# Annex I: Atlas of Global and Regional Climate Projections

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**Notes:** TSU Compiled Version

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## Introduction and Scope

This Annex presents a series of figures showing global and regional patterns of climate change computed from global climate model output gathered as part of the 5th Coupled Model Intercomparison Project (CMIP5). Maps of surface air temperature change and relative precipitation change (i.e., change expressed as a percentage of mean precipitation) in different seasons are presented for the globe, Africa, Europe, Asia, Australasia, North America, Central and South America, Polar Regions, and Small Islands (excluding open oceans). Twenty-year average changes for the near-term (2016–2035), for 2046–2065, and for the long-term (2080–2099) are given, relative to a reference period of 1986–2005. Time series for temperature and relative precipitation changes are shown for global land and sea averages, and most of the 32 sub-continental regions of (Giorgi et al., 2001). In total this Atlas gives projections for 16 regions, 2 variables, and 4 seasons for temperature, 2 seasons for relative precipitation, Maps are only shown for the RCP4.5 scenario, however the time series presented show how the area-average response varies among the RCP2.6, RCP4.5, RCP6.0 and RCP8.5 scenarios. Figures AI.1 and AI.2 gives a graphical explanation of aspects of both the time series plots and the spatial maps. While some of the background to the information presented is given here, discussion of the maps and time-series, and important additional background is provided in Chapters 9, 11, 12 and 14.

As is evident in the main body of this report, the projection of future climate change involves the careful evaluation of models, observations and understanding in order to produce credible projections and assess sensitivity to uncertainties. The information presented in this Atlas, on the other hand, is based entirely on all available CMIP5 model output taken at face value. Complementary methods for making projections exist [PLACEHODER FOR SECOND ORDER DRAFT: cross reference chapters 11 and 12] and should be considered in impacts studies. While such projections can be assessed alongside the output from CMIP5 presented here, this is beyond the scope of this Atlas. Nor do the simple maps provided represent a robust estimate of the uncertainty associated with the projections. Here the range of model spread is provided as a simple albeit imperfect guide to the range of possible futures. Alternative approaches used to estimate uncertainty are discussed in Chapters 11 and 12. The information presented in this Atlas is therefore intended to be a starting point only for anyone interested in more detailed information on model-simulated future climate change.

As discussed in Chapter 9, different climate models have varying degrees of success in simulating past climate variability and change when compared to observations. Some model-inadequacies are common to all models but robustness of patterns of change across successive generations of models gives some confidence in projections. However, there is no guarantee that climate models produced in the future will show the same patterns of change as those available today or indeed that the climate will change as represented by figures in this Atlas. We urge caution in interpreting the time series and maps literally.

Series of maps for the other scenarios are available in the Supplementary Material (see Appendix AI.A: SM RCP2.5; Appendix AI.B: SM RCP6.0; and Appendix AI.C: SM RCP8.5).

**Technical Notes**

**Data and Processing:** The First Order Draft of the Atlas has been constructed using the CMIP5 model output available at the time of writing (11 November 2011). This dataset comprises 31/51/26/51 scenario experiments for RCP 2.6/4.5/6.0/8.5 from 17 climate models (Table AI.1). Only concentration-driven experiments are used. We show maps from one scenario (RCP4.5) but include time series from all RCPs.

**Table AI.1:** The number ensemble members used in this Annex for each of the historical and RCP scenario experiments performed by the models. Historical data were only used if the experiment was continued for one or more RCP experiments. Some model data sets do not include the year 2100.

| CMIP5 Model name | Historical | RCP2.6 | RCP4.5 | RCP6.0 | RCP8.5 |
|---|---|---|---|---|---|
| CCSM4 | 5 | 5 | 5 | 5 | 5 |
| CNRM-CM5 | 1 | 1 | 1 | 0 | 3 |
| CSIRO-Mk3-6-0 | 10 | 10 | 10 | 10 | 10 |
| CanESM2 | 5 | 5 | 5 | 0 | 5 |
| EC-EARTH | 8 | 0 | 8 | 0 | 8 |
| GISS-E2-R | 5 | 0 | 5 | 1 | 1 |
| HadGEM2-CC | 1 | 0 | 1 | 0 | 1 |
| HadGEM2-ES | 1 | 1 | 2 | 4 | 4 |
| IPSL-CM5A-LR | 4 | 0 | 4 | 1 | 4 |
| MIROC-ESM | 1 | 1 | 1 | 1 | 1 |
| MIROC-ESM-CHEM | 1 | 1 | 1 | 1 | 1 |
| MIROC5 | 1 | 1 | 1 | 1 | 1 |
| MPI-ESM-LR | 3 | 3 | 3 | 0 | 3 |
| MRI-CGCM3 | 1 | 1 | 1 | 0 | 1 |
| NorESM1-M | 1 | 1 | 1 | 1 | 1 |
| bcc-csm1 | 1 | 1 | 1 | 1 | 1 |
| inmcm4 | 1 | 0 | 1 | 0 | 1 |
| Number of models | 12 | 12 | 17 | 10 | 17 |
| Number of experiments | 51 | 31 | 51 | 26 | 51 |

**Equal model weighting:** Model evaluation uses a multitude of techniques (see Chapter 9) and there is no consensus view in the community about how to use this information to assign likelihood to different model projections. Consequently the different CMIP5 models used for the projections in this Atlas are all considered to give equally likely projections. Where multiple initial condition ensemble members from the same model exist, all are included but are given a weight inversely proportional to the number of members in the initial condition ensemble. Thus each distinct model contributes to the calculation of means and percentiles in the sense of 'one model, one vote'. In the case where the noise of natural variability is much bigger than the signal of the response of the climate system to the forcing, a better estimate of the distribution of model responses is obtained using this approach.

**Variables:** Two variables have been plotted: temperature change and relative precipitation change. The relative precipitation change is defined as the percentage change from the 1986–2005 reference period in each ensemble member. For area averages, the variables are first averaged and next the changes from the reference period are computed. [PLACEHODER FOR SECOND ORDER DRAFT: global maps of a few more variables such as sunshine, humidity and ice/snow cover may be possible.]

**Seasons:** For temperature, the standard meteorological seasons March-May, June-August, September-November and December-February are shown, as these often correspond roughly with the warmest and coldest seasons in which changes have the largest impact, and the beginning and end of growing seasons. For precipitation, the half years April-September and October-March are shown so that in most monsoon areas the local rain seasons are entirely contained within the season plotted. As first the seasonal average is computed and next the percentile change, these numbers are dominated by the rainy months within the half-year.

**Regions:** In addition to the global maps, we use the list of areas defined in (Giorgi et al., 2001) with the following changes. The land areas were taken from the list with the exception of Central and Eastern North America, which were combined. The eastern half of the Sahara is also shown separately as Middle East. The western boundary of the South-East Asia region was moved 5° westwards to include all of Sumatra and Malaysia. Consequently these parts are no longer in the South Asia region. The sea areas of Arctic, Antarctic, Caribbean, Southeast Asia, West Pacific and Central Pacific were used to represent the effect on small islands, which are not resolved by the models used. Note that temperature and precipitation over the islands may be very different from that over the surrounding sea.

**Time Series:** For each of the resulting areas the areal mean was computed on the original model grid using either only land or only sea points, depending on the definition of the region. As an indication of the model uncertainty and natural variability, the time series of one ensemble member per model and scenario over the common period 1900–2099 are shown on the top of the page as anomalies relative to 1986–2005 (the seasons December-February and October-March are counted towards the second year in the interval). The multi-model ensemble means are also shown. Finally, for the period 2080–2099 the 20-year means are computed and the box-and-whiskers plots show the 5th, 25th, 50th (median), 75th and 95th percentiles sampled over the distribution of ensemble members, including both natural variability and model spread. The percentiles have again been computed such that each model contributes equally so multiple ensemble members of the same model have been weighted as described above. In the 20-year means the natural variability is suppressed relative to the annual values in the time series whereas the model uncertainty is the same.

**Spatial Maps:** The maps in the Atlas show, for an area encompassing two regions, the difference between the periods 2016–2035, 2046–2065 and 2080–2099 and the reference period 1986–2005. As local projections of climate change are very uncertain (cf. Chapters 9–12), a measure of the range of model projections is shown rather than the mean response of the model ensemble. It should again be emphasized that this range does not represent the full uncertainty in the projection. On the left the 20th percentile of the distribution of ensemble members is shown, on the right the 80th percentile. This distribution combines the effects of natural variability and model spread. The colour scale is kept constant over all maps. Hatching indicates regions where the magnitude of the 20th or 80th percentile of the 20-year mean change is less than twice the standard deviation of model-estimated natural variability of 20-year mean differences. The natural variability is estimated by computing the intra-model variability of the 20-year means in all (currently 6) models with 4 or more ensemble members. This implies that the trend and other serial autocorrelations have been taken into account and that the changes of the natural variability with the background state are also accounted for. It does also mean that, for this First Order Draft, the model estimate of natural variability is based on a different set of models than the difference fields themselves. Note that the 20-year period difference shown here is often too short to show a change that is significantly larger than the natural variability at the 2-standard deviation level. Other measures of precipitation changes can show more significant changes.

**Scenarios:** Spatial patterns of changes for scenarios other than RCP4.5 can be found in the Annex I Supplementary Material (see Appendix AI.A: SM RCP2.5; Appendix AI.B: SM RCP6.0; and Appendix AI.C: SM RCP8.5).

**[INSERT FIGURE AI.1 HERE]**

**Figure AI.1:** Explanation of the features of a typical time series figures presented in the Annex.

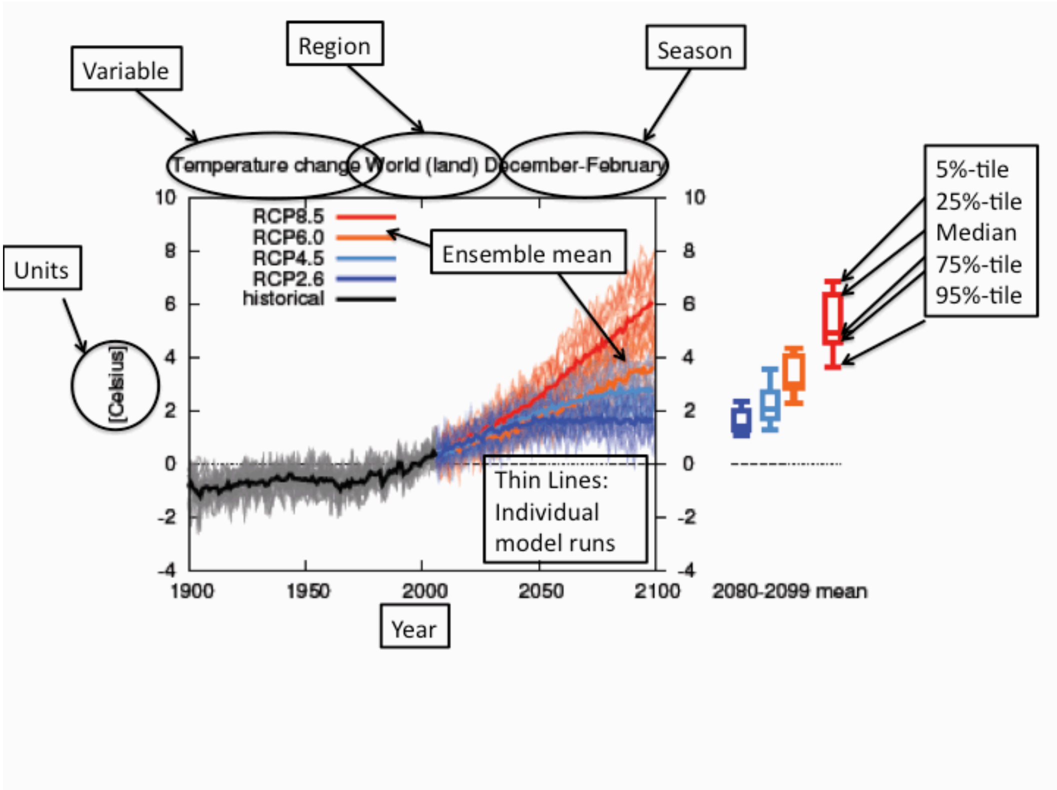
**[INSERT FIGURE AI.2 HERE]**

**Figure AI.2:** Explanation of the features of a typical spatial maps presented in the Annex. Hatching indicates regions where the magnitude of the 20th or 80th percentile of the 20-year mean change is less than twice the standard deviation of model-estimated natural variability of 20-year mean differences.

## References

Giorgi, F., Whetton, P.H., Jones, R.G., Christensen, J.H., Mearns, L.O., Hewitson, B., vonStorch, H., Francisco, R. and Jack, C., 2001. Emerging patterns of simulated regional climatic changes for the 21st century due to anthropogenic forcings. Geophysical Research Letters, 28(17): 3317-3320.

## Figures

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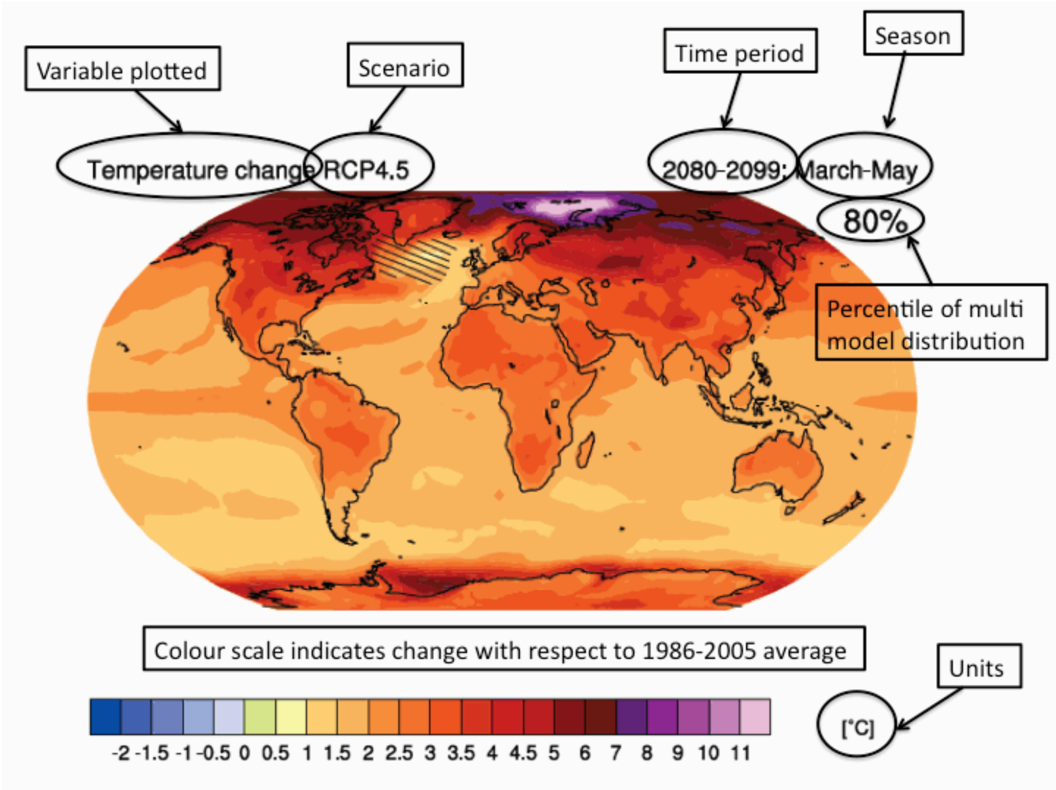


**Figure AI.2:** Explanation of the features of a typical spatial maps presented in the Annex. Hatching indicates regions where the magnitude of the 20th or 80th percentile of the 20-year mean change is less than twice the standard deviation of model-estimated natural variability of 20-year mean differences.

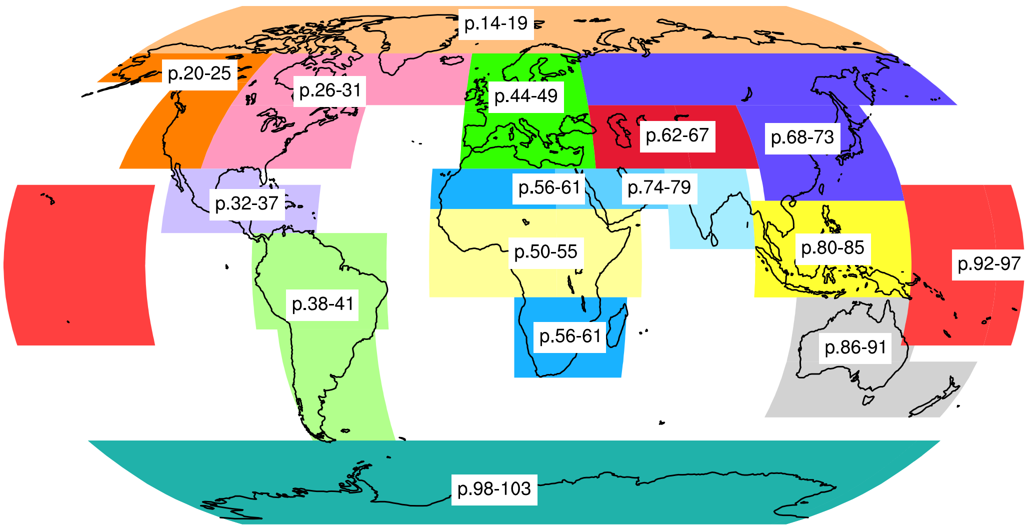


**Figure AI.3: Overview of the regions used.**

Figures AI-4 to AI-9, p.8–13: World
Figures AI-10 to AI-15, p.14–19: Arctic
Figures AI-16 to AI-21, p.20–25: North America (West)
Figures AI-22 to AI-27, p.26–31: North America (East)
Figures AI-28 to AI-33, p.32–37: Central America and Caribbean
Figures AI-34 to AI-39, p.38–43: South America
Figures AI-40 to AI-45, p.44–49: Europe and Mediterranean
Figures AI-46 to AI-51, p.50–55: Western and Eastern Africa
Figures AI-52 to AI-57, p.56–61: Southern Africa
Figures AI-58 to AI-63, p.62–67: Central Asia
Figures AI-64 to AI-69, p.68–73: Eastern Asia
Figures AI-70 to AI-75, p.74–79: Middle East and Southern Asia
Figures AI-76 to AI-81, p.80–85: Southeast Asia
Figures AI-82 to AI-87, p.86–91: Australia
Figures AI-88 to AI-93, p.92–97: Pacific Islands region
Figures AI-94 to AI-99, p.98–103: Antarctica

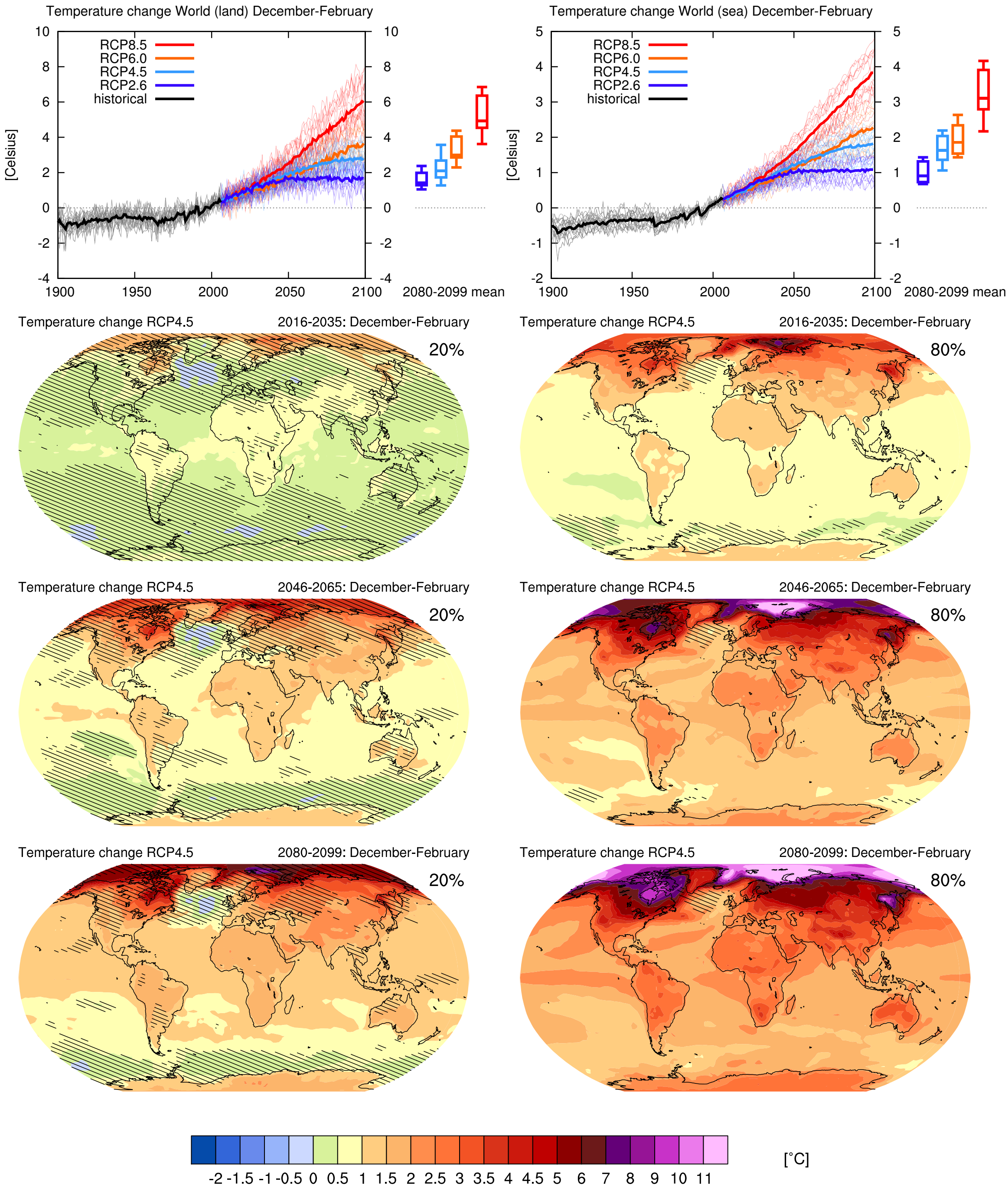


**Figure AI.4:** top left: time series of temperature averaged over land grid points over the globe in December–February. Top right: same for sea grid points. Thin lines denote one ensemble member per model, thick lines the partial CMIP5 multi-model mean. On the right-hand side the 5th, 25th, 50th (median), 75th and 95th percentiles of the distribution of 20-yr mean changes are given for the period 2080–2099 (relative to 1986–2005) for the four RCP scenarios.

Below: maps of temperature changes in 2016–2035, 2046–2065 and 2080–2099 with respect to 1986–2005 in the RCP4.5 scenario. For each point, the 20% and 80% percentile of the distribution of the partial CMIP5 ensemble are shown, this includes both natural variability and inter-model spread. Hatching denotes areas where the 20-yr mean differences of the 20th (left) and 80th (right) percentiles are less than two times the standard deviation of model-estimated natural variability of 20-yr mean differences.

[PLACEHOLDER FOR SECOND ORDER DRAFT: Cross references to relevant sections of Chapters 9, 11, 12 and 14 for information regarding the evaluation of models in this region, the model spread in the context of other methods of projecting changes and the role of modes of variability and other climate phenomena.]

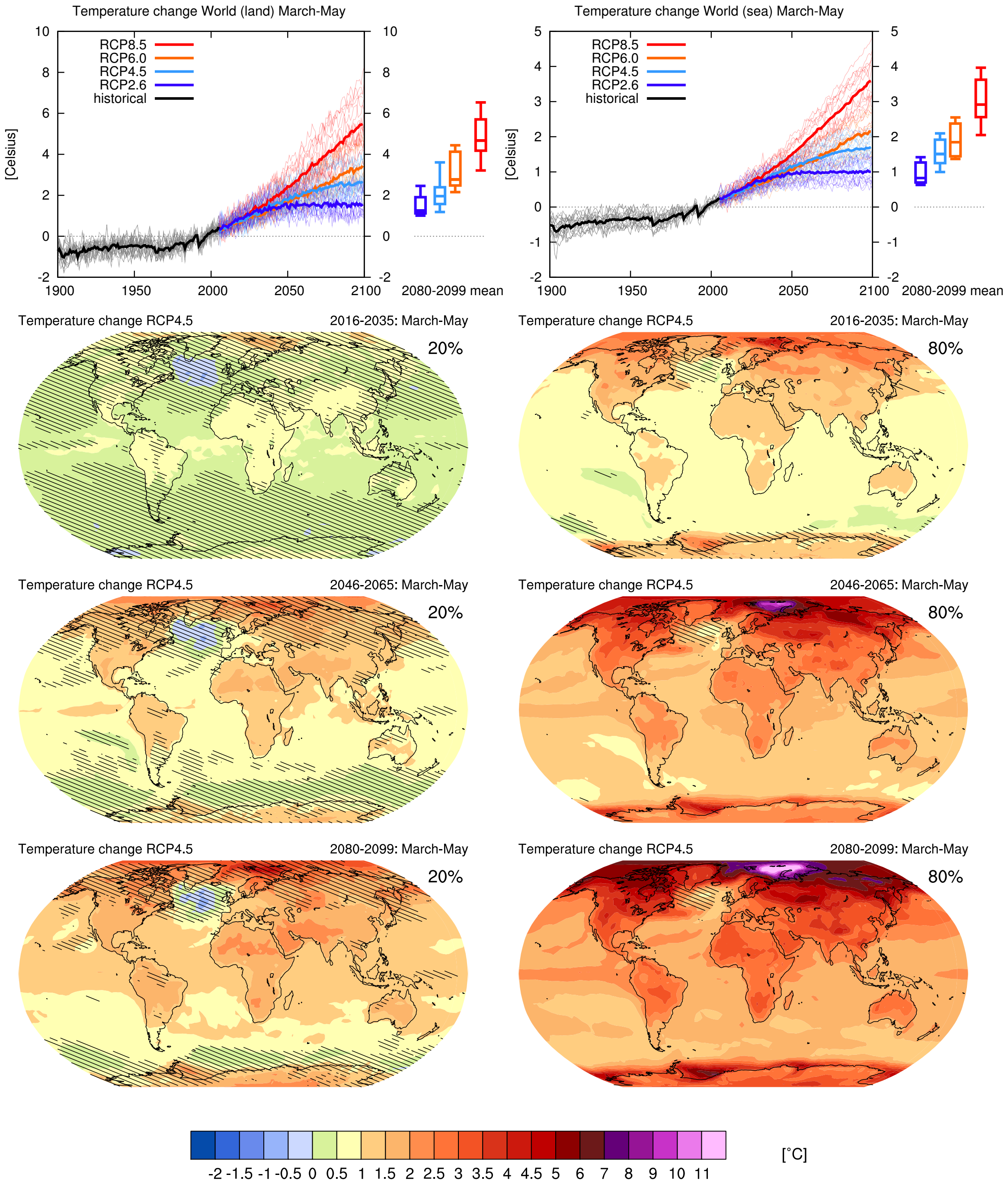


**Figure AI.5:** top left: time series of temperature averaged over land grid points over the globe in March–May. Top right: same for sea grid points. Thin lines denote one ensemble member per model, thick lines the partial CMIP5 multi-model mean. On the right-hand side the 5th, 25th, 50th (median), 75th and 95th percentiles of the distribution of 20-yr mean changes are given for the period 2080–2099 (relative to 1986–2005) for the four RCP scenarios.

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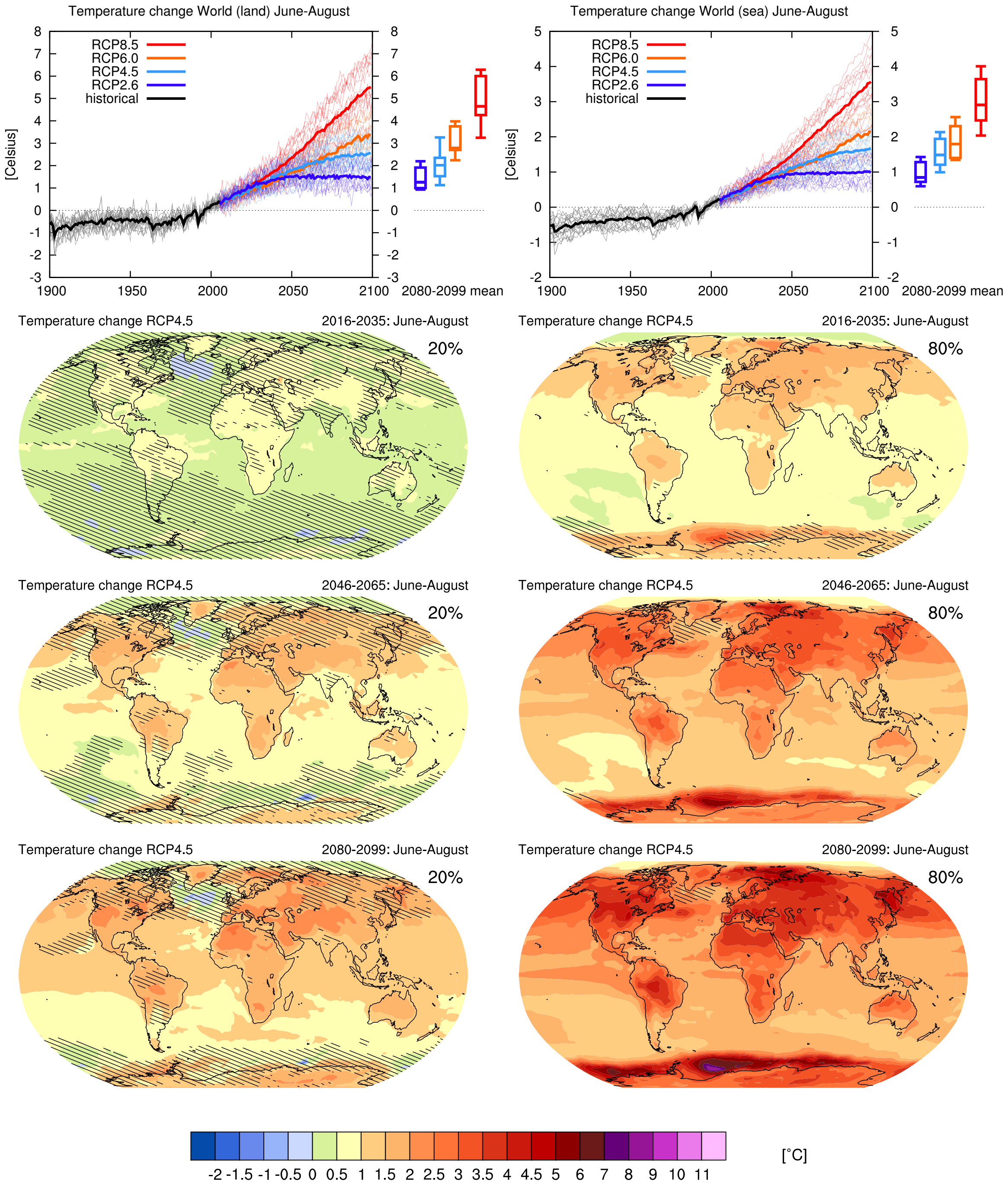


**Figure AI.6:** top left: time series of temperature averaged over land grid points over the globe in June–August. Top right: same for sea grid points. Thin lines denote one ensemble member per model, thick lines the partial CMIP5 multi-model mean. On the right-hand side the 5th, 25th, 50th (median), 75th and 95th percentiles of the distribution of 20-yr mean changes are given for the period 2080–2099 (relative to 1986–2005) for the four RCP scenarios.

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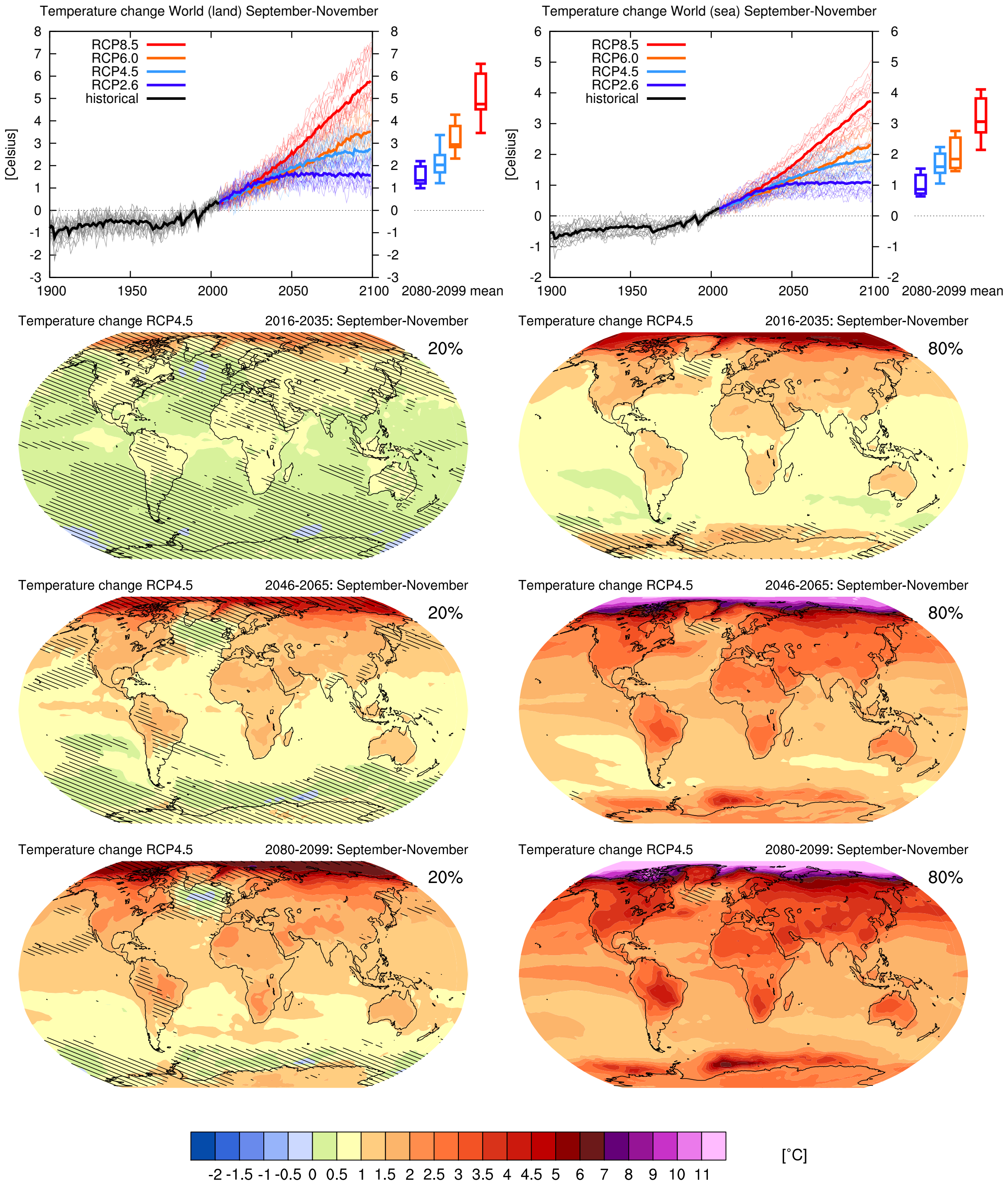


**Figure AI.7:** top left: time series of temperature averaged over land grid points over the globe in September–November. Top right: same for sea grid points. Thin lines denote one ensemble member per model, thick lines the partial CMIP5 multi-model mean. On the right-hand side the 5th, 25th, 50th (median), 75th and 95th percentiles of the distribution of 20-yr mean changes are given for the period 2080–2099 (relative to 1986–2005) for the four RCP scenarios.

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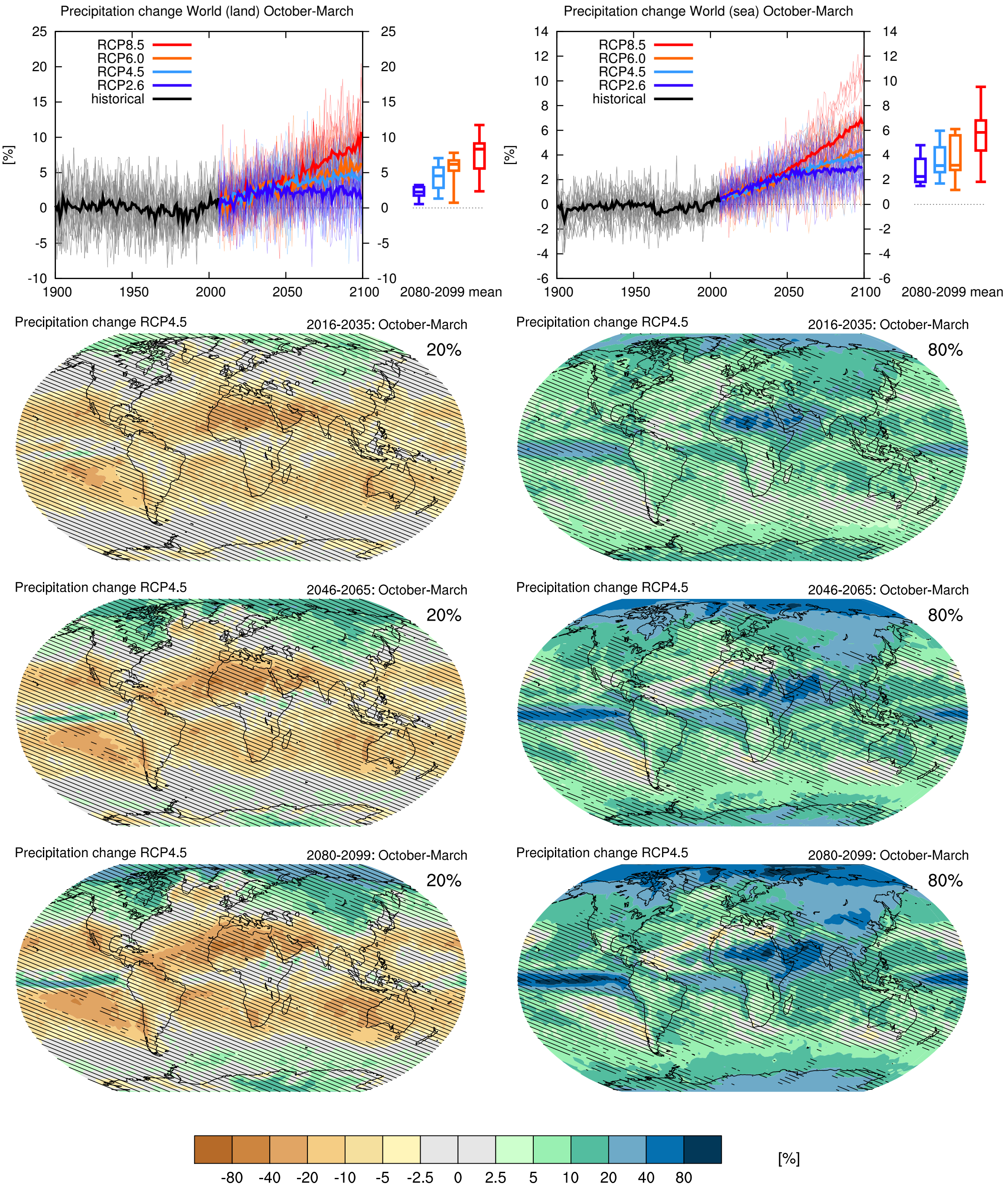


**Figure AI.8:** top left: time series of relative precipitation averaged over land grid points over the globe in October–March. Top right: same for sea grid points. Thin lines denote one ensemble member per model, thick lines the partial CMIP5 multi-model mean. On the right-hand side the 5th, 25th, 50th (median), 75th and 95th percentiles of the distribution of 20-yr mean changes are given for the period 2080–2099 (relative to 1986–2005) for the four RCP scenarios.

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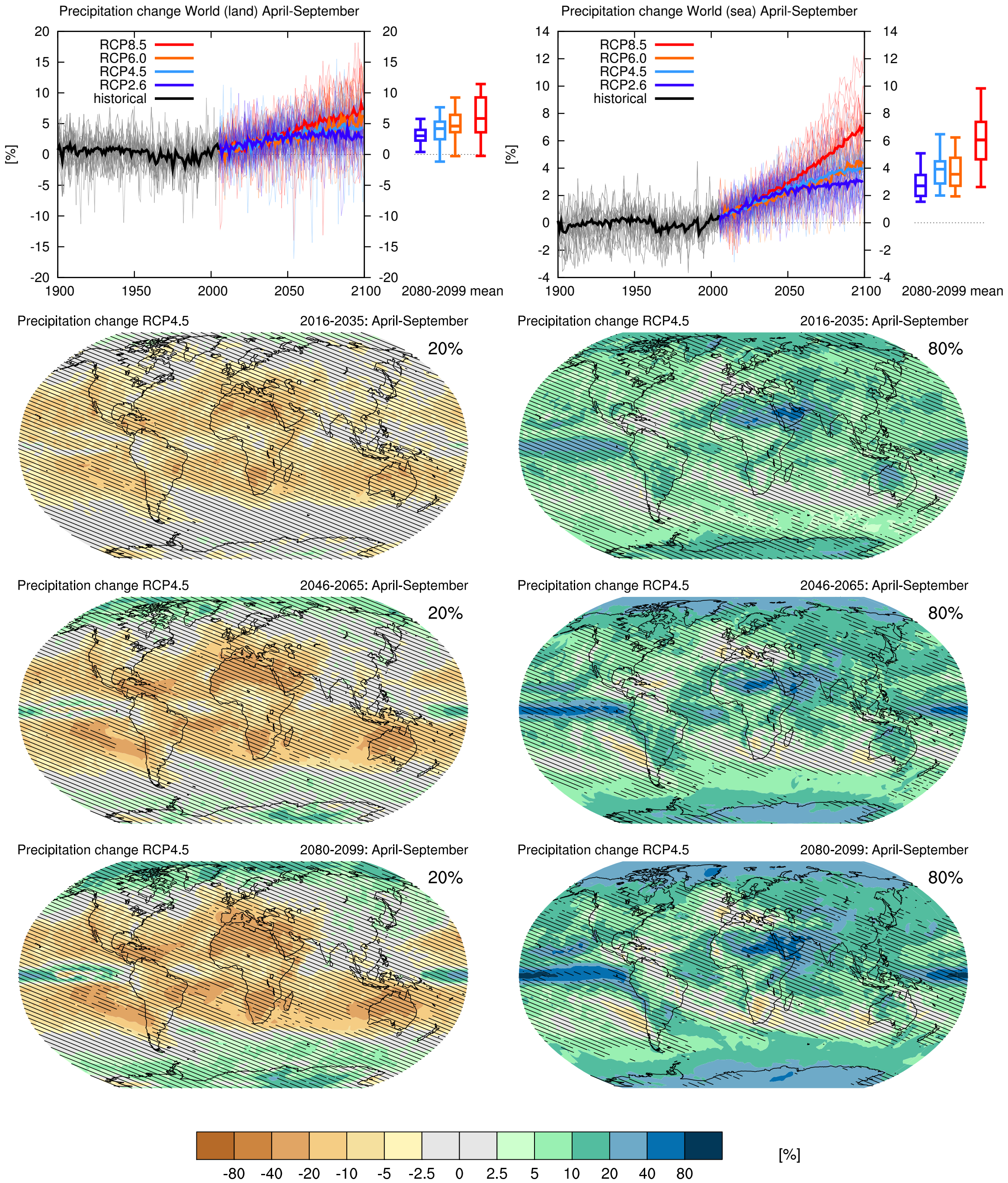


**Figure AI.9:** top left: time series of relative precipitation averaged over land grid points over the globe in April–September. Top right: same for sea grid points. Thin lines denote one ensemble member per model, thick lines the partial CMIP5 multi-model mean. On the right-hand side the 5th, 25th, 50th (median), 75th and 95th percentiles of the distribution of 20-yr mean changes are given for the period 2080–2099 (relative to 1986–2005) for the four RCP scenarios.

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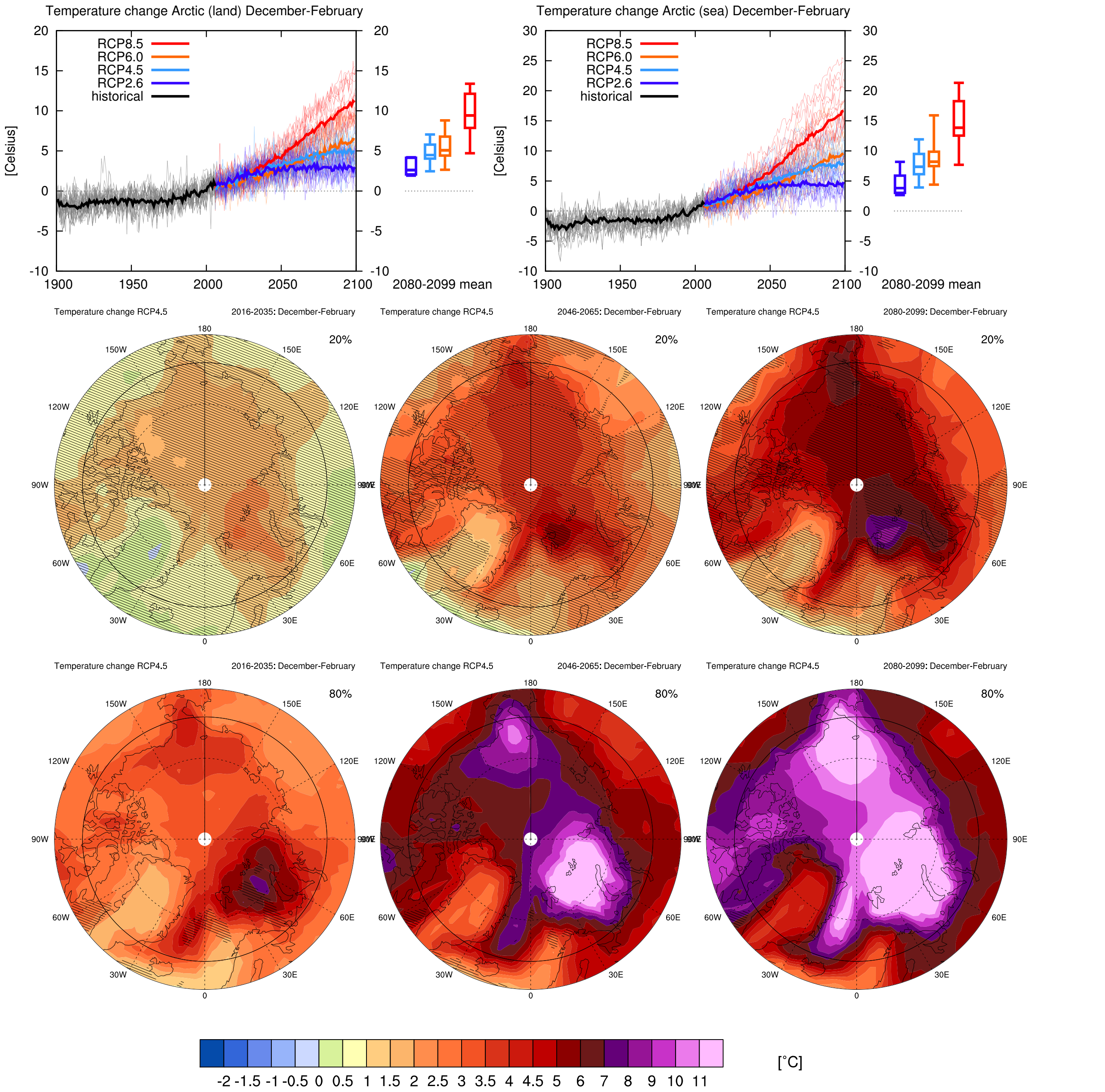


**Figure AI.10:** top left: time series of temperature averaged over land grid points in the Arctic (67.5°–90°N) in December–February. Top right: same for sea grid points. Thin lines denote one ensemble member per model, thick lines the partial CMIP5 multi-model mean. On the right-hand side the 5th, 25th, 50th (median), 75th and 95th percentiles of the distribution of 20-yr mean changes are given for the period 2080–2099 (relative to 1986–2005) for the four RCP scenarios.

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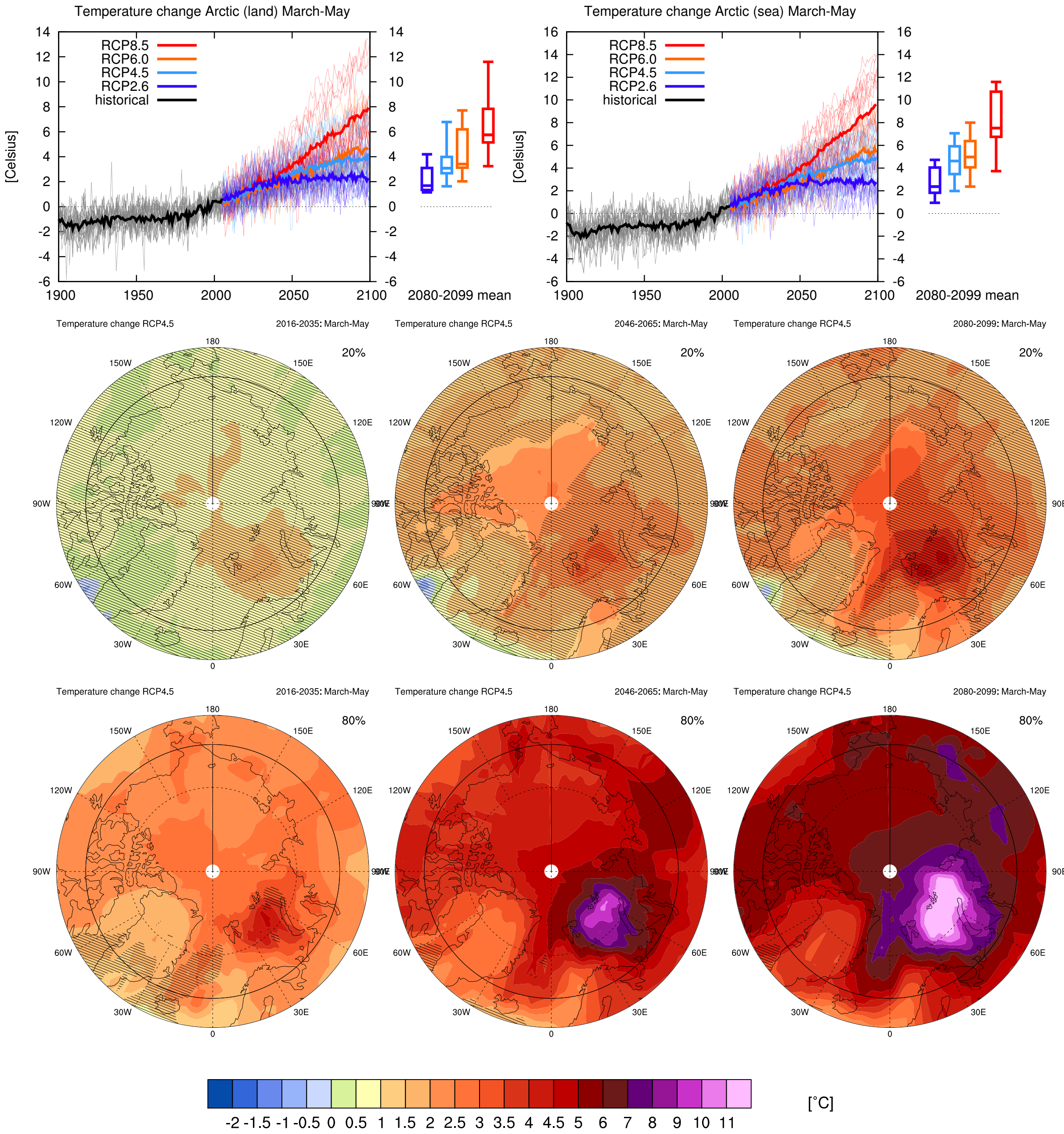


**Figure AI.11:** top left: time series of temperature averaged over land grid points in the Arctic (67.5°–90°N) in March–May. Top right: same for sea grid points. Thin lines denote one ensemble member per model, thick lines the partial CMIP5 multi-model mean. On the right-hand side the 5th, 25th, 50th (median), 75th and 95th percentiles of the distribution of 20-yr mean changes are given for the period 2080–2099 (relative to 1986–2005) for the four RCP scenarios.

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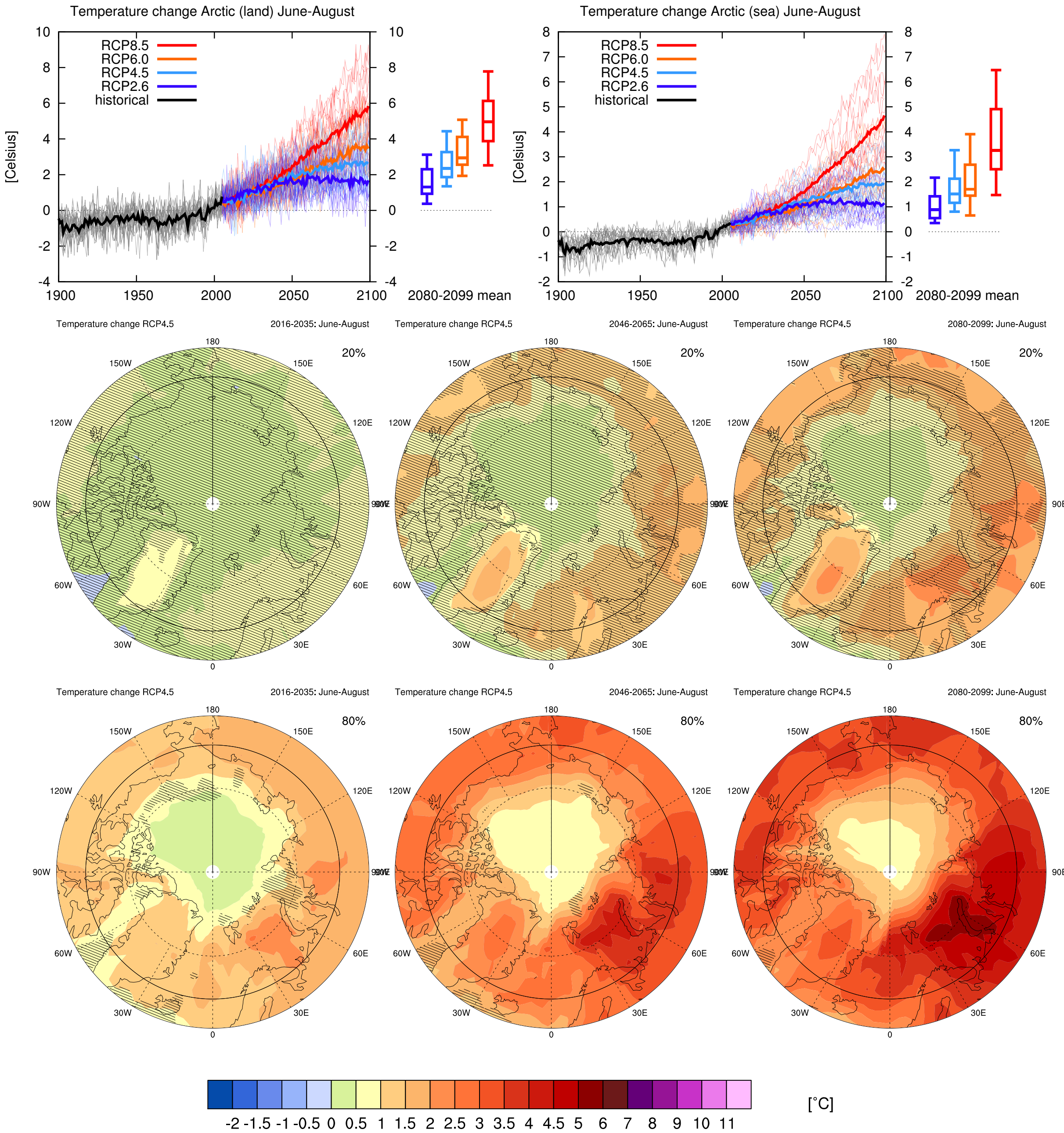


**Figure AI.12:** top left: time series of temperature averaged over land grid points in the Arctic (67.5°–90°N) in June–August. Top right: same for sea grid points. Thin lines denote one ensemble member per model, thick lines the partial CMIP5 multi-model mean. On the right-hand side the 5th, 25th, 50th (median), 75th and 95th percentiles of the distribution of 20-yr mean changes are given for the period 2080–2099 (relative to 1986–2005) for the four RCP scenarios.

