UNDP Climate Change Country Profiles

Mali

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General Climate

Mali is located in western Africa at a latitudes of 10 to 25˚N, straddling the sub-tropical band called the Sahel. The northern parts of Mali reach well into the dry Sahara desert, while the southern regions experience a wetter, more tropical, climate.

The seasonal rainfalls in Mali are controlled by the movement of the tropical rain belt (also known as the Inter-Tropical Conversion Zone, ITCZ) which oscillates between the northern and southern tropics over the course of a year, and brings rainfall to the southern regions of Mali when it is in its northern position between June and October, peaking in August. The average rainfall in the wettest (southernmost) regions at this time is an average 300mm per month, but rainfall totals diminish rapidly with increasing latitude. In the dry months between November and March, almost no rain falls at all. Variations in the latitudinal movements of the ITCZ from one year to another cause large inter-annual variability in wet-season rainfall, which means that Mali suffers from recurring drought. The northern, desert regions of Mali receive very little rainfall all year round.

Annually, mean temperatures are similar across most of the country at 27-30˚C, and only differ substantially in the cooler mountainous regions of the north at 25-27˚C. However, seasonal variations are large, and differ in their patterns for different parts of the country. The most northern parts experience the largest seasonal variations; summer and winter temperatures are distinct at 27-35˚C in summer (JAS) and 15-25˚C in winter (JFM). In the south, less seasonal variation is evident, but the summer months (JAS) are the coolest of the year (23-27˚C) due to the cooling effects of cloud and rainfall at this time of year, whilst the drier season AMJ is the warmest season (25-30˚C).

Recent Climate Trends

Temperature

- Mean annual temperature has increased by 0.7˚C since 1960, an average rate of 0.15˚C per decade.
- The rate of increase is most rapid in the hot, dry season, AMJ, at 0.25˚C per decade, but there is no evidence of a warming trend in the driest season, JFM.

- Despite the observed increases in mean temperature, the frequency of days that are classed as 'hot'[1] has not increased significantly in most seasons. The frequency of nights that are classed as 'hot' has increased significantly in all seasons except winter, DJF.
    - The average number of 'hot' nights per year increased by 55 (an additional 14.9% of nights) between 1960 and 2003. The rate of increase is seen most strongly in JJA when the average number of hot JJA nights has increased by 5.7 nights per month (an additional 18.7% of JJA nights) over this period.
- The frequency of 'cold'[2] days has decreased significantly only in summer (JJA). The frequency of cold nights has decreased significantly in all seasons except winter (DJF).
    - The average number of 'cold' nights per year has decreased by 31 (8.6% of days). This rate of decrease is most rapid in MAM when the average number of cold MAM nights has decreased by 3.0 nights per month (9.7% of MAM nights) over this period.

Precipitation

- Sahelian rainfall is characterised by high variability on inter-annual and inter-decadal timsescales, which can make long-term trends difficult to identify. A period of particularly high rainfall occurred in the early 1960s, whilst the early 80s were very dry, causing widespread dry in Mali and other Sahelian countries. Rainfall in Mali has recovered to some extent since the 80s, and the late 90s and early 00s have been relatively wet.

- Daily rainfall observations indicate statistically significant decreasing trends in 5-day rainfall maxima since 1960. Annual 5-day rainfall maxima have decreased by 4.0mm per decade since 1960. The largest decreases are seen in the wet season (JJA) of 4.9mm per decade.

[1] 'Hot' day or 'hot' night is defined by the temperature exceeded on 10% of days or nights in current climate of that region and season.

[2] 'Cold' days or 'cold' nights are defined as the temperature below which 10% of days or nights are recorded in current climate of that region or season.

GCM Projections of Future Climate

Temperature

- The mean annual temperature is projected to increase by 1.2 to 3.6˚C by the 2060s, and 1.8 to 5.9˚C by the 2090s. The range of projections by the 2090s under any one emissions scenario is 1.5- 2.5˚C.
- The projected rate of warming is similar in all seasons and regions of Mali.

- All projections indicate substantial increases in the frequency of days and nights that are considered 'hot' in current climate.
    - Annually, projections indicate that 'hot' days will occur on 18-38% of days by the 2060s, and 22-54% of days by the 2090s. Days considered 'hot' by current climate standards for their season are may increase most rapidly in JAS, but the range between model projections is large, occurring on 30-91% of days of the season by the 2090s.
    - Nights that are considered 'hot' for the annual climate of 1970-99 are projected to occur on 23-40% of nights by the 2060s and 27-54% of nights by the 2090s. Nights that are considered hot for each season by 1970-99 standards are projected to increase most rapidly in JAS, occurring on 47-95% of nights in every season by the 2090s.
    - Projected increases in hot days and nights are more rapid in the south of the country than the north.
- All projections indicate decreases in the frequency of days and nights that are considered 'cold' in current climate. Cold days occur on less than 5% of days by the 2090s, and cold nights less than 3% of nights. Cold days and nights do not occur at all by the 2090s time in some projections.

Precipitation

- Projections of mean annual rainfall averaged over the country from different models in the ensemble project a wide range of changes in precipitation for Mali, but tend towards decreases. Projected change range from -22 to +25% by the 2090s, with ensemble means between 0 and -11%.
- Proportionally, decreases are largest in the north of Mali. The largest decreases in total rainfall, however, affect the south west corner of Mali in the wet season, JAS.

- The changes proportion of total rainfall that falls in heavy[3] events range widely between increases and decreases. However, annually, these values tend to increase in the south of the country, but to decrease in the north. Decreases are largest in AMJ and increases are largest in OND.

[3] A 'Heavy' event is defined as a daily rainfall total which exceeds the threshold that is exceeded on 5% of rainy days in current the climate of that region and season.

- 1- and 5-day rainfall maxima in projections also tend towards slight increases in JAS and OND, and decreases in AMJ. The range of changes in projections from the model ensemble, is however, covers both increases and decreases in all seasons.

Other Regional Climate Change Information

- Model simulations of precipitation changes for the Sahelian and south-Saharan regions of Africa are strongly divergent and most models fail to reproduce realistic inter-annual and inter-decadal rainfall variability in the Sahel in 20th century simulations. Our understanding of the processes causing tropical rainfall is insufficient to allow a prediction of the direction of change with any certainty. The IPCC identify this as an area requiring further research to understand the variety of model responses in this region (Christensen *et al.* 2007).
- Model simulations show wide disagreements in projected changes in the amplitude of future El Niño events. West African climate can be strongly influenced by ENSO, thus contributing to uncertainty in climate projections for this region.

- For further information on climate projections for Africa, see Christensen *et al.* (2007) IPCC Working Group I Report: '*The Physical Science Basis'*, Chapter 11 *(Regional Climate projections*): Section 11.2 *(Africa*).

Data Summary

	Observed Mean 1970-99	Observed Trend 1960-2006		Projected changes by the 2030s			Projected changes by the 2060s			Projected changes by the 2090s		
				Min	*Median*	*Max*	*Min*	*Median*	*Max*	*Min*	*Median*	*Max*
Temperature												
	(˚C)	*(change in ˚C per decade)*		*Change in ˚C*			*Change in ˚C*			*Change in ˚C*		
			A2	1.3	**1.5**	2.0	1.9	**3.1**	3.6	4.2	**5.2**	5.9
Annual	27.9	0.15*	*A1B*	0.8	**1.8**	2.2	2.1	**3.1**	3.6	3.2	**3.9**	5.4
			B1	0.9	**1.3**	1.8	1.2	**2.0**	2.6	1.8	**2.5**	3.3
			A2	1.1	**1.6**	2.6	1.9	**2.8**	3.9	3.9	**4.8**	5.8
JFM	23.8	-0.01	*A1B*	1.0	**1.9**	2.6	2.0	**2.8**	3.5	3.1	**3.7**	5.4
			B1	0.9	**1.3**	1.5	1.1	**1.9**	2.5	1.7	**2.5**	3.8
			A2	1.3	**1.7**	2.2	1.9	**3.0**	3.9	4.2	**5.4**	6.6
AMJ	32.1	0.25*	*A1B*	0.9	**1.8**	2.4	2.4	**3.4**	3.8	2.6	**4.3**	5.9
			B1	0.8	**1.3**	1.8	1.4	**2.3**	3.0	1.7	**2.7**	3.7
			A2	0.6	**1.4**	2.1	1.8	**3.0**	4.5	3.6	**5.1**	6.8
JAS	30.9	0.21*	*A1B*	0.4	**1.7**	2.4	2.1	**3.0**	4.0	2.3	**3.6**	5.6
			B1	0.7	**1.3**	1.9	0.9	**2.0**	3.1	1.1	**2.7**	3.5
			A2	1.1	**1.4**	2.2	2.0	**3.1**	3.6	4.2	**5.3**	5.9
OND	24.7	0.14*	*A1B*	0.7	**1.5**	2.4	1.9	**3.1**	4.1	2.7	**3.8**	5.3
			B1	0.7	**1.3**	2.4	1.0	**2.0**	2.5	1.8	**2.4**	3.3
Precipitation												
	(mm per month)	*(change in mm per decade)*		*Change in mm per month*			*Change in mm per month*			*Change in mm per month*		
			A2	-5	**0**	6	-13	**0**	8	-18	**-2**	11
Annual	27.2	-0.4	*A1B*	-3	**0**	9	-15	**-2**	8	-20	**-2**	9
			B1	-3	**0**	5	-5	**0**	7	-6	**0**	6
			A2	-1	**0**	0	-2	**0**	0	-2	**0**	2
JFM	1.3	0.3*	*A1B*	0	**0**	0	-1	**0**	0	-2	**0**	1
			B1	0	**0**	0	-2	**0**	1	-1	**0**	0
			A2	-7	**0**	9	-13	**0**	11	-12	**-4**	15
AMJ	20.9	-0.3	*A1B*	-6	**0**	9	-10	**-3**	12	-13	**-4**	11
			B1	-6	**1**	8	-7	**-1**	11	-8	**0**	5
			A2	-15	**0**	15	-60	**1**	20	-77	**-3**	30
JAS	80.2	-1.7	*A1B*	-18	**1**	24	-47	**-2**	22	-65	**-1**	25
			B1	-7	**1**	18	-23	**-2**	14	-25	**-2**	20
			A2	-6	**0**	1	0	**1**	5	-7	**0**	5
OND	6.4	-0.1	*A1B*	-3	**0**	6	-7	**0**	11	-5	**1**	6
			B1	-4	**0**	3	-3	**0**	7	-5	**0**	4
Precipitation (%)												
	(mm per month)	*(change in % per decade)*		*% Change*			*% Change*			*% Change*		
			A2	-13	**1**	15	-24	**-1**	19	-34	**-11**	25
Annual	27.2	-1.4	*A1B*	-11	**2**	21	-28	**-6**	19	-37	**-8**	21
			B1	-12	**1**	23	-15	**1**	15	-22	**0**	13
			A2	-54	**-12**	61	-79	**-10**	55	-78	**-9**	200
JFM	1.3	26.4*	*A1B*	-85	**-13**	46	-47	**-26**	33	-64	**-24**	82
			B1	-59	**-11**	27	-72	**-22**	81	-38	**-11**	54
			A2	-23	**-1**	15	-35	**2**	28	-63	**-18**	25
AMJ	20.9	-1.2	*A1B*	-32	**-1**	15	-34	**-12**	21	-55	**-13**	19
			B1	-22	**5**	13	-40	**-4**	24	-45	**-1**	12
			A2	-12	**1**	27	-40	**1**	27	-52	**-4**	32
JAS	80.2	-2.1	*A1B*	-12	**2**	26	-32	**-3**	20	-44	**-3**	27
			B1	-10	**3**	34	-15	**-2**	20	-19	**-4**	18
			A2	-31	**2**	30	-14	**13**	63	-35	**8**	50
OND	6.4	-1.0	*A1B*	-17	**2**	41	-37	**0**	51	-35	**10**	52
			B1	-19	**2**	36	-28	**4**	34	-31	**3**	44

