

NASA's self-censorship

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Shaping the Future of Aerospace

SELF-CENSOR



discipline
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~~SHIP~~ AT NASA



When the Trump administration arrived in Washington, D.C., a year ago, one might have expected climate change skeptics in the new administration to revel in ordering a cleansing of climate terminology across agencies, given their view that much of the science is politically motivated junk. That hasn't happened, at least not at NASA. Instead, something else has happened. Some researchers began censoring themselves. Keith Button tells the story.

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▲ During a series of NASA test flights, this DC-8 compared JP-8 jet fuel to a 50-50 blend with a renewable alternative fuel. Some scientists working for NASA say they've started changing the language but not the goals of their research to avoid triggering criticism.

After the election of Donald Trump, a consortium of universities headed by Ohio State had second thoughts about the wording of a grant application to NASA. Instead of referring to a goal of reducing carbon emissions from aircraft, the consortium adjusted the wording to say the research would explore “electrical propulsion challenges and opportunities.” The fear was that referring to carbon emissions would hurt chances of winning the grant, given the political climate after Trump’s election, says Meyer Benzakein, Ohio State aerospace professor. The goal and substance of the five-year project — to reduce carbon emissions by shifting to electrical propulsion — remained unchanged, and in April 2017 the consortium won the \$10 million grant.

Consider also the planning document produced annually by the NASA Aeronautics Research Mission Directorate. The 2016 version of this “Strategic Implementation Plan” listed the “transition to low-carbon propulsion” as a top goal. The version published in 2017 reworded that to “transition to alternative propulsion and energy.” Yet the target of reducing net emissions by 50 percent by 2050 remained the same.

This cleansing of politically fraught terminology in documentation and sometimes the spoken word has become a pattern among NASA researchers and affiliates, based on my review of documents and interviews with a dozen researchers in private industry, universities and NASA.

It is a cat-and-mouse game that has some in the field questioning whether fear of the Trump administration is pushing scientists over the line between their responsibility to accurately convey the rationale for their work and their desire to keep funding going.

“Squandering an opportunity”

Maxwell Boykoff, director of the Center for Science and Technology Policy Research at the University of Colorado-Boulder, worries about this trend. “If you’re deliberately avoiding talking about the implications as they relate to climate change, you are squandering an opportunity, and you are self-censoring, and you are avoiding rather than confronting, some of the very motivations that are behind one’s work,” he says. “When it comes to sharing your research findings, and to talking about how it relates to other issues, I do think there’s a certain responsibility to name it what it is.”

Reached by email, climatologist and geophysi-



NASA/SSAI

cist Michael Mann of Penn State says, “the idea that scientists now have to alter their science (or at least how they characterize it) in deference to the politically motivated ideologues that now run the current administration is truly disturbing.” He pointed to the case of post-Russian Revolution agronomist Trofim Lysenko, whose story is often cited by climate change activists. Lysenko’s incorrect conclusions about how plants acquire and pass on traits are partly blamed for causing scientific purges and starvation in the Soviet Union. Mann said the U.S. is “perilously close” to that kind of situation.

So far, though, the scope of the trend at NASA appears to be limited mainly to bureaucratic interactions within government, mostly in documents and sometimes in conversation. The trend has not spread to the agency’s public face, for example. Pages on NASA’s website continue to display extensive evidence of climate change, including rising carbon dioxide levels, rising global temperatures, shrinking Arctic sea and land sheet ice, and rising sea levels, along with links to NASA’s related climate science missions.

Why are climate researchers and technologists so worried then? President Trump’s disdain sounds personal to them, and it appears to run deep. The

NASA NOMINEE SHIFTS TONE ON CLIMATE QUESTION

President Donald Trump’s choice for NASA administrator, Rep. Jim Bridenstine, R-Okla., told senators during his November confirmation hearing that “human activity is absolutely a contributor” to the warming climate, but he added that “there are other contributing factors that may have more of an impact.”

His message was similar to that of a 2013 speech on the floor of the House of Representatives, but this time his tenor was entirely different. In 2013, Bridenstine colorfully bucked scientific consensus:

“Global temperatures stopped rising 10 years ago. Global temperature changes, when they exist, correlate with sun output and ocean cycles. During the medieval warm period from 800 to 1300 A.D. — long before cars, power plants, or the Industrial Revolution — temperatures were warmer than today. During the Little Ice Age from 1300 to 1900 A.D., temperatures were cooler.”

