$\delta^{88/86}$Sr record of phanerozoic marine carbonates

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For the first time we extend and complete earlier application of radiogenic Sr isotopes [1] with a simultaneous measurement of radiogenic and stable strontium (Sr) isotopes [2] ($\delta^{88/86}$Sr[‰]= (^{88}Sr/^{86}Sr$_{sample}$/^{88}Sr/^{86}Sr$_{NBS987}$-1)*1000). Applying a ^{87}Sr/^{84}Sr-double spike we measured paired $\delta^{88/86}$Sr-^{87}Sr/^{86}Sr* ratios of phanerozoic marine carbonates samples which were screened for diagenesis prior to the measurement. For compatibility to earlier measurements ^{87}Sr/^{86}Sr* ratios are also renormalized to $\delta^{88/86}$Sr=0‰ (^{88}Sr/^{86}Sr=8.375209). Data reduction and denormalization is performed using an iterative algorithm closely following the one for Ca-isotopes developed earlier by Heuser *et al.* [3]. External $\delta^{88/86}$Sr reproducibility based on an internal coral carbonate standard (JCp-1) correspond to ~0.013‰ (2σ of the mean).

Our data reveal that $\delta^{88/86}$Sr of phanerozoic brachiopods and belemnites samples are in the range of modern marine carbonates (JCp-1 coral standard value: 0.197±0.013‰) but isotopically lighter than modern seawater ($\delta^{88/86}$Sr$_{IAPSO}$= 0.386±0.006‰) being in the range between ~0.081 and ~0.370‰ (mean of 0.189±0.031‰). We observe a constant increase in $\delta^{88/86}$Sr from the beginning of the Paleozoic towards the upper Permian. Highest values (~0.370‰) of $\delta^{88/86}$Sr are reached close to the Permian/Trias boundary. There is no correlation between $\delta^{88/86}$Sr, ^{87}Sr/^{86}Sr* and δ^{18}O on phanerozoic timescale.

[1] Veizer *et al*. (1999) *Chem geol.* **161**, 59-88 [2] Fietzke and Eisenhauer (2006) *Geochem. Geophys. Geosyst.* **7**, Q08009 [3] Heuser *et al*. (2002) *Int. J. of mass spectr*. **220,** 385-397

Mantle sources and fluids in the Northern Kamchatka back arc

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Miocene to Quaternary volcanic rocks of the northern Sredinny Range (SR) represent the northernmost extension of the back-arc in Kamchatka. New geochemical, isotopic and geochronological data of SR volcanic rocks allow the identification of three source components: (1) variably to strongly depleted N-MORB-type mantle with low Nb/HREE ratios (2) enriched OIB-type mantle with higher Ta, Nb concentrations and HFSE/HREE ratios, and (3) slab-derived fluid with high fluid-mobile element abundances and fluid-mobile/immobile element ratios. The relative contributions of these components and the degrees of melting varies through time: Late Miocene - Pliocene plateau lavas were produced by high degrees of melting (20%) of a fluid-fluxed but extremely depleted mantle wedge. Overlying Late Pleistocene - Holocene volcanic rocks formed by lower degrees of melting (8-10%) from a slightly enriched mantle source (70% depleted MORB+30% OIB) and a smaller contribution from a slab fluid. This demonstrates a clear influence of slab fluids in a zone where geophysical data do not identify active subduction. Quaternary volcanic rocks are less enriched in LILE and less depleted in HFSE – compared to older plateau lavas. This suggests that the fluids from the Pacific Plate formed under different conditions in the back arc. It has been argued that under high-P/high-T conditions in deep slabs a composite supercritical fluid derived from the oceanic crust and sediments may be responsible for elevated HFSE in (back-) arc settings. Here, however, low (MORB-like) Pb and Sr isotopic ratios in SR rocks prevent significant sediment involvement in magma genesis. Moreover, Nb and Ta concentrations in most enriched lavas are so high (26 and 1.6 ppm, respectively) that - in absence of an OIB-type mantle component - we should assume that about 90 % of these elements (i.e. ac. 23 ppm Nb and 1.4 ppm Ta) would have to be transported with such a supercritical component, which we consider unrealistic. For this region of the northern Kamchatka backarc we favour involvement of enriched OIB-type mantle after terrane accretion and slab roll back between the formation of the Late Miocene - Pliocene arc-front plateau-lavas and enriched Quaternary back arc magmatism. Large volumes and large degrees of melting documented in the plateau arc basalts may indicate massive mantle upwelling and extension of the fluid-fluxed arc mantle wedge just prior to and with the change in the subduction geometry.