Updates on ARM High Latitude Data Products

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ARM Translator Group

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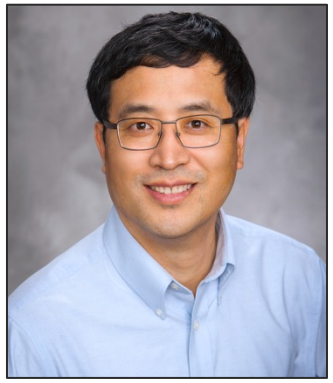
Science Product Development Led by a Team of Scientists

ARM Translator Group

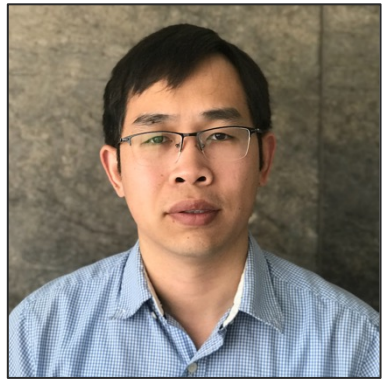
Translators are liaisons between the scientific community and ARM infrastructure staff members, and develop Value-Added Products, or VAPs, from the direct output of ARM instruments.

Our 2023 - 2025 "Translator Plan"



Shaocheng Xie
Warm Clouds POC
EPCAPE POC

John Shilling
Aerosol POC
TRACER POC



Damao Zhang
