Expected outcomes for CalWater 2 include:

- Improvements in prediction systems for the water cycle at weather and climate timescales.
- Distribution of an unprecedented meteorological, microphysical, and chemical dataset collected in AR environments both onshore and offshore for advancing understanding and prediction of aerosol effects on precipitation, and development of decision support tools for extreme precipitation events, hazard response, and water supply for more effective water resources management.

(1) Atmospheric River Phenomenon

ARs are a dynamic confluence of atmospheric moisture prevalent in the midlatitudes and can lead to extreme precipitation totals when they make landfall. They can both modulate and be modulated by lakes and oceans. These phenomena play key roles in the variability of the water cycle at regional and global scales. ARs are a dynamic confluence of atmospheric moisture and can lead to extreme precipitation totals when they make landfall. They can both modulate and be modulated by lakes and oceans.

(2) Cloud-Aerosol-Precipitation Interactions

Atmospheric dynamics couples the water vapor content in the tropics and midlatitudes with aerosols through microphysical processes that, along with orography, influence precipitation. The large-scale flow influences where the aerosols and clouds encounter each other and the thermodynamics determines how the aerosol particles nucleate water vapor to form cloud droplets and ice crystals. Many questions remain regarding the role of aerosols in the development of extratropical cyclones and associated ARs.

Implementation Strategy

A set of science investigations have been proposed to fill gaps including a targeted set of aircraft and ship-based measurements and associated evaluation of data over regions offshore of California and in the eastern Pacific for an intensive observing period between January 2015 and March 2016. The DOE Atmospheric Radiation Measurement (ARM) program has committed airborne and ship-borne facilities for this same period in a study called ACAPEX (ARM Cloud Aerosol and Precipitation Experiment), a complementary study to CalWater 2.

CalWater 2 Vision

Observations are also proposed for subsequent winter seasons as part of a 5-year broad interagency vision to address the CalWater 2 science objectives.