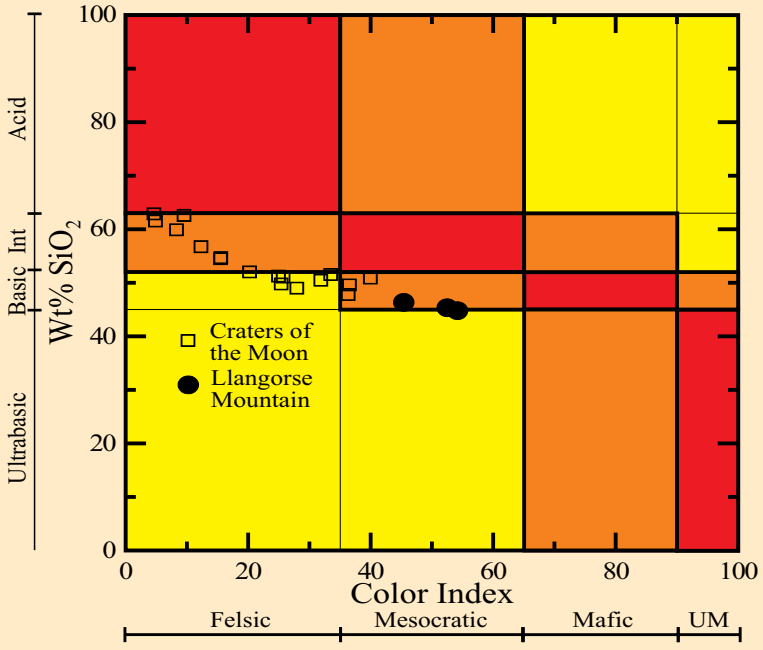

Figure 1: Comparison of the general chemical and modal classifications. Red fields mark on-to-one correspondence between the two classifications. Orange fields represent rocks that could be incorrectly identified in one or the other classifications. There should be few if any igneous rocks with compositions that would fall in the yellow fields. Chemical analyses are precise and presumably accurate. Modes, however, can be subject to systematic error. Modal analyses made with the microscope generally over-estimate the colored, high-relief minerals. The modal analyses represented on the figure were done with non-optical methods and should be free of systematic error. Consequently, they plot to the left of the red fields, which were established on the basis of modal analyses done with the microscope.

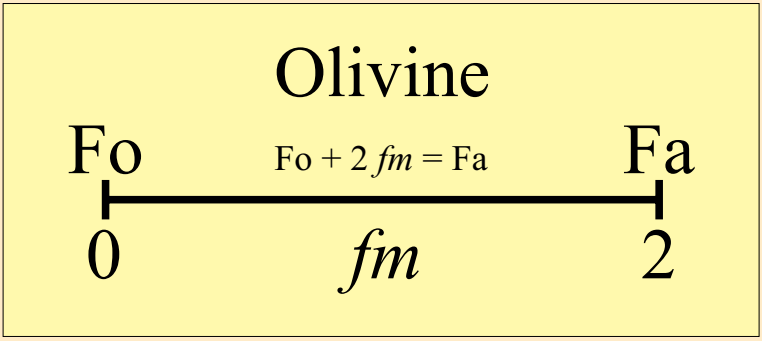

Figure 2: Thompson space representation for binary olivine. The exchange component, fm, varies from 0 to 2 because there are 2 moles of Mg in a mole of Fo that can be replaced by Fe. The value assigned to the exchange component is the number of moles of Mg that have been replaced by Fe in one mole of olivine. The relationship between the Thompson component, fm, and the more commonly used mole fraction, XFo, is: XFo = 1 - fm/2. The additive component is Fo. The value assigned to this variable is the number of moles of olivine in a known amount of the rock. In other words, Fo is the modal amount of olivine in the rock when reported on a mole basis.

