Intraplate and petit-spot volcanism orignating from hydrous mantle transition zone

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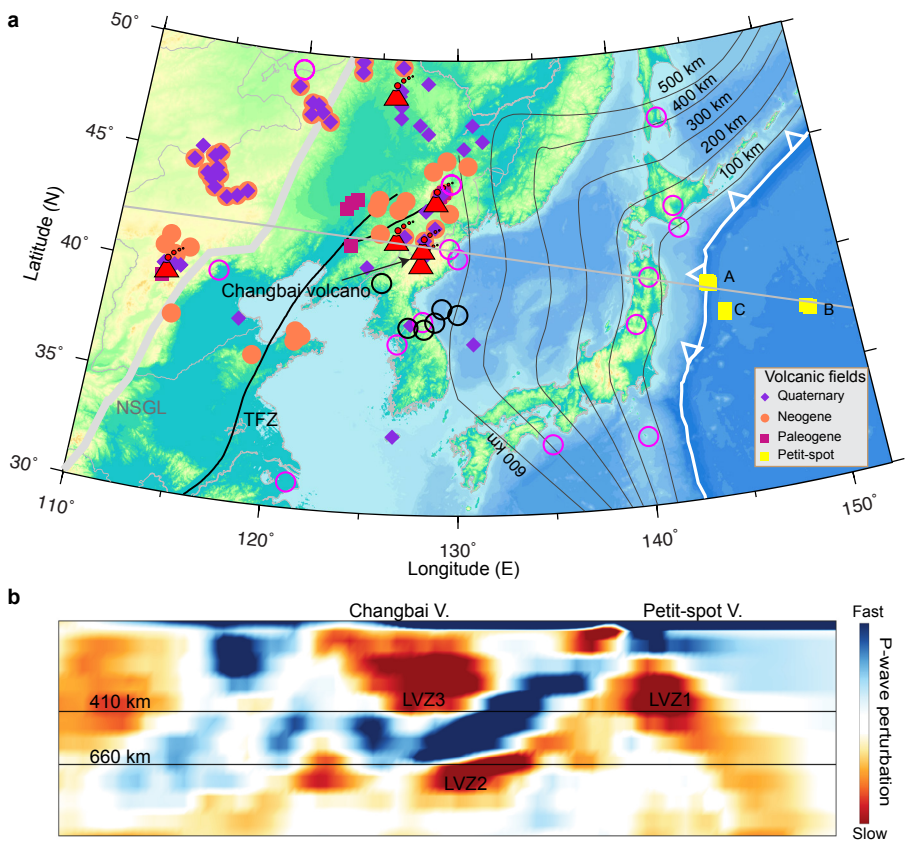

Figure 1 | Geological/Geophysical maps and Cenozoic volcanic fields in notheast China and offshore Japan. a, the red triangles denote volcanoes, the black and magenta circles show seismic low velocity at the 410 km and below 660 km, respectively, as determined by receiver functions. Three young alkaline basalt sites (A, B, C) offshore the Japan trench known as petit-spot. The black contour lines indicate the Pacific Plate depths in the mantle. The present-day Pacific Plate front lies between the Tanlu Fault Zone (TFZ) and the North-South Gravity Lineament (NSGL). **b**, cross-section (grey line in **a**) of seismic P-wave velocity perturbation with three distinct low velocity zones.

