STP Quarterly Review

27 Jan 2015

1QFY15

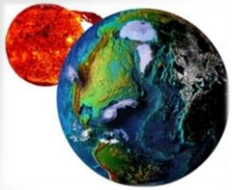
William Denig

Solar & Terrestrial Physics Division

NOAA/NESDIS/NGDC

303 497-6323

William.Denig@noaa.gov

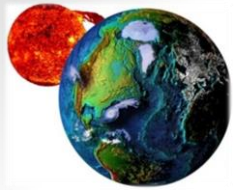


OUTLINE

Solar & Terrestrial Physics Division

- STP Division Overview
- Milestones & Metrics
- Program Updates
- Special Interest Items
- Publications and Presentations
- Issues & Summary

STP Division Overview
STP Organizational Chart



Solar & Terrestrial Physics Division
Bill Denig, Chief
Janet Brown, Admin

Key
F – Federal
C – CIRES
S – Student
V – Vacancy

Earth Observation Group
Chris Elvidge/F
Kim Baugh/C
Tilo Ghosh/C (remote)
Mikhail Zhizhin/C
David Hsu/C
Michael VonHendy/S

Space Weather
Dan Wilkinson/F
Rob Redmon/F
Juan Rodriguez/C
Dominic Fuller-Rowell/S
Solar Physicist/F-V[1]
Margaret Tilton/C
Stefan Codrescu/S

CORS GPS
Fran Coloma/C
Ernie Joynt (ISD@35%)

Ionospheric Sounding
Terry Bullett/C
Jim Manley/C (80%)
Justin Mabie/C (50%)
Ray Conkright/C

GOES-R
W Rowland/C (75%)
Jonathan Darnel/C
Janet Machol/C
Paul Lotoaniu/C (50%)
Jim Manley/C (20%)
Brian Kress/C

WDS for Geophysics
Justin Mabie/C (50%)
Karen Horan/F
Craig Clark/F

DSCOVR
W. Rowland/C (25%)
Paul Lotoaniu/C (50%)

Departures:
Rob Prentice

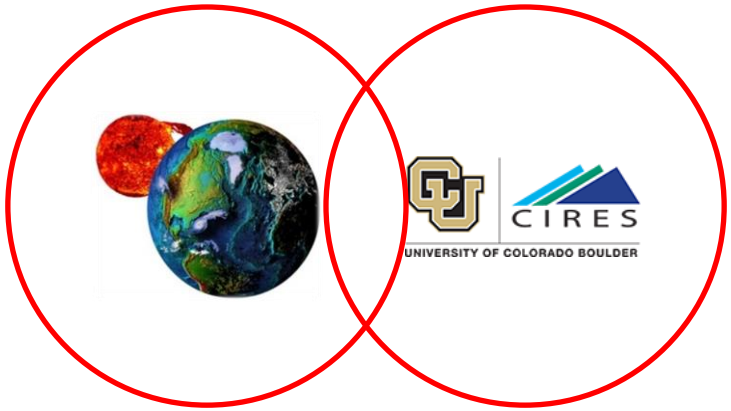
[1]Pending FY15 Funding
3 Federal Vacancies

STP Division Overview
NOAA Affiliate of the Month

Dr. Juan Rodriguez
NOAA Affiliate of the Month
November 2014

Cited for
"Outstanding support of NOAA's space weather mission"

Also featured in CIRES



October 31, 2014

CIRES' Juan Rodriguez, NOAA team member of the month

(direct link:http://cires.colorado.edu/news/announcements/2014/rodriguez.html)

STP Division Overview
WDS Data Stewardship Award

Dr. Rob Redmon
WDS Data Stewardship Award
2014

Cited for

"*Exceptional contributions to the improvement of scientific data stewardship by early career researchers*"

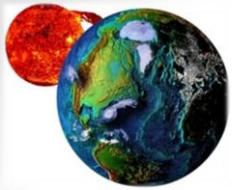
Also

Notification of Rob's award included as a news item in the Space Weather Journal

Rob received his award at the SciDataCon 2014, Jawaharlal Nehru University Convention Centre, New Delhi, India (November 2014)

SciDataCon 2014
International Conference on
Data Sharing and Integration for Global Sustainability

ICSU WORLD DATA SYSTEM



STP Division Overview
Brief Retrospective

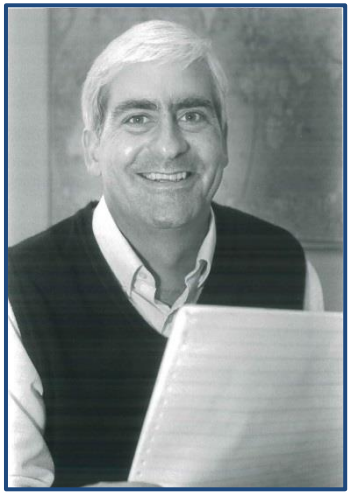
1942	Interservice Radio Propagation Laboratory (IRPL) formed at NBS (DOC) in Washington D.C.
1946	Central Radio Propagation Laboratory (CRPL) formed to replace IRPL
1957	World Data Center A (WDC-A) established in CRPL
1965	Environmental Sciences Services Administration (ESSA) formed to include CRPL and the Environmental Research Laboratories (ERL)
1966	Aeronomy and Space Data Center (ASDC) established under the Space Dynamics Laboratory (SDL) within ERL
1970	NOAA established within DOC
1972	National Geophysical and Solar and Terrestrial Data Center (NGSDC) formed to include the **Solar and Terrestrial Physics (STP) Division**
1973	NGSDC assigned responsibility for archive of GOES and TIROS space environmental data
1982	NGSDC renamed the National Geophysical Data Center (NGDC)
2011	WDC(-A) for STP merges with the WDC for Geophysics and Marine Geology to become the World Data Service for Geophysics
2012	STP assumes responsibilities from SWPC for supporting the GOES-R space weather sensors acquisition and operations
2014	NGDC assigned responsibility for the archive of DSCOVR solar wind data
2015	NGDC merges with other NOAA Data Centers to become the Nation Center for Environment Information (NCEI); STP transitions to the Solar Geophysics Branch (SGB) within the Geophysical Science Division (GSD) of the Center for Coasts, Oceans and Geophysics (CCOG)

STP Division Overview

STP Chiefs / Directors WDC-A for STP

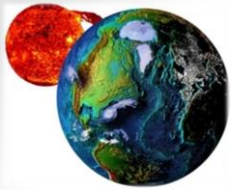
Virginia Lincoln (1972-1981)

Joe Allen (1981-1995)



Herb Kroehl (1995-2004)

Bill Denig (2005-2015)



OUTLINE

Solar & Terrestrial Physics Division

STP Division Overview

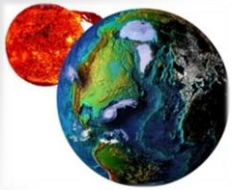
Milestones & Metrics

Program Updates

Special Interest Items

Publications and Presentations

Issues & Summary



Milestones and Metrics

STP FY15 Milestones

Quarter	FY15 Milestones	AOP	Status
Q1	Conduct a successful Preliminary Design Review (PDR) for the Satellite Product Analysis and Distribution Enterprise System (SPADES)	YES	C
Q1	Contribute to the development of the Level 1 Requirements Document (L1RD) for the Total and Spectral solar Irradiance Sensor (TSIS) project	NO	C
Q2	Support launch operations for and initial testing of the Deep Space Climate Observatory (DSCOVR) satellite	YES	
Q2	Establish near real time VIIRS lit fishing boat reporting system for Indonesia	NO	
Q2	Establish near real time global VIIRS nighttime fire detection and reporting system	YES	
Q3	Complete interface testing for the Product Distribution and Access (PDA) system for acquiring GOES-R space weather products	NO	
Q3	Install state-of-the-art ionospheric sounder at Jang Bogo Station, Antarctica for the Korean Polar Research Institute (KOPRI)	NO	
Q3	Provide public access to operational space weather products from the Deep Space Climate Observatory (DSCOVR)	YES	
Q4	Complete algorithm development for filtering background noise and extraneous features from VIIRS DNB monthly and annual cloud-free composites	NO	
Q4	Leverage the NGDC Common Ingest (CI) system for acquiring and archiving selected GOES-R Level-0 data products	NO	
Q4	Complete estimate of national and site specific flared gas volumes from 2012 VIIRS data	NO	

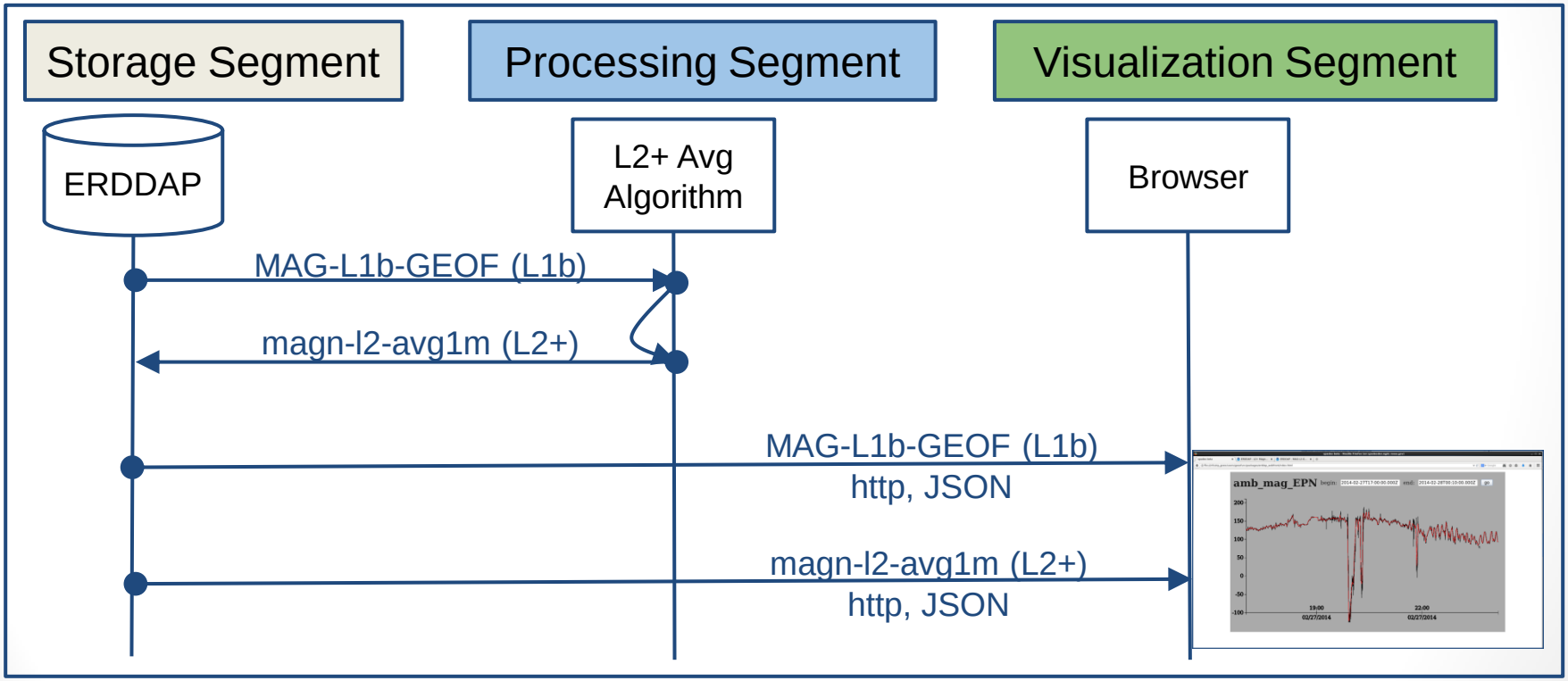
As of 15 Jan 2015

Milestones and Metrics

Milestone: SPADES PDR (AOP)

Milestone: Conduct a successful Preliminary Design Review (PDR) for the Satellite Product Analysis and Distribution Enterprise System (SPADES).

SPADES Working Demo



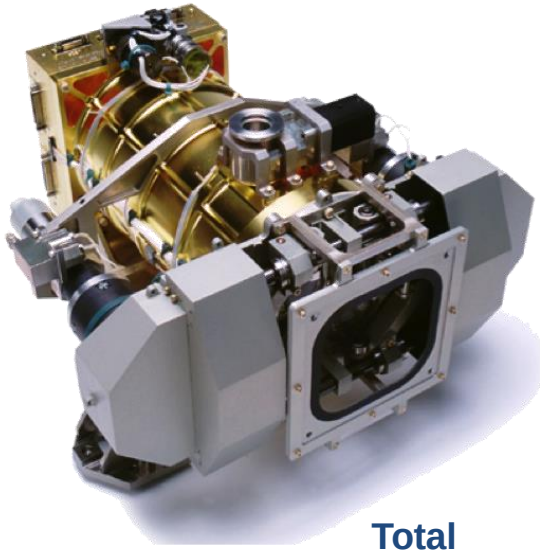
Completion: Planned: 31 Dec 2014 Actual: 30 Oct 2014

Status: C SPADES PDR completed on 30 Oct. Still responding to panel questions.

