Geochemical and geophysical constraints on the most recent volcanism in Tibet

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The most recent volcanic eruption in Tibet is reported to have originated from the Ashi volcano. Ashi is located in the Ashikule volcano basin (AVB) in the northwestern Tibetan Plateau. The AVB covers an area of ~700 km^2 and encompasses 14 main volcanoes, with activity spanning from 2.80 Ma to 1951 AD [1]. We present a concentrated geochemical study on the recent post-collisional potassium-rich lavas from the AVB. These lavas are characterised by remarkably enriched light rare earth elements (LREE) relative to heavy rare earth elements (HREE), and enriched large ion lithophile element (LILE) relative to high field strength elements (HFSE). All lavas have enriched $^{87}Sr/^{86}Sr$ (0.707490 – 0.710523) and $^{143}Nd/^{144}Nd$ (0.512265 – 0.512472) relative to bulk silicate earth (BSE). Lavas from 1.65 Ma to present display strikingly restricted strontium (0.708887-0.710516) and neodymium isotopic compositions (0.512336-0.512254), and show little evidence for mixing or crustal contamination, despite the thick crust upon which they are erupted. These geochemical characteristics indicate a homogeneous source, highly enriched in trace elements, which is most consistent with derivation from long-lived subcontinental lithospheric mantle (SCLM). Recent seismic investigations reveal a gap in the lithosphere directly under the AVB [2]. We propose that shear heating along deep-seated faults may provide a mecahnism to generate localised magma and a means to transport it to the surface without significant modification in the crust.

[1] Xu et al. (2014) *Acta Petrological Sinica* 30(12):3521-3530.

[2] Wei et al. (2016) *Scientific Report* 6:29614.