

Pyroclastic rocks from Kanchanaburi and Uthai Thani Province, Inthanon Zone, Western Thailand

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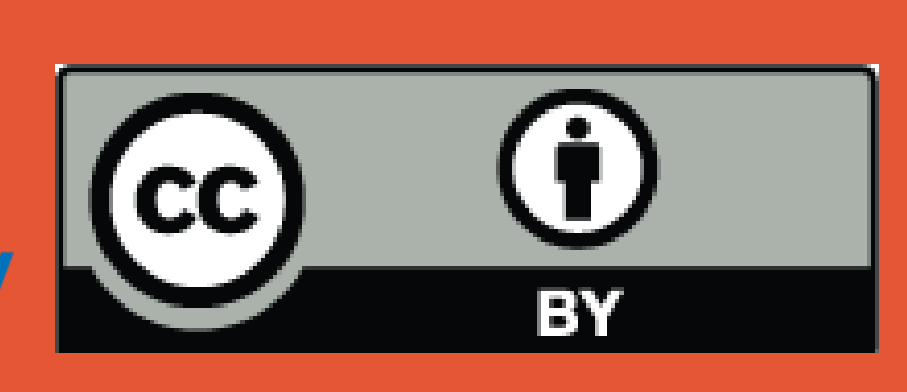
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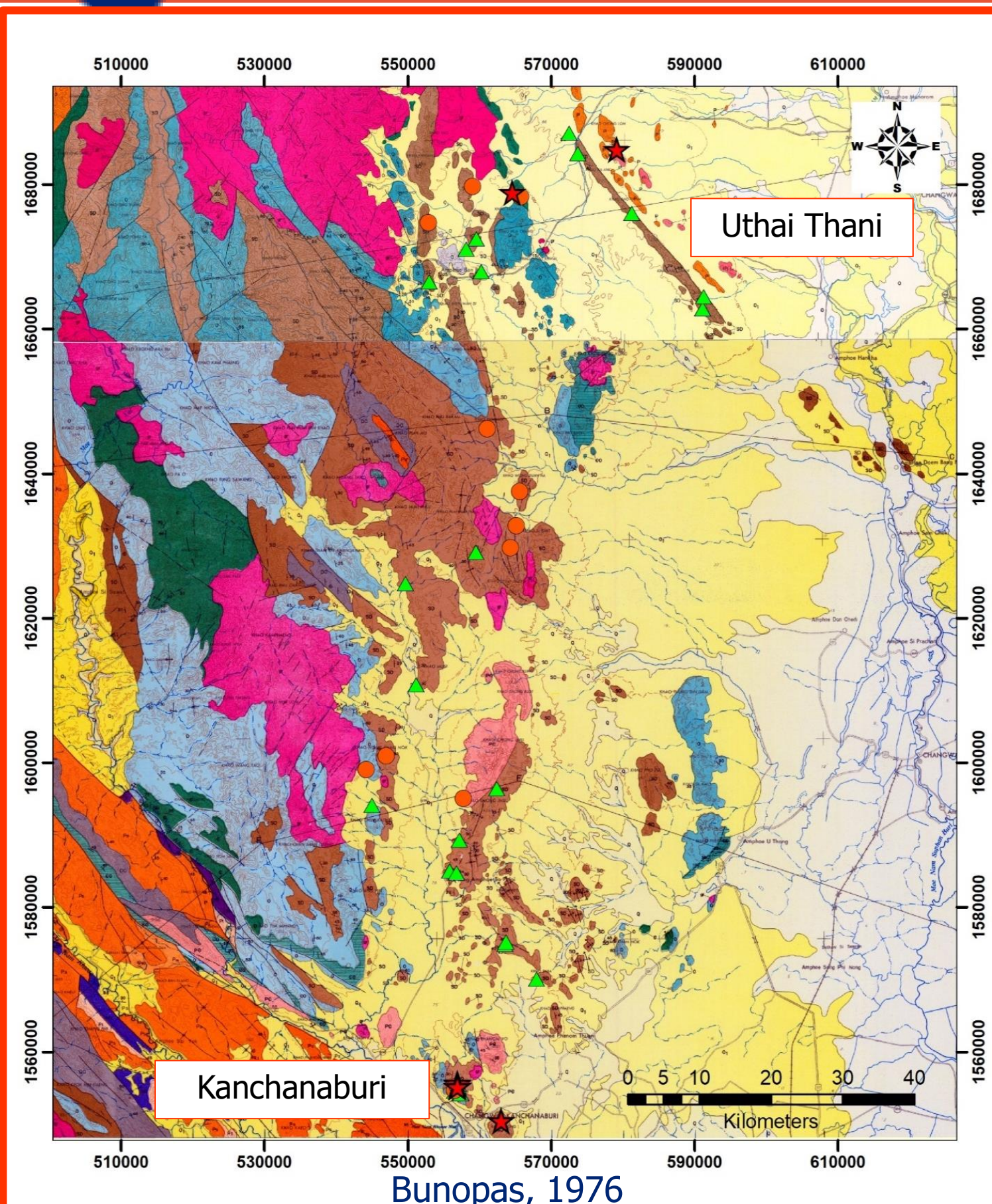


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Introduction

The study area is located in Kanchanaburi and Uthai Thani, Western Thailand, a part of the Inthanon suture zone that represents suture zone related to the closure of the Paleotethys (Devonian–Triassic; Metcalfe, 2013). However, this suture zone also includes thrust slices of the Sibumasu basement within an accretionary complex in the western part of this fold-thrust belt.

This study focuses on a Silurian-Devonian unit (brown area) which comprises mainly metamorphic, metasedimentary, and rarely pyroclastic rocks.

