

UNITED STATES MISSION TO THE UNITED NATIONS  
NEW YORK

January 19, 2017

The United States Mission to the United Nations presents its compliments to the Office of Legal Affairs, Division of International Law and the Secretary-General in reference to E/2016/20, 2017 for delegations to submit their contributions in action undertaken to address the effects of climate change in the ocean. The United States Mission has the honor to submit the attached document that provides such information.

The United States Mission avails itself of this opportunity to renew to the United Nations the assurance of its highest and most cordial cooperation.

Enclosure



United States' Submission to the Office of Legal Affairs of the United Nations regarding Actions to Address Climate Change and Impacts on the Ocean

This submission is in response to the request by the United Nations Office of Legal Affairs to submit a contribution outlining the United States' actions to address the effects of climate change on the oceans, in particular, with regard to:

- (i) collection of relevant scientific data;
- (ii) awareness-raising;
- (iii) fostering climate-resilient sustainable development of oceans and seas;
- (iv) development of ocean-based mitigation measures and adaptation policies and strategies; and
- (v) capacity-building, partnerships and financing, including the role of the private sector.

Summary

The United States welcomes the focus on "the effects of climate change on oceans" at the 2017 UN Conference on the Law of the Sea.

The United States has taken and analyzed significant actions at the national, regional, and global levels to address and raise awareness of climate-related impacts on the ocean.

To advance the collection of relevant scientific data, the National Oceanic and Atmospheric Administration (NOAA) National Center for Environmental Information produce authoritative climate datasets and products that support informed decision making and aid in the understanding of coastal and ocean conditions and their impact on the environment, economies, and societies. NOAA and the National Aeronautics and Space Administration (NASA) use satellites to improve understanding of sea level, salinity, sea surface temperature, ocean carbon cycle, dynamics, sea ice, and other key variables. Further,

the United States is developing a robust national ocean acidification monitoring system and plays a leading role in the development of the Global Ocean Acidification Observing Network (GOA-ON), an integrated, international research effort linked with other international research programs.

To raise awareness of and spur concrete actions to deal with the impacts of climate change on the ocean and other threats to ocean health, the United States initiated the 3rd World Ocean Conference as a part of its participation at the first UN Ocean Conference. The United States and United Kingdom have also committed to protect the ocean. The European Union, Indonesia, and Norway will host the 4th World Ocean Conference in 2017, 2018, and 2019, respectively.

The United States fosters climate resilient sustainable development of vulnerable coastal communities through, for example, capacity building programs in the Pacific Islands to prepare for and help mitigate the negative impacts of climate change. In 2016, the United States pledged nearly \$1 billion to support these efforts.

In order to develop ocean-based mitigation measures and adaptation policies and strategies, the United States and coastal states have developed strategies for addressing flooding, shoreline erosion, and coastal storms.

The United States conducts capacity-building programs and enters into partnerships and financing mechanisms to implement many of these actions, such as capacity-building programs for private partners in 2011. It also builds capacity for ocean acidification monitoring and research development. The United States also leads Pier2Peer, a scientific mentorship program supporting the expansion of ocean acidification observing capacity through the GOA-ON...

## Introduction

1. Our ocean plays a key role in regulating the Earth's weather and climate.
2. The ocean has absorbed about 30% of carbon dioxide released into the atmosphere since the beginning of the industrial revolution. This has helped limit the increase in atmospheric carbon dioxide concentrations, but at a high price – ocean waters are 26% more acidic than in pre-industrial times. This increased acidity weakens the ability of sea creatures to build their shells and skeletons and of coral to build their skeletons.
3. The ocean has also absorbed over 90% of the additional heat in the Earth system since the 1970s. This has helped limit global average temperature rise, but again at a high price. Ocean waters are warmer, which affects the distribution of marine species and the health of marine ecosystems, while also contributing to sea level rise. Sea level and glaciers are melting all around the world, exacerbating sea level rise. By the end of the 21st century, sea level rise could reach 6.6 feet, affecting the lives and livelihoods of coastal communities.
4. The pace of these changes is quickening, making it difficult for marine life and coastal communities to adapt. Coral reefs and other ecosystems are especially vulnerable. We already see differences in the ranges, activities, and populations of many marine species in response to climate change.
5. The impacts of these changes are already clear – fishermen working farther in search of a catch, coastal communities awash at high tide, coral bleaching around the world. Common existing challenges including habitat destruction, pollution, and invasive species, climate change-related ocean acidification, ocean warming, and sea level rise threaten economic livelihoods, food sources, the biodiversity of the ocean, the integrity of coastal ecosystems, recreation, and the creatures of coastal communities.
6. The United States has pleased that the informal meeting of the "Blue Regions" Governmental Informal Consultative Process on Oceans and the Law of the Sea is focusing on this increasingly important suite of issues. The United States is committed to action at the national, regional, and global levels to address climate change and other effects of carbon emissions on the ocean, such as

ocean acidification, through research, monitoring, and supporting mitigation and adaptation efforts.

