

# Surface-Based Aerosol Measurements in Alaska During ARCTAS

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Data

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Cathy Cahill, Aerosol Chemistry

Ken Sassen, Polarization Lidars

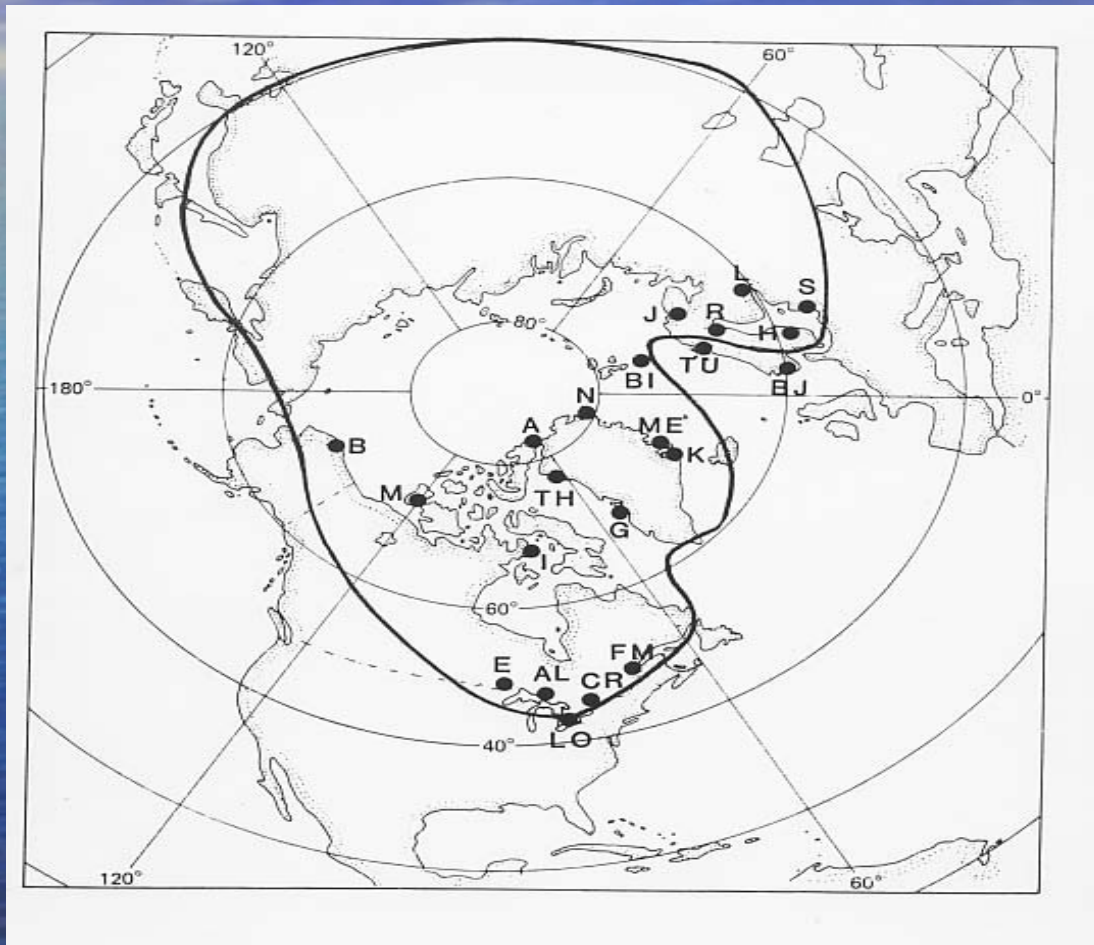


# Haze over North Pole





# Arctic Air Mass at Maximum

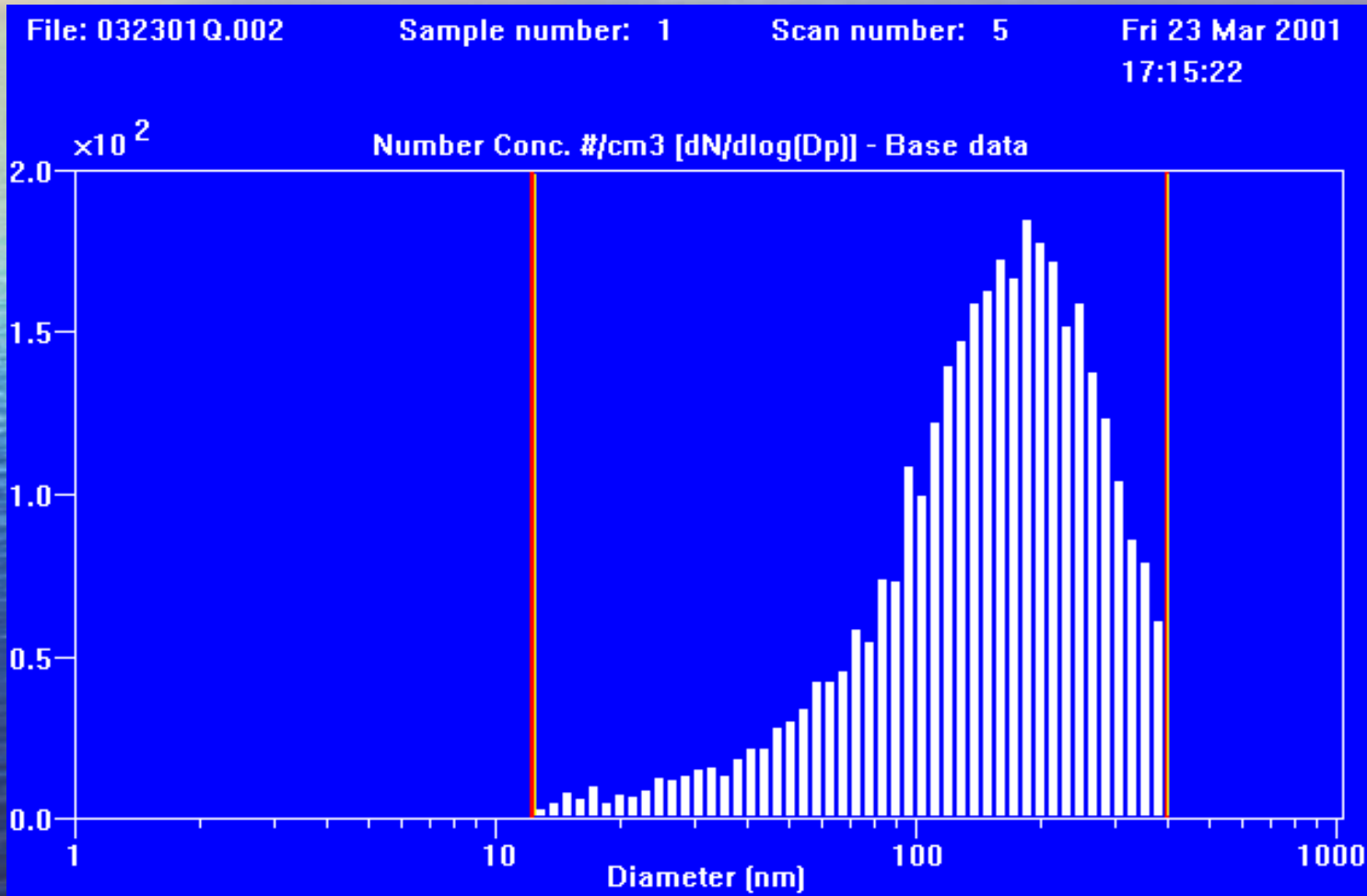


