

1.41 TOPOGRAPHIC INFLUENCE ON SNOWFALL: A RADAR BASED SPATIO-TEMPORAL ANALYSIS

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In this contribution we analyze the topographic influence on snow precipitation, in terms of variability and microphysics, by interpreting polarimetric radar data. The former is related to the dynamics i.e. growth and decay analysis of the snowfall precipitation field, obtained by re-sampling high resolution radar observations (83m in range). The latter is related to the 3D hydrometeor classification of precipitation, supplemented by the hydrometeor de-mixing approach. The analysis focuses on the region around the Weissfluhgipfel (WFG) radar, in the vicinity of Davos, in the Eastern Swiss Alps.

The growth and decay analysis is based on the advection (semi-Lagrangian scheme) of the snowfall field and the comparison with the following actual measurement. Basically, we shift the precipitation field without incorporating the impact of the local topography and then compare it with the measurement which obviously accounts for the micro-scale influence. The growth and decay maps are obtained by averaging the instantaneous estimates over several different time periods, allowing us to conduct analysis at various temporal resolutions.

The applied hydrometeor classification is a semi-supervised approach, adapted to the technical specificities of a radar, capable of distinguishing between 9 different hydrometeor classes, among which rimed ice particles, aggregates (AG), crystals (CR) and vertically aligned ice. The hydrometeor de-mixing allows to estimate, beside the primary hydrometeor type, the proportions of secondary hydrometeor types present in radar sampling volumes, which proves to be very relevant for such a spatially concentrated study.

Links of both variability (snowfall growth) and microphysics (intense riming + AG/CR co-occurrence) observation to the local topography are assessed through multi-scale spatial wavelet analysis. Also, the analysis shows an interesting correspondence between the zones of snowfall growth on one side and the zones of relatively more intense riming and AG/CR co-occurrence on other side.
