UNDP Climate Change Country Profiles

The Gambia

C. McSweeney[1], M. New[1,2] and G. Lizcano[1]

1. School of Geography and Environment, University of Oxford.
2. Tyndall Centre for Climate Change Research

http://country-profiles.geog.ox.ac.uk

General Climate

The Gambia is a small country located in western Africa on the Atlantic Coast. The country's borders follow the meanders of the River Gambia, and the country is bordered by Senegal on all but its coastal border. At latitudes of 13˚N, Gambia is located just south of the sub-tropical semi-arid belt called the Sahel, and has a tropical climate.

The Gambia has one wet season between July and September. There is a strong north-south gradient in total rainfall received at this time in this region of Africa, and this is evident even across the narrow latitudinal range of The Gambia. Mean monthly wet-season rainfall in The Gambia varies between 150 and 300mm between the northern and southern extremes. This rainfall season is 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, affecting The Gambia when it is in its northern position. Variation in the latitudinal movements of the ITCZ from one year to another causes large inter-annual variability in this wet-season rainfall. The most well documented cause of these variations is the El Niño Southern Oscillation (ENSO). El Niño events are associated with drier conditions in Sahelian Africa.

Temperatures in The Gambia generally increase from the coast towards the west. The exception to this is in the wet season, JAS, when the cooling influence of cloud and rainfall mean that all regions experience similar temperatures. In the hottest season, AMJ, the hottest (inland) regions have averages temperatures of up to 35˚C, whilst the cooler coastal regions are 25 to 28˚C. In the cooler seasons (OND and JFM) average temperatures can be below 25˚C at the coast and up to 30˚C in the west. Inter-annual variability in temperature in this region of Western Africa is caused by the El Niño Southern Oscillation (ENSO). In la Niña years, temperatures tend to be cooler than average throughout the year.

Recent Climate Trends

Temperature

- Mean annual temperature has increased by 1.0˚C since 1960, an average rate of 0.21˚C per decade.
- The rate of increase is most rapid in OND, at 0.32˚C per decade.

- There are insufficient daily temperature observations available from which to identify trends in most daily temperature extremes. However, available data indicate that the average number of 'hot'[1] nights per year increased by 28 (an additional 7.8% of nights[2]) between 1960 and 2003.

Precipitation

- Sahelian rainfall characterized by high variability on inter-annual and inter-decadal timescales, 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 particularly dry.
- Linear trends do, however, indicate that wet season (JAS) rainfall in The Gambia has decreased significantly between 1960 and 2006, at an average rate of 8.8mm per month per decade.

- There are insufficient daily rainfall observations available from which to determine changes in extremes indices of daily rainfall.

GCM Projections of Future Climate

Temperature

- The mean annual temperature is projected to increase by 1.1 to 3.1˚C by the 2060s, and 1.8 to 5.0˚C by the 2090s. The range of projections by the 2090s under any one emissions scenario is 1.0- 2.0˚C.
- The projected rate of warming is faster in the interior regions of The Gambia than in those areas closer to the coast.

- 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 22-48% of days by the 2060s, and 25-69% 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

[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] The increase in frequency over the 43-year period between 1960 and 2003 is estimated based on the decadal trend quoted in the summary table.

between model projections is large, occurring on 26-99% 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 28-50% of nights by the 2060s and 36-69% 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 67-99% of nights in every season by the 2090s.
    - Projected increases in hot days and nights are more rapid in the east of the country than the west.
- All projections indicate decreases in the frequency of days and nights that are considered 'cold'[3] in current climate. Cold days occur on less than 3% of days by the 2090s, and cold nights less than 2% of nights. Cold nights do not occur at all by the 2090s in any projections under the highest emissions scenario (A2).

Precipitation

- Projections of mean annual rainfall averaged over the country from different models in the ensemble project a wide range of increases and decreases in precipitation for The Gambia, but tend towards decreases, particularly in the wet season, JAS. Projected annual change ranges from -23 to +18% by the 2090s, with ensemble means between 0 and -3%. Projected JAS changes ranges from -53 to +74% by the 2090s, with ensemble means between -7 and -20%.

- Despite the projected decreases in total rainfall, the proportion of total annual rainfall that falls in heavy[4] events tends towards increases in the ensemble projections. Seasonally, this varies between tendencies to decrease in JFM and AMJ, and to increase in JAS and OND. The range of projections from different models in the ensemble, however, includes both increases and decreases in all seasons.
- 1- and 5-day rainfall maxima in projections all tend towards increases in JAS. The range of changes in projections from the model ensemble covers both increases and decreases in most seasons.

[3] '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.

[4] 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.

Other Regional Climate Change Information

- Model simulations of precipitation changes for the Sahelian 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.
- The coastal lowlands of The Gambia may be vulnerable to sea-level rise. Sea-level in this region is projected by climate models to rise by the following levels[5] by the 2090s, relative to 1980-1999 sea-level:
    - 0.13 to 0.43m under SRES B1
    - 0.16 to 0.53m under SRES A1B
    - 0.18 to 0.56m under SRES A2

- 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*).

[5] Taken from the IPCC Working group I (*The Physical Science Basis*): Chapter 10 (Global Climate Projections) (Meehl *et al*., 2007). Regional sea-level projections are estimated by applying regional adjustments (Fig 10.32, p813) to projected global mean sea-level rise from 14 AR4 models.

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	1.0	**1.3**	1.7	1.9	**2.6**	3.1	3.3	**4.2**	5.0
Annual	27.4	0.21*	*A1B*	0.7	**1.4**	1.6	1.9	**2.5**	3.0	2.4	**3.4**	4.4
			B1	0.6	**1.1**	1.5	1.1	**1.7**	2.2	1.8	**2.0**	2.8
			A2	0.9	**1.4**	1.6	1.9	**2.7**	3.2	3.3	**4.3**	5.1
JFM	26.4	0.17*	*A1B*	0.7	**1.6**	1.8	2.0	**2.6**	3.1	2.4	**3.4**	4.7
			B1	0.6	**1.3**	1.4	1.1	**1.6**	2.3	1.8	**2.3**	3.0
			A2	0.9	**1.1**	1.9	1.7	**2.3**	3.3	3.0	**4.0**	5.0
AMJ	29.5	0.15*	*A1B*	0.5	**1.4**	1.8	1.5	**2.4**	2.8	1.8	**3.1**	3.8
			B1	0.5	**1.0**	1.4	1.1	**1.7**	2.3	1.6	**2.0**	2.6
			A2	0.8	**1.3**	1.9	1.7	**2.5**	3.0	2.9	**4.2**	5.1
JAS	27.0	0.20*	*A1B*	0.6	**1.5**	1.8	1.6	**2.5**	2.8	2.0	**3.4**	4.3
			B1	0.5	**1.1**	1.5	0.8	**1.8**	2.2	1.1	**2.1**	2.7
			A2	1.2	**1.4**	1.7	2.0	**2.6**	3.4	3.5	**4.4**	5.7
OND	26.5	0.32*	*A1B*	0.8	**1.4**	1.9	1.9	**2.6**	3.5	2.8	**3.4**	5.1
			B1	0.7	**1.2**	1.8	1.3	**1.9**	2.5	1.6	**2.3**	2.9
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	-10	**-1**	10	-12	**-1**	5	-25	**-2**	4
Annual	67.6	-2.4	*A1B*	-4	**0**	5	-7	**-2**	3	-18	**-3**	6
			B1	-6	**0**	14	-11	**0**	12	-7	**0**	18
			A2	-1	**0**	1	-1	**0**	4	-1	**0**	4
JFM	0.9	0.2	*A1B*	0	**0**	2	-1	**0**	3	-1	**0**	4
			B1	0	**0**	2	-1	**0**	4	0	**0**	3
			A2	-8	**-1**	5	-15	**-1**	6	-11	**-4**	0
AMJ	30.4	-0.8	*A1B*	-6	**-1**	7	-6	**-2**	2	-22	**-3**	2
			B1	-4	**0**	28	-19	**0**	14	-6	**0**	19
			A2	-31	**-5**	44	-48	**-2**	9	-100	**-6**	12
JAS	216.7	-8.8*	*A1B*	-19	**-1**	15	-29	**-5**	7	-50	**-7**	25
			B1	-18	**-1**	32	-33	**2**	37	-18	**-3**	45
			A2	-8	**0**	1	-3	**0**	13	-16	**-1**	16
OND	21.6	-0.3	*A1B*	-8	**0**	15	-11	**0**	20	-14	**-1**	14
			B1	-4	**0**	9	-7	**0**	15	-11	**0**	21
Precipitation (%)												
	(mm per month)	*(change in % per decade)*		*% Change*			*% Change*			*% Change*		
			A2	-26	**-3**	16	-26	**-7**	17	-51	**-17**	12
Annual	67.6	-3.5	*A1B*	-16	**-3**	12	-29	**-11**	11	-48	**-17**	35
			B1	-20	**3**	26	-28	**2**	17	-23	**-1**	28
			A2	-76	**-21**	56	-90	**-35**	193	-94	**-36**	195
JFM	0.9	27.4	*A1B*	-95	**-19**	91	-93	**-28**	155	-94	**-36**	202
			B1	-94	**-17**	100	-93	**-34**	171	-90	**-19**	126
			A2	-38	**-11**	7	-64	**-19**	25	-73	**-29**	13
AMJ	30.4	-2.5	*A1B*	-49	**-6**	11	-56	**-15**	13	-68	**-27**	11
			B1	-24	**1**	40	-66	**-3**	23	-45	**-11**	53
			A2	-33	**-5**	40	-31	**-6**	29	-53	**-20**	28
JAS	216.7	-4.0*	*A1B*	-19	**-3**	32	-31	**-9**	15	-46	**-16**	74
			B1	-19	**-3**	37	-29	**1**	24	-24	**-7**	31
			A2	-37	**-9**	29	-43	**13**	41	-53	**-10**	71
OND	21.6	-1.4	*A1B*	-52	**-1**	28	-59	**-8**	35	-74	**-2**	61
			B1	-27	**-2**	62	-41	**-2**	26	-57	**4**	37

	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	****	****	****	28	**33**	47	43	**52**	69
Annual	****	****	*A1B*	****	****	****	28	**32**	48	39	**41**	64
			B1	****	****	****	22	**26**	39	25	**30**	49
			A2	****	****	****	33	**44**	53	53	**66**	77
JFM	****	****	*A1B*	****	****	****	34	**44**	49	45	**59**	64
			B1	****	****	****	28	**31**	39	34	**39**	47
			A2	****	****	****	31	**48**	66	51	**69**	88
AMJ	****	****	*A1B*	****	****	****	33	**47**	65	45	**64**	80
			B1	****	****	****	25	**35**	54	28	**47**	67
			A2	****	****	****	35	**60**	77	59	**86**	97
JAS	****	****	*A1B*	****	****	****	34	**61**	85	42	**74**	92
			B1	****	****	****	21	**47**	57	26	**56**	72
			A2	****	****	****	38	**46**	53	51	**74**	86
OND	****	****	*A1B*	****	****	****	32	**46**	58	46	**62**	80
			B1	****	****	****	29	**31**	42	34	**42**	50
Frequency of Hot Nights (TN90p)												
			A2	****	****	****	30	**44**	46	55	**63**	69
Annual	11.1	1.81*	*A1B*	****	****	****	28	**44**	50	48	**52**	66
			B1	****	****	****	28	**35**	38	36	**41**	50
			A2	****	****	****	37	**45**	55	65	**72**	91
JFM	****	****	*A1B*	****	****	****	35	**45**	51	52	**61**	67
			B1	****	****	****	24	**34**	38	32	**44**	49
			A2	****	****	****	43	**57**	69	65	**84**	97
AMJ	****	****	*A1B*	****	****	****	46	**54**	62	66	**71**	80
			B1	****	****	****	34	**39**	48	45	**51**	62
			A2	****	****	****	66	**78**	88	94	**97**	99
JAS	****	****	*A1B*	****	****	****	62	**79**	94	82	**93**	98
			B1	****	****	****	42	**60**	72	67	**70**	84
			A2	****	****	****	37	**44**	65	59	**67**	93
OND	****	****	*A1B*	****	****	****	36	**45**	64	42	**56**	86
			B1	****	****	****	27	**33**	42	32	**40**	54
Frequency of Cold Days (TX10p)												
			A2	****	****	****	0	**2**	2	0	**0**	1
Annual	****	****	*A1B*	****	****	****	1	**1**	3	0	**0**	2
			B1	****	****	****	1	**3**	5	1	**1**	3
			A2	****	****	****	0	**1**	1	0	**0**	1
JFM	****	****	*A1B*	****	****	****	0	**1**	3	0	**1**	1
			B1	****	****	****	1	**2**	7	0	**1**	3
			A2	****	****	****	1	**1**	4	0	**0**	2
AMJ	****	****	*A1B*	****	****	****	0	**2**	4	0	**0**	1
			B1	****	****	****	0	**2**	3	0	**2**	4
			A2	****	****	****	0	**2**	3	0	**0**	1
JAS	****	****	*A1B*	****	****	****	0	**0**	3	0	**0**	2
			B1	****	****	****	0	**2**	5	0	**1**	6
			A2	****	****	****	0	**1**	3	0	**0**	1
OND	****	****	*A1B*	****	****	****	0	**1**	4	0	**1**	2
			B1	****	****	****	1	**2**	6	0	**1**	3
Frequency of Cold Nights (TN10p)												
			A2	****	****	****	0	**1**	1	0	**0**	0
Annual	****	****	*A1B*	****	****	****	0	**1**	1	0	**0**	1
			B1	****	****	****	1	**2**	3	0	**1**	2
			A2	****	****	****	0	**0**	1	0	**0**	0
JFM	****	****	*A1B*	****	****	****	0	**0**	2	0	**0**	1
			B1	****	****	****	0	**1**	4	0	**0**	2
			A2	****	****	****	0	**0**	1	0	**0**	0
AMJ	****	****	*A1B*	****	****	****	0	**0**	2	0	**0**	0
			B1	****	****	****	0	**1**	2	0	**0**	2
			A2	****	****	****	0	**0**	1	0	**0**	0
JAS	****	****	*A1B*	****	****	****	0	**0**	1	0	**0**	0
			B1	****	****	****	0	**0**	2	0	**0**	1
			A2	****	****	****	0	**0**	1	0	**0**	0
OND	****	****	*A1B*	****	****	****	0	**1**	1	0	**0**	1
			B1	****	****	****	1	**2**	4	0	**1**	2