Scientific consensus rebuffs Bridenstine on most of those points. Since 1970, Earth’s average temperature has been rising at a rate of about 0.17 degrees Celsius per decade, according to the NOAA website. The close of 2009 marked the second warmest year on record and ended the warmest decade, according to the NASA website. As for the role of the sun, if there is one, it’s much less significant than that of human activities. Scientists continue to research the question of global temperature during the medieval period compared to today, but the period from 1901 through 2016 was “the warmest in the history of modern civilization,” according to the latest U.S. “Climate Change Special Report.”

Bridenstine did not get into any of that during his confirmation hearing. Instead, he said “we have to keep the debate dispassionate and driven by science.”

topic was a hot one on his Twitter feed even before he announced his candidacy for president in June 2015. A year earlier, Trump tweeted: “This very expensive GLOBAL WARMING [expletive] has got to stop. Our planet is freezing, record low temps, and our GW scientists are stuck in ice.” As a candidate, Trump promised to “cancel” the Paris climate accord. The U.S. president can’t unilaterally end an international agreement signed by 197 countries and the European Union, but Trump made good on his promise in a sense by announcing in June that the U.S. would withdraw from the accord.

No mass exodus

Researchers in NASA’s Earth Science Division were discouraged and disheartened by the election of Trump. His views about the climate are at odds with international scientific consensus that warming of the climate since the 1950s is unequivocal and that human activity is extremely likely to be the dominant cause of that warming.

One scientist in the division who asked not to be identified says that after the election, many peers began making plans to retire or resign. So far, though, there has not been a mass exodus from the division. The administration seemed to become distracted

► **Melt ponds** like this one photographed by an instrument on NASA’s ER-2 plane will be among the science targets for NASA’s ICESat-2, the Ice, Cloud and Land Elevation Satellite-2, which is scheduled for launch in 2018. A photon-counting laser altimeter will bounce laser pulses off Earth’s surface to measure the height of ice.



NASA



TARGETED FOR CUTS

NASA/JPL-Caltech

Congress has yet to fully weigh in on the Trump administration's proposal to cut NASA funding in 2018 for five satellites or instruments related to climate science.

Climate Absolute Radiance and Refractivity Observatory Pathfinder (CLARREO PF)

This spectrometer would be attached to a pallet on the truss of the International Space Station to measure reflected sunlight over many wavelengths. As a pathfinder, it would demonstrate measurement technologies needed for a possible free-flying satellite or satellites that would gather long-term observations to test and improve climate predictions.

Management: NASA's Langley Research Center, Virginia

Deep Space Climate Observatory (DSCOVR)

The budget proposal would block data from two NASA instruments on this NOAA solar-wind satellite positioned 1.5 kilometers from Earth:

- NASA would no longer post daily images of Earth online from EPIC, the Earth Polychromatic Imaging Camera, an instrument first proposed by Al Gore when he was vice president. Funds for acquisition and processing of the images would be cut.

Management: NASA's Goddard Space Flight Center, Maryland

- Ends funds for NASA analysis of data from NISTAR, the National Institute of Standards and Technology Advanced Radiometer. NISTAR measures Earth's emitted radiation and reflected sunlight, improving climate science modeling and studies of global temperatures.

Management: NASA's Goddard Space Flight Center

Orbiting Carbon Observatory-3 (OCO-3)

This near-infrared spectrometer would be attached to a shelf on the International Space Station called the Japanese Equipment Module Exposed Facility. From this perch, it would measure the distribution of carbon dioxide in the atmosphere. OCO-3 is undergoing final pre-launch tests after being assembled from spare parts left over from construction of its free-flying predecessor, OCO-2.

Management: NASA-funded Jet Propulsion Laboratory, California

Plankton, Aerosol, Cloud, ocean Ecosystem (PACE)

This free-flying satellite would carry a hyperspectral Ocean Color Instrument to chronicle the changing distribution of varieties of phytoplankton, which are vital food sources for ocean fish that can also proliferate into harmful algal blooms. PACE also would gather atmospheric readings related to air quality and the land-ocean carbon cycle, with a goal of better defining the ocean-atmosphere relationship.

