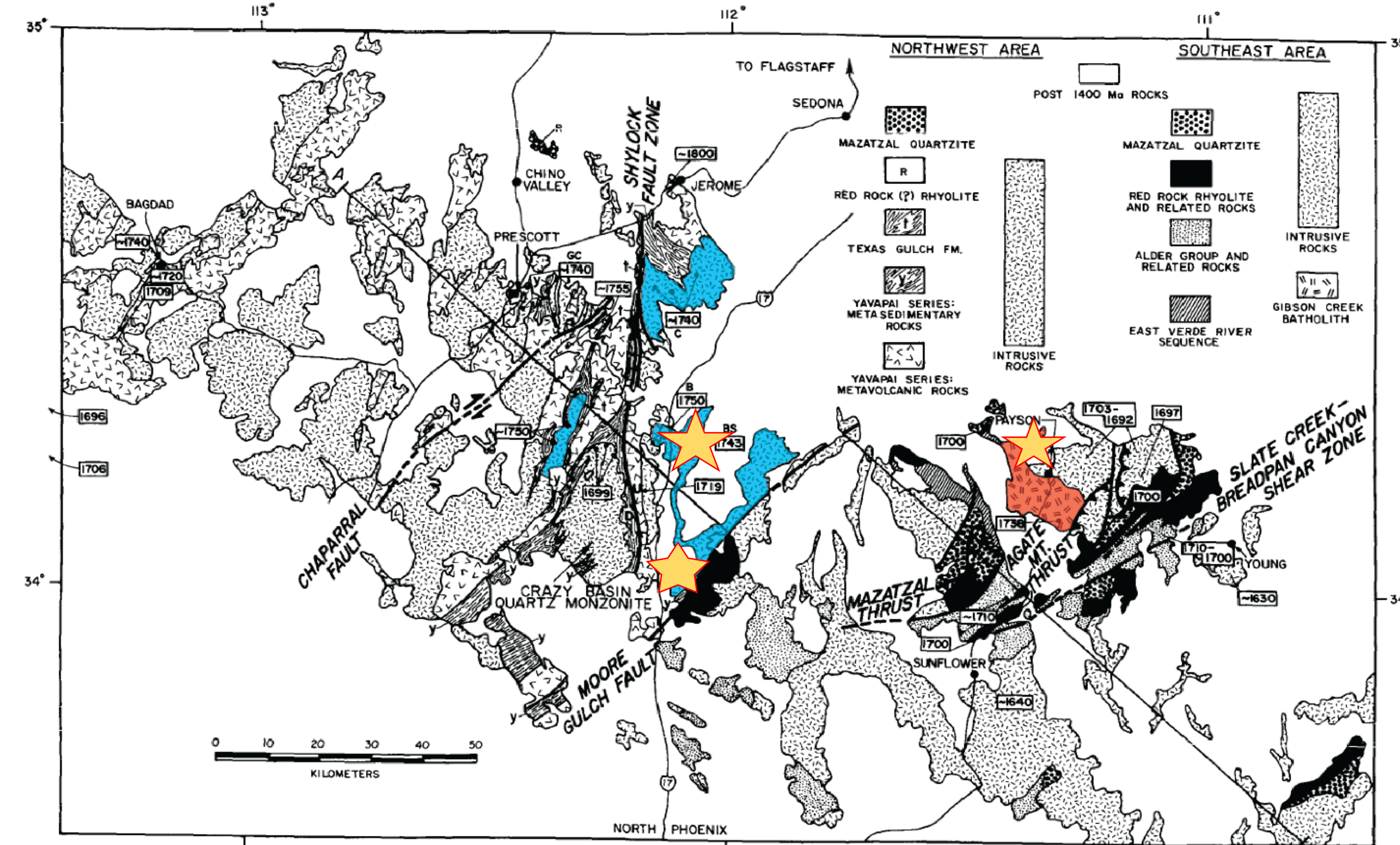


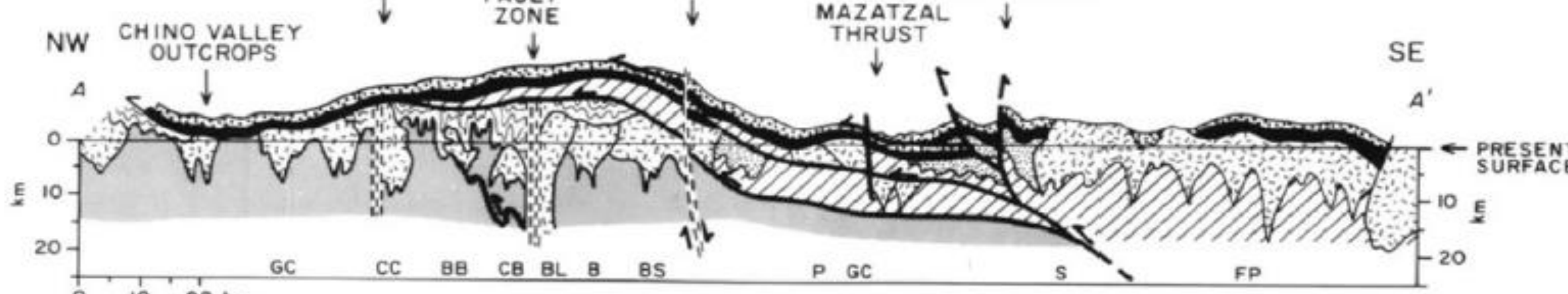
Introduction

Proterozoic crust of southwestern Laurentia is widely considered to be an example of continental growth by accretionary processes. In a broadly accepted model, Laurentia grew by the sequential addition of crustal provinces, each having their own distinctive geologic histories. Two key provinces in this model are the ca. 1.8-1.7 Ga Yavapai and ca. 1.7-1.6 Ga Mazatzal provinces, delineated by marked differences in lithology, metamorphic