

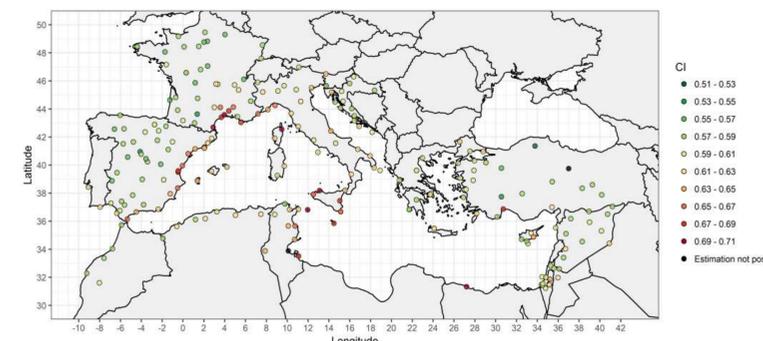
Introduction and objectives

Under the influence of the well-evidenced global warming, a changing in the precipitation patterns is expected and extreme weather events are predicted to be more frequent in many places over the world including the Mediterranean region . Spatial and temporal contrasts in precipitation patterns associated with high interannual variability are the most relevant characteristics of precipitation over the Mediterranean. to assess the spatial and temporal variation of the daily precipitation concentration variability in the Mediterranean using daily precipitation datasets at annual scales

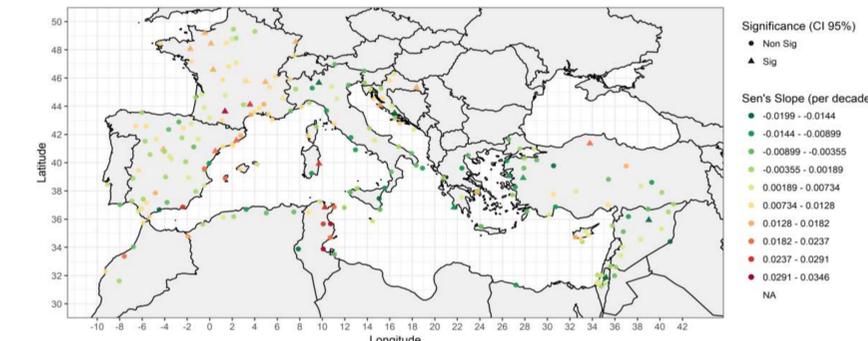
Daily Precipitation Concentration CI

The precipitation concentration (CI) introduced by Martín-Vide (2004) and include the definition of daily precipitation concentration has been applied. This index is reduced to the calculating of the concentration curves that reveal the cumulative percentage of precipitation contributed by the cumulative percentage of days when precipitation occurred to assess the contribution of the largest daily event to the total amount. This method can reveal the structure of precipitation accumulation caused by the accumulated number of precipitation days at each station, which can then be used to determine the cause of the asymmetrical distribution of precipitation

Results and discussion



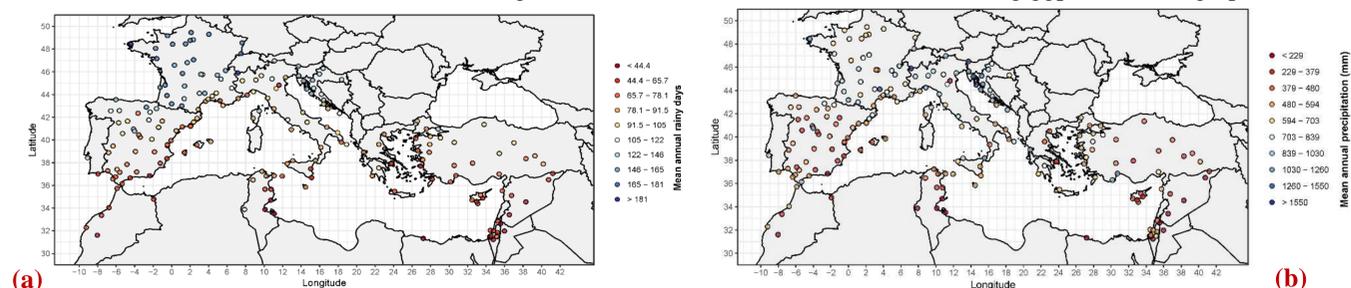
A0.56annual CI values distribution (1975-2015) in the Mediterranean. < (low), 0.56-0.59 moderate, 0.60 -0.69 high, => 0.70 very high.



Annual CI trend distributions (1975–2015) in the Mediterranean basin. The statistical significance of the trends was checked applying the non-parametric Mann-Kendall test for the confidence levels of 95%.

Data and study area

The MR with latitude boundaries between 28 and 49N and longitude boundaries between 10W and 45E is the study area in this work . Daily precipitation data from the Global Historical Climatology Network-Daily database (GHCN-Daily) and the European Climate Assessment & Dataset (ECA&D) dataset of 233 meteorological stations has been analysed during the last four decades (1975- 2015) in the Mediterranean basin. In our study case, the average annual precipitation shows a great spatial variability between western and eastern parts of the Mediterranean with more than 1500 in the west (Croatia and Italy) and less than 100 mm in the Levant region. The original series of daily precipitation data were completely controlled and reconstructed using the R package RCLindex . All the statistical analyses, calculations, graphs and illustration of the results were achieved using the R (3.2.2) statistical environment including ggplot2 for the graphics.



The average annual precipitation (1975–2015) (a), and the average number of wet (precipitation>0 mm) during (1975–2015) (b)

Conclusion

- 1-n Concentration Index (CI), using the Lorenz Curve concept, the high to moderate irregularity and rainfall concentration are the two very characteristic features of rainfall in the Mediterranean basin.
- 2-. The annual CI values range from 0.57 to 0.70 and the highest values are found in the western part of the Mediterranean along the French and Spanish coasts, Sicily in South Italy and eastern coastlands of Tunisia.
- 3-The lowest annual precipitation CI values occurred in Turkey and inland areas of France and Spain.
- 4-The strongest gradient in CI values occurred between west and south Spain, the north and southern coastlands of France and between north and south Tunisia.
- 5-Generally, the application of the Mann–Kendall test has revealed spatially non-uniform significant patterns in CI trends over the Mediterranean. Only 7.3 % of stations over the Mediterranean basin have returned a statistically significant negative trend during 1975-2015, while 30.1% of the stations have detected a statistically significant positive trend during the study period.
- 6-The statistically significant CI increasing has been mainly found in south France, northern coastlands of the Iberian Peninsula, Greece and Tunisia, whereas the statistically significant decreasing has been observed in Italy, northern coastlands of Algeria, Turkey and in the southern parts of the Eastern Mediterranean (e.g. Israel, Syria and Lebanon).
- 7-> Both of latitude and the distance from the sea can play the major role in spatial and temporal distributions of CI.

Acknowledgments

This study was performed within the framework of Climatology Group of the University of Barcelona (2014 SGR 300, Catalonia Regional Govt) and the WEMOTOR (CSO2014-55799-C2-1-R 2015- 2017, Spanish Ministry of Economy and Competitiveness) project.