

# NOAA Real-Time Network of Direct Broadcast Receiving Stations: Access to Real-time Advanced Sounder Data for NWP

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1: CIMSS/SSEC/UW-Madison

2: NOAA

CSPP/IMAPP Users' Group Meeting  
June 2017



# Project Overview

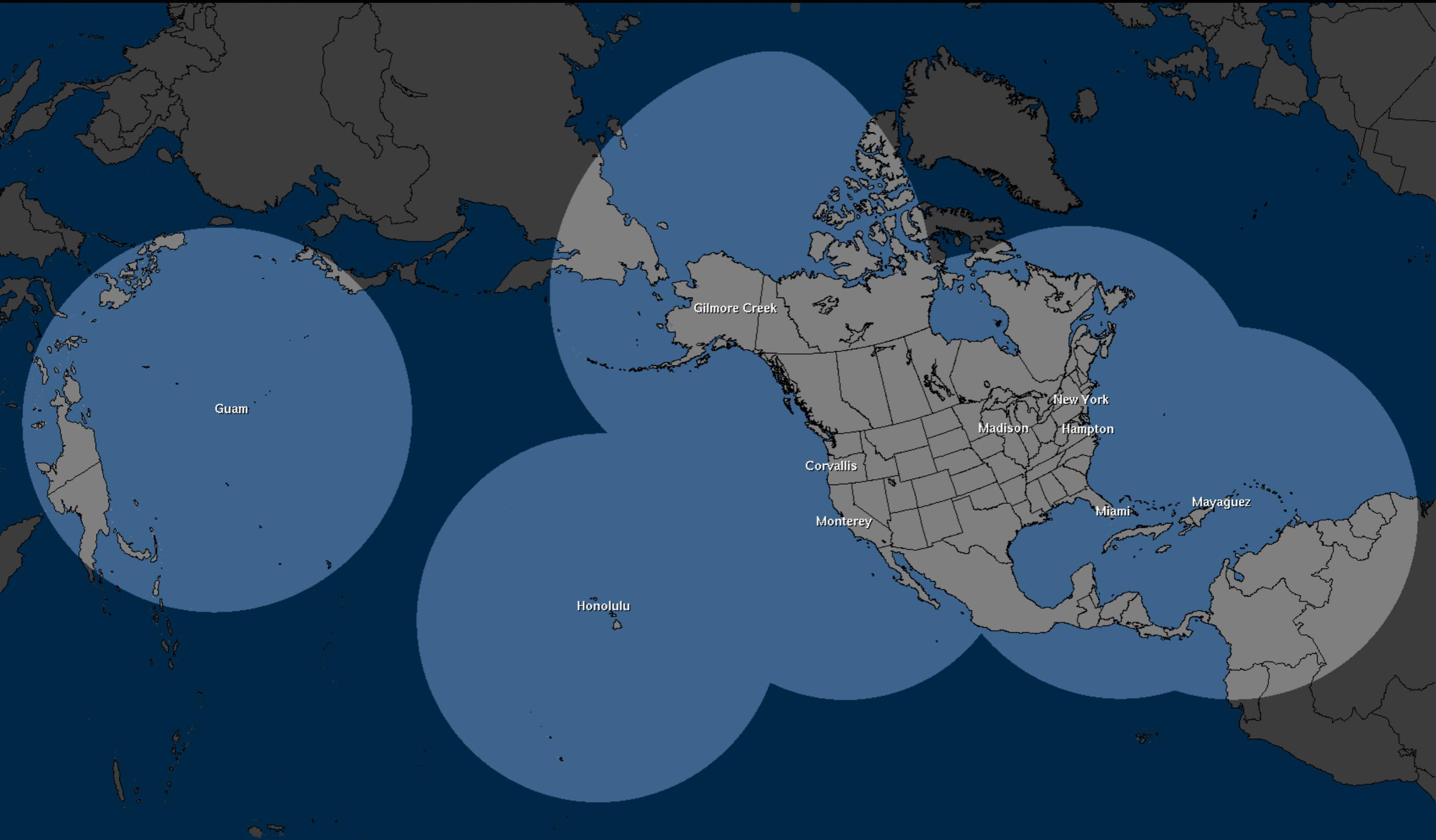


- NOAA/JPSS has funded a network of polar satellite receiving stations in North America and the Pacific.
- The goal is to deliver advanced infrared and microwave sounder data to NOAA/NWS/NCEP with low latency (<15 min) for data assimilation in rapid refresh models (achieved in 2016).
- CIMSS/SSEC at UW-Madison acquires, processes, and delivers the sounder data in near real-time.
- Advanced sounder data from the NOAA network are distributed on the EUMETCAST rebroadcast service starting in May 2017 under an agreement with EUMETSAT.

# NOAA DB Antenna Network

- NOAA DB antennas for **Honolulu, Madison, Miami, Mayaguez, and Guam** are owned and operated by CIMSS/SSEC on behalf of NOAA.
- NOAA DB antennas for **Fairbanks** and **Monterey** are owned and operated by UAF and NWS, respectively.
- Partner DB antennas are owned and operated by other groups: **Corvallis** (OSU), **New York** (CCNY), and **Hampton** (HU).

