Atmos. Chem. Phys. Discuss.,
https://doi.org/10.5194/acp-2018-1197-RC3, 2019

Atmospheric Chemistry and Physics Discussions

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

Anonymous Referee #2

Received and published: 30 January 2019

General Comments:

This a comprehensive and well executed paper of low-level radiosonde observations along the East Antarctic coast. In general, the coast is a region of sharp changes in topography and atmospheric conditions. The horizontally varying nature of the katabatic winds across the coast needs to be emphasized (e.g., Parish and Bromwich 2007). In addition, the manuscript already discusses the impact of the free-flying radiosonde balloons being advected away by the wind. The results one gets from radiosonde observations will depend on their launch locations. The discussion in this manuscript would be improved by systematic review of the station location characteristics and lo-

cal meteorology. Halley and Neumayer are located on ice shelves. Dumont D'Urville is on an offshore island. McMurdo sits on the southern end of the mountainous Ross Island. Mawson is located at the base of the coastal slopes. Casey is on the west side of local Law Dome. Davis is on the western side of the Bunger (?) Oasis in the Vestfold Hills. Mario Zucchelli sits in Terra Nova Bay region and is affected by katabatic flows from Reeves and Priestley Glaciers and their modification by local mountains*. More generally, how the coastal katabatic winds behave could be very localized in regions of complex topography. The International Antarctic Weather Forecasting Handbook, available online, provides information about many of these locations and should be consulted for a more refined interpretation of your results.

This review was prepared without consulting previous comments on the manuscript.

Specific Comments:

1. Page 1, line 21: Douglas is not the right reference. It should be Mawson, D., 1915: The Home of the Blizzard. Vols. 1 and 2, William Heinemann, 687 pp. Similarly, an important relatively contemporary reference for the extreme winds affecting Adélie Land (Cape Denison, in particular) is Parish, T.R., and R. Walker, 2006: A re-examination of the winds of Adélie Land, Antarctica. Aust. Meteor. Mag., 55, 105–117. 2. Page 2, line 5, Loewe's phenomenon. This clearly does apply/happen along many parts of the coast of East Antarctica. There is abundant direct evidence that is rarely important in the Ross Sea sector, see for example: Parish, T. R., and D. H. Bromwich, 1989: Instrumented aircraft observations of the katabatic wind regime near Terra Nova Bay. Mon. Wea. Rev., 117, 1570-1585, doi: 10.1175/1520-0493(1989)117<1570:IAOOTK>2.0.CO;2. 3. Page 2, forcing of the katabatic wind regime, the following paper provides an insightful analysis: Parish, T.R., and J. J. Cassano, 2003: The role of katabatic winds on the Antarctic surface wind regime. Mon. Wea. Rev.,131, 317–333. 4. Page 2, line 18: Spelling of "Weddell" should be corrected. Several other places in the manuscript, including Figure 1. 5. Section 2.3 Polar WRF Simulations. Suspect for this large grid you did not do any nudging at upper levels

to ERA-Interim (for large spatial scales). If not, you probably would have gotten better results for the Polar WRF downscaling with nudging, especially as it appears you ran continuously for 8 years. (See Glisan, J. M., W. J. Gutowski, J. J. Cassano, and M. E. Higgins, 2013: Effects of spectral nudging in WRF on Arctic temperature and precipitation simulations. J. Climate, 26, 3985–3999, doi:10.1175/JCLI-D-12-00318.1). It is appropriate to remember that, when comparing data sets, the Polar WRF results are from free running forecasts whereas the ECMWF reanalyses are tightly constrained by frequent 4DVAR assimilation of observations. 6. Figures 2-4 Can only see 3 colored lines plotted on each side of the median, not 4.

* Bromwich et al. 1993: Spatial and temporal variations of the intense katabatic winds at Terra Nova Bay, Antarctica. Antarctic Meteorology and Climatology: Studies Based on Automatic Weather Stations, Amer. Geophys. Union, 47-68.

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