



ARM West Antarctic Radiation Experiment (AWARE)



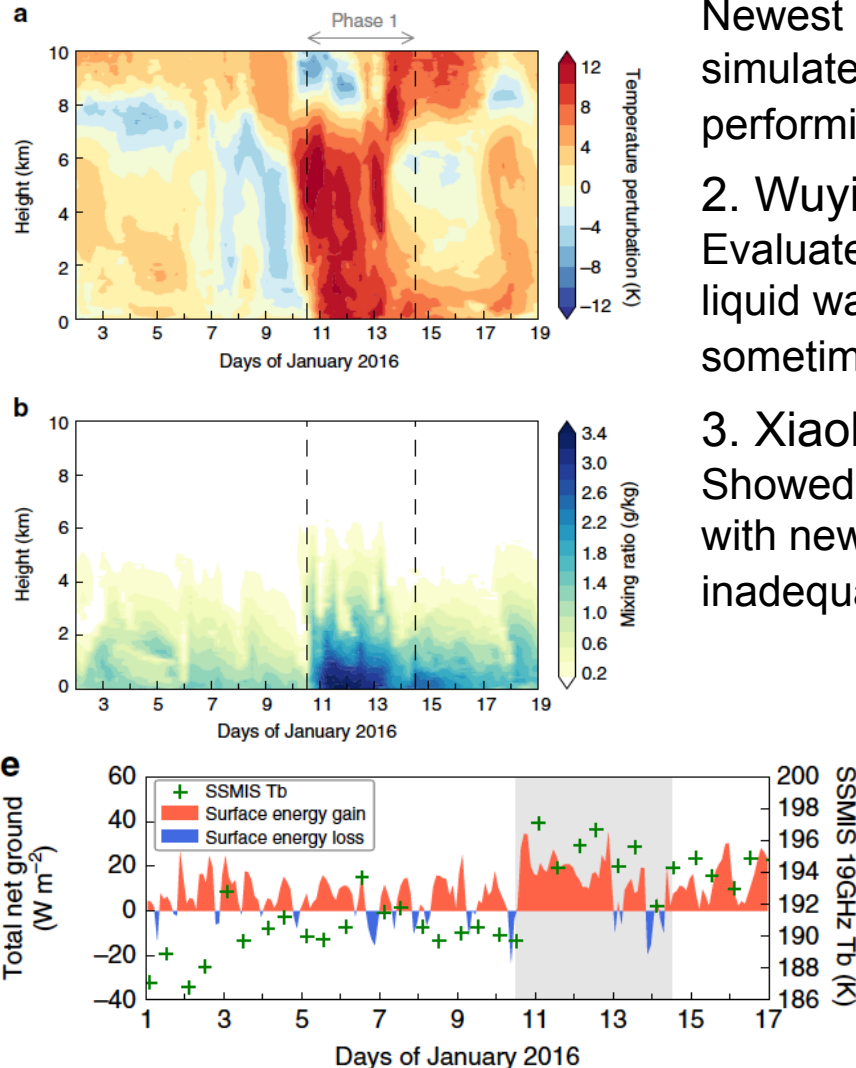
Breakout Session Summary

Dan Lubin, Scripps Institution of Oceanography
2019 ARM/ASR Joint User Facility and PI Meeting

- WAIS Divide 2015-2016 Melt Event case study data are now being used to evaluate and potentially improve a variety of regional and global climate models
- AMF2 data from McMurdo have yielded interesting process studies, case studies, and retrieval techniques some of which are now published in *JGR*, *ACP*, etc.
- Realization that AWARE has been extraordinarily lucky and successful:
 - AWARE's scientific accomplishments are now starting to highlight what we *didn't* get.
 - Time to start thinking about next steps in Antarctic atmospheric science.



Melt event analysis of Nicolas et al. 2017



1. Keith Hines (Byrd Polar)

Evaluated two regional models, AMPS & Polar WRF: Newest mixed-phase parameterizations needed to simulate cloud liquid water & SEB, but still not performing well enough.

