

Consolidated Observation Requirements List (CORL)

NOAA Program Observation Requirements Document (PORD)

**FINAL for Program Verification
Version 1.0**

FY 2010

Weather and Water Goal

**Local Forecasts and Warnings Program,
National Hurricane Center Subprogram
(WW-LFW_NHC)**

December 29, 2011¹

¹ PORD Document Date reflects date for publication of this [FINAL with Requirements Validation]
CORL Data was downloaded at [12/29/2011 2:39:07 PM]

Table of Contents

Signatures	iii
Observation Requirement Validation.....	Error! Bookmark not defined.
1. Program Summary	1
2. Observation Requirements Summary	4
2.1 Observation Requirements by Priority	4
2.2 Observation Requirements by Discipline.....	5
2.3 Observation Requirements by Type	6
3. Observation Requirements Mapping to Performance Measures.....	6
4. Status of Program List.....	7
Appendix A Local Forecasts and Warnings Program, National Hurricane Center Subprogram, Observation Requirements	A-1
Table Key and Definitions:	A-5
Appendix B WW-LFW_NHC, Priority-1 Requirements Validation.....	B-1
Appendix B.1 Validation Documents Submitted	B-1
Appendix B.2 Validation Documents Mapping to Observation Requirements.....	B-5
Appendix B.3 Validation Assessment for Priority-1 Requirements	B-7
Appendix C Program Acronym List	C-1
Appendix D PORD Table Column Definitions.....	D-1

List of Figures

Figure 1: WW-LFW_NHC Observation Requirements by Priority (%)	4
Figure 2: WW-LFW_NHC Observation Requirements by Discipline.	5
Figure 3: WW-LFW_NHC Observation Requirements by Type.	6

List of Tables

Table 1: WW-LFW_NHC Observation Requirement Attributes Remaining [blank] or [tbs].....	7
Table B-1: Validation Documents provided to support Priority- Requirements	B-1
Table B-2: Validation Document Mapping to Observation Requirement	B-5
Table B-3: Level of Validation for each Priority 1 Requirement Attribute.....	B-7

Signatures

Observation Requirement Validation

NOSC Endorsement

The NOSC has received the Local Forecasts and Warnings Program, National Hurricane Center Subprogram's Observation Requirements with Goal Lead and Line Office concurrence, and is satisfied with the Level-of-Validation provided for the Priority-1 Requirements.

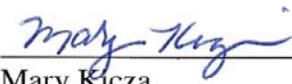


Dr. Kathryn Sullivan
Chair, NOSC

2/6/12
Date



Endorsed

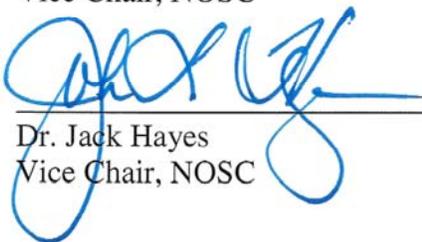


Mary Kicza
Vice Chair, NOSC

2/6/2012
Date



Endorsed



Dr. Jack Hayes
Vice Chair, NOSC

2/7/2012
Date



Endorsed

Goal and Line Office Concurrence

The Manager's Supervisor and Local Forecasts and Warnings Program, National Hurricane Center Subprogram's Goal Team Lead concur with the Observation Requirements and are satisfied with the Level-of-Validation provided by the Priority-1 Requirements.



Donald Berchhoff
Director
NWS Office of Science & Technology
NWS Representative, NOSC

1/16/12
Date



Validated



David Caldwell
Director
NWS Office of Climate, Water & Weather Services

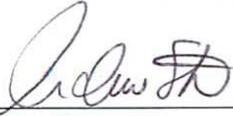
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Validated

Program Manager Validation

The Local ForecastLocal Forecasts and Warnings Program, National Hurricane Center Subprogram's 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 five key attributes of those requirements.



Andrew Stern
Senior Staff (former LFW Program Manager)
NWS Office of Climate, Water and Weather Services

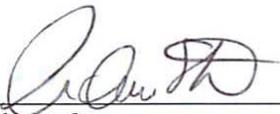
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✓
Validated

Observation Requirement Verification

The Program Manager, with Program Membership concurrence, has verified that the Local Forecasts and Warnings Program, National Hurricane Center Subprogram's Observation Requirements, as documented in the CORL and reproduced in this document, comprise the Local Forecasts and Warnings Program's Threshold and Objective level requirements for environmental observations, and are ready for Validation.

Program Manager Verification



Andrew Stern
Senior Staff (former LFW Program Manager)
NWS Office of Climate, Water and Weather Services

12/19/11
Date

✓
Verified

Program Membership Concurrence



Michael J. Brennan
Team Lead

12/9/11
Date

✓
Concurred



Christopher W. Landsea

12/9/11
Date

✓
Concurred



Jessica L. Schauer

12/9/11
Date

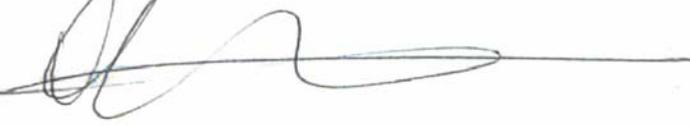
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Concurred



Robert Ballard

12/9/11
Date

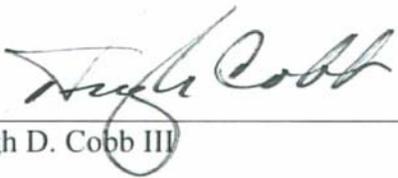
✓
Concurred



Daniel Meléndez-Alvira

19 Dec 11
Date

✓
Concurred



Hugh D. Cobb III

12/9/11
Date

✓
Concurred



James L. Franklin

12/9/11
Date

✓
Concurred



Raymond M. Tanabe

12/19/11
Date

✓
Concurred

1. Program Summary

The Local Forecasts and Warnings (LFW) Program, under the former Planning, Programming, Budgeting and Execution System (PPBES) encompassed many of NOAA's most critical operations focused on protecting lives and livelihoods. The program delivered essential NOAA services, especially those related to high-impact events, and to local communities through its distributed structure of field offices and national centers.

The LFW Program was one of the largest and most complex within NOAA which spanned the end-to-end observation, forecasting and warning process. As such, attempting to identify and organize one set of observing requirements would have been daunting. Hence, the Program was logically divided into two sub-programs based upon commonalities of operations and areas of responsibility (AOR). For the purposes of developing observing requirements, the Program was divided into Weather Forecast Office/Storm Prediction Center (LFW_WFO/SPC) operations and National Hurricane Center (LFW_NHC) tropical operations. The LFW_WFO/SPC requirements have been validated in a separate document.

LFW's tropical sub-program consisted of operations at both the National Hurricane Center (NHC) and the Central Pacific Hurricane Center (CPHC). NHC is a component of the NWS National Centers for Environmental Prediction (NCEP) and consists of a number of divisions that each has observing requirements. These include the Hurricane Specialist Unit (HSU) which produces analyses, forecasts, and warnings for tropical cyclones in the North Atlantic and Eastern North Pacific basins, the Tropical Analysis and Forecast Branch (TAFB), which issues surface analyses, offshore waters and high seas forecasts, and marine warnings for large areas of the tropical North Atlantic, Caribbean Sea, Gulf of Mexico, and the Eastern North and South Pacific, and the Technology and Science Branch (TSB) which supports techniques development, information dissemination and storm surge guidance.

CPHC is co-located with the NWS Weather Forecast Office (WFO) in Honolulu and issues warnings, watches, advisories, discussions and statements for tropical cyclones between 140 Degrees West Longitude to the International Dateline. In addition, the marine forecasting unit at the Honolulu WFO provides analyses and forecasts for vast portions of the North and South Pacific Oceans. The combined marine and tropical cyclone forecasting missions of NHC and CPHC constitute the LFW_NHC sub-program. A graphic depicting the estimated tropical cyclone operations AOR is shown in Figure 1.

