grephontable data entry
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decoder:
GSL — growing season length
SOS/EOS — start of season/end of season (almost always referring to remote sensing)

Process:

1. **Read your paper, and take notes** highlighting (potentially) important information.
2. **Enter ONE ROW** per distinct results of growth x GSL in your paper (Lizzie will not break out single rows into multiple rows, so be sure you have entered as many rows as you think your paper should have.[Prioritize result closest to our definition of GSL and include similar metrics with similar results in gs_metric_other.] You would have MORE than one row when a study includes multiple datasets / measures of growth, growing season length, and / or resources / temperature, such that multiple tests are conducted and interpreted separately (fill out the columns separately for each metric / measure). So, **enter >1 row in these cases:**

2a. Distinctly different measures of growth and/or GSL (or parts of GSL, including SOS and EOS). Example: they measure GSL via budset and also via end of xylogenesis — one of these is vegetative phenology and one is wood phenology, however two different measures of vegetative phenology would be one row unless results diverge. Another example: they measure growth as flux tower and as tree radial width (these should be separate rows).

2b. They report distinctly different results for growth x GSL. For example, using budset for GSL they find a growth x GSL relationship, but using leaf coloring they do not. Base this on the authors interpretations of their findings.

2c. (Rule deleted due to new gs_metric_other column).

2d. Varying their input data related to resources/temperature or related, such that multiple tests are conducted and interpreted (example here is Dow paper used one set of data to look at GSL x growth and then a DIFFERENT set of data to test for temperature/precipitation constraints — this would be two lines).

2e. Multiple distinct studies of other sorts. (Unless they put them all together somehow, in which case enter 'synthesis' in 'study_type'.)

You do not need to include more than one row for statistical tests / data that are unrelated to the question of growth, growing season length and mechanism. Or if the authors are working to analyze or show it altogether as one big thing (path model, giant table of many stats etc.) or if you basically would enter the same for all columns beyond **gsl_end_metric**. In general, do not enter multiple rows per species if there is a general result consistent to most species, but do mention if results depend on species in **notes** or **notes_specific_columns** (you can enter multiple rows for different species or species groups if not possible to discern a more consistent result). Do NOT include results you would have to look in appendix for the data on (if mentioned in main text, but results actually in appendix, still do not include).

2f. If the authors are stressing different results for end of season versus start versus length (or some combo of those), then enter multiple rows for each.

**If in doubt, run it by Kavya!**
3. Enter your data **following along with the information below**.
4. Save your files as a csv with you initials at the end of the filename and **send to Lizzie**.
5. Take general notes on any difficulties you have filling out the table, and think about whether these are issues arising because there is some important piece of information you feel needs to be included (missing column), because you can not find the most relevant answer in the drop down menu, or because you are not sure what you should do.
6. Note citations within your paper and review papers that have cited your paper for other papers we should add. Make a list and organize so you have a top list of 0-5 papers.
NEW! If you have a paper that never seems to test for GSL x growth (and by this I mean *any* version of it — NOT just our version of it) for whatever reason (often this seems to happen in modeling papers) then you should enter data through **gsl_end_metric** but then can enter NA for all following columns. Please FLAG these papers when you email your data to Lizzie.

Enter the following in each column:

*Extra notes indicated by an asterisk. Please do not enter the asterisk in the csv files though!
Please try to enter something in every column to show you considered it, even if the entry is NA.
I added 'elevation' and 'latitude' as ways to measure GSL based on Ruben's questions.
If the paper's metrics are ever modeled (e.g., they call it budbreak data but do not have empirical budbreak data, instead they have a model to predict budbreak date and use those predicted dates as their 'data' then add **[modeled]** or **[simulated]** or **[your free form explanation]** after your main entry (example: xylogenesis [simulated]).

**paper_id**: first author's last name then year (no spaces please)
**who_entered:** your name or initials
**country [new!]**: give country names if less than 5; otherwise give general region info (such as '22 sites across continental Europe')
**biome**: guess at biome description (e.g., temperate forest etc.); keep it short
**species_num**: How many species? Give exact number if possible us >XX (e.g., >20) if not possible. 'No species listed' also possible. Aim to give the number related to the study/result you're reporting, where easily possible.
**species_list**: If less than 10 species, list out species — use comma between species names. If more than 10 species and you can enter genera, please do!
**study_scale**: give brief description; for common gardens please give NUMBER of provenances and NUMBER of gardens clearly, ideally also with scale for each (e.g., '2 gardens across Canada with up to 30 provenances from across North America')
**study_type**: ideally one of these or brief alternative entry:
- tree ring
- provenance trial
- whole forest experiment (e.g., FACE, SPRUCE)
- permanent plot (e.g., FIA inventory)

greenhouse or chamber
synthesis *
[free form to enter what is not covered above]

* Synthesis: Most often these types of studies would be separate lines, but when the data don't stand alone at all, this might work. Here's an example where we entered as one row and choose 'synthesis' — Harvard Forest carbon sequestration study (Finzi) where data was combined for just one relevant finding — including permanent plot data (dbh, other) with lots of other things AND also some experiments to explore carbon dynamics over time.

