

Supplement: Do growing season length and growth relate?

And if not, why not?

And if we're not sure, why is that?

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## 1 Literature review

We conducted a systematic review to find studies focused on relationships between growing season length and tree wood growth. After reviewing several recent papers (Dow *et al.*, 2022; Zohner *et al.*, 2023), we searched ISI Web of Science for “growing season length” AND “tree ring\*” (ALL FIELDS) on 12 April 2023, which returned 33 citations. We next reviewed abstracts and discarded papers that did not mention the relationship between growing season length and growth. We further reviewed all citations within all papers for additionally relevant papers and included them in our review.

Given the large diversity of metrics we found, we did not extract quantitative estimates of growing season length, growth, or their relationship. Instead, we extracted data on location, species, how they measured growing season length, growth, what relationship they found and what internal and external drivers they mentioned (full dataset with more details available on the Knowledge Network for Biocomplexity at publication).

Papers often reported dozens or more statistical tests that were variations of their data, thus we recorded a unique meta-analytic observation (i.e., one row within of data) within each paper (a ‘study’ ID) when papers reported: (1) distinctly different datasets (e.g., a global analyses of observations and a short-term experiment); (2) multiple distinctly different measures of growth (e.g., tree ring width and flux tower) and/or growing season length (e.g., they reported both end of season as budset and end of wood growth through xylogenesis); (3) distinctly different results for growth  $\times$  growing season length depending on metric (e.g., using budset for growing season length they find a growth  $\times$  growing season length, but using leaf coloring they do not).

## 2 References

- Dow, C., Kim, A.Y., D'Orangeville, L., Gonzalez-Akre, E.B., Helcoski, R., Herrmann, V., Harley, G.L., Maxwell, J.T., McGregor, I.R., McShea, W.J. *et al.* (2022) Warm springs alter timing but not total growth of temperate deciduous trees. *Nature* **608**, 552–557.
- Zohner, C.M., Mirzaghali, L., Renner, S.S., Mo, L., Rebindaine, D., Bucher, R., Palouš, D., Vitasse, Y., Fu, Y.H., Stocker, B.D. *et al.* (2023) Effect of climate warming on the timing of autumn leaf senescence reverses after the summer solstice. *Science* **381**, eadf5098.