Hello Everyone, the semester is about half way through and spring break is here! Now that all those midterms are out of the way, you can enjoy a cold beverage on a hot beach. Ok that may be a lie; I think most of us are going to continue working on our research right through this break with at most, only a “work from home” day where we sit in our pajamas and play Legend of Zelda: Breath of the Wild or binge watch Netflix. Just make sure you don’t over work yourselves and do what you must to stay mentally healthy. This is especially true for those of us preparing to graduate in the spring, working hard on their thesis/dissertation defense. If you are not graduating, and therefore not turning grey, losing sleep or clumps of hair because of stress, make sure you support your fellow colleagues by checking in on them, help them out in any way you can, and at the very least go to their defense in support of them and their research! Even if you don’t know the student defending, if the topic sounds interesting, GO! Keep working hard, and at the very least I think we can all take the time to imagine a cold beverage on that hot beach.
ANNOUNCEMENTS

Conferences

A large cohort from the Nerenberg, Doudrick and Wei labs traveled to Anne Arbor, Michigan for the Borchardt Conference hosted by the University of Michigan’s Department of Civil and Environmental Engineering on February 21 and 22. Several students presented posters over the course of the two-day conference on advancements in water and wastewater treatment.

Academic Social Happy Hour

The CEEES Graduate Student Organization (GSO) sponsored another successful research and social event with presentations from Tyler Spano and Shuo Yang on the exciting research they are conducting (abstracts below). For February, we invited everyone to bring their own lunch to presentations followed by an evening of bowling at Chippewa Lanes in South Bend. This was our first time hosting an event at the bowling alley, and for everyone who couldn’t attend, it was nothing but strikes, spares, and good times. Opportunities like this continue to be a convenient, affordable, and often educational way to get to know others in the department through an informal setting. The month of March promises to bring another fun event as St. Patrick’s Day approaches (actually on March 17) and we head to Legends of Notre Dame on Wednesday, March 22 to celebrate and look forward to spring weather and the second half of the semester. Don’t forget to wear your green! See the upcoming schedule below.

Tyler Spano: “Uranium Mineralogy and Nuclear Forensics (My Five Years of Grad School in 10 Minutes)”

Assessing the long term environmental behavior of uranium represents a necessary step in utilizing nuclear energy. To better understand the relationship between the structural and thermodynamic properties of materials, uranyl vanadate mineral analogues were synthesized and examined using numerous analytical techniques. Normalized charge deficiency per anion calculations were developed to quantify bonding requirements in sheet-like structures and can be used to predict the thermodynamic stability of minerals. Nuclear forensics research seeks to ensure the safe implementation of nuclear energy by developing methods and techniques by which to assess the origin and history of radioactive materials. Trace element and isotopic signatures were determined for U-rich materials and examined as a function of the source ores of origin. Deposit type average trace element signatures were developed for the purpose of rapid origin assessment of uranium ores and derivative materials (Advisers: Drs. Peter Burns and Antonio Simonetti).

Lab Link: http://www.tylerlspano.com/home.html
A number of essential structures, such as conventionally built and seismically isolated bridges, cross active tectonic faults in earthquake-prone regions around the world. The observed performance of these essential structures following recent earthquakes suggested that conventional design methods might not provide the desired performance levels. When there is no other alternative than to design a bridge crossing an active fault, factors such as the spatially varying ground motion due to fault crossing (including permanent tectonic displacements across the fault), fault crossing location, fault crossing angle, pier stiffness and deck stiffness need to be considered in the design. In this study a simplified analysis procedure for seismically isolated bridges crossing fault rupture zones is proposed. Accounting for the nonlinear behavior of the seismic isolation system and the spatially varying ground motion due to fault crossing, the simplified procedure is validated using recorded and simulated near-fault records from three earthquakes and rigorous nonlinear response history analyses. The presented results demonstrate that the proposed simplified analysis procedure can be adopted for the seismic design and analysis of seismically isolated bridges crossing fault rupture zones (Adviser: Dr. George Mavroeidis).

