GOES-Next Requirements Workshop
(GOES VW)

Meeting Organizing Team

From SWPC

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From ~~NGDC~~ NCEI

(National Centers for Environmental Information)

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13 April, 2015

Agenda

9:00 Plenary

- Introduction
- GOES Overview (Goodman)

9:30 Solar

- X ray Irradiance
- EUV Irradiance
- Solar Imaging

9:30 In Situ

- Magnetometer
- Space Environment In-Situ Suite (particles)

3:30 Wrap Up

- GOLD (Eastes)
- Summaries (XRS, EUVS, SUVI, SEISS, Mag)

Objective

- To assess the space weather observation requirements currently slated for the GOES program and determine if modifications or updates are required.
  - Inputs from forecasters
  - Inputs from customers
  - Inputs from the research community.

- Notes:
  - This is a first step in the processes. There will be other meetings and workshops to refine requirements and discuss implementation
  - While implementation is not the topic of this meeting, if there are new developments that could change the requirements, they may be brought forward for discussion.

Outcomes

- Confirmation that the current requirements meet the needs of the users.

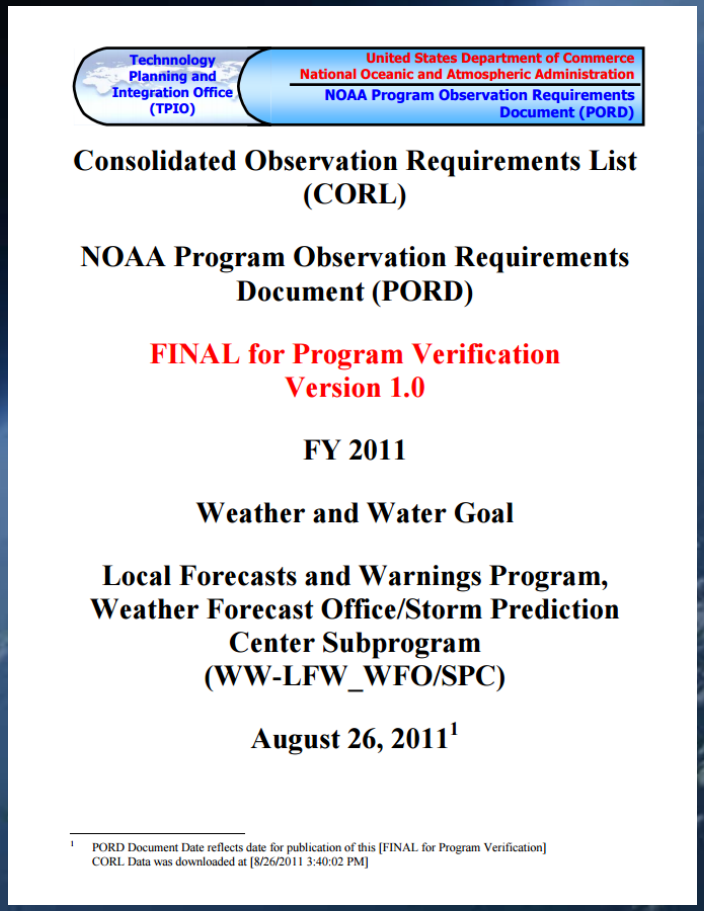
or…

- Suggested updates to the requirements that may be brought into the NOAA requirements process.

NOAA Requirements Process

Coordinated by the NOAA Technology Planning and Integration Office (TPIO)

- Step 1. Get the requirements into the CORL.



