

SMP055-04

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P-T estimates of lawsonite eclogite and associated metasediments from the southern Motagua fault zone, Guatemala

Shunsuke Endo^{1*}, Simon R. Wallis¹, Motohiro Tsuboi², Rafael Torres de Leon³, Luigi A. Solari³

¹Nagoya University, ²Kwansei Gakuin University, ³Universidad Nacional Autonoma de Mexico

Blocks of lawsonite eclogite (metabasalt and rare metadolerite) and associated metasediments in a serpentinite melange from an area just south of the Motagua fault zone (SMFZ), Guatemala, represent excellent natural records of the forearc slab-mantle interface. We have studied a suite of these rocks to decipher their pressure (P) -temperature (T) evolution. Garnet-omphacite-phengite thermobarometry yields P-T conditions of <26 kbar and 350-580 deg.C. Thermometry using Raman spectroscopy of carbonaceous material (RSCM) yields constraints on peak-T of 520-570 deg.C. Barometry using Raman spectroscopy shows unfractured quartz inclusions in garnet rims retain overpressures of up to 10 kbar, implying these inclusions were trapped at pressure conditions just below the quartz/coesite transition in agreement with the results of the garnet-clinopyroxene-phengite barometry. Pseudosection modelling reproduces the observed peak mineral assemblages in compatible P-T ranges. The derived peak P-T conditions correspond to thermal gradients of 7 deg.C/km (density: 3300 kg/m³) and are not unusually cold among oceanic subduction suits worldwide. The SMFZ eclogites have been subjected to retrograde metamorphism in the lawsonite-blueschist facies, followed by a pumpellyite-actinolite facies overprint. This significant cooling during exhumation can account for the pristine nature of the SMFZ lawsonite eclogites.

Keywords: lawsonite eclogite, P-T path, oceanic subduction metamorphism