Evaluation and Assimilation of Geostationary Hyperspectral InfraRed Sounders (GeoHIS) : Progress and Challenges

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Abstract

High temporal geostationary (Geo) hyperspectral IR sounder (GeoHIS) radiance measurements enable continuous sounding of the atmospheric temperature and moisture, and thus capture the temporal and spatial variability for high impact weather or rapid changing weather events.

On 10 December 2016, the successful launch of China's Fengyung FY-4A satellite into geostationary orbit initiated a new era in Earth observation by providing the first time-continuous observations of the upwelling thermal infrared at high spectral resolution with the Geostationary Interferometric Infrared Sounder (GIIRS). A subset of GIIRS longwave temperature sounding channels has been assimilated in China's global NWP system GRAPES (Global/Regional Assimilation and PrEdiction System) since December 2018 and improve the forecast over East Asia , especially for high impact weather forecasting, such as Typhoons and cold air outbreaks. The European Organization for the Exploitation of Meteorological Satellites (EUMETSAT) is developing an operational advanced GEO hyperspectral IR sounder (IRS) as a part of Meteosat Third Generation (MTG-3) in the mid 2020's.

Based on the evaluation and assimilation of the real GeoHIS data from GIIRS, this talk will discuss the recent progress , current major challenges of GeoHIS assimilation. The opportunities include targeted observing for high impact weather, and improvement in convective storm forecasts, including tornadoes and hurricanes. The challenges include accurate spectral and radiometric calibration, considering the possible diurnal variation, fast radiative transfer model for large satellite zenith angles, and continuous data assimilation for application to high temporal observations.

Keywords: GIIRS, Geostationary Hyperspectral InfraRed Sounder, assimilation, calibration

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