

## 2020 EOL Seminar Series

### AEROSOL-CLOUD-PRECIPITATION INTERACTIONS IN MIXED-PHASE CLOUDS OVER THE SOUTHERN OCEAN: RESULTS FROM RECENT FIELD CAMPAIGN

#### Prof. Greg McFarquhar

School of Meteorology, University of Oklahoma

Director, Cooperative Institute for Mesoscale Meteorological Studies



**DATE:** May 5, 2020

**TIME:** 3:30 - 4:30 pm

**LOCATION:** Virtual Talk

#### ABSTRACT

Climate models are challenged by uncertainties and biases in simulating Southern Ocean (SO) clouds, aerosols, precipitation and radiation tracing to a poor understanding of the underlying processes. The Southern Ocean Cloud Radiation Aerosol Transport Experimental Study (SOCRATES) using the NSF/NCAR G-V aircraft, the Macquarie Island Cloud Radiation Experiment (MICRE) using surface observations, the Measurements of Aerosols, Radiation and Clouds over the Southern Ocean (MARCUS) and the Clouds Aerosols Precipitation Radiation and Atmospheric Composition over the Southern Ocean (CAPRICORN) cruises using shipborne instruments made extensive in-situ and remote sensing measurements of clouds, aerosols, precipitation and thermodynamics over the SO between 2016 and 2018. Synergistically these data provide measurements of the boundary layer and free troposphere structure, together with vertical distributions of liquid and mixed-phase clouds and aerosols over cold waters where supercooled and mixed-phase boundary layer clouds are frequent, including the most comprehensive data south of the oceanic polar front and in the cold drop sector of cyclones.

Data from these campaigns allow the investigation of cloud-aerosol-radiation-precipitation interactions. Highlights from these campaigns include measurements of pristine environments with few ice nucleating particles, numerous small and few large aerosols above cloud, and ubiquitous supercooled water in thin, multiple layers with small-scale generating cells near cloud tops. The dependence of cloud properties and icing regions on aerosol amount and environmental characteristics (e.g., wind speed, sea surface temperature, position relative to cyclone center, etc). and the nature of fine-scale transitions between phases will be presented. The use of SO data for evaluating and improving models with different spatial/temporal scales will be discussed.

**Webcast:** [www.fin.ucar.edu/it/mms/tw/fl-1022.html](http://www.fin.ucar.edu/it/mms/tw/fl-1022.html)

For more information, contact Melissa Ward: [mward@ucar.edu](mailto:mward@ucar.edu)