# Alaska Range during Arctic Haze





# Arctic Haze Size Distribution



# Alaska Range without Arctic Haze



# Pacific Marine Air Mass--CLEAN

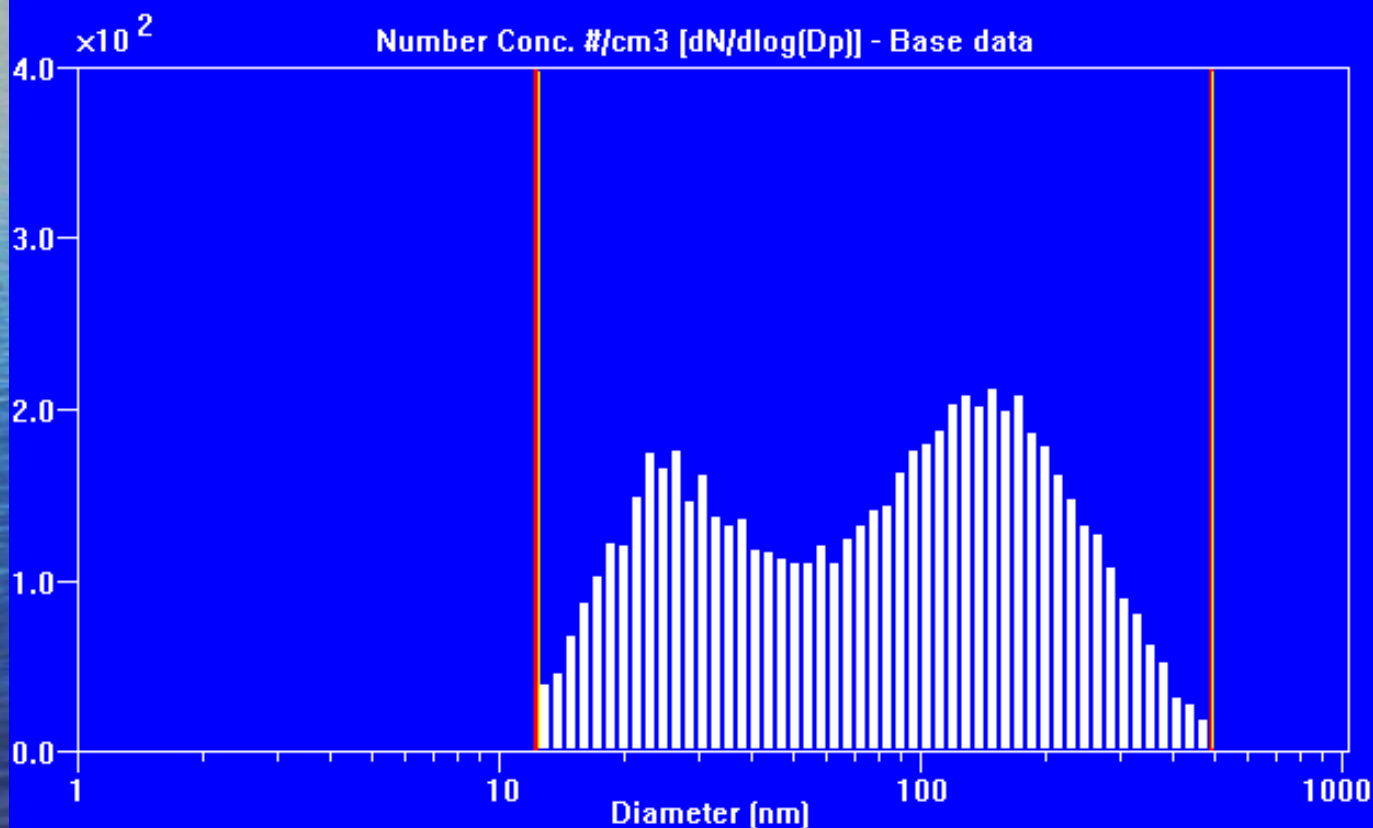
File: 040901.043

Sample number: 44

Scan number: 6

Tue 10 Apr 2001

11:58:48





# Poker Flat Aerosol Laboratory





# AFARS Remote Sensors

<http://137.229.93.139/AFARS/>

