

WORKING GROUP I CONTRIBUTION TO THE IPCC FIFTH ASSESSMENT REPORT CLIMATE CHANGE 2013: THE PHYSICAL SCIENCE BASIS

Final Draft Underlying Scientific-Technical Assessment

A report accepted by Working Group I of the IPCC but not approved in detail.

Note:

The final draft Report, dated 7 June 2013, of the **Working Group I contribution to the IPCC 5th Assessment Report "Climate Change 2013: The Physical Science Basis"** was accepted but not approved in detail by the **12th Session of Working Group I and the 36th Session of the IPCC on 26 September 2013 in Stockholm, Sweden**. It consists of the full scientific and technical assessment undertaken by Working Group I.

The Report has to be read in conjunction with the document entitled "Climate Change 2013: The Physical Science Basis. Working Group I Contribution to the IPCC 5th Assessment Report - Changes to the underlying Scientific/Technical Assessment" to ensure consistency with the approved Summary for Policymakers (IPCC-XXVII/Doc.4) and presented to the Panel at its 36th Session. This document lists the changes necessary to ensure consistency between the full Report and the Summary for Policymakers, which was approved line-by-line by Working Group I and accepted by the Panel at the above-mentioned Sessions.

Before publication the Report will undergo final copyediting as well as any error correction as necessary, consistent with the IPCC Protocol for Addressing Possible Errors. Publication of the Report is foreseen in January 2014.

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INTERGOVERNMENTAL PANEL ON climate change

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**WORKING GROUP I CONTRIBUTION TO THE IPCC FIFTH ASSESSMENT
REPORT (AR5), CLIMATE CHANGE 2013: THE PHYSICAL SCIENCE BASIS**

**Annex I: Atlas of Global and Regional Climate Projections - Final Draft Underlying Scientific-
Technical Assessment**

(Submitted by the Co-Chairs of Working Group I)

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NOTE:

The Final Draft Underlying Scientific-Technical Assessment is submitted to the Twelfth Session of Working Group I for acceptance. The IPCC at its Thirty-sixth Session (Stockholm, 26 September 2013) will be informed of the actions of the Twelfth Session of Working Group I in this regard.

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Annex I: Atlas of Global and Regional Climate Projections

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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 Coupled Model Intercomparison Project Phase 5 (CMIP5; Taylor et al., 2012). 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 and for a number of different sub-continental-scale regions. Twenty-year average changes for the near-term (2016–2035), for mid-term (2046–2065), and for the long-term (2081–2100) 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, the 26 sub-continental SREX regions (IPCC, 2012) augmented with polar regions and the Caribbean, two Indian Ocean and three Pacific Ocean regions. In total this Atlas gives projections for 35 regions, 2 variables, and 2 seasons. The projections are made under the Representative Concentration Pathway scenarios, or RCPs, which are introduced in Chapter 1 with more technical detail given in Section 12.3 (also note the discussion of near-term biases in Sections 11.3.5.1 and 11.3.6.1). 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. Spatial maps for the other RCP scenarios and additional seasons are presented in the Supplementary Material. Figures AI-1 and AI-2 give 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. Figure captions on each page of the Annex reference the specific sub-sections in the report relevant to the regions considered on that page.

The projection of future climate change involves the careful evaluation of models, taking into account uncertainties in observations and consideration the physical basis of the findings, in order to characterise the credibility of the projections and assess their sensitivity to uncertainties. As discussed in Chapter 9, different climate models have varying degrees of success in simulating past climate variability and mean state when compared to observations. Verification of regional trends is discussed in Box 11.2 and provide further information on the credibility of model projections. The information presented in this Atlas is based entirely on all available CMIP5 model output with equal weight given to each model or version with different parametrisations.

Complementary methods for making quantitative projections, in which model output is combined with information about model performance using statistical techniques, exist and should be considered in impacts studies (see Sections 9.8.3, 11.3.1 and 12.2.2–12.2.3). While results from the application of such methods can be assessed alongside the projections from CMIP5 presented here, it 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 (including the effect of natural variability). Alternative approaches used to estimate projection uncertainty are discussed in Sections 11.3.1 and 12.2.2–12.2.3. The reliability of past trends is assessed in Box 11.2, which concludes that the time series and maps cannot be interpreted literally as probability density functions. They should not be interpreted as 'forecasts'

Projections of future climate change are conditional on assumptions of climate forcing, affected by shortcomings of climate models and inevitably also subject to internal variability when considering specific periods. Projected patterns of climate change may differ from one climate model generation to the next due to improvements in models. Some model-inadequacies are common to all models, but so are many patterns of change across successive generations of models, which gives some confidence in projections. The information presented is intended to be a starting point only for anyone interested in more detailed information on projections of future climate change and complements the assessment in Chapters 11, 12 and 14.

Technical Notes

Data and Processing: The figures have been constructed using the CMIP5 model output available at the time of the AR5 cut-off for accepted papers (15 March 2013). This dataset comprises 32/42/25/39 scenario experiments for RCP2.6/4.5/6.0/8.5 from 42 climate models (Table AI-1). Only concentration-driven experiments are used (i.e., those in which concentrations rather than emissions of greenhouse gases are prescribed) and only one ensemble member from each model is selected, even if multiple realisations exist with different initial conditions and different realisations of natural variability. Hence each model is given equal weight. Maps from only one scenario (RCP4.5) are shown but time-series are included from all four RCPs. Maps from other RCPs are presented in the Annex I Supplementary Material.

Table AI-1: The CMIP5 models used in this Annex for each of the historical and RCP scenario experiments. A number in each column is the identifier of the single ensemble member from that model that is used. A blank indicates no run was used, usually because that scenario run was not available. For the pre-industrial control column (piControl), a ‘tas’ indicates that those control simulations are used in the estimate of internal variability of surface air temperature and a ‘pr’ indicates that those control simulations are used in the estimate of precipitation internal variability.

CMIP5 Model Name	piControl	Historical	RCP2.6	RCP4.5	RCP6.0	RCP8.5
ACCESS1-0		1		1		1
ACCESS1-3	tas/pr	1		1		1
bcc-csm1-1	tas/pr	1	1	1	1	1
bcc-csm1-1-m		1	1	1	1	
BNU-ESM	tas/pr	1	1	1		1
CanESM2	tas/pr	1	1	1		1
CCSM4	tas/pr	1	1	1	1	1
CESM1-BGC	tas/pr	1		1		1
CESM1-CAM5		1	1	1	1	1
CMCC-CM		1		1		1
CMCC-CMS	tas/pr	1		1		1
CNRM-CM5	tas/pr	1	1	1		1
CSIRO-Mk3-6-0	tas/pr	1	1	1	1	1
EC-EARTH		1	8	8		8
FGOALS-g2	tas/pr	1	1	1		1
FIO-ESM	tas/pr	1	1	1	1	1
GFDL-CM3	tas/pr	1	1	1	1	1
GFDL-ESM2G	tas/pr	1	1	1	1	1
GFDL-ESM2M	tas/pr	1	1	1	1	1
GISS-E2-H p1		1	1	1	1	1
GISS-E2-H p2	tas/pr	1	1	1	1	1
GISS-E2-H p3	tas/pr	1	1	1	1	1
GISS-E2-H-CC		1		1		
GISS-E2-R p1		1	1	1	1	1

GISS-E2-R p2	pr	1	1	1	1	1
GISS-E2-R p3	pr	1	1	1	1	1
GISS-E2-R-CC		1		1		
HadGEM2-AO		1	1	1	1	1
HadGEM2-CC		1		1		1
HadGEM2-ES		2	2	2	2	2
inmcm4	tas/pr	1		1		1
IPSL-CM5A-LR	tas/pr	1	1	1	1	1
IPSL-CM5A-MR		1	1	1	1	1
IPSL-CM5B-LR		1		1		1
MIROC5	tas/pr	1	1	1	1	1
MIROC-ESM	tas/pr	1	1	1	1	1
MIROC-ESM-CHEM		1	1	1	1	1
MPI-ESM-LR	tas/pr	1	1	1		1
MPI-ESM-MR	tas/pr	1	1	1		1
MRI-CGCM3	tas/pr	1	1	1	1	1
NorESM1-M	tas/pr	1	1	1	1	1
NorESM1-ME		1	1	1	1	1
Number of models		42	32	42	25	39

Reference period: Projections are expressed as anomalies with respect to the reference period of 1986–2005 for both time series and spatial maps (i.e. differences between the future period and the reference period). Thus the changes are relative the climate change that has already occurred since the pre-industrial period and which is discussed in Chapters 2 and 10. For quantities where the trend is larger than the natural variability such as large-area temperature changes, a more recent reference period would give better estimates (see Section 11.3.6.1), for quantities where the natural variability is much larger than the trend a longer reference period would be preferable.

Equal model weighting: Model evaluation uses a multitude of techniques (see Chapter 9) and there is no consensus 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 in the sense of ‘one model, one vote’. Models with variations in physical parametrisation schemes are treated as distinct models.

Variables: Two variables have been plotted: surface air 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 the time series, the variables are first averaged over the domain and then the changes from the reference period are computed. This implies that in regions with large climatological precipitation gradients, the change is generally dominated by the areas with most precipitation.

Seasons: For temperature, the standard meteorological seasons June–August and December–February are shown, as these often correspond roughly with the warmest and coldest seasons. The annual mean and remaining seasons, March–May and September–October can be found in the Supplementary Material. 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 seasonal range plotted. Since the seasonal average is computed first, followed by the percentile change, these numbers are dominated by the rainy months within the half-year. The annual means are included in the Supplementary Material.

Regions: In addition to the global maps, the areas defined in the SREX (IPCC, 2012) are plotted with the addition of six regions containing the Caribbean, Indian Ocean and Pacific Island States and land and sea areas of the two polar regions. For regions containing large land-areas, averages are computed only over land grid points only. For ocean regions, averages are computed over both land and ocean grid points (see figure captions). A grid box is considered land if the land fraction is larger than 50% and sea if it is smaller than this. SREX regions with long coastlines (west coast of South America, North Europe, Southeast Asia) therefore include some influence of the ocean. Note that temperature and precipitation over islands may be very different from those over the surrounding sea.

Time Series: For each of the resulting areas the areal mean is computed on the original model grid using land, sea or all points, depending on the definition of the region (see above). As an indication of the model uncertainty and natural variability, the time series of each model and scenario over the common period 1900–2100 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 2081–2100, 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 the 20-year means of the model time series indicated in Table AI-1, including both natural variability and model spread. 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. Note that due to a smaller number of models, the box-and-whisker plots for the RCP2.6 scenario and especially the RCP6.0 scenario are less certain than those for RCP4.5 and RCP8.5.

Spatial Maps: The maps in the Atlas show, for an area encompassing two or three regions, the difference between the periods 2016–2035, 2046–2065 and 2081–2100 and the reference period 1986–2005. As local projections of climate change are uncertain, a measure of the range of model projections is shown in addition to the median response of the model ensemble interpolated to a common 2.5° grid (the interpolation was done bilinearly for surface air temperature and first order conservatively for precipitation). It should again be emphasized (see above) that this range does not represent the full uncertainty in the projection. On the left, the 25th percentile of the distribution of ensemble members is shown, on the right the 75th percentile. The median is shown in the middle (different to similar plots in Chapters 11 and 12 and the time series which show the multi-model mean). The distribution combines the effects of natural variability and model spread. The colour scale is kept constant over all maps.

Hatching: Hatching indicates regions where the magnitude of the change of the 20-year mean is less than one standard deviation of model-estimated present-day natural variability of 20-year mean differences. The natural variability is estimated using all pre-industrial control runs which are at least 500 year long. The first 100 years of the pre-industrial are ignored. The natural variability is then calculated for every grid point as the standard deviation of non-overlapping 20-year means after a quadratic fit is subtracted at every grid point to eliminate model drift. This is multiplied by the square root of 2, a factor that arises as the comparison is between two distributions of numbers. The median across all models of that quantity is used. This characterizes the typical difference between two 20-year averages that would be expected due to unforced internal variability. The hatching is applied to all maps so, for example, if the 25th percentile of the distribution of model projections is less than one standard deviation of natural variability, it is hatched.

The hatching can be interpreted as some indication of the strength of the future anomalies from present-day climate, when compared to the strength of present day internal 20-year variability. It either means that the change is relatively small or that there is little agreement between models on the sign of the change. It is only presented as a guide to assessing the strength of change as the difference between two 20-year intervals. Using other measures of natural variability would give smaller or larger hatched areas, but the colours underneath the hatching would not be very different. Other methods of hatching and stippling are possible (see Box 12.1) and, in cases where such information is critical, it is recommended that thorough attention is paid to assessing significance using a statistical test appropriate to the problem being considered.

Scenarios: Spatial patterns of changes for scenarios other than RCP4.5 can be found in the Supplementary Material.

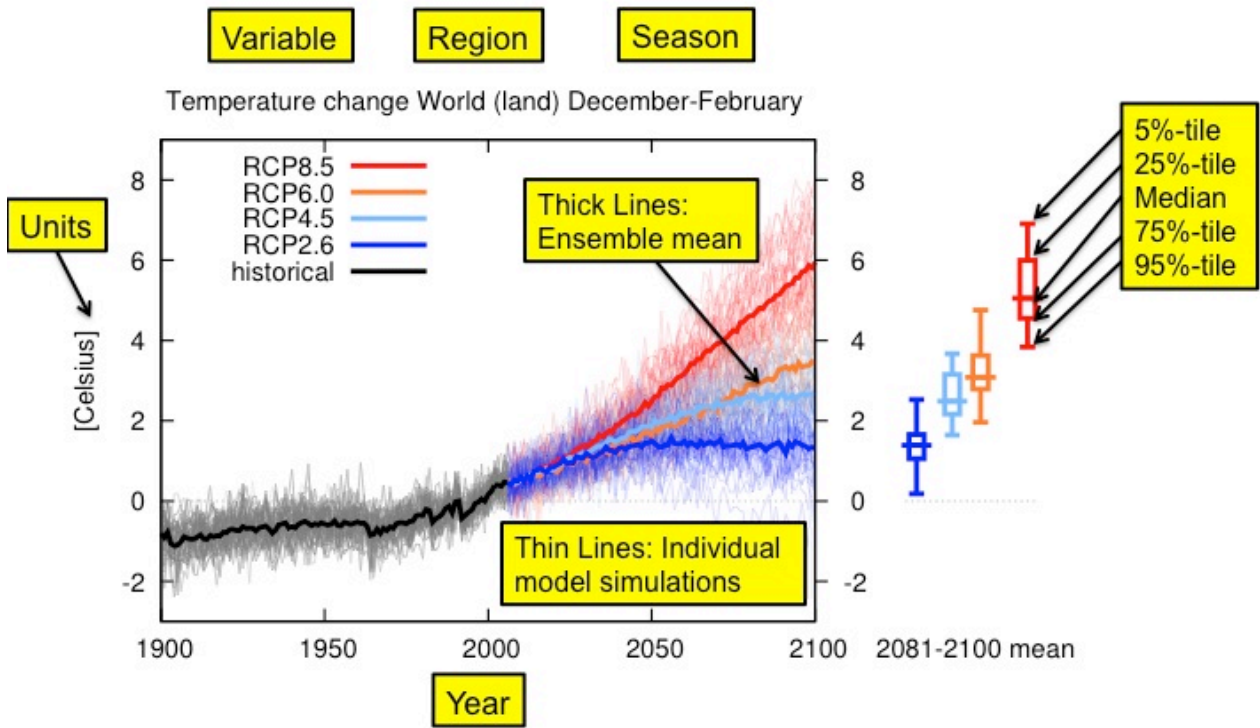


Figure AI-1: Explanation of the features of a typical time series figure presented in Annex I.

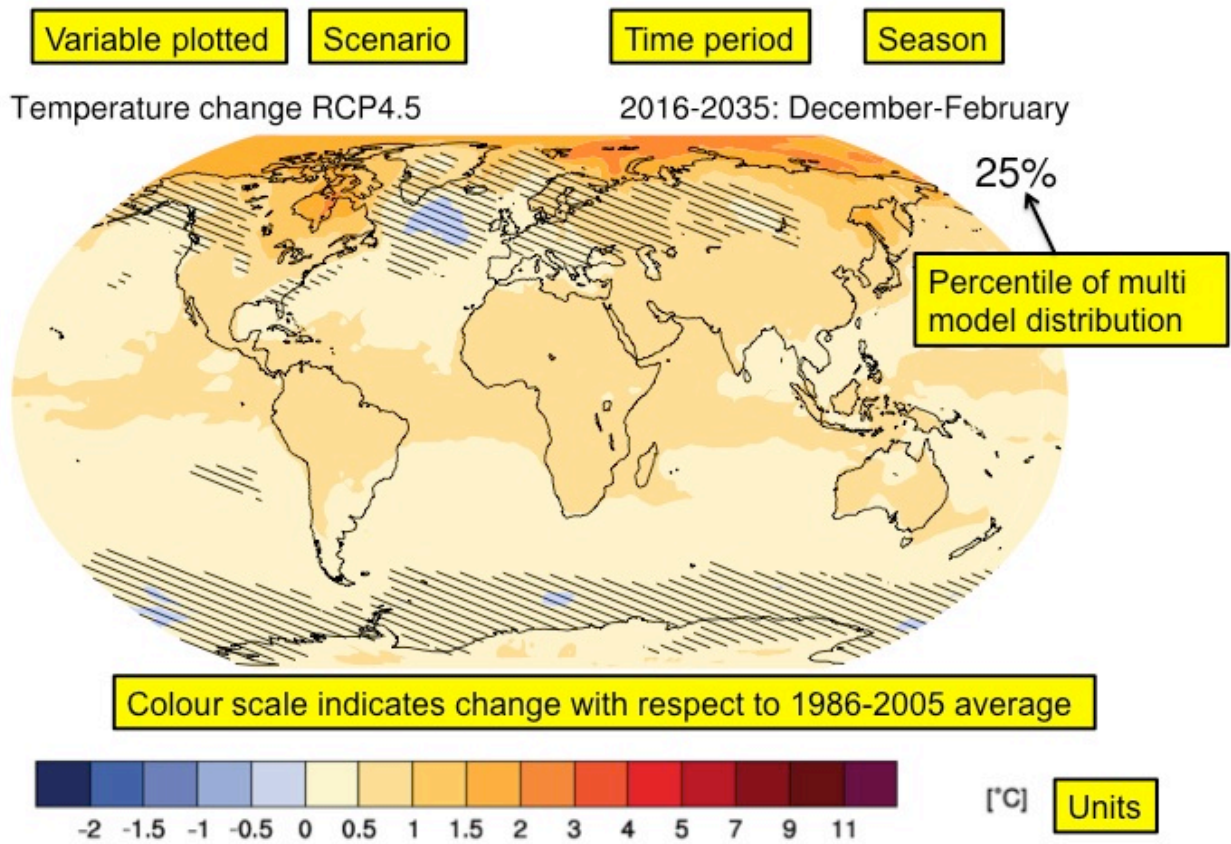
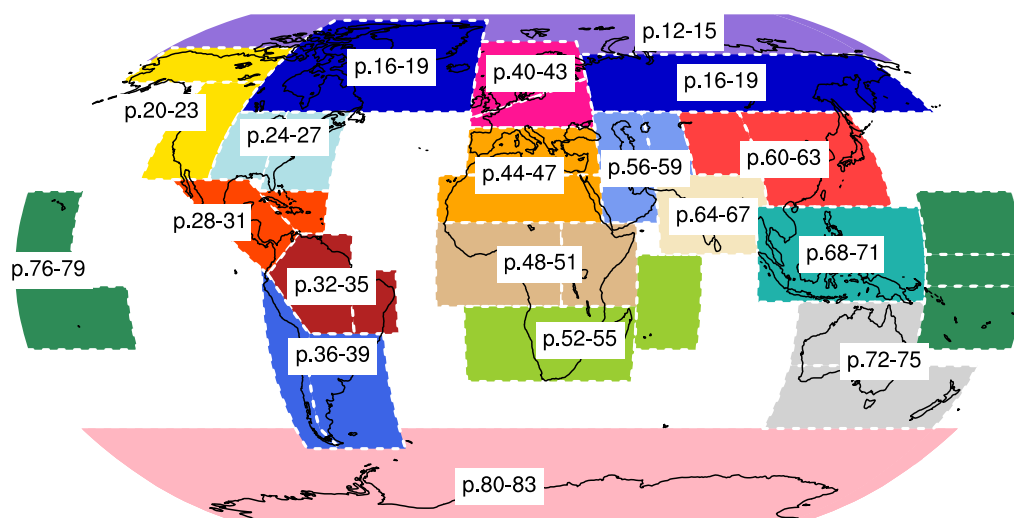


Figure AI-2: Explanation of the features of a typical spatial maps presented in Annex I. Hatching indicates regions where the magnitude of the 25th, median or 75th percentile of the 20-year mean change is less than one standard deviation of model-estimated natural variability of 20-year mean differences.

References

- IPCC, 2012. *Managing the Risks of Extreme Events and Disasters to Advance Climate Change Adaptation*. A Special Report of Working Groups I and II of the Intergovernmental Panel on Climate Change [C.B. Field, V. Barros, T.F. Stocker, D. Qin, D.J. Dokken, K.L. Ebi, M.D. Mastrandrea, K.J. Mach, G.-K. Plattner, S.K. Allen, M. Tignor and P.M. Midgley (Eds.)]. Cambridge University Press, UK, and New York, NY, USA, pp. 582.
- Taylor, K.E., Stouffer, R.J. and Meehl, G.A., 2012. A Summary of the CMIP5 Experiment Design. *Bull. Amer. Meteor. Soc.*, **93**, 485-498.



1
2 **Figure AI.3: Overview of the SREX, ocean and polar regions used.**

3 Figures AI-4 to AI-7, p.8–11: World

4 Figures AI-8 to AI-11, p.12–15: Arctic

5 Figures AI-12 to AI-15, p.16–19: High latitudes

6 Figures AI-16 to AI-19, p.20–23: North America (West)

7 Figures AI-20 to AI-23, p.24–27: North America (East)

8 Figures AI-24 to AI-27, p.28–31: Central America and Caribbean

9 Figures AI-28 to AI-31, p.32–35: Northern South America

10 Figures AI-32 to AI-35, p.36–39: Southern South America

11 Figures AI-36 to AI-39, p.40–43: North and Central Europe

12 Figures AI-40 to AI-43, p.44–47: Mediterranean and Sahara

13 Figures AI-44 to AI-47, p.48–51: West and East Africa

14 Figures AI-48 to AI-51, p.52–55: Southern Africa and West Indian Ocean

15 Figures AI-52 to AI-55, p.56–59: West and Central Asia

16 Figures AI-56 to AI-59, p.60–63: Eastern Asia and Tibetan Plateau

17 Figures AI-60 to AI-63, p.64–67: South Asia

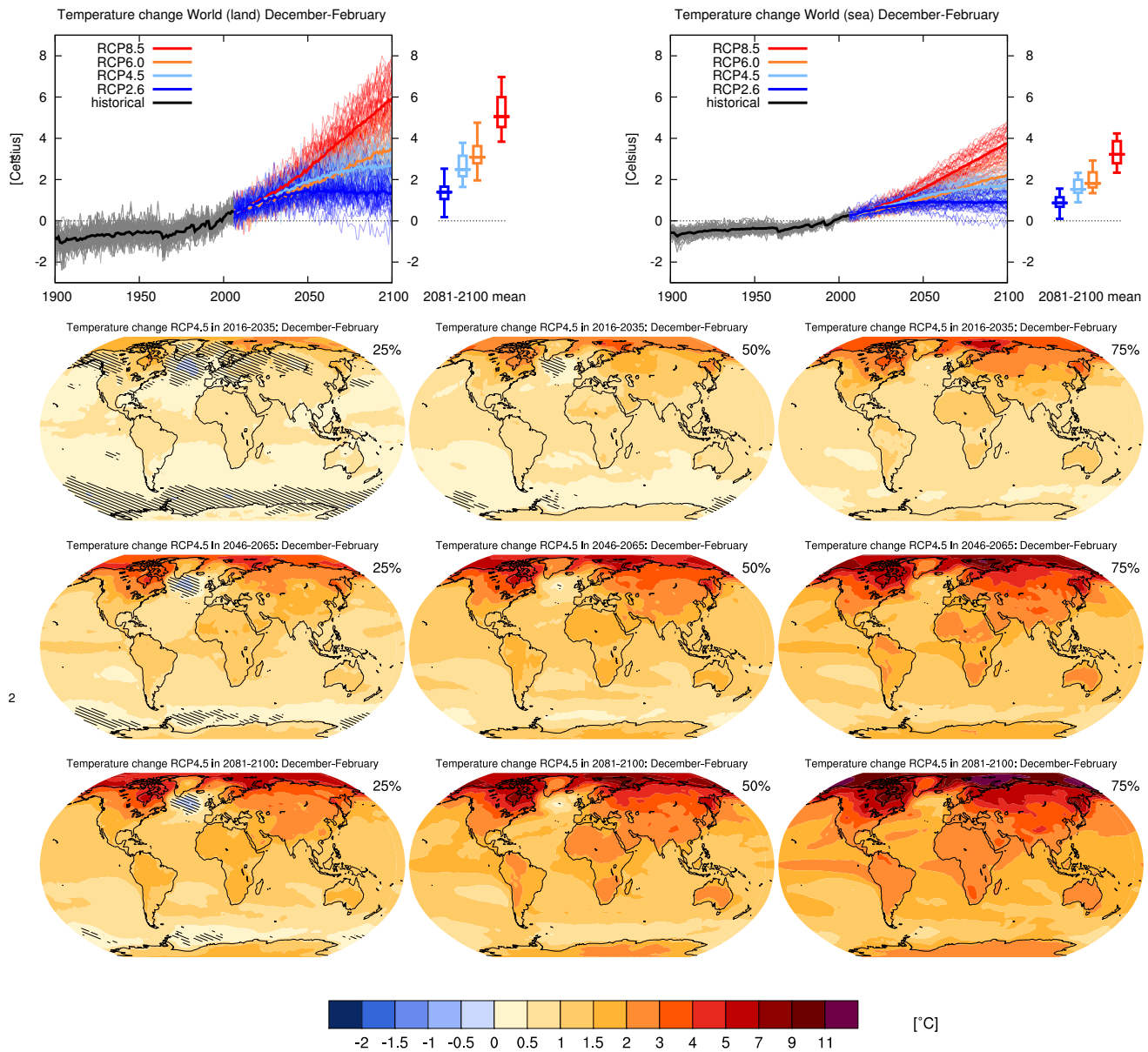
18 Figures AI-64 to AI-67, p.68–71: Southeast Asia

19 Figures AI-68 to AI-71, p.72–75: Australia and New Zealand

20 Figures AI-72 to AI-75, p.76–79: Pacific Islands region

21 Figures AI-76 to AI-79, p.80–83: Antarctica

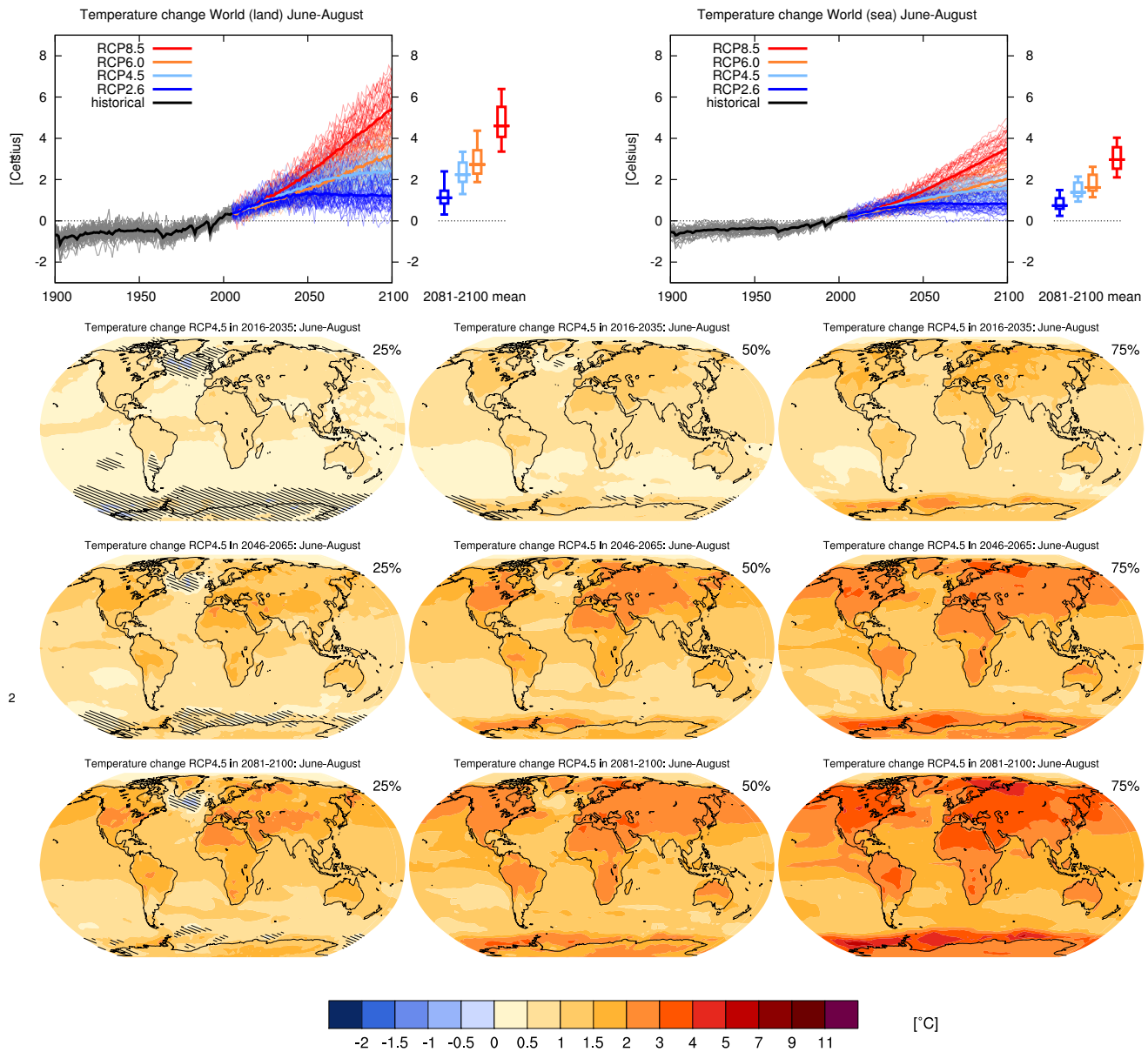
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3 **Figure AI.4:** Top left: time series of temperature change relative to 1986–2005 averaged over land grid points
 4 over the globe in December–February. Top right: same for sea grid points. Thin lines denote one ensemble
 5 member per model, thick lines the CMIP5 multi-model mean. On the right-hand side the 5th, 25th, 50th
 6 (median), 75th and 95th percentiles of the distribution of 20-yr mean changes are given for 2081–2100 in the
 7 four RCP scenarios.

8 Below: maps of temperature changes in 2016–2035, 2046–2065 and 2081–2100 with respect to 1986–2005
 9 in the RCP4.5 scenario. For each point, the 25th, 50th and 75th percentile of the distribution of the CMIP5
 10 ensemble are shown, this includes both natural variability and inter-model spread. Hatching denotes areas
 11 where the 20-yr mean differences of the percentiles are less than the standard deviation of model-estimated
 12 present-day natural variability of 20-yr mean differences.

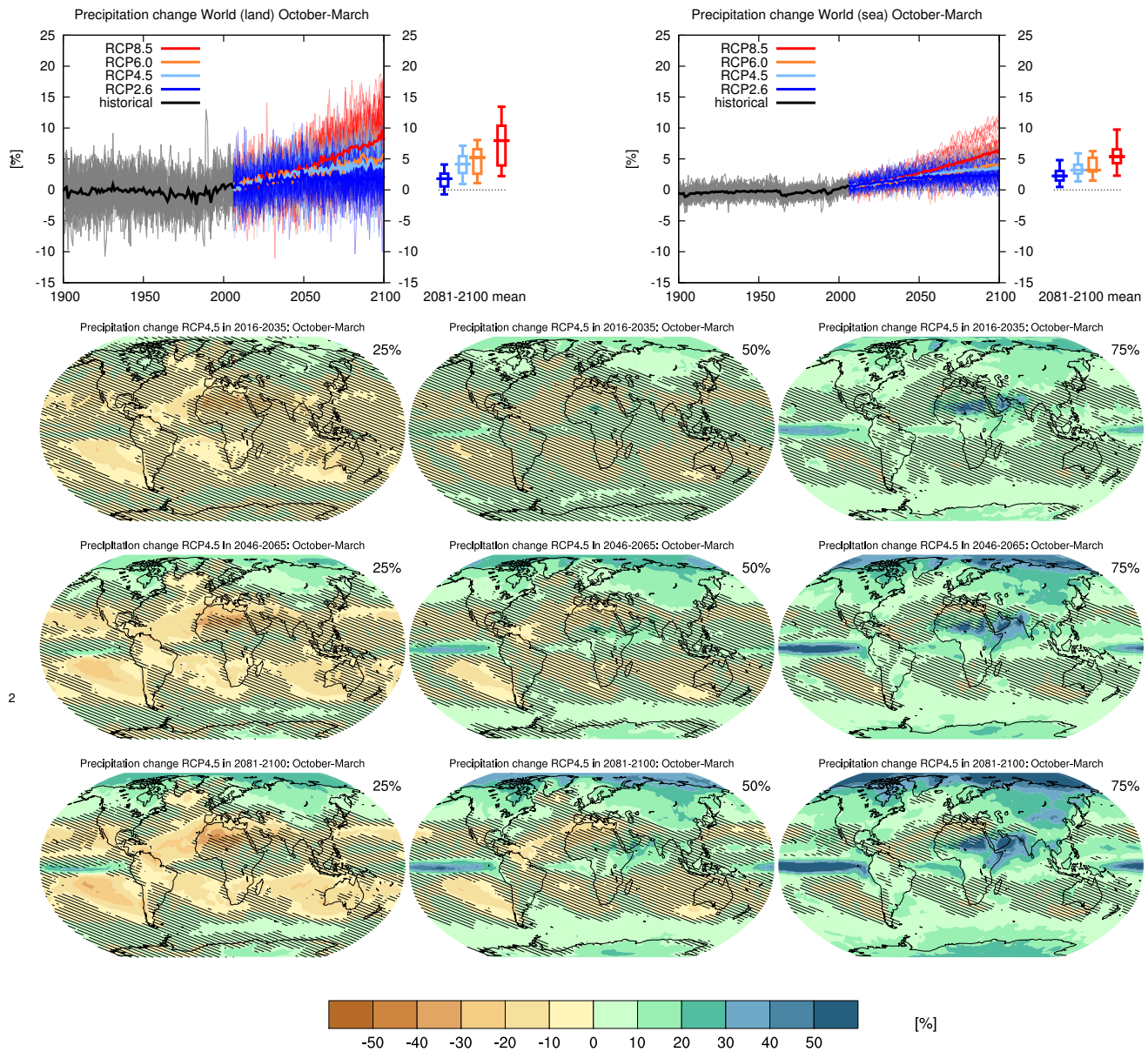
13 Sections 9.4.1.1, 9.6.1.1, 10.3.1.1.4, 11.3.2.1.2, 11.3.3.1, Box 11.2, 12.4.3.1 and 12.4.7 contain relevant infor-
 14 mation regarding the evaluation of models in this region, the model spread in the context of other methods of
 15 projecting changes and the role of modes of variability and other climate phenomena.



3 **Figure AI.5:** Top left: time series of temperature change relative to 1986–2005 averaged over land grid points
 4 over the globe in June–August. Top right: same for sea grid points. Thin lines denote one ensemble member per
 5 model, thick lines the CMIP5 multi-model mean. On the right-hand side the 5th, 25th, 50th (median), 75th and
 6 95th percentiles of the distribution of 20-yr mean changes are given for 2081–2100 in the four RCP scenarios.

7 Below: maps of temperature changes in 2016–2035, 2046–2065 and 2081–2100 with respect to 1986–2005
 8 in the RCP4.5 scenario. For each point, the 25th, 50th and 75th percentile of the distribution of the CMIP5
 9 ensemble are shown, this includes both natural variability and inter-model spread. Hatching denotes areas
 10 where the 20-yr mean differences of the percentiles are less than the standard deviation of model-estimated
 11 present-day natural variability of 20-yr mean differences.

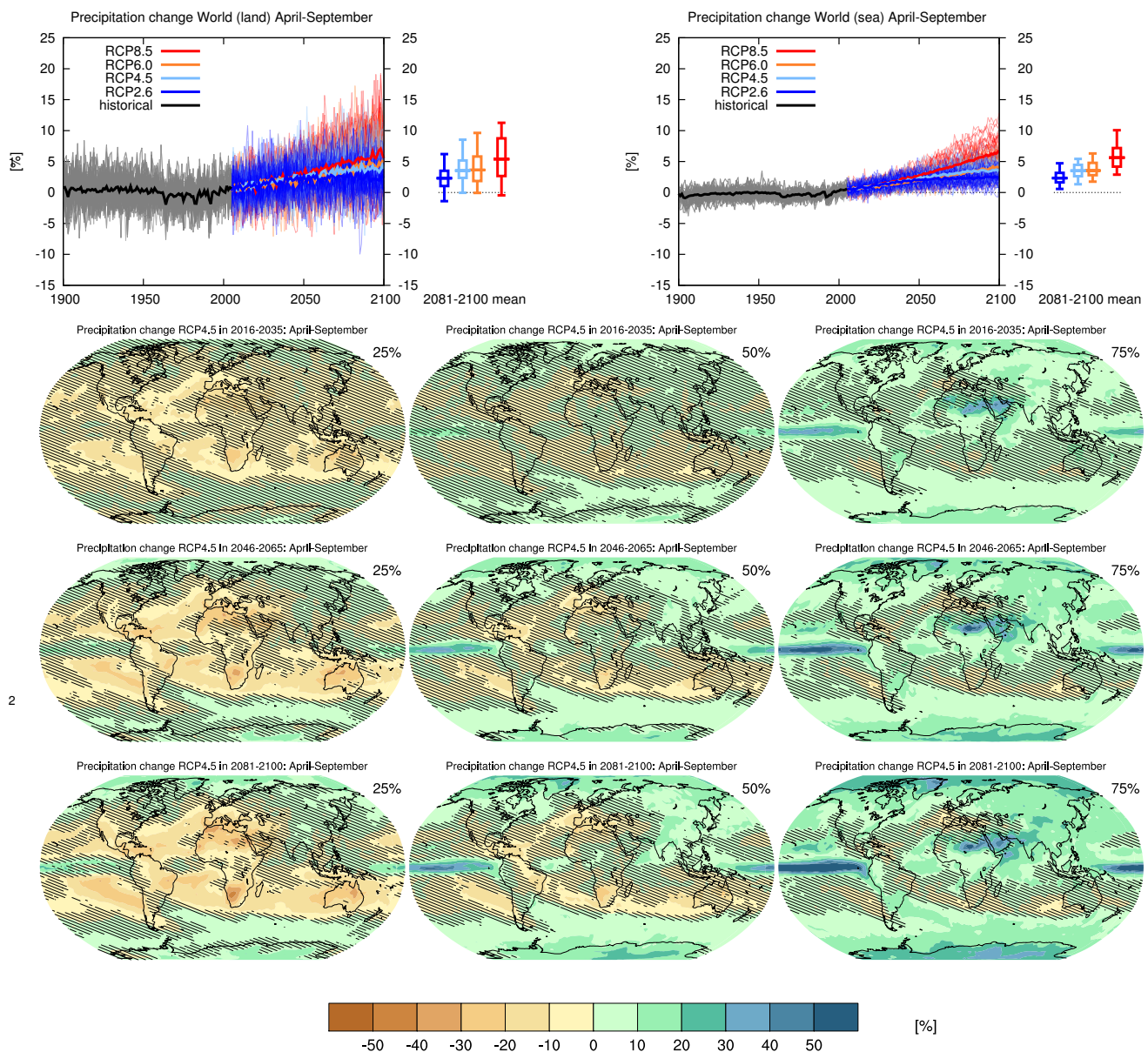
12 Sections 9.4.1.1, 9.6.1.1, 10.3.1.1.4, 11.3.2.1.2, 11.3.3.1, Box 11.2, 12.4.3.1 and 12.4.7 contain relevant infor-
 13 mation regarding the evaluation of models in this region, the model spread in the context of other methods of
 14 projecting changes and the role of modes of variability and other climate phenomena.



3 **Figure AI.6:** Top left: time series of relative change relative to 1986–2005 in precipitation averaged over
 4 land grid points over the globe in October–March. Top right: same for sea grid points. Thin lines denote one
 5 ensemble member per model, thick lines the CMIP5 multi-model mean. On the right-hand side the 5th, 25th,
 6 50th (median), 75th and 95th percentiles of the distribution of 20-yr mean changes are given for 2081–2100 in
 7 the four RCP scenarios.

8 Below: maps of precipitation changes in 2016–2035, 2046–2065 and 2081–2100 with respect to 1986–2005
 9 in the RCP4.5 scenario. For each point, the 25th, 50th and 75th percentile of the distribution of the CMIP5
 10 ensemble are shown, this includes both natural variability and inter-model spread. Hatching denotes areas
 11 where the 20-yr mean differences of the percentiles are less than the standard deviation of model-estimated
 12 present-day natural variability of 20-yr mean differences.

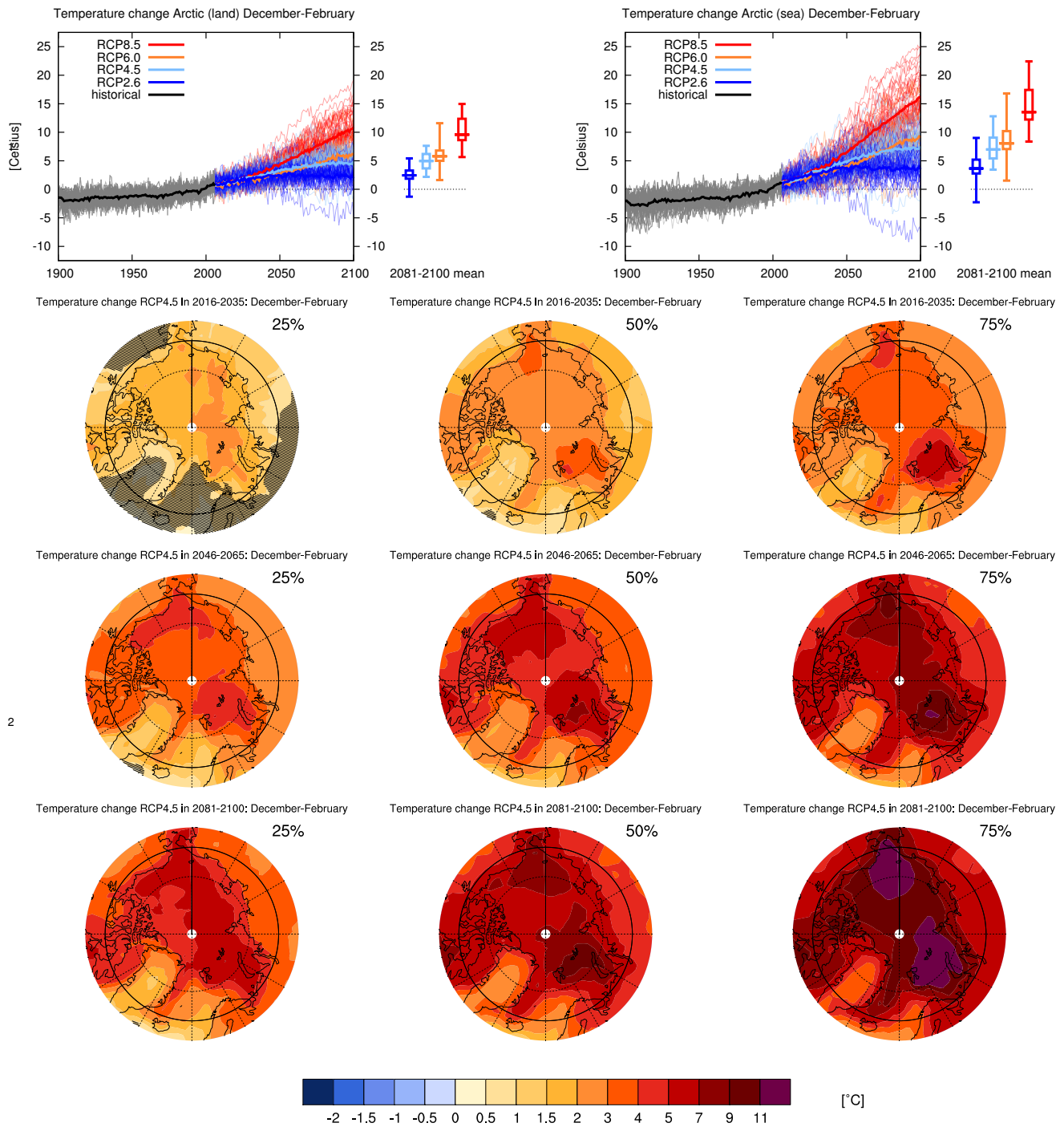
13 Sections 9.4.1.1, 9.6.1.1, 10.3.2.2, 11.3.2.3.1, Box 11.2, 12.4.5.2, 14.2 contain relevant information regarding
 14 the evaluation of models in this region, the model spread in the context of other methods of projecting changes
 15 and the role of modes of variability and other climate phenomena.



3 **Figure AI.7:** Top left: time series of relative change relative to 1986–2005 in precipitation averaged over land
 4 grid points over the globe in April–September. Top right: same for sea grid points. Thin lines denote one
 5 ensemble member per model, thick lines the CMIP5 multi-model mean. On the right-hand side the 5th,
 6 50th (median), 75th and 95th percentiles of the distribution of 20-yr mean changes are given for
 7 the four RCP scenarios.

8 Below: maps of precipitation changes in 2016–2035, 2046–2065 and 2081–2100 with respect to 1986–2005
 9 in the RCP4.5 scenario. For each point, the 25th, 50th and 75th percentile of the distribution of the CMIP5
 10 ensemble are shown, this includes both natural variability and inter-model spread. Hatching denotes areas
 11 where the 20-yr mean differences of the percentiles are less than the standard deviation of model-estimated
 12 present-day natural variability of 20-yr mean differences.

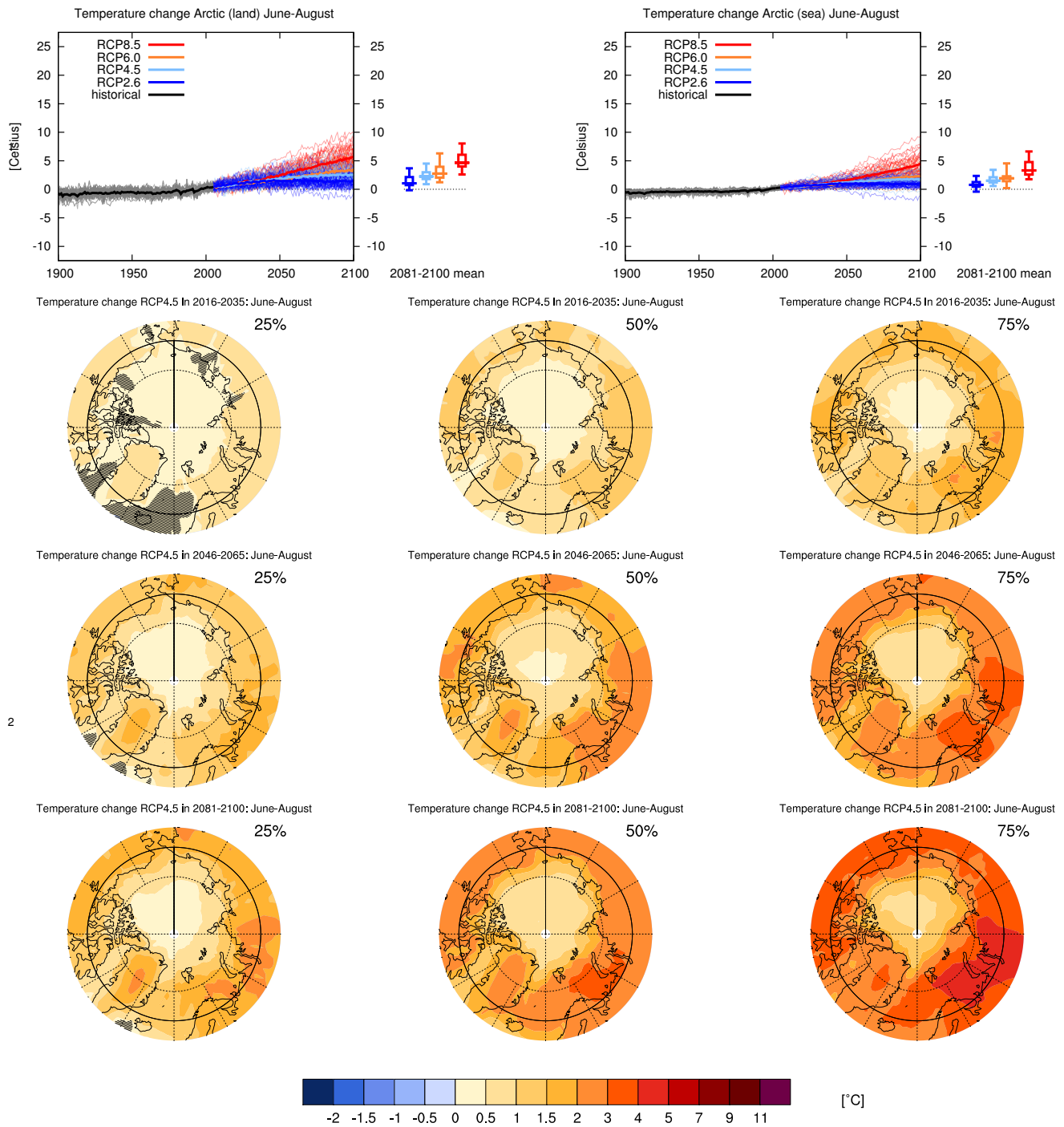
13 Sections 9.4.1.1, 9.6.1.1, 10.3.2.2, 11.3.2.3.1, Box 11.2, 12.4.5.2, 14.2 contain relevant information regarding
 14 the evaluation of models in this region, the model spread in the context of other methods of projecting changes
 15 and the role of modes of variability and other climate phenomena.



3 **Figure AI.8:** Top left: time series of temperature change relative to 1986–2005 averaged over land grid points
 4 in the Arctic (67.5° – 90° N) in December–February. Top right: same for sea grid points. Thin lines denote one
 5 ensemble member per model, thick lines the CMIP5 multi-model mean. On the right-hand side the 5th, 25th,
 6 50th (median), 75th and 95th percentiles of the distribution of 20-yr mean changes are given for 2081–2100 in
 7 the four RCP scenarios.

8 Below: maps of temperature changes in 2016–2035, 2046–2065 and 2081–2100 with respect to 1986–2005
 9 in the RCP4.5 scenario. For each point, the 25th, 50th and 75th percentile of the distribution of the CMIP5
 10 ensemble are shown, this includes both natural variability and inter-model spread. Hatching denotes areas
 11 where the 20-yr mean differences of the percentiles are less than the standard deviation of model-estimated
 12 present-day natural variability of 20-yr mean differences.