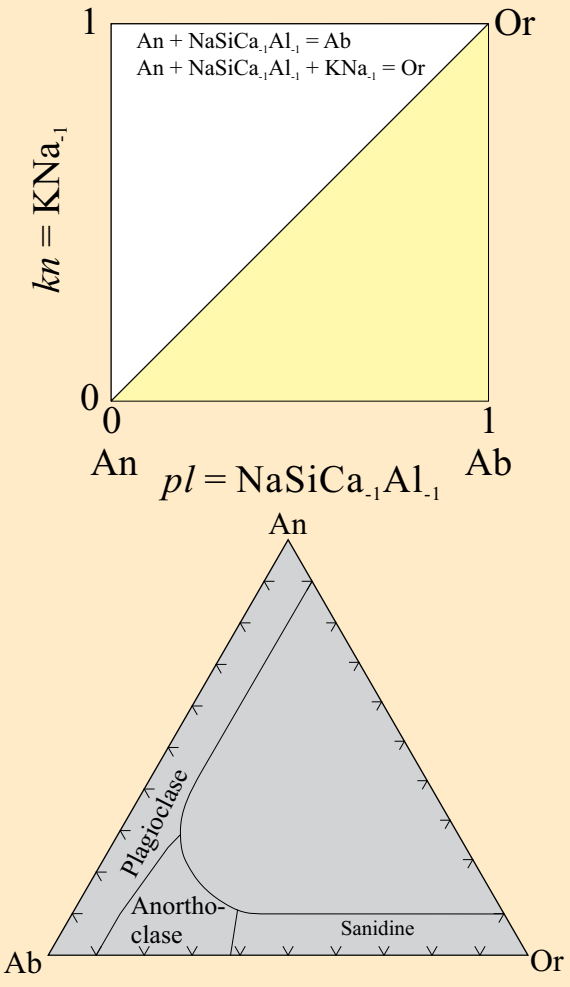

Figure 3: Thompson space and traditional representative of the compositions of ternary feldspars. The Thompson space can be obtained from the traditional diagram by a 60° rotation and a distortion of the triangle from an equilateral shape to a right triangle.

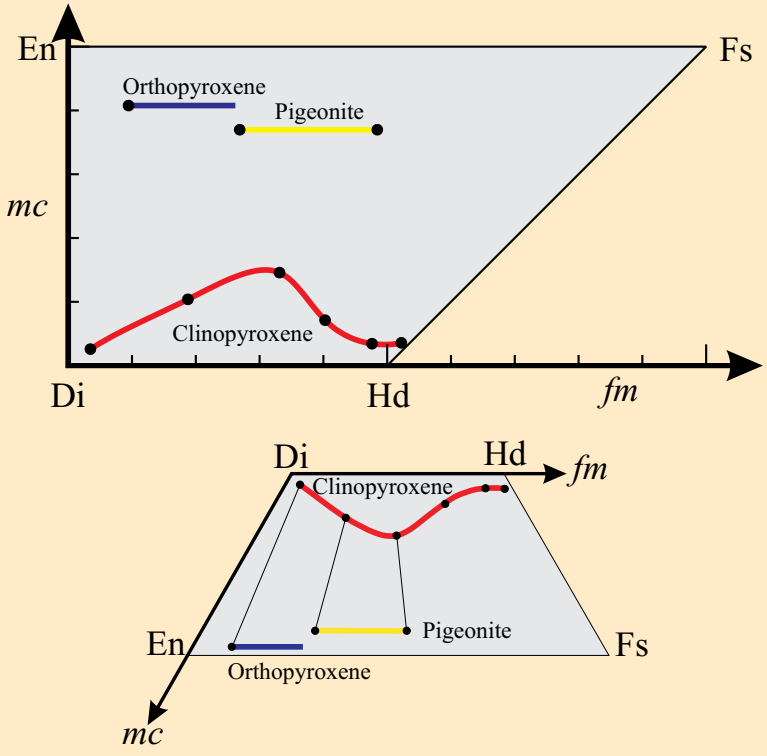

Figure 4: Thompson space and traditional representations of the compositions of quadrilateral pyroxenes. The origin is at an end member composition, which can be picked arbitrarily. Clinopyroxene is more abundant than orthopyroxene so Di is a more logical choice than En for the additive component.

