Comparison of IAPP and ICI Sounding Products at CIMSS

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Introduction

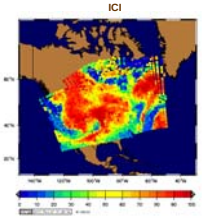
The International ATOVS Processing Package (IAPP) and its predecessor, the International TOVS Processing Package (ITPP), have been developed at SSEC/CIMSS to retrieve atmospheric temperature and moisture profiles and other parameters in both clear and cloudy atmospheres from (Advanced) TIROS Operational Vertical Sounder (ATOVS/TOVS) radiance measurements. The software has been run operationally for NOAA TOVS and/or ATOVS Global Area Coverage data and direct broadcast (DB) data since the early 1990's. Meanwhile, another ATOVS/TOVS DB processing package, called Inversion Coupled with Imager (ICI), was developed by Meteo-France. At SSEC/CIMSS the DB ATOVS data have been processed operationally in near real-time by both IAPP and ICI, since February 2001. The products separated over land and sea and clear and cloudy condition are monitored on a daily basis and validated on the web site:

http://cimss.ssec.wisc.edu/iapp_ici/

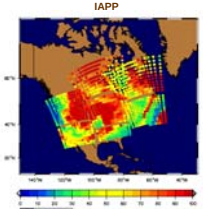
The poster presents comparisons of the temperature retrievals processed by the two software packages between July and October 2003 for both clear and cloudy skies, and land and ocean cases altogether. Temperature bias and RMS difference fields between retrievals and NCEP/AVIATION global NWP analyses are shown for the morning and the afternoon orbits. The retrievals are interpolated to the NWP model grids. The daily bias and RMS vertical distributions vs. time are also shown.

Acquisition area

ICI



IAPP



500 hPa relative humidity, NOAA16, 18 UTC on 11-26-2001

Details

	ICI	IAPP
Input	•NOAA17/HRPT level 1D data Processed by AAPP & MAIA •NCEP/AVN NWP analyses, forecast	•NOAA17/HRPT level 1B data Processed by AAPP •Surface metars •Regression first guess for real-time NWP analyses/forecast first guess for post processing
Channels used vary on clear/cloudy/partly-cloudy and sea/land/coast situations	HIRS channels: 2-8,10-16 AMSU-A 5-11, AMSU-B 3,4	HIRS 1-17, AMSU-A 3-14, AMSU-B 2-5 (AMSU-A 1,2,15 and AMSU-B 1)
Resolution	1X1 HIRS	3X3 HIRS
Bias adjustment	Yes	No

Conclusions

•Results show retrievals compared to NWP analyses
•Retrieval biases in both algorithms are large over mountain regions in lower levels (700 HPa)
•Retrieval RMS are approximately 2-3K; surface and tropopause regions have largest RMS differences
•IAPP shows larger biases, likely a result of not doing a radiance bias adjustment in the retrieval
•This study is a result of a strong collaboration between Meteo-France and UW CIMSS

References

ICI documentation: http://www.meteorologie.eu.org/ici/
To obtain IC source code: http://www.eumetsat.de

IAPP documentation:

Li, J., W. Wolf, W. P. Menzel, W. Zhang, H-L. Huang, and T. H. Achtor, Global Sounding of the Atmosphere from ATOVS Measurements: The Algorithm and Validation, *J. Appl. Meteor.*, *39*, 1248-1268, 2000.

To obtain IAPP source code, contact tom.achtor@ssec.wisc.edu

Acknowledgements
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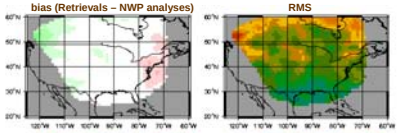
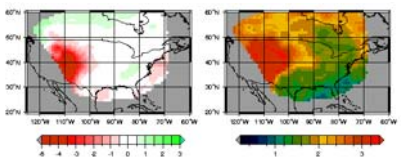
Horizontal comparison

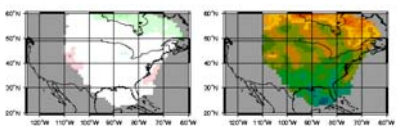
Temperature fields
July 1 – Oct. 20, 2003