64.86° Lat, -147.84° Long



**Cloud Polarization  
Lidar (CPL)**  
0.694  $\mu\text{m}$   
0.1 Hz PRF



**• Polarization  
Diversity Lidar (PDL)**  
Scanning,  
0.532 + 1.06  $\mu\text{m}$ ,  
10 Hz PRF



**• W-band Doppler  
Radar**  
3.2 mm  
Polarimetric

# Solar Radiometer



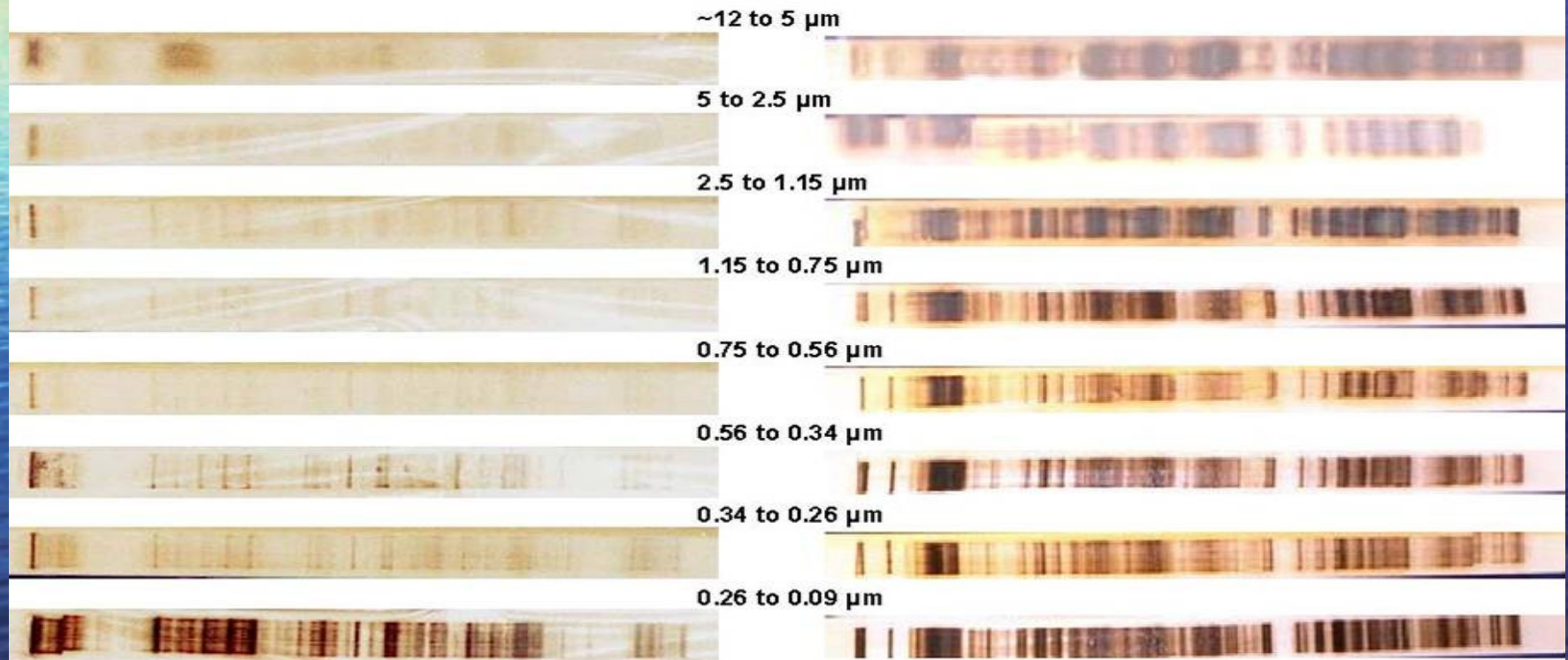


# Aerosol DRUM Strips

(coarse to very fine)

