

5.4.P08**Geochemical characteristics of basaltic lavas from Lucky Strike central volcanic complex**

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Dredge and Tv-grabed basalt rocks were collected along the axial valley of the Mid-Atlantic Ridge from 37° 20,26' N to 37° 12,03' N (TTR-12 / Leg 5 cruise, 2002). This sampled area is located inside the large central volcanic complex, which constitutes the central part of the so called Lucky Strike segment. The summit area around the three volcanic cones, which encloses the hydrothermal field, was excluded once previous sampling was already carried on.

Most of the samples are relatively fresh, as determined from petrographic evidence, with low L.O.I. (loss on ignition) values (< 0,53%). The majority of the samples are aphyric basalts but some are sparsely phyrlic (plagioclase is the dominant phase but olivine is also present).

Bulk rock concentrations vary from comparatively high values of 9,1% to values as low as 5,2%, (Mg#s ranging from 72.2 to 60.2) with a comparable range in highly compatible trace element abundances (Ni= 62-144 ppm; Cr= 85-1207 ppm; V= 136-296 ppm). Limited, but distinguished, ranges in incompatible element abundances (Zr, Nb, Ba, La) and element ratios (Zr/Nb, Y/Nb, La/Sm) are observed. All of these ratios are characteristic of geochemically enriched MORB. Variable slopes ((La/Yb)_{Cn} ranging from 1,3 to 5,4) and crossing patterns of chondritic normalised REE abundances characterize these lavas.

Crystal fractionation can qualitatively account for the general vertical range of REE patterns, major and compatible trace elements variation, but not the steeper orientation of patterns for some samples, neither the different incompatible element ratios. Significant is the necessity to invoke the involvement of clinopyroxene (cpx) fractionation during the evolution of these basalts, as a result of CaO/Al₂O₃ ratio and Sc (highly compatible in cpx) content decreasing. Often, this characteristic is associated with cristallization at elevated pressures.

Melting a small scale heterogeneous mantle or variations in the proportions of melt extracted from different depths in the melting zone (variable mantle temperatures and accompanying pressure) must be complementary considered.

5.4.P09**Zn isotopic composition of fumarolic gases from Merapi volcano (Indonesia), preliminary results**

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Because of selective magma distillation, volcanoes release to the atmosphere and the hydrosphere trace gases and heavy metals (MTE) which might be involved in global geochemical cycles. MTE are transported mainly as volatile halides. Steep physical and chemical gradients (T°, f O₂) affect the composition of volcanic fluids en route to the surface. At the volcano-atmosphere interface, MTE are partitioned between gaseous and solid phases leading to sublimates-incrustations deposits. This process is usually studied by using elemental and thermodynamic approach, providing fundamental insights into the understanding of volatilisation, transport and deposition of volatile elements by magmatic fluids. An isotopic approach of MTE transport is now possible due to the recent appearance of multiple-collector plasma source mass spectrometers (MC-ICP-MS) associated with new efficient chemical separation techniques. Such data should increase the knowledge of mass-dependent isotopic fractionation of heavy stable isotopes in volcanic areas.

Within this frame, preliminary Zn isotopic measurements have been performed in fumarolic condensates from Merapi volcano. Zn was selected because of its high enrichment factor in fumarolic fluids, aerosols and solid deposits. Zn fractions are purified by anion exchange chromatography (AG MP-1 resin). Analytical measurements are performed on both a VG elemental Plasma 54 and on a Thermo-Finnigan Neptune. Instrumental mass fractionation is corrected by using the known isotopic composition of a Cu standard admixed to the sample solutions. Accuracy is further improved by sample-standard bracketing technique using a reference mixed Zn-Cu standard solution. The variation in Zn isotopic composition, expressed as δ⁶⁶Zn (δ⁶⁶Zn=[(⁶⁶Zn/⁶⁴Zn)_{sample}/⁶⁶Zn/⁶⁴Zn]_{standard}-1]×10³) is found to be on the order of 1‰. The overall reproducibility is usually better than 0.1‰.

Even if these preliminary results have to be confirmed by further analyses and completed by isotopic characterisation of solid deposits, a correlation is observed between δ⁶⁶Zn and the sampling temperature of the fumarolic vent (n=6 ; R²=0.8) which suggest a preferential deposition of the heavy isotope during cooling of volcanic gas.