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Evidence for the Involvement of Medium- to High- Pressure Fractionation Processes in the Origin of Marie Byrd Land Pantellerites, West Antarctic Rift System.

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Pantellerites, trachytes, and phonolites, of mid-Miocene (~14Ma) to Holocene age, occur in close proximity to each other in 6 large felsic shield volcanoes along the coast of western Marie Byrd Land (MBL). Work on pantellerites in the Afar region of Ethiopia, a good analog for MBL, showed that low-pressure fractional crystallization of transitional basalt provided a reasonable mechanism for the development of Afar pantellerites (Barberi, et al., 1974). In MBL, however, the predominant basaltic rocks are ne-normative basanites, which could be expected to produce phonolites via low-pressure fractionation. The problem here is to determine what mechanisms, and what sort of plumbing system can produce pantellerite, phonolite, and trachyte within the same time interval, and in close proximity. There are suggestions from cumulate nodules, trace element chemistry, and modeling, that fractionation of kaersutite, and perhaps orthopyroxene, at depths between 25 and 50 km, was a factor in the origin of MBL pantellerites, though as many previous studies have shown, it is difficult to unambiguously demonstrate the involvement of high- pressure phases when these processes have been overprinted by low- pressure crystallization. Further fractionation, at higher levels in the crust, under conditions of low PH2O and low fO2, appears to have produced the high peralkalinity and high FeO content of MBL pantellerites. Isotopic and trace element data provide no evidence for crustal contamination as a factor in the origin of these rocks.

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