Hafnium (and Sr-Nd) isotope analysis of mineral dust: from sample digestions to mass spectrometry

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Hf isotope tracer of dust

The use of $^{176}Hf/^{177}Hf$ isotopic ratios in dust fingerprinting is crucial in situations when Sr-Nd isotopes are inconclusive in source identification.

Hf isotope analyses in these cases have to be done on small samples (5-10 mg dust) and for proper source area characterization high sample throughput is needed.

Our method and analytical setup meet both requirements.

ABF digestion

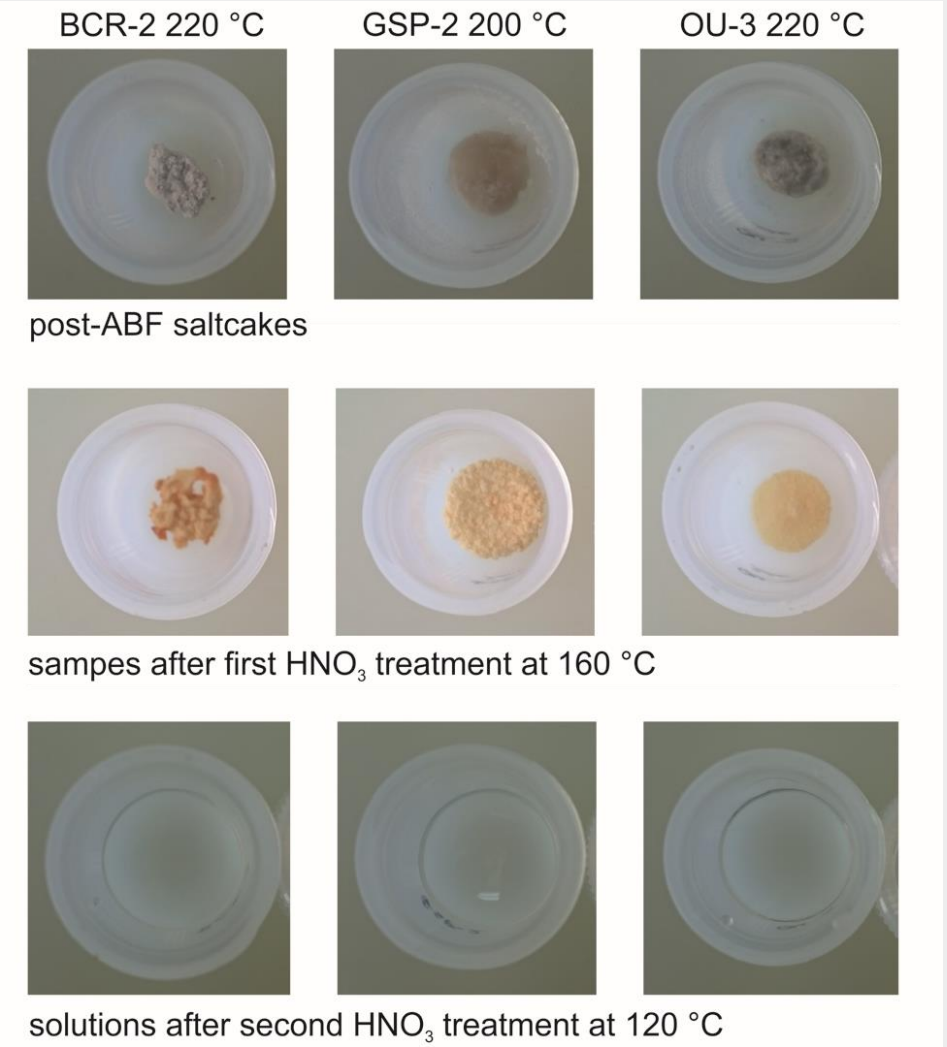
Ammonium bifluoride, ABF (NH_4HF_2)

220/230 Celsius

1:5 sample:ABF in PFA beakers

HNO_3 treatments

- Hf isotope tracer
- ABF digestion
- HNO_3 treatm.
- Col.chemistry
- USGS standards
- Limitations



