

EARTH SYSTEM SCIENCE & MODELING

SUPPORTING RESEARCH TO ADVANCE UNDERSTANDING OF THE EARTH SYSTEM

To understand and predict changes in climate, weather, oceans, and coasts—so people can protect themselves and their property—we need to understand global patterns, climate variability, and climate change. And to help manage and conserve coastal resources and marine ecosystems, we need to understand and monitor our oceans and coasts.

The Earth System Science and Modeling Division (ESSM) in the NOAA Climate Program Office is actively building the global and regional scale understanding and modeling needed to improve predictions. The Division coordinates an array of researchers from federal agencies, national labs, and universities, and international partners, focusing them on the most pressing climate research necessary to advance NOAA's prediction, applications, and other services.



ESSM research enables decision-makers in societal risk areas to respond to extreme events created by changing climate conditions and natural variability.

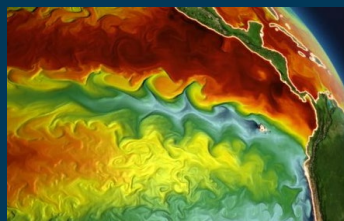
ESSM FUNDS RESEARCH THROUGH A COMPETITIVE GRANTS PROCESS



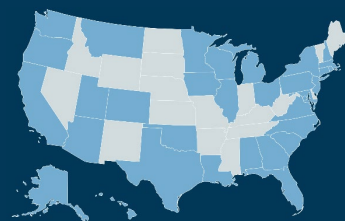
**MONITORING
& DATA**



**PROCESS LEVEL
UNDERSTANDING**

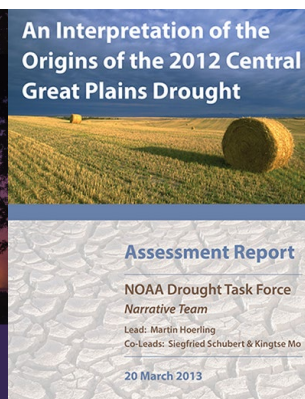
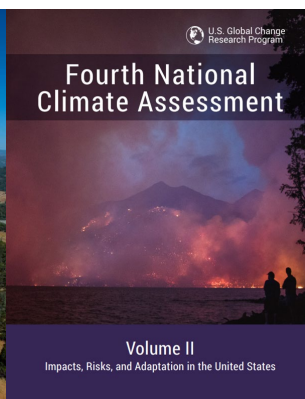
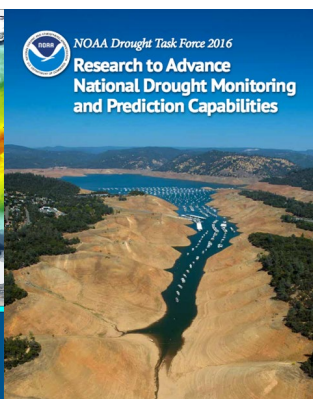
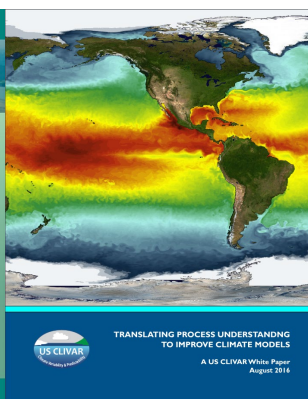
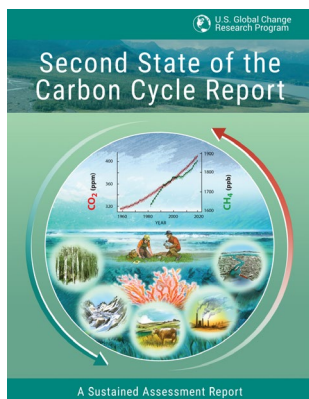


**MODELING
& PREDICTION**



**RESEARCH IN
30+ STATES**

ESSM research is essential to understanding climate impacts



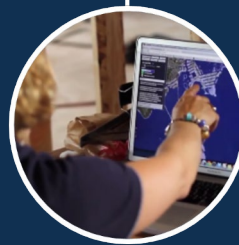
AMERICANS RELY ON NOAA'S EARTH SYSTEM SCIENCE & MODELING CAPABILITIES FOR ●●●



National Security



Risk Management



Billion-Dollar Markets



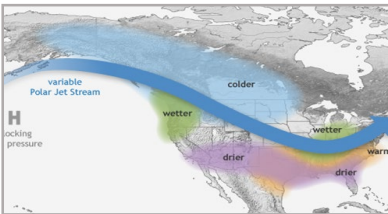
Health

ESSM supports research via the following programs:



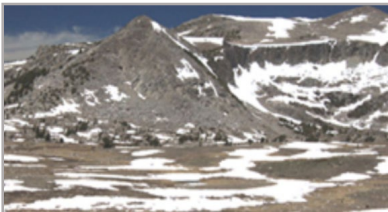
ATMOSPHERIC CHEMISTRY, CARBON CYCLE & CLIMATE (AC4)

Research under this program refines our understanding of chemical processes in the climate system, including emissions, chemistry and deposition of atmospheric trace gases and aerosols. Atmospheric composition and its impacts are studied using various measurement platforms and numerical models.



CLIMATE VARIABILITY & PREDICTABILITY (CVP)

Researchers in this program study interactions among the atmosphere, ocean, and land, and how they work together to make weather and climate events. This vital knowledge is needed to improve climate models and predictions so that scientists and society can better anticipate the impacts of future climate variability and change.



CLIMATE OBSERVATIONS AND MONITORING (COM)

The Climate Observation and Monitoring Program supports projects that develop data sets needed to understand the climate system and provides these data sets to the research community. Researchers transform observational data into authoritative products that are used worldwide to assess variability and change, forecast future conditions, and manage risk.



EARTH'S RADIATION BUDGET (ERB)

Researchers supported by this program investigate natural and human activities that might alter the reflectivity of the stratosphere or the marine boundary layer through the addition of aerosols and their potential impacts on Earth systems. These activities include proposed climate intervention to influence climate warming by reflecting sunlight, which requires extensive scientific research.



MODELING, ANALYSIS, PREDICTIONS & PROJECTIONS (MAPP)

This program advances climate and Earth system modeling to improve our ability to predict climate variability. Program outcomes include better simulations of climate conditions on various timescales, improvements in long-term projections of future climate, and improvements in NOAA's climate modeling capabilities.