ARM Translator Products for WBLP

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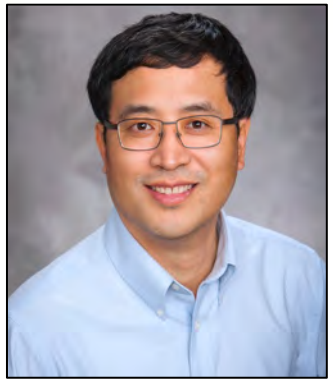
U.S. DEPARTMENT OF ENERGY

This work was performed under the auspices of the U.S. Department of Energy by Lawrence Livermore National Laboratory under contract DE-AC52-07NA27344. Lawrence Livermore National Security, LLC. LLNL-PRES-841505

Science Product Development Led by a Team of Scientists

ARM Translator Group

Translators are liaisons between the scientific community and ARM infrastructure staff members, and develop Value-Added Products, or VAPs, from the direct output of ARM instruments or other VAPs.



Shaocheng Xie
Warm Clouds POC
EPCAPE POC

John Shilling
Aerosol POC
TRACER POC

Damao Zhang
High-Latitude POC
SAIL POC

Scott Collis
Convective POC
AWAKEN POC

Scott Giangrande
Lead Translator
COMBLE POC

Krista Gaustad
Software Development

Ken Kehoe
Data Quality

More on ARM Translators

- **Translators actively engage with the climate community to promote:**
  i. Improved accessibility
  ii. Improved documentation and uncertainty estimates for ARM datasets
  iii. New support for data visualization and analyses
  iv. New modeling diagnostics or forward-instrument operator tools
  v. New model-observational hybrid activities
- **Translators prioritize efforts based on input from the communities including the ARM UEC, AMSG, CPMSG, Triennial Review, ASR WGs, ARM field campaign ST.**
  - Provide more timely AMF VAP production and formalizing of AMF VAP request processes in conjunction with ARM infrastructure leads and active AMF campaign Pis
  - Support for new instrumentation and capabilities (e.g., AOS, scanning radar and lidar)
  - Data quality and uncertainty
  - Improvements to product communication and accessibility

See the updated “ARM translator plan”, which will be available in November 2022

Core ARM Translator VAPs for AMFs

WBLP WG Translator Point of Contact: Shaocheng Xie xie2@llnl.gov

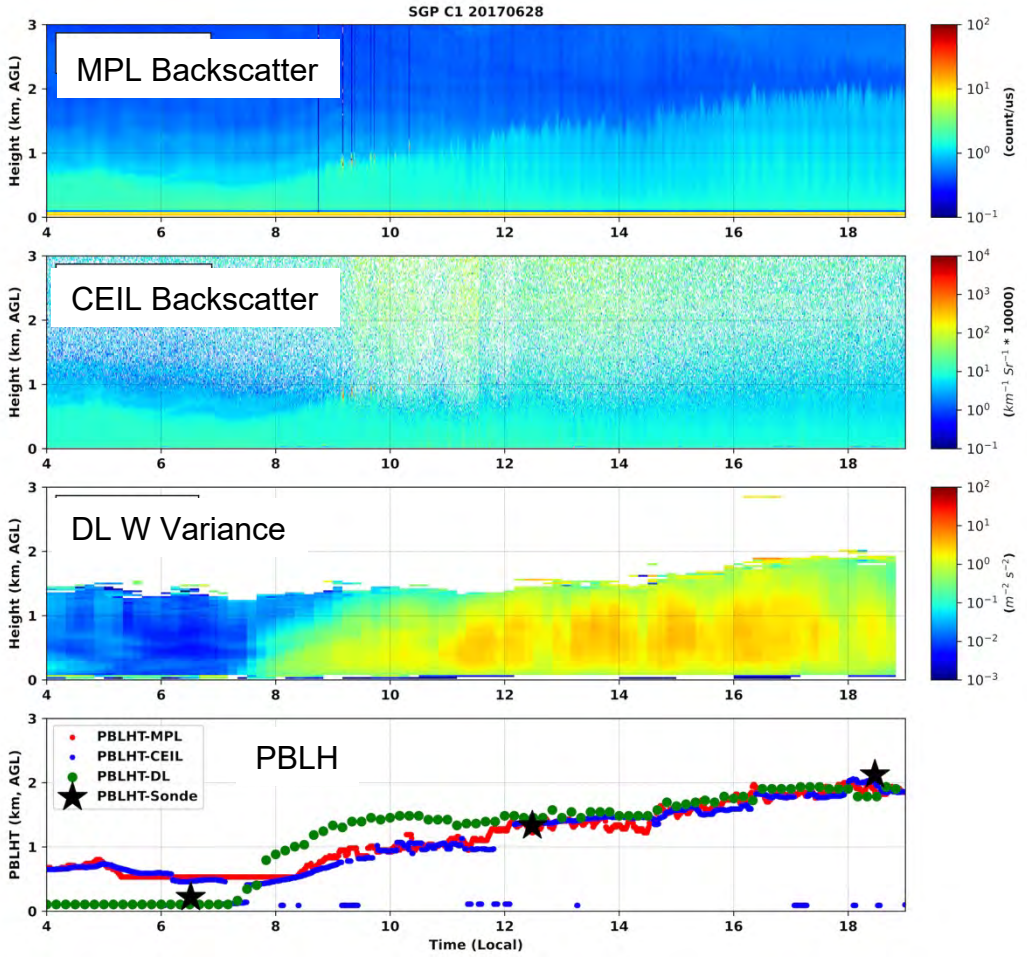
The list includes aerosol & cloud properties, PBLH, Surface Fluxes, as well as the large-scale conditions.

