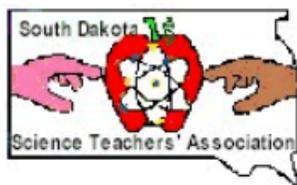


South Dakota Science Teachers' Association



Winter 2017

December 2017

Volume 147



President's Letter - Elizabeth Mcmillan

Dear SDSTA members,

Liz's last "president's letter" but you won't be rid of me – as Past-President I'll work with Mark Iverson of Watertown and support his needs and goals for the organization these next few years.

The eclipse, the unseasonably warm year, the extreme weather incidents, and all of the reported advances in science and medicine have been quite a reminder to me of the need to identify the role that science has in the classroom and how critical thinking, problem solving, and a basic level of science content knowledge (physical, life, and earth science) is necessary to be a citizen, let alone a future STEM professional. Thanks for your contribution to future, scientifically literate citizens.

The SDSTA/SDCTM Joint Board who does the behind the scenes planning for the 2018 Conference has been meeting over video conference at Jean Gomer (co-Conference Coordinator)'s place in White, SD. I am so lucky to be able to work with this team of dedicated educators who are working to make the SD Math/Science Conference awesome for next year. There are over 100 sessions given by teachers for teachers! I look forward to seeing many of you there!

This winter I elected to take a course offered by BHSU in 3D Science Instruction, and... I am continually reminded about how reflective practice is the best strategy we as educators can use to evaluate our own practice. The [NGSS Screening Tool](#) is a great outline (although, (she says apologetically) cumbersome) and modifying it to meet your needs might be a great way to take a look at some of your activities, lessons, units.

The officer team has been talking about... What can SDSTA do beyond the annual conference? What efforts do care about that you think the organi-

zation could support? Would you like to connect as a group more than once per year (perhaps more informally)? What could SDSTA be doing better? You can email us at officers@sdsta.org or email me directly at Liz@sdsta.org with your thoughts and ideas. Also, we will have our annual business meeting on Friday, Feb 9 at 4:30pm during the Conference. I pitched last year's idea about a resource/calendar for all events and programs that teachers and students might be able to participate in to EPSCoR and, the Education Director and Marketing Director are considering ways that they might manage this resource... stay tuned.

Happy Holidays and Happy New Year! I hope to see you soon!

~LIZ 2016-2018 SDSTA President

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Outstanding Biology Teacher Award—call for nominations

This award honors teachers of the life sciences. They do not need to have a majority of their class load in the life sciences – as we all know this is just not possible in small school systems where a science teacher has all of the sciences and sometimes adding on math, etc. They just have to have consistently taught and currently teach life sci-

ences (life science, biology, environmental science, AP, dual credit, etc.) To nominate a teacher, email the following information to Julie Olson (Julie.olson@k12.sd.us)

Name of Nominee
School



“Science is a way of thinking much more than it is a body of knowledge”
Carl Sagan

Phenomena for NGSS

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

The use of phenomena to stimulate student interest, start discussions, to find out what students know before and after instruction, and to anchor units/lessons. Phenomena should drive units and keep students working to “figure out” rather than “learning about.”



APS Online Teacher Professional Development Program

SIX STAR SCIENCE ONLINE TEACHER (OT) PROFESSIONAL DEVELOPMENT PROGRAM – \$1,400 STIPENDS PAID (for completed work)

This program is a 10-month online pedagogy-based professional development that focuses on the three Dimensions in the Next Generation Science Standards: Scientific Practices; Cross Cutting Concepts (especially “Cause and Effect” and “Structure and Function”), and Core Ideas (Life Sciences) and on expanding teacher skills in three major areas: 1) Updating Teacher Content and Pedagogy Knowledge; 2) Understanding the Research Process; and 3) Applying Six Star Science in the Classroom. Fellows **receive stipends** for completion of their online work.

Online Teacher (OT) Fellows participate in a dynamic and interactive virtual learning community that focuses on exploring effective teaching strategies, understanding the research process, and enhancing classroom materials. **Application deadline: January 31, 2018**

More info on the program can be found at: www.frontiersinphys.org

Middle and High School Science Teachers Program Runs March 2018–February 2019

National STEM Cell Scholars Program

The National Stem Cell Foundation (NSCF) partners with The Carol Martin Gatton Academy of Science and Mathematics at Western Kentucky University (WKU) to fund ten scholarships each year for middle school science teachers working to transfer a passion for science to students in this age group. Research shows that students who get excited about STEM subjects in middle school are the ones who will take those courses in high school and major in them at the college level.

