Notes from fall 2022 reading group

1. Week 1: Dow *et al. 2022* and skim Gantois 2022
    (a) Curious about standardizing ... why they did it what way? Do results hold up with other methods?
    (b) What about autocorrelations in climate?
    (c) Heartwood! Roots!
    (d) What about VPDI? They should do analyses with that
    (e) They did not have much data in the end ... especially given they don't define how big an effect they expect to find or how big an effect they could detect (simulate data people!)
    (f) Why did Gantois exclude March from the spring?
    (g) Lots of good citations in Dow on other hypotheses/latitudinal variation to review!
2. Week 2: Zohner *et al. 2022* solstice pre-print
    (a) Paper diverges from Keenan work cited where longer seasons mean more carbon storage
    (b) Things that could explain the shift over time that looks to go with solstice and that earlier means you stop growing sooner (if you are tree)
        i. Drought correlates with earlier springs
        ii. NEW **cool** hypothesis from Alana: EOS_{10} is just a measure of herbivory ... so maybe this paper just means that earlier springs means earlier onset of 10% herbivory
        iii. Running out of nutrients?
        iv. Limited leaf lifespan
        v. Specific to some species?
        vi. Something about radiation
        vii. enumerate
        viii. Kavya suggests they needed a daylength experiment to make the solstice argument convincing
        ix. No changes over latitude seem weird
        x. Thermal optimum of leaf tissue can change up to 10C on the SAME tree each year, says Alana.
        xi. See also the to do list below
        xii. Misc.
            A. Some of the error reported is ODDLY small, suggesting the models are wrong somehow.
            B. Needs better measures of senescence says Fredi – check A_{max} and other measurements and see how they correlate with MODIS

C. We're not sure that MODIS is not just measuring radiation also ... in which case part of the paper is circular but that does not explain the ground observational data

D. Radiation? ... constructing leaf tissue, increase productivity (not sure what I meant here says Lizzie looking at her notes later)

E. enumerate

(c) Week 3: Schofield *et al. 2016* tree rings

i. This paper compares tree ring methods in a joint Bayesian models and shows that when you model altogether you get WILDLY different temperatures.

ii. Cat and Lizzie loved the math and paper, others found it dense and frustrating ... and we all agreed the figures are bad.

iii. Ruben found discussions of uncertainty in the step-wise approach and in cross-dating important and cool.

iv. Who has cited this paper?

v. Lizzie really enjoyed how they used the models to show support for classic approach and less support for RCS and how much a slightly more realistic biology sucked up variation and climate stuff.

vi. New paper idea from JHRL: Write an ecological paper with a joint model and show that you get something NEW out of it

Paper ideas

Interesting papers to read:

(a) `https://besjournals.onlinelibrary.wiley.com/doi/full/10.1111/1365-2745.13464` (Some of Jucker last papers, super interesting approach, used something similar to the RCS but then use those to calculate the over/under production. Is not phenology, but shows I think a bit better how to use dendro in a better way)

(b) VS-lite models: this is a way to build physiological constrains (very similar to what they did in Schofield paper with the thresholds) to decompose tree ring into intra-annual patterns and then model it forward. It's really interesting and loads of paper but it really feels like it shouldn't work. I would be curious to dig in and get people's feedback, specially of those most experience in these. Definitively has more links to phenology if we consider it robust:

i. "Original" paper: Tolwinski-Ward: `https://link.springer.com/article/10.1007/s00382-010-0945-5`

ii. Example of application: `https://onlinelibrary.wiley.com/doi/full/10.1111/geb.13377`

(c) Aloni R (2022) How the Three Organ-Produced Signals: Auxin, Cytokinin and Gibberellin, Induce and Regulate Wood Formation and Adaptation. In: Auxins, Cytokinins and Gibberellins Signaling in Plants. T Aftab (Ed), Springer Nature, Cham, Switzerland.

(d) Decoupled leaf-wood phenology in two pine species from contrasting climates: Longer growing seasons do not mean more radial growth

(e) A photoperiod-budset paper

(f) Papers on VPDI and heartwood? (sink limitation)

(g) Any other papers on phenology and tree growth??!!