**study_level**: what is the level they are using for inference? Ideally one of these or brief alternative entry:

across years within individuals
across individuals
merged individuals across sites*
model
across years within sites
within individuals (for a study that did a split plant design)
across years within pixels (for a remote sensed data study design)
across sites/populations
across species
[free form to enter what is not covered above]

* tree ring chronologies built by merging tree rings across individuals within sites- a common practices in tree ring research

**rep_number**: estimate of replicate number used for most stats or most of study — or write 'not sure' if you're not sure.

**growth_metric**: What is their index of growth? Ideally one of these or brief alternative entry:

DBH diameter
dendrometer diameter
annual core
intra-annual core (xylogeneis)
biomass
photosynthesis etc. (uptake, Amax etc.)
CO2 assimilation
NDVI/greenness
height
photosynthesis*
not measured
[free form to enter what is not covered above]

*Please be specific about how photosynthesis is measured.

**gsl_metric**: How did they measure growing season length? Ideally one of these or brief alternative entry:

satellite derived
plant vegetative phenology (budburst, leafout)
wood phenology
MAT
latitude
elevation
GDD
not measured

[free form to enter what is not covered above]

**gs_start_metric**: Do they — and how — measure onset of the growing season? (Studies can consider only a start and/or end of GSL but not consider GSL.) Ideally one of these or brief alternative entry:

SOS
onset vegetative
onset wood
none
[free form to enter what is not covered above]
* If they mention gsl_start data that you did not easily find in the paper please add **'[data not found]'**; additionally if they did not use this metric in their statistical tests of gs x growth please add **'[not used for gsxgrowth]' If both, enter [data not found and not used for gsxgrowth]**

**gs_start_satellite [new!]:** If they used satellite data for their start metric; please give their resolution and metric here. You can also comment on if you think it is a good metric (if you feel confident to do that). Not satellite data? Enter NA.

NA
Free form entry

**gs_end_metric**: Do they — and how — measure end of the growing season? (Studies can consider only a start and/or end of GSL but not consider GSL.) Ideally one of these or brief alternative entry:

EOS
end vegetative
end wood
end height
none
[free form to enter what is not covered above]
* If they mention gsl_end data that you did not easily find in the paper please add **'[data not found]'**; additionally if they did not use this metric in their statistical tests of gs x growth please add **'[not used for gsxgrowth]' If both, enter [data not found and not used for gsxgrowth]**

**gs_end_satellite [new!]:** If they used satellite data for their end metric; please give their resolution and metric here. You can also comment on if you think it is a good metric (if you feel confident to do that). Not satellite data? Enter NA.

NA
Free form entry

**gs_all_metrics_described [new!]:** Do they fully describe the growing season metrics they use? Must be:

yes
no
Add details AFTER a yes or no if you want.

**gs_metric_used [new!]**: What metric are you reporting on for the next column (authorsthink_evidence_gslxgrowth)? Ideally one of these:

start metric only (this should be the metric you listed in gsl_start_metric)
end metric only (this should be the metric you listed in gsl_start_end)

start to to end (these should be the metric you listed in gsl_start_metric and gsl_end_metric)
suitable days
time with growth observed (e.g., days or weeks etc.)
[free form to enter what is not covered above, but PLEASE try to use what is offered above]

**gs_metric_other [new!]:** Other metrics of GS that found similar results to those you are reporting (and are clearly shown and easy to find in the paper) but you do not need to break out into multiple rows based on aforementioned multi-row rules. Separate multiple entries with a comma.
*example*: start metric, end metric
NA (NA here means 'I did not easily see other metrics that belong in this data row')

**authorsthink_evidence_gsxgrowth [UPDATED!]**: Did they find evidence that tree growth (whatever the metric of growth you listed previously) increases with growing season length (whatever metric you listed previously)? Ideally one of these:
yes
no
not mentioned
not sure*
* Use 'not sure' only in extreme cases (where you really cannot commit to another answer).

