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In The Trenches

THE NEWS MAGAZINE OF THE NATIONAL ASSOCIATION OF GEOSCIENCE TEACHERS



The Art of Teaching Meteorologic Concepts

In The Trenches

Editor in Chief: Redina Finch

Managing Editor: Nancy Ashmore

On the Cover: A portion of Vincent van Gogh's *Rain, or Enclosed Wheat Field in the Rain* [public domain], one of the works of art discussed by Teresa Bals-Elsholz and her students (inset photo by Teresa Bals-Elsholz) in "Art and Atmosphere," a class that linked art and weather phenomena.

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is a quarterly magazine of the National Association of Geoscience Teachers, a professional association that works to foster improvement in the teaching of the Earth Sciences at all levels of instruction, to emphasize the cultural significance of the Earth Sciences and to disseminate knowledge in this field to the general public.

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TO CONTACT US:

Email: inthetrenches@nagt.org

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Mailing Address:

NAGT, c/o Carleton College, B-SERC
One North College Street
Northfield, MN 55057



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Georgia O'Keeffe's *Sky Above Clouds IV* [Photo by bejoyfulthough (CC BY-NC 2.0)]

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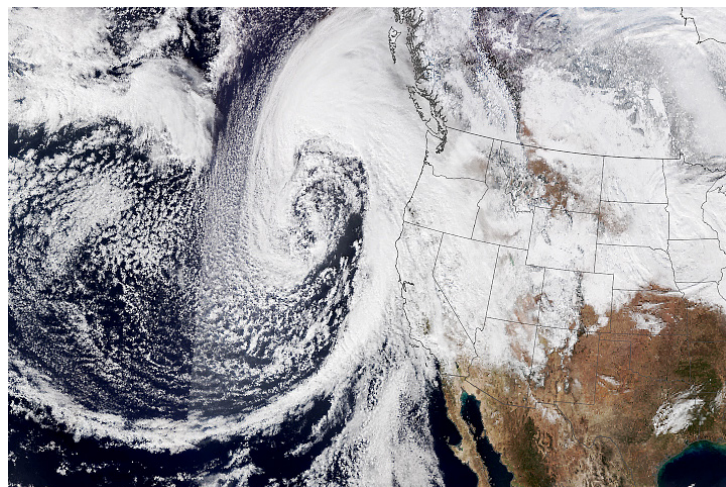
Earth Educators' Rendezvous 2023

From the Editor

Outside? Frightful. In This Issue? Delightful...

Wow, there is no end to the weather extremes in 2023! An “atmospheric river” caused high winds and near-continuous rain in California starting on January 4. This became very heavy snow and blizzard conditions at higher elevations. The first tornado outbreak of the year happened in the Southeast on January 1 (102 confirmed tornadoes). On January 12, strong to severe thunderstorms swept across the U.S. Southeast, from Mississippi to Georgia, spawning numerous tornadoes (86 reports). Farther north, these same systems caused heavy snow, sleet and freezing rain. On January 24, the National Weather Service issued a Winter Storm Warning for an area stretching from Central New Mexico to eastern Ohio, with another tornado outbreak possible in the Southeast. And it’s not even spring yet! Our thoughts and best wishes go to out to everyone impacted.

In this issue, an article by Teresa Bals-Elsholz describes how she uses art to teach observation concepts in meteorology. This is followed by an article on “Earth As Art,” a project of the Earth Resources Observation and Science (EROS) Center that produces artistic images that at first glance do not look like satellite images.



The image above of the atmospheric river that caused flooding, toppled trees, and downed power lines in California was acquired on January 4, 2023, by the Visible Infrared Imaging Radiometer Suite (VIIRS) on the NOAA-20 satellite. [NASA Earth Observatory images by Lauren Dauphin]

On the NAGT side of things, we have an update on the activities of the Advocacy Committee and the draft of a revised statement intended to replace the existing Position Statement on High school Earth science instruction.

We also have a special treat for you in this edition. Some of our Outstanding Teaching Assistant Award winners tell us about being a TA. It was pretty amazing reading their stories.—**Redina Finch**

NAGT Seeks a New Editor-in-Chief for *JGE*

- ▶ Do you enjoy learning about research that is happening across the geoscience education community?
- ▶ Are you interested in broadening access to education research and elevating the work of researchers?
- ▶ Do you have high standards and a willingness to support editors and authors in meeting those standards?

If you answered yes to these questions, then you might be a good fit for Editor-in-Chief of JGE!

The *Journal of Geoscience Education* (*JGE*) seeks an Editor-in-Chief who will work with NAGT to maintain and increase the journal's impact and reach while also upholding an editorial ethos that encourages and supports new authors in their development.



◀ **LEARN MORE AND APPLY BY MAY 1, 2023:**
nagt.org/nagt/jge/editor_search.html



Encouraging Scientific Observation of Meteorology through Art



Among the pieces studied were *Cloud Gate* by Anish Kapoor and works by Constable, van Gogh, and O'Keeffe. [Photo by vincent desjardins (CC BY 2.0)]

As digital screens replace printed maps, visualization software sketches contours, and social media connects our students, I sense a disconnect from atmospheric observations and scientific applications. Since students enthusiastically post their snapshots of clouds, storms and more, I introduced a class to leverage their interest and enhance their atmospheric science skills. “Art and Atmosphere” was offered in spring 2021 to Valparaiso University undergraduate meteorology majors.

