Inferences for the style of subduction in the Carpathian-Pannonian region based on boron signatures

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Miocene calc-alkaline (CA) volcanic suites – more or less parallel with the Carpathian Mt. range – suggest a southwest-westward subduction process. Indeed, composition of the CA volcanic rocks shows typical subduction-related features, such as elevated LILE and relatively depleted HFSE. Boron, a fluid-mobile, incompatible trace element can be effectively used to monitor the subduction influence along the arc. In general, the boron concentration of the CA volcanic rocks of the region is typical of subduction-related magmas; however, it shows both significant spatial and temporal variations.

In the western segment of the arc, we cannot see a clear variation in the B content, nor in the B/Nb ratio towards the back-arc region, such as was found in other arcs (e.g., Japan and Kurile, Kamchatka). However, a gradual temporal decrease of these values can be observed. These features can be explained by the strong connection of the CA volcanism in this segment to the lithospheric extension of the Pannonian Basin, more than to the southward dipping subduction.

In the eastern segment of the region, the volcanic arc is narrower. Here, volcanism is getting to be younger towards the southeast. The boron content is increasing to the south along the arc; however, a sharp decrease can be observed at South Harghita. This is consistent with the change in the overall composition of the volcanic rocks and the position of the Trotus fault, which divides two main lithospheric domains.

In the northeastern part of the arc, a kind of transition is observed. At first sight, no correlation can be recognized between the B content and the spatial and temporal distribution of the volcanics. But separately, in the more basic and in the more silica rich rocks, we observe a B content decrease towards SSE. The present volcanologycal information is too incomplete to understand this. It may indicate the influence of the subduction-related fluids originating from a previously existing subducting slab under the Tokaj region.

Electrodynamic disaggreagation of geologic material

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A series of tests were run on a selFrag Lab electrodynamic disaggregation machine produced by selFrag AG, Langenthal, Switzerland. The operation principle is an electrical discharge passing trough a non-conductive material (e.g., rock) immersed in a dielectric liquid. The electrical pulses are of very short duration (<500 ns). In this case, the solid material becomes the better conductor, and hence the electrical "discharge channel" will pass through the solid material. High amounts of energy are deposited along this discharge channel leading to local temperature of up to 10000 ºK and pressures of up to 10^{10} Pa (Rudashevsky *et al*., 1995, Andres and Timoshkin, 1997), thus conditions reached by using conventional explosives.

The tests using different geologic material immersed in deionised water showed that electrical discharges as low as 80 kV and a few hundred pulses at a frequency of 1- 5Hz are commonly sufficient to disintegrate rocks or other mineral aggregates. Accessory minerals separated at voltages of 80 – 100 kV retain their original shape (e.g. zircon, apatite, magnetite); the minerals may break under increased energy input. Sieves replacing the reactor vessel bottom allow small enough material to be removed during operation, and hence to prevent further grain size reduction. Major rock constituents generally disaggregate mainly along internal impurities or fissures, leading to a grain size reduction. However, the minerals contain fewer inclusions. Rare artefacts of the method are formation of melt films, and contamination by very small particles derived from the electrode material. The amount of contamination from the electrode material is much lower than by using conventional crushing methods. A closed disposable microcontainer allows to disaggregate sub-gram samples for microanalysis minimizing loss. Preliminary result did not show negative effects on isotopic systems.

Major advantages in comparison with conventional methods (jaw crusher, vibration disk mill, ball mill) lie in the reduction of fines, the omission of dust, the production of inclusion-free and/or isometrically shaped products, and the reduction of cross contamination.

References

Andres, U. and Timoshkin, U.A. (1997), *1998 IEEE International Conference on Conduction and Breakdown in solid Dielectrics*, Västerås, Sweden. 452-455.

Rudashevsky, N.S., Burakov, B.E., Lupal, S.D., Thalhammer, O.A.R. and Saini-Eidukat, B. (1995), *Trans. Inst. Mining Metal*. **104**. C25-C29.