



## **Result of estimation of the weather radars dual-polarization products in the hail events cases.**

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This research is focused on the finding new operational capabilities from dual-polarization radars as well as on the operational assessment of dual-polarization radar products in connection with hail events.

In this study, is used a data-set collected from Vaisala WXT510 weather transmitters, which were located in the capital region of Finland in 2009-2010 within the framework of the project Testbed. WXT510 weather transmitters reported 22 hail hits from May to October 2009 and 17 hail hits from May to October 2010. This data-set provides records of hail occurrences, exact location and times of those events. I studied radar observations data from C-band dual-polarization weather radar Kumpula (University of Helsinki) and weather radar Vantaa (Finnish Meteorological Institute) through the weather radar data repository browser tools, which was developed 2015-2017 in FMI. I studied radar data in those days, times and places, when WXT 510 weather transmitters detected the hail. Study result was compared and analyzed with Probability-Of- Hail (POH), calculation result from FMI, and reports (photos) published in Media. The date of radio sounding of the atmosphere at these moments was also analyzed and satellite data.

The study shows that different climate regimes in Finland produce different hail signatures due to the amount of milting. In most observed hail cases in southern Finland radar hydrometeor classification was reporting graupel or a mixture of hail and graupel observed on a small area at size is often from 100 to 1000 m and with a duration of several minutes. Therefore, the ground stations cannot record all cases of hail. Dual polarization variables in almost all cases have different values and Base Reflectivity Z more 40 dBZ.

Using a radar data repository browser tools showed good results in the study of hail cases. This browser created for users and researchers and it is easy to use, but some errors must be considered:

1. The geographical precision it is not verified;
2. Hydro Class PseudoRHI product is not a "finished" product, because it classification codes are interpolated in the same way as physical intensities;
3. The radars settings were not completely effective at the beginning of the use of the dual-polarization radars;
4. The hail to be produced by various convective storm types and dual-polarization parameters depend of the weather conditions.