The list could be revised according to feedback from the communities

ARM VAP	Translator / Contact	Expected Timetable
AOP/AOD	**Shilling**	**1 week of data collection for AOP, ~1 year for AOD**
AERIoe	Zhang	6 months of end of campaign
ARMBE	**Xie**	**<1 month when required VAPs available**
AERINF	**Zhang**	1 week of data collection
ARSCL	**Giangrande**	**< 1 month of data collection**
INTERPSONDE	**Giangrande**	**< 1 month of data collection**
MWRRET	**Zhang**	**1 week of data collection**
MICROBASE_PLUS	**Giangrande**	**Upon availability of MWRRET**
PBL Height	**Zhang**	**1 week of data collection**
MPLCLDMASK	**Zhang**	**1 week of data collection**
DLPROF	**Zhang**	**1 week of data collection**
QCRAD / RADFLUX	**Zhang**	**1 week of data collection**
QCECOR	Xie	1 month of end of campaign
SPHOT COD	**Giangrande**	**6 months of end of campaign**
LDQUANTS/VDISQUANTS	**Giangrande**	<1 week of data collection
SACRGRID	**Giangrande**	<2 months of data collection
VARANAL	**Xie**	3-6 months of end of campaign

Data Product Highlight: PBLHT from Lidar Measurements

VAPs	ARM sites
PBLHT-Sonde	SGP(2001-2021), ENA(2013-2021), NSA(2002-2021), AMF field campaigns
PBLHT-MPL	SGP (2014-2021), CACTI
PBLHT-CEIL	SGP (2012-2021), ENA (2013-2021), NSA (2013-2021), AMF field campaigns
PBLHT-DL	SGP (2010-2021)
PBLHT-RL	Under development

