

## ***Interactive comment on “Brief Communication: Upper air relaxation in RACMO2 significantly improves modelled interannual SMB variability in Antarctica” by W. J. van de Berg and B. Medley***

**Anonymous Referee #2**

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This short communication examines the impact of “nudging” on the simulation of inter-annual variability of Antarctic accumulation by a regional climate. Nudging is found to generally improve the representation of interannual variability (as might be expected) but there is a trade-off, in that there is some degradation of the spatial pattern of mean accumulation in regions of complex orography. The results are clearly-presented and the methodology used is sound. I recommend publication of the manuscript subject to attention to the (generally minor) points listed below.

Specific points

P2, l15: “Antarctic”, not “Antarctica”

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P3, l5: “obtained” might be better than “resolved”?

P3, l9: I can envisage situations where interannual variability might be better represented in a RCM even without data assimilation. For example, in regions where accumulation is dominated by orographic precipitation over small-scale topography (which would not be resolved in the driving model).

P3, l11 (and elsewhere): To avoid confusion, I would say “relaxation to large-scale forcing fields”, rather than “relaxation to boundary conditions”. The latter is what you are doing at the lateral boundaries of the model domain while the former describes the nudging process.

P5, l1 (see also section 3.1): Why did you choose not to nudge moisture fields? Nudging T but not q has clearly had an impact on precipitation as it changes the relative humidity field.

P6, l18: Insert “than” after “lower”

P6, section 3.2: It might be useful to include a short table that summarises the key metrics (correlations, mean and RMS differences) from figure 4?

P7, section 3.3: As well as being wider than in RACMO, the AP orography in ERA-Int is also lower, which will affect the magnitude of the orographic precipitation field as well as its spatial extent.

Figure 3: Would it be better to display the change as a percentage, rather than an absolute difference?

Figure 4: Caption needs to make clear that the data are for the region shown in figure 2.

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Interactive comment on The Cryosphere Discuss., 9, 4981, 2015.

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