	Observed Mean 1970-99	Observed Trend 1960-2006		Projected changes by the 2030s			Projected changes by the 2060s			Projected changes by the 2090s		
				Min	Median	Max	Min	Median	Max	Min	Median	Max
	% Frequency	Change in frequency per decade					Future % frequency			Future % frequency		
Frequency of Hot Days (TX90p)												
			A2	****	****	****	24	**27**	38	33	**42**	54
Annual	10.0	0.26	*A1B*	****	****	****	23	**28**	38	29	**33**	52
			B1	****	****	****	18	**22**	31	22	**25**	38
			A2	****	****	****	19	**26**	35	33	**39**	47
JFM	8.0	(-1.62)	*A1B*	****	****	****	19	**25**	30	29	**32**	47
(DJF)			*B1*	****	****	****	19	**21**	25	16	**25**	32
			A2	****	****	****	33	**40**	62	52	**60**	78
AMJ	9.8	(0.89)	*A1B*	****	****	****	33	**40**	63	46	**53**	78
(MAM)			*B1*	****	****	****	23	**30**	49	27	**38**	62
			A2	****	****	****	36	**38**	66	44	**65**	91
JAS	11.1	(1.05)	*A1B*	****	****	****	28	**47**	68	45	**51**	86
(JJA)			*B1*	****	****	****	17	**36**	49	30	**39**	65
			A2	****	****	****	23	**30**	33	39	**45**	51
OND	12.2	(2.01*)	*A1B*	****	****	****	24	**28**	37	31	**38**	45
(SON)			*B1*	****	****	****	17	**22**	30	21	**26**	35
Frequency of Hot Nights (TN90p)												
			A2	****	****	****	29	**36**	39	45	**51**	54
Annual	13.1	3.48*	*A1B*	****	****	****	27	**35**	40	37	**45**	48
			B1	****	****	****	23	**27**	29	27	**33**	37
			A2	****	****	****	20	**27**	38	36	**46**	57
JFM	12.5	(1.72)	*A1B*	****	****	****	17	**27**	31	31	**38**	50
(DJF)			*B1*	****	****	****	18	**22**	24	20	**25**	34
			A2	****	****	****	40	**45**	53	63	**69**	75
AMJ	13.3	(4.15*)	*A1B*	****	****	****	39	**47**	52	52	**60**	69
(MAM)			*B1*	****	****	****	30	**37**	43	35	**42**	51
			A2	****	****	****	54	**64**	77	80	**90**	95
JAS	13.9	(4.34*)	*A1B*	****	****	****	50	**65**	80	71	**79**	91
(JJA)			*B1*	****	****	****	33	**46**	52	47	**56**	71
			A2	****	****	****	26	**30**	40	38	**47**	58
OND	13.5	(4.01*)	*A1B*	****	****	****	22	**32**	37	28	**39**	51
(SON)			*B1*	****	****	****	18	**24**	27	23	**27**	34
Frequency of Cold Days (TX10p)												
			A2	****	****	****	1	**3**	4	0	**1**	1
Annual	10.2	-0.11	*A1B*	****	****	****	2	**3**	4	0	**2**	2
			B1	****	****	****	3	**5**	7	2	**3**	5
			A2	****	****	****	0	**2**	2	0	**1**	2
JFM	12.0	(1.1)	*A1B*	****	****	****	0	**1**	4	0	**1**	2
(DJF)			*B1*	****	****	****	1	**4**	7	0	**2**	4
			A2	****	****	****	1	**2**	4	0	**0**	1
AMJ	10.5	(-0.71)	*A1B*	****	****	****	1	**2**	5	0	**1**	2
(MAM)			*B1*	****	****	****	2	**3**	6	1	**2**	5
			A2	****	****	****	0	**3**	6	0	**1**	3
JAS	8.9	(-1.05*)	*A1B*	****	****	****	0	**2**	6	0	**2**	4
(JJA)			*B1*	****	****	****	1	**3**	8	0	**2**	6
			A2	****	****	****	1	**2**	4	0	**0**	1
OND	9.8	(-0.29)	*A1B*	****	****	****	1	**2**	3	0	**1**	3
(SON)			*B1*	****	****	****	2	**4**	6	1	**3**	4
Frequency of Cold Nights (TN10p)												
			A2	****	****	****	0	**1**	3	0	**0**	1
Annual	8.4	-1.99*	*A1B*	****	****	****	0	**1**	2	0	**0**	2
			B1	****	****	****	2	**3**	5	0	**2**	3
			A2	****	****	****	0	**0**	2	0	**0**	0
JFM	9.6	(-1.19)	*A1B*	****	****	****	0	**1**	3	0	**0**	1
(DJF)			*B1*	****	****	****	0	**2**	4	0	**1**	2
			A2	****	****	****	0	**1**	2	0	**0**	0
AMJ	8.3	(-2.25*)	*A1B*	****	****	****	0	**1**	1	0	**0**	1
(MAM)			*B1*	****	****	****	1	**2**	4	0	**2**	3
			A2	****	****	****	0	**1**	1	0	**0**	0
JAS	7.9	(-2.09*)	*A1B*	****	****	****	0	**1**	1	0	**0**	0
(JJA)			*B1*	****	****	****	0	**1**	3	0	**1**	2
			A2	****	****	****	0	**1**	2	0	**0**	0
OND	8.6	(-1.92*)	*A1B*	****	****	****	0	**0**	2	0	**0**	1
(SON)			*B1*	****	****	****	1	**2**	3	0	**1**	3

	Observed Mean 1970-99	Observed Trend 1960-2006		Projected changes by the 2030s Min	Median	Max	Projected changes by the 2060s Min	Median	Max	Projected changes by the 2090s Min	Median	Max
% total rainfall falling in Heavy Events (R95pct)												
	%	*Change in % per decade*					*Change in %*			*Change in %*		
			A2	****	****	****	-9	**1**	4	-13	**0**	11
Annual	24.4	-1.61	*A1B*	****	****	****	-9	**-1**	6	-13	**0**	7
			B1	****	****	****	-6	**2**	7	-5	**2**	5
			A2	****	****	****	-22	**-5**	12	-22	**-1**	7
JFM	****	****	*A1B*	****	****	****	-17	**-5**	4	-20	**-7**	4
(DJF)			*B1*	****	****	****	-13	**0**	22	-16	**-7**	10
			A2	****	****	****	-15	**-4**	5	-30	**-5**	13
AMJ	****	****	*A1B*	****	****	****	-16	**-3**	10	-28	**-6**	6
(MAM)			*B1*	****	****	****	-13	**-3**	8	-22	**-4**	5
			A2	****	****	****	-14	**3**	11	-19	**1**	15
JAS	****	****	*A1B*	****	****	****	-14	**-2**	9	-14	**3**	13
(JJA)			*B1*	****	****	****	-9	**1**	8	-11	**0**	8
			A2	****	****	****	-6	**0**	13	-24	**0**	9
OND	****	****	*A1B*	****	****	****	-11	**0**	11	-14	**1**	13
(SON)			*B1*	****	****	****	-10	**2**	17	-8	**1**	12
Maximum 1-day rainfall (RX1day)												
	mm	*Change in mm per decade*					*Change in mm*			*Change in mm*		
			A2	****	****	****	-1	**1**	5	-3	**2**	7
Annual	54.7	-0.53	*A1B*	****	****	****	-1	**1**	6	-2	**1**	6
			B1	****	****	****	-3	**1**	5	-2	**1**	6
			A2	****	****	****	-1	**0**	0	-1	**0**	1
JFM	0.9	(-0.45*)	*A1B*	****	****	****	-1	**0**	0	-1	**0**	0
(DJF)			*B1*	****	****	****	-1	**0**	0	-1	**0**	0
			A2	****	****	****	-2	**0**	2	-4	**0**	9
AMJ	10.2	(-2.27*)	*A1B*	****	****	****	-1	**0**	3	-3	**0**	3
(MAM)			*B1*	****	****	****	-2	**0**	4	-2	**0**	1
			A2	****	****	****	-3	**1**	5	-3	**1**	8
JAS	****	****	*A1B*	****	****	****	-2	**0**	6	-2	**1**	7
(JJA)			*B1*	****	****	****	-2	**1**	5	-2	**1**	7
			A2	****	****	****	0	**0**	5	-3	**0**	3
OND	10.6	(-1.33)	*A1B*	****	****	****	-1	**0**	2	0	**0**	4
(SON)			*B1*	****	****	****	-1	**0**	4	-1	**0**	2
Maximum 5-day Rainfall (RX5day)												
	mm	*Change in mm per decade*					*Change in mm*			*Change in mm*		
			A2	****	****	****	-12	**4**	7	-6	**3**	12
Annual	85.2	-3.96*	*A1B*	****	****	****	-11	**1**	11	-11	**1**	13
			B1	****	****	****	-6	**2**	8	-5	**1**	7
			A2	****	****	****	-2	**0**	0	-2	**0**	3
JFM	1.6	(-0.4)	*A1B*	****	****	****	-1	**0**	0	-3	**0**	0
(DJF)			*B1*	****	****	****	-2	**0**	0	-1	**0**	0
			A2	****	****	****	-7	**-1**	5	-9	**-1**	14
AMJ	11.7	(-2.50*)	*A1B*	****	****	****	-5	**-1**	6	-9	**-1**	7
(MAM)			*B1*	****	****	****	-5	**-1**	7	-6	**0**	3
			A2	****	****	****	-19	**2**	6	-24	**4**	13
JAS	60.4	(-4.91*)	*A1B*	****	****	****	-16	**0**	10	-20	**2**	13
(JJA)			*B1*	****	****	****	-5	**0**	8	-6	**1**	7
			A2	****	****	****	0	**0**	9	-12	**0**	5
OND	21.4	(-3.92*)	*A1B*	****	****	****	-7	**0**	6	-2	**1**	8
(SON)			*B1*	****	****	****	-3	**0**	12	-2	**0**	5

* indicates trend is statistically significant at 95% confidence

**** indicates data are not available

Bracketed trend values for extremes indices indicate values for the closest seasons that data is available. See documentation.

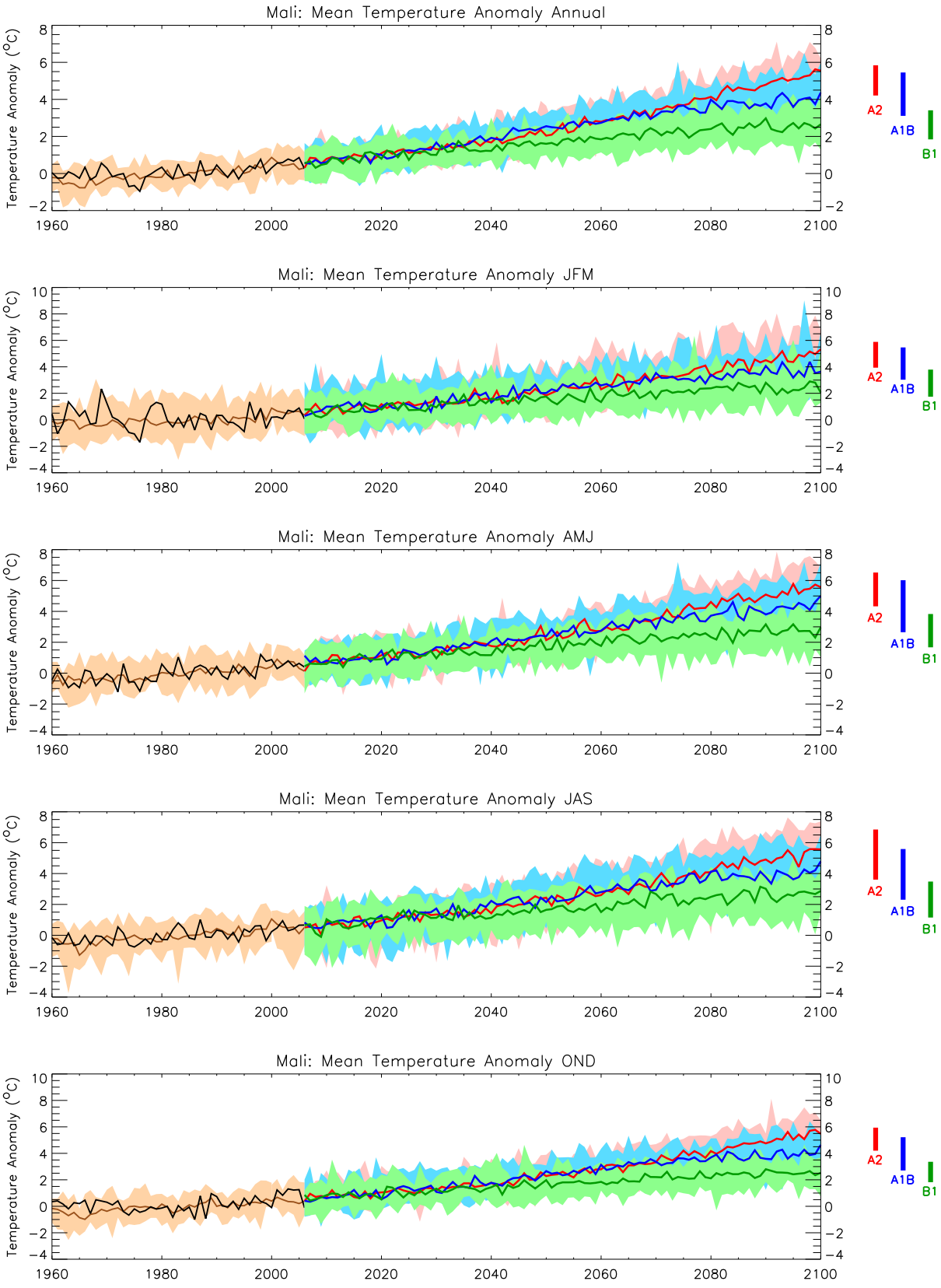

Figure 1: Trends in annual and seasonal mean temperature for the recent past and projected future. All values shown are anomalies, relative to the 1970-1999 mean climate. Black curves show the mean of observed data from 1960 to 2006, Brown curves show the median (solid line) and range (shading) of model simulations of recent climate across an ensemble of 15 models. Coloured lines from 2006 onwards show the median (solid line) and range (shading) of the ensemble projections of climate under three emissions scenarios. Coloured bars on the right-hand side of the projections summarise the range of mean 2090-2100 climates simulated by the 15 models for each emissions scenario.