During hurricane season, which extends from June 1 through November 30 for the North Atlantic and Central North Pacific and May 15 through November 30 for the Eastern North Pacific, staff from NHC and CPHC work with NWS field offices, national centers, partner Federal agencies, and international partners to communicate a unified set of forecasts and warnings for tropical cyclones. During the period from 1970-2010, the average number of tropical cyclones per year included²:

- North Atlantic Ocean, Caribbean Sea and Gulf of Mexico: 11 tropical storms, 6 of which became hurricanes
- Eastern North Pacific Ocean: 15 tropical storms, 8 of which became hurricanes

² Tropical Cyclones: A Preparedness Guide, U.S. Department of Commerce, NOAA, NWS, revised March 2011, <http://www.nws.noaa.gov/os/hurricane/resources/TropicalCyclones11.pdf>

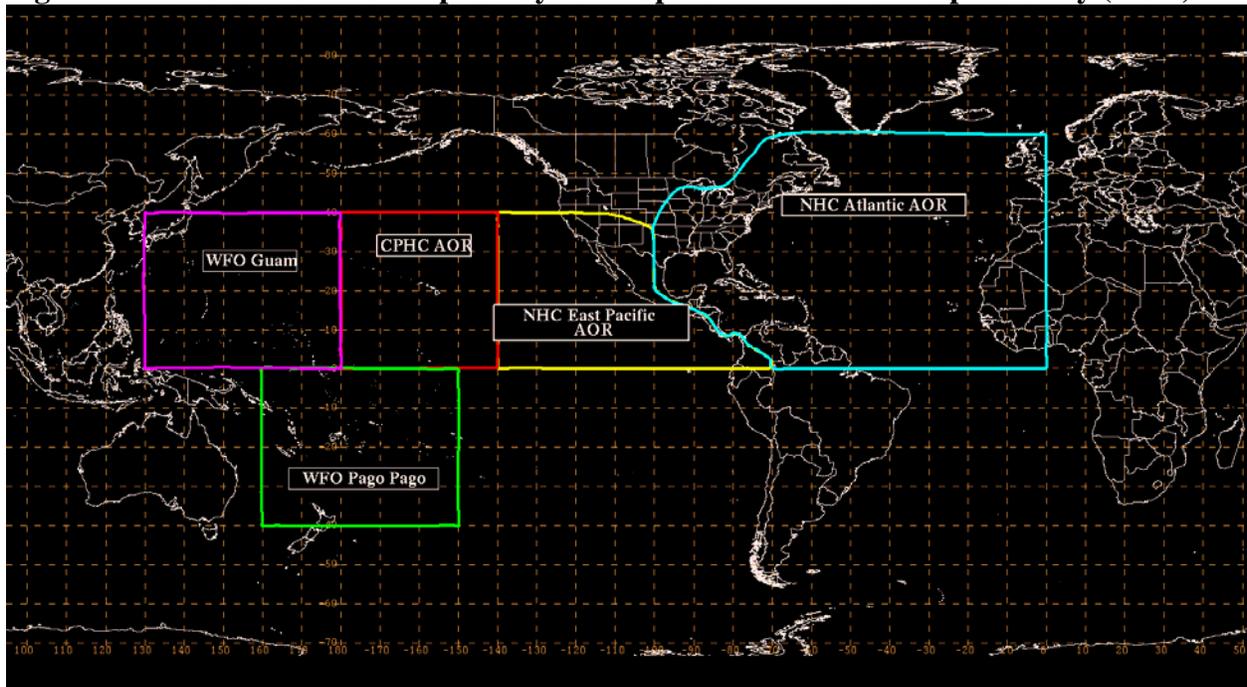
- Central North Pacific Ocean: 4 tropical storms, 2 of which became hurricanes

Over a typical 2-year period, the U.S. coastline is struck by an average of 3 hurricanes (maximum sustained winds of 74 mph or higher), 1 of which is classified as a major hurricane (maximum sustained winds of 111 mph or higher). Hurricanes produce numerous impacts to life and property including damaging winds, storm surge, flooding rainfall, tornadoes, and rip currents.

For example, Hurricane Katrina in 2005 was the costliest and one of the five deadliest hurricanes to ever strike the United States³. The total number of fatalities known to be either directly or indirectly related to Katrina is 1833, with about 1300 in Louisiana. Storm surge reached as high as 19 feet in New Orleans, which contributed to failures in several levees which flooded about 80% of the city. Katrina spawned 43 tornadoes, produced 10-12 inches of rain over eastern Louisiana, destroyed thousands of homes and businesses and caused an estimated \$108 Billion in damage.

Staff of the LFW_NHC work year round on hurricane education and outreach and techniques development as well as producing analyses, forecasts and warnings, primarily for marine interests over vast reaches of the Atlantic and Pacific Oceans.

Figure 1 – NHC and CPHC Tropical Cyclone Operations Area of Responsibility (AOR)



³ Knabb, Richard, J Rhome, and D Brown; Tropical Cyclone Report Hurricane Katrina 23-30 August 2005, National Hurricane Center, 20 December 2005, http://www.nhc.noaa.gov/pdf/TCR-AL122005_Katrina.pdf

2. Observation Requirements Summary

The **Local Forecasts and Warnings Program, National Hurricane Center Subprogram** of NOAA's Weather and Water Goal requires a total of 57 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: 57

2.1 Observation Requirements by Priority

The Local Forecasts and Warnings Program, National Hurricane Center Subprogram's observation requirements are distributed among priority levels as follows:

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

The following chart provides the distribution of the Local Forecasts and Warnings Program, National Hurricane Center Subprogram's requirements by priority.

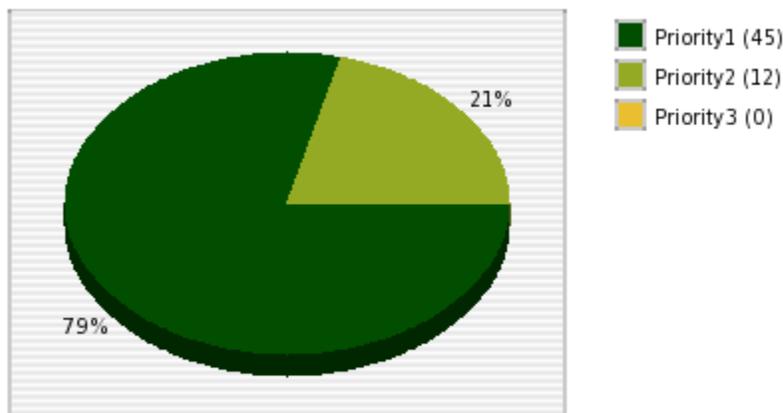


Figure 1: WW-LFW_NHC Observation Requirements by Priority (%)

2.2 Observation Requirements by Discipline

The Local Forecasts and Warnings Program, National Hurricane Center Subprogram's observation requirements are distributed among environmental disciplines as follows:

31 = Atmosphere

0 = Biosphere

0 = Cryosphere

0 = Human Dimensions

1 = Terrestrial Hydrosphere

1 = Land Surface

18 = Oceans

0 = Solid Earth

6 = Spectral/Engineering

0 = Sun-earth Interactions

The following chart provides the distribution of the Local Forecasts and Warnings Program, National Hurricane Center Subprogram's requirements by discipline.

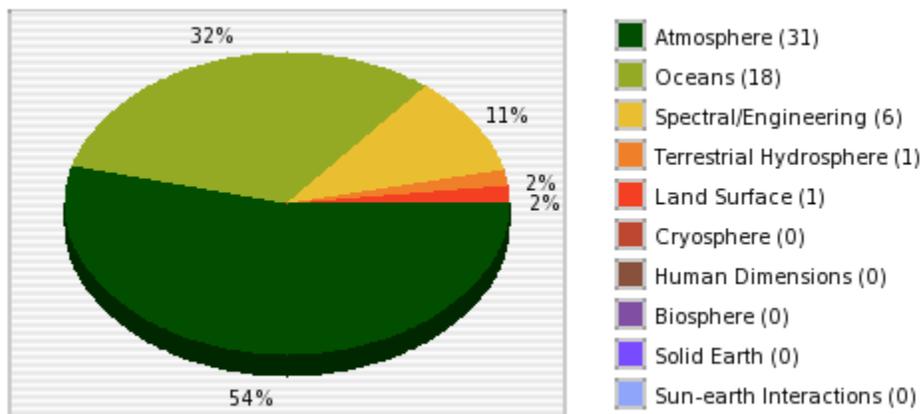


Figure 2: WW-LFW_NHC Observation Requirements by Discipline.

2.3 Observation Requirements by Type

The Local Forecasts and Warnings Program, National Hurricane Center Subprogram's observation requirements are distributed among types as follows:

0 = Biological

1 = Chemical

56 = Physical

0 = Social

0 = Socio-economic

0 = Other

The following Chart gives the distribution of the Local Forecasts and Warnings Program, National Hurricane Center Subprogram's requirements by type.