	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*
% total rainfall falling in Heavy Events (R95pct)												
	%	*Change in % per decade*					*Change in %*			*Change in %*		
			A2	****	****	****	-12	**3**	10	-35	**3**	12
Annual	****	****	*A1B*	****	****	****	-12	**1**	9	-26	**4**	14
			B1	****	****	****	-12	**5**	12	-8	**5**	12
			A2	****	****	****	-17	**-7**	1	-17	**-5**	25
JFM	****	****	*A1B*	****	****	****	-21	**-9**	6	-23	**-9**	15
			B1	****	****	****	-13	**-2**	12	-15	**-3**	13
			A2	****	****	****	-18	**-3**	6	-38	**-7**	8
AMJ	****	****	*A1B*	****	****	****	-19	**-4**	9	-26	**-1**	9
			B1	****	****	****	-20	**-6**	9	-20	**1**	11
			A2	****	****	****	-13	**4**	8	-19	**6**	12
JAS	****	****	*A1B*	****	****	****	-12	**5**	10	-33	**6**	20
			B1	****	****	****	-22	**4**	10	-9	**7**	16
			A2	****	****	****	-20	**1**	11	-42	**1**	9
OND	****	****	*A1B*	****	****	****	-41	**1**	15	-29	**3**	16
			B1	****	****	****	-7	**0**	11	-18	**7**	14
Maximum 1-day rainfall (RX1day)												
	mm	*Change in mm per decade*					*Change in mm*			*Change in mm*		
			A2	****	****	****	-1	**0**	17	-1	**1**	47
Annual	****	****	*A1B*	****	****	****	-5	**1**	27	-1	**2**	32
			B1	****	****	****	-4	**2**	25	-4	**2**	51
			A2	****	****	****	-1	**0**	0	0	**0**	3
JFM	****	****	*A1B*	****	****	****	-1	**0**	1	-1	**0**	3
			B1	****	****	****	-1	**0**	0	0	**0**	1
			A2	****	****	****	-5	**0**	2	-6	**0**	8
AMJ	****	****	*A1B*	****	****	****	-3	**0**	4	-2	**0**	9
			B1	****	****	****	-2	**0**	3	-5	**0**	21
			A2	****	****	****	0	**1**	19	-2	**1**	43
JAS	****	****	*A1B*	****	****	****	0	**2**	26	-1	**3**	29
			B1	****	****	****	-3	**1**	20	-3	**2**	40
			A2	****	****	****	-1	**0**	5	-3	**0**	10
OND	****	****	*A1B*	****	****	****	-5	**0**	5	-1	**0**	11
			B1	****	****	****	0	**0**	5	0	**0**	4
Maximum 5-day Rainfall (RX5day)												
	mm	*Change in mm per decade*					*Change in mm*			*Change in mm*		
			A2	****	****	****	-2	**2**	19	-7	**2**	32
Annual	****	****	*A1B*	****	****	****	-7	**0**	25	-5	**5**	28
			B1	****	****	****	-10	**3**	32	-7	**4**	72
			A2	****	****	****	-2	**0**	2	-1	**0**	5
JFM	****	****	*A1B*	****	****	****	-1	**0**	3	-1	**0**	6
			B1	****	****	****	-2	**0**	2	0	**0**	3
			A2	****	****	****	-12	**-1**	3	-9	**-1**	1
AMJ	****	****	*A1B*	****	****	****	-5	**-1**	11	-21	**-1**	13
			B1	****	****	****	-8	**0**	5	-6	**0**	48
			A2	****	****	****	-2	**0**	17	-7	**2**	30
JAS	****	****	*A1B*	****	****	****	-6	**0**	20	-4	**2**	26
			B1	****	****	****	-9	**3**	25	-6	**4**	45
			A2	****	****	****	-1	**2**	9	-15	**-1**	13
OND	****	****	*A1B*	****	****	****	-3	**0**	13	-4	**1**	18
			B1	****	****	****	-3	**0**	11	-1	**0**	11

* indicates trend is statistically significant at 95% confidence

**** indicates data are not available

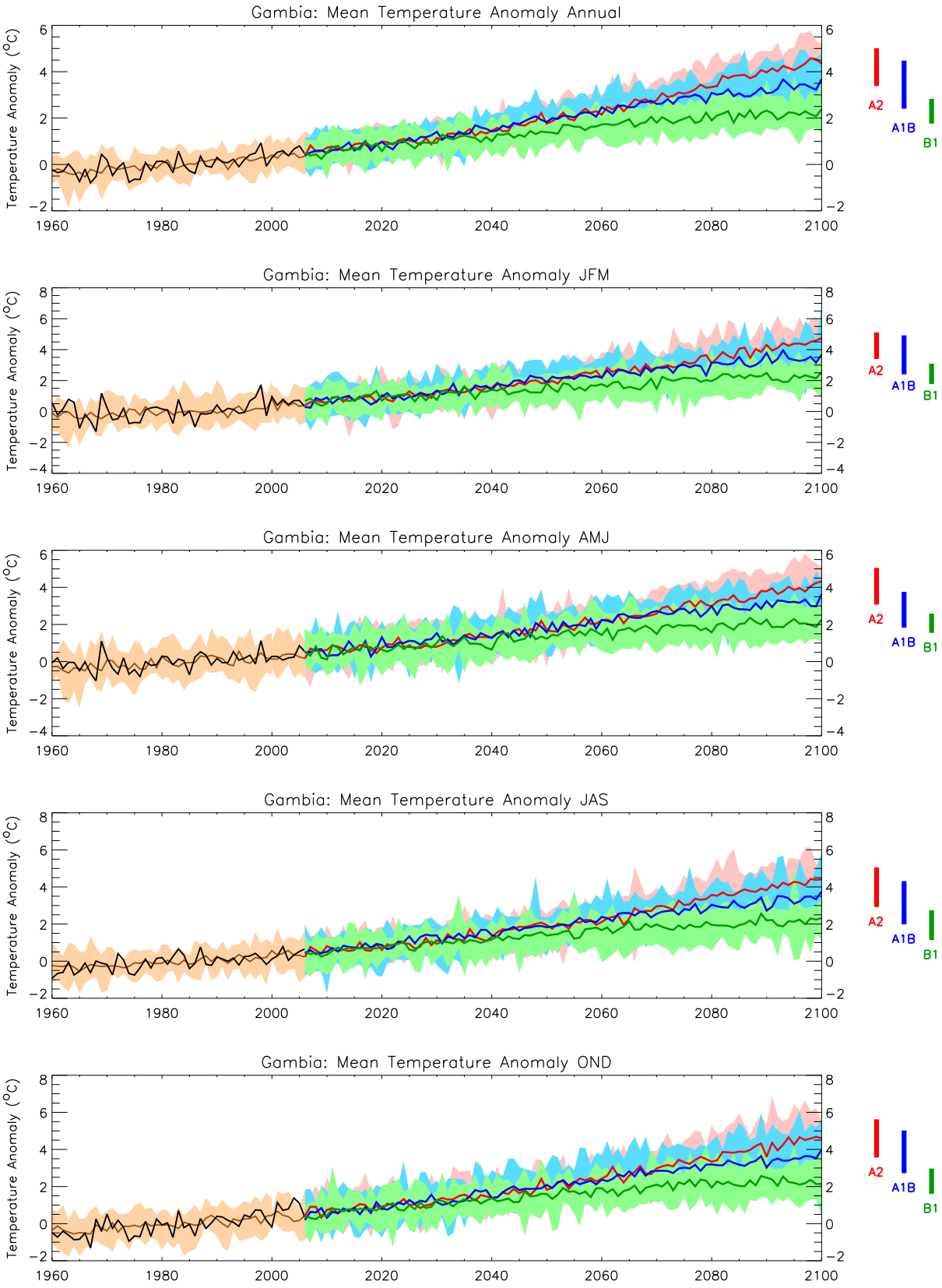

Figure 1: Trends in annual and seasonal mean temperature for the recent past and projected future. All values shown are anomalies, relative to the 1970-1999 mean climate. Black curves show the mean of observed data from 1960 to 2006, Brown curves show the median (solid line) and range (shading) of model 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.

