



## **AIRS high-resolution stratospheric temperature retrievals evaluated with operational Level-2 data and ERA-Interim**

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The Atmospheric InfraRed Sounder (AIRS) aboard NASA's Aqua satellite provides stratospheric temperature observations for a variety of scientific tasks. However, the horizontal resolution of the operational temperature retrievals is generally not sufficient for studies of gravity waves.

The retrieval discussed here provides stratospheric temperature profiles for each individual AIRS footprint and therefore has nine times better horizontal sampling than the operational data. The retrieval configuration is optimized so that the results provide a trade-off between spatial resolution and retrieval noise which is considered optimal for gravity wave analysis.

Here the quality of the high-resolution data is assessed by comparing a nine-year record (2003 – 2011) of stratospheric temperatures with results from the AIRS operational Level-2 data and the ERA-Interim meteorological reanalysis. Due to the large amount of data we performed a statistical comparison of the high-resolution retrieval and reference data sets based on zonal averages and time-series. The temperature data sets are split into day and night, because the AIRS high-resolution retrieval uses different configurations for day- and night-time conditions to cope with non-LTE effects. The temperature data are averaged on a latitudinal grid with a resolution of one degree. The zonal averages are calculated on a daily basis and show significant day-to-day variability. To further summarize the data we calculated monthly averages from the daily averaged data and also computed zonal means. Additionally, the standard deviation of the three data sets was computed.

The comparisons show that the high-resolution temperature data are in good agreement with the reference data sets. The bias in the zonal averages is mostly within  $\pm 2$  K and reaches a maximum of 7 K to ERA-Interim and 4 K to the AIRS operational data at the stratopause, which is related to the different resolutions of the data sets. Variability is nearly the same in all three data sets, having maximum standard deviations around the polar vortex in the mid and upper stratosphere. The evaluation presented here indicates that the high-resolution temperature retrievals are well-suited for scientific studies and that they will become a valuable asset for further studies of stratospheric gravity waves.

### Reference:

Meyer, C. I. and L. Hoffmann, Validation of AIRS high-resolution stratospheric temperature retrievals, Proc. SPIE 9242, Remote Sensing of Clouds and the Atmosphere XIX; and Optics in Atmospheric Propagation and Adaptive Systems XVII, 92420L (17 October 2014); doi: 10.1117/12.2066967