Conductive anomalies related to the Mérida Andes derived from the 3D inversion of a magnetotelluric profile

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Abstract
The geodynamic settings of north-western Venezuela are conditioned by the expulsion of the North Andean Block (NAB), and the deformational structures related to the Caribbean – South America plate interactions. The most prominent feature is the 100 km wide Mérida Andes (MA) that reach from the Colombian border to the Caribbean coast over more than 500 km. We present the analysis of a magnetotelluric (MT) profile acquired at 72 broadband sites along a 240 km long profile with station spacing between 3 and 5 km across the central part of the MA, including the sedimentary Maracaibo (MB) and Barinas-Apure (BAB) basins. Phase Tensors (PT) are consistent with 1D/2D dimensionality above the MB and the BAB, however, stations above the MA show a clear 3D dimensionality, with the induction vectors indicating the presence of off-profile structures. Following the dimensionality analysis, 3D inversions of the entire dataset were performed, employing the finite differences code ModEM. The results are in agreement with prominent geological structures, and are particularly effective in modelling the depth extensions of major fault systems. A conductive structure east from the profile at mid crustal levels seems to correlate with the tectonic escape of the Trujillo block, which is part of the NAB.