7. A number of the actions and activities undertaken by the United States at national, regional, and global levels to combat the effects of climate change on the ocean are outlined below. This list is not meant to be comprehensive; rather, it provides an overview and examples of the United States work in this field.

### United States' Actions to Address the Effects of Climate Change on the Ocean

#### (i) Collection of relevant scientific data

8. The United States National Oceanic and Atmospheric Administration (NOAA) National Centers for Environmental Information (NCEI) manages the world's largest collection of publicly available oceanographic data ([www.noaa.gov](http://www.noaa.gov)). Its authoritative climate datasets and products support informed decision making and aid in the understanding of global ocean acidification and their impact on the environment, economics, and societies around the world. The NCEI World Ocean Database (WOD) is the world's largest freely available, high-resolution, multi-profile data archive whose data allows scientists to assess past and present change, and predict future change both in the ocean and in other sectors of the earth's climate system.
9. NOAA Coral Reef Watch's decision support system for coral reef management that integrates satellite-delivered active thermal remote sensing data from global satellite sensors and in situ data around the world. Coral Reef Watch helps resource managers identify areas vulnerable to bleaching and other climate change impacts (including coral disease) and develop strategies to enhance resilience and bleaching response efforts (<https://www.coralreefwatch.noaa.gov/satellite-bleaching>).
10. NOAA's North Pacific Climate Regimes and Ecosystem Productivity Project (NRCREP) (<http://www.pfeg.noaa.gov/npcrep/>) is a multi-agency effort to understand and predict environmental and ecosystem interactions in the North Pacific and Bering Sea ecosystems. This information, combined with research and modeling conducted to understand and predict environmental and ecosystem interactions, is being used to guide fisheries and other activities in a changing climate.
11. NOAA's Fisheries Service developed a methodology to assess climate vulnerability of fish stocks and is using it to assess vulnerability of marine fisheries stocks in all U.S. marine regions. In 2016, NOAA Fisheries completed the Northeast Fishery Climate Vulnerability Assessment. Additional assessments will be completed in 2017 for fish stocks in the Bering Sea and along the West Coast of the United States, and assessments for the Pacific Islands and the Southeast United States will be completed in 2017. In 2017, NOAA Fisheries stock climate vulnerability assessments can be found at: <http://www.stm.nmfs.noaa.gov/ecosystems/climate/stock-assessing-vulnerability-of>

fish stocks. NOAA's Fisheries Service is working with the National Oceanic and Atmospheric Administration (NOAA) to improve the reliability of fish stock data. NOAA is also working with the regional fish stock climate vulnerability assessments in each region are completed. Information on the fishing community social indicators is available at <https://www.st.nmfs.noaa.gov/humandimensions/socialindicators/index.html>.

12. The United States, in partnership with the Centre National d'Etudes Spatiales (CNES) and the European Organisation for the Exploitation of Meteorological Satellites (EUMETSAT), operates the Jason-2 and Jason-3, the third and fourth in the altimetry satellite series designed to maintain long-term satellite altimetry observations of global sea surface height. In 2013, Jason-2 was launched. In 2016, Jason-3 will help us to track global and regional sea level rise, an increasing risk to coastal communities and to the environment. (https://www.star.nesdis.noaa.gov/star/SeaLevelRise/)

13. The NOAA Arctic LTER program and the Arctic Sea Ice Science Team works to obtain precise measurements of sea ice thickness, ice extent, ice age, ice extent, thickness, and drift rates, so as to determine inter-annual variability in the ice cover and to understand the nature of such change. These measurements are compared to the output of seasonal to decadal model predictions of the Arctic system, through data assimilation and validation and the improvement of physical parameterizations in numerical climate models. (https://www.star.nesdis.noaa.gov/star/SeaIce/)

