The U-series evolution of Stromboli volcano in the last century

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The typical volcanic activity of Stromboli consists of small explosions erupting a highly porphyritic (*hp*) magma. In addition, every few months/years, a magma with low phenocryst (*lp*) content can also occur during more energetic eruptions. This magma is thought to bypass the shallow *hp* magma chamber and the associated crystal mush, and represents the most primitive liquid at Stromboli volcano.

We integrate the U-series dataset of Bragagni *et al.* [1] with $^{228}Ra/^{232}Th$ measurements and additional U-Th disequilibrium data. The U-series dataset cover two periods of intense volcanic activity (1930-1955 AD and 1996-2007 AD) and one of more moderate activity (1965-1986 AD). $^{234}U/^{238}U$ is in secular equilibrium (with one exception), suggesting no U mobility during alteration or hydrothermal activity. Moreover, the $(^{228}Ra/^{232}Th)\approx1$ attests the lack of significant Ra/Th fractionation in the last decades due to magmatic or surface processes.

On the equiline diagram, the *lp* and *hp* magmas follow two distinct and sub parallel trends, with younger products having lower $^{238}U/^{232}Th$ and $^{230}Th/^{232}Th$. At a given time, *hp* magmas have $^{238}U/^{232}Th$ higher than *lp* magmas due to the assimilation of ancient material (crystals and especially melts) within the *hp* magna chamber [1]. The persistence of such compositional gap (with one exception) reflects the steady state of the shallow plumbing system during the last century.

In the most recent period (1996-2007 AD), the constant $^{238}U/^{232}Th$ within *lp* and *hp* magmas, made it possible to investigate the variation in $^{230}Th/^{232}Th$ in terms of melting rate (*lp* magmas) [2] and shallow residence times (*hp* magmas) [1]. In contrast, the previous two volcanic periods show variable $^{238}U/^{232}Th$. This suggests changes in the primary magma, which likely reflect different mantle sources as also confirmed by $^{87}Sr/^{88}Sr$ data [3].

[1] Bragagni *et al.* (2014) EPSL **404**, 206-219. [2] Avanzinelli *et al.* (2013) MinMag, 631. [3] Francalanci *et al.* (1999) EPSL **167**, 61-69.