Petrochemical evidence for autometasomatic alteration associated with fluidized emplacement of dykes in subvolcanic rhyolitic pyroclastic systems: implications for dissecting W-Mo-Bi and Sn-Zn-Cu-In ore-forming environments like Mount Pleasant, New Brunswick

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In intrusion-related environments, the emplacement of dykes can often be overlooked as part of an analysis of the ore-forming system. Although typically cryptic, fluidization is commonly the dominant process controlling the emplacement, via hydrofracturing, of these felsic dykes, based on rheologic arguments and empirical field and petrographic evidence, i.e., tuffisites. It is well known that that expansion of exsolved volatiles increases the ΔV of the system, thus enhancing the energy associated with an eruption.

The decrease in geostatic pressure to sub-hydrostatic conditions within the subvolcanic magma chamber and conduit further pressure quenches these evolved low-T magmas inhibiting flow as a melt. The rhythmic textural features, various types of quench textures (i.e., skeletal growth), crystal fragmentation, autobrecciation, and conduit scaling all point to the important role of magmatic volatiles, i.e., gas-glass.

Rheomorphic like features associated with continual emplacement of the tuffisite may be developed. However, subsolidus recrystallization processes, governed by the degree of undercooling below the solidus (ΔT), may obscure these primary textures. The vapour associated with pyroclastic emplacement can also alter and mineralize the quenched glass entrained within it, but also along the conduit walls, by devitrification-alteration processes; this mineralization process has implications for metal vapour transport.

These deuteric alteration effects resultant from $F/R >> 1$ can obscure those same textural features that might otherwise indicate the emplacement mechanism. In addition, ore-element abundances and sulfur can be enhanced within these autometasomatically altered dykes indirectly revealing the ore-forming potential of the magmatic systems from which they were derived.

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