

## **SLAB WINDOWS: GATEWAYS FOR LATERAL MANTLE CURRENTS**

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Subducting slabs divide the upper mantle into regional sub-slab and supra-slab reservoirs which may remain distinct for tens of millions of years. However, the slab barrier between the reservoirs can be breached by slab windows at ridge-trench intersections, permitting mantle to flow from one reservoir to another. The direction of mantle flow through a slab window may have both vertical and horizontal components. Mantle upwelling (vertical flow) is probably common to most slab window environments, but lateral flow may be equally important. Lateral mantle flow has been documented in two cases along the Americas. Westward flow through the Patagonian slab window is evident from the volcanic arc (supra-slab) geochemical character in proximal parts of the Chile Rise. Eastward flow through the Central American slab window is evident from the ocean-island-like (sub-slab) geochemistry in the Panama-Costa Rica regions of the Central American volcanic arc. Asthenospheric flow directions deduced from shear-wave splitting indicate that the flow paths through the slab windows belong to a larger circuit. In this circuit, asthenosphere flows west from the supra-slab reservoir beneath Chile through the Patagonian slab window, and into the sub-slab (Pacific basin) reservoir. It then moves northward alongside South America to the Central American slab window where it flows eastward beneath Panama, and back into the supra-slab reservoir of the Caribbean. Lateral currents in the mantle, as illustrated by this flow circuit, are akin to ocean currents such as the Gulf Stream which transport thermal and chemical anomalies for thousands of kilometres.