

## ***Interactive comment on “The modelled surface mass balance of the Antarctic Peninsula at 5.5 km horizontal resolution” by J. M. van Wessem et al.***

**X. Fettweis (Referee)**

xavier.fettweis@ulg.ac.be

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This paper presents very high resolution (5.5km) RACMO SMB results over the Antarctic Peninsula (AP) by comparing these outputs with observations and by discussing afterwards the spatial/temporal variability of these last ones over AP. To my knowledge, it is the first time that a SMB simulation at such a resolution is performed over AP using a robust snow energy balance model fully coupled with a RCM. The paper is pleasant to read while the discussion about the spatial/temporal variability does not bring something really new in respect to previous IMAU's papers using RACMO-27km (the SMB reference simulation for the international community) over the whole Antarctica. This paper fits well with TC and I recommend to accept it.

However, before publication, a comparison with RACMO2.3-27km is needed for me to  
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really see the interest of using a resolution of 5.5 km over AP, independently of the RACMO-5.5km results discussion. A resolution of 5.5 km is needed for AP or 27 km is enough ? Only some comparisons with ERA-Int (75km) are shown. The authors suggest that a resolution of 5.5km is not enough fine to resolve the AP topography. OK, but in respect to RACMO-27km, what are the advantages of RACMO-5.5km ? Results from RACMO-27km should be included in Fig2 and Fig3 (It is likely that for some observations, RACMO-27km is better due to errors compensations!). The equivalent of Fig 6 for RACMO-27 km should also be added. I don't think that including some RACMO-27km results in this paper is a big job for the authors.

Franco et al. (TC, 2012) shown that increasing resolution with MAR does not impact the interannual variability and that the trends are the same. Is it also the case between RACMO-27km vs RACMO-5.5km (Figs 7-9). Or, a resolution of 5.5 km is needed to better capture the interannual variability over AP knowing that the melt is likely better represented in RACMO-5km?

Finally, ERA-Interim (75km) seems to be used to directly force RACMO at 5km. Forcing RACMO-5km with RACMO-27km has been tested ? In such area, where ERA-Interim is not constrained a lot, using the RACMO-27km atmospheric fields as forcing could improve the RACMO-5km results.

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