

Climate Literacy Education: Barriers, Successes, and Future Work

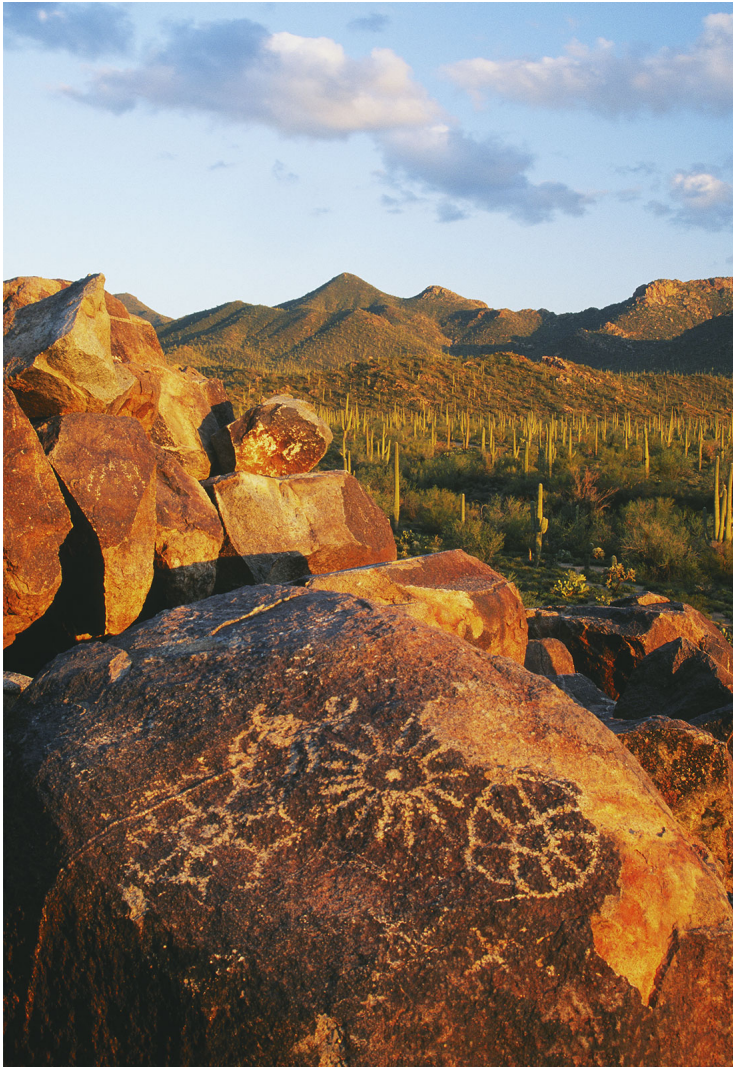
Kathryn Boyd and Anne Gold

Geological Society of America Annual Meeting

September 24, 2019



Honoring the Stewards of the Land



We acknowledge that we are on traditional lands of the O'odham, Hohokam, and Yavapai people.

We honor their stewardship of the land, past, present and future. We engage our students in climate science/NGSS so we can learn to make good decisions that heal our planet and protect our environment.

#HonorNativeLand: <https://usdac.us/nativeland>

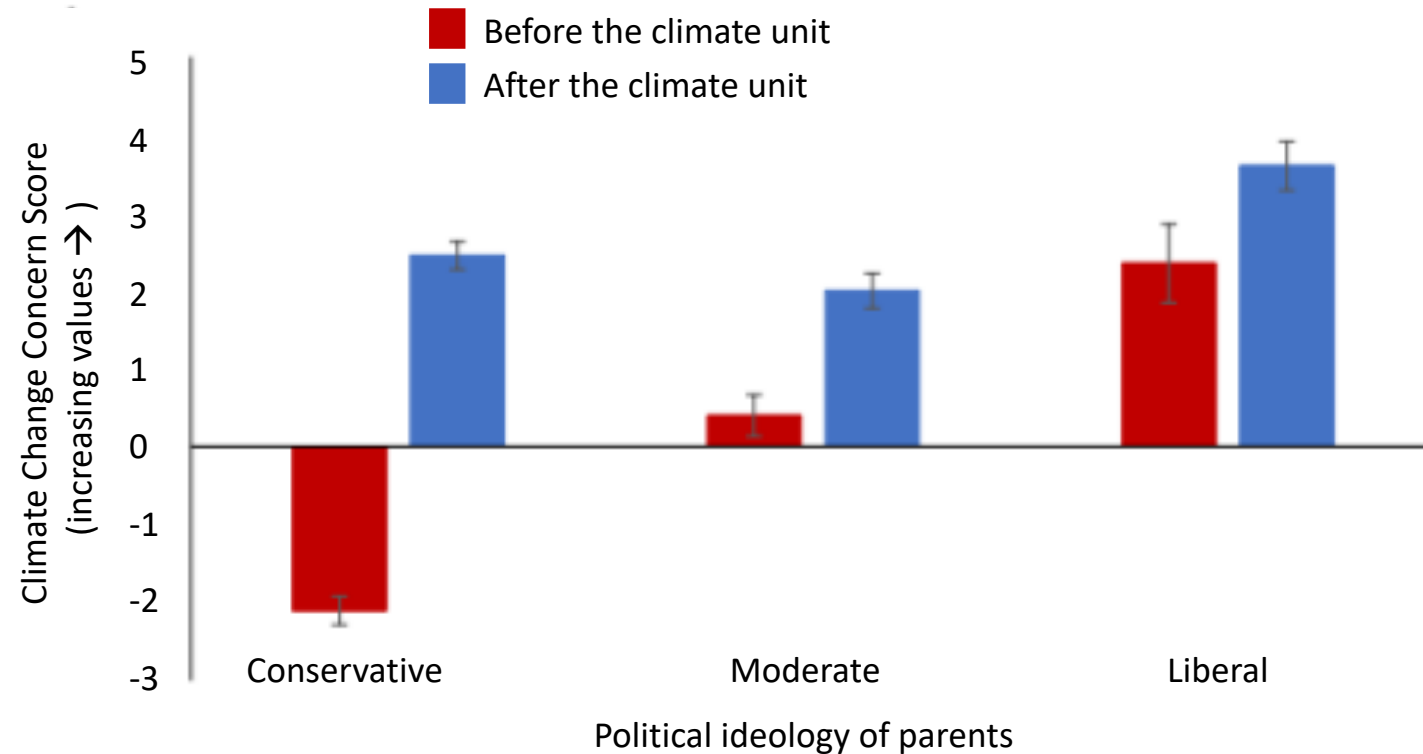
Look up native lands: <https://native-land.ca>

