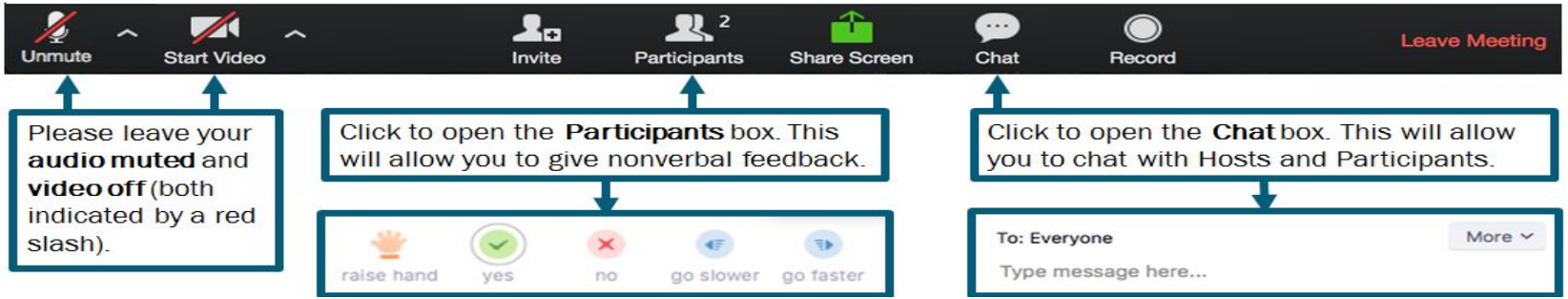
NGSS-ESS Webinar:

Remote & Hybrid ESS Teaching & Learning Resources

September 10 2020

1:00 PM Pacific | 2:00 PM Mountain | 3:00 PM Central | 4:00 PM Eastern



NATIONAL EARTH SCIENCE TEACHERS ASSOCIATION

AGI american geosciences institute
connecting earth, science, and people

NAGT

This webinar is being recorded

NGSS-ESS Webinar:

Remote & Hybrid ESS Teaching & Learning Resources

Organizers:
Aida Awad, NAGT Past President / Secretary/Treasurer
Ed Robeck, American Geosciences Institute
Missy Holzer, NESTA
Mitchell Awalt, SERC/NAGT

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Webinar overview:

Presenters:

- Infiniscope
- iVFT: Columns of the Giants
- Teach The Earth
- Model Evidence Link Diagrams Project
- Snackbox Resources for Teachers and Parents
- UNAVCO
- Earth Science Week
- OpenSciEd
- AMS Education PD & Curriculum Resources
- InTeGrate
- Eos

- Discussion and Q&A
- Post webinar survey link:

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Upcoming webinars:

- October 15: NGSS-ESS Mini-series: MORE! Remote Teaching & Learning Resources, part 2

- The entire webinar archive is now available on the AGI YouTube Channel as a playlist!
- https://www.youtube.com/user/AmericanGeosciences/playlists

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Please feel free to type your questions into the chat box during the webinar.

Today's presentation:

Remote & Hybrid ESS Teaching & Learning Resources

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Infiniscope

A NASA-funded project creating digital learning experiences for all ages and an educator community of practice.

Each lesson contains:

- Full NGSS Alignment
- Adaptive Feedback
- Learning Metrics
- 5 E Lesson Plan
- Timelines
- Teacher Tips
- Misconception Alerts
- Time Management Tips

Find lessons on:

Moon Phases
Eclipses
Extinction
Geologic time
Kepler's Third Law
and many more!

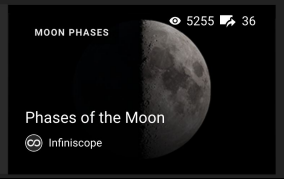
Join the network for access to

- Visualizations
- Contributed content from community members
- A community of practice.

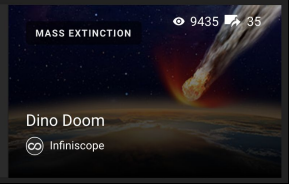
www.Infiniscope.org
www.infiniscope.org/join
Contact: jlswann@asu.edu

Find us on Facebook, Twitter, and Instagram @Infiniscope

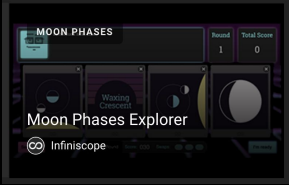
Space Explorations



Earth Explorations



Visualization Library



Contributed Content


Infiniscope
The Future of Learning Online
Phases of the Moon

EARTH SCIENCE WEEK

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connecting earth, science, and people

Celebrate Earth Science Week 2020!

Use materials in the Earth Science Week 2020 Toolkit:

- Earth Science Week Poster
- Earth Science Activity Calendar
- Earth Science Week Toolkit

EARTH SCIENCE WEEK

american geosciences institute
connecting earth, science, and people

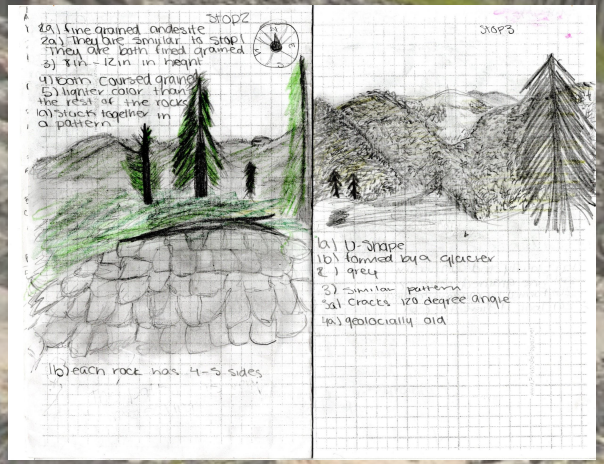
And explore Earth Science Week Online resources:

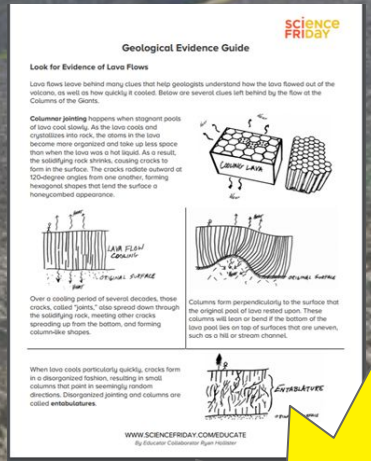
- Earth Science Week Online Toolkit
- Minerals Day, October 12
- “Earth Materials Frontiers” Webinars

Columns of the Giants IVFE

Utilizing NGSS SEP's to Scaffold Collaborative Student Discovery & Sense-making

https://www.sciencefriday.com/photosphere





Works on any web browsing device!

