Geophysical Research Abstracts
Vol. 16, EGU2014-7696-4, 2014
EGU General Assembly 2014

Using of clinopyroxene thermobarometry for the eclogites and omphacite diamond inclusions of Yakutian and worldwide kimberlites .

Igor Ashchepkov (1), Zdislav Spetsius (2), Hilary Downes (3), Alla Logvinova (1), Subramanian Ravi (4), and Theodoros Ntaflos (5)

(1) Institute of Geology and Mineralogy, Geodynamics, Novosibirsk, Russian Federation (igor.ashchepkov@igm.nsc.ru, +7 (383) 333-27-92), (2) Alrosa Stock Company, Lenina str. 6 Mirny, Russia, (3) Birkbeck College, University of London, UK, (4) Geological Survey of India, Bandlaguda Complex, Hyderabad 500068, Ind, (5) Vienna University, A-1090Vienna, Austria

Modified clinopyroxene thermobarometry (Ashchepkov et al., 2010) in combination with (Krogh, 1988) or (Nimis, Taylor, 2000) thermometers checked using 570 published runs in eclogite system clarified position of eclogites in Siberian and Worldwide SCLM (Ashchepkov et al, 2010; 2012; 2013).
In Siberia Fe- eclogites related to Fe- basalts or TTG cumulates sediments and are found in the middle pyroxenite layer formed in Early Archean when eclogites can't be subducted and were remelted in near 100 -130 km (3.5-4GPa) (Udachnaya, Mir, Prianabarie) .
In Middle and late Archean they locate ∼5 GPa forming several deeper levels (Udachnaya). Hi- Mg arc cumulates (Horodyskyj ea, 2007) are related to the different depth and relate to Low-T geotherms starting from 7.5 to 4 GPa. Diamond omphacite inclusions from melt metasomatized eclogites or protokimberlite cumulates often trace HT geotherm. In Siberia eclogites positions in SCLM differ.
In Magan terrain abundant eclogites of varying (Mg') correspond to different types. Majority (4-5 GPa, Mal-oBotupbinsky and Khramai) form several trends decreasing P- Fe corresponding to melt differentiation and reaction with kimberlites referring to high –T conditions. The 3.0-3.5 GPa lens traced by both high and low-Fe eclogites. Cold low Fe type are probably referring to subduction type eclogites (LT) but HT -to protokimberlite crystallization .
In West Daldyn (Alakit) terrain eclogites locate in middle SCLM part. In Daldyn West they are distributed in all section.
In Nakyn field (Markha terrane) Fe-rich eclogites dominate in lower SCLM like in Upper Muna fields. In northern Siberian craton part in Hapchan (Kuoyka) and Birekte terrain most eclogites belong to middle part. Those from Upper part may corresponds to TTG cumulates. Abundant eclogite diamond inclusions suggest that they should be also in the low SCLM.
Proterozoic kimberlites commonly carry hot eclogites from middle part like in Wajrakarur field (KL-4) in India where Ca- rich eclogites and grospydites reflect reactions of Ca- rich mater with mantle peridotites. In South Africa Proterozoic Roberts Victor and Premier kimberlites HT eclogite and diamond inclusions mostly came from deeper part of SCLM 5.5-4 GPa and show Fe rising upward in section.
Mz kimberlites in Lesotho carry omphacites from 5.5-4.0 GPa showing several P- Fe # trends. In Namibia diamond inclusions 5.5-7.5 GPa show Fe# rise with depth. In Angola eclogite lens is found at 5-6 GPa (Ashchepkov et al., 2013).
In Wyoming craton Devonian kimberlites carry eclogites from upper SCLM forming three clusters: near Moho at Gar-Sp boundary and Fe 3.5-2.5 interval. Fe – enriched varieties locate 4.5-5 GPa interval and Mg rich at 7-6 GPa.
In Slave craton Mg eclogites (Heaman ea, 2006) correspond to LSCLM while Fe-rich are from middle part. In Karelian craton eclogites of varying Fe# are in LSCLM.
Spider diagrams of eclogite clinopyroxenes demonstrates four types of patterns. Smooth rounded one corresponds to protokimberlites. Flatter or inclined with HFSE troughs and U, Pb peaks are of MORB. The jugged highly inclined patterns refer to TTG cumulates showing LILE enrichments and HFSE through. TRE of metasomatic clinopyroxenes eclogites are variable . RFBR 11-05-00060