2. Wuyin Lin & Andrew Vogelmann (BNL)

Evaluated E3SM & GISS ModelE: Showed how liquid water biases contributed to LW biases, which sometimes cancel other biases, masking errors.

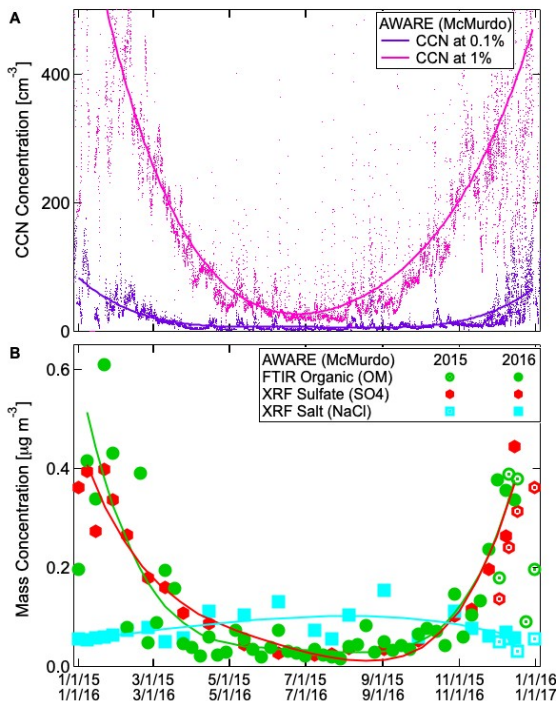
3. Xiaohong Liu (U Wyoming)

Showed how overestimated LWP in E3SM, even with newest mixed-phase physics, leads to inadequate surface SW flux.

4. Israel Silber (Penn State)

Examined ERA5 and AMPS, showed surface LW biases linked to excess ice production, emphasized sensitivity to mixed-phase cloud simulation.

AMF2 on Ross Island



5. Lynn Russell (SIO)

Variability in aerosol sources and chemistry, including sharp contrasts with Arctic, demonstrates high value of a full annual cycle of aerosol observations in polar regions.

6. Fan Yang (BNL)

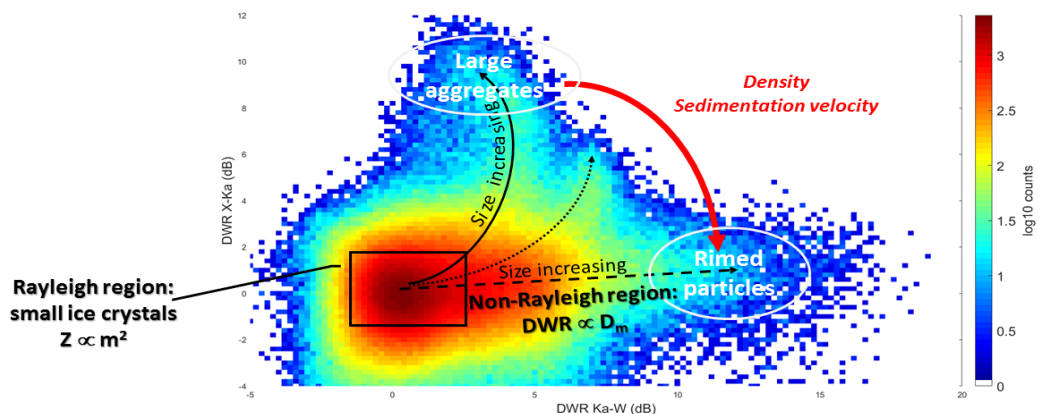
Examined rapid changes in phase partitioning in Ross Island cloud, and possible explanation via boundary layer decoupling.

7. Damao Zhang (BNL)

Examined contrasts in Antarctic versus Arctic aerosol vertical profile using HSRL and KAZR, and relationship with CCN and cloud liquid water.

