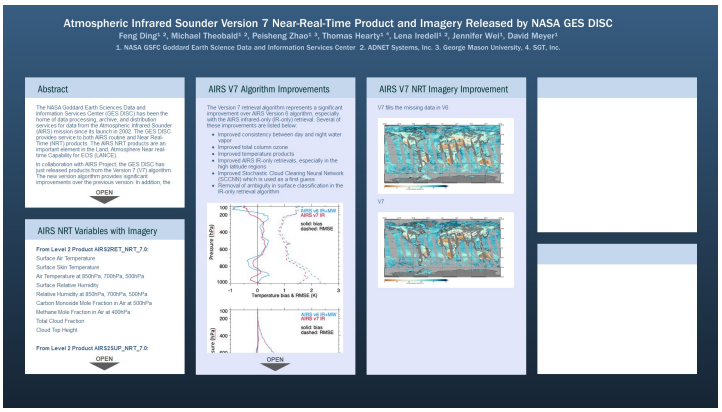
Atmospheric Infrared Sounder Version 7 Near-Real-Time Product and Imagery Released by NASA GES DISC



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ABSTRACT

The NASA Goddard Earth Sciences Data and Information Services Center (GES DISC) has been the home of data processing, archive, and distribution services for data from the Atmospheric Infrared Sounder (AIRS) mission since its launch in 2002. The GES DISC provides service to both AIRS routine and Near Real-Time (NRT) products. The AIRS NRT products are an important element in the Land, Atmosphere Near real-time Capability for EOS (LANCE).

In collaboration with the AIRS Project, the GES DISC has just released products from the Version 7 algorithm. The new algorithm provides significant improvements over the previous version. In addition, the GES DISC produces AIRS NRT imagery. The AIRS NRT imagery are generated by mosaicking and mapping the available AIRS 6-minute retrieval granules to a global projection. The images are constantly refreshed when new granules are produced. The AIRS NRT Viewer and LANCE Worldview provide visualization services to online users for AIRS NRT imagery. The data products used to generate this imagery include atmospheric temperature, humidity, precipitation, cloud, Dust Score, CO, and SO2.

In this presentation, we demonstrate visualization of the AIRS NRT imagery from the Version 7 data, and demonstrate some improvements over the previous version. Progress on improving the AIRS NRT imagery, a collaboration project with the AIRS Applications Development Team at NASA Jet Propulsion Laboratory (JPL), is also presented.

ACCESS AIRS NRT PRODUCTS AND VARIABLES WITH IMAGERY

Access AIRS NRT products from LANCE AIRS NRT website and GES DISC website:

LANCE AIRS NRT

https://earthdata.nasa.gov/earth-observation-data/near-real-time/download-nrt-data/airs-nrt (https://earthdata.nasa.gov/earth-observation-data/near-real-time/download-nrt-data/airs-nrt)

GES DISC

https://disc.gsfc.nasa.gov/ (https://disc.gsfc.nasa.gov/)

Visualize AIRS NRT imagery on Worldview:

https://worldview.earthdata.nasa.gov/ (https://worldview.earthdata.nasa.gov/)

AIRS NRT variables with imagery:

From product AIRS2RET_NRT_7.0

Surface Air Temperature

Surface Skin Temperature

Air Temperature at 850hPa, 700hPa, 500hPa

Surface Relative Humidity

Relative Humidity at 850hPa, 700hPa, 500hPa

Carbon Monoxide Mole Fraction in Air at 500hPa

Methane Mole Fraction in Air at 400hPa

Total Cloud Fraction

Cloud Top Height

From product AIRS2SUP_NRT_7.0

Sulfur Dioxide Brightness Temperature Difference

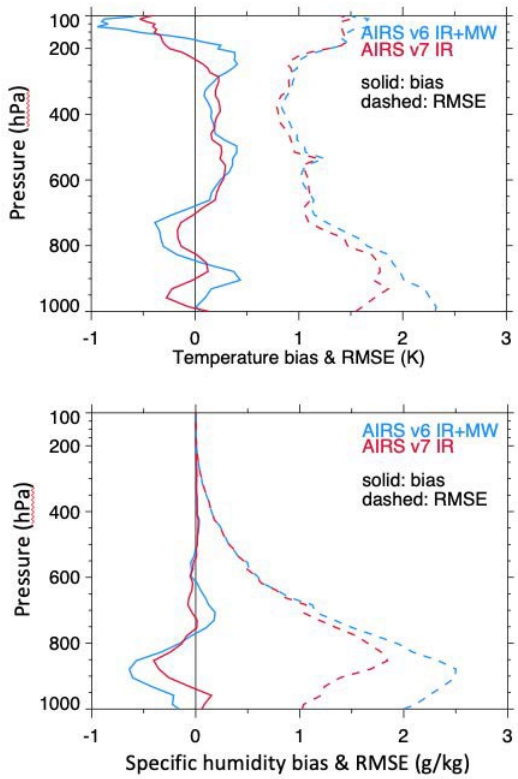
Dust Score

Precipitation Estimate

AIRS VERSION 7 ALGORITHM IMPROVEMENTS

The AIRS Version 7 retrieval algorithm represents a significant improvement over the Version 6 algorithm, especially with the AIRS infrared-only (IR-only) retrieval. Several of these improvements are listed below:

