1. Objective
The Advanced Baseline Imager (ABI) and the Hyperspectral Environmental Suite (HES) on the GOES-R series will enable improved monitoring of the distribution and evolution of atmospheric thermodynamics and clouds. The HES will be able to provide hourly atmospheric soundings with spatial resolution of 4-10 km with high accuracy using its high spatial resolution infrared measurements. However, the presence of clouds affects the sound retrieval and needs to be dealt with properly. The ABI will provide high spatial resolution (0.5-2 km) cloud mask, surface and cloud types, cloud-top phase information, cloud top pressure (CTP), cloud particle size (CPS), and cloud optical thickness (COT), etc. The combined ABI/HES system offers the opportunity for atmospheric and cloud products to be improved over those possible from either system alone. The key step for synergistic use of ABI/HES radiance measurements is the collocation in space and time. Collocated ABI can (1) provide HES sub-pixel cloud characterization (mask, amount, phase, layer information, etc.) within the HES footprint; (2) be used for HES cloud-clearing for partly cloudy HES footprints; (3) provide background information in variational retrieval of cloud properties with HES cloudiness. The Moderate-Resolution Imaging Spectroradiometer (MODIS) and the Hyperspectral Environmental Suite (HES) measurements (from the Earth Observing System’s (EOS) Aqua satellite) provide the opportunity to study the synergistic use of advanced imager and sounder measurements. The combined MODIS and ABI data for various scenes are analyzed to study the utility of synergistic use of ABI products and HES radiances for better retrieving atmospheric soundings and cloud properties. ABI can also help HES for cloud-clearing of footprints in partial cloud cover. Currently there is no option that ABI and HES might be located on different satellites; this design will have impact on the ABI/HES synergy. In order to answer the question on what the impact will be on the ABI/HES synergy, the two satellites are separated by a distance of 1.0, 2.5, and 5.0 degree in longitude, a study is carried out to simulate the ABI BT differences within collocated HES footprints due to the two-satellite system for ABI and HES.

2. Fast Cloudy Radiative Transfer Model and Retrieval Schemes

3. Hyperspectral IR Sounder Cloud Properties Retrieval

4. Imager/Sounder cloud-clearing

An optimal imager/sounder cloud-clearing method is developed (Li et al. 2005). IEEE Transaction on Geoscience and Remote Sensing, June issue. MODIS/AIRS data are used for verifying the algorithm.

5. GOES-R Design Impact on ABI/HES synergy

6. Summary

References

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