The Challenges of a Changing Planet
A Letter from the Assistant Administrator

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"The research impacts in this document tell the story of some of the preeminent contributions OAR scientists and our partners have made to build the knowledge base, tools, products, and services through which we can better understand and address the dynamics of our changing planet."

Dear Reader:

In the decades and century to come, we will experience extraordinary changes in our world's oceans and atmosphere, with consequences that may dramatically change the way we live our lives. Reducing uncertainty, whether in predicting future climate, severe weather, or changes in our ecosystems, requires a solid understanding of the Earth as an interdependent system of ocean, air, and land.

Through the preeminent research conducted and sponsored by NOAA's Office of Oceanic and Atmospheric Research, or OAR, we render knowledge and technology that drive products and services that reduce those risks. Ultimately, these products and services prevent loss of human life, improve management of natural resources, build understanding of the Earth-system, and strengthen the economy. This document represents OAR leadership in understanding how the ocean, atmosphere, and climate change that impact our health, our economy, and our future.

As we look to the future, OAR will tackle a number of large societal challenges. Perhaps the greatest is climate change. Defining the nature of climate change, and its potential impacts, is foremost in our research agenda. Our scientists will build on the CM2.1 climate model, which has become known as one of the best climate models in the world, to help anticipate more accurately future societal needs.

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Americans rely on weather forecasts and warnings that save lives, and protect property. Technologies transitioned from NOAA research labs and programs into weather forecast offices across the Nation are the backbone of today's weather services.

Though our weather forecasting capabilities have improved dramatically over the past two decades, the public expects even more accurate forecasts and earlier warnings. Working with the National Weather Service, as part of the proposed 10-year Hurricane Forecast Improvement Project (HFIP), OAR researchers will apply expert science to support better predictions of hurricane intensity. Over the next few years, the NEXRAD Doppler radar system will upgrade to a dual-polarized radar system to detect different types of precipitation better. In a decade, we anticipate an even more sensitive technology, Multi-function Phased Array Radar (MPAR), an innovative application of proven Navy technology, will provide longer lead times for warning on forecasts of hazardous weather.

Recognizing that air safety relies on accurate and timely weather predictions, OAR is engaged in developing a single national NextGen Network Enabled Weather system (NNEW) for the Federal Aviation Administration (FAA). NNEW will be a conduit to tens of thousands of weather observations and forecasts updated in real-time explicitly for the FAA to reduce delays and accidents in commercial aviation.

Drought and flooding likely will intensify as a result of global warming. This impacts our ability to produce food and manage water resources. The NOAA-led National Integrated Drought Information System (NIDIS), a collaboration between numerous federal agencies and state governments, promises to provide vital information for community planners and decision makers.

Marine life, from microscopic life forms at the bottom of the food web to larger species such as coral, shellfish, and commercial fisheries, will be affected by "ocean acidification." Commercial fisheries, already failing, may suffer further economic loss. OAR researchers are at the forefront of studying and monitoring this marker of climate change. Currently, a lone buoy equipped with sensors measures the extent of acidification in the Gulf of Alaska. We will need more and better sensors, technologies for studying impacts on physiology and ecosystems, and modeling efforts to provide ecological models, predictions, and forecasts.

All OAR research is grounded in observation data. Unmanned Aircraft Systems (UAS) will revolutionize NOAA's ability to monitor the global environment, improve predictive services, and enhance homeland security. UAS will fill critical observation gaps and benefit climate change research, weather and water resources forecasting, ecosystem monitoring and management, and coastal mapping.

The research impacts in this document tell the story of some of the preeminent contributions OAR scientists and our partners have made to build the knowledge base, tools, products, and services through which we better understand and address the dynamics of our changing planet. OAR will remain a world leader in understanding our oceans, atmosphere, and climate – and how they impact our health, our economy, and our future.

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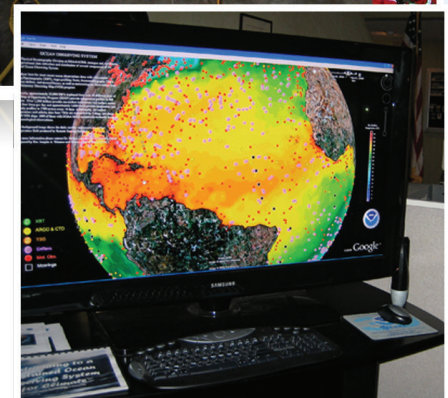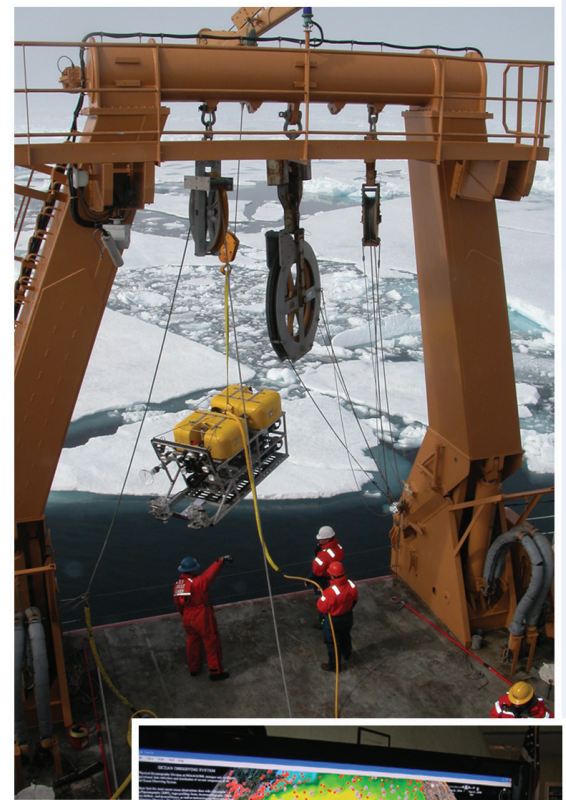
Images, top to bottom: A Remotely-Operated Vehicle is deployed during the Arctic 2005 Exploration; A Google Earth display of Global Ocean Observing System data; an Aerosonde® Unmanned Aircraft System is launched in Nov. 2007 from a moving platform to rendezvous with Hurricane Noel.