

Figure 1: Plot of Bayes factor versus posterior probability of H_0 . The prior probability of H_0 is p_o . The yellow region is defined by the range of B ($0 < B < 1$) and is where the posterior probability of H_1 increases over p_1 . The grey region is defined by $B > 1$ and is where the posterior probability of H_0 is larger than p_o .

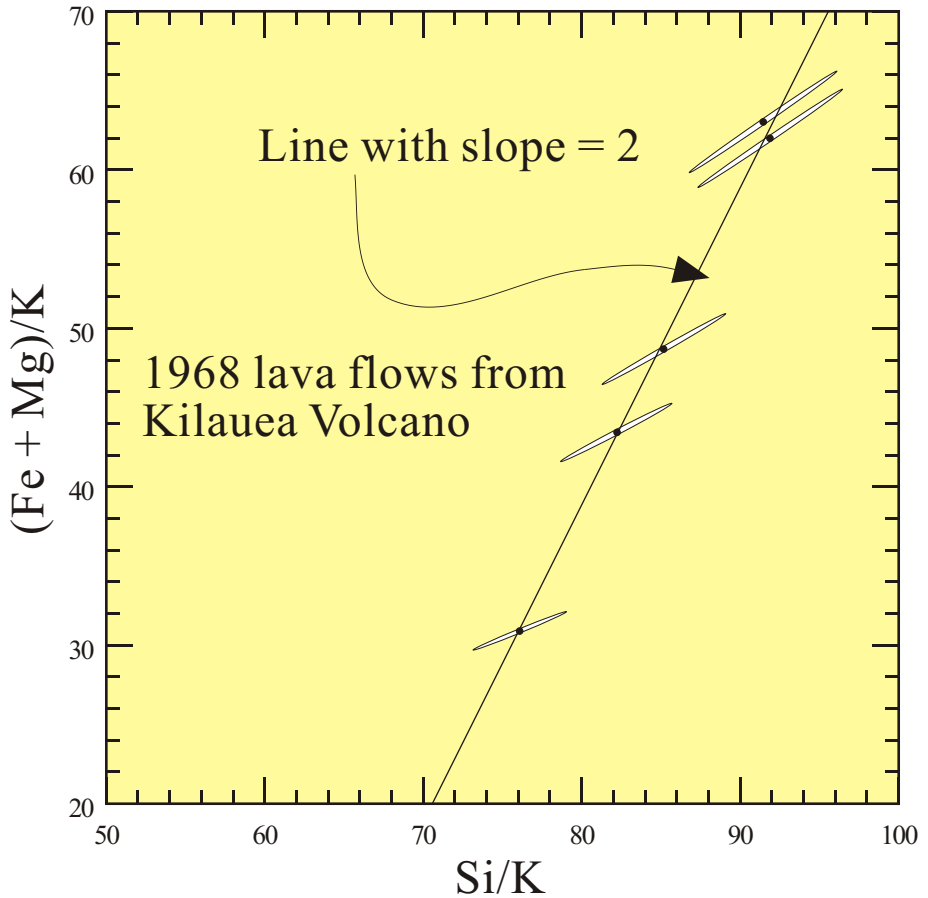


Figure 2: Element ratio diagram for picrites and a basalt that, by hypothesis, are related by olivine sorting. A consequence of the hypothesis is that the data should all lie on a line with a slope of 2. Comparing the dispersion in the intercepts formed by drawing a line with a slope of 2 through each data point with the dispersion expected from analytical uncertainty tests the hypothesis.

