積乱雲発生の早期検知のための雲レーダーネットワーク
Cloud Radar Network for Early Detection of Cumulonimbus Generation

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Recently municipal engineers point out that urban city is vulnerable for localized heavy rainfall, and that rainfall monitoring and forecasting are important for water management. A weather radar is a powerful tool for that purpose; however it is only precipitation particles (hydrometeors excluding cloud particles) that current operational radars (S-, C- and X-band) can detect. This means that when the radar catches the echo, the rainfall may have already started. Meanwhile, the heavy rainfall is caused by a mature cumulonimbus which develops from a cumulus. So the detection of the cumulous is expected to make the lead time of heavy rainfall forecasting longer. But the current radar cannot observe the cumulus which consists of the cloud particles. For an early warning of heavy rainfall, we developed the cloud radar network around Tokyo metropolitan area.
The network consists of five Ka-band (35 GHz) radars whose specifications are as follows: azimuth-/elevation-scanning Cassegrain antenna with a diameter of 2 m, 3 kW Extended Interaction Klystron (EIK) as a microwave amplifier, pulse compression by linear frequency modulation, and dual polarimetric capability (simultaneous transmission and reception of H and V; only three of the five radars). The minimum sensitivity we need is -17 dBZ (-20 dBZ) at 20 km range for dual (single) polarimetric type, respectively, because our target is the detection of a conversion from cloud droplets to raindrops. These radars were just deployed in February 2015. We would like to present preliminary results of our cloud radar and to discuss the availability to the early monitoring of cumulonimbus generation.

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