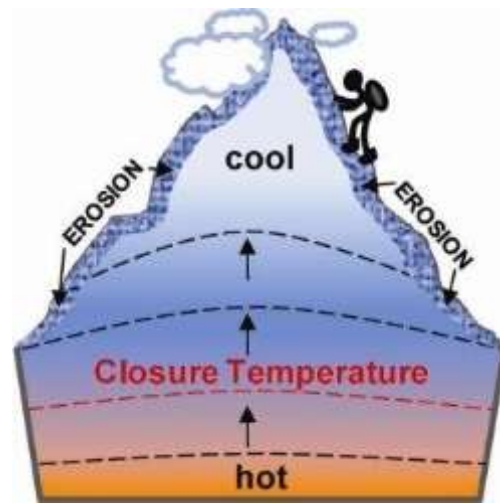


Thermochronology of the Recsk Igneous Complex, NE-Hungary



Róbert Arató, István Dunkl, Ágnes Takács,
Géza Szebényi

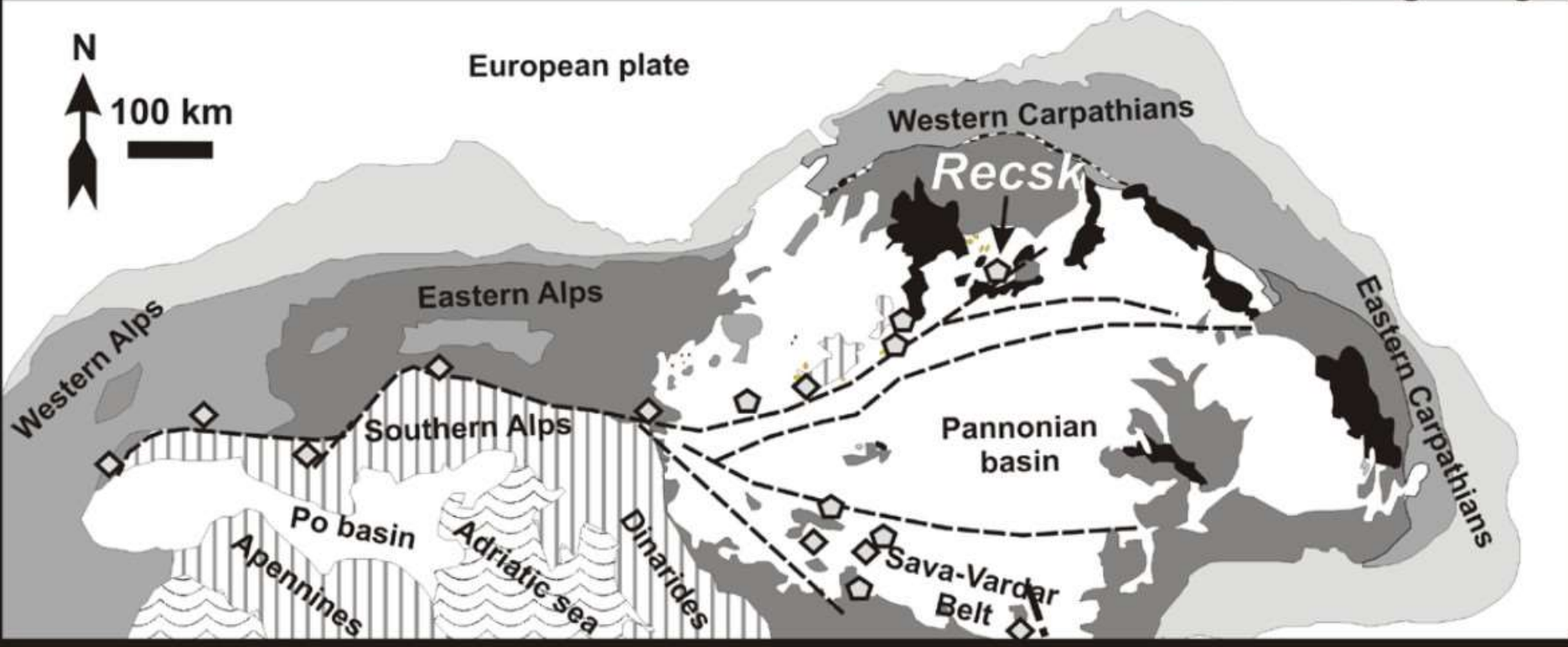


28.03.2014.

