

Updates on MOSAiC ARM Data Products

Damao Zhang

ARM Translator; PNNL

Laura Riihimaki

Research Scientist; CIRES

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ARM Value-added Products (VAPs)



VAPs are higher-order data products that have been analyzed and processed using well established retrieval algorithms/methods to ease scientists' use of ARM data in atmospheric research and global climate models

- Aerosol macro-, and micro-physical, and chemical properties
- Cloud macro- and micro-physical properties
- Precipitation retrievals
- Radiation
- Atmospheric thermodynamic environment

<https://www.arm.gov/capabilities/vaps>

CAPABILITIES
VAPS

Value-added products (VAPs) are higher-order data products that have been analyzed and processed to ease scientists' use of ARM data in atmospheric research and global climate models.

VAPs are created by using existing ARM datastreams as input. Scientists work as translators analyzing the data in conjunction with research community needs, and then applying algorithms or models to enhance users' scientific research and model development. VAPs provide an important translation between the instrumental measurements and the geophysical quantities needed for scientific analysis.

Priorities for VAP development needs are solicited from the research community in cooperation with the translator team.

Different types of VAPs include baseline, evaluation, and external.

- **Baseline:** A production-status VAP that has had ARM quality control and data standards applied.
- **Evaluation:** A proposed baseline VAP currently undergoing evaluation. In this stage, feedback is encouraged from the scientific community.
- **External:** A VAP produced and submitted by an external organization.

Search...

Category... Measurement... Location...

Status... Type... Begin... End... Location type... **FILTER**

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NAME	FULL NAME	ACTIVE	TYPE	START	END
2DS-AIR	2 Dimensional Stereo Probe aboard aircraft	✓	Baseline	21 June 2017	8 December 2018
ABRFC	Arkansas-Red Basin River Forecast Center	✓	External	24 June 1994	19 February 2020
ACRED	ARM Cloud Retrieval Ensemble Data	✓	Evaluation	1 January 1997	30 June 2009

MOSAiC – ARM Translator VAPs



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



Image courtesy of the ARM user facility

For additional questions on VAP availability, please contact the specific VAP Translator

ARM VAP	Translator / Contact	Availability?
AOP	Shilling	Newly available
ARMBE	Xie	Available soon
AERloe	Zhang	Planned
(KAZR) ARSCL	Giangrande	Available
INTERSONDE	Giangrande	Available
MWRRET	Zhang	Available
MICROBASEKAPLUS	Giangrande	On Request
PBL Height -SONDE	Zhang	Available
MPLCLDMASK	Zhang	Available
DLPROF	Zhang	Newly available
THERMOCLDPHASE	Zhang	Available soon
QCRAD / RADFLUX	Zhang	Newly available/planned PI-Riihimaki
SACR GRID RHI / PPI	Giangrande	Available

