

# ***Interactive comment on “Revisiting Austfonna, Svalbard with potential field methods – A new characterization of the bed topography and its physical properties” by Marie-Andrée Dumais and Marco Brönnner***

## **Anonymous Referee #2**

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This paper addresses an important and interesting topic regarding the estimation of sub-glacial bed topography from combined geophysical methods: combination of airborne gravity measurements with magnetic data. The authors compare their results to previous estimations obtained from GPR measurements. They found clear discrepancies in area with previous poor coverage and provide improvements in the overall estimation of the bedrock topography. An important improvement also concerns a fine description of the physical properties of the bedrock (lithology, roughness, density, thermal conductivity. . .) which are of prime interest to describe and predict the dynamics

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of the ice cap.

This paper has been carefully prepared, is well written with figures of high quality. The context of the study is well presented. The readers will certainly appreciate the detailed analysis provided regarding the multiple geophysical methods used with systematic estimation of their uncertainties and discussion of their limitations. The geological interpretation presented by the authors is rigorous (I am not familiar with the area though), supported by both geophysical data and field observations. I only found that a more detailed discussion on the implications of having such improved estimations of sub-glacial bed topography on our understanding of the dynamics and evolution of the ice cap is missing. I would recommend to provide a dedicated paragraph with perspectives. In the following I raise few additional minor points.

Pg1, Line 29: The distribution of rheological properties of the ice might also play a critical role. Pg6, Line 13: typo Pg6, Line 31: Provide mean and std values of density for granites from the literature? Pg6, Line 40: Please provide more arguments to justify the link of this granite intrusion with the observed Caledonian Rjipfjorden. Pg 7, Line 41: What do you mean by “Calcite precipitation influences the bed roughness and the water film[. . .]”. Please clarify. Pg8, Line 9: Do you have local evidences/estimations of this heat flux? Figure 4: Same color scale for all panels. Figure 5: Radar topography is missing in profile B. Some captions could be improved by providing more information with major observation/interpretation/messages (i.e. Figures 2, 3 and 6).

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