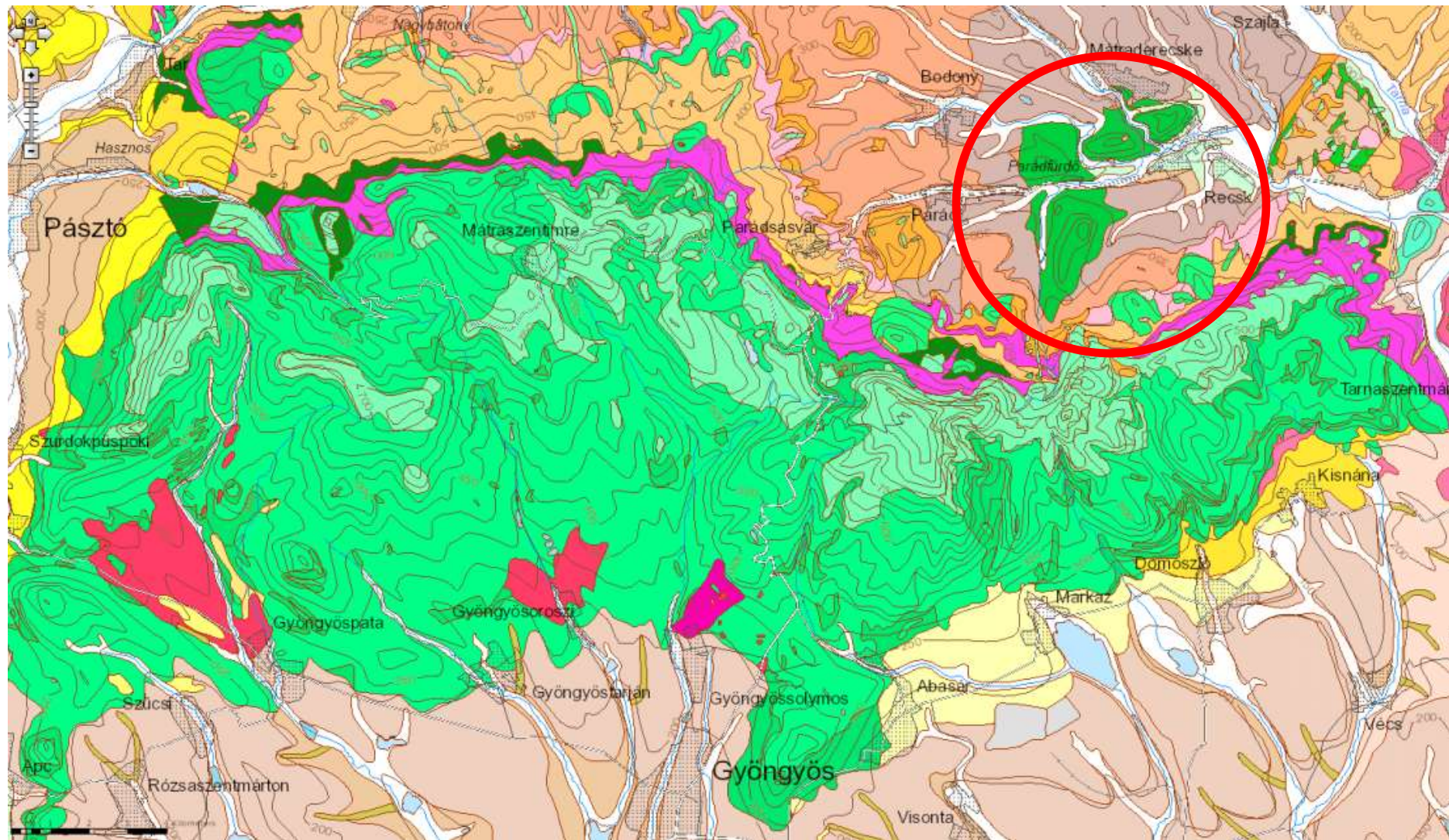


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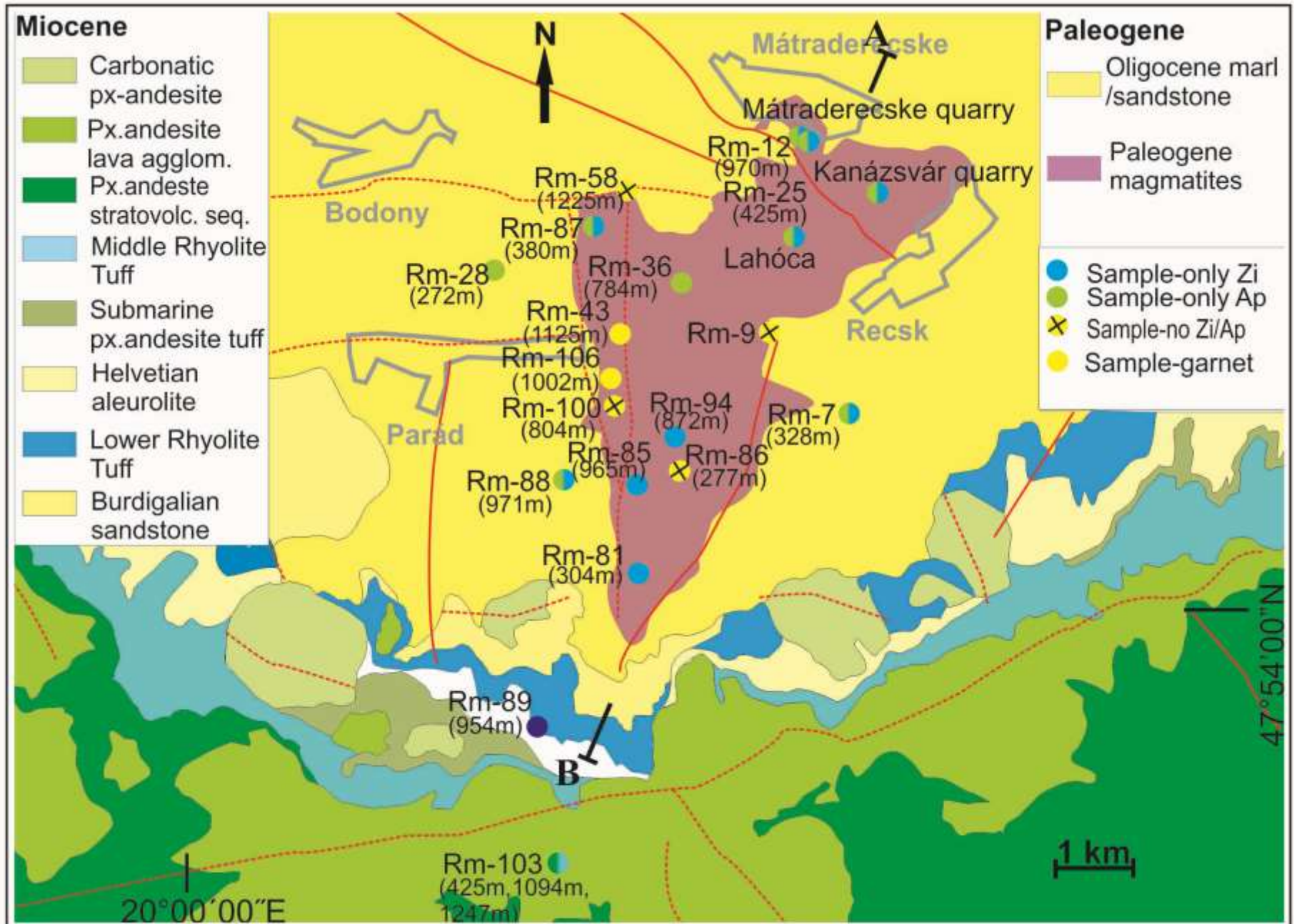
Geological setting



