ESEG-2: Tectonoestratigrafía de las cuencas andinas Mesozoicas

The influence of Andean orogenic uplift and deformation style on the evolution of stratigraphic architecture, Cretaceous Magallanes foreland basin, Chilean Patagonia

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Andean foreland basins provide insight into the tectono-sedimentary evolution of South America over deep geologic time. Numerous uplift mechanisms (e.g., thrust sheet emplacement) have contributed to the formation of the Andes and the evolution of adjacent basins. Many workers have studied foreland basin evolution during periods of sustained uplift; however, studies on the depositional response to changes in uplift style during these periods are few. We analyze stratigraphic data along with >13,700 U-Pb detrital zircon ages (49 samples) from Coniacian-Maastrichtian units (Cerro Toro, Tres Pasos, Dorotea formations) of the Magallanes Basin in Última Esperanza Province to evaluate basin evolution over ~22 m.y. of Andean uplift. We use this integrated dataset to examine how uplift style can impact foreland basin catchment evolution and depositional architecture. Uplift via thrust sheet emplacement and associated convergence was prevalent in the Patagonian Andes from 90-82 Ma. Fine-grained units of the lower Cerro Toro Formation (90-88 Ma), which record coarse-grained sediment starvation, contain abundant Jurassic and Cretaceous zircons, while conglomeratic channel-levee strata in the upper Cerro Toro Formation (88-81 Ma) feature abundant Paleozoic zircons. We link this shift to exhumation of Paleozoic units via thrusting, along with efficient sediment transfer to the basin across a narrow shelf. Previous workers have documented pluton intrusion into thrust sheets starting at 82 Ma, which has been interpreted to have led to uplift characterized by lithospheric doming in the orogen. This shift coincides with a prolonged period of mass wasting in the basin (81-78 Ma) recorded by up to 800 m of chaotically bedded deposits in the lower Tres Pasos Formation. U-Pb age spectra from this interval resemble upper Cerro Toro Formation age spectra. We suggest that doming led to widespread mass failure and promoted intrabasinal recycling. Mass wasting was followed by evolution of a shelf margin clinoform system recorded in the upper Tres Pasos and Dorotea formations (78-68 Ma). Strata in this interval contain abundant Paleozoic zircons. We suggest that doming led to further extrusion and erosion of the orogenic wedge, resulting in a decline in basin subsidence and ultimately, terminal infilling of the bathyal basin. These results elucidate the effects of Andean uplift in Chilean Patagonia, and may help inform basin evolution in other deep-water foreland systems globally.