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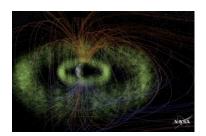


EOS IN THE NEWS



An Out Of This World Experience

High school students collaborated with UNH scientists to create a museum exhibit about humans in space



Space Waves

Marc Lessard receives \$1.62M NSF grant to study ultra-low frequency magnetic waves that impact the Earth's radiation belts



Frozen Commons

Alexander Shiklomanov receives NSF grant to study shared Arctic landscapes affected by climate change



<u>p Call: New</u> ts Flooding, Sea-Level Rise

Elizabeth Burakowski and Cameron Wake discuss IPCC report's implications for N.H.



Artist At Sea

Jennifer Miksis-Olds collaborated with artist Wendy Klemperer to document ocean research



To Save Earth's Climate, Map the Oceans

Larry Mayer notes the cost and value of mapping the world's oceans



Sea-Level Rise and Coastal Flooding are Accelerating – How Much?

Cameron Wake discusses projections for sealevel rise and groundwater rise on the N.H. seacoast



When Restoring Marine Life, Clumping Works Best

David Burdick weighs in on coastal restoration planting strategies



N.H. Coastal Communities May Benefit from Infusion of Federal Funds

Jennifer Jacobs discusses infrastructure and climate change with Senator Maggie Hassan



U.S. Icebreaker Departs on a Voyage that will Transit the Northwest Passage

Larry Mayer is aboard the Healy to map the Arctic seafloor



How NOAA Programs Develop Community-Based Solutions Where the Water Can't Wait

UNH ocean engineering students are helping N.H. coastal communities monitor flooding

SEMINARS AND EVENTS

AerospaceFest at the McAuliffe-Shepard Discovery Center

September 4, 10:30 a.m. – 4:00 p.m. Sponsored by the N.H. Space Grant Consortium

ArtLAB Lecture

Speakers: Wendy Klemperer and Jennifer Miksis-Olds

September 8, 4:00 p.m. - 6:30 p.m.

Part of CARE's Art-Science Collaboration

ArtBreak Artist Talk

Speaker: Wendy Klemperer

September 15, 12:10 p.m. - 1:00 p.m. Part of CARE's Art-Science Collaboration

CONFERENCE FUNDING AVAILABLE FOR STUDENT RESEARCHERS

Each year, EOS raises funds during The (603) Challenge to support our student researchers who attend professional conferences to present their work. These funds can cover travel and/or registration and are applicable for both in-person and virtual conferences. Please contact <u>Rebecca Irelan</u> to apply for funding.

CONGRATULATIONS

Kudos to Hilary Kates Varghese, who received Best Paper – Young Investigator Award in Noise at the Acoustics in Focus Conference. Well done, Hilary!

FAREWELL

We bid adieu to Robbin McPherson, the Senior Administrative Assistant for EOS, who is retiring after 30 years of working at UNH. Robbin has been the glue holding this Institute together and she will be sorely missed. Wishing you all the best in your new adventures, Robbin!

Please send any news items or suggestions for future Convergence content to Rebecca Irelan at rebecca.irelan@unh.edu.

Convergence is produced by the Institute for the Study of Earth, Oceans, and Space.

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University of New Hampshire 9 Edgewood Road Durham, NH 03824

An Out Of This World Experience

Collaboration and teamwork drive creation of space museum exhibit

Thursday, August 26, 2021

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Students from two New Hampshire career and technical education centers learned a lot about space and perhaps even more about the importance of collaboration and relying on others during an unusual but enriching experience this year: They developed a museum exhibit about humans in space.

Juniors and seniors from the Seacoast School of Technology in Exeter and the Applied Technology Center in Milford worked tirelessly to research and develop numerous interactive displays for the McAuliffe-Shepard Discovery Center (MSDC) in Concord. The exhibit, titled "Human Physiology in Space," draws from a wide spectrum of educational disciplines that all intertwine, including engineering, medicine, energy, water and agriculture. The N.H. Space Grant Consortium provided the funding for the exhibit, and numerous partners, educators and UNH scientists provided guidance for the students when needed.



