



The pace of Earth shaping processes by high resolution trace element and isotopic composition measurements: from colliding continents to human life histories

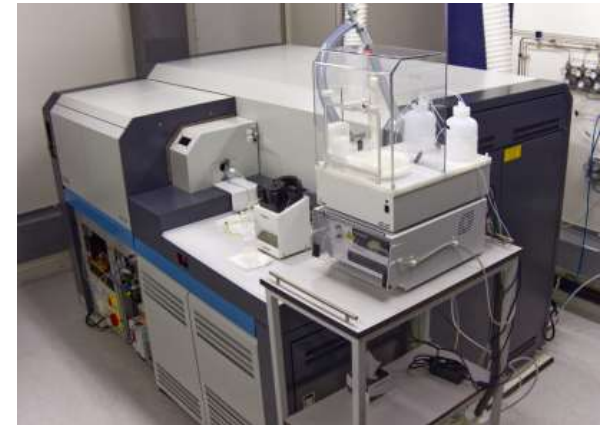
Geochronology and Isotope Geochemistry

Kraków Research Centre

Metal free, ultra clean laboratory



MC ICPMS Neptune



TIMS Triton



ICP MS Xseries II



Laser ablation 193nm



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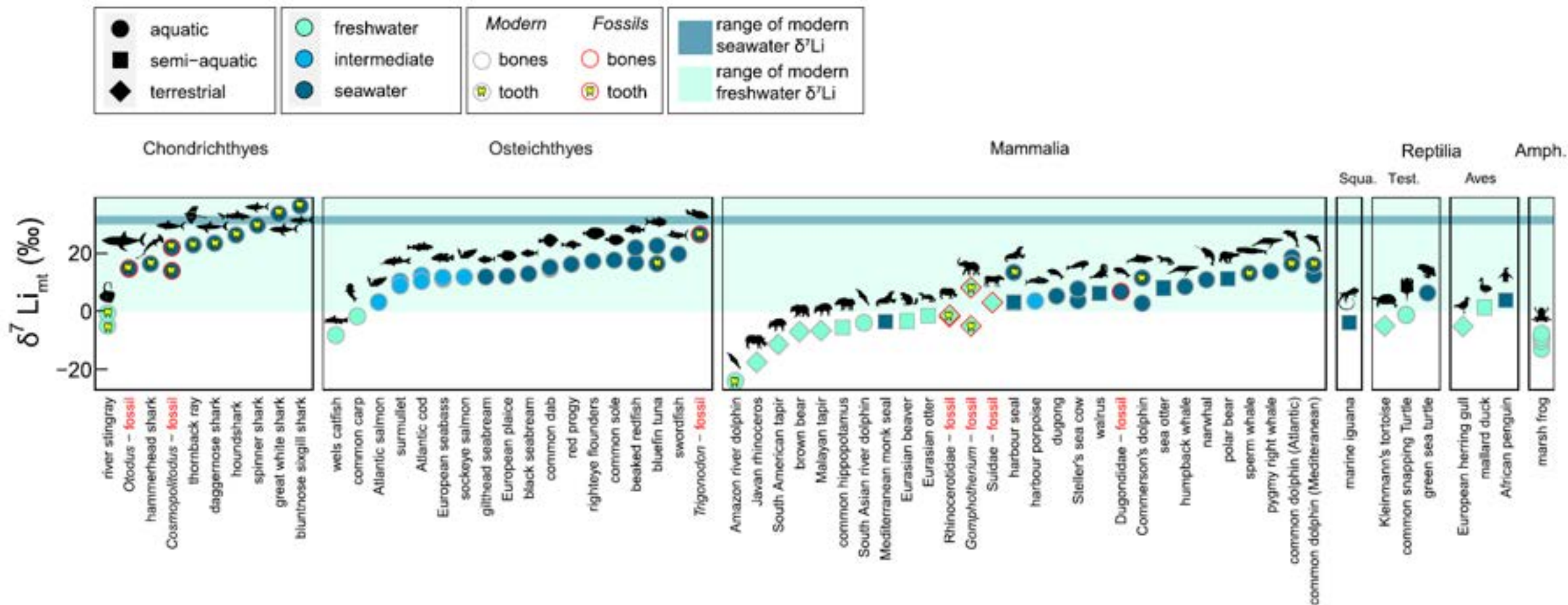
ICP MS/MS Agilent 8900



