We thank you for your thoughtful reviews and responses to our revised version of the manuscript. Both reviewers raised relevant points regarding the altitude correction to the temperature differences and provided great suggestions on what could be causing the observed biases.

We respond to your comments in more detail below:

Reviewer 1

The authors have reasonably well addressed most of my comments. However, my most important comment on the altitude correction is not properly addressed. The authors have done the correction using a moist-adiabatic lapse rate of 6.5 K/km, which is a typical value for the troposphere as a global average. It differs from the dry-adiabatic lapse rate due to the release of latent heat of condensation, which often occurs when air parcels rise from the Earth surface. However, the Antarctic atmosphere is very dry, not least in the region of the McMurdo Dry Valleys addressed in the manuscript. Hence, there is typically no condensation and, even if there sometimes is, the amount of water vapour condensed is so small that it seldom has detectable effects on the lapse rate. Accordingly, the dry-adiabatic lapse rate of 9.8 K/km has to be applied in the altitude correction, as done, e.g., in Bromwich et al. (2013). This will have a large effect on the results and conclusions of the manuscript.

Thank you for pointing out this relevant issue. Indeed, the use of a dry adiabatic lapse rate correction is more appropriate for the Antarctic continent and particularly for the Dry Valleys region which is known for its cold, arid climate. By running our analysis utilizing the lapse rate correction of 9.8 K/km the regional averaged bias is low for the ERA5 dataset and still significant for the bias-corrected product. However, as the new version of the manuscripts highlights, the biases observed at independent stations suggest that there can be significant differences in the overall temperatures of the AWS and the reanalysis products and that these differences have a seasonal dependence. Our results also suggest that topography is not a deterministic factor on the bias. Ultimately, our goal is to report these discrepancies with the hope that it will create awareness on the direct use of ERA5 data for certain applications and perhaps open a border discussion on the phenomenology that causes the seasonal variations.

Reference: Bromwich, D. H., F. O. Otieno, K. M. Hines, K. W. Manning, and E. Shilo (2013), Comprehensive evaluation of polar weather research and forecasting model performance in the Antarctic,J. Geophys. Res. Atmos.,118, 274–292,doi:10.1029/2012JD018139.

Thank you for the suggestion, we have added the citation to the manuscript.

Reviewer 2

Authors have satisfyingly responded most of my questions and concerns and the manuscript is almost on the sufficient level for publishing. However, I am totally satisfied the methods how different elevations of model grid cell and observational site are taken into account. Typically in the atmosphere temperature decreases upward and the lapse rate correction 6.5 °C/km perhaps mostly leads a reasonable correction. However, in the polar region especially in winter, temperature inversions are common and therefore temperature often increases upwards. Occurrence of inversions also amplify the effect of local topography on near surface temperature as the coldest airmass pour in the valleys and near surface temperature are often remarkably higher on slopes and tops of hills or mountains than on valleys.
Overall, it is challenging to compare model products directly with observation because they represent different things. Model product represents average over the whole grid cell and observation might be representative only near observational site. Complex surface topography and frequently occurring temperature inversion makes direct comparison between observations and model product even more difficult.
My suggestion is at least add some discussion about effects of stratification on elevation correction or calculate correction coefficient utilizing specific lapse rate for seasons. You may use observed temperatures to estimate specific lapse rate correction for the area and each season as the observational site are located in different elevation but horizontally relatively close to each other. However, small scale surface topography can still cause large differences between observed and modelled temperatures.
Overall, in my opinion, the manuscript can be published after adding thorough thinking of the effects of stratification and local surface topography on differences between observations and model fields in the manuscript.

Thank you for your comments. We agree that it is challenging to have a direct comparison of the temperatures from the climate reanalysis products and the temperatures measured at the AWS. This is precisely the objective of our manuscript, to emphasize the existence of biases at a local scale and that these differences have a seasonal dependence, so that further studies proceed with caution when using the reanalysis datasets.

By using the dry adiabatic lapse-rate correction suggested by Reviewer 1, which is indeed appropriate for Antarctica, the seasonal biases became quite evident, even when the regional average decreased. We added to the discussion arguing that the warm winter biases can be due to temperature inversions (thank you for pointing this out). However, we refrained from calculating season-dependent bias corrections, since the scope of our manuscript is to show the existence of such biases and suggesting that future work should proceed with caution when using ERA5 data as a direct metric of near-surface temperatures.