Modelling of the thermal structure of the Mexican Volcanic Belt for geothermal energy

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Mexico is a major geothermal energy player in the world with an installed capacity of over 900 MW for electricity production, positioning Mexico at the 6th position. The installed capacity is supported by 4 geothermal location: Cerro Prieto, Los Azufres, Los Humeros, and Las Tres Virgenes. Two of these sites are in Trans-Mexican Volcanic Belt (TMVB) a volcanic arc structure that is the result of the subduction of the Cocos Plate underneath the North American plate. The interesting feature of this onshore volcanic arc is the combination of magmatism with the extentional stress field within the arc with a shear component as a result of the oblique subduction. As a result of this combination, is a very favourable regional setup for the development of geothermal energy.

The core of the work is the establishment of a thermal model at present day at the scale of TMVB. The elements considered in the thermal-tectonic model are the composition of the lithosphere, the volcanic evidences, and temperature measurements available. The newly developed b3t software at Utrecht University and TNO will perform the modelling, which allow the identification of thermal variation in the lithosphere at present-day with the data integration.

The result of the thermal-tectonic modelling is a thermal model of the TMVB lithosphere that is considered according to the general geological and geodynamical context. The variation of temperature are intricately related to the magmatic centres and the lithological composition of the TMVB.