- Improved consistency between day and night water vapor
- Improved total column ozone
- Improved temperature products
- Improved AIRS IR-only retrievals, especially in the high latitude regions
- Improved Stochastic Cloud Clearing Neural Network (SCCNN) which is used as a first guess
- Removal of ambiguity in surface classification in the IR-only retrieval algorithm

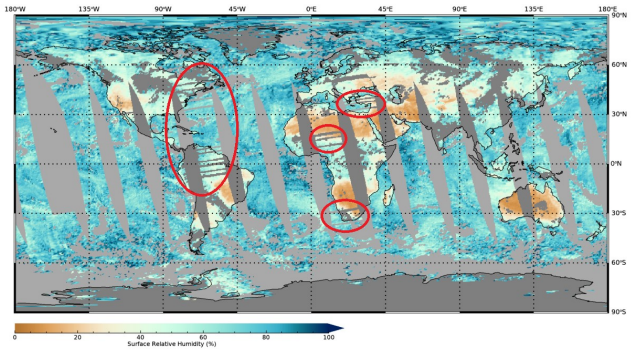


An averaged sample bias and Root Mean Square Error (RMSE) profile of AIRS Version 6 and Version 7 temperature and specific humidity profiles compared with approximately 500 sonde data profiles, which highlights some of the improvements.

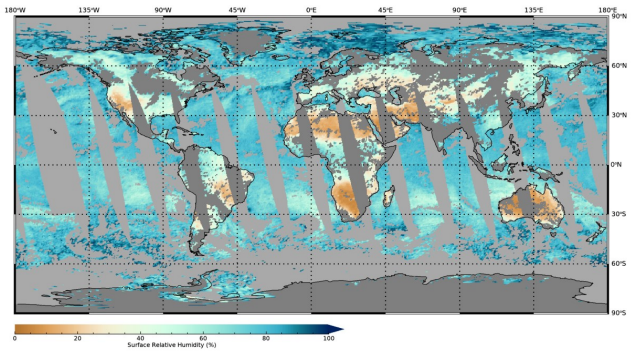
AIRS VERSION 7 NRT IMAGERY IMPROVEMENT

The stripes (marked with red circles) in AIRS Version 6 imagery are corrected in Version 7. The AIRS Version 7 algorithm performs better in relying on data from alternate channels when a channel cannot be calibrated for some scans, usually because of the bursts of noise.

Version 6



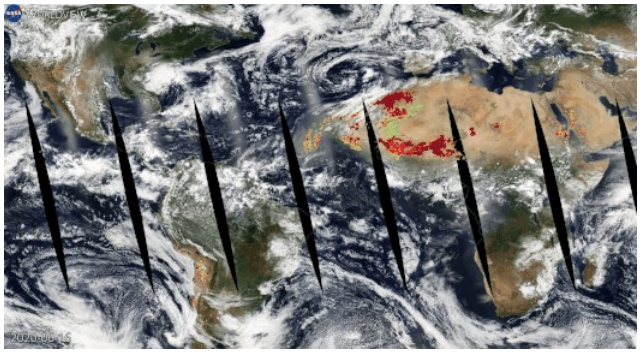
Version 7



Relative Humidity at Surface (%) Imagery in Daytime/Ascending on September 12, 2019 from AIRS Version 6 and Version 7

AIRS OBSERVATION OF TRANS-ATLANTIC AFRICAN DUST PLUME IN JUNE 2020

In June 2020, a record-breaking dust plume originating in the Sahara Desert of Africa spread thousands of kilometers across the Atlantic Ocean and reached the USA.



Ten-day animaton of AIRS Dust Score from 6/16/2020 to 6/25/2020 generated with Worldview.

SUMMARY AND FUTURE WORK

- The AIRS Version 7 retrieval algorithm represents a significant improvement over the AIRS Version 6 algorithm, especially with the IR-only retrieval.
- Some improvements are shown on the AIRS NRT imagery.
- Prototype AIRS polar projection imagery is being tested and under review.
- The LANCE imagery gallery will have more AIRS variables.

LANCE AIRS NRT:

GES DISC:

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In collaboration with AIRS Project, the GES DISC has just released products from the Version 7 algorithm. The new version algorithm provides significant improvements over the previous version. The most substantial advances are: improved consistency between day and night water vapor; improved total column ozone and temperature; improved infrared-only (IR-only) retrievals, especially in high latitude regions; an improved Stochastic Cloud Clearing Neural Network used as a first guess at the initial value in the iterative retrieval process; and removal of ambiguity in surface classification in the IR-only retrieval algorithm.

In addition, the GES DISC produces AIRS NRT imagery. The AIRS NRT imagery are generated by mosaicking and mapping the available AIRS 6-minute retrieval granules to a global projection. The images are constantly refreshed when new granules are produced. The AIRS NRT Viewer and LANCE Worldview provide visualization services to online users for AIRS NRT imagery. The data products used to generate this imagery include atmospheric temperature, humidity, precipitation, cloud, Dust Score, CO, and SO_2.

In this presentation, we will demonstrate visualization of the AIRS NRT imagery from the new Version 7, and demonstrate some improvements over the previous version. Progress on improving the AIRS NRT imagery, a collaboration project with the AIRS Applications Development Team at NASA Jet Propulsion Laboratory (JPL), will also be presented.