Supplementary Table S1. CMIP6 models used in the study (realisation used is r1i1p1f1 except for: CESM2 (r4i1p1f1), CNRM-CM6-1 (r1i1p1f2), CNRM-ESM2-1 (r1i1p1f2), HadGEM3-GC31-LL (r1i1p1f3), MIROC-ES2L (r1i1p1f2) and UKESM1-0-LL (r1i1p1f2)).

	Model	Country	Modeling institution
1	ACCESS-CM2	Australia	Commonwealth Scientific and Industrial Research Organization (CSIRO), Australian Research Council Centre of Excellence for Climate System Science (ARCCSS)
2	bcc-csm2-mr	China	Beijing Climate Center
3	CanESM5	Canada	Canadian Centre for Climate Modelling and Analysis, Environment and Climate Change Canada
4	CESM2	USA	National Center for Atmospheric Research (NCAR)
5	CMCC-CM2-SR5	Italy	Fondazione Centro Euro-Mediterraneo sui Cambiamenti Climatici
6	CMCC-ESM2	Italy	Fondazione Centro Euro-Mediterraneo sui Cambiamenti Climatici
7	CNRM-CM6-1	France	Centre National de Recherches Météorologiques
8	CNRM-ESM2-1	France	Centre National de Recherches Météorologiques
9	EC-Earth3-CC	Various	European Earth System Model
10	EC-Earth3-Veg-LR	Various	European Earth System Model
11	FGOALS-g3	China	Chinese Academy of Sciences
12	GFDL-ESM4	USA	NOAA Geophysical Fluid Dynamics Laboratory
13	HadGEM3-GC31-LL	UK	Met. Office Hadley Centre
14	IITM-ESM	India	Centre for Climate Change Research, Indian Institute of Tropical Meteorology Pune
15	INM-CM4-8	Rusia	Institute for Numerical Mathematics, Russian Academy of Science
16	INM-CM5-0	Rusia	Institute for Numerical Mathematics, Russian Academy of Science
17	IPSL-CM6A-LR	France	Institut Pierre-Simon Laplace
18	KACE-1-0-G	Repubic of Korea	National Institute of Meteorological Sciences/Korea Meteorological Administration, Climate Research Division
19	MIROC6	Japan	Japan Agency for Marine-Earth Science and Technology (JAMSTEC), Atmosphere and Ocean Research Institute (AORI), National Institute for Environmental Studies (NIES) and RIKEN Center for Computational Science (R-CCS)
20	MIROC-ES2L	Japan	Japan Agency for Marine-Earth Science and Technology (JAMSTEC), Atmosphere and Ocean Research Institute (AORI), National Institute for Environmental Studies (NIES) and RIKEN Center for Computational Science (R-CCS)
21	MPI-ESM1-2-LR	Germany	Max Planck Institute for Meteorology
22	MRI-ESM2-0	Japan	Meteorological Research Institute
23	NESM3	China	Nanjing University of Information Science and Technology
24	NorESM2-MM	Norway	NorESM Climate modeling Consortium consisting of CICERO
25	UKESM1-0-LL	UK	Met Office Hadley Centre

Supplementary Table S2. Precipitation multi-model ensemble mean contribution by season in percentage for the five MEDClim regions for the historical period (1970-1999) and the future (2050-2079) scenarios ssp2-4.5 and ssp5-8.5.

		Winter	Spring	Summer	Autumn
CAL	Historical	47,6%	27,1%	6,7%	18,6%
	ssp2-4.5	49,8%	26,2%	6,5%	17,5%
	ssp5-8.5	50,7%	25,0%	6,8%	17,4%
MED	Historical	35,2%	24,7%	11,4%	28,7%
	ssp2-4.5	36,8%	24,6%	10,3%	28,3%
	ssp5-8.5	37,7%	24,4%	9,8%	28,2%
SAA	Historical	49,7%	19,7%	8,2%	22,4%
	ssp2-4.5	51,2%	19,0%	7,9%	21,9%
	ssp5-8.5	51,6%	18,4%	8,0%	21,9%
SAF	Historical	41,7%	20,9%	12,3%	25,1%
	ssp2-4.5	42,6%	20,2%	12,5%	24,8%
	ssp5-8.5	42,6%	19,8%	12,8%	24,8%
AUS	Historical	39,4%	16,5%	18,2%	25,9%
	ssp2-4.5	37,5%	15,4%	19,4%	27,7%
	ssp5-8.5	36,1%	14,4%	20,1%	29,4%

Supplementary Table S3. Seasonal sum of precipitation (mm season^{-1}) for the five MEDClim regions over the historical period (1970-1999) and the future (2050-2079) changes under ssp2-4.5 and ssp5-8.5 scenarios.

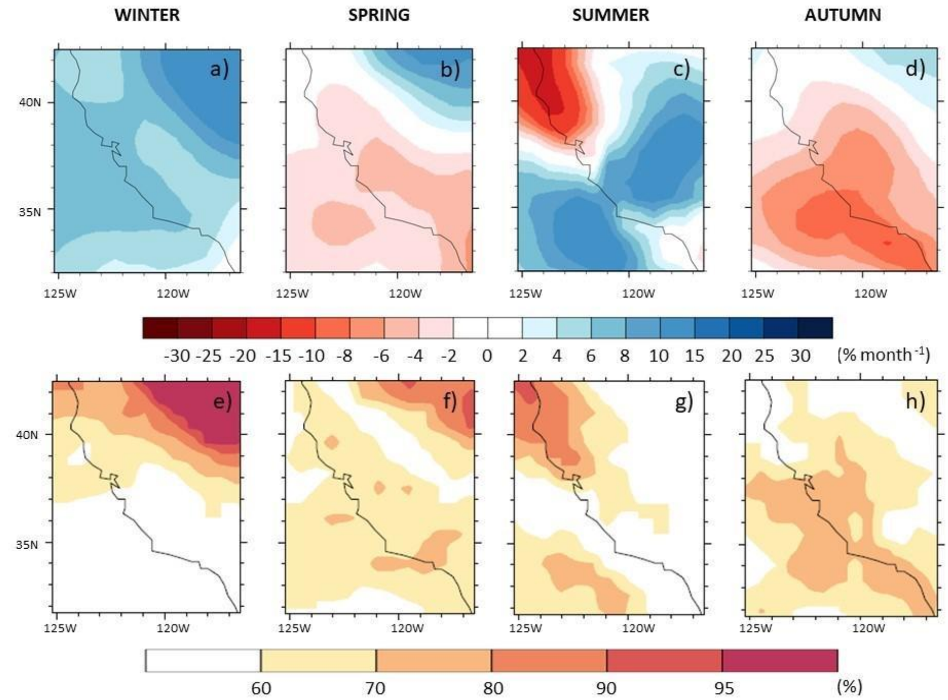
		Winter (mm season^{-1})	Spring (mm season^{-1})	Summer (mm season^{-1})	Autumn (mm season^{-1})	Annual (mm year^{-1})
CAL	Historical	287.1	163.4	40.3	112.0	602.8
	ssp2-4.5	+18.7	-2.2	-0.4	-4.6	+11.5
	ssp5-8.5	+26.7	-8.7	+1.9	-4.4	+15.5
MED	Historical	163.2	114.4	52.9	132.9	463.4
	ssp2-4.5	-1.9	-6.7	-7.8	-9.1	-25.5
	ssp5-8.5	-7.9	-13.8	-12.6	-16.8	-51.1
SAA	Historical	415.6	164.2	68.7	187.0	835.5
	ssp2-4.5	-51.8	-29.1	-12.8	-31.1	-124.8
	ssp5-8.5	-77.6	-43.4	-16.5	-43.3	-180.8
SAF	Historical	169.7	85.0	50.1	102.0	406.8
	ssp2-4.5	-19.1	-13.6	-5.8	-14.4	-52.9
	ssp5-8.5	-25.8	-18	-6.8	-18.3	-68.9
AUS	Historical	171.9	71.9	79.5	113.2	436.5
	ssp2-4.5	-26.0	-12.1	-3.8	-5.2	-47.1
	ssp5-8.5	-34.5	-17.0	-3.2	-1.5	-56.2

Supplementary Table S4. Precipitation multi-model ensemble mean changes (spatial ranges over the regions) in mm for mid-late century (2050-2079) ssp5-8.5 future scenario with respect to the reference historical period (1970-1999) for the MEDClim regions (CAL, MED, SAA, SAF and AUS) for each season and annual.

