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Updraft width in severe thunderstorms – observations of significant-hail producing thunderstorms

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Characteristics of 14 supercell storms that produced significant-hail (≥5 cm) in Finland were studied. All supercells began as ordinary cells or as multicells before they developed into supercells and all had a persistent hook echo. Most (11/14) storms had bounded weak echo region (BWER) observed before the first significant-hail observations. Six storms lost both BWER and hook echo close to the onset of the significant-hail fall. Each of the 14 storms had a different evolution - no common storm-development structure was present before the significant-hail fall. This brings out a questions what other features in the storm structure we could use as a sign of significant hail potential. Why in the same environment only some storms produce significant hail and can we see those signs in storm evolution by using radar observations?

Recent research has shown that in simulated supercells the most intense updrafts are generally the widest. In simulated hail-producing supercells the size of updraft area controls the hail growth. How can we estimate the updraft area of a supercell storm by using radar observations? Previous model simulations showed substantial difference of BWER size with different updraft strengths. The present study uses the radar data to document the evolution on the bounded weak echo region along significant-hail producing supercell storm tracks. The bounded weak echo region volume is compared to severe weather observations and occurrence of other severe storm features such as hook echo. The purpose is to find out how the updraft area changes in time in observed supercells and how it compares to the ongoing severe weather.