National STEM Scholars receive advanced education in the development of STEM projects for classroom implementation, spend a full day with a national thought leader in STEM education (the 2017 speaker was Dr. Eric Mazur of Harvard University) and build a national network of colleagues for information sharing. STEM Scholar classrooms also have an opportunity to speak with astronauts on the International Space Station during the school year and work directly with providers of space technology education nationwide. Scholars are selected based solely on the merit of questions answered in the application. The selection committee is not provided with names or locations of teacher applicants. Applications are open now by visiting <https://www.wku.edu/gifted/nss/application.php>

South Dakota Space Grant Consortium Summer Research Experience for Teachers

The South Dakota Space Grant Consortium (SDSGC) is accepting applications for 2018 Research Experience for Teachers (RET) summer fellowships. The program enables high school teachers to enrich their knowledge of science and engineering practices by joining a research group at a South Dakota university or laboratory in the summer of 2018. Research has shown that teachers who participate in research in science and engineering are able to provide an enriched classroom experience for their students in subsequent years. All 2018 awards are contingent upon U.S. Congressional approval of the 2018 federal budget and the availability and receipt of FY2018 Space Grant funding from NASA. We invite current high school teachers in science, technology, engineering or mathematics (STEM) disciplines to apply for one of two RET fellowships to be offered during the summer of 2018. Research projects must align with NASA's mission and those of the SDSGC and its affiliates. The RET fellowship will be \$8000. Teachers will make their own arrangements for working with a research group. However, if you are interested in a particular area of research and/or location and need help in making contact with a faculty member, please contact Peggy Norris at pnorris@sanfordlab.org. Important Dates Application Receipt Deadline: January 19, 2018, 11:59 p.m. MST. Award Notification: anticipated to be announced by March 21, 2018.

RET 2018 Application & Instructions: <http://sdspacegrant.sdsmt.edu/SDSGC-RET2018-Announcement.pdf> Note: The single-page "Application Form" is downloadable in Word format at: <http://sdspacegrant.sdsmt.edu/SDSGC-RET2018-ApplicationForm2018-Word.docx>

STEM Scholars Award

Each scholarship recipient receives the following:

Advanced education and leadership training on the campus of WKU June 3-9, 2018. All expenses – travel, lodging, meals – are included

A notebook/tablet (Chromebook or similar) to facilitate ongoing collaboration

A credit of up to \$2,500 for technology and supplies to implement a classroom Challenge Project

Sponsored attendance at the National Science Teacher Association (NSTA) Conference in St. Louis in April 2019. All expenses – registration, travel, lodging, meals – are included

Year-long mentorship and support provided by Western Kentucky University faculty

Dialogues in the Classroom— Larry Browning SDSU Physics Department

Dialogues for classrooms can be an effective way to engage students in active learning. Many students find it fun to act out roles while discussing concepts from your lessons. This allows a bridge between science, theater, and literature. To quote from Craig Berg's *Dialogues for the Science Classroom* (Moose Moss Press, 2016, p. 14):

Dialogues are conversations between two or more characters regarding a topic being studied in class. Built into the conversation is science content, concepts, information and ideas that students should know, understand and think about.

Dialogues can have many goals, but modeling the Science and Engineering practices is one. During the conversation, the author can introduce misconceptions and have the characters resolve them in a correct way thereby modeling critical thinking skills. Dialogues can be useful both for reviewing material for exams and for introducing new concepts. Additionally, if a student can write an effective dialogue, it shows a certain mastery of the material.

Dialogues are not for every student or teacher. Some students have trouble collaborating with others. In addition, reading skills enter into the

effectiveness of a dialogue activity, which may make it difficult for those whose first language is not the same as the dialogue. However, many students enjoy Dialogues as an alternative to lecture or drill-and-practice exercises and benefit from its active learning emphasis. Dialogues work well in flipped classrooms.

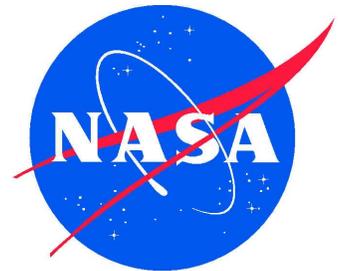
During a Dialogue activity, the teacher's role is quite different. This gives the teacher an opportunity to observe students' level of engagement and identify problem issues. However, the teacher should not be the "sage on the stage" for Dialogues, which are a learner-centered strategy.

A key to the effectiveness of Dialogues is having one that is well crafted for your goals. Quite a few classroom tested Dialogues are available on-line and in print. Moose Moss Press in Milwaukee is a valuable resource in this regard. Although they are available for a variety of subjects, the science centered Dialogues can be found at: <http://moosemosspress.com/dialogues/science/> where you can also download free samples and the book: *Using Dialogues in the Science Classroom*.

NASA EARTH Observatory Newsletter

Hey science friends! I love getting mail, and especially email that is meaningful that I can use in my science classroom.

