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Universal single grain amphibole thermobarometer for mantle rocks - preliminary calibration.

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Calibration of S-Al- K-Na-Ca distribution in the structure of the mantle amphiboles (Cr- hornblende, pargasite, kaersutite) using experimental data (Niida, Green, 1999; Wallace Green, 1991, Conceicao, Green, 2004; Medard et al, 2006; Safonov, Butvina, 2013; 2016; Pirard, Hermann, 2015 etc) allows to obtain an equation for pressure estimates in 0.5 – 4.5 GPa interval. Regression calculated pressures with experimental values (R $\sim$ 0.82) and precision$\sim$ 5 kbar allow to use barometer for a wide range of mantle rocks from peridotite to pyroxenites and megacrystals.
For the higher pressures (Cr- pargasite richterite) calibration is carried by the cross- correlations with the estimates calculated for the natural associations obtained using clino- and orthopyroxene.
IT was used KD =Si/(8-Al-2.2*Ti)*(Na+K))/Ca for the following equation:
P(GPa)=0.0035*(4+K/(Na+K))*2*Mg)/Fe+3.75*(K+Na)/Ca))*KD*ToK**0.75/
(1+3.32*Fe)-ln(1273/ToK*5*(8*Mg-Al*2 +3*Ti+8*Cr+3*K)/10
Th advantage of this barometer comparing with the previous (Ridolfi, Renzulli, 2012) is that is working with all mantle amphibole types.
For the calculations of the PT parameters of the natural xenocrysts it was used monomineral version of Gar-Amph termometer (Ravna et al., 2000) in combination with the received barometer. Contents of Ca- Mg and Fe in associated garnets were calculated usinf the regressions obtained from natural and experimental associations.
Aplication of the mantle amphibole thermobarometry for the reconstruction of sections of the cratonic mantle lithosphere of Yakutia show that amphibloles are distributed in various parts of mantle sections in deifferent mantle terranes of Yakutia.
The most abundant amphoboles from Alakite region are distributed within all mantle section. In the SCLM beneat Yubileyaya pipe thehalf of them belong to the spinel garnet facie refering to the upper pyroxenitic suit and Cr-hornblende - mica viens. The second group reffer to the eclogite pyroxenite layer in the middle part of SCLM and the third group refer to richterites form the depleted manle peridotites. In SCLM beneat the Sytykanskaya they are more frequent and trace through all the mantle layers. In SCLM beneat the Aykhal they mostly are from the lower and in Komsomolskaya from the middle SCLM parts.
In Daldyn field rare amdphibles from Dalnaya are Fe- enriched pargasites belonging to the Ilm bearing peridotites in middle SCLM part as well as in SCLM beneath thr Udachnaya. But there are Fe- low amphiboles substitutng the orthopyroxenes. In Zarnitsa the Cr - hornblendes occur in shallow garnet pyroxenites. One deep seated richterite substitute garnet grains.
Rare amphiboles were detedted in Mirninsky filed in Internatiolnaya pipe and reffer to the resorbed and deformed granets from the Garnet -Spinel facies and from 4.0 GPa boundary.
Amphiboles are frequent in the SCLM from the northern part of Siberian craton. In SCLM beneath the Kharmai the Fe- encriched varietes are from the Moho boundary. Common Cr-pargasite occurs to 3 GPa in Obnazhennay, pipe, Kharamai field
In mantle SCLM beneath Obnazhennaya pipe and circum Anabr region friquent Cr- pargasies and horblendes refer to the relatively hot branch of mantle lithosphere and probably corresponds to the Triassic mantle reactivation.
Mantle Cr- hornbleneds occurs on most upper part of the mantle column beneath Quaternary mujeritic Bartoy vocanoes in Transbaikal. The pargasites and kaersutites in this locality refer to more heated conditions and could be found to 2.0 GPa.
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