Technology Planning and Integration Office (TPIO)

United States Department of Commerce
National Oceanic and Atmospheric Administration
NOAA Program Observation Requirements Document (PORD)

Consolidated Observation Requirements List (CORL)

NOAA Program Observation Requirements Document (PORD)

FINAL for Program Verification
Version 1.0

FY 2011

Weather and Water Goal

Local Forecasts and Warnings Program, Weather Forecast Office/Storm Prediction Center Subprogram (WW-LFW_WFO/SPC)

August 26, 2011[1]

[1] PORD Document Date reflects date for publication of this [FINAL for Program Verification] CORL Data was downloaded at [8/26/2011 3:40:02 PM]

NOAA Space Weather Requirements

Survey Title	Validation Complete (Yes/No)	NOAA GCMD Variable	Threshold/Objective	Spatial/Angular Coverage	Vertical Range	Vertical Resolution	Spatial/Angular Resolution	Measurement Range	Measurement Accuracy	Sampling Interval	Data Latency	Long-Term Stability
WW-SWX - Auroral Boundary: LEO	Yes	Aurorae: Boundary, LEO	T	Greater than 30 deg N and S	na	na	50 km	0 to +/-90 deg lat	50 km	10 min	15 min	50 km
WW-SWX - Auroral Particle Energy Deposition: LEO	Yes	Aurorae: Energy Deposition, LEO	T	Greater than 30 deg N and S	LEO In situ, Polar	na	100 km	10^-4 to 1 W/m^2	10^-4 W/m^2	10 min	15 min	10 %/yr
WW-SWX - Galactic Cosmic Rays (Neutrons)	Yes	Cosmic Rays	T	Greater than 75 deg N	0 to 6 km	na	na	>1 to >15 GeV	10 % above median background	5 min	5 min	na
WW-SWX - Electric Field: LEO	Yes	Electric Fields/Electric Currents: LEO	T	Global	LEO In situ, Polar	na	10 km	-150 to 150 mV/m [in plane normal to geomagnetic field]	3 mV/m	10 min	15 min	10 %/yr
WW-SWX - Electrons: Medium & High Energy, GEO	Yes	Electrons: Medium & High Energy, GEO	T	Global	GEO In situ	na	35 deg pitch angle	1.9x10^6 E^(-2.2) to 7.2x10^11 E^(-2.8) (cm^2 s sr keV)^(-1)	25 %	30 sec	1 min	10 %/mission
WW-SWX - Energetic Heavy Ions	Yes	Energetic Heavy Ions	T	Global	GEO In situ	na	1 look directions	0.055 (E/n)^(-1) to 5x10^4 (E/n)^(-2.3) (cm^2 s sr MeV/n)^(-1)	25 %	5 min	5 min	15 %/mission
WW-SWX - Energetic Ions: LEO	Yes	Energetic Ions: LEO	T	Greater than 30 deg N and S	LEO In situ, Polar	na	25 km	0.5 p< 100 MeV; .1 p>100 MeV to 2X10^5 p100 MeV 1/(cm^2-s-str)	0.1 1/(cm^2-s-str)	10 min	15 min	10 %/mission
WW-SWX - Geomagnetic Field: GEO	Yes	Geomagnetic Field: GEO	T	Global	GEO In situ	na	3 axis orthogonal	-400 to 400 nT/axis	1 nT/axis	2 samples/sec	5 sec	na