Milestones and Metrics

Milestone: TSIS L1RD

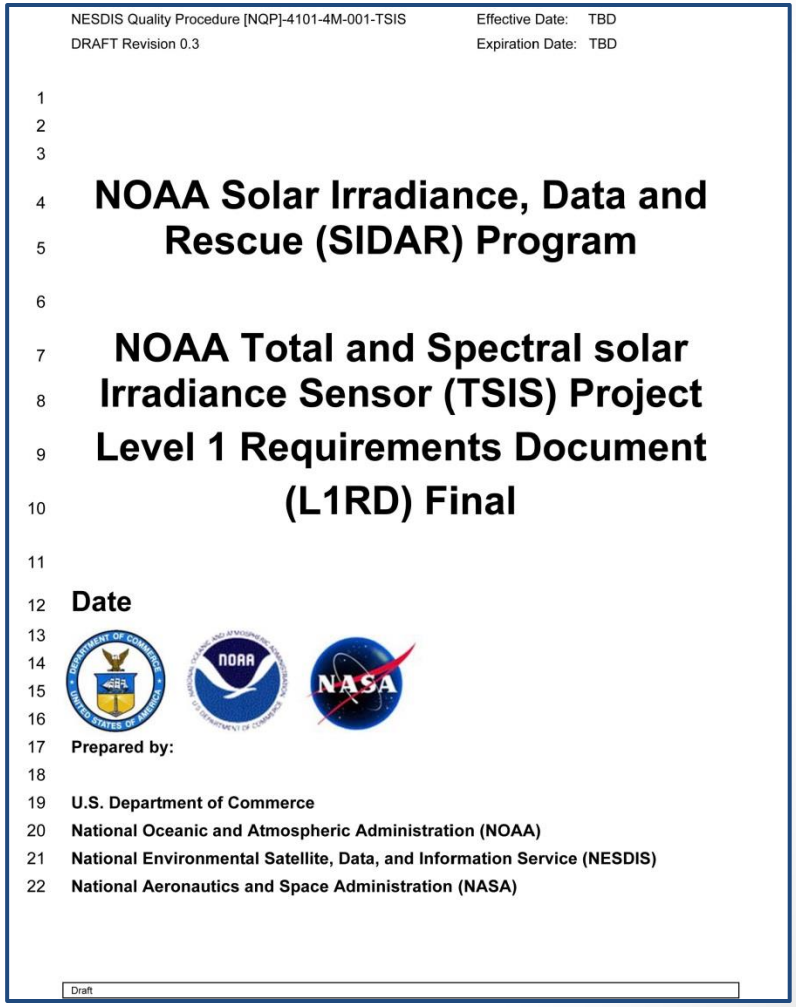
Milestone: Contribute to the development of the Level 1 Requirements Document (L1RD) for the Total and Spectral solar Irradiance Sensor (TSIS) project.



Total Irradiance Monitor

Completion: Planned: 30 Dec 2014
Actual: 31 Oct 2014

Status: C The L1RD has passed the Low earth Orbiting Requirement Working Group (LORWG). TSIS partly funded in FY15 exclusive of government support.



NESDIS Quality Procedure [NQP]-4101-4M-001-TSIS Effective Date: TBD
DRAFT Revision 0.3 Expiration Date: TBD

NOAA Solar Irradiance, Data and Rescue (SIDAR) Program

NOAA Total and Spectral solar Irradiance Sensor (TSIS) Project

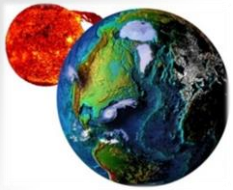
Level 1 Requirements Document (L1RD) Final

Date

Prepared by:

U.S. Department of Commerce
National Oceanic and Atmospheric Administration (NOAA)
National Environmental Satellite, Data, and Information Service (NESDIS)
National Aeronautics and Space Administration (NASA)

Draft



Milestones and Metrics
FY15 Metrics Overview

Space Weather Metric							
Goal	Objective	Performance Measure	POC	2QFY14	3QFY14	4QFY14	1QFY15
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%	100%	100%
Ionosonde							
Goal	Objective	Performance Measure	POC	2QFY14	3QFY14	4QFY14	1QFY15
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%	98.8%	99.1%
Nightime Lights Metric							
Goal	Objective	Performance Measure	POC	2QFY14	3QFY14	4QFY14	1QFY15
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	Baugh	100%	100%	100%	100%
(See Note)							
CORS							
Goal	Objective	Performance Measure	POC	2QFY14	3QFY14	4QFY14	1QFY15
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%	99%	100%

As of 26 Jan 2015

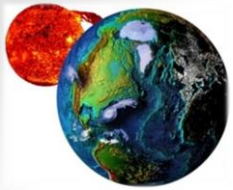
Greater than 99% (3-sigma) Cumulative Distribution

Greater than 97% (2-sigma) Cumulative Distribution

Greater than 84% (1-sigma) Cumulative Distribution

Below 84.1% (1-sigma) Cumulative Distribution

[1]Bldg 11 Power Outage: 9:43PM 12/12/14- 5:41 PM 12/13/14



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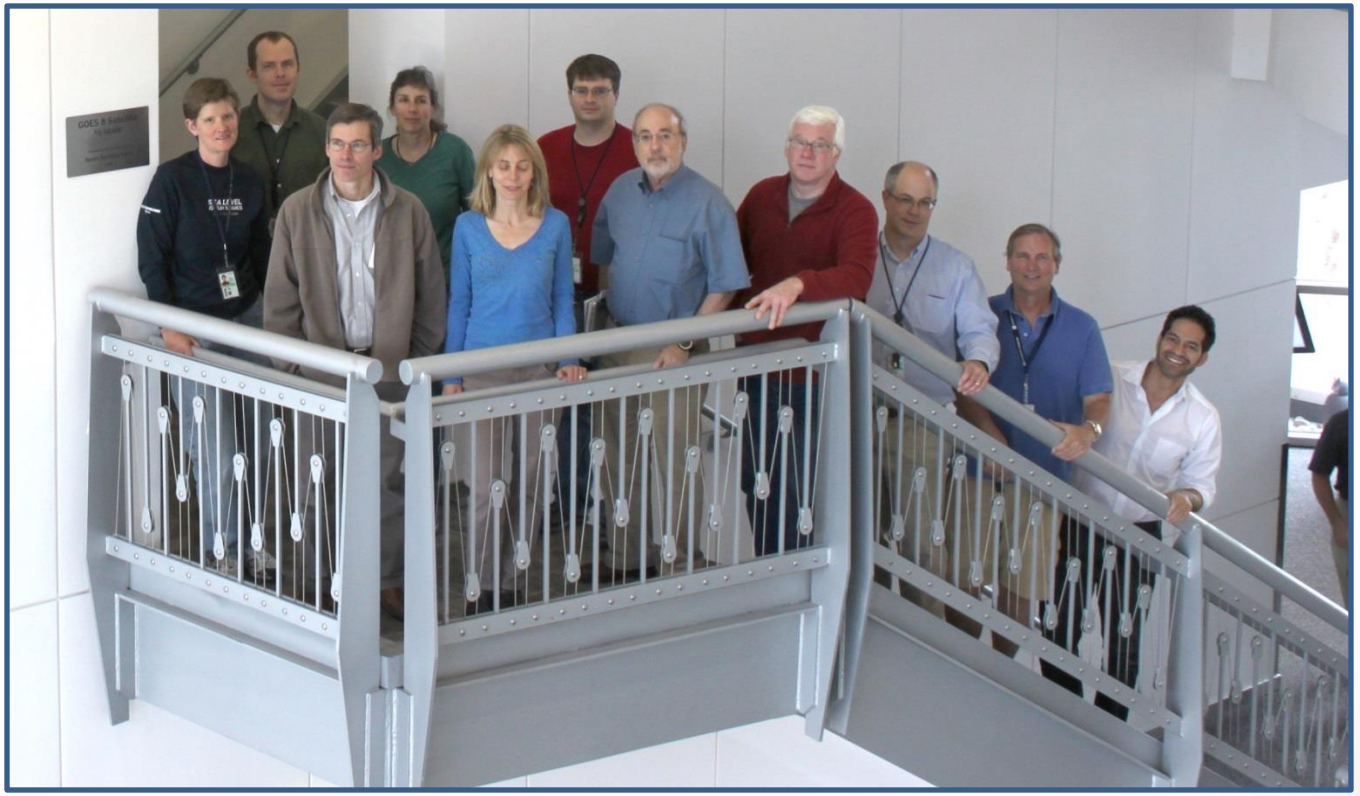
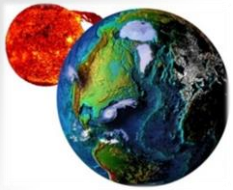
Space Weather Team

Roles and Responsibilities

- Provide long-term scientific stewardship of NOAA's SWx data
- Assess and improve satellite operational environmental products
- Monitor the performance of current geostationary/polar SWx sensors
- Support the acquisition/execution of the GOES-R & DSCOVR satellites





Space Weather Team

Status: GOES-R Status – SME Assessments

FOUO

SME assessments do not represent Program views

EXIS

H/W	(G)	No Issues
L1b	(G)	No Issues
L2+	(G)	No Issues

MAG

H/W	(Y/G)	Less mature design – actual performance may not be as predicted
L1b	(R/Y)	Impending waivers will likely result in inferior products
L2+	(G)	No Issues

SEISS

H/W	(Y)	EHIS FM2 peak-hold circuit anomaly seriously degrades heavy ion performance.[1]
L1b	(G)	No issues
L2+	(G)	No issues

SUVI

H/W	(G)	No issues
L1b	(G)	No issues
L2+	(G)	No Issues

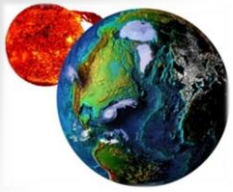
Products

L0	(Y/G)	LZSS access firming up; Interface development separately funded
L1b	(Y)	Limited independent development; Unfunded Cal-Val tool development
L2+	(Y)	AA decision to implement L2+ processing within IDP; FY16 PCS submitted

Access

PDA, SPADES	(Y/G)	Successful test. PDA will accept proxy data. Story points > sprints * velocity.[1]
GRB, SPADES	(Y/G)	GRB baselined for SPADES FOC; Interface not specified.[1]
CLASS	(G)	No issues
SPADES	(G)	No issues.
GRB&PDA, PLT	(R)	Severe potential impact to PLT. Outage still not quantified. Workaround uncertain.[1]

[1]Assessment or text updated.



