Seminar 2 (to follow Lecture 8)

"Crystal chemical controls on the partitioning of Sr and Ba between plagioclase feldspar, Silicate melts, and hydrothermal solutions" by Blundy and Wood, GCA, 55, 193-209, 1991.

Feldspar is the most abundant mineral in the earth's crust, and it plays an important role in petrogenetic processes, such as fractional crystallization, occurring within the earth's crust. We have already seen that the occurrence of Eu^{+2} and its preferential incorporation into feldspar is useful in understanding the importance of feldspar in a process (Fig. **16 of Lecture 6**); we have also seen that Sr is a compatible element in feldspar.

Plagioclase phenocryst/matrix measurements clearly show that the partition coefficient for Sr increases with increasing albite, i.e. ($NaAlSi_3O_8$), content of the plagioclase (Fig. **17 of Lecture 6**). Note that this is a counter-intuitive result if one associates Sr with Ca, since both are alkaline earths. This paper concludes that crystal chemistry control is dominant because the size of the structural site occupied by Na^{+1} in feldspar is more suitable for Sr^{+2} than that occupied by Ca^{+2}. Also charge balance is not a limiting factor because Sr^{+2}-Na^{+1} exchange is readily balanced by Al^{+3}-Si^{+4} exchange. The crystal structure is inferred to be more important than temperature and melt composition. An important contribution of this paper is the comparison of plagioclase/melt partition coefficients determined experimentally and in natural systems (see their Fig. 2).