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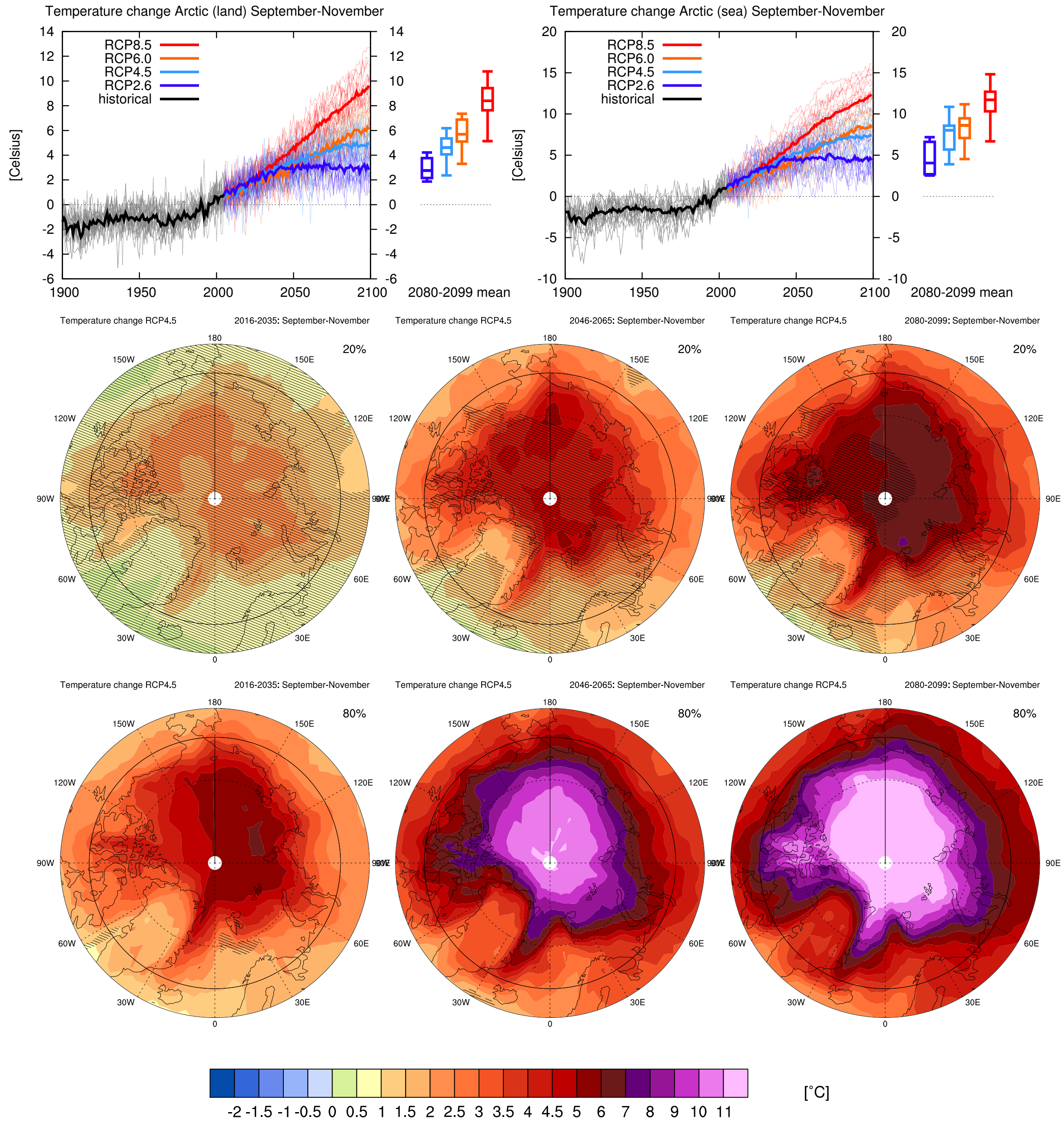


**Figure AI.13:** top left: time series of temperature averaged over land grid points in the Arctic (67.5°–90°N) in September–November. Top right: same for sea grid points. Thin lines denote one ensemble member per model, thick lines the partial CMIP5 multi-model mean. On the right-hand side the 5th, 25th, 50th (median), 75th and 95th percentiles of the distribution of 20-yr mean changes are given for the period 2080–2099 (relative to 1986–2005) for the four RCP scenarios.

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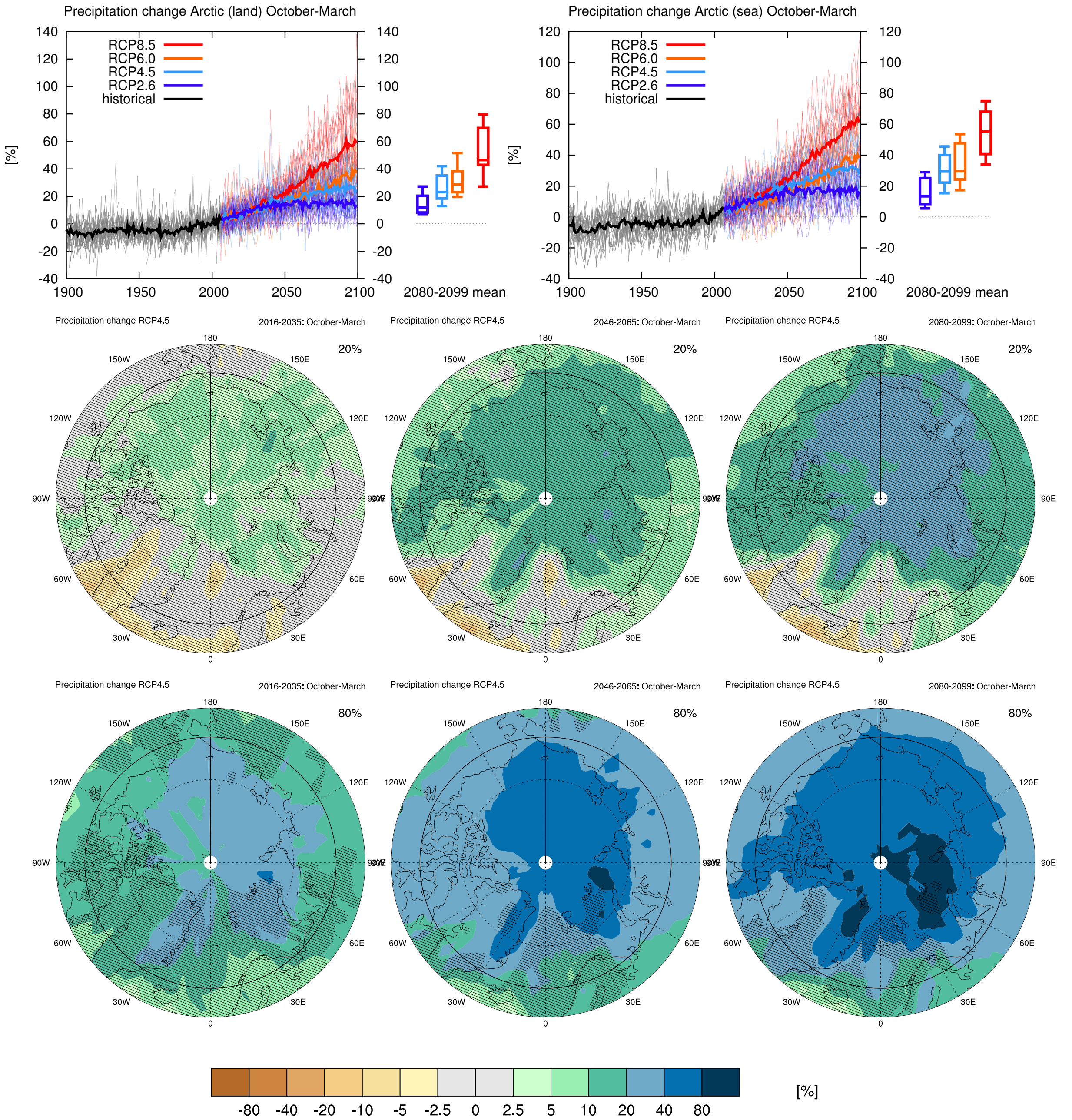


**Figure AI.14:** top left: time series of relative precipitation averaged over land grid points in the Arctic (67.5°–90°N) in October–March. Top right: same for sea grid points. Thin lines denote one ensemble member per model, thick lines the partial CMIP5 multi-model mean. On the right-hand side the 5th, 25th, 50th (median), 75th and 95th percentiles of the distribution of 20-yr mean changes are given for the period 2080–2099 (relative to 1986–2005) for the four RCP scenarios.

Below: maps of relative precipitation changes in 2016–2035, 2046–2065 and 2080–2099 with respect to 1986–2005 in the RCP4.5 scenario. For each point, the 20% and 80% percentile of the distribution of the partial CMIP5 ensemble are shown, this includes both natural variability and inter-model spread. Hatching denotes areas where the 20-yr mean differences of the 20th (top row) and 80th (bottom row) percentiles are less than two times the standard deviation of model-estimated natural variability of 20-yr mean differences.

[PLACEHOLDER FOR SECOND ORDER DRAFT: Cross references to relevant sections of Chapters 9, 11, 12 and 14 for information regarding the evaluation of models in this region, the model spread in the context of other methods of projecting changes and the role of modes of variability and other climate phenomena.]

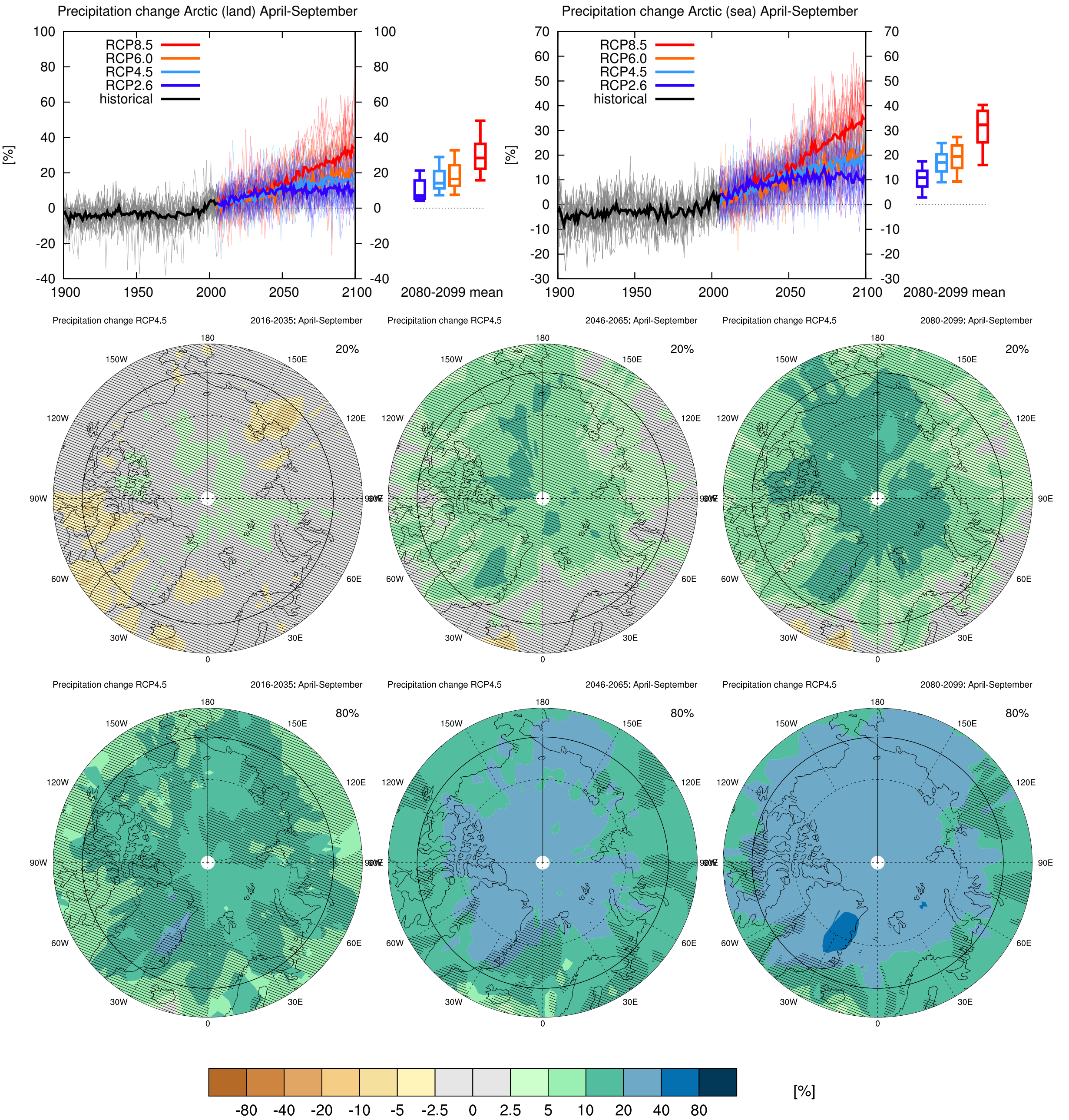


**Figure AI.15:** top left: time series of relative precipitation averaged over land grid points in the Arctic (67.5°–90°N) in April–September. Top right: same for sea grid points. Thin lines denote one ensemble member per model, thick lines the partial CMIP5 multi-model mean. On the right-hand side the 5th, 25th, 50th (median), 75th and 95th percentiles of the distribution of 20-yr mean changes are given for the period 2080–2099 (relative to 1986–2005) for the four RCP scenarios.

Below: maps of relative precipitation changes in 2016–2035, 2046–2065 and 2080–2099 with respect to 1986–2005 in the RCP4.5 scenario. For each point, the 20% and 80% percentile of the distribution of the partial CMIP5 ensemble are shown, this includes both natural variability and inter-model spread. Hatching denotes areas where the 20-yr mean differences of the 20th (top row) and 80th (bottom row) percentiles are less than two times the standard deviation of model-estimated natural variability of 20-yr mean differences.

[PLACEHOLDER FOR SECOND ORDER DRAFT: Cross references to relevant sections of Chapters 9, 11, 12 and 14 for information regarding the evaluation of models in this region, the model spread in the context of other methods of projecting changes and the role of modes of variability and other climate phenomena.]

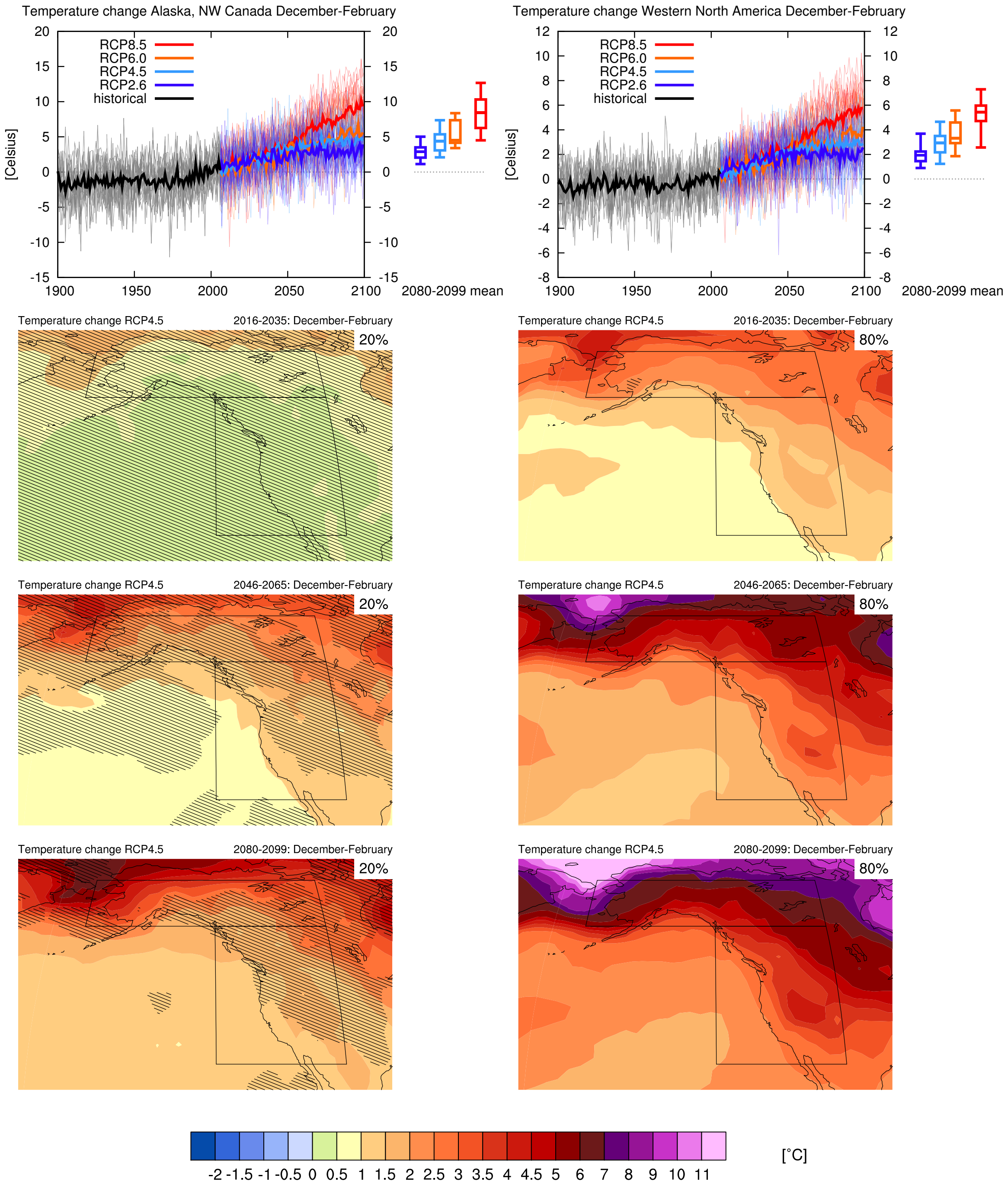


**Figure AI.16:** top left: time series of temperature averaged over land grid points in Alaska, NW Canada (57.5°–67.5°N, 170°–105°W) in December–February. Top right: same for land grid points in Western North America (30°–57.5°N, 135°–105°W). Thin lines denote one ensemble member per model, thick lines the partial CMIP5 multi-model mean. On the right-hand side the 5th, 25th, 50th (median), 75th and 95th percentiles of the distribution of 20-yr mean changes are given for the period 2080–2099 (relative to 1986–2005) for the four RCP scenarios.

Below: maps of temperature changes in 2016–2035, 2046–2065 and 2080–2099 with respect to 1986–2005 in the RCP4.5 scenario. For each point, the 20% and 80% percentile of the distribution of the partial CMIP5 ensemble are shown, this includes both natural variability and inter-model spread. Hatching denotes areas where the 20-yr mean differences of the 20th (left) and 80th (right) percentiles are less than two times the standard deviation of model-estimated natural variability of 20-yr mean differences.

[PLACEHOLDER FOR SECOND ORDER DRAFT: Cross references to relevant sections of Chapters 9, 11, 12 and 14 for information regarding the evaluation of models in this region, the model spread in the context of other methods of projecting changes and the role of modes of variability and other climate phenomena.]

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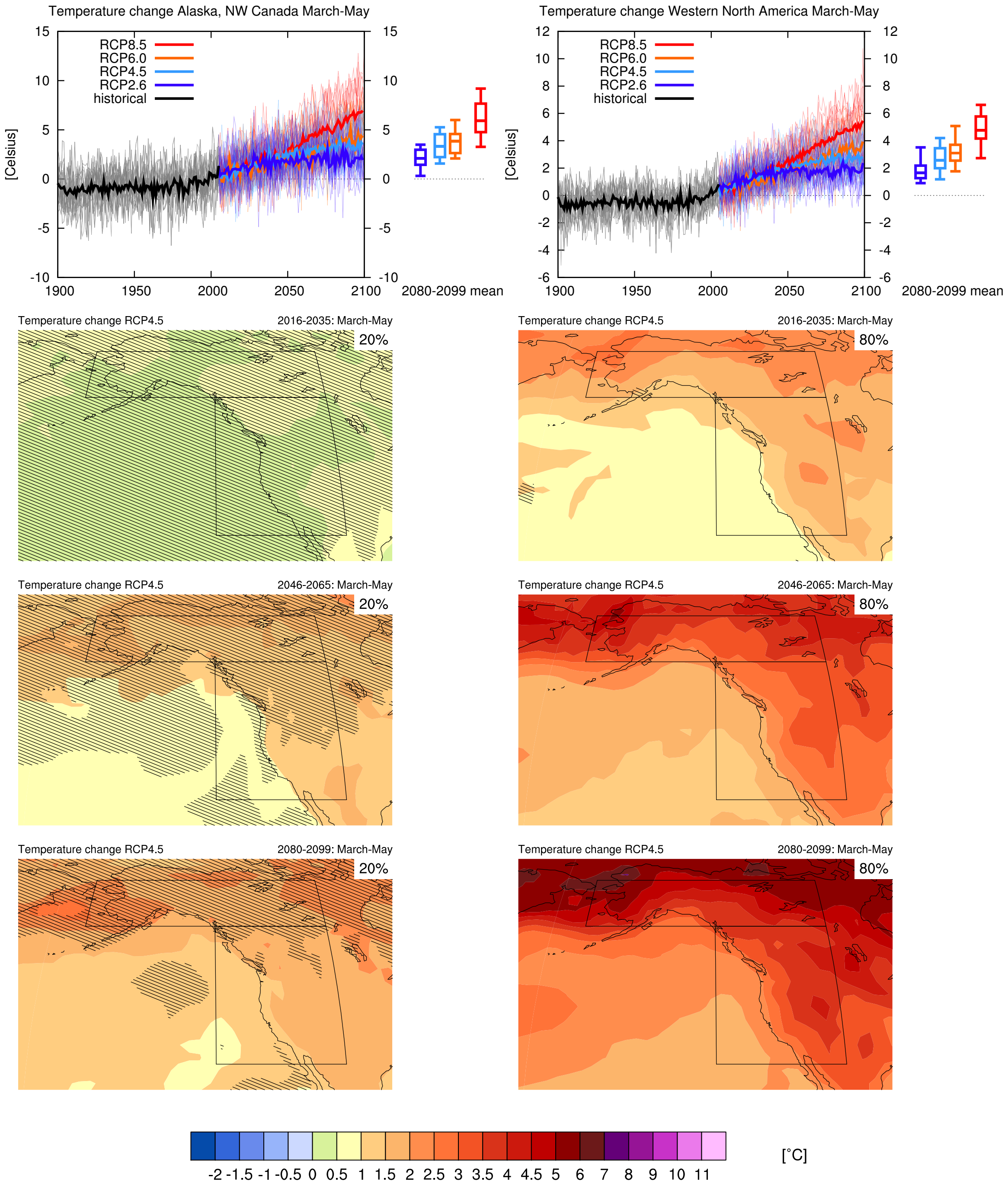


**Figure AI.17:** top left: time series of temperature averaged over land grid points in Alaska, NW Canada (57.5°–67.5°N, 170°–105°W) in March–May. Top right: same for land grid points in Western North America (30°–57.5°N, 135°–105°W). Thin lines denote one ensemble member per model, thick lines the partial CMIP5 multi-model mean. On the right-hand side the 5th, 25th, 50th (median), 75th and 95th percentiles of the distribution of 20-yr mean changes are given for the period 2080–2099 (relative to 1986–2005) for the four RCP scenarios.

Below: maps of temperature changes in 2016–2035, 2046–2065 and 2080–2099 with respect to 1986–2005 in the RCP4.5 scenario. For each point, the 20% and 80% percentile of the distribution of the partial CMIP5 ensemble are shown, this includes both natural variability and inter-model spread. Hatching denotes areas where the 20-yr mean differences of the 20th (left) and 80th (right) percentiles are less than two times the standard deviation of model-estimated natural variability of 20-yr mean differences.

[PLACEHOLDER FOR SECOND ORDER DRAFT: Cross references to relevant sections of Chapters 9, 11, 12 and 14 for information regarding the evaluation of models in this region, the model spread in the context of other methods of projecting changes and the role of modes of variability and other climate phenomena.]

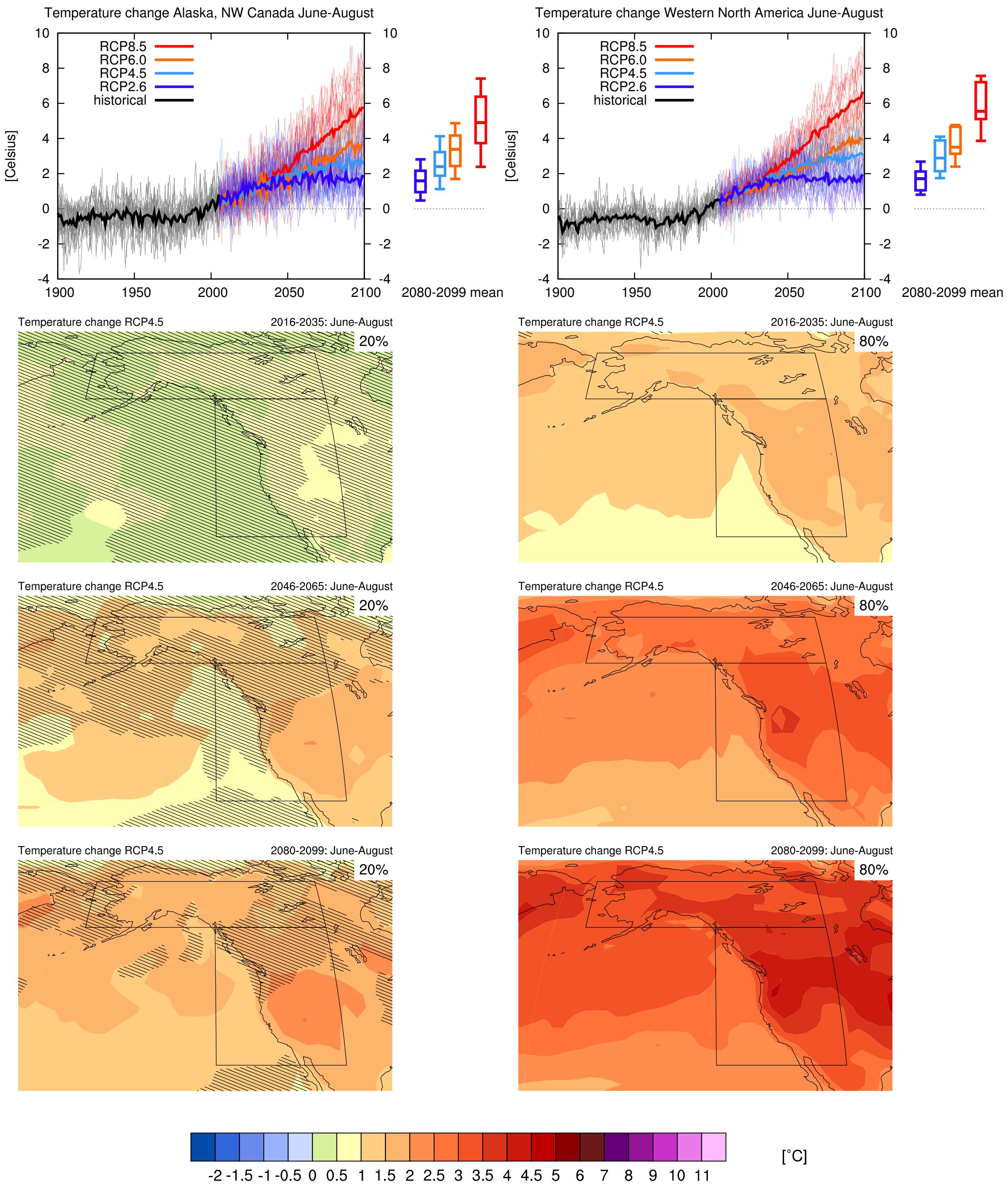


**Figure AI.18:** top left: time series of temperature averaged over land grid points in Alaska, NW Canada (57.5°–67.5°N, 170°–105°W) in June–August. Top right: same for land grid points in Western North America (30°–57.5°N, 135°–105°W). Thin lines denote one ensemble member per model, thick lines the partial CMIP5 multi-model mean. On the right-hand side the 5th, 25th, 50th (median), 75th and 95th percentiles of the distribution of 20-yr mean changes are given for the period 2080–2099 (relative to 1986–2005) for the four RCP scenarios.

Below: maps of temperature changes in 2016–2035, 2046–2065 and 2080–2099 with respect to 1986–2005 in the RCP4.5 scenario. For each point, the 20% and 80% percentile of the distribution of the partial CMIP5 ensemble are shown, this includes both natural variability and inter-model spread. Hatching denotes areas where the 20-yr mean differences of the 20th (left) and 80th (right) percentiles are less than two times the standard deviation of model-estimated natural variability of 20-yr mean differences.

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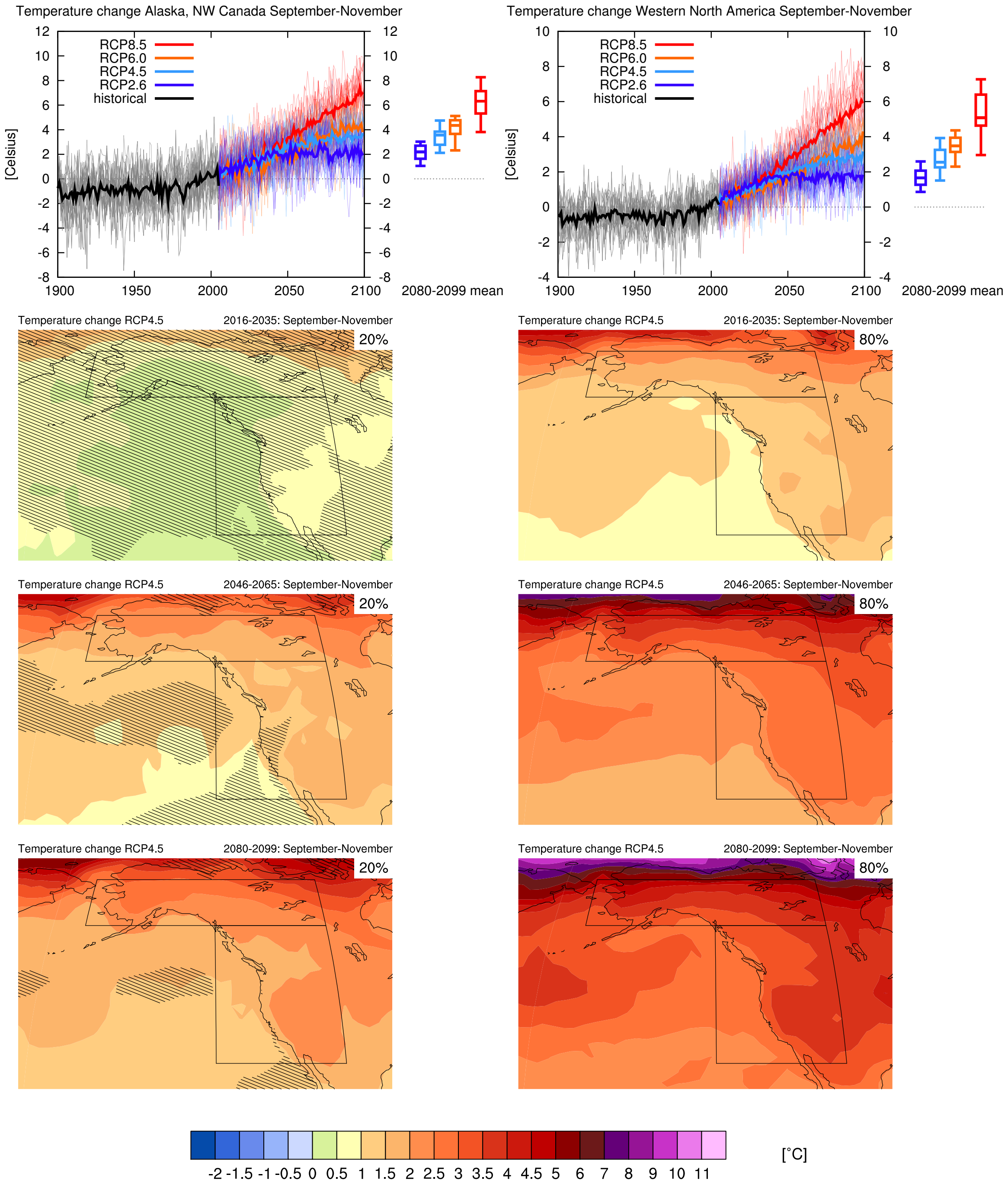


**Figure AI.19:** top left: time series of temperature averaged over land grid points in Alaska, NW Canada (57.5°–67.5°N, 170°–105°W) in September–November. Top right: same for land grid points in Western North America (30°–57.5°N, 135°–105°W). Thin lines denote one ensemble member per model, thick lines the partial CMIP5 multi-model mean. On the right-hand side the 5th, 25th, 50th (median), 75th and 95th percentiles of the distribution of 20-yr mean changes are given for the period 2080–2099 (relative to 1986–2005) for the four RCP scenarios.

Below: maps of temperature changes in 2016–2035, 2046–2065 and 2080–2099 with respect to 1986–2005 in the RCP4.5 scenario. For each point, the 20% and 80% percentile of the distribution of the partial CMIP5 ensemble are shown, this includes both natural variability and inter-model spread. Hatching denotes areas where the 20-yr mean differences of the 20th (left) and 80th (right) percentiles are less than two times the standard deviation of model-estimated natural variability of 20-yr mean differences.

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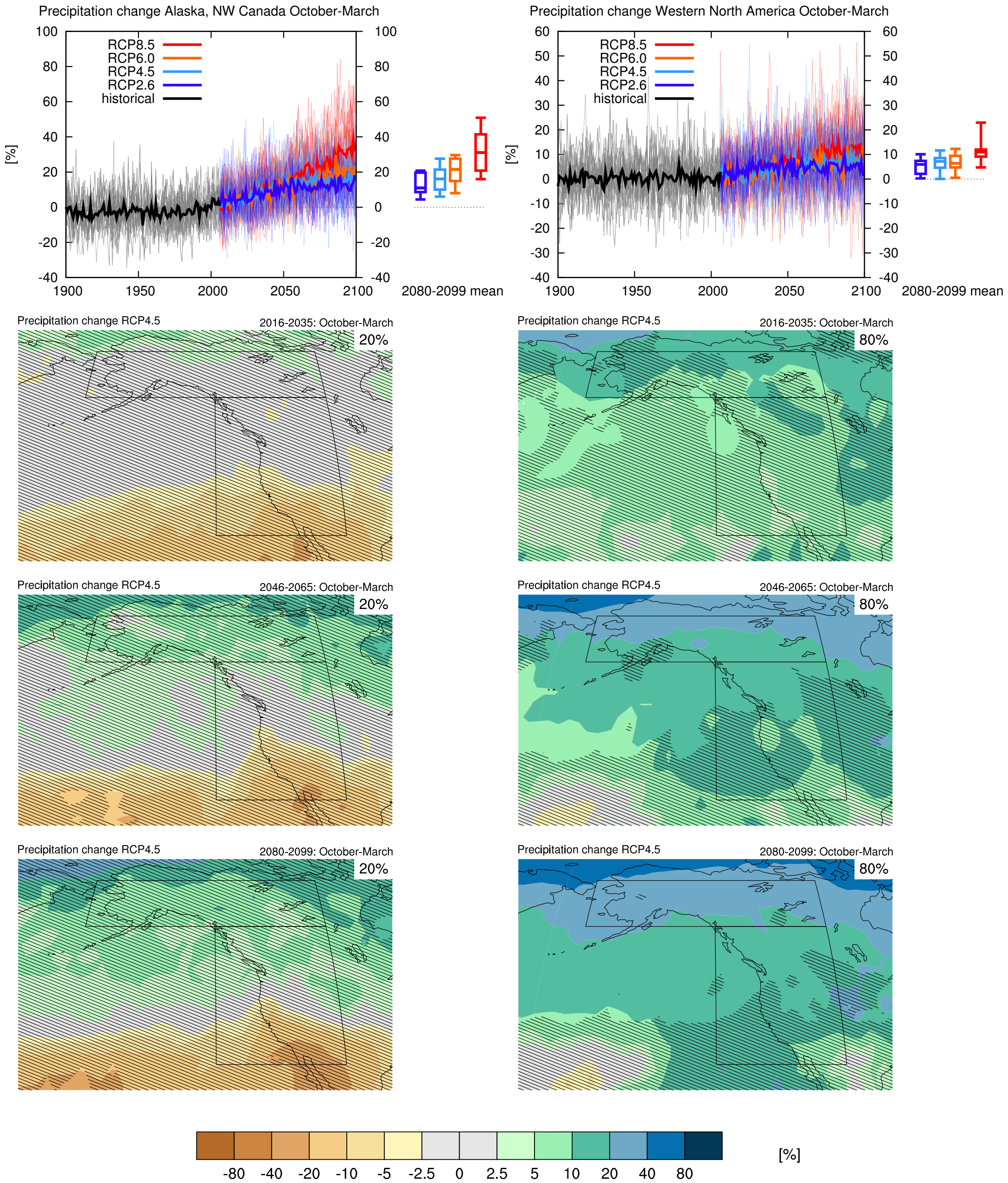


**Figure AI.20:** top left: time series of relative precipitation averaged over land grid points in Alaska, NW Canada (57.5°–67.5°N, 170°–105°W) in October–March. Top right: same for land grid points in Western North America (30°–57.5°N, 135°–105°W). Thin lines denote one ensemble member per model, thick lines the partial CMIP5 multi-model mean. On the right-hand side the 5th, 25th, 50th (median), 75th and 95th percentiles of the distribution of 20-yr mean changes are given for the period 2080–2099 (relative to 1986–2005) for the four RCP scenarios.

Below: maps of relative precipitation changes in 2016–2035, 2046–2065 and 2080–2099 with respect to 1986–2005 in the RCP4.5 scenario. For each point, the 20% and 80% percentile of the distribution of the partial CMIP5 ensemble are shown, this includes both natural variability and inter-model spread. Hatching denotes areas where the 20-yr mean differences of the 20th (left) and 80th (right) percentiles are less than two times the standard deviation of model-estimated natural variability of 20-yr mean differences.

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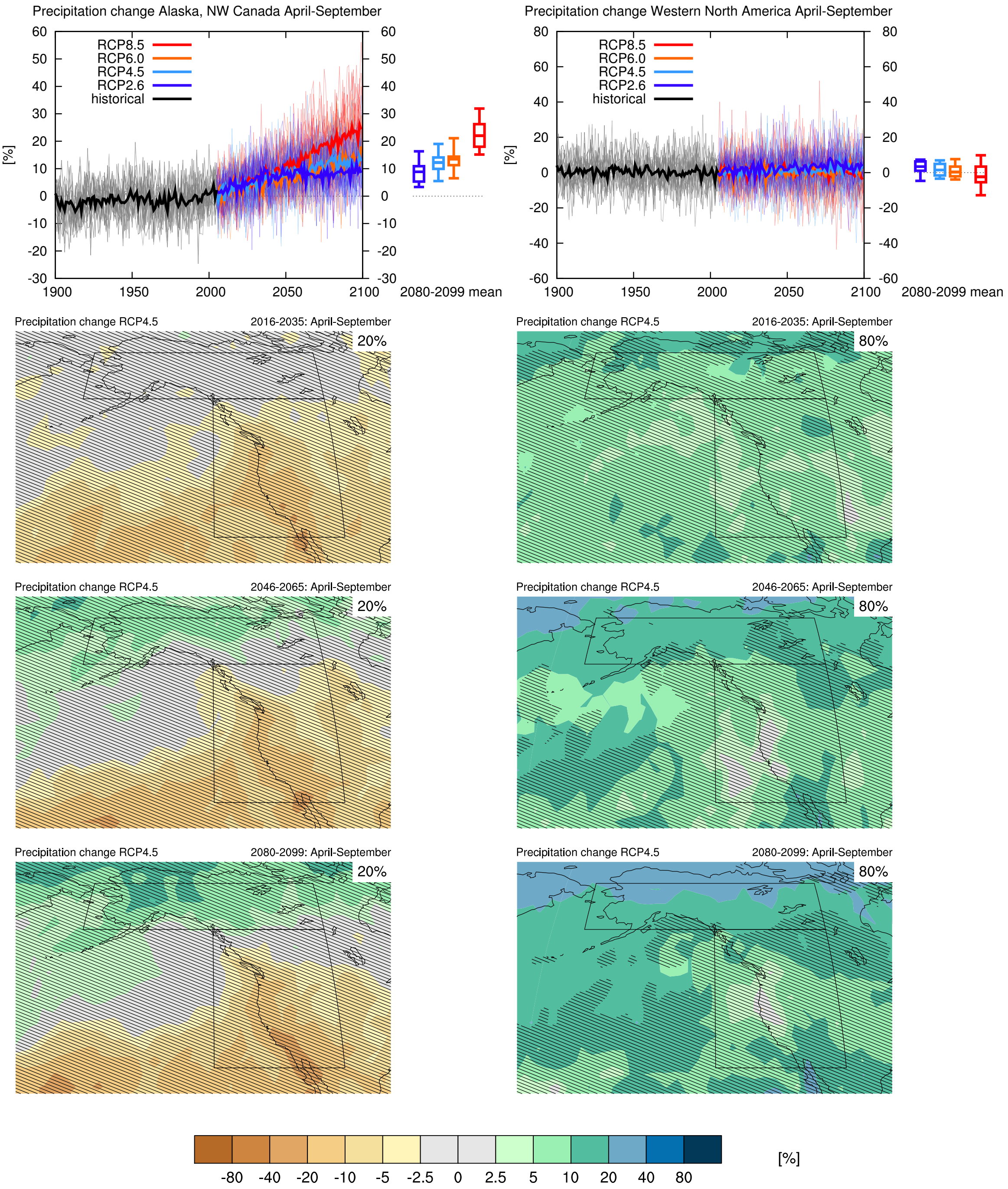


**Figure AI.21:** top left: time series of relative precipitation averaged over land grid points in Alaska, NW Canada (57.5°–67.5°N, 170°–105°W) in April–September. Top right: same for land grid points in Western North America (30°–57.5°N, 135°–105°W). Thin lines denote one ensemble member per model, thick lines the partial CMIP5 multi-model mean. On the right-hand side the 5th, 25th, 50th (median), 75th and 95th percentiles of the distribution of 20-yr mean changes are given for the period 2080–2099 (relative to 1986–2005) for the four RCP scenarios.

Below: maps of relative precipitation changes in 2016–2035, 2046–2065 and 2080–2099 with respect to 1986–2005 in the RCP4.5 scenario. For each point, the 20% and 80% percentile of the distribution of the partial CMIP5 ensemble are shown, this includes both natural variability and inter-model spread. Hatching denotes areas where the 20-yr mean differences of the 20th (left) and 80th (right) percentiles are less than two times the standard deviation of model-estimated natural variability of 20-yr mean differences.

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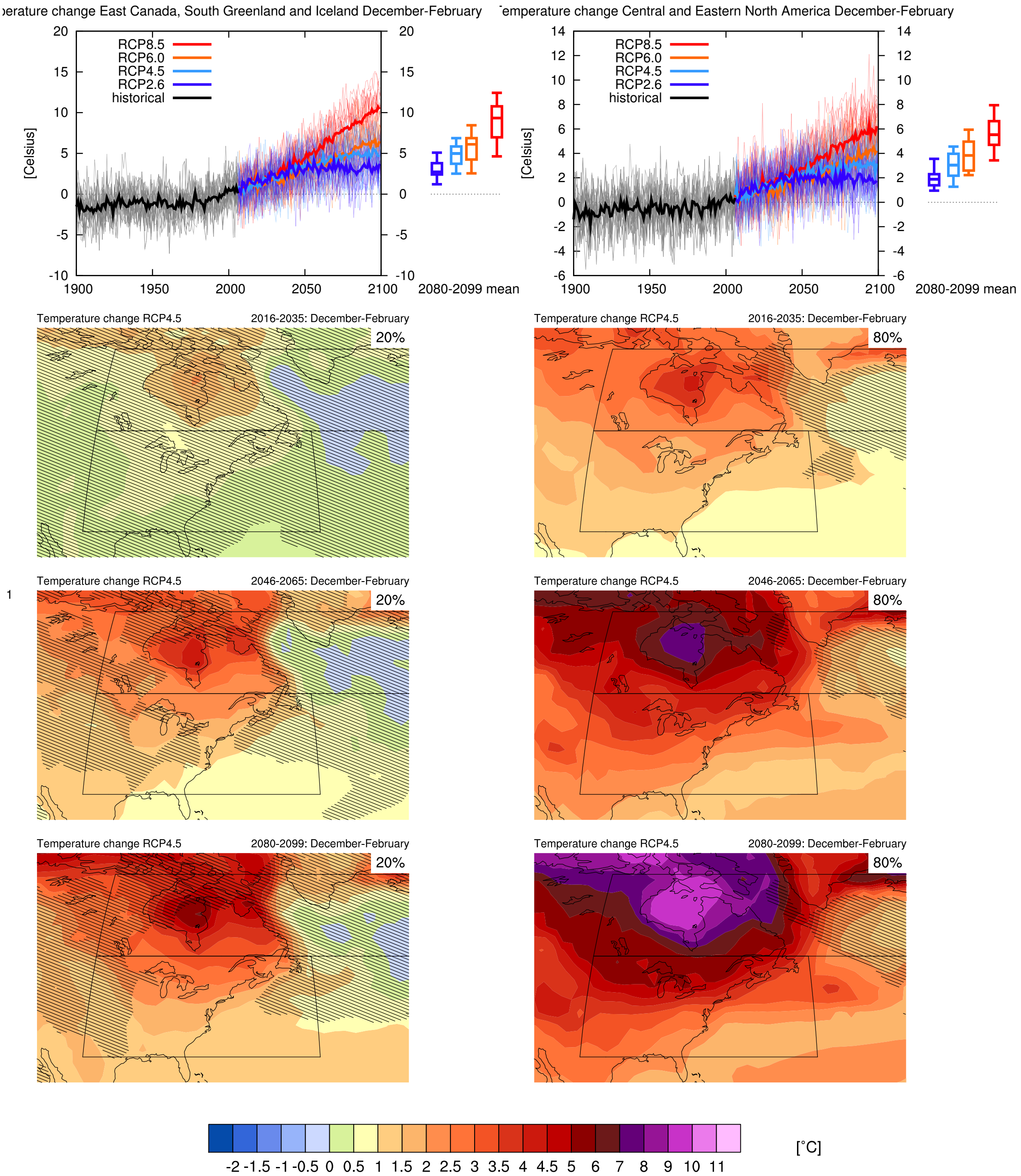


**Figure AI.22:** top left: time series of temperature averaged over land grid points in East Canada, South Greenland and Iceland (50°–67.5°N, 105°–10°W) in December–February. Top right: same for land grid points in Central and Eastern North America (30°–50°N, 105°–50°W). Thin lines denote one ensemble member per model, thick lines the partial CMIP5 multi-model mean. On the right-hand side the 5th, 25th, 50th (median), 75th and 95th percentiles of the distribution of 20-yr mean changes are given for the period 2080–2099 (relative to 1986–2005) for the four RCP scenarios.

Below: maps of temperature changes in 2016–2035, 2046–2065 and 2080–2099 with respect to 1986–2005 in the RCP4.5 scenario. For each point, the 20% and 80% percentile of the distribution of the partial CMIP5 ensemble are shown, this includes both natural variability and inter-model spread. Hatching denotes areas where the 20-yr mean differences of the 20th (left) and 80th (right) percentiles are less than two times the standard deviation of model-estimated natural variability of 20-yr mean differences.

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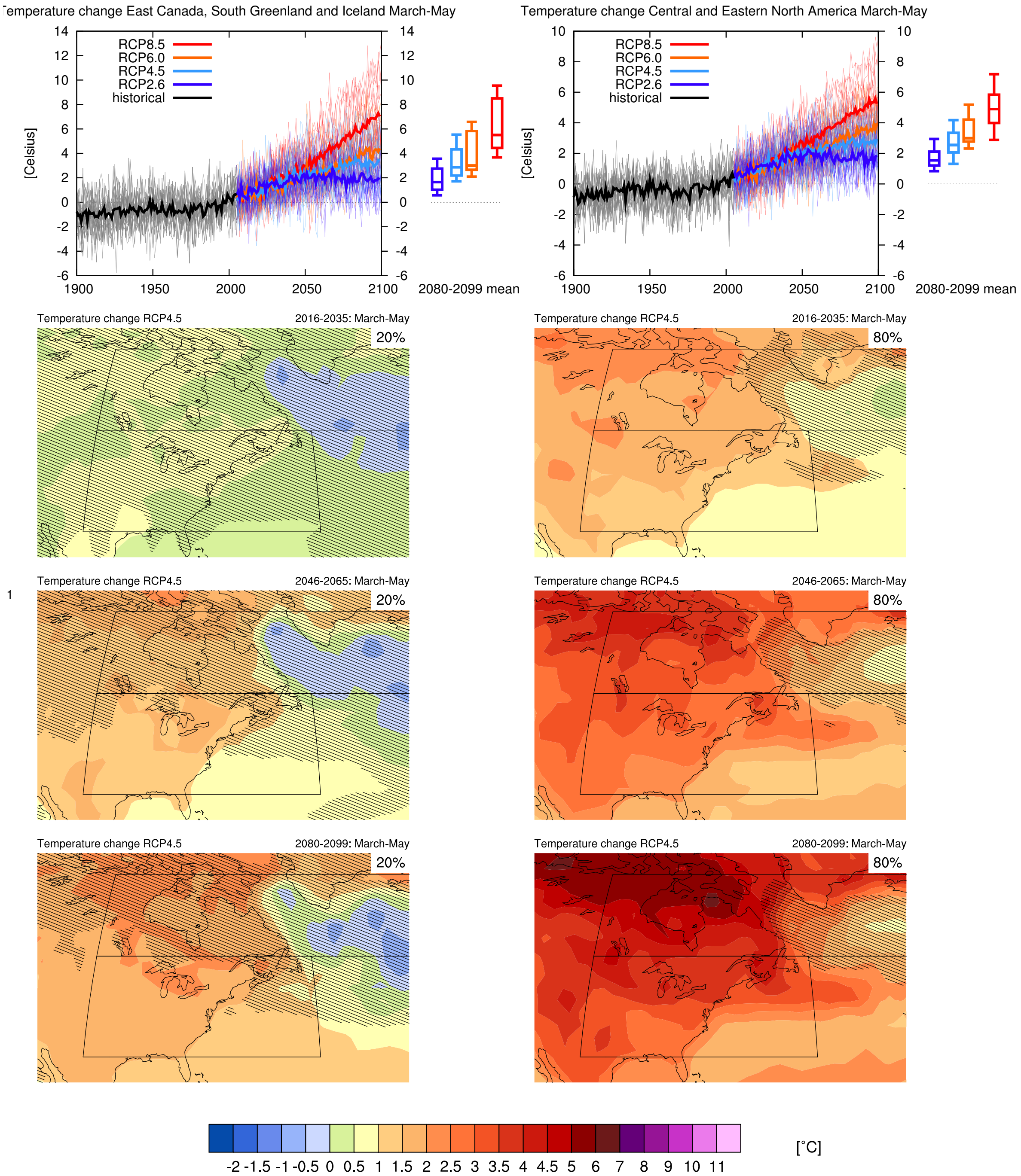


**Figure AI.23:** top left: time series of temperature averaged over land grid points in East Canada, South Greenland and Iceland (50°–67.5°N, 105°–10°W) in March–May. Top right: same for land grid points in Central and Eastern North America (30°–50°N, 105°–50°W). Thin lines denote one ensemble member per model, thick lines the partial CMIP5 multi-model mean. On the right-hand side the 5th, 25th, 50th (median), 75th and 95th percentiles of the distribution of 20-yr mean changes are given for the period 2080–2099 (relative to 1986–2005) for the four RCP scenarios.

Below: maps of temperature changes in 2016–2035, 2046–2065 and 2080–2099 with respect to 1986–2005 in the RCP4.5 scenario. For each point, the 20% and 80% percentile of the distribution of the partial CMIP5 ensemble are shown, this includes both natural variability and inter-model spread. Hatching denotes areas where the 20-yr mean differences of the 20th (left) and 80th (right) percentiles are less than two times the standard deviation of model-estimated natural variability of 20-yr mean differences.

[PLACEHOLDER FOR SECOND ORDER DRAFT: Cross references to relevant sections of Chapters 9, 11, 12 and 14 for information regarding the evaluation of models in this region, the model spread in the context of other methods of projecting changes and the role of modes of variability and other climate phenomena.]

