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The M´Fema and SM Carbonatites, Mozambique

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The M´Fema and SM carbonatites, located approximately 30 km northwest of the city of Tete, in Mozambique, were explored by Vale Moçambique Lda. in 2011. They were respectively emplaced at southern and northern contacts of the Chacocoma granite with the Tete Mafic Suite, a gabbro-anorthosite complex. From a regional perspective, the contacts between the Chacocoma and Mussata granites and the Tete Mafic Suite were preferential loci for the emplacement of carbonatitic magmas, a fact supported by presence of over ten other carbonatites, sometimes previously mapped as marbles, both to the North and South of the M'Fema and SM carbonatites [1]. These carbonatites are connected to the Cretaceous alkaline magmatism associated with the East Africa Rift [1,2]. The recognition of a large number of carbonatites and alkaline rocks in this region could arguably suggest a new alkaline province in the northeast of Mozambique.

The M'Fema carbonatite is a two-carbonate carbonatite (calcite and dolomite) with a NE-SW strike of 6 km. It is characterized both in outcrop and in drill core by swarms of veins and dikes of variable thicknesses and strike. Up to twenty carbonatite dikes with an individual maximum apparent thickness of 22 m have been identified in drill core. The main accessory minerals are apatite and magnetite. Grain size varies from medium to coarse, and pegmatitic portions are often observed. Banding is the most evident feature and reflects a process of fractional crystallization indicated by differing proportions of the constituent minerals (carbonate, apatite and magnetite), sometimes by grain size variation or by both features. In addition to bands rich in apatite and magnetite, phoscorites and more particularly nelsonites are observed. The occurrence of these minerals suggests that magma immiscibility has taken place in the original carbonatite magma, leading to the segregation of carbonatite and phoscorite magmas [3]. A geochemical soil sampling program covering M'Fema shows that the carbonatite is characterized by high vales of P_2O_5, coincident with elevated LREE and Ca, and low SiO_2.

The SM carbonatite is a calcite carbonatite with a low proportion of apatite and magnetite. It is characterized by a swarm of dikes and veins analogous to the M'Fema carbonatite, occurring along a strike of 7 km with a NE-SW trend. It is hosted by pyroxenites and gabbros of the Tete Mafic Suite. Zones of potassic metasomatism (fenitization) in the host rocks have been mapped associated with this carbonatite, and are more frequent than at the M'Fema carbonatite. Analyses of soil samples over the SM carbonatite indicate that P_2O_5 values are lower than those at M'Fema but still anomalous.

The occurrence of swarms of carbonatitic veins and dikes at the M'fema and SM carbonatites could indicate the presence of a larger carbonatite body at depth.

References:

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