

Supplementary information (Figures S1-S6; Tables S1-S3)

**Distinct climate effects on Dahurian larch growth at an Asian temperate-boreal forest
ecotone and nearby boreal sites**

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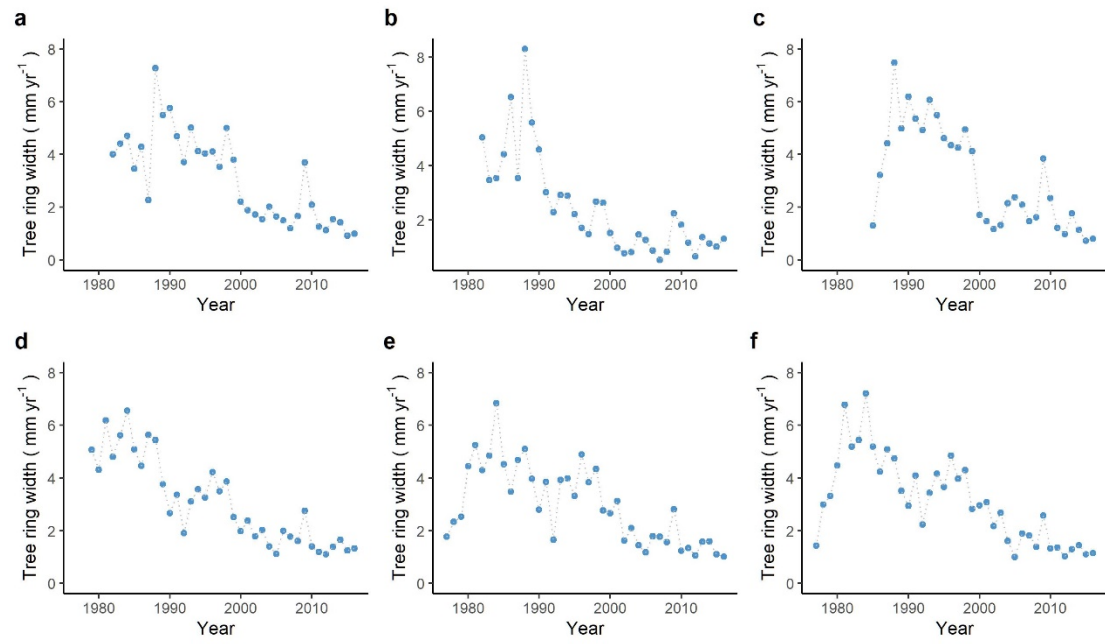


Figure S1. Temporal variations of crossdated tree ring width (mm yr⁻¹) for the six Dahurian larch plantations at the southern boreal sites (a–c for stands 1–3) and the boreal-temperate forest ecotone (d–f for stands 4–6).

