Retrieving wind gust information from radar data

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From April to September severe storms regularly affect the Alpine and pre-Alpine region of Switzerland. Heavy precipitation, wind gusts and large hail are the typical characteristics of severe thunderstorms and often cause substantial damage to vehicles, buildings as well as agriculture and forests. They thus represent extremely high costs for insurance companies.

Accurate real-time point measurements of wind gusts within Switzerland are available from about 130 ground weather stations. Due to the high spatial variability of wind gusts they are however of limited use in relation to damages. Estimating wind gusts from Doppler measurements provided by weather radar networks could improve the spatial coverage.

With weather radars the 3D development of thunderstorms can be observed in real time with high spatial and temporal resolution. However, the detection of wind gust on a local scale still remains very challenging. Algorithms for wind gust detection which use low-level wind shear derived from radar data have been developed for flat topographic areas. For regions with complex terrain, like the Swiss Alpine region, more research and adaptations should be done in order to increase the skill of such algorithms. It is therefore of high interest to develop such an algorithm, which provides an approximation of wind gusts from the dual-polarisation Doppler radar data of the available radars in Switzerland. Together with the project presentation, first detailed analyses of wind characteristics of a set of severe storms detected within 10-50km from the radar sites during the convective seasons 2012 and 2013, are presented.