Earth Syst. Dynam. Discuss.,
https://doi.org/10.5194/esd-2019-78-RC2, 2020

Earth System Dynamics
Discussions

Interactive comment on "Precipitation Ansatz dependent Future Sea Level Contribution by Antarctica based on CMIP5 Model Forcing" *by* Christian B. Rodehacke et al.

Anonymous Referee #2

Received and published: 23 February 2020

The authors used CMIP5 RCPs outputs for driving icesheet simulations to test how the precipitation boundary condition determines Antarctica's sea-level contribution. They found that the simulated ice-sheet thickness generally grows in a broad marginal strip where incoming storms deliver topographically governed precipitation. They further conducted scaling analysis showing that the scaling is higher across the East Antarctic Ice Sheet but lower across the West Antarctic Ice Sheet and lowest around the Siple Coast.

This study focuses on an interesting topic and potentially contributes to our understanding of further Antarctic icesheet change and sea level rise. Thereby, I would like

to support this manuscript be published in Earth System Dynamics after minor revisions.

First, the authors may want to notice the effect of evaporation and atmospheric moisture budget on Antarctic icesheet. Evaporation (E) is large and comparable with precipitation (P) over most of Antarctic during SON and DJF. In the atmospheric moisture budget over Antarctic, P-E is in generally balanced by horizontal convergence of vertically integrated moisture transport. Given the projected different responses of atmosphere circulation in various RCPs, it is would be nice to discuss the potential roles of atmospheric winds, moisture transports and in turn, P-E in Antarctic icesheet change.

Also, I am wondering how the results of authors' icesheeting simulations will affect Antarctic sea ice and deepwater formation. How will they modulate the Antarctic sea ice projection in various RCPs? How will they modulate deep convection in the marginal seas of the Antarctica, the formation of Antarctic Bottom Water and the strength of abyssal circulation?

Interactive comment on Earth Syst. Dynam. Discuss., https://doi.org/10.5194/esd-2019-78, 2020.