

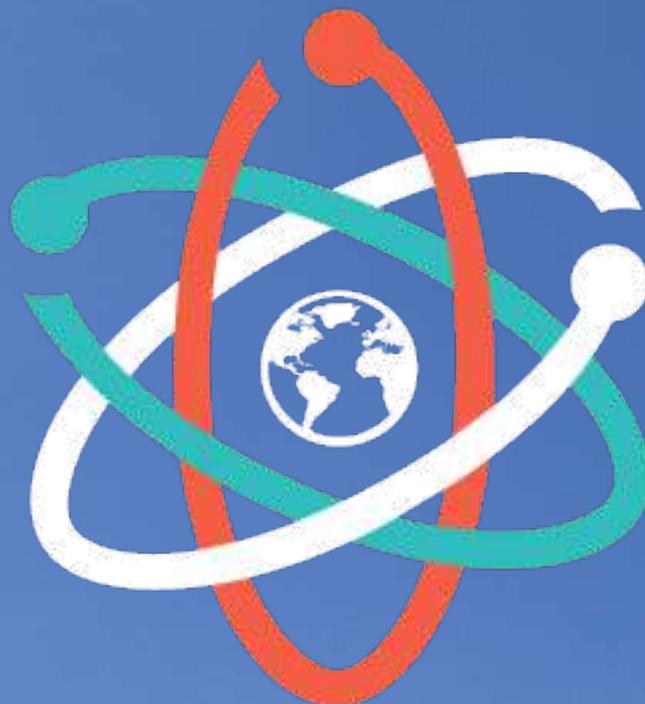
Prime Meridian (69) April 22, 2017

From 2012, this newsletter has been flagging up an aspect of the battle for our environment that has been all-too-often neglected by eco-campaigners, namely the essential role to be played by scientific research.

As we have stressed repeatedly, the reality of a global environmental crisis is beyond any reasonable doubt - we don't need more research before we can accept that fact. There is, however, a necessity for intensive programmes of research to monitor our increasing impact on planet Earth, to help us refine models of exactly how we are affecting it, to help us find the best ways to reduce the damage that we are inflicting on the Earth's natural life support systems and to safeguard human communities around the world.

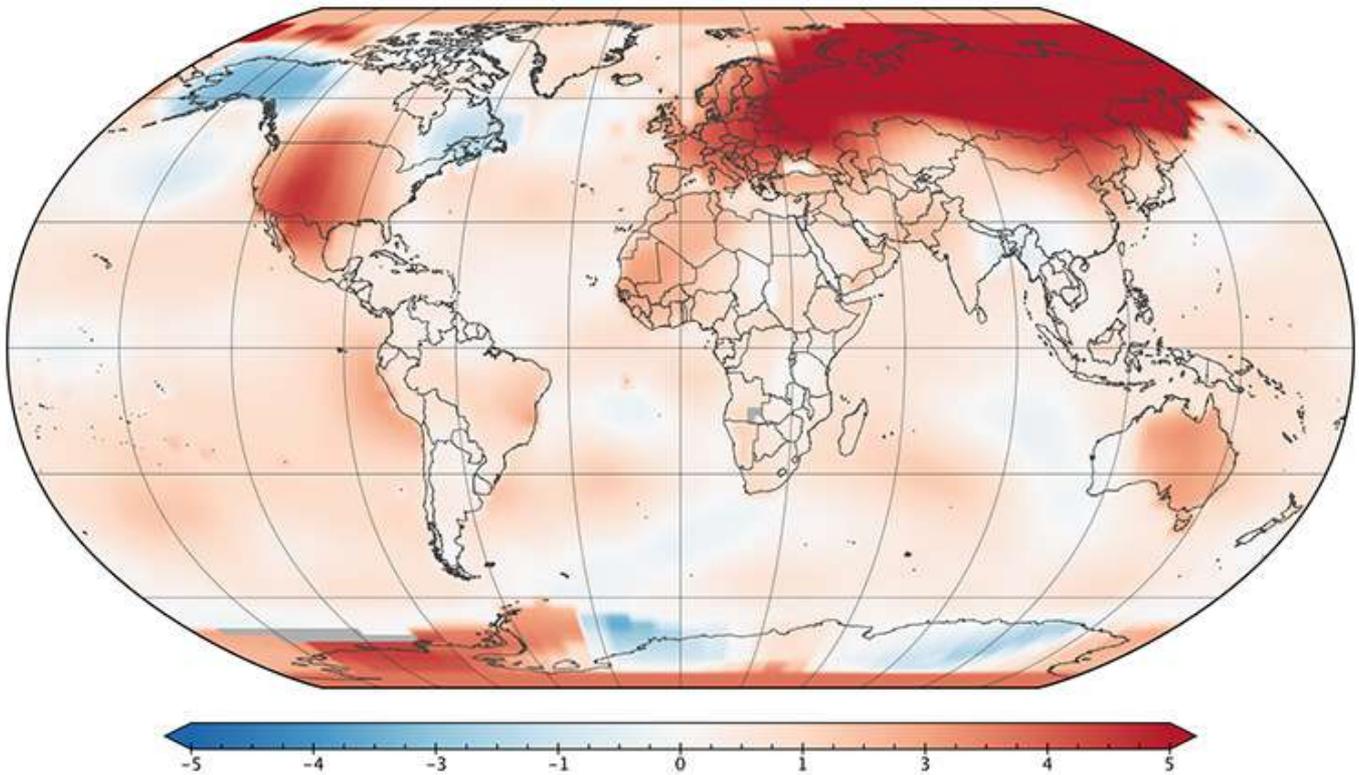
This is why, in the face of downright hostility to environmental science from within the Trump administration, we are publishing this issue to express our support for the March for Science. This is being staged by a group of scientists and science educators in the USA, with similar events being held across the world (details to be found online). We lay out the organisers' goals and we ask how far scientists should go down the road of political-style action.