New York City,  
Oct 2 to 30, 2001

Beijing, P.R. China  
March 20 to April 26, 2001

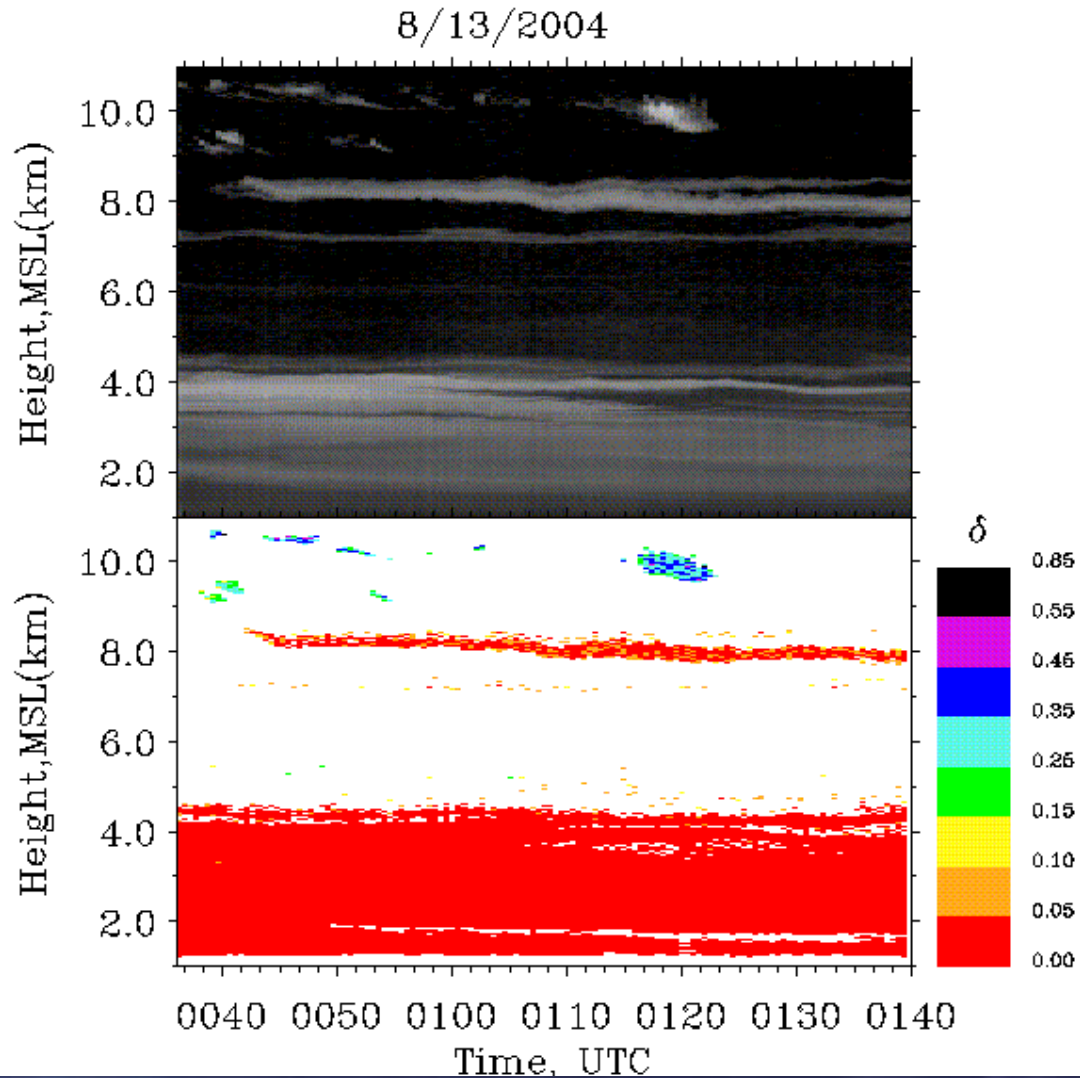


Courtesy of T. Cahill and Delta Group, UC Davis





# Forest Fire Smoke







2004-06-30 17:28:06 PFRR, Alaska

# University of Alaska Participants

D. Atkinson: Coordinate Arctic weather briefings

C. Cahill: Chemical sampling system at PFRR

K. Sassen: Coordinate measurements from AFARS

G. Shaw, PI: Aerosol size distributions and bscat at PFRR