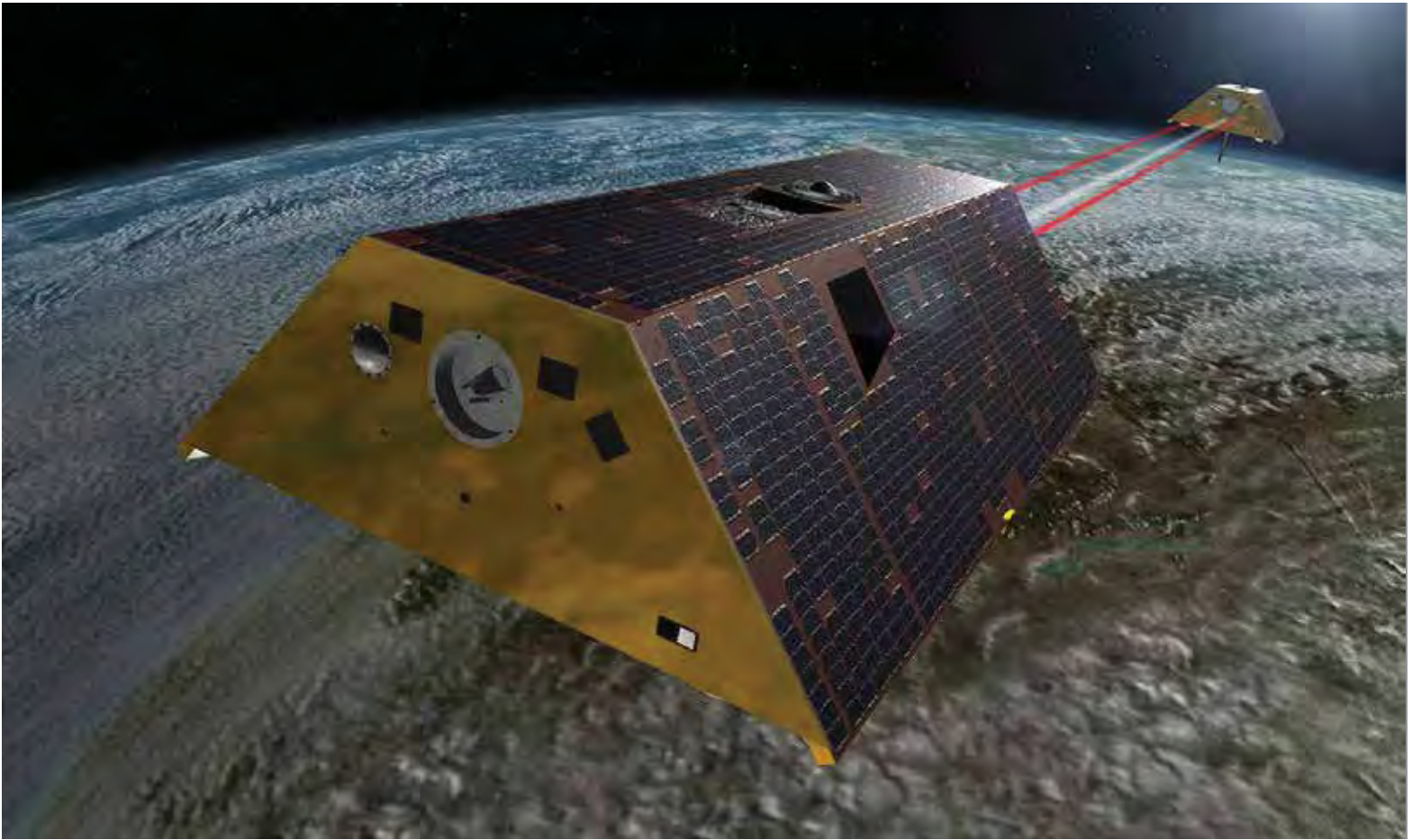
Management: NASA's Goddard Space Flight Research Center, Maryland

Radiation Budget Instrument (RBI)

A scanning radiometer instrument that would ride on NOAA's Joint Polar Satellite System-2 weather satellite to measure the effects of clouds on Earth's energy balance, factors that impact weather and climate. RBI would continue measurements dating back about 30 years, including those from the CERES (Clouds and the Earth's Radiant Energy Systems) instruments on NASA and NOAA satellites.

Management: NASA's Langley Research Center, Virginia

▲ NASA's Orbiting Carbon Observatory-2, or OCO-2, collected the data for this map showing global atmospheric carbon dioxide concentrations, which are highest above northern Australia, southern Africa and eastern Brazil. The Orbiting Carbon Observatory-3 is planned to be OCO-2's successor, but funding to continue the program is not included in the Trump administration's 2018 budget request.



NASA/JPL-Caltech



▲ **Engineers and technicians** check the fit of ICESat-2's telescope to its sling, before moving it into place on the instrument's optical bench.