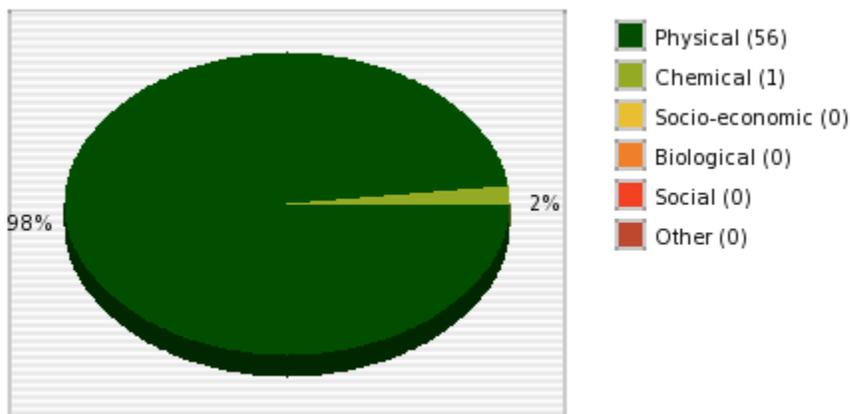


Figure 3: WW-LFW_NHC Observation Requirements by Type.

3. Observation Requirements Mapping to Performance Measures

Section to be completed in future version of the WW-LFW_NHC PORD.

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 the Threshold level (NOTE: 100% Objective level requirements were not validated.) The following table provides the attribute completion status of the observation requirements list for the Local Forecasts and Warnings Program, National Hurricane Center Subprogram. All attributes at the Priority-1/Threshold Level must be completed to allow for observation gap analyses to be conducted.

Table 1: WW-LFW_NHC Observation Requirement Attributes Remaining [blank] or [tbs]

Priority	Key Threshold Attributes	Other Threshold Attributes	Objective Attributes
1	0	0	na
2	96	0	na
3	0	0	na
Total	96	0	na

Note: The five key attributes are: Geographic Coverage, Vertical Resolution, Horizontal Resolution, Measurement Accuracy, and Sampling Interval.

**NOAA Program Observation Requirements Document (PORD)
(WW-LFW_NHC)**

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Jan. 19, 2012

Appendix A Local Forecasts and Warnings Program, National Hurricane Center Subprogram, Observation Requirements

Key: V=value, U=units, W=weight, Yellow Column=Attribute Not validated

Observation Requirement	Obs Req Prty	T/O	Geo Cov		Vert Range				Vert Res			Horiz Res			Msmnt Accy			Smpng intvl		
			V	W	Low	High	U	W	V	U	W	V	U	W	V	U	W	V	U	W
Bathymetry, Surface, Coastal	1	T	TC/Marine/Surface Analysis AOR	10	na	na	na		na	na	0	10	m	40	15	cm	40	1	yr	10
		O	TC/Marine/Surface Analysis AOR		na	na	na		na	na		tbs	tbs		tbs	tbs		tbs	tbs	
Dew Point Temperature: Profiles, Marine/Surface Analysis AOR	1	T	TC/Marine/Surface Analysis AOR	10	na	na	na		50	hPa	20	50	km	35	1	K	25	3	hr	10
		O	TC/Marine/Surface Analysis AOR		na	na	na		tbs	tbs		tbs	tbs		tbs	tbs		tbs	tbs	
Dew Point Temperature: Profiles, Storm Area/Tropical Cyclones	1	T	TC/Marine/Surface Analysis AOR	15	na	na	na		10	hPa	20	25	km	30	1	K	20	1	hr	15
		O	TC/Marine/Surface Analysis AOR		na	na	na		tbs	tbs		tbs	tbs		tbs	tbs		tbs	tbs	
Dew Point Temperature: Surface	1	T	TC/Marine/Surface Analysis AOR	15	na	na	na		na	na	0	25	km	40	1	K	30	1	hr	15
		O	TC/Marine/Surface Analysis AOR		na	na	na		na	na		tbs	tbs		tbs	tbs		tbs	tbs	
Dewpoint Constant Altitude, Storm Area/Tropical Cyclones/Inverts	1	T	TC/Marine/Surface Analysis AOR	35	0	15000	m		na	na	0	3	km	25	1	K	30	1	hr	10
		O	TC/Marine/Surface Analysis AOR		na	na	na		tbs	tbs		tbs	tbs		tbs	tbs		tbs	tbs	
Hydrometeor Size and Type, Marine/Surface Analysis AOR	1	T	TC/Marine/Surface Analysis AOR	10	na	na	na		1500	m	30	25	km	30	20	%	10	1	hr	20
		O	TC/Marine/Surface Analysis AOR		na	na	na		tbs	tbs		tbs	tbs		tbs	tbs		tbs	tbs	
Hydrometeor Size and Type, Storm Area/Tropical Cyclones	1	T	TC/Marine/Surface Analysis AOR	15	na	na	na		500	m	35	1	km	30	20	%	10	5	min	10
		O	TC/Marine/Surface Analysis AOR		na	na	na		tbs	tbs		tbs	tbs		tbs	tbs		tbs	tbs	
Imagery: Infrared, Storm Area/Tropical Cyclones	1	T	TC/Marine/Surface Analysis AOR	35	na	na	na		na	na	0	1	km	35	1	K	20	15	min	10
		O	TC/Marine/Surface Analysis AOR		na	na	na		na	na		tbs	tbs		tbs	tbs		tbs	tbs	
Imagery: Infrared, TC/Marine/Surface Analysis AOR	1	T	TC/Marine/Surface Analysis AOR	40	na	na	na		na	na	0	1	km	30	1	K	20	15	min	10
		O	TC/Marine/Surface Analysis AOR		na	na	na		na	na		tbs	tbs		tbs	tbs		tbs	tbs	
Imagery: Microwave, Marine/Surface Analysis AOR	1	T	TC/Marine/Surface Analysis AOR	35	na	na	na		na	na	0	10	km	30	1	K	20	3	hr	15
		O	TC/Marine/Surface Analysis AOR		na	na	na		na	na		tbs	tbs		tbs	tbs		tbs	tbs	
Imagery: Microwave, Storm Area/Tropical Cyclones	1	T	TC/Marine/Surface Analysis AOR	40	na	na	na		na	na	0	10	km	30	1	K	20	1	hr	10
		O	TC/Marine/Surface Analysis AOR		na	na	na		na	na		tbs	tbs		tbs	tbs		tbs	tbs	
Imagery: Visible, Marine/Surface Analysis AOR	1	T	TC/Marine/Surface Analysis AOR	40	na	na	na		na	na	0	0.5	km	30	10	%	20	15	min	10
		O	TC/Marine/Surface Analysis AOR		na	na	na		na	na		tbs	tbs		tbs	tbs		tbs	tbs	

NOAA Program Observation Requirements Document (PORD) (WW-LFW_NHC)