W. Simpson: Consultant on atmospheric chemistry

# Work Plan

- Year 1:
  - PFRR data-acquisition upgrades
  - ARCTAC intensive observations PFRR, AFARS
  - Chemical analysis for drum samples
  - Data post-processing for PFRR and AFARS insts
  - Conference participation and prelim results



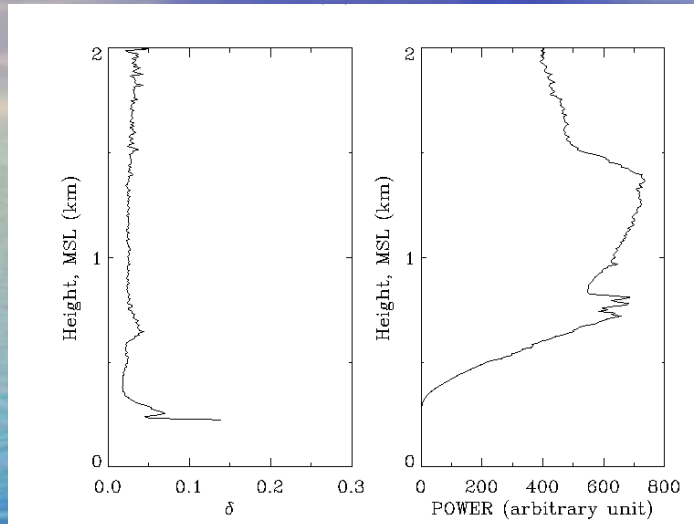
# Work Plan (cont)

## Year 2

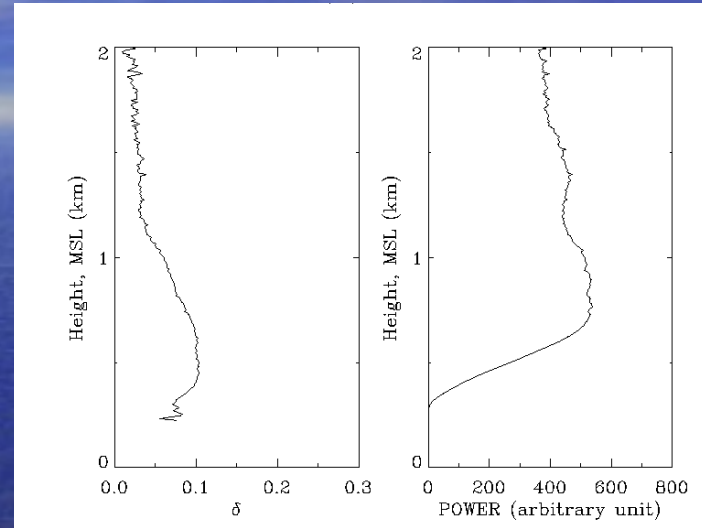
- Continued data analysis
- Confrence participation and final results for publication

