Protolith and metamorphic ages of eclogites from the Eastern Alps: Implications for the Permian to Cretaceous Wilson cycle of the Austroalpine mega-unit

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Research Background | **Geochronology and Hf isotope** | **Geochemistry**

Conclusions

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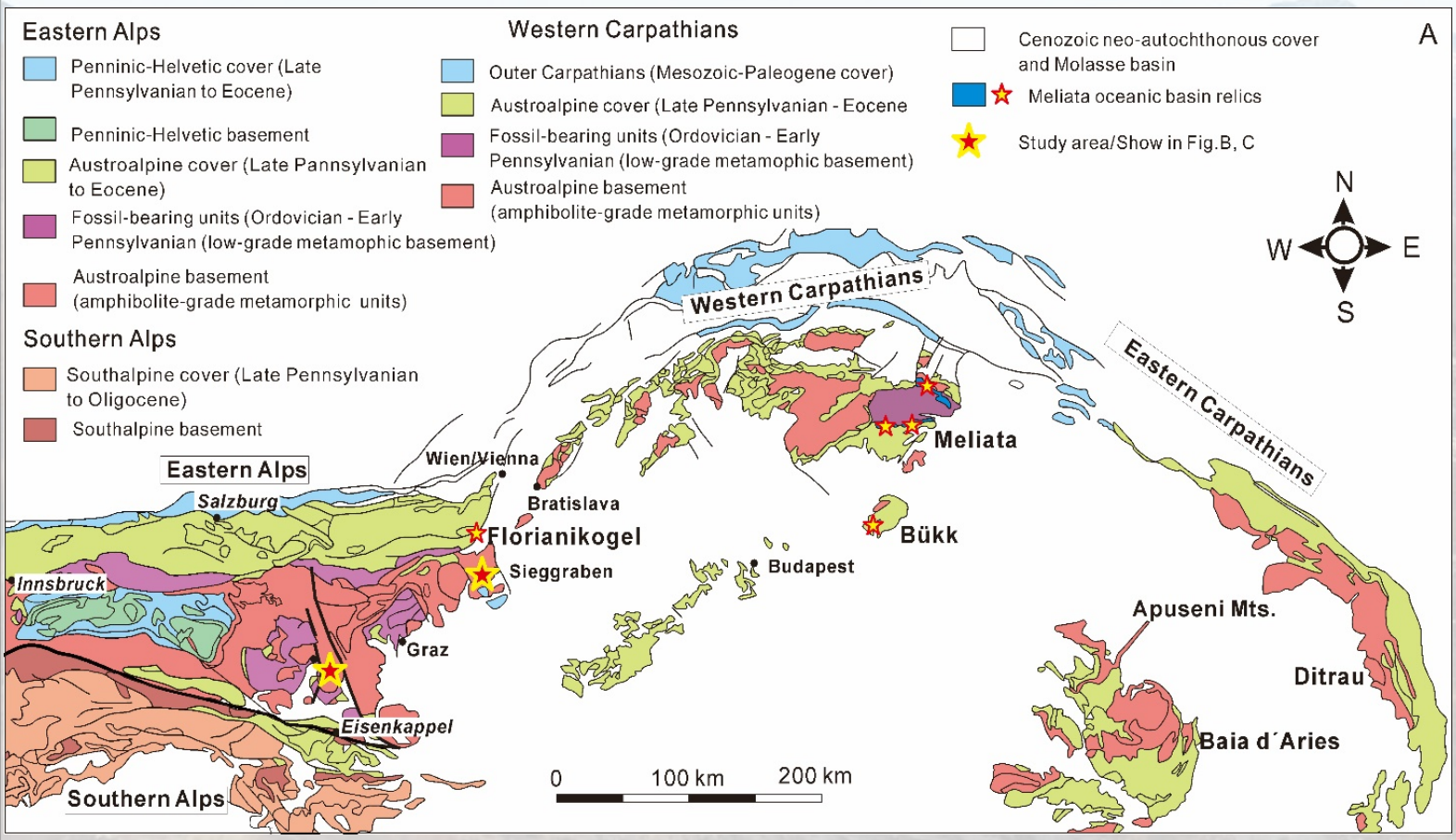
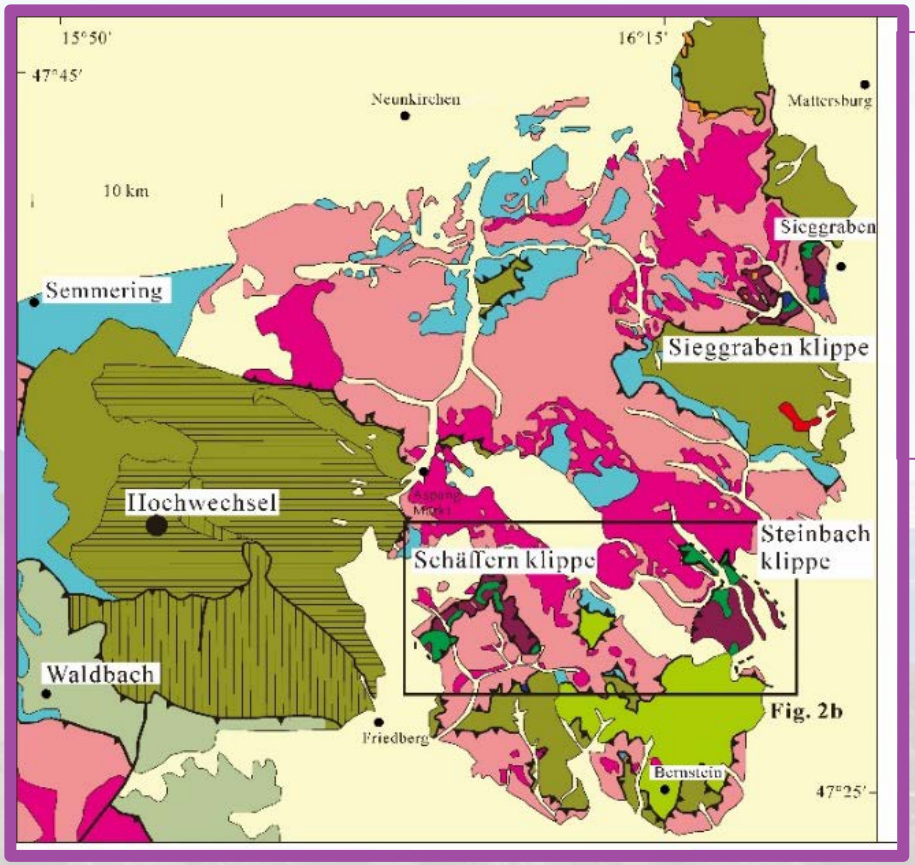
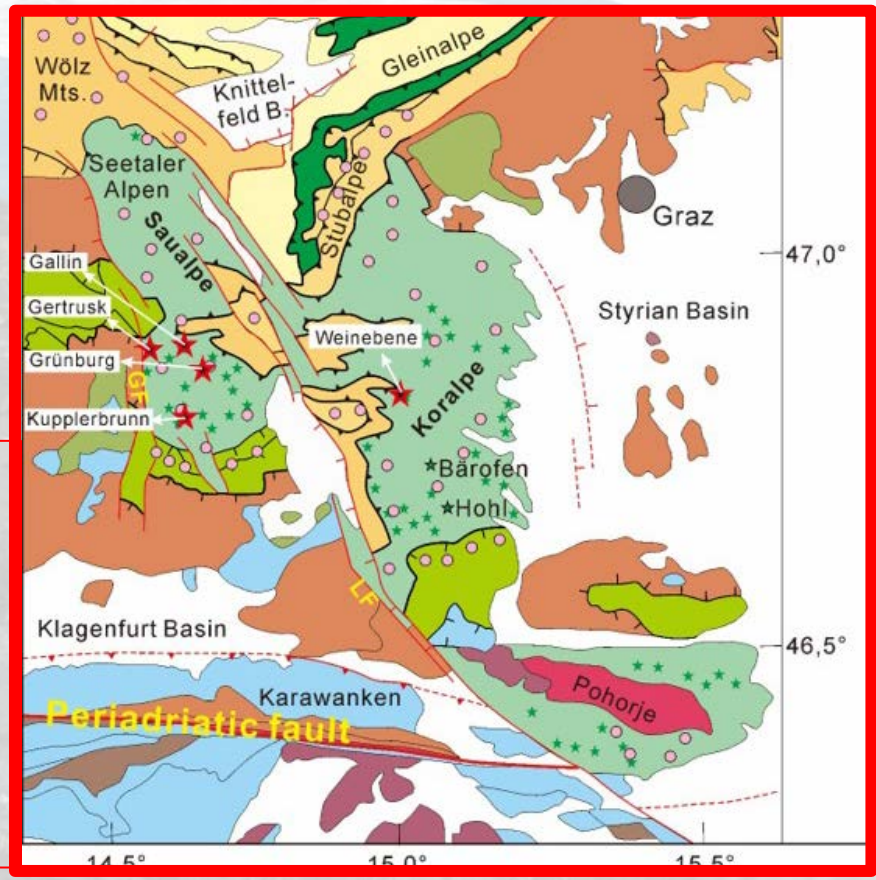
Research background

