AIRS Level 2 Status

ITSC XIII

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Sung-Yung Lee
Evan Manning
Edward Olsen

Jet Propulsion Laboratory
California Institute of Technology

Introduction to AIRS

- AIRS is a facility instrument on EOS Aqua
- AIRS is a grating spectrometer covering 650 to 2650 waver number, with gaps
  - Nominal Spectral Resolution of 1200 $\nu/\delta\nu$
  - 2378 channels, or spectral samples
  - Spatial resolution of 1.1 degree, 15km footprint at nadir
  - 4 additional VIS/NIR channels at higher spatial resolution
- AIRS operates with microwave sounders AMSU-A and HSB
  - AMSU-A is a copy of NOAA's microwave sounder
  - HSB is functionally equivalent to NOAA's humidity sounder AMSU-B
  - The three instruments are synchronized to have 3 by 3 AIRS/HSB footprints within an AMSU footprint
- Major level 2 products
  - Temperature Profile
  - Water Vapor Profile
  - Surface skin temperature and other surface parameters
  - Cloud fraction and cloud top pressure
- Level 1b products were made public in early 2003
- Goddard DAAC is processing level 2 with V3.0.9
  - Validated only for ocean profiles between 40N and 40S.

Main Contributors of Level 2 Algorithm

- Phill Rosenkranz of MIT
  - MW only retrieval algorithm and MW Rapid Transmittance Algorithm
- Catherine Gautier of UCSB
  - VIS/NIR algorithm
- Larrabee Strow of UMBC
  - AIRS Rapid Transmittance Algorithm
- Larry McMillin of NOAA/NESDIS
  - Brightness temperature tuning and local angle adjustment
- Mitch Goldberg of NOAA/NESDIS
  - Initial Regression Algorithm
- Joel Susskind of NASA/GSFC
  - Final retrieval algorithm and cloud clearing algorithm
- JPL is responsible for combining these algorithms into a unified team algorithm/software.

