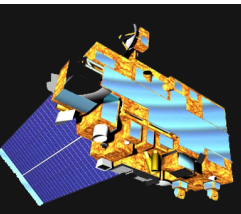


EOS-TERRA

THE CHESAPEAKE LIGHTHOUSE AND AIRCRAFT MI FOR SATELLITES (CLAMS) EXPERIMEN Mission Summary and Early Results

W. Smith, T. Charlock, K. Rutledge, T. Zhang and ma

A Radiative Closure Experiment for Satellite Product Validation

NASA ER-2

MAS,AirMISR, S-HIS

Cessna 210

Scanning Polarimeter

Proteus **LW, MW Spectra**

Lear 25C

A-band Spectrometer

NASA OV-10

SW Spectra, Broadband Radiation

University of Washington Convair 580

In-situ Aerosols
Sun-photometry
BRDF

CERES Ocean Validation Experiment (COVE) at the Chesapeake Lighthouse

Meteorology
- RAOB
- T, Td, Wind
- GPS $H20_{(v)}$

Radiation
- BSRN
- Spectral SW

Aerosols
- Aeronet
- MPL
- Chemistry

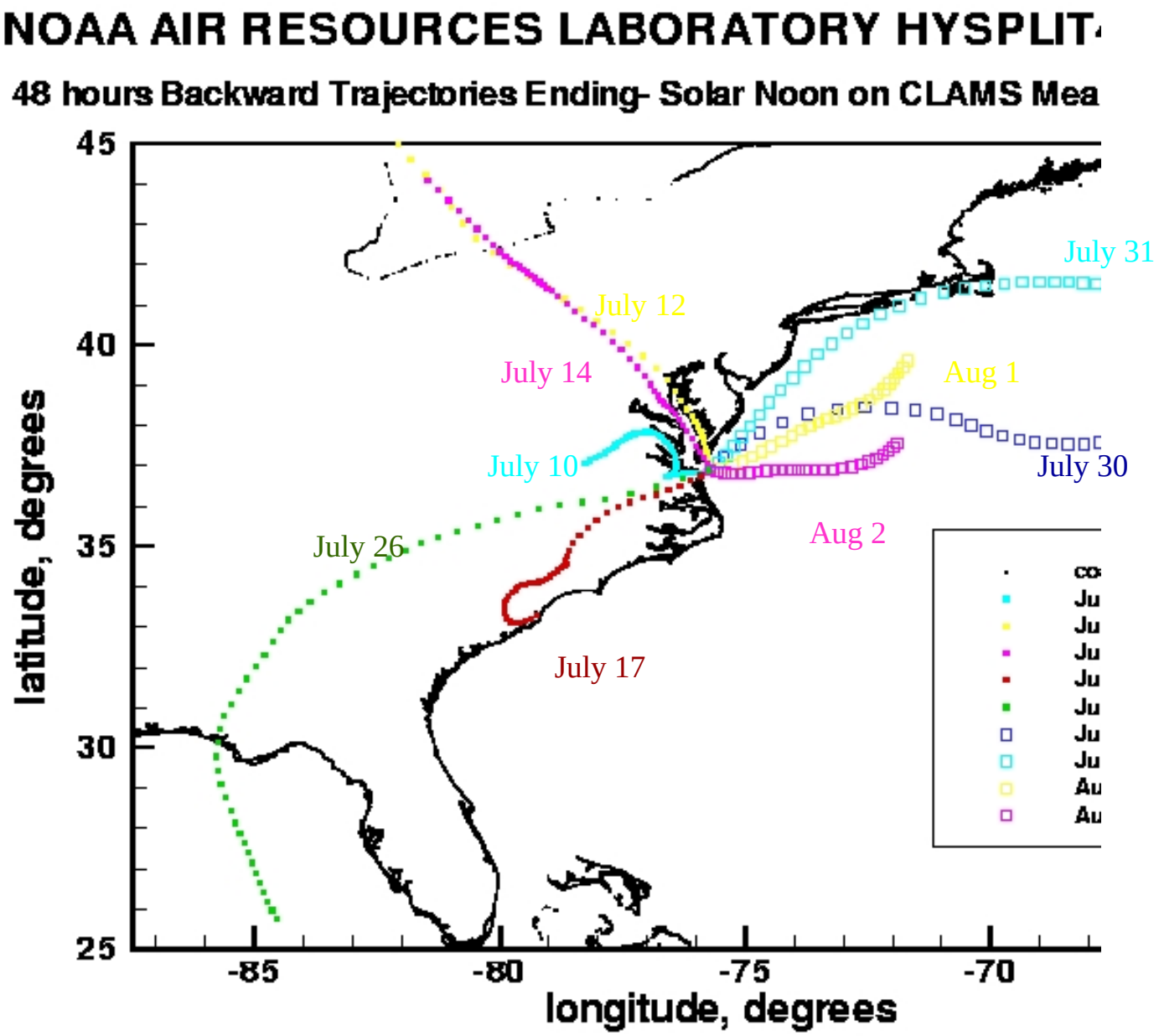
Oceanography
- Optical
- Biological/Chemical
- Physical

CLAMS Flight Summary

Date (2001)	Aircraft	Location	AOT (500nm)
10-Jul	1,2,4,5	COVE	0.23
12-Jul	1,2,3,4	COVE, E of Wallops	0.08
14-Jul	1,2,4,5	COVE	0.08
17-Jul	1,2,3,4,5,6	COVE	0.47
23-Jul	1	E of Wallops	0.06
26-Jul	1,2,4	COVE/Bouy 44014	0.17
30-Jul	1,2,3,4	COVE/Buoy 44014	0.06
31-Jul	1,2,3	Deep Ocn Bouy 44004/ D.Swamp	0.08
2-Aug	1,2,3	COVE	0.1

1. **UW CV-580:** ***AATS-14, CAR, BBSW, UV, in-situ Aerosols, scattering, absorption***
2. **LaRC OV-10:** ***BBSW, BBLW, Spectral SW***
3. **NASA ER-2:** ***AirMISR, MAS, S-HIS, AVIRIS***
4. **Proteus:** ***NAST-I, NAST-M, FIRSC***
5. **Cessna 210:** ***Research Scanning Polarimeter***
6. **Lear 25C:** ***LAABS (LaRC A-band)***

*note: the Cessna and Proteus flew missions on other days to accomplish other objectives


NOAA AIR RESOURCES LABORATORY HYSPLIT
48 hours Backward Trajectories Ending- Solar Noon on CLAMS Mea
45
40
35
30
25
-85
-80
-75
-70
latitude, degrees
longitude, degrees
July 31
July 12
July 14
Aug 1
July 10
July 30
July 26
Aug 2
July 17

CLAMS: JULY 17, 2001
Satellite

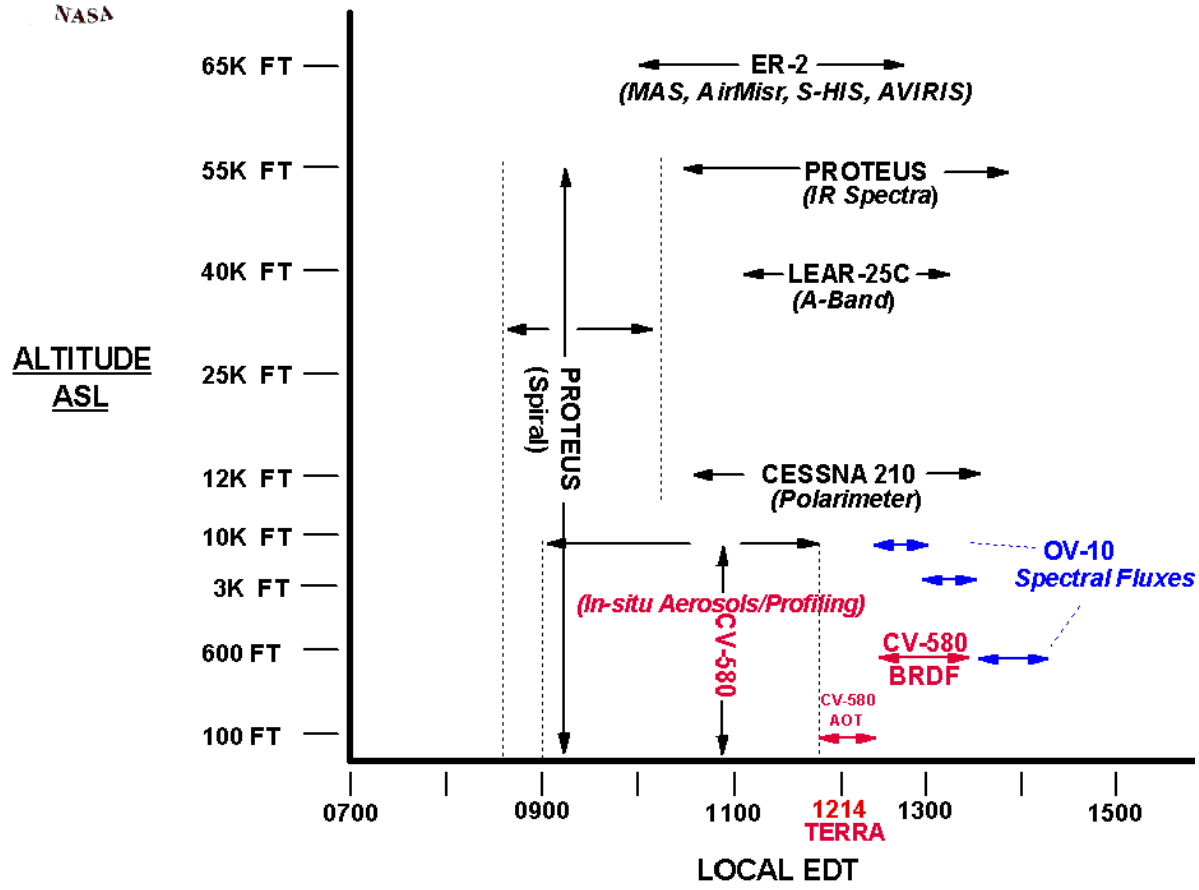
TERRA

VZA = 14°

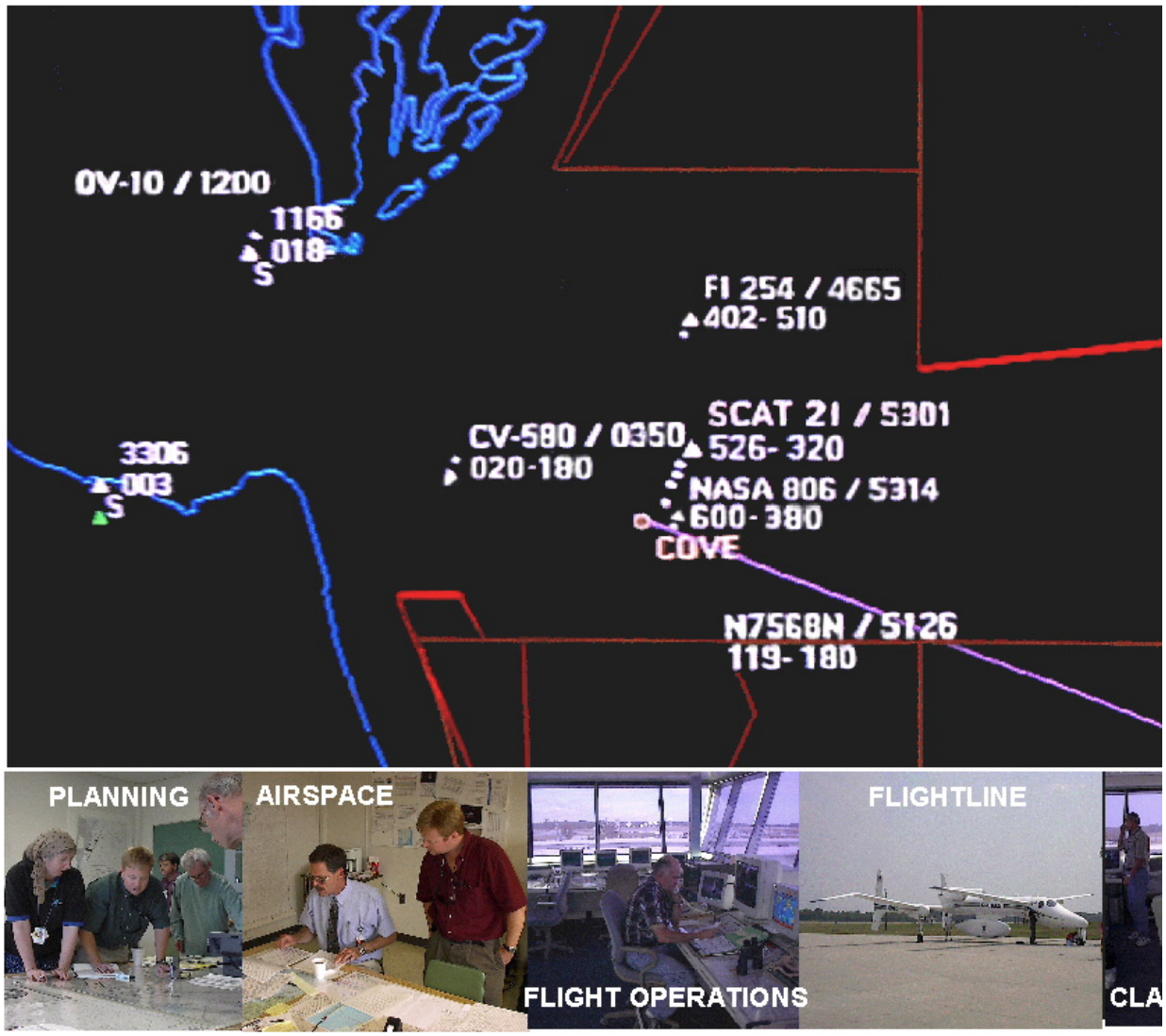
CLAMS Golden Day: July 17,

Aircraft Profiles over Chesapeake Light

(BSRN, Aeronet, MPL, Ocean BRDF)

