Mineral liberation analysis of stream sediments. Implications for exploration with emphasis on provenance and anthropogenic input

Helmholtz Institute Freiberg for Resource Technology

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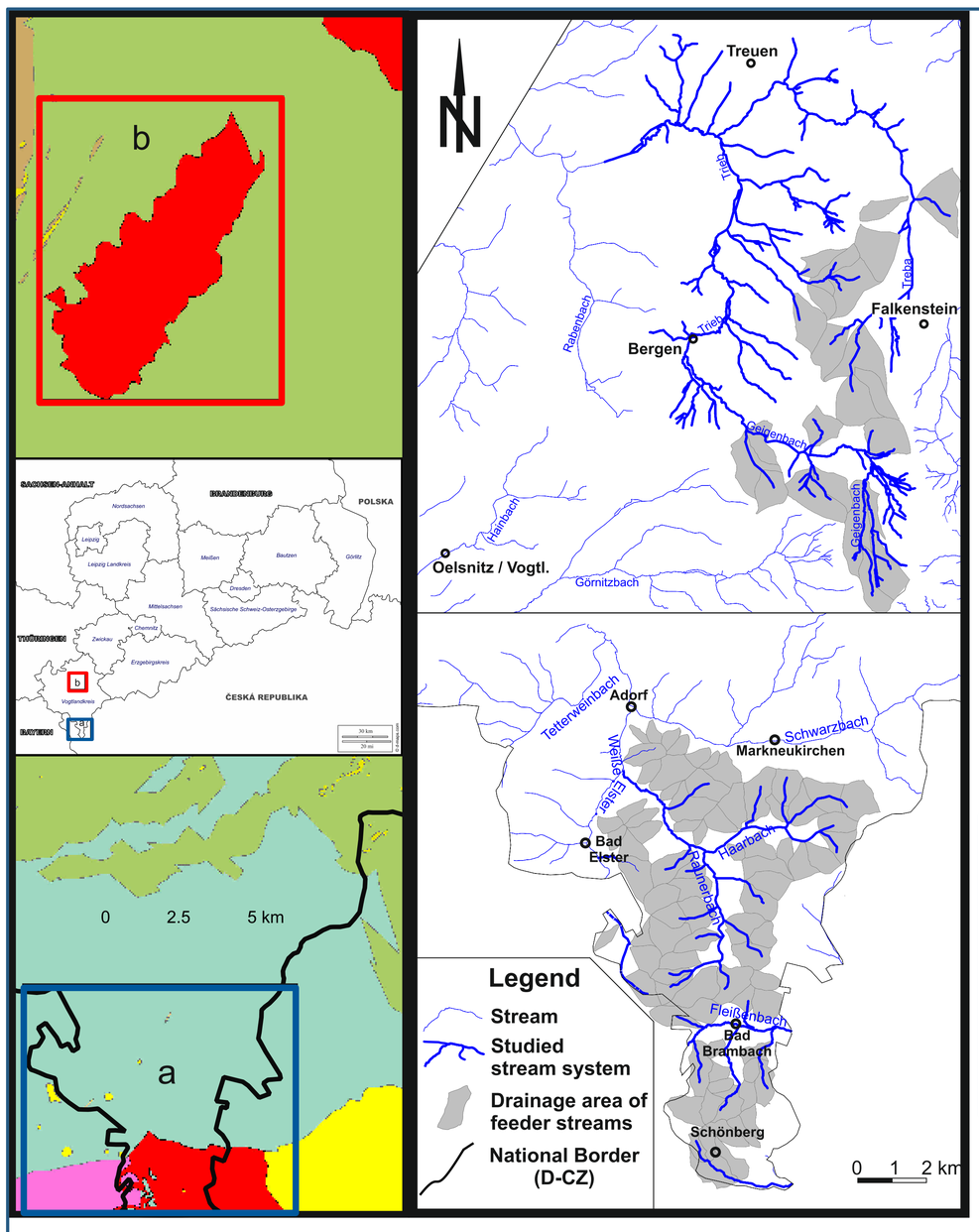
Aim & Approach

