

Question 5: What are the geochemical products of subduction zones, ~~from mantle geochemical reservoirs~~ to the architecture of the arc lithosphere, and how do these influence the formation of new continental crust?

Q1: What are the geochemical characteristics of the materials that subduction returns to the Earth's mantle, and how are these related to the development of long-term mantle heterogeneity?

- “characteristics of materials”
 - Punt. How much of the subducting mantle is serpentized? When and where do you hydrate the downgoing plate? Interesting, yes, but dealt with by group 4.
- “development of long-term mantle heterogeneity”
 - Deprioritize sending people to plumes to study subduction and the creation of mantle heterogeneity.

Q2: What are the rates and processes of arc crust growth and differentiation and how is arc crust transformed to continental crust?

- How fast is arc crust growing (i.e. what are the rates of emplacement) and what is the **ratio of volcanic to plutonic fluxes**? Is this evolving in time?
 - Superb seismic imaging of crust
 - Field studies of exhumed arcs
 - Chronology
 - Petrology + Geochemistry
 - Dynamics
- **What doesn't erupt? Why?**
 - Where are magmas stalling? Is this where differentiation is occurring (lower, middle, upper crust? All?)

Q2 continued: What are the rates and processes of arc crust growth and differentiation and how is arc crust transformed to continental crust?

- What is the architecture of the arc lithosphere?
 - Why is the crust compositionally stratified?
 - What is the process of **arc crustal differentiation**?
 - Does it depend on the thermal model of the crust as models predict?
- Why is island arc crust fundamentally more mafic than average continental crust?
 - Is **delamination** necessary? Does delamination ever occur (does it even solve this problem)? If so, how widespread is delamination and under what conditions and at what timescales? (Group not sure if this is tractable but certainly would require a community effort.)

Q3: What role do weathering and erosion play in the compositional and dynamic evolution of volcanoes and volcanic arcs?

- Deprioritize this sub-question.

Question 5 Summary:

Evolution from MARGINS

focus on extrusives *and* **intrusives**

focus on evolution from basalt to **continental crust**
(intracrustal differentiation)

Use sequestered funds to target areas that are already well-characterized (mapped, with baseline datasets). Apply an arsenal of geophysical, geochemical, and geodynamic tools to characterize and understand the entire crustal column, including the plutonic rocks (i.e. what is *not* erupting), and how (if?) juvenile arc crust transitions to continental crust.