Utilization of Research Aircraft for Validation of Satellite-Derived Products

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Science and Technology Branch

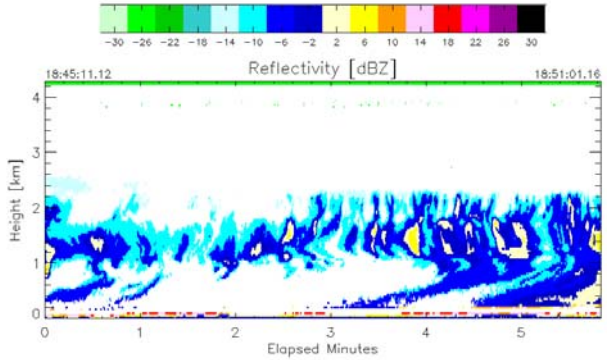
Environment Canada

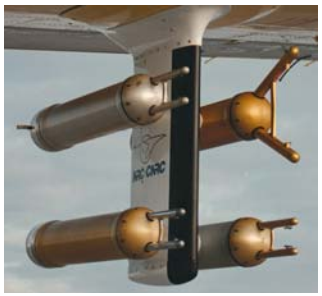
Environnement Canada

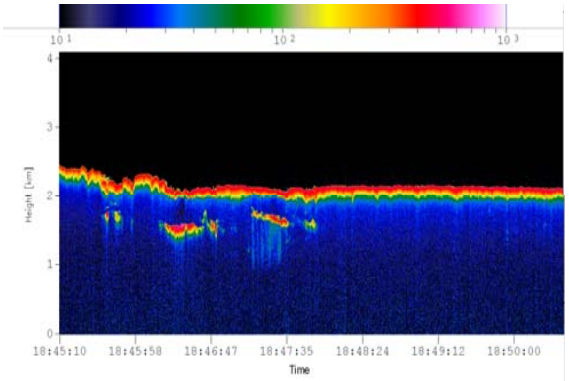
Outline

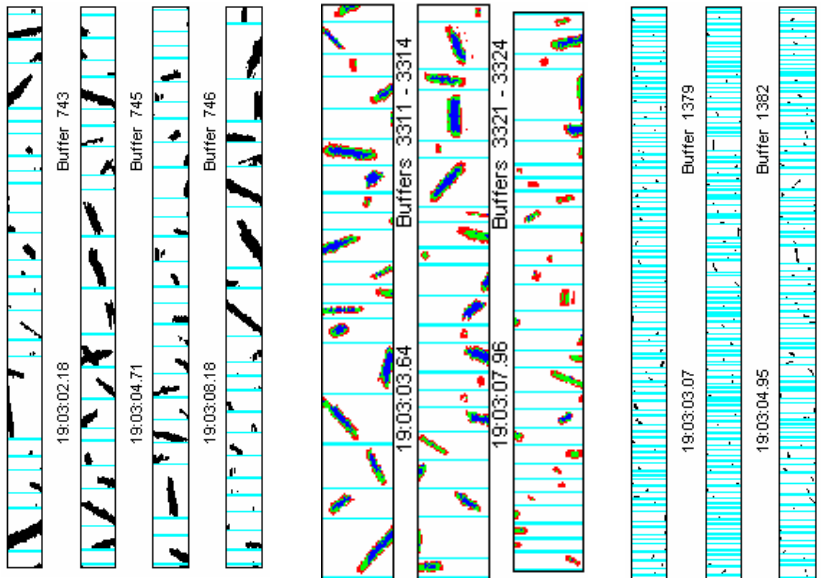
- Aircraft Validation
- CloudSat Example
- Instrumentation
- Processes and Parameterizations