Ryan J Hollister
Science Coach –Turlock Unified School District (CA)
Science Friday Educator Collaborator

Columns of the Giants IVFE

https://www.sciencefriday.com/photosphere

What Do Students Do on this IVFE?

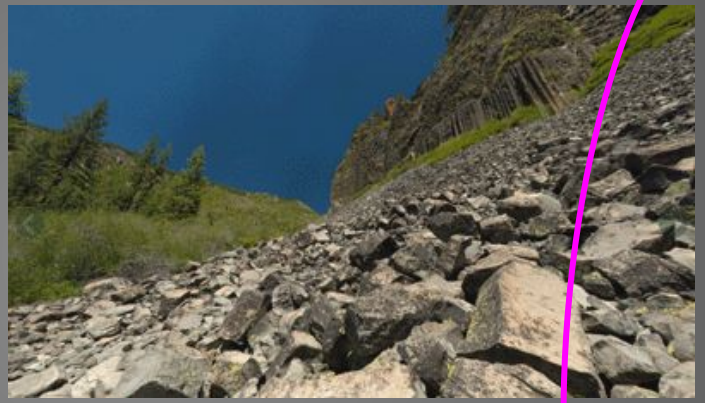
1. **Ask Questions and Define Problems**
   Students are allowed to explore, notice and wonder with freedom within the field site. Make field sketches.
2. **Analyze & Interpret Data**
   Students use a customized field guide and guided questions to collaboratively make sense of the landscape in small groups (2 or 3).*
3. **Engage in Argument from Evidence.**
   Students partake in small group and large group scientific discussions to make geologic claims at each stop using annotated guiding questions*
4. **Construct Explanations.**
   Students use their data and work collaboratively to synthesize a timeline of the geologic evidence they discovered*
5. **Obtain, Evaluate & Communicate Information.**
   Students individually use the timeline to create a story that explains the story. In this case, the formation of the Columns of the Giants.

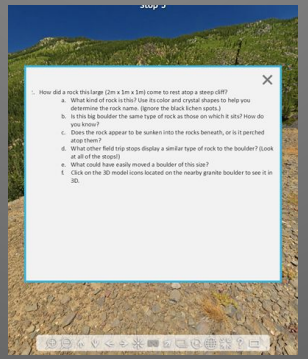
- * Updated lesson plans that use Jamboard / Breakout Rooms for distance learning collaboration are in the works.

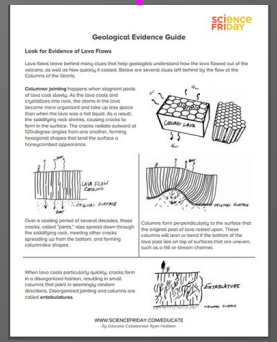
Tutorials & Resources Links (FREE!)

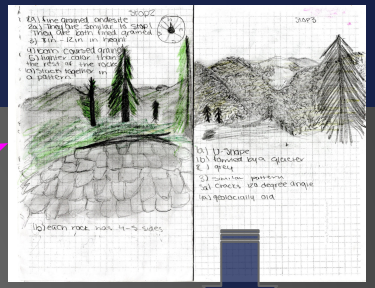
https://www.mrhollisterphoto.com/super-science-saturday-2020.html

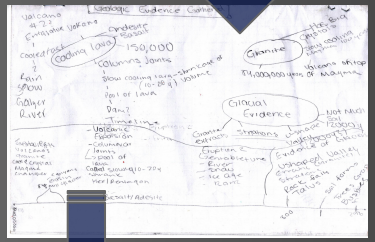
Students immersed in six high-resolution 360 photospheres and five high-resolution 3D models

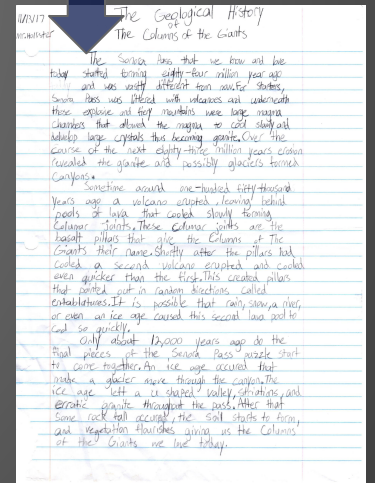












OpenSciEd

develops and supports adoption of high-quality open-source science materials

www.openscied.org

Science Instructional Materials

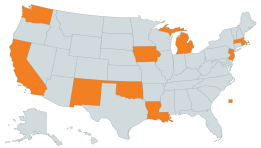
OpenSciEd instructional materials are robust, research-based, open-source science instructional materials designed to increase accessibility for all teachers and students.

Professional Learning

To support key instructional shifts in the Next Generation Science Standards, OpenSciEd has developed professional learning materials to accompany the instructional materials.