When you subscribe to the NASA Earth Observatory newsletter, you will get images, notes from the field, blogs, and so very much more that are perfect for sharing Planet Earth with our students. You know those class periods when you have unexpected time left at the end of class, or you have students that finish early with an assignment that need some extension work? This is the perfect source of info to assist in those times! Project images on your big screen or give students the website. To not miss any postings, go to the NASA Earth Observatory website <https://earthobservatory.nasa.gov/> and click on "subscribe today" in the lower left to get signed up and watch your inbox. Have fun exploring!!! Science Rocks ! For further information, contact Jen fowler



"Somewhere, something incredible is waiting to be known."

— [Carl Sagan](#)

National Renewable Energy Laboratory Resources:

NEED RESOURCES? GIVE THIS A CLICK -- The National Renewable Energy Laboratory provides educational resources to help students, teachers, and parents learn about renewable energy and energy efficiency technologies. This lab's resources include hands-on projects and curriculum suggestions for elementary school, middle school, and high school students as well as teachers.

Some Examples of Level Resources:

Elementary:

Experiments with Biomass:
Grades 4-6

Power from Potatoes: Grades 2-3

Energy and the Environment:
Grades K-3

Energy Conservation: Grades 3-6

Middle School:

Biogas Generator: Grades 6-8PDF
Ethanol What It Is And How To Make It: Grades 6-8

High School:

Photovoltaics in the classroom

<https://www.nrel.gov/workingwithus/education-resources.html>



Go Solar With Us—Contest

GO SOLAR WITH US -- The Department of Energy's [Better Buildings Challenge](https://betterbuildingsinitiative.energy.gov/challenge/) is helping five K-12 school districts go solar! For some schools, executing district-wide renewable energy education programs to further students' STEM education goes hand in hand with saving hundreds of thousands of dollars in energy savings through DOE programs. <https://betterbuildingsinitiative.energy.gov/challenge/sector/k-12-school-districts>



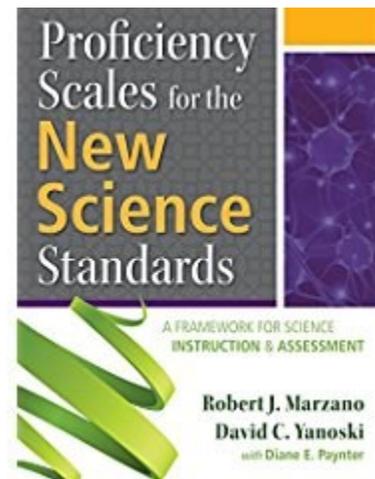
Kids to Parks National School Contest

National Park Trust's annual **Kids to Parks Day National School Contest** empowers students to plan their own educational park experience. Open to all Title 1 schools in grades preK through 12, this contest provides grants up to \$1,000 to cover transportation, park-related fees, stewardship supplies, or anything else students believe would enhance their experience. The deadline to apply is February 1, 2018. Details can be found at <https://www.parktrust.org/kids-to-parks/school-contest/>



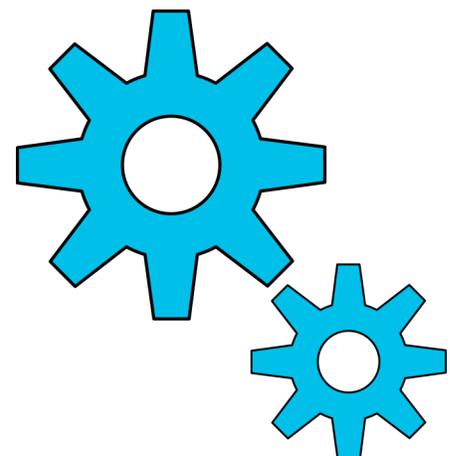
Standards Implementation Resource:

Mark Iverson (President-elect) recommended this resource. The book provides an overview of the NGSS and then how to do proficiency scoring for the NGSS and framework aligned science standards for all grade levels. Can be found on Amazon or other book retailers.



TEST YOUR MANUFACTURING IQ --

Do you know how many manufacturing workers are currently in the United States, or how many manufacturing jobs will likely be needed over the next decade? How about how much manufacturers contributed to the U.S. economy in 2016? Click the play button to find out how much you really know about the manufacturing sector and its economic impact with [the Advanced Manufacturing Office's Manufacturing IQ Game!](#)





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Compound Chemistry InfoGraphics

Quality, though provoking infographics produced by Andy Bunning. If you didn't have the chance to see Andy at ChemEd this summer, you can see all of the wonderful infographics he creates including: "This Week In Chemistry" infographics are created under the Creative Commons=Attribution Non-commercial licenses.

Subscribe to updates of Compound Interest updates at: <http://www.compoundchem.com/subscribe/>

You can look at many other infographics at: <http://www.compoundchem.com/>

THIS WEEK IN CHEMISTRY

12TH NOVEMBER 2017 – 18TH NOVEMBER 2017

Links to articles & studies for the featured stories are provided at: <https://goo.gl/64Hwwx>



CONCERNS OVER ROCK STORAGE OF FERTILISER NITRATES

New research suggests nitrate from farm fertilisers can be stored in rocks below the ground, and that these nitrates could eventually seep into water-bearing aquifers. This could impact water quality, as well as causing algal blooms and affecting marine life.