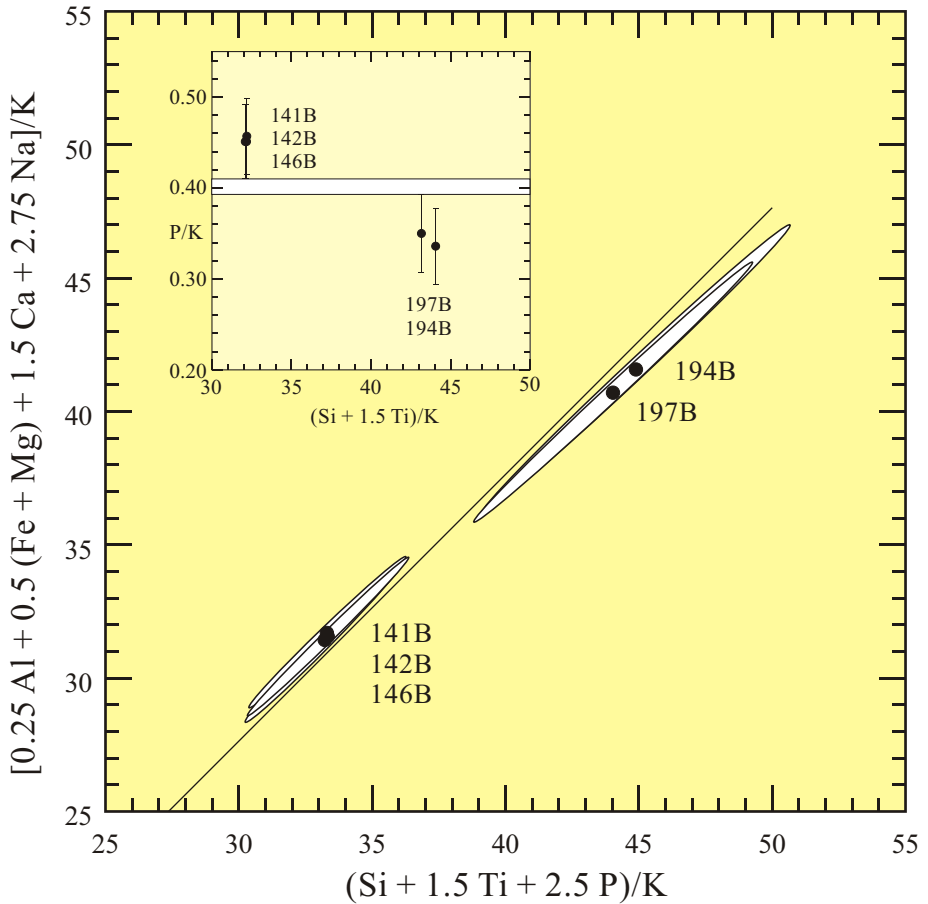


Figure 3: Pearce element ratio diagrams for samples of lava flows collected at two sites near Mt. Edziza, British Columbia. The problem is whether the samples are from the same magma batch or not. If they are, then it is likely the flows at the two sites are the same age. If they are not from the same magma batch, then only by coincidence can they be the same age.

