Updates on MOSAiC ARM Data Products

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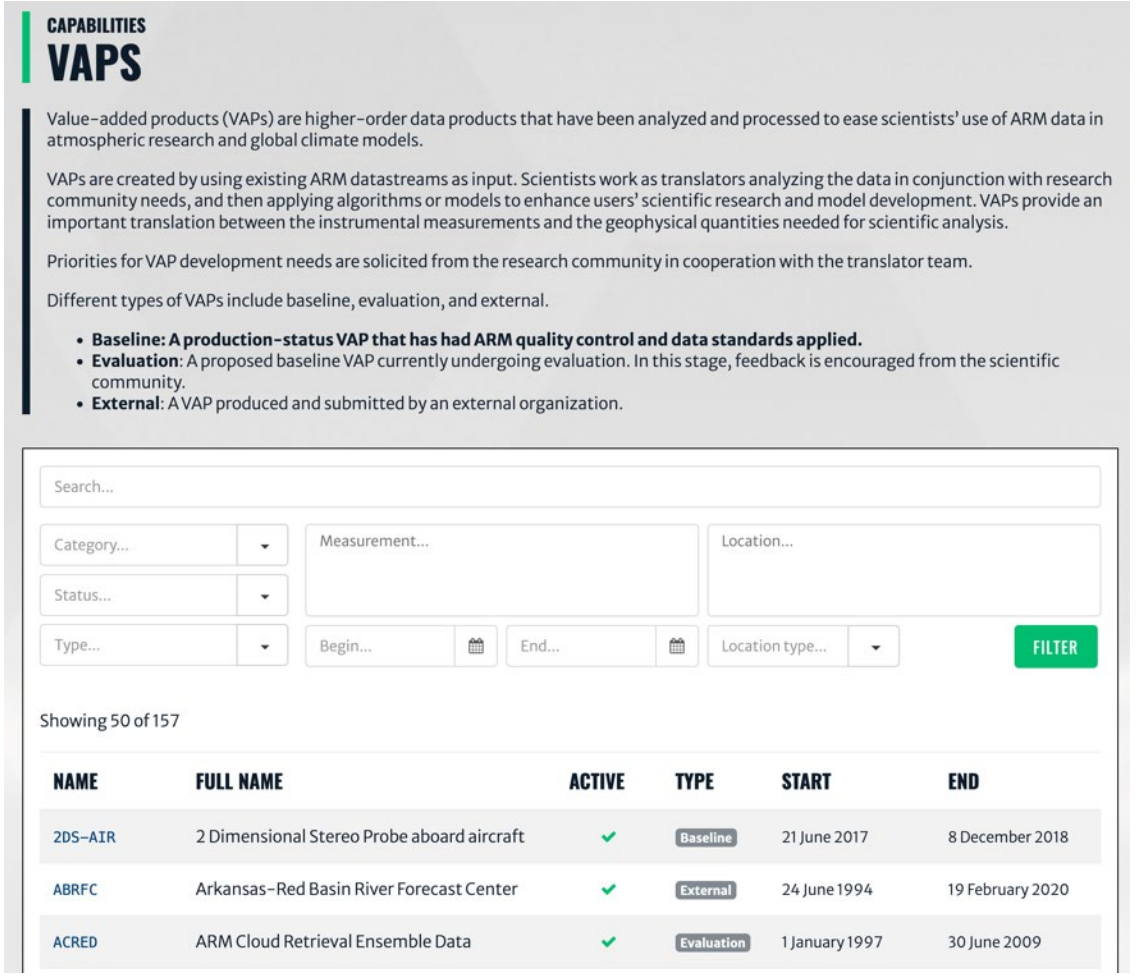
ARM Value-added Products (VAPs)

