

# AWARE Breakout Session Season Two: The Hotel Inspectors



The AWARE Science Team has been evaluating and scrutinizing an array of climate models, reminiscent of the elusive hotel inspectors who made Basil Fawlty neurotic.

## INTRODUCTION

Dan Lubin, Scripps Institution of Oceanography  
2019 ARM/ASR Joint User Facility and Principal Investigator Meeting  
June 12, 2019



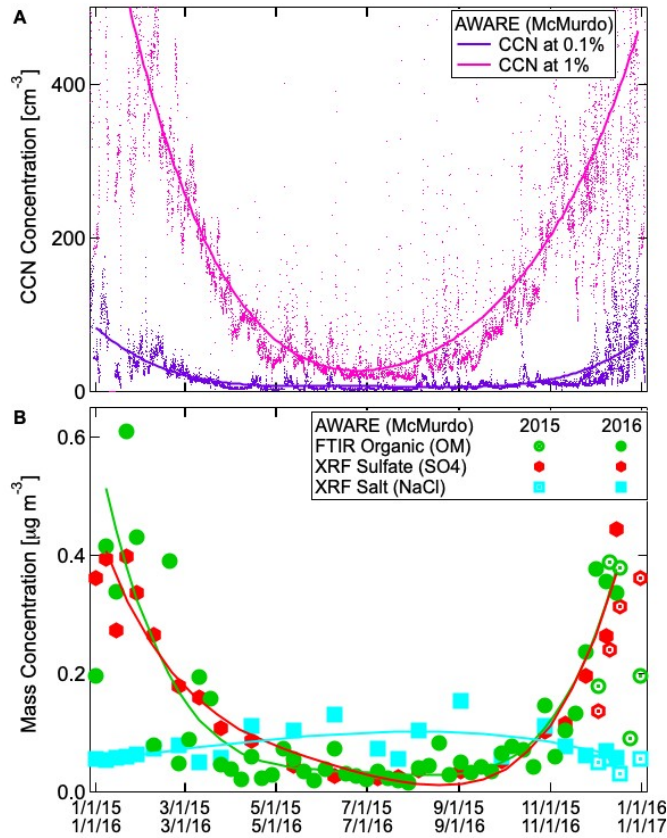
1. 10:30 **Dan Lubin** (Scripps Institution of Oceanography) – Introduction
2. 10:40 **Keith Hines** (Byrd Polar and Climate Research Center) - Microphysics of Summer Clouds in Central West Antarctica Simulated by Polar WRF and AMPS
3. 10:50 **Wuyin Lin** (BNL) - WAIS warming event simulated with GISS ModelE and E3SM
4. 11:00 **Xiaohong Liu** (University of Wyoming) - Evaluating the impact of simulated mixed-phase clouds on the Antarctic energy budget during the AWARE field campaign
5. 11:10 **Israel Silber** (Penn State) - Cloud and water vapor influences on ERA5, AMPS, and ModelE3 surface downwelling longwave radiation biases in West Antarctica
6. 11:20 **Fan Yang** (BNL) - Effects of boundary decoupling layer on the change of phase partitioning in the mixed-phase stratiform clouds
7. 11:30 **Damao Zhang** (BNL) - Polar aerosol profile comparisons using AWARE lidar measurements
8. 11:40 **Alessandro Battaglia** (University of Leicester) - Triple frequency radar characterization of cloud microphysics at McMurdo during AWARE
9. 11:50 **Discussion** – Topic 1: From model evaluation to microphysical parameterization improvements. Topic 2: Future ARM science and fieldwork in Antarctica.

