Development of the GEO-KOMPSAT-2A AMI rainfall rate algorithm

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A rainfall rate algorithm has been developed for the Advanced Meteorological Imager (AMI) onboard the GEO-KOMPSAT-2A (GK-2A), the second Korea's geostationary satellite, scheduled to be launched in early 2018. The AMI rainfall rate algorithm uses the a-priori information including the microwave rainfall data from the low-earth orbiting satellites and infrared (IR) brightness temperatures from geostationary satellites. The algorithm may better perform with a variety of a-priori information describing all possible precipitating systems. In addition, separation of physically different precipitating systems likely to improve the accuracy of retrieval process. However, it has been well known that such the separation can be hardly achieved based on the measurements of cloud top temperatures. This algorithm tries to utilize the radiative characteristics observed differently for different wavelengths in IR spectral regions. The characteristics include the different emissivity as a function of wavelength and cloud thickness. Using the brightness temperature differences (BTDs) between IR channels the algorithm discriminates three types of precipitating clouds: shallow, not-shallow-tall and not-shallow-taller types. The separation of three types of precipitating clouds may help the accuracy of rainfall estimates for each type of clouds. In addition to the separation of cloud types in the databases, the algorithm also uses databases classified by latitudinal bands. The bands are separated with four latitudinal zones. The separation of database based on latitudes may have an effect of distinguishing the cloud types that can occur regionally. The a-priori databases are thus classified with 12 different categories. Once the a-priori databases are constructed, the algorithm inverts the AMI IR brightness temperatures to the surface rainfall rate based on a Bayesian approach. The Bayesian approach has advantages on using multi-channel brightness temperatures simultaneously and utilizing the probability of rainfall reserved in the a-priori databases. As a proxy for the AMI this algorithm first tests the Advanced Himawari Imager (AHI) data. Retrieval results and the status and plan of the algorithm development will be introduced.

Keywords: GK-2A, AMI, Rainfall rate algorithm