Supporting Information for

Effects of climate extremes on spring phenology of temperate vegetation in China

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Contents of this file

Tables S1 to S7

Table S1. Summary of six curve fitting methods in determining start of the growing season (SOS) from satellite-derived NDVI data.

Method	curve fitting function
AG	$NDVI(t) = \begin{cases} g_1 + g_2 e^{-(\frac{t-n_1}{n_2})^{n_3}} & if \ t > n_1 \\ g_1 + g_2 e^{-(\frac{n_1-t}{n_4})^{n_5}} & if \ t \le n_1 \end{cases}$
Beck	$NDVI(t) = m_1 + m_2 \left(\dfrac{1}{1+e^{m_3-m_4 t}} - \dfrac{1}{1+e^{m_5-m_6 t}} \right)$
Elmore	$NDVI(t) = m_1 + (m_2 - m_7 t)\left(\dfrac{1}{1+e^{(m'_3-t)/m'_4}} - \dfrac{1}{1+e^{(m'_5-t)/m'_6}} \right)$
Gu	$NDVI(t) = k_1 + \dfrac{k_2}{(1+e^{l_1-l_2 t})^{u_1}} - \dfrac{k_3}{(1+e^{l_3-l_4 t})^{u_2}}$
Klos	$NDVI(t) = (a_1 t + b_1) + (a_2 t^2 + b_2 t + c)\left(\dfrac{1}{(1+q_1 e^{d_1-d_2 t})^{v_1}} - \dfrac{1}{(1+q_2 e^{d_3-d_4 t})^{v_2}} \right)$
Zhang	$NDVI(t) = \dfrac{c_3}{1+e^{c_1+c_2 t}} + c_4$

In the curve filter function, t is the Julian date, NDVI(t) is the fitted NDVI value by the equation of each filter function and the others are parameters to be fitted.

Table S2. Temporal trends of the start of the growing season (SOS) for the three vegetation types: mixed forest (MF), grasslands (GL), and barren or sparsely vegetated land (BOSV). The percentages represent the percentage of pixels with advanced or delayed SOS (percentage of pixels with p value < 0.05 in parentheses).

Vegetation types	1982-1998		1998-2015		1982-2015	
	Advance (%)	Delay (%)	Advance (%)	Delay (%)	Advance (%)	Delay (%)
MF	86.6 (21.9)	13.4 (0.4)	55.5 (8.4)	44.5 (2.7)	87.2 (53.1)	12.8 (1.8)
GL	59.9 (10.6)	40.1 (5.0)	45.2 (5.5)	54.8 (8.8)	60.0 (17.7)	40.0 (10.0)
BOSV	53.0 (5.3)	47.0 (3.8)	30.3 (3.7)	69.7 (13.2)	52.8 (12.8)	47.2 (12.2)

Table S3. Changes in climate extremes indices over the period 1982-2015. Negative means that the climate extremes indices decrease with the year (percentage of pixels with P < 0.05 in parentheses), while positive means that it increases with the year. The values in the table are the percentage of the trend.

