Probable Precambrian Oceanic Remnants in the Palghat-Cauvery Suture Zone, southern India

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The Neoproterozoic Palghat-Cauvery Suture Zone (PCSZ) in the southern India acts as a terrain boundary that separates Archean greenschist-amphibolite rocks towards the North and Proterozoic amphibolite to granulite facies rocks towards the South. This suture zone is characterized by several isolated occurrences of ultramafic and related rocks in close association with high-T and high-P metamorphic rocks. The vital petrological understanding on the origin of ultramafic bodies from this collision zone has not been well documented in spite of its tectonic importance. The present study aims at the petrogenesis of an isolated ultramafic rock closely associated with metagabbro and eclogites cropped out in the Sittampundi anorthosite complex in the PCSZ to bring out its probable tectonic significances in relation to suture zone tectonics. The rock under investigation is identified as harzburgite with a primary mineral assemblage of olivine+orthopyroxene+spinel±amphibole. An initial porphyroclastic texture is obscured by later deformation and metamorphism which imparted a mylonitic texture to the rock. The Mg# (=100*Mg/Mg+Fe) of primary olivine is ~ 90. The Mg# (=100*Mg/Mg+Fe^2+) and the Cr# (=100*Cr/Cr+Al) of the primary chromian spinel grains range from 55-60 and ~30, respectively. The Mg# of olivine and Cr# of chromian spinel indicate the degree of partial melting experienced by the rock. The data plot in the field of mantle array, on an overlap area between the fields of suprasubduction zone peridotites and mid ocean ridge peridotites and in the ophiolite/ocean floor peridotite fields. The data plot in a region of abyssal/ocean floor peridotite in olivine spinel mantle array (OSMA) diagram. These features suggest that harzburgite has been probably derived from the abyssal upper mantle by low degree partial melting of a fertile MORB mantle. The abyssal harzburgite, probably after experiencing mantle-wedge condition, was emplaced into the lower crust during collision/suturing to form a high-*P*-*T* metamorphic zone in the PCSZ. Our study points to the existence of an ocean plate in the PCSZ area which disappeared during the collision to subduction processes operated between the northern Archean and the southern Neoproterozoic terranes.