# Aerosol Lidar Depolarization

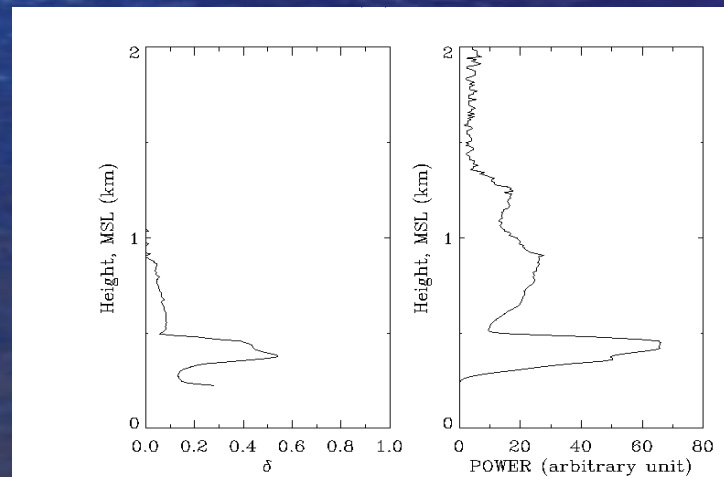
## Arctic Haze



## Spruce Tree Pollen



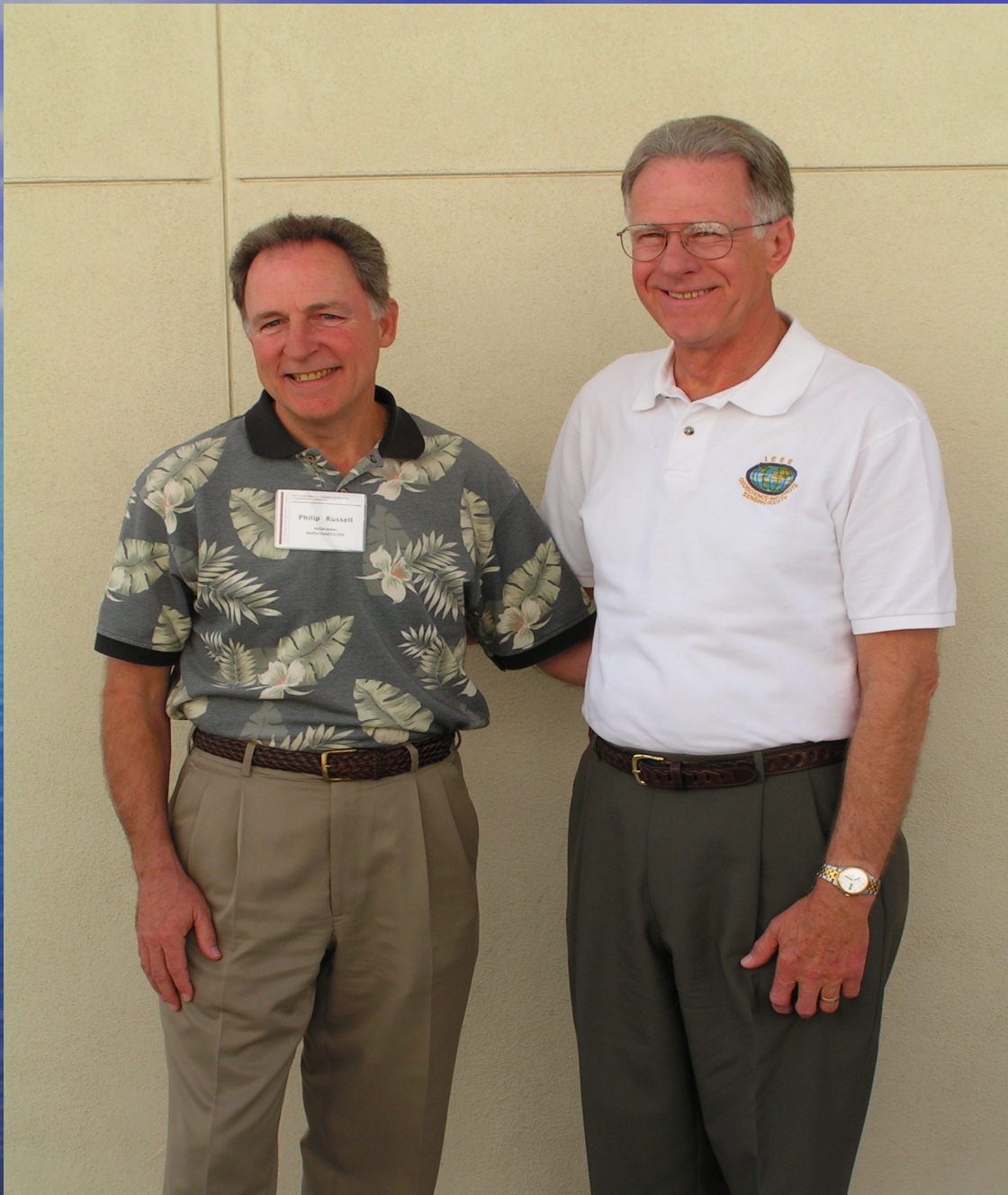
## Ice Fog







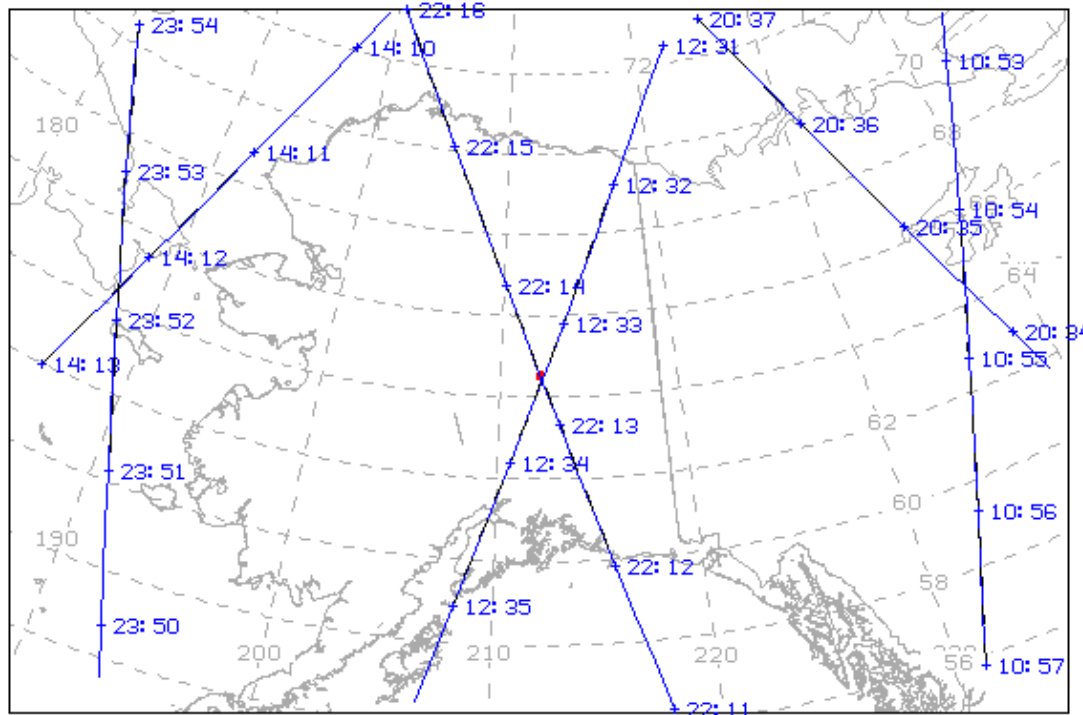








# CALIPSO Ground Track



AQUA 2006/03/22 UTC

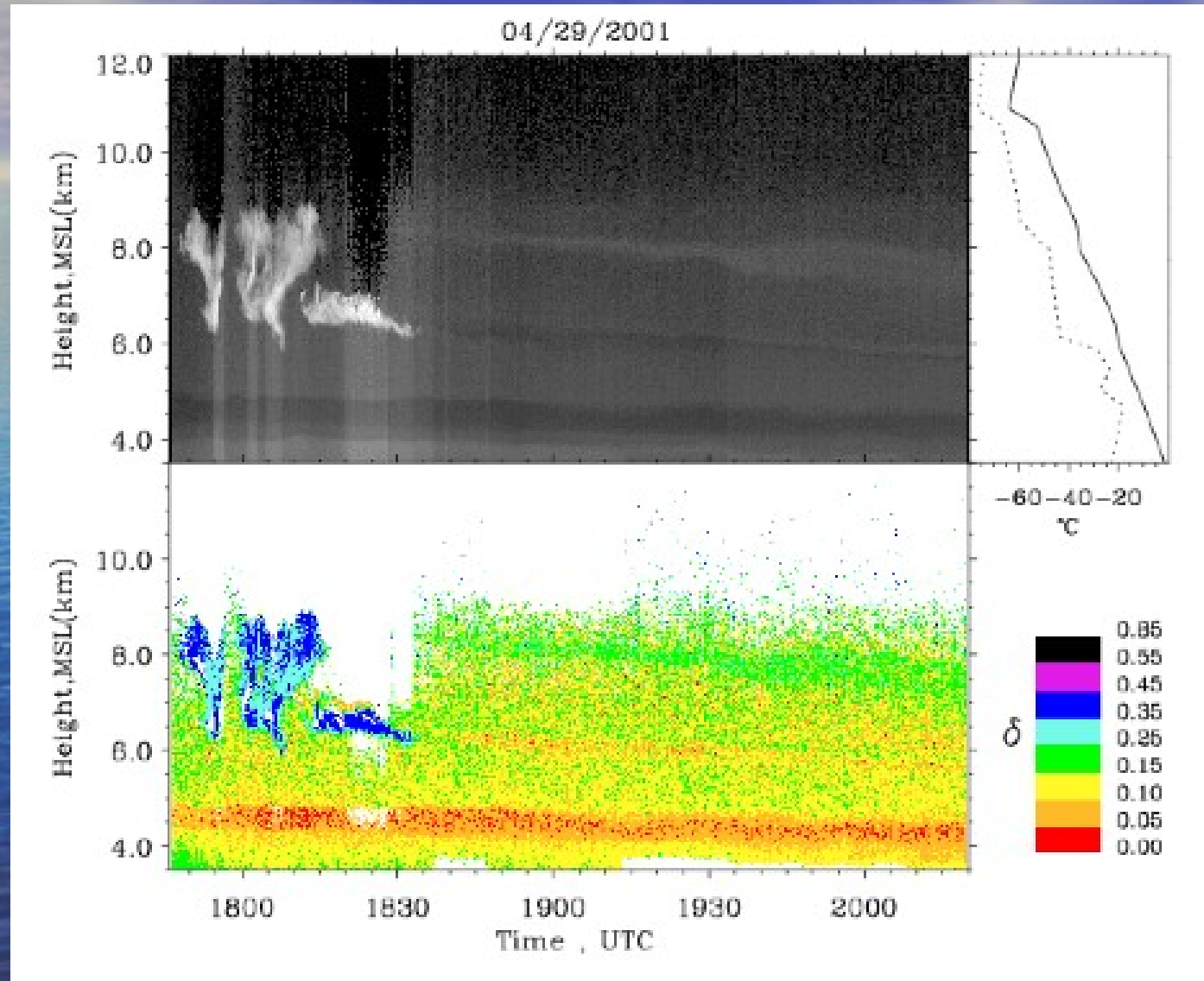
AQUA ORBITAL PREDICT PLOT

EPOCH DATE: 06/03/17

■ lat: 64.86 lon: 212.16 res: 9 km



