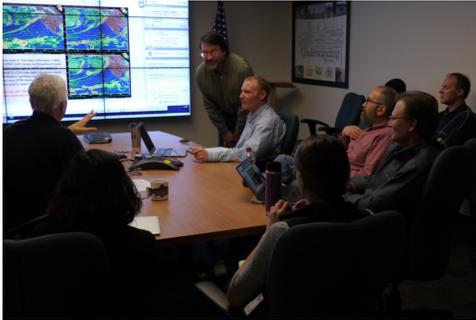


EARTH SYSTEM RESEARCH LABORATORY

PHYSICAL SCIENCES DIVISION



ADVANCING PREDICTIONS

WHO WE ARE...

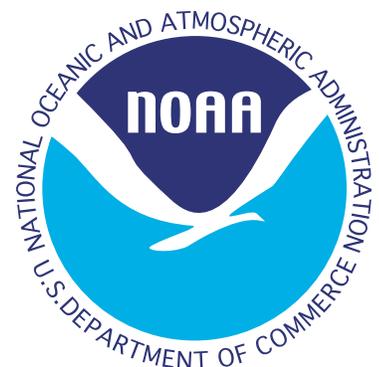
The **Physical Sciences Division (PSD)** analyzes and interprets physical processes that influence weather and climate from hours to decades to provide scientific information to support NOAA's mission. A major effort is to improve predictions on weather-to-climate time scales (days to decades) by identifying early warning indicators in atmosphere and ocean patterns that cause extreme events (such as floods, droughts, and heat waves). To do this we conduct research to improve observations, understanding, modeling and predictions of weather, water and climate variations and extremes, and their related impacts.

IN-HOUSE PARTNERS...

PSD hosts the National Integrated Drought Information System (NIDIS) Program Office, and collaborates with local partners from the University of Colorado and Colorado State University. PSD leads the NOAA Drought Task Force and NOAA's Hydrometeorology Testbed. These co-located activities motivate and link water research (predictions of too much or too little water) to societal needs.

OTHER PARTNERS...

- Bureau of Reclamation
- California Dept. of Water Resources
- Department of Energy/National Renewable Energy Laboratory
- NASA
- National Drought Mitigation Center
- NOAA National Marine Fisheries Service/Fisheries Science Centers
- NOAA National Weather Service/ National Water Center
- Scripps Institution of Oceanography
- Sonoma County Water Agency
- U. S. Army Corps of Engineers
- U. S. Geological Survey
- Western States Water Council



## WHAT WE DO...

- Lead national and international field programs to observe and understand the behavior of the atmosphere over land, oceans, ice, and snow.
- Study Earth system processes in critical areas of water, climate variability, and extreme events.
- Identify early warning indicators in the Earth system that can help improve predictions at weather and climate time scales.
- Pioneer research to explain weather, water, and climate extreme events based on rigorous evaluation of observed conditions and state-of-the-art computer simulations.
- Lead an innovative effort to reconstruct the Earth's atmospheric weather and climate patterns using only surface pressure data back to 1870 that puts today's weather, water, and climate extremes in the context of the past.
- Develop observing technologies, data analyses, and applications that support decision making for water resource management and wind energy production.
- Advance numerical representations of physical processes in computer models and evaluate the performance of these models across weather and climate time scales.
- Help NOAA formulate its scientific vision and contribute to national and international assessments (led four NOAA Science Challenge Workshops).

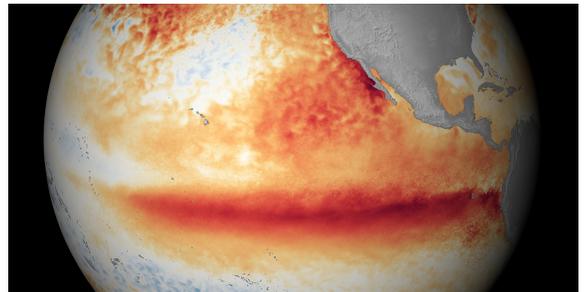
## WHAT'S NEXT FOR PSD...

During the next five to ten years, PSD will continue to support NOAA by:

- Explaining the underlying causes of recent weather, water, and climate extremes and assessing their predictability;
- Advancing the use of hydrometeorology observations and modeling in watersheds across the United States to deliver improved scientific information for managing water resources, for protecting lives and property, and informing preparedness;
- Improving understanding of the physical processes underlying short-term climate variations and long-term trends to improve the skill and reliability of climate predictions and projections;
- Improving observation, understanding, and modeling of physical processes in polar regions, especially related to predicting weather, sea ice, and climate variations and extremes;
- Improving physical understanding of the causes of regional climate variations and impacts, such as those associated with droughts and floods, and evaluating model forecast performance;
- Developing regionally-specific experimental weather and climate information and forecast products.



**WATER:** Too much of it, or too little can have devastating consequences. PSD scientists perform research to improve observations, understand causes, and advance predictions of weather and climate extremes.



**EL NIÑO RAPID RESPONSE FIELD CAMPAIGN:** PSD led a land, sea, and airborne research effort from the tropical Pacific to the U.S. West Coast to better observe and understand how El Niño influences U.S. weather. Researchers gathered never-before collected observations of the initial interaction between the ocean and atmosphere during one of the strongest El Niños in the last century.



**EXPERIMENTAL PRODUCTS:** PSD has developed and made available online a number of experimental research products. One example is a new experimental sea ice forecasting model, which is being used to understand the atmospheric, oceanic, and sea ice processes that impact formation.

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