

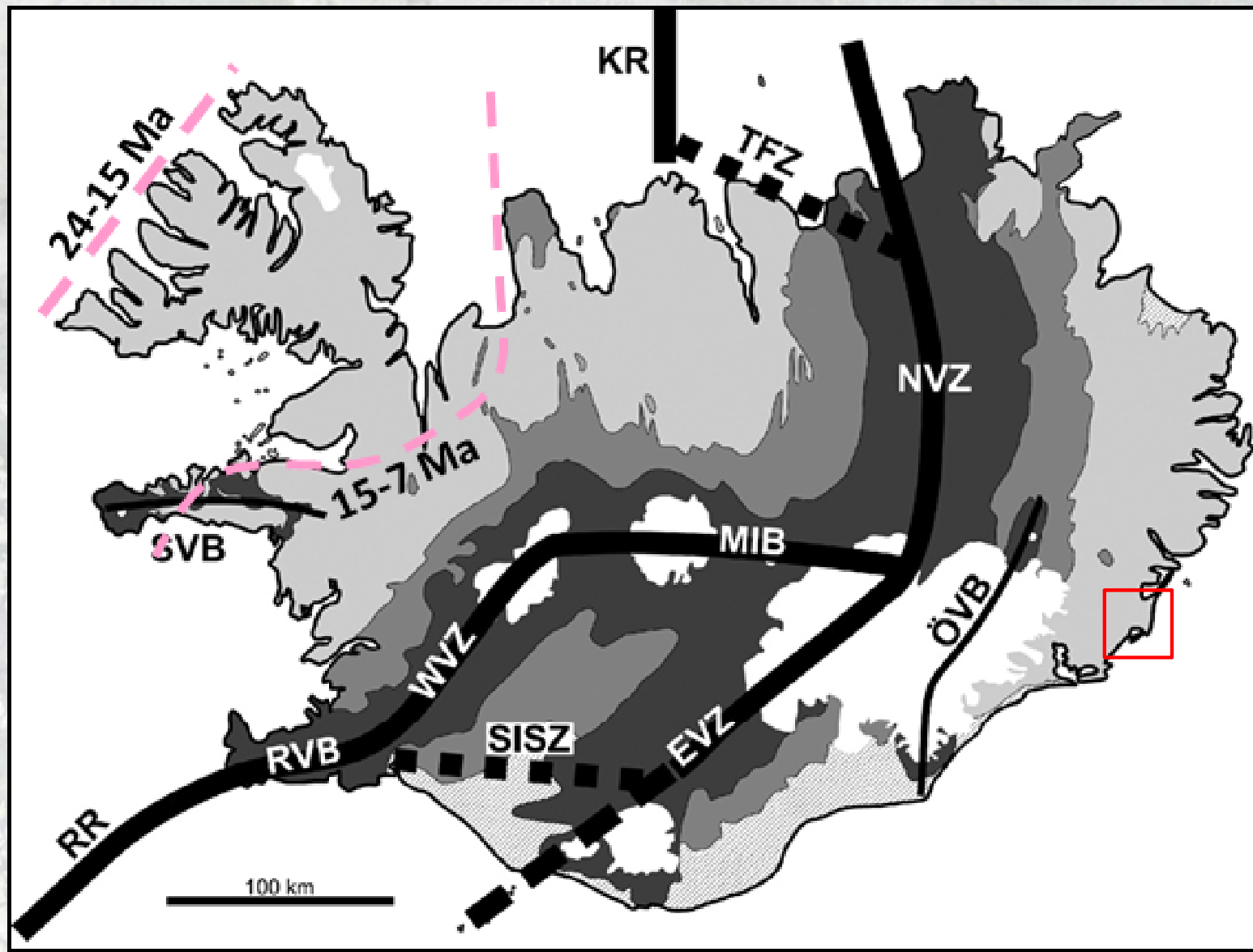
GENERATING THE WORLD'S LOWEST MAGMATIC ZIRCON $\delta^{18}\text{O}$: MELTING OF INTENSELY HYDROTHERMALLY ALTERED SOURCES AT AUSTURHORN INTRUSIVE COMPLEX, SE ICELAND



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GEOLOGIC BACKGROUND



Modified After Carley et al., 2011



-
- Geological map of the Hvalnesfjall area in Iceland. The map displays various geological units and sample locations.
- Legend:**
- Tertiary Volcanics (Green)
 - Hvalnesfjall Gabbro (Blue)
 - Homogeneous Granophyre (Pink)
 - Mafic-Felsic Composite Zone (Red)
- Sample Locations:**
- IA-G-1
 - IA-G-2
 - IA-G-3
 - IA-G-5
 - IA-NS-1
 - IA-NS-2
 - IA-NS-3
 - IA-NS-4
 - IA-NS-5
 - IA-NS-6
 - IA-NS-7
 - IA-NS-8
 - IA-NS-9
- The map includes topographic contours, rivers, and place names such as Geirhamar, VÍKURFJALL, and Hvalnesfjall.