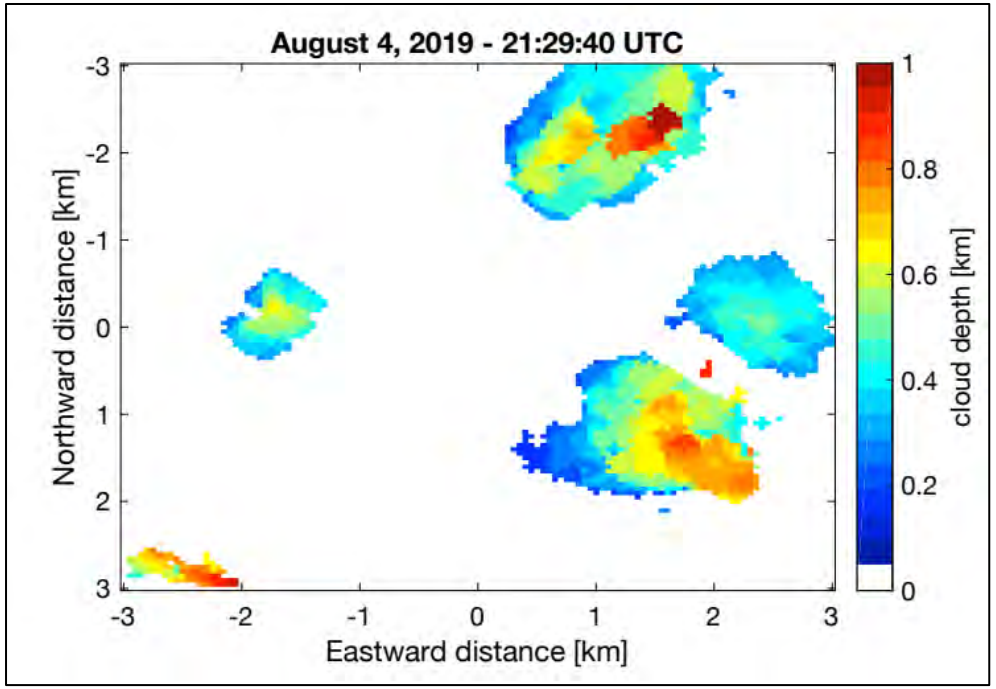


Translator Contact: Damao Zhang, damao.zhang@pnnl.gov

Clouds Optically Gridded by Stereo (COGS) VAP

For more VAP information, please contact Rusem Oktem: roktem@lbl.gov

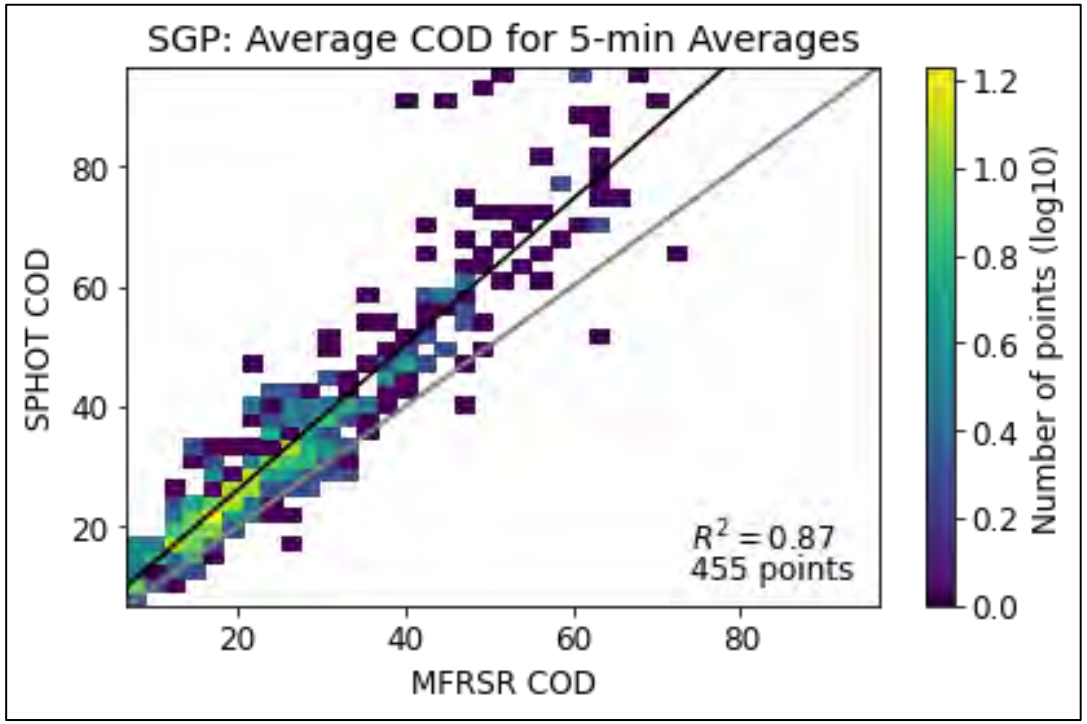
- COGS is generated from a ring of six stereo cameras at the SGP site.
- Available in the ARM archive as an evaluation product. The VAP is best-suited for shallow cumulus clouds.
- It provides a 4D map of cloudiness, which can be used to calculate cloud-base height, vertically projected cloud fraction estimates, cloud-top speeds, etc.
- The 4D map of cloudiness has:
  - 50 m resolution in space,
  - 20 sec resolution in time, and
  - Samples (6 km)^3 volume.