Linking art and weather phenomena in the classroom had long been a goal. I enjoyed the art-related presentations and posters at the American Meteorological Society Conference on Education (e.g., Passow, 2019, 2020), but I had never sketched out a curriculum. A conversation with atmospheric sci-

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TERESA M. BALS-ELSHOLZ (teresa.bals-elsholz@valpo.edu) is a professor of meteorology in the Department of Geography and Meteorology at Valparaiso University, Valparaiso, IN.

tist Eric Bruning of Texas Tech University propelled my goal onto the course schedule. Through an NSF Career Program grant, he teamed up with visual artist Tina Fuentes to explore the intersection of lightning research and art. Their collaboration into the perceptions and observations of storms through visual media in oil, sculpture, video, and photography led to the Texas Tech University Museum exhibit *Marcando el Rélampago* (2017). The grant included travel funds for educational outreach, and the Valparaiso University Brauer Museum of Art seemed ideal. I reached out to the museum director, and we arranged for the exhibit to take place in fall 2020. My inaugural class would coincide with the exhibit opening and offer the community and students the opportunity to connect with the science, scientists, art, and artists.

Then the COVID pandemic happened. The museum temporarily closed in spring 2020 (reopening in fall 2022), and both the exhibit and class were canceled for the fall semester. Then Bruning offered to

host a remote exhibit for the class and the course was back on for spring 2021.

Twenty-five freshmen, sophomores, juniors, seniors, and I wore masks and sat five feet apart with extra desks to expand our seating. For optimal viewing a large mobile TV screen was used alongside the in-class video screen. My worries that discussion would be hampered by the accommodations were quickly dispelled. Students were eager to interact, express opinions, point out their observations (yes, observations!), and even disagree with each other. Even as the students and class shifted in-and-out of quarantine protocols and a few remote classes, the discussions and explorations billowed into thoughtful connections of how each artist viewed and portrayed the weather.

The course followed a timeline starting with the Hudson River School from the 1800s to present day artists. Without access to our nearby museum, I augmented my photos from past museum visits with artwork available on the Internet. Each class session covered a specific artist or style. Each class approached looking at the art and atmosphere in a progression from overall impression to a deeper connection of what is weather and how is it perceived.

In the works of Frederick Church, Winslow Homer, John Constable, and George Inness we discussed how the weather conveyed a message. Whether the grandeur of the country and unexplored western lands shown by a brilliant sunset falling over western mountains or the role of man in creating bountiful farmland reflected in rolling cumulus clouds. We argued over whether a figure cloaked in mist or fog was menacing or menaced. While in the Impressionists, we described how the immediate impression of sun, rain, clouds, and weather were captured by artists as if for a noon weather update. We exclaimed over Georgia O'Keefe's *Cloud Streets* as first observed from a plane and translated that to our view from satellite images. We reflected on the changes and similarities in message seen by the weather from the early artists to the black and white photography of Alfred Stieglitz and Ansel Adams. We challenged ourselves to find the very molecules and properties of meteorology in the weather-titled abstract works of Jackson Pollock and Agnes Martin. While in the contemporary outdoor exhibits, the weather became an intrinsic and changing aspect of the art with sunlight and sky reflected in *Cloud Gate*

by Anish Kapoor or the wind and shadows of the suspended rope sculptures of Janet Echelman.

Mid-semester, we had our long-awaited remote session with Eric Bruning. He talked us through the process of using photography to study lightning and storms beyond mere observation, his three-dimensional sculpture of a lightning strike to understand the intricacies of electricity and path, and the introduction of an artist and artist's view into the scientific process. Numerous questions ensued and, satisfyingly, displayed the connections between art and atmosphere I was striving for. Students asked about the scientific process of studying lightning, motivation for the subject, particulars on the research process, and path to including an artist. They asked about specific art pieces and how they were produced, did they intend to show storms in the way they perceived it, and how did other scientists interact with an artist at a professional conference. They made connections with the exhibit to the artists we had talked about.

An unexpected outcome of the class included a discussion of mental health, not a typical subject for my atmospheric science courses. The isolation, loneliness, and depression of van Gogh contrasted by his brilliant colors, swirls, and thundering storms seen from his hospital room became part of a broader discussion on mental health, pandemic isolation, and the need to express emotions as van Gogh did through his art. We also discussed the role of faith as portrayed by the weather in artists such as Inness. In class evaluation comments, student after student commented on the joy of a weekly break in not thinking about COVID and just talking about meteorology without equations, derivations, and a final exam.

In late spring I knew I had reached my goal of enhancing students' observations of the current weather. During class, someone exclaimed, "Look, it's van Gogh's [*Rain*](#) happening right now!" Streaks of grey rain against the greening grass were visible, exactly as van Gogh had observed and depicted.