8. Frédéric Tridon (U Cologne)

Demonstrated how triple-frequency radar analysis can reveal important Antarctic cloud processes such as intense aggregation and riming.



Please keep us informed about papers using AWARE data!



Time for some provocative discussion...

- What are the next steps and new directions for Antarctic atmospheric science using ARM/ASR facilities?
 - Building on the success of AWARE and perhaps MARCUS
 - More community input in planning a field program than was possible with AWARE
- MARCUS – a great acronym!
 - Solid *male* name from Western heritage and antiquity
 - e.g., Marcus Aurelius, 167: *Meditations*
 - To start discussing future Antarctic work, how about a solid *female* name from Western heritage and antiquity - ALCINA
 - *Who is ALCINA?...*



- **ALCINA - Antarctic Low Cloud Interaction with Natural Aerosol**
 - A provisional acronym to begin discussion of current scientific issues and next steps in Antarctic atmospheric research.
 - Perhaps involving ARM/ASR facilities.
 - Maybe deploy to a major research station near the Antarctic Peninsula.
 - ❖ Palmer Station (US Antarctic Program)
 - ❖ Rothera Station (British Antarctic Survey)
 - ❖ These year-round stations may be better than McMurdo for atmospheric science, supporting variety of techniques
 - ❖ Relevant to West Antarctic Ice Sheet loss and sea level rise



- Definition 1: ALCINA - Antarctic Low Cloud Interaction with Natural Aerosol
 - A provisional acronym to begin discussion of current scientific issues and next steps in Antarctic atmospheric research.
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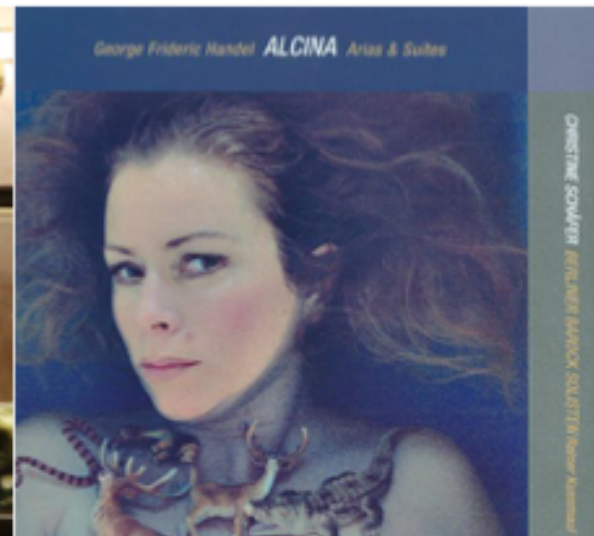
- Definition 2: From Western mythology
 - (e.g., *Orlando Furioso*)
 - ALCINA - a sorceress living on an island who, when she became bored with her lovers, would turn them into rocks, trees, or wild animals.

More on Definition 2



- ALCINA is a favorite character in early opera...
- Handel's 1735 "Fatal Attraction" opera (*Alcina*, HWV 34)
 - Haydn's best opera, 1782 (*Orlando Paladino*, Hob. 28/11)
 - The first opera ever written by a female composer: Francesca Caccini, 1625 (*La Liberazione di Ruggiero Dall'Isola d'Alcina*)

**Add this to your
Music Appreciation 101:**
Handel: *Alcina*
Festival d'Aix-en-Provence
Starring: Patricia Petibon
Freiberger Barockorchester
Andrea Marcon, Conductor
ERATO Blue ray 9029 597435



Going Forward in Antarctica



Rothera Station, BAS
67°34'02" S 68°07'33" W

These winter-over stations may offer better siting for aerosol sampling and radar observation, and potential for aircraft & ship support.

Palmer Station, USAP
64°46'27"S 64°04'10" W



THANKS!

QUESTIONS?