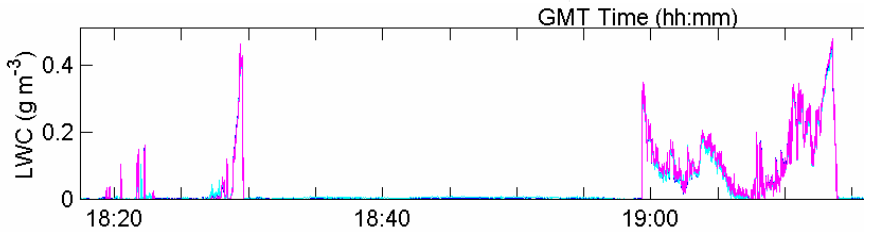
Airborne Measurements

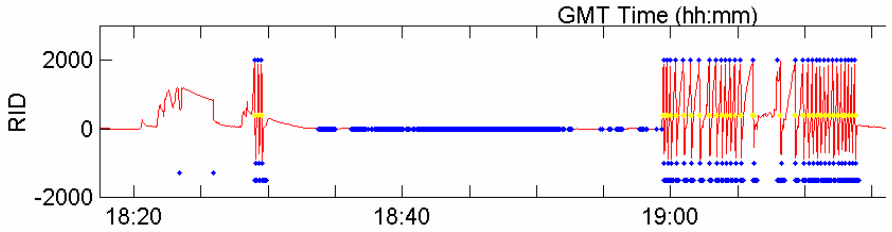


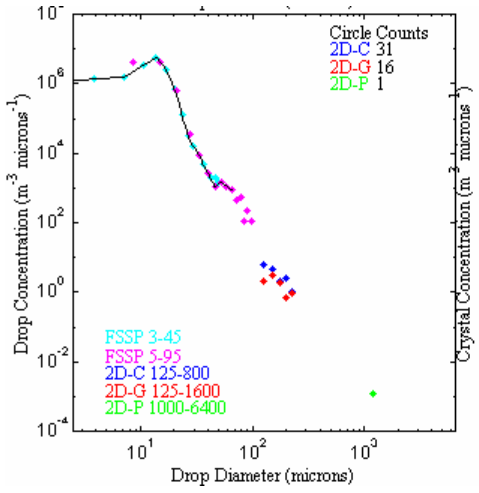


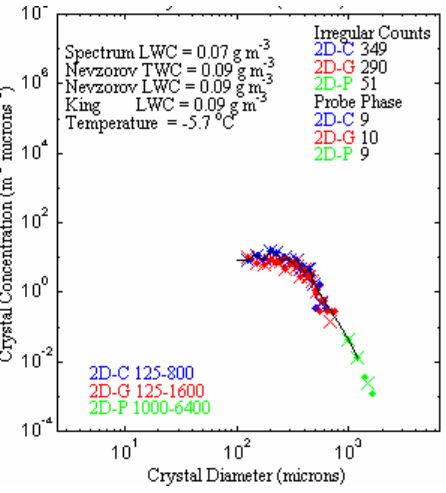




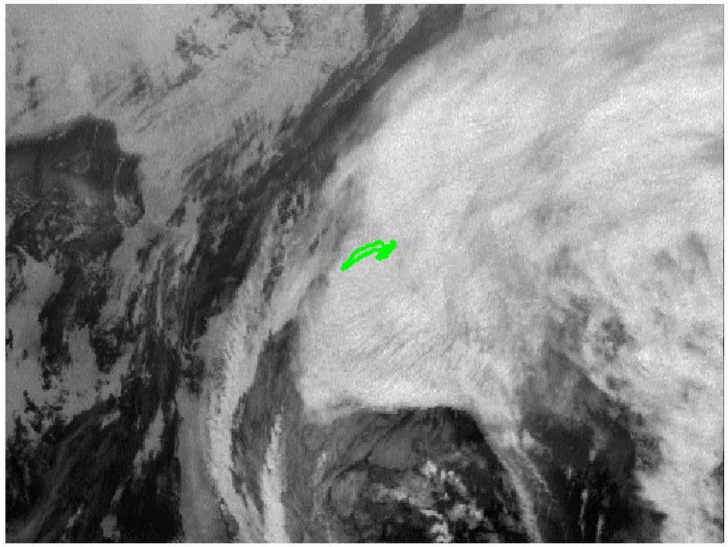


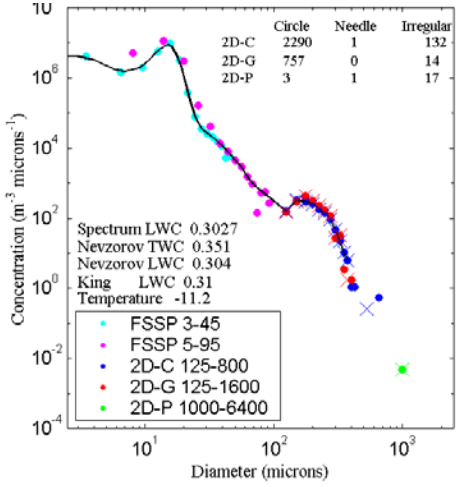