Modified After *Furman et al.*, 1992

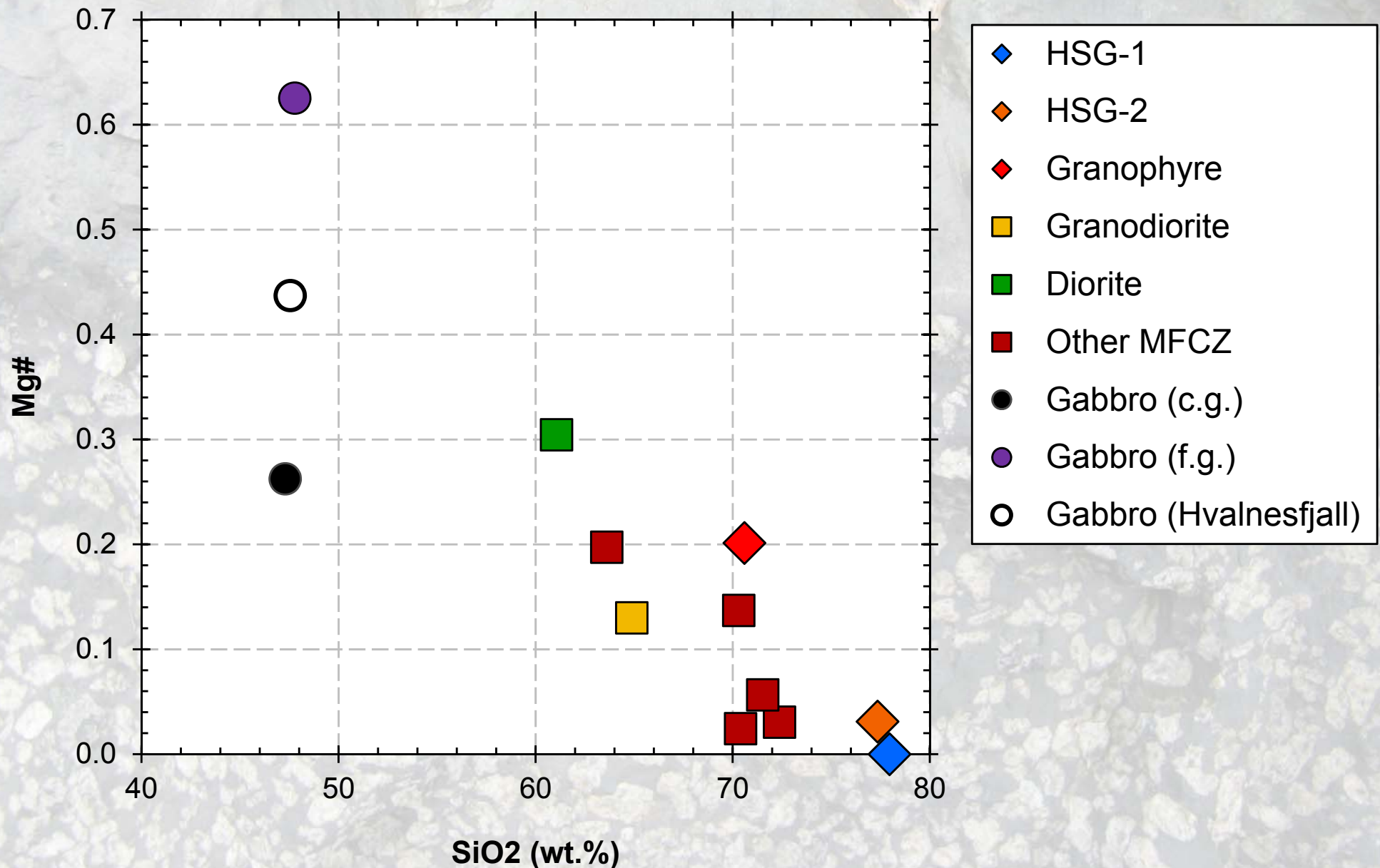
GEOLOGIC BACKGROUND

- MFCZ: Magma Replenishment, Mingling, and Hybridization