EASIER METHOD FOR TAGGING DRUGS WITH HEAVY HYDROGEN

Swapping hydrogens in drug molecules with heavier hydrogen isotopes can allow scientists to track what happens to them in the body. A new method uses an iridium photocatalyst, blue light, and heavy water to accomplish this more simply than other methods.



HYDROCARBON HAZE EXPLAINS PLUTO'S COOL TEMPERATURE

Pluto is cooler than had been predicted. New research suggests this might be due to the presence of hydrocarbon nanoparticles in its atmosphere. These nanoparticles absorb infrared radiation and cause the atmosphere's temperature to be lower than expected.



DRUG REPAIRS SOME BRAIN FUNCTION IN LEAD-POISONED RATS

Ingesting lead damages the brain. New tests of a small flavonoid molecule found it was able to restore some synapse function in rats exposed to lead. Further tests will see if it affects learning in these rats, with clinical trials to follow if the results are successful.



'TWISTACENE' WITH RECORD TWISTED ANGLE PREPARED

Researchers have synthesised a molecule called 'decatwistacene', the longest twisted acene yet synthesised. It also has a record torsion angle of 170°, beating the previous record of 144°. Twistacenes have some interesting and unusual properties due to their twisted nature.



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2018 SDSTA Executive Board Elections

2018 is an “election year” for SDSTA. During the Friday afternoon SDSTA Business Meeting at the 2018 Joint Math/Science Ed Conference we will accept final nominations and vote for officers to lead SDSTA until Feb 2020. Their ‘reign’ begins when the 2018 conference ends. Mark Iverson is currently the President-Elect and will transition to SDSTA President on Feb 10. Liz McMillan, current President, will become Past-President; and Julie Olson will transition from Past-President back to a single title of Newsletter Editor. There are 4 current nominees for positions for the 2018 Election, see below for descriptions of their current activities with the organization. If you would like to nominate yourself or a colleague for one of the positions up for election or would like to be considered for an appointed role (TBA by President Mark Iverson), please send an email to Liz@sdsta.org with the information (name, school/organization, position, contact information). Liz will connect with the nominee to determine their acceptance and they will be given an opportunity to address membership at the 2018 Business Meeting.

President Elect Nominee: Jennifer Fowler, 8th Grade Science Teacher with Rapid City Area Schools. This is Jen’s 13th year in the middle school science classroom. A former field tech with the Rocky Mountain Bird Observatory she also works as a Parks Ranger in the summers in the Black Hills. She is a long time member of SDSTA and has served the Joint Board as the Hospitality Coordinator for 3+ years. She attended the National Congress on Science Education

on behalf of SDSTA in summer 2017 and continues to be an advocate for science and science education in our state.

Treasurer Nominee: James Stearns, high school science and math educator at Aberdeen Area Schools. A grandfather of nine, James has long provided distinguished service to SDSTA and SDCTM. He attends most of the planning sessions for the conference and has been the Newsletter Co-Editor and Webmaster of the SDSTA site. James does many “behind the scenes” activities that make the annual conference possible. He served 2 terms as the SDSTA Treasurer and is committed to ensuring that all of SDSTA’s non-profit paperwork is updated and set-up for generations of SDSTA members to come.

Secretary Nominee: (Incumbent): Tiffany Kroeger, high school science at Montrose High School. A REMAST Scholar and awardee of several other honors, Tiffany has served SDSTA as secretary since 2016 and will run for re-election of the office in this, her second term. ***(Note: SDSTA Constitution & Bylaws outline that with the exception of the Newsletter Editor, no officer shall hold the same office for more than two consecutive terms. An interval of two years shall elapse before a member is again eligible for re-election to the same office).***

Newsletter Co-Editor/Webmaster Nominee (although this position is appointed by the president, we wanted to get you acquainted with a nominee for the role): Michelle Bartles has been a Liason for SDSTA since 2016. She has dedicated a lot of time and effort to support the officer team and is willing to support the SDSTA website and support Julie Olson with the newsletter for 2018 and beyond.



STEM Teaching Tools—submitted by Liz McMillan (SDSTA president)



Are you looking for ways to make SD Science Standards and 3Diemsional teaching and learning actually happen in your classroom? Are you like me and the Framework for K-12 Science Education was spot on but you don't really get how to put it all into practice? Through SD's involvement in the NSF ACESSE project I have come across an amazing resource that puts the language of the Framework and 3 dimensional teaching and learning into language I can understand and actions that I can actually accomplish. Helps digest assessment, the SD Science Standards, the 3 Dimensions, formative assessment, what is STEM?, and more. Visit: <http://stemteachingtools.org/> to learn more. My new favorite resource there is in the PD Modules tab – mid-way down the page... the "STEM Teaching Tools' PD "Playlists"" These are selections of their articles ("briefings") that give the background, relevance, and instruction for putting these concepts to practice. Each briefing also contains links to many other resources. Connect with the DOE to learn more about the ACESSE project or the people behind the STEM Teaching Tools.



