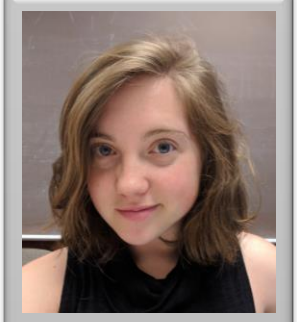

# WEST ANTARCTICA AS A NATURAL LABORATORY FOR SINGLE- AND MIXED-PHASE CLOUD MICROPHYSICS

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Clouds are important atmospheric features that contribute to energy regulation in the global climate system. Remote and unaffected by local pollution sources, Antarctica offers a unique laboratory to study clouds and their influence on the surface energy budget. The study of these clouds is particularly interesting as global temperatures increase and ice sheets begin to melt. As solar radiation travels to the surface of Earth, clouds over Antarctica absorb and scatter that radiation. The amount of radiation absorbed depends on certain physical properties of the cloud, including its thermodynamic phase (whether the cloud consists of ice crystals, liquid water droplets, or a mixture of both), cloud base height, optical depth, and effect cloud particle radius. This research includes analysis of data from active and passive remote sensors deployed at the West Antarctic Ice Sheet during the 2015-2016 summer field season. Cloud microphysical properties were retrieved via differential analysis of solar spectra as well as a numerical radiative transfer model. These parameters have never been examined in this way on the West Antarctic Ice Sheet, and their values will be essential to understanding how clouds over West Antarctica influence our changing global climate.

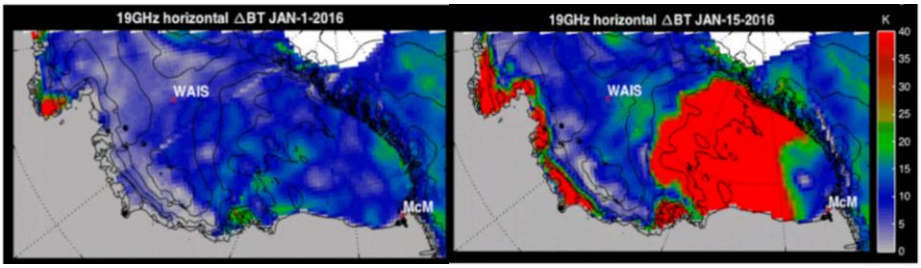


**Figure 1 Satellite data in the microwave region over the West Antarctic Ice Sheet shows a large-scale ice melt event (red) during January 2016.** *Courtesy of R.C. Scott.*

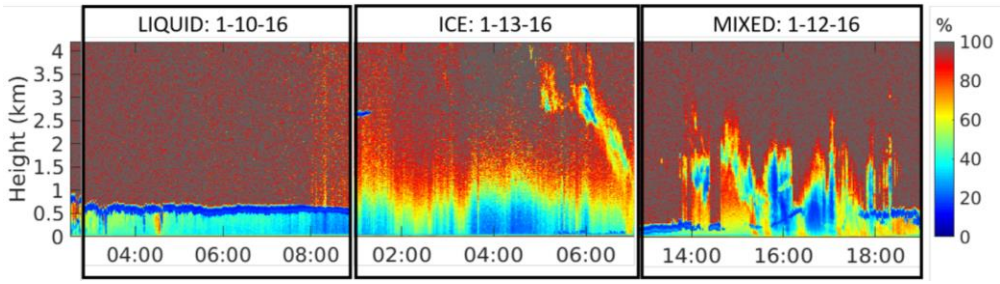


**Figure 2 Lidar data as a function of time shows the thermodynamic phase of clouds over West Antarctica. High depolarization ratios (red/orange) correspond to ice clouds, and low ratios correspond to liquid-bearing clouds (blues).**