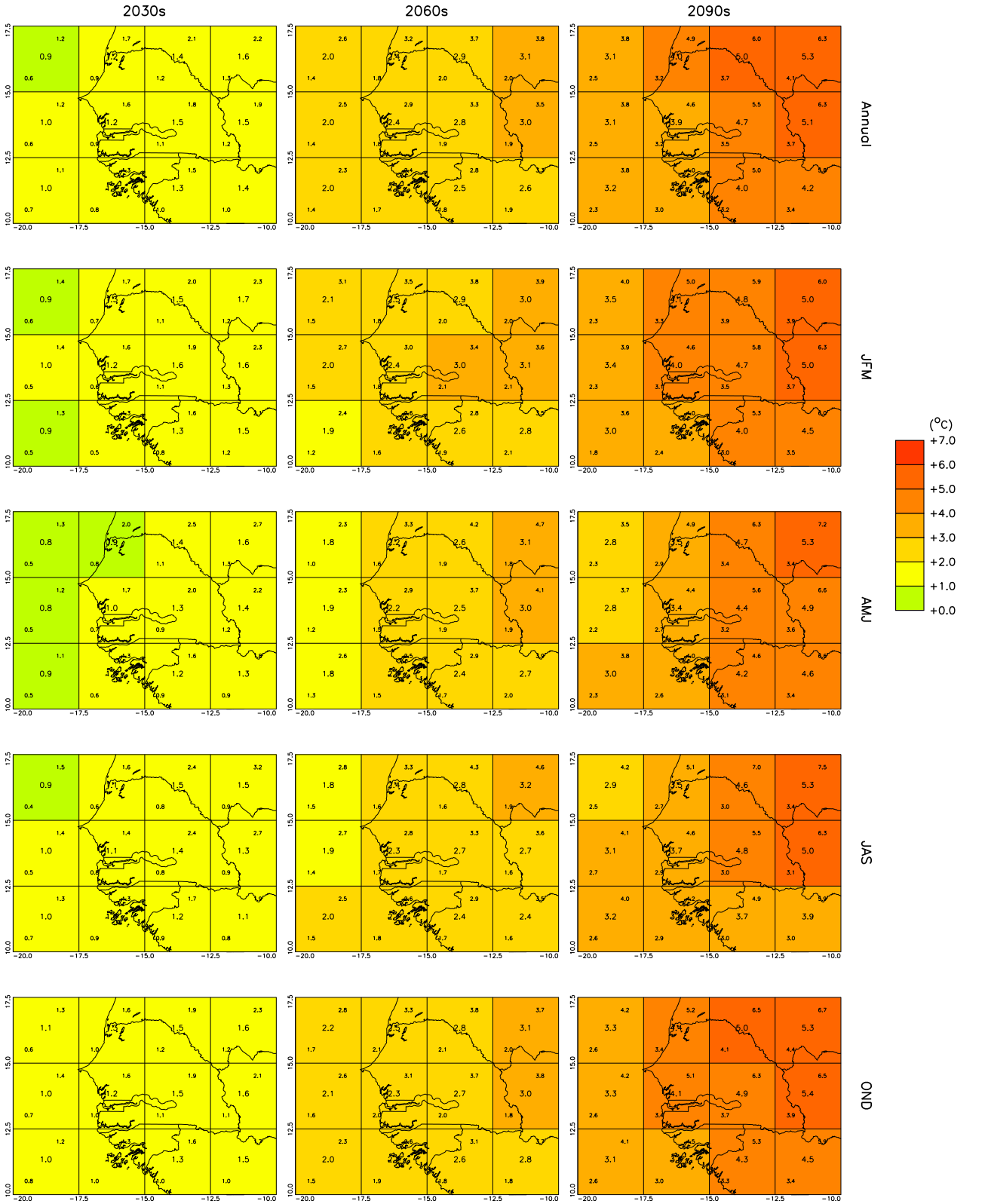

Figure 2: Spatial patterns of projected change in mean annual and seasonal temperature for 10-year periods in the future under the SRES A2 scenario. All values are anomalies relative to the mean climate of 1970-1999. In each grid box, the central value gives the ensemble median and the values in the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

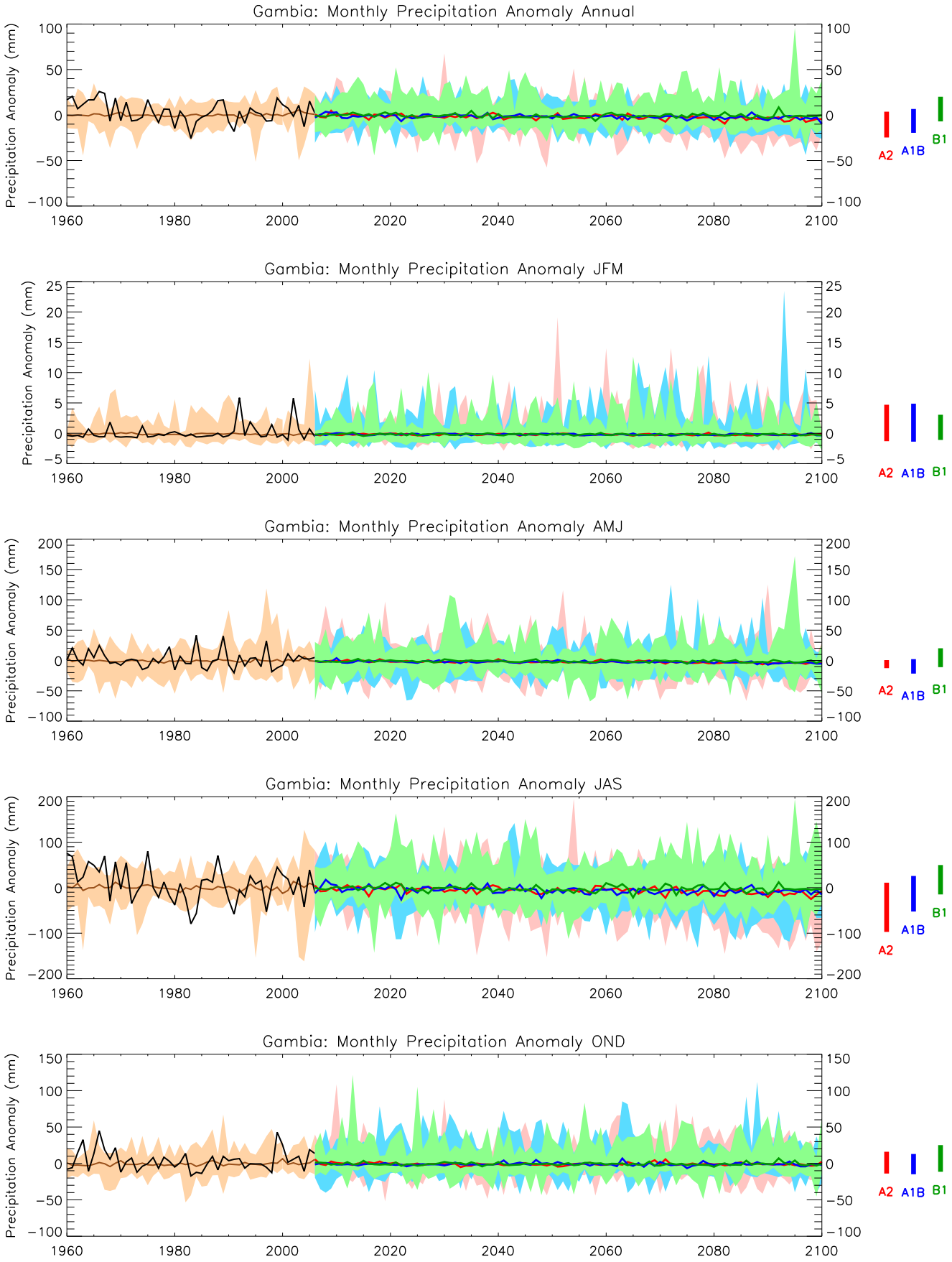

Figure 3: Trends in monthly precipitation for the recent past and projected future. All values shown are anomalies, relative to the 1970-1999 mean climate. See Figure 1 for details.

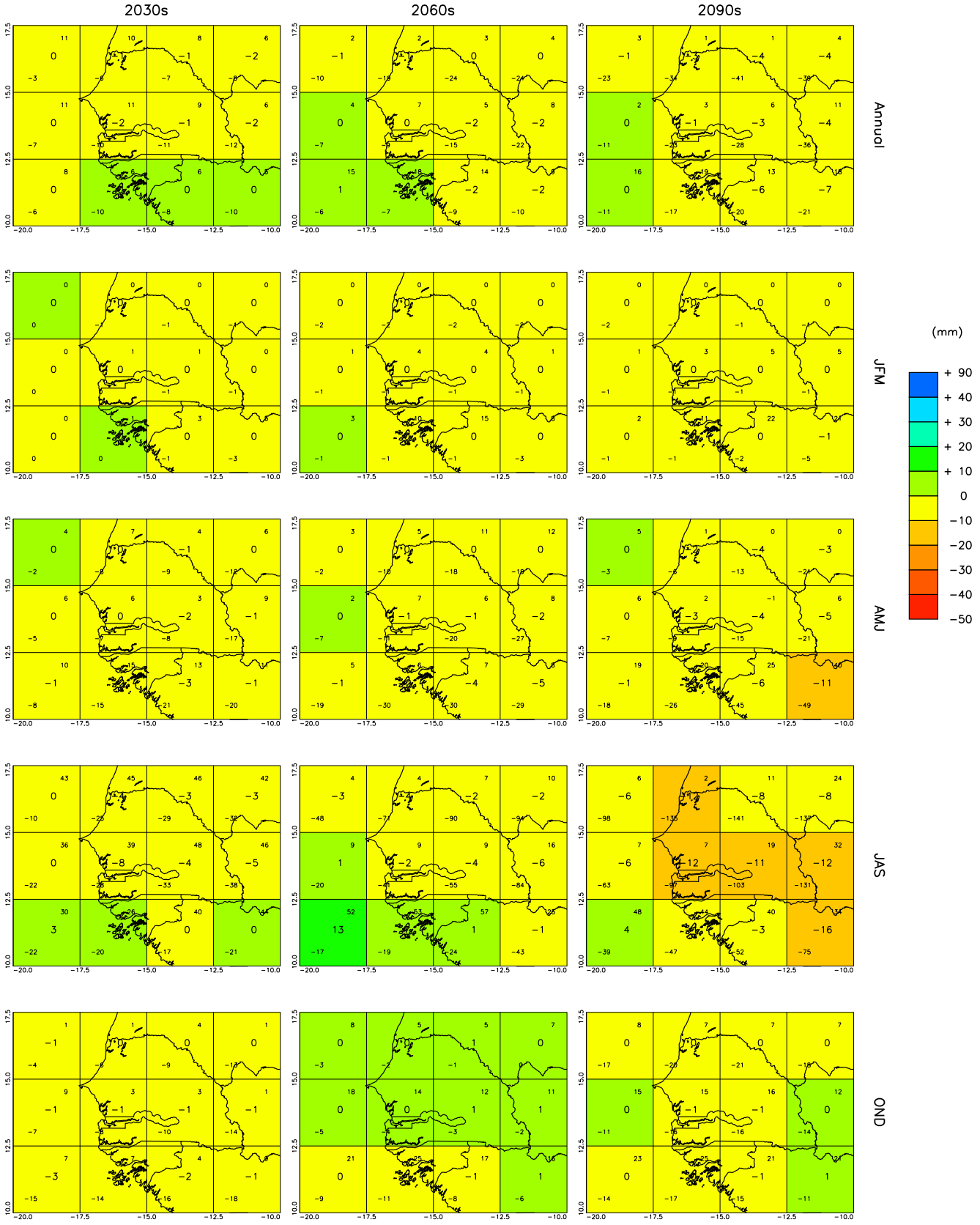

Figure 4: Spatial patterns of projected change in monthly precipitation for 10-year periods in the future under the SRES A2 scenario. All values are anomalies relative to the mean climate of 1970-1999.See Figure 2 for details.

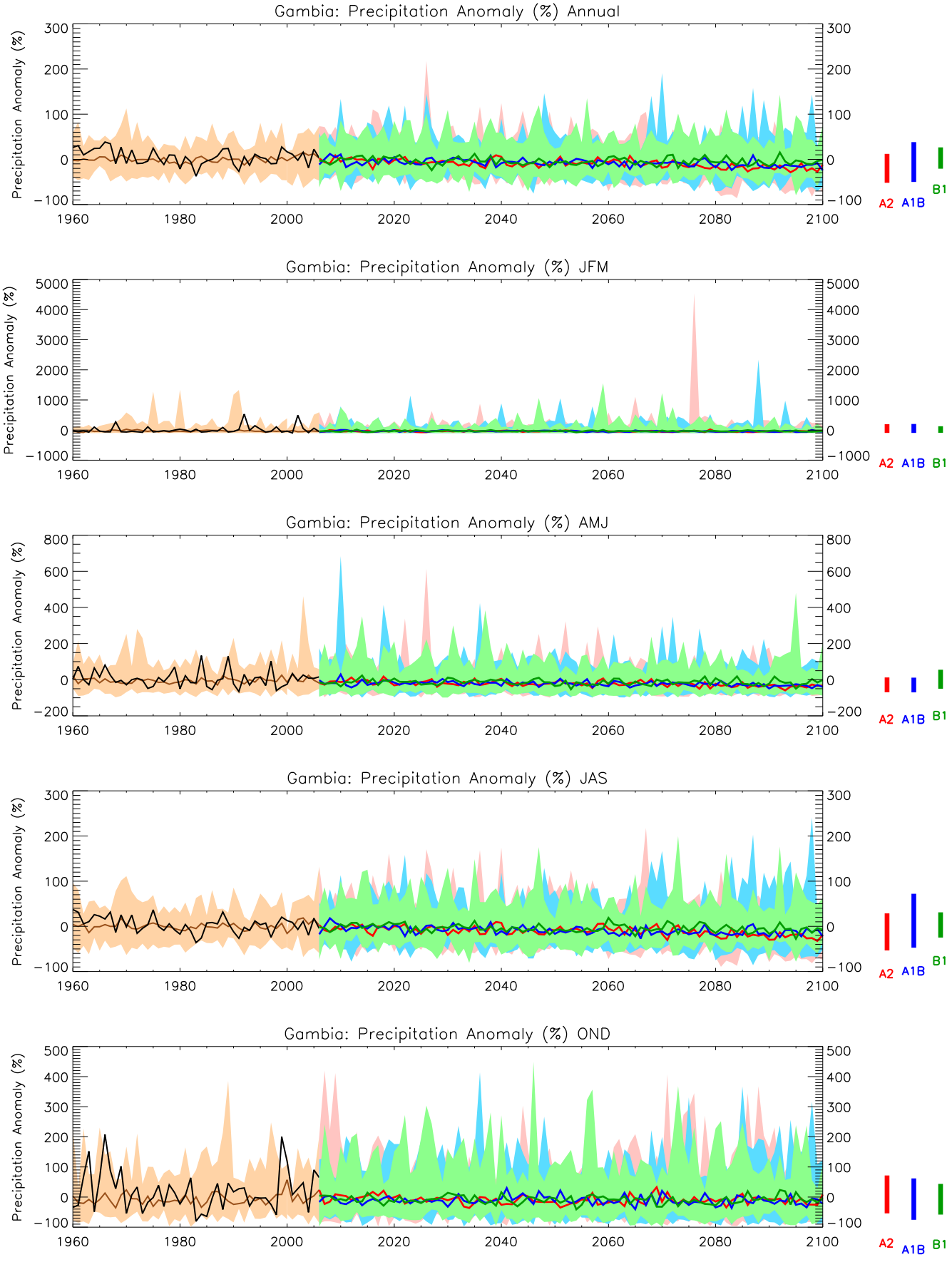

Figure 5: Trends in monthly precipitation for the recent past and projected future. All values shown are percentage anomalies, relative to the 1970-1999 mean climate. See Figure 1 for details.

