

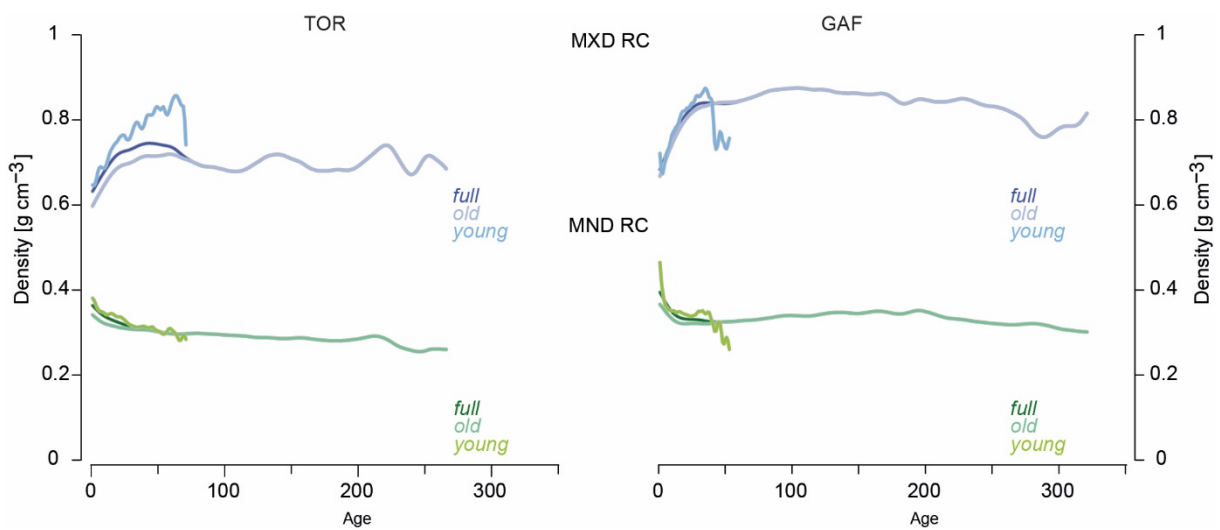
1 Supplements

2 **Table S1:** Descriptive statistics for the ADS detrended chronologies by site and correlation of
 3 the density chronologies, asterisk indicating significance ($p < 0.01$).

	Parameter	EPS	Rbar	SD Rbar	Mean AR1	SD AR1	TRD	EWD	MND	LWD	
TOR	TRD	0.97	0.56	0.19	0.26	0.19					5
	EWD	0.96	0.48	0.23	0.37	0.22	0.74*				
	MND	0.95	0.41	0.22	0.32	0.21	0.52*	0.90*			6
	LWD	0.98	0.63	0.22	0.18	0.22	0.70*	0.19*	-0.08		7
	MXD	0.98	0.64	0.23	0.20	0.22	0.68*	0.17*	-0.10	0.99*	8
GAF	TRD	0.96	0.48	0.17	0.31	0.24					9
	EWD	0.94	0.42	0.15	0.43	0.20	0.86*				
	MND	0.92	0.34	0.14	0.39	0.22	0.74*	0.94*			10
	LWD	0.96	0.45	0.19	0.34	0.17	0.64*	0.36*	0.24*		11
	MXD	0.96	0.46	0.20	0.34	0.17	0.60*	0.31*	0.17*	0.99*	12

