ai2es.org

AI2ES NEWS

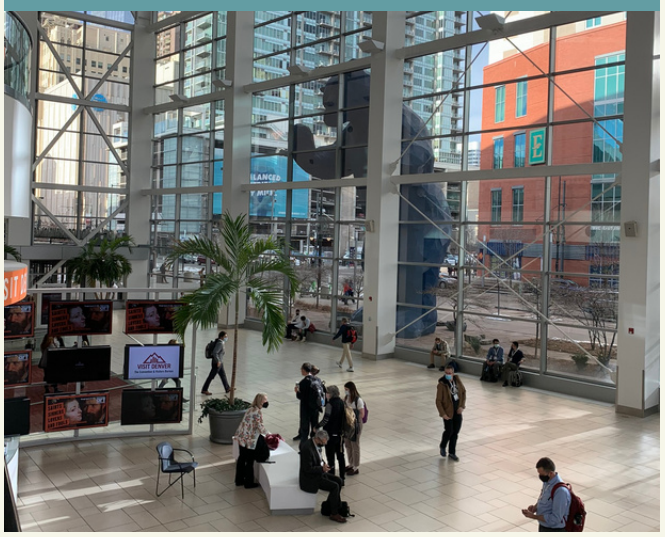
AMS Special Edition *January 30, 2023*

Edited by Raven Reese, Dr. Philippe Tissot, and Jennifer Warrillow
with contributions from Dr. Amy McGovern and Susan Dubbs

AMS ANNUAL MEETING

Over 7,000 people from across the world gathered this January for the 2023 American Meteorological Society (AMS) annual meeting, whether from behind a screen or, for over 5,700 in-person attendees, behind a face mask in Denver, Colorado. About 70 of the attendees at this year's conference represented AI2ES; many contributed oral and poster presentations and several participated in a presidential panel moderated by AI2ES leadership. The AMS meeting is the world's largest conference focused on climate, water, and weather. The origin of the AI2ES Institute is based on the AMS Artificial Intelligence (AI) conference and the AMS AI Committee. This network of researchers formed in 1985 with the organization of Workshops on Artificial Intelligence Research in the Environmental Sciences (AIRES), led by William Moninger. The first AMS AI conference took place in 1998 in Phoenix, Arizona. The AMS annual meeting encourages pioneers in the application of AI to environmental sciences to network and share research.

Many of the present AI2ES researchers benefitted from participation in the AMS AI conferences over the ensuing years. Several of the AI2ES leaders, including Amy McGovern, John Williams, Philippe Tissot, David John Gagne, and Christina Kumler, have chaired the AMS AI Committee and organized past conferences. We extend a big thank you to outgoing AMS AI Chair David John Gagne and new Chair Christina Kumler. Thanks to Dr. Gange and Ms. Kumler also for organizing the Denver AMS AI Conference. Anyone interested in helping with the organization of next year's AMS AI conference and other AMS AI activities should contact Christina Kumler for more information.



AI2ES @ AMS

After 2 ½ years of virtual meetings and conferences, AI2ES organizers recognized the need for a face-to-face networking event around the time of the AMS annual meeting. AI2ES PI Dr. Amy McGovern, Co-PI Dr. Imme Ebert-Uphoff, and Dr. David John Gagne organized the AI2ES @ AMS meeting to gather researchers, faculty, students, and others contributing to AI2ES on the day before the AMS conference. Panels such as the Career Q&A and networking breaks allowed students to connect meaningfully with the other members of AI2ES. Ashley Marines, undergraduate research assistant and student at Texas A&M University - Corpus Christi, appreciated "that we were able to have conversations with people who are leading AI2ES." As an undergraduate Physics major, Marines feels "more like a part of the team rather than an onlooker in virtual meetings" as a result of the bonds created by the AI2ES @ AMS meeting.

AI2ES leadership also gathered to review progress and tweak strategy for upcoming project years. NSF Program Director Jim Donlon, overseeing the overall NSF AI Institutes program, placed the Institute's initiatives in the context of the NSF AI strategy and interacted with the AI2ES members through a Q&A session. It was essential for every attendee either to see each other in person again or finally meet outside the camera boxes of virtual meetings. Traveling back from Boulder, a few members even tried out a few dance moves on the "party bus" home!

