

Rapid Access to Advanced Sounder Data over North America and the Pacific Ocean from the NOAA Direct Broadcast Real Time Network (DBRTN)

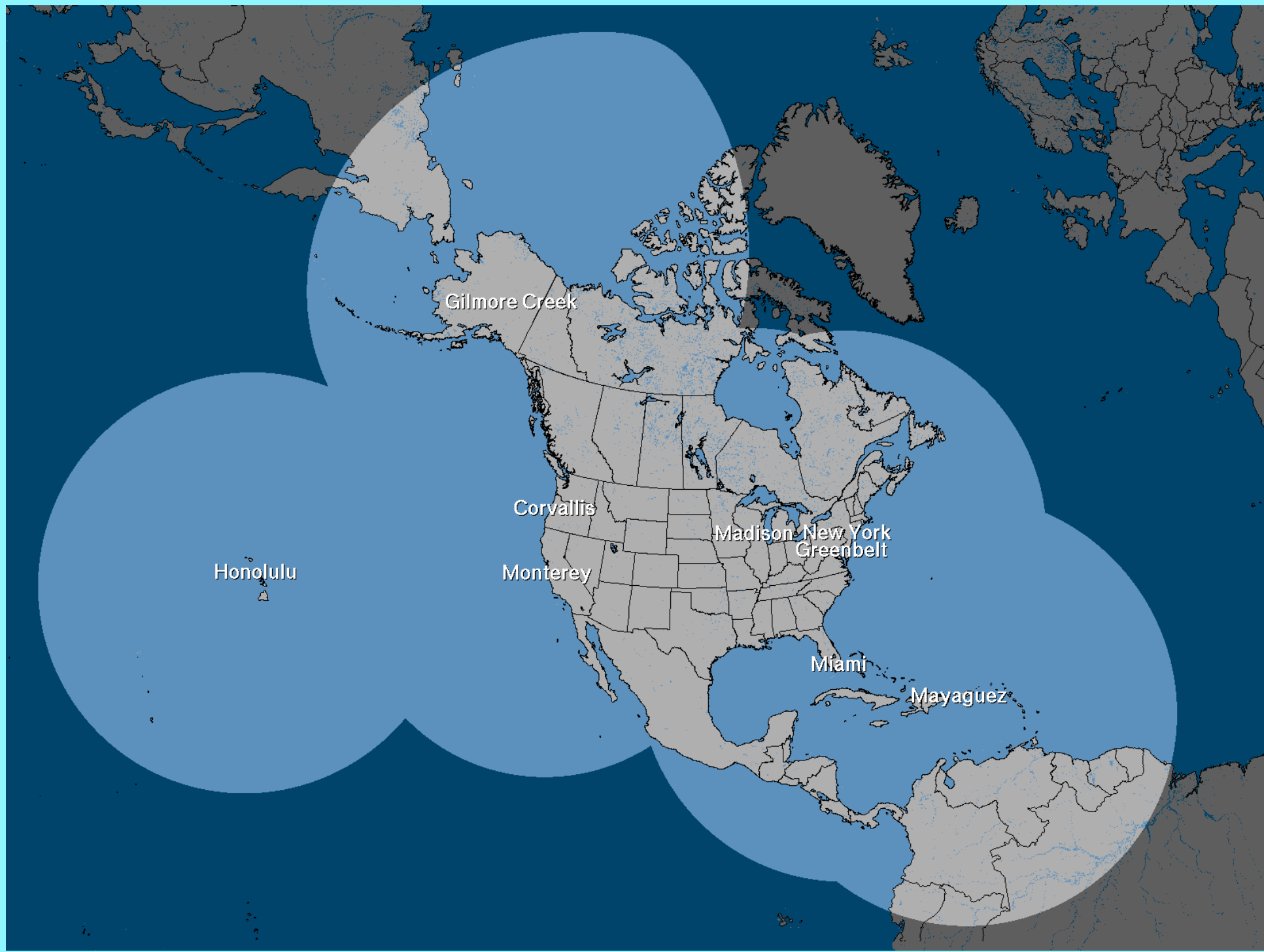
Liam Gumley, B. Flynn, D. Santek, J. Davies, J. Braun, K. Strabala
Space Science and Engineering Center, University of Wisconsin-Madison



