

Crustal rheology of the Tibetan Plateau Inferred from magnetotelluric data

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Magnetotelluric (MT) data permit the electrical resistivity of the crust and mantle to be imaged from the surface using natural variations of the Earth's magnetic field. These resistivity measurements are inherently sensitive to presence of interconnected fluids such as water and partial melts. MT data have shown that a low resistivity layer is present beneath Southern Tibet along a significant proportion of the Tibetan-Himalayan orogen. The observed electrical resistivity values can be accounted for with 5-12% partial melt and represents at least a factor of 10 decrease in viscosity. This reduction in viscosity is sufficient for geodynamic models that invoke erosion controlled channel flow and which exhume mid-crustal rocks and expose them in the High Himalaya.

MT data also give evidence for a different style of crustal flow in Northern and Eastern Tibet. A low resistivity zone was imaged at mid-crustal depths on MT profiles located south of the Kunlun Fault near Golmud and west of the Xianshuihe Fault in Sichuan. These low resistivity zones could represent a zone of reduced viscosity that delineates a channel of mid-crustal flow that is escaping from the Indian-Asia collision zone.