Laser ablation 193nm

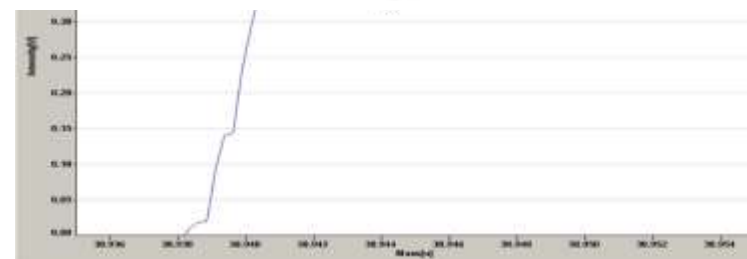


MC ICP-MS



Li, Fe, Cu, Zn

High precision analyses on c. ≥ 5 ng amount of analyte



TIMS



Methods:

(Rb)-Sr (Sr stratigraphy)

Sm-Nd

Small Pb (by ion counting, a few pg level)

^{142}Nd (early Earth)

Re-Os

Ca isotopes (^{40}Ca)

High precision analyses on 1 ng Sr

Small amount of analyte

Sr, Nd c. 300-500 pg. ($10^{13} \Omega$ resistors)

ICP-MS/MS Agilent 8900

Main parameters of 3Q MS/MS ICPMS

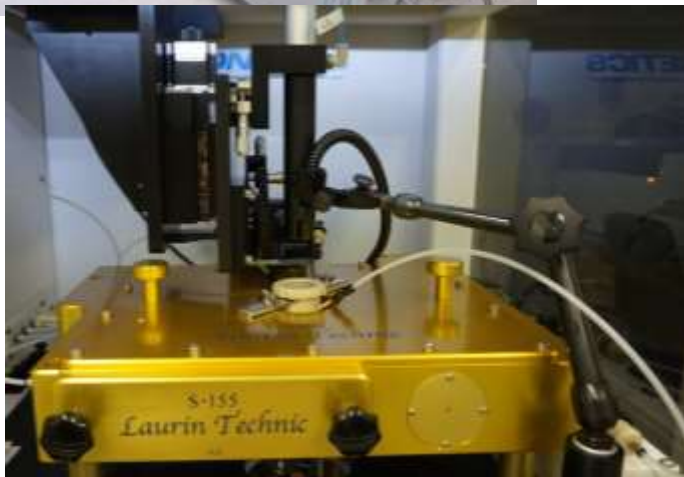
Mass range	2 - 275
Mass resolution	0.3 -1.0 amu
Detector dynamic range	11 orders of magnitude
Min. dwell time in TRA mode	0.1 ms
Sensitivity (solution mode):	
^7Li	≥ 200 (Mcps/ppm);
^{89}Y	≥ 700 (Mcps/ppm);
^{238}U	≥ 800 (Mcps/ppm);
Detection limits (solution mode)	
^9Be	≤ 100 ppq
^{238}U	≤ 50 ppq
Resolution via collision/reaction cell	Elimination of e.g. ^{87}Rb from ^{87}Sr .



Laser ablation



Main parameters of LA		
	RESOLUTION	Iridia
Wavelength	193 nm (ArF)	193 nm (ArF)
Pulse width	20 ns	4 - 7 ns
Frequency	1 - 100 Hz	1 - 500 Hz
Fluence	1 - 30 J/cm ²	0.05 - 15 J/cm ²
Spot size (circle, square, + rotation)	1 - 380 μm	1 - 210 μm
Cell		
Wash in, wash out	< 2 s. 99% of signal	> 1 s. to less than a millisecond
Sample size	150 x 100 mm	100 x 100 mm



In situ methods:

LA ICPMS

U-Th-Pb geochronology

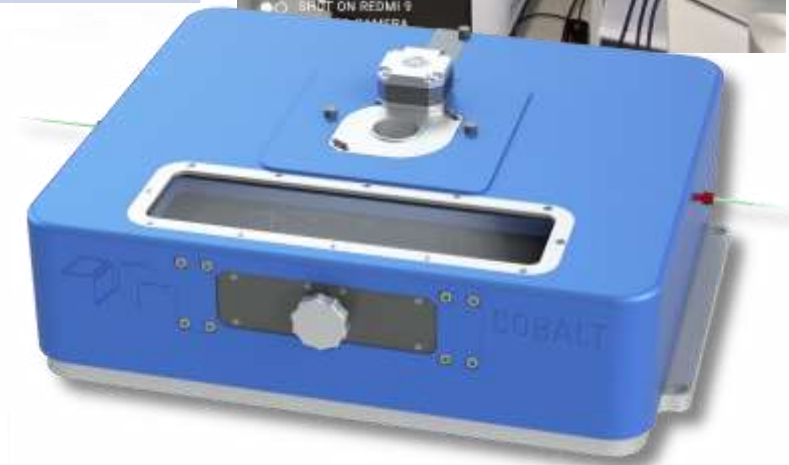
Trace element analyses

silicates, phosphates, carbonates,
glasses

LA MC ICPMS

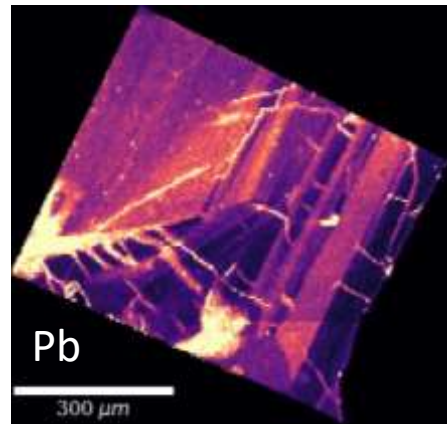
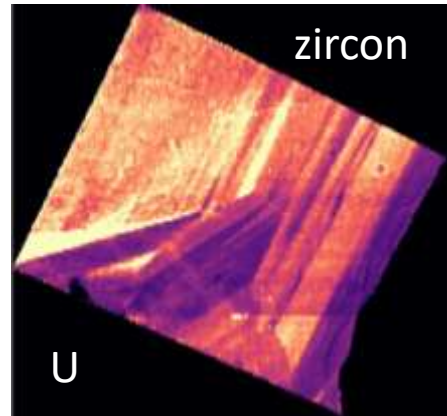
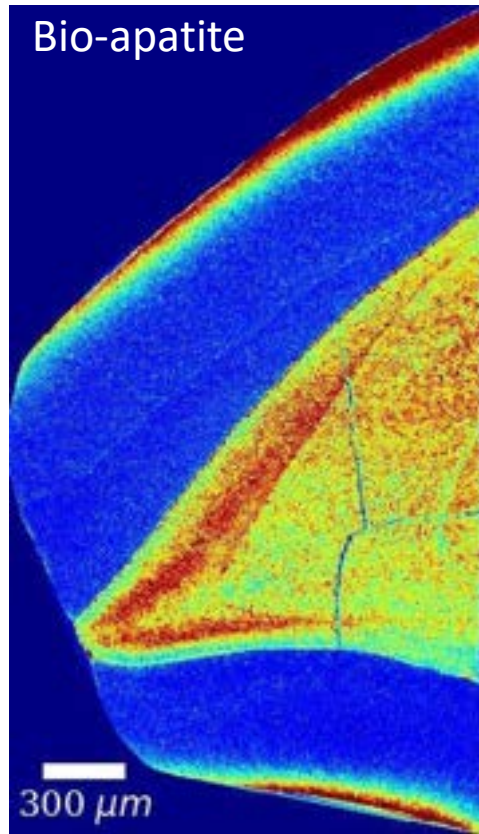
Hf isotopes

Sr isotopes

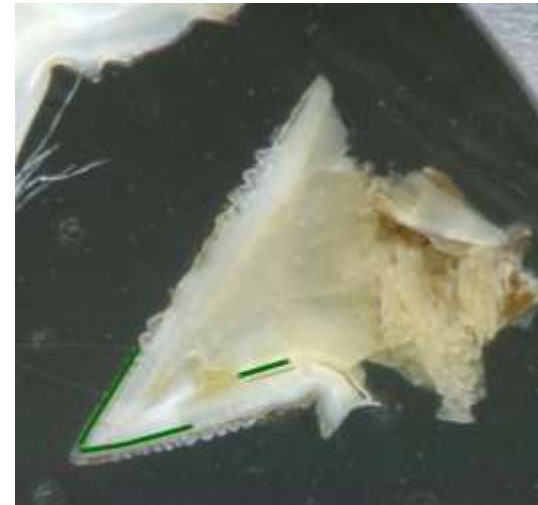
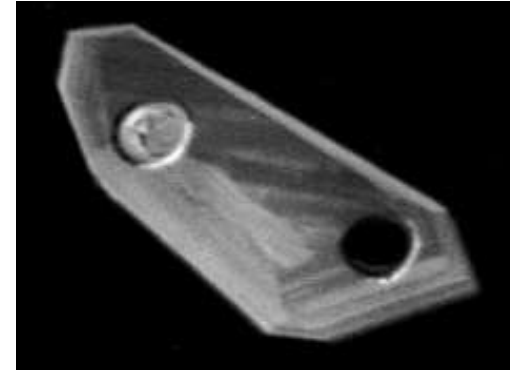


