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Density structure and rheology of northern Argentina: from the Central Andes to the foreland basin

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The Central Andes along with their related basins constitute a heterogeneous and complex system. Its present state results from the interaction of the recent Andean orogeny with inherited structures of the lithosphere. Several studies have been conducted in the region, producing a variety of geological and geophysical data that shed light on the lithospheric structure of the orogen and its foreland basins. Individual studies have integrated these data into regional models, however, a data-based density model of northern Argentina has not yet been published. In a joint effort, we present a consistent lithosphere-scale 3D structural and density model of northern Argentina that integrates two previously published models of the Central Andes and the Chaco-Paraná foreland basin. The gravity response of the combined model agrees with the observed Bouguer gravity field. In a second step, starting from this model, we present data-constrained estimates on the thermal field and rheological behaviour across northern Argentina. We address how the present-day thermal field can be estimated in a transient arc-backarc system, which problems arise and propose an approach to tackle them. Thermomechanical models using our validated subsurface structure then allow to analyse present-day and future deformation in northern Argentina. Together with the temperature and rheology estimates, a better understanding of the whole system and the processes leading to its present state is achieved. The model will be further used to reconstruct basin evolution and georesource formation.