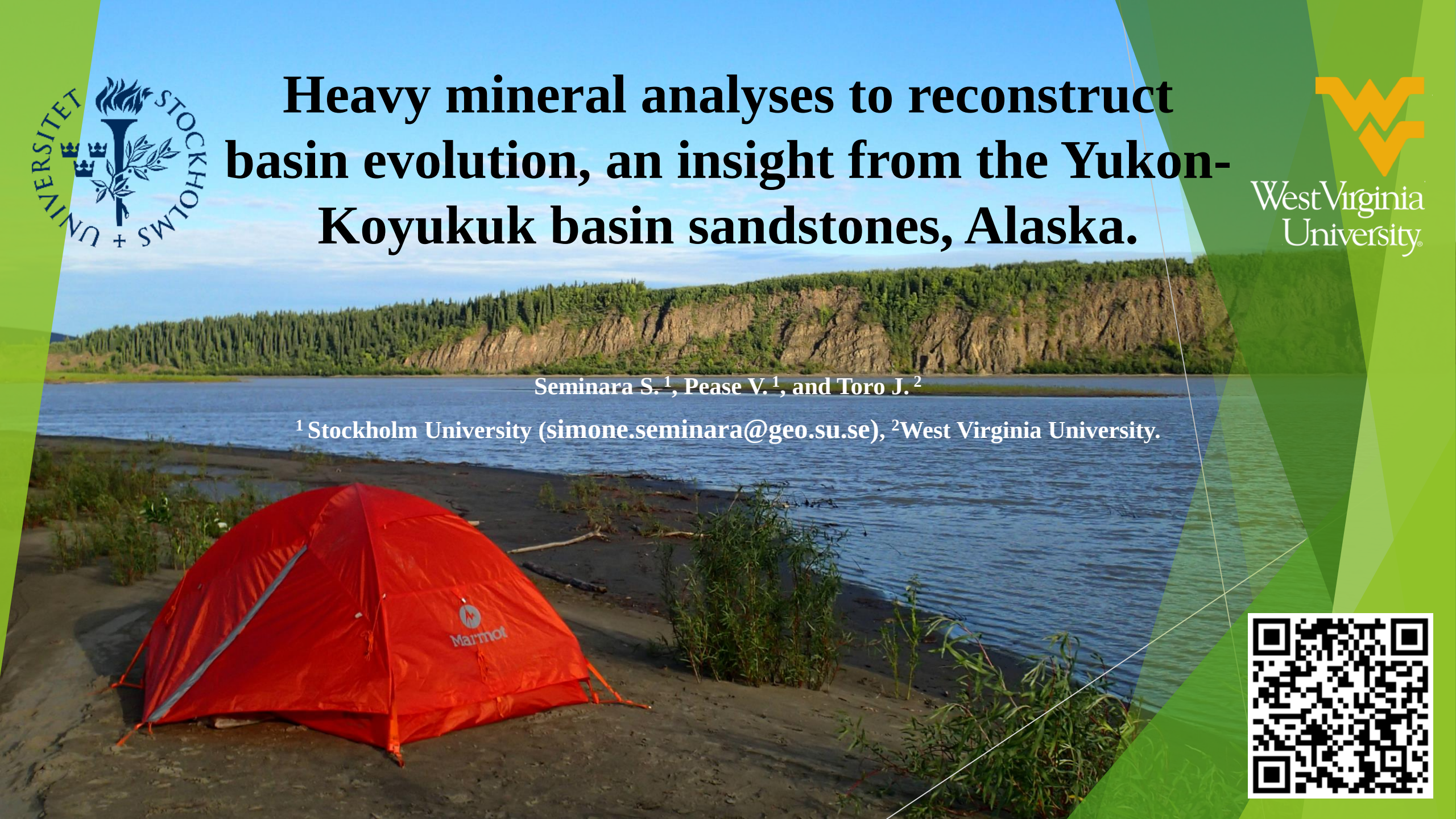
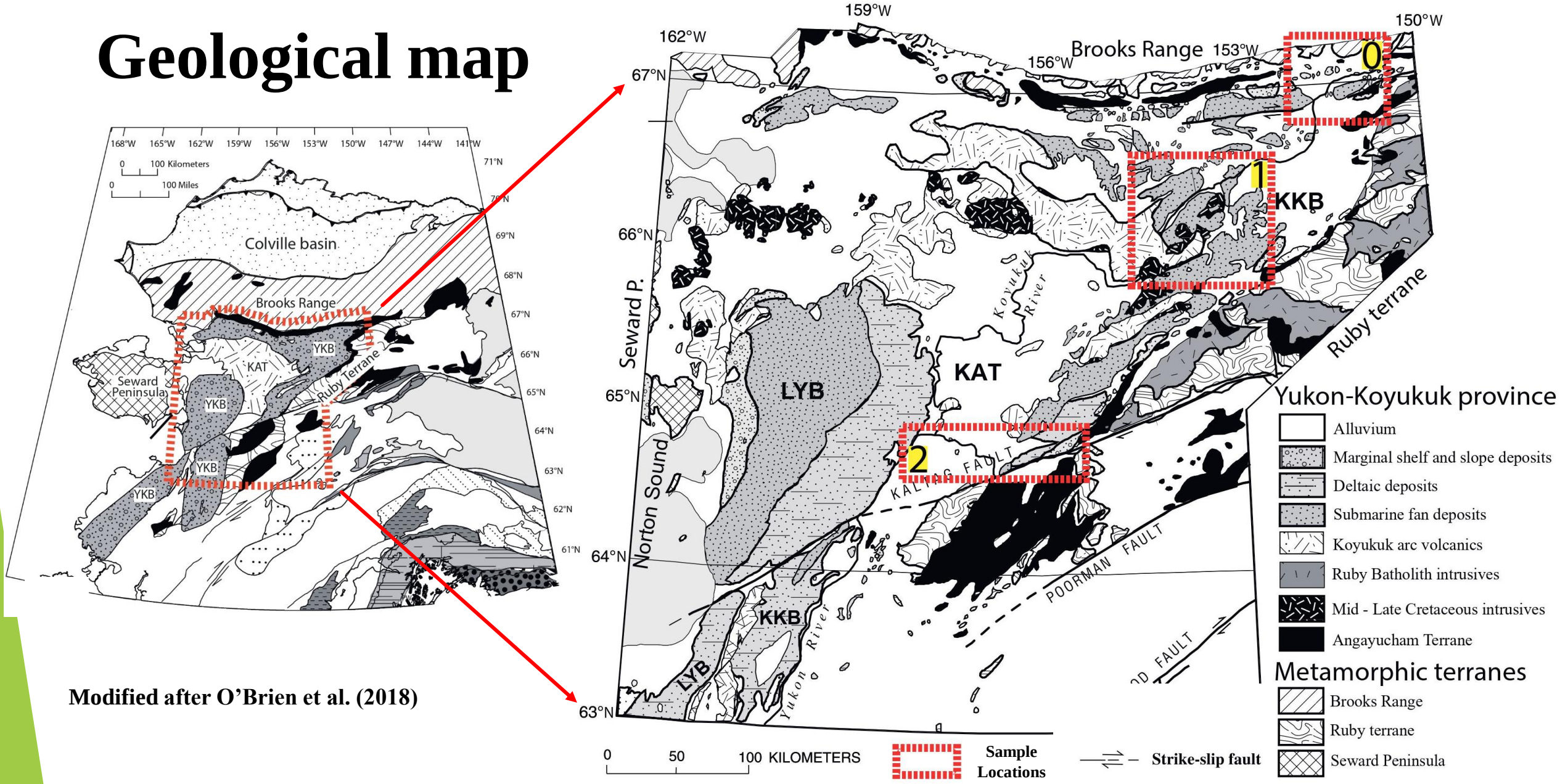
Heavy mineral analyses to reconstruct basin evolution, an insight from the Yukon-Koyukuk basin sandstones, Alaska.



Seminara S. [1], Pease V. [1], and Toro J. [2]

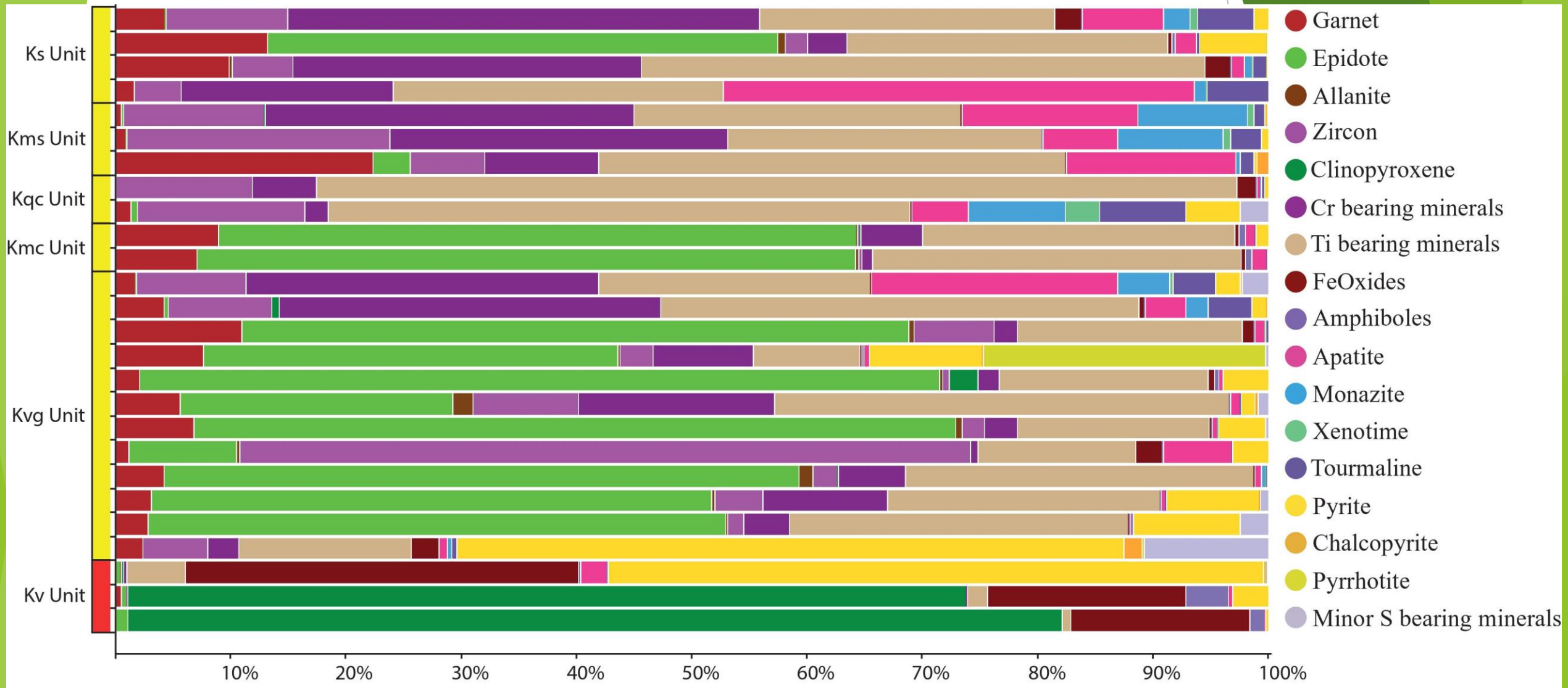
[1] Stockholm University (simone.seminara@geo.su.se), [2]West Virginia University.

