at L1 which provides ~45 minute advanced warning of incoming solar disturbances. Interplanetary environmental measurements will be collected and processed by SWPC into daily files of solar wind parameters (n_p, v_p, t_p) and the Interplanetary Magnetic Field (IMF). NGDC is the designated archive for the DSCOVR space weather data which will be accessible to users via NEXT and other distribution services

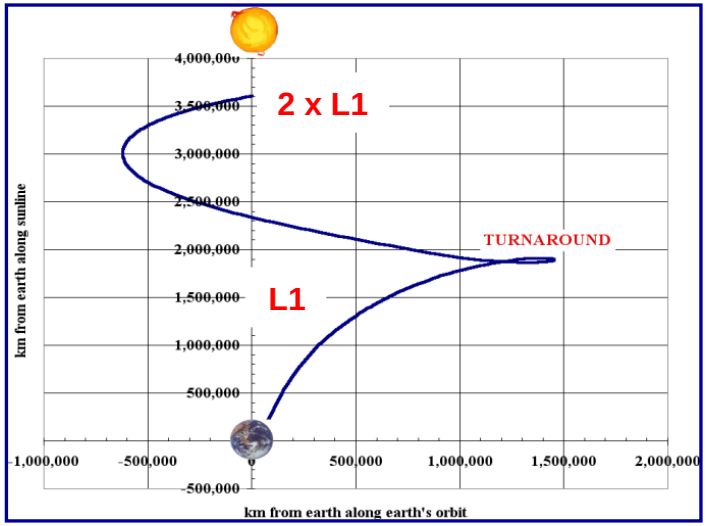




Accomplishments & Updates
Sunjammer – Solar Sail Demonstration

- Sunjammer is a NASA technology demonstration mission (TDM) to examine the propellantless propulsion potential of solar sails
- Mission will demonstrate sail maneuvers in its first 30 days – then fly to 2 x L1 and then out of the ecliptic plane
- NOAA plans to partner with L'Garde, Inc to provide data reception, analysis and archive
- Space weather instruments:
  - Particle spectrometer – MSSL
  - Magnetometer – Imperial College London
- SWPC will assist in evaluating the data
- Co-launched with DSCOVR – 11/2014





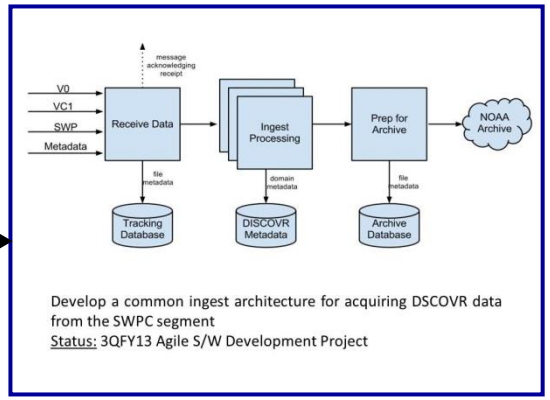
Accomplishments & Updates

SPADES Development Status

SPADES 101 – Satellite Product Analysis and Distribution System

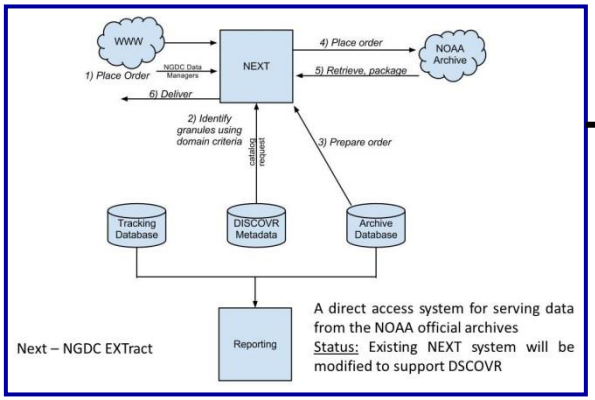
DSCOVR Ingest

SWPC



Develop a common ingest architecture for acquiring DSCOVR data from the SWPC segment
Status: 3QFY13 Agile S/W Development Project

