Petit spot-like volcanoes exposed in Costa Rica

D.M. BUCHS[1]*, S. PILET[1], P.O. BAUMGARTNER[1], M. COSCA[2], K. FLORES[1] AND A. BANDINI[1]

[1]IGP/IMG, University of Lausanne, Switzerland (correspondence: dbuchs@ifm-geomar.de)
[2]US Geological Survey, USA

The study of volcanism in the ocean is fundamental to better understand the dynamics of the Earth mantle and plate tectonics. However, our understanding of this volcanism is limited by difficulties to access the roots of ocean volcanoes and the ocean floor. Recent results in Panama shown that exposed accreted volcanoes can provide another way of understanding volcanism in the oceans [1].

Petit spot volcanoes found on the subducting plate off Japan are considered to reflect volcanism in response to plate flexure [2]. However, petit spot volcanoes are very small and it remains unclear if they are a common feature on the ocean floor; documenting new occurrences of petit spot volcanoes is a key multidisciplinary issue. We recognize here ancient petit spot-like volcanoes accreted in Costa Rica based on new geochemical, geological, ^{40}Ar-^{39}Ar, and biochronologic data.

Petit spot-like volcanoes acccreted in Costa Rica consists of tectonic stacks of volcano-sedimentary material that includes vesiculated pillow lavas, volcanic breccias and thick radiolarite beds. Igneous sills compositionnally similar to the lavas are common in the radiolarite beds. Major and trace element contents of the igneous rocks indicate an alkalic, moderately fractionated composition, and support very low degrees of partial melting in the garnet stability field. Normalized trace element patterns are very similar to those of petit spot volcanoes in Japan, and distinct from those of typical OIB, MORB and off-axis seamounts.

Step-heating ^{40}Ar-^{39}Ar dating on co-magmatic amphiboles gave two ~175 Ma ages of formation for the petit spot-like volcanoes in Costa Rica. Tectonostratigraphic and biochronologic data clearly document a ~110 Ma age of accretion, and indicate that the volcanoes did not formed close to a subduction zone or a mid-ocean ridge. Therefore, we propose that petit spot-like volcanoes may represent a ubiquitous feature on the ocean floor, which can form far from mid-ocean ridges and subduction zones. Possibly, petit spot-like volcanoes exposed in Costa Rica reflect tectonically-induced leaking of melts pre-existing at the base of the lithosphere.

[1] Buchs *et al.* (2011) *Geology* **39,** 335-338. [2] Hirano *et al.* (2006) *Science* **313**, 1426-1428.

Cross calibration of a Pb Multi Ion Counting array on TIMS

NADINE BUCHS, DIETMAR TUTTAS AND CLAUDIA BOUMAN*

Thermo Fisher Scientific, Hanna-Kunath-Str. 11, 28199 Bremen, Germany.
(*correspondence: claudia.bouman@thermofisher.com)

Multicollector instruments using arrays of Faraday detectors are the first choice for high precision isotope ratio measurements. With decreasing sample sizes, the noise level of the Faraday detectors becomes the limiting factor for high precision isotope ratio measurements. The new TRITON *Plus* TIMS provides Multi Ion Counting with up to eight ion counters in addition to its variable multicollector array of nine Faraday cups. Classical large scale SEMs can be combined with the newly introduced compact discrete dynode electron multipliers (CDDs). The performance of these small electron multipliers is directly comparable to the classical large-scale SEMs. Both show identical stability and linearity. Also dynamic range and noise characteristics are equal for both ion counter types.

In case of Faraday detectors, precise cross calibration is guaranteed by the gain calibration and baseline measurements. In a Multi Ion Counting array, individual yield factors must be taken into account, but the stability of the yield factors needs to be assessed as well to obtain ultimate precision for isotope ratio measurements.

This study presents two strategies for precise cross calibation of all ion counting channels. The first one includes a calibration up-front; the second strategy involved an in-run calibration to control yield drift. Experiments were done on a TRITON *Plus* setup with four ion counting detectors to collect ^{204}Pb, ^{206}Pb, ^{207}Pb and ^{208}Pb. Internal correction for mass fractionation was done using $^{208}Pb/^{206}Pb$.