DEEPS Dive 2026

Newsletter

BROWN

Department of Earth, Environmental and Planetary Sciences

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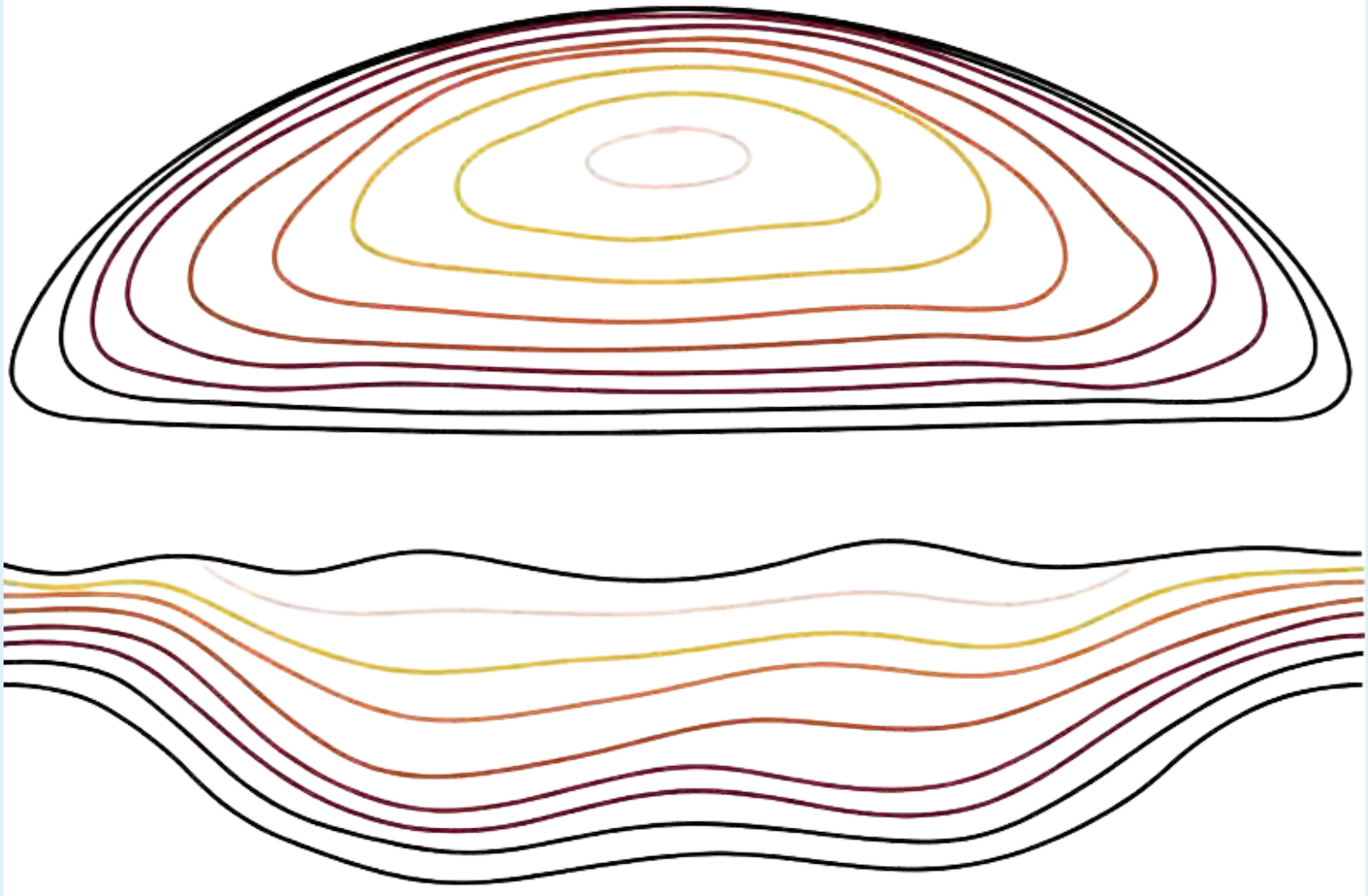
Climate & Environment



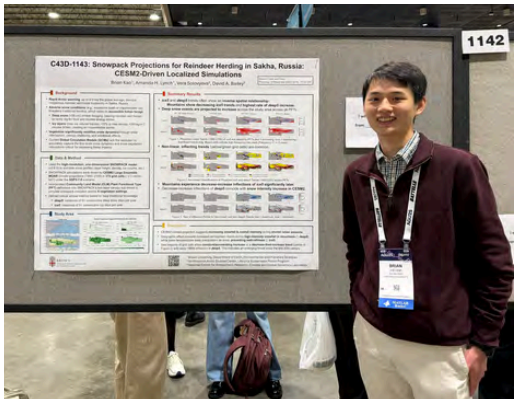
Lynch Lab

Working with Dr. Amanda Lynch, this group is working to understand how rapid environmental change in the Arctic is affecting both natural systems and human activities, and how these changes can be better predicted to reduce risk.

Graduate student Malu's work focuses on Polar Lows, with particular attention to the roles of surface heat fluxes, sea-ice conditions, and marine cold-air outbreaks in storm formation and intensification. Early work has involved detailed regional model case studies, while current research uses Polar WRF simulations and reanalysis data to examine a larger number of storms. The project aims to combine physically detailed case-study analysis with data-driven modeling approaches to more efficiently evaluate many events and better quantify which environmental factors most strongly influence Polar Low development.

Undergraduate Jasper Perlis investigates vulnerabilities in Arctic shipping and supply operations in Greenland. His work focuses on identifying high-risk locations by mapping multiple weather hazard layers alongside shipping routes to better understand potential operational hazards in a changing Arctic environment.

Undergraduate James Carr studies community exposure and vulnerability in Greenland, with emphasis on infrastructural, demographic, economic, industrial, and strategic factors. His work aims to provide a comprehensive assessment of how environmental and societal conditions interact to shape risk for Arctic communities.



Undergraduate Brian Kao studies the impacts of rapid Arctic warming on the Indigenous reindeer- and horse-based economies of the Sakha Republic. Using high-resolution snow modeling driven by climate projections, his research examines how changing snow conditions affect forage accessibility for herding animals. The results show increasing frequency of deep snow and icy layers, largely driven by rain-on-snow events, which pose growing challenges for traditional herding practices and highlight the need for climate-resilient adaptation strategies.

