Time scales of magmatic processes of mafic historical eruptions from Tenerife, Canary Islands

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The spatial and temporal distribution of recent volcanism on Tenerife shows that the island is a highly active volcanic zone and that future eruptions may occur from many different vent sites on the island. All historical activity corresponds to relatively mafic and small volume eruptions which have produced cinder cones, reduced lapilli and ash deposits and several kms long lava flows, causing a relatively low damage. However, the same type of eruptions would cause today a significantly higher lost, as the increase in population and infrastructure has made Tenerife much more vulnerable. We have started a study of the rates of magmatic processes involved in this type of eruptions to provide a temporal framework for the eventaulity of such an event in the island.

We have concentrated on the NE rift basaltic eruptions of 1704 (V. Siete Fuentes) and 1705 (V. Arafo and Fasnia). These eruptions evolved from a fissure style activity to a small cinder cone and emitted magma volumes increase with time. New petrological and geochemical data show that the eruptions also became slightly more mafic with time. We found a large variety of olivine crystal populations, with core compositions ranging from forsterite (Fo) 88 to 79. Many crystals are homogeneous at Fo79-81, but others are normally or reversely zoned in Fo. Such variety of crystal compositions indicate that the magmas are the result of mixing/mingling involving at least three different mafic components (crystals and melts). Kinetic modelling of the Fe-Mg zoning in olivine (e.g., Costa *et al*.,[1]) gives times between the mixing and eruption that vary from a few months to a few years. The longer times are obtained from crystals that show reverse zoning and probably reflect an early event of mixing before the last one that brought the crystals to the surface. All times are longer than the ca. one week of earthquake activity that occurred prior to the 1704 eruption based on historical accounts. This shows that a hierarchy of times may be involved in the precursor activity of such types of volcanic events and it should be considered when making scenarios of future eruptions.

[1] Cost, Dohmen & Chakraborty(2008) *Rev Mineral Geochem* **69**, 545-594.

Genesis of syn-D3 two-mica granite from Aguiar da Beira (central Portugal)

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Medium-grained muscovite>biotite granite from the Aguiar da Beira area, central Portugal, crops out as an elongated NW-SE intrusion in the Central Iberian Zone of the Iberian Massif. It is syn-D3, heterogeneously deformed, showing in its western parts a gneissosity concordant with the D3 Variscan structures. The ID-TIMS U-Pb zircon age is 317 ± 2 Ma. This granite consists of quartz, plagioclase (An_{0}-An_{19}), microcline (Or_{82}-Or_{97}), primary muscovite, biotite $Fe^{2+}/(Fe^{2+}+Mg)$ of 0.64 to 0.83, zircon, apatite, monazite and ilmenite. It exhibits a compositional variation (SiO_2 = 70-74 wt %), is strongly peraluminous (A/CNK = 1.2-1.4), has low Ca, Mg, Ti and ∑REE contents, high Rb/Sr values (2.6-17.4), $(^{87}Sr/^{86}Sr)_{317}$ of 0.7104-0.7146, εNd_{317} of -7 to -8.7, suggesting a crustal origin. Its REE pattern is enriched in LREE with respect to HREE (La_N/Lu_N = 16-69) and has a negative Eu anomaly (Eu/Eu* = 0.20-0.48). There is a good agreement between the εNd_{317} values for this granite (-7.7 to -8.7) and the Cambrian and Early Paleozoic metasediments (εNd_{317} = -6.6 to -11.9). However, the $(^{87}Sr/^{86}Sr)_{317}$ ratios for the granite (0.7104-0.7146) are lower than those of the probable crustal sources [$(^{87}Sr/^{86}Sr)_{317}$ = 0.7134-0.7180]. As the Sr isotopic ratios of the granite and potential protoliths could have been disturbed by disequilibrium partial melting and/or post-magmatic alteration, the geochemical and isotopic characteristics of the granite are well accounted for by moderate degrees of partial melting of the basement metasediments under vapour absent conditions.