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An Introduction to Himawari-8 Cloud Products

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The Himawari-8 is the next generation geostationary meteorological satellite of Japan Meteorological Agency (JMA), and it has entered operations on 7 July 2015. The satellite carries the Advanced Himawari Imager (AHI), which is greatly improved than past ones in terms of the number of observation bands and temporal/spatial resolution.

The Meteorological Satellite Center (MSC) has developed the AHI Cloud Product (ACP), which consists of cloud mask, type, phase and top height. The cloud mask, type and phase are detected using threshold tests, and the cloud top height is retrieved by 3 methods (e.g., radiance fitting, radiance rationing and intercept method) depending on the cloud type. These techniques are based on NWC-SAF and NOAA/NESDIS cloud algorithm. The ACP is used for the AHI level 2 products (e.g., CSR and SST) in MSC. Spatial resolution of the ACP is the same with the Himawari Standard Data of infrared bands (i.e., 2km at sub satellite point), and it created every one hour. The ACP was evaluated by comparison with the MODIS cloud product (MYD06, 35 C6) during 2 weeks in Sep. 2015. As a result, the cloud mask hit rate was above 80%, and the cloud phase captured some 90% for ice and some 70% for water. The cloud top height was compared with the CALIPSO product (L2 1km V3.30). Although bias errors of low and middle level cloud were within some +1000m (positive means the ACP is higher), that of high level cloud reached -4000m.

The High-resolution Cloud Analysis Information (HCAI) is created from the ACP. The HCAI is the successor product of the Satellite Cloud Grid Information Data (SCGID) in MSC. The HCAI is composed cloud mask, type, top height, dust mask, snow ice mask and quality control information. Spatial resolution of the HCAI is 0.02° in both latitude and longitude, and it is higher than that of the SCGID whose resolution was 0.20° in latitude and 0.25° in longitude. Due to high resolution, the HCAI can capture local cumulonimbus that cannot be captured by the SCGID. In addition, it is possible to detect cloud top surface clearly. Thus, misclassifications of stratocumulus around stratus or fog are reduced. The HCAI has been operational since Himawari-8 began, and it has been disseminated to Myanmar and Indonesia with modified spatial resolution and limited region.