

1. Background and Objective

Background:

Recent studies have proposed the use of an empirical correlation between **Sr/Y** and **La/Yb** ratios and the formation depth of arc magmas to model the changes in crustal thickness over time. Other studies have brought to light sampling biases and inconsistencies in this methodology when applied globally.

Objective:

To use generalized depleted mantle/slab melts and their resulting trace element compositions to examine the reliability of **Sr/Y** and **La/Yb** ratios as a tool for ancient arc reconstruction.

2. Sampled Areas

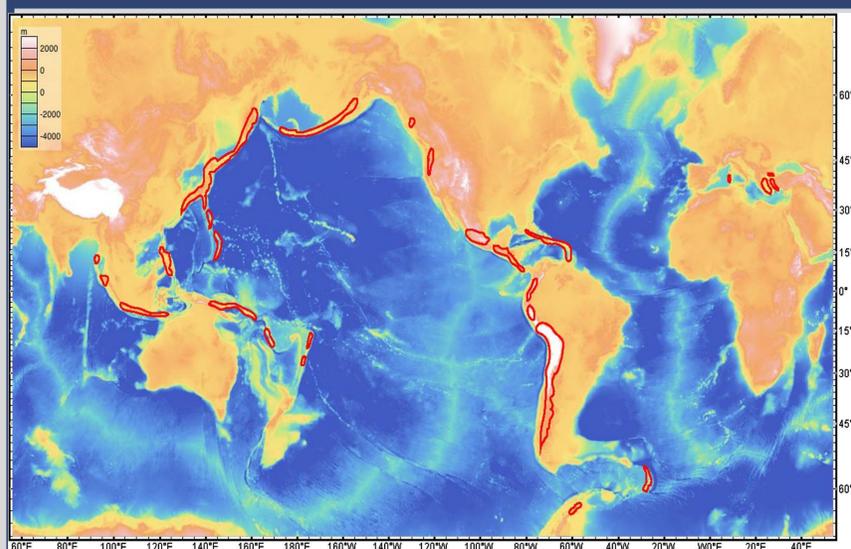


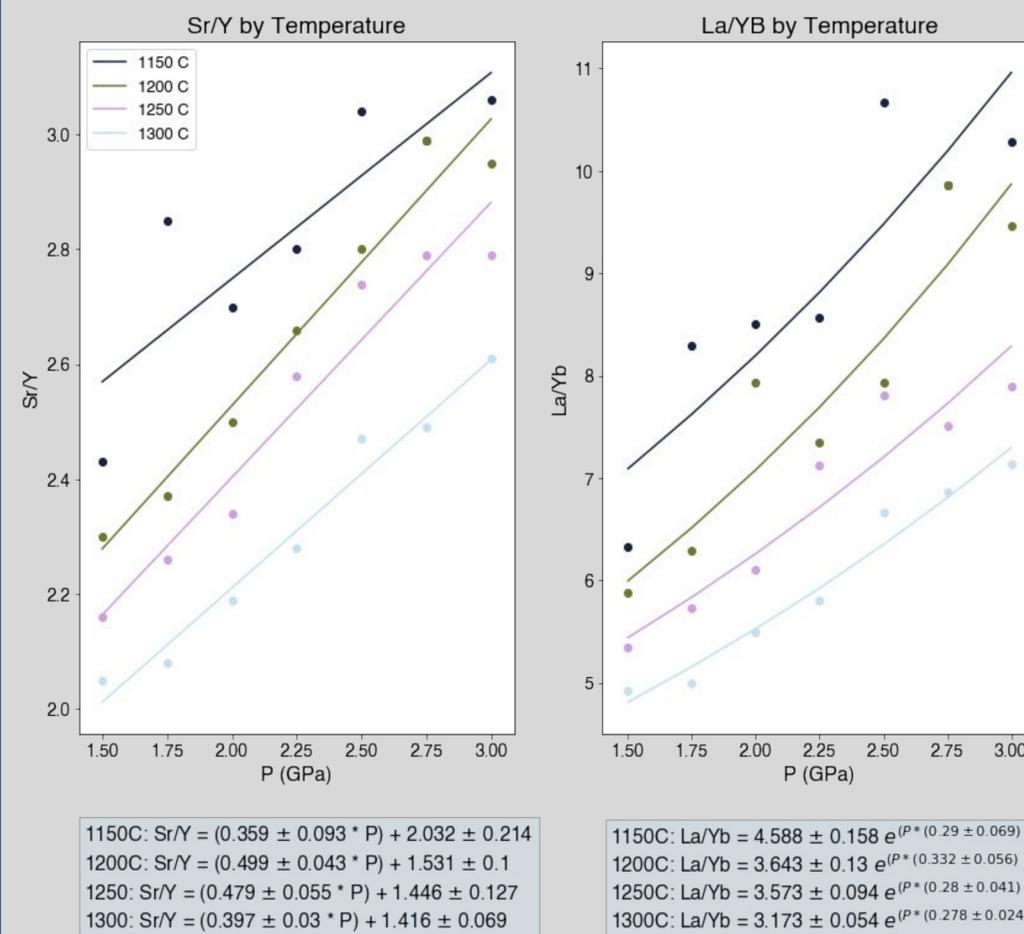
Fig. 1: Locations of compiled arc lavas (outlined in red). Farner & Lee (2017)

