



IOOS[®] Unlocking the Mysteries of the Earth's Climate

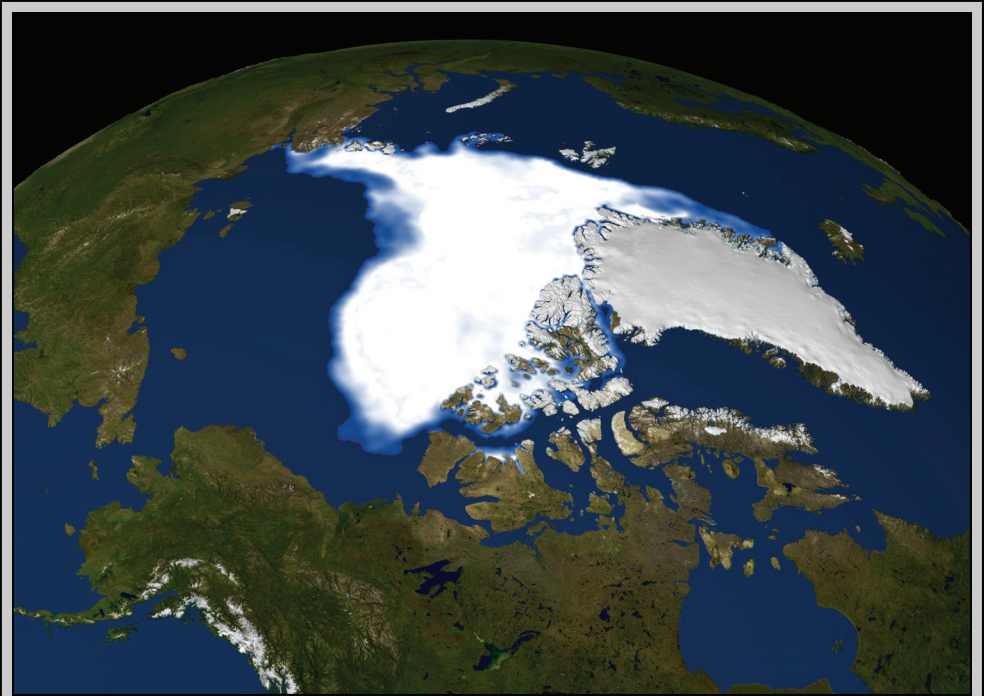
Enhancing Our Ability to Predict, Adapt, and Respond

Life on Earth has historically been planned on the expectation of a fairly predictable and consistent climate. As our climate begins to show greater variability with warmer temperatures, extreme precipitation, sea level rise, and ice cap melting, it is becoming increasingly clear that the ability to monitor and predict climate change is of vital importance to society.

The U.S. must learn to cope with an increasing rate of change in environmental conditions. The Ocean Research and Resources Advisory Panel states that a fully implemented Integrated Ocean Observing System (IOOS) will offer data from the ocean, coasts, and Great Lakes to determine trends in climate change and predict future change.

Impacts of Climate:

The Joint Ocean Commission released a report on ocean priorities to the Obama Administration stating that the ocean profoundly influences the planet, our lives, and livelihoods. Two fundamental changes in the ocean are of great concern: increasing acidity and ocean water temperature.