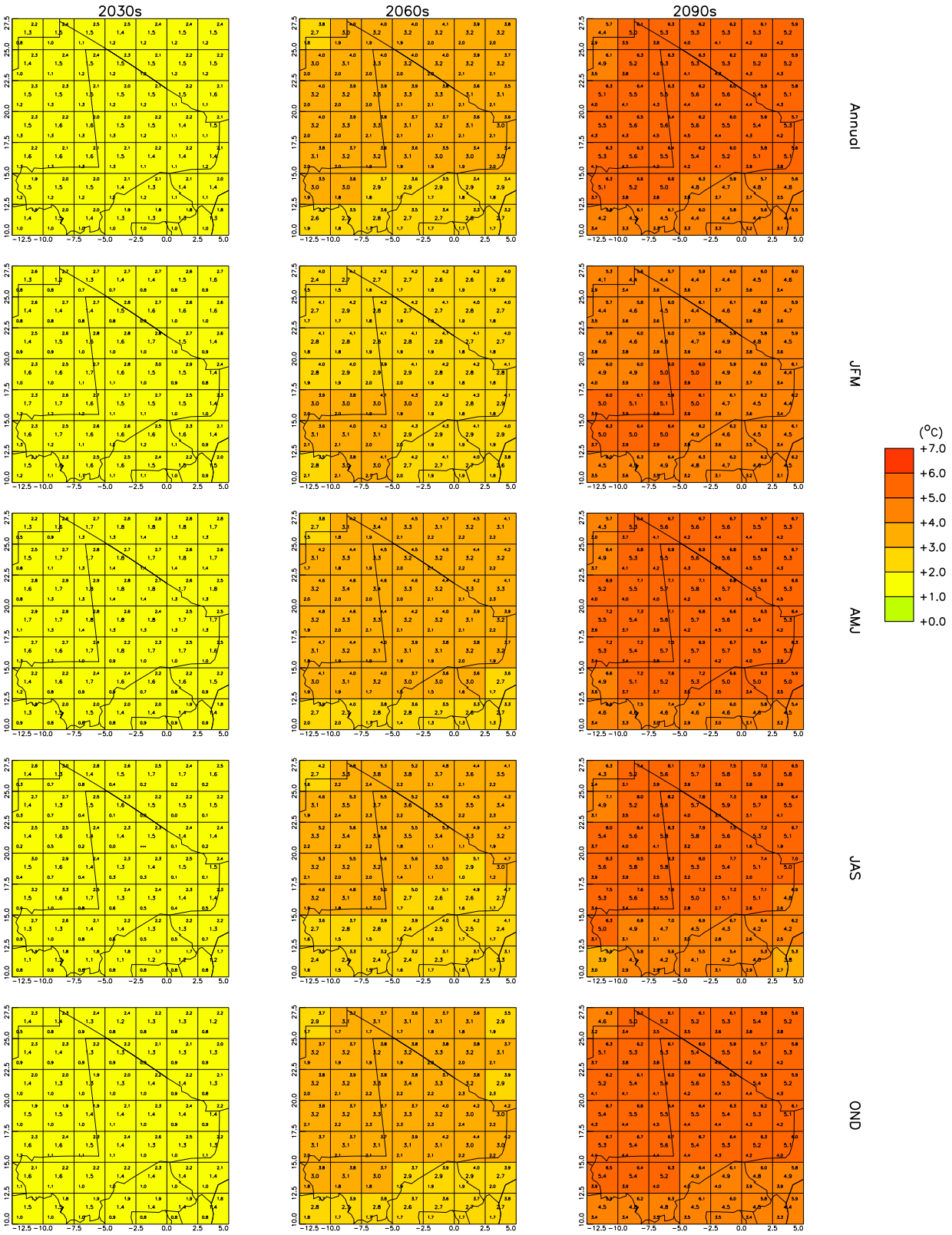

Figure 2: Spatial patterns of projected change in mean annual and seasonal temperature for 10-year periods in the future under the SRES A2 scenario. All values are anomalies relative to the mean climate of 1970-1999. In each grid box, the central value gives the ensemble median and the values in the upper and lower corners give the ensemble maximum and minimum.

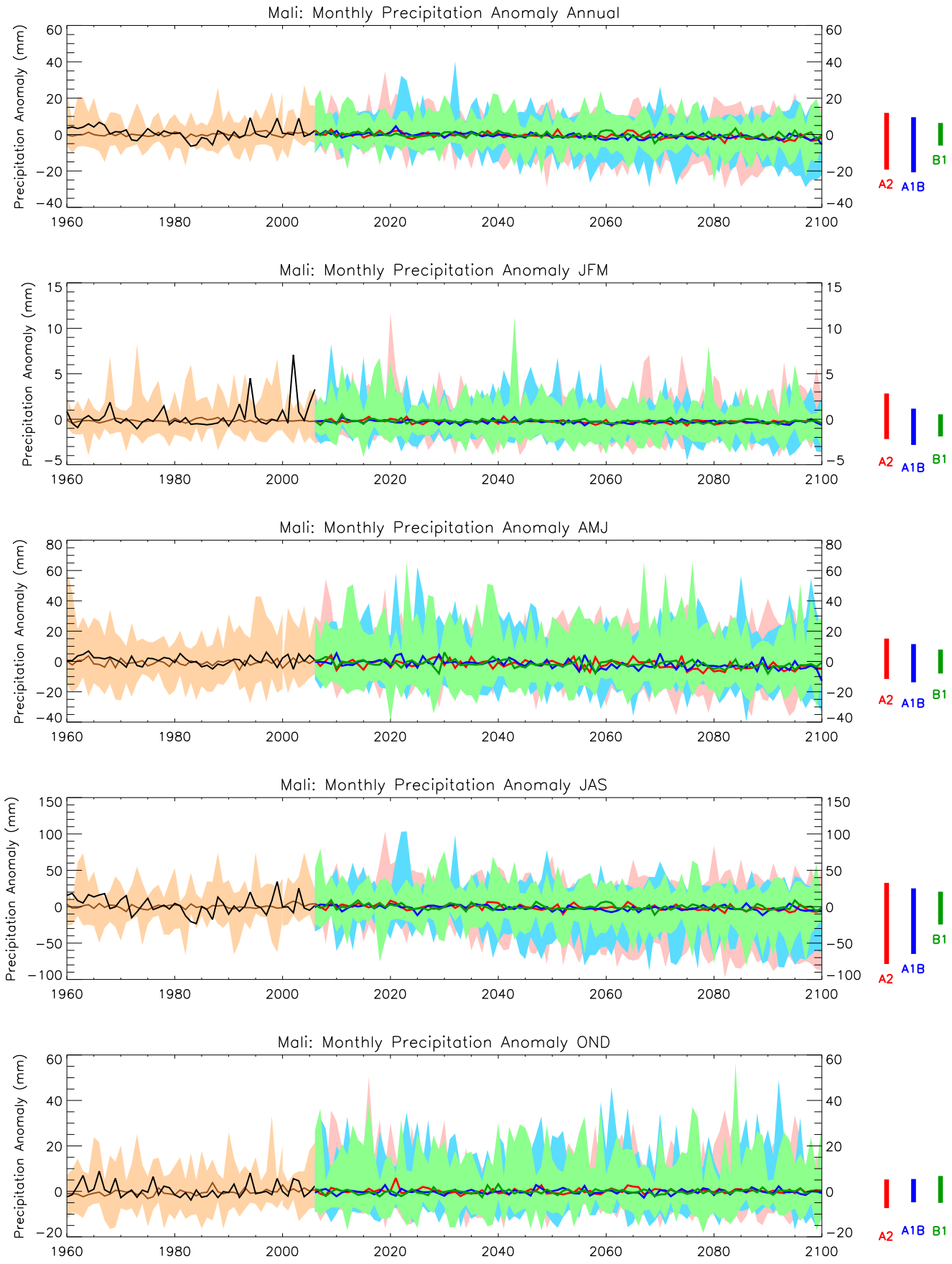

Figure 3: Trends in monthly precipitation for the recent past and projected future. All values shown are anomalies, relative to the 1970-1999 mean climate. See Figure 1 for details.

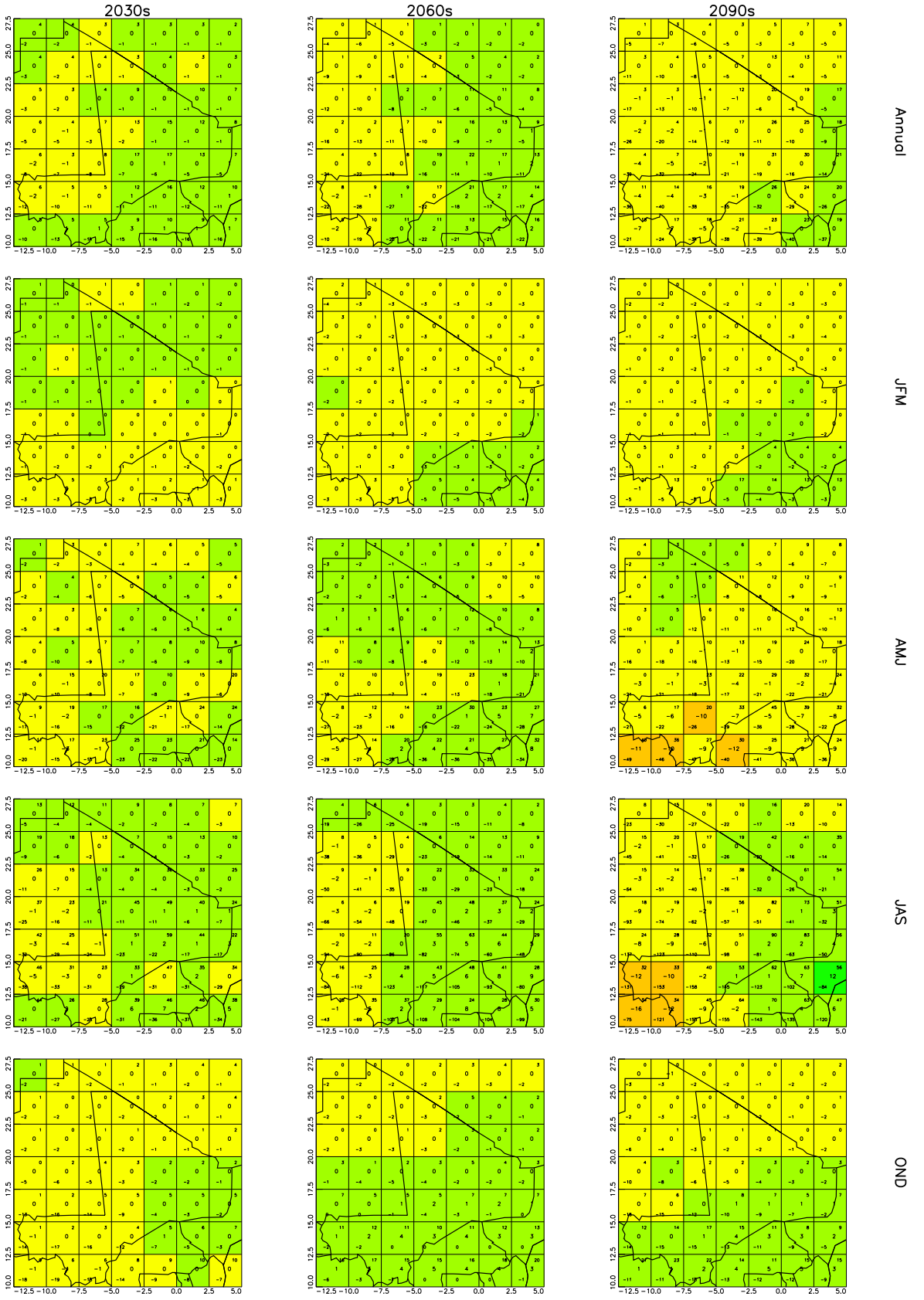

Figure 4: Spatial patterns of projected change in monthly precipitation for 10-year periods in the future under the SRES A2 scenario. All values are anomalies relative to the mean climate of 1970-1999.See Figure 2 for details.

