Radar refractivity estimation using solid-state weather radar

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Many researches have been made to observe phase data of ground targets using weather radar to estimate refractivity of the atmosphere (e.g., Fabry et al. 1997; Fabry 2004; Cheong et al. 2008; Seko et al. 2009; Bodine et al. 2011). Refractivity depends on temperature, atmospheric pressure and water vapor pressure of the atmosphere, therefore, by measuring the radar refractivity, it is possible to obtain some information on the amount of water vapor near the ground. However, the radar refractivity includes uncertainty due to vegetation sway (Fabry (2004)), frequency drift of the klystron transmitter (Roberts et al. (2008)), vertical gradient of the refractivity (Bodine et al. (2011)), etc. Meanwhile, many weather radars using solid-state amplifiers, which are made of GaN or GaAs, have been installed all over the world, including Japan. These so-called solid-state weather radars are characterized by stable phase, compared to magnetron/klystron radars. We are now investigating characteristics of radar refractivity using C-band solid-state weather radars. In this presentation, we will show the result of case studies, and introduce a new phase-unwrap technique using median filter.

Keywords: radar refractivity, solid-state weather radar