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Observation Requirement	Obs Req Prty	T/O	Geo Cov		Vert Range				Vert Res			Horiz Res			Msmnt Accy			Smping intvl		
			V	W	Low	High	U	W	V	U	W	V	U	W	V	U	W	V	U	W
Imagery: Visible, Storm Area/Tropical Cyclones	1	T	TC/Marine/Surface Analysis AOR	35	na	na	na		na	na	0	0.5	km	35	10	%	20	15	min	10
		O	TC/Marine/Surface Analysis AOR		na	na	na		na	na		tbs	tbs		tbs	tbs		tbs	tbs	
Imagery: Water Vapor, Marine/Surface Analysis AOR	1	T	TC/Marine/Surface Analysis AOR	45	na	na	na		na	na	0	1	km	25	1	K	20	15	min	10
		O	TC/Marine/Surface Analysis AOR		na	na	na		na	na		tbs	tbs		tbs	tbs		tbs	tbs	
Imagery: Water Vapor, Storm Area/Tropical Cyclones	1	T	TC/Marine/Surface Analysis AOR	35	na	na	na		na	na	0	1	km	30	1	K	25	15	min	10
		O	TC/Marine/Surface Analysis AOR		na	na	na		na	na		tbs	tbs		tbs	tbs		tbs	tbs	
Minimum Central Pressure, Storm Area/Tropical Cyclones	1	T	TC/Marine/Surface Analysis AOR	50	na	na	na		na	na	0	na	na	0	1	hPa	30	1	hr	20
		O	TC/Marine/Surface Analysis AOR		na	na	na		tbs	tbs		tbs	tbs		tbs	tbs		tbs	tbs	
Ocean Temperature: Profiles	1	T	TC/Marine/Surface Analysis AOR	15	na	na	na		10	m	20	25	km	30	0.5	K	25	3	day	10
		O	TC/Marine/Surface Analysis AOR		na	na	na		tbs	tbs		tbs	tbs		tbs	tbs		tbs	tbs	
Precipitation Amount	1	T	TC/Marine/Surface Analysis AOR	15	na	na	na		na	na	0	1	km	35	5	mm	25	1	hr	25
		O	TC/Marine/Surface Analysis AOR		na	na	na		na	na		tbs	tbs		tbs	tbs		tbs	tbs	
Precipitation Rate	1	T	TC/Marine/Surface Analysis AOR	15	na	na	na		na	na	0	1	km	35	5	mm/hr	35	5	min	15
		O	TC/Marine/Surface Analysis AOR		na	na	na		na	na		tbs	tbs		tbs	tbs		tbs	tbs	
Pressure Profiles, Storm Area/Tropical Cyclones	1	T	TC/Marine/Surface Analysis AOR	20	na	na	na		1	hPa	25	10	km	25	1	hPa	20	1	hr	10
		O	TC/Marine/Surface Analysis AOR		na	na	na		tbs	tbs		tbs	tbs		tbs	tbs		tbs	tbs	
Sea Surface Height	1	T	TC/Marine/Surface Analysis AOR	30	na	na	na		na	na	0	25	km	25	3	cm	35	1	day	10
		O	TC/Marine/Surface Analysis AOR		na	na	na		na	na		tbs	tbs		tbs	tbs		tbs	tbs	
Sea Surface Temperature	1	T	TC/Marine/Surface Analysis AOR	30	na	na	na		na	na	0	5	km	35	0.5	K	25	6	hr	10
		O	TC/Marine/Surface Analysis AOR		na	na	na		na	na		tbs	tbs		tbs	tbs		tbs	tbs	
Station Pressure, Marine/Surface Analysis AOR	1	T	TC/Marine/Surface Analysis AOR	30	na	na	na		na	na	0	25	km	20	1	hPa	40	1	hr	10
		O	TC/Marine/Surface Analysis AOR		na	na	na		na	na		tbs	tbs		tbs	tbs		tbs	tbs	
Surface Temperature	1	T	TC/Marine/Surface Analysis AOR	30	na	na	na		na	na	0	25	km	25	1	K	30	1	hr	15
		O	TC/Marine/Surface Analysis AOR		na	na	na		na	na		tbs	tbs		tbs	tbs		tbs	tbs	
Surface Winds: Direction, Global	1	T	Global	35	na	na	na		na	na	0	5	km	25	10	deg	15	1	hr	25
		O	Global		na	na	na		na	na		tbs	tbs		tbs	tbs		tbs	tbs	
Surface Winds: Direction, Storm Area/Tropical Cyclones	1	T	TC/Marine/Surface Analysis AOR	35	na	na	na		na	na	0	2.5	km	30	10	deg	15	1	hr	20
		O	TC/Marine/Surface Analysis AOR		na	na	na		na	na		tbs	tbs		tbs	tbs		tbs	tbs	
Surface Winds: Speed, Global	1	T	Global	35	na	na	na		na	na	0	5	km	25	1	m/sec	20	1	hr	20
		O	Global		na	na	na		na	na		tbs	tbs		tbs	tbs		tbs	tbs	

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Observation Requirement	Obs Req Prty	T/O	Geo Cov		Vert Range				Vert Res			Horiz Res			Msmnt Accy			Smplng intvl		
			V	W	Low	High	U	W	V	U	W	V	U	W	V	U	W	V	U	W
Surface Winds: Speed, Storm Area/Tropical Cyclones	1	T	TC/Marine/Surface Analysis AOR	35	na	na	na		na	na	0	1	km	30	1	m/sec	15	1	hr	20
		O	TC/Marine/Surface Analysis AOR		na	na	na		na	na		tbs	tbs		tbs	tbs		tbs	tbs	
Temperature Constant Altitude, Storm Area/Tropical Cyclones/Invests	1	T	TC/Marine/Surface Analysis AOR	35	0	15000	m		na	na	0	3	km	25	1	K	30	1	hr	10
		O	TC/Marine/Surface Analysis AOR		na	na	na		tbs	tbs		tbs	tbs		tbs	tbs		tbs	tbs	
Temperature Profiles, Marine/Surface Analysis AOR	1	T	TC/Marine/Surface Analysis AOR	10	na	na	na		50	hPa	20	50	km	35	1	K	25	3	hr	10
		O	TC/Marine/Surface Analysis AOR		na	na	na		tbs	tbs		tbs	tbs		tbs	tbs		tbs	tbs	
Temperature Profiles, Storm Area/Tropical Cyclones	1	T	TC/Marine/Surface Analysis AOR	20	na	na	na		10	hPa	25	10	km	25	1	K	20	1	hr	10
		O	TC/Marine/Surface Analysis AOR		na	na	na		tbs	tbs		tbs	tbs		tbs	tbs		tbs	tbs	
Topography	1	T	TC/Marine/Surface Analysis AOR	10	na	na	na		na	na	0	10	m	40	15	cm	40	1	yr	10
		O	TC/Marine/Surface Analysis AOR		na	na	na		na	na		tbs	tbs		tbs	tbs		tbs	tbs	
Total Lightning	1	T	TC/Marine/Surface Analysis AOR	40	na	na	na		na	na	0	0.5	km	15	LTE 0.5	km	10	0.001	sec	35
		O	TC/Marine/Surface Analysis AOR		na	na	na		na	na		tbs	tbs		tbs	tbs		tbs	tbs	
Total Water Level	1	T	TC/Marine/Surface Analysis AOR	25	na	na	na		na	na	0	10	km	35	1	cm	20	6	min	20
		O	TC/Marine/Surface Analysis AOR		na	na	na		na	na		tbs	tbs		tbs	tbs		tbs	tbs	
Visibility	1	T	TC/Marine/Surface Analysis AOR	20	na	na	na		na	na	0	10	km	35	250	m	25	1	hr	20
		O	TC/Marine/Surface Analysis AOR		na	na	na		na	na		tbs	tbs		tbs	tbs		tbs	tbs	
Wave Direction, Global Oceans	1	T	Global Ocean	35	na	na	na		na	na	0	25	km	30	10	deg	25	1	hr	10
		O	Global Ocean		na	na	na		na	na		tbs	tbs		tbs	tbs		tbs	tbs	
Wave Height, Global Oceans	1	T	Global Ocean	35	na	na	na		na	na	0	25	km	30	0.25	m	25	1	hr	10
		O	Global Ocean		na	na	na		na	na		tbs	tbs		tbs	tbs		tbs	tbs	
Wave Height, Storm Area/Tropical Cyclones	1	T	TC/Marine/Surface Analysis AOR	35	na	na	na		na	na	0	1	km	30	0.25	m	25	1	hr	10
		O	TC/Marine/Surface Analysis AOR		na	na	na		na	na		tbs	tbs		tbs	tbs		tbs	tbs	
Wave Period, Global Oceans	1	T	Global Ocean	35	na	na	na		na	na	0	25	km	30	1	sec	25	1	hr	10
		O	Global Ocean		na	na	na		na	na		tbs	tbs		tbs	tbs		tbs	tbs	
Wind Direction Constant Altitude, Storm Area/Tropical Cyclones/Invests	1	T	TC/Marine/Surface Analysis AOR	35	0	15000	m		na	na	0	1	km	30	5	deg	25	1	hr	10
		O	TC/Marine/Surface Analysis AOR		na	na	na		tbs	tbs		tbs	tbs		tbs	tbs		tbs	tbs	
Wind Profiles: Direction, Marine/Surface Analysis AOR	1	T	TC/Marine/Surface Analysis AOR	35	na	na	na		50	hPa	15	50	km	30	10	deg	10	3	hr	10
		O	TC/Marine/Surface Analysis AOR		na	na	na		tbs	tbs		tbs	tbs		tbs	tbs		tbs	tbs	
Wind Profiles: Direction, Storm Area/Tropical Cyclones	1	T	TC/Marine/Surface Analysis AOR	35	na	na	na		1	hPa	20	2.5	km	25	10	deg	10	1	hr	10
		O	TC/Marine/Surface Analysis AOR		na	na	na		tbs	tbs		tbs	tbs		tbs	tbs		tbs	tbs	

NOAA Program Observation Requirements Document (PORD) (WW-LFW_NHC)

