New U-Pb ages and Hf zircon data from Brooks Range ophiolite (BRO) and Koyukuk arc, the upper plate of the Brookian Orogen, northern Alaska

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Siniktanneyak Mountain (SM) is an erosional BRO klippe in the central BR, the structurally highest sheet in the N-directed BR thrust belt. SM layering dips steeply to the NNW and suggests an apparent thickness of up to 12 km. From SE to NW, SM consists 2 km of ultramafic (UM) rocks, 6 km of cumulate gabbro (CG), and 4 km of isotropic gabbro (IG), diabase dikes (DD) and basaltic lavas (BL). Intermediate to felsic intrusions (FI) cross-cut the IG and DD, but also cut the basal UM. BL and DD have island arc tholeiite chemistry with low La/Yb (~2) and moderate Nb-Ta depletion. FI also have arc-type chemistry but distinctly higher La/Yb (~5), and are not co-genetic with the DD-BL. Scattered high-Mg boninite dikes also cut IG and CG, and are characteristic of early magmatism in modern island arcs. Three new SHRIMP-RG U-Pb zircon ages of FI at SM, as well as 2 from Misheguk and Asik Mountains, range from 161.1 to 163.7 Ma, all within error of each other. Zircon εHf(t) are juvenile and range from +16 (L. Jurassic depleted mantle) to +7; the most felsic dikes have the lowest εHf(t). By comparison L. Jurassic tonalite (SHRIMP-RG: 146.9 +/- 1.2 Ma) from the Koyukuk arc terrane S of the BR yielded similarly juvenile εHf(t) (+11 - +13) and a similar TE signature to the dated BRO samples. The arc tholeiite lavas and sheeted dikes, along with boninite dikes, suggest BRO was generated in an extensional setting during arc initiation (forearc of the Koyukuk arc system?). The dated BRO intrusive phases are younger than the main mass of the BRO, but how much younger is uncertain.