

**THERMODYNAMIC COMPUTATION OF ECLOGITE PHASE EQUILIBRIA:
THE KEY ROLE OF REDOX STATE**

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Thermodynamic calculations are vital for estimating the temperatures and pressures experienced by eclogites. Such calculations are especially important for locating the minimum temperatures and pressures required for eclogite stability; i.e., the blueschist-eclogite and amphibolite-eclogite transitions. These transitions are best constrained by constructing pseudosections with programs such as THERMOCALC or PERPLEX. The accuracy of pseudosections for quantifying eclogite phase equilibria hinges on well-tested and robust solid-solution models.

We calculated pseudosections for a series of metabasalts used in high-pressure experiments and compared them to experimental phase equilibria. We initially used a series of models that have been repeatedly applied to high-pressure metabasites in the literature and found dramatically lower pressures and temperatures for the eclogite transitions compared to the experiments. These models do not consider ferric iron; however, high pressure rocks commonly have high ferric iron contents, particularly in phases such as clinopyroxene, amphibole, and epidote. Adding ferric iron to our models and imposing oxygen fugacities of QFM and NNO markedly increases the pressures and temperatures of the amphibole-out boundary and increases the temperature of the lawsonite-out curve. Nevertheless, notable discrepancies still exist, particularly with epidote. Within this framework, we are able to evaluate the strengths and weaknesses of various solid-solution models and to demonstrate the need for improved solid-solution models for certain phases.