OpenSciEd has Impacted:

15,000+
Registered Users



265
Field Test Teachers

10
Partner States

20,000+
Students Using OSE Materials

5,000+
Field Test Students

7
High-Quality Units

OpenSciEd

www.openscied.org

6-8 materials:

https://www.openscied.org/access-the-materials/

Professional learning materials:

https://www.openscied.org/access-the-pd-materials/

COVID-19 & Health Equity Units:

https://www.openscied.org/covid-19-health-equity/

Remote Learning support

Staying Grounded When Teaching Remote:
https://www.openscied.org/remote-teaching/

Remote Learning Adaptations:
https://www.openscied.org/remote-learning-adaptations/

Elementary school development:

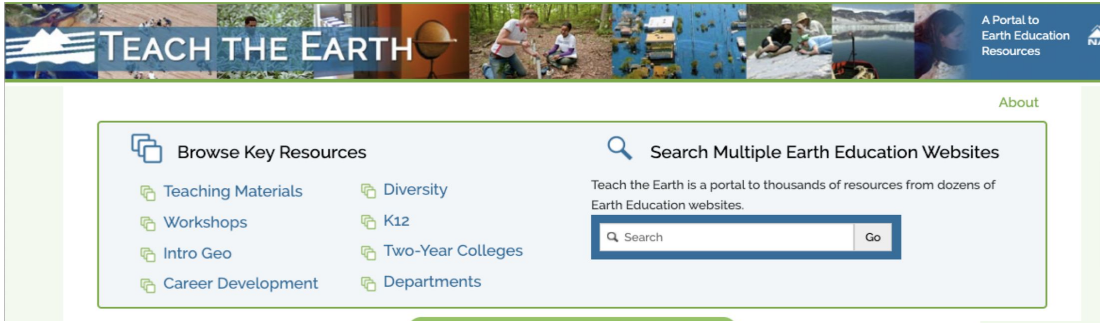
mid-2021 start

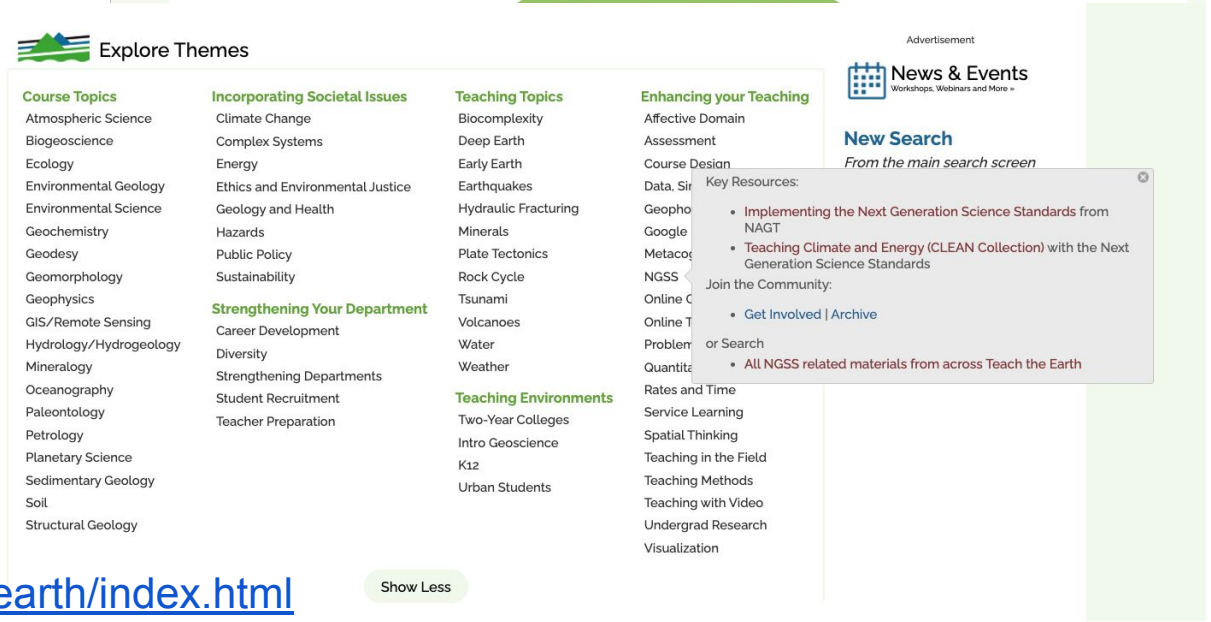
High School development:

starts January 2021

Teach the Earth is the portal to all things Geoscience education-related that can be found on SERC.

- The idea behind Teach the Earth is the sharing of high-quality, classroom-tested education materials

