Geophysical Research Abstracts
Vol. 13, EGU2011-6995, 2011
EGU General Assembly 2011

Curie Point depth estimates and correlation with flat-slab subduction in Mexico

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We investigate the regional thermal structure of the crust in Mexico using Curie Point Depth (CPD) estimates. The top and bottom of the magnetized crust were calculated using the power-density spectra of the total magnetic field from the freely available "Magnetic Anomaly Map of North America". We applied this method to estimate the regional crustal thermal structure in overlapping square windows of $2^\circ \times 2^\circ$. The CPD estimates range between 10 and 40 km and show several regions of relatively shallow and deep magnetic sources, with a general inverse correlation with measured heat flow. A deep CPD region (20–30 km) is located in the fore-arc area where the subducting Cocos plate has a flat-slab geometry. This deep region is bound to the NW and SE by shallow CPD areas beneath the states of Michoacan (CPD = 12–16 km) and Oaxaca (CPD = $\sim$16 km), respectively. There is a good spatial correlation between this deep CPD area and two main fracture zones located on the incoming Cocos plate (Orozco and O'Gorman fracture zones), suggesting that subduction plays an important role in setting apart different CPD provinces along the Mexican coast. Another deep CPD (16–32 km) area corresponds to the region where the Rivera plate subducts beneath Jalisco block. The Trans-Mexican Volcanic Belt is characterized by a decrease in Curie depths from west (16–20 km) to east (10–12 km). Finally, several deep CPD areas are situated in the back-arc region where old Mesozoic terrains are present. Our results suggest that the main control on the crust's regional thermal structure in the fore-arc and volcanic arc regions is due to the subduction of the Cocos and Rivera plates beneath Mexico.