EGU2020-8593
https://doi.org/10.5194/egusphere-egu2020-8593
EGU General Assembly 2020

Extreme precipitation events in the Mediterranean region: their characteristics and connection to large-scale atmospheric patterns

Nikolaos Mastrantonas[1,2], Linus Magnusson[1], Florian Pappenberger[1], and Jörg Matschullat[2]
[1]European Centre for Medium-Range Weather Forecasts (ECMWF), Forecast, United Kingdom of Great Britain and Northern Ireland (nikolaos.mastrantonas@ecmwf.int)
[2]Technische Universität Bergakademie Freiberg (TUBAF), Germany

The Mediterranean region is an area with half a billion population, about 10 percent contribution to the world's GDP, and locations of global natural, historical and cultural significance. In this context, natural hazards in the area have the potential for severe negative impacts on society, economy, and environment.

Some of the most frequent and devastating natural hazards that affect the Mediterranean relate to extreme precipitation events causing flash floods and landslides. Thus, given their adverse consequences, it is of immense importance to better understand their statistical characteristics and connection to large-scale atmospheric patterns. Such advances can substantially support the accurate and early identification of these extreme events, improve early warning systems, and contribute to mitigating related risks.

This work focuses on the characteristics and spatiotemporal variability of extreme precipitation events of large spatial coverage across the Mediterranean region. The study uses the ERA5 dataset, the latest, state of the art, reanalysis dataset from Copernicus/ECMWF. Initially, exploratory analysis is performed to assess the different characteristics at various subdomains within the study area. Furthermore, composite analysis is used to understand the connection of extreme events with large-scale atmospheric patterns. Finally, the Empirical Orthogonal Function (EOF) analysis is implemented to quantify the importance of weather regimes with respect to the frequency of extreme precipitation events.

Preliminary results indicate that there is a spatial division in the occurrence of identified events. Winter and autumn are the seasons of the highest frequency of extreme precipitation for the east and west Mediterranean respectively. Troughs and cut-off lows in the lower and middle-level troposphere have a strong association with such extreme events, and the effect is modulated by other parameters, such as local orography. Results of this work are in accordance with previous studies in the region and provide information that can be utilized by future research for improving the predictability of such events in the medium- and extended-range forecasts.

This work is part of the Climate Advanced Forecasting of sub-seasonal Extremes (CAFE) project. The project has received funding from the European Union's Horizon 2020 research and

innovation programme under the Marie Skłodowska-Curie grant agreement No 813844.