Technnology 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 with Requirements Validation Version 1.1

FY 2009

Weather and Water Goal

Space Weather Program (WW-SWX)

September 4, 2009[1]

[1] PORD Document Date reflects date for publication of this [FINAL with Requirements Validation] CORL Data was downloaded at [09-03-2009 10:28:34]

Table of Contents

Signatures ..... **iv**
Observation Requirement Validation iv
Observation Requirement Verification v

1. Program Summary **1**

2. Observation Requirements Summary **1**
2.1 Observation Requirements by Priority 1
2.2 Observation Requirements by Discipline 2
2.3 Observation Requirements by Type 3

3. Observation Requirements Mapping to Performance Measures **4**

4. Status of Program List **6**

Appendix A Space Weather Program, Observation Requirements **A-1**

Appendix B WW-SWX, Priority-1 Requirements Validation **B-1**
Appendix B.1 Validation Documents Submitted B-1
Appendix B.2 Validation Documents Mapping to Observation Requirements B-2
Appendix B.3 Validation Assessment for Priority-1 Requirements B-4

Appendix C Program Acronym List **C-1**

Appendix D PORD Table Column Definitions **D-1**

List of Figures

Figure 1: WW-SWX Observation Requirements by Priority (%) 2
Figure 2: WW-SWX Observation Requirements by Discipline. 3
Figure 3: WW-SWX Observation Requirements by Type. 3

List of Tables

Table 1: WW-SWX Observation Requirements Mapping to Performance Measures 4
Table 2: WW-SWX Observation Requirement Attributes Remaining [blank] or [tbs] 6
Table B-1: Validation Documents provided to support Priority- Requirements B-1
Table B-2: Validation Document Mapping to Observation Requirement B-2
Table B-3: Level of Validation for each Priority 1 Requirement Attribute B-4

Document Changes applied after Requirements Validation

Version	Date	Pages Affected	Description
FY2007	11/14/2007	ALL – PORD Document Created	FINAL for Program Verification
FY2009 v1.0	5/19/2009	ALL – PORD Document Created	Significant Changes, including: • Revised Requirement Names, • Clarification of Attribute Definitions for Space Weather
FY2009 v1.1	5/19/2009		NOSC Presentation and Endorsement
	6/15/2009	Appendix B	Replaced with Requirements Validation data briefed to NOSC on 5/20/09
	9/4/2009	Appendix A Appendix A, Pg A-2	Significant Changes including: • Reqmt Weights, • Objective Values, and • Threshold Values not briefed to NOSC. Of the Parameter Values briefed to NOSC, the threshold value for Spatial/Angular Resolution of Protons: Medium & High Energy, L5, was changed from “120 deg fov” to “35 deg pitch angle”
		Appendix C Appendix D	Added for Clarity
		Document Finalized [per Above]	FINAL with Requirements Validation Magnitude of changes requires re-Verification by Program Members
V 1.2	12/10/09	Appendix A	Changed Protons: Medium & High Energy, L5 spatial coverage from “Along solar wind B field” to “tbs.”
	07/31/09	Appendix A	Changed Protons: Medium & High Energy, L5 spatial/angular res from “120 deg fov” to “35 deg pitch angle.”
	07/23/09	Appendix A	Changed Slant Total Electron Count of the Ionosphere meas acc from “3x10^16 electrons/m^2” to “3 TECU.”
	12/11/09	Appendix A	Changed Solar Wind: Low Energy Particle Population, L1 geo cov from “Sunward along Sun-Earth Line” to “L1 In-Situ.”
	12/11/09	Appendix A	Changed Solar Wind: Magnetic Field Vector, L1 geo cov from “Sunward along Sun-Earth Line” to “L1 In-Situ.”
	12/11/09	Appendix A	Changed Solar Wind: Plasma Ion Density, L1 geo cov from “Sunward along Sun-Earth Line” to “L1 In-Situ.”
	12/11/09	Appendix A	Changed Solar Wind: Plasma Ion Temperature, L1 geo cov from “Sunward along Sun-Earth Line” to “L1 In-Situ.”
	12/11/09	Appendix A	Changed Solar Wind: Plasma Ion Velocity Vector, L1 geo cov from “Sunward along Sun-Earth Line” to “L1 In-Situ.”

Signatures

Observation Requirement Validation

NOSC Endorsement

The NOSC has received the Space Weather Program's Observation Requirements with Goal Lead and Line Office concurrence, and is satisfied with the Level-of-Validation provided for the Priority-1 Requirements.

Mary Kicza Co-Chair, NOSC	12/01/09 Date	Endorsed
Jack Hayes Co-Chair, NOSC	12/01/2009 Date	Endorsed

Goal Lead and Line Office Concurrence

The Program Manager's Supervisor and Space Weather Program's Goal Team Lead concur with the Observation Requirements and are satisfied with the Level-of-Validation provided for the Priority-1 Requirements.

Ed Johnson Goal Lead, Weather and Water Goal	10 Nov 09 Date	Concurred
Donald Berchoff Director, Office of Science and Technology	6 NOV 09 Date	Concurred

Program Manager Validation

The Space Weather Program Manager has validated the Priority-1 Observation Requirements by providing the Documentation listed in Appendix B as evidence of a substantiated basis for each of the 5 Key Attributes of those requirements.

Thomas Bogdan Program Manager, Space Weather Program	10/26/2009 Date	✓ Validated

Observation Requirement Verification

The Program Manager, with Program Membership concurrence, has verified that the Space Weather Program's Observation Requirements, as documented in the CORL and reproduced in this document, comprise the Space Weather Program's Threshold and Objective level requirements for environmental observations, and are ready for Validation.

Program Manager Verification

Thomas Bogdan Program Manager, Space Weather Program	10/26/2009 Date	✓ Verified

Program Membership Concurrence

Christopher Fox	10/27/09 Date	✓ Concurred
William (Bill) Denig	10/27/09 Date	✓ Concurred
Rodney Viereck	4 Nov 2009 Date	✓ Concurred

1. Program Summary

NOAA's Space Weather Program (SWX) delivers space weather alerts, watches, warnings and forecasts to the aviation industry, satellite operators, precision GPS users, federal and state emergency managers, the DoD, federal and commercial space mission controllers, and power distribution grid managers. The advanced technologies that underlie our homeland security and economic prosperity are vulnerable to solar and geomagnetic storms. NOAA is the nations official source for space weather guidance, prediction and data archiving, and is designated a National Critical System by the Department of Homeland Security. The end-to-end Space Weather Program develops requirements for NOAA's operational satellite sensors; ingests and processes space weather data; leverages the research supported by the National Aeronautics and Space Administration and the National Science Foundation; transitions this knowledge and capability into products to provide advance warning of space weather events that can disrupt and damage communication, transportation and related systems; and archives and distributes NOAA and Department of Defense space weather data. The Space Weather Program works in close collaboration with the Air Force Weather Agency, which uses and modifies many of our products and services to meet the unique space situational awareness needs of the national defense and intelligence communities.

2. Observation Requirements Summary

The **Space Weather** Program of NOAA's Weather and Water Goal requires a total of 66 environmental observation requirements to address its mission. The following graphs provide a breakdown of these requirements by mission Priority, environmental Discipline and Type.

Total Records: 66

2.1 Observation Requirements by Priority

The Space Weather program's observation requirements are distributed among priority levels as follows:

48 = **Priority 1, Mission Critical:** Cannot meet operational mission objectives without this data.
15 = **Priority 2, Mission Optimal:** Data not critical but would provide significant improvement to operational capability.
3 = **Priority 3, Mission Enhancing:** Needed to enhance state of knowledge / assess potential for operational capability.

The following chart provides the distribution of the Space Weather program's requirements by priority.

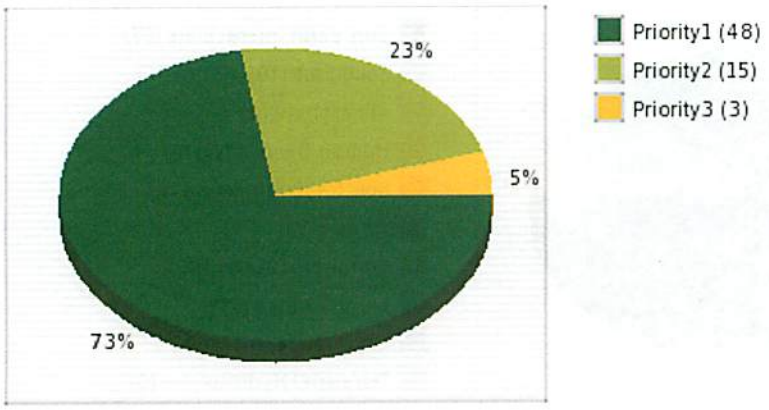

Figure 1: WW-SWX Observation Requirements by Priority (%)

2.2 Observation Requirements by Discipline

The Space Weather program's observation requirements are distributed among environmental disciplines as follows:

3 = Atmosphere
0 = Biosphere
0 = Cryosphere
0 = Human Dimensions
0 = Terrestrial Hydrosphere
0 = Land Surface
0 = Oceans
6 = Solid Earth
0 = Spectral/Engineering
57 = Sun-earth Interactions

The following chart provides the distribution of the Space Weather program's requirements by discipline.

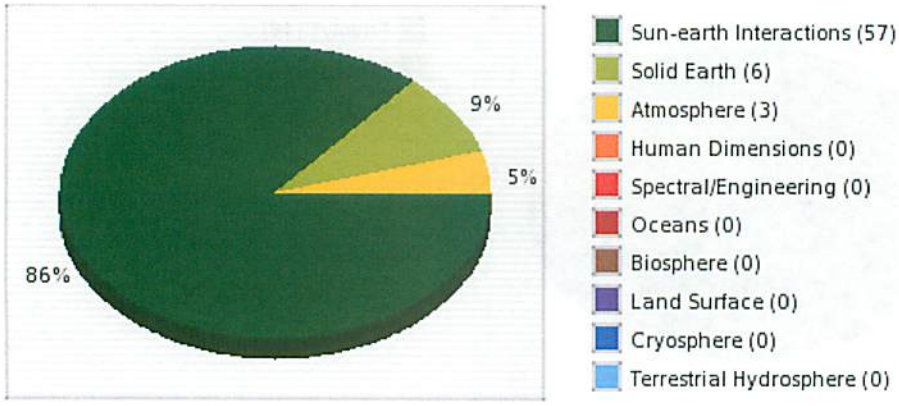

Figure 2: WW-SWX Observation Requirements by Discipline.

