



OMEGA



Oceanography, Meteorology, Environment, Geology, & Astronomy

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President's Message



NJESTA Annual Conference: Earth Systems in Your Classroom

The 34th Annual NJESTA Annual Conference will take place on Saturday March 18th at the Rutgers University Department of Marine & Coastal Sciences on the scenic Cook College campus in New Brunswick. NJESTA has partnered with the outreach team from the Department of Marine and Coastal Sciences to provide a full agenda of exciting new data-rich lessons and activities related to Next Generation Science Standards (NGSS) ESS2: Earth's Systems. The day will include speakers, break-out sessions, and tours. Your registration includes all conference materials, lunch, and door prizes. Registration is now open and can be found at njesta.org/conference.htm

For more information contact Missy Holzer at mholzer@monmouth.com

NGSS Tip: Another "P"BL

As time progresses our pedagogical lexicon fills with terms and acronyms that define the current trends in science teaching and learning. PBL is the acronym we usually associate with either "problem-based learning" or "project-based learning," both of which have been utilized for quite some time as an effective instructional tools. However, since the adoption of the Next Generation Science Standards (NGSS) another PBL has been added to our teaching arsenal. Unlike project or problem-based learning, phenomena-based learning provides us with a starting point to transform our instruction from a topical approach to a "sense-making" approach with students in the driver's seat of their learning.

A typical approach to planning for our classes is to see what needs to be "covered" in our curriculum, and plan around those particular topics. However, this approach hardly lends itself to 3-dimensional (DCIs, SEPs, and CCCs) teaching and learning, as expected in the implementation of NGSS in our classrooms. A way to refocus our approach to planning is adopt the new PBL approach by identifying engaging phenomena for the students to investigate using

3-D teaching and learning. Phenomena is defined here "...Something observable that happens in the real world, whether natural or man-made. Student inquiry about phenomena — together with student-driven designing of solutions to problems — should drive instruction."

(Nextgenscience.org) To understand the phenomena students will likely be combining multiple DCIs, SEPs, and CCCs to determine the cause of the phenomena. The phenomena can be large scale to guide unit planning, or smaller scale to guide lesson planning.

What does this look like in a classroom? If students are presented with a compelling problem to solve or question to answer, they will be the ones connecting science content while using the practices of science. For example, a typical lesson on stream dynamics may have students using stream tables to make observations and measurements, but from a phenomenon approach students could instead determine why some communities are more vulnerable to river flooding than others. While the lesson could include the use of stream tables, it may also include the use of online mapping tools such as Google Earth, and ArcGIS Online. To assess their efforts, the students could craft a letter to a town engineer about their findings.

To get started with using Phenomena Based Learning in your classroom consider these resources:

Phenomena for NGSS: Creating the Next Generation for Student Engagement:

<https://www.ngssphenomena.com/>

Next Generation Science – Bundling the NGSS:

<http://www.nextgenscience.org/resources/bundling-ngss>

Physics Related PBL books from NSTA Press:

<http://www.nsta.org/store/search.aspx?action=quicksearch&text=Phenomenon-Based%20learning>

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Another NGSS Tip: Infographic: Essential Practices for K-12 Science Classrooms

This interactive infographic from the National Academies Press highlights essential practices for K-12 science classrooms from *A Framework for K-12 Science Education* with references to the contents of the full report. [https://www.nap.edu/visualizations/practices-for-k-12-classrooms/?utm_campaign=NGSS Dec 2016&utm_medium=email&utm_source=Agile](https://www.nap.edu/visualizations/practices-for-k-12-classrooms/?utm_campaign=NGSS+Dec+2016&utm_medium=email&utm_source=Agile)

Jersey Gems for Earth & Space Science Teachers and Students

North Jersey: Newark Museum (<http://www.newarkmuseum.org/>) "Discover the Sciences at the Newark Museum: With more than 83,000 objects ranging from rare, exotic seashells and minerals to a mastodon skeleton and animal specimens, along with the Alice and Leonard Dreyfuss Full-Dome Planetarium--New Jersey's first, together with a history of creating innovative interactive exhibits for all ages, the Newark Museum is the place to be to discover the sciences. All of our science offerings—exhibits, family and school programs, as well as intergenerational festivals—are designed to ensure that visitors can become engaged in the pursuit of interesting, exciting and informative STEAM (Science, Technology, Engineering, Art, Math) experiences. By providing such immersive, stimulating and interactive

experiences, visitors can explore, discover and understand science phenomena, perhaps like they never have before."

