

NETCARE Meeting, University of Toronto  
Nov 16, 2015

# Characterizing Artificially Generated Marine Aerosol

Rachel Chang

Coady Boudreau, Ashley Drodge, Matt Boyer  
Department of Physics and Atmospheric Science

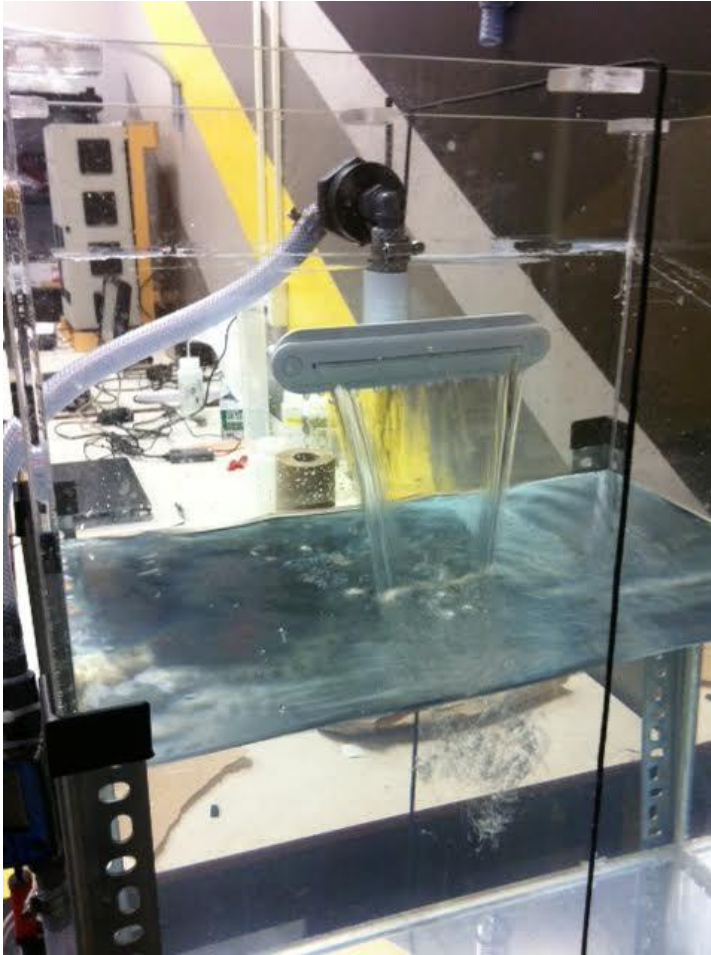
[rachel.chang@dal.ca](mailto:rachel.chang@dal.ca)



# OBJECTIVES

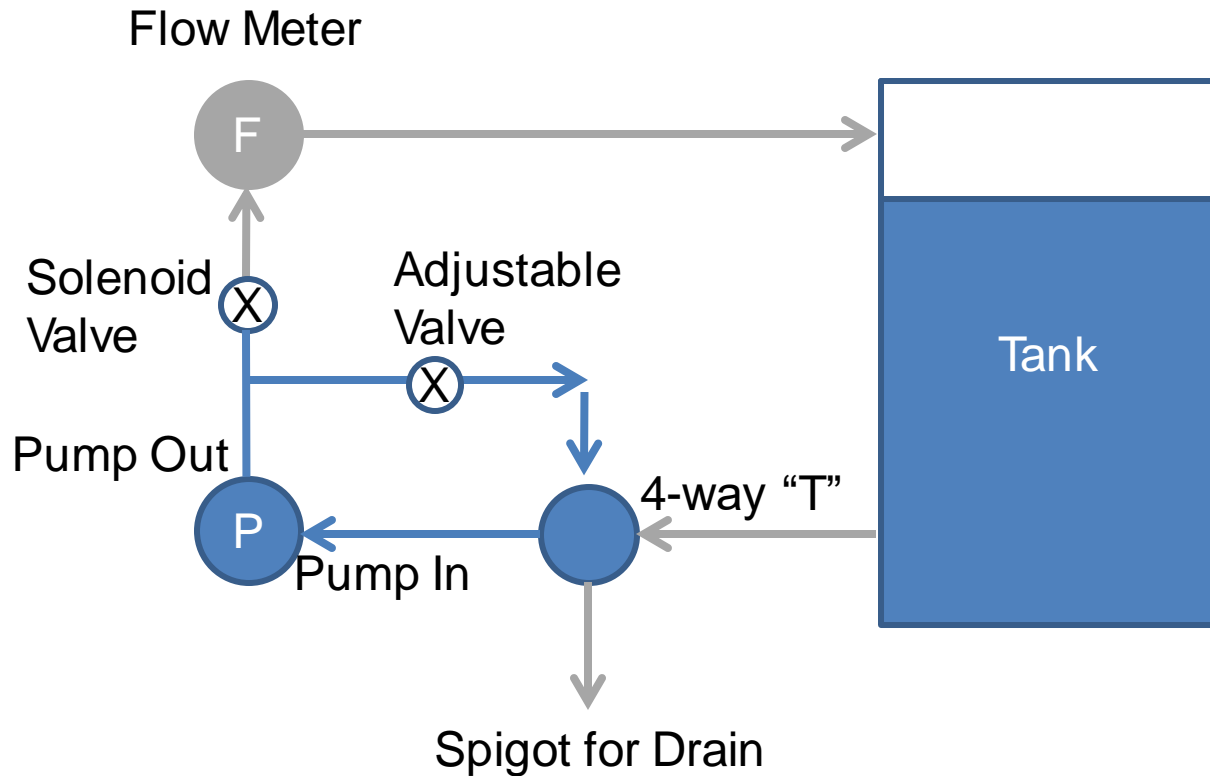
- study properties of sea spray aerosol
- generate sea spray aerosol from ocean water
  - characterize bubble size distribution
  - study their chemical and physical properties

