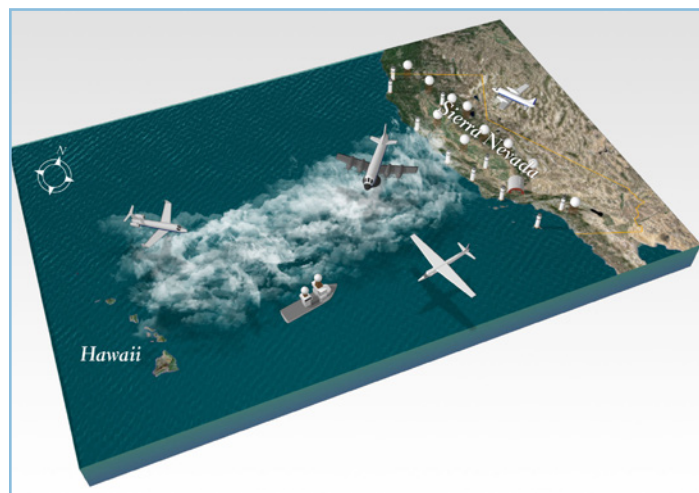


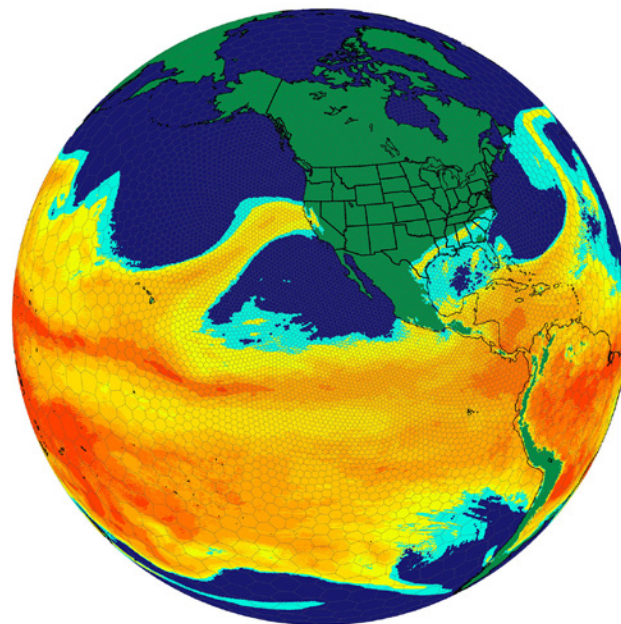
## ARM Cloud Aerosol Precipitation Experiment

On the U.S. West Coast, winter's snowpack provides up to 90 percent of the region's water supply, and the majority of this comes from atmospheric rivers and the clouds that form when they run into mountains. Atmospheric rivers are bands of flowing water vapor in the sky, usually much larger than their land-based counterparts. Clouds are heavily shaped by aerosols—airborne particles made of dust, sea salt, natural and manmade volatile molecules, and pollution. Researchers are exploring atmospheric rivers and how aerosols influence precipitation in the western United States to better understand what leads to floods and droughts.

Led by the Department of Energy's Pacific Northwest National Laboratory, researchers with the ARM Cloud Aerosol Precipitation Experiment, or ACAPEX, will use DOE atmospheric research facilities to study the two phenomena. The data the DOE ARM facilities collect will be used to improve computer models that predict extreme events in a changing climate. Collaborating with the National Oceanic and Atmospheric Administration (NOAA) field campaign called CalWater 2, ACAPEX will have instruments on



On land, sea and sky, ACAPEX and CalWater 2 will study the life cycle of atmospheric rivers and the clouds and precipitation they lead to.



Branching from equatorial storms, an atmospheric river stretches from Hawaii to San Francisco.

a NOAA ship in the Pacific Ocean and on a DOE-sponsored plane over land and sea. These researchers will study:

- (1) water sources, evolution and structure of atmospheric rivers over the Pacific Ocean
- (2) long range transport of aerosols over the Pacific Ocean between Hawaii and the U.S. West Coast, and how aerosols interact with atmospheric rivers
- (3) the point where atmospheric rivers make landfall on the U.S. West Coast, especially how clouds form where atmospheric rivers meet mountains. They will explore how aerosols from sources—both near and far—influence cloud formation as well as when and where rain, snow, and other forms of precipitation will fall.

The team will be at the beck and call of the weather. When an atmospheric river forms, researchers will mobilize the ship to follow it and collect data and organize aircraft to fly through clouds. Typical winters see about a half dozen atmospheric rivers, and this winter has already seen one.

**Dates:** January to March, 2015

**Ship:** The NOAA research vessel, *Ronald H. Brown*, will host the second DOE ARM Mobile Facility (AMF2).

**Aircraft:** The DOE sponsored Gulfstream-1 (G-1) aircraft will be stationed in Sacramento, California, from where it will fly over the Sierra Nevada Mountains and over the NOAA's *Ron Brown* as it nears Bodega Bay, California. Flight patterns will be coordinated with CalWater 2's research aircraft—the NOAA WP-3D and G-IV and the National Aeronautics and Space Administration (NASA) ER-2.

**Collaborations:** ACAPEX scientists are collaborating with principal investigators from Scripps Institution of Oceanography at University of California - San Diego and NOAA Earth System Research Laboratory, who are conducting CalWater 2, a major field study combining measurements from land, sea, and air. DOE is the sponsor of ACAPEX, providing support to Pacific Northwest National Laboratory, Colorado State University, and The Hebrew University of Jerusalem.

Nine DOE national laboratories share the responsibility of managing and operating the ARM Climate Research Facility. ACAPEX operations for AMF2 is being provided by Argonne National Laboratory and Los Alamos National Laboratory. The ARM Aerial Facility is operated by Pacific Northwest National Laboratory.

**ACAPEX Website:**

<http://www.arm.gov/sites/amflacx>



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