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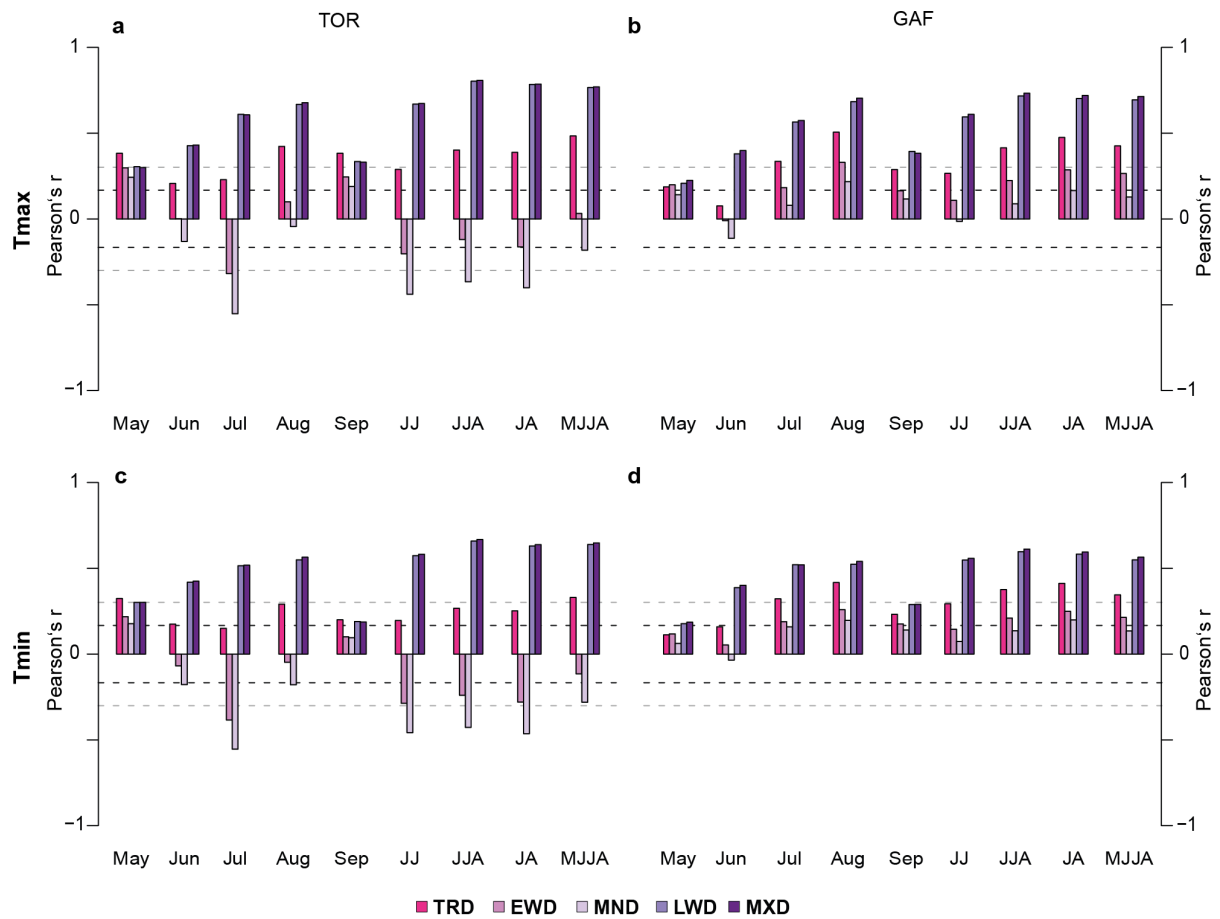
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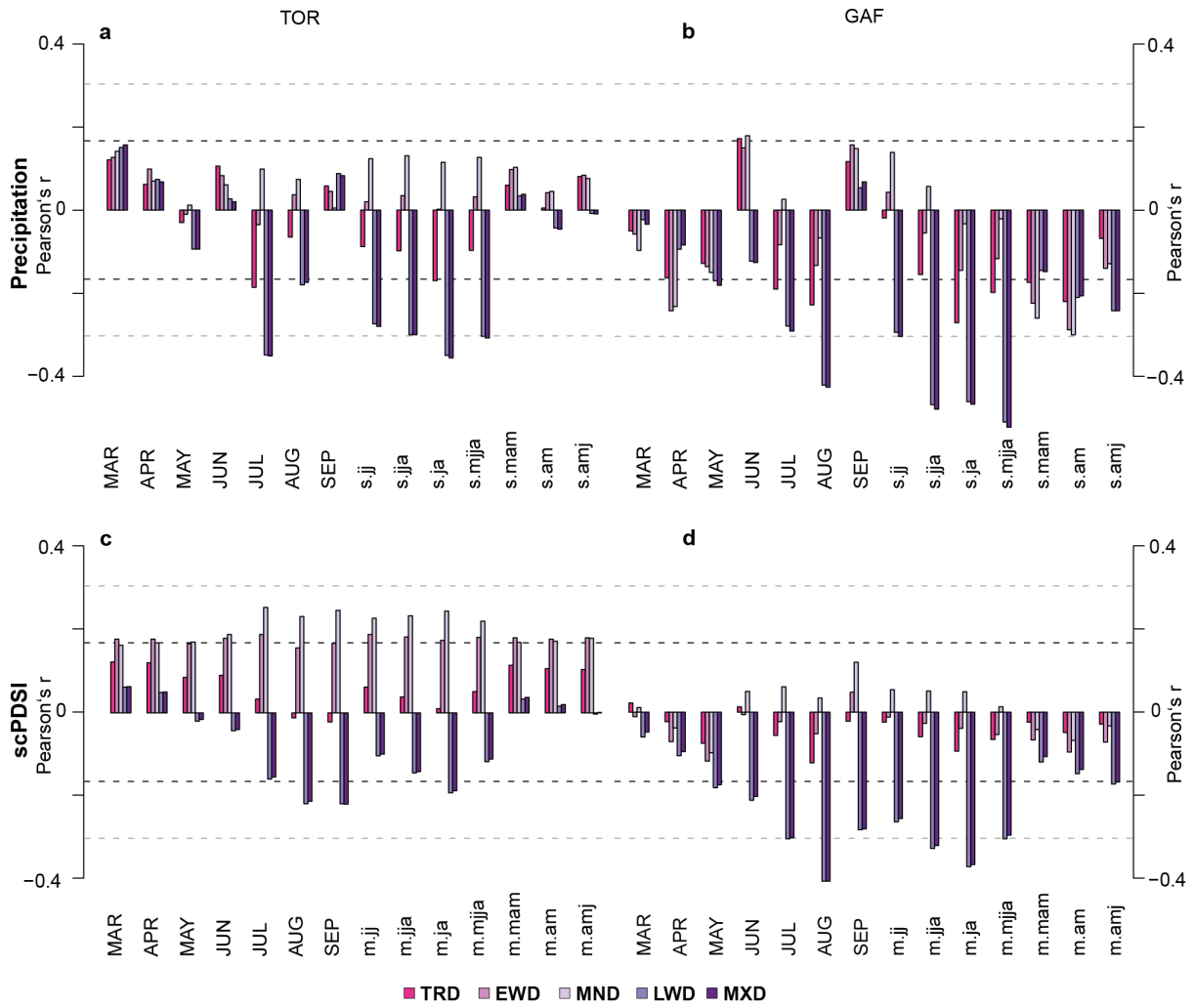
16 **Fig. S1:** Regional curves for TOR on the left and GAF on the right with MND (green hues)
 17 and MXD (blue hues) for the *full*, *old*, and *young* chronologies.