High-Latitude POC
SAIL POC

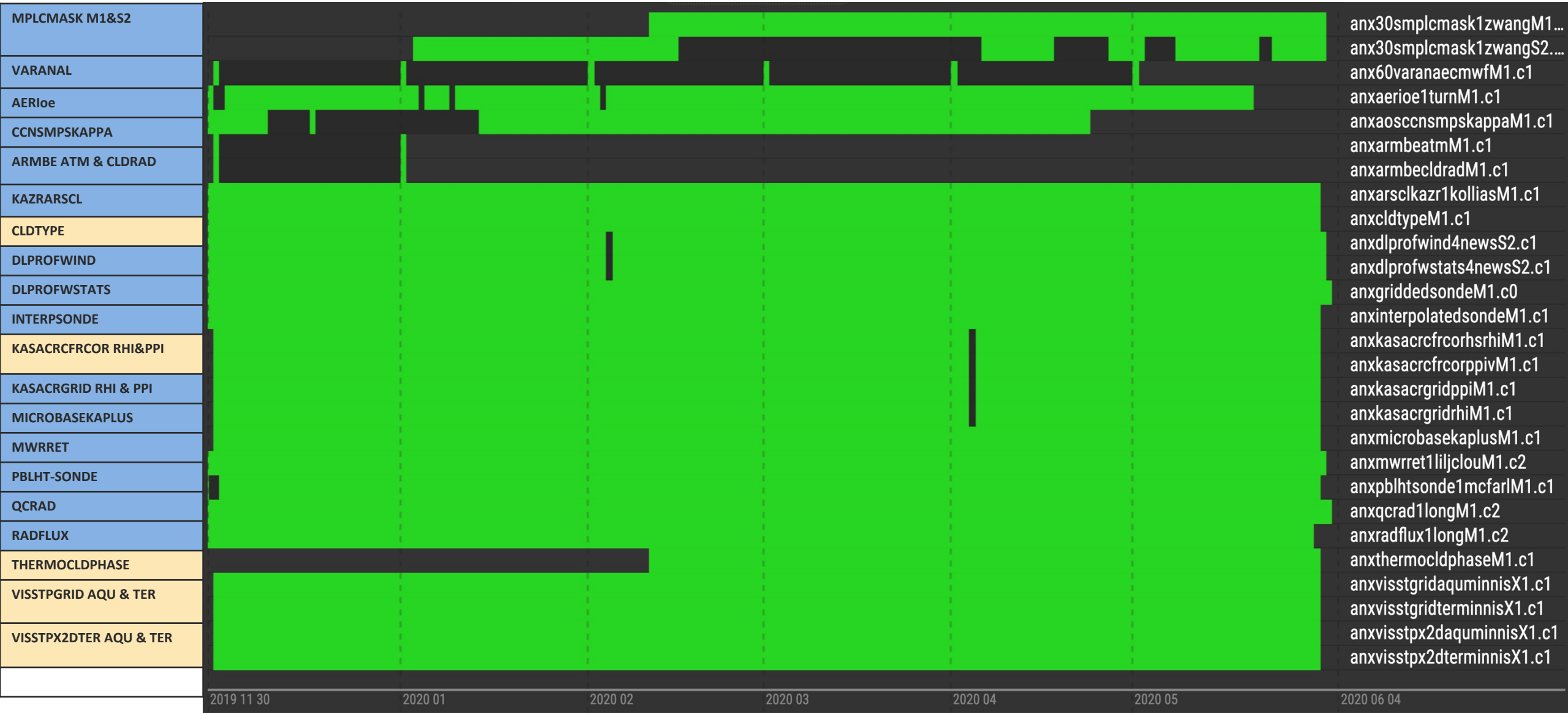
Scott Collis
Convective POC
CAPE-K POC

Scott Giangrande
Lead Translator
COMBLE POC

Krista Gaustad
Software Development

Ken Kehoe
Data Quality

COMBLE VAPs


MPLCMASK M1&S2
VARANAL
AERIoe
CCNSMPSKAPPA
ARMBE ATM & CLDRAD
KAZRARSCL
CLDTYPE
DLPROFWIND
DLPROFWSTATS
INTERPSONDE
KASACRCFRCOR RHI&PPI
KASACRGRID RHI & PPI
MICROBASEKAPLUS
MWRRET
PBLHT-SONDE
QCRAD
RADFLUX
THERMOCLDPHASE
VISSTPGRID AQU & TER
VISSTPX2DTER AQU & TER
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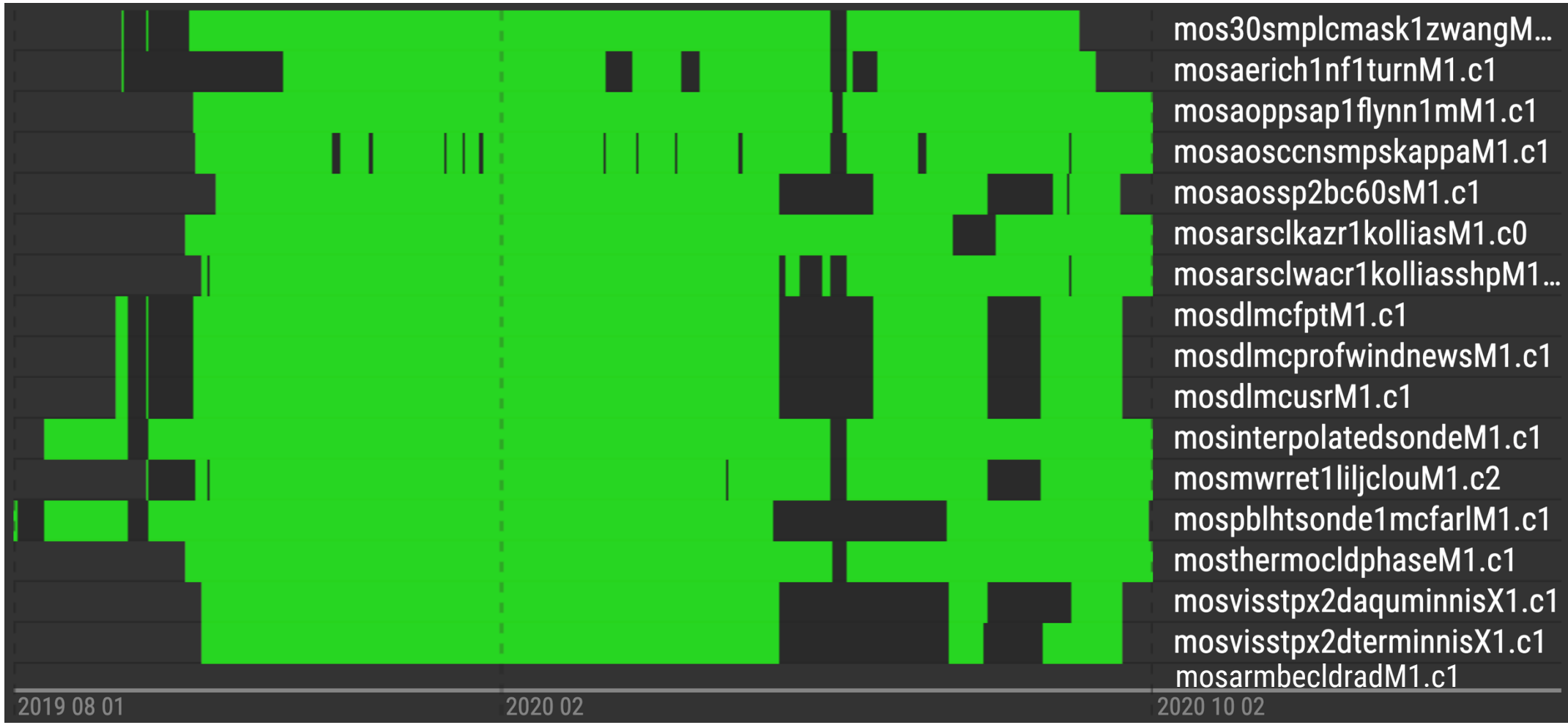
2019 11 30
2020 01
2020 02
2020 03
2020 04
2020 05
2020 06 04