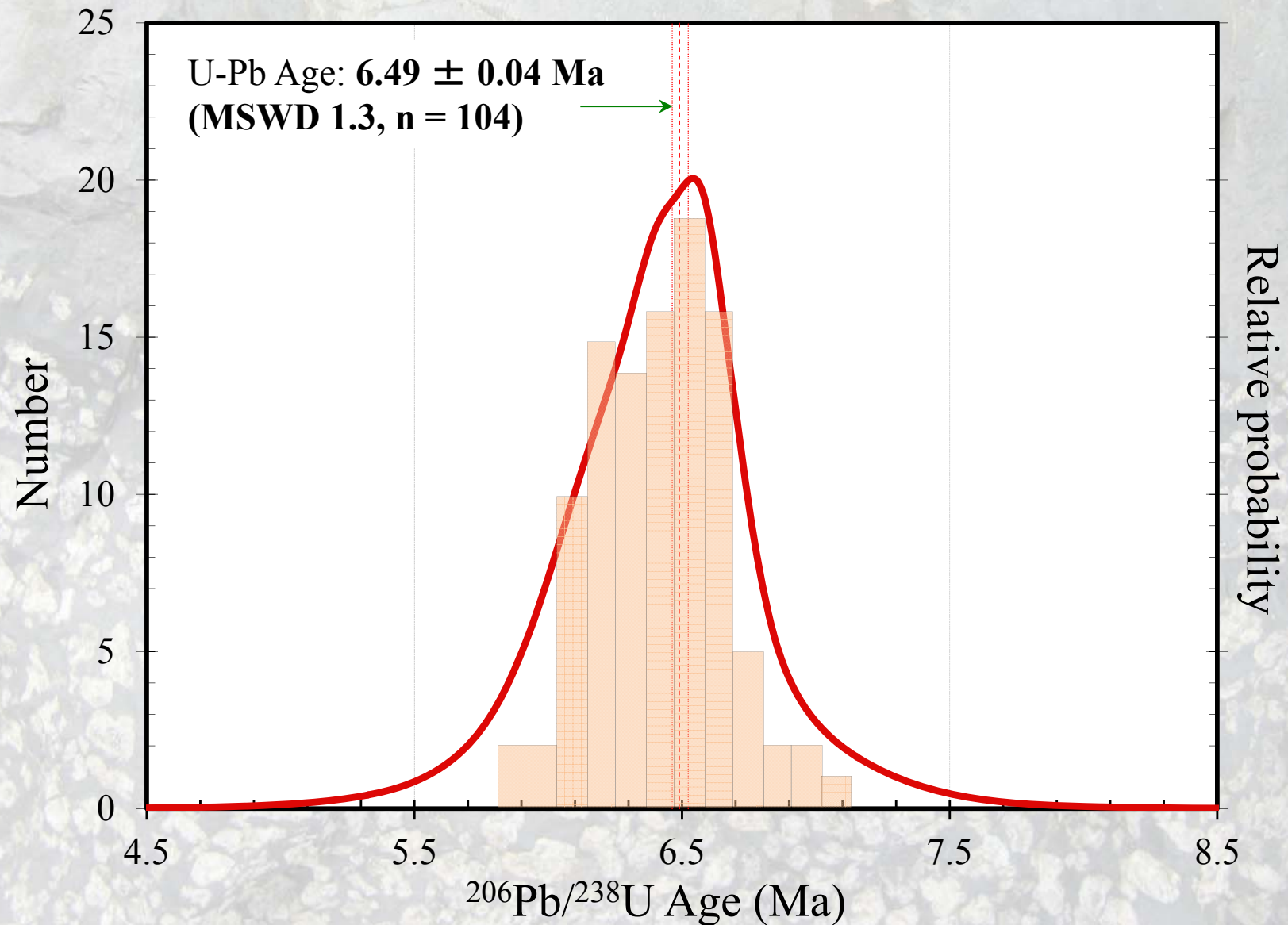
GEOLOGIC BACKGROUND

- Geochemical Variation in the AIC



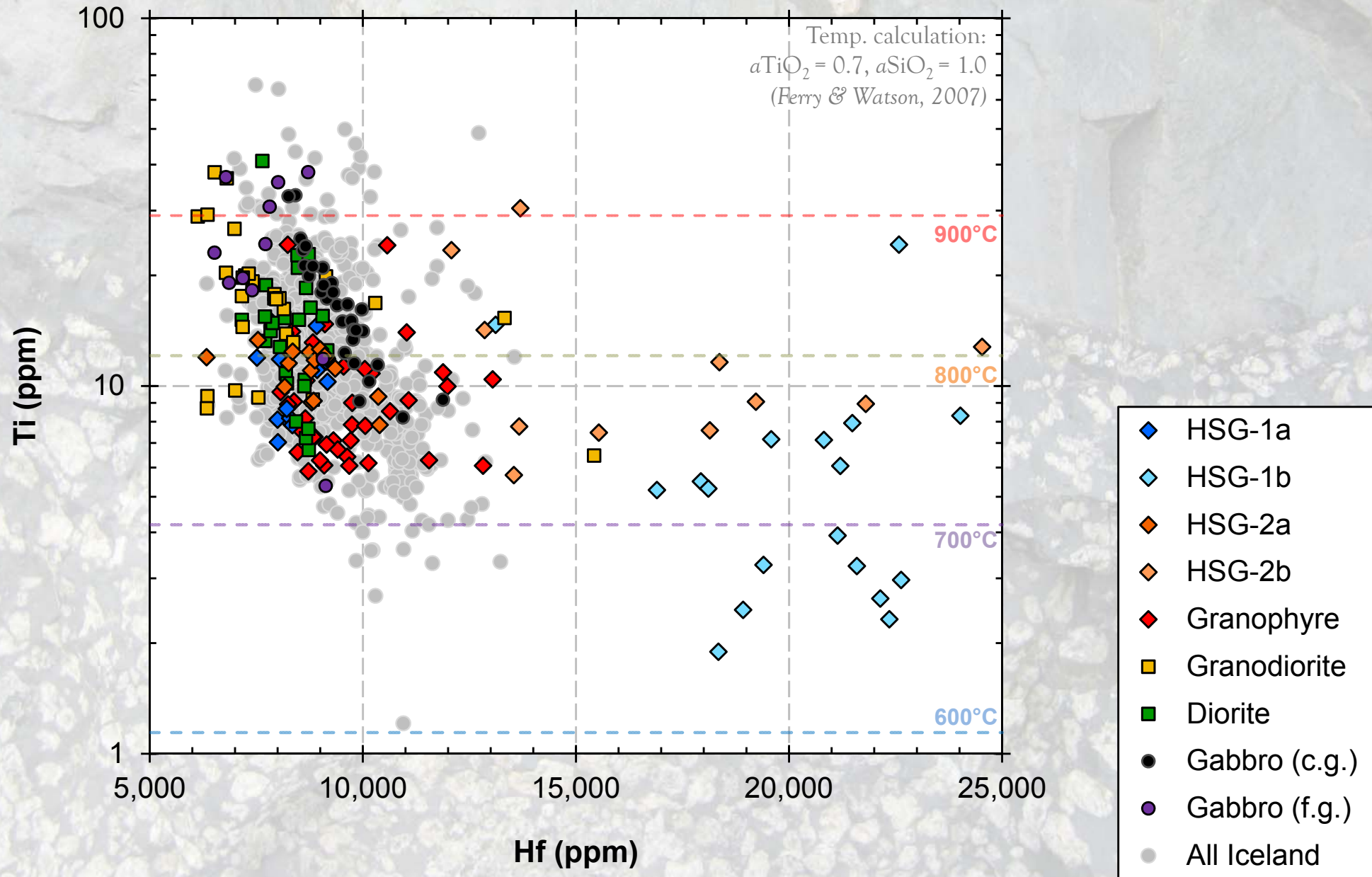
GEOLOGIC BACKGROUND