3. Methodology

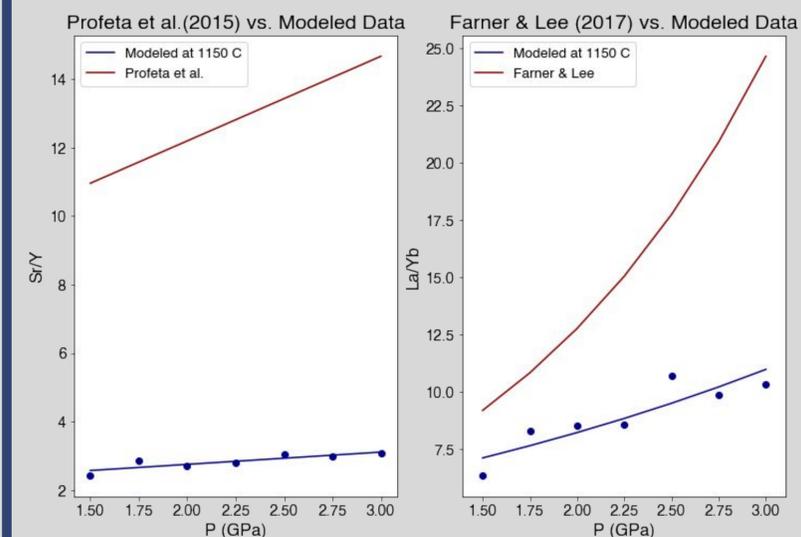
- Assimilate a generalized depleted mantle with **2%** slab fluid to create a bulk composition.
- Simulate the mantle/slab melt at each of our **P** and **T** regimes with **PELE**.
- Compare derived **Sr/Y** and **La/Yb** ratios from resulting melt compositions to natural data

4. Least-Square Regression

Sr/Y vs. **P** we found to have a linear regression, while **La/Yb** vs. **P** regressed exponentially



5. Comparison and Results



- Trace element ratios from the collected natural data are significantly higher than those from the the model: nearly **5x** for **Sr/Y** and nearly **2x** for **La/Yb**.

6. Discussion

- For this disparity between datasets to exist, factors aside from initial depth must influence the trace element composition of surface arc magma.
- **Due to the existence of impacting factors, we can conclude that the use of Sr/Y and La/Yb for reconstruction of ancient arc crustal thickness is unreliable until further examination into these factors is performed.**

Acknowledgments

-This material is based upon work supported by the National Science Foundation under Grant No. 1724794. Any opinions, findings, and conclusions or recommendations expressed in this material are those of the author(s) and do not necessarily reflect the views of the National Science Foundation.
- I would like to thank UNAVCO and their staff members for their aid and guidance over the course of the RECESS program. Special thanks to Ellen Alexander, Andi Ellis, Seth Myers, Morgan Baker, and Joel Johnson for their mentorship and support.

References

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