Space Weather Team

Status: GOES-R Status – History

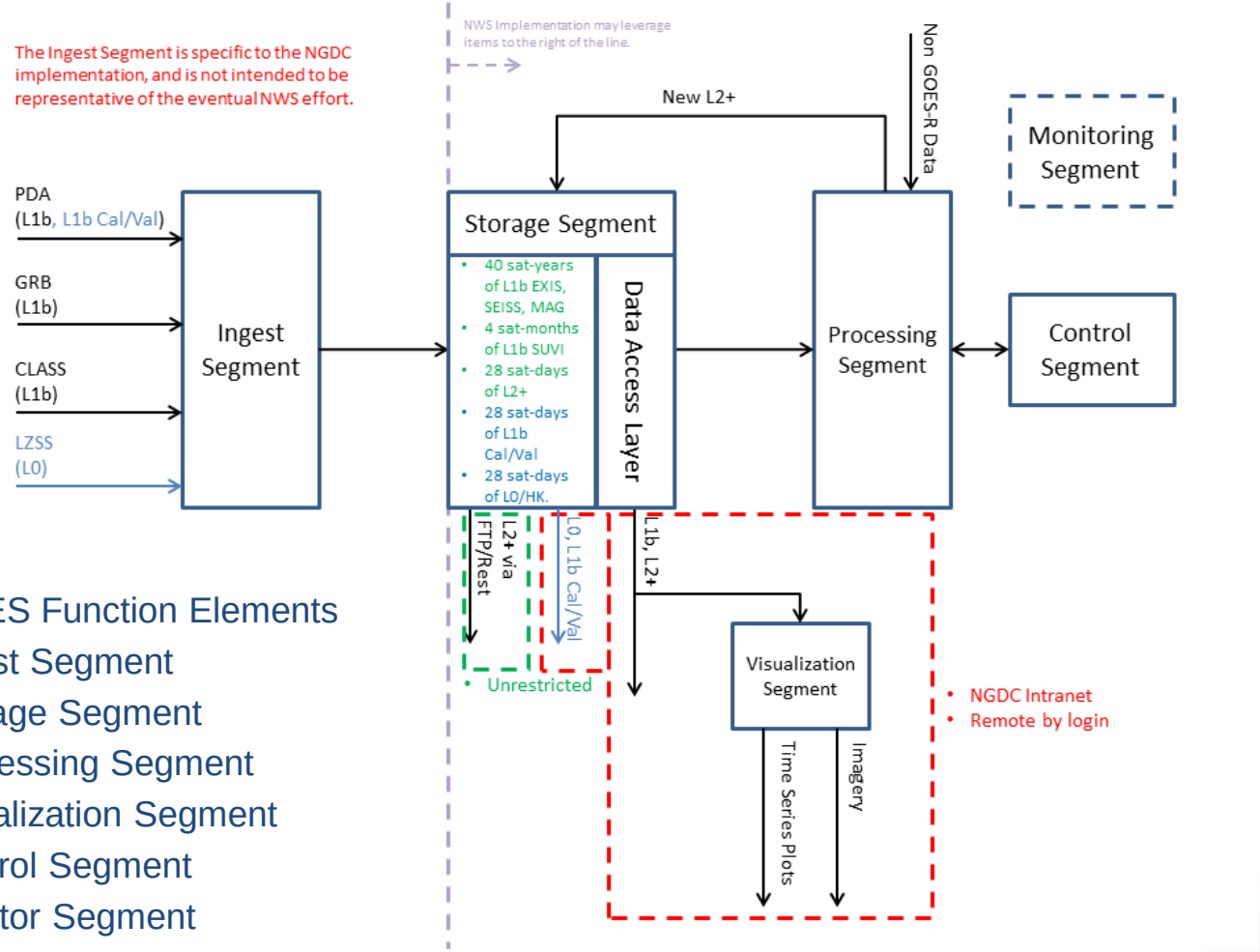
FOUO

	1QFY15	4QFY14	3QFY14	2QFY14	1QFY14
EXIS					
H/W	G	G	G	G	G
L1b	G	G	G	G	G
L2+	G	G	G	G	G
MAG					
H/W	Y/G	Y/G	Y/G	Y/G	Y/G
L1b	R/Y	R/Y	R/Y	R/Y	R/Y
L2+	G	G	G	G	G
SEISS					
H/W	Y	Y/G	Y/G	Y/G	Y/G
L1b	G	G	G	G	G
L2+	G	G	G	G	G
SUVI					
H/W	G	G	G	G	G
L1b	G	G	G	G	G
L2+	G	G	G	G	G
Products					
L0	Y/G	Y/G	Y/G	Y/G	Y
L1b	Y	Y	Y	Y	Y
L2+	Y	Y	Y	Y	R
Access					
PDA, SPADES	Y/G	Y	Y/G	Y	G
GRB, SPADES	Y/G	Y/G	Y/G	Y	G
CLASS	G	G	G	G	G
SPADES	G	G	G	G	Y
GRB&PDA, PLT	R	R			

Space Weather Team

Cal-Val: SPADES Status (Post PDR)

In 2QFY15 the NGDC Agile Team will tackle the SPADES Ingest and Storage Segments. SPADES CDR now bumped to 30 April 15.



SPADES Function Elements

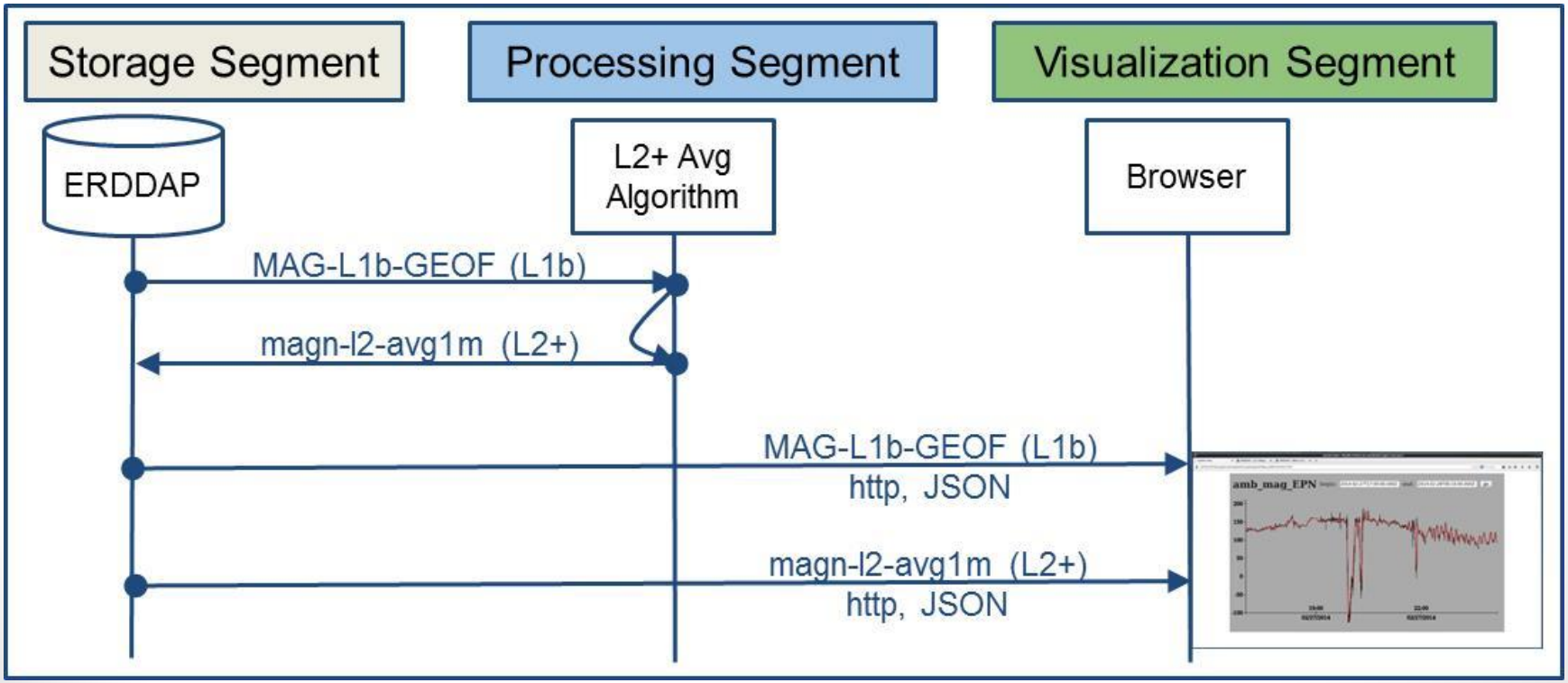
- Ingest Segment
- Storage Segment
- Processing Segment
- Visualization Segment
- Control Segment
- Monitor Segment

Space Weather Team

Cal-Val: SPADES Load Testing (PDR Demo)

Load test SPADES access using MAG proxy data by varying duration (length of proxy data) and instances (independent processes). All times in seconds. Data access layer uses ERDDAP.

Instances	1 min	10 min	1 hour	1 day	10 day
1	0.0547	0.1637	0.5417	8.8033	91.657
2	0.0443	0.1373	0.5269	8.1265	-
4	0.0932	0.1649	0.5971	14.617	-
8	0.0777	0.2043	1.0060	29.572	-
16	0.3044	0.4342	2.4698	64.889	-



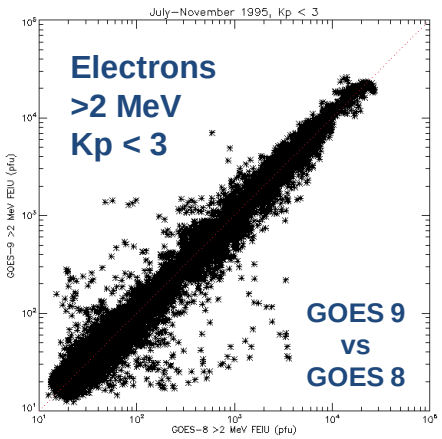
ERDDAP – Environmental Research Division's Data Access Program

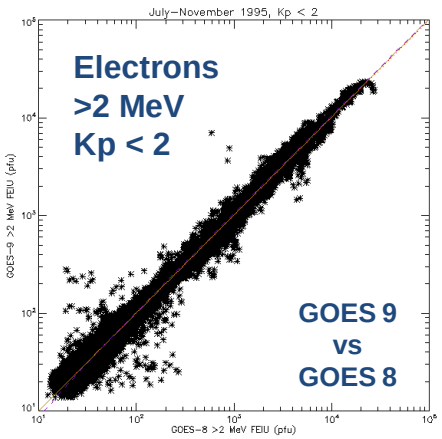
Space Weather Team

GOES-R Cal-Val: GOES 8-15 Cross Comparisons

Prep for GOES-R

- Combines methods of Onsager et al. [2004] and Rodriguez et al. [2014]
- Restricting cross-comparisons to quiet times (Kp < 2) reduces scatter
- Results show good consistency among the GOES >2 MeV channels





GOES (y)	GOES (x)	Period	Slope
9	8	Jul-Nov 1995	1.0477
10	9	Jul 1998	0.6845
11	10	Jun-Aug 2006	0.8067
10	12	Jan-May 2007	0.8805
15w	13w	Apr-Aug 2011	1.2301

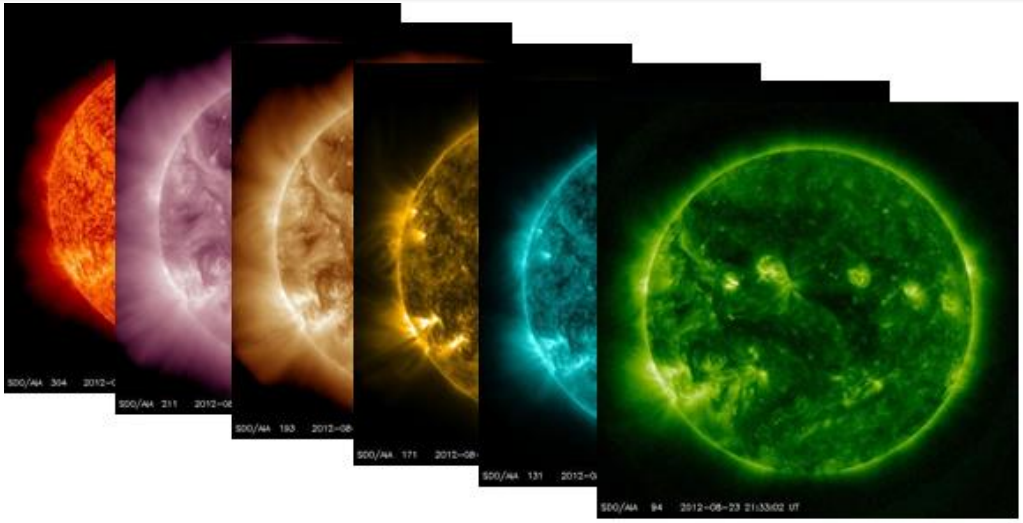
References:

Onsager, T. G., A. A. Chan, Y. Fei, S. R. Elkington, J. C. Green, and H. J. Singer (2004), The radial gradient of relativistic electrons at geosynchronous orbit, *J. Geophys. Res., 109*, A05221, doi:10.1029/2003JA010368

Rodriguez, J. V., J. C. Krosschell, and J. C. Green (2014), Intercalibration of GOES 8-15 solar proton detectors, *Space Weather, 12*, 92-109, doi:10.1002/2013SW000996.

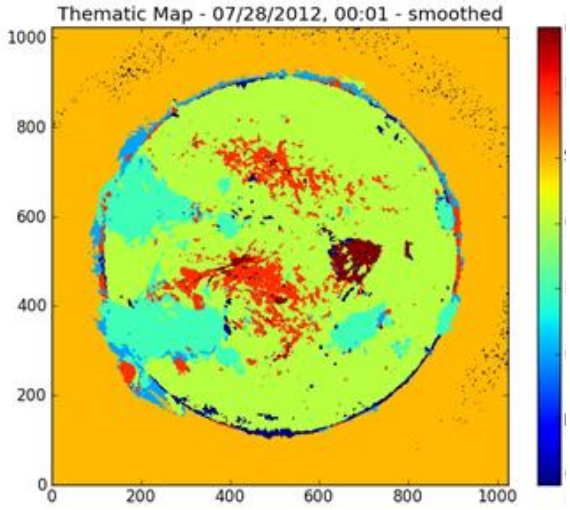
Space Weather Team

GOES-R Cal-Val: SUVI Solar Thematic Maps



Pixels are classified from probability distributions created from training sets using all six bandpasses.