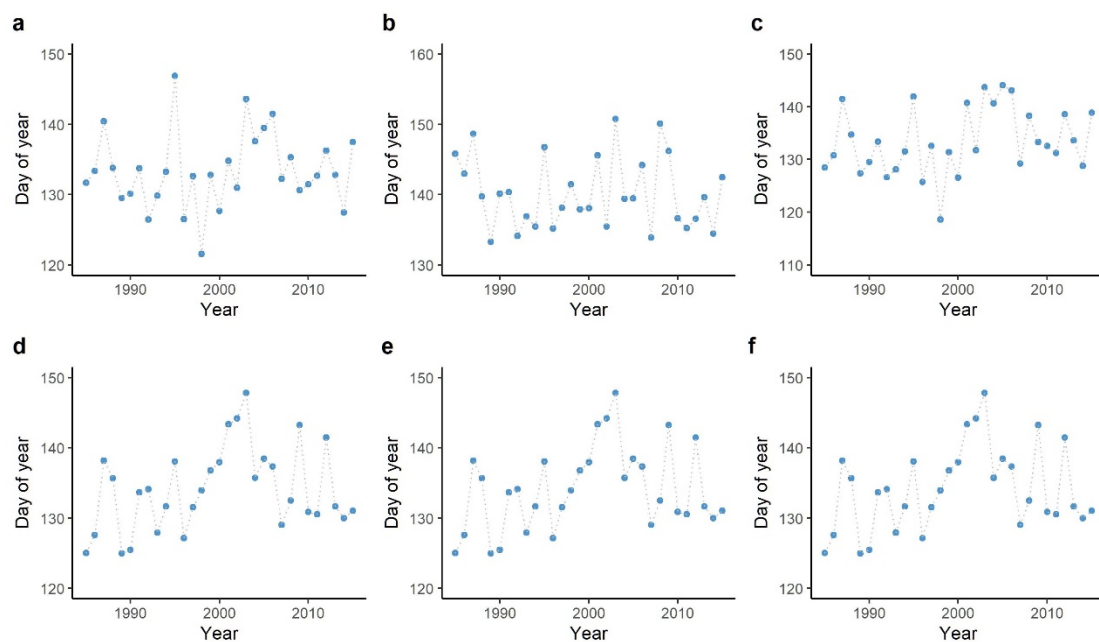


Figure S2. Three-decadal variations in satellite-derived beginning dates of growing season for the six Dahurian larch plantations at the southern boreal sites (a–c for stands 1–3) and the boreal-temperate forest ecotone (d–f for stands 4–6).

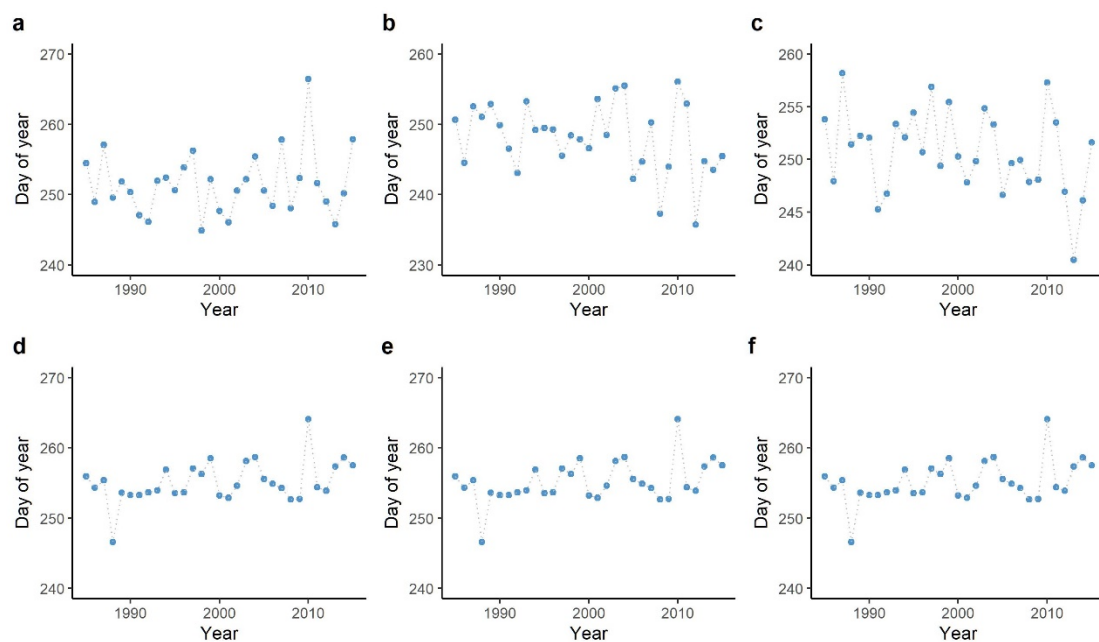


Figure S3. Three-decadal variations in satellite-derived ending dates of growing season for the six Dahurian larch plantations at the southern boreal sites (a–c for stands 1–3) and the boreal-temperate forest ecotone (d–f for stand 4–6).

