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Origin of the geothermal in Tianshui region in the northeastern margin of Tibet and its implication

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There are two tectonic uplifts of magma in Tianshui and its neighbor regions in southeast Gansu province in the northeastern margin of Tibet plateau, many hot springs are located between these two uplifts. According to the previous research upon the geology, geochemical and the component of the water, the heat fluxes of the surface in the region could be separated into two parts, one part is from crust and another is from mantle. Based on the teleseismic receiver functions of 18 broad-band permanent seismic stations, we estimate the crustal thickness, V_p/V_s (or Poisson ratio) and V_p below this region, and surface wave dispersions are also considered to decrease the nonuniqueness of the result. The migration method based on the local model has been used to image the upper mantle discontinuities. A simple but valid method is applied to estimate the topography of upper mantle discontinuities with depth series of receiver functions according to the location of pierce points. The results indicate the high velocity and high V_p/V_s value in the Tianshui region, which maybe result from the upwelling of the mantle materials thrust by the plates collision. We assume that there is a plume beneath the east margin of Tibet, because of the low velocity disturbance in the results of tomography and depressed 410-km discontinuity. We deduce that the subduction of India plate might reached to the mantle transition zone beneath northeast margin of Tibet, and leads to the upwelling of hot materials because of dehydration.

Keywords: Northeast margin of Tibet, Plume, hot springs, receiver function, upper mantle discontinuity