

APPLICATION OF PHOTOGRAMMETRIC TECHNIQUES TO CRATER MEASUREMENT FOR SHALLOW BURIED, SURFACE, AND SMALL HEIGHT OF BURST EXPLOSIONS

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ABSTRACT

Explosive cratering as a function of height/depth of burst (HOB/DOB) has been the focus of many studies in decades past, but few well controlled field-scale experiments have been completed since Pre-Multiple Burst (PMB-II) in late 1978. The recent Humble Redwood (HR) HOB/DOB effects experiment, a joint LLNL/DTRA seismic coupling series in desert alluvium in 2007, provided an opportunity for collecting new data. The HR experiment series consisted of seven 1450-lb ANFO detonations at scaled DOBs & HOBs ranging from -60 [$\text{m/kt}^{1/3}$] to +60 [$\text{m/kt}^{1/3}$]. Apparent crater data were collected post-test using conventional survey as well as state-of-the-art digital photogrammetric methods not used previously for cratering studies. The photogrammetric results were compared to traditional survey results as well as a model from a laser ranging system. The comparison indicates that digital photogrammetry provides a possible solution for rapid and accurate modeling of geological environments, especially in those that would otherwise be inaccessible due to safety concerns. The photogrammetric system used has been tested in other geologic environments (besides desert sediment) and has performed well for rock mass characterization contributing to RMR. The use of the system for mensuration in cratering studies is a new application which has proven highly effective.