Cloud-top height estimation using DIWATA-2 and its application

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It is known that the cloud reflects meteorological phenomena, and its structure makes a dramatic transformation, especially in the area of severe weather conditions such as torrential rainfall. Early studies indicated a positive correlation between the vertical growth rate of cloud and the number of lightning flashes as well as rainfall rate [e.g., Adler and Mack, 1984; Dye et al., 1989]. Besides, Price et al. [2009] indicated that typhoon intensity is correlated with the number of lightning flashes with a few days delay. Therefore, the growth speed of the cloud can be regarded as an indicator of typhoon intensity, and it can probably be useful in predicting such severe weather. To date, several approaches were demonstrated to obtain cloud-top height, and one of the direct methods among such is stereoscopy using satellite [e.g., Mack et al., 1983; Seiz et al., 2006 and 2007].

The Philippines 2nd microsatellite, DIWATA-2, was developed under the PHL-Microsat program that is a predecessor of the Space Technology & Applications Mastery, Innovation and Advancement (STAMINA4Space) Program. DIWATA-2 was launched via the H-IIA rocket from Japan’s Tanegashima Space Center on October 29, 2018, and it has a sun-synchronous orbit with an altitude of ~620 km. This satellite carries five optical payloads that have different ground sampling distance (GSD) from 4.5 m ~ 7 km at nadir-viewing, applicable to the Earth observation. These optical payloads are used in imaging cloud patterns and weather disturbances as well as ground, such as agricultural, forestry, and aquatic area. In this presentation, we will present the cloud-top height estimated by processing the stereoscopic images obtained by DIWATA-2 and discuss a possible methodology in predicting severe weather based on the results.

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