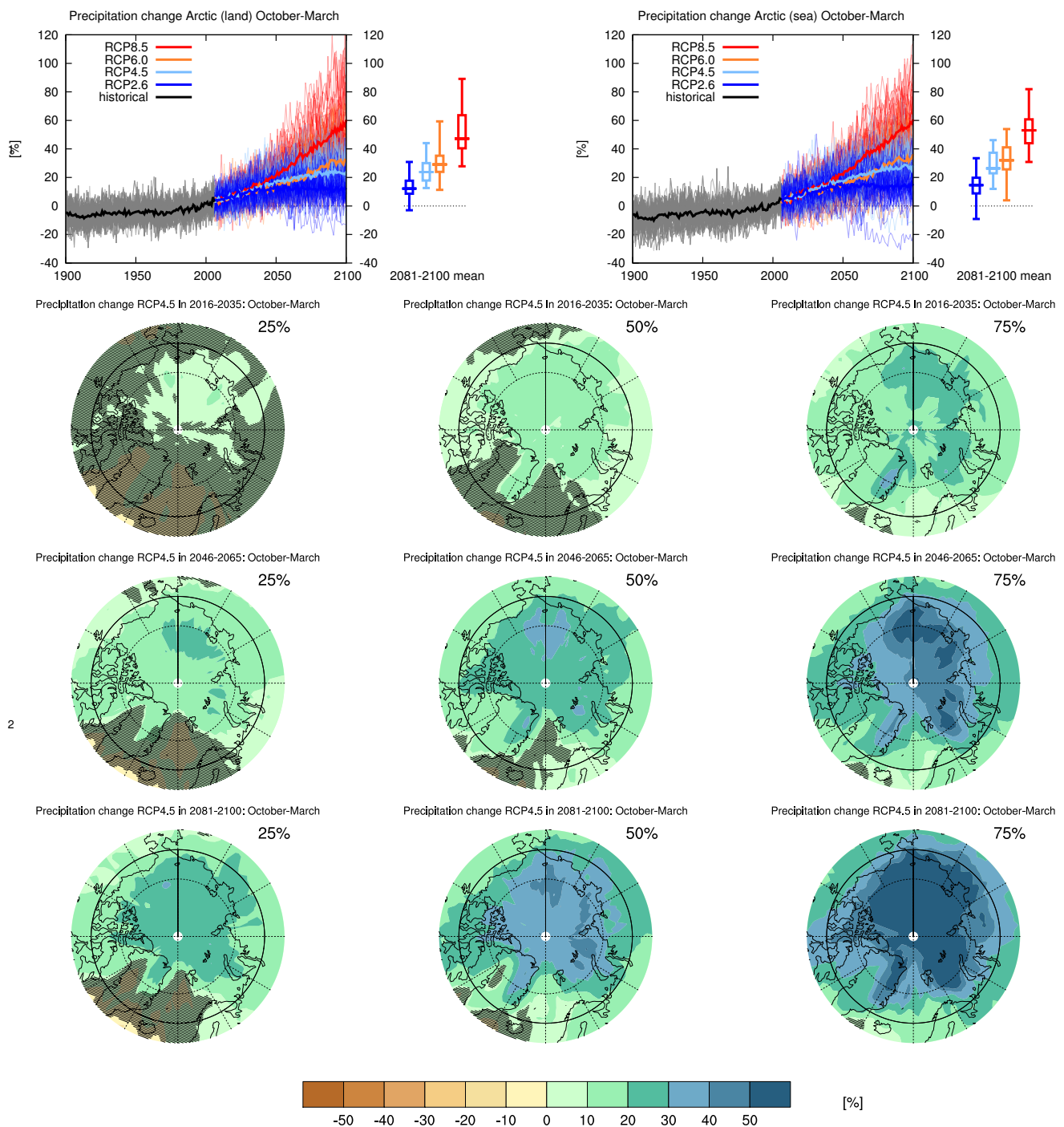
13 Sections 9.4.1.1, 9.6.1.1, 10.3.1.1.4, 11.3.2.1.2, Box 11.2, 12.4.3.1, 14.8.2 contain relevant information regard-
 14 ing the evaluation of models in this region, the model spread in the context of other methods of projecting
 15 changes and the role of modes of variability and other climate phenomena.



3 **Figure AI.9:** Top left: time series of temperature change relative to 1986–2005 averaged over land grid points
 4 in the Arctic (67.5° – 90° N) in June–August. Top right: same for sea grid points. Thin lines denote one ensemble
 5 member per model, thick lines the CMIP5 multi-model mean. On the right-hand side the 5th, 25th, 50th
 6 (median), 75th and 95th percentiles of the distribution of 20-yr mean changes are given for 2081–2100 in the
 7 four RCP scenarios.

8 Below: maps of temperature changes in 2016–2035, 2046–2065 and 2081–2100 with respect to 1986–2005
 9 in the RCP4.5 scenario. For each point, the 25th, 50th and 75th percentile of the distribution of the CMIP5
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 11 where the 20-yr mean differences of the percentiles are less than the standard deviation of model-estimated
 12 present-day natural variability of 20-yr mean differences.

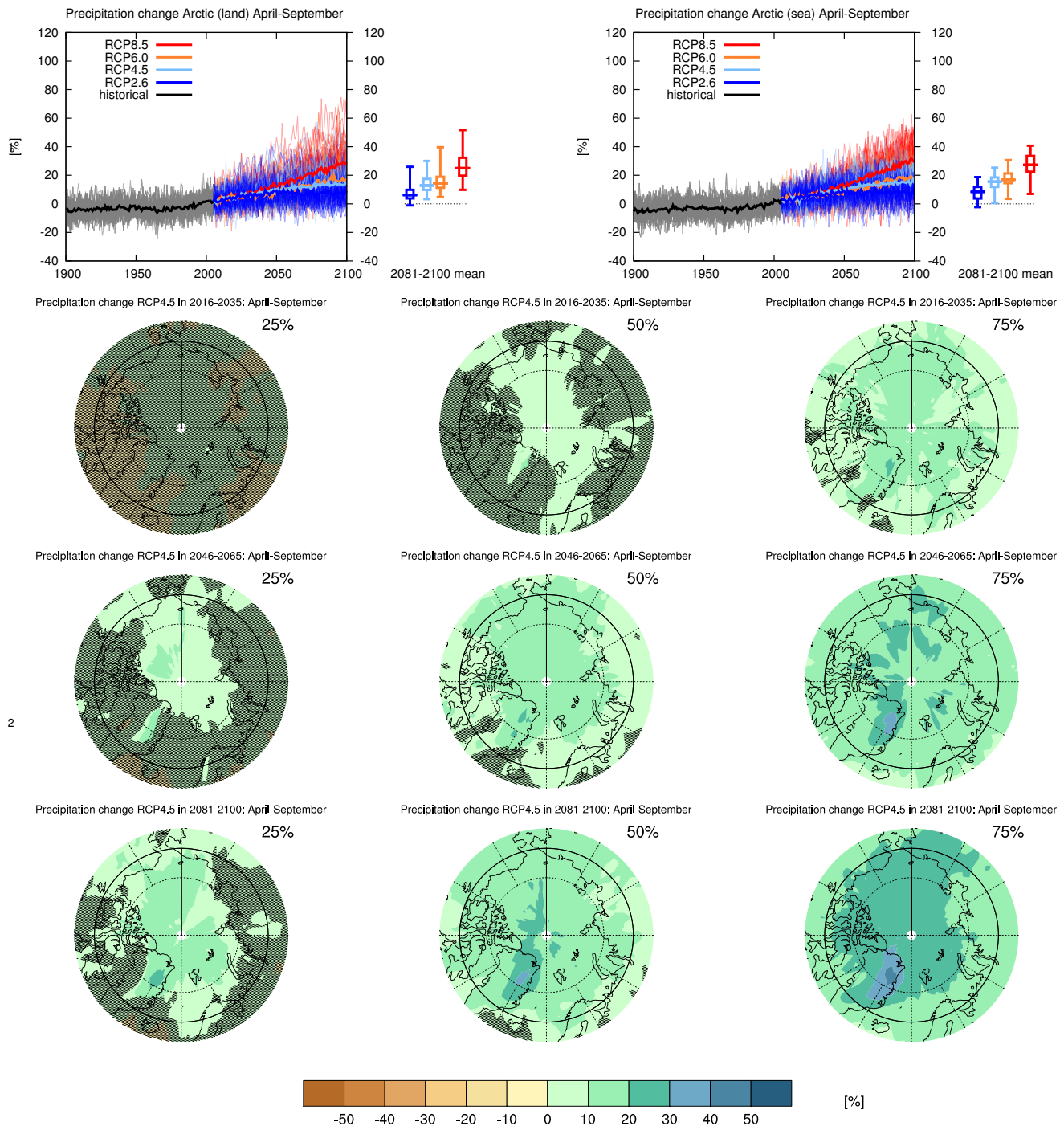
13 Sections 9.4.1.1, 9.6.1.1, 10.3.1.1.4, 11.3.2.1.2, Box 11.2, 12.4.3.1, 14.8.2 contain relevant information regard-
 14 ing the evaluation of models in this region, the model spread in the context of other methods of projecting
 15 changes and the role of modes of variability and other climate phenomena.



3 **Figure AI.10:** Top left: time series of relative change relative to 1986–2005 in precipitation averaged over
 4 land grid points in the Arctic (67.5° – 90° N) in October–March. Top right: same for sea grid points. Thin lines
 5 denote one ensemble member per model, thick lines the CMIP5 multi-model mean. On the right-hand side
 6 the 5th, 25th, 50th (median), 75th and 95th percentiles of the distribution of 20-yr mean changes are given for
 7 2081–2100 in the four RCP scenarios.

8 Below: maps of precipitation changes in 2016–2035, 2046–2065 and 2081–2100 with respect to 1986–2005
 9 in the RCP4.5 scenario. For each point, the 25th, 50th and 75th percentile of the distribution of the CMIP5
 10 ensemble are shown, this includes both natural variability and inter-model spread. Hatching denotes areas
 11 where the 20-yr mean differences of the percentiles are less than the standard deviation of model-estimated
 12 present-day natural variability of 20-yr mean differences.

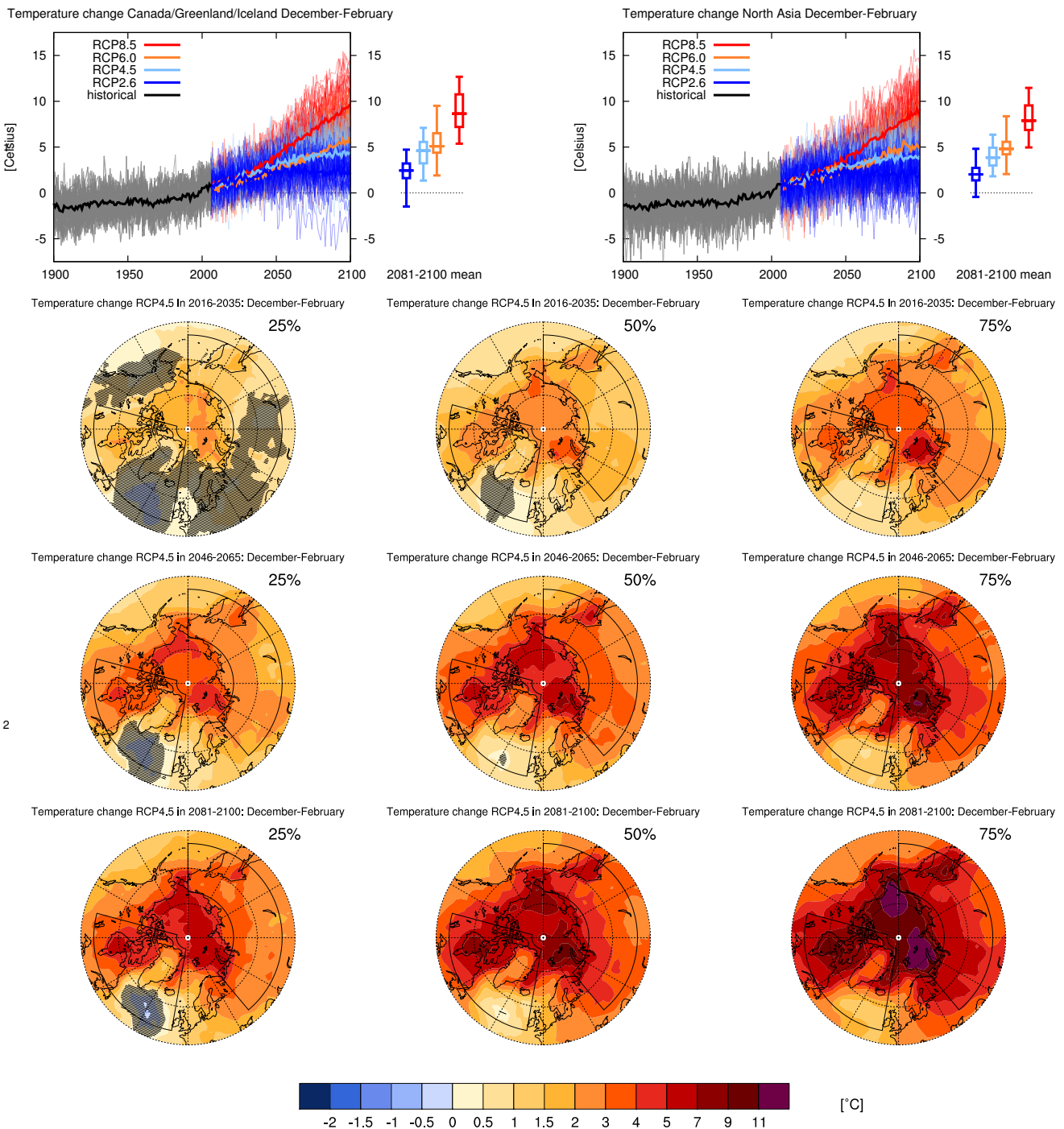
13 Sections 9.4.1.1, 9.6.1.1, 11.3.2.3.1, Box 11.2, 12.4.5.2, 14.8.2 contain relevant information regarding the eval-
 14 uation of models in this region, the model spread in the context of other methods of projecting changes and the
 15 role of modes of variability and other climate phenomena.



3 **Figure AI.11:** Top left: time series of relative change relative to 1986–2005 in precipitation averaged over land
 4 grid points in the Arctic (67.5° – 90° N) in April–September. Top right: same for sea grid points. Thin lines
 5 denote one ensemble member per model, thick lines the CMIP5 multi-model mean. On the right-hand side
 6 the 5th, 25th, 50th (median), 75th and 95th percentiles of the distribution of 20-yr mean changes are given for
 7 2081–2100 in the four RCP scenarios.

8 Below: maps of precipitation changes in 2016–2035, 2046–2065 and 2081–2100 with respect to 1986–2005
 9 in the RCP4.5 scenario. For each point, the 25th, 50th and 75th percentile of the distribution of the CMIP5
 10 ensemble are shown, this includes both natural variability and inter-model spread. Hatching denotes areas
 11 where the 20-yr mean differences of the percentiles are less than the standard deviation of model-estimated
 12 present-day natural variability of 20-yr mean differences.

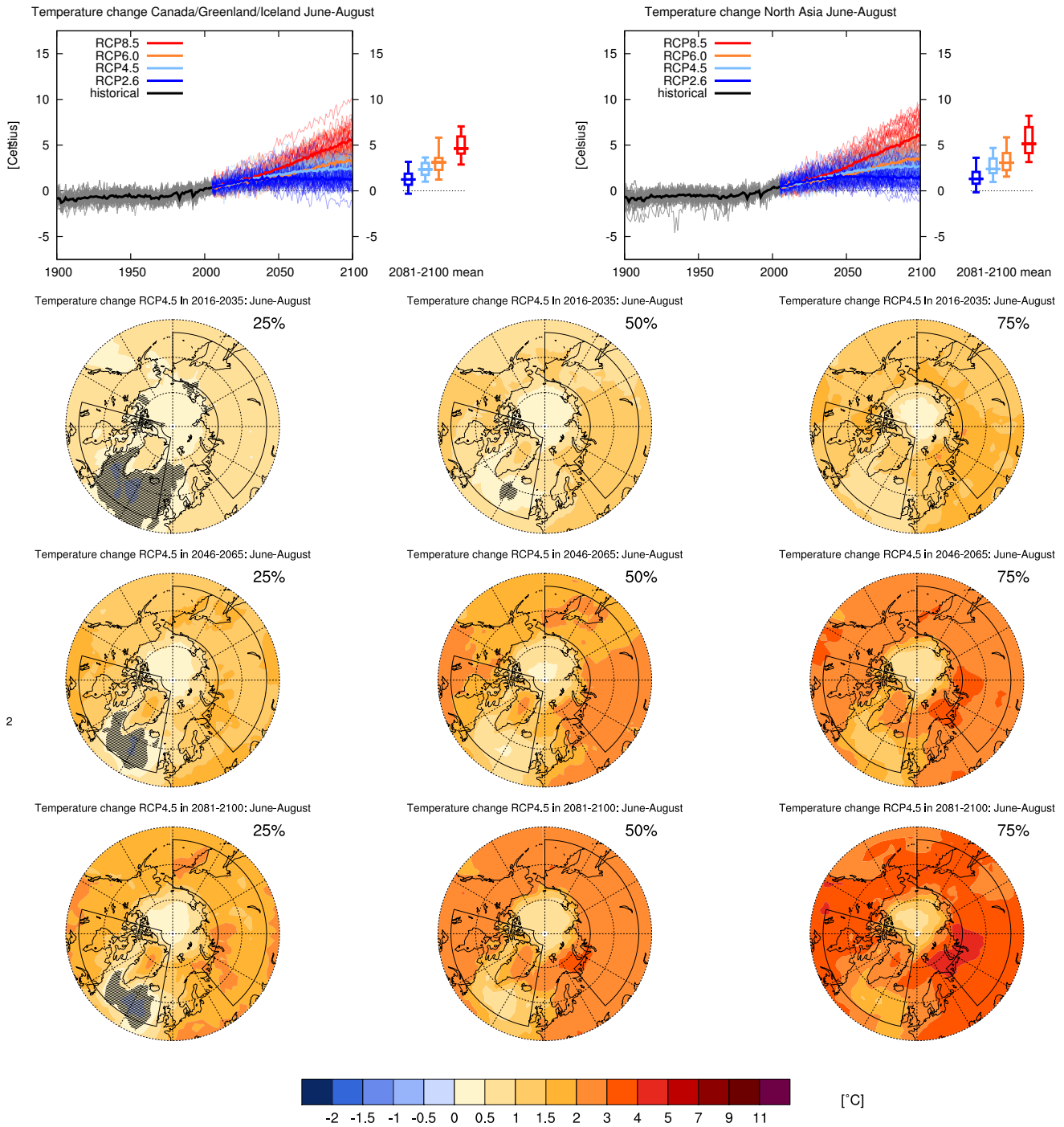
13 Sections 9.4.1.1, 9.6.1.1, 11.3.2.3.1, Box 11.2, 12.4.5.2, 14.8.2 contain relevant information regarding the eval-
 14 uation of models in this region, the model spread in the context of other methods of projecting changes and the
 15 role of modes of variability and other climate phenomena.



3 **Figure AI.12:** Top left: time series of temperature change relative to 1986–2005 averaged over land grid points
 4 in Canada/Greenland/Iceland (50° – 85° N, 105° – 10° W) in December–February. Top right: same for land grid
 5 points in North Asia (50° – 70° N, 40° – 180° E). Thin lines denote one ensemble member per model, thick lines
 6 the CMIP5 multi-model mean. On the right-hand side the 5th, 25th, 50th (median), 75th and 95th percentiles
 7 of the distribution of 20-yr mean changes are given for 2081–2100 in the four RCP scenarios.

8 Below: maps of temperature changes in 2016–2035, 2046–2065 and 2081–2100 with respect to 1986–2005
 9 in the RCP4.5 scenario. For each point, the 25th, 50th and 75th percentile of the distribution of the CMIP5
 10 ensemble are shown, this includes both natural variability and inter-model spread. Hatching denotes areas
 11 where the 20-yr mean differences of the percentiles are less than the standard deviation of model-estimated
 12 present-day natural variability of 20-yr mean differences.

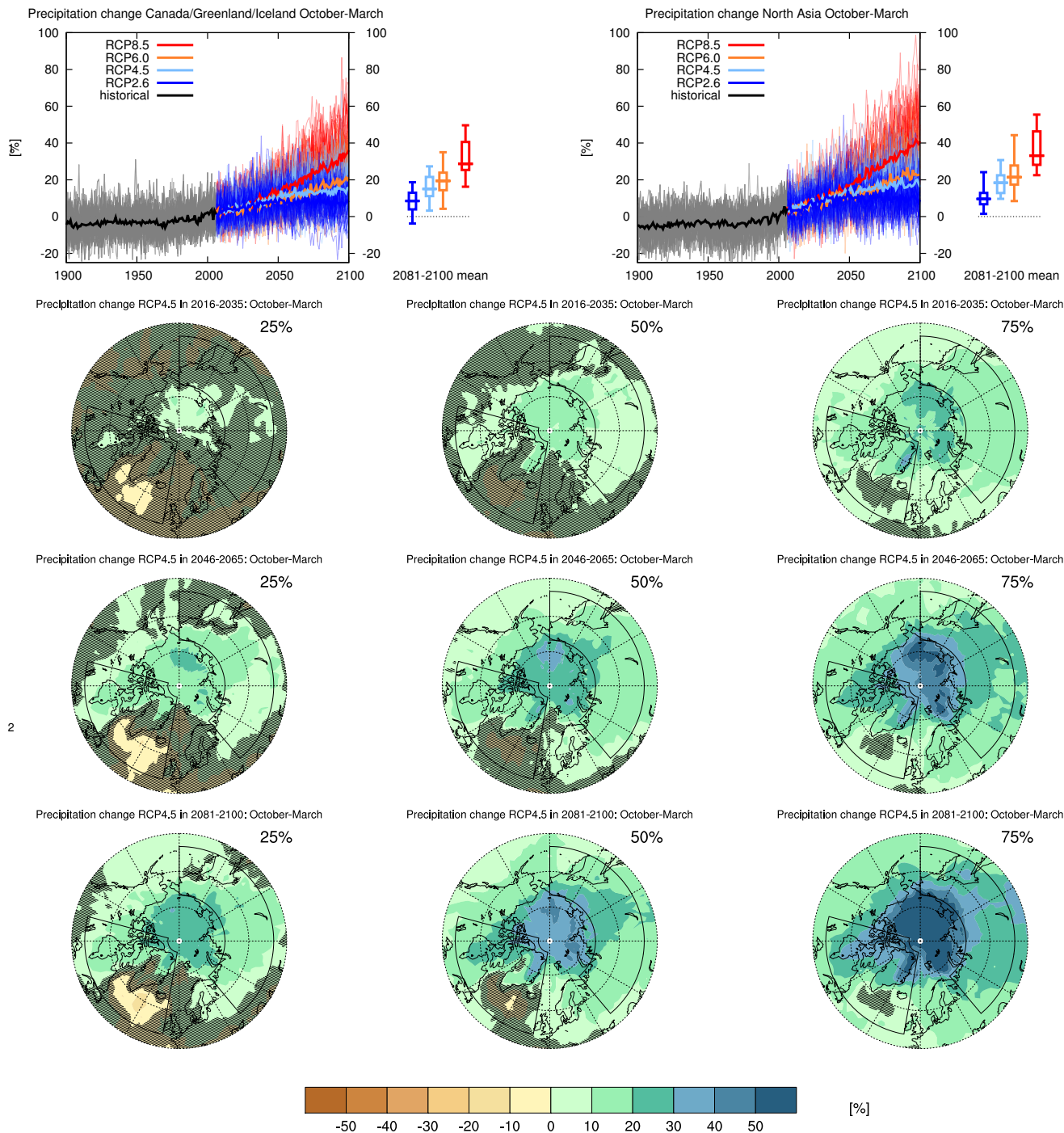
13 Sections 9.4.1.1, 9.6.1.1, 10.3.1.1.4, 11.3.2.1.2, Box 11.2, 14.8.2, 14.8.8 contain relevant information regarding
 14 the evaluation of models in this region, the model spread in the context of other methods of projecting changes
 15 and the role of modes of variability and other climate phenomena.



3 **Figure AI.13:** Top left: time series of temperature change relative to 1986–2005 averaged over land grid points
 4 in Canada/Greenland/Iceland (50°–85°N, 105°–10°W) in June–August. Top right: same for land grid points
 5 in North Asia (50°–70°N, 40°–180°E). Thin lines denote one ensemble member per model, thick lines the
 6 CMIP5 multi-model mean. On the right-hand side the 5th, 25th, 50th (median), 75th and 95th percentiles of
 7 the distribution of 20-yr mean changes are given for 2081–2100 in the four RCP scenarios.

8 Below: maps of temperature changes in 2016–2035, 2046–2065 and 2081–2100 with respect to 1986–2005
 9 in the RCP4.5 scenario. For each point, the 25th, 50th and 75th percentile of the distribution of the CMIP5
 10 ensemble are shown, this includes both natural variability and inter-model spread. Hatching denotes areas
 11 where the 20-yr mean differences of the percentiles are less than the standard deviation of model-estimated
 12 present-day natural variability of 20-yr mean differences.

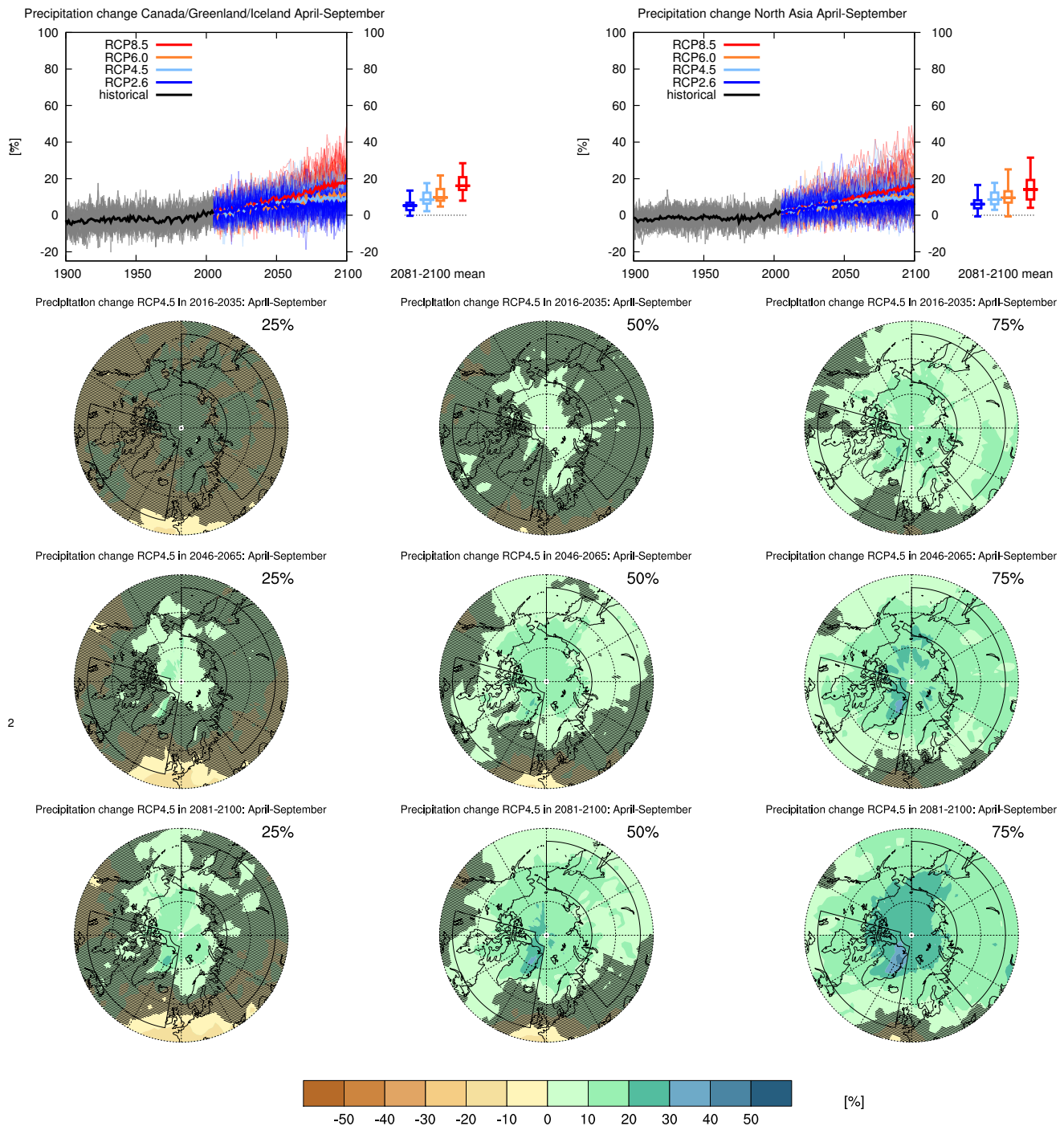
13 Sections 9.4.1.1, 9.6.1.1, 10.3.1.1.4, 11.3.2.1.2, Box 11.2, 14.8.2, 14.8.8 contain relevant information regarding
 14 the evaluation of models in this region, the model spread in the context of other methods of projecting changes
 15 and the role of modes of variability and other climate phenomena.



3 **Figure AI.14:** Top left: time series of relative change relative to 1986–2005 in precipitation averaged over
 4 land grid points in Canada/Greenland/Iceland (50°–85°N, 105°–10°W) in October–March. Top right: same for
 5 land grid points in North Asia (50°–70°N, 40°–180°E). Thin lines denote one ensemble member per model,
 6 thick lines the CMIP5 multi-model mean. On the right-hand side the 5th, 25th, 50th (median), 75th and 95th
 7 percentiles of the distribution of 20-yr mean changes are given for 2081–2100 in the four RCP scenarios.

8 Below: maps of precipitation changes in 2016–2035, 2046–2065 and 2081–2100 with respect to 1986–2005
 9 in the RCP4.5 scenario. For each point, the 25th, 50th and 75th percentile of the distribution of the CMIP5
 10 ensemble are shown, this includes both natural variability and inter-model spread. Hatching denotes areas
 11 where the 20-yr mean differences of the percentiles are less than the standard deviation of model-estimated
 12 present-day natural variability of 20-yr mean differences.

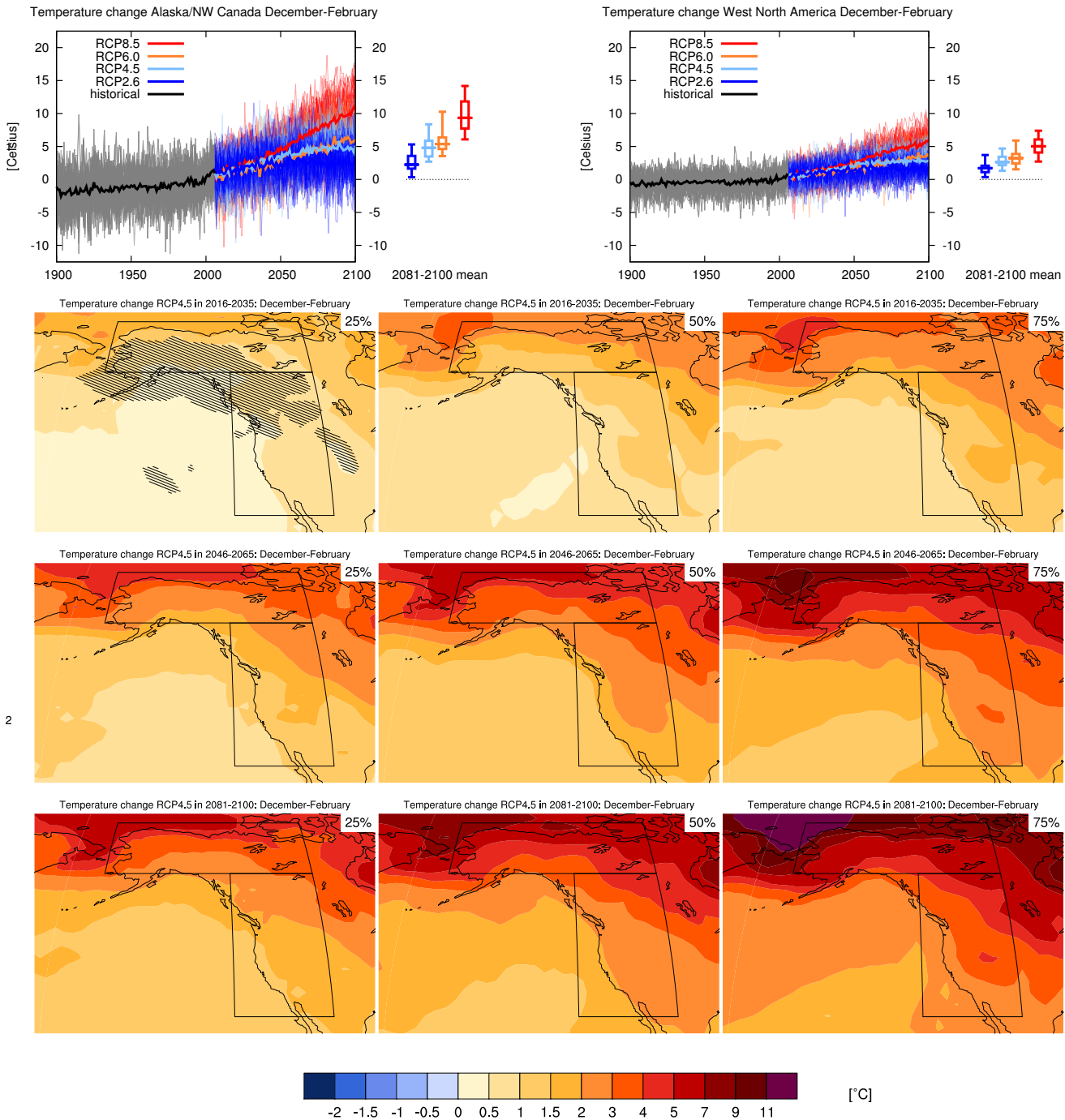
13 Sections 9.4.1.1, 9.6.1.1, 10.3.2.2, 11.3.2.3.1, Box 11.2, 12.4.5.2, 14.8.2, 14.8.8 contain relevant information
 14 regarding the evaluation of models in this region, the model spread in the context of other methods of projecting
 15 changes and the role of modes of variability and other climate phenomena.



3 **Figure AI.15:** Top left: time series of relative change relative to 1986–2005 in precipitation averaged over
 4 land grid points in Canada/Greenland/Iceland (50° – 85° N, 105° – 10° W) in April–September. Top right: same
 5 for land grid points in North Asia (50° – 70° N, 40° – 180° E). Thin lines denote one ensemble member per model,
 6 thick lines the CMIP5 multi-model mean. On the right-hand side the 5th, 25th, 50th (median), 75th and 95th
 7 percentiles of the distribution of 20-yr mean changes are given for 2081–2100 in the four RCP scenarios.

8 Below: maps of precipitation changes in 2016–2035, 2046–2065 and 2081–2100 with respect to 1986–2005
 9 in the RCP4.5 scenario. For each point, the 25th, 50th and 75th percentile of the distribution of the CMIP5
 10 ensemble are shown, this includes both natural variability and inter-model spread. Hatching denotes areas
 11 where the 20-yr mean differences of the percentiles are less than the standard deviation of model-estimated
 12 present-day natural variability of 20-yr mean differences.

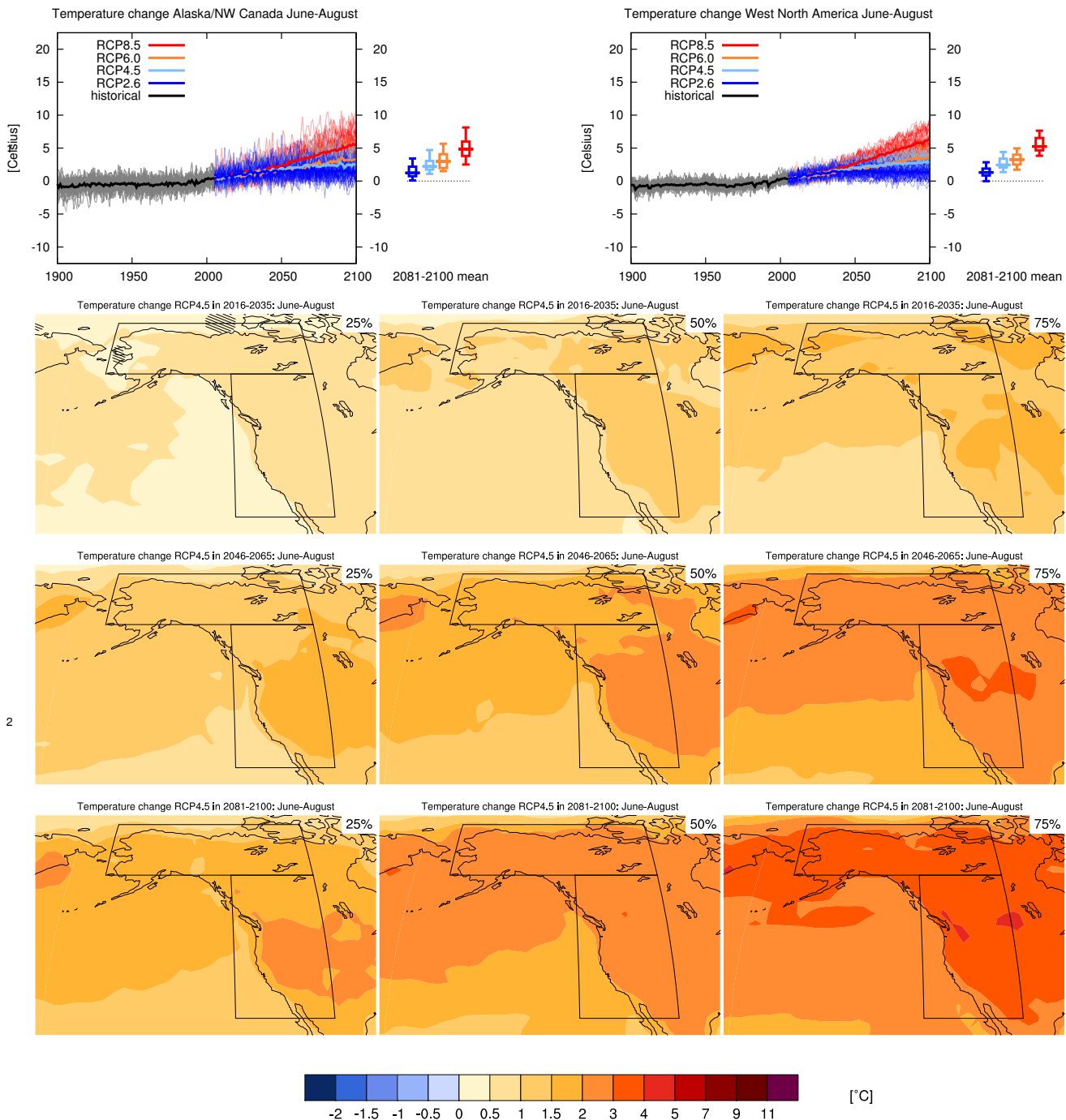
13 Sections 9.4.1.1, 9.6.1.1, 10.3.2.2, 11.3.2.3.1, Box 11.2, 12.4.5.2, 14.8.2, 14.8.8 contain relevant information
 14 regarding the evaluation of models in this region, the model spread in the context of other methods of projecting
 15 changes and the role of modes of variability and other climate phenomena.



3 **Figure AI.16:** Top left: time series of temperature change relative to 1986–2005 averaged over land grid
 4 points in Alaska/NW Canada (60° – 72.6° N, 168° – 105° W) in December–February. Top right: same for land
 5 grid points in West North America (28.6° – 60° N, 130° – 105° W). Thin lines denote one ensemble member per
 6 model, thick lines the CMIP5 multi-model mean. On the right-hand side the 5th, 25th, 50th (median), 75th and
 7 95th percentiles of the distribution of 20-yr mean changes are given for 2081–2100 in the four RCP scenarios.

8 Below: maps of temperature changes in 2016–2035, 2046–2065 and 2081–2100 with respect to 1986–2005
 9 in the RCP4.5 scenario. For each point, the 25th, 50th and 75th percentile of the distribution of the CMIP5
 10 ensemble are shown, this includes both natural variability and inter-model spread. Hatching denotes areas
 11 where the 20-yr mean differences of the percentiles are less than the standard deviation of model-estimated
 12 present-day natural variability of 20-yr mean differences.

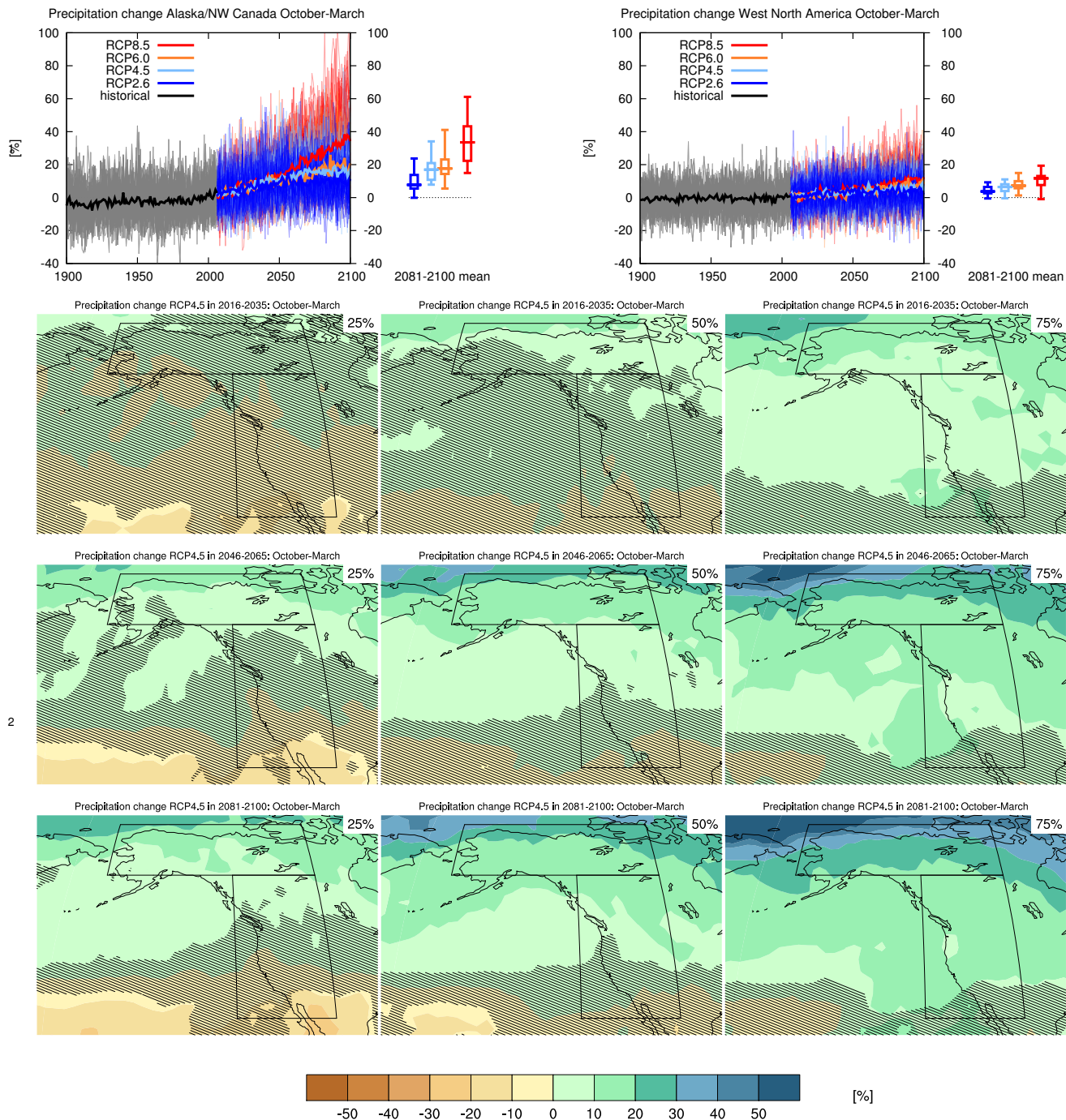
13 Sections 9.4.1.1, 9.6.1.1, 10.3.1.1.4, Box 11.2, 14.8.3 contain relevant information regarding the evaluation of
 14 models in this region, the model spread in the context of other methods of projecting changes and the role of
 15 modes of variability and other climate phenomena.



3 **Figure AI.17:** Top left: time series of temperature change relative to 1986–2005 averaged over land grid
 4 points in Alaska/NW Canada (60° – 72.6° N, 168° – 105° W) in June–August. Top right: same for land grid
 5 points in West North America (28.6° – 60° N, 130° – 105° W). Thin lines denote one ensemble member per model,
 6 thick lines the CMIP5 multi-model mean. On the right-hand side the 5th, 25th, 50th (median), 75th and 95th
 7 percentiles of the distribution of 20-yr mean changes are given for 2081–2100 in the four RCP scenarios.

8 Below: maps of temperature changes in 2016–2035, 2046–2065 and 2081–2100 with respect to 1986–2005
 9 in the RCP4.5 scenario. For each point, the 25th, 50th and 75th percentile of the distribution of the CMIP5
 10 ensemble are shown, this includes both natural variability and inter-model spread. Hatching denotes areas
 11 where the 20-yr mean differences of the percentiles are less than the standard deviation of model-estimated
 12 present-day natural variability of 20-yr mean differences.

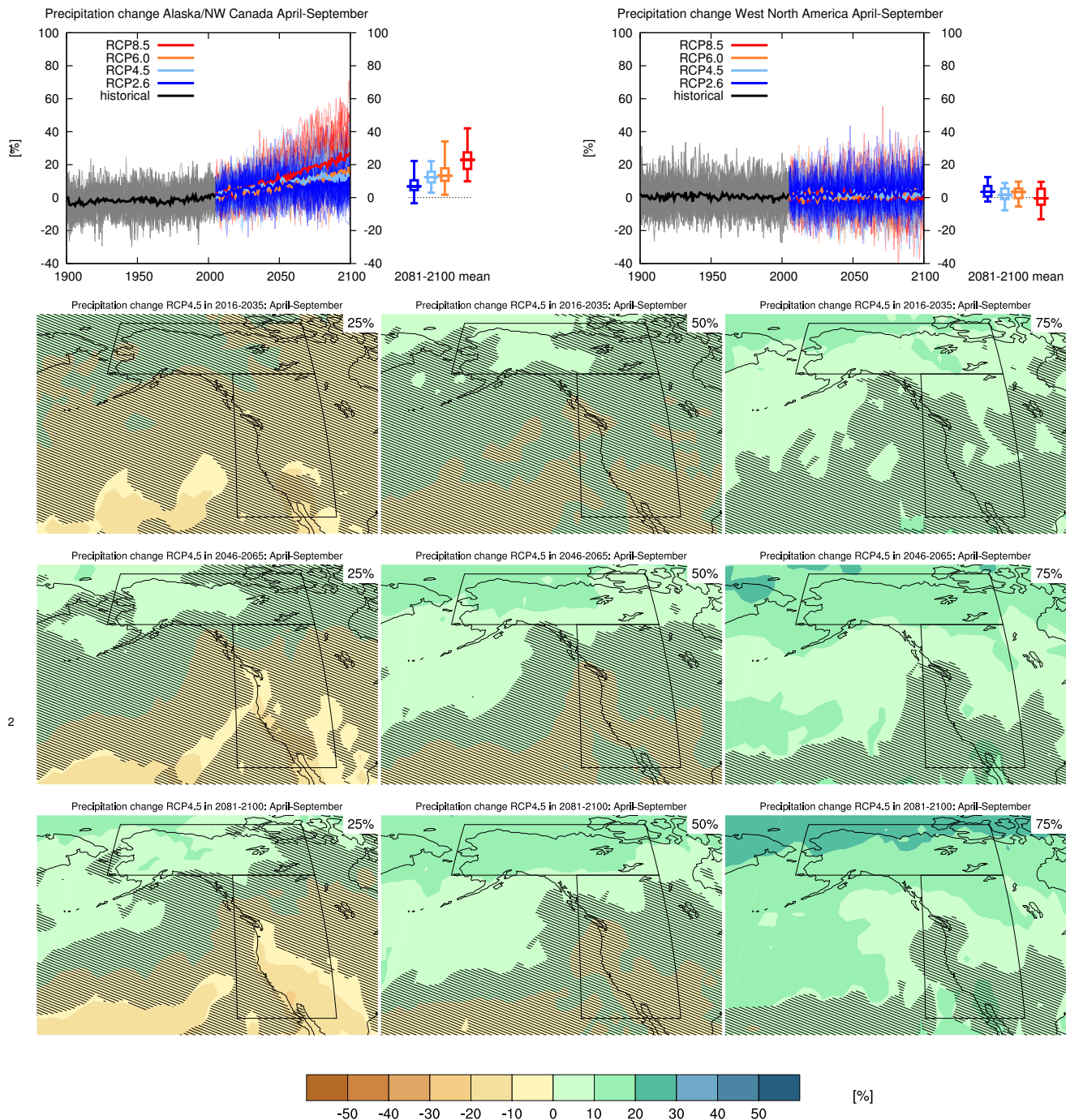
13 Sections 9.4.1.1, 9.6.1.1, 10.3.1.1.4, Box 11.2, 14.8.3 contain relevant information regarding the evaluation of
 14 models in this region, the model spread in the context of other methods of projecting changes and the role of
 15 modes of variability and other climate phenomena.



3 **Figure AI.18:** Top left: time series of relative change relative to 1986–2005 in precipitation averaged over land
 4 grid points in Alaska/NW Canada (60° – 72.6° N, 168° – 105° W) in October–March. Top right: same for land
 5 grid points in West North America (28.6° – 60° N, 130° – 105° W). Thin lines denote one ensemble member per
 6 model, thick lines the CMIP5 multi-model mean. On the right-hand side the 5th, 25th, 50th (median), 75th and
 7 95th percentiles of the distribution of 20-yr mean changes are given for 2081–2100 in the four RCP scenarios.

8 Below: maps of precipitation changes in 2016–2035, 2046–2065 and 2081–2100 with respect to 1986–2005
 9 in the RCP4.5 scenario. For each point, the 25th, 50th and 75th percentile of the distribution of the CMIP5
 10 ensemble are shown, this includes both natural variability and inter-model spread. Hatching denotes areas
 11 where the 20-yr mean differences of the percentiles are less than the standard deviation of model-estimated
 12 present-day natural variability of 20-yr mean differences.

