Interactive comment on "Modelling the climate and surface mass balance of polar ice sheets using RACMO2, part 2: Antarctica (1979–2016)"

M. Lehning (Referee)

RC: Dear authors

Most review comments have been answered and I thank you for the revision effort.
The model explanations are still too general in my opinion: For example, why not presenting the equation in which the cloud parameter l_crit is used along with an explanation of the context?

AC: We thank the referee for his final comments. We have added the cloud parameters equation for the onset of precipitation generation to the manuscript and a short explanation of its terms.
"Therefore, the critical cloud water and cloud ice content (l_{crit}) threshold, that governs the onset of effective precipitation formation for mixed-phase and ice clouds, is increased in the following equation, adapted from ECMWF-IFS (2008):

$$G_{precip} = Ac_0 l_{cld}\left[1 - \exp\left\{ -\left(\frac{l_{up}}{l_{crit}/\mathrm{BF}_e}\right)^2 \right\}\right].$$

Here, A is a scaling value which is the cloud fraction for stratiform clouds and the updraught strength for convective clouds, respectively; c_0 is the coefficient for autoconversion of cloud ice/water into snow/rain; l_{cld} the total cloud ice and water content and BF_e an enhancement factor for stratiform mixed phase clouds. The value of l_{crit} is increased by a factor 2 for convective clouds and stratiform water/mixed phase clouds, and by a factor 5 for stratiform ice clouds. "

RC: I still encourage the authors to publish the observational data set collection en block with the paper. Just think back how much work it was to collect those. It is not helping open science if somebody has to do this again. Persons and emails will change, a published data set is a more stable milestone.
AC: We have uploaded available datasets on a public server if they were not freely available elsewhere. Some data sources request to be contacted by email, so for those datasets we have kept the previous description in the data-accessibility section. The section now reads as follows:

"The following data are available through the IMAU website:
http://www.projects.science.uu.nl/iceclimate/:

- *RACMO2.3p2 model data (this study). Contact: j.m.vanwessem@uu.nl, m.r.vandenbroeke@uu.nl. – AWS SEB data (Van Wessem et al., 2014a). Contact: c.h.tijm-reijmer@uu.nl, m.r.vandenbroeke@uu.nl.*
- *10 m Snow temperature observations (Van den Broeke,2008;Van Wessem et al.,2014a). Contact:j.m.vanwessem@uu.nl, m.r.vandenbroeke@uu.nl.*

- *GRACE mass anomalies (this study). Contact: b.wouters@uu.nl.*
- *Drifting snow transport fluxes (Amory et al., 2017). Contact: charles.amory@uliege.be*
- *Cloudsat-CALIPSO (Van Tricht et al., 2016a). Contact: S.Lhermitte@tudelft.nl.*
- *Antarctic Peninsula ice discharge (Wuite et al., 2015; Hogg et al., 2017). Contact: Jan.Wuite@enveo.at.*

All other data used in this study are available without conditions by contacting the corresponding authors.

- *In- situ SMB observations (Favier et al.,2013). Contact:publicly available:http://www-lgge.ujf-grenoble.fr/ServiceObs/SiteWebAntarc/database.php.*

- *Neumayer meltfluxes (this study). Contact: s.l.jakobs@uu.nl, m.r.vandenbroeke@uu.nl.*

- *QuikSCATmeltfluxes(Truseletal.,2013). Contact:trusel@rowan.edu. Available throughQuantarcticav3http://quantarctica.   npolar.no/*

- *Accumulation radar-derived annual accumulation fluxes (Medley et al., 2015). Contact: brooke.c.medley@nasa.gov.*

- *Kohnen radiosonde data (this study). Contact: Gerit.Birnbaum@awi.de.* "

The link on the IMAU website is still under construction, but the correct link will be provided when the peer review is finished and the manuscript will be finalized.