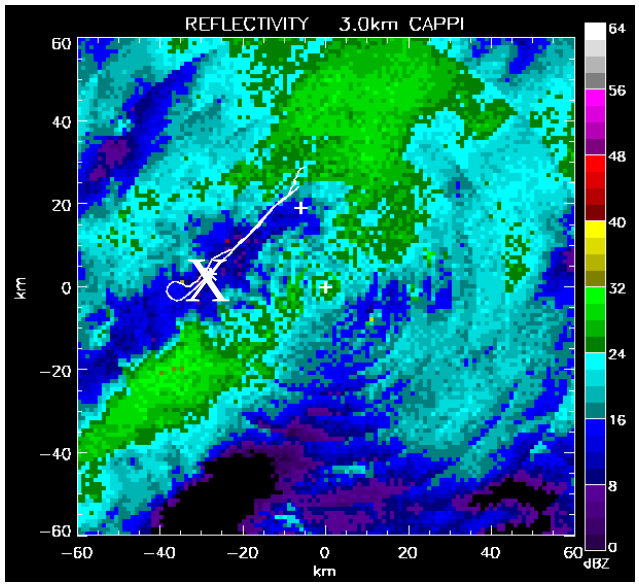


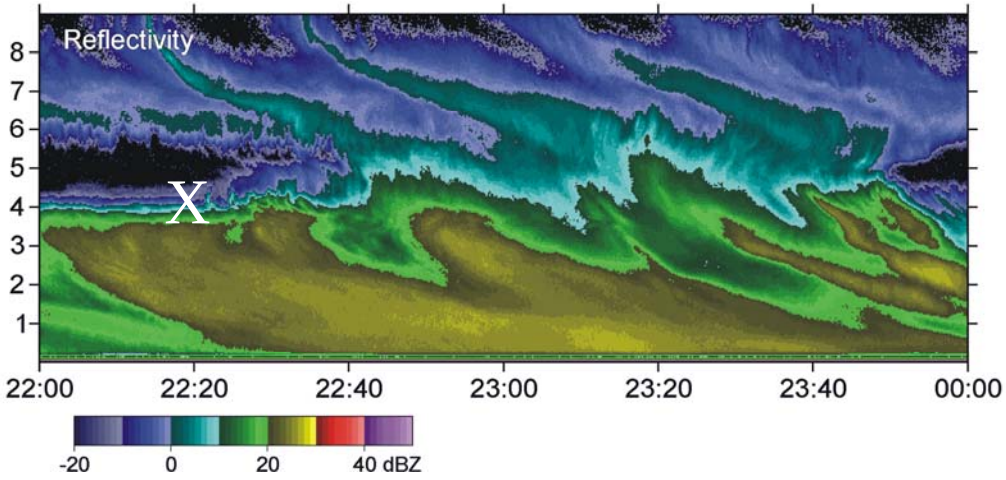


Remote Sensing Validation

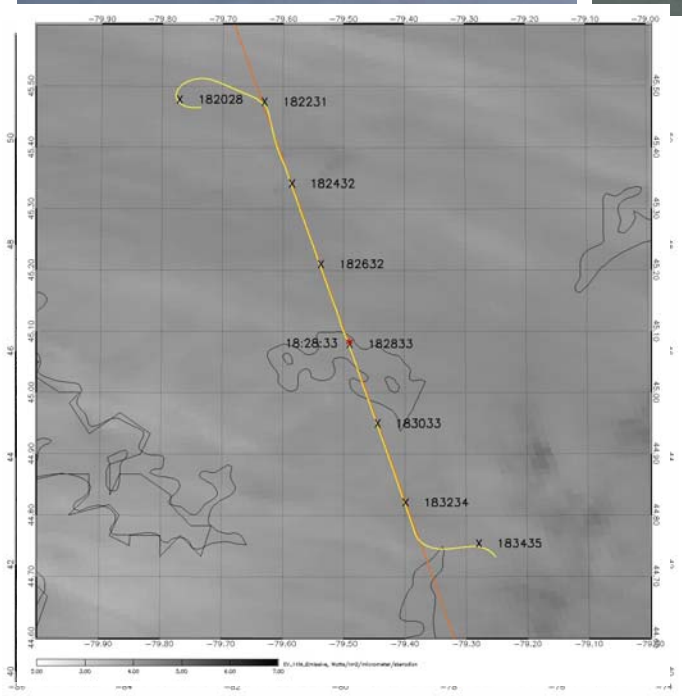








CloudSat Example 1

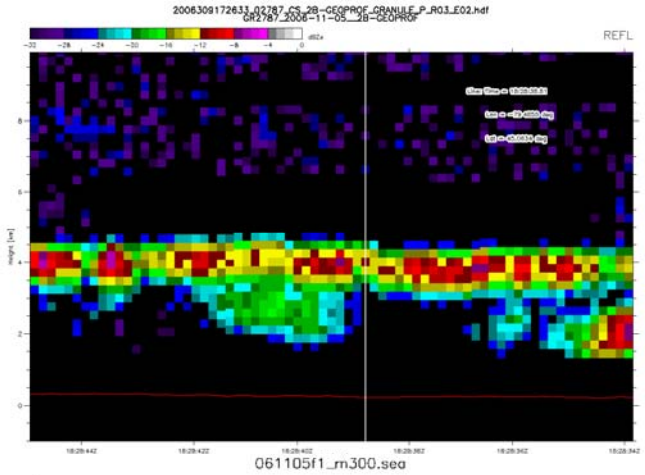


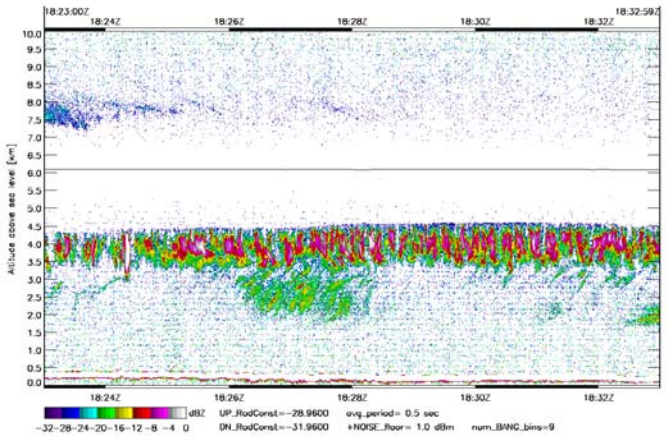
CloudSat CPR

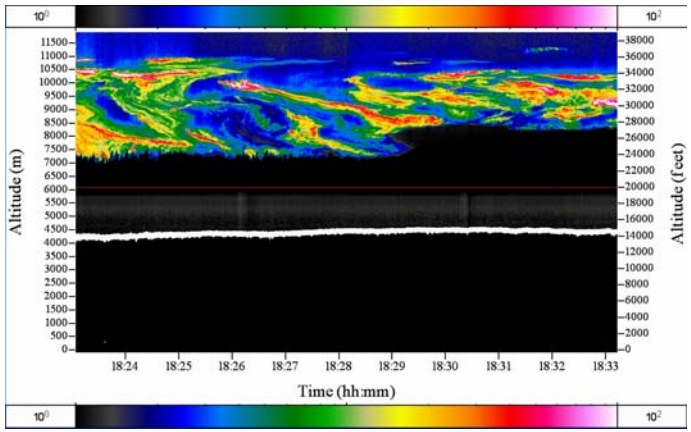