PERSONAL GENETICS

What are you doing to prepare your students to make informed choices?

Join our effort to build awareness, respect and confidence through genetic discussions. Explore how genetics interconnects with issues of social justice, and as genetic technologies become more widespread, how our society can ensure that education and access to information is available to all people.

Learn more and join the conversation by visiting sanfordresearch.org/education or pged.org.

019059-01053 9/17



SD -AAPT Photo Contest

<http://sdaapt.sdsta.org/>

The contest is open to high school students in grades 9 - 12. Students must print out, sign, and return the Contest Rules and Entry Agreement, HTML version or WORD version, when submitting their entry. Failure to submit this form will in - validate the contest entry. Entries are limited to 6 per teacher per school each year. If possible, please place all entries from the school in one package. The deadline for entry is being moved up so that online voting may take place, so email entries by the first week of January. If you have students with entries, you need to get that entry in right away. Send an email with attached photo & description to James@SDSTA.org (We still plan to display photos & descriptions at the conference so either mail or bring original photo to conference .)

SD-AAPT High School Photo Contest — Rules and Entry Agreement

(this page must be returned with submission)

Rules

Photos must be unmounted, 8" x 10" or 8.5" x 11", and may be either black-and-white or color. Traditional photos must be submitted on photographic stock. Photos taken with a digital camera must be submitted as a high-quality print on photo stock and be trimmed to 8" x 10" or 8.5" x 11".

If photos are taken with a digital camera: an unmodified electronic file must accompany the submission. (Small adjustments to brightness, ... is acceptable.)

Computers shall not be used to modify or enhance photos.

Only one photo per student. (Multiple small photos on one 8.5" x 11" sheet are not allowed.) Only one student per entry. (Photo cannot be taken by two or more people.)

The student must take the photo.

The submission must include the following information both in hard copy and attached to an email.(PC format: MS Word):

- Student's name, complete home mailing address and email address;
- Student's high school & complete school address;
- School phone number;
- Teacher's name and email address;
- Specify "Natural" or "Contrived" category entry;
- Essay of 250 words or less describing the physics in the photo. The essay should have a title and submissions are not acceptable and will be disqualified.)

We cannot mail prizes if we do not have complete mailing addresses. Email and phone numbers may be used to contact you with questions, but will not be sold or otherwise used for marketing purposes.

Entrant grants SD-AAPT permission to post their submission on the SD-AAPT website, or to use it in SD-AAPT publications or marketing materials. Submissions will not be returned. Any submission which does not meet the above criteria will not be considered.

I have read the above rules and agree to all terms and conditions. I understand that if I omit or falsify information, or if I do not sign this form, I will not be eligible for this contest.

Student signature

Date

Home address

Student email address

Student's High School

H. S. Address

School Phone Number

Teacher's name & email

Is your photo (Circle one) "Natural" or "Contrived"

Send entry to: James Stearns
15 North Fifth Street

26th Annual Joint Science & Math Professional Development Conference
Thursday night, February 8 - Saturday afternoon February 10, 2018
Huron Events Center - Crossroads, Huron, SD

▶ video competition

WHAT DOES BIOTECHNOLOGY MEAN TO YOU?

scholarship AWARDS

\$750 **\$500** **\$250**
1ST PLACE 2ND PLACE 3RD PLACE

▶ Submissions due by
January 31, 2018

WHAT DOES “BIOTECHNOLOGY” MEAN TO YOU?

The competition is an annual, statewide opportunity for high school students to explore how biotechnology is a part of their communities and earn a scholarship for undergraduate education in South Dakota.

- Are you a high school student living in the state of South Dakota?
- Are you excited about technology, science or both?
- Are you looking for scholarships to pursue undergraduate education experiences?

The competition encourages students to be creative and use videos to show how biotechnology is feeding, fueling, or healing in their community and helping to make a better world. Act it out, create an animation, sing it, but, it must be appropriate for all ages.

The Challenge:

1. Research and connect with one or more regional biotechnology companies/organizations.
2. Create a short, creative video (60-120 seconds in length) that showcases how biotechnology is important in SD.
2018 Topics: A. How does Biotech Feed SD? B. How does Biotech Fuel SD? C. How does Biotech Heal SD?

All submissions are due by **January 31, 2018** – in the meantime, start connecting with area biotechnology organizations to learn more about what they do in/for your community.