Ver 1.1 - Validate

Jan. 19, 2012

Observation Requirement	Obs Req Prty	T/O	Geo Cov		Vert Range				Vert Res			Horiz Res			Msmnt Accy			Smplng intvl		
			V	W	Low	High	U	W	V	U	W	V	U	W	V	U	W	V	U	W
Wind Profiles: Speed, Marine/Surface Analysis AOR	1	T	TC/Marine/Surface Analysis AOR	35	na	na	na		50	hPa	15	50	km	30	1	m/sec	10	3	hr	10
		O	TC/Marine/Surface Analysis AOR		na	na	na		tbs	tbs		tbs	tbs		tbs	tbs		tbs	tbs	
Wind Profiles: Speed, Storm Area/Tropical Cyclones	1	T	TC/Marine/Surface Analysis AOR	35	na	na	na		1	hPa	20	2.5	km	25	1	m/sec	10	1	hr	10
		O	TC/Marine/Surface Analysis AOR		na	na	na		tbs	tbs		tbs	tbs		tbs	tbs		tbs	tbs	
Wind Speed Constant Altitude, Storm Area/Tropical Cyclones/Invests	1	T	TC/Marine/Surface Analysis AOR	35	0	15000	m		na	na	0	1	km	25	2	m/sec	30	1	hr	10
		O	TC/Marine/Surface Analysis AOR		na	na	na		tbs	tbs		tbs	tbs		tbs	tbs		tbs	tbs	
Dust/Smoke	2	T	TC/Marine/Surface Analysis AOR		na	na	na		tbs	tbs		tbs	tbs		tbs	tbs		tbs	tbs	
		O	CONUS+AK+HI+US EEZ		na	na	na		tbs	tbs		tbs	tbs		tbs	tbs		tbs	tbs	
Ocean Currents: Direction, Profiles	2	T	TC/Marine/Surface Analysis AOR		na	na	na		tbs	tbs		tbs	tbs		tbs	tbs		tbs	tbs	
		O	TC/Marine/Surface Analysis AOR		na	na	na		na	na		tbs	tbs		tbs	tbs		tbs	tbs	
Ocean Currents: Direction, Surface	2	T	TC/Marine/Surface Analysis AOR		na	na	na		tbs	tbs		tbs	tbs		tbs	tbs		tbs	tbs	
		O	TC/Marine/Surface Analysis AOR		na	na	na		tbs	tbs		tbs	tbs		tbs	tbs		tbs	tbs	
Ocean Currents: Speed, Profiles	2	T	TC/Marine/Surface Analysis AOR		na	na	na		tbs	tbs		tbs	tbs		tbs	tbs		tbs	tbs	
		O	TC/Marine/Surface Analysis AOR		na	na	na		tbs	tbs		tbs	tbs		tbs	tbs		tbs	tbs	
Ocean Currents: Speed, Surface	2	T	TC/Marine/Surface Analysis AOR		na	na	na		tbs	tbs		tbs	tbs		tbs	tbs		tbs	tbs	
		O	TC/Marine/Surface Analysis AOR		na	na	na		tbs	tbs		tbs	tbs		tbs	tbs		tbs	tbs	
River Stage Height	2	T	TC/Marine/Surface Analysis AOR		na	na	na		tbs	tbs		tbs	tbs		tbs	tbs		tbs	tbs	
		O	CONUS+AK+HI+US EEZ		na	na	na		tbs	tbs		tbs	tbs		tbs	tbs		tbs	tbs	
Sea Level	2	T	TC/Marine/Surface Analysis AOR		na	na	na		tbs	tbs		tbs	tbs		tbs	tbs		tbs	tbs	
		O	TC/Marine/Surface Analysis AOR		na	na	na		tbs	tbs		tbs	tbs		tbs	tbs		tbs	tbs	
Swell Direction	2	T	TC/Marine/Surface Analysis AOR		na	na	na		tbs	tbs		tbs	tbs		tbs	tbs		tbs	tbs	
		O	TC/Marine/Surface Analysis AOR		na	na	na		tbs	tbs		tbs	tbs		tbs	tbs		tbs	tbs	
Swell Height	2	T	TC/Marine/Surface Analysis AOR		na	na	na		tbs	tbs		tbs	tbs		tbs	tbs		tbs	tbs	
		O	TC/Marine/Surface Analysis AOR		na	na	na		tbs	tbs		tbs	tbs		tbs	tbs		tbs	tbs	
Swell Period	2	T	TC/Marine/Surface Analysis AOR		na	na	na		tbs	tbs		tbs	tbs		tbs	tbs		tbs	tbs	
		O	TC/Marine/Surface Analysis AOR		na	na	na		tbs	tbs		tbs	tbs		tbs	tbs		tbs	tbs	
Volcanic Ash	2	T	TC/Marine/Surface Analysis AOR		na	na	na		tbs	tbs		tbs	tbs		tbs	tbs		tbs	tbs	
		O	CONUS+AK+HI+US EEZ		na	na	na		tbs	tbs		tbs	tbs		tbs	tbs		tbs	tbs	
Wave Length	2	T	TC/Marine/Surface Analysis AOR		na	na	na		tbs	tbs		tbs	tbs		tbs	tbs		tbs	tbs	
		O	TC/Marine/Surface Analysis AOR		na	na	na		tbs	tbs		tbs	tbs		tbs	tbs		tbs	tbs	

Table Key and Definitions:

Column Titles: V=value, U=units, W=weight

Table Entries: na=not applicable, tbs=to be supplied

Observation Requirements Modifiers:

Storm Area/Tropical Cyclones: "Storm Area/Tropical Cyclones" does not encompass a fixed time or space region.

- It is defined as: "A relocatable, three-dimensional region within the 20-kt surface wind radius of an active tropical cyclone or its remnants." For disturbances that have the potential to become a tropical cyclone, the region is defined as: "A relocatable, three-dimensional region within a radius of 200 km of the estimated center of the disturbance, be it at the surface or aloft."

Profile: An observation that shows the variation of a meteorological parameter with height.

Surface: Typically refers to an observation at standard measuring levels above a surface, such as 2m above ground level for temperature and 10m for winds.

Constant Altitude Invest: Refers to a set of observations provided by aircraft flying at a constant altitude in the vicinity of and through a disturbance area or tropical cyclone.

Vertical range (shown under "other attributes" in Table 1) are included in the Appendix A table but are not validated.

Appendix B WW-LFW_NHC, Priority-1 Requirements Validation

Appendix B.1 Validation Documents Submitted

The following Validation Documents have been submitted in support of the Local Forecasts and Warnings Program's Priority-1 Observation Requirements.

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

Doc #	Validation Document Title	Document Type
1	2nd GOES Users' Conference report, Oct 2002	Technical Conference Report
2	An Automated Method to Estimate Tropical Cyclone Intensity Using SSM/I Imagery, JAM Vol 41, May 2002	Peer-reviewed Journal Article
3	Analysis of Tropical Cyclones Using Microwave Satellite Imagery, JMA	Peer-reviewed Journal Article
4	Application of Oceanic Heat Content Estimation to Operational Forecasting of Recent Atlantic Category 5 Hurricanes, Feb 2008	Technical Report
5	CT-MWX Final PORD	Validated PORD
6	Experimental Tropical Rainfall Product Description (http://www.nhc.noaa.gov/experimental/rainfall/about.php#examples)	Product Description
7	Eyewall Wind Profiles in Hurricanes Determined By GPS Dropwindsondes, April 2000	Technical Report
8	Federal Lightning Capability Requirements (OFCM), July 2008	Federal Government Requirements Document
9	Federal Meteorological Handbook No. 1 (FMH-1), Chapter 10, Sept 2005	Federal Meteorological Handbook
10	Federal Meteorological Handbook No. 1 (FMH-1), Chapter 12, Sept 2005	Federal Meteorological Handbook
11	Federal Meteorological Handbook No. 3 (FMH-3): Rawinsonde and Pibal Observations, FCM-H3-1997, Chapter 5, May 1997	Federal Meteorological Handbook
12	Further Improvements to the Statistical Hurricane Intensity Prediction Scheme (SHIPS)	Technical Report
13	GLOBAL VIEW OF THE ORIGIN OF TROPICAL DISTURBANCES AND STORMS, October 1968	Peer-reviewed Journal Article
14	Guidance for Reduction of Flight-level Observations and Interpretation of GPS Dropwindsonde Data, Feb 2001	Operating Procedures Manual
15	http://www.ametsoc.org/amsedu/dstreme/extras/usr_guide/Metgram.html	Product Description
16	Microwave Rainfall Estimation over Coasts	Technical Report
17	Modeling of storm-induced coastal flooding for emergency management	Technical Report
18	MULTIFUNCTIONAL MESOSCALE OBSERVING NETWORKS, BAMS, July 2005	Peer-reviewed Journal Article
19	National Data Buoy Center, NDBC - What are the sensors reporting, sampling, and accuracy readings?	Technical Report
20	National Hurricane Center Hurricane Specialist Station Duty Manual Unit Station Duty Manual, May 2010	Operating Procedures Manual
21	National Hurricane Operations Plan, FCM-P12-2010, May 2010	Operating Procedures Manual

