Freezing condition monitoring and FMI's icing forecast model evaluation with observations from ceilometer network in Finland

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Super-cooled liquid water containing clouds are frequently observed especially at high latitudes. Their presence can cause icing which is a challenge, as an example, for energy production with wind turbines, aviation and a number of other applications in various fields. However, forecasting of icing conditions is still challenging for national weather services. An on-going project of Finnish Meteorological Institute (FMI) aims improving and evaluating its icing forecast model with the help of observations from ceilometer network and in-situ icing sensors. Additionally, the project investigates usability of near-real-time attenuated backscatter profile observations of ceilometers in operational icing condition evaluation. Currently, FMI collects ceilometer profile observations from eight sites distributed throughout the country. The number of locations with routine profile observations in Finland is continuously increasing simultaneously with upgrades at measurement stations. We have developed a robust icing condition classification for liquid water containing clouds which are identified from ceilometer attenuated backscatter profiles. In addition, icing conditions are further characterized with in-situ sensor observations in tall towers. The icing forecast model is based on ISO STANDARD 12494 and it is fed with atmospheric parameters (e.g. cloud liquid water content) from FMI's operational HARMONIE model. The results of icing forecast model will be compared with observations in order to evaluate current model representation. The latest status of observational results and evaluation of the icing forecast model will be presented during the conference.