- **Eclogite (**“*selected rock*“**) was described by Haüy, 1822** from the Saualpe and Koralpe region in southern Austria. With the advent of plate tectonics, eclogite came into the focus of geologists as indicator of fossil subduction zones**. Up to now, poor constraints on the protolith ages(s) of eclogites.**
- Meliata-related record mainly focused on the stable sedimentary sequence. In Eastern Alps, details of th Meliata (oceanic?) basin and its margins are poorly known.



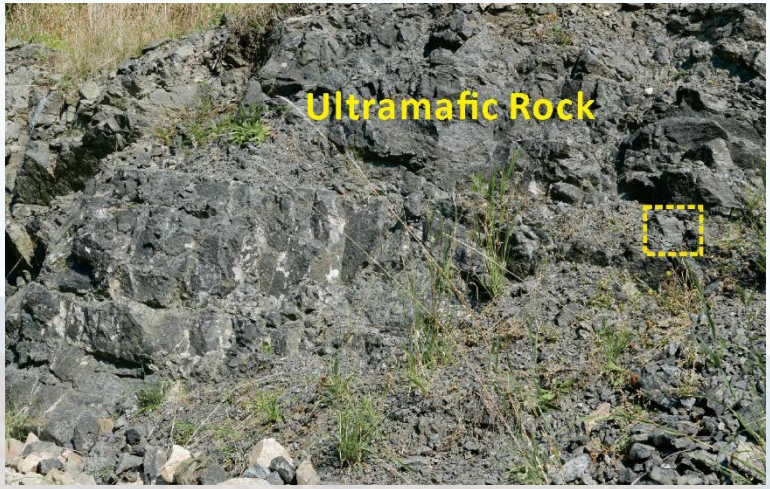


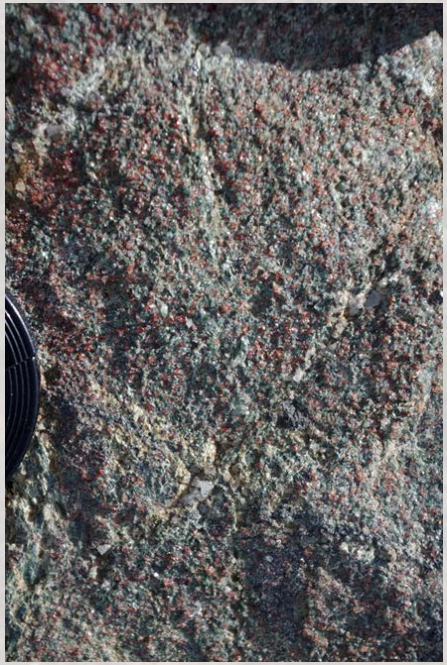
- Sieggraben Complex： Exposed in three tectonic klippens, the Sieggraben, Schäffern and Steinbach klippen. Comprises eclogite and garnet-peridotite, metagabbro, orthogneiss, marble and partly migmatitic paragneiss.



Koralpe-Saualpe： partly mylonitic paragneisses, subordinate eclogites, precursor metagabbros (only three localities) and metabasaltic eclogites (> 99 %!), calcsilicate rocks, rare quartzites, small pegmatites including mineable Li-pegmatite bodies (Weinebene)