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Fig. S2 Temperature sensitivity of tree-ring density parameters. **a-b**, Correlations of the *full* TOR and GAF chronologies with maximum monthly and seasonal temperatures from 1902-2020. Dashed black lines indicate $p < 0.05$ significance, and dashed grey lines indicate significance adjusted using Bonferroni correction. **c-d**, Correlations of the *full* TOR and GAF chronologies with minimum monthly and seasonal temperatures from 1902-2020. Dashed black lines indicate $p < 0.05$ significance, and dashed grey lines indicate significance adjusted using Bonferroni correction



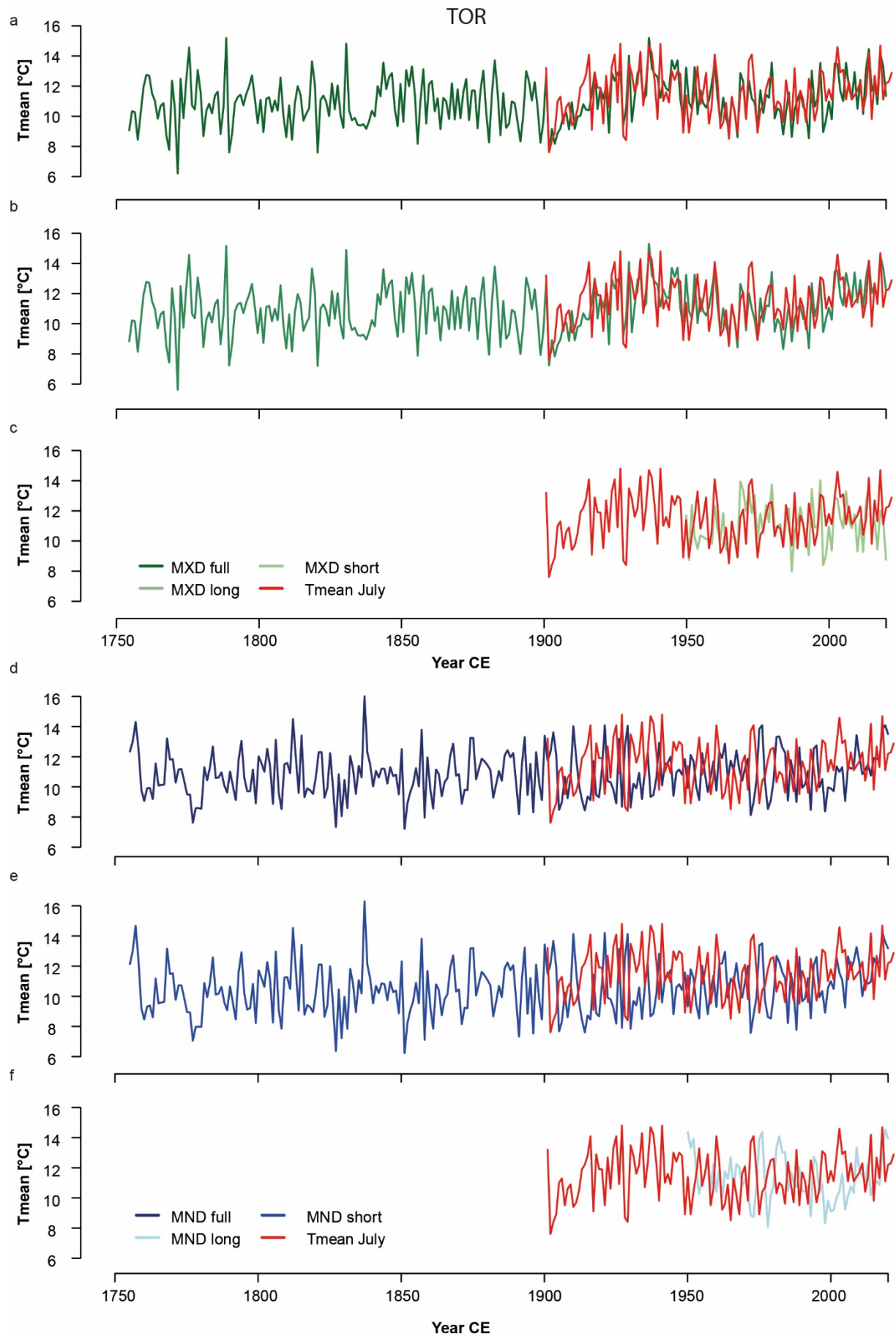
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30 **Fig. S3** Climate response of density parameters. **a-b**, Correlations of the *full* TOR and GAF
 31 chronologies with monthly and seasonal ($s = \text{sum}$) precipitation from 1902-2020. Dashed black
 32 lines indicate $p < 0.05$ significance, and dashed grey lines indicate significance adjusted using
 33 Bonferroni correction. **c-d**, Correlations of the *full* TOR and GAF chronologies with monthly
 34 and seasonal ($m = \text{mean}$) scPDSI from 1902-2020. Dashed black lines indicate $p < 0.05$
 35 significance, and dashed grey lines indicate significance adjusted using Bonferroni correction