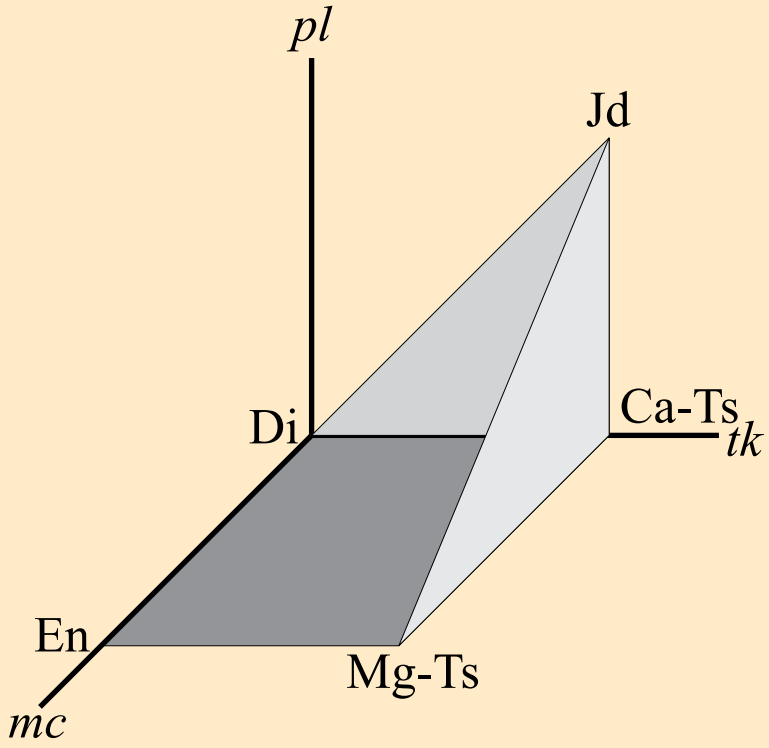

Figure 5: Thompson space diagram showing the subspace occupied by Fe-free, Na and Al-rich pyroxenes. Although tk and pl are prominent exchange components in amphiboles and feldspars, they also are important in pyroxenes.

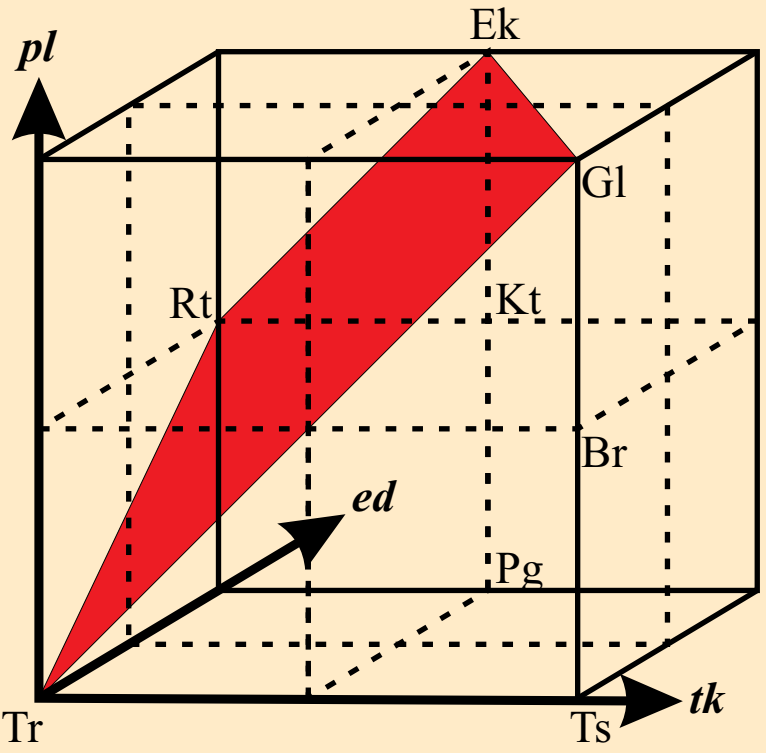

Figure 6: Thompson space diagram showing the subspace occupied by the Mg end members of the Ca-rich amphiboles. The Fe end members can be described by a subspace that has the same shape as the diagram shown. The axes of the space are defined by changes in the tk, ed, and pl exchange components. The end members are Tr (tremolite), Ts (tschermakite), Pg (pargasite), Ek (ekermanite), Rt (richterite), Kt (kataphorite), Gl (glaucophane), and Br (barroisite). Amphibole compositions are restricted to the space beneath the red plane.

