

Interactive comment on “Impact of snow cover on CO₂ dynamics in Antarctic pack ice” by N.-X. Geilfus et al.

Anonymous Referee #2

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The paper by Geilfus et al "Impact of snow cover on CO₂ dynamics in Antarctic pack ice" describes measurements on two pack ice sites. The measurements improve the general understanding of CO₂ dynamics in pack ice under different conditions. The data gained under difficult experimental conditions are doubtlessly a useful piece in the complex puzzle to understand the physical, chemical and biological evolution of pack ice. As such, the paper reports valuable data, with methods well described. However, the experimental design to determine the effect of the snow cover is methodologically rather incomplete. I also missed quantitative measurements of the properties of the cover (as stratigraphy, density, specific surface area, thermal conductivity). As thermal conductivity strongly depends not only on density but also on structural properties, the heat flux could be even equal on both sites, a fact which probably can not be fixed anymore. Concerning the statistical comparison of the key figure 8, I question if any

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statistically significant conclusion can be drawn from these data. What seems to be clear is that the Liège site has a smaller flux, but this could as well be an effect of the different ice properties. I consider the paper a valuable report, but clearly not a paper which elucidates the effects of snow cover on CO₂ dynamics.

Point-by-point comments p 3266 l 5: To validate such conclusions, detailed measurements of snow permeability would be necessary!

p 3267 l 1 "maximum homogeneity" : which type of measurements quantified this property? The description of snow depth does not really support this statement.

p 3208 l 9: "precision of +- 0.1" relative, absolute, unit?

p 3270 l 13 How was this additional steel tube made airtight? How was the additional volume taken into account in the calculations?

General comments on Figures

The size of symbols and lettering is close to illegible when the paper is printed (fortunately, there is a digital version...)

Interactive comment on The Cryosphere Discuss., 8, 3263, 2014.