This year, the Lynch group published two papers, Malu attended the 18th Polar AMS, and last December, Brian attended AGU 2025. Malu was also awarded the Jarislowsky Graduate Fellowship (IBES). Next year, they are looking forward to working in collaboration with Met Norway to improve our weather hazard modeling skills and learn more about operational weather forecasting and vessel crew safety.

SciML Group/Bergen Lab

Working with Dr. Karianne Bergen, the SciML group works to design machine learning systems that move beyond prediction to enable scientific discovery, uncovering scientific insights by embedding domain knowledge, interpretability and representation learning.

Recently, the SciML group has been working on projects titled Neural Network Emulators of the ISMIP6 Ice Sheet Model Ensemble for Improved Sea Level Projections,

Explainable AI (XAI) for Geosciences: Intrinsically Interpretable Neural Networks with Channel-Specific Reasoning for Geospatial Learning Tasks,

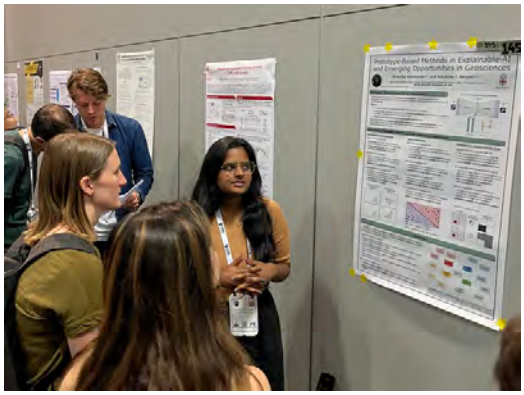
and Evaluating Knowledge Transfer for Regional Adaptation with Geoscientific Foundation Models.

SciML Group in Fall 2023: *(left to right) Prof. Karianne Bergen, Dr. Hilarie Sit, Peter Van Katwyk, and Anushka Narayayan*

This year the SciML Group published three papers:
P. Van Katwyk, B. Fox-Kemper, H. Hewitt, and K. J. Bergen. Rewiring climate modeling with machine learning emulators. Communications Earth & Environment. DOI: 10.1038/s43247-026-03238-z.

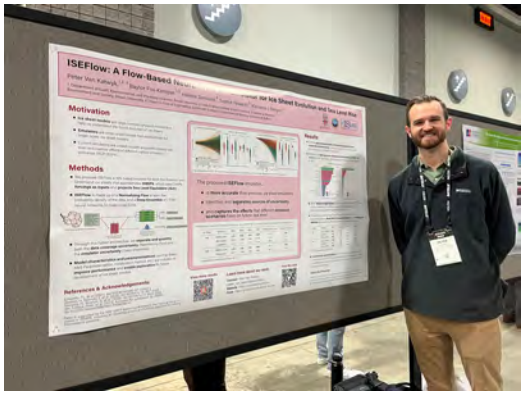
P. Van Katwyk and K. J. Bergen (2025). HybridFlow: Quantification of Aleatoric and Epistemic Uncertainty with a Single Hybrid Model. Transactions on Machine Learning Research (TMLR). DOI: 10.48550/arXiv.2510.005054.

A. Narayanan and K. J. Bergen. Prototype-based Explainable Neural Networks with Channel-specific Reasoning for Geospatial Learning Tasks. arXiv preprint. DOI: 10.48550/arXiv.2602.00331.



ICML 2024: *DEEPS Ph.D. student Anushka Narayanan presenting at the AI4Science Workshop at the 2024 International Conference on Machine Learning (ICML) in Vienna, Austria.*

SciML Group at Peter's dissertation defense (he passed!!): *Prof. Karianne Bergen, Peter Van Katwyk, Anushka Narayanan*



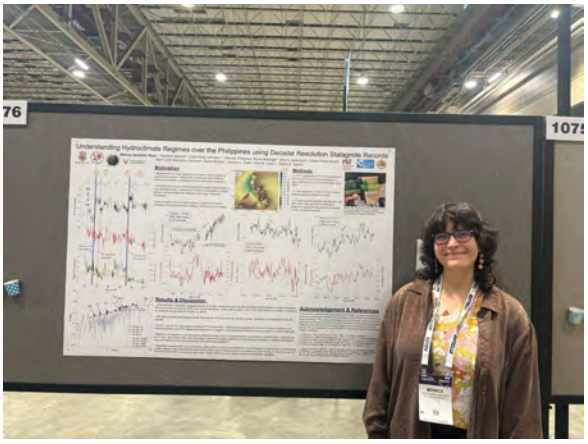
AGU 2024: *DEEPS Ph.D. student Peter Van Katwyk presenting at the AGU Fall 2024 Meeting in Washington D.C.*

Cobb Lab

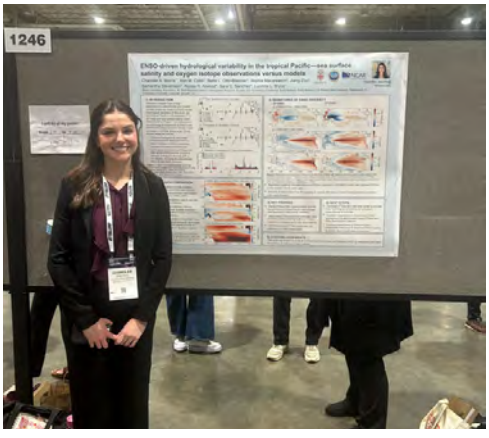
Working with Dr. Kim Cobb, this group is working to understand how natural climate variability and human-driven forcing interact across different timescales to shape climate change and its disproportionate impacts on vulnerable communities.

The Cobb Lab group is made up of PI Kim Cobb, undergraduate students Lucinda Bryce, Sam Levin, Kiki Ko, Sarah Knox, Shaochi Chuang, and Victoria Kim, graduate students Monica Geraldes, Chandler Morries, Emma Witanowski, and post-doc researcher Xikai Wang.

