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Glacial, fluvioglacial and fluvial sedimentary discharge in the northwestern coastal sector of the Ross Sea continental margin since upper Miocene to LGM

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The Borchgrevink Coast stretches from the Coulman Island northward to the Cape Adare for at least 200 km, bordering the western side of the northern Drygalski Trough. The early phase of the acquisition objectives of the PNRA Project Glevors (Glacial Evolution in the northwestern Ross Sea, offshore North Victoria Land, Antarctica) was accomplished in the north western coastal sector of the Ross Sea continental margin along the Borchgrevink Coast, from Coulman Island to Cape Hallett. Single channel seismic and sub bottom profiles, swath bathymetry and gravity cores were collected during the Austral summer of 2016/2017, by the scientific research vessel OGS/Explora.

The studied area along this segment of the Borchgrevink Coast documents, by the analysis and the interpretation of available geophysical, geological and oceanographic data, the paleo ice discharge and ice flowing patterns of the inferred Mariner-Borchgrevink and Tucker coastal glaciers, since at least the Upper Miocene until the Holocene Time. The repeated and possibly asynchronous oscillations of these valley glaciers from the North Victoria Land coast, at least about tens km offshore, and their interaction with fast flowing ice streams from the south are recorded. In particular, the analysis of the architecture and of the geometrical relationship of the interpreted seismic facies and units allows to infer past glacial and interglacial environments. Modelling of paleo environments and related climate condition is achieved despite the age constrain uncertainty of local seismic stratigraphy and of biostrathigraphic correlations to coeval sediment section in southern Ross Sea inner-shelf sector (McMurdo Sound), and besides the acoustic facies ambiguity due to not enough data resolution.

The interpreted shallower and Holocene-Present glacial related features are simple or composite ice-marginal landforms, with overstepping smaller recessional deposits on top or behind. They testify the coastal glaciers grounded events and the ice retreat modality during the pre-LGM and the LGM. We infer that northern coastal glaciers, from the Tucker glacier northward, about 72° latitude, did not advance or reach the northwestern Ross Sea shelf edge at the LGM, but possibly before. The grounding line of NVL coastal glaciers would correlate with the pre-LGM grounding lineament reconstructed for the major ice-streams flowing from the south. More ancient and buried wedge, underlying the main composite Grounding Zone Wedge (GZW) system raises the issue if it was possible the formation and the preservation as a pinning point, of a previously developed GZW or of the upper part of a fluvioglacial delta in late Miocene or Pliocene time. Moreover, further offshore from the coast, the evidence, of an ancient buried glacial/fluvioglacial or fluvial delta, embedded within the glaciomarine clinoforms of the Trough Mouth Fans (TMFs) deposits filling the Northern Drygalski Trough, suggest climate change and an inferred preceding coastal open-sea condition.