JEANNE SHAHEEN SPOKE WITH MSDC EDUCATION SPECIALIST WALLIS BORAM ABOUT THE EXHIBIT ON ITS OPENING NIGHT.

The exhibit offers museum attendees the opportunity to learn about the effects of radiation on astronauts, build a miniature Mars colony and use touch-screen kiosks to watch the students' presentations and run computer simulations about what it would take for humans to survive on the Red Planet.

"We're always looking for new exhibits, especially those that explore missions to the moon and to Mars and humans living in space," says Mirka Zapletal, Director of Education at the MSDC. "But our larger goal was for students to have a real-world experience, to work on an actual project for a client from start to finish, while thinking

about how to make it interactive, fun and sturdy enough for children to use it. They did a really phenomenal job."

Vasiliki Partinoudi '03G, director for the Milford Applied Technology Center worked closely with the center's biotechnology teacher to make sure the project fit within the parameters of the school's curriculum and competency requirements and attended "the big reveal" — the exhibit's unveiling in July.

"It's so exciting for a high school student to see their work in a museum, to see all their hard work on display," Partinoudi says. "It's rewarding to give high schoolers the opportunity to work on something that can be scaled up to experiments in space."

Jennifer Bourgeault is a project director and the U.S. Country Coordinator for The GLOBE Program, a NASA-sponsored program where students around the world work together to collect environmental data and conduct research. Her work, based out of the <u>UNH Earth Systems Research Center</u>, involves collaboration with NASA employees whose positions require support from subject matter experts: engineers, journalists, welders, biologists, mathematicians, digital artists and many others. Bourgeault knows firsthand about the importance of teamwork to complete a project, and now so does her daughter — Josie Bourgeault, who is entering her senior year at the Seacoast School of Technology, was involved in developing part of the exhibit for the MSDC and along with other students from both schools had the opportunity to speak with NASA subject matter experts via Zoom.

"Part of the message that I've been getting from NASA is that they are trying to connect to the next generation and be role models for them, and this project with the MSDC and the two high schools really fit in with that goal."

"Part of the message that I've been getting from NASA is that they are trying to connect to the next generation and be role models for them, and this project with the MSDC and the two high schools really fit in with that goal," Jennifer Bourgeault says.

The students were given wide latitude to create the final products for the exhibit, Zapletal says. She helped with logistics and connected the students with experts, including Andrew Jordan and Wouter de Wet, both research scientists in <u>UNH's Space Science Center</u>. Other MSDC staff members held regular meetings with the students to check in on their progress and help them address obstacles — many of which happen in real life.

"Personally, I have always been a very independent worker, so having to work on this project with three other people forced me to be more open-minded to others' ideas," says Makayla Bobusia, an incoming senior at the Milford School of Applied Technology. "During the brainstorming stage was where this skill was most stimulated, but in the end I am very happy with the ideas we came up with."

"Personally, I have always been a very independent worker, so having to work on this project with three other people forced me to be more open-minded to others' ideas."

Brianna Arnoldy, an incoming senior from the Milford Applied Technology School, says, "This project was quite different from others I've done in the past. I've never felt so creatively free with a project." Perhaps not coincidentally, her grandfather, Roger Arnoldy, is a professor emeritus from UNH's Space Science Center whose own research focused on rocket science.

Josie Bourgeault, who wants to be an engineer, observed that final product might not have ended up how it was originally intended, but with good collaboration and communication, the exhibit became something even better.

"I wish more high schoolers got to do this kind of project," Josie Bourgeault says. "Group projects are not usually this collaborative. It was such a broad subject area—I think that's what made it so cool, you saw how the project evolved and matured, and you could take it in almost any direction."

After this summer, the exhibit will be moved to a few different locations, including both participating schools, Zapletal says. This project will continue for the 2021-22 school year and engage a new cohort of students who will design another exhibit for the MSDC next summer.