The SDO/AIA is the heritage sensor for SUVI



- Coronal Hole
- Prominence / Filament
- Space
- Corona Quiet
- Bright Regions
- Corona off-disk
- Flare
- Coronal Hole off-disk

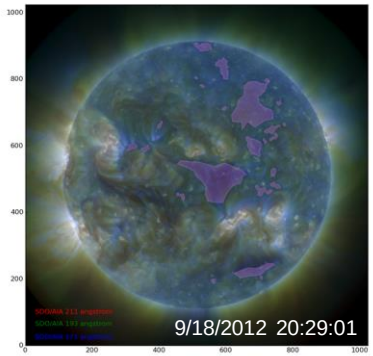
AIA – Atmospheric Imaging Assembly

Space Weather Team

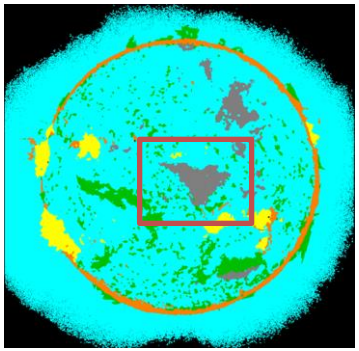
GOES-R Cal-Val: Coronal Hole (CH) Shape Files

SDO AIA solar images are used as proxy for SUVI. SUVI Thematic Maps (SUVI.19) and Coronal Hole Boundaries (SUVI.15) are L2+ SWx products.

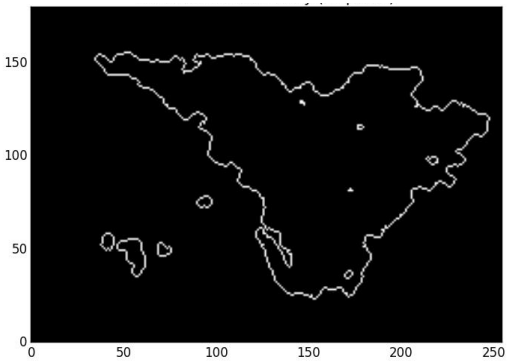
NASA/SDO as Proxy



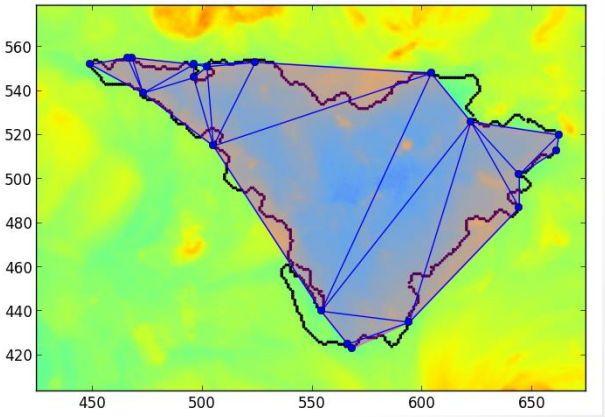
Thematic Map



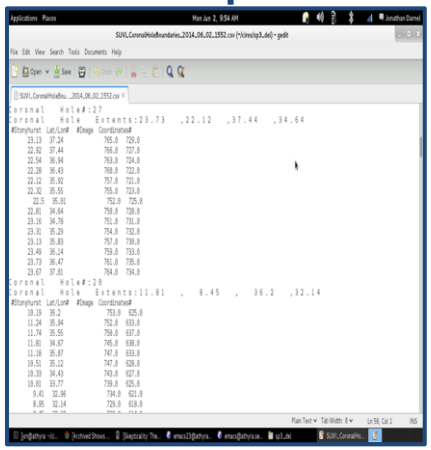
Coronal Hole Boundary



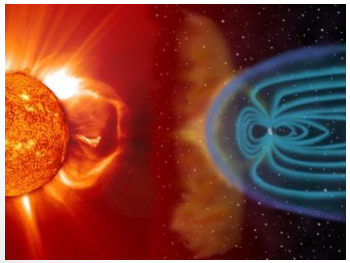
Finite Vertices



CH Shape File



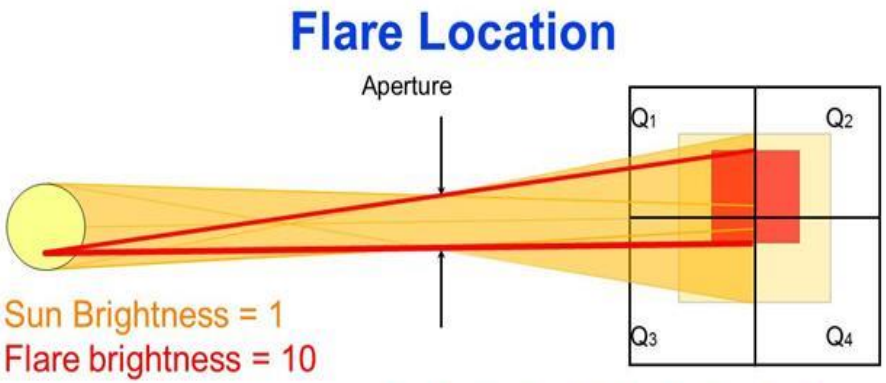
Recurring larger solar speeds originate within coronal holes.



Space Weather Team

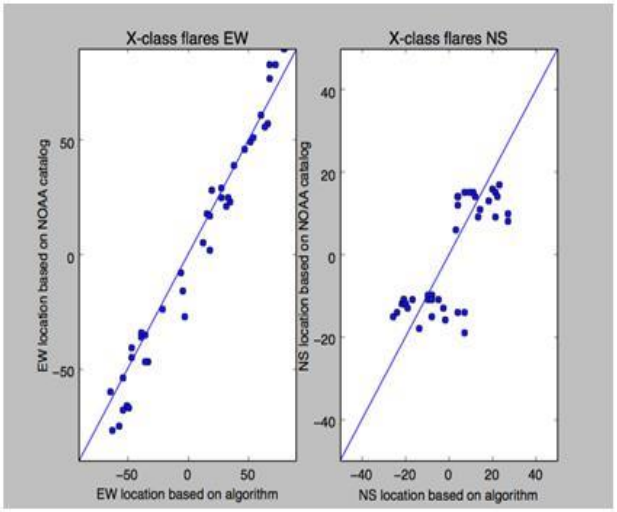
GOES-R Cal-Val: EXIS/XRS Flare Location (IAC Brief)

EXIS/XRS uses a new "quad-diode" design to locate flares on the sun's surface



$X=([Q_2 + Q_4]-[Q_1 + Q_3])/sum = ([(¼+4)+(¼+1)]-[(¼+4)+(¼+1)])/(1+10) = 0.00$

$Y=([Q_1 + Q_2]-[Q_3 + Q_4])/sum = ([(¼+4)+(¼+4)]-[(¼+1)+(¼+1)])/(1+10) = \mathbf{0.55}$

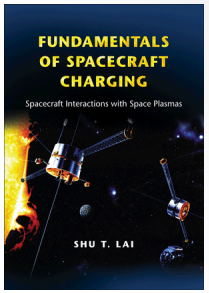


Initial PLPT performance results using "quad-diode" proxy data from SXI compared to the NOAA flare catalog (5 arcminute requirement)

	All flares	Good backgrounds
X-class flares	3.0±1.7 arcminutes	3.0±1.6 arcminutes
M-class flares	4.0±3.4 arcminutes	3.7±3.2 arcminutes
C-class flares	7.3±6.1 arcminutes	6.7±5.6 arcminutes

Space Weather Team

Spacecraft Anomalies: Status Update



Satellite Anomaly Support (Redmon):

- Satellite anomaly - Draper Lab request – details are FOUO
- NOAA-16 support of decommissioning report
  - ✓ Launched in 2000, relegated to backup for NOAA-18 in 2005
  - ✓ NOAA June press release
  - ✓ NOAA OSPO - Decommissioned on June 9, 2014 at 14:23 UTC due to major spacecraft anomaly
  - ✓ NGDC contributed space environmental assessment to final report

Conference Attendance (Denig):

- Space Environment Applications, Systems and Operations for National Security (SEASONS)
  - ✓ Presented overview of Galaxy-15 anomaly investigation
  - ✓ Invitation to present report at National Defense University (NDU)

Papers in Progress (Loto'aniu):

- *Space Weather Conditions During the Galaxy 15 Anomaly (submitted)*
- *Space Weather Conditions During the February 2014 WAAS Outage (in draft)*

Initiative: $366K (FY15) – NESDIS Approved; Funding Status Unknown

Space Weather Team

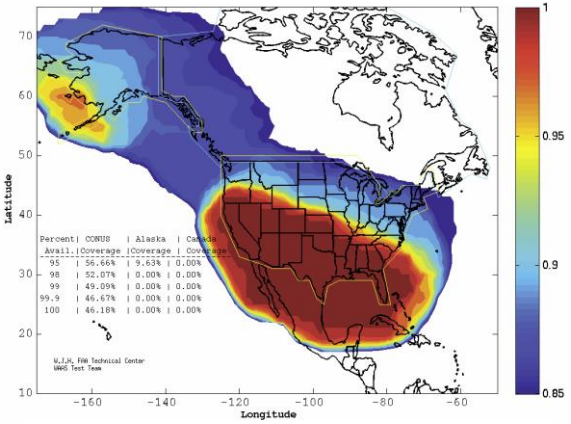
Manuscript in Preparation (Loto'aniu)

Spacecraft Anomalies: WAAS Outage – 27 Feb 14

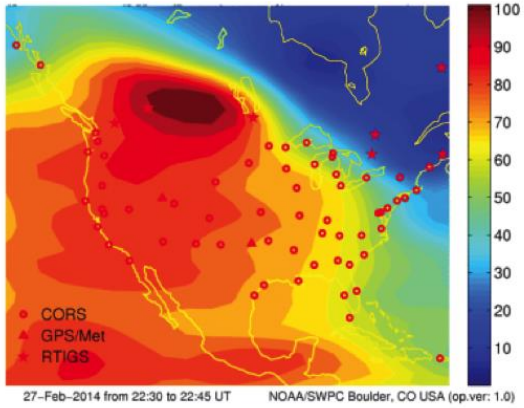
FAA Message to SWPC: "An Ionospheric Storm began on 2/27/14. The Satellite Operations Specialists were alerted at the WAAS O&M by a Significant Event 757 at 2120 Zulu. So far, LPV and LPV200 service has not been available in Eastern Alaska and Northeastern CONUS. At times, North Central CONUS and all of Alaska have lost LPV and LPV200 Service."