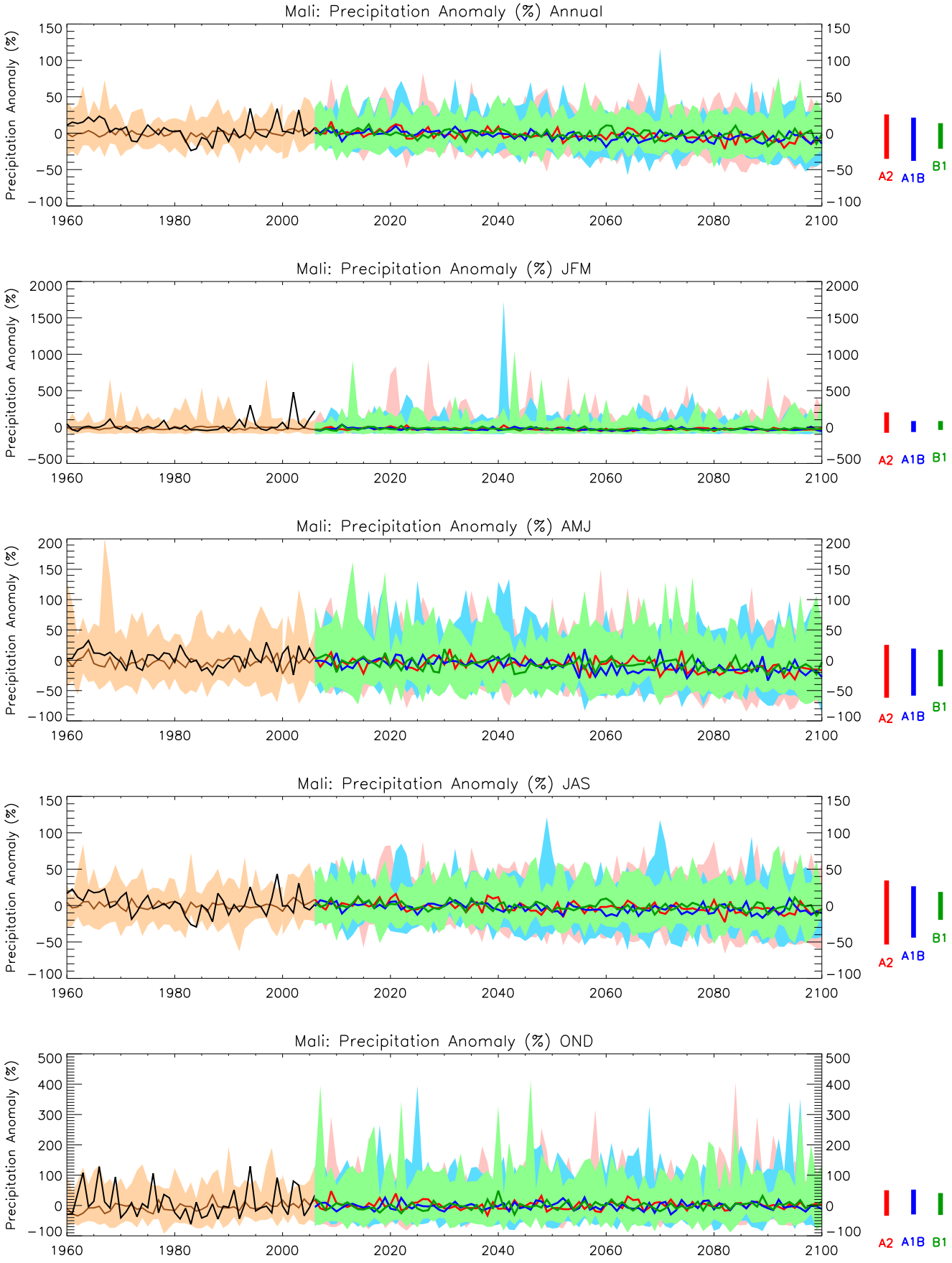

Figure 5: Trends in monthly precipitation for the recent past and projected future. All values shown are percentage anomalies, relative to the 1970-1999 mean climate. See Figure 1 for details.

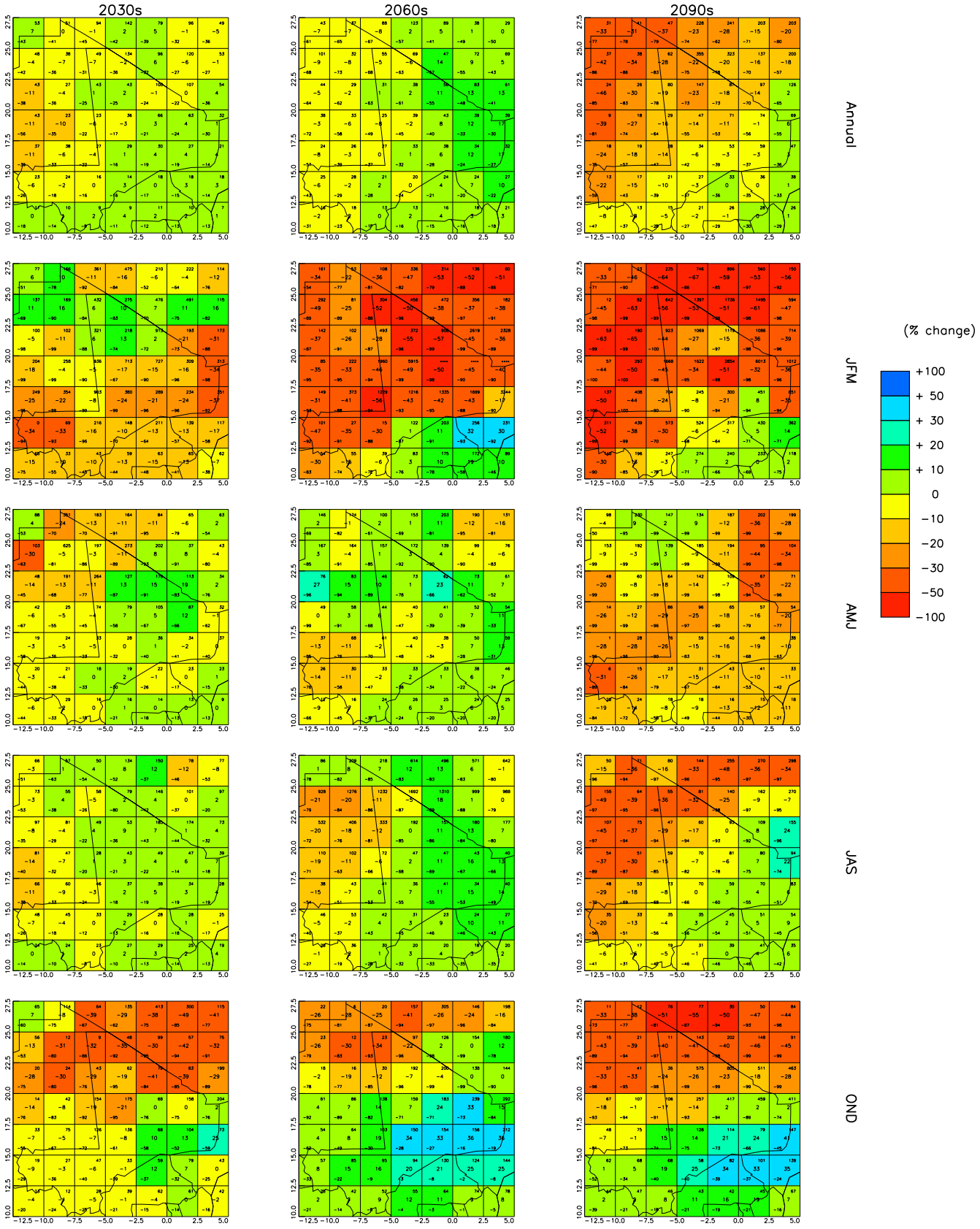

Figure 6: Spatial patterns of projected change in monthly precipitation for 10-year periods in the future under the SRES A2 scenario. All values are percentage anomalies relative to the mean climate of 1970-1999.See Figure 2 for details.

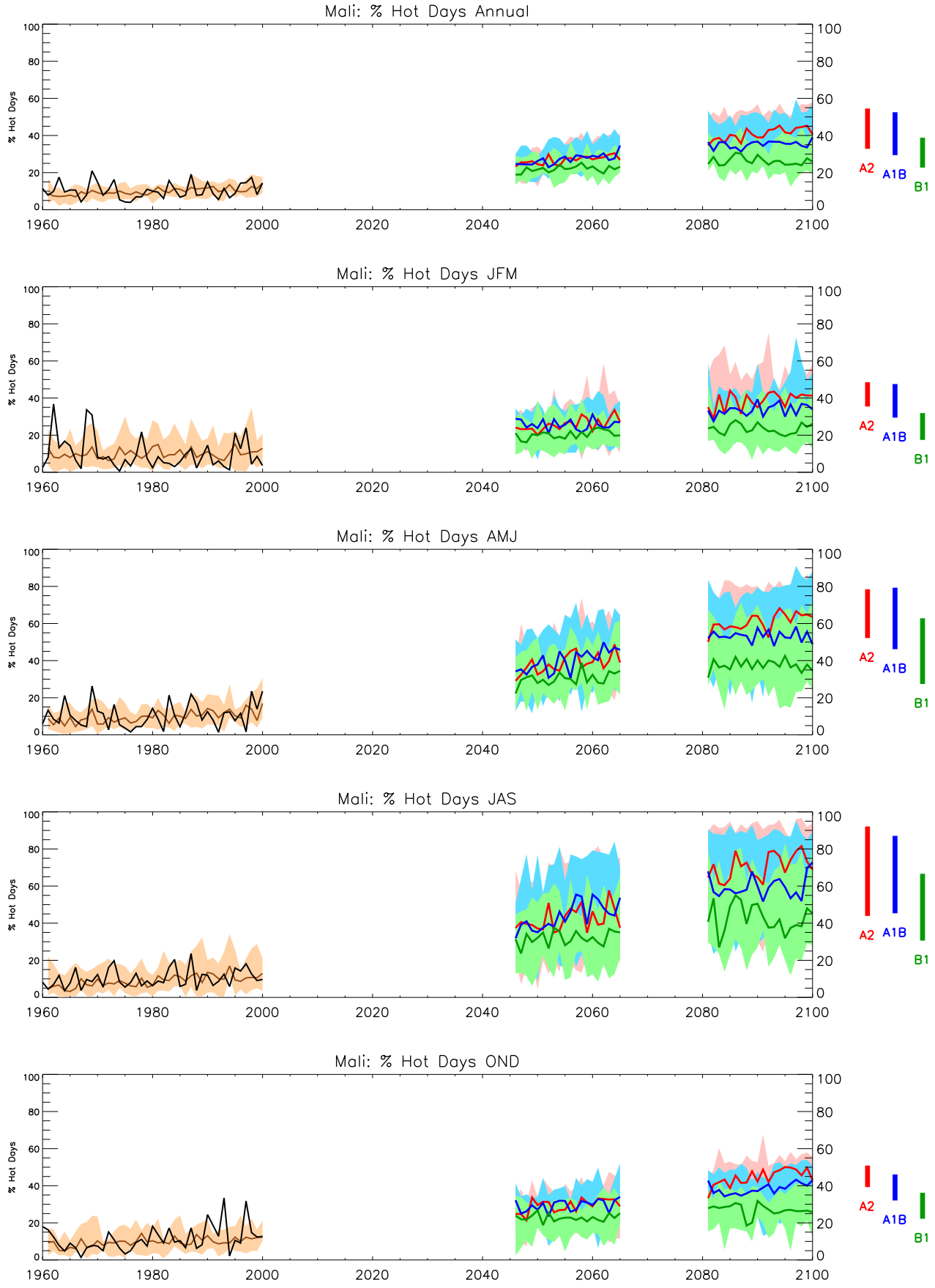

Figure 7: Trends in Hot-day frequency for the recent past and projected future. See Figure 1 for details.

