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Metasomatised mantle and growth of the Tibet Plateau

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The timing and mechanism of the Tibet Plateau formation remain elusive. Whether the bulk of its formation really occurred during the Cenozoic, either by continuous and homogenous thickening of the whole lithosphere followed by mantle delamination, or by localized continental subductions reactivating ancient suture zones, are questions yet to be assessed. Here we report mantellic phlogopite and magmatic carbonates preserved in Eocene potassic rocks from Eastern Qiangtang bringing direct evidence that the lithospheric mantle in Central Tibet had been hydrated and CO_2-enriched prior to the India-Asia collision. Rheological calculations suggest that such metasomatized mantle would have been extremely weak but buoyant enough to prevent sinking into the deep mantle. The slow seismic anomaly beneath Central Tibet would image a weakened lithosphere of normal thickness rather than an asthenospheric upwelling resulting from any delamination. This soft and buoyant inherited Tibetan lithosphere may have permitted the growth of the Tibet Plateau by underthrusting of stronger Indian and Asian continental slabs