The Cobb group has been working on projects related to Tropical Pacific Corals Reveal Coherent Reductions in Pre-Industrial ENSO Variability, Reconstructing Last-Interglacial Climate Variability and Seasonal Ocean Dynamics in the Red Sea Using Coral d18O and Sr/Ca Proxies Millennial-Scale Hydroclimate Responses over Southwest Philippines during the MIS5b – MIS4 Transition, and Water Isotopologue Time Series across Tropical Sites during ENSO Extremes



This year, Kim, Chander, Monica, Sam, and Lucy went to AGU 2025. Kim received the Friend of the Planet award from the National Center for Science Education and was elected to be a member of the American Academy of Arts and Sciences. Lucinda Bryce received Sarah LaMendola Undergraduate Research Award.



Horvat Lab

Working with Dr. Chris Horvat, the AntiPodal Oceanography (APOG) lab is working to answer the questions; How can we better predict climate change impacts in vulnerable regions by understanding the interaction between small-scale processes and large-scale climate systems? How do we explain 21st century Arctic sea ice biases in coupled climate models and their impacts on ocean heat transport and storage? How can we quantify biases in sea ice products used in climate records and data assimilation? and how does not resolving Pacific Small Island States' land masks in global climate models contribute to output uncertainty?

The APOG Lab group is made up of PI Christopher Horvat, undergraduate students Konstantin Dichev, Dhruv Jain, Ziqi Deng, Katie Liu, and Qizhi Sun, graduate students Gillian Cheong, Abrielle Mannino, and Anu Raghunathan, post-docs Aikaterini Tavri, Bingjie Zhao, and Ali Siddiqui, and researcher Paul Hall

The APOG lab group has been working on how small island states are underrepresented in models and how we can use machine learning to improve data availability there. They are using satellite observations from passive microwave, Synthetic Aperture Radars, and altimetric sensors to study sea ice surface properties. They are working on better understanding the sea ice - wave interactions in the polar marginal zones. They are also building a new sea ice model through the SASIP project, quantifying the role of sea ice albedo changes in the solar heating of the Arctic Ocean. They are also working on quantifying Arctic ocean water mass representation biases relative to the global ocean in CMIP6 models.

This year, the APOG lab group has published these papers:

Horvat, C., Buckley, E., & Stewart, M. (2025). Sea ice concentration estimates from ICESat-2 linear ice fraction–Part 2: Gridded data comparison and bias estimation. The Cryosphere, 19(10), 4819-4833.

Buckley, E. M., Horvat, C., & Yoosiri, P. (2025). Sea ice concentration estimates from ICESat-2 linear ice fraction–Part 1: Multi-sensor comparison of sea ice concentration products. The Cryosphere, 19(10), 4805-4818.

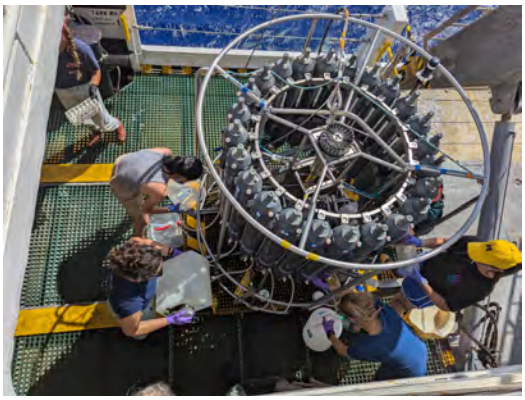
Zhao, B., Horvat, C., & Gao, H. (2025). An optimal path threshold method for rigorously identifying extreme climate events. Environmental Research Letters, 20(2), 024048.

Members of the group attended AGU25 in New Orleans, USA, 2025 SASIP Meeting, Providence, RI, USA, Climate and the Cryosphere (CliC) 2026 in Wellington, NZ, ECCO summer school 2025, Pacific Grove, CA, CESM Tutorial 2025, NCAR, Boulder CO, CAMAS 2026 Early Career School and Workshop, Monterey, CA, 2025 Waves in sea ice Workshop, Providence, RI, USA, 2025 Pacific Workshop on Loss and Damage, Savusavu, Fiji, American Association of Geographers General Meeting, San Francisco, CA.

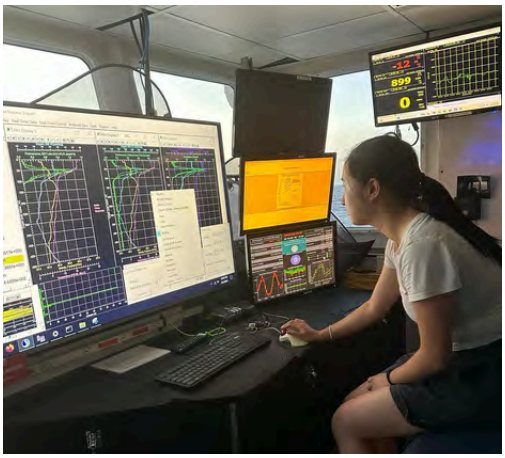
This year, they are looking forward to advancing our research, expanding collaborations, and improving our ability to predict and understand climate change impacts.

Freilich Lab

Working with Dr. Mara Freilich, this group is working to understand the role of ocean dynamics (fluid dynamics & ecosystems) in global carbon and nutrient cycles.



The APOG Lab group is made up of PI Mara Freilich, undergraduate students Cassidy Charles, Wyatt Sieminski, Liam Johnson, Kathy Sun, Scarlett Lindgren, Raymond Zhong, and Erin Kim, graduate students Katarina Merk, Alejandra Lopez, Élise Beaudin, Lulabel Ruiz Seitz (APMA), Leah Hoogstra (APMA), Erin Okey (APMA), post docs Arianna Krinos, Shailja Gangrade, and Ryan Creedon, and post-bac researcher Emily Hu.



Some of the projects the Freilich lab has been working on include Chemical Currencies of a Microbial Planet: Understanding how eddies in the ocean modify dissolved organic carbon, including microbial community composition and carbon fluxes; Ocean Margins: examines the linkages between a biologically productive coastal ocean, coastal communities that depend on the sea, and the pelagic ocean basins. One topic is terrestrial to open ocean linkages, especially during precipitation extremes;

Salton Sea Environmental Timeseries: a community science initiative led by a team of community members and non-local scientists conducting water and air quality monitoring research on the Salton Sea. We are studying connections between water quality and air quality; and Submesoscale dynamics: We are investigating how upper ocean frontal instabilities respond to realistic factors such as waves and variations in the density layers in the ocean.

