Videosonde observations in the Pre-YMC field campaign

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For the better understanding of microphysics in tropical precipitating clouds, videosonde observations were carried out as a part of the Pre-YMC field campaign, which was a pilot study of the Years of Maritime Continent (YMC).
18 videosondes were launched at Bengkulu weather station located in the southwestern coastal land of Sumatera Island, Indonesia from November 24 to December 15, 2015. Videosonde is one of strong tools to measure precipitation particles in clouds directly. It has a CCD camera, a strobe and an infra-red sensor inside. A precipitation particle interrupts the sensor, it triggers the strobe and the particle image is then captured by the CCD camera. Recorded particle images are classified as raindrops, frozen drops, graupel, ice crystals, or snowflakes on the basis of their transparency and shape. Videosonde observation will give us information on the number, size, and shape of precipitation particles in vertical. After the launch of a videosonde, the RHI scan by a C-band dual-polarimetric radar installed on the R/V Mirai, which was approximately 50 km off Sumatera Island, were continuously preformed, targeting the videosonde in the precipitating cloud.
On 30 November 2015, we experienced a strong rain associated with diurnal variation with convection along the coastline of Sumatera Island. A videosonde was launched into this convective cloud with cloud top 9 km. It transmitted images of large raindrops up to 6 mm in diameter in the lower level, and nearly round frozen drops and graupel above the freezing level. This was a typical tropical convective cloud characterized by the warm rain and freezing process.
In another case of November 25, a strong convection occurred 10 km away from our observation site. The RHI scan of R/V Mirai radar showed a tall convective tower and an anvil cloud. We launched a videosonde into a weak convective cloud formed by the convergence of the outer flow from the strong convection. A lot of graupel were observed in the upper layer, which is supposed to be formed by riming of uplifted supercooled droplets. This solid precipitation particle distribution was different from that in a typical stratiform cloud observed on December 15.

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