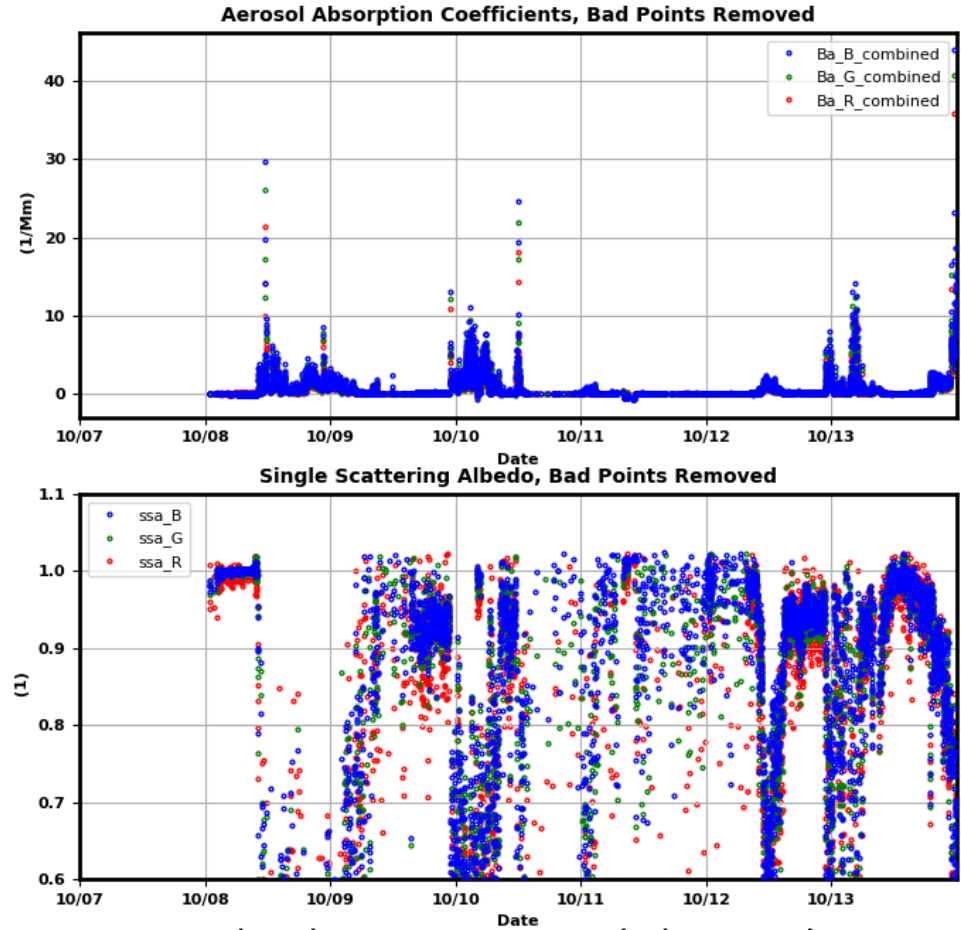
Aerosol Optical Properties (AOP) VAP: MOSAIC



For more VAP information, please contact John Shilling:
John.Shilling@pnnl.gov

- ▶ AOP VAP combines PSAP extinction and Nephelometer scattering data at 3 wavelengths to calculate:
 - aerosol absorption coefficients
 - corrected scattering
 - SSA
 - angstrom exponent (absorption and scattering)
- ▶ Data are available for the entire MOSAIC period at 1 or 10 minute frequency.
 - NOTE: 1 minute frequency has mix of 1 and 10 μm impactor states.

Examples of AOP MOSAIC Data



2 of 7799 Refresh Timeline Data Sorted by: Start Date

mosaoppsap1fynn1hM1.c1
mosaoppsap1fynn1mM1.c1

2019 10 08 2019 11 2019 12 2020 01 2020 02 2020 03 2020 04 2020 05 2020 06 2020 07 2020 08 2020 09 2020 10 02

ARMBECLDRAD for MOSAiC

LLNL: Yuying Zhang
Shaocheng Xie

ARM

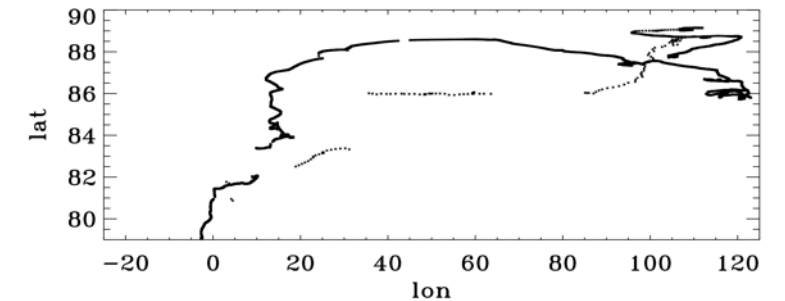
For more VAP information, please contact Yuying Zhang
(zhang24@llnl.gov)

- ARMBECLDRAD assembles a best estimate of cloud and radiation into one single dataset (Xie et al., 2010, BAMS).
- ARMBE for MOSAiC slightly different from standard ARMBE and not include all the typical variables due to its data availability

