



A special view on the Storkwitz Carbonatite with 2D μ -EDXRF, LIBS and Hyperspectral imaging

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The Storkwitz diatreme is part of the late Cretaceous Delitsch Complex consisting of ultramafic lamprophyres and carbonatites emplaced in Palaeozoic to lower Permian volcanic and sedimentary host rock covered by Tertiary sedimentary rocks. The Storkwitz diatreme is highly complex due to poly-brecciation, variable amounts of rock fragments and multiple injections of carbonatites of variable chemical composition. The diatreme was formerly explored for U, and recently for REE and niobium mineralization.

For better insight into the development of the diatreme spectroscopic 2D imaging methods were applied at high spatial resolution. Hyperspectral (HSI; VNIR 25 μ m, SWIR 25 μ m, LWIR 400 μ m), μ -EDXRF (20 μ m) and LIBS (200 μ m) imaging provide in combination chemical, mineralogical, lithological and textural information over larger areas of the drill cores. Partly automatized hyperspectral data evaluation, based on ENVI was applied besides the individual instrument evaluation software.

Next to the distribution of country rock fragment types, the distribution and textural information of REE-carriers such as carbonates, pyrochlor, and apatites as well as other minerals such as phlogopites, sulfides and silicates, the emplacement history of multiple generations of carbonatites could be obtained directly from the half drill core surface in very good detail. SEM, Raman and microprobe investigations were performed to verify the mineralogy.

The combination of these relatively fast, non- and quasi non-destructive methods such as HSI, μ -EDXRF, and LIBS, respectively, provides very detailed information over large core sections with minimal sample preparation effort. The most time-consuming parts are the pixel correlation across the methods for each sample, and to establish a suitable database for the investigated lithology for all the individual methods to overcome non-diagnostic signals.