Petroglyphs created by the prehistoric Hohokam people, who lived from about 200 to 1400 CE, Saguaro National Park, Arizona.

©Dndavis/dreamstime.com; Retrieved from <https://www.britannica.com>

Why teach climate change?

- Create an informed public
- “End climate silence”
- Kids inform parents

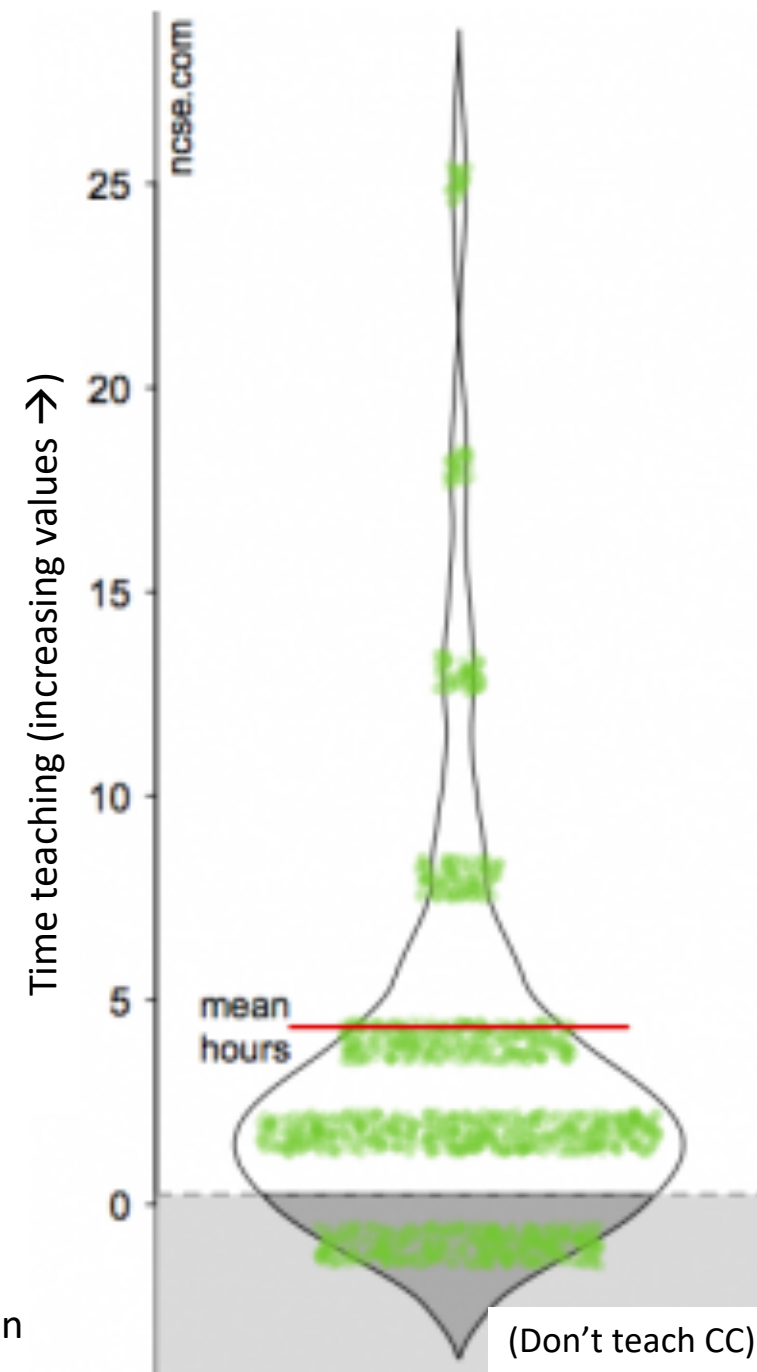


Lawson, et al. (2019). Parent Climate Change Concern in the treatment group (changes seen here were not seen in the control group)

Teachers spend <5 hours per class
on climate change (Plutzer et al., 2016)

