Preliminary Case Study of Geostationary IR Sounding Data from FY-4A GIRS: Preparing for the Next Generation GOES Jessica Gartzke, Robert Knuteson, William Smith, Elisabeth Weisz, Hank Revercomb and Paul Menzel

Abstract

sounder, the Geostationary hyperspectral Infrared Interferometric Infrared Sounder (GIIRS), is pre-operational aboard the Chinese Fengyun-4A satellite. The GIIRS has an spectral resolution in the thermal infrared which matches the JPSS CrIS sensors on S-NPP and NOAA-20. It is the first geostationary interferometer that provides continuous soundings horizontal directions. Interpolation of temperature and humidity which has been successfully launched into Earth orbit. The GIIRS radiance data is currently in preliminary processing but is expected to become widely available later this year. GIIRS will obtain hourly vertical data of the atmosphere which is valuable for near real-time tracking of the pre-convective storm environment. In this study, comparisons are made between GIIRS-derived vertical profiles of temperature and humidity and local observational data from coincident radiosonde launch sites, e.g. at Shanghai. The GIIRS soundings and those derived using SNPP CrIS are compared using the CSPP DR algorithm and the operational NOAA NUCAPS ATMS/CrIS retrievals. This activity is part of an assessment performed at SSEC/CIMSS of the characteristics of the GIIRS radiances and the suitability of assimilation into NWP models.

Background



Data

WMO Radiosondes 2 or more launches per day 0, 12z Limited to participating locations **GIIRS** Sounder Observations every hour, bundled into 3 hour packages Domain shown above- eastern hemisphere MADIS Surface stations Observations every hour Limited to participating locations



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Gridding GIRS to ERA Spatial Grid

of the local radiosonde is

preformed to the GIIRS 100





Preliminary Results



- 1. Validation sites were identified within the GIIRS domain with upper air soundings from radiosonde launch sites and surface observation stations. See lower left figures for station locations.
- 2. Case studies for 2 locations were evaluated: Shanghai, China and Darwin, Australia. Validation data from WMO radiosonde network and NOAA MADIS.
- http://www.cma.gov.cn
- 4. Representative cases were selected for mostly clear sky conditions to illustrate the comparison of GIIRS retrieved profiles with a nearby WMO radiosonde. 5. Preliminary statistics suggest temperature bias is less than 3 K with standard deviation much less than 1 K. 6. Dewpoint temperature bias is 5-10 K with standard deviation less than 1 K.

- 7. Special attention will be made to validation of the diurnal dependence of surface observations of air temperature and dewpoint for assessment of atmospheric stability; CAPE, CIN, Lifted Index, etc.

Contact: Jessica Gartzke <u>imgartzke@wisc.edu</u> Gartzke, J., R. Knuteson, G. Przybyl, S. Ackerman, and H. Revercomb, 2017: Comparison of satellite-, model-, and radiosonde-derived convective available potential energy in the Southern Great Plains Region. J. Appl. Meteor. Climatol., 56, 1499–1513, doi:https://doi.org/10.1175/JAMC-D-16-0267.1. Link, Google Scholar



Surface Application: Diurnal Cycle

- Example Diurnal cycle Shanghai March 2, 2018
- Temperature increase between 0 and 10 UTC is typical of solar heating of the surface. Sunset in Shanghai was at 10 UTC.
- MADIS dewpoint shows a decrease between 4 and 14 UTC, perhaps due to land sea breeze effect
- In this case, GIIRS surface T, Tdew estimates are too high.
- GIIRS data will be used to assess the diurnal sampling of the BL.

Conclusions

3. GIIRS preliminary soundings from the Chinese Meteorological Agency (CMA) were downloaded from