

Replies to Reviewer #1

General comment

This paper is very interesting. The manuscript represents a substantial contribution to scientific progress. The authors discussed the changes of rainfall intensities (frequencies of occurrences in regard to depth and duration) and they studied their trends. They analyzed annual maximum rainfall series at 1, 3, 6, 12, 24 h duration and daily rainfall. This analyze is relevant, because it provides a comprehensive view on water availability, on water management or on design of water engineering structures and on all the hydrological applications which use rainfall characteristics.

We really appreciated the reviewer's comment, declaring our work as an interesting contribution to the scientific literature and recognizing the importance of the effects of changes in rainfall statistics.

Listed comments

P2326 §25: You should use North of Africa instead of North Africa. The latter encompasses an ensemble of countries: Morocco, Algeria, Tunisia, Libya and Egypt. They have a variety of climate. These countries are in arid to semi-arid region with a Saharan climate in the South; an oceanic one in the West and Mediterranean in the North (Agoumi ,2003 and Abou-Hadid 2006).

Thanks for this observation and for the suggested references. We have changed the text.

P2330 §15: you should reorganize the paragraph. The results of AR(1) should appear in §2.3 rather than in Methodology.

We agree with the reviewer that all the results should be described under the same section of results discussion. However, the autoregressive analysis AR(1) is a pre-processing analysis aimed to demonstrate that a prewhitening procedure was not necessary and thus not described in the methodology section. For such reason we prefer to maintain the original structure.

P2331 Could you add information about the difference between daily rainfall and 24h duration one.

The 24h rainfall duration rarely corresponds to the daily rainfall given that the former is computed as the most severe precipitation in a 24h window over the year, which not necessarily corresponds to the 24h of a day. This clarification has been also reported within the text.

P2332 Would you expose the reasons of classification. What are additional (or relevant) information?

The classification in categories allows finding out whether the rainfall trend exists only for a specific rainfall category (e.g. light or moderate or heavy rainfall). As stated in the manuscript, a similar approach was adopted by Alpert et al., (2002) for the Mediterranean extreme daily rainfall analysis. For the Italian case, for example, findings revealed an increasing trend for heavy-torrential rainfall simultaneously to a highly significant decreasing trend for the weaker rainfall categories (Alpert et al., 2002).

Conclusions: I am skeptic about relation between global warming and modification in rainfall regime. The authors didn't use the outputs of climate models and they didn't analyze their effects (values).

The reviewer probably refers to the sentence at P2340 L1-6: "According to the most recent climate predictions, Mediterranean ecosystems will probably face a radical modification of the climatic conditions in the next future due to the Earth global warming, mainly related to the greenhouse effect. In Southern Mediterranean areas the effects of climate changes are summarized in a rainfall reduction and a temperature increase". This observation is pertinent and we agree that we have to clarify. The analysis of the causes of any possible trend was clearly out of scope of this work and we simply analyzed historical rainfall data series, observing some relevant trends. Notwithstanding the same authors have analyzed temperature trends, no cause-effect relationships has been investigated. Therefore, for sake of clarity, the sentence "In Southern Mediterranean areas the effects of climate changes are summarized in a rainfall reduction and a temperature increase" has been deleted.

References

Alpert, P., Ben-Gai, T., Baharad, A., Benjamini, Y., Yekutieli, D., Colacino, M., Diodato, L., Ramis, C., Homar, V., Romero, R., Michaelides, S., and Manes, A. (2002) The paradoxical increase of Mediterranean extreme daily rainfall in spite of decrease in total values, *Geophys. Res. Lett.*, 29, 1–31.