AIRS Level 2 Flow Chart

FLOW CHART FROM Evan M Manning
WILL GO HERE

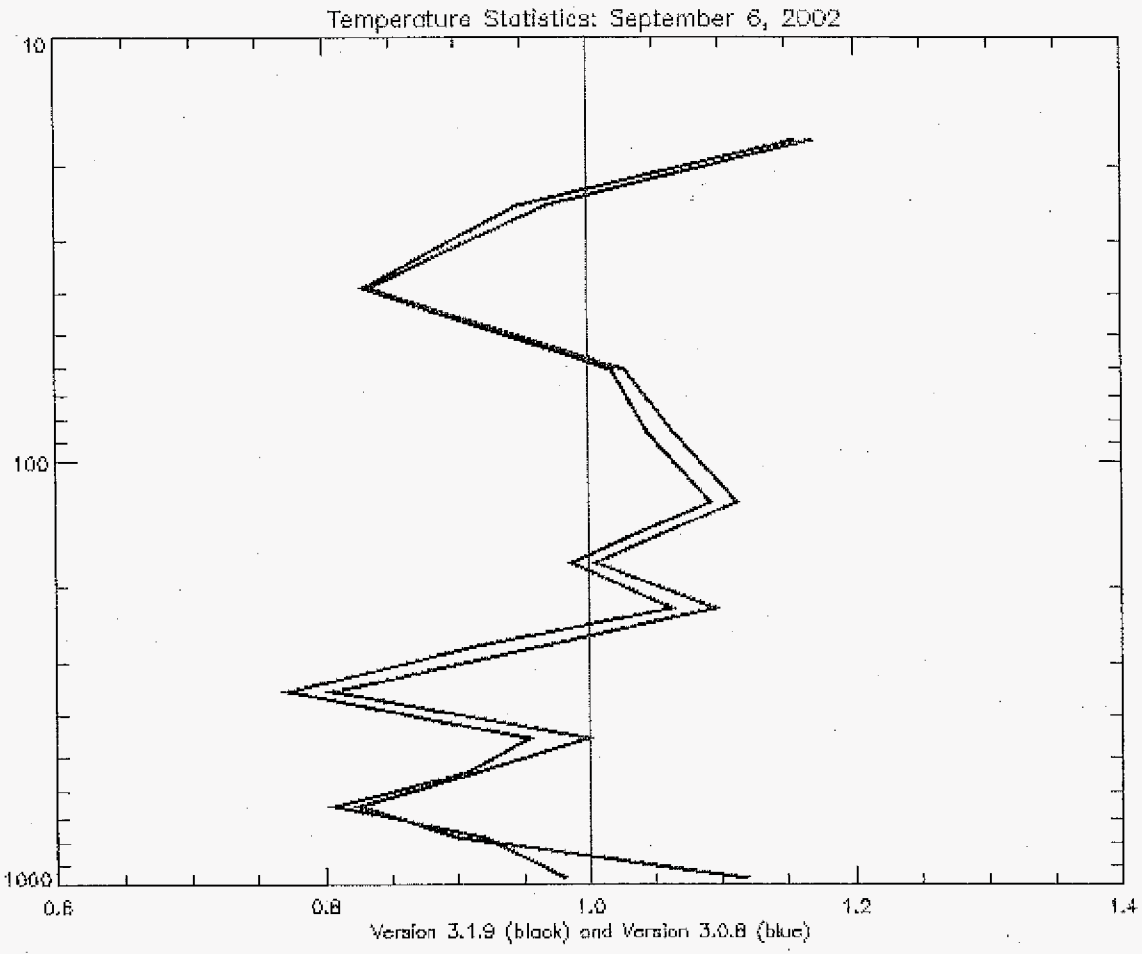
Level 2 Data Availability

- First public release of AIRS level 2 data - Version 3.0.9
  - Validated for ocean footprints between 40N and 40S
  - GDAAC AIRS Data Support
    - http://daac.gsfc.nasa.gov/atmodyn/airs
  - Current data since September 2003 is available
  - Old data since September 2002 will be processed and made available
- Various Documentation Available
  - AIRS Public Web page
    - http://www.jpl.nasa.gov/airs
  - GDAAC AIRS Data Support
    - [illegible]
- Other AIRS Data Sources
  - NRT System at NESDIS
    - Releasing BUFR format level 1b files to NWP centers
    - Plan to distribute BUFR format level 2 files to NWP centers
  - Direct Down Link software for AIRS level 1 will be made available soon

Level 2 Files

- Level 2 standard file
  - Standard or core products
  - Profiles at 28 mandatory pressure levels
- Level 2 support file
  - Research products and intermediate products
  - Profiles at 100 pressure levels
  - Dependent on the standard file
    - Not all parameters in standard file are duplicated
- Cloud cleared radiance file
  - Radiances that would have been observed if there was no cloud
  - Available about 60% of AMSU footprints
  - May be available up to 80% cloudy cases.
- One set of files for a granule, 6 minutes of data
  - 45 AMSU scan lines of data, 135 scan line of AIRS/HSB data
  - 240 granules per day
  - All files are in swath format of HDF-EOS

Temperature Statistics vs ECMWF Analysis



- Blue curve is for public release version, v3.0.9
- Black curve is for the internal version, v3.1.9
- Main difference is better QA on retrievals

RetQAFlag

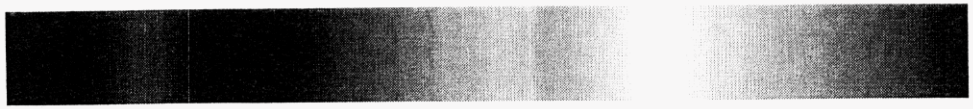
- The AIRS level 2 files contain rejected retrievals.
  - Casual users should examine only "accepted" retrievals, retrievals with RetQAFlag value of zero.
- RetQAFlag is a two byte, 16 bit, flag