MOSAiC VAPs

MPLCMASK
AERINF
AOP
CCNSMPSKAPPA
SP2BC
KAZRARSCL
WACRARSCL
DLMCFPT
DLMCPROFWINDNEWS
DLMCUSR
INTERPSONDE
MWRRET
PBLHT-SONDE
THERMOCLDPHASE
VISSTPX2DAQU
VISSTPX2DTER
ARMBECLDRAD



ARM VAPs: https://www.arm.gov/capabilities/science-data-products/vaps

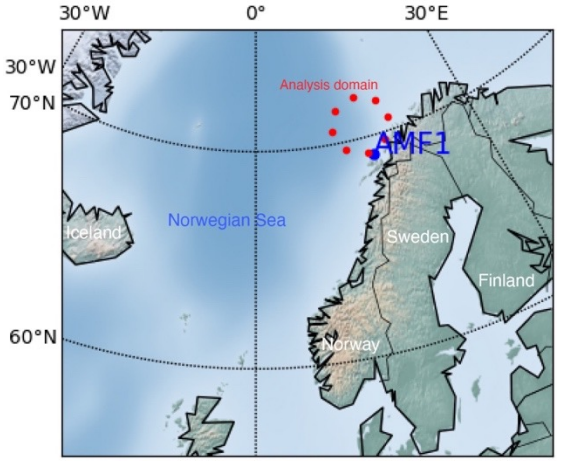
Data Product Highlight: Large-scale Forcing (VARANAL)

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 14.9°E, 70.6°N
- 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.

MOSAiC

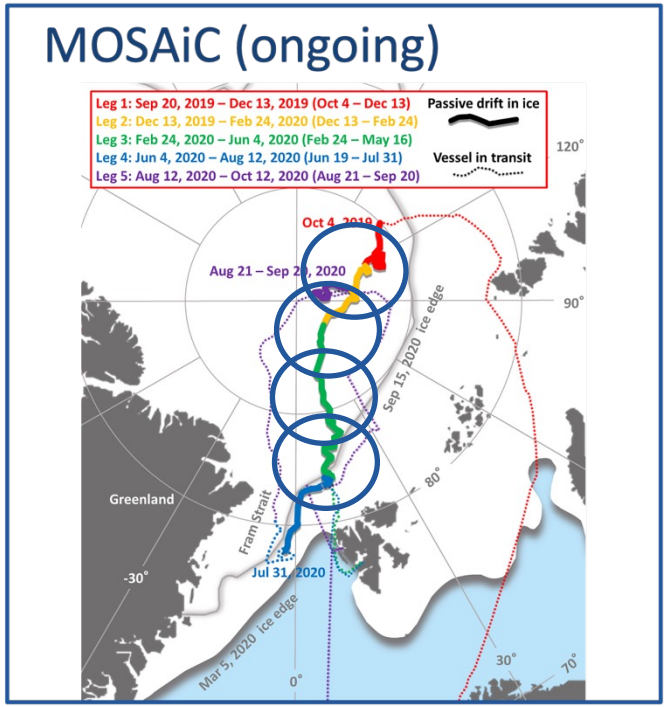
Research Focus: Surface energy budget of sea ice; Clouds, precipitation; Aerosols; Atmospheric boundary layer, etc.