Geological map



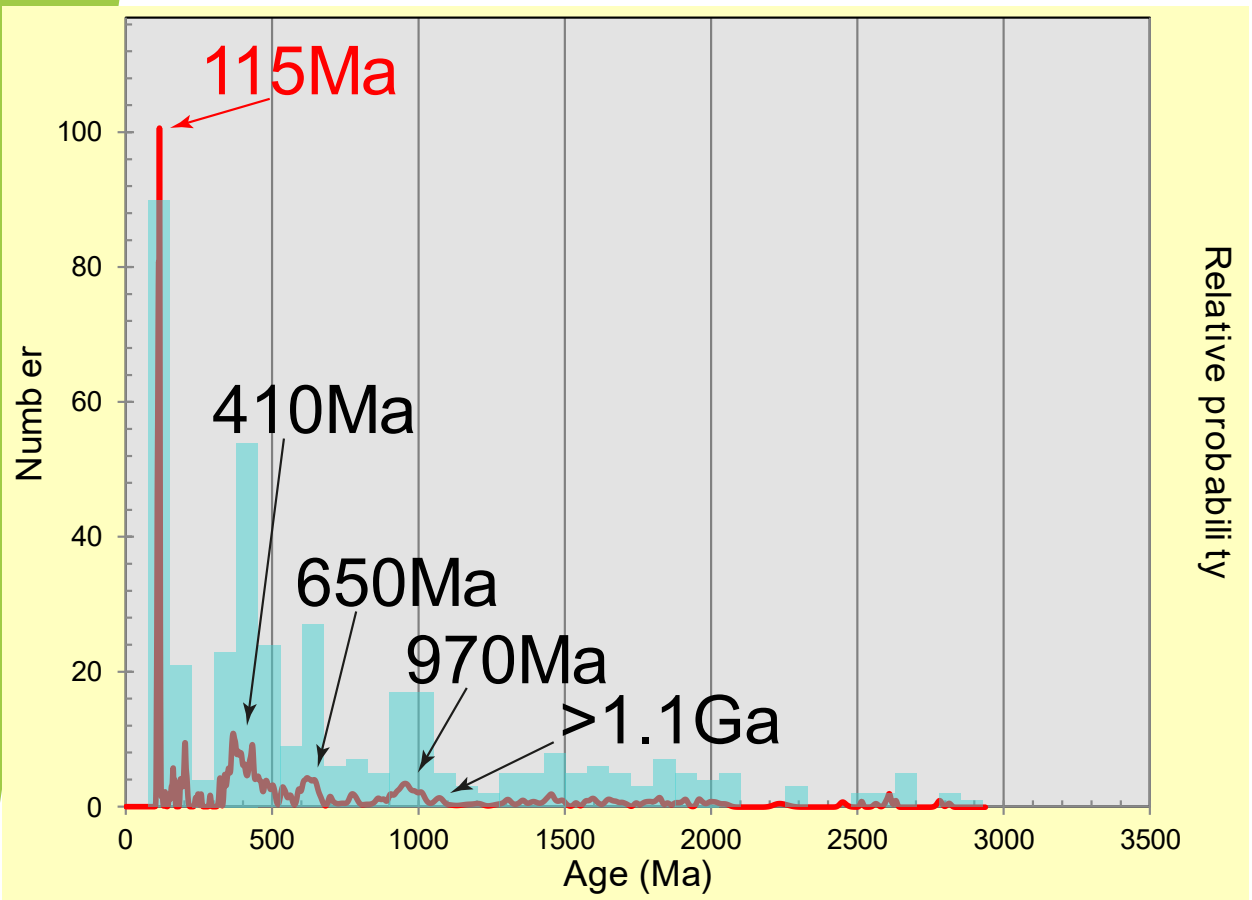
Modified after O'Brien et al. (2018)

Heavy mineral data

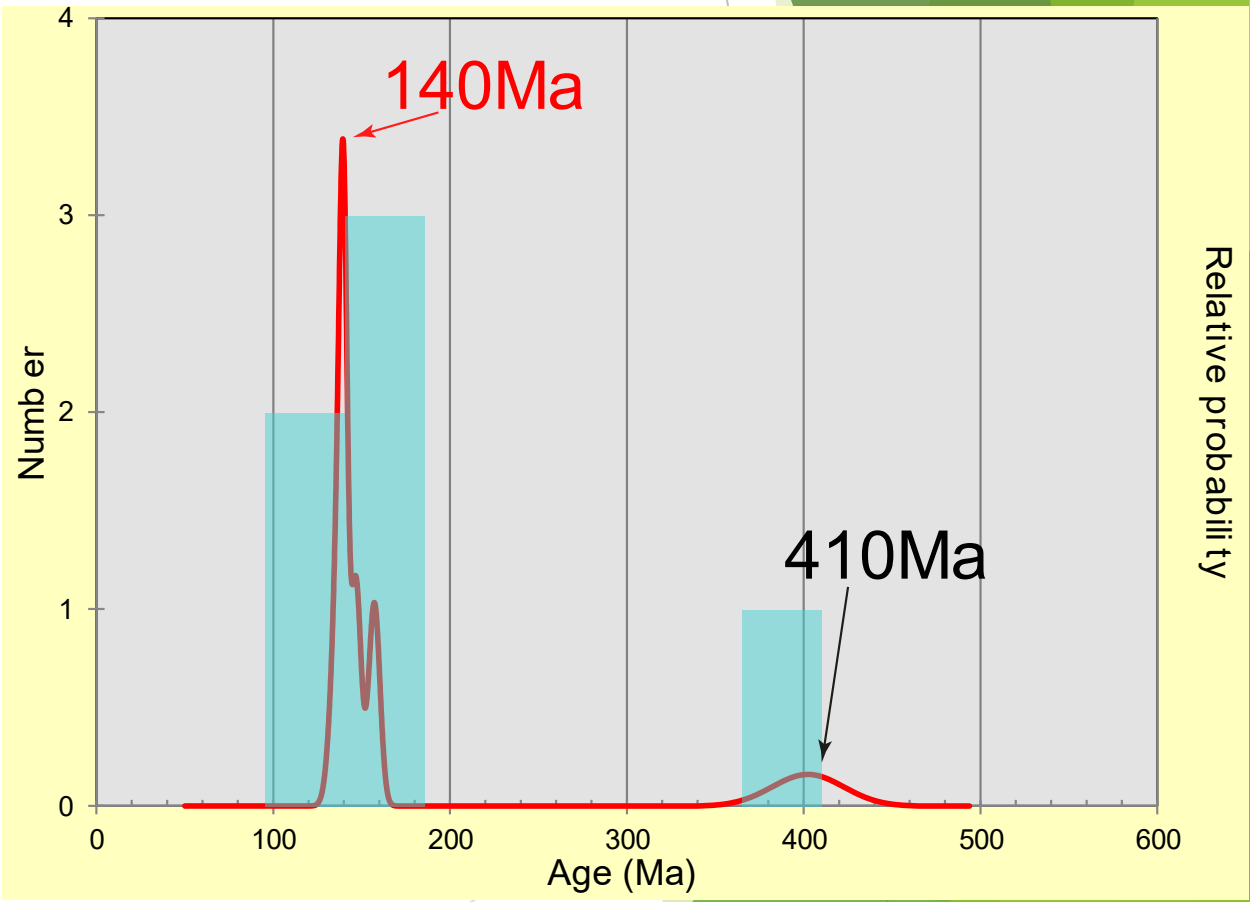


Maximum Age of Deposition (MAD)

