The Regional East Atmospheric Lidar Mesonet (REALM)

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What's a lidar mesonet and why?

- Europe has funded several lidar networks (TOR, EARLINET, ….) and this is because funding agencies (EC, national) find value in cooperation across geographic boundaries
- In the U.S., agency boundaries (NASA, EPA, NOAA, DOE, etc.) are an impediment to making cooperation on such a lidar network possible

Regional East Atmospheric Lidar Mesonet: REALM

UMBC

GSFC

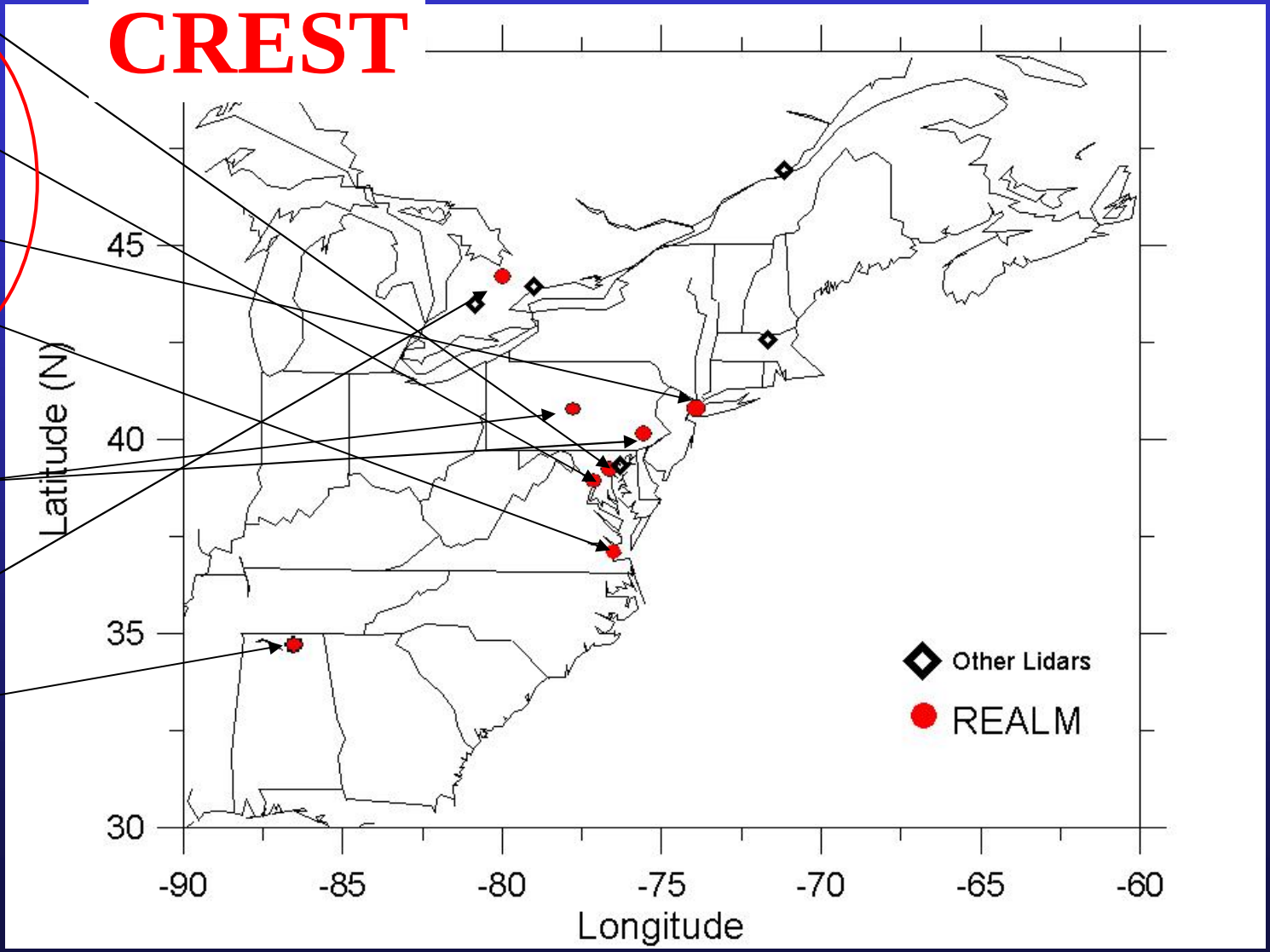
CCNY

HU

Penn State

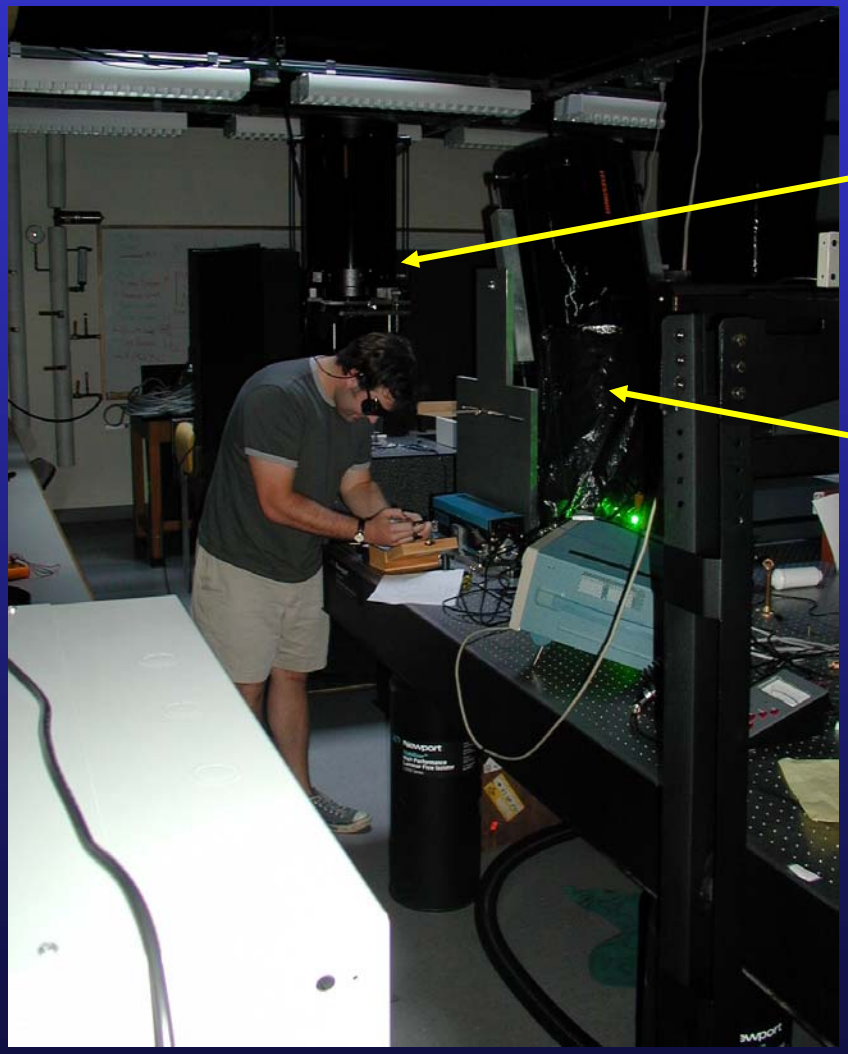
MSC

UAH



UMBC Facilities

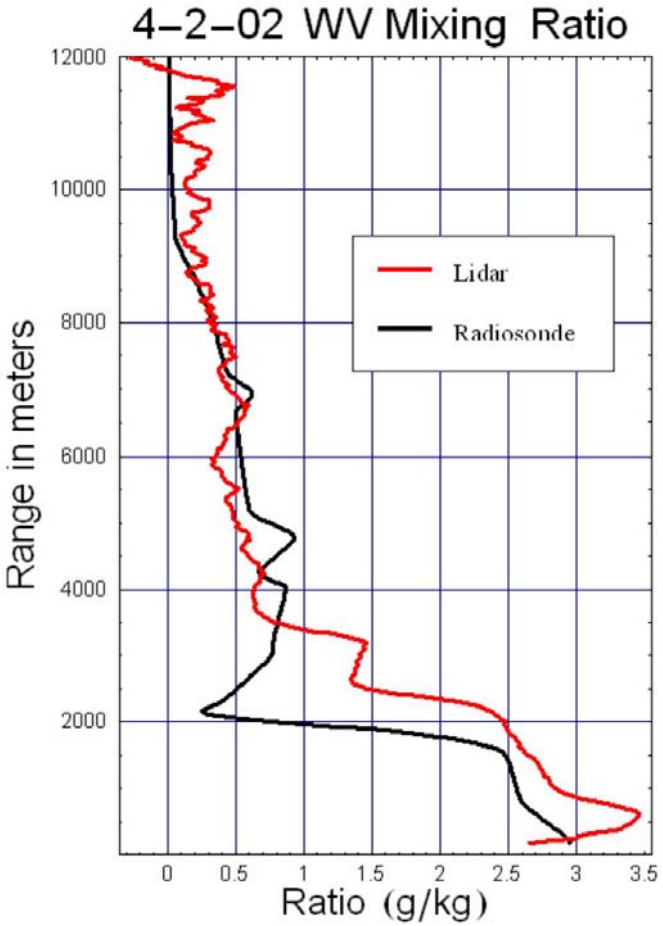
(Hoff and McCann)



