

EGU2020-11568

<https://doi.org/10.5194/egusphere-egu2020-11568>

EGU General Assembly 2020

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## Geomorphological analysis of a sub-Antarctic valley under deglaciation: the Guynemer basin, Kerguelen Archipelago (49°S), Southern Indian Ocean

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Located in the southern part of the Indian Ocean (49°S), the Kerguelen Archipelago is the largest of the sub-Antarctic islands with an area of around 7,200 km<sup>2</sup>. With a volcanic origin, its main island Grande Terre is partly covered by the Cook ice Cap which rises above 1000 m a.s.l. Numerous glaciers flow towards deep fjords especially from the ice cap. Their total surface area decreased by 21 % between 1963 and 2001, from 703 to 552 km<sup>2</sup> [1]. This high retreat rate was associated with an increase in air temperature and a decrease in precipitation potentially associated with a modification of the westerlies' regime. The archipelago has so far been the subject of very little geomorphological work, while thirty cosmogenic nuclide dates distributed on the archipelago allow a first insight in the deglaciation with ages between  $41.9 \pm 4.4$  and  $0.7 \pm 0.37$  ka [2].

Within the PALAS expedition (PAleoclimate from LAke Sediments) carried out in November and December 2019 on several lakes located between the ice cap and the Peninsula of the Société de la Géographie, we mapped the geomorphology of several valleys. Here we present the mapping results and analysis of the Guynemer basin located downstream the Guynemer Peak (1088 m a.s.l.). Located c. 10 km north of the Cook Ice Cap, its slopes mainly consist of frost-shattered debris interspersed with rocky escarpments, but the basin still contains a small glacier (<1.5 km<sup>2</sup>) at the foot of the east face of the peak. This face has several small hanging glaciers, one of which showing signs of destabilization. An upper Guynemer Lake resulting from the glacial over-deepening (0.5 km<sup>2</sup>; 245 m a.s.l.) is separated from the lower Guynemer Lake (1.5 km<sup>2</sup>; 121 m a.s.l.) by a rock step, a gorge and a wide delta incised by several channels. The mapped sector has many glacial inheritances, from the cirque which contains the upper lake to a frontal moraine that is partly damming the lower lake. Several dozens of morainic ridges have been recognized, corresponding at least to 6 or 7 main stages, from possibly early Holocene or Lateglacial to the 1960s. Surface exposure dating of moraines and erratic boulders in the coming months will supply a detailed chronology of the glacier fluctuations.

[1] Berthier et al. (2009). Journal of Geophysical Research - Earth Surface, 114: F3.

[2] Jomelli et al. (2018). *Quaternary Science Reviews*, 183: 110-123.