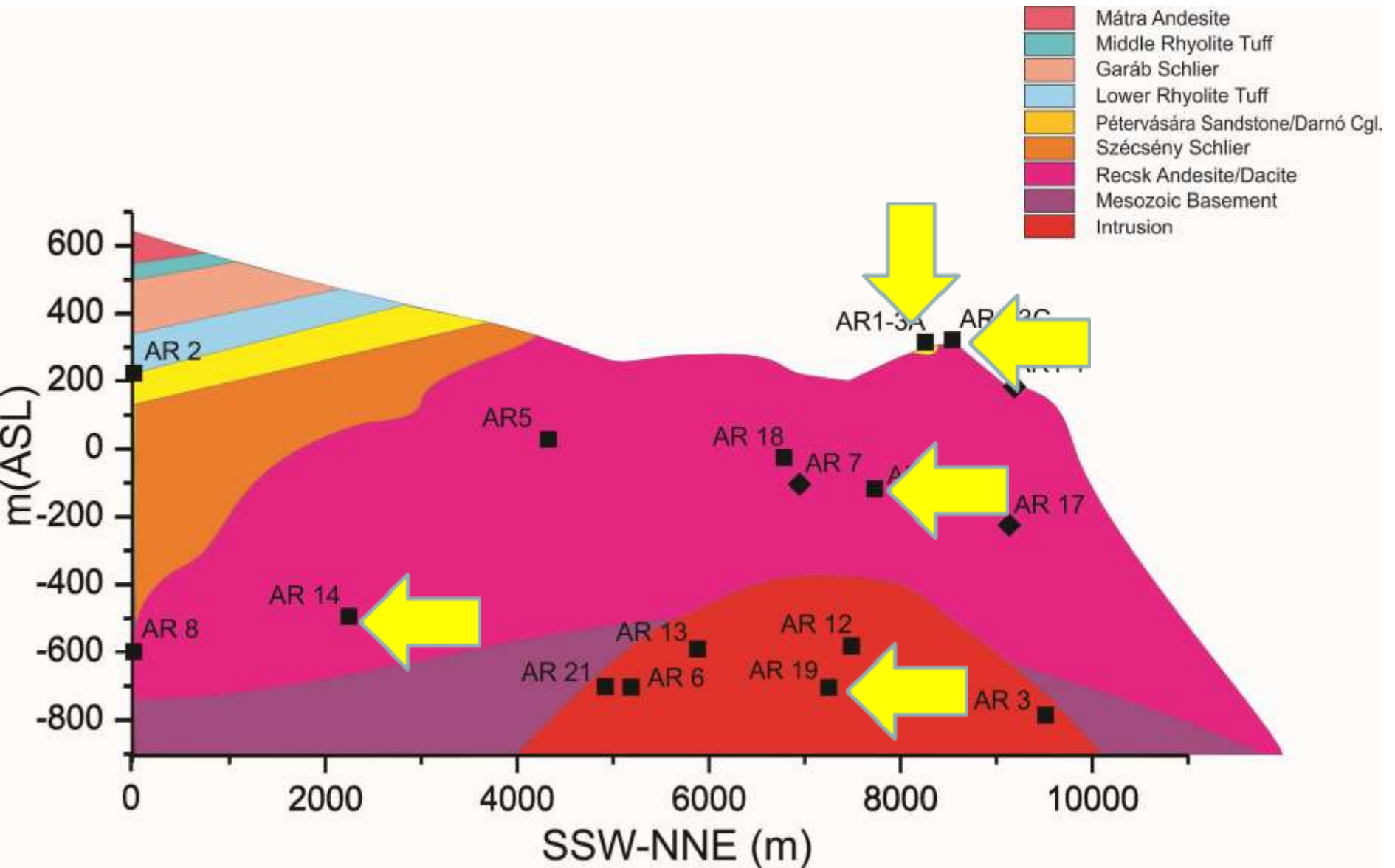
Aims of the study



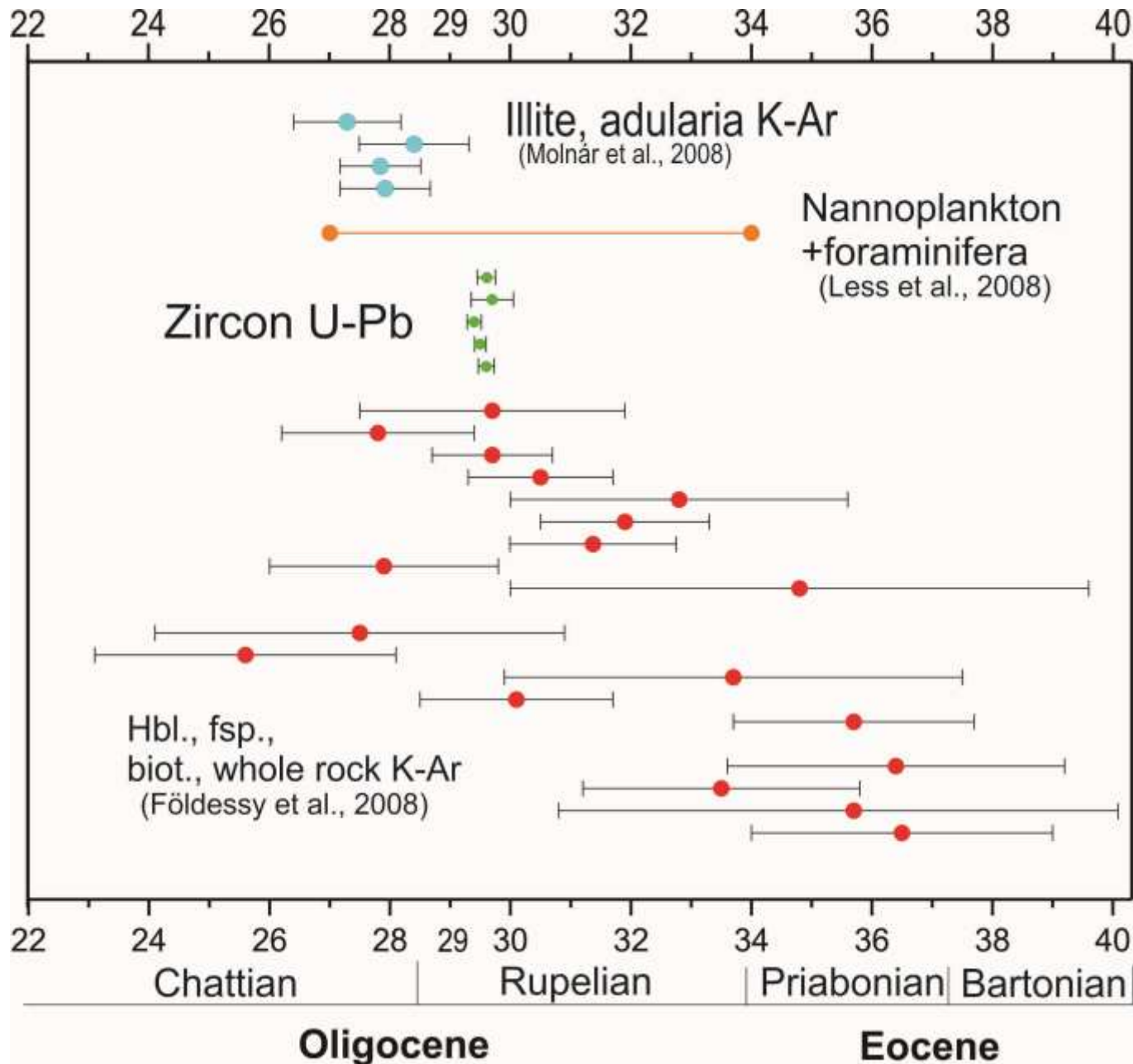
Samples



Samples



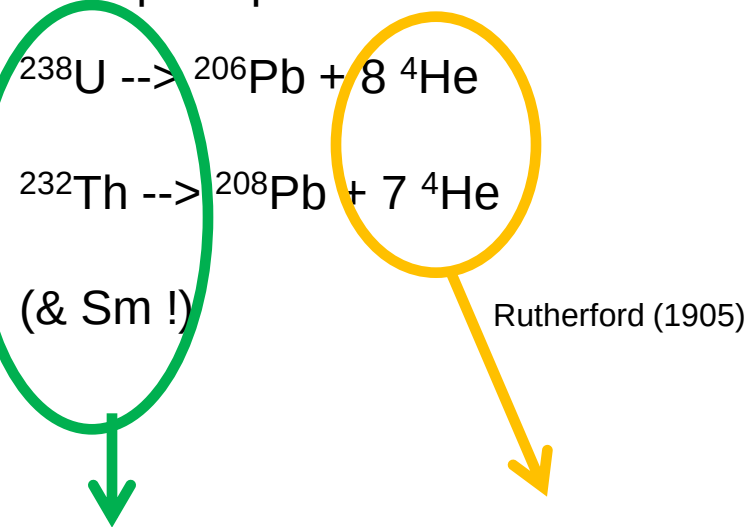
The age of the Recsk igneous-hydrothermal system



U-Th/He method

- Isotope geochronological method
- Routinely dated: apatite, zircon and titanite

Main principle:

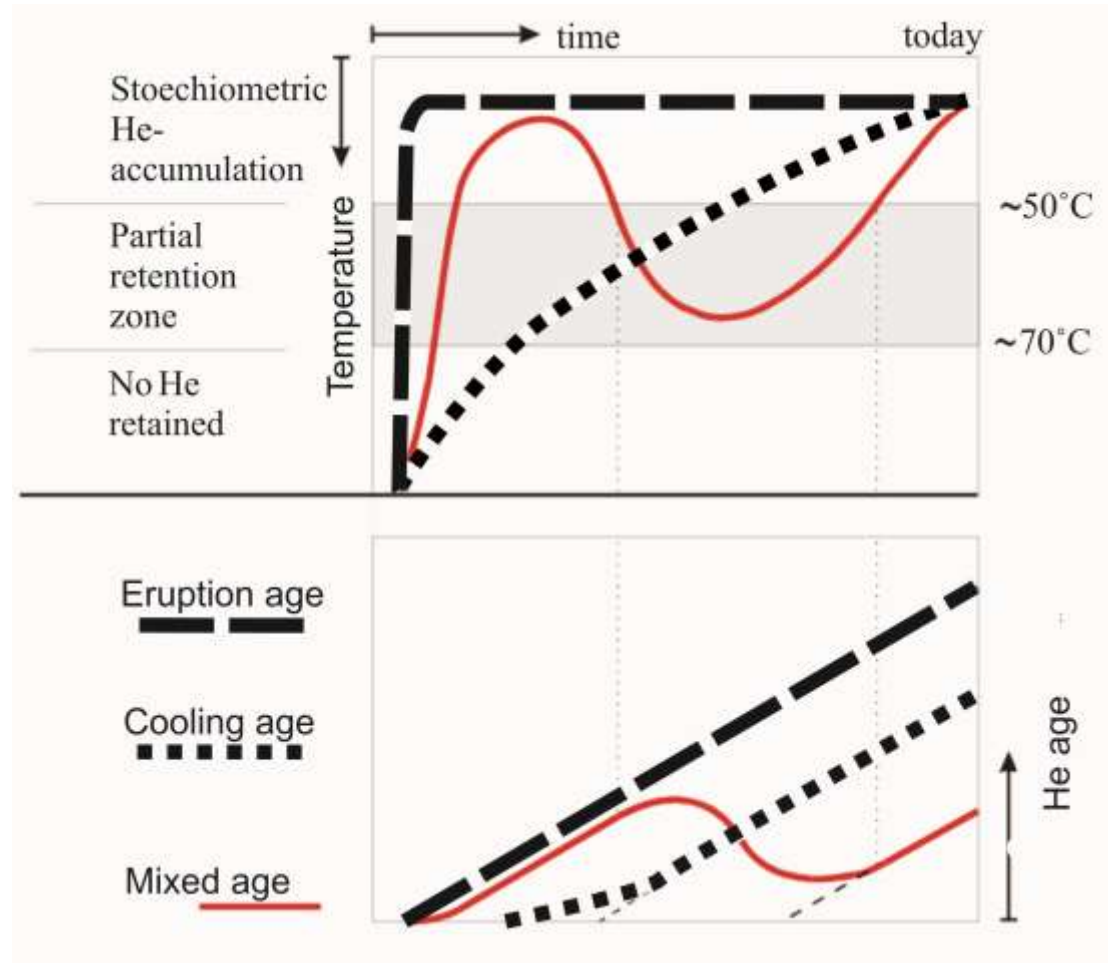


Mother isotopes

Daughter isotopes

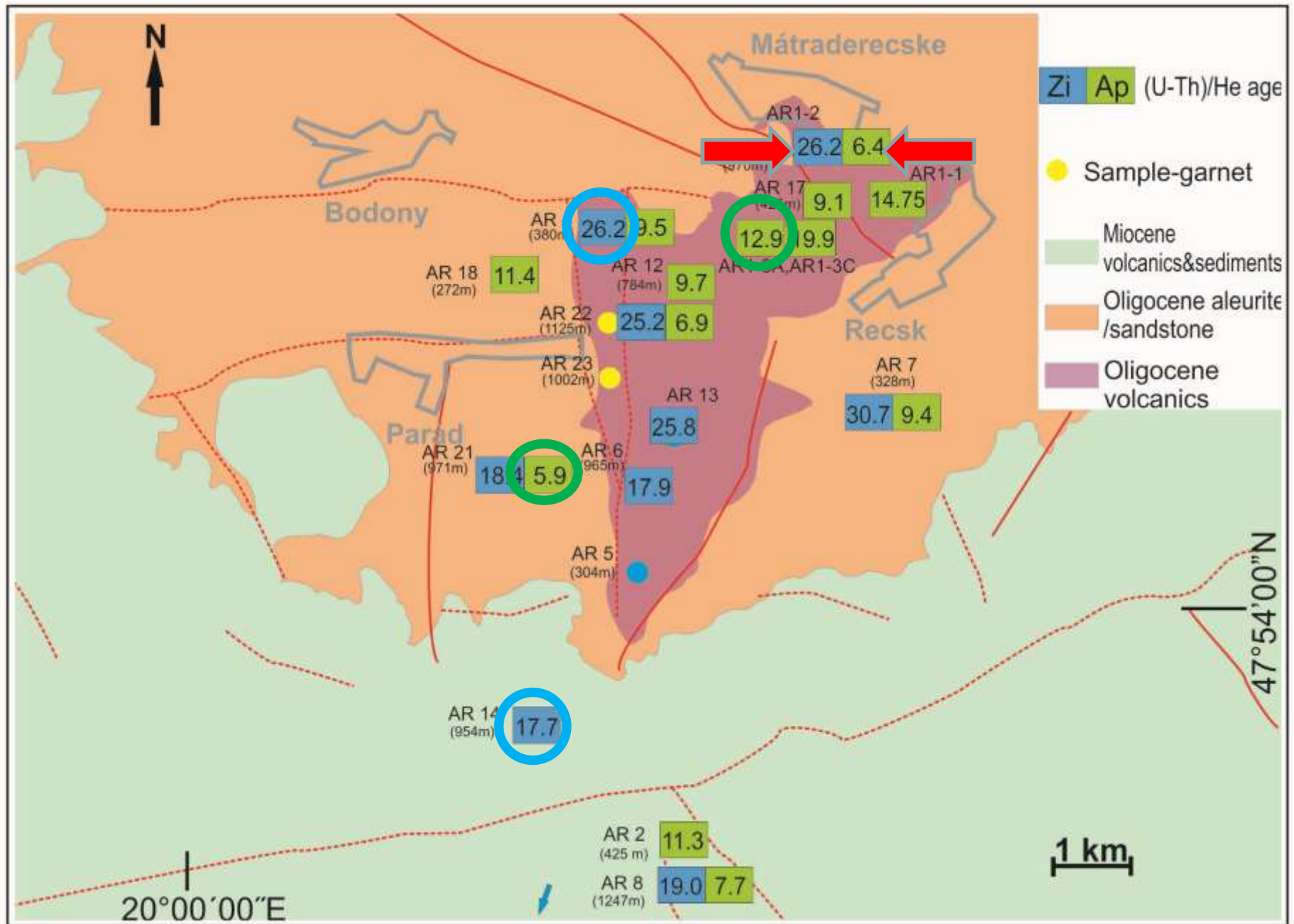
Apatite closure temperature: **50-70 °C**

