A subducted slab of the Paleo-Tethys oceanic lithosphere associated with the formation of the Emeishan large igneous province

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The formation of large igneous provinces is a focus of geoscientists and is a major scientific issue in mantle dynamics. A broad consensus holds that the Emeishan large igneous province (ELIP) was generated by an upwelling mantle plume. However, recent geological and seismic studies have challenged this notion. In this study, I redraw and reanalyze previous tomographic images and use images of three velocity perturbation profiles crossing the ELIP. I collected abundant high-quality teleseismic data and performed common conversion point (CCP) stacking of receiver functions in the mantle transition zone (MTZ) of the ELIP. The tomographic images show a high-velocity anomaly of a northeastward-subducted slab-like body beneath the ELIP, which might be a relic of the Paleo-Tethys oceanic lithosphere. Images from CCP stacking of receiver functions indicate that the subducted slab of the Paleo-Tethys oceanic lithosphere retained an imprint on the X-discontinuity and the 410 and 660 km discontinuities. Based on my assessment, the subducted slab might have induced return mantle flow or large-scale mantle upwelling, which possibly played an important role in the formation of the ELIP.