These projects have involved fieldwork, numerical modeling, lots of international collaboration, and analysis of microbial ('omics) data.

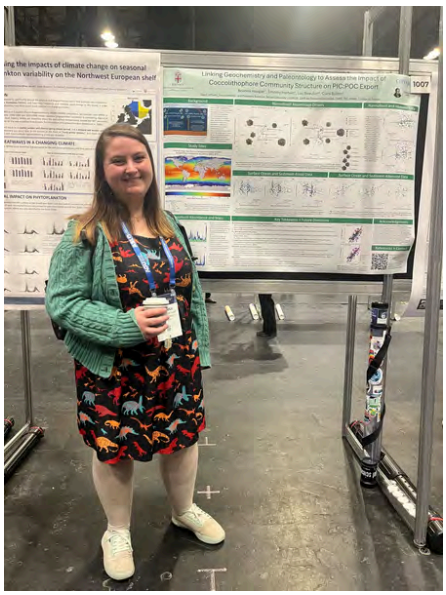
This year, the Freilich lab has published six papers. Members from the group also attended the Ocean Sciences Meeting, AGU, and APS Division of Fluid Dynamics.

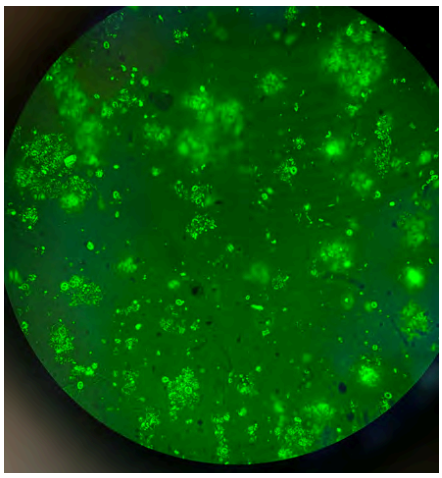
Next year, Emily Hu and Cassidy Charles are looking forward to starting graduate school. The rest of the group is looking forward to writing papers and presenting findings at conference this summer including ASLO-SIL conference in Montreal, Gordon Research Conferences on Ocean Mixing (Massachusetts) and Marine Microbes (Barcelona), and SIAM Annual Meeting as well as Fieldwork at the Salton Sea and the Gulf of Guinea

Herbert Lab

Working with Dr. Tim Herbert, this lab works on many questions, including understanding how plankton ecosystems respond to climate change and generate carbon fluxes to the deep sea. Recently, they have been working on a project involving the global changes in ocean temperature at orbital scales in the warm Pliocene.

This lab group is made up of PI Tim Herbert, Undergraduates Ella Giampietro, Clara Roberti, Matty Berman, and Sofia Hernandez, graduate student Brianna Hoegler, and post doc Taehee Lee as well as Jamie Pahigian, Marcelo Alexandre, and Weimin Si.





This year, the Herbert group published papers titled:

Herbert, T.D., D. Evans, B. Hönisch, E.L. McClymont, M. Peral, J. Sepúlveda, K.K. Śliwińska and V.E. Taylor, Synchronizing marine temperature records to study past climate change, 2026, PAGES.

Si, W., T. Herbert, and J.R. Toggweiler, 2026, Late Holocene cooling and increased zonal asymmetry in the mid-latitude North Atlantic, Climate of the Past, https://doi.org/10.5194/egusphere-2025-5181

Hodell, D.A., David Hodell, Fatima Abrantes, Carlos Alvarez Zarikian, Timothy Herbert, Mengyao Du and the Expedition 397 Scientific Party, 2026, Abrupt onset of glacial millennial climate variability with the Intensification of Northern Hemisphere glaciation, Science. https://doi.org/10.17863/CAM.126603

*van Dommelen, N., C. *McNally, T. Herbert, 2026, Plio-Pleistocene Evolution of the Benguela and Agulhas Currents, Paleoceanography and Paleoclimatology.

*Cheung, A.H., X. Du, *M.C. Parish, *R.S.Vachula, B. Fox-Kemper and T.D. Herbert, 2025, The influence of carbon dioxide and precession on western North American hydroclimate and Pacific sea surface temperature during the Holocene, Paleoceanography and Paleoclimatology.

*Mitsunaga, B.A., A.M. Jewell, S. Buchanan, A.J. Crocker, P.A. Wilson, T.D. Herbert, J. M. Russell, 2025, Fundamentally unchanged North African rainfall regimes across the Plio-Pleistocene transition, Science Advances.

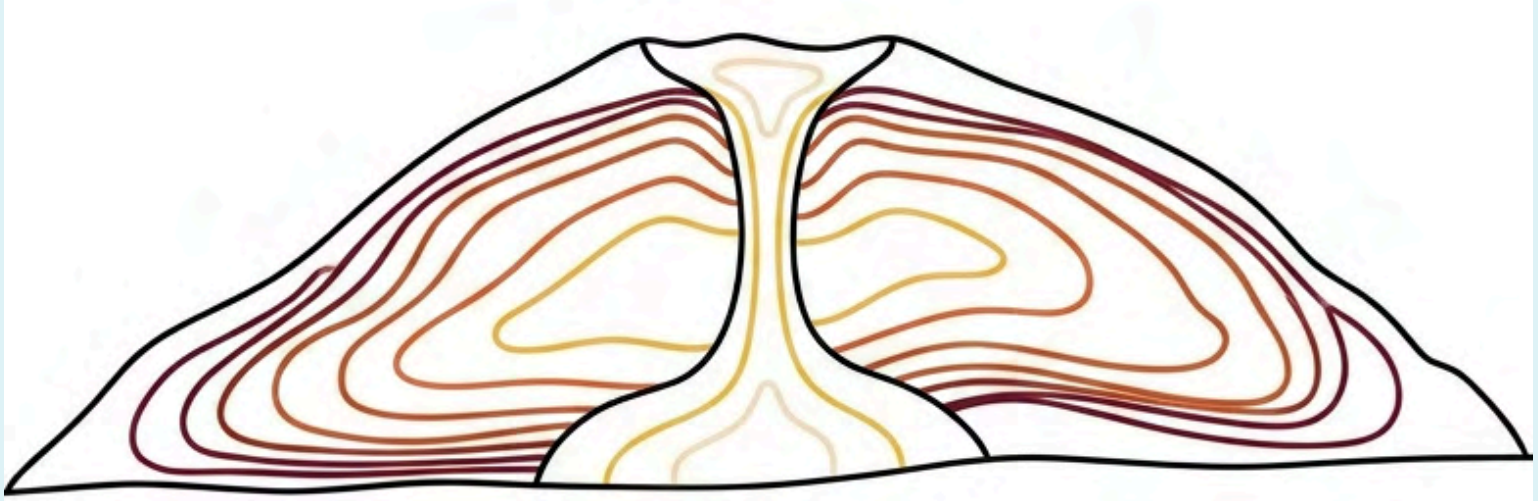
Addante, M., T.D. Herbert; A. Girone; A. Caruso; M. Marino, G. Scopelliti, P. Maiorano, 2025, Monsoon variability and high latitude climate signals in the central Mediterranean at the Pliocene – Pleistocene transition: the Gelasian stratotype section (Monte San Nicola, Sicily), Global and Planetary Change.

