

The first record of allochthonous kimberlite within the Batain Nappes, Eastern Oman

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Kimberlites, carbonatites, alkaline and ultramafic lamprophyres and other alkalic ultrabasic rocks have been recently discovered within the Batain Nappes in the eastern Oman Mountains. The kimberlite area comprises several allochthonous bodies. Most of these are carbonatite and carbonate kimberlite which contains mantle derived (altered peridotitic) xenoliths and xenocrysts. The kimberlite occurs either as breccia pipes and/or as long dykes ~ 6 km long. The kimberlites contain abundant macrocrysts of mica (phlogopite and/or biotite), chromite, chrome diopside, pelletal lapilli and autolithic fragments in a calcite + serpentine matrix. The kimberlites are dominantly composed of 'hapabyssal and diatreme facies' volcanoclastic rocks. These include pyroclastic lapilli-, carbonate-dominated tuffs, and volcanoclastic kimberlite, all of which intruding late Jurassic to Lower Cretaceous marine sedimentary rocks (cherts and shales) of the Wahra Formation, within the Allochthonous Batain Mel'ange. Major and trace elements and isotopic composition indicate that the Omani kimberlites in this study form a compositionally cohesive group of rocks more akin geochemically to the Koidu type kimberlites of West Africa than the Group I kimberlites from South Africa. The kimberlite contained zircon, G9 garnet and chromite grains with typical kimberlitic morphologies and chemical properties similar to diamond inclusion chromite. However, there were no micro-diamonds observed.

Fifteen pinkish ('kimberlitic') zircon grains, 0.5 to 1.5 mm in size, were picked from the kimberlite tuff and were analyzed at GEMOC. Trace-element patterns are typical of kimberlitic to carbonatitic zircons. Their mean age of 137.5 ± 1 Ma (95 % confidence, MSWD = 0.49) is consistent with intrusion into Lower Cretaceous rocks. Their $^{176}\text{Hf}/^{177}\text{Hf}$ (0.28286 ± 1 , $\varepsilon_{\text{Hf}} = 6.2$) is typical of kimberlitic zircons of this age, and may represent the subcontinental lithospheric mantle.