WW-SWX - Geomagnetic Field: Ground-Based Auroral (12 Stations, 60 to 71 degrees Geomagnetic Latitude)	Yes	Geomagnetic Field: Ground-Based	T	Point Source	na	na	30 deg longitude approximately equally spaced	-65000 to 65000 nT	1 nT	1 min	1 min	5/yr nT
WW-SWX - Geomagnetic Field: Ground-Based Low Latitude (4 Stations, 10 to 35 degrees Geomagnetic Latitude)	Yes	Geomagnetic Field: Ground-Based	T	Point Source	na	na	90 deg longitude approximately equally spaced	-65000 to 65000 nT	1 nT	1 min	1 min	5/yr nT
WW-SWX - Geomagnetic Field: Ground-Based Mid-Latitude (13 Stations, 45 to 63 degrees Geomagnetic Latitude)	Yes	Geomagnetic Field: Ground-Based	T	Point Source	na	na	30 deg longitude approximately equally spaced	-65000 to 65000 nT	1 nT	1 min	1 min	5/yr nT
WW-SWX - Electrons & Protons: Low Energy, GEO	Yes	Ion Flux: Low Energy, GEO	T	Global	GEO In situ	na	35 deg pitch angle	9x10^4 E^(-1.3) to 8x10^8 E^(-0.8) (cm^2 s sr keV)^(-1)	25 %	30 sec	1 min	10 %/mission
WW-SWX - Electrons: Medium & High Energy, LEO	Yes	Ion Flux: Medium & High Energy, LEO	T	Global	LEO In situ, Polar	na	2 look directions	100 to 5X10^7 1/(cm^2-s-str)	100 1/(cm^2-s-str)	10 min	15 min	5 %/mission
WW-SWX - Ions: Medium & High Energy, LEO	Yes	Ion Flux: Medium & High Energy, LEO	T	Global	LEO In situ, Polar	na	25 km	100 to 5X10^7 1/(cm^2-s-str)	100 1/(cm^2-s-str)	10 min	15 min	5 %/mission
WW-SWX - Ionospheric Electron Density Profiles	Yes	Ionospheric Electron Density: Profiles	T	Global	90 to 1500 km	10 km	100 km	1000 to 10000000 cm^-3	30 %	na	15 min	na
WW-SWX - Solar Mg II Core-to-Wing Ratio	Yes	Mg II Core-to-Wing Ratio	T	Heliocentric	0 to 1 Rsun	na	na	0.05 to 0.4 W/m^2/nm	0.10 %	1 hr	1 hr	0.01 %/yr
WW-SWX - Protons: Medium & High Energy, L5	Yes	Protons: Medium & High Energy	T	L5 In-Situ	L5 to L5 In situ	na	35 deg pitch angle	6.6x10^5 E^(-2.3) to 1.7x10^8 E^(-1.6) (cm^2 s sr keV)^(-1)	25 %	30 sec	1 min	10 %/mission
WW-SWX - Protons: Medium & High Energy, GEO	Yes	Protons: Medium & High Energy, GEO	T	Global	GEO In situ	na	35 deg pitch angle	6.6x10^5 E^(-2.3) to 1.7x10^8 E^(-1.6) (cm^2 s sr keV)^(-1)	25 %	30 sec	1 min	10 %/mission
WW-SWX - Solar & Galactic Protons: GEO	Yes	Solar and Galactic Protons: GEO	T	Global	GEO In situ	na	2 look angles	8.0x10^2 E^(-1.8) to 5.4x10^9 E^(-2.1) (cm^2 s sr keV)^(-1)	25 %	1 min	1 min	10 %/mission
WW-SWX - Solar Flux: EUV	Yes	Solar Flux: Solar	T	Heliocentric	0 to 1 Rsun	na	na	1/10*(Solar Min) to 10*(Solar	20 %	30 sec	30 sec	2 %/yr

