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# Forecasting challenges associated with supercells of 7th July 2017 over south-western Poland

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During 7th July 2017, numerous supercells hit south-western part of Poland. Significant hail, severe wind gusts and one tornado of F2 estimated intensity in Fujtia scale were reported. Thunderstorms developed in warm sector within the trough. Moderate to high sheared and low to moderate buoyant environmental conditions lead to rapid formation of supercells. As for Poland the number of six confirmed supercells during one day was an extraordinary phenomenon. The main aim of the research was to examine meteorological conditions which resulted in severe storms, and to validate their projections in meteorological models. The secondary aim of conducted research was to answer the question if assimilation of different meteorological data and model adjustment could result in appropriate simulation of path and intensity of tornadic supercell.
Supercells detection was made with the use of the Polish radar system POLRAD managed by the Institute of Meteorology and Water Management – National Research Institute (IMGW-PIB). The radar data included a classic scan of a range of 250 km and 125 km range Doppler data. Additionally, the geostationary and polar satellite data which included a visible channel, water vapour, and the RGB composition were applied. The data was provided by NOAA and METEOSAT. Surface and upper air meteorological conditions were obtained from hourly observations (SYNOP) from stations in Poland and soundings from Lindenberg, Prague, Wrocław and Prostejov. The high resolution nonhydrostatic models AROME, COSMO and hydrostatic mesoscale model ALARO were analysed. Examination of radar and satellite data yielded abundance of sharp and classic severe convection signatures as bounded weak echo region (BWER), hook echo and velocity couplets. The most intensive supercells lasted more than 2.5 hours, with tops reaching 12 km, and reflectivity up to 67 dBz. Surface observations and soundings exposed significant wind veering with height and wind shear values reaching 20-25 m/s (0-6km). Operational runs of ALARO, AROME and COSMO showed favorable for severe convection values of instability and wind shear. However, the models incorrectly simulated convection as multicellular and displaced it significantly.