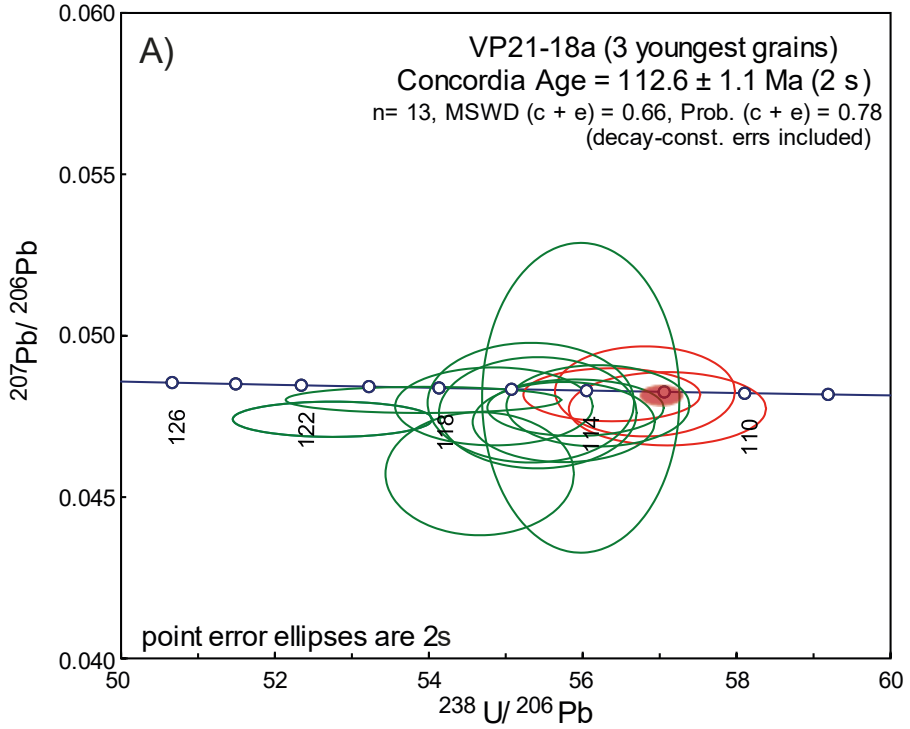
Kvg unit

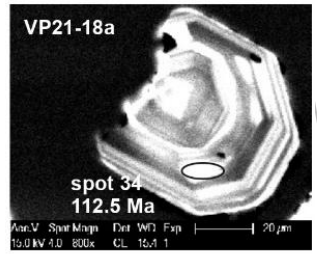


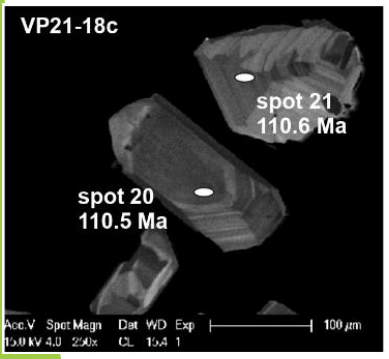
Kv unit

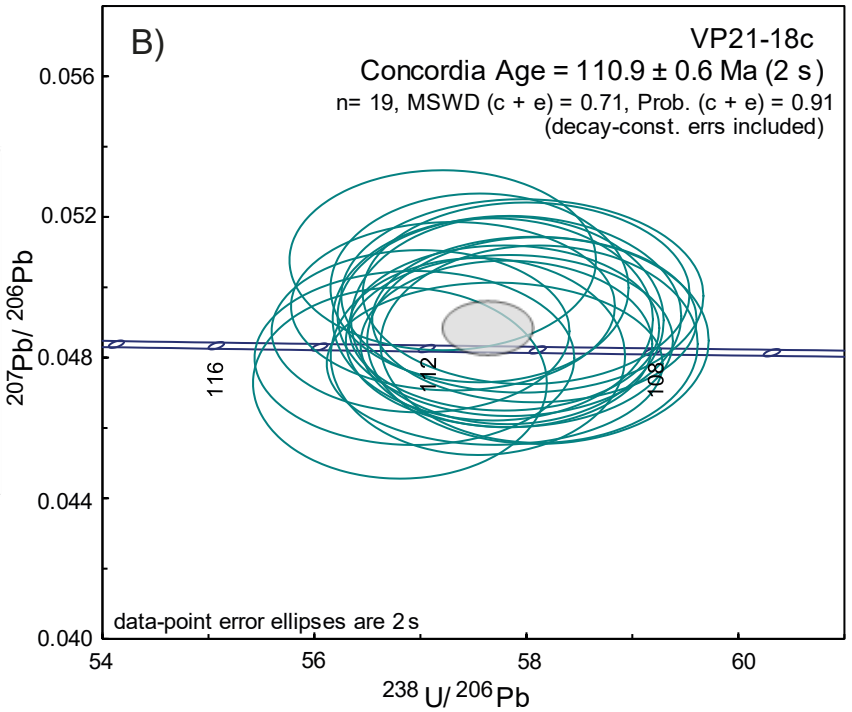


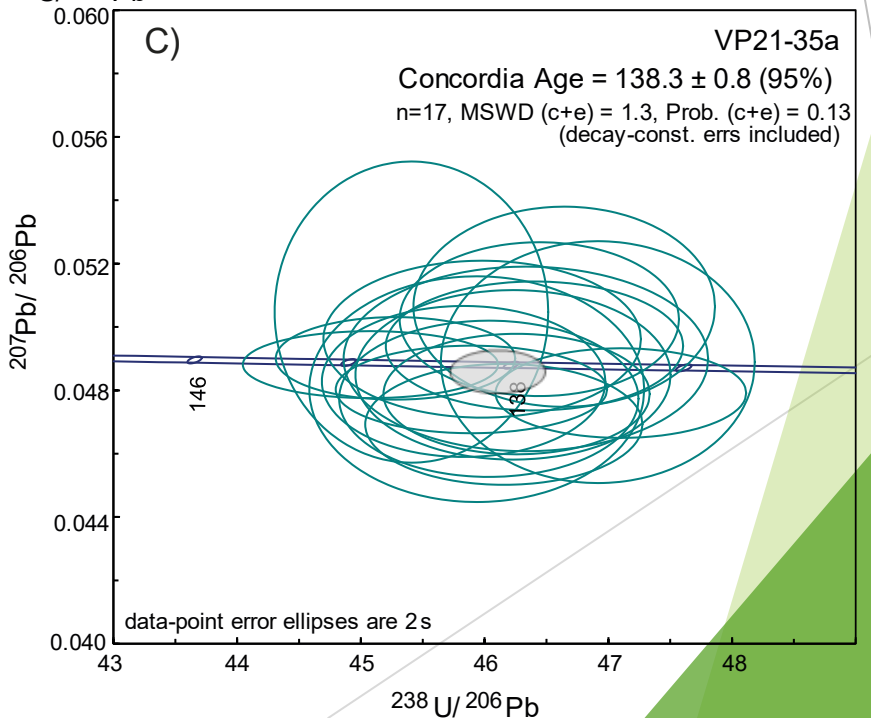
Absolute U-Pb ages

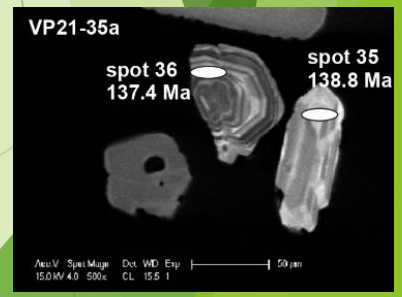










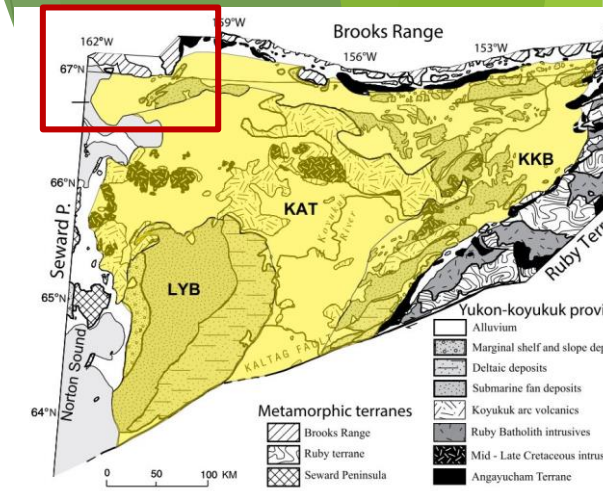


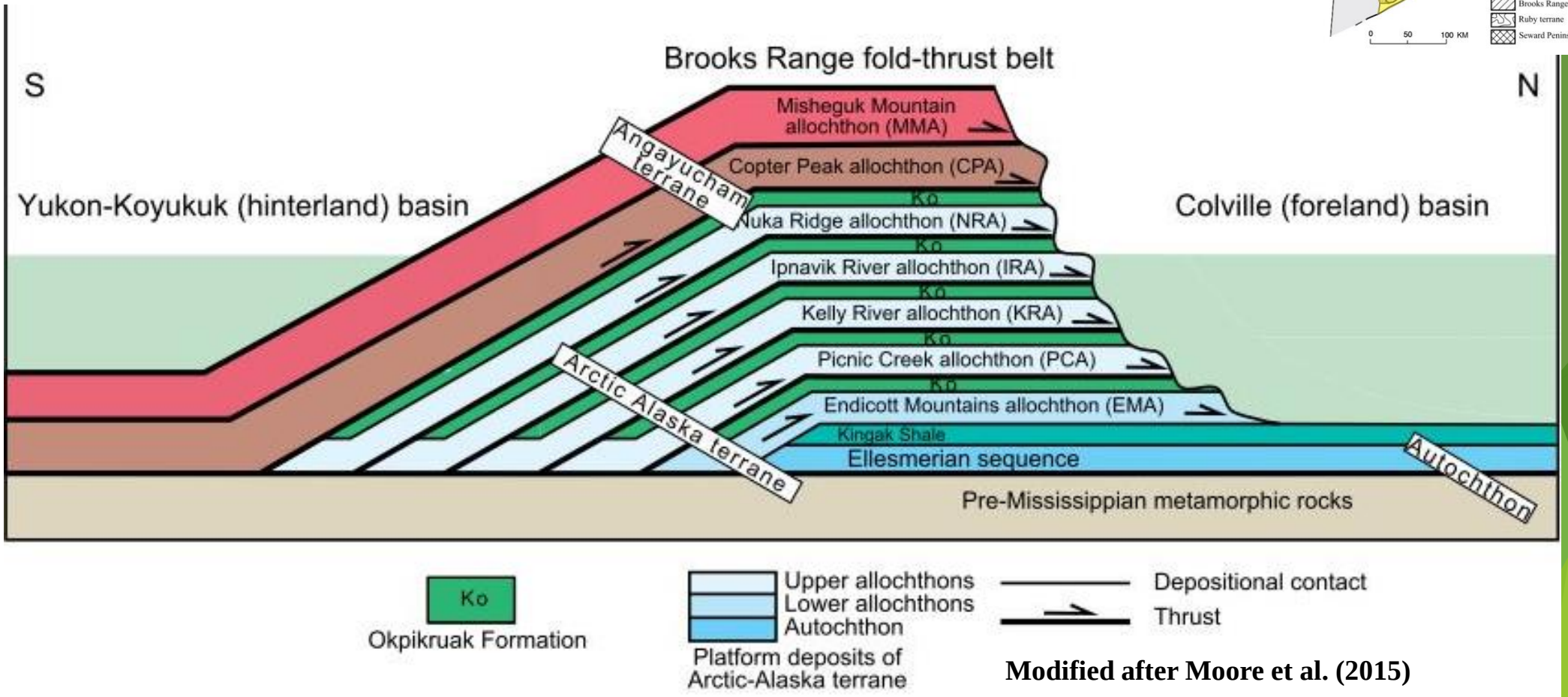
Conclusions

- **Heavy mineral assemblages document a shift in basin input from a southern volcanic-rich source to a northern metamorphic source.**
- **MAD and absolute U-Pb ages are concordant at c. 115 Ma and c. 140 Ma for Kvg and Kv deposition, respectively.**
- **Ongoing sedimentation at 140 Ma implies that the YKB formed at least 10 Ma prior to the active extension between 130 Ma and 90 Ma inferred by the second model, suggesting the forearc model is most likely.**

