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# Primitive magmatic compositions at collisional settings

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Approximately 30–50% of convergent margins that have undergone continental subduction and collision over the past 10 Ma are magmatic. Contrary to the common view that such magmas represent highly silicic mid-crustal melts generated by radiogenic heating (e.g., the canonical Himalayan leucogranites), collision-related volcanism closely resembles subduction volcanism. It is dominated by andesitic to dacitic compositions displaying negative High-Field-Strength Element anomalies and typically forms stratovolcanoes. Young volcanic systems in the Carpathians, Greater Caucasus, Lesser Caucasus, Eastern Anatolia, and Zagros exemplify this magmatic style. In these regions, oceanic slabs that preceded continental collision have largely been consumed, rendering classical models of slab dehydration insufficient without substantial modification of system boundary conditions. Nevertheless, collisional volcanic belts are widespread and commonly endowed with metals, in many cases exceeding the metallogenic potential of typical subduction systems. Despite this, they remain comparatively understudied, yet are essential for constraining global magmatic processes.

Here, we compile a dataset of ~400 of the most mafic compositions reported from collisional belts associated with the Neo-Tethys realm. These samples represent the least evolved magmatic products of their respective suites, with many corresponding to true basalts. The data indicate predominantly calc-alkaline affinities and, almost universally, pronounced negative Nb–Ta anomalies characteristic of arc magmas, underscoring their geochemical similarity to subduction-related melts. In addition, basaltic thermobarometric approaches used to estimate equilibration pressures and temperatures suggest P–T distributions comparable to those observed in modern oceanic subduction environments. Our preliminary conclusions are that mantle melting in collisional settings is fundamentally governed by processes analogous to subduction, although the nature of the downgoing lithosphere differs from that of a typical oceanic slab and varies among individual collisional belts.