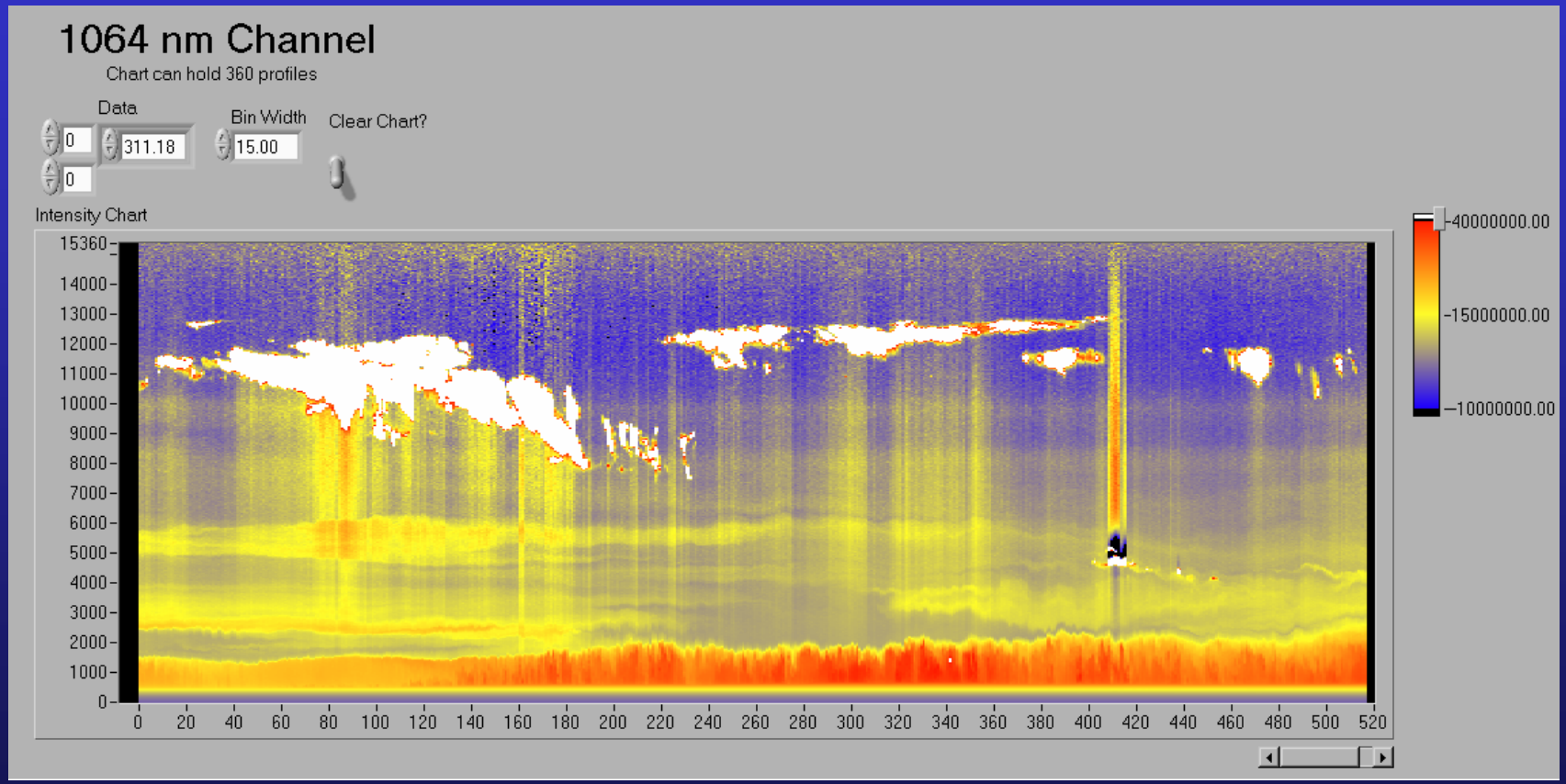
- ALEX Raman LIDAR
  - 355 nm
  - N_2, H_20, Aerosol
- Elastic LIDAR
  - 532 nm, 1064 nm
  - Aerosols, Boundary Layer, Subvisible Cirrus
- UAWL
- Integrating nephelometer
- GPS Suominet
- Bomem AERI Interferometer

ALEX is currently being used for AIRS validation during the ABOVE experiment.

Comparison of ALEX H_2O mixing ratio profile in late April with the Dulles (IAD) radiosonde
$\Delta x = 50$ km $\Delta t \sim 1$ hr



Elastic Lidar Facility (ELF) - 532/1064 nm backscatter



May 15, 2002

Surelite Nd-YAG will be mounted here

30 m fiber-coupled detector box will come off south port

UMBC Atmospheric Water vapor Lidar (UAWL)

GSFC Scanning Raman Lidar (SRL)

