



Structural characterization of the thrust front of the Malargüe fold-and-thrust-belt (35°- 36° S) and its relationship with intrusion of Miocene igneous bodies

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In the southern part of Mendoza province, Argentina, the Malargüe fold-and-thrust-belt develops as a thick-skinned belt during the Andean orogeny. Contraction across this FTB reactivates previous rift structures of the oil-producing Triassic-Cretaceous Neuquén Basin and generates new thrusts which deform only the sedimentary cover. At this latitude, the main Andean deformation phase started in the early Miocene (~20 Ma) and advanced to the foreland with the present-day deformation front near Malargüe city. An expansion of the magmatic arc during the Miocene is also recorded in the study area.

We focused our work in the Agua Botada area, placed on the western flank of the Malargüe anticline near the deformation front. Using surface information from field surveys and sub-surface data from oil wells and seismic surveys, we have constructed a series of balanced cross-sections of the Agua Botada area showing the relationship between Mesozoic inverted faults and newly created faults. We have surveyed and mapped in surface and complemented with the logs of oil wells, the igneous bodies emplaced in the sedimentary succession of the Neuquén basin and analyzed the relationship between the intrusion, active structures and the stress field.

Mesozoic structures trending NNW to NW were inverted during the Andean contraction probably due to their orientation, whilst other rift-related structures recognized in seismic data with WNW orientation were not reactivated.

Based on the relationship between distance and thickness and orientation of the sills and dykes in the area we propose that two volcanic necks, Tronquimalal and Mirano, are the main feeders of the igneous bodies. These feeders have NW to WNW orientations which allow us to infer that the magma flowed using deep rooted structures such as the WNW rift structures not inverted in the Andean orogeny.

We propose a geomechanic model with three main episodes: in the first one (17-10 Ma) the deformation was focused to the west of the actual thrust front and the Agua Botada area corresponds to the foredeep zone of the foreland basin.

In the second episode (10-7 Ma), the deformation progressed to the east affecting the western part of the study zone with the activity of thrust faults under a compressive stress field. By this time some sills were emplaced using the thrusts as feeders in the western domain, while in the eastern domain a strike-slip/compressional stress regime promoted the dilatance of WNW rift-related faults that were suitable as magma feeders for the sills and dykes.

Finally, in the third episode (7-1 Ma) the deformation moved farther east to the present-day deformation front, reactivating the preexisting Malargüe fault as a reverse fault and folding the sedimentary succession into the Malargüe anticline.