# NOAA DB Antenna Network coverage



# NOAA DB Antennas operated by CIMSS/SSEC



Madison, WI



Honolulu, HI



Miami, FL



Mayaguez, PR



Guam

# Advanced Sounder Data

High priority datasets for the NOAA DB Network include:

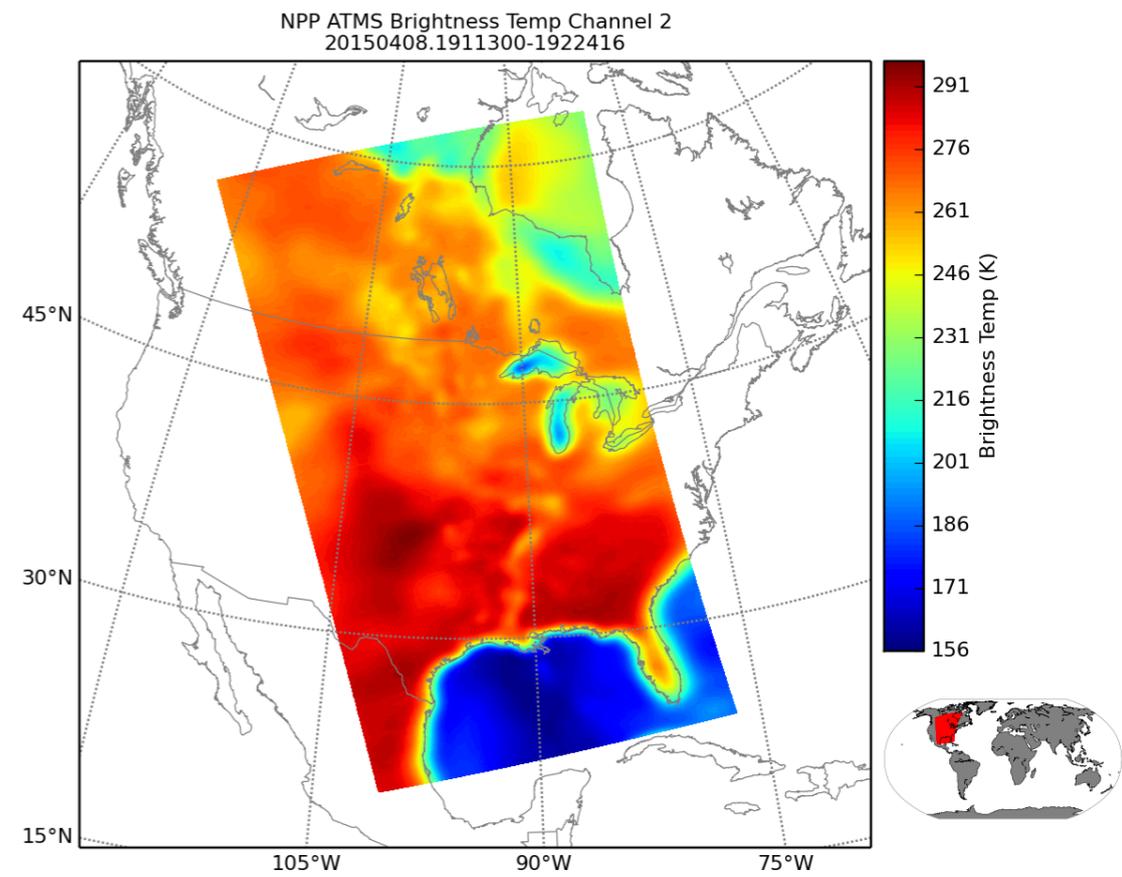
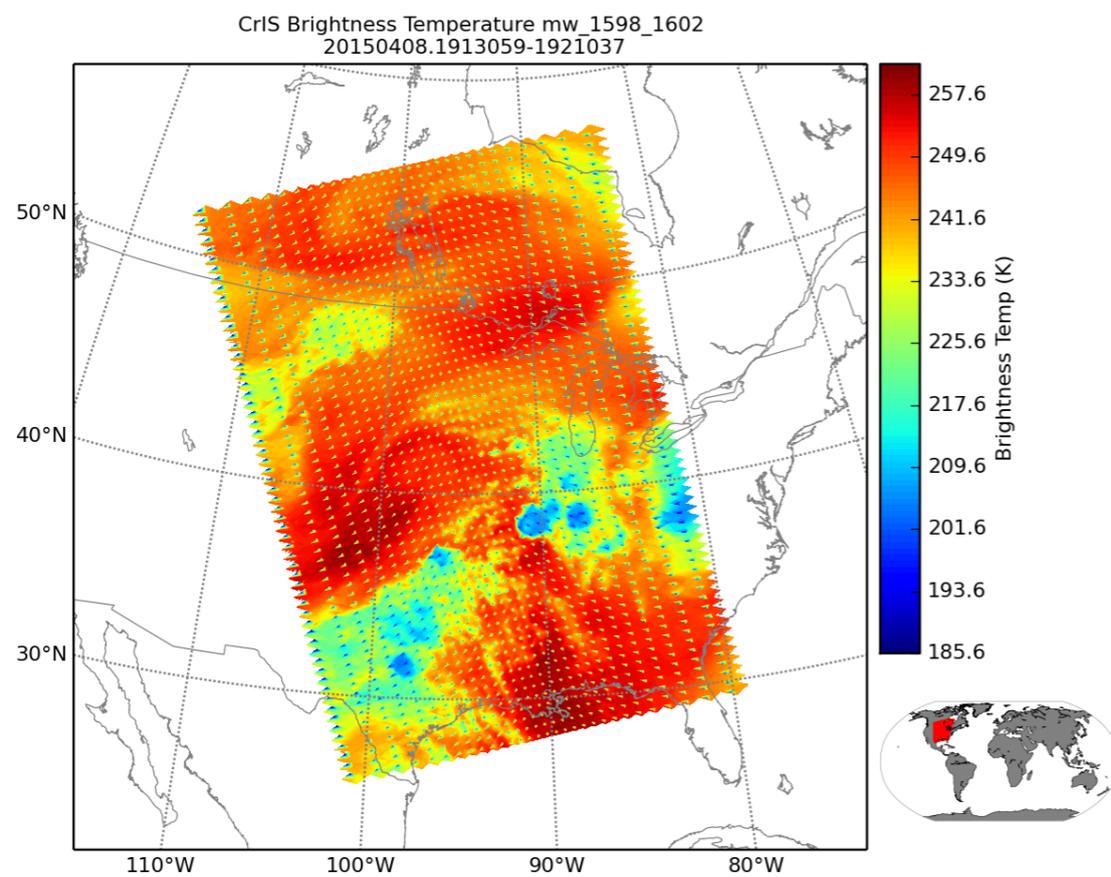
- CrIS high spectral resolution infrared sounder (SNPP, JPSS-1)
- ATMS microwave sounder (SNPP)
- IASI high spectral resolution infrared sounder (Metop-A, Metop-B)