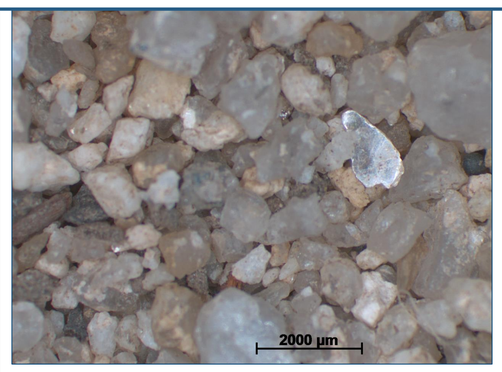
WISTAMERZ Project

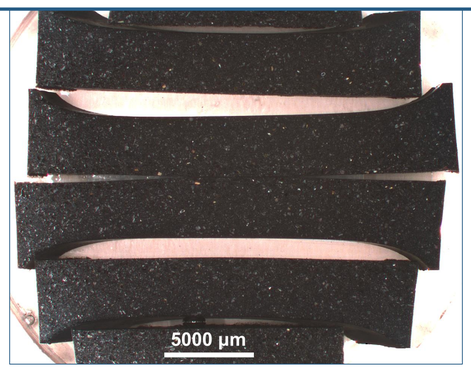
- Estimating the potential of critical raw material primary based on stream-sediment analyses.
- Investigation area (c. 5000 m²) Erzgebirge and the southern Vogtland. (this study)

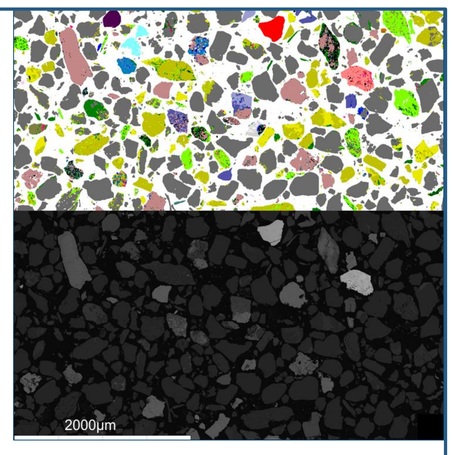
Potential of stream-sediment analyses for mineral exploration

- Fast and simple method to generate detailed information (lithology, tectonic, valuable mineral content, weathering, transport, deposition and diagenesis) on a broad geological area
- Provenance Analyses to identify all factors associated to sediment production, source rock composition; weathering/climate; transport/deposition/diagenesis
- Focus is the combination and comparison of mineralogical and geochemical data
- Mineral Liberation Analyser (MLA) provides unrivaled quantitative mineralogical and textural provenance data









Preparation and Measurement

MLA-Output

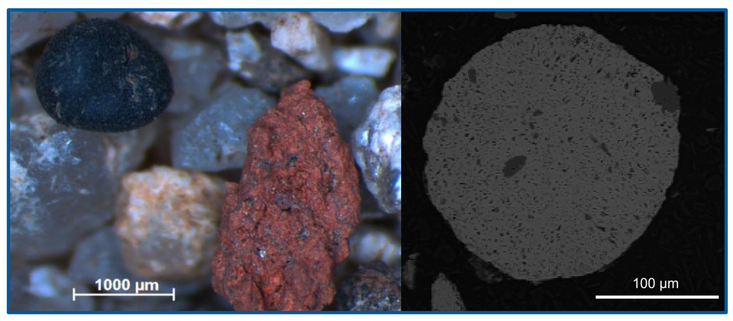
Modal mineralogy
Grain size distributions
Shape parameters
Particle size
Chemical composition

