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Short-term dynamics of Sermeq Kujalleq in Kangia (Jakobshavn Isbræ), Greenland derived from TRI and GNSS measurements

Adrien Wehrlé¹, Martin P Lüthi¹, Ana Nap¹, Guillaume Jouvét¹, and Fabian Walter²

¹Institute of Geography, University of Zurich, Zurich, Switzerland

²Swiss Federal Institute for Forest, Snow and Landscape Research (WSL), Birmensdorf, Switzerland

Sermeq Kujalleq in Kangia (Jakobshavn Isbræ), Greenland has been extensively investigated over the past decades due to its recent retreat associated with extremely fast ice stream flow and high solid ice discharge. However, its short-term dynamics still remain poorly understood as they consist in transient states that can only be captured by high spatial and temporal in situ measurements. In the new COEBELI project, we aim at combining high resolution field data sets from seismic arrays, global navigation satellite system (GNSS) receivers, long-range uncrewed aerial vehicles and terrestrial radar interferometers (TRI) to achieve a comprehensive and detailed study of the short-term ice stream dynamics. Here, we present TRI and GNSS retrievals of surface velocity and elevation acquired during the first, exploratory field campaign of the COEBELI project in summer 2021. Seven kilometers away from the calving front, we specifically identified a slowdown of 1.12 m d^{-1} within a single day in the main trunk of the ice stream. While the absolute slowdown is larger in the main trunk than in the outer area of the shear margin (1.12 m d^{-1} versus 0.75 m d^{-1}), it corresponds to a larger fraction of the pre-slowdown velocity in the latter zone (-4.48% versus -7.94%). We further discuss the challenges associated with the acquisition, processing and analysis of high-resolution data sets for the study of such complex and dynamic environments.