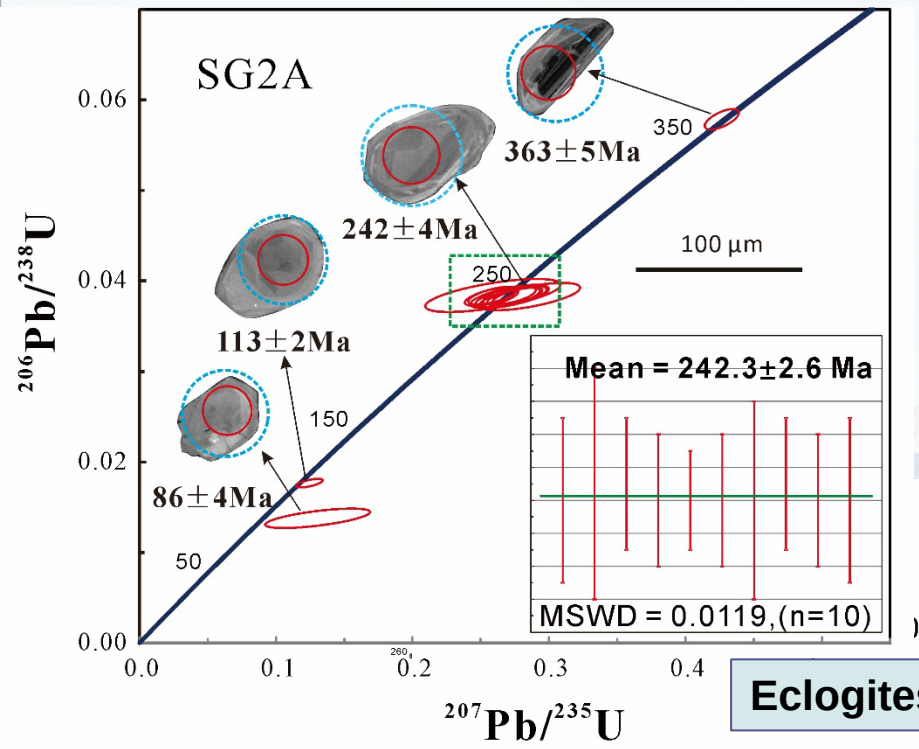
Field Work

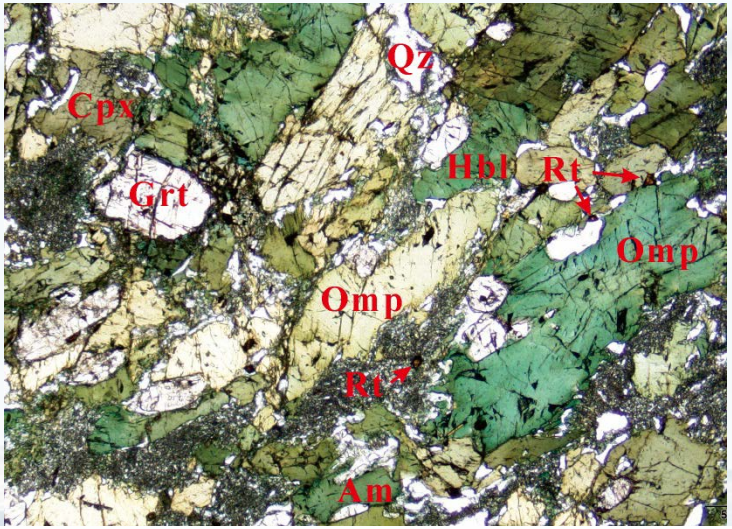

Ultramafic Rock



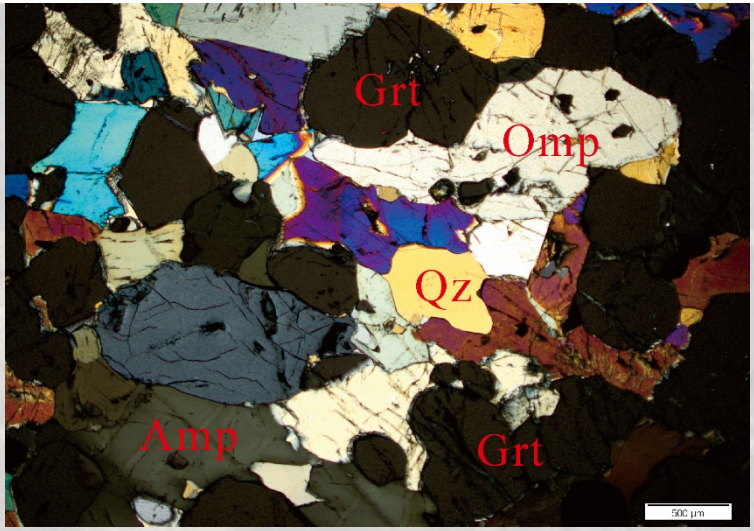

Sieggraben, Schäffern klippe
Trondhjemite dike