Dalton, C.A., C. Huber, T.D. Herbert and W. Si, 2025, Consequences of a Global Slowdown in Seafloor Spreading for Sea Level and Mantle Heat Loss, 2025, G3. http://dx.doi.org/10.1029/2024GC011773

This year, the group attended several AGU meetings, ASLO, RCMNS Catania, Italy, and International Ocean Discovery Program Post-Cruise Expedition 397. Brianna Hoegler received a Chateaubriand Fellowship from the French government and was selected to present at the annual "Research Matters" event sponsored by the Graduate School. Jared Nirenberg finished his Ph.D. thesis

Next year, the Herbert group looks forward to bringing 2 lab robots into action!

Geology, Minerology, & Petrology



TRACES/Cooperdock Lab

Working with Dr. Emily Cooperdock, this lab works to understand how Earth's tectonic systems evolve over time—specifically, the timing and rates and associated geochemical changes during processes like plate movement, mountain building, and crust formation.

This lab group is made up of PI Emily Cooperdock, Undergraduate students EShannon White, and Preya Nguyen, graduate students César Bucheli-Olaya, Nadia McGlynn, and Alexia Rojas, and research assistant Travis Parsons.

The TRACES lab at University of Rhode Island (left) and the TRACES research team (right)

César is working on a project titled "Halogen Records of Magmatic Evolution in the Sierra Nevada Arc and Batholith, California"; Nadia is working on "Preliminary insights into faulting and exhumation in the Iberia-Newfoundland Hyperextended Margins" Alexia Rojas is working on "Characterizing the Mineral Products of Weathering at the Twin Sisters Ultramafic Complex", and Shannon is working on "Mineral and Textural Observations of Serpentinized Fault Surfaces at Twin Sisters, WA"

This year, members of the TRACES lab attended multiple conferences. Cesar attended the 2025 edition of the International Summer School on Geohazards in Volcanic Islands (University of the Azores, Portugal), Emily attended the Geochronology Gordon Research Conference and Emily, Alexia, and Shannon went together to AGU in New Orleans (left). As a group they published four papers.

Next year, Nadia is looking forward to attending a conference to present her work, Alexia is excited to finish the paper she's been working on, and Cesar is looking forward to him and his friends being done with prelims!

The TRACES lab at Amherst College

Ibarra Lab

Working with Dr. Dan Ibarra, this Terrestrial Biogeochemistry and Paleoclimatology Lab works to answer the questions: When did Earth's largest mountain range, the Himalaya-Tibet system, rise? And what impact did it have on the long-term carbon cycle and climate?

This lab group is made up of PI Dan Ibarra, undergraduate students Andrea Condormango Rafael, Claire Xu, Eleanor Barth Wu, Exiquio Salinas, Frankie Zhang, Galen Gibb, Jenna Serotta, Josephine Harrison, Kira Ivanova, Lynden Auckly, Meredith Whitlock, Milla Vogelezang-Liu, Ronan Zwa, Sarah Kramer, and Nicholas Prior, Graduate students Cathy Gagnon (defended November 2025), Sebastian Muñoz (defending April 2026), Justin Custado, Mónica Geraldes Vega, and Riley Havel, post-doc researcher Gavin Piccione, as well as Hannah Tompkins, Marcelo Da Rosa Alexandre, and Srikanth Gedela.

The Ibarra lab has been working on projects related to Paleoclimate reconstructions from the Mojave Desert, paleo-uplift of Tibet and the Himalayas, weathering and carbon fluxes of mafic and ultramafic catchments, new triple oxygen isotope methods and data syntheses, and critical mineral resources.

UTRA student Lynden Auckly helps Gavin Piccione mix and pour resin to mount a stalagmite for a museum display.

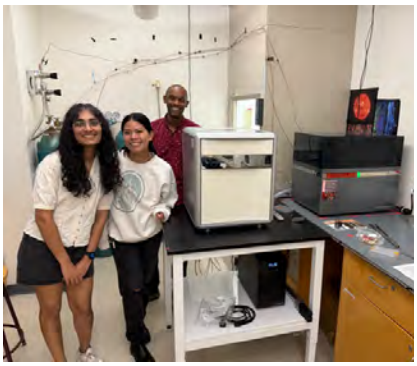
This year, members of the Ibarra lab attended multiple conferences and published four papers. Claire Xu and Justin Custado attended the GSA Northeastern Section Meeting 2026 where they presented "Constraining Triple Oxygen Isotope Signatures of Precipitation During the 2023-2024 Strong El Niño in the Western US". Justin Custado, Sebastian Muñoz, and Mónica Geraldes-Vega attended AGU 2025 where they presented "Comparing Triple Oxygen (δ18O-δ17O) and δ18O-δ2H Isotope Systematics Using a Lake Balance Approach: Insights from Bear Lake, Utah-Idaho" and "Balancing the weathering budget in deglaciating catchments: a case study from Kachemak Bay, AK" as well as "Moisture Source vs Rainfall Amount in a Last Interglacial Stalagmite from the Philippines."