Central Jersey: Thomas Edison National Historic Park (<https://www.nps.gov/edis/index.htm>) "Thomas Edison's home and laboratory are a step back in time, when machines were run by belts and pulleys and music was played on phonographs. Where to the passerby, the buildings betray little evidence of the industries they once started. Discover where America's greatest inventor changed our world forever."

South Jersey: Adventure Aquarium (<http://www.adventureaquarium.com/>) "Adventure Aquarium is just minutes from downtown Philadelphia on the Camden Waterfront and features one-of-a-kind exhibits with more than 8,500 aquatic species throughout two million gallons of water. The Aquarium is home to the largest collection of sharks on the East Coast, including the only great hammerhead shark on exhibit in the United States as well as two rare scalloped hammerhead sharks, the only aquarium in the world to exhibit hippos, one of only six facilities in the US to have Little Blue penguins as permanent residents and exhibits the longest Shark Bridge in the world, a unique V-shaped rope suspension bridge just inches over Shark Realm. Adventure Aquarium is an accredited member of the Association of Zoos and Aquariums (AZA), and is held to the absolute highest standards in animal care and exhibition."

Do you have suggestions for our list of Jersey Gems? Send them to Missy Holzer at mholzer@monmouth.com

Listservs & E-News that Rock!

Earth Science Picture of the Day

To sign up go to: <http://epod.usra.edu/>

Daily images from Earth Science Picture of the Day will inspire and delight anyone interested in the Earth Sciences. Each photo comes with a detailed description of the content in the photo, and many also include how the photo was taken. The photos can be used as bell-ringers to engage students in the phenomena of the day. They can also be used to armchair travel to places not easily accessible by most. The archives can be searched if you are looking for a photo of something specific.

Astronomy Picture of the Day

To sign up go to: <https://apod.nasa.gov/apod/astropix.html>

"Each day a different image or photograph of our fascinating universe is featured, along with a brief explanation written by a professional astronomer." Like the EPOD photos, the astronomy photos include a detailed description of the contents of the photo and information on how the photo was taken. The archives can be searched if you are looking for a photo of something specific.

It's Elementary: Lessons Shared at the 2016 NJ Science Convention

| Lesson | Shared by | Link & Description |
|--|-------------------|--|
| Toxic Popcorn Design Challenge | Steve Timmerman | <p>http://tryengineering.org/lesson-plans/toxic-popcorn-design-challenge</p> <p>"This lesson introduces students to the engineering design process (EDP)—the process engineers use to solve design challenges. Students work in teams to solve the challenge by designing both a product and process to safely remove “toxic” popcorn and save the city."</p> |
| How Big, How Far, How Hot, How Old | Christine Girtain | <p>http://ngss.nsta.org/Resource.aspx?ResourceID=488</p> <p>"Participants use provided images of earth and space objects to arrange them in order of their size, their distance from Earth, their temperature, and/or their age. Through this work students represent and confront their mental models of space and time. This resource was developed by the Stanford SOLAR (Solar On-Line Activity Resources) Center in conjunction with NASA for informal audiences, but can be used in the classroom"</p> |
| Observing the Sun | Angela Best | <p>https://betterlesson.com/lesson/613470/observing-the-sun</p> <p>"In this unit, students are not only studying space, they are observing and making discoveries about patterns in the sky! The NGSS standard states, 1-ESS1-1. Use observations of the sun, moon, and stars to describe patterns that can be predicted. "</p> |
| Simulating an Oil Spill to Understand Environmental Impact | Missy Holzer | <p>http://ngss.nsta.org/Resource.aspx?ResourceID=65</p> <p>"Students take on the task of cleaning up a simulated oil spill. Educator uses the 5E curriculum model to engage students with fiction and non-fiction texts before exploring methods that simulate an oil spill and its cleanup. Video demonstrates the key portions of the activity and models appropriate teacher questioning and interactions with the students."</p> |