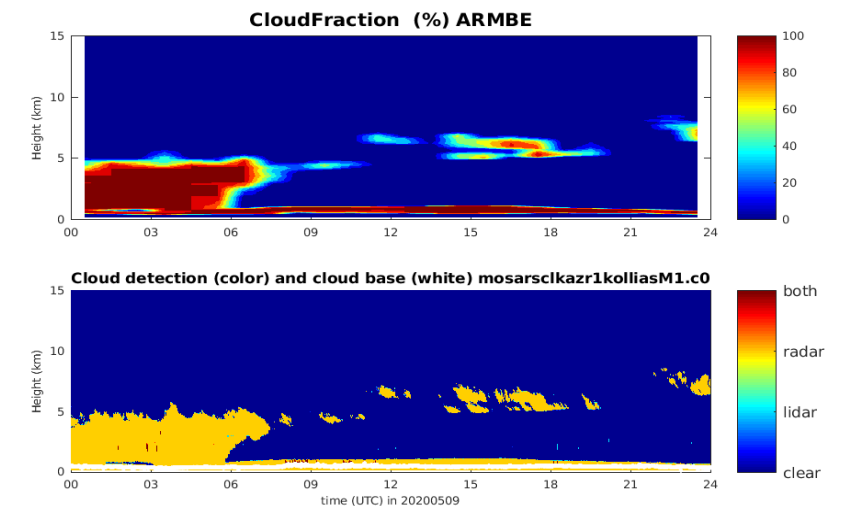
ARMBE Data Availability

Variables	Data Source	Time	Res
LWP, PWV	mwrret1liljclouM1.c2	2019/10/09-2020/09/30	1hr
Total Cloud fraction	tsiskycoverM1.b1	2020/03/23-2020/10/03	1hr
Cloud fraction (cld_frac, cld_frac_radar, cld_frac_MPL)	arsclkazr1kolliasM1.c0	2019/10/05-2020/10/01	1hr, 596 levels
Surface Radiative fluxes (swdn, swup, lwdn, lwup)	iceradriihimakiS3.b1	2019/10/14-2020/09/18	1hr
Lat, Lon (time)	navM1.a1	2019/10/01-2020/09/30	1hr

Ship position:



arsclkazr1kolliasM1.c0

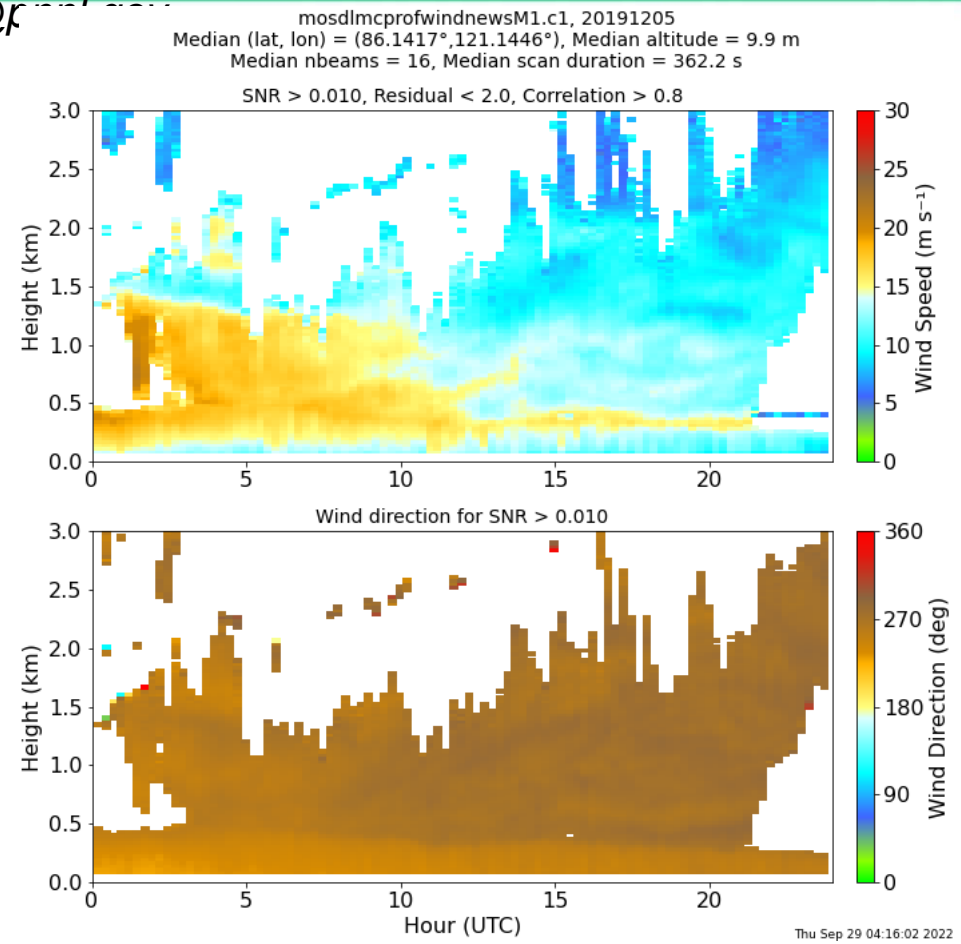


Doppler Lidar Motion Corrected (DLMC) Data for MOSAIC



For more VAP information, please contact Rob Newsom:
Rob.Newsom@pnnl.gov

- The DLMC value-added product (VAP) uses inertial data from the ARM navigational location and attitude (NAV) system to transform the Doppler lidar beam angles (az and el) from the lidar's frame of reference to an Earth-fixed frame
- The azimuth angle is measured clockwise from true north and the elevation angle is measured from the local horizon
- The VAP compensates the observed radial (air) velocity data for the effects of the platform velocity (i.e., $\text{corrected_radial_velocity} = \text{observed_radial_velocity} - \text{platform_radial_velocity}$)
- The `dlnmfpt.c1` product contains the fixed point or starting data. The `dlnmcusr.c1` product contains a user-defined scan data



2019 09 09

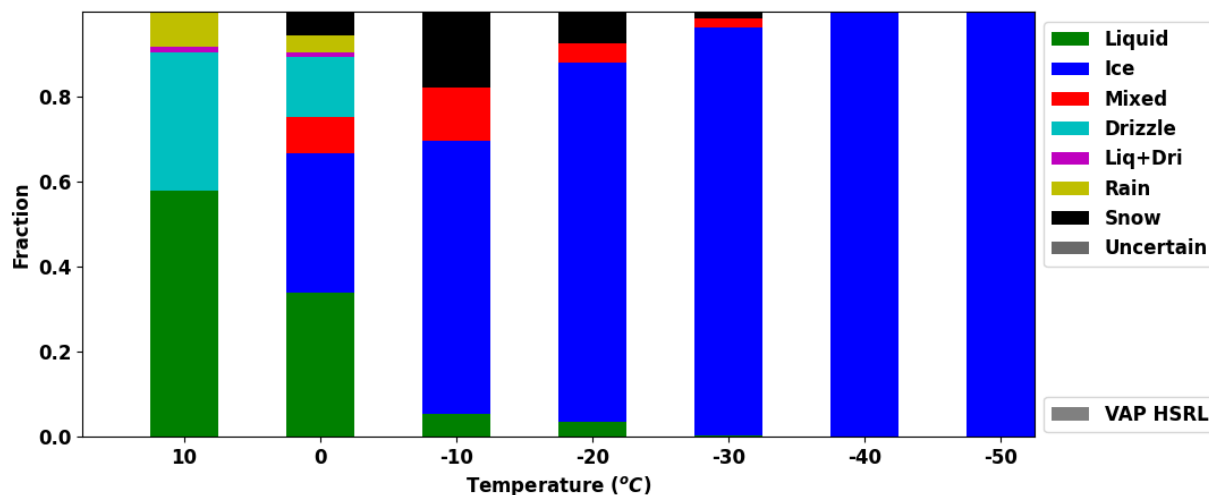
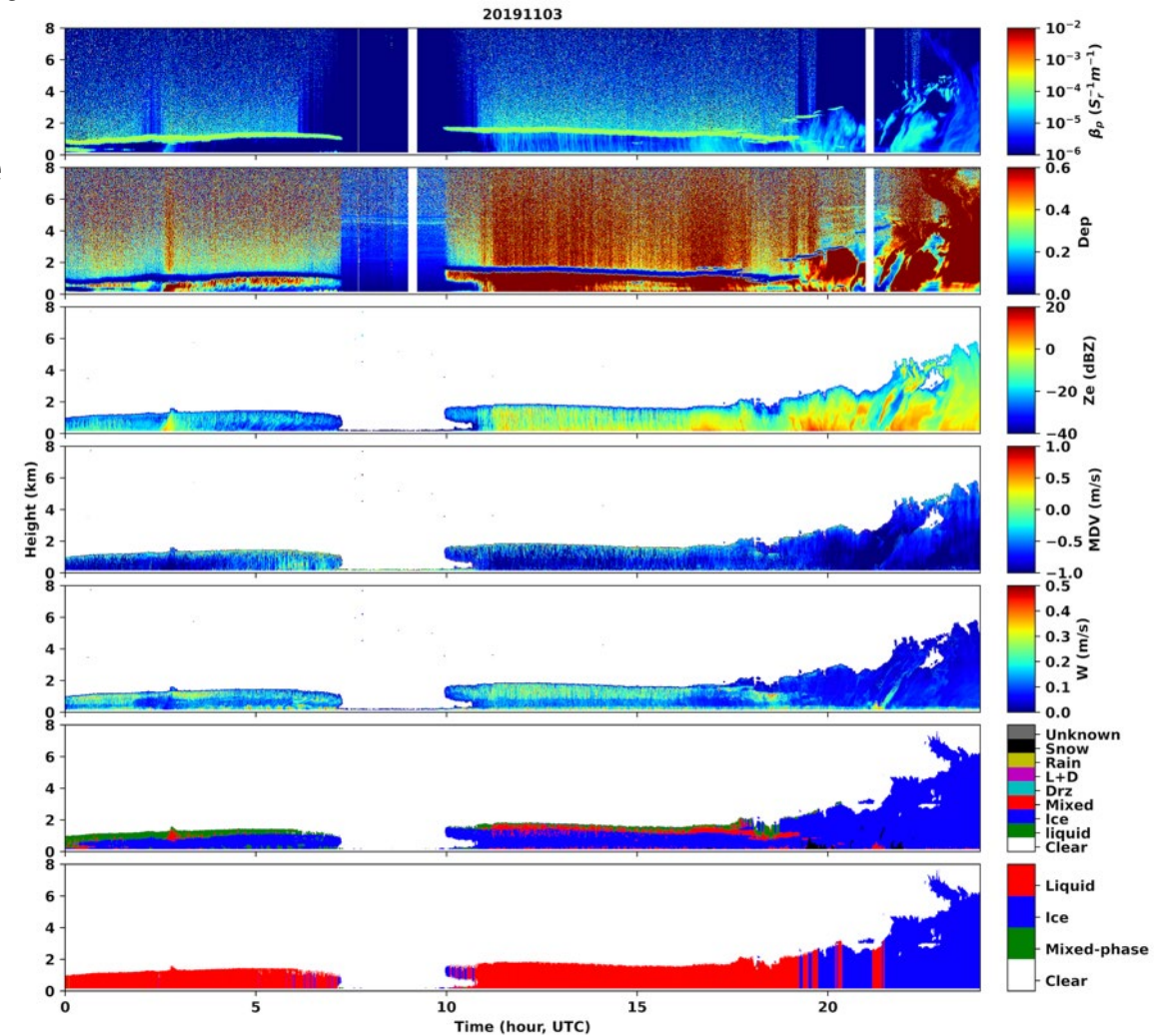
2020 03

