# Noble gas isotopic ratios of volcanics and xenoliths from northern Taiwan-Luzon Arc

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The Taiwan-Luzon Arc, which was generated in response to the subduction of the South China Sea Plate, is currently colliding with the eastern margin of the Eurasian continental plate at the arc's southern and northern ends. Systematic temporal and spatial variations in the geochemistry of the magmas erupted along the arc are ascribed to the involvement of the subducted continent-derived sediments or crustal slivers close to the collision zones.

Three $^{3}He/^{4}He$ ratios of hornblende, biotite and pyroxene separated from the arc volcanics near the collision zone were obtained. The ratios of Hsiaolanyu lava from northern arc are less than 2.3 and 1.3 times atmospheric ratios (Ra). The other is 3.0 Ra of Mt. Arayat lava from southern part of the Taiwan-Luzon arc. This implies that the crustal component played an important role in the petrogenesis of the arc magmatism, at least near the collision zone, to the lower down the $^{3}He/^{4}He$ ratios of the lavas.

The helium isotopic ratios of olivines from xenoliths of Lanyu, Batan and Diogo island fall in a range from 8.1 to 10.1 Ra. They are close to the value of the average MORB ratio. However, the co-existing amphibole from the same nodule of Batan Island (8.4 Ra of olivine) shows a much lower ratio of 4.7 Ra, which are similar with the ratios of the arc lavas. In addition, pyroxenes and amphiboles from gabbroic xenoliths of the arc lavas exhibit a wide range from 2.3~7.6 Ra. It infers that they are cumulates in origin at different stages of fractionation in former magma chamber.

Combined with the Sr-Nd-Pb and helium isotopic data, we can conclude that at least two components, i.e., crustal component (Ra<1) and MORB component (Ra ~8), are necessary for the generation of Taiwan-Luzon arc magmatism.

# Tracing water exchange between mantle and continental crust with the δD values of NAMs in granulite

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## Introduction

A poorly defined parameter of the inner Earth water budget is the possible flux through the mantle and continental crust boundary. Therefore, in the aim to obtain new constraints on Mantle-Crust exchange, we undertook to determine the D/H ratio of granulites from North China Craton.

## Results

3 set of granulites were analyzed: Archean-early proterozoic granulite xenoliths from Nushan, granulite from Hannuoba archean terrain, and phanerozoic granulite xenoliths from Hannuoba, for which the water contents have been previously determined by FTIR spectrometry (Xia *et al*, 2006 and Yang *et al*, submitted), with value ranging from 150 ppm up to 2300 ppm. The CRPG IMS 1270 ion microprobe were used for D/H ratio in situ measurements of Cpx, Opx and Plag. Measurements where performed with a $0^{-}$ 10 µm diameter primary beam, and calibrated against already known NAMs and hydrous minerals. The $\delta D_{SMOW}$ values obtained for Plag of the 3 samples set range from –80 to –150, for Opx from –150 to –100 for Nushan, -150 to –50 for Hannuoba Terrains and –100 and – 20 for Hannuoba xenoliths and all the measurements on Cpx range from –60 to +20.

## Discussion and conclusion

The high δD values observed for Cpx suggest that Cpx were affected by a diffusion hydrogen loss, as well as some Opx from Hannuoba. The preferential loss of hydrogen from Opx and then Opx may be associated to their high initial water and iron content, both supporting H loss. Therefore the initial granulite δD values should be the one preserved in Plag and part of the Opx, and is similar in the 3 localities, mostly ranging in between –100 and –150. This low δD value may reflect either a lower continental crust or a deep mantle plume signature, but significantly differ from the expected composition of the upper mantle (-60 to –80). This suggests that not any water flux affected the granulite H isotopic composition, even for the Proterozoic granulite from Nushan that were transported to the surface during Cenozoic volcanism.

## References

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