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



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

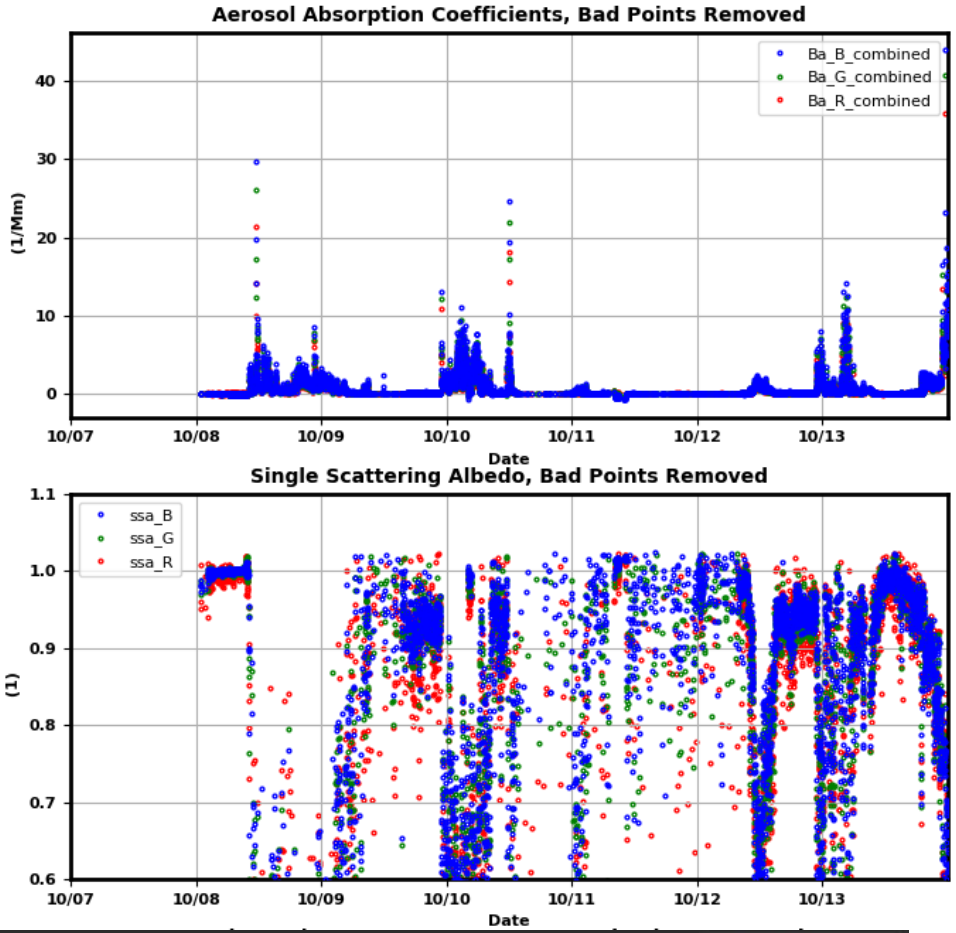
ARM VAP	Translator / Contact	Availability?
AOP	Shilling	Newly available
ARMBE	Xie	Available soon
AERIoe	Zhang	Planned
(KAZR) ARSCL	Giangrande	Available
INTERPSONDE	Giangrande	Available
MWRRET	Zhang	Available
MICROBASEKAPLUS	Giangrande	On Request
PBL Height -SONDE	Zhang	Available
MPLCLDMASK	Zhang	Available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

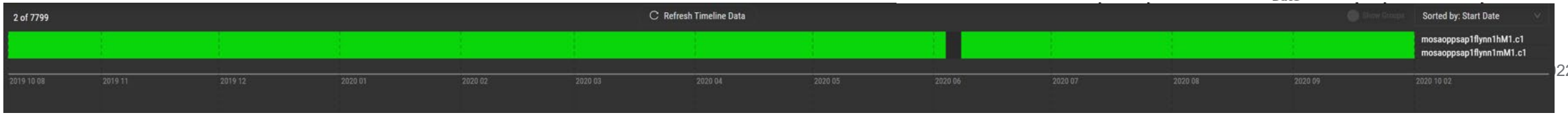
Aerosol Optical Properties (AOP) VAP: MOSAiC

