Hornblendite - the result of unusual monomineralic amphibole crystallization of residual fluid-rich melts in Ural-Alaskan-type ultramafic intrusions

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Horhblendites are almost monomineralic amphibole rocks widespread in Ural-Alaskan-type ultramafic intrusions. They finalize development of dunite-clinopyroxenite series and form numerous dykes, small intrusive bodies and zones of eruptive breccias within ultramafites. Hornblendites have close genetic relations with clinopyroxenites which contain a variety amount of amphibole in interstitial space. It is represented by high-Al pargasite and hastingsite and was crystallized from residual fluid-rich melt, remnant from olivine-clinopyroxene cotectic crystallization of primary ultramafic melt. The major elements composition of interstitial pargasite from clinopyroxenites and amphibole from intrusive hornbendites are the same and it is characterized by Mg-number more than 0.7, high alumina and alkaline contents. They both have similar REE distribution pattern and compositions of oxigen and hydrogen isotopes. In generally $\delta^{18}O_{SMOW}$ = +4.7-6.9‰ and δD = – 66-104 ‰, that is corresponded to juvenile magmatic water. We suppose that this intergranular melt of amphibole composition, could be extracted from clinopyroxenite and intruded into associated dunite and other rocks. High water pressure in this melt depresses the plagioclase crystallization and provide long presipitation of pargasite which can not change the melt composition because they both are similar in composition. In the case of increasing of oxygen fugacity, magnetite start to crystallize and the melt composition will be shifted to more Al and Si-rich. If the water pressure dramatically decreases plagioclase appear again on the liquidus and at the end of crystallization some amount of plagioclase-bearing hornblendite or amphibole-rich melanogabbro to be formed. All these examples are well known in Ural-Alaskan-type ultramafic intrusions. Clinopyroxenites and hornblendites sometimes comprise economic titanomagnetite deposits and they are accompanied by plagioclasite and plagiogranite veins or amphibole-rich melanogabbro and gabbro-pegmatite. State Scientific project № AAAA-A18-118052590029-6