An experimental study of reaction textures of volcaniclastic kimberlites to determine their emplacement process

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Some of the most famous diamond deposits are associated with Kimberly-type volcaniclastic kimberlite facies (KPK) located within the diatreme part of the kimberlite pipes. The emplacement process of this type of kimberlite is still highly debated around the world. The two contemporary models suggest either (1) explosive pyroclastic eruption with subsequent welding of the pyroclasts or (2) in-situ magma fragmentation without formation of a pyroclastic deposit. The latter model suggests that a reaction between silicate fragments of the country rock and carbonatitic magma exsolves CO_2 causing the magma fragmentation and freezing. The study will test the two hypotheses by examining the reaction of granitoid and basaltic xenoliths with carbonate-rich kimberlite magma, composition of which will be similar to that of Anaconda hypabyssal kimberlite dyke located on Ekati property, Northwest Territories, Canada. Experiments will be conducted at 0.1 MPa in a box furnace to explore the effect of temperature and cooling rate on the textures and the sequence of the reaction minerals. The developed reaction mineral phases, their textures, and the reaction with the xenoliths will be compared to the textures of natural KPK in BK1 kimberlite from Orapa kimberlite cluster, Botswana. [Poster]

Atlantic Geology, 2018, Volume 54
Atlantic Universities Geoscience Conference 2018 – 68th Annual Conference, November 1-3, 2018
doi:10.4138/atlgeol.2018.015