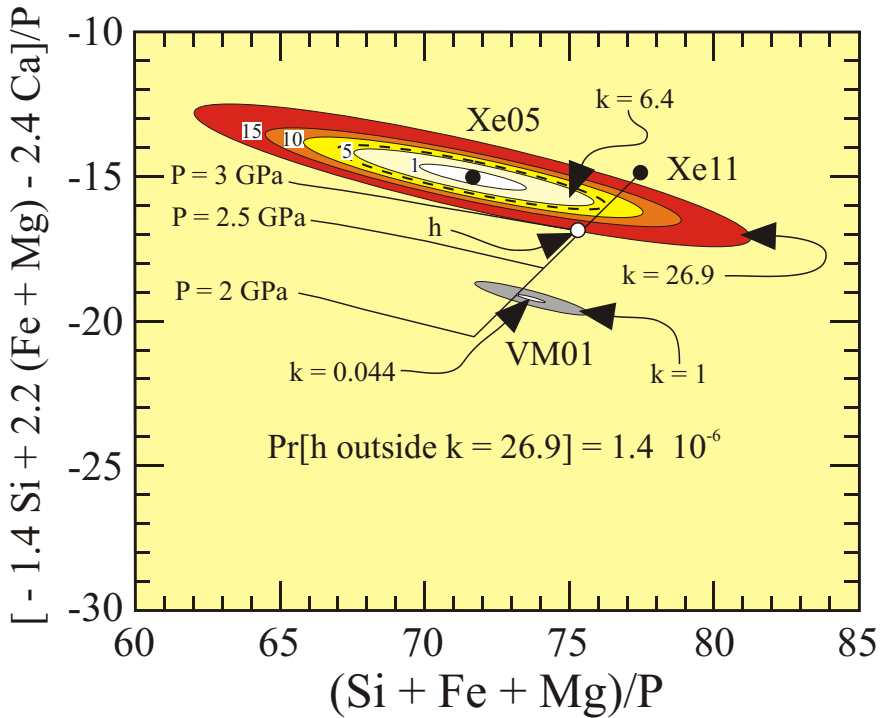


Figure 4: Pearce element ratio diagram for three samples from Volcano Mountain, Yukon (Trupia, 1992; Trupia and Nicholls, 1996). Fractionation of olivine from Xe11 would produce melts that fall on a line with a slope of one through Xe11 (e.g. VM01). Clinopyroxene plus olivine fractionation from Xe11 would produce melts that would fall on lines with small negative slopes. The particular line depends on pressure. Pressures larger or smaller than approximately 3 GPa produce fractionation lines at more negative values of the Y axis variable. Contours around the data points are lines of equal probability density. Labels on the contours are values of the parameter k [equation (33)] that characterize the particular probability densities. The point labeled h marks the coordinates where a contour is tangent to the fractionation path at 3 GPa. The dashed ellipse around the point representing Xe05, $k = 6.4$, is just tangent to the path with a slope of one that represents olivine fractionation.

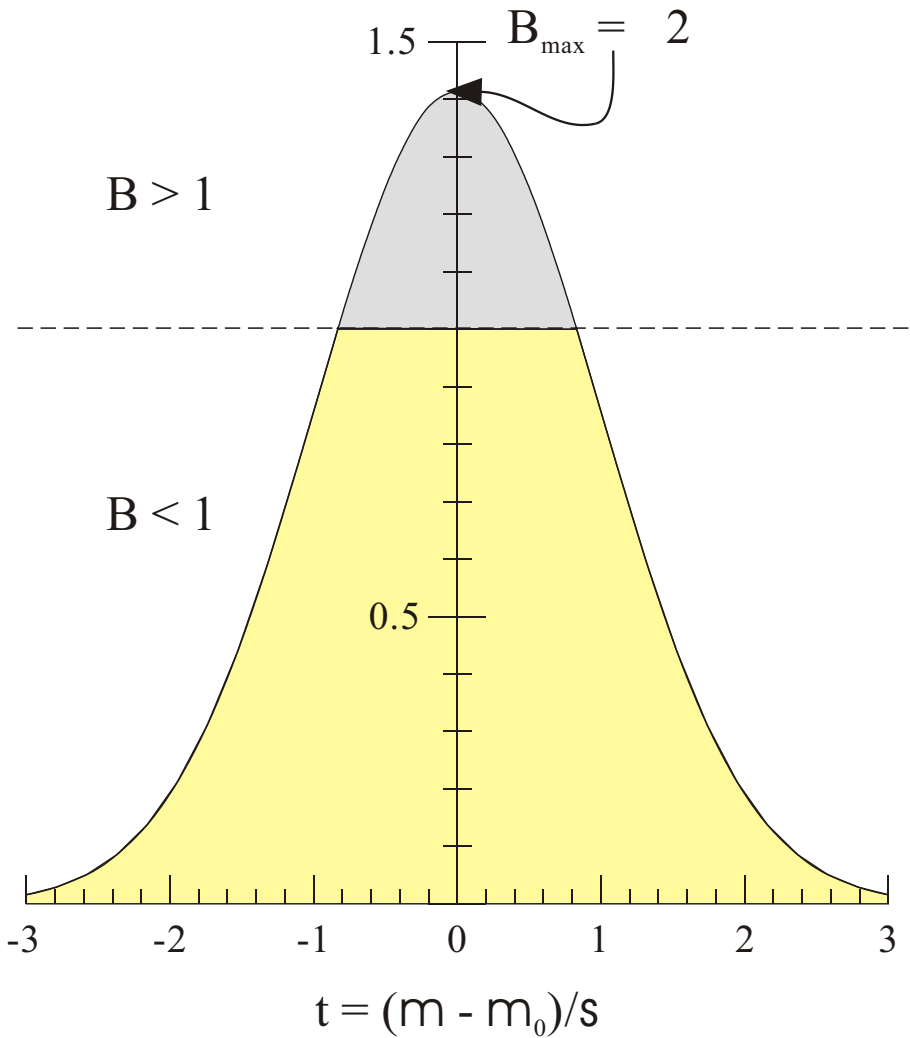


Figure 5: Plot of the Bayes factor, B , versus t [equation (22)]. Values of the Bayes factor that increase the posterior probability over the prior probability are limited to the range 1 to 2.