# DALHOUSIE ARTIFICIAL WAVE TANK (DAWT)



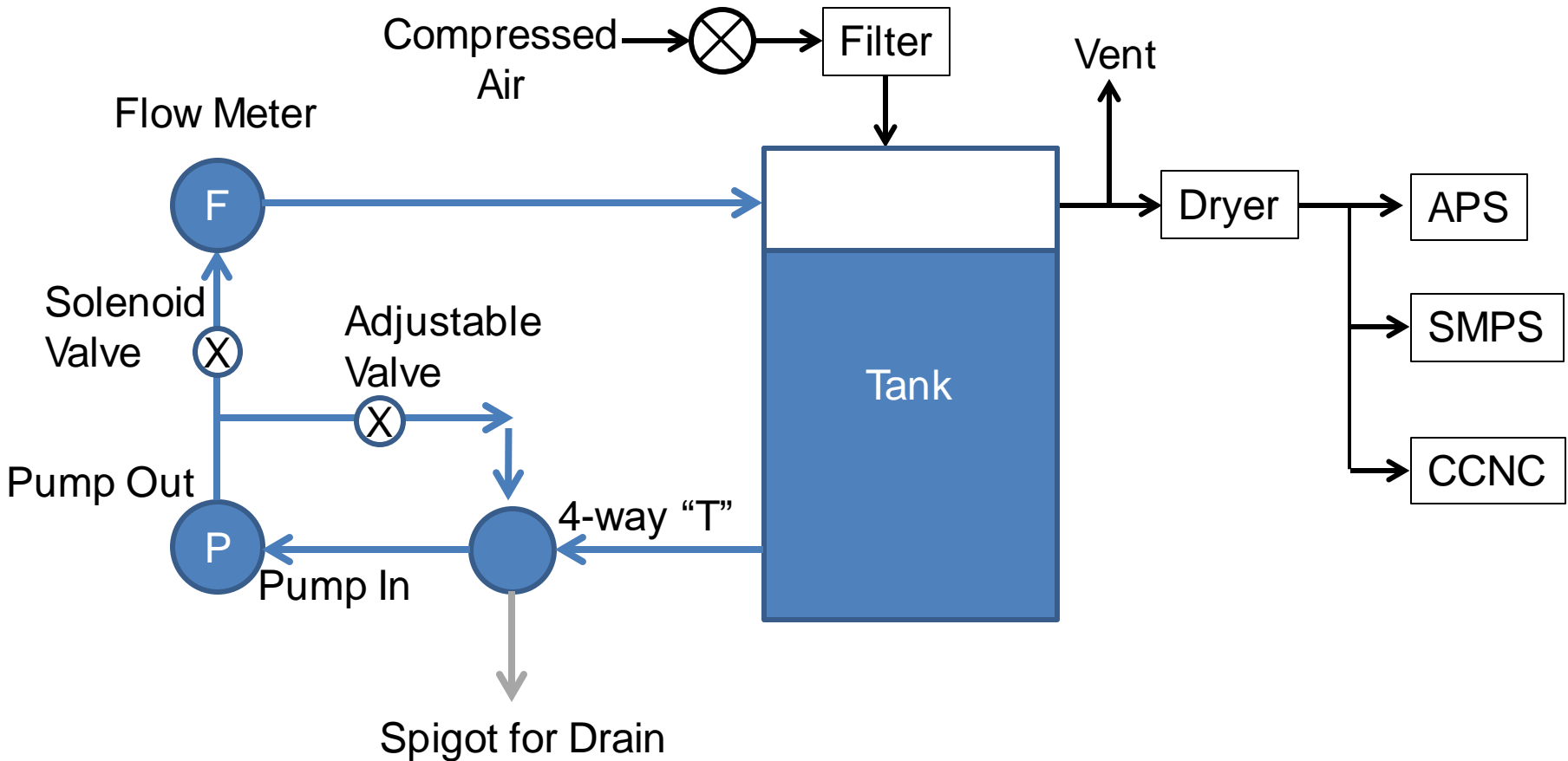
- Tank: 48 cm x 30 cm x 60 cm (LxDxH)
- Rack: 57 cm x 40 cm x 150 cm
- ~ 40 L headspace
- ~ 48 L water
- water flow rate 8-12.5 L/min