**authorsthink_evidence_gsxgrowth_notsure:** If you entered 'not sure' above, explain why. Or NA.
**authorsthink_teststatistic**: If they think they found evidence, do they have a test of GSL x growth
yes
no
NA
**teststatistic_where**: For either of previous columns give figure or table; if no figure or table, give pg number as follows:
fig XX
table XX
pg XX
NA
**authorsthink_ALTinfo [updated!]**: Provide additional details on their gsxgrowth test here if you want.
NA
Free form entry
**youthink_evidence_gsgrowth [updated!]**: Did you think that they find evidence that tree growth (whatever the metric of growth you listed previously) increases with growing season length (whatever metric you listed previously)? Ideally one of these:
yes
no
not sure*
NA
* Use 'not sure' only in extreme cases (where you really cannot commit to another

answer).
**youthink_evidence_gsxgrowth_notsure**: Hopefully, you didn't but if you entered 'not sure' above, explain why. Or NA.
**ifyouthink_no_why**: Follows from last column, brief free-form entry or NA.

**ourdefinition_evidence_gslxgrowth [NEW!]**: Did they find evidence that growth (whatever metric they used) increased with longer growing seasons. Their GSL metric must be: start to end of wood or vegetative growth (can include satellite data) or periods suitable for growth related to wood or vegetative growth (this latter case mainly for drought systems etc.). Suitable days CANNOT be the number of days they observed growth.

yes
no
negative relationship
no data for this
not tested but have data
not sure

**ourdefinition_evidence_gslxgrowth_notsure [new!]**: If you entered 'not sure' above, explain why. Or NA.

NA
Free form entry

**authorslooked_externalfactors**: Did they look for evidence that external factors, like resources or temperature, limits the length of the growing season or limits growth? Ideally one of these or brief alternative entry:

yes - length of growing season
yes - growth
no
not sure*
NA
[free form to enter what is not covered above]

* Use 'not sure' only in extreme cases (where you really cannot commit to another answer).
**authorslooked_externalfactors_notsure:** If you entered 'not sure' above, explain why. Or NA.

free form to explain
NA

**authorsfoundevidence_externalfactors:** Did they find evidence that external factors, like resources or temperature, limits the length of the growing season or limits growth? Ideally one of these or brief alternative entry:

yes - length of growing season
yes - growth
yes - growth and growing season
no
not sure*
NA
[free form to enter what is not covered above]

* Use 'not sure' only in extreme cases (where you really cannot commit to another answer).

**authorsfoundevidencefor_externalfactors_notsure**: If you entered 'not sure' above, explain why. Or NA.

free form to explain
NA

**ifyes_whichexternal**: Follows from last column, brief free-form entry or NA. Examples include:

max temperature
drought
precipitation
NA

**authorslooked_endogenousfactors**: Did they look for evidence that developmental, biophysical or provenance constraints (endogenous factors) limits the length of the growing season? Ideally one of these:

yes
no
not sure*
NA

* Use 'not sure' only in extreme cases (where you really cannot commit to another answer).

**authorslooked_endogenousfactors_notsure**: If you entered 'not sure' above, explain why.

free form to explain
NA

**authorsfoundevidencefor_endogenousfactors**: Did they find that evidence developmental, biophysical or provenance constraints (endogenous factors) limits the length of the growing season? Ideally one of these:

yes
no
not sure*
NA

* Use 'not sure' only in extreme cases (where you really cannot commit to another answer).

**authorsfoundevidencefor_endogenousfactors_notsure:** If you entered 'not sure' above, explain why.

free form to explain
NA

**ifyes_whichendogenous**: Follows from last column, brief free-form entry or NA. Examples include:

provenance
species
NA
[free form to enter what is not covered above]

**double_entry**: Does this paper need to be entered separately and independently by someone else (basically, do we need a check on this)?

yes
maybe
no entered correctly
no study is not very relevant

**excellent_study**: Do you consider this an excellent example of study exploring the link between growing season length and growth (e.g. measures all the right things,

interdisciplinary, etc)? If so, why? If not, why not?
**big_problems**: Did you find any major issues with this study? If so, briefly explain (e.g., contradictory results, fatal flaws such as using your growth metric to define your phenology metric in design etc.).
**missing_something_major**: Is there anything you wish the authors of this study had measured that would have allowed them to better address the question of how growing season length and tree growth are linked? If so, what and why?
**notes**: any more notes you want to share here generally?
**notes_specific_columns**: any notes on your entries in specific columns (give column header name)

**FAQs**
- What if they measured root to shoot ratio? This does not count as a separate measure of growth (i.e. don't add a separate row in the table). Presumably they measured biomass, and analyzed this measure of growth - so they paper will still show up in the table.
- What if they measured growth using more than one metric? If they reported results on both aspects of growth, add an additional row to the table for that paper, and fill out the columns separately for each growth metric.
- What if they measured growing season length using more than one metric? Add a separate row to the table for the same paper and enter the data separately for each measure of growing season length.
- What if they looked at multiple species, and found evidence for resource limitation / endogenous constraints for some, but not all species? If they found any evidence in one of their tests for resource limitation and / or endogenous constraints, then answer yes to this question.