Temperature, water vapor and ozone retrievals from IASI radiance measurements, using the NOAA inversion algorithm

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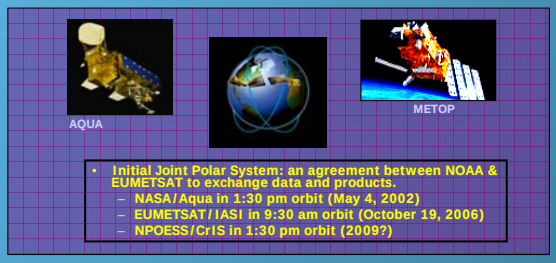
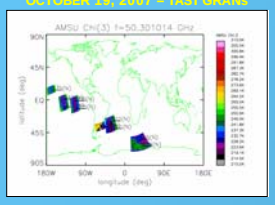
We present an updated status on temperature, water vapor and ozone retrievals from IASI radiance measurements using the NOAA Unique retrieval algorithm. We compare IASI and AIRS best collocated retrieval performances by using match-up ECMWF measurements.
The NOAA Unique retrieval algorithm is based on an iterative least squares physical inversion of clear column radiances. To summarize, the IASI retrieval software includes: 1) a calibration module which converts the level-1A raw data to Level-1C calibrated radiance and brightness temperature for IASI and AMSU; 2) a microwave retrieval module which derives cloud liquid water flags and microwave surface emissivity uncertainty; 3) a fast eigenvector regression retrieval for temperature and moisture that is trained using the ECMWF analysis and IASI cloudy radiances; 4) a cloud clearing module that uses a set of microwave and IR channels to produce the cloud-cleared IR radiance product and reject those cases violating the cloud-clearing requirements; 5) a fast eigenvector regression retrieval for temperature and moisture that is trained using the ECMWF analysis and IASI cloud cleared radiances; 6) the final IR retrieval module, which uses the regression retrieval as an initial solution and produces the final version of the physical retrieval by an iterated regularized least squared minimization.

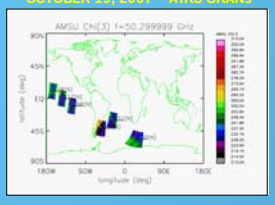
The NOAA level 2 processing is a unique system to compute atmospheric core and trace gas products. The whole architecture is a file-driven system compatible with multiple instruments. This system has been developed during the Aqua mission, using AIRS/AMSU/MODIS Instruments. Although the system was built for AIRS, it was designed to be expandable for both IASI and CrIS.
AIRS, IASI and CrIS have the potential to measure atmospheric components for the next 20+ years. These observations will provide a mid-tropospheric climatology and may also be able to discriminate between the anthropogenic and natural sources & sinks of trace gases.