# AWARE Publications

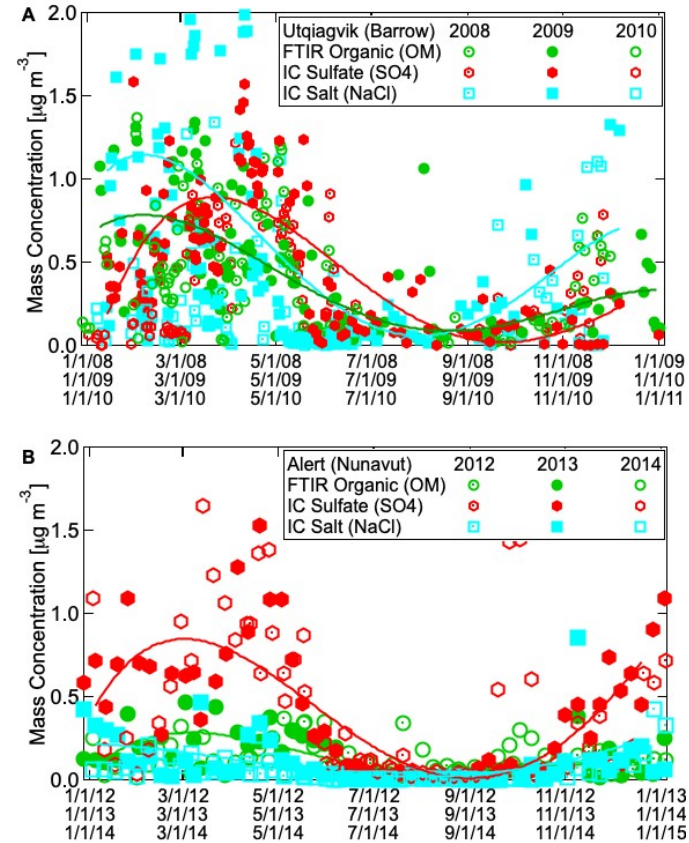
- Hines, K. J., D. H. Bromwich, S.-H. Wang, I. Silber, J. Verlinde, and D. Lubin, 2019: Microphysics of summer clouds in central West Antarctica simulated by Polar WRF and AMPS. *Atmos. Chem. Phys. Disc.*, acp-2018-1251, in review.
- Hu, X., S. A. Sejas, M. Cai, Z. Li, and S. Yang, 2019: Atmospheric dynamics footprint on the January 2016 ice sheet melting in West Antarctica, *Geophys. Res. Lett.*, **46**, 2829-2835. <https://doi.org/10.1029/2018GL0181374>.
- Liu, J., and Coauthors, 2018: High summertime aerosol organic functional group concentrations from marine and seabird sources at Ross Island, Antarctica, during AWARE. *Atmos. Chem. Phys.*, **18**(12), 8571-8587, doi: 10.5194/acp-18-8571-2018.
- Lubin, D., and Coauthors, 2019: AWARE: The Atmospheric Radiation Measurement (ARM) West Antarctic Radiation Experiment, *BAMS*, in review.
- Nicolas, J. P., and Coauthors, 2017: January 2016 extensive summer melt in West Antarctica favored by strong El Niño, *Nature Commun.*, **8**:15799, doi: 10.1038/ncomms15799.
- Scarci, K., R. S. Scott, M. L. Ghiz, and D. Lubin, 2019: Influence of meteorology and cloud properties on shortwave irradiance at Ross Island, Antarctica. *Geophys. Res. Lett.*, in review.
- Scott, R. C., D. Lubin, A. M. Vogelmann, and S. Kato, 2017: West Antarctic Ice Sheet cloud cover and surface radiation budget from NASA A-Train satellites. *J. Clim.*, **30**, 6151-6170, doi: 10.1175/JCLI-D-16-0644.1.
- Scott, R. C., J. P. Nicolas, D. H. Bromwich, J. R. Norris, and D. Lubin, 2019: Meteorological drivers and large-scale climate forcing of West Antarctic surface melt. *J. Clim.*, **32**, 665-683, doi:10.1175/JCLI-D-18-023.1.
- Silber, I., J. Verlinde, E. W. Eloranta, and M. Cadeddu, 2018: Antarctic cloud macrophysical, thermodynamic phase, and atmospheric inversion coupling properties at McMurdo Station: 1. Principal data processing and climatology. *J. Geophys. Res.*, **123**, 6099-6121, <https://doi.org/10.1029/2018JD028279>.
- Silber, I., J. Verlinde, E. W. Eloranta, C. J. Flynn, & D. M. Flynn, 2018: Polar liquid cloud base detection algorithms for high spectral resolution or micropulse lidar data. *J. Geophys. Res.* <https://doi.org/10.1029/2017JD027840>.
- Silber, I., Verlinde, J., Cadeddu, M., Flynn, C. J., Vogelmann, A. M., & Eloranta, E. W., 2019: Antarctic cloud macrophysical, thermodynamic phase, and atmospheric inversion coupling properties at McMurdo Station. Part II: Radiative impact during different synoptic regimes. *J. Geophys. Res.* <https://doi.org/10.1029/2018JD029471>.
- Silber, I., A. M. Fridlind, J. Verlinde, A. S. Ackerman, Y.-S. Chen, D. H. Bromwich, S.-H. Wang, M. Cadeddu, and E. W. Eloranta, 2019: Persistent supercooled drizzle at temperatures below -25°C observed at McMurdo Station, Antarctica, *J. Geophys. Res.*, in review.
- Wilson, A., R. C. Scott, M. P. Cadeddu, V. Ghate, and D. Lubin, 2018: Cloud optical properties over West Antarctica from shortwave spectroradiometer measurements during AWARE. *J. Geophys. Res.*, **123**, doi:10.1029/2018JD028347.
- Zhang, D., A. M. Vogelmann, P. Kollias, E. P. Luke, F. Yang, D. Lubin, and Z. Wang, 2019: Comparison of Antarctic and Arctic Stratiform Mixed-phase Cloud Properties Using Ground-based Remote Sensing Measurements, *J. Geophys. Res.*, in review.
- Zou, X., D. H. Bromwich, J. P. Nicolas, A. Montenegro, and S.-H. Wang, 2019: West Antarctic surface melt event of January 2016 facilitated by foehn warming. *Q. J. R. Meteorol. Soc.*, **145**, 687-704, doi: 10.1002/qj.3460.
- Witze, A., 2016: Antarctic cloud study takes off. *Nature*, **529**, 12.

