High-performance clear-sky temperature and humidity information from geostationary imagers and their applications to short-term weather forecasting

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As more and more high-performance imagers are flying in geostationary orbits, there has been growing interest in how to utilize the imager-derived products and how accurate those products are. Although researchers and forecasters have already been provided with very accurate data from the numerical weather prediction (NWP) model or hyperspectral sounders onboard the polar orbiters, both type of data are provided in lower temporal and spatial resolution when compared to that from high-resolution imagers such as the Advance Himawari Imager (AHI) on board Himawari-8 that is operating on orbit or the Advanced Meteorological Imager (AMI) on board Korea’ s 2nd generation geostationary satellite, Geo-KOMPSAT-2A, scheduled to launch in 2018. Furthermore, NWP model accuracy decreases in the presence of clouds or in data sparse areas. This study focuses on this aspect, emphasizing the advantage of using high-resolution products, particularly moisture related products, retrieved from the AHI through a couple of case studies and suggests the potential benefits of using those products for short-range severe weather forecasting. Product accuracy is evaluated using radiosonde measurements, NWP model analysis, and Radio-Occultation measurements. Presentation will cover a brief introduction to the retrieval algorithm, which is based on an optimal estimation method with the unified model forecast as the first guess to produce clear-sky vertical profiles of temperature and moisture and other atmospheric parameters such as total precipitable water and instability indices. Algorithm characteristics and validation results will be also presented during the conference.

Keywords: high-performance geostationary imager, temperature and humidity profile retrieval algorithm, short-term weather forecasting, optimal estimation

