Observation of Volcanic Ash Clouds by Himawari-8

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Volcanic ash released by volcanic eruptions not only fall and accumulate on the ground over a wide area, but also float and disperse in the air for a long period. Since an encounter between aircrafts and volcanic ash clouds could result in a serious accident such as damage on the aircraft body and engine failure, information of distribution and altitude of volcanic ash clouds is essential for the safe operation of aircrafts. Geostationary meteorological satellites are one of the most important tools to monitor volcanic ash clouds, in the point that they can observe the wide range on the earth homogeneously and continuously.
Japan Meteorological Agency (JMA) began operation of the new-generation geostationary meteorological satellite, Himawari-8, on 7 July 2015. This year, JMA is also planning to launch Himawari-9, which is a backup system of Himawari-8. The imager on board is called Advanced Himawari Imager (AHI), whose observation performance is highly improved compared to that of the predecessor MTSAT-series satellites. For example, the number of observation bands is increased from 5 to 16, the spatial resolution is almost doubled, and the full-disk observation frequency is improved from hourly to every 10 minutes. Furthermore, for the small region including Japan, high-frequency observation as much as every 2.5 minutes is carried out. These high-resolution and high-frequency observations enable us to observe relatively small-scale and quickly changing phenomena, such as volcanic plumes and rapidly developing cumuli.
Volcanic ash clouds can be detected from satellite observation data using wave-length dependence of light absorbance of volcanic ash. With numerical weather prediction data and sea surface temperature data, we estimate volcanic ash cloud height, optical depth and several other quantities. Utilizing 16 bands observation data of Himawari-8, improvements in accuracy of volcanic ash clouds detection and estimation of those altitudes can be expected.
In this talk, I will show some cases of volcanic plume observed by Himawari-8. A basic concept of volcanic ash detection from satellite observations and how to generate volcanic ash RGB composite imageries will be explained. Additionally, I will briefly introduce satellite volcanic ash products which include physical quantities of volcanic ash clouds such as altitude and optical depth.

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