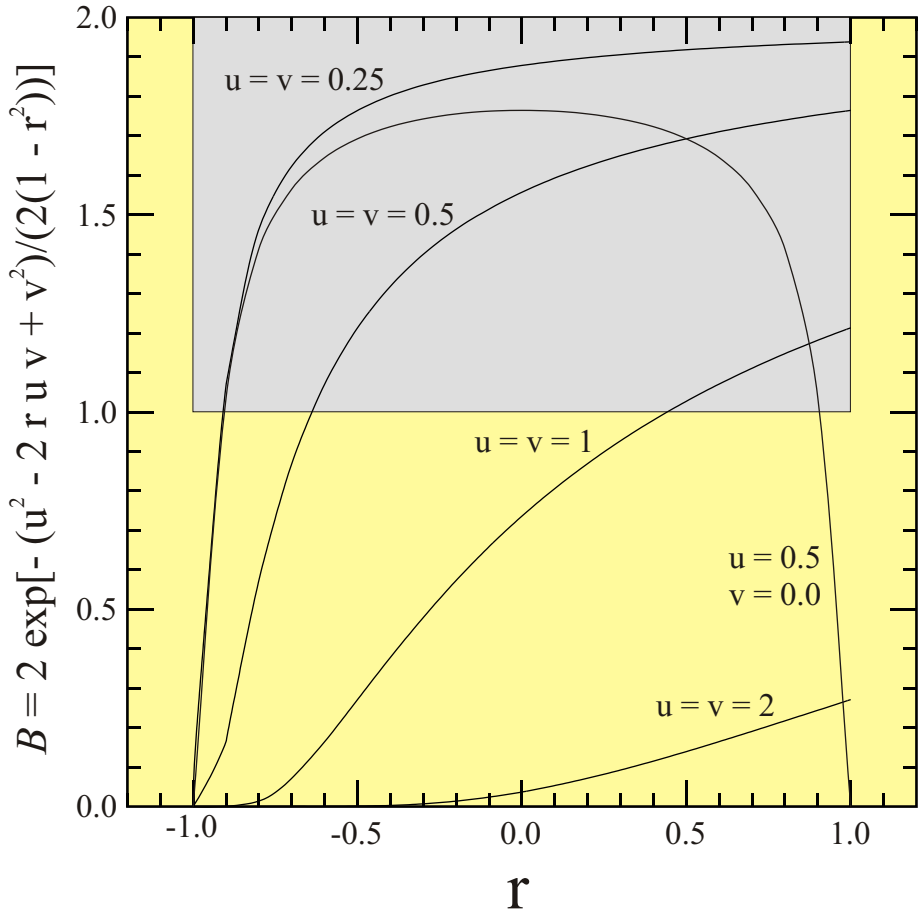


Figure 6: Plots of the Bayes factor, B , versus r , the correlation coefficient for several values of $u = v$ [equation (32)]. Values of B that increase the posterior probability over the prior probability are limited to the range 1 to 2.

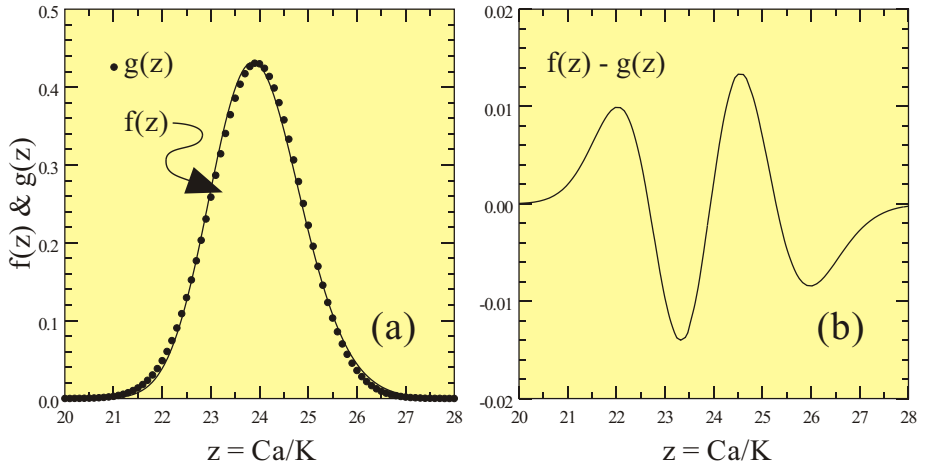


Figure A-1: (a) Plot of the exact and approximate probability distributions for the ratio Ca/K listed in Table 1. See equations (A-6) and (A-7). (b) Difference between the two distributions.