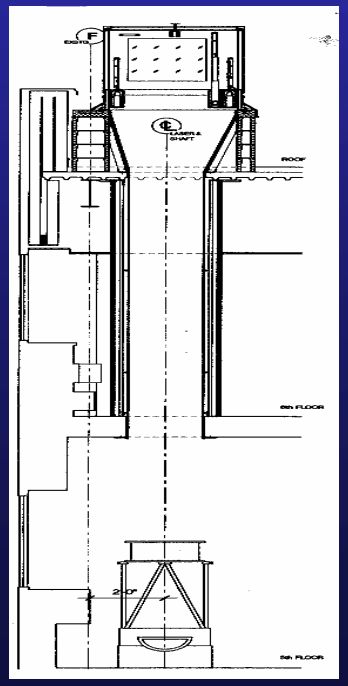
David Whiteman, Belay Demoz

0.76 m and 0.25m telescopes

- –High/Low ranges
- •Nd:YAG (9 W @ 355 nm)
- •Full aperture scanning
- •Windows for all-weather operations
- •12 channel AD/PC data acquisition
- •Measurements
  - –Water vapor mixing ratio
  - –Aerosol scattering, extinction, depolarization
  - –Cirrus cloud properties
  - –Liquid water

REALM Lidar Observation Station CCNY

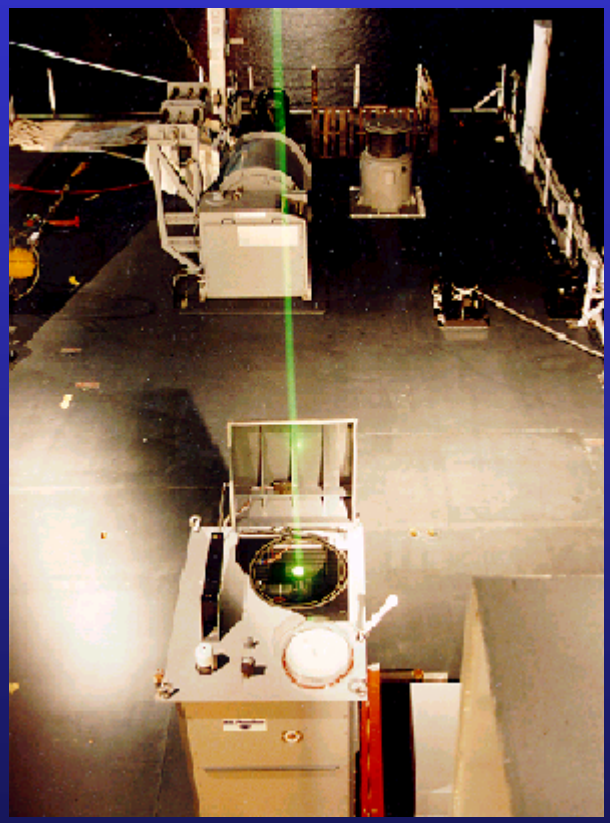
