Supplementary materials for

Tree Radial Growth Responses to Climate and Reservoir Impoundment in Valleys in Southwestern China

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Figure S1: Growth-climate correlation relationship by stations Huaping, Jingdong and Miyi.

Table S1: Results of difference test for differential chronologies to test changes between pre- and post-impounding of reservoir.
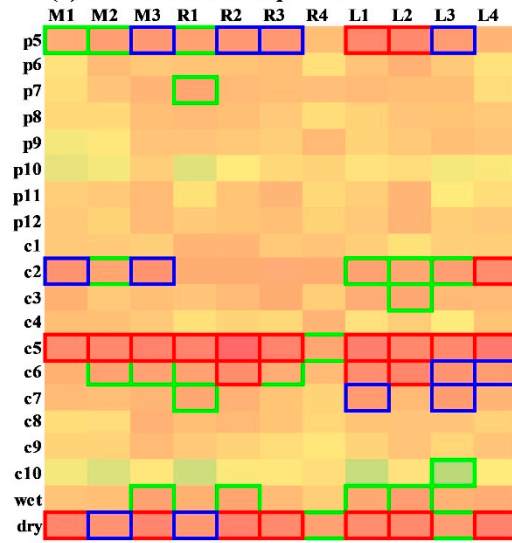
Text S1: Method of spatial comparison between chronologies.

Huaping station

(a) with precipitation amount
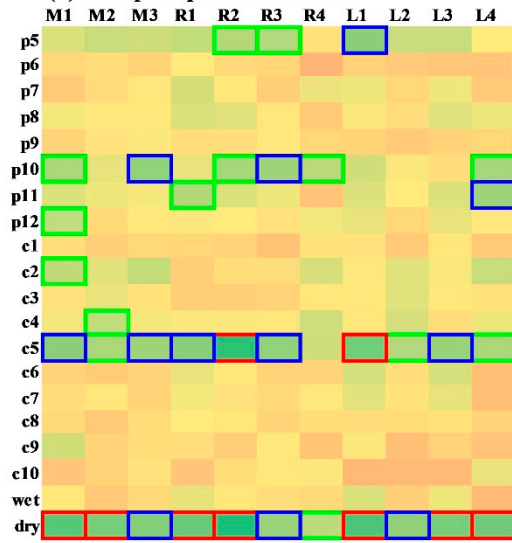
(b) with mean air temperature