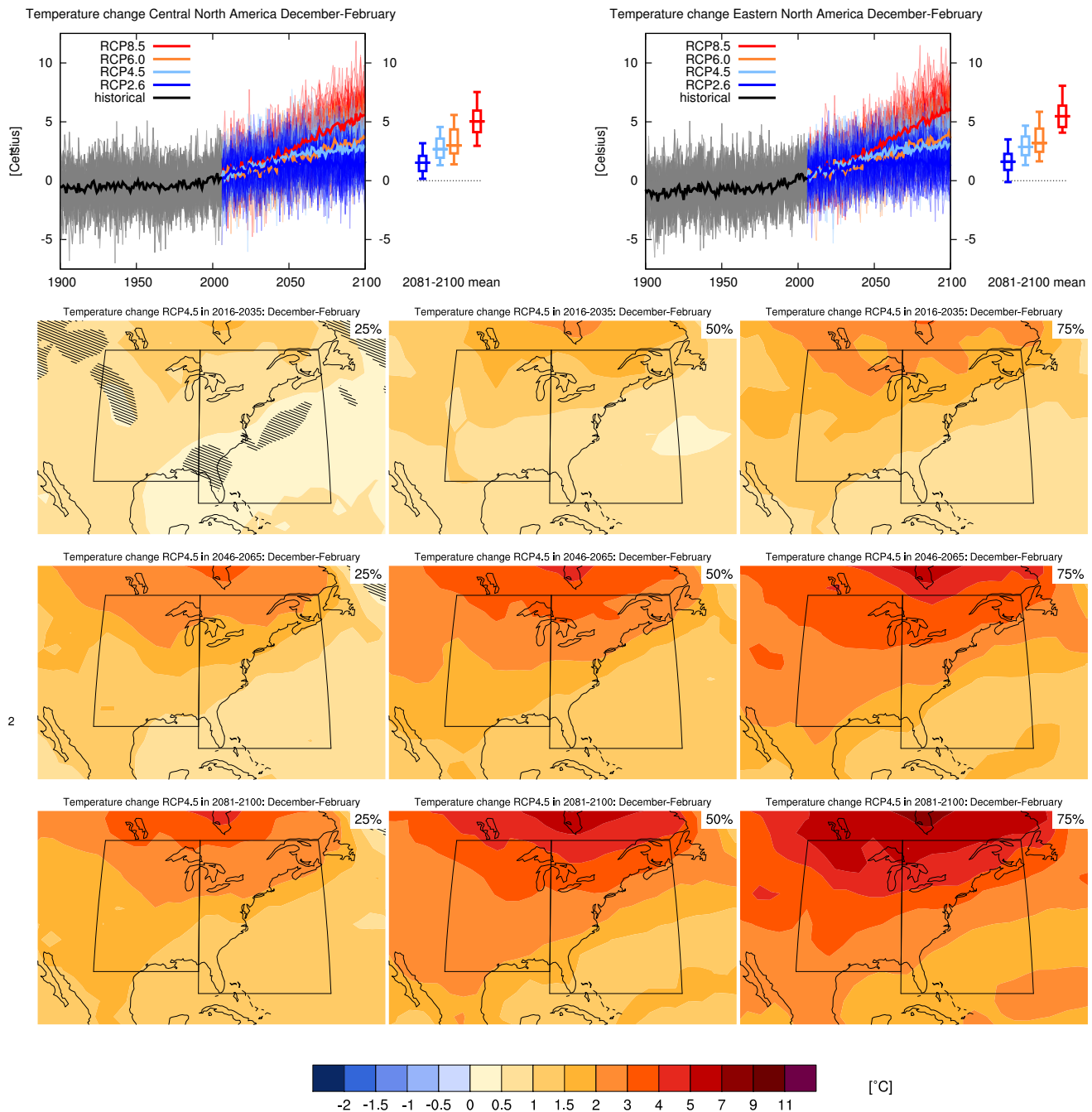
13 Sections 9.4.1.1, 9.6.1.1, Box 11.2, 12.4.5.2, 14.2.3.1, 14.8.3 contain relevant information regarding the evalu-
 14 ation of models in this region, the model spread in the context of other methods of projecting changes and the
 15 role of modes of variability and other climate phenomena.



3 **Figure AI.19:** Top left: time series of relative change relative to 1986–2005 in precipitation averaged over land
 4 grid points in Alaska/NW Canada (60° – 72.6° N, 168° – 105° W) in April–September. Top right: same for land
 5 grid points in West North America (28.6° – 60° N, 130° – 105° W). Thin lines denote one ensemble member per
 6 model, thick lines the CMIP5 multi-model mean. On the right-hand side the 5th, 25th, 50th (median), 75th and
 7 95th percentiles of the distribution of 20-yr mean changes are given for 2081–2100 in the four RCP scenarios.

8 Below: maps of precipitation changes in 2016–2035, 2046–2065 and 2081–2100 with respect to 1986–2005
 9 in the RCP4.5 scenario. For each point, the 25th, 50th and 75th percentile of the distribution of the CMIP5
 10 ensemble are shown, this includes both natural variability and inter-model spread. Hatching denotes areas
 11 where the 20-yr mean differences of the percentiles are less than the standard deviation of model-estimated
 12 present-day natural variability of 20-yr mean differences.

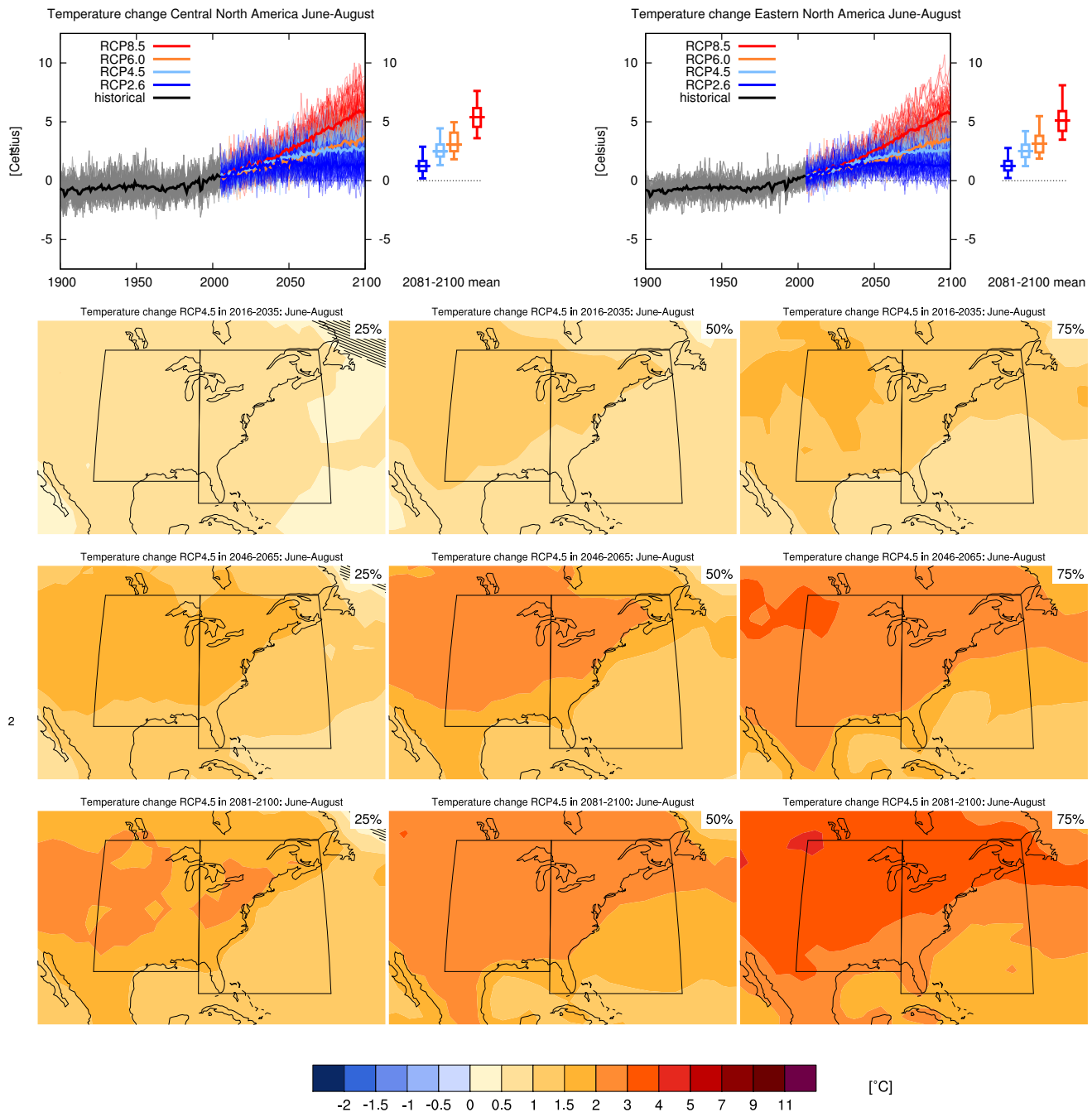
13 Sections 9.4.1.1, 9.6.1.1, Box 11.2, 12.4.5.2, 14.2.3.1, 14.8.3 contain relevant information regarding the evalu-
 14 ation of models in this region, the model spread in the context of other methods of projecting changes and the
 15 role of modes of variability and other climate phenomena.



3 **Figure AI.20:** Top left: time series of temperature change relative to 1986–2005 averaged over land grid points
 4 in Central North America (28.6° – 50° N, 105° – 85° W) in December–February. Top right: same for land grid
 5 points in Eastern North America (25° – 50° N, 85° – 60° W). Thin lines denote one ensemble member per model,
 6 thick lines the CMIP5 multi-model mean. On the right-hand side the 5th, 25th, 50th (median), 75th and 95th
 7 percentiles of the distribution of 20-yr mean changes are given for 2081–2100 in the four RCP scenarios.

8 Below: maps of temperature changes in 2016–2035, 2046–2065 and 2081–2100 with respect to 1986–2005
 9 in the RCP4.5 scenario. For each point, the 25th, 50th and 75th percentile of the distribution of the CMIP5
 10 ensemble are shown, this includes both natural variability and inter-model spread. Hatching denotes areas
 11 where the 20-yr mean differences of the percentiles are less than the standard deviation of model-estimated
 12 present-day natural variability of 20-yr mean differences.

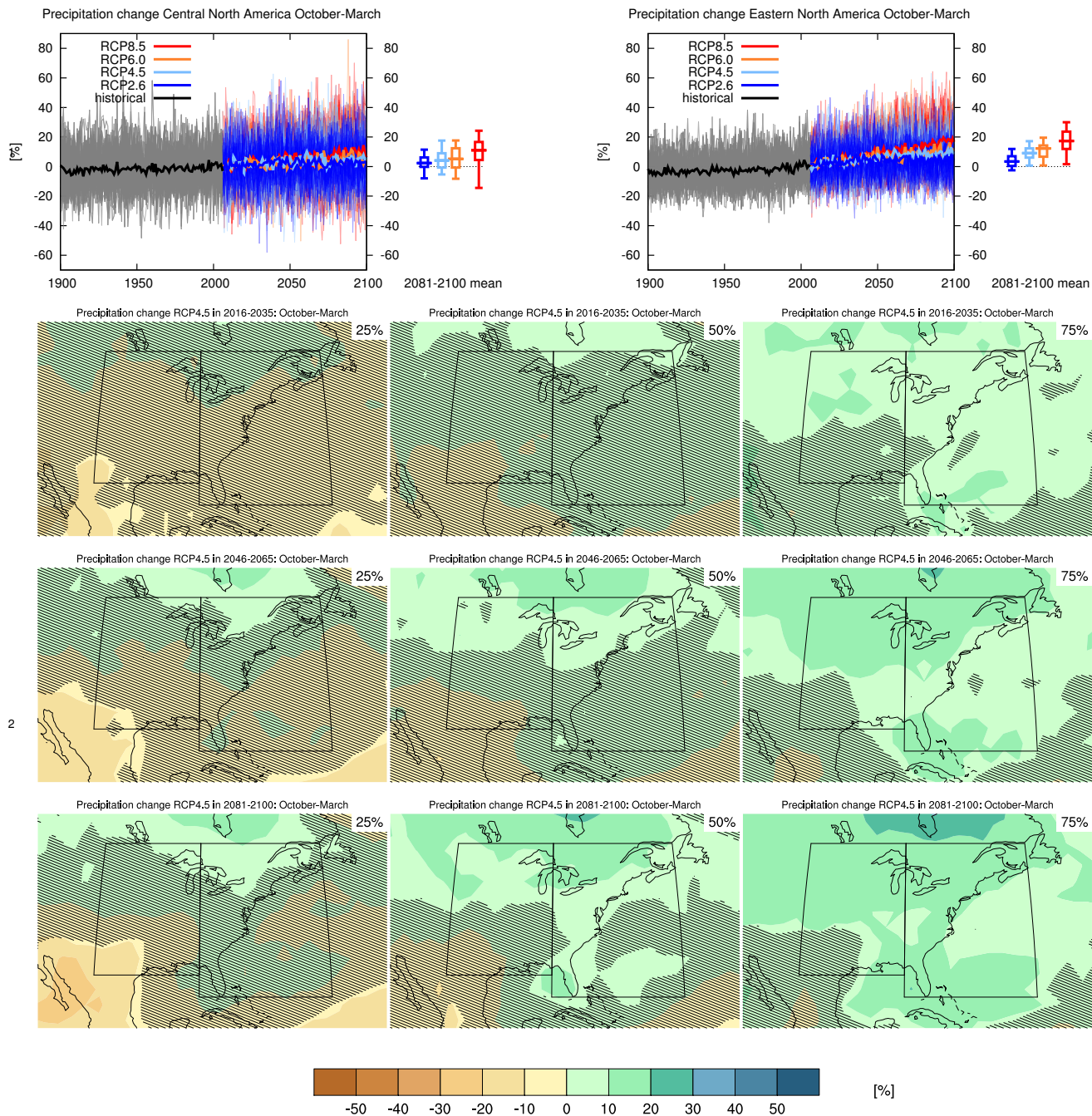
13 Sections 9.4.1.1, 9.6.1.1, 10.3.1.1.4, Box 11.2, 14.8.3 contain relevant information regarding the evaluation of
 14 models in this region, the model spread in the context of other methods of projecting changes and the role of
 15 modes of variability and other climate phenomena.



3 **Figure AI.21:** Top left: time series of temperature change relative to 1986–2005 averaged over land grid points
 4 in Central North America (28.6° – 50° N, 105° – 85° W) in June–August. Top right: same for land grid points in
 5 Eastern North America (25° – 50° N, 85° – 60° W). Thin lines denote one ensemble member per model, thick lines
 6 the CMIP5 multi-model mean. On the right-hand side the 5th, 25th, 50th (median), 75th and 95th percentiles
 7 of the distribution of 20-yr mean changes are given for 2081–2100 in the four RCP scenarios.

8 Below: maps of temperature changes in 2016–2035, 2046–2065 and 2081–2100 with respect to 1986–2005
 9 in the RCP4.5 scenario. For each point, the 25th, 50th and 75th percentile of the distribution of the CMIP5
 10 ensemble are shown, this includes both natural variability and inter-model spread. Hatching denotes areas
 11 where the 20-yr mean differences of the percentiles are less than the standard deviation of model-estimated
 12 present-day natural variability of 20-yr mean differences.

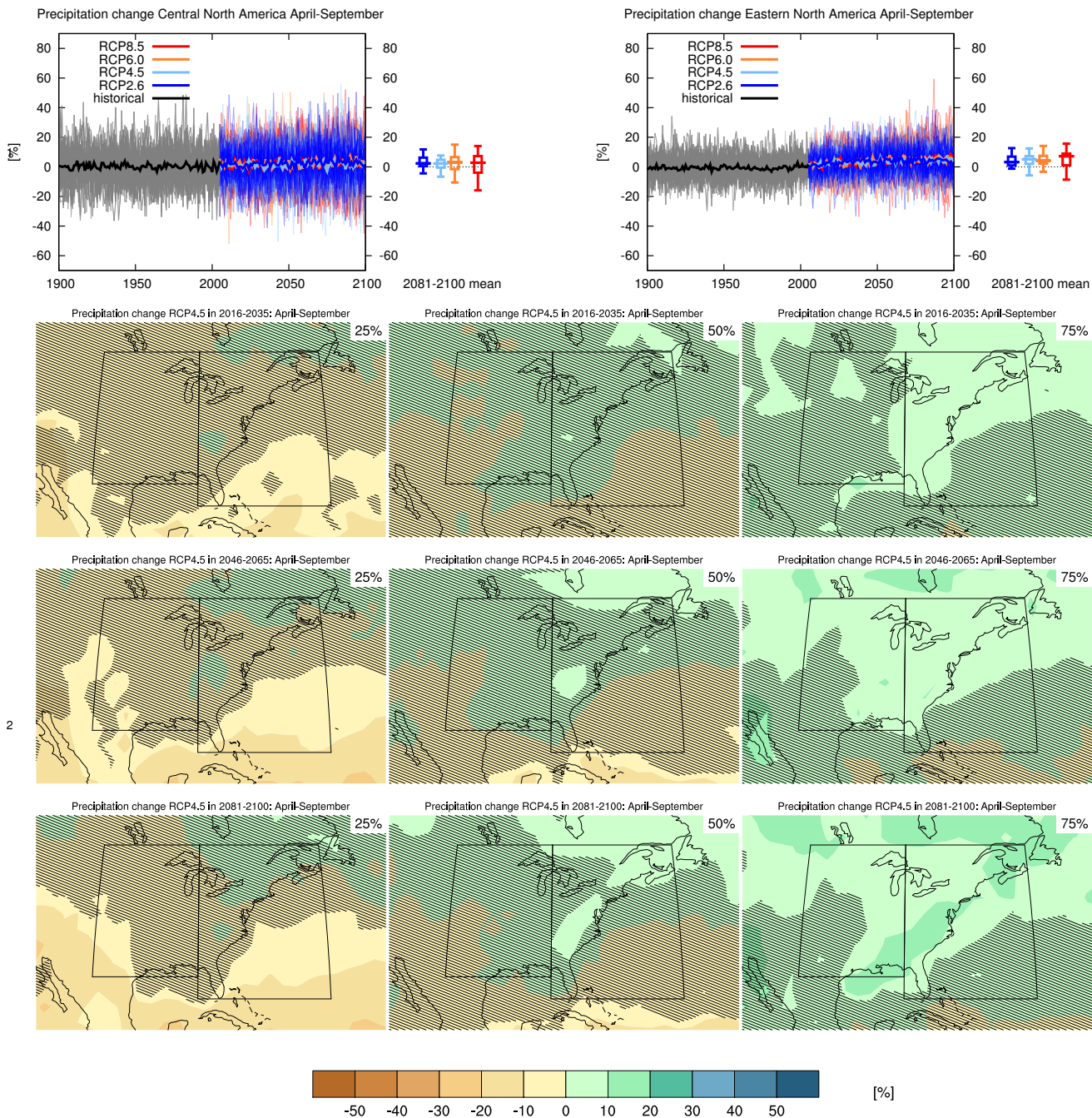
13 Sections 9.4.1.1, 9.6.1.1, 10.3.1.1.4, Box 11.2, 14.8.3 contain relevant information regarding the evaluation of
 14 models in this region, the model spread in the context of other methods of projecting changes and the role of
 15 modes of variability and other climate phenomena.



3 **Figure AI.22:** Top left: time series of relative change relative to 1986–2005 in precipitation averaged over land
 4 grid points in Central North America (28.6° – 50° N, 105° – 85° W) in October–March. Top right: same for land
 5 grid points in Eastern North America (25° – 50° N, 85° – 60° W). Thin lines denote one ensemble member per
 6 model, thick lines the CMIP5 multi-model mean. On the right-hand side the 5th, 25th, 50th (median), 75th and
 7 95th percentiles of the distribution of 20-yr mean changes are given for 2081–2100 in the four RCP scenarios.

8 Below: maps of precipitation changes in 2016–2035, 2046–2065 and 2081–2100 with respect to 1986–2005
 9 in the RCP4.5 scenario. For each point, the 25th, 50th and 75th percentile of the distribution of the CMIP5
 10 ensemble are shown, this includes both natural variability and inter-model spread. Hatching denotes areas
 11 where the 20-yr mean differences of the percentiles are less than the standard deviation of model-estimated
 12 present-day natural variability of 20-yr mean differences.

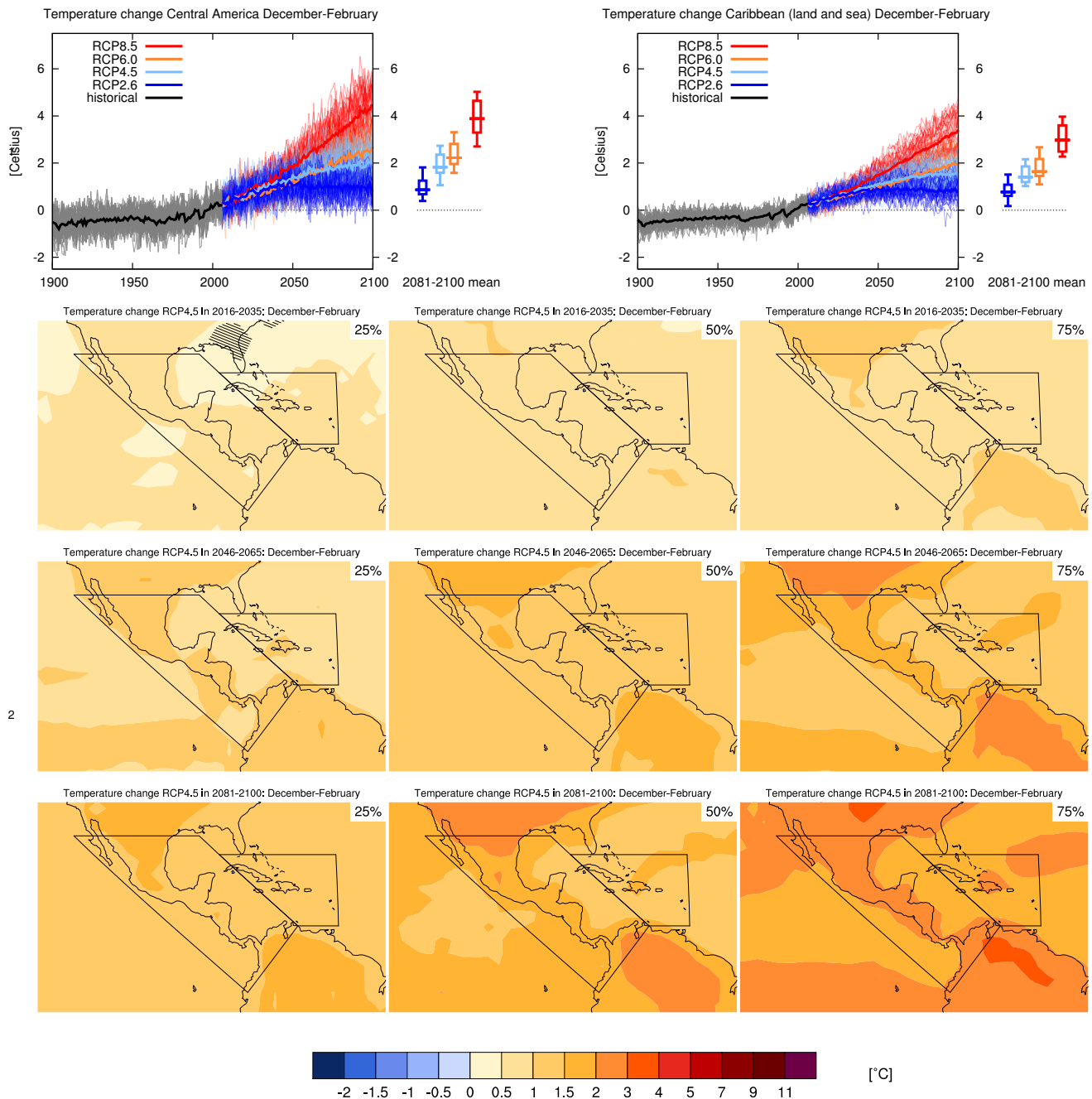
13 Sections 9.4.1.1, 9.6.1.1, Box 11.2, 14.8.3 contain relevant information regarding the evaluation of models in
 14 this region, the model spread in the context of other methods of projecting changes and the role of modes of
 15 variability and other climate phenomena.



3 **Figure AI.23:** Top left: time series of relative change relative to 1986–2005 in precipitation averaged over land
 4 grid points in Central North America (28.6° – 50° N, 105° – 85° W) in April–September. Top right: same for land
 5 grid points in Eastern North America (25° – 50° N, 85° – 60° W). Thin lines denote one ensemble member per
 6 model, thick lines the CMIP5 multi-model mean. On the right-hand side the 5th, 25th, 50th (median), 75th and
 7 95th percentiles of the distribution of 20-yr mean changes are given for 2081–2100 in the four RCP scenarios.

8 Below: maps of precipitation changes in 2016–2035, 2046–2065 and 2081–2100 with respect to 1986–2005
 9 in the RCP4.5 scenario. For each point, the 25th, 50th and 75th percentile of the distribution of the CMIP5
 10 ensemble are shown, this includes both natural variability and inter-model spread. Hatching denotes areas
 11 where the 20-yr mean differences of the percentiles are less than the standard deviation of model-estimated
 12 present-day natural variability of 20-yr mean differences.

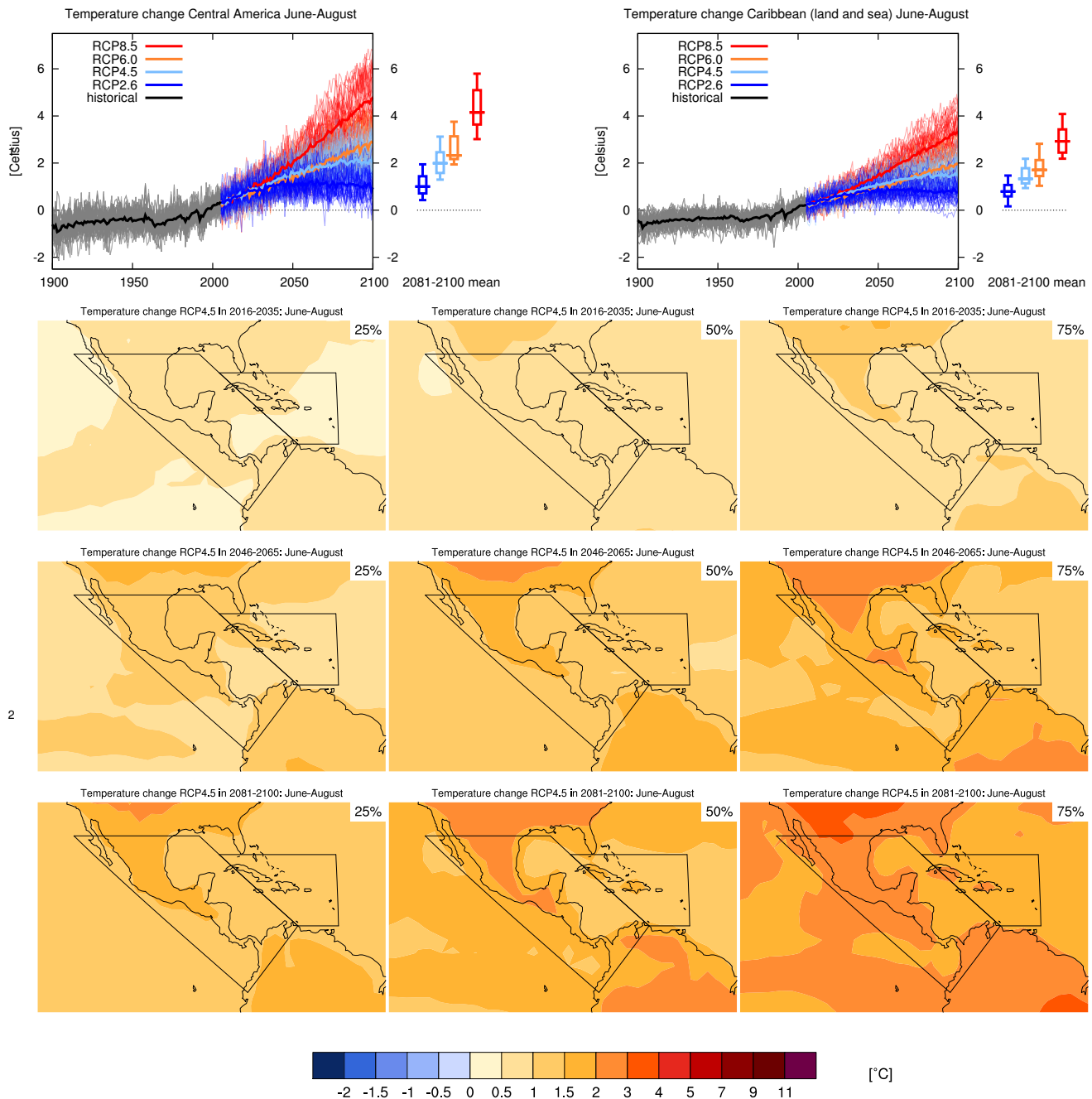
13 Sections 9.4.1.1, 9.6.1.1, Box 11.2, 14.8.3 contain relevant information regarding the evaluation of models in
 14 this region, the model spread in the context of other methods of projecting changes and the role of modes of
 15 variability and other climate phenomena.



3 **Figure AI.24:** Top left: time series of temperature change relative to 1986–2005 averaged over land grid points
 4 in Central America (68.8°W,11.4°N; 79.7°W, 1.2°S; 116.3°W,28.6°N; 90.3°W,28.6°N) in December–February.
 5 Top right: same for all grid points in Caribbean (land and sea) (68.8°W,11.4°N; 85.8°W,25°N, 60°W,25°N,
 6 60°W,11.44°N). Thin lines denote one ensemble member per model, thick lines the CMIP5 multi-model mean.
 7 On the right-hand side the 5th, 25th, 50th (median), 75th and 95th percentiles of the distribution of 20-yr mean
 8 changes are given for 2081–2100 in the four RCP scenarios.

9 Below: maps of temperature changes in 2016–2035, 2046–2065 and 2081–2100 with respect to 1986–2005
 10 in the RCP4.5 scenario. For each point, the 25th, 50th and 75th percentile of the distribution of the CMIP5
 11 ensemble are shown, this includes both natural variability and inter-model spread. Hatching denotes areas
 12 where the 20-yr mean differences of the percentiles are less than the standard deviation of model-estimated
 13 present-day natural variability of 20-yr mean differences.

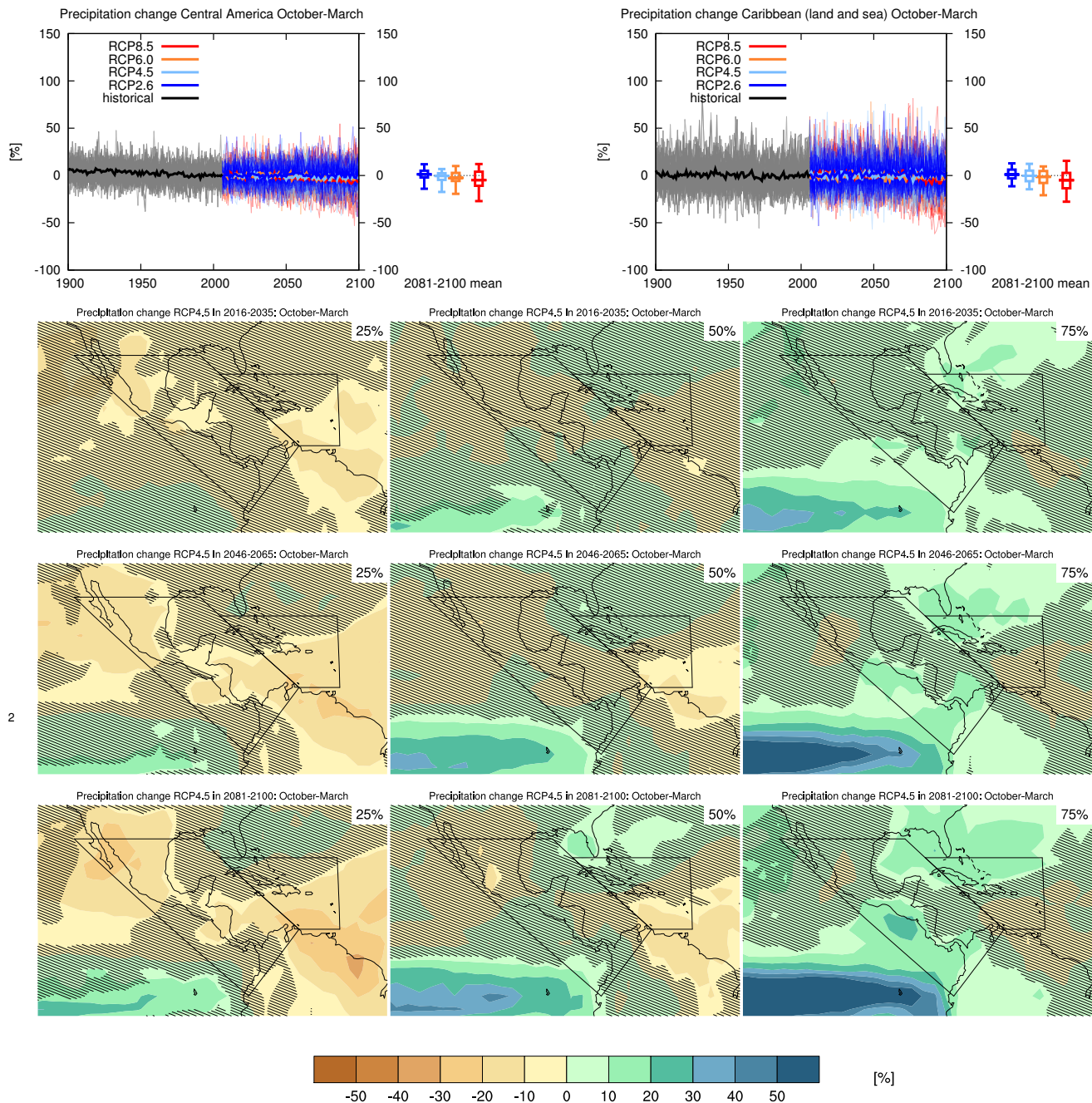
14 Sections 9.4.1.1, 9.6.1.1, 10.3.1.1.4, Box 11.2, 14.8.4 contain relevant information regarding the evaluation of
 15 models in this region, the model spread in the context of other methods of projecting changes and the role of
 16 modes of variability and other climate phenomena.



3 **Figure AI.25:** Top left: time series of temperature change relative to 1986–2005 averaged over land grid points
 4 in Central America (68.8°W,11.4°N; 79.7°W, 1.2°S; 116.3°W,28.6°N; 90.3°W,28.6°N) in June–August. Top
 5 right: same for all grid points in Caribbean (land and sea) (68.8°W,11.4°N; 85.8°W,25°N, 60°W,25°N, 60°W,
 6 11.44°N). Thin lines denote one ensemble member per model, thick lines the CMIP5 multi-model mean. On
 7 the right-hand side the 5th, 25th, 50th (median), 75th and 95th percentiles of the distribution of 20-yr mean
 8 changes are given for 2081–2100 in the four RCP scenarios.

9 Below: maps of temperature changes in 2016–2035, 2046–2065 and 2081–2100 with respect to 1986–2005
 10 in the RCP4.5 scenario. For each point, the 25th, 50th and 75th percentile of the distribution of the CMIP5
 11 ensemble are shown, this includes both natural variability and inter-model spread. Hatching denotes areas
 12 where the 20-yr mean differences of the percentiles are less than the standard deviation of model-estimated
 13 present-day natural variability of 20-yr mean differences.

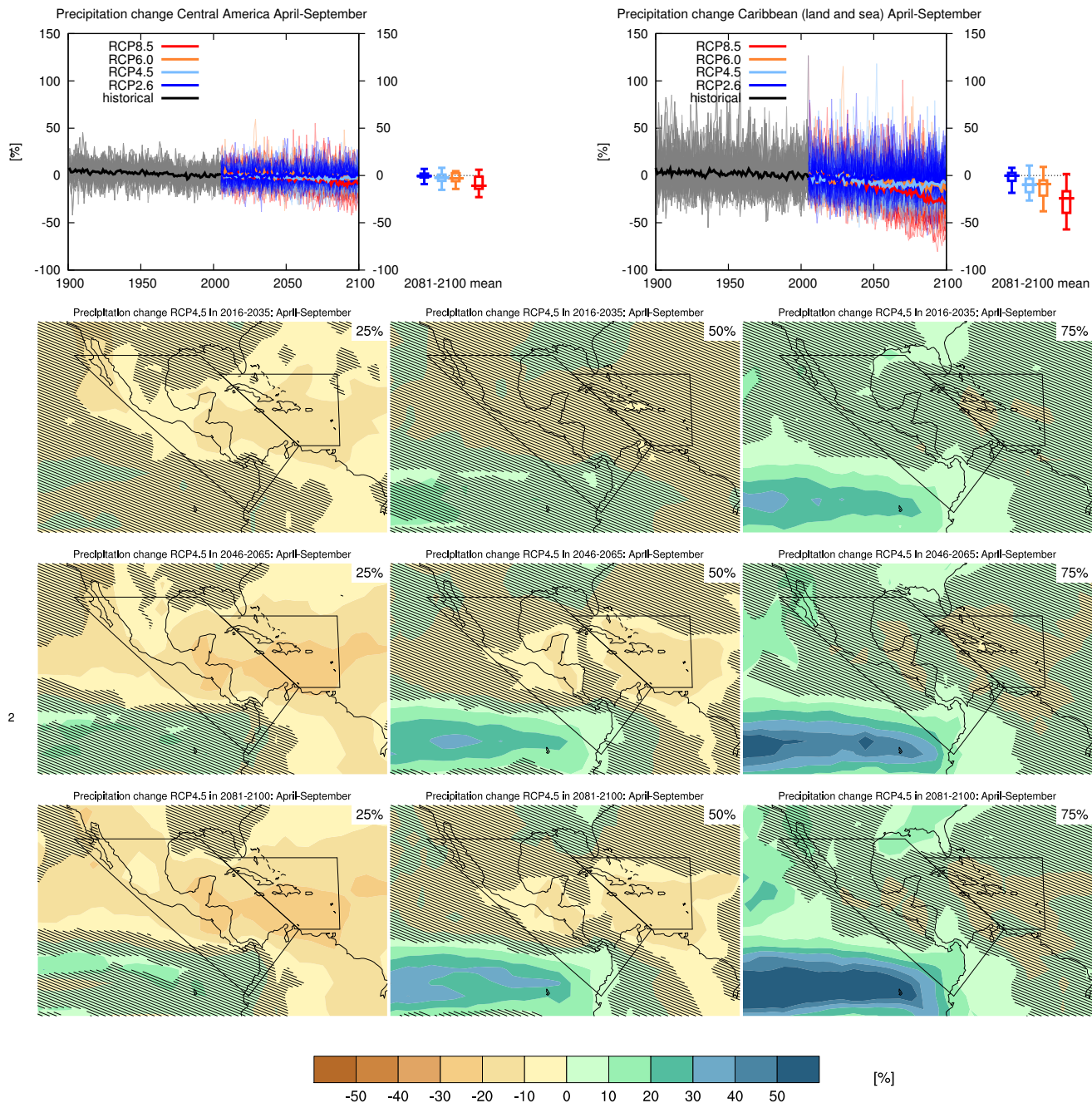
14 Sections 9.4.1.1, 9.6.1.1, 10.3.1.1.4, Box 11.2, 14.8.4 contain relevant information regarding the evaluation of
 15 models in this region, the model spread in the context of other methods of projecting changes and the role of
 16 modes of variability and other climate phenomena.



3 **Figure AI.26:** Top left: time series of relative change relative to 1986–2005 in precipitation averaged over land
 4 grid points in Central America ($68.8^{\circ}\text{W}, 11.4^{\circ}\text{N}$; $79.7^{\circ}\text{W}, 1.2^{\circ}\text{S}$; $116.3^{\circ}\text{W}, 28.6^{\circ}\text{N}$; $90.3^{\circ}\text{W}, 28.6^{\circ}\text{N}$) in October–
 5 March. Top right: same for all grid points in Caribbean (land and sea) ($68.8^{\circ}\text{W}, 11.4^{\circ}\text{N}$; $85.8^{\circ}\text{W}, 25^{\circ}\text{N}$, 60°W ,
 6 25°N , $60^{\circ}\text{W}, 11.44^{\circ}\text{N}$). Thin lines denote one ensemble member per model, thick lines the CMIP5 multi-model
 7 mean. On the right-hand side the 5th, 25th, 50th (median), 75th and 95th percentiles of the distribution of 20-yr
 8 mean changes are given for 2081–2100 in the four RCP scenarios.

9 Below: maps of precipitation changes in 2016–2035, 2046–2065 and 2081–2100 with respect to 1986–2005
 10 in the RCP4.5 scenario. For each point, the 25th, 50th and 75th percentile of the distribution of the CMIP5
 11 ensemble are shown, this includes both natural variability and inter-model spread. Hatching denotes areas
 12 where the 20-yr mean differences of the percentiles are less than the standard deviation of model-estimated
 13 present-day natural variability of 20-yr mean differences.

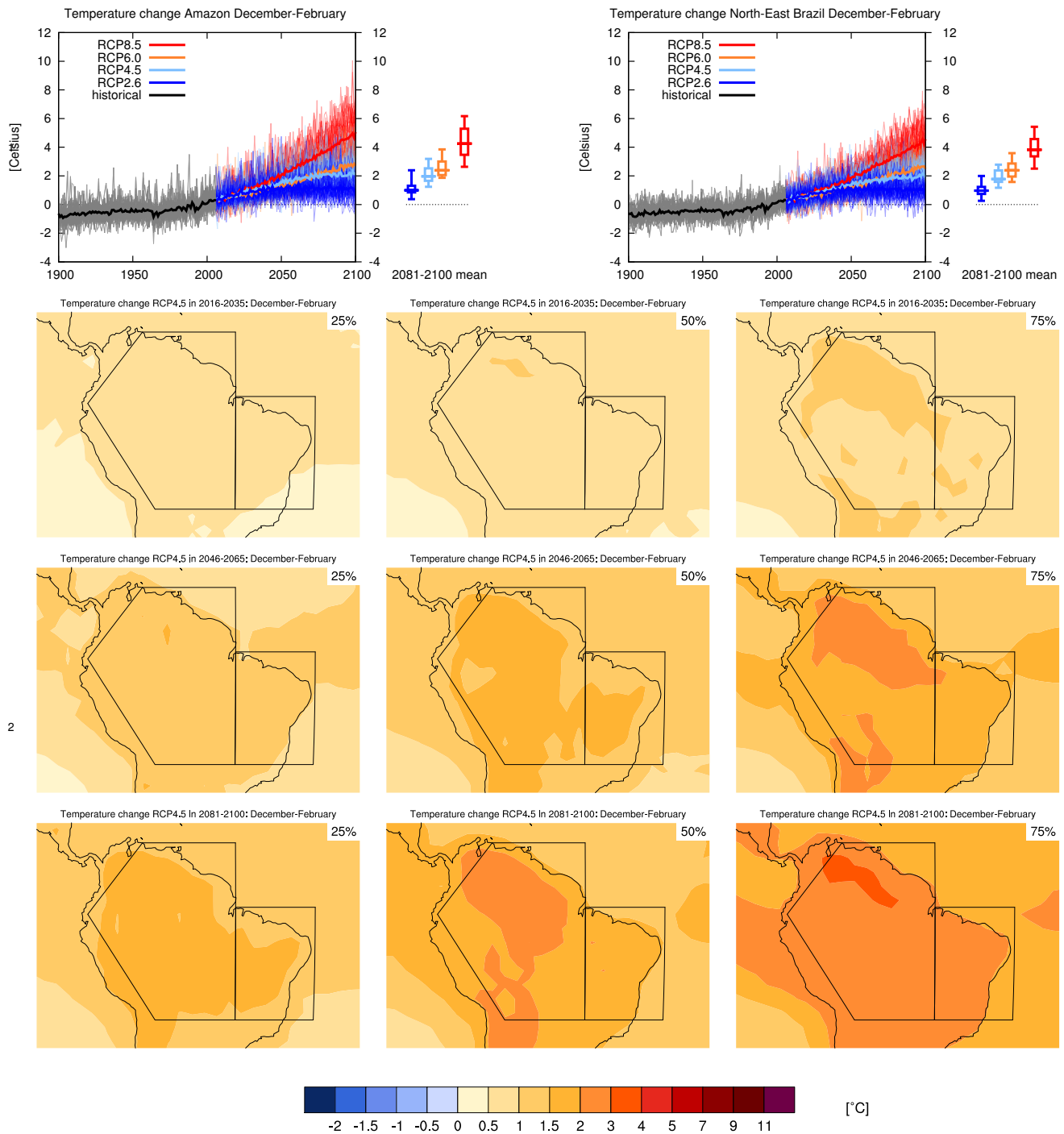
14 Sections 9.4.1.1, 9.6.1.1, Box 11.2, 12.4.5.2, 14.2.3.1, 14.8.4 contain relevant information regarding the evalu-
 15 ation of models in this region, the model spread in the context of other methods of projecting changes and the
 16 role of modes of variability and other climate phenomena.



3 **Figure AI.27:** Top left: time series of relative change relative to 1986–2005 in precipitation averaged over land
 4 grid points in Central America (68.8°W,11.4°N; 79.7°W, 1.2°S; 116.3°W,28.6°N; 90.3°W,28.6°N) in April–
 5 September. Top right: same for all grid points in Caribbean (land and sea) (68.8°W,11.4°N; 85.8°W,25°N,
 6 60°W,25°N, 60°W,11.44°N). Thin lines denote one ensemble member per model, thick lines the CMIP5 multi-
 7 model mean. On the right-hand side the 5th, 25th, 50th (median), 75th and 95th percentiles of the distribution
 8 of 20-yr mean changes are given for 2081–2100 in the four RCP scenarios.

9 Below: maps of precipitation changes in 2016–2035, 2046–2065 and 2081–2100 with respect to 1986–2005
 10 in the RCP4.5 scenario. For each point, the 25th, 50th and 75th percentile of the distribution of the CMIP5
 11 ensemble are shown, this includes both natural variability and inter-model spread. Hatching denotes areas
 12 where the 20-yr mean differences of the percentiles are less than the standard deviation of model-estimated
 13 present-day natural variability of 20-yr mean differences.

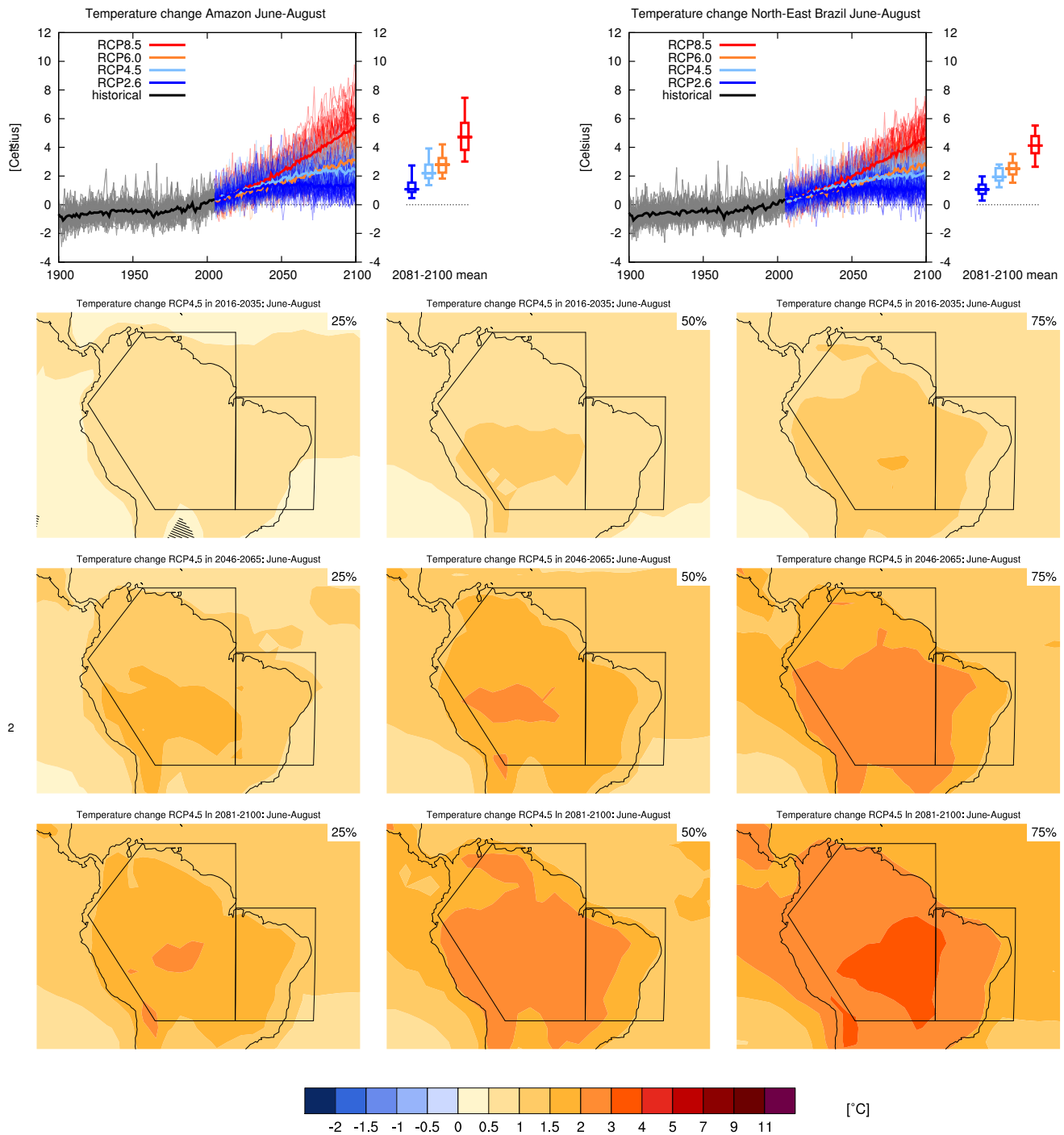
14 Sections 9.4.1.1, 9.6.1.1, Box 11.2, 12.4.5.2, 14.2.3.1, 14.8.4 contain relevant information regarding the evalu-
 15 ation of models in this region, the model spread in the context of other methods of projecting changes and the
 16 role of modes of variability and other climate phenomena.



3 **Figure AI.28:** Top left: time series of temperature change relative to 1986–2005 averaged over land grid points
 4 in the Amazon (20°S,66.4°W; 1.24°S,79.7°W; 11.4°S,68.8°W; 11.44°S,50°W; 20°S,50°W) in December–
 5 February. Top right: same for land grid points in North-East Brazil (20°S–EQ, 50°–34°W). Thin lines de-
 6 note one ensemble member per model, thick lines the CMIP5 multi-model mean. On the right-hand side the
 7 5th, 25th, 50th (median), 75th and 95th percentiles of the distribution of 20-yr mean changes are given for
 8 2081–2100 in the four RCP scenarios.

9 Below: maps of temperature changes in 2016–2035, 2046–2065 and 2081–2100 with respect to 1986–2005
 10 in the RCP4.5 scenario. For each point, the 25th, 50th and 75th percentile of the distribution of the CMIP5
 11 ensemble are shown, this includes both natural variability and inter-model spread. Hatching denotes areas
 12 where the 20-yr mean differences of the percentiles are less than the standard deviation of model-estimated
 13 present-day natural variability of 20-yr mean differences.