VARANAL settings:

- Time: 201910 – 202010
- Domain: 150-km radius domain following the *Lagrangian* trajectories.
- Resolution: hourly, 25 mb
- v0 (ongoing): ERA5 only

Collaboration:

- Prof. Minghua Zhang at Stony Brook University



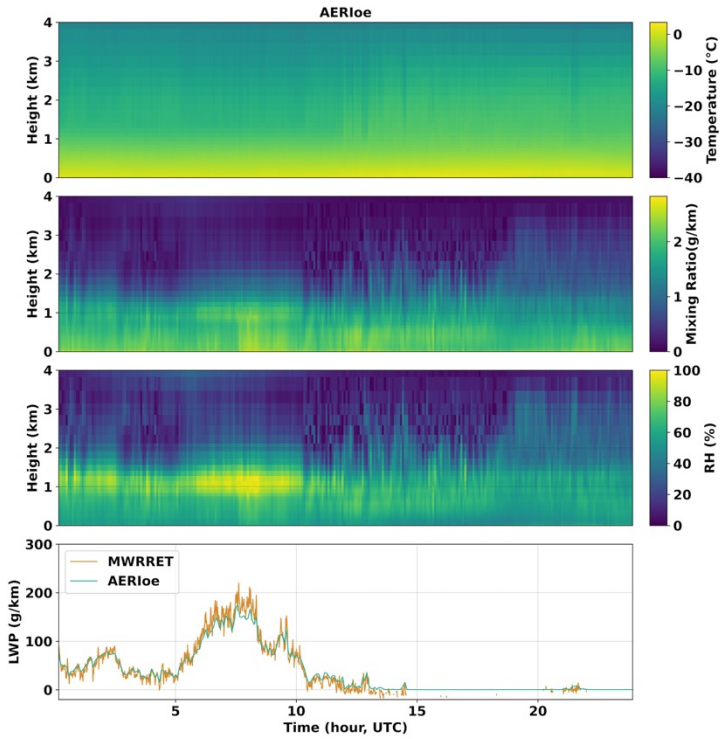
Contact: Cheng Tao, LLNL, tao4@llnl.gov

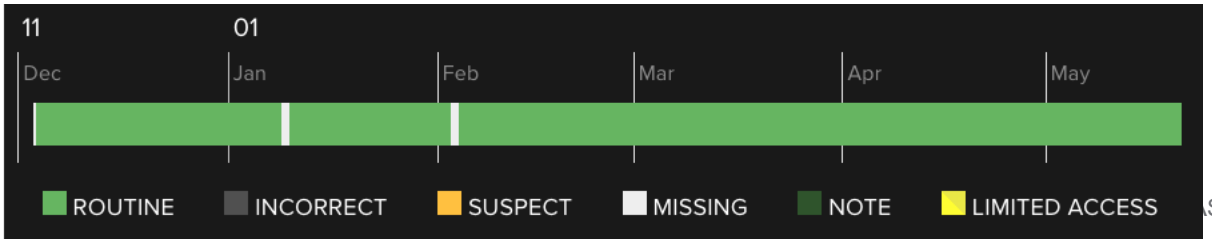
Data Product Highlight:

AERIoe and RLPROF-FEX

AERIoe available at ANX:

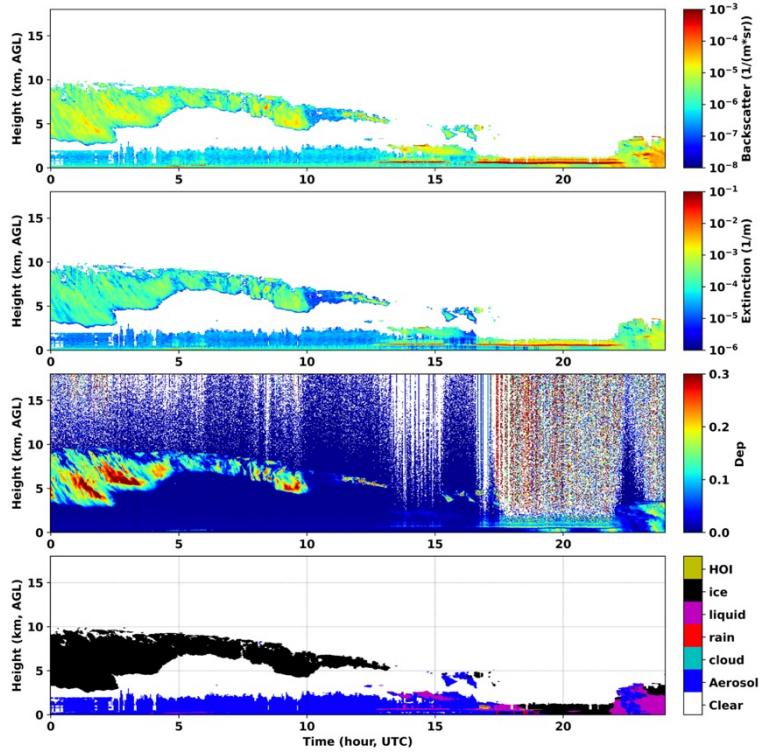
- Retrievals of boundary-layer temperature and water vapor mixing ratio profiles, and cloud liquid water path
- Upgrading AERIoe to TROPoe to run on Cumulus





RLPROF-FEX at OLI:

- Available at OLI (02/2015-10/2019)
- Data are largely missing due to the harsh environment at OLI



Data Product Highlight:

THERMOCLDPHASE VAP

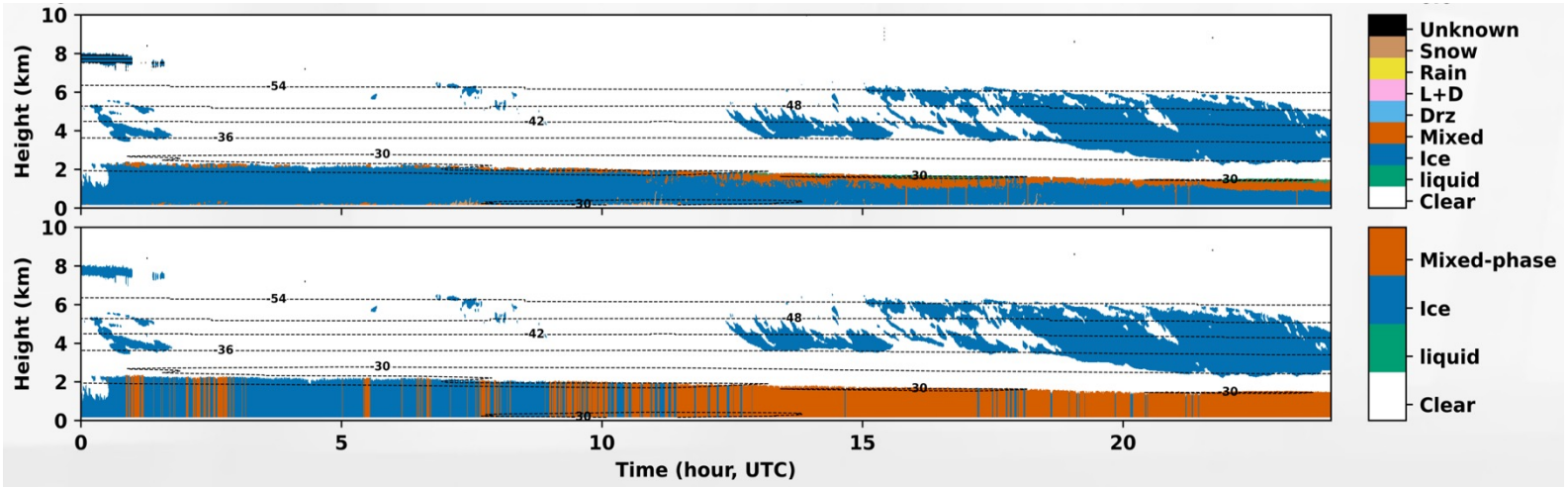
Inputs:

