

Temporal stability and pressure calibration of barium carbonate and talc/pyrex pressure media in a piston-cylinder apparatus

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ABSTRACT

New melting experiments in a 0.5 inch piston-cylinder apparatus from 0.5 to 3.0 GPa on compositions along the diopside-wollastonite join show that the eutectic liquid composition, which varies with pressure, does not change with time in experiments with barium carbonate or with talc/pyrex pressure media. Mapping out the trace of the diopside-wollastonite eutectic curve in P - T space with both piston-in and piston-out experiments reveals high-temperature pressure intensification in piston-in experiments with barium carbonate or talc/pyrex assemblies, in contrast to frictional loss of pressure at lower temperatures. A new pressure correction algorithm, derived by multiple regression analysis, incorporates both effects. When applied to a barium carbonate experiment at the intersection of the CMAS spinel-lherzolite to garnet-lherzolite transition (SGT) with the model peridotite solidus, the model pressure increases from 2.25 to 2.82 GPa. When a similar type of correction is applied to piston-out experiments run in talc/pyrex assemblies, the pressure of the intersection of the SGT and the CMAS solidus decreases from 3.0 to \sim 2.9 GPa, in agreement with the barium carbonate experiments from this study and with experiments from other studies run with salt/pyrex assemblies.