	MF		GL		BOSV		ALL	
	Negative (%)	Positive (%)	Negative (%)	Positive (%)	Negative (%)	Positive (%)	Negative (%)	Positive (%)
Extreme temperature indices								
FD	91.7 (60.5)	8.3 (0.0)	82.7 (24.2)	17.3 (1.8)	72.0 (22.4)	28.0 (1.9)	83.4 (27.3)	16.6 (1.6)
TN10P	93.2 (3.9)	6.8 (0.0)	58.1 (10.0)	41.9 (1.3)	60.7 (33.6)	39.3 (0.0)	61.1 (9.7)	38.9 (1.2)
TX10P	60.7 (0.0)	39.3 (0.0)	40.0 (2.0)	60.0 (1.7)	35.5 (15.9)	64.5 (0.0)	41.7 (1.9)	58.3 (1.6)
TN90P	11.5 (0.1)	88.5 (0.3)	42.1 (1.7)	57.9 (4.4)	23.4 (0.0)	76.6 (15.9)	39.3 (1.5)	60.7 (4.1)
TX90P	40.5 (7.0)	59.5 (10.4)	56.6 (6.3)	43.4 (4.5)	43.9 (1.9)	56.1 (6.5)	55.1 (6.3)	44.9 (5.0)
TXX	41.9 (16.0)	58.1 (2.4)	60.0 (8.0)	40.0 (4.5)	51.4 (11.2)	48.6 (7.5)	58.4 (8.8)	41.6 (4.4)
TNX	52.0 (28.9)	48.0 (3.1)	50.5 (6.2)	49.5 (7.0)	42.1 (8.4)	57.9 (15.9)	50.6 (8.1)	49.4 (6.8)
TXN	39.0 (7.9)	61.0 (0.0)	91.9 (14.4)	8.1 (0.0)	96.3 (29.0)	3.7 (0.0)	87.4 (14.0)	12.6 (0.0)
TNN	28.9 (0.1)	71.1 (3.9)	79.4 (17.3)	20.6 (0.6)	62.6 (30.8)	37.4 (4.7)	75.0 (16.0)	25.0 (1.0)
TMAXMEAN	87.1 (10.0)	12.9 (0.1)	51.6 (6.7)	48.4 (8.3)	33.6 (12.1)	66.4 (26.2)	54.4 (7.0)	45.6 (7.8)
TMINMEAN	56.2 (11.2)	43.8 (0.1)	42.6 (4.0)	57.4 (14.5)	31.8 (11.2)	68.2 (34.6)	43.7 (4.6)	56.3 (13.4)
CSDI	60.4 (0.0)	39.6 (0.0)	43.6 (1.4)	56.4 (1.5)	41.1 (20.6)	58.9 (0.0)	45.0 (1.5)	55.0 (1.4)
SU	44.4 (19.4)	55.6 (6.9)	26.7 (1.6)	73.3 (3.5)	29.9 (0.9)	70.1 (1.9)	28.2 (3.1)	71.8 (3.8)
ID	47.7 (0.0)	52.3 (0.0)	56.2 (9.1)	43.8 (0.2)	68.2 (33.6)	31.8 (2.8)	55.6 (8.5)	44.4 (0.2)
TR	50.3 (26.0)	49.7 (2.1)	34.2 (4.6)	65.8 (5.7)	39.3 (2.8)	60.7 (3.7)	35.6 (6.4)	64.4 (5.4)
Extreme precipitation indices								
RX1DAY	70.2 (8.3)	29.8 (0.1)	54.4 (5.3)	45.6 (2.6)	47.7 (1.9)	52.3 (2.8)	55.7 (5.5)	44.3 (2.4)
RX5DAY	70.4 (3.1)	29.6 (0.1)	56.5 (4.6)	43.5 (2.5)	53.3 (1.9)	46.7 (2.8)	57.6 (4.5)	42.4 (2.3)
R95P	74.1 (16.3)	25.9 (0.0)	51.4 (5.2)	48.6 (5.3)	48.6 (1.9)	51.4 (4.7)	53.3 (6.1)	46.7 (4.8)
R99P	41.3 (1.8)	58.7 (4.6)	56.9 (7.2)	43.1 (2.6)	47.7 (2.8)	52.3 (5.6)	55.5 (6.7)	44.5 (2.8)
CDD	16.6 (0.0)	83.4 (4.8)	52.6 (8.3)	47.4 (4.4)	60.7 (3.7)	39.3 (2.8)	49.6 (7.6)	50.4 (4.4)
CWD	79.9 (7.1)	20.1 (0.1)	41.6 (1.4)	58.4 (4.4)	55.1 (2.8)	44.9 (1.9)	45.0 (1.9)	55.0 (4.0)
R10MM	78.9 (31.0)	21.1 (0.3)	51.8 (5.4)	48.2 (4.6)	38.3 (0.9)	61.7 (3.7)	54.0 (7.5)	46.0 (4.2)
R20MM	56.6 (2.7)	43.4 (0.9)	52.2 (6.1)	47.8 (1.7)	29.9 (0.9)	70.1 (0.9)	52.4 (5.8)	47.6 (1.6)
SDII	51.2 (5.1)	48.8 (1.0)	46.9 (5.4)	53.1 (4.6)	49.5 (2.8)	50.5 (10.3)	47.3 (5.4)	52.7 (4.3)
PRCPTOT	79.2 (31.1)	20.8 (0.0)	56.2 (8.0)	43.8 (6.4)	53.3 (3.7)	46.7 (2.8)	58.1 (9.9)	41.9 (5.8)

