

UW-led field project watching clouds from a remote island off Antarctica

8 April 2016, by Hannah Hickey



Australia has operated a research station on Macquarie Island, located about halfway between New Zealand and Antarctica, since the early 1900s. The local population consists mainly of research staff and penguins. Credit: Jeff Aquilina

It turns out not all clouds are created equal. Though Seattle presents an ideal location for cloud-gazing, it can't reproduce the unique clouds in a part of the world thought to play a key role in the planet's climate.

The vast Southern Ocean circling Antarctica soaks up a large portion of the carbon emissions taken up by the oceans and stores some of the extra heat trapped by the carbon emissions that remain in the air. Clouds play a key role, influencing the transfer of heat and light to the surface, but knowledge of these [clouds'](#) properties and their impacts on the surface is hazy.

A University of Washington atmospheric scientist is leading a project to study the clouds above the Southern Ocean. Seeing how the [cloud droplets](#), small bits of dust, sea spray, and other materials

on which cloud droplets form, ocean and sun interact will help improve global climate models.

Roger Marchand, a UW research associate professor of atmospheric sciences, is leading the 2-year project sponsored by the Department of Energy. The Macquarie Island Cloud and Radiation Experiment, or MICRE, will collect new data for clouds and precipitation in the southernmost seas. The instruments were installed on the island in late March, and are now beginning to collect data.



Instruments, installed in late March, will record just how cloudy it is in the Southern Ocean, how much sunlight reaches the surface, and how much water is in these clouds. Credit: Jeff Aquilina

"We want to study the properties of the clouds, aerosols and precipitation over the remote Southern Ocean, and there are very few land sites where we can take continuous measurements for two years," Marchand said. "Macquarie is one such place, and is ideal in several respects."

The equipment includes instruments to measure such things as the surface precipitation, solar energy reaching the surface, heat radiated by the

sky and surface, water vapor, cloud water and cloud base height.

"The properties of low-altitude clouds appear to be different here, with much larger amounts of supercooled liquid water and smaller droplets than over Northern Hemisphere oceans," Marchand said. Supercooled water is below its freezing point while remaining a liquid.

The field experiment hopes to learn why low-cloud properties are different in this region. It will also provide new measurements of the daily and seasonal changes in cloud cover, and help ground-truth measurements coming from satellites - something that has not been done much for the stormy, inhospitable Southern Ocean.

Marchand hopes that the project will become part of the larger Southern Ocean Cloud Rainfall and Aerosol Transport experiment, or SOCRATES, which if funded will put him and colleagues from the UW and elsewhere aboard ships and aircraft to get more firsthand measurements of Southern Ocean clouds.

MICRE is an international collaboration between the U.S. Department of Energy, the Australian Bureau of Meteorology and the Australian Antarctic Division, which operates a research station on Macquarie Island. After weather-related delays, a French ship was able to deliver the instruments to the island in late March.

Provided by University of Washington

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