



Characterizing large-scale circulation triggering heavy precipitation amounts over the northern French Alps

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Large-scale circulations (LSCs) explain a significant part of Alpine precipitations. Characterizing circulations triggering heavy precipitation is usually done using weather-type classifications. A different characterization is implemented here, based on analogy using the atmospheric descriptors proposed in Blanchet et al 2018, 2019. These descriptors are both related to the dynamics of LSC and to their relative position in the atmospheric space. This work is applied to the Isère river catchment for the 1950-2011 period, considering a 3-day time step. The 500 hPa and 1000 hPa geopotential heights covering part of the western Europe are used separately to represent LSC. Two analogy criteria are investigated for constructing the atmospheric descriptors, namely TWS and RMSE.

Our results reveal that LSCs triggering heavy precipitation amounts correspond to strong geostrophic wind with quasi constant direction during the three days, corresponding to blocking situations in altitude. Moreover, those patterns of circulation are among the least singulars, and they show the highest degree of clustering in the atmospheric space. We interpret the latest results by the fact that heavy precipitation LSCs feature twin circulation patterns. In addition, the 500 hPa geopotential height appears to discriminate better heavy precipitation situations than the 1000 hPa one. Finally, our work points out the benefit of a combined use of TWS and RMSE. TWS gives information about the direction of geostrophic wind, while RMSE -combined with TWS- informs about its strength.

References:

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