



Hazardous weather for aviation in Europe: climatological estimates based on ERA5 reanalysis

Mateusz Taszarek (1), Sebastian Kendzierski (1), and Natalia Pilgaj (2)

(1) Adam Mickiewicz University, Department of Climatology, Poznań, Poland (mateusz.taszarek@amu.edu.pl), (2) Department of Climatology and Atmosphere Protection, University of Wrocław, Poland

The consistently growing demand for airline transportation has resulted in an increased air traffic and air operations in airports the world over. According to the International Air Transport Association, forecasts assume that in the year 2036 about 7.8 billion passengers will travel by means of air transport. In Europe, this movement will also increase, adding around 550 million passengers per year. One of the crucial factors that significantly affect air transportation is the weather. In this article, ERA5 reanalysis and a timeframe of 1979–2018 are used to construct the European climatology of environmental proxies associated with hazardous weather conditions affecting air transportation near airports. These include limited visibility, thunderstorms, strong low-level wind shear, and blizzard conditions. The results indicate that airports in northern Europe and in mountainous zones are the most often affected by unfavorable weather conditions, while those in southern Europe are the least affected. Winter has the highest estimated number of situations with strong low-level wind shear and blizzard conditions. Conditions with limited visibility are the most frequent in autumn. Thunderstorms are the main threat during summer over continental Europe and winter over the Mediterranean. Long-term trends of the analyzed proxies indicate that situations with strong low-level wind shear and blizzard conditions are becoming less frequent while the number of thunderstorm situations increases, particularly in northern Europe and the Balkan Peninsula. The increasing tendency of situations with limited visibility is observed over Germany, Sweden, Finland, the British Isles, and northwestern Russia, while a decreasing tendency is seen over Norway, France, Italy, and Romania.