(c) with relative humidity

(d) with SPEI with timescale of 6 months

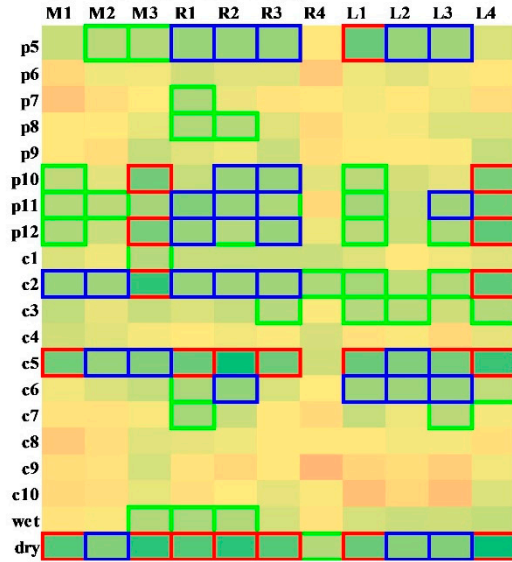Correlation coefficients

Jingdong station
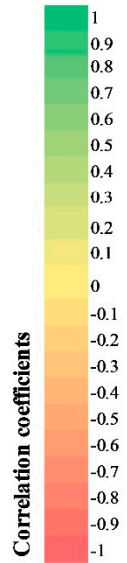
(a) with precipitation amount
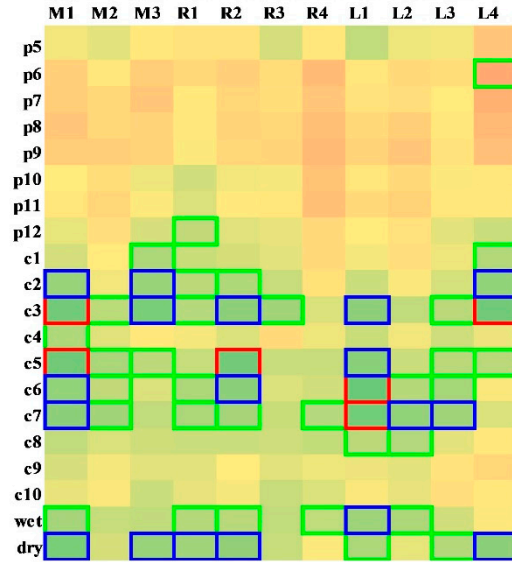
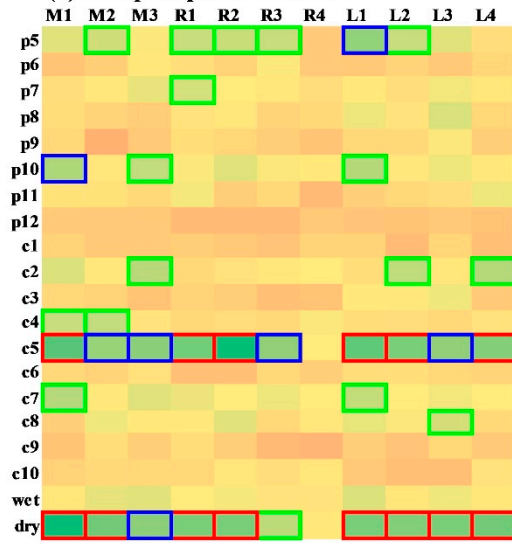(b) with mean air temperature