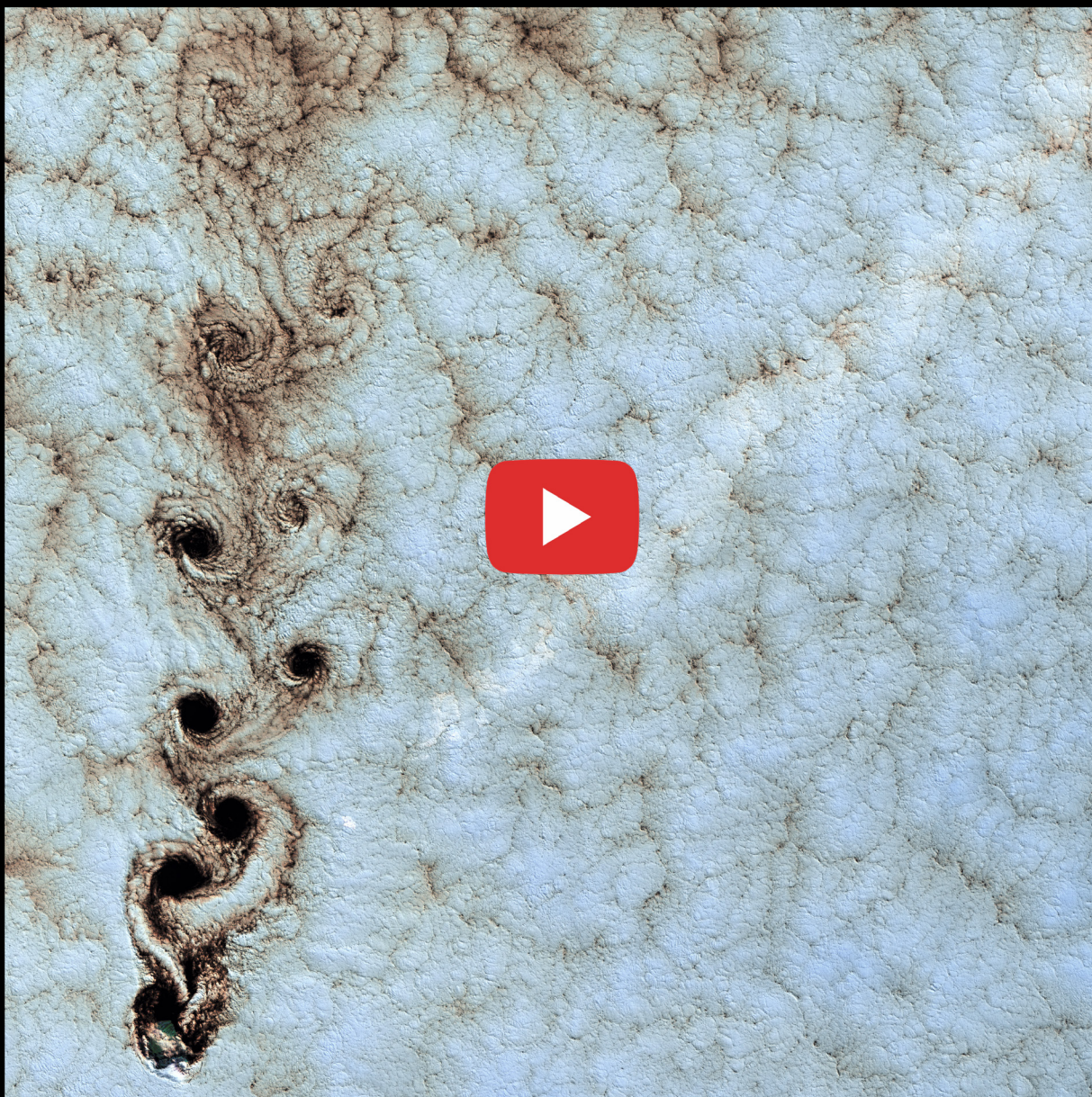
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On the Flip Side: The Earth Itself as Art

The Earth As Art project of the USGS's Earth Resources Observation and Science (EROS) Center offers the opportunity to look at clouds (and other Earth phenomena) "from both sides now"—the aesthetic as well as the scientific. Begun in the early 2000s, its original intent remains the same: to produce images that do not look like satellite images at first glance. Earth As Art shows not only what satellites capture in the visible wavelengths of light

Karman Vortices

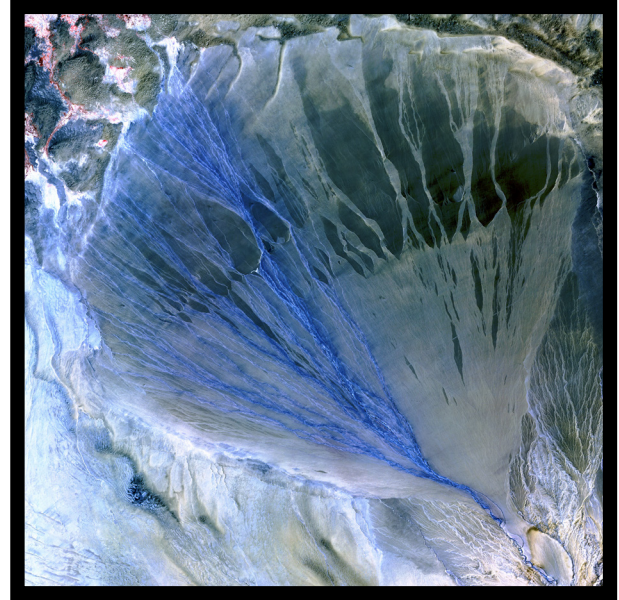


KARMAN VORTICES—Each of these swirling clouds is a result of a meteorological phenomenon known as a Karman vortex. These appeared over Alexander Selkirk Island in the southern Pacific Ocean. Rising precipitously from the surrounding waters, the island's highest point is nearly a mile (1.6 km) above sea level. As wind-driven clouds encounter this obstacle, they flow around it to form these large, spinning eddies. [Photo credits, pages 4 and 5: USGS and NASA.]