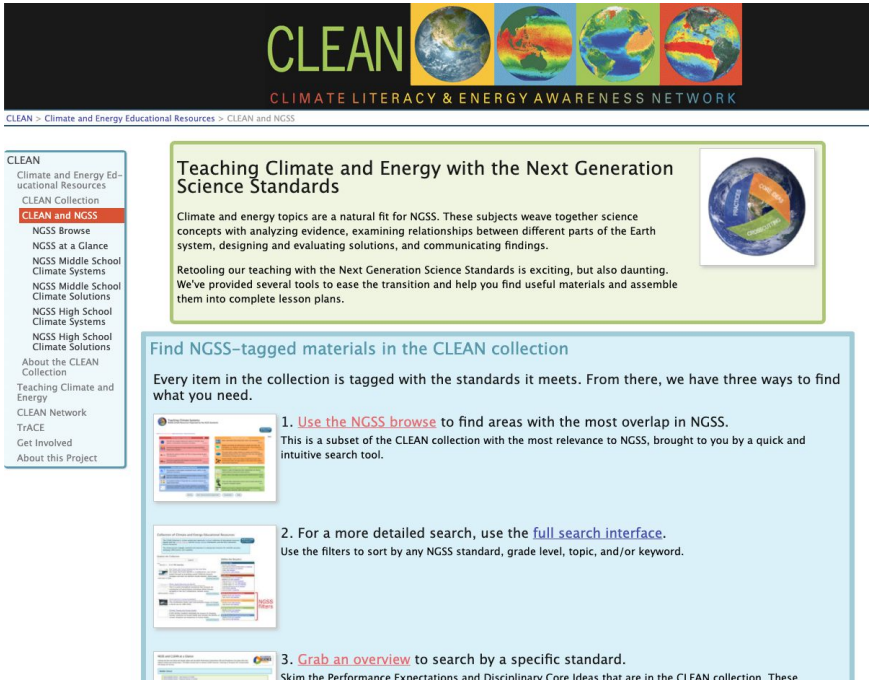


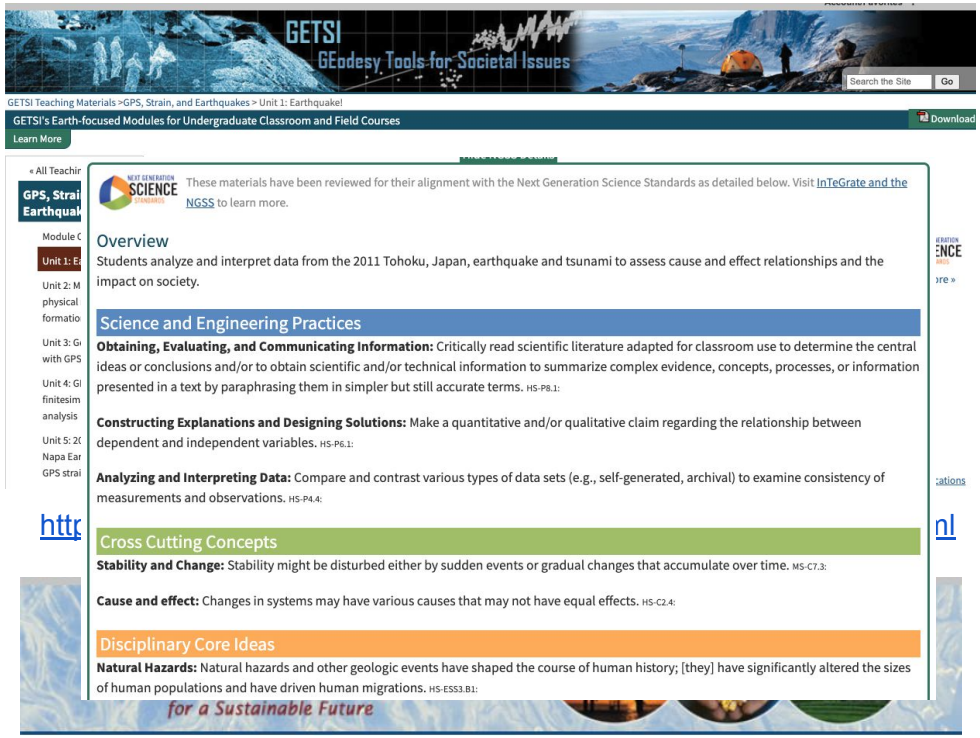


https://serc.carleton.edu/teachearth/index.html

Teach the Earth is the portal to all things Geoscience education-related found on SERC.

- NGSS topics have been tagged and outlined in several projects, including CLEAN, GETSI, InTeGrate





https://cleanet.org/clean/educational_resources/clean-ngss

AMS Education Program

Foster scientific literacy in Earth system science
with focus on the leveraging current data as a learning tool

We're a K-13 program with 2 Primary Activities:

1) Offering teachers Professional Development courses in Weather, Ocean, & Climate science
   - 50th Semester of online DataStreme courses, &
   - Two competitive summer courses, Project Atmosphere, & Project Ocean (formerly the Maury Project)

the DataStreme PROJECT
weather, ocean and climate courses for K-12 teachers

project ATMOSPHERE
sensing, analyzing and forecasting

project OCEAN
exploring the physical foundations of oceanography

CERTIFIED CAT AMS TEACHER

2) Creating and supporting Faculty to adopt complete digital curriculum packages for 3 undergraduate courses in weather, ocean & climate science

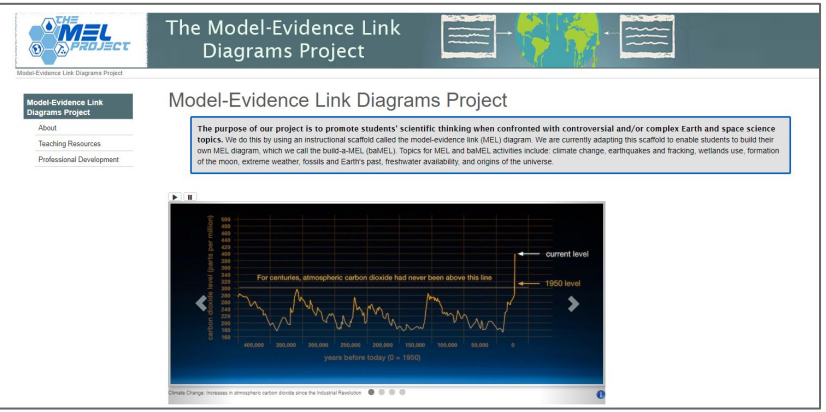
- Packages include e-text, lab manuals, web portals, faculty resources, and more
- We have activated more than 900 institutional licenses, half of which are from MSIs

We're celebrating our 30th anniversary this fall!

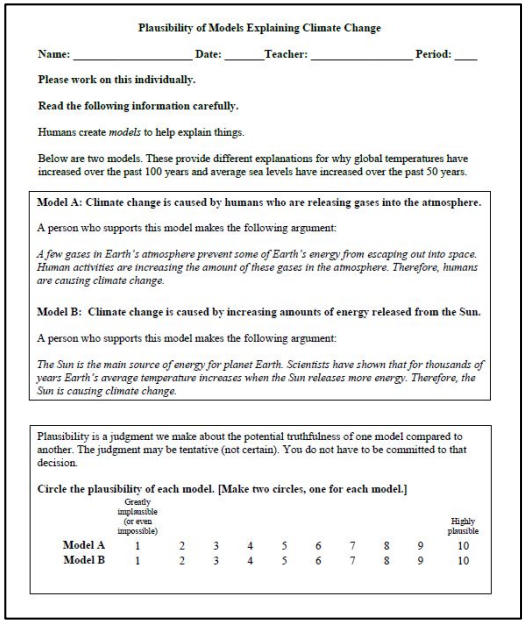
ametsoc.org/amsedu

AMS American Meteorological Society

Going Beyond the Controversy: *Promoting Critique, Evaluation, and Argument in Earth Science*



https://serc.carleton.edu/mel/index.html



Plausibility of Models Explaining Climate Change

Name: _____ **Date:** _____ **Teacher:** _____ **Period:** ____

Please work on this individually.

