

## ***Interactive comment on “Thermodynamic and dynamic responses of the hydrological cycle to solar dimming” by Jane E. Smyth et al.***

### **Anonymous Referee #1**

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Review of Smyth et al. acp-2016-886

In general, I think this is a nice paper. The study is clean and straightforward, and I think we've learned something new. I do have a few comments:

General comments:

1. I would periodically get lost in the paper and had to re-read quite a number of lines. It would help if there were an outline at the beginning (maybe even a numbered list) of the factors that affect hydrological cycle changes. Then you can go through them one by one.
2. The abstract doesn't really say much, and the conclusions don't appear to agree with the results presented. Maybe I'm confused somewhere, in which case I think the

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description needs to be clearer.

Specific comments:

Page 1, line 24: Not all of the models were run for 500 years after spin-up. This really varies among the different modeling groups.

Page 2, line 8: Why only 12? You should say more about this here.

Page 2, lines 24ff: This isn't a sentence.

Page 3, lines 1ff: Somewhere in here, you should discuss how well these assumptions hold, and if they don't, what you can still learn.

Page 3, line 6: Instead of "project", use "study" or something like that.

Page 4, lines 1-2: I don't think this is quite fair. They had a lot of warming at high latitudes in particular, so it makes sense there would be a P-E responds, regardless of whether the temperature response to 4xCO<sub>2</sub> is compensated.

Page 5, line 22: Typo - two periods at the end of the sentence.

Page 6, lines 14 and 16: Citation is coming out weirdly. Put 2014 on line 14.

Page 7, line 21: This doesn't strike me as consistent with what you discussed earlier, nor is it what figure 4 shows.

Page 8, lines 6-7: This is not correct as written. Turning down the sun by a uniform fraction cannot restore preindustrial P–E patterns. That doesn't say anything about geoengineering as a whole.

Figure 7: The paper by Haywood et al., 2015, GRL might be relevant here. (You don't need to do anything about this unless you want to – I just thought you'd find it interesting.)

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