Supplementary slides

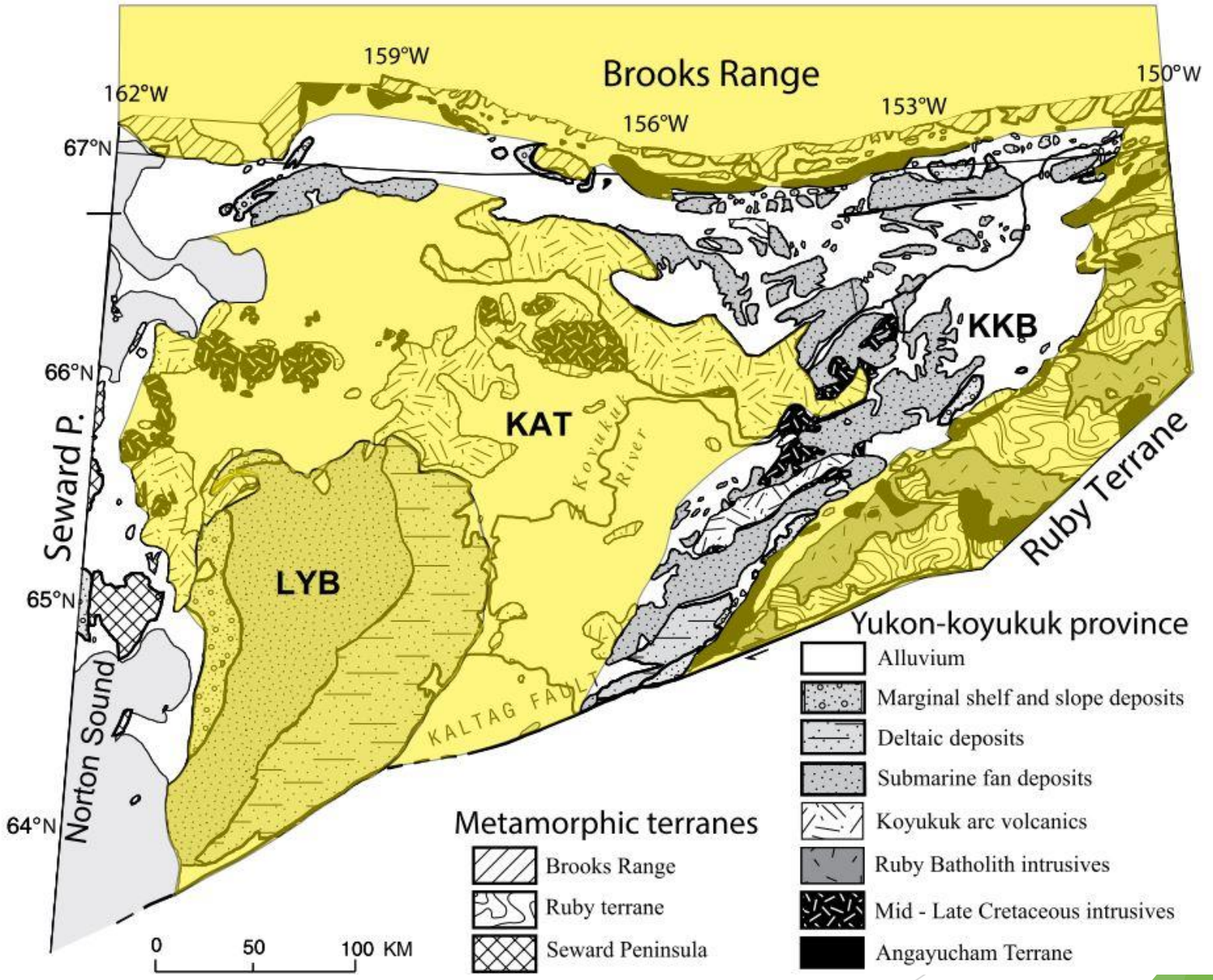
Western Brooks Range



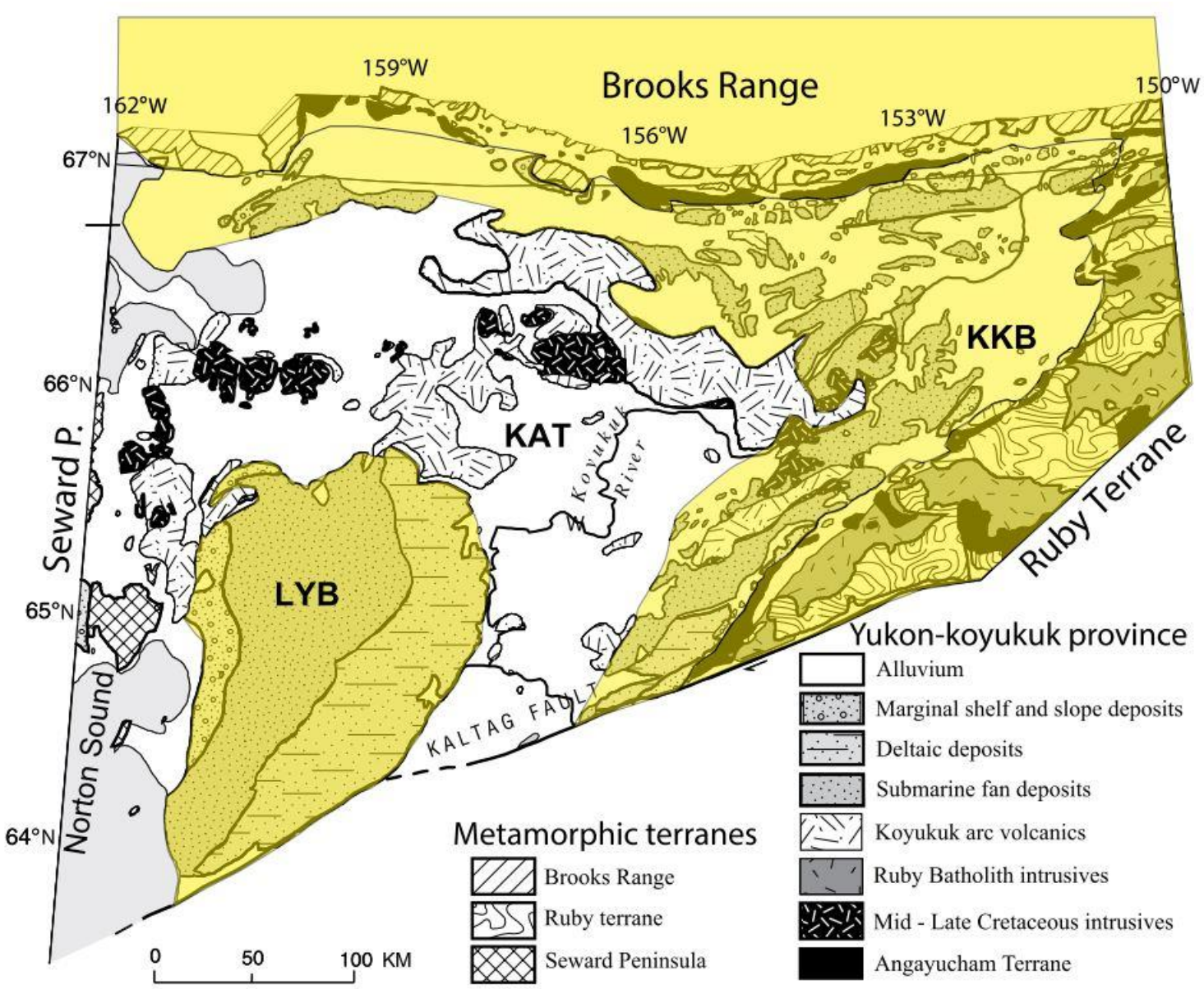


Modified after Moore et al. (2015)

Kobuk-Koyukuk Basin (KKB)



Koyukuk Arc Terrane (KAT)



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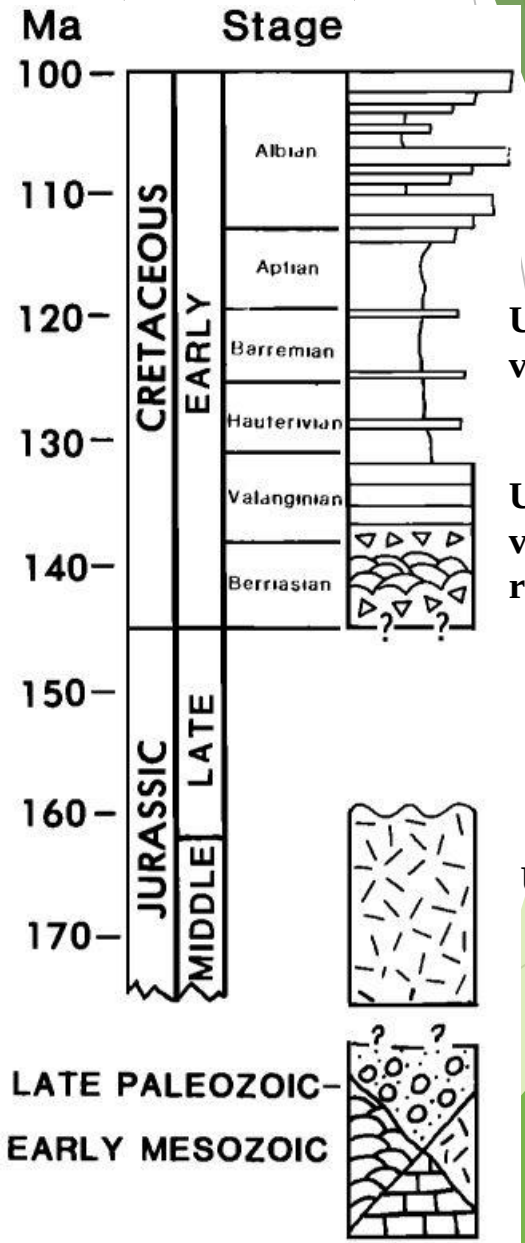


Modified after Box and Patton (1989)

Overlap assemblages (Kvg unit and above)