▲ **NASA's Gravity Recovery and Climate Experiment Follow-On** would consist of two satellites flown in tandem to document the changing mass of features including ice sheets, glaciers and aquifers. Just as in the first GRACE mission, the tandem will pass radio waves between each other to measure the distance between the pair, which varies with variations in the pull of gravity. GRACE FO also would test a laser ranging system developed in collaboration with the German Aerospace Center, DLR, for even more accurate measurements.

by other issues, including health care and tax legislation. The Earth Science staff started to believe that the White House might not accept an idea that worried them the most: Cutting the \$1.9 billion division from NASA and leaving Earth studies entirely to NOAA, and then not funding NOAA to continue the work that NASA was doing.

The fear sprang from an op-ed in Space News written a few weeks before the election by Trump policy advisers Robert Walker, a former congressman from Pennsylvania who once chaired the House Science Committee, and economist Peter Navarro, a former University of California-Irvine professor. They said NASA should focus on “deep space activities rather than Earth-centric work that is better handled by other agencies.”

Today, the Earth Science Division remains in place, and the Trump administration's nominee as NASA administrator, Rep. Jim Bridenstine, R-Okla., has shown no appetite for dismantling it. Just the opposite, in fact. In written answers to lawmakers after his Nov. 1 confirmation hearing, Bridenstine said that if he is confirmed, “the world class experts in NASA's Earth Sciences Division will continue contributing to important reports” such as the latest “Climate Change Special Report” from the U.S.

Global Change Research Program. That report says “human activities, especially emissions of greenhouse gases, are the dominant cause of the observed warming since the mid-20th century.”

Given the tone of Trump’s tweets about climate science, Bridenstine also was pressed during his confirmation hearing about possible reprisals against NASA researchers. “Without question, I will not punish them,” he said.

When I asked NASA’s media office about the future of the Earth Science Division, I received a prepared statement: “NASA remains committed to studying our home planet and the universe, but we are reshaping our focus within the resources available to us.”

As for those resources, the budget ax has fallen, but not as deeply as some researchers feared. The administration’s proposal for 2018 would cut five of the division’s 18 space projects. Gone would be the Orbiting Carbon Observatory-3, for instance, an instrument that would be attached to the exterior of the International Space Station. In dollars, the division’s budget would be trimmed to \$1.75 billion compared to the 2017 budget of \$1.93 billion.

When I asked a White House spokesman about the administration’s policy on climate change research, he referred me to an August 2017 memo by Michael Kratsios, the U.S. deputy chief technology officer, and Mick Mulvaney, the director of the Office of Management and Budget. The memo does not mention climate research. The closest would be a reference to “American Energy Dominance” as a priority.

Semantic cleansing

So, with some climate projects pegged for cancellation and the administration’s overall policy at best uncertain, some researchers are defending the semantic cleansing. Their goal is not so much to sneak under the White House radar as to avoid any wording that could make a project harder to sell or protect in Congress, which they consider their last line of defense.

Changing some words assures “that some 22-year-old intern can’t go searching through and pull out everything that says ‘climate.’ That’s kind of the level of what people are doing now. That’s what they’re preventing against: Some Congressman waving your project around, calling it the stupidest thing that’s ever been funded,” said one researcher who works with NASA and asked not to be named.

The trend is not limited to the Earth Science Division. Technology in the Aeronautics Research Mission Directorate that was once billed as reducing carbon dioxide as a greenhouse gas is now emphasized as increasing efficiency and American economic competitiveness. When NASA’s legislative liaisons meet with members of Congress, they avoid mention of climate change and place greater emphasis on analyses showing the economic benefits

for U.S. business interests.

The goal of relabeling is to blend in. “If it says ‘frequency of weather distribution’ instead of ‘climate’ in the abstract, it doesn’t bother me that much,” says the climate researcher who works with NASA.

And if that strategy doesn’t work, NASA over the decades has distributed research and funding for its projects across congressional districts. For example, NASA’s proposed ICESat-2 satellite, still planned for launch in 2018 to measure sea ice and Earth’s vegetation, had its ground system built in Dulles, Virginia, its spacecraft built in Gilbert, Arizona, and its space launch provider based in Decatur, Alabama. Cutting funding across the board for the Earth Science Division would draw the ire of congressional members, NASA researchers believe.

“NASA has been very good about that; they make sure that the very expensive satellites aren’t just built in one state,” one climate scientist says.

Is the strategy succeeding at protecting projects? The results are mixed. The Trump administration has brought “an unprecedented set of changes,” Boykoff says. Past presidential administrations have recognized “a common set of goals of environmental stewardship, of commitment to science, of commitment to discovery. This new administration has really forced a reprioritization. A number of these science and environmental themes were not partisan as much as they are today.” ★

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