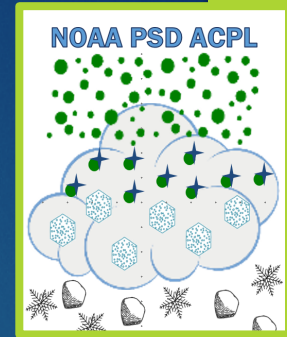


INPOP



Ice Nucleating Particles at Oliktok Point

PI: JESSIE CREAMEAN

PRESENTED BY: GIJS DE BOER

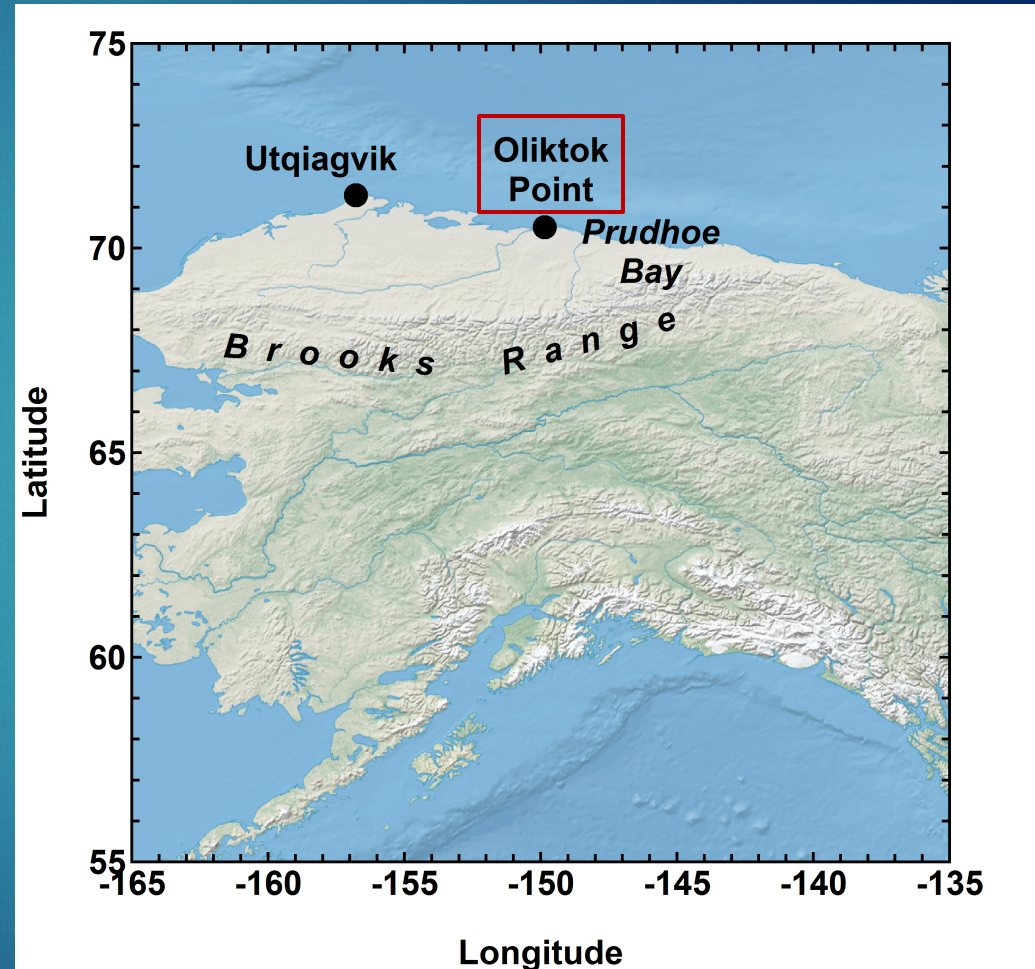
ARM/ASR JOINT USER FACILITY AND PI MEETING

13-17 MAR 2017



Motivation

- ▶ Ice nucleating particles (INPs) have the potential to significantly impact cloud microphysics in Arctic mixed-phase clouds.
- ▶ However, INPs are poorly understood in the Arctic.
- ▶ INPOP will measure the first INP freezing temperatures and concentrations at Oliktok Point (ARM AMF-3).