Stereo data also available for CACTI and TRACER

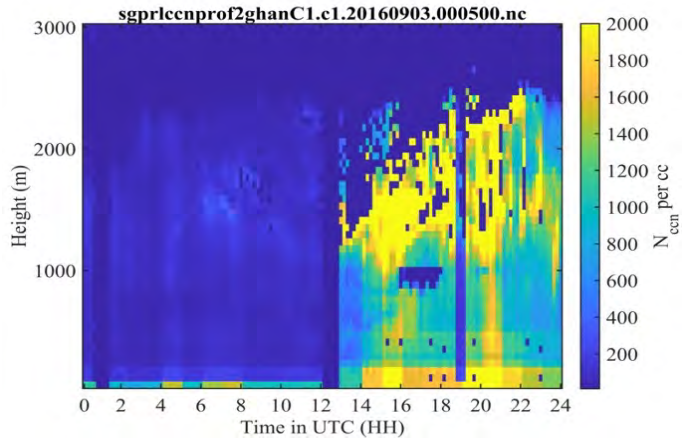
ARM Cimel Sunphotomter Cloud Mode VAP Product

For more VAP information, please contact Lynn Ma: malynn@bnl.gov

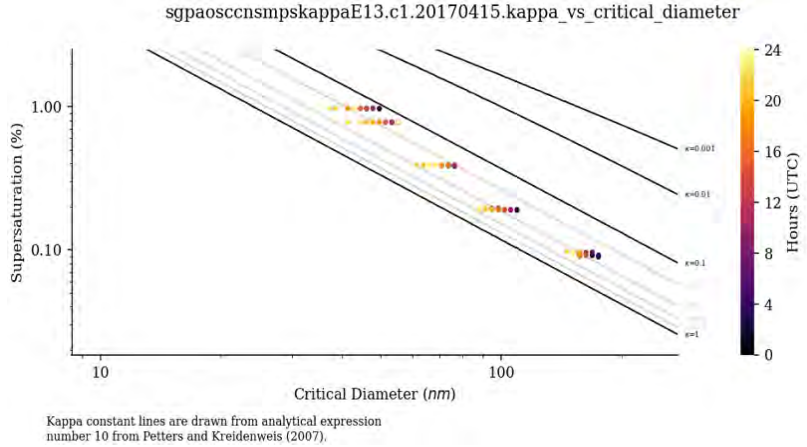


- Microphysical Cloud Properties from ARM Cimel Sunphotometer
- New Cloud Optical Depth (COD), Cloud droplet effective radius (EFF), and Liquid Water Path (LWP) retrievals.
- Uncertainty quantification, and long-term ARM evaluation.
- Initial dataset release covering ARM SGP site can be downloaded now. Adding ENA, COMBLE, LASIC, and other sites soon.

Data Product Highlight: Aerosol VAPs



Vertical CCN profiles at 0.4% supersaturation



CCNPROF: estimates the vertical distribution of CCN as a function of supersaturation.

- Currently working on 2016 SGP data and comparing to in-situ G-1 measurements from HI-SCALE.
- Starting to derive f(RH) for ENA.