grade, and structural style across the Moore Gulch shear zone in central Arizona.



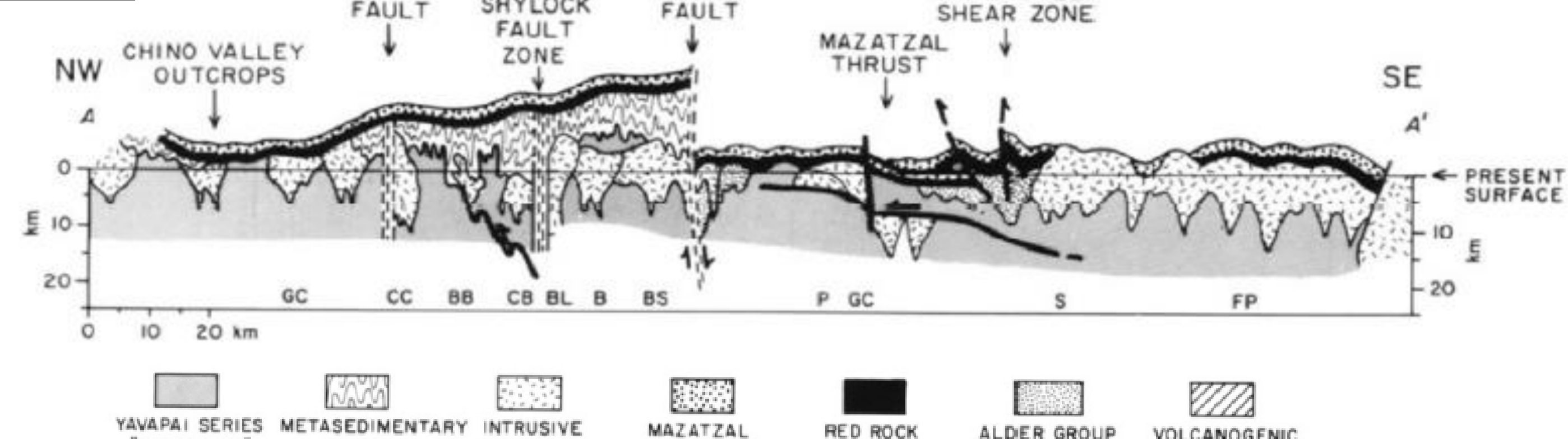
Karlstrom et al. (1987) proposed two endmember hypotheses have been proposed to account for the differences between crustal provinces. In **Hypothesis 1**, rocks of the Mazatzal province are allochthonous with respect to the Yavapai province, and were juxtaposed by subduction-related thrusting, with the Moore Gulch shear zone representing a reactivated hinge-zone that marks the approximate crustal boundary.