2.3 Observation Requirements by Type

The Space Weather program's observation requirements are distributed among types as follows:

0 = Biological
0 = Chemical
66 = Physical
0 = Social
0 = Socio-economic

The following Chart gives the distribution of the Space Weather program's requirements by type.

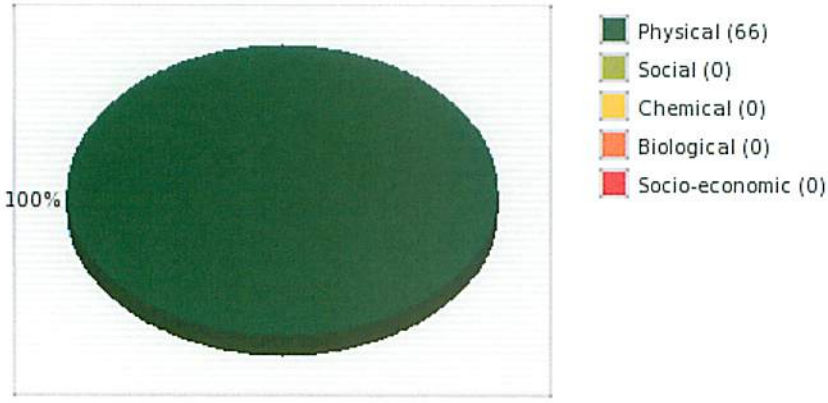

Figure 3: WW-SWX Observation Requirements by Type.

3. Observation Requirements Mapping to Performance Measures

The following table provides the listing of observation requirements for the **Space Weather** Program of NOAA's Weather and Water Goal by GPRA and Corporate (NOAA) Performance Measures, and Regional Collaboration Priorities (RC).

NOAA-1: WW-SWX - Direct delivery of real-time space weather information to registered customers
NOAA-2: WW-SWX - Improved Accuracy of Geomagnetic Storm Warnings
NOAA-3: WW-SWX - Improved Accuracy of Radiation Storm Warnings
NOAA-4: WW-SWX - Improved Lead Time/Timing Error of Geomagnetic Storm Warnings
NOAA-5: WW-SWX - Improved Lead Time/Timing Error of Radiation Storm Warnings
NOAA-6: WW-SWX - Percent of Space Weather Alerts Delivered Within 10 Minutes of Event Onset
NOAA-7: WW-SWX - Preservation of National Space Weather Data to NOAA Standards
NOAA-8: WW-SWX - Improved Retrospective Products for Understanding the Space Environment
NOAA-9: WW-SWX - Accuracy of Ionospheric GPS Position Correction (meters)
NOAA-10: WW-SWX - Cadence of Ionospheric GPS Anomaly Maps (minutes)

RC-1: Hazard Resilient Coastal Communities
RC-2: Integrated Ecosystem Assessments
RC-3: Integrated Water Resource Services

Table 1: WW-SWX Observation Requirements Mapping to Performance Measures

Requirement	Priority	NOAA										RC		
		1	2	3	4	5	6	7	8	9	10	1	2	3
Aurorae: Supra-thermal through Auroral Energy Particles, Electrons	1	X	X		X			X	X	X	X			
Aurorae: Supra-thermal through Auroral Energy Particles, Ions	1	X	X		X			X	X					
Auroral Boundary: LEO	1	X	X		X				X	X	X			
Auroral Particle Energy Deposition: LEO	1	X	X		X			X	X	X	X			
Electric Field: LEO	1	X	X		X			X	X					
Electrons & Protons: Low Energy, GEO	1	X						X	X					
Electrons: Medium & High Energy, GEO	1	X					X	X	X					
Electrons: Medium & High Energy, LEO	1	X						X	X	X				
Energetic Heavy Ions	1	X		X		X	X	X	X					
Energetic Ions: LEO	1	X		X		X		X	X					
Galactic Cosmic Rays (Neutrons)	1	X						X	X					
Geomagnetic Field: GEO	1	X	X		X			X	X					
Geomagnetic Field: Ground- Based Mid-Latitude	1	X	X		X		X	X	X		X			
Geomagnetic Field: Ground-Based Auroral	1	X	X		X		X	X	X		X			
Geomagnetic Field: Ground-Based Low Latitude	1	X	X		X		X	X	X		X			
Ionospheric Electron Density Profiles	1	X						X	X	X	X			

Requirement	Priority	NOAA										RC		
		1	2	3	4	5	6	7	8	9	10	1	2	3
Ions: Medium & High Energy, LEO	1	X		X		X		X	X					
Protons: Medium & High Energy, GEO	1	X		X		X	X	X	X					
Protons: Medium & High Energy, L5	1	X		X		X	X	X	X					
Slant Total Electron Content of the Ionosphere	1	X						X	X	X	X			
Solar & Galactic Protons: GEO	1	X		X		X	X	X	X					
Solar Flux: EUV	1	X						X	X	X	X			
Solar Flux: X-Ray Irradiance	1	X					X	X	X		X			
Solar H Alpha Imagery	1	X	X	X	X	X	X	X	X					
Solar Imagery: Corona , L5	1	X	X		X		X	X	X					
Solar Imagery: Corona, L1	1	X	X		X		X	X	X					
Solar Imagery: Heliospheric, L1	1	X	X		X		X	X	X					
Solar Imagery: Heliospheric, L5	1	X	X		X		X	X	X					
Solar Imagery: Magnetogram, L1	1	X	X	X	X	X	X		X	X	X			
Solar Imagery: Magnetogram, L5	1	X	X	X	X	X	X		X					
Solar Imagery: White Light	1	X	X	X	X	X	X	X	X	X	X			
Solar Imagery: X-Ray, Radiance, L1	1	X	X	X	X	X	X	X	X	X	X			
Solar Imagery: X-Ray, Radiance, L5	1	X	X	X	X	X	X	X	X					
Solar Imagery: X-Ray, Temperature	1	X	X	X	X	X	X	X	X	X	X			
Solar Mg II Core-to-Wing Ratio	1	X						X	X	X				
Solar Radio Emissions	1	X	X	X	X	X	X	X	X	X	X			
Solar Wind: High Energy Electrons, L1	1	X	X	X	X	X	X	X	X					
Solar Wind: High Energy Electrons, L5	1	X	X	X	X	X	X	X	X					
Solar Wind: Low Energy Particle Population, L1	1	X	X	X	X	X	X	X	X	X	X			
Solar Wind: Low Energy Particle Population, L5	1	X	X	X	X	X	X	X	X					
Solar Wind: Magnetic Field Vector, L1	1	X	X	X	X	X	X	X	X	X	X			
Solar Wind: Magnetic Field Vector, L5	1	X	X	X	X	X	X	X	X					
Solar Wind: Plasma Ion Density, L1	1	X	X	X	X	X	X	X	X	X	X			
Solar Wind: Plasma Ion Density, L5	1	X	X	X	X	X	X	X	X					
Solar Wind: Plasma Ion Temperature, L1	1	X	X	X	X	X	X	X	X	X	X			
Solar Wind: Plasma Ion Temperature, L5	1	X	X	X	X	X	X	X	X					
Solar Wind: Plasma Ion Velocity Vector, L1	1	X	X	X	X	X	X	X	X	X	X			
Solar Wind: Plasma Ion Velocity Vector, L5	1	X	X	X	X	X	X	X	X					
Auroral Imagery	2													
Electrons & Protons: Low Energy, MEO	2													
Geomagnetic Field: LEO	2													
Geomagnetic Field: MEO	2													
Magnetospheric Electrons: Medium & High Energy, MEO	2													
Magnetospheric Protons: Medium & High Energy, MEO	2													
Neutral Density Profiles	2													
Neutral Thermospheric Winds	2													
Solar Flux: Total Irradiance	2													
Solar Flux: UV-VIS-IR Spectral Irradiance	2													

Requirement	Priority	NOAA										RC		
		1	2	3	4	5	6	7	8	9	10	1	2	3
Solar Imagery: Backside of Sun	2													
Solar Imagery: Heleoseismology	2													
Solar Wind: Plasma Electron Temperature	2													
Solar and Galactic Particles: MEO	2													
Thermospheric Neutral Composition	2													
In-Situ Plasma Temperature: LEO	3													
Ionospheric Irregularities: Amplitude	3													
Ionospheric Irregularities: Phase	3													

4. Status of Program List

As shown in Appendix A, each NOAA Observation Requirement is further specified by spatial, temporal and accuracy related attributes at both Threshold and Objective levels. The following table provides the attribute completion status of the observation requirements list for the Space Weather Program. All attributes at the Priority-1/Threshold Level must be completed to allow for observation gap analyses to be conducted.

