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Comment

## ***Interactive comment on “A lower and more constrained estimate of climate sensitivity using updated observations and detailed radiative forcing time series” by R. B. Skeie et al.***

**R. B. Skeie et al.**

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I would welcome comments by the authors on reports that ECS estimates using energy balance models and "effective climate sensitivity (Eff-CS)" may depend on the length of the studied intervals,. In particular, Eff-CS estimates from data derived over the course of several decades or less may underestimate ECS by failing to fully incorporate slowly evolving feedbacks. A recent paper by Armour et al - Time-Varying Climate Sensitivity from Regional Feedbacks, J. Climate, July 2013 - illustrates this concept.

Response: We agree that it is important to consider a long time period when climate

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feedbacks and climate sensitivity are assessed. We use observational data for more than a century to estimate the ECS, from the 19th century and up to 2010. In the conclusion we mention that "It should be noted that the estimated ECS in this study does not include very slow climate feedbacks like melting of ice sheets." And in the introduction (p788 l8): "However, these changes are slow and the climate sensitivity estimated here (i.e. the average effective climate sensitivity over the 1750-2010 period) is what is required for analysis of climate change on a century timescale". We also mention in the introduction that the assumption that the feedbacks do not change over time adds some additional uncertainty to the estimate of the tail towards higher values, since the slow feedbacks are not fully represented. We have added a reference to the study by Armour et al. (2012) here. Also the new section in the discussion "Interhemispheric difference" touches upon the issue of regional differences in feedbacks.

Armour, K. C., Bitz, C. M., and Roe, G. H.: Time-Varying Climate Sensitivity from Regional Feedbacks, *J.Clim.*, 26, 4518-4534, doi:10.1175/JCLI-D-12-00544.1, 2012.

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Interactive comment on *Earth Syst. Dynam. Discuss.*, 4, 785, 2013.

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