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A study of anomalous radar signatures observed in Bulgaria regarding severe hail nowcasting

Stefan Georgiev and Tsvetelina DImitrova
Hail Suppression Agency, Sofia, Bulgaria (georgiev_stefan@abv.bg)

The three-body scatter spike (TBSS) and sidelobe spike (SLS) are radar artifacts. The TBSS caused by non-Rayleigh radar microwave scattering from a region of large hydrometeors and sidelobe spike is a result of power return in usually the first sidelobe of the radar beam in the presence of a strong reflectivity gradient.
Bulgaria is country with high frequency of hail storms. The present research is directed to answer the question how to use the radar data of TBSS and SLS as a tool for nowcasting of severe hail in Bulgaria.
The radar data were obtained by network of S-band Doppler radars, equipped with IRIS (Interactive Radar Information System) software of Vaisala and volumetric scanning at every 4 minutes.
In the study, severe hail cells producing TBSS and SLS during the summers of the period 2010-2016 were analyzed. The presence of the artefacts (TBSS and SLS), each having different origin, confirm the theory that they are linked to the presence of large hailstones. Large hailstones (size greater than 2 cm) on the ground in various duration and intensity were detected during the lifetime of the cells. Radar reflectivity, vertical integrated liquid, VIL and the Doppler velocity fields as well as the length, depth and duration of TBSS and SLS signature will be discussed. The relationship between the main features of the artefacts, VIL and hail reports on the ground will be considered.