Column chemistry for Hf-Sr-Nd

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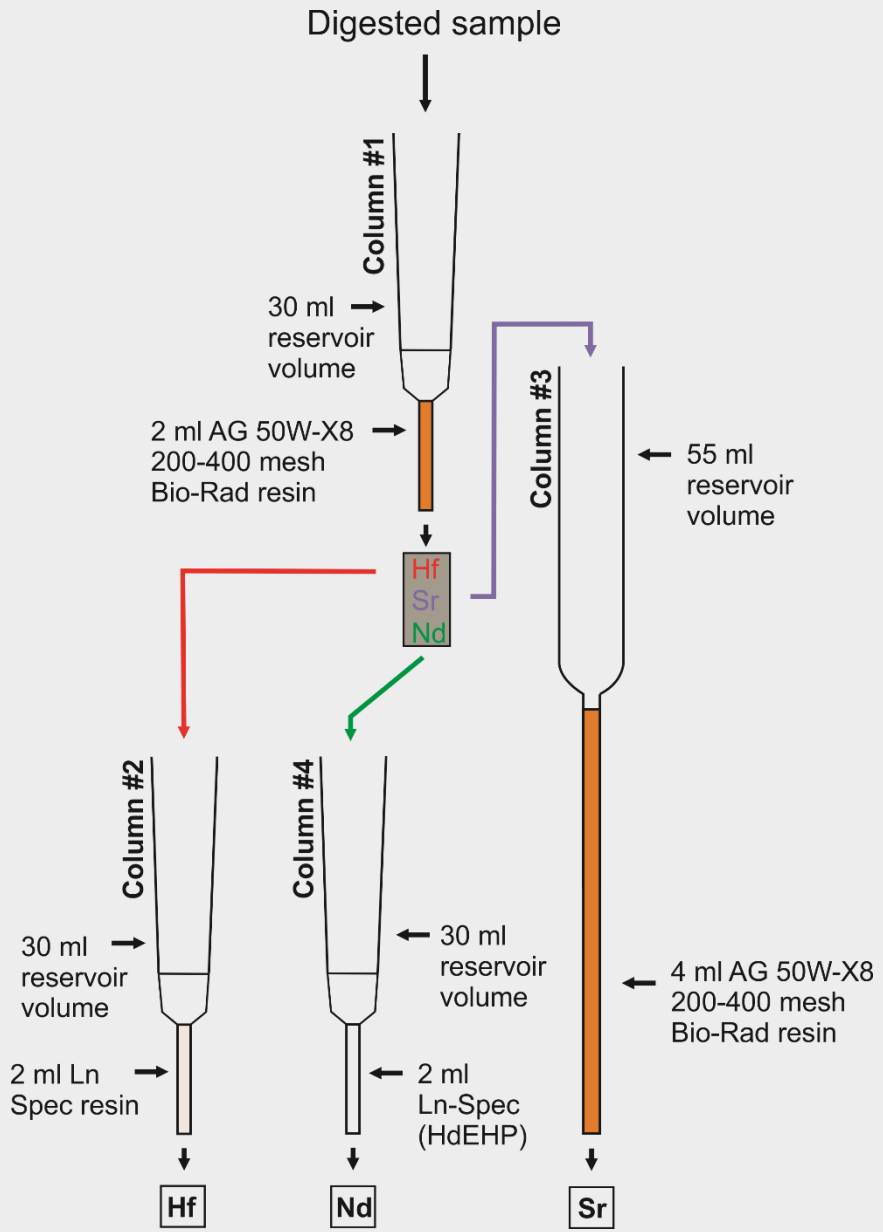