Sample collection at AMF-3

▶ Aerosol samples will be collected:

1. 1-15 Mar using a 6-stage cascading impactor
 - ▶ 6 size cuts $> 0.25 \mu\text{m}$
 - ▶ Collected on 22 mm siliconized circular glass microscope slides
 - ▶ Change samples daily
2. 1 Mar – 31 May using a DRUM rotating impactor
 - ▶ 4 size cuts between $\sim 0.15 - 12 \mu\text{m}$
 - ▶ Collected on strips of Mylar coated with a solution of petrolatum and xylenes
 - ▶ Daily samples will be collected on the strips as the drums rotate, but strips will be changed \sim once a month



Other DRUMs pictured are collecting for collaborative grants for bulk and single-particle chemistry



Offline INP analysis

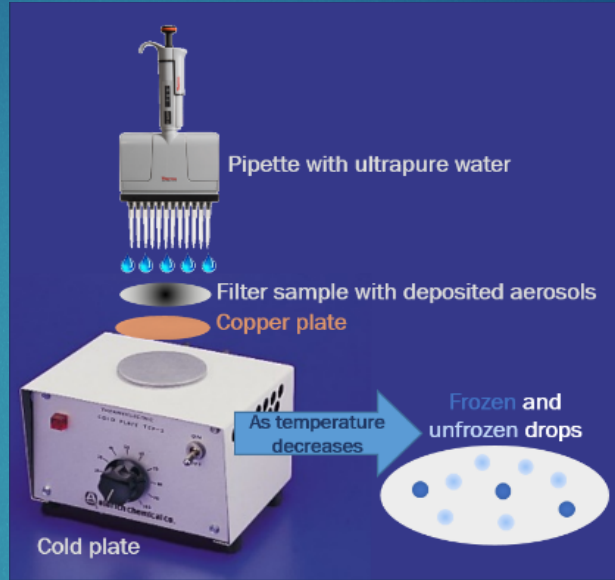


- ▶ Method: cold plate assay
- ▶ Daily samples will be tested:

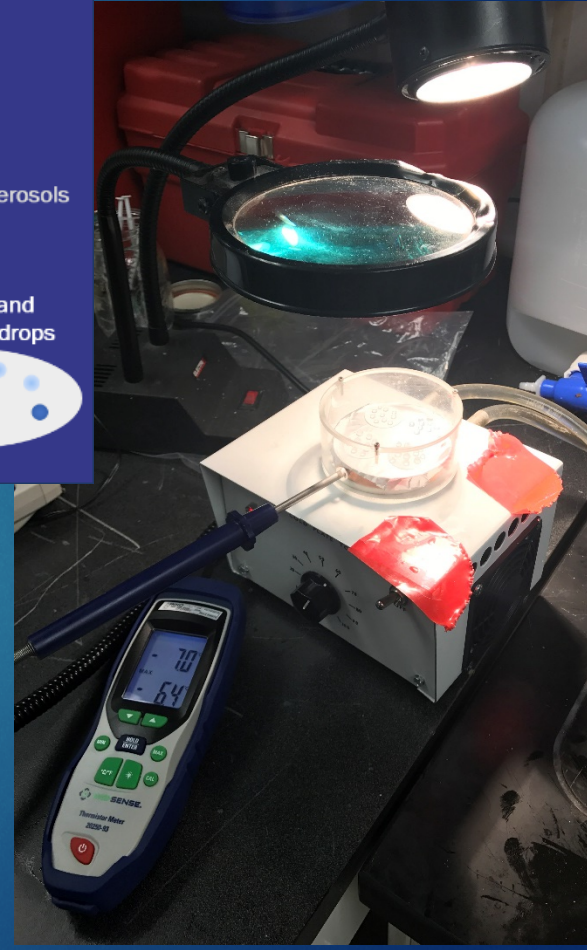
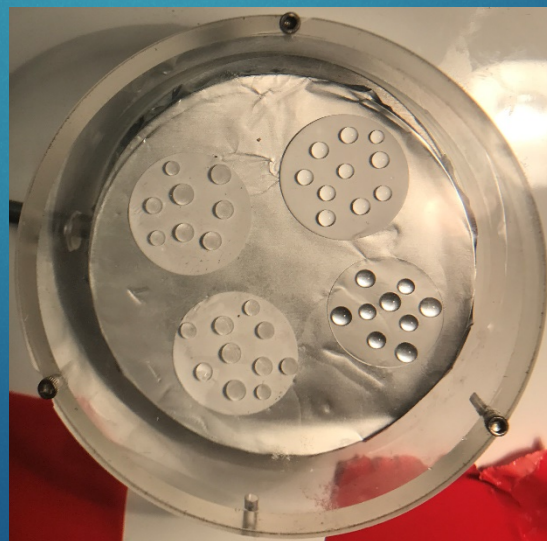
1. For highest freezing temperature (bulk)
 - ▶ Large ultrapure water (UPW) drop(s) on sample surface (near center where most aerosol are deposited)