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• WRITTEN BY:

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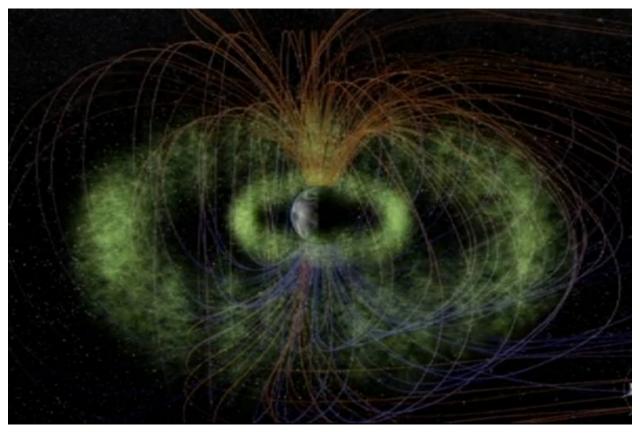
Space Waves

Researchers receive \$1.62M to study magnetic waves that impact Earth's radiation belts

Thursday, August 19, 2021

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GRAPHIC BY NASA.

UNH researchers have received a \$1.62 million grant from the National Science Foundation to study ultra-low frequency magnetic waves from space. This research will help scientists better understand Earth's radiation belts, which are an important component in the space weather that can impact our power grid and other technologies.

"This grant will help support our research in making global measurements of Earth's magnetic field and, specifically, ultra-low frequency waves," said Marc Lessard,

professor of physics in UNH's Space Science Center and the College of Engineering and Physical Sciences. "These waves are thought to play an important role in Earth's radiation belts and magnetospheric substorms. These goals are important in trying to understand the effects of magnetic storms, or space weather, that can interfere with communication satellites, GPS and so-called ground-induced currents that affect our power grid."



CHRETIEN '24, A PHYSICS MAJOR HAILING FROM ROCHESTER, NEW HAMPSHIRE, IS HELPING TO BUILD MAGNETOMETERS FOR THIS NSF-FUNDED PROJECT.

The five-year project will rely on an array of induction coil magnetometers that measure ultra-low frequency waves in Earth's magnetic field. The magnetometers will be installed underground in the Arctic regions of northern Canada, Greenland and Svalbard, Norway. Data collected from this project will help support UNH's research to improve our understanding of magnetic storms, or space weather, that can affect technology.

Lessard says the project has a significant student training component: The funding will support a UNH graduate student for the entire five years of the project, and a UNH postdoctoral researchers for the first three years. Two UNH undergraduates have already begun to fabricate the magnetometers for the project. Lessard says his team will also purchase the magnetic material from Mushield, Inc., a company based in Manchester, New Hampshire.

This type of hands-on research experience not only results in real-world data, but it also provides an amazing opportunity for the students: From fabricating and testing the magnetometers to holding team meetings and checking the deployment schedules, the students working on this mission will emerge with valuable research project management skills to help launch their careers.

"This project is another example of very compelling, state-of-the-art science where undergraduates and graduate students are taking on the role of research

scientists," Lessard says. "It continues a decades-long series of student opportunities supported by UNH, and we're proud to continue to be a part of it."

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GRANTS AND CONTRACTS NEWS



University of New Hampshire

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Frozen Commons

Researchers will study shared Arctic landscapes affected by climate change

Thursday, August 19, 2021

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IMAGE: NASA/JOHN SONNTAG

As the Arctic experiences rapid alterations in its landscape due to climate change, questions are beginning to emerge about how to best plan for the future in regions where ice, snow and permafrost currently exist. UNH researchers have received funding to study the use and governance of these "frozen commons" — interconnected Arctic landscapes that are shared, used and managed by a diverse array of governments,

Indigenous peoples and local communities — in order to improve the resilience of these regions.

With a \$488,983 grant provided by the Navigating the New Arctic NSF Initiative, UNH will collaborate with five other universities and social, environmental and civil engineering scientists on the five-year project. The research will focus on three major elements — natural and built environments and social systems — that are critical to understanding the changing Arctic.