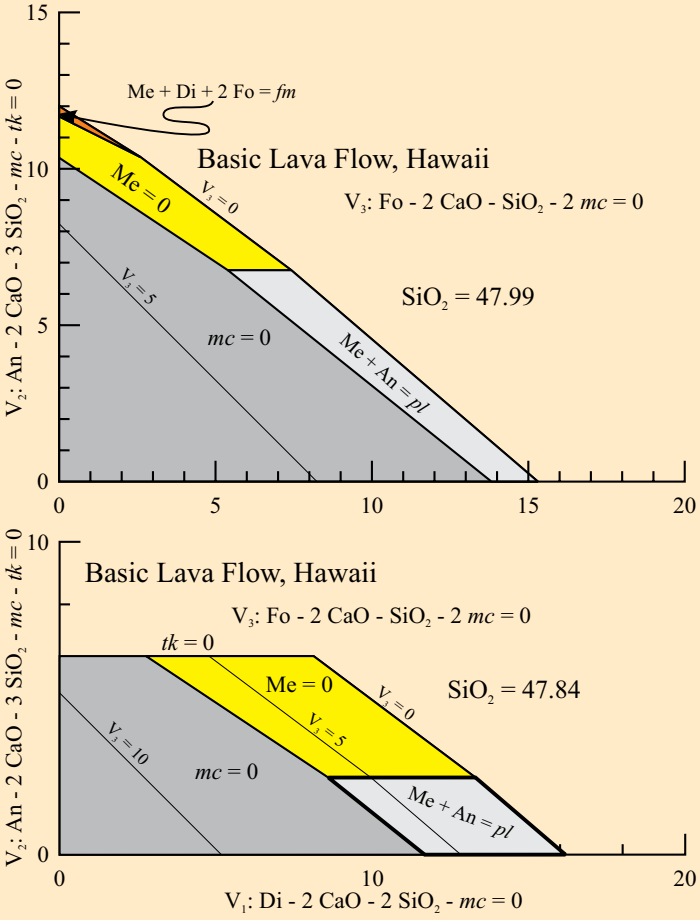

Figure 7: Thompson space for two different basic melts. The spaces are three dimensional and display the limits to the spaces where melt can coexist with pyroxene (V_1), plagioclase (V_2), and olivine (V_3). The yellow surface is the surface where the melt composition can crystallize to an assemblage of clinopyroxene, plagioclase, and olivine.