Lab Link: [http://www3.nd.edu/~gmavroeij/](http://www3.nd.edu/~gmavroeij/)
Upcoming Events:

**March 22, 2017** - St. Patrick’s Day party.

**April 2017** - Outdoor park activities and games party.

**May 2017** - Potluck at a local park.

If you have any particular questions or concerns regarding the academic social events, please contact any of the organizers: **Andrew Schranck** (aschranc@nd.edu), **Theresa Aragon** (aragon.10@nd.edu), **Lara Grotz** (sisman.1@nd.edu), and **Stefanie Lewis** (Lewis.184@nd.edu). They would love to hear from you.
GRADUATE STUDENT SPOTLIGHT

**Travis Olds**: Travis Olds is a 5th year PhD student who studies under the guidance of Dr. Peter Burns. His work focuses on uranium mineralogy, crystallography and finding new minerals, which requires collecting trips to underground uranium mines in search of crystals. So far, he has found and named six new minerals approved by the International Mineralogical Association (IMA); including leószilárdite, gauthierite, ewingite, leesite, redcanyonite, and shinkolobweite. They’re all uranium minerals of varying chemistry, but studying their structures and properties are crucial to understand the behavior of uranium in the environment. Perhaps the most interesting of these is ewingite, Earth’s most structurally complex mineral which contains the largest cluster of atoms known in a mineral (Figure 1). It measures only 24 angstroms across but this is massive in the mineralogical world.

Techniques required to describe new minerals include synchrotron single-crystal X-ray diffraction, electron microprobe and ICP-MS analyses, Raman and infrared spectroscopy, and polarized-light optical techniques.

He recently gave a talk at the New Minerals and Mineralogy in the 21st Century conference in Jáchymov, Czech Republic on the new mineral ewingite which was found there. The uranium ore mined in Jáchymov was used by Marie and Pierre Curie to discover the radioactive elements radium and polonium. Last year he was funded by an Oak Ridge Institute for Science and Education fellowship, and is now working on finishing up his PhD dissertation this spring. With four manuscripts in press and one more in prep, he just wishes writing, reviewing, and publishing was easier! Also, a career that lets him continue working on uranium minerals would be nice.

Figure 1. Golden yellow crystals of the Ca-Mg uranyl carbonate mineral ewingite rest atop massive black uraninite, with transparent gypsum. From the Plavno mine (Vladimir shaft), 2nd level, Jáchymov, CZ.
Figure 2. Pale yellow blades of leőszilárđite, a Na-Mg uranyl carbonate from the Markey mine, Red Canyon, Utah. Horizontal field of view is 2 mm.

Lab Link

http://www.petercburns.com/home.html
GRADUATE STUDENT UNION UPDATE

The month of February brought a brief meeting. Of most interest may be the upcoming GSU elections for executive officers. To learn more about the GSU, visit their website (http://gsu.nd.edu/about/) or contact your representative, Andrew Schranck.

The 3MT competition Finals will be held March 27, 2017 at 4pm in the Jordan Auditorium of the Mendoza College of Business. See this website for more details: http://3mt.nd.edu/.

If you are looking for an outside the box way to present your research and express your artistic side, look out for the upcoming Research Slam competition coming soon to the University of Notre Dame and brought to you by the GSU Professional Development Committee.

The GSU Social Committee is sponsoring several events including a brewery tour March 26, charity gala April 22, and winery tour April 30. Tickets are required and more information can be acquired here (http://gsu.nd.edu/social/gsuevents/).

The next council meeting is Thursday, March 23 at 6:30 PM in the LaFortune Student Center Room 202. Please let Andrew Schranck (aschranc@nd.edu) know if you have any concerns or feedback pertaining to graduate student government.

Don't forget, all graduate students can receive conference funding once per year from the GSU based on a competitive application process. See the Conference Presentation Grants website (http://gsu.nd.edu/about/cpg/) for more details.
RESEARCH GROUP SPOTLIGHT

David Richter Research Group – The Richter research group includes PhD students Elise Wright (third year), Karina Soto Rivas (third year), Tianze Peng (second year), Duy Nguyen (first year), John (Hyungwon) Park (first year), Postdoctoral researcher Indrajith Nissanka, and undergraduate students Paolo Fiocco, Kevin O’Keefe, and Lorenzo Cabrera.

The group works on computational fluid dynamics problems, focusing on techniques including direct numerical simulation and large eddy simulation for investigating turbulence in the atmosphere and ocean. Specifically, they study flows with multiphase components. Using these numerical techniques, they can effectively study basic atmospheric processes in a wide range of applications including surface-atmosphere coupling, atmospheric boundary layer dynamics, and turbulent transport. This research informs our understanding of weather and the way fluids affect our environment. Further, their research is also devoted to developing tools for simulating multiphase systems that can be applied to a wide variety of geophysical flows.