Storm Day

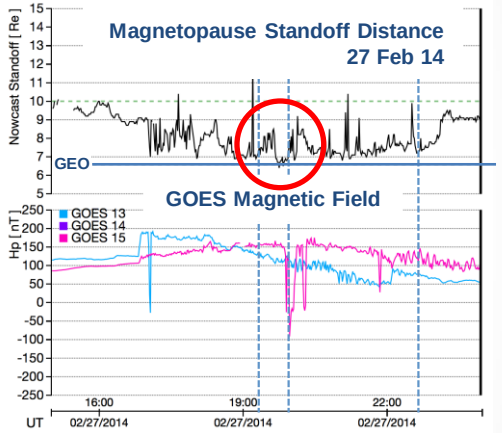
WAAS Coverage 27 February



TEC 27 February 22:30 UT

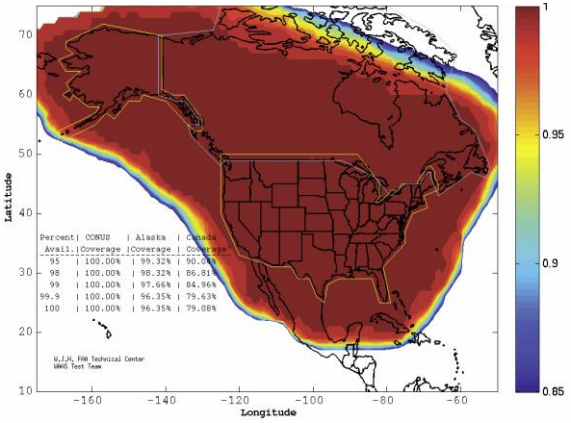


NGDC Magnetopause Crossing
27 Feb 14 – 17-24 UT

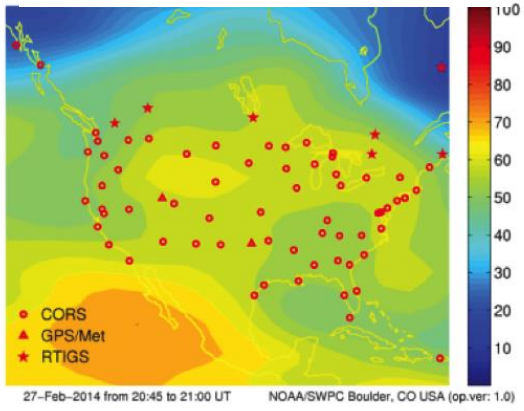


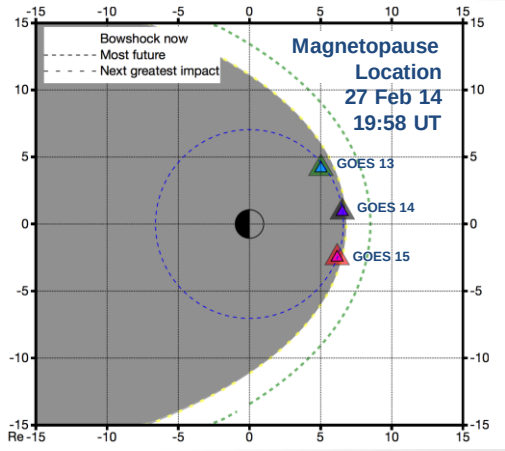
Reference Day

WAAS Coverage 26 February



TEC 26 February 20:45 UT



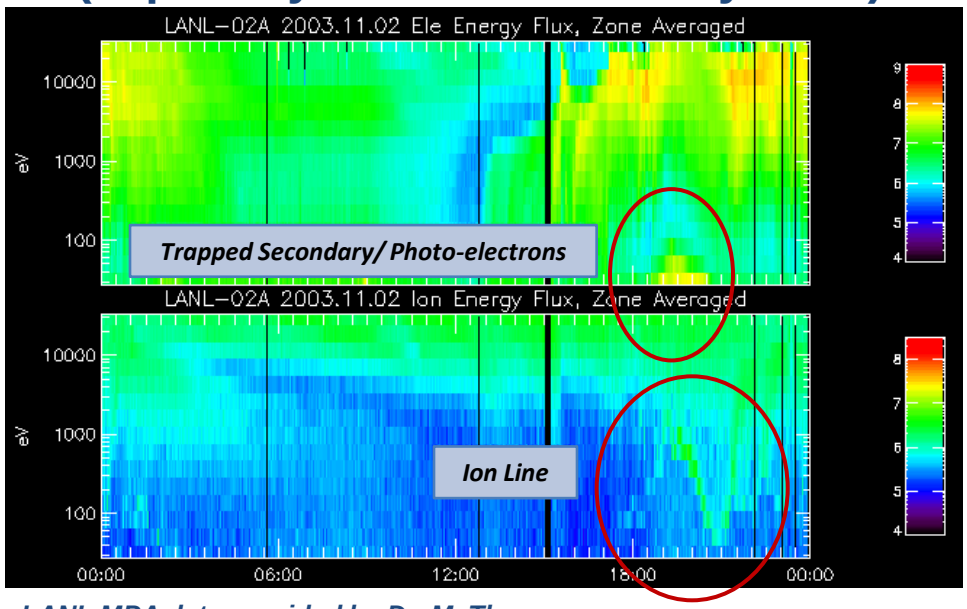


LPV - Lateral Precision with Vertical guidance

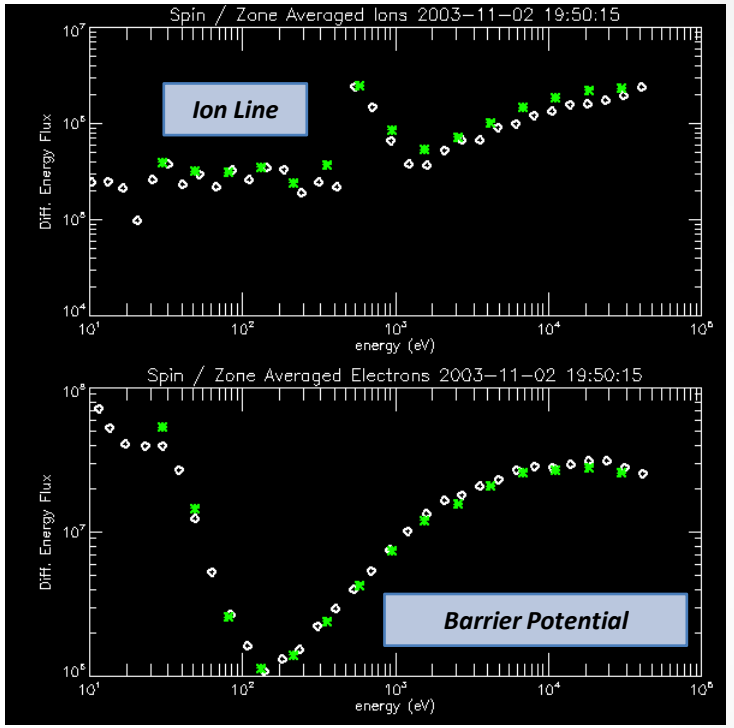
Space Weather Team

Spacecraft Anomalies: Spacecraft Frame Charging

Planning ahead for GOES-R (capability does not currently exist)



LANL MPA data provided by Dr. M. Thomsen



Spacecraft electric potential derived from electron and ion fluxes (0.03 - 30 keV)

- GEO s/c charge negatively to balance currents due to incident and emitted electrons and ions
- Upsets caused by discharges from differential charging when s/c is sunlit or emerges from eclipse
- Uniform (frame) charging is seen as an 'ion line' at the s/c potential [DeForest, 1972]
- Differential charging traps secondaries and photoelectrons in a barrier potential [Whipple, 1976]

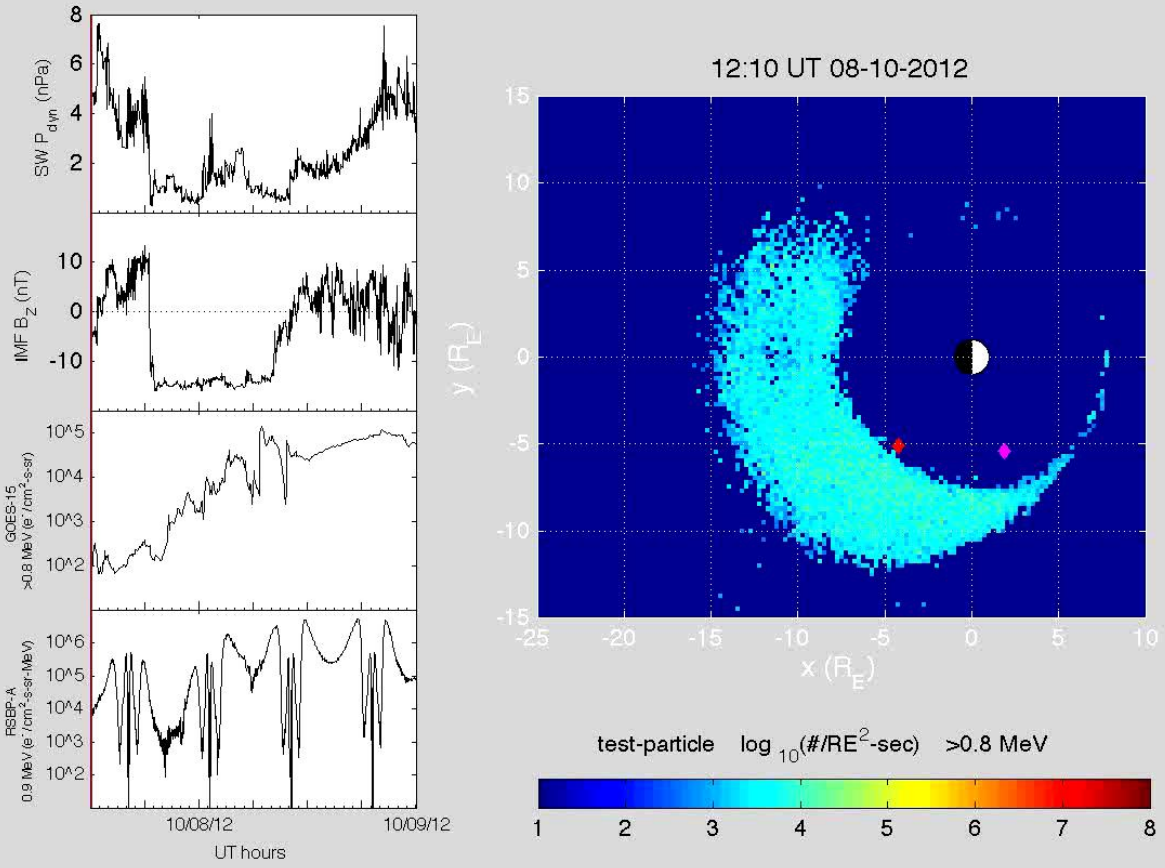
DeForest, S. E. (1972), Spacecraft charging at synchronous orbit, *J. Geophys. Res., 77*, pp. 651–659, doi:10.1029/JA077i004p00651.

Whipple Jr., E. C. (1976), Observation of photoelectrons and secondary electrons reflected from a potential barrier in the vicinity of ATS 6, *J. Geophys. Res., 81*, pp. 715–719, doi:10.1029/JA081i004p00715.

Space Weather Team

Research Item: Radiation Belt Dynamics

Rebuilding of Earth's outer radiation belt during 8-9 October 2012 geomagnetic storm



>0.8 MeV electron flux in equatorial plane in SM coordinates.

GOES-15 and RBSP-A spacecraft positions

[After Kress et al., GRL, 2014]

Kress, B. T., M. K. Hudson, and J. Paral (2014), Rebuilding of the Earth's outer electron belt during 8–10 October 2012, *Geophys. Res. Lett., 41*, 749–754, doi:10.1002/2013GL058588.

IONO Team

Terry & Justin's Most Excellent Adventure

NOAA SATELLITE AND INFORMATION SERVICE
NATIONAL OCEANIC AND ATMOSPHERIC ADMINISTRATION

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Terry Bullett & Justin Mabie

NESDIS News Archive

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NOAA Affiliates Help Improved Air Traffic Communication near the Antarctic

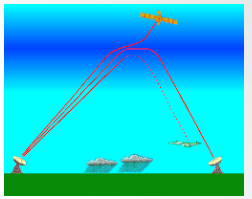
January 26, 2014

Across the globe, we continually bounce high-frequency (HF) radio waves off the ionosphere to communicate across long distances. Earth's upper atmosphere—the ionosphere—may be invisible to most of us, but it is critical to everyday activities on the surface of the planet. Moreover, at Earth's poles in particular, scientists, aircraft pilots and others rely on those HF radio signals to maintain contact with safety and emergency staff. To better understand the ionosphere near the South Pole and improve local communications there, the Cooperative Institute for Research in Environmental Sciences (CIRES) scientists working at NOAA's National Geophysical Data Center in Boulder, Colorado, are deploying a state-of-the art ionospheric sounder at South Korea's Jang Bogo Station in Antarctica.