14. In 2016, the United States National Aeronautics and Space Administration (NASA) announced several projects to advance research on climate change and the ocean. The Plankton, Aerosol, Cloud ocean Ecosystem (PACOS) satellite mission is scheduled for launch in 2022, which will monitor the health of our ocean ecosystems and improve our understanding of the carbon cycle dynamics in the ocean and atmosphere (https://pace.gsfc.nasa.gov/). The Surface Water and Ocean Topography (SWOT) satellite, due to launch in 2020, will improve our understanding of ocean circulation and climate and will partner with the French space agency CNES, as well as a collaboration with Canada and the United Kingdom (https://www.swot.jpl.nasa.gov/). The SMAP satellite, launched in 2015, is now routinely producing sea surface salinity observations, which can reveal important information about changes in rain forest water cycle, ocean circulation, and climate (http://smap.jpl.nasa.gov/). In addition, NASA launched Earth Venture Suborbital 1 (EVS-1) projects: the Coral Reef Airborne Laboratory (CORAL; https://coral.eas.gatech.edu/coral/) will produce the first comprehensive assessment of coral reef health in the Great Barrier Reef, the Mariana Islands, Palau, and the Hawaiian Islands; the North Atlantic Aerosols and Marine Ecosystems Study (NAAMES; https://naames.arch.nasa.gov/) will explore key processes controlling marine ecosystems and their influences on air quality, aerosols, and the ocean; and the Greenland (GEM; https://gem.jpl.nasa.gov/coral/) project will investigate the role of ocean warming on glacier retreat in Greenland and the interplay between glacier melt and sea level rise.

15. The U.S. Global Change Research Program (USGCRP) aims to enhance understanding of global change, including the effects of climate change on the ocean. The program's main activities include:
  - improving our knowledge of Earth's past and present climate variability and change; improving our understanding of natural and human forces of climate change; improving our capability to model and predict future conditions and impacts; assessing the nation's vulnerability to current and anticipated impacts of climate change; and improving the nation's ability to respond to climate change by providing climate information and decision support tools that are useful to policymakers and the general public (<http://www.globalchange.gov/>).
16. The United States is also working towards a global ocean acidification monitoring system. In addition, it has played a leading role in the development and operation of the Global Ocean Acidification Investigation Observing Network (GOA-ION), an integrated, international research effort closely linked with other international research programs (<http://www.goa-ion.org/>).
17. To identify biological response endpoints that are most sensitive to ocean acidification, the U.S. Environmental Protection Agency (EPA) collaborates with universities on laboratory studies to predict ecological effects of ocean acidification on various organisms. In addition, studies of estuarine phytoplankton, seagrass, and coral reef systems are underway to quantify the role of estuarine macrophytes in moderating acidification, and field studies of nutrients and carbonate chemistry. Additionally, EPA has current projects to explore the effects of acidification in combination with other stressors on laboratory and field organisms. The effects of ocean acidification on larval settlement. To project relative risk of ocean acidification on various organisms, a trait-based risk framework is being developed. These data and climate data are synthesized via the Coastal Biodiversity Risk Analysis (<http://www.usra.gov/>).
18. The U.S. EPA is developing models to assess the effects of ocean acidification on ecosystem services and assessing the economic impacts of ocean acidification. These models have several components: climate models to estimate future ocean conditions with respect to temperature and acidification, population models to estimate the number of organisms that will be affected by ocean acidification, and models to estimate the economic impacts of ocean acidification on various sectors, including fisheries, aquaculture, tourism, and other economic activities.

**(iii) Awareness-raising**

19. The U.S. National Oceanic and Atmospheric Administration (NOAA) has been a significant player in the effort to spur collective actions to deal with the threats our ocean faces, including climate-related impacts on the ocean. The 2016 conference, hosted by the U.S. National Oceanic and Atmospheric Administration (NOAA) and the U.S. Department of the Interior, focused on the key ocean issues of marine protected areas, sustainable fisheries, marine energy, and climate-related impacts on the ocean, and aimed to inspire and empower a new generation of leaders, entrepreneurs, scientists, and civil society to take action to address these issues and protect our ocean ([www.OurOcean2016.org](http://www.OurOcean2016.org)). The United States and other participants announced new commitments to protect the ocean. A total of over 55,241 individuals and organizations signed up to...



four million square kilometers of the ocean. This brings the total amount included at all these conferences, hosted by the United States and Chile, to \$9.2 billion and 9.9 million square kilometers, almost the size of the United States. These conferences have been a key part of U.S. efforts to raise the profile of climate change and attract attention to the ocean as a key area for climate action to combat the risks of a future sea level rise. Indonesia in 2010 and Norway in 2012.