Read the following information carefully.

Humans create *models* to help explain things.

Below are two models. These provide different explanations for why global temperatures have increased over the past 100 years and average sea levels have increased over the past 50 years.

Model A: Climate change is caused by humans who are releasing gases into the atmosphere.

A person who supports this model makes the following argument:

A few gases in Earth's atmosphere prevent some of Earth's energy from escaping out into space. Human activities are increasing the amount of these gases in the atmosphere. Therefore, humans are causing climate change.

Model B: Climate change is caused by increasing amounts of energy released from the Sun.

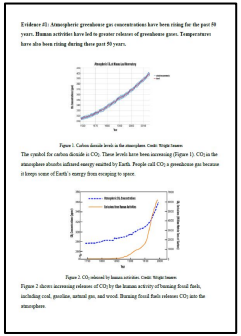
A person who supports this model makes the following argument:

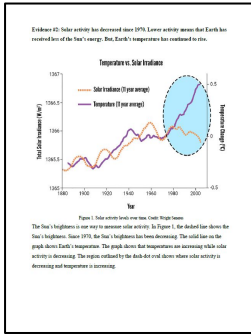
The Sun is the main source of energy for planet Earth. Scientists have shown that for thousands of years Earth's average temperature increases when the Sun releases more energy. Therefore, the Sun is causing climate change.

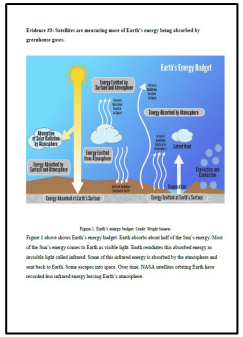
Plausibility is a judgment we make about the potential truthfulness of one model compared to another. The judgment may be tentative (not certain). You do not have to be committed to that decision.

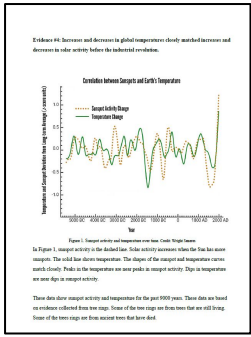
Circle the plausibility of each model. [Make two circles, one for each model.]

	Greatly implausible (or even impossible)									Highly plausible
Model A	1	2	3	4	5	6	7	8	9	10
Model B	1	2	3	4	5	6	7	8	9	10

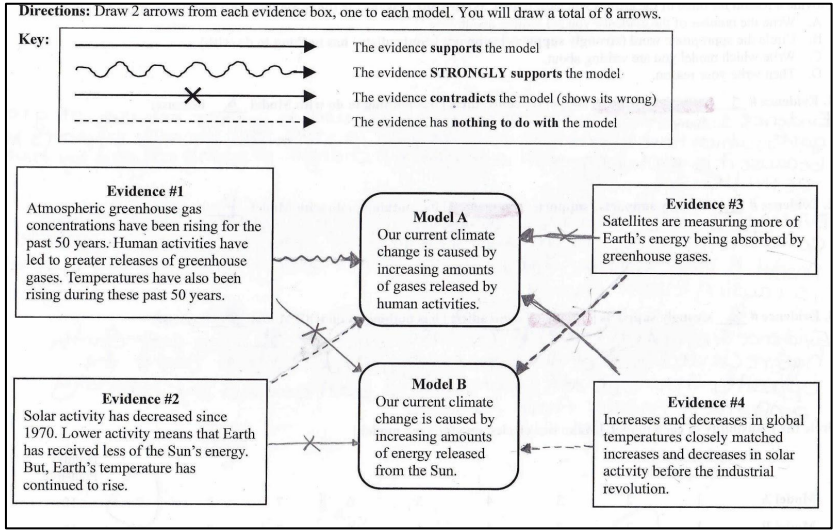


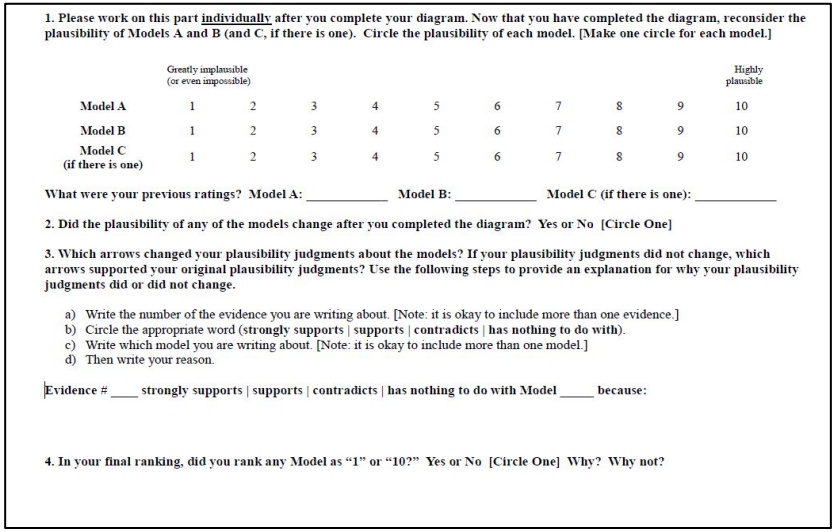






This research and project is supported by the US National Science Foundation (NSF) under Grant No DRL-1721041. Any opinions, findings, conclusions, or recommendations expressed are those of the authors and do not necessarily reflect the NSF's views.





1. Please work on this part individually after you complete your diagram. Now that you have completed the diagram, reconsider the plausibility of Models A and B (and C, if there is one). Circle the plausibility of each model. [Make one circle for each model.]