Table 2: WW-SWX Observation Requirement Attributes Remaining [blank] or [tbs]

Priority	Threshold	Objective
1	16	18
2	124	115
3	27	27
Total	**167**	**160**

Appendix A Space Weather Program, Observation Requirements

Key: V=value, U=units, W=weight

Observation Requirement	Obs Req Prty	T/O	Spatial Cov.		Vert Range				Vert Res			Spatial/ Angular Res			Meas Range				Msmnt Accy			Smpling Intvl			Data Lncy			Long Stab		
			V	W	Low	High	U	W	V	U	W	V	U	W	Low	High	U	W	V	U	W	V	U	W	V	U	W	V	U	W
Aurorae: Supra-thermal through Auroral Energy Particles, Electrons	1	T	>30 deg N & S	10	LEO	LEO	In situ, Polar	20	na	na	0	10	km	10	10^5	10^10	1/(cm^2-s-str)	15	10^5	1/(cm^2-s-str)	15	10	min	10	90	min	15	10	%/mission	5
		O	>30 deg N & S	10	LEO	LEO	In situ, Polar	20	na	na	0	5	km	10	10^5	10^10	1/(cm^2-s-str)	15	10^5	1/(cm^2-s-str)	15	5	min	10	15	min	15	10	%/mission	5
Aurorae: Supra-thermal through Auroral Energy Particles, Ions	1	T	>30 deg N & S	10	LEO	LEO	In situ, Polar	20	na	na	0	10	km	10	10^5	10^9	1/(cm^2-s-str)	15	10^5	1/(cm^2-s-str)	15	10	min	10	90	min	15	10	%/mission	5
		O	>30 deg N & S	10	LEO	LEO	In situ, Polar	20	na	na	0	5	km	10	10^4	10^9	1/(cm^2-s-str)	15	10^5	1/(cm^2-s-str)	15	5	min	10	15	min	15	10	%/mission	5
Auroral Boundary: LEO	1	T	>30 deg N & S	20	na	na	na	0	na	na	0	50	km	20	0	+/-90	deg lat	10	50	km	20	10	min	10	15	min	10	50	km	10
		O	>30 deg N & S	20	na	na	na	0	na	na	0	10	km	20	0	+/-80	deg lat	10	10	km	20	10	min	10	1	min	10	10	km	10
Auroral Particle Energy Deposition: LEO	1	T	>30 deg N & S	5	LEO	LEO	In situ, Polar	25	na	na	0	100	km	15	10^-4	1	W/m^2	15	10^-4	W/m^2	10	10	min	5	15	min	20	10	%/yr	5
		O	>30 deg N & S	5	LEO	LEO	In situ, Polar	25	na	na	0	5	km	15	5X10^-5	1	W/m^2	15	10^-4	W/m^2	10	5	min	5	1	min	20	10	%/yr	5
Electric Field: LEO	1	T	Global	10	LEO	LEO	In situ, Polar	0	na	na	0	10	km	10	-150	150	mV/m [in plane normal to geomagnetic field]	20	3	mV/m	15	10	min	15	15	min	20	10	%/yr	10
		O	Global	10	LEO	LEO	In situ, Polar	0	na	na	0	0.1	km	10	-250	250	mV/m [in plane normal to geomagnetic field]	20	0.1	mV/m	15	1	min	15	5	min	20	10	%/yr	10
Electrons & Protons: Low Energy, GEO	1	T	Global	10	GEO	GEO	In situ	0	na	na	0	35	deg pitch angle	0	9x10^4 E^(-1.3)	8x10^8 E^(-0.8)	(cm^2 s sr keV)^(-1)	20	25	%	20	30	sec	5	1	min	20	10	%/mission	25
		O	Global	10	GEO	GEO	In situ	0	na	na	0	35	deg pitch angle	0	9x10^4 E^(-1.3)	8x10^8 E^(-0.8)	(cm^2 s sr keV)^(-1)	20	10	%	20	10	sec	5	1	min	20	10	%/mission	25
Electrons: Medium & High Energy, GEO	1	T	Global	15	GEO	GEO	In situ	10	na	na	0	35	deg pitch angle	20	1.9x10^6 E^(-2.2)	7.2x10^11 E^(-2.8)	(cm^2 s sr keV)^(-1)	10	25	%	10	30	sec	10	1	min	15	10	%/mission	10
		O	Global	15	GEO	GEO	In situ	10	na	na	0	35	deg pitch angle	20	1.9x10^6 E^(-2.2)	7.2x10^11 E^(-2.8)	(cm^2 s sr keV)^(-1)	10	10	%	10	10	sec	10	1	min	15	10	%/mission	10
Electrons: Medium & High Energy, LEO	1	T	Global	10	LEO	LEO	In situ, Polar	20	na	na	0	2	look directions	10	100	5X10^7	1/(cm^2-s-str)	15	100	1/(cm^2-s-str)	15	10	min	5	15	min	20	5	%/mission	5
		O	Global	10	LEO	LEO	In situ, Polar	20	na	na	0	2	look directions	10	50	2X10^8	1/(cm^2-s-str)	15	100	1/(cm^2-s-str)	15	10	min	5	5	min	20	5	%/mission	5
Energetic Heavy Ions	1	T	Global	15	GEO	GEO	In situ	5	na	na	0	1	look directions	5	0.055 (E/n)^(-1)	5x10^4 (E/n)^(-2.3)	(cm^2 s sr MeV/n)^(-1)	15	25	%	20	5	min	15	5	min	20	15	%/mission	5
		O	Global	15	GEO	GEO	In situ	5	na	na	0	1	look directions	5	0.055 (E/n)^(-1)	5x10^4 (E/n)^(-2.3)	(cm^2 s sr MeV/n)^(-1)	15	10	%	20	5	min	15	5	min	20	10	%/mission	5
Energetic Ions: LEO	1	T	>30 deg N & S	15	LEO	LEO	In situ, Polar	15	na	na	0	25	km	5	0.5 p< 100 MeV; .1 p>100 MeV	2X10^5 p<100 MeV;3X10^4 p>100 MeV	1/(cm^2-s-str)	15	0.1	1/(cm^2-s-str)	15	10	min	10	15	min	20	10	%/mission	5
		O	>30 deg N & S	15	LEO	LEO	In situ, Polar	15	na	na	0	25	km	5	0.5 p< 100 MeV; .1 p>100 MeV	2X10^5 p<100 MeV;3X10^4 p>100 MeV	1/(cm^2-s-str	15	0.1	1/(cm^2-s-str)	15	25	min	10	5	min	20	10	%/mission	5

Observation Requirement	Obs Req Prty	T/O	Spatial Cov.		Vert Range				Vert Res			Spatial/ Angular Res			Meas Range				Msmnt Accy			Smplng Intvl			Data Lncy			Long Stab		
			V	W	Low	High	U	W	V	U	W	V	U	W	Low	High	U	W	V	U	W	V	U	W	V	U	W	V	U	W
Galactic Cosmic Rays (Neutrons)	1	T	> 75 deg N Geomagnetic	15	0	6	km	15	na	na	0	na	na	0	>1	>15	GeV	20	10	% above median background	15	5	min	15	5	min	20	na	na	0
		O	> 75 deg N (geomagnetic)	15	0	6	km	15	na	na	0	na	na	0	100	1000	MeV	20	10	% above median background	15	5	min	15	5	min	20	na	na	0
Geomagnetic Field: GEO	1	T	Global	15	GEO	GEO	In situ	15	na	na	0	3	axis orthogonal	0	-400	400	nT/axis	20	1	nT/axis	15	2	samples/sec	15	5	sec	20	na	na	0
		O	Global	15	GEO	GEO	In situ	15	na	na	0	3	axis orthogonal	0	-400	400	nT/axis	20	1	nT/axis	15	20	samples/sec	15	5	sec	20	na	na	0
Geomagnetic Field: Ground- Based Mid-Latitude	1	T	13 stations; 45 to 63 degrees geomagnetic latitude	15	na	na	na	0	na	na	0	30	deg longitude approximately equally spaced	0	minus 65000	65000	nT	20	1	nT	20	1	min	15	1	min	20	5/yr	nT	10
		O	13 stations; 45 to 63 degrees geomagnetic latitude	15	na	na	na	0	na	na	0	30	deg longitude approximately equally spaced	0	minus 65000	65000	nT	20	0.1	nT	20	1	sec	15	1	min	20	1/yr	nT	10
Geomagnetic Field: Ground-Based Auroral	1	T	12 stations; 60 to 71 degrees geomagnetic latitude	15	na	na	na	0	na	na	0	30	deg longitude approximately equally spaced	0	minus 65000	65000	nT	20	1	nT	20	1	min	15	1	min	20	5/yr	nT	10
		O	12 stations; 60 to 71 degrees geomagnetic latitude	15	na	na	na	0	na	na	0	30	deg longitude approximately equally spaced	0	minus 65000	65000	nT	20	0.1	nT	20	1	sec	15	1	min	20	1/yr	nT	10
Geomagnetic Field: Ground-Based Low Latitude	1	T	4 stations; 10 to 35 degrees geomagnetic latitude	15	na	na	na	0	na	na	0	90	deg longitude approximately equally spaced	0	minus 65000	65000	nT	20	1	nT	20	1	min	15	1	min	20	5/yr	nT	10
		O	4 stations; 10 to 35 degrees geomagnetic latitude	15	na	na	na	0	na	na	0	90	deg longitude approximately equally spaced	0	minus 65000	65000	nT	20	0.1	nT	20	1	sec	15	1	min	20	1/yr	nT	10
Ionospheric Electron Density Profiles	1	T	Global	15	90	1500	km	15	10	km	15	100	km	10	1000	10000000	cm^-3	10	30	%	10	na	na	0	15	min	15	na	na	10
		O	Global	15	90	1500	km	15	10	km	15	50	km	10	100	1000000	cm^-3	10	30	%	10	na	na	0	5	min	15	na	na	10
Ions: Medium & High Energy, LEO	1	T	Global	15	LEO	LEO	In situ, Polar	20	na	na	0	25	km	10	100	5X10^7	1/(cm^2-s-str)	10	100	1/(cm^2-s-str)	10	10	min	10	15	min	15	5	%/mission	10
		O	Global	15	LEO	LEO	In situ, Polar	20	na	na	0	10	km	10	50	2X10^8	1/(cm^2-s-str)	10	> of (50 or 1)	1/(cm^2-s-str) or %	10	10	min	10	5	min	15	5	%/mission	10
Protons: Medium & High Energy, GEO	1	T	Global	15	GEO	GEO	In situ	10	na	na	0	35	deg pitch angle	20	6.6x10^5 E^(-2.3)	1.7x10^8 E^(-1.6)	(cm^2 s sr keV)^(-1)	15	25	%	10	30	sec	10	1	min	15	10	%/mission	5
		O	Global	15	GEO	GEO	In situ	10	na	na	0	35	deg pitch angle	20	6.6x10^5 E^(-2.3)	1.7x10^8 E^(-1.6)	(cm^2 s sr keV)^(-1)	15	25	%	10	30	sec	10	1	min	15	10	%/mission	5
Protons: Medium & High Energy, L5	1	T	Along solar wind B field	15	L5	L5	In situ	10	na	na	0	35	deg pitch angle	20	6.6x10^5 E^(-2.3)	1.7x10^8 E^(-1.6)	(cm^2 s sr keV)^(-1)	15	25	%	10	30	sec	10	1	min	15	10	%/mission	5
		O	Along solar wind B field	15	L5	L5	In situ	10	na	na	0	35	deg pitch angle	20	6.6x10^5 E^(-2.3)	1.7x10^8 E^(-1.6)	(cm^2 s sr keV)^(1)	15	25	%	10	30	sec	10	1	min	15	10	%/mission	5
Slant Total Electron Content of the Ionosphere	1	T	Global	15	100	20200	km	15	na	na	0	500	km	5	0	400	TECU	15	3	TECU	10	15	min	15	10	min	15	1	%/decade	10
		O	Global	15	100	20200	km	15	na	na	0	100	km	5	0	400	TECU	15	0.3	TECU	10	1	min	15	1	min	15	0.5	%/decade	10