From Ruben:

Groups/people doing 'modern ecology' with tree-rings to keep an eye on:

(a) Margaret Evans. Arizona. https://scholar.google.com/citations?hl=en&user=IGG0ZKQAAAAJ&view_op=list_works&sortby=pubdate

(b) Charlotte Grossiord. Lausanne. https://scholar.google.com/citations?hl=en&user=RsHW0OsAAAAJ&view_op=list_works&sortby=pubdate

(c) Tommasso Jucker. Bristol. https://scholar.google.com/citations?hl=en&user=s0x7E5wAAAAJ&view_op=list_works&sortby=pubdate

(d) Valerie Trouet. Belgium. https://scholar.google.com/citations?hl=en&user=-hF1HN8AAAAJ&view_op=list_works&sortby=pubdate

(e) Loic D'Orangeville. New Brumswick. https://scholar.google.com/citations?hl=en&user=CwBKApgAAAAJ&view_op=list_works&sortby=pubdate

(f) Dario Martin-Benito. Madrid. https://scholar.google.com/citations?hl=en&user=Qiooe3EAAAAJ&view_op=list_works&sortby=pubdate

Zhao et al. 2018 is the paper where we commented about this project together with Shoudong of characterizing the bias of the ITRDB and where we proposed some ideas on how to tackle it. It is the base for the ERC proposal but not much else went with it afterwards (and the database went again back to get filled with problems, but well... we tried)

To do items ... maybe?

(a) Email Keenan to see his perspectives on Zohner preprint; also ask Norby? ... Keenan, T. F. et al. Net carbon uptake has increased through warming-induced changes in temperate forest phenology. Nat. Clim. Chang. 4, 598–604 (2014). Do they also use MODIS GPP?

(b) Check refs of earlier spring = later EOS in Zohner preprint and COMPARE the papers

(c) For the Zohner preprint: Check if budbset is earlier in years with early springs (from common gardens with multiple years of data)

(d) Review refs in Pederson for latitude and other things ... here's all the ones Lizzie highlighted (last 3 are latitude).

   i. Ahlstrom, A., Schurgers, G., Arneth, A. & Smith, B. Robustness and uncertainty in terrestrial ecosystem carbon response to CMIP5 climate change projections. Environ. Res. Lett. 7, 044008 (2012).

ii. Zweifel, R. et al. Why trees grow at night. New Phytol. 231, 2174–2185 (2021).

iii. Tumajer, J., Scharnweber, T., Smiljanic, M. & Wilmking, M. Limitation by vapour pressure deficit shapes different intra-annual growth patterns of diffuse- and ring-porous temperate broadleaves. New Phytol. 233, 2429–2441 (2022).

iv. Cabon, A. et al. Cross-biome synthesis of source versus sink limits to tree growth. Science 376, 758–761 (2022).

v. D'Orangeville, L. et al. Drought timing and local climate determine the sensitivity of eastern temperate forests to drought. Glob. Chang. Biol. 24, 2339–2351 (2018).

vi. Helcoski, R. et al. Growing season moisture drives interannual variation in woody productivity of a temperate deciduous forest. New Phytol. 223, 1204–1216 (2019).

vii. Anderson-Teixeira, K. J. et al. Joint effects of climate, tree size, and year on annual tree growth derived from tree-ring records of ten globally distributed forests. Glob. Chang. Biol. 28, 245–266 (2022).

viii. Banbury Morgan, R. et al. Global patterns of forest autotrophic carbon fluxes. Glob. Chang. Biol. 27, 2840–2855 (2021).

ix. Churkina, G., Schimel, D., Braswell, B. H. & Xiao, X. Spatial analysis of growing season length control over net ecosystem exchange. Glob. Chang. Biol. 11, 1777–1787 (2005).

(e) Check who has cited Schofield et al. 2016 since it was published!

Lizzie's earlier notes below

Background: As springs shift growing seasons lengthen and plants are expected to grow longer. Especially trees, but tree rings suggest growth may not be increasing with earlier seasons in temperate zones.

Hypotheses:

(a) Statistical – Non-stationarity in temperature (climate) data may make accurately estimating phenological change and tree growth change accurately difficult. Check this early and often.

(b) Climate correlations – warmer springs may be associated with factors that reduce plant growth such as drought (and/or did someone write something about winter chilling?). Relates to climate hazards work.

(c) Ecology – shifting competitive landscapes (or something else?)

(d) Evolution – It may not be a long-term stable strategy to try to adjust growth dramatically year-to-year, so should we really expect this correlation? If this is true, you predict:

   i. Latitudinal variation in length of growing season and tree growth. (May connect back to Ailene's Putnam – predicts species from warmer provenances would better exploit longer growing seasons?) ... also these papers cited in Dow 2022: 44. Anderson-Teixeira, K. J. et al. Joint effects of climate, tree size, and year on annual tree growth derived from tree-ring records of ten globally distributed forests. Glob. Chang. Biol. 28, 245–266 (2022). 45. Banbury Morgan, R. et al. Global patterns of forest autotrophic carbon fluxes. Glob. Chang. Biol. 27, 2840–2855 (2021). 46. Churkina, G., Schimel, D., Braswell, B. H. & Xiao, X. Spatial analysis of growing season length control over net ecosystem exchange. Glob. Chang. Biol. 11, 1777–1787 (2005).

   ii. Species diversity: species should vary in how much they try to take advantage of interannual variation in climate (likely early-active species show the highest correlation? Again, Ailene's Putnam focused on this.)