

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	Sept	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sept	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sept	Oct
SGP			Green	Green	Green	Green	Green	Green	Yellow	Red	Red	Red	Red														
Oliktok	Green	Green	Green	Green	Green																						
SAIL																Yellow	Red	Red	Red								
TRACER																							Red	Red	Red	Red	Red
SGP TRS																					Yellow						
SAIL																											

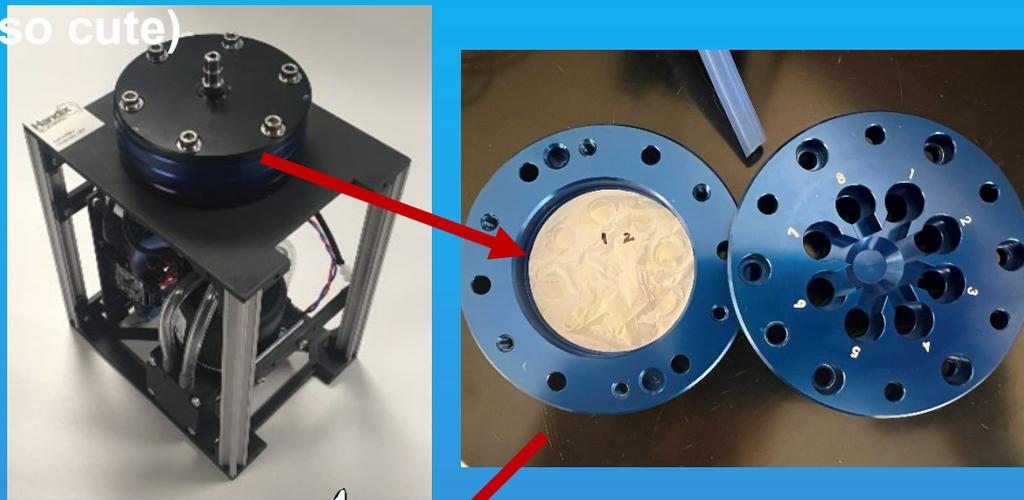
data available

data pending/some analysis complete

sample analysis

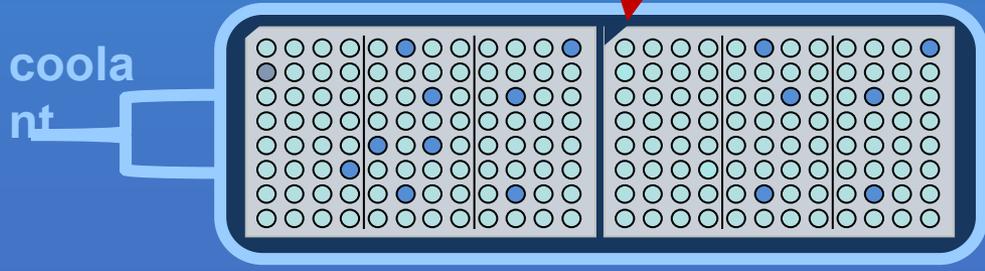
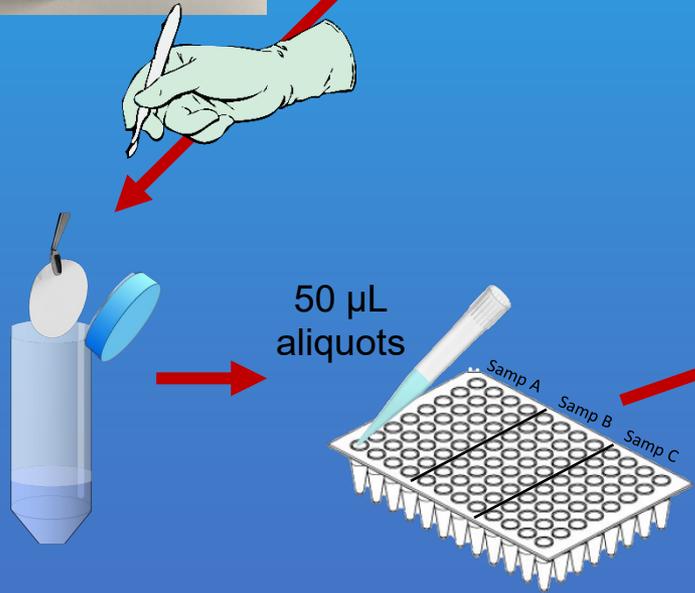
TBS filter collection & offline INP analysis

