Miriam's Comments to Ailene

Draft 3, “How to climate change experiments actually change climate?”

May 16, 2017

AFFILIATIONS

-Mine: please add “Harvard University” after “Department of Organismic and Evolutionary Biology”

-Aaron's: there's an extra space after the zip code

INTRODUCTION

Regarding some of the citations in the first sentence:

Shukla & Mintz 1982, Cox et al. 2000, and Field et al. 2007 are all about feedbacks between vegetation and climate (in the case of Shukla & Mintz, there's actually more focus on vegetation's influence on climate). I think that I originally offered these citations in response to a comment of Yann's about the importance of feedbacks, and I'm not sure any of them is quite applicable to the first sentence as it stands now. Perhaps you could amend the second part of the sentence to say “cascading community, ecosystem, and climate effects”?

*-“Performance of process-based models, which rely on explicit empirical relationships between observed phenomena and climate, can be limited because the underlying assumptions of these models may be poorly constrained”*

I don't think that either bioclimatic envelope models or phenology models (i.e. models referenced in the papers cited at the end of this sentence) are process-based – they're correlative/empirical. Theoretically, process-based models rely on mechanistic understanding rather than on empirical relationships (though there is certainly data from empirical relationships embedded in the parameters of those models and sometimes 'filling in' where mechanism is unknown). One of the values of process-based models is that they are more competent under no-analog conditions. Instead, this sentence could start: “Performance of models which rely on...”

EFFECTS ON LOCAL CLIMATE VARY OVER TIME AND SPACE

*“(see Supplement Materials)”*

Specific location? This shows up in other parts of the manuscript also... maybe add section numbers to the supplemental material sections?

For me, “air temperature” is more intuitive than “above-ground temperature.” If they mean the same thing (they're both used in this section), using only “air” could be more straightforward.

In the second paragraph, the last sentence seems tenuous – there's good development of why there could be seasonal variations, but not annual. The solution may be to bring in the annual concept earlier in the paragraph, right after inconsistent seasonal heat applications, i.e.: “Seasonal and annual precipitation patterns can alter....” Then delete the last sentence of that paragraph.

EXPERIMENTAL INFRASTRUCTURE ALTERS LOCAL CLIMATE

*“(i.e., ‘shams’ or ‘disturbance controls,’ which contained all the warming infrastructure, such as soil cables or infrared heating units but with no heat applied)”*

The equivalent of this parenthetical was in the previous paragraph – delete.

*“There are several possible reasons for the observed differences between ambient and structural controls.”*

Add “in climate” after “differences”

*“at Duke Forest(exp03,exp10)”*

Spacing

SECONDARY AND TERTIARY EFFECTS OF CLIMATE CHANGE MANIPULATIONS

*\*\*\*“For example, precipitation treatments typically reduce temperatures in climate change manipulations”*

For similar claims (i.e. about soil moisture), there are analyses – no analyses here? If impossible, perhaps suggest why

BIOLOGICAL IMPLICATIONS

*“using fine-scale, measured climate as the explanatory variables”*

Either missing a word (climate measurements?) or no “s” on “variables”

Perhaps wait to introduce phenology until the second paragraph? I don't think it's needed/useful in the first.

*“Other biological responses may be exaggerated in experiments when direct and indirect effects of climate manipulations work in concert (Figure 6c).”*

Without any more discussion, this seems too flat, either remove or expand?

*“accurate interpretation about”* → accurate interpretation of

*\*\*\*[In response to your query re. whether anything should be added]:* In this section, it would be very convincing to analyze how conclusions about phenological patterns are different when using as predictor variables (1) reported climate vs. actual climate and/or (2) actual climate + soil moisture vs. actual climate only. If the inferences were different, it would quantitatively drive home how important some of your recommendations are.

CONCLUSIONS

*“require the ecological community to evaluate their data”*

Change to *“*require ecologists to evaluate their data” or “require the ecological community to evaluate its data”

BOX 1

*“There can be substantial variation in the effects of warming and precipitation treatments”*

Specify climatic effect? Otherwise, it's unclear whether you mean climatic or biological.

REFERENCES

A bunch of the references have extraneous stuff at the end of them (“PT: J”, etc.)

FIGURES

(1) Add units (years) to “Study Length”, add an inset map for the Massachusetts area so we can see what's going on with all the overlapping symbols

(5) No dashed lines in plots, contrary to what figure legend suggests – probably a holdover from the legend from Fig. 2? Include units for mean annual moisture when it's mentioned in the figure legend.

(6) Figure legend missing a word: *“Complications arise when biological responses are a mix the direct and indirect effects of experimental warming.”*

(2,5) These figures are aligned to the top of the page, whereas the other figures are centered on the page.

TABLES

(S1) Title is bold here, but not for any of the other supplement tables.

(S2) extra space in “soil moisture depth(s)” heading

(S8,9,10) In the table titles' first sentence, “fit monthly” is specified twice.

(S8) “number of observations ranged from...” [start with the smaller number]

(S12 – and associated text in the main document): it seems strange to lump warmed treatments, since there are so many different degrees of warming.

SUPPLEMENT

2nd line typo: “These database of daily climate data allow”

Re. *Analysis of effects of infrastructure on local experimental climate:*

*“We fit linear mixed effect models by month with mean daily soil temperature, minimum and maximum daily air and soil temperature ((Farnsworth et al., 1995) did not measure these predictors so there are only four different studies in these models), and soil moisture as response predictors.” = c*onvoluted sentence/punctuation

*“these five studies occurred at two sites”*

*T*ypo? Do you mean that they had two types of control plots?

Also, one of the citations is a “?”

*“above-ground temperatures” →* air temperatures?

I don't think you need results in this section; other sections in the SI have only methods and they work nicely.

Re. *Analysis of effects of experimental warming on soil moisture:*

There's a line return that shouldn't be there on the fourth line

Again, there are a few oddities in the references (and in the Marchin reference, “Global change biology” should be capitalized)