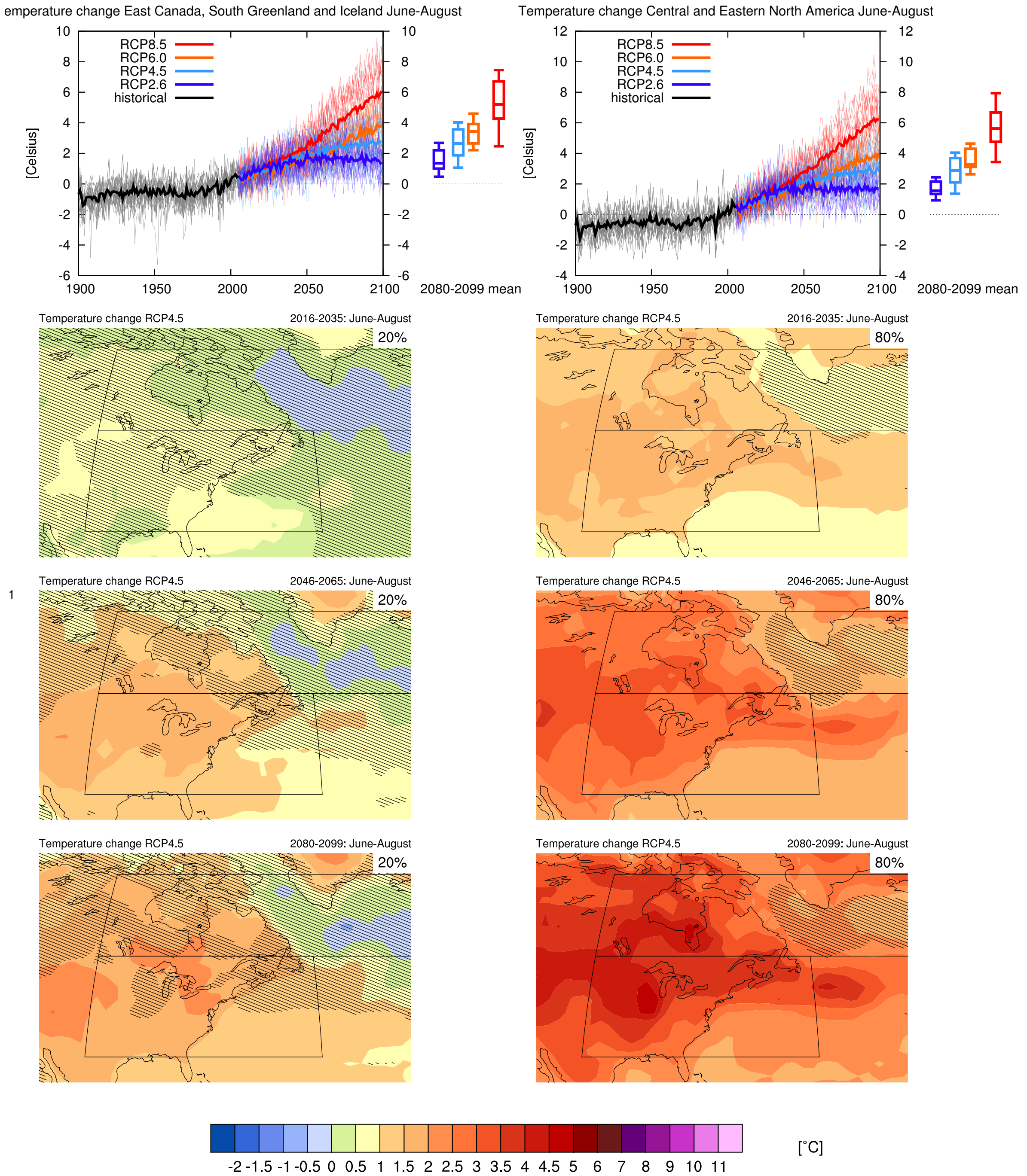


**Figure AI.24:** top left: time series of temperature averaged over land grid points in East Canada, South Greenland and Iceland (50°–67.5°N, 105°–10°W) in June–August. Top right: same for land grid points in Central and Eastern North America (30°–50°N, 105°–50°W). Thin lines denote one ensemble member per model, thick lines the partial CMIP5 multi-model mean. On the right-hand side the 5th, 25th, 50th (median), 75th and 95th percentiles of the distribution of 20-yr mean changes are given for the period 2080–2099 (relative to 1986–2005) for the four RCP scenarios.

Below: maps of temperature changes in 2016–2035, 2046–2065 and 2080–2099 with respect to 1986–2005 in the RCP4.5 scenario. For each point, the 20% and 80% percentile of the distribution of the partial CMIP5 ensemble are shown, this includes both natural variability and inter-model spread. Hatching denotes areas where the 20-yr mean differences of the 20th (left) and 80th (right) percentiles are less than two times the standard deviation of model-estimated natural variability of 20-yr mean differences.

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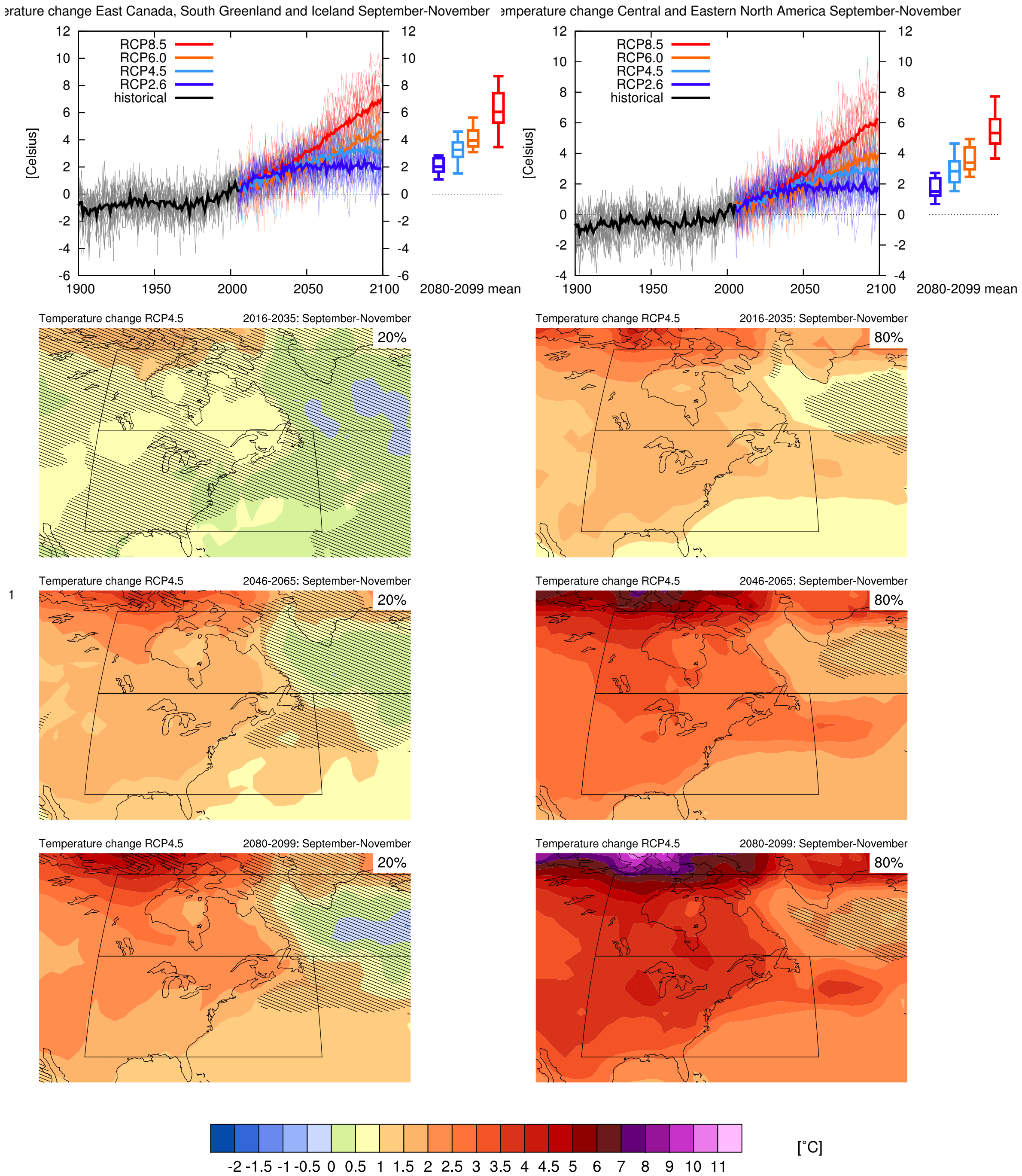


**Figure AI.25:** top left: time series of temperature averaged over land grid points in East Canada, South Greenland and Iceland (50°–67.5°N, 105°–10°W) in September–November. Top right: same for land grid points in Central and Eastern North America (30°–50°N, 105°–50°W). Thin lines denote one ensemble member per model, thick lines the partial CMIP5 multi-model mean. On the right-hand side the 5th, 25th, 50th (median), 75th and 95th percentiles of the distribution of 20-yr mean changes are given for the period 2080–2099 (relative to 1986–2005) for the four RCP scenarios.

Below: maps of temperature changes in 2016–2035, 2046–2065 and 2080–2099 with respect to 1986–2005 in the RCP4.5 scenario. For each point, the 20% and 80% percentile of the distribution of the partial CMIP5 ensemble are shown, this includes both natural variability and inter-model spread. Hatching denotes areas where the 20-yr mean differences of the 20th (left) and 80th (right) percentiles are less than two times the standard deviation of model-estimated natural variability of 20-yr mean differences.

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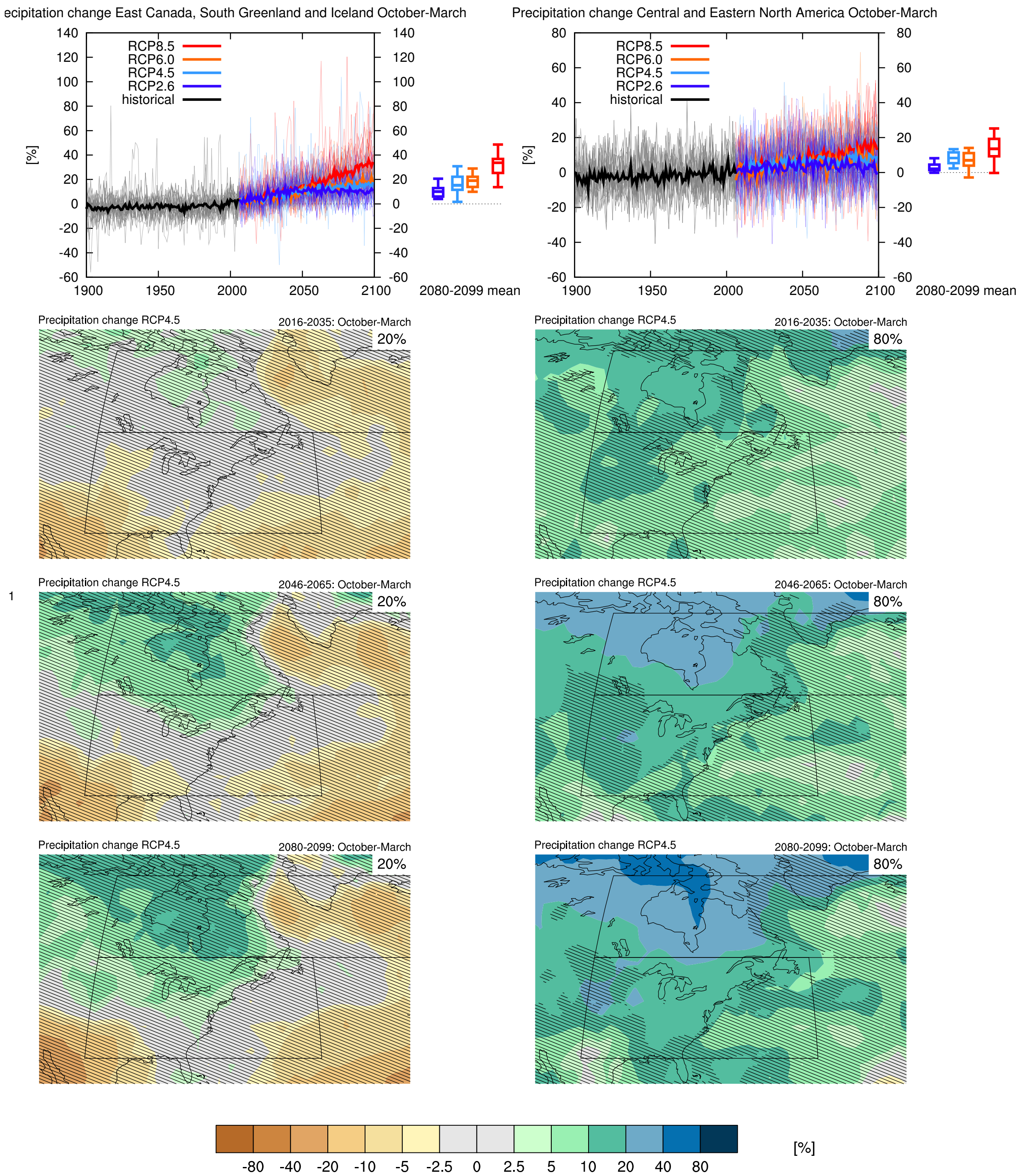


**Figure AI.26:** top left: time series of relative precipitation averaged over land grid points in East Canada, South Greenland and Iceland (50°–67.5°N, 105°–10°W) in October–March. Top right: same for land grid points in Central and Eastern North America (30°–50°N, 105°–50°W). Thin lines denote one ensemble member per model, thick lines the partial CMIP5 multi-model mean. On the right-hand side the 5th, 25th, 50th (median), 75th and 95th percentiles of the distribution of 20-yr mean changes are given for the period 2080–2099 (relative to 1986–2005) for the four RCP scenarios.

Below: maps of relative precipitation changes in 2016–2035, 2046–2065 and 2080–2099 with respect to 1986–2005 in the RCP4.5 scenario. For each point, the 20% and 80% percentile of the distribution of the partial CMIP5 ensemble are shown, this includes both natural variability and inter-model spread. Hatching denotes areas where the 20-yr mean differences of the 20th (left) and 80th (right) percentiles are less than two times the standard deviation of model-estimated natural variability of 20-yr mean differences.

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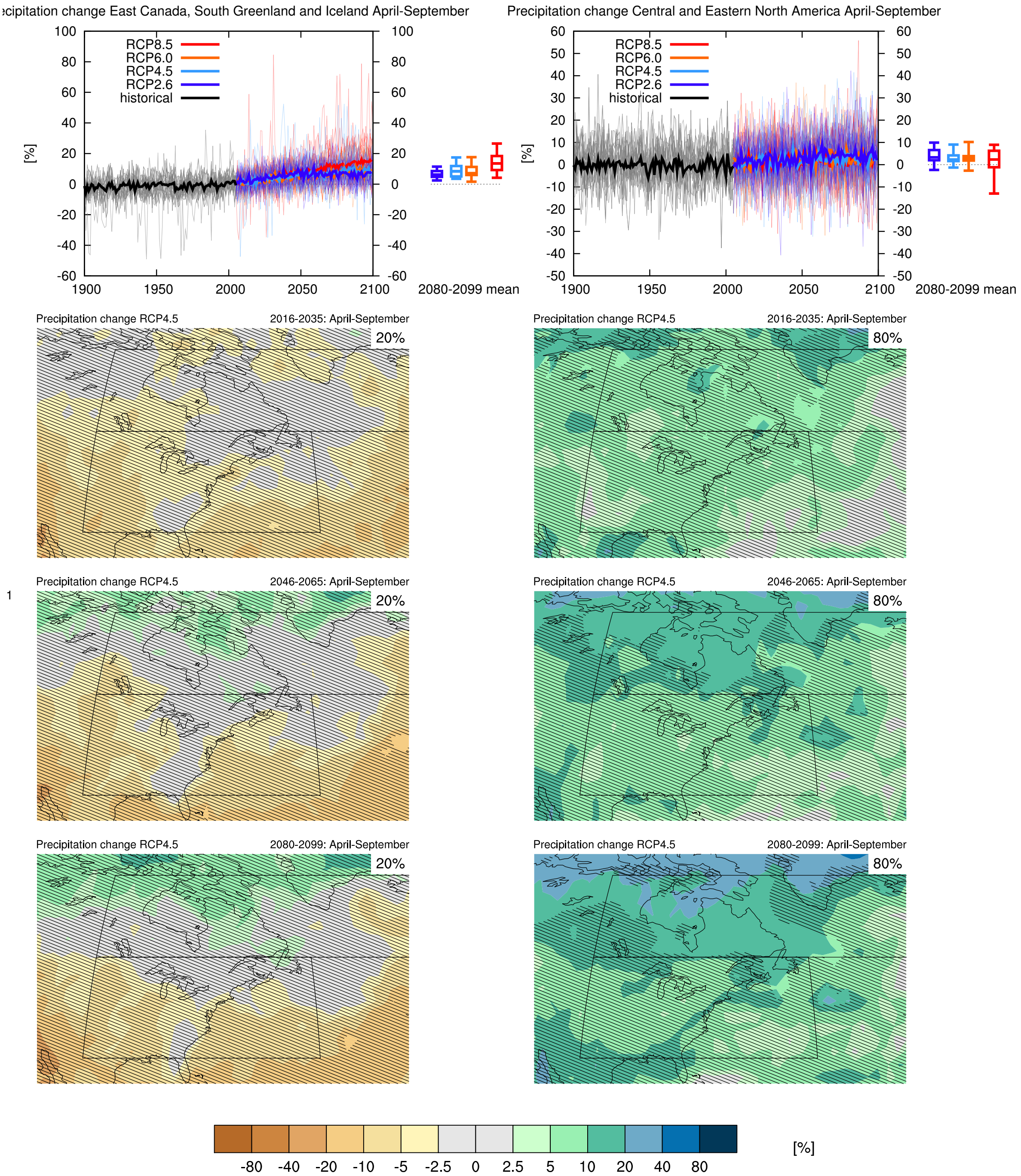


**Figure AI.27:** top left: time series of relative precipitation averaged over land grid points in East Canada, South Greenland and Iceland (50°–67.5°N, 105°–10°W) in April–September. Top right: same for land grid points in Central and Eastern North America (30°–50°N, 105°–50°W). Thin lines denote one ensemble member per model, thick lines the partial CMIP5 multi-model mean. On the right-hand side the 5th, 25th, 50th (median), 75th and 95th percentiles of the distribution of 20-yr mean changes are given for the period 2080–2099 (relative to 1986–2005) for the four RCP scenarios.

Below: maps of relative precipitation changes in 2016–2035, 2046–2065 and 2080–2099 with respect to 1986–2005 in the RCP4.5 scenario. For each point, the 20% and 80% percentile of the distribution of the partial CMIP5 ensemble are shown, this includes both natural variability and inter-model spread. Hatching denotes areas where the 20-yr mean differences of the 20th (left) and 80th (right) percentiles are less than two times the standard deviation of model-estimated natural variability of 20-yr mean differences.

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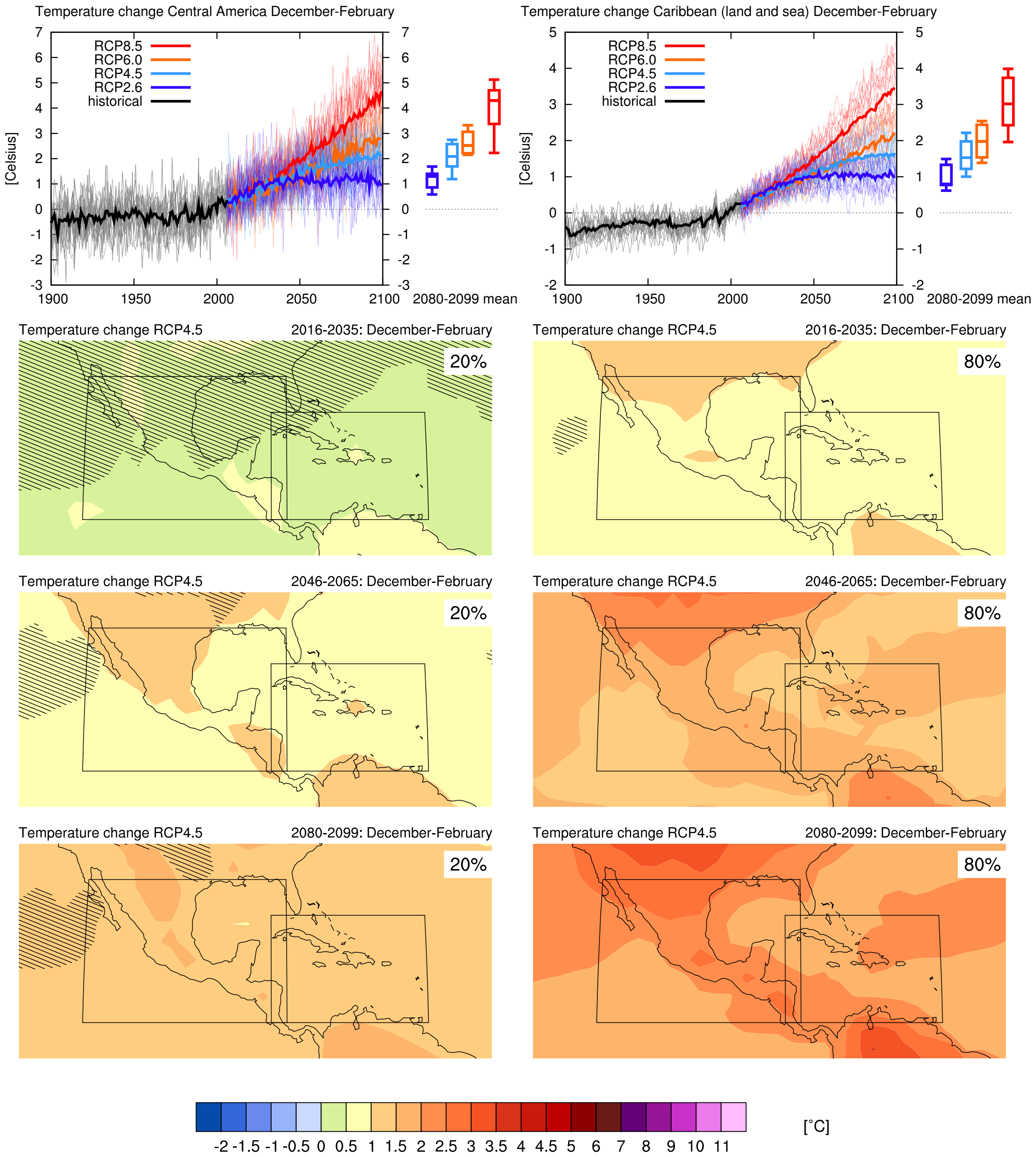


**Figure AI.28:** top left: time series of temperature averaged over land grid points in Central America (10°–30°N, 115°–82.5°W) in December–February. Top right: same for all grid points in Caribbean (land and sea) (10°–25°N, 85°–60°W). Thin lines denote one ensemble member per model, thick lines the partial CMIP5 multi-model mean. On the right-hand side the 5th, 25th, 50th (median), 75th and 95th percentiles of the distribution of 20-yr mean changes are given for the period 2080–2099 (relative to 1986–2005) for the four RCP scenarios.

Below: maps of temperature changes in 2016–2035, 2046–2065 and 2080–2099 with respect to 1986–2005 in the RCP4.5 scenario. For each point, the 20% and 80% percentile of the distribution of the partial CMIP5 ensemble are shown, this includes both natural variability and inter-model spread. Hatching denotes areas where the 20-yr mean differences of the 20th (left) and 80th (right) percentiles are less than two times the standard deviation of model-estimated natural variability of 20-yr mean differences.

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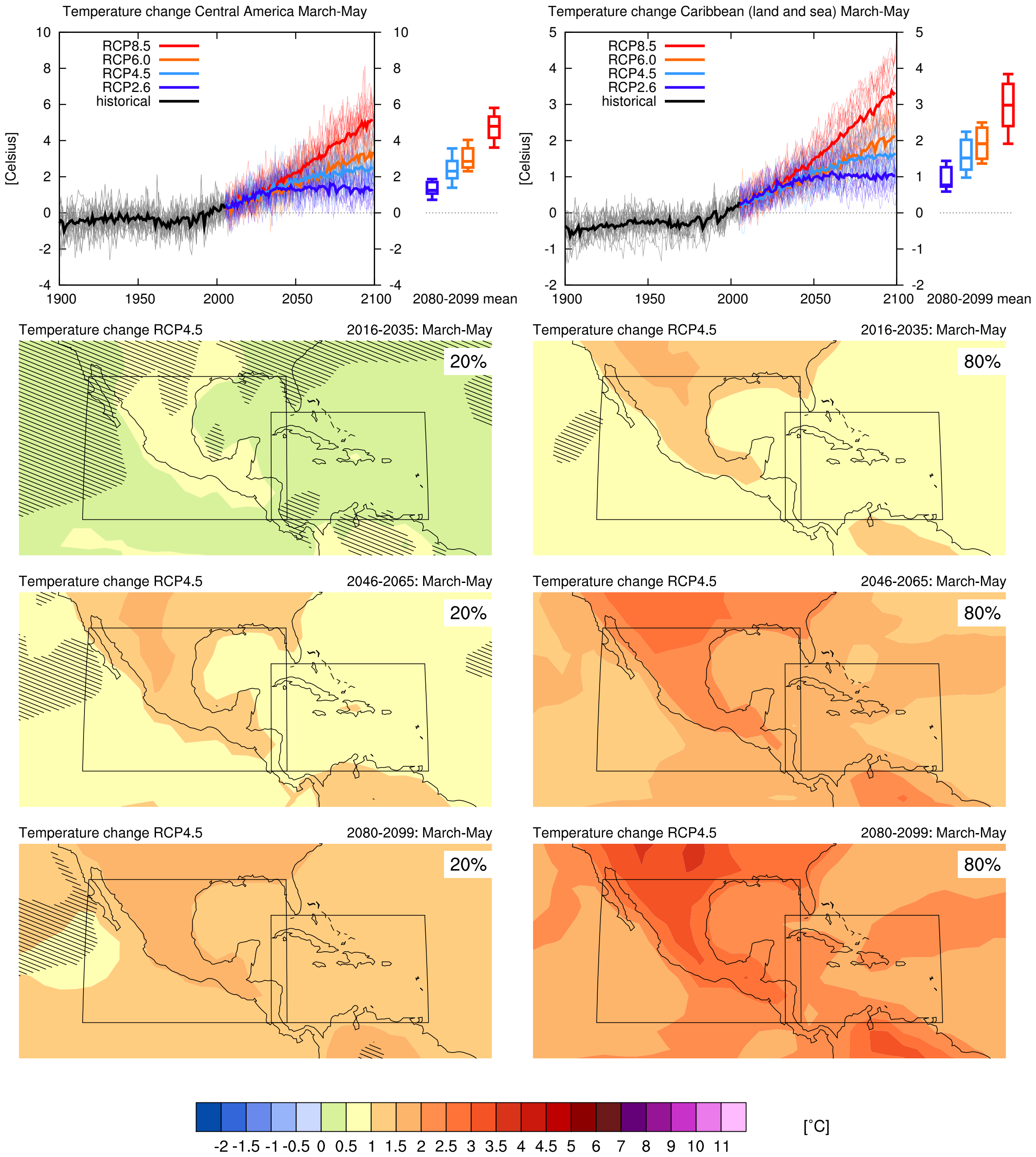


**Figure AI.29:** top left: time series of temperature averaged over land grid points in Central America (10°–30°N, 115°–82.5°W) in March–May. Top right: same for all grid points in Caribbean (land and sea) (10°–25°N, 85°–60°W). Thin lines denote one ensemble member per model, thick lines the partial CMIP5 multi-model mean. On the right-hand side the 5th, 25th, 50th (median), 75th and 95th percentiles of the distribution of 20-yr mean changes are given for the period 2080–2099 (relative to 1986–2005) for the four RCP scenarios.

Below: maps of temperature changes in 2016–2035, 2046–2065 and 2080–2099 with respect to 1986–2005 in the RCP4.5 scenario. For each point, the 20% and 80% percentile of the distribution of the partial CMIP5 ensemble are shown, this includes both natural variability and inter-model spread. Hatching denotes areas where the 20-yr mean differences of the 20th (left) and 80th (right) percentiles are less than two times the standard deviation of model-estimated natural variability of 20-yr mean differences.

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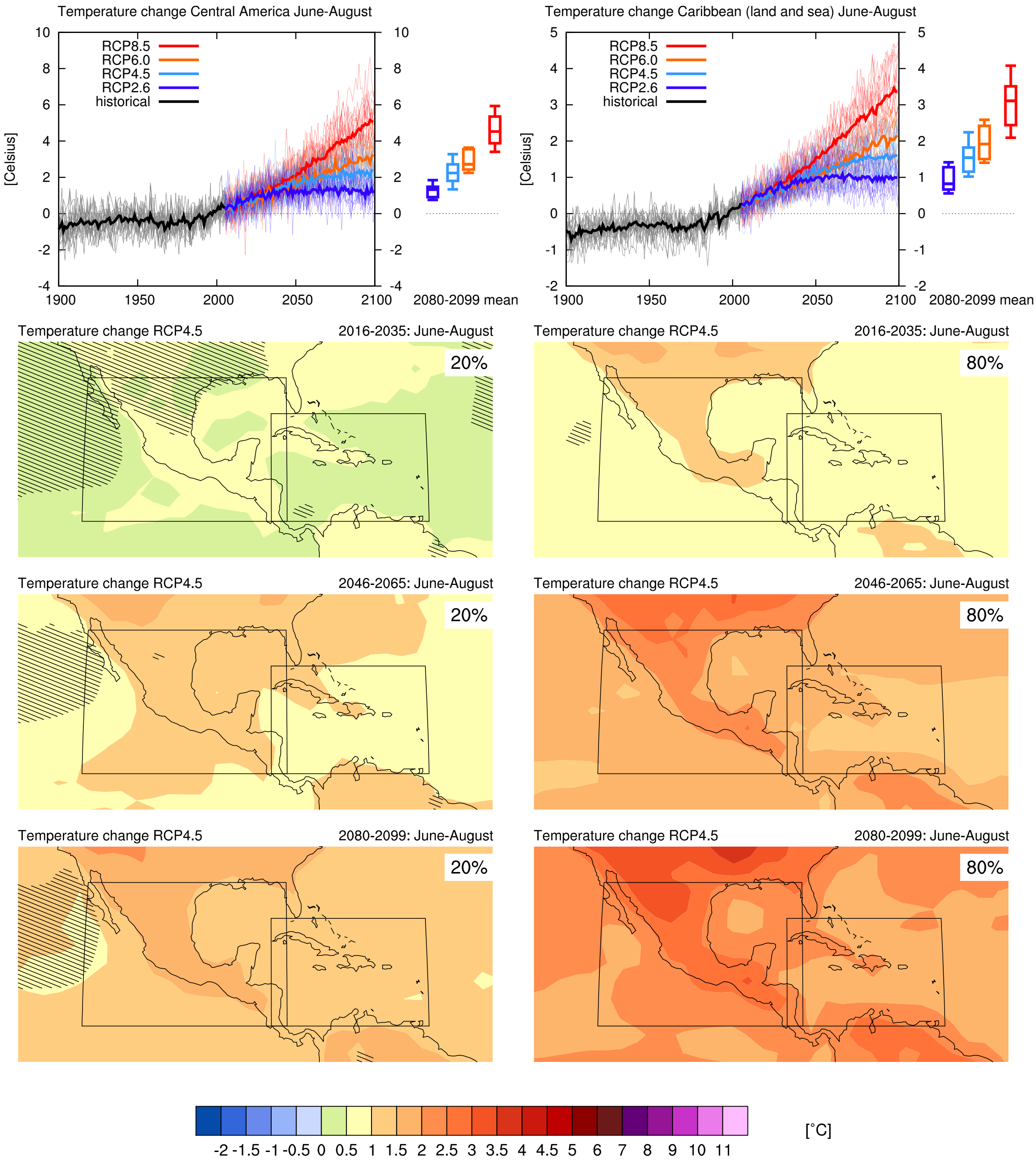


**Figure AI.30:** top left: time series of temperature averaged over land grid points in Central America (10°–30°N, 115°–82.5°W) in June–August. Top right: same for all grid points in Caribbean (land and sea) (10°–25°N, 85°–60°W). Thin lines denote one ensemble member per model, thick lines the partial CMIP5 multi-model mean. On the right-hand side the 5th, 25th, 50th (median), 75th and 95th percentiles of the distribution of 20-yr mean changes are given for the period 2080–2099 (relative to 1986–2005) for the four RCP scenarios.

Below: maps of temperature changes in 2016–2035, 2046–2065 and 2080–2099 with respect to 1986–2005 in the RCP4.5 scenario. For each point, the 20% and 80% percentile of the distribution of the partial CMIP5 ensemble are shown, this includes both natural variability and inter-model spread. Hatching denotes areas where the 20-yr mean differences of the 20th (left) and 80th (right) percentiles are less than two times the standard deviation of model-estimated natural variability of 20-yr mean differences.

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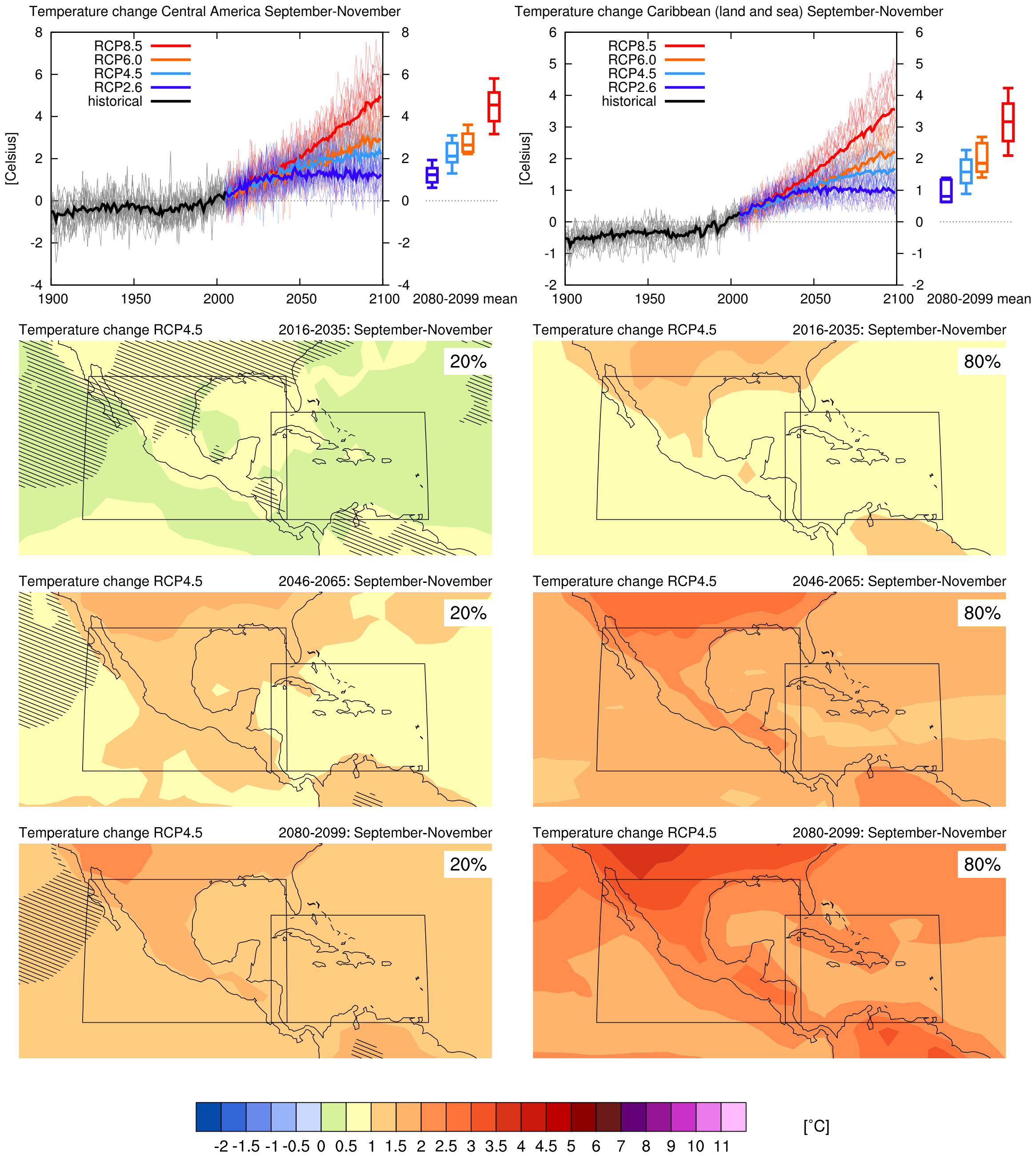


**Figure AI.31:** top left: time series of temperature averaged over land grid points in Central America (10°–30°N, 115°–82.5°W) in September–November. Top right: same for all grid points in Caribbean (land and sea) (10°–25°N, 85°–60°W). Thin lines denote one ensemble member per model, thick lines the partial CMIP5 multi-model mean. On the right-hand side the 5th, 25th, 50th (median), 75th and 95th percentiles of the distribution of 20-yr mean changes are given for the period 2080–2099 (relative to 1986–2005) for the four RCP scenarios.

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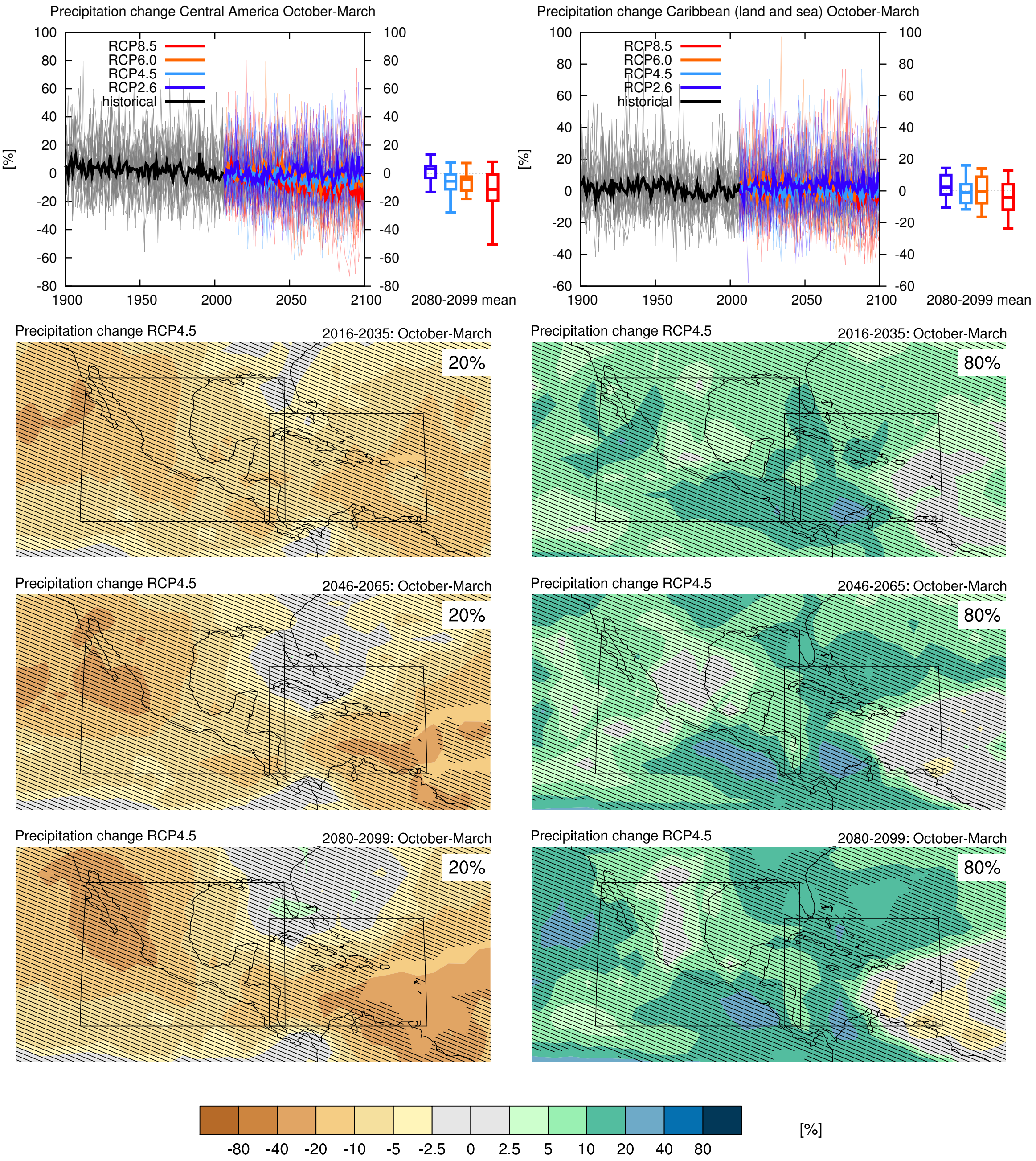


**Figure AI.32:** top left: time series of relative precipitation averaged over land grid points in Central America (10°–30°N, 115°–82.5°W) in October–March. Top right: same for all grid points in Caribbean (land and sea) (10°–25°N, 85°–60°W). Thin lines denote one ensemble member per model, thick lines the partial CMIP5 multi-model mean. On the right-hand side the 5th, 25th, 50th (median), 75th and 95th percentiles of the distribution of 20-yr mean changes are given for the period 2080–2099 (relative to 1986–2005) for the four RCP scenarios.

Below: maps of relative precipitation changes in 2016–2035, 2046–2065 and 2080–2099 with respect to 1986–2005 in the RCP4.5 scenario. For each point, the 20% and 80% percentile of the distribution of the partial CMIP5 ensemble are shown, this includes both natural variability and inter-model spread. Hatching denotes areas where the 20-yr mean differences of the 20th (left) and 80th (right) percentiles are less than two times the standard deviation of model-estimated natural variability of 20-yr mean differences.

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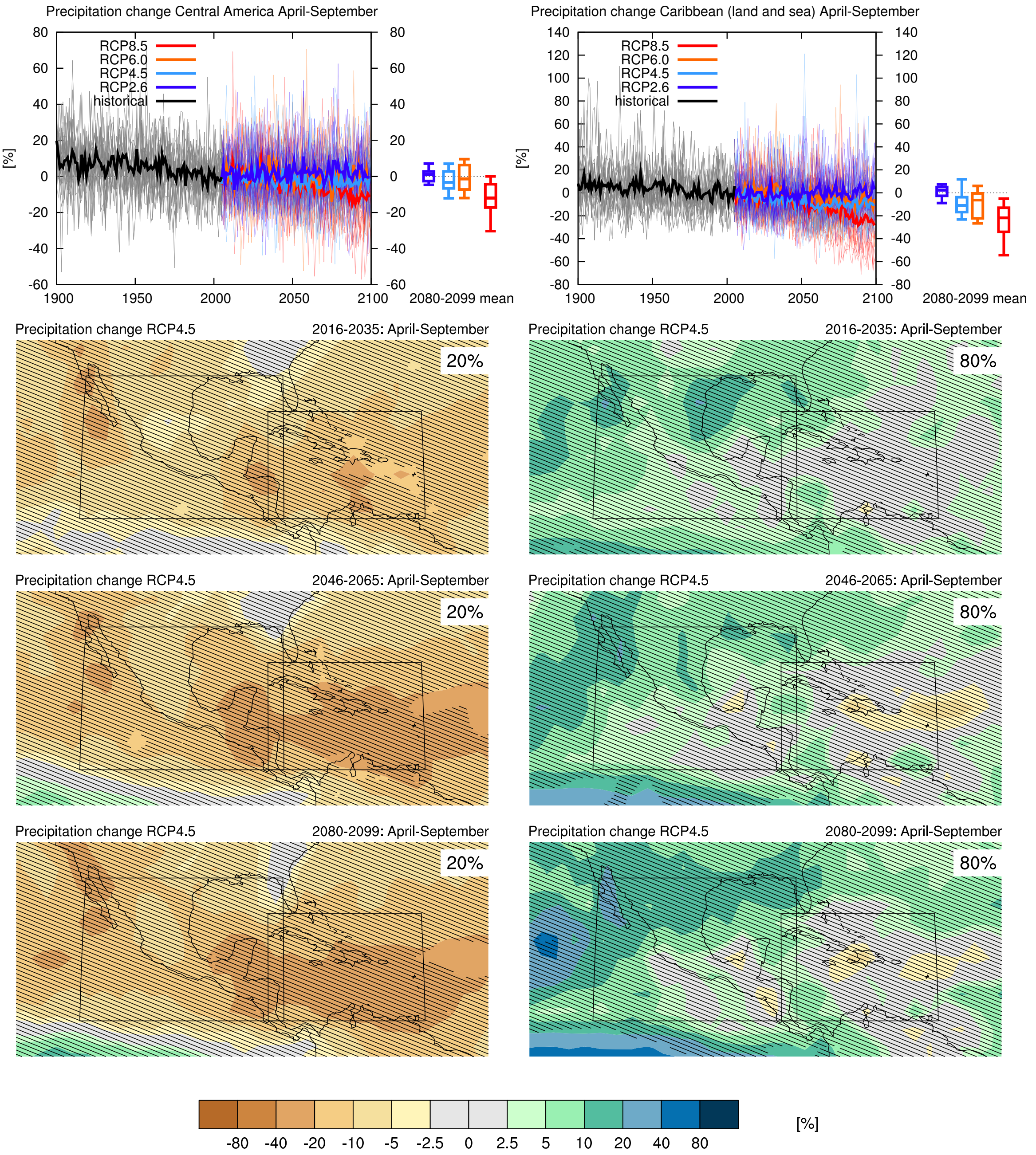


**Figure AI.33:** top left: time series of relative precipitation averaged over land grid points in Central America (10°–30°N, 115°–82.5°W) in April–September. Top right: same for all grid points in Caribbean (land and sea) (10°–25°N, 85°–60°W). Thin lines denote one ensemble member per model, thick lines the partial CMIP5 multi-model mean. On the right-hand side the 5th, 25th, 50th (median), 75th and 95th percentiles of the distribution of 20-yr mean changes are given for the period 2080–2099 (relative to 1986–2005) for the four RCP scenarios.

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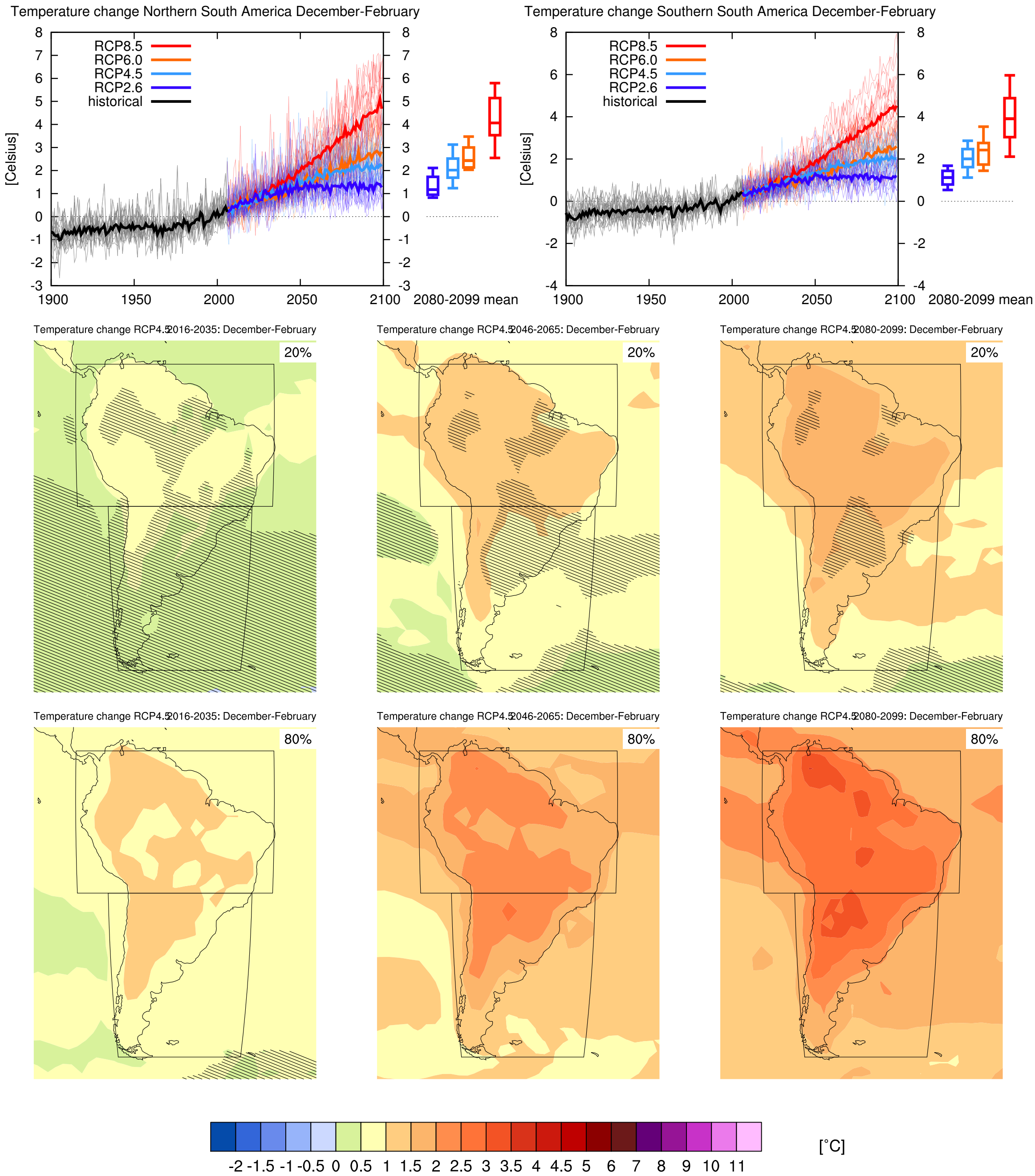


**Figure AI.34:** top left: time series of temperature averaged over land grid points in Northern South America (20°S–10°N, 82.5°–60°W) in December–February. Top right: same for land grid points in Southern South America (55°–20°S, 75°–40°W). Thin lines denote one ensemble member per model, thick lines the partial CMIP5 multi-model mean. On the right-hand side the 5th, 25th, 50th (median), 75th and 95th percentiles of the distribution of 20-yr mean changes are given for the period 2080–2099 (relative to 1986–2005) for the four RCP scenarios.

Below: maps of temperature changes in 2016–2035, 2046–2065 and 2080–2099 with respect to 1986–2005 in the RCP4.5 scenario. For each point, the 20% and 80% percentile of the distribution of the partial CMIP5 ensemble are shown, this includes both natural variability and inter-model spread. Hatching denotes areas where the 20-yr mean differences of the 20th (top row) and 80th (bottom row) percentiles are less than two times the standard deviation of model-estimated natural variability of 20-yr mean differences.

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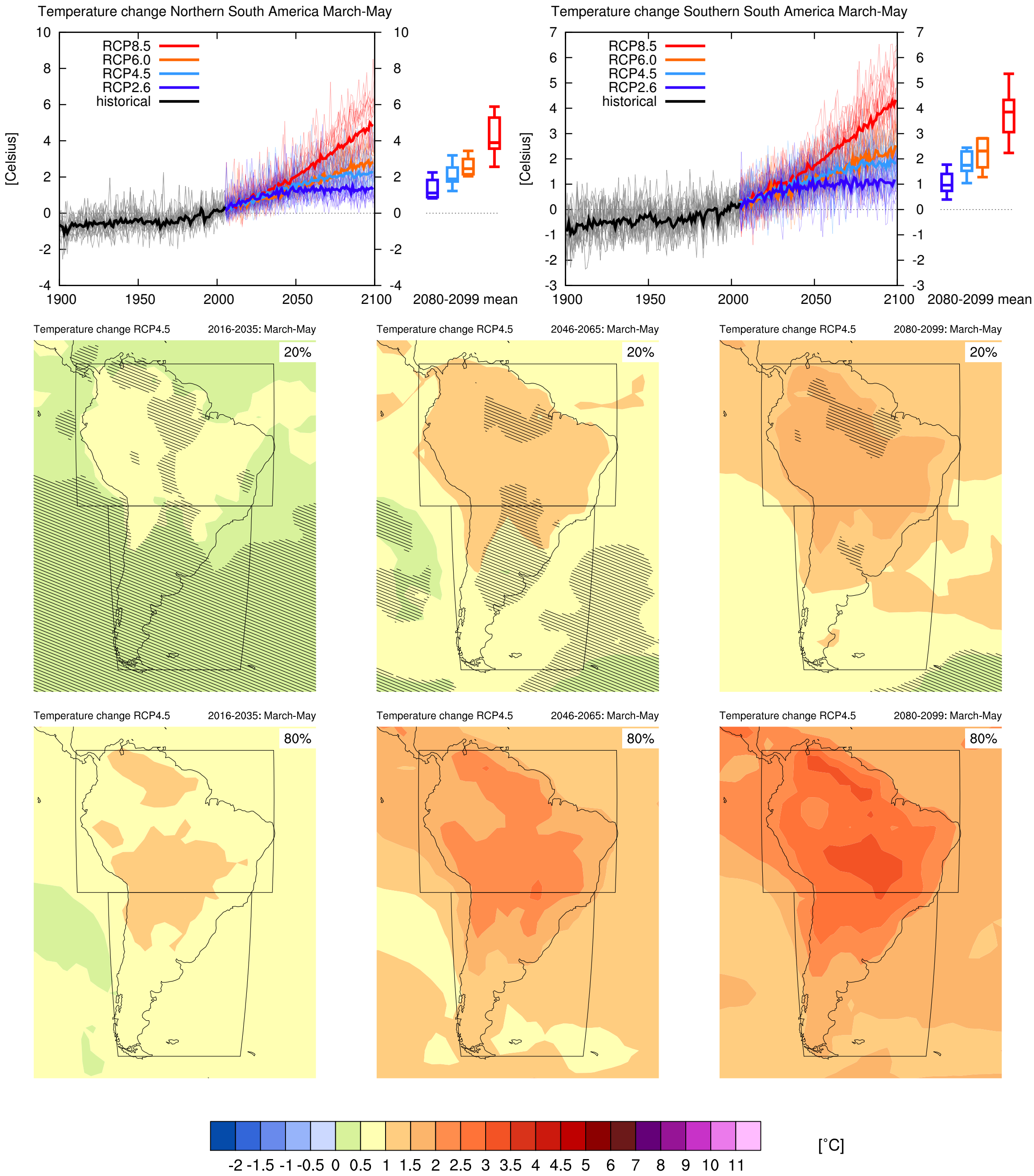


**Figure AI.35:** top left: time series of temperature averaged over land grid points in Northern South America (20°S–10°N, 82.5°–60°W) in March–May. Top right: same for land grid points in Southern South America (55°–20°S, 75°–40°W). Thin lines denote one ensemble member per model, thick lines the partial CMIP5 multi-model mean. On the right-hand side the 5th, 25th, 50th (median), 75th and 95th percentiles of the distribution of 20-yr mean changes are given for the period 2080–2099 (relative to 1986–2005) for the four RCP scenarios.

Below: maps of temperature changes in 2016–2035, 2046–2065 and 2080–2099 with respect to 1986–2005 in the RCP4.5 scenario. For each point, the 20% and 80% percentile of the distribution of the partial CMIP5 ensemble are shown, this includes both natural variability and inter-model spread. Hatching denotes areas where the 20-yr mean differences of the 20th (top row) and 80th (bottom row) percentiles are less than two times the standard deviation of model-estimated natural variability of 20-yr mean differences.