Eclogite
SG2

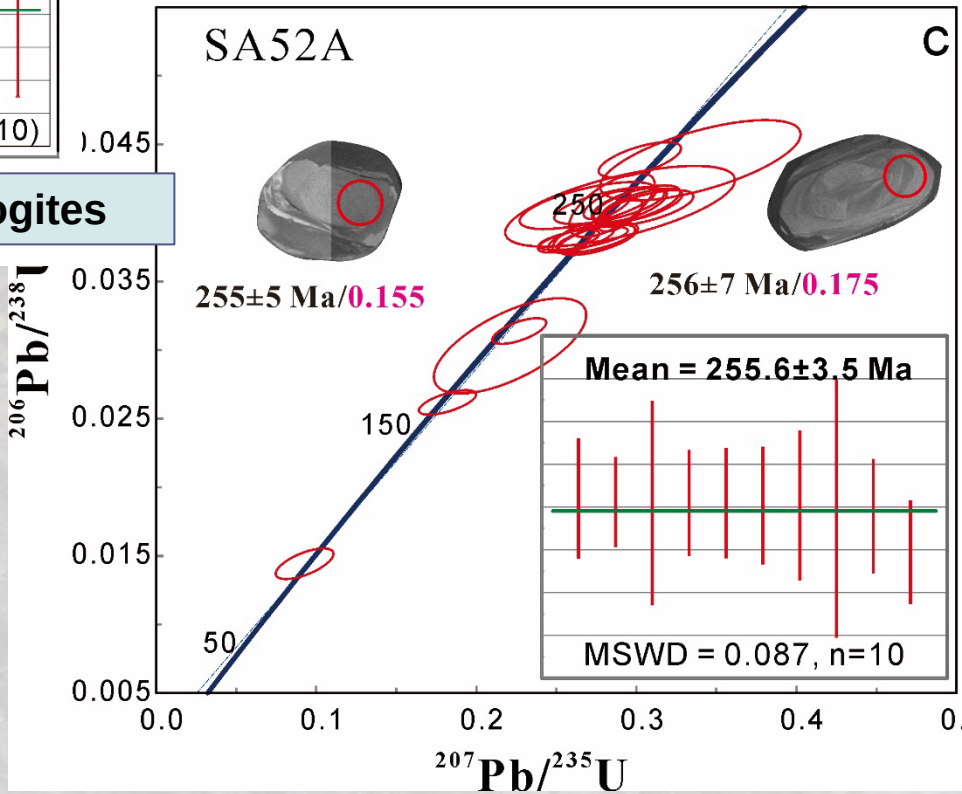
Examples of protolith ages



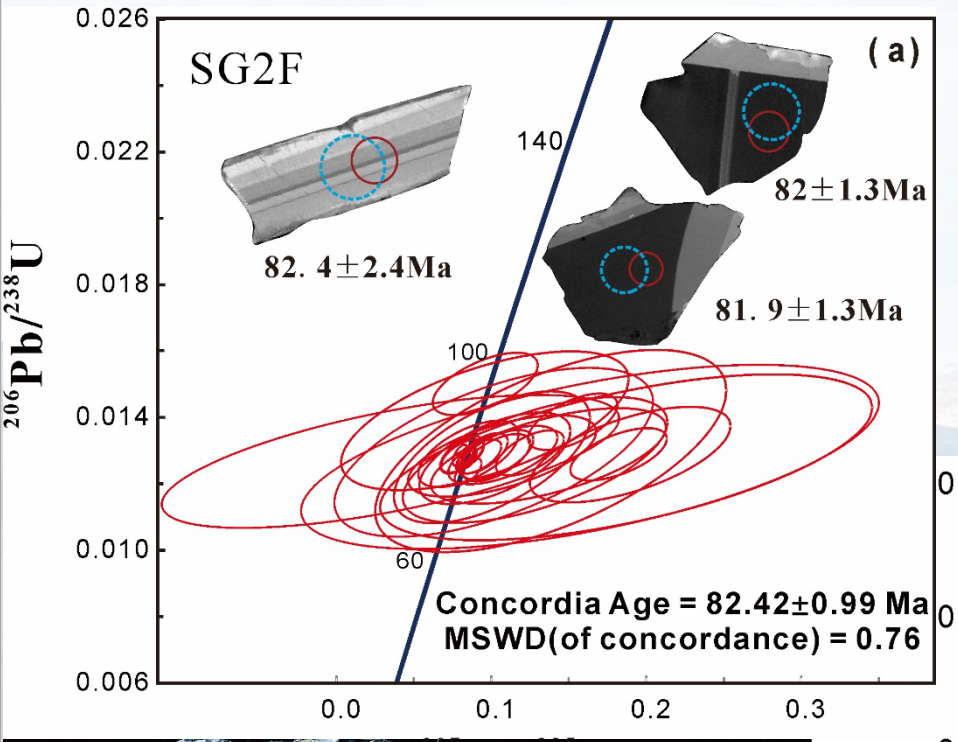


Eclogites

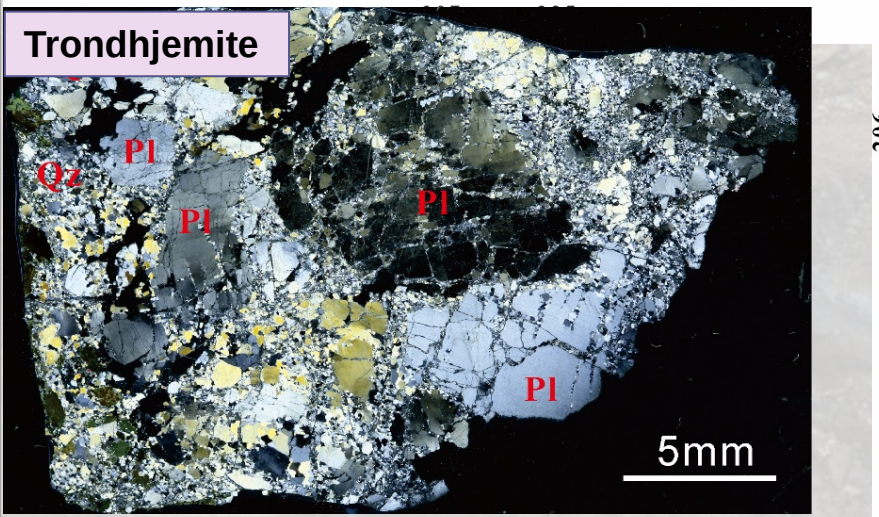