Questions? Contact:

Joni Johnson at SD Biotech: jjohnson@sdbio.org

- **Kelly Lane Earth and Space Science Grant (\$5,000):**

Science and math teachers at public, private, or tribal schools in South Dakota may now apply for the 12th annual “**Kelly Lane Earth and Space Science Grant**” provided by the NASA South Dakota Space Grant Consortium. This **\$5,000 grant** is awarded annually to a select science or math **teacher** of U.S. citizenship in South Dakota. The award seeks to improve science, technology, engineering, and mathematics (STEM) education in the state through the support of innovative programs in pre-college education. The application announcement for the 2018 grant is available at the following web-site. Preference will be given to applications focusing on topics pertaining to space science, earth science, and/or the use of geospatial technology, and to applicants who have not won this award in the past ten years. Applications must be received by **January 17, 2018**.

<http://sdspacegrant.sdsmt.edu/KellyLaneTeacherGrant.htm>

Thomas V. Durkin, CPG; Deputy Director
South Dakota Space Grant Consortium; SD School of Mines & Technology
501 E. Saint Joseph Street
Rapid City, SD 57701

Email: Thomas.Durkin@sdsmt.edu

Phone: (605) 394-1975

Website: <http://sd.spacegrant.org>

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- **Daniel Swets Robotics Materials Award (\$6,000) - NASA South Dakota Space Grant:**

The NASA South Dakota Space Grant Consortium invites applications for the **2018 “Daniel Swets Robotics Materials Award”**. We anticipate providing **\$6,000** in award funding under this call-for-applications. This funding is open to South Dakota teachers and informal educators of U.S. citizenship who either have: A) taken robotics training or plan to take robotics training and want to begin new robotics programs and teams, or B) have sustained robotics programs/curriculum in their classrooms or at their schools.

Preference will be given to: 1) applications that would start new robotics programs and teams (e.g., at a school that didn’t have one before), as opposed to augmenting existing robotics programs, 2) robotics programs at the Middle School level, and 3) applications from teachers/educators who have not won any prior robotics or other teacher awards provided by SD Space Grant in the past 12 years. The 2018 Application and Instructions are downloadable at the following website. Applications must be received by **January 17, 2018**.

<http://sdspacegrant.sdsmt.edu/DanSwetsRoboticsAward.html>

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501 E. Saint Joseph Street
Rapid City, SD 57701

Email: Thomas.Durkin@sdsmt.edu

Phone: (605) 394-1975

Website: <http://sd.spacegrant.org>

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Winners of the 2017 Kelly Lane Earth & Space Science Grant

(Left to right): Julie Olson (SCHS/Mitchell Senior High), Tom Durkin (SD Space Grant), and Patty Martin (Aberdeen Roncalli High School)



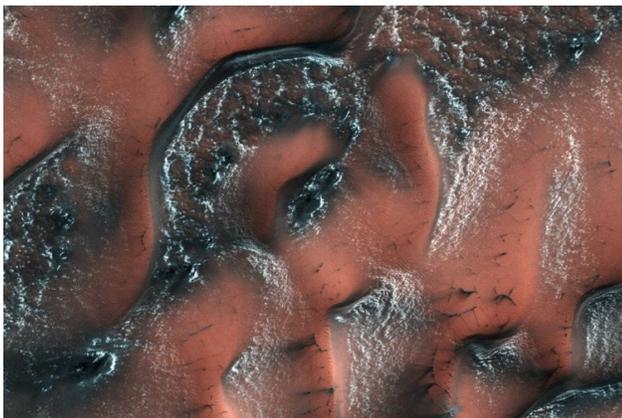
Snowy Worlds Beyond Earth

By Linda Hermans-Killiam

There are many places on Earth where it snows, but did you know it snows on other worlds, too? Here are just a few of the places where you might find snow beyond Earth:

Mars

The north pole and south pole of Mars have ice caps that grow and shrink with the seasons. These ice caps are made mainly of water ice—the same kind of ice you’d find on Earth. However, the snow that falls there is made of carbon dioxide—the same ingredient used to make dry ice here on Earth. Carbon dioxide is in the Martian atmosphere and it freezes and falls to the surface of the planet as snow. In 2017, NASA's Mars Reconnaissance Orbiter took photos of the sand dunes around Mars' north pole. The slopes of these dunes were covered with carbon dioxide snow and ice.



NASA's Mars Reconnaissance Orbiter captured this image of carbon dioxide snow covering dunes on Mars. Credit: NASA/JPL/University of Arizona

A Moon of Jupiter: Io

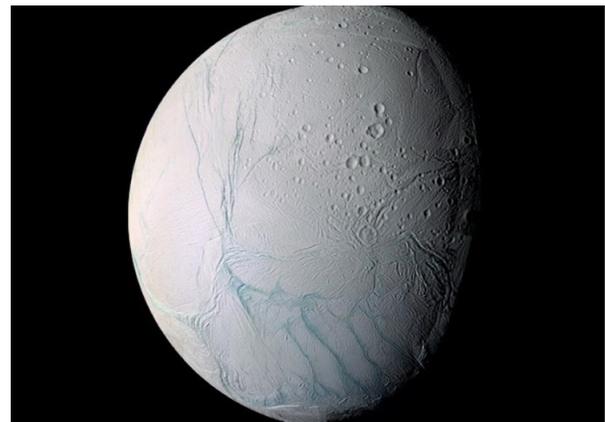
There are dozens of moons that orbit Jupiter and one of them, called Io, has snowflakes made out of sulfur. In 2001, NASA's Galileo spacecraft detected these sulfur snowflakes just above Io's south pole. The sulfur shoots into space from a volcano on Io's surface. In space, the sulfur quickly freezes to form snowflakes that fall back down to the surface.



