

12.490 Magma Mixing Lab

Magma mixing and crustal contamination

This lab is intended to give you some first hand experience in identifying evidence of magma mixing and crustal contamination.

Giant Crater suite. This suite of lavas records crustal level processes in a compositionally zoned lava flow at Medicine Lake volcano, a back arc volcano in the S. Cascades, USA.

- 1) Go over the eruptive history of the giant Crater lava field (Donnelly-Nolan et al. and Baker et al. reprints) and then examine thin sections of each of the eruptive phases.
- 2) What is the evidence of magma mixing preserved in the Group 1, 2 or 3 lavas that you can see in thin section and/or using petrographic techniques at your disposal? How many different magmas are represented in these lavas? You don't need to look at all of the thin sections, look at least one from Group 1 and one from Group 3.
Group 1: 83-1, 83-2 Group 3: 82-65, 82-66, 82-71.
- 3) Look at inclusions 85-32 and 1160M. What do they tell you about the nature of the components in the mixed magma?
- 4) For the Group 4 lavas can you tell that they represent mixed magmas? What evidence is used by Baker et al. (1991) to reach this conclusion?
Group 4: 80-2b, 82-59, 82-58, 82-39
Group 6 – Are these mixed? Why or why not?
Group 6: 82-72c, 82-72a
- 5) This mixed magma (79-26) is also from Medicine Lake volcano, and is from the Glass Mountain lava flow. Note the differences in mixing texture in these rocks when compared with the Giant Crater samples. How does the style of mixing differ? What factors do you think led to these differences? (see hand sample),
- 6) This sample (83-55) is a classic andesite from the Cascades (from Mt. Shasta). Identify the phenocryst phases that are present. What can you say about the types of magmas that were mixed together? How many different magmas are represented in these lavas?