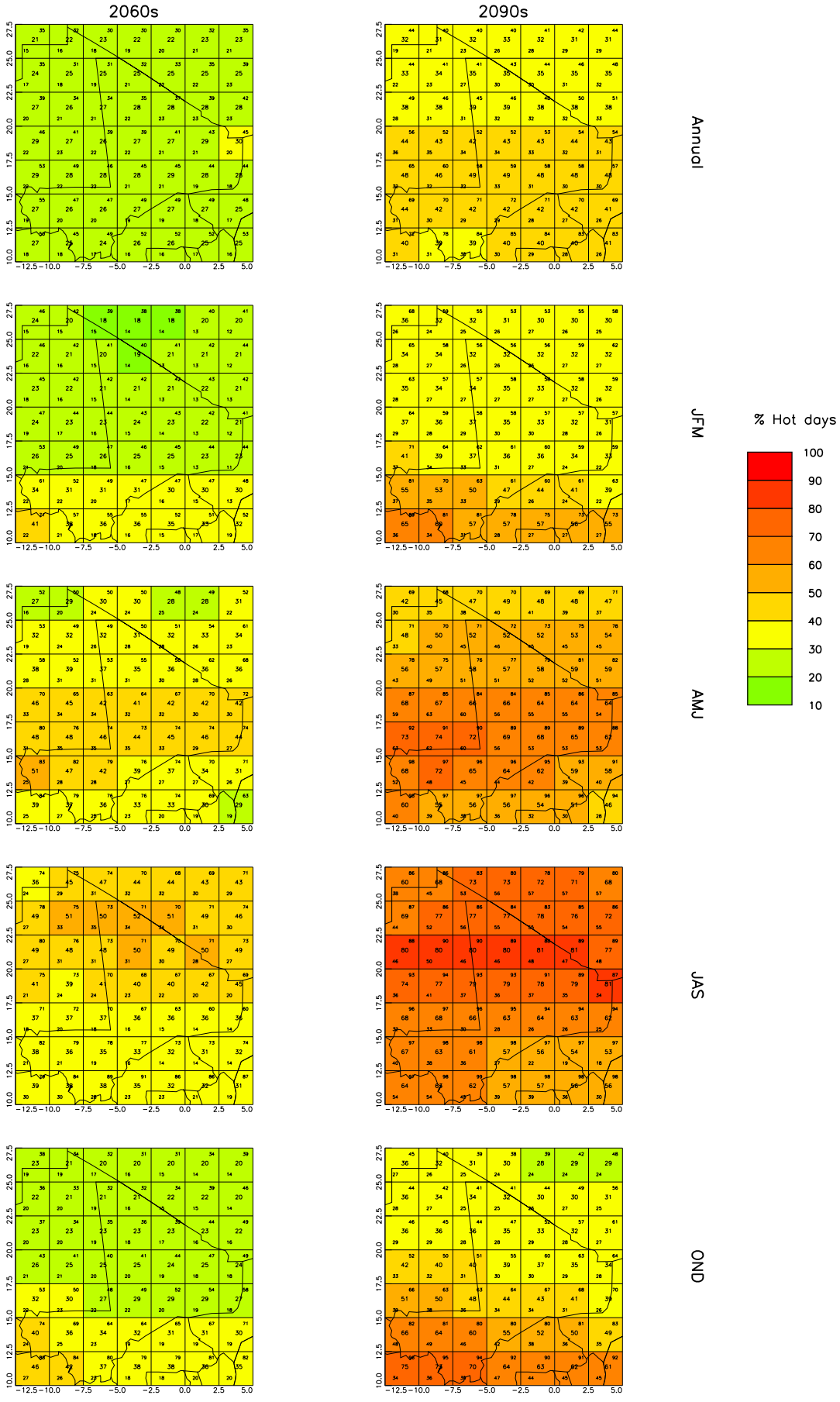

Figure 8: Spatial patterns of projected change in Hot-day frequency for 10-year periods in the future under the SRES A2 scenario. See Figure 2 for details.

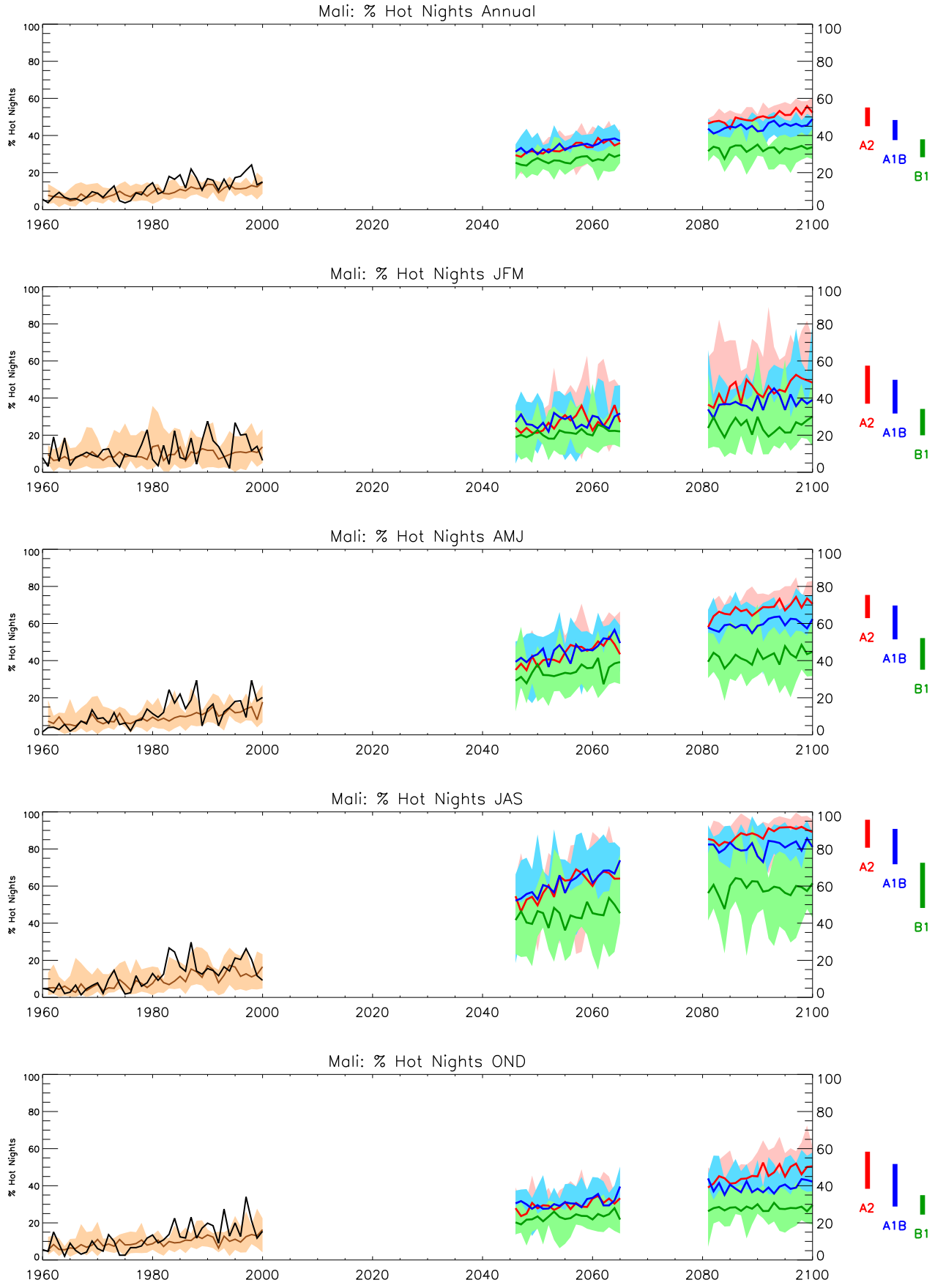

Figure 9: Trends in hot-night frequency for the recent past and projected future. See Figure 1 for details.

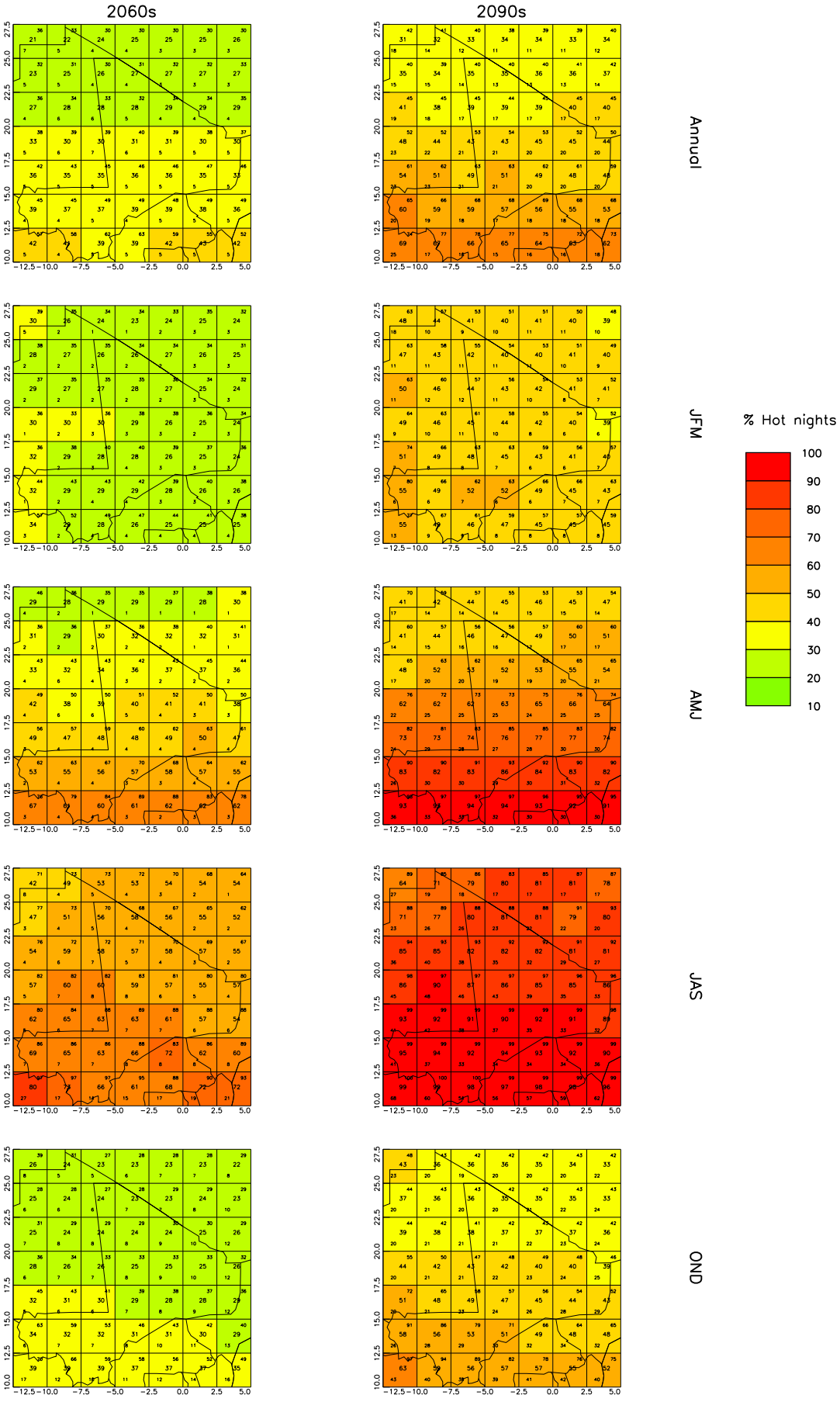

Figure 10: Spatial patterns of projected change in hot-night frequency for 10-year periods in the future under the SRES A2 scenario. See Figure 2 for details.