Table S4. Changes in trends in climate extremes indices from 1982-1998 to 1998-2015. Negative means that the climate extremes indices decrease with the year (percentage of pixels with P < 0.05 in parentheses), while positive means that it increases with the year. The values in the table are the difference in the percentage of the trend in the climate extremes indices between 1998-2015 and 1982-1998.

	MF		GL		BOSV		ALL	
	Negative (%)	Positive (%)	Negative (%)	Positive (%)	Negative (%)	Positive (%)	Negative (%)	Positive (%)
Extreme temperature indices								
FD	-57.9	57.9	-66.9	66.9	-57.0	57.0	-66.0	66.0
	(-5.4)	(0.0)	(-18.8)	(4.3)	(-15.9)	(15.9)	(-17.6)	(4.0)
TN10P	-79.7	79.7	-60.1	60.1	-15.8	15.8	-61.3	61.3
	(-15.4)	(0.0)	(-1.1)	(1.3)	(0.0)	(0.0)	(-2.3)	(1.2)
TX10P	-60.9	60.9	-42.0	42.0	-14.9	14.9	-43.4	43.4
	(-2.6)	(0.0)	(0.0)	(0.9)	(0.0)	(0.0)	(-0.2)	(0.8)
TN90P	12.2	-12.2	9.1	-9.1	-16.8	16.8	9.1	-9.1
	(0.6)	(-0.1)	(1.5)	(-2.1)	(0.9)	(-2.8)	(1.4)	(-1.9)
TX90P	-15.0	15.0	4.3	-4.3	8.4	-8.4	2.7	-2.7
	(-0.6)	(0.8)	(0.1)	(2.4)	(0.9)	(11.2)	(0.1)	(2.4)
TXX	-32.7	32.7	-9.8	9.8	-6.5	6.5	-11.7	11.7
	(6.0)	(0.4)	(-4.7)	(3.1)	(1.9)	(12.1)	(-3.7)	(2.9)
TNX	-15.7	15.7	3.7	-3.7	-6.5	6.5	2.0	-2.0
	(10.2)	(0.6)	(2.4)	(0.2)	(2.8)	(7.5)	(3.1)	(0.4)
TXN	34.6	-34.6	21.4	-21.4	4.6	-4.6	22.3	-22.3
	(2.4)	(-6.8)	(0.5)	(-0.8)	(1.9)	(0.0)	(0.6)	(-1.3)
TNN	34.2	-34.2	38.8	-38.8	21.4	-21.4	38.2	-38.2
	(-6.9)	(-3.9)	(7.9)	(-4.9)	(6.6)	(0.0)	(6.7)	(-4.7)
TMAXMEAN	21.5	-21.5	23.2	-23.2	-12.2	12.2	22.7	-22.7
	(-10.6)	(-4.6)	(4.6)	(-6.8)	(2.8)	(6.5)	(3.3)	(-6.5)
