

# ***IFFEx0***

## ***Ice Fog Field Experiment***

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# ***IFFExO Objective***

**To better understand and predict the formation, evolution and decay of Arctic Ice Fog (Vis<1 km)**

- **The IFFExO Pilot Study was completed successfully at the SGP site (slide#3) and preparations were underway for **the IFFExO campaign at AMF3 during March 22 to April 5, 2020 but now will be performed for first 2 weeks of Nov 2020**.**
  - **Project location: Oliktok Point, AK, ARM site**
  - **Platforms: TBS, AMF3, GONDOLA (Microphysics)**
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- **IF occurs due to presence of tiny ice crystals (size<200  $\mu\text{m}$ ) in the lower atmosphere.**
  - **IF occurs at subfreezing temperatures (less than  $-10^{\circ}$ )**
  - **IF occurs directly by deposition of onto ice nuclei or freezing of supercooled small droplets (Gultepe et al. 2014, 2020; Kim et al. 2014).**

# TBS based IF microphysics and IN physical and chemical characteristics

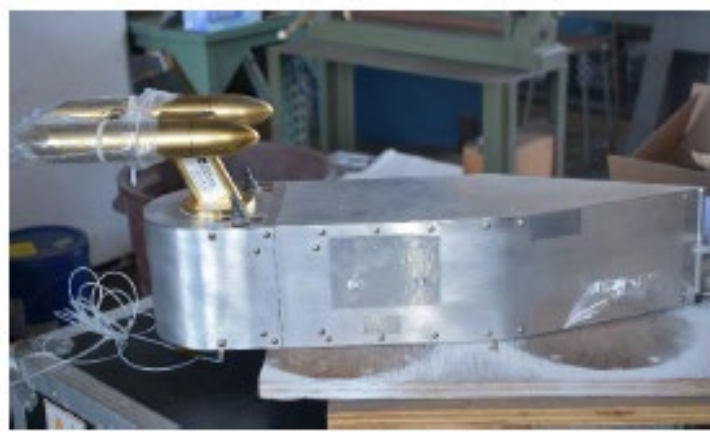


Figure 4a: The Gondola platform of the University of Ontario Institute of Technology (UOIT).



Fig 4b: Gondola suspended on a base plate attached to the tethered balloon system (TBS).

1. Gondola with CDP and BCP
2. VIPS, Video Particle Imaging Spectrometer
3. Aerosol spectra with POPS, printed optical particle spectrometer
4. 3D wind an ultrasonic anemometer
5. Aerosol impactor system
6. Met parameters



Fig. 4c: Instruments along the tether line



Fig 4c: Overall TBS-Instrument deployment.