March for Science Earth Day April 22, 2017



GISTEMP LOTI Anomaly (°C)

March 2017



Base Period: 1951-1980

Data Min = -3.2, Max = 12.1, Mean = 1.1

NASA/GISS/GISTEMP

Above: Earth Day 2017 arrives as both NASA (chart above from the Goddard Institute for Space Studies in New York) and NOAA report that March 2017 was the second warmest March on record.

The March for Science in its own words.

The March for Science is co-chaired by Caroline Weinberg, Valorie Aquino and Jonathon Berman, with Bill Nye, Mona Hanna-Attisha and Lydia Villa-Komaroff as honorary co-chairs. It has a vision for science as an enterprise serving humanity.

The following quotes, selected from the March for Science website, outline their stance:

The March for Science champions robustly funded and publicly communicated science as a pillar of human freedom and prosperity. We unite as a diverse, nonpartisan group to call for science that upholds the common good and for political leaders and policy makers to enact evidence based policies in the public interest.

Science protects the health of our communities, the safety of our families, the education of our children, the foundation of our economy and jobs, and the future we all want to live in and preserve for coming generations.

We speak up now because all of these values are currently at risk. When science is threatened, so is the society that scientists uphold and protect.

Scientists work to build a better understanding of the world around us. Science is a process, not a product -- a tool of discovery that allows us to constantly expand and revise our knowledge of the universe. In doing so, science serves the interests of all humans, not just those in power. We recognize that inclusion, diversity, equity, and accessibility in science are critical to ensure that science reaches its potential to serve all communities. We must protect the rights of every person to engage with, learn from, and help shape science, free from manipulation by special interests.

Science observes and asks questions about the world. Our understanding is constantly changing, presenting us with new questions and answers. Science gives us the ability to examine these questions, enabling us to craft improved policies and regulations that serve our best interests. Political decision-making that impacts the lives of Americans and the world at large should make use of peer-reviewed evidence and scientific consensus, not personal whims and decrees.

De-funding and hiring freezes in the sciences are against any country's best interests. We believe that the federal budget should reflect the powerful and vital role that science plays in supporting our democracy. We advocate federal funding in support of research, scientific hiring, and agency application of science to management. This funding cannot be limited to a few fields or specific demographics -- scientific support must be inclusive of diverse disciplines and communities.

Science is a vital feature of a working democracy, spurring innovation, critical thinking, increased understanding, and better, healthier lives for all people. By marching in Washington, DC and around the world, we take one of many steps to become more active in our communities and in democratic life. We hold our leaders -- both in science and in politics -- accountable to the highest standards of honesty, fairness, and integrity.

The application of science to policy is not a partisan issue. Anti-science agendas and policies have been advanced by politicians on both sides of the aisle, and they harm everyone -- without exception. Science should neither serve special interests nor be rejected based on personal convictions. At its core, science is a tool for seeking answers. It can and should influence policy and guide our long-term decision-making.

Below: On March 9, 2017, the rising Sun caught the peaks of Ellesmere Island in the Arctic. Taken during NASA's first flight for Operation Icebridge 2017. Credit: NASA/Nathan Kurtz.





Above: NASA has been gearing up for a major airborne study of the world's coral reefs by carrying out observations in Hawaii. Credit: NOAA.

A danger of politicised science say critics.