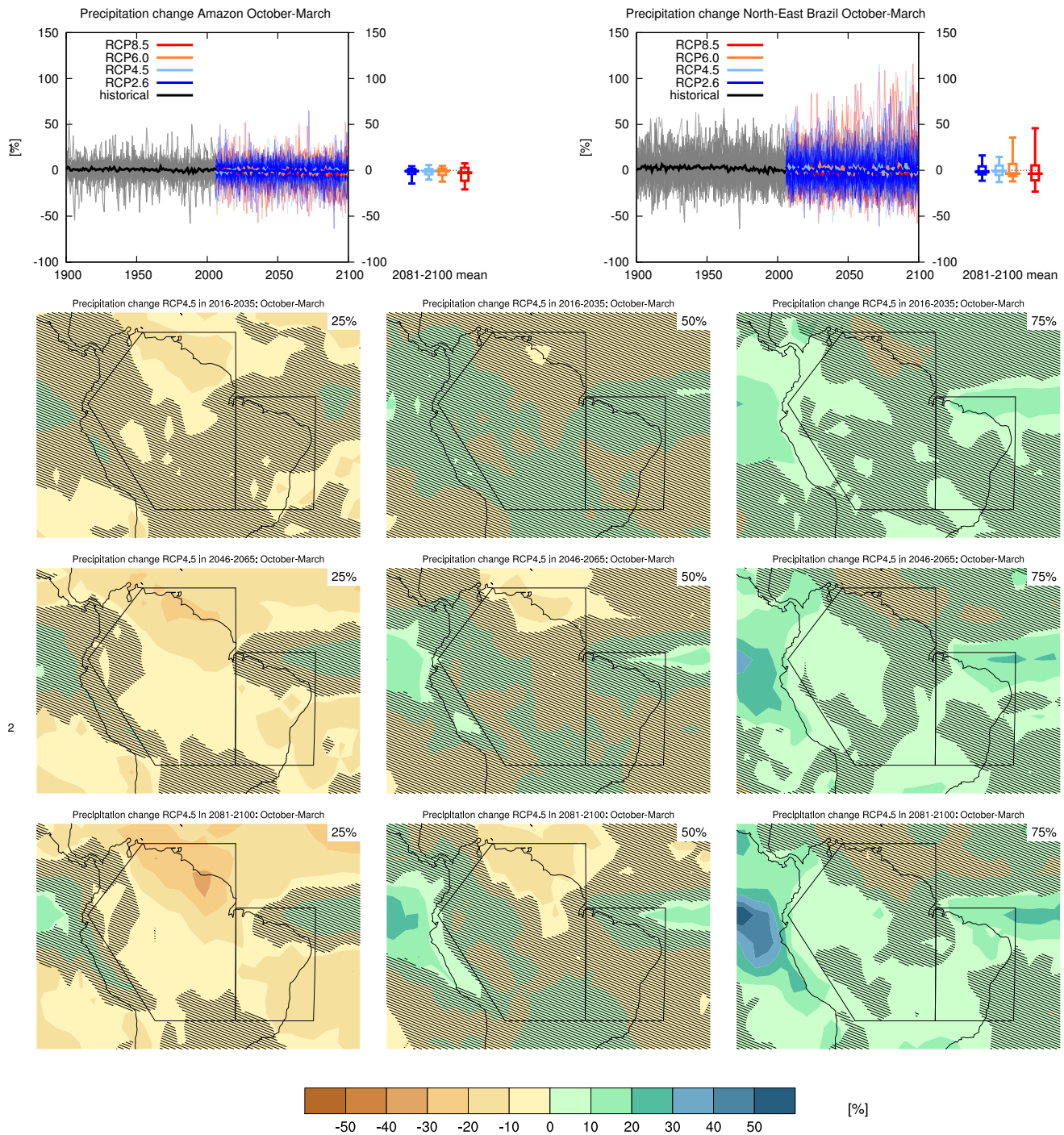
14 Sections 9.4.1.1, 9.6.1.1, 10.3.1.1.4, Box 11.2, 14.8.5 contain relevant information regarding the evaluation of
 15 models in this region, the model spread in the context of other methods of projecting changes and the role of
 16 modes of variability and other climate phenomena.



3 **Figure AI.29:** Top left: time series of temperature change relative to 1986–2005 averaged over land grid
 4 points in the Amazon (20°S,66.4°W; 1.24°S,79.7°W; 11.4°S,68.8°W; 11.44°S,50°W; 20°S,50°W) in June–
 5 August. Top right: same for land grid points in North-East Brazil (20°S–EQ, 50°–34°W). Thin lines denote
 6 one ensemble member per model, thick lines the CMIP5 multi-model mean. On the right-hand side the 5th,
 7 25th, 50th (median), 75th and 95th percentiles of the distribution of 20-yr mean changes are given for 2081–
 8 2100 in the four RCP scenarios.

9 Below: maps of temperature changes in 2016–2035, 2046–2065 and 2081–2100 with respect to 1986–2005
 10 in the RCP4.5 scenario. For each point, the 25th, 50th and 75th percentile of the distribution of the CMIP5
 11 ensemble are shown, this includes both natural variability and inter-model spread. Hatching denotes areas
 12 where the 20-yr mean differences of the percentiles are less than the standard deviation of model-estimated
 13 present-day natural variability of 20-yr mean differences.

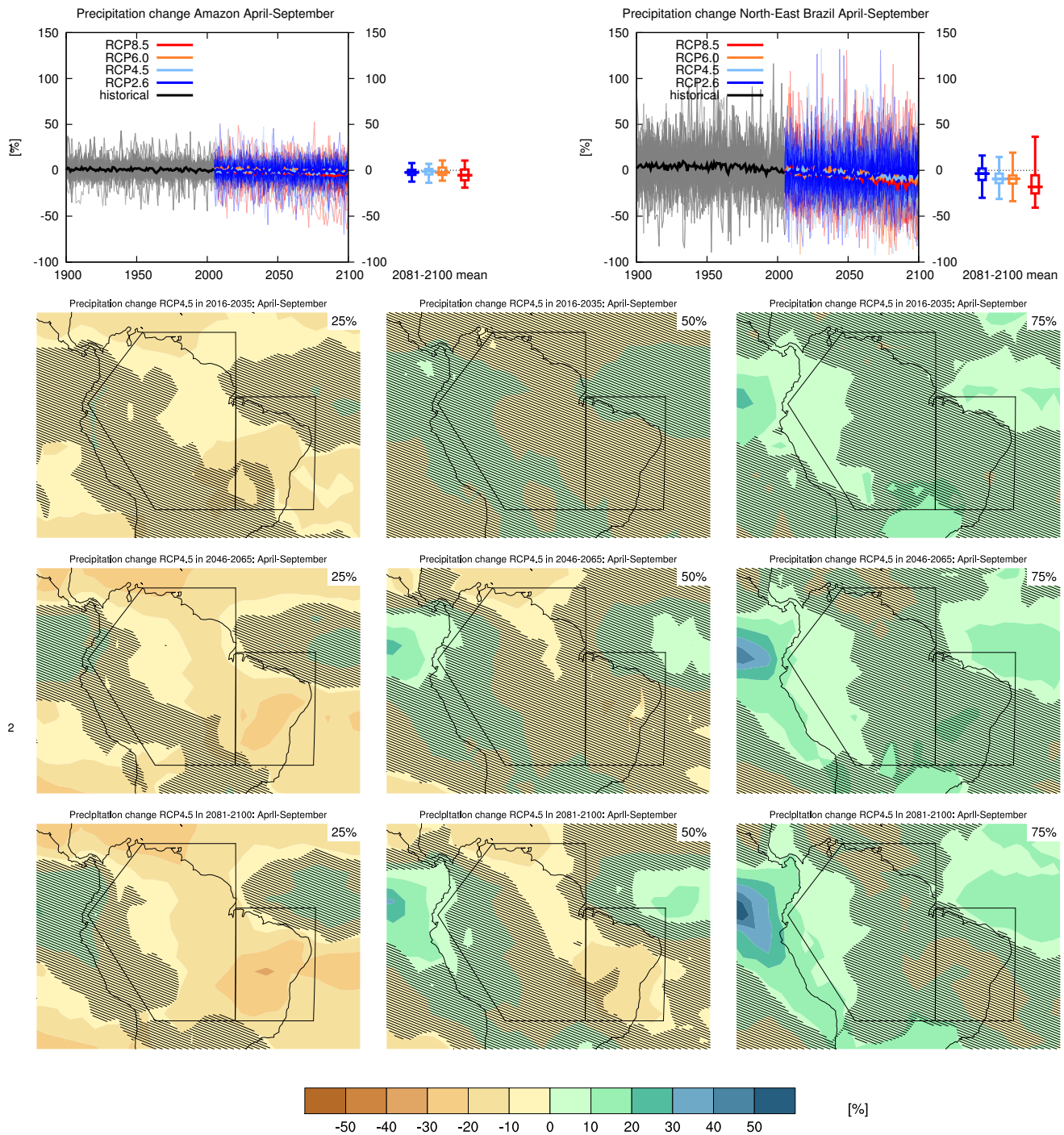
14 Sections 9.4.1.1, 9.6.1.1, 10.3.1.1.4, Box 11.2, 14.8.5 contain relevant information regarding the evaluation of
 15 models in this region, the model spread in the context of other methods of projecting changes and the role of
 16 modes of variability and other climate phenomena.



3 **Figure AI.30:** Top left: time series of relative change relative to 1986–2005 in precipitation averaged over
 4 land grid points in the Amazon ($20^{\circ}\text{S}, 66.4^{\circ}\text{W}$; $1.24^{\circ}\text{S}, 79.7^{\circ}\text{W}$; $11.4^{\circ}\text{S}, 68.8^{\circ}\text{W}$; $11.44^{\circ}\text{S}, 50^{\circ}\text{W}$; $20^{\circ}\text{S}, 50^{\circ}\text{W}$) in
 5 October–March. Top right: same for land grid points in North-East Brazil (20°S –EQ, 50° – 34°W). Thin lines
 6 denote one ensemble member per model, thick lines the CMIP5 multi-model mean. On the right-hand side
 7 the 5th, 25th, 50th (median), 75th and 95th percentiles of the distribution of 20-yr mean changes are given for
 8 2081–2100 in the four RCP scenarios.

9 Below: maps of precipitation changes in 2016–2035, 2046–2065 and 2081–2100 with respect to 1986–2005
 10 in the RCP4.5 scenario. For each point, the 25th, 50th and 75th percentile of the distribution of the CMIP5
 11 ensemble are shown, this includes both natural variability and inter-model spread. Hatching denotes areas
 12 where the 20-yr mean differences of the percentiles are less than the standard deviation of model-estimated
 13 present-day natural variability of 20-yr mean differences.

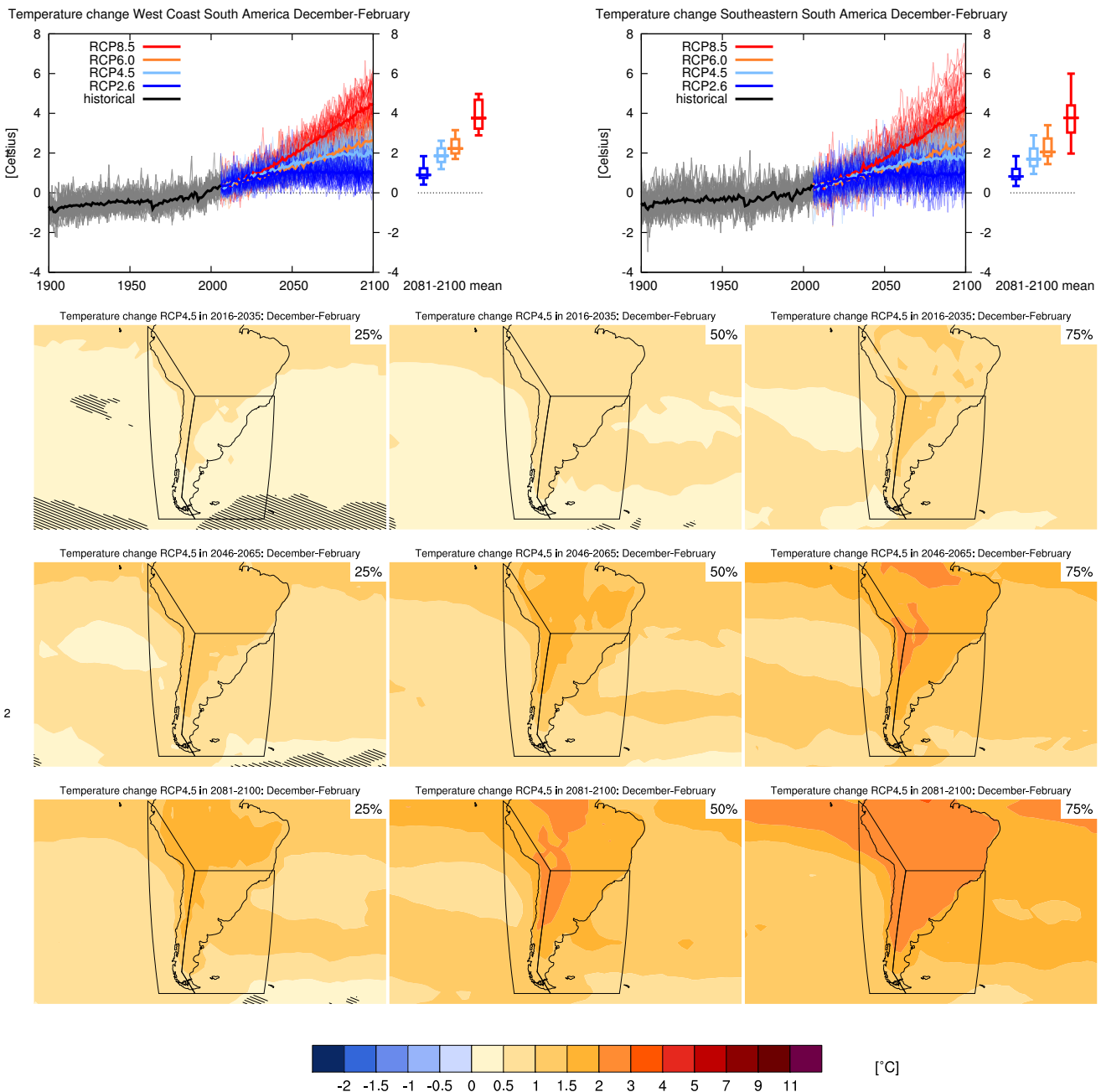
14 Sections 9.4.1.1, 9.6.1.1, 11.3.2.1.2, Box 11.2, 14.2.3.2, 14.8.5 contain relevant information regarding the eval-
 15 uation of models in this region, the model spread in the context of other methods of projecting changes and the
 16 role of modes of variability and other climate phenomena.



3 **Figure AI.31:** Top left: time series of relative change relative to 1986–2005 in precipitation averaged over
 4 land grid points in the Amazon ($20^{\circ}\text{S}, 66.4^{\circ}\text{W}$; $1.24^{\circ}\text{S}, 79.7^{\circ}\text{W}$; $11.4^{\circ}\text{S}, 68.8^{\circ}\text{W}$; $11.44^{\circ}\text{S}, 50^{\circ}\text{W}$; $20^{\circ}\text{S}, 50^{\circ}\text{W}$) in
 5 April–September. Top right: same for land grid points in North-East Brazil (20°S –EQ, 50° – 34°W). Thin lines
 6 denote one ensemble member per model, thick lines the CMIP5 multi-model mean. On the right-hand side
 7 the 5th, 25th, 50th (median), 75th and 95th percentiles of the distribution of 20-yr mean changes are given for
 8 2081–2100 in the four RCP scenarios.

9 Below: maps of precipitation changes in 2016–2035, 2046–2065 and 2081–2100 with respect to 1986–2005
 10 in the RCP4.5 scenario. For each point, the 25th, 50th and 75th percentile of the distribution of the CMIP5
 11 ensemble are shown, this includes both natural variability and inter-model spread. Hatching denotes areas
 12 where the 20-yr mean differences of the percentiles are less than the standard deviation of model-estimated
 13 present-day natural variability of 20-yr mean differences.

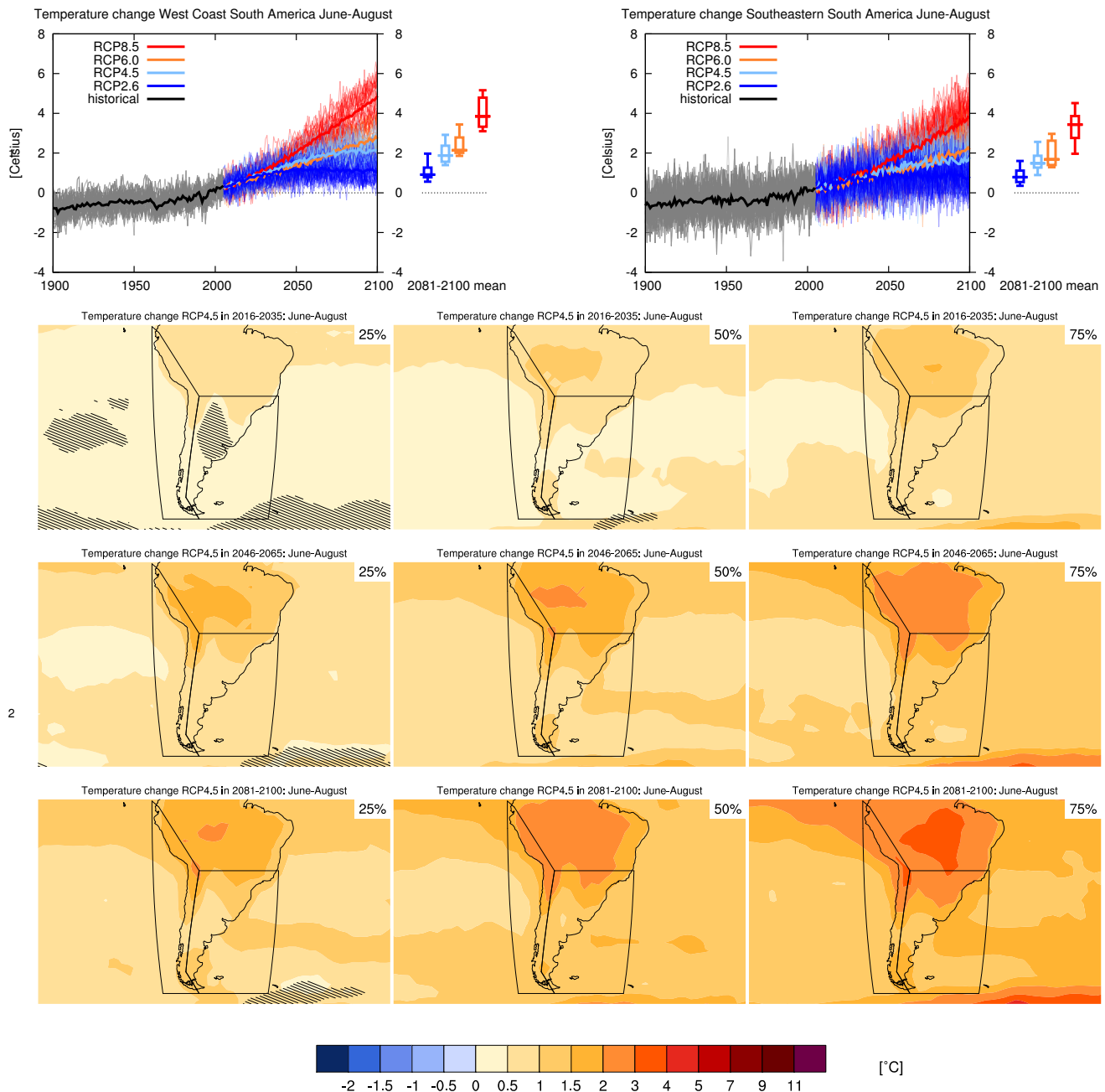
14 Sections 9.4.1.1, 9.6.1.1, 11.3.2.1.2, Box 11.2, 14.2.3.2, 14.8.5 contain relevant information regarding the eval-
 15 uation of models in this region, the model spread in the context of other methods of projecting changes and the
 16 role of modes of variability and other climate phenomena.



3 **Figure AI.32:** Top left: time series of temperature change relative to 1986–2005 averaged over land grid
 4 points in the West Coast of South America ($79.7^{\circ}\text{W}, 1.2^{\circ}\text{S}$; $66.4^{\circ}\text{W}, 20^{\circ}\text{S}$; $72.1^{\circ}\text{W}, 50^{\circ}\text{S}$; $67.3^{\circ}\text{W}, 56.7^{\circ}\text{S}$; 82.0°W
 5 56.7°S ; $82.2^{\circ}\text{W}, 0.5^{\circ}\text{N}$) in December–February. Top right: same for land grid points in Southeastern South
 6 America ($39.4^{\circ}\text{W}, 20^{\circ}\text{S}$; $39.4^{\circ}\text{W}, 56.6^{\circ}\text{S}$; $67.3^{\circ}\text{W}, 56.7^{\circ}\text{S}$; $72.1^{\circ}\text{W}, 50^{\circ}\text{S}$; $66^{\circ}\text{W}, 20^{\circ}\text{S}$). Thin lines denote one en-
 7 semble member per model, thick lines the CMIP5 multi-model mean. On the right-hand side the 5th, 25th, 50th
 8 (median), 75th and 95th percentiles of the distribution of 20-yr mean changes are given for 2081–2100 in the
 9 four RCP scenarios.

10 Below: maps of temperature changes in 2016–2035, 2046–2065 and 2081–2100 with respect to 1986–2005
 11 in the RCP4.5 scenario. For each point, the 25th, 50th and 75th percentile of the distribution of the CMIP5
 12 ensemble are shown, this includes both natural variability and inter-model spread. Hatching denotes areas
 13 where the 20-yr mean differences of the percentiles are less than the standard deviation of model-estimated
 14 present-day natural variability of 20-yr mean differences.

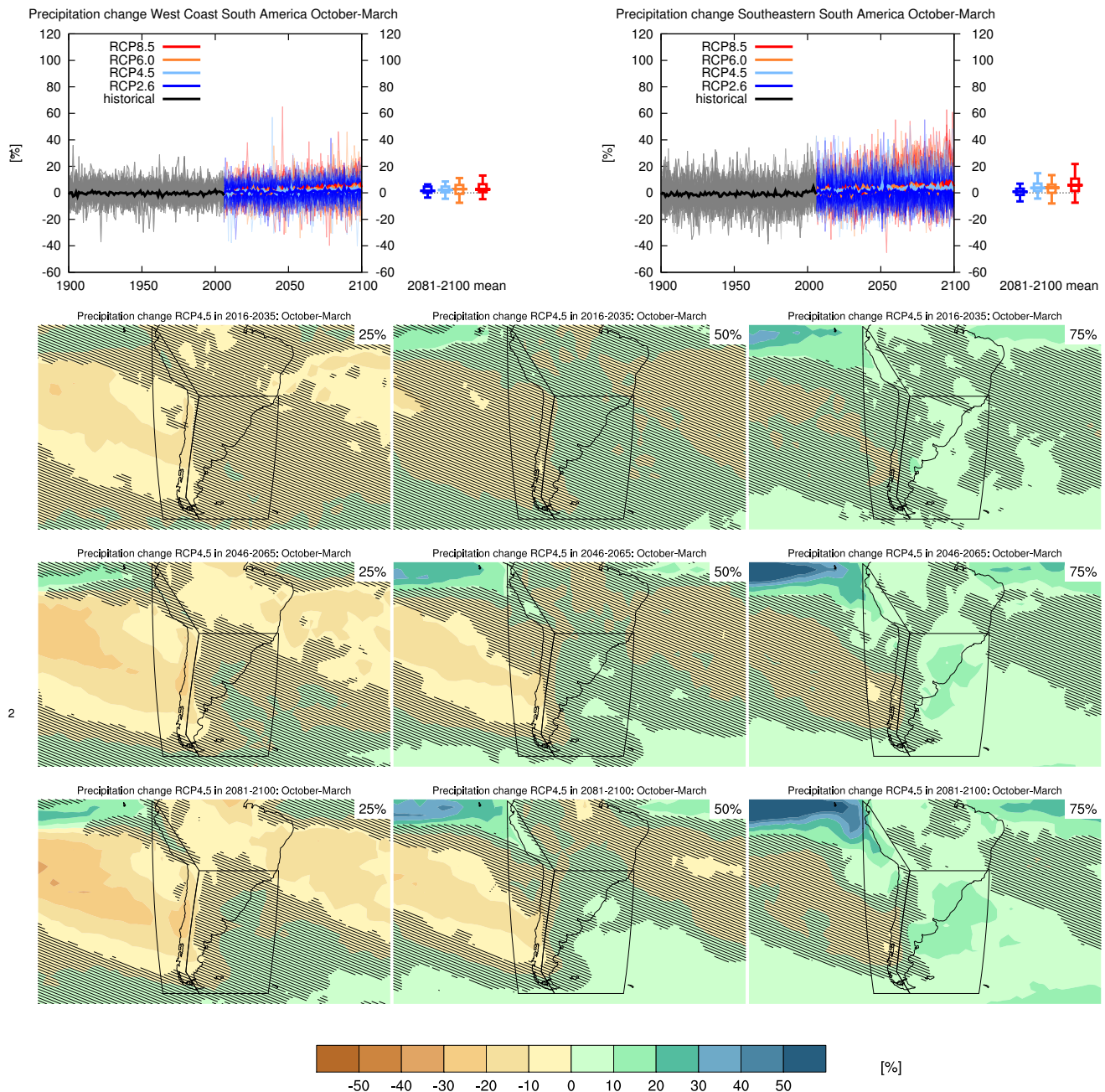
15 Sections 9.4.1.1, 9.6.1.1, 10.3.1.1.4, Box 11.2, 14.8.5 contain relevant information regarding the evaluation of
 16 models in this region, the model spread in the context of other methods of projecting changes and the role of
 17 modes of variability and other climate phenomena.



3 **Figure AI.33:** Top left: time series of temperature change relative to 1986–2005 averaged over land grid
 4 points in the West Coast of South America ($79.7^{\circ}\text{W}, 1.2^{\circ}\text{S}$; $66.4^{\circ}\text{W}, 20^{\circ}\text{S}$; $72.1^{\circ}\text{W}, 50^{\circ}\text{S}$; $67.3^{\circ}\text{W}, 56.7^{\circ}\text{S}$;
 5 $82.0^{\circ}\text{W}, 56.7^{\circ}\text{S}$; $82.2^{\circ}\text{W}, 0.5^{\circ}\text{N}$) in June–August. Top right: same for land grid points in Southeastern South America
 6 ($39.4^{\circ}\text{W}, 20^{\circ}\text{S}$; $39.4^{\circ}\text{W}, 56.6^{\circ}\text{S}$; $67.3^{\circ}\text{W}, 56.7^{\circ}\text{S}$; $72.1^{\circ}\text{W}, 50^{\circ}\text{S}$; $66^{\circ}\text{W}, 20^{\circ}\text{S}$). Thin lines denote one ensemble
 7 member per model, thick lines the CMIP5 multi-model mean. On the right-hand side the 5th, 25th, 50th
 8 (median), 75th and 95th percentiles of the distribution of 20-yr mean changes are given for 2081–2100 in the
 9 four RCP scenarios.

10 Below: maps of temperature changes in 2016–2035, 2046–2065 and 2081–2100 with respect to 1986–2005
 11 in the RCP4.5 scenario. For each point, the 25th, 50th and 75th percentile of the distribution of the CMIP5
 12 ensemble are shown, this includes both natural variability and inter-model spread. Hatching denotes areas
 13 where the 20-yr mean differences of the percentiles are less than the standard deviation of model-estimated
 14 present-day natural variability of 20-yr mean differences.

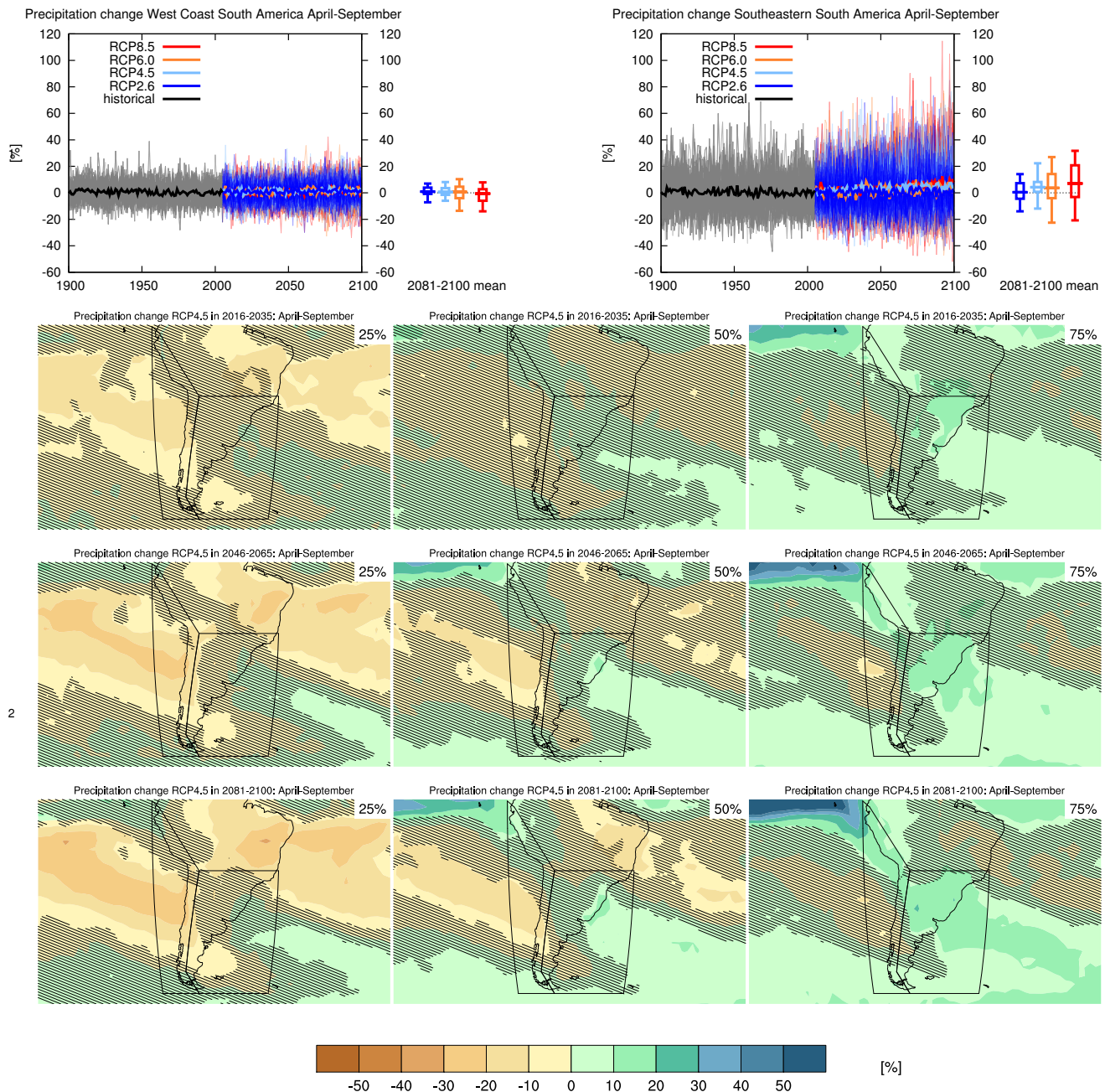
15 Sections 9.4.1.1, 9.6.1.1, 10.3.1.1.4, Box 11.2, 14.8.5 contain relevant information regarding the evaluation of
 16 models in this region, the model spread in the context of other methods of projecting changes and the role of
 17 modes of variability and other climate phenomena.



3 **Figure AI.34:** Top left: time series of relative change relative to 1986–2005 in precipitation averaged over land
 4 grid points in the West Coast of South America (79.7°W,1.2°S; 66.4°W,20°S; 72.1°W,50°S; 67.3°W,56.7°S;
 5 82.0°W 56.7°S; 82.2°W,0.5°N) in October–March. Top right: same for land grid points in Southeastern South
 6 America (39.4°W,20°S; 39.4°W,56.6°S; 67.3°W,56.7°S; 72.1°W,50°S; 66°W,20°S). Thin lines denote one en-
 7 semble member per model, thick lines the CMIP5 multi-model mean. On the right-hand side the 5th, 25th, 50th
 8 (median), 75th and 95th percentiles of the distribution of 20-yr mean changes are given for 2081–2100 in the
 9 four RCP scenarios.

10 Below: maps of precipitation changes in 2016–2035, 2046–2065 and 2081–2100 with respect to 1986–2005
 11 in the RCP4.5 scenario. For each point, the 25th, 50th and 75th percentile of the distribution of the CMIP5
 12 ensemble are shown, this includes both natural variability and inter-model spread. Hatching denotes areas
 13 where the 20-yr mean differences of the percentiles are less than the standard deviation of model-estimated
 14 present-day natural variability of 20-yr mean differences.

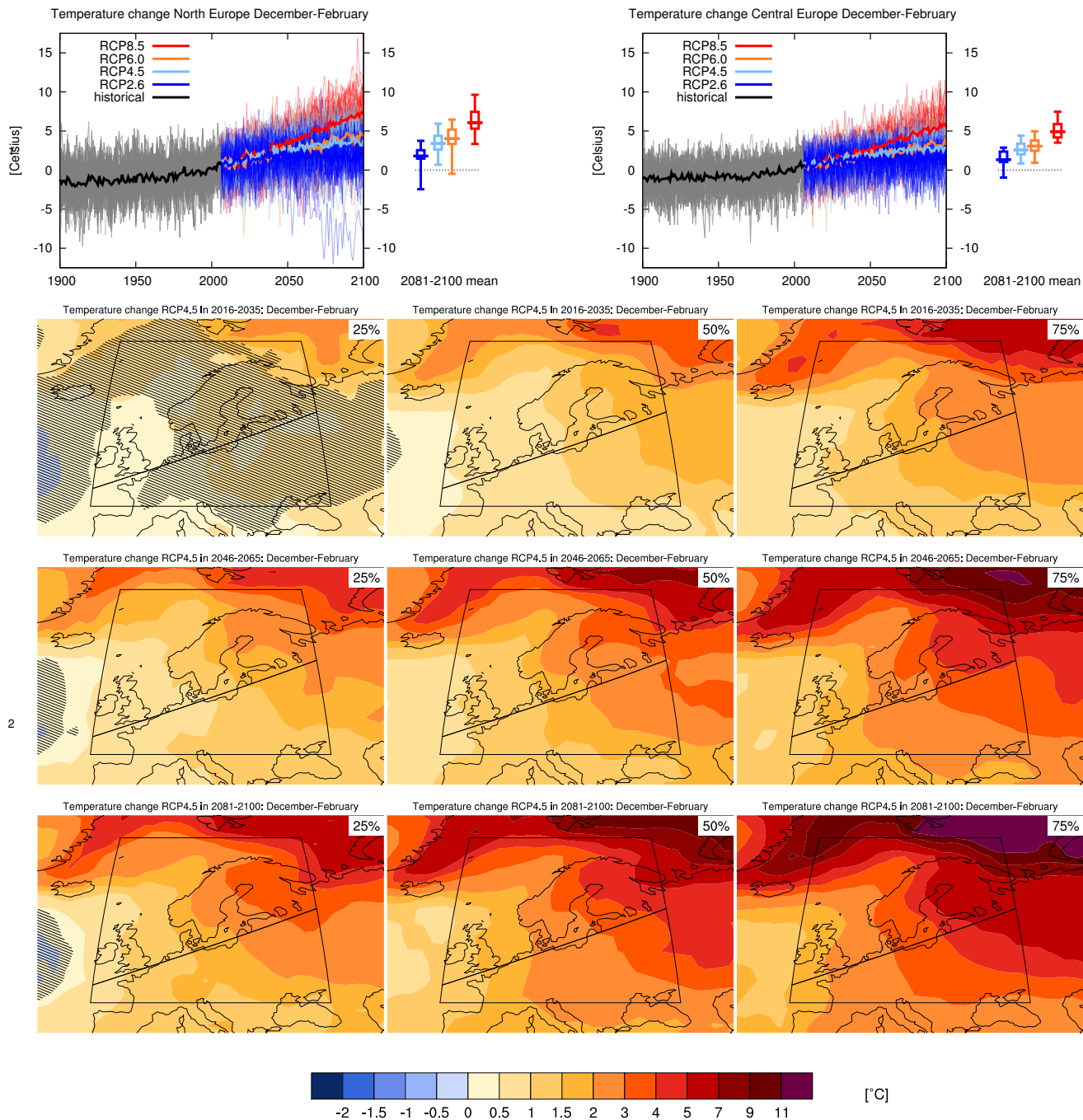
15 Sections 9.4.1.1, 9.6.1.1, Box 11.2, 12.4.5.2, 14.8.5 contain relevant information regarding the evaluation of
 16 models in this region, the model spread in the context of other methods of projecting changes and the role of
 17 modes of variability and other climate phenomena.



3 **Figure AI.35:** Top left: time series of relative change relative to 1986–2005 in precipitation averaged over land
 4 grid points in the West Coast of South America (79.7°W,1.2°S; 66.4°W,20°S; 72.1°W,50°S; 67.3°W,56.7°S;
 5 82.0°W 56.7°S; 82.2°W,0.5°N) in April–September. Top right: same for land grid points in Southeastern
 6 South America (39.4°W,20°S; 39.4°W,56.6°S; 67.3°W,56.7°S; 72.1°W,50°S; 66°W,20°S). Thin lines denote
 7 one ensemble member per model, thick lines the CMIP5 multi-model mean. On the right-hand side the 5th,
 8 25th, 50th (median), 75th and 95th percentiles of the distribution of 20-yr mean changes are given for 2081–
 9 2100 in the four RCP scenarios.

10 Below: maps of precipitation changes in 2016–2035, 2046–2065 and 2081–2100 with respect to 1986–2005
 11 in the RCP4.5 scenario. For each point, the 25th, 50th and 75th percentile of the distribution of the CMIP5
 12 ensemble are shown, this includes both natural variability and inter-model spread. Hatching denotes areas
 13 where the 20-yr mean differences of the percentiles are less than the standard deviation of model-estimated
 14 present-day natural variability of 20-yr mean differences.

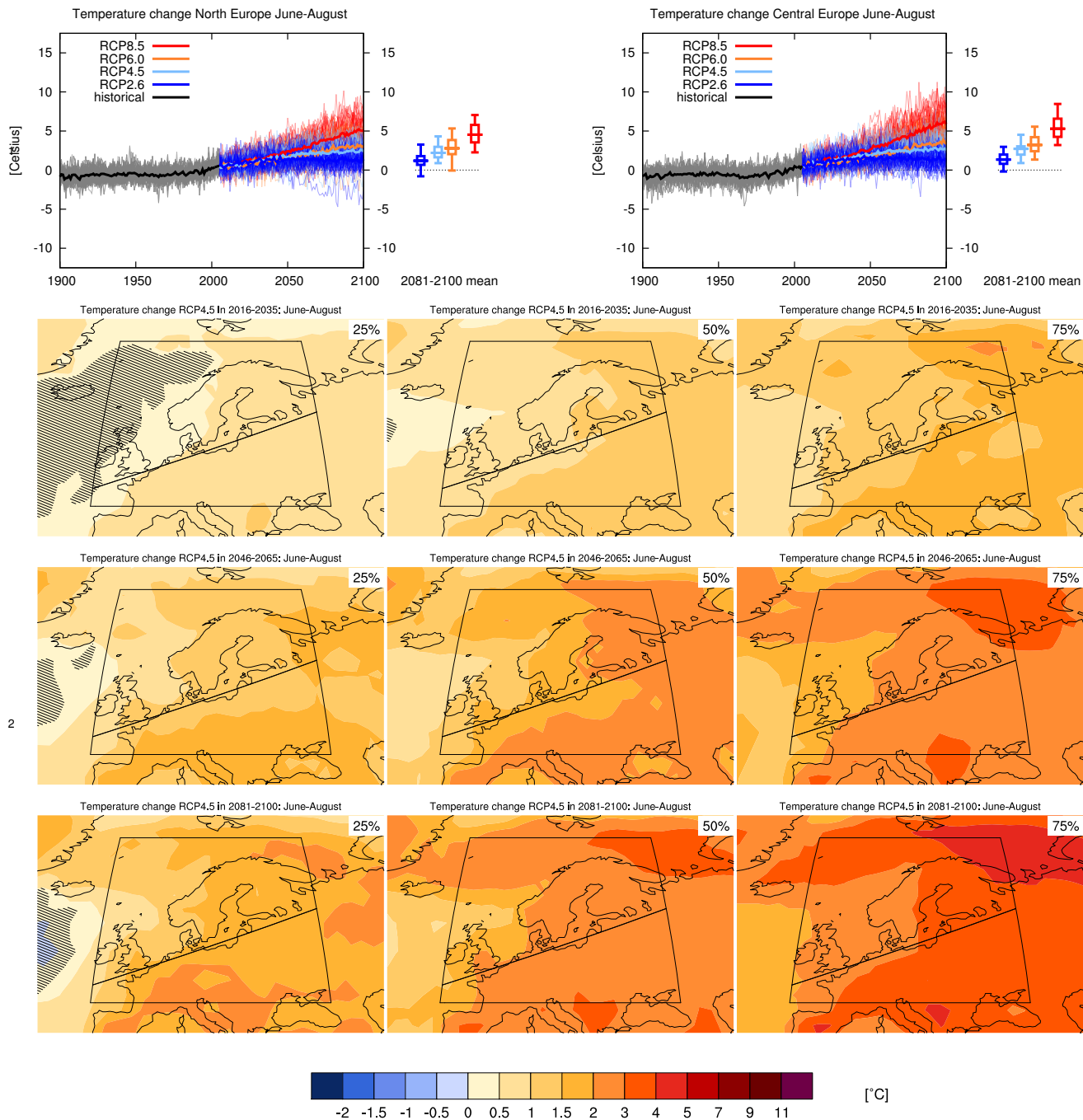
15 Sections 9.4.1.1, 9.6.1.1, Box 11.2, 12.4.5.2, 14.8.5 contain relevant information regarding the evaluation of
 16 models in this region, the model spread in the context of other methods of projecting changes and the role of
 17 modes of variability and other climate phenomena.



3 **Figure AI.36:** Top left: time series of temperature change relative to 1986–2005 averaged over land grid
 4 points in North Europe (10°W,48°N; 10°W,75°N; 40°E,75°N; 40°E,61.3°N) in December–February. Top right:
 5 same for land grid points in Central Europe (10°W, 45°N; 10°W,48°N; 40°E, 61.3°N; 40°E,45°N). Thin lines
 6 denote one ensemble member per model, thick lines the CMIP5 multi-model mean. On the right-hand side
 7 the 5th, 25th, 50th (median), 75th and 95th percentiles of the distribution of 20-yr mean changes are given for
 8 2081–2100 in the four RCP scenarios.

9 Below: maps of temperature changes in 2016–2035, 2046–2065 and 2081–2100 with respect to 1986–2005
 10 in the RCP4.5 scenario. For each point, the 25th, 50th and 75th percentile of the distribution of the CMIP5
 11 ensemble are shown, this includes both natural variability and inter-model spread. Hatching denotes areas
 12 where the 20-yr mean differences of the percentiles are less than the standard deviation of model-estimated
 13 present-day natural variability of 20-yr mean differences.

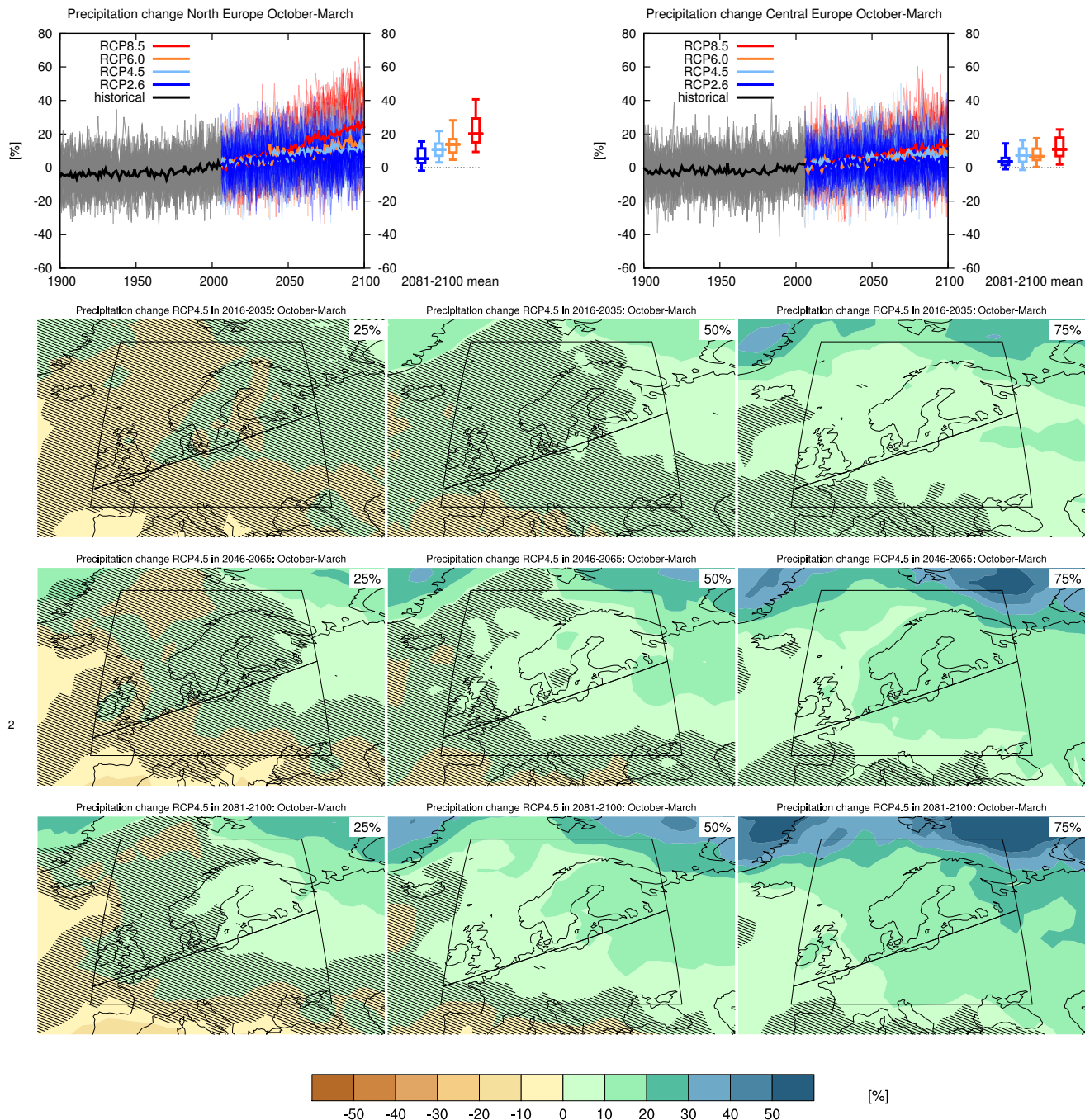
14 Sections 9.4.1.1, 9.6.1.1, 10.3.1.1.4, 10.3, Box 11.2, 14.8.6 contain relevant information regarding the evalua-
 15 tion of models in this region, the model spread in the context of other methods of projecting changes and the
 16 role of modes of variability and other climate phenomena.



3 **Figure AI.37:** Top left: time series of temperature change relative to 1986–2005 averaged over land grid points
 4 in North Europe (10°W,48°N; 10°W,75°N; 40°E,75°N; 40°E,61.3°N) in June–August. Top right: same for
 5 land grid points in Central Europe (10°W, 45°N; 10°W,48°N; 40°E, 61.3°N; 40°E,45°N). Thin lines denote
 6 one ensemble member per model, thick lines the CMIP5 multi-model mean. On the right-hand side the 5th,
 7 25th, 50th (median), 75th and 95th percentiles of the distribution of 20-yr mean changes are given for 2081–
 8 2100 in the four RCP scenarios.

9 Below: maps of temperature changes in 2016–2035, 2046–2065 and 2081–2100 with respect to 1986–2005
 10 in the RCP4.5 scenario. For each point, the 25th, 50th and 75th percentile of the distribution of the CMIP5
 11 ensemble are shown, this includes both natural variability and inter-model spread. Hatching denotes areas
 12 where the 20-yr mean differences of the percentiles are less than the standard deviation of model-estimated
 13 present-day natural variability of 20-yr mean differences.

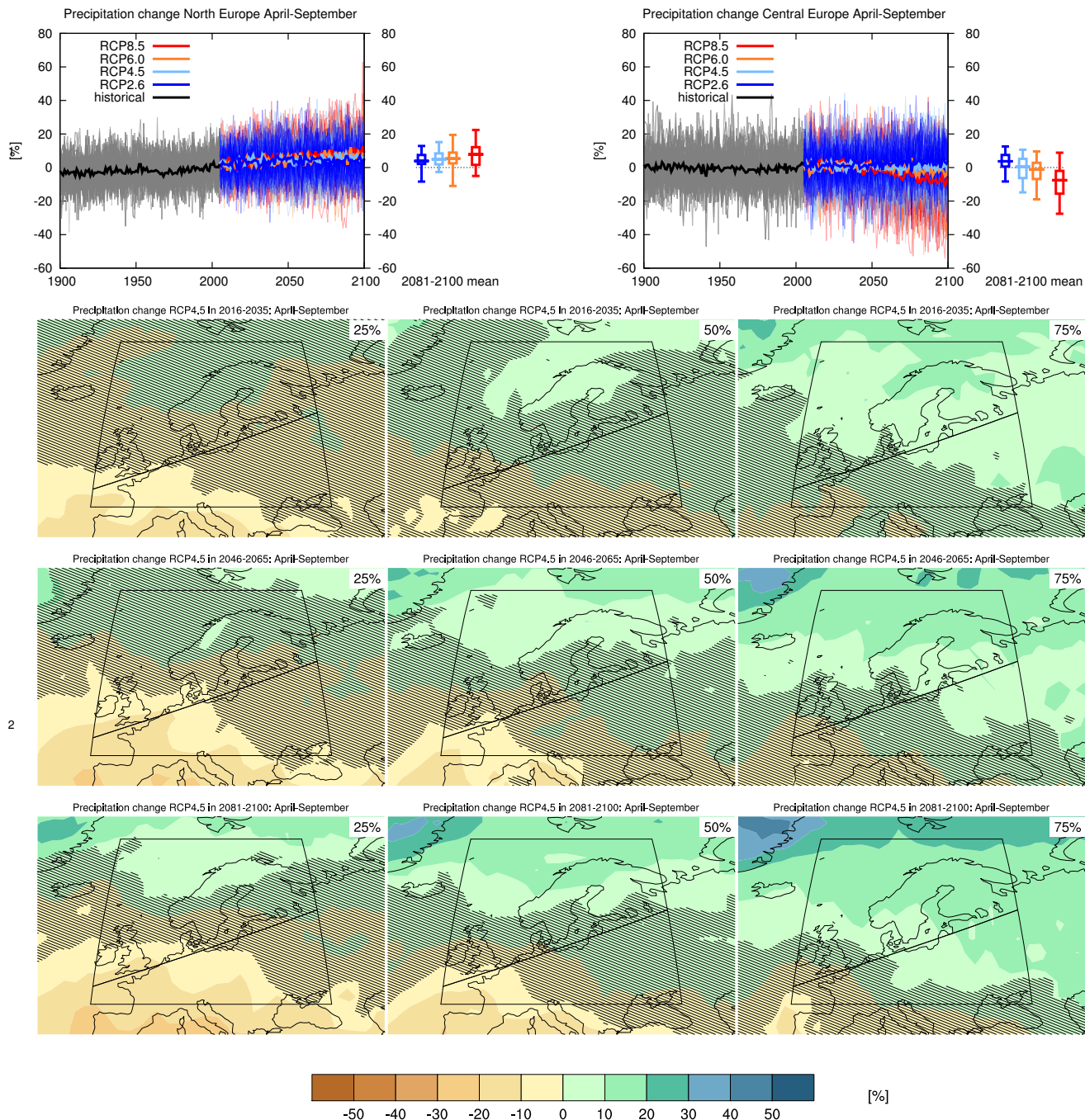
14 Sections 9.4.1.1, 9.6.1.1, 10.3.1.1.4, 10.3, Box 11.2, 14.8.6 contain relevant information regarding the evalua-
 15 tion of models in this region, the model spread in the context of other methods of projecting changes and the
 16 role of modes of variability and other climate phenomena.