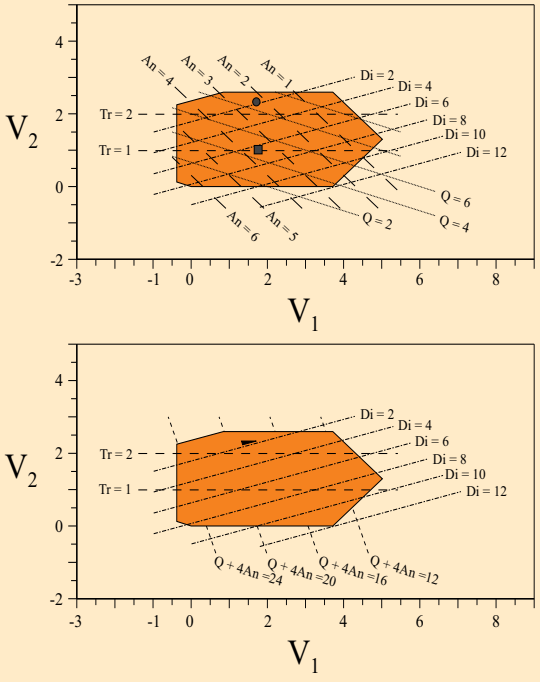

Figure 8: Reaction space and isopleths for a basaltic composition derived from the modal composition of BR-2. Upper diagram shows the isopleths with An and Q contents as independent quantities. A dot marks the intersection of the Di and Tr isopleths for the modal amounts measured in thin section. A square marks the intersection of the An and Q isopleths for the modal amounts measured in thin section. Lower diagram is drawn with the amounts of Q and An constrained by Equation (51). The small black triangle encloses the intersections of the Tr and Di, the (Q + 4 An) and Tr, and the (Q + 4 An) and Di isopleths for the modal amounts of the minerals in the rock (Table 8). The zero isopleths are coincident with the solid lines marking the boundaries to the reactions spaces.

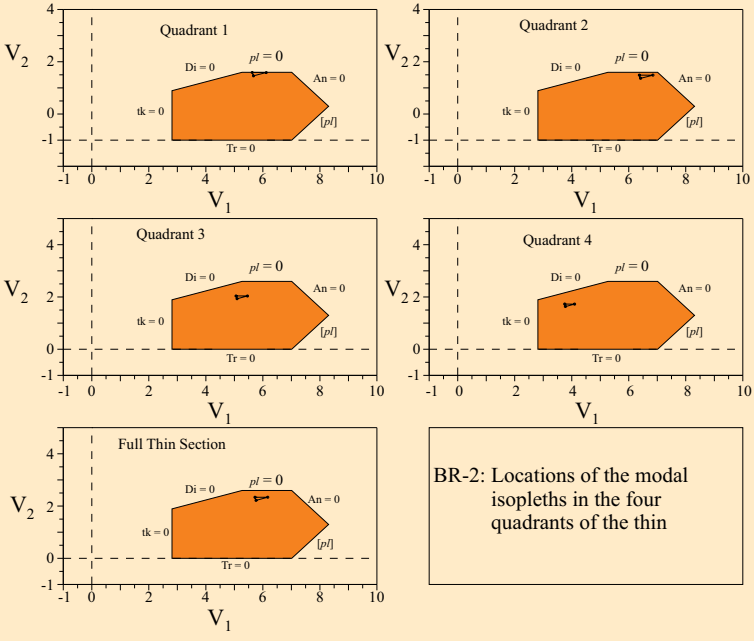

Figure 9: Reaction space defined by the chemical compositions of BR-2. Small black triangle enclose the intersections of the Tr and Di, the Tr and (Q + 4 An), and the Di and (Q + 4 An) isopleths defined by the modal amounts of these phases in the four quadrants of a thin section.