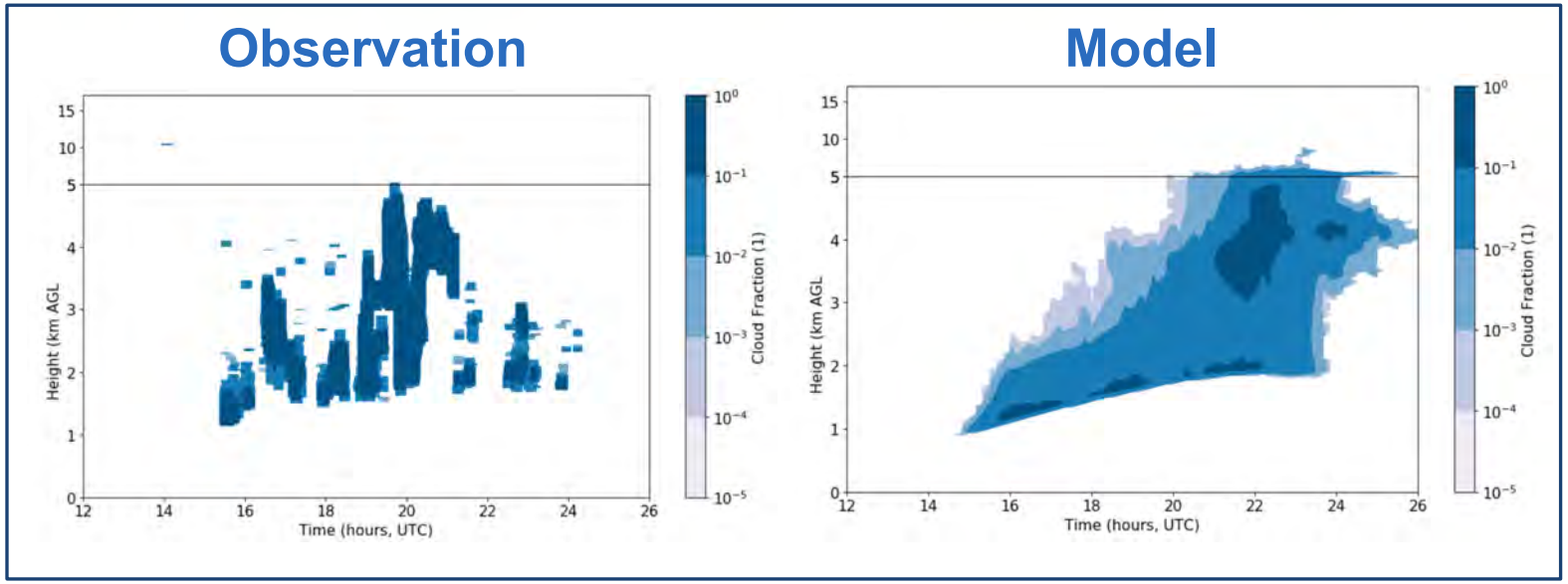
CCN kappa VAP: uses CCNC and SMPS measurements to parameterize hygroscopicity with the kappa parameter.

- Kappa data for April 2017 – February 2021 at SGP are newly available.
- Will extend to other sites/deployments (ANX, ASI, COR, MOS) in coming FY.

Translator Contact: John Shilling, john.shilling@pnnl.gov

LASSO-O Bundles

For more VAP information, please contact Bill Gustafson: william.gustafson@pnnl.gov



- The initial Large-Eddy Simulation (LES) ARM Symbiotic Simulation and Observation (LASSO) projects enables users to compare models with ARM observations collected at the SGP site during shallow cumulus events.
- Bundles consist of LES outputs for each event (95 shallow cumulus events observed from 2015-2019 over the SGP site), and the items needed to reproduce the LES results.
- Observations from those shallow cumulus events, and skill scores / diagnostic details identifying how the LES behaved.

Large-scale Forcing (VARANAL)

LLNL: Cheng Tao
Shaocheng Xie

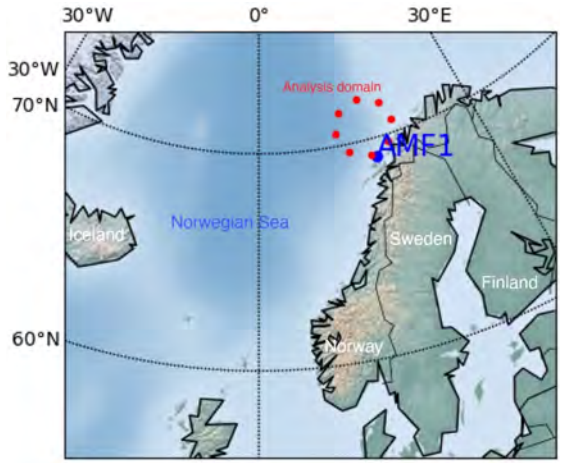
ARM CLIMATE RESEARCH FACILITY

COMBLE

Objective: To quantify the properties of boundary layer convection and air-mass transformations in cold-air outbreaks (CAO) over open water in the Arctic.