NOAA Program Observation Requirements Document (PORD)
Ver 1.1 - Validate (WW-LFW_NHC) Jan. 19, 2012

Doc #	Validation Document Title	Document Type
22	National Hurricane Operations Plan: FCM-P12-2011	Operating Procedures Manual
23	NATIONAL WEATHER SERVICE INSTRUCTION 10-311: OFFSHORE, NAVTEX, HIGH SEAS, AND MARINE FORECAST SERVICES, AUGUST 22, 2008	NWS Instruction
24	NATIONAL WEATHER SERVICE INSTRUCTION 10-601, JULY 27, 2009, Operations and Services Tropical Cyclone, Weather Services Program, NWSPD 10-6, TROPICAL CYCLONE PRODUCTS	NWS Instruction
25	NATIONAL WEATHER SERVICE INSTRUCTION 10-601: TROPICAL CYCLONE PRODUCTS	NWS Instruction
26	NATIONAL WEATHER SERVICE INSTRUCTION 10-604, JUNE 9, 2010, Operations and Services Tropical Cyclone, Weather Services Program, NWSPD 10-6, TROPICAL CYCLONE DEFINITIONS	NWS Instruction
27	NATIONAL WEATHER SERVICE POLICY DIRECTIVE 10-6, SEPTEMBER 29, 2009, Operations and Services, TROPICAL CYCLONE WEATHER SERVICES PROGRAM	NWS Policy Directive
28	NexSat: Satellite Product Tutorials: Water Vapor Imagery	Product Tutorial
29	NOAA Operational Ocean Surface Vector Winds Requirements Workshop, NHC, July 2006	Technical Conference Report
30	NOAA Technical Memorandum NOS CO-OPS 0048, A Network Gaps Analysis For The National Water Level Observation Network	NOAA Technical Memorandum
31	NOAA/National Weather Service, National Hurricane Center / Tropical Analysis and Forecast Branch, Experimental Gridded Marine Forecasts, Product Description Document	Product Description Document
32	NOAA Technical Report NESDIS 11 - Tropical Cyclone Intensity Analysis Using Satellite Data, Sept 1984	Technical Report
33	Observing Weather and Climate FROM THE GROUND UP, A Nationwide Network of Networks, National Research Council, The National Academies Press	NRC Document
34	Product Description Document: NCEP Model Analyses & Forecasts, July 2010	Product Description Document
35	RECENT INNOVATIONS IN DERIVING TROPOSPHERIC WINDS FROM METEOROLOGICAL SATELLITES, BAMS Feb 2005	Peer-reviewed Journal Article
36	STATION DUTY MANUAL FOR THE ATLANTIC AND EAST PACIFIC TROPICAL WEATHER DISCUSSION (Last updated by GR on September 29, 2011)	Operating Procedures Manual
37	STUDY OF FOG PROPERTIES USING LANDSAT DATA	Peer-reviewed Journal Article
38	Subject Matter Expert (SME) Statement	SME Statement
39	TAFB HIGH SEAS FORECAST STATION DUTY MANUAL, CHAPTER 1 - ATLANTIC HIGH SEAS FORECAST, MIAHSFAT2	Operating Procedures Manual
40	TAFB Station Duty Manual for Tropical Cyclone Satellite Related Functions: Dvorak Classifications, AODT, Microwave Fixes, Electronic Fix Form and the ATCF, June 2008	Operating Procedures Manual
41	TAFB Surface Analysis Station Duty Manual, Dec 2007	Operating Procedures Manual
42	The Future Global Earth Observing System: System requirements and architecture	GEOS Document

NOAA Program Observation Requirements Document (PORD)
Ver 1.1 - Validate (WW-LFW_NHC) Jan. 19, 2012

Doc #	Validation Document Title	Document Type
43	The Integrated, Strategic Design Plan for the Coastal Ocean Observations Module of the Global Ocean Observing System, GOOS Report No. 125, 2003	GOOS Report
44	The NCAR GPS Dropwindsonde, March 1999	Technical Report
45	THE ROLE OF THE SLOSH MODEL IN NATIONAL WEATHER SERVICE STORM SURGE FORECASTING	Technical Report
46	Tropical Clouds and Cloud Systems Observed in Satellite Imagery, Volume 1	Technical Report
47	Tropical Cyclone Fixes, (Local Reference - maintained by focal points), Documentation associated with the following programs: Satellite Remote Sensing	Technical Report
48	TROPICAL CYCLONE FORCING OF OCEAN SURFACE WAVES	Technical Report
49	Tropical Cyclone Intensity Analysis and Forecasting from Satellite Imagery	Technical Report
50	Unified Surface Analysis Manual, Hydrometeorological Prediction Center, Ocean Prediction Center, Tropical Prediction Center, Honolulu Forecast Office, Dec 2006	Operating Procedures Manual
51	WMO Manual on Marine Meteorological Services, Vol 1	WMO Manual
52	WMO Observing Requirements Database - Details for Air pressure (at surface)	WMO Observing Requirements Database
53	WMO Observing Requirements Database - Details for Air temperature (at surface)	WMO Observing Requirements Database
54	WMO Observing Requirements Database - Details for Bathymetry	WMO Observing Requirements Database
55	WMO Observing Requirements Database - Details for Cloud Cover	WMO Observing Requirements Database
56	WMO Observing Requirements Database - Details for Cloud Top Temperature	WMO Observing Requirements Database
57	WMO Observing Requirements Database - Details for Details for Significant Wave Height_req 536	WMO Observing Requirements Database
59	WMO Observing Requirements Database - Details for Dominant Wave Period_req 494	WMO Observing Requirements Database
60	WMO Observing Requirements Database - Details for Ocean dynamic topography	WMO Observing Requirements Database
61	WMO Observing Requirements Database - Details for Ocean Temperature 514	WMO Observing Requirements Database
62	WMO Observing Requirements Database - Details for Ocean Temperature 515	WMO Observing Requirements Database
63	WMO Observing Requirements Database - Details for Ocean Temperature 516	WMO Observing Requirements Database
64	WMO Observing Requirements Database - Details for Precipitation intensity at surface (liquid or solid)	WMO Observing Requirements Database
66	WMO Observing Requirements Database - Details for Sea surface height anomaly	WMO Observing Requirements Database
67	WMO Observing Requirements Database - Details for Sea surface temp	WMO Observing Requirements Database

NOAA Program Observation Requirements Document (PORD)
Ver 1.1 - Validate (WW-LFW_NHC) Jan. 19, 2012

Doc #	Validation Document Title	Document Type
68	WMO Observing Requirements Database - Details for Significant Wave Height_req 540	WMO Observing Requirements Database
69	WMO Observing Requirements Database - Details for Wind Vector over surface	WMO Observing Requirements Database
70	WSR-88D Tropical Cyclone Operations Plan, 05/14/2010 Build 11 and 12.0: Systems Without Dual Polarization	Operating Procedures Manual
71	Advanced Hurricane Modeling at EMC: The HWRF, Dec 2010	Technical Report
72	03.0C Invest Areas - (Local Reference - maintained by focal points), Documentation associated with the following programs: CPHC Tropical Cyclone	Local Reference
73	Interpretation of TRMM TMI Images of Tropical Cyclones, 2002	Technical Report
74	GOES R Atmospheric Requirements List	Not Used
75	Federal Meteorological Handbook No. 1 (FMH-1), Chapter 11, Sept 2005	Federal Meteorological Handbook
76	Federal Meteorological Handbook No. 1 (FMH-1), Appendix C, Sensor Standards, Sept 2005	Federal Meteorological Handbook
77	Federal Meteorological Handbook No. 1 (FMH-1), Chapter 5, Sept 2005	Federal Meteorological Handbook
78	NATIONAL WEATHER SERVICE INSTRUCTION 10-302, OCTOBER 2010: MARINE AND COASTAL SERVICES AREAS OF RESPONSIBILITY	NWS Instruction
79	The Hurricane's Inner Core Region. I. Symmetric and Asymmetric Structure, Nov 1973	Technical Report
80	The Structure of a Small, Intense Hurricane--Inez 1966, April 1976	Technical Report
81	MULTIFUNCTIONAL MESOSCALE OBSERVING NETWORKS, BAMS, July 2005	Peer-reviewed Journal Article
82	A National Operational Wave Observation Plan, March 2009	Technical Report
83	WMO Observing Requirements Database - Details for Dominant Wave Direction_req 330	WMO Observing Requirements Database
84	Wind/Wave Analysis and Forecast charts, (Local Reference - maintained by focal points), Documentation associated with the following programs: HMT, National Center Marine	Technical Report
85	Tropical Cyclone Forecast Centers' Areas of Responsibility	Technical Report
86	Wind Profiles in Hurricanes and Their Operational Implications	Technical Report
87	High Seas Forecasts (Local Reference - maintained by focal points), Documentation associated with the following programs: National Center Marine	Technical Report

