



**Woodwell
Climate
Research
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The only thing crazier than talking about solar radiation management is not talking about it

Last week, I sat on two panels at CERAWeek in Houston—the world’s premier energy conference, attended by thousands of energy executives but also several climate scientists. One panel focused on nature-based climate solutions: the management and conservation of forests, soils, and other natural systems to harness their extraordinary capacity to draw carbon out of the atmosphere and store it. That is Woodwell’s home territory, and a topic I can discuss with the confidence of decades of institutional science behind me.

The second panel was on a topic many serious climate scientists have considered almost too hot to handle: that we may need to think carefully about intentionally reflecting sunlight away from Earth to slow global warming.

Woodwell has never shied away from science that challenges comfortable assumptions. If the status quo of climate action is insufficient to meet this moment—and it is—then expanding

what we are willing to seriously examine is not a departure from our mission. It is an expression of it.

Let me start with what we know. The most important things society must do to address climate change remain exactly what they have always been: slash greenhouse gas emissions, draw carbon dioxide out of the atmosphere (most immediately through nature-based climate solutions), and prepare communities for the disruption already baked into the system. Woodwell’s science and policy work is built on that foundation, and nothing about our consideration of solar radiation management (SRM) changes it.

But we also have to be honest with ourselves about where we are. Despite decades of warnings from climate scientists, emissions continue to rise. We are on a trajectory to blow past the Paris Agreement’s temperature targets, likely in the next few years. Our own research underscores the danger: thawing Arctic

permafrost, warming feedbacks from wetlands, and the potential dieback of Amazonian rainforest could accelerate emissions in ways that overwhelm even our best efforts. In that context, responsible science demands that we examine every possible option, including ones that make us deeply uncomfortable.

Solar radiation management refers to proposed approaches that would cool the Earth by reflecting a portion of incoming sunlight back into space. The most-discussed approach, stratospheric aerosol injection, would involve releasing reflective particles into the upper atmosphere via aircraft—mimicking the temporary cooling effect of large volcanic eruptions. Research suggests that if deployed, SRM could reduce surface temperatures and potentially limit the risk of crossing dangerous climate tipping points.

To be very clear, Woodwell is not advocating for deployment. SRM would do nothing to address the root causes of climate change, nor harmful consequences of rising carbon dioxide levels like ocean acidification. It carries real and poorly understood risks, including uncertain effects on rainfall patterns, crop yields, and ecosystems. And it raises profound questions of fairness and governance: who decides, and on whose behalf, to alter the global climate system? What happens if deployment begins and then stops abruptly, triggering “termination shock,” a rapid and dangerous rebound in warming?

These are exactly the questions that responsible research needs to answer. Woodwell believes that research on SRM must tackle priority scientific and ethical questions; must be international in scope, with meaningful participation from Global South nations and Indigenous communities; and must be well-governed, with robust standards. Our concerns include the Arctic, where the stakes of rapid warming are especially dire, consideration of SRM is increasing, and governance frameworks for SRM research are lacking.

There has been a temptation in the climate community to treat SRM, indeed, climate engineering more broadly, as a forbidden subject, to worry that even discussing it signals a surrender on mitigation, or opens the door to reckless deployment by actors unwilling to do the hard work of decarbonization. Those are legitimate concerns, and I share them. But the answer to the risks of SRM is not to ignore them. If deployment were to happen, whether carefully governed or not, we would be far worse off without the science to understand what was coming.

SRM is no longer a fringe conversation. It is being considered by the Intergovernmental Panel on Climate Change (IPCC), taken up in government research programs, in philanthropic investment decisions, and (whether we like it or not) in the ambitions of private actors operating with little to no oversight.

Woodwell’s role is not to champion solar geoengineering. Rather, our mission is to provide science-based guardrails to ensure that as this conversation accelerates, it is shaped by rigorous science, ethical seriousness, and a commitment to effective and equitable governance.

This topic is not new to Woodwell. In 2023, we issued a policy brief on the need for research and governance of SRM and this past August, Woodwell awarded a grant through our Fund for Climate Solutions program to investigate whether Woodwell should further responsibly-governed SRM research. Led by Senior Science Policy Advisor Dr. Peter Frumhoff, a longtime thought leader on SRM governance, the project will bring together subject matter experts, NGOs, Arctic community thought leaders, and philanthropists to help inform future work in this space.

I had plenty of time to think about the challenges of SRM governance on my way home from CERAWeek. Flying out of Houston on Friday, I waited over four hours in a TSA screening line. Funding TSA would seem to be a relatively simple task, a core function of government.

Now consider governing a planetary intervention that would alter rainfall patterns, growing seasons, and temperatures across every nation on Earth, requiring sustained international cooperation among countries with profoundly different interests and vulnerabilities. The governance of SRM may, in fact, be a far greater challenge than the science of SRM.

Nature-based climate solutions will always remain central to Woodwell’s work. But we also recognize that they alone are not enough, and will not shy away from uncomfortable conversations about other approaches that may someday be necessary. Given the current reality of accelerating climate change impacts and relatively modest climate action, it may be that the only thing crazier than talking about solar radiation management is not talking about it.

Onward,



M₄x

Dr. Max Holmes
President & CEO

Scientists call for enhanced methane monitoring

New paper in Science proposes global network to track unaccounted for methane emissions from natural ecosystems

Katherine Sele Senior Associate, 90 West



In a new paper, published today in Science, climate scientists from Woodwell Climate Research Center and leading research institutions across the world propose the creation of a new, global methane observation system to track methane emissions from natural ecosystems in near real-time and inform mitigation strategies and global climate policy.