Observation Requirement	Obs Req Prty	T/O	Spatial Cov.		Vert Range				Vert Res			Spatial/ Angular Res			Meas Range				Msmnt Accy			Smplng intvl			Data Ltncy			Long Stab		
			V	W	Low	High	U	W	V	U	W	V	U	W	Low	High	U	W	V	U	W	V	U	W	V	U	W	V	U	W
Solar & Galactic Protons: GEO	1	T	Global	15	GEO	GEO	In situ	15	na	na	0	2	look angles; E/W	10	8.0x10^2 E^(-1.8)	5.4x10^9 E^(-2.1)	(cm^2 s sr keV)^(-1)	10	25	%	10	1	min	15	1	min	15	10	%/mission	10
		O	Global	15	GEO	GEO	In situ	15	na	na	0	2	look angles; E/W	10	8.0x10^2 E^(-1.8)	5.4x10^9 E^(-2.1)	(cm^2 s sr keV)^(-1)	10	10	%	10	30	sec	15	1	min	15	10	%/mission	10
Solar Flux: EUV	1	T	Heliocentric	20	0	1	Rsun	25	na	na	0	na	na	0	1/10*(Solar Min)	10*(Solar Max)	nm	15	20	%	10	30	sec	10	30	sec	10	2	%/yr	10
		O	Heliocentric	20	0	1	Rsun	25	na	na	0	na	na	0	1/10*(Solar Min)	10*(Solar Max)	nm	15	10	%	10	10	sec	10	10	sec	10	1	%/yr	10
Solar Flux: X-Ray Irradiance	1	T	Heliocentric	20	0	1.3	Rsun	25	na	na	0	na	na	0	5x10^-9	2x10^-3	W/m^2	15	10	%	15	3	sec	10	3	sec	10	5	%/mission	5
		O	Heliocentric	20	0	1.3	Rsun	25	na	na	0	na	na	0	1x10^-9	4x10^-3	W/m^2	15	5	%	15	1	sec	10	3	sec	10	5	%/mission	5
Solar H Alpha Imagery	1	T	Heliocentric	15	0	1	Rsun	10	na	na	0	5	arcsec	20	1.5	1.65	W/m2/nm @ 656.3 nm	15	10	%	10	1	min	10	5	min	10	10	%/yr	10
		O	Heliocentric	15	0	1	Rsun	10	na	na	0	1	arcsec	20	1.5	1.65	W/m2/nm @ 656.3 nm	15	10	%	10	1	min	10	5	min	10	10	%/yr	10
Solar Imagery: Corona , L5	1	T	Heliocentric	15	3	17	Rsun	10	na	na	0	50	arcsec	20	1x10^-11	1x10^-8	B/BSun	20	10	%	10	15	min	10	15	min	15	na	na	0
		O	Heliocentric	15	3	17	Rsun	10	na	na	0	50	arcsec	20	1x10^-11	1 x 10^-8	B/BSun	20	10	%	10	15	min	10	1	min	15	na	na	0
Solar Imagery: Corona, L1	1	T	Heliocentric	15	3	17	Rsun	10	na	na	0	50	arcsec	20	1x10^-11	1 x 10^-8	B/BSun	20	10	%	10	15	min	10	15	min	15	na	na	0
		O	Heliocentric	15	3	17	Rsun	10	na	na	0	50	arcsec	20	1 x 10^-11	5 x 10^-8	B/BSun	20	10	%	10	2	min	10	1	min	15	na	na	0
Solar Imagery: Heliospheric, L1	1	T	Heliocentric	15	15 Solar Radii	1 Astronomical Unit	Solar Radii or Astronomical Unit	10	na	na	0	1	deg	15	tbs	tbs	tbs	15	10	%	15	60	min	10	15	min	10	10 (Total Life)	%	10
		O	Heliocentric	15	15 Solar Radii	1 Astronomical Unit	Solar Radii or Astronomical Unit	10	na	na	0	5	arcmin	15	tbs	tbs	tbs	15	10	%	15	60	min	10	10	min	10	10 (Total Life)	%	10
Solar Imagery: Heliospheric, L5	1	T	Heliocentric	15	15 Solar Radii	1 Astronomical Unit	Solar Radii or Astronomical Unit	10	na	na	0	1	deg	15	tbs	tbs	tbs	15	10	%	15	60	min	10	15	min	10	10 (Total Life)	%	10
		O	Heliocentric	15	15 Solar Radii	1 Astronomical Unit	Solar Radii or Astronomical Unit	10	na	na	0	5	arcmin	15	tbs	tbs	tbs	15	10	%	15	60	min	10	10	min	10	10 (Total Life)	%	10
Solar Imagery: Magnetogram, L1	1	T	Heliocentric	15	0	1	Rsun	10	na	na	0	5	arcsec	15	-6000	6000	gauss	15	20	%	15	3	hr	10	60	min	10	1	%/yr	10
		O	Heliocentric	15	0	1	Rsun	10	na	na	0	1	arcsec	15	-10000	10000	gauss	15	0.1	%	15	3	hr	10	60	min	10	1	%/yr	10
Solar Imagery: Magnetogram, L5	1	T	Heliocentric	15	0	1	Rsun	10	na	na	0	5	arcsec	15	-6000	6000	gauss	15	20	%	15	3	hr	10	60	min	10	1	%/yr	10
		O	Heliocentric	15	0	1	Rsun	10	na	na	0	1	arcsec	15	-10000	10000	gauss	15	0.1	%	15	3	hr	10	60	min	10	1	%/yr	10
Solar Imagery: White Light	1	T	Heliocentric	15	0	1	Rsun	10	na	na	0	1	arcsec	20	350	800	nm	15	5	%	15	10	min	15	1	hr	10	na	na	0
		O	Heliocentric	15	0	1	Rsun	10	na	na	0	1	arcsec	20	350	800	nm	15	5	%	15	10	min	15	1	hr	10	na	na	0
Solar Imagery: X-Ray, Radiance, L1	1	T	Heliocentric	15	0	1.3	Rsun	10	na	na	0	5	arcsec	15	0.3	10^6	ph/cm2/arcsec/sec; MK	15	20	%	15	Image:< or = 2	min	10	<1	min	15	20	%	5
		O	Heliocentric	15	0	1.3	Rsun	10	na	na	0	3	arcsec	15	0.3	10^6	ph/cm2/arcsec/sec; MK	15	10	%	15	Image:< or = 2	min	10	<1	min	15	20	%	5

Observation Requirement	Obs Req Prty	T/O	Spatial Cov.		Vert Range				Vert Res			Spatial/ Angular Res			Meas Range				Msmnt Accy			Smplng intvl			Data Ltncy			Long Stab		
			V	W	Low	High	U	W	V	U	W	V	U	W	Low	High	U	W	V	U	W	V	U	W	V	U	W	V	U	W
Solar Imagery: X-Ray, Radiance, L5	1	T	Heliocentric	15	0	1.3	Rsun	10	na	na	0	5	arcsec	15	0.3	10^6	ph/cm2/arcsec/sec; MK	15	20	%	15	Image:< or = 2	min	10	<1	min	15	20	%	5
		O	Heliocentric	15	0	1.3	Rsun	10	na	na	0	5	arcsec	15	0.3	10^6	ph/cm2/arcsec/sec; MK	15	10	%	15	Image:< or = 2	min	10	<1	min	15	20	%	5
Solar Imagery: X-Ray, Temperature	1	T	Heliocentric	10	0	1.3	Rsun	10	na	na	0	5	arcsec	15	1	10	ph/cm2/arcsec/sec; MK	15	20	%	15	6	min	15	<1	min	15	20	%	5
		O	Heliocentric	10	0	1.3	Rsun	10	na	na	0	3	arcsec	15	0.5	20	ph/cm2/arcsec/sec; MK	15	10	%	15	3	min	15	<1	min	15	20	%	5
Solar Mg II Core-to-Wing Ratio	1	T	Heliocentric	20	0	1	Rsun	20	na	na	0	na	na	0	0.05	0.4	W/m^2/nm	10	0.10	%	15	60	min	10	60	min	10	0.01	%/yr	15
		O	Heliocentric	20	0	1	Rsun	20	na	na	0	na	na	0	0.05	0.4	W/m^2/nm	10	0.5	%	15	60	min	10	15	min	10	0.001	%/yr	15
Solar Radio Emissions	1	T	Heliocentric	20	1	2	Rsun	0	na	na	0	na	na	0	0.02	15400	MHz	15	5	%	15	1	sec	15	1	min	20	0.1	%/yr	15
		O	Heliocentric	20	1	2	Rsun	0	na	na	0	na	na	0	0.02	15400	MHz	15	5	%	15	1	min	15	1	min	20	0.1	%/yr	15
Solar Wind: High Energy Electrons, L1	1	T	Sunward along Sun-Earth Line	5	L1	L1	Along Sun-Earth Line	10	na	na	0	40	Re perpendicular to Sun-Earth Line	10	tbs	tbs	tbs	20	20	%	15	1	min	20	5	min	20	tbs	tbs	5
		O	Sunward along Sun-Earth Line	5	L1	L1	along Sun-Earth Line	10	na	na	0	40	Re perpendicular to Sun-Earth line	10	tbs	tbs	tbs	20	tbs	%	15	1	min	20	5	min	20	tbs	tbs	5
Solar Wind: High Energy Electrons, L5	1	T	L5 in situ	10	1	1	AU	10	na	na	0	na	na	0	tbs	tbs	tbs	20	20	%	20	1	min	20	5	min	20	tbs	tbs	5
		O	L5 in situ	10	1	1	AU	10	na	na	0	na	na	0	tbs	tbs	tbs	20	tbs	%	20	1	min	20	5	min	20	tbs	tbs	5
Solar Wind: Low Energy Particle Population, L1	1	T	Sunward along Sun-Earth Line	5	L1	L1	Along Sun-Earth Line	10	na	na	0	40	Re perpendicular to Sun-Earth line	10	50	2000	KeV	20	20	%	10	5	min	20	5	min	20	20	%	5
		O	Sunward along Sun-Earth Line	5	L1	L1	Along Sun-Earth Line	10	na	na	0	40	Re perpendicular to Sun-Earth line	10	50	1000	KeV	20	20	%	10	5	min	20	5	min	20	20	%	5
Solar Wind: Low Energy Particle Population, L5	1	T	L5 in situ	10	1	1	AU	10	na	na	0	na	na	0	50	2000	KeV	20	20	%	15	5	min	20	5	min	20	20	%	5
		O	L5 in situ	10	1	1	AU	10	na	na	0	na	na	0	50	1000	KeV	20	20	%	15	5	min	20	5	min	20	20	%	5
Solar Wind: Magnetic Field Vector, L1	1	T	Sunward along Sun-Earth Line	5	L1	L1	Along Sun-Earth Line	10	na	na	0	40	Re perpendicular to Sun-Earth line	10	0.1	100	nT	20	0.10	nT	10	1	min	20	5	min	20	1	nT	5
		O	Sunward along Sun-Earth Line	5	L1	L1	Re along Sun-Earth line	10	na	na	0	40	Re perpendicular to Sun-Earth line	10	0.1	100	nT	20	0.1	nT	10	1	min	20	5	min	20	1	nT	5
Solar Wind: Magnetic Field Vector, L5	1	T	L5 in situ	10	1	1	AU	10	na	na	0	na	na	0	0.1	100	nT	20	0.1	nT	15	1	min	20	5	min	20	1	nT	5
		O	L5 in situ	10	1	1	AU	10	na	na	0	na	na	0	0.1	100	nT	20	0.1	nT	15	1	min	20	5	min	20	1	nT	5

