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**Origin of the LLSVPs at the base of the mantle is a consequence of plate tectonics: A petrological and geochemical perspective**

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**Abstract Text:**

In studying the petrogenesis of intra-plate ocean island basalts (OIB) associated with hotspots or mantle plumes, we hypothesized that the two large-low-shear-wave-velocity provinces (LLSVPs) at the base of the mantle beneath the Pacific (Jason) and Africa (Tuzo) are piles of subducted ocean crust (SOC) accumulated over Earth's history. This hypothesis was formulated using petrology, geochemistry and mineral physics in the context of plate tectonics and mantle circulation. Because the current debate on the origin of the LLSVPs is limited to the geophysical community and modelling discipline and because it is apparent that such debate cannot be resolved without considering relevant petrological and geochemical information, it is my motivation here to objectively discuss such information in a readily accessible manner with new perspectives in light of most recent discoveries. The hypothesis has the following elements: (1) subduction of the ocean crust of basaltic composition to the lower mantle is largely irreversible because (2) SOC is denser than the ambience of peridotitic composition under lower mantle conditions in both solid state and liquid form; (3) this understanding differs from the widespread view that OIB come from ancient SOC that returns from the lower mantle by mantle plumes, but is fully consistent with the understanding that OIB is not derived from SOC because SOC is chemically and isotopically too depleted to meet the requirement for any known OIB suite on Earth; (4) SOC is thus the best candidate for the LLSVPs, which are, in turn, the permanent graveyard of SOC; (5) the LLSVPs act as thermal insulators, making core-heating induced mantle diapirs or plumes initiated at their edges, which explains why the large igneous provinces (LIPs) are associated with the edges of the LLSVPs; (6) the antipodal positioning of Jason and Tuzo represents the optimal momentum of inertia, which explains why the LLSVPs are stable in the spinning Earth; (7) they have been stable and will continue to be stable.

**Session Selection:**
Current understanding of large igneous provinces, hotspot tracks, and mantle plumes

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