TMINMEAN	53.2	-53.2	41.8	-41.8	-7.5	7.5	42.3	-42.3
	(7.6)	(-11.2)	(7.5)	(-16.2)	(2.8)	(5.6)	(7.5)	(-15.6)
CSDI	-50.9	50.9	-39.0	39.0	-14.1	14.1	-39.7	39.7
	(0.0)	(0.1)	(-0.4)	(0.9)	(0.0)	(-0.9)	(-0.4)	(0.8)
SU	-0.6	0.6	19.9	-19.9	14.0	-14.0	18.1	-18.1
	(8.9)	(0.8)	(1.5)	(-2.1)	(6.5)	(1.9)	(2.2)	(-1.7)
ID	-76.2	76.2	-43.1	43.1	-17.8	17.8	-45.7	45.7
	(-1.4)	(0.5)	(-2.0)	(3.5)	(-2.8)	(-0.9)	(-2.0)	(3.2)
TR	-39.2	39.2	15.3	-15.3	2.8	-2.8	10.5	-10.5
	(13.3)	(0.7)	(2.8)	(-1.0)	(6.5)	(-1.0)	(3.7)	(-0.8)
Extreme precipitation indices								
RX1DAY	-20.5	20.5	-1.0	1.0	-5.6	5.6	-2.7	2.7
	(-3.4)	(-0.2)	(-0.7)	(-0.7)	(2.8)	(-2.8)	(-0.9)	(-0.7)
RX5DAY	-7.5	7.5	3.8	-3.8	-20.6	20.6	2.6	-2.6
	(-10.6)	(-2.2)	(0.7)	(-0.8)	(-0.9)	(2.8)	(-0.4)	(-0.9)
R95P	2.8	-2.8	12.7	-12.7	-2.8	2.8	11.7	-11.7
	(-7.1)	(-1.5)	(1.8)	(-0.3)	(-0.9)	(0.9)	(1.1)	(-0.3)
R99P	-29.7	29.7	4.7	-4.7	-17.7	17.7	1.6	-1.6
	(-5.7)	(0.6)	(-0.9)	(-0.8)	(-0.9)	(0.0)	(-1.4)	(-0.7)
CDD	-20.4	20.4	-13.5	13.5	-10.3	10.3	-14.1	14.1
	(-0.3)	(0.0)	(-10.3)	(-3.0)	(-6.5)	(0.9)	(-9.4)	(-2.7)
CWD	6.7	-6.7	27.7	-27.7	10.3	-10.3	25.8	-25.8
	(-2.8)	(-1.2)	(1.3)	(-3.7)	(-0.9)	(1.9)	(1.0)	(-3.4)
R10MM	14.6	-14.6	7.9	-7.9	-5.7	5.7	8.3	-8.3
	(-7.7)	(0.0)	(2.5)	(-0.2)	(-0.9)	(1.0)	(1.6)	(-0.2)
R20MM	-10.8	10.8	3.6	-3.6	-4.7	4.7	2.3	-2.3
	(-3.6)	(-1.4)	(-1.9)	(0.0)	(0.9)	(0.0)	(-2.1)	(-0.1)
SDII	13.3	-13.3	-22.6	22.6	-33.6	33.6	-19.6	19.6
	(-6.7)	(0.2)	(-2.1)	(0.0)	(-1.0)	(-0.9)	(-2.5)	(0.0)
PRCPTOT	28.2	-28.2	14.5	-14.5	-3.7	3.7	15.5	-15.5
	(-11.3)	(-0.6)	(2.4)	(-0.7)	(-0.9)	(3.8)	(1.2)	(-0.7)