Lesson Spotlight: ACS Climate Toolkit

The American Chemical Society has created a "[Climate Science Toolkit](#)" packed with information and data about climate science. The FAQ section provides streamlined answers to many common climate change questions. The toolkit also features sections on [Energy Balance and Planetary Temperatures](#), [Greenhouse Gases](#), and [Oceans, Rocks & Ice](#). This resource is aimed at helping you learn about these topics as well as integrate them into the classroom.

Direct Link:

<https://www.acs.org/content/acs/en/climatescience.html>

Duke Farms Climate Science & Sustainable Actions Academy

Weather, climate, and sustainable actions are prominent in the Next Generation Science Standards (NGSS) and the NJ Student Learning Standards (NJSLS) for Science. Let the 2,700 acre Duke Farms property serve as your living laboratory and source of inspiration for exciting new lessons on these topics.

Participating K-12 educators, administrators and non-formal educators will conduct hands-on outdoor fieldwork, hear lectures from NJ's top experts, and develop NGSS/NJSLS-aligned lesson plans that bring the concepts of climate change and sustainability to life for students.

Academy Topics:

1. The processes that lead to climate change
2. How human activity contributes to climate change
3. Local and global impacts of climate change
4. Climate change mitigation and adaptation strategies
5. Sustainable actions within educational institutions

Academy Schedule:

- Registration Deadline March 1, 2017
- In-Person Orientation Dinner (Wednesday, March 15, 2017)
- Pre-Academy Distance Learning (March-June; roughly 12 hours of independent work)
- In-Person Summer Academy Sessions (June 26 - June 29, 2017, 8:00am-4:30pm)
- FINAL NGSS-Aligned Teaching Plan (Due: September 30, 2017)

Cost: \$150 includes all course materials, orientation dinner and on-site housing (June 26-29) for the first eight registered participants.

Participants can also earn points for *Sustainable Jersey for Schools* certification.

The **Biology Teachers Association of New Jersey** is pleased to announce that Highland Park School District will be hosting **EdCamp NGSS**. EdCamp NGSS is an unconference designed to meet science teachers' needs with an agenda created by the participants at the start of the event. Watch this video to learn more about the EdCamp model. <https://www.youtube.com/watch?v=I7DwCI7j0Bg> Participants are encouraged to have discussions and hands-on sessions. Attendees are also encouraged to lead sessions! Best of all this is Free!!

- Date: Saturday April 22, 2017
- Time: 8:30am-12:30pm (Registration and breakfast starts at 7:30am)
- Location: Highland Park Middle School 330 Wayne Street Highland Park, NJ 08904
- Space is limited to the first 150 people.
- To register: <http://www.btanj.org/edcampngss>

Iceland | Surveying the Geological Wonders of Iceland with National Earth Science Teachers Association

<http://www.holbrooktravel.com/where-we-travel/polar-regions/iceland/iceland-surveying-geological-wonders-iceland-national-earth>

July 6, 2017 - July 14, 2017

About this trip:

The land of fire and ice, Iceland is an earth scientist's dream, abundant with majestic waterfalls, active volcanoes, expansive lakes, winding rivers, massive glaciers, and vast mountainous and uninhabited terrain. A land of arctic desert, towering mountains, hot springs, erupting volcanoes, and midnight sun, our itinerary includes opportunities to study a number of topics, including plate tectonics, volcanic systems, rock formation, geological history, glaciation, deposition, geothermal power, hydrology, natural history, carbon sequestering, Viking history, human geography, environmental science, and conservation in this 9-day immersive experience.

CEUs or Graduate Credits are Available.