Graduate students Riley Havel and Monica Geraldes Vega both received external research grants and Milla Vogelezang-Liu was awarded a Voss Undergraduate Fellowship! The Ibara group will have some new people arriving and new analytical instruments being installed this coming year, which will lead to some new research directions and projects that we are looking forward to!

SNaCLab/Dottin Lab

Working with Dr. James Dottin, the Sulfur, Nitrogen and Carbon Lab at Brown works to understand how the isotopic compositions of planetary materials, such as asteroids, Mars, the Moon, and Earth, can help us better understand their formation and evolution.

This lab group is made up of PI James Dottin, undergraduate student Sofia Davison-Gauss, graduate students Kiran Patil, Cameron Adams, and Dagny Keltner, post-docs Olivia Anderson and Hairu Fu, and Post-bacc researcher Jianna Calcinari. They work closely with Marcelo Alexandre and Sri Gedela.



Kiran is working on analysis of in-situ sulfur isotopes on a suite of martian meteorites using SIMS at WHOI where Dagny is also working on measuring in-situ sulfur isotopes on R-chondrite sulfides for the first time. Olivia is working on sulfur isotopes in martian apatites, lundar sulfides from meteorites, and Hawaiian oceanic xenoliths to understand sulfur cycles on planetary bodies. Olivia is also working on hydrogen isotopes in high 3He/4He lavas from Ofu, Samoa and on submarine glasses from enriched mantle sources.

This year, the SNaC Lab attended multiple conferences. Kiran, Olivia, and Cameron attended the Goldschmidt conference in Prague, Dagny and Hairu attended LPSC, and James and Hairu went to AGU in San Francisco. James attended NESF (NASA Exploration Science Forum). This year, James was awarded a junior faculty teaching fellowship award and Kiran published her paper in Communications Earth and Environment.

Next year, the SNaC lab is excited to attend and present at Goldschmidt in Montreal. James is looking forward to learning about CT scans and incorporating them into their interpretation of sulfur isotope data. Olivia is excited to analyze the sulfur isotopes in apatites, one of her long-time obsessions, which are a great recorder of volatile processes. Dagny is looking forward to making bulk sulfur isotope measurements on R-Chondrites. The whole group is super excited to welcome Sofia this summer!

Planetary

Dalton Lab

Working with Dr. Colleen Dalton, this group works to understand the processes that form and subsequently modify the lithosphere here on Earth.

The Dalton group is made up of Graduate students Yiran Huang, Abby Case, and Johnelle Gonzales.

This group is working on projects related to layering in the cratonic lithosphere, new approaches to image seismic attenuation at a regional scale, and imaging the magma plumbing system beneath active volcanoes.

This year, the Dalton group published two papers:

Huang, Y., C.A. Dalton, and A. Hariharan, A new approach to constrain crustal Vp/Vs from Rayleigh wave phase velocity and local amplification: Application to the western U.S., Geophysical Research Letters, 52, https://doi.org/10.1029/2024GL111980, 2025.

Dalton, C.A., C. Huber, T.D. Herbert, and W. Si, Consequences of a global slowdown in seafloor spreading for sea level and mantle heat loss, Geochemistry, Geophysics, Geosystems, 26, https://doi.org/10.1029/2024GC011773, 2025.

This year, the group attended the Gordon Research Conference on the Interior of the Earth and the American Geophysical Union Annual Meeting.

Birch Lab

Working with Dr. Sam Birch, samlab works to answer the questions: how do planetary landscapes evolve under conditions very different from those on Earth, what patterns do their landscapes record about their changing climates, and how can we use these worlds to understand more about fundamental processes that shape Earth's landscapes?

Samlab is made up of PI Sam Birch, Undergraduate Students Ceci D'Hondt-Gorbea, Matt Moser, and Asha Davis, Graduate students Julia Miller, Sara Cuevas-Quiñones, Lex Schultz, Eads Fouché, Anthony Merchan, and Brianna Fernandez, and post-docs Abhinav Jindal, Andrea Bryant, and Rola Dbouk.

Recently, samlab has been working a lot on understanding cometary geology, how comet surfaces erode, how they retain their ices, and which ices they retain, and what all this means for how comets formed in the protoplanetary disk. They have also been working a lot on Titan, trying to understand its fluvial and coastal landscapes. This involves lots of remote sensing work, theory, simulations, and lab experiments, all with the goal of trying to quantify observed patterns in its landscapes such that we can say something about Titan's materials and/or how its climate has changed through time.

Eads making measurements

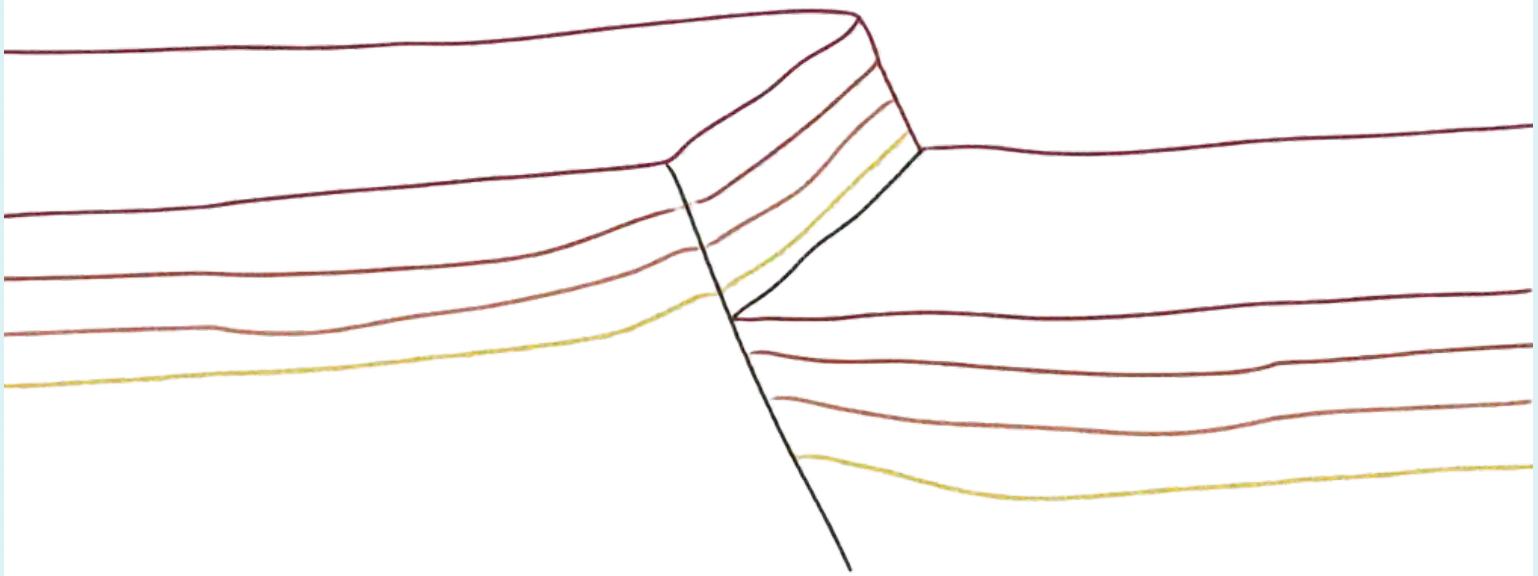
Julia, Abhinav, and Sam with the ISSI Team