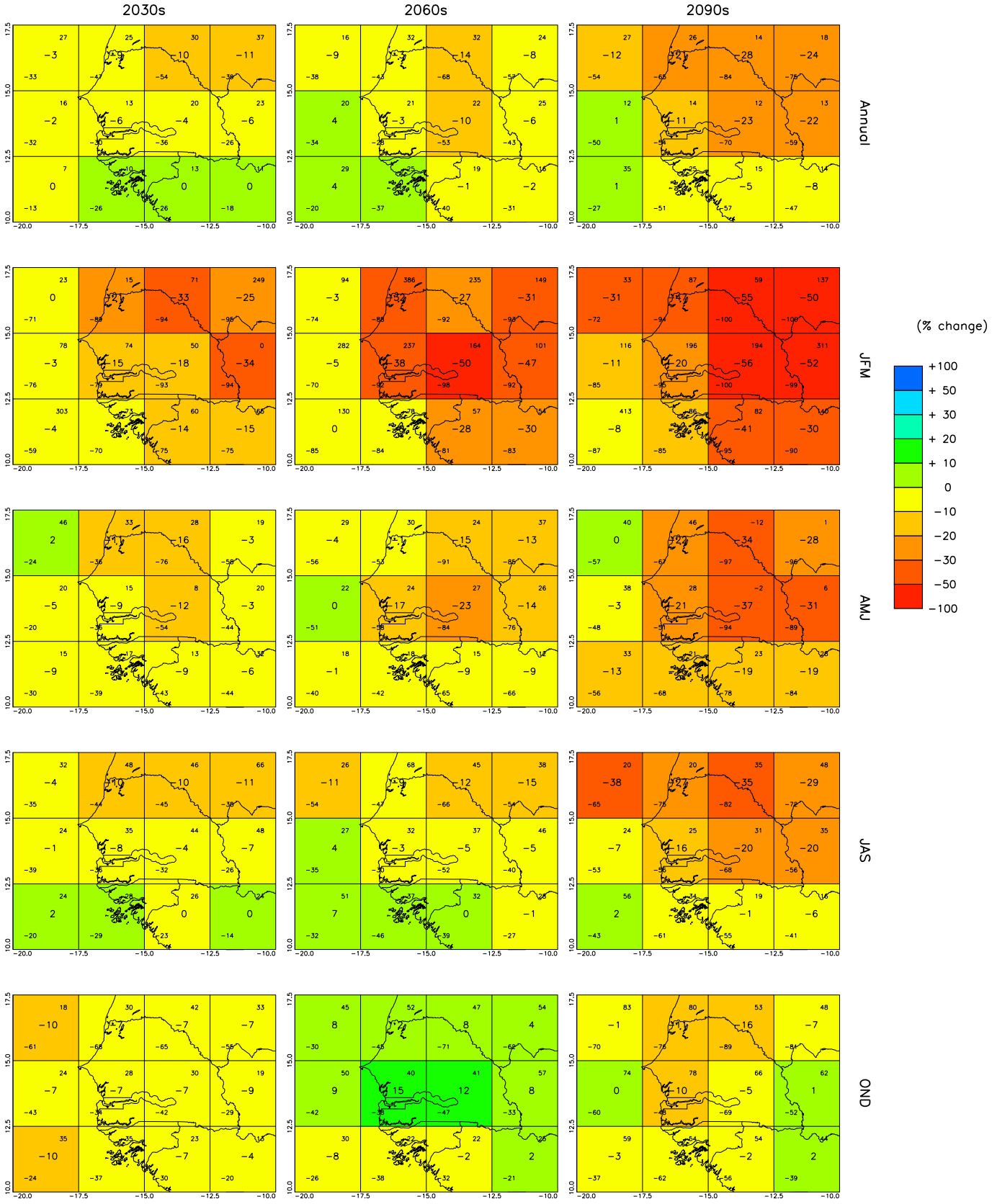

Figure 6: Spatial patterns of projected change in monthly precipitation for 10-year periods in the future under the SRES A2 scenario. All values are percentage anomalies relative to the mean climate of 1970-1999.See Figure 2 for details.

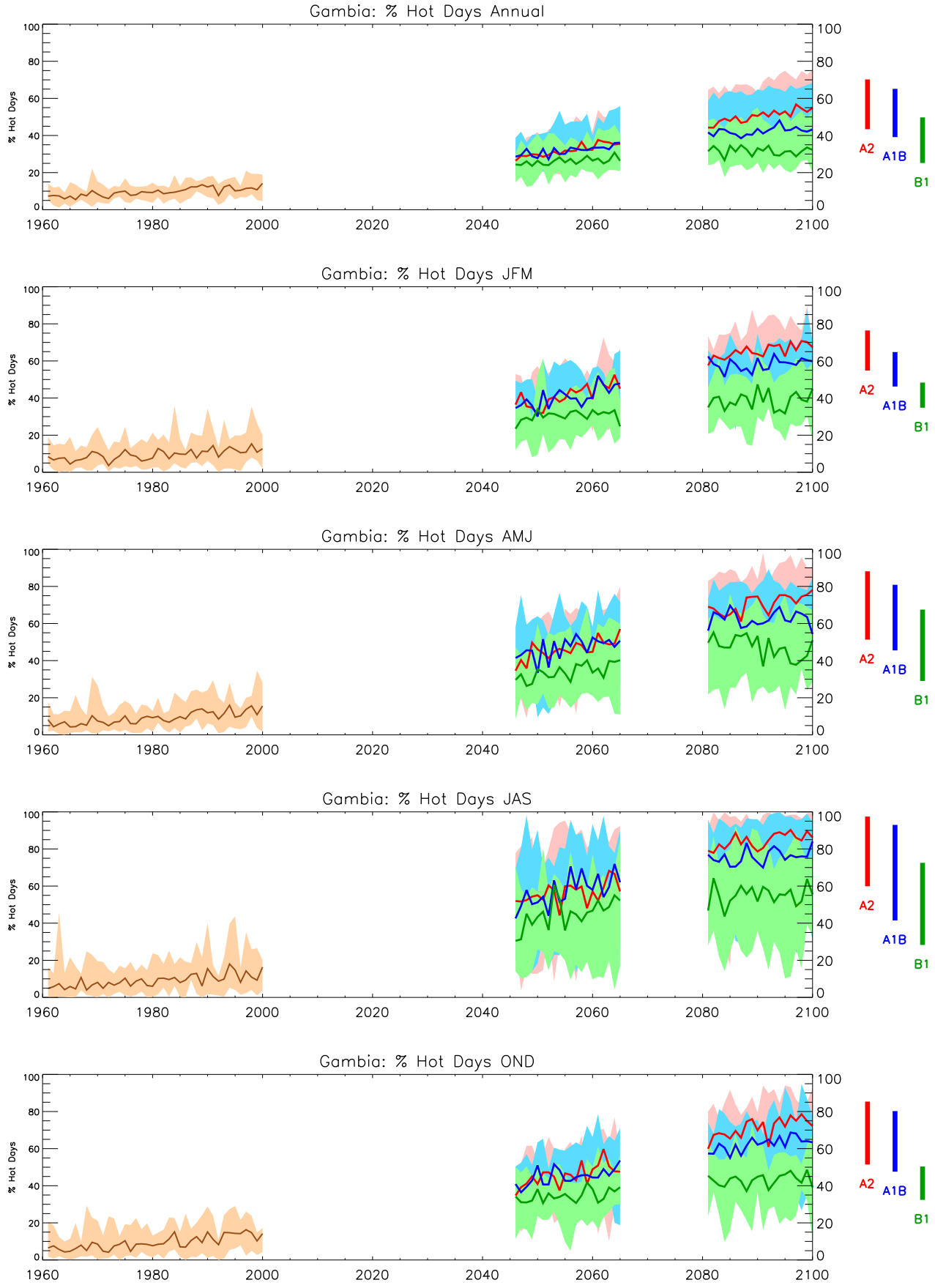

Figure 7: Trends in Hot-day frequency for the recent past and projected future. See Figure 1 for details.

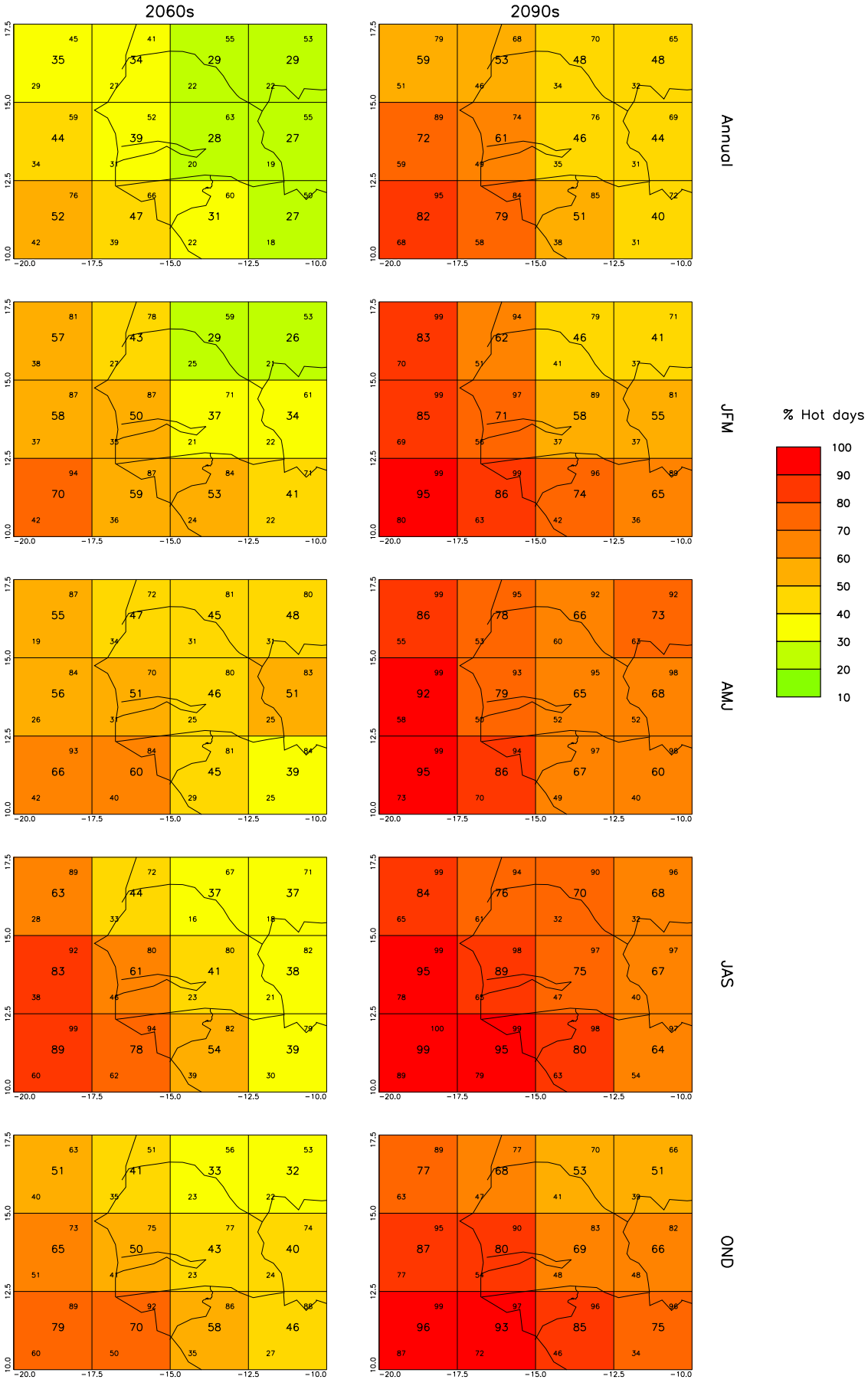

Figure 8: Spatial patterns of projected change in Hot-day frequency for 10-year periods in the future under the SRES A2 scenario. See Figure 2 for details.

