Abstract

The daily weather pattern classification is founded on a 100 km regular grid centred on Belgium. The geopotential heights of 850 hPa level was extracted from the ERA-40 database on the period 1958-2002 and from ECMWF operational analysis until the end of year 2007. The classification was based on a similarity index calculated on the orientation of exaggerated slopes of different daily geopotential fields.

Wildfire occurrence (in yearly means) were analysed in April-May and September-October (which are the two periods with the most frequent wildfire days in the Hautes-Fagnes region, situated in the eastern side of Belgium, altitude higher than 550m). These wildfire occurrences were compared with monthly frequency and persistence of daily weather patterns classes as well as with yearly variability of weather patterns climate conditions.

On this poster, we only focus our analysis on the daily weather patterns extracted for April (1500 different days).

20 weather patterns extracted by the automatic classification

Weather classification algorithm

1. We compute firstly a similarity index based on the slopes between two weather maps. We compute the geometrical 3D direction of the vertical vector of the 850hPa geopotential surface for all grid points. For a given weather map, we compute the mean of these vertical vectors, and we use this vector as a reference of the first class. For each weather map, we compute the two slope between the reference vector and the vertical vector of this weather map, expressed in degree.

2. We compute a second similarity index based on the absolute difference between two weather maps. This index is the sum on the grid points of the absolute difference in meter of geopotential between two weather maps. The second slope is the final similarity index used in order to find a final similarity index threshold.

3. From a given similarity index threshold for each weather map, we compare this number of similar weather maps. This is done separately for each class and for each season. The number of similar weather maps is the maximum for a fixed threshold. The weather map with similarity index threshold is then said to be in this class and season. The weather map with a fixed threshold is then used to classify all the weather maps in the database (150 similar weather maps used to evaluate the total number of weather maps in each class and season).