WW-SWX - Solar Flux: EUV	Yes	Solar Flux: Solar Ultraviolet Emissions	T	Heliocentric	0 to 1 Rsun	na	na	1/10*(Solar Min) to 10*(Solar Max) nm	20 %	30 sec	30 sec	2 %/yr
WW-SWX - Solar Flux: X-Ray Irradiance	Yes	Solar Flux: Solar X-ray Emissions	T	Heliocentric	0 to 1.3 Rsun	na	na	5x10^-9 to 2x10^-3 W/m^2	10 %	3 sec	3 sec	5 %/mission
WW-SWX - Solar Imagery: Corona, L1	Yes	Solar Imagery: Corona	T	Heliocentric	3 to 17 Rsun	na	50 arcsec	1x10^-11 to 1 x 10^-8 B/BSun	10 %	15 min	15 min	na
WW-SWX - Solar Imagery: Corona, L5	Yes	Solar Imagery: Corona	T	Heliocentric	3 to 17 Rsun	na	50 arcsec	1x10^-11 to 1x10^-8 B/BSun	10 %	15 min	15 min	na
WW-SWX - Solar Imagery: Heliospheric, L1	Yes	Solar Imagery: Heliospheric	T	Heliocentric	15 Solar Radii to 1 Astronomical Unit	na	1 deg	tbs	10 %	1 hr	15 min	10 (Total Life) %
WW-SWX - Solar Imagery: Heliospheric, L5	Yes	Solar Imagery: Heliospheric	T	Heliocentric	15 Solar Radii to 1 Astronomical Unit	na	1 deg	tbs	10 %	1 hr	15 min	10 (Total Life) %
WW-SWX - Solar Imagery: Magnetogram, L1	Yes	Solar Imagery: Magnetogram	T	Heliocentric	0 to 1 Rsun	na	5 arcsec	-6000 to 6000 gauss	20 %	3 hr	1 hr	1 %/yr
WW-SWX - Solar Imagery: Magnetogram, L5	Yes	Solar Imagery: Magnetogram	T	Heliocentric	0 to 1 Rsun	na	5 arcsec	-6000 to 6000 gauss	20 %	3 hr	1 hr	1 %/yr
WW-SWX - Solar H Alpha Imagery	Yes	Solar Imagery: Solar H Alpha	T	Heliocentric	0 to 1 Rsun	na	5 arcsec	1.5 to 1.65 W/m2/nm @ 656.3 nm	10 %	1 min	5 min	10 %/yr
WW-SWX - Solar Imagery: White Light	Yes	Solar Imagery: White Light	T	Heliocentric	0 to 1 Rsun	na	1 arcsec	350 to 800 nm	5 %	10 min	1 hr	na
WW-SWX - Solar Imagery: X-Ray, Radiance, L1	Yes	Solar Imagery: X-Ray, Radiance	T	Heliocentric	0 to 1.3 Rsun	na	5 arcsec	0.3 to 10^6 ph/cm2/arcsec/ sec; MK	20 %	LTE 2 min	LT 1 min	20 %
WW-SWX - Solar Imagery: X-Ray, Radiance, L5	Yes	Solar Imagery: X-Ray, Radiance	T	Heliocentric	0 to 1.3 Rsun	na	5 arcsec	0.3 to 10^6 ph/cm2/arcsec/ sec; MK	20 %	LTE 2 min	LT 1 min	20 %
WW-SWX - Solar Imagery: X-Ray, Temperature	Yes	Solar Imagery: X-Ray, Temperature	T	Heliocentric	0 to 1.3 Rsun	na	5 arcsec	1 to 10 ph/cm2/arcsec/ sec; MK	20 %	6 min	1 min	20 %
WW-SWX - Solar Radio Emissions	Yes	Solar Radio Wave Emissions	T	Heliocentric	1 to 2 Rsun	na	na	0.02 to 15400 MHz	5 %	1 sec	1 min	0.1 %/yr