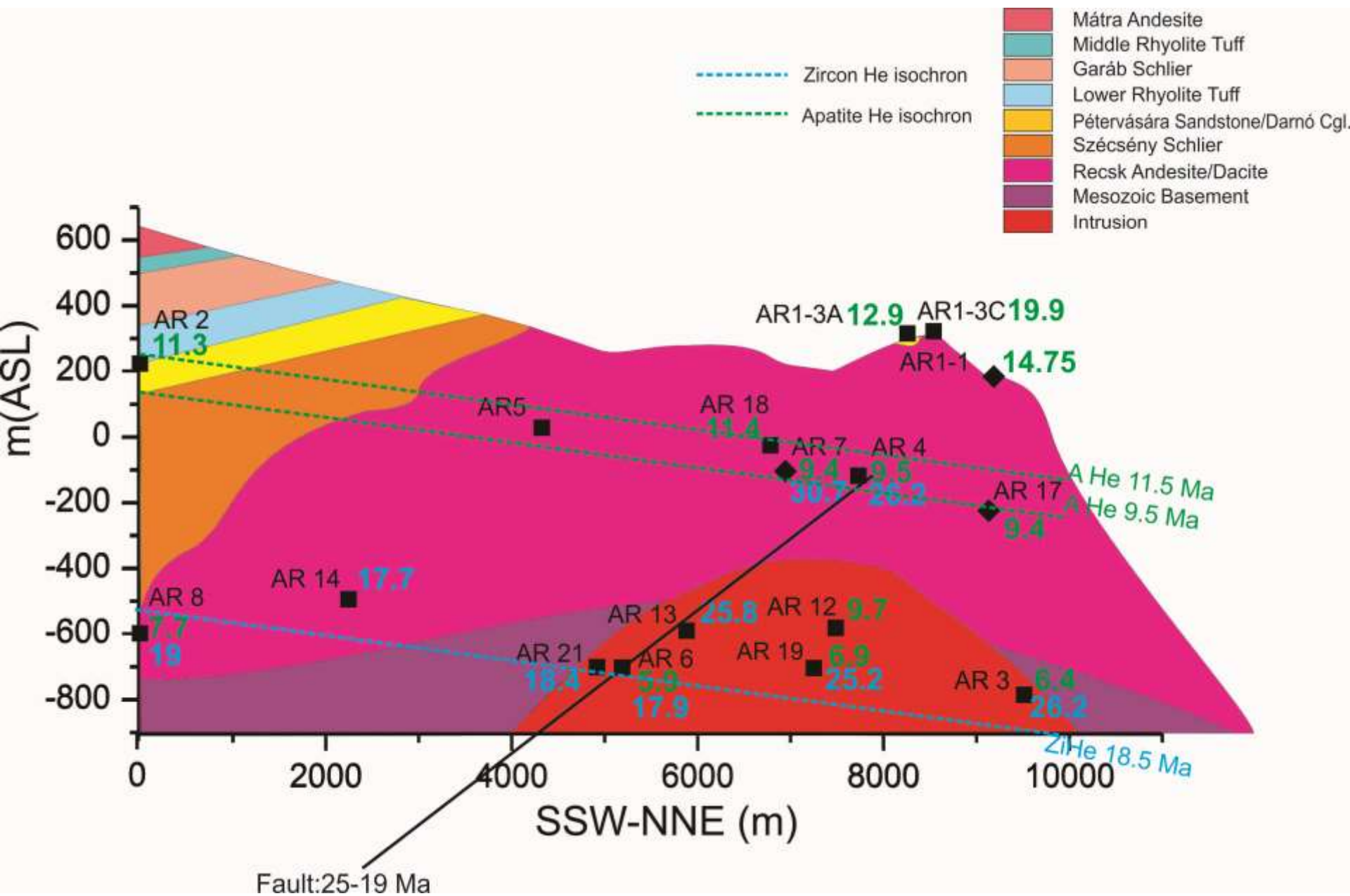
Zircon closure temperature: **130-180 °C**



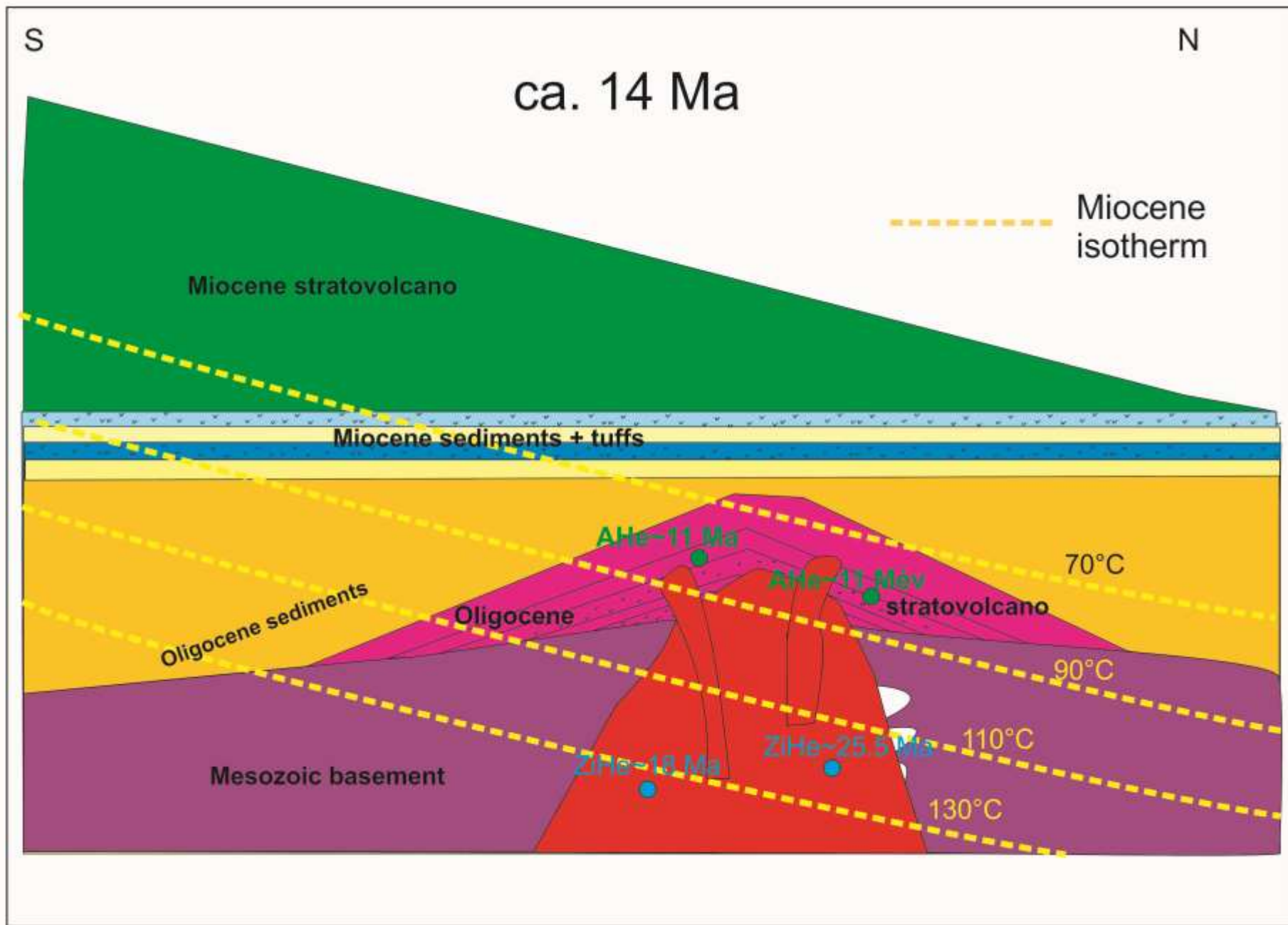
Modified after Wagner (1979)

