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# Sampling Patterns of Mid-Ocean Ridge (MOR) Magmas as Evidenced by Plagioclase Megacrysts and their Melt Inclusions (MI)

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Our understanding of the identity and magnitude of processes active in upper mantle relies heavily on compositional analyses of glassy basaltic lavas erupted onto the ocean floor and olivine-hosted melt inclusions (MI). However, it is widely accepted that these aphyric lavas are the product of a complex array of mixing and differentiation processes. Therefore, restriction to glassy lavas alone makes it difficult to resolve the influence and location of processes active during transport to the surface.

Previous data on depth of entrapment for plagioclase-hosted melt inclusions, based on $CO_2$ saturation, indicate that many plagioclase crystals from Plagioclase Ultraphyric Basalts (PUB) form at depths >10 km and are, hence, the products of crystallization in the lower crust and shallow upper mantle [1, 2]. Further, the wide range of trace element composition exhibited by megacrysts and their MI, the relatively compatible behavior of a number of minor and trace elements in plagioclase, together with the slower diffusion rates of elements such as Ba, Ti, LREE in plagioclase compared to olivine have made plagioclase an increasingly important source of information on the original composition of the magmas as they exist at depth [3]. This work focuses on understanding how plagioclase megacrysts, their MI, and the associated lava suites are petrogenetically related. The observed relationship between megacrysts, MI and associated lavas are influenced by the nature of the density filter [4], depth of mixing and differentiation and post-entrapment modification of the MI and host [5]. Homogenization experiments were performed on plagioclase megacryts of PUB lavas from a variety of tectonic settings (e.g., slow vs. fast spreading rate, on axis vs. off-axis, variable crustal thickness, and magma supply). Using the information from rehomogenized MI, together with the major and trace element characteristics of host plagioclase we modeled the identity and magnitude of petrogenic processes responsible in the production of these lavas.

[1] Drignon et al. (2019) *G3*., **20**, 109-199. [2] Bennett et al. (2019) *Contrib MinPet.*, **174**, 49-71. [3] Nielsen et al. (2020) *G3,* **21**, 1-24. [4] Lange et al. (2013) *Geochem G3,* **14**, 3382-3296. [5] Lewis et al. (2021) *Front. Earth Sci.*, **8**, 673-689.