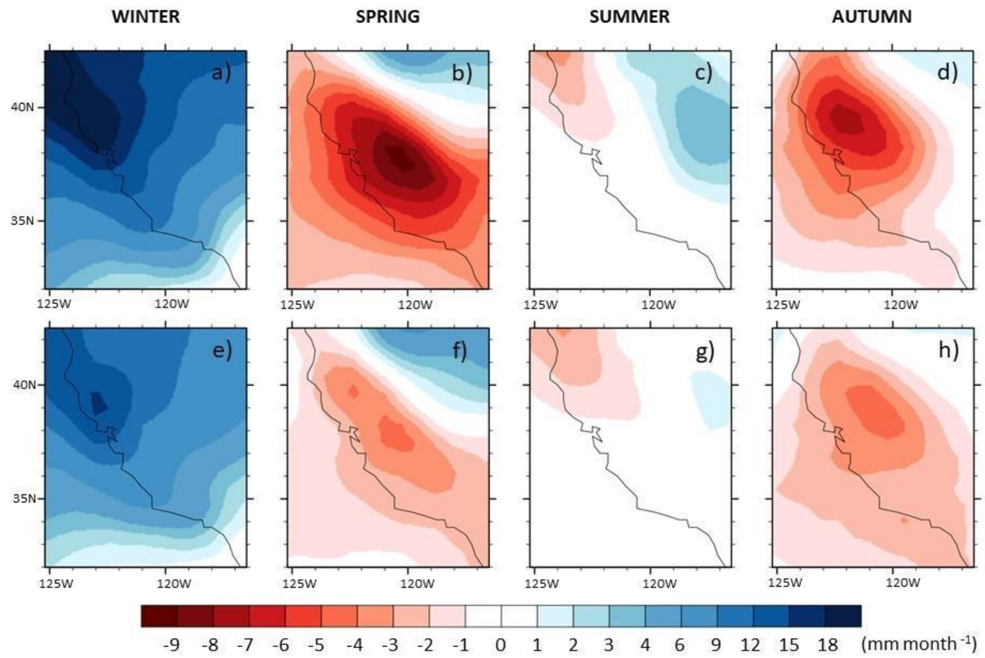
	Winter	Spring	Summer	Autumn	Annual
CAL	-2,6 – 21,3	-9,4 – 5,3	-3,6 – 3,8	-7,5 – 2,5	-1,0 – 5,8
MED	-16,2 – 10,8	-17,0 – 5,3	-14,5 – 0,6	-22,5 – 0,4	-12,0 – 1,0
SAA	-44,8 – -4,6	-27,0 – -3,5	-21,6 – 0,3	-33,2 – 0,6	-27,5 – -2,9
SAF	-11,5 – -6,1	-7,9 – -2,9	-4,9 – -0,6	-7,7 – -3,0	-7,1 – -3,5
AUS	-31,0 – -0,4	-13,3 – -1,1	-2,7 – 0,6	-10,0 – 4,0	-14,0 – 0,2

Supplementary Table S5. Precipitation multi-model ensemble mean changes (spatial ranges over the regions) in mm for mid-late century (2050-2079) ssp2-4.5 future scenario with respect to the reference historical period (1970-1999) for the MEDClim regions (CAL, MED, SAA, SAF and AUS) for each season and annual.

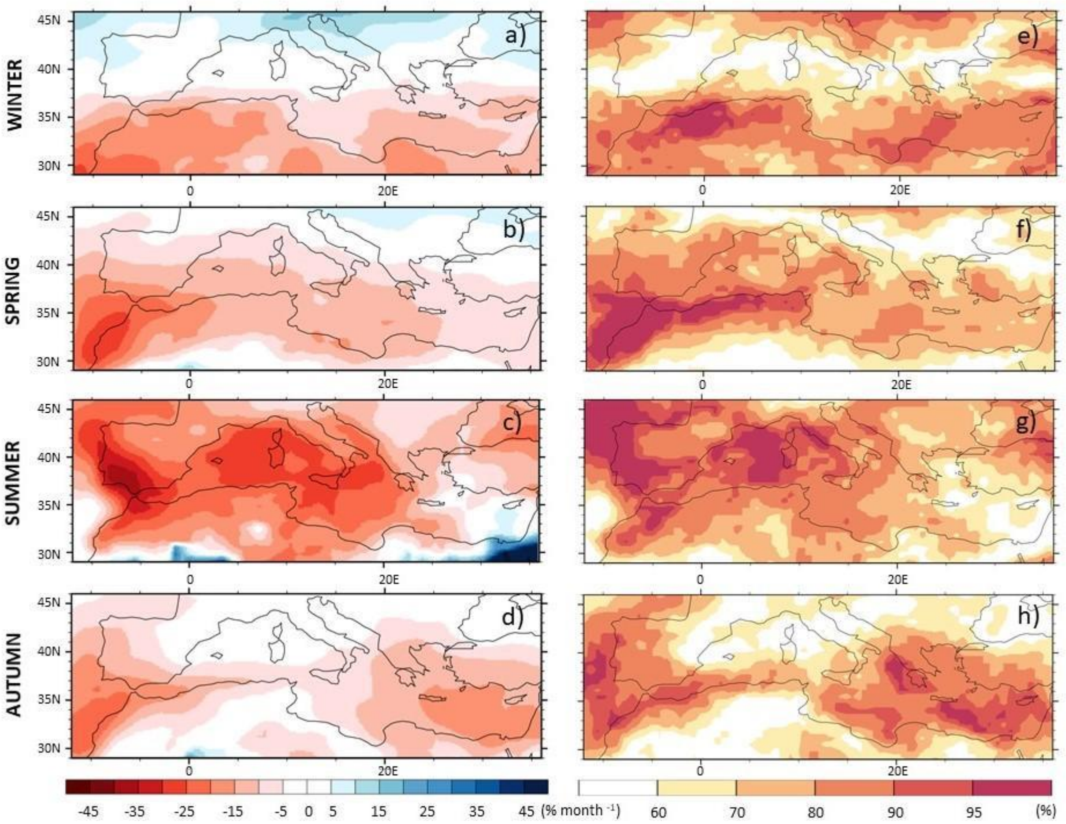
	Winter	Spring	Summer	Autumn	Annual
CAL	-1,3 –15,3	-4,4 – 6,4	-3,2 – 1,2	-4,5 – 1,9	-1,4 – 4,2
MED	-12,2 – 11,9	-10,7 – 7,1	-9,9 – 0,5	-11,9 – 3,5	-7,6 – 4,6
SAA	-29,9 – -4,3	-16,9 – -2,6	-15,8 – 0,2	-22,5 – -0,4	-18,0 – -2,9
SAF	-8,5 – -4,5	-5.8 – -2,2	-4,2 – -0,7	-6,3 – -2,5	-5,3 – -2,7
AUS	-22,0 – -1,7	-9,3 – -0,7	-2,3 – -0,3	-6,7 – 2,8	-9,7 – -0,4