Table S5. Changes in extreme climate indices over the period 1982-1998. Negative means that the extreme climate indices decreases with the year (percentage of pixels with P < 0.05 in parentheses), while positive means that it increases with the year. The values in the table are the percentage of the trend.

ID	MF		GL		BOSV		ALL	
	Negative (%)	Positive (%)	Negative (%)	Positive (%)	Negative (%)	Positive (%)	Negative (%)	Positive (%)
Extreme temperature indices								
FD	99.5 (6.1)	0.5 (0.0)	89.3 (19.8)	10.7 (0.1)	83.2 (16.8)	16.8 (0.0)	90.1 (18.6)	9.9 (0.1)
TN10P	98.6 (15.4)	1.4 (0.0)	81.3 (1.1)	18.7 (0.0)	55.1 (0.0)	44.9 (0.0)	82.5 (2.3)	17.5 (0.0)
TX10P	74.0 (2.6)	26.0 (0.0)	54.4 (0.0)	45.6 (0.0)	33.6 (0.0)	66.4 (0.0)	55.9 (0.2)	44.1 (0.0)
TN90P	9.5 (0.0)	90.5 (0.1)	37.7 (0.8)	62.3 (3.3)	34.6 (0.0)	65.4 (3.7)	35.3 (0.7)	64.7 (3.0)
TX90P	52.3 (1.7)	47.7 (1.0)	41.1 (1.8)	58.9 (1.4)	34.6 (0.0)	65.4 (8.4)	42.0 (1.7)	58.0 (1.4)
TXX	77.3 (12.7)	22.7 (0.1)	55.5 (6.7)	44.5 (0.7)	46.7 (0.9)	53.3 (4.7)	57.3 (7.1)	42.7 (0.7)
TNX	63.7 (3.1)	36.3 (3.1)	49.6 (2.6)	50.4 (3.0)	36.4 (0.0)	63.6 (5.6)	50.6 (2.6)	49.4 (3.0)
TXN	26.1 (0.0)	73.9 (6.8)	46.5 (0.4)	53.5 (0.8)	90.7 (0.0)	9.3 (0.0)	45.2 (0.4)	54.8 (1.3)
TNN	27.3 (6.9)	72.7 (3.9)	41.7 (0.1)	58.3 (5.0)	63.6 (0.9)	36.4 (0.0)	40.7 (0.7)	59.3 (4.8)
TMAXMEAN	52.2 (12.4)	47.8 (4.6)	40.9 (0.9)	59.1 (7.6)	45.8 (0.0)	54.2 (2.8)	41.9 (1.8)	58.1 (7.3)
TMINMEAN	22.2 (0.3)	77.8 (11.2)	24.0 (0.1)	76.0 (17.1)	41.1 (0.0)	58.9 (5.6)	24.0 (0.1)	76.0 (16.5)
CSDI	90.1 (0.0)	9.9 (0.0)	67.9 (0.5)	32.1 (0.1)	47.7 (0.0)	52.3 (0.9)	69.6 (0.5)	30.4 (0.1)
SU	49.5 (2.7)	50.5 (0.5)	14.7 (0.9)	85.3 (2.9)	11.2 (0.0)	88.8 (0.9)	17.6 (1.0)	82.4 (2.6)
ID	76.4 (1.4)	23.6 (0.1)	70.0 (2.5)	30.0 (0.0)	63.6 (2.8)	36.4 (0.9)	70.5 (2.4)	29.5 (0.0)
TR	85.1 (13.0)	14.9 (0.3)	21.2 (0.9)	78.8 (2.9)	25.2 (0.0)	74.8 (4.7)	26.7 (1.9)	73.3 (2.7)
Extreme precipitation indices								
RX1DAY	71.3 (7.2)	28.7 (0.3)	57.7 (2.2)	42.3 (1.2)	58.9 (0.0)	41.1 (2.8)	58.9 (2.6)	41.1 (1.2)
RX5DAY	60.0 (11.0)	40.0 (2.5)	53.0 (1.0)	47.0 (1.5)	57.0 (0.9)	43.0 (0.0)	53.7 (1.9)	46.3 (1.6)
R95P	64.1 (10.9)	35.9 (1.8)	52.3 (0.8)	47.7 (1.2)	45.8 (0.9)	54.2 (1.9)	53.3 (1.6)	46.7 (1.2)
R99P	61.6 (6.5)	38.4 (0.3)	53.7 (2.6)	46.3 (1.6)	57.9 (0.9)	42.1 (0.9)	54.4 (3.0)	45.6 (1.5)
CDD	60.0 (0.6)	40.0 (0.2)	61.7 (10.6)	38.3 (6.0)	50.5 (6.5)	49.5 (0.0)	61.5 (9.7)	38.5 (5.5)
CWD	51.3 (3.9)	48.7 (1.4)	28.6 (1.3)	71.4 (7.2)	33.6 (2.8)	66.4 (0.0)	30.6 (1.5)	69.4 (6.6)
R10MM	58.4 (9.7)	41.6 (0.3)	52.8 (0.8)	47.2 (1.7)	42.1 (0.9)	57.9 (0.9)	53.2 (1.5)	46.8 (1.6)
R20MM	50.3 (6.2)	49.7 (2.5)	44.8 (3.0)	55.2 (0.7)	27.1 (0.0)	72.9 (0.0)	45.1 (3.3)	54.9 (0.8)
SDII	49.0 (8.6)	51.0 (1.9)	67.5 (3.0)	32.5 (1.4)	65.4 (1.9)	34.6 (3.7)	65.9 (3.5)	34.1 (1.5)
PRCPTOT	58.0 (13.0)	42.0 (0.6)	49.4 (0.7)	50.6 (2.0)	45.8 (0.9)	54.2 (0.9)	50.1 (1.8)	49.9 (1.9)

