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Abstract

This study synthesizes the tectonomagmatic evolution of the Andes between 35°30'S to 48°S with the aim to spotlight early contractional phases on Andean orogenic building and to analyze their potential driving processes. We examine early tectonic stages of the different fold-thrust belts that compose this Andean segment. Additionally, we analyzed the spatio-temporal magmatic arc evolution as a proxy of dynamic changes in Andean subduction during critical tectonic stages of orogenic construction. This revision proposes a hypothesis related the existence of a continuous large-scale flat subduction setting in Cretaceous times with a similar size to the present-largest flat-slab setting on earth. This potential process would have initiated diachronically in the late Early Cretaceous and achieved full development in Late Cretaceous to earliest Paleocene times, constructing a series of fold-thrust belts on the retro-arc zone from 35°30'S to 48°S. Moreover, we assess major paleogeographic changes that took place during flat-slab full development in Maastrichtian-Danian times. At this moment, an enigmatic Atlantic-derived marine flooding covered the Patagonian foreland reaching as far as the Andean foothills. Based on flexural and dynamic topography analyses, we suggest that focused dynamic subsidence at the edge of the flat-slab may explain sudden marine ingression previously linked to continental tilting and orogenic loading during a high sea level global stage. Finally, flat-subduction destabilization could have triggered massive outpouring of synextensional intraplate volcanic rocks in southern South America and the arc retraction in late Paleogene to early Neogene times.