

# THE RELATION BETWEEN NEOGENE DENUDATION OF THE SOUTHERNMOST ANDES AND SEDIMENTATION IN THE OFFSHORE ARGENTINE AND MALVINAS BASINS DURING THE OPENING OF THE DRAKE PASSAGE

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**ABSTRACT:** The Neogene orogenic growth of the Southern Patagonian Andes has been related to the approximation and collision of a series of segments of the Chile seismic ridge, which separates the Antarctic and Nazca plates, against South America. The compiled thermochronological data consistently indicates an eastward moving trend of exhumation, starting with uplift of the western basement domain from ~34 to 15 Ma, followed by denudation of the fold and thrust belt between ~20 Ma and 5 Ma. The Neogene foreland basin stage started with a transgressive marine phase (*Patagoniano*), followed by a middle Miocene regression and the onset of continental conditions in Patagonia. Continental deposits are represented by a coarsening upward succession of fluvial deposits from the Santa Cruz Formation, thinning eastward from a maximum 600 meters in the foothills to 250 meters on the Atlantic coast. There has been an assumption that tectonic growth in southern Patagonia ended in late Miocene times, largely based on the top age of the Santa Cruz Formation, deposited from ~22-19 to 14 Ma. However, multiple thermochronological evidence shows that exhumation in the hinterland continued profusely, with large volumes of rock denudated rapidly between ~15 and 5 Ma, and steadily since ~7 Ma. Continental sedimentation rate was very low in the Magallanes-Austral basin after the middle Miocene, which is followed by upper Cenozoic piedmont and glacifluvial gravel deposits known as *Rodados Patagónicos* covering most of extra-Andean Patagonia. Contrastingly, the upper Miocene-lower Pliocene constitutes a transgressive aggradational period very well developed in the offshore Argentine and Malvinas basins. Late Miocene to Pliocene denudation has been assigned to Patagonian Glaciations, isostatic rebound and dynamic topography due to an asthenospheric window. Sedimentation rates in the Magallanes-Austral basin of the Southernmost Andes after deposition of the Santa Cruz Formation, could have been dramatically reduced by the dynamic uplift of Patagonia. We propose that the great volumes of sediments produced by Miocene-Pliocene denudation of the Southernmost Andes bypassed Patagonia and reached the Argentine and Malvinas basins, where they were accommodated in thick sequences with high sedimentation rates. Those sediments were distributed along the Southern Atlantic margin by Subantarctic currents, which propagated into the Argentine continental margin during the deepening of the Drake Passage. The sediments were probably funneled through gargantuan fluvial and glacifluvial W-E systems, similar to those preserved in Patagonia from the last glaciation, and axially through the Fuegian Andes foothills towards the offshore basins.

**KEYWORDS:** South-Atlantic offshore basins, Southernmost Andes, Drake Passage, Malvinas current