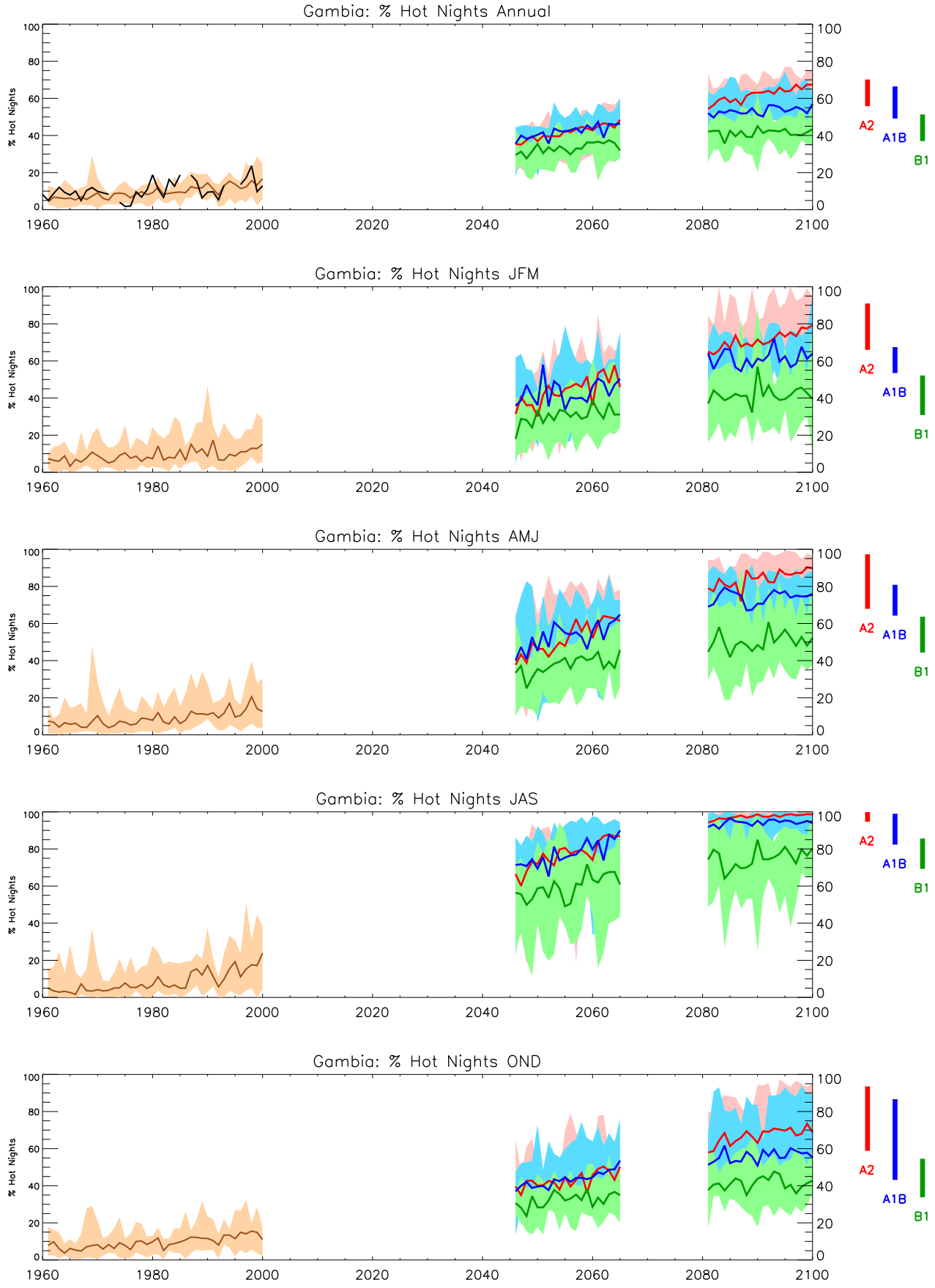

Figure 9: Trends in hot-night frequency for the recent past and projected future. See Figure 1 for details.

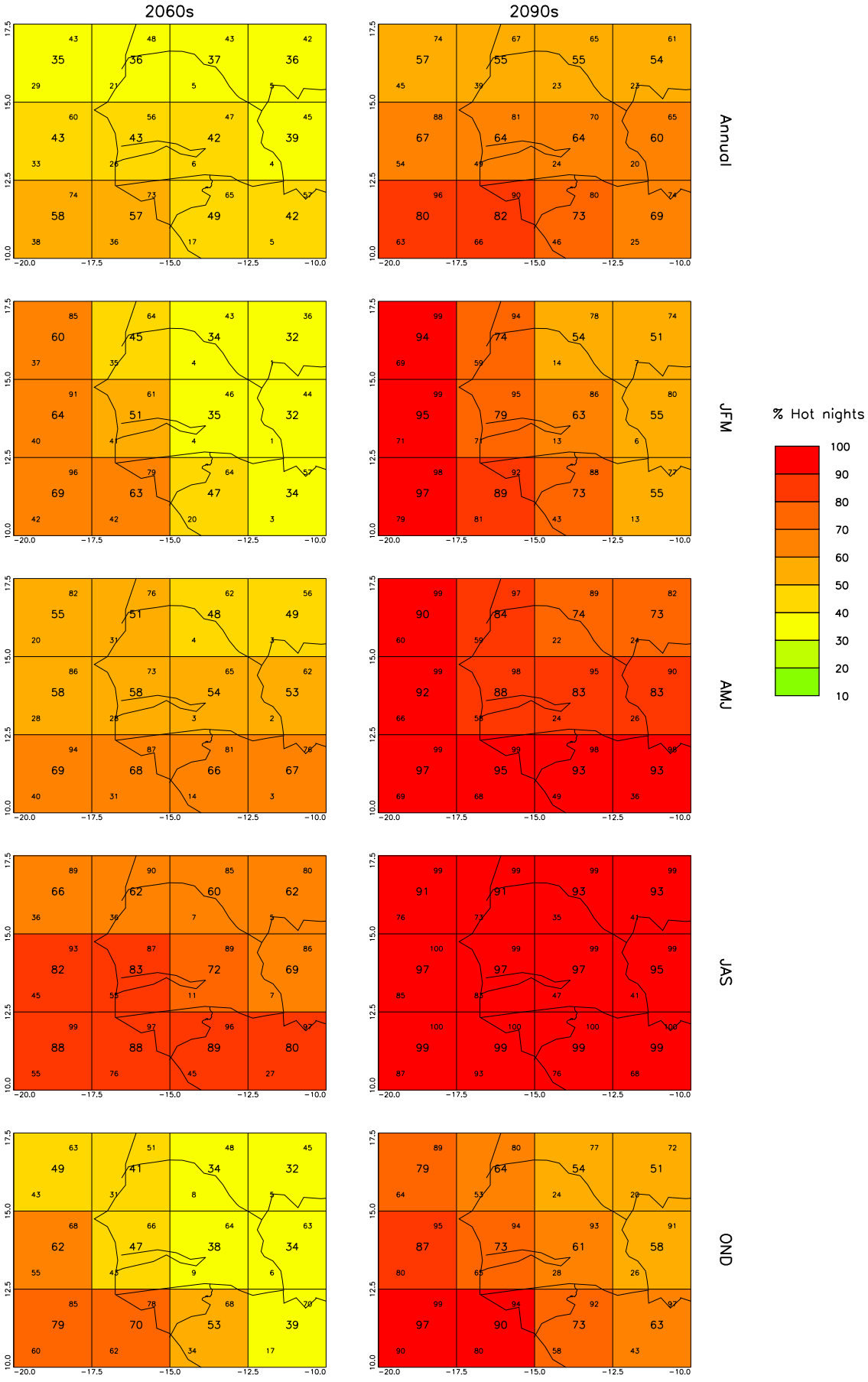

Figure 10: Spatial patterns of projected change in hot-night frequency for 10-year periods in the future under the SRES A2 scenario. See Figure 2 for details.

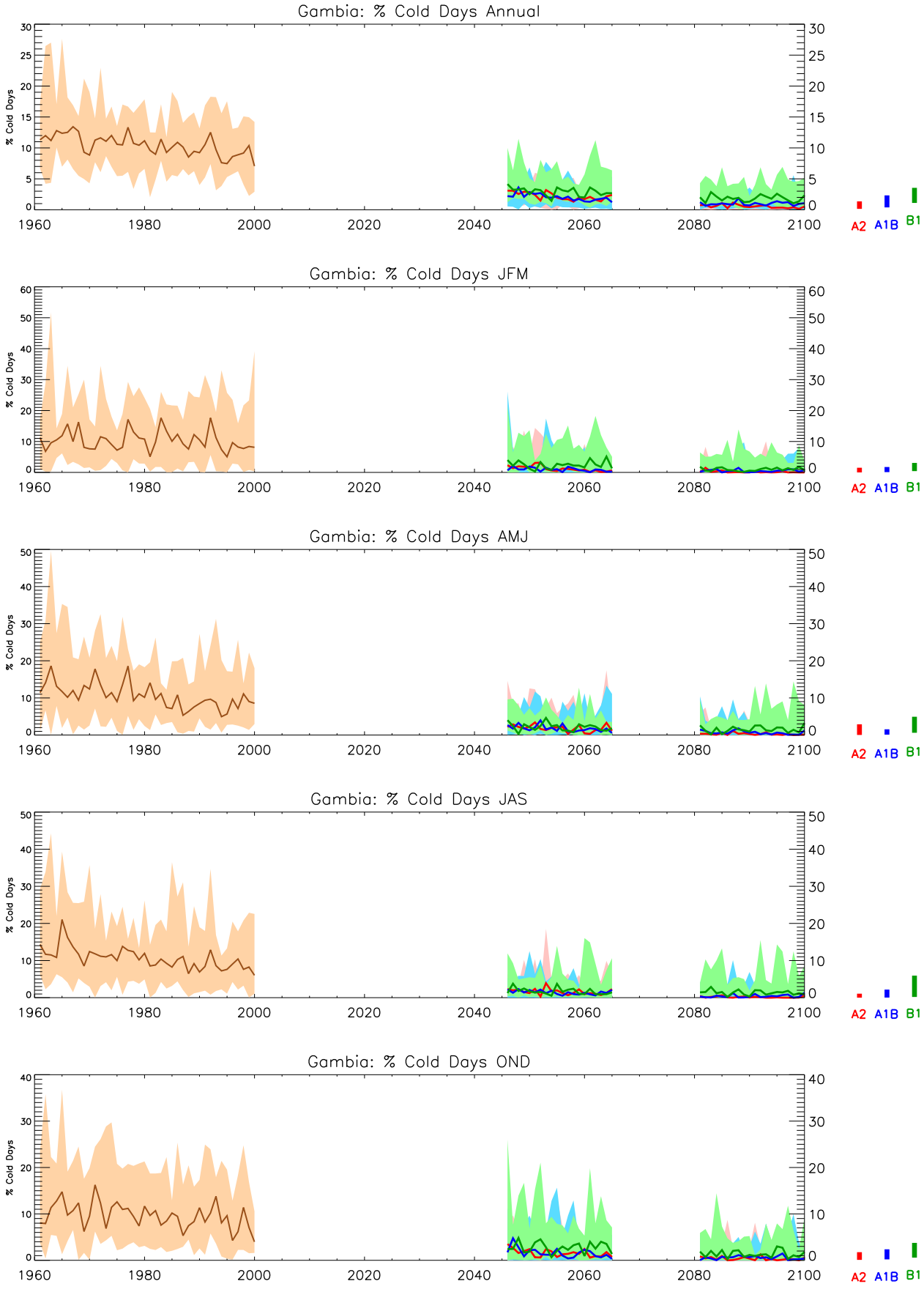

Figure 11: Trends in cold-day frequency for the recent past and projected future. See Figure 1 for details.