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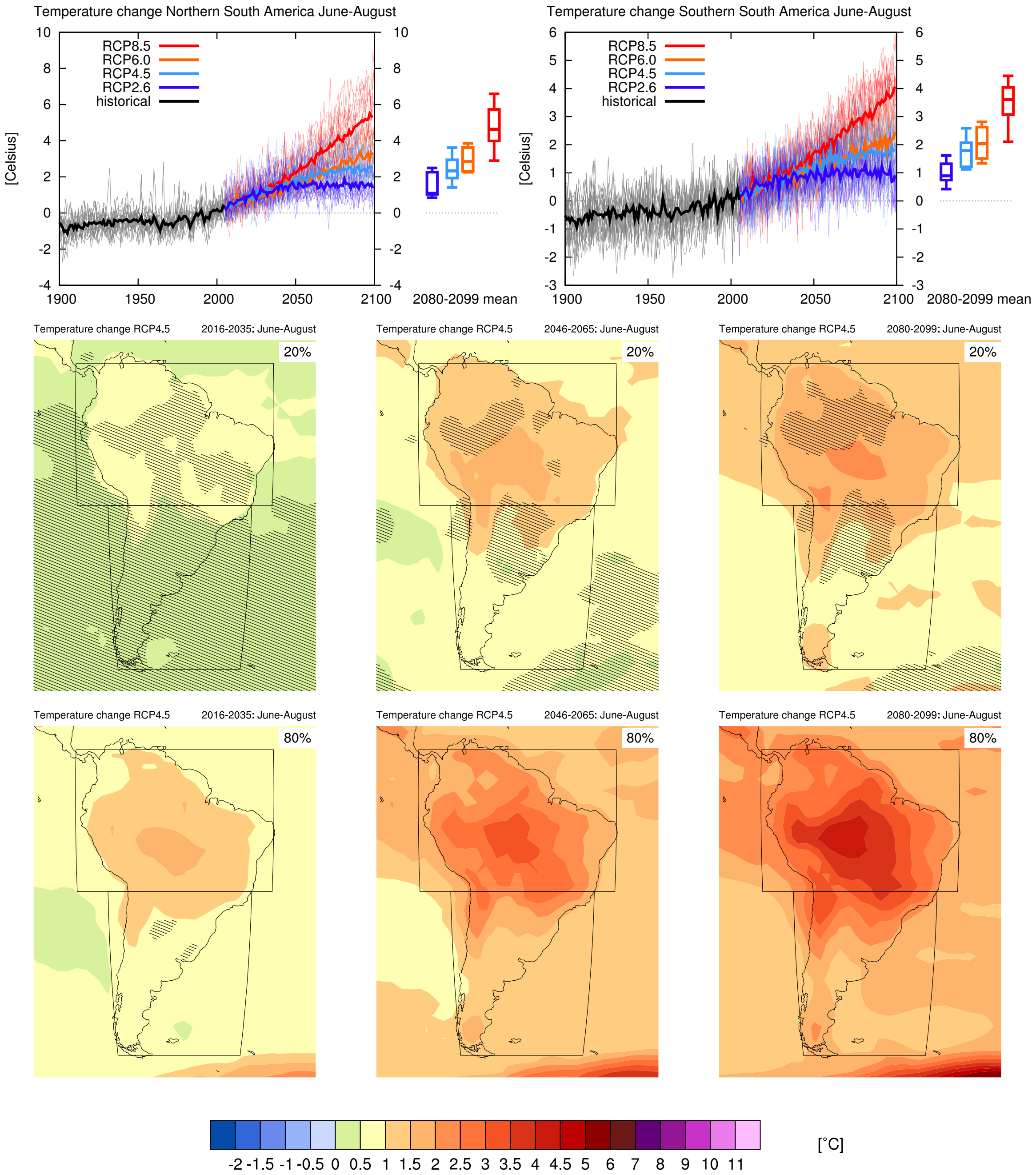


**Figure AI.36:** top left: time series of temperature averaged over land grid points in Northern South America (20°S–10°N, 82.5°–60°W) in June–August. Top right: same for land grid points in Southern South America (55°–20°S, 75°–40°W). Thin lines denote one ensemble member per model, thick lines the partial CMIP5 multi-model mean. On the right-hand side the 5th, 25th, 50th (median), 75th and 95th percentiles of the distribution of 20-yr mean changes are given for the period 2080–2099 (relative to 1986–2005) for the four RCP scenarios.

Below: maps of temperature changes in 2016–2035, 2046–2065 and 2080–2099 with respect to 1986–2005 in the RCP4.5 scenario. For each point, the 20% and 80% percentile of the distribution of the partial CMIP5 ensemble are shown, this includes both natural variability and inter-model spread. Hatching denotes areas where the 20-yr mean differences of the 20th (top row) and 80th (bottom row) percentiles are less than two times the standard deviation of model-estimated natural variability of 20-yr mean differences.

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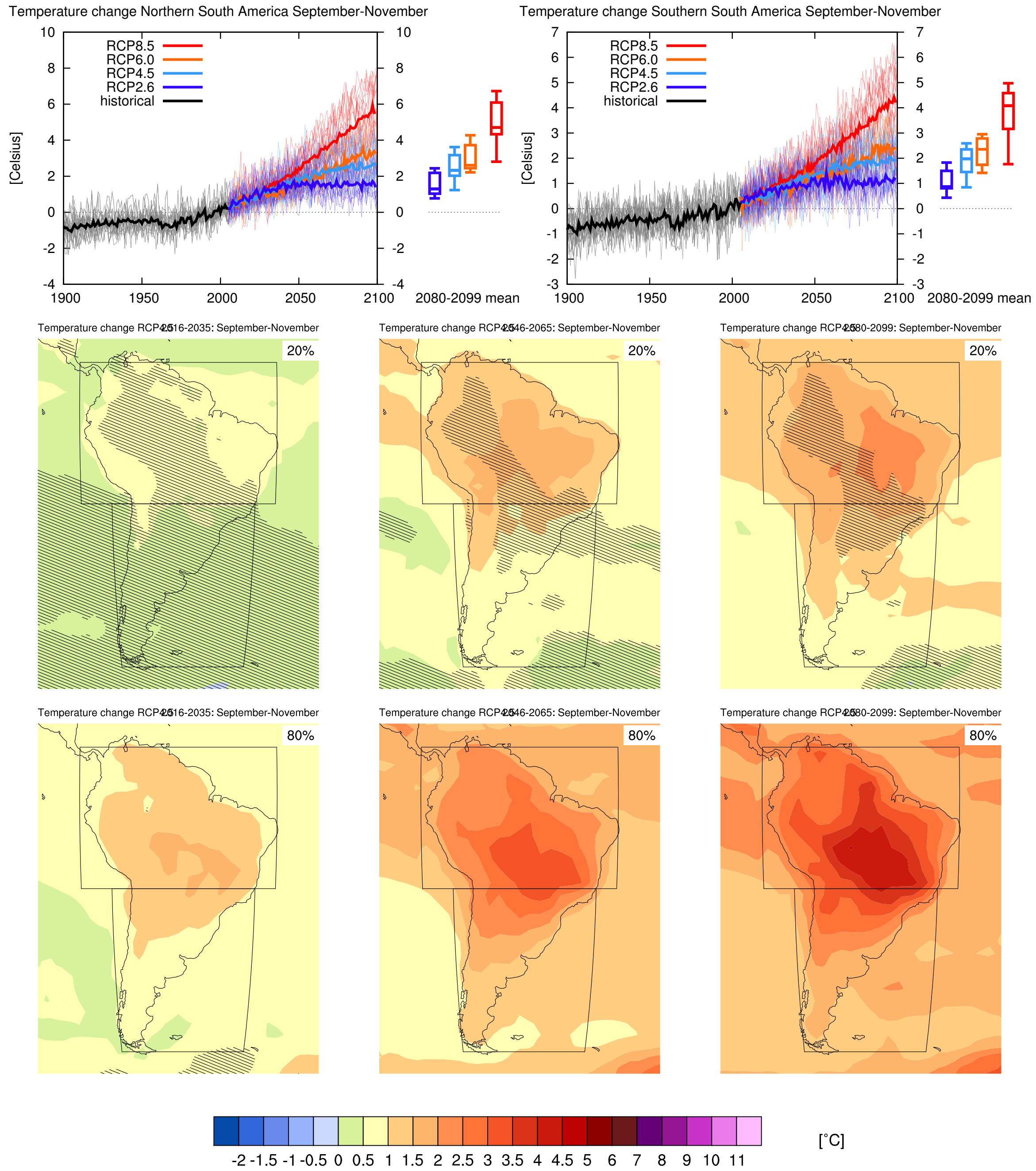


**Figure AI.37:** top left: time series of temperature averaged over land grid points in Northern South America (20°S–10°N, 82.5°–60°W) in September–November. Top right: same for land grid points in Southern South America (55°–20°S, 75°–40°W). Thin lines denote one ensemble member per model, thick lines the partial CMIP5 multi-model mean. On the right-hand side the 5th, 25th, 50th (median), 75th and 95th percentiles of the distribution of 20-yr mean changes are given for the period 2080–2099 (relative to 1986–2005) for the four RCP scenarios.

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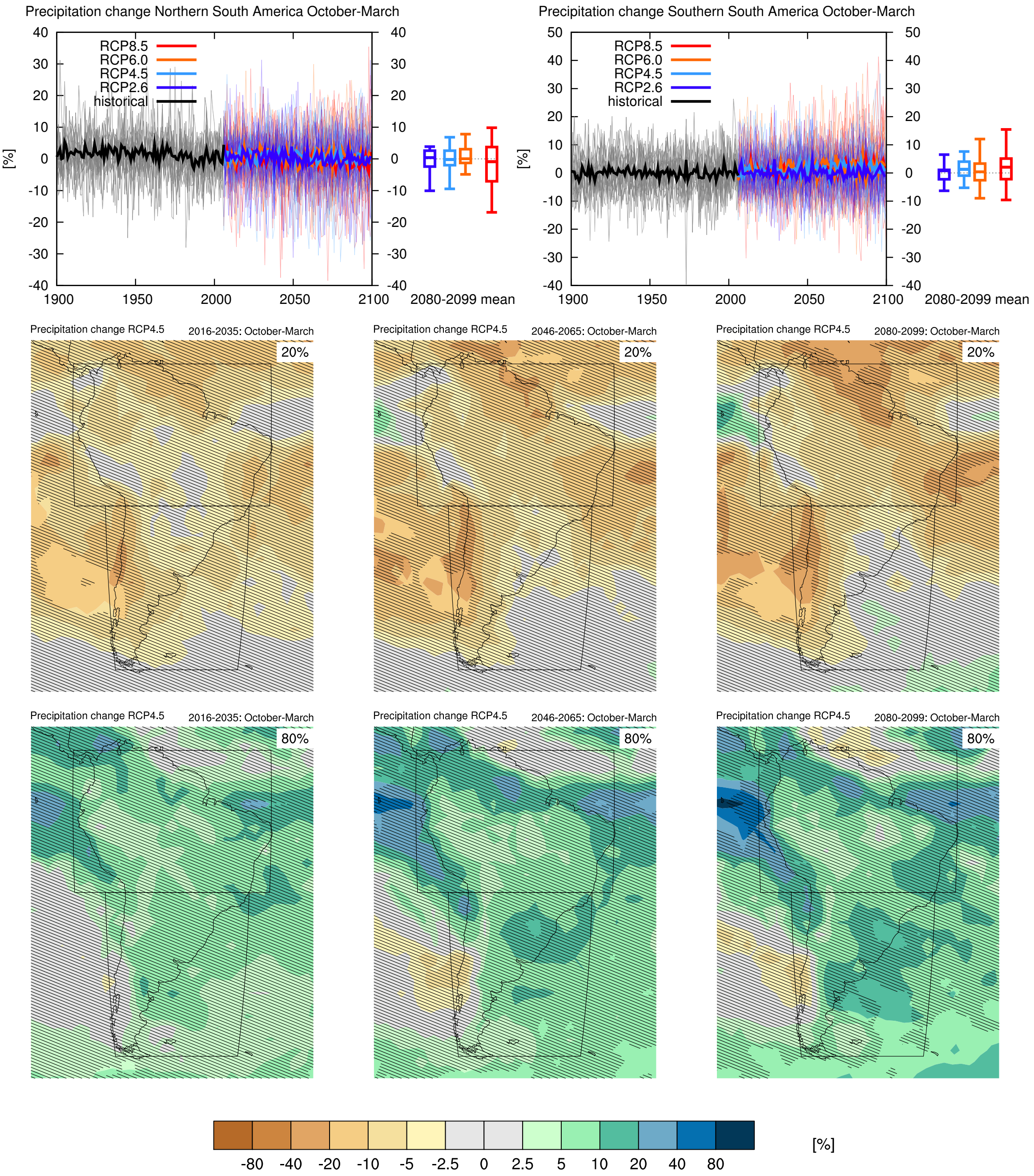


**Figure AI.38:** top left: time series of relative precipitation averaged over land grid points in Northern South America (20°S–10°N, 82.5°–60°W) in October–March. Top right: same for land grid points in Southern South America (55°–20°S, 75°–40°W). Thin lines denote one ensemble member per model, thick lines the partial CMIP5 multi-model mean. On the right-hand side the 5th, 25th, 50th (median), 75th and 95th percentiles of the distribution of 20-yr mean changes are given for the period 2080–2099 (relative to 1986–2005) for the four RCP scenarios.

Below: maps of relative precipitation changes in 2016–2035, 2046–2065 and 2080–2099 with respect to 1986–2005 in the RCP4.5 scenario. For each point, the 20% and 80% percentile of the distribution of the partial CMIP5 ensemble are shown, this includes both natural variability and inter-model spread. Hatching denotes areas where the 20-yr mean differences of the 20th (top row) and 80th (bottom row) percentiles are less than two times the standard deviation of model-estimated natural variability of 20-yr mean differences.

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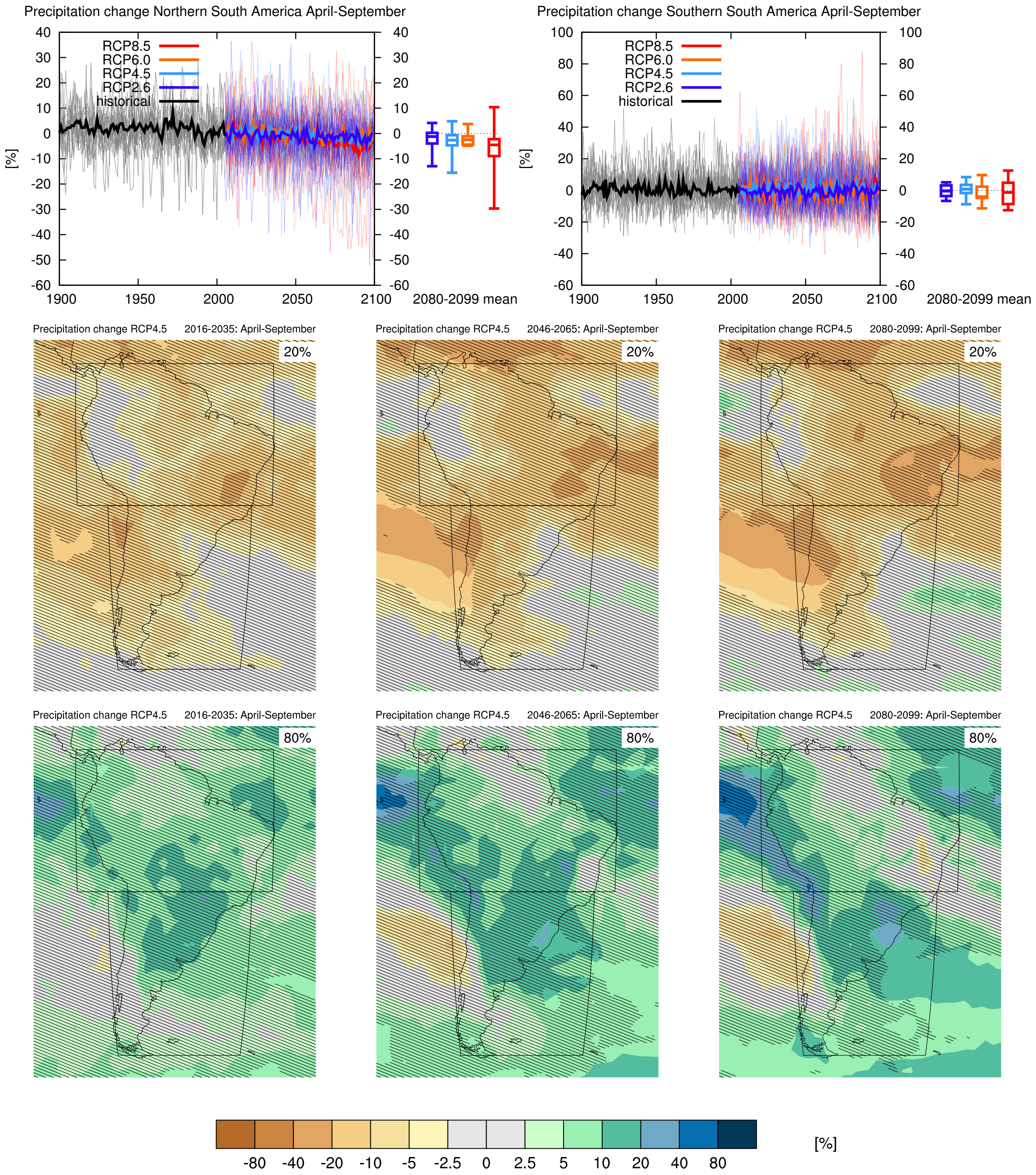
1 


2 **Figure AI.39:** top left: time series of relative precipitation averaged over land grid points in Northern South
3 America (20°S–10°N, 82.5°–60°W) in April–September. Top right: same for land grid points in Southern South
4 America (55°–20°S, 75°–40°W). Thin lines denote one ensemble member per model, thick lines the partial
5 CMIP5 multi-model mean. On the right-hand side the 5th, 25th, 50th (median), 75th and 95th percentiles of
6 the distribution of 20-yr mean changes are given for the period 2080–2099 (relative to 1986–2005) for the four
7 RCP scenarios.

8 Below: maps of relative precipitation changes in 2016–2035, 2046–2065 and 2080–2099 with respect to 1986–
9 2005 in the RCP4.5 scenario. For each point, the 20% and 80% percentile of the distribution of the partial
10 CMIP5 ensemble are shown, this includes both natural variability and inter-model spread. Hatching denotes
11 areas where the 20-yr mean differences of the 20th (top row) and 80th (bottom row) percentiles are less than
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13 [PLACEHOLDER FOR SECOND ORDER DRAFT: Cross references to relevant sections of Chapters 9, 11,
14 12 and 14 for information regarding the evaluation of models in this region, the model spread in the context of
15 other methods of projecting changes and the role of modes of variability and other climate phenomena.]

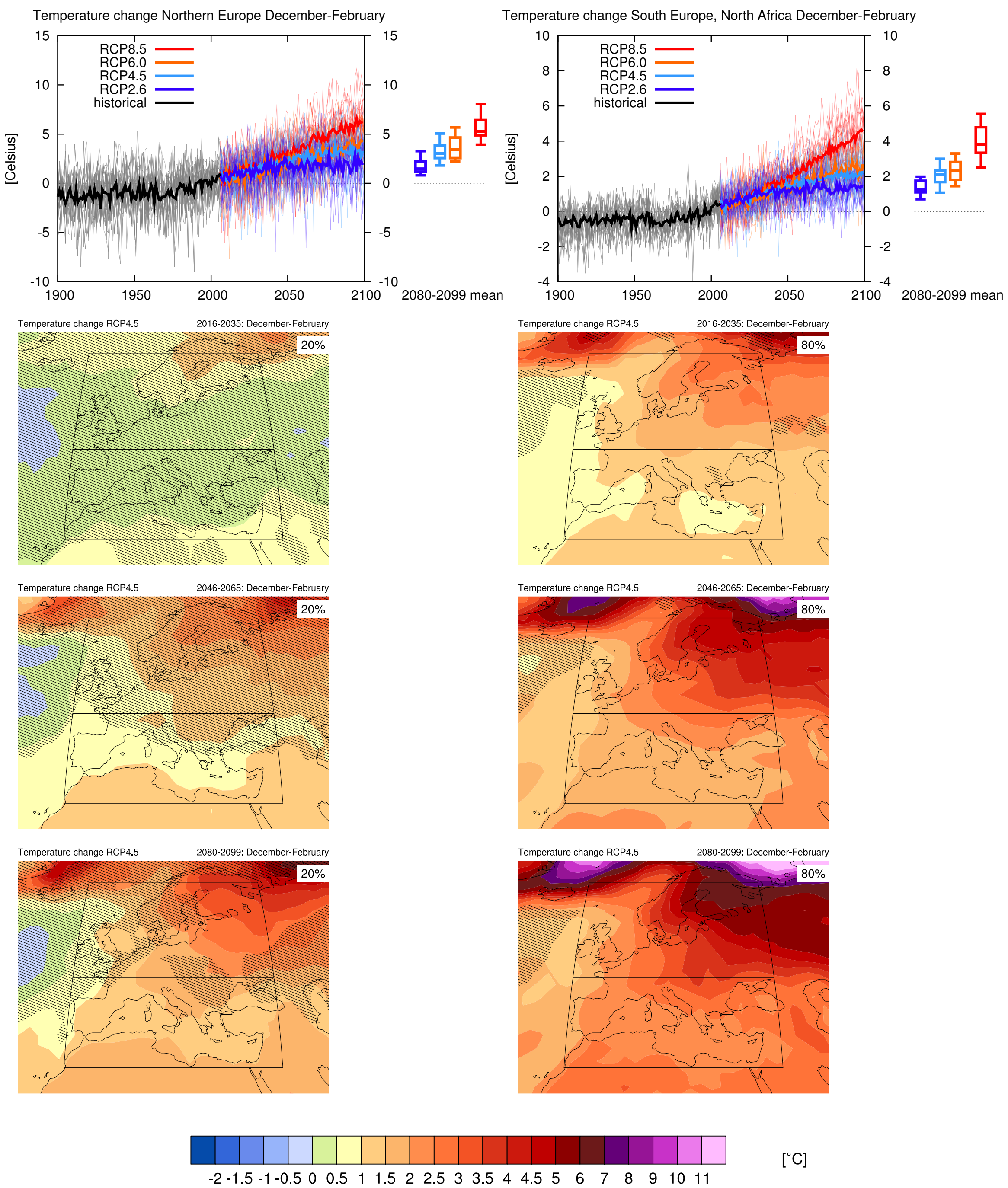


**Figure AI.40:** top left: time series of temperature averaged over land grid points in Northern Europe (47.5°–67.5°N, 10°W–40°E) in December–February. Top right: same for land grid points in South Europe, North Africa (30°–47.5°N, 10°W–40°E). Thin lines denote one ensemble member per model, thick lines the partial CMIP5 multi-model mean. On the right-hand side the 5th, 25th, 50th (median), 75th and 95th percentiles of the distribution of 20-yr mean changes are given for the period 2080–2099 (relative to 1986–2005) for the four RCP scenarios.

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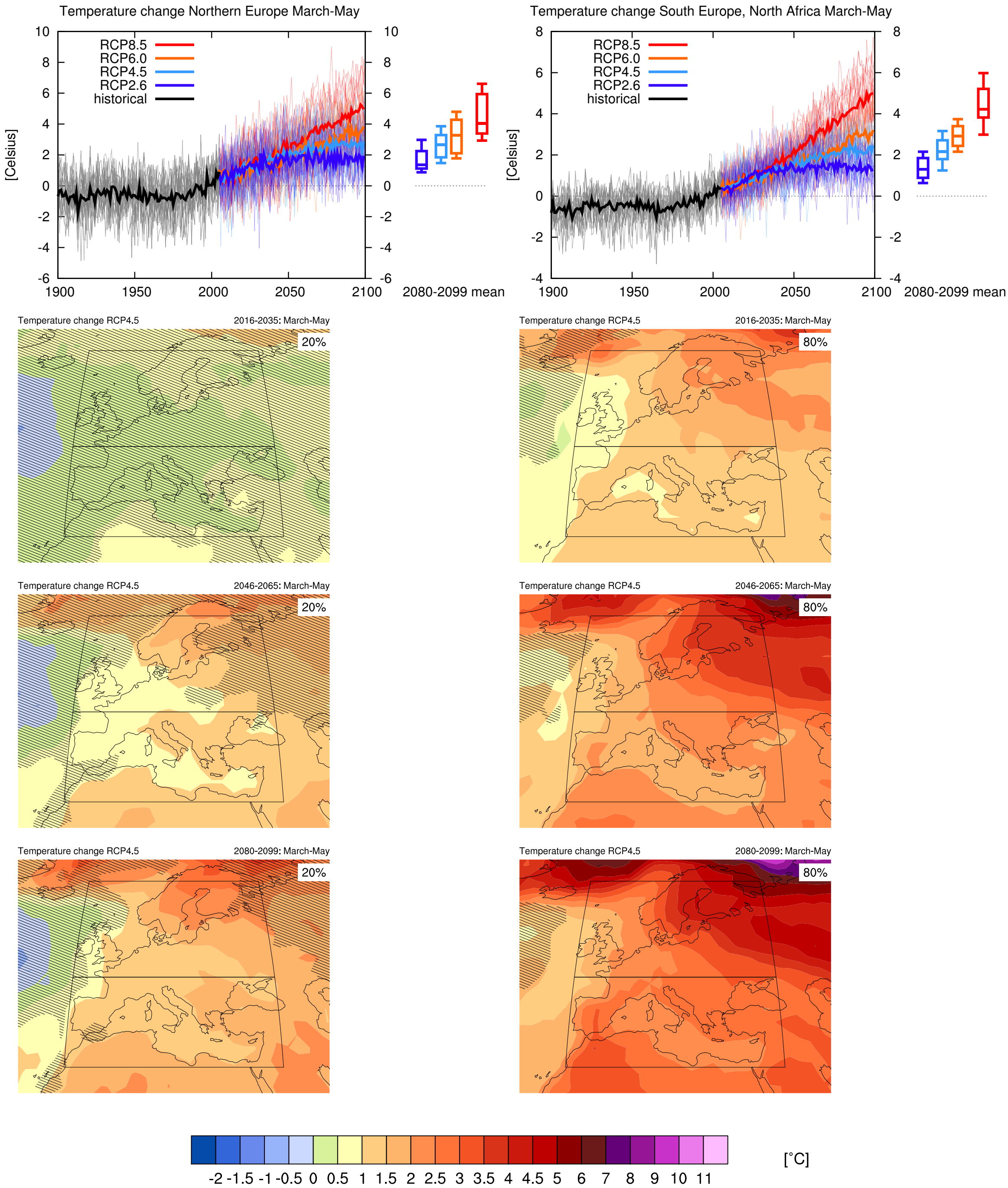


**Figure AI.41:** top left: time series of temperature averaged over land grid points in Northern Europe (47.5°–67.5°N, 10°W–40°E) in March–May. Top right: same for land grid points in South Europe, North Africa (30°–47.5°N, 10°W–40°E). Thin lines denote one ensemble member per model, thick lines the partial CMIP5 multi-model mean. On the right-hand side the 5th, 25th, 50th (median), 75th and 95th percentiles of the distribution of 20-yr mean changes are given for the period 2080–2099 (relative to 1986–2005) for the four RCP scenarios.

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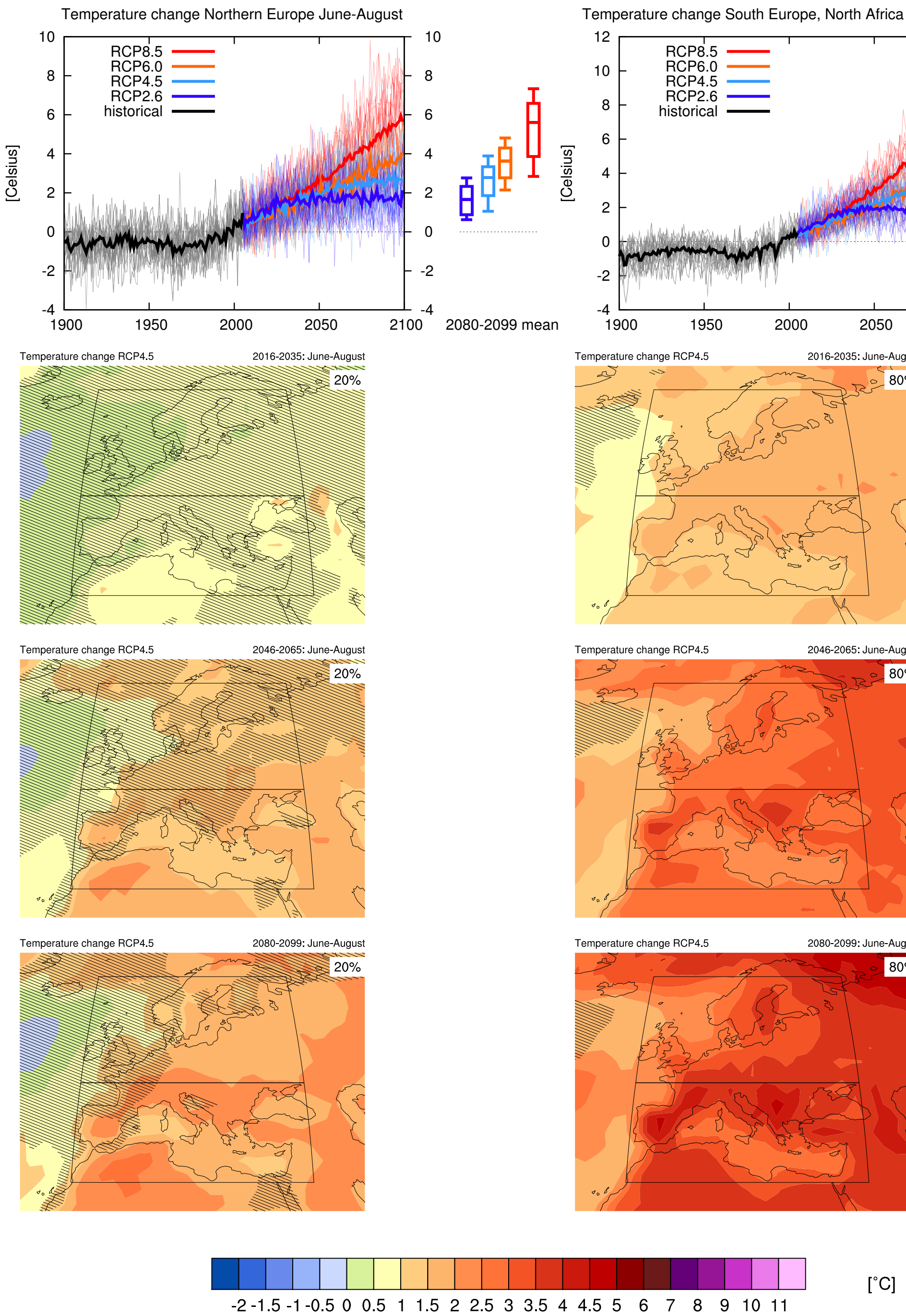


**Figure AI.42:** top left: time series of temperature averaged over land grid points in Northern Europe (47.5°–67.5°N, 10°W–40°E) in June–August. Top right: same for land grid points in South Europe, North Africa (30°–47.5°N, 10°W–40°E). Thin lines denote one ensemble member per model, thick lines the partial CMIP5 multi-model mean. On the right-hand side the 5th, 25th, 50th (median), 75th and 95th percentiles of the distribution of 20-yr mean changes are given for the period 2080–2099 (relative to 1986–2005) for the four RCP scenarios.

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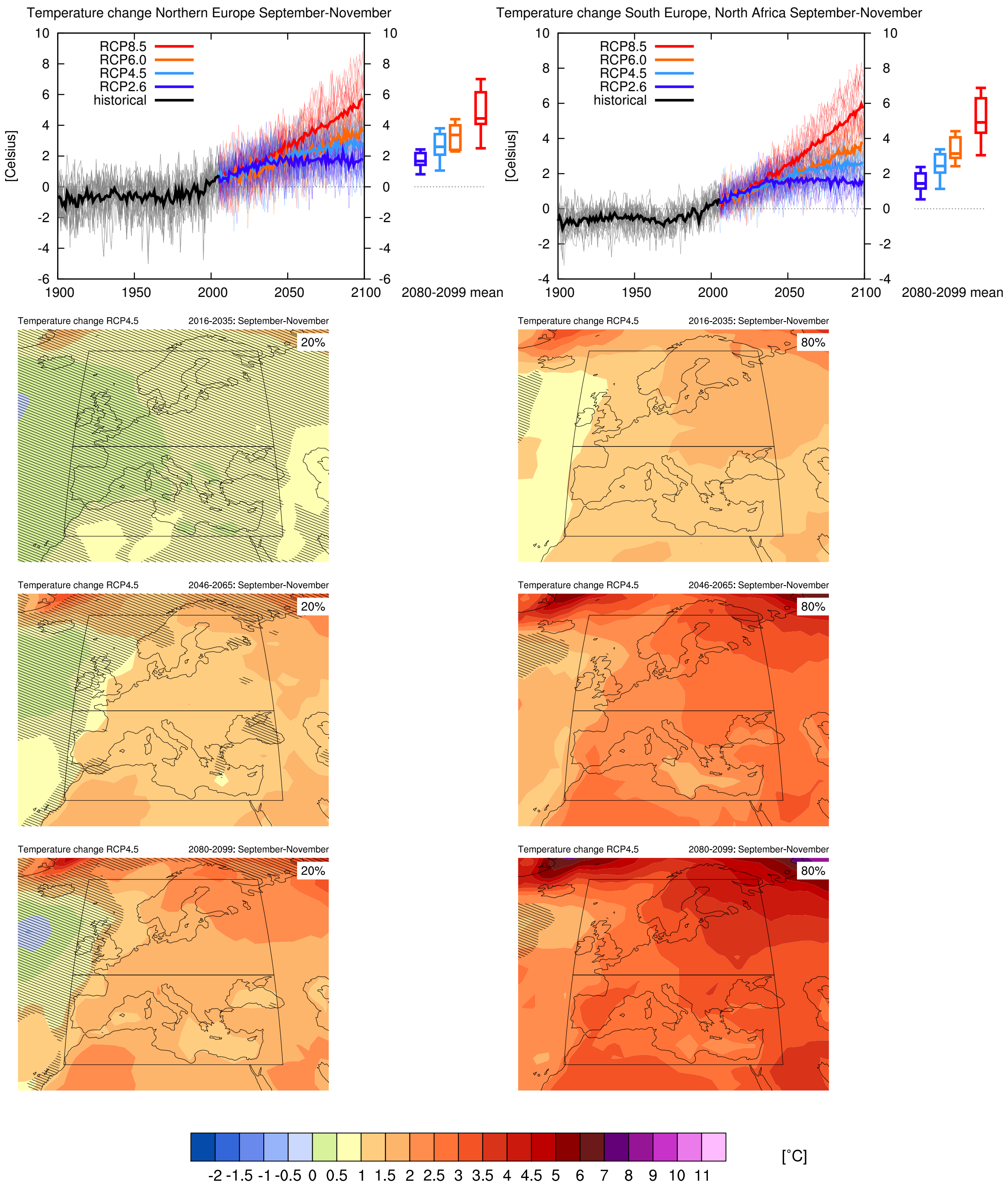


**Figure AI.43:** top left: time series of temperature averaged over land grid points in Northern Europe (47.5°–67.5°N, 10°W–40°E) in September–November. Top right: same for land grid points in South Europe, North Africa (30°–47.5°N, 10°W–40°E). Thin lines denote one ensemble member per model, thick lines the partial CMIP5 multi-model mean. On the right-hand side the 5th, 25th, 50th (median), 75th and 95th percentiles of the distribution of 20-yr mean changes are given for the period 2080–2099 (relative to 1986–2005) for the four RCP scenarios.

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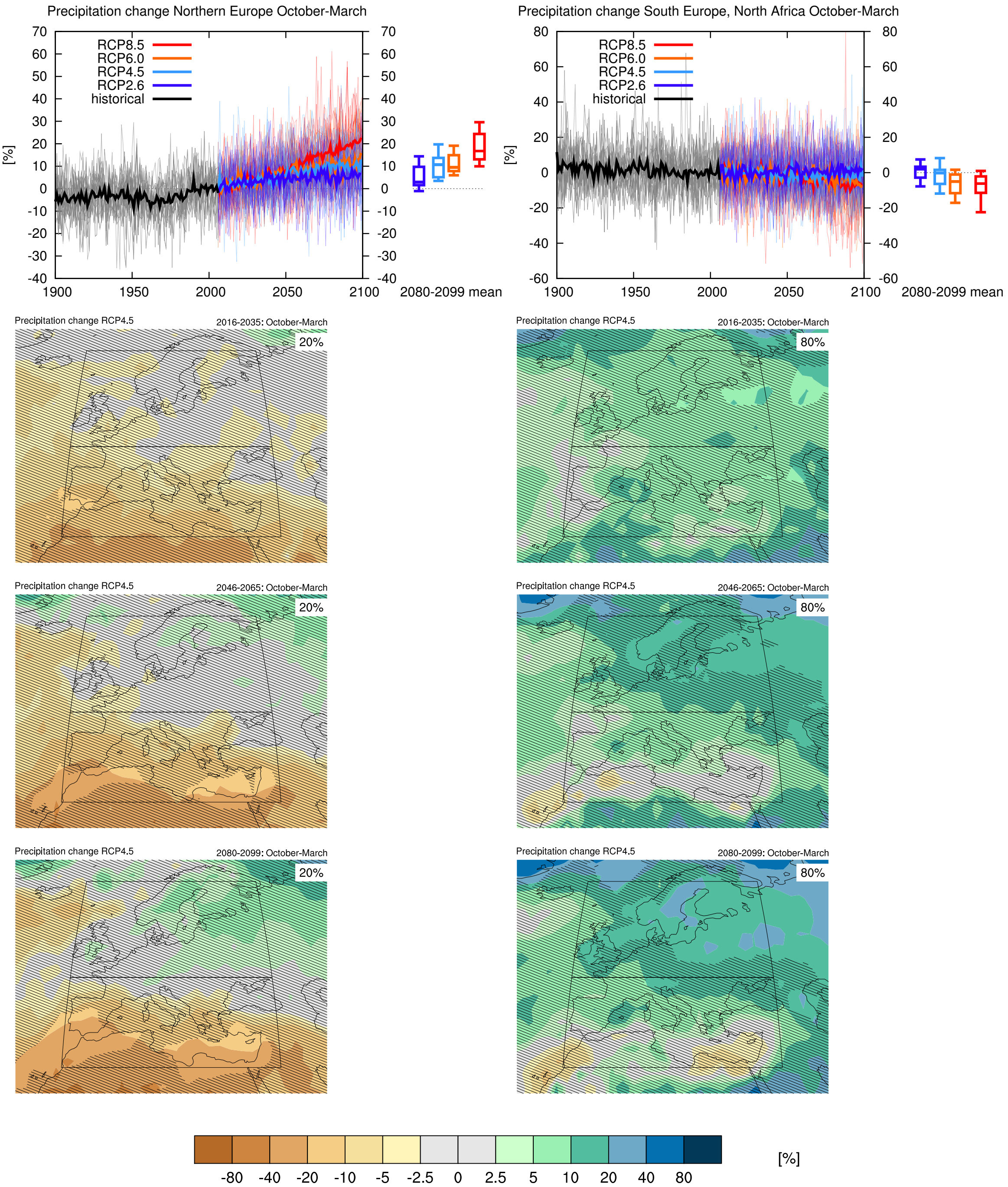


**Figure AI.44:** top left: time series of relative precipitation averaged over land grid points in Northern Europe (47.5°–67.5°N, 10°W–40°E) in October–March. Top right: same for land grid points in South Europe, North Africa (30°–47.5°N, 10°W–40°E). Thin lines denote one ensemble member per model, thick lines the partial CMIP5 multi-model mean. On the right-hand side the 5th, 25th, 50th (median), 75th and 95th percentiles of the distribution of 20-yr mean changes are given for the period 2080–2099 (relative to 1986–2005) for the four RCP scenarios.

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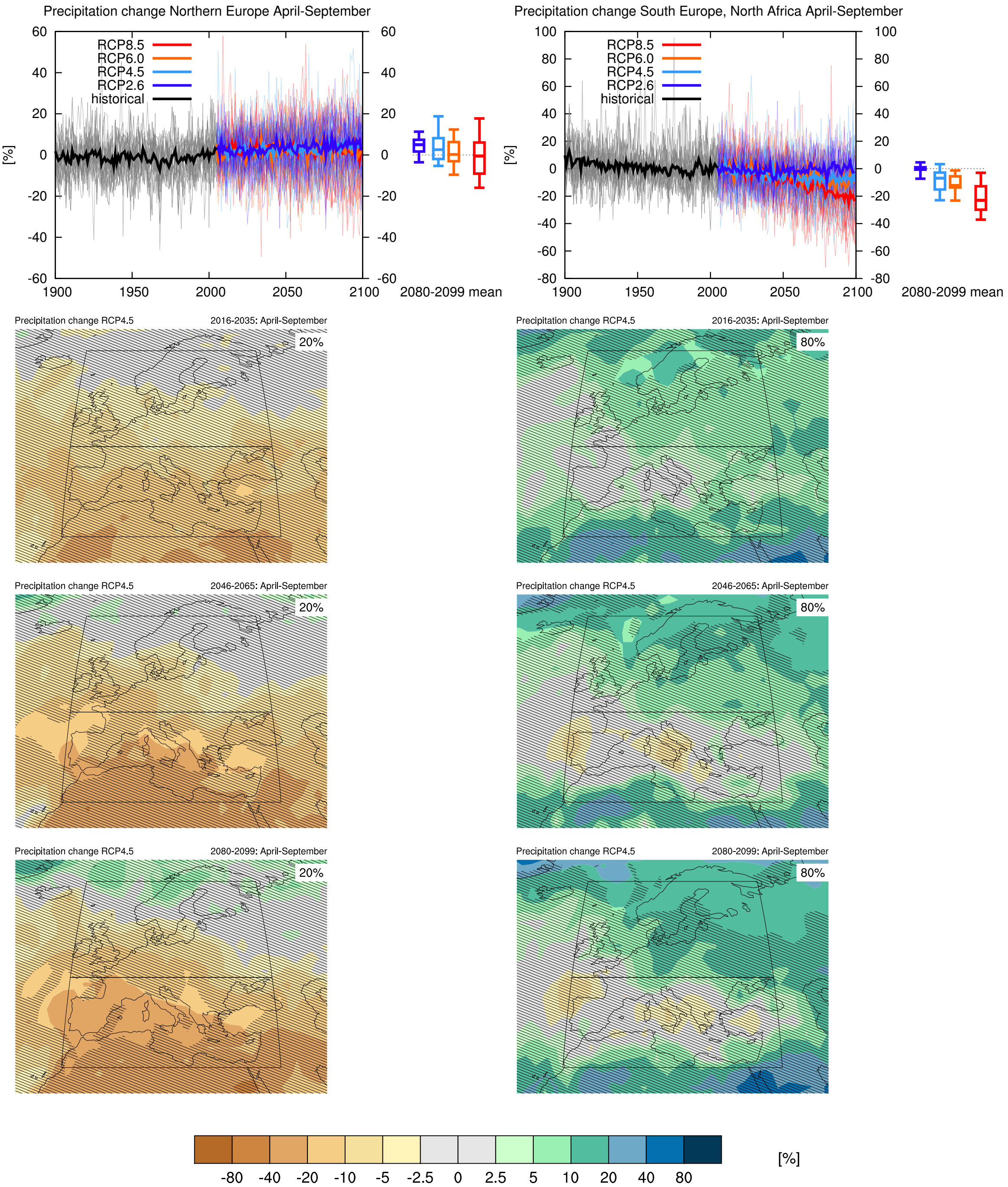


**Figure AI.45:** top left: time series of relative precipitation averaged over land grid points in Northern Europe (47.5°–67.5°N, 10°W–40°E) in April–September. Top right: same for land grid points in South Europe, North Africa (30°–47.5°N, 10°W–40°E). Thin lines denote one ensemble member per model, thick lines the partial CMIP5 multi-model mean. On the right-hand side the 5th, 25th, 50th (median), 75th and 95th percentiles of the distribution of 20-yr mean changes are given for the period 2080–2099 (relative to 1986–2005) for the four RCP scenarios.

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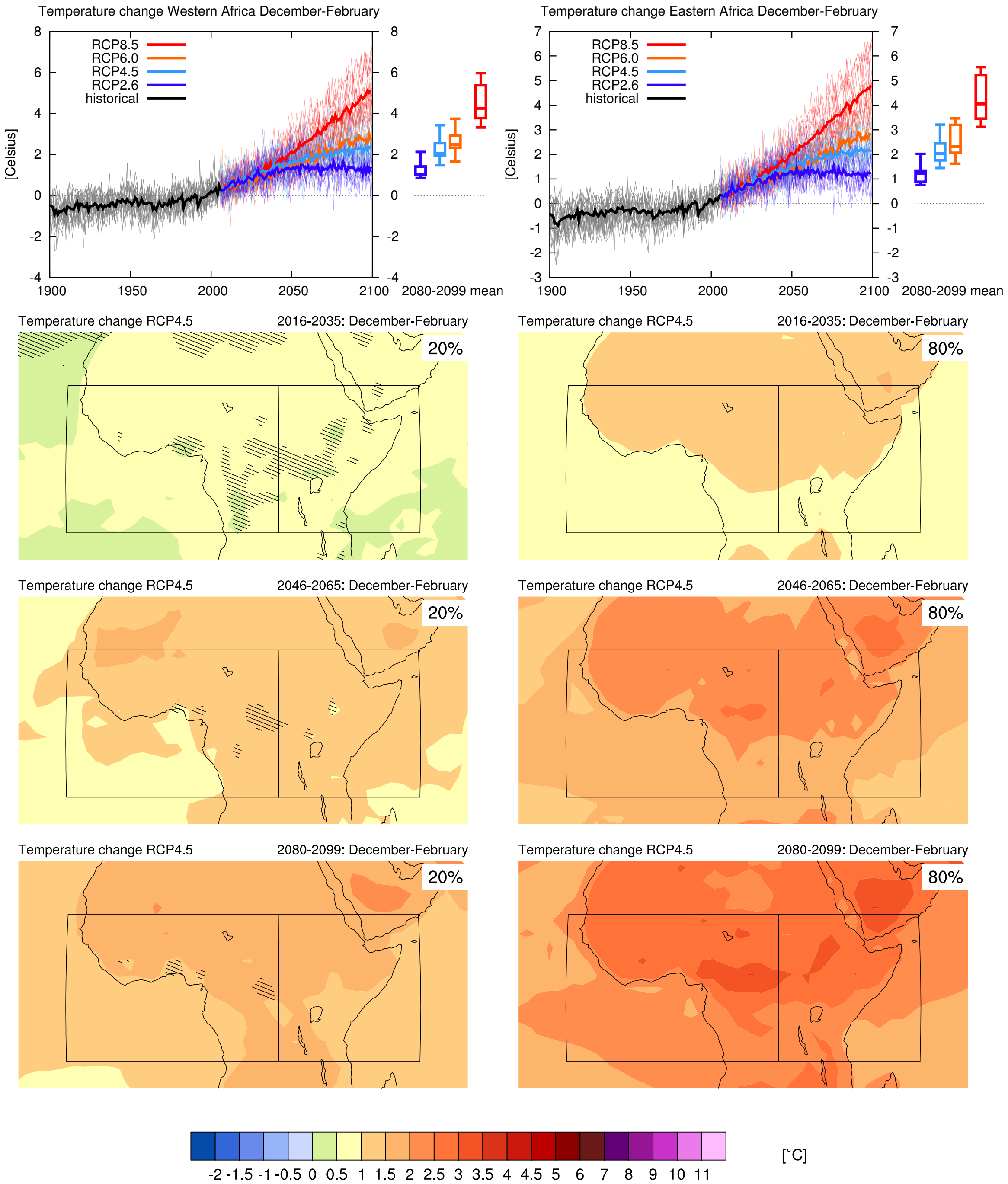


**Figure AI.46:** top left: time series of temperature averaged over land grid points in Western Africa (10°S–17.5°N, 20°W–25°E) in December–February. Top right: same for land grid points in Eastern Africa (10°S–17.5°N, 25°–55°E). Thin lines denote one ensemble member per model, thick lines the partial CMIP5 multi-model mean. On the right-hand side the 5th, 25th, 50th (median), 75th and 95th percentiles of the distribution of 20-yr mean changes are given for the period 2080–2099 (relative to 1986–2005) for the four RCP scenarios.

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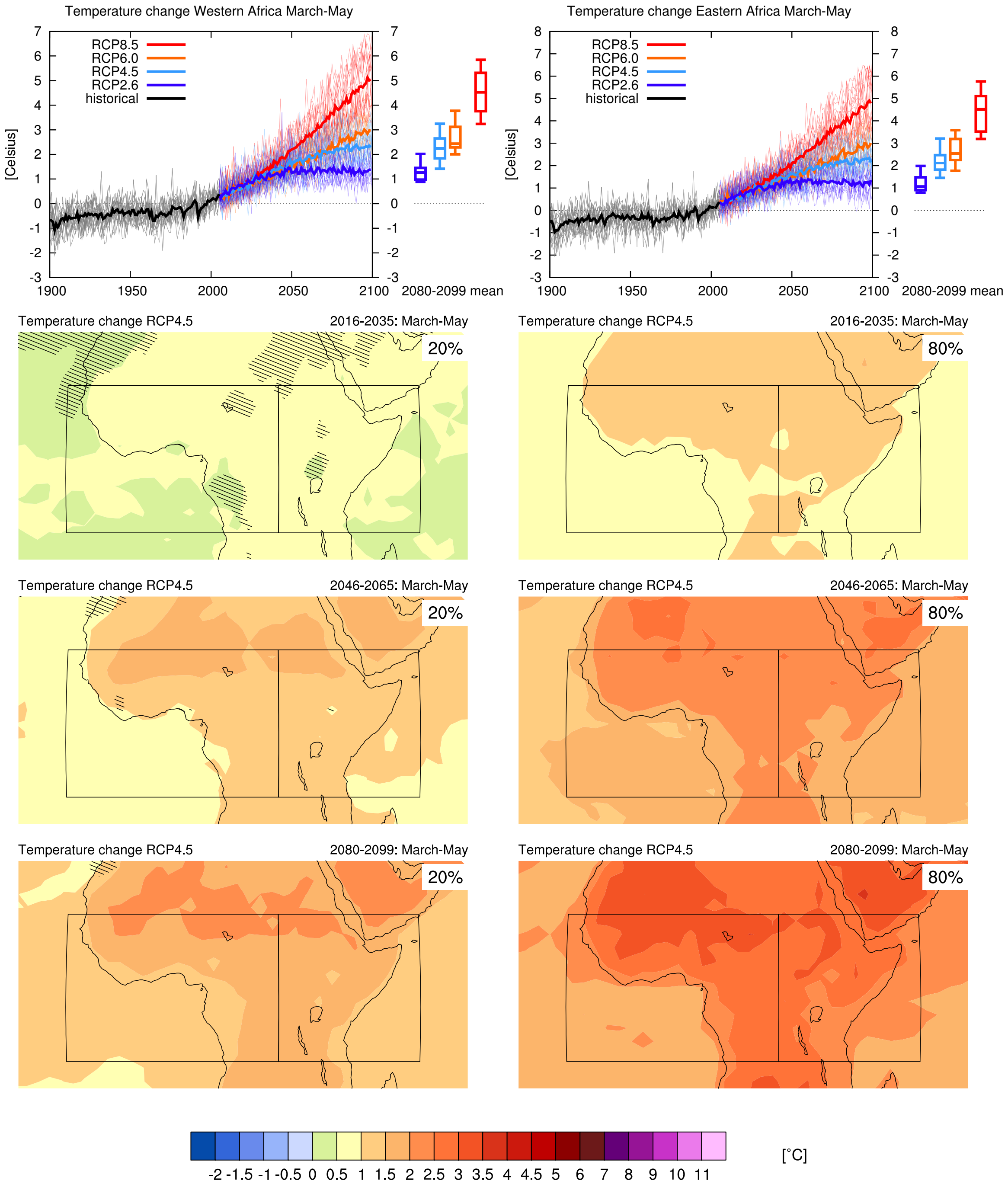


**Figure AI.47:** top left: time series of temperature averaged over land grid points in Western Africa (10°S–17.5°N, 20°W–25°E) in March–May. Top right: same for land grid points in Eastern Africa (10°S–17.5°N, 25°–55°E). Thin lines denote one ensemble member per model, thick lines the partial CMIP5 multi-model mean. On the right-hand side the 5th, 25th, 50th (median), 75th and 95th percentiles of the distribution of 20-yr mean changes are given for the period 2080–2099 (relative to 1986–2005) for the four RCP scenarios.

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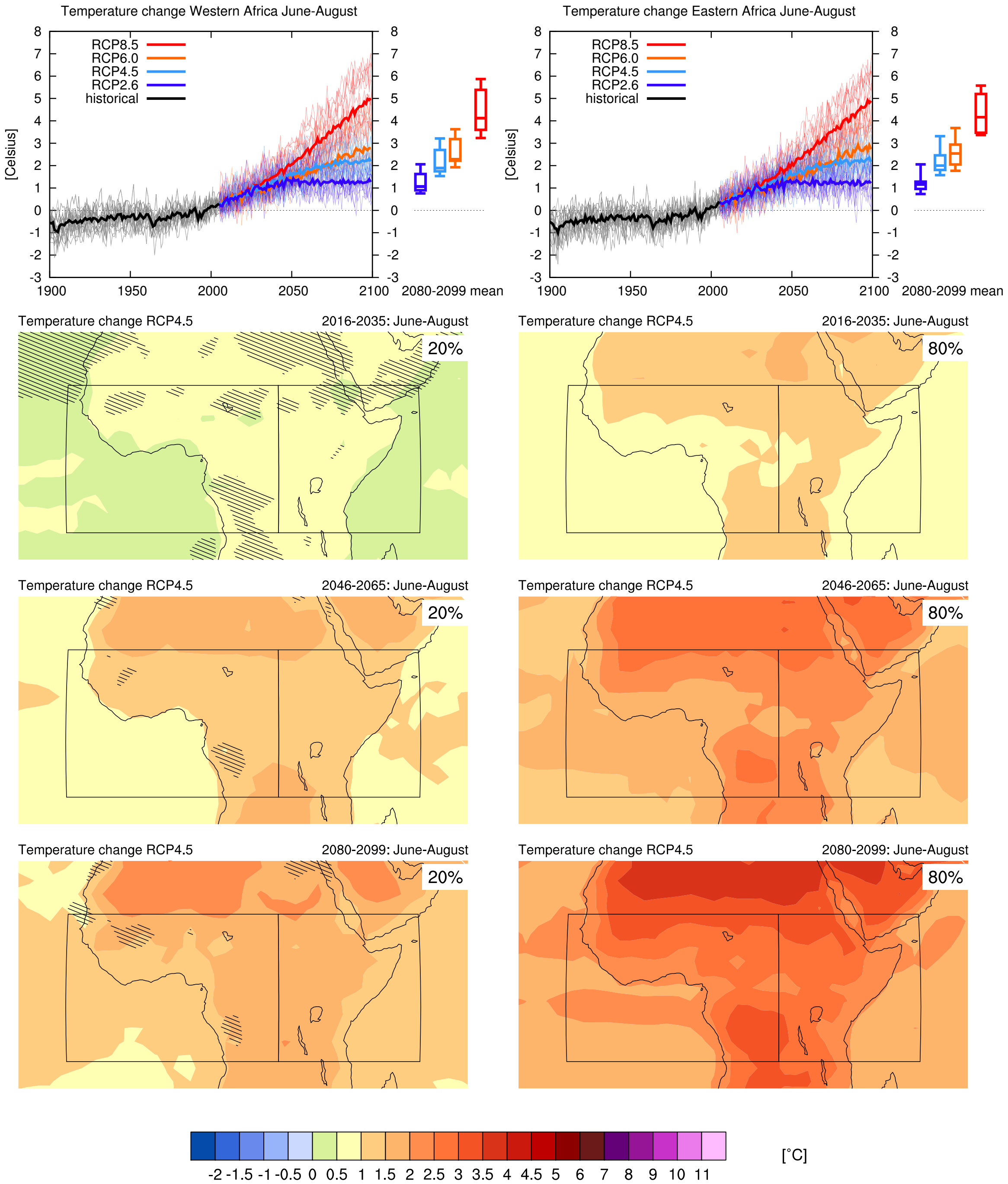


**Figure AI.48:** top left: time series of temperature averaged over land grid points in Western Africa (10°S–17.5°N, 20°W–25°E) in June–August. Top right: same for land grid points in Eastern Africa (10°S–17.5°N, 25°–55°E). Thin lines denote one ensemble member per model, thick lines the partial CMIP5 multi-model mean. On the right-hand side the 5th, 25th, 50th (median), 75th and 95th percentiles of the distribution of 20-yr mean changes are given for the period 2080–2099 (relative to 1986–2005) for the four RCP scenarios.