- U-Pb Geochronology



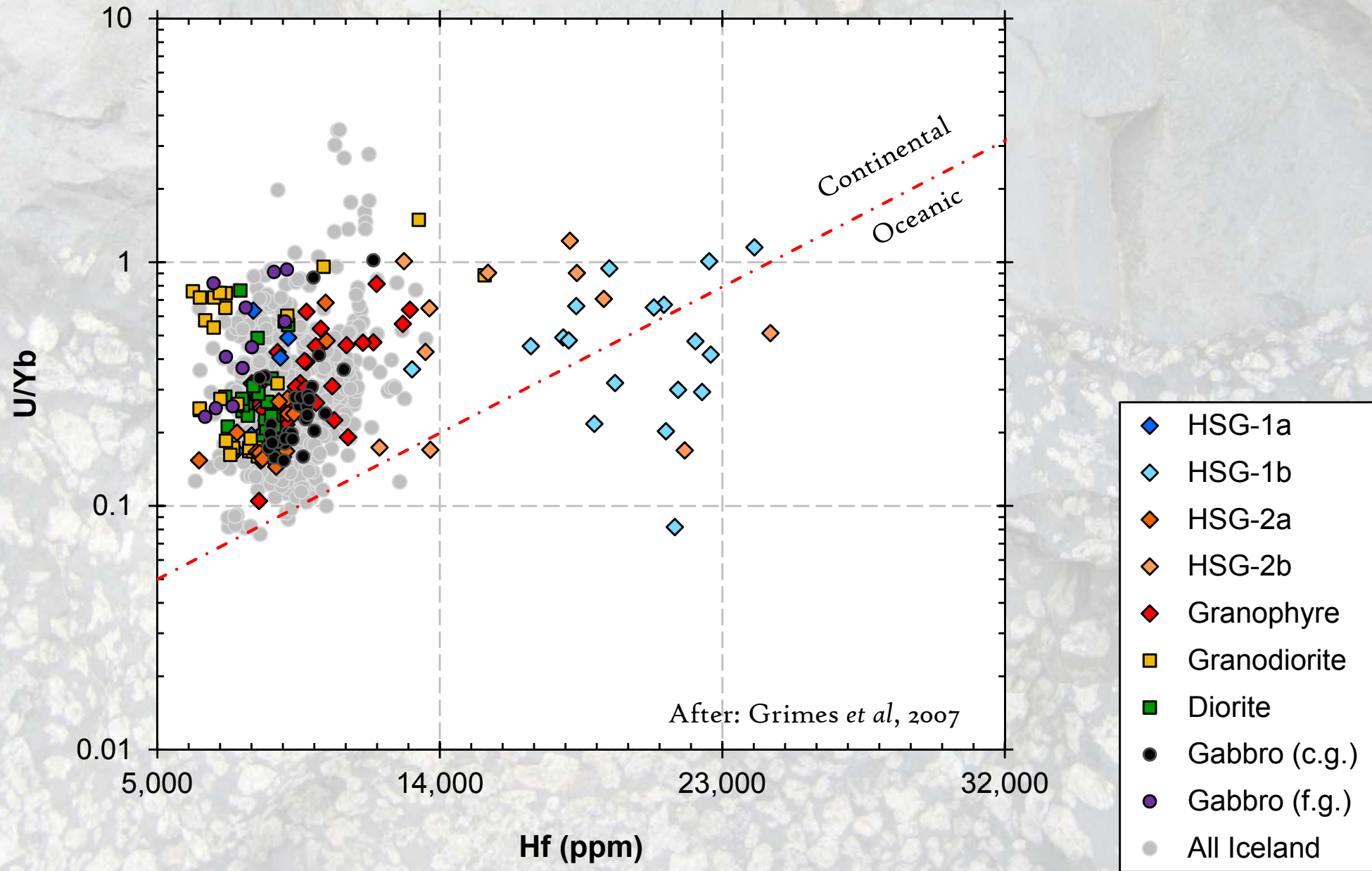
ZIRCON GEOCHEMISTRY

- Trace Elements



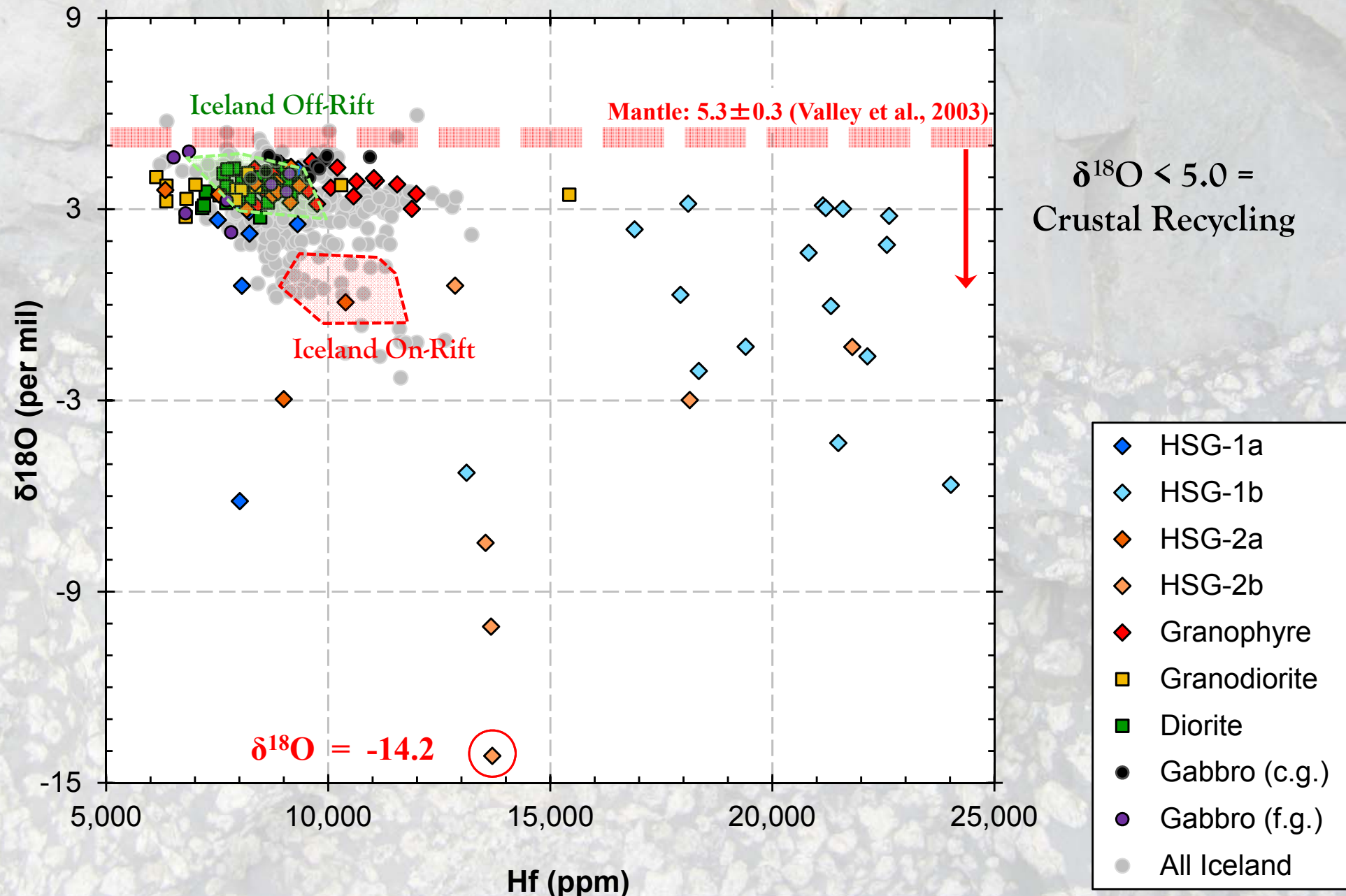
