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Exhumation of the Fitz Roy Granite: How Efficient are the Mantel and Glaciations Processes?

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Whether late Cenozoic cooling and glaciations induced an increase of mountain erosion or not remains enigmatic. Indeed, most places where an increase of erosion rate has been argued experienced concomitant active tectonics and glaciations. The Chile ridge subducted beneath the region of the Miocene calc-alkaline Fitz Roy pluton (~49°S) complex 12 Myrs ago. Following the northward migration of the Chilean triple junction, this part of the Southern Patagonian Andes exhibited limited tectonic activity. On the other hand, morainic record testifies for the growth of large glaciers flowing and coalescing in the foothills since about 6 Ma, after which glaciations were repeated cyclically during the Late Pliocene and regularly during the Pleistocene. These glaciations left a strong imprint on the landscape, producing some of the most conspicuous glacial landforms on Earth. The diachronism between the end of tectonic shortening and the onset of glacial erosion thus offers the possibility of deciphering the respective role of tectonics and climate on erosion rate and related exhumation. Here we report new thermochronometric data from the 16.8 Ma old Fitz Roy (Cerro Chaltèn) pluton and show that erosion rates increased in the last ~7 Myr. Comparison of our new data with data collected along a 500 km transect extending further north and south reveals that the 6 Myrs-old increase was regional and therefore most likely associated with mountain glaciations rather than with uplift triggered by ridge subduction.