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The formation of a retroarc fold-thrust belt by the closure and inversion of a back-arc basin; Patagonian-Fuegian fold-thrust belt, Chile.

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The Late Cretaceous closure and inversion of the Late Jurassic Rocas Verdes back-arc basin (RVB) defines the onset of the Andean orogeny and the development of the Patagonian retroarc fold-thrust belt (FTB) be- tween 50°-54.5° S. Back-arc extension in the RVB led to the generation of new oceanic crust that was coeval with the deposition of syn-rift silicic volcanoclastic rocks on the continental margin. A > 500 m thick succes- sion of mudstone and distal turbidite deposits accumulated in the RVB (post-rift). New maps and line- balanced cross-sections from three transects across the FTB show a transition through time from thin-to thick-skinned structural styles that is controlled by the inherited stratigraphic architecture and structure of the RVB.

The closure of the RVB and development of the FTB occurred in two stages. During the initial stage, mafic schist, gabbro, basalt, and hemipelagic mudstone of the RVB floor were imbricated and thrust onto the continental margin resulting in the formation of the Magallanes foreland basin and underthrusting of the continental crust to depths of ~ 35 km. Displacement from the obduction of the RVB was transferred along two decollement levels into the FTB by ~85 Ma. Each decollement level formed at a rheological boundary within the syn- and post-rift stratigraphy. The lower decollement formed in quartz-chlorite schist (basement) > 1 km beneath the top-basement contact with relatively strong syn-rift volcanoclastic deposits. The lower decollement is defined by a ~1 km thick ductile shear zone. C-S fabrics, C-C' shear bands and prominent SW plunging quartz stretching lineations that occur within the shear zone indicate a top-NE transport direction. Isoclinal recumbent F2 folds and inclined tight F3 folds refold the S1/L1 surface. The decollement cuts up- section through the syn-rift volcanoclastic deposits to join a structurally higher decollement that formed within weak, post-rift mudstone and turbidite deposits on the continental margin. A low-taper triangle zone formed at the tip of the thrust wedge where Late Cretaceous strata of the foreland basin are backthrust (top-SE) above the shale decollement. Several NE-vergent thrusts sole into the shale decollement and imbri- cate foreland basin strata. Shortening in the basement beneath the lower decollement is detached from the cover and accommodated by polyphase folding and penetrative strain. A minimum of ~10 km (16%) of shortening is transferred into the FTB during this stage.

The second stage is marked by basement-involved, steeply dipping (>60°) reverse faults that cut the ini- tial decollements. One high-angle reverse fault places basement and RVB rocks above the foreland basin strata and can be traced for >100 km along strike. Two other basement-involved reverse faults cut early phase structures of the retroarc FTB. On the basis of steep dip, and the cross cutting relationship with the early decollements, basement-involved reverse faults are interpreted to reactivate Jurassic normal faults. Thick-skinned faulting accounts for a minimum of ~7 km (10%) shortening. The Patagonian-Fuegian FTB pro- vides an important example of how decollement levels and structural style of a retroarc FTB can be con- trolled by the inherited stratigraphic architecture and structure of a back-arc basin in a noncollisional setting.

Keywords: retroarc fold-thrust belt, basin inversion, Andes, tectonics, foreland basin