On-going development of ground observation system for typhoon and thunderstorm activities connected to real-time micro-satellite operation

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In order to realize precise real-time monitoring and issuing alert for extreme weather, such as torrential rainfall or typhoon, we have been developing a ground observation network with lightning sensors under the projects of a SATREPS "ULAT" and e-ASIA under international cooperation among Japan, Philippines, Indonesia and other SE-Asian countries.

It is pointed out that intensification of lightning activity is precursor of typhoon growth as well as an indicator of individual thunderstorm activity. In these projects, we apply two new technologies, that is, the lightning activity estimated by the ground-based lightning networks with 12 sites for VLF radio wave measurement in nation-wide of Philippines and with 50 sites for electrostatic field measurement in Metro Manila together with infrasound sensor and automated weather station, and the 3 dimensional capturing of thunderstorms by the on-demand operation of 50-kg micro-satellites, including the Philippine-developed satellites. Also few more lightning stations installed in Indonesia and Japan are used. Based on these new observations we try to construct the cutting-edge observation system to monitor the development of typhoons and thunderstorms, which may greatly contribute to the prediction of disasters and the public alerting system. We started ULAT project in 2017 and completed the installation of the ground lightning observation station with automated weather station about half of the original plan and started continuous recording of the data. As for the satellite observation, we succeeded in reconstructing 3-D cloud structure with cameras onboard DIWATA-1at high resolution of ten to several meters. In this presentation we update the recent progress of the projects.

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