Methane's powerful near-term warming effects—80 times that of carbon dioxide—position methane mitigation as an urgent and important target for actionable global climate policy. Over the past decade, scientists and policymakers have made important strides in tracking methane emissions from anthropogenic sources, including fossil fuels, livestock, agriculture, waste management, and integrating those emissions in international climate policy and mitigation strategies. However, escalating methane emissions stemming from natural ecosystems driven by global temperature increases and climate feedbacks, such as tropical wetlands and thawing permafrost, make up more than one-third of the global methane budget, and yet remain largely omitted from global methane budgets and decisionmaking due to gaps in monitoring.

“As the planet warms, methane emissions from these natural systems, including permafrost, lakes, and wetlands, are rising quickly, bringing the potential for increased frequency and impact of extreme weather events like flooding, drought, wildfire, and extreme heat. Our ability to track and detect these emissions will be critical to informing solutions to the climate crisis,” said Dr. Jennifer Watts, Scientist at Woodwell Climate Research Center and lead author of this paper. “We

are calling on national governments, international institutions, philanthropies, the private sector, and other partners to invest in adequate infrastructure to detect and monitor temperature-driven methane emissions from ecosystems to guide solutions that curb the impacts of methane and the climate crisis.”

This paper grew out of a multi-day convening of more than 30 leading methane scientists, modelers, and policy experts held in Aspen, Colorado in October 2025, organized through the Aspen Global Change Institute (AGCI). Co-chaired by scientists from Woodwell Climate Research Center/Permafrost Pathways, Stanford University, Arizona State University, and Spark Climate Solutions, the workshop brought together participants from universities, federal agencies, and research institutions spanning six continents to identify critical gaps in natural methane monitoring and chart a course for an integrated global observation system. The findings and recommendations in this paper reflect the collective expertise of that broader scientific community.

As global leaders in methane science, policy, and innovation prepare to gather at Methane 250 in Italy next week to chart a path forward for methane mitigation, this paper makes the case for investing in the development of an integrated Global Ecosystem Methane-Observation System to inform future Global Methane Pledges and action. Specifically, this system would close gaps in methane monitoring by securing and expanding ground-based networks of greenhouse gas observing towers, including flux towers, across underrepresented regions including rapidly thawing Arctic permafrost and wetlands in the tropics.

“Through Permafrost Pathways, we’ve seen firsthand how critical it is to fill the monitoring gaps in the Arctic, where thawing permafrost releases methane across landscapes so vast and varied that our current observation systems cannot fully capture them,” said paper co-lead and workshop co-organizer, Dr. Sue Natali, Senior Scientist at Woodwell Climate and lead of Permafrost Pathways. “This paper charts a path toward the integrated, global monitoring infrastructure we need to account for these emissions in climate policy before they outpace our ability to act.”

“Methane from natural systems is one of the biggest emerging climate risks,” said Dr. Danie Potocek, paper co-author and scientist at Spark Climate Solutions. “And right now, we simply don’t have the monitoring infrastructure to fully understand what we are up against. The global community has made real progress in building systems to track methane from human sources. Now we need to extend that to the rest of the methane challenge.”



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Since its launch in 2018, the **Fund for Climate Solutions** has funded 80+ projects that push the boundaries of scientific knowledge, influence decision makers, and attract additional funding for critically important work.

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Selected news coverage

Reuters named Dr. Frances Seymour on their 2026 Trailblazing Women in Climate list. The announcement story quoted Frances about the need for leaders that can navigate both within and between societal silos.

An episode of the *ClimateGenn* YouTube series featured Dr. Jen Francis as a guest, where she spoke about projections for the 2026 El Niño.

AP News published a widely-syndicated story about changes to El Niño due to climate warming, quoting Francis about how we need to “buckle up” for the extreme weather the amount of heat in our climate system will fuel.

A *New York Times* article about the wild weather in the U.S. this March quoted Francis on its relation to a “wacky” jet stream pattern. She explained the jet stream’s enormous swings further in a widely-syndicated *Associated Press* article.

Dr. Peter Frumhoff appeared as a guest on *The Will Brownsberger Podcast* for an episode on climate change mitigation and resilience.

The International Cryosphere Climate Initiative’s COP30 video of the week featured Dr. Christina Schädel as a panelist on “The Many Impacts of Permafrost Thaw – From Health to Infrastructure.”

Schädel was invited to write a “Behind the Paper” blog post for *Springer Nature*, with the title “What changes for climate targets when permafrost emissions are included?”

Dr. Foster Brown was interviewed on *Jornal do Acre 2* about the upcoming dry season in the region.

A recent intergovernmental report concluded that biodiversity loss is now a direct threat to global financial stability. In an article covering the report, *NewsGhana* interviewed Dr. Glenn Bush for the context on how structural failures are driving nature-harming investment.

A *EurekAlert!* press release by Northern Arizona University mentioned Dr. Brendan Rogers’ co-authorship of a recent study, which found that wildfires in Alaska and Canada currently have differing effects on our climate.

An *MIT Technology Review* story covered a startup seeking to stop lightning strikes for wildfire prevention, quoting Rogers about the need for these types of efforts to consult with local communities, as well as why he’s “optimistic” about the solution if it works without major downsides.

National Geographic Netherlands published a story about “zombie fires” in northern regions, featuring satellite images by Woodwell Climate.

cover: Woodwell President & CEO Max Holmes participated in two panel discussions at CERAWeek, held March 23-27, in Houston, Texas—"Nature-based Solutions" and "Geoengineering the Climate." / photo courtesy of CERAWeek

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