2.15 DUAL-DOPPLER AND POLARIMETRIC RADAR ANALYSIS OF CONVECTIVE SYSTEMS IN WEST GERMANY

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The interaction between dynamics and microphysics in convective systems is complex, and not yet fully understood. Doppler and Polarimetric weather radars have the ability to look simultaneously into the microphysics and dynamics of precipitation systems and thus provide insight in their interaction, helping in better understanding their development and ultimately improve nowcasting of severe weather.

The Meteorological Institute at the University of Bonn owns and maintains an X-band polarimetric Doppler radar (BoXPol), installed in the city of Bonn. A similar radar (JuXPol) located about 50 km to the west-northwest of the Bonn radar at is owned by the Forschungszentrum Jülich. Using the data from both radars and performing a Dual Doppler analysis the 3D wind field may be retrieved. Simultaneously, the polarimetric capability of the radars allows the retrieval of hydrometeor types and microphysical processes. Therefore, we are able to identify the processes through which precipitation systems evolve by revealing the interdependence between storm dynamics and microphysics. One prominent example of such interactions is the development of so-called Zdr columns, that are associated with storm updrafts, and consequent freezing and potential hail formation.

The retrieval of the wind fields was successfully applied to two distinct events where large hail was observed at the surface. Strong mid-level updrafts (over 15m/s) are observed near the Zdr columns, and the regions where hail was reported. One of the events presented a well defined bounded weak echo region (BWER) which was also closely located to a maximum in the updraft.

The temporal evolution of some derived parameters (updraft strength, updraft volume and volume of the Zdr column) were analyzed. It was observed that the updraft peaks in volume first, then in intensity, and lastly the Zdr column reaches its maximum. This is however still very preliminary because it was only performed for one case. In the future we plan to investigate a larger number of systems. This will help in understanding how each of these parameters relate to the others and can help interpret how convective storms develop, intensify, and dissipate.