

Interactive comment on “On the fine vertical structure of the low troposphere over the coastal margins of East Antarctica” by Étienne Vignon et al.

King (Referee)

jcki@bas.ac.uk

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In this well-written paper, the authors develop the first ever climatology of low-level (0 – 3000 m above ground level) atmospheric structure in the Antarctic coastal zone. This is an extremely important region where intense atmosphere-ocean interaction control globally-important processes such as sea ice and bottom water formation. It is thus important to understand how well atmospheric models can capture the structure of this region. Obtaining the high-resolution radiosonde data required for producing a climatology that can be used for model validation is no easy task as there is no central repository for such data and the database that the authors have put together is an

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achievement in itself.

The authors use their climatology to validate two reanalysis products and a high-resolution regional atmospheric simulation using the Polar WRF model. All three products produce a reasonable simulation of the Antarctic coastal atmosphere but with some notable weaknesses. In particular, the model products tend to show katabatic flow extending further offshore than is seen in reality.

The presentation of the manuscript is clear and the methodology is straightforward and sound. Careful thought has been given to the strengths and weaknesses of the data used. Conclusions are soundly based on the analysis presented. I believe that the paper is more or less suitable for publication in ACP as it stands. However, below, and in the attached annotated manuscript I have listed some points which, if addressed, could further improve the manuscript.

Major points

1. The main variables validated are temperature, relative humidity and wind speed. While characterising the wind speed profile is a useful first step, the wind direction is also important for things such as the offshore wind stress (which drives sea ice export) and the low-level atmospheric mass and moisture fluxes. It would be a straightforward extension of the validation already carried out to include some validation of the u and v components of the wind separately. Around the coast of East Antarctica the v -component corresponds closely to the offshore or downslope component, making interpretation straightforward.

2. It would be useful to have some additional information on the physical settings of the locations of the radiosonde stations. In particular, give the actual elevation, local terrain slope and distance from the coast for each station and the corresponding values for the model locations.

Minor points

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Please refer to the annotated manuscript. Note also throughout: “East-Antarctica” should just be “East Antarctica” (no hyphen). “Mc Murdo” should be “McMurdo” (no space)

Please also note the supplement to this comment:
<https://www.atmos-chem-phys-discuss.net/acp-2018-1197/acp-2018-1197-RC1-supplement.pdf>

Interactive comment on Atmos. Chem. Phys. Discuss., <https://doi.org/10.5194/acp-2018-1197>, 2019.