Hydrocode Simulation of the Ries Crater Impact

This work was conducted as part of a NASA Astrobiology project (David A. Kring, PI).

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Ries Crater

Ries Crater

• Complex Crater

• 24-26 km final crater diameter

• 12-16 km transient crater diameter

• The impact occurred 14 to 15 Ma

• The larger crater of a binary impact with a WSW to ENE trajectory; the other crater is called Steinheim

Ries Crater

LPI-JSC Center for Lunar Science and Exploration
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Kring (2005)
The target sequence is composed of 600 m of sedimentary lithologies and an underlying granitic basement. A computer hydrocode called CTH was used to model the impact event. The Malmian limestone thickens from the north to the south. For the model, an average thickness of 150 m was utilized.
Hydrocode Simulation of Ries Impact

Movie of Impact
Ries Target Sequence

Ries Crater

- Four time-steps in the hydrocode simulation of the impact event

- The projectile is 1.6 km in diameter and strikes at an angle of 45° at a velocity of 15 km/s.

- The trajectory is from WSW to ENE (left to right), so a plume of ejecta is thrown down-range (to the right).
Ries Target Sequence

Ries Crater

- Schematic view of the Ries and Steinheim craters after the impact event
- Because a sea cross-cut the ejecta ENE of the crater, a lot of that material was eroded. The best preserved impact ejecta deposits occur to the south of the crater

Modified after G. Wagner
Reconstruction of Ries Transient Crater

Transient crater

- Melt (dark gray zone) extended to a depth slightly greater than 2 km and was dominated by silicate basement lithologies
- The excavation depth (medium gray zone) approached 2 km
- The transient crater depth of disturbed rock (light gray zone) approached 5 km
- Fracturing of the crust extended to depths of about 6 km

Kring (2005)
References
