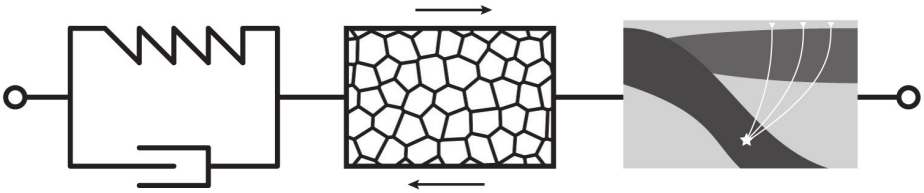

PPEM
Physical Properties of Earth Materials
sites.agu.org/ppem/

Annual Newsletter

December 2019

A note from the chair

Christine McCarthy
Lamont-Doherty Earth Observatory
PPEM Chair

Dear friends and colleagues, I'm very much looking forward to seeing you all at our annual PPEM dinner. This year we are in for a treat: our Fine Dining Search Team has booked us for shabu shabu, a Japanese-style hotpot cooked at the table. Special thanks goes to Andy Rathbun (who also serves as our Industry representative) for doing the lion's share of the organization for the dinner.

Make sure to attend this year's PPEM special sessions at the AGU Fall Meeting. After merging with another session, we now have almost a full day devoted to material properties over the full range of time and length scales, with three oral sessions on Thursday (MR42A, MR43A, and MR44A) and a big poster session on Friday morning (MR51B). On that note, if you have not yet volunteered to judge student presentations, please consider doing so. Our PPEM students can't win if they don't have enough judges, so lets make sure they all get a fair shake! Sign up today at: https://ospa.agu.org/2019/ospa/

As always, AGU marks transitions in the PPEM committee. This year Chris Marone and Tom Mitchell will be rotating off. A big thanks to you both for your service to the community, Chris for steering the ship as Chair and Tom for pulling together the last few Newsletters. Last year, Lars Hansen and Melodie French joined the team, Lars is taking over the Newsletter this year and Melodie is heading up membership and communications. And starting this year, the PPEM Steering Committee welcomes Ashley Griffith as the new webmaster, Katie Kumamoto as the early career representative, and Marco Scuderi as the International representative. I should also take this time to acknowledge Nick Beeler, who has continued to act as Treasurer through the years. His maintaining the books allows us to coordinate the annual dinner and to sponsor a night of drinks at the GRC. Thank, Nick!

Speaking of GRC, this summer's meeting will be led by Dan Faulkner (Chair) and Heather Savage (Vice Chair) with the title, "Combining Laboratory Measurements with Observational Constraints to Understand Tectonic Processes." It will take place in—ahem—an exciting new venue, Bates College in Lewiston, Maine. The program online is already shaping up to be a great meeting and I strongly urge you all to attend. The meeting will once again be preceded by the Gordon Research Seminar, where early career researchers meet to exchange ideas and results. This year's

Physical Properties of Earth Materials Annual Newsletter
The oldest continuously published annual newsletter on experimental rock mechanics and San Francisco (and beyond) fine dining.

Brought to you by your PPEM steering committee:

Christine McCarthy	Lamont-Doherty
Melodie French	Rice University
Ashley Griffith	The Ohio State University
Lars Hansen	University of Minnesota
Kathryn Kumamoto	University of Oxford
Andy Rathbun	Chevron
Marco Scuderi	Università di Roma

GRS will be chaired by Taka Kanaya and Carolyn Tewksbury-Christle.

Award winners in the PPEM community this year include Katie Kumamoto and Chris Thom winning the MRP Graduate Research Award and Judi Chester awarded the Paul G. Silver Award for Outstanding Scientific Service from AGU. Chris Marone received EGU's 2019 Louis Néel Medal and it was just recently announced that Wenlu Zhu is the 2020 recipient. The Louis Néel medal is awarded to individuals in recognition of outstanding achievements in rock magnetism, rock physics and geomaterial. Congratulations to all!

Finally, if you have any ideas about how the Steering Committee can help promote science, activities and visibility of the PPEM community, or if you have nominations for future committee members, please feel free to contact any one of us.

Cheers,
Christine

RCN: *In-situ* Studies of Rock Deformation (ISRD)

Wenlu Zhu

University of Maryland

ISRD Chair

Application of emerging beamline capabilities, such as the ability to probe the microstructures of multi-grain and multi-phase materials in three dimensions in real time, is poised to revolutionize the testing and calibration of rheological models by elucidating the underlying physical processes of rock deformation. The NSF-funded Research Coordination Network (RCN) "*In-Situ* Studies of Rock Deformation" will facilitate the integration of beamline technologies with deformation experiments and create new directions for experimental rock deformation research. Through the network, we will organize five workshops at various synchrotron and neutron beamlines over the next five years, which will provide training and education opportunities both for a diverse group of experimentalists to gain necessary knowledge about beamline technologies, and for beamline scientists to recognize the needs and constraints associated with deformation research on geomaterials. Our goal is to foster collaborations across disciplines to develop new experimental methodologies for studying dynamic processes at various time scales.

