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9 YEAR LONG MOISTURE SOURCE DIAGNOSTIC FOR THE PRECIPITATION IN DEBRECEN, EAST HUNGARY: IMPLICATIONS FOR THE CHANGES IN THE CLIMATE REGIME

Content :

In the last few years, the analysis of backward trajectories has become a common use for identifying moisture uptake regions for the precipitation of a given region (Sodemann and Zubler, 2010, Krklec and Domínguez-Villar, 2014). Our examination focuses on the air moisture source regions for the precipitation in Debrecen (East-Hungary) from January 2006 to December 2014. In addition, for this period, there is an event-based stable isotopic data set for the precipitation in Debrecen, so these data were also involved to the analysis. Beside the determination of the origin of the water vapour, we tracked the moisture variability for relative long time period. Additionally, we evaluated the relation between the isotopic composition of the precipitation and its source region, as well as their seasonal and interannual variability during the examined period.

For the determination of the moisture source regions, we applied the NOAA HYSPLIT model based on GDAS database with 1° spatial and 6 hours temporal resolution. The backward trajectories were calculated for every day and every hour when precipitation was observed, for heights of 500, 1500 and 3000 m. The evaluation of the right time interval of the precipitation event was carried out by applying a threshold for relative humidity of 80% for every height for the starting point. Only these trajectories were considered for further calculation.

The evaporative regions along the trajectories were determined by calculation of the specific humidity along the trajectories. If the amount of the humidity rose between two time interval at least 0.1 g/kg, then the area overpassed in the time interval was considered as moisture source area.

We determined five moisture source regions based on the trajectories: Atlantic, North European, East European, Mediterranean and continental. We also evaluated the ratios of the water originated from the different regions so we could give the first long-term quantitative estimation for the precipitation supply of Hungary. We examined the statistics of the stable isotope data for every region and looked forward to find relation between the source region and the stable isotope composition of the precipitation samples.

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