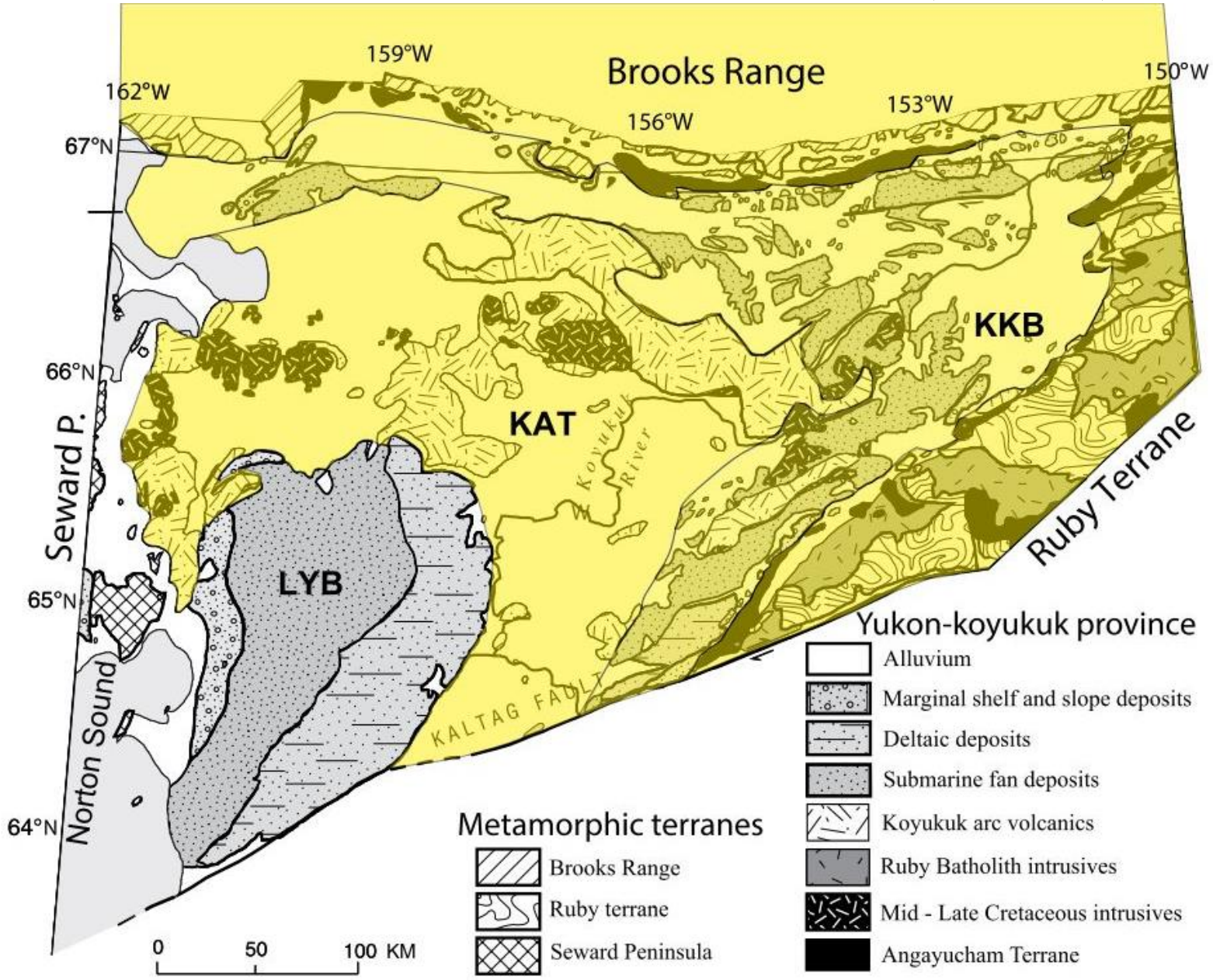
Unit 4 (volcanic and volcaniclastic rocks)

Unit 3 (volcanic and volcaniclastic rocks+lava flows)

Unit 2 (intermediate to felsic plutonic rocks)

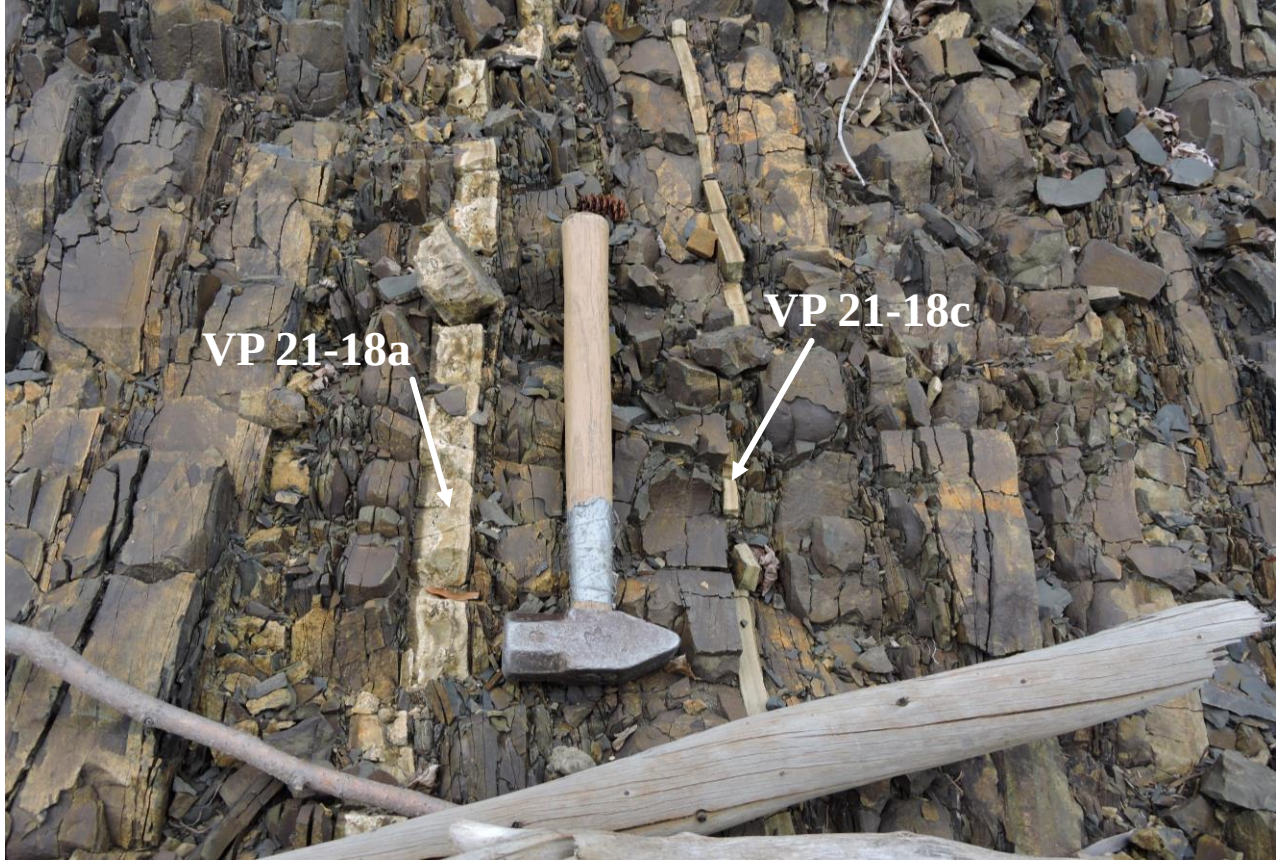
Unit 1 (pillow basalts)

Lower-Yukon Basin (LYB)



Kv unit

basaltic and andesitic lava flows interbedded with volcanogenic conglomerate to mudstone rocks. K-Ar ages vary from 134 Ma and 118 Ma with a U-Pb age obtained from a tuffaceous layer of about 138 Ma.



Kvg unit

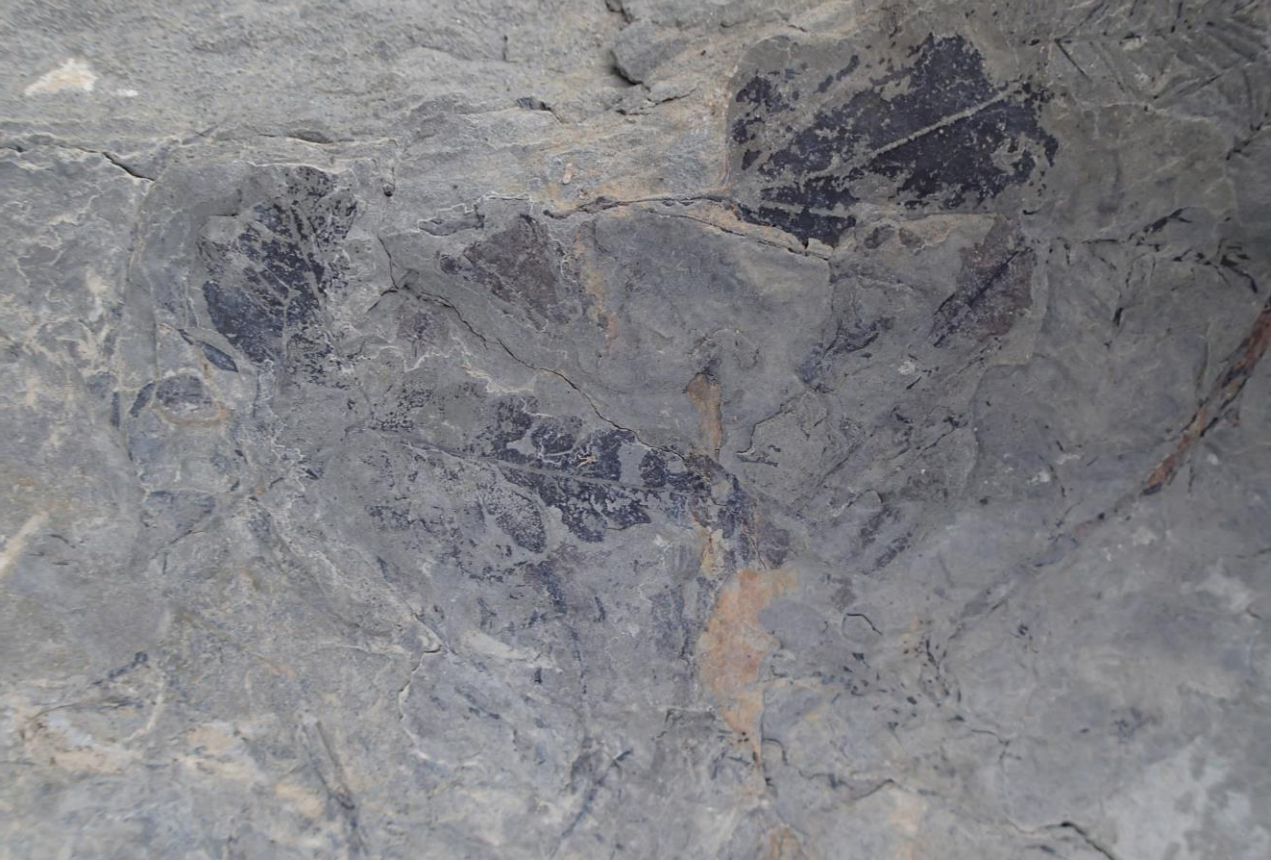
volcaniclastic greywacke and mudstone interbedded with tuffaceous layers which give U-Pb ages comprised between 112 Ma and 110 Ma (Albian). Molluscs of the same time have been reported throughout the entire unit.

Kmc and Kqc units

The former consists of conglomerate with mafic igneous clasts and mafic and calcareous greywacke and mudstone. Marine molluscs of Cretaceous age have been found. The latter is a quartz rich unit composed of conglomerate, sandstone and mudstone. Plant fossils date the unit to the Cretaceous.

