Abstract Submitted
for the SHOCK13 Meeting of
The American Physical Society

Deformation response of rocky material for a range of stress states and strain rates ANGELA STICKLE, K.T. RAMESH, The Johns Hopkins University — The failure of rocky materials under impact conditions will occur in a rapidly evolving, multi-axial stress state. Significant improvements in understanding impact processes, then, can come from physically-based models for the dynamic response of materials under general stress states. To provide insight into the deformation response of geologic materials under impact conditions, we present results from a suite of failure experiments on basalt under general stress states. Compression and tension/torsion Kolsky bars are used to illustrate the dynamic (100-1000 1/s) compressive, tensile, and shear responses of the material. Quasi-static compression experiments are used to determine deformation mechanisms at low rates (10^{-3}-10^{-4} 1/s). Using results from these experiments, the evolution of strength and damage mechanisms with strain rate can be examined. High-speed imaging (frames every 2-4 μsec) is used to illustrate crack speeds and failure processes during experiments, while post-mortem SEM analysis provides information about fracture surfaces and relevant damage mechanisms across strain rates.

Angela Stickle
The Johns Hopkins University

Date submitted: 26 Feb 2013 Electronic form version 1.4