VARANAL settings for COMBLE:

- Location: centered at 14.9ºE, 70.6ºN
- Time: Dec. 2019 – May 2020
- Domain size: 150 km in radius
- Resolution: hourly, 25 mb



*The variational analysis domain is enclosed by the red circle. The AMF1 is located at the edge of the domain.

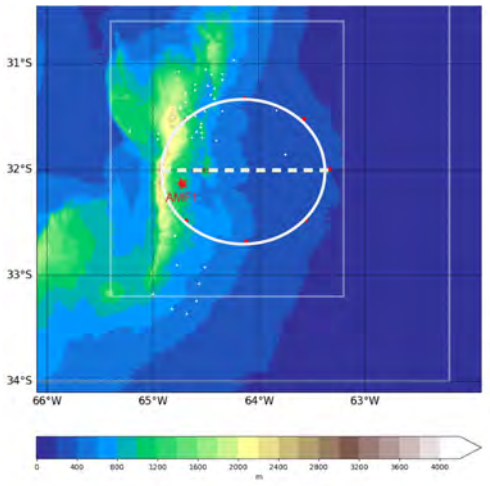
Available in the ARM Archive.

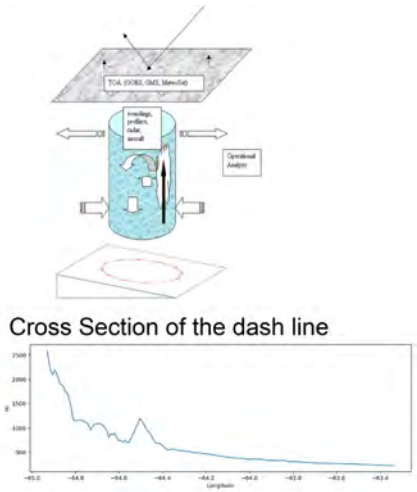
CACTI

Objective: To improve understanding of cloud life cycle and organization in relation to environments.

VARANAL settings for CACTI:

- Location: centered at 64.1ºW, 32ºS
- Time: Oct. 2018 – Apr. 2019
- Domain size: 75 km in radius
- Resolution: hourly, 25 mb





*The VARANAL for CACTI is derived in both pressure and sigma coordinate.

Data completed.

Will be available in the ARM Archive soon.

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Contact: Cheng Tao, LLNL, tao4@llnl.gov

Questions?