ATOVS data (AMSU, HIRS) are also acquired but are a lower priority for this project.

# SNPP Direct Broadcast data from Madison antenna 2015/04/08 19:10 UTC

## CrIS 1600 cm<sup>-1</sup>

## ATMS 31.4 GHz



# Satellite Reception Priorities for NOAA DB Antennas

1. Suomi NPP (and JPSS-1 by end 2017)
2. Metop-A and Metop-B
3. Terra and Aqua
4. NOAA-18 and NOAA-19
5. GCOM-W1 (#1 at Miami)
6. FY-3B and FY-3C
7. SARAL

# Reception schedule: Honolulu

- OrbitalSystems::print\_schedule 1.13 starting at Thu May 19 00:00:03 2016.

Tracking Schedule for Pedestal\_1 on 19-May-2016 00:00:03

ITEM	SAT	DIR	EL	MODE	START	END	OVR	IDLE
75702	NOAA 19	N	83	DAY	19-May-2016 00:51:13	19-May-2016 01:04:51	0	1
75718	FENGYUN 3B	N	31	DAY	19-May-2016 01:23:56	19-May-2016 01:36:30	0	1
75693	NOAA 18	N	54	DAY	19-May-2016 03:46:08	19-May-2016 03:59:29	0	1
75711	SARAL	S	85	MIXED	19-May-2016 04:38:47	19-May-2016 04:51:42	0	1
75694	NOAA 18	N	11	DAY	19-May-2016 05:29:13	19-May-2016 05:37:54	0	1
75703	METOP-A	S	05	NIGHT	19-May-2016 06:04:06	19-May-2016 06:09:33	0	1
75710	SARAL	S	05	DAY	19-May-2016 06:22:07	19-May-2016 06:28:49	0	1
75692	METOP-B	N	24	NIGHT	19-May-2016 06:50:26	19-May-2016 07:02:00	0	1
75700	METOP-A	N	84	NIGHT	19-May-2016 07:37:27	19-May-2016 07:38:46	0	1
75699	TERRA	N	14	NIGHT	19-May-2016 07:38:46	19-May-2016 07:47:27	0	1
75701	METOP-A	N	84	NIGHT	19-May-2016 07:47:27	19-May-2016 07:50:46	0	1
75719	METOP-B	N	25	NIGHT	19-May-2016 08:30:11	19-May-2016 08:41:59	0	1
75695	TERRA	N	35	NIGHT	19-May-2016 09:14:48	19-May-2016 09:26:10	0	1
75716	NPP	S	09	NIGHT	19-May-2016 10:43:02	19-May-2016 10:50:40	0	1
75714	NOAA 19	S	07	NIGHT	19-May-2016 11:47:05	19-May-2016 11:53:08	0	1
75689	GCOM-W1	S	60	NIGHT	19-May-2016 11:55:17	19-May-2016 11:59:10	0	1
75688	AQUA	S	59	NIGHT	19-May-2016 11:59:10	19-May-2016 12:11:03	0	1
75698	FENGYUN 3B	S	22	NIGHT	19-May-2016 12:14:59	19-May-2016 12:20:35	0	1
75697	NPP	S	60	NIGHT	19-May-2016 12:20:35	19-May-2016 12:33:48	0	1
75706	NOAA 19	S	75	NIGHT	19-May-2016 13:24:08	19-May-2016 13:37:51	0	1
75707	GCOM-W1	S	08	NIGHT	19-May-2016 13:37:51	19-May-2016 13:39:20	0	1
75705	AQUA	S	08	NIGHT	19-May-2016 13:39:20	19-May-2016 13:45:15	0	1
75722	FENGYUN 3B	S	28	NIGHT	19-May-2016 13:54:58	19-May-2016 14:07:02	0	1
75717	SARAL	N	41	DAY	19-May-2016 15:45:27	19-May-2016 15:57:49	0	1
75713	NOAA 18	S	60	MIXED	19-May-2016 16:18:49	19-May-2016 16:32:16	0	1
75715	SARAL	N	13	DAY	19-May-2016 17:26:23	19-May-2016 17:35:35	0	1
75704	NOAA 18	S	11	DAY	19-May-2016 18:01:29	19-May-2016 18:09:47	0	1
75686	METOP-B	S	24	DAY	19-May-2016 19:18:08	19-May-2016 19:29:49	0	1
75712	TERRA	S	07	DAY	19-May-2016 19:49:43	19-May-2016 19:55:26	0	1
75696	METOP-A	S	86	DAY	19-May-2016 20:05:28	19-May-2016 20:18:47	0	1
75708	METOP-B	S	26	DAY	19-May-2016 20:58:00	19-May-2016 21:09:43	0	1
75709	TERRA	S	56	DAY	19-May-2016 21:24:30	19-May-2016 21:36:20	0	1
75687	METOP-A	S	06	DAY	19-May-2016 21:49:17	19-May-2016 21:53:39	0	1
75691	GCOM-W1	N	20	DAY	19-May-2016 22:51:33	19-May-2016 22:55:26	0	1
75690	AQUA	N	19	DAY	19-May-2016 22:55:26	19-May-2016 23:05:21	0	1
75721	FENGYUN 3B	N	14	DAY	19-May-2016 23:30:10	19-May-2016 23:32:44	0	1
75720	NPP	N	81	DAY	19-May-2016 23:32:44	19-May-2016 23:46:07	0	1