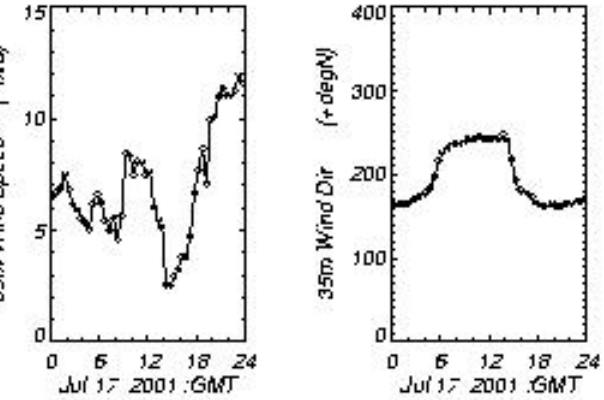


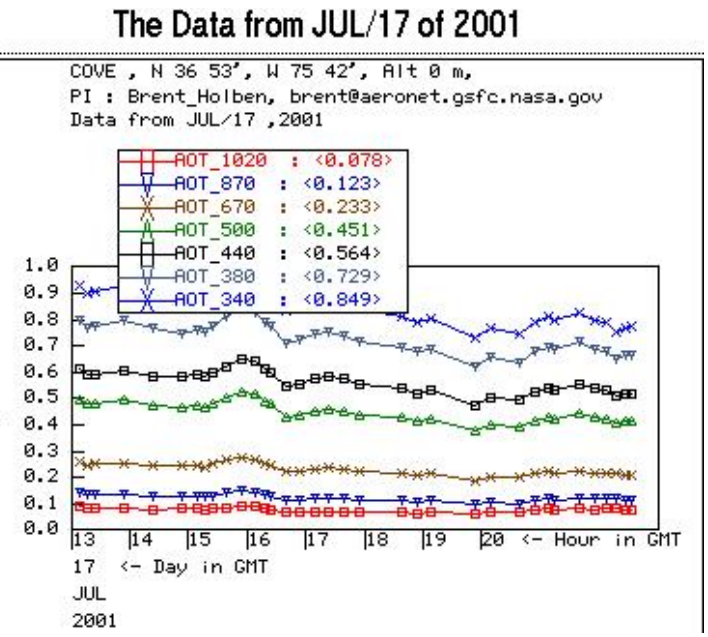
CLAMS Aircraft Converging on COVE during TERRA Overpa
July 17, 2001

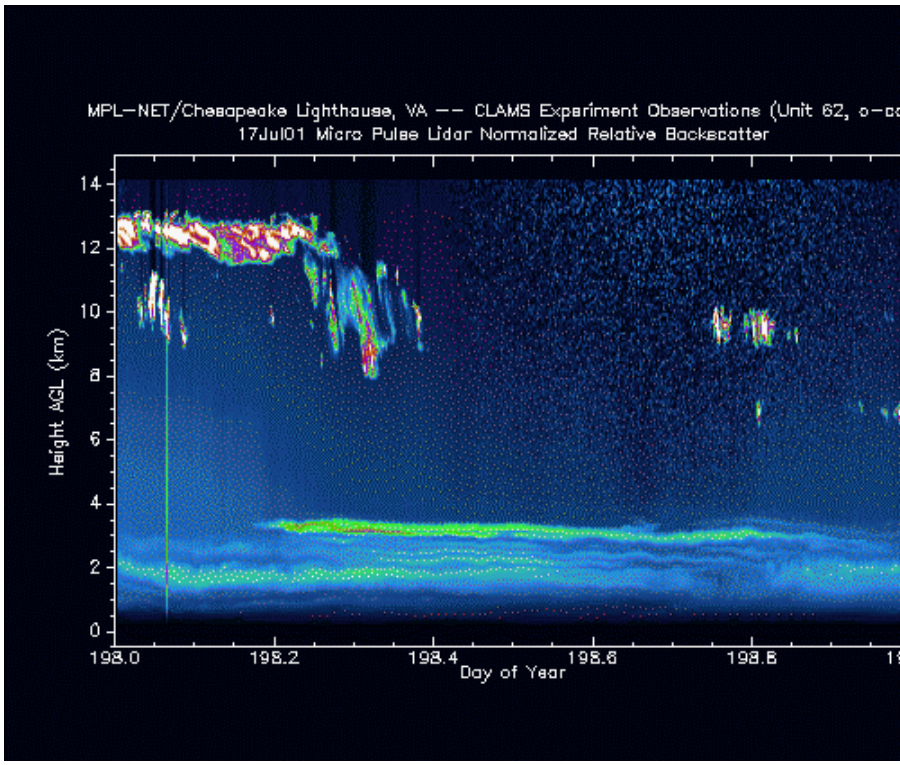


CLAMS: July 17, 2001

COVE WINDS

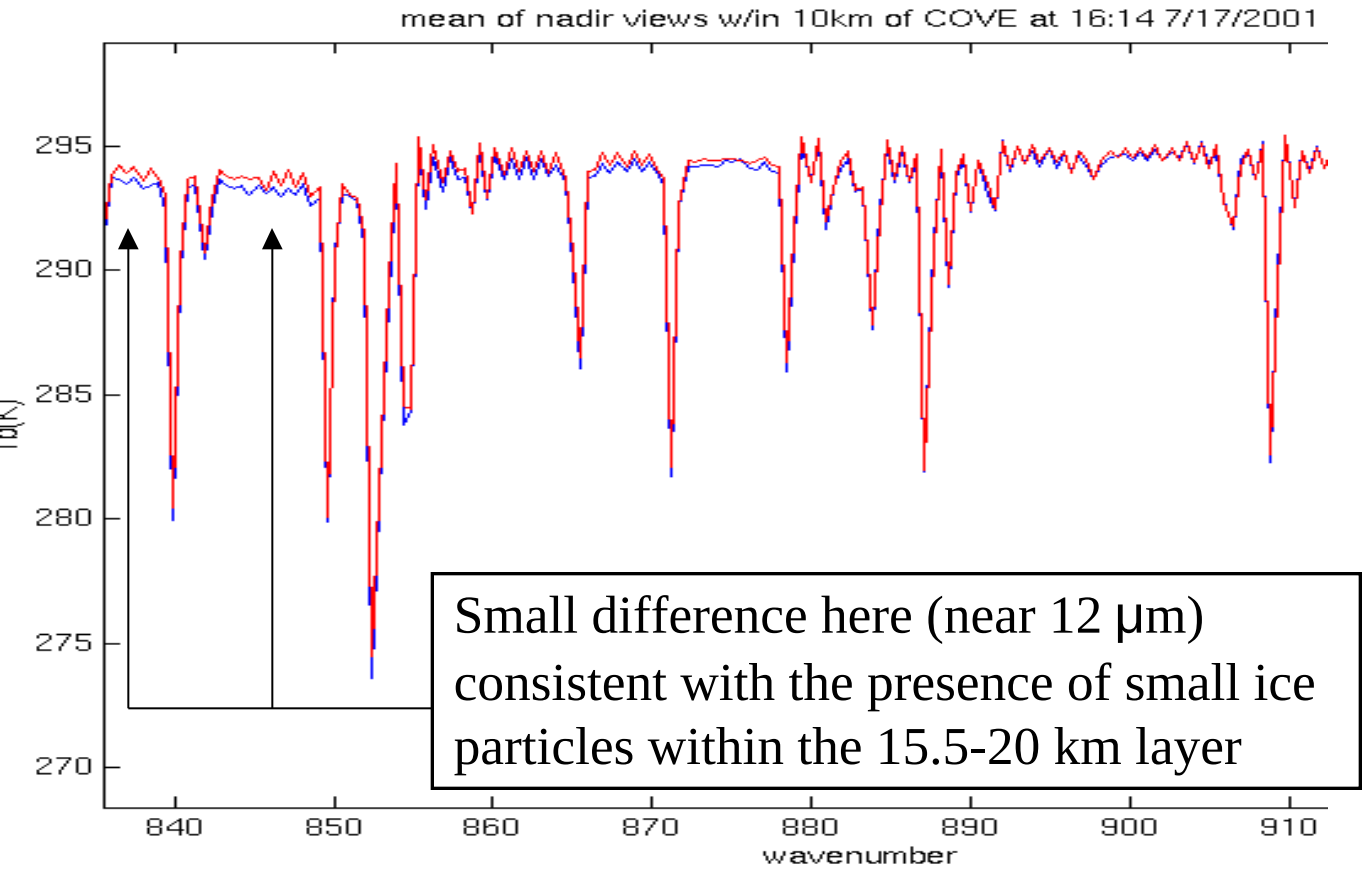






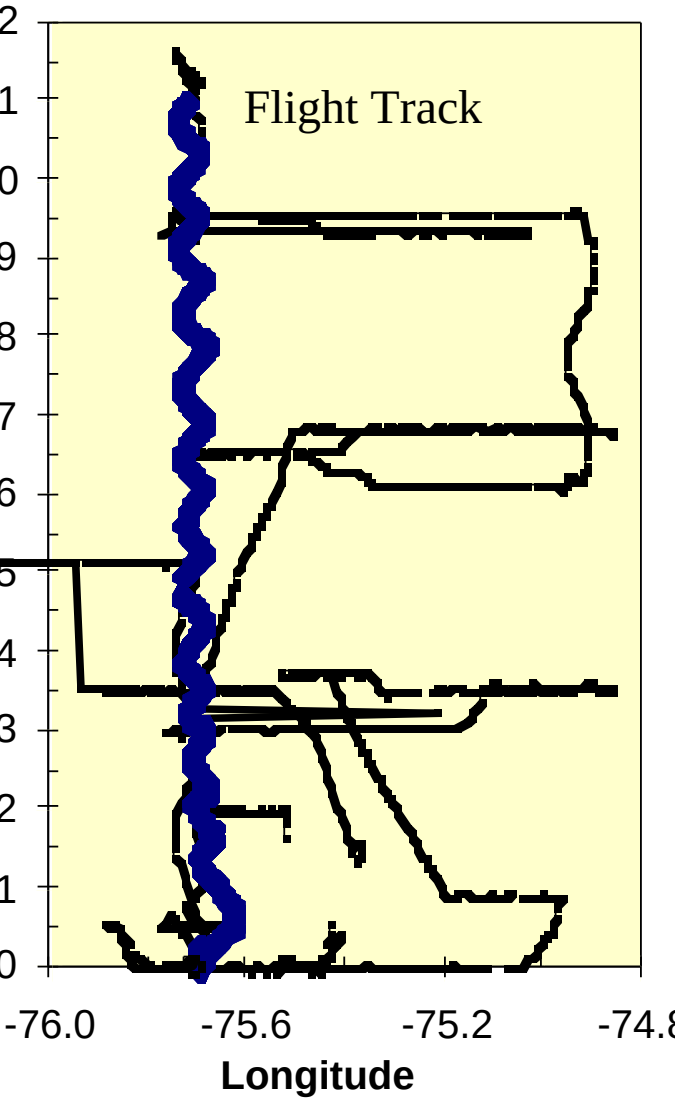
NASTI & SHIS Comparisons (July 17, 2001)