(U-Th)/He ages





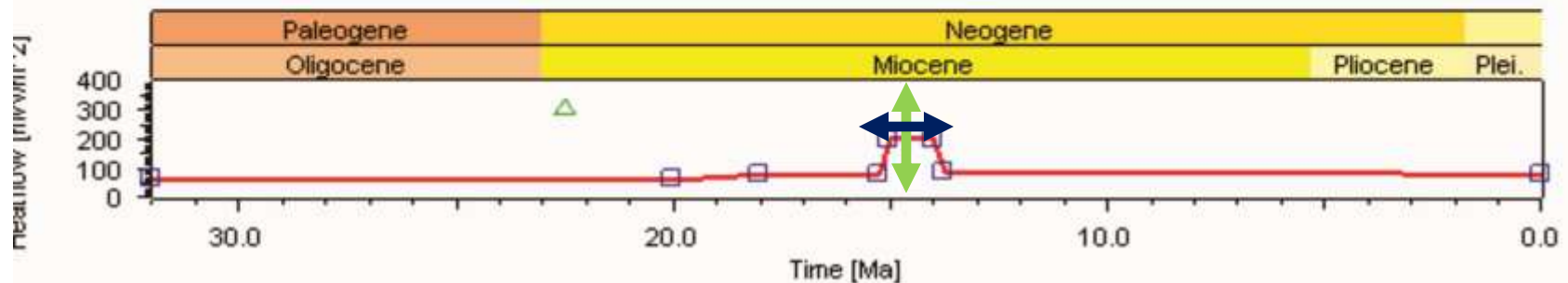
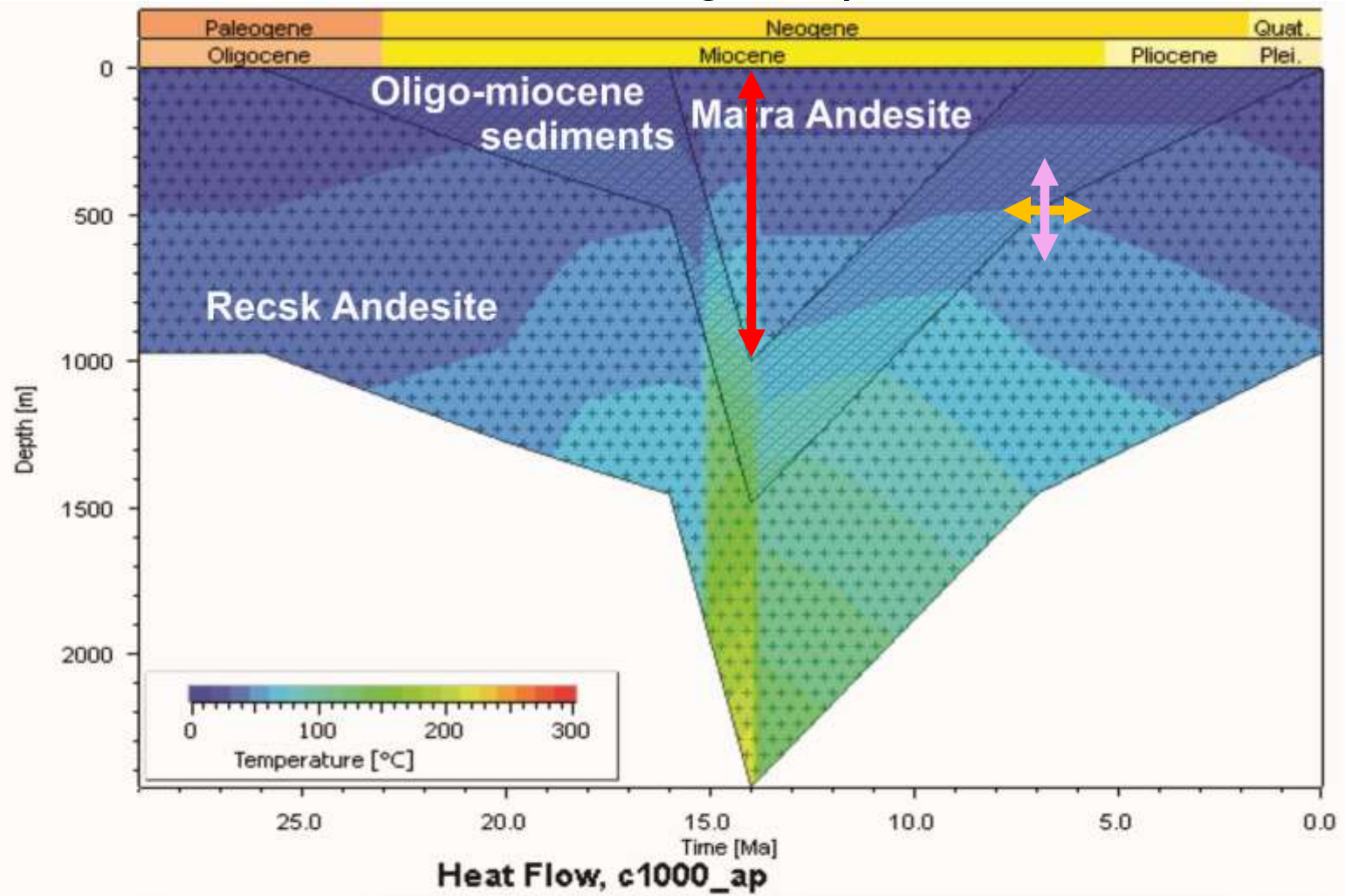
Possible interpretation of the (U-Th)/He ages: Burial effect



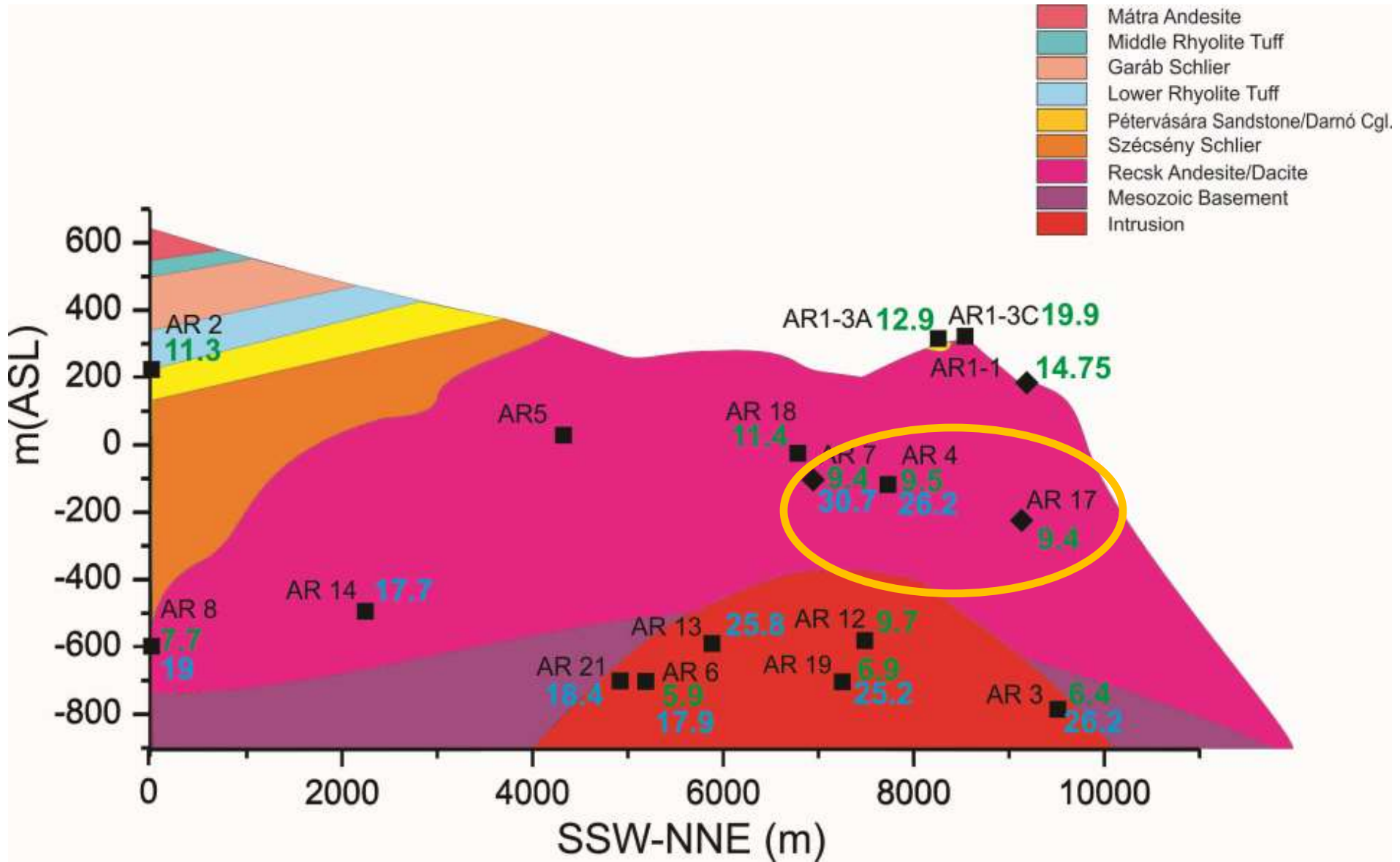
Modelling

- 1 dimensional modelling
- In two steps:
 1. Burial history model-> result (output): thermal history (Petromod software)
 2. Input data: thermal history->result: **modelled** He ages
->analysis of their "goodness", compared to the **measured** He ages (HeFTY software)

Modelling: Step 1.

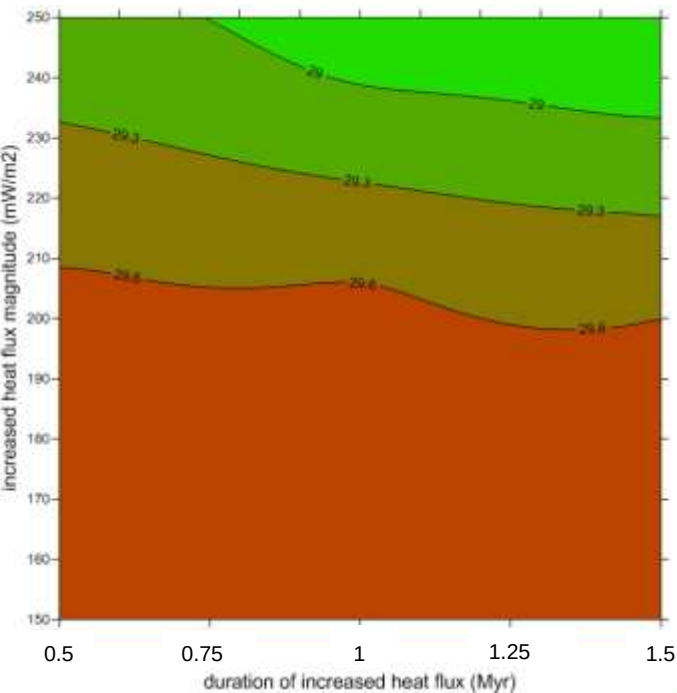


Modelling: Step 2.