2. For INP concentrations (cumulative spectra)

- ▶ Resuspended aerosol in UPW and create array of droplets
- ▶ $-\ln(f)/V$ where f = fraction of drops frozen and V = volume of drops
- ▶ Heat treat to determine relative amount of biological versus non-biological sample



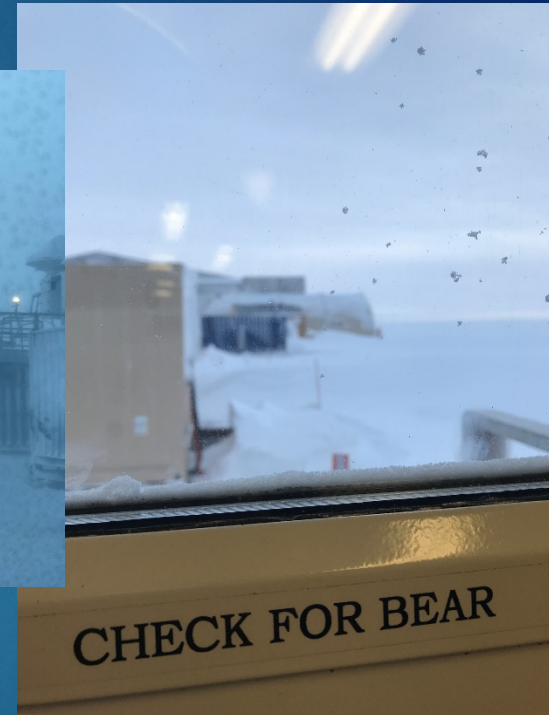
Examples of setup:



Expected outcomes

- ▶ 3-month time series of daily, size-resolved INP freezing temperatures and concentrations of biological and non-biological INPs during Arctic Haze season.
 - ▶ Determine if INPs are important at Oliktok during the calendar spring.
 - ▶ Determine the relative contribution from biological and non-biological INPs.
- ▶ Provide insight into the potential for future semi-routine or routine INP measurements at ARM sites.
 - ▶ Is this measurement too labor intensive or difficult?
 - ▶ Which substrates and collection methods work best?
- ▶ Compare INP concentrations with aerosol chemistry (XRF and SEM-EDX) with two simultaneous IOP deployments from PI Nick Spada (UC Davis) and PI Kerri Pratt (U Michigan), respectively.
- ▶ Compare with AOS aerosol measurements.

Study is currently ongoing. Hello from the Arctic!



Check out my blog of my
research adventures:
[http://ciresblogs.colorado.
edu/inpop/](http://ciresblogs.colorado.edu/inpop/)



For questions,
contact
[jessie.creaman@
noaa.gov](mailto:jessie.creaman@noaa.gov)