# AWARE Aerosol Contrasts with Arctic

- Prof. Lynn Russell (SIO), using AOS and her own filter sampling/FTIR
- This work featured in the AWARE BAMS article (in review)



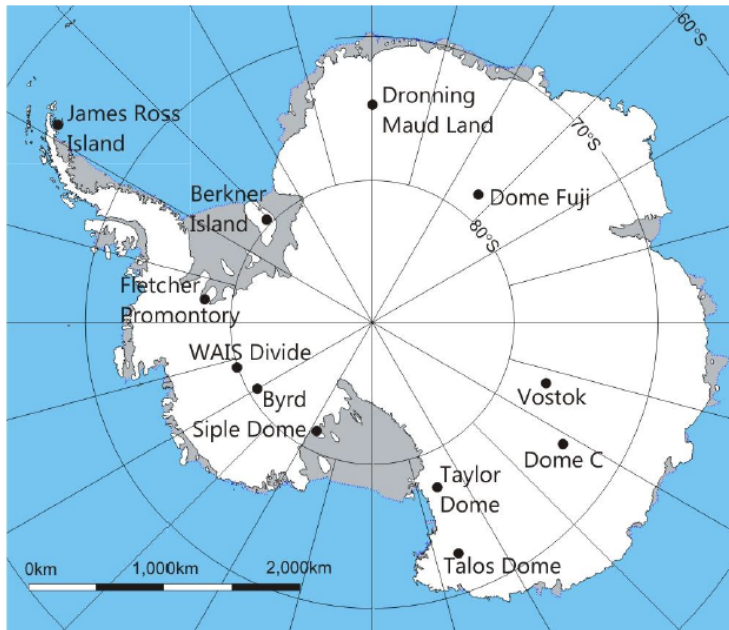
Antarctic seasonal cycle driven by phytoplankton (sulfate), seabirds (organic), and wind-driven sea spray (salt).



Arctic seasonal cycle shows highest sulfate and organic mass concentrations associated with springtime Arctic haze.

# “SELF-AWARE”

- A new NSF-supported summer field program at Siple Dome
- Dan Lubin and Ryan Scott will deploy December 2019-January 2020
- Build on success with SEB equipment, here miniaturized and solar-powered for small aircraft support at remote West Antarctic locations



# First Discussion Topic



Challenge to AWARE Science Team and ARM/ASR Researchers:  
Can we make a Waldorf Salad?

Specifically, now that we have evaluated the performance of various models, can we use AWARE case studies to help build new and improved mixed-phase parameterizations?



# Second Discussion Topic

- What are the next steps and new directions for Antarctic atmospheric science using ARM/ASR facilities?
- Building on the success of AWARE and MARCUS
- MARCUS – a great acronym!
  - Solid *male* name from Western heritage and antiquity.

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- MARCUS – a great acronym!
  - Solid *male* name from Western heritage and antiquity.
  - So to start discussion on future work, I'll suggest for an acronym a solid *female* name from Western heritage and antiquity - ALCINA
  - Who is ALCINA? Stick around for the discussion session...