OCTOBER 19, 2007 – IASI GRANs



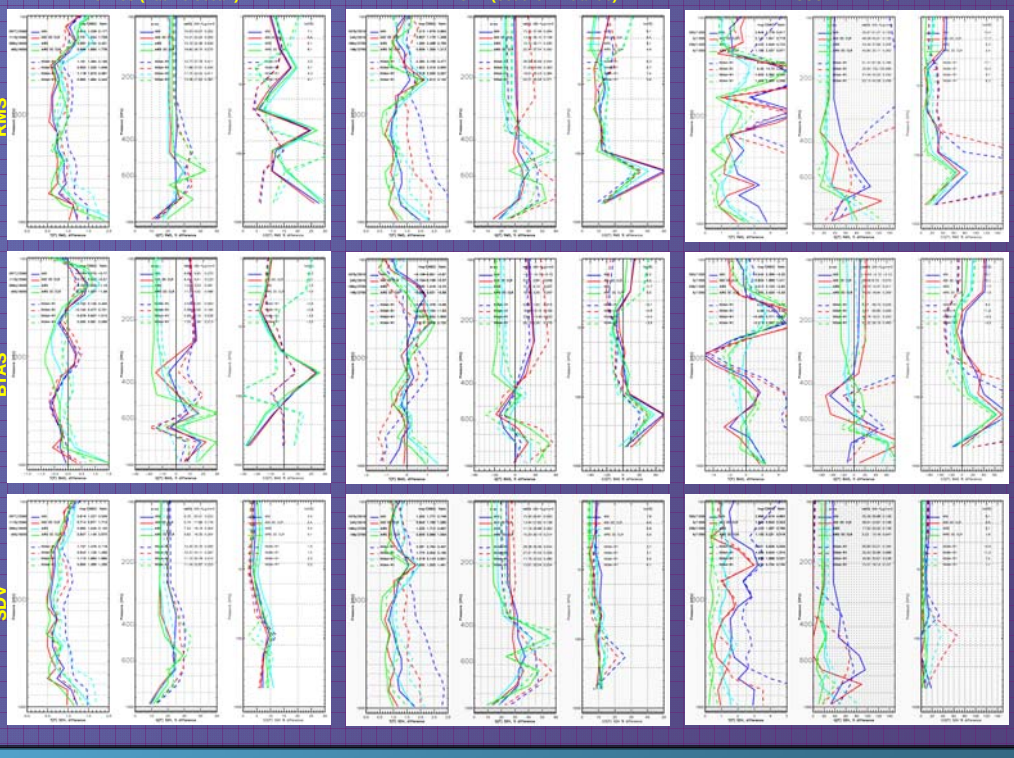
OCTOBER 19, 2007 – AIRS GRANs



LEGEND

Solid Blue: IASI vs ECMWF
Solid Red: IASI vs ECMWF- OCEAN CLEAR
Solid Cyan: AIRS vs ECMWF
Solid Green: AIRS vs ECMWF- OCEAN CLEAR

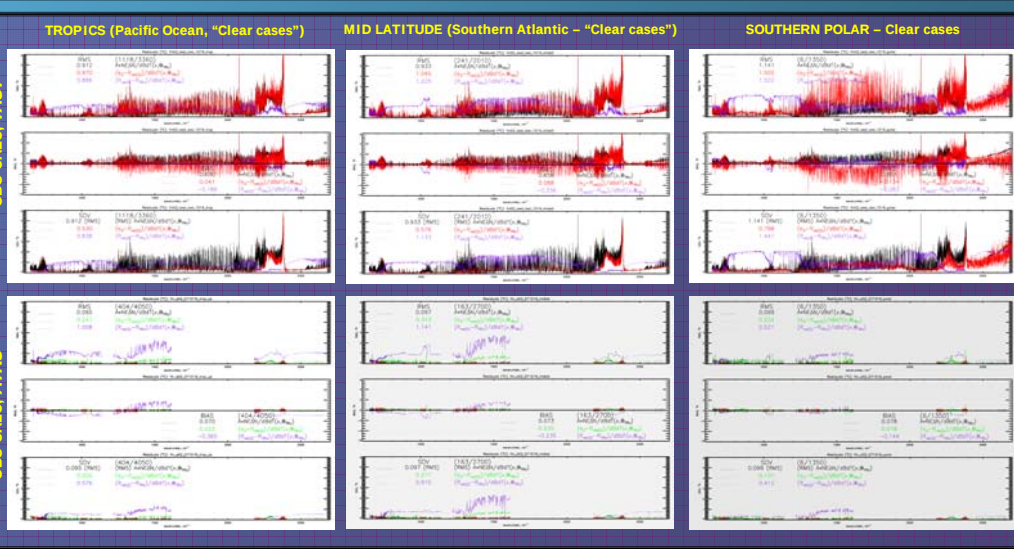
Dashed Blue: IASI vs ECMWF
Dashed Red: IASI vs ECMWF- OCEAN CLEAR
Dashed Cyan: AIRS vs ECMWF
Dashed Green: AIRS vs ECMWF- OCEAN CLEAR



LEGEND

In each figure:
RMS(upper), BIAS (middle), SDV(bottom)

Red: IASI CloudClearRad-CALC(ret)
Green: AIRS CloudClearRad-CALC(ret)
Purple: CALC(ret) – CALC(ecmwf)
Black: Instrumental noise



COMING NEXT

- Improve tuning and RTA error terms
- Compute local angle corrections
- Introduce NLTE corrections
- Improve regression statistics
- Optimize least square fit parameters
- Compute further cross-vlidations

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Whom to blame:


The NOAA NESDIS Sounding Team