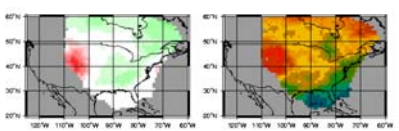
ICI (real-time)

bias (Retrievals – NWP analyses) | RMS



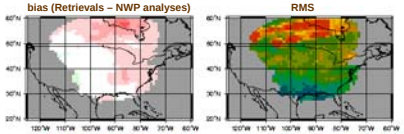


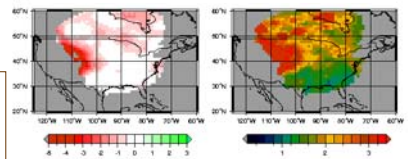


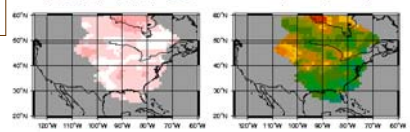


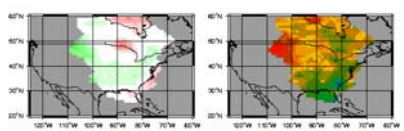
IAPP (real-time)

bias (Retrievals – NWP analyses) | RMS



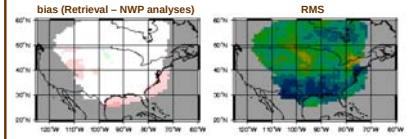


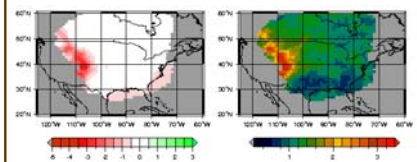


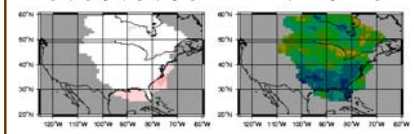


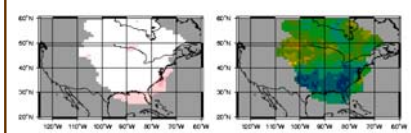
IAPP (post processed)

bias (Retrieval – NWP analyses) | RMS









500 hPa morning orbits

700 hPa morning orbits

Bias and RMS differences between ICI/IAPP and NWP temperature fields are shown for the morning and afternoon orbits from July to October, 2003 for all weather conditions. The retrievals are interpolated to the NWP model grids.

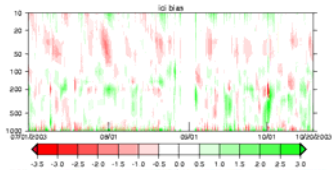
500 hPa afternoon orbits

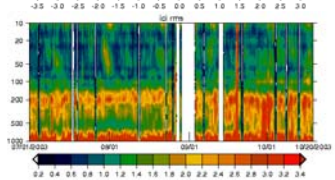
700 hPa afternoon orbits

Vertical comparison

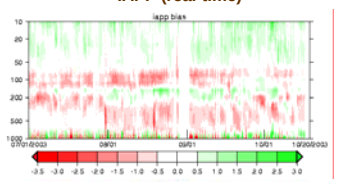
Temperature fields
July 1 – Oct. 20, 2003, 06 UTC

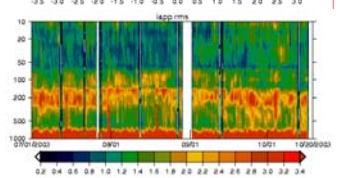
ICI (real-time)



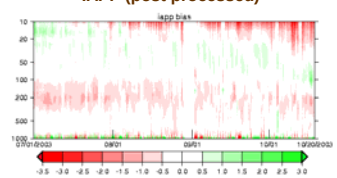


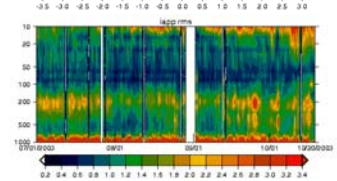
IAPP (real-time)





IAPP (post processed)





bias (Retrievals – NWP analyses)

Shown are the daily bias and RMS differences between temperature retrievals and collocated NWP analyses on the 40 RTTOV pressure levels between July and October, 2003 for all weather conditions.

RMS

International TOVS Study Conference, 13th, TOVS-13, Sainte Adele, Quebec, Canada, 29 October-4 November 2003. Madison, WI, University of Wisconsin-Madison, Space Science and Engineering Center, Cooperative Institute for Meteorological Satellite Studies, 2003.