

ACCACIA

Aerosol-Cloud Coupling And
Climate Interactions in the Arctic

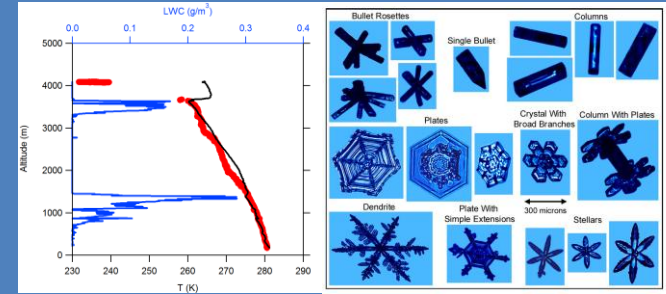
Ian Brooks and many more

Field campaign

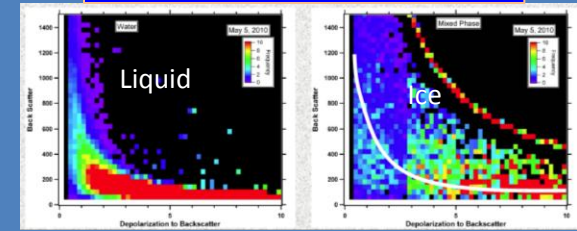
- Boundary-layer flights looking at Arctic stratus, aerosols and BL structure
- Off ice (clean) flows
- On ice flows
- FAAM 146 & BAS Twin Otter – March 2013
 - Kiruna & Svalbard
- BAS Twin Otter – JJA 2013
- Secondary aims
 - Orographic flows around Svalbard?
 - Polar lows?

Cloud Microphysical & Aerosol Properties - Deep Stratus Flight Profile

Liquid & Ice Water Profiles & Path



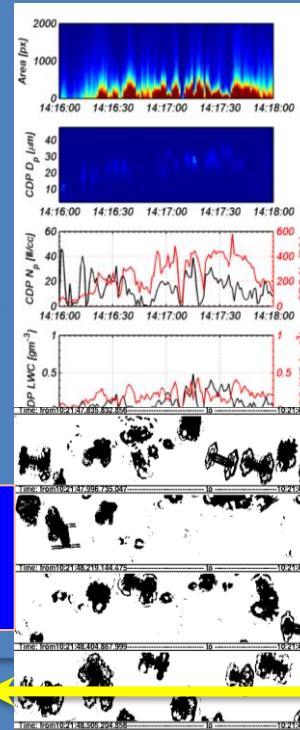
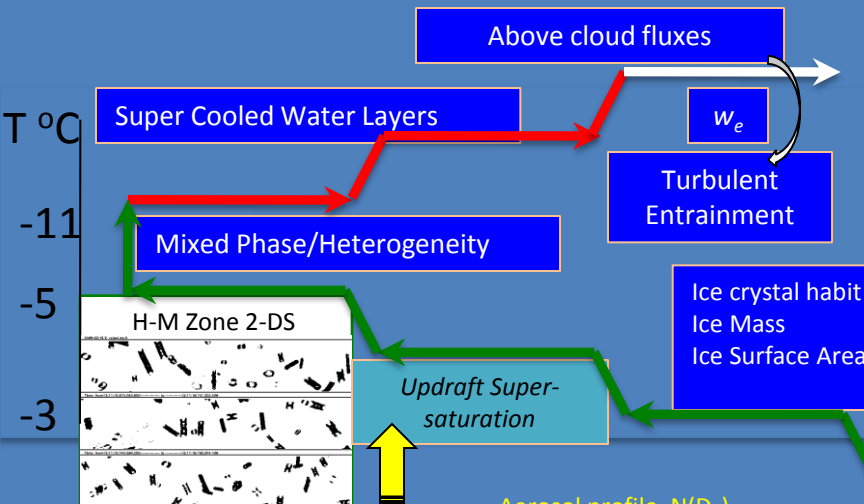
Liquid/Mixed Phase Fraction



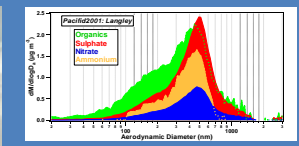
CLOUD

— Above cloud turbulent entrainment velocities & Aerosol Properties inc. IN concentration

— Super-cooled Layers, Primary Ice Generation



- Aerosol profile, $N(D_p)$
- Organic Aerosol Mass HOA, OOA $M_o(D_p)$
- Inorganic Mass, NO_3, SO_4, NH_4, Cl $IM(D_p)$
- Refractory black carbon mass & number $rBC, N_{BC}(D_p)$
- Aerosol absorption coefficient k_e
- Scattering/Absorbing $M, N_{scat/absorb}(D_p)$
- CCN, Volatility
- Ice Nucleus Concentration IN - (MO)
- Turbulence – Latent/Sensible Heat



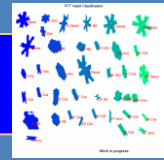
— Below cloud aerosol profile & composition

