

AWARE

ARM West Antarctic Radiation Experiment

<https://scripps.ucsd.edu/expeditions/aware/>



Principal investigator

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Areas of contribution

Polar atmospheric processes

Modelling and forecasting

Polar-lower latitude linkages

Education

Observations

Data archiving

Outreach

Summary

The primary objective of AWARE on the West Antarctic Ice Sheet (WAIS) is to characterize the atmospheric and surface energy budget, and atmospheric thermodynamic structure as completely as possible with available logistics and instrumentation, in order to garner a data set that can be interpreted in the context of large-scale atmospheric dynamics to understand specific warming mechanisms over West Antarctica. The primary objectives of AWARE at McMurdo are (1) to empirically understand the unique Antarctic manifestations of mixed-phase clouds and aerosols, and their effect on the radiation budget, and (2) using the most advanced atmospheric instrumentation available, examine microphysical properties of clouds that have recently descended from the WAIS to Ross Island via the Ross Ice Shelf. Principal Investigator (PI): Dan Lubin, Scripps. D.

Bromwich is one of four Co-PIs.

Description

AWARE scientific goals related to the warming over West Antarctica are accomplished by the following measurements:

1. Surface energy balance including downwelling and upwelling shortwave and longwave radiation, and surface fluxes of momentum, moisture, precipitation, and latent and sensible heat (McMurdo and WAIS).
2. Spectral downwelling radiation measurements in the shortwave and longwave, to relate cloud microphysical properties and atmospheric aerosol and moisture content to the broadband radiation components at the surface, and to make independent retrievals of cloud optical properties for closure study in comparison with the active sensor data (McMurdo primarily and somewhat at WAIS).
3. A complete inventory of cloud properties, including the basic properties of cloud type, cloud fraction, cloud base and geometric thickness (WAIS and McMurdo), and more advanced and altitude-dependent measurements of cloud particle size distribution, thermodynamic phase, cloud particle vertical velocity, and precipitation rate and type (McMurdo).
4. A complete inventory of aerosol properties (McMurdo) including chemical composition, particle size distribution, cloud condensation nuclei (CCN) behavior, hygroscopic behavior, and light scattering properties.
5. The atmospheric state including surface measurements and vertical profiles of temperature, pressure, relative humidity, wind speed and direction (McMurdo and WAIS).

The measurement campaign will take place at McMurdo Station, Ross Island from November 2015 through January 2017 and at the WAIS Divide Ice Camp December 2015 through January 2016. It is possible that an additional observational campaign at WAIS Divide site will take place in the 2016-2017 austral summer.

AWARE will provide comprehensive measurements of liquid, mixed phase and ice clouds and associated aerosols, key processes of concern to YOPP. Further, analysis of the measurements will contribute directly to the improvement of the cloud microphysics scheme in the Antarctic Mesoscale Prediction System (AMPS) that supports the extensive aircraft operations of the U.S. Antarctic Program. AWARE addresses many of the central goals of YOPP.

Timeline

2015-11-01 - 2017-01-25

Regional emphasis

Northern hemisphere: No

Southern hemisphere: Yes

Key project deliverables

Covered in detail in topic 5 but summarized again here.

1. Surface energy balance measurements.
2. Surface radiation measurements.
3. Complete characterization of clouds
4. Complete characterization of aerosols.
5. Atmospheric state measurements.

The primary data set will be for McMurdo Station.

The instrumentation suite is described here:

<https://scripps.ucsd.edu/expeditions/aware/aware-related-instrumentation/>

Fast and open data access is provided by the Atmospheric Radiation Monitoring (ARM) Climate Research Facility, probably completely within 6 months of completion of the AWARE field campaign, around mid 2017.

Data management

<http://www.arm.gov/data/campaigns>

Is data provided to WMO Global Telecommunication System

No

Real-time provision

Enhanced radiosonde observations from McMurdo Station to support AWARE will be transmitted over the GTS

Other information

AWARE is underway but the observational campaign will almost overlap with the start of YOPP. The analysis phase will continue into YOPP. AWARE contributes to many of the goals of YOPP.