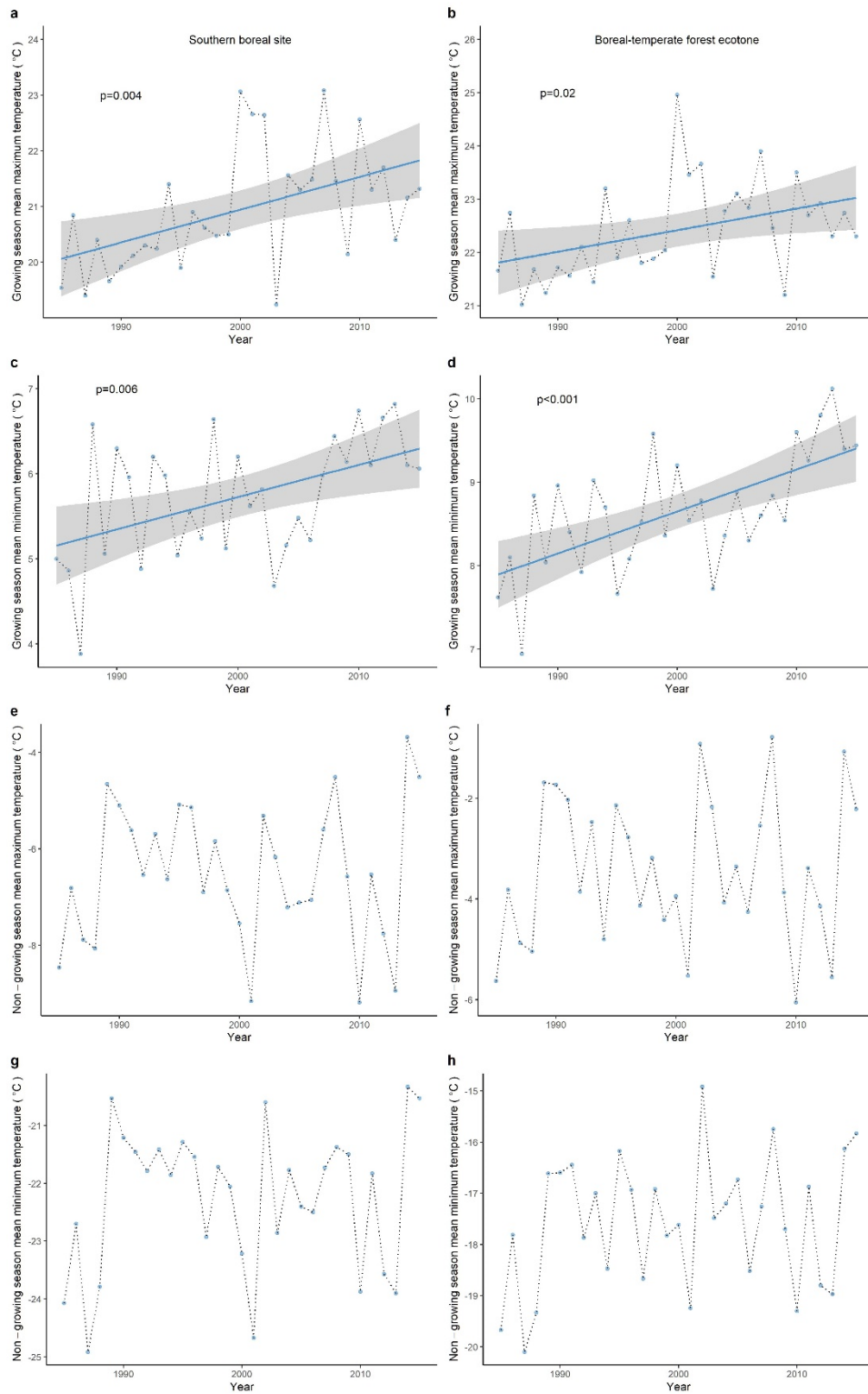


Figure S4. Three-decadal variations (1985–2015) of growing-season mean daytime maximum temperature (a, b), growing-season mean nighttime minimum temperature (c, d), non-growing-season mean daytime maximum temperature (e, f), and non-growing-season mean night minimum temperature (g, h) at the southern boreal sites and the boreal-temperate forest ecotone.

