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Peridotite melting calculations in THERMOCALC: an activity-composition model for mafic melt

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We present thermodynamic calculations on the melting of peridotite, in the system NCFMF'ACrS (Na2O-CaO-FeO-MgO-Fe2O3-Al2O3-Cr2O3-SiO2). The work was performed with the phase equilibrium calculation software THERMOCALC. We employ a new activity-composition model for mafic melts, together with existing solid solution models that have been extended to an appropriate compositional range.

The mafic melt model facilitates the investigation of, for example, the solid assemblages that coexist with melt along a given supersolidus P-T path, and the melt production associated with each. It may also be used to calculate pseudosections (multivariant phase diagrams drawn for a single bulk composition). It is formulated in the spirit of THERMOCALC's granitic melt model, which has been extensively used, via pseudosections, to explore the thermodynamic constraints on metapelite melting.

The calculations presented are preliminary, and many further applications are possible. It is intended that the melt model should ultimately handle a larger compositional range: the addition of TiO2, K2O and H2O are priorities.