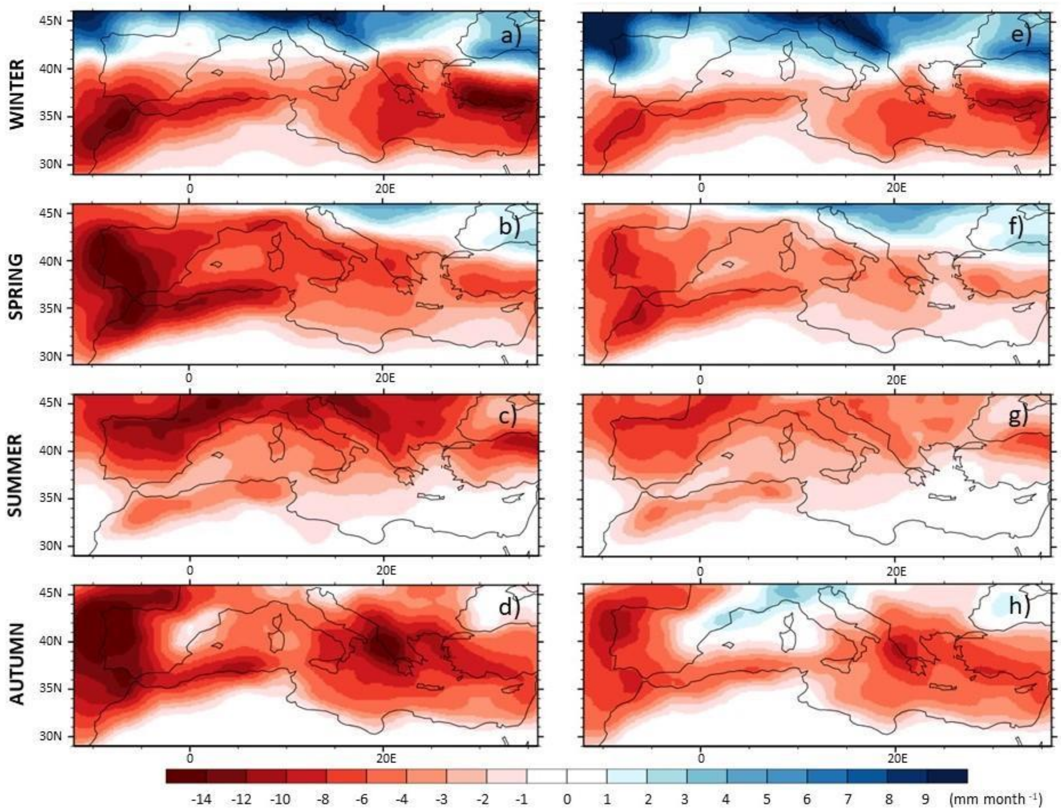
Supplementary Figure S1. Future seasonal (winter – DJF, spring - MAM, summer – JJA and autumn – SON) precipitation anomalies expressed in % and model agreement for California (CAL) based on the CMIP6 multi-model ensemble mean changes for mid-late century (2050-2079) ssp2-4.5 future scenario; (a-d): seasonal ensemble mean changes; (e-h): percentage of models agreeing on the same sign of future precipitation changes.



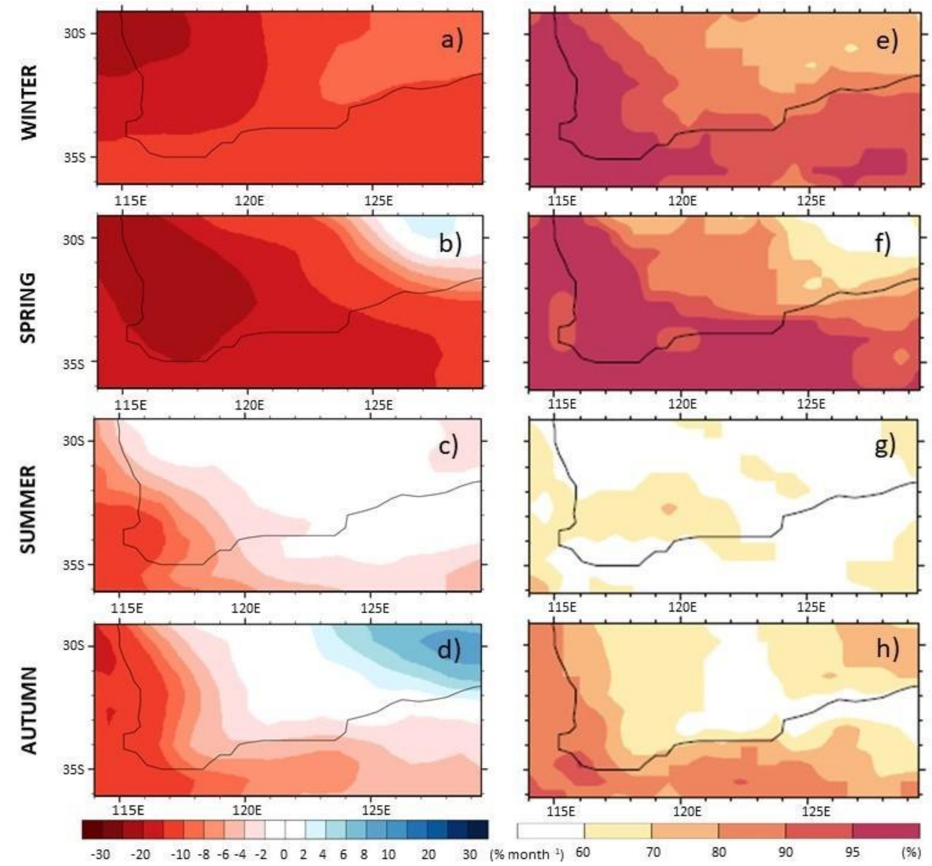
Supplementary Figure S2. Future seasonal (winter – DJF, spring - MAM, summer – JJA and autumn – SON) precipitation anomalies expressed in mm for California (CAL) based on the CMIP6 multi-model ensemble mean changes for mid-late century (2050-2079); (a-d): ssp5-8.5 future scenario; (e-h): ssp2-4.5 future scenario.



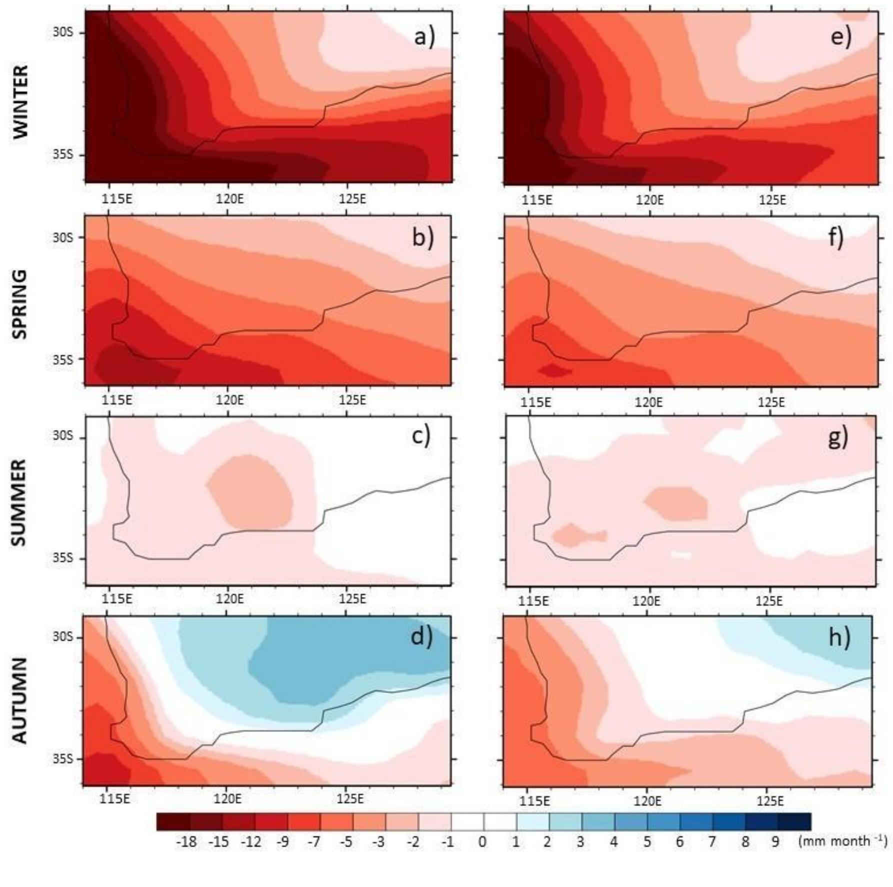
Supplementary Figure S3. Future seasonal (winter – DJF, spring - MAM, summer – JJA and autumn – SON) precipitation anomalies expressed in % and model agreement for Mediterranean Basin (MED) based on the CMIP6 multi-model ensemble mean changes for mid-late century (2050-2079) ssp2-4.5 future scenario; (a-d): seasonal ensemble mean changes; (e-h): percentage of models agreeing on the same sign of future precipitation changes.



