EMS Annual Meeting Abstracts
Vol. 16, EMS2019-287, 2019

Study of Clear Air Turbulence Related to Tropopause Folding over Romanian Airspace

Sabina Stefan (1), Bogdan Antonescu (1,2), Cristian Necula (1), and Ana Denisa Urlea (1)

(1) University of Bucharest, Faculty of Physics, Atmospheric Physics, BUCHAREST-Magurele, Romania (sabina_stefan@yahoo.com), (2) National Institute of Research & Development for Optoelectronics, Magurele - Ilfov, Romania

Clear Air Turbulence (CAT) pose a threat to aviation and because are difficult to forecast represent an issue for many aviation forecasting centers. CAT usually occurs in the lower stratosphere and upper troposphere and it is associated in general with large scale waves, mountain waves, jet streams, upper-level fronts, and tropopause folds. Tropopause folds are extrusions of stratospheric air into the troposphere occurring near an upper-level frontal zone beneath the polar and subtropical jet streams. An aircraft will experience CAT when flying in the proximity of a tropopause fold. To better understand and diagnose CAT associated with tropopause folds, a series of cases were selected from all turbulence cases reported by pilots (i.e. airport report, AIREP) between 2017–2018 in the Romanian airspace. The data on turbulence were used in conjunction with synoptic data, EUMESAT satellite imagery, and vertical profiles (i.e. wind, potential temperature, potential vorticity) from ECMWF ERA-Interim. Using satellite imagery the tropopause folding area can be easily identified as being in the cold region of the jet-stream, close to the maximum Water Vapor gradient. In addition, a set of indices as ELLROD (TI1, TI2), Richardson number (Ri), Potential Vorticity (PV) were computed to diagnose the Clear Air Turbulence for the cases of tropopause folding. The indices values were also analyzed in order to test the physics mechanism explaining the occurrence of severe turbulence.The results showed that out of the 430 cases reported by pilots, severe turbulence was reported in 82 cases of which few where associated with tropopause folding.