"The project sets the stage for a convergence of knowledge and concepts across diverse cultural and political contexts, starting with thoughts held by Indigenous and local communities and scaled up to those implemented by regional stakeholders," said Alexander Shiklomanov, research assistant professor in UNH's Earth Systems
Research Center who is the principal investigator on the grant. "By providing recommendations to policy makers, increasing education efforts and fostering extensive community-to-community and science-to-community adaptation and innovation, the goal is to help promote sustainability and resilience in the Arctic."

The research will take place in Arctic regions within Alaska and Russia, where scientists will work closely with local communities, Indigenous people and governments on all parts of the project, including research design, methodologies, data collection and dissemination. The team will host workshops with local and Indigenous community members discuss their progress and share their results more broadly.

As part of the grant, Shiklomanov will focus on the environmental components of the frozen commons, including the current state and dynamics of climate, permafrost, hydrology, vegetation and geomorphology, he says, building on data previously collected by other UNH researchers and adding information provided by the local communities. The data will be archived and analyzed using a new online system that will be developed by UNH research scientist Alex Prusevich and Stanley Glidden, a UNH information technologist. Weiwei Mo, UNH assistant professor of environmental engineering, will develop and implement a role-play simulation for the frozen commons and will also develop engineering solutions to improve the sustainability of those Arctic landscapes.

Shiklomanov says he's also interested in developing a new methodology to determine the environmental thresholds and tipping points for the snow, ice and permafrost conditions that allow those regions to be used as frozen commons. "This methodology can then be applied to other socially important environmental elements or domains," he adds.

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A Final Wakeup Call: New Report Predicts Flooding, Extreme Heat, Sea-Level Rise in State

Elizabeth Burakowski and Cameron Wake discuss IPCC report's implications for N.H.

Read the New Hampshire Bulletin article

Artist At Sea

New art exhibition documents ocean research

Wednesday, August 11, 2021

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"SEASCAPE #4," A WATERCOLOR BY WENDY KLEMPERER.

A new exhibition, "Wendy Klemperer: Artist at Sea," will be on view at the <u>UNH Museum of Art</u> beginning Aug. 30 and running through Oct. 15, 2021. The Museum of Art and programs are open to the public free of charge.

In 2019, Wendy Klemperer joined Dr. Jennifer Miksis-Olds, director of the <u>UNH Center</u> <u>for Acoustics Research and Education</u>, for a unique three-week artist residency at sea as part of a project focused on the development of the <u>Atlantic Deepwater Ecosystem</u> <u>Observatory Network (ADEON)</u>. Her pencil sketches of the crew members highlight the

collaborative nature of scientific research and her watercolors of the sea and ocean life celebrate the scientific and experiential rewards of conducting environmental research outdoors.



INK ON PAPER BY WENDY

KLEMPERER: KYLE COVERT, JUNIOR ENGINEER, R/V NEIL ARMSTRONG, 2019. "Having an artist onboard highlighted elements of science that I as a scientist often either take for granted in the unpredictable atmosphere of field work, overlook, or underappreciate," says Miksis-Olds. "Wendy's ability to capture the humanity onboard the ship in her portraits of the ship and science crews really captured the message that at-sea research is a team sport. Every person Wendy captured in her portfolio of portraits was essential to a successful science cruise. From the cooks who took such good care of us to the often unseen engineers that kept the vessel and everything on it running, every person played a role. Often it is only the scientists that get credited with the research results. Wendy reminded us all that each person on the ship is essential in successful oceanographic research."

"I have always admired explorers — scientists, artists and adventurers seeking information from the natural world — and was happy to join their ranks on this three week excursion at sea," Klemperer says. "This saw me deciphering the massive marine migration each day on computer screens, throwing net tows at midnight, drawing

portraits of scientists and crew and painting watercolor ship details and seascapes whenever time allowed. The experience whetted my appetite for more, and deepened my admiration for scientists probing the ocean depths for greater knowledge."