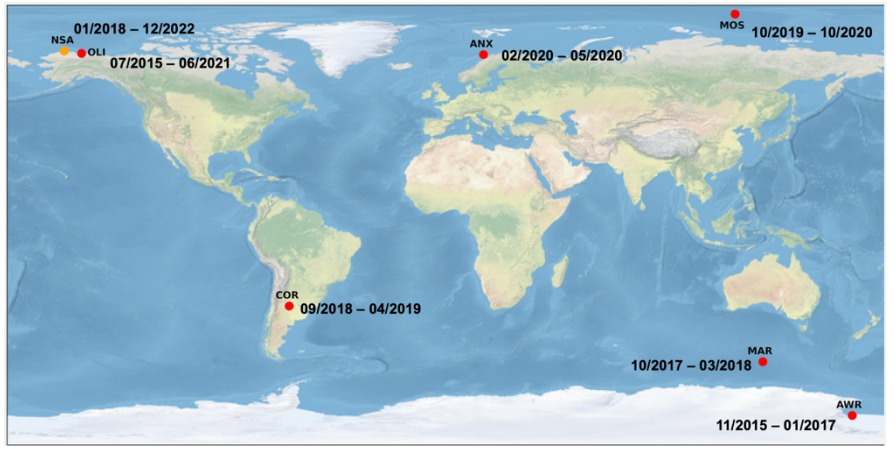
Cloud mask (ARSCL), HSRL (or MPL) β and depolarization ratio, KAZR Z_e, MDV, W, MWRRET LWP, and temperature (Shupe 2007).

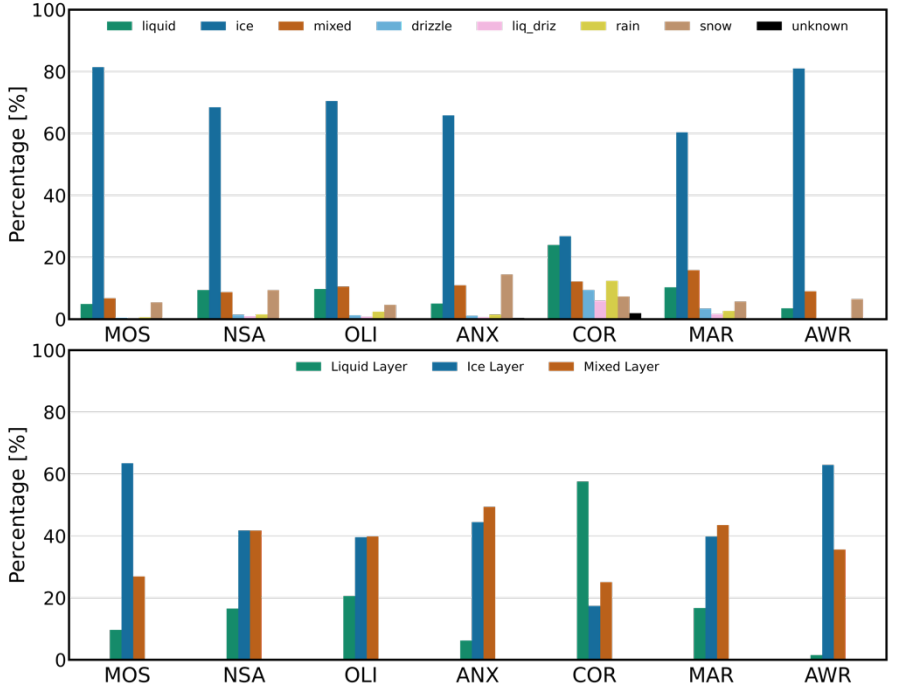
Outputs:

Cloud hydrometeors are classified into liquid, ice, mixed-phase, drizzle, liquid + drizzle, rain, and snow.