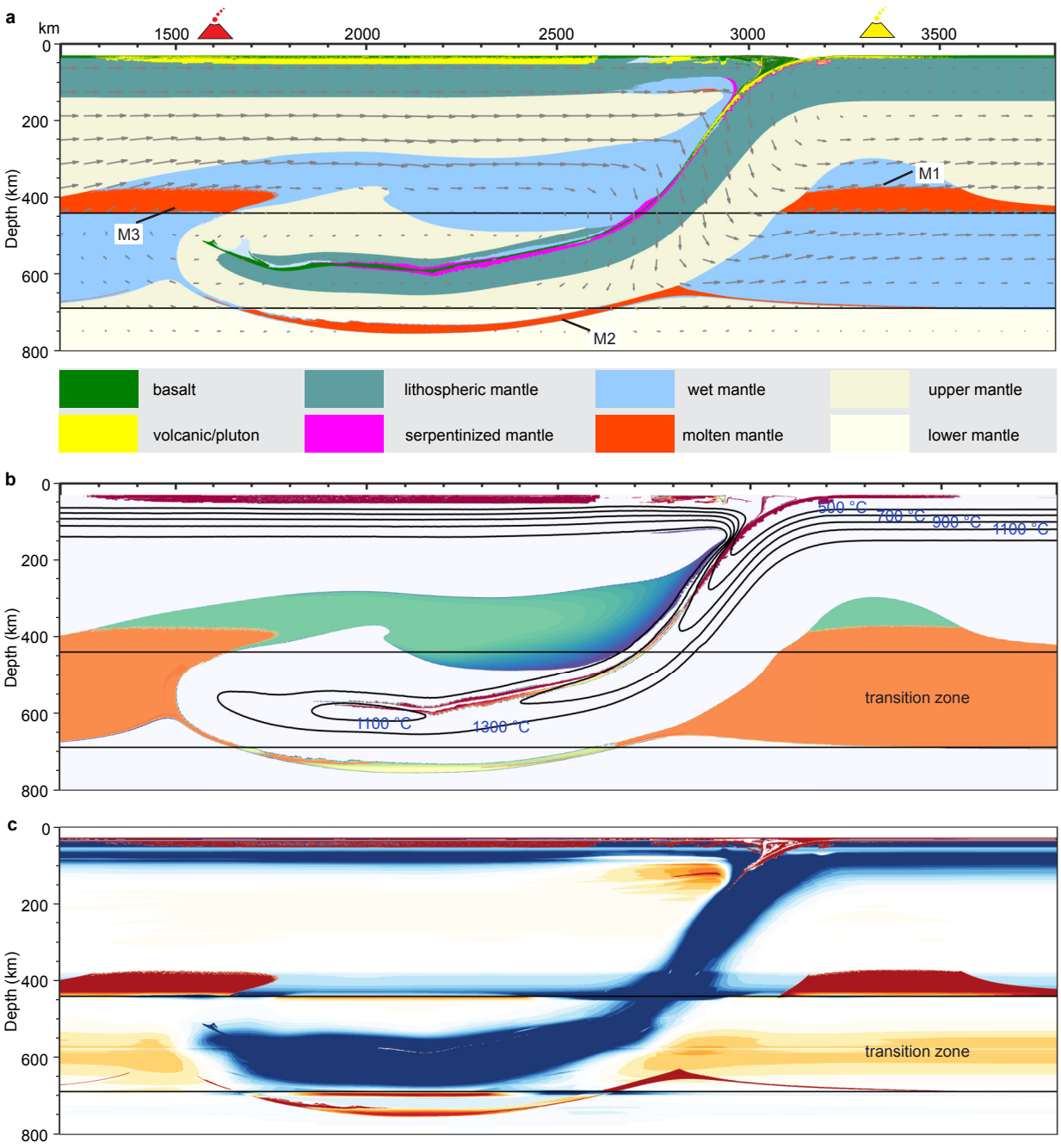

Figure 2 | Dynamics of subduction-induced dehydration melting above and below the transition zone. a, composition field and colors indicating different rock types at the bottom. Two black lines mark depth of 410-km and 660-km. Three partially molten regions (M) are indicated. **b**, water content with temperature contours and **c**, seismic P wave velocity anomalies. An initial water content of 0.3 wt.% is assumed in the MTZ and tref=6 kyr.

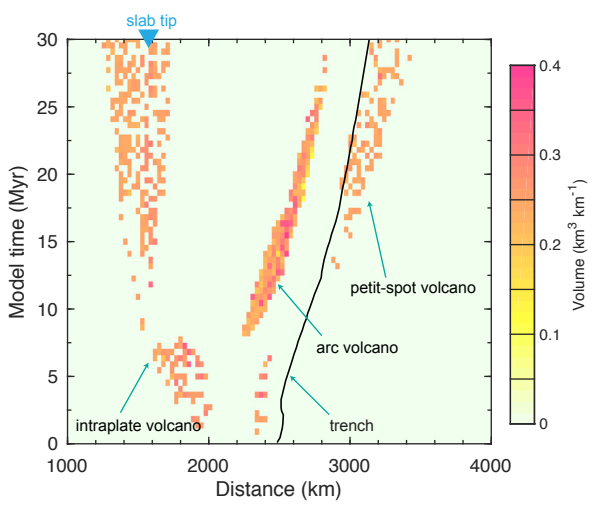

Figure 3 | Volcanics volume versus time. The volcanics include arc volcanoes by shallow decompression/hydrous melting and intraplate/petit-spot volcanoes by wet deep upper mantle melting. The trench location (black line) through the model evolution and the final locaiton of the slab tip (in inverted blue triangle) are also indicated.