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





ARMBECLDRAD for MOSAiC

LLNL: Yuying Zhang
Shaocheng Xie

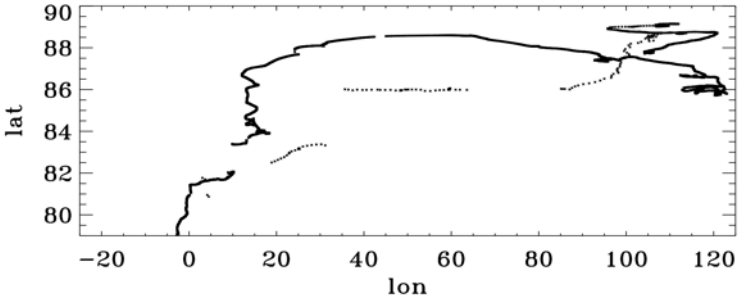
For more VAP information, please contact Yuying Zhang (zhang24@llnl.gov)

- 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:



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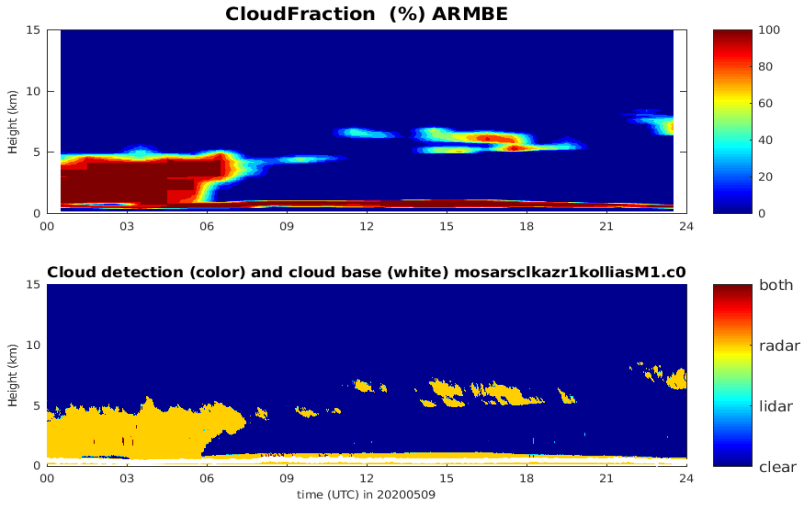
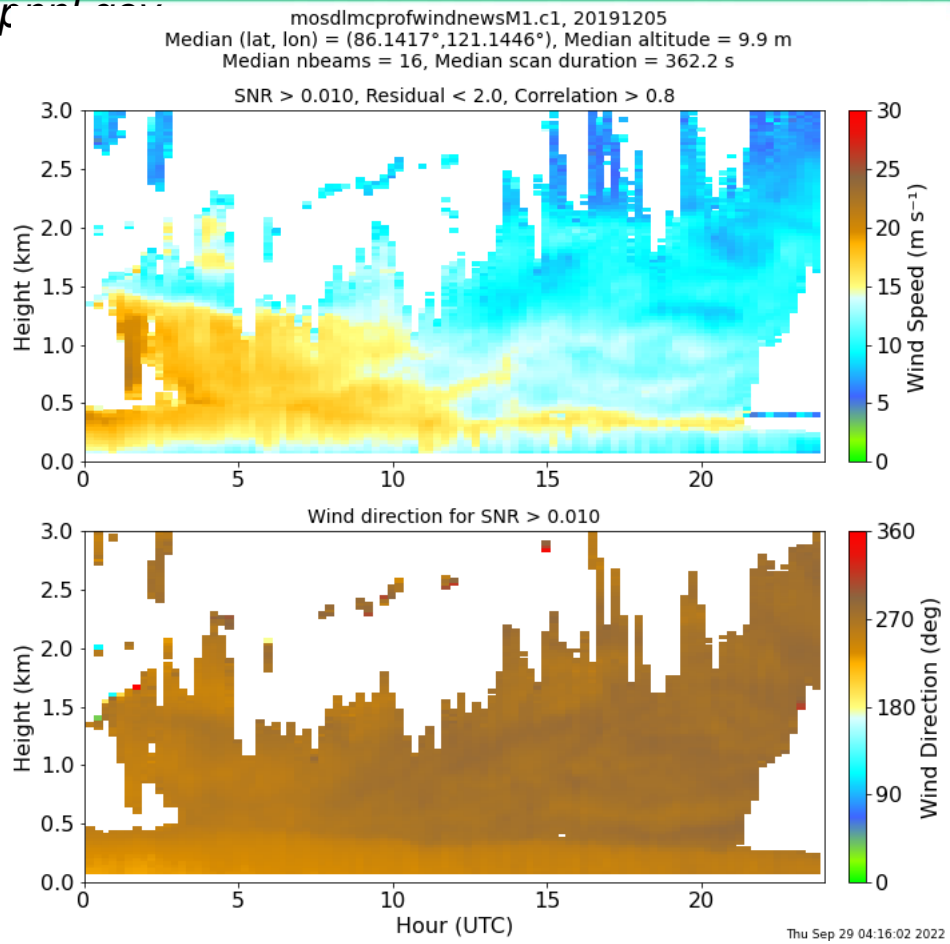


