

## ***Interactive comment on “Rainfall statistics changes in Sicily” by E. Arnone et al.***

**E. Arnone et al.**

elisa.arnone@unipa.it

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Dear Yves Trambly,

we thank you for your constructive comment and your interest in our research.

We agree that the presence of cross-correlation may affect the results of a trend detection test, by increasing the significance of regional trend, when this is evaluated over a region. Consequently, we are aware that a procedure which takes into account the cross-correlation is required in that case.

For instance, a bootstrap approach (Efron, 1979) was used by our group for similar analyses (e.g. Viola et al., 2013). Particularly, in Viola et al. (2013) the regional average Kendall's S was used in order to evaluate the presence of a regional trend in temperature; and the bootstrap approach (Efron, 1979) was used therein to determine

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the critical value for the percentage of stations expected to show a trend by chance.

In the present study we essentially carried out analyses at single rain-gauge stations, in which series are analyzed separately and thus the verification of serial correlation existence is the only required significant test. Results at regional scale have been only showed for two of the 6 analyzed variables, i.e. for the rainfall contribution to annual occurrences from each class (Fig.5a and Fig.5c) and the rainfall contribution to the total annual volume from each class (Fig.5b and Fig.5d), both as regional average over all the stations. The results showed a trend existence only for one of the 18 series depicted in the figure, therefore we cannot state the a possible cross-correlation have increased the expected number of trends. Moreover, as we stated in the manuscript (lines 16-22, pag. 2337), such a regional analysis, based on averaged values among the different raingauges, has probably hidden any local tendency. For such reasons the two mentioned stochastic variables have been also investigated at a local level, i.e. at each station, where the possible presence of cross-correlation does not affect the results of the trend test.

We surely appreciated your comment which will be considered for revising the manuscript, by discussing why it was not necessary to apply a procedure for spatial dependeces.

#### References

Efron, B., 1979. Bootstrap methods: another look at the jack knife. *The Annals of Statistics* 1-26.

Viola, F., Liuzzo, L., Noto, L.V., Conti, F.L., Loggia, G.L., 2013. Spatial distribution of temperature trends in Sicily. *International Journal of Climatology*. DOI: 10.1002/joc.3657

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