HAILSTORMS ANALYSIS OVER THE SWISS ALPINE REGION

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Abstract

During the warm season of the year, intense thunderstorms regularly affect the Alpine area. High impact convective phenomena like severe hailstorms can cause substantial hail, water, and storm damage to agriculture, forest, buildings, and cars. In Switzerland severe summer storms are among the costliest high-impact weather events. High resolution data from weather radars and hail detection algorithms were used to quantify the occurrence of hail. This analysis relies on data by the 3 C-Band radars of the Swiss radar network spanning the period April-September 2002-2013. Radars have a good coverage and provide high quality information about the structure of storm cells at very high spatial and temporal resolutions (1 km^2 , 5 minutes). For this reason, they are considered as a valid system for monitoring hail. Two different methodologies (a pixel based approach and an object based approach) are used to extrapolate information about hail. This information is further analyzed with respect to its spatial and temporal characteristics at different scales and meteorological interpretations (genesis location, pathways, propagation speed, growth and decay rate, lifespan, extension as well as micro-scale characteristics like hailstones dimension). Furthermore, challenges in using radar measurement in a region characterized by a complex terrain are discussed. This paper presents the preliminary result of a more general project, where in the first part hailstorms are analyzed from a climatological perspective and in the second part the synoptic-scale environment that supports hail formation in the alpine region as well potential predictors at different scales (synoptic-, meso-, and micro scale) are investigated for Nowcasting purposes. Expected results are valuable from a weather forecasting point of view but will also answer the question, if it is possible to extract information on future hail storms in Switzerland from regional climate simulations based on synoptic-scale flow patterns.