- /opt/orbital\_systems/bin/print\_schedule.pl 1.13 ending with SUCCESS at Thu May 19 00:00:03 2016

# Data Processing Software

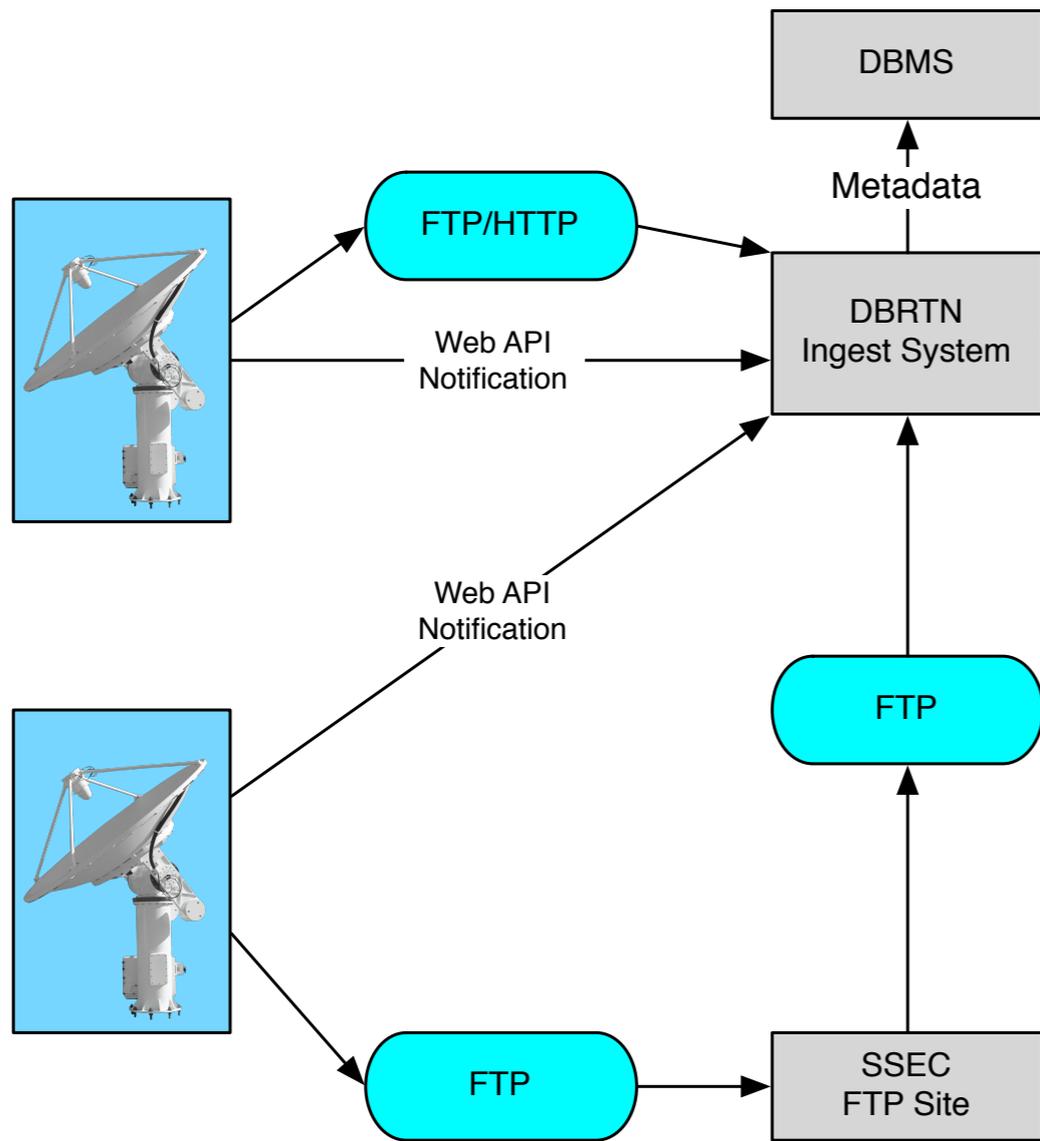
- CrIS and ATMS: CSPP SDR v2.2
- IASI and ATOVS: AAPP v7.12 and OPS-LRS v7-0+p12.
- BUFR conversion for NCEP: NESDIS BUFR library
- BUFR conversion for EARS: AAPP v7.12