(c) with relative humidity

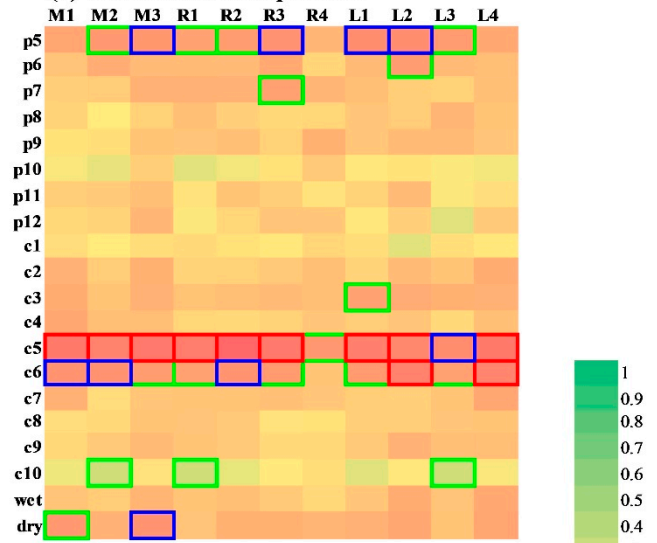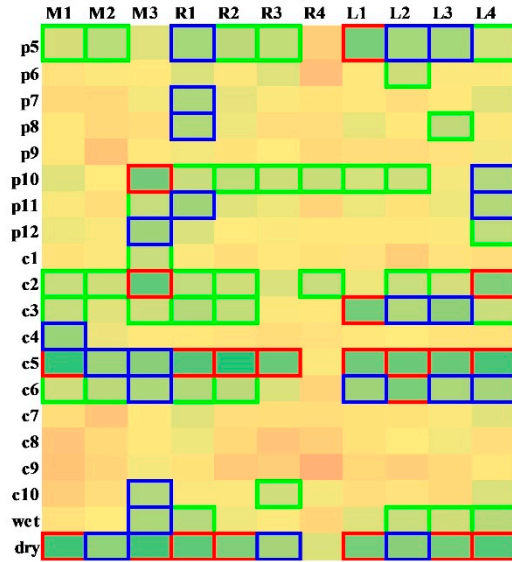(d) with SPEI with timescale of 6 months
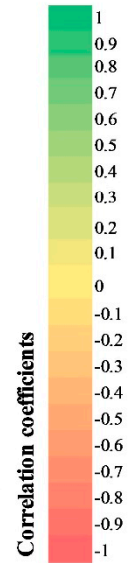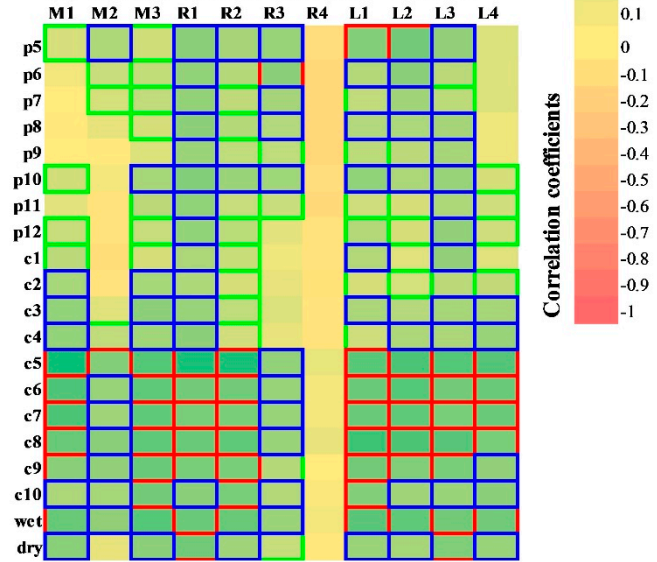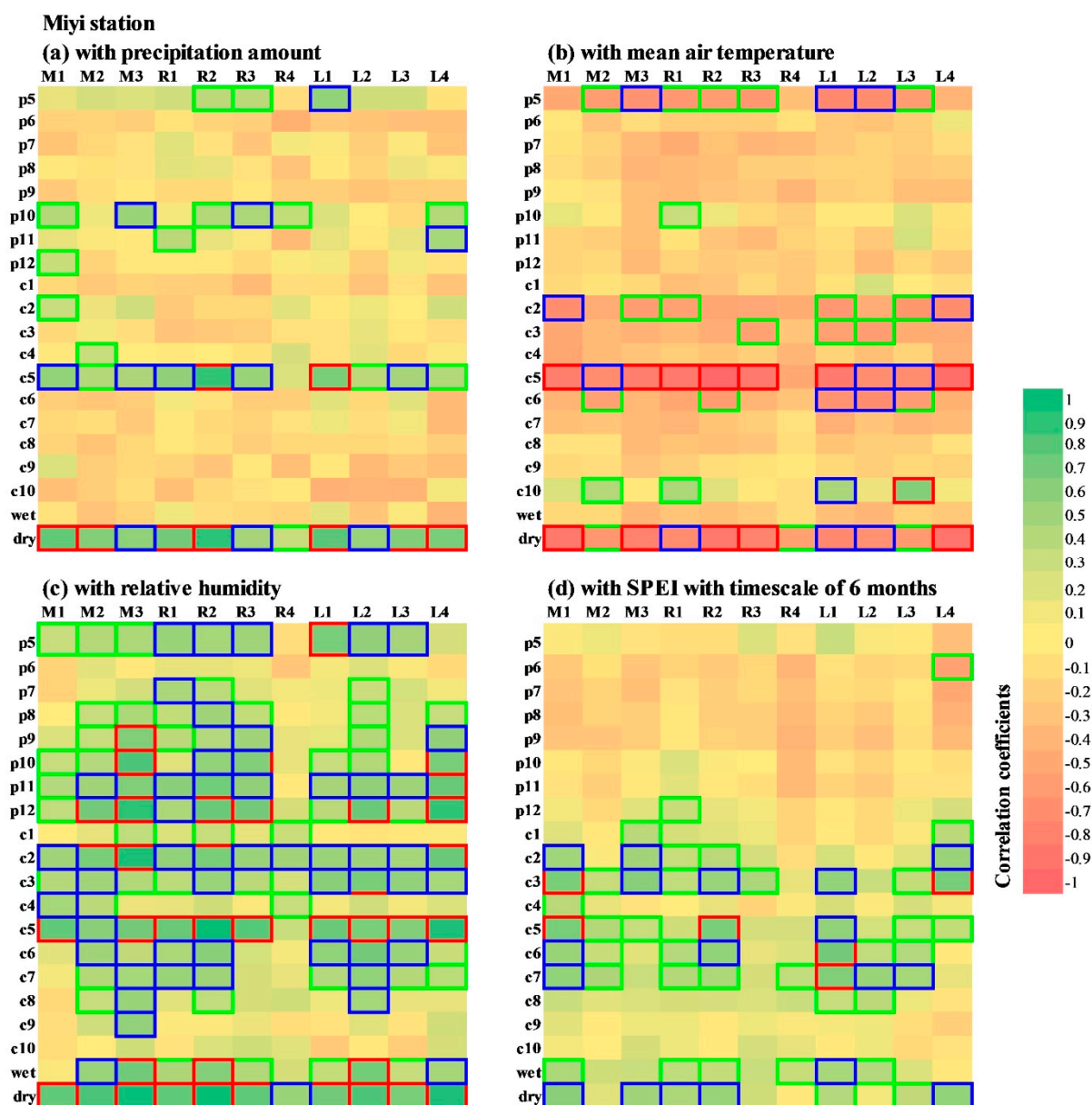
Figure S1. Growth-climate correlation relationship by stations Huaping (the upper four panels), Jingdong (the middle four panels) and Miyi (the lower four panels). The horizontal and vertical labels in each panels mean tree-ring sites and months, respectively. "p", "c", "wet" and "dry" refer to previous year, current years, wet season and dry season, respectively. (a)~(d) indicate that the tree-ring chronology is correlated with precipitation amount, mean air temperature, relative humidity, and SPEI with timescale of 6 months, respectively. The green, blue and red frames represent significance levels of 0.05, 0.01 and 0.001.