1. Overview

- In order to enable the **timely use of advanced sounder data** in numerical weather prediction applications, and to provide a backup in the event of unanticipated satellite coverage gaps, **NOAA** has funded the installation of a **Direct Broadcast Real Time Network (DBRTN)** covering North America and the Pacific Ocean to receive infrared and microwave sounder data from polar orbiting satellites including **Suomi NPP, Metop-A/B, NOAA-18/19, and Aqua**. Stations in the network include Honolulu (Hawaii), Monterey (California), Madison (Wisconsin), Miami (Florida), and Mayaguez (Puerto Rico).
- Sounder data from **ATMS, CrIS, IASI, AMSU, MHS, HIRS, and AIRS** are centrally processed to Level 1B and converted to BUFR. The BUFR data are delivered to **NOAA/NWS/NCEP** currently, and will be delivered to **EUMETSAT** for rebroadcast by the end of 2016.
- Other satellites acquired by the stations in the DBRTN network include **Terra, FY-3B, FY-3C, GCOM-W1, and SARAL**. Reception Priority (highest to lowest) is SNPP (1), Aqua/Terra (2), Metop-A/B (3), NOAA-18/19 (4), GCOM-W1 (5), FY-3B/C (6), SARAL (7).

2. Antenna Hardware and Area Covered



Coverage from Existing DBRTN Antenna Sites



Honolulu Antenna

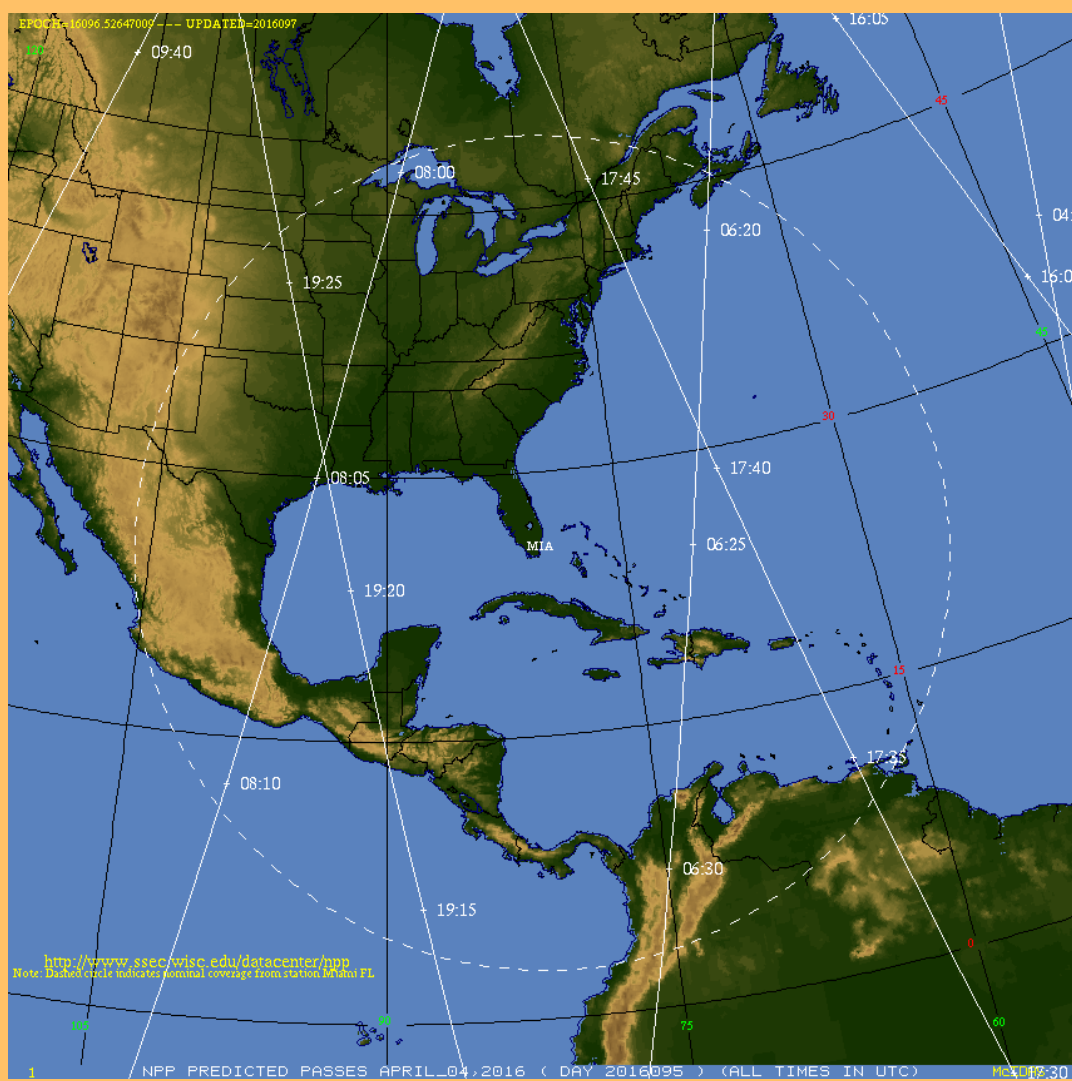


Miami Antenna

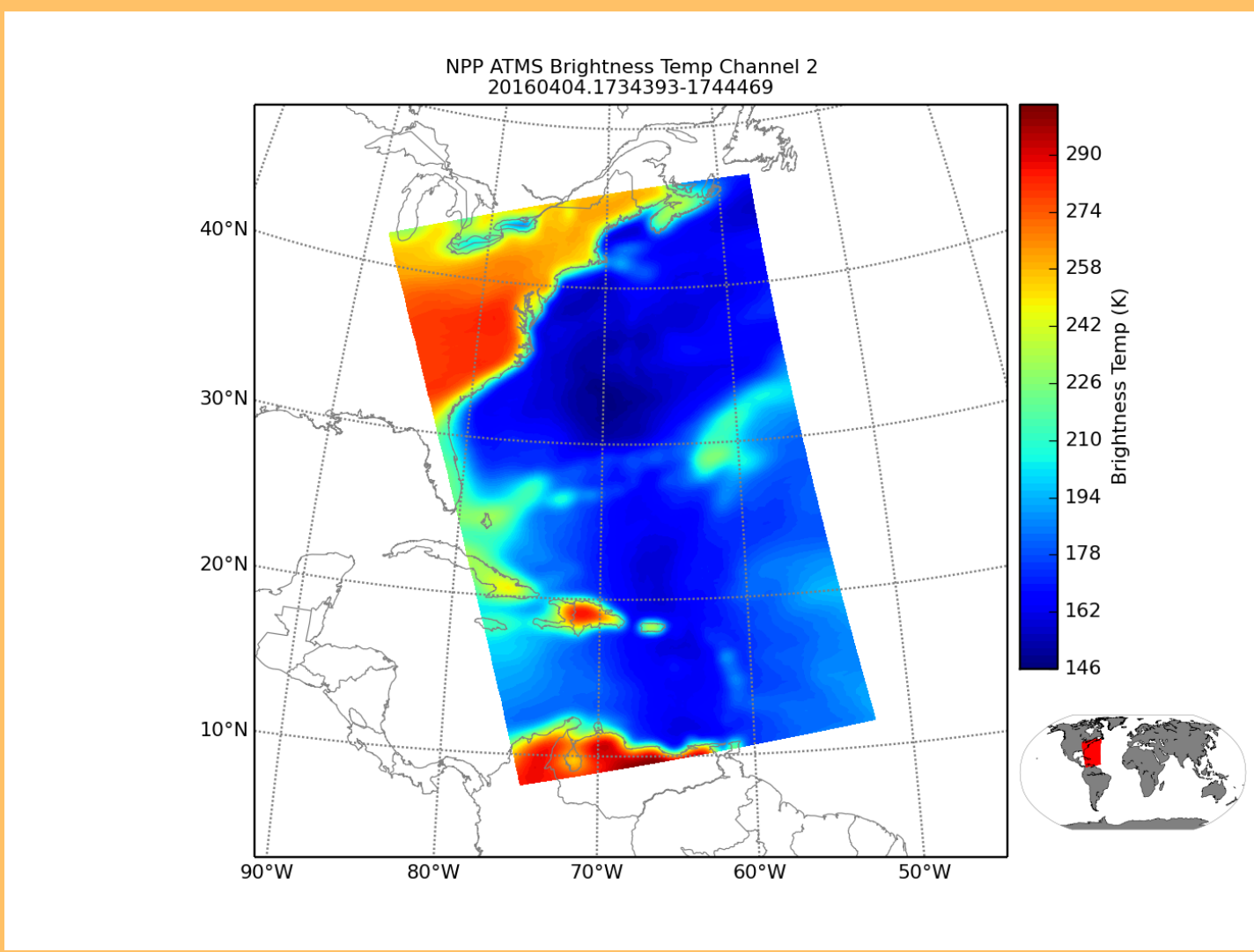
DBRTN antennas are 2.4-meter Orbital Systems dual X/L-band. Sounder data from partner antennas operated by Oregon State University, University of Alaska Fairbanks, and City College New York are also ingested by DBRTN. An additional NOAA station will be installed at Guam by the end of 2016.