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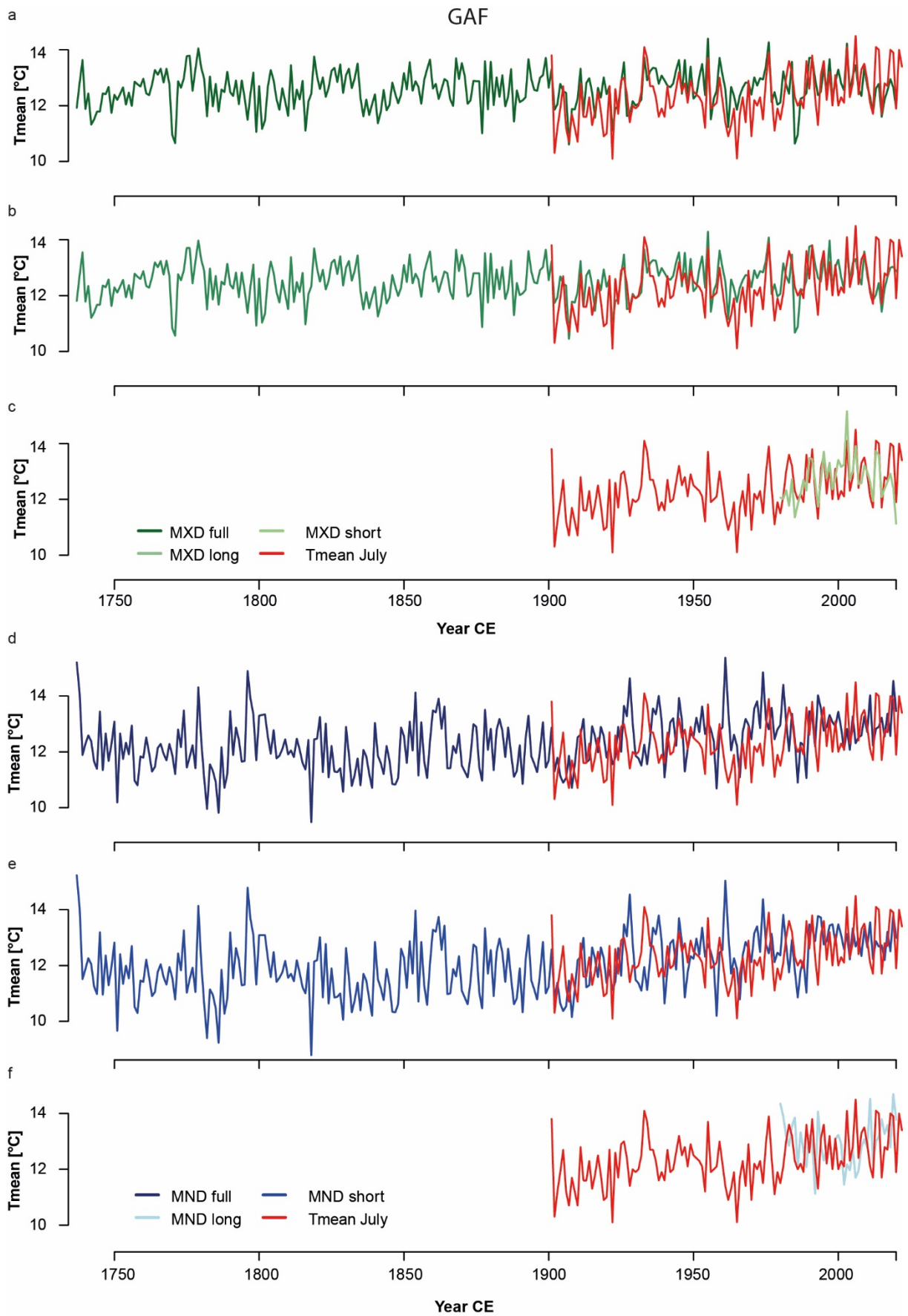
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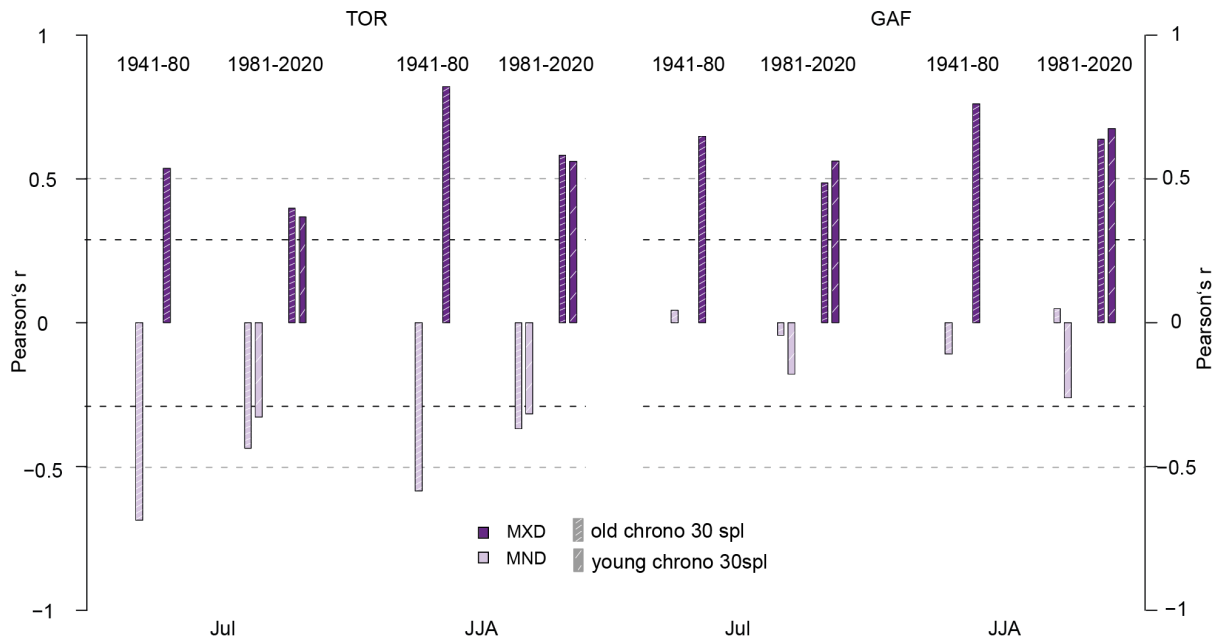
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Fig S4: July mean temperature and TOR MXD ADS full (a), long (c) and short (d) and MND ADS full (d), long (e) and short (f) chronologies, all scaled to 1981-2020.