Sam Ahmed

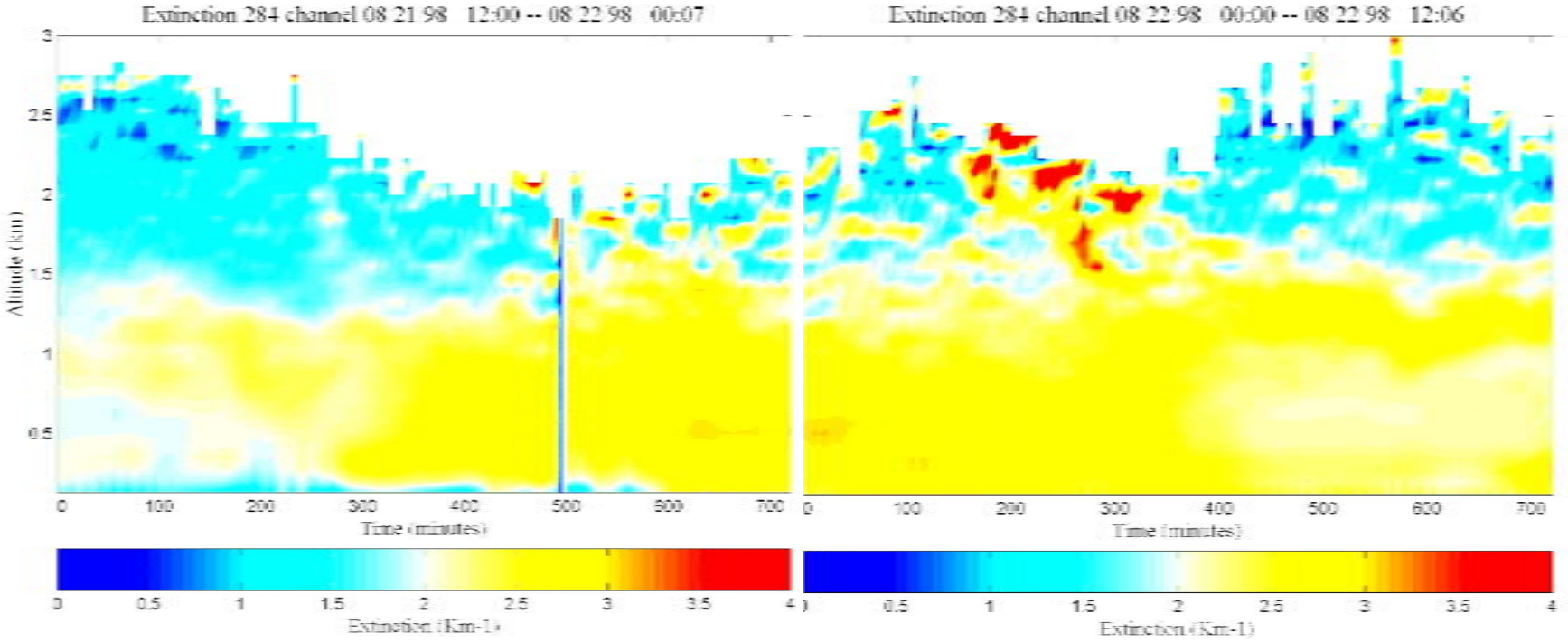


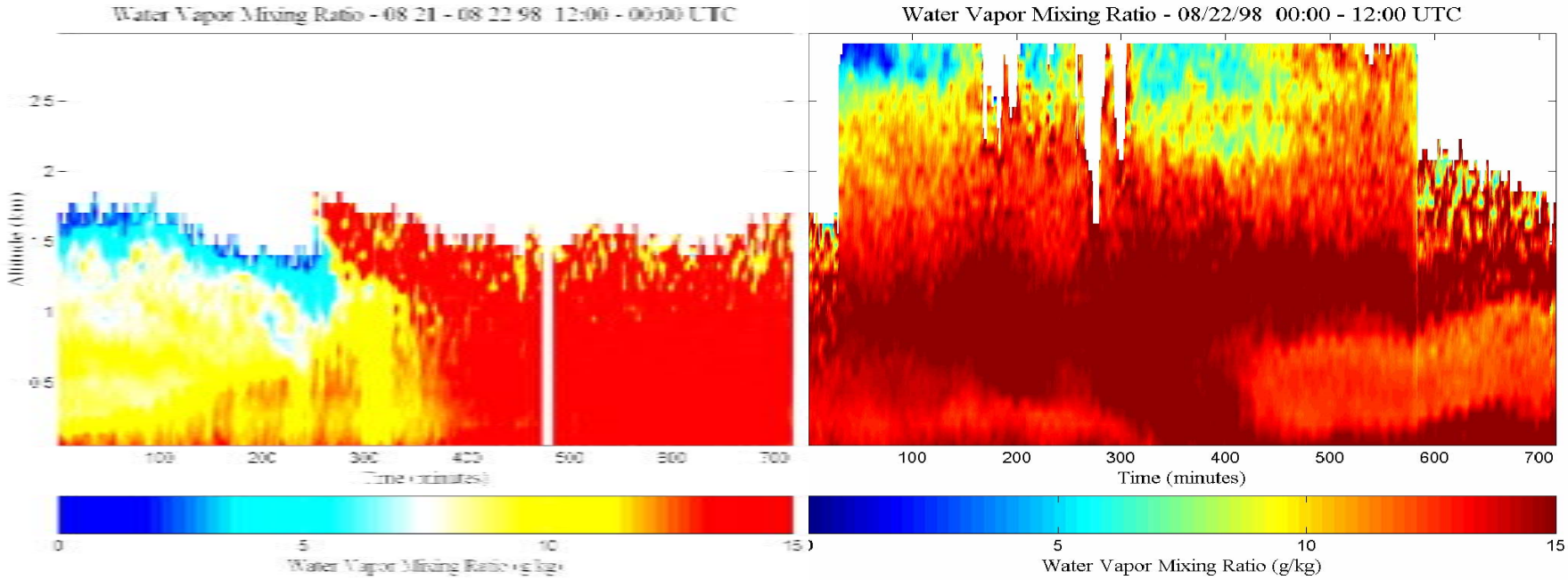
	Lab Platform	Mobile Unit
Channels	4	3
Wavelengths (nm)	355/532/1064 260-1600 (OPO-0.1 cm-1 BW)	355/532/1064 450-1600 (OPO, 5 cm-1 BW)
Rep Rate	20-100 Hz	10 Hz
Telescope	20” Dobsonian	14” Cassegrain
Detectors	PMT and APD	PMT and APD
Raman	Yes	Planned
DIAL	Yes	No
Support Inst.	CIMEL	YES MFRSR

Penn State LAPS Lidar Facility
(heritage from the LAMP instrument)

