



Challenging forecast of a mesocyclonic tornado on 3rd October 2018 in Slovakia

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Tornadoes are a rare occurrence in Slovakia with only a few documented cases. Until 3rd October 2018, no clear photo and video-documentation of a tornado was captured here. On this day, tornado hit Lekárovce in eastern Slovakia with multiple photos and videos of the event. Tornado was rated as F1 based on the damage survey performed by a local storm spotter. Radar imagery clearly identified presence of a strong mesocyclone at the time of a tornado.

Due to the rare occurrence of such events in Slovakia and also the failure of the NWP to anticipate the favourable environment for tornadogenesis, meteorologists from the Slovak Hydrometeorological Institute were not able to recognize the threat of tornado. One of the important ingredients for tornadogenesis is a presence of substantial lower tropospheric shear with significant streamwise vorticity in the lowest hundreds of m above the ground. While the NWP managed to simulate only up to 5 m/s of bulk vertical wind shear in the surface to 1 km layer with a predominantly crosswise component of vorticity, reconstructed hodograph using observed surface, radar- and sounding-derived winds shows more than 10 m/s of surface to 1 km bulk vertical wind shear, along with a substantial streamwise vorticity component in this layer. We discuss how the analysis of the real time observations could greatly aid the forecasters in anticipating the threat of a mesocyclonic tornado over eastern Slovakia. Furthermore, we show how the signatures in the radar reflectivity and velocity coincide with the occurrence of the tornado.