Abstract Submitted
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**Shock velocity, sound speed, and Hugoniot temperature in silicate liquids to 100 GPa**[1] PAUL ASIMOW, JINPING HU, OLIVIA PARDO, Caltech, CHANG SU, Chinese Academy of Sciences, XIAOJUAN MA, Southwest Jiao Tong University — Modeling planetary interiors and magma oceans requires the liquid properties expressed by a thermodynamically complete equation of state (EoS), relating pressure, volume, temperature, and internal energy. Shock compression offers techniques that can, in concert, yield data needed to calibrate a complete liquid EoS. The Hugoniot is not sufficient; it must be coupled with shock temperature and bulk sound speed. We studied two silicate liquids, diopside-anorthite eutectic (preheated above glass transition) and soda-lime glass. A matching pair of light gas gun shots at each pressure use thick and thin flyer plates; the Caltech six-channel pyrometer is the diagnostic. A thick flyer launches a supported shock through the sample, yielding shock temperature and shock velocity. A thin flyer produces a rarefaction wave that overtakes the shock, yielding bulk sound speed and a replicate temperature. The shock and rarefaction velocities of Mo flyers and drivers are known. Temperature data confirm heat capacities larger than ambient pressure values or classical limits. Sound speeds confirm increasing Grüneisen parameter upon compression, consistent with previously finite difference comparison of parallel Hugoniots. More experiments will test the Mie-Grüneisen approximation for these liquids.

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