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Petrography, geochemistry and origin of deep magmatic cumulates in the Canary Islands – the xenolith record.

Tenerife is the largest, highest, and most central of the Canary Islands. It represents the most diverse rock exposures in relation to the other islands. Ranging from the island-building basalts to the felsic products of the Teide-Pico Viejo stratovolcanoes (the explosive ones). The island originated 11.9 million years ago, while the Anaga Massif, which this study is concerned with, represents the last island building stage at 4 million years ago. After the conclusion of this basaltic event, we are introduced to the explosive volcanism, and a sequence of caldera collapses.

This study's focus lies exclusively on the xenolithic record from the Anaga peninsula due to a shortage of prior research concerning this stage. Xenoliths are foreign pieces of rock confined in a different type of rock. These are brought up from depth during a volcanic eruption. The magma that brings these up becomes the host rock and the xenolithic material is an inclusion that was picked up at a certain depth underneath the volcano. Therefore, these xenoliths may be thought of as records of information about the volcano's plumbing system. Studies on the minerals found in them reveal valuable data, that can be used to understand the processes that formed this volcano.

The xenoliths in this study reveal a water-bearing mineral, amphibole, as one of the main constituents of this rock. This find was significant as it attributed the source of these rocks to contain water to some extent. To understand this water source I had looked at oxygen isotope signatures in the specific rock-forming minerals of clinopyroxene, hornblende and apatite to relate a significant initial melt value that would tell us about the conditions of the source itself.

A striking find of this study is the determination of two distinct mantle reservoirs, where the xenoliths in question had crystallized and resided before being picked up. The study finds a shallow reservoir at 3 km and a deep reservoir at a 30km depth. This latter reservoir is studied under a greater emphasis as it related to a crystallization at a mantle depth. Here, the earlier mentioned oxygen isotopes are associated with a depth difference where the deeper xenoliths represent the initial values, whereas the shallow xenoliths are related to some extent of contamination. This study therefore highlights the importance of depth associations of xenolithic material when inferring further geochemical analysis to obtain data relating to a source.

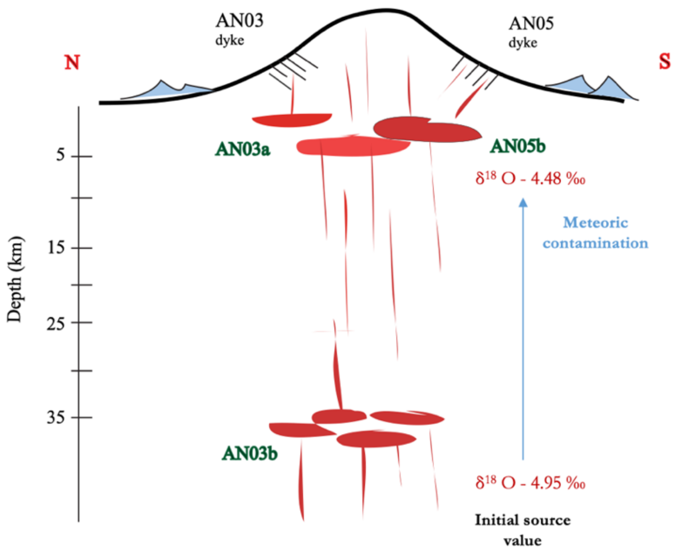

Figure 18. a conceptualisation of the clinopyroxene δ^{18} O value differences related to depth associations, where in the shallow reservoir cpx is subject to contamination.