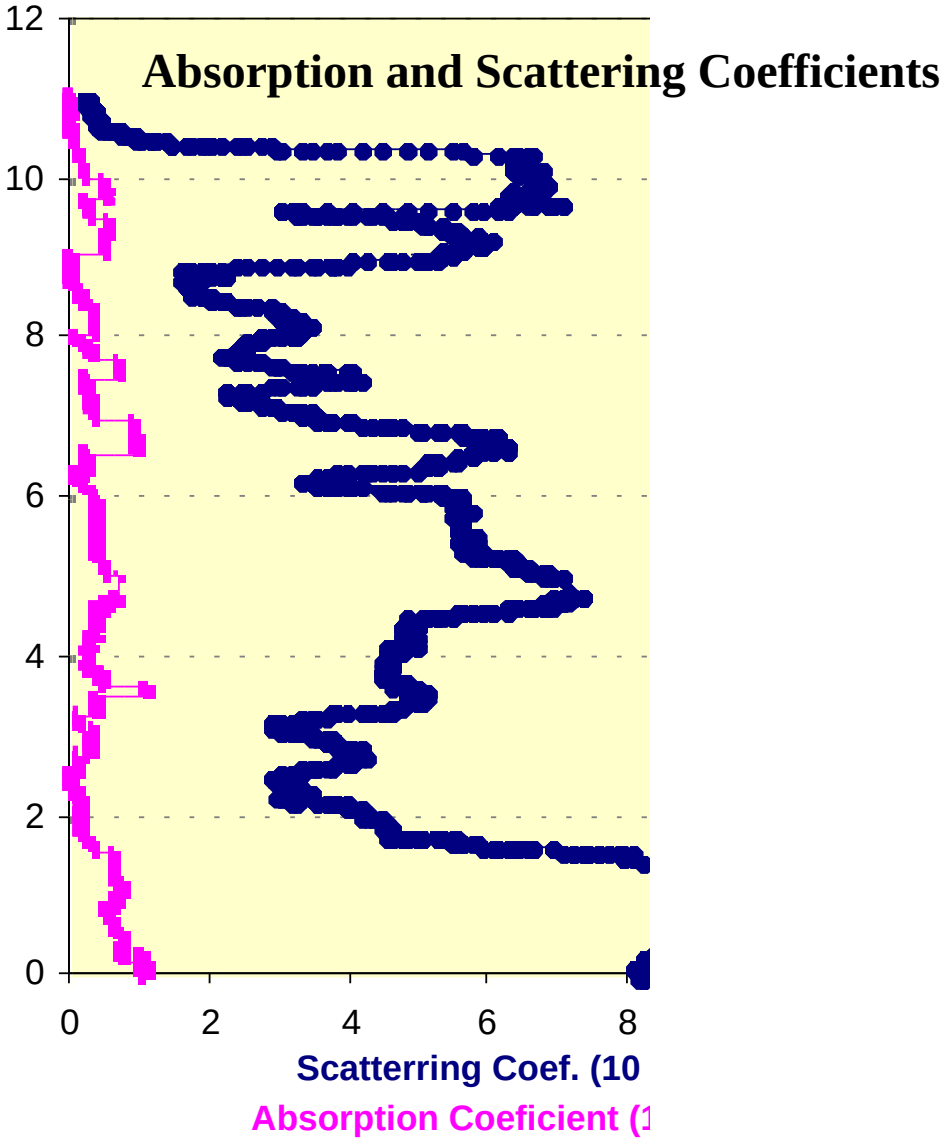
"Window" region spectral radiance comparison between NAST-I on Proteus (~15.5 km) and SHIS on the ER-2 (~20 km) near the Chesapeake Lighthouse



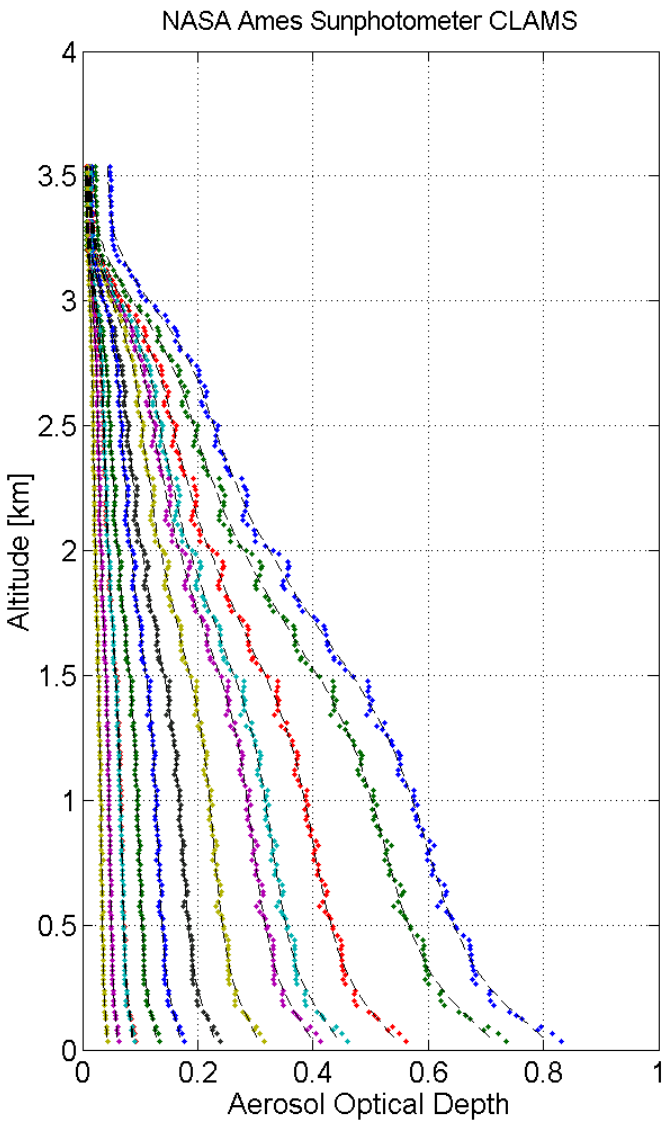
Small difference here (near 12 μm) consistent with the presence of small ice particles within the 15.5-20 km layer

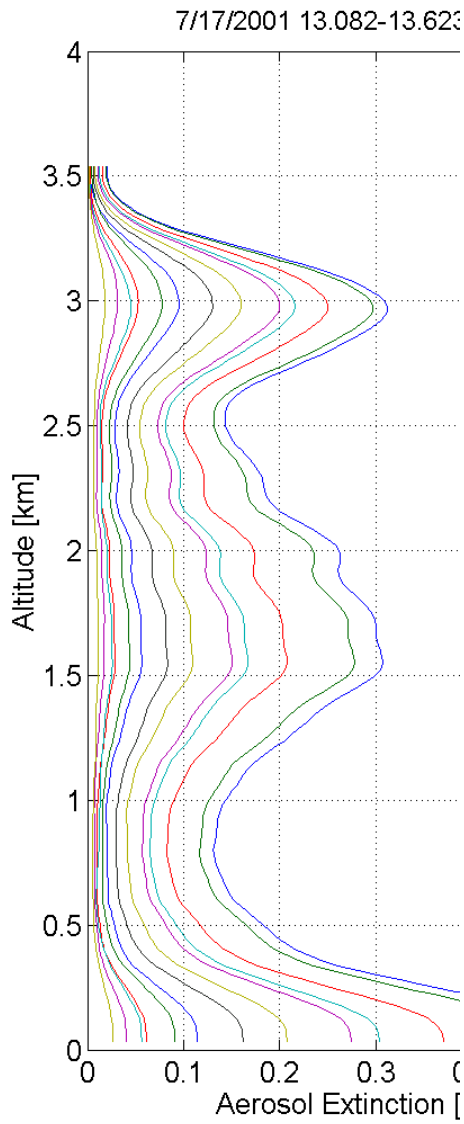
Vertical Profile of Scattering and Absorption Coefficients UW CV580



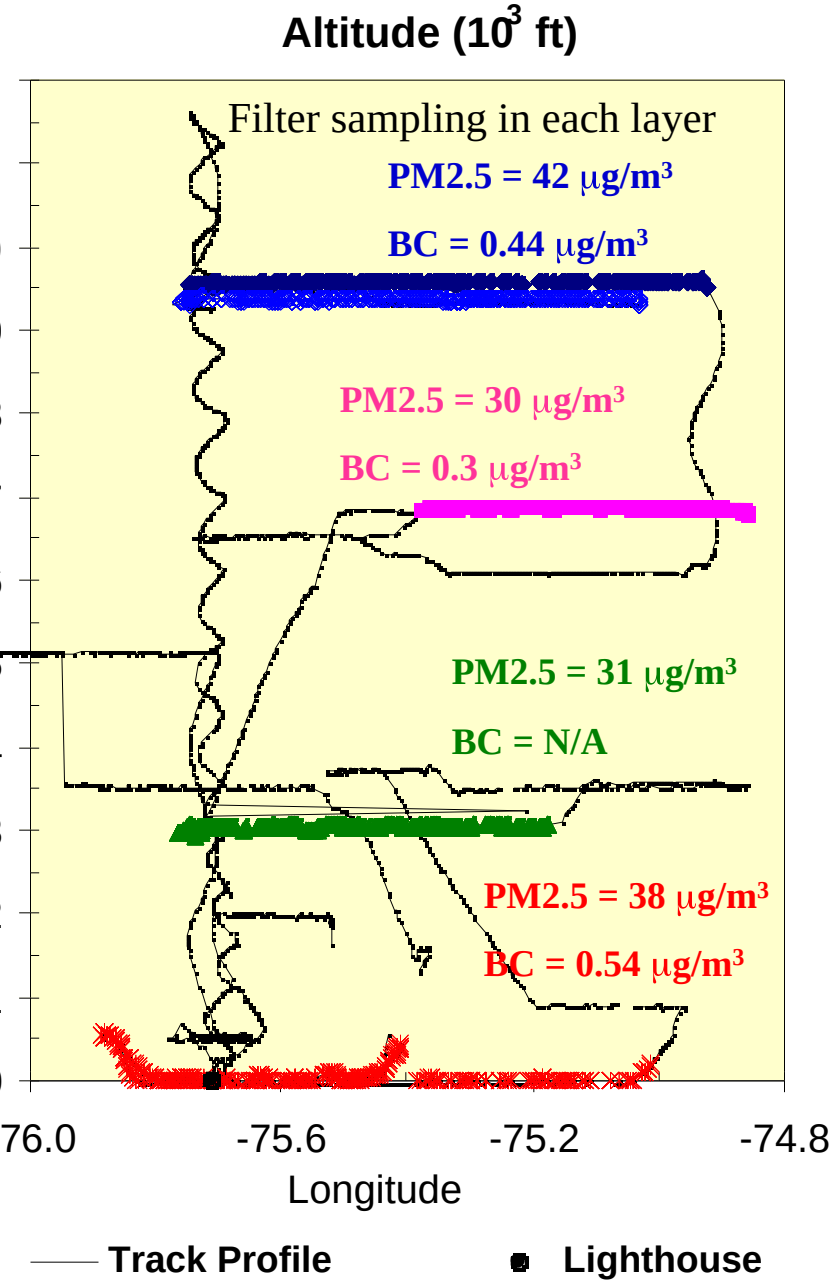


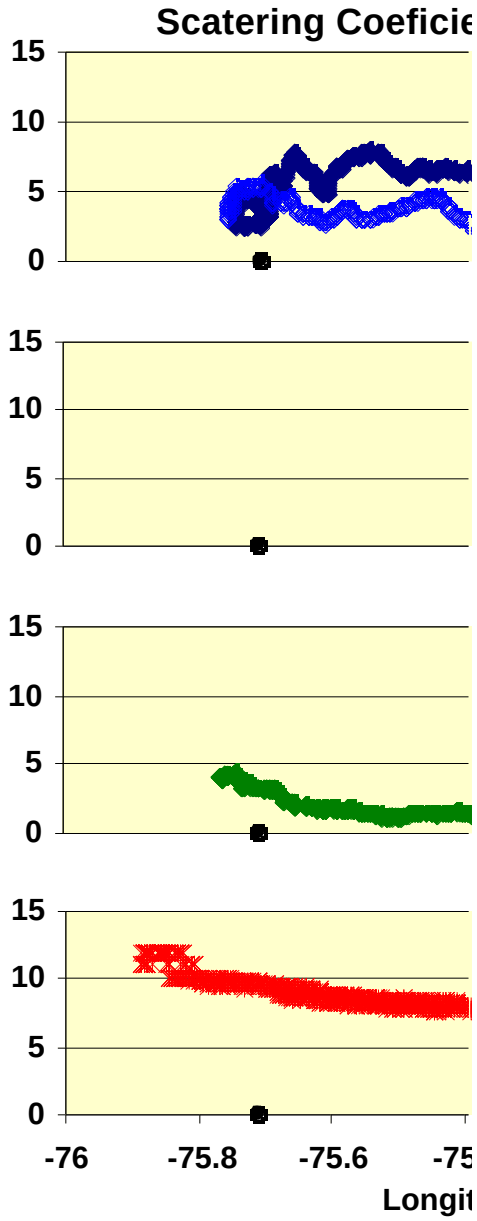
Vertical aerosol structure, July 17, 2001
From the AMES Sunphotometer