2020 09 21

Cloud Thermodynamic Phase (THERMOCLDPHASE) VAP: MOSAIC

For more VAP information, please contact Damao Zhang:
damao.zhana@pnnl.gov

- The multisensor method (Shupe 2007) uses measurements from depolarization lidar, cloud radar, microwave radiometer, and temperature sounding
- Cloud hydrometeors are classified as ice, snow, mixed-phase, liquid, drizzle, or rain.
- Cloud layers are classified as ice ($frc_{ice} > 0.9$), mixed-phase ($0.1 < frc_{ice} < 0.9$), or liquid ($frc_{ice} < 0.1$)



Ongoing Efforts for MOSAiC VAPs

- ▶ AERloe
 - waiting for surface met from the meteorological tower mounted at "Met City"
- ▶ MPLCMASKML
 - will be extended to MOSAiC soon
- ▶ PBLHT-MPL
 - will be extended to MOSAiC in FY23
- ▶ MWRRET-3C
 - working on the updated calibration
- ▶ MICROBASEKAPLUS
 - upon request

Up and Down Radiometer systems deployed at Met City

(for more info contact laura.Riihimaki@noaa.gov)

- *Instruments:* Up and down SW and LW, SW components measured with SPN1
- *Products:* **mosiceradriihimakiS3.b1** available—qcrad-like product with automated and manual qc; Radiative Flux Analysis (clear sky/cloud fraction) coming soon

Riihimaki, L. (2021), Radiation instruments on Ice (ICERADRIIHIMAKI). Atmospheric Radiation Measurement (ARM) user facility. DOI: <http://dx.doi.org/10.5439/1608608>.