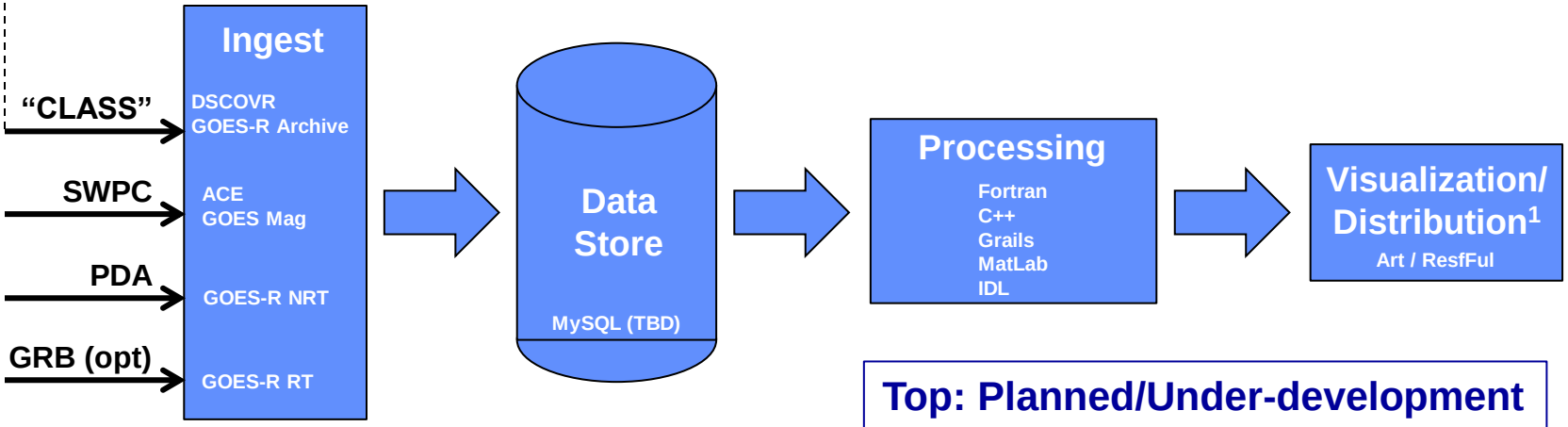
DSCOVR Access



A direct access system for serving data from the NOAA official archives
Status: Existing NEXT system will be modified to support DSCOVR

USERS

SPADES Sandbox – Supporting Product Prototyping and GOES-R Cal/Val



Top: Planned/Under-development
Bottom: Under consideration

Accomplishments & Updates

Satellite Products & Services Review Board

Project: Detecting Magnetopause Crossings in GOES-NOP

Description: Implement a real-time capability to detect when the dayside magnetopause is inside the location of geostationary orbit (~6.7 R_e)

Required Data: GOES magnetometer data and ACE beacon data (both available via SWPC); Shue model

Theory: The magnetopause is balanced by solar wind (p_{sw}) and geospace magnetic pressures (p_B):

$$p_{sw} = \rho v^2 = \frac{2B^2}{\mu_0} = p_B$$

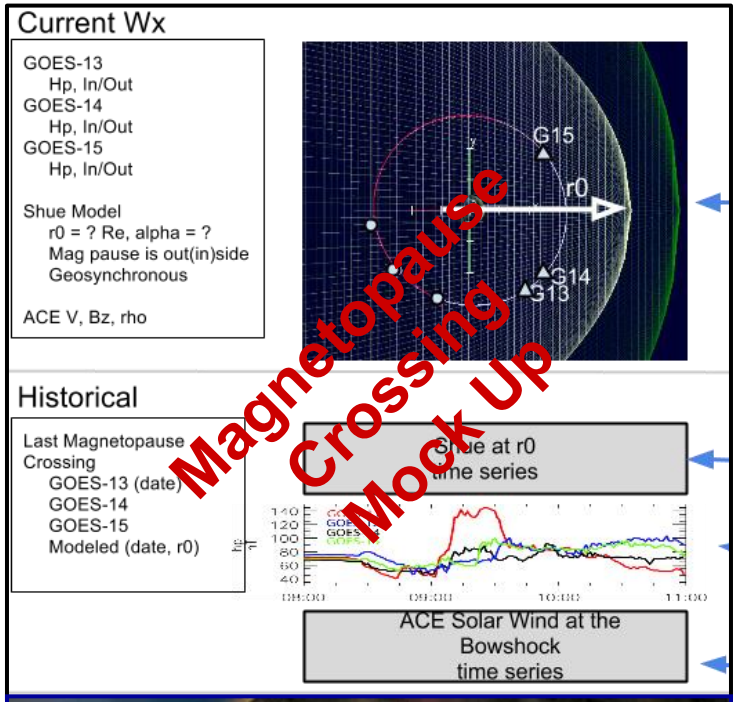
Quiet-time location of the magnetopause is ~ 9.5 R_e