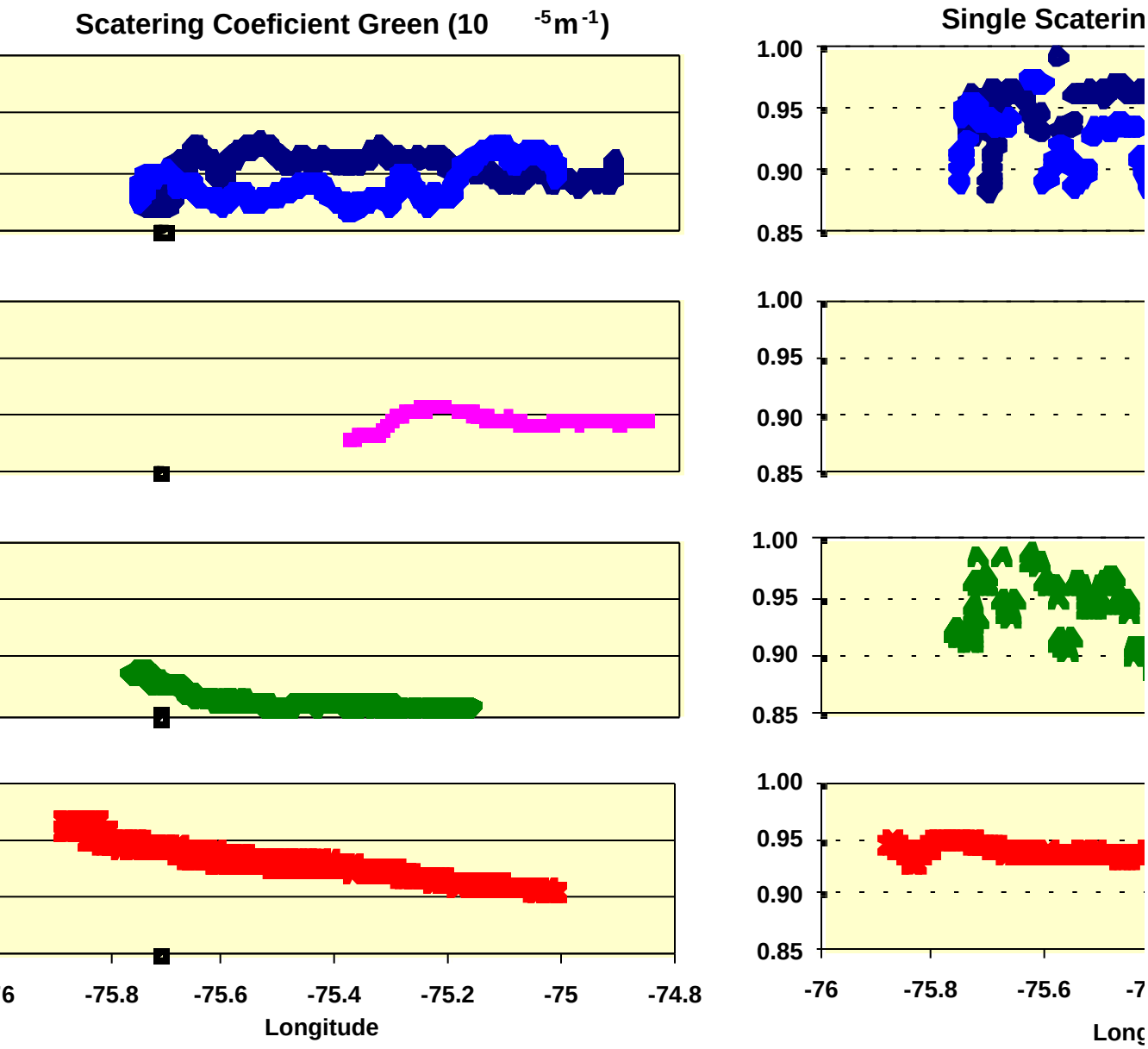


Vertical Profile by the CV580 – July 17th

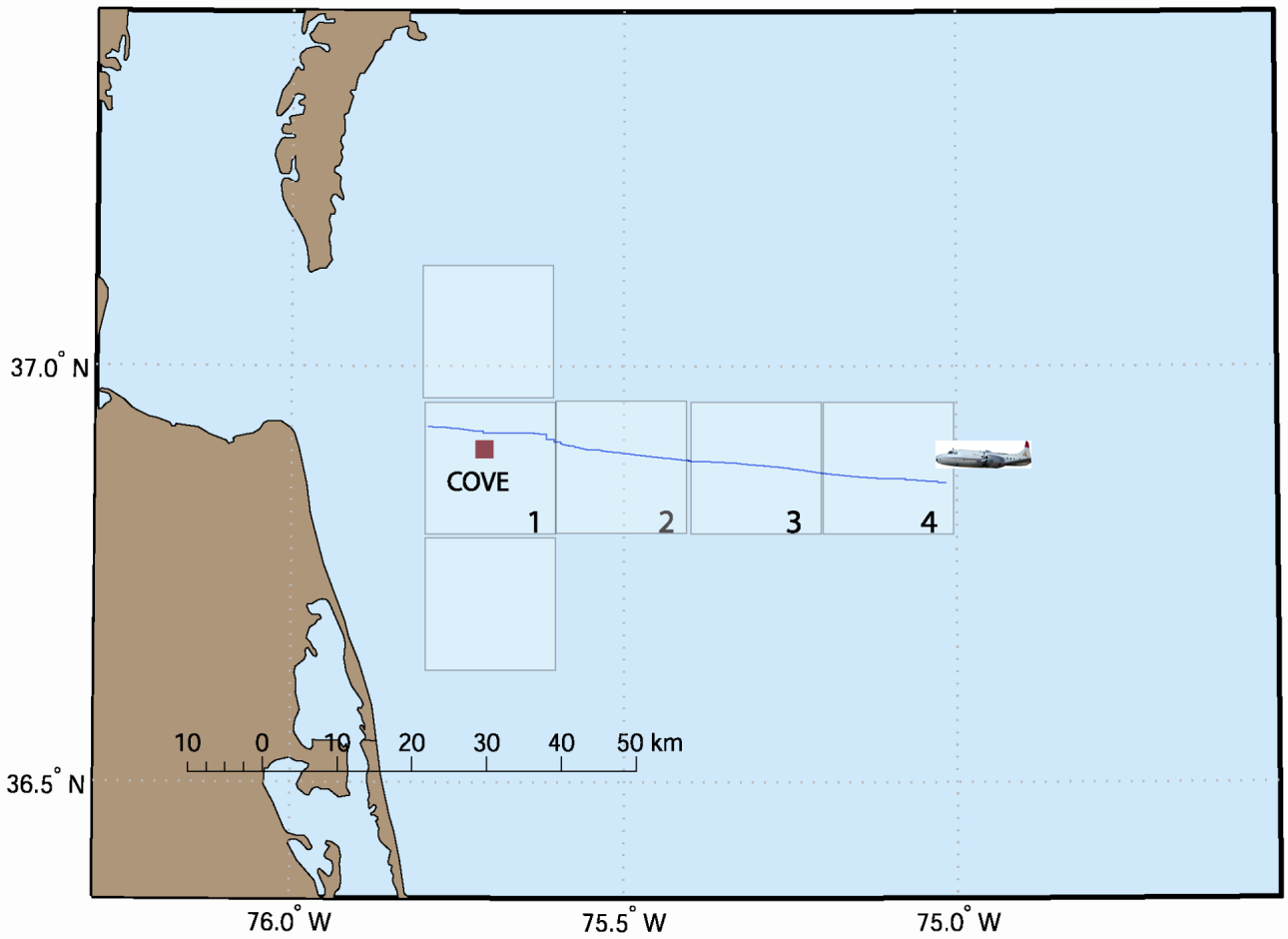




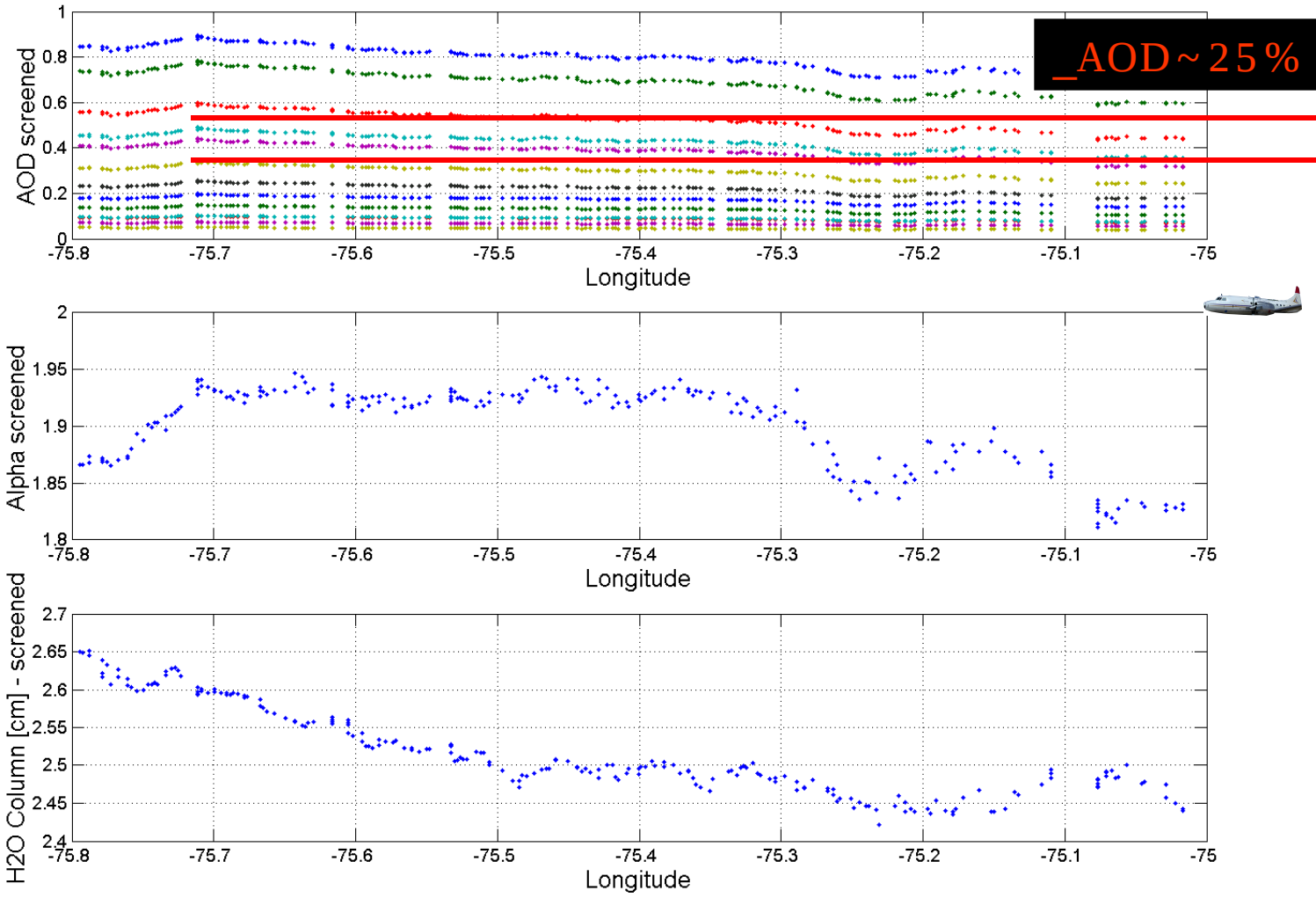
Physical Properties in Each Layer



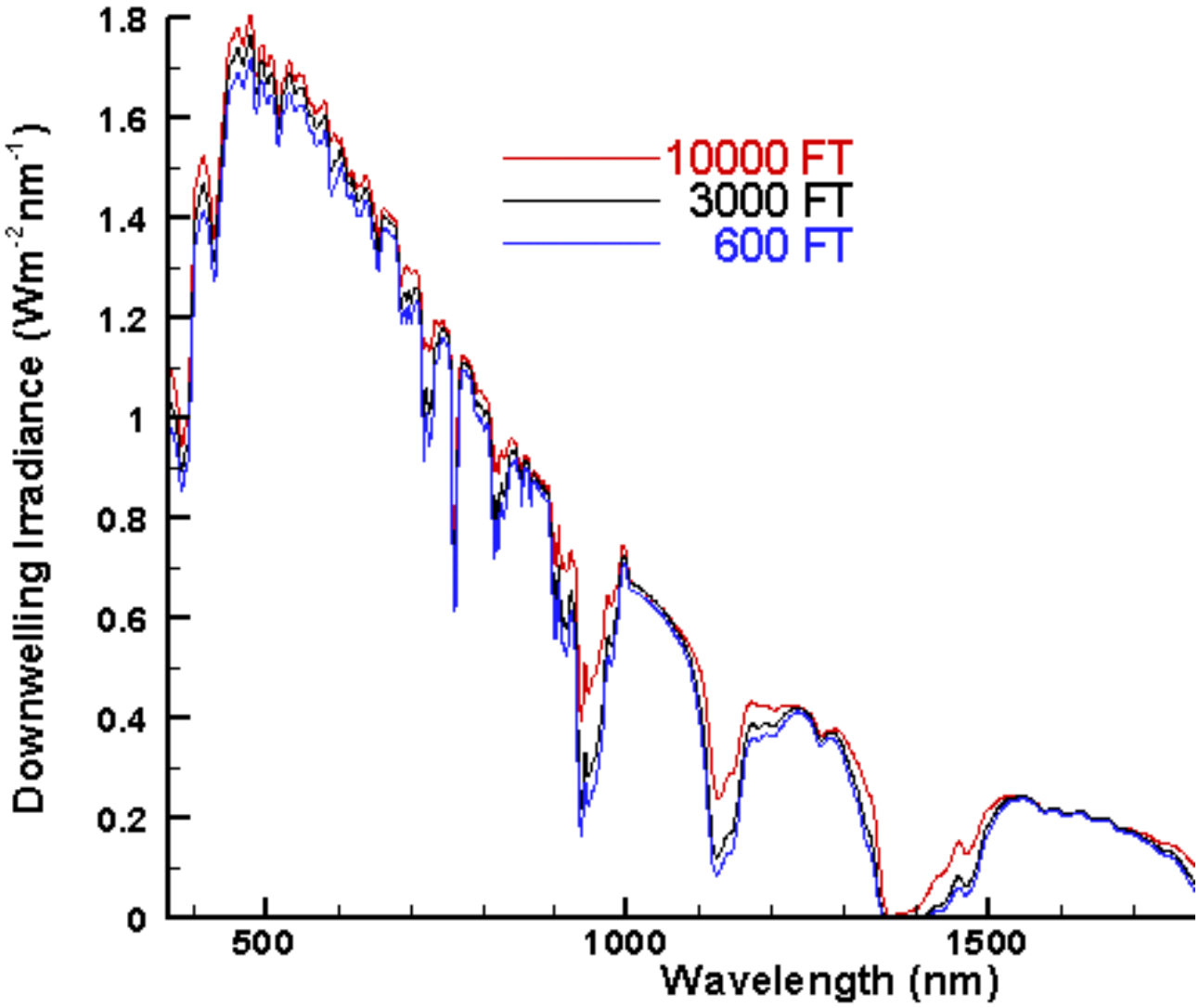
V-580/AATS-14 location, CLAMS July 17, 2001, 16:0
16:15 UTC



