





Tree-ring based climate reconstruction and growth–climate analysis of *Pinus kesiya* Royle ex Gordon in Doi Khuntan National Park, northern Thailand

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Electronic Supplementary Material (ESM)

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Table S1. Correlation coefficient (r) between the residual chronology of *Pinus kesiya* at Doi Khuntan National Park with the monthly, seasonal, and annual climatic variables

Period	Climatic variables ³									
	<i>RF</i> (mm)	<i>MT</i> (°C)	<i>MMT</i> (°C)	<i>MMaT</i> (°C)	<i>EMT</i> (°C)	<i>EMaT</i> (°C)	<i>RH</i> (%)	<i>EQ_SST</i>	<i>EQ_SOI</i>	
Monthly data	Jan	0.11	-0.12	0.01	-0.19	-0.07	-0.18	0.20	-0.32	0.33
	Feb	-0.11	-0.09	0.04	-0.16	0.05	0.05	0.30	-0.30	0.17
	Mar	0.39	-0.15	0.03	-0.22	0.03	-0.17	0.31	-0.27	0.29
	Apr	0.21	-0.42	-0.27	-0.39	-0.22	-0.43	0.41	-0.23	0.21
	May	0.27	-0.29	-0.30	-0.24	-0.15	-0.23	0.29	-0.18	-0.05
	Jun	0.16	-0.40	-0.30	-0.36	-0.27	-0.42	0.40	-0.14	0.14
	Jul	0.05	-0.32	-0.28	-0.29	-0.20	-0.24	0.18	-0.13	0.07
	Aug	0.01	-0.25	-0.32	-0.16	-0.22	-0.12	0.06	-0.09	-0.01
	Sep	0.15	-0.24	-0.16	-0.16	-0.12	-0.20	0.31	-0.07	-0.03
	Oct	0.11	-0.17	-0.13	-0.10	-0.02	-0.09	0.18	-0.05	0.06
	Nov	0.04	0.06	0.07	0.01	0.21	0.00	0.18	-0.04	0.00
	Dec	-0.13	-0.09	0.03	-0.18	-0.06	-0.03	0.10	-0.04	-0.01
	pJan	0.15	0.04	0.11	-0.01	0.06	-0.01	0.12	0.09	-0.20
	pFeb	-0.11	-0.13	-0.13	-0.01	-0.16	0.02	-0.01	0.09	-0.15
	pMar	0.13	-0.01	-0.04	0.03	-0.04	-0.06	0.05	0.06	-0.04
	pApr	-0.10	0.08	-0.04	0.17	-0.19	-0.04	-0.13	0.01	-0.10
	pMay	0.08	0.05	0.07	0.08	-0.02	0.21	-0.06	0.02	0.15
	pJun	-0.08	0.09	0.08	0.12	0.04	0.00	-0.09	-0.11	0.12
	pJul	0.26	-0.17	-0.03	-0.16	-0.03	-0.17	0.24	-0.21	0.13
	pAug	0.03	-0.24	-0.09	-0.21	-0.14	-0.24	0.29	-0.25	0.17
	pSep	-0.01	-0.23	-0.07	-0.17	-0.11	-0.01	0.12	-0.24	0.21
	pOct	0.08	-0.16	0.02	-0.19	-0.08	-0.09	0.17	-0.30	0.15
	pNov	0.04	-0.06	0.09	-0.15	0.07	-0.09	0.24	-0.29	0.33
	pDec	0.14	0.01	0.14	-0.09	0.02	0.00	0.29	-0.30	0.26
Seasonal data	Apr–Oct	0.31	-0.43	-0.34	-0.37	-0.26	-0.40	0.45	-0.13	0.06
	Nov–Mar	-0.03	-0.03	0.01	-0.06	0.06	-0.09	0.16	-0.04	0.03
	Apr–Jul	0.31	-0.47	-0.35	-0.43	-0.30	-0.45	0.45	-0.18	0.12
	Aug–Oct	0.14	-0.25	-0.22	-0.16	-0.13	-0.16	0.22	-0.07	0.01
	pApr–pOct	0.09	-0.07	-0.03	-0.03	-0.16	-0.04	0.04	-0.18	0.15
	pNov–pMar	0.31	-0.09	0.09	-0.20	0.03	-0.08	0.33	-0.30	0.32
	pApr–pJul	0.10	-0.03	0.02	0.10	-0.12	0.03	-0.05	-0.08	0.10
pAug–pOct	0.04	-0.24	-0.06	-0.21	-0.15	-0.15	0.25	-0.27	0.19	
Annual data	Jan–Dec ¹	0.33	-0.31	-0.13	-0.32	-0.08	-0.29	0.45	-0.18	0.17
	Apr–Mar ²	0.30	-0.26	-0.14	-0.25	-0.07	-0.29	0.36	-0.09	0.05
	pJan–pDec	0.13	-0.06	0.02	-0.05	-0.08	-0.04	0.12	-0.15	0.11
	pApr–pMar	0.17	-0.10	0.05	-0.13	-0.05	-0.07	0.22	-0.25	0.25

^{1,2}annual cycles, with the first month of each cycle defined by either the calendar year or the beginning of the wet season; orange – a significant correlation ($P < 0.05$); green – a highly significant correlation ($P < 0.01$); the prefix ‘p’ – the previous year; *RF* – rainfall; *MT* – mean temperature; *MMT* – mean minimum temperature; *MMaT* – mean maximum temperature; *EMT* – extreme minimum temperature; *EMaT* – extreme maximum temperature; *RH* – relative humidity; *EQ_SST* – equatorial sea surface temperature; *EQ_SOI* – equatorial southern oscillation index

