
Evolution of glaciers in Ecuador during the late Holocene based on ^{36}Cl moraine dating and glacio-climatic modelling

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Abstract

Over the past decades, tropical glaciers have experienced rapid retreat due to ongoing global warming and now face complete disappearance, jeopardizing water resources and other essential services for local populations. In this context, reconstructing past glacier fluctuations is essential to place this trend within a longer temporal framework. However, Late Holocene (4.2 ka to present) glacier fluctuations in Ecuador remain poorly constrained, whereas Bolivian and Peruvian glacier chronologies are relatively well documented. Using 8 samples from moraines combined with a Positive Degree-Day (PDD) glaciological model, this study provides new insights into the evolution of Antisana glacier over the Late Holocene. Antisana glacier advanced at 2.11 ± 0.24 ka and 0.23 ± 0.06 ka, and its fluctuations appear to follow the trends observed in Tropical and North Atlantic glaciers. The PDD model partially reproduces the extents recorded by moraines, at least for the present day and the Little Ice Age. Future reconstructions of paleoglacier extents could be improved by optimizing the surface mass balance calibration of the PDD model or by using more reliable past climate inputs.

Keywords: glacial fluctuations, paleoclimate, ^{36}Cl CRE dating, Ecuadorian glaciers, Positive Degree, Day glaciological model

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