● **Metamorphic rocks:** quartzite, feldspathic quartzite

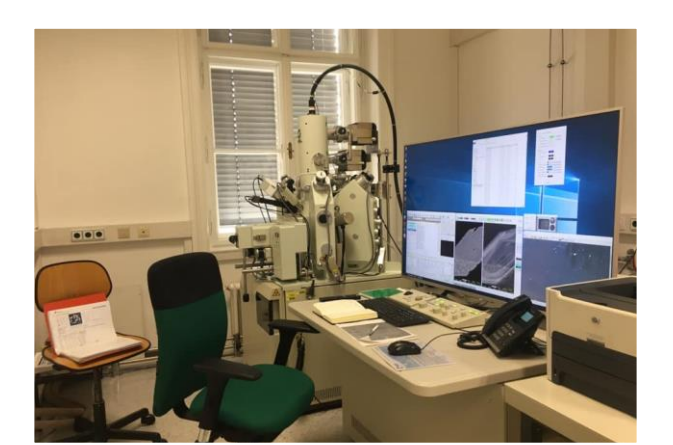
▲ **Metasedimentary rocks:** meta sandstone, meta-quartz wacke, metaargillaceous silty sandstone (questionably volcanogenic origin?)

★ **Pyroclastic rocks:** meta-quartz-K-feldspar crystal tuff, meta-quartz crystal tuff, meta-lithic tuff

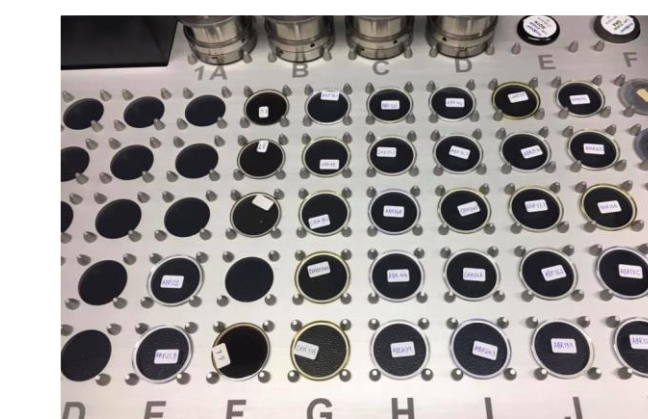
Analytical method



Polarizing microscope



SEM



XRF



ICP-MS



LA-MC-ICP-MS

Field observation



Amphoe Mueang, Kanchanaburi

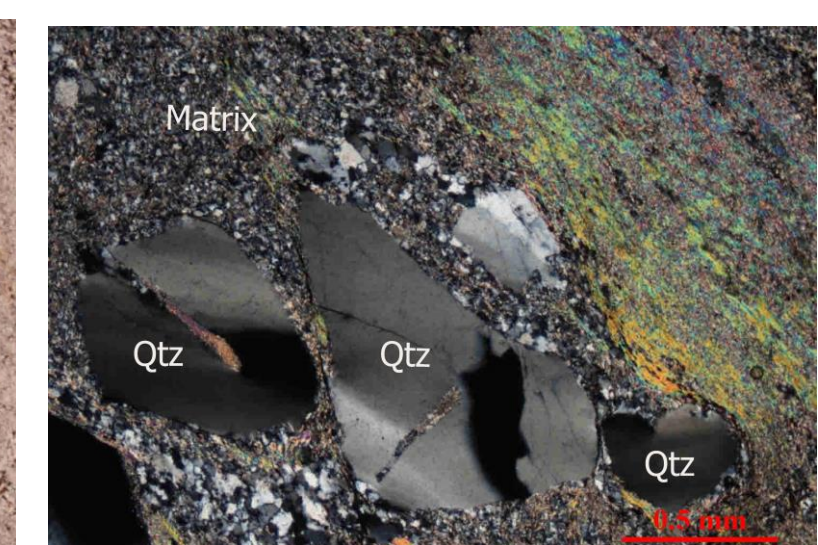
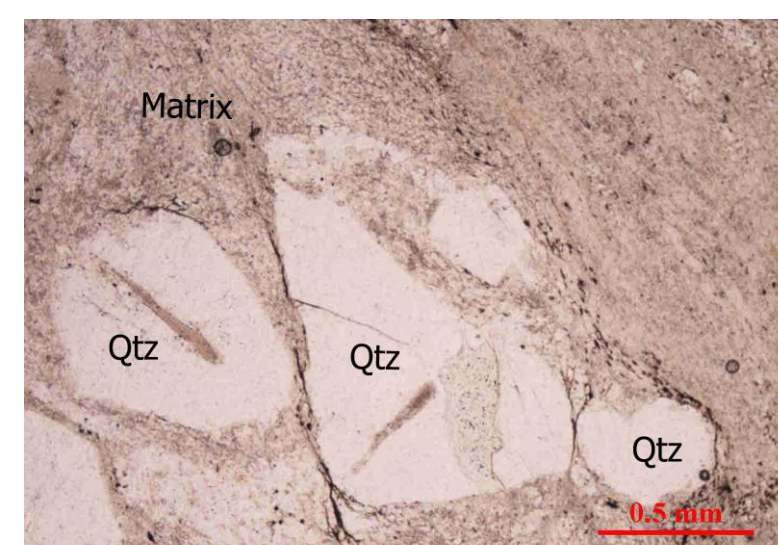