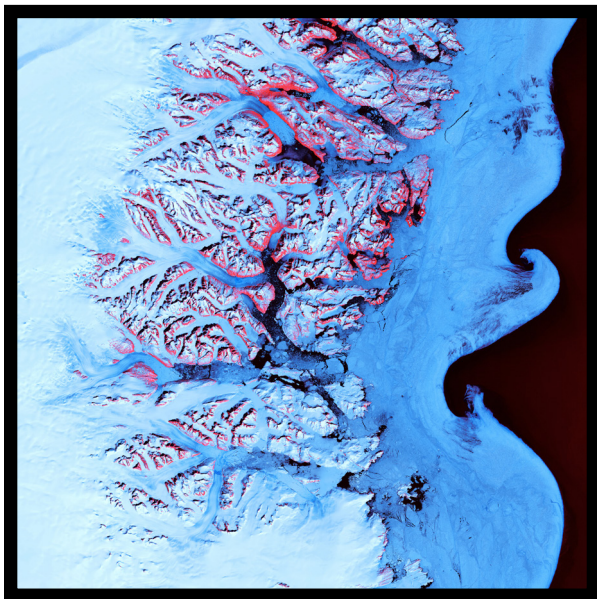
we can see, but also what's hiding in the invisible wavelengths that Landsat sensors can detect in the infrared part of the electromagnetic spectrum. Those combinations can bring out much more scientific value, but also can produce imagery of breathtaking beauty. Download these images for free at <https://eros.usgs.gov/media-gallery/earth-as-art>, where you can also find videos like the one linked to the image of the Karman vortices on page 4.



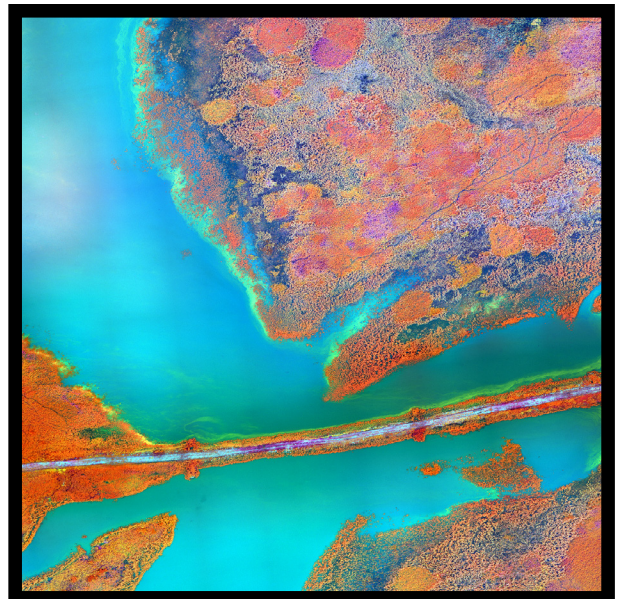
ALGERIAN ABSTRACT—What look like pale yellow paint streaks here are ridges of wind-blown sand that make up Erg Iguidi, an area of ever-shifting sand dunes which often surpass 500 meters—nearly a third of a mile—in both width and height extending from Algeria into Mauritania in northwestern Africa.



ALLUVIAL FAN—A vast alluvial fan blossoms across the desolate landscape between the Kunlun and Altun mountain ranges that form the southern border of the Taklimakan Desert in China's XinJiang Province.



ICE WAVES—Along the southeastern coast of Greenland, a network of fjords funnels glacial ice to the Atlantic Ocean. During the summer, newly calved icebergs join slabs of sea ice and weathered bergs in an offshore slurry that the southward-flowing East Greenland Current sometimes swirls into stunning shapes.



A STUDY IN ALGAE—Algal blooms occur annually on Milford Lake in the summer and can be harmful to fragile wetland ecosystems. The USGS Kansas Water Science Center uses multispectral sensors on board drones to identify harmful algal blooms and study how they affect local businesses and human and animal health.

From the President of NAGT

Dear NAGT members,
Welcome to 2023! I'm so honored and delighted to bring in the new year with you and a very special year for NAGT. This is our Astatine year! The rarest naturally occurring element in the Earth's crust... wait, what? Did I just make a reference to the periodic table of elements? I sure did. You see... if you weren't aware, it's the 85th element, *and* I'm giving it a special nod here in my opening letter for 2023, because come May, it's our 85th anniversary as an organization!

There is much excitement ahead in our 85th year. In my new role as NAGT president, I thought I'd take this opportunity to share with you several NAGT activities that I'm particularly jazzed about for 2023.

First, I'll start with work to strengthen our sections. My own journey in NAGT leadership began at the section level; I never could have imagined the impact it would have on me. It connected me to a community of passionate educators in the region and beyond, immersed me in a wealth of resources that improved my instruction, and more. As part of my work in NAGT this year, expect to see more about our sections, including staying tuned as to what is happening near you! It's exciting to see the line-up of fantastic education sessions advertised already for several section GSA meetings... keep an eye on news from your section as to meet-ups and/or how to get involved. Please don't hesitate to [reach out to me](#) personally as well if you're eager to learn more about opportunities in your section.