Doppler Lidar Motion Corrected (DLMC) Data for MOSAiC

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

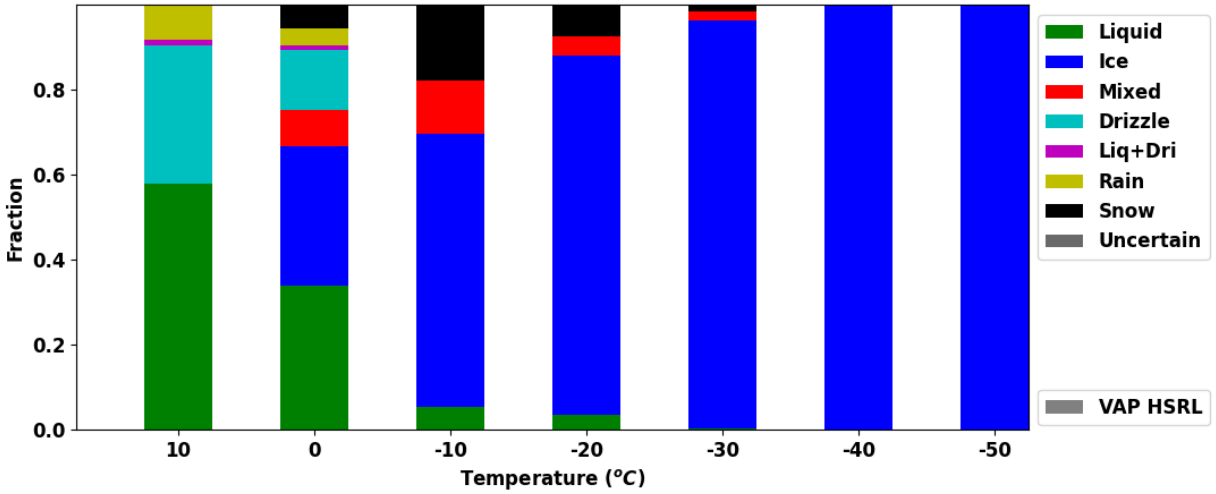
- The DLMC value-added product (VAP) uses inertial data from the ARM navigational location and attitude (NAV) system to transform the Doppler lidar beam angles (az and el) from the lidar's frame of reference to an Earth-fixed frame
- The azimuth angle is measured clockwise from true north and the elevation 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., corrected_radial_velocity = observed_radial_velocity-platform_radial_velocity)
- The dlmcfpt.c1 product contains the fixed point or staring data. The dlmcusr.c1 product contains a user-defined scan data