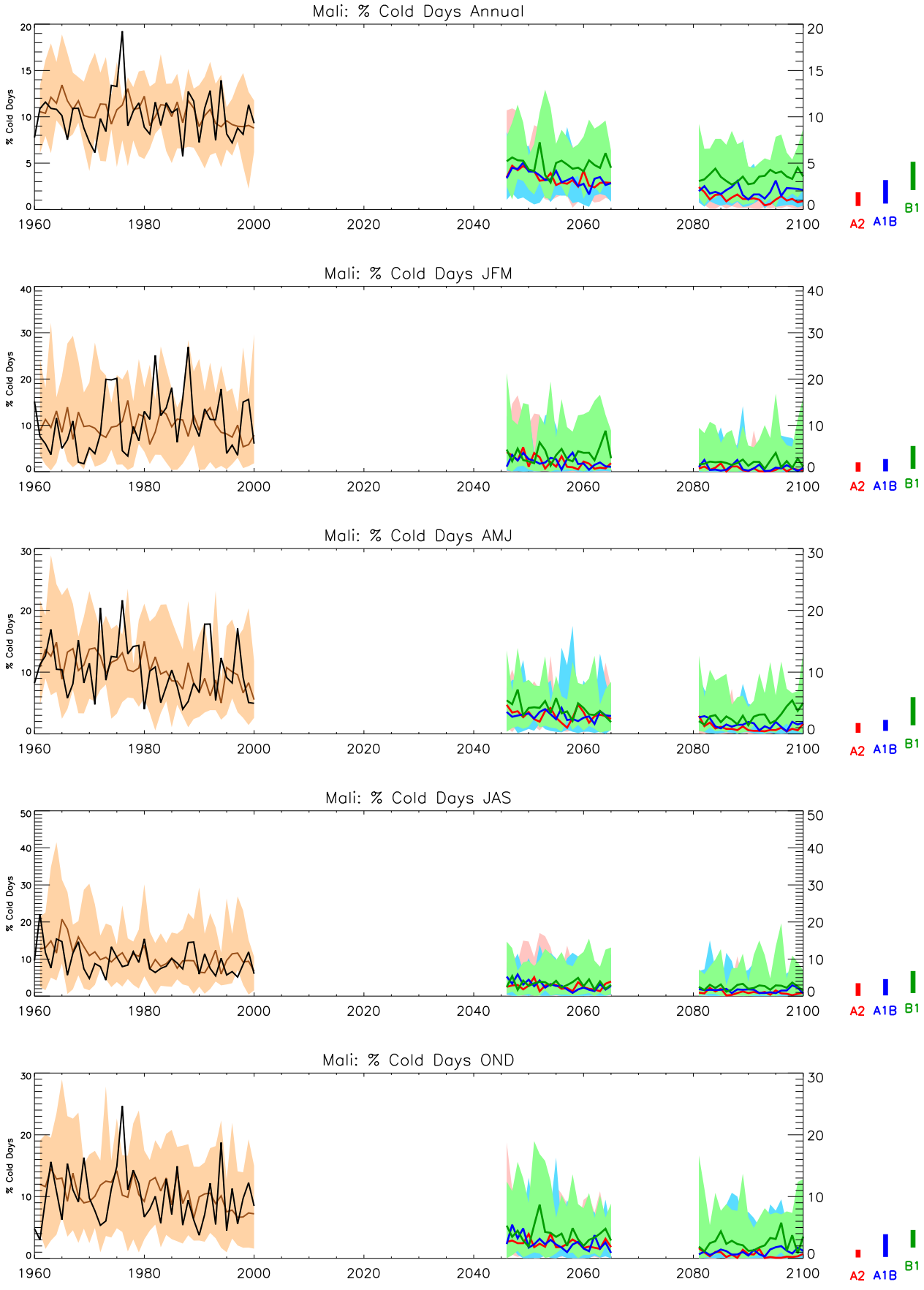

Figure 11: Trends in cold-day frequency for the recent past and projected future. See Figure 1 for details.

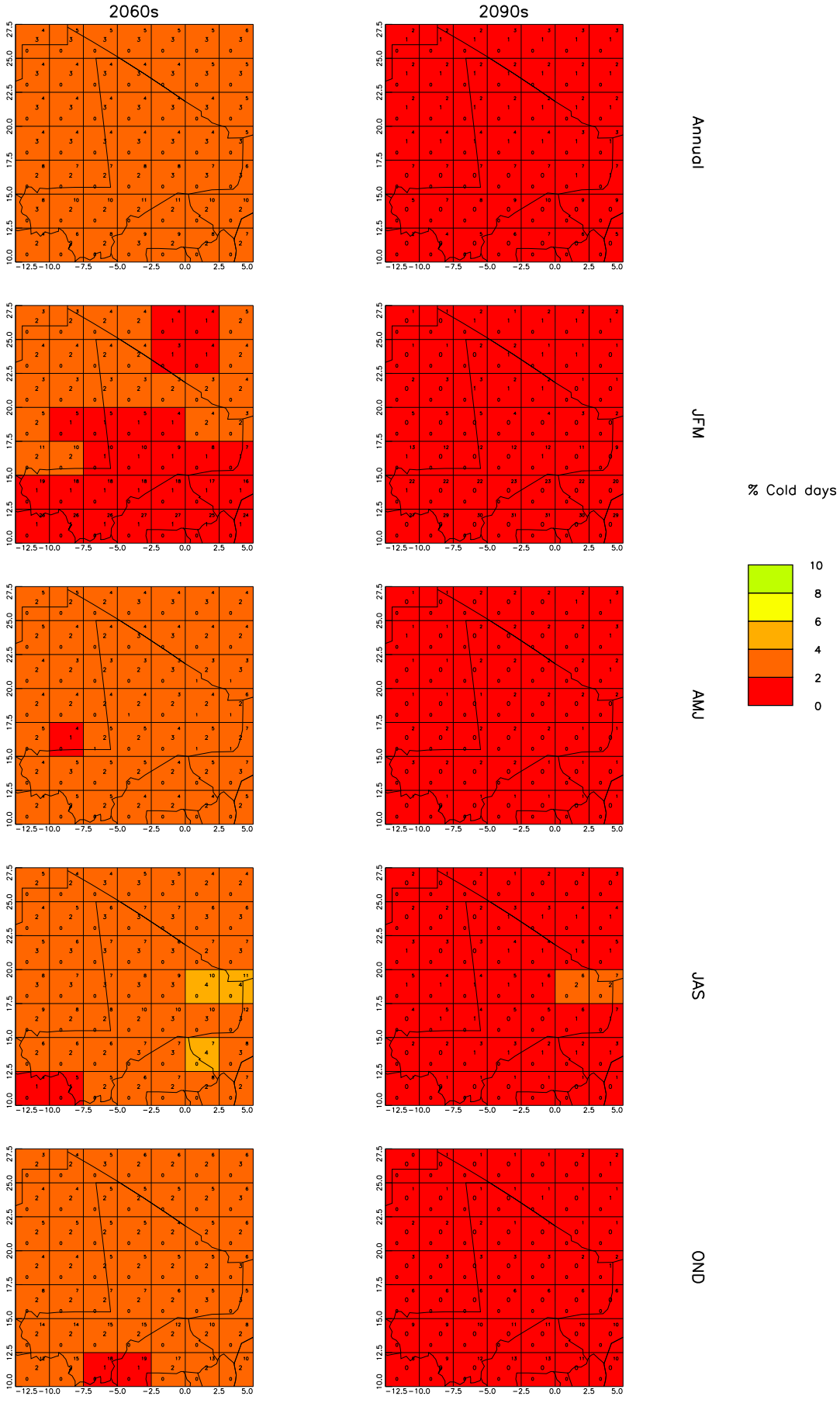

Figure 12: Spatial patterns of projected change in cold-day frequency for 10-year periods in the future under the SRES A2 scenario. See Figure 2 for details.

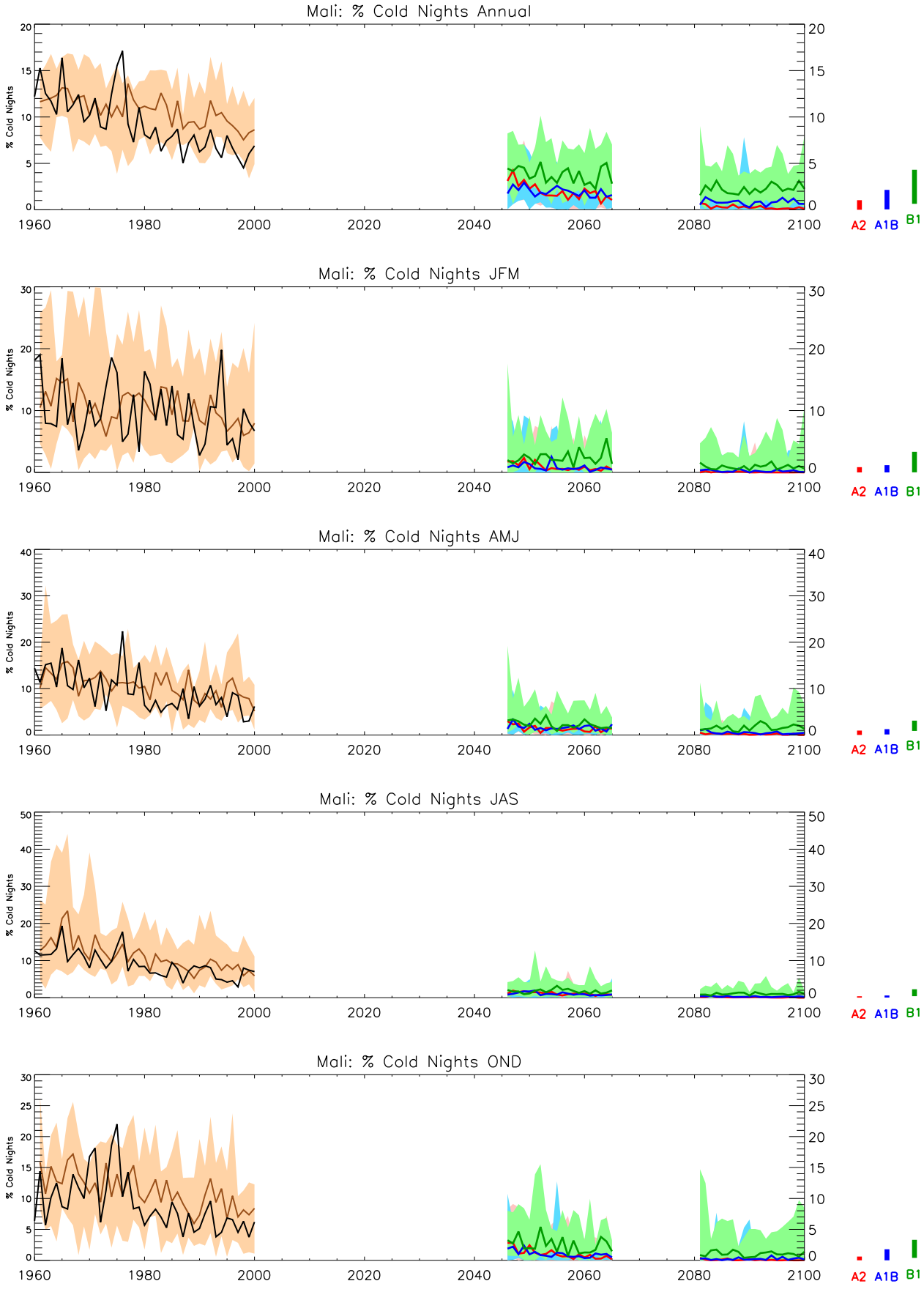

Figure 13: Trends in cold-night frequency for the recent past and projected future. See Figure 1 for details.

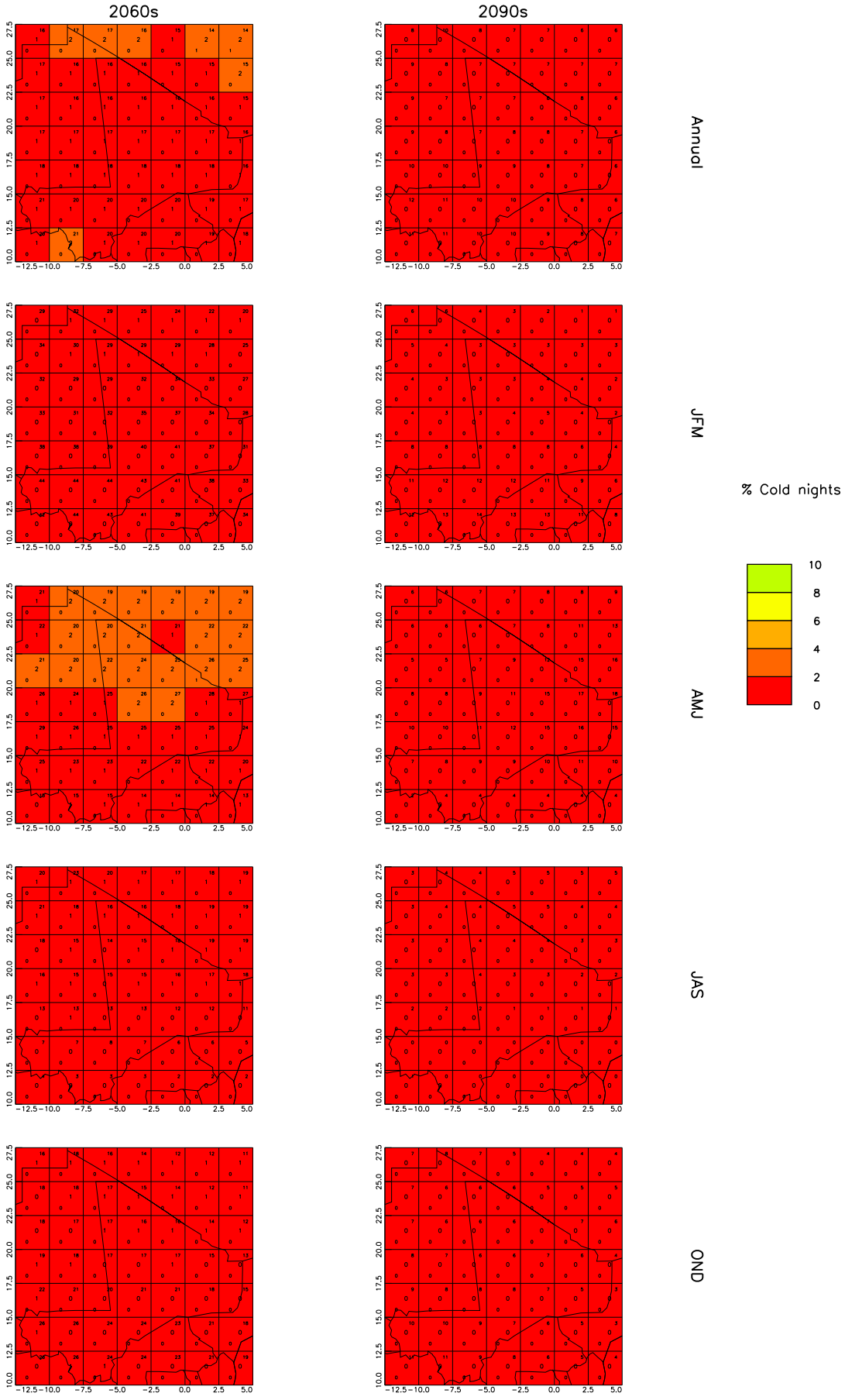

Figure 14: Spatial patterns of projected change in cold-night frequency for 10-year periods in the future under the SRES A2 scenario. See Figure 2 for details.

