# Fertile lherzolites within Franciscan Complex: Possible origin as remnants of oceanic fracture zones near a slow-spreading ridge

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We describe a lherzolite-harzburgite complex within shale-matrix melanges of the late Mesozoic Franciscan Complex at the western margin of central California. The Cr# (= Cr/(Cr + Al) atomic ratio) of spinels in the lherzolite is extremely low, plotting in the low-Cr# end of the abyssal peridotite field, although the moderate to high Cr# of spinels in the harzburgite leaves two possible origins as forearc or abyssal peridotite. The relations between the Fo and NiO contents of olivines indicate the residual character of the lherzolite. A high Mg# (= Mg/(Mg + $Fe^{2+}$) atomic ratio) for clinopyroxenes is one of the characteristics of the lherzolite, reflecting low-temperature Mg-Fe redistribution with olivine beneath the ocean floor. The REE patterns of clinopyroxenes in sampled lherzolite show simple LREE-depleted patterns with flat MREE and HREE concentrations, resembling those obtained for peridotites dredged from the Vulcan Fracture Zone at the American-Antarctica Ridge. These mineral chemistries, in combination with a lack of association with igneous rocks, imply that the lherzolite-harzburgite complex represents fertile abyssal peridotites along oceanic fracture zones near a slow-spreading ridge; the peridotites experienced a low degree of melting during their history. This origin is in contrast to that of the Coast Range ophiolite, the most extensive ophiolitic belt in California, which formed in a supra-subduction zone setting.