Amphoe Ban Rai, Uthai Thani

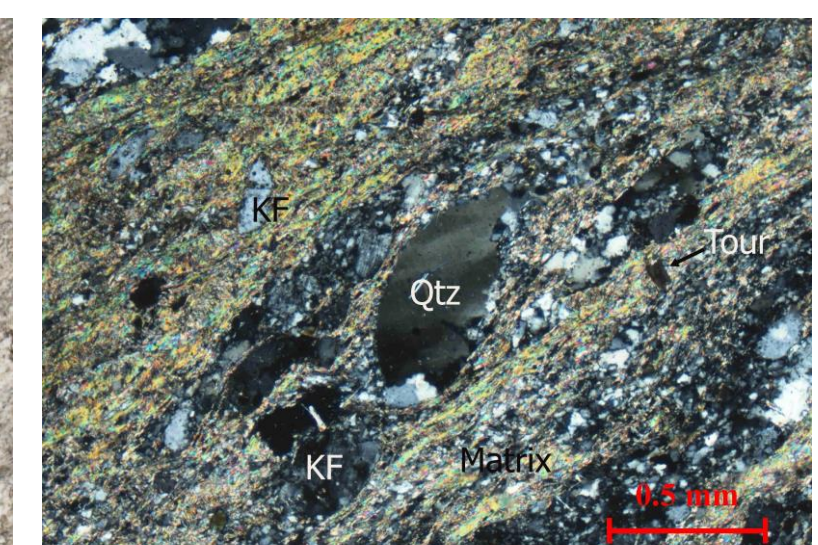
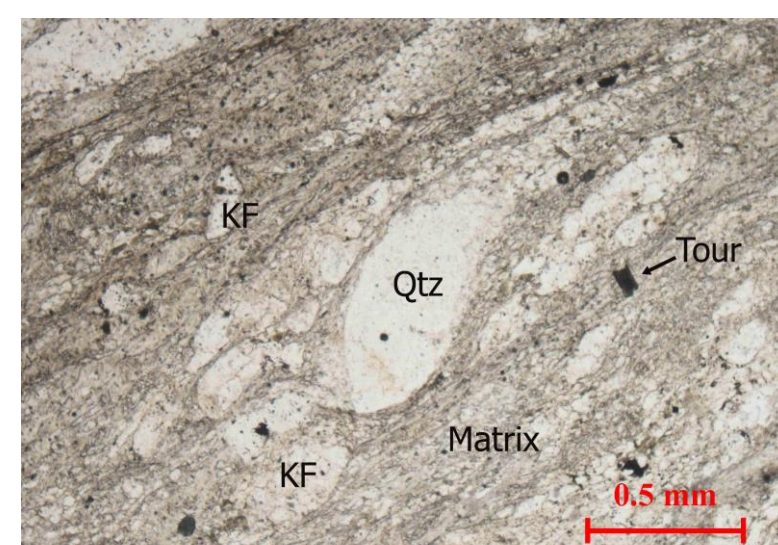


The Kanchanaburi pyroclastic rocks are underlain by quartzite and metasedimentary rocks and overlain by metaargillaceous limestone, while the structural position of the Uthai Thani pyroclastic rocks is unclear due to the overprinting Mae Ping Fault.

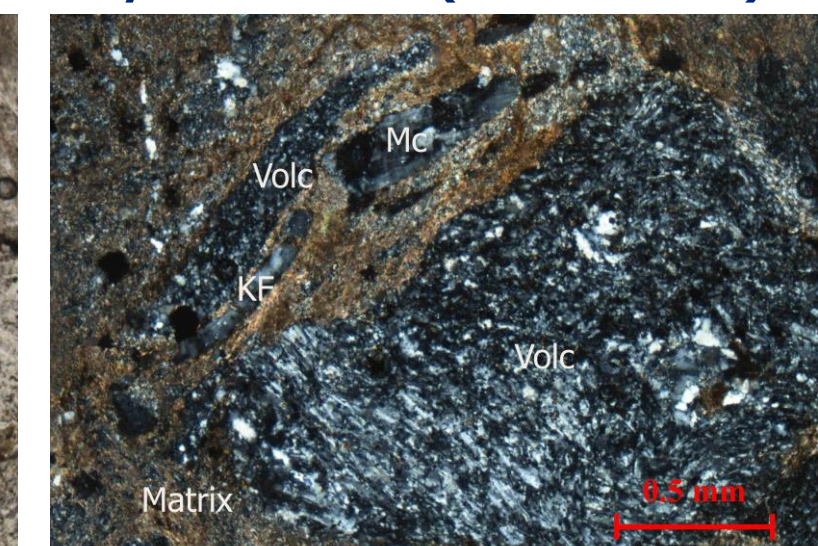
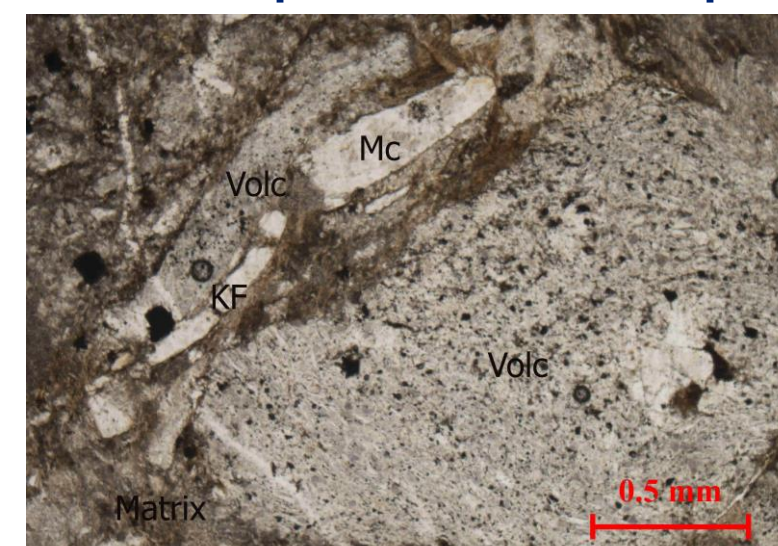
Petrography



Meta-quartz crystal tuff (Abr04h1)



