

Interactive comment on “Climate pattern scaling set for an ensemble of 22 GCMs – adding uncertainty to the IMOGEN impacts system” by Przemyslaw Zelazowski et al.

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The paper describes a system for emulating CMIP3 climate models in terms of land surface variables at low computational cost, including its design, performance, applications and limitations. The manuscript is clearly written. I understand the importance of the attempt and usefulness of the tool, although honestly I felt that CMIP3 models are relatively dated and the authors might have been able to adopt CMIP5 data sooner.

I have a couple of overall comments, which are rather my impression and not something really critical.

1. In my view, a climate emulator like the one presented here based on an energy bal-

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ance model and pattern scaling is particularly powerful when it is applied for exploring a wide range of different scenarios (e.g., intermediate levels between RCPs). If the authors agree with this, it should be mentioned with more emphasis.

2. The applications described are mostly focused on ecosystem impacts. I reckon however that the tool has a potential to be applied to a wider range of impact studies, including water resource, agriculture, health and so on. It could also be emphasized.

Minor comments:

1. P.2, L.2, “Global Climate Models (GCMs, also called Earth System Models, ESMs)”: In my understanding, a GCM is called an ESM especially when (or only if) it incorporates some biogeochemical components. Simply paraphrasing them sounds uncomfortable to me.

2. P.3, L.1, “Intergovernmental Panel for Climate Change”: “on” instead of “for”.

3. P.4, L.33, “50 km (e.g. MIROC3.2 hires model,): The atmospheric resolution of MIROC3.2-hires is T106, which is approximately 100 km in mid-latitudes instead of 50 km.

4. P.5, L.14, “climate regime c”: Not clear what it means.

5. P.5, L.22, “one regression co-efficient, rather than two.” Not entirely clear to me. Do you mean only slope rather than slope and intercept (or, equivalently, intercept is always zero)?

6. P.5, L.33, “(ii) a constant ratio of mean land and ocean surface (SST) rate of warming, ν , (iii-iv) climate sensitivity over land λ_l and ocean λ_o ($W\ m^{-2}\ K^{-1}$)”: Instinctively, it sounds over-specification to me, as it looks like ν could be calculated by λ_l/λ_o (at least approximately). It might be my silly misunderstanding, but a bit of further explanation might be helpful to other readers as well.

7. P.6, L.13, Eq (2): “(is, ms, g)” in the r.h.s might have to be “(gs, ms, i)”.

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8. P.16, L.22: "Shiogama, H., Shiogama, H.,": duplicated. Please delete one.

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