(Even less for teachers outside of Earth
Science classes)

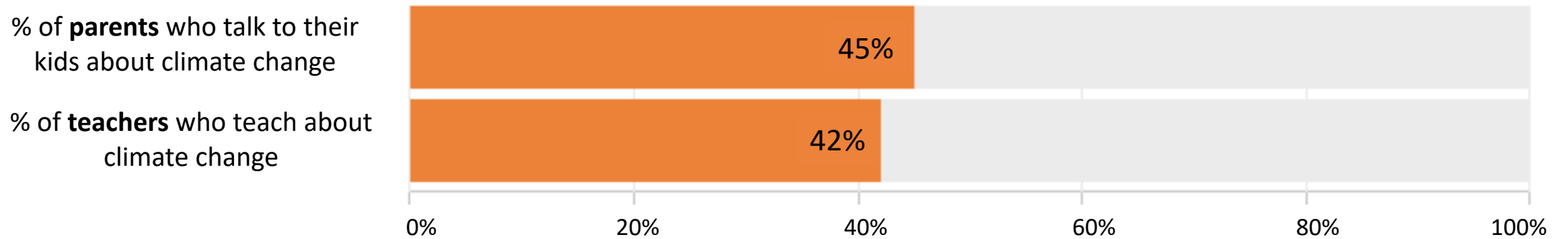
Plutzer et al. (2016). Hours spent teaching climate change in



Fewer than half of teachers include climate change

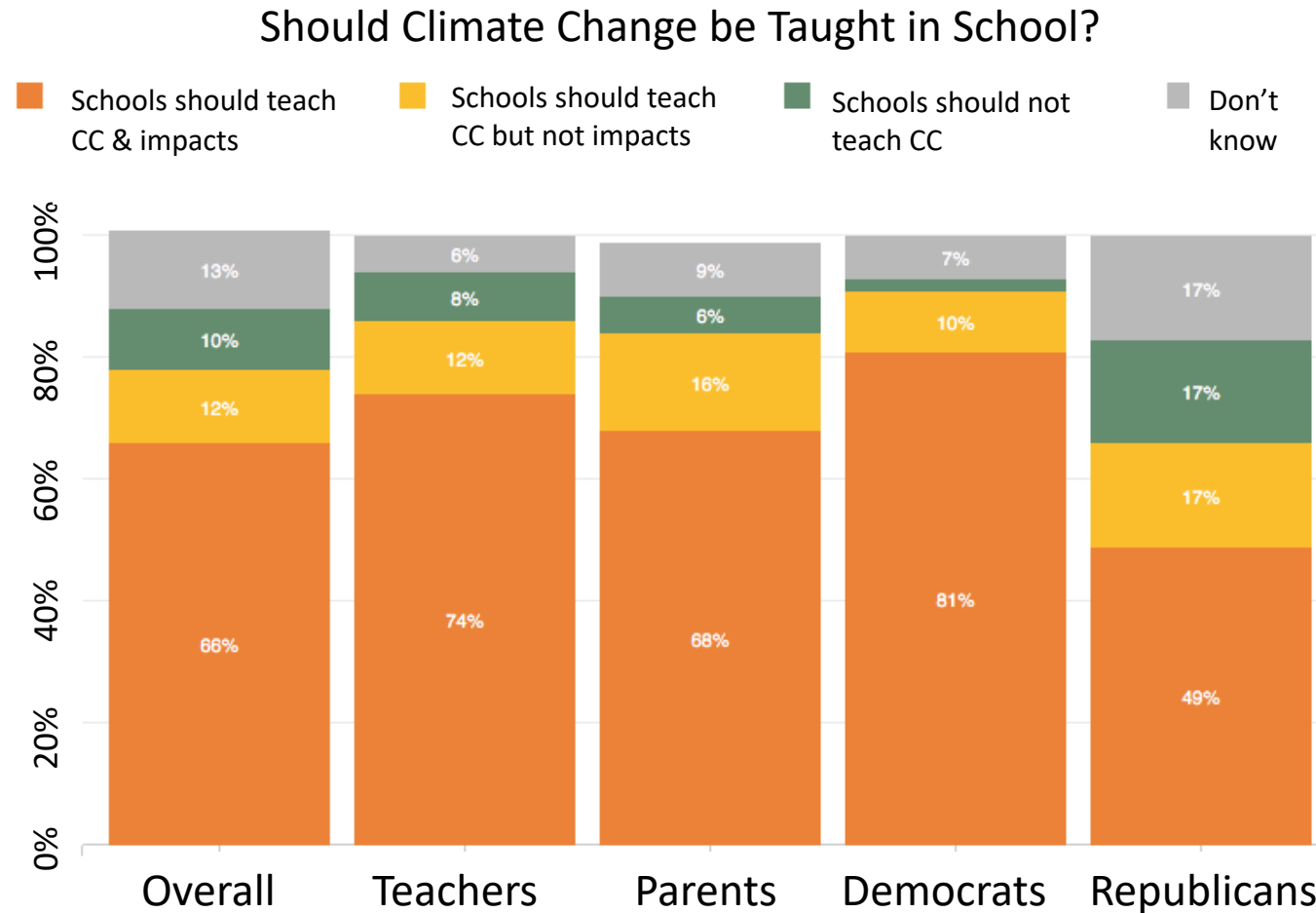
(Kamenetz, 2019)