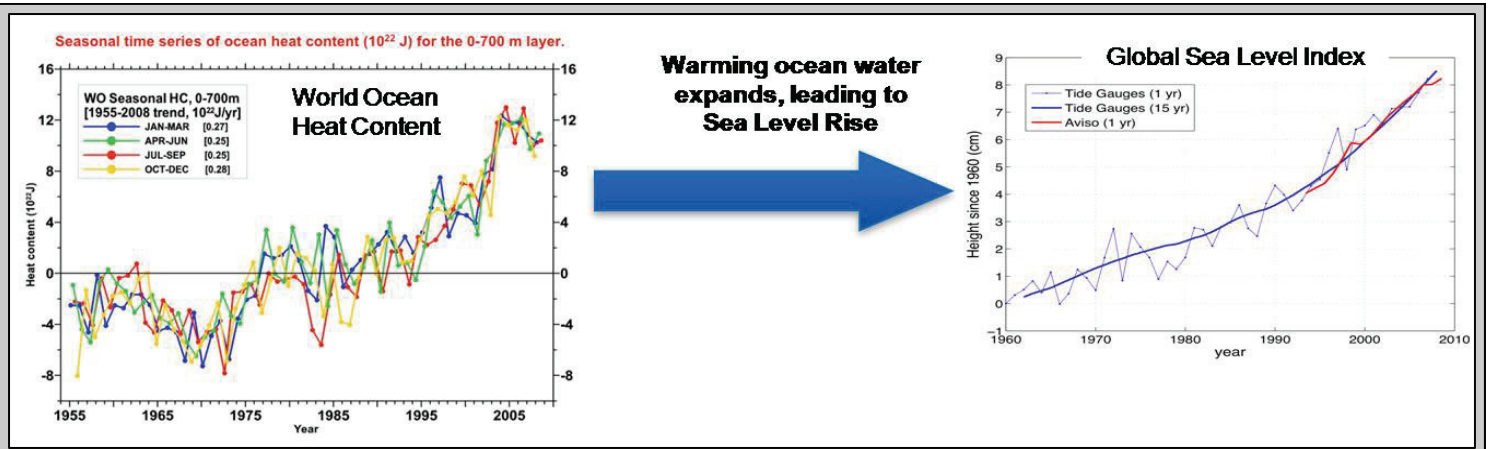


Climate change is impacting our Earth's surface temperature in ways we are still working to understand. For example, this National Aeronautics and Space Administration (NASA) satellite image shows the sea ice extent in 2007, where scientists saw the sharpest annual reduction since measurements began in 1979. Photo: Arctic Ice, NASA/Stanford University.

Oceans drive our climate, functioning as a reservoir for carbon dioxide and heat. Ocean circulation systems affect the amount of carbon dioxide the ocean stores, changing the acidity, which can negatively impact the health of marine ecosystems, including coral reefs, zooplankton, and important fish and shellfish. Ocean temperature increase and its effect on ocean circulation affects weather patterns, seasonal changes, agricultural production, and transportation activities. Increasing temperature of our ocean waters can shift ocean circulation patterns and cause record melting of Arctic ice.

Climate change will affect society through loss of property in coastal locations due to sea level rise and increased coastal storm intensity. If current trends continue, society will lose fishery resources from ocean acidification, temperature and circulation changes, harmful algal bloom outbreaks, and changes to weather and precipitation patterns that lead to drought and flooding.

The important point is that these impacts will not be within the realm of normal past variability. Therefore, the result will be beyond our current capacity to deal with intense storms, floods, crop loss, property loss, and drought.



Although the ocean has the potential to store 1000 times more heat than the atmosphere, measureable increases in ocean heat leads to sea temperature increases. IOOS data, specifically temperature, is used in models to predict and forecast sea level rise which helps determine the impacts of climate change.

IOOS Benefits:

IOOS will provide the observing systems to collect ocean, coastal, and Great Lakes data. This will help produce better and faster forecasts and predictions such as expected sea level rise and warnings for coastal communities.

These observing and information systems reside in dozens of federal and state agencies, universities, and private industries and are tailored to the individual missions of those who fund them. To avoid isolated, individual systems, the United States needs to integrate all of these assets. IOOS was developed to evolve existing programs into a unified structure that provides a seamless delivery of ocean and coastal information and predictions.

IOOS is the U.S. contribution to the international Global Ocean Observing System (GOOS). GOOS is the ocean and coastal component of the Global Earth Observation System of Systems (GEOSS).

The role of IOOS in climate monitoring and forecasting will expand in the future. IOOS will

provide long-term, high-quality data to discern trends and interpret data for predictions needed to determine the extent of climate change now and in the future. For example, IOOS captures and combines a wide variety of observations to produce more accurate and timely trends and forecasts.

This information will enable decision makers to understand and respond to ongoing and anticipated changes, including flooding from sea level rise, and the effects of rain, urban runoff, coastal development, and storm strength.

IOOS data and information will serve to strengthen and improve our forecasts of trends in predicted climate change. Having these capabilities and maintaining them long-term will highlight large scale changes in climate and improve the ability to understand and adapt to such changes.

History tells us that the future always holds surprises. We can maximize our ability to manage the effects of the changes ahead only if we have the needed data, as well as information development and forecast systems in place to improve

safety, enhance our economy, and protect our environment.

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This **dead sea urchin** is representative of the thousands of sensitive coral species that can die when water temperatures reach above normal tolerance levels. When an entire coral reef begins to die, it is referred to as bleached and requires years to rebuild.