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43 **Fig S5:** July mean temperature and GAF MXD ADS full (a), long (c) and short (d) and MND
 44 ADS full (d), long (e) and short (f) chronologies, all scaled to 1981-2020.

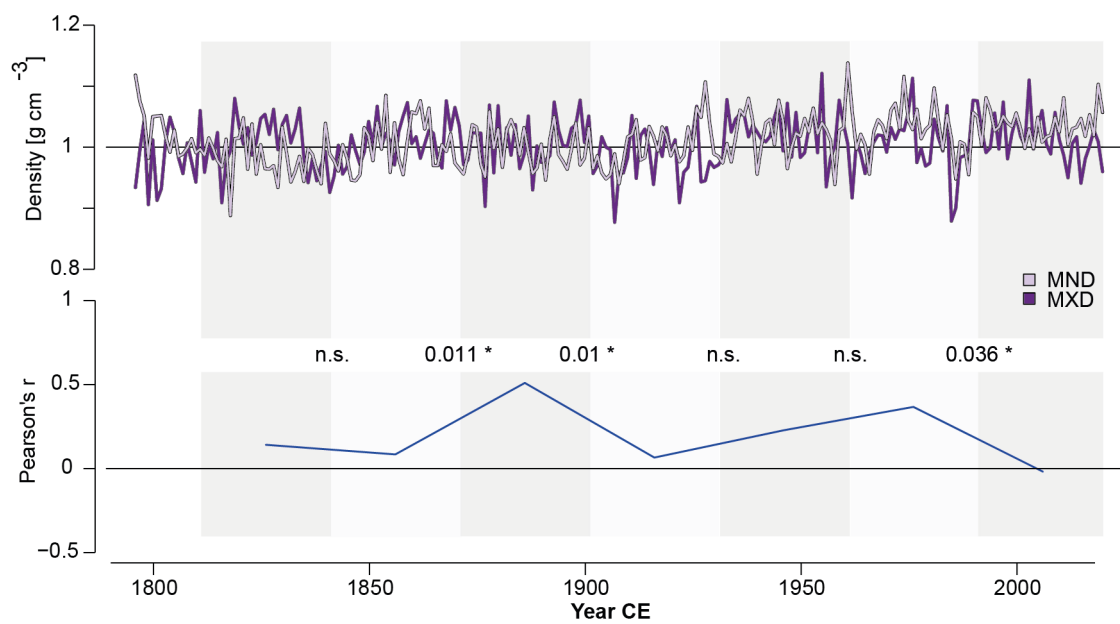


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46 **Fig. S6** Influence of tree age on climate signals after 30-year spline detrending of chronologies
 47 and instrumental data. Correlation of MND (light pink) and MXD (purple) *full* (blank), *old*
 48 (*tight hatch*) and *young* (*loose hatch*) chronologies with July and June-July-August (JJA)
 49 temperatures. Dashed black lines indicate $p < 0.05$ significance and dashed grey lines after
 50 adjusted using the Bonferroni correction