3. Data Reception

The primary mission of the DBRTN antennas is to acquire sounder data. However, data from all sensors onboard each spacecraft are acquired and processed (where processing software is available). Each station typically acquires 50-60 satellite passes per day (passes are scheduled when satellites are >5 deg above the horizon). Primary sensor data acquired for DBRTN includes **SNPP**: ATMS, CrIS, VIIRS **Metop-A/B**: IASI, AMSU, MHS, HIRS, AVHRR, ADCS **NOAA-18/19**: AMSU, MHS, HIRS, ADCS **Aqua**: AIRS, AMSU, MODIS



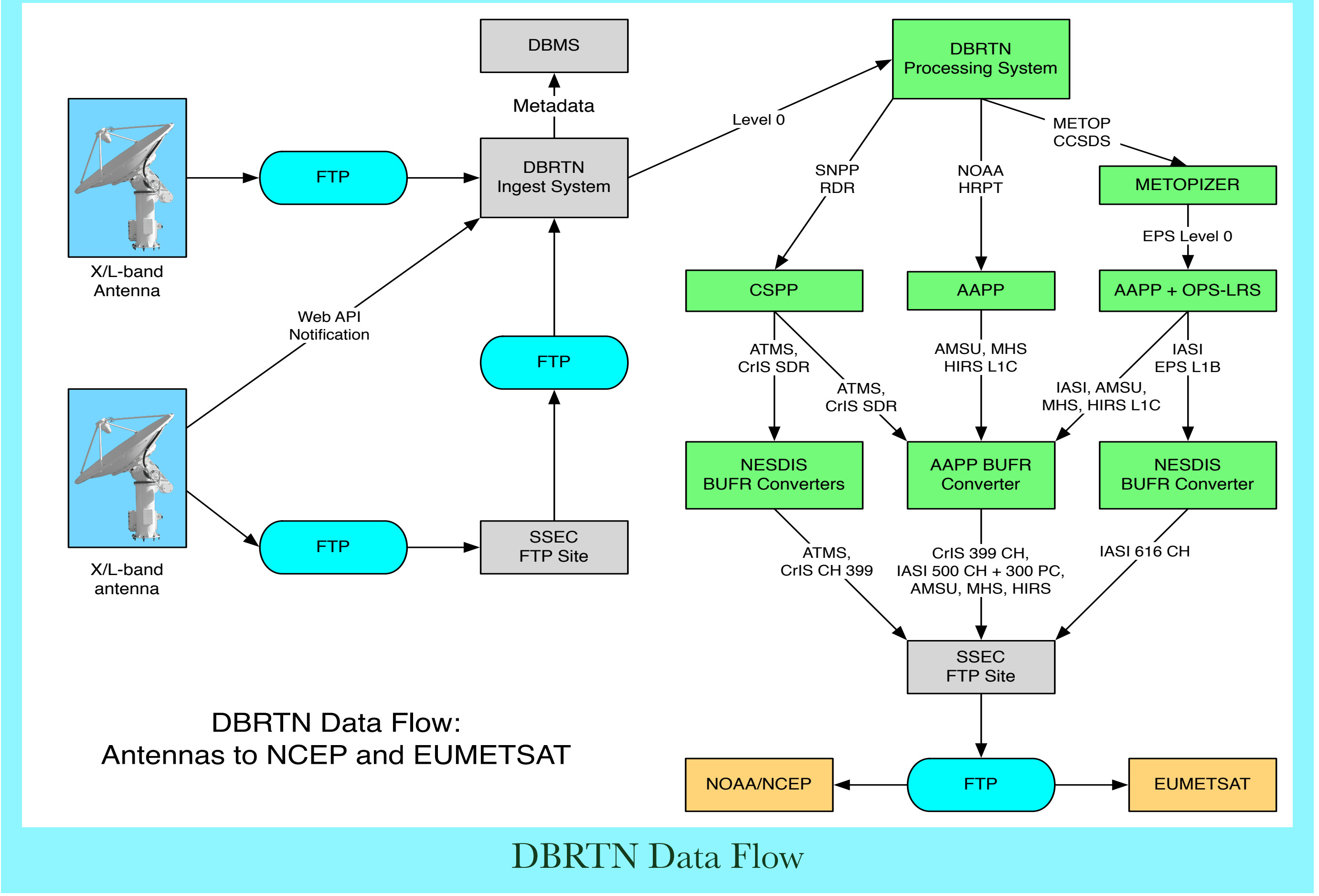
SNPP passes over Miami on 4/4/16