# Sounder Data Status

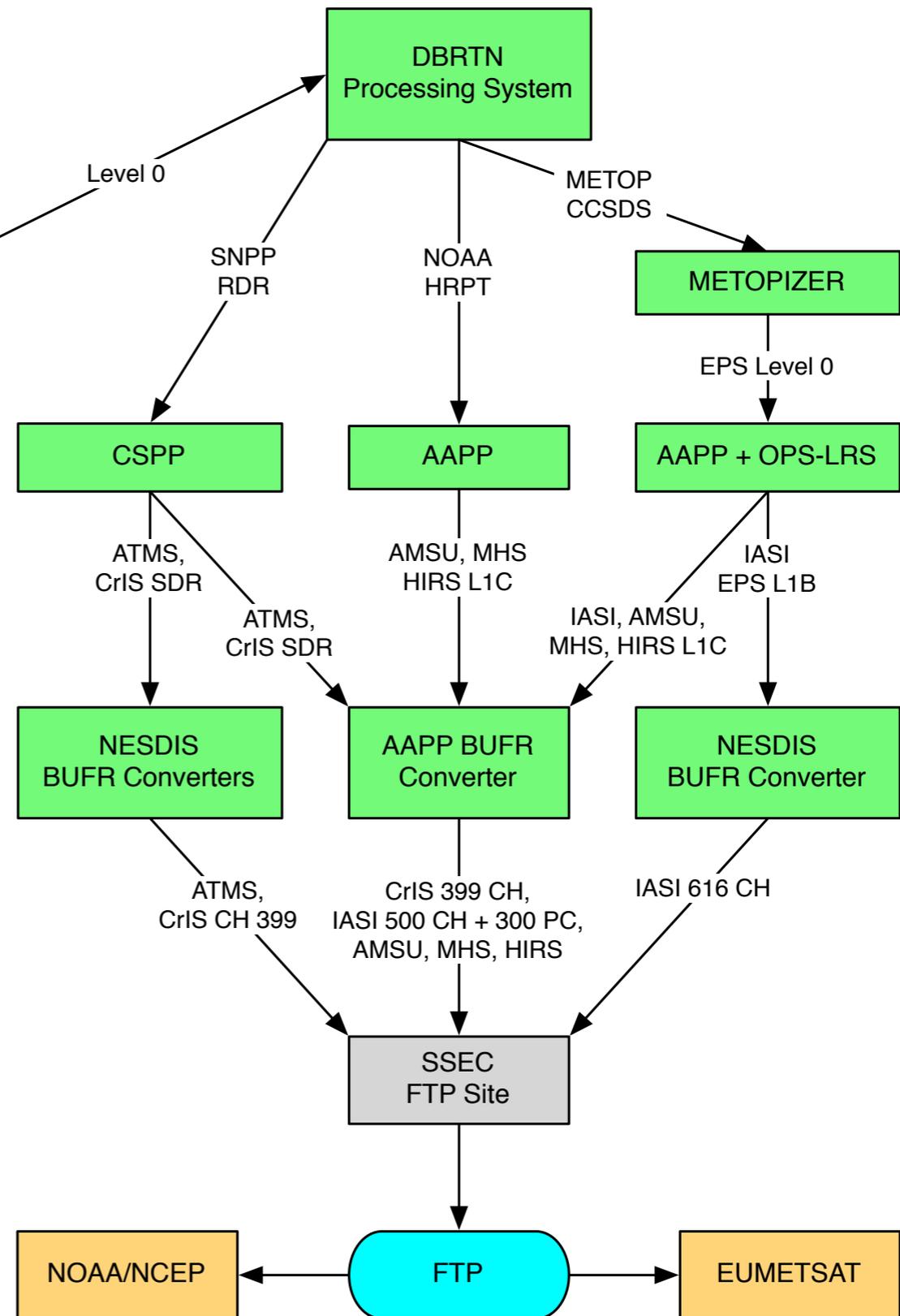
Site	ATMS	CrIS	Metop IASI	Metop ATOVS	NOAA ATOVS
Madison	✓	✓	✓	✓	✓
Honolulu	✓	✓	✓	✓	✓
Miami	✓	✓	✓	✓	✓
Mayaguez	✓	✓	✓	✓	✓
Guam	✓	✓	✓	✓	✓
Monterey	✓	✓	✓	✓	✓
Gilmore Creek	✓	✓	✓	✓	
New York City	✓	✓			
Corvallis	✓	✓			
Hampton	✓	✓	✓	✓	