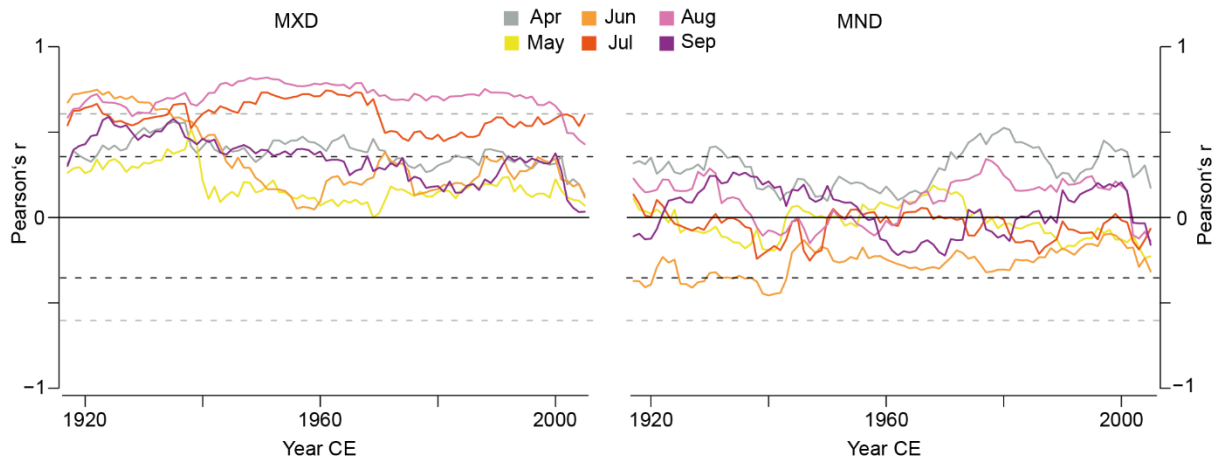
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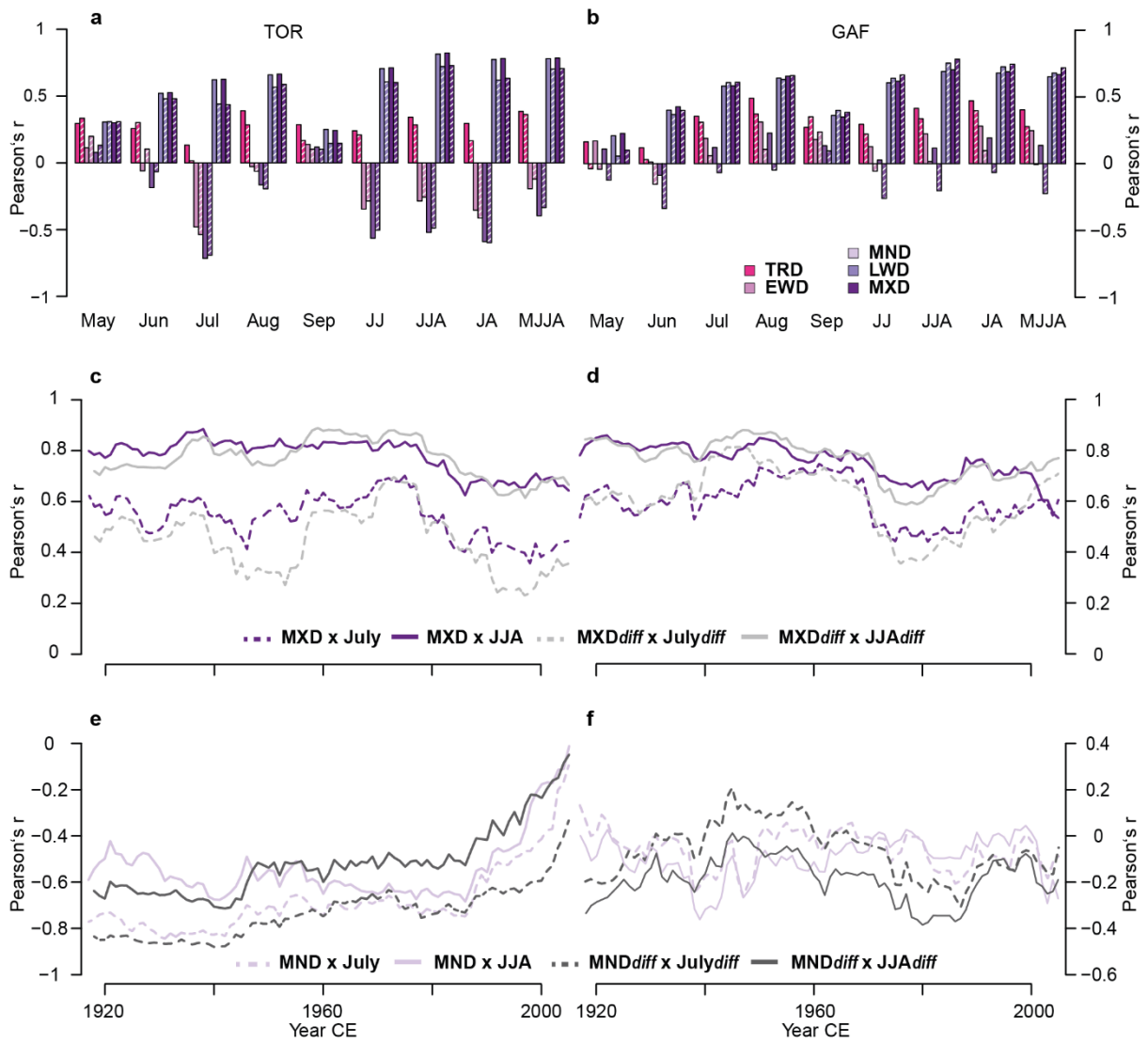