C-580 Ka-Band

C-580 Lidar 1064

5 Nov 2006
18:25 UTC
MODIS 12 μm

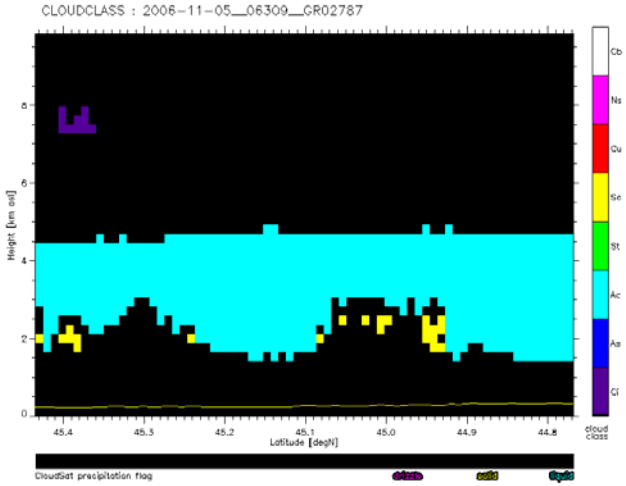


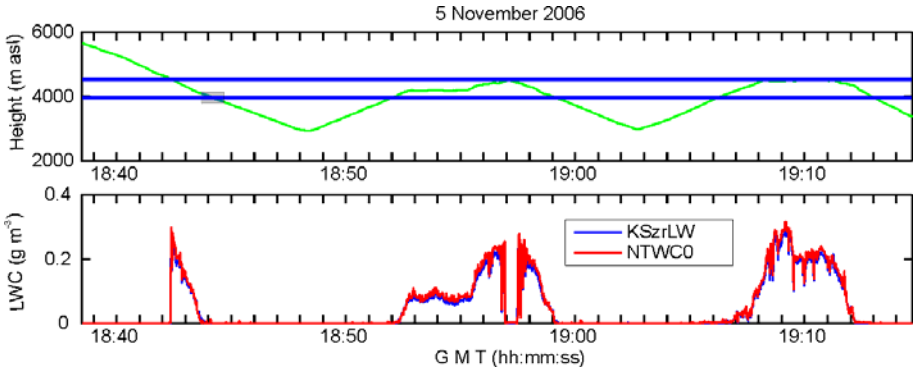


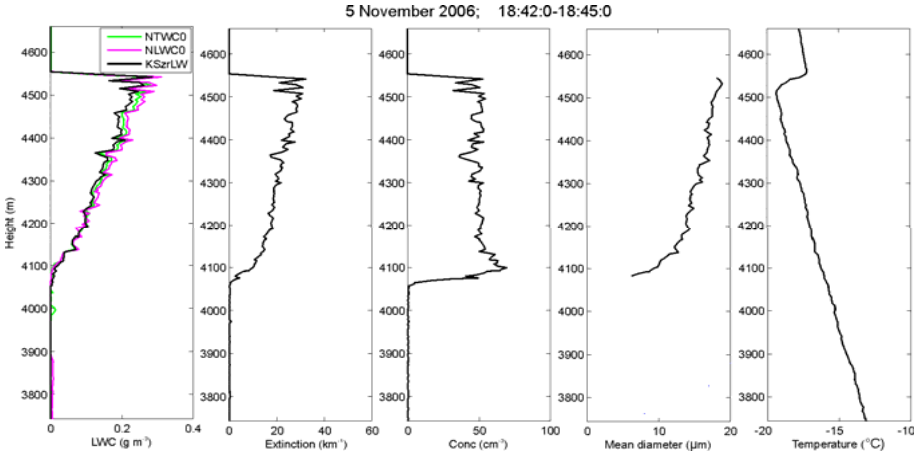


CloudSat Example 2

Mixed Phase Multi-Layer Cloud System







Instrumentation D[1]

