Hell (hail) alleys at the Danubian Plain in Bulgaria.

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The Danubian Plain is one of the regions of Bulgaria where the most active severe storms are developing very often. The investigation of the movement paths of the severe storms there shows that there are some typical patterns in specific synoptic situations of southwestern lead flow. This study aims to reveal and describe them using BULATSA meteorological archives with the help of numerical simulations using the abilities of WRF numerical weather prediction model to predict type and development of severe storms. The analysis of the situations is made by using a time synchronous satellite, radar and WRF simulated pictures of severe storms which show specific features of the convective developments and their paths. The pre-convection environment is being studied with NWP fields, upper level sounding and synoptic observation at different altitudes. The images from METEOSAT WV channels are used for analysis of upper level dynamics. As indicators of storm severity in terms of nowcasting, the following signatures in satellite and radar images during the mature stage of the severe storms are considered:

• On the meteorological radar images: Reflectivity above 45dBz – indicative for a zone with high potential for hail formation and 50dBz that indicates a zone with formed hailstones; Weak echo regions (WER); Bounded weak echo regions (BWER) and low level rear inflow notch – indicative for a zone of strong updrafts; Bow echo and mid-level rear inflow notch – indicate a rear inflow jet at mid-levels, which bowed the storm system.

• On the METEOSAT images: the cloud top features as: strong cooling rate of brightness temperature, cold ring shape forms, overshooting tops etc.

The results determine the usual tracks of severe storms at the Danube plain in Bulgaria at specific synoptic situations of southwestern lead flow (this result must be proved by detailed climatological study in the future). The WRF numerical approximation of specific features of supercell, like: a high radar reflectivity, hail, mesocyclone, local high pressure (pressure tooth), even hook echo are shown. Nevertheless, the model forecast for location and timing of convective process is still not enough accurate. Deviation of supercells from lead flow are discussed too.