This year Julia published a paper about the thermal evolution of Pluto and whether it could retain a subsurface ocean, Sara published a paper about the detection of a volcano around Jezero Crater on Mars, Sam published a paper that showed Titan truly lacks river deltas, and Abhinav published a paper in the final round of review that details how sediment is transported across comets, despite the low gravity.

This year, Julia, Matt, Abhinav, and Sam all attended the DPS conference in Helsinki in September, and Andrea attended a Cassini workshop, presenting on her Titan seismology work. Julia received a FINESST award, and Lex and Eads received the NSF-GRFP! Next year. some in the group will be going to Namibia for a month to do a lot of field work to understand how the Namib desert has dried through time. The project involves drone work, sediment sampling, archaeology, paleoclimate, remote sensing, landscape modeling, and planetary science all in one!

Pascal Presenting

Geophysics



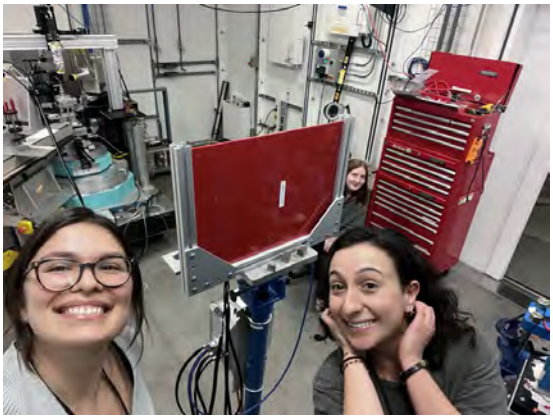
Brown Rock Deformation/Hirth Lab

Working with Dr. Greg Hirth, this (very, very) diverse group has been working on projects that aim to understand the rheology of physical systems ranging from the cold surface of extraterrestrial planetary bodies to faults expressed at the Earth's surface, all the way down to the deep subduction interface.

The Rock Deformation lab is made up of PI Greg Hirth, undergraduate students Daniel Lukens, Noah Johnson, and Gregorio Posada, graduate students Thomas Czernik, Hannah Shabtian, Maisy Waech, and Emily Snell, and research assistant Cameron Meyers.

Thomas conducts cryogenic deformation experiments on ice for applications to the rheology of Europa's icy shell. Maisy runs experiments that aim to understand the effect of pore fluids on crustal rheology at the brittle-ductile transition. Hannah runs creep experiments at high pressure and temperature to understand the effect that mechanical and chemical interactions have on the deformation behavior of the subduction interface.

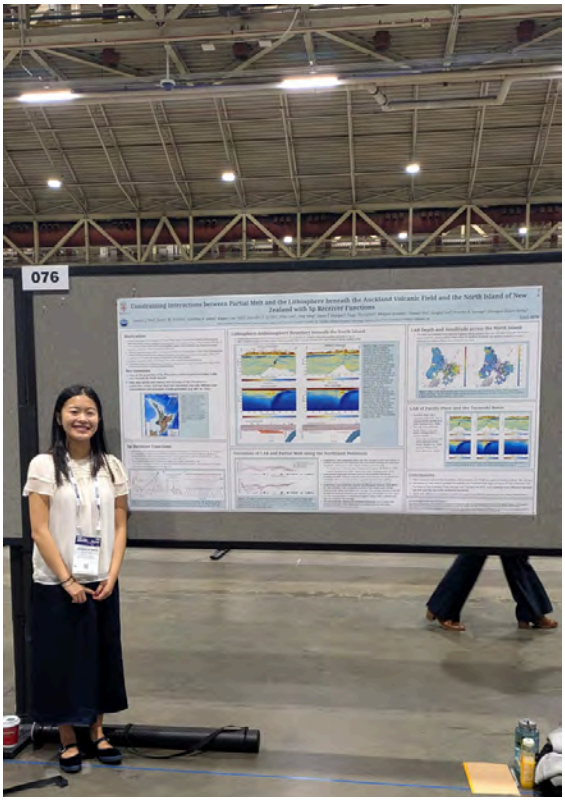
This year, Thomas published two papers, one on the synthesized microstructures and reflectance spectra of solids in the ice Ih–MgCl2·12H2O system: Implications for Europa, and one investigating Binary Systems for Ocean Worlds: the Influence of Soluble Impurities on Ice Crystal Growth and Morphology. Hannah published a paper titled "Creep of Talc at Subduction Zone Conditions: Implications for Slow Slip and Strength of the Lithosphere."



This year, Thomas was awarded FINESST, and Hannah received the Brown Presidential Award for Excellence in Teaching. In the coming year, the Rock Deformation Lab is looking forward to attending the Gordon Research Conference for Rock Deformation this August.

