

## Summary of the SPP-PROM CR-SIM Workshop at University of Leipzig

A one-week workshop on the radar forward operator CR-SIM (Cloud resolving model Radar Simulator) was given by CR-SIM developer Mariko Oue from Stony Brook University, USA from Sep 9 to Sep 13, 2019 at the Institute for Meteorology of the University of Leipzig (Fig. 1 and Fig. 2). Seven participants from the SPP-PROM community attended the workshop.



Figure 1: CR-SIM workshop group.

The workshop included

- 1) an introduction of the capabilities of CR-SIM and its applications,
- 2) the download and installation of CR-SIM,
- 3) the configuration and realization of test runs of CR-SIM,
- 4) a case study-based training of CR-SIM usage and output analysis,
- 5) the presentation of preliminary analysis by participants.



Figure 2: Snapshot made during the CR-SIM Workshop.

Mariko Oue had prepared a few sample WRF simulation outputs at different US DOE Atmospheric Radiation Measurement (ARM) stations for the participants (e.g., shallow cumulus case from LASSO campaign, deep convection case from MC3E campaign, and an Arctic mixed-phase cloud case at Utqiagvik, Alaska). The participants

learned using CR-SIM by looking at different questions like:

1. How do radar variables change with locations (convective/stratiform regions, land/ocean)?
2. How do radar variables change when accounting for instrument characteristics like e.g., attenuation, sensitivity (Fig. 4)?
3. How do radar variables change with radar frequency etc. (Fig. 3)?

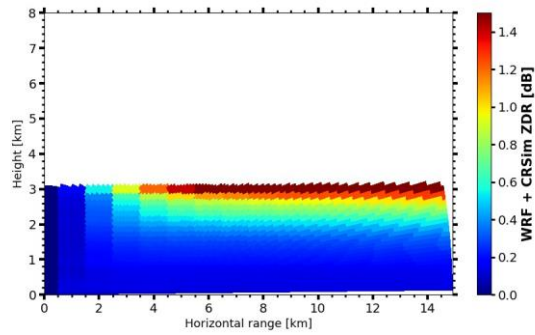


Figure 3: CR-SIM tests: 1. A range-height indicator (RHI) plot of differential reflectivity (ZDR) simulated from an Arctic case (WRF model 2013-05-02, Barrow). Radar frequency is 35 GHz, and range resolution is 100m.

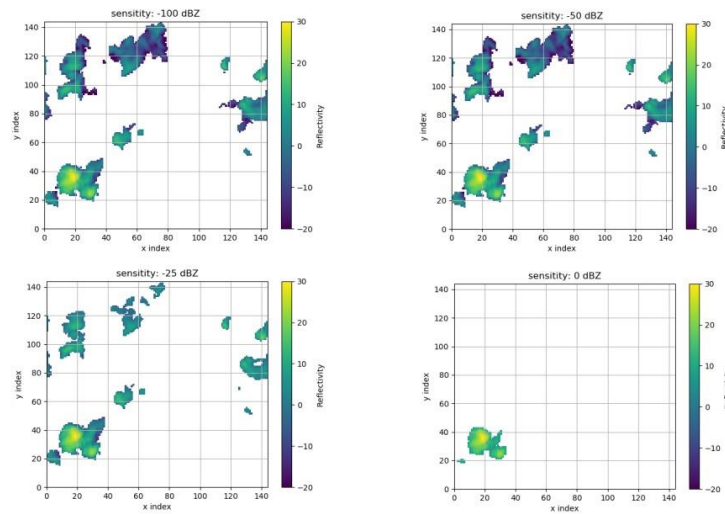


Figure 4: CR-SIM tests: 2. Comparisons of radar reflectivity with different sensitivity assumptions for shallow cumulus case of LASSO experiment.

Not only the workshop participants enjoyed the workshop and feel ready to use CR-SIM in the future but also Mariko Oue found the feedback of the new users on points to be improved helpful. During her stay in Leipzig, Mariko Oue also gave a seminar on a CR-SIM application titled “Investigation of Observational Error Sources in Multi Doppler Radar Wind Retrievals Using a Radar Forward Simulator”.