	Greatly implausible (or even impossible)									Highly plausible
Model A	1	2	3	4	5	6	7	8	9	10
Model B	1	2	3	4	5	6	7	8	9	10
Model C (if there is one)	1	2	3	4	5	6	7	8	9	10

What were your previous ratings? Model A: _____ Model B: _____ Model C (if there is one): _____

2. Did the plausibility of any of the models change after you completed the diagram? Yes or No [Circle One]

3. Which arrows changed your plausibility judgments about the models? If your plausibility judgments did not change, which arrows supported your original plausibility judgments? Use the following steps to provide an explanation for why your plausibility judgments did or did not change.

a) Write the number of the evidence you are writing about. [Note: it is okay to include more than one evidence.]
b) Circle the appropriate word (strongly supports | supports | contradicts | has nothing to do with).
c) Write which model you are writing about. [Note: it is okay to include more than one model.]
d) Then write your reason.

Evidence # ____ strongly supports | supports | contradicts | has nothing to do with Model _____ because:

4. In your final ranking, did you rank any Model as "1" or "10?" Yes or No [Circle One] Why? Why not?

MEL Topics	baMEL Topics
Climate Change	Freshwater
Wetlands	Extreme Weather
Origin of the Moon	Origin of the Universe
Fracking	Fossils

https://serc.carleton.edu/mel/index.html

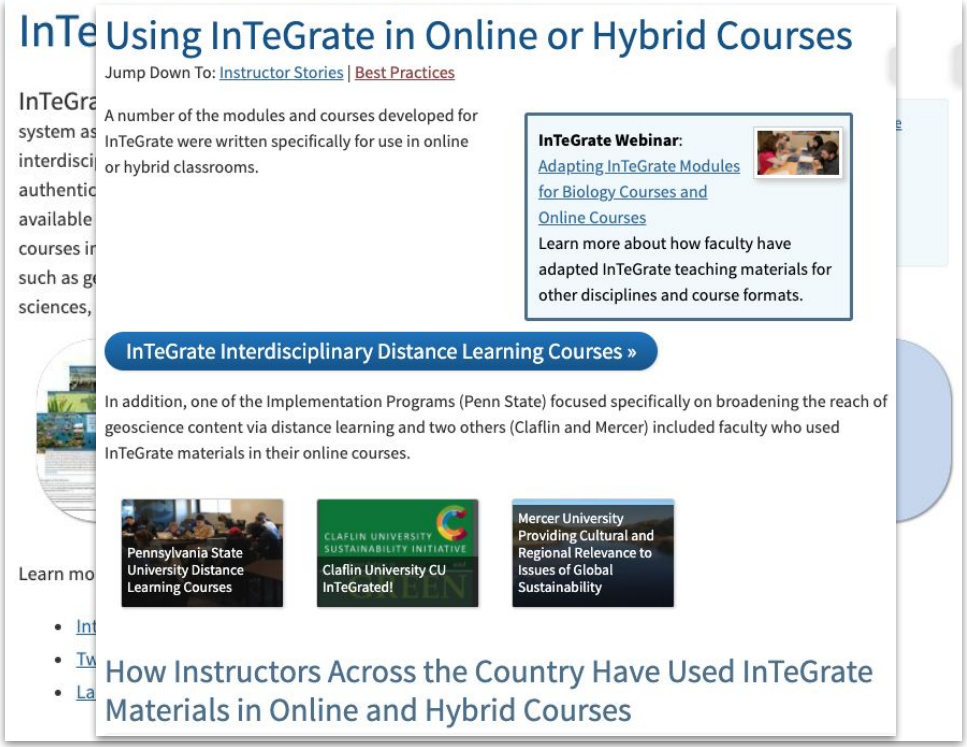
AGI NGSS-ESS Implementation Webinar Playlist:
Thinking Scientifically in a Changing World

InTeGrate

Interdisciplinary Teaching about Earth for a Sustainable Future

InTeGrate rigorously developed and tested curricular materials that…

- Address interdisciplinary grand challenges society is facing
- Engage students in the science and engineering practices, highlighting geoscientific thinking
- Make use of real-world data and issues
- Develop students' systems thinking
- Follow evidence-based practices in teaching and learning
- Are adaptable and adoptable by instructors in a variety of settings



Using InTeGrate in Online or Hybrid Courses

Jump Down To: Instructor Stories | Best Practices

A number of the modules and courses developed for InTeGrate were written specifically for use in online or hybrid classrooms.

InTeGrate Webinar: Adapting InTeGrate Modules for Biology Courses and Online Courses

Learn more about how faculty have adapted InTeGrate teaching materials for other disciplines and course formats.

InTeGrate Interdisciplinary Distance Learning Courses »

In addition, one of the Implementation Programs (Penn State) focused specifically on broadening the reach of geoscience content via distance learning and two others (Claflin and Mercer) included faculty who used InTeGrate materials in their online courses.

Pennsylvania State University Distance Learning Courses

Claflin University CU InTeGrated!

Mercer University Providing Cultural and Regional Relevance to Issues of Global Sustainability

How Instructors Across the Country Have Used InTeGrate Materials in Online and Hybrid Courses

https://serc.carleton.edu/integrate/teaching_materials/index.html

InTeGrate

Interdisciplinary Teaching about Earth for a Sustainable Future

Search and browse InTeGrate using the NGSS

How do I find what I want?

Use the links under **Refine the results** on the right to navigate all of the InTeGrate materials by cross-cutting concepts, science and engineering practices, disciplinary core ideas, and performance expectations.

The logo for the Next Generation Science Standards.

Once you select a grade level, you can hover over the code to see the full text of the standards and their categories.

To search all InTeGrate materials by topics or themes in addition to the NGSS, you can use our standard search tool.

Search | Go

Help

Current Search Limits:

NGSS Performance Expectations: High School > Earth and Space Sciences > HS-ESS3 > HS-ESS3-1: Construct an explanation based on evidence for how the availability of natural resources, occurrence of natural hazards, and changes in climate have influenced human activity.

