Estimation of Melting Layer Altitudes from Dual-Polarization Weather Radar Observations

Reino Keränen
Vaisala Oyj, Finland

Alku Catalina, Laura (University of Helsinki, Finland; Vaisala Oyj, Vantaa, Finland)
Selzler Jason (Vaisala Inc, Westford, USA)

E-mail: reino.keranen@vaisala.com

The melting layer altitude (MLA) is a key input parameter to many advanced weather radar applications, such as hydrometer identification and quantitative estimates of surface rainfall. Significant uncertainty may be introduced in these applications if MLA is assumed to be a constant in the area covered by the radar. Temporal variability adds to the uncertainty.

We have implemented a method for estimating current MLA from dual polarization weather radar observations. The method builds on the well-established capability to detect melting snow, gate-by-gate. The method is suited for near-real-time processing and the outcomes can be used as input to multiple applications. Estimates of MLA can be obtained at good spatial and temporal resolution.

The performance of the method is evaluated using dual-polarization weather radar observations operated at C-band across multiple seasons in the region of Helsinki, Finland. Observations at proximately co-located radars as well as the 0°C isotherms derived from the nearest sounding data are compiled for validating the MLA products in individual weather cases as well as in data sets covering seasonal changes.