Taking Responsibility for Teaching Climate Change



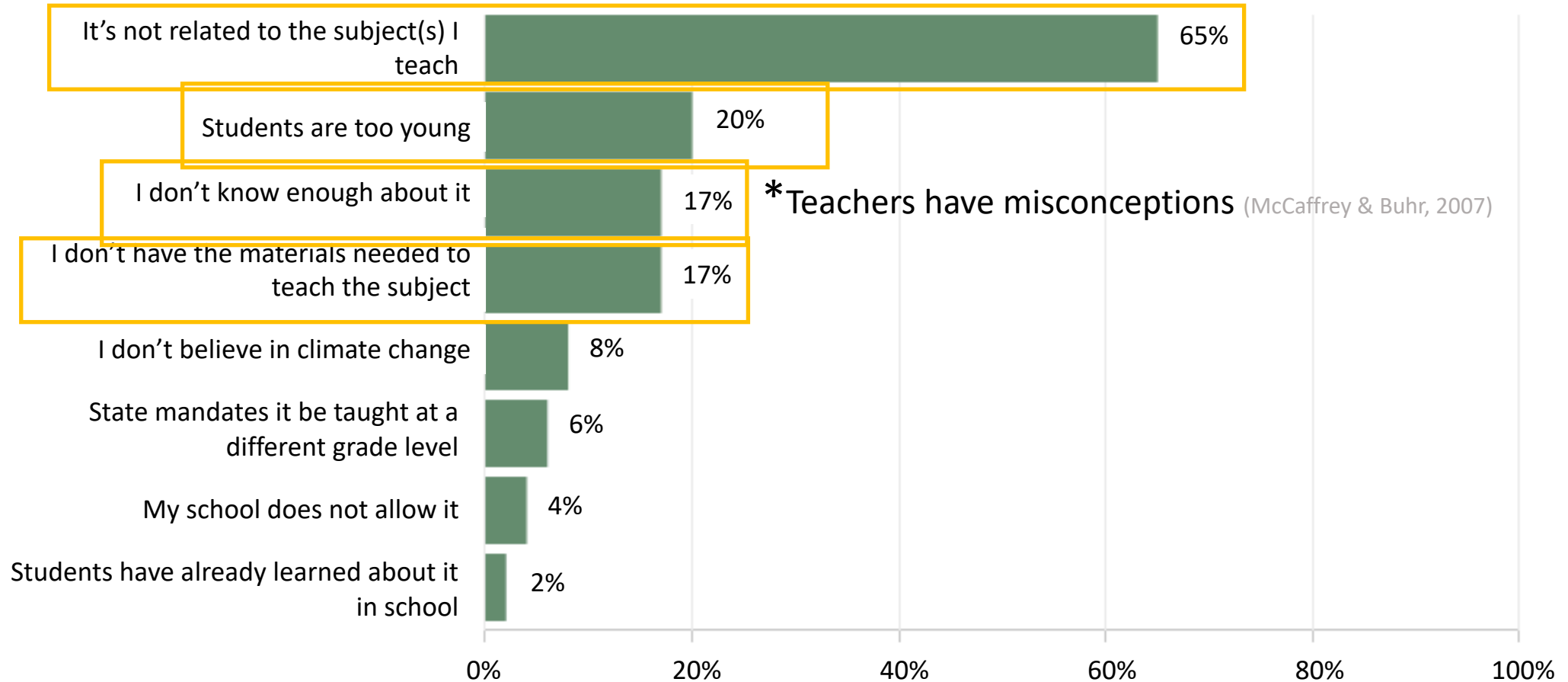
Kamenetz (2019). Percentages of parents and teachers surveyed who talk to kids/teach about climate change

Teachers want to teach about climate change



Kamenetz (2019). The levels at which the public thinks climate change should be taught in schools by various groups of people (teachers, parents, political affiliation).

