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Glacial geomorphology and neoglacial advances of Marinelli glacier, Cordillera Darwin Icefield, Tierra del Fuego, Chile.

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During the recent years, an increasing number of articles on Cordillera Darwin Icefield (CDI) and the extensive recession of its glaciers during the last termination has been published. Although, only a few authors have focused on neoglacial advances and the differences between the evolution of marine-terminating and land-terminating glaciers. In this study, we combine satellite imagery interpretation validated by fieldwork and new radiocarbon data to improve the glacial history during the Holocene of the largest glacier in Tierra del Fuego, Marinelli glacier, and to compare its tidewater dynamics with Pigafetta glacier, an adjacent land-terminating glacier.

Marinelli glacier (54º36' S, 69º36' W), with 119 km2 in 2016 is a tidewater calving glacier located in the northern part of Cordillera Darwin. It has one of the largest studied retreat rates in South America: -11.32 km between 1984-2014 (-337.3 m/yr). Paleostratigraphic and sedimentologic evidences show that this glacier has been limited inside the Marinelli fjord since, at least, ∼12.500 cal yr BP, developing a large terminal moraine, partly controlled by geotectonics. Radiocarbon dates of the organic remains in the outer part of this terminal moraine complex suggest that the Marinelli glacier retreated at >2,795 cal yr BP. Later, few moraine ridges show new neoglacial advances before the last expansion of ice during the Little Ice Age.

Pigafetta glacier (54º36º S, 69º34' W), with 23.5 km2 in 2016 is a freshwater calving glacier located nearby the first one. But otherwise, it presents a gradual shrinkage during the Holocene, preserving recessional moraine landforms on its way back to form the LIA moraine ridge, which is damming a proglacial lake nowadays. In this area, we determined that the tephra layer found in one of the peat cores, is well related to the geochemical analysis and chronological age derived from MB2 eruption of Mount Burney volcano (52º S), expanding the previous >1 cm isopach further to the southeast of Tierra del Fuego.

Our results emphasize the importance of local conditions, such as the marine-terminating or land-terminating character of the glaciers under study, as crucial for a correct understanding of the glacier dynamics and glacial history reconstruction.