Observation Requirement	Obs Req Prty	T/O	Spatial Cov.		Vert Range				Vert Res			Spatial/ Angular Res			Meas Range				Msmnt Accy			Smplng Intvl			Data Ltncy			Long Stab		
			V	W	Low	High	U	W	V	U	W	V	U	W	Low	High	U	W	V	U	W	V	U	W	V	U	W	V	U	W
Solar Wind: Plasma Ion Density, L1	1	T	Sunward along Sun-Earth Line	5	L1	L1	Along Sun-Earth Line	10	na	na	0	40	Re perpendicular to Sun-Earth line	10	0.1	100	part/cm^3	20	20	%	10	1	min	20	5	min	20	20	%	5
		O	Sunward along Sun-Earth Line	5	L1	L1	Along Sun-Earth Line	10	na	na	0	40	Re perpendicular to Sun-Earth line	10	0.1	100	part/cm^3	20	20	%	10	1	min	20	5	min	20	20	%	5
Solar Wind: Plasma Ion Density, L5	1	T	L5 in situ	10	1	1	AU	10	na	na	0	na	na	0	0.1	100	part/cm^3	20	20	%	15	1	min	20	5	min	20	20	%	5
		O	L5 in situ	10	1	1	AU	10	na	na	0	na	na	0	0.1	100	part/cm^3	20	20	%	15	1	min	20	5	min	20	20	%	5
Solar Wind: Plasma Ion Temperature, L1	1	T	Sunward along Sun-Earth Line	5	L1	L1	Along Sun-Earth Line	10	na	na	0	40	Re perpendicular to Sun-Earth line	10	0.04	2	mK	20	20	%	10	1	min	20	5	min	20	20	%	5
		O	Sunward along Sun-Earth Line	5	L1	L1	Along Sun-Earth Line	10	na	na	0	40	Re perpendicular to Sun-Earth line	10	0.04	2	mK	20	20	%	10	1	min	20	5	min	20	20	%	5
Solar Wind: Plasma Ion Temperature, L5	1	T	L5 in situ	10	1	1	AU	10	na	na	0	na	na	0	0.04	2	mK	20	20	%	15	1	min	20	5	min	20	20	%	5
		O	L5 in situ	10	1	1	AU	10	na	na	0	na	na	0	0.04	2	mK	20	20	%	15	1	min	20	5	min	20	20	%	5
Solar Wind: Plasma Ion Velocity Vector, L1	1	T	Sunward along Sun-Earth Line	5	L1	L1	Along Sun-Earth Line	10	na	na	0	40	Re perpendicular to Sun-Earth line	10	200	2000	km/sec	20	5	%	10	1	min	20	5	min	20	5	%	5
		O	Sunward along Sun-Earth Line	5	L1	L1	Along Sun-Earth Line	10	na	na	0	40	Re perpendicular to Sun-Earth line	10	200	2000	km/sec	20	5	%	10	1	min	20	5	min	20	5	%	5
Solar Wind: Plasma Ion Velocity Vector, L5	1	T	L5 in situ	10	1	1	AU	10	na	na	0	na	na	0	200	2000	km/sec	20	5	%	15	1	min	20	5	min	20	5	%	5
		O	L5 in situ	10	1	1	AU	10	na	na	0	na	na	0	200	2000	km/sec	20	5	%	15	1	min	20	5	min	20	5	%	5
Auroral Imagery	2	T	Global		na	na	na		na	na		100	km		Moderate	Active	Aurora		10	%		50	km		90	min		na	na	
		O	Global		na	na	na		an	na		100	km		Quite	Active	Aurora		10	%		50	km		90	min		na	na	
Electrons & Protons: Low Energy, MEO	2	T	35 deg pitch angle		na	na	na		na	na		na	na		tbs	tbs	tbs		25	%		30	sec		1	min		10	%/mission	
		O	20 deg pitch angle		na	na	na		na	na		na	na		tbs	tbs	tbs		10	%		10	sec		1	min		10	%/mission	
Geomagnetic Field: LEO	2	T	LEO In-situ, Polar	15	300	1000	km	15	na	na		1	km	15	-60000	60000	nT	15	5	nT/axis	15	na	na		90	min	15	5	nT per axis	10
		O	LEO In-situ, Polar	15	300	1000	km	15	na	na		0.1	km	15	-60000	60000	nT	15	2	nT per axis	16	na	na		15	min	15	2	nT per axis	10
Geomagnetic Field: MEO	2	T	MEO; 3-axis orthogonal		3	5	Re=1 Earth radii (6378 km)		na	na		na	na		-2000	2000	nT/axis		1	nT/axis		tbs	sample/sec		5	sec		na	na	
		O	MEO; 3-axis orthogonal		3	5	Re=1 Earth radii (6378 km)		na	na		na	na		-2000	2000	nT/axis		1	nT/axis		tbs	sample/sec		5	sec		na	na	

Observation Requirement	Obs Req Prty	T/O	Spatial Cov.		Vert Range				Vert Res			Spatial/ Angular Res			Meas Range				Msmnt Accy			Smplng Intvl			Data Ltncy			Long Stab		
			V	W	Low	High	U	W	V	U	W	V	U	W	Low	High	U	W	V	U	W	V	U	W	V	U	W	V	U	W
Magnetospheric Electrons: Medium & High Energy, MEO	2	T	35 deg pitch angle		na	na	na		na	na		na	na		tbs	tbs	tbs		10	%		30	sec		1	min		10	%/mission	
		O	20 deg pitch angle		na	na	na		na	na		na	na		tbs	tbs	tbs		10	%		10	sec		1	min		10	%/mission	
Magnetospheric Protons: Medium & High Energy, MEO	2	T	35 deg pitch angle		na	na	na		na	na		na	na		tbs	tbs	tbs		10	%		30	sec		1	min		10	%/mission	
		O	20 deg pitch angle		na	na	na		na	na		na	na		tbs	tbs	tbs		10	%		10	sec		1	min		10	%/mission	
Neutral Density Profiles	2	T	Global		150	500	km		25	km		500	km		2x10^-12	7x10^-17	g/cm^3		15	%		na	na		15	min		2	%/yr	
		O	Global		90	1000	km		10	km		250	km		3x10^-9	1x10^-18	g/cm^3		5	%		na	na		5	min		1	%/yr	
Neutral Thermospheric Winds	2	T	Global	15	150	400	km	15	20	km	10	100	km	10	-1500	1500	m/sec	15	> of 10 or 10	% or m/s	10	na	na		5	min	15	na	na	10
		O	Global	15	150	400	km	15	20	km	10	100	km	10	-1500	1500	m/sec	15	> of 10 or 10	% or m/s	10	na	na		5	min	15	na	na	10
Solar Flux: Total Irradiance	2	T	Heliocentric	20	na	na	na		na	na		na	na		1310	1420	W/m^2	20	0.1	%	15	90	min	10	1	day	5	0.0005	%/yr	20
		O	Heliocentric	20	na	na	na		na	na		na	na		1310	1420	W/m^2	20	0.01	%	15	1	min	10	90	min	5	0.0005	%/yr	20
Solar Flux: UV-VIS-IR Spectral Irradiance	2	T	Heliocentric	20	na	na	na		na	na		na	na		1/2*(Solar Min)	2*(Solar Max)	W/m^2/nm	10	1	%	15	20	min/90 min	10	15	min	5	0.002	%/yr	20
		O	Heliocentric	20	na	na	na		na	na		na	na		1/2*(Solar Min)	2*(Solar Max)	W/m^2/nm	10	0.1	%	15	90	min/90 min	5	90	min	5	0.002	%/yr	20
Solar Imagery: Backside of Sun	2	T	Heliocentric		na	na	na		na	na		na	na		270	290	nm		1	%		10	min		5	min		0.01	%/yr	
		O	Heliocentric		na	na	na		na	na		na	na		270	290	nm		1	%		10	min		5	min		0.01	%/yr	
Solar Imagery: Heleoseismology	2	T	Heliocentric		tbs	tbs	tbs		tbs	tbs		250	km		-1500	1500	m/sec		> of 5 or 5	m/sec or %		tbs	tbs		90	min		tbs	tbs	
		O	Heliocentric		na	na	na		na	na		na	na		270	290	nm		1	%		10	min		5	min		0.01	%/yr	
Solar Wind: Plasma Electron Temperature	2	T	L1 In-situ		200	>200	Re along Sun-Earth line		na	na		40	Re perpendicular to Sun-Earth line		0.05	2	mK		30	%		1	min		5	min		30	%	
		O	L1 In-situ		200	>200	Re along Sun-Earth line		na	na		40	Re perpendicular to Sun-Earth line		0.05	2	mK		30	%		1	min		5	min		30	%	
Solar and Galactic Particles: MEO	2	T	tbs		na	na	na		na	na		na	na		tbs	tbs	tbs		25	%		1	min		1	min		10	%/mission	
		O	tbs		na	na	na		na	na		na	na		tbs	tbs	tbs		10	%		30	sec		1	min		10	%/mission	