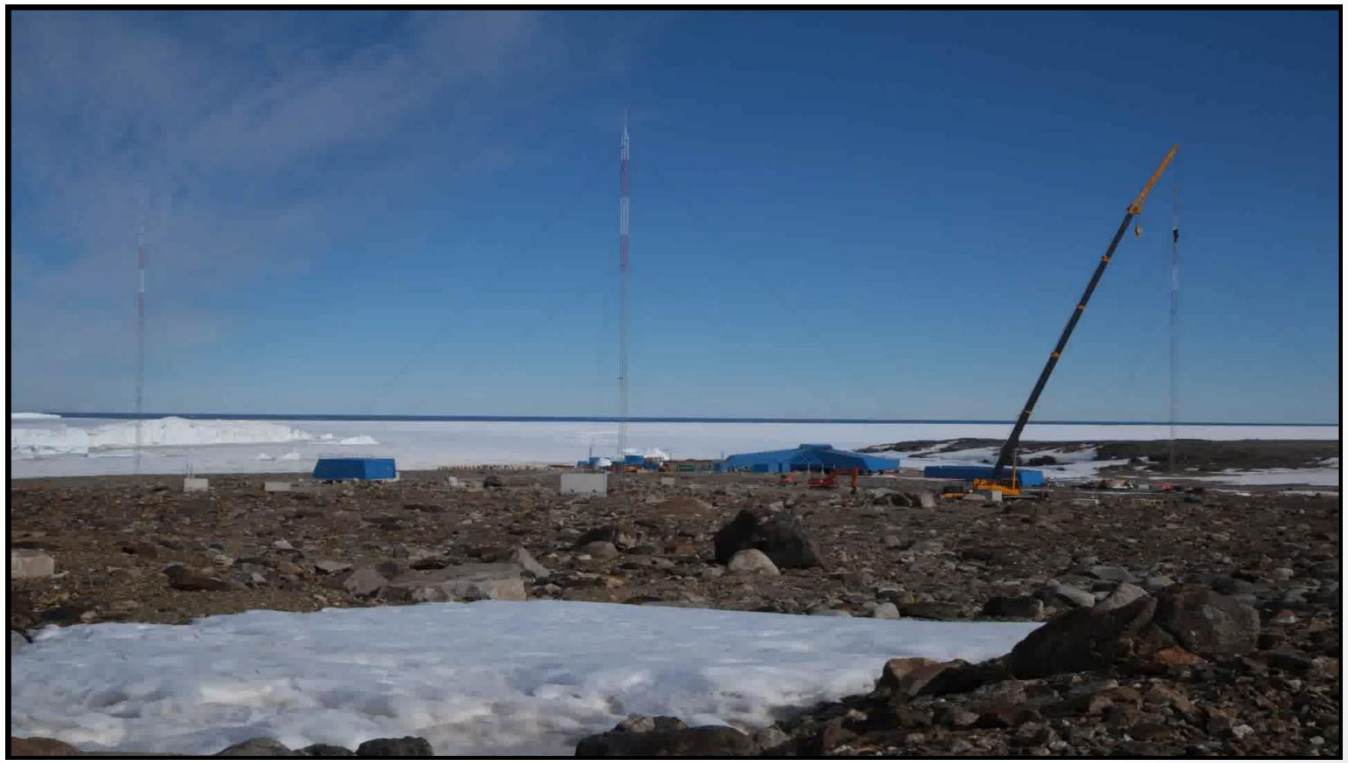
Antarctica, Palmer Peninsula,

IONO Team

VIPIR: Antarctic Construction



Terry and Justin continue to assemble the Vertical Incidence Pulsed Ionosphere Radar (VIPIR) at South Korea's Jang Bogo Station in the Antarctic. Once operational, these data will contribute to Korea's increased interest in space weather. The team is currently trying to work through some equipment issues.

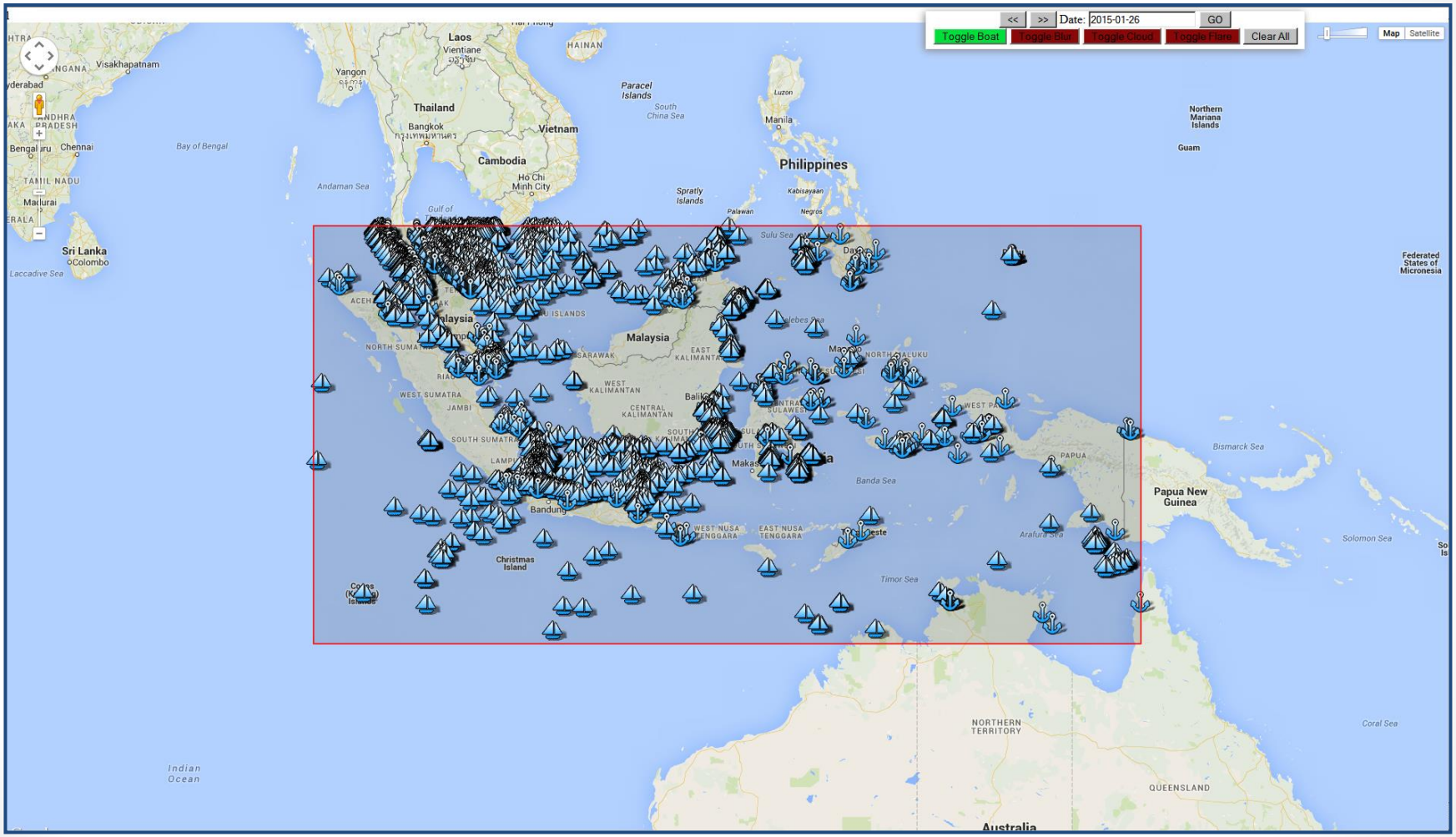


[Movie]

Antarctic Blog: http://ciresblogs.colorado.edu/spaceweather/

EOG Team

DNB Boat Detection: Indonesia



[Demo (Under Development)]

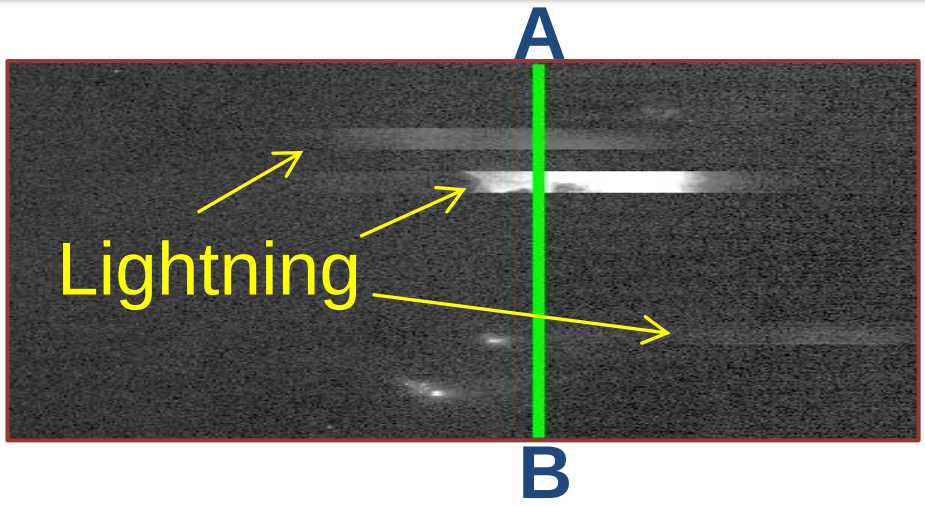
STP 1QFY15 27-Jan-15

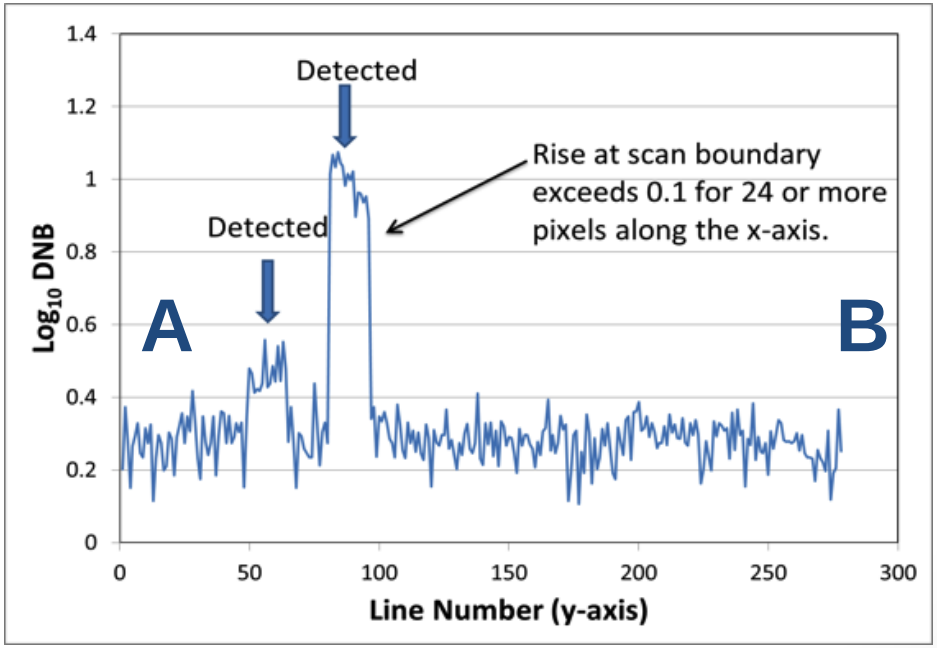
EOG Team

VIIRS Application: Lightning Detection (aka noise)

Identifying noise spikes in VIIRS DNB data

DNB – Day/Night Band

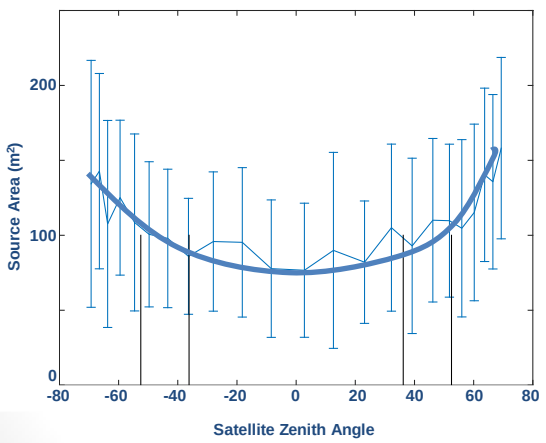




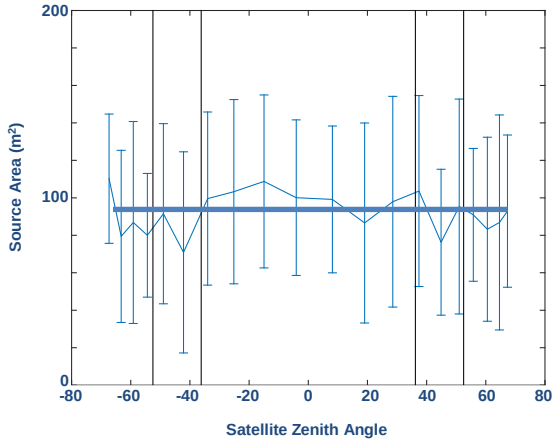
EOG Team

Flare Shapes: Source Area vs Zenith Angle

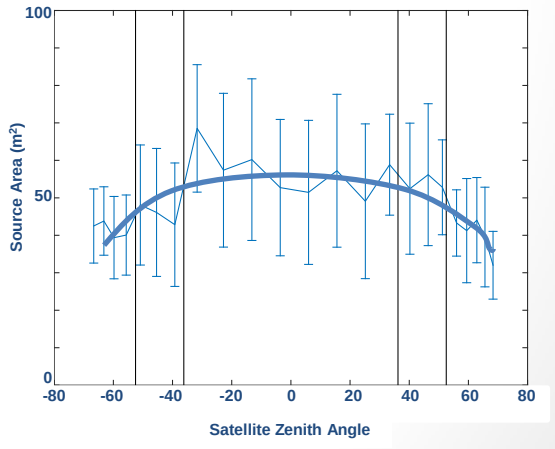
Flare in Northern Iraq

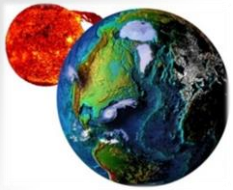


Flare Array in Basra



Door to Hell inTadzhikistan





OUTLINE

Solar & Terrestrial Physics Division

- STP Division Overview
- Milestones & Metrics
- Program Updates
- Special Interest Items
- Publication and Presentations
- Issues & Summary

Special Interest Item

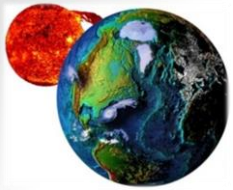
NOAA Satellite Science Week 2015

NOAA Satellite Science Week 2015 will be held 23-27 February at the UCAR Center Green facility, Boulder CO. NOAA **Space Weather** will be covered in 2 sessions in the afternoon of Tuesday, 24 Feb.