Sub-cloud Boundary Layer

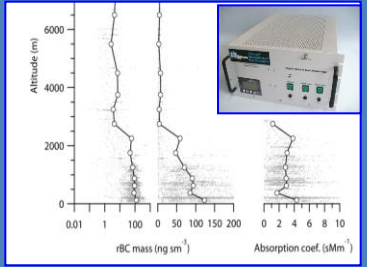
Particle Shape, Roughness, Scattering Coefficient (UH)

Sea salt

Airborne Eddy Covariance Surface Fluxes



Refractory Black Carbon Mass



Tower micromet footprint validation

Sea

Cloud Microphysical & Aerosol Properties - Thin Stratus Flight Profile

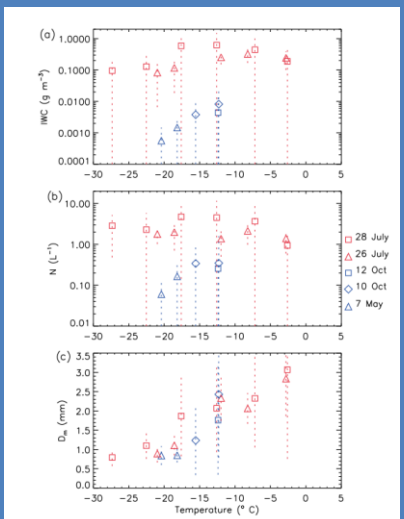
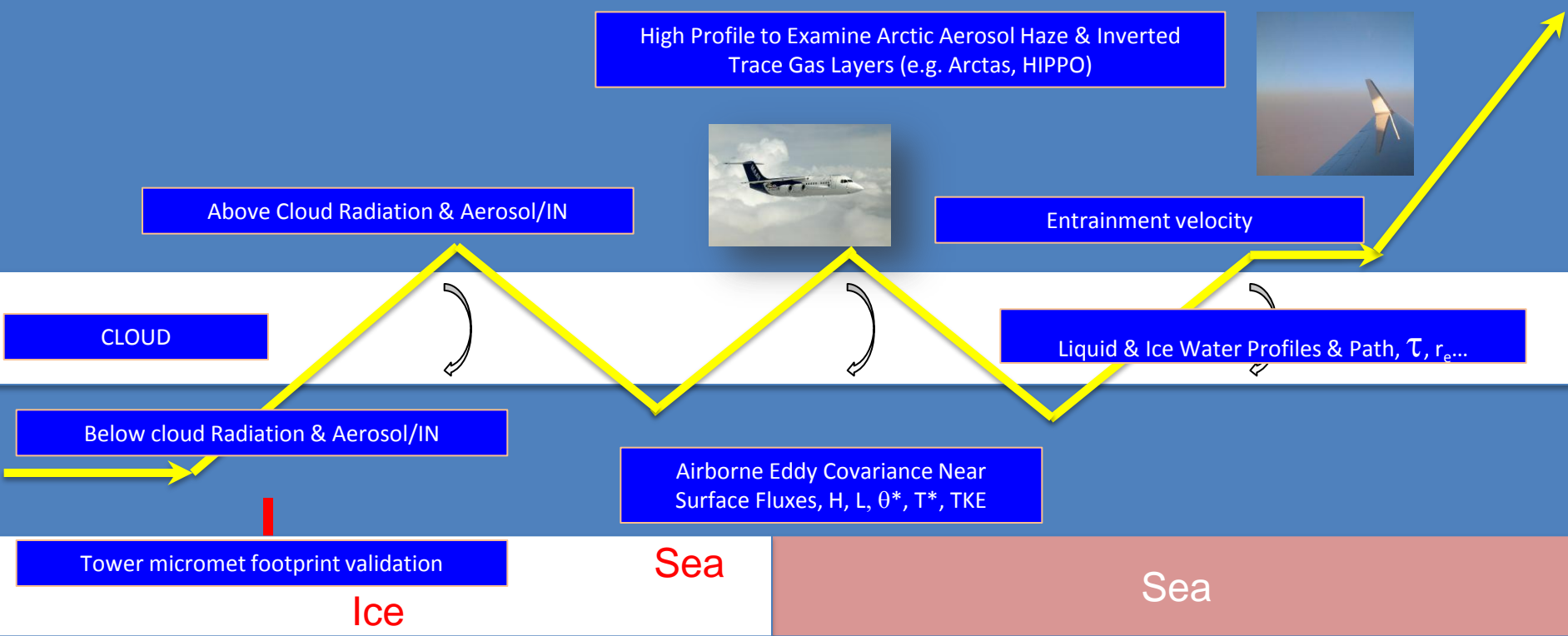
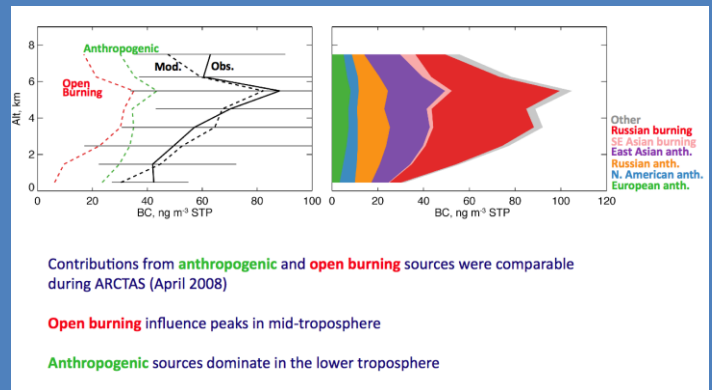


Figure 5. (a) IWC, (b) N_l and (c) D_w as a function of temperature. Case-average values are shown by the symbols, with the vertical dotted line indicating ± 1 standard deviation based on 10 s data.