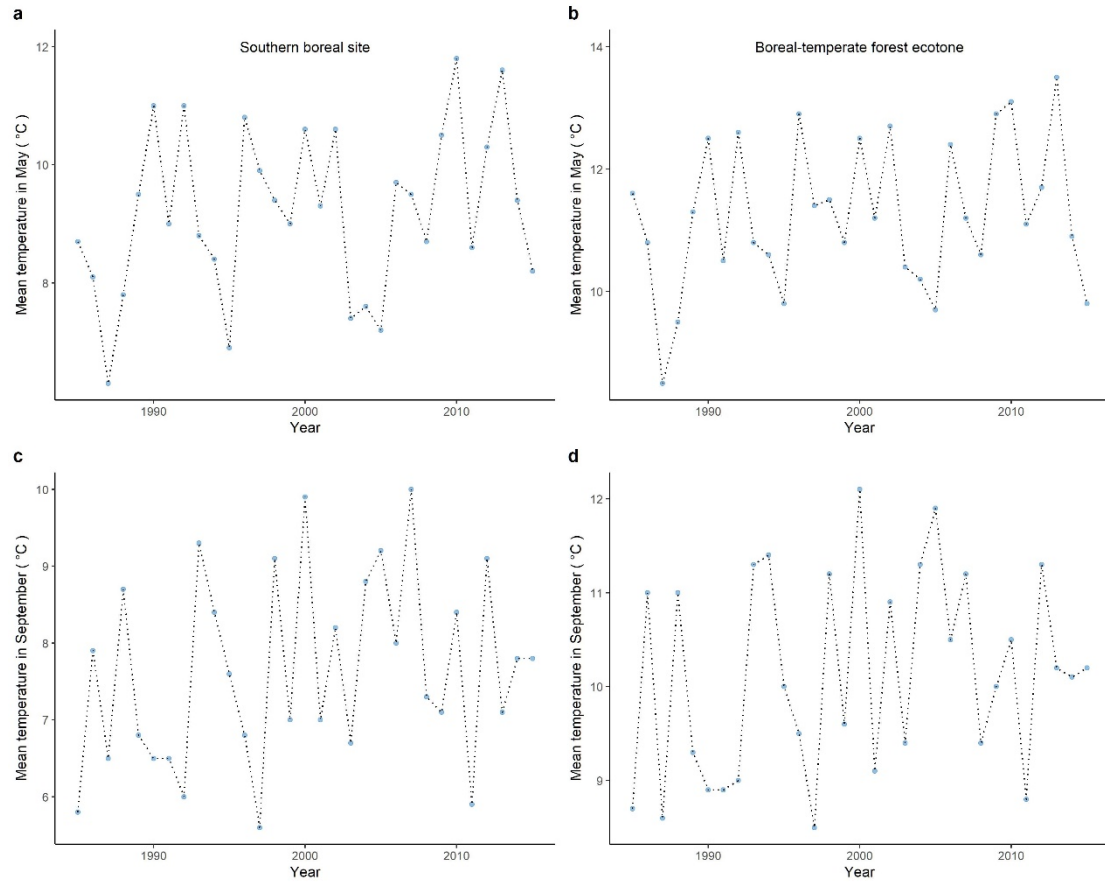


Figure S5. Three-decadal variations (1985–2015) of monthly mean temperature in May (a, b) and September (c, d) at the southern boreal sites and the boreal-temperate forest ecotone