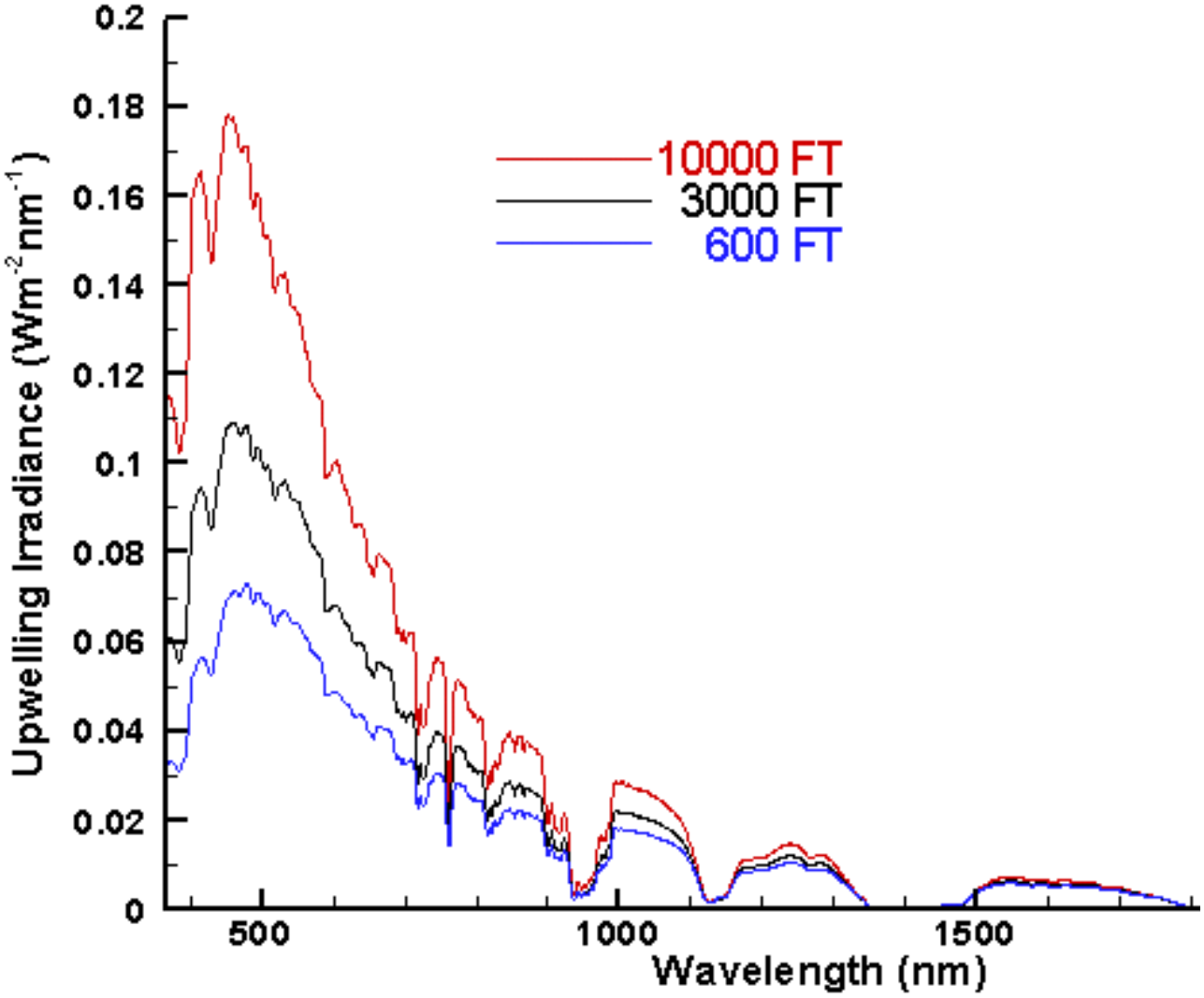
AOD variability on July 17th, 2001



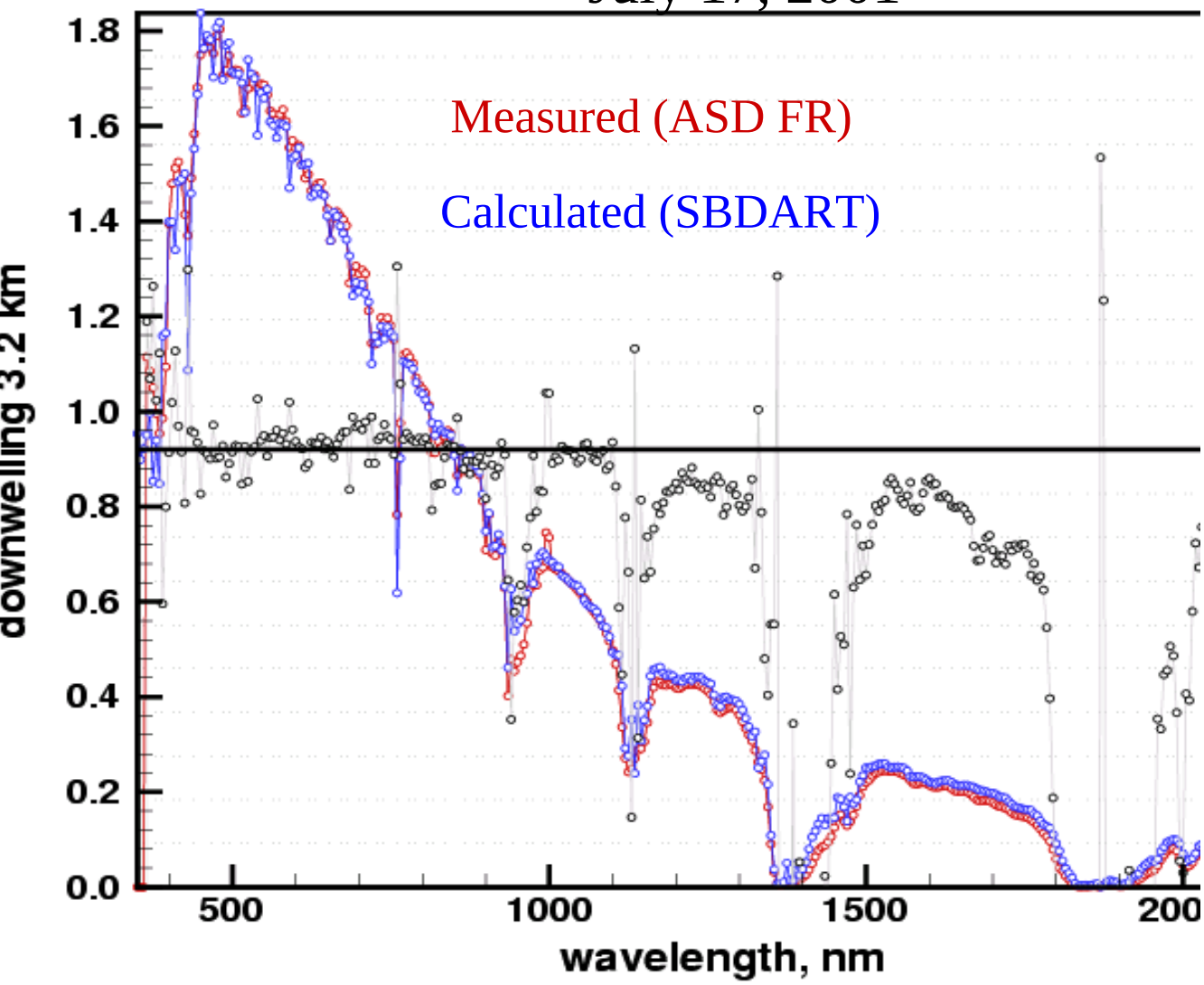
Downwelling Spectral Flux Profile Measured by the OV-10 near COVE (July 17, 2001)



Upwelling Spectral Flux Profile Measured by the OV-10 near COVE (July 17, 2001)



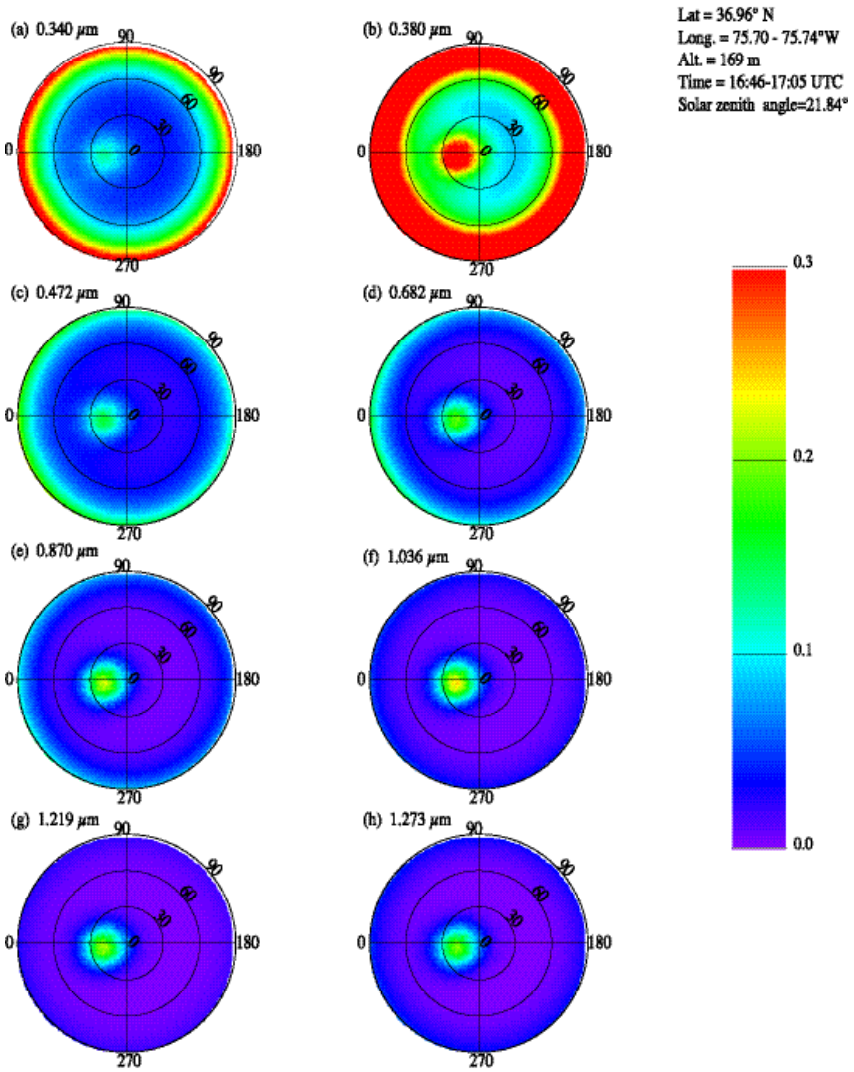
Calculated vs. Measured Downwelling Spectra at 10kft
July 17, 2001