Kms unit

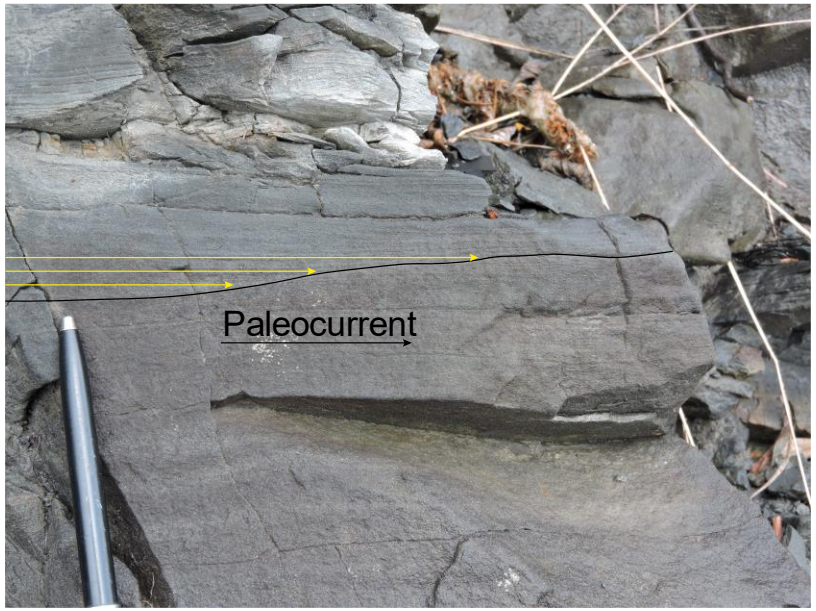
fine to coarse sandstone interbedded with shaly layers. Interpreted to be the marine tongue of the Ks deposits.

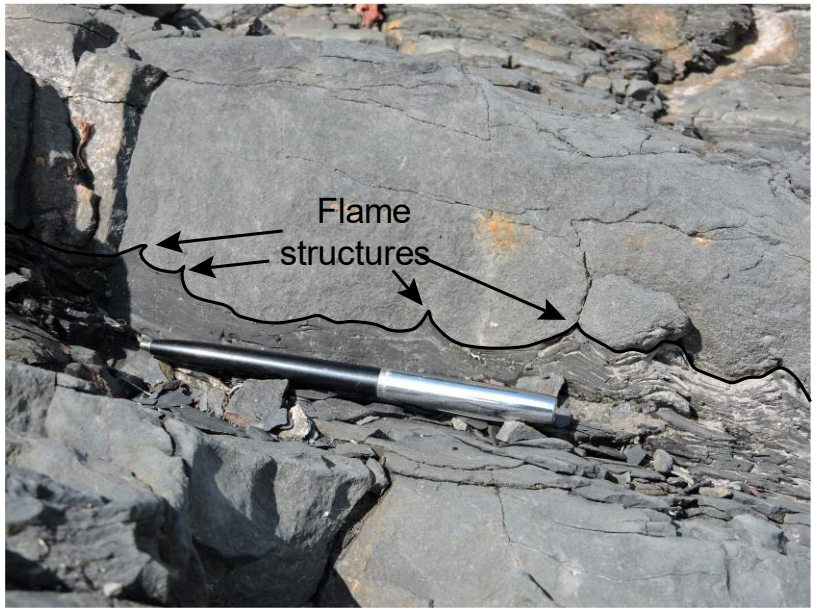


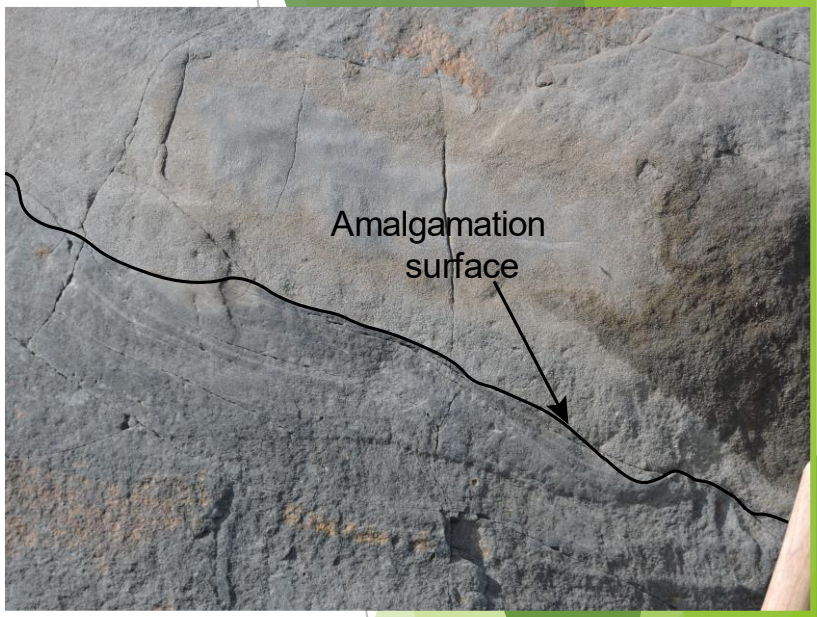
Ks unit

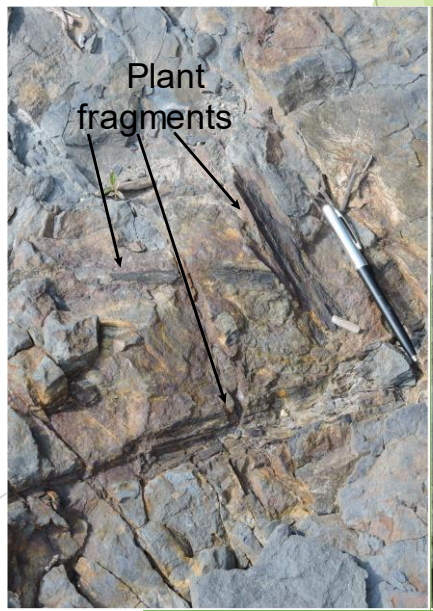
late Cretaceous in age, this unit consists of alternations of sandstone and shale layers deposited in fluvial to shallow marine environments.

Sediment characterization

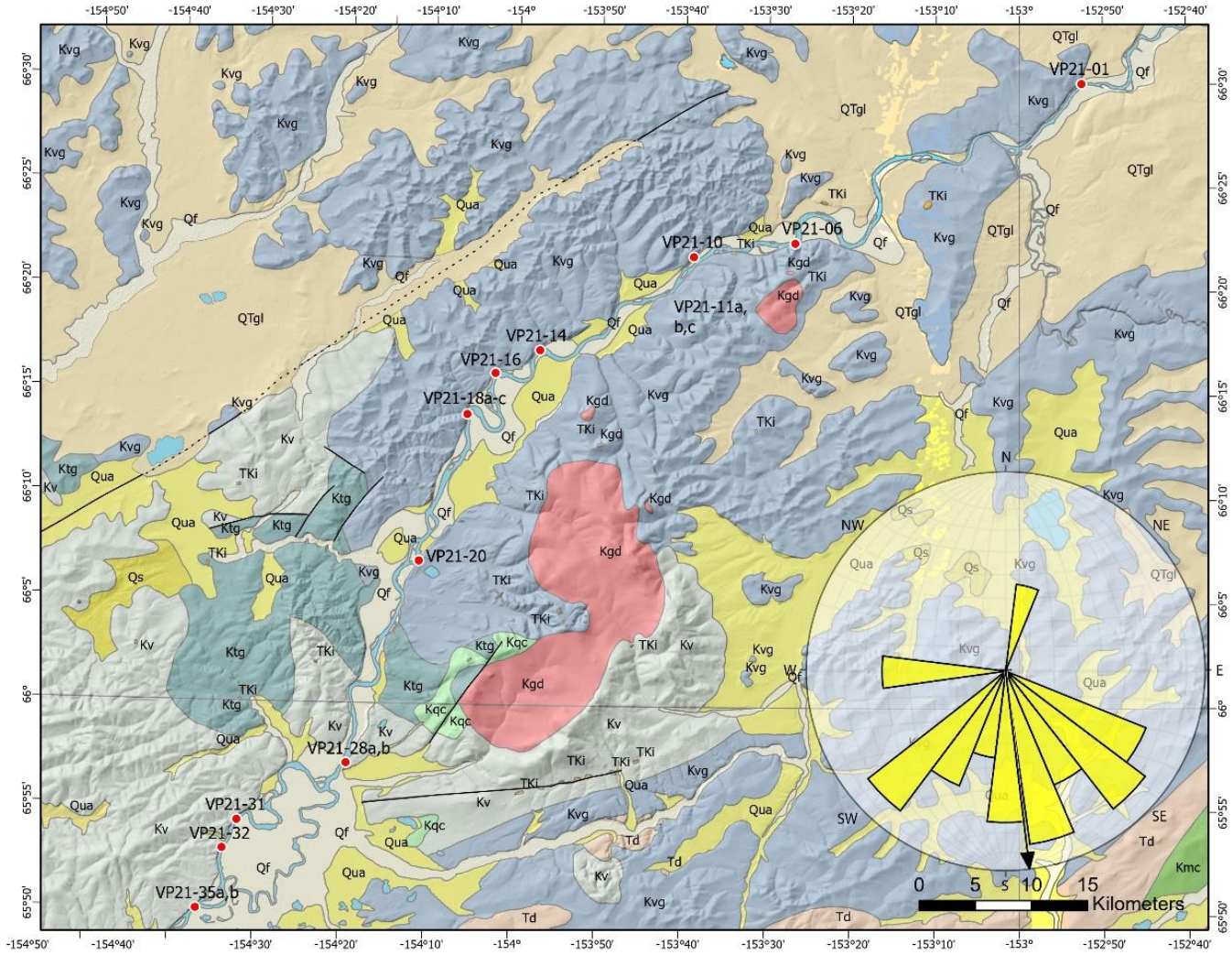








Sampling area 1



Samples→ Coordinates ↓	VP 21-01	VP 21-06	VP 21-10	VP 21-14	VP 21-16	VP 21-18a-c	VP 21-20	VP 21-28b	VP 21-31	VP 21-32	VP 21-35
N Lat	66.49982798	66.37141798	66.35994198	66.28390596	66.26519303	66.23421603	66.114013	65.95139796	65.90405496	65.86863102	65.83283502
W Long	-152.87789	-153.449305	-153.651297	-153.955297	-154.043027	-154.097095	-154.188866	-154.325052	-154.536436	-154.569956	-154.613362

Sedimentary Units

- Ktg — Volcanic graywacke, and mudstone (Early Cretaceous)
- Kvg — Volcanic-clast graywacke and mudstone (Cretaceous)
- Kmc — Mafic igneous-clast conglomerate, sandstone, and mudstone (Cretaceous)
- Kqc — Quartz- and metagraywacke-clast conglomerate, sandstone, and shale (Cretaceous)