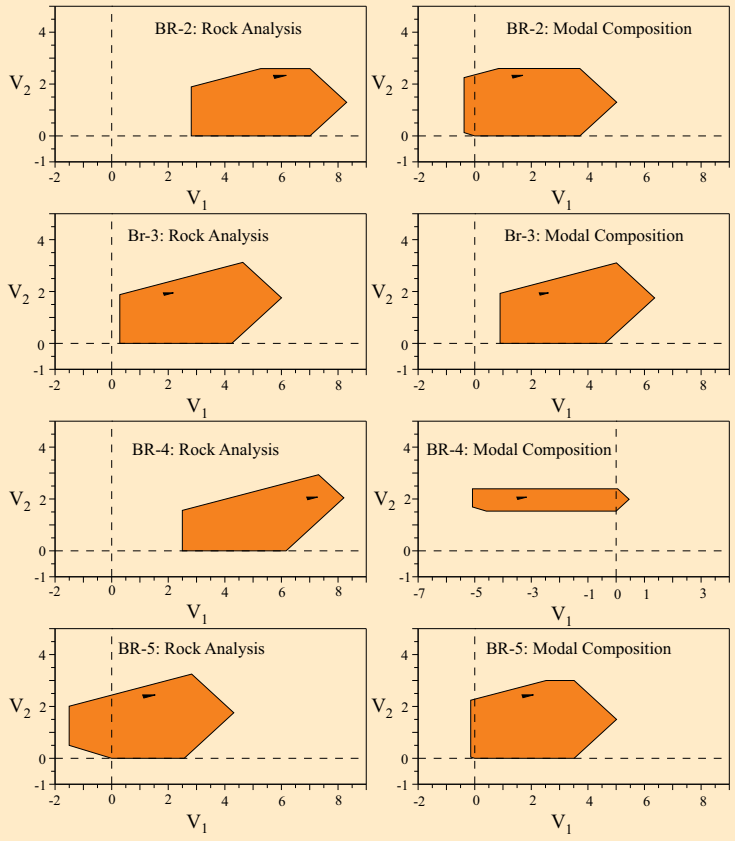

Figure 10: Comparison of reaction spaces defined by the chemical compositions of the rocks and by the compositions derived from the modal amounts of the major minerals in the rocks (see Table 8).

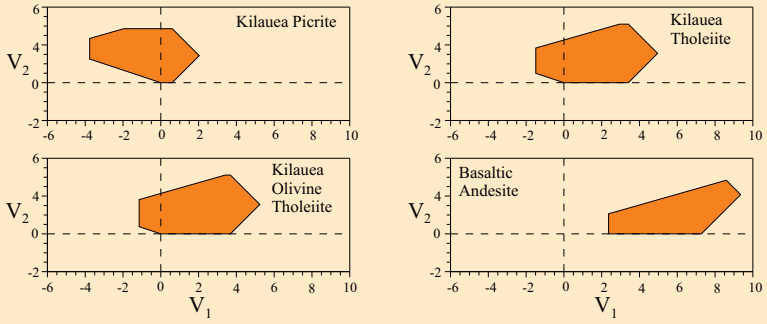

Figure 11: Reaction space polygons for a tholeiitic picrite, olivine tholeiite, tholeiite basalt and a basaltic andesite. Compositions of the Kilauean rocks from Wright (1971, Table 4: HM68-4, olivine tholeiite; HM68-12, tholeiite) and Wright et al. (1975, Table 3: Hi68-12, picrite). The basaltic andesite composition is from Lowder and Carmichael (1970, Table 2: 339).

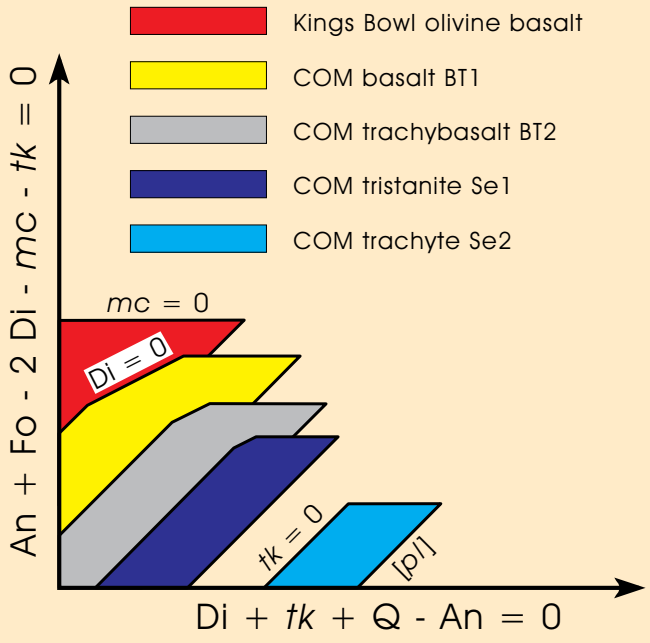

Figure 12: Thompson space diagram for the Craters of the Moon lava flows and a Kings Bowl olivine basalt.