3 **Figure AI.38:** Top left: time series of relative change relative to 1986–2005 in precipitation averaged over
 4 land grid points in North Europe (10°W,48°N; 10°W,75°N; 40°E,75°N; 40°E,61.3°N) in October–March. Top
 5 right: same for land grid points in Central Europe (10°W, 45°N; 10°W,48°N; 40°E, 61.3°N; 40°E,45°N). Thin
 6 lines denote one ensemble member per model, thick lines the CMIP5 multi-model mean. On the right-hand
 7 side the 5th, 25th, 50th (median), 75th and 95th percentiles of the distribution of 20-yr mean changes are given
 8 for 2081–2100 in the four RCP scenarios.

9 Below: maps of precipitation changes in 2016–2035, 2046–2065 and 2081–2100 with respect to 1986–2005
 10 in the RCP4.5 scenario. For each point, the 25th, 50th and 75th percentile of the distribution of the CMIP5
 11 ensemble are shown, this includes both natural variability and inter-model spread. Hatching denotes areas
 12 where the 20-yr mean differences of the percentiles are less than the standard deviation of model-estimated
 13 present-day natural variability of 20-yr mean differences.

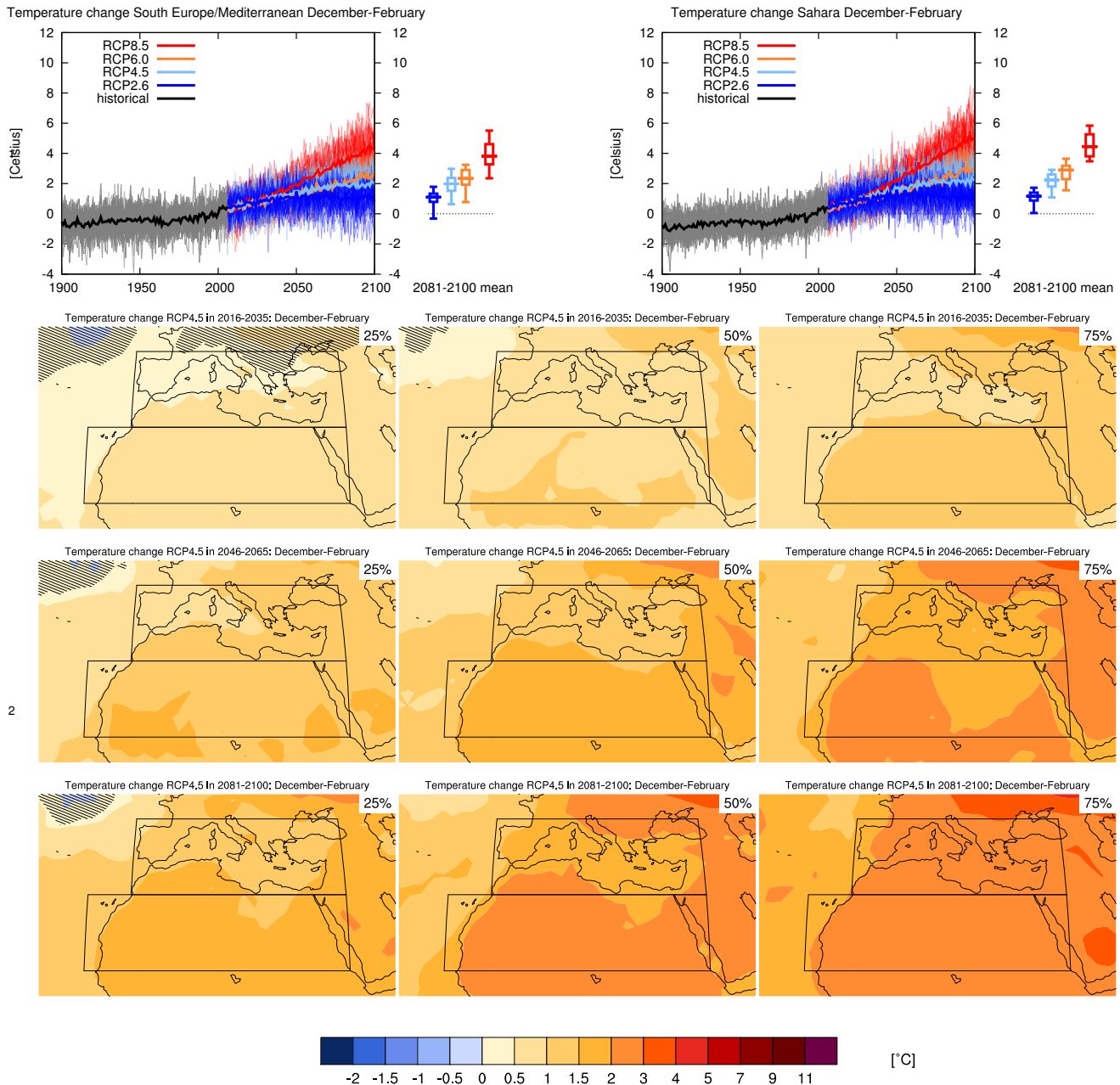
14 Sections 9.4.1.1, 9.6.1.1, Box 11.2, 12.4.5.2, 14.8.6 contain relevant information regarding the evaluation of
 15 models in this region, the model spread in the context of other methods of projecting changes and the role of
 16 modes of variability and other climate phenomena.



3 **Figure AI.39:** Top left: time series of relative change relative to 1986–2005 in precipitation averaged over land
 4 grid points in North Europe (10°W,48°N; 10°W,75°N; 40°E,75°N; 40°E,61.3°N) in April–September. Top
 5 right: same for land grid points in Central Europe (10°W, 45°N; 10°W,48°N; 40°E, 61.3°N; 40°E,45°N). Thin
 6 lines denote one ensemble member per model, thick lines the CMIP5 multi-model mean. On the right-hand
 7 side the 5th, 25th, 50th (median), 75th and 95th percentiles of the distribution of 20-yr mean changes are given
 8 for 2081–2100 in the four RCP scenarios.

9 Below: maps of precipitation changes in 2016–2035, 2046–2065 and 2081–2100 with respect to 1986–2005
 10 in the RCP4.5 scenario. For each point, the 25th, 50th and 75th percentile of the distribution of the CMIP5
 11 ensemble are shown, this includes both natural variability and inter-model spread. Hatching denotes areas
 12 where the 20-yr mean differences of the percentiles are less than the standard deviation of model-estimated
 13 present-day natural variability of 20-yr mean differences.

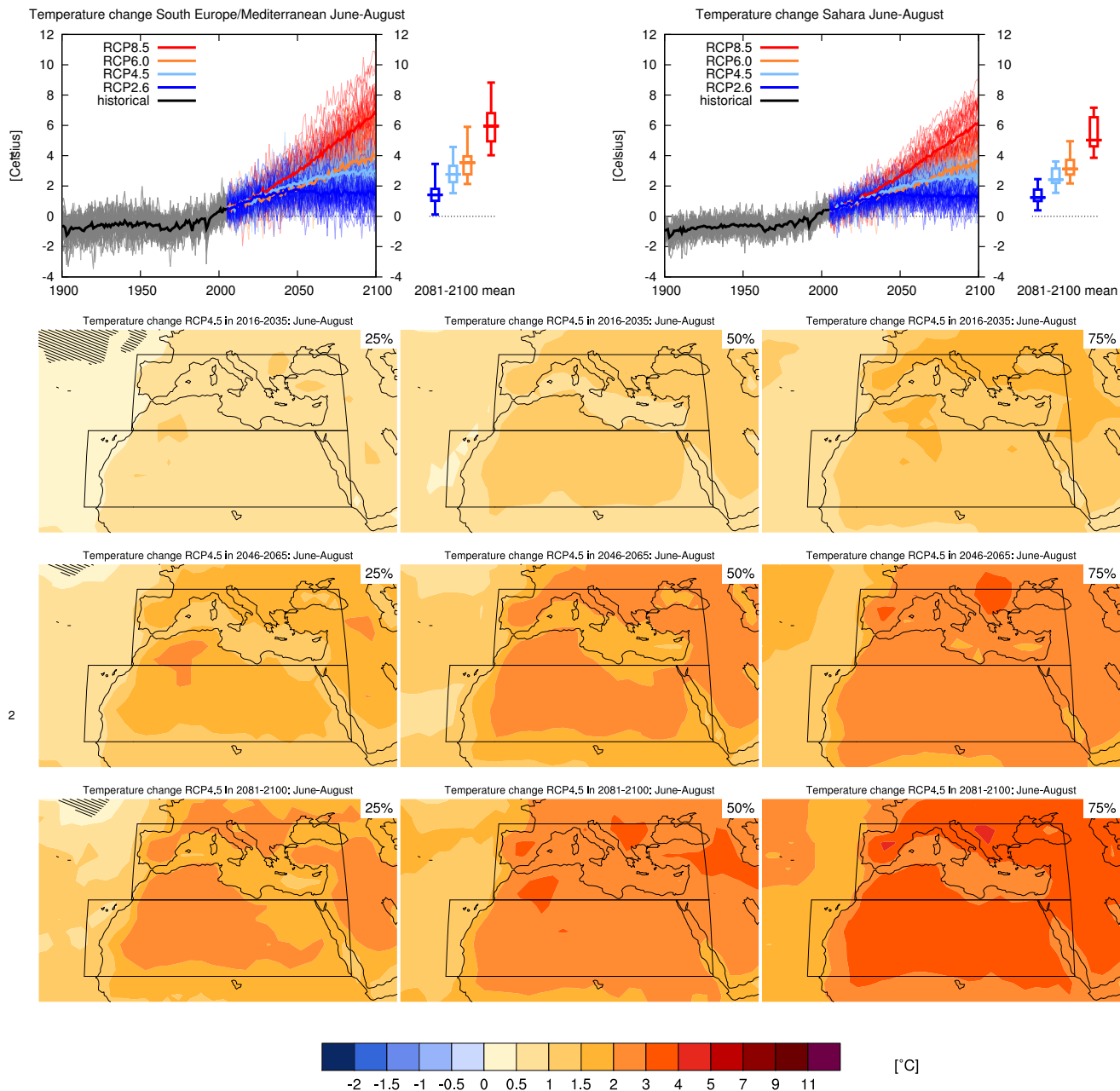
14 Sections 9.4.1.1, 9.6.1.1, Box 11.2, 12.4.5.2, 14.8.6 contain relevant information regarding the evaluation of
 15 models in this region, the model spread in the context of other methods of projecting changes and the role of
 16 modes of variability and other climate phenomena.



3 **Figure AI.40:** Top left: time series of temperature change relative to 1986–2005 averaged over land grid points
 4 in the region South Europe/Mediterranean (30°–45°N, 10°W–40°E) in December–February. Top right: same
 5 for land grid points in the Sahara (15°–30°N, 20°W–40°E). Thin lines denote one ensemble member per model,
 6 thick lines the CMIP5 multi-model mean. On the right-hand side the 5th, 25th, 50th (median), 75th and 95th
 7 percentiles of the distribution of 20-yr mean changes are given for 2081–2100 in the four RCP scenarios.

8 Below: maps of temperature changes in 2016–2035, 2046–2065 and 2081–2100 with respect to 1986–2005
 9 in the RCP4.5 scenario. For each point, the 25th, 50th and 75th percentile of the distribution of the CMIP5
 10 ensemble are shown, this includes both natural variability and inter-model spread. Hatching denotes areas
 11 where the 20-yr mean differences of the percentiles are less than the standard deviation of model-estimated
 12 present-day natural variability of 20-yr mean differences.

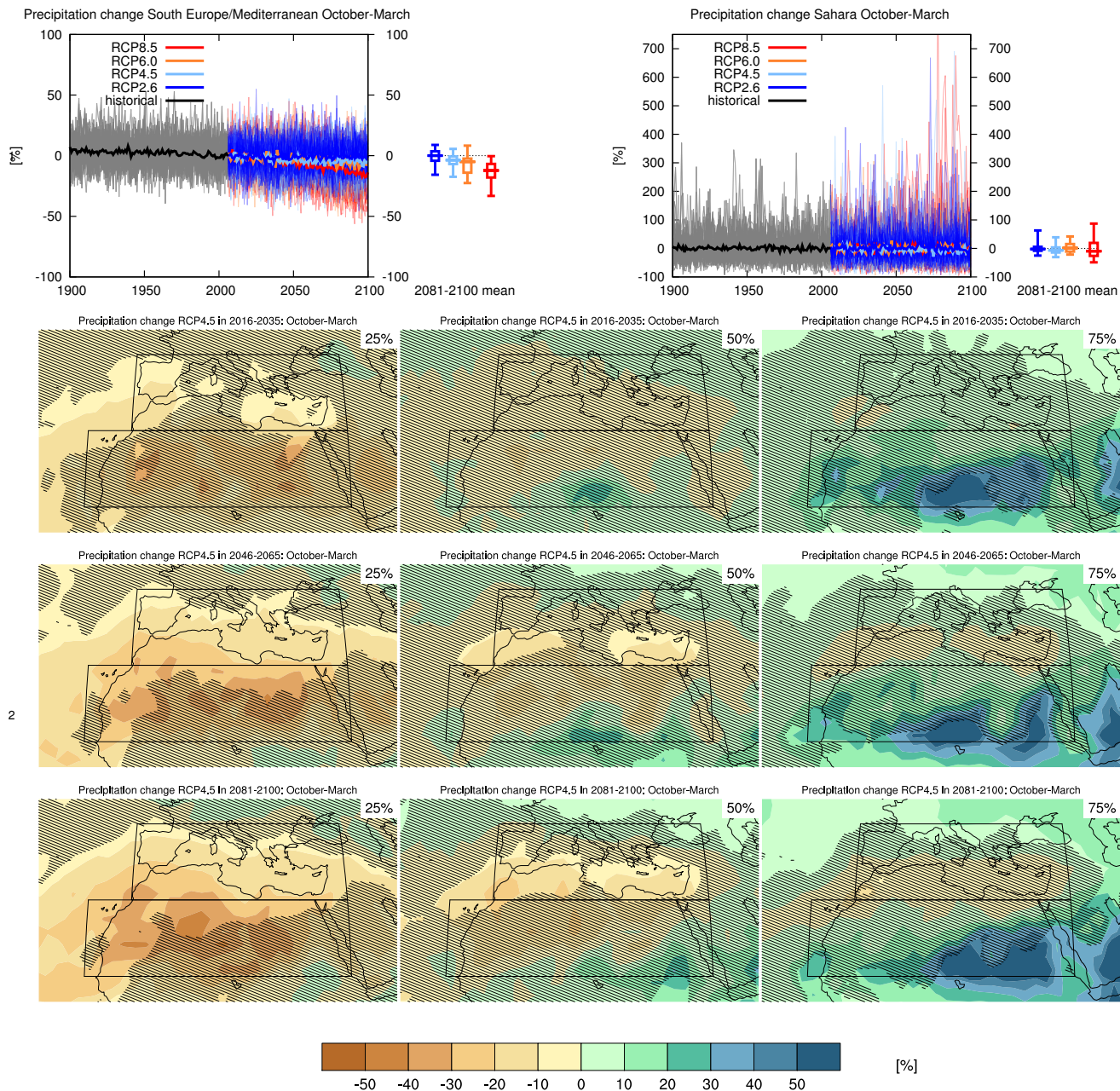
13 Sections 9.4.1.1, 9.6.1.1, 10.3.1.1.4, Box 11.2, 14.8.6, 14.8.7 contain relevant information regarding the evalu-
 14 ation of models in this region, the model spread in the context of other methods of projecting changes and the
 15 role of modes of variability and other climate phenomena.



3 **Figure AI.41:** Top left: time series of temperature change relative to 1986–2005 averaged over land grid
 4 points in the region South Europe/Mediterranean (30° – 45° N, 10° W– 40° E) in June–August. Top right: same
 5 for land grid points in the Sahara (15° – 30° N, 20° W– 40° E). Thin lines denote one ensemble member per model,
 6 thick lines the CMIP5 multi-model mean. On the right-hand side the 5th, 25th, 50th (median), 75th and 95th
 7 percentiles of the distribution of 20-yr mean changes are given for 2081–2100 in the four RCP scenarios.

8 Below: maps of temperature changes in 2016–2035, 2046–2065 and 2081–2100 with respect to 1986–2005
 9 in the RCP4.5 scenario. For each point, the 25th, 50th and 75th percentile of the distribution of the CMIP5
 10 ensemble are shown, this includes both natural variability and inter-model spread. Hatching denotes areas
 11 where the 20-yr mean differences of the percentiles are less than the standard deviation of model-estimated
 12 present-day natural variability of 20-yr mean differences.

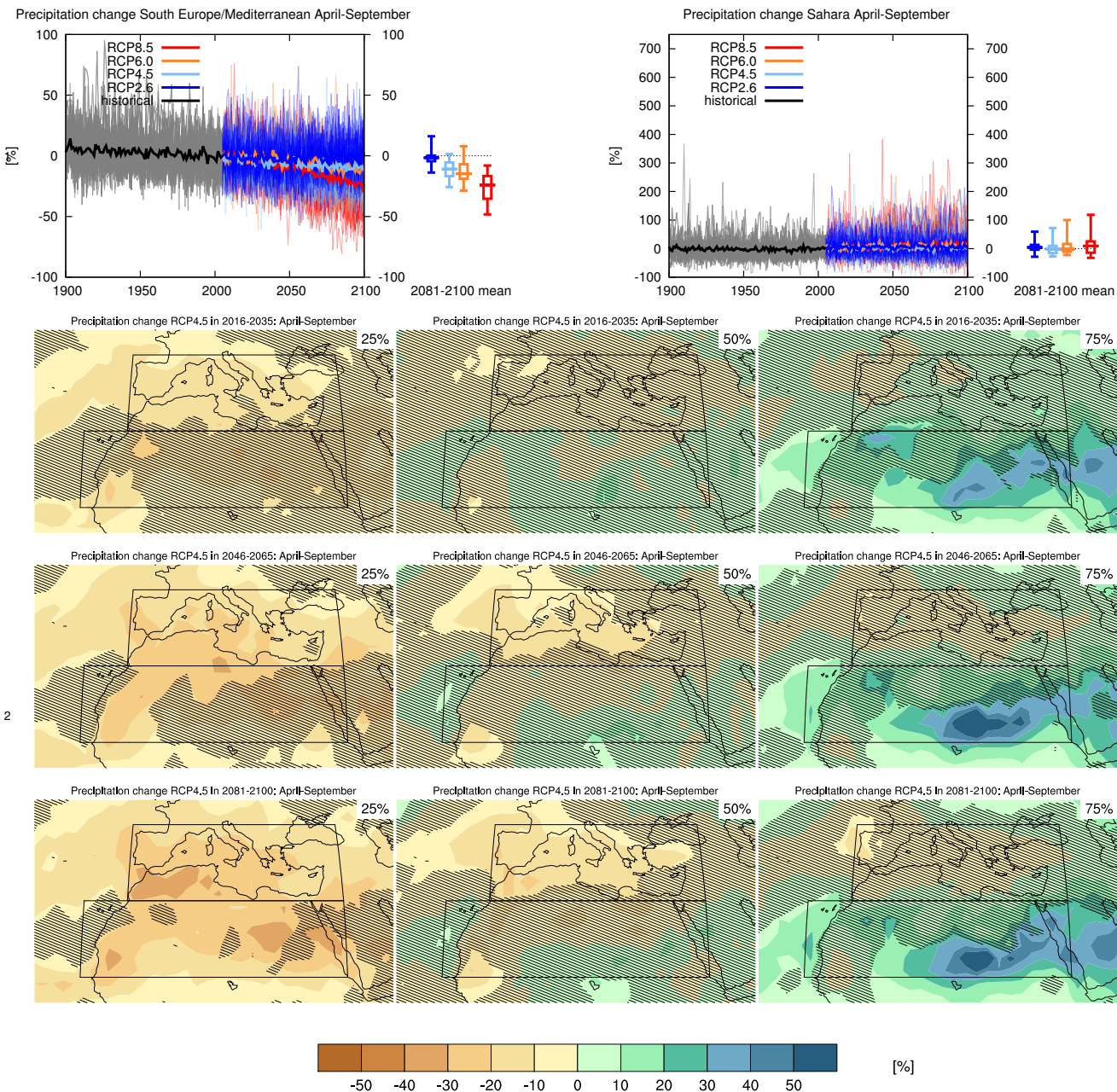
13 Sections 9.4.1.1, 9.6.1.1, 10.3.1.1.4, Box 11.2, 14.8.6, 14.8.7 contain relevant information regarding the evalu-
 14 ation of models in this region, the model spread in the context of other methods of projecting changes and the
 15 role of modes of variability and other climate phenomena.



3 **Figure AI.42:** Top left: time series of relative change relative to 1986–2005 in precipitation averaged over land
 4 grid points in the region South Europe/Mediterranean (30° – 45° N, 10° W– 40° E) in October–March. Top right:
 5 same for land grid points in the Sahara (15° – 30° N, 20° W– 40° E). Thin lines denote one ensemble member per
 6 model, thick lines the CMIP5 multi-model mean. On the right-hand side the 5th, 25th, 50th (median), 75th and
 7 95th percentiles of the distribution of 20-yr mean changes are given for 2081–2100 in the four RCP scenarios.
 8 Note different scales.

9 Below: maps of precipitation changes in 2016–2035, 2046–2065 and 2081–2100 with respect to 1986–2005
 10 in the RCP4.5 scenario. For each point, the 25th, 50th and 75th percentile of the distribution of the CMIP5
 11 ensemble are shown, this includes both natural variability and inter-model spread. Hatching denotes areas
 12 where the 20-yr mean differences of the percentiles are less than the standard deviation of model-estimated
 13 present-day natural variability of 20-yr mean differences.

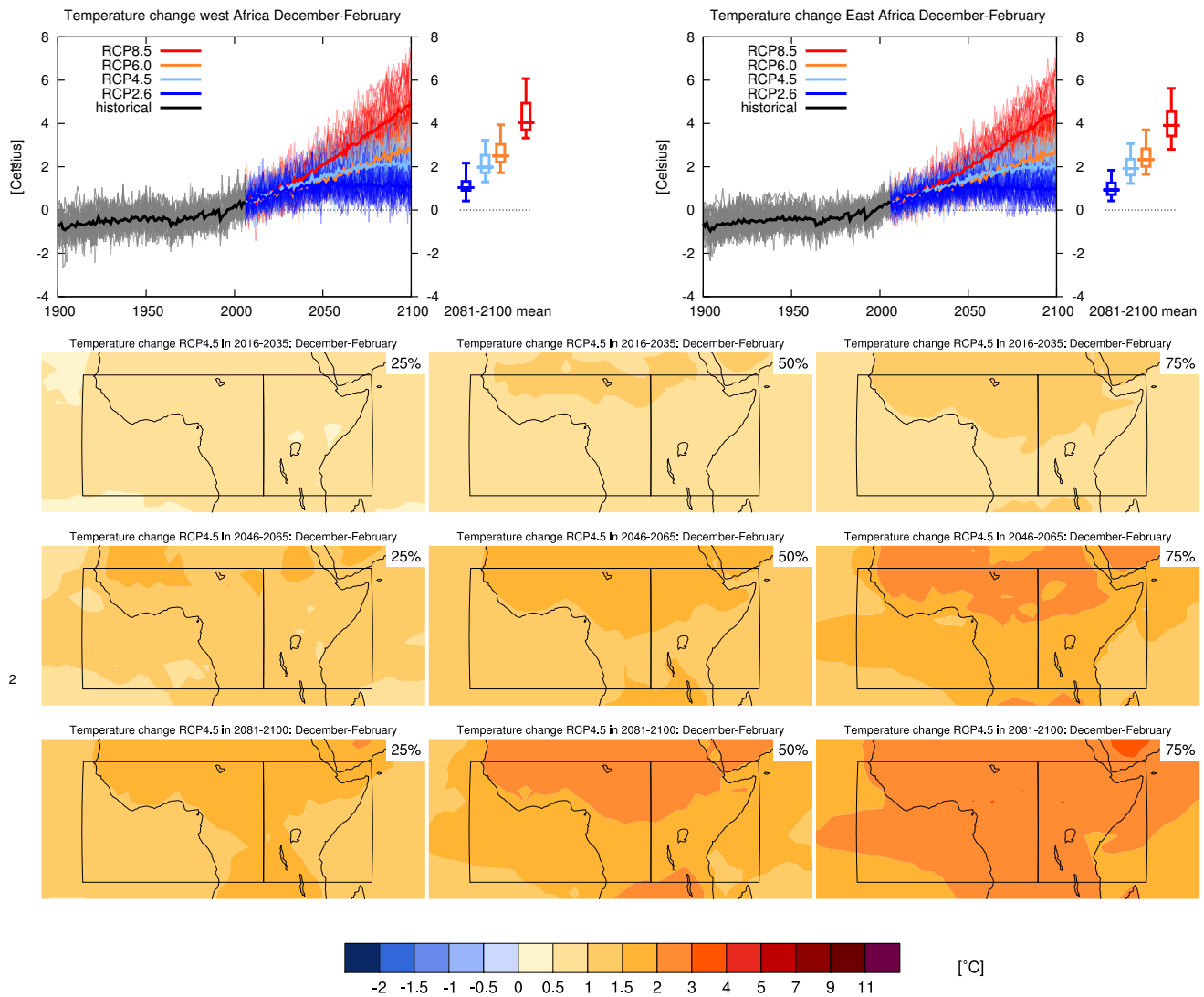
14 Sections 9.4.1.1, 9.6.1.1, Box 11.2, 12.4.5.2, 14.8.6, 14.8.7 contain relevant information regarding the evalua-
 15 tion of models in this region, the model spread in the context of other methods of projecting changes and the
 16 role of modes of variability and other climate phenomena.



3 **Figure AI.43:** Top left: time series of relative change relative to 1986–2005 in precipitation averaged over land
 4 grid points in the region South Europe/Mediterranean (30° – 45° N, 10° W– 40° E) in April–September. Top right:
 5 same for land grid points in the Sahara (15° – 30° N, 20° W– 40° E). Thin lines denote one ensemble member per
 6 model, thick lines the CMIP5 multi-model mean. On the right-hand side the 5th, 25th, 50th (median), 75th and
 7 95th percentiles of the distribution of 20-yr mean changes are given for 2081–2100 in the four RCP scenarios.
 8 Note different scales.

9 Below: maps of precipitation changes in 2016–2035, 2046–2065 and 2081–2100 with respect to 1986–2005
 10 in the RCP4.5 scenario. For each point, the 25th, 50th and 75th percentile of the distribution of the CMIP5
 11 ensemble are shown, this includes both natural variability and inter-model spread. Hatching denotes areas
 12 where the 20-yr mean differences of the percentiles are less than the standard deviation of model-estimated
 13 present-day natural variability of 20-yr mean differences.

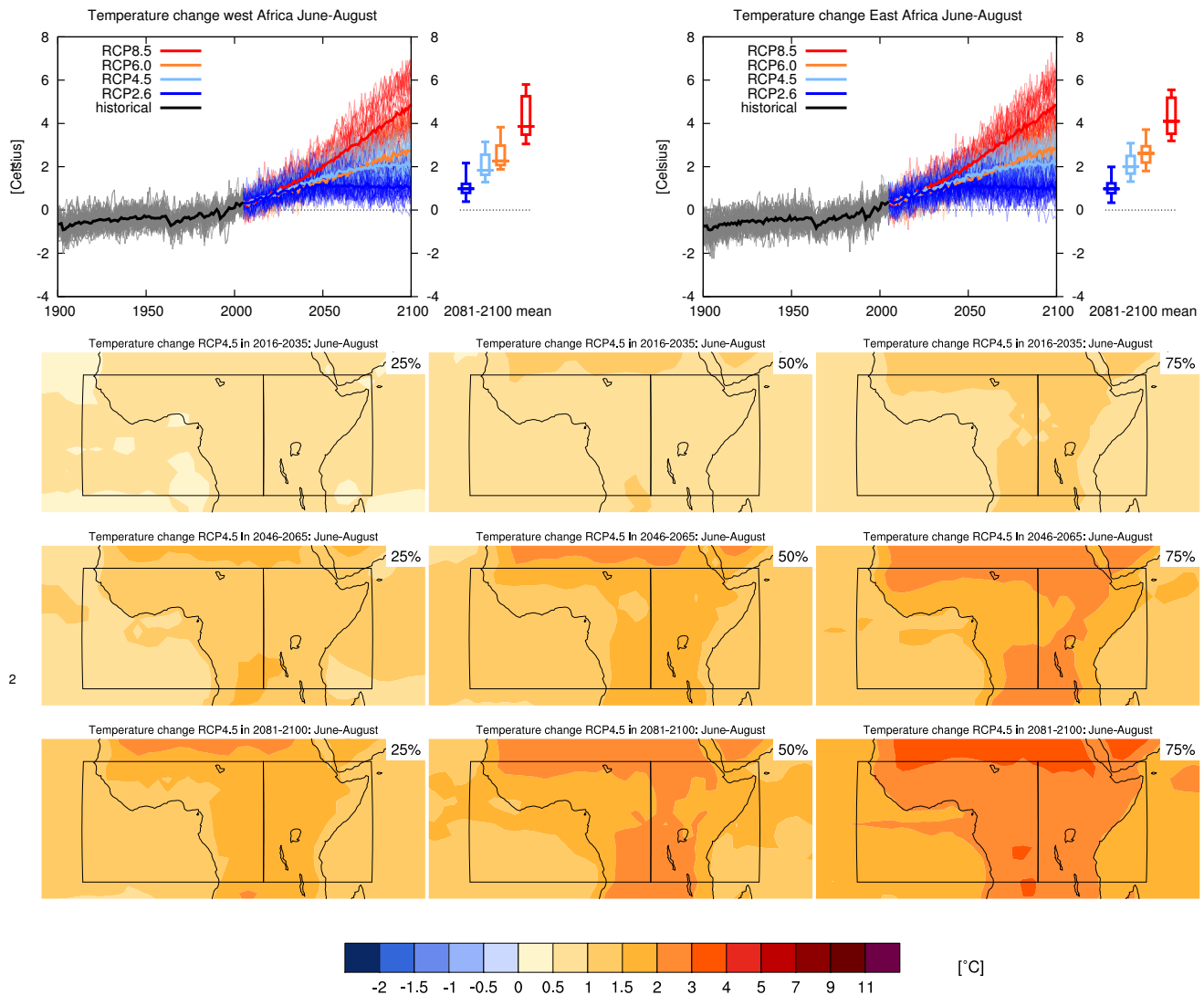
14 Sections 9.4.1.1, 9.6.1.1, Box 11.2, 12.4.5.2, 14.8.6, 14.8.7 contain relevant information regarding the evalua-
 15 tion of models in this region, the model spread in the context of other methods of projecting changes and the
 16 role of modes of variability and other climate phenomena.



3 **Figure AI.44:** Top left: time series of temperature change relative to 1986–2005 averaged over land grid
 4 points in west Africa (11.4°S – 15°N , 20°W – 25°E) in December–February. Top right: same for land grid
 5 points in East Africa (11.3°S – 15°N , 25° – 52°E). Thin lines denote one ensemble member per model, thick lines the
 6 CMIP5 multi-model mean. On the right-hand side the 5th, 25th, 50th (median), 75th and 95th percentiles of
 7 the distribution of 20-yr mean changes are given for 2081–2100 in the four RCP scenarios.

8 Below: maps of temperature changes in 2016–2035, 2046–2065 and 2081–2100 with respect to 1986–2005
 9 in the RCP4.5 scenario. For each point, the 25th, 50th and 75th percentile of the distribution of the CMIP5
 10 ensemble are shown, this includes both natural variability and inter-model spread. Hatching denotes areas
 11 where the 20-yr mean differences of the percentiles are less than the standard deviation of model-estimated
 12 present-day natural variability of 20-yr mean differences.

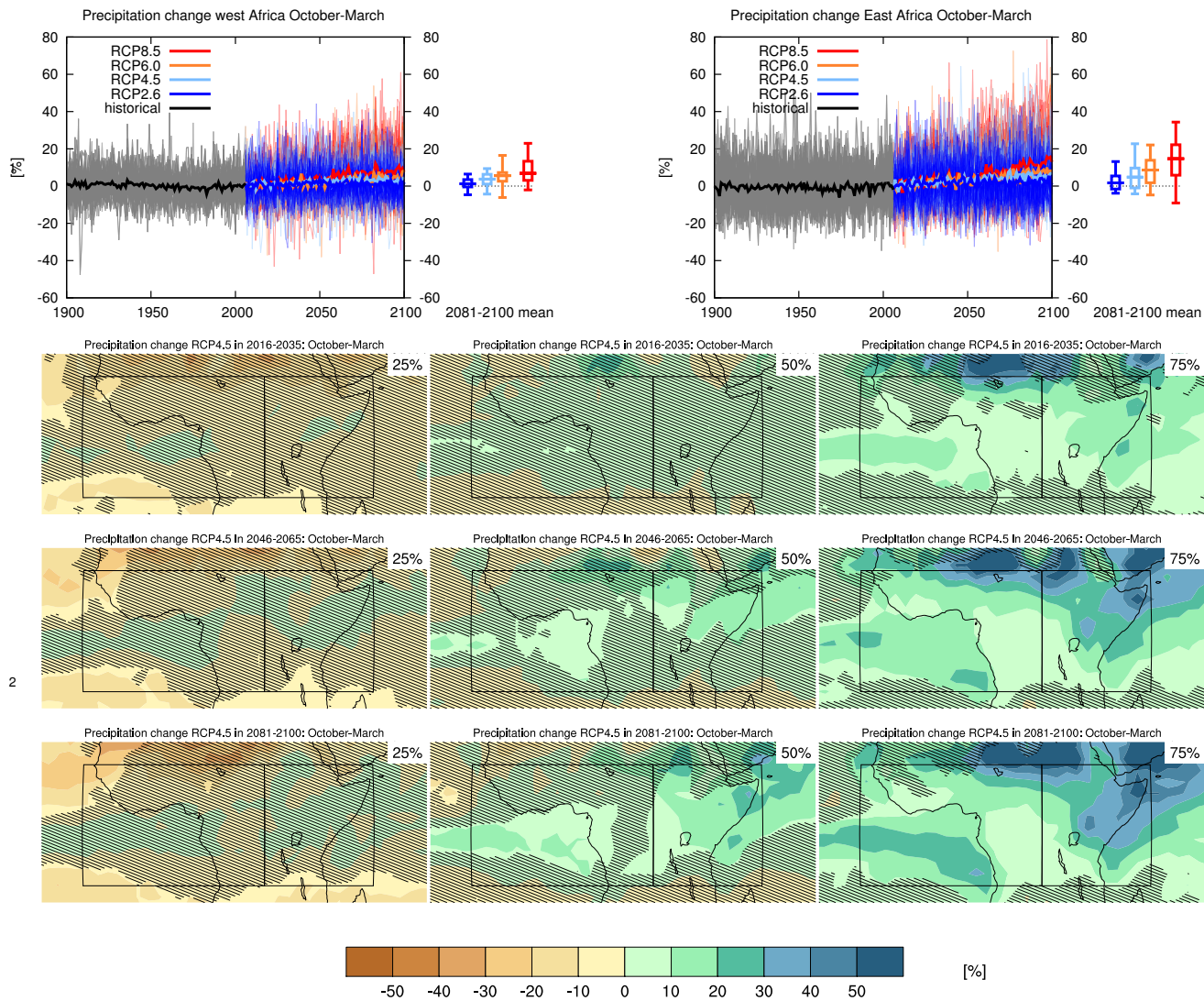
13 Sections 9.4.1.1, 9.6.1.1, 10.3.1.1.4, Box 11.2, 14.8.7 contain relevant information regarding the evaluation of
 14 models in this region, the model spread in the context of other methods of projecting changes and the role of
 15 modes of variability and other climate phenomena.



3 **Figure AI.45:** Top left: time series of temperature change relative to 1986–2005 averaged over land grid points
 4 in west Africa (11.4°S–15°N, 20°W–25°E) in June–August. Top right: same for land grid points in East Africa
 5 (11.3°S–15°N, 25°–52°E). Thin lines denote one ensemble member per model, thick lines the CMIP5 multi-
 6 model mean. On the right-hand side the 5th, 25th, 50th (median), 75th and 95th percentiles of the distribution
 7 of 20-yr mean changes are given for 2081–2100 in the four RCP scenarios.

8 Below: maps of temperature changes in 2016–2035, 2046–2065 and 2081–2100 with respect to 1986–2005
 9 in the RCP4.5 scenario. For each point, the 25th, 50th and 75th percentile of the distribution of the CMIP5
 10 ensemble are shown, this includes both natural variability and inter-model spread. Hatching denotes areas
 11 where the 20-yr mean differences of the percentiles are less than the standard deviation of model-estimated
 12 present-day natural variability of 20-yr mean differences.

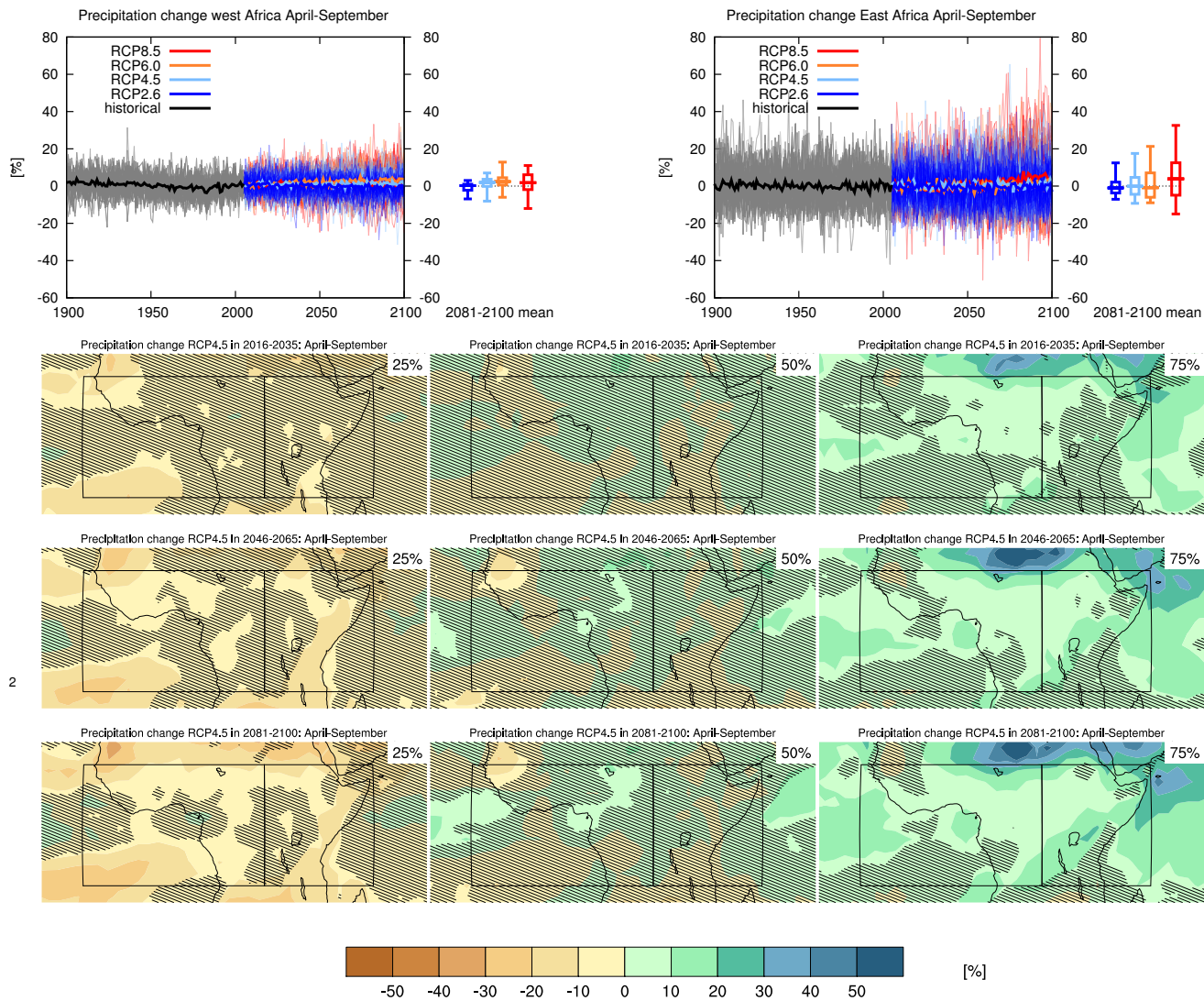
13 Sections 9.4.1.1, 9.6.1.1, 10.3.1.1.4, Box 11.2, 14.8.7 contain relevant information regarding the evaluation of
 14 models in this region, the model spread in the context of other methods of projecting changes and the role of
 15 modes of variability and other climate phenomena.



3 **Figure AI.46:** Top left: time series of relative change relative to 1986–2005 in precipitation averaged over land
 4 grid points in west Africa (11.4°S–15°N, 20°W–25°E) in October–March. Top right: same for land grid points
 5 in East Africa (11.3°S–15°N, 25°–52°E). Thin lines denote one ensemble member per model, thick lines the
 6 CMIP5 multi-model mean. On the right-hand side the 5th, 25th, 50th (median), 75th and 95th percentiles of
 7 the distribution of 20-yr mean changes are given for 2081–2100 in the four RCP scenarios.

8 Below: maps of precipitation changes in 2016–2035, 2046–2065 and 2081–2100 with respect to 1986–2005
 9 in the RCP4.5 scenario. For each point, the 25th, 50th and 75th percentile of the distribution of the CMIP5
 10 ensemble are shown, this includes both natural variability and inter-model spread. Hatching denotes areas
 11 where the 20-yr mean differences of the percentiles are less than the standard deviation of model-estimated
 12 present-day natural variability of 20-yr mean differences.

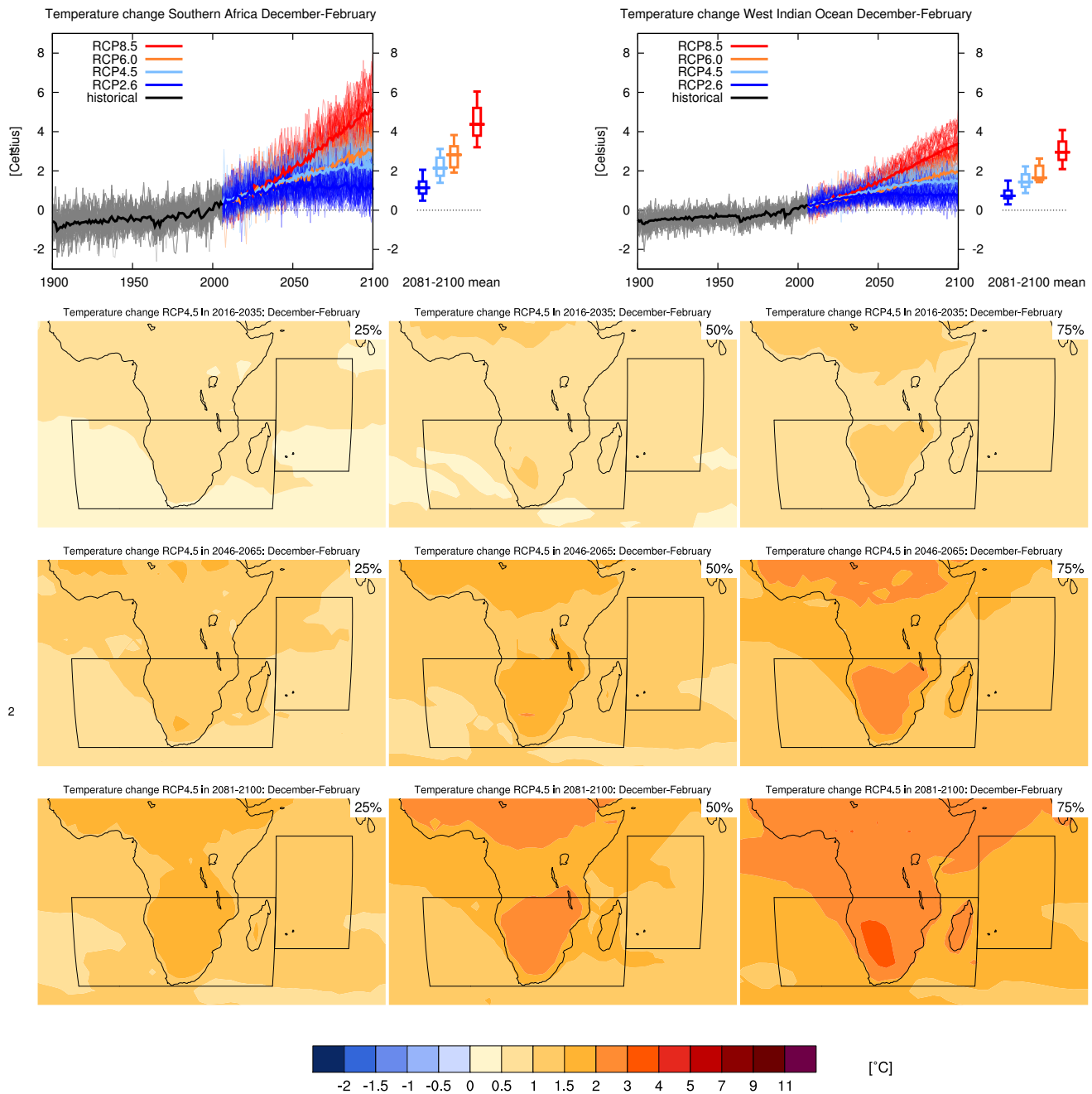
13 Sections 9.4.1.1, 9.6.1.1, 11.3.2.1.2, Box 11.2, 12.4.5.2, 14.2.4, 14.8.7 contain relevant information regarding
 14 the evaluation of models in this region, the model spread in the context of other methods of projecting changes
 15 and the role of modes of variability and other climate phenomena.



3 **Figure AI.47:** Top left: time series of relative change relative to 1986–2005 in precipitation averaged over
 4 land grid points in west Africa (11.4°S–15°N, 20°W–25°E) in April–September. Top right: same for land grid
 5 points in East Africa (11.3°S–15°N, 25°–52°E). Thin lines denote one ensemble member per model, thick lines
 6 the CMIP5 multi-model mean. On the right-hand side the 5th, 25th, 50th (median), 75th and 95th percentiles
 7 of the distribution of 20-yr mean changes are given for 2081–2100 in the four RCP scenarios.

8 Below: maps of precipitation changes in 2016–2035, 2046–2065 and 2081–2100 with respect to 1986–2005
 9 in the RCP4.5 scenario. For each point, the 25th, 50th and 75th percentile of the distribution of the CMIP5
 10 ensemble are shown, this includes both natural variability and inter-model spread. Hatching denotes areas
 11 where the 20-yr mean differences of the percentiles are less than the standard deviation of model-estimated
 12 present-day natural variability of 20-yr mean differences.

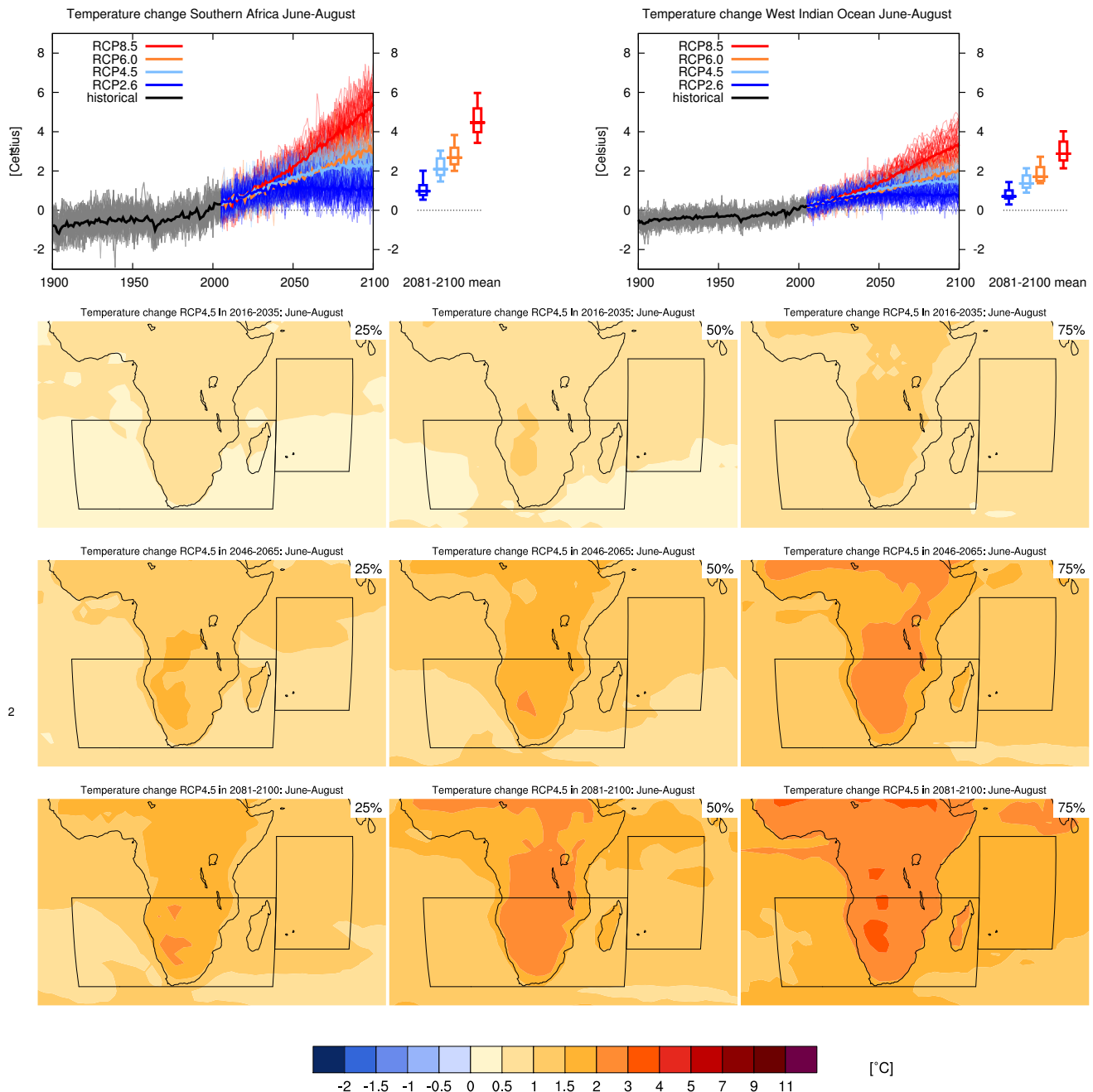
13 Sections 9.4.1.1, 9.6.1.1, 11.3.2.1.2, Box 11.2, 12.4.5.2, 14.2.4, 14.8.7 contain relevant information regarding
 14 the evaluation of models in this region, the model spread in the context of other methods of projecting changes
 15 and the role of modes of variability and other climate phenomena.



3 **Figure AI.48:** Top left: time series of temperature change relative to 1986–2005 averaged over land grid points
 4 in Southern Africa (35°–11.4°S, 10°W–52°E) in December–February. Top right: same for sea grid points in
 5 the West Indian Ocean (25°S–5°N, 52°–75°E). Thin lines denote one ensemble member per model, thick lines
 6 the CMIP5 multi-model mean. On the right-hand side the 5th, 25th, 50th (median), 75th and 95th percentiles
 7 of the distribution of 20-yr mean changes are given for 2081–2100 in the four RCP scenarios.