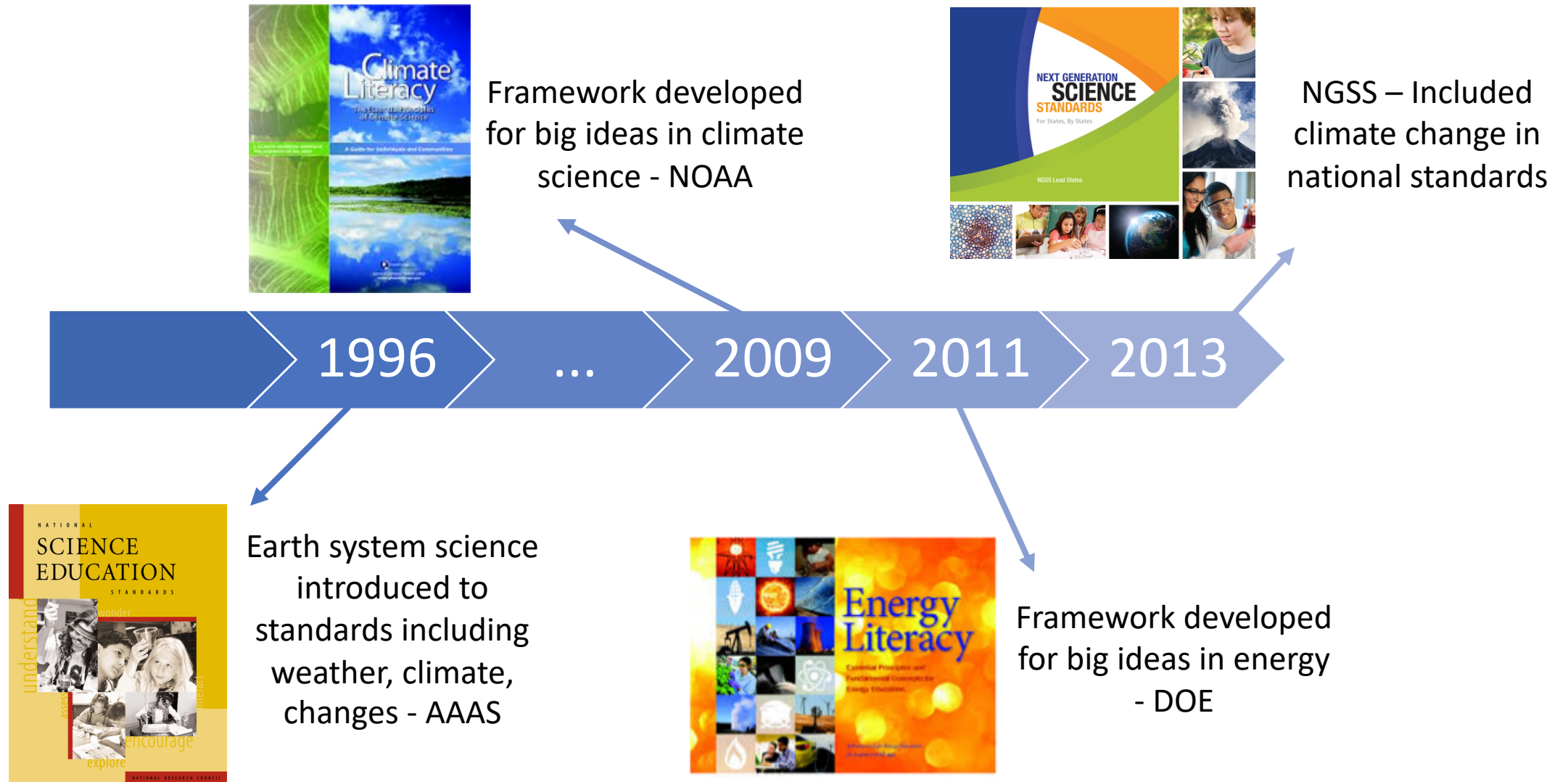
Reasons Teachers Don't Teach Climate Change



Kamenetz (2019). The reasons teachers gave for not teaching about climate change.

Resistance from parents less of an issue but still can cause fear (Wise, 2010)

