

Exploration of ground targets to improve radar refractivity retrieval

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Radar refractivity retrievals provide insight on the near surface atmospheric moisture map. However, for further quantitative applications or radar network implementation, the unsolved data quality problems associated with the vertical gradient of refractivity (DN/DH) and with the ground target height must be improved.

High temporal resolution dual-polarization data at multiple low elevations are studied to enhance the knowledge of the properties of ground targets and to improve the quality of refractivity measurement. From pulse-to-pulse scanning of fixed ground targets, it depicts the pictures of phase and power variation along azimuths and elevations, which are related to target's characteristics (size, position, etc.) and radar antenna patterns. Accordingly, a method is developed to estimate the DN/DH variation and representative target heights by using both the phase and power return of targets at successive elevations. In addition, dual-polarization information is an indicator for reliable ground targets selections.

Based on the newly obtained knowledge of ground targets at the calibration stage, the representativeness of refractivity measurements will be clarified and a more accurate refractivity map at a given height will be obtained.