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Whole-rock geochemistry, Sr-Nd-Hf isotope compositions, and geochronology of Mesozoic metamorphic rocks of the Alisitos-Vizcaíno terrane, Baja California Peninsula, Mexico: Continental growth by island arc accretion

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Almost a third of the Mexican continental crust is formed by Mesozoic terranes accreted to the ancient continental margin at the end of the Early Cretaceous. These are the Guerrero terrane of west-central Mexico and the Alisitos-Vizcaíno terrane of the Baja California Peninsula. Here, we focus on the petrogenesis of the meta-igneous and metasedimentary rocks of the southernmost part of the Alisitos-Vizcaíno terrane to explore a possible relationship with the Guerrero terrane. The southernmost outcrops of the Alisitos-Vizcaíno terrane are located in the Sierra El Arco, which consists of greenschist-facies meta-igneous rocks. Northward, in the Calmallí area, amphibolite and paragneiss dominate. The meta-igneous rocks of Sierra El Arco constitute a magmatic system ranging from peridotite to granodiorite, with basaltic to dacitic volcanic rocks. The suite displays average values of negative εSr_t (-8.4, n= 23) and positive εNd_t (+5.8, n= 23) and εHf_t (+14, n= 2), suggesting mantle-derived melts with no discernible assimilation of continental crustal material. Geochemical and isotopic data of the amphibolite suggests a protolith similar to the meta-igneous rocks. Paragneiss samples display moderately evolved average values of εSr_t (+103, n= 4), εNd_t (-9.4, n= 4), and εHf_t (-6, n= 2), suggesting an origin from continentally derived detritus. These paragneisses show Nd crustal residence ages of ca. 1.3 Ga and ancient detrital zircon populations similar to Triassic-Middle Jurassic metasedimentary rocks of the Guerrero terrane. Middle Jurassic magmatism of the Alisitos-Vizcaíno terrane defines an εSr_t vs. εNd_t evolutionary trend that is mostly within the mantle array, suggesting an island arc subduction setting origin, comparable to five meta-igneous rocks of the Guerrero terrane. Fifteen Jurassic metaigneous rocks define a continental affinity trend, with positive εSr_t (+39) and negative εNd_t (-4.2) average values. Our Sr-Nd isotope mixing curves suggest that the assimilation of Late Triassic metasedimentary rocks, or a lower crust, could explain the isotopic composition of the continental affinity Jurassic magmatism.