Table S2. Correlation coefficient (r) between the stabilised false ring frequencies of *Pinus kesiya* at Doi Khuntan National Park with the monthly, seasonal, and annual climatic variables

Period	Climatic variables									
	<i>RF</i> (mm)	<i>MT</i> (°C)	<i>MMT</i> (°C)	<i>MMaT</i> (°C)	<i>EMT</i> (°C)	<i>EMaT</i> (°C)	<i>RH</i> (%)	<i>EQ_SST</i>	<i>EQ_SOI</i>	
Monthly data	Jan	0.12	-0.26	-0.17	-0.36	-0.03	-0.24	0.15	0.01	0.03
	Feb	-0.02	-0.23	-0.18	-0.30	-0.23	-0.28	0.18	0.03	0.00
	Mar	0.09	-0.44	-0.20	-0.48	-0.34	-0.45	0.27	0.04	-0.14
	Apr	-0.04	-0.35	-0.42	-0.26	-0.49	-0.29	0.00	0.05	-0.19
	May	-0.31	0.05	-0.17	0.05	0.01	-0.04	-0.22	0.11	-0.35
	Jun	-0.16	-0.06	-0.18	-0.10	-0.04	-0.05	-0.25	0.17	-0.31
	Jul	-0.22	0.09	-0.04	0.02	-0.16	0.21	-0.45	0.15	-0.29
	Aug	0.16	0.00	-0.19	-0.09	-0.12	0.09	-0.25	0.15	-0.31
	Sep	0.02	-0.16	0.11	-0.29	0.08	-0.28	0.00	0.19	-0.34
	Oct	0.04	-0.03	-0.03	-0.15	0.04	-0.17	0.02	0.17	-0.30
	Nov	0.00	0.04	0.01	0.00	-0.01	-0.10	-0.04	0.18	-0.24
	Dec	0.00	0.00	-0.03	-0.11	-0.05	-0.08	-0.10	0.17	-0.19
	pJan	-0.01	-0.31	-0.29	-0.25	-0.22	-0.28	0.00	-0.12	-0.04
	pFeb	0.09	-0.26	-0.24	-0.22	-0.16	-0.38	-0.02	-0.09	-0.02
	pMar	0.01	-0.27	-0.37	-0.14	-0.32	-0.04	0.00	-0.09	-0.10
	pApr	-0.25	-0.08	-0.26	0.03	-0.27	-0.11	-0.21	-0.08	0.07
	pMay	-0.21	-0.04	-0.14	-0.05	0.03	-0.18	-0.13	-0.06	0.10
	pJun	-0.07	-0.12	-0.30	-0.08	-0.09	0.17	-0.17	-0.07	0.14
	pJul	0.06	-0.22	-0.32	-0.25	-0.16	0.00	-0.09	-0.11	-0.06
	pAug	-0.14	-0.17	-0.33	-0.19	-0.20	-0.19	-0.07	-0.16	0.02
	pSep	0.01	-0.23	0.00	-0.20	-0.02	-0.19	-0.03	-0.13	-0.09
	pOct	0.15	-0.23	-0.10	-0.37	-0.09	-0.25	0.15	-0.10	0.11
	pNov	0.03	-0.16	-0.08	-0.24	-0.14	-0.22	0.03	-0.06	-0.06
	pDec	0.33	-0.13	-0.11	-0.18	0.00	-0.30	0.13	-0.06	-0.11
Seasonal data	Apr–Oct	-0.17	-0.11	-0.15	-0.16	-0.17	-0.11	-0.26	0.16	-0.38
	Nov–Mar	0.04	-0.05	-0.10	-0.10	-0.15	-0.14	-0.11	0.17	-0.25
	Apr–Jul	-0.35	-0.11	-0.30	-0.10	-0.34	-0.07	-0.26	0.12	-0.36
	Aug–Oct	0.13	-0.07	0.04	-0.20	0.05	-0.13	-0.12	0.17	-0.34
	pApr–pOct	-0.15	-0.19	-0.23	-0.19	-0.19	-0.15	-0.17	-0.11	0.04
	pNov–pMar	0.22	-0.32	-0.20	-0.40	-0.20	-0.37	0.19	-0.01	-0.07
	pApr–pJul	-0.21	-0.13	-0.30	-0.09	-0.21	-0.05	-0.21	-0.08	0.07
pAug–pOct	-0.01	-0.24	-0.09	-0.29	-0.11	-0.27	0.01	-0.13	0.01	
Annual data	Jan–Dec ¹	-0.14	-0.21	-0.18	-0.28	-0.21	-0.23	-0.07	0.14	-0.31
	Apr–Mar ²	-0.16	-0.09	-0.14	-0.15	-0.18	-0.14	-0.22	0.17	-0.34
	pJan–pDec	-0.11	-0.29	-0.33	-0.25	-0.28	-0.26	-0.09	-0.11	-0.02
	pApr–pMar	-0.09	-0.30	-0.24	-0.33	-0.23	-0.29	0.02	-0.07	-0.01

^{1,2}annual cycles, with the first month of each cycle defined by either the calendar year or the beginning of the wet season; orange – a significant correlation ($P < 0.05$); green – a highly significant correlation ($P < 0.01$); the prefix ‘p’ – the previous year; *RF* – rainfall; *MT* – mean temperature; *MMT* – mean minimum temperature; *MMaT* – mean maximum temperature; *EMT* – extreme minimum temperature; *EMaT* – extreme maximum temperature; *RH* – relative humidity; *EQ_SST* – equatorial sea surface temperature; *EQ_SOI* – equatorial southern oscillation index