Climate Literacy Frameworks & Standards



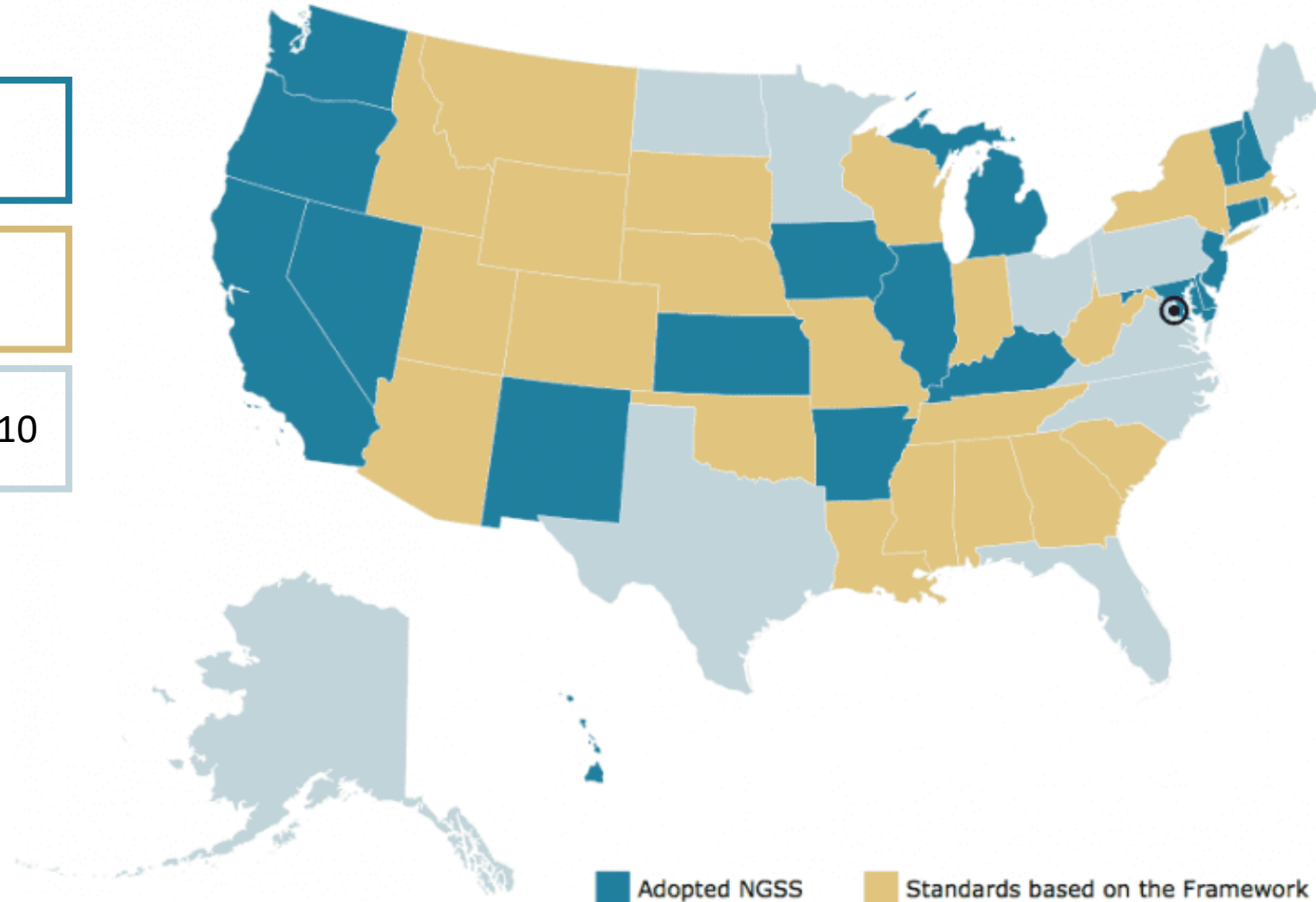
Climate Education Programs - National

K-12 Science Standards Adoption

States that have
adopted NGSS: 19

States with standards
based on NGSS: 21

States with no NGSS: 10



Climate Literacy and Energy Awareness Network (CLEAN)

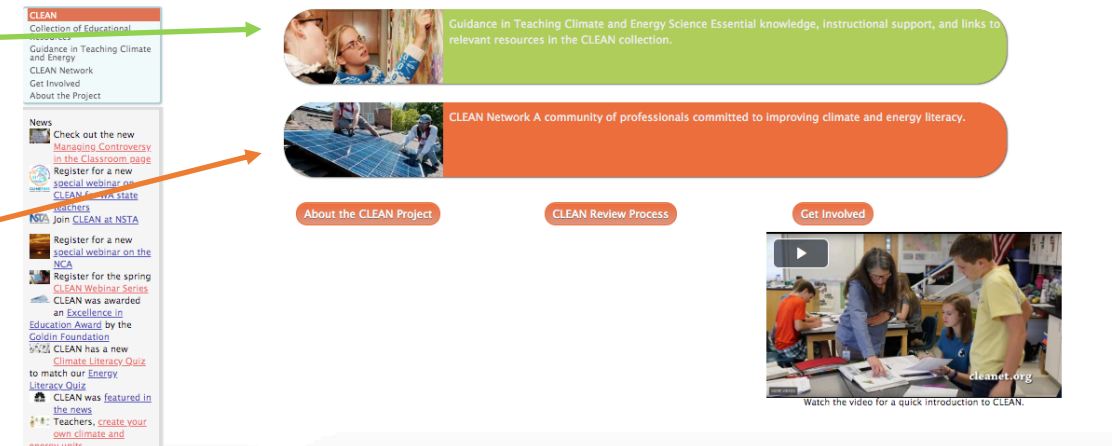
- CLEAN Collection

- Curated collection of 700+ resources (videos, visualizations, class activities) for grades 6-16.



- Teaching Guidance

- Pedagogical support & background knowledge for climate & energy topics (newsletters, PD, NGSS)



- CLEAN Network

- Community of practice of climate & energy literacy stakeholders (teleconferences, email list, partners)



<http://cleanet.org>
<https://climate.gov/teaching>

CLEAN Collection

- 700+ online, free resources
- Activities, videos, visualizations
- Classroom ready
- Community & Expert scientist reviewed
- Aligned with NGSS, Literacy Frameworks
- Grades 6-16
- Curated collection – resources developed by others

*For more information about the review process:

<https://cleanet.org/clean/about/review.html>




Animation About the Greenhouse Effect

http://www.damocles-eu.org/education/Animation_about_the_greenhouse_effect_182.shtml


DAMOCLES

[Jump to this Animation »](#)



This is a basic animation/simulation with background information about the greenhouse effect by DAMOCLES. The animation has several layers to it that allow users to drill into more detail about the natural greenhouse effect and different aspects of it, including volcanic aerosols and human impacts from burning fossil fuels.

[Learn more about Teaching Climate Literacy and Energy Awareness»](#)



See how this Animation supports the Next Generation Science Standards»

Middle School: 1 Disciplinary Core Idea, 2 Cross Cutting Concepts
High School: 2 Disciplinary Core Ideas, 1 Cross Cutting Concept

Notes From Our Reviewers

The CLEAN collection is hand-picked and rigorously reviewed for scientific accuracy and classroom effectiveness. Read what our review team had to say about this resource below or learn more about how [CLEAN reviews teaching materials](#)

[Teaching Tips](#) | [Science](#) | [Pedagogy](#) | [Technical Details](#)

Teaching Tips

- Educators will need to scaffold this animation to ensure that the information presented is well understood by learners.
- When teaching about the greenhouse effect, using the term "heat," as this animation does, may confuse students, especially if they think of heat as a verb. The more accurate technical term "outgoing long wave IR radiation" may prove more difficult to convey, but ultimately is a clearer depiction of Earth's energy balance.