# Cirrus Formation in Asian Dust



# AFARS Lidar Specs

<u>Operational</u>	<u>CPL</u>	<u>PDL</u>	<u>ESPD</u>
Laser	Ruby	Nd:YAG	Nd:YAG/OPO
Wavelengths	0.694 $\mu\text{m}$	0.532 + 1.06 $\mu\text{m}$	1.574 $\mu\text{m}$
Peak Energy	1.5 J	0.35 J each color	0.2 J
Maximum PRF	0.1 Hz	10 Hz	10 Hz
Pulse Width	27 ns	9 ns	9 ns
Beamwidths – Tran.	1.0 mrad	0.5 mrad	1.1 mrad
Rec.	1.0-3.0 mrad	0.2-3.8 mrad	1.0-3.0 mrad
Receiver Diameter	25 cm	2, 30 cm telescopes	36 cm
Detectors – Visible	2 PMT's	2, Gated PMT's	---
- IR	---	2, SAPD's	2, InGaAs APD
- Raman	---	Licel	---
Scan Rate	Manual	5.0° s <sup>-1</sup>	5.0° s <sup>-1</sup>
<u>Data Handling</u>			
Channel Numbers	2 polarized	4 polarized, 1 Raman	2 polarized
Sample Width (Max)	7.5 m	1.5 m	6.0
Range gates (Max)	4 k	8 k	8 k
Pulses Averaged	1	1-10	10
Digitizer Resolution	10 bits	8 bits	12 bits
<u>Polarization Properties</u>			
Transmitted	V	V (Vis) + H (IR)	V + H
Received	V + H	V + H (Vis + IR)	V + H