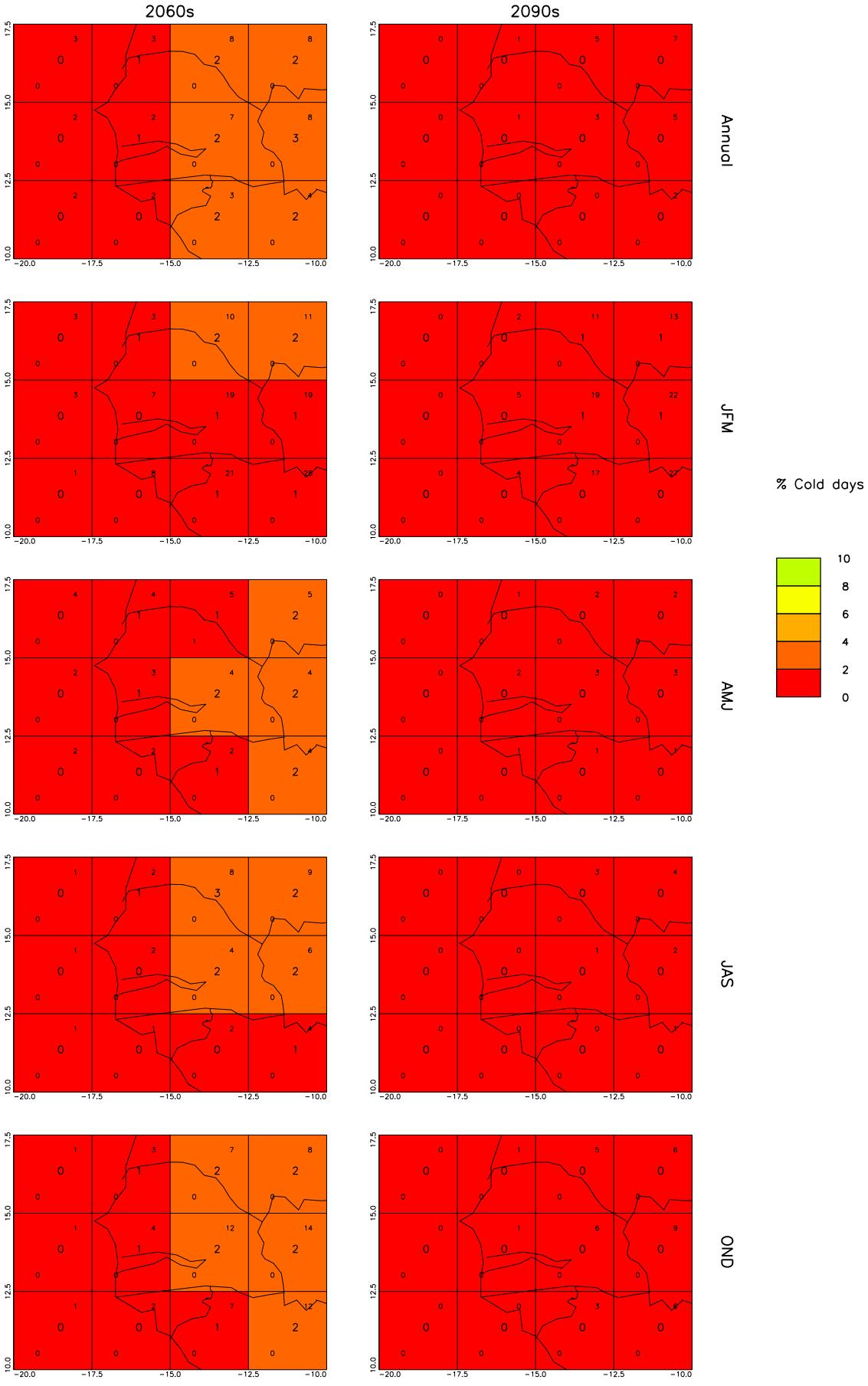

Figure 12: Spatial patterns of projected change in cold-day frequency for 10-year periods in the future under the SRES A2 scenario. See Figure 2 for details.

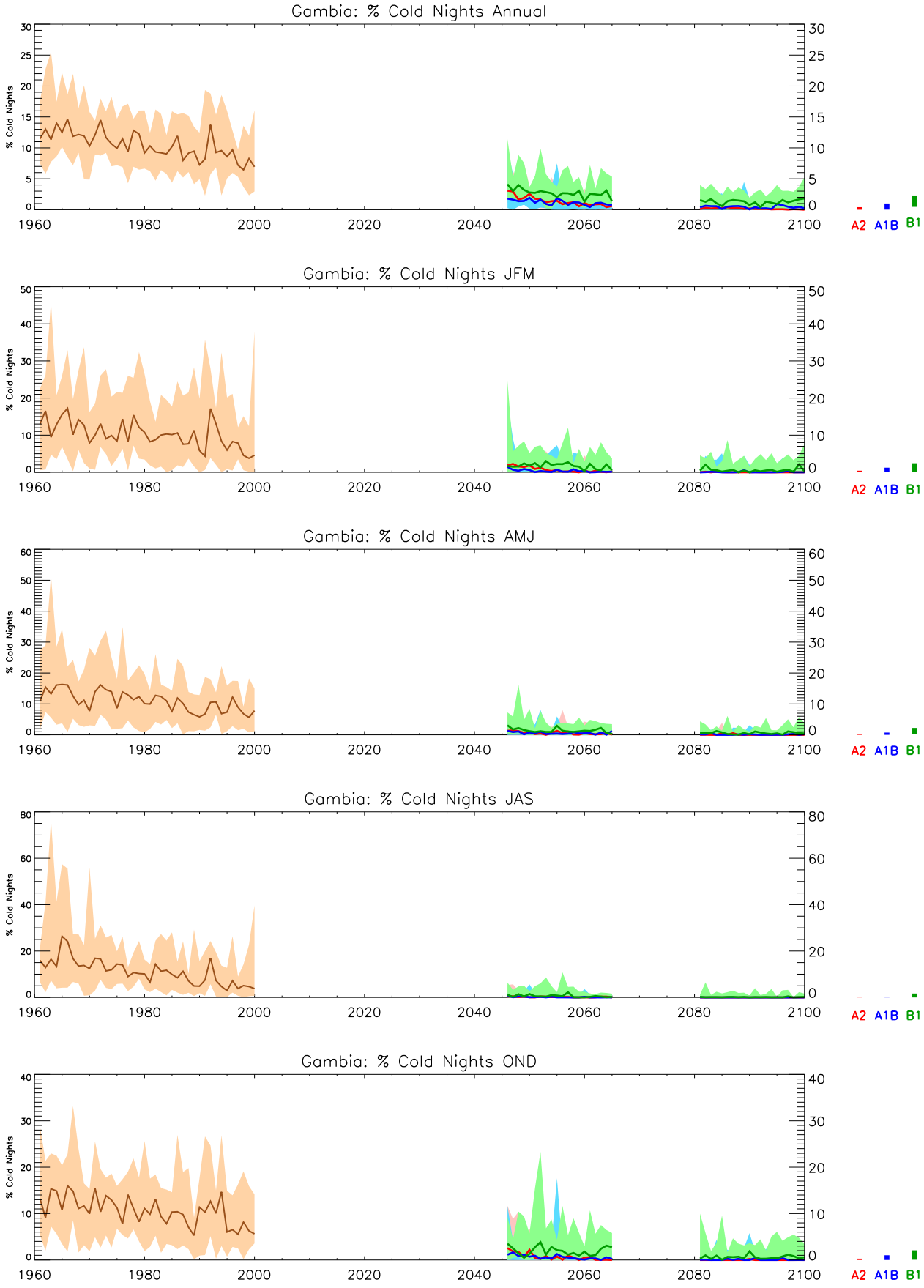

Figure 13: Trends in cold-night frequency for the recent past and projected future. See Figure 1 for details.

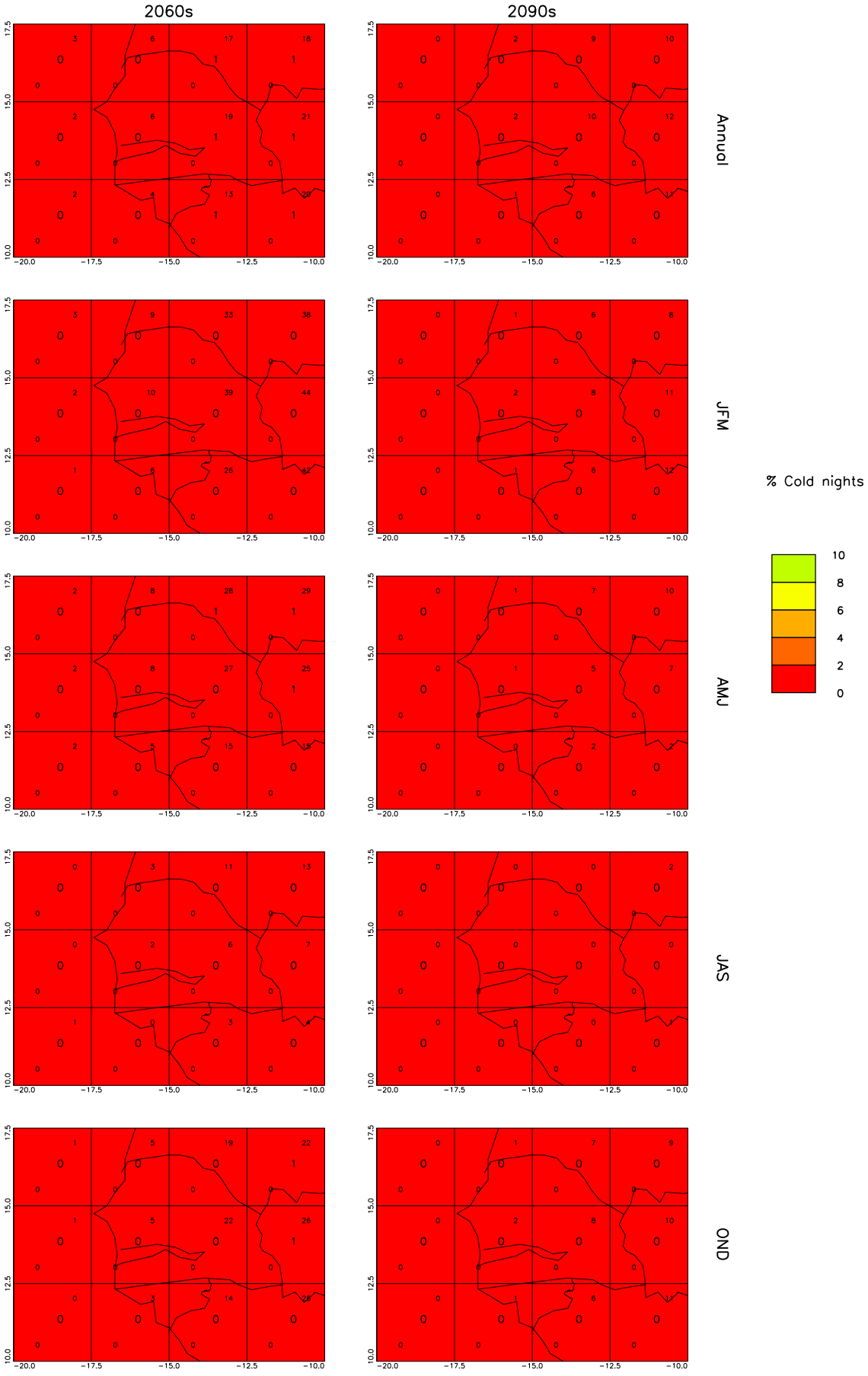

Figure 14: Spatial patterns of projected change in cold-night frequency for 10-year periods in the future under the SRES A2 scenario. See Figure 2 for details.