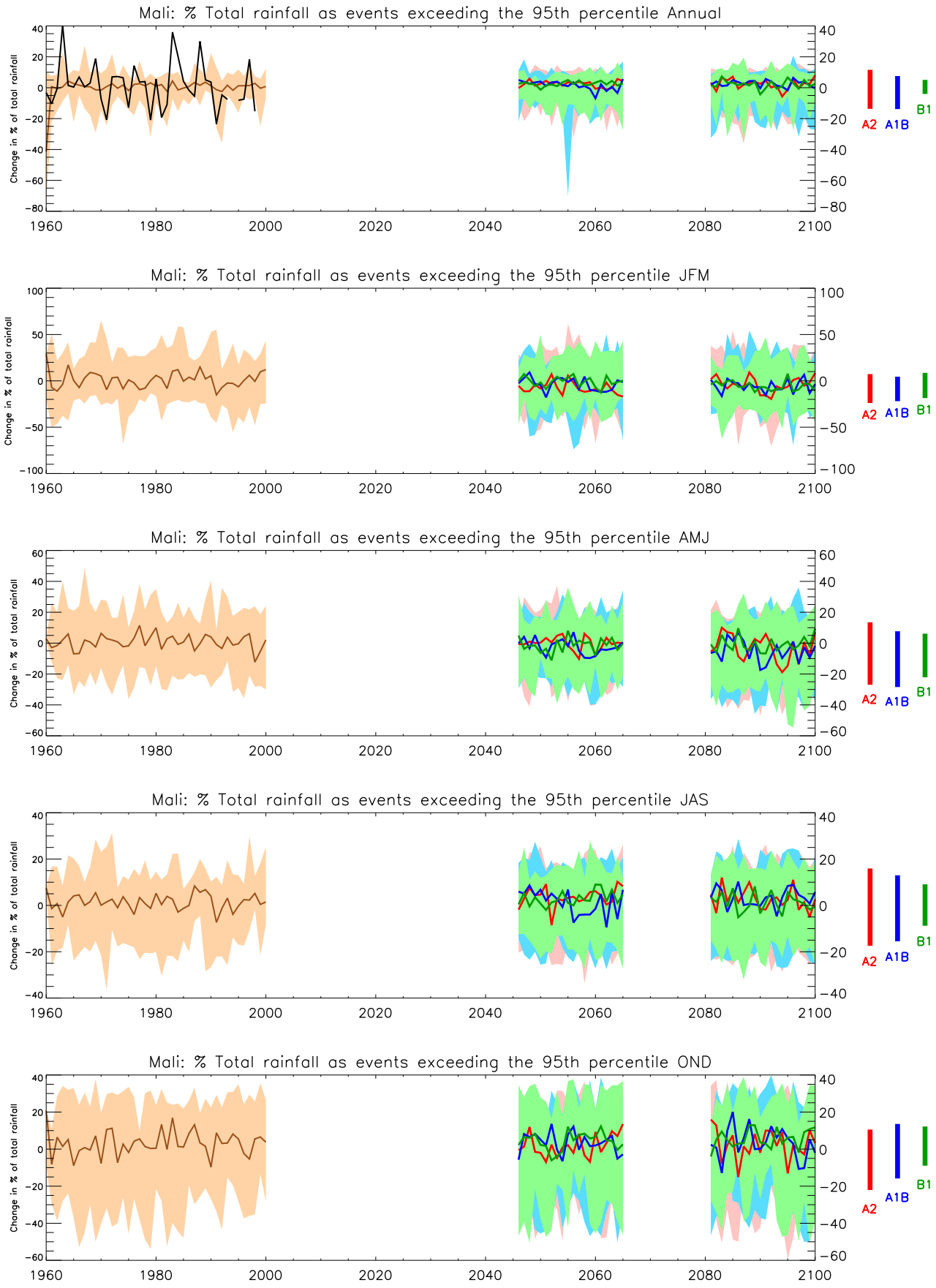

Figure 15: Trends in the proportion of precipitation falling in 'heavy' events for the recent past and projected future. All values shown are anomalies, relative to the 1970-1999 mean climate. See Figure 1 for details.

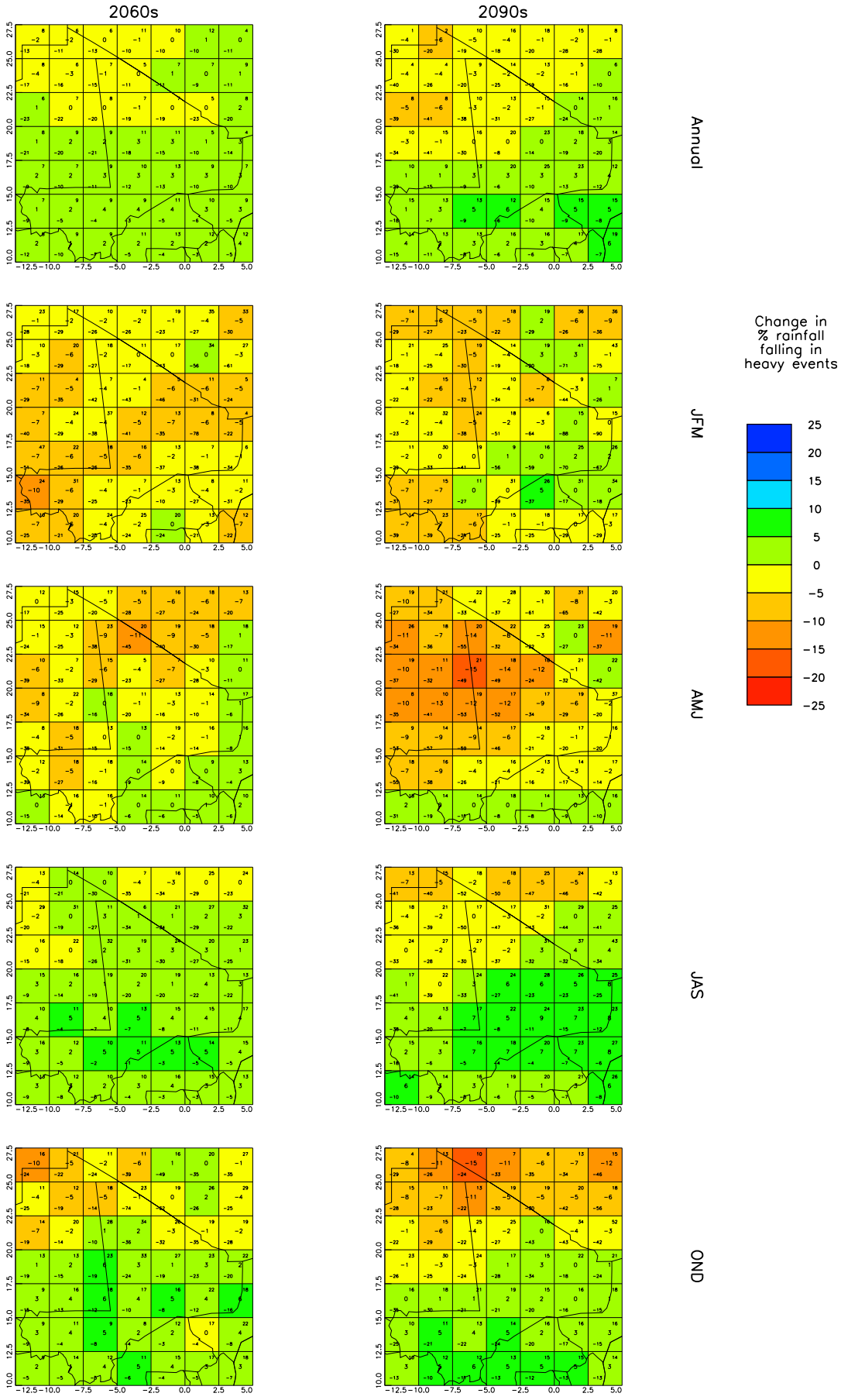

Figure 16: Spatial patterns of projected change in the proportion of precipitation falling in 'heavy' events for 10-year periods in the future under the SRES A2 scenario. All values are anomalies relative to the mean climate of 1970-1999. See Figure 2 for details.

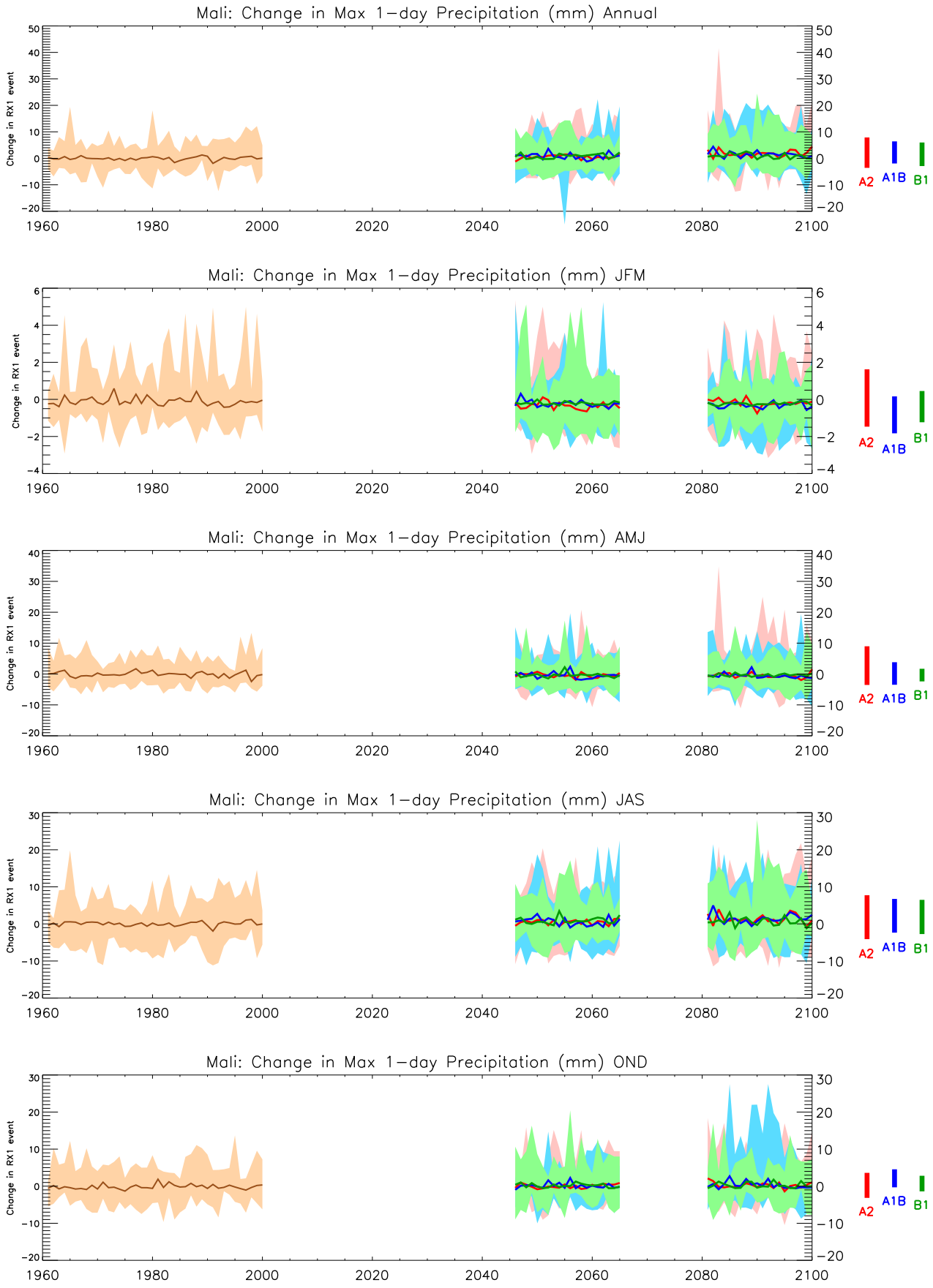

Figure 17: Trends in maximum 1-day rainfall for the recent past and projected future. All values shown are anomalies, relative to the 1970-1999 mean climate. See Figure 1 for details.

