Skarn mineralization and related hydrothermal alterations in Aliabad Cu-porphyry deposit (Taft-Yazd)

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The area is a part of Cenozoic magmatic belt of Central Iran which is contact in West of Yazd province & North-West margin of Shirkuk batolite granite. Nayband terigenous formation is the oldest rock unit as bed rock and has undergone weak contact metamorphism by Shirkuh granite in middle Jurasic. The young intrusive bodies which are mainly leucocrate are granite to granodiorite with Cu-porphyry mineralizations. They have widespread fractures & alterations. Those intrusives have intruded Shirkuh granite, arcosic sandstones & conglomerates of Sangestan formation (lower Cretaceous). Skarns are formed in expense of carbonate huge pebbles of Sangestan conglomerates. The following mineral assemblage has been determined: garnet + epidote + quartz + calcite + pyrite and turquoise.

Turquoise (Cu A_{l6} $(PO_4)_4$ $(OH)_8$ $5H_2O$) is a phosphate mineral with secondary origin that occurs veinlet shape in volcanic rocks. This mineral is accompanied with other mineral such as: alunite, jarosite, iron oxides and (Cu, OH) carbonates in oxidation zone that formed in a late stage after scarnization. Grassular formed in the kaoline, SiO_2, CaO and $CaCl_2$ mixture in the 900°C and 2000 atmosphere pressure (Dear *et al*, 1991). But volastonite and grassular formed in 500°C temperature in the mixture of silica, calcite and aluminum oxide with ratio: 3 SiO_2: Al_2O_3: 3 $CaCO_3$ This reaction supposed for formation of andradite (Dear et al., 1991): $3CaCO_3 + Fe_2O_3 + 3SiO_2 = Ca_3Fe_2Si_3O_{12} + 3CO_2$

Stable formation condition of andradite is in the high fO2 and temperature> 390°C. 1 and 2 area (Fig.) that indicate stable condition of garnet-pyrite and quartz. Hydrothrmal alteration took place after contact metamorphism (skarn formation) in intrusive bodies, skarns, conglomerates & specially arcosic sandstones quartz-sericite-pyrite (or phyllic) type alteration is characteristic in those rocks.

Subduction zone magmatism without a slab-derived flux: High-Nb basalts from Sabah (Borneo)

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Low concentrations of High Field Strength Elements (HFSE) and their depletion relative to Large Ion Lithophile Elements (LILE) and Rare Earth Elements (REE) are characteristic of many subduction zone magmas. Some subduction zones, however, have generated basaltic rocks in which HFSE are abundant and only mildly depleted, or even enriched, relative to the LILE. These "high-Nb basalt" have been attributed either to (i) low degree melts derived from beneath the slab, (ii) mantle wedge metasomatised by partial melts of subducted basaltic crust, or (iii) melting of enriched mantle without a significant slab input. Neither of the first two models is consistent with compositions and spatial distributions of Plio-Pleistocene high-Nb basalts from Sabah, NE Borneo. First, the most primitive Sabah basalts are isotopically similar to high-Nb basalts from SW Philippines and several sites in the South China Sea, requiring similar sources throughout SE Asia. This is highly unlikely to result from mantle metasomatism by slab melts. Second, the Sabah rocks are part of a Late-Miocene to Pleistocene low-volume magmatic province extending SW into Borneo and NE into the Philippines. Basement fabrics display similar orientations suggesting that the lithosphere plays a key role in determining the locus of magmatism. Either the sources of high-Nb basalts reside in the lithospheric mantle, or they represent a regional component of the convecting mantle from which melt is transported along lithospheric structures. In either case, the creation of the high-Nb basalt source is independent of recent/active subduction. Sources of high-Nb basalt may melt when subduction induces stress in arc lithosphere and/or upwelling of sub-lithospheric mantle. The presence of high-Nb basalt in several active arcs suggests that these sources can escape modification by material derived from the slab through the lifetime of a subduction zone.