Letter to Texas State Board of Education

Dear Members of the Texas State Board of Education,

We write to you as climate scientists concerned with the quality and integrity of Texas science education with regard to climate change.

In November 2020 and June 2021, the board wisely voted to improve the treatment of climate change in the high school standards for Biology, Integrated Physics and Chemistry, Earth Systems Science and Environmental Systems.

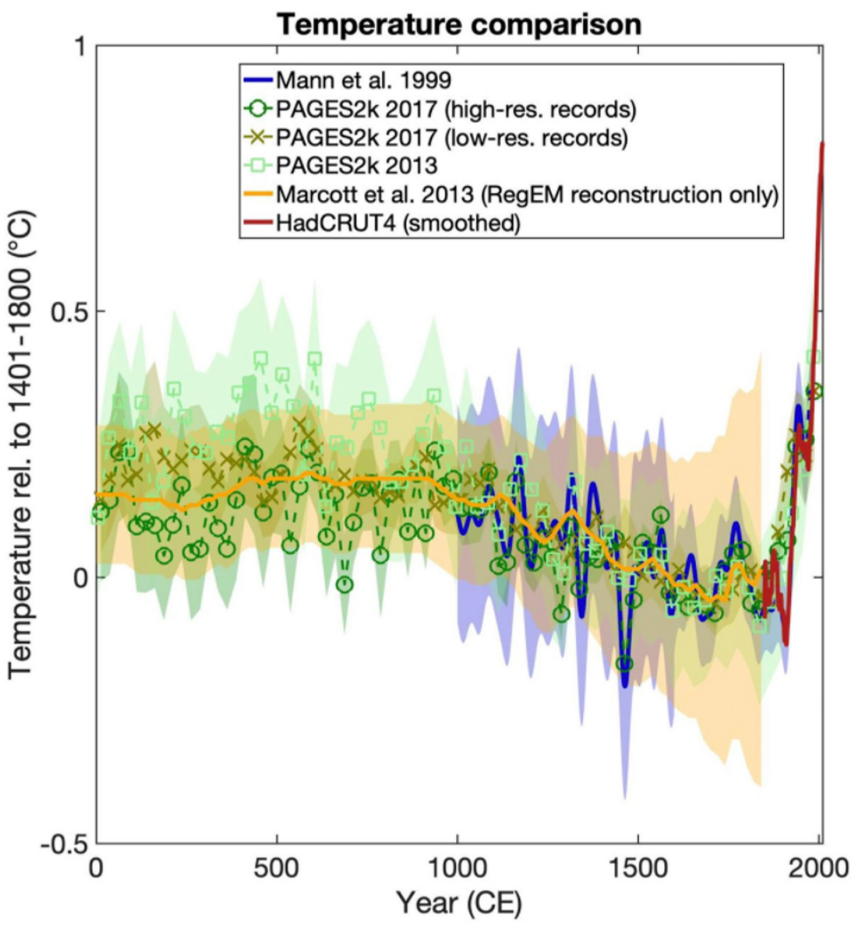
Now, as you are considering revisions to the science standards for kindergarten through grade 8, we urge you to ensure that students are prepared for the demands of those high school classes, as well as for the challenges of the warming world that they will inherit.

Specifically, we urge you to revise the eighth-grade standard 8.11.B to "use scientific evidence to describe how human activities over the past 150 years, including the release of greenhouse gases, deforestation, and urbanization, influence climate."

The revision would undo three revisions proposed during the board's September 2021 meeting which compromise the quality and integrity of the standard:

- First, "can" was added. But the influence of human activities on climate is not a mere possibility, as "can" suggests: it is a reality, of which there is abundant scientific evidence. As the National Academy of Sciences affirmed[1] in 2020, "It is now more certain than ever, based on many lines of evidence, that humans are changing Earth's climate." So the standard should read, "... human activities ... influence climate" without any qualification.

- Second, "over the past 150 years" was removed. But it is only over the last 150 years or so that human activities — the release of greenhouse gases in particular — have significantly affected climate. The graph of global temperature[2] is basically flat for centuries until a sharp upturn over the last 150 years. So the standard should specify that it is human activities "over the past 150 years" that have influenced climate.



- Third, "including" was replaced with "such as," which means that discussing the release of greenhouse gases is optional rather than required. But the primary way in which human activities influence climate is by the release of greenhouse gases, through various processes including the burning of fossil fuels as well as deforestation and (aspects of) urbanization. So the standard should read "including the release of greenhouse gases."