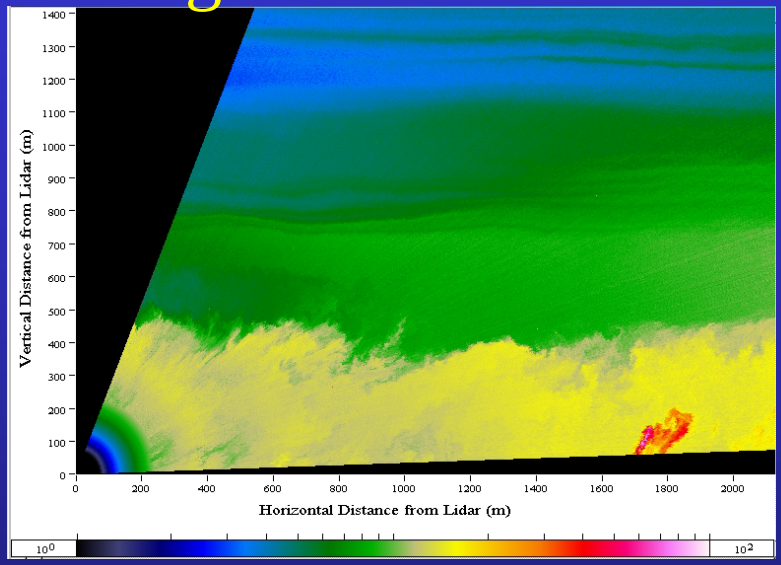
C.Russ Philbrick

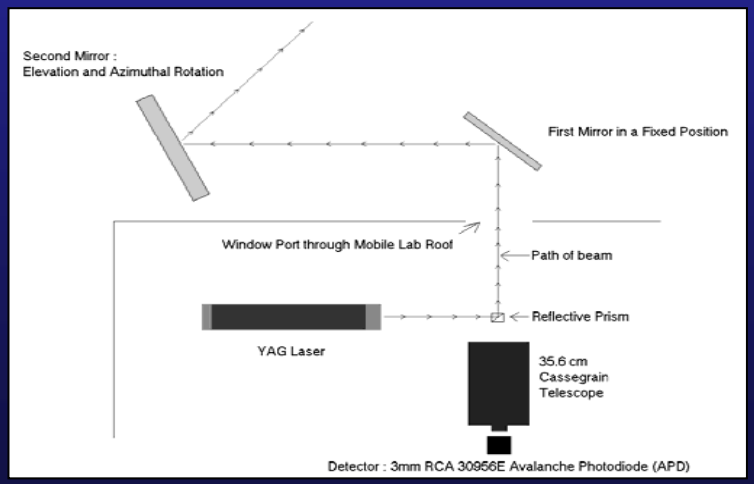



Extinction 284 channel 08 21 98 12:00 -- 08 22 98 00:07
Extinction 284 channel 08 22 98 00:00 -- 08 22 98 12:06
Altitude (km)
Time (minutes)
Extinction (Km-1)


Water Vapor Mixing Ratio - 08 21 - 08 22 98 12:00 - 00:00 UTC
Water Vapor Mixing Ratio - 08/22/98 00:00 - 12:00 UTC
Altitude (km)
Time (minutes)
Water Vapor Mixing Ratio (g/kg)

MSC – RASCAL
(Rapid Acquisition Scanning Aerosol Lidar)
Kevin Strawbridge





- 26’ mobile lab, generators, air/ground communications etc.
- 14” optical path, two 24” mirrors (one fixed, one scans)
- 50 Hz Nd:YAG, 550mJ @ 1064 nm
- 3 m resolution along beam axis
- scan speeds of up to several degrees/s

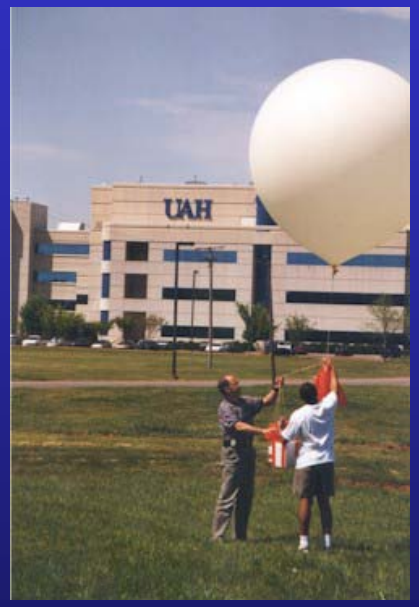
MSC - ALIAS (Aerosol Lidar Instrument for Atmospheric Studies)