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



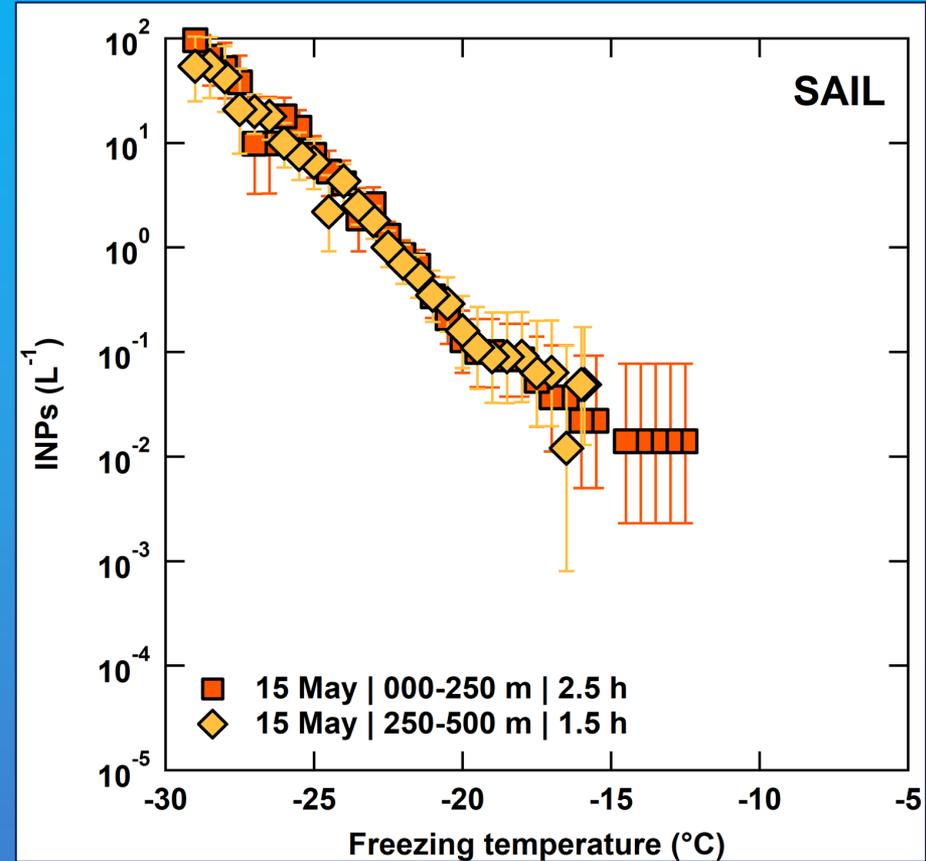
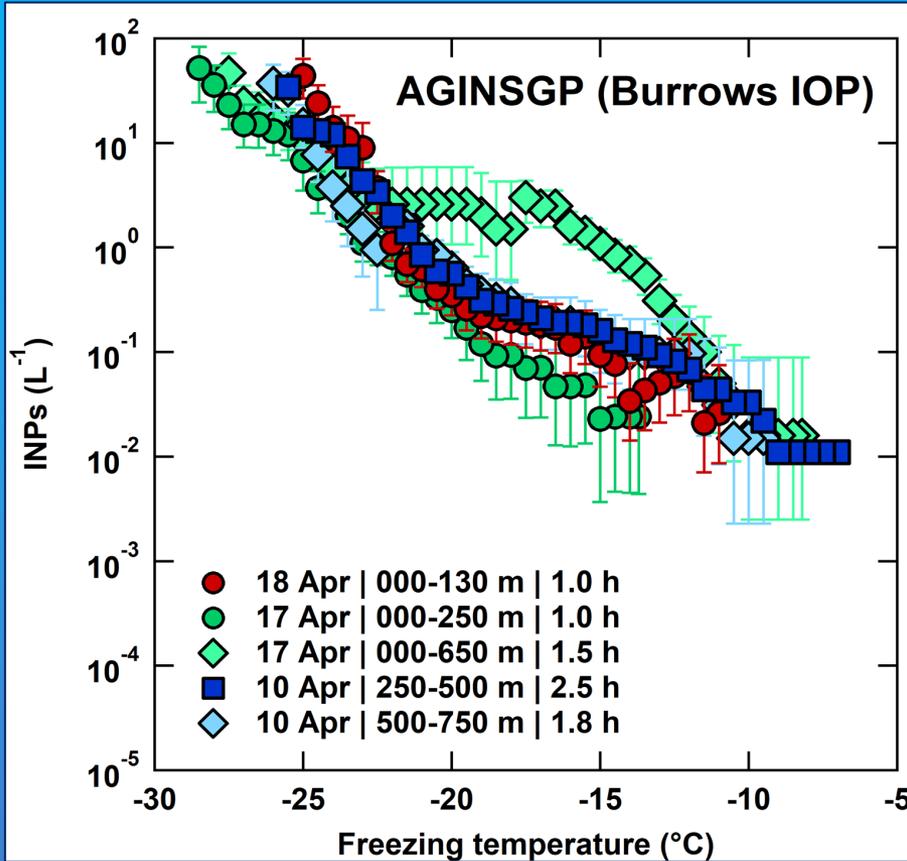
Ice Nucleation Spectrometer (INS)