Cloud layers are classified as liquid (frc_{ice}<0.1), mixed-phase (0.1<frc_{ice}<0.9), or ice (frc_{ice}>0.9).







Ice Precipitation Properties Data Product

Inputs:

HSRL observations (backscatter and extinction), KAZR moments, sounding, (in the future) Doppler lidar; retrieval following Silber, JGR 2023

Outputs:

Profiles of estimated sub-cloud ice properties, including variable uncertainties. Retrieved ice precipitation variables include:

particle number concentration

Water content

PSD parameters (e.g., gamma distribution shape parameter)

precipitation rate

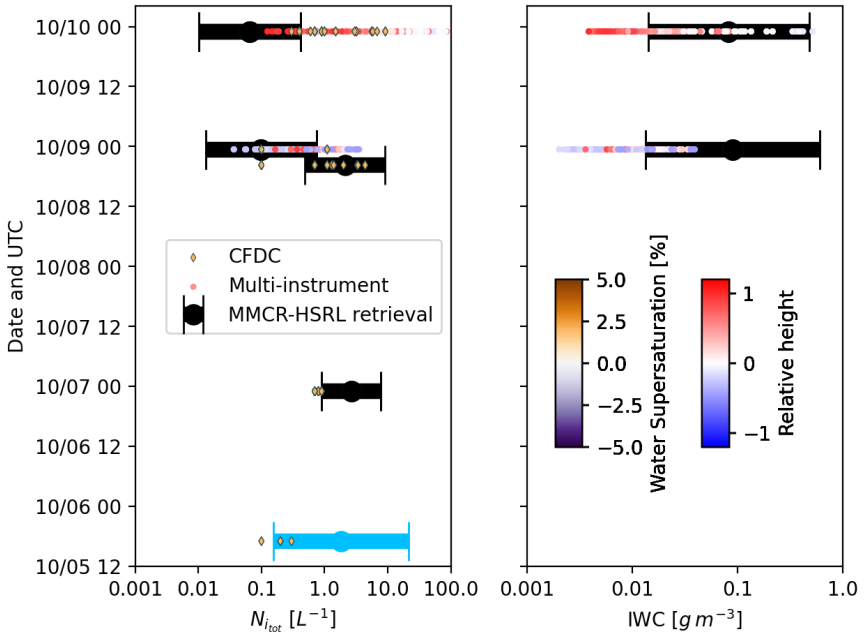
mass-weighted fall velocity

effective radius

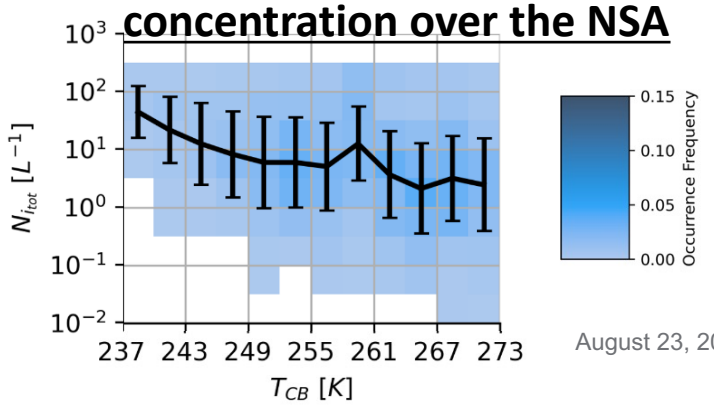
vertical air motion estimates

Starting with the **NSA site*

Comparison with in-situ M-PACE obs



Bulk statistics of cloud base number concentration over the NSA