About the Science

- The animation is an accurate general overview of Earth's energy balance, but educators should recognize some of the sun/Earth dynamics have been oversimplified.
- For example, the atmosphere does filter out some short wave energy from the sun, such as extreme ultraviolet and X-rays.
- In general, the animation provides a good overview of the incoming shortwave radiation from the sun, and Earth radiating long wave Infrared Radiation (IR) once it has been warmed by the short wave visible and IR.

Topics

Greenhouse Effect
See more on this topic.

Carbon Cycle
See more on this topic.

Grade Level

Middle (6–8)
See more at this grade level.

High School (9–12)
See more at this grade level.

College Lower (13–14)
See more at this grade level.

Informal
See more at this grade level.

Climate Literacy

About Teaching Climate Literacy

► [2c \(see details\)](#)
About Teaching Principle 2
Other materials addressing 2c

► [2d \(see details\)](#)
About Teaching Principle 2

Climate Education Programs - Policy



Top Down - Washington state climate education legislation funded efforts

*A state-led network for climate science learning that helps teachers and their students understand climate science issues affecting Washington communities



Grassroots - Idaho standards and people are leading efforts

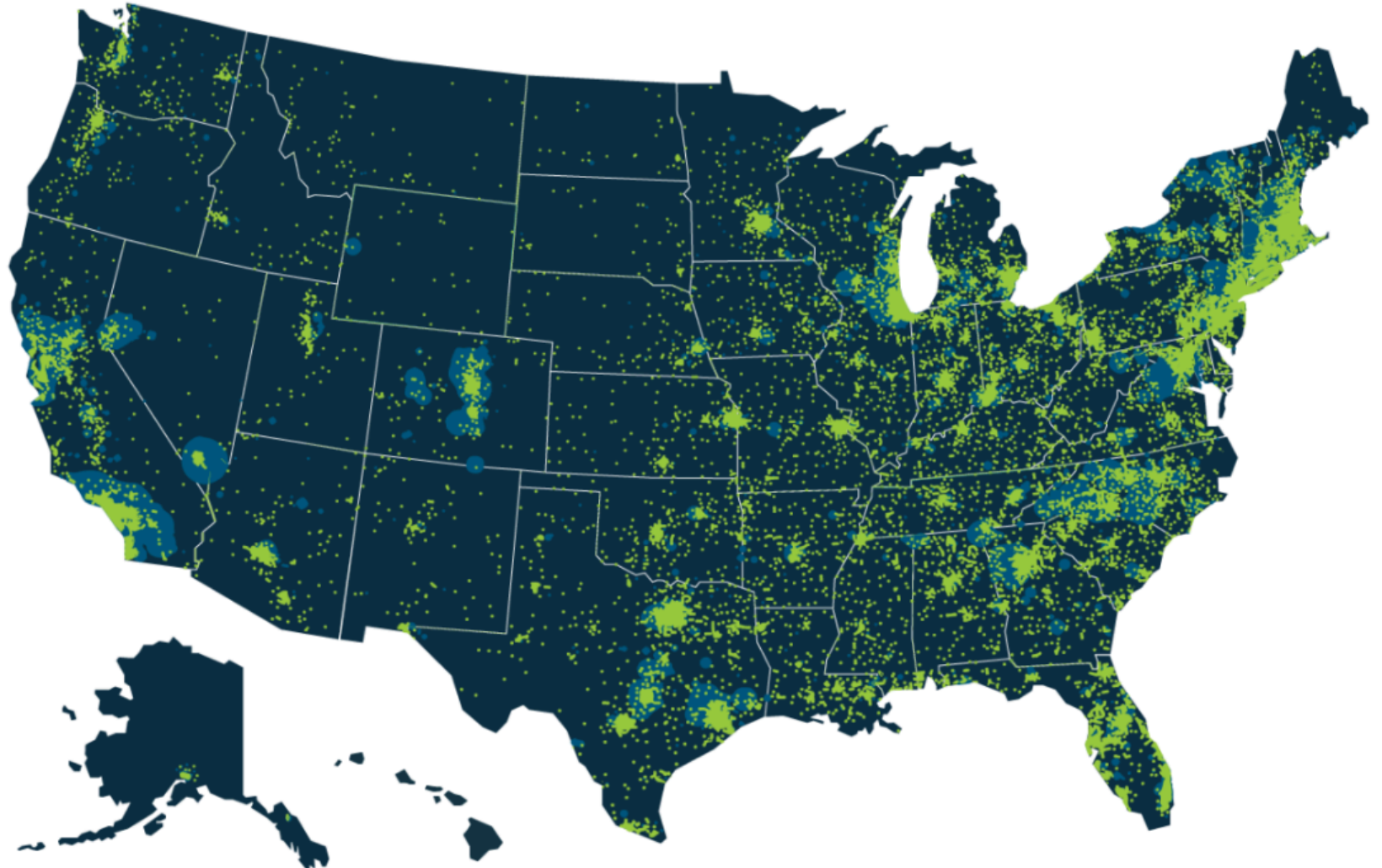
*A recently formed university professor driven network for climate science learning that encourages and helps teachers implement climate change in their classrooms