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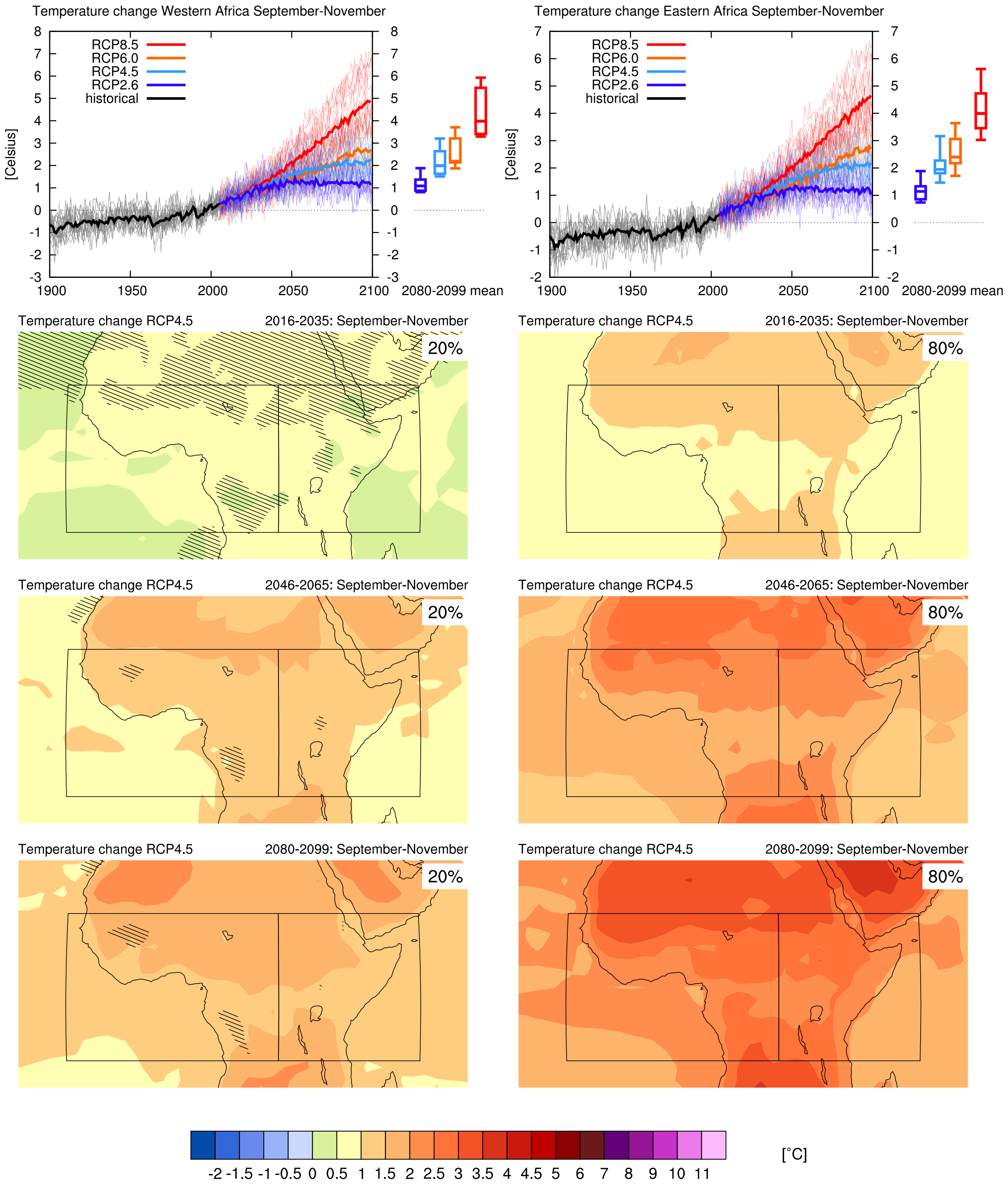


**Figure AI.49:** top left: time series of temperature averaged over land grid points in Western Africa (10°S–17.5°N, 20°W–25°E) in September–November. Top right: same for land grid points in Eastern Africa (10°S–17.5°N, 25°–55°E). Thin lines denote one ensemble member per model, thick lines the partial CMIP5 multi-model mean. On the right-hand side the 5th, 25th, 50th (median), 75th and 95th percentiles of the distribution of 20-yr mean changes are given for the period 2080–2099 (relative to 1986–2005) for the four RCP scenarios.

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[PLACEHOLDER FOR SECOND ORDER DRAFT: Cross references to relevant sections of Chapters 9, 11, 12 and 14 for information regarding the evaluation of models in this region, the model spread in the context of other methods of projecting changes and the role of modes of variability and other climate phenomena.]

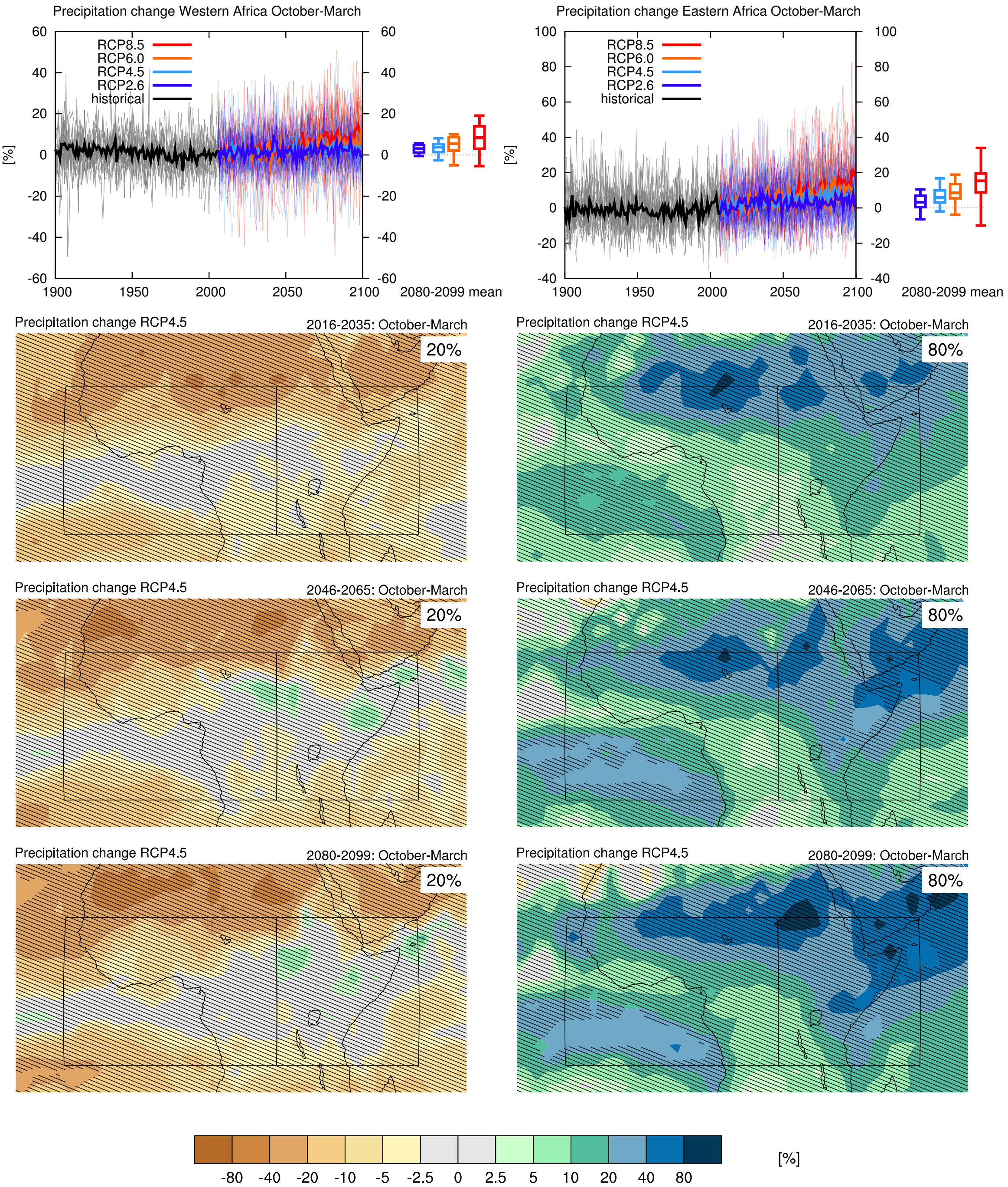


**Figure AI.50:** top left: time series of relative precipitation averaged over land grid points in Western Africa (10°S–17.5°N, 20°W–25°E) in October–March. Top right: same for land grid points in Eastern Africa (10°S–17.5°N, 25°–55°E). Thin lines denote one ensemble member per model, thick lines the partial CMIP5 multi-model mean. On the right-hand side the 5th, 25th, 50th (median), 75th and 95th percentiles of the distribution of 20-yr mean changes are given for the period 2080–2099 (relative to 1986–2005) for the four RCP scenarios.

Below: maps of relative precipitation changes in 2016–2035, 2046–2065 and 2080–2099 with respect to 1986–2005 in the RCP4.5 scenario. For each point, the 20% and 80% percentile of the distribution of the partial CMIP5 ensemble are shown, this includes both natural variability and inter-model spread. Hatching denotes areas where the 20-yr mean differences of the 20th (left) and 80th (right) percentiles are less than two times the standard deviation of model-estimated natural variability of 20-yr mean differences.

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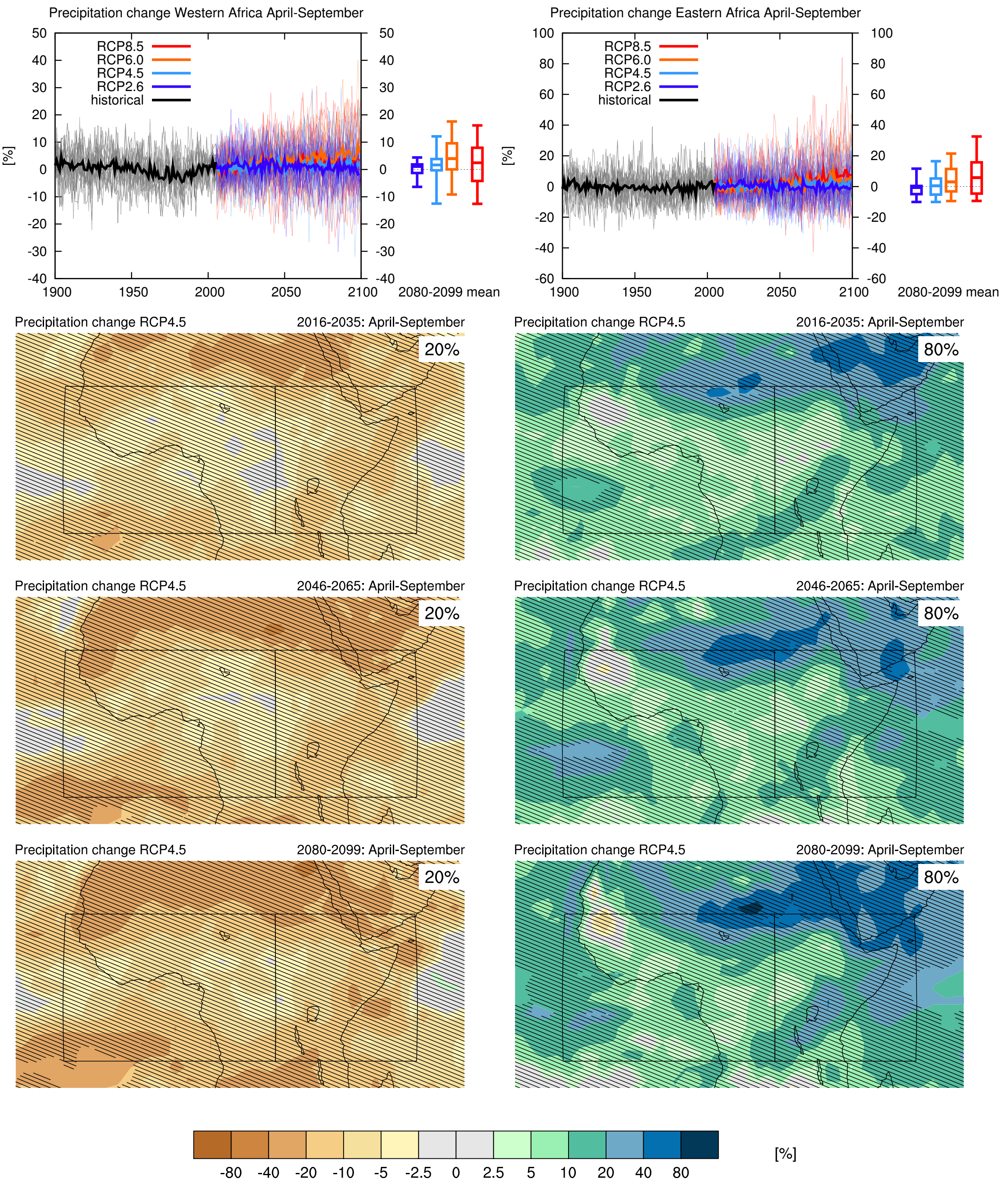


**Figure AI.51:** top left: time series of relative precipitation averaged over land grid points in Western Africa (10°S–17.5°N, 20°W–25°E) in April–September. Top right: same for land grid points in Eastern Africa (10°S–17.5°N, 25°–55°E). Thin lines denote one ensemble member per model, thick lines the partial CMIP5 multi-model mean. On the right-hand side the 5th, 25th, 50th (median), 75th and 95th percentiles of the distribution of 20-yr mean changes are given for the period 2080–2099 (relative to 1986–2005) for the four RCP scenarios.

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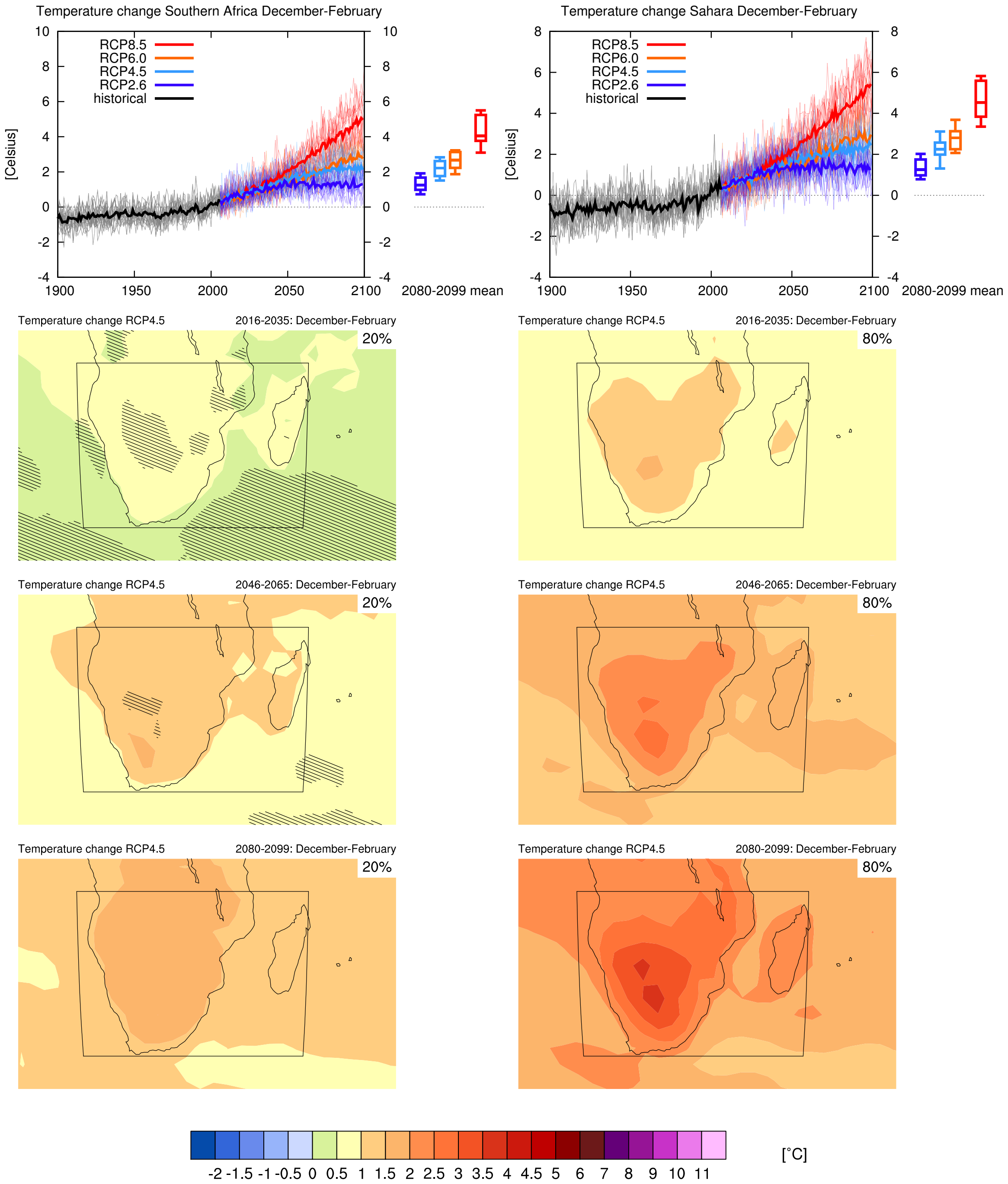


**Figure AI.52:** top left: time series of temperature averaged over land grid points in Southern Africa (35°–10°S, 10°–50°E) in December–February. Top right: same for land grid points in the Sahara (17.5°–30°N, 20°W–65°E). Thin lines denote one ensemble member per model, thick lines the partial CMIP5 multi-model mean. On the right-hand side the 5th, 25th, 50th (median), 75th and 95th percentiles of the distribution of 20-yr mean changes are given for the period 2080–2099 (relative to 1986–2005) for the four RCP scenarios.

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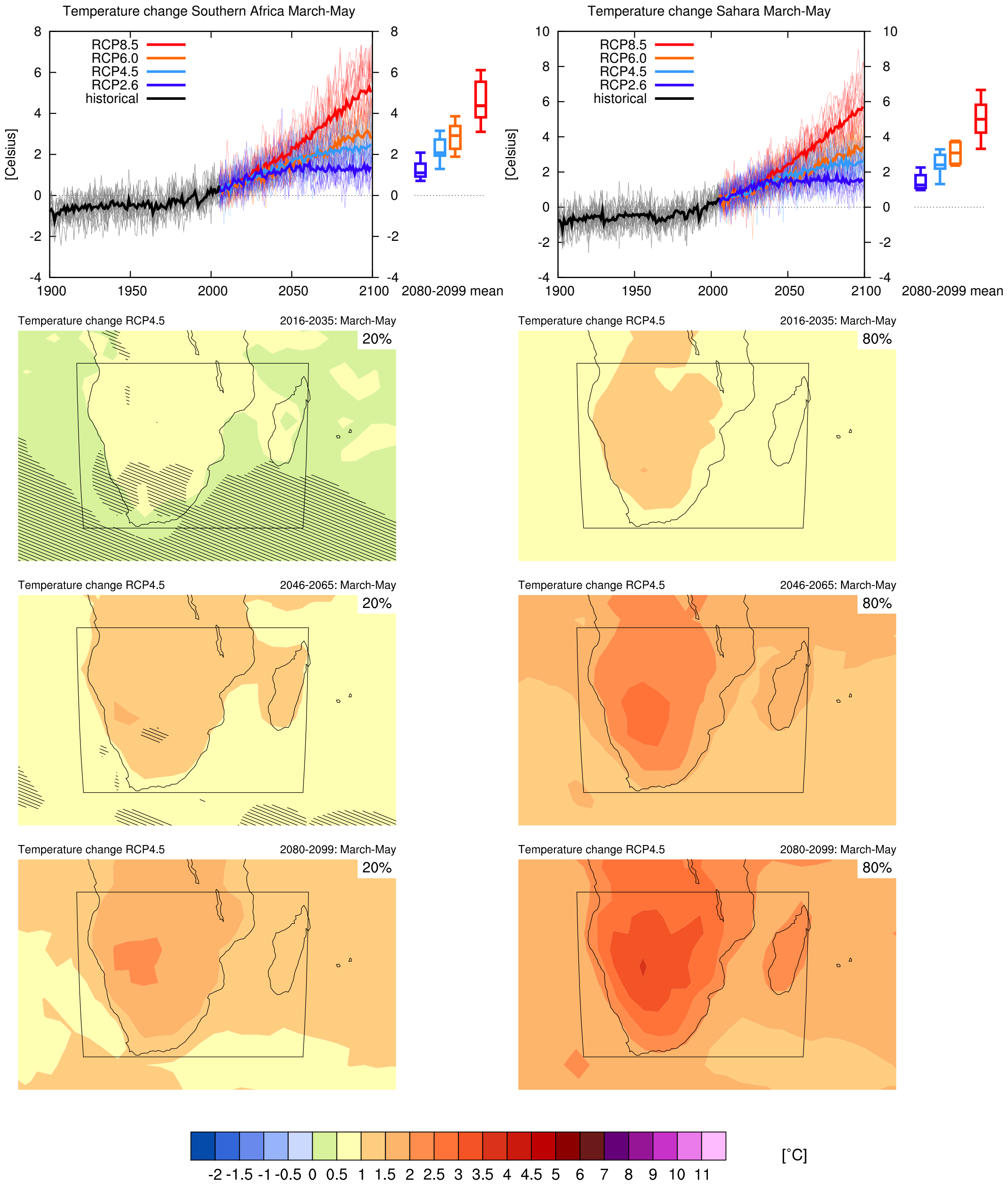


**Figure AI.53:** top left: time series of temperature averaged over land grid points in Southern Africa (35°–10°S, 10°–50°E) in March–May. Top right: same for land grid points in the Sahara (17.5°–30°N, 20°W–65°E). Thin lines denote one ensemble member per model, thick lines the partial CMIP5 multi-model mean. On the right-hand side the 5th, 25th, 50th (median), 75th and 95th percentiles of the distribution of 20-yr mean changes are given for the period 2080–2099 (relative to 1986–2005) for the four RCP scenarios.

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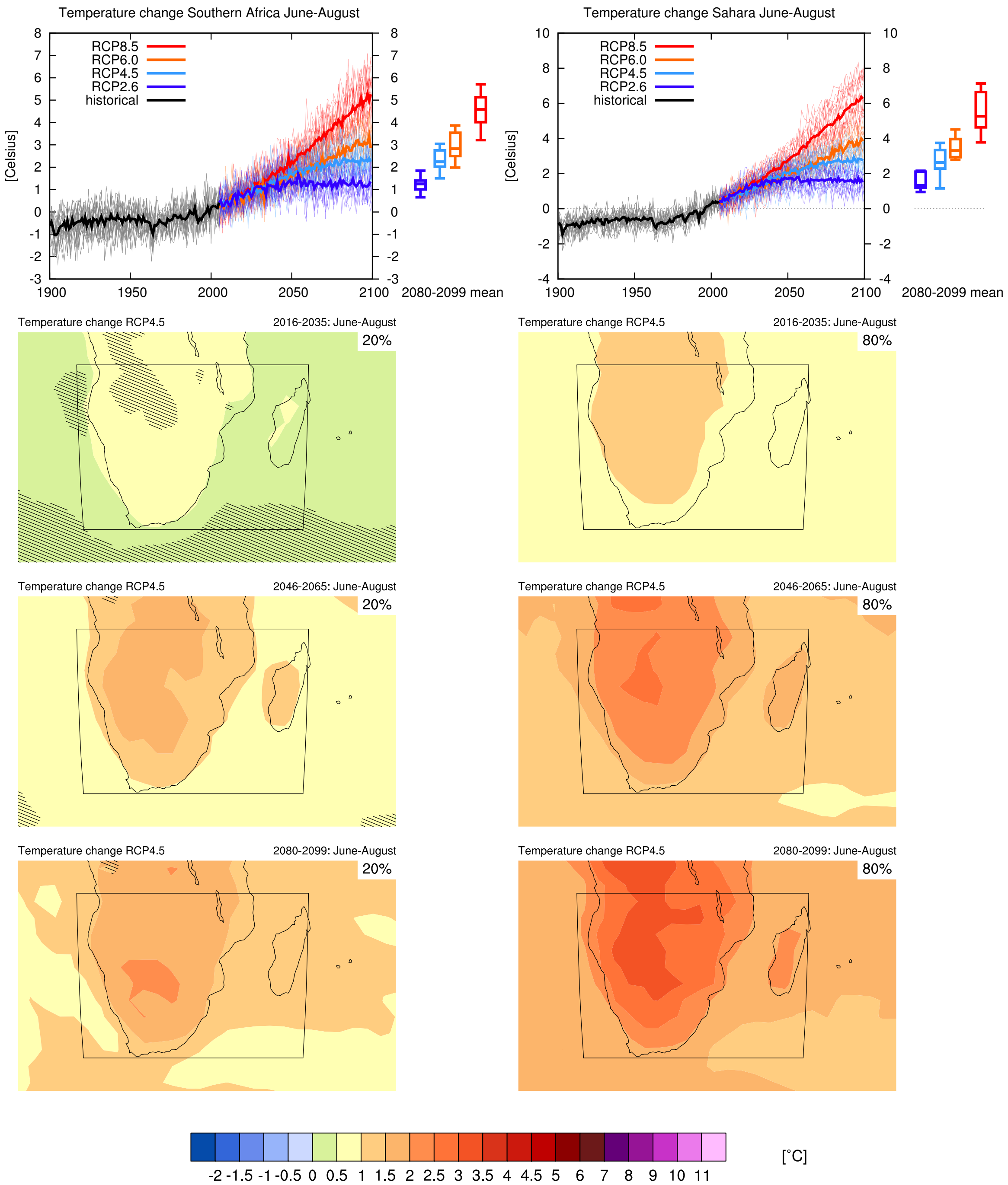


**Figure AI.54:** top left: time series of temperature averaged over land grid points in Southern Africa (35°–10°S, 10°–50°E) in June–August. Top right: same for land grid points in the Sahara (17.5°–30°N, 20°W–65°E). Thin lines denote one ensemble member per model, thick lines the partial CMIP5 multi-model mean. On the right-hand side the 5th, 25th, 50th (median), 75th and 95th percentiles of the distribution of 20-yr mean changes are given for the period 2080–2099 (relative to 1986–2005) for the four RCP scenarios.

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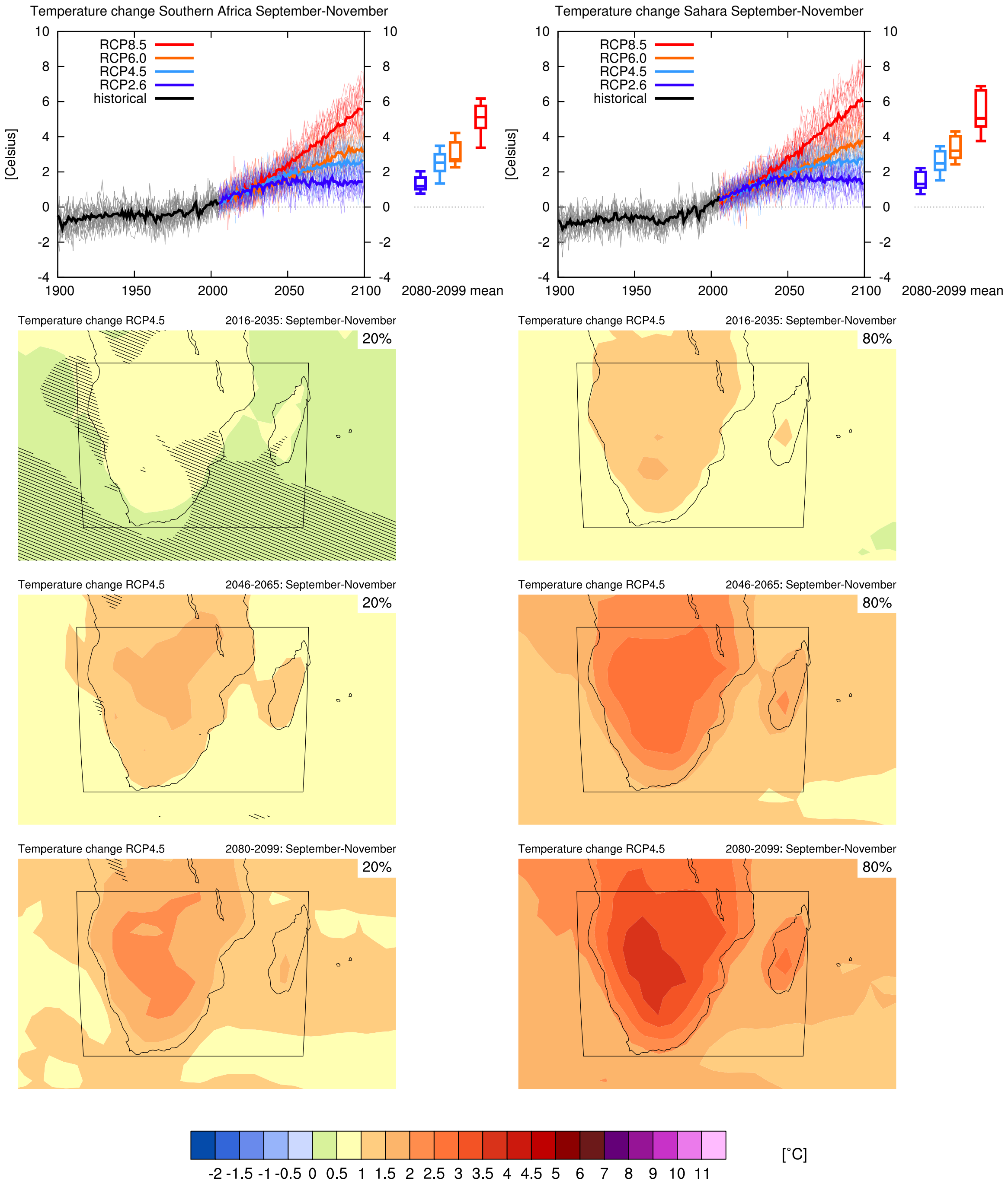


**Figure AI.55:** top left: time series of temperature averaged over land grid points in Southern Africa (35°–10°S, 10°–50°E) in September–November. Top right: same for land grid points in the Sahara (17.5°–30°N, 20°W–65°E). Thin lines denote one ensemble member per model, thick lines the partial CMIP5 multi-model mean. On the right-hand side the 5th, 25th, 50th (median), 75th and 95th percentiles of the distribution of 20-yr mean changes are given for the period 2080–2099 (relative to 1986–2005) for the four RCP scenarios.

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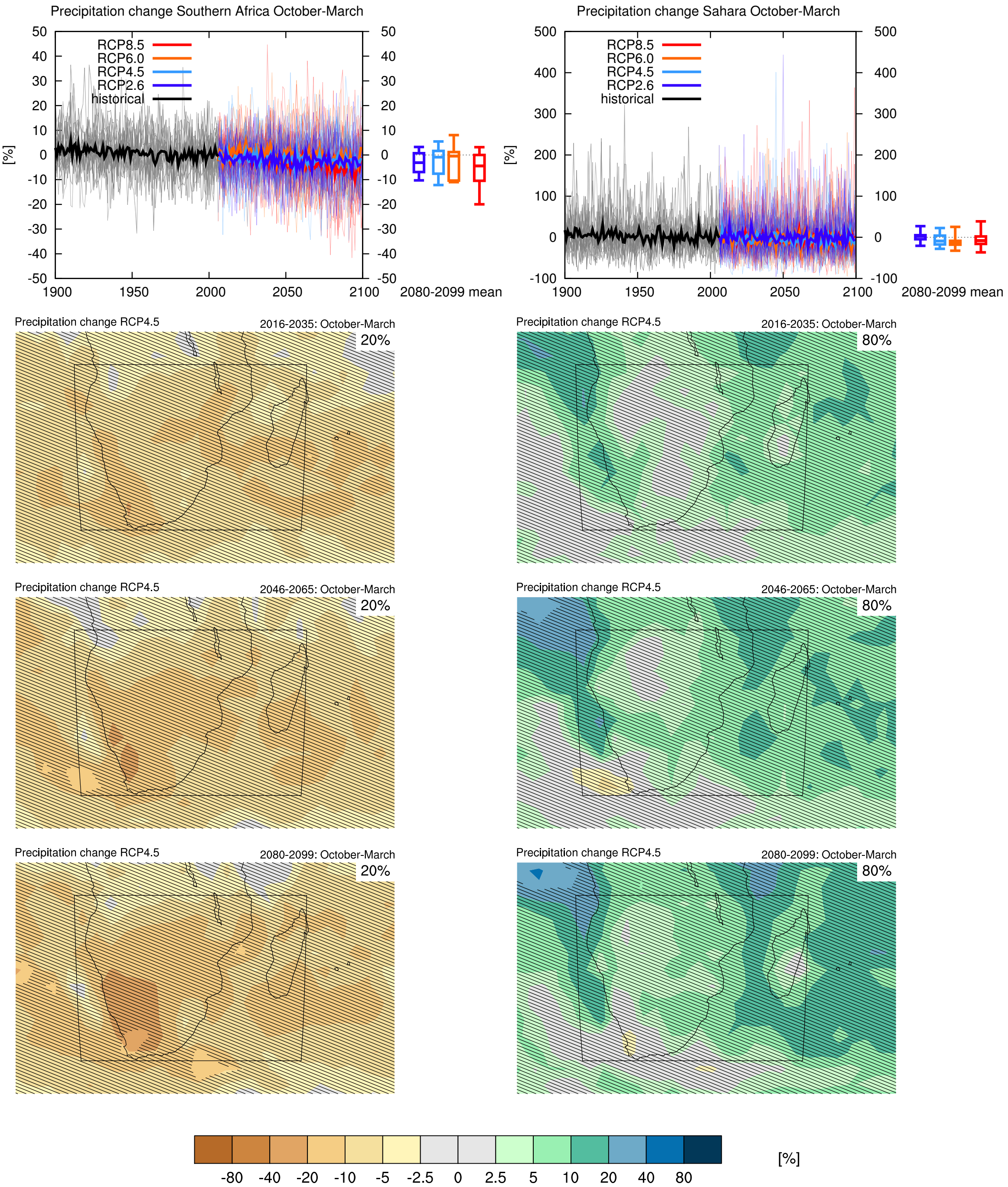


**Figure AI.56:** top left: time series of relative precipitation averaged over land grid points in Southern Africa (35°–10°S, 10°–50°E) in October–March. Top right: same for land grid points in the Sahara (17.5°–30°N, 20°W–65°E). Thin lines denote one ensemble member per model, thick lines the partial CMIP5 multi-model mean. On the right-hand side the 5th, 25th, 50th (median), 75th and 95th percentiles of the distribution of 20-yr mean changes are given for the period 2080–2099 (relative to 1986–2005) for the four RCP scenarios.

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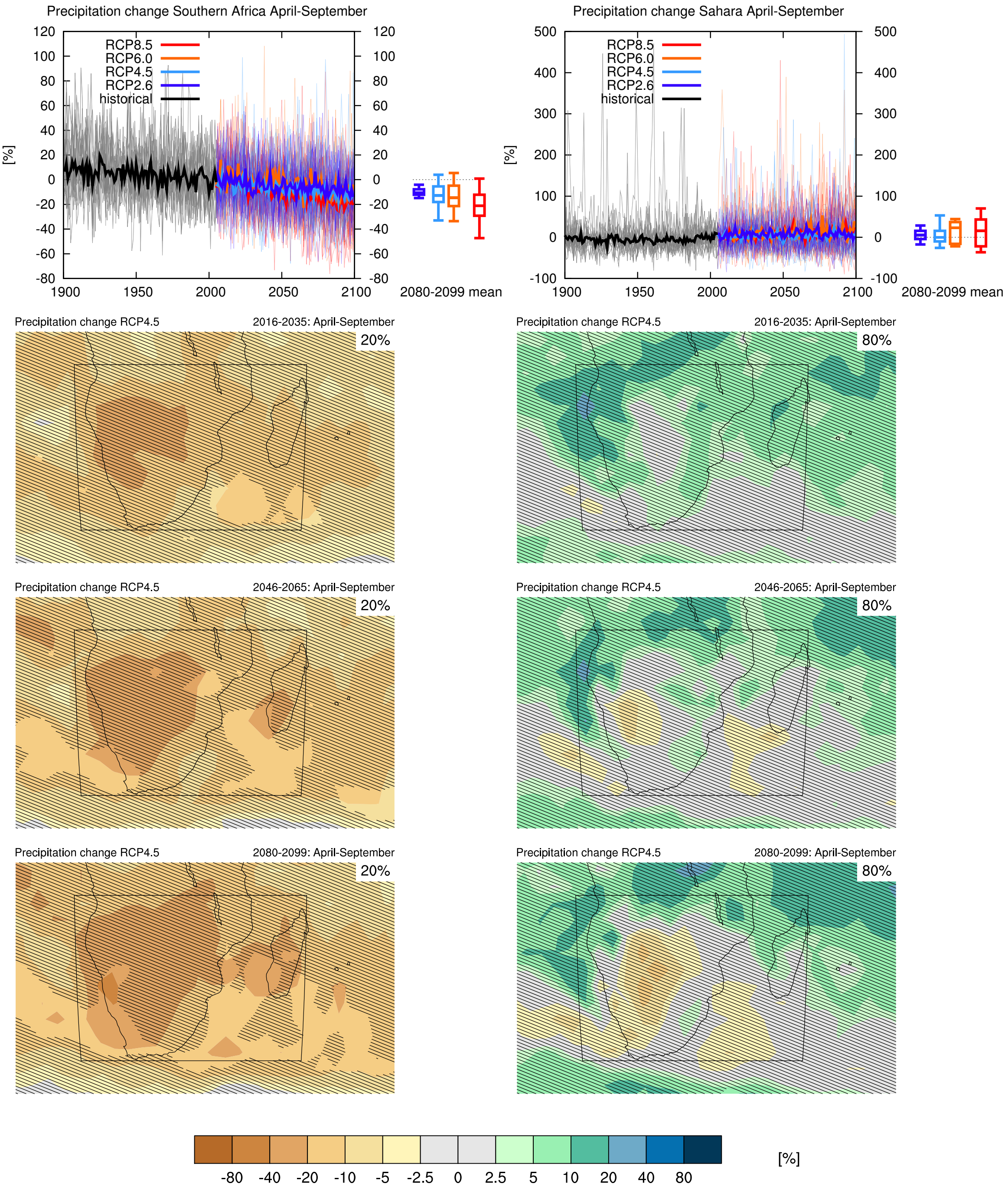


**Figure AI.57:** top left: time series of relative precipitation averaged over land grid points in Southern Africa (35°–10°S, 10°–50°E) in April–September. Top right: same for land grid points in the Sahara (17.5°–30°N, 20°W–65°E). Thin lines denote one ensemble member per model, thick lines the partial CMIP5 multi-model mean. On the right-hand side the 5th, 25th, 50th (median), 75th and 95th percentiles of the distribution of 20-yr mean changes are given for the period 2080–2099 (relative to 1986–2005) for the four RCP scenarios.

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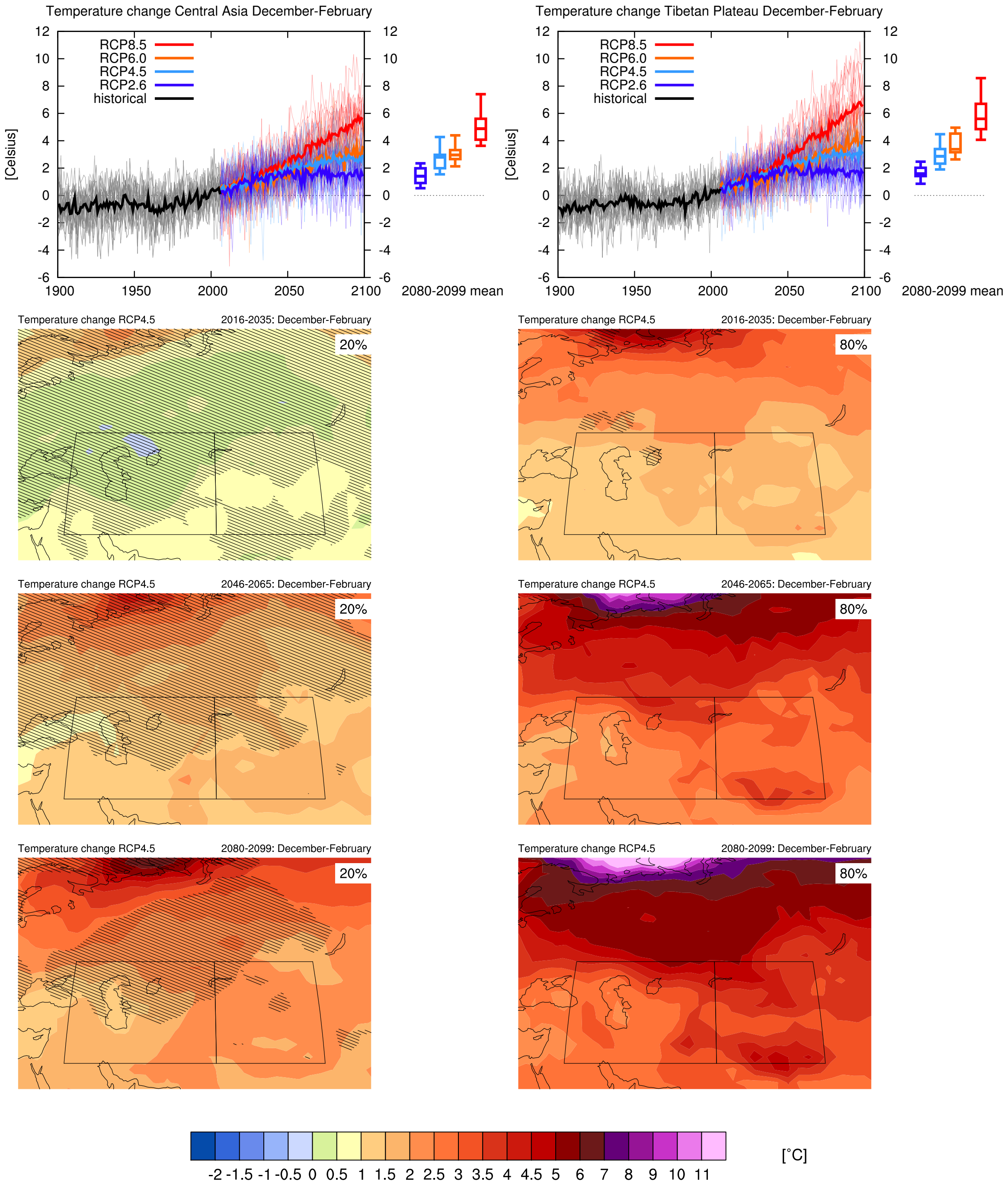


**Figure AI.58:** top left: time series of temperature averaged over land grid points in Central Asia (30°–50°N, 40°–75°E) in December–February. Top right: same for land grid points on the Tibetan Plateau (30°–50°N, 75°–100°E). Thin lines denote one ensemble member per model, thick lines the partial CMIP5 multi-model mean. On the right-hand side the 5th, 25th, 50th (median), 75th and 95th percentiles of the distribution of 20-yr mean changes are given for the period 2080–2099 (relative to 1986–2005) for the four RCP scenarios.

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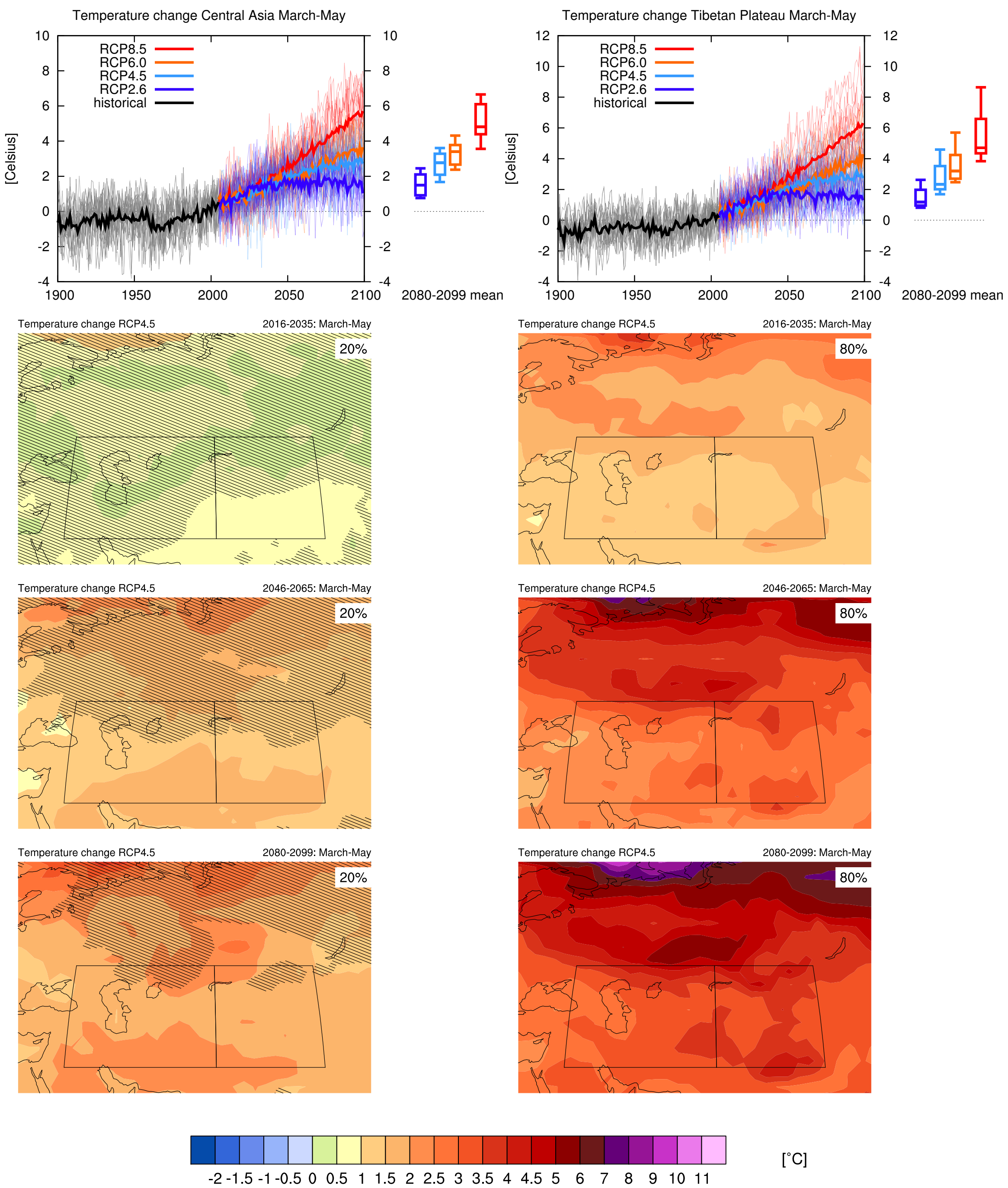


**Figure AI.59:** top left: time series of temperature averaged over land grid points in Central Asia (30°–50°N, 40°–75°E) in March–May. Top right: same for land grid points on the Tibetan Plateau (30°–50°N, 75°–100°E). Thin lines denote one ensemble member per model, thick lines the partial CMIP5 multi-model mean. On the right-hand side the 5th, 25th, 50th (median), 75th and 95th percentiles of the distribution of 20-yr mean changes are given for the period 2080–2099 (relative to 1986–2005) for the four RCP scenarios.

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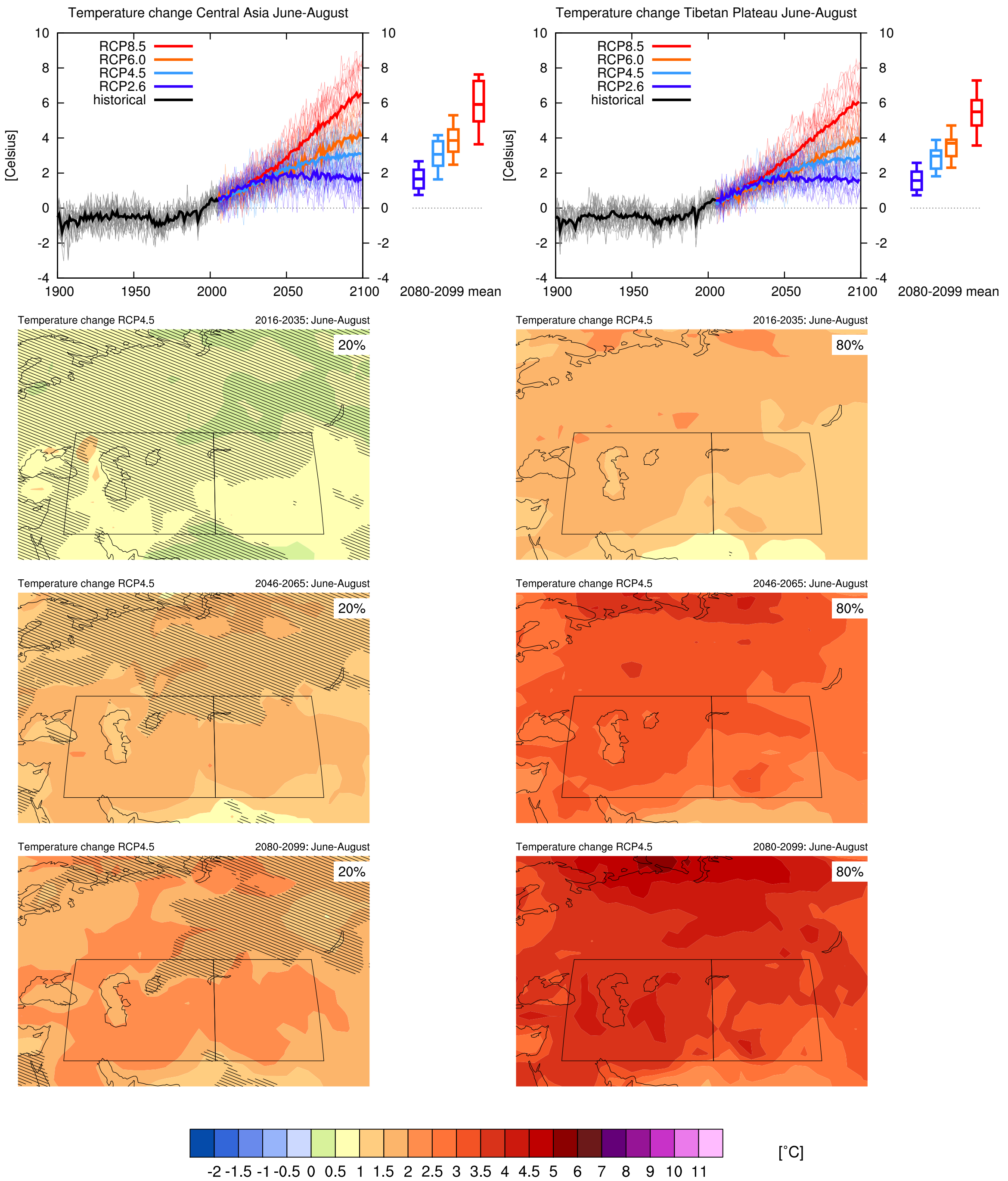


**Figure AI.60:** top left: time series of temperature averaged over land grid points in Central Asia (30°–50°N, 40°–75°E) in June–August. Top right: same for land grid points on the Tibetan Plateau (30°–50°N, 75°–100°E). Thin lines denote one ensemble member per model, thick lines the partial CMIP5 multi-model mean. On the right-hand side the 5th, 25th, 50th (median), 75th and 95th percentiles of the distribution of 20-yr mean changes are given for the period 2080–2099 (relative to 1986–2005) for the four RCP scenarios.

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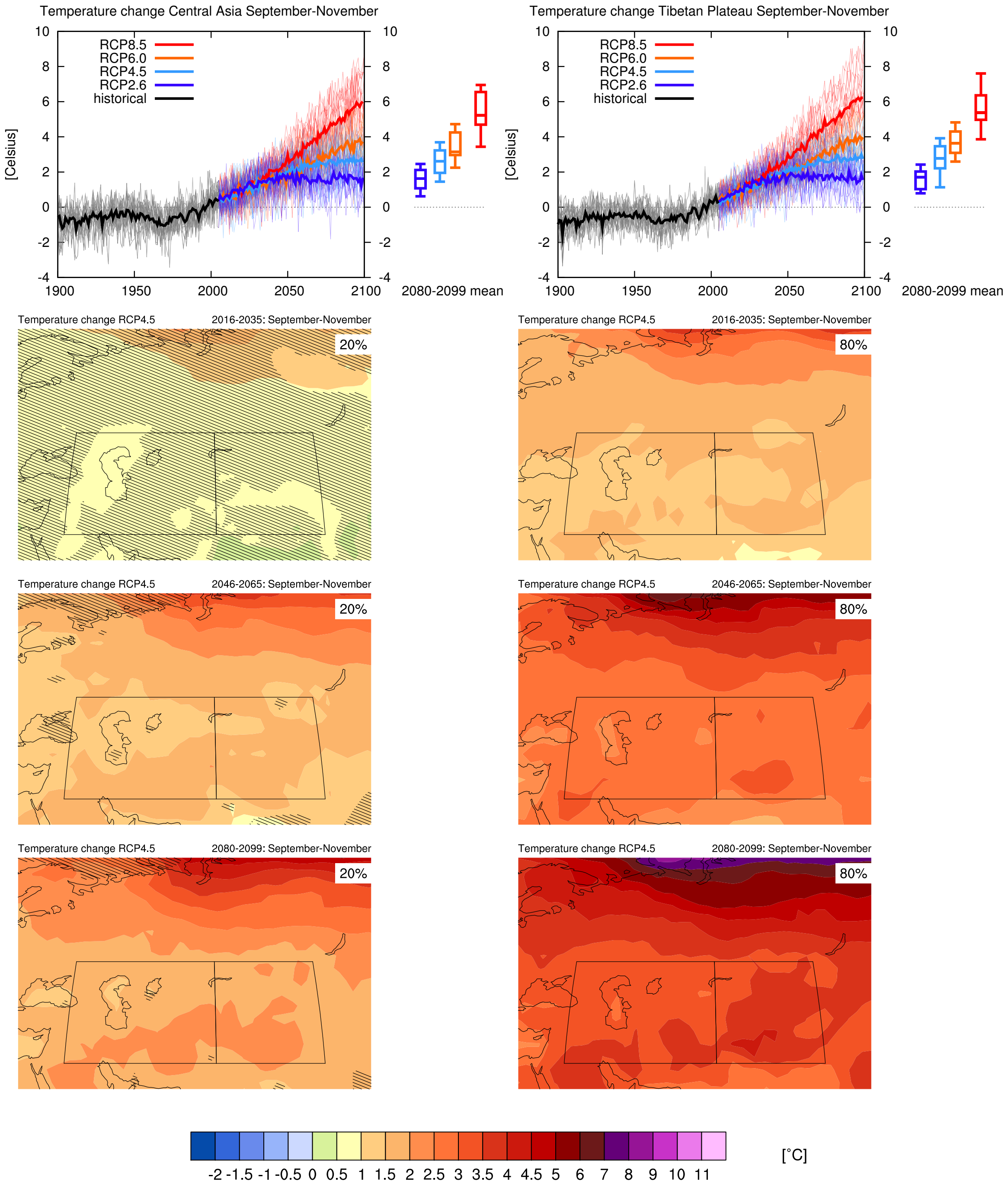


**Figure AI.61:** top left: time series of temperature averaged over land grid points in Central Asia (30°–50°N, 40°–75°E) in September–November. Top right: same for land grid points on the Tibetan Plateau (30°–50°N, 75°–100°E). Thin lines denote one ensemble member per model, thick lines the partial CMIP5 multi-model mean. On the right-hand side the 5th, 25th, 50th (median), 75th and 95th percentiles of the distribution of 20-yr mean changes are given for the period 2080–2099 (relative to 1986–2005) for the four RCP scenarios.

