Reply to Referee comments #1

In this study, the author investigated the contributions of the changes in mean and variability of climate to the change in precipitation extreme events over Europe, basing on CRCM5 simulations. The author suggested that the contributions from a change in variability are in parts equally important to changes in the mean, and can even exceed them. For the level of contributions, there are regional differences. In addition, the contributions also show differences in summer and winter. The topic is interesting and the results are valuable to better understand the changes in the precipitation extremes over Europe. I have following comments and suggestions:

1. *I remember that the pre-industrial control simulations did not include the natural forcing. If so, the CRCM5 simulations drived by the CanESM2 pre-industrial control simulations cannot be used as the NAT forcing experiment.*
   Thank you for this comment. To avoid future confusion the NAT forcing experiment will be renamed to PIC (pre-industrial control). The relevant information on forcing is already included in the manuscript. The PIC simulation uses constant atmospheric CO2 concentrations of 284.7 ppm. The concept of this work is unaltered by the change in naming, since the goal is to compare a world with climate change (RCP8.5) with a world before anthropogenic climate change (pre-industrial).

2. *Are the warming levels of 1, 2, 3, and 4 Celsius degrees calculated from global mean or regional mean? The related information should be given in the manuscript.*
   The warming levels have been derived from the driving CanESM2 model and are calculated as Global mean temperature changes. This will be clarified in the manuscript.

3. *In this study, the author used the 50-memer initial-condition large ensemble. So the result uncertainty from the initial conditions should be given in the manuscript.*
   Not entirely sure what this comment refers to. If it refers to the influence of initialization, then the answer is, that the timescales analyzed here (multiple decades away from the initialization) are not affected by any imprint of initialization anymore.
   If the comment refers to the sub-sampling of 35 from the 50 members, then my reply is the following. In the setup random 35 members were picked from the full 50-member ensemble. The different subsamples have however no influence on the results, since the different 35 member subsamples share many of the same members. Hence, the different subsamples are not independent from each other, and therefore yield no substantial differences among the different subsamples. I tested this, but only very marginal differences were visible among different subsamples.

4. *The author presented well the results. I suggest that the author could make some discussion on the possible reasons of the results. For example, the strongest increases in the total risk ratio can be seen in the Scandinavian region. Why is the strongest increase in the region? Related discussion can enrich the manuscript.*
   For Scandinavia a possible explanation

5. *The result shows that in summer the PRvar is above the PRmean, and in winter vice versa. Possible reasons should also be discussed.*
   Thank you for these two comments. The discussion will be extended by a few references and hypothesis about the reasons.