FSSP 5-95 µm

CIP 12-768 µm

FSSP 2-47 µm

2D-C 25-800 µm

2D-P 200-6400 µm

2D-S 10-1280 µm

HVPS 200-25000 µm

PCASP 0.1-3 µm

Instrumentation D^2

Instrumentation D^3

King

Nevzorov

JW (DF)

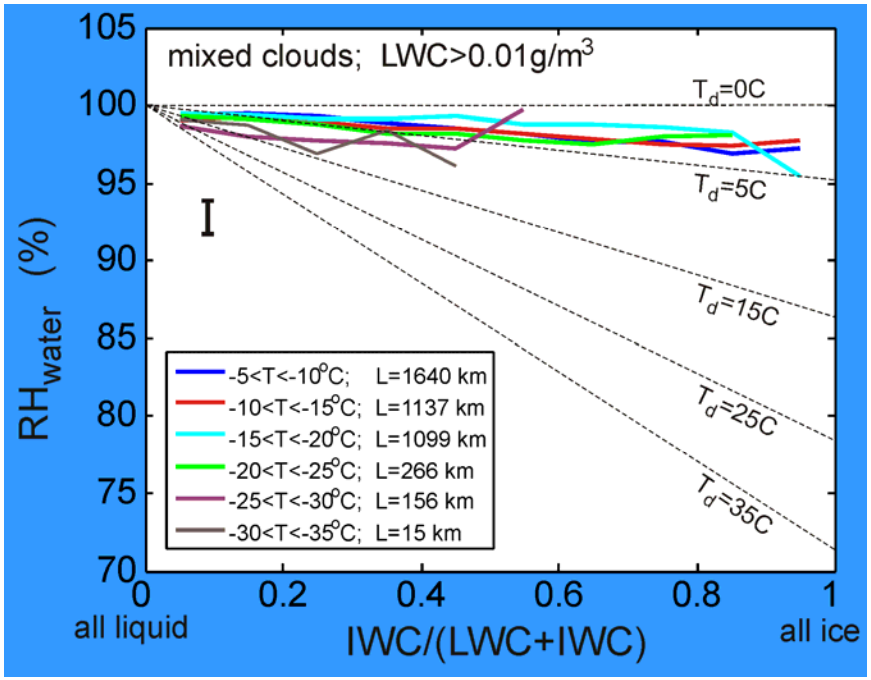
CVI-CSI

Instrumentation Issues

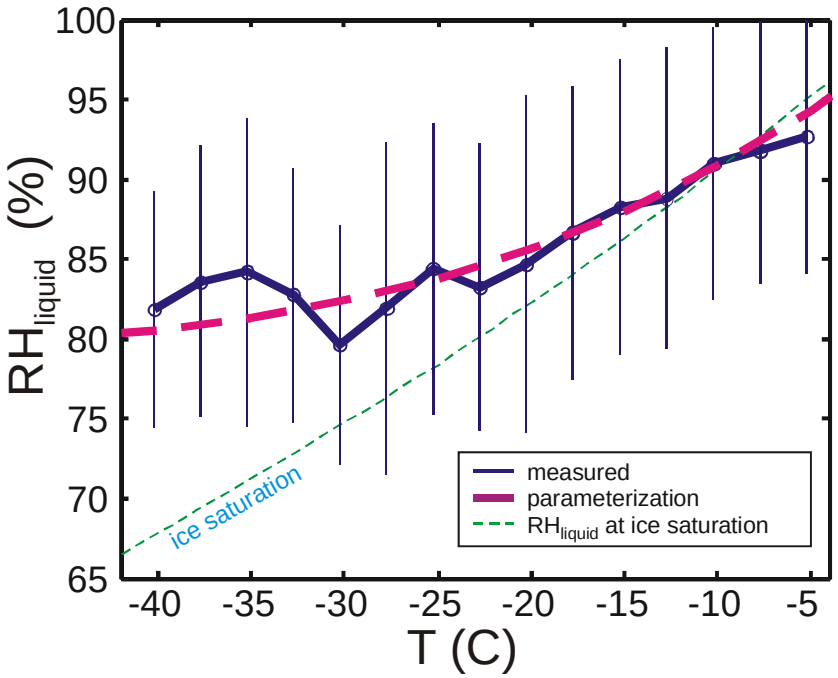
- Measurement of ice crystals < 100 μm
- Depth of field (CIP, 2DS, 2D probes)
- Sample volume, particle reconstruction and reflectivity
- Separation of ice and water spectra
- Accuracy of low IWC and LWC <0.01 g m^{-3}
- Underestimation of IWC caused by particle bouncing
- Particle shattering
- Ideally want consistency between independent measurements of D^1, D^2 and D^3
- Problematic for glaciated and mixed phase clouds