A volcano shooting molten sulfur out from the surface of Io. Credit: NASA/JPL-Caltech

A Moon of Saturn: Enceladus

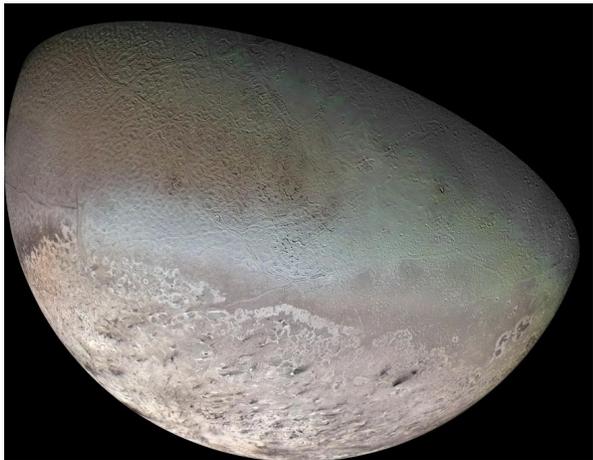
Saturn's moon, Enceladus, has geysers that shoot water vapor out into space. There it freezes and falls back to the surface as snow. Some of the ice also escapes Enceladus to become part of Saturn's rings. The water vapor comes from a heated ocean which lies beneath the moon's icy surface. (Jupiter's moon Europa is also an icy world with a liquid ocean below the frozen surface.) All of this ice and snow make Enceladus one of the brightest objects in our solar system.



Enceladus as viewed from NASA's Cassini spacecraft. Credit: NASA

A Moon of Neptune: Triton

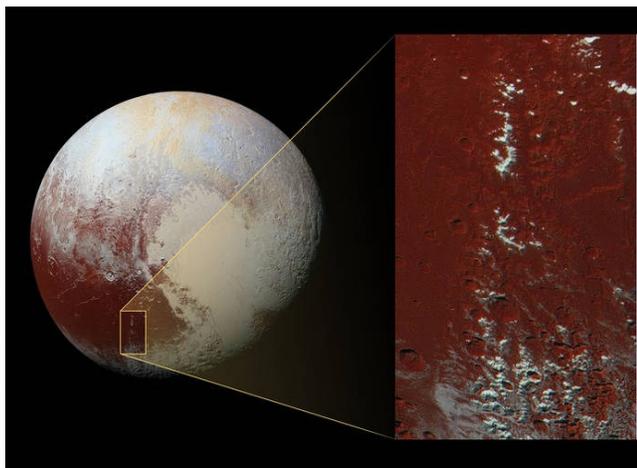
Neptune's largest moon is Triton. It has the coldest surface known in our solar system. Triton's atmosphere is made up mainly of nitrogen. This nitrogen freezes onto its surface covering Triton with ice made of frozen nitrogen. Triton also has geysers like Enceladus, though they are smaller and made of nitrogen rather than water.



The Voyager 2 mission captured this image of Triton. The black streaks are created by nitrogen geysers. Credit: NASA/JPL/USGS

Pluto

Farther out in our solar system lies the dwarf planet Pluto. In 2016, scientists on the New Horizons mission discovered a mountain chain on Pluto where the mountains were capped with methane snow and ice.

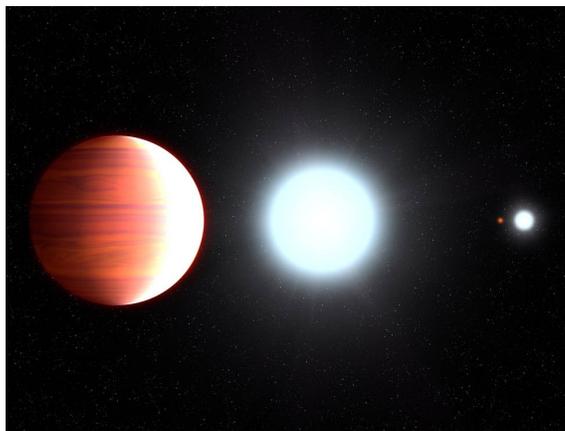


The snowy Cthulhu (pronounced kuh-THU-lu) mountain range on Pluto. Credits: NASA/JHUAPL/SwRI



Beyond Our Solar System

There might even be snow far outside our solar system! Kepler-13Ab is a hot, giant planet 1,730 light years from Earth. It's nine times more massive than Jupiter and it orbits very close to its star. The Hubble Space Telescope detected evidence of titanium oxide—the mineral used in sunscreen—in this planet's upper atmosphere. On the cooler side of Kepler-13Ab that faces away from its host star, the planet's strong gravity might cause the titanium oxide to fall down as "snow."