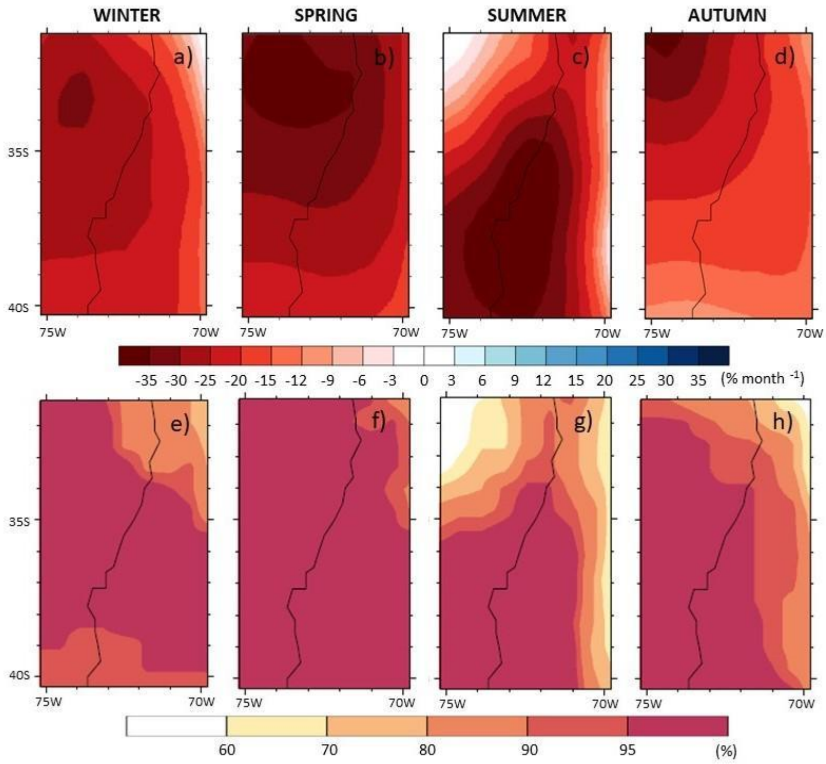
Supplementary Figure S4. Future seasonal (winter – DJF, spring - MAM, summer – JJA and autumn – SON) precipitation anomalies expressed in mm for Mediterranean Basin (MED) based on the CMIP6 multi-model ensemble mean changes for mid-late century (2050-2079); (a-d): ssp5-8.5 future scenario; (e-h): ssp2-4.5 future scenario.



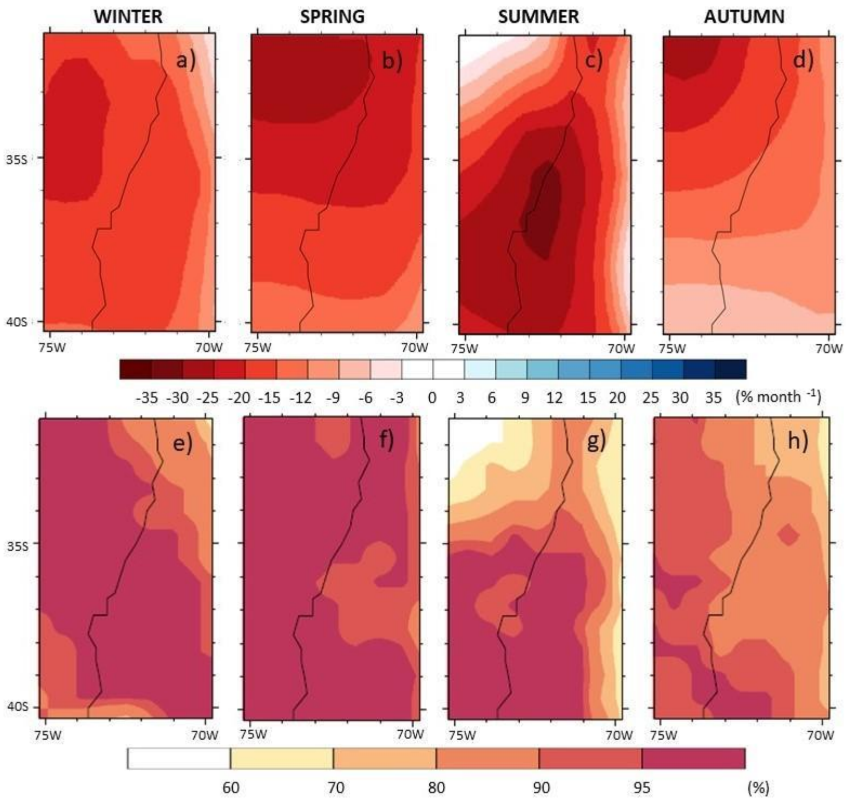
Supplementary Figure S5. Future seasonal (winter – JJA, spring - SON, summer –DJF and autumn – MAM precipitation anomalies expressed in % and model agreement for Australia (AUS) based on the CMIP6 multi-model ensemble mean changes for mid-late century (2050-2079) ssp2-4.5 future scenario; (a-d): seasonal ensemble mean changes; (e-h): percentage of models agreeing on the same sign of future precipitation changes.



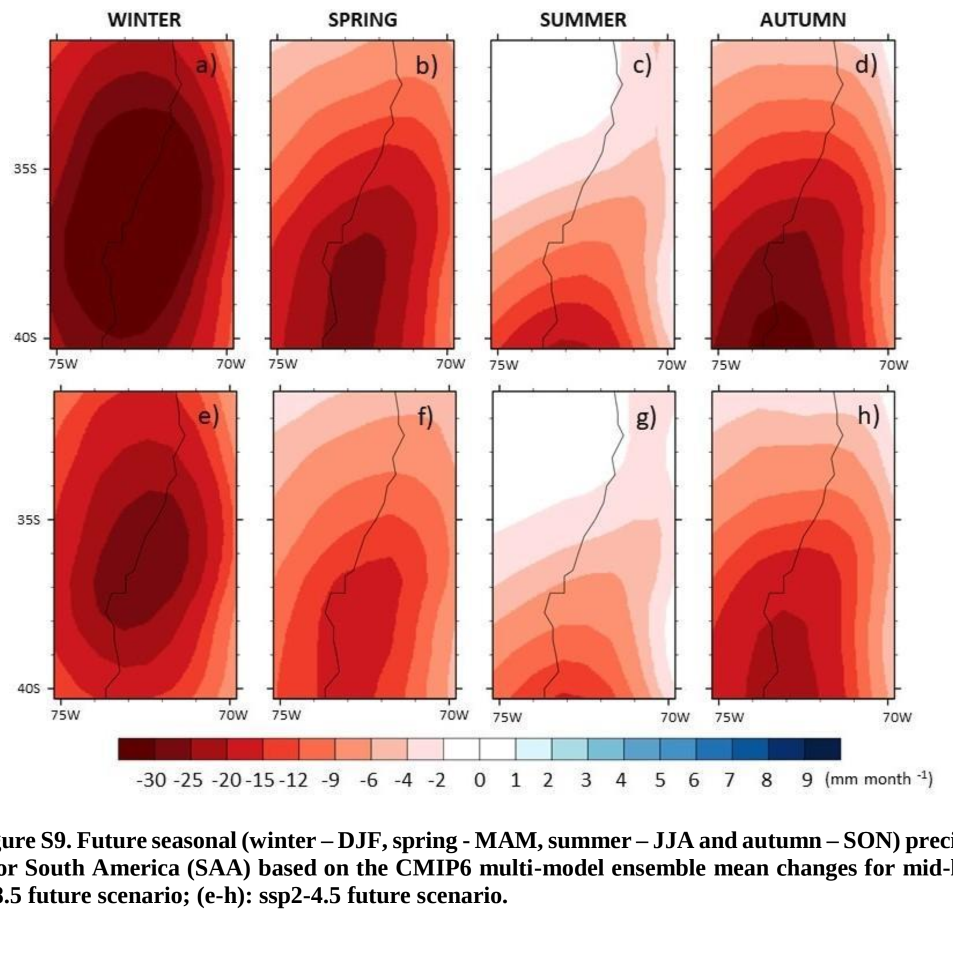
Supplementary Figure S6. Future seasonal (winter – JJA, spring - SON, summer – DJF and autumn – MAM) precipitation anomalies expressed in mm for Australia (AUS) based on the CMIP6 multi-model ensemble mean changes for mid-late century (2050-2079); (a-d): ssp5-8.5 future scenario; (e-h): ssp2-4.5 future scenario.