# WATER FLOW DURING OFF PHASE



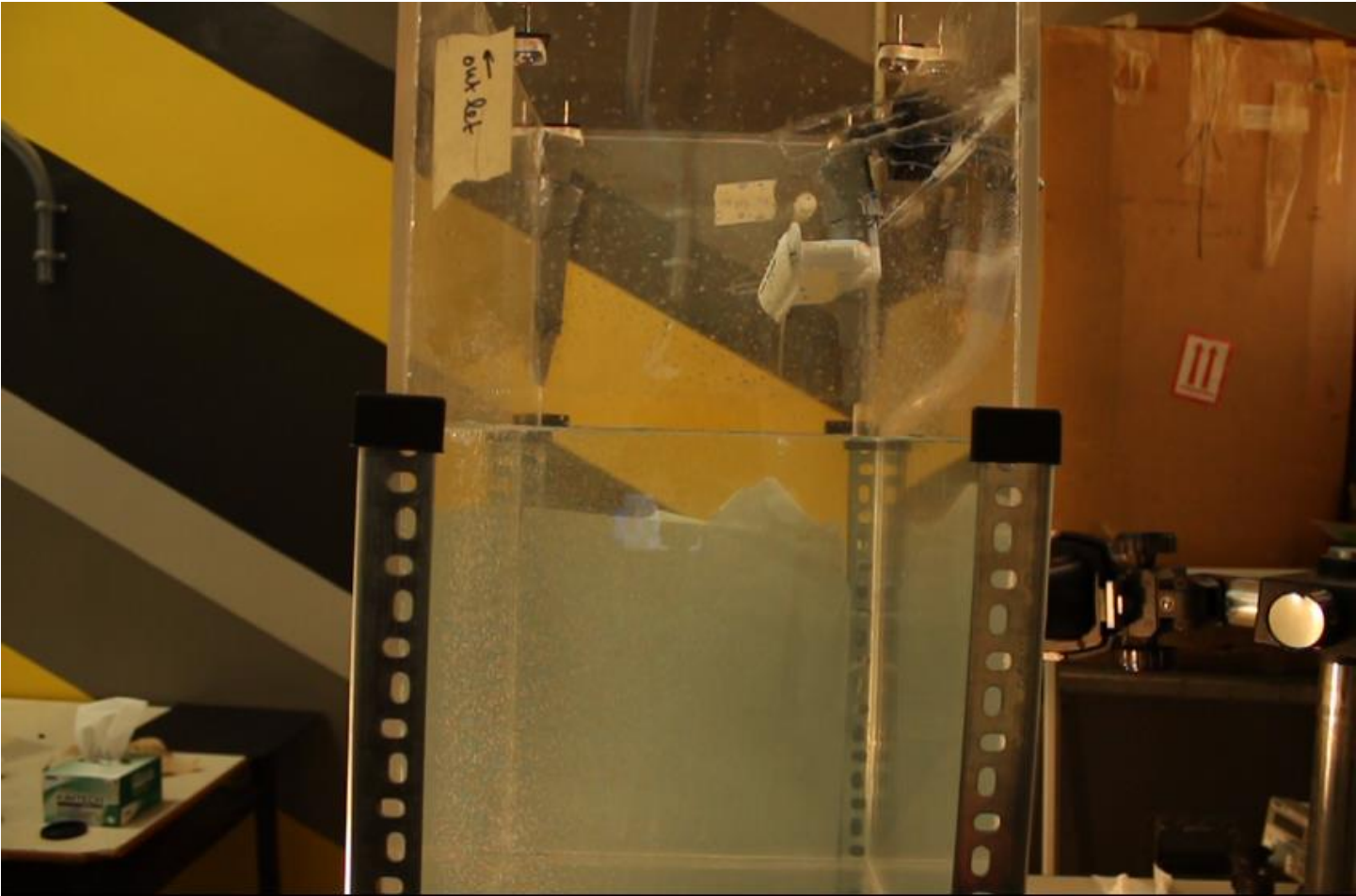
**Water Flow**  
No Water Flow

# WATER FLOW DURING ON PHASE

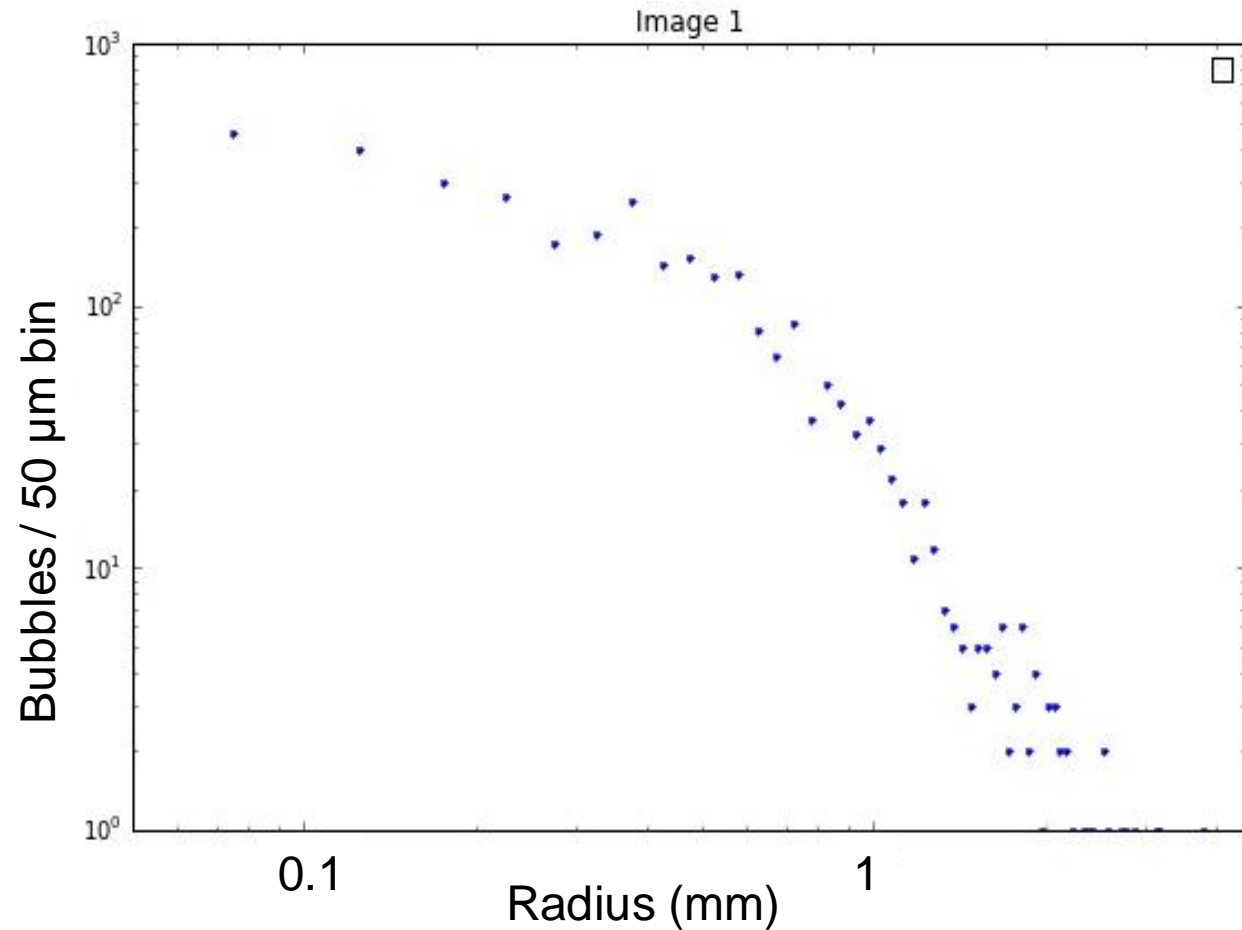


