EMS Annual Meeting Abstracts
Vol. 14, EMS2017-110-1, 2017

Influence of an upper potential vorticity anomaly on a cyclogenetic event over Black Sea

Meda Daniela Andrei (1,2), Mirela Pietriși (1,2), and Sabina Ștefan (1)

(1) University of Bucharest, Faculty of Physics, Bucharest, Romania (meda.georgescu@gmail.com), (2) National Meteorological Administration, Bucharest, Romania (meda.georgescu@gmail.com)

In most cases, extreme weather events occurring in the east and south-east of Romania manifest when a cyclone is formed and evolves over the Black Sea. The forecast of these events represents a challenge for meteorologists. This work is focused on the study of a Black Sea cyclogenesis event that occured on the 20th of February, 2017. For this study has been used the potential vorticity (PV) approach. At that time, an upper-level positive PV anomaly had been advected over a low-level baroclinic zone present on the eastern part of Bulgaria. The coupling of this PV anomaly with the jet stream had caused the descent of dynamic tropopause toward the middle troposphere and had accelerated the development of a cyclone over the western Black Sea basin. Using synoptic analysis and numerical simulations with the ALARO limited area model, the role of diabatic processes in the deepening of that cyclone has been studied. The results show that, in this case, the contributions from the surface thermal anomaly are much weaker than those associated with the tropopause fold and with diabatically generated PV anomalies. Satellite imagery was also employed in order to emphasize the important role played by stratospheric dry air intrusion during the evolution of the cyclone. Finally, this paper revealed the importance of PV analysis in the forecast of extreme events related to cyclonic patterns.

Key words: potential vorticity anomaly, dynamic tropopause, cyclones, ALARO