UiO : University of Oslo
Faculty of Mathematics and Natural Sciences, Department of Geosciences, Section for Meteorology and Oceanography

Date: 21 June 2021

Dear Editor,

We would like to submit the manuscript entitled *"The contribution of drifting snow to cloud properties and the atmospheric radiative budget over Antarctica"* to Geophysical Research Letters for consideration for publication. Here, we briefly outline the significance of this submission and its relevance to the journal.

The Antarctic Ice Sheet is the largest body of ice on our planet and will be a main contributor to 21st century sea level rise. Due to strong differences in temperature between the interior plateau of Antarctica and the Southern Ocean perpetual katabatic winds emerge, which transport snow from the interior towards the edges. However, most climate model do not account for the presence of drifting snow, despite its large extent (up to 1000 km spatially, 300 m vertically) and the fact that drifting snow amends the surface energy budget like a "normal "cloud. In this study we use a regional climate model which explicitly models drifting snow and we

i) show that accounting for drifting snow over Antarctica leads to a radiative forcing of +2.7 Wm^{-2} over the grounded ice sheet
ii) show that accounting for drifting snow increases the cloud cover over Antarctica by 18.6%
iii) show that drifting snow improves the comparison of our model data with in-situ observations of the surface energy budget and reduces the bias of the model by 2.17 Wm^{-2}, especially in the longwave part of the spectrum.
iv) Based on the above, we conclude that drifting snow is an important yet often neglected component of the Antarctica surface energy budget and therefore needs to be accounted for in future Antarctic climate and sea level rise projections.

Yours sincerely,

Stefan Hofer

Postal address: Postboks 1022 Blindern, 0315 OSLO
E-mail: stefan.hofer@geo.uio.no
www.uio.no