4

Table S6. Changes in extreme climate indices over the period 1998-2015. Negative means that the extreme climate indices decreases with the year (percentage of pixels with P < 0.05 in parentheses), while positive means that it increases with the year. The values in the table are the percentage of the trend.

	MF		GL		BOSV		ALL	
ID	Negative (%)	Positive (%)	Negative (%)	Positive (%)	Negative (%)	Positive (%)	Negative (%)	Positive (%)
				Extreme temperature indices				
FD	41.6 (0.7)	58.4 (0.0)	22.4 (1.0)	77.6 (4.4)	26.2 (0.9)	73.8 (15.9)	24.1 (1.0)	75.9 (4.1)
TN10P	18.9 (0.0)	81.1 (0.0)	21.2 (0.0)	78.8 (1.3)	39.3 (0.0)	60.7 (0.0)	21.2 (0.0)	78.8 (1.2)
TX10P	13.1 (0.0)	86.9 (0.0)	12.4 (0.0)	87.6 (0.9)	18.7 (0.0)	81.3 (0.0)	12.5 (0.0)	87.5 (0.8)
TN90P	21.7 (0.6)	78.3 (0.0)	46.8 (2.3)	53.2 (1.2)	17.8 (0.9)	82.2 (0.9)	44.4 (2.1)	55.6 (1.1)
TX90P	37.3 (1.1)	62.7 (1.8)	45.4 (1.9)	54.6 (3.8)	43.0 (0.9)	57.0 (19.6)	44.7 (1.8)	55.3 (3.8)
TXX	44.6 (18.7)	55.4 (0.5)	45.7 (2.0)	54.3 (3.8)	40.2 (2.8)	59.8 (16.8)	45.6 (3.4)	54.4 (3.6)
TNX	48.0 (13.3)	52.0 (3.7)	53.3 (5.0)	46.7 (3.2)	29.9 (2.8)	70.1 (13.1)	52.6 (5.7)	47.4 (3.4)
TXN	60.7 (2.4)	39.3 (0.0)	67.9 (0.9)	32.1 (0.0)	95.3 (1.9)	4.7 (0.0)	67.5 (1.0)	32.5 (0.0)
TNN	61.5 (0.0)	38.5 (0.0)	80.5 (8.0)	19.5 (0.1)	85.0 (7.5)	15.0 (0.0)	78.9 (7.4)	21.1 (0.1)
TMAXMEAN	73.7 (1.8)	26.3 (0.0)	64.1 (5.5)	35.9 (0.8)	33.6 (2.8)	66.4 (9.3)	64.6 (5.1)	35.4 (0.8)
TMINMEAN	75.4 (7.9)	24.6 (0.0)	65.8 (7.6)	34.2 (0.9)	33.6 (2.8)	66.4 (11.2)	66.3 (7.6)	33.7 (0.9)
CSDI	39.2 (0.0)	60.8 (0.1)	28.9 (0.1)	71.1 (1.0)	33.6 (0.0)	66.4 (0.0)	29.9 (0.1)	70.1 (0.9)
SU	48.9 (11.6)	51.1 (1.3)	34.6 (2.4)	65.4 (0.8)	25.2 (6.5)	74.8 (2.8)	35.7 (3.2)	64.3 (0.9)
ID	0.2 (0.0)	99.8 (0.6)	26.9 (0.5)	73.1 (3.5)	45.8 (0.0)	54.2 (0.0)	24.8 (0.4)	75.2 (3.2)
TR	45.9 (26.3)	54.1 (1.0)	36.5 (3.7)	63.5 (1.9)	28.0 (6.5)	72.0 (3.7)	37.2 (5.6)	62.8 (1.9)
				Extreme precipitation indices				
RX1DAY	50.8 (3.8)	49.2 (0.1)	56.7 (1.5)	43.3 (0.5)	53.3 (2.8)	46.7 (0.0)	56.2 (1.7)	43.8 (0.5)
RX5DAY	52.5 (0.4)	47.5 (0.3)	56.8 (1.7)	43.2 (0.7)	36.4 (0.0)	63.6 (2.8)	56.3 (1.5)	43.7 (0.7)
R95P	66.9 (3.8)	33.1 (0.3)	65.0 (2.6)	35.0 (0.9)	43.0 (0.0)	57.0 (2.8)	65.0 (2.7)	35.0 (0.9)
R99P	31.9 (0.8)	68.1 (0.9)	58.4 (1.7)	41.6 (0.8)	40.2 (0.0)	59.8 (0.9)	56.0 (1.6)	44.0 (0.8)
CDD	39.6 (0.3)	60.4 (0.2)	48.2 (0.3)	51.8 (3.0)	40.2 (0.0)	59.8 (0.9)	47.4 (0.3)	52.6 (2.8)
CWD	58.0 (1.1)	42.0 (0.2)	56.3 (2.6)	43.7 (3.5)	43.9 (1.9)	56.1 (1.9)	56.4 (2.5)	43.6 (3.2)
R10MM	73.0 (2.0)	27.0 (0.3)	60.7 (3.3)	39.3 (1.5)	36.4 (0.0)	63.6 (1.9)	61.5 (3.1)	38.5 (1.4)
R20MM	39.5 (2.6)	60.5 (1.1)	48.4 (1.1)	51.6 (0.7)	22.4 (0.9)	77.6 (0.0)	47.4 (1.2)	52.6 (0.7)
SDII	62.3 (1.9)	37.7 (2.1)	44.9 (0.9)	55.1 (1.4)	31.8 (0.9)	68.2 (2.8)	46.3 (1.0)	53.7 (1.5)
PRCPTOT	86.2 (1.7)	13.8 (0.0)	63.9 (3.1)	36.1 (1.3)	42.1 (0.0)	57.9 (4.7)	65.6 (3.0)	34.4 (1.2)