Another major focus of my work in NAGT is elevating DEI conversations across the entire organization. We are likely all aware of the lack of diversity in the geosciences, contributing factors that have led problems in the discipline, and how marginalized communities more often bear a heavier burden when it comes to the impacts of climate change, pollution, natural hazards, etc. Prioritizing diversity, equity, and inclusion in all that we do as geoscience educators and researchers is critical. In NAGT, such work falls on *all* of our shoulders, not just the DEI committee, and of course, it is something we have to reflect and act on both professionally and personally in order to effect change. There are several activities in the works that

will help strengthen our collective DEI efforts, and we invite your ideas and energy to help us move forward in our goals for more equitable and inclusive geoscience education. One activity in particular that I've been involved in this last year is the drafting of a DEI position statement from NAGT. As with all position statements, NAGT community members will be able to provide feedback prior to full approval, but for anyone interested in contributing at the draft stage, please [email me](#) and get involved!



Christy Visaggi

These are but a few of the many reasons I'm excited about 2023 and being able to contribute to this phenomenal organization as president. For the last 10 years, I've benefitted greatly from numerous NAGT webinars, workshops, and resources; I hope you have as well. As you ease back into the new year and spring semester, don't forget that NAGT is here to support you with a wealth of activities via the [Teach the Earth](#) portal and the many [professional development](#) opportunities that we offer! Have a great February, y'all... and keep being the rock stars that you are in the classroom, field, and wherever you find teachable moments to share about the Earth!

Best,

A handwritten signature in black ink that reads "Christy C. Visaggi". The script is cursive and fluid.

P.S. It's never too early to start planning ahead for summer and beyond. Go ahead and mark your calendar for the [Earth Educators' Rendezvous](#) in Pasadena, encourage a new colleague to attend the [Workshop for Early Career Geoscience Faculty](#) in Minnesota, and convince your chair to apply for the [Traveling Workshop Program](#) to come to YOUR department. Up your Earth education game this year!

NAGT Advocacy Committee Update

The mission of the National Association of Geoscience Teachers (NAGT) is to support a diverse, inclusive, and thriving community of educators and education researchers to improve teaching and learning about the Earth. One of the ways in which that mission is addressed is through the work of the Advocacy Committee.

The committee seeks to increase the number of members who advocate for geoscience education at all levels and to provide a structure and materials that facilitate those members' ability to be advocates for sound science education policy. The committee maintains a small section on the NAGT website to share information, develops position statements on issues important to the membership, communicates opportunities to members via the NAGT newsletter and *In The Trenches*, and, in some instances, writes letters to lawmakers explaining our position and discussing the implications of bills under their consideration.

We are in the process of updating the web materials. The landing page was updated in 2022, and we are reviewing and updating the position statements and information sheet members can share when they engage in advocacy.

The process for developing and revising position statements was updated in 2020. We currently have four position statements: Teaching Evolution was drafted and approved in 2006, is in the early stages of review, and will likely be revised. Climate Change was revised in 2021. High School Earth Science Instruction was revised in 2022; the statement will now be "Earth Sciences Education for Each K-12 Grade Band" (the revision is provided on [pages 9-11](#)) and will go before the NAGT Council later this year for approval. Dual Credit and Concurrent Enrollment was reviewed and received minor revisions in 2022; the minor revisions will be presented to the NAGT Executive Committee for approval this year. In addition to the

existing position statements, new statements on the Importance of Justice, Equity, Diversity, and Inclusion and Freedom to Teach Earth Sciences (Academic Freedom) are being drafted and may be presented to the membership later this year, and a position statement on accessibility is being considered.

The Advocacy Committee also works with partner organizations including the Geological Society of America (GSA), American Geophysical Union (AGU), and the American Geological Institute (AGI). Last fall, two Advocacy Committee members (who are also AGU members) participated in AGU's Congressional Visits Day (CVD). AGU funded our trip to Washington, DC, provided a day of training (including the develop-



NAGT Advocacy Chair Mike Phillips with Illinois Congresswoman Lauren Underwood (IL14)

ment of messages and materials), scheduled visits to Senate offices, and accompanied us on those visits. Participants included graduate students, faculty, and researchers from a wide range of geoscience disciplines; including geoscientists with a strong interest in geoscience education allowed us to highlight the importance and impact of robust federal funding

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MIKE PHILLIPS (mike_phillips@ivcc.edu) is chair of the NAGT Advocacy Committee and a professor of geology at Illinois Valley Community College, Oglesby, Illinois.

beyond research. I was able to share personal examples of federally-funded opportunities for professional development that improved my ability to teach in terms of content and technique.

What you can do? You can begin by visiting the Advocacy section of the NAGT website. You can read the existing position statements, comment on revisions, suggest new statements, and share the statements with colleagues, administrators, and law makers. You can let us know what is happening in your state or region; the NAGT relies on members calling our attention to issues that may impact your ability to teach (in a positive or negative way). You can get to know your local officials including your institution's board members, state and federal law makers and their staff, and agency officials; you can share your experiences and perspective as well as NAGT's position statements. You can also run for office; it is especially useful to have experienced geoscience educators on school boards (see [Run for Something: The Importance of Serving on a School Board](#) in the April 2021 of *ITT*).