ZIRCON GEOCHEMISTRY

- Trace Elements

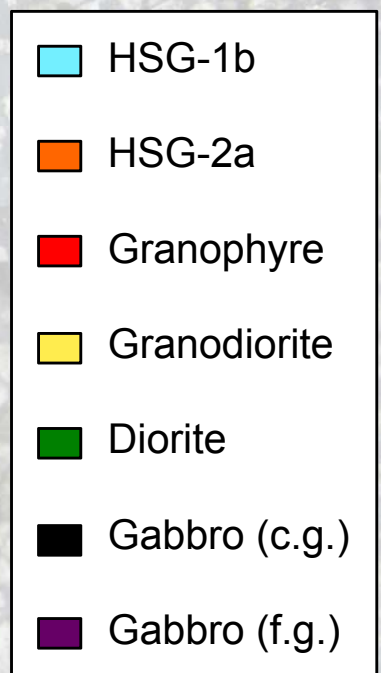
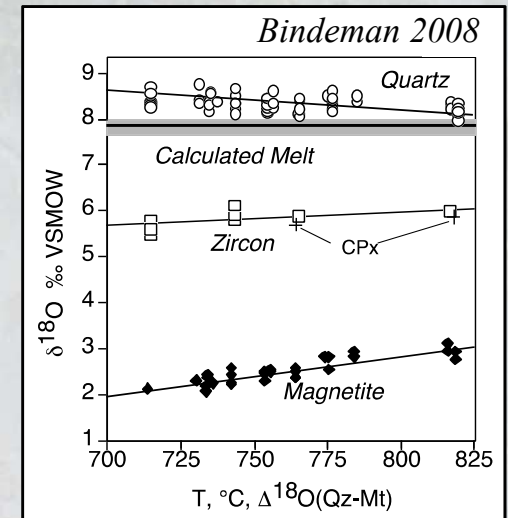
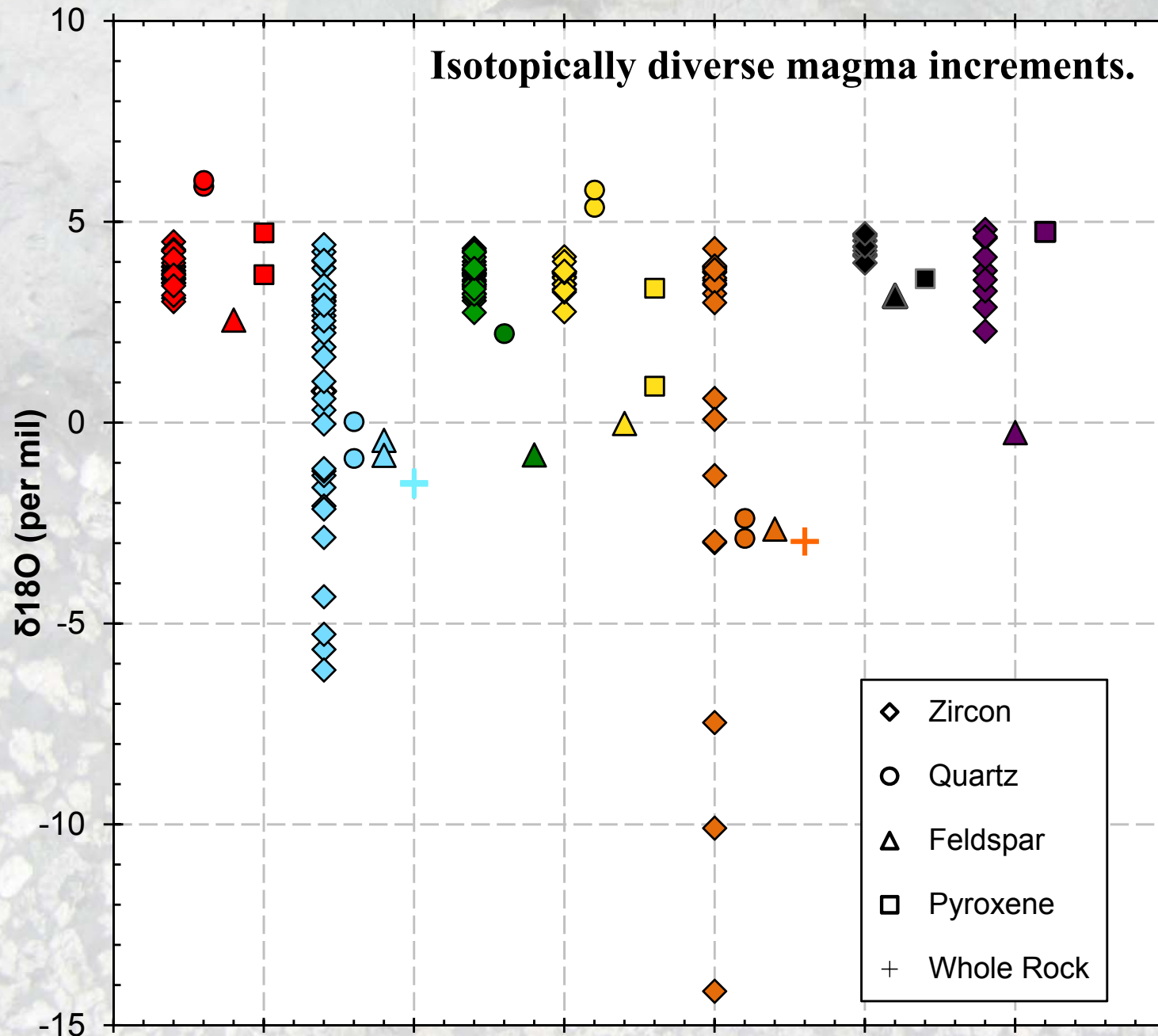