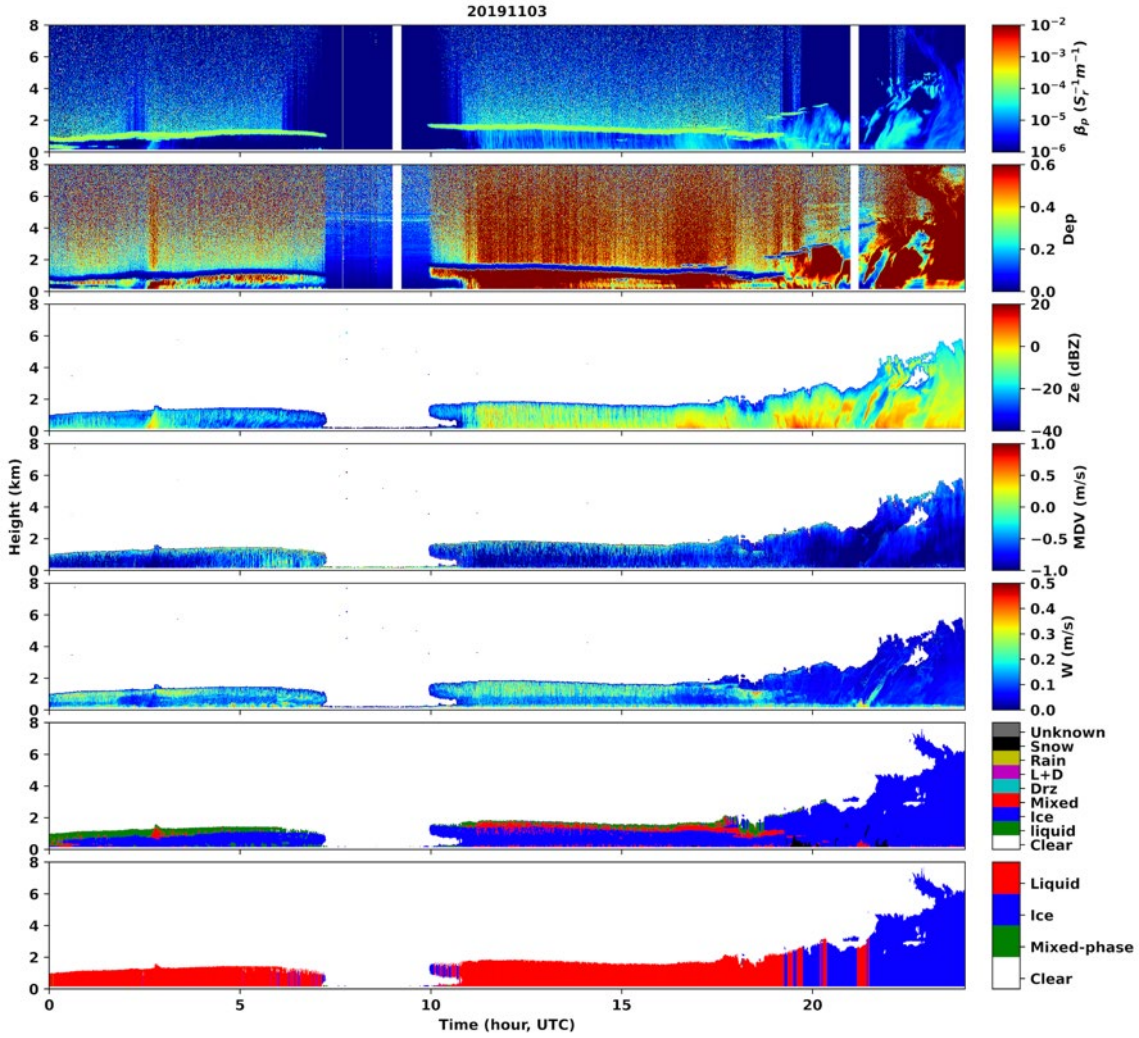


Cloud Thermodynamic Phase (THERMOCLDPHASE) VAP: MOSAiC

For more VAP information, please contact Damao Zhang: damao.zhang@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 ($frc_{ice}<0.1$)