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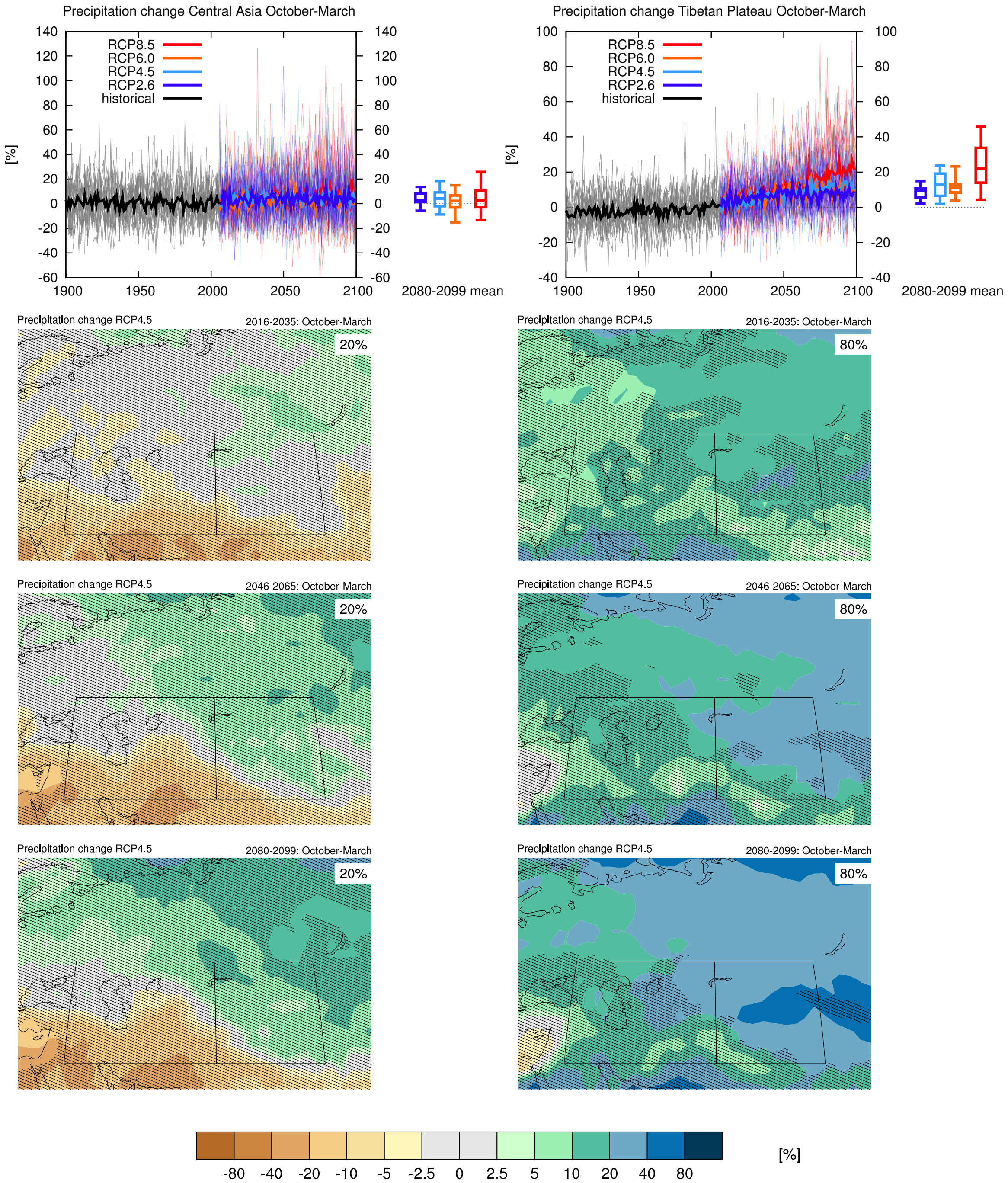


**Figure AI.62:** top left: time series of relative precipitation averaged over land grid points in Central Asia (30°–50°N, 40°–75°E) in October–March. Top right: same for land grid points on the Tibetan Plateau (30°–50°N, 75°–100°E). Thin lines denote one ensemble member per model, thick lines the partial CMIP5 multi-model mean. On the right-hand side the 5th, 25th, 50th (median), 75th and 95th percentiles of the distribution of 20-yr mean changes are given for the period 2080–2099 (relative to 1986–2005) for the four RCP scenarios.

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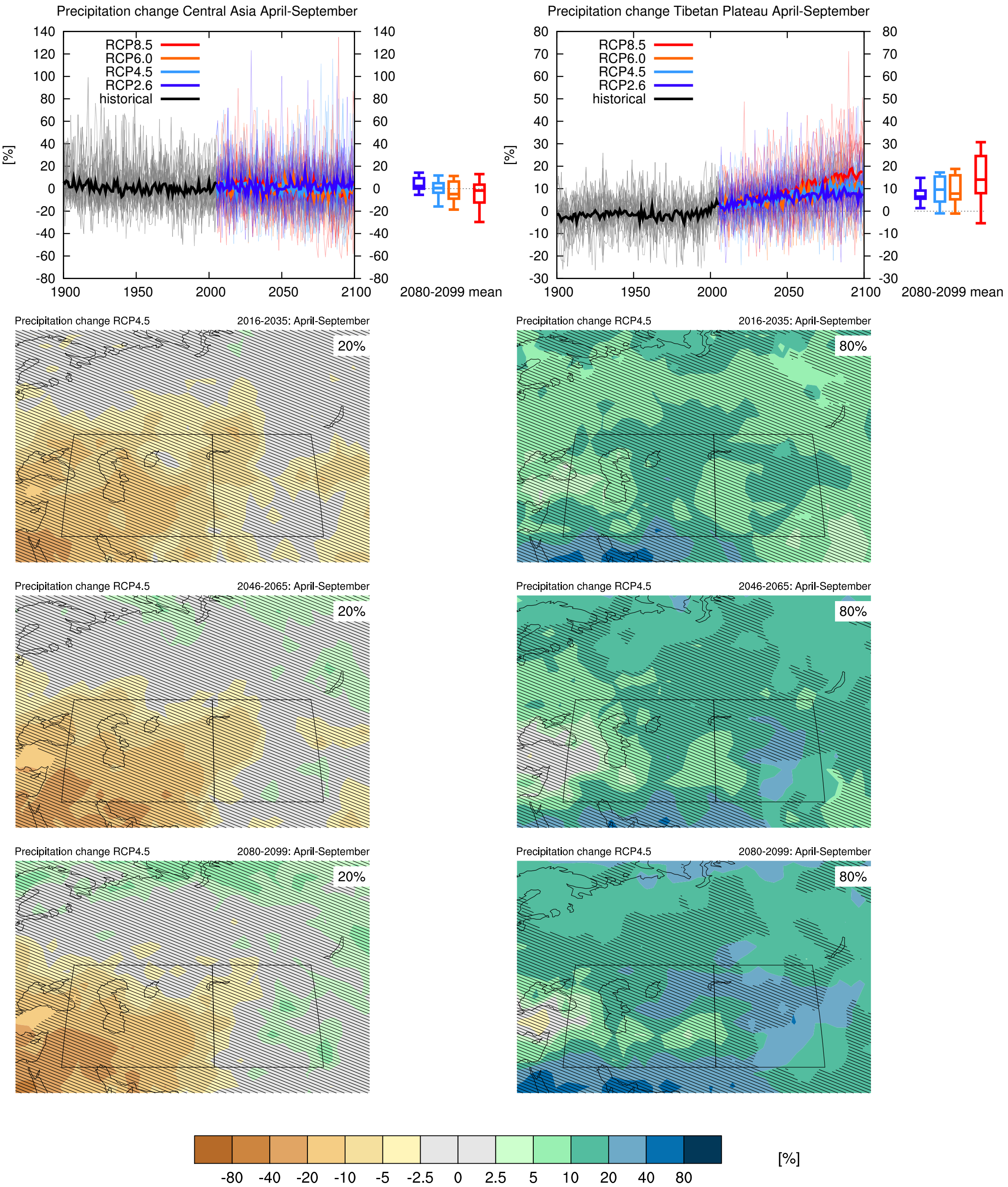


**Figure AI.63:** top left: time series of relative precipitation averaged over land grid points in Central Asia (30°–50°N, 40°–75°E) in April–September. Top right: same for land grid points on the Tibetan Plateau (30°–50°N, 75°–100°E). Thin lines denote one ensemble member per model, thick lines the partial CMIP5 multi-model mean. On the right-hand side the 5th, 25th, 50th (median), 75th and 95th percentiles of the distribution of 20-yr mean changes are given for the period 2080–2099 (relative to 1986–2005) for the four RCP scenarios.

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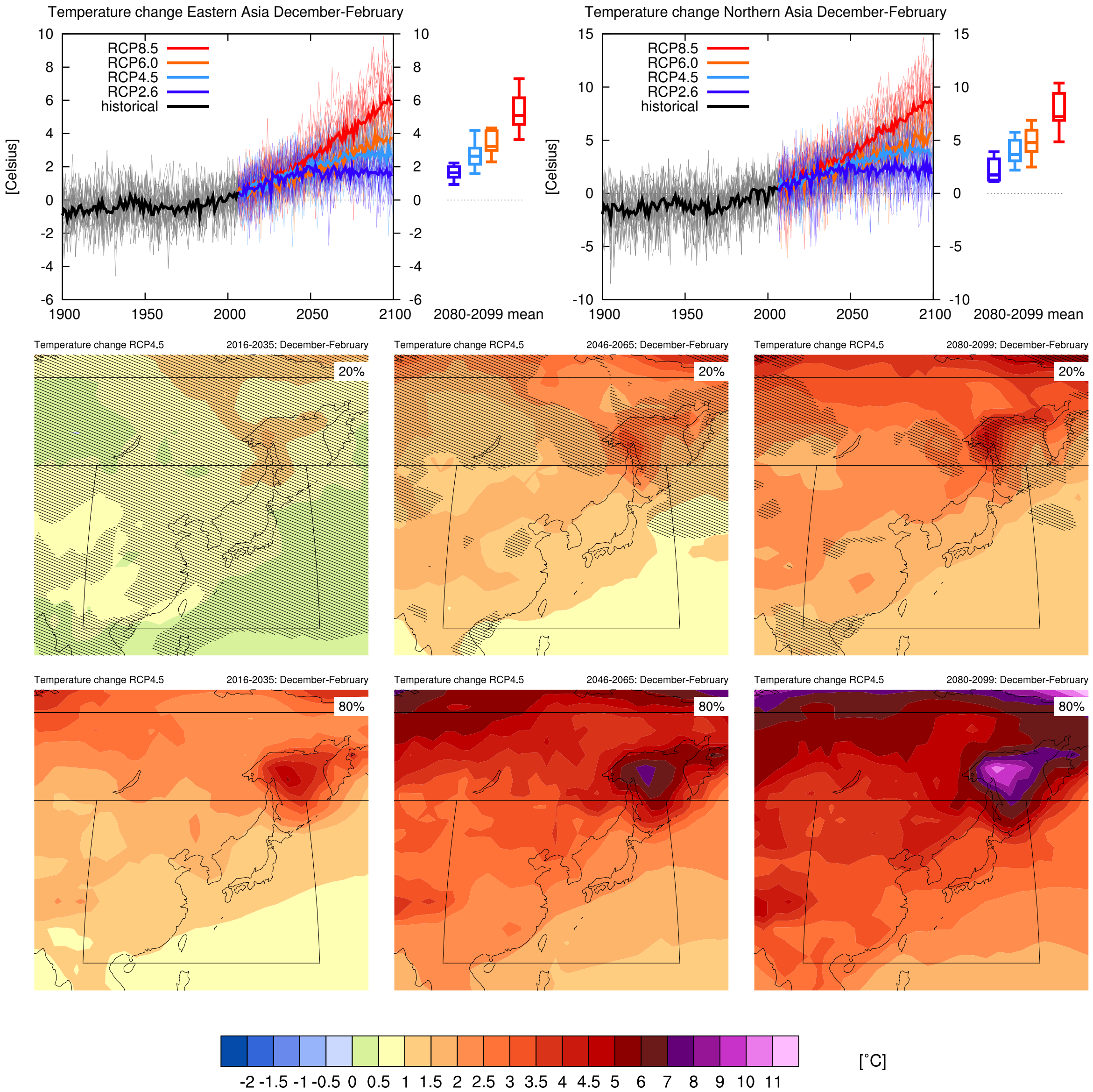


**Figure AI.64:** top left: time series of temperature averaged over land grid points in Eastern Asia (20°–50°N, 100°–150°E) in December–February. Top right: same for land grid points in Northern Asia (50°–67.5°N, 40°E–170°W). Thin lines denote one ensemble member per model, thick lines the partial CMIP5 multi-model mean. On the right-hand side the 5th, 25th, 50th (median), 75th and 95th percentiles of the distribution of 20-yr mean changes are given for the period 2080–2099 (relative to 1986–2005) for the four RCP scenarios.

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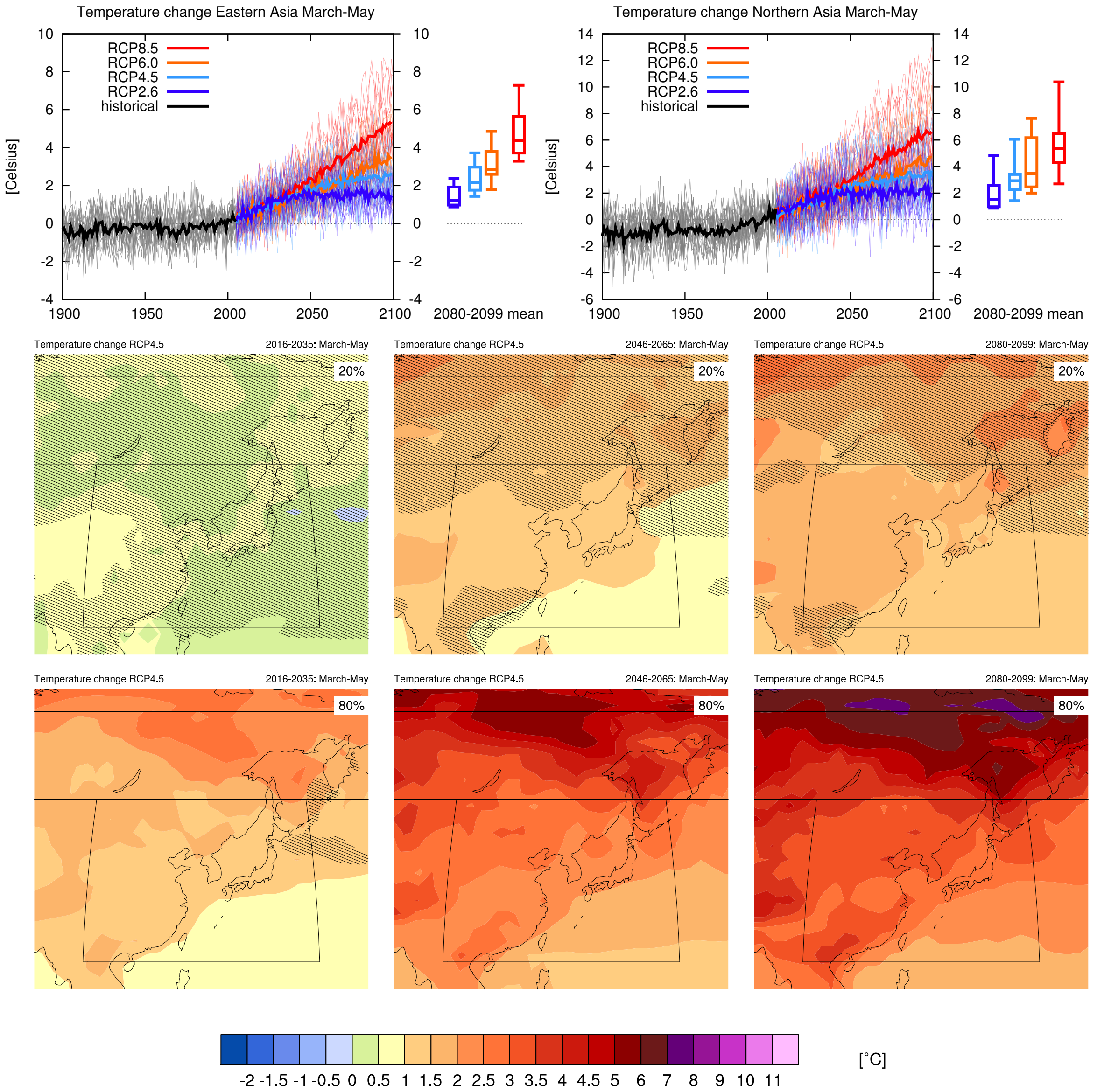


**Figure AI.65:** top left: time series of temperature averaged over land grid points in Eastern Asia (20°–50°N, 100°–150°E) in March–May. Top right: same for land grid points in Northern Asia (50°–67.5°N, 40°E–170°W). Thin lines denote one ensemble member per model, thick lines the partial CMIP5 multi-model mean. On the right-hand side the 5th, 25th, 50th (median), 75th and 95th percentiles of the distribution of 20-yr mean changes are given for the period 2080–2099 (relative to 1986–2005) for the four RCP scenarios.

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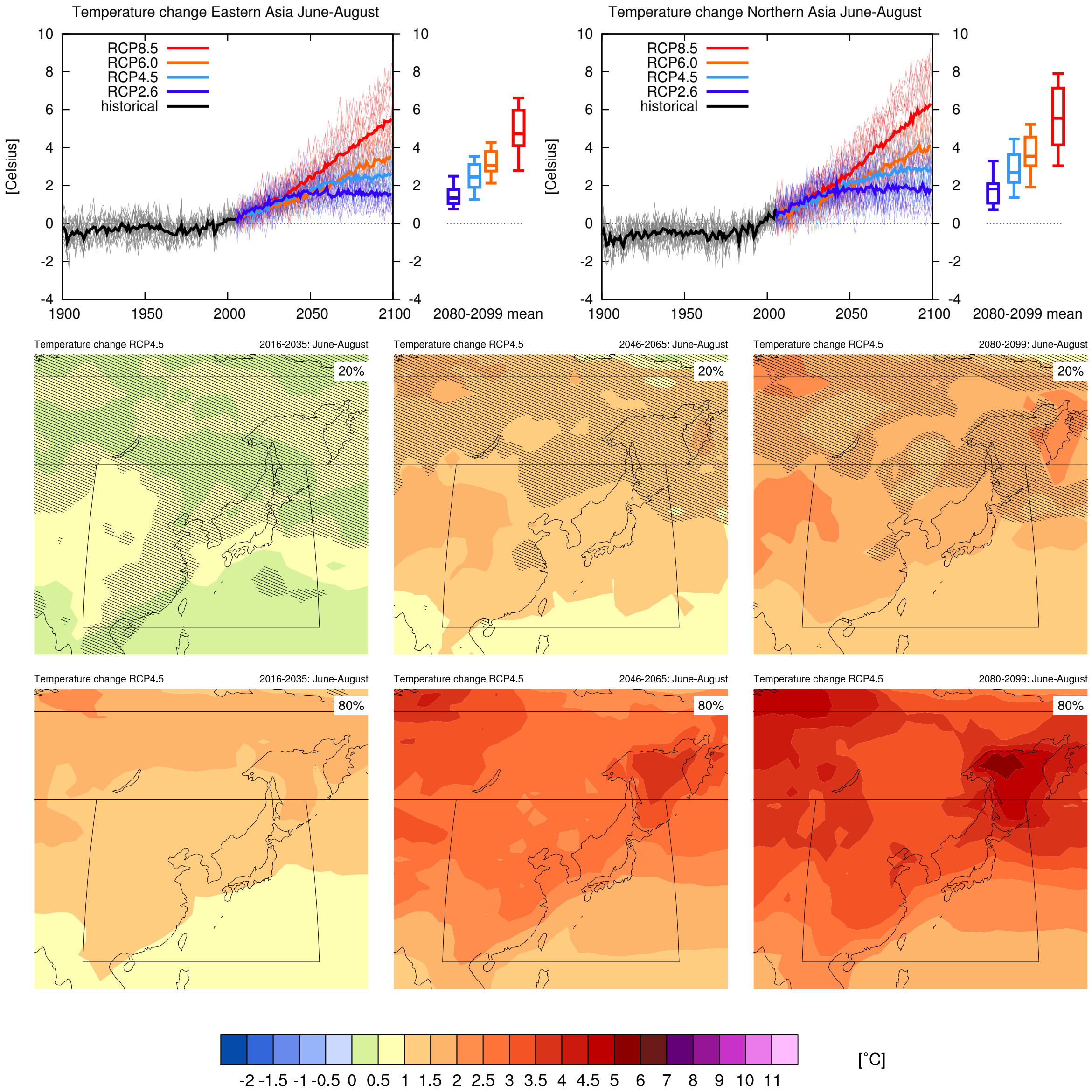


**Figure AI.66:** top left: time series of temperature averaged over land grid points in Eastern Asia (20°–50°N, 100°–150°E) in June–August. Top right: same for land grid points in Northern Asia (50°–67.5°N, 40°E–170°W). Thin lines denote one ensemble member per model, thick lines the partial CMIP5 multi-model mean. On the right-hand side the 5th, 25th, 50th (median), 75th and 95th percentiles of the distribution of 20-yr mean changes are given for the period 2080–2099 (relative to 1986–2005) for the four RCP scenarios.

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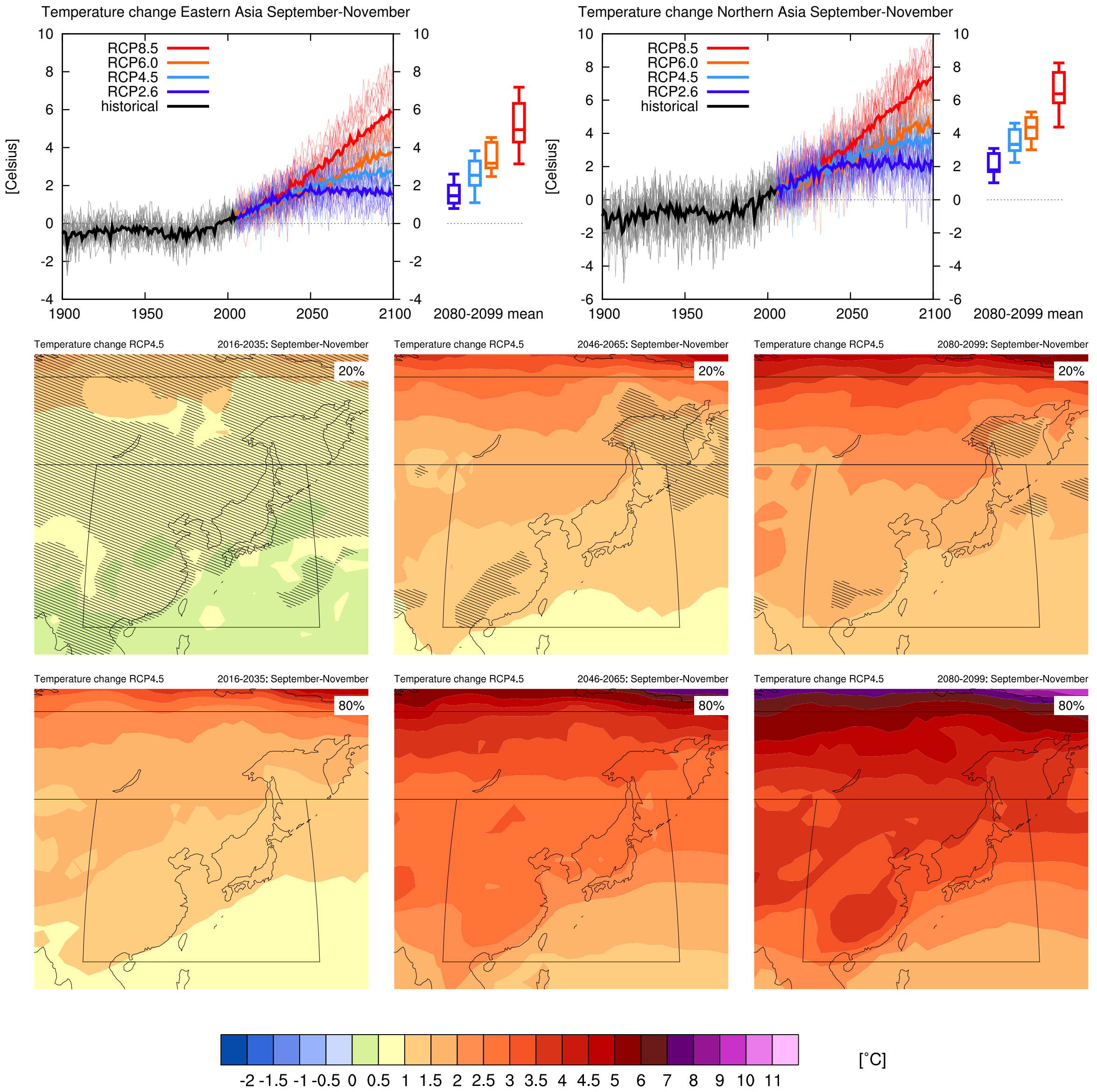


**Figure AI.67:** top left: time series of temperature averaged over land grid points in Eastern Asia (20°–50°N, 100°–150°E) in September–November. Top right: same for land grid points in Northern Asia (50°–67.5°N, 40°E–170°W). Thin lines denote one ensemble member per model, thick lines the partial CMIP5 multi-model mean. On the right-hand side the 5th, 25th, 50th (median), 75th and 95th percentiles of the distribution of 20-yr mean changes are given for the period 2080–2099 (relative to 1986–2005) for the four RCP scenarios.

Below: maps of temperature changes in 2016–2035, 2046–2065 and 2080–2099 with respect to 1986–2005 in the RCP4.5 scenario. For each point, the 20% and 80% percentile of the distribution of the partial CMIP5 ensemble are shown, this includes both natural variability and inter-model spread. Hatching denotes areas where the 20-yr mean differences of the 20th (top row) and 80th (bottom row) percentiles are less than two times the standard deviation of model-estimated natural variability of 20-yr mean differences.

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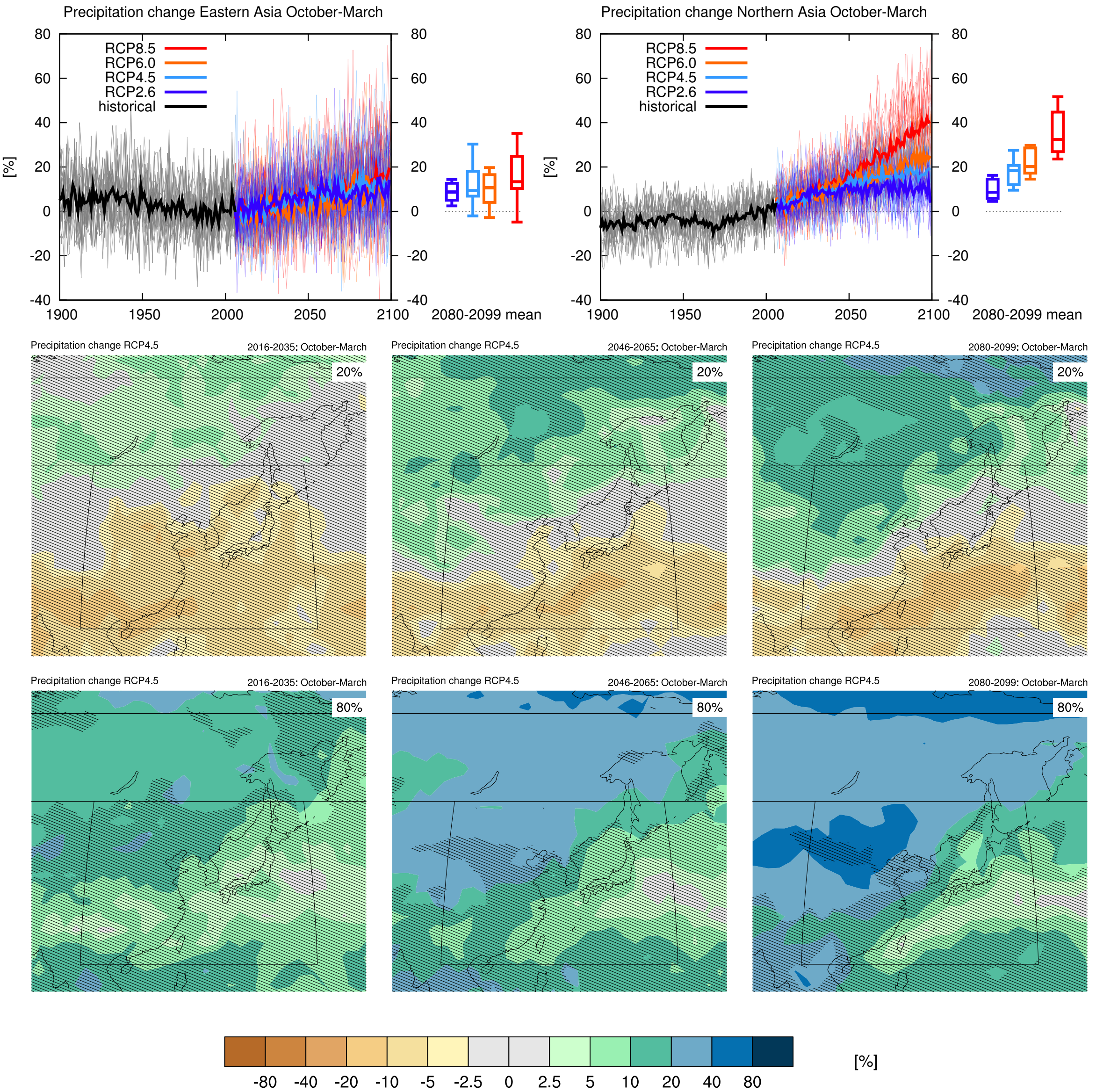


**Figure AI.68:** top left: time series of relative precipitation averaged over land grid points in Eastern Asia (20°–50°N, 100°–150°E) in October–March. Top right: same for land grid points in Northern Asia (50°–67.5°N, 40°E–170°W). Thin lines denote one ensemble member per model, thick lines the partial CMIP5 multi-model mean. On the right-hand side the 5th, 25th, 50th (median), 75th and 95th percentiles of the distribution of 20-yr mean changes are given for the period 2080–2099 (relative to 1986–2005) for the four RCP scenarios.

Below: maps of relative precipitation changes in 2016–2035, 2046–2065 and 2080–2099 with respect to 1986–2005 in the RCP4.5 scenario. For each point, the 20% and 80% percentile of the distribution of the partial CMIP5 ensemble are shown, this includes both natural variability and inter-model spread. Hatching denotes areas where the 20-yr mean differences of the 20th (top row) and 80th (bottom row) percentiles are less than two times the standard deviation of model-estimated natural variability of 20-yr mean differences.

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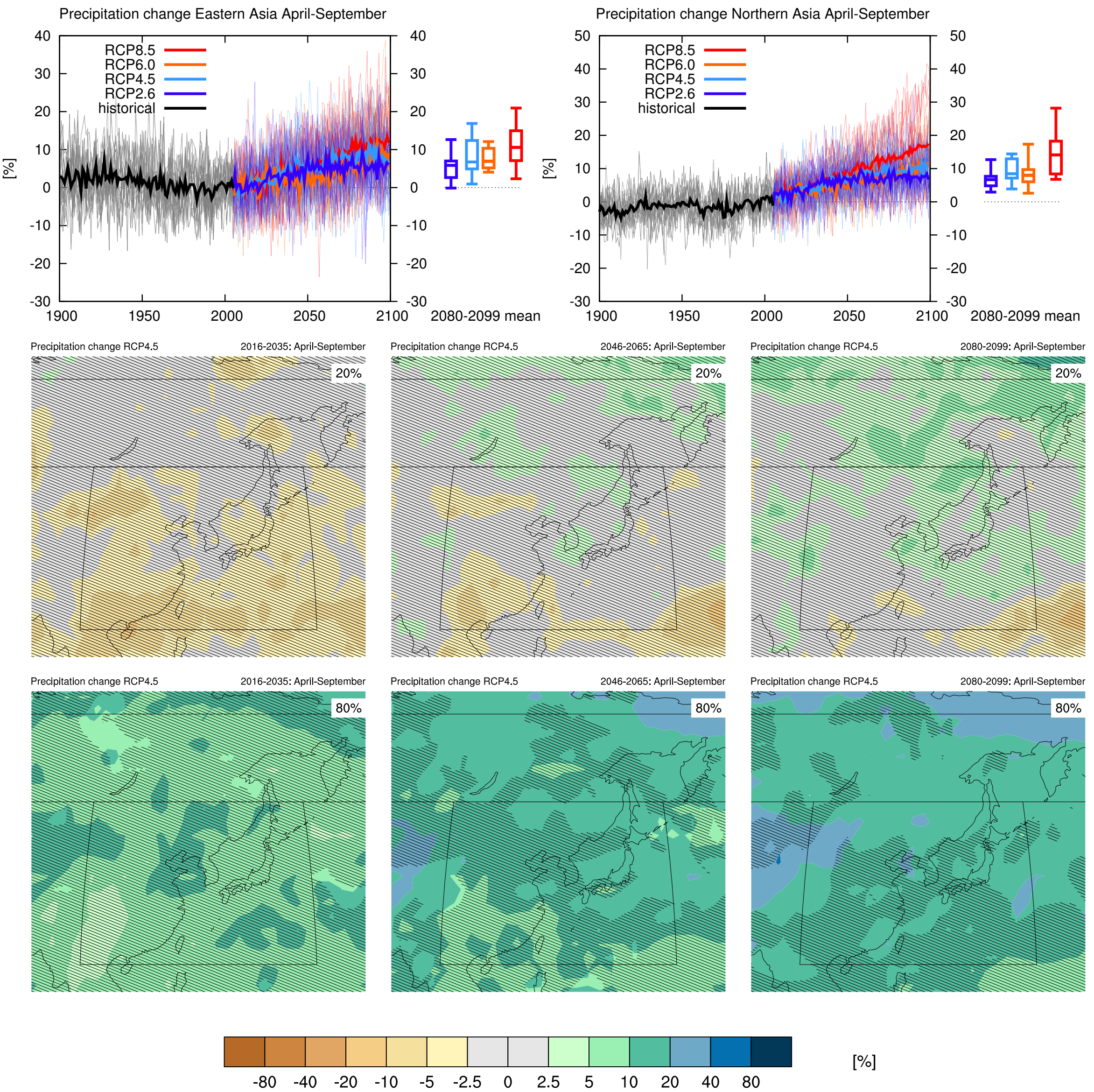


**Figure AI.69:** top left: time series of relative precipitation averaged over land grid points in Eastern Asia (20°–50°N, 100°–150°E) in April–September. Top right: same for land grid points in Northern Asia (50°–67.5°N, 40°E–170°W). Thin lines denote one ensemble member per model, thick lines the partial CMIP5 multi-model mean. On the right-hand side the 5th, 25th, 50th (median), 75th and 95th percentiles of the distribution of 20-yr mean changes are given for the period 2080–2099 (relative to 1986–2005) for the four RCP scenarios.

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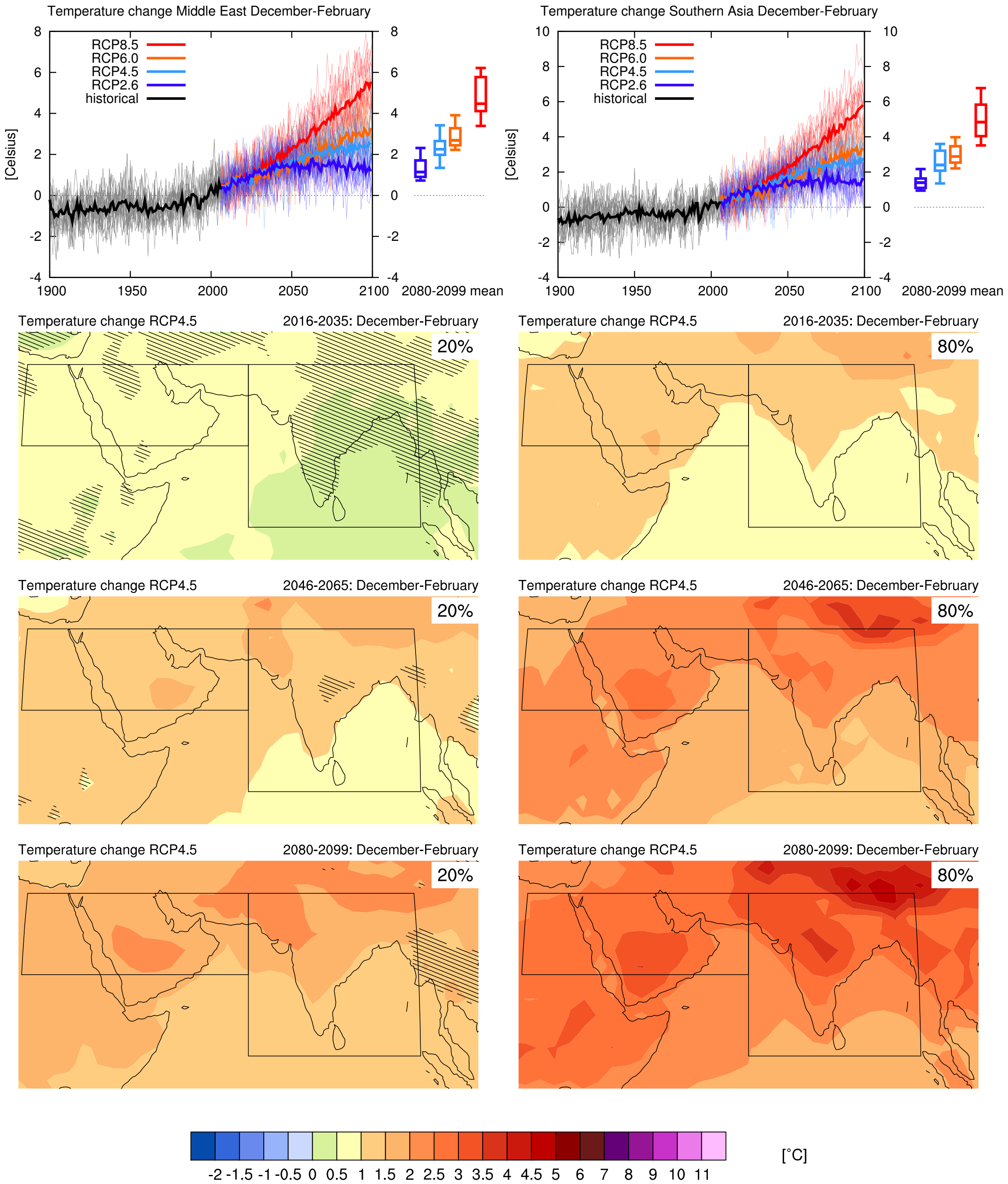


**Figure AI.70:** top left: time series of temperature averaged over land grid points in the Middle East (17.5°–30°N, 25°–65°E) in December–February. Top right: same for land grid points in Southern Asia (5°–30°N, 65°–95°E). Thin lines denote one ensemble member per model, thick lines the partial CMIP5 multi-model mean. On the right-hand side the 5th, 25th, 50th (median), 75th and 95th percentiles of the distribution of 20-yr mean changes are given for the period 2080–2099 (relative to 1986–2005) for the four RCP scenarios.

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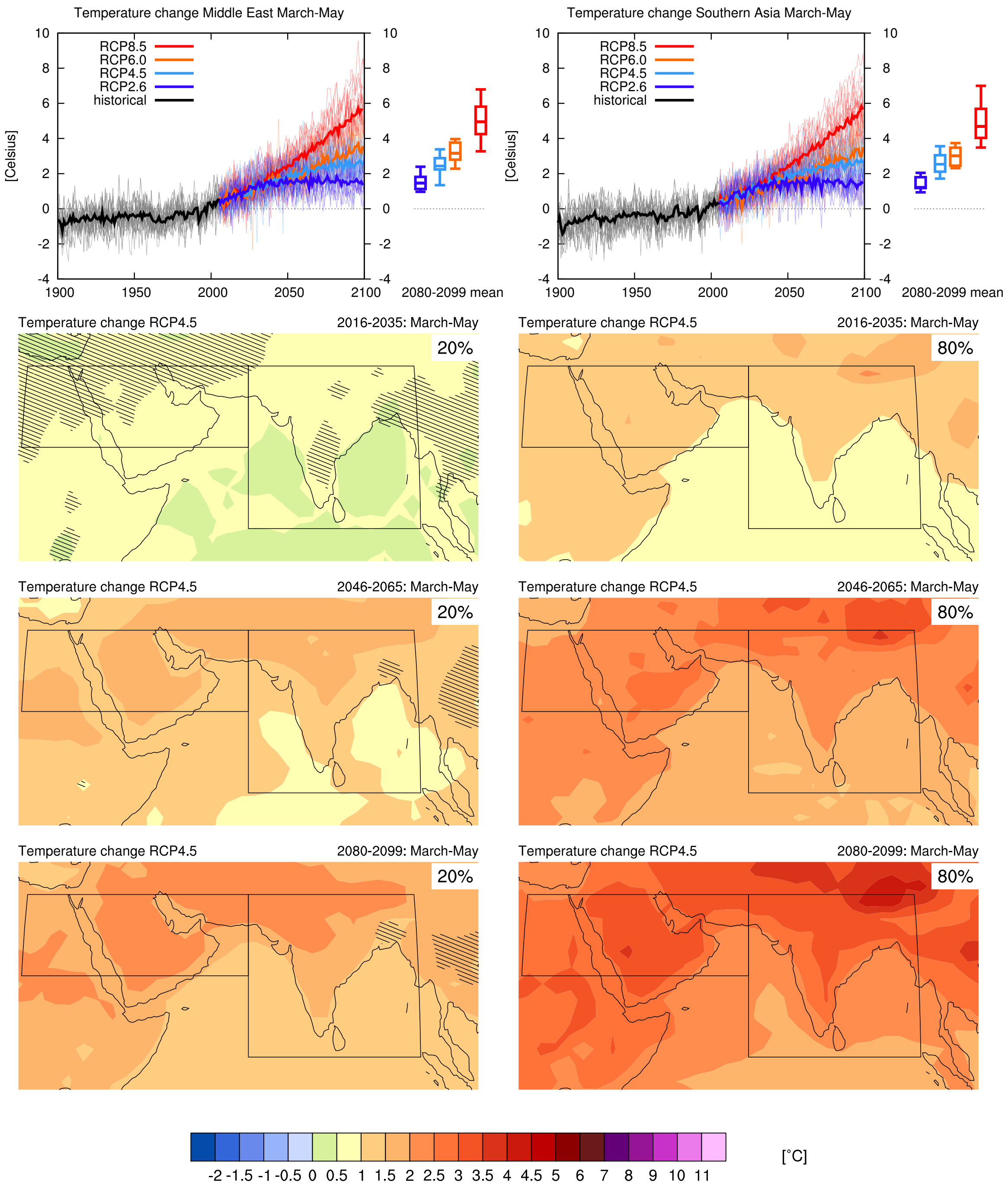


**Figure AI.71:** top left: time series of temperature averaged over land grid points in the Middle East (17.5°–30°N, 25°–65°E) in March–May. Top right: same for land grid points in Southern Asia (5°–30°N, 65°–95°E). Thin lines denote one ensemble member per model, thick lines the partial CMIP5 multi-model mean. On the right-hand side the 5th, 25th, 50th (median), 75th and 95th percentiles of the distribution of 20-yr mean changes are given for the period 2080–2099 (relative to 1986–2005) for the four RCP scenarios.

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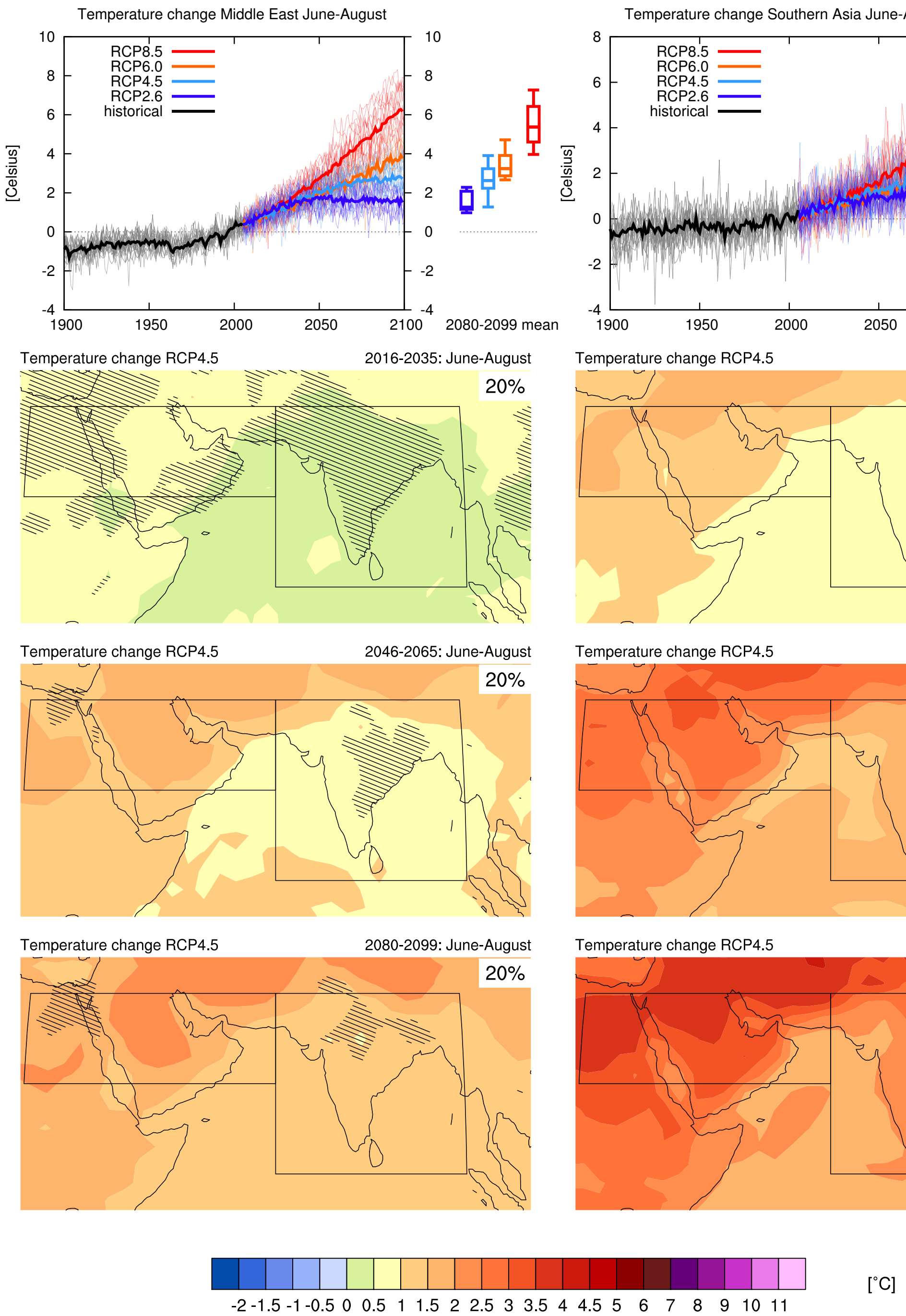


**Figure AI.72:** top left: time series of temperature averaged over land grid points in the Middle East (17.5°–30°N, 25°–65°E) in June–August. Top right: same for land grid points in Southern Asia (5°–30°N, 65°–95°E). Thin lines denote one ensemble member per model, thick lines the partial CMIP5 multi-model mean. On the right-hand side the 5th, 25th, 50th (median), 75th and 95th percentiles of the distribution of 20-yr mean changes are given for the period 2080–2099 (relative to 1986–2005) for the four RCP scenarios.

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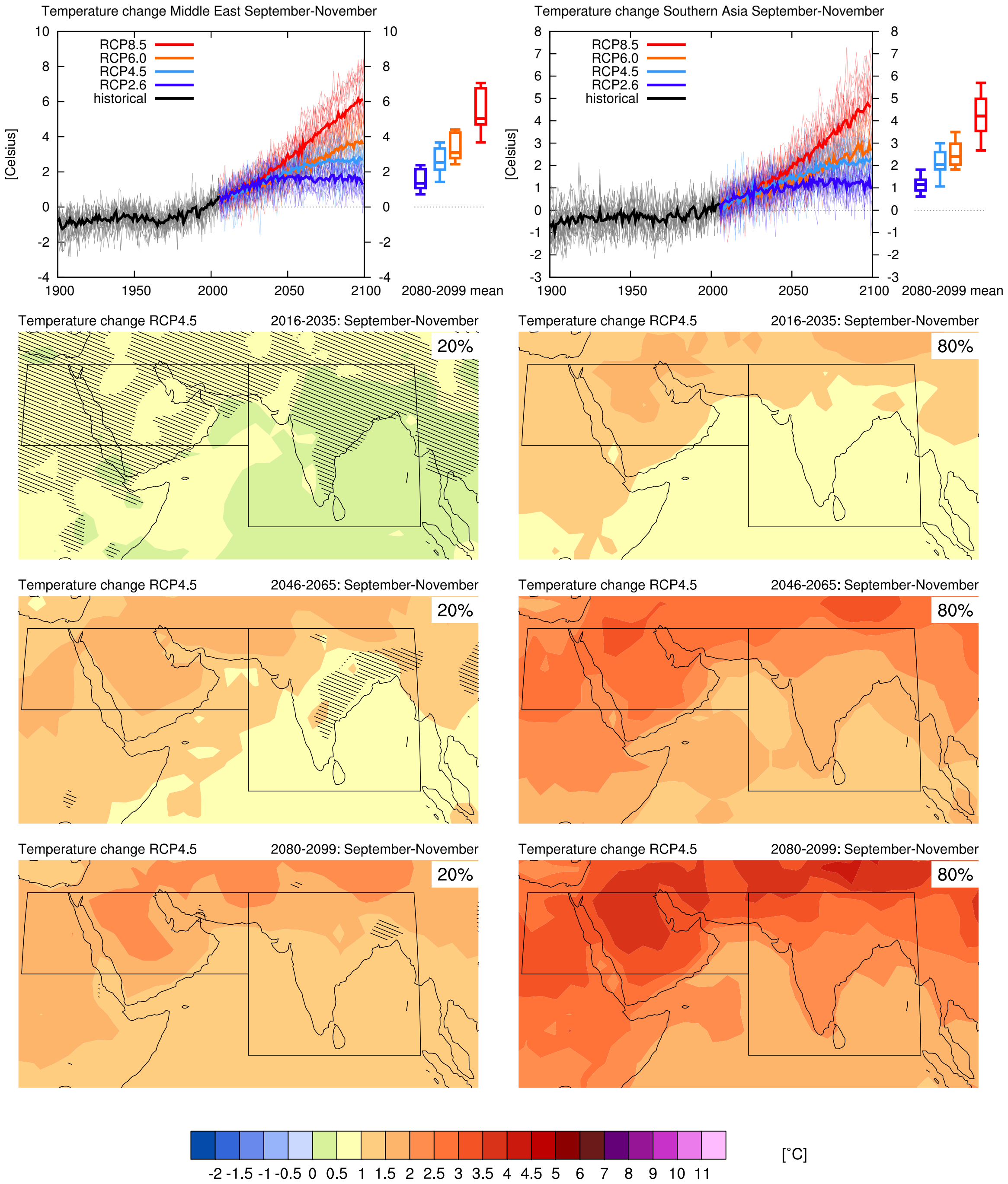


**Figure AI.73:** top left: time series of temperature averaged over land grid points in the Middle East (17.5°–30°N, 25°–65°E) in September–November. Top right: same for land grid points in Southern Asia (5°–30°N, 65°–95°E). Thin lines denote one ensemble member per model, thick lines the partial CMIP5 multi-model mean. On the right-hand side the 5th, 25th, 50th (median), 75th and 95th percentiles of the distribution of 20-yr mean changes are given for the period 2080–2099 (relative to 1986–2005) for the four RCP scenarios.

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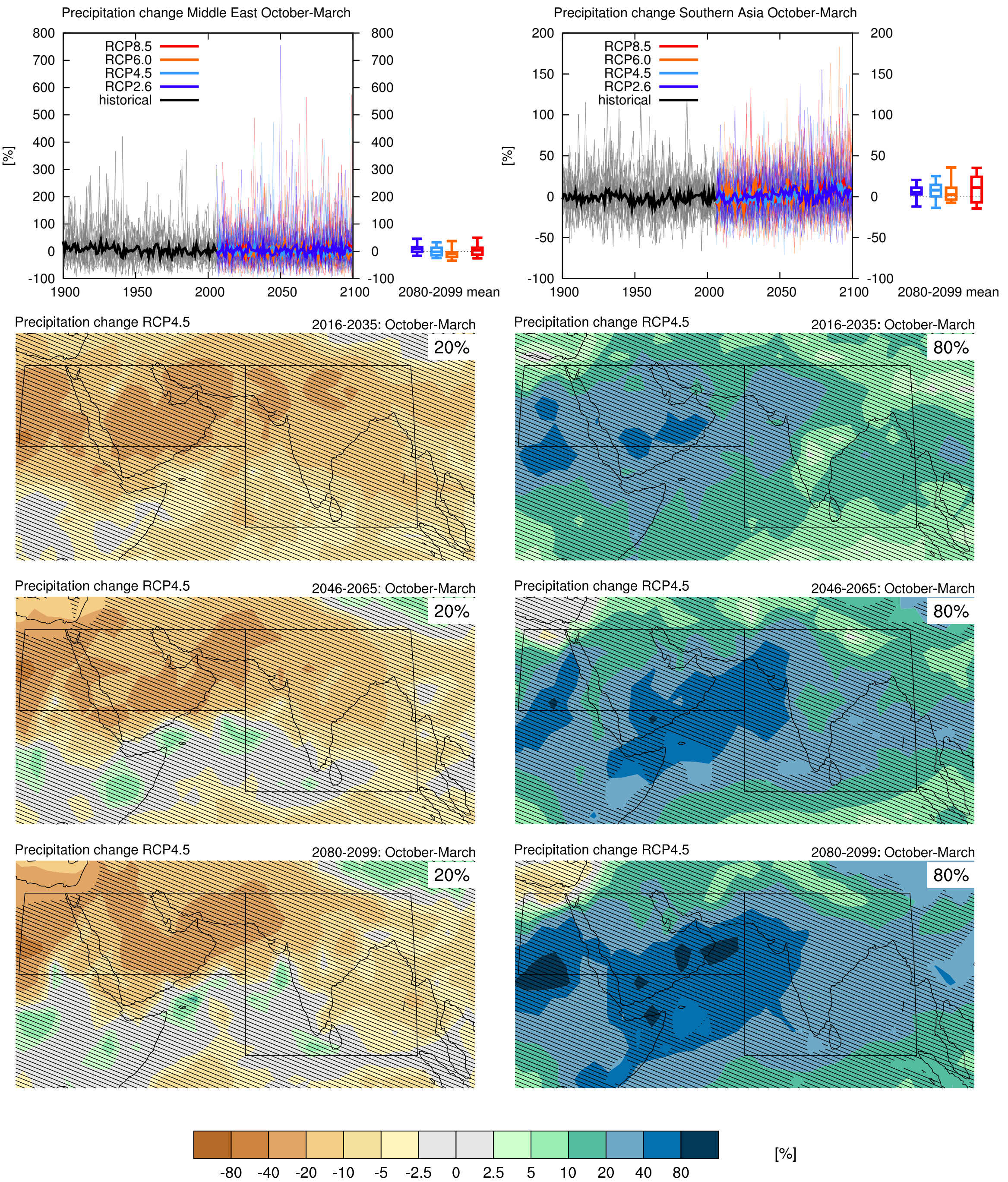


**Figure AI.74:** top left: time series of relative precipitation averaged over land grid points in the Middle East (17.5°–30°N, 25°–65°E) in October–March. Top right: same for land grid points in Southern Asia (5°–30°N, 65°–95°E). Thin lines denote one ensemble member per model, thick lines the partial CMIP5 multi-model mean. On the right-hand side the 5th, 25th, 50th (median), 75th and 95th percentiles of the distribution of 20-yr mean changes are given for the period 2080–2099 (relative to 1986–2005) for the four RCP scenarios.