Laser ablation ICP-MS

Trace element mapping

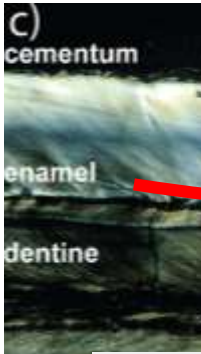
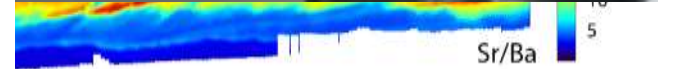
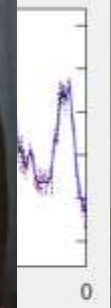


Trace element abundances



ablation MC TCPMS + TCP-MS

se



Volume One

Treatise on GEOCHEMISTRY

Human life histories

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Third Edition



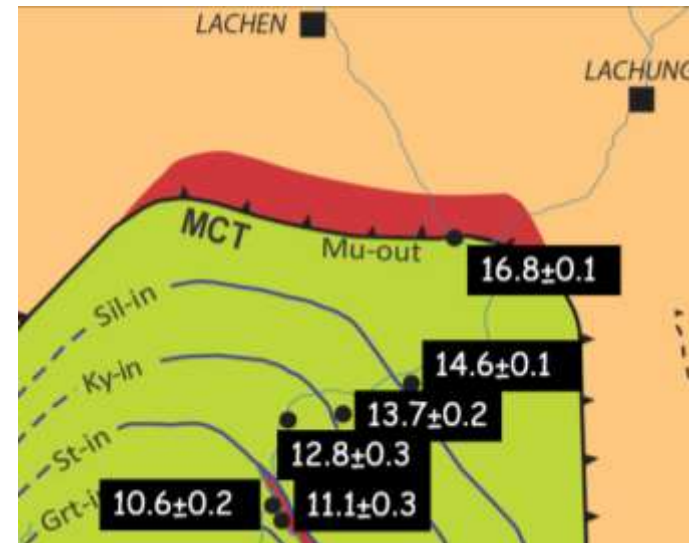
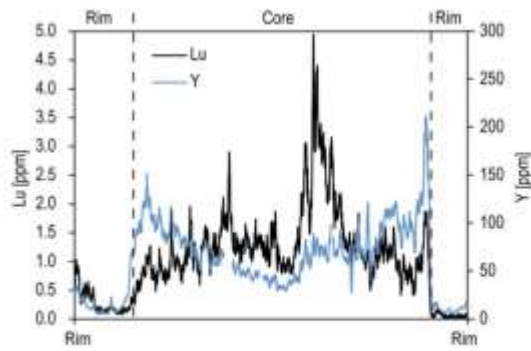
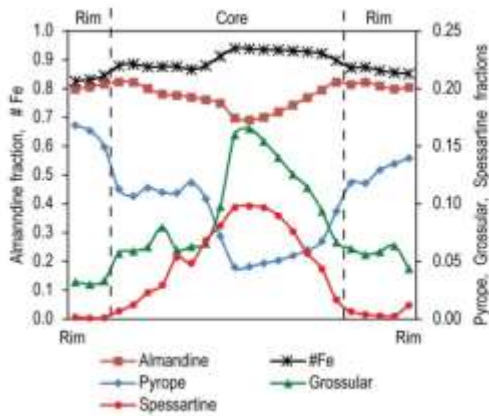
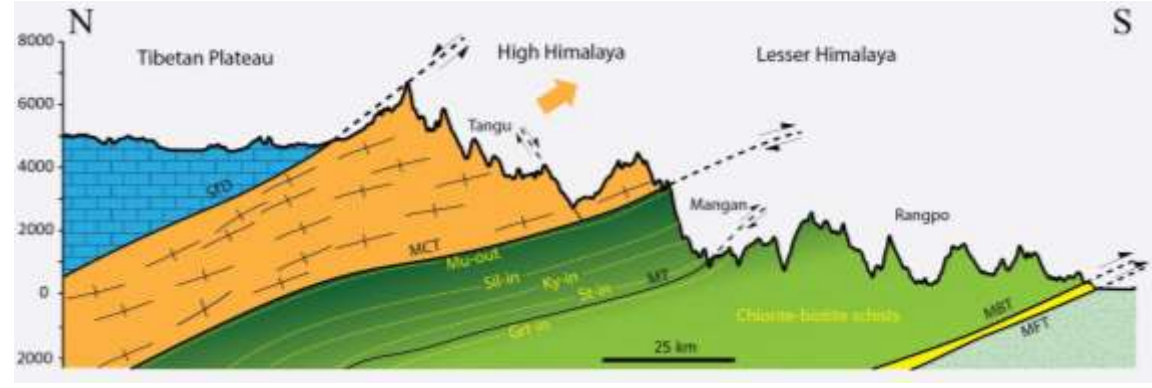
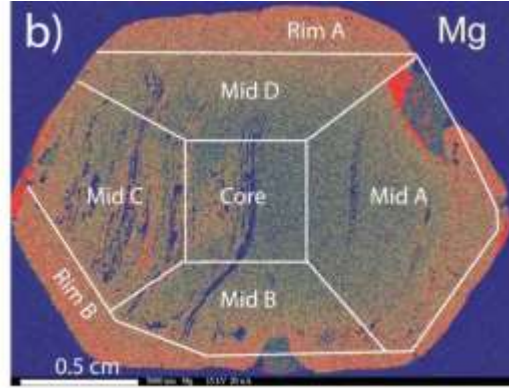
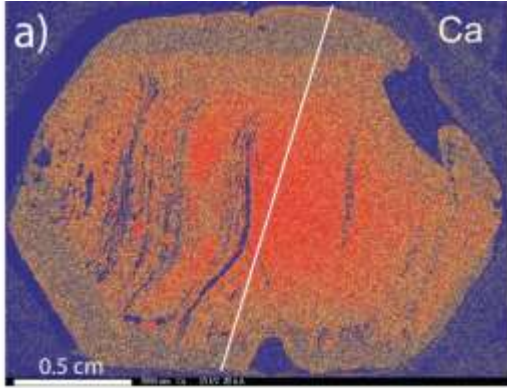
Time res