8 Below: maps of temperature changes in 2016–2035, 2046–2065 and 2081–2100 with respect to 1986–2005
 9 in the RCP4.5 scenario. For each point, the 25th, 50th and 75th percentile of the distribution of the CMIP5
 10 ensemble are shown, this includes both natural variability and inter-model spread. Hatching denotes areas
 11 where the 20-yr mean differences of the percentiles are less than the standard deviation of model-estimated
 12 present-day natural variability of 20-yr mean differences.

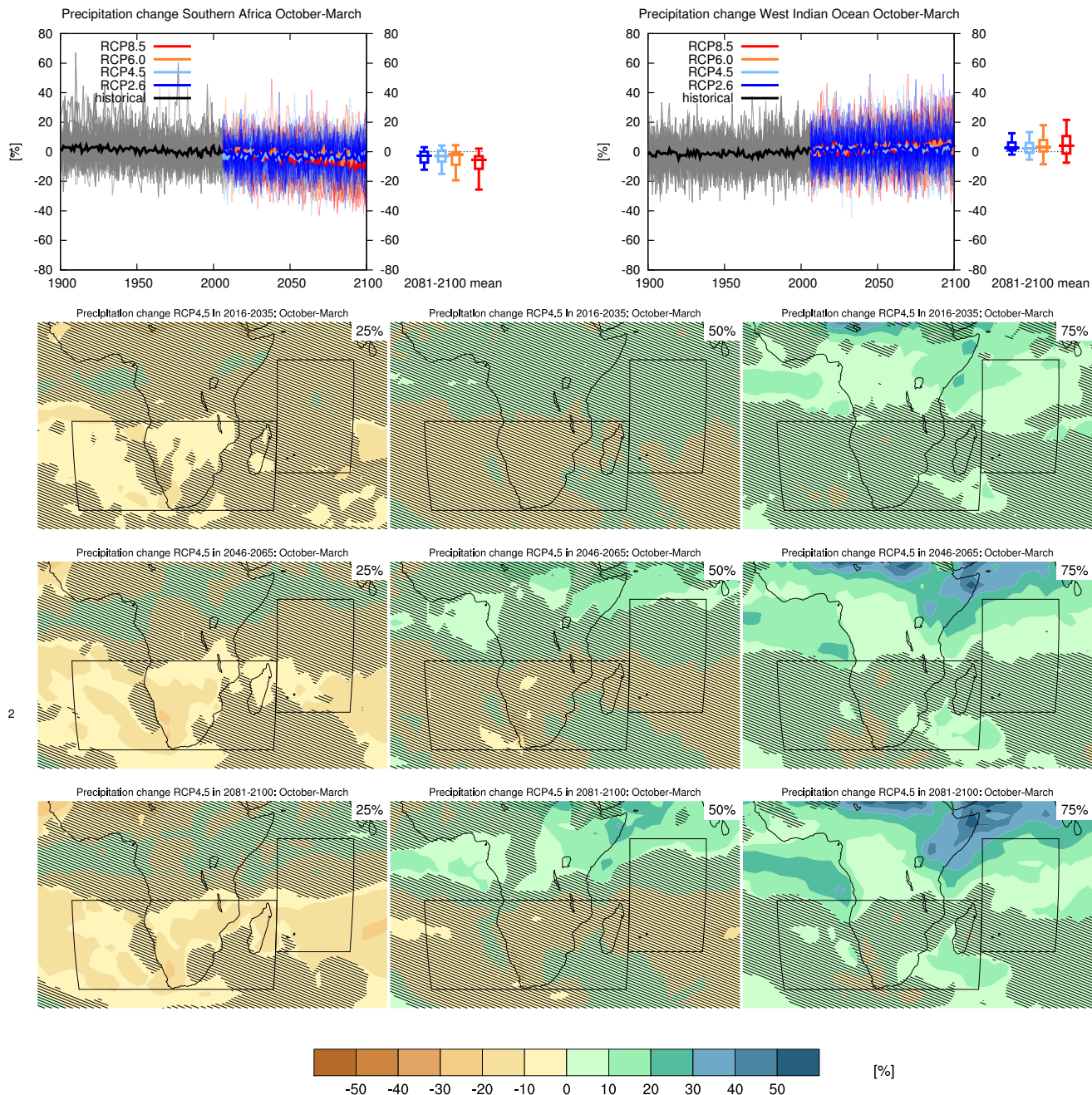
13 Sections 9.4.1.1, 9.6.1.1, 10.3.1.1.4, Box 11.2, 14.8.7 contain relevant information regarding the evaluation of
 14 models in this region, the model spread in the context of other methods of projecting changes and the role of
 15 modes of variability and other climate phenomena.



3 **Figure AI.49:** Top left: time series of temperature change relative to 1986–2005 averaged over land grid
 4 points in Southern Africa (35° – 11.4° S, 10° W– 52° E) in June–August. Top right: same for sea grid points in the
 5 West Indian Ocean (25° S– 5° N, 52° – 75° E). Thin lines denote one ensemble member per model, thick lines the
 6 CMIP5 multi-model mean. On the right-hand side the 5th, 25th, 50th (median), 75th and 95th percentiles of
 7 the distribution of 20-yr mean changes are given for 2081–2100 in the four RCP scenarios.

8 Below: maps of temperature changes in 2016–2035, 2046–2065 and 2081–2100 with respect to 1986–2005
 9 in the RCP4.5 scenario. For each point, the 25th, 50th and 75th percentile of the distribution of the CMIP5
 10 ensemble are shown, this includes both natural variability and inter-model spread. Hatching denotes areas
 11 where the 20-yr mean differences of the percentiles are less than the standard deviation of model-estimated
 12 present-day natural variability of 20-yr mean differences.

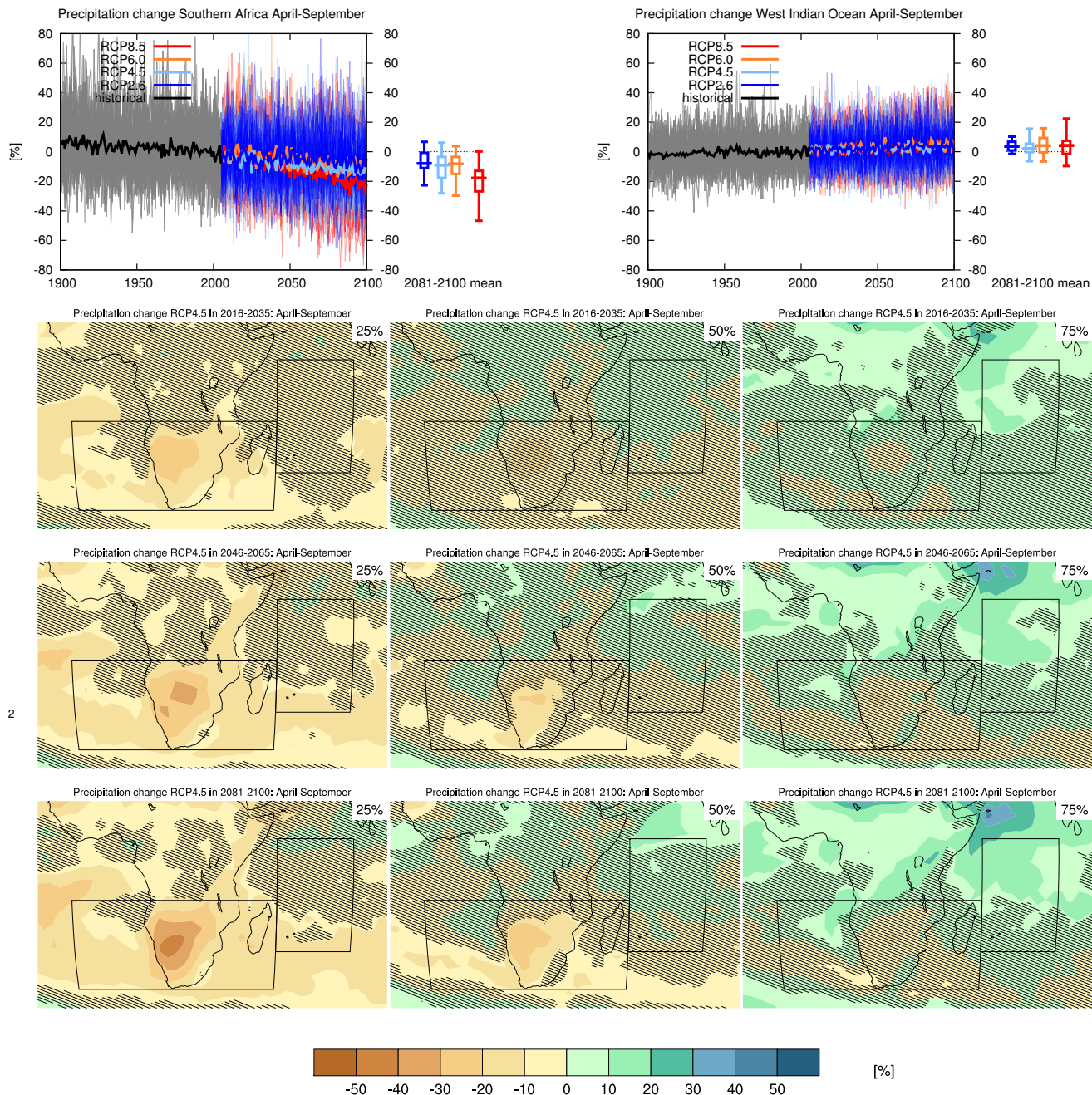
13 Sections 9.4.1.1, 9.6.1.1, 10.3.1.1.4, Box 11.2, 14.8.7 contain relevant information regarding the evaluation of
 14 models in this region, the model spread in the context of other methods of projecting changes and the role of
 15 modes of variability and other climate phenomena.



3 **Figure AI.50:** Top left: time series of relative change relative to 1986–2005 in precipitation averaged over
 4 land grid points in Southern Africa (35° – 11.4° S, 10° W– 52° E) in October–March. Top right: same for sea grid
 5 points in the West Indian Ocean (25° S– 5° N, 52° – 75° E). Thin lines denote one ensemble member per model,
 6 thick lines the CMIP5 multi-model mean. On the right-hand side the 5th, 25th, 50th (median), 75th and 95th
 7 percentiles of the distribution of 20-yr mean changes are given for 2081–2100 in the four RCP scenarios.

8 Below: maps of precipitation changes in 2016–2035, 2046–2065 and 2081–2100 with respect to 1986–2005
 9 in the RCP4.5 scenario. For each point, the 25th, 50th and 75th percentile of the distribution of the CMIP5
 10 ensemble are shown, this includes both natural variability and inter-model spread. Hatching denotes areas
 11 where the 20-yr mean differences of the percentiles are less than the standard deviation of model-estimated
 12 present-day natural variability of 20-yr mean differences.

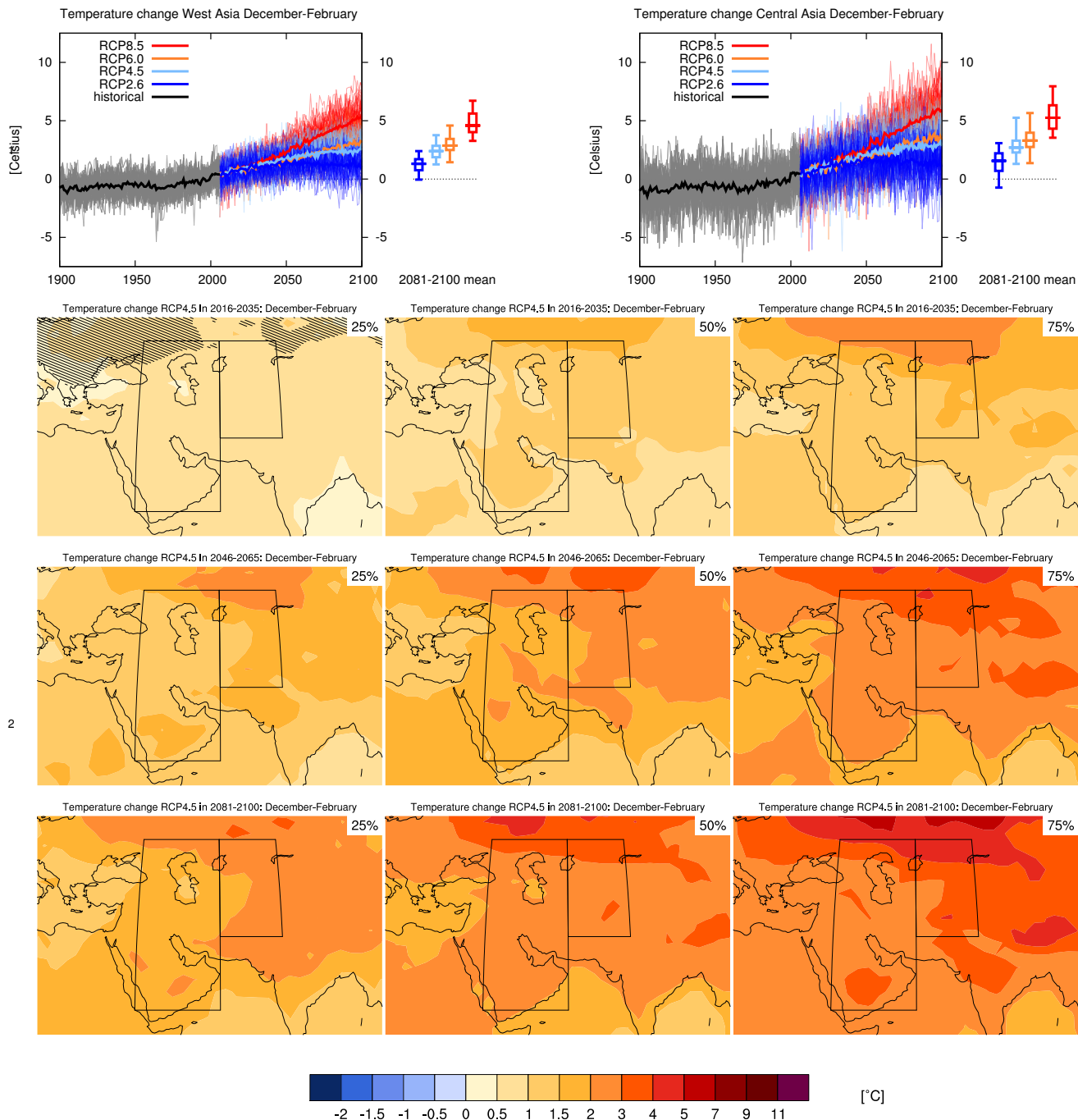
13 Sections 9.4.1.1, 9.6.1.1, Box 11.2, 12.4.5.2, 14.8.7 contain relevant information regarding the evaluation of
 14 models in this region, the model spread in the context of other methods of projecting changes and the role of
 15 modes of variability and other climate phenomena.



3 **Figure AI.51:** Top left: time series of relative change relative to 1986–2005 in precipitation averaged over land
 4 grid points in Southern Africa (35° – 11.4° S, 10° W– 52° E) in April–September. Top right: same for sea grid
 5 points in the West Indian Ocean (25° S– 5° N, 52° – 75° E). Thin lines denote one ensemble member per model,
 6 thick lines the CMIP5 multi-model mean. On the right-hand side the 5th, 25th, 50th (median), 75th and 95th
 7 percentiles of the distribution of 20-yr mean changes are given for 2081–2100 in the four RCP scenarios.

8 Below: maps of precipitation changes in 2016–2035, 2046–2065 and 2081–2100 with respect to 1986–2005
 9 in the RCP4.5 scenario. For each point, the 25th, 50th and 75th percentile of the distribution of the CMIP5
 10 ensemble are shown, this includes both natural variability and inter-model spread. Hatching denotes areas
 11 where the 20-yr mean differences of the percentiles are less than the standard deviation of model-estimated
 12 present-day natural variability of 20-yr mean differences.

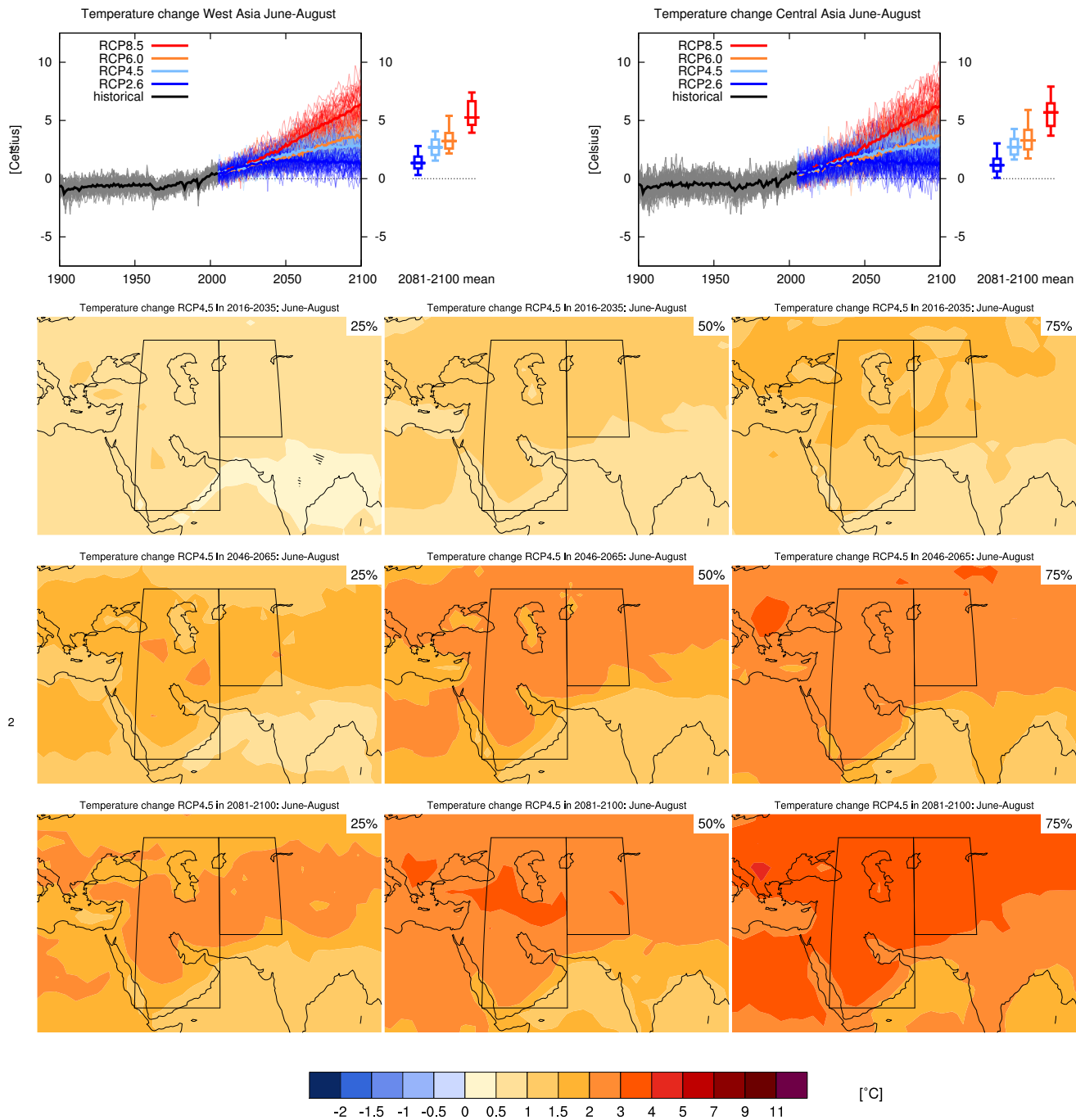
13 Sections 9.4.1.1, 9.6.1.1, Box 11.2, 12.4.5.2, 14.8.7 contain relevant information regarding the evaluation of
 14 models in this region, the model spread in the context of other methods of projecting changes and the role of
 15 modes of variability and other climate phenomena.



3 **Figure AI.52:** Top left: time series of temperature change relative to 1986–2005 averaged over land grid points
 4 in West Asia (15° – 50° N, 40° – 60° E) in December–February. Top right: same for land grid points in Central
 5 Asia (30° – 50° N, 60° – 75° E). Thin lines denote one ensemble member per model, thick lines the CMIP5 multi-
 6 model mean. On the right-hand side the 5th, 25th, 50th (median), 75th and 95th percentiles of the distribution
 7 of 20-yr mean changes are given for 2081–2100 in the four RCP scenarios.

8 Below: maps of temperature changes in 2016–2035, 2046–2065 and 2081–2100 with respect to 1986–2005
 9 in the RCP4.5 scenario. For each point, the 25th, 50th and 75th percentile of the distribution of the CMIP5
 10 ensemble are shown, this includes both natural variability and inter-model spread. Hatching denotes areas
 11 where the 20-yr mean differences of the percentiles are less than the standard deviation of model-estimated
 12 present-day natural variability of 20-yr mean differences.

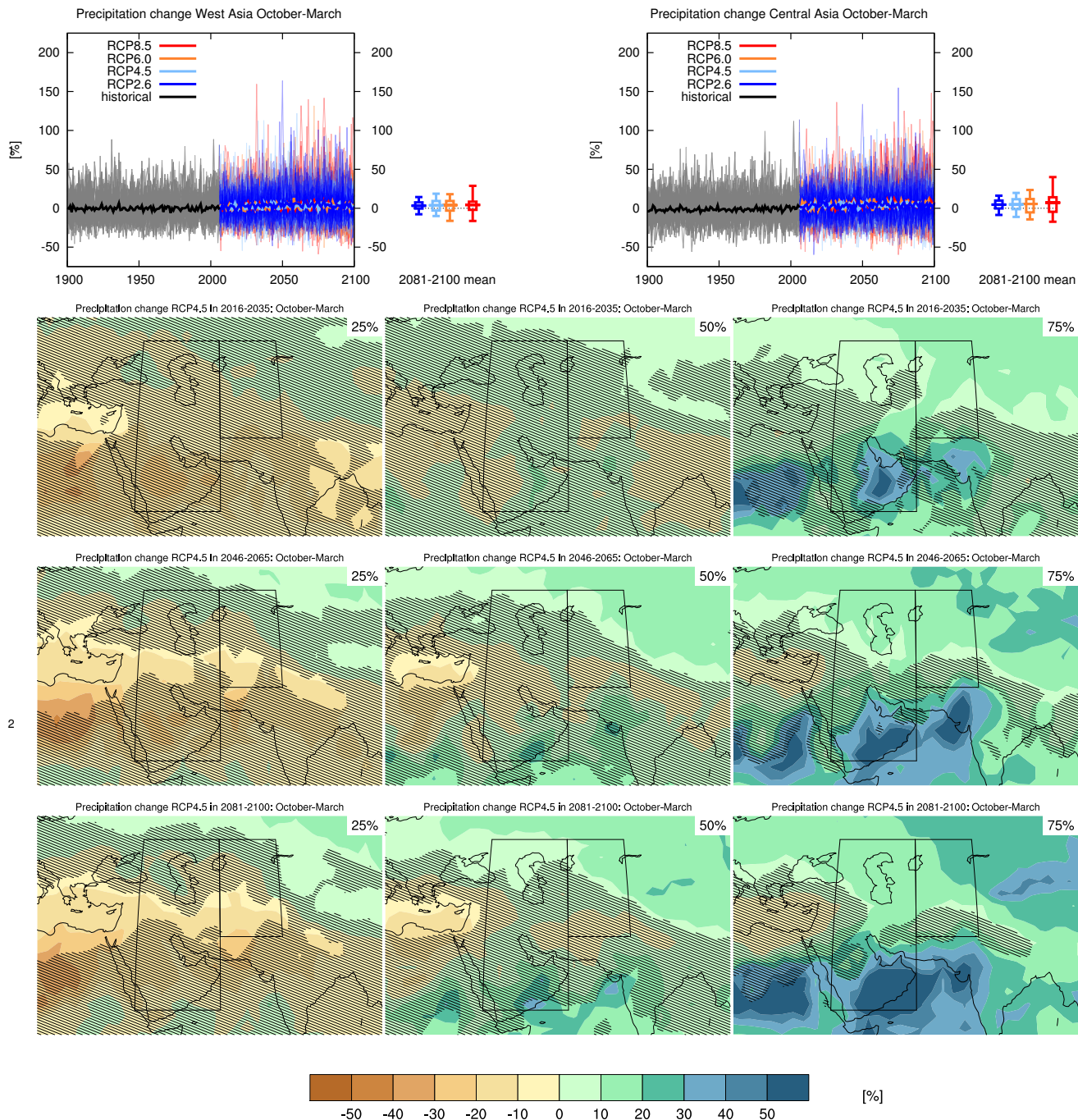
13 Sections 9.4.1.1, 9.6.1.1, 10.3.1.1.4, Box 11.2, 14.8.8, 14.8.10 contain relevant information regarding the eval-
 14 uation of models in this region, the model spread in the context of other methods of projecting changes and the
 15 role of modes of variability and other climate phenomena.



3 **Figure AI.53:** Top left: time series of temperature change relative to 1986–2005 averaged over land grid points
 4 in West Asia (15° – 50° N, 40° – 60° E) in June–August. Top right: same for land grid points in Central Asia (30° –
 5 50° N, 60° – 75° E). Thin lines denote one ensemble member per model, thick lines the CMIP5 multi-model
 6 mean. On the right-hand side the 5th, 25th, 50th (median), 75th and 95th percentiles of the distribution of 20-yr
 7 mean changes are given for 2081–2100 in the four RCP scenarios.

8 Below: maps of temperature changes in 2016–2035, 2046–2065 and 2081–2100 with respect to 1986–2005
 9 in the RCP4.5 scenario. For each point, the 25th, 50th and 75th percentile of the distribution of the CMIP5
 10 ensemble are shown, this includes both natural variability and inter-model spread. Hatching denotes areas
 11 where the 20-yr mean differences of the percentiles are less than the standard deviation of model-estimated
 12 present-day natural variability of 20-yr mean differences.

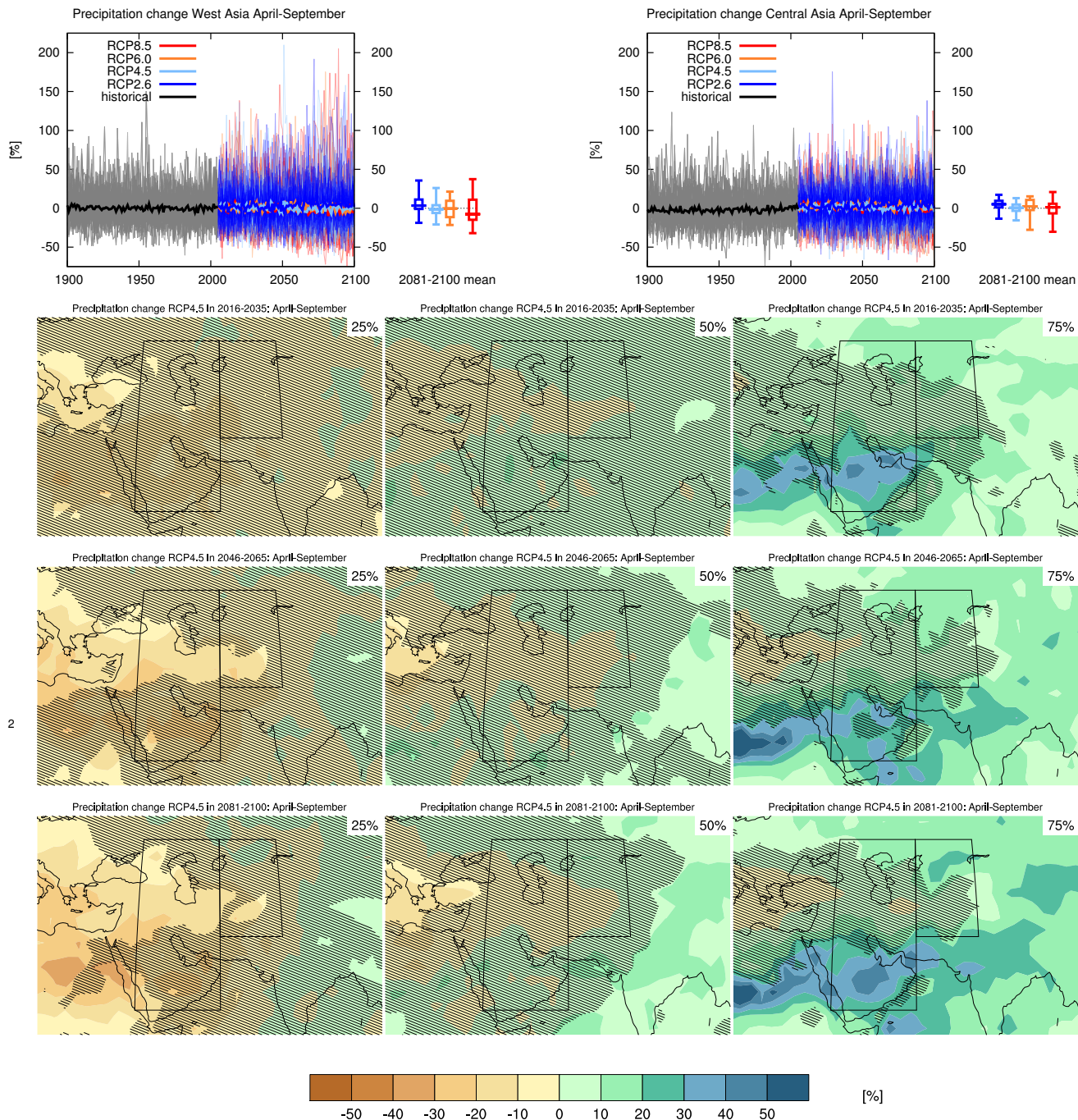
13 Sections 9.4.1.1, 9.6.1.1, 10.3.1.1.4, Box 11.2, 14.8.8, 14.8.10 contain relevant information regarding the eval-
 14 uation of models in this region, the model spread in the context of other methods of projecting changes and the
 15 role of modes of variability and other climate phenomena.



3 **Figure AI.54:** Top left: time series of relative change relative to 1986–2005 in precipitation averaged over
 4 land grid points in West Asia (15° – 50° N, 40° – 60° E) in October–March. Top right: same for land grid points
 5 in Central Asia (30° – 50° N, 60° – 75° E). Thin lines denote one ensemble member per model, thick lines the
 6 CMIP5 multi-model mean. On the right-hand side the 5th, 25th, 50th (median), 75th and 95th percentiles of
 7 the distribution of 20-yr mean changes are given for 2081–2100 in the four RCP scenarios.

8 Below: maps of precipitation changes in 2016–2035, 2046–2065 and 2081–2100 with respect to 1986–2005
 9 in the RCP4.5 scenario. For each point, the 25th, 50th and 75th percentile of the distribution of the CMIP5
 10 ensemble are shown, this includes both natural variability and inter-model spread. Hatching denotes areas
 11 where the 20-yr mean differences of the percentiles are less than the standard deviation of model-estimated
 12 present-day natural variability of 20-yr mean differences.

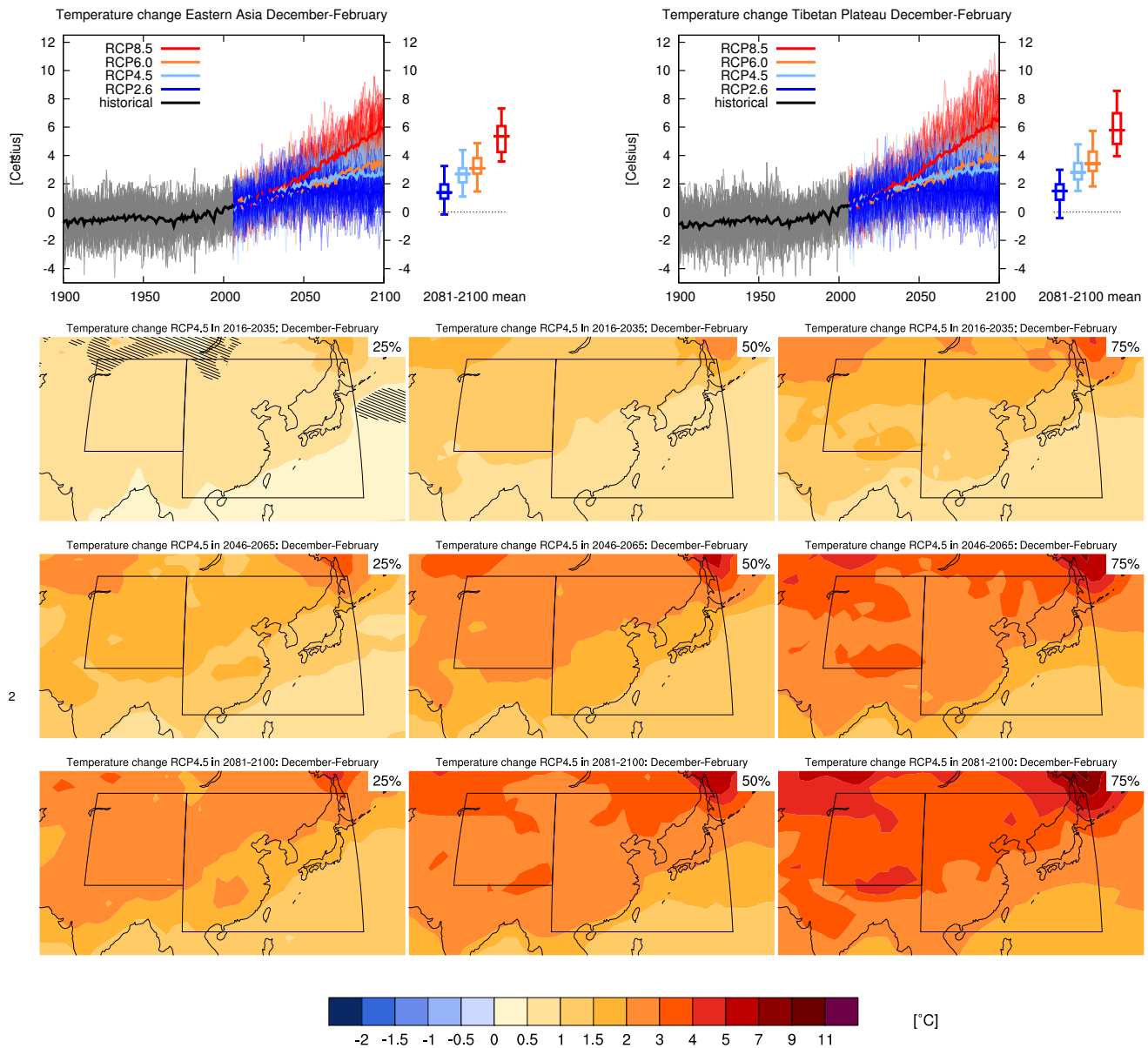
13 Sections 9.4.1.1, 9.6.1.1, Box 11.2, 12.4.5.2, 14.8.8, 14.8.10 contain relevant information regarding the evalu-
 14 ation of models in this region, the model spread in the context of other methods of projecting changes and the
 15 role of modes of variability and other climate phenomena.



3 **Figure AI.55:** Top left: time series of relative change relative to 1986–2005 in precipitation averaged over
 4 land grid points in West Asia (15° – 50° N, 40° – 60° E) in April–September. Top right: same for land grid points
 5 in Central Asia (30° – 50° N, 60° – 75° E). Thin lines denote one ensemble member per model, thick lines the
 6 CMIP5 multi-model mean. On the right-hand side the 5th, 25th, 50th (median), 75th and 95th percentiles of
 7 the distribution of 20-yr mean changes are given for 2081–2100 in the four RCP scenarios.

8 Below: maps of precipitation changes in 2016–2035, 2046–2065 and 2081–2100 with respect to 1986–2005
 9 in the RCP4.5 scenario. For each point, the 25th, 50th and 75th percentile of the distribution of the CMIP5
 10 ensemble are shown, this includes both natural variability and inter-model spread. Hatching denotes areas
 11 where the 20-yr mean differences of the percentiles are less than the standard deviation of model-estimated
 12 present-day natural variability of 20-yr mean differences.

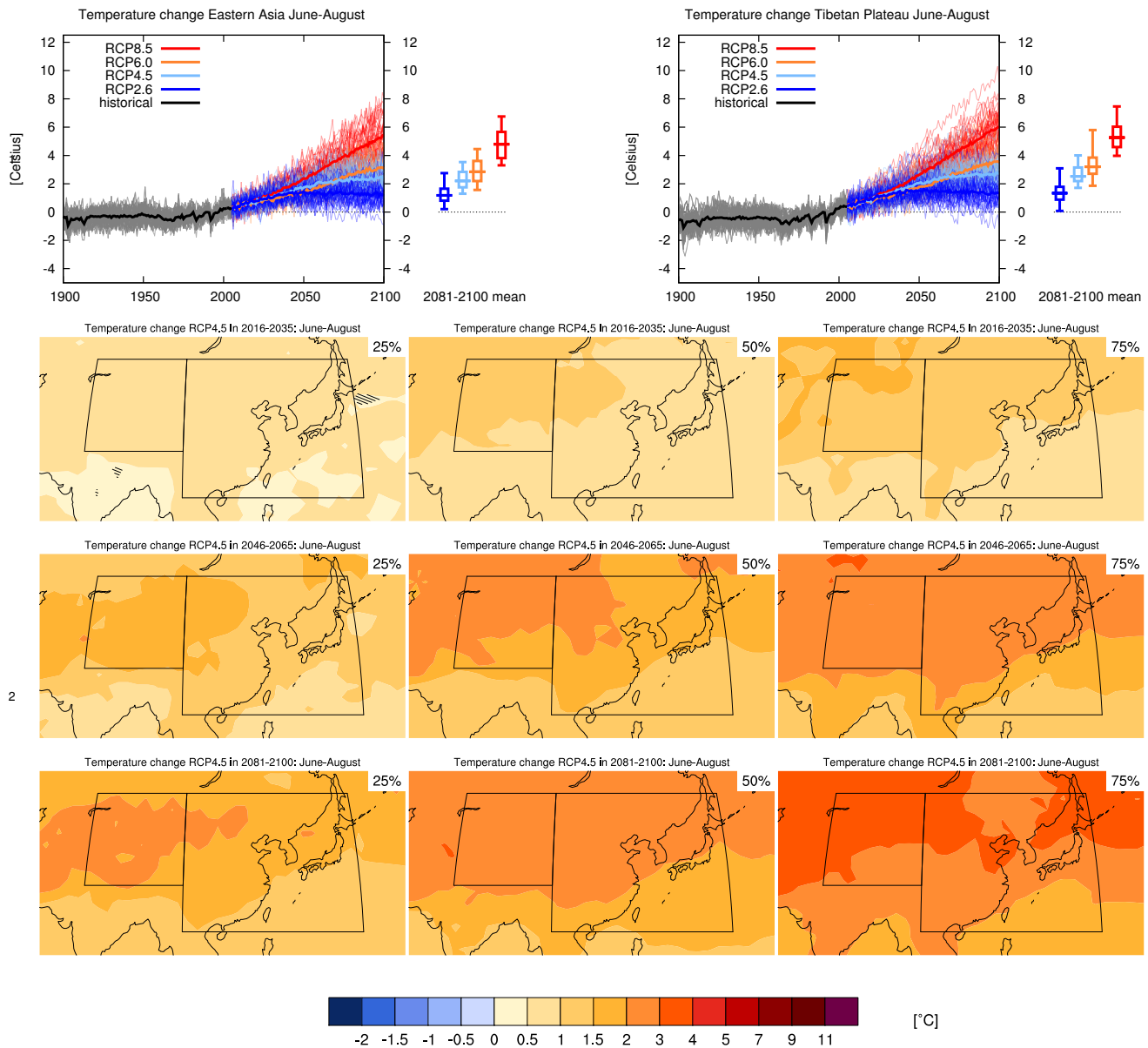
13 Sections 9.4.1.1, 9.6.1.1, Box 11.2, 12.4.5.2, 14.8.8, 14.8.10 contain relevant information regarding the evalu-
 14 ation of models in this region, the model spread in the context of other methods of projecting changes and the
 15 role of modes of variability and other climate phenomena.



3 **Figure AI.56:** Top left: time series of temperature change relative to 1986–2005 averaged over land grid points
 4 in Eastern Asia (20° – 50° N, 100° – 145° E) in December–February. Top right: same for land grid points on the
 5 Tibetan Plateau (30° – 50° N, 75° – 100° E). Thin lines denote one ensemble member per model, thick lines the
 6 CMIP5 multi-model mean. On the right-hand side the 5th, 25th, 50th (median), 75th and 95th percentiles of
 7 the distribution of 20-yr mean changes are given for 2081–2100 in the four RCP scenarios.

8 Below: maps of temperature changes in 2016–2035, 2046–2065 and 2081–2100 with respect to 1986–2005
 9 in the RCP4.5 scenario. For each point, the 25th, 50th and 75th percentile of the distribution of the CMIP5
 10 ensemble are shown, this includes both natural variability and inter-model spread. Hatching denotes areas
 11 where the 20-yr mean differences of the percentiles are less than the standard deviation of model-estimated
 12 present-day natural variability of 20-yr mean differences.

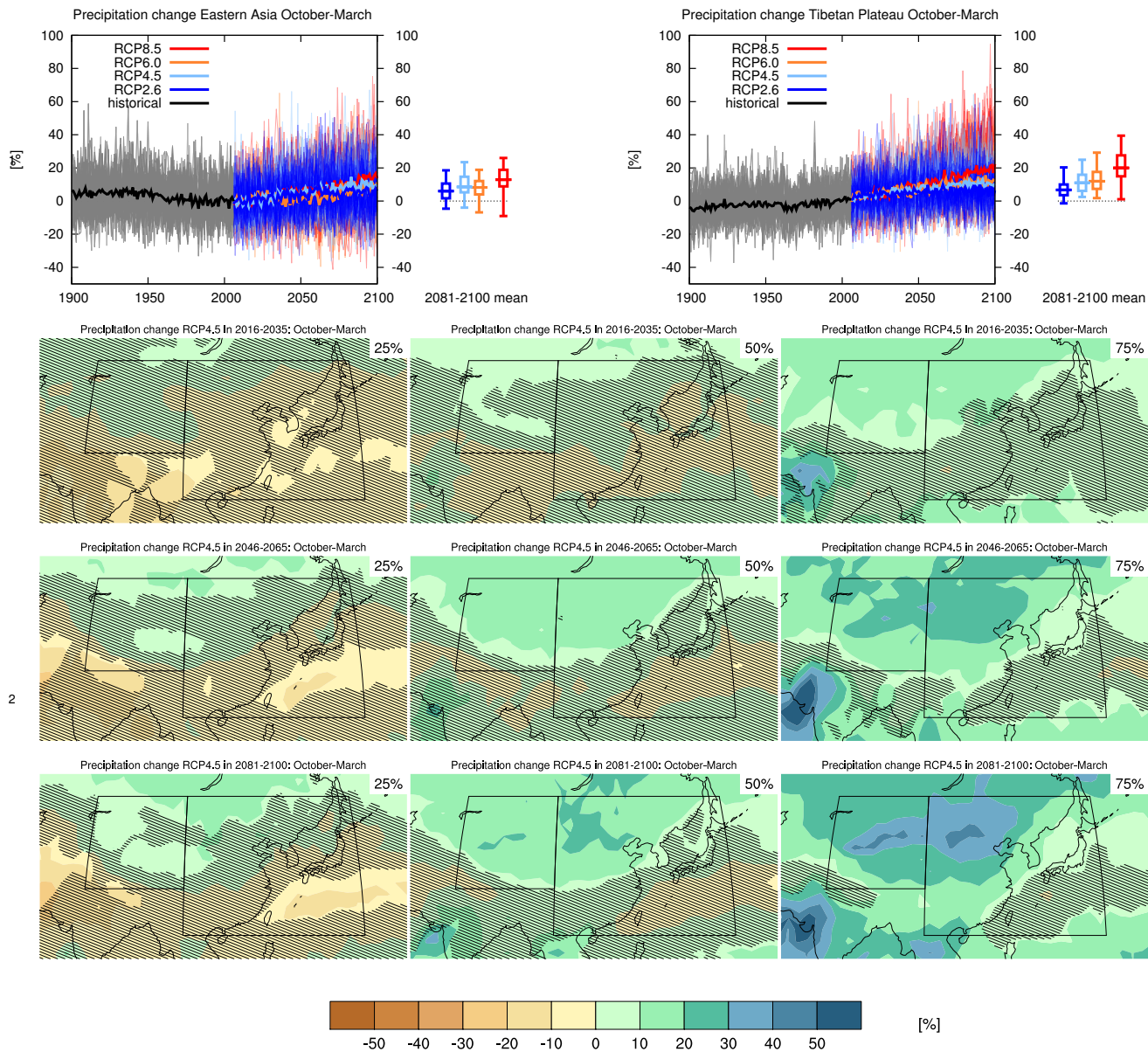
13 Sections 9.4.1.1, 9.6.1.1, 10.3.1.1.4, Box 11.2, 14.8.8, 14.8.9 contain relevant information regarding the evalu-
 14 ation of models in this region, the model spread in the context of other methods of projecting changes and the
 15 role of modes of variability and other climate phenomena.



3 **Figure AI.57:** Top left: time series of temperature change relative to 1986–2005 averaged over land grid
 4 points in Eastern Asia (20° – 50° N, 100° – 145° E) in June–August. Top right: same for land grid points on the
 5 Tibetan Plateau (30° – 50° N, 75° – 100° E). Thin lines denote one ensemble member per model, thick lines the
 6 CMIP5 multi-model mean. On the right-hand side the 5th, 25th, 50th (median), 75th and 95th percentiles of
 7 the distribution of 20-yr mean changes are given for 2081–2100 in the four RCP scenarios.

8 Below: maps of temperature changes in 2016–2035, 2046–2065 and 2081–2100 with respect to 1986–2005
 9 in the RCP4.5 scenario. For each point, the 25th, 50th and 75th percentile of the distribution of the CMIP5
 10 ensemble are shown, this includes both natural variability and inter-model spread. Hatching denotes areas
 11 where the 20-yr mean differences of the percentiles are less than the standard deviation of model-estimated
 12 present-day natural variability of 20-yr mean differences.

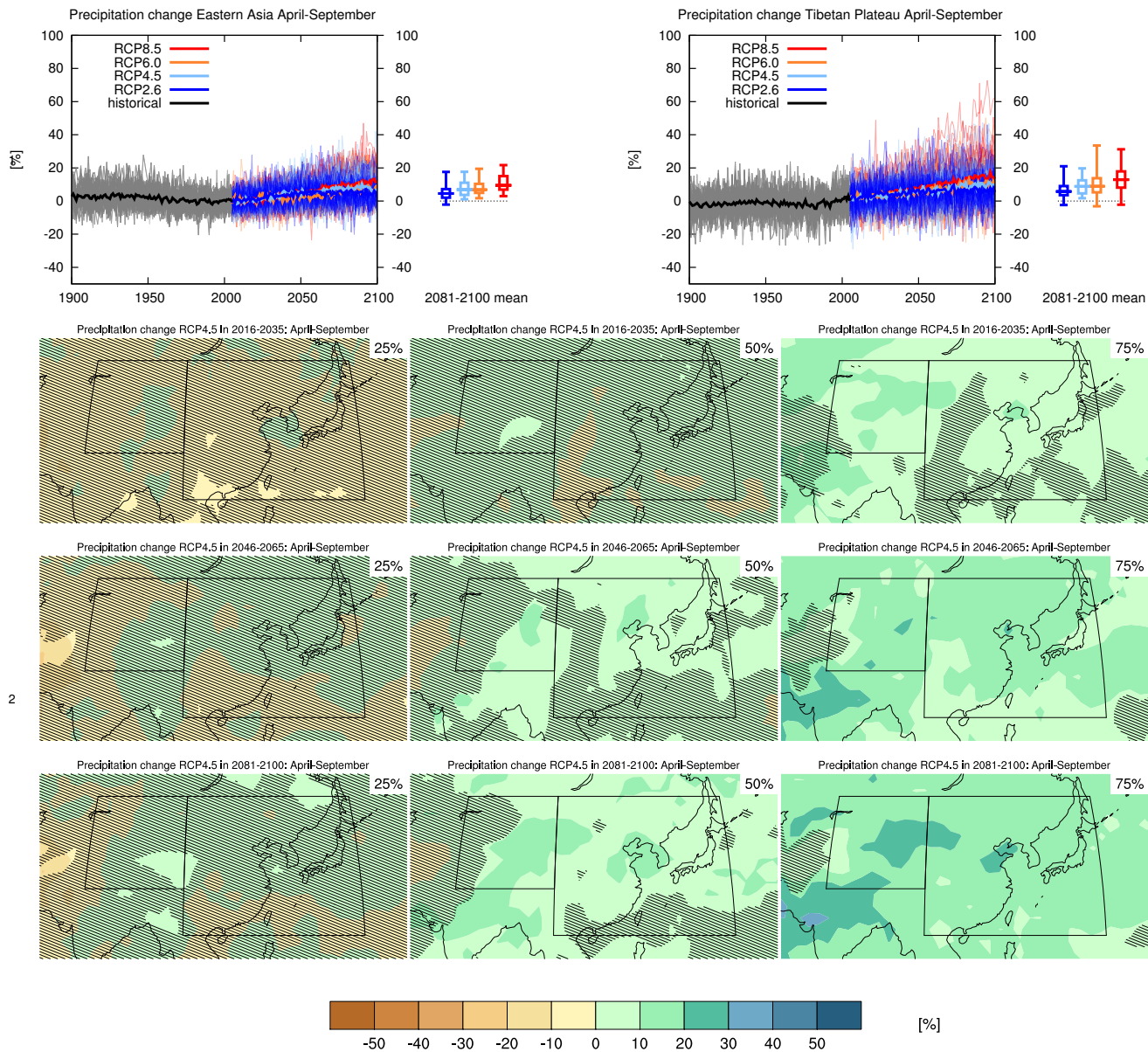
13 Sections 9.4.1.1, 9.6.1.1, 10.3.1.1.4, Box 11.2, 14.8.8, 14.8.9 contain relevant information regarding the evalu-
 14 ation of models in this region, the model spread in the context of other methods of projecting changes and the
 15 role of modes of variability and other climate phenomena.



3 **Figure AI.58:** Top left: time series of relative change relative to 1986–2005 in precipitation averaged over land
 4 grid points in Eastern Asia (20° – 50° N, 100° – 145° E) in October–March. Top right: same for land grid points
 5 on the Tibetan Plateau (30° – 50° N, 75° – 100° E). Thin lines denote one ensemble member per model, thick lines
 6 the CMIP5 multi-model mean. On the right-hand side the 5th, 25th, 50th (median), 75th and 95th percentiles
 7 of the distribution of 20-yr mean changes are given for 2081–2100 in the four RCP scenarios.

8 Below: maps of precipitation changes in 2016–2035, 2046–2065 and 2081–2100 with respect to 1986–2005
 9 in the RCP4.5 scenario. For each point, the 25th, 50th and 75th percentile of the distribution of the CMIP5
 10 ensemble are shown, this includes both natural variability and inter-model spread. Hatching denotes areas
 11 where the 20-yr mean differences of the percentiles are less than the standard deviation of model-estimated
 12 present-day natural variability of 20-yr mean differences.