**Water Flow**

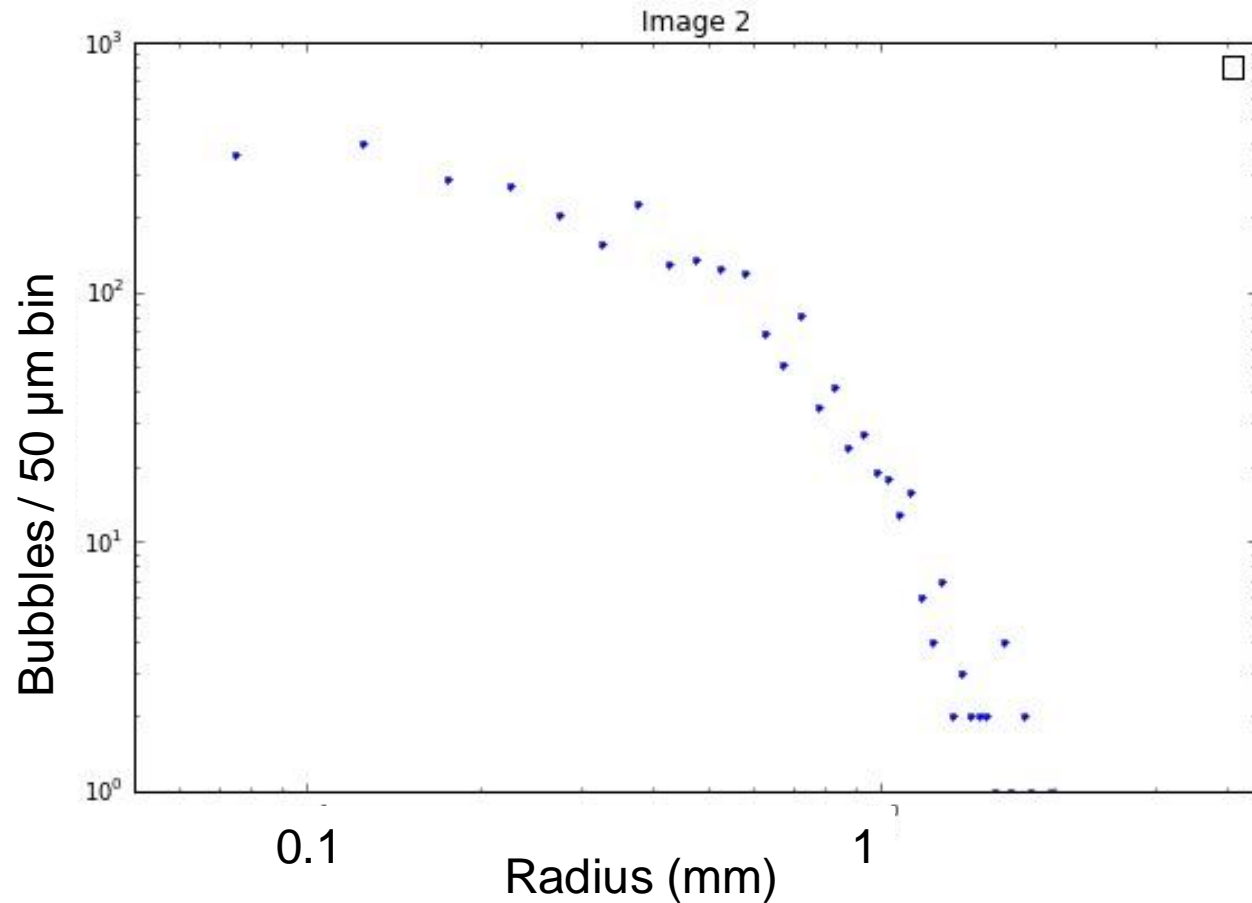
No Water Flow



# BUBBLE IMAGE PROCESSING



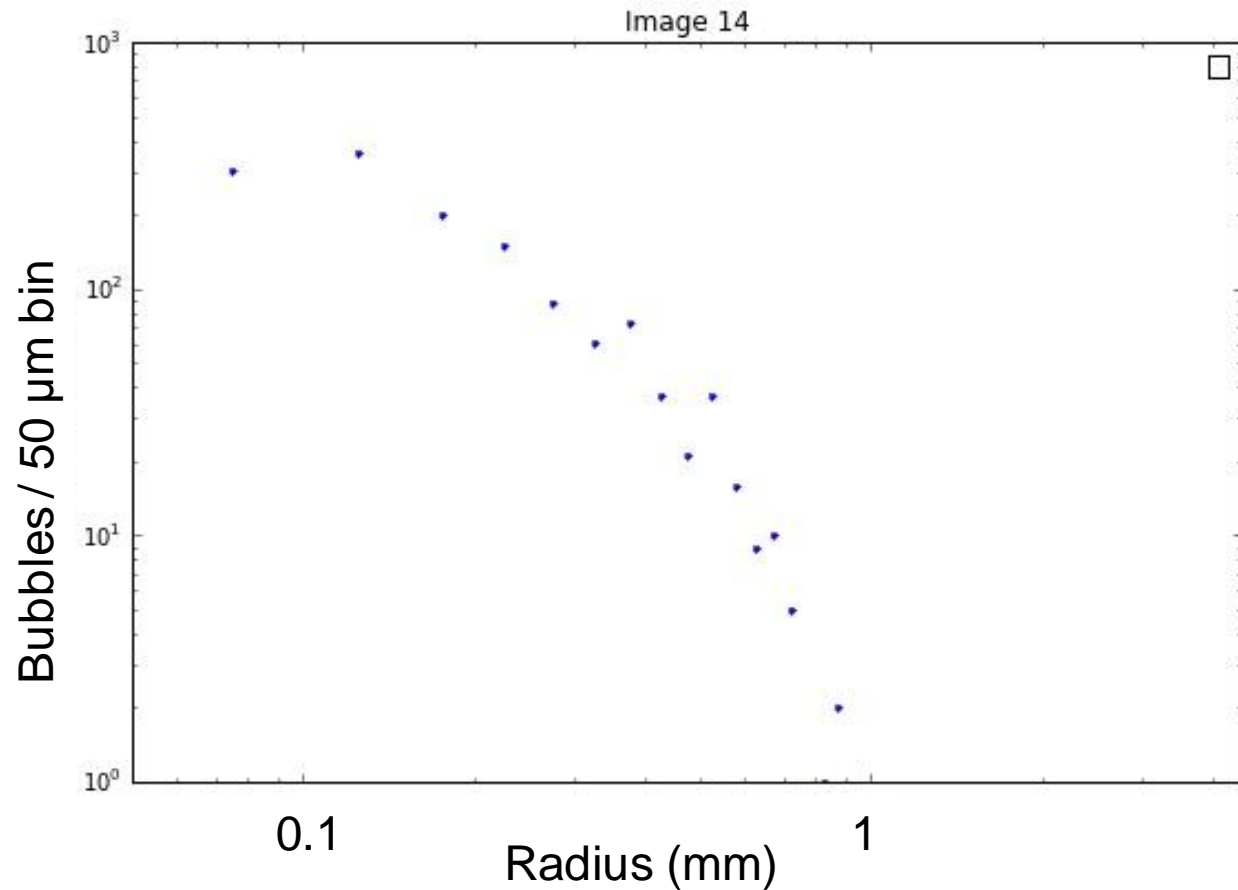