Results 1 - 10 of **33 matches**

Refine the Results

NGSS Cross-Cutting Concepts
Middle School 19 matches
High School 32 matches

NGSS Science and Engineering Practices
Middle School 15 matches
High School 27 matches

NGSS Disciplinary Core Ideas
Middle School 17 matches
High School 27 matches

NGSS Performance Expectations Show all
High School > Earth and Space Sciences > HS-ESS3 > HS-ESS3-1:
33 matches

Unit 1: Slip-sliding away: case study landslides in Italy and Peru part of Surface Process Hazards

Sarah Hall, College of the Atlantic; Becca Walker, Mt. SAC

How have mass-wasting events affected communities, and what lessons have we learned from these natural disasters that might help us mitigate future hazards? In this unit, students answer these questions by being ...

GETSI Developed

Unit 5: Mitigating future disasters: developing a mass-wasting hazard map part of Surface Process Hazards

Becca Walker, Mt. SAC

empty

GETSI Developed

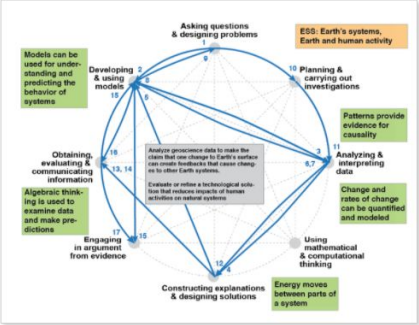
https://serc.carleton.edu/integrate/teaching_materials/ngss/ngss_browse.html

Pathways to performance expectations

Investigating Earth's climate and human impacts

This investigation was compiled by Joe Behnke, Danielle DeRousse, and Kendra Robinson-Harding, participants in a 2018 workshop entitled Connecting Earth science and sustainability to teach the NGSS, and edited by Anne Egger

Students are expected not only to be able to develop and use models of Earth's climate system that illustrate feedbacks within the system, but also to evaluate the impact that humans are having on the climate system and consider design solutions that might mitigate those impacts.



The investigation described here is intended for a 9th-grade science class, and should take about three weeks. The steps in the investigation are illustrated in the diagram, showing the science and engineering practices that the student engage in along with major cross-cutting concepts and core ideas that will be developed. The steps are described in more detail in the table below.

The investigation will help students make progress towards three performance expectations:

- HS-ESS2-2: Analyze geoscience data to make the claim that one change to Earth's surface can create feedbacks that cause changes to other Earth systems
- HS-ESS3-4: Evaluate or refine a technological solution that reduces impacts of human activities on natural systems
- HS-ESS3-6: Analyze geoscience data and the results from global climate models to make an evidence-based forecast of the current rate of global or regional climate change and associated future impacts to Earth systems.

https://serc.carleton.edu/integrate/teaching_materials/ngss/pathways_PEs.html

IMSA
Illinois Mathematics and Science Academy

STEM focused lessons and activities for all students.

https://www.imsa.edu/educator-development/e-teaching-resources/

30 Snack boxes each with 4-9 resource links to trusted sites with hands-on activities in 5 grade bands plus a special series for summer.

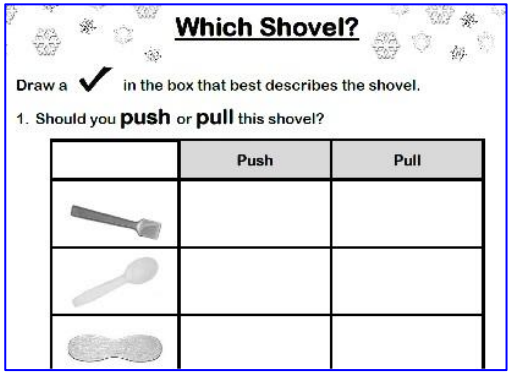
STEM for the Family, K-2, 3-5, 6-8, 9-12

Sample topics: Buttery Science, Engineering Toilet Paper, Science behind Ballet, Tracking Marine Mammals, Women Who Changed Science, Space Chef, Medieval Castles.

NGSS Model Lessons introduce educators to NGSS and three dimensional teaching for kindergarten through fifth grade. Each lesson includes a Teacher's Page and student resources that are available to download and use in classrooms.

https://digitalcommons.imsa.edu/model_ngss_lessons_k_3/

https://digitalcommons.imsa.edu/model_ngss_lessons_4_5/



Grade Level: Kindergarten

- Earth and Space Science - WHAT'S THE WEATHER?: Patterns
- Engineering, Technology - BUILD A NEST: Changing the Environment
- Engineering, Technology - WINTER CLOTHING CHALLENGE: Engineering
- Life Science - ANIMAL COATS: Seasonal Change
- Life Science - TIME TO EAT: Patterns in Survival
- Physical Science - WHICH SHOVEL? Engineering Challenge

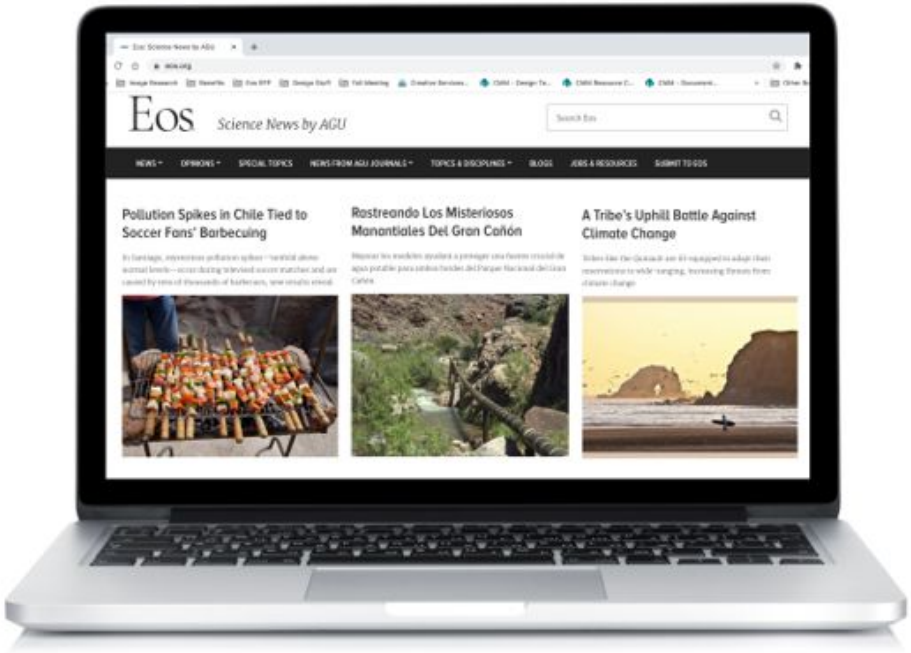
Eos – Using Science News in the Classroom

Eos.org

- Daily science news
- Ties geoscience to engaging, real world stories
- Accessible language level
- ~500 words per article

Also

- Third Pod from the Sun podcast
- Spanish translations



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- *Eos* E-Alert – All newly published articles organized by topic
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Explore plate tectonics & *more* through GPS data

Full suite of education resources on the science of measuring the Earth aligned to NGSS and FREE!!

