

Interactive comment on “Multi-year analysis of distributed glacier mass balance modelling and equilibrium line altitude on King George Island, Antarctic Peninsula” by Ulrike Falk et al.

Anonymous Referee #2

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This manuscript describes an interesting dataset of meteorological and glaciological data collected over the Patagonian Icefield over two glaciers, during 5 years, at short time intervals. The data is then used in order to process and calibrate a glacio-hydrological model that permits to assess the increase and amount of fresh melt water inputs into the sea/ocean due to a negative mass balance. This suggests strong impacts of climate change on the micro biota in the region but this is not described in detail. The scientific quality of the data and its relevance are both high, but unfortunately the structure of the text lacks organisation and shall be better put into perspective in order to smooth the reading and provide a more valuable input. I recommend this study to be published. The manuscript should undergo major revisions before that:

C1

structure should be revised: results, methods, and data description are too much mixed resulting in a confusing overall text.

the introduction could be shortened a bit and resynthesized; how does the different changes in the climatic processes actually link to the melt/accumulation processes?

a broader perspective shall be introduced: for example: future predictions or discussion of the results in terms of future climate change...impact of these changes on the society/microbiota, etc...?

Specific comments

abstract

line 5 "distinct spatial heterogeneity reflecting the impact of synoptic[...]" I don't understand what you mean

line 6 "moist air with high temperatures and rain, and leads to melt conditions on the ice cap, fixating surface air temperatures to the melting point[...]" I believe you mean melting surface temperature? please rephrase

Introduction

line 1 "a large fraction" how much? page 3 line 16: add a point 6? projection?

Study area

the section could be synthesised

p3 line 32 "rarely absent" -> "frequent" ? p3-4: "all year round" -> you said "rarely absent" just before so that is confusing p4 line 3: link that with the changes in the climatic systems evoked in the introduction

Datas and glaciological datasets

line 15 p4: are the radiation shield aspirated artificially? you should discuss if there's an impact of the radiation on the air temperature measurements.

C2

p4 line 26: the nationality has no scientific significance

p6 line 9-11: might be moved to "methods"

p6 line 28: so what do you do in that case? could you explain?

p9 line 11-22: could you explain more precisely how you use your density measurement to interpret your snow height changes in terms of swe?

p10-11, until 3.4 : that mixes results/methods, please clarify.

p12 line 12: can you provide an estimate of the uncertainties on discharge outputs resulting from all the unknowns such as, for example, the bedrock topography? do you have any discharge measurements?

p12 line 30: how much that would impact further predictions (such as those made with the AAR)

p14 line 24: coverage

p15 line 2: to methods

p15 lines 6-10: to methods

line 21: ?

line 26 - onwards: to methods

p17: the AAR method should be described in a methods section

p18 line 19: See general comments: what would be the impact on micro biota of these changes (make links to the introduction)

Interactive comment on The Cryosphere Discuss., <https://doi.org/10.5194/tc-2017-232>, 2017.