Thermobarometry, from theory to practice: Pseudosection calculations using Perplex Software

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Retrieval of pressure-temperature-time (P-T-t) history of a particular piece of metamorphic rock is always a challenge for petrologists. The internally-consistent thermodynamic data is the first compound for a successful recipe. The activity-composition relations among the minerals, melts, fluids need in order to improve the computations. Two strategies applied to calculate the P-T conditions: conventional methods and pseudosections. The latter approach is a modern way to evaluate the equilibrium assemblages of a particular segment of a rock sample. Thus, alternatively they named as *equilibrium phase maps*.

In particular, pseudosections provide information about mineral assemblages and their relation with the intensive variables, although showing only the equilibria that are relevant to one bulk composition. This is a great way to illustrate mineral assemblage` dependence with pressure or temperature. In that context, pseudosections provide the tool to integrate hand specimen features with thin section textures like reactions between specific minerals, peak assemblages, mineral zonation or stability of certain mineral(s).

Among various computer software that allow P-T calculations and pseudosection, THERMOCALC, THERIAK-DOMINO and PERPLEX are the most popular. In the current lecture, I attempt to navigate through the PERPLEX logic, advantages and disadvantages, calculation steps using theory and examples.

The PERPLEX is a collection of several programs dedicated on phase diagram calculations. The PERPLEX calculation procedure includes the following: i) run the program BUILD to create the necessary input information describing the calculation, ii) read the output file using the program VERTEX which output the calculation summaries and files, iii) read the output file using the program PSSECT which output a PostScript file of the diagram (e.g. pseudosection). Another program is WERAMI which read the output of VERTEX. WERAMI permits the user to extract information from the section at a point, throughout a region, or along a line or curve and is able to provide several calculations such as mineral isopleths or modal of a phase(s) or any other that is incorporated within the relevant menu. The WERAMI output can be read either by program PSTABLE or using the more sophisticated, windows-based program, PYWERAMI.