Atmos. Chem. Phys. Discuss., 15, C8044–C8045, 2015
www.atmos-chem-phys-discuss.net/15/C8044/2015/

Atmospheric Chemistry and Physics Discussions

Interactive comment on "Controlled meteorological (CMET) balloon profiling of the Arctic atmospheric boundary layer around Spitsbergen compared to a mesoscale model" *by* T. J. Roberts et al.

GJ Steeneveld

gert-jan.steeneveld@wur.nl

Received and published: 14 October 2015

This is an interesting study that documents the WRF model performance against a new measurement technique for the challenging Arctic region.

Just two remarks:

-In the study you use the WRF 3.3.1 version. It is known that WRF versions older than the release 3.4.1 is suffering from a bug in the YSU scheme concerning the stable

boundary layer. It appeared that the stability was not correctly activated. This results in too deep stable boundary layers, with low levels jets that are too much diluted (thick and low wind speeds). These have been documented in

Sterk, H. A. M., G. J. Steeneveld, and A. A. M. Holtslag (2013), The role of snow-surface coupling, radiation, and turbulent mixing in modeling a stable boundary layer over Arctic sea ice, J. Geophys. Res. Atmos., 118, 1199–1217, doi:10.1002/jgrd.50158

Sterk, H.A.M., G. J. Steeneveld, T. Vihma, P. S. Anderson, F. C. Bosveld, A. A. M. Holtslag, Clear-sky stable boundary layers with low winds over snow-covered surfaces. Part 1: WRF model evaluation, Quarterly Journal of the Royal Meteorological Society, 2015, 141, 691, 2165.

Xiao-Ming Hu, Petra M. Klein, Ming Xue, Evaluation of the updated YSU planetary boundary layer scheme within WRF for wind resource and air quality assessments, Journal of Geophysical Research: Atmospheres, 2013, 118, 18, 10,490

Although I believe the model biases that are shown also are the result of other aspects of the modelling effort, perhaps it is worth checking.

-A second question is related to the land/snow-atmosphere coupling. The representation of the complex process of how to represent the heat and moisture transport from the subsurface and the land surface to the atmosphere is crucial. Do the model results remain the same in case another land-surface scheme is used?

Interactive comment on Atmos. Chem. Phys. Discuss., 15, 27539, 2015.