Cloud Physics Processes

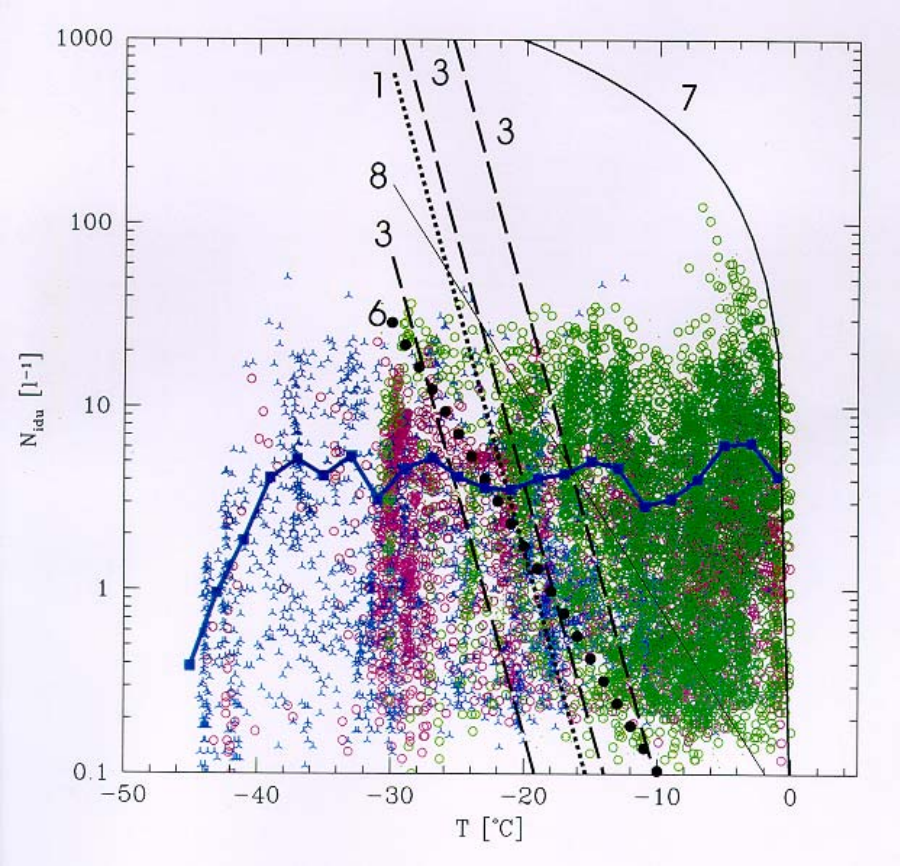
Relative Humidity in Mixed Clouds

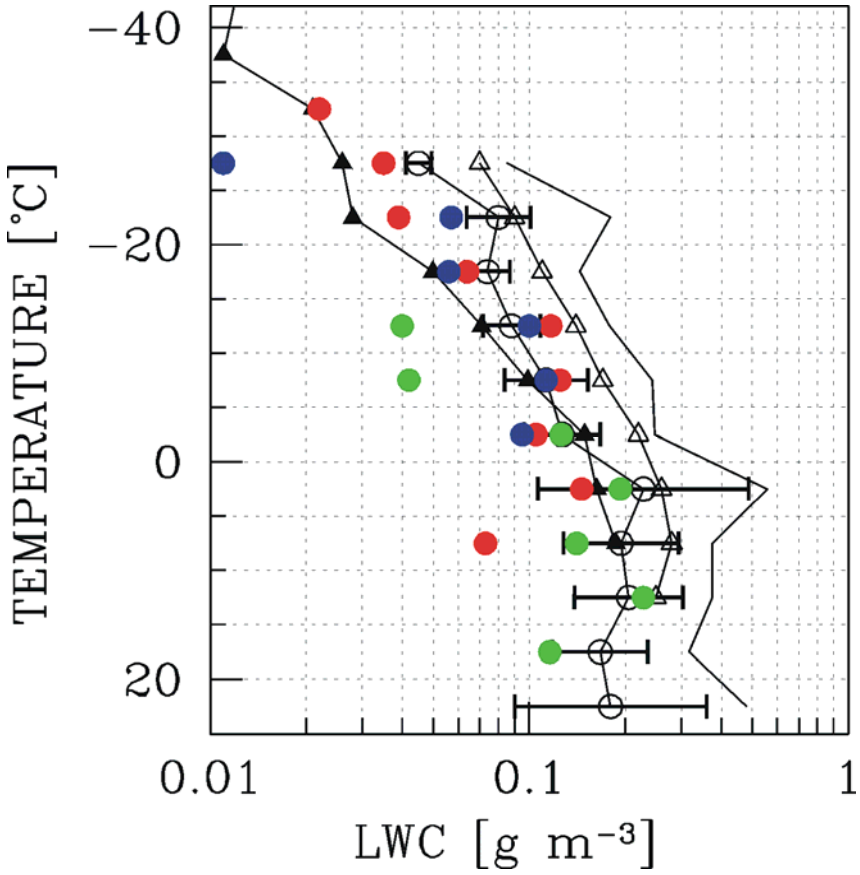