Bit number 11-15 (MSB)	Spare, set to zero bit
10	Lower part of profile may not be valid Check the parameter Press_valid_bottom
9	Retrieved SST is more than 3K different from forecast
8	Record type not validated For v3.0.9, set to zero only for ocean cases between 40N and 40S
5 - 7	Spare, set to zero bit
4	Final retrieval rejected or not attempted
3	Final Cloud Clearing rejected or not attempted
2	Initial Regression rejected or not attempted
1	Initial Cloud Clearing rejected or not attempted
Bit Number 0 (LSB)	MW Only retrieval rejected or not attempted

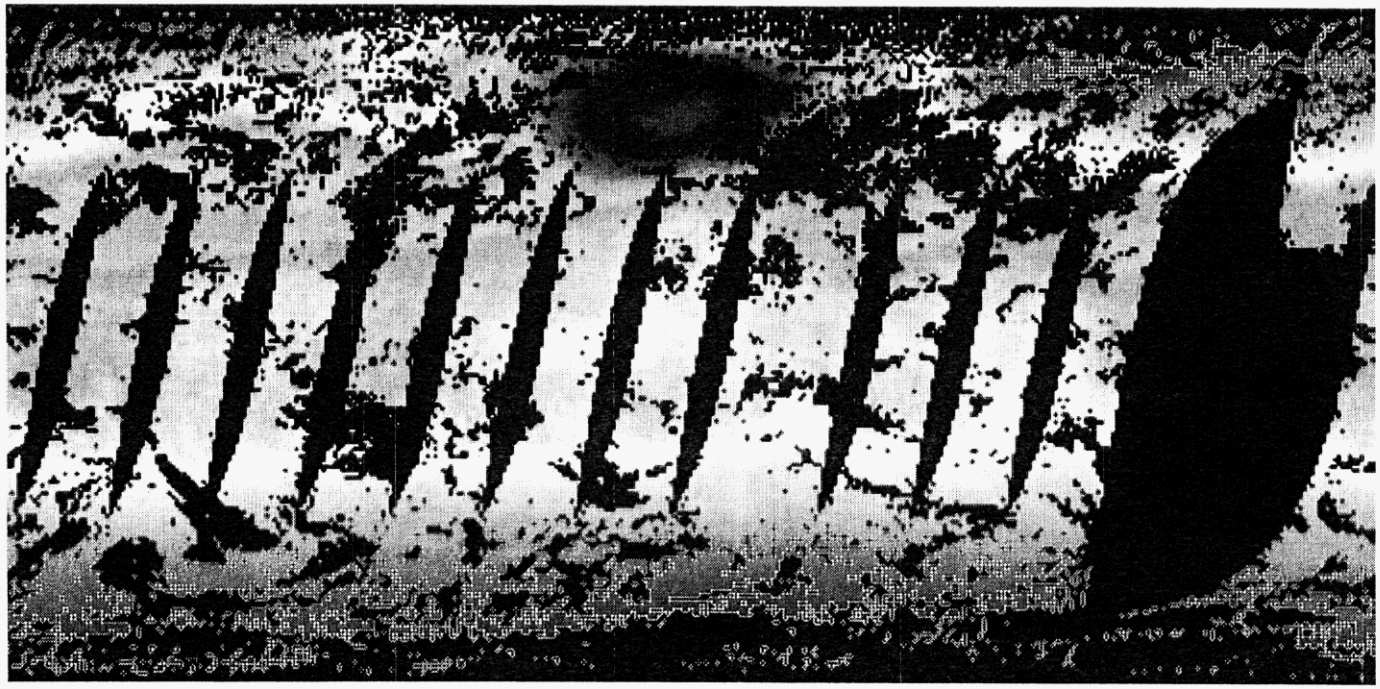
Sample Browse Products

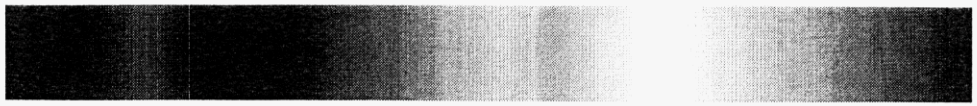
- Simple gridded data based on January 2003 data
  - Separate maps for ascending (day) and descending (night) parts of orbit
  - One degree by one degree resolution
- For these maps, only the second half of RetQAFlag was checked
  - The first byte (bit numbers 8 through 15) was ignored
- 10 mb temperature map compare very well with ECMWF forecast
- SST map reveals artifacts over sun glint area and over persistent stratus area
- The total ozone map compares pretty well with TOMS ozone

