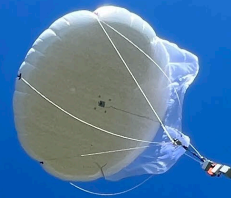


TBS ice nucleating particle (INP) measurements



ARM

CLIMATE RESEARCH FACILITY

**Colorado
State
University**



Your friendly INP mentor team:
Jessie Creamean, Thomas Hill, & Carson Hume

A HUGE thanks to the SNL TBS team, SAIL site operators, and SGP site operators!

New INP data available through ARM!



Tom Hill



Carson Hume



Scan for direct link to data OR go to ARM Data Discovery and search for "Measurement: Ice Nucleating Particle (INP) Concentration"

	2020					2021										2022												
	Aug	Sep	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	
SGP			Green	Green	Green	Green	Green	Green	Yellow	Yellow	Yellow	Yellow	Yellow	Yellow	Yellow	Yellow	Yellow	Red	Red	Red	Red	Red	Red	Red	Red	Red	Red	Red
Oliktok	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green																	
SAIL														Yellow	Yellow	Yellow	Yellow	Yellow	Yellow	Yellow	Yellow	Yellow	Yellow	Red	Red	Red	Red	Red
TRACER																							Red	Red	Red	Red		
SGP TBS																					Yellow							
SAIL TBS																						Yellow		Red				

