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**Title:** Viewgraphs for w20\_marsimpacts

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## Viewgraphs for w20\_marsimpacts

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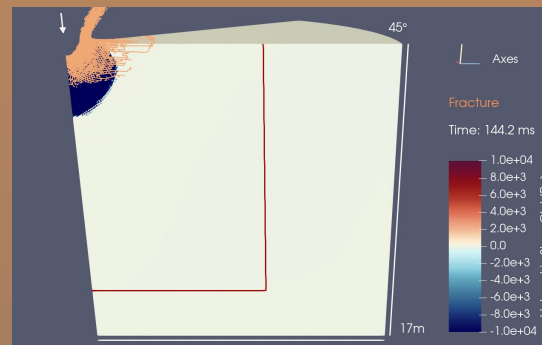
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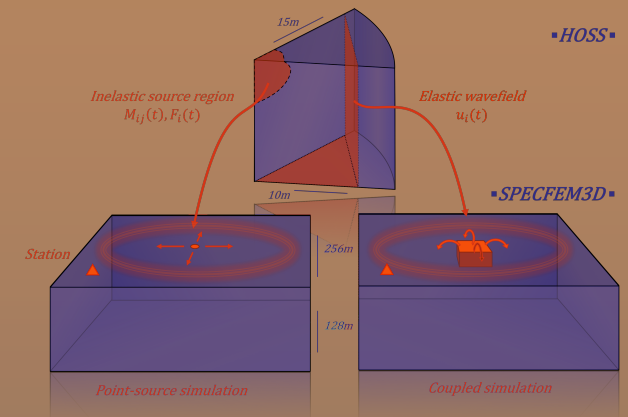
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LA-UR-22-XXXX May 2022

## COUPLING TWO CODES

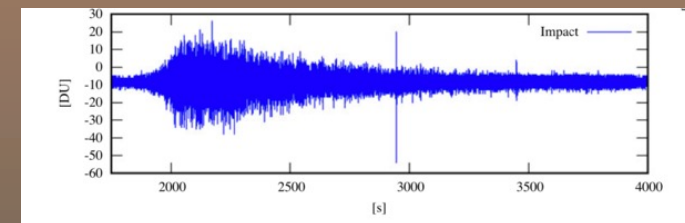
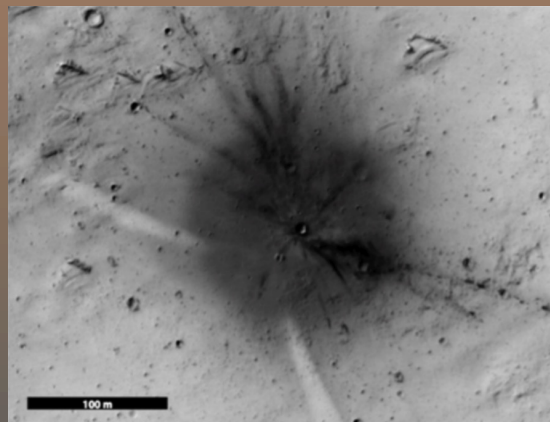


HOSS: finite-discrete element method for impact modeling.



SPECIFEM3D: spectral element method for seismic modeling.

## FOR THE DEVELOPMENT OF NEW SEISMIC MODEL OF IMPACTS



Left: New dated impact site with complex blast zone, including a complex albedo structure. Image credit NASA/JPL/University of Arizona. Figure from (Daubar et al. 2016). Top: seismic record of a lunar impact recorded on January 13, 1976.

## Modelization of a 1000m/s impact

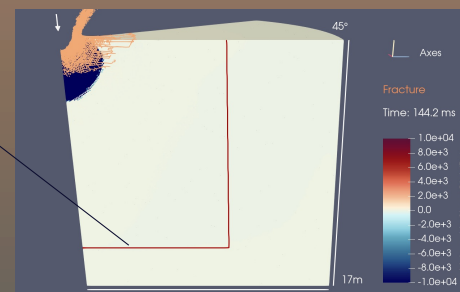
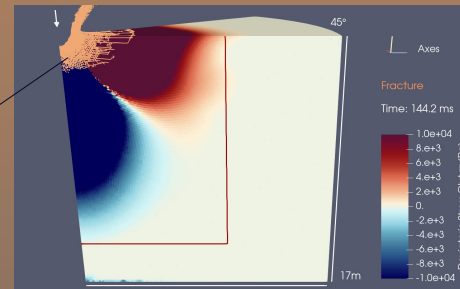
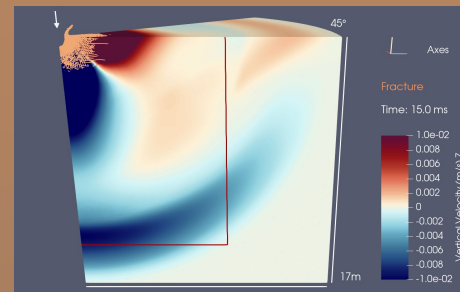
$\gamma_i^V, \gamma_i^S$  : equivalent forces of the impact.  
 $\gamma_i^V \approx -\partial_j \Pi_{ij}, \gamma_i^S \approx \Pi_{ij} n_j$  (and other terms...)

Stress Glut :  $\Pi_{ij} = \psi_{ij} - S_{ij}$   
 =  
 Ideal – Real stresses

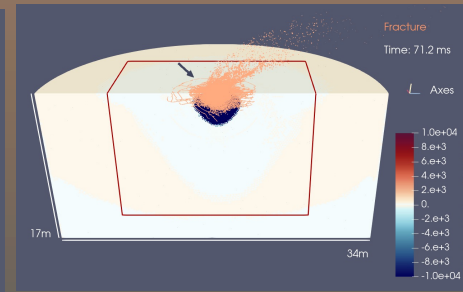
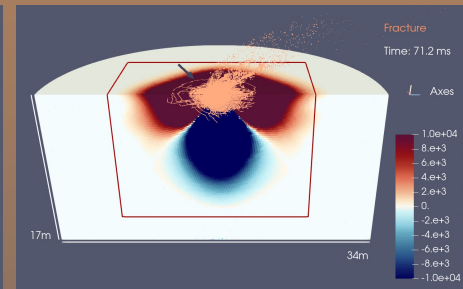
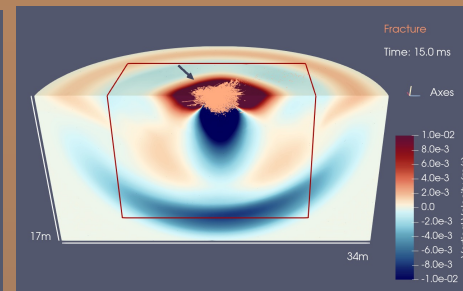
Fractured material.

Limits of the coupling box.

VERTICAL



OBLIQUE



Vertical velocity field  $V_z$  at 15ms.

Deviatoric Stress Glut Field component  $\Pi_{zz}^D$ .

Volumetric Stress Glut Field component  $\Pi_{zz}^V$ .