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Study of Clear Air Turbulence in Romanian Airspace

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Clear Air Turbulence (CAT) also known as upper air turbulence is a sudden, hazardous weather phenomenon occurring in cloudless regions and affecting especially commercial aircrafts. In case of a CAT encounter, an aircraft may suffer violent buffeting. Generally, during CAT episodes, passengers experience discomfort, but if caught unaware and not buckled up they may even sustain serious injuries. The aim of this work is to obtain a distribution of the turbulence events over the Romanian airspace, taking into account the aircraft flight levels (FLs) and the Romanian orography. Our study was carried out using 429 subjective pilot reports (AIREPs) covering a 19 months period (June 2017- December 2018). 81 of them were reported as severe turbulences, but only 51 were severe turbulence cases occurred at FL350 or higher (maybe CAT). These reports provide useful information on the occurrence of turbulences, but they are not always reliable in terms of spatial and temporal accuracy. In order to find the probability that the 51 cases were actually CAT cases, we computed the Richardson number (Ri), the Ellord (TI1) and the Dutton indices. Satellite data and meteorological parameters associated to synoptic patterns were used to diagnose the turbulence cases. The Ellrod (TI1) index proved to have the best consistency with the 51 pilot reports, but only for a few of them its values were indicative of CAT events. An important number of the 51 cases were reported over the western part of Romania as most of domestic and international flights overfly that area.