A big thank you to Taysia Peterson and all those from NCAR who prepared the venue, organized the technology, set up registration, and did all the other tasks that made this event possible.

PRESIDENTIAL SESSIONS

One highlight of the AMS week in Denver was the Presidential Forum panel titled "How AI Can Drive New Sciences and Improve Decision Making for All People." Hosted and moderated by AI2ES leaders Drs. McGovern, Williams, and Tissot, the panel welcomed academic and industry voices. The three panelists were Dr. Kelvin Droegemeier, Regents' Professor of Meteorology at the University of Oklahoma and recently the Director of The White House Office of Science and Technology Policy and Acting Director of the National Science Foundation; Dr. Gina Eosco, the Social Science Program Manager for NOAA OAR's Weather Program Office; and Dr. Peter Neilley, Director of Weather Forecasting Sciences and Operations at The Weather Company, an IBM Business.

The panel was introduced by AMS President Dr. Richard Clark, who emphasized the importance and timeliness of this discussion. It did not take long for the three panelists to dive into their experience and their thoughts on the future of AI and its application for weather and climate. This panel was perfectly timed with the popularization of AI in the public sphere. The panelists wove thoughtful reflections on the ethics of emerging AI with the utility that such a powerful tool holds for its users. Other topics, including ongoing changes brought by rapid AI scientific and technology advances, the need to continuously work on better integrating humans and changing technology, the impact of ChatGPT, and many more, were discussed during the 75 minute session. A recording is available on the AMS program for conference attendees and on the CBI AI2ES Facebook page for public view.

STUDENT SPOTLIGHT

This month our Student Spotlight landed on Evan Krell, PhD student and researcher in the Texas A&M - Corpus Christi CBI AI2ES program! Krell traveled to Denver for the 2023 AMS Annual Meeting to deliver two oral presentations, one titled "The Influence of Grouping Spatio-Temporal Features on Explainable Artificial Intelligence (XAI): A Case Study with FogNet, a 3D CNN for Coastal Fog Prediction," and another on "Development of a Machine Learning System for Detecting the Atmospheric Potential of Wildfire-driven Thunderstorms."

An adventurous person in his native South Texas environment, Krell discovered the beauty of snowy downtown Denver on 15-mile nature walks and hikes. When his fellow AI2ES members proposed a trip to the ice skating rink, Krell couldn't refuse the chance to embrace the ice.

It seems that the ice welcomed that hard embrace with open arms, because Krell ended the skating session with a trip to the ER. "I've never ice skated, or skated, or anything of the sort," Krell recalls, so he slowly swept his circles around the rink with caution. When he finally began to understand the glide, the realization set in that he "had no idea what the actual technique is to stop. Within a moment, my face was just on the ice." Within minutes, an ambulance arrived at the ice rink to scoop up the bloodied Krell and assess his injury. All that Krell could think about, despite the fresh eyebrow wound left by his glasses, was his two presentations the next day.

Evan Krell
PhD Student/ Graduate Researcher
TAMUCC
CBI AI2ES

After a long visit to the emergency room and seven stitches on his brow, Krell wouldn't let this bump in the road (or ice) deter him from presenting the next day. Instead, he acknowledged the injury during his speech as a lesson in "gaining a respect for the ice." This hook at the start of his first presentation left the audience chuckling and cheering for his newfound knowledge. "People like a funny story, so if you lead with one, it endears you to the audience." Krell delivered two spectacular presentations that Wednesday, capping off an extraordinarily eventful 24 hours from ice rink to ER to presenting at the AMS AI conference. Back in the mild South Texas winter, Krell continues his research in XAI with a fading souvenir from this year's AMS Annual Meeting.

