Geochronologic and geophysical constraints on the origin of the Emeishan large igneous province

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Geochronological and geophysical studies have been carried out on the Emeishan LIP, providing further constraints on its plume origin. The age of the Emeishan lavas in SW China remains poorly constrained because the extrusive rocks are (1) thermally overprinted and so represent an open systemunsuitable for $^{40}Ar/^{39}Ar$ geochronology and (2) in most cases devoid of zircon so that it is impossible for the application of U–Pb geochronology. CA-TIMS zircon U–Pb technique yielded a weighted mean $^{206}Pb/^{238}U$ age of 259.1 ± 0.5 Ma for the felsic ignimbrite at the uppermost part of the Emeishan lava succession, interpreted as the termination age of the Emeishan flood basalts. This, together with the fact that Emeishan lavas situate at the Guadalupian–Lopingian boundary (259.8 ±0.4Ma), indicates a very brief (<1 Ma) emplacement [1]. The comprehensive geophysical investigations revealed distinct features of the crustal nature and geometry in the inner zone of the Emeishan LIP. Several distinct crustal properties, including high density, high P-wave velocity, high Vp/Vs ratio, low heat flow, a thick crust and the geometry of intra-crustal features, strongly support a mafic layer of 15–20km thick and 150–180km in lateral extent at the base of the crust in the inner zone. The continuous seismic signature CD, which is interpreted as the Conrad discontinuity, is present in the whole IMZ and in the eastern part of INZ, but is absent in the central and western parts of INZ. Such a spatial configuration of the signatures UI and CD is attributable to the addition of plume-derived melts into the pre-existing crust and intensive interaction between them. The salient spatial correlation between the deep crustal structure and the dome strongly supports a genetic link between crustal thickening and plume activity, if the pre-volcanic domal uplift is generated by the Permian Emeishan mantle plume.

[1] Zhong Y.T. *et al*. (2014) *Lithos* **204**: 14–19. [2] Chen Y. *et al*. (2015) *Earth Planet. Sci. Lett*. **432**: 103–114.