ZIRCON GEOCHEMISTRY

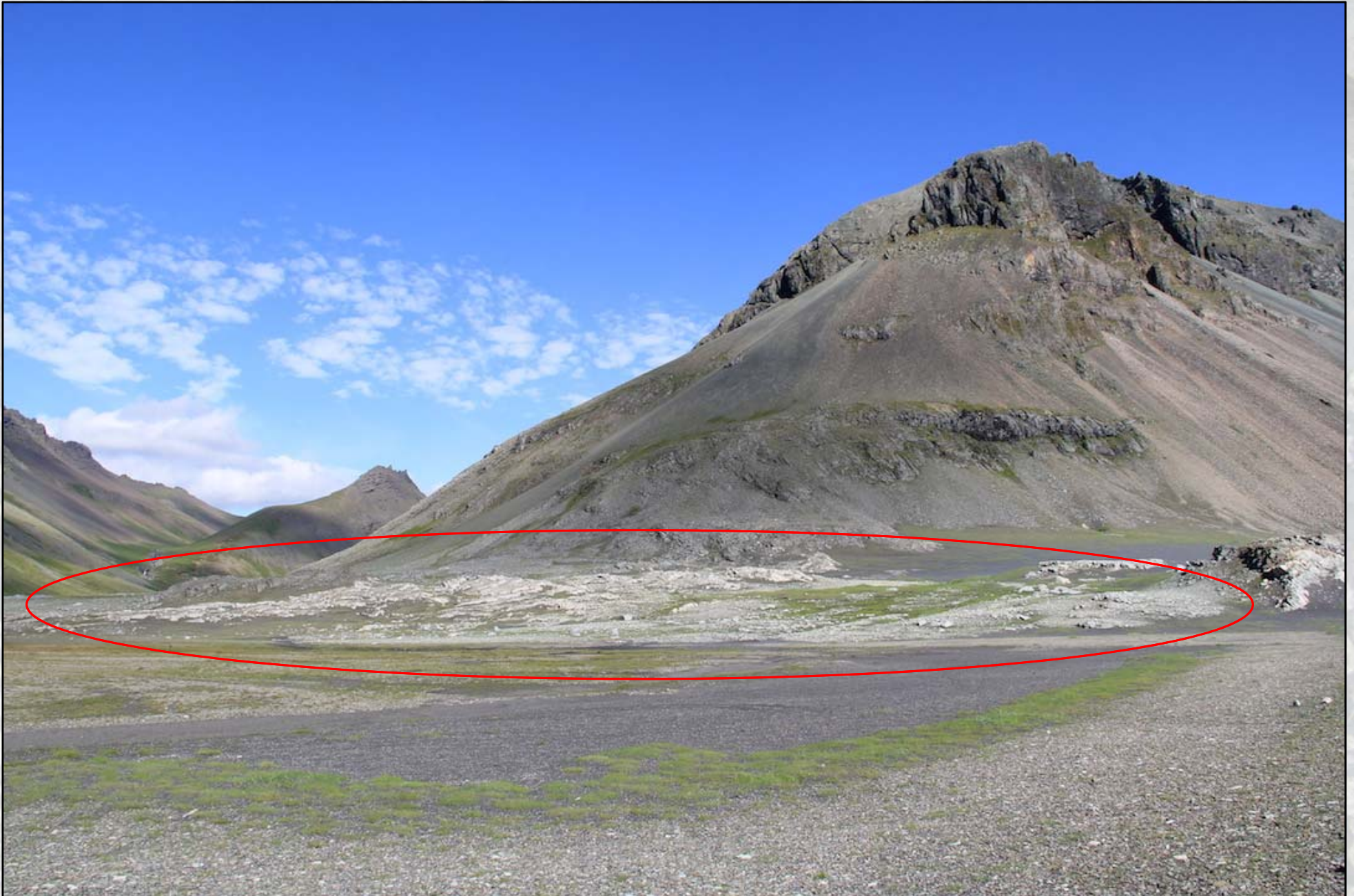
- Stable Isotope Geochemistry: Oxygen



LOW $\delta^{18}\text{O}$ MAGMAS



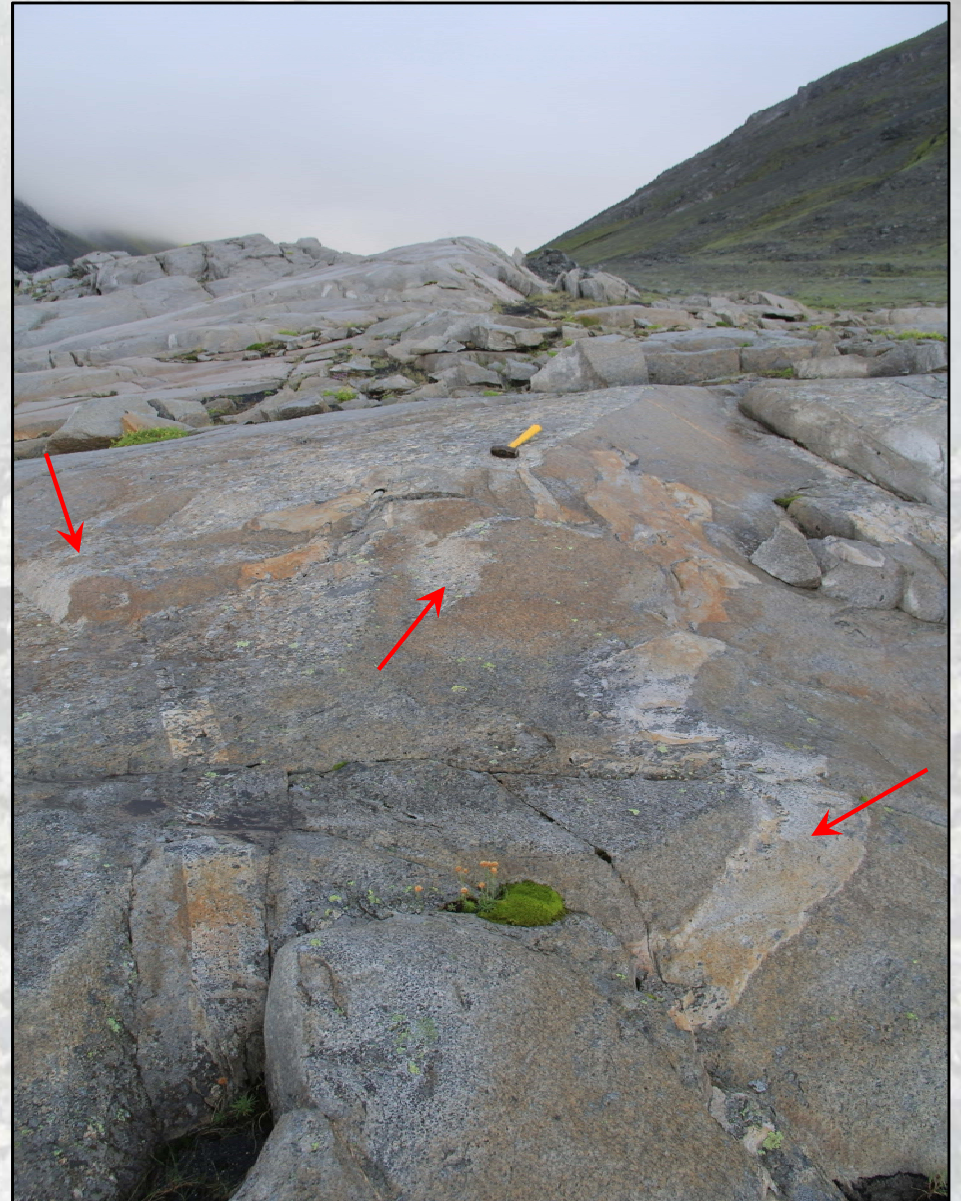
LOW $\delta^{18}\text{O}$ MAGMAS



Low $\delta^{18}\text{O}$ MAGMAS