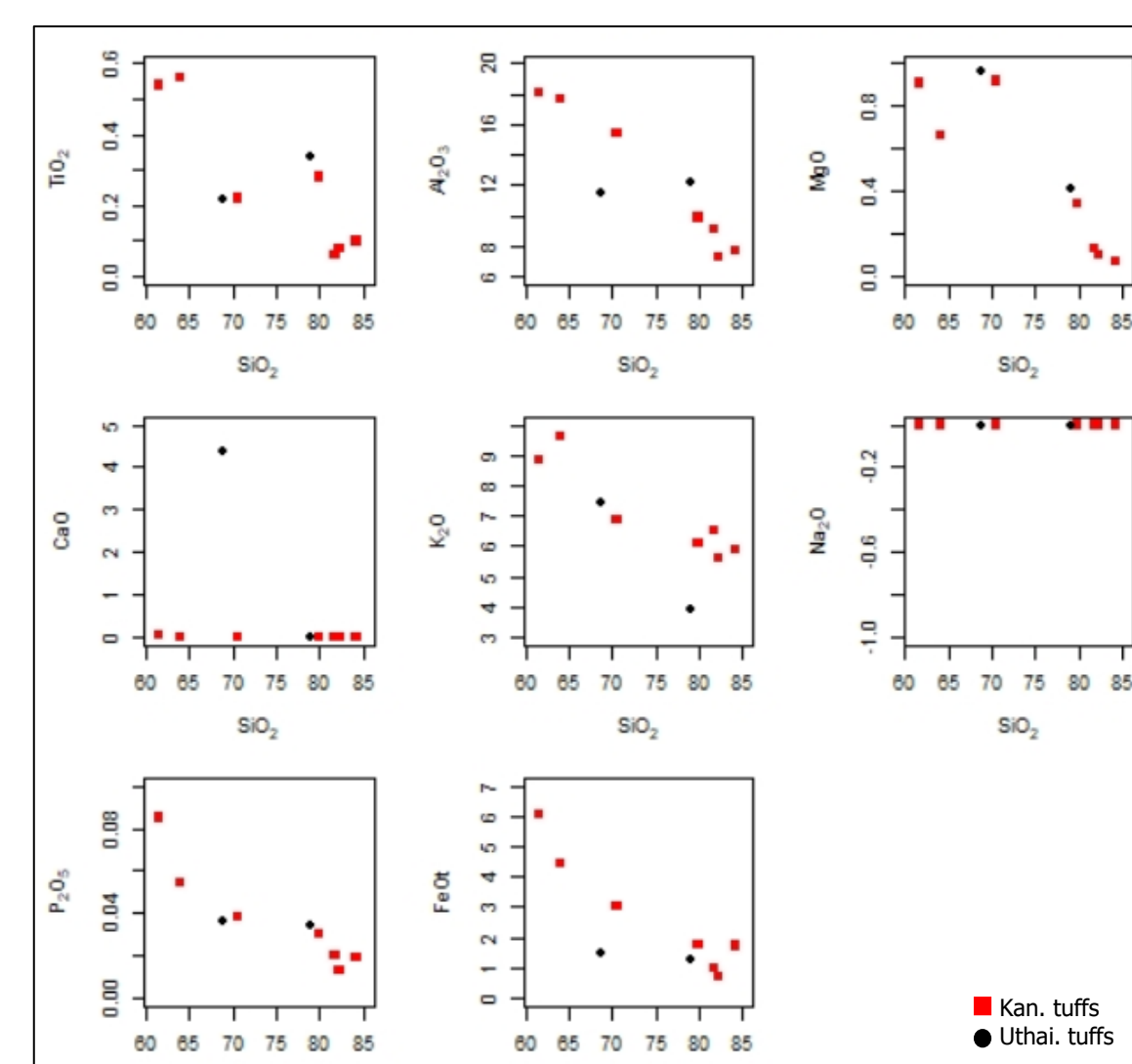
Meta-quartz-K-feldspar crystal tuff (Chk07a1)



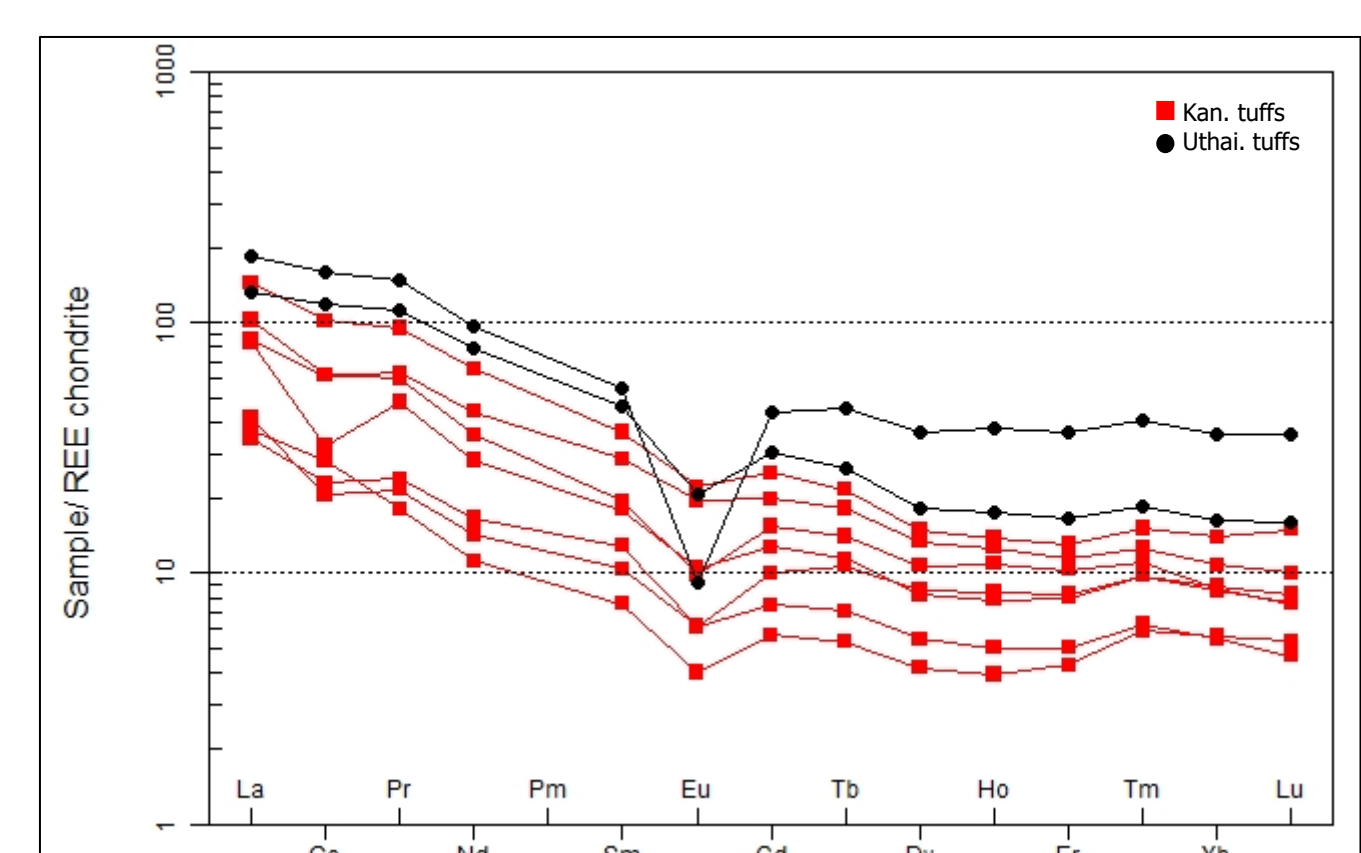
Meta-lithic tuff (Chk11a)