ECMWF 10 mb Temperature
January 3, 2003



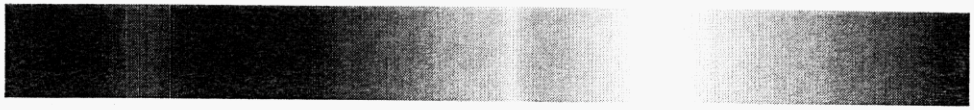
AIRS 10 mb Temperature
January 3, 2003





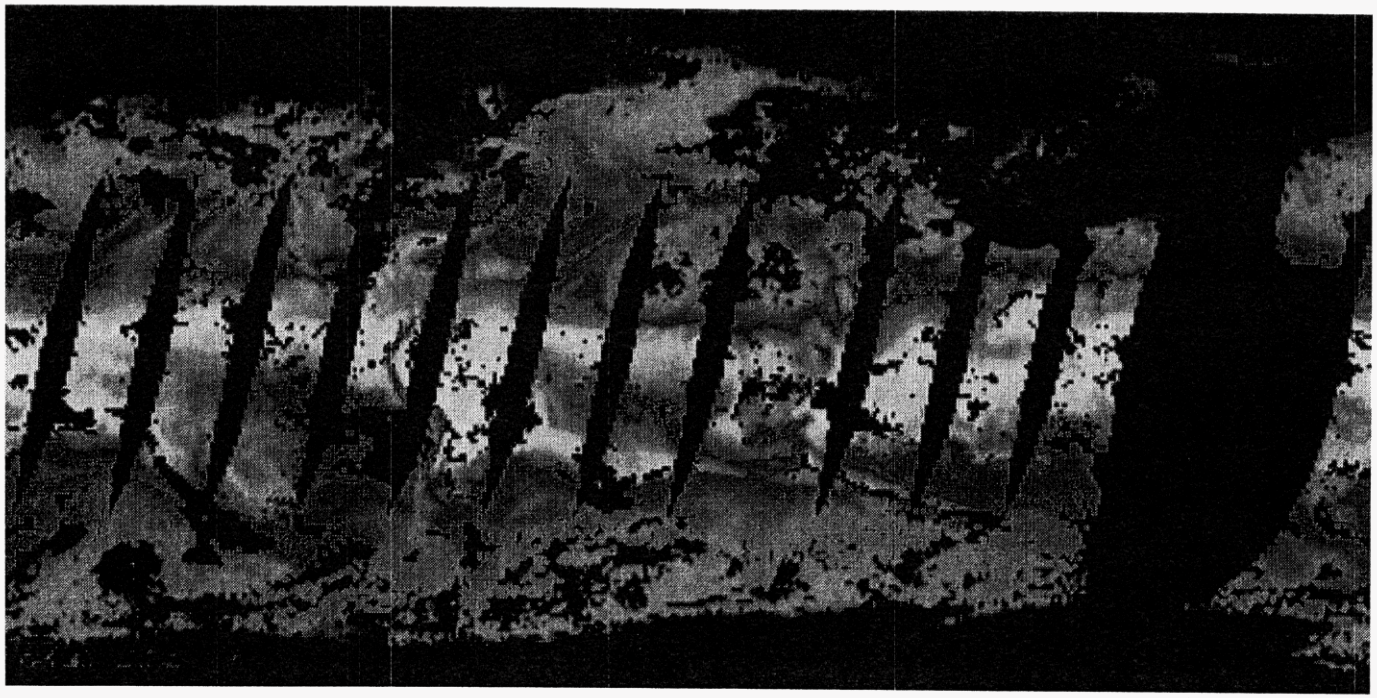