WW-SWX - Solar Wind: High Energy Electrons, L1	Yes	Solar Wind: High Energy Electrons	T	L1 In-situ	L1 to L1 Along Sun-Earth Line	na	40 Re perpendicular to Sun-Earth Line	tbs	20 %	1 min	5 min	tbs
WW-SWX - Solar Wind: High Energy Electrons, L5	Yes	Solar Wind: High Energy Electrons	T	L5 In-Situ	1 to 1 AU	na	na	tbs	20 %	1 min	5 min	tbs
WW-SWX - Solar Wind: Low Energy Particle Population, L1	Yes	Solar Wind: Low Energy Particle Population	T	L1 In-situ	L1 to L1 Along Sun-Earth Line	na	40 Re perpendicular to Sun-Earth line	50 to 2000 KeV	20 %	5 min	5 min	20 %
WW-SWX - Solar Wind: Low Energy Particle Population, L5	Yes	Solar Wind: Low Energy Particle Population	T	L5 In-Situ	1 to 1 AU	na	na	50 to 2000 KeV	20 %	5 min	5 min	20 %
WW-SWX - Solar Wind: Magnetic Field Vector, L1	Yes	Solar Wind: Magnetic Field Vector	T	L1 In-situ	L1 to L1 Along Sun-Earth Line	na	40 Re perpendicular to Sun-Earth line	0.1 to 100 nT	0.10 nT	1 min	5 min	1 nT
WW-SWX - Solar Wind: Magnetic Field Vector, L5	Yes	Solar Wind: Magnetic Field Vector	T	L5 In-Situ	1 to 1 AU	na	na	0.1 to 100 nT	0.1 nT	1 min	5 min	1 nT
WW-SWX - Solar Wind: Plasma Ion Density, L1	Yes	Solar Wind: Plasma Ion Density	T	L1 In-situ	L1 to L1 Along Sun-Earth Line	na	40 Re perpendicular to Sun-Earth line	0.1 to 100 part/cm^3	20 %	1 min	5 min	20 %
WW-SWX - Solar Wind: Plasma Ion Density, L5	Yes	Solar Wind: Plasma Ion Density	T	L5 In-Situ	1 to 1 AU	na	na	0.1 to 100 part/cm^3	20 %	1 min	5 min	20 %
WW-SWX - Solar Wind: Plasma Ion Temperature, L1	Yes	Solar Wind: Plasma Ion Temperature	T	L1 In-situ	L1 to L1 Along Sun-Earth Line	na	40 Re perpendicular to Sun-Earth line	0.04 to 2 mK	20 %	1 min	5 min	20 %
WW-SWX - Solar Wind: Plasma Ion Temperature, L5	Yes	Solar Wind: Plasma Ion Temperature	T	L5 In-Situ	1 to 1 AU	na	na	0.04 to 2 mK	20 %	1 min	5 min	20 %
WW-SWX - Solar Wind: Plasma Ion Velocity Vector, L1	Yes	Solar Wind: Plasma Ion Velocity Vector	T	L1 In-situ	L1 to L1 Along Sun-Earth Line	na	40 Re perpendicular to Sun-Earth line	200 to 2000 km/sec	5 %	1 min	5 min	5 %
WW-SWX - Solar Wind: Plasma Ion Velocity Vector, L5	Yes	Solar Wind: Plasma Ion Velocity Vector	T	L5 In-Situ	1 to 1 AU	na	na	200 to 2000 km/sec	5 %	1 min	5 min	5 %
WW-SWX - Aurorae: Supra-thermal through Auroral Energy	Yes	Supra-thermal through Auroral Energy: Electrons	T	Greater than 30 deg N and S	LEO In situ, Polar	na	10 km	10^5 to 10^10 1/(cm^2-s-str)	10^5 1/(cm^2-s-str)	10 min	1.5 hr	10 %/mission

