Radiative forcing of clouds plays a crucial role in the determination of the surface and atmospheric energy balance. Studies performed in the Arctic show that cloud-radiation interactions may result in persistence and resilience of mixed-phase clouds, which are closely associated to atmospheric moisture and temperature inversions. The extent to which our knowledge of Arctic cloud processes transfer to Antarctic clouds is not clear. The paucity of detailed observations of the Antarctic atmosphere and its relationship to cloud macrophysics suggest that we do not yet have sufficient descriptions to evaluate the accuracy of the Antarctic cloud process representations in climate models. In the view that the U.S. Department of Energy (DOE) launched the 1-year long Atmospheric Radiation Measurement (ARM) West Antarctic Radiation Experiment (AWARE) campaign, which involved various instruments (e.g., lidars, radars, radiometers, etc.). The use of data obtained by the same instrument suite and the utilization of uniform methodology allows an unbiased bulk statistics comparison between Arctic and Antarctic observations. Here, we present a comparison between annual data gathered during AWARE (in 2016) and data gathered at Barrow, Alaska (in 2015), aiming to address some of the Antarctic long-term observational deficiencies.

**Methodology**

- **Utilization of (mainly) the Ka-band ARM zenith radar (KAZR) and the high-spectral resolution lidar (HSRL) data, together with sounding, microwave radiometer (MWR), and ceilometer data.**
- Generate a KAZR cloud mask (unknown phase or unknown phase with liquid in the profile when the retrieved LWP > 25 g/m²) using the moderate sensitivity (MD) and general (GE) modes (-16 dB SNR threshold), after low-level artifacts are removed from the data, and MD mode signal leakage above reflective layers are mitigated.
- Generate a HSRL cloud mask which includes water phase classification based on median-filtered monthly linear depolarization ratio (LDR) versus particulate backscatter cross-section (β_a) histograms (Fig. 1), with the aid of the ceilometer data (at low-levels to prevent biases from low-level artifacts).
- Grid the KAZR cloud masks into the HSRL grid, i.e., 10 sec (7.5 m) temporal (vertical) resolutions.
- Complementary analysis steps (e.g., removing cloud mask layers thinner than 60 m) and the HSRL’s liquid-cloud mask with the MWR liquid water path retrievals to calculate liquid water occurrence fraction, etc.

**Fig. 1:** HSRL return linear depolarization ratio (LDR) versus log-scaled particulate backscatter cross-section (β_a) two-dimensional monthly histogram for McMurdo on March 2016, after a 4x4 median filter was performed. The locations of the different populations within the histogram, as well as the resolved boundary lines between them (determined by following the histogram’s “troughs”) are shown as well.

**Fig. 2:** Cloud profile evolution at McMurdo during August 2016, using hourly bin fraction threshold of 25%. The ticks on the x-axis denote the days of the month at 00:00 UTC.