



Innovative approaches for crop hail damage assessment based on Radar and drone technologies

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The main goal of our study is to improve the efficiency of crop hail damage assessment practices. The preliminary study focuses on the combined analysis of hail signature information from radar and ground measurements for crop hail damage assessment. The days with the high crop hail damage claims were selected for the investigation. Total 16 hail days were assigned to examine the relation between radar-derived products and damages produced by hail in Styria, Austria during 2015. 3D single polarization C-band weather radar data and radiosonde freezing level data were used to derive hail kinetic energy flux as well as flux integrated over the whole event. The spatial distribution maps of total hail kinetic energy were developed to capture the swath and intensity of the hail storms to identify potential hail damage areas. Hail events from ESWD (European Severe Weather Database), crop damage reports from the Austrian Hail Insurance System were allotted for validation. The hail signature information from radar also compared with lightning trajectories. The results show that in most cases radar-based hail signature information well corresponds to the areas where hail events and damage footprints were reported.

We conducted a pilot study using drone technologies in crop hail damage assessment. A severe hailstorm occurred on July 12, 2016 in the province of Styria, Austria which caused damage to crops in the village of Hartensdorf in Eastern Styria. A drone was brought into operation over a pumpkin crop in Hartensdorf to gather damage information. The very high-resolution drone imageries were collected, processed, and analysed. The drone based visual damage assessment shows that the damage footprints were well captured over the pumpkin patch. The images from the drone with the help of image processing tools could be used to estimate total area and relative level of damage in cropped areas.