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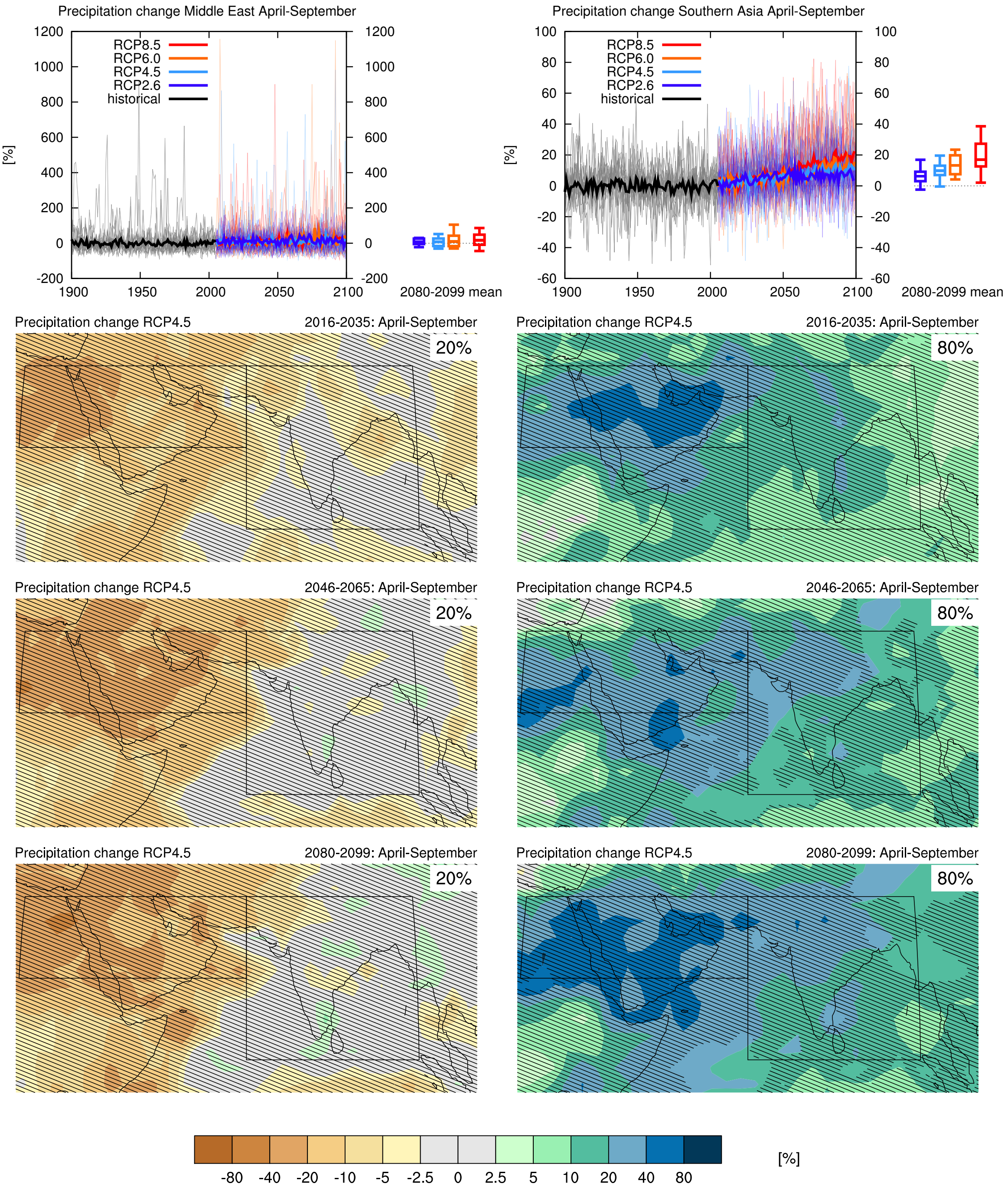


**Figure AI.75:** top left: time series of relative precipitation averaged over land grid points in the Middle East (17.5°–30°N, 25°–65°E) in April–September. Top right: same for land grid points in Southern Asia (5°–30°N, 65°–95°E). Thin lines denote one ensemble member per model, thick lines the partial CMIP5 multi-model mean. On the right-hand side the 5th, 25th, 50th (median), 75th and 95th percentiles of the distribution of 20-yr mean changes are given for the period 2080–2099 (relative to 1986–2005) for the four RCP scenarios.

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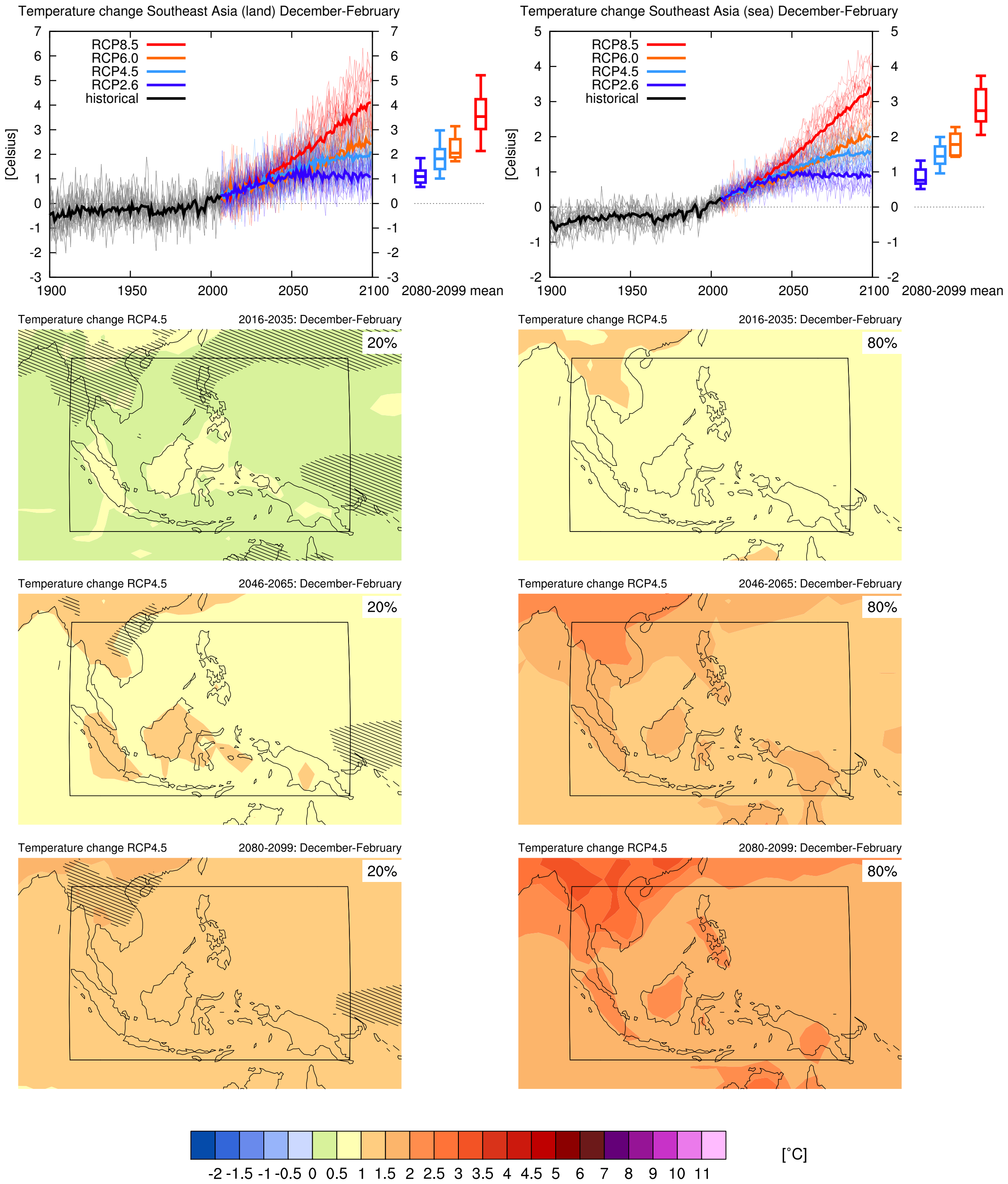


**Figure AI.76:** top left: time series of temperature averaged over land grid points in Southeast Asia (10°S–20°N, 95°–150°E) in December–February. Top right: same for sea grid points. Thin lines denote one ensemble member per model, thick lines the partial CMIP5 multi-model mean. On the right-hand side the 5th, 25th, 50th (median), 75th and 95th percentiles of the distribution of 20-yr mean changes are given for the period 2080–2099 (relative to 1986–2005) for the four RCP scenarios.

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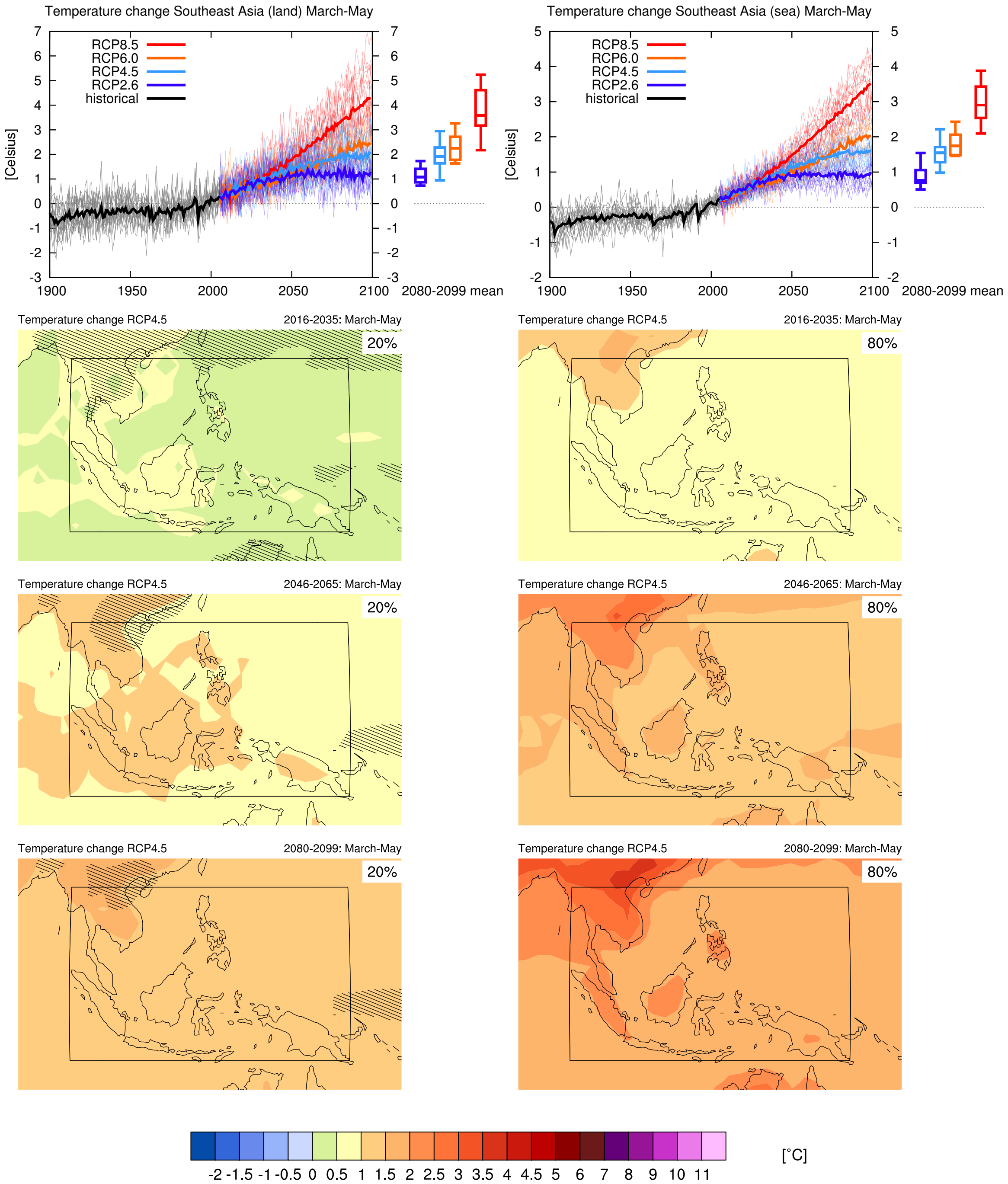


**Figure AI.77:** top left: time series of temperature averaged over land grid points in Southeast Asia (10°S–20°N, 95°–150°E) in March–May. Top right: same for sea grid points. Thin lines denote one ensemble member per model, thick lines the partial CMIP5 multi-model mean. On the right-hand side the 5th, 25th, 50th (median), 75th and 95th percentiles of the distribution of 20-yr mean changes are given for the period 2080–2099 (relative to 1986–2005) for the four RCP scenarios.

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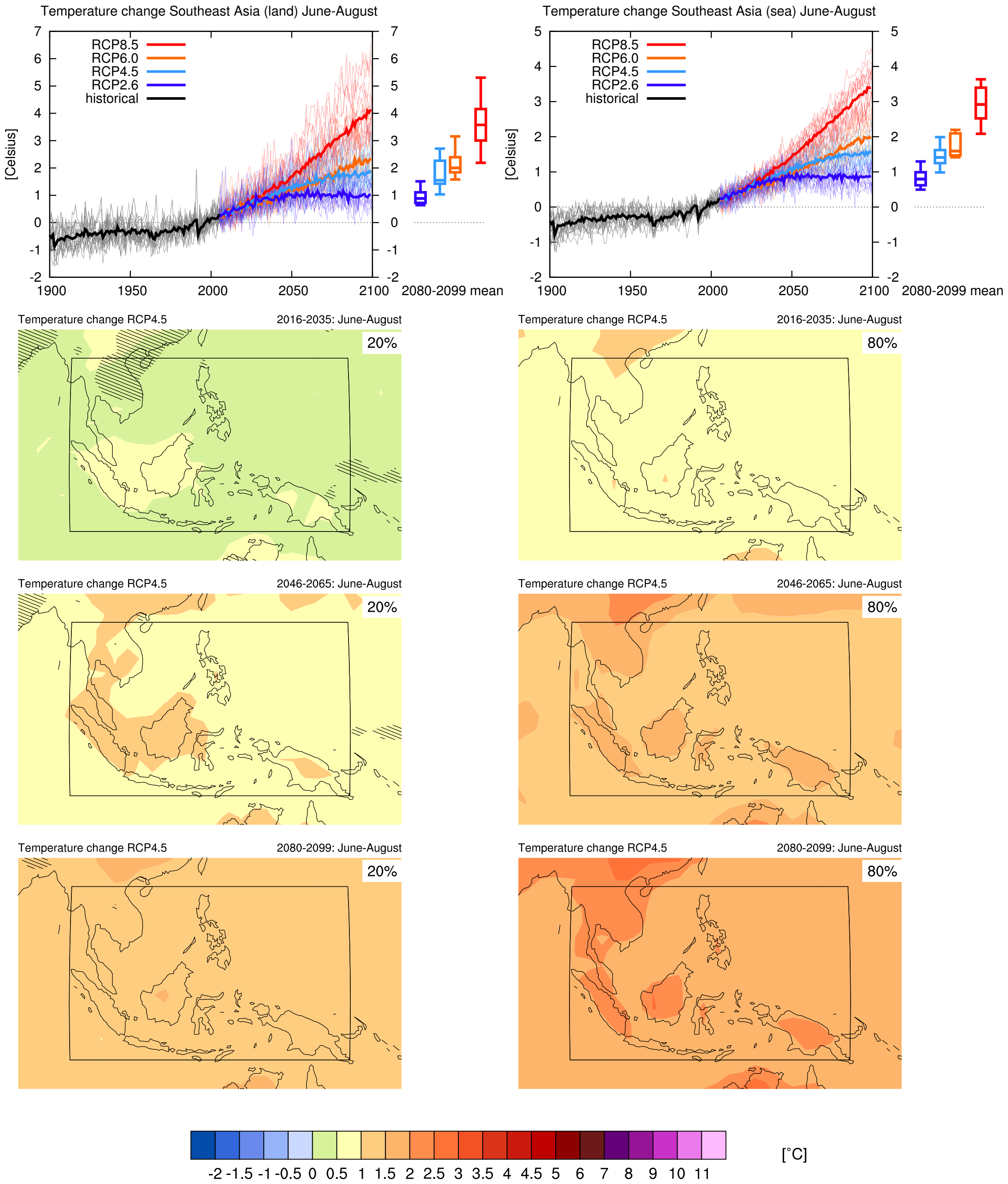


**Figure AI.78:** top left: time series of temperature averaged over land grid points in Southeast Asia (10°S–20°N, 95°–150°E) in June–August. Top right: same for sea grid points. Thin lines denote one ensemble member per model, thick lines the partial CMIP5 multi-model mean. On the right-hand side the 5th, 25th, 50th (median), 75th and 95th percentiles of the distribution of 20-yr mean changes are given for the period 2080–2099 (relative to 1986–2005) for the four RCP scenarios.

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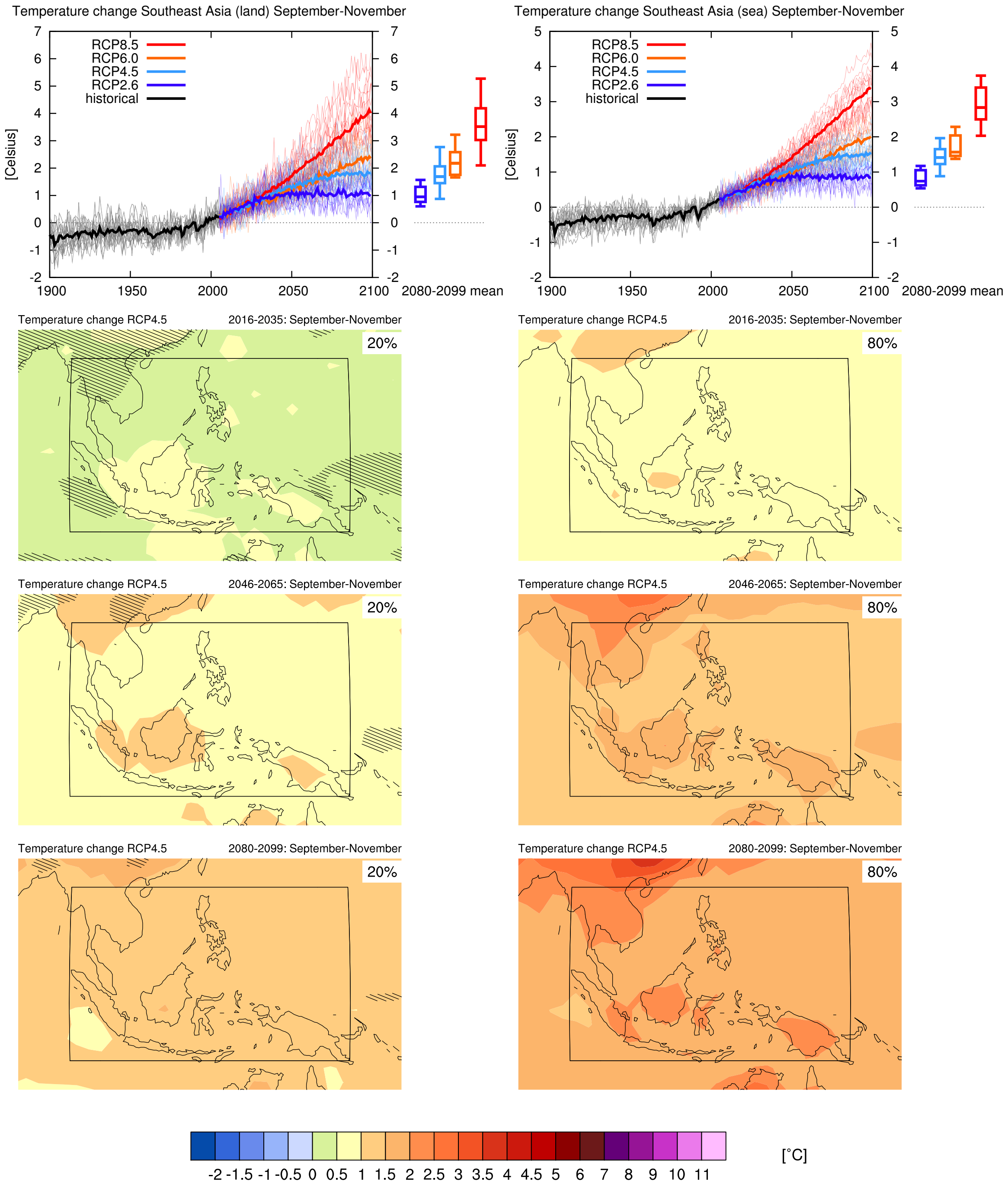


**Figure AI.79:** top left: time series of temperature averaged over land grid points in Southeast Asia (10°S–20°N, 95°–150°E) in September–November. Top right: same for sea grid points. Thin lines denote one ensemble member per model, thick lines the partial CMIP5 multi-model mean. On the right-hand side the 5th, 25th, 50th (median), 75th and 95th percentiles of the distribution of 20-yr mean changes are given for the period 2080–2099 (relative to 1986–2005) for the four RCP scenarios.

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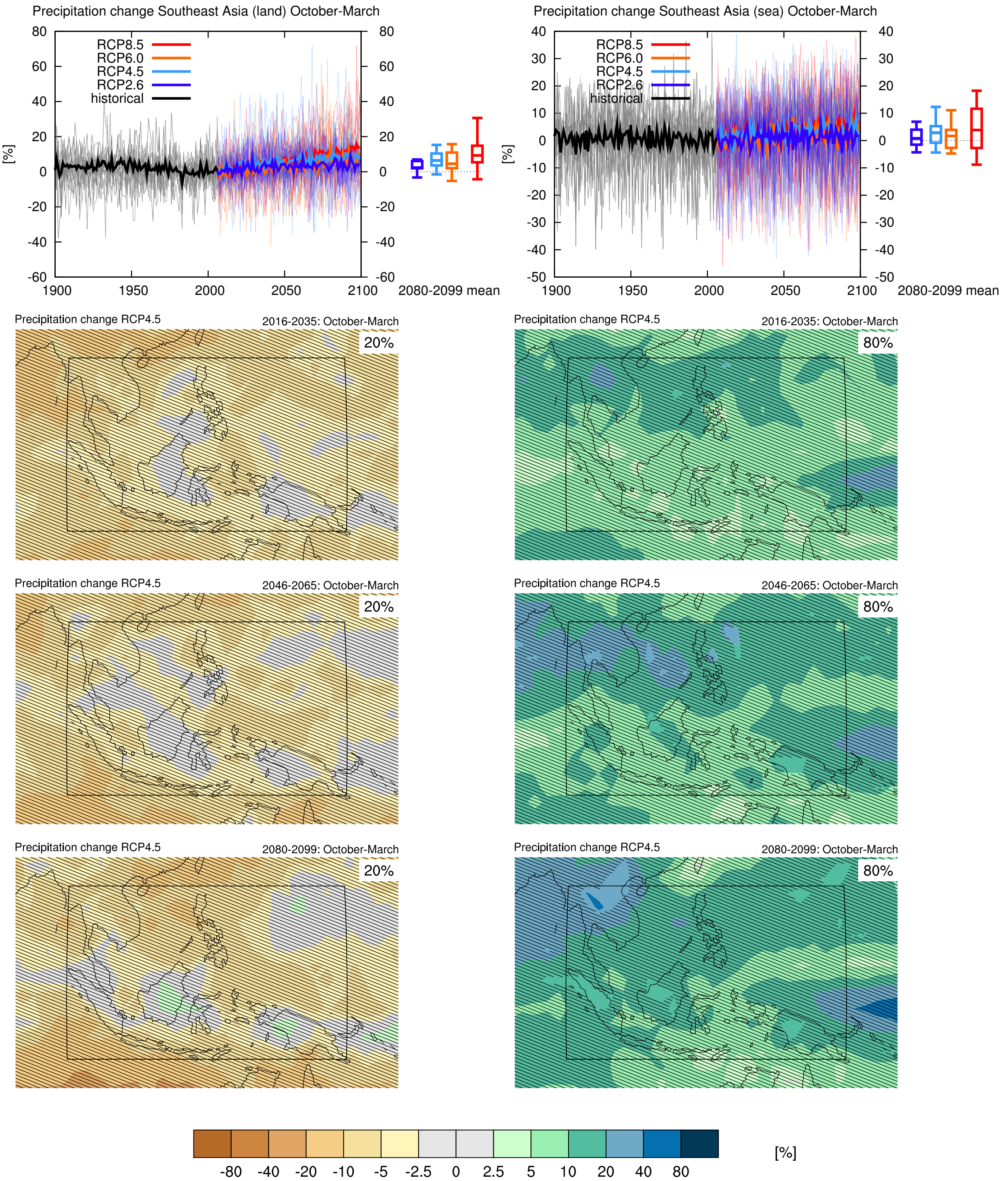


**Figure AI.80:** top left: time series of relative precipitation averaged over land grid points in Southeast Asia (10°S–20°N, 95°–150°E) in October–March. Top right: same for sea grid points. Thin lines denote one ensemble member per model, thick lines the partial CMIP5 multi-model mean. On the right-hand side the 5th, 25th, 50th (median), 75th and 95th percentiles of the distribution of 20-yr mean changes are given for the period 2080–2099 (relative to 1986–2005) for the four RCP scenarios.

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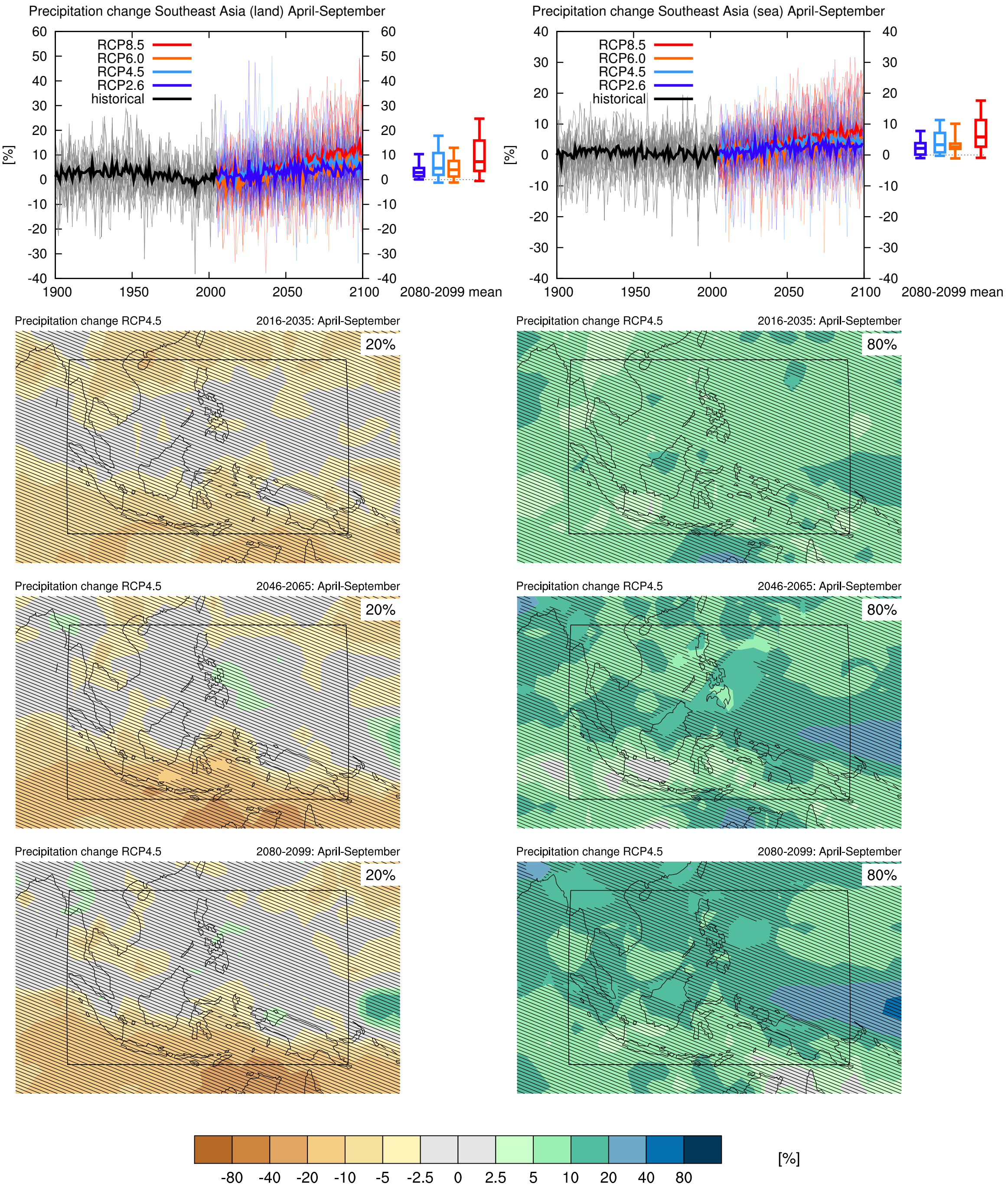


**Figure AI.81:** top left: time series of relative precipitation averaged over land grid points in Southeast Asia (10°S–20°N, 95°–150°E) in April–September. Top right: same for sea grid points. Thin lines denote one ensemble member per model, thick lines the partial CMIP5 multi-model mean. On the right-hand side the 5th, 25th, 50th (median), 75th and 95th percentiles of the distribution of 20-yr mean changes are given for the period 2080–2099 (relative to 1986–2005) for the four RCP scenarios.

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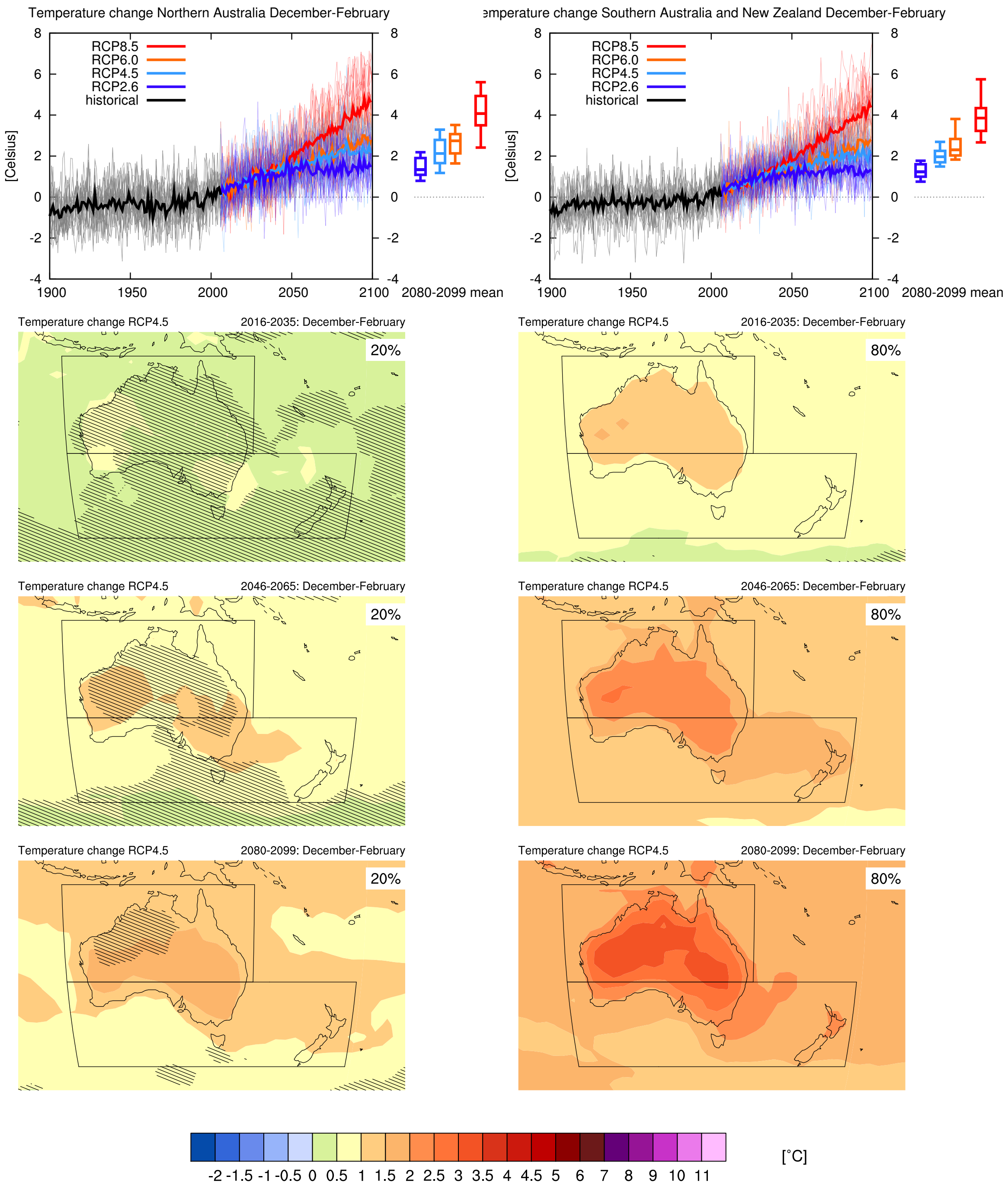


**Figure AI.82:** top left: time series of temperature averaged over land grid points in Northern Australia (30°–10°S, 110°–155°E) in December–February. Top right: same for land grid points in Southern Australia and New Zealand (47.5°–30°S, 110°–180°E). Thin lines denote one ensemble member per model, thick lines the partial CMIP5 multi-model mean. On the right-hand side the 5th, 25th, 50th (median), 75th and 95th percentiles of the distribution of 20-yr mean changes are given for the period 2080–2099 (relative to 1986–2005) for the four RCP scenarios.

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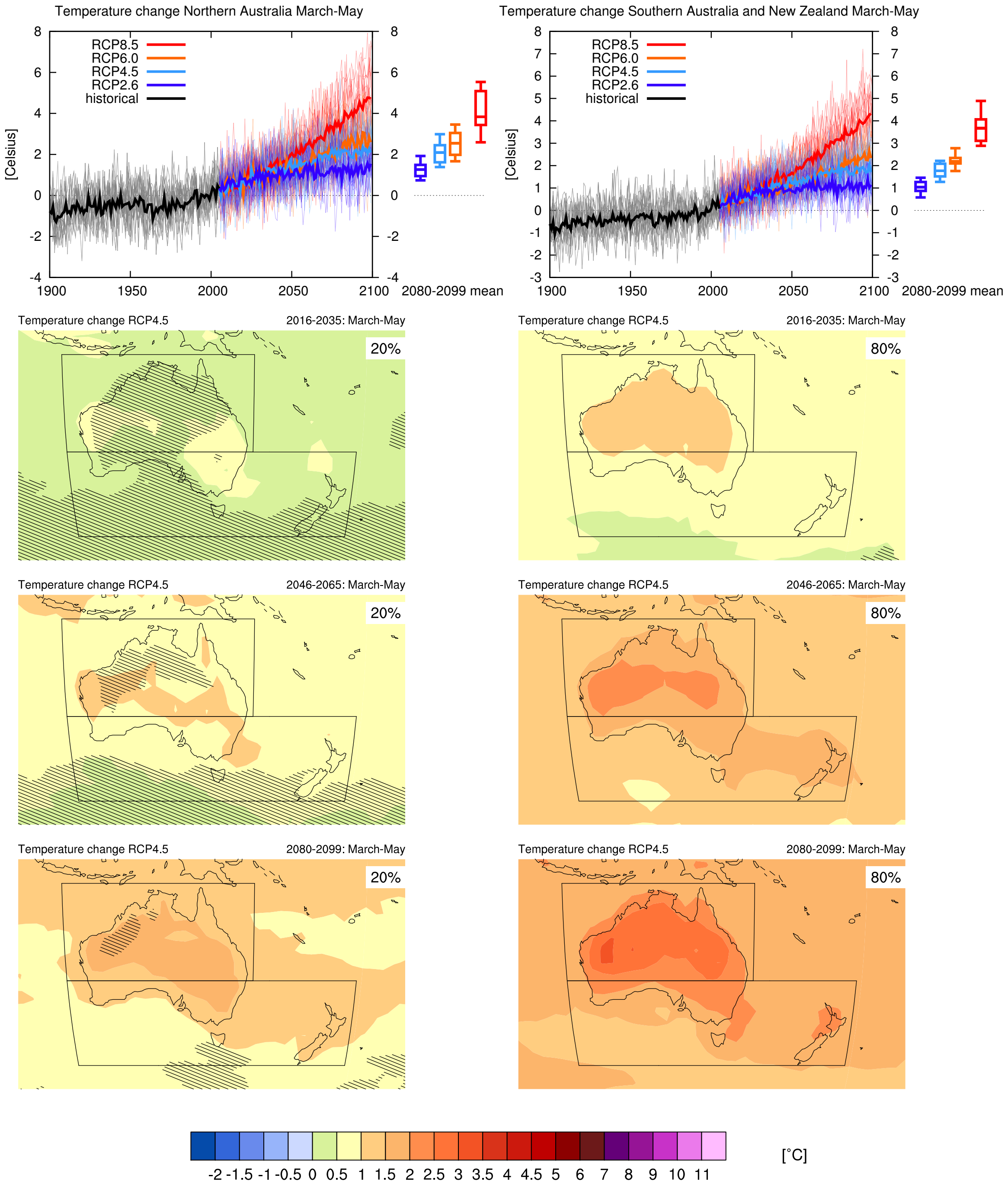


**Figure AI.83:** top left: time series of temperature averaged over land grid points in Northern Australia (30°–10°S, 110°–155°E) in March–May. Top right: same for land grid points in Southern Australia and New Zealand (47.5°–30°S, 110°–180°E). Thin lines denote one ensemble member per model, thick lines the partial CMIP5 multi-model mean. On the right-hand side the 5th, 25th, 50th (median), 75th and 95th percentiles of the distribution of 20-yr mean changes are given for the period 2080–2099 (relative to 1986–2005) for the four RCP scenarios.

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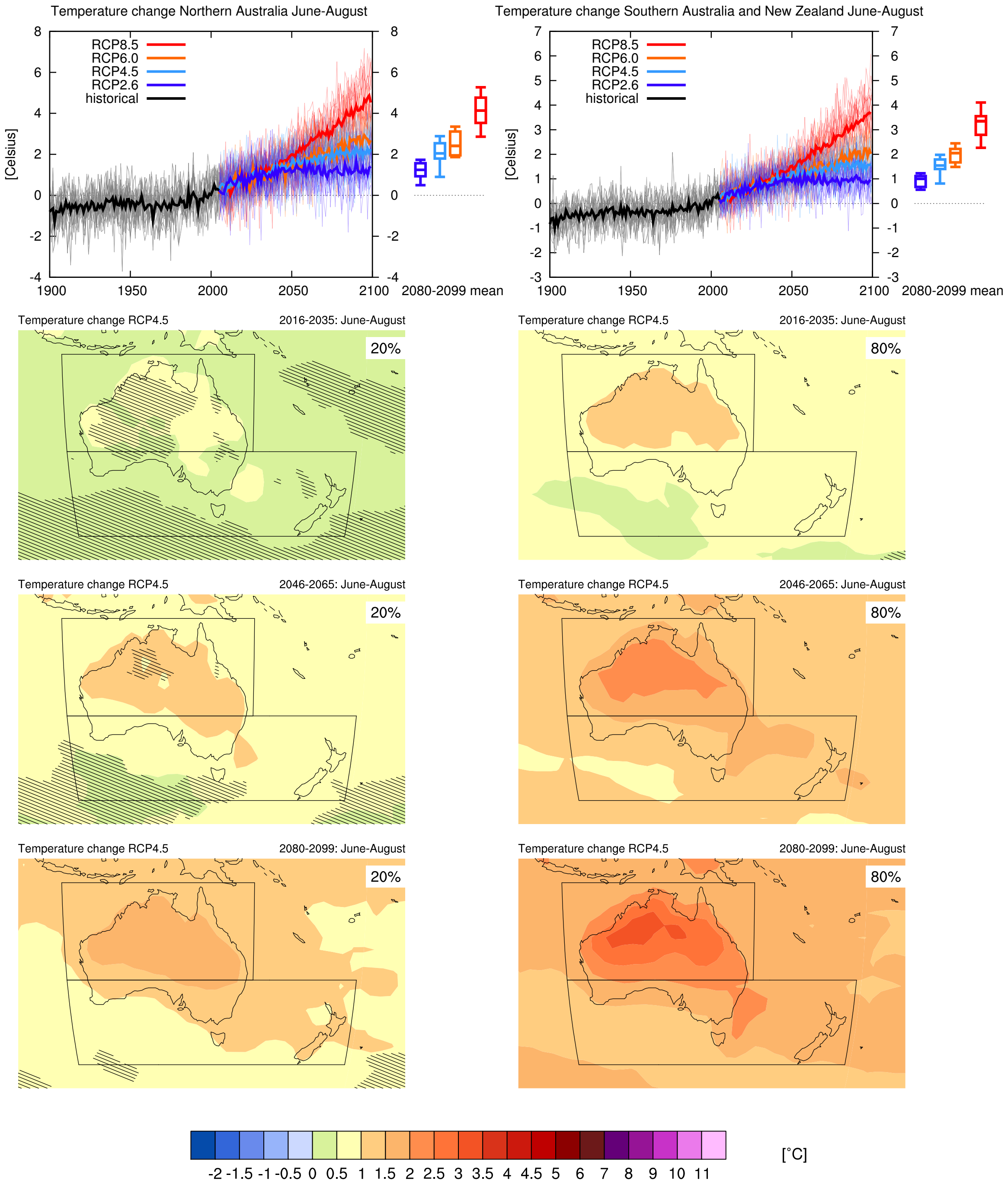


**Figure AI.84:** top left: time series of temperature averaged over land grid points in Northern Australia (30°–10°S, 110°–155°E) in June–August. Top right: same for land grid points in Southern Australia and New Zealand (47.5°–30°S, 110°–180°E). Thin lines denote one ensemble member per model, thick lines the partial CMIP5 multi-model mean. On the right-hand side the 5th, 25th, 50th (median), 75th and 95th percentiles of the distribution of 20-yr mean changes are given for the period 2080–2099 (relative to 1986–2005) for the four RCP scenarios.

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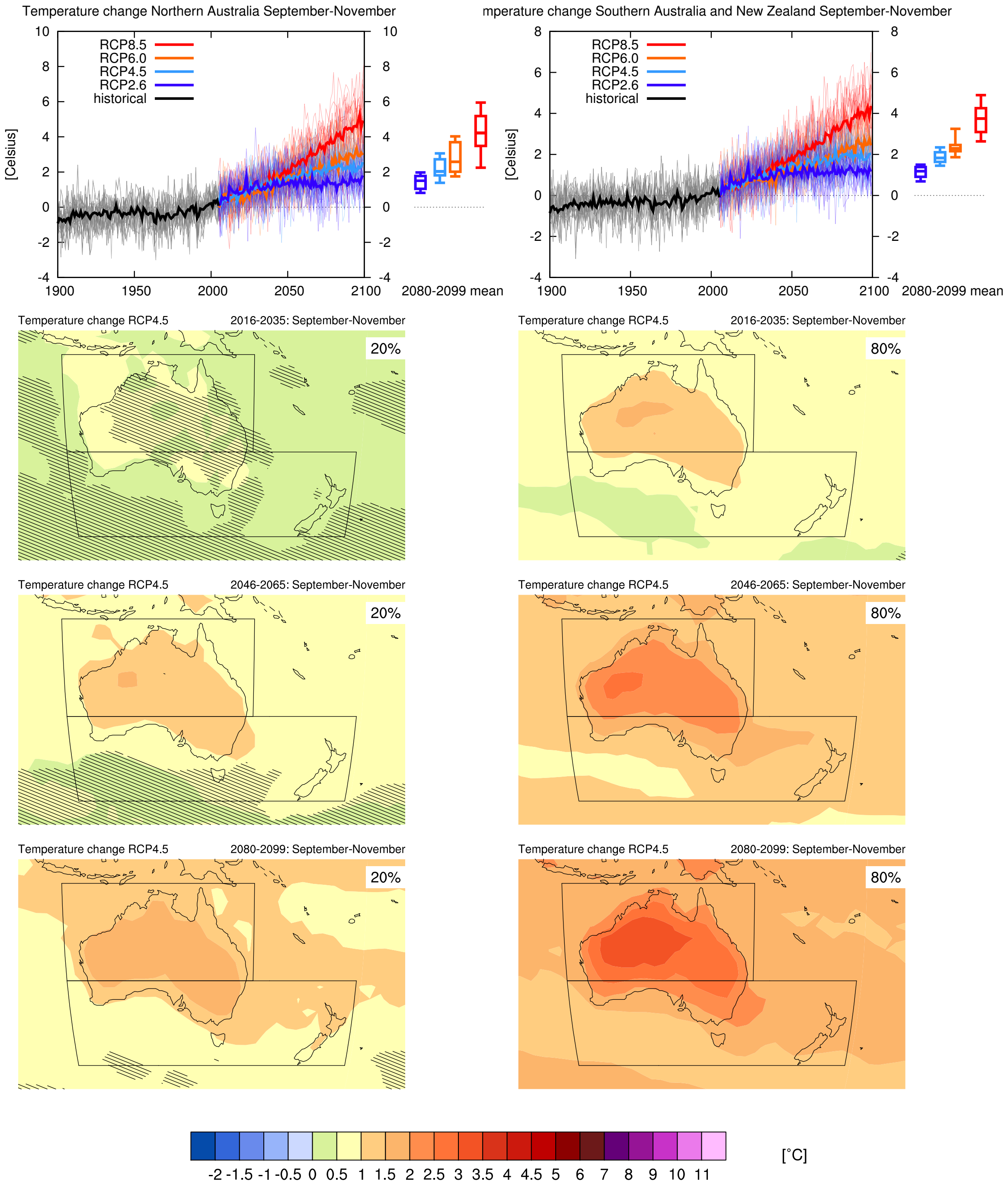


**Figure AI.85:** top left: time series of temperature averaged over land grid points in Northern Australia (30°–10°S, 110°–155°E) in September–November. Top right: same for land grid points in Southern Australia and New Zealand (47.5°–30°S, 110°–180°E). Thin lines denote one ensemble member per model, thick lines the partial CMIP5 multi-model mean. On the right-hand side the 5th, 25th, 50th (median), 75th and 95th percentiles of the distribution of 20-yr mean changes are given for the period 2080–2099 (relative to 1986–2005) for the four RCP scenarios.

Below: maps of temperature changes in 2016–2035, 2046–2065 and 2080–2099 with respect to 1986–2005 in the RCP4.5 scenario. For each point, the 20% and 80% percentile of the distribution of the partial CMIP5 ensemble are shown, this includes both natural variability and inter-model spread. Hatching denotes areas where the 20-yr mean differences of the 20th (left) and 80th (right) percentiles are less than two times the standard deviation of model-estimated natural variability of 20-yr mean differences.

[PLACEHOLDER FOR SECOND ORDER DRAFT: Cross references to relevant sections of Chapters 9, 11, 12 and 14 for information regarding the evaluation of models in this region, the model spread in the context of other methods of projecting changes and the role of modes of variability and other climate phenomena.]

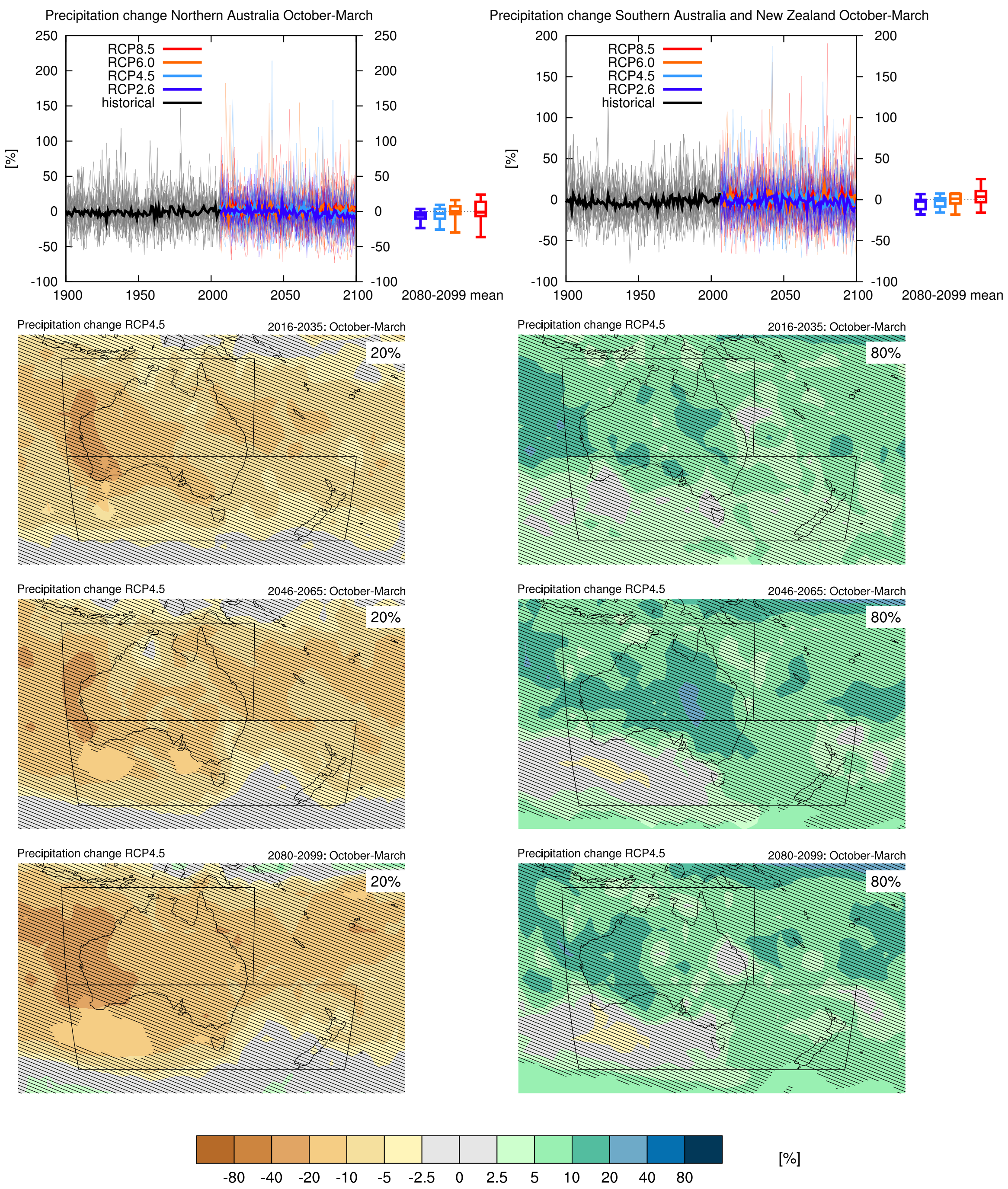


**Figure AI.86:** top left: time series of relative precipitation averaged over land grid points in Northern Australia (30°–10°S, 110°–155°E) in October–March. Top right: same for land grid points in Southern Australia and New Zealand (47.5°–30°S, 110°–180°E). Thin lines denote one ensemble member per model, thick lines the partial CMIP5 multi-model mean. On the right-hand side the 5th, 25th, 50th (median), 75th and 95th percentiles of the distribution of 20-yr mean changes are given for the period 2080–2099 (relative to 1986–2005) for the four RCP scenarios.

Below: maps of relative precipitation changes in 2016–2035, 2046–2065 and 2080–2099 with respect to 1986–2005 in the RCP4.5 scenario. For each point, the 20% and 80% percentile of the distribution of the partial CMIP5 ensemble are shown, this includes both natural variability and inter-model spread. Hatching denotes areas where the 20-yr mean differences of the 20th (left) and 80th (right) percentiles are less than two times the standard deviation of model-estimated natural variability of 20-yr mean differences.