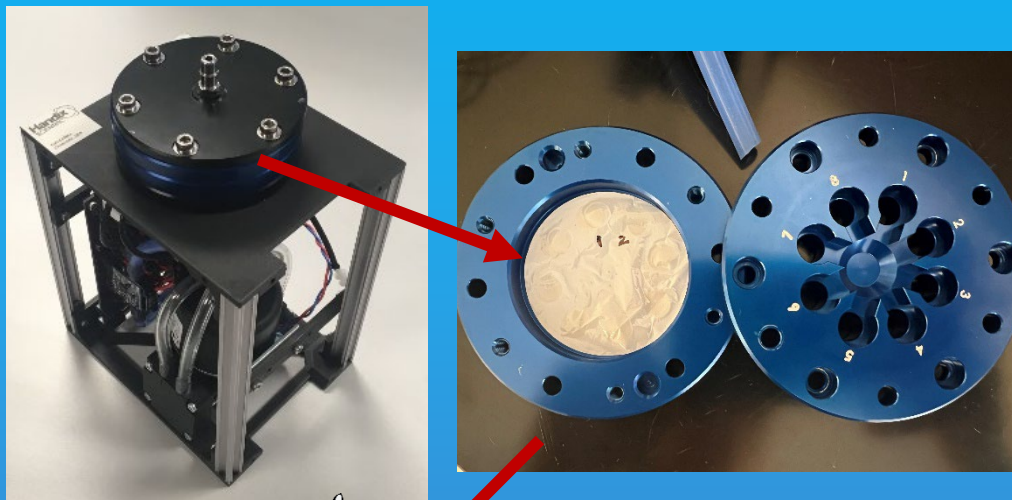
data available

data pending/some analysis complete

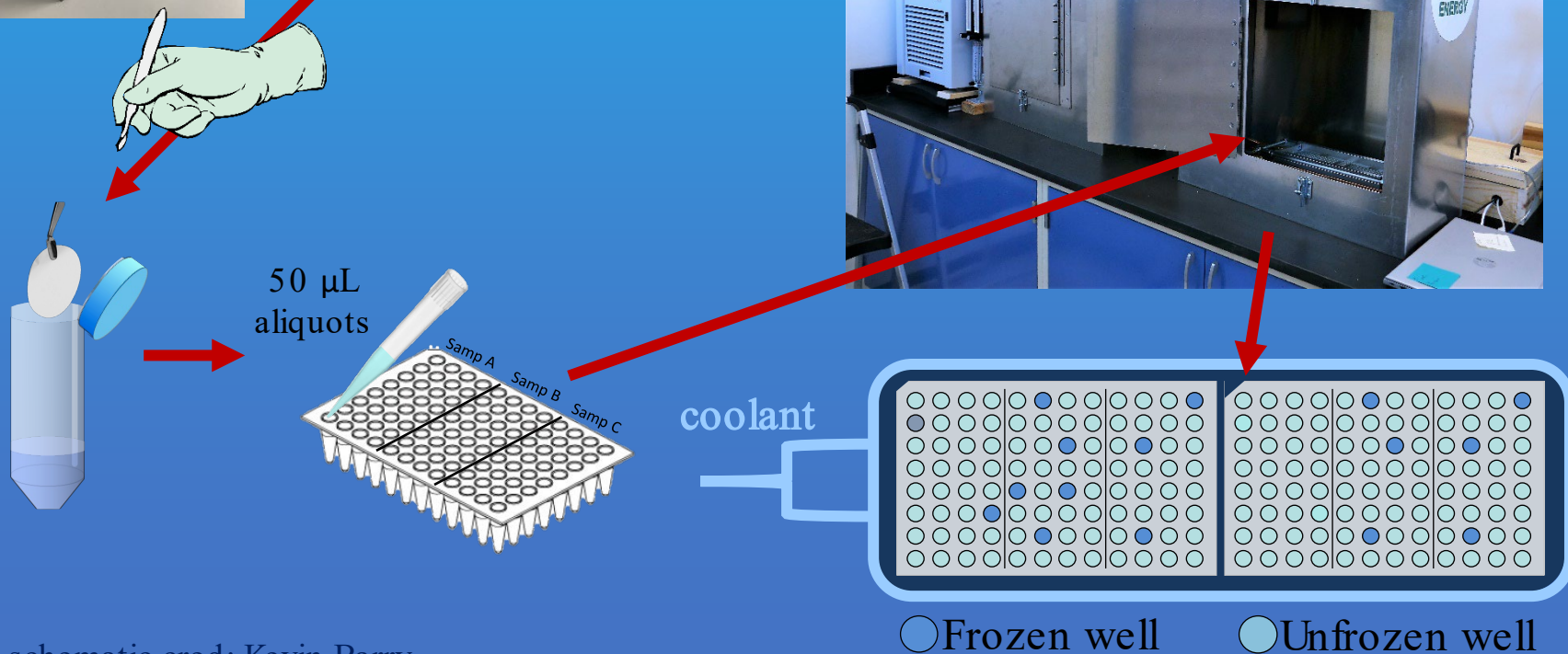
sample analysis pending

TBS filter collection & offline INP analysis

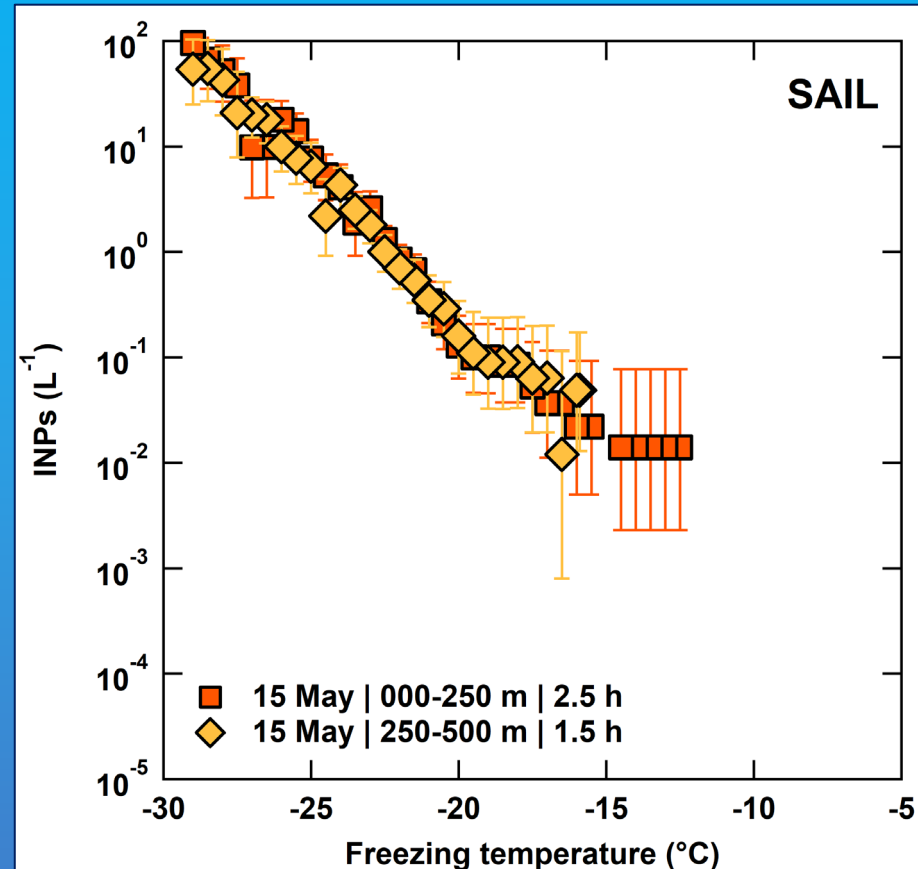
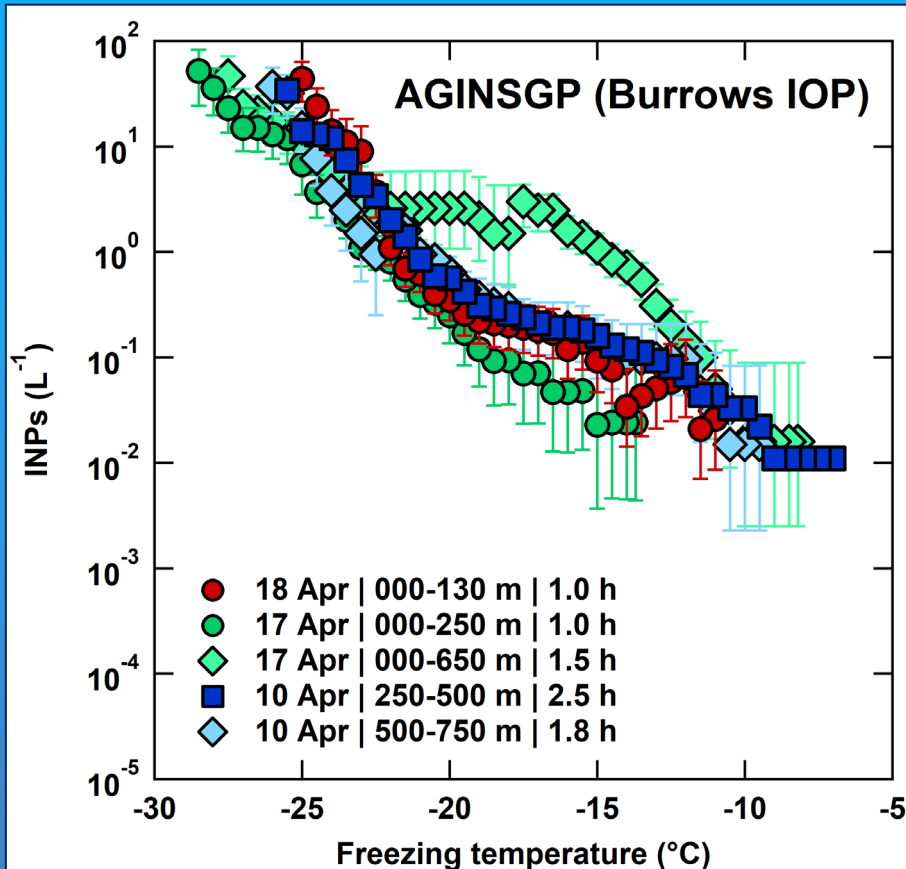
The IcePuck: A mini time-resolved filter sampler (aww, so cute)



Ice Nucleation Spectrometer (INS)
(aka the CSU Ice Spectrometer)



TBS INP preliminary data & future plans



Note: PRELIMINARY. Working on some blank correction issues.

- AGINSGP flights in Apr 2022 (PI: Susannah Burrows)
- SAIL flights in May & Jul 2022
- **WE SEE DETECTABLE INPS! CONCEPT PROVEN TO WORK :D**
- Next: IcePuck will fly during SAIL TBS flights next year
- Where do YOU want to see IcePuck fly? Submit an ARM IOP request!

Want to know more? Reach out to us!

See our **instrument page** for more info, including links to the INS handbook, data, filter availability log, etc.

Also, check out Tom's poster on Thu morning (session 3)!

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thomas.hill@colostate.edu

<https://www.arm.gov/capabilities/instruments/ins>

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INS HANDBOOK CITE DATA BROWSE DATA

Ice Nucleation Spectrometer

INS > ICE NUCLEATION SPECTROMETER
INSTRUMENT TYPE(S) > BASELINE • GUEST

The ice nucleation spectrometer (INS) is an offline analytical measurement system used to process filter samples for freezing temperature spectra of immersion-mode ice-nucleating particle (INP) number concentrations. It is almost identical to the Colorado State University (CSU) ice spectrometer design. Filter samples are collected at ARM facilities routinely and during intensive operational periods, and on the ARM tethered balloon system operated by Sandia National Laboratories, then processed on the INS at CSU.