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54 **Fig. S7** Comparison of *full* GAF MND and MXD detrended chronologies (top panel).
 55 Correlation of 30-year intervals of the *full* GAF MND and MXD chronologies (in blue) and p-
 56 values (black numbers) assessing the significance of changes between successive 30-year
 57 intervals, asterisk indicating significant ($p < 0.05$) change between two periods (bottom panel)
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 63 **Fig. S8** Seasonal fidelity of *full* GAF MXD and MND temperature correlation. Moving
 64 correlation (31-year window moved by 1 year) of MXD (top) and MND (bottom) with a mean
 65 temperature of single months from 1902–2020. Dashed black lines indicate $p < 0.05$
 66 significance, and dashed grey lines indicate significance adjusted using Bonferroni correction



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68 **Fig. S9** Temperature sensitivity of density parameters. **a.** Monthly and seasonal correlations of

69 the *full* TOR original (first difference (hatched)) density chronologies and mean temperature

70 from 1902 to 2020 (1903 to 2020). **b.** Monthly and seasonal correlations of the GAF original

71 (first difference (hatched)) density chronologies and mean temperature from 1902 to 2020

72 (1903 to 2020). **c.** Moving correlation (31-year windows shifted by 1 year) of the TOR MXD

73 original (purple) and MXD first difference (grey) with mean July temperature (dashed line),

74 and mean June-July-August temperature (solid line) from 1902 (1903) to 2020. **d.** Moving

75 correlation (31-year windows shifted by 1 year) of the *full* GAF MXD original (purple) and

76 MXD first difference (grey) with mean July temperature (dashed line), and mean June-July-

77 August temperature (solid line) from 1902 (1903) to 2020. **e.** Moving correlation (31-year

78 windows shifted by 1 year) of the TOR MND original (light pink) and MXD first difference
79 (grey) with mean July temperature (dashed line), and mean June-July-August temperature
80 (solid line) from 1902 (1903) to 2020. f. Moving correlation (31-year windows shifted by 1
81 year) of the GAF MND original (light pink) and MXD first difference (grey) with mean July
82 temperature (dashed line), and mean June-July-August temperature (solid line) from 1902
83 (1903) to 2020

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88 **Table S2:** Descriptive statistics for the ADS detrended *young* chronologies by site.

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	Parameter	EPS	Rbar	SD Rbar	Mean AR1	SD AR1
TOR	TRD	0.931	0.475	0.198	0.228	0.222
	EWD	0.929	0.416	0.209	0.294	0.227
	MND	0.943	0.548	0.239	0.062	0.194
	LWD	0.922	0.374	0.219	0.297	0.208
	MXD	0.945	0.532	0.264	0.099	0.200
GAF	TRD	0.848	0.343	0.182	0.147	0.234
	EWD	0.822	0.326	0.163	0.299	0.201
	MND	0.817	0.301	0.196	0.259	0.200
	LWD	0.846	0.267	0.144	0.255	0.226
	MXD	0.806	0.302	0.199	0.271	0.208

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