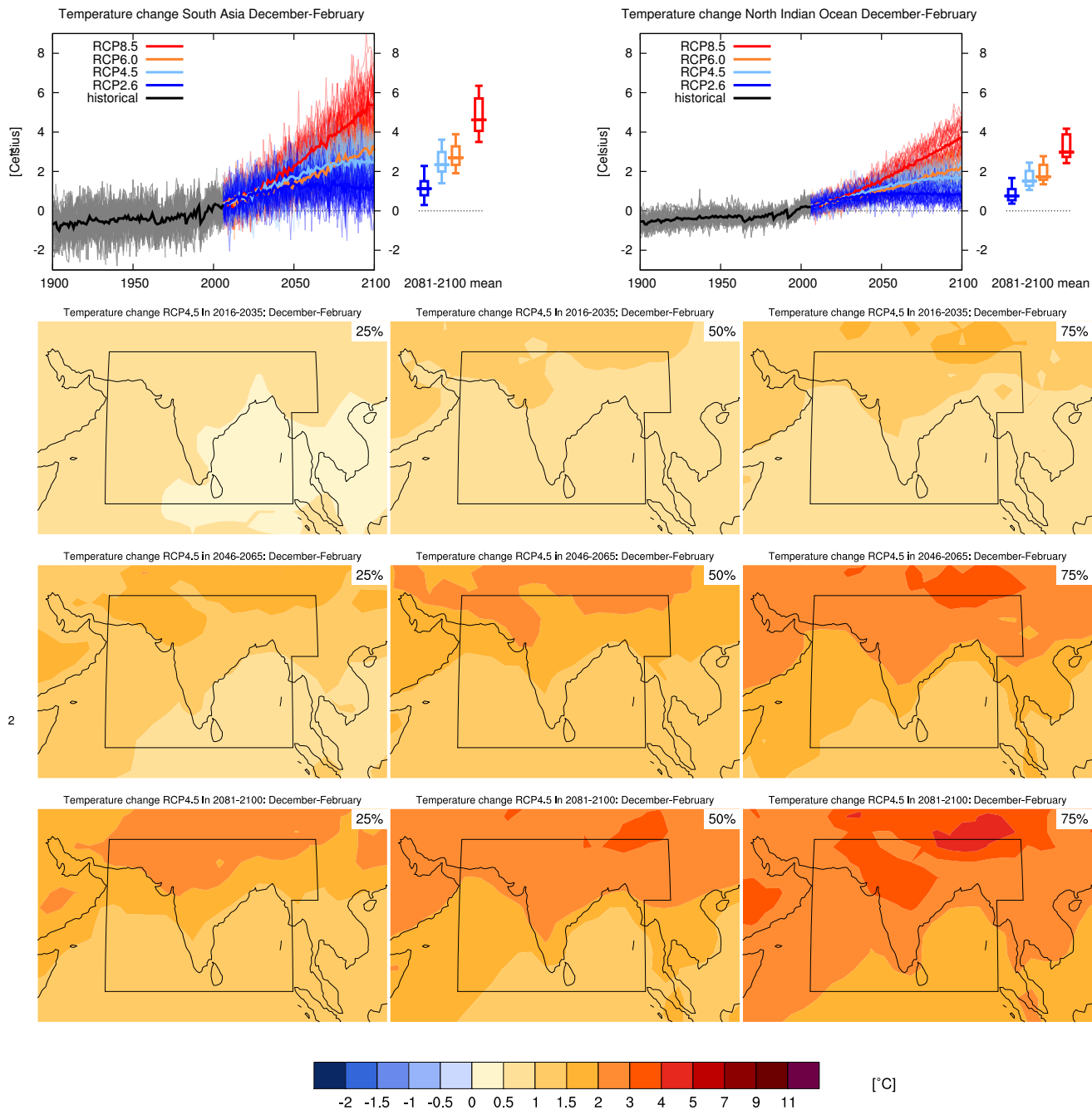
13 Sections 9.4.1.1, 9.6.1.1, Box 11.2, 14.2.2.2, 14.8.8, 14.8.9 contain relevant information regarding the evalua-
 14 tion of models in this region, the model spread in the context of other methods of projecting changes and the
 15 role of modes of variability and other climate phenomena.



3 **Figure AI.59:** Top left: time series of relative change relative to 1986–2005 in precipitation averaged over land
 4 grid points in Eastern Asia (20° – 50° N, 100° – 145° E) in April–September. Top right: same for land grid points
 5 on the Tibetan Plateau (30° – 50° N, 75° – 100° E). Thin lines denote one ensemble member per model, thick lines
 6 the CMIP5 multi-model mean. On the right-hand side the 5th, 25th, 50th (median), 75th and 95th percentiles
 7 of the distribution of 20-yr mean changes are given for 2081–2100 in the four RCP scenarios.

8 Below: maps of precipitation changes in 2016–2035, 2046–2065 and 2081–2100 with respect to 1986–2005
 9 in the RCP4.5 scenario. For each point, the 25th, 50th and 75th percentile of the distribution of the CMIP5
 10 ensemble are shown, this includes both natural variability and inter-model spread. Hatching denotes areas
 11 where the 20-yr mean differences of the percentiles are less than the standard deviation of model-estimated
 12 present-day natural variability of 20-yr mean differences.

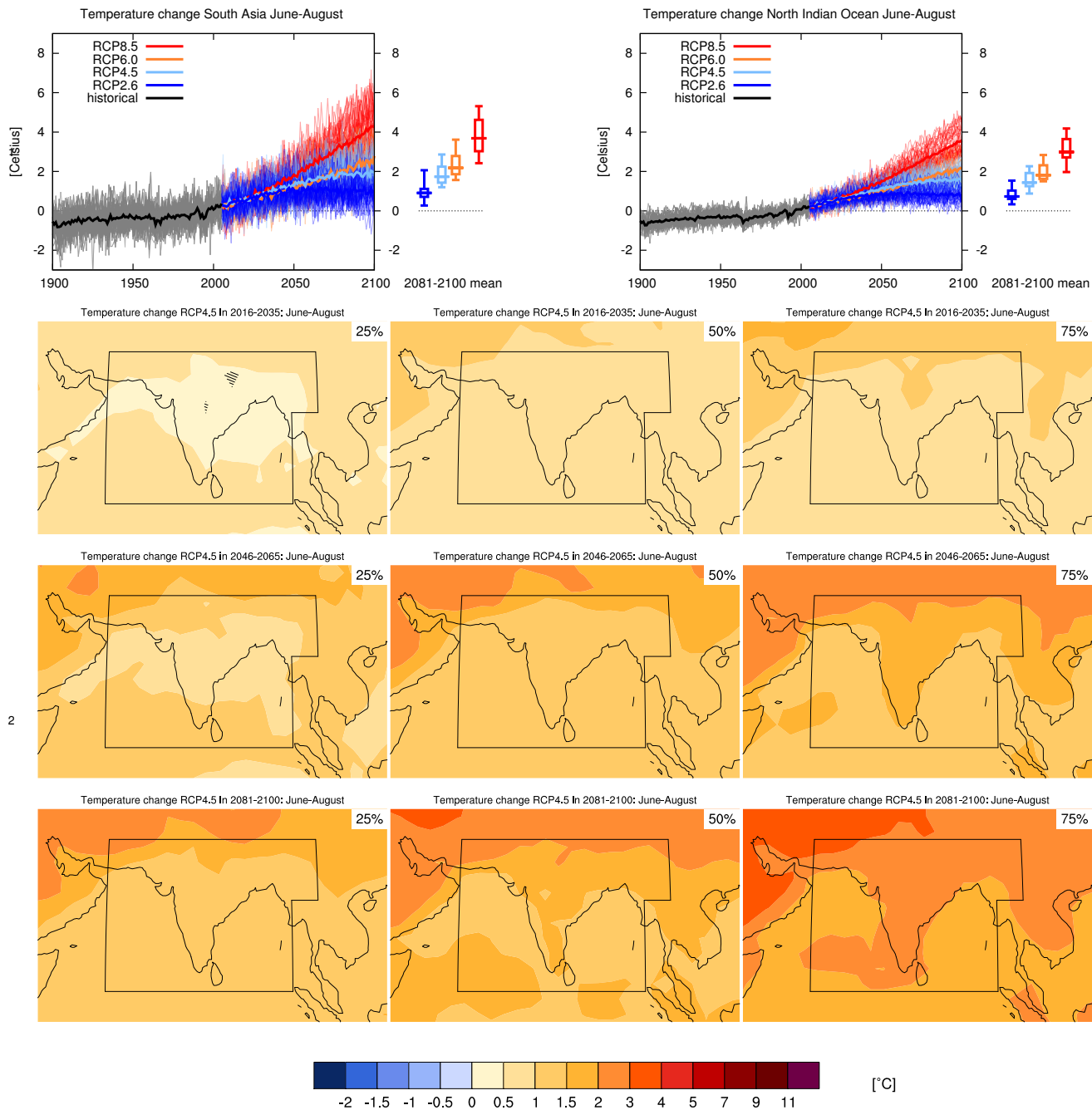
13 Sections 9.4.1.1, 9.6.1.1, Box 11.2, 14.2.2.2, 14.8.8, 14.8.9 contain relevant information regarding the evalua-
 14 tion of models in this region, the model spread in the context of other methods of projecting changes and the
 15 role of modes of variability and other climate phenomena.



3 **Figure AI.60:** Top left: time series of temperature change relative to 1986–2005 averaged over land grid
 4 points in South Asia (60°E,5°N; 60°E,30°N; 100°E,30°N; 100°E,20°E; 95°E,20°N; 95°E,5°N) in December–
 5 February. Top right: same for sea grid points in the North Indian Ocean (5°–30°N, 60°–95°E). Thin lines
 6 denote one ensemble member per model, thick lines the CMIP5 multi-model mean. On the right-hand side
 7 the 5th, 25th, 50th (median), 75th and 95th percentiles of the distribution of 20-yr mean changes are given for
 8 2081–2100 in the four RCP scenarios.

9 Below: maps of temperature changes in 2016–2035, 2046–2065 and 2081–2100 with respect to 1986–2005
 10 in the RCP4.5 scenario. For each point, the 25th, 50th and 75th percentile of the distribution of the CMIP5
 11 ensemble are shown, this includes both natural variability and inter-model spread. Hatching denotes areas
 12 where the 20-yr mean differences of the percentiles are less than the standard deviation of model-estimated
 13 present-day natural variability of 20-yr mean differences.

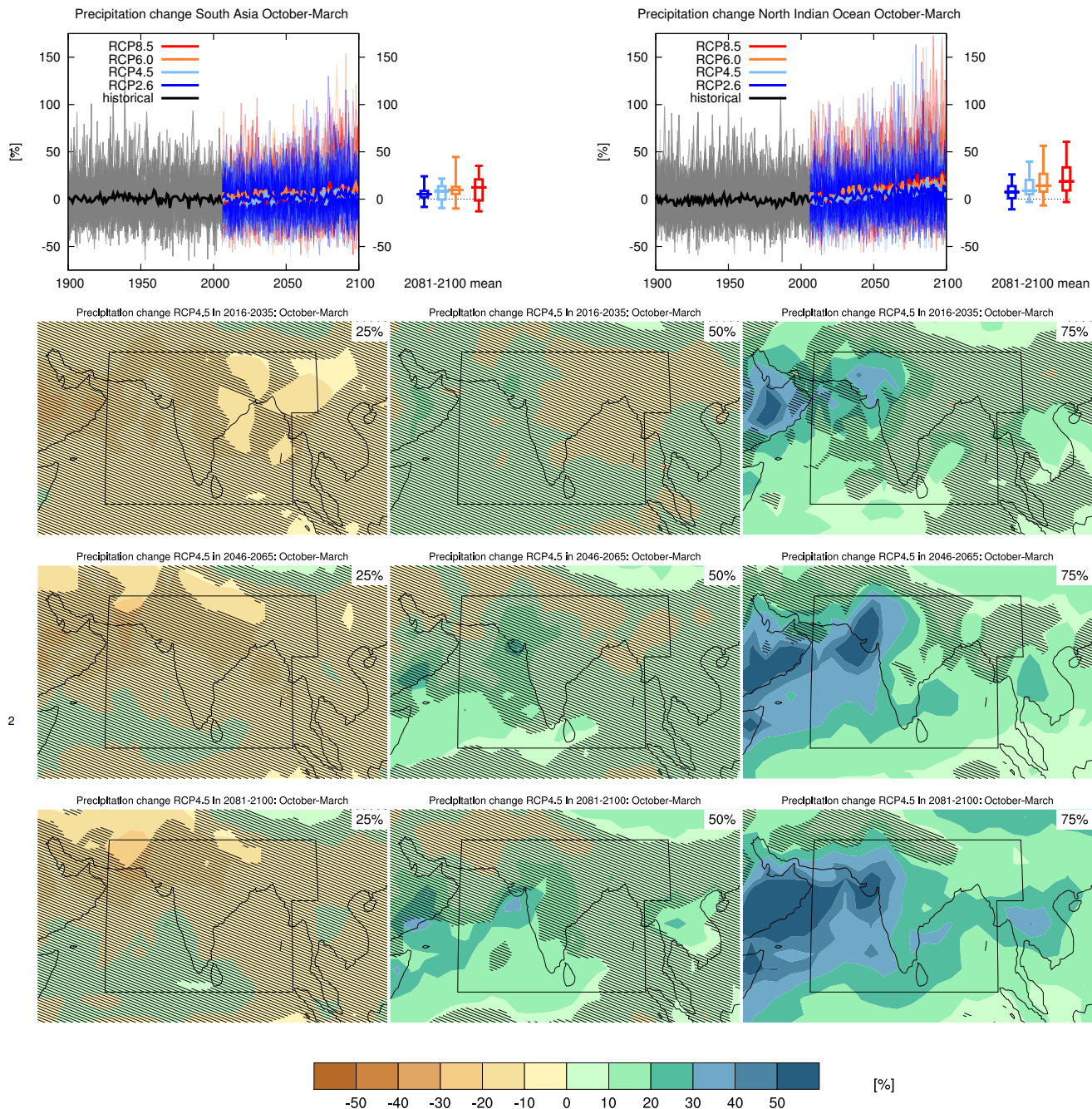
14 Sections 9.4.1.1, 9.6.1.1, 10.3.1.1.4, Box 11.2, 14.8.11 contain relevant information regarding the evaluation of
 15 models in this region, the model spread in the context of other methods of projecting changes and the role of
 16 modes of variability and other climate phenomena.



3 **Figure AI.61:** Top left: time series of temperature change relative to 1986–2005 averaged over land grid points
 4 in South Asia (60°E,5°N; 60°E,30°N; 100°E,30°N; 100°E,20°E; 95°E,20°N; 95°E,5°N) in June–August. Top
 5 right: same for sea grid points in the North Indian Ocean (5°–30°N, 60°–95°E). Thin lines denote one ensemble
 6 member per model, thick lines the CMIP5 multi-model mean. On the right-hand side the 5th, 25th, 50th
 7 (median), 75th and 95th percentiles of the distribution of 20-yr mean changes are given for 2081–2100 in the
 8 four RCP scenarios.

9 Below: maps of temperature changes in 2016–2035, 2046–2065 and 2081–2100 with respect to 1986–2005
 10 in the RCP4.5 scenario. For each point, the 25th, 50th and 75th percentile of the distribution of the CMIP5
 11 ensemble are shown, this includes both natural variability and inter-model spread. Hatching denotes areas
 12 where the 20-yr mean differences of the percentiles are less than the standard deviation of model-estimated
 13 present-day natural variability of 20-yr mean differences.

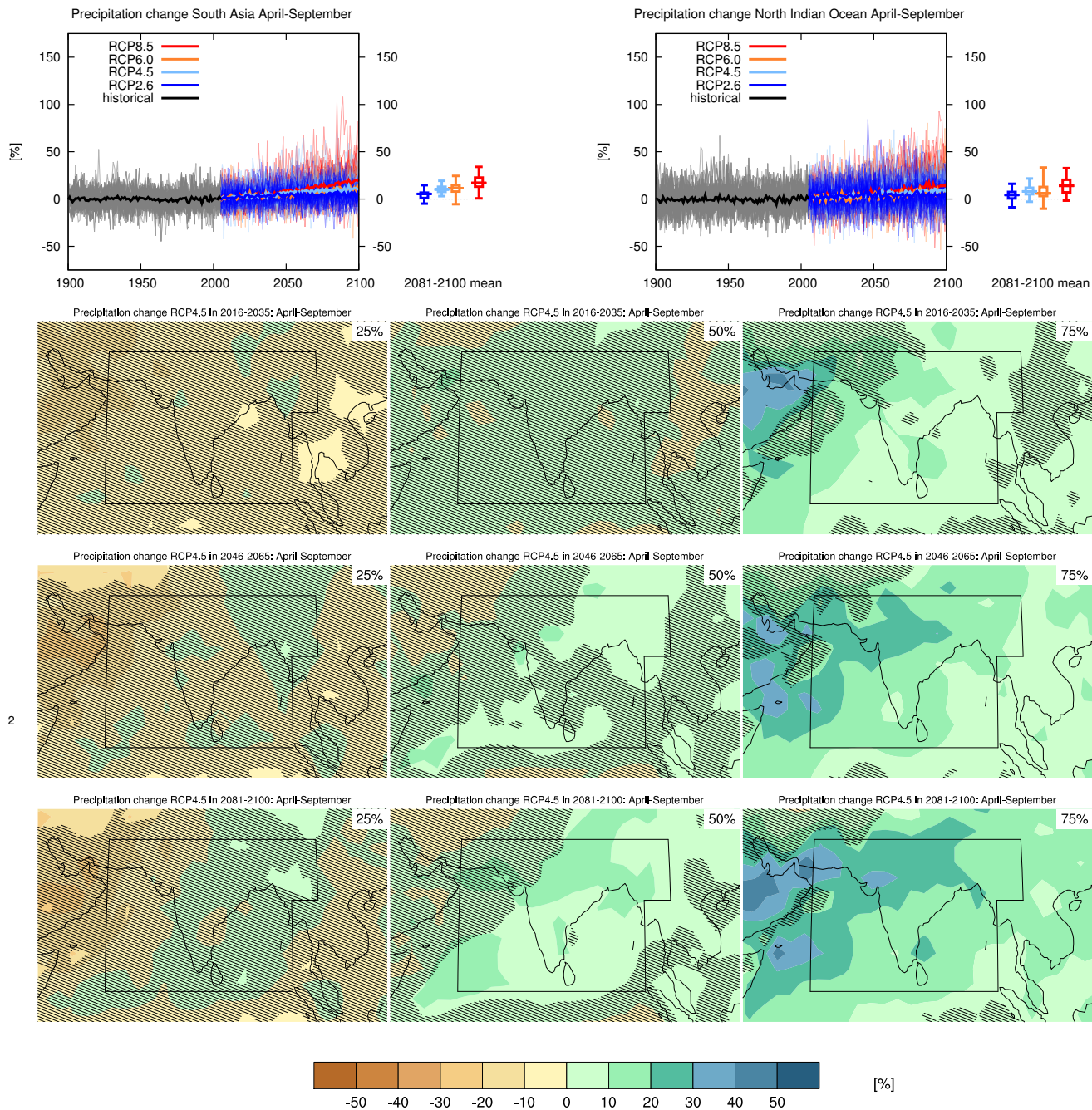
14 Sections 9.4.1.1, 9.6.1.1, 10.3.1.1.4, Box 11.2, 14.8.11 contain relevant information regarding the evaluation of
 15 models in this region, the model spread in the context of other methods of projecting changes and the role of
 16 modes of variability and other climate phenomena.



3 **Figure AI.62:** Top left: time series of relative change relative to 1986–2005 in precipitation averaged over
 4 land grid points in South Asia (60°E,5°N; 60°E,30°N; 100°E,30°N; 100°E,20°E; 95°E,20°N; 95°E,5°N) in
 5 October–March. Top right: same for sea grid points in the North Indian Ocean (5°–30°N, 60°–95°E). Thin
 6 lines denote one ensemble member per model, thick lines the CMIP5 multi-model mean. On the right-hand
 7 side the 5th, 25th, 50th (median), 75th and 95th percentiles of the distribution of 20-yr mean changes are given
 8 for 2081–2100 in the four RCP scenarios.

9 Below: maps of precipitation changes in 2016–2035, 2046–2065 and 2081–2100 with respect to 1986–2005
 10 in the RCP4.5 scenario. For each point, the 25th, 50th and 75th percentile of the distribution of the CMIP5
 11 ensemble are shown, this includes both natural variability and inter-model spread. Hatching denotes areas
 12 where the 20-yr mean differences of the percentiles are less than the standard deviation of model-estimated
 13 present-day natural variability of 20-yr mean differences.

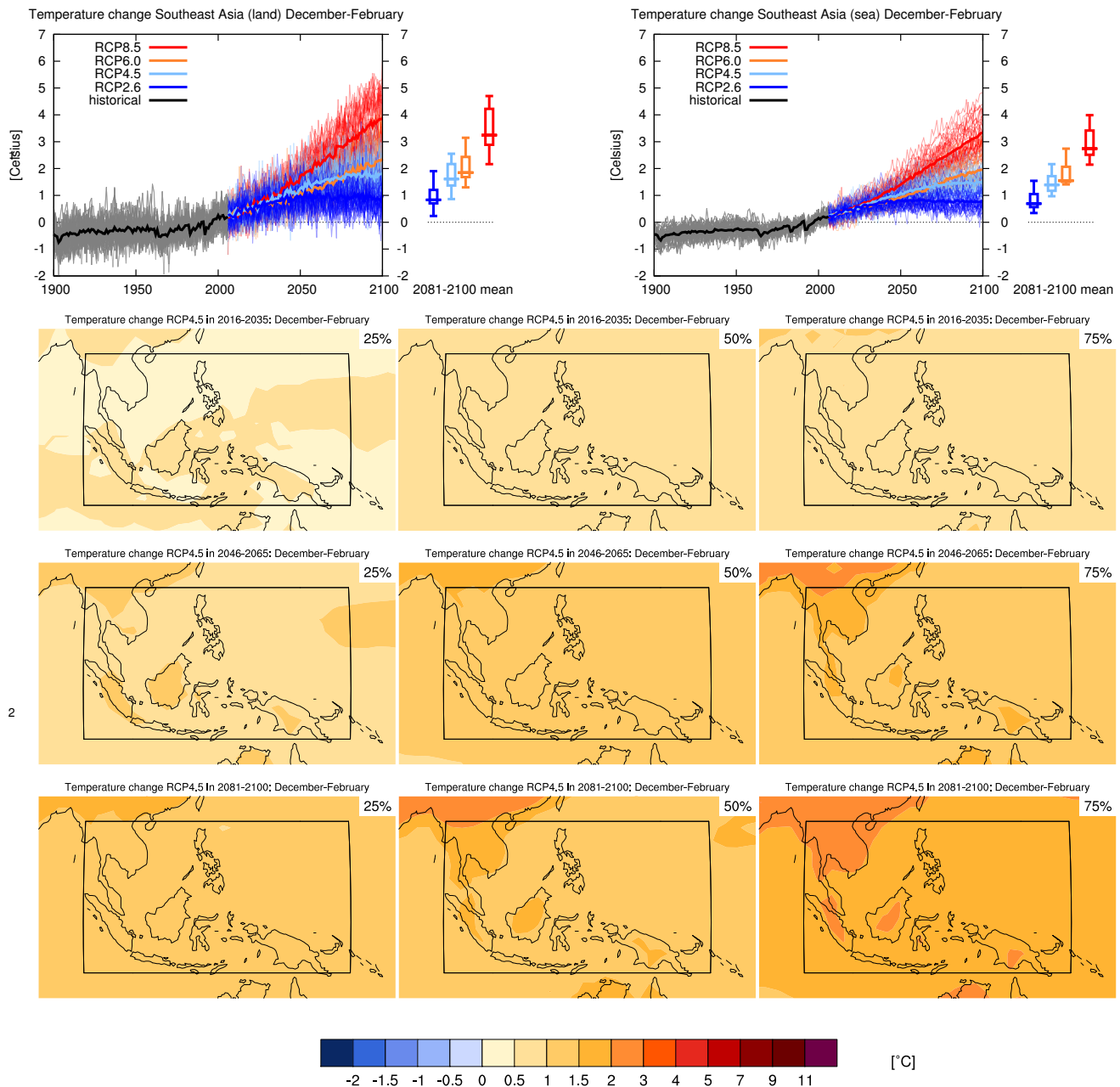
14 Sections 9.4.1.1, 9.6.1.1, Box 11.2, 14.2.2.1, 14.8.11 contain relevant information regarding the evaluation of
 15 models in this region, the model spread in the context of other methods of projecting changes and the role of
 16 modes of variability and other climate phenomena.



3 **Figure AI.63:** Top left: time series of relative change relative to 1986–2005 in precipitation averaged over
 4 land grid points in South Asia (60°E,5°N; 60°E,30°N; 100°E,30°N; 100°E,20°E; 95°E,20°N; 95°E,5°N) in
 5 April–September. Top right: same for sea grid points in the North Indian Ocean (5°–30°N, 60°–95°E). Thin
 6 lines denote one ensemble member per model, thick lines the CMIP5 multi-model mean. On the right-hand
 7 side the 5th, 25th, 50th (median), 75th and 95th percentiles of the distribution of 20-yr mean changes are given
 8 for 2081–2100 in the four RCP scenarios.

9 Below: maps of precipitation changes in 2016–2035, 2046–2065 and 2081–2100 with respect to 1986–2005
 10 in the RCP4.5 scenario. For each point, the 25th, 50th and 75th percentile of the distribution of the CMIP5
 11 ensemble are shown, this includes both natural variability and inter-model spread. Hatching denotes areas
 12 where the 20-yr mean differences of the percentiles are less than the standard deviation of model-estimated
 13 present-day natural variability of 20-yr mean differences.

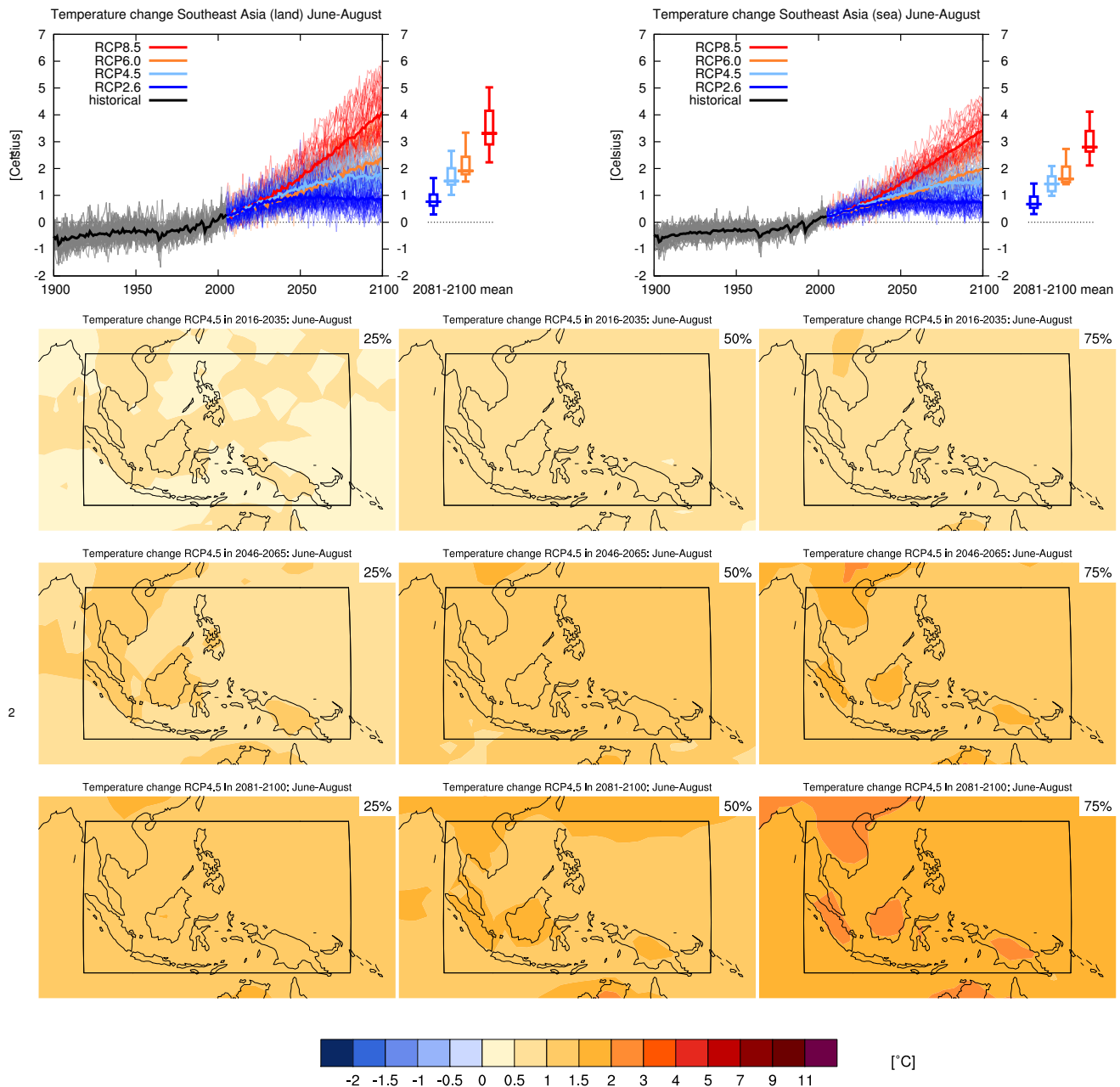
14 Sections 9.4.1.1, 9.6.1.1, Box 11.2, 14.2.2.1, 14.8.11 contain relevant information regarding the evaluation of
 15 models in this region, the model spread in the context of other methods of projecting changes and the role of
 16 modes of variability and other climate phenomena.



3 **Figure AI.64:** Top left: time series of temperature change relative to 1986–2005 averaged over land grid points
 4 in Southeast Asia (10°S – 20°N , 95° – 155°E) in December–February. Top right: same for sea grid points. Thin
 5 lines denote one ensemble member per model, thick lines the CMIP5 multi-model mean. On the right-hand
 6 side the 5th, 25th, 50th (median), 75th and 95th percentiles of the distribution of 20-yr mean changes are given
 7 for 2081–2100 in the four RCP scenarios.

8 Below: maps of temperature changes in 2016–2035, 2046–2065 and 2081–2100 with respect to 1986–2005
 9 in the RCP4.5 scenario. For each point, the 25th, 50th and 75th percentile of the distribution of the CMIP5
 10 ensemble are shown, this includes both natural variability and inter-model spread. Hatching denotes areas
 11 where the 20-yr mean differences of the percentiles are less than the standard deviation of model-estimated
 12 present-day natural variability of 20-yr mean differences.

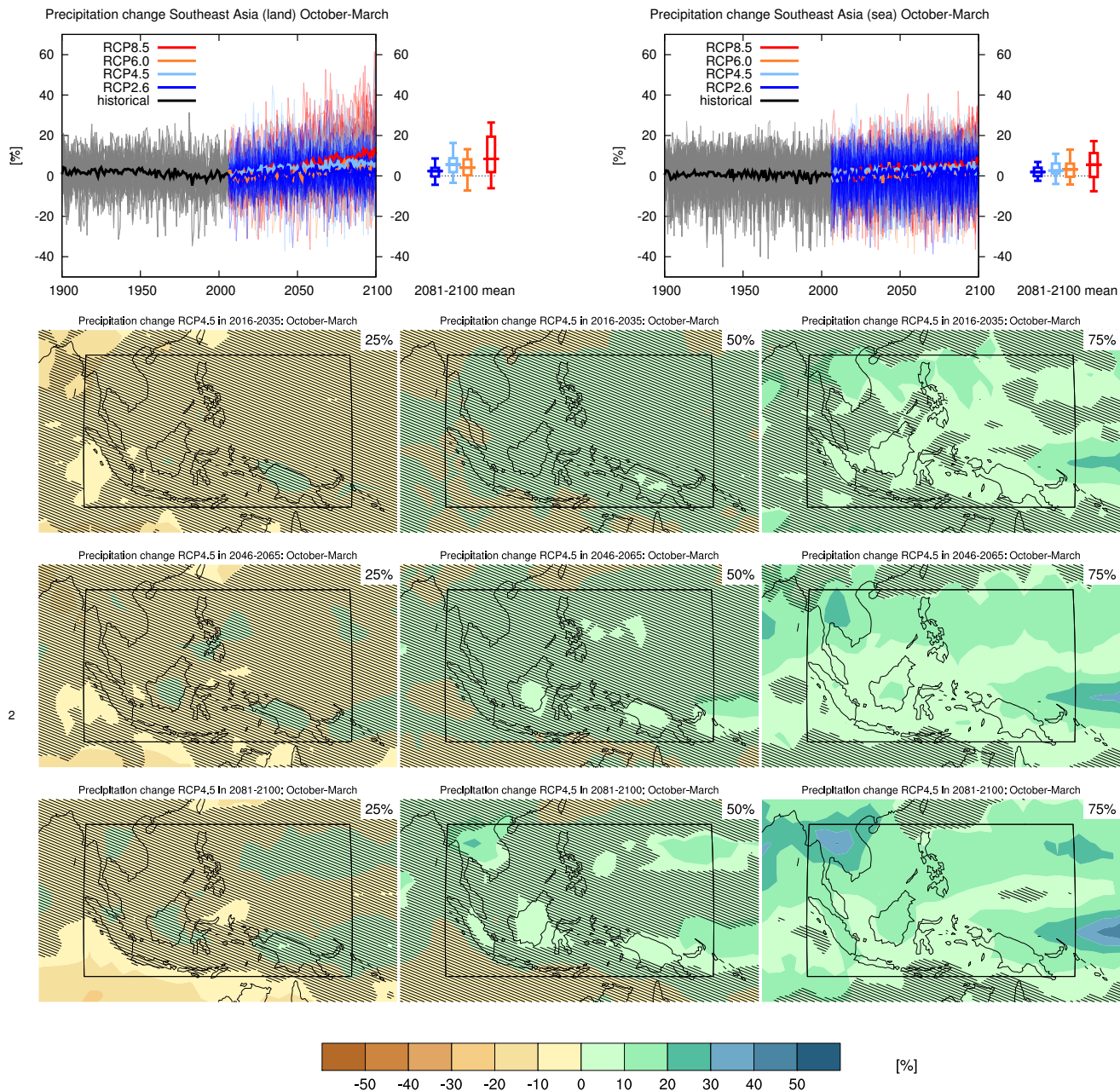
13 Sections 9.4.1.1, 9.6.1.1, 10.3.1.1.4, Box 11.2, 14.8.12 contain relevant information regarding the evaluation of
 14 models in this region, the model spread in the context of other methods of projecting changes and the role of
 15 modes of variability and other climate phenomena.



3 **Figure AI.65:** Top left: time series of temperature change relative to 1986–2005 averaged over land grid points
 4 in Southeast Asia (10°S – 20°N , 95° – 155°E) in June–August. Top right: same for sea grid points. Thin lines
 5 denote one ensemble member per model, thick lines the CMIP5 multi-model mean. On the right-hand side
 6 the 5th, 25th, 50th (median), 75th and 95th percentiles of the distribution of 20-yr mean changes are given for
 7 2081–2100 in the four RCP scenarios.

8 Below: maps of temperature changes in 2016–2035, 2046–2065 and 2081–2100 with respect to 1986–2005
 9 in the RCP4.5 scenario. For each point, the 25th, 50th and 75th percentile of the distribution of the CMIP5
 10 ensemble are shown, this includes both natural variability and inter-model spread. Hatching denotes areas
 11 where the 20-yr mean differences of the percentiles are less than the standard deviation of model-estimated
 12 present-day natural variability of 20-yr mean differences.

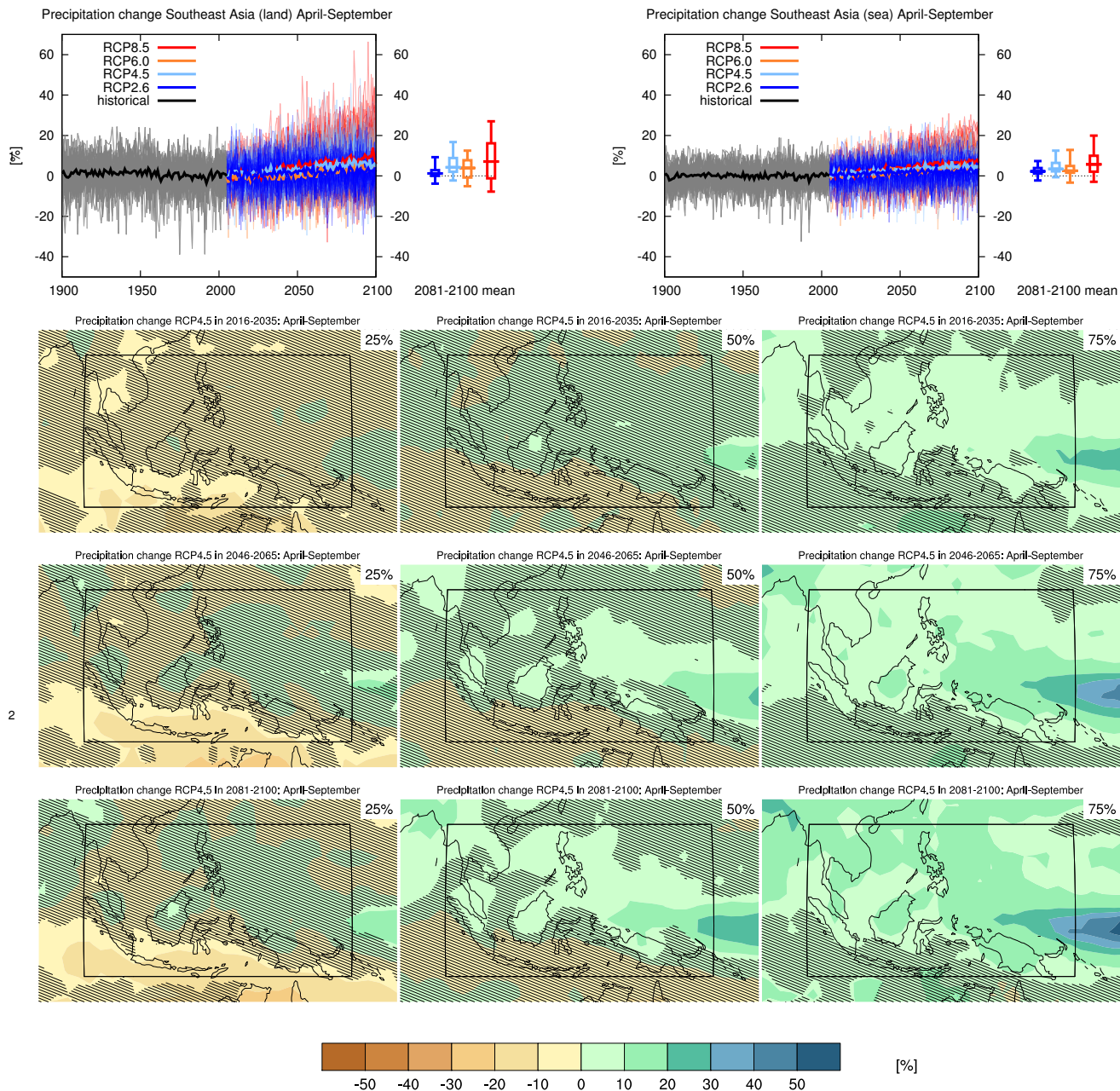
13 Sections 9.4.1.1, 9.6.1.1, 10.3.1.1.4, Box 11.2, 14.8.12 contain relevant information regarding the evaluation of
 14 models in this region, the model spread in the context of other methods of projecting changes and the role of
 15 modes of variability and other climate phenomena.



3 **Figure AI.66:** Top left: time series of relative change relative to 1986–2005 in precipitation averaged over
 4 land grid points in Southeast Asia (10°S – 20°N , 95° – 155°E) in October–March. Top right: same for sea grid
 5 points. Thin lines denote one ensemble member per model, thick lines the CMIP5 multi-model mean. On the
 6 right-hand side the 5th, 25th, 50th (median), 75th and 95th percentiles of the distribution of 20-yr mean changes
 7 are given for 2081–2100 in the four RCP scenarios.

8 Below: maps of precipitation changes in 2016–2035, 2046–2065 and 2081–2100 with respect to 1986–2005
 9 in the RCP4.5 scenario. For each point, the 25th, 50th and 75th percentile of the distribution of the CMIP5
 10 ensemble are shown, this includes both natural variability and inter-model spread. Hatching denotes areas
 11 where the 20-yr mean differences of the percentiles are less than the standard deviation of model-estimated
 12 present-day natural variability of 20-yr mean differences.

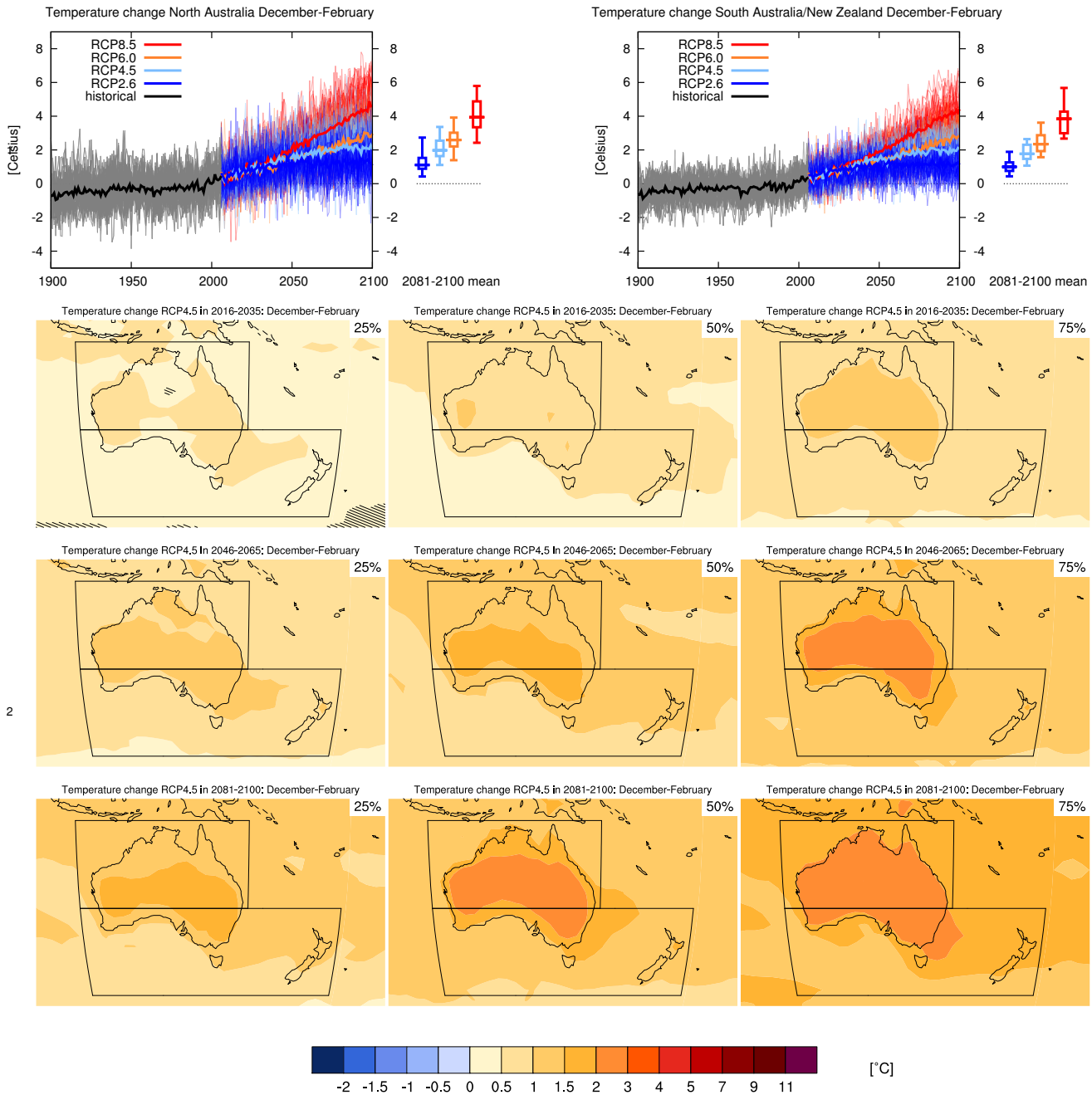
13 Sections 9.4.1.1, 9.6.1.1, Box 11.2, 14.2.2.3, 14.2.2.5, 14.8.12 contain relevant information regarding the eval-
 14 uation of models in this region, the model spread in the context of other methods of projecting changes and the
 15 role of modes of variability and other climate phenomena.



3 **Figure AI.67:** Top left: time series of relative change relative to 1986–2005 in precipitation averaged over
 4 land grid points in Southeast Asia (10°S – 20°N , 95° – 155°E) in April–September. Top right: same for sea grid
 5 points. Thin lines denote one ensemble member per model, thick lines the CMIP5 multi-model mean. On the
 6 right-hand side the 5th, 25th, 50th (median), 75th and 95th percentiles of the distribution of 20-yr mean changes
 7 are given for 2081–2100 in the four RCP scenarios.

8 Below: maps of precipitation changes in 2016–2035, 2046–2065 and 2081–2100 with respect to 1986–2005
 9 in the RCP4.5 scenario. For each point, the 25th, 50th and 75th percentile of the distribution of the CMIP5
 10 ensemble are shown, this includes both natural variability and inter-model spread. Hatching denotes areas
 11 where the 20-yr mean differences of the percentiles are less than the standard deviation of model-estimated
 12 present-day natural variability of 20-yr mean differences.

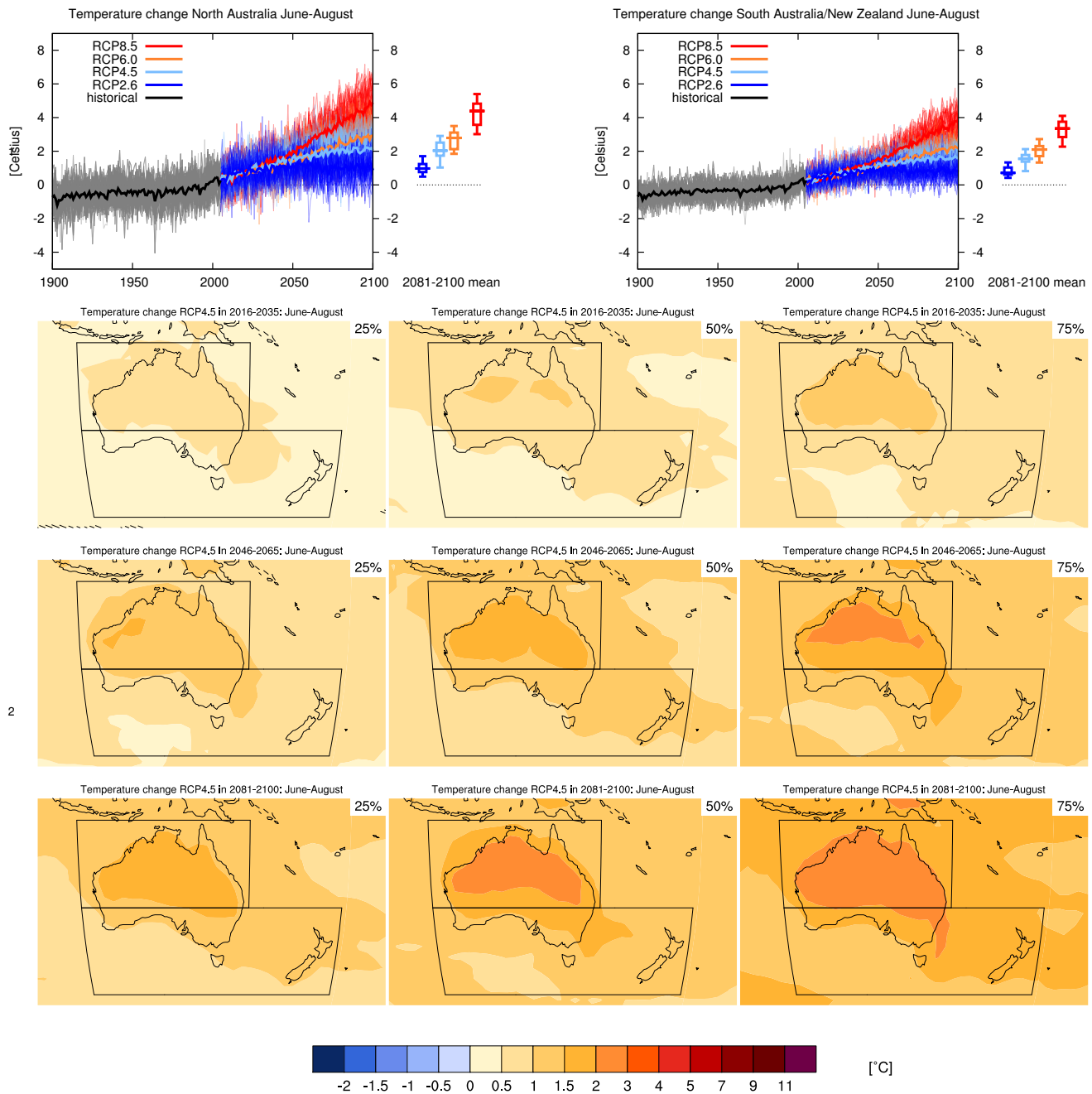
13 Sections 9.4.1.1, 9.6.1.1, Box 11.2, 14.2.2.3, 14.2.2.5, 14.8.12 contain relevant information regarding the eval-
 14 uation of models in this region, the model spread in the context of other methods of projecting changes and the
 15 role of modes of variability and other climate phenomena.



3 **Figure AI.68:** Top left: time series of temperature change relative to 1986–2005 averaged over land grid points
 4 in North Australia (30°–10°S, 110°–155°E) in December–February. Top right: same for land grid points in
 5 South Australia/New Zealand (5°–30°S, 110°–180°E). Thin lines denote one ensemble member per model,
 6 thick lines the CMIP5 multi-model mean. On the right-hand side the 5th, 25th, 50th (median), 75th and 95th
 7 percentiles of the distribution of 20-yr mean changes are given for 2081–2100 in the four RCP scenarios.

8 Below: maps of temperature changes in 2016–2035, 2046–2065 and 2081–2100 with respect to 1986–2005
 9 in the RCP4.5 scenario. For each point, the 25th, 50th and 75th percentile of the distribution of the CMIP5
 10 ensemble are shown, this includes both natural variability and inter-model spread. Hatching denotes areas
 11 where the 20-yr mean differences of the percentiles are less than the standard deviation of model-estimated
 12 present-day natural variability of 20-yr mean differences.