Hypothesis 1



In **Hypothesis 2**, rocks of the Mazatzal province were deposited unconformably atop rocks of the Yavapai province, and the difference in lithotectonic character is ascribed to the juxtaposition of different crustal levels across the Moore Gulch shear zone.

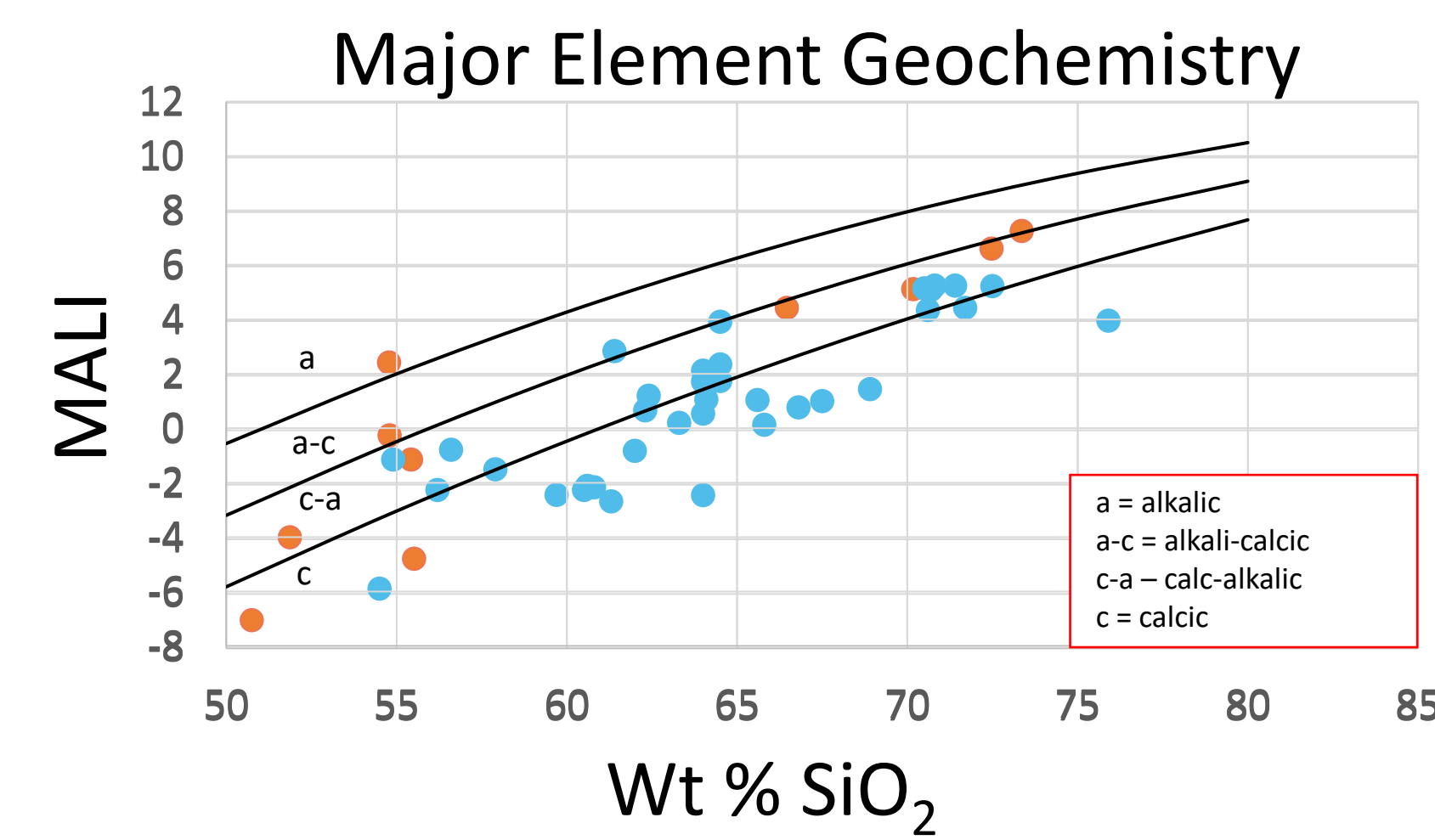
Hypothesis 2



Hypothesis

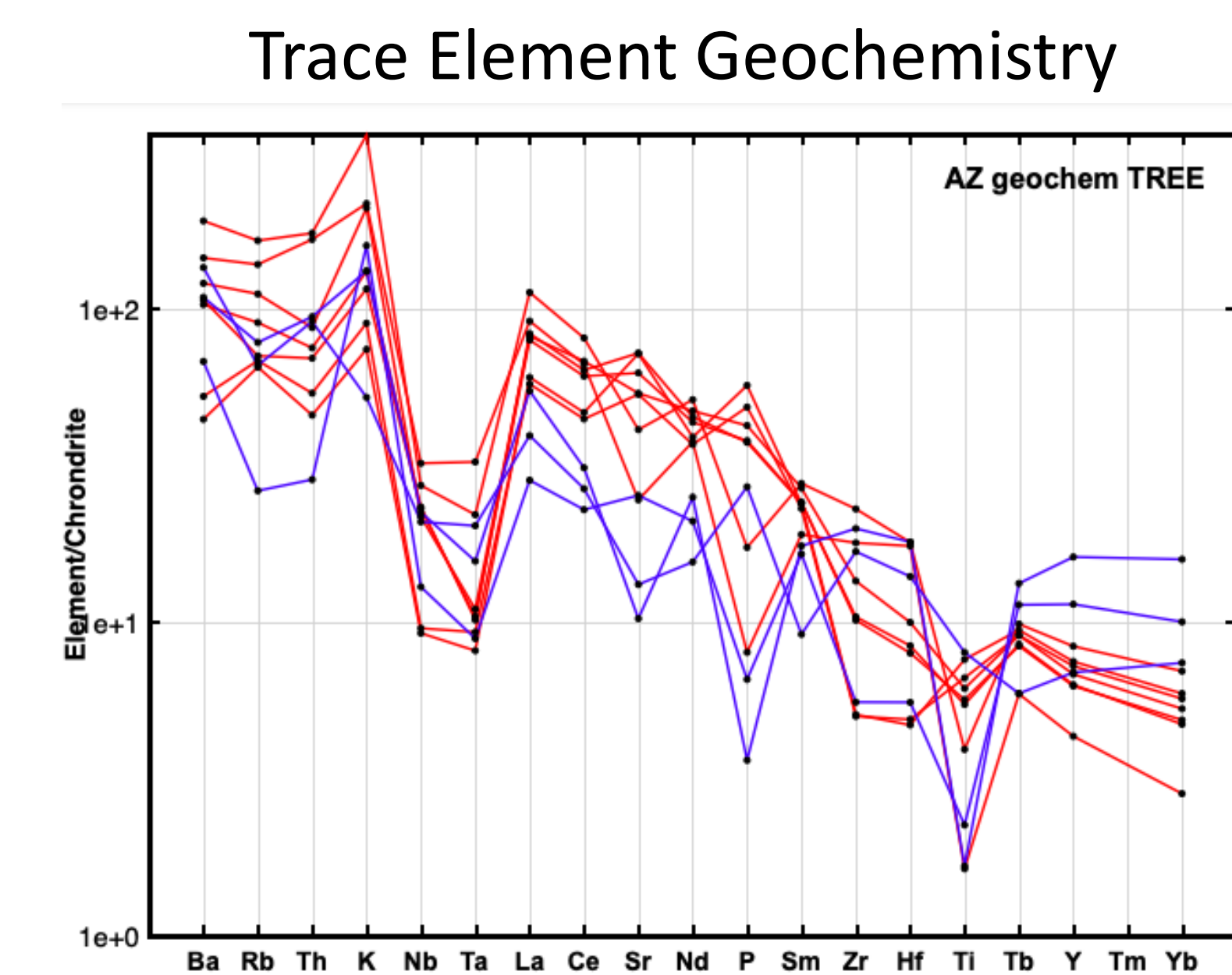
A crucial test of these opposing hypotheses is evaluating the petrogenetic history of ca. 1.74 Ga plutonic rocks on either side of the Moore Gulch shear zone. We present paired U-Pb zircon geochronology and Hf-isotope analysis and bulk-rock major and trace element geochemistry of intermediate plutonic rocks on either side of the Moore Gulch shear zone.