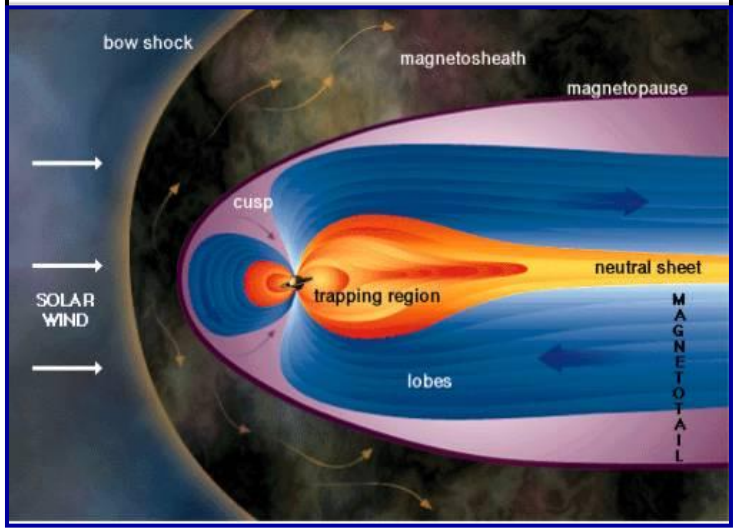
Period of Performance: 01 Jun 13 – 31 May 14[1]

Responsible Scientist : Rob Redmon

Note: Another SPSRB project for POES internal processing is complete. Janet Green is scheduled for a final out-brief to the review board in May 2013.

Thanks to Ken Tanaka for contributing to this project.



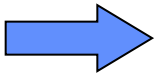


OUTLINE
Solar & Terrestrial Physics Division

STP Division Overview

Milestones & Performance Measures

Accomplishments & Updates



Issues & Summary

Issues & Summary
STP FY13 Publications – 8

Publications (FY13):

Araujo-Pradere, E.A., D. Buresova, **D.J. Fuller-Rowell** and T.J. Fuller-Rowell (2013), Initial results of the evaluation of IRI hmF2 performance for minima 22-23 and 23-24, *Adv. Space Res., 51,* pp.630-638. [**Peer reviewed**].

Denig, W.F. (2012), Space Weather Products for NOAA Satellites, *Earth System Monitor, 19, p.9.*

Green, J. (2012)., Space Weather Ready, *Earth System Monitor, 19*, p.3.

Erwin, E.H., **H.E. Coffey**, **W.F. Denig**, D.M. Willis, R. Henwood and M.N. Wild, The Greenwich Photo-heliographic Results (1874 – 1976): Initial Corrections to the Printed Publications, accepted for publication in *Solar Physics* (SOLA2128R1). [**Peer reviewed**]

Rowland, W., and R.S. Weigel (2012), Intracalibration of particle detectors on a Three-axis Stabilized Geostationary Platform, *Space Weather*, 10, S11002, doi:10.1029/2012SW000816. [**Peer reviewed**]

Redmon, R.J., W.K. Peterson, L. Andersson, P.G. Richards (2012), Dawnward shift of the dayside O+ outflow distribution: The importance of field line history in O+ escape from the ionosphere, *J. Geophys. Res.*, http://dx.doi.org/10.1029/2012JA018145 [**Peer reviewed**]

Willis, D.M., **H.E. Coffey**, R. Henwood, **E.H. Erwin**, D.V. Hoyt, M.N. Wild and **W.F. Denig**, The Greenwich Photo-heliographic Results (1874 – 1976): Summary of the Observations, Applications, Datasets, Definitions and Errors, accepted for publication in *Solar Physics* (SOLA2126R1). [**Peer reviewed**]

Willis, D.M., R. Henwood, M.N. Wild, **H.E. Coffey**, **W.F. Denig**, **E.H. Erwin** and D.V. Hoyt, The Greenwich Photo-heliographic Results (1874 – 1976): Procedures for Checking and Correcting the Sunspot Digital Datasets, accepted for publication in *Solar Physics* (SOLA2127R1). [**Peer reviewed**]

Peer Reviewed Publications: AOP Metric

Issues & Summary
STP FY13 Presentations – 36 (1 of 3)

YTD Presentations (FY13):

High Energy Particle Precipitation into the Atmosphere (HEPPA) – 09-11 October 2012, Boulder, CO

