1. MOTIVATIONS
A evidenced in recent years, most of the nature-related economic costs and human losses in many regions of Europe, including the Mediterranean zone, are due to extreme phenomenology (heat waves, cold spells, persistent droughts, heavy precipitations; etc.). Perspectives on the future of these extreme events are here derived by using observed and model projected daily meteorological data from E-OBS and EURO-CORDEX database, respectively. To properly project the regional climate models at local scale, a quantile-quantile adjustment (Amengual et al. 2012) has been applied to the simulated regional scenarios. However for our specific purposes dealing with extreme phenomenology, the general method has been adapted to explicitly focus on the tails of the distribution. Results about future incidence of heat waves, cold spells, heavy precipitation and droughts at annual and seasonal scale are here presented for each emission scenario over Europe.

2. STATISTICAL DOWNSCALING
Quantile-Quantile adjustment (Amengual et al. 2012)
The general method, “the global calibration”, has been adapted to explicitly focus on the tails of the distribution, instead of deriving the calibration parameters from the general spectrum of CDFs.

3. DATABASE AND METHODOLOGY
- As a observed baseline we have used the E-OBS gridded data set (25 km)
- Regarding the future projections, we use the regional simulations database available from the EURO-CORDEX project. A set of 14 RCM simulations of daily series of 2-m minimum and maximum temperature under 95\% percentile of observed minimum daily temperature in winter.

4. RESULTS
**HEAT WAVES:** a spell lasting 3 or more consecutive days with daily maximum temperature above 95\% percentile of observed daily maximum temperature in summer.

**COLD SPELLS:** a spell lasting 3 or more consecutive days with daily minimum temperature under 5\% percentile of observed daily minimum temperature in winter.

**HEAVY PRECIPITATION:** a spell lasting dh = 2 or more consecutive days with daily precipitation (> 0.01 mm) above 95\% percentile of observed daily precipitation.

**DROUGHT:** a spell lasting dh = 3 or more consecutive days with daily precipitation <= 0.1 mm

### Validation task
- Perkins skill score (Perkins et al. 2007)

<table>
<thead>
<tr>
<th>Variable</th>
<th>Raw</th>
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<th>Local</th>
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<tr>
<td>Pr</td>
<td>62.8</td>
<td>71.3</td>
<td>73.5</td>
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### Climate change projections
Compute changes in calibrated CDFs between a 25-year past (i.e. control/observed; 1981-2005) and successive future 25-year RCM time-slices (2021-2045; 2046-2070; 2071-2095)

### CONCLUSIONS
Expected results about the future extreme events for the late twenty first century under the RCP6.5 scenario would indicate:
- An overall increase of the heat wave amplitude in summer, being more marked in the Mediterranean
- A decrease in the future events under the 5\% percentile of observed minimum daily temperature in winter. It is expected a general increase of the cold spell amplitude.
- Regarding the annual heavy precipitation results, we observe a rise in the percentage of events over the P95 in the central and northern Europe but a decrease in the Mediterranean. The heavy precipitation amplitude it is expected to increase in the whole domain.
- A rise in number of future events with a duration over the P95 of observed drought duration of up to 1 drought/year in the Iberian peninsula.