

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. 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 ...

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. They consider different parts of GSL separately, but never GSL altogether (e.g., a study uses EOS and SOS as response variable (two separate tests), but not growing season length, then enter as two rows).

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 this 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 that case, you can put multiple entries in the growth or GSL metric columns and Lizzie will adjust in R).

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.

paper_id: first author's last name then year (no spaces please)

who_entered: your name or initials

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.**

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*

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]

gsl_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]

gsl_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]

authorsthink_evidence_gslxgrowth [double check closely!]: Did they find evidence that tree growth (whatever the metric of growth you listed previously) increases with growing season length? Their GSL metric must be either start to end of wood or vegetative growth or periods suitable for growth related to wood or

vegetative growth (this latter case mainly for drought systems etc.). 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_gslxgrowth_notsure: If you entered 'not sure' above, explain why. Or NA.

authorsthink_evidence_gslxgrowth_suitabledays_or_starttoend: Follows form previous. Ideally one of these:

- start to end
- suitable days
- NA

authorsthink_teststatistic: If they think they found evidence, do they have a test of GSL x growth

- yes
- no
- NA

authorsthink_ALTteststatistic: If they think they found evidence, using a test of NOT GSL x growth, then what is their evidence? Brief free-form entry or NA. Be sure to clarify here what relationship they looked at. [If you fill this out you should probably have entered 'not mentioned' in **authorsthink_evidence_gslxgrowth**.]

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

youthink_evidence_gslxgrowth: Do you think they found evidence that growth (whatever the metric of growth you listed previously) increases with growing season length? Their GSL metric must be either start to end of wood or vegetative growth or periods suitable for growth related to wood or vegetative growth (this latter case mainly for drought systems etc.). 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_gslxgrowth_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.

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

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 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.