Checkmark means data are routinely acquired, processed, and delivered

# Sounder Data Flow

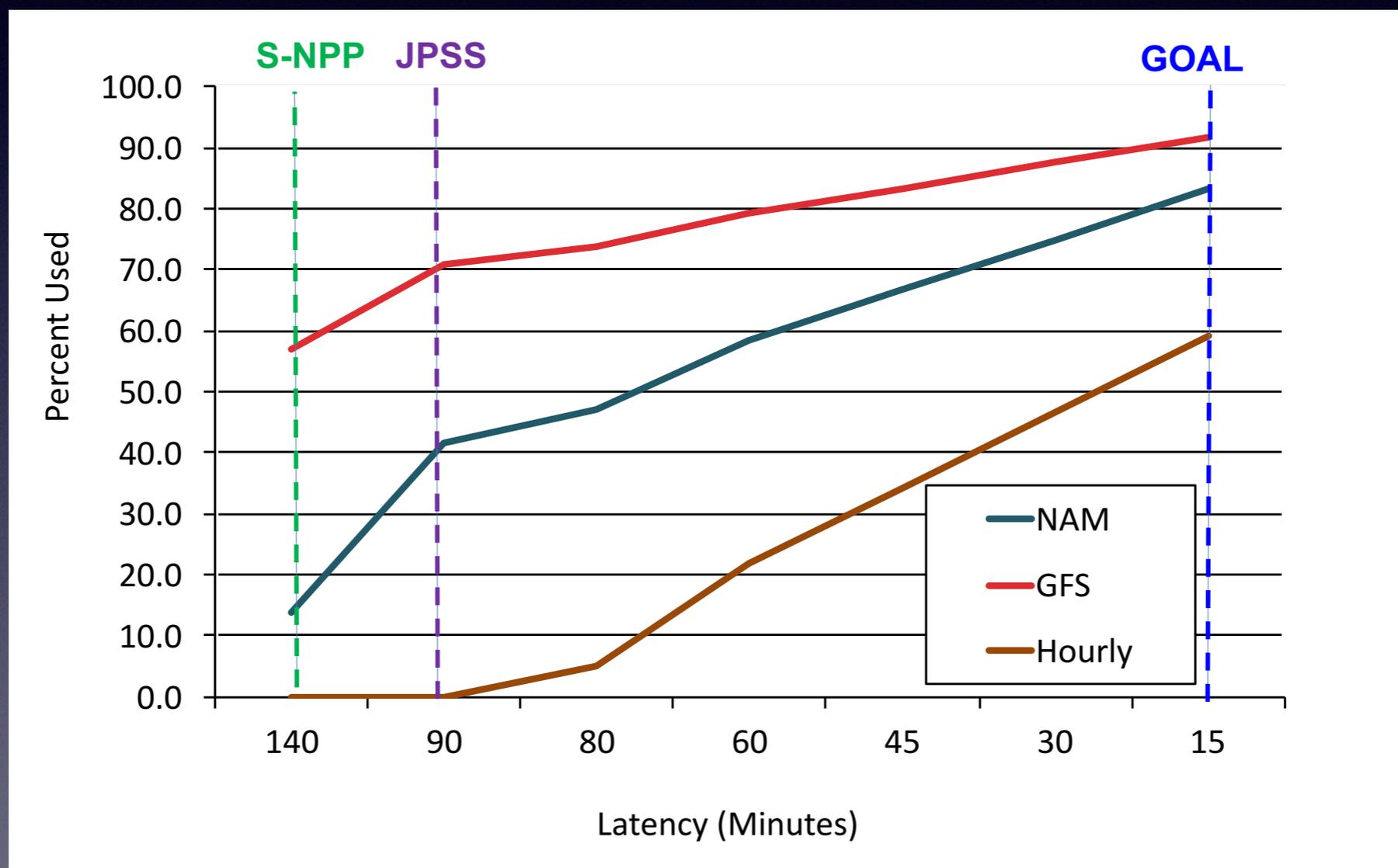


DBRTN Data Flow:  
Antennas to NCEP and EUMETSAT



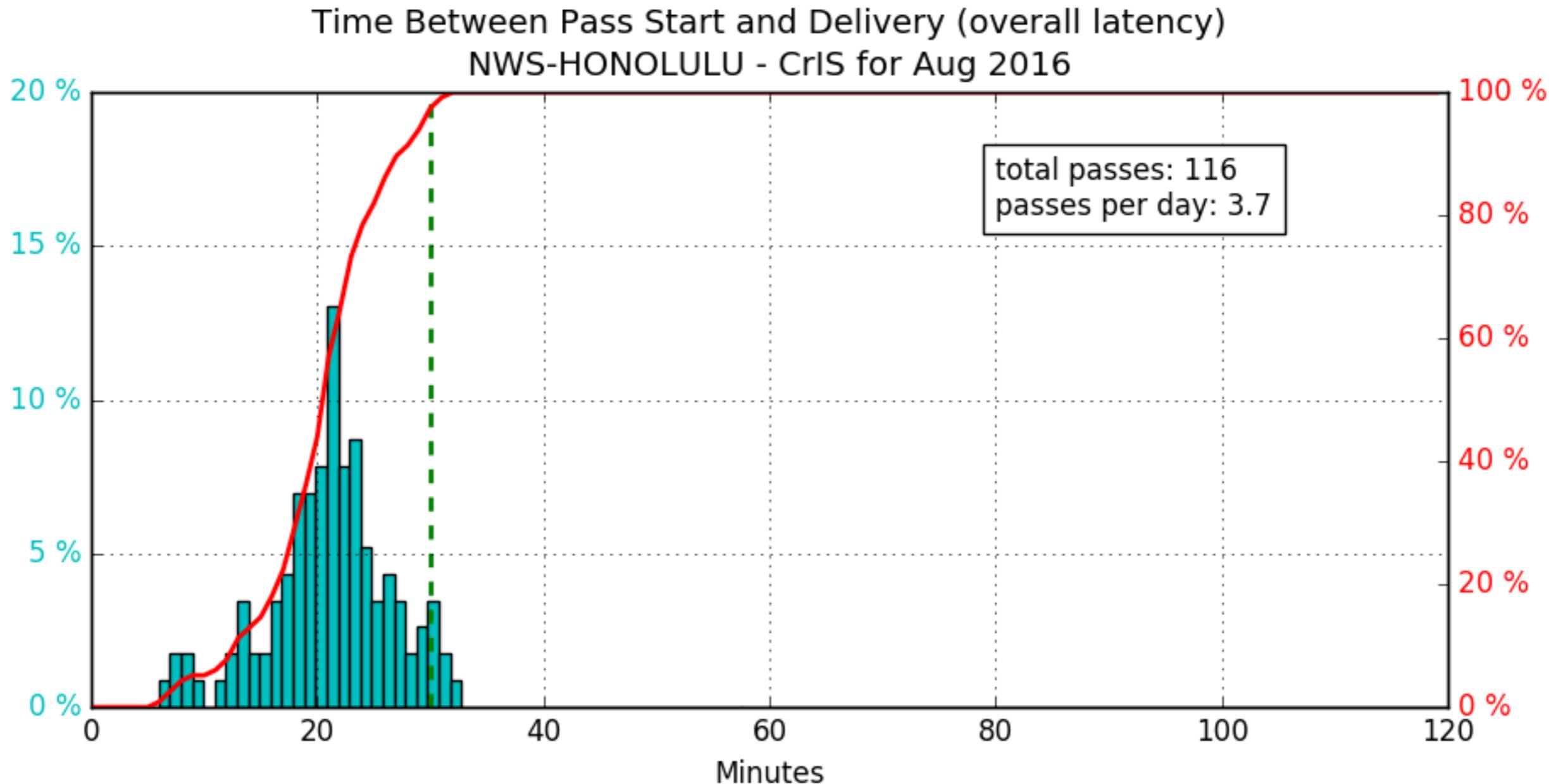
# Sounder Data Latency

The longer the delay in providing the data, the higher the likelihood that it will not meet the cutoff for assimilation.



Percentage of LEO sounder data used as a function of latency in NCEP models