Results



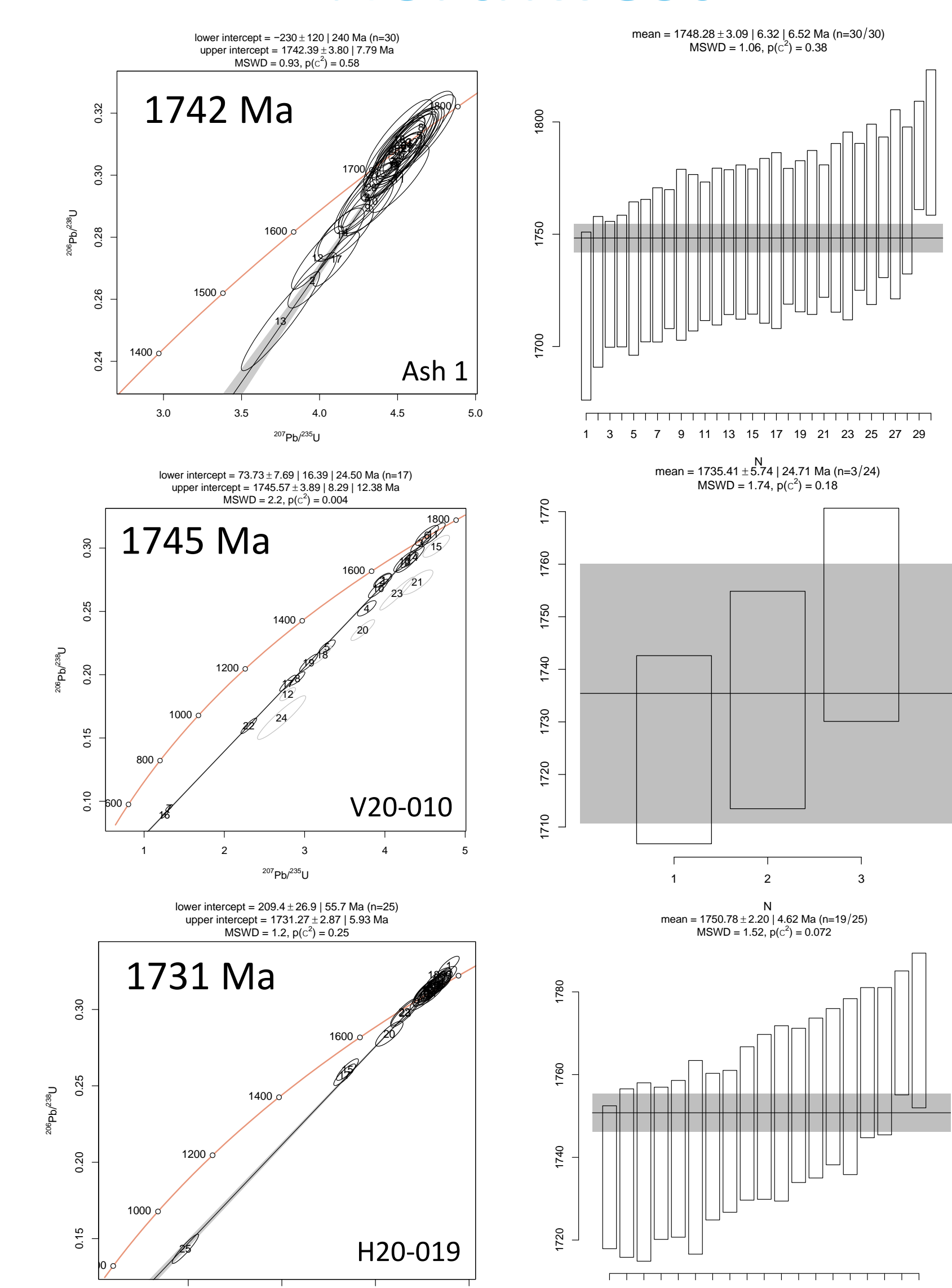
- To the southeast of the Moore Gulch shear zone the **Gibson Creek Batholith** displays a range of calc-alkalic to calcic major element compositions
- To the northwest of the Moore Gulch shear zone the **Cherry Creek batholith**, and **Bland Creek, Government Canyon, and Brady Butte** suites show a similar range of calc-alkalic compositions

