

Extreme weather monitoring system using microsatellite and ground observation network in Asia

Yukihiro Takahashi¹, *Mitsuteru Sato¹, Meryl Regine Llenaresas Algodon², Hisayuki Kubota¹

1. Faculty of Science, Hokkaido University, 2. Graduate School of Science, Hokkaido University

From tropical regions such as Southeast Asia to mid-latitude regions including Japan, extreme weather such as cumulonimbus clouds, typhoons, and linear rainbands that cause torrential rainfall which results in large-scale damage every year, and the damage could be related to the global warming and is becoming serious. All of these phenomena are deeply related to cumulonimbus activity, but the time scale of each cumulonimbus cloud is as small as a few kilometers at the minimum, and it develops rapidly in a short time, an order of 10s min, so it is impossible to monitor them sufficiently with existing geostationary orbit satellites and ground radar. Although the resolution can be improved with low altitude satellites, it is difficult to continuously track the development due to the long revisiting period. The ULAT project (SATREPS) conducted by Hokkaido University and other universities operates micro-satellites based on ground-based dense weather and lightning observation networks and geostationary orbit satellites, and concentrates on specific important areas such as cumulonimbus clouds and the center of typhoons. By observing, we aim to dramatically improve the accuracy of monitoring and prediction. So far, we have succeeded in constructing a 3D model of clouds with a resolution of 100 m or better, which is the most detailed in the world, and observing the center of a typhoon. In the future, we are planning to establish a continuous monitoring system using an international satellite constellation.

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