## 3.3 IFFExO Field Campaign

# ARM Doppler lidar at Oliktok Point

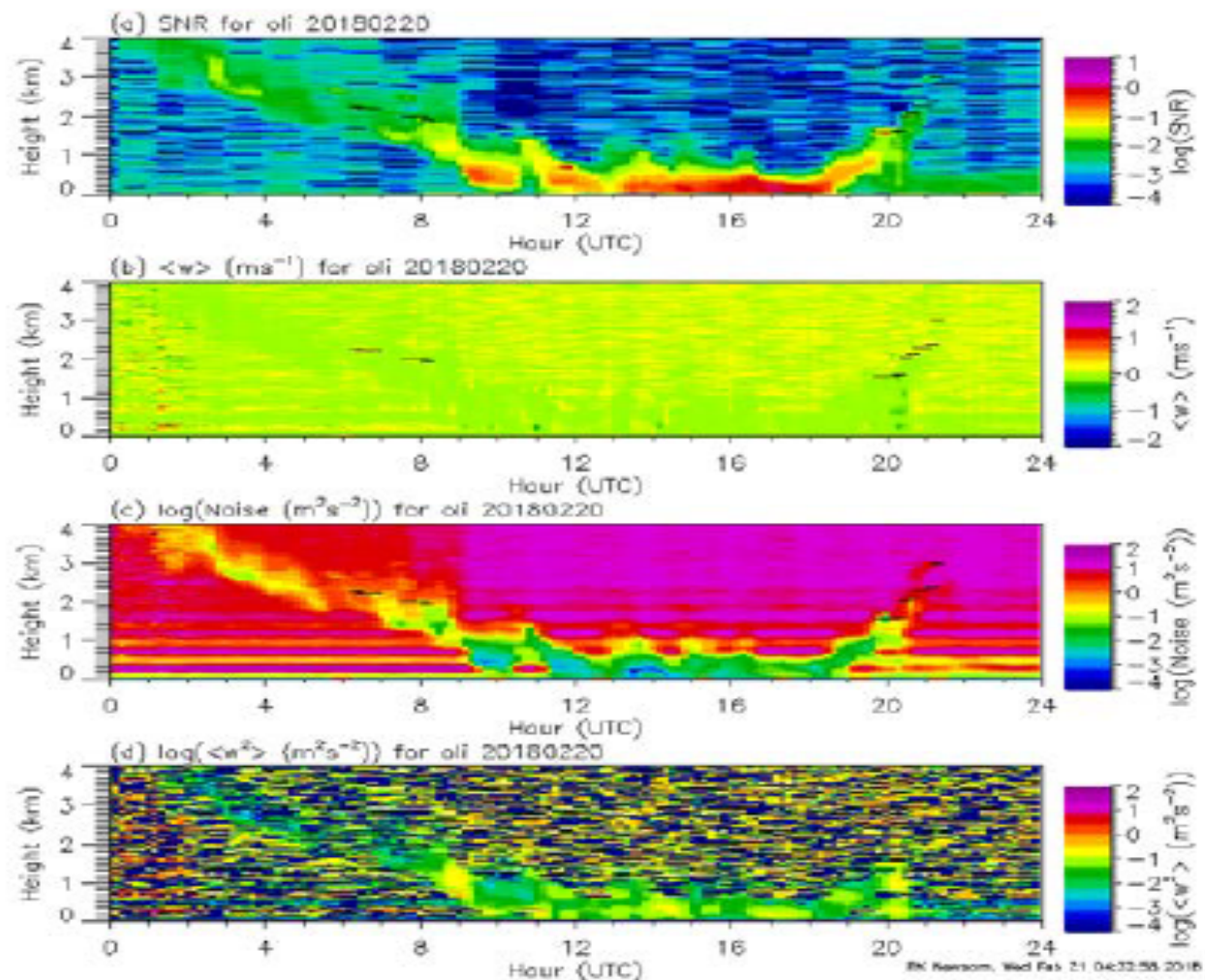
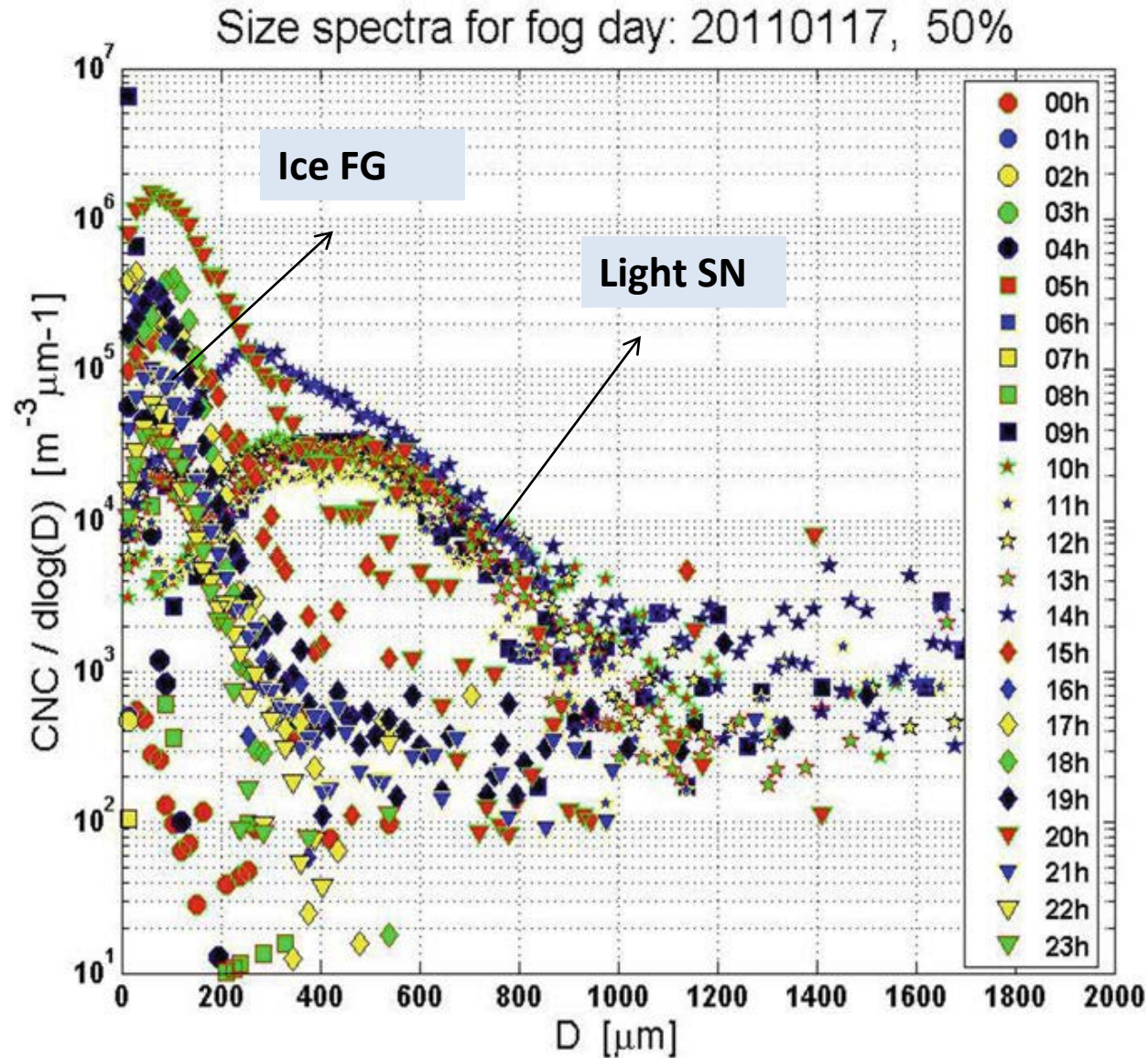


Figure 5: Doppler lidar time-height cross-sections of (a) Signal to noise ratio, (b) 1Hz vertical velocity, (c) 10-min vertical velocity error variance (noise), (d) 10-min vertical velocity variance (without noise correction) on 02-20-2018 at AMF3. Courtesy: Dr. Rob Newsom and Dr. Raghu Krishnamurthy (PNNL Lidar Mentors)

# GCIP IF Crystal Spectra



# Expected Accomplishments

- Improve ice fog microphysics parameterizations
- Develop relationships between IF Ni versus IN & thermodynamics and dynamics parameters that can improve ice fog extinction ( &Vis) prediction for NWP
- Evaluate new instruments platforms for BL processes and responses to IF
- Improve IF monitoring and prediction using LES&NWP as well as regional climate models
- Evaluate remote sensing retrievals for IF microphysical characteristics