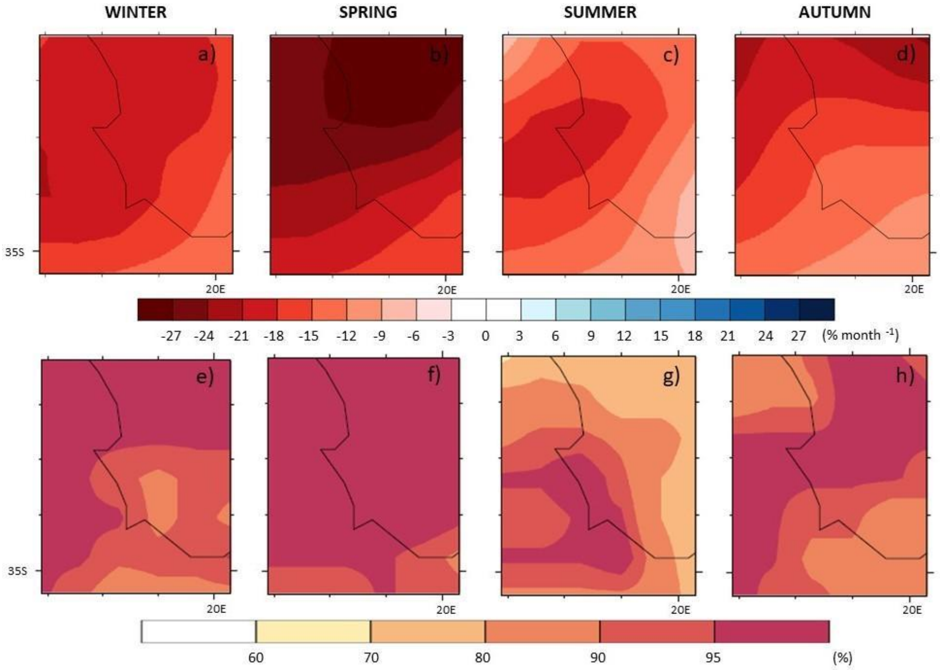
Supplementary Figure S7. Future seasonal (winter – JJA, spring - SON, summer – DJF and autumn – MAM) precipitation anomalies expressed in % and model agreement for South America (SAA) based on the CMIP6 multi-model ensemble mean changes for mid-late century (2050-2079) ssp5-8.5 future scenario; (a-d): seasonal ensemble mean changes; (e-h): percentage of models agreeing on the same sign of future precipitation changes.



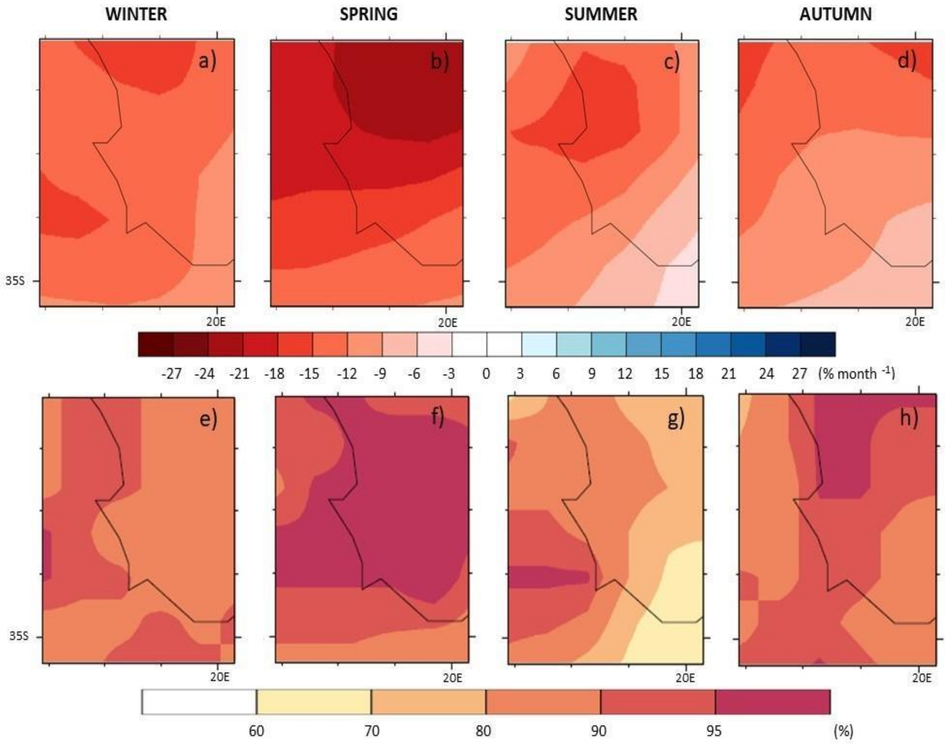
Supplementary Figure S8. Future seasonal (winter – JJA, spring - SON, summer – DJF and autumn – MAM) precipitation anomalies expressed in % and model agreement for South America (SAA) based on the CMIP6 multi-model ensemble mean changes for mid-late century (2050-2079) ssp2-4.5 future scenario; (a-d): seasonal ensemble mean changes; (e-h): percentage of models agreeing on the same sign of future precipitation changes.



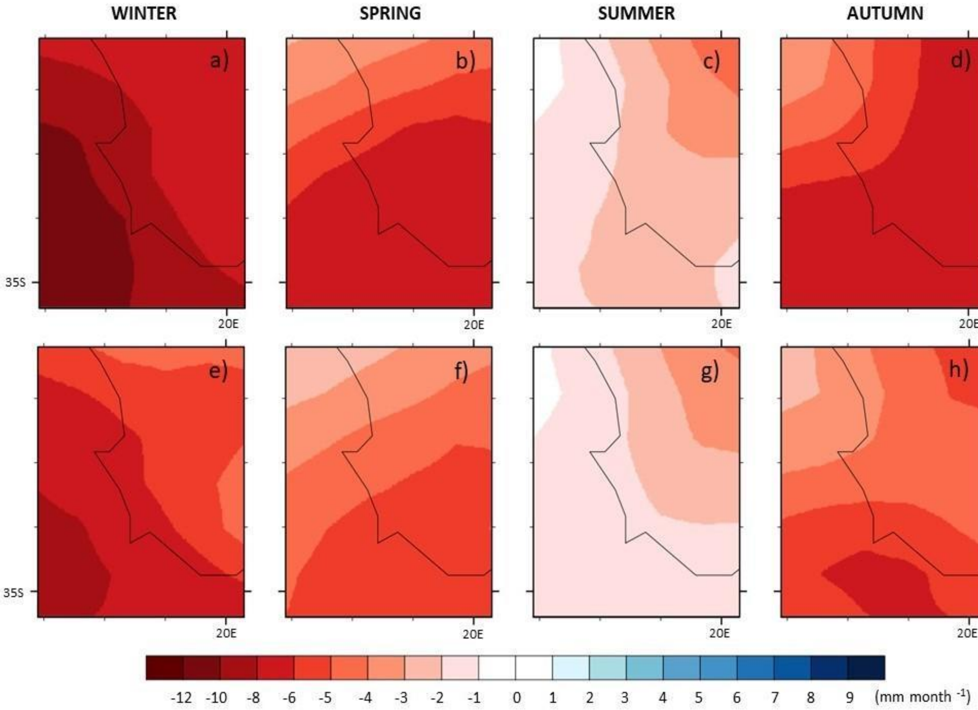
Supplementary Figure S9. Future seasonal (winter – DJF, spring - MAM, summer – JJA and autumn – SON) precipitation anomalies expressed in mm for South America (SAA) based on the CMIP6 multi-model ensemble mean changes for mid-late century (2050-2079); (a-d): ssp5-8.5 future scenario; (e-h): ssp2-4.5 future scenario.