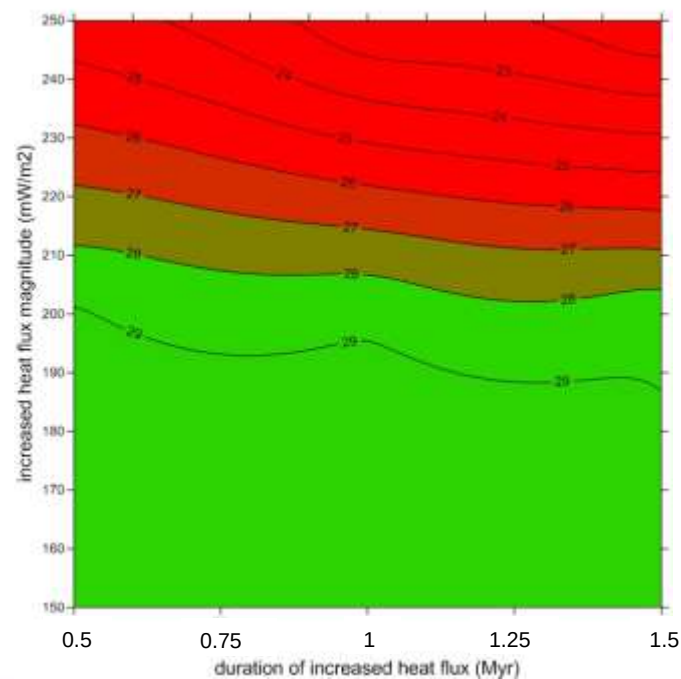


fix  Volcanic cover: 500 m

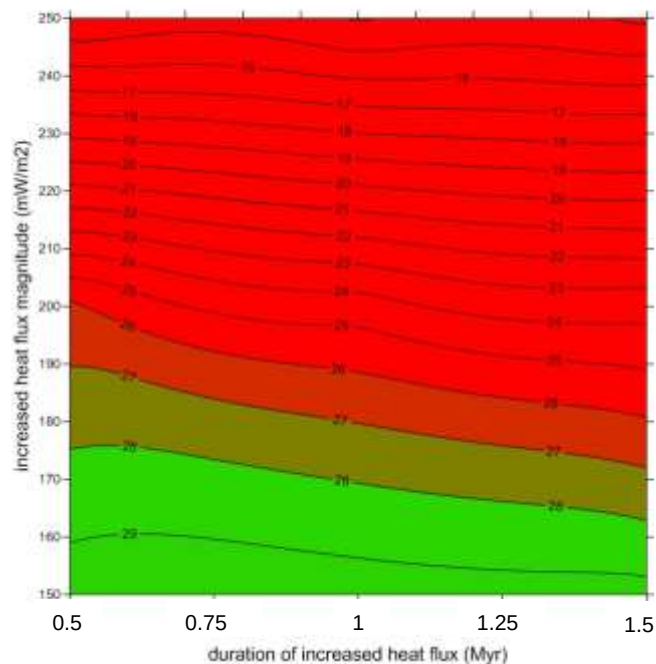
Modelling: Step 2. Zircon



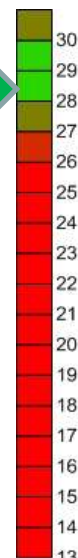
Volcanic cover: 1000 m



Volcanic cover: 1500 m



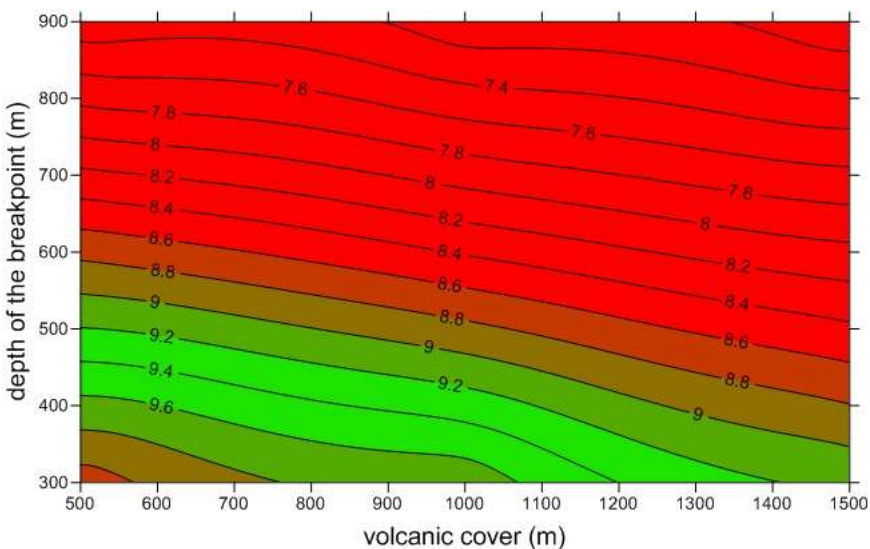
Good fit 



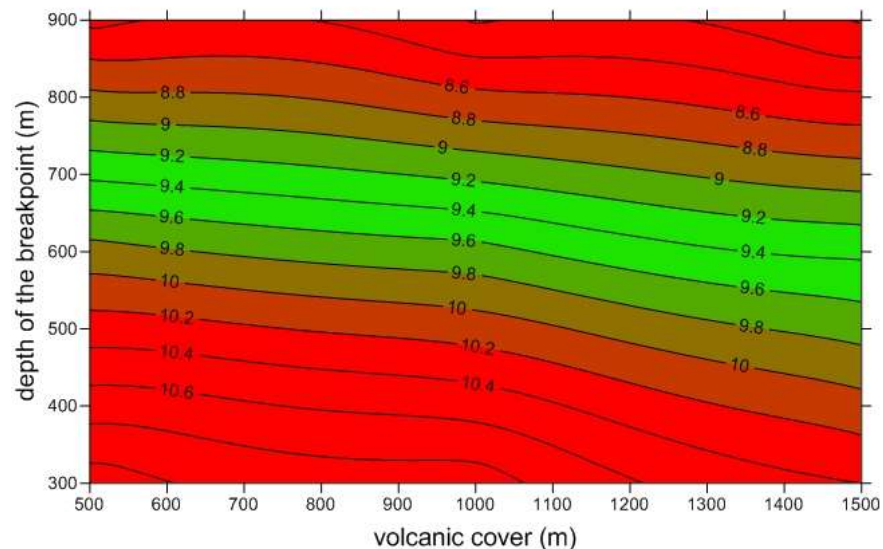
Modelling: Step 2.

Apatite

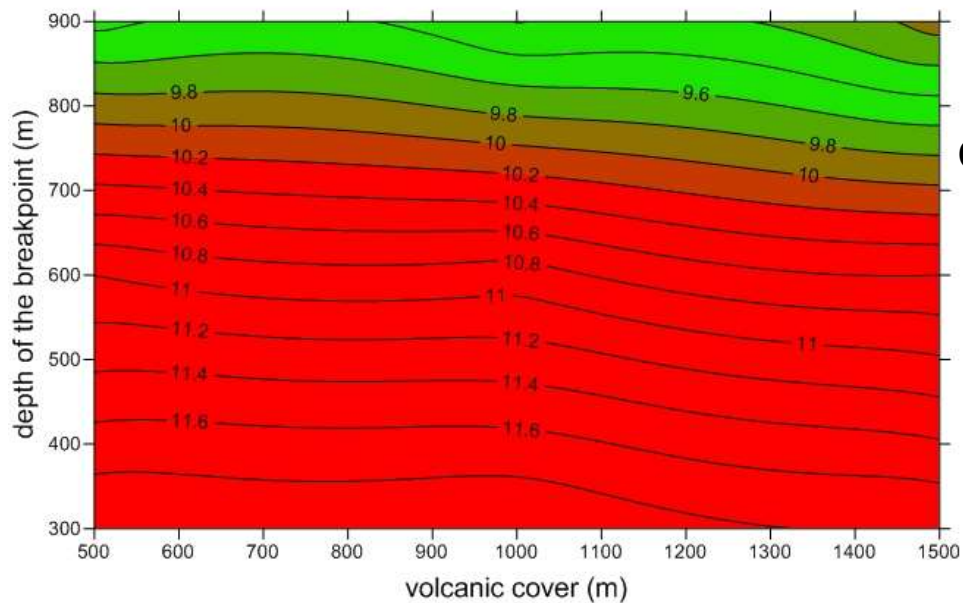
fix → age of the breakpoint: 8 Ma



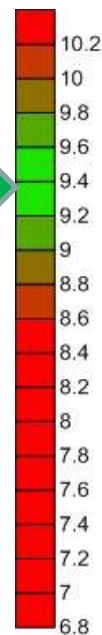
age of the breakpoint: 10 Ma



age of the breakpoint: 12 Ma



Good fit →



Summary

- Formation age of the Recsk Igneous Complex: 29-30 Ma, Early-Oligocene, Kiscellian (Late-Rupelian)
- Clear evidence of a post-formational thermal overprint: complex explanation

