Stability indices and wind shear for forecasting severe storm type over Bulgaria

Boryana Markova (1), Tsvetelina Dimitrova (2), Nadezhda Kadiyska (3), and Rumjana Mitzeva (3)

(1) National Institute of Meteorology and Hydrology - BAS, Sofia, Bulgaria (boryana.markova@meteo.bg), (2) Hail Suppression Agency, Sofia, Bulgaria, (3) Faculty of Physics, University of Sofia, Sofia, Bulgaria

Severe storms are one of the most difficult and challenging problems for forecasters. The greatest percentage of severe thunderstorms in Bulgaria are multicell type storms (cluster and squall line), however the most severe type of thunderstorm is supercell. Identifying the atmospheric conditions where severe thunderstorms (multicell and supercell) are formed and developed is important regarding the proper and timely hail suppression operations.

The environmental conditions for development of severe hailstorm over Bulgaria during seventeen-year period (2000–2016) is investigated using proximity sounding obtained by the numerical model GFS. The separation of hailstorms in two samples (supercells and multicells) is based on information from S-band Doppler weather radar network and rain gauge network in Bulgaria. Several instability indices (CAPE, Lifted index, K index, Total-Total index and etc.) and vertical wind shears between various layers are analyzed in order to verify their ability to forecast severe storms. Their skill to predict severe storm types is evaluated by calculation of probability of detection (POD) and false alarm ratio (FAR).