- Update on the NOAA Polar Satellite Program, Data, and Products (Poster), **J. Machol**, **J. Green**, **W. Denig**, T. Sotirelis, **D. Wilkinson**, **J. Rodriguez** and **R. Redmon**

Extreme Ultraviolet Variability Experiment (EVE) Science Meeting - 31 October -1 November 2012, Yosemite Valley, CA

- The Use of EVE Data at NOAA (Invited Oral), **J. Machol**

Conference on Space Environment Applications, Systems, and Operations for National Security (SEASONS), 14-16 November 2012, Laurel, MD

- NOAA Satellite Anomaly Program (Oral), J.C. Green (Paper presented by G. Fish)

American Geophysical Union, 03-07 December 2012, San Francisco, CA

- Intracalibration of Particle Detectors on a Three-Axis Stabilized Geostationary Platform (Poster), **W. Rowland**, and R. Weigel, (Paper: SM31B-2304)
- New NOAA resources for safeguarding the satellite infrastructure from space weather (Poster), **J.C. Green**; **W.F. Denig**; **J.V. Rodriguez**; **R.J. Redmon**; T.G. Onsager, H.J. Singer, W. Murtagh, R. Rutledge, J. Stankiewicz, J. Kunches and **D.C. Wilkinson** (Paper: SM23B-2316)
- NOAA People Empowered Products (PeEP): Combining social media with scientific models to provide eye-witness confirmed products (Oral), S. Codrescu**, J.C. Green**, **R.J. Redmon**, **W.F. Denig** and E.A. Kihn (Paper: IN23F-02) (Paper presented by J. Rodriguez)
- Non-standard Space Weather Products and Services from NOAA (Oral), **W.F. Denig** and R.A. Viereck (Paper: IN31D-03)
- Dawnward shift of the dayside O+ outflow distribution and the Influence of e- precipitation on ion upwelling in the nightside auroral zone (Poster), **R.J. Redmo**n, L. Andersson, W.K. Peterson and P.G. Richards (Paper: SM41B-2215)
- GOES Observations of Pitch Angle Evolution During an Electron Radiation Belt Dropout (Poster), D.P. Hartley, M.H. Denton, **J.C. Green**, T.G. Onsager**, J.V. Rodriguez** and H.J. Singer (Paper: SM31C-234)
- Numerical Simulations of the Ring Current During Geomagnetic Storms (Invited Oral) M.W. Chen, C.Lemon, T.B. Guild, M. Schulz; J.L. Roeder; A.Lui, A.M. Keesee, J.Goldstein, G. Le and **J.V. Rodriguez** (Paper: SM32A-03)

ftp://ftp.ngdc.noaa.gov/STP/publications/stp_presentations/stp_presentations.pdf

Issues & Summary
STP FY13 Presentations – 36 (2 of 3)

YTD Presentations (continued):

American Geophysical Union, 03-07 December 2012, San Francisco, CA (continued)

- Pulsating Aurora: the Equatorial Source Population & Local Morphological Interplay with Diffuse Aurora (Poster), A.N. Jaynes, M. Lessard, **J.V. Rodriguez**, K.M. Rychert, E. Donovan, R.G. Michell and M. Samara (Paper: SM43B-2240)
- Comparison of Geomagnetically-shielded Solar Energetic Proton Fluxes Observed at Geostationary Orbit by GOES and in Low-earth Orbit by SAMPEX, POES and MetOp (Poster**), J.V. Rodriguez**, J.E. Mazur, **J.C. Green** and **J.L. Machol** (Paper: SH33C-2243)
- Real-time mapping of combustion sources using Suomi NPP satellite VIIRS and CrIMSS data (Poster), M Zhizhin, C. Elvidge, K. Baugh and F.C. Hsu (Paper: IN33C-1553)

American Meteorological Society, 06-10 January 2013, Austin, TX

- The GOES-R Sudden Impulse Detection Algorithm (Poster), **W. Rowland**, **R. Redmon** and H.J. Singer (Paper 315)
- GOES-R solar extreme-ultraviolet irradiance: requirements, observations, and products (Poster), **J.L. Machol**, R.A. Viereck, A. Reinard, F.G. Eparvier, M.Snow, A.R. Jones, T.N. Woods, **W.F. Denig**, D.L. Woodraska and S. W. Mueller (Paper 304)
- Development of a Proxy Data Set for the Energetic Heavy Ion Sensor (EHIS) in the GOES-R Space Environment In-Situ Suite (Poster), **R. Bharath**, **J.V. Rodriguez**, **J.C. Green** and **W.F. Denig** (Paper 296)
- Improved Space Weather Monitoring for GOES-R (Invited Oral), **W.F. Denig** and S.M. Hill (Paper J2.4)
- Automatic Analysis of EUV Solar Features using Solar Imagery for the GOES-R SUVI (Poster), **J.M. Darnel**, S.M. Hill and **W.F. Denig** (Paper 660)

