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Climatological study of frontal precipitation over the Mediterranean

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It is well known that severe weather and heavy precipitation are closely connected to the presence or passage of cold fronts over a region. In this study, the MedFTS_DT scheme, developed recently for the identification of cold fronts, is used to perform an objective climatological analysis of cold frontal activity and precipitation in the Mediterranean region. The MedFTS_DT algorithm has been developed for the automated and objective identification of cold fronts and optimized for the Mediterranean. It is based on a combination of wind-shift and thermal criteria. Wind-shift is applied in 6-hour intervals for the identification of cold fronts, whereas the thermal criteria are used to properly filter out any erroneous frontal identifications.

In this work, the spatial distribution and frequency of cold fronts are calculated over the Mediterranean for the period 2007–2016 on a monthly, seasonal and annual basis. The spatial distribution of the total precipitation (TP) and the frontal-induced precipitation (FP) are also calculated for the same region and temporal scales in order to determine the contribution of cold fronts to the total precipitation (FP/TP). It is observed that, in general, the local maxima of FP agree well with the corresponding maxima of frontal activity. It also becomes evident that, contrary to the TP regime, the maxima of FP are not found over the main mountain ranges of the Mediterranean regions, suggesting that orography does not play an important role in the formation of FP.