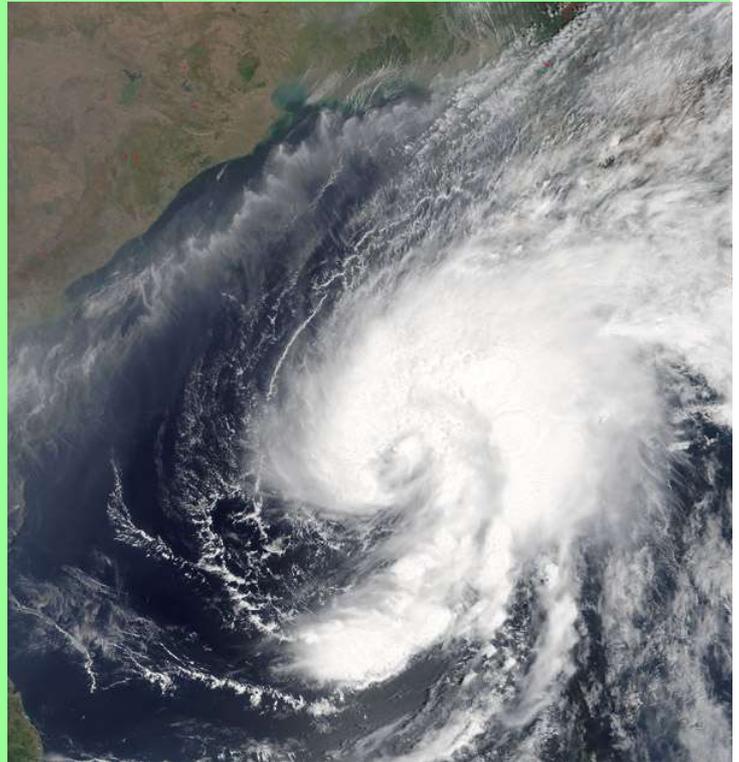
We are obliged, in the interests of even-handedness, to report that The March for Science has not been without its critics. Writing in *Forbes* (April 16, 2017), environmental writer Tim Worstall (who describes himself as “*boringly mainstream concerning climate science,*” and “*equally boringly mainstream with what we should do about it--have a carbon tax*”) argued that the Union of Concerned Scientists, a prime mover in the March, was confusing threats to certain economic and political policies with attacks on science and the scientific method. He wrote “*The truth of emissions causing warming has no influence at all upon the best method of reducing emissions and thus warming.*” Policy, he asserted, should be devised not by people each of whom has expertise only in one narrow area of science, but by economists and others with relevant knowledge. A editorial in the leading science journal *Nature* recognised that there was a risk of scientists appearing politicised or being side-tracked by various interests, but opted for support - along with major scientific bodies around the world: “*Nature is delighted to offer its own endorsement of the march and, more importantly, of the movement that the marchers will represent.*”

We note that President Trump and advisors have verbally lashed out at climate science many times and so, have themselves helped to bring climate science into the political spotlight. Trump has explained his ridiculed claim that global warming had been devised by the Chinese to undermine the USA's economy as a joke, and has even denied dismissing global warming as a hoax. There is, however, no doubt that in December 2015, Trump declared in South Carolina “*Obama's talking about all of this with the global warming and ... a lot of it's a hoax. It's a hoax. I mean, it's a money-making industry, okay? It's a hoax, a lot of it.*” It would be difficult to avoid an awkward intertwining of politics and science here. Trump clearly sees the analyses of global climate from mainstream science in terms of how they might be used by his political opponents rather than in scientifically objective terms.

Why the Ecospheres Project is campaigning for research.

Regardless of the political ramifications of environmental science for opposing partisan groups, the case for boosting research is cogent. In a 2012 bulletin (mostly internal circulation) we sketched out our own rationale for campaigning for science. There is an urgent need, we believe, for our civilisation to invest in research if it is to meet the challenges of the coming century.

Right: Tropical cyclone Maarutha in the Bay of Bengal on April 15, 2017. Obtained by the MODIS unit aboard NASA's Terra satellite.



With the March for Science, our conclusions have acquired new relevance and we re-print them below:

In the absence of effective research, “*Planetary stewardship*” will never be more than a meaningless slogan.

The determined work of existing campaigns is essential and we salute them. Our civilisation has brought benefits unparalleled in human history, yet at the same time, its expansion has created a global environmental crisis. Scientific organisations have presented a sobering picture of our escalating impact on our world, but there is a very real danger that we shall do too little, too late. Many campaign bodies are fighting hard to get that message across to politicians. There is, however, an aspect of the crisis which has not received the same emphasis. There is a danger that whatever actions we do take to protect our environment may be based upon inadequate knowledge of how the Earth works, or of the risks associated with new technologies developed to combat environmental problems. Our knowledge needs to expand as fast as the threats which we are creating for ourselves. If it does not, schemes devised to safeguard our world may backfire.

The concept of “*planetary stewardship*” has been presented as an alternative to the destructive exploitation of the global environment for short-term gain. It has achieved worldwide popularity and it carries a sense of moral imperative. It conveys the implication that our activities should be conducted with foresight and with responsibility towards the Earth's natural life support systems. Our civilisation depends upon these systems for its existence, and so planetary stewardship translates directly into responsibility towards human communities. Unfortunately, a desire to safeguard the Earth cannot, no matter how heart-felt, transform us into planetary stewards any more than a desire to relieve the suffering of the sick amounts in itself to a medical qualification.