- Cherry Creek, Bland Creek, Government Canyon, and Brady Butte major element data from DeWitt et al., 2008

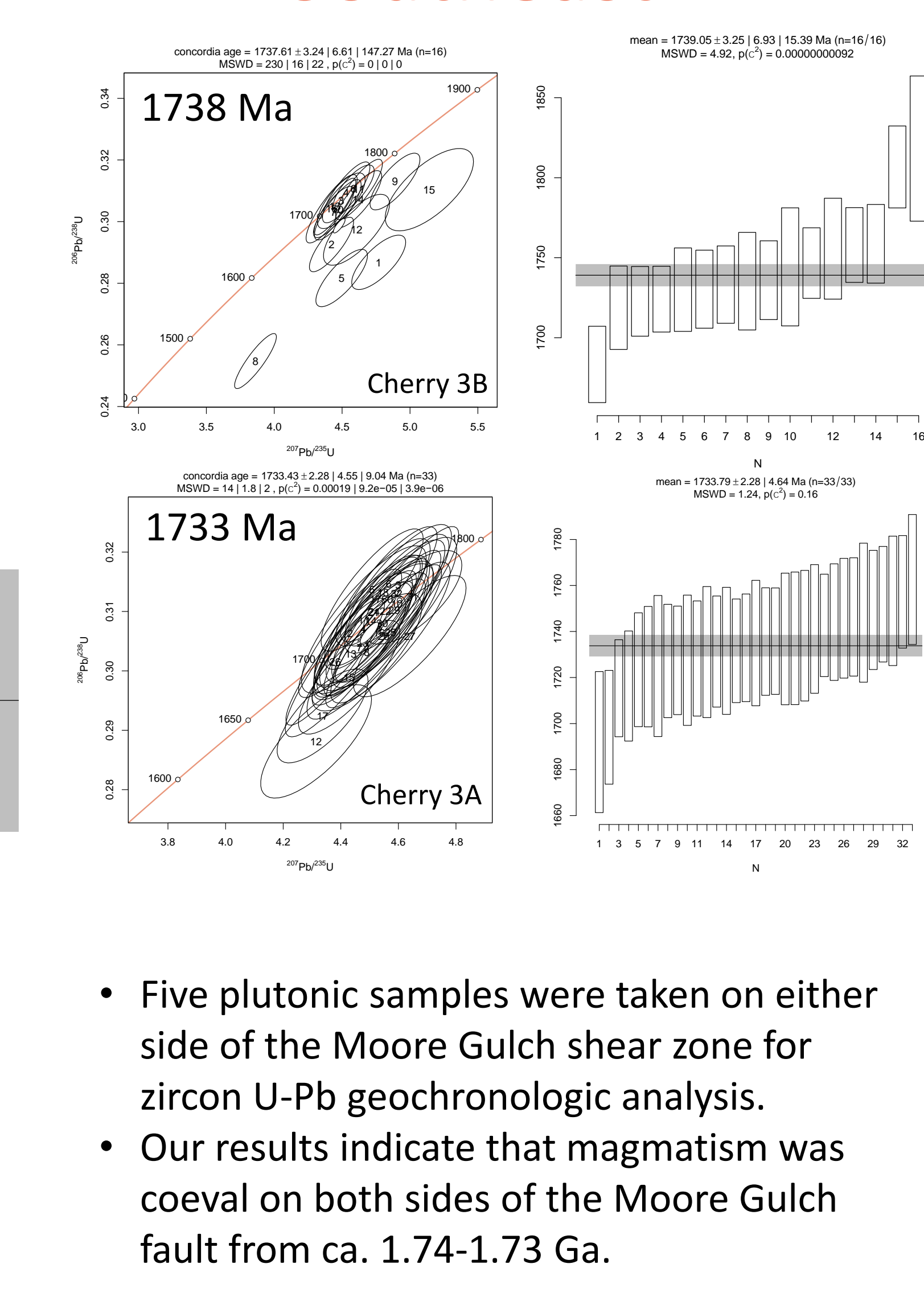


- Trace element geochemical analysis of the **Gibson Creek Batholith** shows enriched high-field strength elements (HFSE) relative to large ion lithophile elements (LILE) with pronounced negative Nb, Ta, P, and Ti anomalies.
- This is similar to samples **H20-ASH-1**, **H20-019**, and **V20-010** taken from northeast of the Moore Gulch shear zone
- Together, these results indicate that plutonic rocks on both sides of the Moore Gulch shear zone shared a common source.