# BUBBLE IMAGE PROCESSING





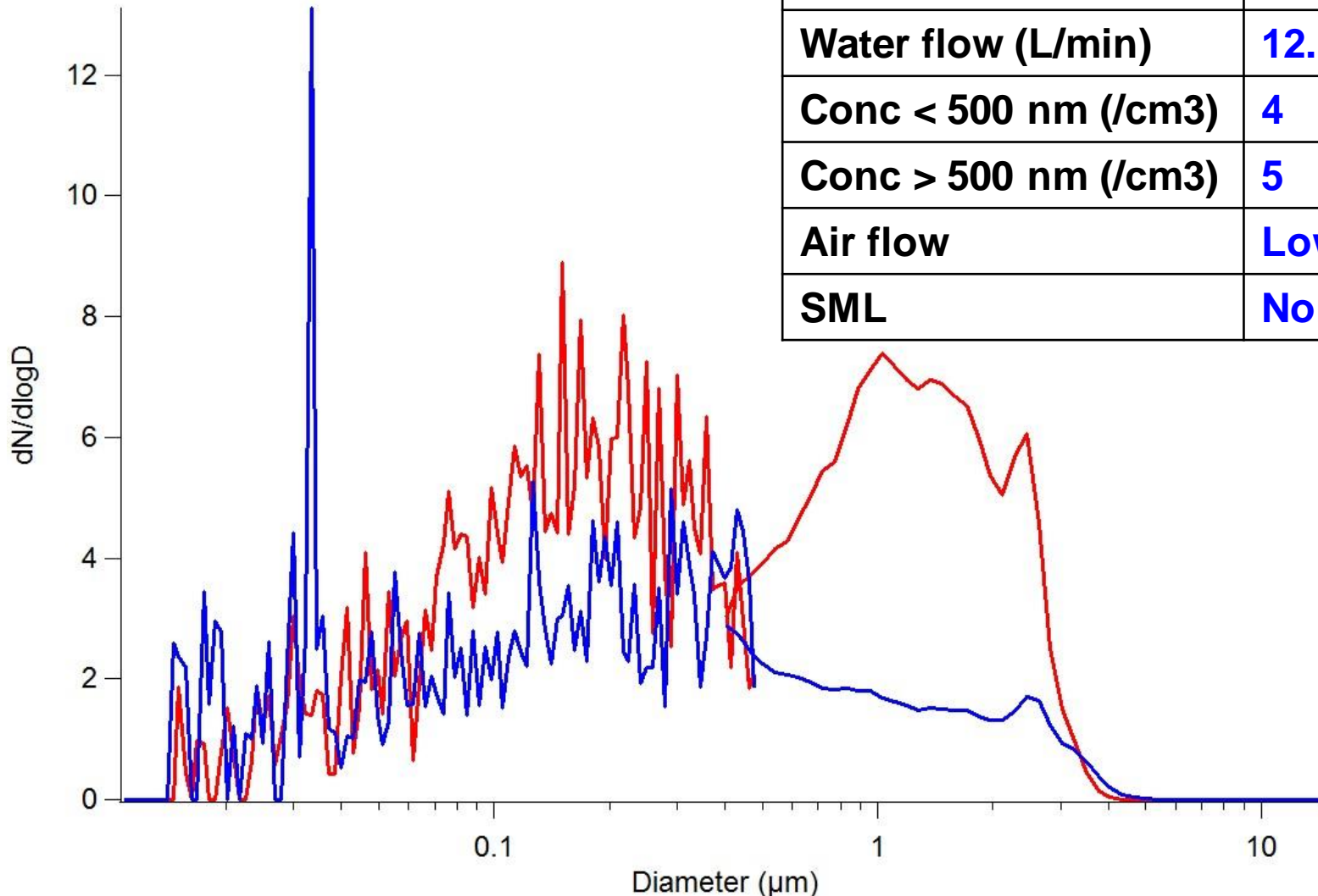


# BUBBLE IMAGE PROCESSING

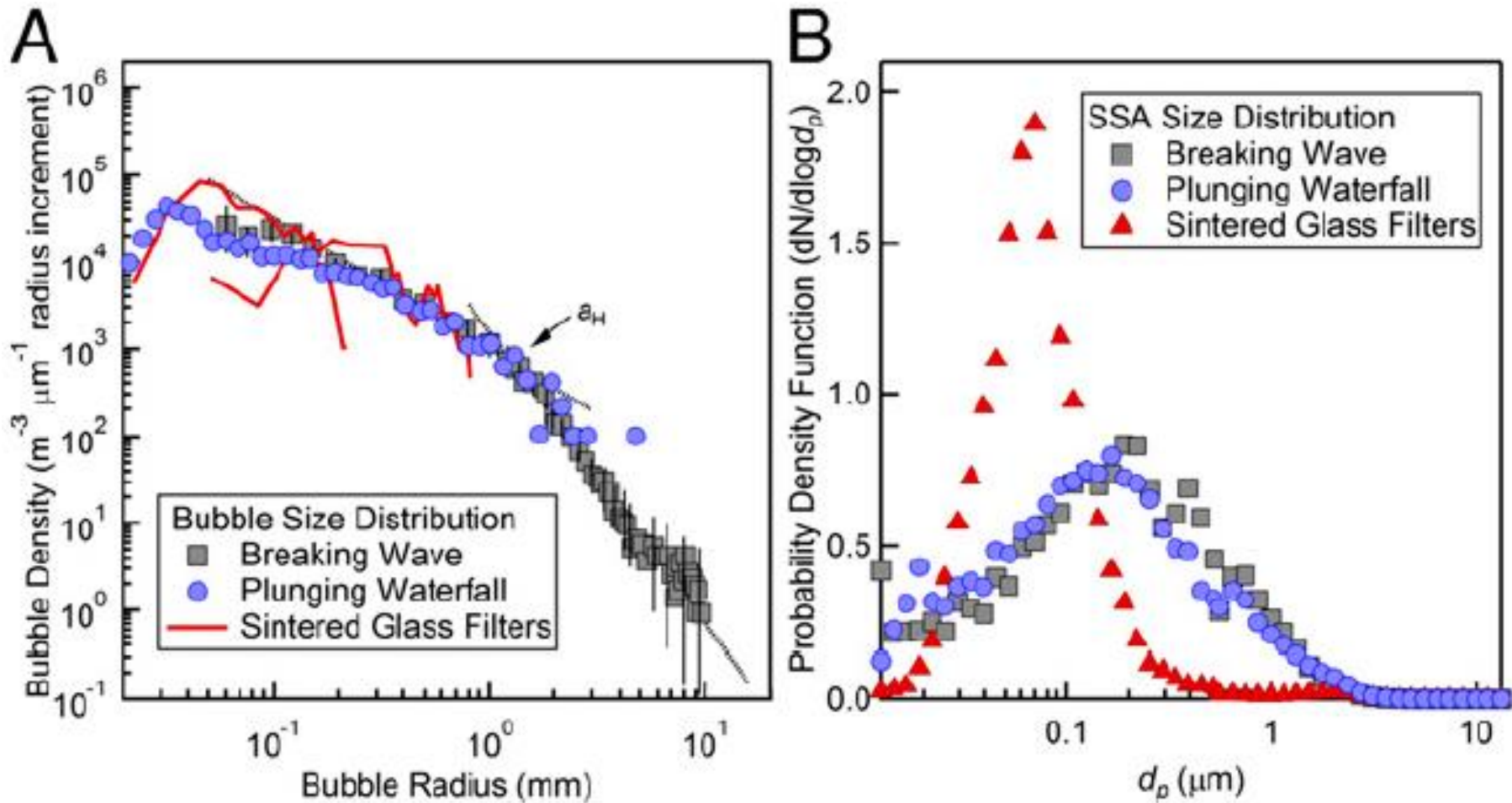


# DAWT SIZE DISTRIBUTION

	<b>Trial 1</b>	<b>Trial 2</b>
<b>Time on, off (s)</b>	<b>10, 10</b>	<b>20, 10</b>
<b>Water flow (L/min)</b>	<b>12.5</b>	<b>10</b>
<b>Conc &lt; 500 nm (/cm<sup>3</sup>)</b>	<b>4</b>	<b>5</b>
<b>Conc &gt; 500 nm (/cm<sup>3</sup>)</b>	<b>5</b>	<b>5</b>
<b>Air flow</b>	<b>Low</b>	<b>High</b>
<b>SML</b>	<b>None</b>	<b>300 μm</b>