Arctic Stratus
Sheba '98.
Morrison et al.
2011



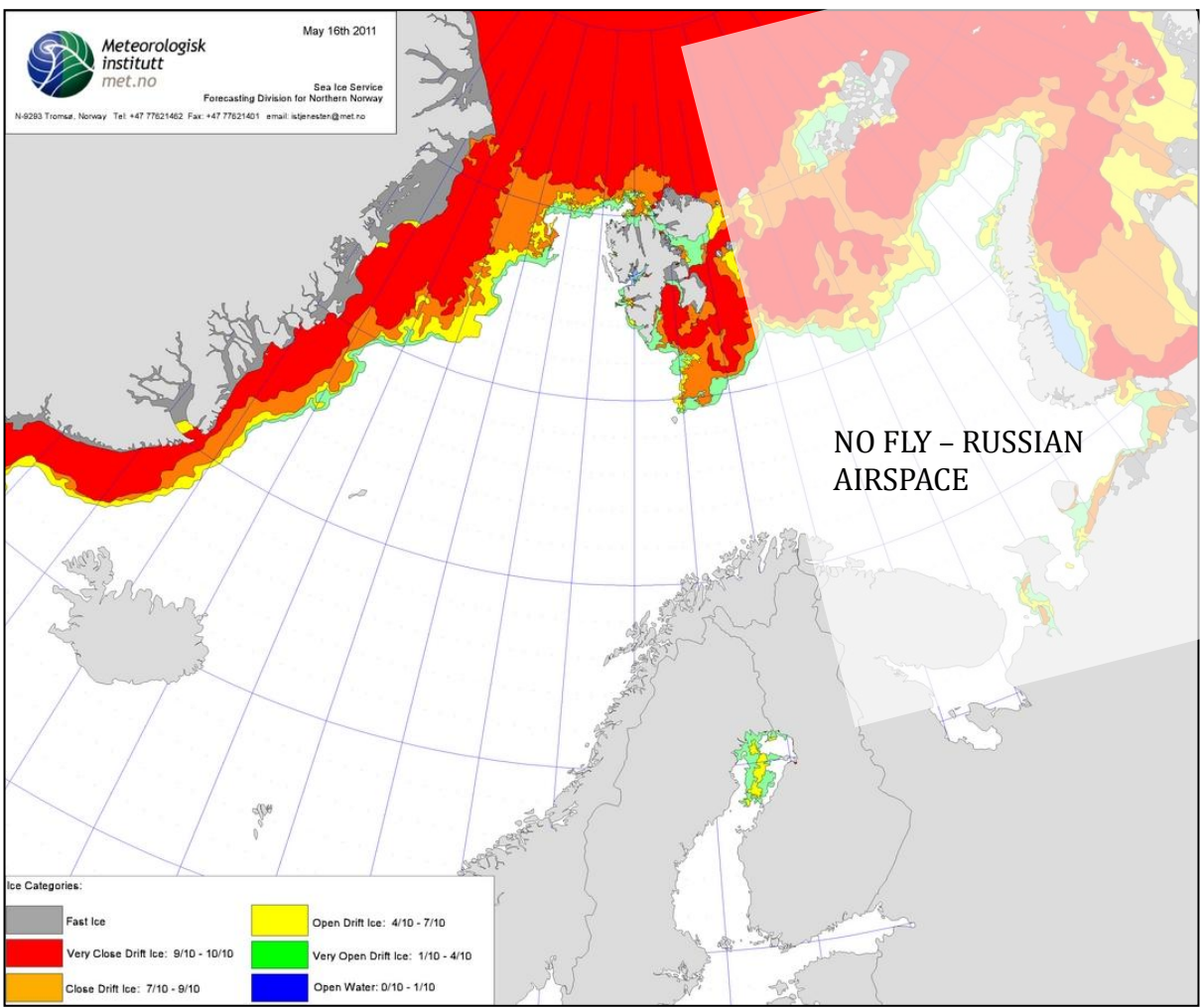
Arctic Black Carbon Aerosol
Fisher (2010) Harvard, Arctas Experiment 2008









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May 18th 2011

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Ice Categories:

	Fast Ice		Open Drift Ice: 4/10 - 7/10
	Very Close Drift Ice: 9/10 - 10/10		Very Open Drift Ice: 1/10 - 4/10
	Close Drift Ice: 7/10 - 9/10		Open Water: 0/10 - 1/10



March 2012

 median
1979–2000



March 2011

median
1979-2000