# Honolulu: CrIS delivery latency



Relative to start of the overpass, average latency is 20 minutes.

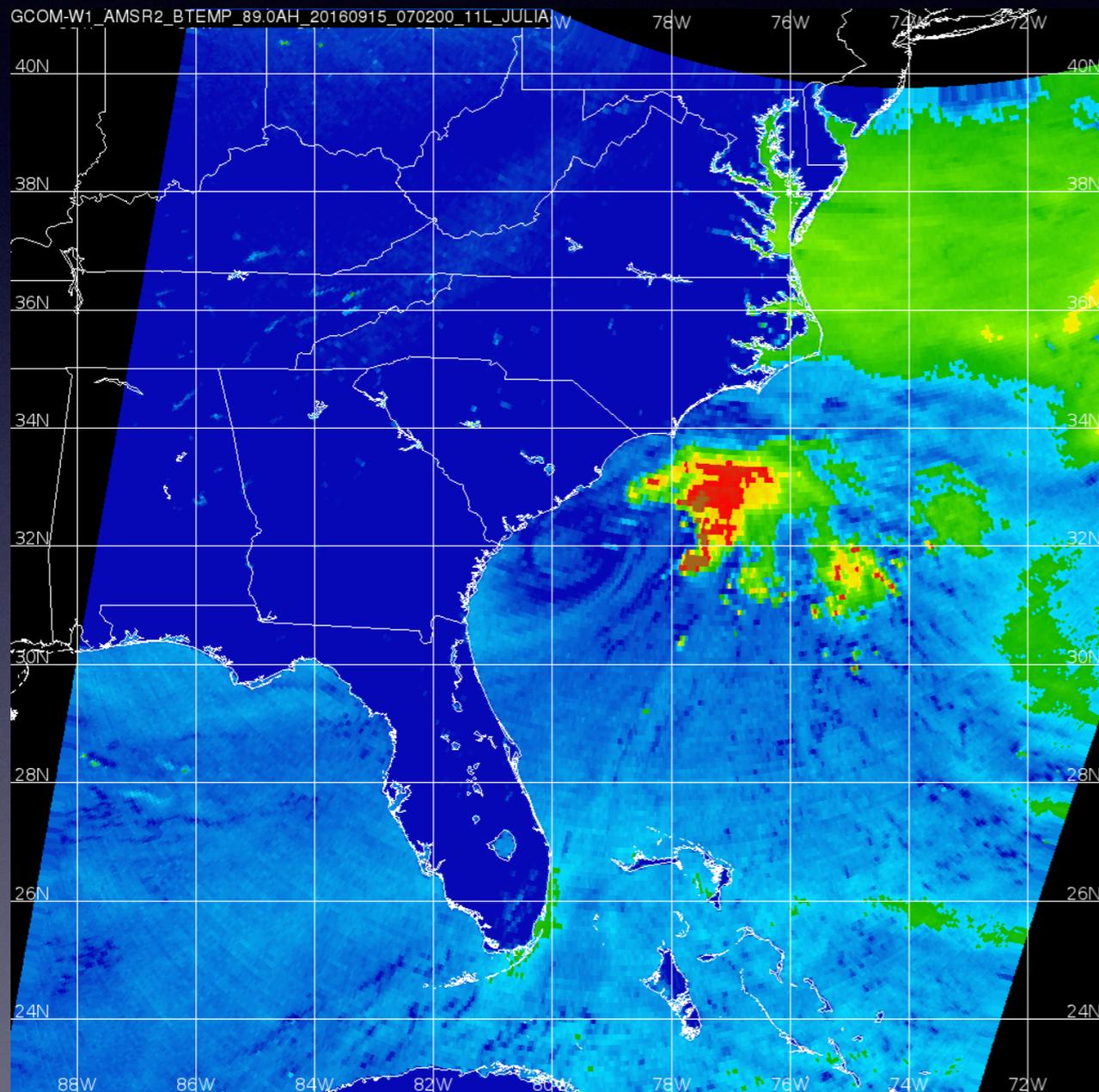
# EARS Pilot Service

- NOAA DB network is providing ATMS, CrIS, and IASI data in AAPP BUFR format to EUMETSAT starting in May 2017 for dissemination via EUMETCAST as a pilot service.
- High level agreement between EUMETSAT and NESDIS was signed in 2016.
- BUFR products from SSEC processing have been verified against the corresponding EARS products.
- Duration of EARS pilot service will be two years.