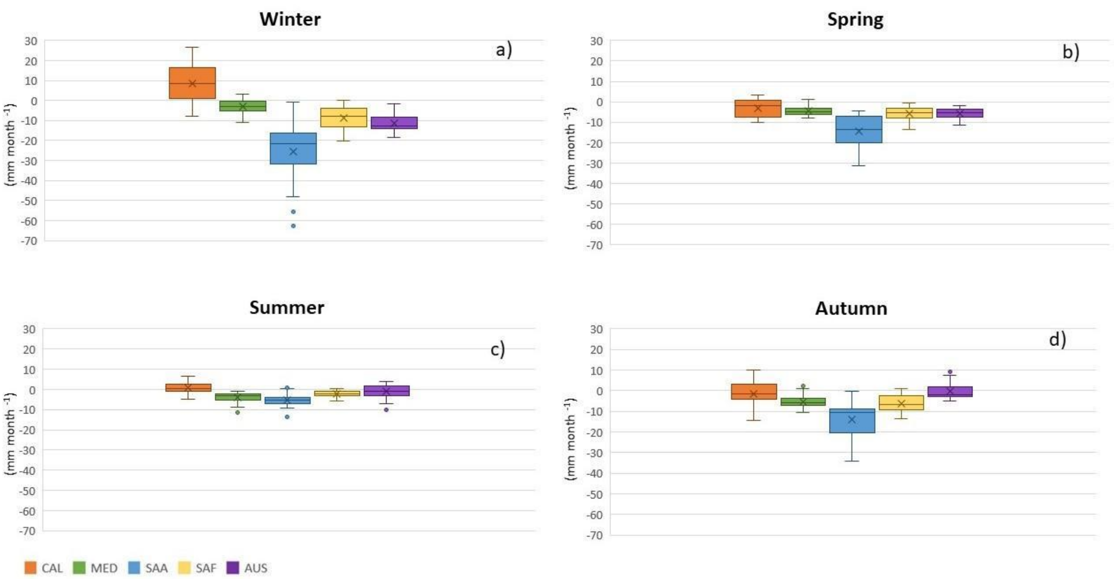
Supplementary Figure S10. Future seasonal (winter – JJA, spring - SON, summer – DJF and autumn – MAM) precipitation anomalies expressed in % and model agreement for South Africa (SAF) based on the CMIP6 multi-model ensemble mean changes for mid-late century (2050-2079) ssp5-8.5 future scenario; (a-d): seasonal ensemble mean changes; (e-h): percentage of models agreeing on the same sign of future precipitation changes.



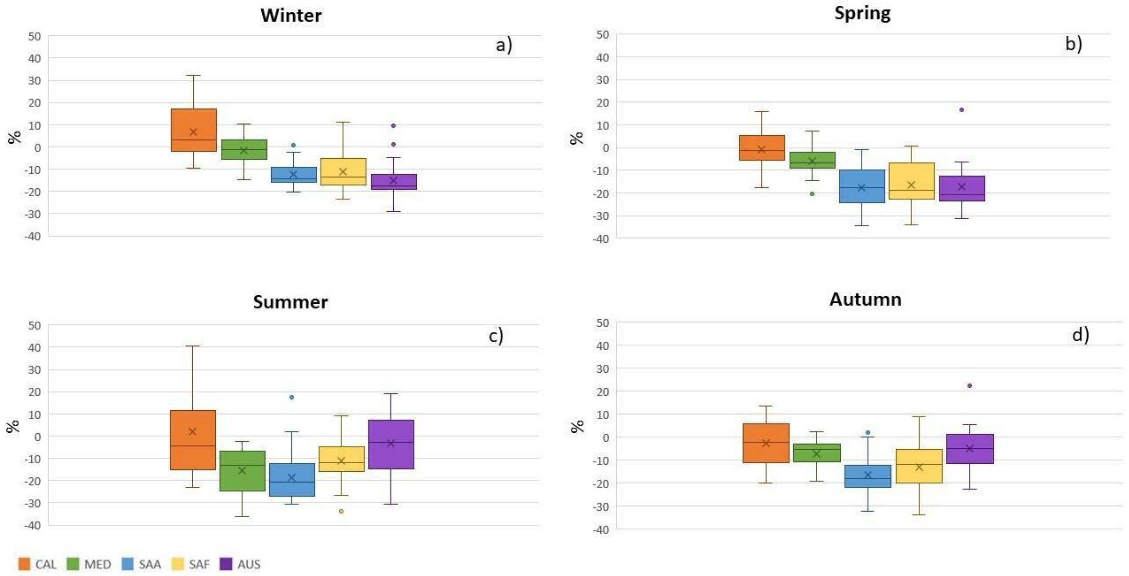
Supplementary Figure S11. Future seasonal (winter – JJA, spring - SON, summer – DJF and autumn – MAM) precipitation anomalies expressed in % and model agreement for South Africa (SAF) based on the CMIP6 multi-model ensemble mean changes for mid-late century (2050-2079) ssp2-4.5 future scenario; (a-d): seasonal ensemble mean changes; (e-h): percentage of models agreeing on the same sign of future precipitation changes.



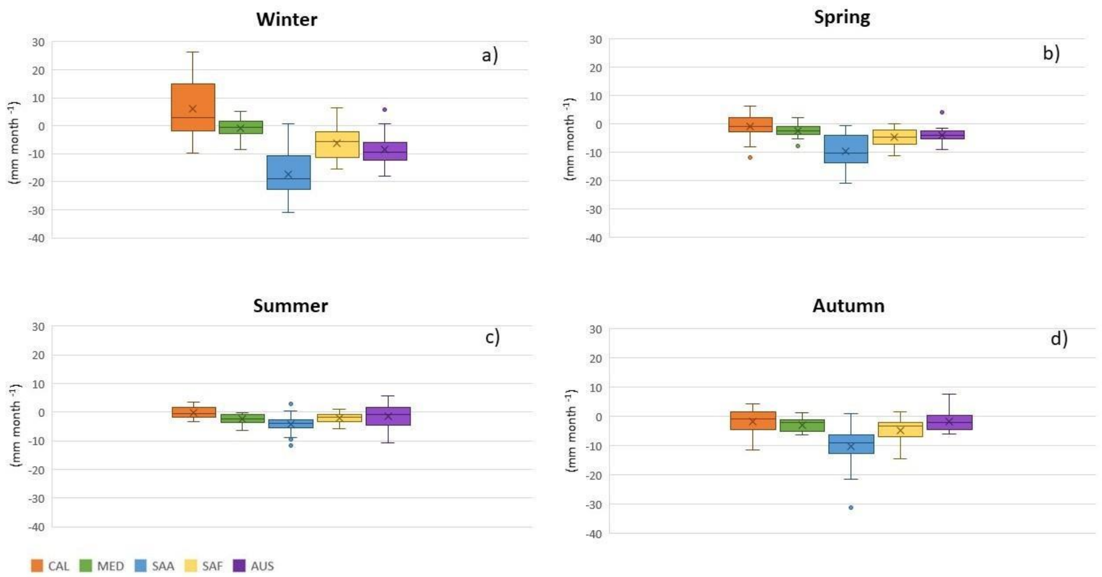
Supplementary Figure S12. Future seasonal (winter – JJA, spring - SON, summer – DJF and autumn – MAM) precipitation anomalies expressed in mm for South Africa (SAF) based on the CMIP6 multi-model ensemble mean changes for mid-late century (2050-2079); (a-d): ssp5-8.5 future scenario; (e-h): ssp2-4.5 future scenario.