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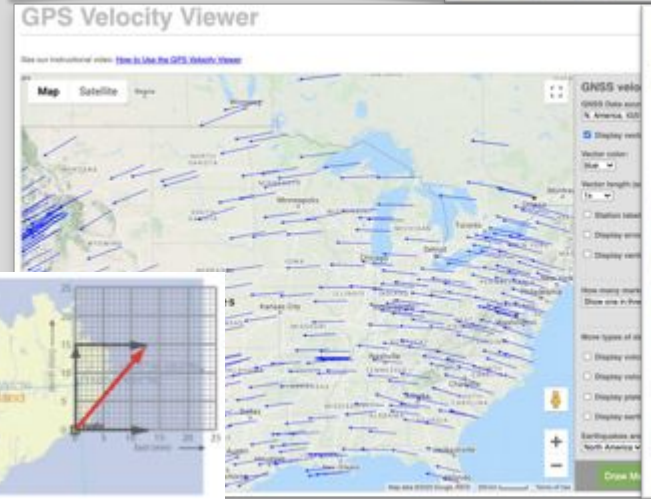
Shelley E. Olds, UNAVCO
September 10, 2020

Email us:
education -at - unavco.org

Dive into data about plate tectonics & *more*

- Modules & Activities - Explore plate tectonics, earthquakes, and volcanoes
- Velocity Viewer: Interactive mapping data explorations
- Animations & Career Spotlights on YouTube
- Hands-on Demonstrations *(Do these at home too!)*
- Educator packet *(mini*



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> Workshops > Implementing the NGSS > October 2018 Webinar > NGSS Post Webinar Survey

NGSS Post Webinar Survey

Please reflect on this event and let us know what worked and what needs improvement.

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- 3 - Satisfied
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- 1 - Not satisfied

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- 4 - Very clear
- 3 - Clear
- 2 - Somewhat clear
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Rate the content of this webinar i

- 4 - Highly valuable
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Post webinar survey: http://nagt.org/239193

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Upcoming webinars:

- October 15: NGSS-ESS Mini-series: MORE! Remote Teaching & Learning Resources, part 2

- The entire webinar archive is now available on the AGI YouTube Channel as a playlist!
- https://www.youtube.com/user/AmericanGeosciences/playlists

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ON THE CUTTING EDGE PROGRAM

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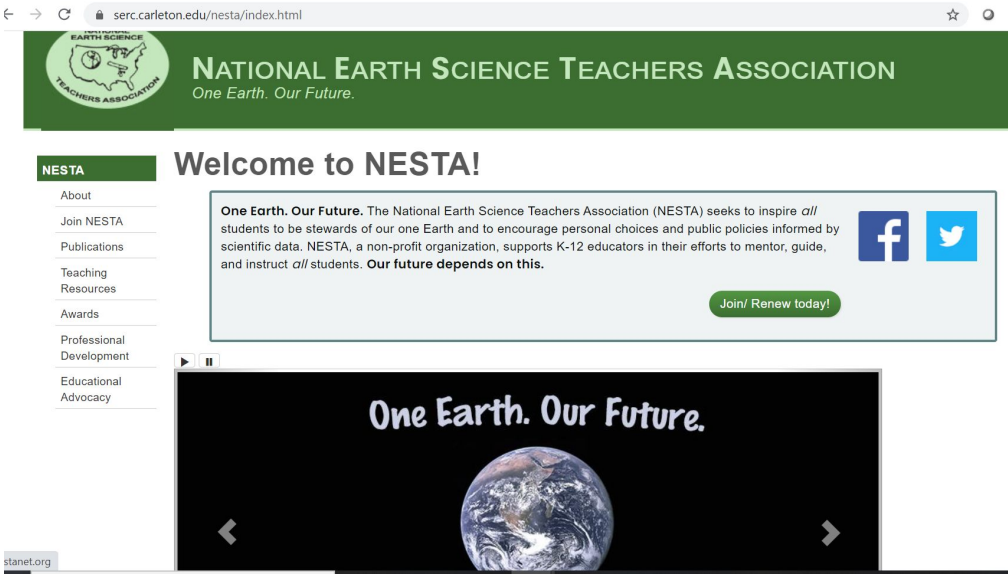
NATIONAL EARTH SCIENCE TEACHERS ASSOCIATION

Serving the Earth Science educator community

NESTA offers a variety of timely resources for teachers in partnership with other organizations.

Short URL: https://serc.carleton.edu/nesta/index.html



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The mission of AGI's Center for Geoscience and Society is to enhance geoscience awareness across all sectors of society. The Center accomplishes this by generating new approaches to building geoscience knowledge, engaging the widest possible range of stakeholders, and creatively promoting existing and new resources and programs.

https://www.americangeosciences.org

Thank you for participating!

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Celebrate Earth Science Week 2020!

Use materials in the Earth Science Week 2020 Toolkit:

- Earth Science Week Poster
- Earth Science Activity Calendar
- Earth Science Week Toolkit

EARTH SCIENCE WEEK

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And explore Earth Science Week Online resources:

- Earth Science Week Online Toolkit
- Minerals Day, October 12
- "Earth Materials Frontiers" Webinars

EARTH SCIENCE WEEK

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