BRDF from the Cloud Absorption Radiometer on the UW-CV5

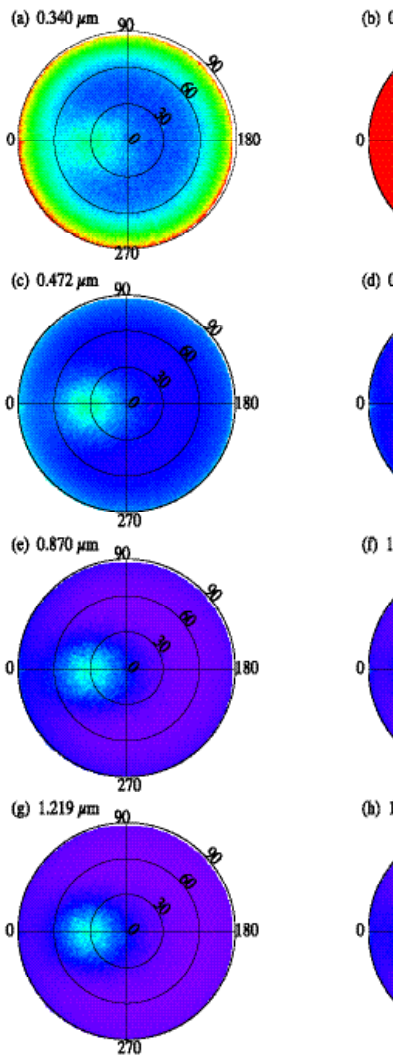
CALM

CAR BRDF AT CHESAPEAKE LIGHT HOUSE: 17 JULY 2001

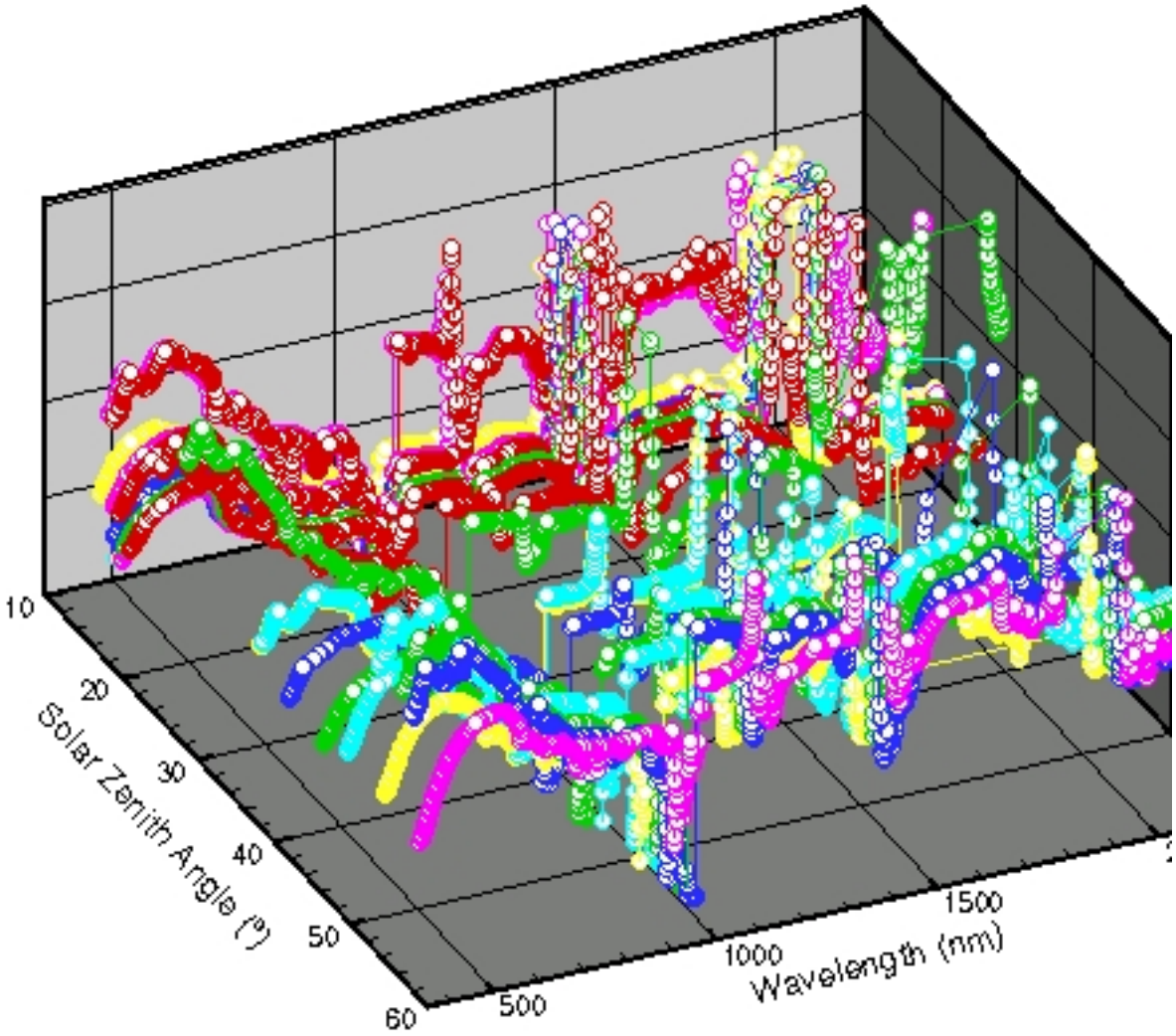


WINDY

CAR BRDF AT BOUY 44004: 30 JU



Spectral albedo measured by the OV-10 near COVE during CLAMS



Mouth Map w CLT

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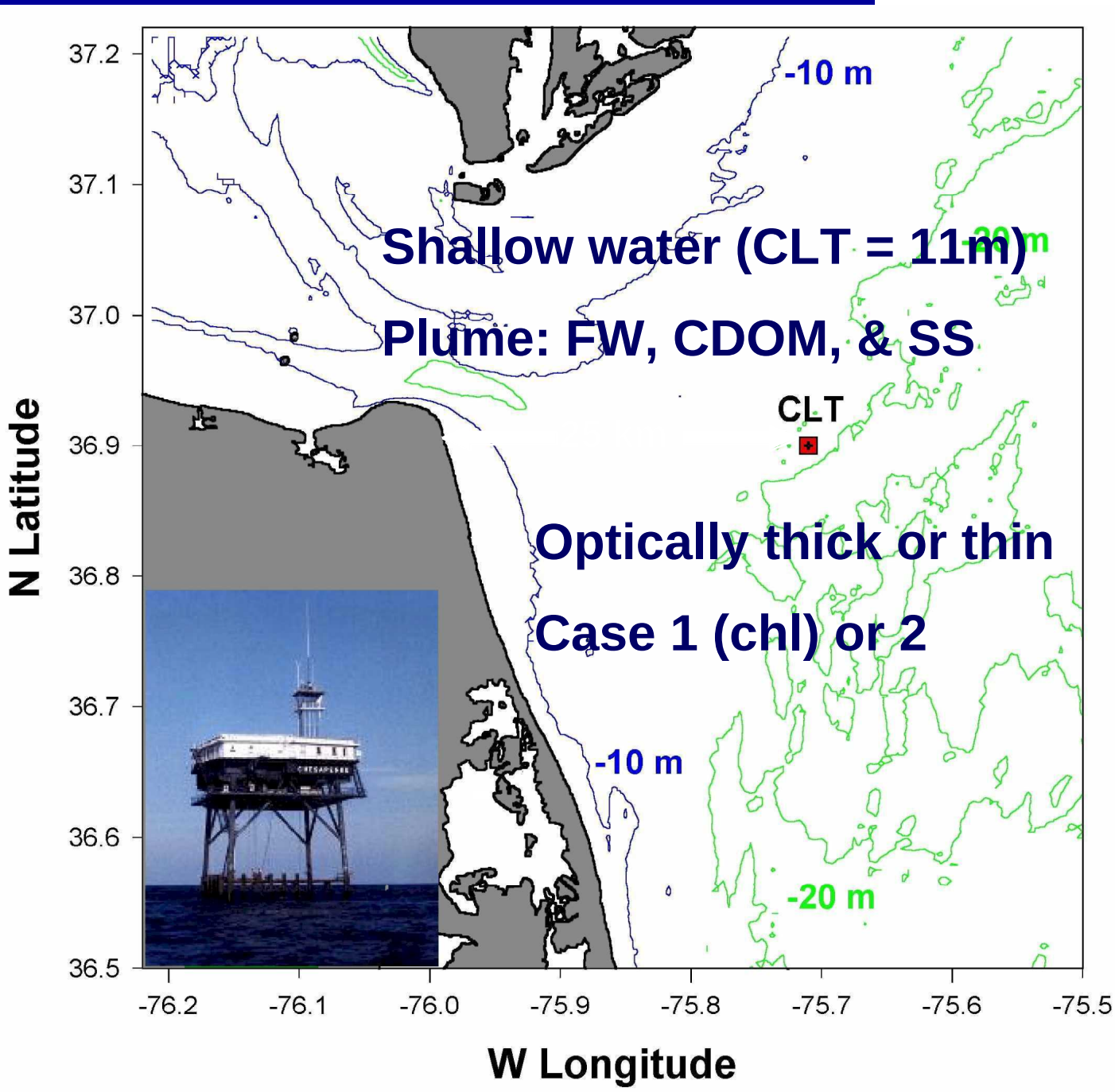
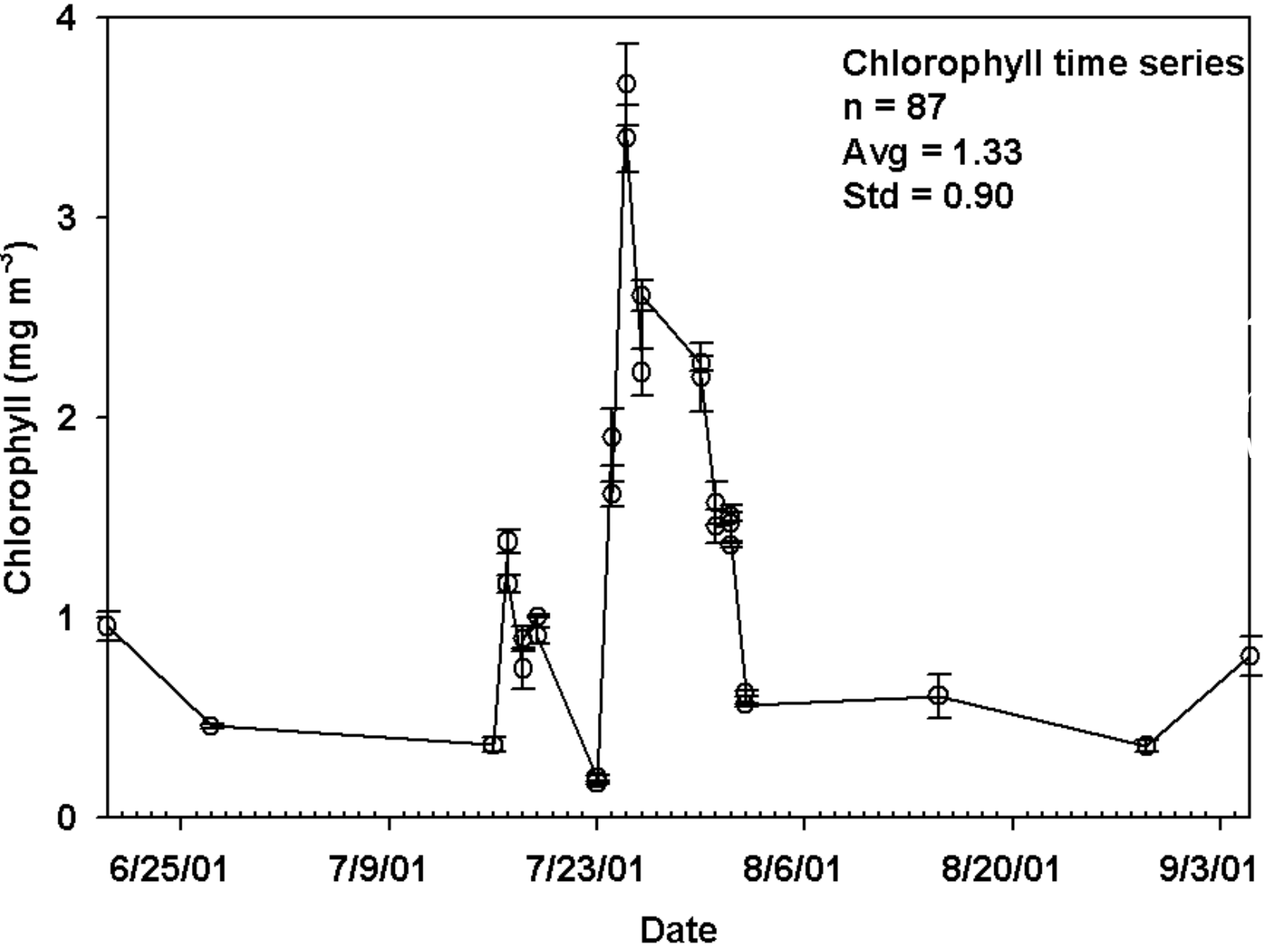
, etc.)