SNPP ATMS Channel 2 at 17:34 on 4/4/16

4. Central Data Processing

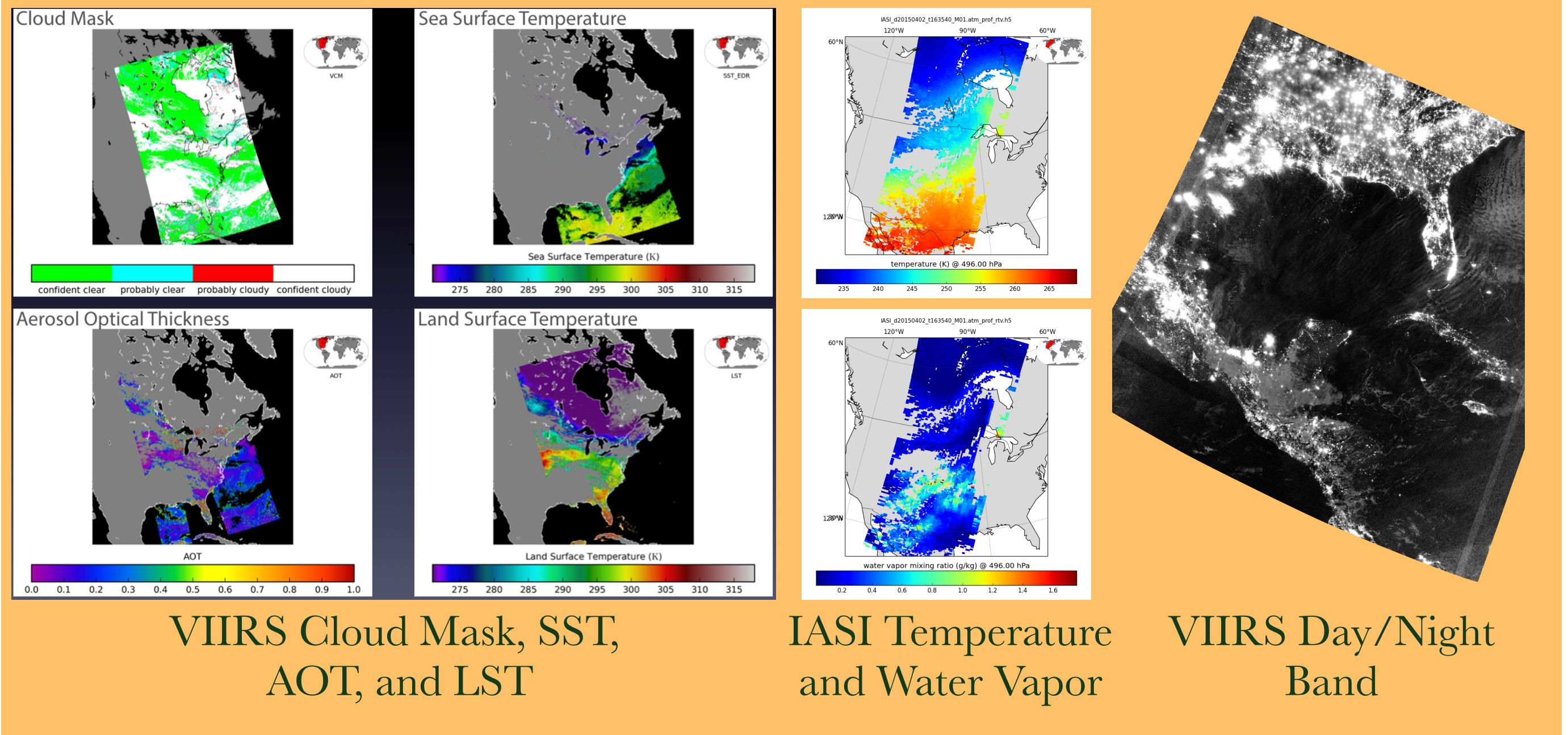
To ensure consistent geolocation, calibration, and product formats, the Level 0 sounder data are ingested and processed centrally at SSEC. The DBRTN ingest system keeps a record of when each Level 0 file is ingested, processed, and delivered. Key software components of the DBRTN processing system include **CSPP SDR v2.1.1, AAPP v7.12, OPS-LRS v7-0+p12, and NESDIS BUFR converters**. Metop-A/B ephemeris TLE data are extracted from the downlinked MMAM to ensure the best geolocation product from AAPP.



