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Magma genesis in the lithosphere-asnthenosphere boundary during lithosphere break up

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The magmatic diversity associated to lithosphere break-up is the result of the mantle heterogeneity derived from previous processes, such as ancient subductions and metasomatism. The subducted slabs turns itself to OH- and/or CO_2- bearing eclogites and causes chemical heterogeneities in the mantle. From such heterogeneous mantle, alkaline and tholeiites magmas can be generated depending on the melting pattern, the place in the mantle undergone to melting and the CO_2 + OH- distribution. Understanding the consequences of an OH- and CO_2- bearing eclogitic slab into the upper mantle add information on the genesis of those basalts diversity. This work investigates experimentally the reactions between two layers of different compositions that mimics the contact between a hydrous lithosphere and a carbonate-bearing eclogite enriched asthenosphere. A depleted mantle (NHD-peridotite) metasomatized by Na, K, and water (0,8%) represents the metasomatized lithosphere. A fertile mantle (MPY, 3 – 4 wt% CaO and Al_2O_3 and olivine of Mg#= 89 – 90) enriched with 20% of an eclogite composition (GA1, OH- and CO2 bearing) simulates the enriched asthenosphere with recycled old slabs. Experiments were conducted at 4.5 GPa and different temperatures at the Laboratório de Geoquímica e Petrologia Experimental (LAGEPE), Brazil. The preliminary results show olivine, clinopyroxene, orthopyroxene, phlogopite, amphibole and garnet, as mineral phases. All generated melts are alkaline up to 1300°C, according to the TAS diagram with primitive composition (Mg# above 80). Lower-temperature generated more alkaline magmas than higher-temperature experiments as a function of partial melts degree. Based on their TiO2 concentration: low-TiO2 melts were found in the lithosphere and high-TiO2 in the asthenosphere. All experiments show bubbles due to CO_2+H_2O degassing, mainly in the 1000°C experiment when compared to the 1200°C experiment, which suggests that with increasing temperature, a greater amount of CO_2 and H_2O can be dissolved in the generated magma.