Antarctic Peninsula exhumation and landscape evolution investigated by detrital low-temperature thermchronometry

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We present detrital apatite (U-Th)/He (AHe) thermochronometric ages from the Antarctic Peninsula (AP) to investigate landscape evolution by glacial erosion. The topographic response to glacial erosion is widely debated, largely due to the duality between glacial erosion efficacy and temperature. The AP is a valuable location for examining the topographic effects of glaicers as it exhibits many of the same geomorphic features observed in temperate alpine landscapes, but it has likely experienced a very different glacial history. The AHe system can constrain the timing and rates of glacial erosion, due to its sensitivity to shallow perturbations in the geothermal field beneath an evolving topography. AHe thermochronometry is typically applied to bedrock samples, to quantify time-temperature paths at specific locations. However, such bedrock samples are not easily obtained along the heavily glaciated AP. We circumvent this limitation by applying the AHe system to detrital offshore samples in conjunction with a thermokinematic model, Pecube. Our modified version of Pecube incorporates a modern erosion scheme for predicting the detrital age distribution using Bayesian statistics. Our analysis of preliminary data indicates relatively low background exhumation rates (<0.015 km/Myr) and an onset of more rapid, km-scale topographic change at ~30 Ma. This supports the hypothesis that glacial erosion along the AP began much earlier than in temperate sites. We will discuss our approach of using simple geomorphic laws to predict the distribution of detrital ages to study the physical mechanisms and patterns of modern erosion.