

MEMIN Impact Cratering Workshop

28.09.-29.09.2011

Institute for Geosciences – Geology

University of Freiburg

Albertstr. 23b

79104 Freiburg

Impact cratering is a fundamental geological process that affects all solar system objects with a solid surface. The formation of meteorite impact craters involves complicated physical processes that occur over a wide range of temperatures, pressures, and spatial scales, and consequently a multidisciplinary approach to research is required to improve knowledge of the cratering process.

The purpose of this workshop is to bring together researchers from various disciplines to address major outstanding problems. The presentation of ideas and results will be through a combination of invited and contributed oral presentations, followed by a substantial discussion session.

Wednesday, 28th September

14:00 Greetings and general introduction (Thomas Kenkmann)

14:15 Overview of the MEMIN Research Unit: Current status (Michael Poelchau)

Session I: Cratering Experiments

14:30-15:05 **Keynote Speaker:** Olivier Barnouin

Crater formation in pre-existing target structures: Implications from hyper-velocity impacts into particulates

15:05-15:30 **MEMIN:** Tobias Hoerth, Frank Schäfer, Klaus Thoma, Michael Poelchau, Thomas Kenkmann:

Hypervelocity impacts into dry and wet sandstones

15:30-15:55 **MEMIN:** Anja Dufresne, Michael Poelchau, Thomas Kenkmann:

Crater morphologies and the transient crater in impact experiments

15:55-16:15 20 minute coffee break

16:15-16:40 **MEMIN:** Michael Poelchau, Anja Dufresne, Thomas Kenkmann:

Impacts into sandstone: Porosity effects in the strength regime

16:40-17:05 **Guest:** Jens Ormö, Kevin Housen, Keith Holsapple, A. Lepinette, I. Melero Asensio

Facility for experimental studies of wet target impacts at Centro de Astrobiología, Spain.

17:05-17:30 **Guest:** Kevin Keller, T. Schlothauer, M. Schwarz, G. Heide, E. Kroke

The shockwave-laboratory at the Freiberg High-Pressure Research Centre (FHP)

Evening Program:

18:00-18:30 Guided tour of the **Uniseum Freiburg**, Bertoldstraße 17 (Torbogen), 79085 Freiburg

18:30-21:45 Evening reception and dinner in the "Bursenkeller", Uniseum

Thursday, 29th September

Session II: Numerical Modeling

- 9:00-9:35 **Keynote Speaker:** Natalia Artemieva
Ejecta-atmosphere interaction in nature and in experiments
- 9:35-10:00 **MEMIN:** Stefan Hiermaier
Numerical predictions for the target design of an impact campaign
- 10:00-10:25 **MEMIN:** Nicole Güldemeister, Nathanael Durr, Kai Wünnemann, Stefan Hiermaier
Numerical modeling of hypervelocity impact cratering processes

Session III: Shock, Damage & Projectile Analysis

- 10:25-10:50 **MEMIN:** Astrid Kowitz, Ralf Schmidt, Uwe Reimold, Jörg Fritz, Ulrich Hornemann
Shock recovery experiments at low shock pressure with dry Seeberger sandstone
- 10:50-11:15 **Guest:** Christoph Mang, Agnes Kontny
Low and high temperature study of experimentally and naturally shocked pyrrhotite
- 11:15-11:35 20 minute coffee break
- 11:35-12:00 **MEMIN:** Matthias Ebert, Lutz Hecht, Alex Deutsch, Thomas Kenkmann
Chemical modification of meteoritic projectile, target melts and shocked quartz in cratering experiments
- 12:00-12:25 **MEMIN:** Lutz Hecht, Matthias Ebert, C. Giese, L. Scharfe, Alex Deutsch
Chemical interaction between projectile target melts in cratering and laser melting experiments using steel and Al alloy projectiles
- 12:25-12:50 **MEMIN:** Fiona Reiser, Anja Dufresne, Michael Poelchau, Tobias Hoerth, Alex Deutsch, Thomas Kenkmann:
Ejection behavior characteristics during variation of impact energy and target water saturation
- 12:50-13:30 Lunch break

Session IV: Geophysical and Petrophysical Analysis

- 13:30-14:05 **Keynote Speaker:** Jeff Plescia
Geophysical studies of impact structures
- 14:05-14:30 **MEMIN:** Dorothee Moser, Christian Große
Evaluation of hypervelocity impact-induced damage of rocks using elastic waves
- 14:30-14:55 **MEMIN:** Elmar Buhl, Michael Poelchau, Thomas Kenkmann, Georg Dresen
Mapping of microstructural deformation in experimental impact craters formed in sandstone
- 14:55-16:00 **General Discussion:**
- Comments and criticism of current work
 - Open scientific questions in impact cratering research
 - What questions should be addressed next?
 - (How) can this be achieved in MEMIN?
 - What type of collaboration is possible?
- 16:15-17:15 **Guided tour of the EMI Freiburg Facilities** (Eckerstraße 4, 79104 Freiburg)
- ~18:30 Informal dinner at the restaurant “Paradies” (Mathildenstrasse 26/28)

Friday, 30th September

Closed session for MEMIN participants, potential 2nd phase applicants and keynote speakers