The pyroclastic rocks are made up of mm sized clasts in a finely grained matrix. The clasts consist of potassium feldspar (KF), mainly microcline (Mc), rounded and embayed quartz (Qtz), tourmaline (Tour), trachytic (Volc), and metasedimentary rock clasts embedded in a highly altered devitrified fine-ash matrix containing foliated sericite of low graded regional metamorphism.

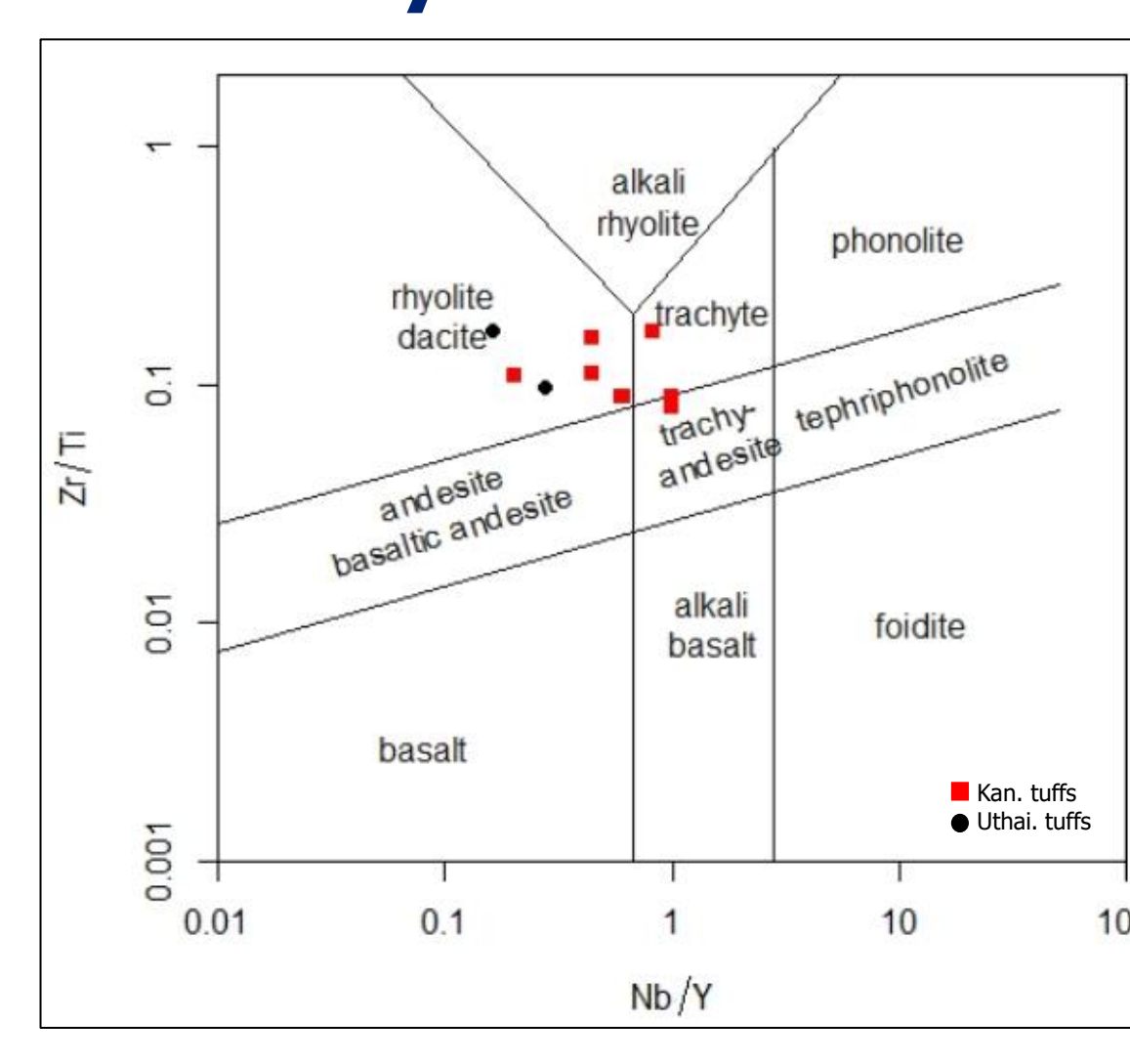
Geochemistry