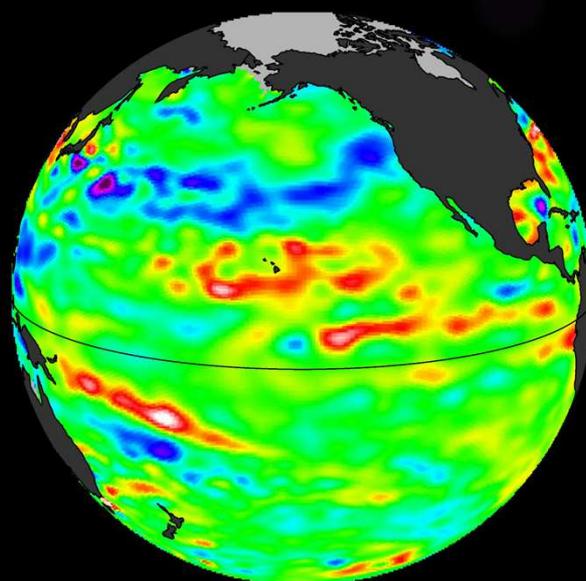
Responsible stewardship will require us to expand our working knowledge of our planet and ongoing development of reliable networks for monitoring Earth processes. We do not need more research before we can be sure that a human-driven global environmental crisis is real. Well-documented degradation of our environment is taking place on a broad front, on every scale from the local to the planetary.

If we are to safeguard ecosystems and human communities, however, we will need well-funded programmes of research, enabling us to tighten the accuracy of our predictions about looming environmental change, and to develop new technologies and agriculture techniques. . . . shortfalls in our knowledge of our home planet are substantial and they are being emphasised by authors of papers published in main-stream peer-reviewed scientific journals and reports.

The environmental challenge is a coming-of-age test for our civilisation. Graduating to true planetary stewardship will be tough, because (beyond any political-diplomatic issues of international co-operation) Earth systems, and our relationships with them, are awesomely complex. We have a daunting amount to learn and we must tackle that task successfully if we are to earn ourselves a more secure tenancy of the Earth. There is little time for us to serve our apprenticeship as planetary stewards, and the time-scale will shrink proportionately as our impact on the world expands. We have no guarantee of success and every possibility of failure. We have a hard struggle ahead of us. We human beings have demonstrated that we have the intelligence and inventive capabilities to initiate a global civilisation fuelled by exploitation of natural resources. However, we have not demonstrated foresight in developing long-term strategies for the survival of civilisation. Many resources are limited, and our negative impact on the global environment, which cannot absorb limitless damage, has escalated. Now, confronted by one of the greatest challenges which our species has ever faced, we must become cleverer. We must devise means to pursue the development of our technological civilisation whilst, at the same time, safeguarding the world upon which it depends. If we fail to make this our priority, then the next few decades may well see us blundering through a succession of “fixes” that precipitate us into worse crises than that which we face already. Both public and politicians must understand that our relationship with our planet involves a level of reality more fundamental than the financial realities that are internal to human societies.

Research into Earth systems is not a luxury in which societies can indulge in times of affluence and downsize in times of austerity; it is about our long-term survival. Nor would it make sense to decrease our research expenditure should environmental problems begin to undermine our economies, because that would further reduce our capacity to respond.

Below: Warm phase (El Niño) conditions in the Pacific boosted 2016 to the hottest year on record. Cooler conditions set in, but climate scientist are now asking whether lingering heat will restore El Niño later this year. Sea surface heights are related to temperature and this chart of data from the U.S./European Jason-3 satellite (collected Feb. 28 to March 12, 2017) shows neutral heights (green), lower in blue and warmer, higher water in red. NASA/JPL-Caltech.



A token commitment to research will not help. Filling the research gap is a responsibility that must be met in actuality; it cannot be accomplished through sloganeering or manufactured appearances as feature so prominently in advocacy and politics.

Healthy research programmes providing sound data and effective answers to environmental problems are a prerequisite of planetary stewardship. Through safeguarding human communities, research can make a fundamental contribution to global social justice.

The message of our newsletter is not that we are all doomed and that there is nothing that we can do about it, but rather that the survival of our civilisation will require hard work and determination - it will have to be earned.



Above: With the arrival of spring, the fields, woods and hedgerows of South East England are rapidly turning green. April 19, 2017. Near Ash, Kent.

Prime Meridian

This newsletter follows the cycle of the seasons in South East England, alongside global environmental issues. We step back to look at the Earth in its astronomical context and explore the opportunities for other habitable worlds.

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