This filter log contains the detailed metadata at all ARM sites where INP filter sample collection has occurred or is currently ongoing. Metadata include start and end times, vacuum line pressures and temperatures, and flow rates; total accumulated flow through each filter; and notes on collection issues or weather conditions. Users can also keep up to date with the status of filter and data processing, even before data are available on ARM's Data Discovery. Users can contact INP mentors [Jessie Creamean](#) or [Thomas Hill](#) with any

RELATED DATA ANNOUNCEMENTS
First Routine Ice-Nucleating Particle Data Available From ARM Sites in Alaska, Oklahoma
16 May 2022

REFERENCES
Creamean et al. [Ice Nucleation Spectrometer \(INS\) Instrument Handbook](#). 2022. 10.2172/1846263. [View Citation](#)



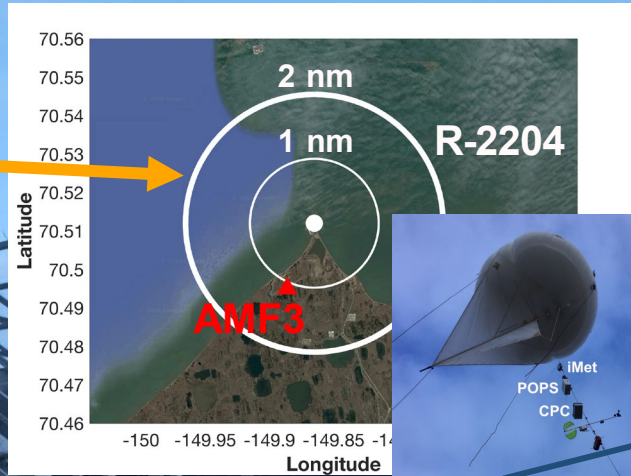
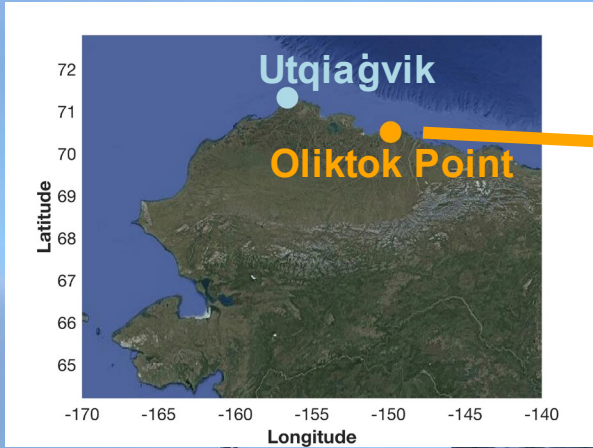
Scan this for a link to our data



Scan this for a link to our instrument page

Extra slides

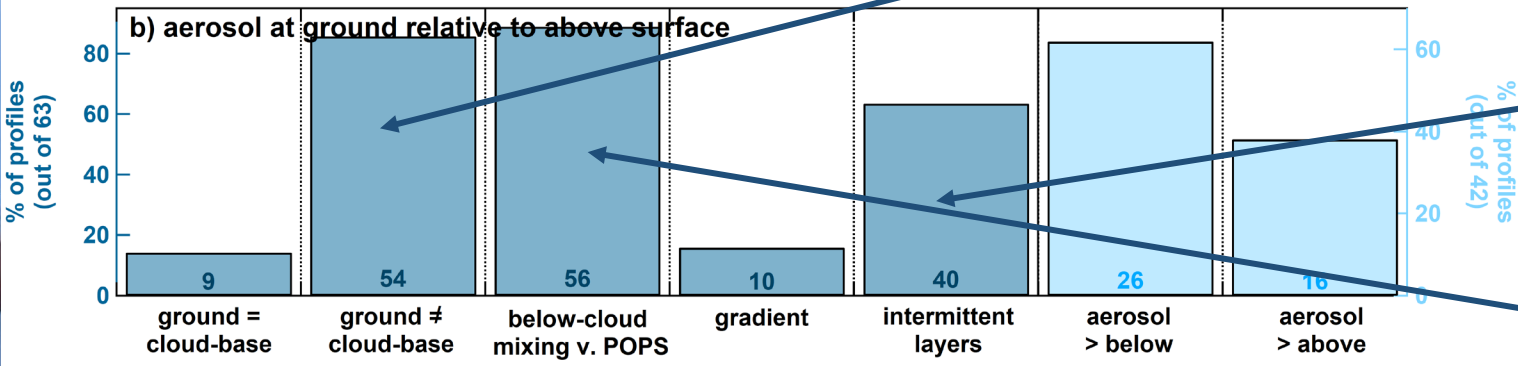
Previous DOE TBS aerosol measurements: The need for more information



Ground based aerosol not same as aloft most of the time

Most aerosol below cloud in layers

Boundary layer mixing reflects structure



Aerosol numbers can vary from the ground to cloud level, but what about aerosols that seed clouds (i.e., INPs)?