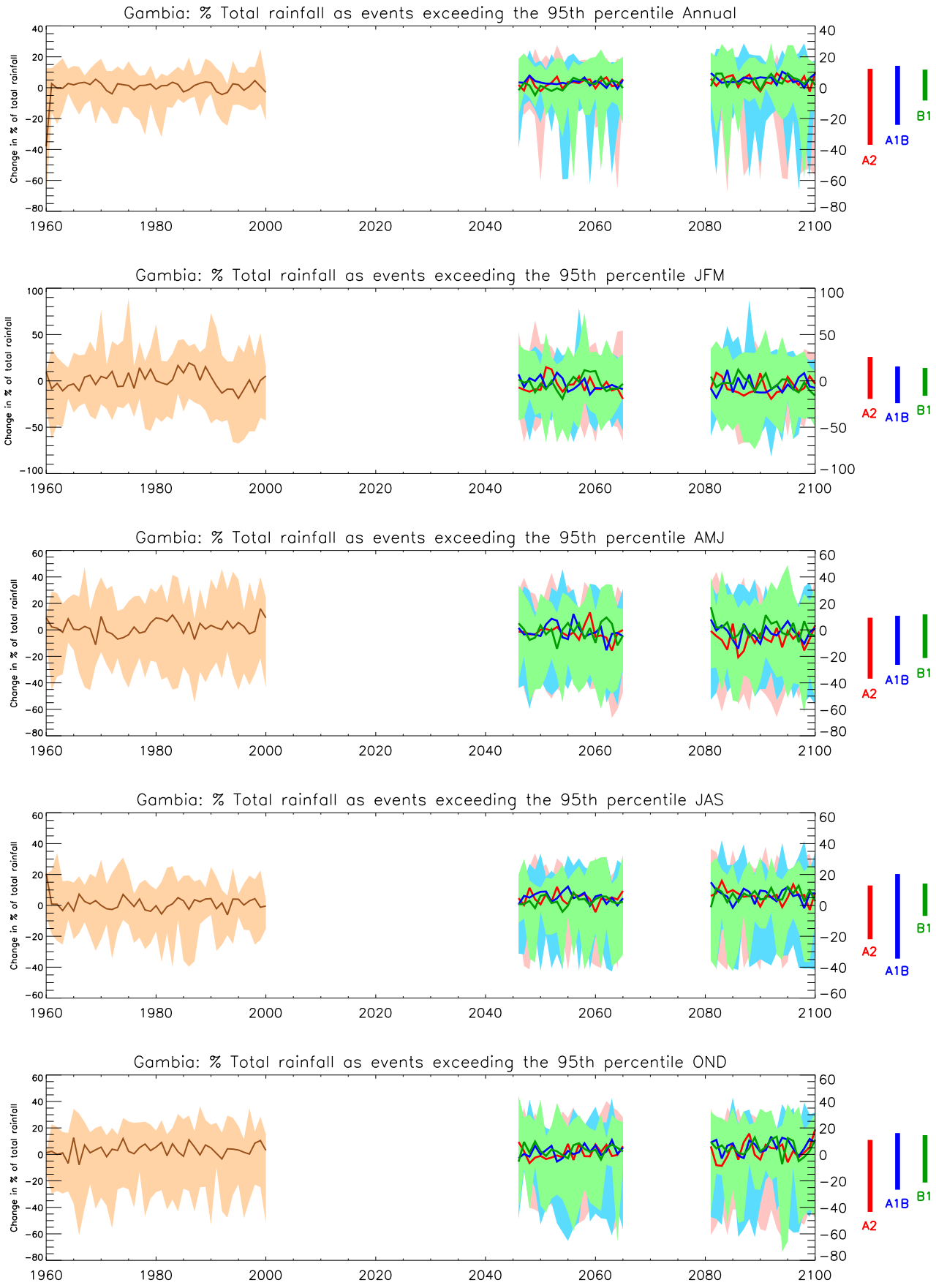

Figure 15: Trends in the proportion of precipitation falling in 'heavy' events for the recent past and projected future. All values shown are anomalies, relative to the 1970-1999 mean climate. See Figure 1 for details.

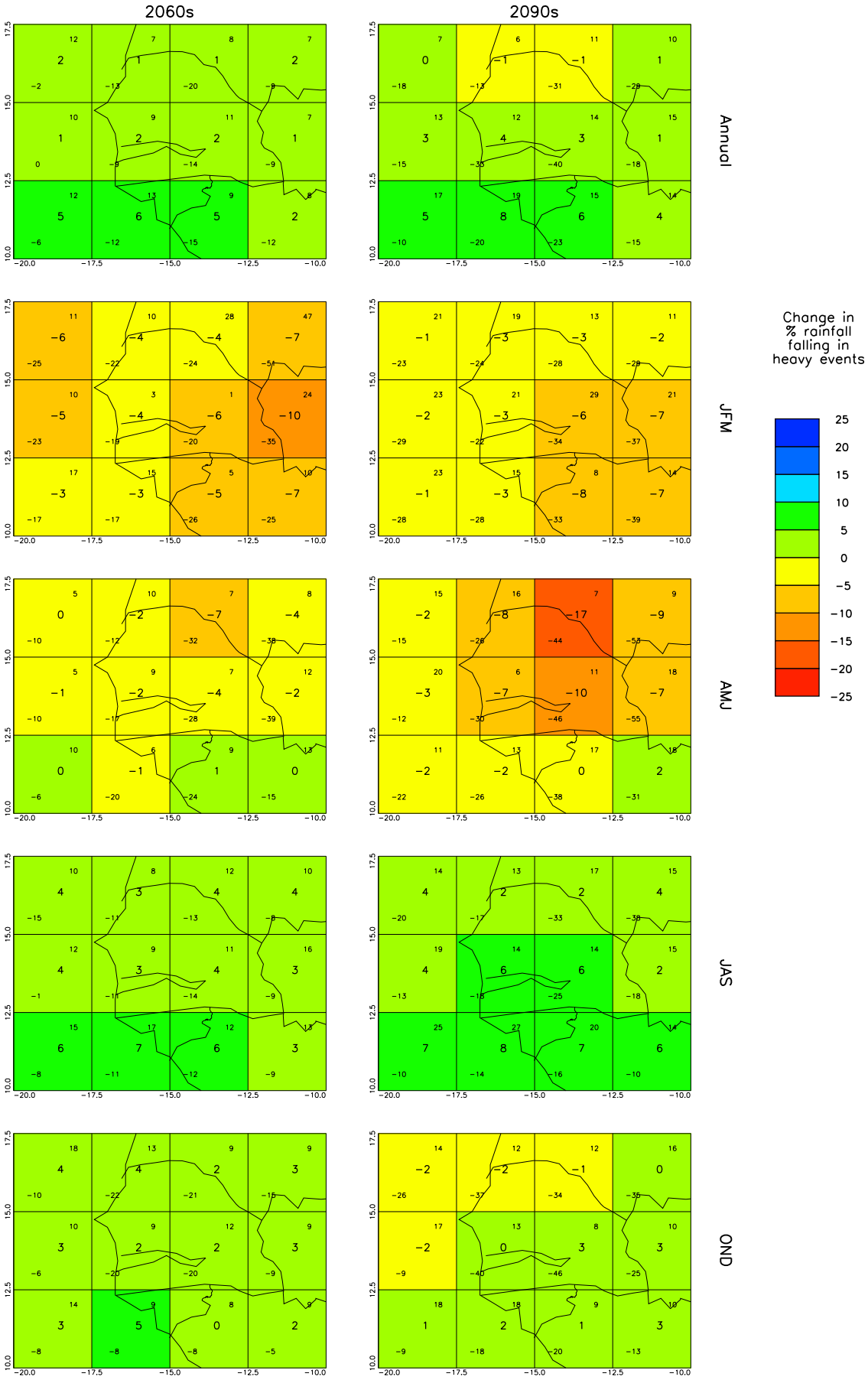

Figure 16: Spatial patterns of projected change in the proportion of precipitation falling in 'heavy' events for 10-year periods in the future under the SRES A2 scenario. All values are anomalies relative to the mean climate of 1970-1999. See Figure 2 for details.

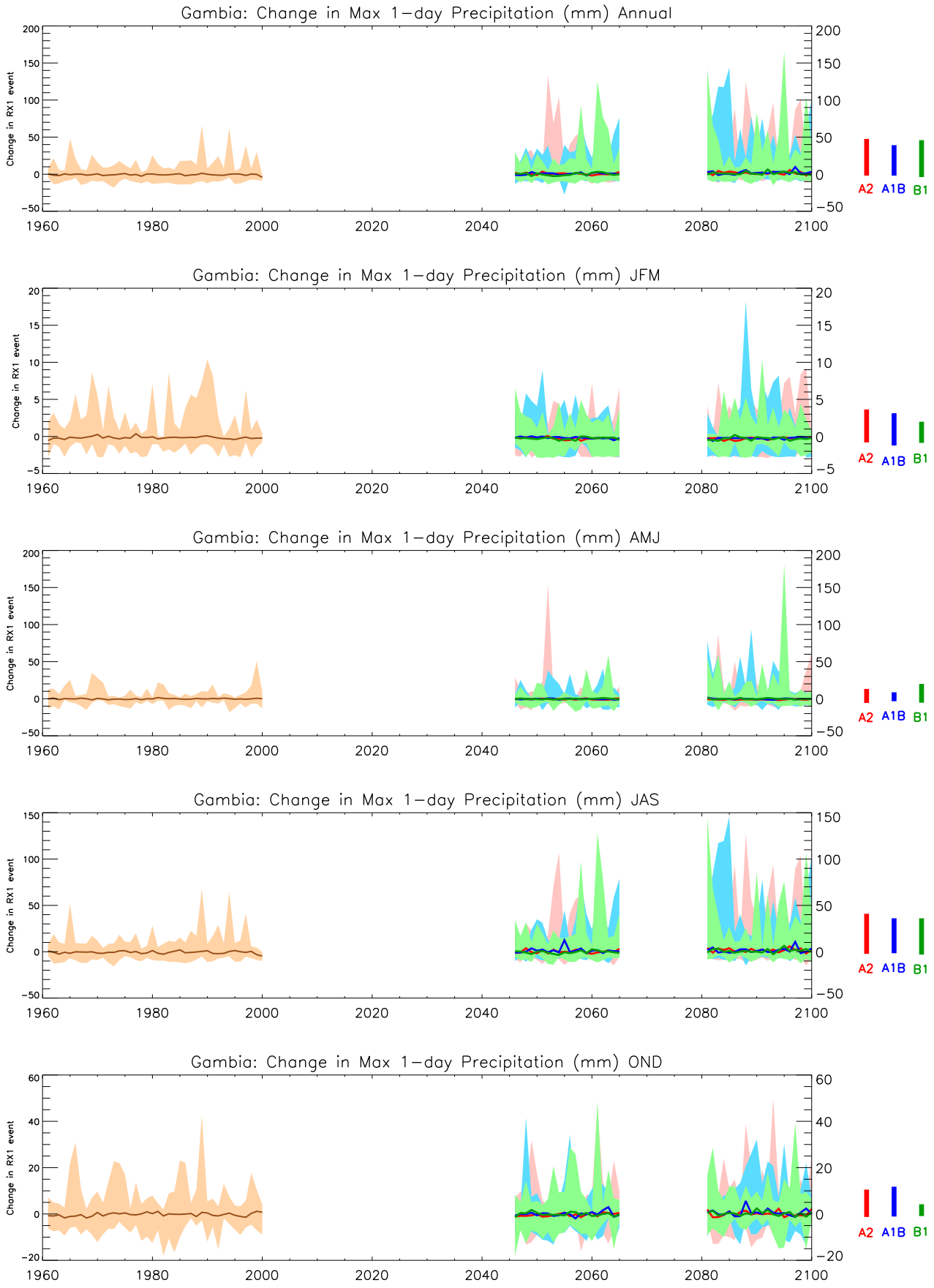

Figure 17: Trends in maximum 1-day rainfall for the recent past and projected future. All values shown are anomalies, relative to the 1970-1999 mean climate. See Figure 1 for details.