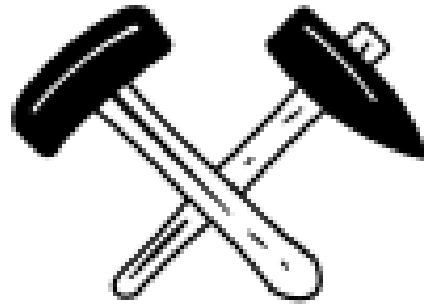
Thermal effect of the Mátra volcano

Burial effect

The contribution of these effects can be quantified by modelling

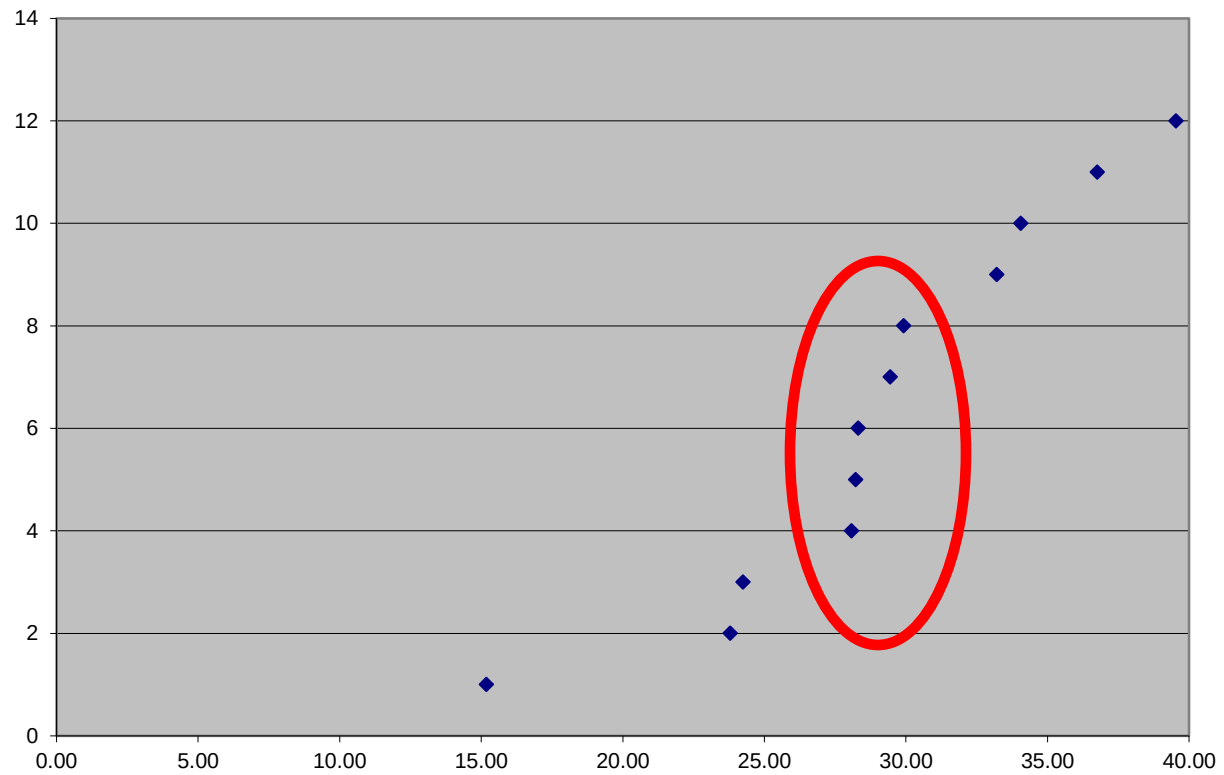
- Tectonic events can also be dated by the He ages

Thank you for your attention!

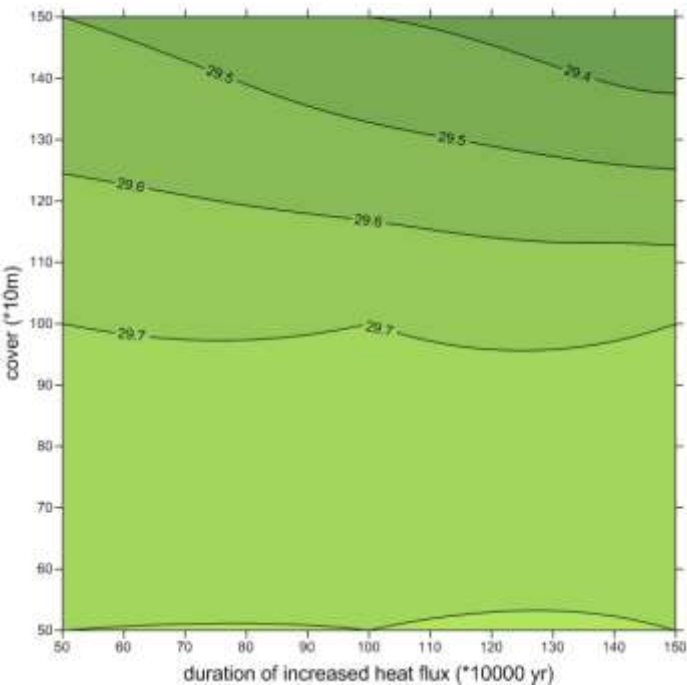


MENTE ET MALLEO

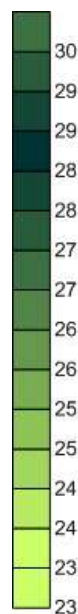
Garnet (U-Th)/He ages



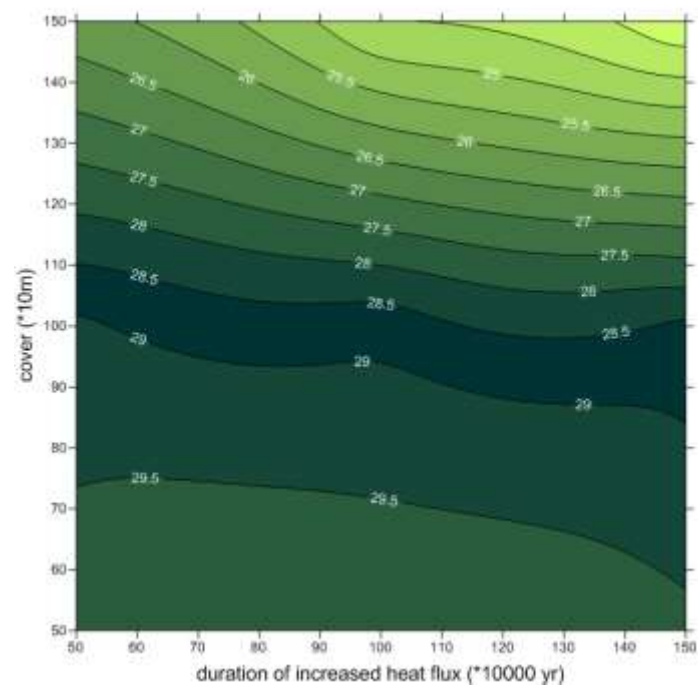
increased heat flux magnitude: 150 mW/m²



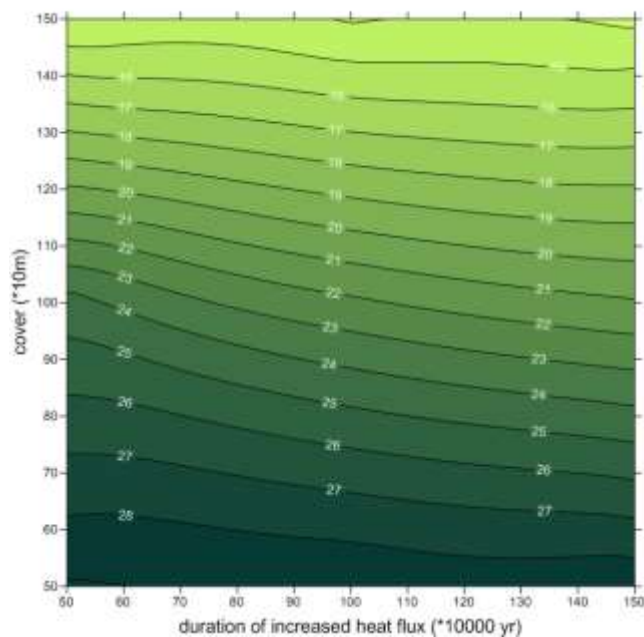
Cirkon He korok



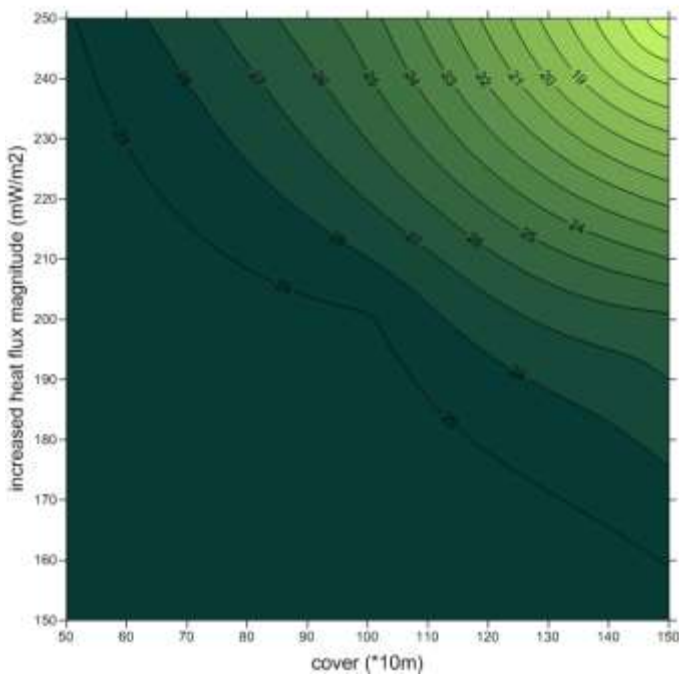
increased heat flux magnitude: 200 mW/m²



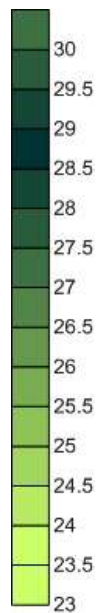
increased heat flux magnitude: 250 mW/m²



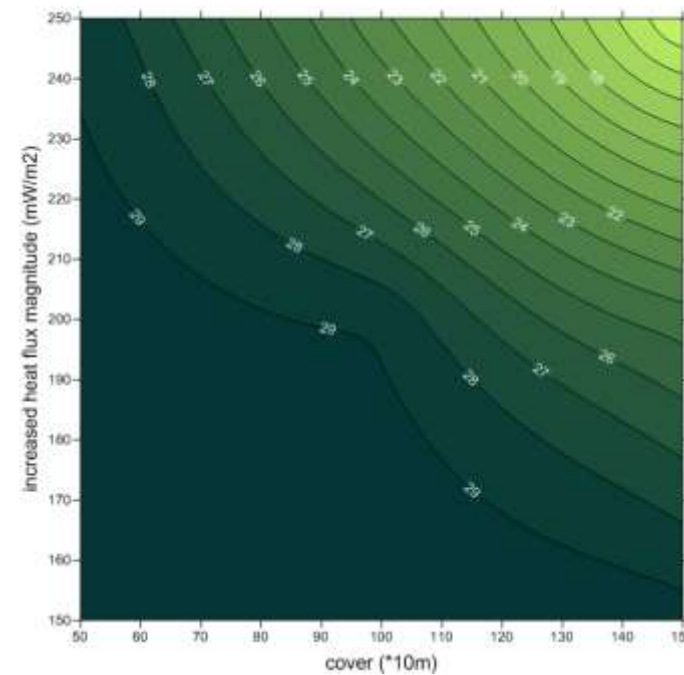
duration of increased heat flux: 0.5 Myr