Observation Requirement	Obs Req Prty	T/O	Spatial Cov.		Vert Range				Vert Res			Spatial/ Angular Res			Meas Range				Msmnt Accy			Smplng Intvl			Data Ltncy			Long Stab		
			V	W	Low	High	U	W	V	U	W	V	U	W	Low	High	U	W	V	U	W	V	U	W	V	U	W	V	U	W
Thermospheric Neutral Composition	2	T	Global	15	130	500	km	15	20	km	15	250	km	15	Atomic O: 1x10^13; Molecular N2: 1 x 10^11; Integrated O/N2: 0.2	Atomic O: 5 x 10^16; Molecular N2: 1 x 10^17; Integrated O/N2: 1.5	unitless	15	10	%	15	na	na		15	min	10	na	na	
		O	Global	15	100	500	km	15	20	km	15	100	km	15	Atomic O: 1x10^13; Molecular N2: 1 x 10^11; Integrated O/N2: 0.2	Atomic O: 5 x 10^16; Molecular N2: 1 x 10^17; Integrated O/N2: 1.5	unitless	15	5	%	15	na	na		5	min	10	na	na	
In-Situ Plasma Temperature: LEO	3	T	Global		na	na	na		na	na		100	km		500	10000	K		10	%		na	na		90	min		na	na	
		O	Global		na	na	na		na	na		10	km		500	10000	K		5	%		na	na		15	min		na	na	
Ionospheric Irregularities: Amplitude	3	T	Global		na	na	na		na	na		25	km		0.1	1.5	unitless		0.1	unitless		na	na		15	min		na	na	
		O	Global		na	na	na		na	na		25	km		0.1	1.5	unitless		0.1	unitless		na	na		5	min		na	na	
Ionospheric Irregularities: Phase	3	T	From -35 to 35		na	na	na		na	na		25	km		0.1	20	radians		0.1	radians		na	na		15	min		na	na	
		O	Global		na	na	na		na	na		25	km		0.1	20	radians		0.1	radians		na	na		5	min		na	na	

Appendix B WW-SWX, Priority-1 Requirements Validation

Appendix B.1 Validation Documents Submitted

The following Validation Documents have been submitted in support of the Space Weather Program's Priority-1 Observation Requirements.

Table B-1: Validation Documents provided to support Priority- Requirements

#	Validation Document Title	Document Type
1	Space Environment Sensor Suite (SESS) System Requirements Review; SESS Government Advisory Team	Requirements Review
2	Summary Report; Workshop on Energetic Particle Measurements for the GOES R+ Satellites	Workshop Report
3	Characterizing the Earth's Outer Van Allen Zone Using a Radiation Belt Content Index	Journal Article
4	GOES-R SEISS Formulation Phase Concept and Cost Review Volume 1; 30 Aug-1 Sep 2005	Program Review
5	GOES-R SEISS Formulation Phase Concept and Cost Review Volume 2; 30 Aug-1 Sep 2005	Program Review
6	GOES-R SEISS Formulation Phase Concept and Cost Review Technical Session, 7 September 2005	Program Review
7	Neutron Monitors in the 21st Century?	Journal Article
8	AFGL Handbook Chapter 4; The Geomagnetic Field	Handbook
9	The ISEE 1 and 2 Fluxgate Magnetometers	Journal Article
10	Report from the World Data CenterC2 for Geomagnetism, Kyoto, Kyoto University, and Tokai University Research Institute of Science and Technology	Technical Report
11	Guide for Magnetic Measurements and Observatory Practice, Jankowski	Operational Guide
12	Introduction to Space Physics, Kivelson	Textbook
13	National Polar-orbiting Operational Environmental Satellite System (NPOESS) Integrated Operational Requirements Document-II	Requirements Document
14	The relativistic electron response at geosynchronous orbit during the January 1997 magnetic storm, Reeves et al	Journal Article
15	A search for two-component energetic proton events observed on board SOHO, Al-Sawad et al	Journal Article
16	A statistical study of large-scale traveling ionospheric disturbances observed by GPS TEC during major magnetic storms over the years 2003-2005	Journal Article
17	Real-Time US Total Electron Content Product Description	Product Description
18	Report of the GOES R+ EUV Sensor Workshop, Oct 28-29, 2002	Workshop Report
19	EUVS: An Instrument to be Flown on the GOES Spacecraft	Journal Article
20	The SMS/GOES Space Environment Monitor Subsystem	Technical Memo
21	Temperature and Emission Measure from GOES Soft X-ray Measurements	Journal Article
22	Three Dimensional Stereoscopic Analysis of Solar Active Region Loops, I. SOHO/EIT Observations at Temperatures of (1.0-1.5) x 10E6 K	Journal Article
23	The USAF Improved Solar Observing Optical Network (ISOON) And Its Impact on Solar Synoptic Data Bases	Technical Paper
24	Active-Region Monitoring and Flare Forecasting, Gallagher et al	Journal Article
25	Solar Imaging Needs for the Space Environment Monitor on the Geostationary Operational Environmental Satellites (GOES-R+)	Workshop Report
26	Solar Coronagraph (SCOR) TS5c: SCOR Design and Performance Briefing	Slide Briefing
27	The Solar Mass-Ejection Imager (SMEI) Mission	Journal Article
28	Sun Earth Connection Coronal and Heliospheric Investigation (SECCHI)	Journal Article

29	ISOON Description	Technical Description
30	The GOES Solar X-Ray Imager: Overview and Operational Goals	Journal Article
31	The Solar Radiation and Climate Experiment (SORCE)	Journal Article
32	Air Force Weather Agency Manual 15-2 Ch 1.2	Technical Manual
33	Air Force Weather Agency Manual 15-2 Ch 3 and 4	Technical Manual
34	Air Force Weather Agency Manual 15-2 Ch 6	Technical Manual
35	Up to 1-hour forecasting of radiation hazards from solar energetic ion events with relativistic electrons	Journal Article
36	The L5 mission for space weather forecasting, Akioka, et al	Journal Article
37	The NOAA Real-Time Solar Wind (RTSW) System Using ACE Data, Zwickl, et al	Journal Article
38	The Advanced Composition Explorer, Stone, et al	Journal Article
39	The ACE Magnetic Fields Experiment	Journal Article
40	Solar Wind Electron Proton Alphamonitor (SWEPAM) for the Advanced Composition Explorer, McComas, et al	Journal Article
SME	Memo from Subject Matter Experts	SME Memo

Appendix B.2 Validation Documents Mapping to Observation Requirements

Space Weather Program and Technology, Planning and Integration Office (TPIO) representatives worked jointly to identify references to validate both the need for an observation requirement and its specific measurement attributes. These validation documents support one or more of the Priority-1 Requirements as shown in Table B-2 below. For occurrences where validation documents could not be identified, Program Subject Matter Experts (SME) justifications are provided.

Table B-2: Validation Document Mapping to Observation Requirement

Observation Requirement	Priority	Document[s] Submitted
Aurorae: Supra-thermal through Auroral Energy Particles, Electrons	1	1, 12
Aurorae: Supra-thermal through Auroral Energy Particles, Ions	1	1, 12
Auroral Boundary: LEO	1	1, 12
Auroral Particle Energy Deposition: LEO	1	1, 12
Electric Field: LEO	1	1, 12
Electrons & Protons: Low Energy, GEO	1	2, 4, 6
Electrons: Medium & High Energy, GEO	1	3, 4, 5, 6
Electrons: Medium & High Energy, LEO	1	1, 14
Energetic Heavy Ions	1	2, 4, 6
Energetic Ions: LEO	1	1, 15
Galactic Cosmic Rays (Neutrons)	1	7, SME
Geomagnetic Field: GEO	1	8, 9
Geomagnetic Field: Ground-Based Auroral	1	10, 11
Geomagnetic Field: Ground-Based Low Latitude	1	11, 12
Geomagnetic Field: Ground-Based Mid-Latitude	1	8, 11, 12
Ionospheric Electron Density Profiles	1	13
Ions: Medium & High Energy, LEO	1	1, 15
Protons: Medium & High Energy, GEO	1	4, 5, 6

Protons: Medium & High Energy, L5	1	4, 5, 6, 36
Slant Total Electron Content of the Ionosphere	1	13, 16, 17
Solar & Galactic Protons: GEO	1	2, 4, 5
Solar Flux: EUV	1	18, 19
Solar Flux: X-Ray Irradiance	1	20, 21, 22
Solar H Alpha Imagery	1	23, 24, SME
Solar Imagery: Corona, L1	1	25, 26
Solar Imagery: Corona, L5	1	25, 26, 36
Solar Imagery: Heliospheric , L1	1	26, 27, 28
Solar Imagery: Heliospheric , L5	1	26, 27, 28, 36
Solar Imagery: Magnetogram, L1	1	23, 24
Solar Imagery: Magnetogram, L5	1	23, 24, 36
Solar Imagery: White Light	1	23, 24, 29
Solar Imagery: X-Ray, Radiance, L1	1	21, 22, 25, 30
Solar Imagery: X-Ray, Radiance, L5	1	21, 22, 25, 30,36
Solar Imagery: X-Ray, Temperature	1	21, 22, 25, 30
Solar Mg II Core-to-Wing Ratio	1	31
Solar Radio Emissions	1	32, 33, 34
Solar Wind High Energy Electrons, L1	1	35, 37
Solar Wind High Energy Electrons, L5	1	35, 36
Solar Wind: Low Energy Particle Population, L1	1	37, 38, 40, SME
Solar Wind: Low Energy Particle Population, L5	1	36, 37, SME
Solar Wind: Magnetic Field Vector, L1	1	37, 38, 39
Solar Wind: Magnetic Field Vector, L5	1	36, 37, 39
Solar Wind: Plasma Ion Density, L1	1	37, 38, 40
Solar Wind: Plasma Ion Density, L5	1	36, 37, 40
Solar Wind: Plasma Ion Temperature, L1	1	37, 38, 40
Solar Wind: Plasma Ion Temperature, L5	1	36, 37, 40
Solar Wind: Plasma Ion Velocity Vector, L1	1	37, 38, 40
Solar Wind: Plasma Ion Velocity Vector, L5	1	36, 37, 40

Appendix B.3 Validation Assessment for Priority-1 Requirements

Space Weather Program and TPIO representatives worked jointly to review the submitted documentation, and identify the "level of validation" for the Threshold value of each of the five key attributes of each Priority-1 Observation Requirement.