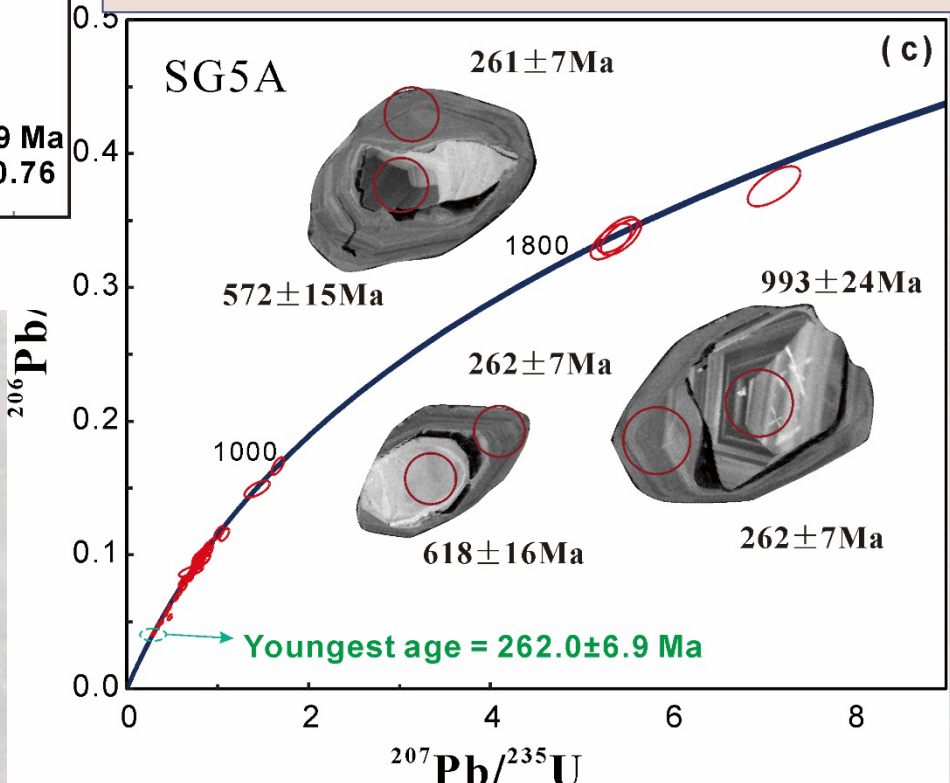


Examples of protolith ages



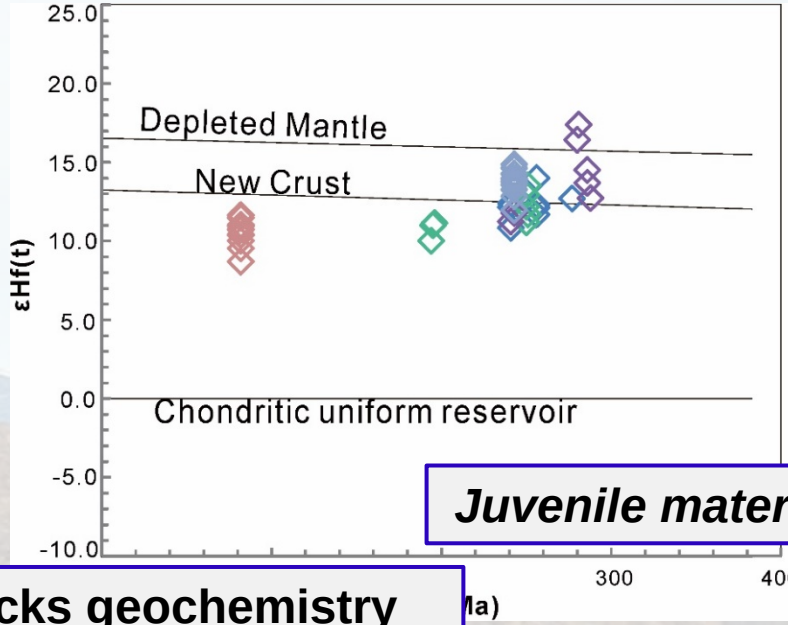
Migmatitic paragneisses as country rocks

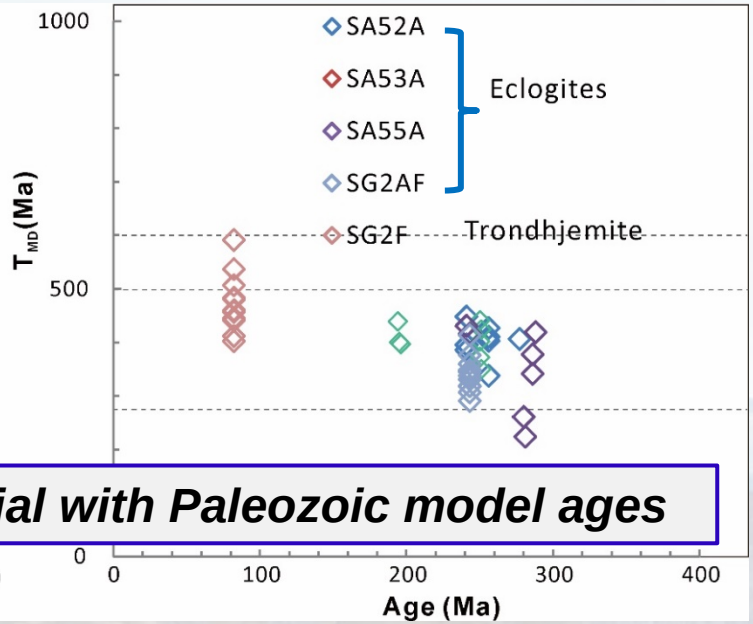




Geochemistry-Where?

