

Inverted structures in the western Central Andes thrust belt front

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Abstract

This chapter presents different examples of inversion structures recognized under the Pampa del Tamarugal along the western mountain front of the Central Andes in northern Chile, which were ignored during many years. This chapter begins with a regional-scale perspective of the geological context and the previous interpretations proposed to the region. Then, we detailed the workflow and seismic criterion applied to the identification of the inversion structures in the region. Afterward, we present a detailed description of the seismic and structural interpretation based on the identification of some key stratigraphic and structural elements found both in the field and the seismic data. This allows interpreting the structural styles related to the reverse-reactivation of previous basement-involved normal faults created during the early rifting of the western margin of South America. Finally, we propose a tectonic evolution of the study region, considering the interpretations shown in this chapter.

Introduction

Inversion structures are widely recognized in orogenic belts with a large variety of structural styles (e.g., [Cooper and Warren, 2010](#)). An essential feature of these structures is the change in the regional stress from extension to compression over time. Extension creates the accommodation space for syn-rift sequences. Later, compression deforms these sequences and produces asymmetric folding with steeper forelimb and gentle backlimbs, as well as other subsidiary structures.

We present seismic examples that illustrate the reactivation of preexisting normal faults in the Pampa del Tamarugal in the western Central Andes thrust belt front (Fig. 1a and b). The Pampa del Tamarugal corresponds to a nonmarine forearc basin forming a broad depression that extends along the western Domeyko Cordillera and/or Chilean Precordillera (Fig. 37.1). It is characterized by N–S contractional structures as a result of the several orogenic events affecting the region between the Late Cretaceous and the Pliocene ([Muñoz and Charrier, 1996](#); [Farías et al., 2005](#); [Victor et al., 2004](#); [Nester, 2008](#); [Jordan et al., 2010](#); [Armijo et al., 2015](#); [Fuentes et al., 2018](#); [López et al., 2020](#)). The morphology of the Pampa del Tamarugal corresponds to a vast plain of about 12.000 km² that extends to the west of the Domeyko Cordillera.