

Development of advanced radar technologies for weather application

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Recently, unusual extreme weather which causes natural disasters are increasing and the lives of citizen are at risk, especially by localized heavy rains, tornado and gusts. Weather radar plays an important role in observation of such meteorological phenomena. At the same time, new weather radar technologies are rapidly developed and improved. We come to the crossroad to choose appropriate weather radar for own needs. For NMHSs to choose appropriate radar, we introduce new type of weather radars; Solid-State Weather Radars (SSWR), Phased-Array Weather Radar (PAWR) and Dual-Polarization Phased-Array Weather Radar (DP-PAWR), with history and features.

SSWR is using semiconductor based transmitter which is suitable for precise rain observation by using Dual-Pol function. Generally, it is more accurate, lower lifecycle cost, less down time and less spectrum use, compare with klystron or magnetron. Number of SSWR is already installed as a part of operational radar network in Japan, and currently expanding over the sea.

PAWR is more advanced weather radar, developed for rapid observation of cumulonimbus clouds, which has less than 30 minutes of lifecycle. In spite of such lifecycle, conventional parabolic antenna weather radar requires approximately 5 minutes for full volume scanning to observe 3D structural behavior of a cumulonimbus. To achieve precise 3D observations, weather radar is expected to perform full volume scanning within 1 minute. Recently we successfully observed clear view of cumulonimbus clouds by the radar installed on the top roof of Osaka University.

DP-PAWR is most advanced weather radar, developing for rapid and precise observation of meteorological phenomena, to complement disadvantage of current single polarization PAWR. Presentation will include latest development status of Dual-Pol PAWR.

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