Contact: Israel Silber, israel.silber@pnnl.gov

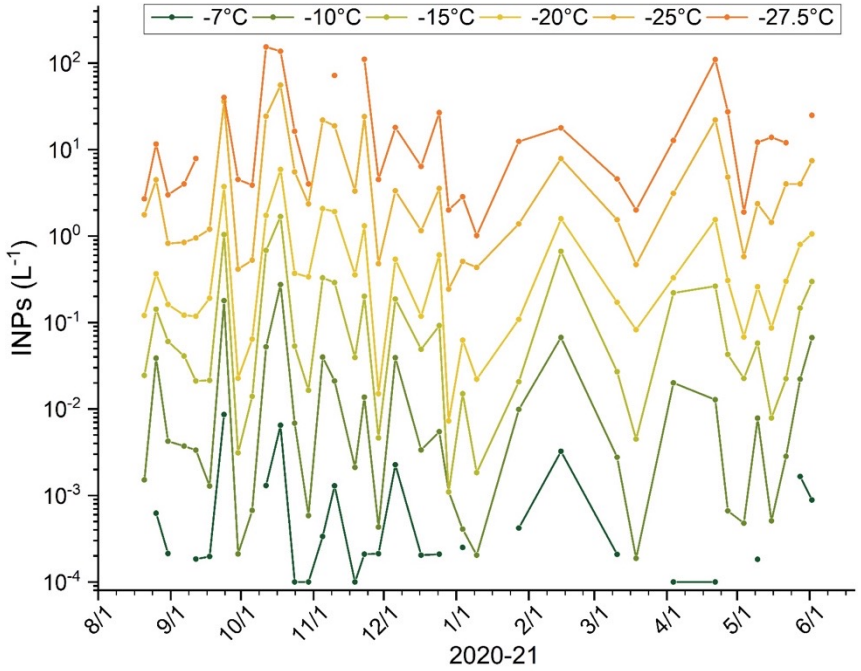
Ice nucleating particles (INPs) at OLI and NSA

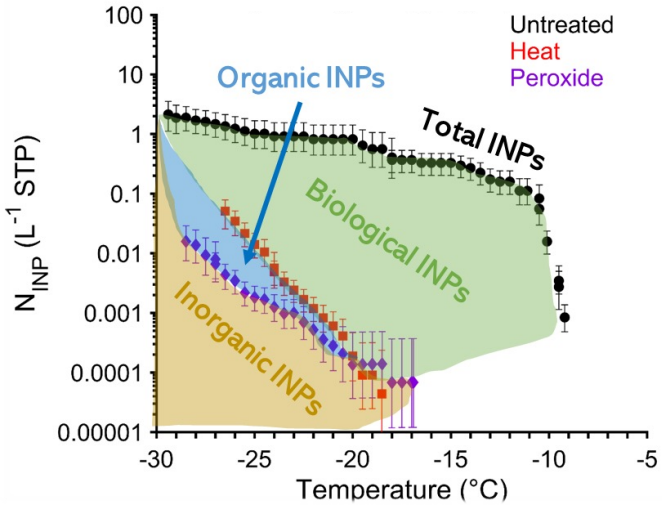



Jessie Creamean, Tom Hill, Carson Hume, Tim Devadoss

- INPs catalyze the formation of ice in clouds and influence precipitation, latent heat release, cloud electrification, cloud albedo and cloud lifetime
- 0.2 µm pore filters run for 24 h every 3-4 days

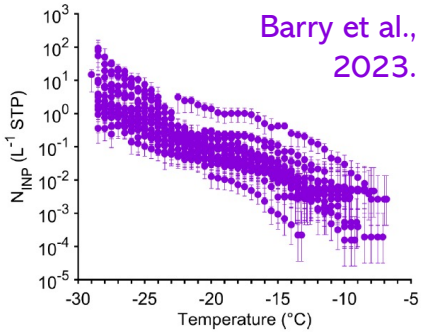
Complete time series at OLI available on Data Discovery





Select samples retested after treatments to estimate abundance of biological, heat stable organic, and inorganic INPs.

NSA starting in spring 2024!



Scan for link to our Ice Nucleation Spectrometer (INS) ARM instrument page

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CLIMATE RESEARCH FACILITY