A Fully Operational Near Real-Time AIRS Processing and Distribution System: Level 2 Products

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Objectives
- Current low-spectral resolution sounders, with relatively few spectral bands, are being phased out by advanced high spectral resolution infrared sounders with thousands of narrow spectral bands (channels).
- The Atmospheric Infrared Sounder (AIRS) is the first high spectral resolution infrared sounder data to be routinely distributed to Numerical Weather Prediction (NWP) Centers in near real-time – generally within 3 hours from observation time.
- Demonstrate processing and utilization of high spectral resolution infrared data in preparation for CrIS and IASI.

Atmospheric InfraRed Sounder (AIRS)
- AIRS is a cooled grating-array spectrometer.
- Spectral coverage 3.7 to 15.4 microns in 17 arrays with 2378 spectral channels.
- AIRS observes 281 AIRS channels + AMSU and HSB (8 MB per orbit).
- Spectral resolution < 15% , ozone (< 15 % (layers) and 3 % total).
- Accuracy is achieved in clear, cloud cleared, or above clouds.
- Algorithms developed by AIRS science team.
- Details can be obtained from http://www-airs.jpl.nasa.gov

Near Real-Time Processing Steps
- NOAA receives raw AQUA data from EOS Data and Operations System (EDOS).
- Process AIRS, AMSU, and HSB data to Level 2 products, 12 GB of data per day.
- Subset Level 1B data and convert to BUFR format to enable distribution on a timely basis.
- Send BUFR files to the NOAA/NESDIS Central Environmental Satellite Computer System (CECS) for distribution to the NWP centers.
- Process AIRS, AMSU, and HSB data to Level 2 products, 12 GB of data per day.

AIRS Processing Milestones at NOAA
- May 4, 2002 – AQUA Launched
- August 7, 2002 – Received Level 0 to Level 1B processing package from JPL.
- October 3, 2002 – routine distribution of thinned Level 1B radiance products to NWP centers.
- January 22, 2003 – Visible cloud fraction and top of atmosphere albedos have been added to the thinned data sets.
- July 1, 2003 – AIRS Level 2 becomes operational at NOAA.
- September 30, 2003 – HSB processing and distribution is turned off.
- September 16, 2003 – AIRS reconstructed radiances for 324 channels are available on the NOAA server in BUFR format.

New NWP Products
- • Thinned Reconstructions: (HDF and BUFR)
- • Types:
  - 324 AIRS channels + AMSU and HSB (11 MB per orbit)
  - 281 AIRS channels + AMSU and HSB (8 MB per orbit)
- • AIRS Reconstructed Cloud Cleared Radiance BUFR files (2004)
- • AIRS Level 2 sounding, surface, and cloud products (2004)
- • AMSR-E Level 1B BUFR files (Near Future)
- • AMSR-E Level 2 BUFR files (2004)

Reconstructed and Cloud Cleared Radiances
- • Reconstructed Radiance (HDF and BUFR)
- • Types:
  - 324 AIRS channels + AMSU and HSB (11 MB per orbit)
  - 281 AIRS channels + AMSU and HSB (8 MB per orbit)
- • AIRS Reconstructed Cloud Cleared Radiance BUFR files (2004)
- • AIRS Level 2 sounding, surface, and cloud products (2004)

AMS-R-E BUFR Files
- • The AMSR-E BUFR Table is available.
- • AMSR-E Level 1B data is stored as “Dice” based on the 89 GHz resolution.
- • Test AMSR-E Level 1B BUFR files will be ready by the end of November.
- • The Level 2 BUFR files will be available in 2004.

AMS-R-E Level 2 Variables
- Rain Products:
  - Rain Rate
  - Total Water
  - Surface Air Temperature
  - Surface Skin Temperature
  - outgoing Longwave Radiation
  - Clear Sky Radiance
  - Cloud Top Pressure
  - Cloud Top Temperature
  - Cloud Fraction
  - Cloud Liquid Water
  - Total Precipitable Water
  - Surface Temperature
  - Sea Ice Concentration
  - Vegetation Water Content

OCEAN PRODUCTS
- • Ocean products:
  - Cloud Liquid Water
  - Total Precipitable Water
  - Surface Temperature

LAND PRODUCTS
- • Land products:
  - Sea Ice Concentration
  - Vegetation Water Content

Processing Hardware
- • NASA NPP project has provided to NOAA 96 CPUs (SGI ORIGIN 3800 RS12K) for MODIS and AIRS processing. (64 MODIS, 32 for AIRS, AMSR-E split between the two machines) 8 TB storage
- • Servers – SGI Origin 1200 dual processor – 2 TB
- • 3x RS10K – 32 RS12K CPUs dedicated for AIRS
- • At least 7 TB for AIRS