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Dynamics of metasomatic transformation of lithospheric mantle rocks under Siberian Craton

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Numerical problem for one- and two-velocity hydrodynamics of heat and mass transfer in permeable zones over 'asthenospheric lenses' (with estimates for dynamics of non-isothermal metasomatosis of mantle rocks, using the approximation of flow reactor scheme) was formulated and solved based on the study of inclusion contents in minerals of metamorphic rocks of the lithosphere mantle and earth crust, estimates of thermodynamic conditions of inclusions appearance, and the results of experimental modeling of influence of hot reduced gases on rocks and minerals of xenoliths in mantle rocks under the cratons of Siberian Platform (SP): 1) the supply of fluid flows of any composition from upper mantle magma sources results in formation of zonal metasomatic columns in ultrabasic lithosphere mantle in permeable zones of deep faults; 2) when major element or petrogenetic components are supplied from magma source, depleted ultrabasic rocks of the lithosphere mantle are transformed into substrates which can be regarded as deep analogs of crust rodingites; 3) other fluid compositions cause deep calcinations and noticeable salination of metasomated substrate, or garnetization (eclogitization) of primary ultrabasic matrix develops; 4) above these zones the zone of basification appears; it is changed by the area of pyroxenitization, amphibolization, and biotitization; 5) modeling of thermo and mass exchange for two-velocity hydrodynamic problem showed that hydraulic approximation increases velocities of heat front during convective heating and decreases pressure in fluid along the flow. It was shown that grospydites, regarded earlier as eclogites, in permeable areas of lithosphere mantle, are typical zones draining upper mantle magma sources of metasomatic columns.

As a result of the convective melting the polybaric magmatic sources may appear. Thus the formation of the (kimberlites?) melilitites or carbonatites is possible at the base of the lithospheric plates. It is shown that the physico - chemical conditions of the carbonation of the depleted mantle peridotites refer to the narrow interval of the possible fluid compositions.

The bulk fluid content near 4 weight % with the SiO_2 CaO 0.5 - 0.1 molar volumes the 1) the Si/Ca molar ratio is < 1; 2) in the C-H-O system the molar ration should be 1/2/3 - 2/1/2; 3) the pO_2 variations should be $-8 < \lg pO_2 < -11$; 4) in the fluid the CO_2 content is twice higher than H_2O and Cl essentially prevail under F. In the system with smaller fraction of the fluid phase less increased by the major element rock components the carbonation is more intensive when the Ca content decrease. The fusions of the basic magmas are possible within the wehrlitization zones.

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