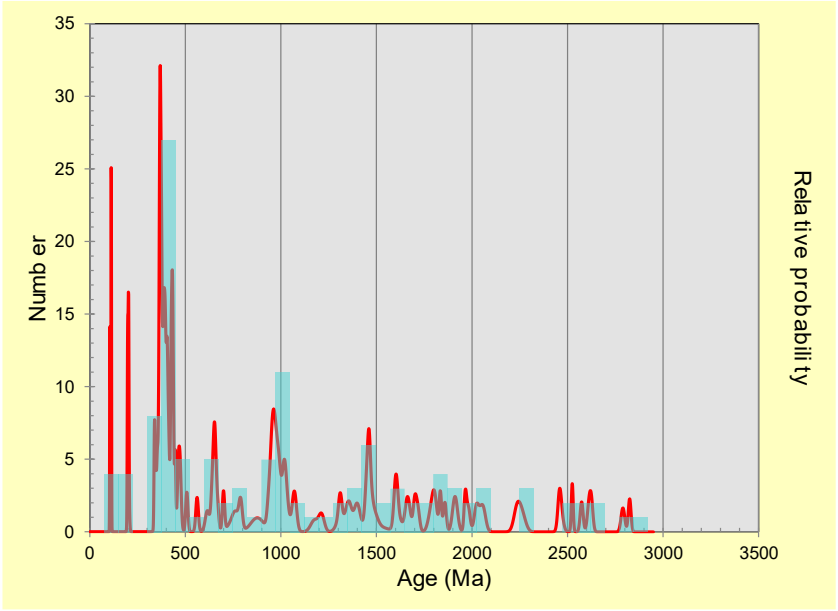
Volcanic Units

- Kv — Andesite and basalt lava flows and volcaniclastic rocks (Early Cretaceous)
- Kgd — Granodiorite and granite (Late Cretaceous)
- TKi — Shallow intrusive rocks of silicic and intermediate composition (Late Cretaceous and Cenozoic)
- Td — Dacite and rhyolite lava flows, domes, and volcaniclastic rocks (Paleocene and Eocene)

Surficial deposits

- QTgl — Glacial and glaciolacustrine deposits (Pliocene? and Pleistocene)
- Qs — Eolian and water-laid sand and silt sheets and stabilized dune fields (Pleistocene and Holocene)
- Qua — Alluvial, colluvial, glacial, and windblown terrace and slope deposits, undivided (Pleistocene and Holocene)
- Qf — Floodplain and tidal flat deposits (Holocene)

VP 21-01



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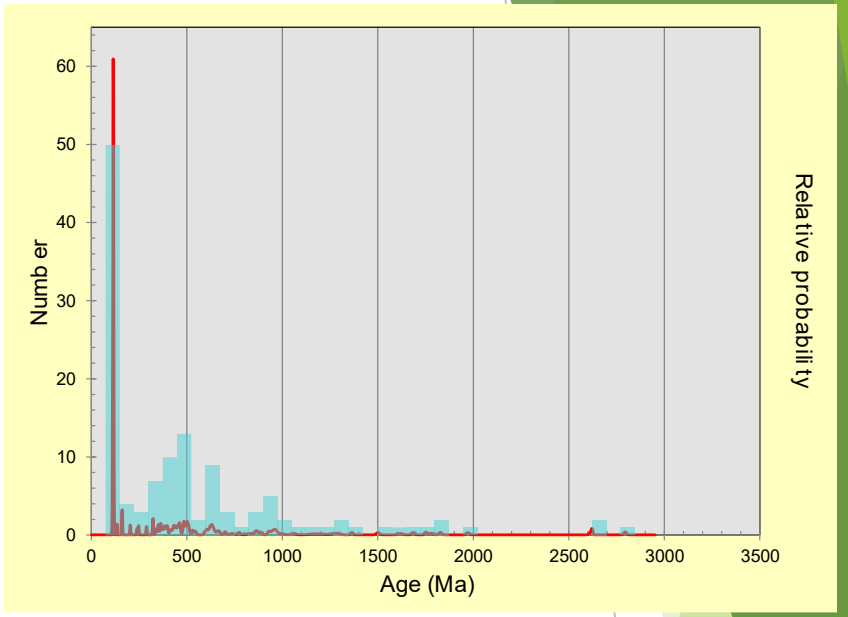
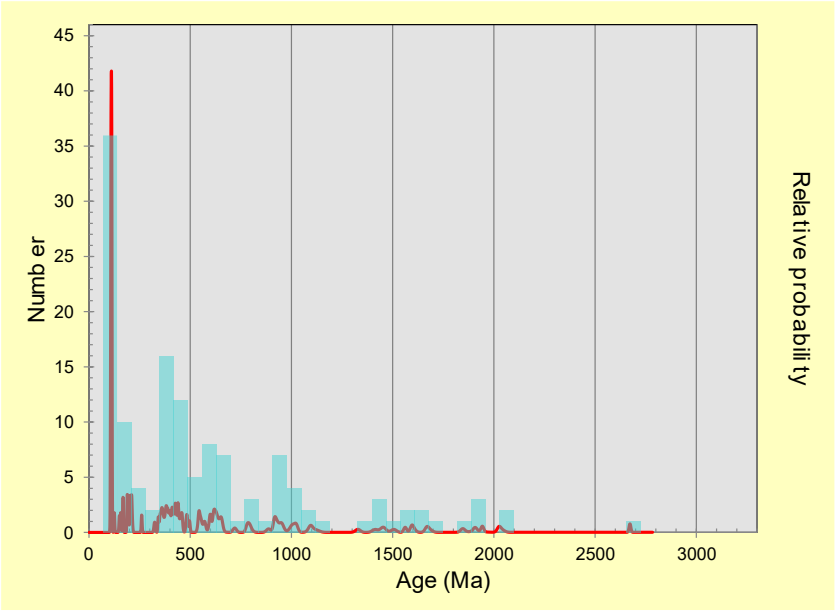
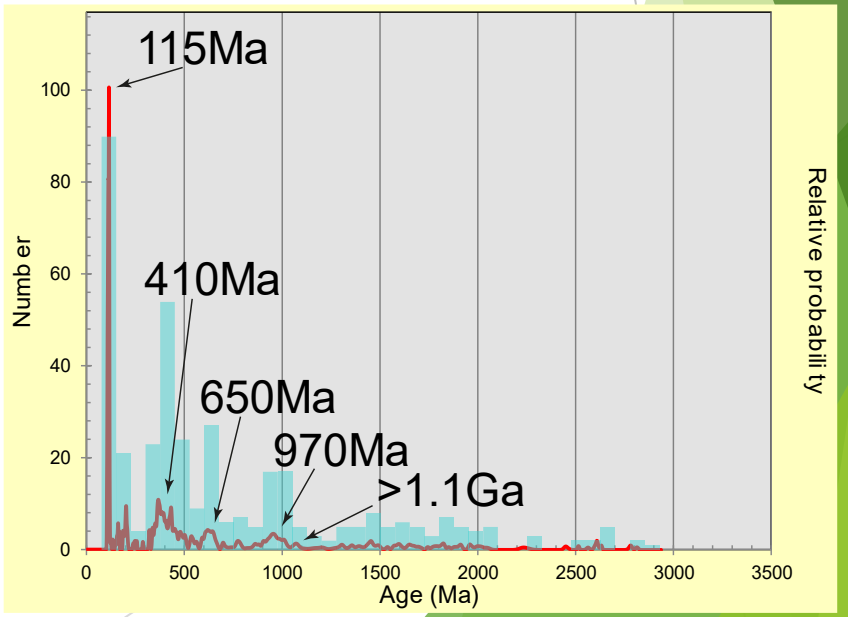