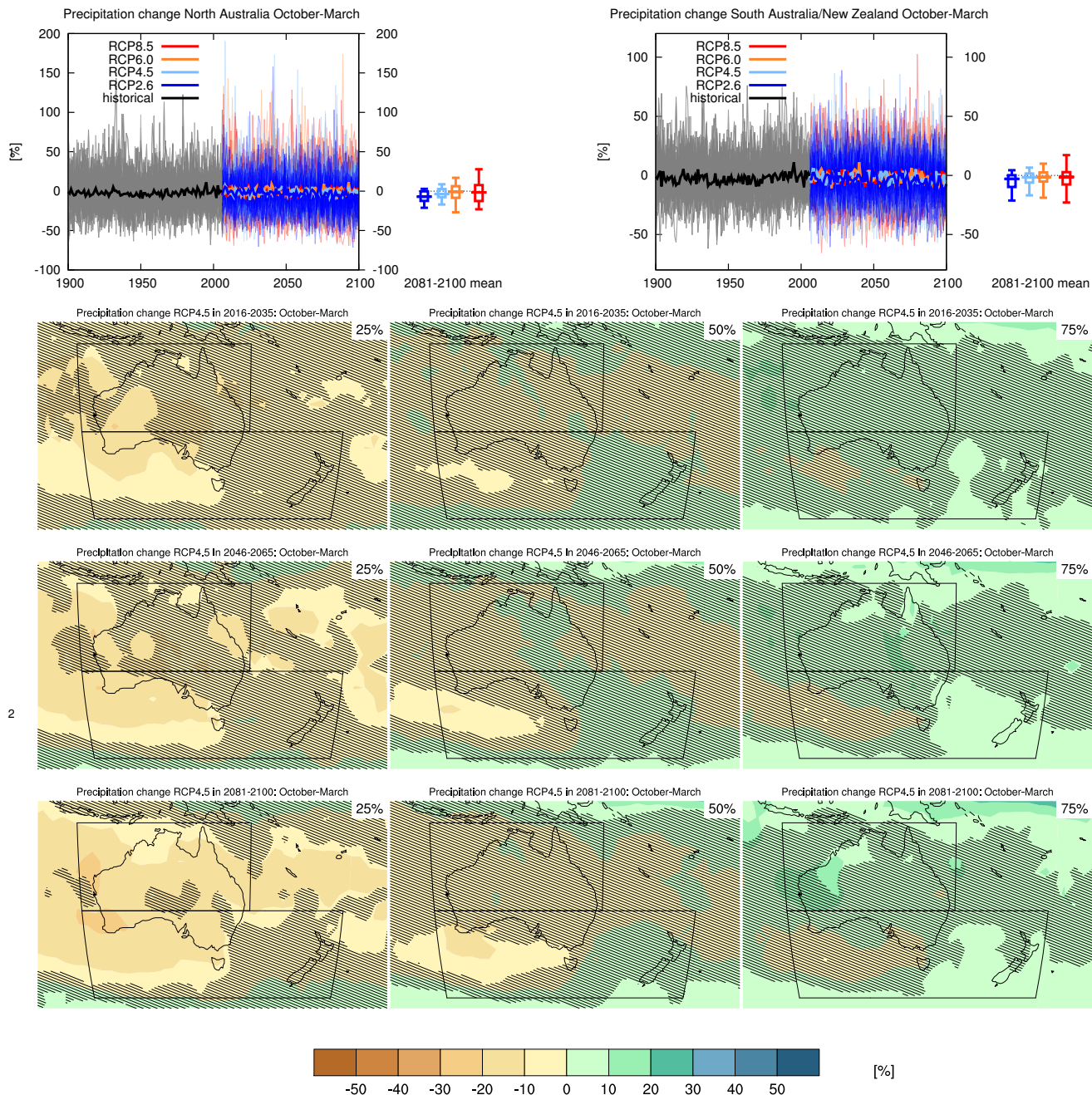
13 Sections 9.4.1.1, 9.6.1.1, 10.3.1.1.4, Box 11.2, 14.8.13 contain relevant information regarding the evaluation of
 14 models in this region, the model spread in the context of other methods of projecting changes and the role of
 15 modes of variability and other climate phenomena.



3 **Figure AI.69:** Top left: time series of temperature change relative to 1986–2005 averaged over land grid
 4 points in North Australia (30°–10°S, 110°–155°E) in June–August. Top right: same for land grid points in
 5 South Australia/New Zealand (5°–30°S, 110°–180°E). Thin lines denote one ensemble member per model,
 6 thick lines the CMIP5 multi-model mean. On the right-hand side the 5th, 25th, 50th (median), 75th and 95th
 7 percentiles of the distribution of 20-yr mean changes are given for 2081–2100 in the four RCP scenarios.

8 Below: maps of temperature changes in 2016–2035, 2046–2065 and 2081–2100 with respect to 1986–2005
 9 in the RCP4.5 scenario. For each point, the 25th, 50th and 75th percentile of the distribution of the CMIP5
 10 ensemble are shown, this includes both natural variability and inter-model spread. Hatching denotes areas
 11 where the 20-yr mean differences of the percentiles are less than the standard deviation of model-estimated
 12 present-day natural variability of 20-yr mean differences.

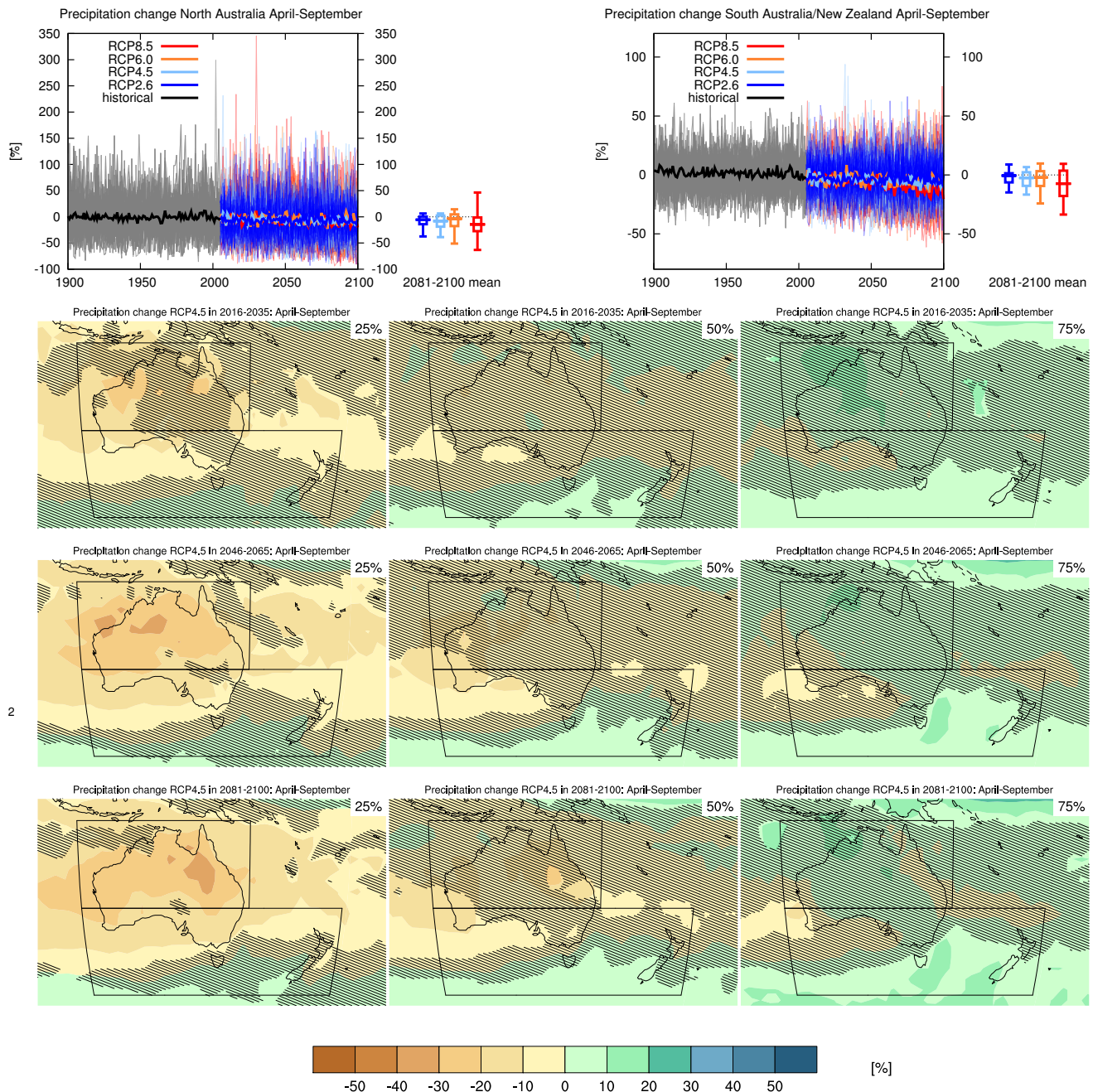
13 Sections 9.4.1.1, 9.6.1.1, 10.3.1.1.4, Box 11.2, 14.8.13 contain relevant information regarding the evaluation of
 14 models in this region, the model spread in the context of other methods of projecting changes and the role of
 15 modes of variability and other climate phenomena.



3 **Figure AI.70:** Top left: time series of relative change relative to 1986–2005 in precipitation averaged over land
 4 grid points in North Australia (30°–10°S, 110°–155°E) in October–March. Top right: same for land grid points
 5 in South Australia/New Zealand (50°–30°S, 110°–180°E). Thin lines denote one ensemble member per model,
 6 thick lines the CMIP5 multi-model mean. On the right-hand side the 5th, 25th, 50th (median), 75th and 95th
 7 percentiles of the distribution of 20-yr mean changes are given for 2081–2100 in the four RCP scenarios. Note
 8 different scales.

9 Below: maps of precipitation changes in 2016–2035, 2046–2065 and 2081–2100 with respect to 1986–2005
 10 in the RCP4.5 scenario. For each point, the 25th, 50th and 75th percentile of the distribution of the CMIP5
 11 ensemble are shown, this includes both natural variability and inter-model spread. Hatching denotes areas
 12 where the 20-yr mean differences of the percentiles are less than the standard deviation of model-estimated
 13 present-day natural variability of 20-yr mean differences.

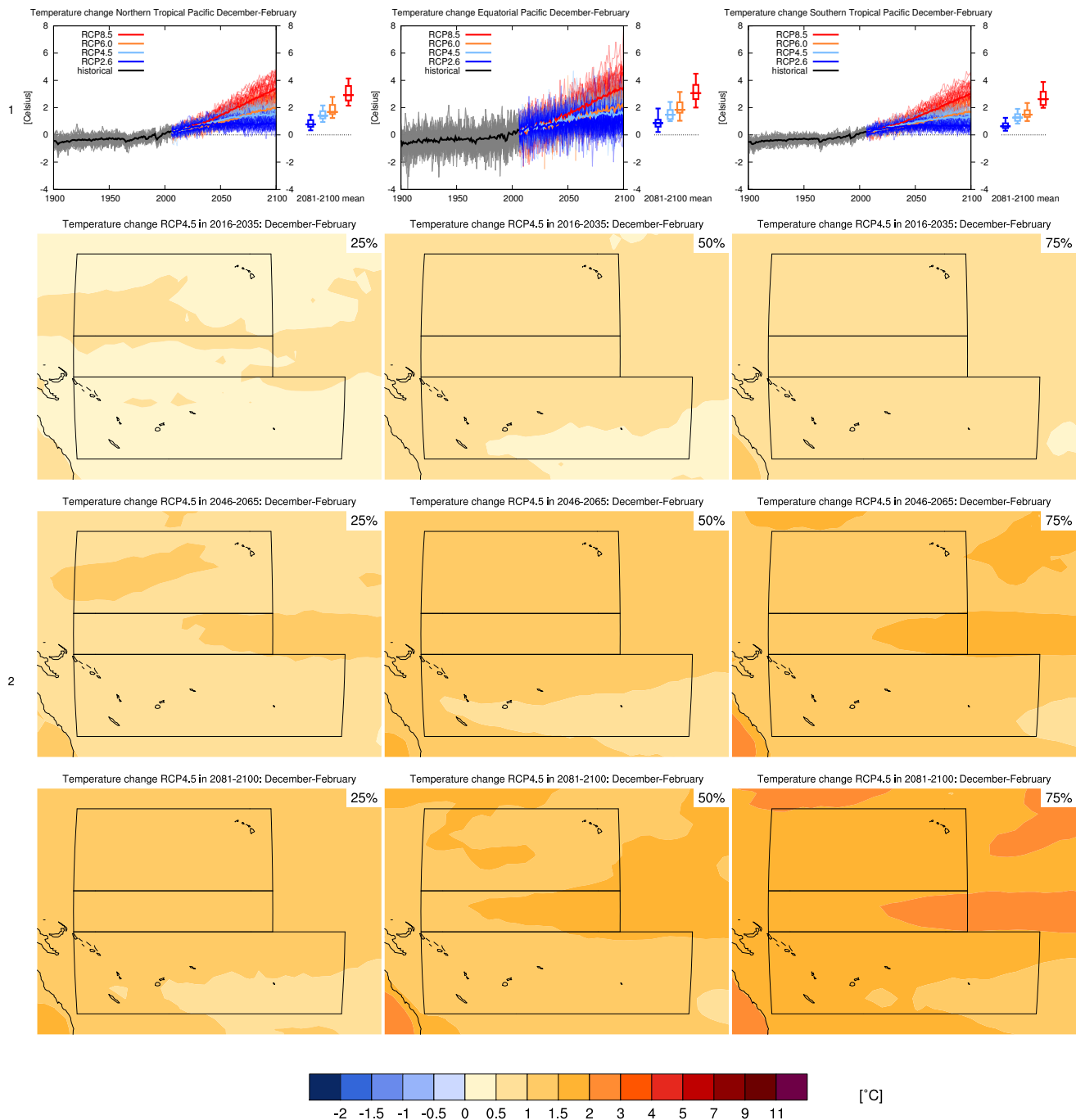
14 Sections 9.4.1.1, 9.6.1.1, Box 11.2, 14.2.2.4, 14.8.13 contain relevant information regarding the evaluation of
 15 models in this region, the model spread in the context of other methods of projecting changes and the role of
 16 modes of variability and other climate phenomena.



3 **Figure AI.71:** Top left: time series of relative change relative to 1986–2005 in precipitation averaged over
 4 land grid points in North Australia (30°–10°S, 110°–155°E) in April–September. Top right: same for land grid
 5 points in South Australia/New Zealand (50°–30°S, 110°–180°E). Thin lines denote one ensemble member per
 6 model, thick lines the CMIP5 multi-model mean. On the right-hand side the 5th, 25th, 50th (median), 75th and
 7 95th percentiles of the distribution of 20-yr mean changes are given for 2081–2100 in the four RCP scenarios.
 8 Note different scales.

9 Below: maps of precipitation changes in 2016–2035, 2046–2065 and 2081–2100 with respect to 1986–2005
 10 in the RCP4.5 scenario. For each point, the 25th, 50th and 75th percentile of the distribution of the CMIP5
 11 ensemble are shown, this includes both natural variability and inter-model spread. Hatching denotes areas
 12 where the 20-yr mean differences of the percentiles are less than the standard deviation of model-estimated
 13 present-day natural variability of 20-yr mean differences.

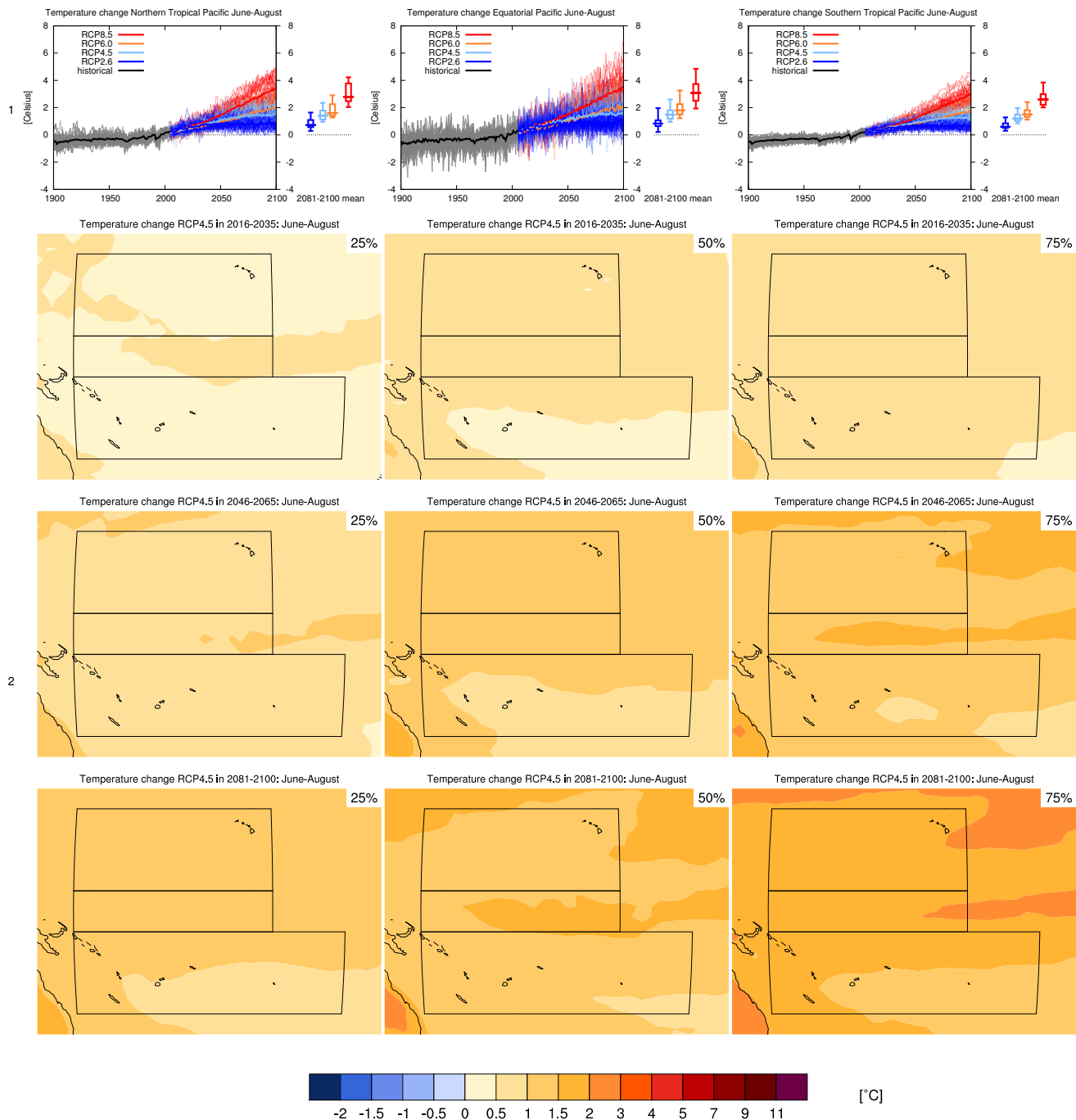
14 Sections 9.4.1.1, 9.6.1.1, Box 11.2, 14.2.2.4, 14.8.13 contain relevant information regarding the evaluation of
 15 models in this region, the model spread in the context of other methods of projecting changes and the role of
 16 modes of variability and other climate phenomena.



3 **Figure AI.72:** Top left: time series of temperature change relative to 1986–2005 averaged over all grid points in
 4 the Northern Tropical Pacific (5° – 25° N, 155° E– 150° W) in December–February. Top middle: same for all grid
 5 points in the Equatorial Pacific (5° S– 5° N, 155° E– 150° W). Top right: same for all grid points in the Southern
 6 Tropical Pacific (5° S– 5° N, 155° E– 150° W). Thin lines denote one ensemble member per model, thick lines the
 7 CMIP5 multi-model mean. On the right-hand side the 5th, 25th, 50th (median), 75th and 95th percentiles of
 8 the distribution of 20-yr mean changes are given for 2081–2100 in the four RCP scenarios.

9 Below: maps of temperature changes in 2016–2035, 2046–2065 and 2081–2100 with respect to 1986–2005
 10 in the RCP4.5 scenario. For each point, the 25th, 50th and 75th percentile of the distribution of the CMIP5
 11 ensemble are shown, this includes both natural variability and inter-model spread. Hatching denotes areas
 12 where the 20-yr mean differences of the percentiles are less than the standard deviation of model-estimated
 13 present-day natural variability of 20-yr mean differences.

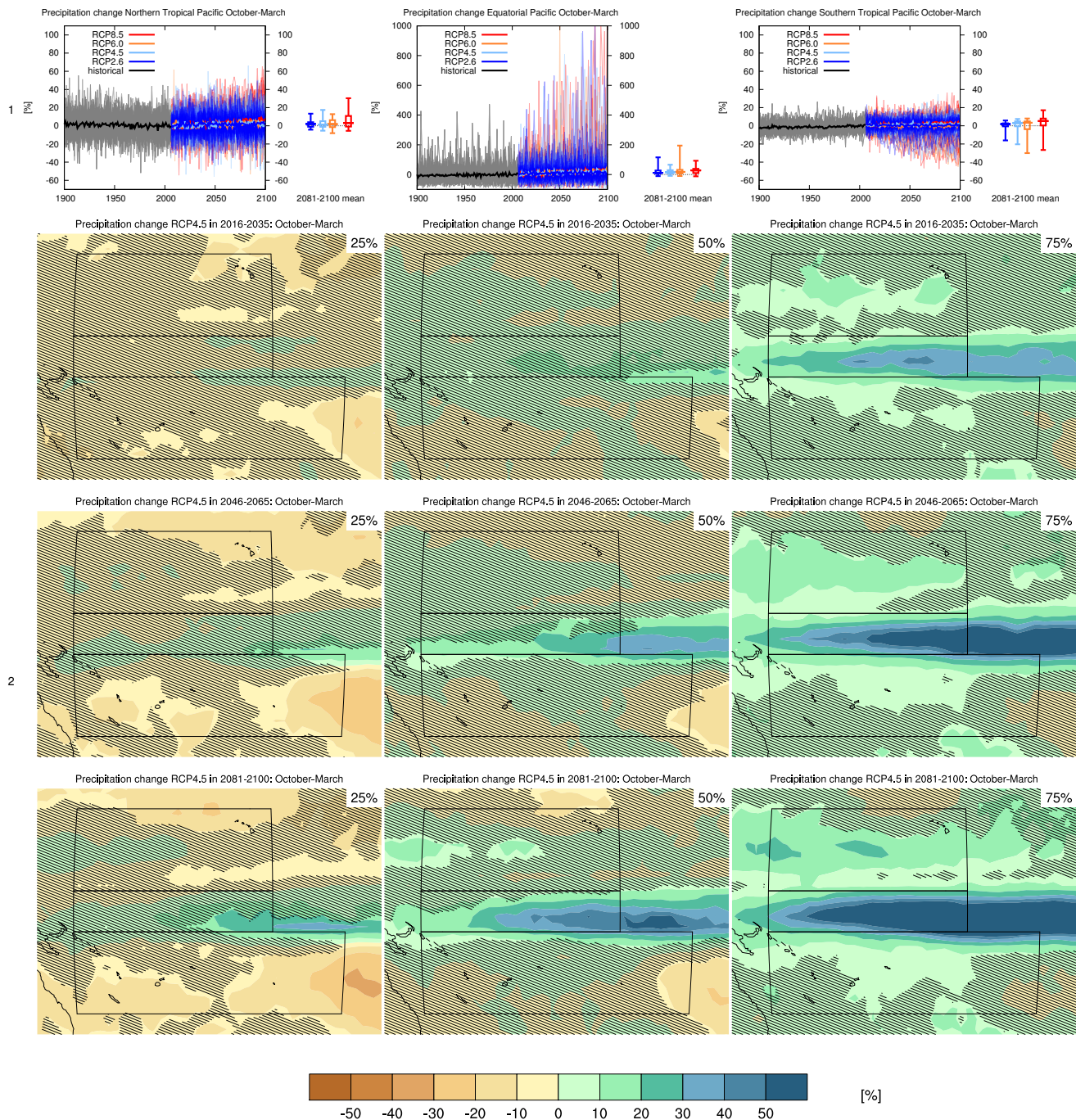
14 Sections 9.4.1.1, 9.6.1.1, 10.3.1.1.4, Box 11.2, 12.4.3.1, 14.4.1, 14.8.14 contain relevant information regarding
 15 the evaluation of models in this region, the model spread in the context of other methods of projecting changes
 16 and the role of modes of variability and other climate phenomena.



3 **Figure AI.73:** Top left: time series of temperature change relative to 1986–2005 averaged over all grid points
 4 in the Northern Tropical Pacific (5° – 25° N, 155° E– 150° W) in June–August. Top middle: same for all grid
 5 points in the Equatorial Pacific (5° S– 5° N, 155° E– 150° W). Top right: same for all grid points in the Southern
 6 Tropical Pacific (5° S– 5° N, 155° E– 150° W). Thin lines denote one ensemble member per model, thick lines the
 7 CMIP5 multi-model mean. On the right-hand side the 5th, 25th, 50th (median), 75th and 95th percentiles of
 8 the distribution of 20-yr mean changes are given for 2081–2100 in the four RCP scenarios.

9 Below: maps of temperature changes in 2016–2035, 2046–2065 and 2081–2100 with respect to 1986–2005
 10 in the RCP4.5 scenario. For each point, the 25th, 50th and 75th percentile of the distribution of the CMIP5
 11 ensemble are shown, this includes both natural variability and inter-model spread. Hatching denotes areas
 12 where the 20-yr mean differences of the percentiles are less than the standard deviation of model-estimated
 13 present-day natural variability of 20-yr mean differences.

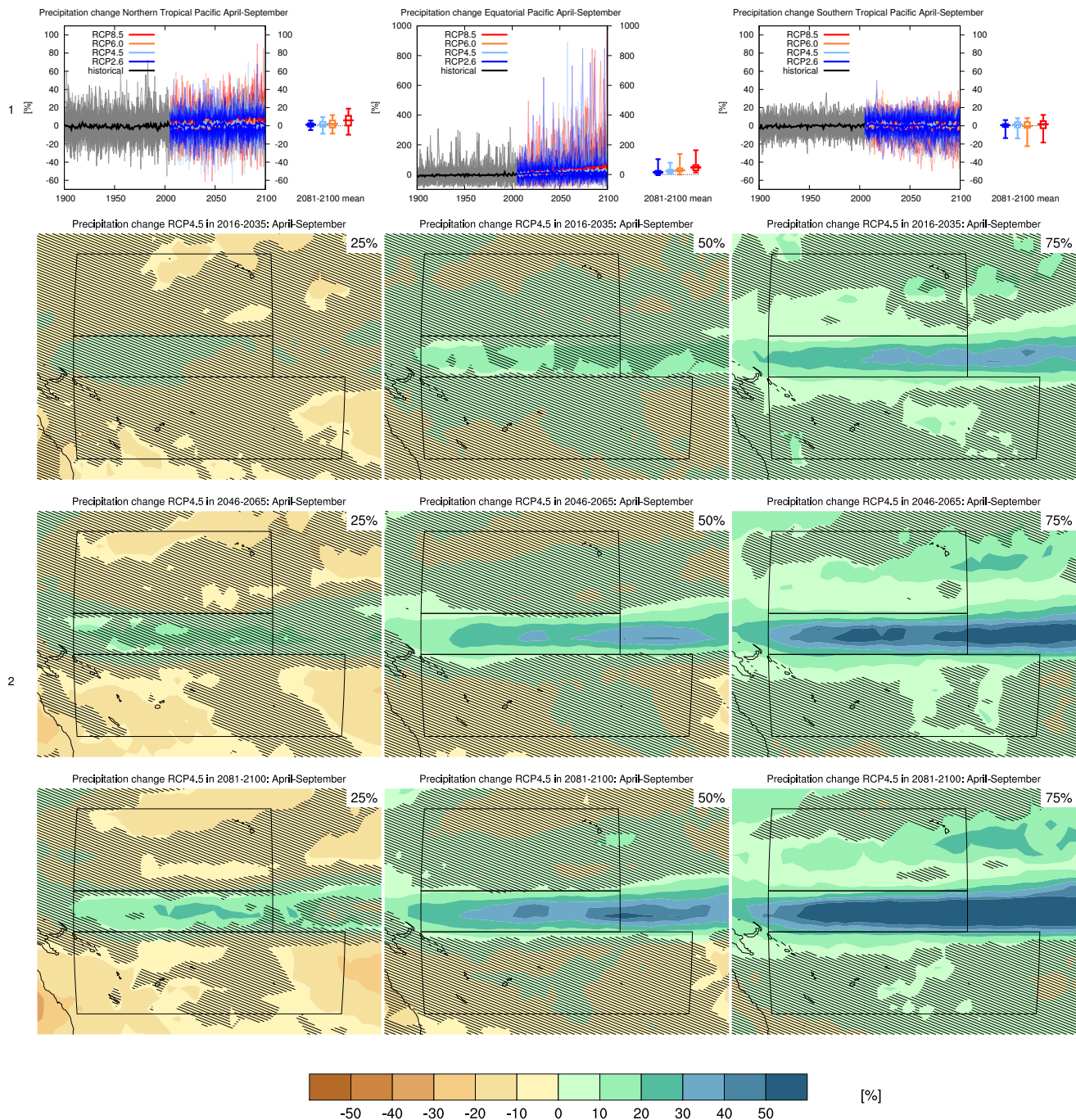
14 Sections 9.4.1.1, 9.6.1.1, 10.3.1.1.4, Box 11.2, 12.4.3.1, 14.4.1, 14.8.14 contain relevant information regarding
 15 the evaluation of models in this region, the model spread in the context of other methods of projecting changes
 16 and the role of modes of variability and other climate phenomena.



3 **Figure AI.74:** Top left: time series of relative change relative to 1986–2005 in precipitation averaged over all
 4 grid points in the Northern Tropical Pacific (5° – 25° N, 155° E– 150° W) in October–March. Top middle: same
 5 for all grid points in the Equatorial Pacific (5° S– 5° N, 155° E– 150° W). Top right: same for all grid points in
 6 the Southern Tropical Pacific (5° S– 5° N, 155° E– 150° W). Thin lines denote one ensemble member per model,
 7 thick lines the CMIP5 multi-model mean. On the right-hand side the 5th, 25th, 50th (median), 75th and 95th
 8 percentiles of the distribution of 20-yr mean changes are given for 2081–2100 in the four RCP scenarios. Note
 9 different scales.

10 Below: maps of precipitation changes in 2016–2035, 2046–2065 and 2081–2100 with respect to 1986–2005
 11 in the RCP4.5 scenario. For each point, the 25th, 50th and 75th percentile of the distribution of the CMIP5
 12 ensemble are shown, this includes both natural variability and inter-model spread. Hatching denotes areas
 13 where the 20-yr mean differences of the percentiles are less than the standard deviation of model-estimated
 14 present-day natural variability of 20-yr mean differences.

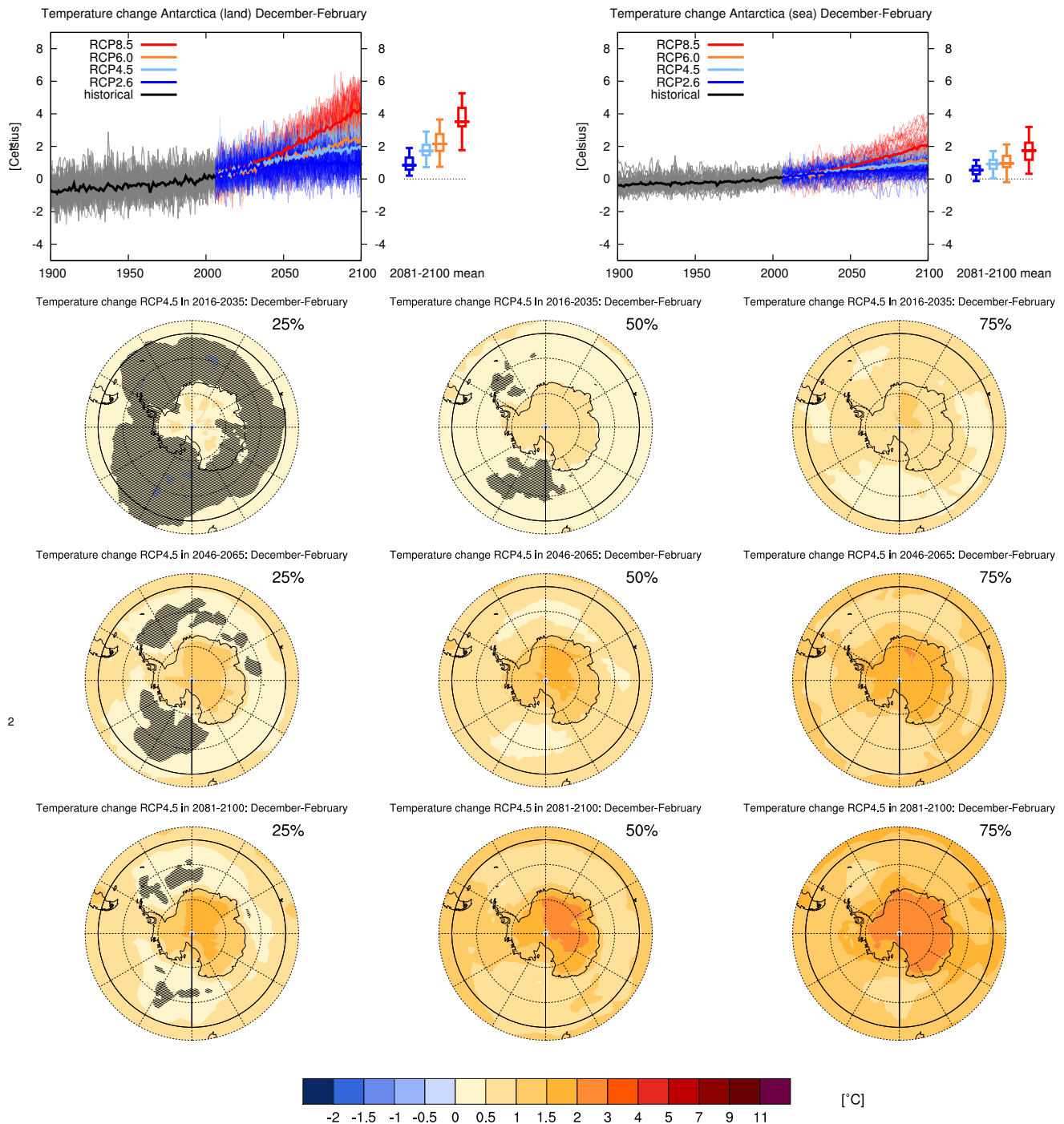
15 Sections 9.4.1.1, 9.6.1.1, 11.3.2.1.2, Box 11.2, 12.4.5.2, 14.8.14 contain relevant information regarding the
 16 evaluation of models in this region, the model spread in the context of other methods of projecting changes and
 17 the role of modes of variability and other climate phenomena.



3 **Figure AI.75:** Top left: time series of relative change relative to 1986–2005 in precipitation averaged over all
 4 grid points in the Northern Tropical Pacific (5° – 25° N, 155° E– 150° W) in April–September. Top middle: same
 5 for all grid points in the Equatorial Pacific (5° S– 5° N, 155° E– 150° W). Top right: same for all grid points in
 6 the Southern Tropical Pacific (5° S– 5° N, 155° E– 150° W). Thin lines denote one ensemble member per model,
 7 thick lines the CMIP5 multi-model mean. On the right-hand side the 5th, 25th, 50th (median), 75th and 95th
 8 percentiles of the distribution of 20-yr mean changes are given for 2081–2100 in the four RCP scenarios. Note
 9 different scales.

10 Below: maps of precipitation changes in 2016–2035, 2046–2065 and 2081–2100 with respect to 1986–2005
 11 in the RCP4.5 scenario. For each point, the 25th, 50th and 75th percentile of the distribution of the CMIP5
 12 ensemble are shown, this includes both natural variability and inter-model spread. Hatching denotes areas
 13 where the 20-yr mean differences of the percentiles are less than the standard deviation of model-estimated
 14 present-day natural variability of 20-yr mean differences.

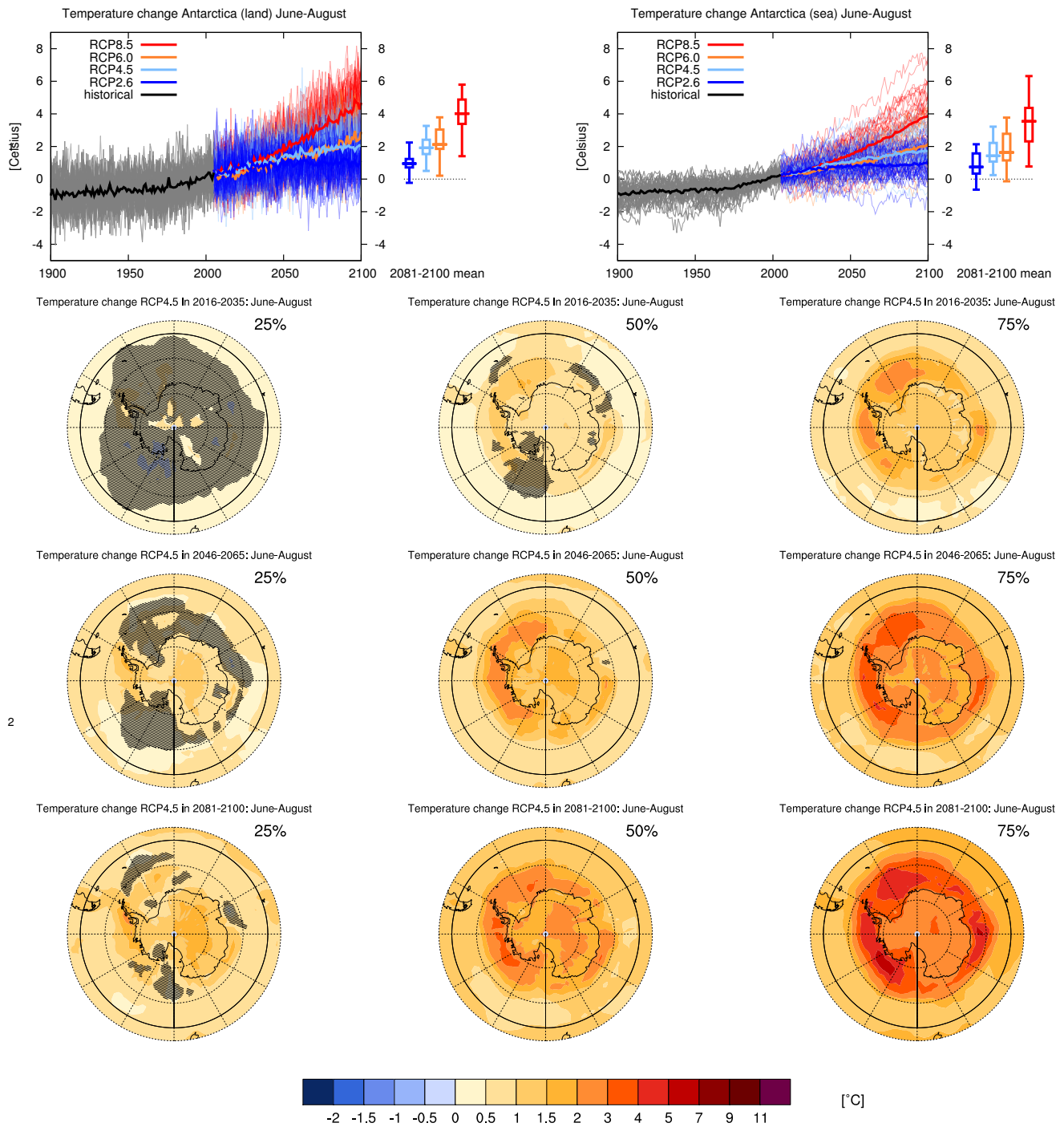
15 Sections 9.4.1.1, 9.6.1.1, 11.3.2.1.2, Box 11.2, 12.4.5.2, 14.8.14 contain relevant information regarding the
 16 evaluation of models in this region, the model spread in the context of other methods of projecting changes and
 17 the role of modes of variability and other climate phenomena.



3 **Figure AI.76:** Top left: time series of temperature change relative to 1986–2005 averaged over land grid points
 4 in Antarctica (90° – 50° S) in December–February. Top right: same for sea grid points. Thin lines denote one
 5 ensemble member per model, thick lines the CMIP5 multi-model mean. On the right-hand side the 5th, 25th,
 6 50th (median), 75th and 95th percentiles of the distribution of 20-yr mean changes are given for 2081–2100 in
 7 the four RCP scenarios.

8 Below: maps of temperature changes in 2016–2035, 2046–2065 and 2081–2100 with respect to 1986–2005
 9 in the RCP4.5 scenario. For each point, the 25th, 50th and 75th percentile of the distribution of the CMIP5
 10 ensemble are shown, this includes both natural variability and inter-model spread. Hatching denotes areas
 11 where the 20-yr mean differences of the percentiles are less than the standard deviation of model-estimated
 12 present-day natural variability of 20-yr mean differences.

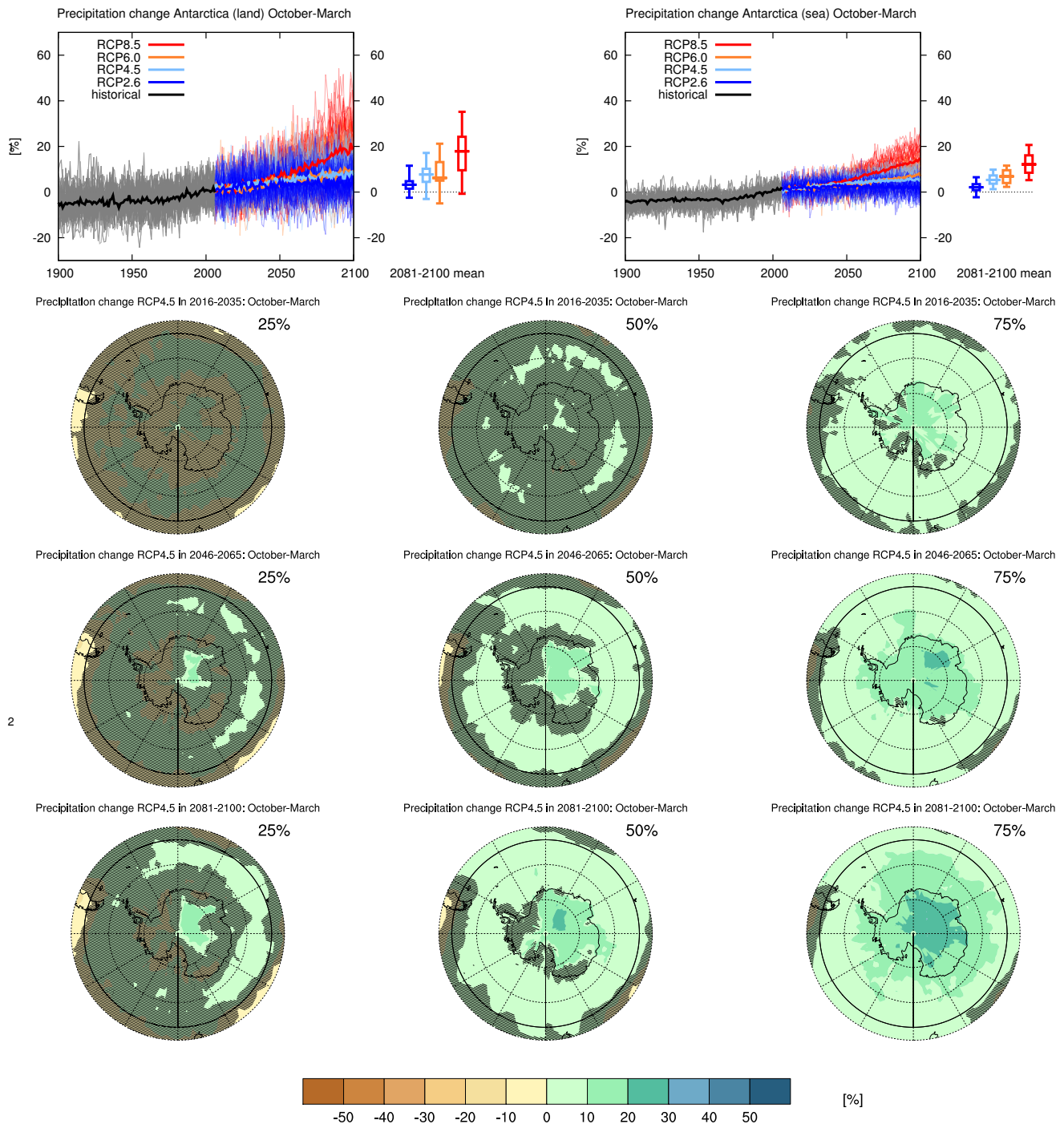
13 Sections 9.4.1.1, 9.6.1.1, 10.3.1.1.4, Box 11.2, 12.4.3.1, 14.8.15 contain relevant information regarding the
 14 evaluation of models in this region, the model spread in the context of other methods of projecting changes and
 15 the role of modes of variability and other climate phenomena.



3 **Figure AI.77:** Top left: time series of temperature change relative to 1986–2005 averaged over land grid
 4 points in Antarctica (90° – 50° S) in June–August. Top right: same for sea grid points. Thin lines denote one
 5 ensemble member per model, thick lines the CMIP5 multi-model mean. On the right-hand side the 5th, 25th,
 6 50th (median), 75th and 95th percentiles of the distribution of 20-yr mean changes are given for 2081–2100 in
 7 the four RCP scenarios.

8 Below: maps of temperature changes in 2016–2035, 2046–2065 and 2081–2100 with respect to 1986–2005
 9 in the RCP4.5 scenario. For each point, the 25th, 50th and 75th percentile of the distribution of the CMIP5
 10 ensemble are shown, this includes both natural variability and inter-model spread. Hatching denotes areas
 11 where the 20-yr mean differences of the percentiles are less than the standard deviation of model-estimated
 12 present-day natural variability of 20-yr mean differences.

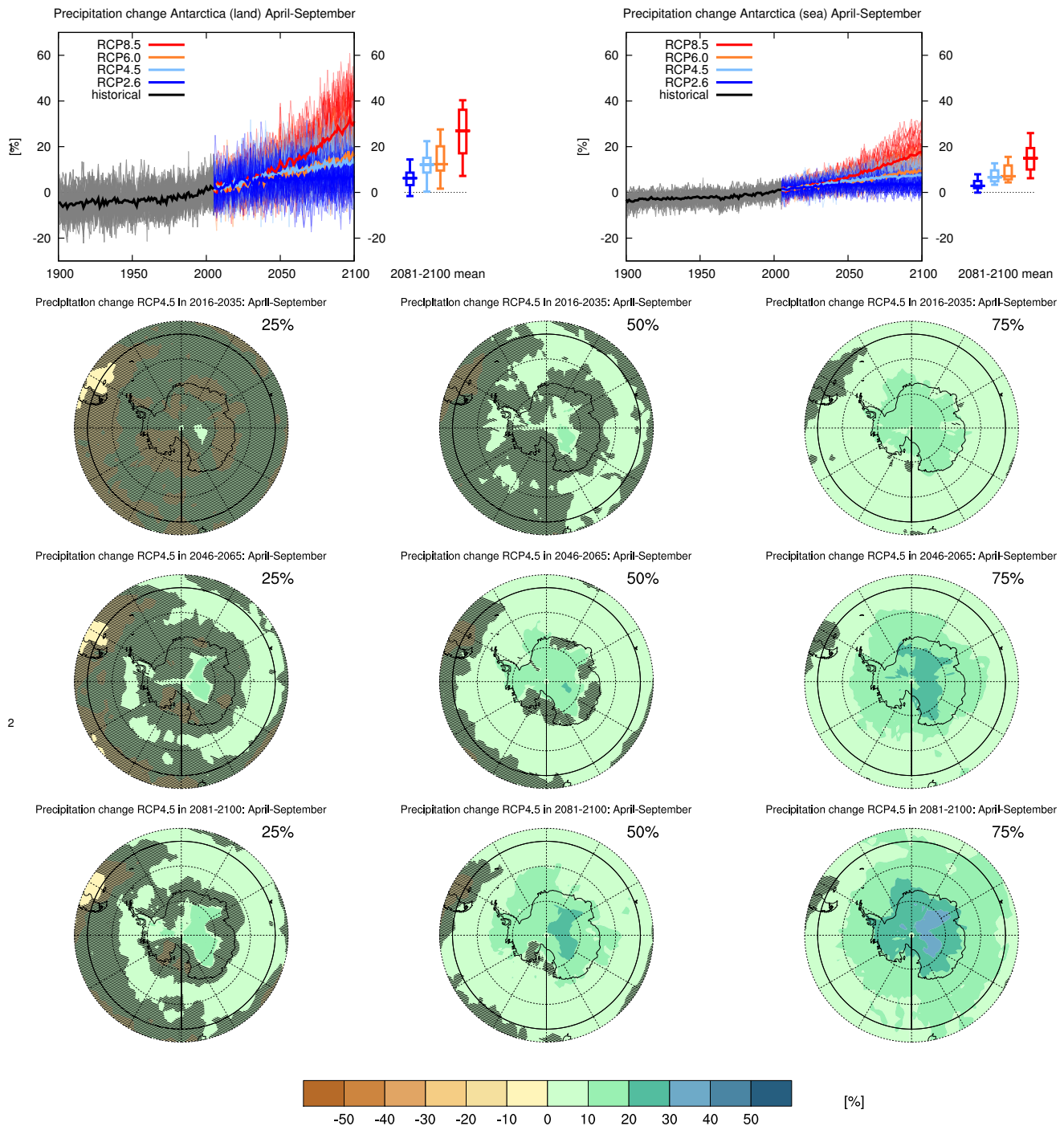
13 Sections 9.4.1.1, 9.6.1.1, 10.3.1.1.4, Box 11.2, 12.4.3.1, 14.8.15 contain relevant information regarding the
 14 evaluation of models in this region, the model spread in the context of other methods of projecting changes and
 15 the role of modes of variability and other climate phenomena.



3 **Figure AI.78:** Top left: time series of relative change relative to 1986–2005 in precipitation averaged over
 4 land grid points in Antarctica (90° – 50° S) in October–March. Top right: same for sea grid points. Thin lines
 5 denote one ensemble member per model, thick lines the CMIP5 multi-model mean. On the right-hand side
 6 the 5th, 25th, 50th (median), 75th and 95th percentiles of the distribution of 20-yr mean changes are given for
 7 2081–2100 in the four RCP scenarios.

8 Below: maps of precipitation changes in 2016–2035, 2046–2065 and 2081–2100 with respect to 1986–2005
 9 in the RCP4.5 scenario. For each point, the 25th, 50th and 75th percentile of the distribution of the CMIP5
 10 ensemble are shown, this includes both natural variability and inter-model spread. Hatching denotes areas
 11 where the 20-yr mean differences of the percentiles are less than the standard deviation of model-estimated
 12 present-day natural variability of 20-yr mean differences.

13 Sections 9.4.1.1, 9.6.1.1, 10.3.2.2, Box 11.2, 12.4.5.2, 14.8.15 contain relevant information regarding the eval-
 14 uation of models in this region, the model spread in the context of other methods of projecting changes and the
 15 role of modes of variability and other climate phenomena.



3 **Figure AI.79:** Top left: time series of relative change relative to 1986–2005 in precipitation averaged over
 4 land grid points in Antarctica (90° – 50° S) in April–September. Top right: same for sea grid points. Thin lines
 5 denote one ensemble member per model, thick lines the CMIP5 multi-model mean. On the right-hand side
 6 the 5th, 25th, 50th (median), 75th and 95th percentiles of the distribution of 20-yr mean changes are given for
 7 2081–2100 in the four RCP scenarios.

8 Below: maps of precipitation changes in 2016–2035, 2046–2065 and 2081–2100 with respect to 1986–2005
 9 in the RCP4.5 scenario. For each point, the 25th, 50th and 75th percentile of the distribution of the CMIP5
 10 ensemble are shown, this includes both natural variability and inter-model spread. Hatching denotes areas
 11 where the 20-yr mean differences of the percentiles are less than the standard deviation of model-estimated
 12 present-day natural variability of 20-yr mean differences.

13 Sections 9.4.1.1, 9.6.1.1, 10.3.2.2, Box 11.2, 12.4.5.2, 14.8.15 contain relevant information regarding the eval-
 14 uation of models in this region, the model spread in the context of other methods of projecting changes and the
 15 role of modes of variability and other climate phenomena.