In my experience, one of the most important actions is to work with local legislators from both the state and federal level. They are interested in understanding how their actions impact their district and their constituents. Legislators return to their districts frequently and participate in large and small gatherings; these gatherings (some political, some official) allow them to meet people and discuss their concerns and interests. You can find out when and where by visiting the legislator's web site or calling their office. If a gathering does not match your style or schedule, you can ask to schedule a meeting with the legislator or a member of their staff. In any case, you should prepare by deciding what you would like to discuss (you can introduce yourself as a resource or you may have a specific issue), and you should bring a one-page overview that includes key points and your contact information. Talking to a staff person is just as important as talking to the legislator (be sure to share your information with both), and it is also important to follow up with an email or call to thank them and provide any additional information based on your discussion.

We also need members to serve on the Advocacy Committee. The Committee works best when we have members from a wide variety of personal, professional, and geographic backgrounds. Committee service is a great way to meet others interested in advocacy, share your experiences, and develop a broader understanding of some of the issues impacting geoscience education. You can contact the Chair of the Advocacy Committee (mike_phillips@ivcc.edu) or nominate yourself at https://nagt.org/nagt/get_involved/committee_positions.html

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The NAGT Executive Committee has approved a significantly revised Position Statement to replace the existing Position Statement on High School Earth Science Instruction (<https://nagt.org/nagt/policy/high-school.html>). The new statement (see pages 9–11), “Earth Sciences Education for Each K-12 Grade Band,” was written by Christopher Roemmele, Laura Hollister, and Suzanne Metlay on behalf of NAGT's [Teacher Education Division](#) and [Advocacy Committee](#). In summary, it says that Earth sciences should be taught as required content in every K-12 grade band. Earth sciences education gives students the ability to investigate, understand, and pose solutions to critical societal challenges. Science teachers should be encouraged and supported when seeking Earth sciences professional development or opportunities to include Earth sciences content in their own disciplinary curricula.

Under the NAGT Procedure for Approval of NAGT Position Statements, the statement is to be sent to members via the next NAGT Newsletter for examination and comment after which “NAGT Council will consider the draft position statement and member comments and may approve, modify, or reject.”

Please read the full statement on pages 9–11 and provide your feedback to mike_phillips@ivcc.edu. Thanks for your careful consideration of this serious matter.

Earth Sciences Education for Each K-12 Grade Band

Position Statement:

NAGT affirms the critical need for a society literate in the Earth sciences to address challenges of energy and natural resources stewardship, natural hazards preparedness and mitigation, environmental impacts of human activities (including climate change), and environmental justice and equity. In alignment with the National Research Council's K-12 Framework for Science Education, Earth sciences is an essential component of non-optional science curricula, and it should make up an equivalent percentage of the science content at each grade level. Earth sciences should be taught as required content in every K-12 grade band.

Rationale:

Some of the greatest challenges facing society today are grounded in the Earth sciences. Students should know that the water we drink, food we eat, resources we consume, technology we use, and the buildings in which we live, work, and attend school are all the products of geologic processes. The decisions we make in our daily lives affect the ground, water, air, and other life on Earth. An Earth literate society is necessary to address energy concerns, natural resources stewardship, climate change mitigation and adaptation, natural hazards preparedness, and matters related to environmental justice. Earth sciences education includes but is not limited to the disciplines of geology, soil science or agronomy, oceanography or marine sciences, meteorology or atmospheric science, astronomy or space sciences, or Earth systems science. Earth sciences give students the ability to investigate, understand, and pose solutions to essential challenges. For this reason, the Next Generation Science Standards (NGSS Lead States, 2013) and state standards based on the *K-12 Framework for Science Education* position Earth sciences equally with physical sciences and life sciences at all levels of the curriculum.

Prior interaction, association, and knowledge

about geology or the Earth and its systems are unique for each student. Although many K-12 students have no direct experience with earthquakes or volcanoes, they do engage with geologic events such as erosion and deposition, rainfall infiltration and runoff, and so on. Students should be aware that the natural environment around them is formed by Earth processes that influence their lives. Lack of exposure and instruction



Participant in the Pasco County (Florida) Young Scientist Fair [Pasco Schools (CC BY-NC 2.0)]

leads to common misconceptions of how the Earth works, causing students to dismiss the Earth systems that surround and impact their lives. Teachers can use geoscientific phenomena to help students make sense

of key concepts and processes in any science discipline and help students enrich their worldview with perspectives about their interconnectivity with Earth and its systems.

Earth sciences education connects ideas and phenomena that are inherently engaging to students. Earth systems science applies physics, chemistry, and biology to explain the natural world around us. Earth sciences concepts help students become

better citizens, voters, and problem solvers. Earth sciences skills are life skills which offer students the opportunity to work for a range of organizations and industries, including resource extraction and conservation, construction, environment, communication, governance, and education, and at the local, state, and national levels. The role of Earth sciences in meeting society's needs is vital.

THE OUTSTANDING EARTH SCIENCE TEACHER (OEST) AWARDS

Recognizing Exceptional Contributions to the Stimulation of Interest in the Earth Sciences at the Pre-college Level

EXCEPTIONAL TEACHERS CREATE RIPPLES THAT TURN INTO WAVES, inspiring K-12 students to become involved citizens and Earth scientists and educators.