(aka the CSU Ice Spectrometer)



○ Frozen well ● Unfrozen

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!

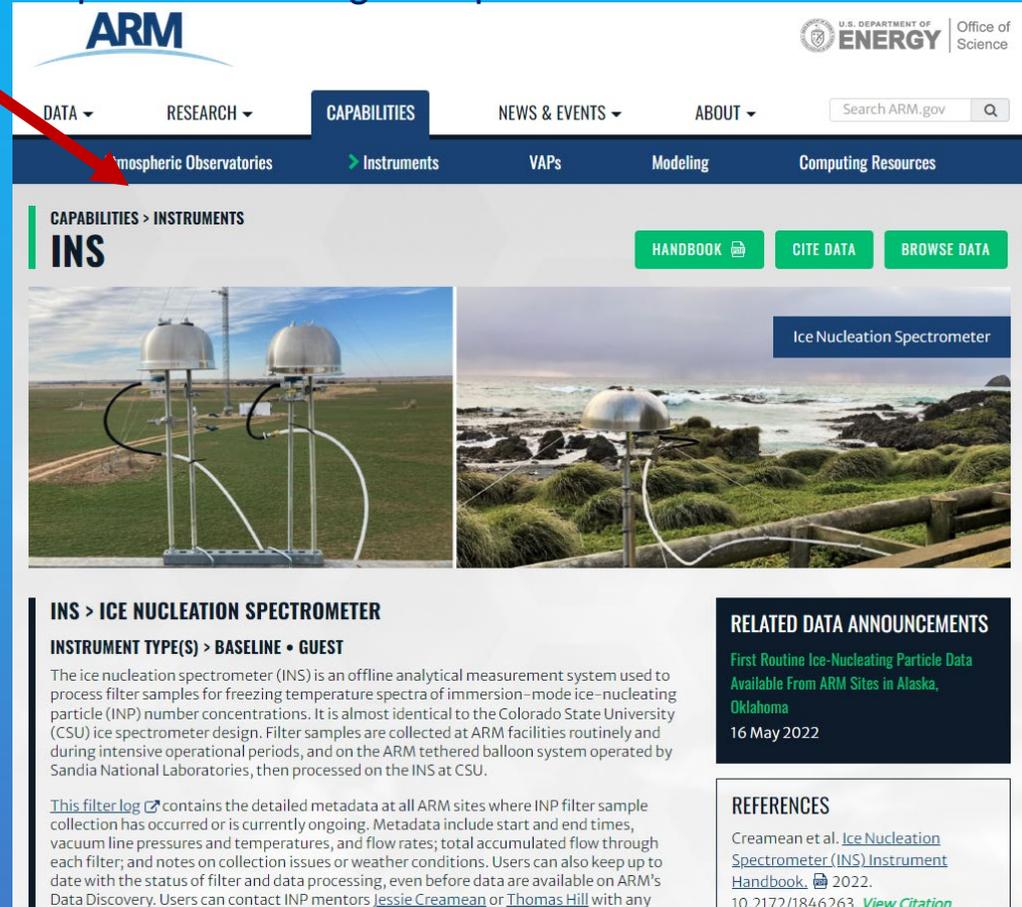
See our **instrument page** for more info, including links to the INS handbook, data, filter availability log, etc.