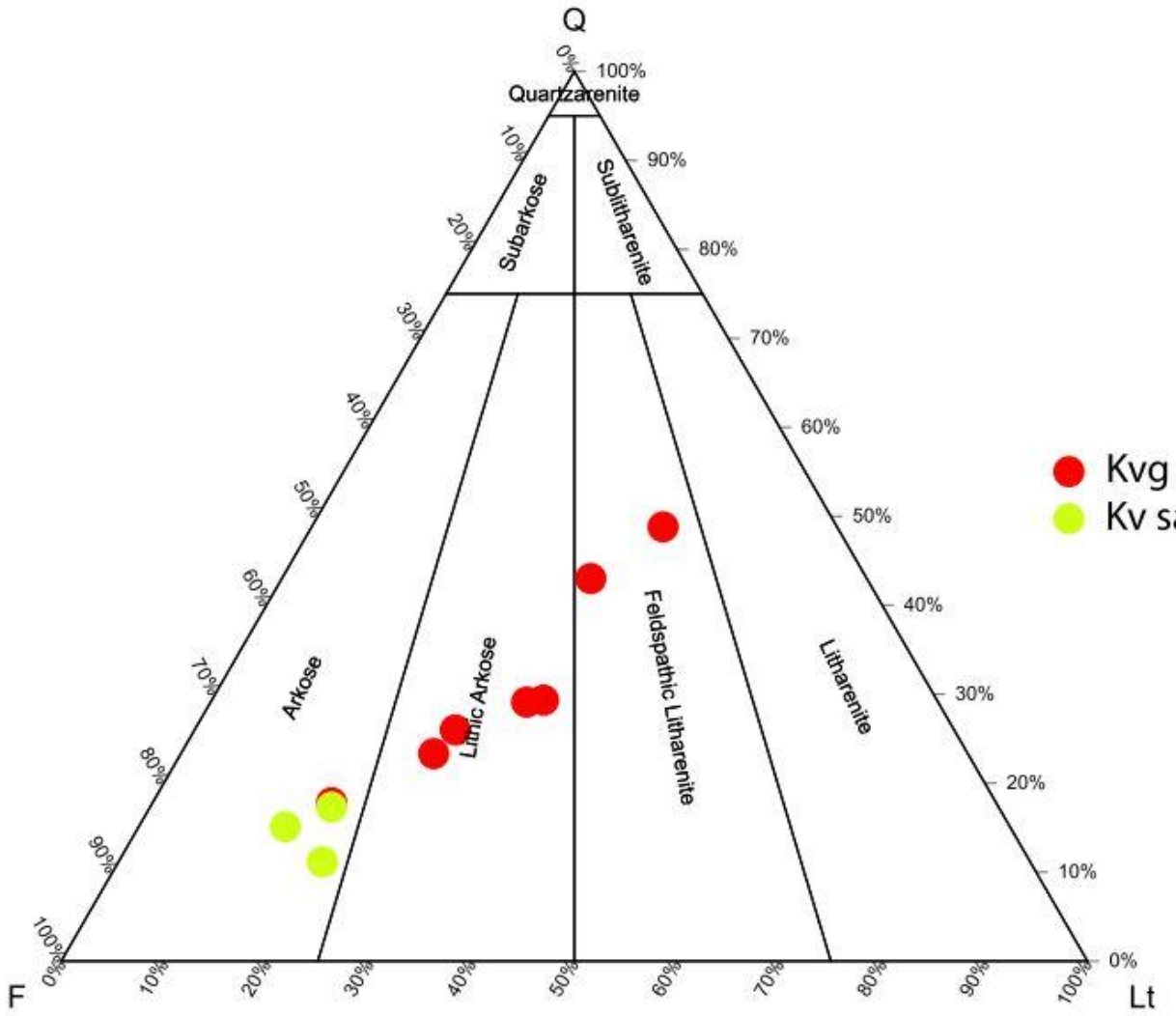
VP 21-14



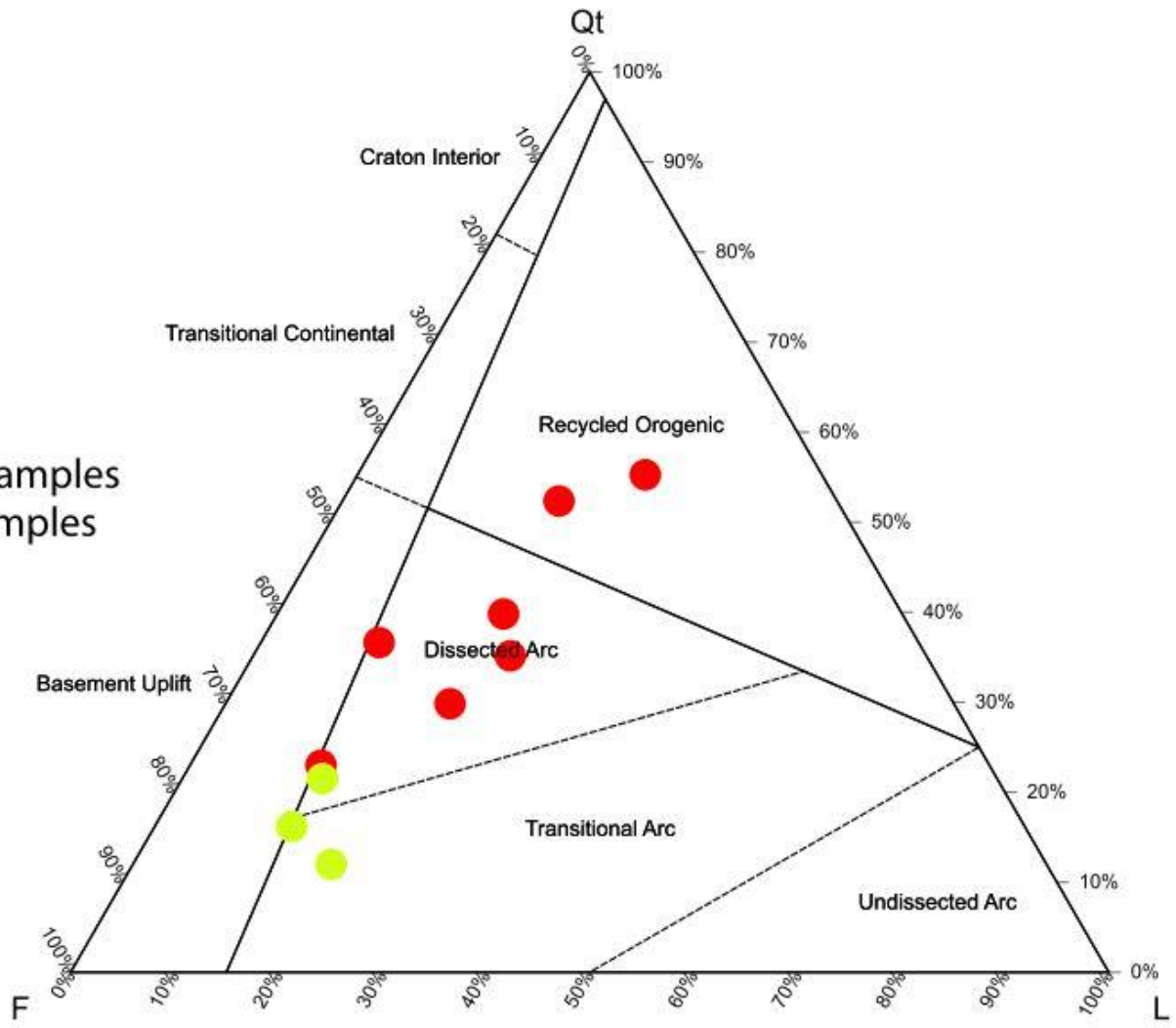
Kvg DZ summary



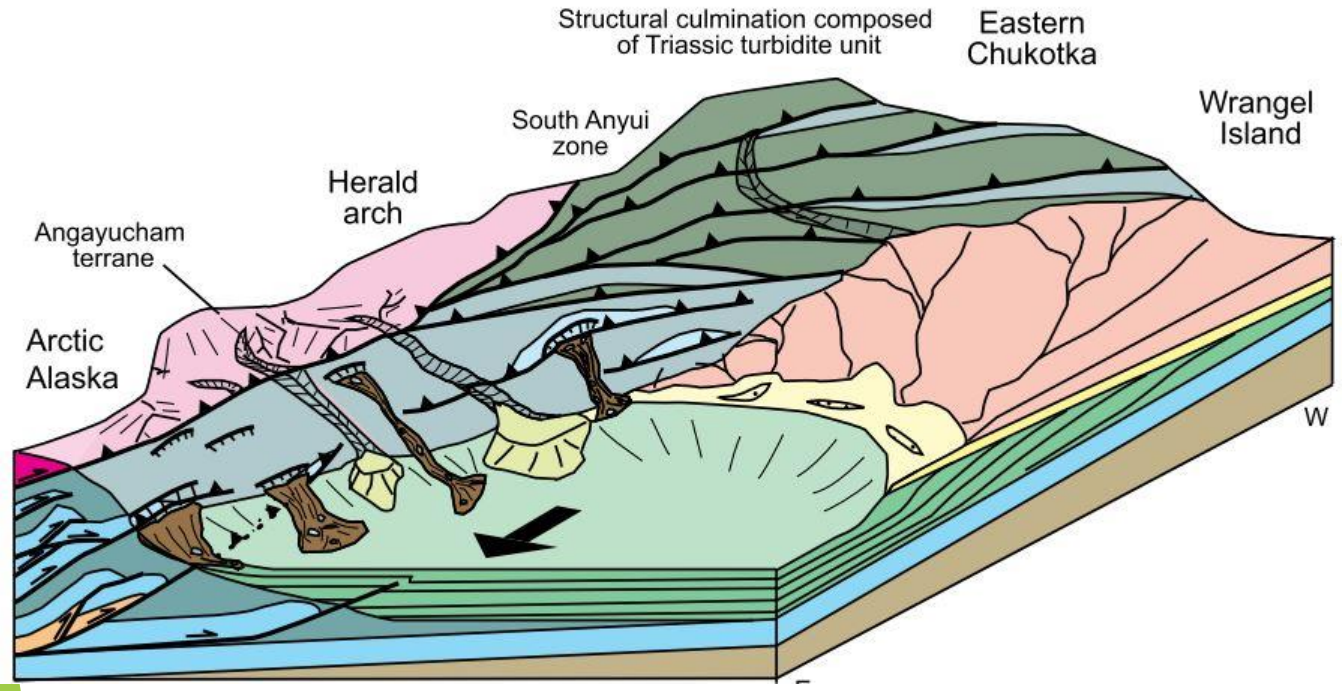
Point counting data



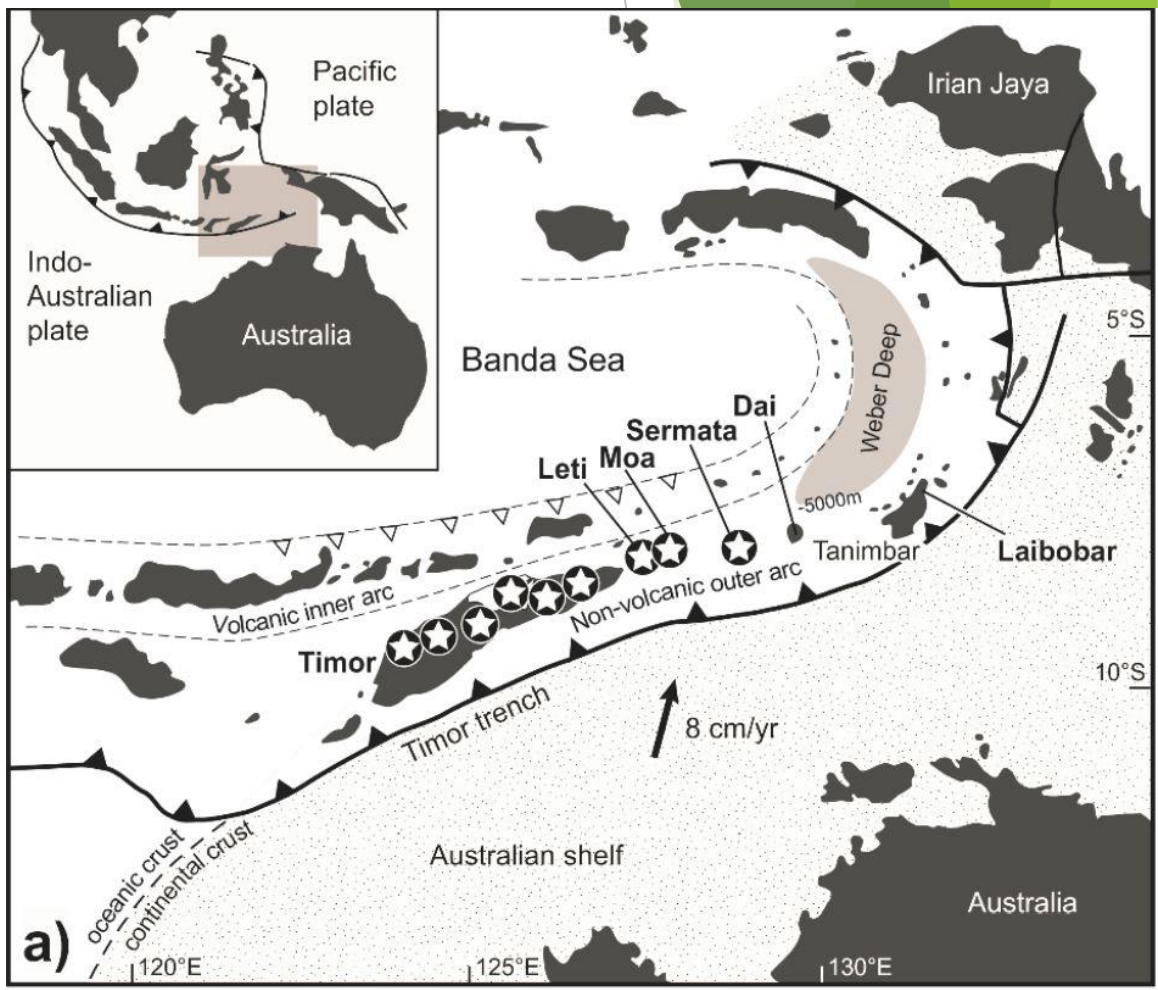
Kvg samples
Kv samples



Relevance and implications



Modified after Moore et al. (2015)



Modified after Maruyama and Safonova (2019)