

Assessment of NCEP GFS Cloud fractions, temperature, and relative humidity against satellite retrievals

There are a bunch of studies that reveal the horizontal distribution of clouds from the surface and from spaceborne sensors. However, the vertical distribution and internal structure of clouds have not been resolved on global scales. As such, the majority of models were evaluated by comparing radiation measurements at the top of atmosphere (TOA) and total column cloud amounts instead of layered clouds. The objective of this study is to diagnose the performance of the NCEP GFS (Global Forecast System) model using different types of satellite retrievals. Comparisons were made against the Moderate Resolution Imaging Spectroradiometer (MODIS) data and Atmospheric InfraRed Sounder (AIRS) for July 2008. Cloud fractions and meteorological variables such as low cloud fractions, atmospheric temperature vertical profile, and relative humidity field were evaluated.

In general, the GFS captures reasonably well the patterns of hydrometeors and follows the general trends of satellite measurements, but large discrepancies in vertical temperature and RH profiles. GFS model results are most comparable with the observation at upper level in the troposphere but overestimated approaching the surface.