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

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



The screenshot shows the ARM website's 'CAPABILITIES > INSTRUMENTS' page for the INS. The page features a navigation bar with 'DATA', 'RESEARCH', 'CAPABILITIES', 'NEWS & EVENTS', and 'ABOUT'. Below the navigation bar, there are links for 'Atmospheric Observatories', 'Instruments', 'VAPs', 'Modeling', and 'Computing Resources'. The main content area includes a 'HANDBOOK', 'CITE DATA', and 'BROWSE DATA' button. Two images of the INS instrument are shown: one in a field and one near a coastline. Below the images, there is a section titled 'INS > ICE NUCLEATION SPECTROMETER' with a sub-section 'INSTRUMENT TYPE(S) > BASELINE • GUEST'. The text describes the instrument's use for measuring ice-nucleating particle (INP) concentrations. A 'RELATED DATA ANNOUNCEMENTS' box highlights 'First Routine Ice-Nucleating Particle Data Available From ARM Sites in Alaska, Oklahoma' dated 16 May 2022. A 'REFERENCES' section lists a paper by Creamean et al. (2022) on the INS instrument handbook.



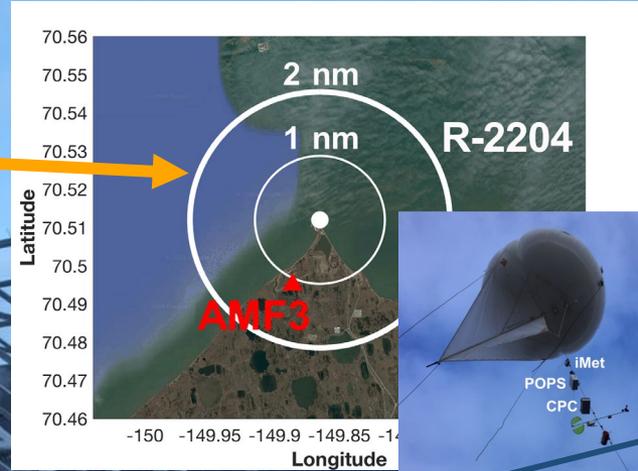
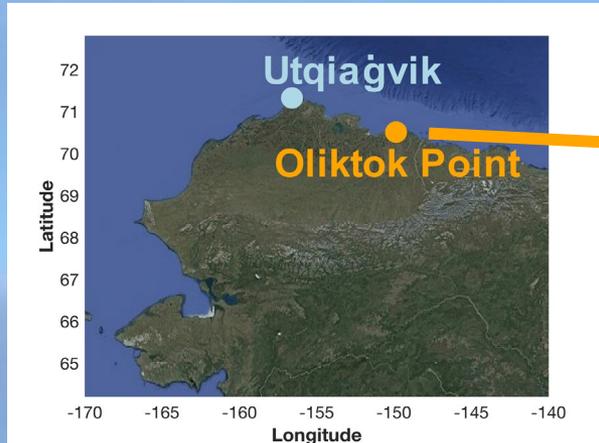
Scan this for a link to our data



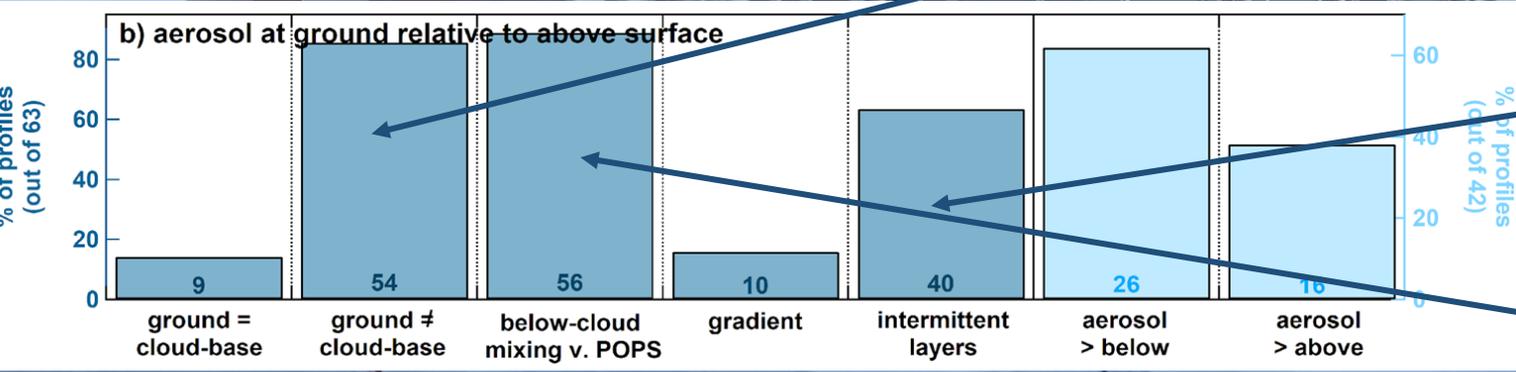
Scan this for a link to our instrument page

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)?