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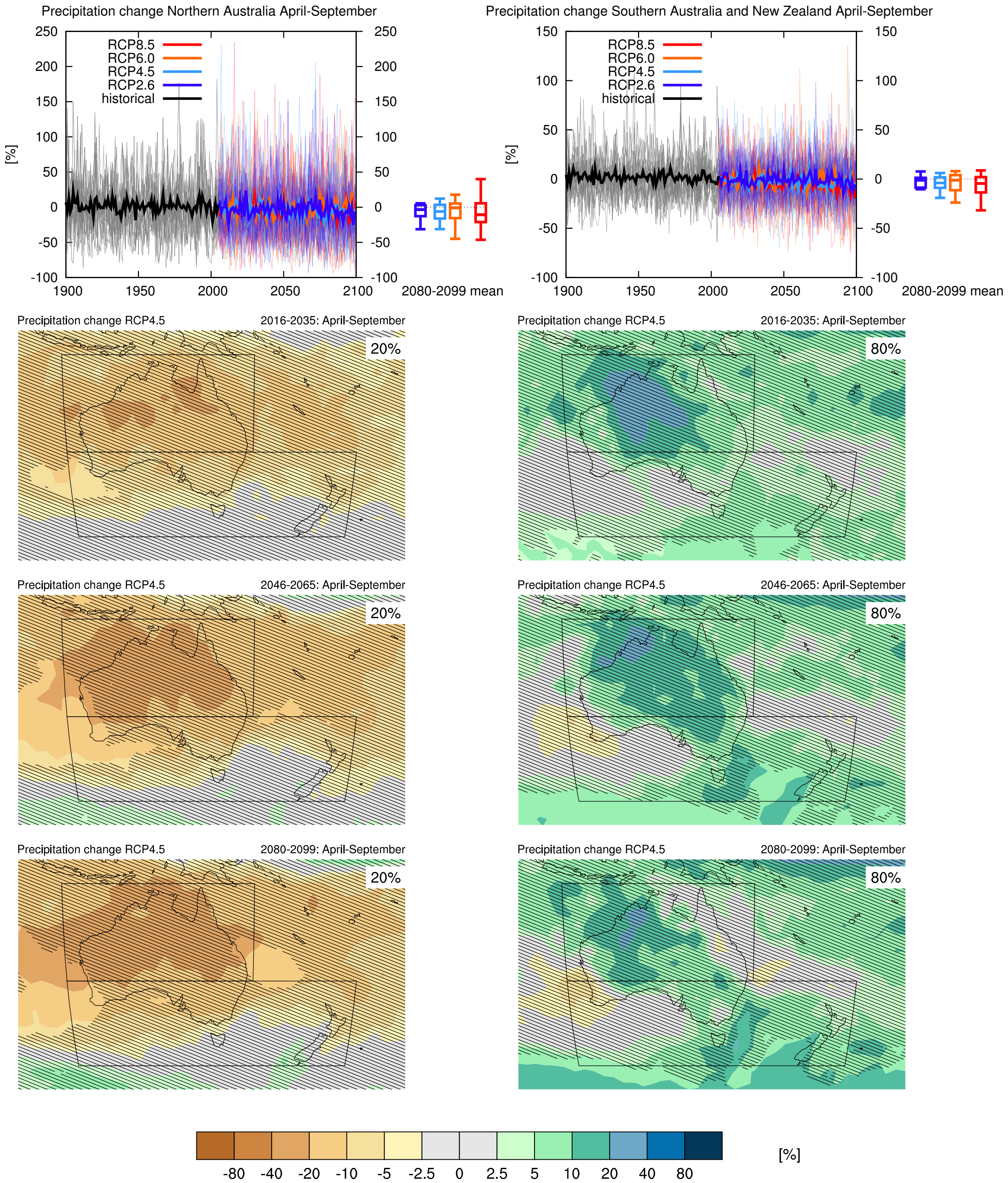


**Figure AI.87:** top left: time series of relative precipitation averaged over land grid points in Northern Australia (30°–10°S, 110°–155°E) in April–September. Top right: same for land grid points in Southern Australia and New Zealand (47.5°–30°S, 110°–180°E). Thin lines denote one ensemble member per model, thick lines the partial CMIP5 multi-model mean. On the right-hand side the 5th, 25th, 50th (median), 75th and 95th percentiles of the distribution of 20-yr mean changes are given for the period 2080–2099 (relative to 1986–2005) for the four RCP scenarios.

Below: maps of relative precipitation changes in 2016–2035, 2046–2065 and 2080–2099 with respect to 1986–2005 in the RCP4.5 scenario. For each point, the 20% and 80% percentile of the distribution of the partial CMIP5 ensemble are shown, this includes both natural variability and inter-model spread. Hatching denotes areas where the 20-yr mean differences of the 20th (left) and 80th (right) percentiles are less than two times the standard deviation of model-estimated natural variability of 20-yr mean differences.

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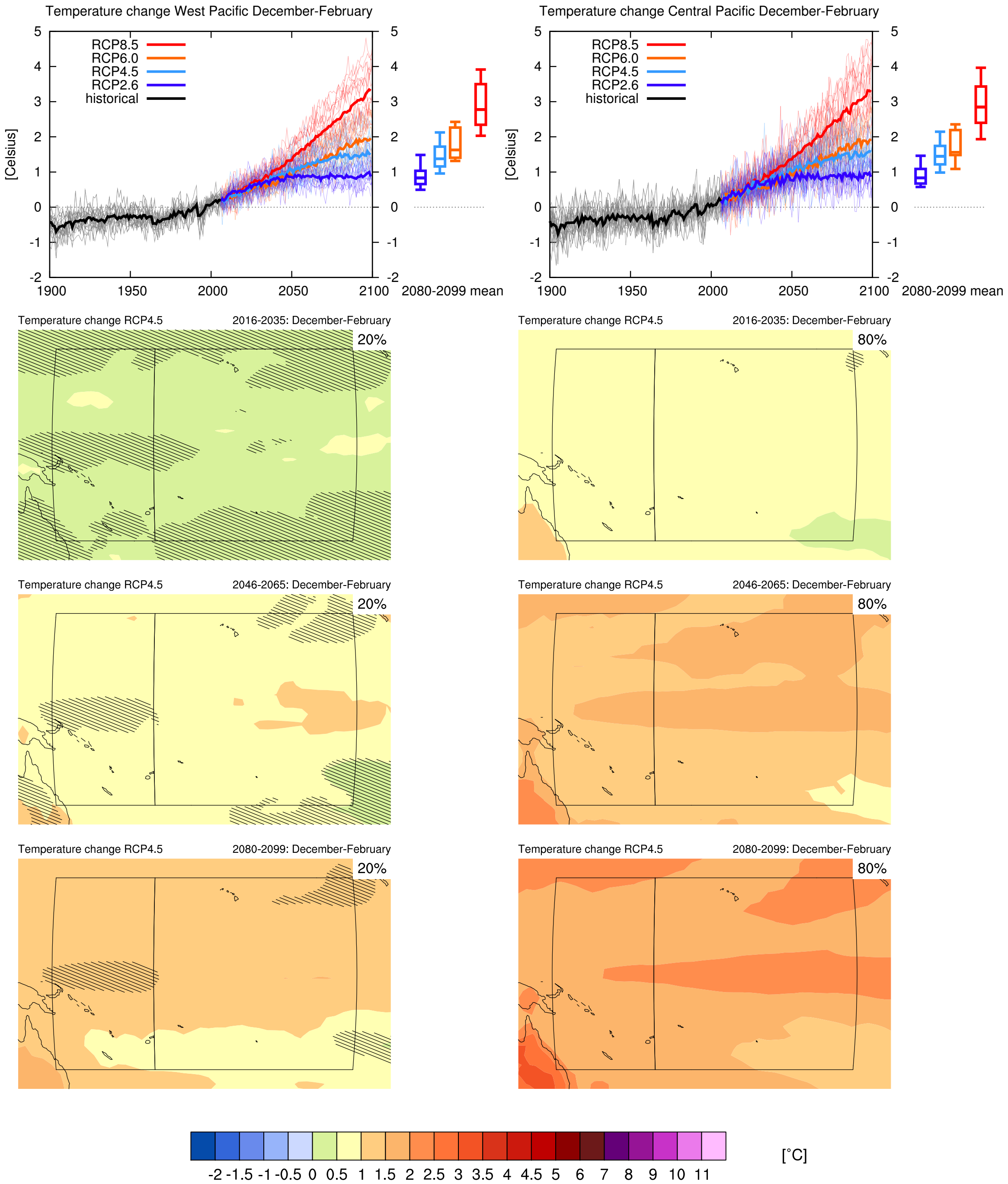


**Figure AI.88:** top left: time series of temperature averaged over all grid points in the West Pacific (25°S–25°N, 150°–180°E) in December–February. Top right: same for all grid points in the Central Pacific (25°S–25°N, 120°–180°W). Thin lines denote one ensemble member per model, thick lines the partial CMIP5 multi-model mean. On the right-hand side the 5th, 25th, 50th (median), 75th and 95th percentiles of the distribution of 20-yr mean changes are given for the period 2080–2099 (relative to 1986–2005) for the four RCP scenarios.

Below: maps of temperature changes in 2016–2035, 2046–2065 and 2080–2099 with respect to 1986–2005 in the RCP4.5 scenario. For each point, the 20% and 80% percentile of the distribution of the partial CMIP5 ensemble are shown, this includes both natural variability and inter-model spread. Hatching denotes areas where the 20-yr mean differences of the 20th (left) and 80th (right) percentiles are less than two times the standard deviation of model-estimated natural variability of 20-yr mean differences.

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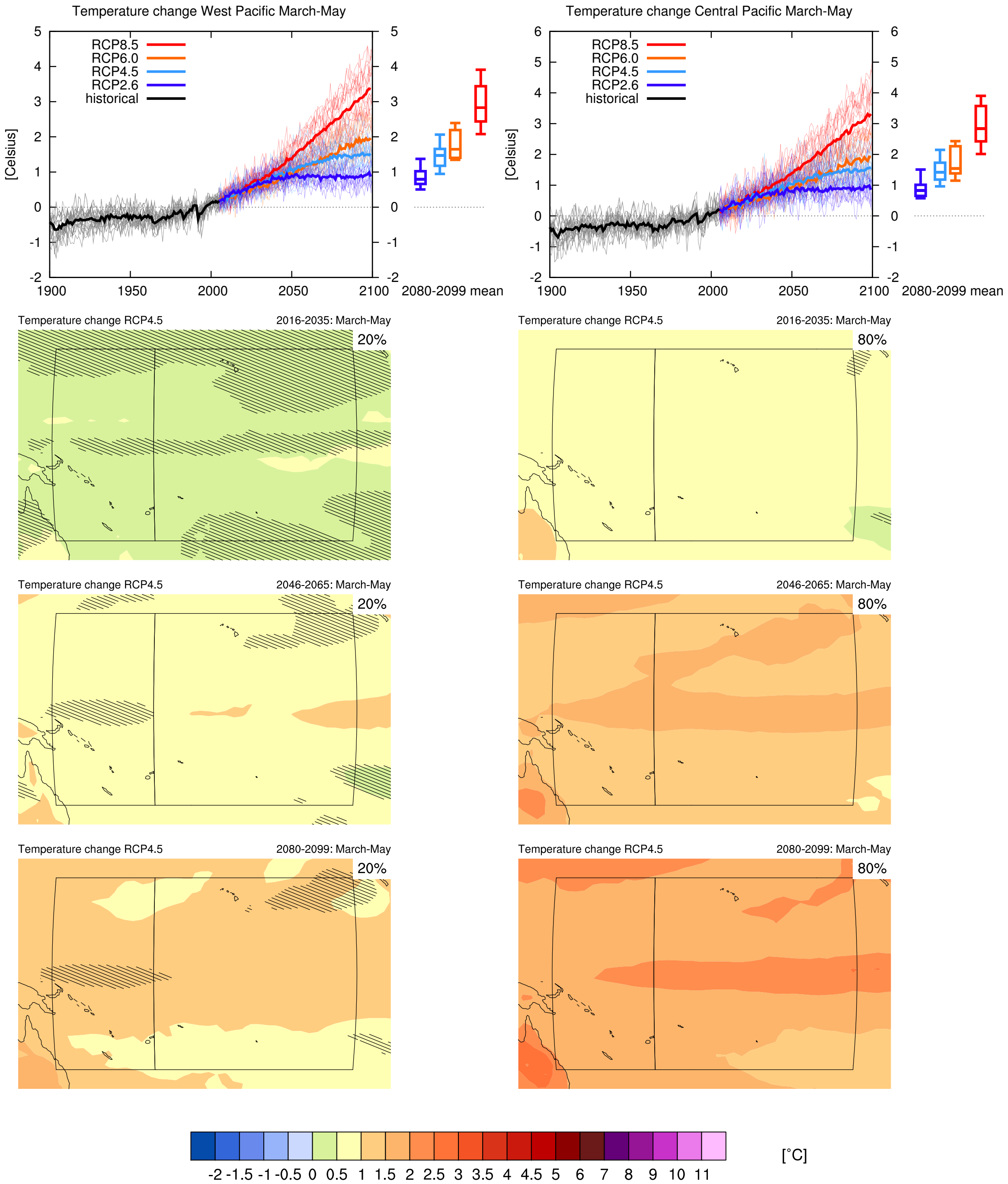


**Figure AI.89:** top left: time series of temperature averaged over all grid points in the West Pacific (25°S–25°N, 150°–180°E) in March–May. Top right: same for all grid points in the Central Pacific (25°S–25°N, 120°–180°W). Thin lines denote one ensemble member per model, thick lines the partial CMIP5 multi-model mean. On the right-hand side the 5th, 25th, 50th (median), 75th and 95th percentiles of the distribution of 20-yr mean changes are given for the period 2080–2099 (relative to 1986–2005) for the four RCP scenarios.

Below: maps of temperature changes in 2016–2035, 2046–2065 and 2080–2099 with respect to 1986–2005 in the RCP4.5 scenario. For each point, the 20% and 80% percentile of the distribution of the partial CMIP5 ensemble are shown, this includes both natural variability and inter-model spread. Hatching denotes areas where the 20-yr mean differences of the 20th (left) and 80th (right) percentiles are less than two times the standard deviation of model-estimated natural variability of 20-yr mean differences.

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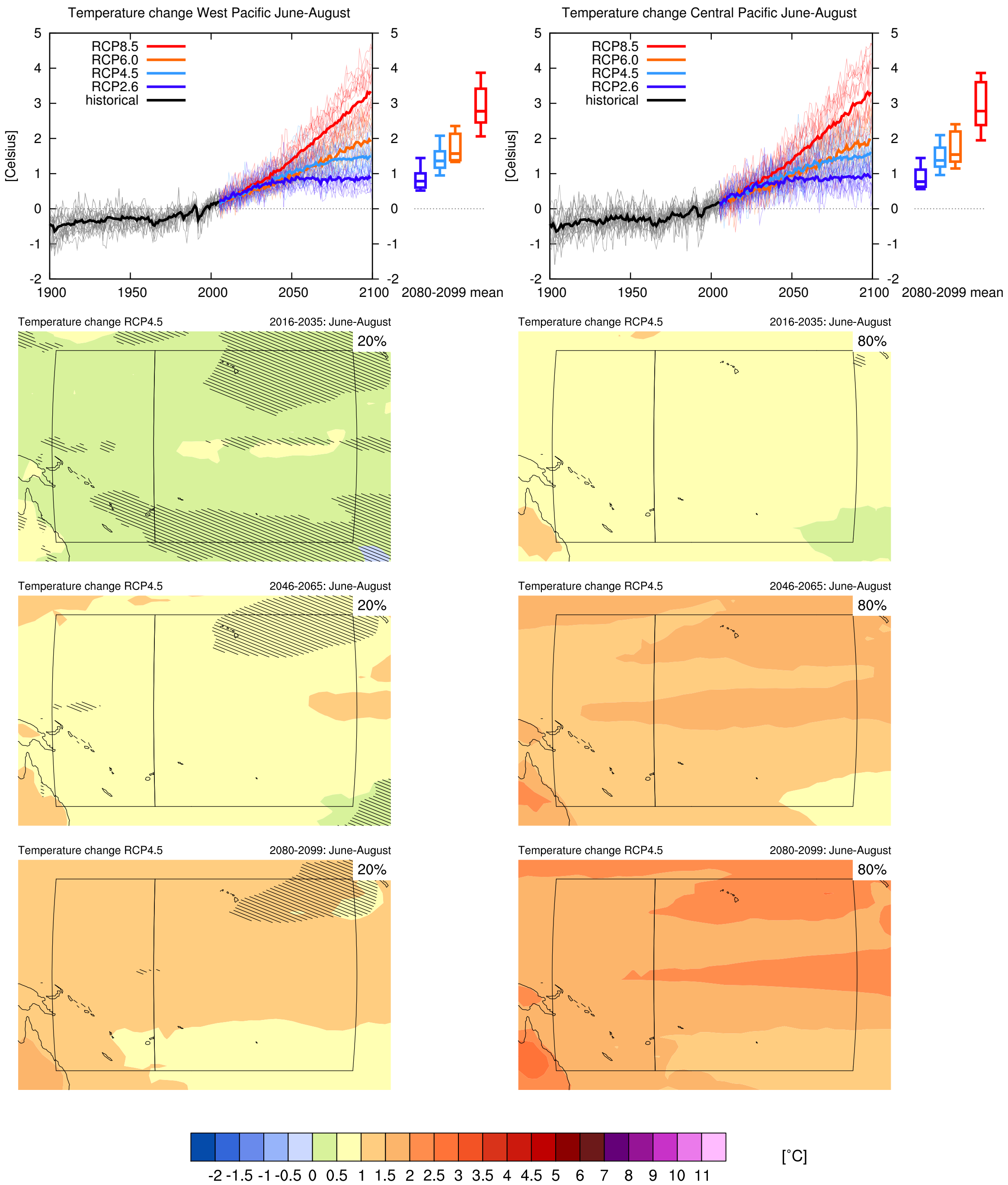


**Figure AI.90:** top left: time series of temperature averaged over all grid points in the West Pacific (25°S–25°N, 150°–180°E) in June–August. Top right: same for all grid points in the Central Pacific (25°S–25°N, 120°–180°W). Thin lines denote one ensemble member per model, thick lines the partial CMIP5 multi-model mean. On the right-hand side the 5th, 25th, 50th (median), 75th and 95th percentiles of the distribution of 20-yr mean changes are given for the period 2080–2099 (relative to 1986–2005) for the four RCP scenarios.

Below: maps of temperature changes in 2016–2035, 2046–2065 and 2080–2099 with respect to 1986–2005 in the RCP4.5 scenario. For each point, the 20% and 80% percentile of the distribution of the partial CMIP5 ensemble are shown, this includes both natural variability and inter-model spread. Hatching denotes areas where the 20-yr mean differences of the 20th (left) and 80th (right) percentiles are less than two times the standard deviation of model-estimated natural variability of 20-yr mean differences.

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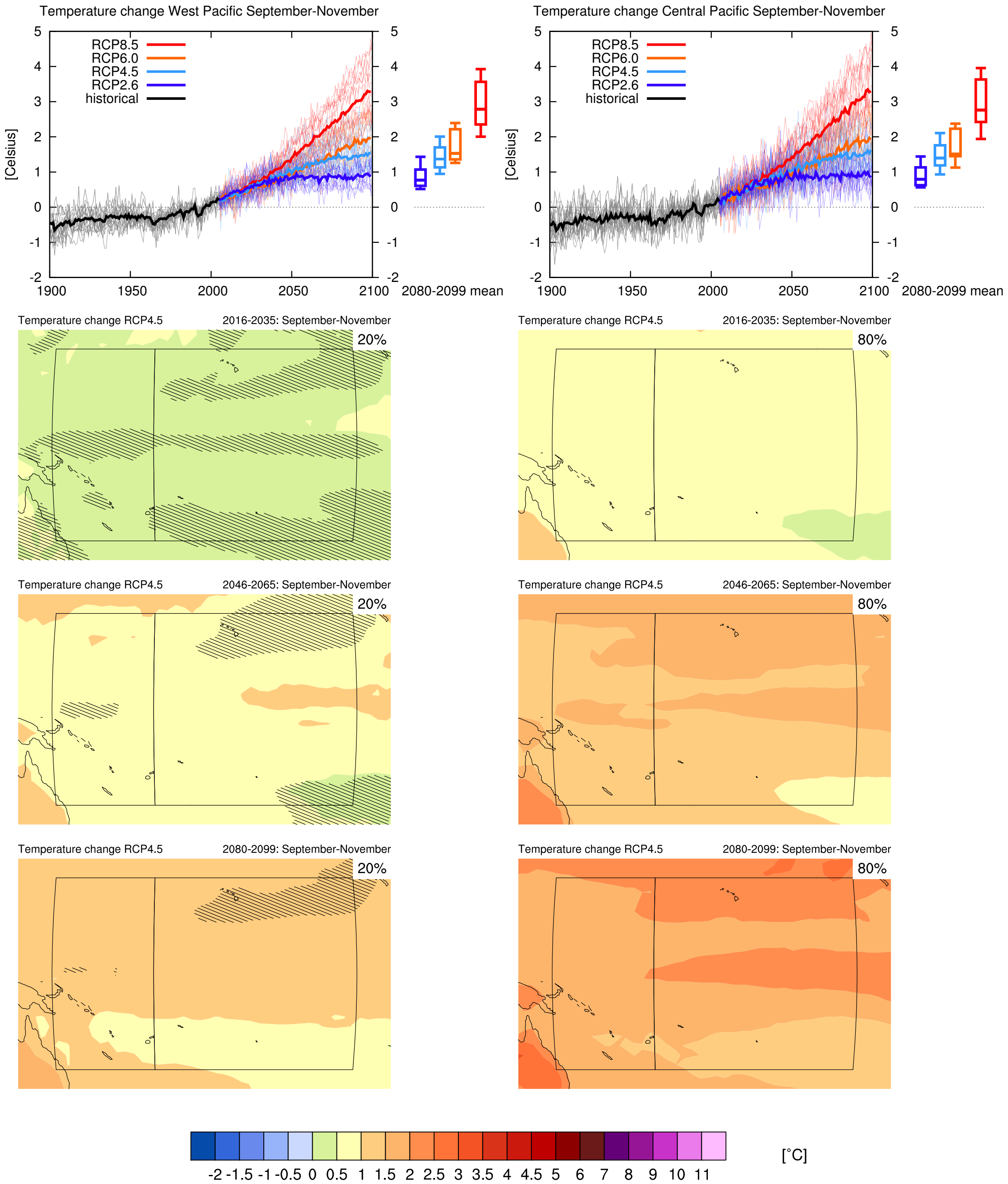


**Figure AI.91:** top left: time series of temperature averaged over all grid points in the West Pacific (25°S–25°N, 150°–180°E) in September–November. Top right: same for all grid points in the Central Pacific (25°S–25°N, 120°–180°W). Thin lines denote one ensemble member per model, thick lines the partial CMIP5 multi-model mean. On the right-hand side the 5th, 25th, 50th (median), 75th and 95th percentiles of the distribution of 20-yr mean changes are given for the period 2080–2099 (relative to 1986–2005) for the four RCP scenarios.

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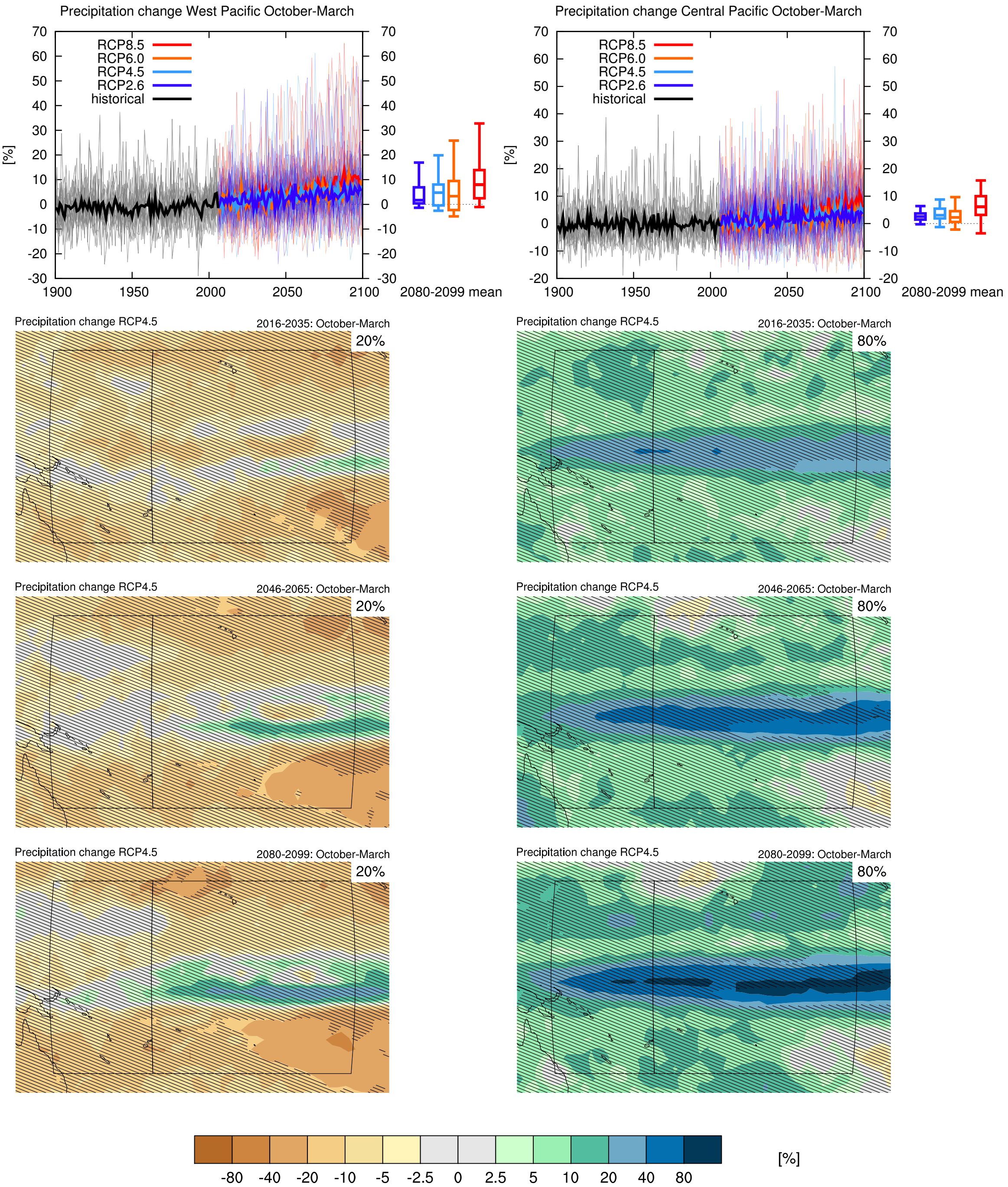


**Figure AI.92:** top left: time series of relative precipitation averaged over all grid points in the West Pacific (25°S–25°N, 150°–180°E) in October–March. Top right: same for all grid points in the Central Pacific (25°S–25°N, 120°–180°W). Thin lines denote one ensemble member per model, thick lines the partial CMIP5 multi-model mean. On the right-hand side the 5th, 25th, 50th (median), 75th and 95th percentiles of the distribution of 20-yr mean changes are given for the period 2080–2099 (relative to 1986–2005) for the four RCP scenarios.

Below: maps of relative precipitation changes in 2016–2035, 2046–2065 and 2080–2099 with respect to 1986–2005 in the RCP4.5 scenario. For each point, the 20% and 80% percentile of the distribution of the partial CMIP5 ensemble are shown, this includes both natural variability and inter-model spread. Hatching denotes areas where the 20-yr mean differences of the 20th (left) and 80th (right) percentiles are less than two times the standard deviation of model-estimated natural variability of 20-yr mean differences.

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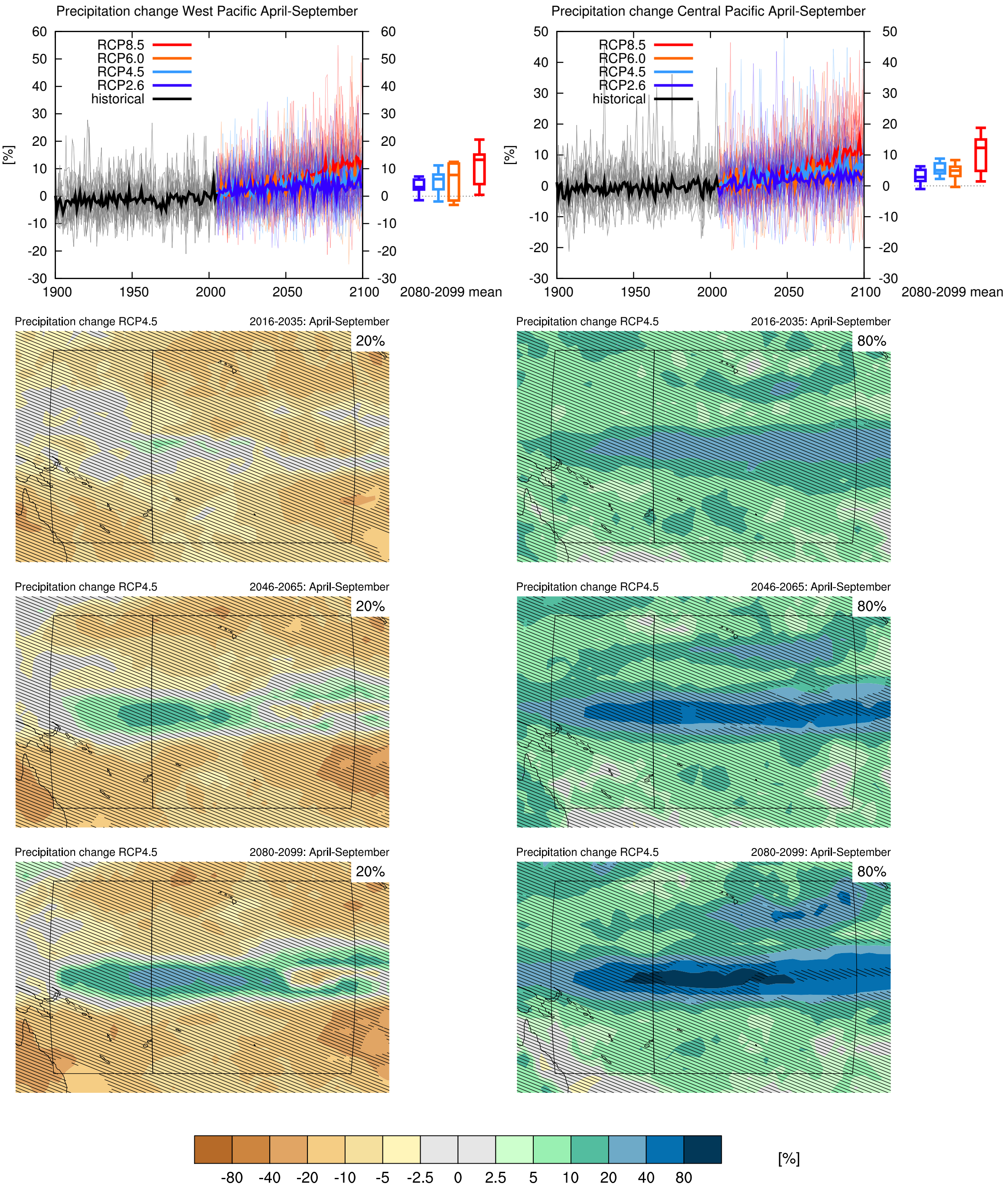


**Figure AI.93:** top left: time series of relative precipitation averaged over all grid points in the West Pacific (25°S–25°N, 150°–180°E) in April–September. Top right: same for all grid points in the Central Pacific (25°S–25°N, 120°–180°W). Thin lines denote one ensemble member per model, thick lines the partial CMIP5 multi-model mean. On the right-hand side the 5th, 25th, 50th (median), 75th and 95th percentiles of the distribution of 20-yr mean changes are given for the period 2080–2099 (relative to 1986–2005) for the four RCP scenarios.

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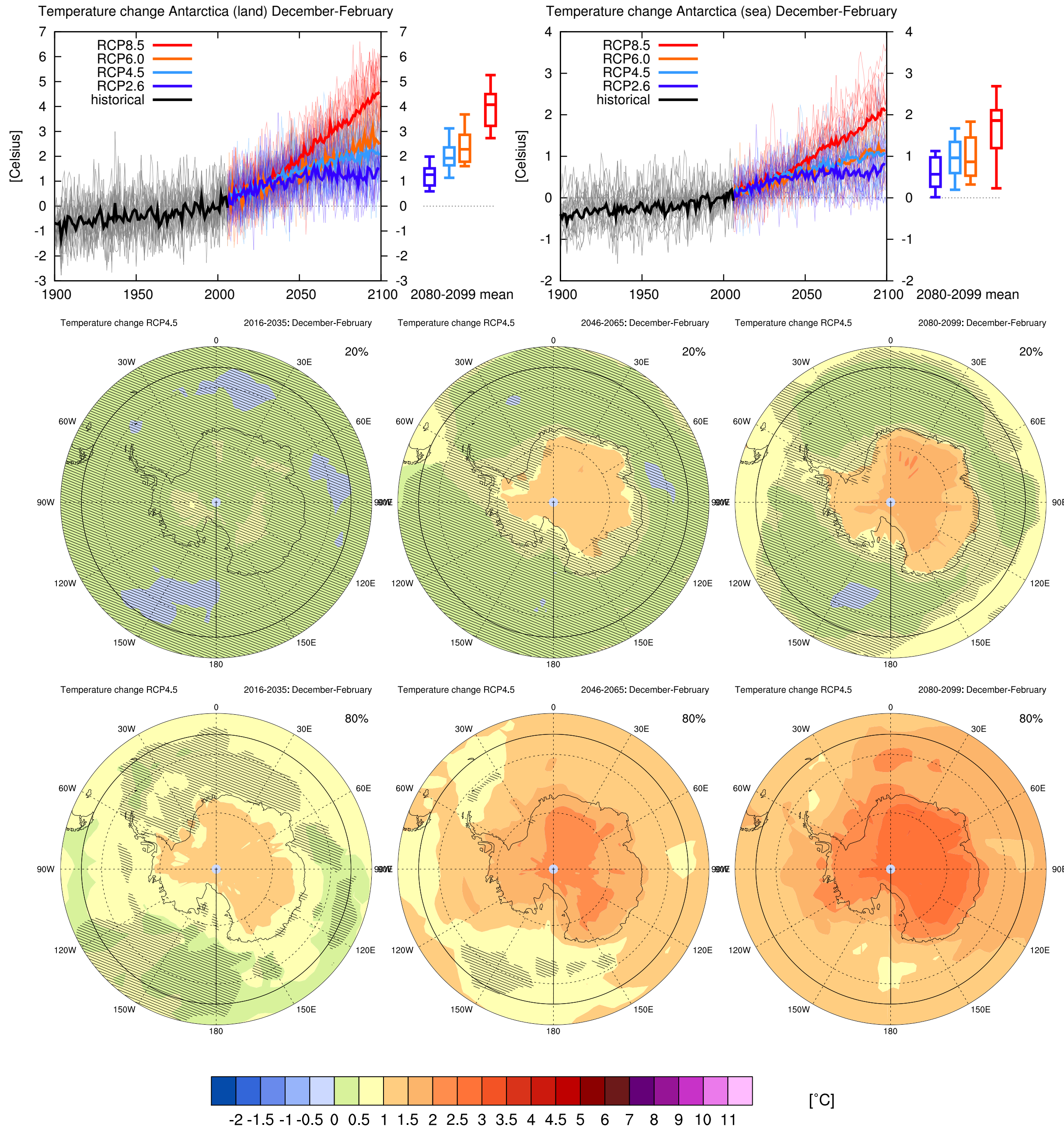


**Figure AI.94:** top left: time series of temperature averaged over land grid points in Antarctica (90°–55°S) in December–February. Top right: same for sea grid points. Thin lines denote one ensemble member per model, thick lines the partial CMIP5 multi-model mean. On the right-hand side the 5th, 25th, 50th (median), 75th and 95th percentiles of the distribution of 20-yr mean changes are given for the period 2080–2099 (relative to 1986–2005) for the four RCP scenarios.

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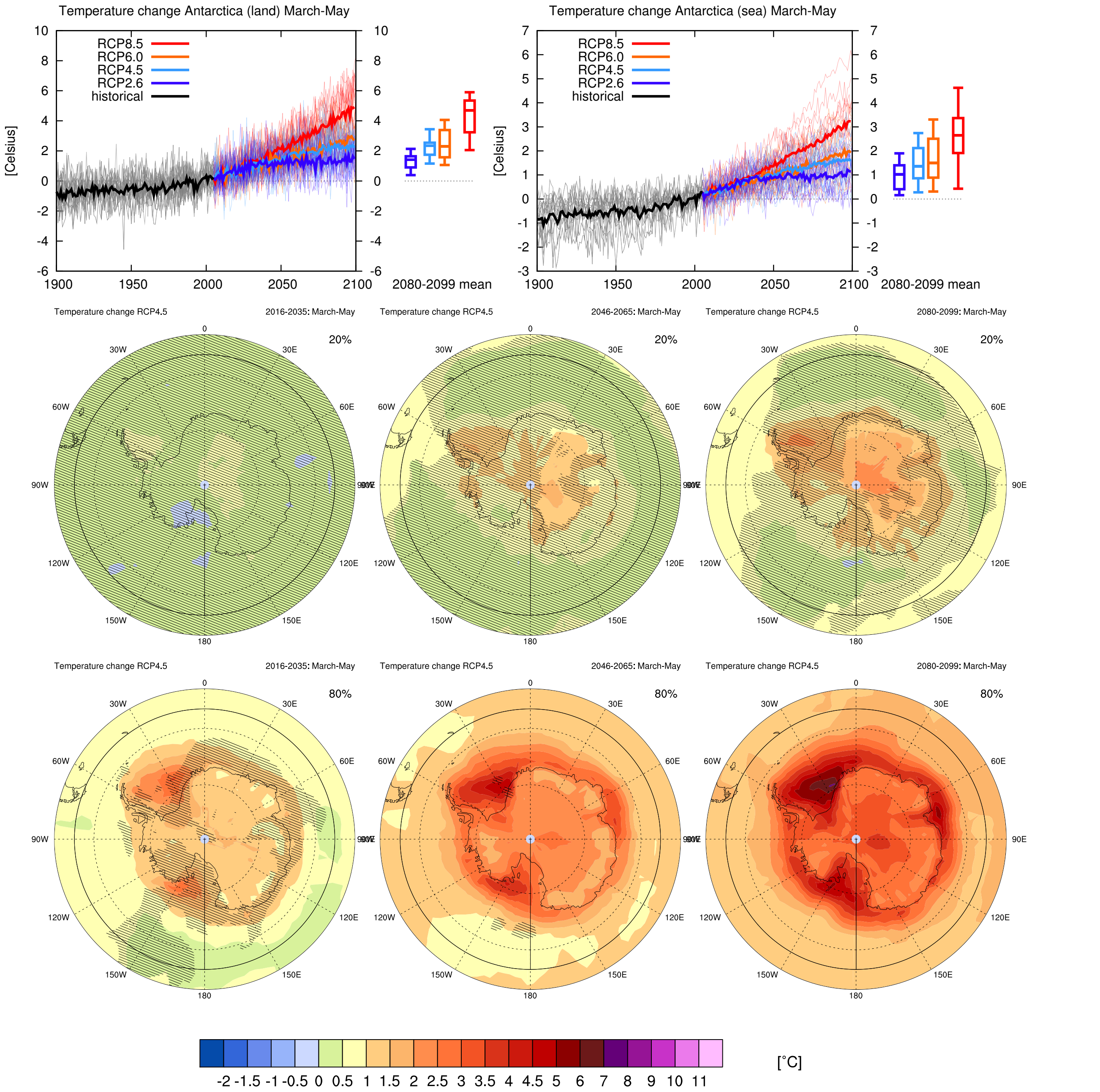


**Figure AI.95:** top left: time series of temperature averaged over land grid points in Antarctica (90°–55°S) in March–May. Top right: same for sea grid points. Thin lines denote one ensemble member per model, thick lines the partial CMIP5 multi-model mean. On the right-hand side the 5th, 25th, 50th (median), 75th and 95th percentiles of the distribution of 20-yr mean changes are given for the period 2080–2099 (relative to 1986–2005) for the four RCP scenarios.

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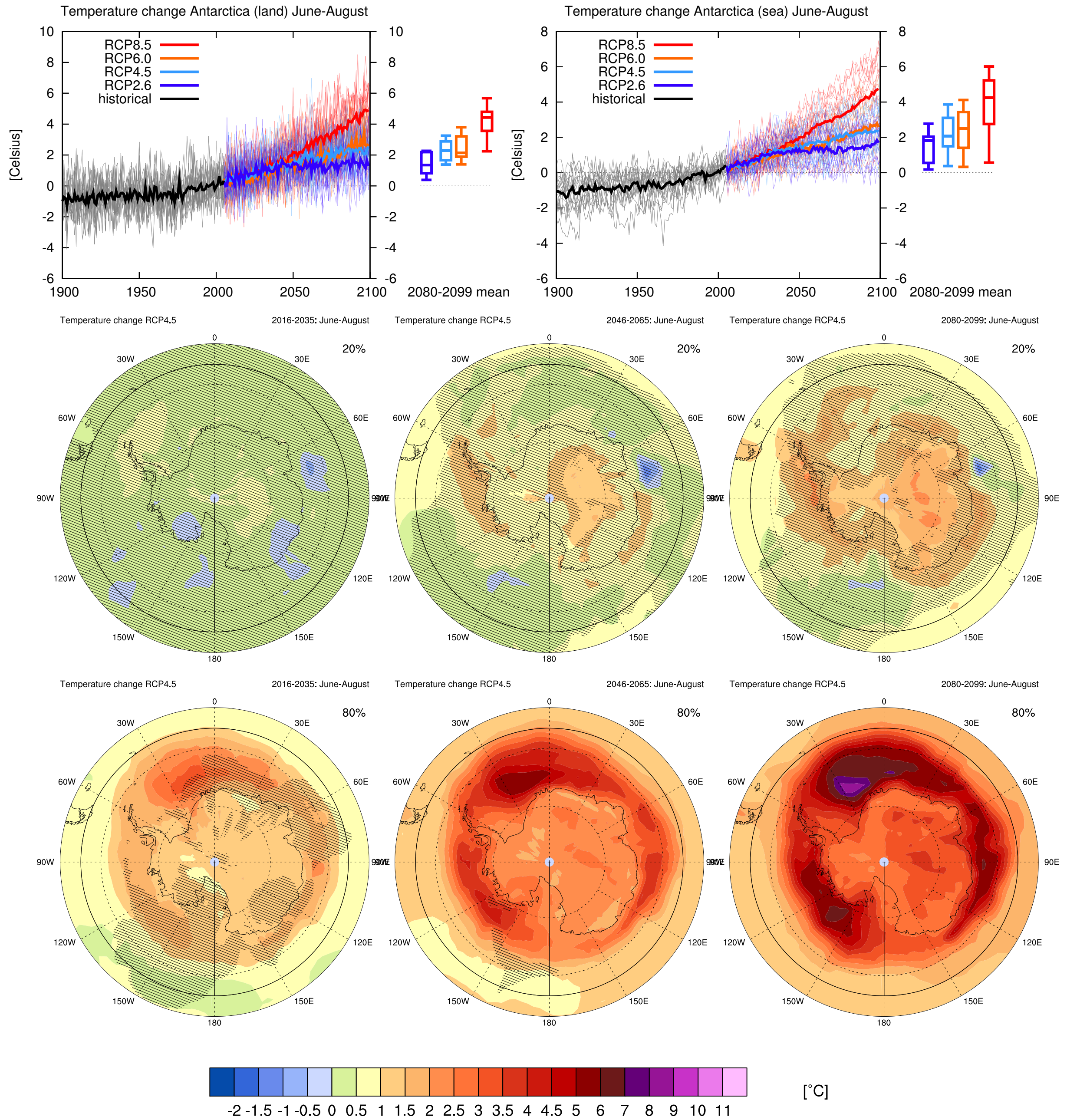


**Figure AI.96:** top left: time series of temperature averaged over land grid points in Antarctica (90°–55°S) in June–August. Top right: same for sea grid points. Thin lines denote one ensemble member per model, thick lines the partial CMIP5 multi-model mean. On the right-hand side the 5th, 25th, 50th (median), 75th and 95th percentiles of the distribution of 20-yr mean changes are given for the period 2080–2099 (relative to 1986–2005) for the four RCP scenarios.

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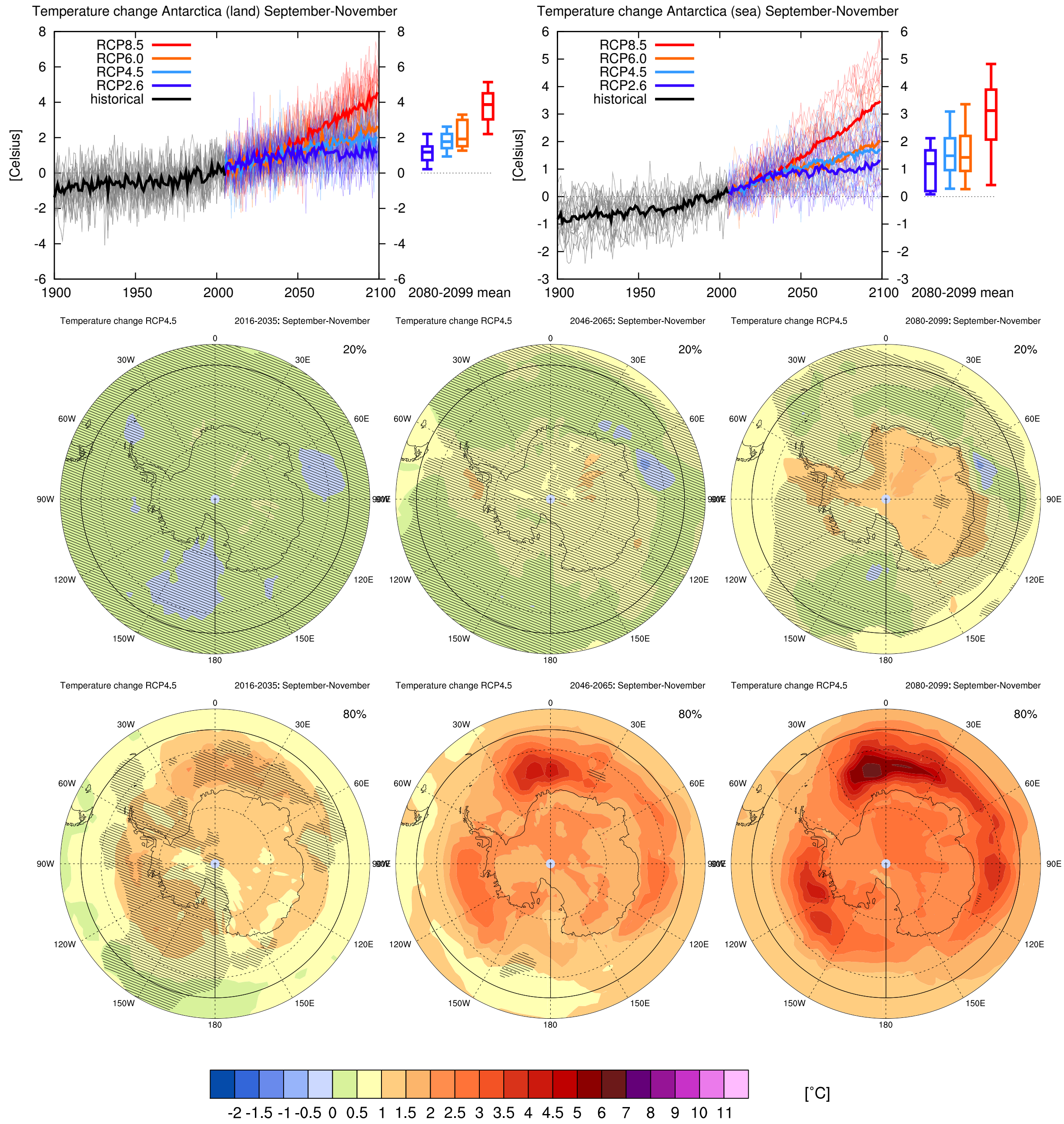


**Figure AI.97:** top left: time series of temperature averaged over land grid points in Antarctica (90°–55°S) in September–November. Top right: same for sea grid points. Thin lines denote one ensemble member per model, thick lines the partial CMIP5 multi-model mean. On the right-hand side the 5th, 25th, 50th (median), 75th and 95th percentiles of the distribution of 20-yr mean changes are given for the period 2080–2099 (relative to 1986–2005) for the four RCP scenarios.

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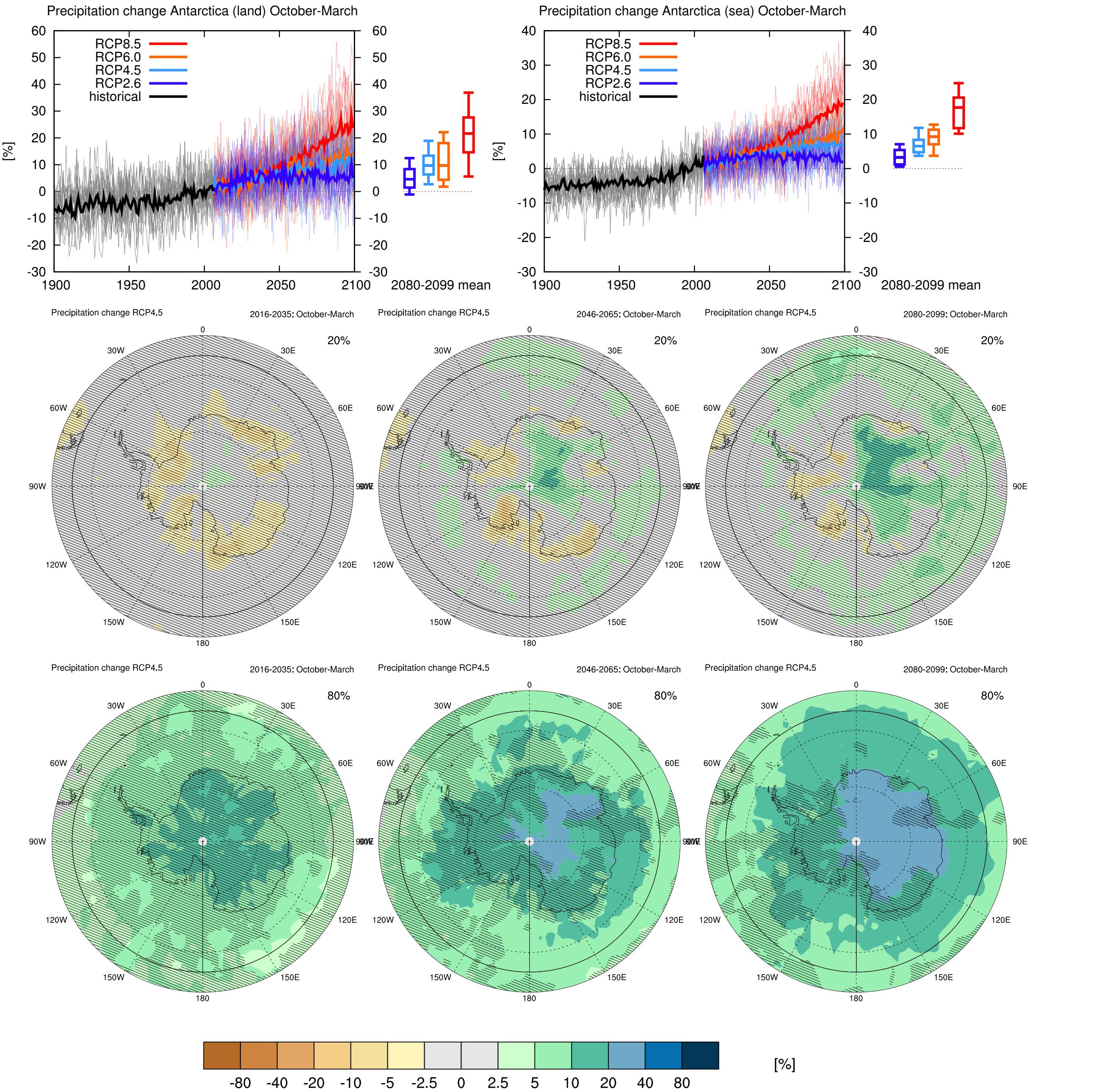


**Figure AI.98:** top left: time series of relative precipitation averaged over land grid points in Antarctica (90°–55°S) in October–March. Top right: same for sea grid points. Thin lines denote one ensemble member per model, thick lines the partial CMIP5 multi-model mean. On the right-hand side the 5th, 25th, 50th (median), 75th and 95th percentiles of the distribution of 20-yr mean changes are given for the period 2080–2099 (relative to 1986–2005) for the four RCP scenarios.

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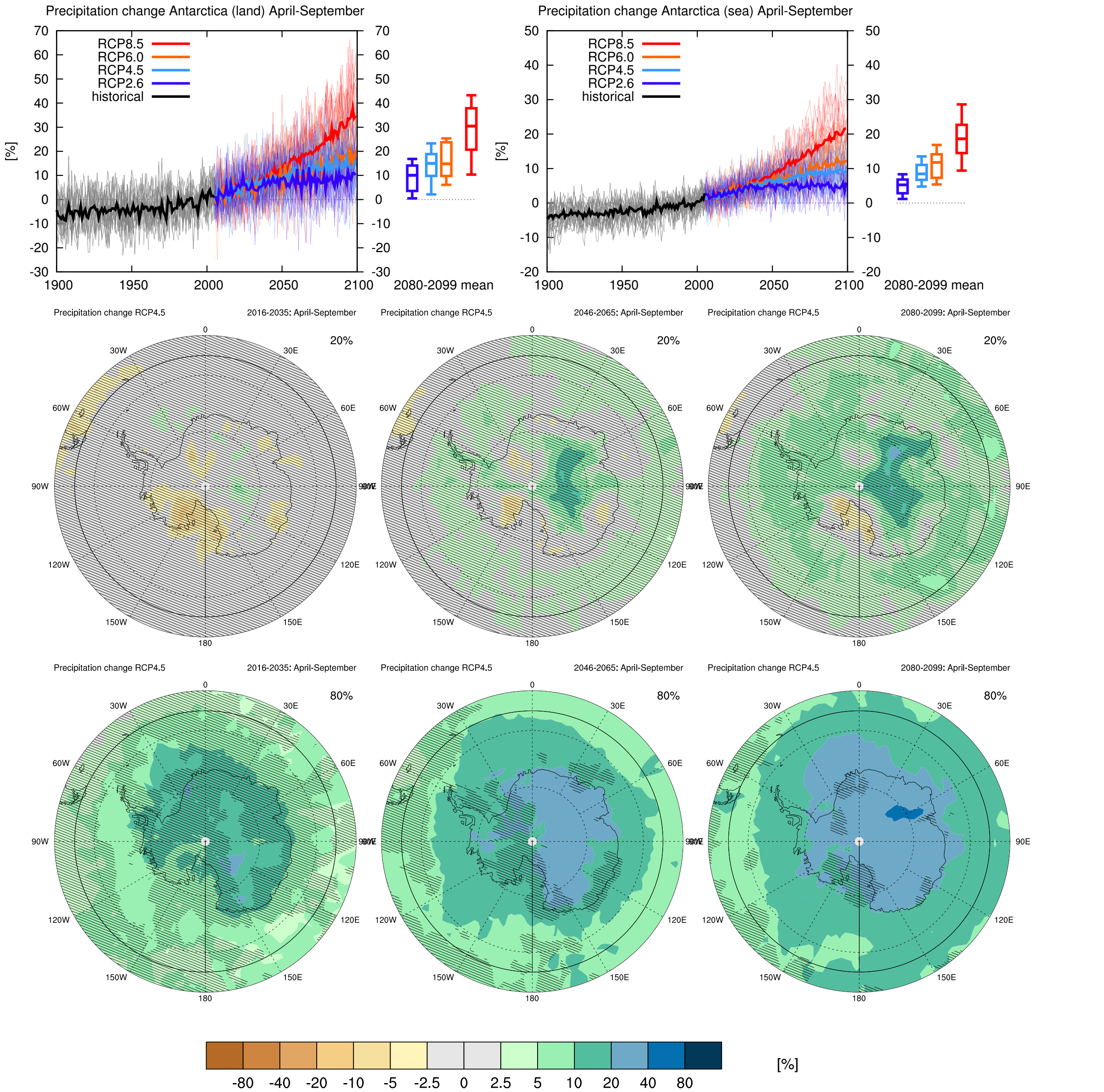


**Figure AI.99:** top left: time series of relative precipitation averaged over land grid points in Antarctica (90°–55°S) in April–September. Top right: same for sea grid points. Thin lines denote one ensemble member per model, thick lines the partial CMIP5 multi-model mean. On the right-hand side the 5th, 25th, 50th (median), 75th and 95th percentiles of the distribution of 20-yr mean changes are given for the period 2080–2099 (relative to 1986–2005) for the four RCP scenarios.

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