Asia Pacific Advanced Network (APAN), 13-18 January 2013, Honolulu, HI

- What is so great about nighttime VIIRS data for the detection and characterization of combustion sources? (Oral), **C. Elvidge**
- Using the short-wave infrared for nocturnal detection of combustion sources in VIIRS data (Oral), **M. Zhizhin**
- Estimating temperature and total radiant output for combustion sources detected at night in VIIRS data (Oral), **Feng-Chi Hsu**
- Ranking gas flares based on radiant output (Oral), **K. Baugh**
- Why VIIRS data are superior to DMSP for mapping nocturnal lighting (Oral), **C. Elvidge**
- A stray filter for improving the quality of VIIRS low light imaging data (Oral), **M. Zhizhin**
- The NGDC VIIRS reprojection toolkit (Oral), **M. Zhizhin**
- A VIIRS cloud detection system optimized for cloud-free compositing (Oral), **Feng-Chi Hsu**
- VIIRS cloud-free compositing for nighttime lights (Oral), **K. Baugh**

Issues & Summary
STP FY13 Presentations – 36 (3 of 3)

YTD Presentations (continued):

Earth-Sun System Exploration 5 - January 13-19, Kona, HI

- Creation and analysis of a novel auroral dataset derived from DMSP satellite observations (Poster), **J.V. Mills**, **R.J. Redmon**, W. K. Peterson, L. Andersson and **W.F. Denig**.
- Dynamic auroral boundaries and ion energization: Solar cycle 23 (Oral, Invited), **R.J. Redmon**, W.K. Peterson, L. Andersson, P.G. Richards, **W.F. Denig** and **J. Mills**

Boulder Solar Days

- Using GOES-R Data for Solar Observations (oral), **J. Darnel**

NOAA Satellite Conference,08-12 Apr 2013, College Park, MD

- Societal Impacts of Space Weather (Poster), **W.F. Denig** and S. Hill

Space Weather Workshop – 16-19 April 2013, Boulder, CO

- NOAA Resources for Safeguarding the Satellite Infrastructure from Space Weather (Oral), **J.C. Green**
- NOAA Operational Space Environmental Monitoring – Current Capabilities and Future Directions (Oral), **W.F. Denig** and **P. Mulligan**
- Intercalibration of GOES 8-15 Solar Proton Measurements (Poster), J. Rodriguez
- A High Resolution Observation of an Ionospheric Disturbance Over Hurricane Sandy (Poster), **J. Mabie, K. Horan and T. Bullett**

Workshop on Inter-Calibration and Degradation of EUV Instruments – 15-18 April 2013, Brussels, Belgium

- Preliminary calibrations of GOES EUVS (Oral), **J. Machol**

Issues & Summary

Solar & Terrestrial Physics Division

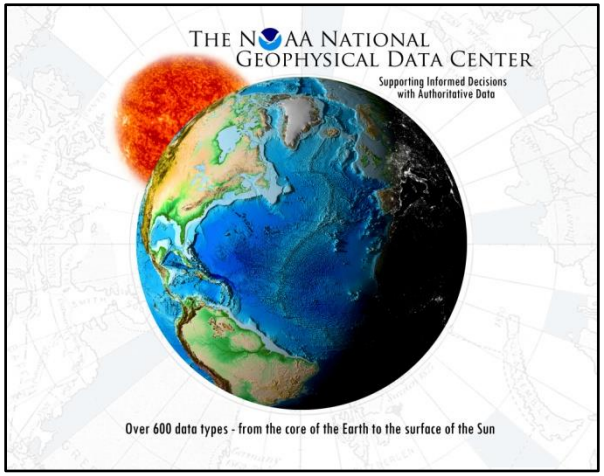
- ✓ **Federal travel restrictions limit program growth (4QFY12) – active**
- ✓ **Fed hiring restrictions having mission impact (3QFY12) – *active***
- ✓ **GOES-R L2+ SWx algorithms (3QFY11) – *stalled (no action)***

Metrics

Papers Published (FY13 YTD): 8

✓ Peer Reviewed: 6

Presentations (FY13 YTD): 36



QUESTIONS?