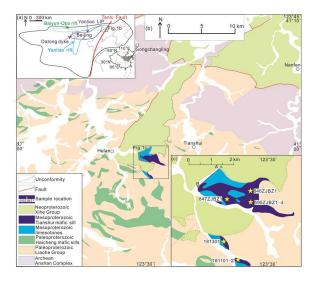
A new 1.32 Ga Tianshui mafic sill of the Yanliao large igneous province in the northern North China Craton

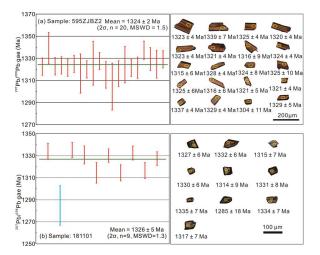
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A new 1.32 Ga Tianshui mafic sill was identified in the Liaodong area, which enlarges the scale of the Yanliao large igneous province (LIP, extending >600 km) in the North China Craton (Fig. 1). It intrudes concordantly into limestone layers and is overlain by Neoproterozoic strata. SIMS baddeleyite Pb-Pb dating on two coarse-grained gabbros yields weighted mean 207 Pb/ 206 Pb ages of 1324 ± 2 Ma (n = 20, MSDW = 1.5) and 1326 \pm 5 Ma (n = 9, MSDW = 1.3) (Fig. 2), similar to those of mafic sills in the Yanliao LIP. The Tianshui mafic sill shows a similar E-MORB geochemical character as the mafic sills in the Yanliao LIP, including tholeiitic composition, enriched light rare earth elements (La/Yb_N = 2.45-3.77), and large ion lithophile elements (e.g., Rb, Th, U, and K), but depleted high field strength elements (e.g., Nb, Ta, Zr, P, and Ti), positive baddeleyite ε_{H} values of 3.59-10.96, with a peak of 6.07, and negative wholerock $\varepsilon_{Nd}t$ values of -1.8 to -0.6, with an average of -1.3, indicative of an enriched mantle source. The 1.32 Ga Yanliao mafic sills underwent extensive crystallization differentiation controlled by olivine, clinopyroxene, and plagioclase. They were generated at a high primary temperature of ~1550 °C and crystallized at ~1140 °C at 0.24 kbar, which could be related to the mantle plume magmatism.

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