

Synchronous Sm-Nd mineral ages from HP Terranes on both sides of the Motagua Fault of Guatemala: convergent suture and strike slip fault?

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Plate tectonic reconstructions and the large scale of the Motagua Fault Zone (MFZ) of Guatemala suggest it is now an active plate boundary containing a series of left-lateral lateral faults that have accommodated displacements of $\sim 10^3$ km. Curiously, a major strand of the MFZ, the Motagua Fault (MF) exposes adjacent serpentinite mélangé on both sides that contain HP/LT eclogites, as well as jadeitites, albitites and other unusual rocks. Ar-Ar ages from white micas of 116-125 Ma from HP/LT rocks south of the fault are significantly older than the 53-81 Ma ages of comparable rocks north of the fault suggesting the unlikely possibility that two similar eclogite-bearing terranes of different ages were coincidentally juxtaposed by strike-slip motion along the fault. However, two Sm-Nd mineral isochrons from lawsonite eclogites south of the fault give ages of 131.7 ± 1.7 and 132 ± 4.6 Ma, which are identical to an age of 130.7 ± 6.3 Ma from an eclogite obtained north of the fault. It is even less likely that strike-slip motion would juxtapose two synchronous and nearly identical HP/LT terranes that originally were $\approx 10^3$ km apart. Either the MF has not undergone significant displacement since the lower Cretaceous, implying that pre-Cretaceous displacement was accommodated by movement along other faults (e.g. the Polochic fault to the north), or the MF has developed strike-slip duplexes that have shifted HP/LT rocks to the other side of the fault. There are complications to both models since the eclogites south of the MF are different from those in the north. Southern eclogites contain lawsonite (an indicator of lower T), give MORB major and trace element patterns, are isotopically depleted ($^{87}\text{Sr}/^{86}\text{Sr}$ ratios of 0.70374 and 0.70489, epsilon Nd of +8.6 and +9.2) and give the older

Ar-Ar ages. Eclogites from north of the fault lack lawsonite and generally show an amphibolite overprint. One surviving northern eclogite has a significantly more enriched signature ($^{87}\text{Sr}/^{86}\text{Sr} = 0.70536$; $\epsilon_{\text{Nd}} = -2.1$) and associated rocks give the younger Ar-Ar ages. The MF apparently represents a complex suture with eclogites derived from depleted mantle to the south and enriched mantle to the north. Explaining these features demands a complex origin, both tectonically and petrogenetically.

This is:

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