AIRS Surface Skin Temperature

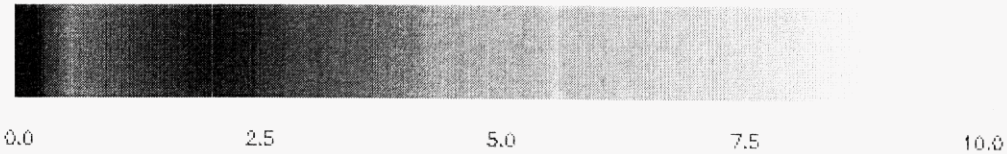
January 3, 2003



AIRS Total Precipitable Water

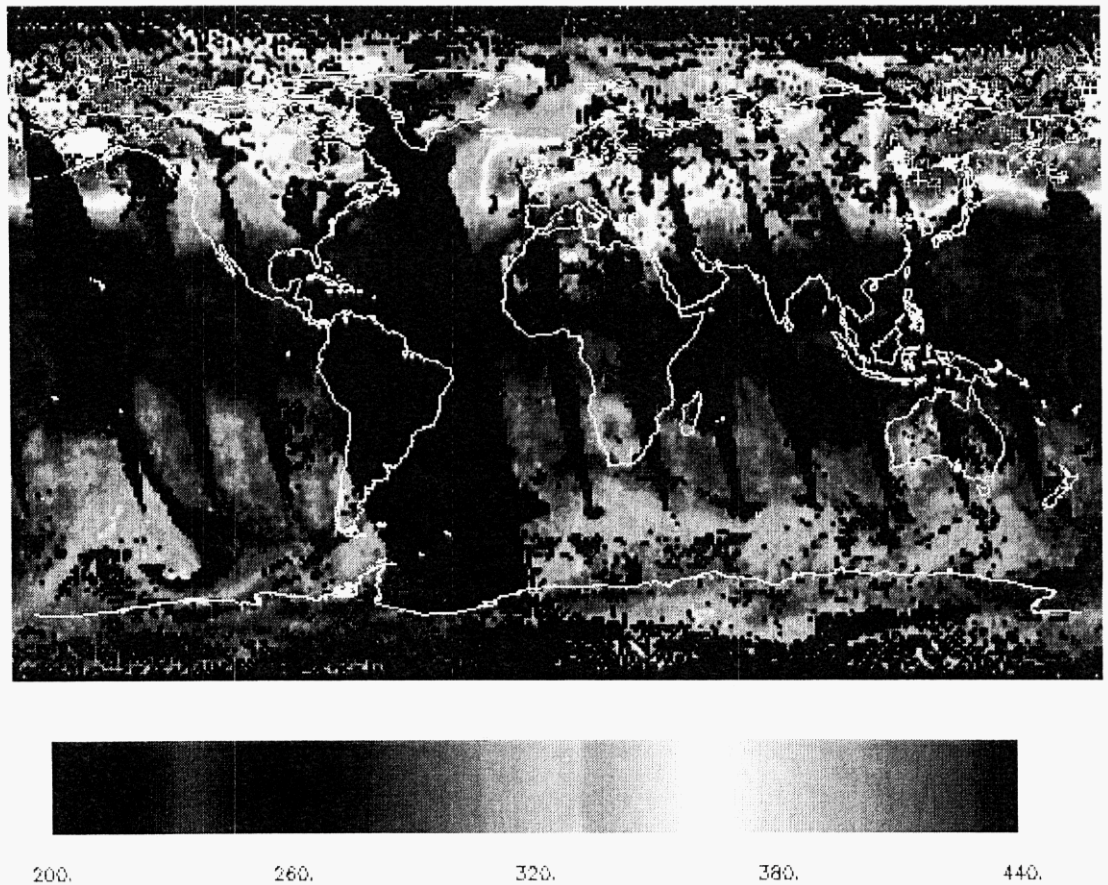