Elise, co-advised by Drs. Richter and Bolster, uses numerical models to study the impact of incomplete mixing on reactive transport through idealized heterogeneous porous media. This is important, because incomplete mixing is a phenomenon that has been found to reduce effective reaction rates in reactive transport. In particular, she uses a Lagrangian reactive particle tracking method to learn more about mixing and reactions in these heterogeneous flows. Tianze’s research focuses on the interaction of sea-spray and air-sea heat transport from the perspective of microphysics. By resolving the turbulence at the finest resolution, the research will connect the commonly-used bulk approximations on air-sea fluxes, which will be helpful for understanding tropical cyclones. Duy’s research is similar to Tianze’s but with more focus on momentum and heat exchange at the air-sea interface layer. He is using both direct numerical simulation and large eddy simulation to effectively investigate a large range of scale from mm to km in the marine atmospheric boundary layer (MABL) to learn the dynamics, thermodynamics and transport of ocean droplets and sprays in the MABL. Karina, who is participating in a double dual degree program through the Pontifical Catholic University of Chile (PUC) and Notre Dame, studies tidal energy. She is running numerical simulations to study the interaction between fluid flows associated with submerged turbines and their relationship to bathymetry. She is evaluating these systems at medium and large scales, and she hopes to find
a parameterization to include the local flow changes into models with bigger scales. **John**, who is co-advised by Drs. Richter and Jumper (Aerospace and Mechanical Engineering) is approaching the turbulence interaction with particulate matter with flow that is completely driven through buoyancy. His simulations are to model cumulus cloud formation in nature and to see how particles suspended in these air-flows can actually change turbulence and effectively the heat transfer through a two-way coupled system.

Lab Links

**http://www3.nd.edu/~drichte2/index.html**

### THE GRADUATE SCHOOL – SCHEDULE OF DEADLINES

<table>
<thead>
<tr>
<th>Event</th>
<th>Fall 2016</th>
<th>Spring 2017</th>
<th>Summer 2017</th>
</tr>
</thead>
<tbody>
<tr>
<td>Teaching assistant list submitted to Graduate School</td>
<td>Aug. 15</td>
<td>Jan. 5</td>
<td>—</td>
</tr>
<tr>
<td>First class day</td>
<td>Aug. 23</td>
<td>Jan. 17</td>
<td>—</td>
</tr>
<tr>
<td>All course changes</td>
<td>Aug. 30</td>
<td>Jan. 24</td>
<td>—</td>
</tr>
<tr>
<td>Initial graduation list available in GradAdmin (Registrar)</td>
<td>Sept. 6</td>
<td>Jan. 31</td>
<td>June 27</td>
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<tr>
<td>Fall/Spring break begins</td>
<td>Oct. 15</td>
<td>Mar. 11</td>
<td>—</td>
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<tr>
<td>Course discontinuance</td>
<td>Oct. 28</td>
<td>Mar. 24</td>
<td>—</td>
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<tr>
<td>Preliminary theses/dissertations submitted for formatting check*</td>
<td>Nov. 7</td>
<td>Mar. 13</td>
<td>Jun. 19</td>
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<tr>
<td>Thanksgiving break begins (Wed. – Sun.)</td>
<td>Nov. 23</td>
<td>—</td>
<td>—</td>
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<tr>
<td>Easter break begins (Fri. – Mon.)</td>
<td>—</td>
<td>Apr. 14</td>
<td>—</td>
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<tr>
<td>Master's comprehensive examinations &amp; PhD dissertation defenses*</td>
<td>Nov. 28</td>
<td>Apr. 7</td>
<td>Jul. 11</td>
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<tr>
<td>All admission to candidacy forms submitted to Graduate School</td>
<td>Dec. 5</td>
<td>Apr. 13</td>
<td>Jul. 17</td>
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<tr>
<td>Final theses/dissertations submitted to Graduate School</td>
<td>Dec. 5</td>
<td>Apr. 13</td>
<td>Jul. 17</td>
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<tr>
<td>Last class day</td>
<td>Dec. 8</td>
<td>May 3</td>
<td>Jul. 28</td>
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<tr>
<td>Final exams begin</td>
<td>Dec. 12</td>
<td>May 8</td>
<td>—</td>
</tr>
<tr>
<td>Graduation date (official degree conferral)</td>
<td>Jan. 8</td>
<td>May 20</td>
<td>Aug. 5</td>
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</tbody>
</table>
FELLOWSHIP/SCHOLARSHIP/EMPLOYMENT OPPORTUNITIES

- Graduate Student Union Conference Presentation Grants (Rolling basis) ([http://gsu.nd.edu/about/cpg/](http://gsu.nd.edu/about/cpg/))
- Graduate School Professional Development Awards (Rolling basis) ([http://graduateschool.nd.edu/professional_development/professional-development-award-application/](http://graduateschool.nd.edu/professional_development/professional-development-award-application/))

NEWSLETTER CONTACTS

If you wish to include or contribute news items for the next issue of the newsletter, please contact one of the editorial members below:

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