Sieving <250 µm

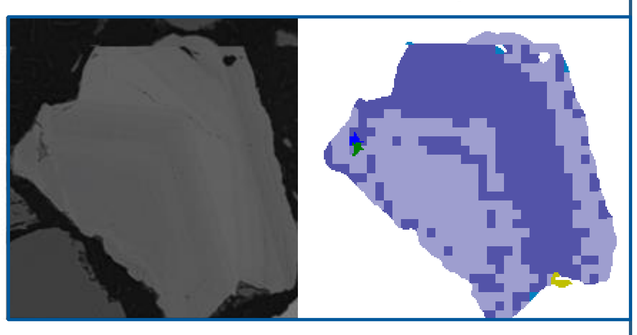
Maximum heavy mineral content (unconcentrated)

BSE data & processing

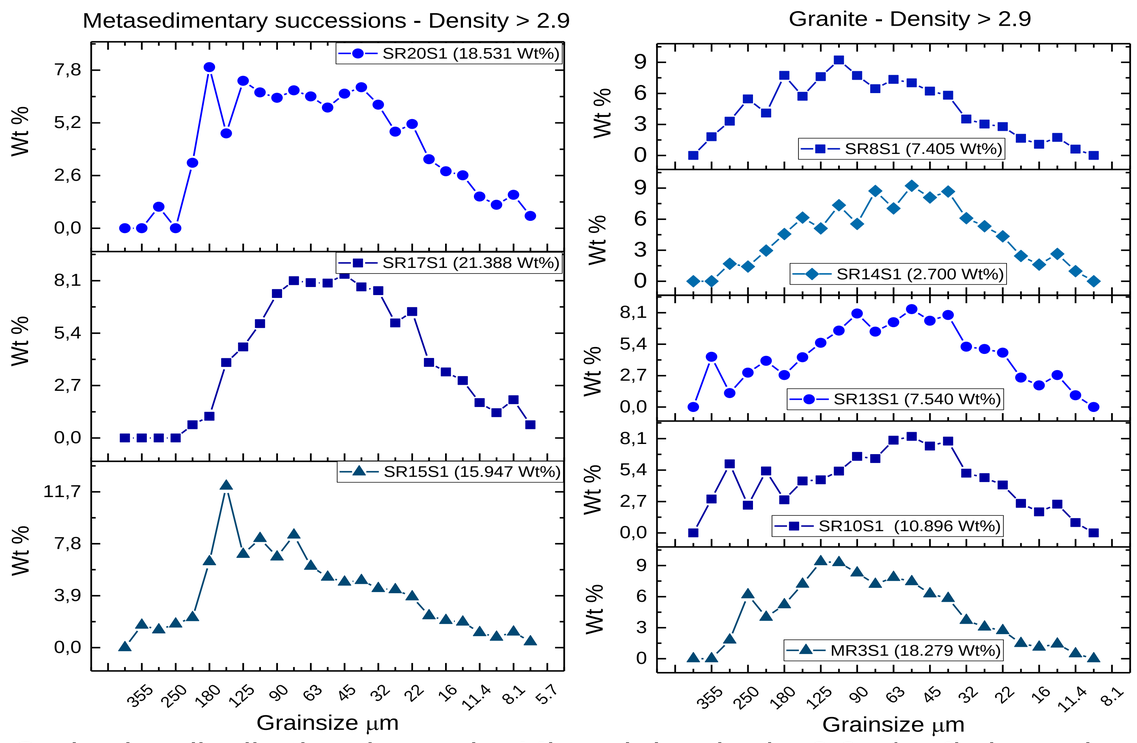
Detailed identification of grains & minerals



Anthropogenic contamination. L – fragment of a red brick; R – spherical slag (BSE).



Zoned garnet- grain, potential indicator-mineral (L-BSE; R-false-colour).



Grain size distribution due to the Mineral density (> 2.9 g/cm³) dependent on the lithologies in the drainage area (granitic/metasedimentary).

Outlook

- Identification of anthropogenic phases by MLA to approximate and deduct the anthropogenic contamination
- Bulk sample analyses - statistical evaluation (grain size, shape, mineralogical composition)

Single grain analyses

- Indicator minerals (e.g. cassiterite, garnet, rutile)
- Transport (corrosion, abrasion and fracturing
- Indicator minerals – selection and analyses of the main weathering and transport features; correlation referring to lithology, grain size transport

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