Table S7. Regression coefficients for the best regression model of climate extremes indices and the start of the growing season (SOS) for three vegetation types: mixed forest (MF), grasslands (GL), and barren or sparsely vegetated land (BOSV).

Land cover	Variable	Coefficient	Scaled coefficient	Significance
	TMINMEAN	2.62	1.54	*
	FD	0.62	1.28	*
	ID	0.31	0.92	*
	PRCPTOT	0.08	0.43	*
	TNN	-0.33	-0.32	*
MF	TR	0.63	0.31	*
	SDII	-1.78	-0.18	*
	R20MM	-1.08	-0.09	*
	CDD	0.07	0.08	*
	TNX	0.23	0.07	*
	Intercept	61.47	0	
	FD	0.82	1.31	*
	TMINMEAN	2.19	0.59	*
	TR	0.62	0.55	*
	ID	0.21	0.3	*
	TNX	0.6	0.27	*
GL	TMAXMEAN	0.84	0.22	*
	TNN	-0.57	-0.17	*
	SU	-0.31	-0.14	*
	TX90P	0.34	0.09	*
	R95P	0.03	0.07	*
	Intercept	27.6	0	
	FD	0.87	1.04	*
	TMINMEAN	3.64	0.71	*
	TR	0.98	0.43	*
BOSV	ID	0.24	0.28	*
	TNN	-0.77	-0.17	*
	SU	-0.77	-0.17	*
	TN90P	0.87	0.11	*
	Intercept	37.25	0	
	FD	0.79	1.25	*
	TMINMEAN	2.91	0.78	*
	TR	0.46	0.37	*
	ID	0.19	0.27	*
All	TNX	0.55	0.22	*
	TNN	-0.52	-0.18	*
	TX90P	0.33	0.08	*
	R95P	0.03	0.07	*
	Intercept	43.13	0	

*P < 0.05.