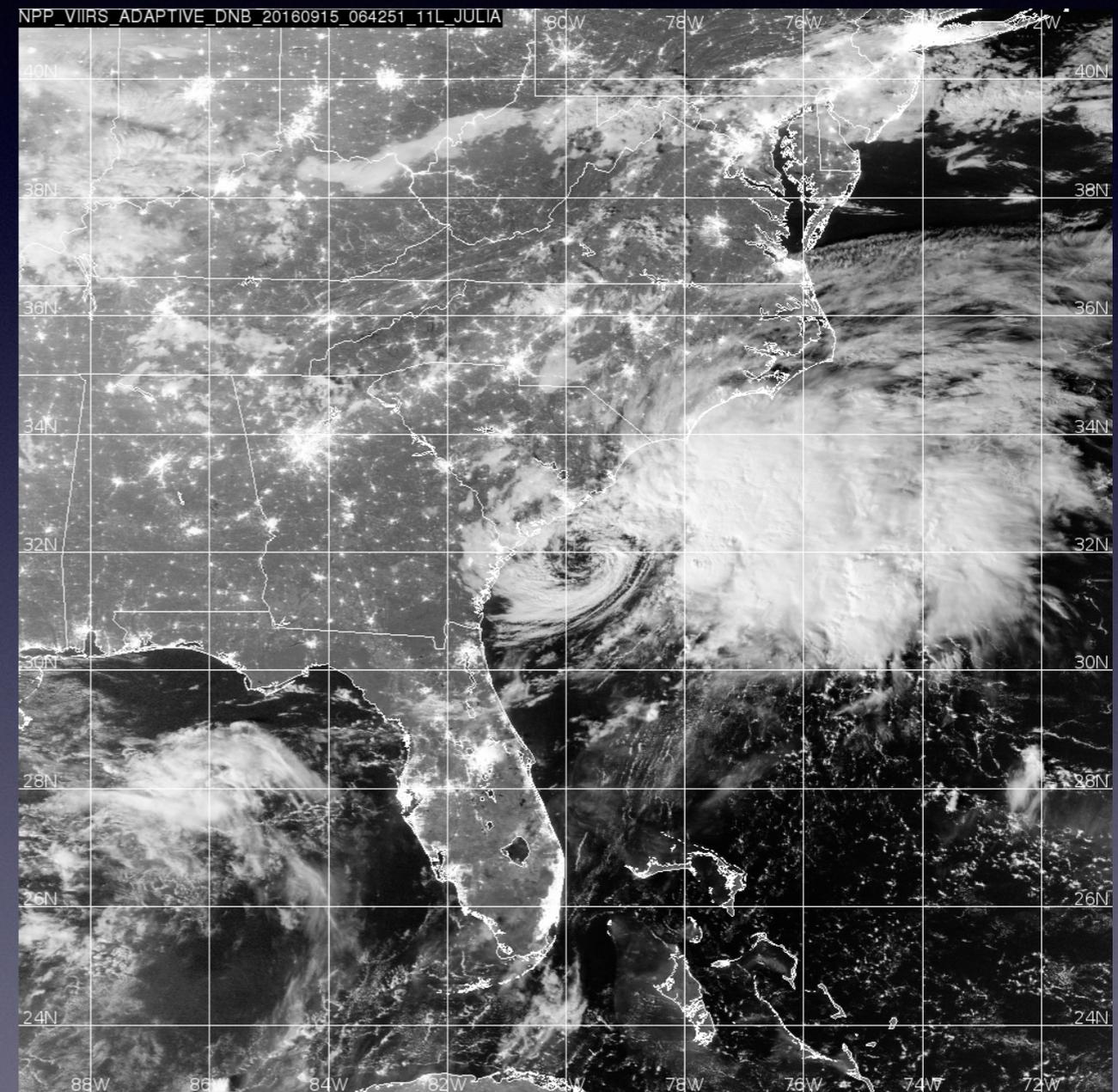
# Other Applications

- The NOAA antennas at Honolulu, Madison, Miami, Mayaguez, and Guam provide real-time imagery from VIIRS, AVHRR, and MODIS via onsite processing. Images are converted to AWIPS format and delivered to National Weather Service Forecast Offices across the USA.
- ARGOS DCS data are received from NOAA-18/19, Metop-A/B, and SARAL at Honolulu, Madison, Miami, and Mayaguez and delivered to CLS in real time.
- GCOM-W1 is received and processed in real time at AOML Miami and imagery is provided to the National Hurricane Center (coming soon from Mayaguez).

# Storm centered imagery from AOML Miami: Tropical Storm Julia 2016/09/15



GCOM-W1 AMSR2 89GHz



SNPP VIIRS DAY/NIGHT



# Summary

- NOAA DB Antenna Network for receiving advanced sounder data is now operational and delivering CrIS, ATMS, and IASI data to NCEP with low latency.
- CrIS, ATMS, and IASI data are being delivered to EUMETSAT in 2017 for rebroadcast on the EUMETCAST service.
- CrIS, ATMS, and IASI data will soon be distributed by NOAA on GTS.
- The network will be ready to support JPSS-1 in 2017.