U-Pb Geochronology Northwest

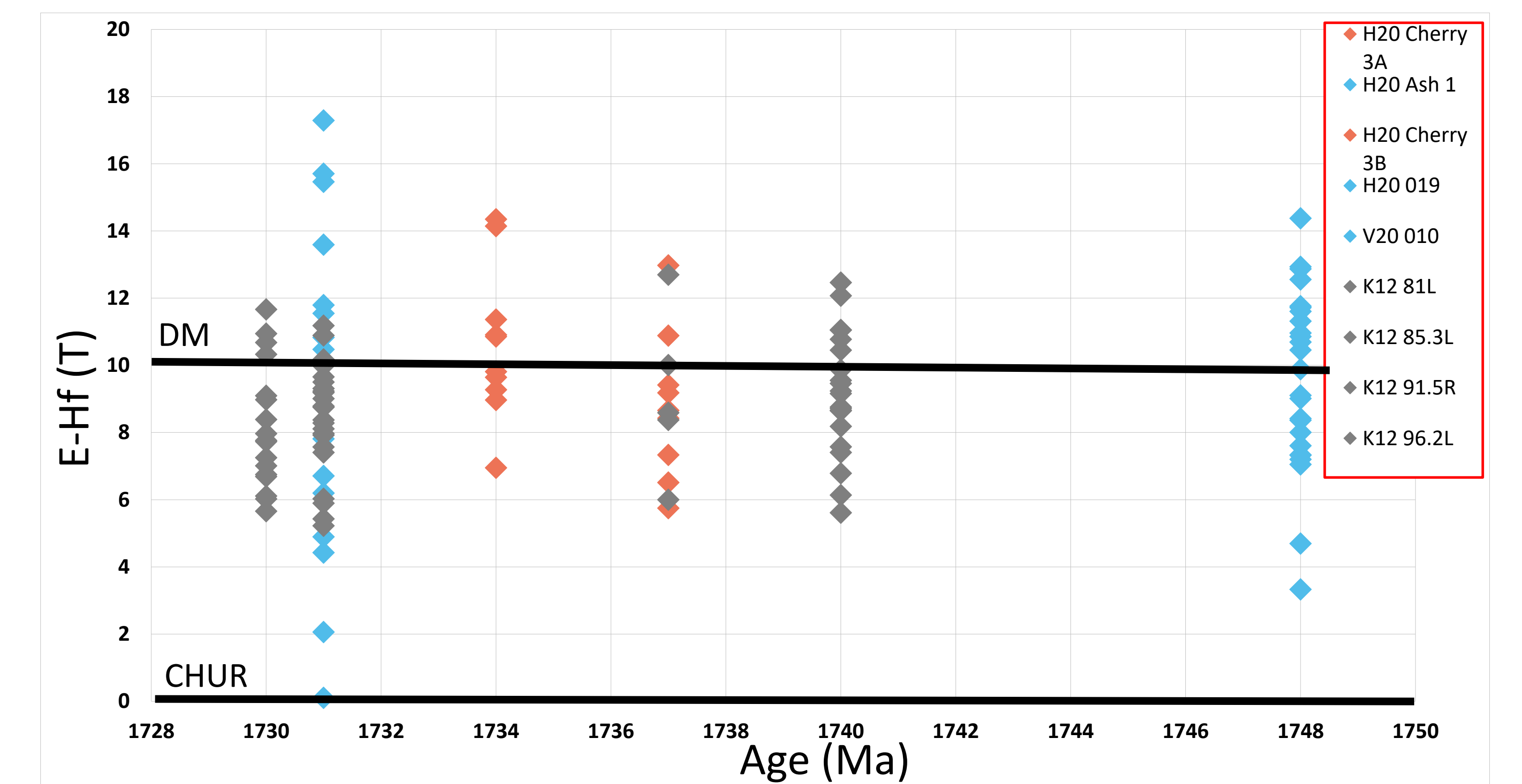


U-Pb Geochronology Southeast



- Five plutonic samples were taken on either side of the Moore Gulch shear zone for zircon U-Pb geochronologic analysis.
- Our results indicate that magmatism was coeval on both sides of the Moore Gulch fault from ca. 1.74-1.73 Ga.

Hafnium Isotopes

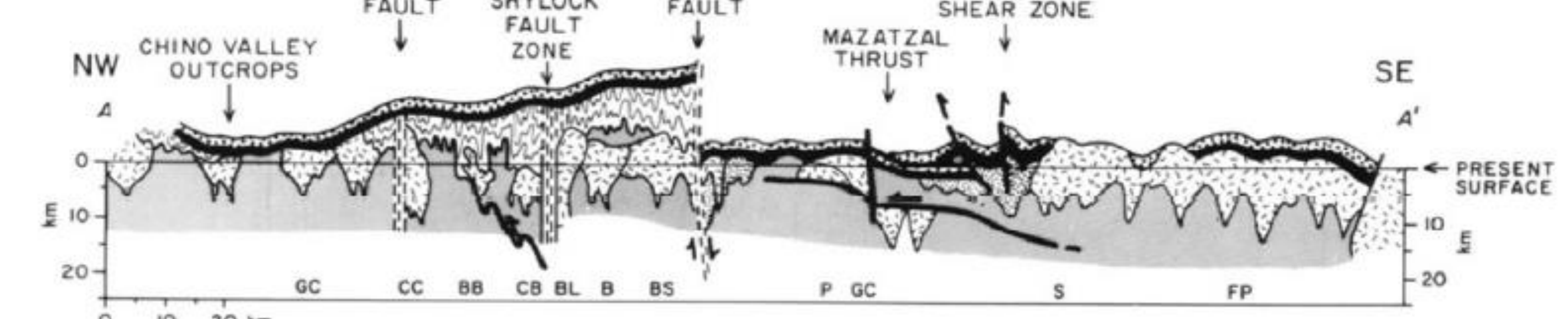


- Grey data points are from Holland et al., 2015

Conclusions

- Our results indicate that ca. 1.74 Ga plutonic rocks on both sides of the Moore Gulch shear zone share similar petrogenetic histories.
- Both suites of rocks have a range of calc-alkalic to calcic major element compositions.
- Both suites of rocks show enriched high-field strength elements relative to large ion lithophile elements with pronounced negative Nb, Ta, P, and Ti anomalies.
- Both suites of rocks are isotopically juvenile at ca. 1.74 Ga, with eHf(t) values ranging from ca. +2 to +14.
- These results favor the second hypothesis, indicating that ca. 1.74 Ga basement characteristic of the Yavapai province is present beneath the Mazatzal province, and that the Mazatzal province is para-autochthonous with respect to the Yavapai province.

Hypothesis 2



References

Karlstrom, K.E., Bowring, S.A., and Conway, C.M., 1987, Tectonic significance of an Early Proterozoic two-province boundary in central Arizona: Geological Society of America Bulletin, v. 99, p. 529-538.

Holland, M.E., Karlstrom, K.E., Doe, M.F., Gehrels, G.E., Pecha, M., Schufeldt, O.P., Begg, G., Griffin, W.L., and Belousova, E., 2015, An imbricate midcrustal suture zone: The Mojave-Yavapai province boundary in Grand Canyon, Arizona: Geological Society of America Bulletin, v. 127, p. 1391-1410.

Acknowledgements

This project was supported by funds from the Killgore Research Center through Faculty Research Grant to Holland, and President's Undergraduate Student Research Grant to Velasquez. We thank the staff of the Arizona Laserchron Center for analytical support, and Kevin Werts for assistance in collecting major and trace element geochemical data at Texas Tech University.