Climate Education Programs - Formal Education

 Youth Action Network  Youth Educated

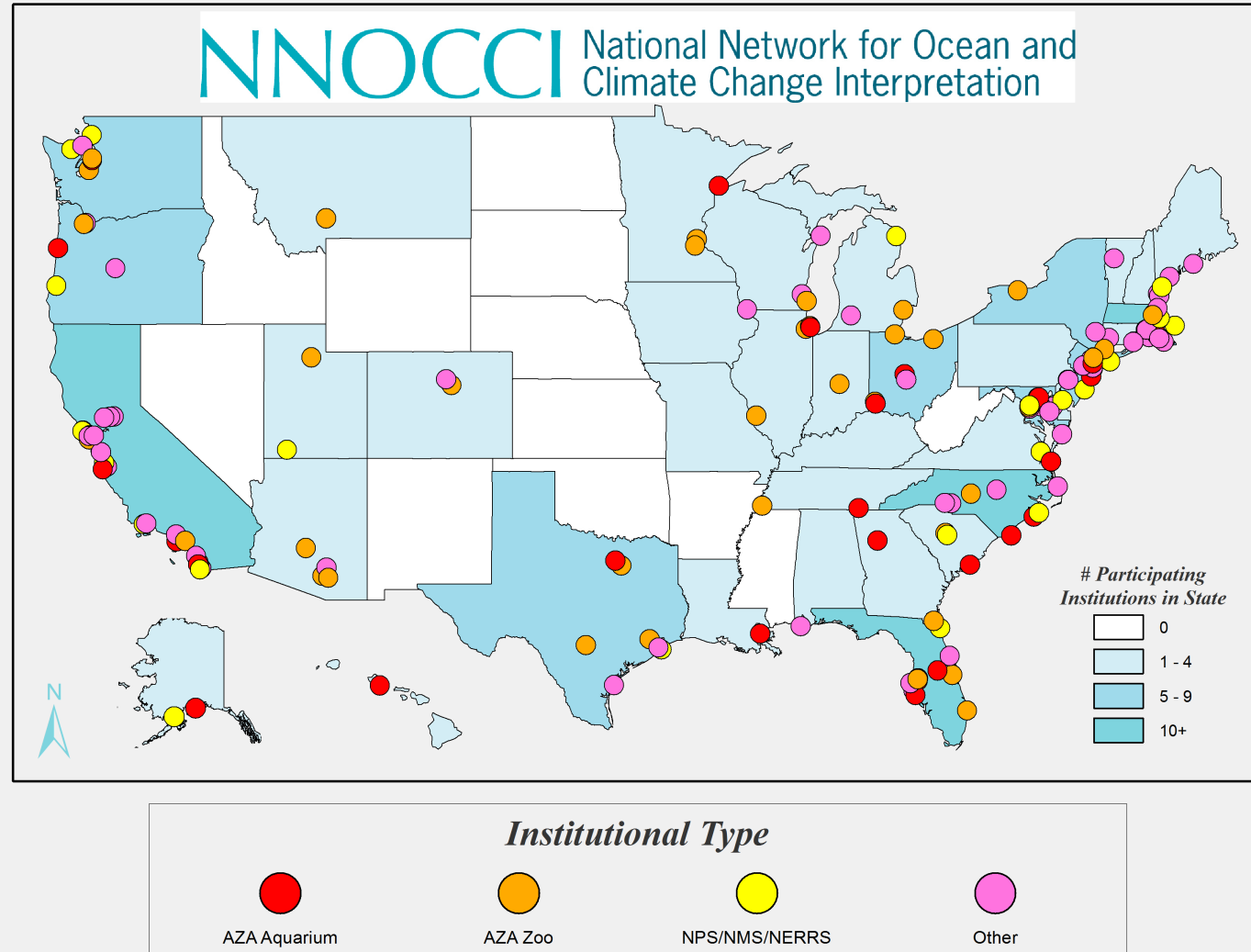


*Educating high school students about climate change and empowering them to lead on climate solutions



Climate Education Programs - Informal Science Education (ISE)

*A network of individuals and organizations in informal education that provides training in evidenced-based communications methods.



Conclusions

- Climate Change is an important education challenge
- Still see a lack of climate change education
- Educators need support
- There are many programs working on this challenge in various settings
 - Formal education
 - Informal education
 - Policy
 - Community/frontline work
- There are many opportunities to get involved with this work for educators, scientists, and others – join the conversation to stay informed

Questions? Thank you!

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CLEAN Website: cleanet.org

References

- Lawson, D. F., Stevenson, K. T., Peterson, M. N., Carrier, S. J., Strnad, R. L., & Seekamp, E. (2019). Children can foster climate change concern among their parents. *Nature Climate Change*, 9(6), 458.
- Plutzer, E., McCaffrey, M., Hannah, A. L., Rosenau, J., Berbeco, M., & Reid, A. H. (2016). Climate confusion among US teachers. *Science*, 351(6274), 664-665.
- Kamenetz, A. (2019, April 22). Most Teachers Don't Teach Climate Change; 4 In 5 Parents Wish They Did. *NPR*. Retrieved from www.npr.org
- McCaffrey, M. S., & Buhr, S. M. (2008). Clarifying climate confusion: Addressing systemic holes, cognitive gaps, and misconceptions through climate literacy. *Physical Geography*, 29(6), 512-528.