Table S1. Results of difference test for differential chronologies to test changes between pre- and post-impounding of reservoir. DF1 and DF2 represent the degrees of freedom of numerator and denominator in variance test, respectively. DF refers to the equal variance not assumed by Welch correction. * denotes the value is less than 0.05.

Differential between chronologies	Difference test for variance				Difference test for mean value		
	F	DF1	DF2	Prob>F	t Statistic	DF	Prob>|t|
M2-M1	0.91	6	24	0.99	-0.18	10.0	0.86
M3-M1	1.01	6	24	0.88	2.30	9.6	0.05*
M3-M2	0.61	6	24	0.56	5.23	12.1	0.00*
R2-R1	1.37	12	18	0.53	-0.89	23.2	0.38
R3-R1	1.59	12	18	0.36	1.08	21.8	0.29
R3-R2	0.92	12	18	0.91	2.06	26.7	0.05*
L2-L1	1.86	26	4	0.58	4.00	7.1	0.01*
L3-L1	11.71	26	4	0.03*	2.19	23.3	0.04*
L4-L1	2.10	26	4	0.50	1.05	7.5	0.33
L3-L2	1.92	26	4	0.56	-1.79	7.2	0.11
L4-L2	21.01	26	4	0.01*	-4.12	28.7	0.00*
L4-L3	2.55	26	4	0.38	-0.13	8.4	0.90

Text S1. Method of spatial comparison between TWI chronologies

Here are the steps of performing spatial comparison by paired t-test for CED between TWI chronologies, taking the Manwan reservoir as an example. First, time span is ensured. Manwan impounded earliest among the three reservoirs, the initial time is the beginning time of common time span of tree-ring chronology selected, i.e., the year of 1986. The end time depends on the impounding time following that of Manwan., i.e., the year of 1998 when Ertan impounded. Then the time span is 1986 to 1998. Secondly, sub-chronologies are divided for three reservoirs. Manwan was impounded in 1993, then all the 11 chronologies during 1986~1998 were divided into two sub-chronologies with first period in 1986~1992 and second period in 1993~1998. Thirdly, we calculated the Euclidean distances between sub-chronologies in same period. For any period, we can get a matrix of distances reflecting the distance of any two sub-chronologies. Fourthly, CED is generated by applying the matrix of second period minus the matrix of first period. Fifthly, three groups for t-test are extracted. Only the CEDs reflecting changes between different reservoirs are extracted from the matrix, which produces three groups of CED. The first group aggregates CED between Manwan and Ertan, the second group denotes that between Manwan and Longkaikou, and the third group comes CED between Ertan and Longkaikou. The first and second groups accumulates CEDs having potential change from reservoir impounding, which serves as experimental groups. The third group represents CEDs without reservoir impounding or can be regarded as reference group. Lastly, paired t-test is performed between experimental group and reference group using normal statistical program such as Origin software. Considering the tree growth responses to environmental change might have elevation effect, a pair in paired t-test should be the same types of site combinations. In other words, the numbers in site names should be consistent. For example, one in pair is CED of sites R1-M1 from experimental group, then its paired one should be that of R1-L1 from reference group; one is L3-M1, then the other is R3-M1.