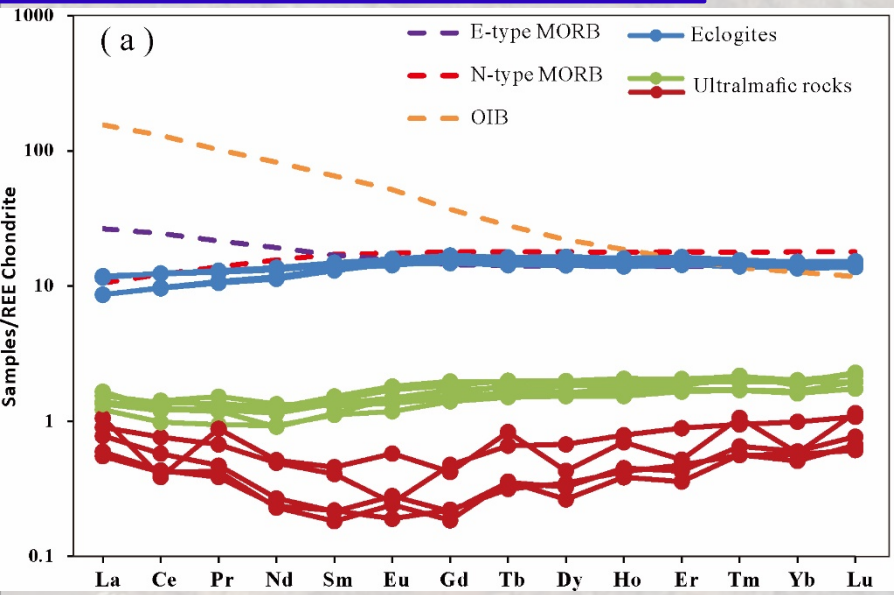
Zircon Hf isotope analyses

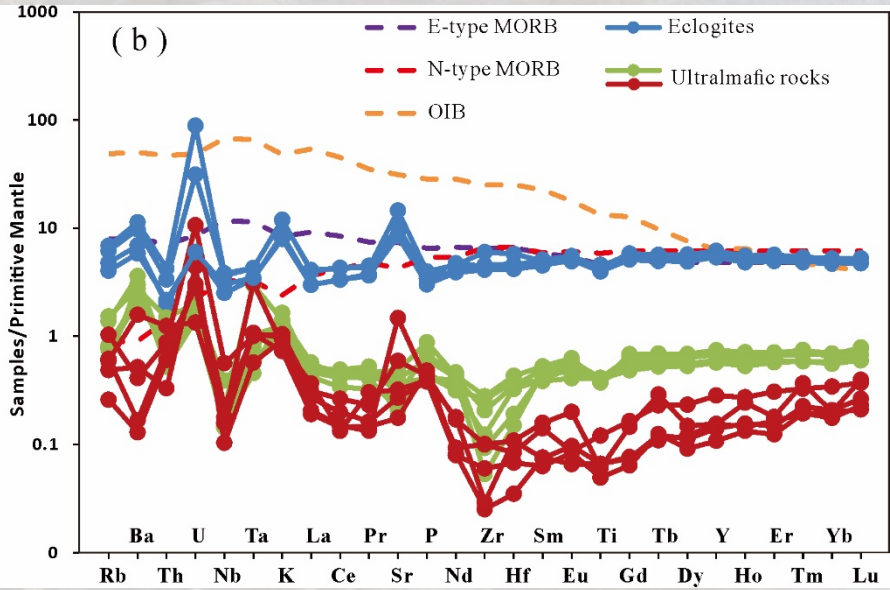




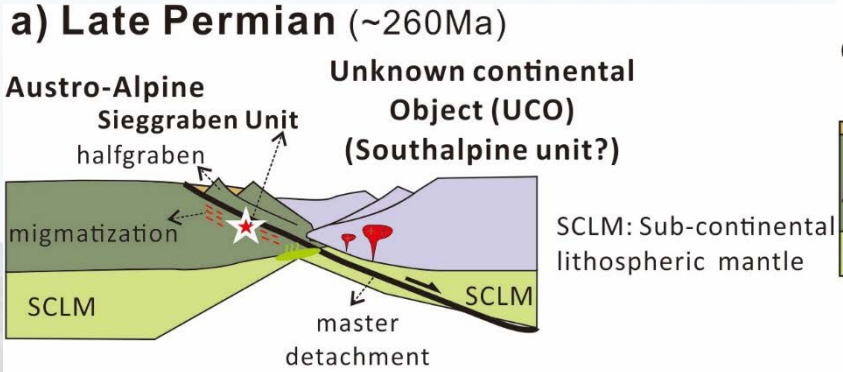
Juvenile material with Paleozoic model ages