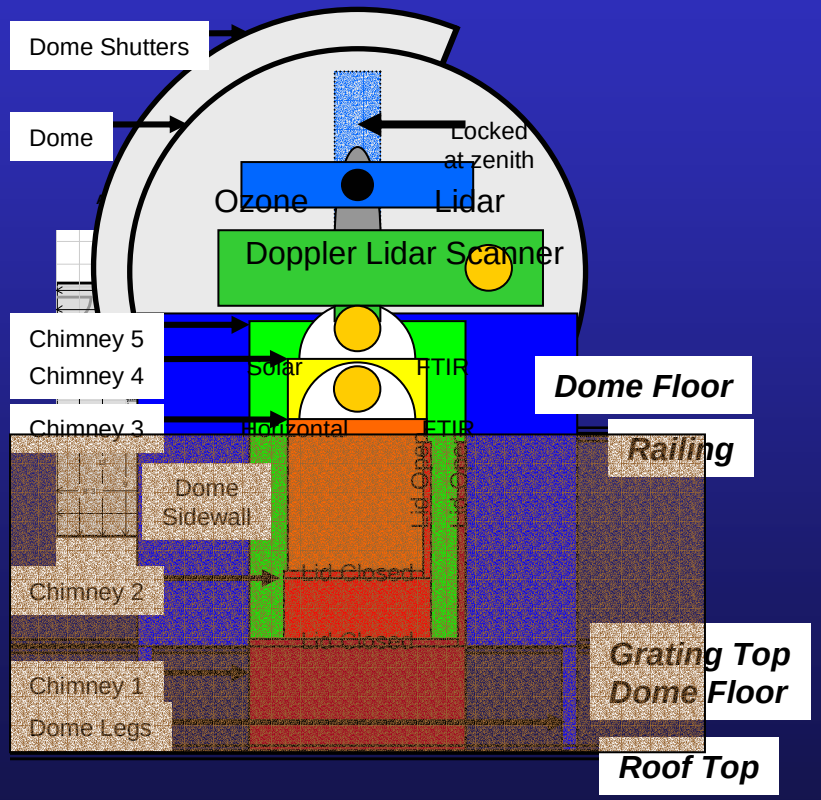
- 10 Hz, Nd:YAG -
  1064nm(>500mJ)
  532nm (>500mJ)
- 14” Celestron Telescope
- log amps on both 1064/532 nm
- 12-bit data acquisition cards
- vertical resolution - 3.75m
- temporal resolution -
  typically 1s - 1 min

NSSTC

Regional Atmospheric Profiling Center for Discovery

RAPCD (Mike Newchurch)





NSSTC
Regional Atmospheric Profiling Center for Discovery
RAPCD

Instrument	Measurement	Δx*	Δt	POC
FT IR Spectrometer	Chemical analysis	2-25	N/A	Fuller/Bowdle
IR Polarimetry Accessories	Aerosol morphology	3-14	N/A	Fuller/Bowdle
Optical Particle Counter	Particle sizing	0.1-10	NRT	Fuller/Bowdle
MOUDI 10-stage Impactor	Collection of aerosols	0.06-18	6 hrs	Fuller/Bowdle
Aerosol Atomizer	Production of test aerosols	0.1-10	N/A	Fuller/Bowdle
Shadowband Radiometer	Direct/diffuse flux, $\tau^{aerosol}$	0.4-1.0	NRT	Fuller/Fix
IR Aerosol Analyzer	Aerosol spectroscopy	5-15	NRT	Bowdle/Fuller
UV-NIR absorption meter*	ID & quantify soot, dust	0.4-0.9	NRT	Fuller
0.906 μm ceilometer	Aerosol vertical profile**	0.1-7 km	1 Hz	Knupp
2 kHz Doppler sodar	Winds	50-500 m	20 s	Knupp
915 MHz Doppler radar	Precipitation/Winds	0.12-4 km	60 s	Knupp
12-ch μwave Radiometer	T, P, RH	to 10 km	600 s	Knupp
Radio accoustic sounding sys	T	0.1-1.5 km	1 Hz	Knupp
Ozonesondes	O3 vertical profile	100 m	wkly	Newchurch
YAG-pumped DIAL O3 Lidar	O3, aerosol vertical profile	50 m	RT	Newchurch/McGee
3-Channel Sky Polarimeter	Aerosol **	0.41 0.68 0.94		Han/Travis
2.0 μm pulsed Doppler lidar	Range-gated aerosol strctr.	0.12-5 km	7Hz	Johnson/Rothermel
Tunable cw CO2 Doppler lidar	Aerosol composition/mphys	5-50 m +	1 Hz	Jarzembski
2.1 μm cw Doppler lidar	Aerosol properties**	5-50 m	1 Hz	Jarzembski
VOAG aerosol generator	Monodisperse calib. aerosol	<1-20 m	N/A	Jarzembski
Particle levitator traps	Study of single particles	<1-20 m	N/A	Jarzembski

AμOR (Applied Microparticle Optics and Radiometry)

MIPS (Mobile Integrated Profiling System)

