

Archetypal kimberlite from the Maniitsoq region, southern West Greenland and analogy to South Africa

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Ultramafic dyke rocks with kimberlitic megacrysts and mantle nodules have been known for decades from the northern part of the Archaean block and adjacent Proterozoic terranes in southern West Greenland (Fig. 1; Escher & Watterson 1973; Goff 1973; Scott 1981; Larsen & Rex 1992; Mitchell *et al.* 1999). Some of the dykes have proved to be diamondiferous (see Jensen *et al.* 2004a, b, for exploration results, diamond contents, and references). The *c.* 600 Ma old dykes were called ‘kimberlitic’ by Larsen & Rex (1992), but Mitchell *et al.* (1999) concluded that they were best referred to a ‘carbonatite-ultramafic lamprophyre’ suite (aillikites or melnoites). Mitchell *et al.* (1999) further suggested that the West Greenland province represents “one of the few *bona fide* examples of ultramafic lamprophyre which contain diamonds”.

Reports on indicator mineral assemblages (Jensen *et al.* 2004b) and diamond contents (e.g. Hudson Resources Inc. 2005) have re-opened the discussion on the classification of the dykes. The results of an investigation of the Majuagaa dyke (Nielsen & Jensen 2005) are summarised below, together with the preliminary results of a regional investigation of the groundmass minerals of the dykes. It is concluded that dykes in the Maniitsoq region are similar to archetypal, South African, on-craton, Type 1 kimberlites, and that all regions of the West Greenland province of ultramafic magmatism are favourable for diamond exploration.

The Majuagaa dyke

The Majuagaa dyke (Jensen *et al.* 2004a) is 2.5 km long and up to 2 m wide. It is located *c.* 50 km SSE of Maniitsoq (Fig. 1) and strikes WSW–ENE. The dyke is dark grey with many olivine-rich fragments (up to 10 cm) and rounded megacrysts of ilmenite (up to 4 cm). It contains the classic kimberlitic suites of megacrysts and mantle nodules, including eclogite (Jensen & Secher 2004, fig. 5). The groundmass is fine-grained and composed of olivine fragments, calcite, serpentine, ilmenite and minor Mg-rich spinel. Phlogopite and apatite are rare. The dyke is diamondiferous (Jensen *et al.* 2004a).

Samples were collected along the length of the dyke. Sixty thin sections (Fig. 2) were examined and a number selected for an electron microprobe study. All mineral data from groundmass, megacrysts and nodules, the bulk chemistry, and analytical techniques are reported in Nielsen & Jensen (2005).

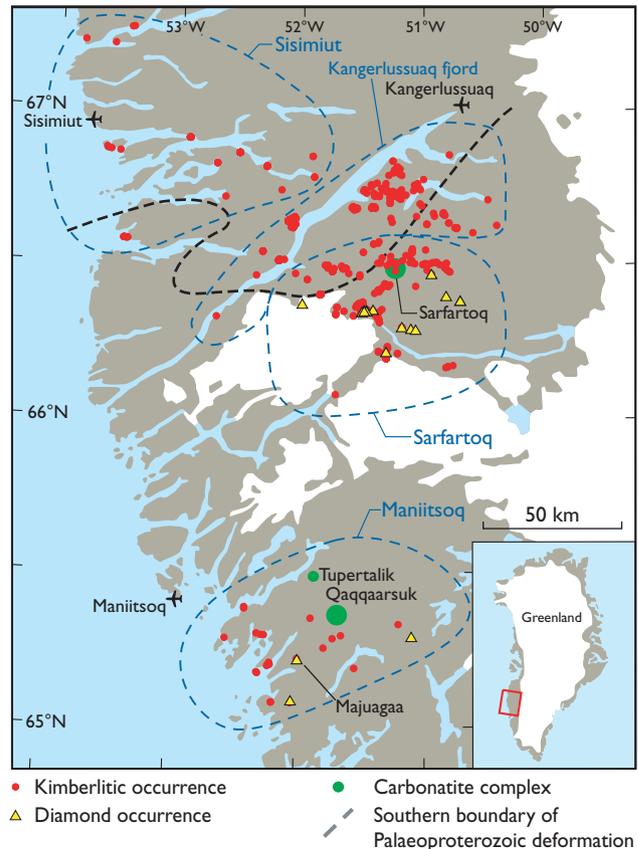


Fig. 1. Kimberlites and ultramafic lamprophyres (kimberlitic occurrences), carbonatite complexes and diamond occurrences in southern West Greenland (after Jensen & Secher 2004). Regions are indicated.

Classification of the Majuagaa dyke

Mitchell (1995) and Tappe *et al.* (2005) use the following criteria for the classification of kimberlite (*s.s.*): (1) the groundmass contains no clinopyroxene; (2) groundmass spinel belongs to the Magmatic Trend 1 (Mg-rich titanomagnetite); (3) phlogopite is zoned towards the Al_2O_3 - and BaO-rich kinoshitalite endmember and (4) ilmenite has a high geikilite component (> 40 mol.% $MgTiO_3$) and little pyrophanite ($MnTiO_3$). Mitchell *et al.* (1999) found that these criteria were not met by the West Greenland dykes and concluded they were ultramafic lamprophyres (aillikites or melnoites) rather than kimberlites.