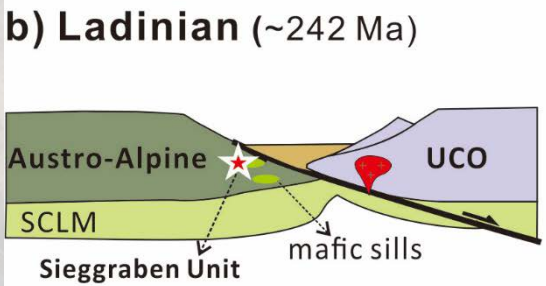
Whole rocks geochemistry

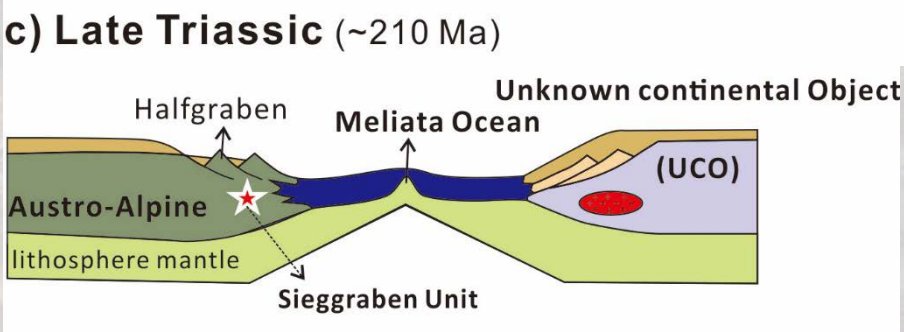


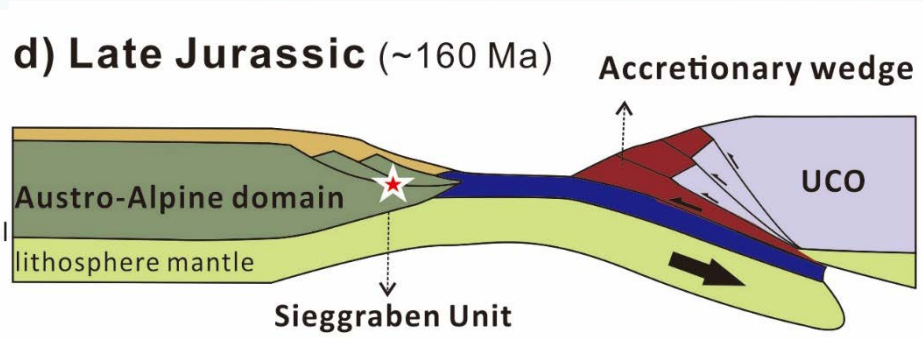


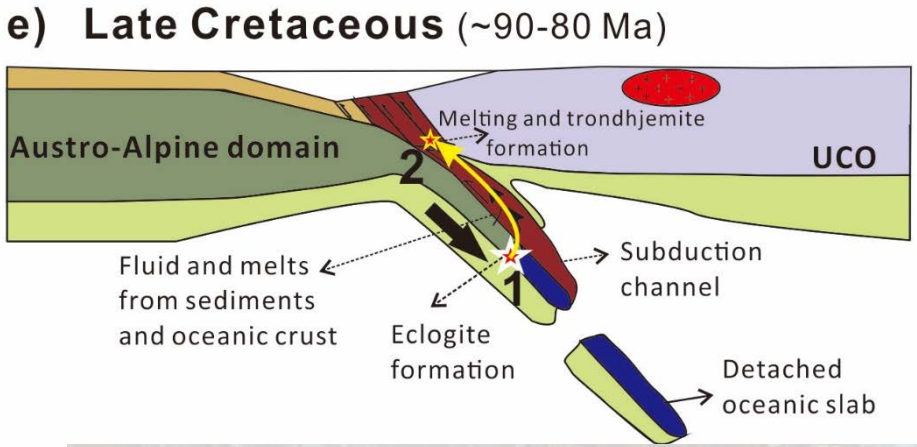
Hypothetical model, incl. data from the literature











Conclusions

How old they are? The age composition of **ECLOGITE** family rocks (U-Pb zircon)

- The **Sieggraben eclogite protolith** has an age at **243±2.6 Ma**, and the **trondhjemite at ~82 Ma** by melting of eclogite, a mantle-derived protolith.
- The **eclogite from Saualpe-Koralpe Complex** yielded a protolith age group ranging from **241±3.2 Ma, 251.1±3.1 Ma, 255.6±3.5 Ma to 283.4±5.1 Ma.**
- The **Sieggraben metasedimentary country rocks** have a **younger migmatitic age group at 262 Ma**, the **dominant detrital age group is at ca. 600 Ma** and some older.

Where are they from?

- The **protolith of the eclogite** formed as a basaltic liquid during Middle Triassic. **Eclogite** metamorphism formed during **subduction of the distant continental margin of the Meliata ocean** and exhumed after detachment of the oceanic slab.
- The host metasedimentary rocks should belong to the **old continental crust close to the margin of the Meliata basin affected by Permian to Triassic magmatism.**
- The **trondhjemite** formed during the **exhumation of Sieggraben eclogite** by partial melting of the depleted mantle-derived eclogite.