

an injected pyroxene-enriched slurry. Orthopyroxene (opx) is euhedral and normally zoned, clinopyroxene (cpx) is interstitial, while plagioclase (plag) generally occurs as small (most <1mm, some 3–4mm), normally-zoned euhedral laths (<An87), some with inherited sodic cores. Euhedral plag laths included in opx primocrysts have similar compositions to groundmass or phenocrystic plag. Throughout the section, there is no systematic cryptic mineral-chemical variation of feldspar or pyroxene, and most rocks do not have cotectic plagioclase/pyroxene ratios, suggesting mechanical redistribution on a 300m scale of an inherited phenocryst load. Model melts from pyroxenite and gabbro-norite are identical to the dominant Ferrar Lavas for trapped melt fractions (TMF) of ca. 30%. The tongue contains feldspathic pipes (1–2m diameter) and layers which commonly contain foliated anorthositic edges, and gabbro-norite cores. Pipe margins appear rooted in the pyroxenite and yield model melts indistinguishable from those of the pyroxenite. We propose that the pipes are ephemeral melt+plagioclase escape structures by which the coprecipitated plag was transferred upward to form the gabbro-norite zone. In plan view, the size and number-density of the feldspathic pipes appears sufficient to have drained a pore melt containing ca. 10–20% small plagioclase laths from the pyroxenite in the time available for cooling the sill. The gabbro-noritic sequence contains anorthositic layers that differ mainly by having lower modal TMF (10%), and which may represent intra-cumulate sills of the feldspathic slurry expelled from the pyroxenite. Bedding-parallel and discordant pegmatitic ‘veins’ attest to the movement of Fe-Ti-PGE-rich fluids or volatile-rich melts which may have been expelled from the low-porosity anorthosites. Thus, recognition of low-TMF layers may represent a PGE-exploration guide.

Differentiation mechanisms in the Basement Sill, Ferrar Province, Antarctica

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The Basement Sill (BS) of the tholeiitic Ferrar flood basalt Province is > 300 m thick, with aphyric micro-gabbro-noritic marginal zones; a lower pyroxenitic tongue which varies in thickness along-strike; and an upper gabbro-noritic zone. The feldspathic websterite tongue could not have crystallized from the plagioclase-phyric chilled margins and represents