Additionally, we urge you to retain 8.11.A in its current form, "use scientific evidence to describe how natural events, including volcanic eruptions, meteor impacts, and abrupt changes in ocean currents, and the release and absorption of greenhouse gases, influence climate." This represents basic knowledge about climate science that every citizen should acquire.

And we urge you to retain 8.11.C in its current form, "describe efforts to mitigate climate change, including a reduction in greenhouse gas emissions." This not only represents basic knowledge relevant to present and future responses to climate change that every citizen should acquire, but also helps to show students that there is reason to hope for a solution to the climate crisis.

We are confident that eighth-grade students are capable of learning such material. In the Next Generation Science Standards, which have been adopted in twenty states plus the District of Columbia, the middle school standards contain a comparable treatment of climate change. And certainly Texas students are no less capable than their counterparts elsewhere!

Finally, we note that 76 percent — more than three in four — of Texans agree that schools should teach about the causes, consequences, and potential solutions to global warming, according[3] to the Yale Program on Climate Change Communication's estimate. Adopting standards containing 8.11.A, the corrected version of 8.11.B, and 8.11.C would help Texas's schools to do so.

Sincerely,

Brett Baker, University of Texas
Jay Banner, University of Texas
Berit Batterton, University of Texas Marine Science Institute
Philip Bennett, University of Texas
Simon Brandl, University of Texas
Dan Breecker, University of Texas
Sarah Brooks, Texas A&M University
Thomas Bytnerowicz, University of Texas
David Cannatella, University of Texas
Jordan Casey, University of Texas Marine Science Institute
Ginny Catania, University of Texas
Amy Concilio, St. Edward's University
Don Conlee, Texas A&M University
Kerry Cook, University of Texas
Adrienne Correa, Rice University
Sylvia Dee, Rice University
Andrew Dessler, Texas A&M University
André Droxler, Rice University
Amy Dunham, Rice University
Kenneth Dunton, University of Texas
Caroline Farrior, University of Texas
Joseph Felix, Texas A&M-Corpus Christi
Norma Fowler, University of Texas
Lee Fuiman, University of Texas
John Geissman, University of Texas at Dallas
Breanna Harris, Texas Tech University
Pedram Hassanzadeh, Rice University
Patrick Heimbach, University of Texas at Austin
Marc Hesse, University of Texas
Bonnie F. Jacobs, Southern Methodist University
Shalene Jha, University of Texas
Matthew Johnson, Texas Tech University
Thomas Juenger, University of Texas
Timothy Keitt, University of Texas
Mark Kirkpatrick, University of Texas
Chuntao Liu, Texas A&M-Corpus Christi
Xiaohong Liu, Texas A&M University
David Lumley, University of Texas at Dallas
Caroline Masiello, Rice University
Mikhail Matz, University of Texas
Matthew McCary, Rice University
James McClelland, University of Texas
Kristin Nielsen, University of Texas
Gerald R. North, Texas A&M University
Jessica O'Connell, University of Texas
Yuko Okumura, University of Texas
Geeta Persad, University of Texas
Kaylie Plumb, University of Texas
Thomas Ptak, Texas State University
Maria Richards, Southern Methodist University
Gunnar Schade, Texas A&M University
Susan Schonberg, University of Texas Marine Science Institute
Anja Schulze, Texas A&M University at Galveston
Courtney Schumacher, Texas A&M University
Kirsten Siebach, Rice University
Nicholas Smith, Texas Tech University
Lisa Smykla, University of Texas Marine Science Institute
Anne Stoner, Texas Tech University
Jason Sylvan, Texas A&M University
Jason West, Texas A&M University
Feiqin Xie, Texas A&M University-Corpus Christi
Yuankun Xu, Southern Methodist University
Yangyang Xu, Texas A&M University
Zong-Lian Yang, University of Texas
Laurence Yeung, Rice University
Colin Zelt, Rice University
Yue Zhang, Texas A&M University

Institutions and affiliations are provided only for the purpose of identification.

---

1. National Academy of Sciences, *Climate Change: Evidence and Causes: Update 2020* (Washington, DC: The National Academies Press, 2020), p. ii.
2. Michael E. Mann, "Beyond the hockey stick: Climate lessons from the Common Era," *Proceedings of the National Academy of Sciences* Sep 2021, 118 (39) e2112797118, figure 1.
3. Yale Climate Opinion Maps 2020. https://climatecommunication.yale.edu/visualizations-data/ycom-us/