Table B-3: Level of Validation for each Priority 1 Requirement Attribute

Parameters	Attribute Validated				
	Spatial Cov	Vert Range	Spatial/ Angular Res	MeaAcc	Sampling Interval
Aurorae: Supra-thermal through Auroral Energy Particles, Electrons	>30 deg N & S	LEO In-situ, Polar	10 km	10^5 1/(cm^2-s-str)	10 min
Aurorae: Supra-thermal through Auroral Energy Particles, Ions	>30 deg N & S	LEO In-situ, Polar	10 km	10^5 1/(cm^2-s-str)	10 min
Auroral Boundary: LEO	>30 deg N & S	na	50 km	50 km	10 min
Auroral Particle Energy Deposition: LEO	>30 deg N & S	LEO In-situ, Polar	100 km	10^-4 W/m^2	10 min
Electric Field: LEO	Global	LEO In-situ, Polar	10 km	3 mV/m	10 min
Electrons & Protons: Low Energy, GEO	Global	GEO In-situ	35 deg pitch angle	25 %	30 sec
Electrons: Medium & High Energy, GEO	Global	GEO In-situ	35 deg pitch angle	25 %	30 sec
Electrons: Medium & High Energy, LEO	Global	LEO In-situ, Polar	2 look directions	100 1/(cm^2-s-str)	10 min
Energetic Heavy Ions	Global	GEO In-situ,	1 look direction	25 %	5 min
Energetic Ions: LEO	>30 deg N & S	LEO In-situ, Polar	25 km	0.1 1/(cm^2-s-str)	10 min
Galactic Cosmic Rays (Neutrons)	> 75 deg N geomagnetic	0–6 km	na	10 % above median background	5 min
Geomagnetic Field: GEO	Global	GEO In-situ	3-axis orthogonal	1 nT/axis	2 sample/sec
Geomagnetic Field: Ground-Based Auroral	12 stations; 60 to 71 degrees geomagnetic latitude	na	30 degrees longitude approximately equally spaced	1 nT	1 min

Parameters	Attribute Validated				
	Spatial Cov	Vert Range	Spatial/ Angular Res	MeaAcc	Sampling Interval
Geomagnetic Field: Ground-Based Low Latitude	4 stations; 10 to 35 degrees geomagnetic latitude	na	90 degrees longitude approximately equally spaced	1 nT	1 min
Geomagnetic Field: Ground-Based Mid-Latitude	13 stations; 45 to 63 degrees geomagnetic latitude	na	30 degrees longitude approximately equally spaced	1 nT	1 min
Ionospheric Electron Density Profiles	Global	90-1500 km	100 km	30 %	na
Ions: Medium & High Energy, LEO	Global	LEO In-situ, Polar	25 km	100 1/(cm^2-s-str)	10 min
Protons: Medium & High Energy, GEO	Global	GEO In-situ	35 deg pitch angle	25 %	30 sec
Protons: Medium & High Energy, L5	Along solar wind B field	L5 In-situ	120 deg fov	25 %	30 sec
Slant Total Electron Content of the Ionosphere	Global	100-20,200 km	500 km	3x10^16 electrons/m^2	15 min
Solar & Galactic Protons: GEO	Global	GEO In Situ	2 look angles; E/W	25 %	1 min
Solar Flux: EUV	Heliocentric	0 to 1.0 Rsun	na	20 %	30 sec
Solar Flux: X-Ray Irradiance	Heliocentric	0 to 1.3 Rsun	na	10 %	3 sec
Solar H Alpha Imagery	Heliocentric	0 to 1.0 Rsun	5 arcsec	10 %	1 min
Solar Imagery: Corona, L1	Heliocentric	3 to 17 Rsun	50 arcsec	10%	15 min
Solar Imagery: Corona, L5	Heliocentric	3 to 17 Rsun	50 arcsec	10%	15 min
Solar Imagery: Heliospheric , L1	Heliocentric	15 Solar Radii to 1 Astronomical Unit	1 degree	10%	60 min
Solar Imagery: Heliospheric , L5	Heliocentric	15 Solar Radii to 1 Astronomical Unit	1 degree	10%	60 min
Solar Imagery: Magnetogram, L1	Heliocentric	0 to 1.0 Rsun	5 arcsec	20 %	3 hr

Parameters	Attribute Validated				
	Spatial Cov	Vert Range	Spatial/ Angular Res	MeaAcc	Sampling Interval
Solar Imagery: Magnetogram, L5	Heliocentric	0 to 1.0 Rsun	5 arcsec	20 %	3 hr
Solar Imagery: White Light	Heliocentric	0 to 1.0 Rsun	1 arcsec	5 %	10 min
Solar Imagery: X-Ray, Radiance, L1	Heliocentric	0 to 1.3 Rsun	5 arcsec	20 %	Image: < or = 2 min
Solar Imagery: X-Ray, Radiance, L5	Heliocentric	0 to 1.3 Rsun	5 arcsec	20 %	Image: < or = 2 min
Solar Imagery: X-Ray, Temperature	Heliocentric	0 to 1.3 Rsun	5 arcsec	20 %	6 min
Solar Mg II Core-to-Wing Ratio	Heliocentric	0 to 1 Rsun	na	0.1 %	60 min
Solar Radio Emissions	Heliocentric	1 - 2 Rsun	na	5 %	1 sec
Solar Wind High Energy Electrons, L1	Sunward along Sun-Earth Line	L1-along Sun-Earth Line	40 Re perpendicular to Sun-Earth line	20 %	1 min
Solar Wind High Energy Electrons, L5	L5 in situ	1 AU	na	20 %	1 min
Solar Wind: Low Energy Particle Population, L1	Sunward along Sun-Earth Line	L1-along Sun-Earth Line	40 Re perpendicular to Sun-Earth line	20 %	5 min
Solar Wind: Low Energy Particle Population, L5	L5 in situ	1 AU	na	20 %	5 min
Solar Wind: Magnetic Field Vector, L1	Sunward along Sun-Earth Line	L1 along Sun-Earth Line	40 Re perpendicular to Sun-Earth line	0.1 nT	1 min
Solar Wind: Magnetic Field Vector, L5	L5 in situ	1 AU	na	0.1 nT	1 min
Solar Wind: Plasma Ion Density, L1	Sunward along Sun-Earth Line	L1 along Sun-Earth Line	40 Re perpendicular to Sun-Earth line	20 %	1 min
Solar Wind: Plasma Ion Density, L5	L5 in situ	1 AU	na	20 %	1 min
Solar Wind: Plasma Ion Temperature, L1	Sunward along Sun-Earth Line	L1 along Sun-Earth Line	40 Re perpendicular to Sun-Earth line	20 %	1 min
Solar Wind: Plasma Ion Temperature, L5	L5 in situ	1 AU	na	20 %	1 min

Parameters	Attribute Validated				
	Spatial Cov	Vert Range	Spatial/ Angular Res	MeaAcc	Sampling Interval
Solar Wind: Plasma Ion Velocity Vector, L1	Sunward along Sun-Earth Line	L1 along Sun-Earth Line	40 Re perpendicular to Sun-Earth line	5 %	1 min
Solar Wind: Plasma Ion Velocity Vector, L5	L5 in situ	1 AU	na	5 %	1 min

Legend: Level of Validation

Direct Validation Documentation Submitted	
Associated Validation Documentation Submitted	
SME Consensus Validation Documentation Submitted	
Not Validated	
Attribute not applicable	

Appendix C Program Acronym List

Acronym	Definition
CL-COM	Climate - Observations and Monitoring
CL-COM_Atmos	Climate - Observations and Monitoring, Atmophere Sub-Program
CL-COM_CF	Climate - Observations and Monitoring, Climate Forcing Sub-Program
CL-COM_Land	Climate - Observations and Monitoring, Land Sub-Program
CL-COM_Oceans	Climate - Observations and Monitoring, Ocean Sub-Program
CL-CRM	Climate - Research & Modeling
CT-AWX	Commerce and Transportation - Aviation Weather
CT-GEO	Commerce and Transportation - Geodesy
CT-MTS	Commerce and Transportation - Marine Transportation Systems
CT-MWX	Commerce and Transportation - Marine Weather
CT-SFX	Commerce and Transportation - Surface Weather
EC-AQC	Ecosystem - Aquaculture
EC-CMR	Ecosystem - Coastal Marine Resources
EC-COR	Ecosystem - Corals
EC-EOP	Ecosystem – Ecosystems Observation Program
EC-ERP	Ecosystem - Ecosystem Research
EC-HAB	Ecosystem - Habitat
MS-IOS	Mission Support - Integrated Ocean Observing System
MS-EMP	Mission Support - Environmental Modeling
MS-EMP_Atmos	Mission Support - Environmental Modeling, Atmosphere Sub-Program
MS-EMP_Climate	Mission Support - Environmental Modeling, Climate Sub-Program
MS-EMP_Marine	Mission Support - Environmental Modeling, Marine Sub-Program
MS-TRP	Mission Support - Technical Requirements, Planning and Integration
WW-AQL	Weather and Water - Air Quality
WW-CEO	Weather and Water - Coasts, Estuaries and Oceans (CEO)
WW-HYD	Weather and Water - Hydrology
WW-LFW	Weather and Water - Local Forecasts and Warnings
WW-SWX	Weather and Water - Space Weather
WW-WWS	Weather and Water - W&W Science & Technology Infusion
WW-WWS_HURR	Weather and Water - W&W Science & Technology Infusion, Hurricanes Sub-Program
WW-WWS_OCW	Weather and Water - W&W Science & Technology Infusion, Ocean & Coastal Weather Sub-Program
WW-WWS_SEV	Weather and Water - W&W Science & Technology Infusion, Severe Weather Sub-Program
WW-WWS_WR	Weather and Water - W&W Science & Technology Infusion, Water Resources Sub-Program

Appendix D PORD Table Column Definitions

[**Note**: In PORA tables "V" = attribute value, "U" = attribute units, "W" = attribute weight]

Attribute Weight: The "importance" indicator value for the basic attributes (Geographic Coverage, Vertical Resolution, Horizontal Resolution, Measurement Accuracy, Sampling Interval, Number of Operating Days at Sea (ODS)/Flight Hours (Flt Hrs)) relative to each other. Each of the basic attributes is assigned a value from 1 to 100, with the most important of the attributes given the highest relative value. All weights across a row should add up to 100. See examples in table below.