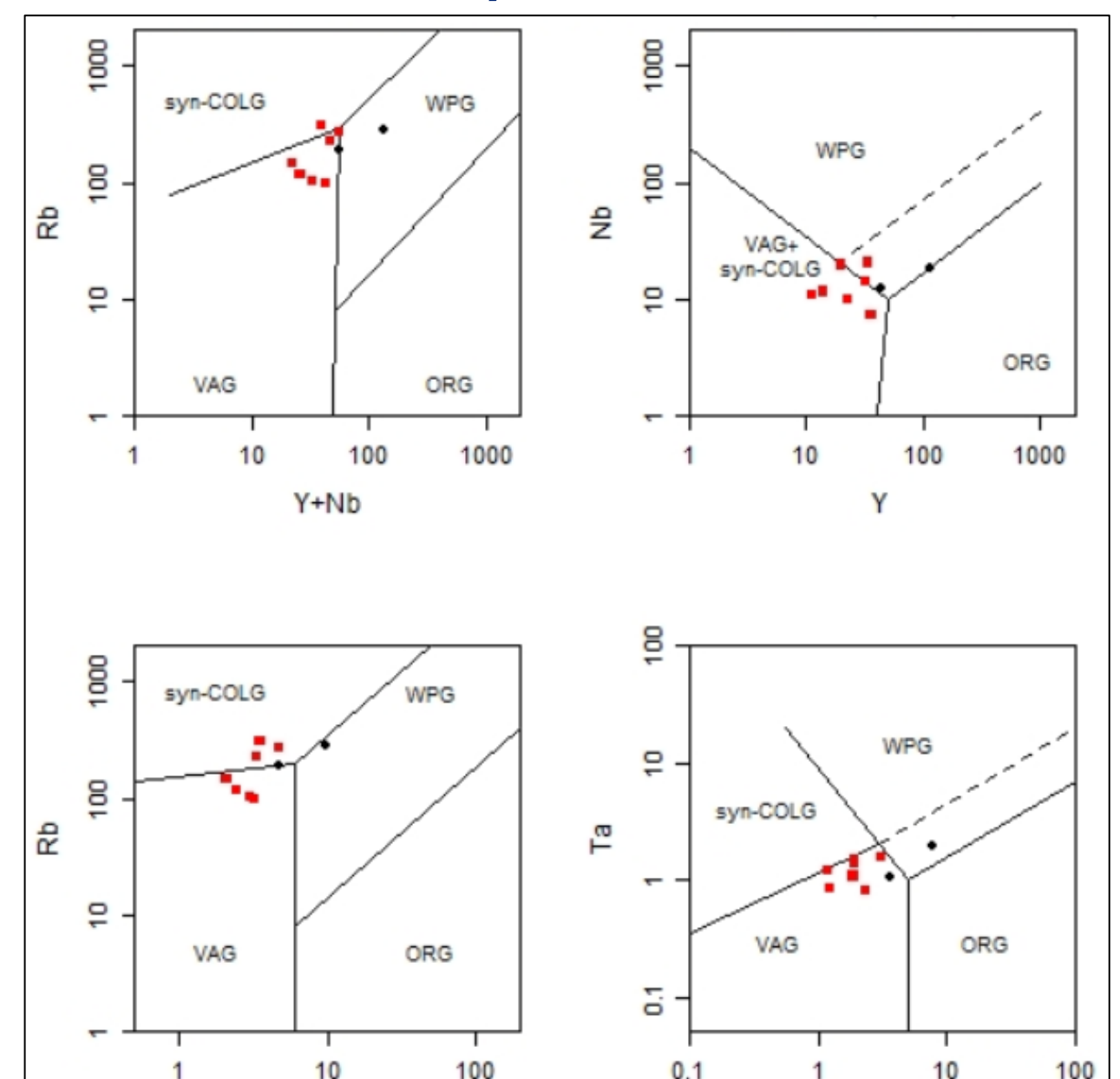
The whole-rock composition (ref. in Janoušek, 2006) shows **enrichments in SiO₂ and K₂O and a strong depletion in CaO and Na₂O** which is related to late alteration of the volcanoclastic rocks.



Their chondrite-normalized REE patterns (ref. in Janoušek, 2006) display light REE enrichment with nearly flat heavy REE and a negative Eu anomaly, typical for **calc-alkaline volcanic rocks**.