Excellent elementary, middle school, and high school educators deserve recognition at all times, but that is especially true now, when their work, always challenging, has been complicated by the need to deal with the impacts and aftereffects of a pandemic. NAGT honors dedication of this sort by presenting OEST Awards to ten national finalists, one from each NAGT regional section. Some sections also recognize state winners.

[Photo by Adrian Luhowy (CC BY-NC-ND 2.0)]



Any teacher or other K-12 educator who covers a significant amount of Earth science content with their students is eligible. Individuals may also apply themselves. Winners are recognized in the October issue of *In the Trenches* and at the annual gathering of the Education Division of the Geological Society of America.

NOMINATION DEADLINE: MARCH 31, 2023

To learn how to nominate an inspiring teacher:
<https://nagt.org/nagt/awards/oest.html>

Recommendations:

- Earth and Space Sciences (ESS) concepts should be taught in all K-12 grade bands.
- ESS curriculum should be based on the *K-12 Framework for Science Education* (NRC, 2012).
 - » In high school, ESS should comprise one full year equivalent of science content.
 - » In blended courses, ESS should comprise $\frac{1}{3}$ of the course content.
 - » In every science course at each grade level, place-based Earth sciences phenomena should be integrated into the curriculum.
- The College Board should develop an Advanced Placement Earth Sciences course in addition to the AP Environmental Sciences course already offered.
- High school dual-enrollment ESS courses should be offered in partnership with local colleges and universities.
- Local businesses and non-profit organizations should support ESS career exploration and workforce development for high school students through internships, externships, and other place-based learning opportunities.
- State departments of education, school districts, and local administrators should support teachers who seek further Earth sciences content knowledge through professional development such as: continuing education credits, graduate coursework, microcredentials, or other accredited certifications.
- Teachers of all science disciplines should be encouraged to broaden their knowledge of Earth sciences pedagogy, including but not limited to: phenomena-based instruction, 3-dimensional storylines, place-based learning opportunities, and real world or virtual field experiences.
- University faculty and professional organization members should facilitate further collaboration between K-12 educators and geoscience education researchers to improve classroom practice and student learning.

- K-12 school districts, local colleges, museums, and other regional non-profit or for-profit Earth sciences partners should partner to develop local ESS educational ecosystems.

Summary: Earth sciences should be taught as required content in every K-12 grade band. Earth sciences education gives students the ability to investigate, understand, and pose solutions to critical societal challenges. Science teachers should be encouraged and supported when seeking Earth sciences professional development or opportunities to include Earth sciences content in their own disciplinary curricula.

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- National Research Council (2012). *A Framework for K-12 Science Education: Practices, Crosscutting Concepts, and Core Ideas*. Washington, D.C.: The National Academies Press. <https://doi.org/10.17226/13165>
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NAGT'S COMMITMENT

In support of high-quality Earth Sciences education, NAGT has and will continue to sponsor professional development programs for geoscience educators, including workshops, seminars, and teacher-scientist collaborations. NAGT disseminates evidence-based practices in the *Journal of Geoscience Education*, in *In the Trenches*, and on the Teach the Earth website. In doing so, the organization supports a diverse, inclusive, and thriving community of educators and education researchers to improve teaching and learning about the Earth.

Once adopted, NAGT position statements remain in effect for five years, as per the [Procedure for Approval of NAGT Position Statements](#).

Tales of Three Outstanding Teaching Assistants

The Outstanding Teaching Assistant Award is presented in June and January each year to students who exemplify what it means to be a teaching assistant. The award is given to up to 30 TAs a year, half to undergraduate and half to graduate students. Award winners receive a one-year membership in NAGT, which includes an online subscription to the *Journal of Geoscience Education* and our *In The Trenches* quarterly magazine. The undergraduate student awards are the gift of Thomas Hendrix, Grand Valley State University, the recipient of the 1994 Neil Miner award and former president of NAGT and former editor of the *Journal of Geoscience Education*. The graduate student awards are funded by NAGT (your membership and donation dollars at work!). To nominate someone for an Outstanding TA Award (next deadline: June 15), visit <https://nagt.org/nagt/awards/ta.html>. We asked recent winners to answer several questions about their success, including what they liked most about being a TA and what unique things they thought they brought to their classes. Here are three of their stories.

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BETH BARTEL (bbartel@mtu.edu) is a PhD candidate in the Department of Geological & Mining Engineering & Sciences at Michigan Technological University, Houghton, MI.

What I love most about teaching is very dependent on which class I'm teaching. In Scientific Communication, I love being able to share everything I know that I wish I'd known as a first-time graduate student. For example: Here is how to craft an elevator speech, and a first paragraph for a proposal/paper/presentation, and effective slides. Are you confused by this paper? Me too! Okay, take another look based on what we've discussed and ask whether it's because of you or the writer. It's probably the writer! So, let's be kind to ourselves, and then in turn be kind to our audiences and make accessing our brilliant research as easy (and enjoyable) as possible as we work on the thesis.