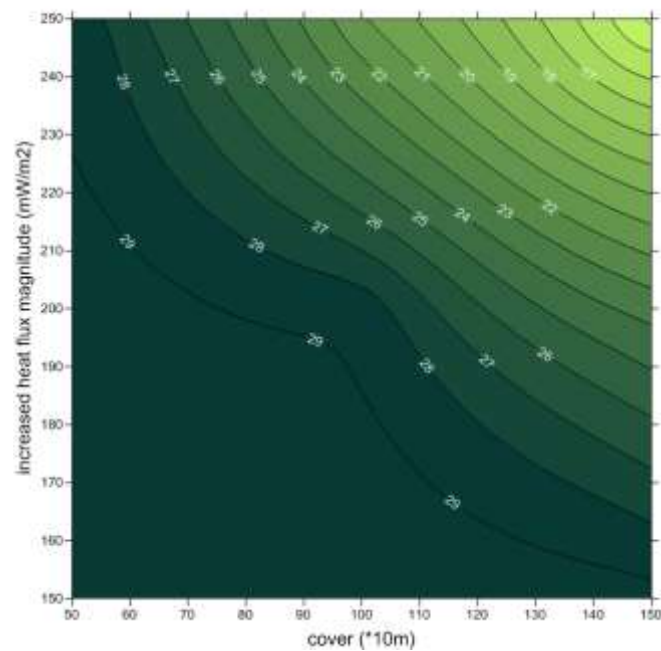
Cirkon He korok



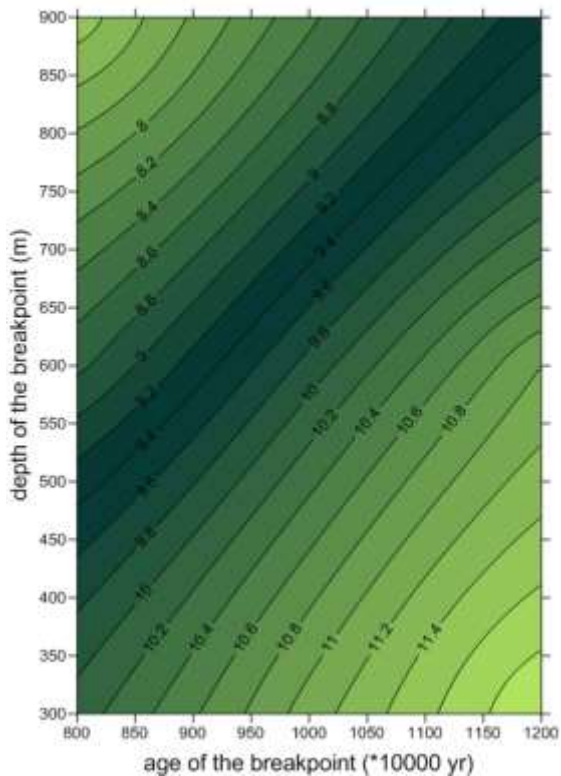
duration of increased heat flux: 1 Myr



duration of increased heat flux: 1.5 Myr

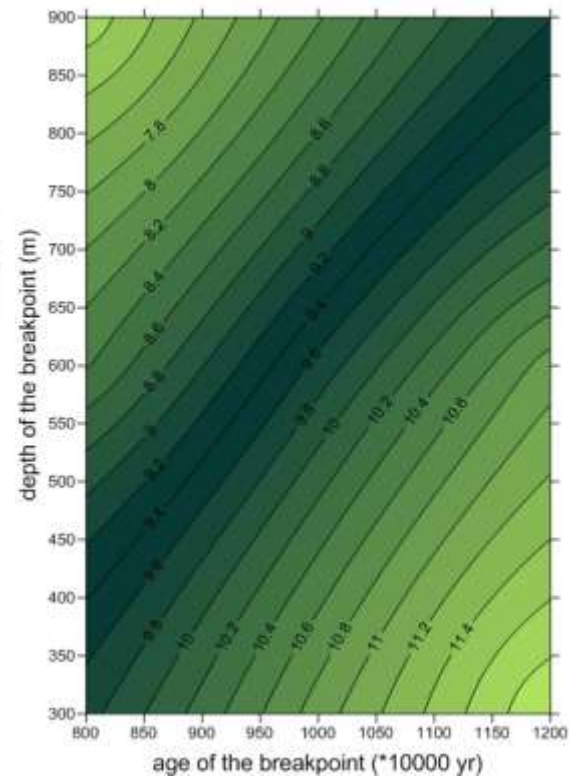


volcanic cover: 500 m

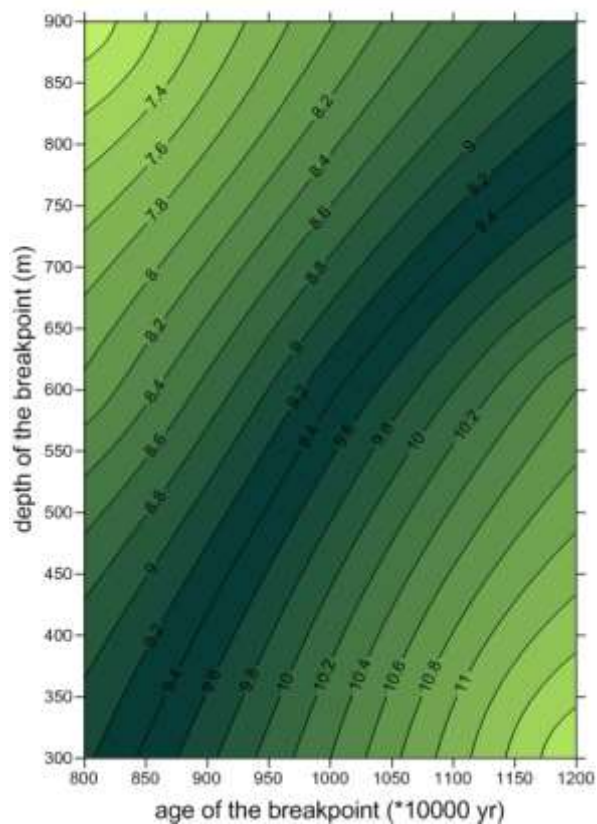


Apatit He korok

volcanic cover: 1000 m

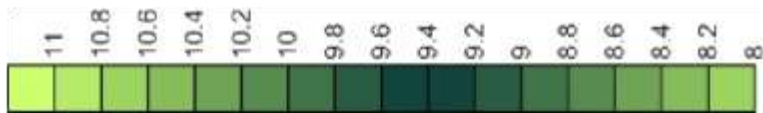
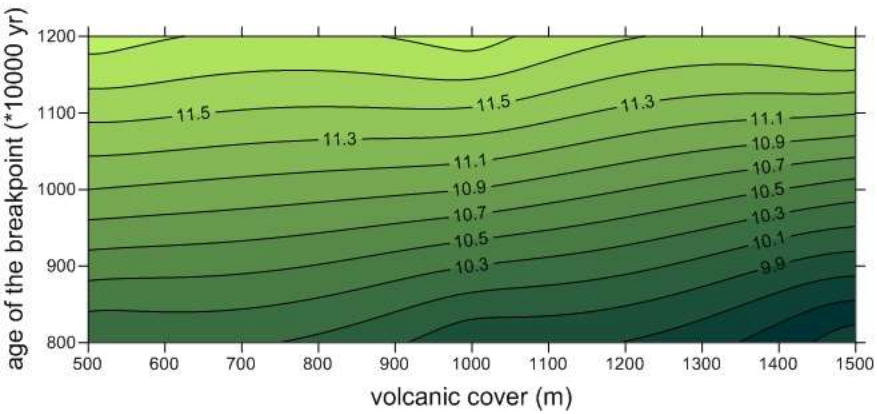


volcanic cover: 1500 m

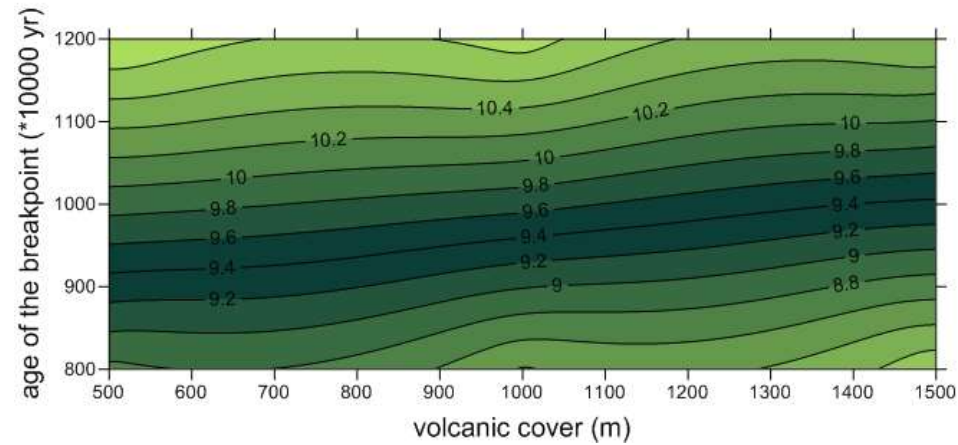


Apatit He korok

depth of the breakpoint: 300 m



depth of the breakpoint: 600 m



depth of the breakpoint: 900 m

