Petrogenesis of syn-orogenic leucogranites (Damara orogen, Namibia)

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The granite-dominated part of the Central Damara Orogen (Namibia) consists of basement gneisses, high-grade metamorphic metasedimentary rocks, and crust-derived granites. Granites that crop out in the Kubas area fall into two groups; 553±8 Ma-old grey granites and 513±6 Ma-old red leucogranites. The grey granites have a common granitic composition but the red leucogranites are highly fractionated melts shown by extremely high Rb/Sr ratios, fractionated REE patterns and the presence of euhedral Mn-rich garnet. Digested remnants of upper crustal pelites are clusters of biotite, sillimanite and cordierite indicating some crustal contamination. The grey granites have less evolved isotopic compositions (init. $^{87}Sr/^{86}Sr$: 0.720; init. ε Nd: -16; large variation in $^{207}Pb/^{204}Pb$ (15.55-15.61) at $^{206}Pb/^{204}Pb$ ratios lower than the red leucogranites). The red leucogranites have more evolved isotopic compositions (init. $^{87}Sr/^{86}Sr$: 0.725-0.750; init. ε Nd: -16; large variation in $^{206}Pb/^{204}Pb$ trending towards the composition of common pelitic metasediments from the Damara orogen). These isotopic features indicate that both granite types represent melts from a similar source (Proterozoic/Archaean basement?) but have undergone different processes. The grey granites appear to be uncontaminated and hence, their composition mirror their sources. The red leucogranites have apparently interacted with upper crustal rocks via AFC processes (digested xenoliths, fractionated REE patterns, large variation in Sr and Pb isotopes), probably during stagnation within the crust. Such lower crustal melts are apparently confined to the pre-to syn-collisional phase of the orogeny and it is therefore likely that they have also contributed to the heat budget that controlled high-temperature metamorphism. Even in complex terranes granites can preserve a record of their sources and can be used to place limits on possible compositions of the unexposed sources of the granites and thus on the nature of the terranes through which the melts ascended.

Level of ^{129}I and ^{127}I in terrestrial environment of Slovenia: A two-year study of background areas

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Introduction

Iodine has two natural isotopes – ^{127}I is a stable isotope, while ^{129}I is a radioactive isotope formed naturally by spallation of cosmic rays on atmospheric Xe and spontaneous fission of ^{238}U. However, the main sources of ^{129}I in the environment are anthropogenic from nuclear fuel reprocessing plants (NFRP). Current levels of ^{129}I do not represent any radiological hazard to humans, but the discharges of ^{129}I from NFRP can be used as an environmental tracer [1]. Our aim was to investigate levels of ^{129}I in environment of Slovenia, because no data exist.

Experimental

Samples of precipitation, soil from opened field and forest, and pine needles were collected three times at four various locations in period 2009–2010. Total concentrations of ^{127}I and ^{129}I were determined with radiochemical neutron activation analysis [2].

Results

Sample	**^{127}I** ($\mu g\ g^{-1}$)	**$^{129}I/^{127}I$** (10^{-8})
precipitation (n = 10)	0.0017–0.0065	<2.3–91.0
soil		
opened field (n = 12)	2.4–22.2	0.7–7.1
forest (n = 12)	3.9–35.2	0.7–7.4
pine needles (n = 12)	0.058–0.413	15–189

Table 1: Range of concentration levels and $^{129}I/^{127}I$ ratios

Discussion

The highest concentrations of ^{127}I and ^{129}I were found in soil samples. Soil samples collected in forest, where more organic matter is present; contained more ^{129}I and ^{127}I than soil from opened field, although the $^{129}I/^{127}I$ isotopic ratio is the same. The highest $^{129}I/^{127}I$ isotopic ratio was found for pine needles. Obtained results are the first for terrestrial environment of South Europe and are comparable to values found in literature for background areas.

[1] Hou (2004) *J. Radioanal. Nucl. Chem* **262**, 67–75.
[2] Osterc *et al*. (2007) *Acta Chim. Slov* **54**, 273–283.