CALCULATED PHASE RELATIONS FOR UHP ECLOGITES AND WHITESCHISTS IN $Na_2O - CaO - K_2O - FeO - MgO - Al_2O_3 - SiO_2 - H_2O$

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Pressure-temperature grids in the system $Na_2O - CaO - K_2O - FeO - MgO - Al_2O_3 - SiO_2 - H_2O$ and its subsystems have been calculated in the range 15 – 45 kbar and 550 – 900 °C, using an internally consistent thermodynamic dataset and newly-developed models of complex solid solutions, with the software THERMOCALC. Minerals considered for the grids include garnet, omphacite, diopside, jadeite, hornblende, actinolite, glaucophane, zoisite, lawsonite, kyanite, coesite, quartz, talc, muscovite, paragonite, biotite, chlorite, and plagioclase, with kyanite, muscovite, coesite/quartz, and H_2O (and also garnet in the case of the full system) assumed to be present. Compatibility diagrams are used to analyse the consistency and validity of the grids. P-T pseudosections prove to be a powerful approach to model natural eclogites of different compositions and a whiteschist from UHP terranes in China.

Under water-saturated conditions, chlorite-bearing assemblages in Mg and Al-enriched eclogites are stable at lower temperatures than in Fe-enriched eclogites. The relative temperature stability of the three amphiboles is hornblende > actinolite > glaucophane (amphibole names used *sensu lato*). Talc-bearing assemblages are stable only at low temperature and high pressure in Mg and Al-enriched eclogites. For most eclogite compositions, talc coexists with lawsonite, but not zoisite, in the stability field of coesite.

Chlorite and lawsonite are two important H_2O-carriers in subducting slabs. Depending on bulk composition and P-T path, amphibole may or may not be a major H_2O-carrier to depth. In most cases, dehydration of a mineral takes place gradually, with H_2O content buffered by divariant or higher variant assemblages, rather than abruptly, as was predicted by intersection with univariant dehydration reactions in P-T projections with geotherms in various types of subducting slab. Therefore, fluid fluxes in subduction zones are likely to be continuous, with the rate of dehydration changing with changing P-T. Further, eclogites of different bulk compositions dehydrate differently. Dehydration of Fe-enriched eclogite is nearly complete at shallow depth, whereas Mg and Al-enriched eclogites dehydrate continuously down to great depth and may provide hydrous fluid for arc magmatism.