



Detection of atmospheric icing conditions in the vertical profile with a ceilometer - validation of the method

Anne Hirsikko (1), Karoliina Hämäläinen (1), Ari Leskinen (2), Mika Komppula (2), Ewan J. O'Connor (1,3)

(1) Finnish Meteorological Institute, Helsinki, Finland (anne.hirsikko@fmi.fi), (2) Finnish Meteorological Institute, Kuopio, Finland, (3) University of Reading, Reading, UK

Icing is a significant challenge for various areas of every life in the modern society; especially aviation, transport and energy sectors can be influenced by the phenomenon. Icing can be caused by super-cooled liquid water droplets in cloud or precipitation. Weather services forecast icing conditions operationally. However, performance skill of every forecast model has to be evaluated, which is best done with observations. We propose to use ceilometer as a real-time icing monitor in vertical profile of the lower atmosphere. We have developed an algorithm to identify super-cooled liquid water containing clouds and subsequent precipitation from ceilometer attenuated backscatter coefficient profiles. Ceilometer based icing target classification is validated against in-situ icing sensor observations at towers. Observations utilized in this study are from two sites in Finland covering altogether 8 years. The high icing season in Finland is from September to April. The results suggest that icing due to super-cooled liquid water containing clouds can be reliably monitored with a ceilometer up to cloud layers visible to sensor.

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