

## ***Interactive comment on “Mean and extreme precipitation over European river basins better simulated in a 25km AGCM” by Reinhard Schiemann et al.***

### **Anonymous Referee #2**

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#### General comments

According to the Authors the main aims of the manuscript are:

(1) to provide a benchmark for future generations of GCMs with grid spacings on the order of 10 km, as well as for km-scale RCM simulations with respect to the UPSCALE project atmospheric GCM (AGCM) simulations in terms of seasonal mean and extreme precipitation;

(2) to provide a methodology (a combination of two previous applied methodologies) to evaluate extreme (daily) precipitation by fitting extreme value distributions and evaluating the model outputs over large (>50000 skm) river basins in Europe for future

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applications as input to impacts models.

(3) to determine to what extent the resolution sensitivity in precipitation is due to the sensitivity to resolution of the simulated North Atlantic storm track and [...] to contrast that with the role of local forcing from the orography at different resolutions;

With regard to aims 1 and 2, correctly, the Authors point out that “is an obvious requirement for climate models to simulate precipitation in a realistic way if the models are to be applied, for example, in process and impact studies of the hydrological cycle [...] Due to the wide range of applications, the required realism concerns all aspects of the precipitation distribution in space and time including the probability distribution function of the precipitation time series and its extremes.”.

Unfortunately, extreme value analysis results seem to refer to averaged values over selected river basins losing the spatial distribution information that is one of the most relevant for impact studies (together with temperature analysis). The analysis of spatial distribution of extreme precipitation (and their timing) is a point to be investigated/clarified in the manuscript.

A second point to be addressed is the sensitivity of the analysis results to the E-OBS dataset horizontal resolution (not reported in the manuscript), is it possible that the more the AGCM horizontal resolution is close to E-OBS horizontal resolution the better the results are, just because the data spatial resolution is “more similar” and values are not averaged in space ?

With regard to aim 3, the Authors test two alternative hypotheses the sensitivity to “the large-scale circulation, specifically the North Atlantic stormtrack” and to “orography” finding that orography effect is dominant with respect to North Atlantic stormtrack in improving precipitation description using a slightly different AGCM.

Specific Comments Page 10 Line 3-4 Authors write “For most cases, the statistical model fits the observed maxima well, but there are a few discrepancies for larger return

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periods of more than about 20 years.” This reasonable considering the sample size of 26 years for each ensemble member.

Page 17-Section 5.2 It will be of interest to report how orography varies within the sensitivity experiment, i.e. change in maximum, mean and standard deviation.

Table 1. According to values reported in Tab.1, N216 simulation is the “worst” one, but it is also the same with only 3 ensemble members, of which one is quite different from the other two in winter (Figure 2). Which will be the statistics of N96 and N512 if only 3 member are considered, or, how much does the ensemble size (for a given resolution) affect the statistics of the results? In Figure 2, it is quite evident that N216 winter values are more scattered than N96 and N512 values for the same season.

Technical corrections Page 1 Line 5 the model resolution is indicated as 135km but in other part of the manuscript is 130km, please fix it across the manuscript

Page 2 Line 15 introduce here the meaning of UPSCALE acronym instead of Page 3 Line 6

Final comments I suggest the publication after minor review

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