USGS standards

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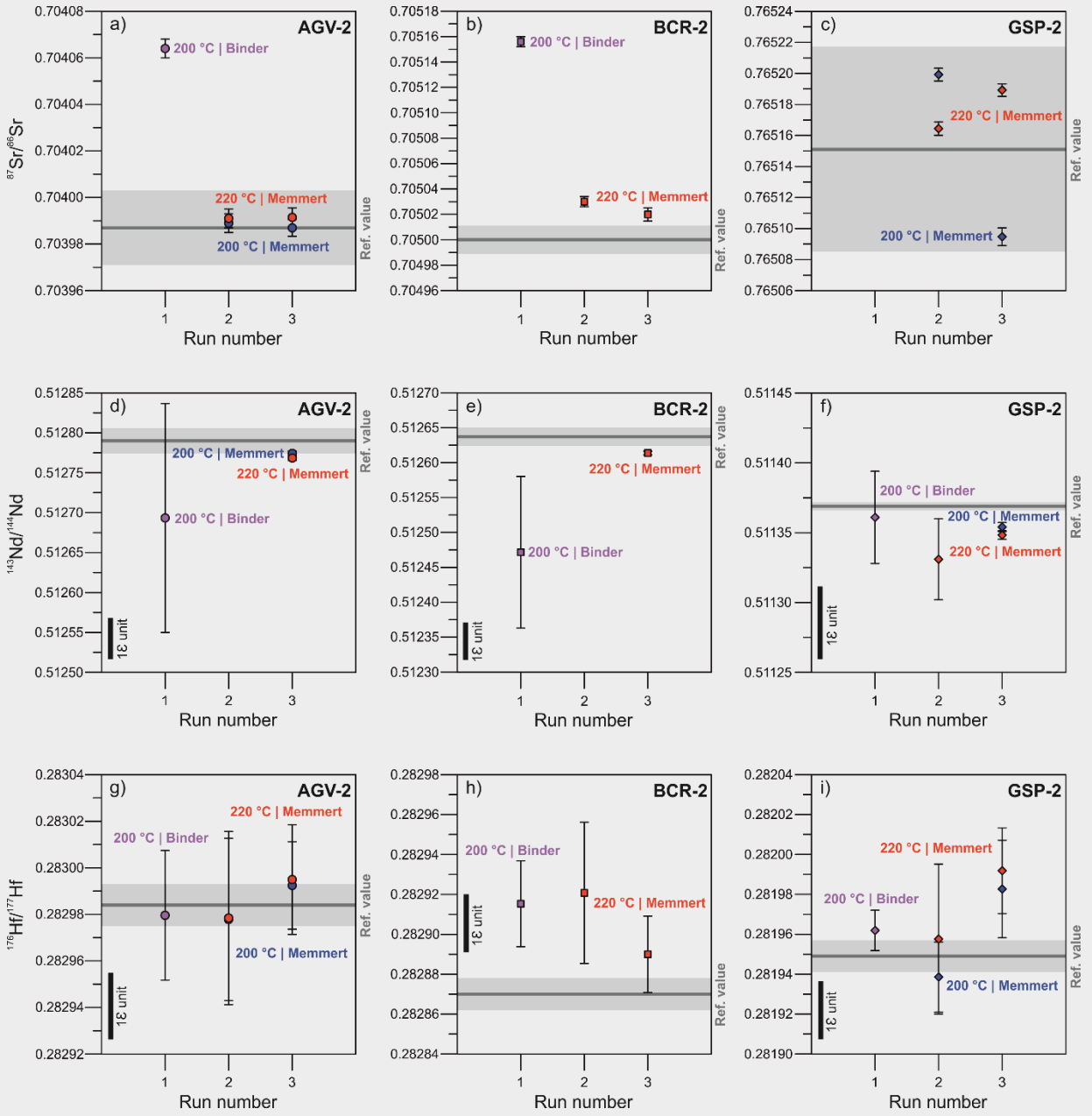

Hf isotope tracer

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HNO_3 treatm.

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Limitations

Mass spectrometry/Limitations

10^{13} Ohm amplifiers for ^{175}Lu, ^{174}Hf and ^{172}Yb (rest: 10^{11} Ohm)

Measured sensitivity: 600-800 V/ppm for Hf (Neptune Plus/Aridus 3)

Lower limit: 5-10 ppb (ng/g) Hf, translating to ca. 4-5 mg dust