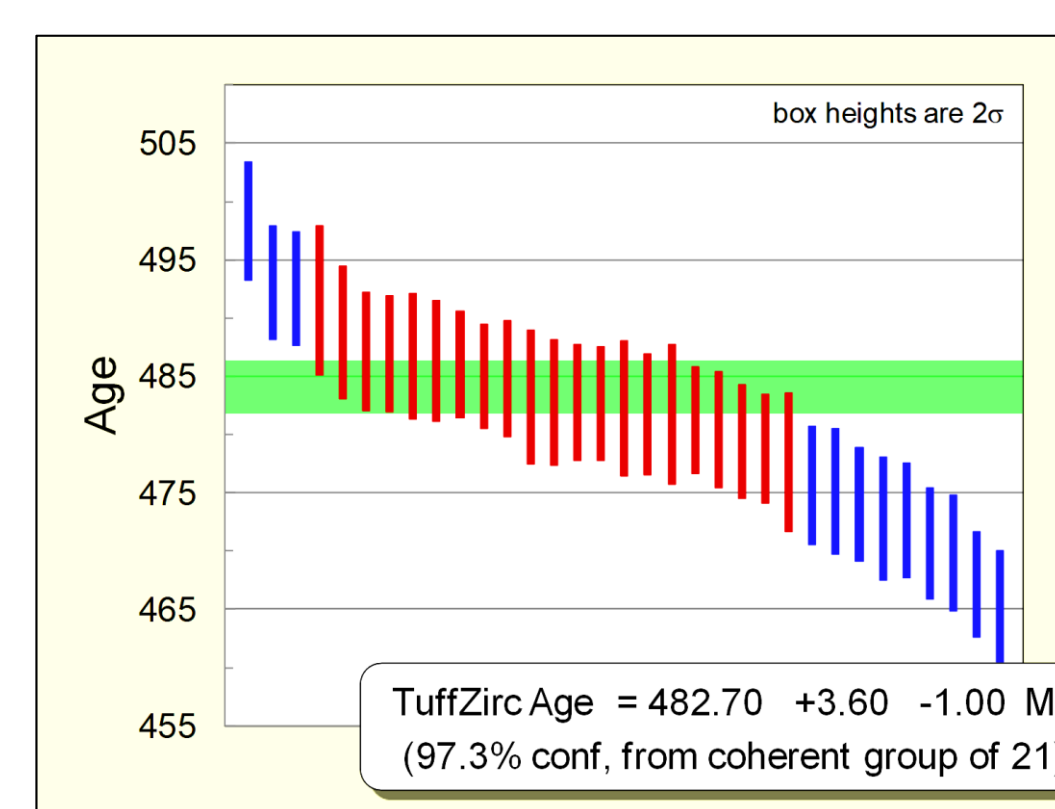
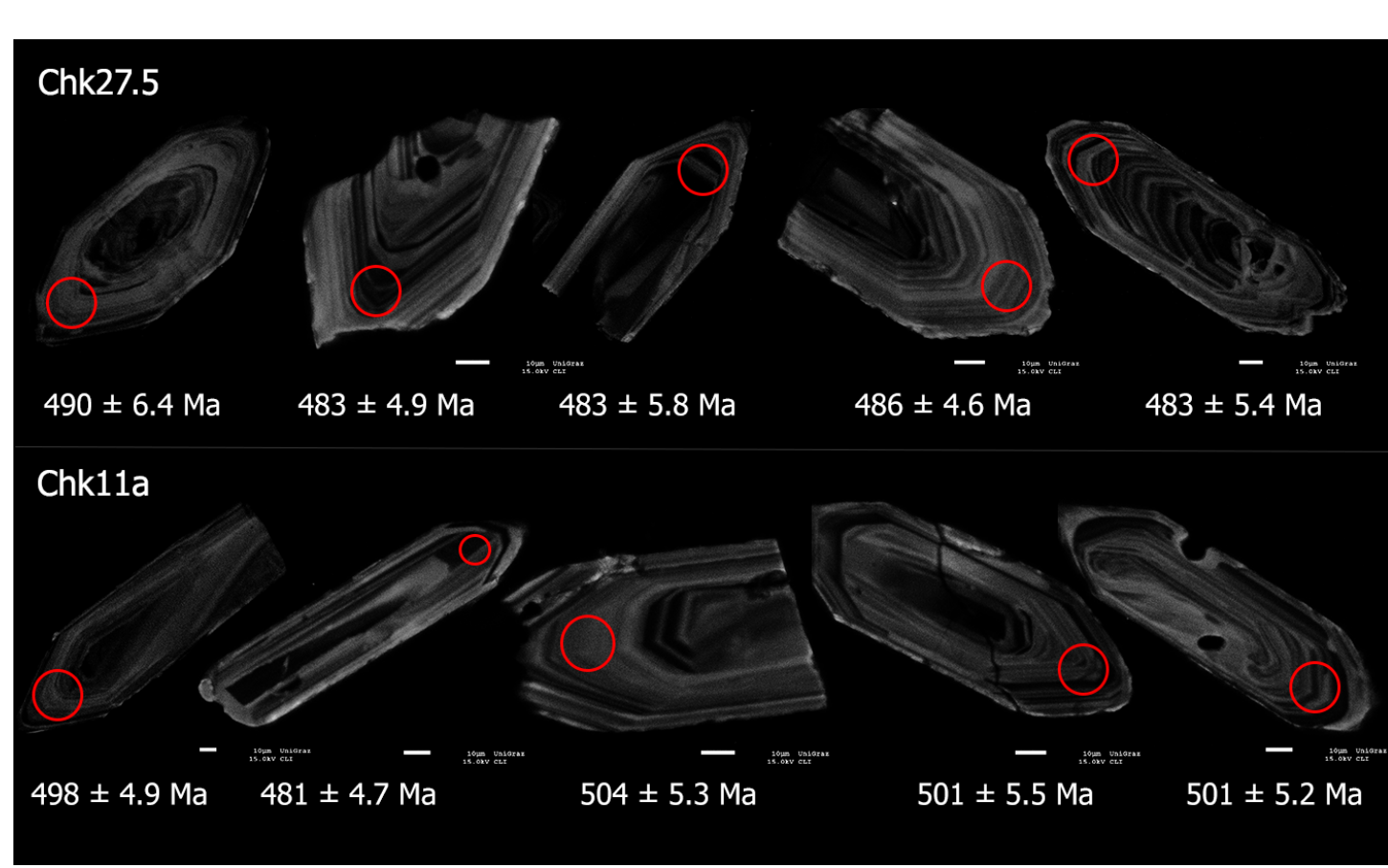


They can be classified as **trachyandesite, trachyte, dacite and rhyolite** (Pearce, 1996; ref. in Janoušek, 2006).

