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## Ground-based lightning and AWS network system for alert of torrential rainfall and typhoon combined with micro-satellite constellation

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We have been developing a ground-based lightning and AWS network system under the projects of a SATREPS “ULAT” and e-ASIA in order to realize precise real-time monitoring and issuing alert for torrential rainfall and typhoon extreme based on international cooperation among Japan, Philippines, Indonesia and other SE-Asian countries supported by JST, JICA, PHL-Microsat and other funding. The intensification of lightning activity is precursor of typhoon growth. In these projects, we are constructing ground-based lightning and AWS—automated weather station—network system 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. We are going to complete the installation of the sensors at most of the planned ~60 sites by the end of this year. We already started with installed sensors and achieved preliminary results for typhoon and thunderstorm measurement. We are also doing practice in operating our micro-satellite which can make rapid target pointing at high accuracy. Using the photos captured from the satellite, now we can reproduce the detailed 3-D structure of the cloud at best quality even compared to the latest radar system.