Observational Requirement Title	Geographic Coverage Weight	Vertical Resolution Weight	Horizontal Resolution Weight	Measurement Accuracy Weight	Sampling Interval Weight	Number of ODS/Flt Weight
Air Temperature: Surface	50	0	10	30	10	0
Land Cover	0	0	30	50	20	0
Water Vapor: Profiles	20	30	10	30	10	0
At Sea Data Collection	20	10	10	10	10	40
Airborne Data Collection	30	10	10	10	10	30

Data Latency (Data Ltncy): Elapsed time from data acquisition until delivery of data to the user. Latest time by which an element can be delivered and still be useful to the customer.

Data Latency Units: Measurement units for data latency of the element.
Use:
"sec" for 1-59 seconds
"min" for 1-59 mins
"hr" for 1-23 hours
"day" for 1-6 days
"wk" for 1-3 wks
Etc.

Data Latency Weight: See "Attribute Weights."

Geographic Coverage (Geo Cov): See table below.

Geographic Coverage Weight: See "Attribute Weights."

GPRA: Government Performance and Results Act

Horizontal Resolution (Horiz Res): The dimension of the smallest object, horizontal area represented by the parametric value. Spatial granularity with which the information is required.

Horizontal Resolution Units: Measurement units for horizontal resolution of the element. Use:
"km" for kilometers
"m" for meters
Etc.

Horizontal Resolution Weight: See "Attribute Weights."

Long-Term Stability (Long Stab): The maximum excursion of the short-term average measured value of a parameter under identical conditions over a stated period of time (e.g. decade). The smaller the maximum excursion, the greater the stability of the observations. The short-average is the average of a sufficient number of successive measurements of the variable under identical conditions such that the random error is negligible relative to the systematic error.

Long-Term Stability Units: Measurement units for Long-Term Stability of the element.

Long-Term Stability Weight: See "Attribute Weights."

Measurement Accuracy (Msmnt Accy): The systematic error, as specified by the difference between a measured or derived parameter and its true value in the absence of random errors. It can be thought of as the looseness of truth and is measured by the bias or systematic error of the observation, that is, the difference between the short-term average measured values of a variable and the truth. The short-term average is the average of a sufficient number of successive measurements of the parameter under identical conditions such that the random error is negligible relative to the systematic error.

Measurement Accuracy Units: Measurement units for Measurement Accuracy of the element. If possible use %.

Measurement Accuracy Weight: See "Attribute Weights."

Measurement (Meas Range) Range Low: Lowest value of range of parameter, within which the parameters must be measurable or reportable (e.g., for temperature 273 to 303 Kelvin enter 273)"

Measurement Range High: Highest value of range of parameter, within which the parameters must be measurable or reportable (e.g., for temperature 273 to 303 Kelvin enter 203)"

Measurement Range Units: Measurement units for measurement range of the element. For example: Kelvin enter "K"

Measurement Range Weight: See "Attribute Weights."

Observational Requirement: Requirement Name

Observational Requirement Priority (Obs Req Prty):

"1" = Mission Critical / Cannot meet operational mission objectives without this data. Not having these data will prevent performance of the mission or preclude satisfactory mission accomplishment.

"2" = Mission Optimal / Data not critical but would provide significant improvement to operational capability.

"3" = Mission Enhancing / Needed to enhance state of knowledge / assess potential for operational capability.

RC: Regional Collaboration Priorities

Sampling Interval (Smplng Intvl): Average time interval between consecutive measurements of the same area of the environment.

Sampling Interval Units: Measurement units for sampling interval of the element. For example: Use:

"sec" for 1-59 seconds
"min" for 1-59 mins
"hr" for 1-23 hours
"day" for 1-6 days
"wk" for 1-3 wks
Etc.

Sampling Interval Weight: See "Attribute Weights."

Threshold (T)/Objective (O): Threshold is the minimum acceptable specification. Objective is the optimal specification that, if met, would significantly enhance meeting the mission.

T/O: Threshold/Objective. See definitions above.

Type: Observation requirement type

"B" = Biological
"C" = Chemical
"P" = Physical
"S" = Socio-economic
"E" = Economic

Vertical Range (Vert Range) Low: Lowest value of vertical range of parameter, within which the parameters must be measurable or reportable (e.g., for temperature profile with vertical range of surface to 15 kilometers enter 0)"

Vertical Range High: Highest value of vertical range of parameter, within which the parameters must be measurable or reportable (e.g., for temperature profile with vertical range of surface to 15 kilometers enter 15)"

Vertical Range Units: Measurement units for vertical resolution of the element.
Use:
"km" for kilometers
"m" for meters
"hPa" for hectopascal
Etc.

Vertical Range Weight: See "Attribute Weights."

Vertical Resolution (Vert Res): The smallest height increment of the data. Spatial granularity in the vertical with which information and data are provided, For example: distance between adjacent vertical grid points in a radiosonde observation.

Vertical Resolution Units: Measurement units for vertical resolution of the element.
Use:
"km" for kilometers
"m" for meters
Etc.

Vertical Resolution Weight: See "Attribute Weights."

Weight: See "Attribute Weights."

Geographic Coverage Table

CORL Geographic Coverage Category	Definition
Coastal Global	The coast is defined as the part of the land adjoining or near the ocean. Coastal is a few km either side of water/land boundary. Includes both littoral and sub littoral (http://en.wikipedia.org/wiki/Littoral_zone).
Coastal US	The coast is defined as the part of the land adjoining or near the ocean.
CONUS	Contiguous U.S. rectangle, 3000 km N/S by approx 5000 km E/W.
CONUS+AK+HI	Contiguous U.S. rectangle, 3000 km N/S by approx 5000 km E/W. Plus Alaska and Hawaii.
CONUS+AK+HI+US EEZ	Contiguous U.S. rectangle, 3000 km N/S by approx 5000 km E/W. Plus Alaska, Hawaii and US Exclusive Economic Zone (see below for definition of EEZ.)
EEZ Global	Under the law of the sea, an Exclusive Economic Zone (EEZ) is a sea zone over which a state has special rights over the exploration and use of marine resources. Generally a state's EEZ extends to a distance of 200 nautical miles (370 km) out from its coast. The exception to this rule occurs when EEZs would overlap; that is, state coastal baselines are less than 400 nautical miles apart. When an overlap occurs, it is up to the states to delineate the actual boundary. Generally, any point within an overlapping area defaults to the most proximate state. States also have rights to the seabed of the continental shelf up ot 350 nautical miles from the coast, where this extends beyond the EEZ, but this does not form part of their EEZ.
EEZ US	The Exclusive Economic Zone starts at the coastal baseline and extends 200 nautical miles out into the sea, perpendicular to the baseline. Thus, the EEZ overlaps both the contiguous zone and territorial waters./td>
Global	Of, relating to, or involving the entire earth; worldwide. (http://www.thefreedictionary.com/global)
Global Land	The continents and islands that cover nearly 30% of the surface of the earth.

CORL Geographic Coverage Category	Definition
Global Ocean	The whole body of salt water that covers 71% of the surface of the earth.
Great Lakes	One of the eight NOAA identified ecosystem regions.
Hemi Eur.	On the observing side, a geostationary satellite provides only capability within the footprint of that particular satellite. Hemi Eur capability refers to geostationary satellites that cover Europe and Africa.
Hemi India	On the observing side, a geostationary satellite provides only capability within the footprint of that particular satellite. Hemi India capability refers to geostationary satellites that cover the India and the corresponding offshore waters.
Hemi Japan	On the observing side, a geostationary satellite provides only capability within the footprint of that particular satellite. Hemi Japan capability refers to geostationary satellites that cover the Japan, Australia and southeast Asia.
Hemi US	On the observing side, a geostationary satellite provides only capability within the footprint of that particular satellite. Hemi US capability refers to geostationary satellites that cover the US.
Offshore	The zone beyond the near shore zone where sediment motion induced by waves alone effectively ceases and where the influence of the sea bed on wave action has become small in comparison with the effect of wind; the portion of the littoral system that is always submerged.
Point Source	There are several observing systems, particularly research systems, that are located in one location only.
Aircraft Track	NOAA P3 ave airspeed is 400km/hour, 12 hr flight =800km traveled
Ship Track	NOAA Ship Nancy Foster has a cruise speed of 11kts, 24 hrs/day =89 km traveled
Targeted Mesoscale	On the capabilities side, there are several networks of observing platforms that are located in one geographic region only and do not provide much if any observing capability to anything other than that region.
tbs.	To be specified by program
GEO In-situ, Global	A local geosynchronous observation required at multiple locations in that orbit
Heliocentric	A location relative to the center of the sun, or in some cases, relative to the center of the observed solar disk.
L1 In-situ	An observation made at the solar Lagrange point, or libration point, between Earth and sun. At this position a satellite can remain between Earth and sun as Earth revolves about the sun. It is about 99 % of the distance from sun to Earth or 0.99 AU (astronomical units) from the Sun. The location is about 1.5 million km from Earth or about 230 Earth radii from Earth towards the sun.
LEO In-situ, Polar	A local observation made in low-Earth polar orbit
MEO; 3-axis orthogonal	Medium Earth Orbit located above Low Earth Orbit (LEO) and below geosynchronous orbit (GEO); 3-axis orthogonal refers to 3 measurements made at 90 degrees to each other to define a vector
Whole Sun	Whole Sun plus out to some distance in corona (about 2 solar radii)