Relative Humidity in Ice Clouds

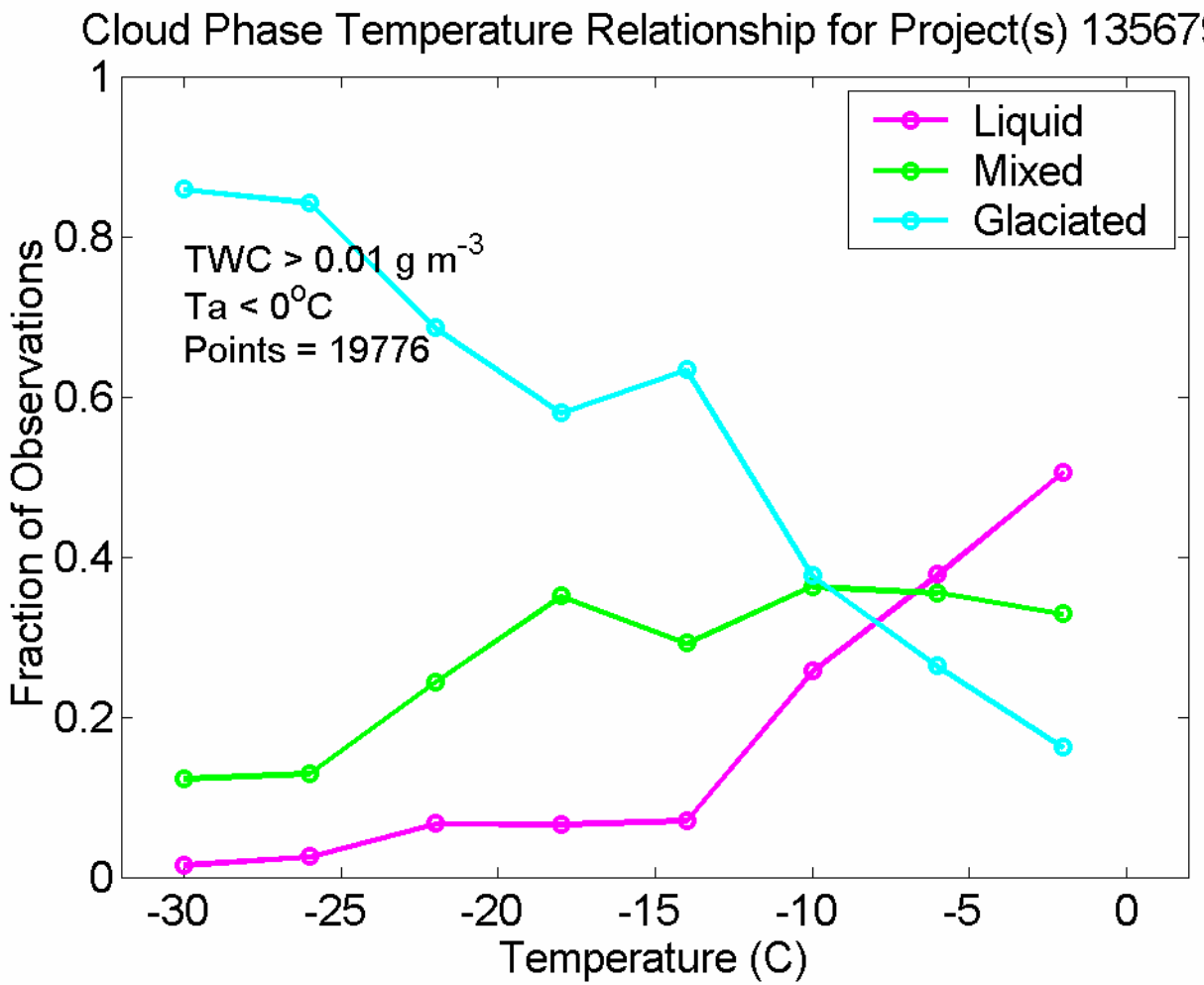
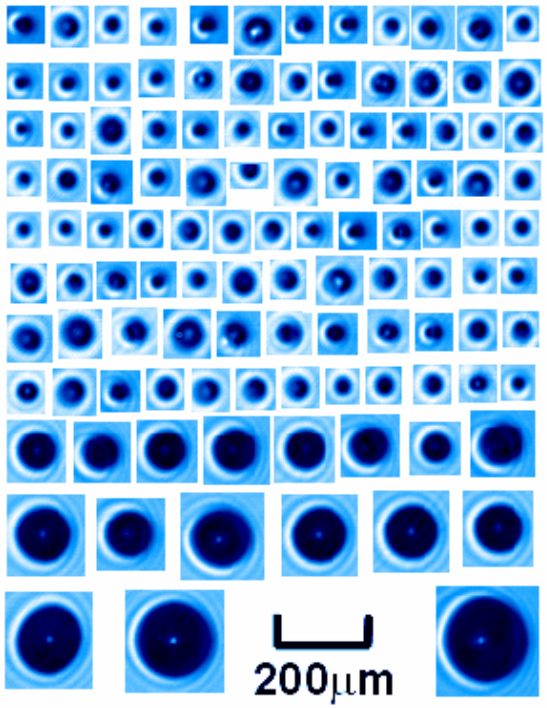
