Climate change of precipitation extremes in the Iberian Peninsula: an overview of the CLIPE project

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1 Main aims of the CLIPE project

1. To diagnose the climate change signal in the precipitation extremes over the Iberian Peninsula (IP)

2. To identify the underlying physical mechanisms.

NOTE: Only the first aim is addressed in the poster.

2. Data: Multi-Model Ensemble (MME)

Precipitation daily-total data obtained from the MME of Regional Climate Model (RCM) simulations provided by the EU FP6 Integrated Project ENSEMBLES (spatial resolution of ~25km). The MME has 15 members which are RCM simulations from 1961 to 2098.

3.Data: ETCCDI-MME and ETCCDI-MMEM

Annual and seasonal indices of precipitation extremes, proposed by the CCI/CLIVAR/JCOMM Expert Team on Climate Change Detection and Indices (ETCCDI), were derived from the daily precipitation MME.

Each index was computed for each member of the MME and for the MME Median (MMEM).
Here, we show PRCTOT (Total amount of precipitation) and R95T (fraction of PRCTOT due to days with daily-total amount ≥95th percentile of wet days of the reference climate (1961-1990)

Each index was computed for each member of the MME and for the MME Mean/Median (MMEM).

4. Methodology: non-parametric approach

- **TREND**: Theil-Sen linear trend, from 1961 to 2098, tested by the Mann-Kendall test.

- **CD**: differences between the climatologies, estimated by the time Median, of a near-future (2021-2050) and a distant-future (2071-2098) climates from the climatology of a recent-past reference climate (1961-1990), tested by the Mann-Whitney test.

- **KS:** difference between the Probability Distribution of the near and distant and near climate from that of reference climate, tested by the Kolmogorov-Smirnov test.

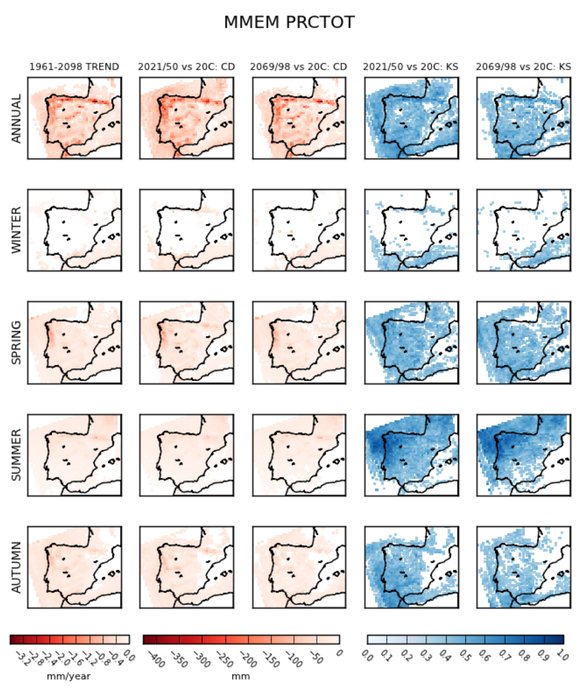
Climate change projections are evaluated from the statistics obtained from the ETCCDI-MMEM, while the uncertainties of those projections are evaluated by a rank-based measure of the spread of these statistics across the ETCCDI-MME: modified version of MAD (Median Absolute Deviation) statistic.

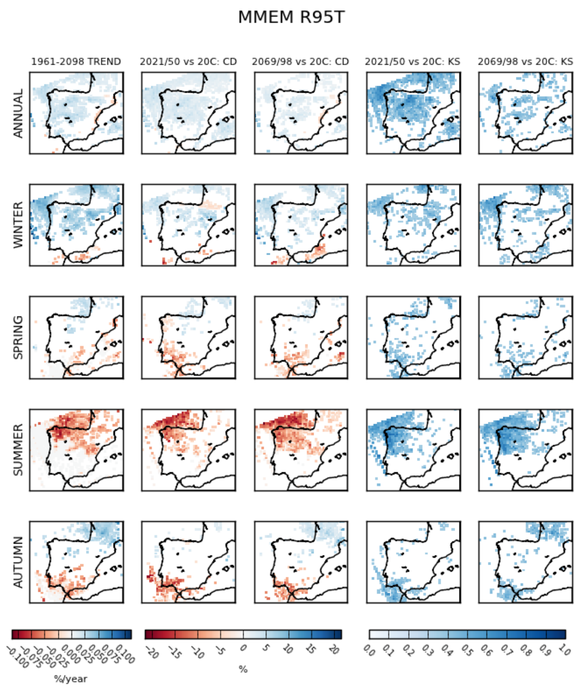
5. Main results

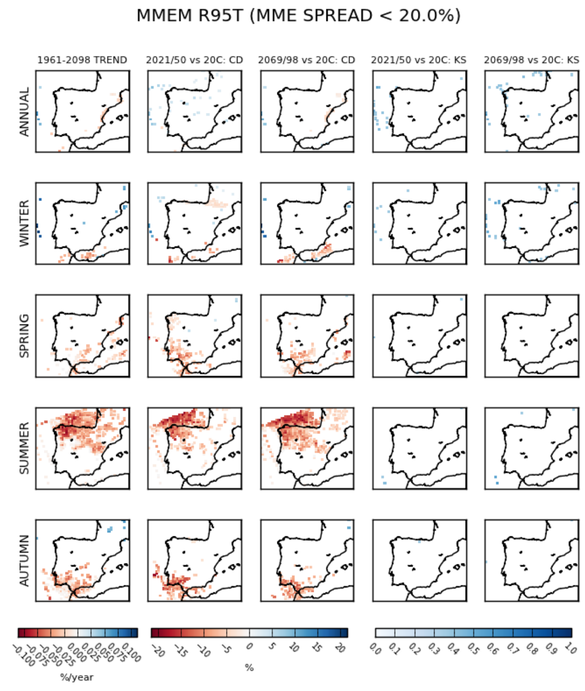
Iberian regions with statistically significant, at 0.05 level, projected climate change, under the A1B scenario, detected by the three methods are identified (**Figures on the left column**).

Since these projections have associated uncertainties, estimated by their spread across the MME, we identify which of these regions have projected uncertainties less than 20% (**Figures on the right column**). That is, these figures show significant climate change signals detected by at least 80% of the RCMs.

The methodology was applied to all precipitation ETCCDI. However, only the for PRCTOT and R95T are shown because of space constraints.







6. Conclusions

Climate change is detected at a high spatial resolution by the MMEM for both PRCTOT and R95T over the Iberian Peninsula

The decrease of annual PRCTOT is due to its decrease in Spring, Summer and Autumn. No significant changes are projected for Winter

The increase of annual R95T (larger contribution of heavy precipitation days) is mainly due to its increase in Winter, but this result varies highly between RCMs. On the other hand, the RCMs do agree for a decrease in R95T in summer over the northern IP and in Autumn over the southern IP

Generally, RCMs agree in the climate change of PRCTOT. For R95T, RCMs agrees from Spring to Autumn but highly disagree for Annual and Winter

Climate change detected by PDFs (KS test) has a MME spread much higher than the one detected by trends and climate differences