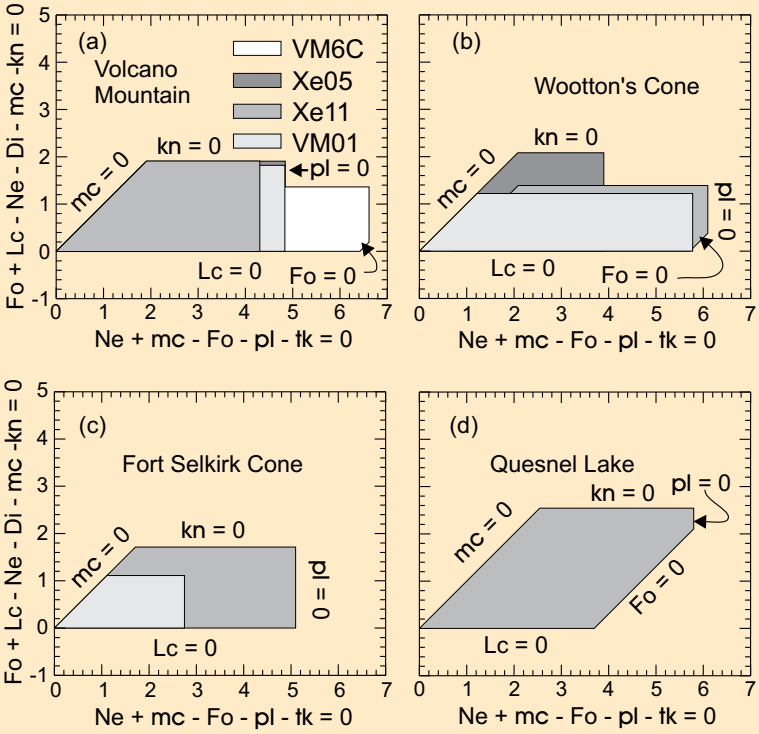

Figure 13: Thompson space representations of nephelinite compositions as olivine, clinopyroxene, nepheline, and leucite assemblages. Rocks from Yukon Territory (Selkirk series, Volcano Mountain, Wootton's Cone and Fort Selkirk Cone) and British Columbia (Quesnel Lake).

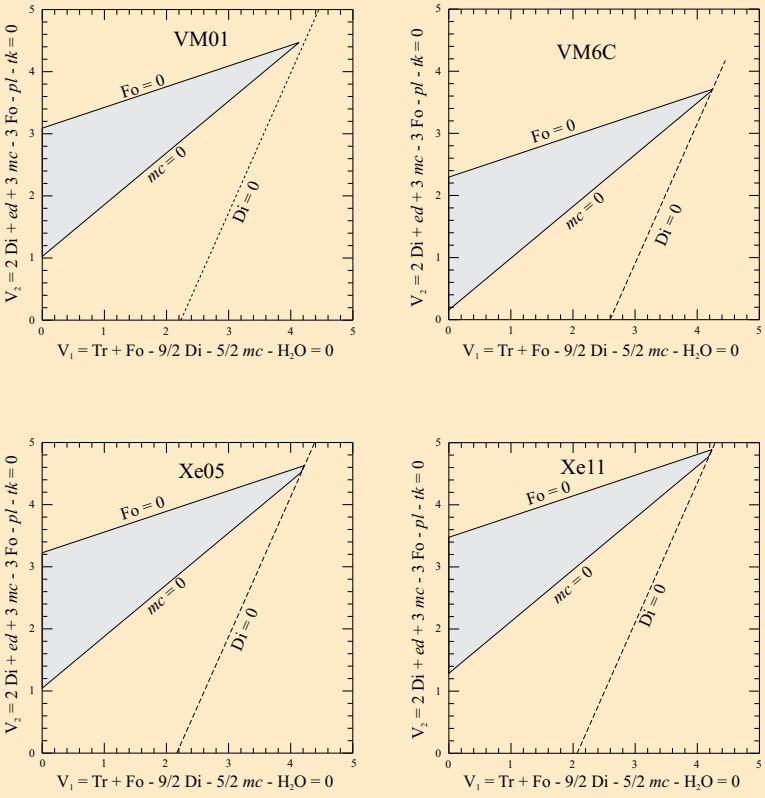

Figure 14: Thompson space representations of Volcano Mountain nephelinite compositions as olivine, clinopyroxene, and amphibole assemblages.