WW-SWX - Solar Wind: Plasma Ion Temperature, L5	Yes	Solar Wind: Plasma Ion Temperature	T	L5 In-Situ	1 to 1 AU	na	na	0.04 to 2 mK	20 %	1 min	5 min	20 %
WW-SWX - Solar Wind: Plasma Ion Velocity Vector, L1	Yes	Solar Wind: Plasma Ion Velocity Vector	T	L1 In-situ	L1 to L1 Along Sun-Earth Line	na	40 Re perpendicular to Sun-Earth line	200 to 2000 km/sec	5 %	1 min	5 min	5 %
WW-SWX - Solar Wind: Plasma Ion Velocity Vector, L5	Yes	Solar Wind: Plasma Ion Velocity Vector	T	L5 In-Situ	1 to 1 AU	na	na	200 to 2000 km/sec	5 %	1 min	5 min	5 %
WW-SWX - Aurorae: Supra-thermal through Auroral Energy Particles, Electrons	Yes	Supra-thermal through Auroral Energy: Electrons	T	Greater than 30 deg N and S	LEO In situ, Polar	na	10 km	10^5 to 10^10 1/(cm^2-s-str)	10^5 1/(cm^2-s-str)	10 min	1.5 hr	10 %/mission
WW-SWX - Aurorae: Supra-thermal through Auroral Energy Particles, Ions	Yes	Supra-thermal through Auroral Energy: Ions	T	Greater than 30 deg N and S	LEO In situ, Polar	na	10 km	10^5 to 10^9 1/(cm^2-s-str)	10^5 1/(cm^2-s-str)	10 min	1.5 hr	10 %/mission
WW-SWX - Slant Total Electron Content of the Ionosphere	Yes	Total Electron Content: Slant	T	Global	100 to 20200 km	na	500 km	0 to 400 TECU	3 TECU	15 min	10 min	1 %/decade
WW-SWX - Auroral Imagery	na	Aurorae: Imagery	T	Global	na	na	100 km	Moderate to Active Aurora	10 %	50 km	1.5 hr	na
WW-SWX - Magnetospheric Electrons: Medium & High Energy, MEO	na	Electrons: Medium & High Energy, MEO	T	35 deg Pitch Angle	na	na	na	tbs	10 %	30 sec	1 min	10 %/mission
WW-SWX - Geomagnetic Field: LEO	na	Geomagnetic Field: LEO	T	LEO In-situ, Polar	300 to 1000 km	na	1 km	-60000 to 60000 nT	5 nT/axis	na	1.5 hr	5 nT
WW-SWX - Geomagnetic Field: MEO	na	Geomagnetic Field: MEO	T	3-axis Orthogonal	3 to 5 Re=1 Earth radii (6378 km)	na	na	-2000 to 2000 nT/axis	1 nT/axis	tbs sample/sec	5 sec	na
WW-SWX - Electrons & Protons: Low Energy, MEO	na	Ion Flux: Low Energy, MEO	T	35 deg Pitch Angle	na	na	na	tbs	25 %	30 sec	1 min	10 %/mission
WW-SWX - Neutral Density Profiles	na	Neutral Particle Density: Profiles	T	Global	150 to 500 km	25 km	500 km	2x10^-12 to 7x10^-17 g/cm^3	15 %	na	15 min	2 %/yr
WW-SWX - Neutral Thermospheric Winds	na	Neutral Thermospheric Winds	T	Global	150 to 400 km	20 km	100 km	-1500 to 1500 m/sec	> of 10 or 10 % or m/s	na	5 min	na
WW-SWX - Magnetospheric Protons: Medium & High Energy, MEO	na	Protons: Medium & High Energy, MEO	T	35 deg Pitch Angle	na	na	na	tbs	10 %	30 sec	1 min	10 %/mission
WW-SWX - Solar and Galactic Particles: MEO	na	Solar and Galactic Protons: MEO	T	Whole Sun	na	na	na	tbs	25 %	1 min	1 min	10 %/mission
WW-SWX - Solar Imagery: Backside of Sun	na	Solar Imagery: Backside of Sun	T	Heliocentric	na	na	na	270 to 290 nm	1 %	10 min	5 min	0.01 %/yr
WW-SWX - Solar Imagery: Heleoseismology	na	Solar Imagery: Heleoseismology	T	Heliocentric	tbs	tbs	250 km	-1500 to 1500 m/sec	> of 5 or 5 m/sec or %	tbs	1.5 hr	tbs
WW-SWX - Solar Flux: UV-VIS-IR Spectral Irradiance	na	Solar Irradiance: Spectral	T	Heliocentric	na	na	na	1/2*(Solar Min) to 2*(Solar Max) W/m^2/nm	1 %	20 min/90 min	15 min	0.002 %/yr
WW-SWX - Solar Flux: Total Irradiance	na	Solar Irradiance: Total	T	Heliocentric	na	na	na	1310 to 1420 W/m^2	0.1 %	1.5 hr	1 day	0.0005 %/yr
WW-SWX - Solar Wind: Plasma Electron Temperature	na	Solar Wind: Plasma Electron Temperature	T	L1 In-situ	200 to >200 Re along Sun-Earth line	na	40 Re perpendicular to Sun-Earth line	0.05 to 2 mK	30 %	1 min	5 min	30 %
WW-SWX - Thermospheric Neutral Composition	na	Thermospheric Neutral Composition	T	Global	130 to 500 km	20 km	250 km	Atomic O: 1x10^13; Molecular N2: 1 x 10^11; Integrated O/N2: 0.2 to Atomic O: 5 x 10^16; Molecular N2: 1 x 10^17; Integrated O/N2: 1.5 unitless	10 %	na	15 min	na
WW-SWX - Ionospheric Irregularities: Amplitude	na	Ionospheric Irregularities: amplitude	T	Global	na	na	25 km	0.1 to 1.5 unitless	0.1 unitless	na	15 min	na
WW-SWX - Ionospheric Irregularities: Phase	na	Ionospheric Irregularities: phase	T	Greater than 30 deg N and S	na	na	25 km	0.1 to 20 radians	0.1 radians	na	15 min	na
WW-SWX - In-Situ Plasma Temperature: LEO	na	Plasma Temperature	T	Global	na	na	100 km	500 to 10000 K	10 %	na	1.5 hr	na

