

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.

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Received and published: 15 November 2015

The authors present simulations using a hydrostatic model at 5.5km resolution. For using a hydrostatic model at a resolution, where all current weather forecast models are non-hydrostatic, they give a short statement:

"At this resolution we assume the assumption of hydrostatic balance to hold, an assumption that is justified to some extent by earlier studies (Lenaerts et al., 2014; Van Wessem et al., 2015), although a non-hydrostatic model version will likely further improve the model output in terms of better resolved processes over sloping surfaces, such as foehn and katabatic winds..."

What is the limit of hydrostatic modelling? The same justification as above could be

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given for a resolution of 1km or less (the model will probably work at these resolutions as well). Of course there are dynamical limitations, i.e. buoyancy effects cannot be simulated with a hydrostatic model. Did you compare hydrostatic and non-hydrostatic runs? I think it is problematic to run a model at scales where the assumption of hydrostatic balance is not valid.

Interactive comment on The Cryosphere Discuss., 9, 5097, 2015.

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