In Social Dimensions of Natural Hazards, I love watching the transformation in the way the students think about how we interact with our environment. They shift from thinking about natural hazards as the cause of disasters to thinking about the role of our society and its structures. What I think is most valuable about this class is that its lessons apply to all of life. Nothing is rarely what it seems at first glance, and if we ask "Why?" with curiosity rather than "Why?!!" with exasperation (e.g., Why don't people just evacuate?) we approach others with more empathy—and learn how complicated the challenges of living on our planet really are, hazards or not!

In both classes, I continue to learn with and from the students. With good resources from the informal education world and mentors like Donna Charlevoix during my time at UNAVCO as a science communication specialist, and maybe because of my own limited attention, I am adamant about making

every class interactive whether online or in person. It helps to have fantastic, supportive, and collaborative lead instructors to work with: Many thanks to Luke Bowman, who nominated me for this recognition, and John Gierke, who assigned me to classes I would be able to best contribute my existing skill set to.

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KRISTEN FOLEY (kristen.meade@wmich.edu) is a PhD candidate in the Mallinson Institute for Science Education at Western Michigan University, Kalamazoo, MI.

What I love most about my role is making science approachable and accessible. My students are early childhood, elementary, and special education majors who are in my class to learn their Earth science content. I love being able to take big, complex ideas that we talk about in class and have students can work together as a team to come up with ways to make the content age-appropriate for their own young students in the future. Our courses cover everything from clouds and weather to the carbon and rock cycles to plate tectonics and beyond, and I think this content is important for educators of young people to know. Children are fascinated with the natural world. Often the wonder takes the form of jumping in puddles or stacking rocks. I don't know a single person who hasn't enjoyed holding a perfectly smooth rock! I try to make learning about the Earth fun and enjoyable for my students.

Something that I think is unique that I bring to my classes is that I approach education from a place of understanding. College is a busy time for everyone, and students are often transitioning to adulthood while taking classes. I empathize with those who have to miss a class to take care of a sick loved one or catch an appointment. Students taking care of themselves is a high priority for me, so I make my courses as accom-

modating as possible with opportunities for extended due dates, recorded material, and online exams. Don't get me wrong; I am by no means a "pushover" nor do I assign grades that students haven't earned. I just do the things I wish I had access to when I was an undergraduate student.

I often think that I have the best job in the world because I have the best of both worlds. I get to be a leader in my classroom and teach my students about the Earth, while spending my time outside of class researching the technology I love that makes accessible and forward-thinking teaching possible. As always, I thank my mentor Heather Petcovic for believing in my abilities and guiding and supporting me in all things. Additional thanks go to Betty Adams and Brandy Pleasants for supporting me in my teaching role at WMU and being wonderful role models for me to follow.

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LAUREN MILLER (laurenmiller@mines.edu) is an MS student in geological engineering in the Colorado School of Mines, Golden, CO.

My favorite part about TAing is watching students develop the confidence to apply the skills they have learned in real-world settings. It is truly inspirational to watch students grow into their education, and take agency in solving the problems we face today. It really gives me hope for the future; I cannot wait to see what today's students take on in their careers.

I think one of the unique things I bring to my classes is meeting my students where they are. Students come from all walks of life and are going through so many things outside of the individual class I instruct. I work hard to appreciate the variable priorities students may have and work with them to structure a schedule that allows them to excel academically, produce work they are proud of, and also have the space to take care of the things that matter most to them, be those academic or otherwise. I also try and bring laughs to the class, though usually at the expense of my typos. Hahaha.

I am grateful every day I teach for the opportunity to be a TA at CSM, and really cannot overstate that fact. I have found a fulfillment in teaching which has added depth to my graduate studies and altered my career goals. Teaching in the field is one of my absolute favorite things, and I hope to keep doing it!



(Top to bottom) Beth Bartel, Kristen Foley, and Lauren Miller



**EARTH EDUCATORS'
RENDEZVOUS**
PASADENA, CA, JULY 10-14, 2023

PASADENA CITY COLLEGE AND CALTECH - JULY 10-14, 2023

WHO IS THE RENDEZVOUS FOR?

K-12 teachers, college faculty, graduate students, education researchers, administrators... Anyone involved in Earth education.

WHAT HAPPENS AT THE RENDEZVOUS?

- ▶ learn about new teaching approaches
- ▶ present your research
- ▶ share your teaching materials and activities
- ▶ prepare for an academic career
- ▶ meet other Earth educators
- ▶ and more!

SESSIONS INCLUDE:

- ▶ interactive workshops
- ▶ talks and posters
- ▶ plenaries
- ▶ teaching demos
- ▶ working groups
- ▶ round tables
- ▶ activity share-a-thon
- ▶ education forum
- ▶ field trips
- ▶ lab tours

**View the program,
register, and learn more ▶**

serc.carleton.edu/earth_rendezvous/2023



More than 220 educators came together in Minnesota in 2022 to participate in hands-on teaching workshops, discussion panels with career professionals, and social events to help facilitate collaborations and foster a shared sense of community and identity among participants.

REGISTER FOR THE RENDEZVOUS:

May 3 - Early registration reduced fee deadline
Registration discount for NAGT members

SUBMIT AN ABSTRACT:

Mar 1 - Talk, poster, teaching demo, and share-a-thon abstract deadline
May 17 - Late posters and share-a-thons

OTHER DEADLINES:

Mar 1 - Working Group application due
Apr 5 - Travel Stipend application due
May 3 - Review Camp application due