AI2ES CONTRIBUTIONS TO 2023 AMS ANNUAL MEETING

The AI2ES team had a strong presence at the AMS annual meeting in Denver, contributing a total of over 50 oral and poster presentations as well as panel appearances and moderation. The majority of the contributions were, as expected, part of the 23rd AMS AI conference; however, there were several presentations at other conferences and joint sessions, such as the 21st Coastal Environment Symposium; the 18th Symposium on Societal Applications: Policy, Research, and Practice; and the 13th Conference on Transition of Research to Operations. AI2ES also delivered presentations at special events, including the Special Symposium on Forecasting, a Continuum of Environmental Threats, and a Walter Orr Roberts Lecture (by Dr. Julie Demuth). For the first time, Dr. McGovern represented AI2ES as a roundtable panelist in the opening Presidential Forum!

AMS AWARDS RECIPIENTS

Dr. Julie Demuth received the Walter Orr Roberts Lecturer award for "Groundbreaking interdisciplinary research to improve hazardous weather risk communication and dedicated work promoting the exchange of knowledge across the meteorology and social sciences communities." She was also named an AMS fellow this year!

Dr. Christopher Thorncroft (second from the left) received the Joanne Simpson Tropical Meteorology Research Award for “Theoretical advances in the meteorology and climate dynamics of Africa and the tropical Atlantic, and for leadership of international research in Africa.”

INTERNSHIP OPPORTUNITIES

The Center for Western Weather and Water Extremes (CW3E) Internship Program. 9 week program. June 20 – August 18, 2023, La Jolla, CA

- All undergraduate students are encouraged to apply, regardless of experience level.

Application deadline: February 12, 2023
https://cw3e.ucsd.edu/cw3e-internship-program/

Research Experiences for Undergraduates (REU) - Earth System Science in the Department of Atmospheric Science, Colorado State University. 10 week program. May 30 – August 4, 2023, Fort Collins, CO

- NSF-supported REU offers paid summer undergraduate research internship

Application deadline: January 31, 2023
https://www.atmos.colostate.edu/ATS_REU/

Significant Opportunities in Atmospheric Research and Science (SOARS), University Corporation for Atmospheric Research (UCAR). 10 week summer program. Boulder, CO

- undergraduate to graduate program built around a summer research internship

Application deadline: February 1, 2023
https://soars.ucar.edu/

Research Experiences for Undergraduates (REU) - Atmospheric and Geographic Sciences, National Weather Center (NWC). 10 week program. May 22 –July 28, 2023, Norman, OK

- University, college, and community college students interested in weather-related research careers are encouraged to apply.

Application deadline: February 12, 2023
https://caps.ou.edu/reu/

Research Experiences for Undergraduates (REU) - Learning the Earth with Artificial Intelligence and Physics (LEAP), Columbia University, program length TBA, New York City, NY

- Applications from students who will be rising sophomores, juniors, or seniors in Fall 2022

Application deadline: TBA
https://leap.columbia.edu/education/leap-summer-reu-program/

NOAA's Educational Partnership Program with Minority-Serving Institutions (EPP/MSI) Undergraduate Scholarship Program (USP), National Oceanic and Atmospheric Administration (NOAA). Two 10 week programs across 2 years, Silver Spring, MD

- provides funds for two years of undergraduate study to rising junior undergraduate students majoring in Science, Technology, Engineering, or and Mathematics (STEM)

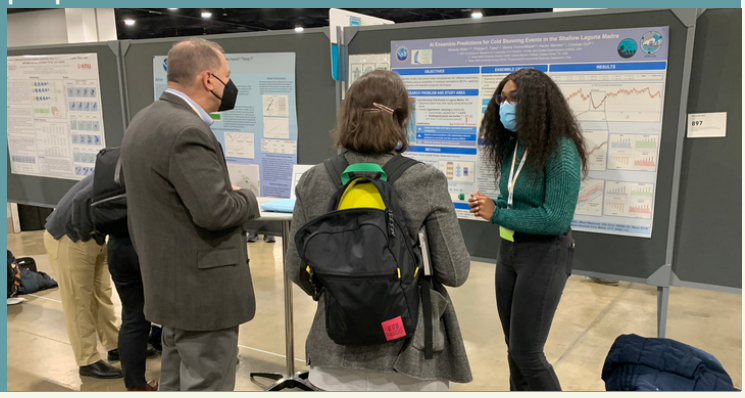
Application deadline: January 31, 2023
https://www.noaa.gov/office-education/epp-msi/undergraduate-scholarship