This is an artist's illustration of what Kepler-13Ab might look like. Credit: NASA/ESA/G. Bacon (STScI)

Want to learn more about weather on other planets? Check out NASA Space Place: <https://spaceplace.nasa.gov/planet-weather>

Teachers: Are you in need of STEM related materials for your classroom projects....at no cost to you?

Public school teachers have an opportunity to partner with 3M Aberdeen to get STEM related materials sent directly to your school at no cost through DonorsChoose.org.



Here's how this works:

1. Register at www.DonorsChoose.org/teachers
2. Post a request for Science, Technology, Engineering or Math materials
3. 3M will be funding materials for selected STEM projects in the community.
4. Projects will be selected until funding runs out.

For questions, please contact:

Candy Bender @ cbender@mmm.com 605-226-6562

Janet Hedges @ jlhedges1@mmm.com 605-226-6611

Tim Sommer @ tim@donorschoose.org 415-800-0390 X247



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Presidential Awards for Excellence in Mathematics and Science Teaching

Rewarding & Inspiring Great Teaching Since 1983

Do you know of a deserving elementary teacher that could be nominated? This year's awards will honor mathematics and science (including computer science) teachers working in grades K-6. Nominations close on April 1, 2018. To make a nomination or if you have questions, contact Ramona Lundberg: Ramona.Lundberg@k12.sd.us

The sooner you nominate, the more time the nominee will have to complete the necessary forms. All forms & letters of recommendation must be submitted by May 1st.

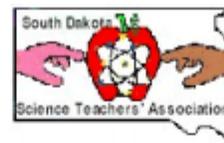
Last year, PAEMST recognized Jennifer Fowler, South Middle School, Rapid City. There were no elementary teachers recognized in the previous cycle.



Up to 108 teachers are recognized each year. Presidential Awardees receive a certificate signed by the President of the United States, a trip to Washington D.C. to attend a series of recognition events and professional development opportunities, and a \$10,000 award from the National Science Foundation.

The SDSTA Newsletter is published four times a year. The December issue (this one) is e-mailed to 130 paid members and several school science departments. The Membership year in SDSTA starts with the February conference and ends the thirty-first of January. Dues are due at each conference for member discount rates. SDSTA members may give a one year free membership to their student teachers by submitting the student teacher's name & address. One paid conference registration may be given to the SDSTA member that has made a submission to the newsletter (or given a presentation at the conference) and has referred at least three new members. Members may also earn a 10% finder's fee for any science related ads placed in the newsletter. Our rates are \$50 per page (or 3 to 4 quarter pages)

Mail to: Deirdre Peck, SDSTA Treas.
 409 S. Kline Street
 Aberdeen, SD 57401

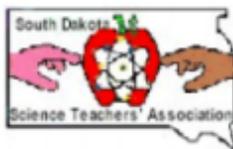


\$ 5	Student
\$ 5	K - 6
\$ 5	Retired
\$20	All Others

Name _____ Home Phone _____ - _____
 Home Address _____ E-mail _____
 City _____ State _____ Zip _____
 Your School _____ School Phone _____
 School Address _____ City _____ State _____ Zip _____
 Your area K-6 7-8 9-12 College Other _____
 (circle one)

Referred by _____

South Dakota Science Teachers' Association
 Julie Olson and James Stearns
 Editors, S D S T A Newsletter
 15 North Fifth Street
 Groton, SD 57445-2024



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Delivered at the speed of light.

Calendar of Events ~ Calendar of Events

January 19, 2018	Deadline for Space Grant Consortium Summer Research	pnorris@sanfordlab.org
January 31	Deadline for APS Online Teacher Fellows -	www.frontiersinphys.org
January 31	Deadline for SD EPSCoR Video Competition	jjohnson@sdbio.org

February 8-9 & 10, 2018 26th Annual Science & Math Professional Development Conference in Huron, SD

February 22	Rare Disease Scientist Spotlight, Sanford Center, SF
March 13	Support Am Indian College Student, Sanford Center, SF
March 15-18, 2018	NSTA National Conference—Atlanta, GA
March 24	Science Olympiad— http://sites.usd.edu/sdscienceolympiad/home
April 5	Stem Cell Augmentation in ACL Surgery, Sanford Center, SF
April 17	Women in Science—Pierre, www.sd-discovery.org
July 11-13, 2018	7th Annual STEM Forum Expo (NSTA) - Philadelphia, PA

Calendar of Events ~ Calendar of Events