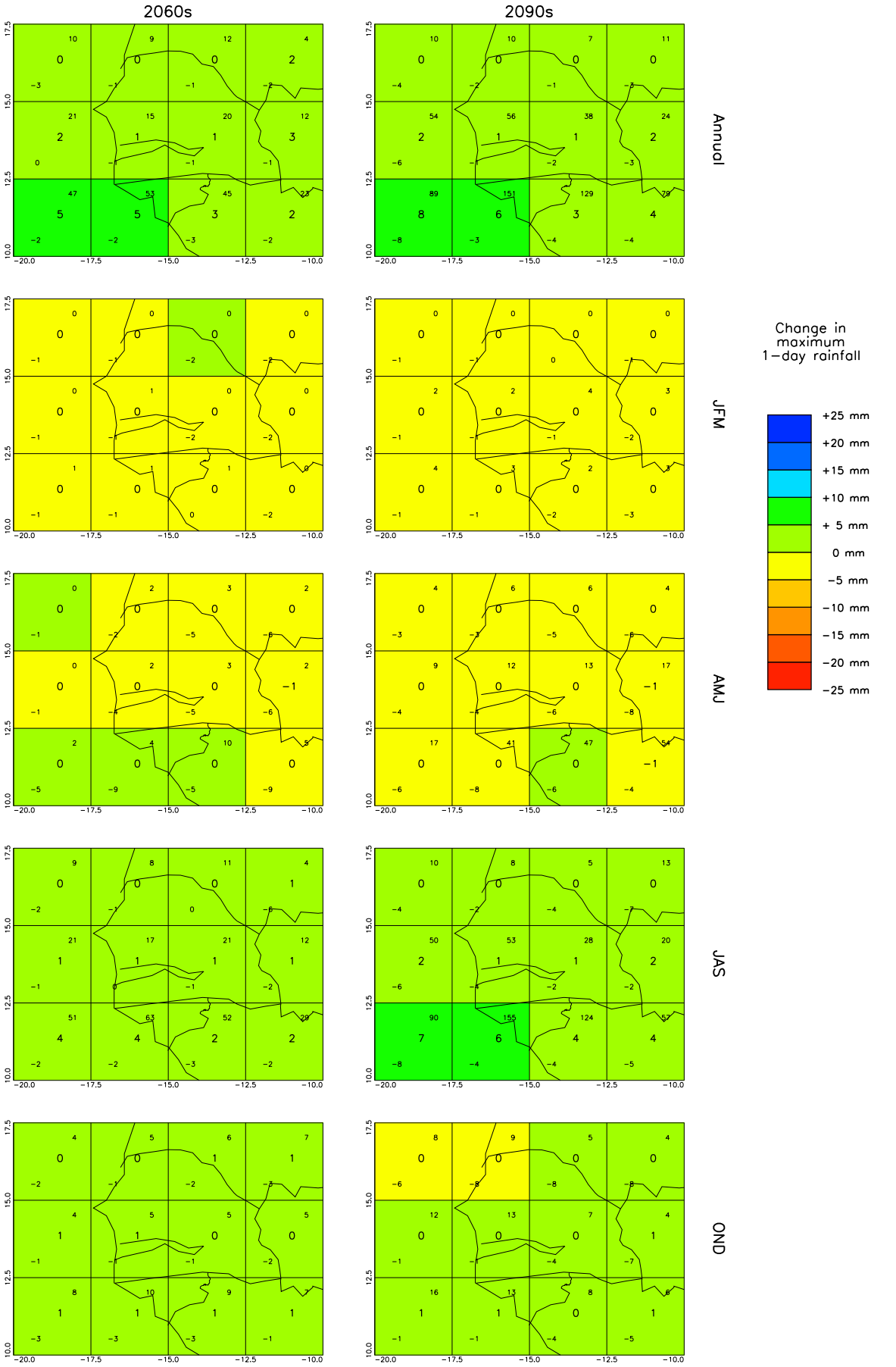

Figure 18: Spatial patterns of maximum 1-day rainfall for 10-year periods in the future under the SRES A2 scenario. All values are anomalies relative to the mean climate of 1970-1999. See Figure 2 for details.

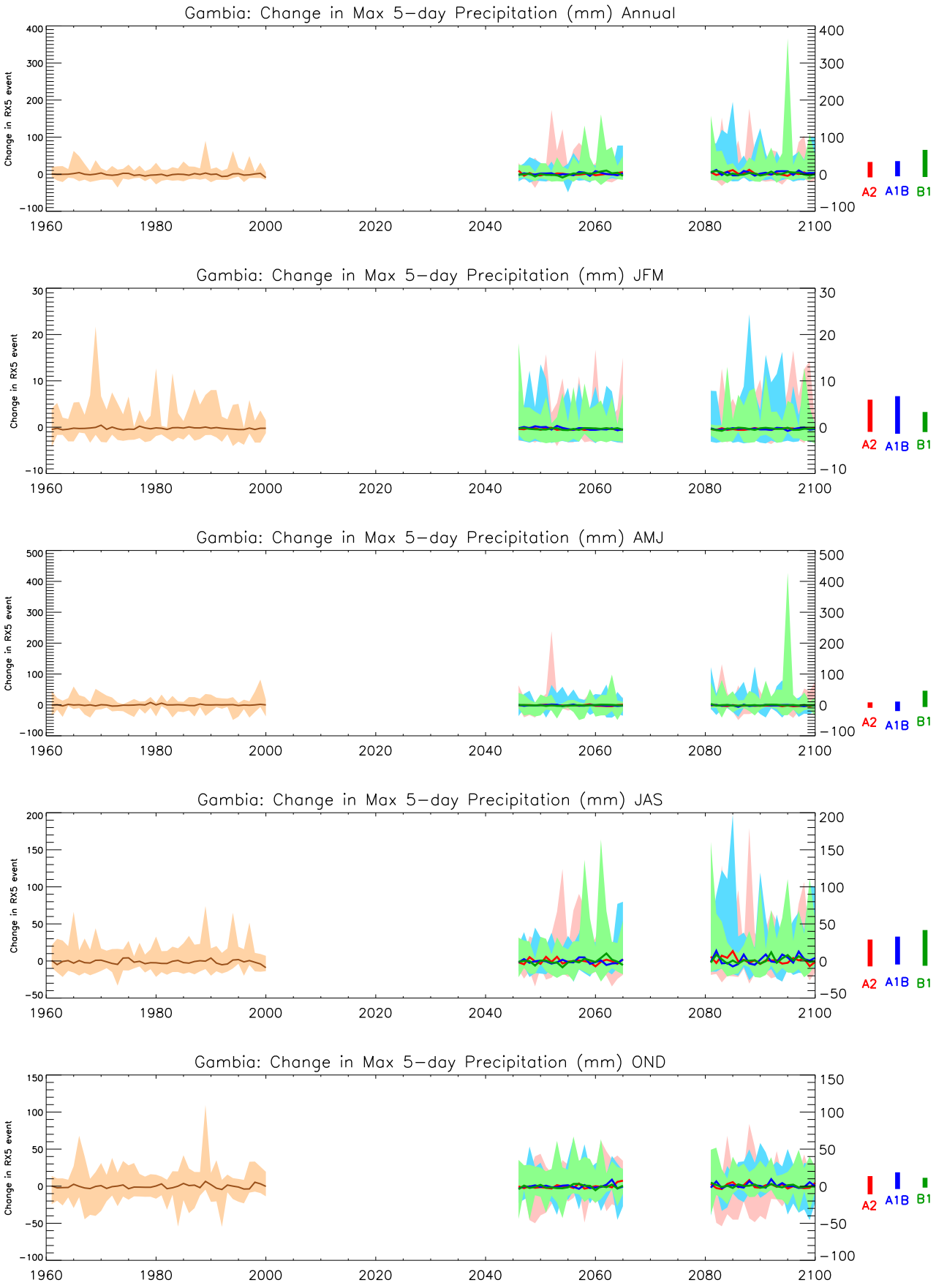

Figure 19: Trends in maximum 5-day rainfall for the recent past and projected future. All values shown are anomalies, relative to the 1970-1999 mean climate. See Figure 1 for details.

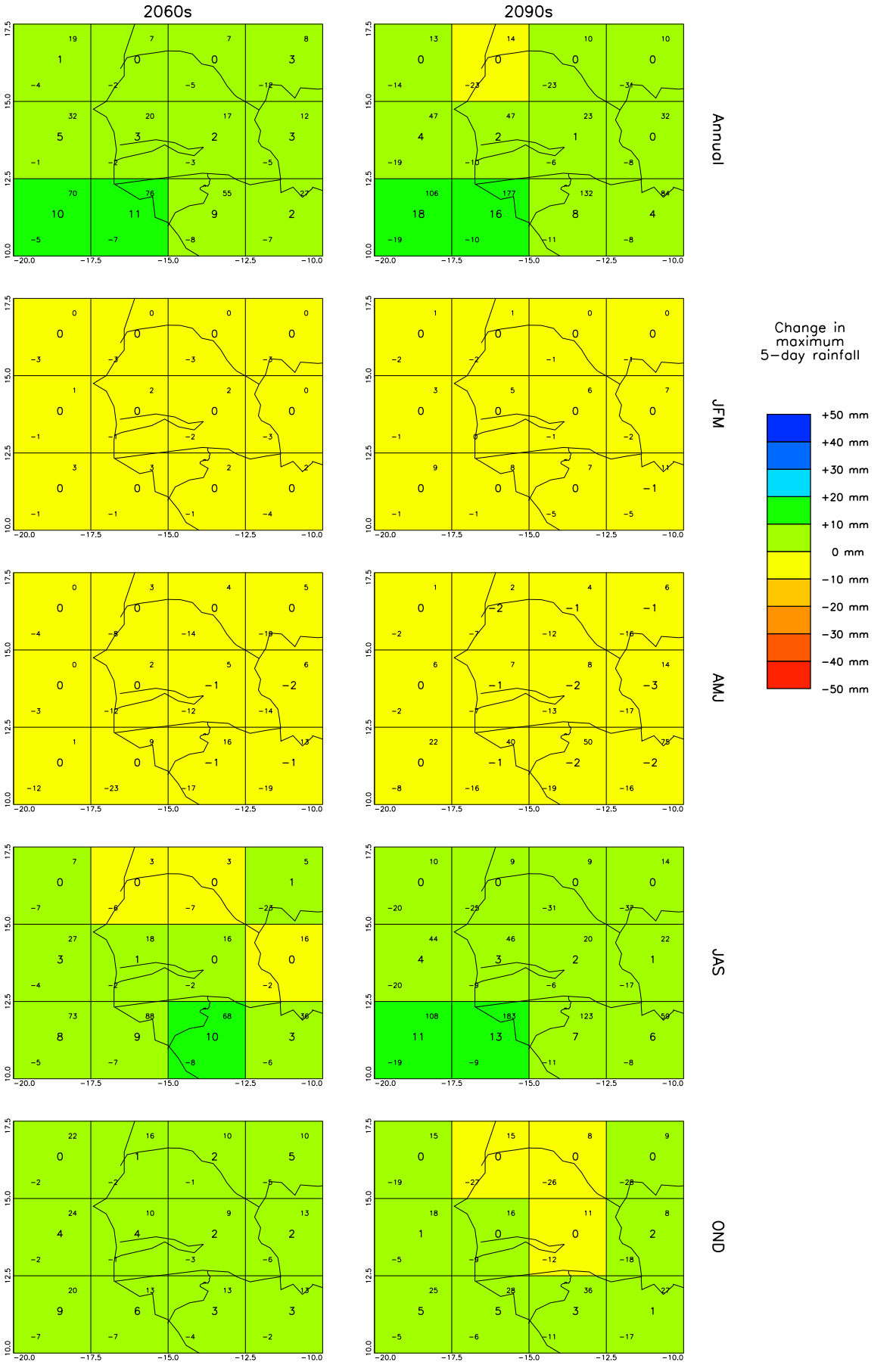

Figure 20: Spatial patterns of projected change in maximum 5-day rainfall for 10-year periods in the future under the SRES A2 scenario. All values are anomalies relative to the mean climate of 1970-1999. See Figure 2 for details.