Ernest F. Hollings Undergraduate Scholarship, National Oceanic and Atmospheric Administration (NOAA). Two years of full-time study and a 10-week, full-time paid summer internship, Silver Spring, MD

- provides successful undergraduate applicants with awards like academic assistance and summer internships

Application deadline: January 31, 2023
https://www.noaa.gov/office-education/hollings-scholarship

Disaster Tech seeks a summer 2023 Research Assistant intern. This person would work closely with a R&D team to conduct case studies of wide-area wind, snow, and/or ice storms from the 2022-23 winter season. This analysis may include contingency tables and ways to improve wet snow accretion modeling. A particular focus will be placed on power system resilience. Social science aspects of this work may include interviewing end users as to how information-rich predictive analytics could be more effectively communicated to inform better storm preparedness actions.



RECENT PUBLICATIONS

Please submit any new publications for listing on the AI2ES website to: https://ousurvey.qualtrics.com/jfe/form/SV_2Ie6VLjkYEbtnIW

- Lagerquist, R. and Ebert-Uphoff, I., 2022. Can we integrate spatial verification methods into neural network loss functions for atmospheric science? *Artificial Intelligence for the Earth Systems*, 1(4), p.e220021. https://doi.org/10.1175/AIES-D-22-0021.1

- Mamalakis, A., Barnes, E.A., and Ebert-Uphoff, I., 2022. Carefully choose the baseline: Lessons learned from applying XAI attribution methods for regression tasks in geoscience. *Artificial Intelligence for the Earth Systems*, pp.1-18. https://doi.org/10.1175/AIES-D-22-0058.1

- Marzban, C., Liu, J., and Tissot, P., 2022. On variability due to local minima and K-fold cross-validation. *Artificial Intelligence for the Earth Systems*, 1-25. https://doi.org/10.1175/AIES-D-21-0004.1

- Liu, N., Liu, C., and Tissot, P.E., 2022. Relative importance of large-scale environmental variables to the world-wide variability of thunderstorms. *Journal of Geophysical Research: Atmospheres*, 127(17), e2021JD036065. https://doi.org/10.1029/2021JD036065

- Ver Hoef, L., Adams, H., King, E.J., and Ebert-Uphoff, I., 2022. A primer on topological data analysis to support image analysis tasks in environmental science. *Artificial Intelligence for the Earth Systems* (published online ahead of print 2022). https://doi.org/10.1175/AIES-D-22-0039.1

- Vicens-Miquel, M, Medrano, A., Tissot, P., Kamangir, H., Starek, M., and Colburn, K., 2022. A deep learning-based method to delineate the wet/dry shoreline and compute its elevation using high-resolution UAS imagery. *Remote Sensing,* Volume 14, Issue 23. https://www.mdpi.com/2072-4292/14/23/5990

FIRST COHORT GRADUATION CEREMONY

Del Mar College faculty and staff, along with other AI2ES members, celebrated the first cohort of graduates with a ceremony this week! This is an amazing feat for one of the first Community College AI programs nationwide. Five students graduated from the new Del Mar College Artificial Intelligence in GIS Occupational Skills program. The program was created and the students completed their studies in less than two years from the beginning of the AI2ES Institute. The graduation ceremony, moderated by Dr. Phil Davis, included speeches from AI2ES PI Dr. Amy McGovern, CBI Director Dr. Rick Smith, Co-PI Dr. Philippe Tissot, and many of the professors who guided the students through the GeoAI program. We are excited to see the great strides this first cohort will make in their machine learning / AI communities and how participation in this program will influence their future endeavors!

Q&A

What is Chat GPT? Do you see its popularity as a benefit or detriment to the AI community?

Discuss your answers in the AI2ES Slack #newsletter channel! Submit another question for a chance at appearing in next month's newsletter.

GALLERY

Below is a link to the Google Drive folder containing photos from AMS 2023. AI2ES members may add their own photos. We encourage you to share your AMS 2023 experience!

https://tinyurl.com/2fwfaeye

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