- Widespread
- Volumetrically Insignificant
- Interact magmatically w/host
- Mingling and mixing

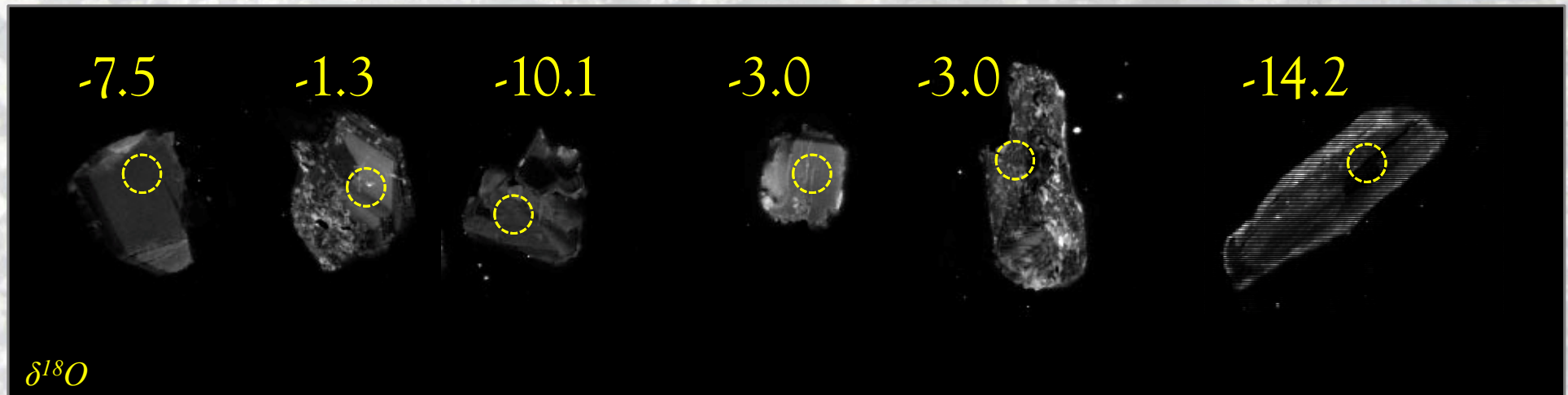
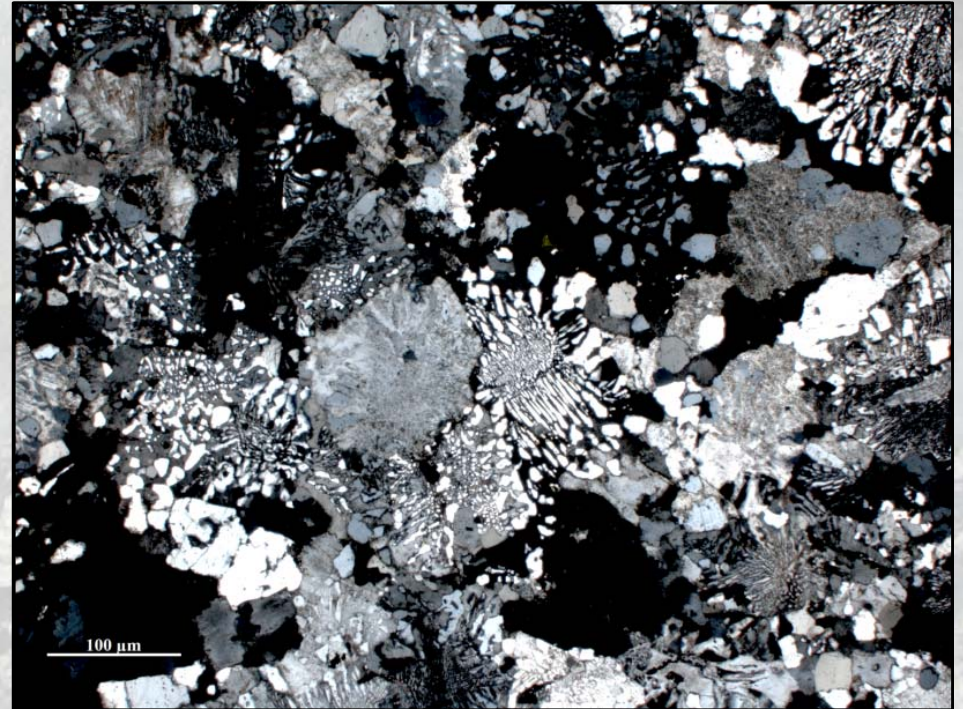
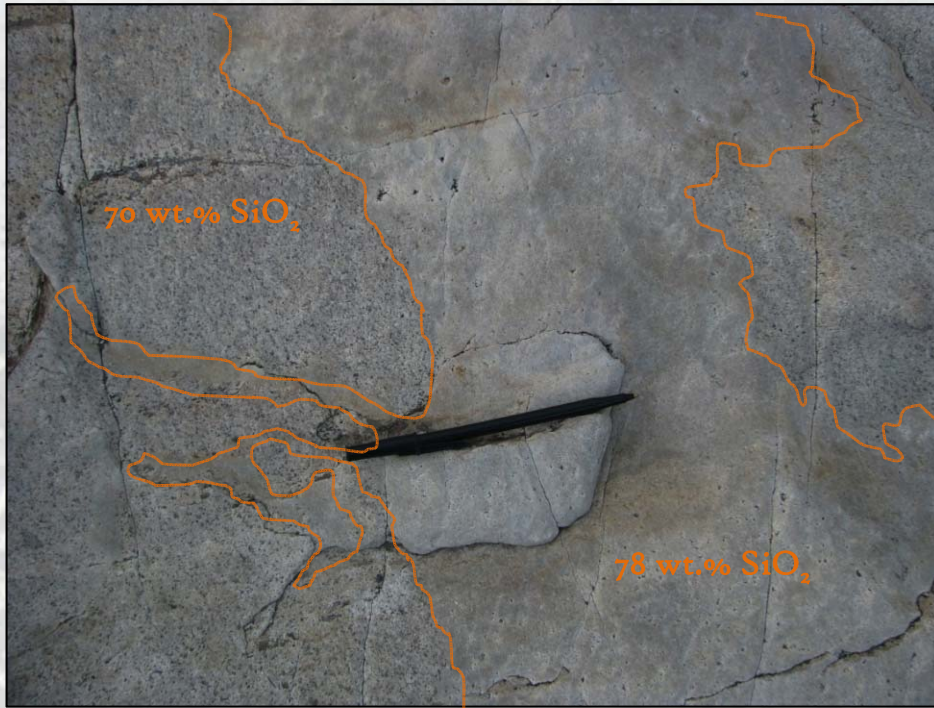


