

# **Analyses of FORMOSAT-3/COSMIC Temperature and Humidity Retrievals and Comparisons with Radiosonde Observations, the AIRS Retrievals and the NCEP/NCAR Reanalysis**

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## **Abstract**

The FORMOSAT-3/COSMIC temperature and humidity retrievals were validated with radiosonde observations and compared with the Aqua AIRS retrievals and the NCEP/NCAR reanalysis over various climatic regions. It has been found that the FORMOSAT-3/COSMIC temperature retrievals are in good agreement with the radiosonde observations in the troposphere and the lower stratosphere with a discrepancy of  $\sim 2$  °C, whereas the humidity retrievals are in good agreement only in the middle and upper troposphere with a percentage discrepancy of 15-20 %. The AIRS retrievals have a high horizontal resolution and a low vertical resolution, whereas the FORMOSAT-3/COSMIC retrievals have a low horizontal resolution and a high vertical resolution. Therefore, comparisons are meaningful only for the temperature and humidity averaged over space and time. Averaged over a season and month, the AIRS-retrieved temperature agrees well with the FORMOSAT-3/COSMIC in the lower troposphere but is lower by 2-4 °C in the middle and upper troposphere. For the humidity, the AIRS retrievals are significantly lower than the FORMOSAT-3/COSMIC retrievals except near the surface. On the other hand, the humidity of the NCEP/NCAR reanalysis is generally higher than the FORMOSAT-3/COSMIC except in the upper troposphere of the tropical deep convection regions where the NCEP/NCAR humidity is lower than the FORMOSAT-3/COSMIC humidity.