Science Week is a joint meeting to review and discuss the state of the science portfolio of the GOES-R and JPSS programs. This includes GOES-R and JPSS products, their availability and maturity, risk reduction science activities, and calibration/validation.

Objectives:

- Communicate status of products available from NESDIS operations and direct readout.
- Review the progress of GOES-R/JPSS Risk Reduction new and continuing projects over the past year.
- Present results/issues/science from the GOES-R/JPSS Risk Reduction participants including: data fusion applications/techniques, proxy data and interactions with anticipated end-users.
- Provide an overview of the GOES-R/JPSS cal/val activities (summary).
- Examine value and impact of using the same/common algorithms for geostationary and polar orbiting data.
- Identify methods for developing products integrated/fused with other data sources.
- Promote understanding of scientific maturity, and readiness of path to operations between baseline, future capability and experimental products and/or decision aids.



Special Interest Item

NOAA Satellite Science Week 2015

STP Presentations:

- GOES-R Space Weather - Operations to Research [Oral, Invited], **W.F. Denig**
- Nighttime Light Compositing using VIIRS DNB [Poster], **K. Baugh**, F-S Hsu, M. Zhizhin, C. Elvidge
- Multi-Spectral Subpixel Nighttime Fire Temperature and Size from VIIRS [Poster], **F-S Hsu**, M. Zhizhin, C. Elvdge and K. Baugh
- Automatic Boat Identification System for VIIRS Low Light Imaging Data [Poster], **M. Zhizhin**, K. Baugh, M. Zhizhin and C. Elvidge
- Automated Solar Feature Classification with the GOES-R SUVI [Poster], **J. Darnel**
- Solar Extreme Ultraviolet and X Ray Irradiance: Impacts and Measurements [Poster], **J. Machol,** A. Reinard and R. Viereck
- Real-Time Monitoring of the Dayside Geosynchronous Magnetopause Location [Poster], **R. Redmon** and Paul Loto'aniu, M. Berguson, S.M. Codrescu, J. Shue, H.J. Singer, W.F. Rowland, W.F. Denig

Other talks of interest:

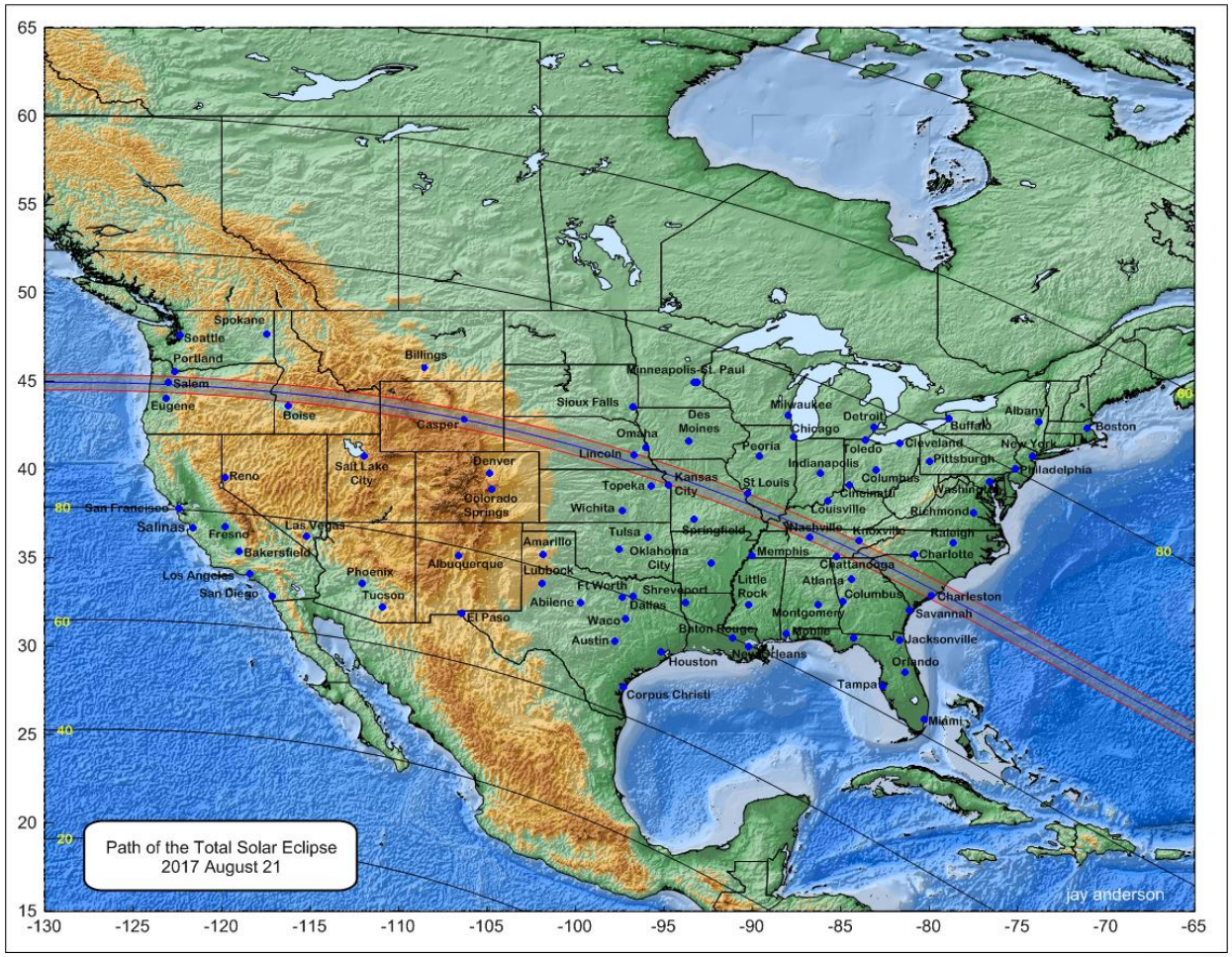
- Deep-space Satellites for Space Weather Forecasting: Science and Technology Challenges, **T. Berger**
- Space Weather Prediction Testbed: Transitioning Satellite Data to Operations, **R. Viereck**
- Title [*TBD*], **S. Hill**
- The Science, Relevance, and Improvements of NOAA's Upcoming TSIS, **G. Kopp**
- International Coordination of Space Weather Observations and Products, **T. Onsager**
- Realizing the Scientific and Operational Utilities of the VIIRS Day/Night Band—An Exercise in Dark Adaptation, **S. Miller**

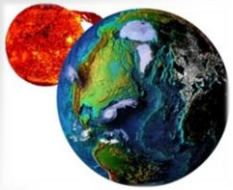
The Tuesday Afternoon Session covers Space Weather

Special Interest Item

Total Solar Eclipse – 21 Aug 2017

Reserve your hotel in Casper, WY for the total solar eclipse that will occur on 21 Aug 2017;





OUTLINE
Solar & Terrestrial Physics Division

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Publications & Presentations

STP YTD FY15 Publications – 12 (1 of 2)

Publications (YTD):

Denig, W. F. (2015), The International Council for Science World Data System Stewardship Award 2014 Presented to Dr. Robert Redmon of the National Geophysical Data Center, *Space Weather, 13*, doi:10.1002/2014SW001136.

Feng-Chi, Hsu, Kimberly Baugh, Tilottama Ghosh, Mikhail Zhizhin, and Christopher Elvidge: DMSP-OLS Radiance Calibrated Nighttime Lights Time Series with Inter-Calibration, Remote Sensing, 2014 (Accepted)

Hudson, M.K., J. Paral, **B.T. Kress**, M. Wiltberger, D.N. Baker, J.C. Foster, D.L. Turner and J.R. Wygant (2015), Modeling CME-shock driven storms in 2012 – 2013: MHD-test particle simulations, J. Geophys. Res., Accepted manuscript online, DOI: 10.1002/2014JA020833. [**Peer Reviewed**]

Ieda, A., S. Oyama, H. Vanhamaki, R. Fujii, A. Nakamizo, O. Amm, T. Hori, M. Takeda, G. Ueno, A. Yoshikawa, **R. J. Redmon**, **W. F. Denig**, Y. Kamide and N. Nishitani (2014), Approximate forms of daytime ionospheric conductance, *J. Geophys. Res.*, 119. DOI: 10.1002/2014JA020665 [**Peer Reviewed**]

Li, Z., R.M. Millan, M.K. Hudson, L.A. Woodger, D.M. Smith, Y. Chen, R. Friedel, **J.V. Rodriguez**, M.J. Engebretson, J. Goldstein, J.F. Fennell and H.E. Spence (2014), Investigation of EMIC Wave Scattering as the Cause for the BARREL 17 January 2013 Relativistic Electron Precipitation Event: A Quantitative Comparison of Simulation with Observations, *Geophys. Res. Lett., 4*1, doi:10.1002/2014GL062273. [**Peer Reviewed**]

Rodriguez, J.V., T.G. Onsager, D. Heynderickx, and P. T. A. Jiggens (2014), Meeting Report: Solar Energetic Particle Measurements Intercalibration Workshop, 11 April 2014, Boulder, Colorado, *Space Weather, 12*, 613-615, doi: 10.1002/2014SW001134.

Sergeev, V.A., A.V. Nikolaev, M.V. Kubyshkina, N.A. Tsyganenko, H.J. Singer, **J.V. Rodriguez**, V Angelopoulos, R. Nakamura, S.E. Milan, J.S. Coxon, B.J. Anderson, and H. Korth (2014), Event Study Combining Magnetospheric and Ionospheric Perspectives of the Substorm Current Wedge Modeling, *J. Geophys. Res, 119*, doi:10.1002/2014JA020522. [**Peer Reviewed**]

Straka, W.C., III; C.J. Seaman, **K. Baugh**, K. Cole, E. Stevens, S.D. Miller (2015), Utilization of the Suomi National Polar-Orbiting Partnership (NPP) Visible Infrared Imaging Radiometer Suite (VIIRS) Day/Night Band for Arctic Ship Tracking and Fisheries Management. *Remote Sens.* 2015, *7*, 971-989. **[Peer reviewed]**

Tuttle, B.T., S. Anderson, **C. Elvidge**, **T. Ghosh**, **K. Baugh**, P. Sutton (2014), Aladdin's Magic Lamp: Active Target Calibration of the DMSP OLS. *Remote Sens.* 2014, *6*, 12708-12722. **[Peer reviewed]**

Publications & Presentations

STP YTD FY15 Publications – 12 (2 of 2)

Publications (continued):

Verkhoglyadova, O. P., A. J. Mannucci, B. T. Tsurutani, M. G. Mlynczak, L. A. Hunt, **R. J. Redmon**, and J. C. Green (2015), Localized thermosphere ionization events during the high-speed stream interval of 29 April to 5 May 2011, J. Geophys. Res. Space Physics, 120, doi:10.1002/2014JA020535. [**Peer reviewed**]

Woods, T., R. Cahalan, **W. Denig**, G. Kopp, P. Pilewskie and T. Sparn (2014), New Space Measurements Extend Sun-Climate Record, EOS, 95, pp. 429-430 [**Peer Reviewed**]

Yuyu Zhou, Y., S.J. Smith, **C.D. Elvidge**, K. Zhao, A. Thomson and M. Imhoff (2014), A Cluster-based Method to Map Urban Area from DMSP/OLS Nightlights, *Remote Sensing of Environment*, *147*, pp. 173-185. [**Peer reviewed**]

Total accepted or published: 12
Peer Reviewed: 10

Publications & Presentations

Featured Publication

Ieda, A., S. Oyama, H. Vanhamaki, R. Fujii, A. Nakamizo, O. Amm, T. Hori, M. Takeda, G. Ueno, A. Yoshikawa, **R.J. Redmon**, **W.F. Denig**, Y. Kamide and N. Nishitani (2014), Approximate forms of daytime ionospheric conductance, *J. Geophys. Res.*, 119. DOI: 10.1002/2014JA020665

Key Points:

- Modeling the solar zenith angle dependence of Hall & Pedersen conductance.
- Prior work relies on invalid assumptions.
- Theoretic approach can be used for improved electro-dynamic calculations.