The first RCN workshop will take place on June 18–20, 2020 at the CHESS (Cornell High Energy

<u>ISRD Steering Committee:</u>
Wenlu Zhu, U Maryland, chair
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Nick Beeler, USGS
Darren Pagan, CHESS, Cornell U
Haiyan Chen, Stony Brook U
Mark Rivers, U Chicago, GSECARS
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Robert Farla*, DESY, Germany

Synchrotron Source). This workshop will focus on high-energy diffraction microscopy (HEDM). The workshop consists of a series of lectures providing an overview of the technique along with science talks describing pressing microstructural/micromechanical questions in the geophysics community. Sessions will be dedicated for discussion about how HEDM techniques can be applied to geophysics challenges and whether new sample environments need to be developed. The final day will be dedicated to hands-on training collecting and processing diffraction data using the HEXRD software package. Students will be given the opportunity to collect data from their own samples (specifically geological materials).

More information will be posted the RCN website www.isrdrcn.org that will be launched on January 1, 2020.

22nd International DRT Meeting Tübingen, Germany June 12–14 , 2019

Paul Bons

Universität Tübingen

President of the DRT Society

Deformation, Rheology, and Tectonics (DRT) Meetings are held every two years somewhere in Europe, to bring together scientists from structural geology, geophysics, petrology, glaciology, etc. The 22nd DRT meeting was hosted by the Department of Geosciences of Tübingen University on June 12–14, 2019. The theme of the meeting, "From Microtectonics to Plate Tectonics," was chosen to honour the contributions of two scholars, Cees Passchier and Janos Urai, both retiring in 2019, who gave the two invited keynote lectures. Janos Urai showed the audience, using analogue experiments and numerical models, how complex boudinage actually is (“Failure mode transitions in boudinage”), while Cees Passchier presented enigmatic structures that highlight that many puzzling questions remain after decades of progress in structural geology (“Puzzles in paradise: the unexplored depths of structural geology”).

The increasing interdisciplinary nature and wide variety in research topics of most contributions made it difficult to organise the meeting in individual topical sessions. Instead, contributions were loosely grouped in themes, such as field studies from large to small, analytics and experiments and numerical studies. Most notable were the many contributions relating to fluid/melt-rock interactions and the deformation of the rock and mineral "ice." This DRT was the first to successfully introduce a Pecha Kucha session (each presentation 22 slides of exactly 20 seconds).

The DRT meeting hosted about 100 scientists (40% students) from 20 different countries. Although most participants came from Europe, a number of delegates also came from far away, such as the USA, China, India, Australia and New Zealand. Despite the full oral and poster programme, delegates had the chance to see the medieval town of Tübingen (SW Germany) where the university was founded in 1477. The meeting ended in a relaxed atmosphere with a tour on the Neckar River in classical Tübingen punts (the so-

called "Stocherkähne"), followed by a BBQ buffet conference dinner. Here Cees Passchier received the Bruce Hobbs medal in recognition of his outstanding contributions to structural geology.

On June 14, the General Assembly approved the founding of the "European Society for Deformation Mechanisms, Rheology and Tectonics" (in short "DRT Society"). This charitable, tax-exempt society has the main purpose of organising DRT meetings and furthermore to support students in the topic, for example to provide travel funds or to pay open-access publication fees. The society is intended to provide a more permanent framework for the ongoing DRT Meeting series in the future.

The next DRT Meeting will be organised by the University of Catania in Italy in 2021.

2020 GRC on Rock Deformation "Combining Laboratory Measurements with Observational Constraints to Understand Tectonic Processes" Bates College, Maine August 9–14, 2020

Dan Faulkner
University of Liverpool
Chair

Heather Savage
UC Santa Cruz
Vice-Chair

Nearly 40 years ago small-scale laboratory experiments were used to constrain the strength of the lithosphere. These consisted of a simple view of brittle upper crustal deformation and viscous deformation dominating at greater depth. Over the years these models have been refined by further experimentation but also through observational constraints from seismology, field investigations, geodesy, microstructural studies, drilling, and modeling. Consequently, laboratory measurements, coupled with a wide range of observations, have helped to determine the fundamental physics and chemistry of rock deformation at a very wide range of scales. Nonetheless, there is still enormous scope for interaction between those working in the laboratory and other fields that will facilitate a fundamental understanding of tectonic processes that are currently poorly understood.

Please join us in Maine next summer to explore how laboratory experimentation is still contributing to understanding large-scale processes and how the field may interface with others to tackle new and relevant problems occurring on all scales.

Please note that Gordon Research Seminar immediately preceding the GRC on 8-9 August is on "Integrating Rock Deformation Studies with Geophysics, Field Geology and Modeling." The GRS chairs are Carolyn Tewksbury-Christle and Taka Kanaya

The Gordon Research Seminar on Rock Deformation is a unique forum for graduate students, postdocs, and other scientists with comparable levels of experience and education to present and exchange new data and cutting-edge ideas. We invite contributions from a wide range of fields that advance our understanding of rock deformation with implications for large-scale tectonic processes.