

## Coupling crushing and laser ablation in submarine glasses provide new constraints on noble gases composition of Earth's mantle

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Rare gases released with traditional experimental procedures in mantle-derived rocks generally display mixing trends between a mantle and an atmospheric component. The origin of atmospheric contamination is still debated and is interpreted to result from surface contamination or recycling in the mantle.

In order to examine this problem, we analyzed noble gases in single vesicles in submarine glasses, because it gives the possibility to look at the end members. Here, we compare data obtained by crushing and by measurement of in single vesicles using a laser UV ablation system on two samples: 2πD43, considered to be representative of upper mantle volatiles from the northern MAR, and one from the western Galapagos, which appears to sample one of the most primitive mantle noble gas reservoirs.

Helium isotopic ratios in single vesicles are constant for both MORB and OIB sample with a mean values of  $90,500 \pm 3,500$  and  $32,000 \pm 1,000$ , respectively.

The systematic Ne-Ar in single vesicles of sample 2πD43 indicates that there is only one population of vesicles, with a mantle composition (the mean value of  $^{40}\text{Ar}/^{36}\text{Ar}$  is  $25,000 \pm 4,000$  and is associated to a  $^{20}\text{Ne}/^{22}\text{Ne}$  of  $11.5 \pm 0.6$ ). This lower  $^{20}\text{Ne}/^{22}\text{Ne}$  ratio compared to those measured by crushing can be explained with a small contribution of gases, with an air-like composition, dissolved in the matrix. We conclude that isotope variations observed by crushing are due to superficial contamination.

In contrast, analyses from individual vesicles of the Galapagos sample show heterogeneities on the scale of individual vesicles ( $^{40}\text{Ar}/^{36}\text{Ar}$  ratio vary from  $3,000 \pm 500$  up to  $7,500 \pm 300$  and being associated to a  $^{20}\text{Ne}/^{22}\text{Ne}$  from  $10.3 \pm 0.5$  to  $11.9 \pm 0.3$ ). Such high  $^{40}\text{Ar}/^{36}\text{Ar}$  values are not observed during crushing.

## Application of statistical methods in geochemical anomalies identification, Baidjan area, North of IRAN

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### Methods

Baidjan Exploration Area is situated in the South of Amol, North of Iran, Whose total surface area is 140 km<sup>2</sup>. A total of 264 samples of the fine grained fraction of active stream sediments were collected and were analysed by ICP-MS method. Chemical variable after replaced censored data and normalized on the base of upper stream rock unit processed and mapped by means of R<sub>mode</sub> factor, K<sub>Means</sub> Cluster and Scatter plot methods.

### Discussion and result

In these ways were determined three anomaly area in north, centre and west of exploration area. In the north and most important promise point, anomalies at the local scale were identified for Au (up to 37 ppb) and As (95.4 ppm). In this anomaly area, the correlation between these threshold values and silisified carbonate or carbonate hosted silisic veins is clearly shown. The second anomaly point, in central of exploration area, anomalies at a local scale were identified for Ag (up to 3 ppm), Sb (up to 5.6 ppm), Bi (up to 2.2 ppm), Zn (up to 231 ppm) and Cu (up to 72.8 ppm). This anomaly reflected mainly a local distribution of the outcropping rock type, mainly silisified andesit and basalt that malachite and azurite in the silisic zone or veins clearly shown. The west anomaly shown threshold obtained for REE, especially Ce (up to 541 ppm) and La (up to 104 ppm) and Cu (up to 70 ppm). This anomaly was correlated to altered Eocene tuffite.

### Conclusion

The high grade of Ce, La and relatively Au, Cu and Zn and association with favourable geological phenomena, ambient needing further validation, gave some indicative references to the economic potential of this area for these elements mineralization.

### Reference

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