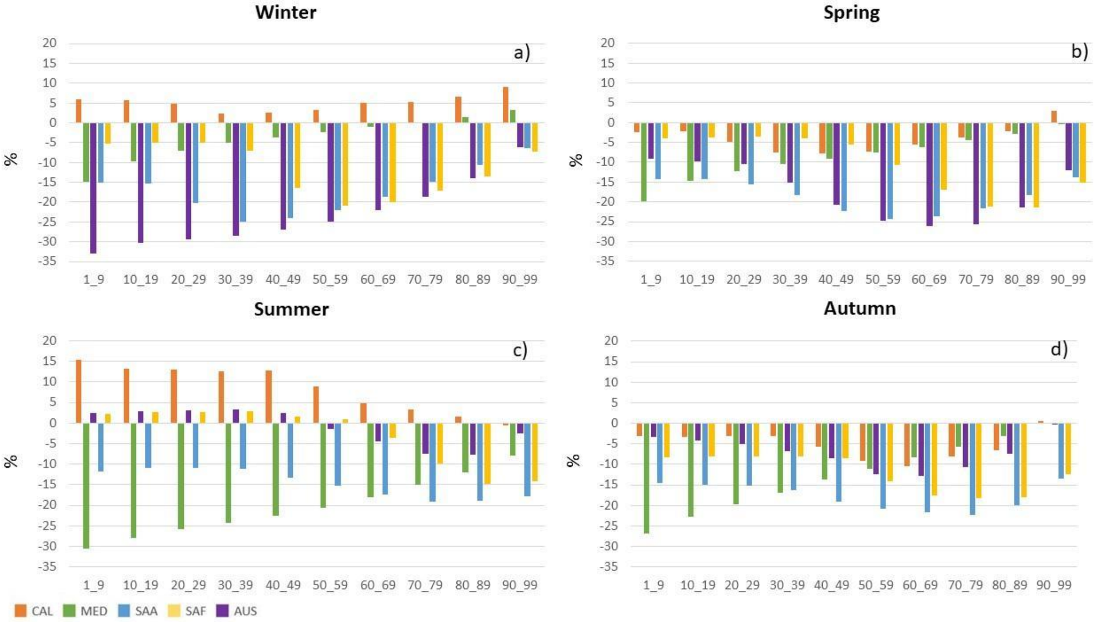
Supplementary Figure S13. Box and whiskers plots showing the seasonal precipitation changes in mm month^{-1} for mid-late century (2050-2079) for ssp5-8.5 scenario over the five MedClim regions in the CMIP6 ensemble. Boxes indicate 25 to 75 percentile interquartile range (IQR) and whiskers minimum and maximum values (values lower (higher) than 1.5xIQR below (above) the 1st (3rd) quartile are shown by dots), ensemble means are indicated by crosses.



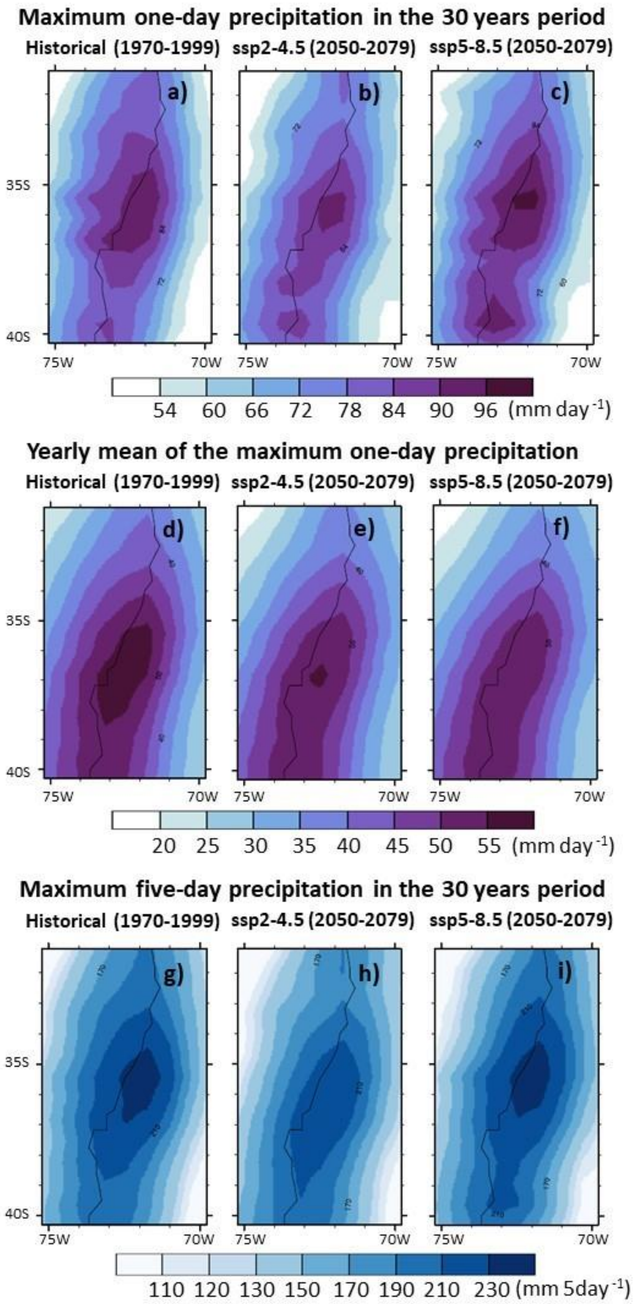
Supplementary Figure S14. Box and whiskers plots showing the seasonal precipitation percentage changes for mid-late century (2050-2079) for ssp2-4.5 scenario over the five MedClim regions in the CMIP6 ensemble. Boxes indicate 25 to 75 percentile interquartile range (IQR) and whiskers minimum and maximum values (values lower (higher) than 1.5xIQR below (above) the 1st (3rd) quartile are shown by dots), ensemble means are indicated by crosses.



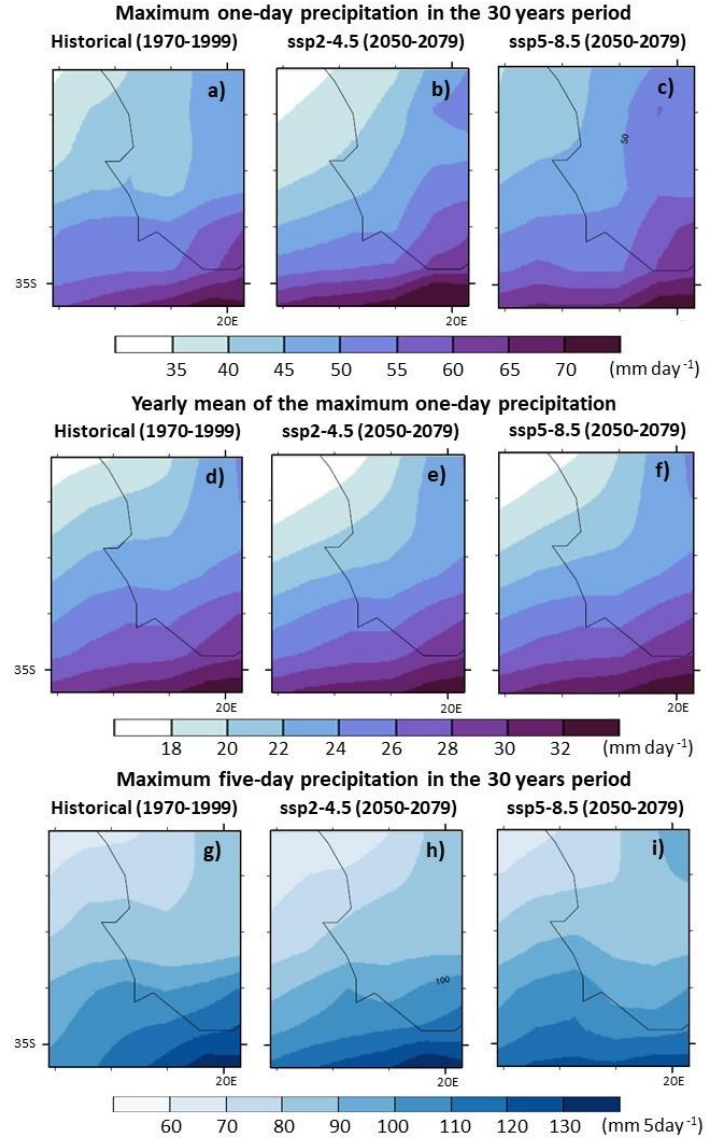
Supplementary Figure S15. Box and whiskers plots showing the seasonal precipitation changes in mm month^{-1} for mid-late century (2050-2079) for ssp2-4.5 scenario over the five MedClim regions in the CMIP6 ensemble. Boxes indicate 25 to 75 percentile interquartile range (IQR) and whiskers minimum and maximum values (values lower (higher) than 1.5xIQR below (above) the 1st (3rd) quartile are shown by dots), ensemble means are indicated by crosses.



