Mineralogy of Zaroo ilvaite bearing skarns, Central Iran

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Zaroo Cu-skarns are located north-west of Yazd province and this region is included in Cenozoic magmatic belt of Central Iran. The widespread rocks in this region are Eocene age volcanic with granitoid intrusives. The Cretaceous limestones in western parts of Zarro are hosted by skarn-marble mineralization in parts. The skarns are distal type and characterized by following assemblages: clinopyroxene + magnetite + quartz + calcite. The paragenetic relationships of these minerals have revealed a polygenetic nature of skarn. Black crystals an dmasses of ilvaite have a close association with hedenbergite clinopyroxene and andradite garnet zone, likely as replacement bodies.

The formation of ilvaite is related to the following reactions:

andradite + $Fe(OH)_2$ + CO_2 = ilvaite + magnetite + quartz + calcite + H_2

hedenbergite + magnetite + $Fe(OH)_2$ = ilvaite

The early skarn minerals are formed at 550°C and the decomposition of early minerals to formation of final hydrous assemblages started below 470°C in high fO_2. The peak metamorphisms for marbels are about 540°C with mineral assemblage as follows:

Garnet + vesuvianite + termolite + epidote + calcite + quartz

Magmatic architecture and geochemical variability at the 9°N segment of the East Pacific Rise

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The 9°N region of the East Pacific Rise (EPR) has been densely sampled by submersible and wax-coring techniques, with over 1200 samples available from less than 100 km of ridge axis. Major and trace element and isotope data is available for many of the samples and can be used to quantify the role of source heterogeneity, mantle melting, fractional crystallisation and melt mixing in petrogenesis at a segment of fast-spreading mid-ocean ridge. The spatial control on the sampling locations and the growing catalogue of geophysical observations from the segment allow the geochemical variations to be understood in the context of the imaged distribution of melt at the ridge axis. The shallow axial melt lens plays an important role in the mixing of melts and destruction of mantle-derived compositional heterogeneity. Samples collected from the sea-floor lying above this melt lens show a narrow range of incompatible trace element ratios. In contrast, samples collected away from the ridges axis, or close to suspected ridge-parallel discontinuiutes in the melt lens, show much greater variation in their trace element composition. These samples appear to have bypassed mixing within the axial region. In addition, evolved compositions, with <7.3 wt% MgO, are rarely sampled above the imaged melt lens and may have been sourced from cooler regions containing low melt fractions. Along-axis major element compositional variations in samples collected <0.5 km from the axis show a strong correlation with variation in ridge bathymetry and depth to the axial magma chamber. However, trace element ratios show poor correlations with geophysical variation on the scale of the segment. It is therefore likely that variations in along-axis bathymetry reflect spatial focussing of melt in the crustal plumbing system rather than changes in mantle properties.

These results have important implications for the interpretation of downhole compositional variation in IODP core such as that from Hole 1256D. Systematic vertical variations in the composition of upper crustal rocks may result from steady-state crustal accretion at a typical fast-spreading ridge, rather than from large-scale variation in the temperature or composition of the mantle source regions.