# AEROSOL FROM MART

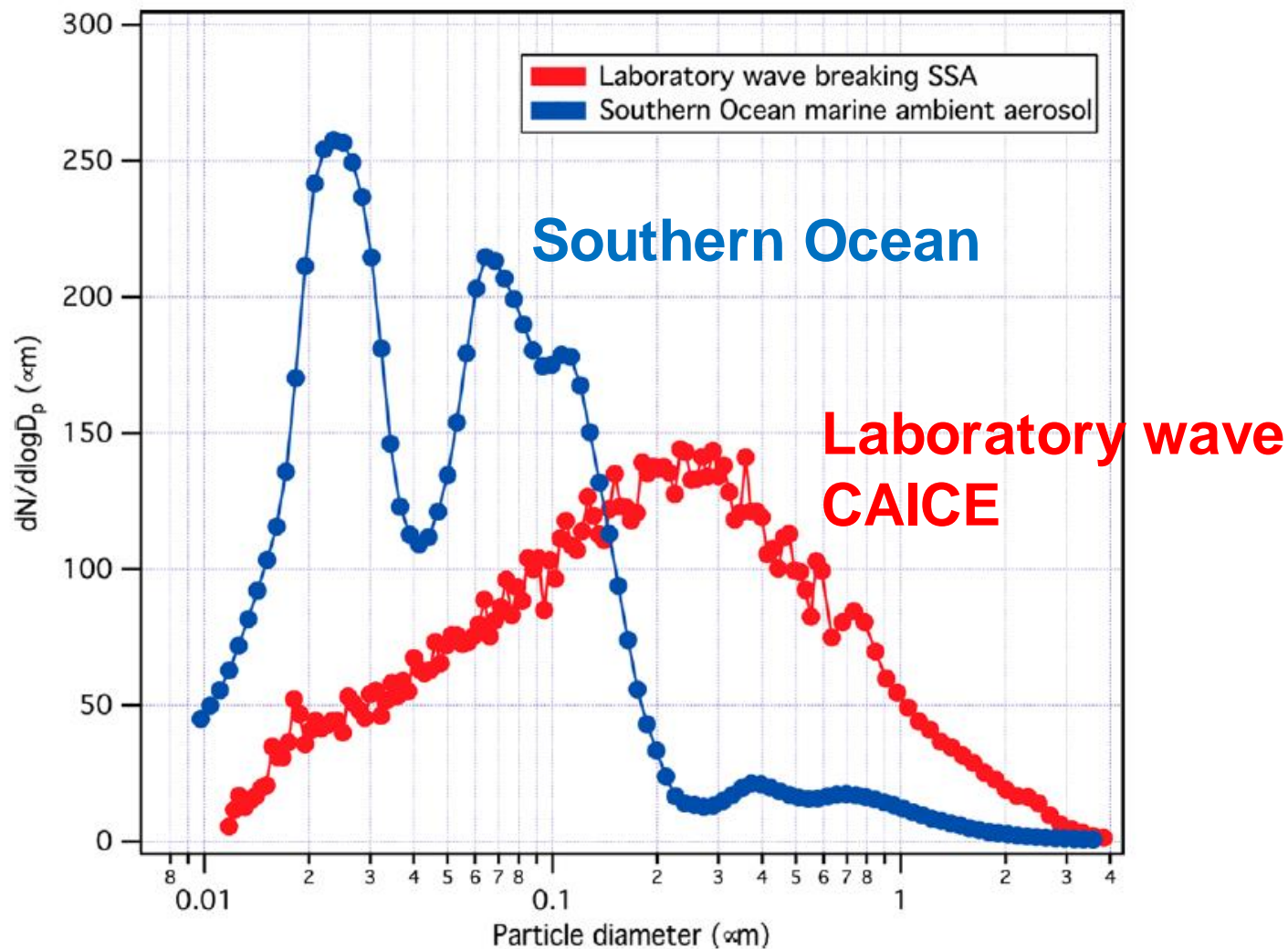


Total concentration > 6000 /  $\text{cm}^3$

Stokes et al., *AMT*, 2013

Prather et al., *Proc. Nat. Acad. Sci.*, 2013

# SIZE OF MARINE AEROSOL



# FUTURE WORK

- trouble shoot particle concentration issues
- use other generation methods
  - bubbler, atomizer, venutri inlet
- use known solution of ammonium nitrate and soluble and surface-active organics
  - characterize with ACSM, SMPS, APS, CCNC
- use surface seawater sampled near Halifax, from the Amundsen, etc.