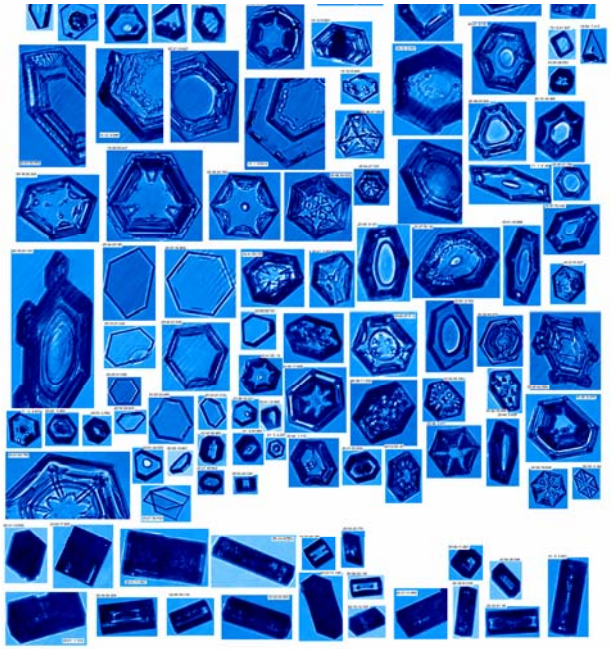
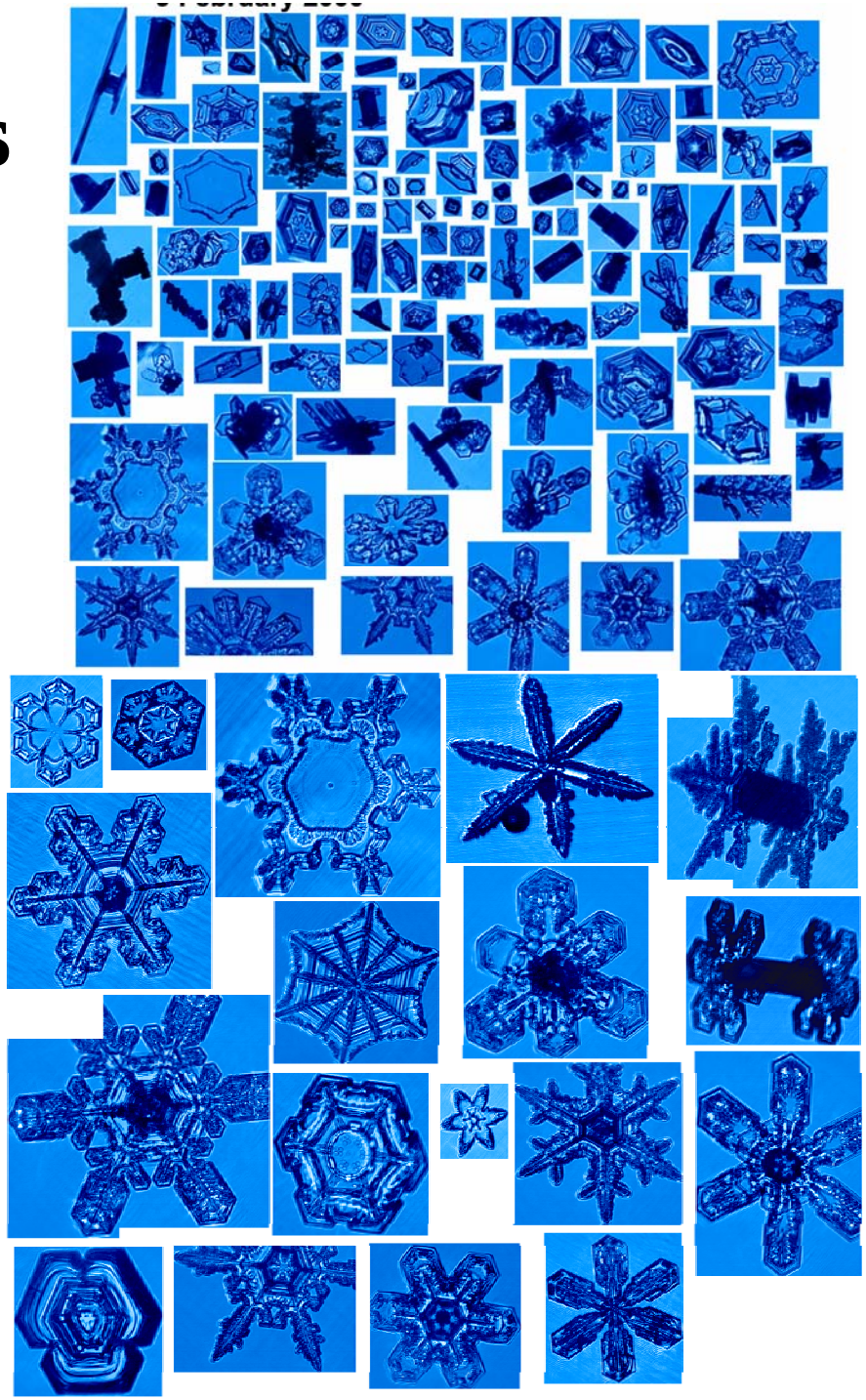


Cloud Physics Parameterizations





Phase Versus Temperature



Questions