January 3, 2003

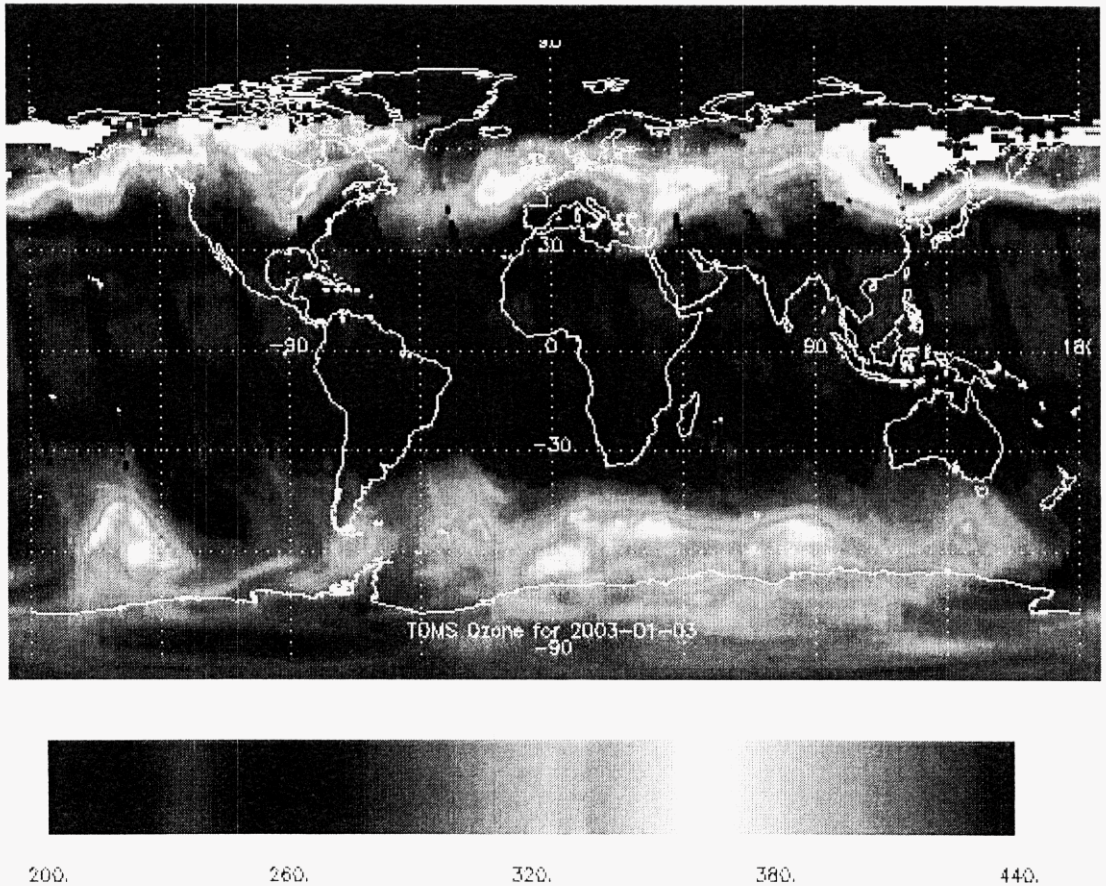




AIRS Total Column Ozone

January 3, 2003



TOMS Total Column Ozone

January 3, 2003