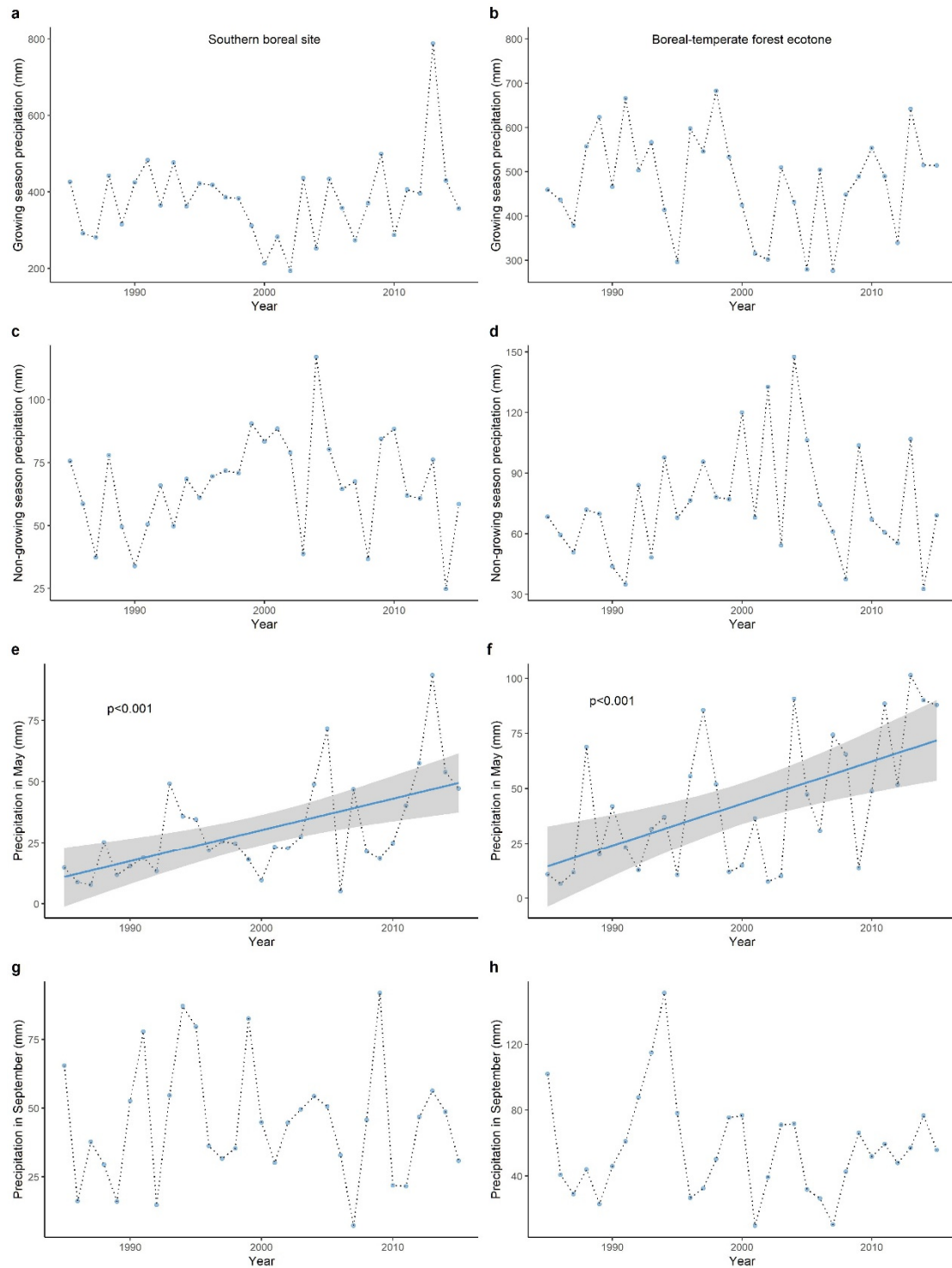


Figure S6. Three-decadal variations (1985–2015) of growing-season precipitation (a, b), non-growing-season precipitation (c, d), monthly precipitation in May (e, f) and September (g, h) at the southern boreal sites and the boreal-temperate forest ecotone.

Table S1. Soil nutrient concentrations of sampled Dahurian larch plantations at the southern boreal sites and the boreal-temperate forest ecotone. Values are shown as mean \pm standard deviation.

| Sites | Alkali-hydrolyzable N (g kg ⁻¹) | Total N (g kg ⁻¹) | Available P (mg kg ⁻¹) | Total P (g kg ⁻¹) | Total K (g kg ⁻¹) | Total Ca (g kg ⁻¹) | Total Mg (g kg ⁻¹) |
|---------------------------------|--|----------------------------------|---------------------------------------|----------------------------------|----------------------------------|-----------------------------------|-----------------------------------|
| Southern boreal site | 0.54 \pm 0.25 ^a | 6.71 \pm 2.43 ^a | 13.7 \pm 6.7 ^a | 0.74 \pm 0.06 ^a | 20.7 \pm 1.2 ^a | 7.0 \pm 2.5 ^a | 4.0 \pm 0.3 ^a |
| Boreal-temperate forest ecotone | 0.79 \pm 0.22 ^a | 6.57 \pm 0.68 ^a | 28.0 \pm 9.1 ^a | 0.74 \pm 0.14 ^a | 19.3 \pm 1.7 ^a | 9.3 \pm 2.4 ^a | 3.9 \pm 0.7 ^a |

Table S2. A summary of the model for the residual BAI of Dahurian larch at the southern boreal sites using growing-season mean nighttime minimum temperature (Tgromin), growing-season mean daytime maximum temperature (Tgromax), and non-growing-season precipitation (Pnongro) as important regulators (residual BAI ~ Tgromin + Tgromax + Pnongro). Variance inflation factors for Tgromin, Tgromax and Pnongro were 1.21, 1.45 and 1.22, respectively, implying inconsiderable collinearity among regulators.

| Coefficients | Estimate | Std. Error | t value | Pr(> t) |
|--------------|----------|------------|---------|----------|
| Intercept | 24.63352 | 5.41669 | 4.548 | *** |
| Tgromin | 2.94698 | 0.40857 | 7.213 | *** |
| Tgromax | -2.19550 | 0.30064 | -7.303 | *** |
| Pnongro | 0.06821 | 0.01483 | 4.599 | *** |

Significance code: *** < 0.001.

Residual standard error: 2.521, Deviance explained 47.0%.

Table S3. A summary of the model for the residual BAI of Dahurian larch at the boreal-temperate forest ecotone using growing-season precipitation (Pgro) as the important regulator (residual BAI ~ Pgro).

| Coefficients | Estimate | Std. Error | t value | Pr(> t) |
|--------------|-----------|------------|---------|----------|
| Intercept | -4.743470 | 1.559565 | -3.042 | ** |
| Pgro | 0.009699 | 0.003189 | 3.042 | ** |

Significance code: ** <0.01.

Residual standard error: 3.421, Deviance explained 9.2%.