“Exploration of high field-strength elements (HFSE) (Hf, Zr, Ti, Nb and Ta) by studying mineralogy and geochemistry of carbonatite in the Kaiserstuhl volcanic complex (KVC) (SW Germany)”

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Abstract
The mineralogy and mineral chemistry of carbonatites of the Kaiserstuhl Volcanic Complex in Southern Germany provide evidences for contamination processes in the carbonatitic magma system. The compositional variations of apatite, mica and clinopyroxene within and between the different bodies reflect the combined effects of fractional crystallization and carbonatite-wall rock interaction during emplacement. The local increase of silica activity during contamination enabled strong REE enrichment in apatite via a coupled substitution involving Si, which demonstrates the influence of contamination on REE mineralization in carbonatites. Oscillatory-zoned F-rich pyrochlore with up to 69 wt% Nb2O5 is common in all coarse-grained calcite-carbonatite bodies and probably formed during magmatic conditions. Pyrochlore data from a drill core penetrating indicate increasing contents of REE, U, and Ta with depth, while Nb, F and Na contents decrease. This may reflect the combined effects of fractional crystallization and assimilation (AFC) or indicates a multi-stage emplacement of the carbonatitic magma. The occurrence of patchy-zoned ceriopyrochlore and REE- and Th-enriched pyrochlore with up to 19 wt% total REE and 6.5 wt% ThO2 indicate that they probably formed during hydrothermal conditions. This study demonstrates that the textural and compositional variation of pyrochlore in carbonatites is a powerful tool to distinguish magmatic, hydrothermal and weathering processes in carbonatitic systems.
Anis Parsapoor was born in Isfahan, Iran in 1978. She completed her university educations all in geology/petrology in Iran. As a visiting researcher she made her first international experience at Oregon State University in 2012. Then she awarded a long post-doctorate fellowship by the Alexander von Humboldt Foundation in 2016.

She is a geologist who studies petrology, geochemistry and ore geology. The overarching goal of her research is to bring geology applicable in the real life to make the life easier and more comfortable. Her work has practical applications in copper industry and technologies dependent to trace and rare earth elements. Her research interests cover a range of disciplines in geochemistry, development of exploration and assessment of raw material resources. Mineralogy of igneous rocks as well as interpretation of magmatic and ore-forming processes, stable isotopes and geochemistry of ore deposits (e.g. HFSE, REE concentrations in carbonatite and porphyry copper deposit) and hydrothermal alterations consist her basic knowledge. Over 15 years of experiences in mineral, metal and Rare earth element exploration help her to have depth scientific understanding of different mineralization systems and knowledge of global research and educational activities. Currently, she has new post-doctorate position at UTSA and she is planning to continue her research on developing high-temperature experimental measurements of rheology and thermal properties of rocks and magmas to understand lava flow emplacement and effusive-explosive transitions on Earth and other planets.