Highlights:

- Study Iceland's dramatic and varied geology including towering waterfalls, bursting geysers, massive glaciers, and volcanoes.
- Visit local power plants to gain an understanding of thermal energy production.
- Examine the social and environmental impact of volcanic eruptions and other environmental events.
- Stand on the rift of the European and North American tectonic plates at Þingvellir.
- Visit one of Iceland's most well-known cascades, Gullfoss waterfall.
- Explore the process of carbon sequestering with the CarbFix Project.



National Association of Geoscience Teachers Outstanding Earth Science Teachers Award

Nominations are now being accepted for this prestigious award. The deadline for the Eastern Section of NAGT is April 1, 2017. Nomination forms can be found at <http://nagt.org/nagt/awards/oest-nom.html> Consider nominating a colleague or yourself!

Section Winners Receive:

- Geological Society of America - monetary awards and 3-year Teacher Associate Membership
- American Geological Institute - Earth Science Week Teacher Toolkit
- American Geophysical Union - one-year membership and subscription to "Eos"
- National Earth Science Teachers Assoc. - one-year membership or renewal and Journal "The Earth Scientist"
- Amer. Institute of Professional Geologists - one-year subscription to "Professional Geologist"
- US Geological Survey - New Edition of "This Dynamic Planet: World Map of Volcanoes, Earthquakes, Impact Craters, and Plate Tectonics"

State Winners Receive:

- a 9" x 12" plaque (black enamel on simulated walnut), from NAGT
- a two-year complimentary membership in NAGT (including a subscription to the *Journal of Geoscience Education*), from NAGT
- one-year membership or renewal and Journal "The Earth Scientist" from National Earth Science Teachers Association
- an assortment of publications from the US Geological Survey
- a one-year membership in the Geologic Division of the Geological Society of America and in GSA an Earth Science Week kit from the American Geological Institute

Calendar of Events of Interest to the ES Teacher

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|----------|---|
| Feb. 11 | Earth 2 Class – Reconstructing the Storm and Industrial History of the Hudson River (LDEO, Palisades, NY) http://www.earth2class.org/ |
| March 2 | Exploring the Highs and Lows of Landscapes: Demystifying Topographic Maps Penn State, University Park, PA 16802 http://www.csats.psu.edu/overview-of-csats-programs/academic-year-workshops/isteam-workshops#registration |
| March 11 | Earth 2 Class - Education Opportunities aboard the <i>JOIDES Resolution</i> and Elsewhere (LDEO, Palisades, NY) http://www.earth2class.org/ |
| March 18 | NJESTA Annual Conference – Cook College Campus, Rutgers University (njesta.org/conference.htm) |
| April 1 | Deadline for NAGT OESTA Nominations http://nagt.org/nagt/awards/oest-nom.html |

- April 8 **More than How Old? Understanding Climate Changes from Tree Rings** (LDEO, Palisades, NY) <http://www.earth2class.org/>
- April 22 **ED Camp** - Highland Park Middle School
<http://www.btanj.org/edcampngss>
- June 26-29 **Climate Science& Sustainable Actions Academy** at Duke Farms
Register by March 1, 2017
<https://www.eventbrite.com/e/duke-farms-climate-science-sustainable-actions-academy-tickets-28948252001>
- July 6-14 **NESTA trip to Iceland**
<http://www.holbrooktravel.com/where-we-travel/polar-regions/iceland/iceland-surveying-geological-wonders-iceland-national-earth>
- July 12 **NYESTA 4th Geologic Field Conference in Fredonia, NY**
<http://www.nyesta.org/Site/Index.html>

Got Dates? Send to mholzer@monmouth.com w/Calendar as the subject

Editor's Note - Missy Holzer

I hope you enjoyed and have received some value from reading this installment of OMEGA. I hope that you will feel free to share article ideas, upcoming events, and your work with us, so that we can share it with all of you. Please send your ideas and dates to me at mholzer@monmouth.com.

NJESTA Membership Note:

Is your NJESTA membership up to date? If not, visit www.NJESTA.org to renew your membership. Not sure when your membership expires? Contact Liz Georger, NJESTA Membership Chair to find out. \$15/year is all it takes to receive the advantages of being a NJESTA member!

NJESTA Executive Board

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|-------------------|-------------------|
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