An ArtLAB lecture Sept. 8 from 4 to 5 p.m. at the Museum of Art in the PCAC will be followed by a reception in the museum from 5 to 6:30 p.m. This hour-long discussion will include the work of Klemperer and Miksis-Olds, as well as accounts of their experiences and research from the three weeks aboard the R/V Neil Armstrong. An additional ArtBreak artist talk will take place with Klemperer on Sept. 15 from 12:10 to 1 p.m. in the PCAC. Klemperer will present work from her artist in residence and share her studio practice.

For more information on these programs visit the <u>museum's website</u>. The Museum of Art hours of operation during the academic year are Monday, Tuesday, Wednesday and Friday from 10 a.m. to 4 p.m., Thursday from 10 a.m. to 6 p.m. and Saturday from noon to 4 p.m. The museum is closed on Sundays and university holidays.

About the artist

Exhibiting artist Wendy Klemperer earned a bachelor's in biochemistry at Harvard before moving to New York City to pursue art full time, earning a Bachelor of Fine Arts in sculpture at Pratt Institute. She lives and works in Brooklyn, New York, and Nelson, New Hampshire. Klemperer is known for her large-scale animal welded sculptures created from industrial refuse, rebar and reinforcement rod used in buildings, bridges and highways. Exhibitions include Socrates Sculpture Park, Queens, New York: Bridgewater-Lustberg Gallery, New York City: Pratt Institute Sculpture Park, Brooklyn, New York; and DeCordova Museum and Sculpture Park, Lincoln, Massachusetts. Her works are installed throughout the U.S. and are part of permanent installations at College of the Atlantic in Bar Harbor, Maine, Coastal Maine Botanical Gardens in Boothbay, Maine and Lay Sculpture Park in Missouri, Great Falls International Airport in Montana, Farmingdale State College, in Farmingdale, New York and SIAS University in Xinzheng, China, Klemperer has taught welded sculpture workshops for more than a decade at several venues, including the Educational Alliance and 3rd Ward, both in New York City, and the Carving Studio and Sculpture Center in West Rutland, Vermont. She has been a visiting artist and lectured about her work at universities throughout the United States.

About Atlantic Deepwater Ecosystem Observatory Network (ADEON)

The Atlantic Deepwater Ecosystem Observatory Network (ADEON) for the U.S. Midand South Atlantic Outer Continental Shelf (OCS) was developed and deployed in November 2017. The lead P.I. for this project is Dr. Jennifer Miksis-Olds, director of the UNH Center for Acoustics Research and Education and research professor in the UNH School of Marine Science & Ocean Engineering. Miksis-Olds leads a collaborative research team consisting of individuals from UNH, Observing AirSea Interactions Strategy (OASIS), Netherlands Organization for Applied Scientific Research, JASCO Applied Sciences, Stony Brook University and the National Oceanic and Atmospheric Administration (NOAA).

This observatory network generates long-term measurements of both the natural and human factors active in this region, thus informing the ecology and soundscape of the Outer Continental Shelf. These data will provide further a mechanistic understanding of the cumulative impacts these factors have on marine resources and provide insight for ecosystem-based management efforts. Long-term observations of living marine resources and marine sound will assist federal agencies, including the Bureau of Ocean Energy Management (BOEM), Office of Naval Research (ONR) and the National Oceanic and Atmospheric Administration (NOAA), in complying with mandates in the Endangered Species Act (ESA), Marine Mammal Protection Act (MMPA), and Sustainable Fisheries Act (SFA).

Exhibitions and accompanying programs are supported by Friends of the Museum of Art. UNH plans a fully open and in-person fall semester. Some precautions may remain in effect such as decreased density as recommended by the CDC and state public health officials. Any precautions affecting the museum will be noted on our website prior to each event or program. For more of the latest updates visit UNH COVID19 guidelines.

• COMPILED BY:

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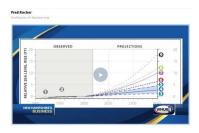
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