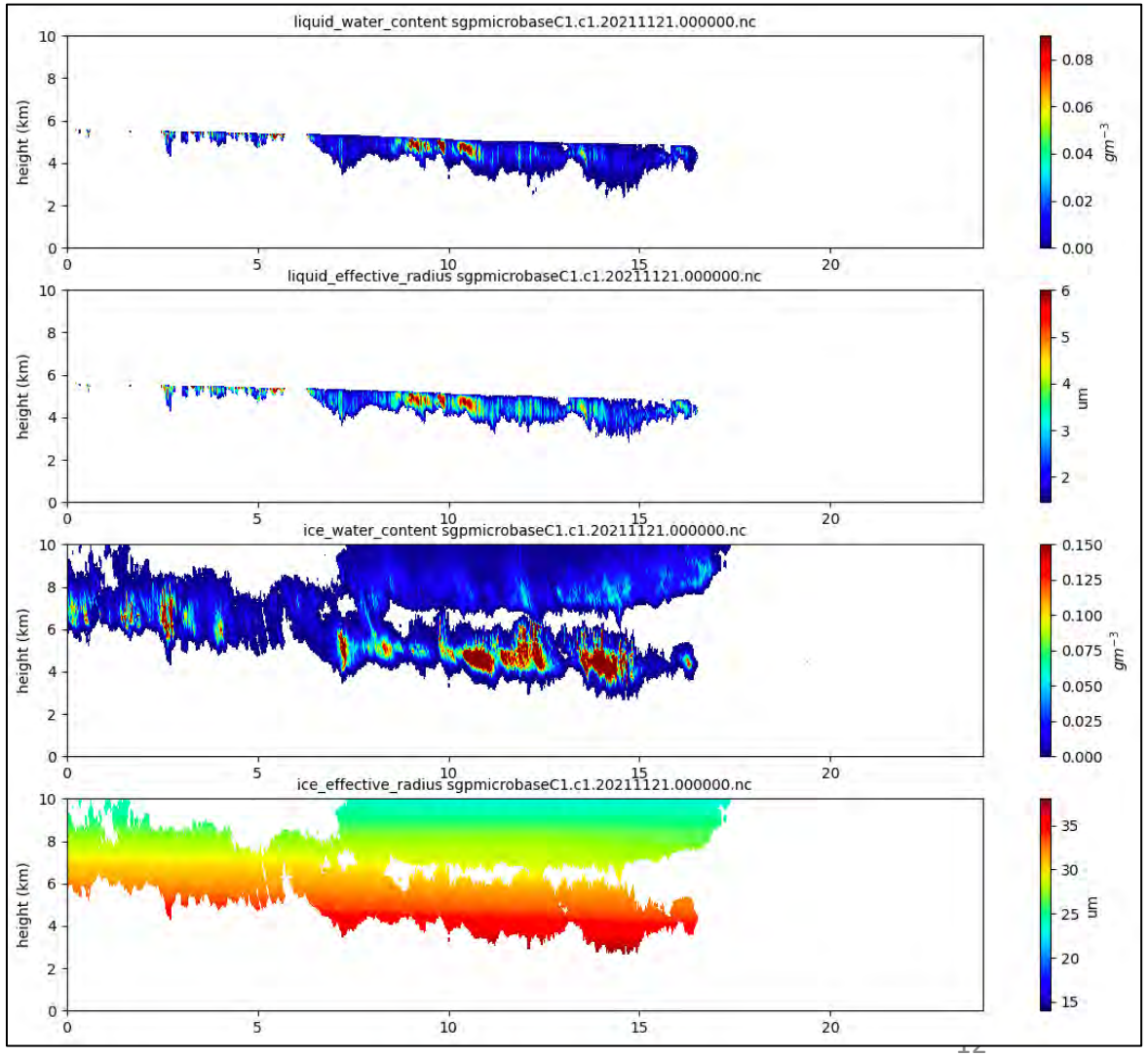
Let’s know your data needs and we are here to support!