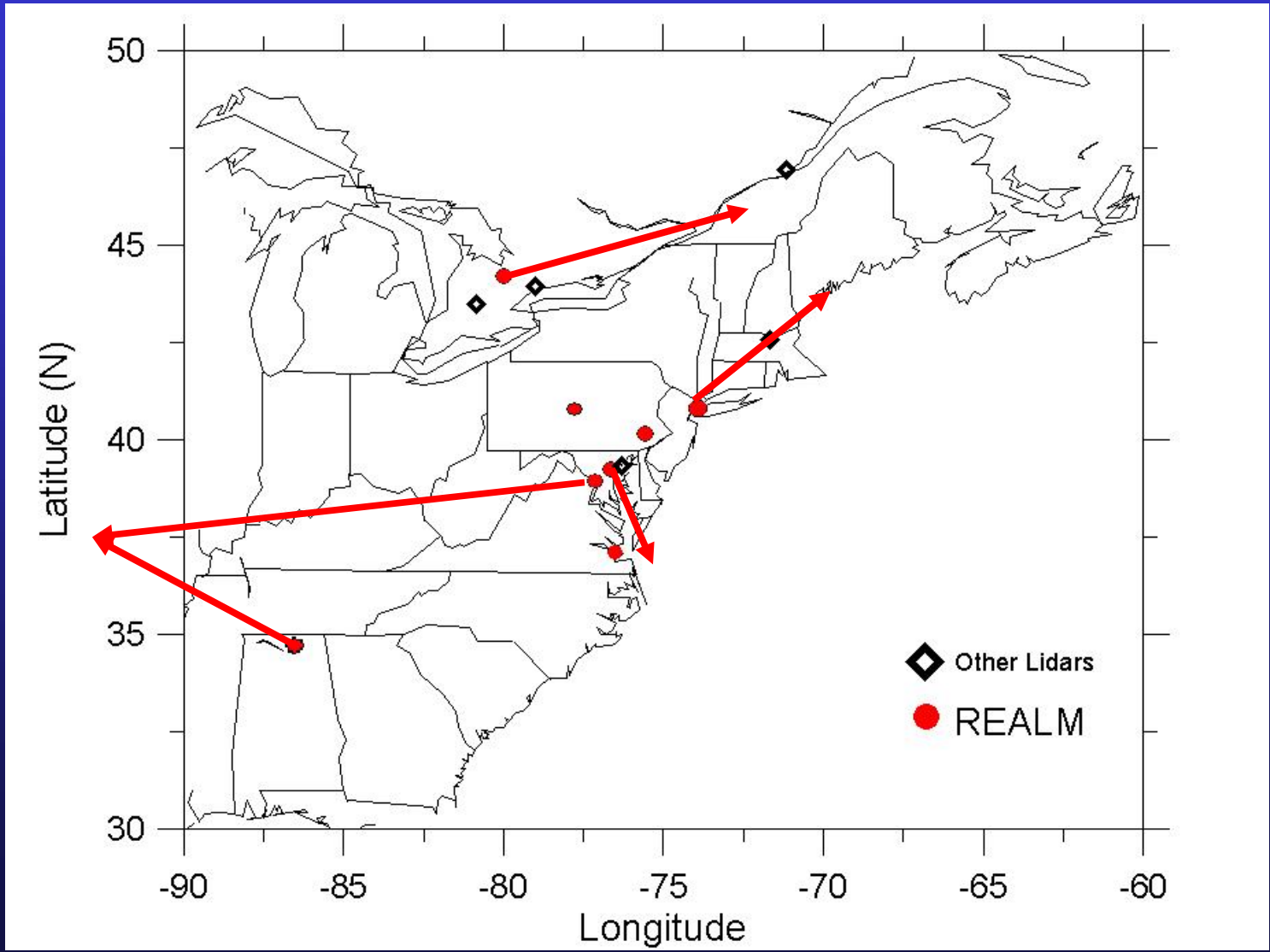
RAPCD

MSFC's Aerosol Optics

Measurements Available (X) or Planned (F)

	Ozone	Extinction	BSc	Extinction	Liq. H20	WV	Temp	BSc	δ	Extinction	WV	BSc	δ
	<300 nm	<300 nm	355 nm	387 nm		407 nm	528/530	532	532	607	660	1064	1064
MSC								X				X	
UMBC			X	X		X		X	F	F	F	X	F
CCNY	F	F						X				X	
PSU	X	X	X				X	X		X	X		
HampU								F				F	
HowU	F							F					
GSFC SRL			X	X	X	X							
GSFC 9-Channel			X	X	X	X		X	X	X		X	
GSFC Excites			X	X		X	X	X	X	X		X	F
GSFC StrozLite	X												
UAH	F							F				F	

For 2002, everyone is on the move. For Calipso validation And AIRMAP and INTEX, maybe we can stay put!



ABOVE

AIRS BBAERI Ocean Validation Experiment (Wallace McMillan, PI)
- AIRS first light experiment

July 18 – September 18, 2002

BBAERI (uplooking)

ELF (cloud clearing)

Snow white radiosondes

+ standard CERES val. products

Invitation

- Membership is voluntary
- Membership is free (except for QA participation)
- Opportunities abound ….

Field of Dreams

- Build it and they will come….