DBRTN Data Flow

5. Local Data Processing

Each DBRTN site has an on-site processing system to create imager and sounder products for local real time users (e.g., National Weather Service Forecast Offices). Examples of local real time applications include (but are not limited to) weather forecasting, air quality monitoring, wildfire detection, sea ice movement and lead detection, and cold air aloft events.

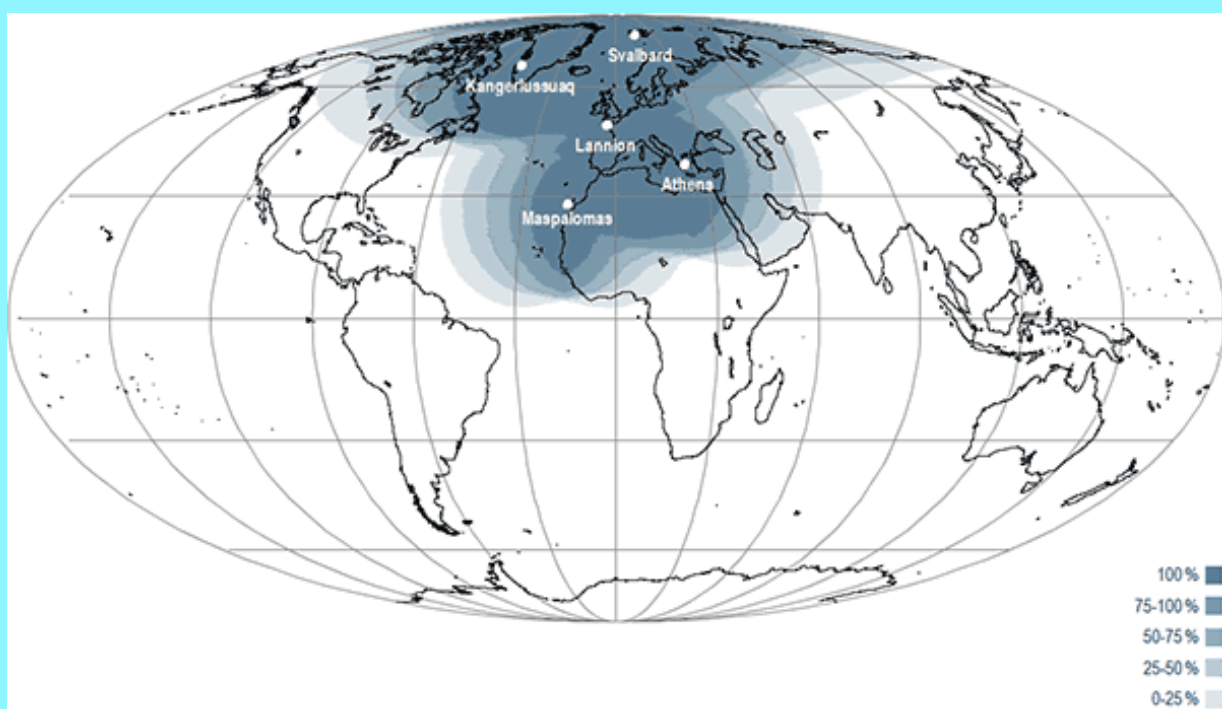


6. Status of Data Usage

DBRTN BUFR files are currently available in the following formats:

- NESDIS format** (ATMS, CrIS 399 channels, IASI 616 channels);
- AAPP format** (ATMS, CrIS 399 channels, IASI 500 channels + 300 PC scores, AMSU, MHS, HIRS).

NCEP is transitioning the DB CrIS and ATMS NESDIS BUFR to operations in their next production release. DB IASI NESDIS BUFR is under evaluation. **NOAA and EUMETSAT** are finalizing an agreement under which DB CrIS, ATMS, IASI, AMSU, MHS, and HIRS AAPP BUFR files will be ingested and distributed by the EUMETSAT Advanced Retransmission Service (EARS).



Current EARS coverage for CrIS, ATMS, and IASI real time data. DBRTN will extend coverage over North America and the Pacific Ocean. (Figure courtesy of EUMETSAT)