Translator POC for WBLP: Shaocheng Xie (LLNL), xie2@llnl.gov

Continuous Baseline Microphysical Retrieval (MICROBASE) VAP

For more VAP information, please contact Meng Wang: mwang@bnl.gov

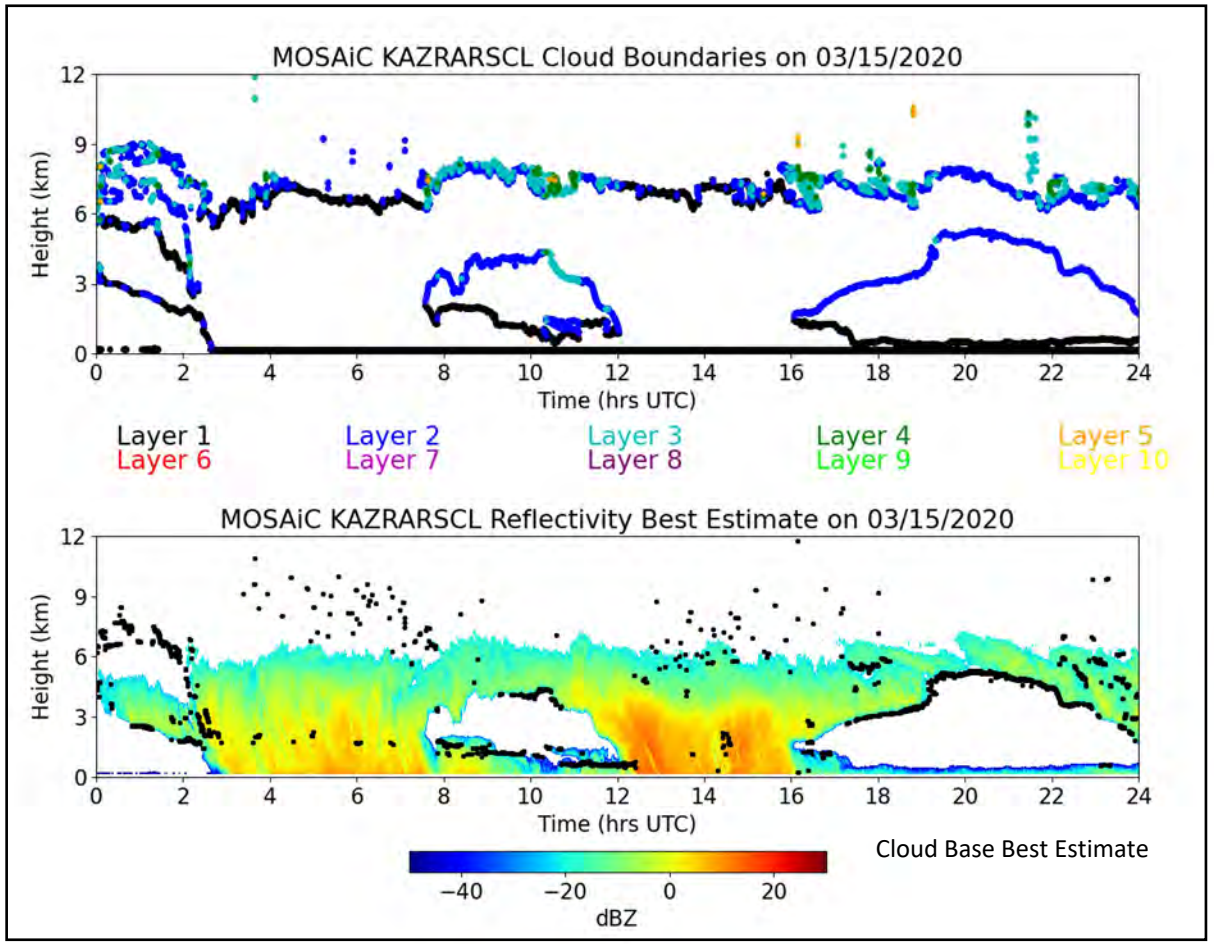
- MICROBASE is available again at SGP, ENA, PVC, ASI, GAN, and other ARM sites in the ARM Archive.
- This VAP provides “baseline” retrievals for:
  - Liquid Water Content (LWC),
  - Ice Water Content (IWC),
  - Effective Size (De).
- The updated VAP includes additional uncertainty quantification, with additional validation/closure efforts planned for FY23.



Active Remote Sensing of Clouds (ARSCL) VAP

For more VAP information, please contact Karen Johnson: kjohnson@bnl.gov

- ARSCL is available now at the ARM Archive for multiple fixed sites and AMF campaigns. These include the recent TRACER, SAIL, and MOSAiC.
- The VAP applies a cloud mask, gaseous attenuation correction, and mean Doppler velocity corrections.
- The VAP is available first in uncalibrated '.c0' and calibrated '.c1' versions, however both are useful for cloud boundaries, layers and other properties.
- Data are available within 1–month of data collection for all current collection, and available for the entire KAZR record.



LASER / VIDEO DISDROMETER VAPs

For more VAP information, please contact Aifang Zhou: azhou@bnl.gov

- LDQUANTS/VDISQUANTS data is available now at the ARM Archive (Baseline product).
- The VAP estimates rainfall rates and several geophysical quantities, parameterized DSD fits (gamma or exponential assumption type methods) following ARM long-term efforts.
- Radar-equivalent quantities, including dual-polarization radar quantities (e.g., Reflectivity Factor Z, Differential Reflectivity ZDR) are also calculated.
- Available daily at all fixed ARM sites under rainy conditions, as well as AMFs such as TRACER, CACTI, GoAmazon, and SAIL.