



Minnesota Science Teachers Association Position Statement Teaching of Global Climate Change Science

Rationale

The mission of the Minnesota Science Teachers Association is to stimulate, coordinate and improve science teaching and learning for all. Climate change is one of the great scientific challenges this generation of students and teachers will face. With this in mind, the Minnesota Science Teachers Association takes the following position regarding climate change and teaching about climate change:

Climate Change Science

The Earth's global climate is not static but changes over geologic time scales in response to natural causes, or forcings, such as volcanic activity or sun luminosity. Over the past decades, scientific research has provided clear evidence that the Earth's climate is currently warming due to anthropogenic causes. According to thousands of peer-reviewed studies, including the National Research Council (2001), Intergovernmental Panel on Climate Change (IPCC, 2013) and the U.S. Global Change Research Program (Melillo et al., 2014) the Earth's global climate has warmed in response to increasing concentrations of carbon dioxide (CO₂) and other greenhouse gases. The concentrations of greenhouse gases in the atmosphere are now higher than they have been for many thousands of years. There is a 97% consensus among climate scientists, that human activities (mainly greenhouse gas emissions) are the dominant cause of the rapid warming since the middle 1900s (IPCC, 2013). If the upward trend in greenhouse-gas concentrations continues, the projected global climate change by the end of the twenty-first century will result in significant impacts on humans and other species. These impacts are already being observed and documented in Minnesota, disproportionately affecting youth, low income communities, and communities of color. Impacts in Minnesota include having one of the fastest warming winter in the nation, an increase in extreme rainfall events, and an increase in invasive species and disease spreading insects. (Climate Central, 2017; Hansen, Soto & Ruedy, 2012)

Climate Science Literacy is a Part of Science Literacy

“Science, mathematics, and technology have a profound impact on our individual lives and our culture. They play a role in almost all human endeavors, and they affect how we relate to one another and the world around us. Science Literacy enables us to make sense of real-world phenomena, informs our personal and social decisions, and serves as a foundation for a lifetime of learning” (AAAS, 2013). As professional science educators we recognize that we have a responsibility to help K-12 students understand 1) the evidence, impacts, and possible solutions of climate change and 2) become climate-literate persons who:

- Understand the essential principles of the Earth's climate system
- Know how to assess scientifically credible information about climate
- Communicate about climate and climate change in a meaningful way
- Are able to make informed and responsible decisions with regard to actions that may affect climate

Teaching Climate Change and Resources

In teaching about climate change it is important to focus instruction on the science concepts and evidence behind climate change to help avoid political debate. Debates over what should be done to alleviate the consequences of climate change are appropriate, and can encourage students to be innovative and solutions focused. Suggestions and resources for teaching about climate change include:

- **Make it relevant:** provide evidence of local changes using information from the Minnesota climatology office and include opportunities for students to gather authentic data. Highlight local solutions focused on climate change mitigation and adaptation, and ask students to innovate their own solutions. Examples may include school wide composting, rain gardens, school wide energy efficiency audits and plans, recycling, conservation, and making a proposal to the school or district to invest in alternative energy.
- **Build historical links:** Show the historical development of the science behind climate change and the people involved (Alley, 2011; Hansen, Sato & Ruedy, 2012; Keeling, et al., 1976; Solomon, et. al, 2010).
- **Build awareness as how we all contribute to climate change:** Build an understanding with students about how our actions as individuals contribute to climate change.
- **Develop an interdisciplinary lens:** Science literacy in global climate change does not just lie in earth science and weather/climate or historical geology. Climate change concepts and challenges may be integrated within biology, chemistry, physics, environmental science, informal education and the humanities.

- **Make it hopeful:** Integrate the science understanding with solutions. Highlight progress that has been achieved such as recycling, conservation and alternative energy. (Adapted from National Center for Science Education: *Teaching Climate Change: Best Practices*: <https://ncse.com/library-resource/teaching-climate-change-best-practices>)

Resources

Climate Central: Researching and reporting the science and impacts of climate change: An independent organization of leading scientists and journalists about our changing climate and its impact on the public.

<http://www.climatecentral.org/>

Climate Generation Climate Change and Energy Curricula: Includes curriculum links & information about professional development opportunities. <https://www.climategen.org/what-we-do/education/climate-change-and-energy-curricula/>

Minnesota Department of Natural Resources: Includes information regarding climate change in Minnesota.

http://www.dnr.state.mn.us/climate/climate_change_info/index.html

National Center for Science Education: A national organization devoted to defending the teaching of climate change in public schools. Their website lists resources for teachers looking for information on climate change and suggestions for how to address challenges to climate change. <https://ncse.com/climate>

National Climate Assessment: Climate Change Impacts in the United States: Summarizes the impacts of climate change on the United States, now and in the future from a team of more than 300 experts, which was extensively reviewed by the public and experts, including a panel of the National Academy of Sciences.

<https://nca2014.globalchange.gov/>

National Oceanic and Atmospheric Administration Essential Principles of Climate Literacy: Information deemed important to understand about Earth's climate, impacts of climate change, and approaches to adaptation or mitigation.

<https://www.climate.gov/teaching/essential-principles-climate-literacy/essential-principles-climate-literacy>

National Science Teachers Association Climate Science Resources: NSTA position statement, NGSS connections to climate change, books available and links to other organizations to learn more. <http://www.nsta.org/climate/>

NOAA Toolbox for Teaching Climate and Energy: Provides supporting resources and programs for those who want to teach climate and energy science, including a pathway teachers can follow to educate students about climate and energy science, develop the skills to take action. <https://www.climate.gov/teaching/toolbox-teaching-climate-energy>

The Teacher-Friendly Guide to Climate Change: Paleontological Research Institution. This book provides both the basics of climate change science and perspectives on teaching about climate change, mostly from the secondary teacher perspective. It is available as a free download at <http://www.priweb.org/index.php/pubs-special/pubs-spec-5813-detail>

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