LOW $\delta^{18}\text{O}$ MAGMAS

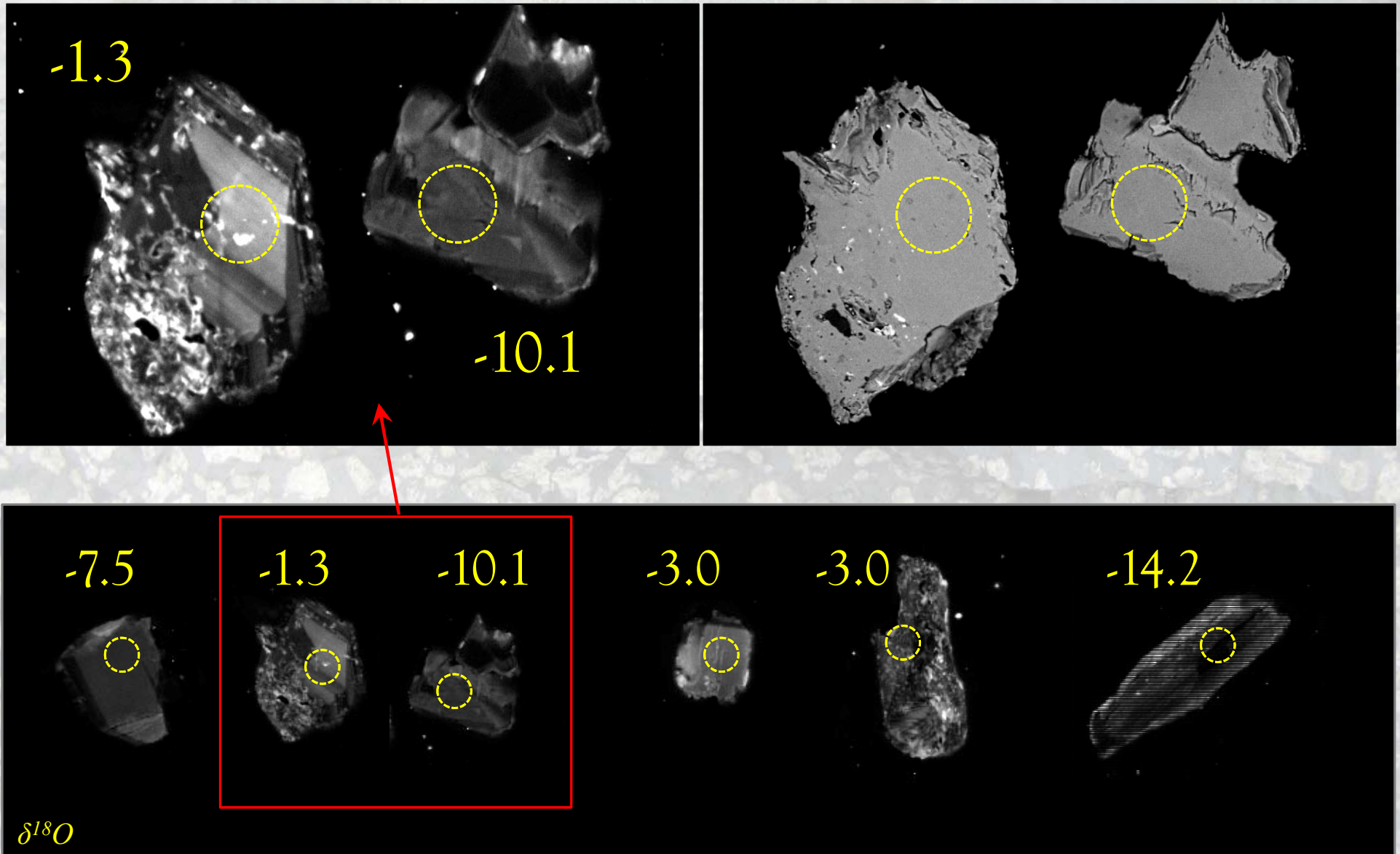


- Widespread
- Volumetrically Insignificant
- Interact magmatically w/host
- Mingling and mixing

LOW $\delta^{18}\text{O}$ MAGMAS



LOW $\delta^{18}\text{O}$ MAGMAS



CLOSING REMARKS



Austurhorn Intrusive Complex:

- Low $\delta^{18}\text{O}$ values: indicate crustal recycling extensive
- Major contribution from hydrothermally (meteoric)-altered crust
- Dominant process in generating silicic melts
- Variable $\delta^{18}\text{O}$: multiple, isotopically-diverse magma increments

Lowest $\delta^{18}\text{O}$ magmas:

- Require large meteoric water/rock ratio
- Near complete high-T oxygen exchange (meteoric)
- Pure melting of intensely altered crust
- Amalgamation of small batches of highly evolved melt



Thank you!

