Calc-alkaline Plutonic Rocks

This set of samples is from the Academy pluton in the western foothills of the Sierra Nevada. The pluton is Jurassic – Early Cretaceous in age and represents an excellent example of a zoned calc-alkaline pluton.

As you work through this lab, use the accompanying paper by Mack et al. and the map to think about the following questions.

1) Which of these samples represent liquid compositions and which ones are cumulate residues of crystallization? Hint: Do the Tables of chemical analyses in the paper help?

2) Based on the map and your observations in thin section can you distinguish between the emplacement mechanisms illustrated in Fig. 13 and discussed beginning on p. 684?

3) Arrange the samples that you examine below in order of increasing bulk silica content and degree of differentiation – e.g. least evolved to most evolved. Does the An content of plagioclase help you out here? Why?

Sample HBG-1  This is the most mafic sample in the suite – a hornblende gabbro. What are the primary igneous minerals? What was that early-forming mineral that is now altered?

Sample SM-4 and CM-5. These sample are both quartz diorites. Again, choose one of these two samples and identify the major igneous minerals. Are these samples liquids or cumulates?

Sample AC-7  This sample is a norite  What minerals are present in this sample?

Sample AC-8 and AC-9. Choose one and these two samples and identify the major igneous minerals. Are these samples more evolved than CM-5 and SM-4? What evidence do you use?

Sample AC-12  This is tonalite. Identify the major igneous minerals, determine the plagioclase composition. Order it along with CM-5 - SM-4, Ac-8 – AC-9 in terms of extent of differentiation.