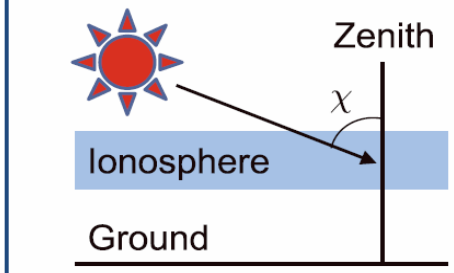


Figure 1. Ionospheric plasmas produced by solar EUV radiation incident on the hydrostatic neutral atmosphere. The solar zenith angle (SZA, χ) is defined as shown.

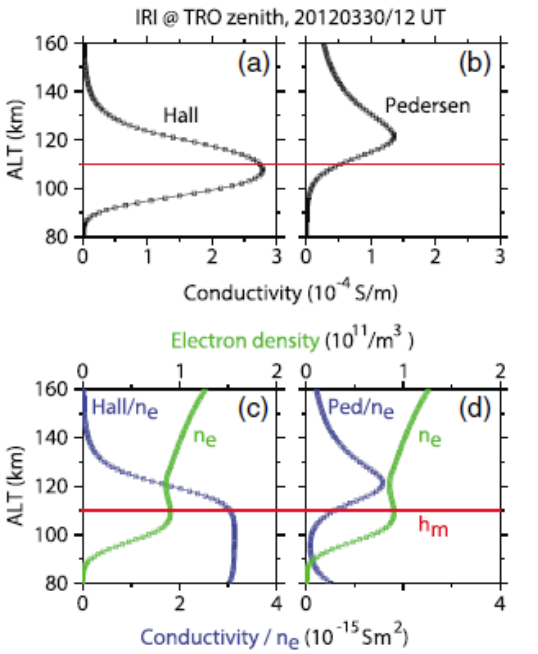
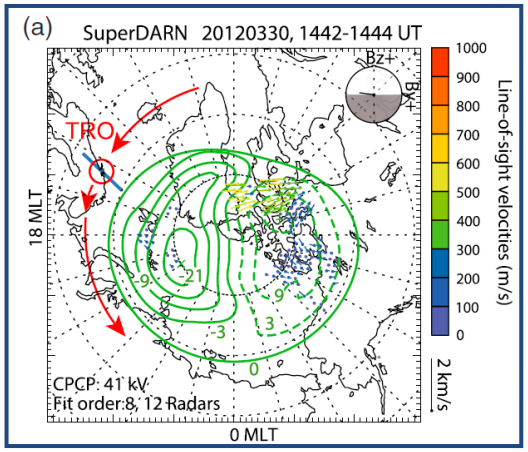
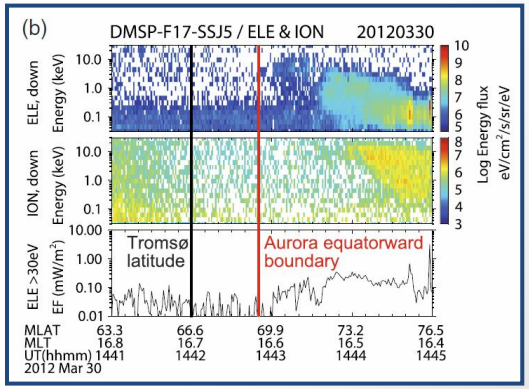
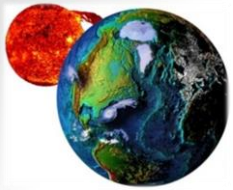


Figure 11. Height profiles of conductivities and electron densities to compare their peak heights. Radar observations were not used but instead the IRI model was used. (a) Hall conductivity (σ_H). (b) Pedersen conductivity (σ_P). (c) Components of σ_H. Green line: electron density (n_e). Blue line: σ_H/n_e. (d) Components of σ_P in a similar way. The height of the peak plasma density (h_m) is indicated by red lines in all panels for reference.





STP 1QFY15 27-Jan-15



Publications & Presentations

STP FY15 Presentations – 22 (Pg 1 of 2)

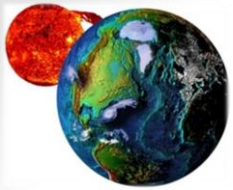
YTD Presentations (FY15):

ICSU WDS and CODATA Joint Science Data Conference, 02-05 Nov 2014; New Delhi, India

- Space Environmental Scientific Data Stewardship at the US National Geophysical Data Center (NGDC): Supporting Satellite Health and Research in Space Weather using Multi-Platform Observations [Invited Oral], Award Acceptance Talk, **R.J. Redmon**
- World Data Service for Oceanography, [Poster], S. Rutz, D. Spring, I. Smolyar, S. Phillips, D. Johnson and M. Gregg (presented by **R.J. Redmon)**
- World Data System for Geophysics, [Poster], **R.J. Redmon** and E.A. Kihn

American Geophysical Union, 15-19 December 2014, San Francisco, CA

- Comparison of GOES Space Environment Monitor Data Collected During Solar Cycles 22, 23, and 24 [SH13B-4088, Poster], **D.C. Wilkinson**
- Mapping Geosynchronous Solar Energetic Particle Observations to Lower Earth Orbits [SM31A-4157, Poster], S.L. Young and **B.T. Kress**
- Improved in Situ Space Weather Data Services from the NOAA National Geophysical Data Center [SM31A-4181, Poster], **J.V. Rodriguez**, **W.F. Denig**, J.C. Green**, T.M. Lotoaniu**, R.E. McGuire, **R.J. Redmon**, **W.F. Rowland**, D.L. Turner, R.S. Weigel and **D.C. Wilkinson**
- Forcasting Equatorial Spread-F on a Night to Night Basis in 5 Longitude Sectors [SA11D-01, Oral], D.N. Anderson, **R.J. Redmon** and **T.W. Bullett**
- A Real-Time Technique for Sudden Commencement Detection [SM31A-4187, Poster], **W.F. Rowland**, **R.J. Redmon** and H.J. Singer
- Evidence of Dayside Asymmetries in High-Latitude Magnetic Perturbations Measured By ST5 and DMSP [SA23D-05, Oral], D.J. Knipp, L.M. Kilcommons, J.A. Slavin, G. Le, J.W. Gjerloev and **R.J. Redmon**
- Localized High-Latitude Ionosphere-Thermosphere Ionization Events during the High Speed Stream Interval of 29 April – 5 May 2011 [SA21B-05, Oral], O.P. Verkhoglyadova, A.J. Mannucci, B.T. Tsurutani, M.G. Mlynczak, L.A. Hunt, **R.J. Redmon** and J.C. Green
- On the Cross-Energy Cross-Pitch-Angle Coherence of Electrons in the Outer Radiation Belt [SM31A-4163, Poster], Y. Chen, G.D. Reeves, W. Tu, G. Cunningham, M.G. Henderson, C. Kletzing and **R.J. Redmon**
- Space Weather Conditions During the February 2014 Wide Area Augmentation System GPS Degradation [SM31A-4188, Poster], **T.M. Lotoaniu**, **R.J. Redmon**, M. Codrescu, H.J. Singer, R.A. Viereck and **W.F. Denig**
- Real-Time Monitoring of the Dayside Geosynchronous Magnetopause Location [SM31A-4164, Poster], **R.J. Redmon**, **T.M. Lotoaniu**, M. Berguson, **S.M. Codrescu**, J-H. Shue, H.J. Singer, **W.F. Rowland** and **W.F. Denig**
- GOES-R Rapid Refresh Imagery Advancements for the Earth and Space Weather Enterprise [IN42A-05, Oral], S.J. Goodman, T.J. Schmit, D.T. Lindsey and **W.F. Denig**



Publications & Presentations

STP FY15 Presentations – 22 (Pg 2 of 2)

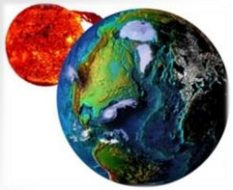
YTD Presentations (Continued)

American Geophysical Union, 15-19 December 2014, San Francisco, CA (continued)

- A Statistical View of the Effect of Density Asymmetry and Guide Field on the Structure of the Reconnection Layer Poleward of the Cusp [SM12B-08, Oral], F.M. Muzamil1, C.J. Farrugia1, R.B. Torbert1, P.L. Pritchett, F. Mozer, J.D. Scudder, C.T. Russell, P.E. Sandholt, **W.F. Denig** and L.B. Wilson III
- Extreme Space Weather Events Observed Through the Decades [SH41D-06, Invited Oral], **W.F. Denig**
- Rescuing NOAA's Earliest Airphoto Archive [IN43E-06, Oral], **F.C. Hsu**, **K. Baugh**, **C.E. Elvidge** and **M. vonHendy**
- Global Urbanization Modeling Supported by Remote Sensing [B33J-03, Oral], Y. Zhou1, S. Smith, K. Zhao, M.L. Imhoff, A.M. Thomson, B.P. Bond-Lamberty and **C.E. Elvidge**
- Improving Cloud-screening for Global Nighttime Lights Composites Using the VIIRS Day/Night Band [IN13C-3653, Poster], **K.E. Baugh**, **M. Zhizhin**, **F-C. Hsu**, and **C.D. Elvidge**
- Nightfire: Sub-pixel Pyrometry of Nighttime Combustion Sources with Suomi NPP and Landsat 8 [A51B-3044, Poster] **M. Zhizhin**, **C. Elvidge**, **F-C Hsu** and **K. Baugh**
- Analysis of fifty year Gas Flaring Emissions from oil/gas companies in Africa [A13E-3217, Poster] E. H. Doumbia, C. Liousse, L. Granier, R. Rosset, T. Oda, and **F-C Hsu**

American Meteorological Society, 04-08 January 2015, Phoenix, AZ

- TSIS on the International Space Station: Continuity of the Solar Irradiance Data Record, P. Pilewskie, T. Sparn, G. Kopp, E. Richard, R.F. Cahalan and **W.F. Denig**



OUTLINE
Solar & Terrestrial Physics Division

STP Division Overview

Milestones & Metrics

Program Updates

Special Interest Items

Publications and Presentations

Issues & Summary

Issues & Summary
Solar & Terrestrial Physics Division

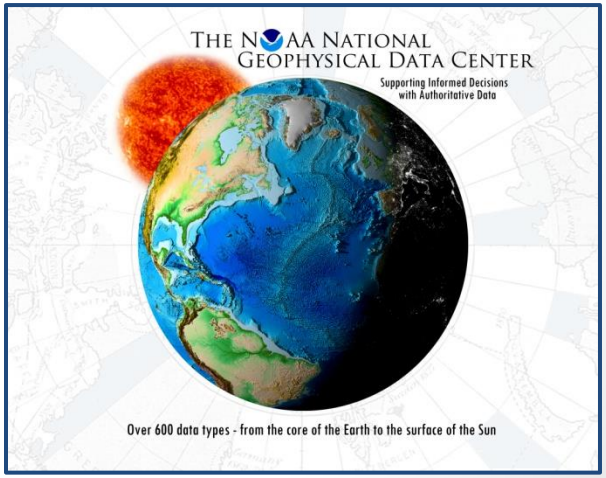
- ✓ NGS Aerial Photography (4QFY13) – ***Unknown Status***
- ✓ GOES-R SWx Algorithm Risks (4QFY13) – ***Some new issues***
- ✓ Fed hiring restrictions having mission impact (3QFY12) – ***Better***
- ✓ GOES-R L2+ SWx algorithms (3QFY11) – *Path to operations defined*
  - ➢ Frozen Baseline / Algorithm Readiness – Waivers – ***Watch Item***
  - ➢ GOES L0 Data Not in CLASS – ***On Track***
  - ➢ GOES-R Data Management Tasks – GOES-R Data Mngr – ***NLAI***

<u>Metrics (ytd)</u>

Papers (FY15): 12

✓ Peer Reviewed: 10

Presentations (FY15): 22



QUESTIONS?