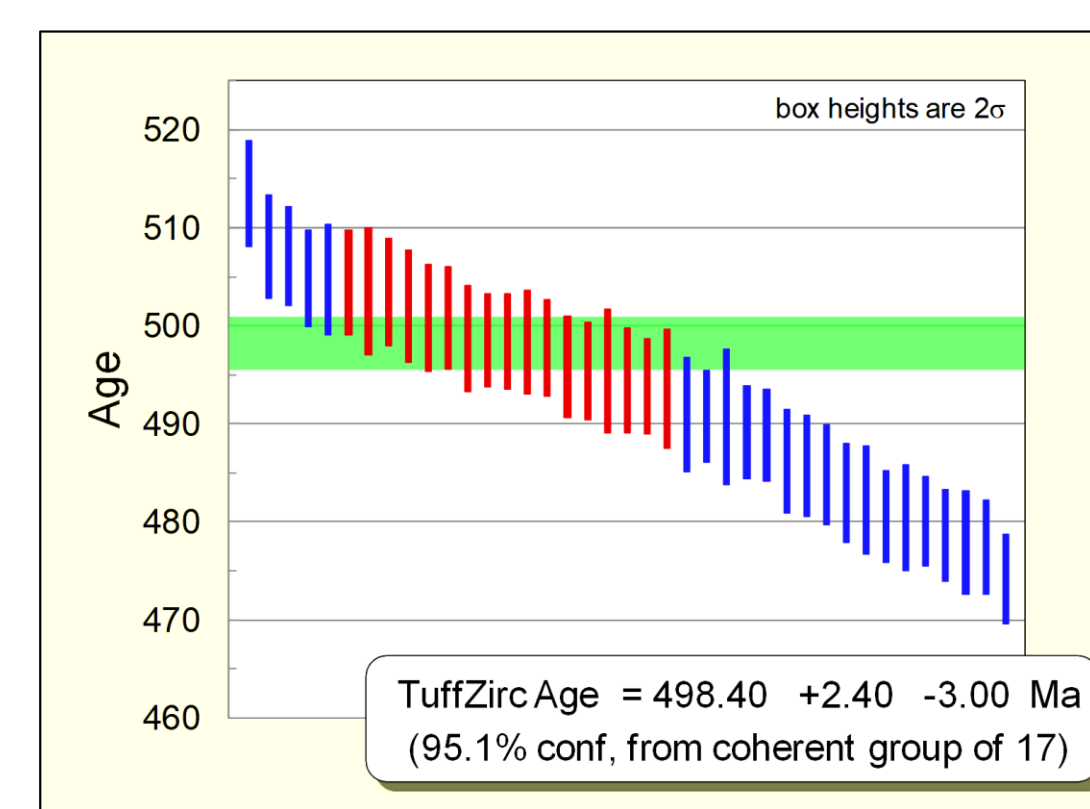


Most samples fall in the **volcanic arc granites field** in the granite discrimination diagrams (Pearce, 1984; ref. in Janoušek, 2006).

U-Pb zircon dating



Chk27.5

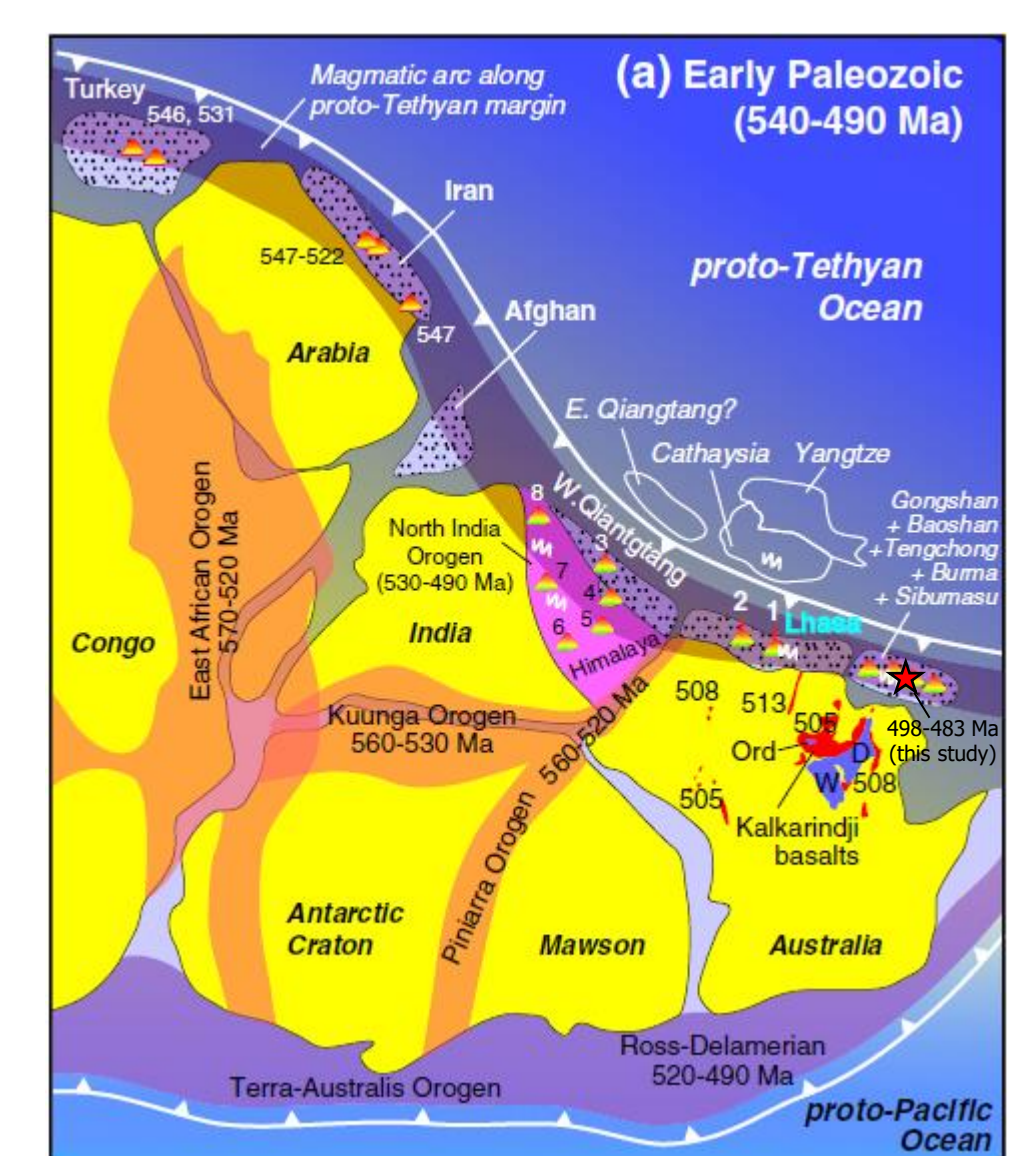


Chk11a

Zircon grains are colorless, yellow, and pink. They occur as elongate grains (100-250 μm), partly with euhedral shape. A second group of zircons, detrital zircons, display a rounded shape which were incorporated into the tuff during deposition. These CL images reveal oscillatory zoning.

The TuffZirc algorithm (Ludwig and Mundil, 2002) of ISOPLOT was applied to identify the mean age of the youngest coherent age component. Only data of zircons measured in a single age domain and unaffected by Pb loss have been included. The Chk27.5 and Chk11a lithic tuffs have a crystallization age of **482.7 ± 3.6 Ma and 498.4 ± 2.4 Ma** respectively.

Conclusion



Modified from Zhu, 2012

The tuffs from Kanchanaburi were emplaced in the Late Cambrian to Early Ordovician. They are trachyandesitic, trachytic, dacitic and rhyolitic series. The tuffs were formed in an island arc environment related to the Proto - Tethyan oceanic subduction.

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