Observation Requirements

- CORL requirements must be mapped to customer requirement or performance measure.
- Every CORL requirement and every parameter must be validated and documented.
- Once validated and prioritized and accepted into the CORL, these requirements become part of the NOAA Program Observation Requirements Document (PORD).
  - Not to be confused with the GOES Performance and Operation Requirements Document (PORD)
- NOAA's Observing System Architecture team then lays out the plan to meet the requirements

GOES Next

(Still tentative)

- First assessment: Where does it make the most sense to put various weather and space weather sensors?
  - Should the solar observing sensors go on a different satellite?
- If there is going to be a GOES VW series of satellites, the first satellite should be launch ready in the 2025-2028 timeframe

GOES VW: The Next Generation of Geosynchronous Space Weather Observations

9:00	Introduction and Requirements Process	Viereck
9:10	GOES VW: The schedule and process	Goodman
Breakout 1: Solar		
9:30	X-ray Sensor (XRS) Introduction (requirements overview):	Reinard
9:40	Forecaster requirements	Steenburgh
9:50	GOES R XRS capabilities	Eparvier
10:00	Solar XRS Discussion (20 Min)	All
Break 10:20 – 10:30		
10:30	Extreme Ultraviolet Sensor (EUVS) Introduction; (Req. overview)	Viereck
10:40	Drag Model Requirements	Tobiska
10:50	Solar EUV Input to Ionosphere/Thermosphere (I/T) models	Solomon
11:00	GOES R EUVS capabilities	Eparvier
11:10	Solar EUV Discussion (1 Hr)	All
Lunch 12:10 - 1:10		
1:10	SWPC Solar Imaging Review of current requirements	Hill
1:20	GOES R Solar Ultraviolet Imager (SUVI) Capabilities and Products	Darnel
1:30	Flare Location	Jones
1:40	Coronal Holes	Hock
1:50	DEM Retreival	Plowman
2:00	Magnetograms	Leka
2:10	Solar Imaging Discussion (1 Hr)	All
Break 3:10		
Breakout 2: In-situ		
9:30	Introduction to In-Situ Observation Breakout	Singer
9:35	Keynote: In-Situ Observation Requirements from GEO	O'Brien
9:55	Forecaster Perspective	Balch
Break 10:05		
10:20	Magnetometer Current Capabilities Overview	Redmon
10:30	Magnetometer Panel B. Anderson, S. Elkington, J. McCollough, T. Nagatsuma	Singer
11:30	Space Environment In-Situ Suite (SEISS) Energetic Particles Description	Rodriguez
Lunch 11:45 – 12:45		
	SEISS Impact Areas	
12:45	Aviation and Human Space Flight Panel K. Copeland, K. Lee, M. Meier	Rutledge
1:45	Satellites Panel J. Mazur, T. Nagatsuma, S. Young	Onsager
2:45	WrapUp	Singer/All
Break 3:10		
Plenary Wrap Up		
3:30	Nadir viewing space weather sensor (GOLD)	Eastes
4:00	XRS	Viereck
4:10	EUVS	Viereck
4:20	SUVI	Hill
4:30	SEISS	Kress
4:40	Mag	Loto'aniu
4:50	Wrap up and conclusions	Singer
5:00	Space Weather Week Reception (NCAR Mesa Lab)	