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**MATERIAL MODELS OF SMALL SOLAR SYSTEM BODIES FOR USE IN IMPACT
HAZARD MITIGATION MODELING**

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ABSTRACT

Computer models of the deflection and disruption of potentially hazardous objects (PHOs) require detailed material models in order to accurately predict the response of the target. A wealth of data on the composition of asteroids and comets has been returned directly from missions in situ (e.g. S. A. Stern 2011), and Earth-based experiments (e.g. Furnish et al. 2013). Here we seek to validate our model approximations against some of these newly available observations. We consider the SESAME equations of state (EOSs) used with the RAGE hydrocode to model target response to impacts and blast energy. Current EOSs approximate PHOs using Earth-analogue materials, e.g., quartz, dunite, hydrated tuff, water ice, and numerical convolutions of analog EOSs. Earth-analogues are used because the formulation of a comprehensive equation of state requires a large amount of experimental data that is destructive to the often-rare samples. Analogue EOS's can, however, perform very differently from the original material under shock loading. Experimental shock-loading and compositional data are becoming available for many PHO types. Here we compare available data from meteorites and small solar system bodies to analogue EOS's available in the public Los Alamos National Laboratory SESAME EOS database to explore the applicability and limitations of these models. We also use the composition data from meteorite and sample return analysis (e.g. Ebihara et al. 2011) to explore the potential response of PHO material types to neutron bombardment in MCNP and the ENDF neutron cross-section libraries, and attempt to provide recommendations on how to best approximate our current understanding of small solar system body composition in particle transport codes.