Appendix B.2 Validation Documents Mapping to Observation Requirements

Local Forecasts and Warnings 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	Documents Submitted
Bathymetry, Surface, Coastal	20, 45, 54
Dew Point Temperature: Profiles, Marine/Surface Analysis AOR	11, 31, 33, 42
Dew Point Temperature: Profiles, Storm Area/Tropical Cyclones	20, 21, 42, 44
Dew Point Temperature: Surface	9, 34, 42
Dewpoint Constant Altitude, Storm Area/Tropical Cyclones/Invests	21, 38
Hydrometeor Size and Type, Marine/Surface Analysis AOR	20, 33, 36
Hydrometeor Size and Type, Storm Area/Tropical Cyclones	20, 33, 70
Imagery: Infrared, Storm Area/Tropical Cyclones	32, 46, 56
Imagery: Infrared, TC/Marine/Surface Analysis AOR	46, 50, 56
Imagery: Microwave, Marine/Surface Analysis AOR	1, 3, 16, 40
Imagery: Microwave, Storm Area/Tropical Cyclones	1, 2, 3, 16, 38
Imagery: Visible, Marine/Surface Analysis AOR	47, 55
Imagery: Visible, Storm Area/Tropical Cyclones	49, 55
Imagery: Water Vapor, Marine/Surface Analysis AOR	1, 28, 35
Imagery: Water Vapor, Storm Area/Tropical Cyclones	1, 28, 35
Minimum Central Pressure, Storm Area/Tropical Cyclones	22, 25
Ocean Temperature: Profiles	61, 62, 63
Precipitation Amount	6, 64
Precipitation Rate	20, 64
Pressure Profiles, Storm Area/Tropical Cyclones	7, 14, 38, 44
Sea Surface Height	4, 60, 66
Sea Surface Temperature	33, 43, 67
Station Pressure, Marine/Surface Analysis AOR	15, 22, 25, 41, 50, 52
Surface Temperature	9, 34, 50, 53
Surface Winds: Direction, Global	29, 42, 50
Surface Winds: Direction, Storm Area/Tropical Cyclones	20, 29, 42
Surface Winds: Speed, Global	29, 42, 69
Surface Winds: Speed, Storm Area/Tropical Cyclones	20, 26, 29, 38
Temperature Constant Altitude, Storm Area/Tropical Cyclones/Invests	21, 38
Temperature Profiles, Marine/Surface Analysis AOR	11, 31, 34, 50
Temperature Profiles, Storm Area/Tropical Cyclones	20, 21, 42, 44, 50
Topography	20, 45, 54
Total Lightning	8
Total Water Level	30, 38, 51, 81
Visibility	23, 37
Wave Direction, Global Oceans	5, 51, 83
Wave Height, Global Oceans	5, 39, 57
Wave Height, Storm Area/Tropical Cyclones	5, 20, 48, 68

NOAA Program Observation Requirements Document (PORD)
Ver 1.1 - Validate (WW-LFW_NHC) Jan. 19, 2012

Observation Requirement	Documents Submitted
Wave Period, Global Oceans	5, 20, 59
Wind Direction Constant Altitude, Storm Area/Tropical Cyclones/Invests	21, 38
Wind Profiles: Direction, Marine/Surface Analysis AOR	11, 33, 34, 38, 42, 50
Wind Profiles: Direction, Storm Area/Tropical Cyclones	21, 29, 38, 42, 44
Wind Profiles: Speed, Marine/Surface Analysis AOR	21, 33, 38, 42, 44
Wind Profiles: Speed, Storm Area/Tropical Cyclones	20, 21, 38, 42, 44
Wind Speed Constant Altitude, Storm Area/Tropical Cyclones/Invests	21, 38

Appendix B.3 Validation Assessment for Priority-1 Requirements

Local Forecasts and Warnings 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					Not required to be validated
	Geographic Coverage	Vertical Resolution	Horizontal Resolution	Measurement Accuracy	Sampling Interval	Vertical Range
Bathymetry, Surface, Coastal	TC/Marine/Surface Analysis AOR	na	10 m	15 cm	1 yr	
Dew Point Temperature: Profiles, Marine/Surface Analysis AOR	TC/Marine/Surface Analysis AOR	50 hPa	50 km	1 K	3 hr	
Dew Point Temperature: Profiles, Storm Area/Tropical Cyclones	TC/Marine/Surface Analysis AOR	10 hPa	25 km	1 K	1 hr	
Dew Point Temperature: Surface	TC/Marine/Surface Analysis AOR	na	25 km	1 K	1 hr	
Dewpoint Constant Altitude, Storm Area/Tropical Cyclones/Invests	TC/Marine/Surface Analysis AOR	na	3 km	1 K	1 hr	0 - 15000 m
Hydrometeor Size and Type, Marine/Surface Analysis AOR	TC/Marine/Surface Analysis AOR	1500 m	25 km	20 %	1 hr	
Hydrometeor Size and Type, Storm Area/Tropical Cyclones	TC/Marine/Surface Analysis AOR	500 m	1 km	20 %	5 min	
Imagery: Infrared, Storm Area/Tropical Cyclones	TC/Marine/Surface Analysis AOR	na	1 km	1 K	15 min	
Imagery: Infrared, TC/Marine/Surface Analysis AOR	TC/Marine/Surface Analysis AOR	na	1 km	1 K	15 min	
Imagery: Microwave, Marine/Surface Analysis AOR	TC/Marine/Surface Analysis AOR	na	10 km	1 K	3 hr	
Imagery: Microwave, Storm Area/Tropical Cyclones	TC/Marine/Surface Analysis AOR	na	10 km	1 K	1 hr	
Imagery: Visible, Marine/Surface Analysis AOR	TC/Marine/Surface Analysis AOR	na	0.5 km	10 %	15 min	
Imagery: Visible, Storm Area/Tropical Cyclones	TC/Marine/Surface Analysis AOR	na	0.5 km	10 %	15 min	
Imagery: Water Vapor, Marine/Surface Analysis AOR	TC/Marine/Surface Analysis AOR	na	1 km	1 K	15 min	
Imagery: Water Vapor, Storm Area/Tropical Cyclones	TC/ Marine/ Surface Analysis AOR	na	1 km	1 K	15 min	
Minimum Central Pressure, Storm Area/Tropical Cyclones	TC/ Marine/ Surface Analysis AOR	na	na	1 hPa	1 hr	
Ocean Temperature: Profiles	TC/ Marine/ Surface Analysis AOR	10 m	25 km	0.5 K	3 days	
Precipitation Amount	TC/ Marine/ Surface Analysis AOR	na	1 km	5 mm	1 hr	
Precipitation Rate	TC/ Marine/ Surface Analysis AOR	na	1 km	5 mm/hr	5 min	
Pressure Profiles, Storm Area/Tropical Cyclones	TC/ Marine/ Surface Analysis AOR	1 hPa	2.5 km	1 hPa	1 hr	
Sea Surface Height	TC/ Marine/ Surface Analysis AOR	na	25 km	3 cm	1 day	

NOAA Program Observation Requirements Document (PORD)
Ver 1.1 - Validate (WW-LFW_NHC) Jan. 19, 2012

