

Interactive comment on “Evaluation of uncertainties in mean and extreme precipitation under climate changes for northwestern Mediterranean watersheds from high-resolution Med and Euro-CORDEX ensembles” by Antoine Colmet-Daage et al.

Anonymous Referee #1

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The manuscript addresses the issue of changes in precipitation patterns under climate change in three selected Mediterranean regions, using a CORDEX high-resolution ensemble. The topic is dealt using widely accepted methodologies (evaluation metrics) and some newer concepts for quantifying changing of extreme precipitation patterns and error additivities in GCM/RCM simulations. The paper in general is well written and constructed. The abstract and conclusions summarize the basic features and findings of the work presented. Their introduction, despite being a bit lengthy is quite

informative, the methodology clearly presented (some issues addressed below) and the description of results clear and concise.

My major comment is that the ensemble members used in this study do not cover the existing EURO and MED-cordex simulations, as the title of the manuscript indicates. The criteria for not including existing and most importantly independent EURO/MED CORDEX simulations (eg RegCM4 or WRF331F) is not clear to me. Moreover, the authors decided to include 2 ensemble members from the same family (ALADIN5.2 and ALADIN5.3) i.e. two model versions which I expect they share similar structural errors and therefore expected to share similar behaviour. I don't find this choice methodologically sound. I understand the choice of authors, only if additional independent EURO-MED CORDEX ensemble members were not available by the time of manuscript preparation.

Technical corrections Page 1, Line 18: "over past period" Over the past period: which is this period?

Page 4, Line 14: there is a submitted paper, if available please provide the full citation

Page 5, Line 7. I missed two important ensemble members of EURO/MED CORDEX simulations, namely RegCM, and WRF. Especially RegCM is one of the most traditional regional climate models used for the investigation of European and particularly Mediterranean climate and I was wondering why authors did not include those ensemble members in their current study.

Page 6, line 4: I don't understand why the RCMs with spatial resolution of 12 Km where regridded to the 8 Km of SAFRAN. Why didn't they regrid from 8 to 12 Km?

Page 6, line 5. Remapping procedures are known to affect precipitation statistics (e.g. Diaconescu et al., 2015 <http://journals.ametsoc.org/doi/pdf/10.1175/JHM-D-15-0025.1>). The authors mention that they have tested how interpolation methods affect their results, without providing additional information. Extra care needs to be taken,

especially when one attempts a percentile analysis in precipitation.

Page 6, line 25. Could authors add a couple of lines on the behaviour of $\Delta\hat{I}\check{S}$? What it means when $\Delta\hat{I}\check{S}$ is <0 or >0 ? Is shortly mentioned in Figure 4 caption, better mention in text.

Page 8, line 9." Figure 2b displays the normalized annual cycle...". The caption of Figure 2b says "Bias of the annual cycle of precipitation".

Page 9, line 7."The results are coherent with other studies...". Please refer to those other studies. Page 9, line 13: "thus" > eventually mean "those"?

Page 20, Table 1: I miss the Radiation, Microphysics and Land Surface Model selections of each RCM simulation. It is useful information for regional climate modellers.

Page 9, line 20: Deque et al., 2011 is missing in the references list.

Page 10, line 9. "...Fig 5 is considerably larger". I don't find the differences in spreads between Fig 3 and 5 "considerable larger" for the Muga region.

Page 11, line 3-4: "Future precipitations from RCP... distribution". I don't think I understand this sentence.

Page 12 ,line 14-15. While some reported that model performance in the past do not necessarily relate with model performance in the future, some report the opposite: Boberg and Christensen, 2012, Nature Climate Change.

Comparison of Fig 3 and Fig 5 is a bit confusing. In Figure 5, colors are used for GCMs and markers for RCMs, which is quite nice. In Figure 3, colors are used for RCMS; it would be easier to keep using markers for RCMs, similar to Figure 5. Finally, is there a particular need to use SAFRAN in Figure 3 and 5? Isn't it supposed to be the diagonal line?

Figure 7. If this figure refers to autumn it should be mentioned in the figure caption.

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