usal

$^{87}\text{Sr}/^{86}\text{Sr}$

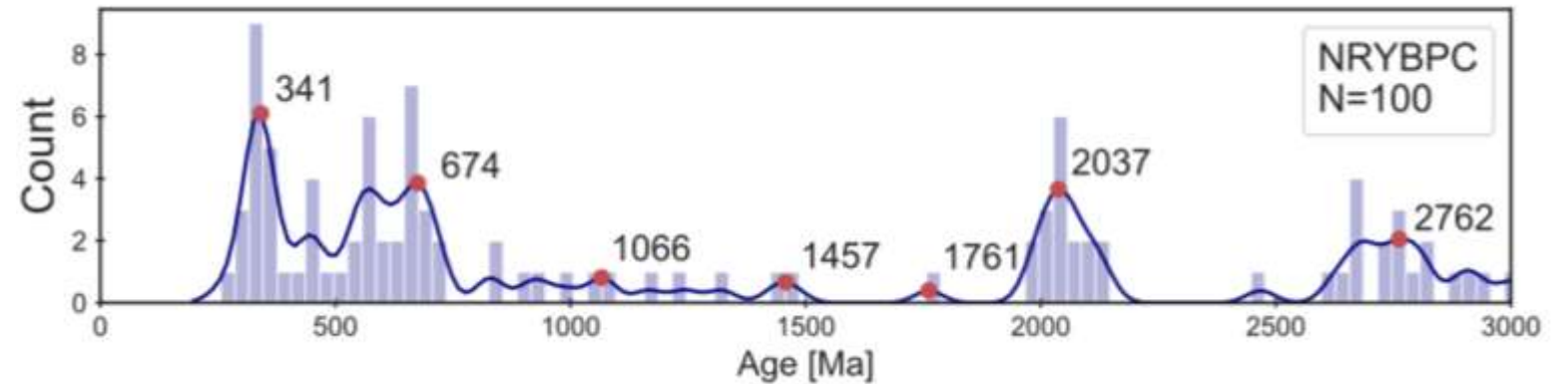
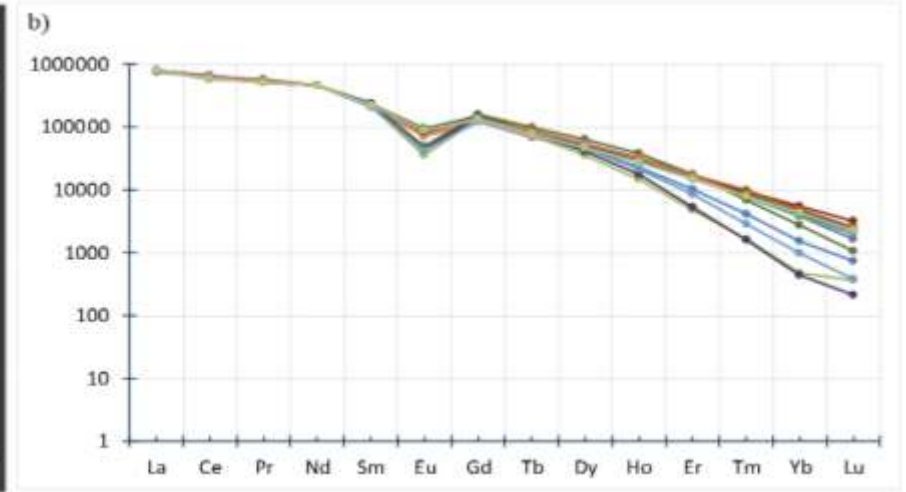
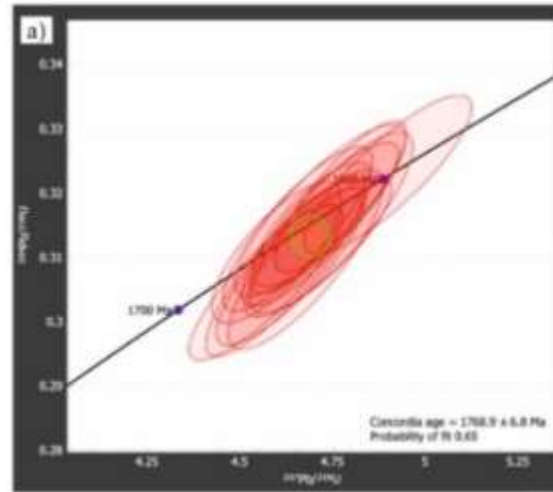
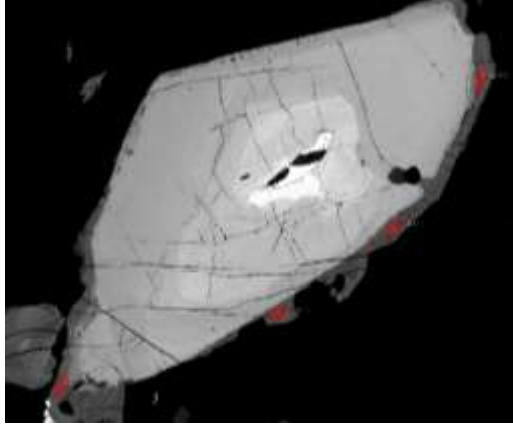
$^{84}\text{Sr}/^{86}\text{Sr}$

High resolution Lu-Hf and Sm-Nd geochronology



LA ICP-MS/MS

- Geochronology together with trace element measurements
- Spatial resolution: zircons 18 microns, monazite < 10 microns
- Age precision 0.5 - 0.7 %

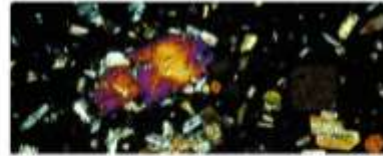


Geochemical database



EPOS database

The EPOS PLUS program hosts a database containing geological data, specifically focused on geochemistry of rocks and thermochronology. It serves as a centralized resource for researchers to access and analyze valuable information pertaining to these fields.



Geochemistry data

Our researchers collected and analyzed samples from various global locations to establish a comprehensive set of geochemical data.

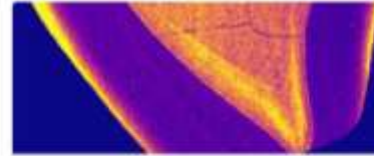
[EXPLORE](#)



Geochronology data

Comprises geochronological data obtained through U/Pb/Th dating, sourced from minerals found in magmatic, sedimentary, and metamorphic rock formations.

[EXPLORE](#)



Geo-Bio-Archeo data

ING PAN offers large dataset of biological samples, including mammoths, rodents, and other.

[EXPLORE](#)



Thermochronology data

Data related to fission tracks and U-Th-He measurements.

[EXPLORE](#)