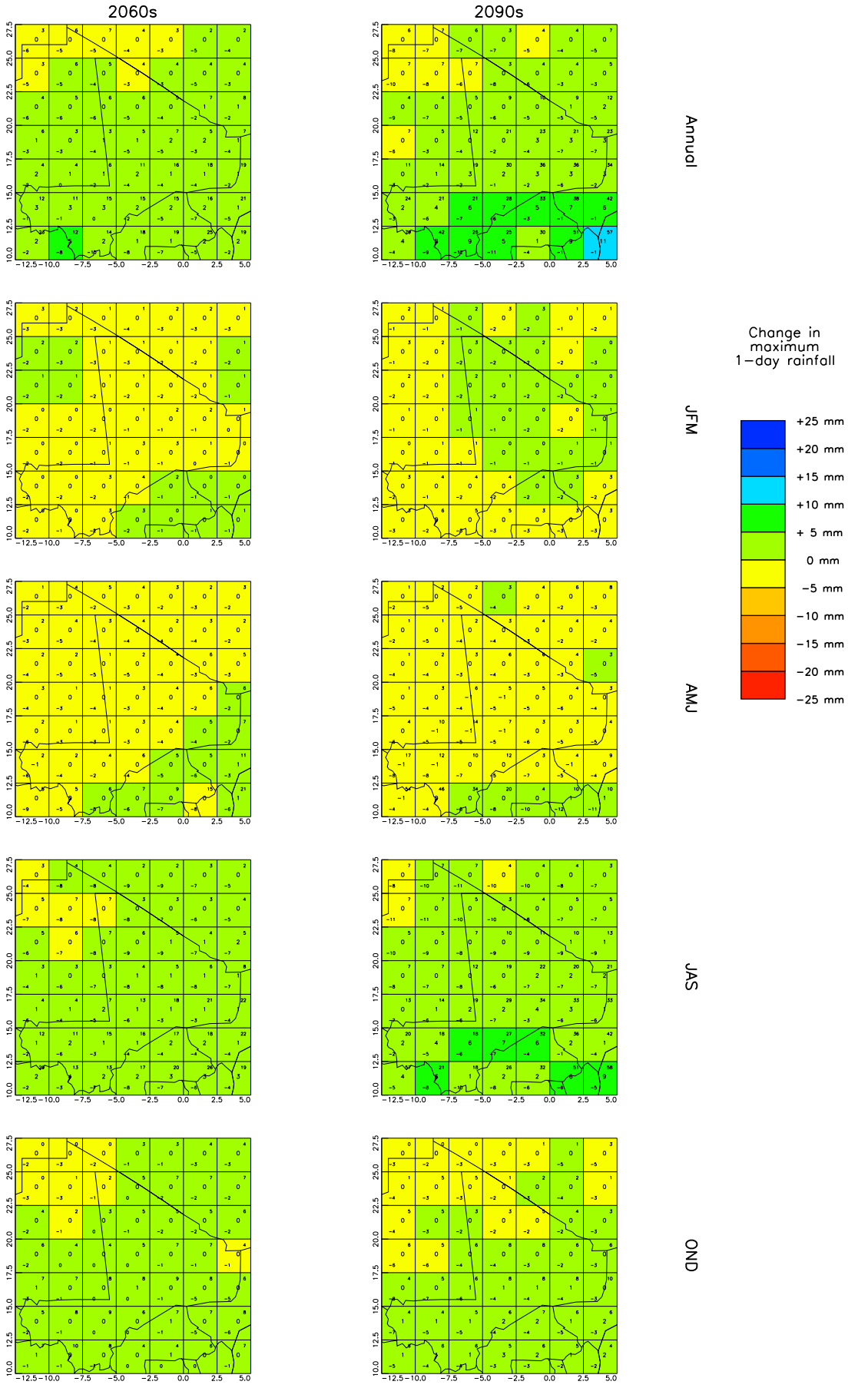

Figure 18: Spatial patterns of maximum 1-day rainfall for 10-year periods in the future under the SRES A2 scenario. All values are anomalies relative to the mean climate of 1970-1999. See Figure 2 for details.

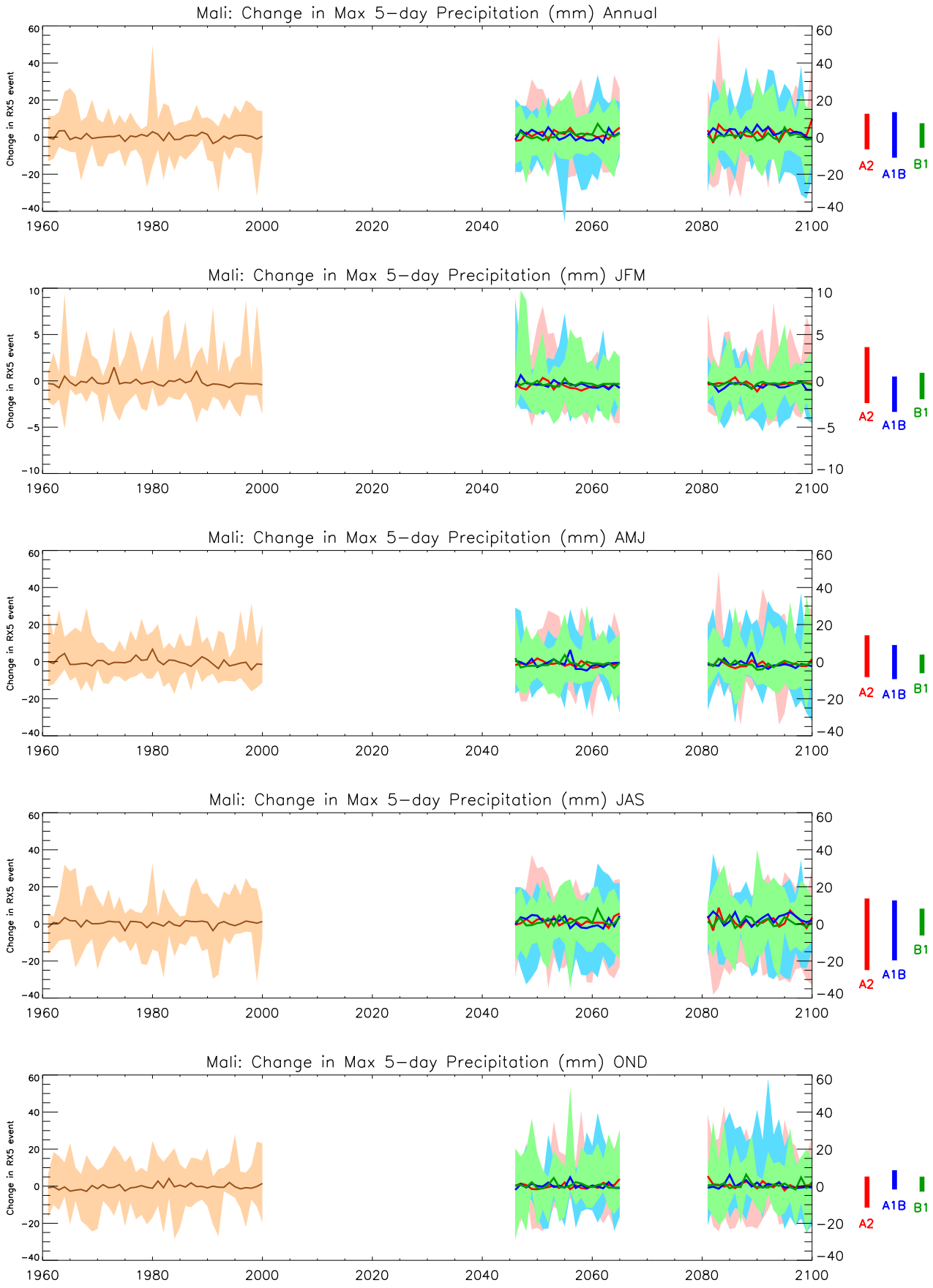

Figure 19: Trends in maximum 5-day rainfall for the recent past and projected future. All values shown are anomalies, relative to the 1970-1999 mean climate. See Figure 1 for details.

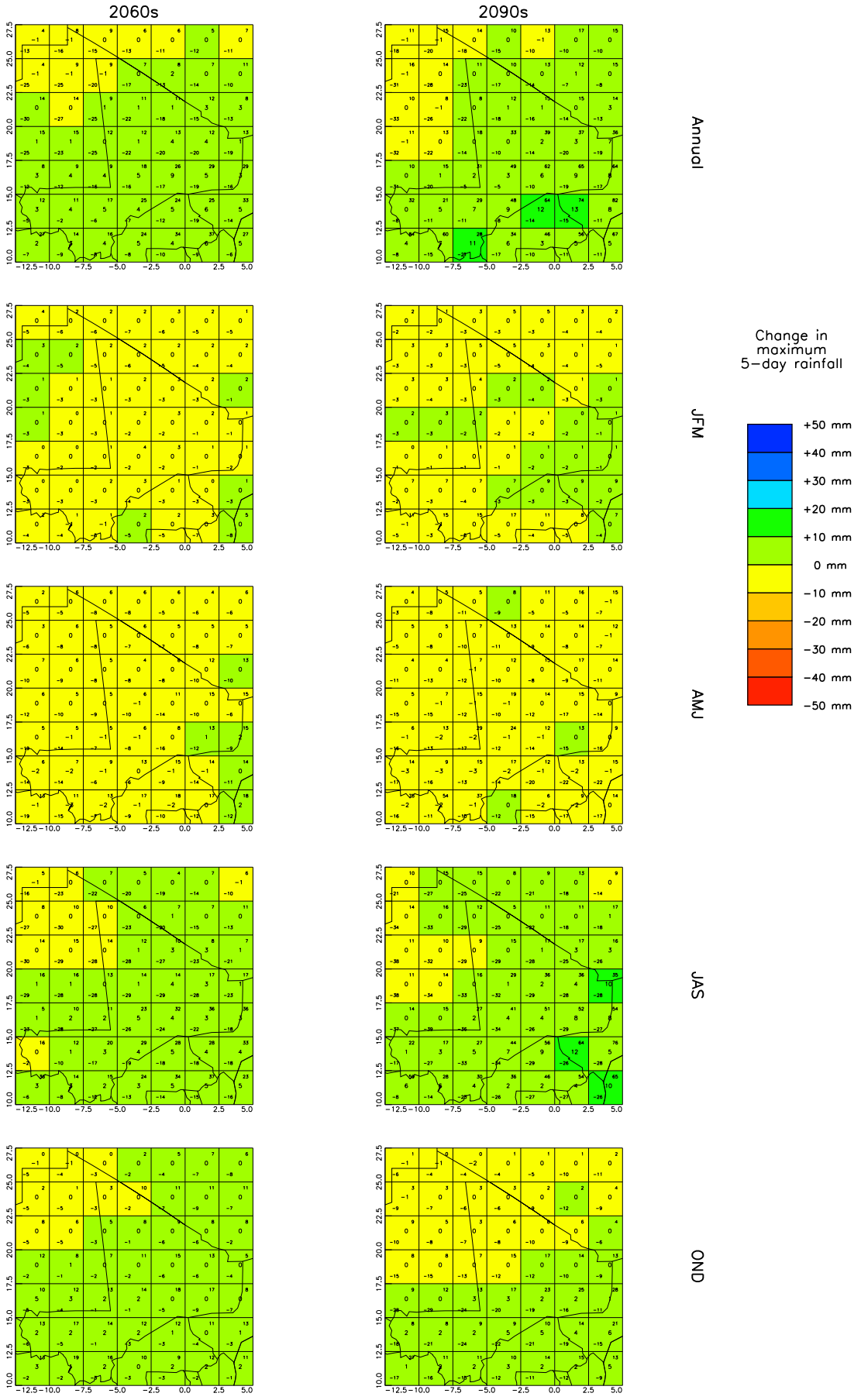

Figure 20: Spatial patterns of projected change in maximum 5-day rainfall for 10-year periods in the future under the SRES A2 scenario. All values are anomalies relative to the mean climate of 1970-1999. See Figure 2 for details.