20. NOAA's PolarWatch Initiative will facilitate ready access to fit-for-purpose ocean satellite data and data products for government, public, commercial, and academic users to support their high-priority priority applications, services, and other user needs and enhance national socio-economic return on investment. This service is essential given the opportunities occurring within these regions due to climate change and other anthropogenic impacts. <http://polarwatch.noaa.gov/>.
21. The U.S. EPA's Climate Ready Estuaries program assesses climate change vulnerability, develops plans and implements adaptation strategies, and engages and educates stakeholders in the United States. The program's website contains resources and guides that show how the sea has risen now and how it might rise, and what the impacts might be, as well as resources for overall climate change adaptation planning, including adaptation options and planning frameworks (<https://www.epa.gov/cre>).
22. The United States has developed regional networks that synthesize and disseminate ocean acidification information in an effort to better inform stakeholders of the issue and solicit critical data and information needs that can guide strategic science investments in coming years. A number of federal agencies conduct activities to support ocean acidification education, outreach, and public engagement (<http://noaa.gov/oceanacidification.gov/engagemnt/initiative/IGESregionalnetwork>).
23. NOAA Research's Climate Field Program Office spearheads climate education and outreach efforts (<https://toolkit.climate.gov/>), which are being used nationally by state and local decision-makers to help prepare their communities for the effects of climate change. These webinars also serve as excellent educational tools for communicating the importance of climate change.
24. NOAA's Fisheries Service co-sponsored the 2016 International "Species on the Move" conference to advance understanding and response to climate-related shifts in the distribution of marine and terrestrial species worldwide in 2016. NOAA and partners will sponsor the 4th International Symposium on the Effects of Climate Change on the World's Oceans to be held in Washington, D.C. June 4-8, 2018 (<http://www.piscesim/2018/climatechange>).

*(iii) Fostering climate resilience and sustainable development of Pacific Islands*

25. At the 2016 Pacific Island Conference on Oceans, the United States announced a package of \$40 million in new programmatic activities and resources to climate change and advance clean energy development by building regional, national, and local capacity in the Pacific Islands to prepare for

and help in mitigating the negative impacts of climate change. This work is part of the U.S. commitments of nearly \$60 million in aid over 2010.<sup>11</sup>

26. NOAA is working with the Global Earth Observation Society (GEO Blue Planet Initiative) (GEO Blue Planet) on multiple programs, including the following: *the 3<sup>rd</sup> Blue Planet Symposium, planned for 10-12 June 2017 in the Washington, D.C. area. Furthermore, NOAA is co-hosting the Secretariat of the GEO Blue Planet Group with Australia's Commonwealth Scientific and Industrial Research Organization (CSIRO), which is co-ordinating a series of initiatives with the U.S. based on the GEO Blue Planet, which works to advance and exploit synergies among the many earth system and climate science disciplines to advance our understanding of the earth system and its interactions with the atmosphere and managing climate change globally with a focus on developing countries* (<http://geoblueplanet.org/>).<sup>12</sup>

**(iv) Development of climate change adaptation strategies and plans for coastal areas**

27. The United States has begun to incorporate considerations about the changing climate into existing management strategies. *new five-year strategies for addressing rising sea levels, including coastal storms have been developed by most U.S. coastal states under their Coastal Zone Management Act programs. Many of these plans explicitly take into account future climate scenarios as part of their adaptation initiatives. In the North Pacific, the National Council and NOAA have declared a moratorium on most new commercial fisheries in the United States pending sufficient understanding of the changing productivity of the fishing grounds as they become increasingly free. Marine protected areas in the National Marine Sanctuaries (NMS) system are preparing climate impact reports and climate adaptation action plans under their Climate Smart Sanctuaries Initiative.*
28. U.S. EPA scientists are exploring concepts and indicators to better understand and quantify the vulnerability and resiliency of coastal ecosystems to sea level rise and other climate events. *Indicators under consideration to track coastal systems are: sea level rise, coastal erosion, and other factors that can be affected by climate events. The indicators are intended to be used in a screening index to monitor communities of the United States and to help guide the development of a more sustainable future.*

**(v) Capacity-building, partnerships and financing mechanisms for the ocean and coastal environment**

29. To combat ocean acidification, the United States has formed public-private partnerships with several foundations to build capacity for ocean acidification monitoring efforts in developing countries. *The United States is also leading a 2012-2014 research initiative to improve coastal management and resilience of coastal ecosystems through capacity building through the Global Ocean Acidification Observing Network. Pier2Peer employs an adaptive and self-driven approach to capacity building and is currently guiding monitoring efforts in several coastal locations. The initiative is also working to foster inter-regional and global cooperation.* (<http://www.goa-observing.org/>)<sup>13</sup>



30. The United States has signed significant international agreements each year since 1947 through the International Atomic Energy Agency's Peaceful Uses of Atomic Energy to the Ocean Acidification International Coordination Center, which communicates, promotes, and facilitates global efforts on ocean acidification science research. (<http://www.oceans.gov/ocean-acidification/page.php?id=2181>)

31. In September, 2015, the United States announced that it would support the International Blue Carbon, which seeks to protect and conserve coastal blue carbon ecosystems to contribute change mitigation and adaptation. This partnership provides a forum for coastal states and organizations to benefit from the experience and expertise of the international community and develop an enabling environment for locally relevant approaches to protect and manage coastal blue carbon ecosystems including mangroves, tidal marshes, and seagrasses. (<http://bluecarbonpartnership.org/>).