Fischer Seismology Group

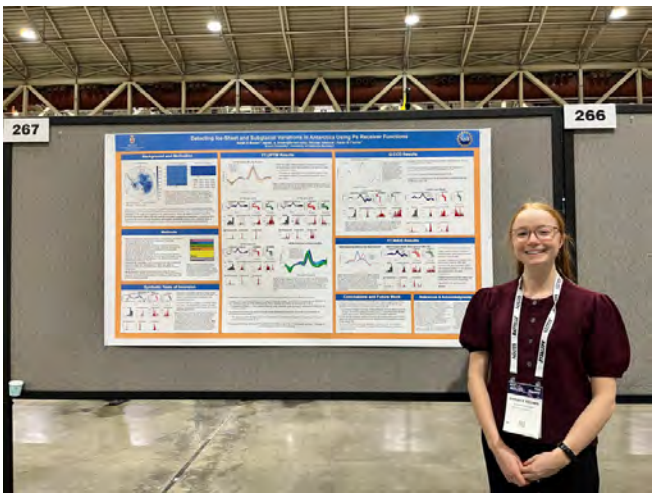
Working with Dr. Karen Fischer, this lab works to understand how the distribution of partial melt in the asthenosphere reflects mantle volatiles and how partial melt rises into and alters the lithosphere.



The Fischer Seismology group is made up of PI Karen Fischer, undergraduate student Ella Creane, and graduate students Sarah Brown and Jessia Wen.

This group uses earthquake waves to study the structure of the Earth at a wide range of scales. Sarah has been studying temperature and partial melt in the lithosphere and asthenosphere beneath Antarctica and also the properties of the Antarctic ice sheet, including how they change over time. Jessica has been focusing on how partial melt interacts with the lithosphere, on its way to surface volcanic fields of the North Island of New Zealand. Ella is analyzing seismic events beneath the Hudson Mountains of Antarctica to determine whether they indicate volcanic activity. Karen has been having a great time working with Sarah, Jessica and Ella, collaborating with Yiran Huang and Colleen Dalton on the internal structure and evolution of the cratonic mantle lithosphere in Fennoscandia and Antarctica, and using seismic velocities to model temperature and partial melt in the lithosphere and asthenosphere beneath the US.

This year, Sarah and Jessica presented their work at the 2025 AGU Meeting, and Sarah, Jessica and Karen all participated in the 2025 Interior of the Earth Gordon Research Conference. They published three papers titled “Investigating the Antarctic lithosphere through Sp receiver function analysis”, “Seismic constraints on temperature, partial melt, and lithosphere-asthenosphere dynamics in the southwestern United States”, “Revealing the Cape Verde hotspot track across the Great Lakes”, and “Reply to Comment by Peace et al. on Revealing the Cape Verde hotspot track across the Great Lakes”



Next year, in September of 2026, the Fischer group will be on a research cruise to deploy ocean bottom seismometers around the NW margin of the North Island of New Zealand. Our goal is to record seismic waves that sample mantle upwelling and partial melting.

Tsai Lab

Working with Dr. Victor Tsai, this lab works to understand how earthquakes are affected by fault network geometries.

The Tsai Lab is made up of PI Victor Tsai, undergraduate student Daniel Zhang, and graduate students Jaeseok Lee and Henry Jurney.

The Tsai lab works on seismology and geomechanics, fluid-solid interactions in Earth systems, theoretical glaciology, and environmental seismology. They also work on modeling of earthquakes, debris flows, tsunamis, and subglacial hydrology and friction, as well as understanding wave propagation, particularly for ground motion amplification using simplified models and imaging with ambient noise. Recently, they have been working on understanding fault geometric complexity for earthquakes, ice sheet subglacial physics, and physics-informed imaging.

This group published five papers this year:

Rosenshine, H., and V. C. Tsai (2026). "Distinguishing between internal ice deformation, Weertman sliding, and Coulomb friction in Antarctic Ice Sheet surface speeds", Glacies. Zeng, Q.,

F.-C. Lin, and V. C. Tsai (2026). "Triple-difference surface-wave travel time adjoint tomography", Geophys. J. Int., 244, doi:10.1093/gji/ggaf524.

McKeown, L. E., E. Lesage, J. E. Scully, E. J. Leonard, R. T. Pappalardo, M. Potter, V. C. Tsai, M. Choukroun, E. Gloesener, S. Diniega, N. Hatcher, and D. McBryde (2025). "Lake stars as an Earth analog for Europa's Manannan crater spider feature", Planet. Sci. J., 6, 279, doi:10.3847/PSJ/ae18a0.

Lee, J., V. C. Tsai, D. T. Trugman, G. Hirth, and A. Chatterjee (2025). "Fault network geometry modulates earthquake source spectra across scales", Geophys. Res. Lett., 52, e2025GL115592, doi:10.1029/2025GL115592.

Lee, J., V. C. Tsai, G. Hirth, A. Chatterjee, and D. T. Trugman (2025). "Reply to:On the effects of fault alignment on slip stability", Nature, 642, E22-E23, doi:10.1038/s41586-025-09118-4.

The group also attended AGU and SSA!

Lau Lab

Working with Dr. Harriet Lau, this lab works to understand and describe Earth's behavior consistently across very different time scales, from short-term processes like tides to long-term processes like mantle convection and plate tectonics.

The Lau lab is made up of PI Harriett Lau, undergraduate student Neal Frankenberg, graduate students Allie Coonin, Steven Ramirez, and Jianming Zhao. and post-doc Nick Wagner.

This year, the Lau Group published three papers titled:
Coonin, A.N., Lau, H.C.P. & Coulson, S. Meltwater Pulse 1A sea-level-rise patterns explained by global cascade of ice loss. Nat. Geosci. 18, 254–259 (2025). https://doi-org.revproxy.brown.edu/10.1038/s41561-025-01648-w

Wagner, N. L., & James, P. B. (2025). New geophysical constraints for intrusive magmatism at large Martian volcanoes: Implications for crustal thickness and volatile outgassing. Journal of Geophysical Research: Planets, 130, e2025JE008959. https://doi-org.revproxy.brown.edu/10.1029/2025JE008959

Lau, H. C. P., & Al Asad, M. M. (2025). True and apparent polar wander from sluggish to active lid tectonics. Journal of Geophysical Research: Solid Earth, 130, e2024JB030886. https://doi-org.revproxy.brown.edu/10.1029/2024JB030886

This year, Nick, Neal, and Allie attended AGU!