Parameters	Attribute Validated					Not required to be validated
	Geographic Coverage	Vertical Resolution	Horizontal Resolution	Measurement Accuracy	Sampling Interval	Vertical Range
Sea Surface Temperature	TC/ Marine/ Surface Analysis AOR	na	5 km	0.5 K	6 hr	
Station Pressure, Marine/Surface Analysis AOR	TC/ Marine/ Surface Analysis AOR	na	25 km	1 hPa	1 hr	
Surface Temperature	TC/ Marine/ Surface Analysis AOR	na	25 km	1 K	1 hr	
Surface Winds: Direction, Global	Global	na	5 km	10 deg	1 hr	
Surface Winds: Direction, Storm Area/Tropical Cyclones	TC/ Marine/ Surface Analysis AOR	na	2.5 km	10 deg	1 hr	
Surface Winds: Speed, Global	Global	na	5 km	1 m/sec	1 hr	
Surface Winds: Speed, Storm Area/Tropical Cyclones	TC/ Marine/ Surface Analysis AOR	na	1 km	1 m/sec	1 hr	
Temperature Constant Altitude, Storm Area/Tropical Cyclones/Invests	TC/ Marine/ Surface Analysis AOR	na	3 km	1 K	1 hr	0 - 15000 m
Temperature Profiles, Marine/Surface Analysis AOR	TC/ Marine/ Surface Analysis AOR	50 hPa	50 km	1 K	3 hr	
Temperature Profiles, Storm Area/Tropical Cyclones	TC/ Marine/ Surface Analysis AOR	10 hPa	10 km	1 K	1 hr	
Topography	TC/ Marine/ Surface Analysis AOR	na	10 m	15 cm	1 yr	
Total Lightning	TC/ Marine/ Surface Analysis AOR	na	0.5 km	LTE 0.5 km	0.001 sec	
Total Water Level	TC/ Marine/ Surface Analysis AOR	na	10 km	1 cm	6 min	
Visibility	TC/ Marine/ Surface Analysis AOR	na	10 km	250 m	1 hr	
Wave Direction, Global Oceans	Global Ocean	na	25 km	10 deg	1 hr	
Wave Height, Global Oceans	Global Ocean	na	25 km	0.25 m	1 hr	
Wave Height, Storm Area/Tropical Cyclones	TC/ Marine/ Surface Analysis AOR	na	1 km	0.25 m	1 hr	
Wave Period, Global Oceans	Global Ocean	na	25 km	1 sec	1 hr	
Wind Direction Constant Altitude, Storm Area/Tropical Cyclones/Invests	TC/ Marine/ Surface Analysis AOR	na	1 km	5 deg	1 hr	0 - 15000 m
Wind Profiles: Direction, Marine/Surface Analysis AOR	TC/ Marine/ Surface Analysis AOR	50 hPa	50 km	10 deg	3 hr	
Wind Profiles: Direction, Storm Area/Tropical Cyclones	TC/ Marine/ Surface Analysis AOR	1 hPa	2.5 km	10 deg	1 hr	
Wind Profiles: Speed, Marine/Surface Analysis AOR	TC/ Marine/ Surface Analysis AOR	50 hPa	50 km	1 m/sec	3 hr	
Wind Profiles: Speed, Storm Area/Tropical Cyclones	TC/ Marine/ Surface Analysis AOR	1 hPa	2.5 km	1 m/sec	1 hr	
Wind Speed Constant Altitude, Storm Area/Tropical Cyclones/Invests	TC/ Marine/ Surface Analysis AOR	na	1 km	2 m/sec	1 hr	0 - 15000 m

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_Atmos	Climate - Observations and Monitoring, Atmosphere 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-EAP	Ecosystem - Ecosystems Assessment Program
EC-ERP	Ecosystem - Ecosystem Research
EC-HAB	Ecosystem - Habitat
EM-EMC	Environmental Modeling - Environmental Modeling Center
MS-IOS	Mission Support - Integrated Ocean Observing System
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-IWF	Weather and Water – Integrated Water Forecasting
WW-LFW/WFO-SPC	Weather and Water - Local Forecasts and Warnings, Weather Forecast Office/Storm Prediction Center Sub-Program
WW-LFW/NHC	Weather and Water - Local Forecasts and Warnings, National Hurricane Center Sub-Program
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: Attribute weight: relative weight of each of the basic attributes, a value from 1 to 100, with the most important of the attributes given the highest relative value. All weights across a requirement row should add up to 100.

Observational Requirement Title	Geographic Coverage Weight	Vertical Resolution Weight	Horizontal Resolution Weight	Measurement Accuracy Weight	Sampling Interval Weight	Number of ODS/Flt Hrs/HODs 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

*Only for Program that have At Sea Data Collection, Flight Hours, or Human Observer Observation Requirements

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): Geographic coverage categories can be defined as needed for the Program. See separate list of Geo Cov category definitions.

Geographic Coverage Weight: See "Attribute Weights."

GPRA: Government Performance and Results Act

Horizontal Resolution (Horiz Res): The smallest horizontal increment needed of the data. Spatial granularity in the horizontal with which information and data are 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."

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*
Arctic	TBD; definition to be added by NOS and TPIO agreement
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.)
CONUS+AK+HI+US Territories	Contiguous U.S. rectangle, 3000 km N/S by approx 5000 km E/W. Plus Alaska, Hawaii, US EEZ and US Territories (Palmyra Atoll, U.S. coastal waters out to 12 nautical miles, U.S. flag vessels at sea, Guam, Northern Mariana Islands (commonwealth), Puerto Rico (commonwealth), United States Virgin Islands, American Samoa, Wake Island, Midway Islands, Johnston Atoll, Baker Island, Howland Island, Jarvis Island, Kingman Reef, Bajo Nuevo Bank, Serranilla Bank, Navassa Island)
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 to 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 US territorial waters.
Equatorial EEZ	The Equatorial EEZ starts at the coast of all states/countries within the equatorial regions of the world (limited in latitude by the Tropic of Cancer in the northern hemisphere at approximately 23°26' (23.4°) N latitude and the Tropic of Capricorn in the southern hemisphere at 23°26' (23.4°) S latitude) and extends 200 nautical miles (370 kilometers) out into the sea, perpendicular to the baseline.

NOAA Program Observation Requirements Document (PORD)
Ver 1.1 - Validate (WW-LFW_NHC) **Jan. 19, 2012**

CORL Geographic Coverage Category*	Definition*
Equatorial Ocean	Seated in the equatorial regions of the world, limited in latitude by the Tropic of Cancer in the northern hemisphere at approximately 23°26' (23.4°) N latitude and the Tropic of Capricorn in the southern hemisphere at 23°26' (23.4°) S latitude
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.
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.
Gulf of Mexico	One of the eight NOAA identified ecosystem regions.
Hemi US	Hemispheric coverage centered on the US.
North America + US Territories	The United States, including AK, HI and U.S. Territories, plus Canada and Mexico
Pacific Island Complex	One of the eight NOAA identified ecosystem regions.
Point Source	A single identifiable localized source; has negligible extent.
tbs	to be specified
TC/Marine/Surface Analysis AOR	Area of Responsibility for tropical cyclone and marine analysis, forecasting, and warning operations, and surface analysis responsibilities of the National Hurricane Center and Central Pacific Hurricane Center/WFO Honolulu. This includes the North Atlantic Ocean, Gulf of Mexico, Caribbean Sea and adjacent land areas; the Eastern and Central North Pacific Ocean and adjacent land areas; and portions of the Central and Eastern South Pacific Ocean.
Tropics (30N-30S)	Seated in the equatorial regions of the world, limited in latitude by 30N-30S
Other	Other geo cov category as defined by program. Program provides specific details/definition.
35 deg Pitch Angle	Pitch angle is the position angle between the geocentric north pole and the solar rotational north pole measured eastward from geocentric north.
3-axis orthogonal	3-axis orthogonal refers to 3 measurements made at 90 degrees to each other to define a vector
Greater than 30 deg N and S	The components of the geomagnetic field at the surface of the Earth. These elements are usually denoted thus in the literature: X-the geographic northward component; Y - the geographic eastward component However, in NOAA use, the geomagnetic northward and geomagnetic eastward components are called the H and D components. The H axis direction is defined by the mean direction of the horizontal component relative to the geomagnetic north by using the small-angle approximation. Thus the D component = H (the horizontal intensity) multiplied by delta D (the declination angle relative to geomagnetic north, expressed in radians).
Greater than 75 deg N Geomagnetic	The components of the geomagnetic field at the surface of the Earth. These elements are usually denoted thus in the literature: X-the geographic northward component; Y - the geographic eastward component However, in NOAA use, the geomagnetic northward and geomagnetic eastward components are called the H and D components. The H axis direction is defined by the mean direction of the horizontal component relative to the geomagnetic north by using the small-angle approximation. Thus the D component = H (the horizontal intensity) multiplied by delta D (the declination angle relative to geomagnetic north, expressed in radians).
Heliocentric	A location relative to the center of the sun, or in some cases, relative to the center of the observed solar disk.

NOAA Program Observation Requirements Document (PORD) Ver 1.1 - Validate	(WW-LFW_NHC)	Jan. 19, 2012
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CORL Geographic Coverage Category*	Definition*
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