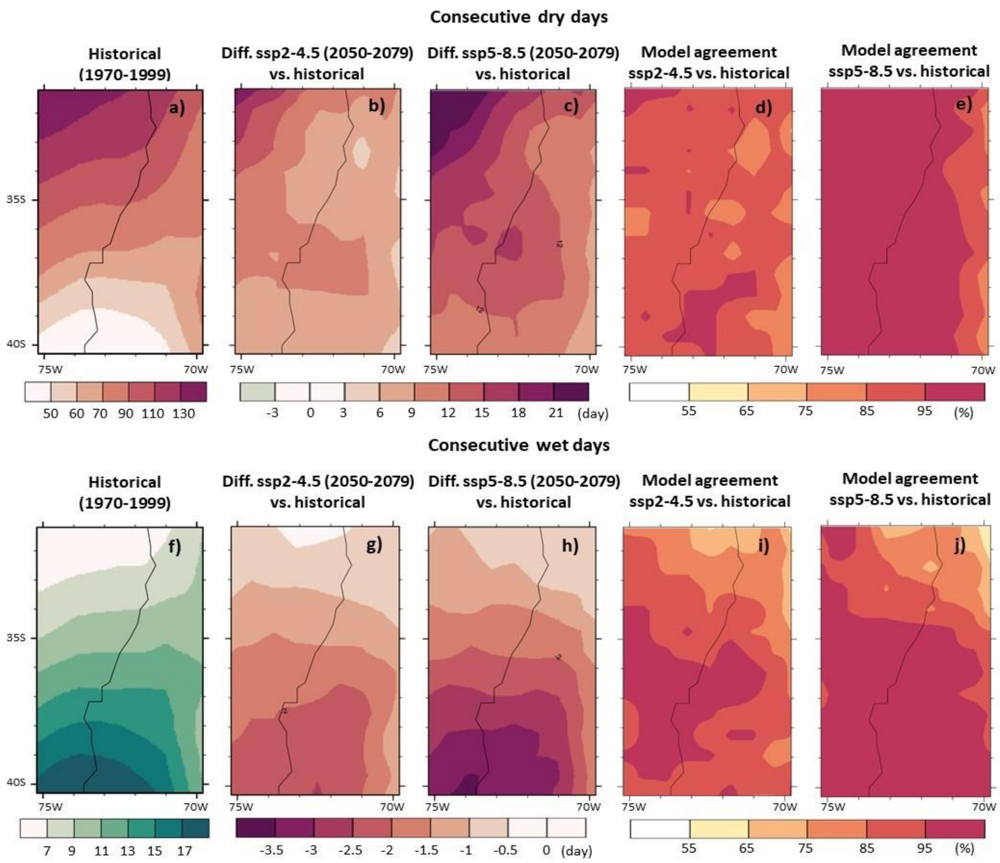
Supplementary Figure 16. Precipitation percentiles, 1st to 99th, by range for the five MEDClim regions for the historical period (1970-1999), and the future (2050-2079) period under ssp2-4.5 scenarios for winter (a), spring (b), summer (c) and autumn (d).



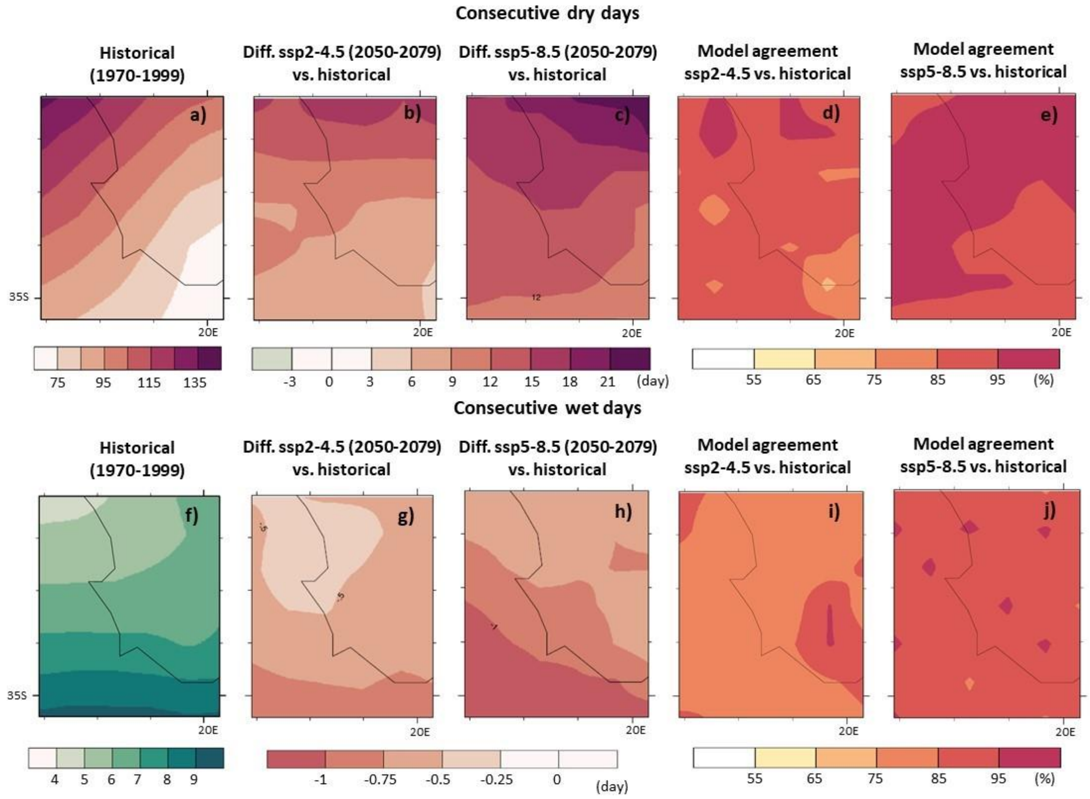
Supplementary Figure S17. Maximum precipitation day (mm day^{-1}) over SAA for the 30-year periods: historical (1970-1999) (a) and future (2050-2079) ssp2-4.5 (b) and ssp5-8.5 (c). And ensemble mean of the maximum precipitation day (mm day^{-1}) in every year over the 30-year period for historical (d) and future ssp2-4.5 (e) and ssp5-8.5 (f) scenarios. And maximum precipitation during 5 days (mm 5day^{-1}) for the 30-year periods: historical (g) and future ssp2-4.5 (h) and ssp5-8.5 (i) scenarios.



Supplementary Figure 18. Maximum precipitation day (mm day^{-1}) over SAF for the 30-year periods: historical (1970-1999) (a) and future (2050-2079) ssp2-4.5 (b) and ssp5-8.5 (c) scenarios. And ensemble mean of the maximum precipitation day (mm/day) in every year over the 30-year period for historical (d) and future ssp2-4.5 (e) and ssp5-8.5 (f) scenarios. And maximum precipitation during 5 days (mm 5day^{-1}) for the 30-year periods: historical (g) and future ssp2-4.5 (h) and ssp5-8.5 (i) scenarios.



Supplementary Figure S19. Ensemble mean of annual consecutive dry days (CDD) for historical period (1970-1999) (a) and differences between historical and mid-late century (2050-2079) for ssp2-4.5 (b) and ssp5-8.5 (c) scenarios. And ensemble mean of annual consecutive wet days (CWD) for historical period (1970-1999) (d) and differences between historical and mid-late century (2050-2079) for ssp2-4.5 (e) and ssp5-8.5 (f) scenarios over South America (SAA). And model agreement in percentage on the same sign of future precipitation changes for ssp2-4.5 (d) and (i) and ssp5-8.5 (e) and (j) scenarios.



Supplementary Figure S20. Ensemble mean of annual consecutive dry days (CDD) for historical period (1970-1999) (a) and differences between historical and mid-late century (2050-2079) for ssp2-4.5 (b) and ssp5-8.5 (c) scenarios. And ensemble mean of annual consecutive wet days (CWD) for historical period (1970-1999) (d) and differences between historical and mid-late century (2050-2079) for ssp2-4.5 (e) and ssp5-8.5 (f) scenarios over South Africa (SAF). And model agreement in percentage on the same sign of future precipitation changes for ssp2-4.5 (d) and (i) and ssp5-8.5 (e) and (j) scenarios.