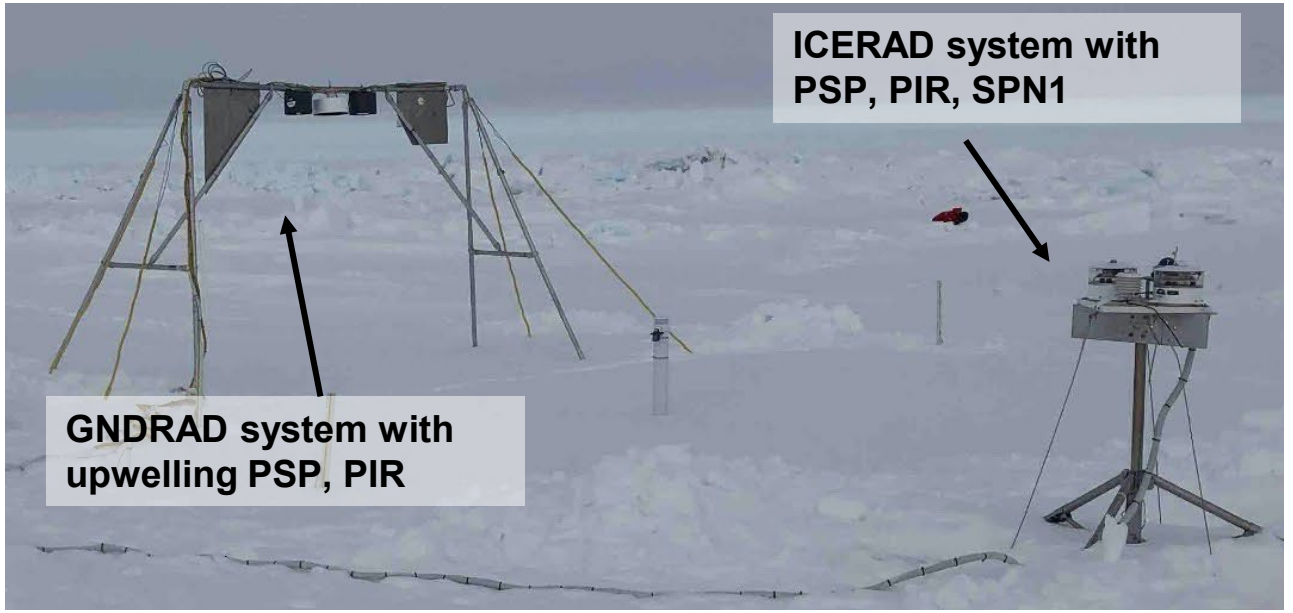
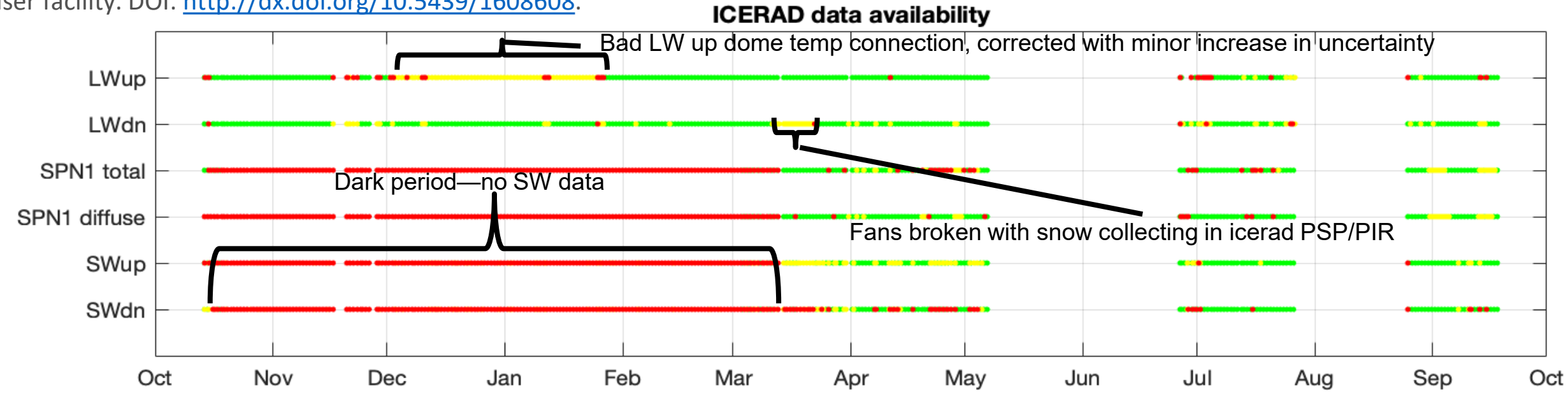
Ongoing Efforts for MOSAiC VAPs

- AERIoe
  - 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.