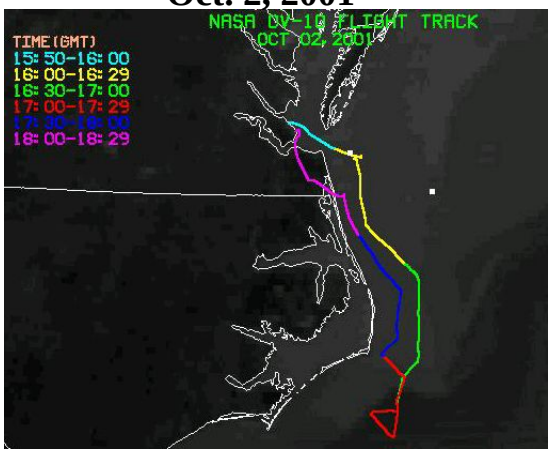


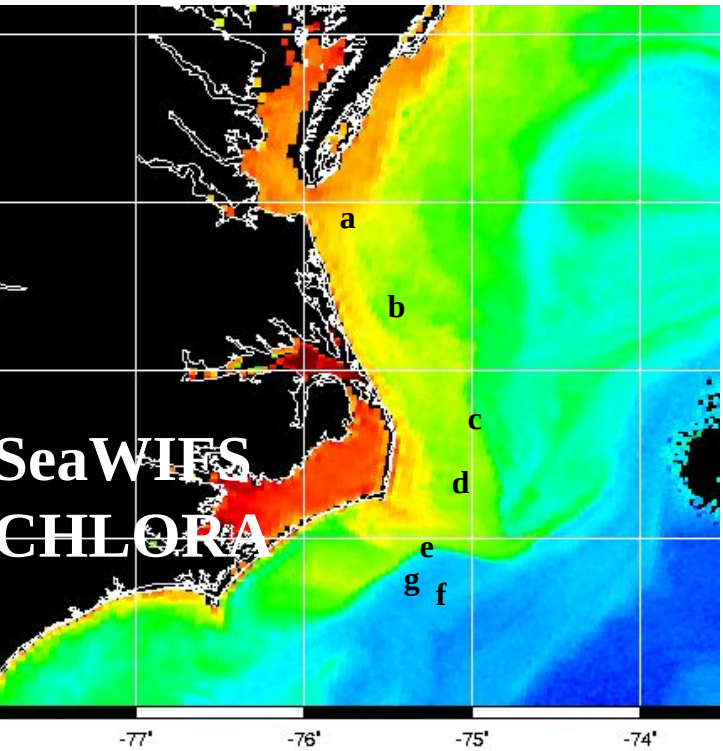
Plant biomass (chlorophyll) vs. time at COVE



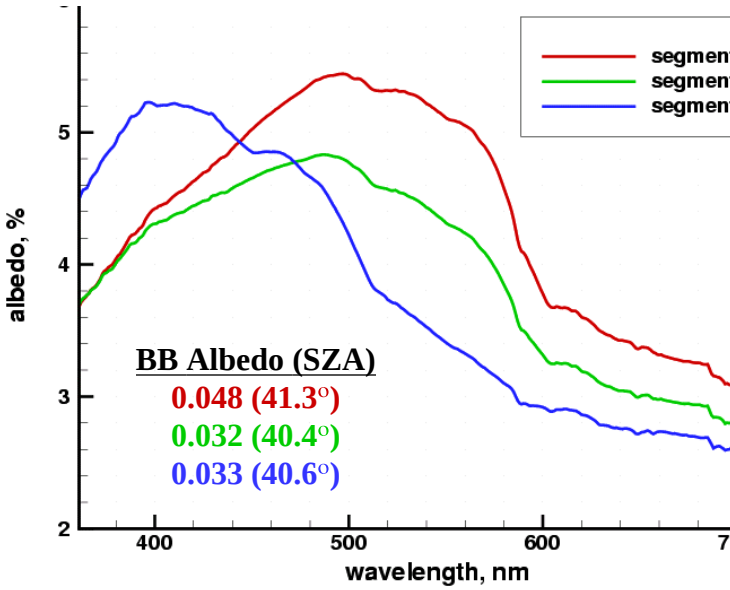
TRANSIT TO THE DARK GULF STREAM WATER ON OCT 2, 2001

OV-10 Flight Track
Oct. 2, 2001

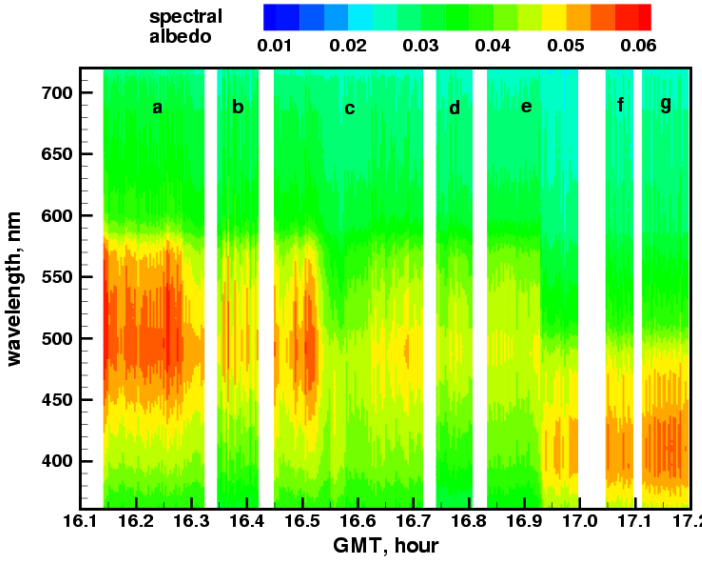




Spectral Albedo Measured Near COVE (
East of Cape Hatteras (b), and the gulf strea



Albedo Time Series in Transit to Gulf Stre



SOME TIDBITS OF RESULTS ON AEROSOLS FROM MEASUREMENTS ABOARD THE UNIVERSITY OF WASHINGTON'S CONVAIR-580 AIRCRAFT IN CLAMS

by

Peter V. Hobbs

University of Washington

and

Tom Kirchstetter and Tica Novakov

Lawrence Berkeley National Laboratory

FOR MORE INFORMATION ON THE UNIVERSITY OF WASHINGTON'S CONVAIR-580 FLIGHTS IN CLAMS SEE

mmary of Flights and Types of Data Collected Aboard
Jniversity of Washington's Convair-580 Research Airc
in the Clams Field Study on the United States East Coa
From 10 July Through 2 August 2001"

by

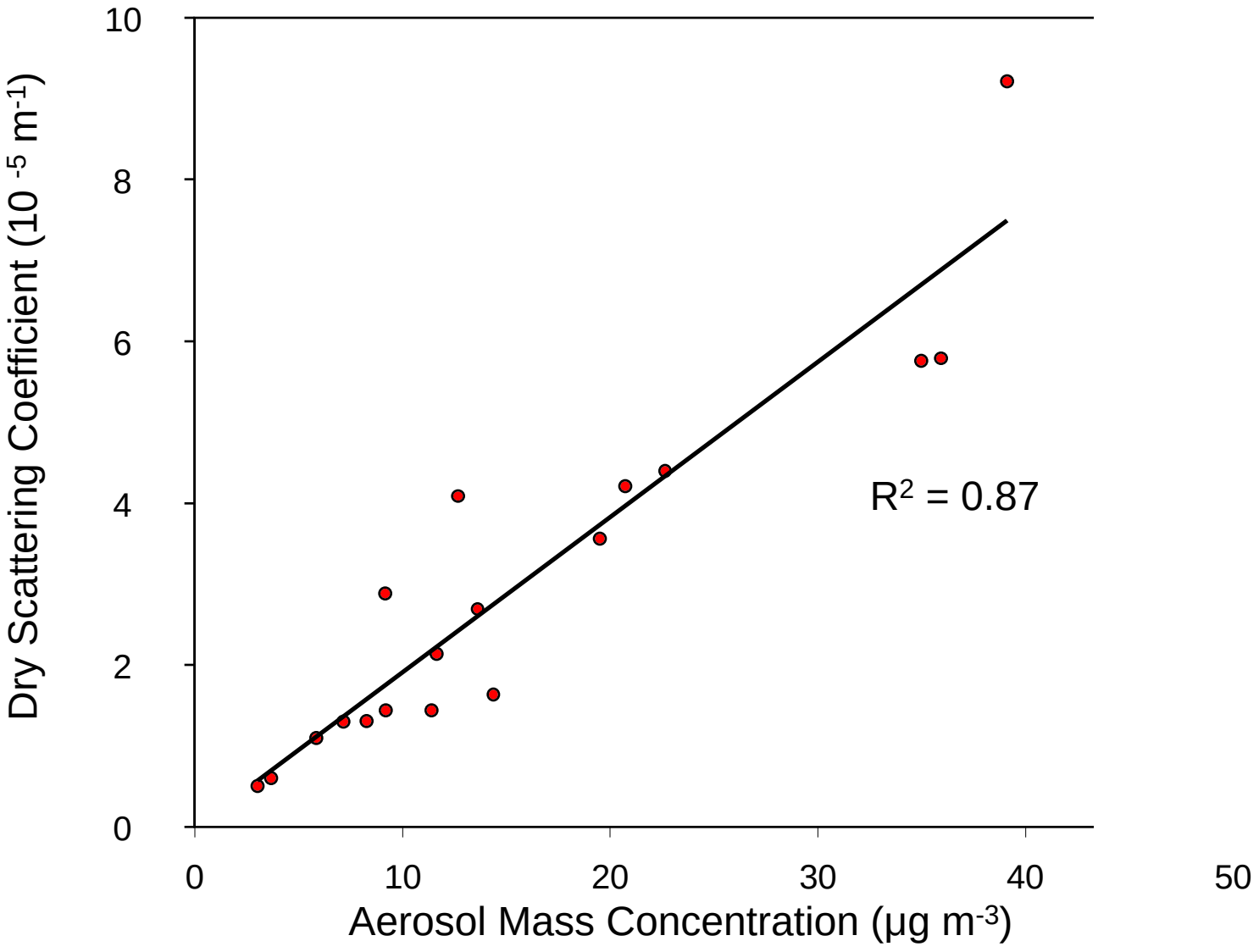
Peter V. Hobbs

November 2001

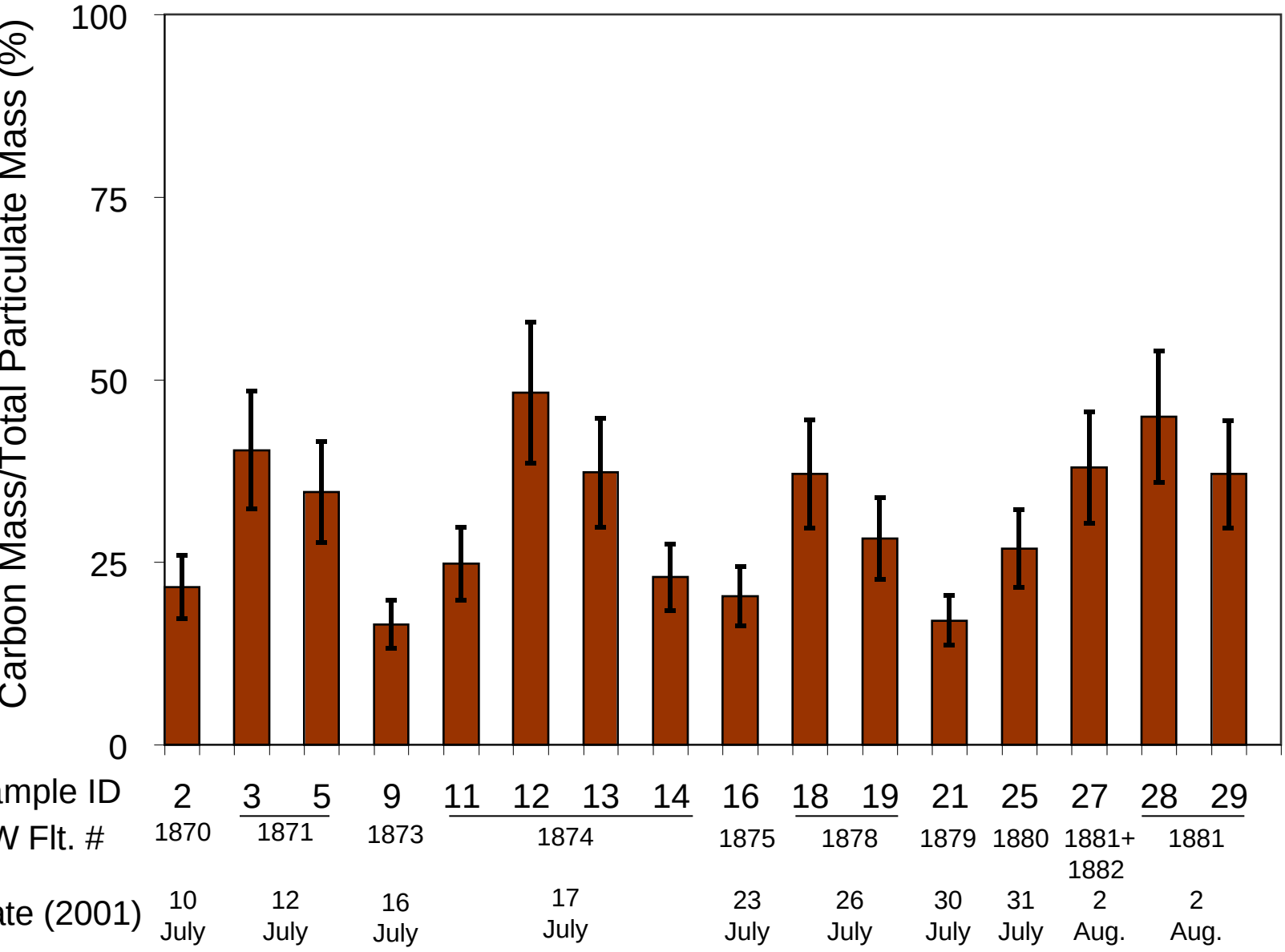
Available at the ftp address:

//cargsun2.atmos.washington.edu/clams-report/CLAMS-MASTER

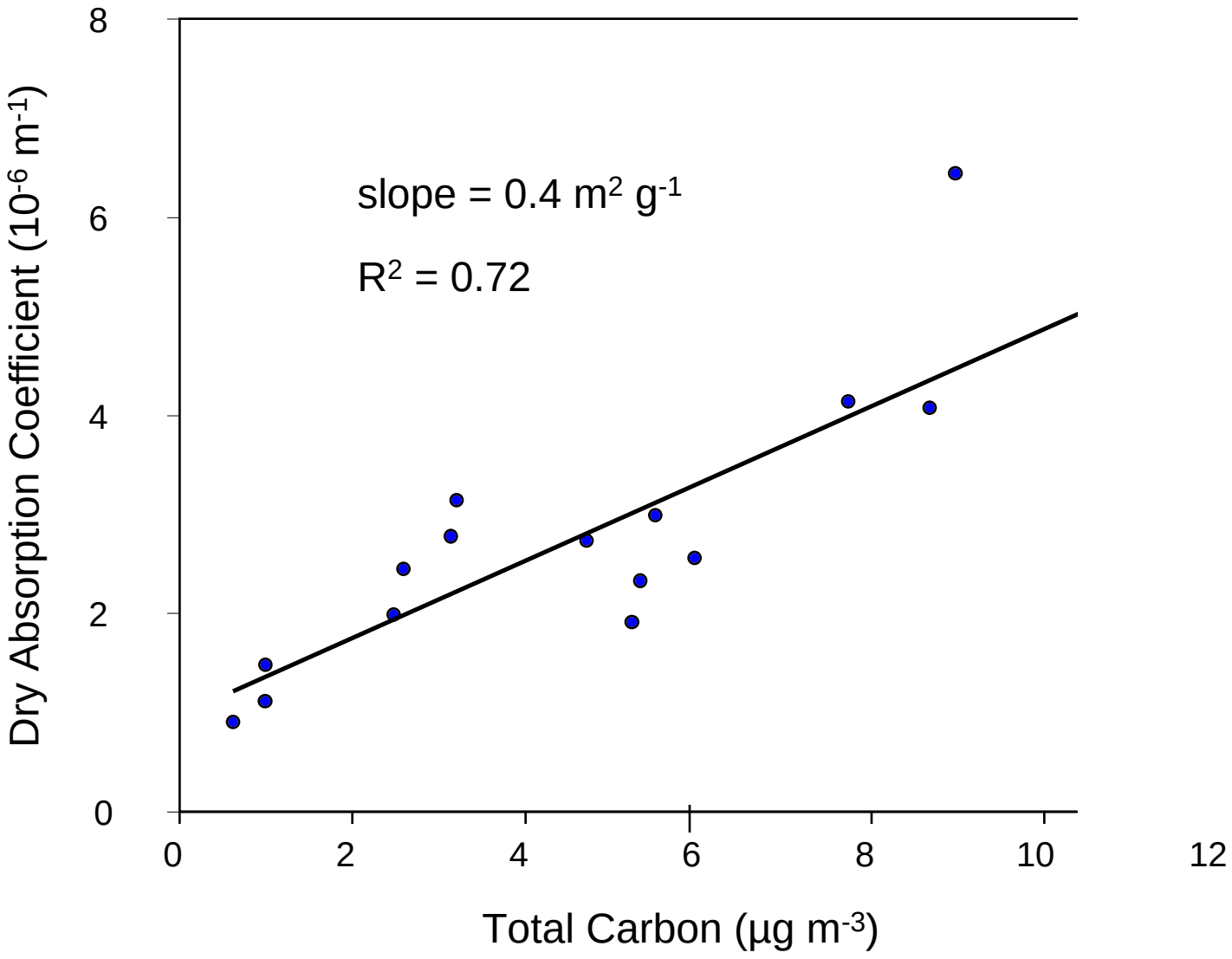
Aerosol Mass Concentration vs. Dry Scattering Coefficient From University of Washington's Airborne Measurements in CLAMS



Carbonaceous Aerosol Mass Fractions in CLAMS From University of Washington's Airborne Measurements



Total Carbon Concentration vs Dry Absorption Coefficient From University of Washington's Airborne Measurements in CLAMS



Upcoming Milestones

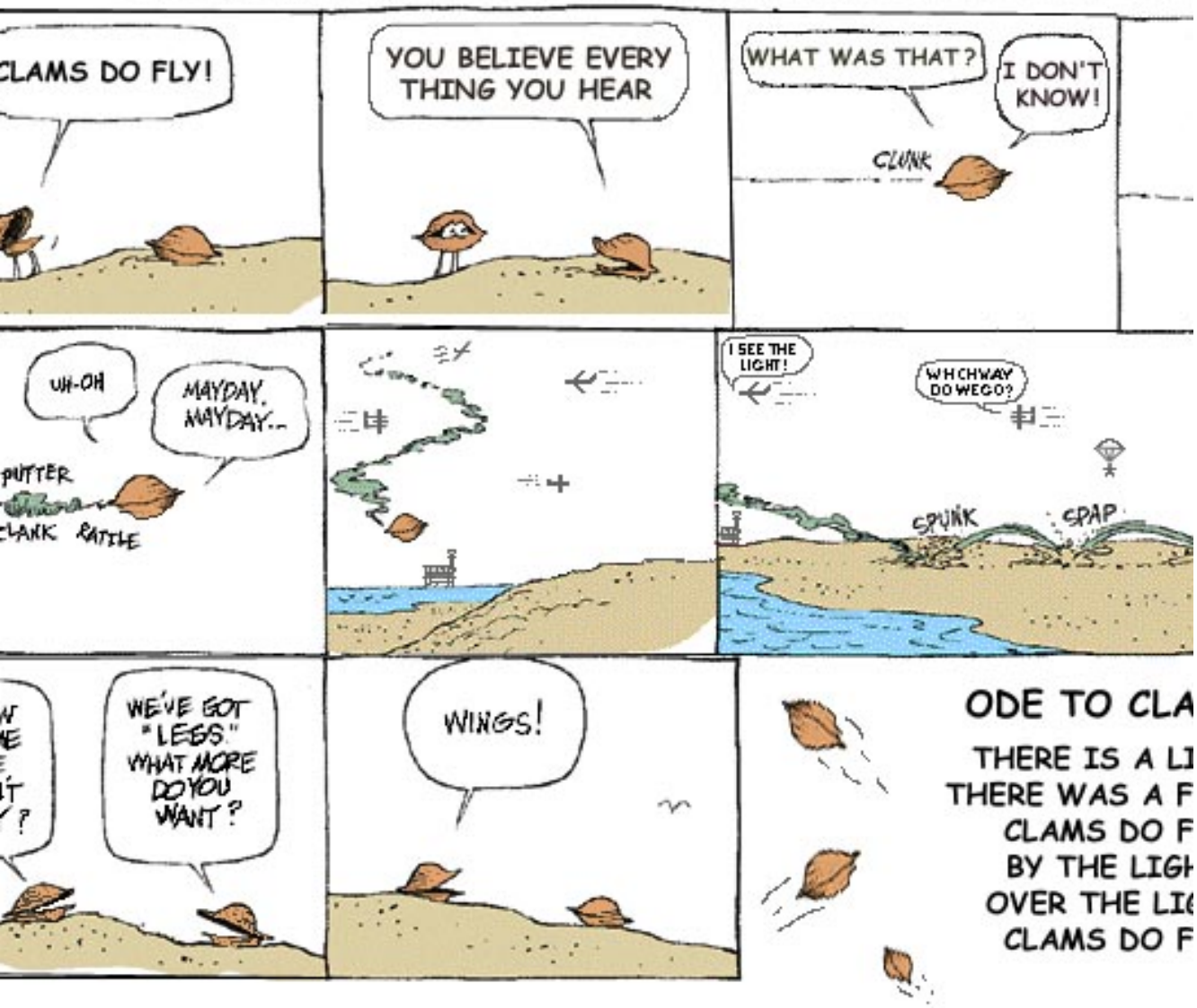
- CLAMS special session (25 papers) at Spring AGU meeting (May 28-29, 2002: Wash D.C)
- Abstracts for joint publication effort due Oct 1; submissions early December
- All data in final form should be available at the Langley ASDC in early December

http://www-clams.larc.nasa.gov/clams

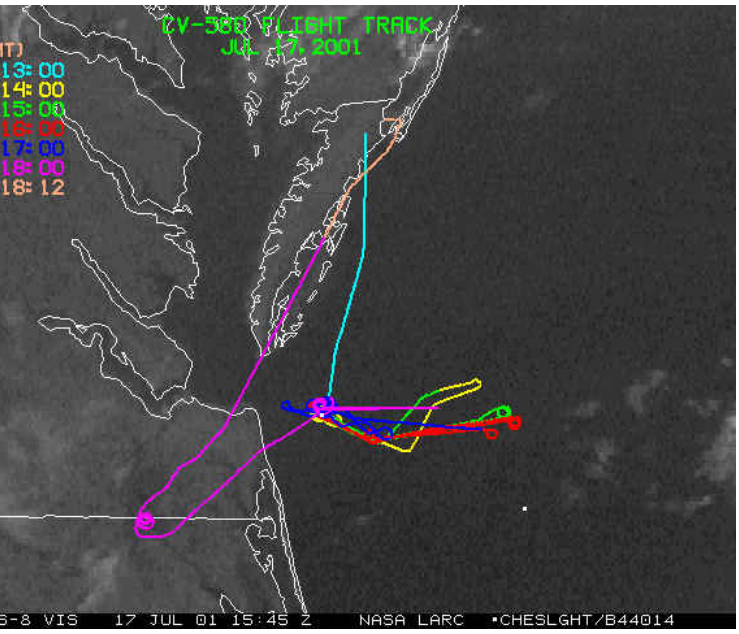
CLAMS SUMMARY

- Conducted nine successful coordinated aircraft experiments coincident with TERRA overpass.
- Sampled a variety of aerosol conditions ranging total 500 nm optical thickness ranging from 0.06 to 0.5 with in-situ measurements of aerosol scattering and absorption properties to validate MODIS and MISR and test CERES SARB.
- Conducted at least six good MISR and MODIS aerosol retrieval validation experiments.
- Conducted three MODIS ‘Glint’ experiments with MAS and MODIS.
- Conducted two spatial variability experiments for MISR.
- Obtained measurements of coastal, offshore and deep ocean BRDF(15 total;8 uncontaminated by cloud) under a variety of sun angles and wind conditions for CERES, MISR and MODIS.
- Conducted twelve OV-10 flights measuring shortwave fluxes for CERES to improve ocean optics parameterizations, test the validity of COVE platform measurements and assess the spatial variability of ocean optical properties.
- July 17 was “Golden Day” with moderate aerosol and six aircraft vertically stacked over the Chesapeake Lighthouse at TERRA overpass time.

Chesapeake Lighthouse and Aircraft Measurements for S



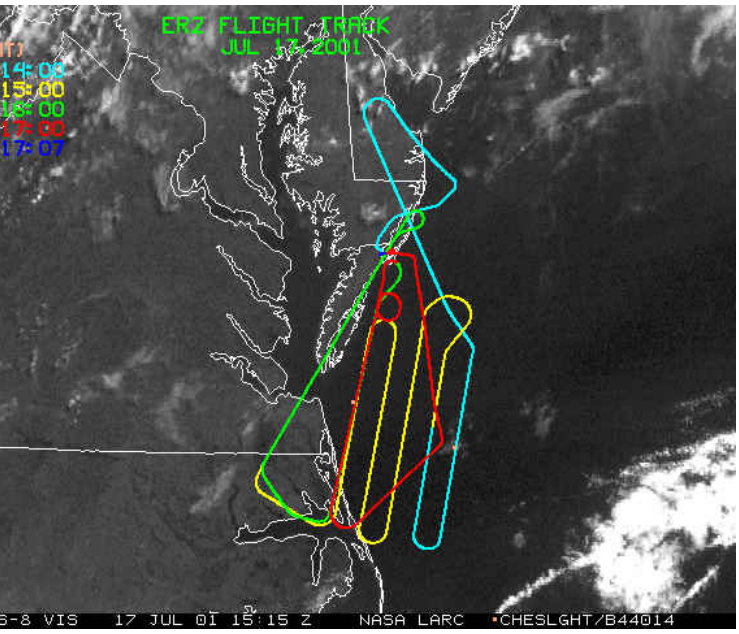
CLAMS: July 17, 2001



CV-580

- slow spiral over COVE (100 ft – 11kft)
- Aerosol chemistry@ 9, 6, 3 kft (L-patter
- 100 ft AOD run (west to east)
- BRDF near COVE

T/O = 1235 UTC
Land=1812 UTC

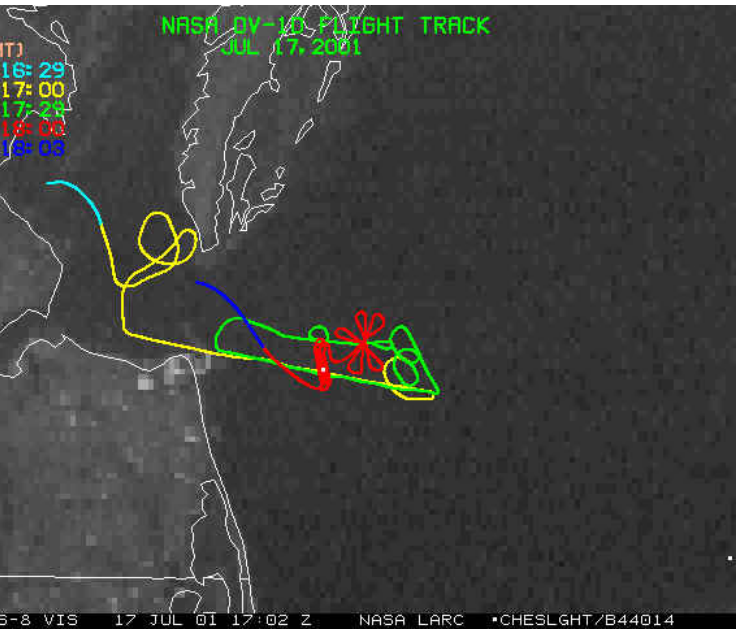


ER-2

- Glint pattern
- Geo-Cal
- COVE track (parallel to TERRA); airMISR nine angle mode
- Track to 44014

T/O = 1300 UTC
Land=1701 UTC

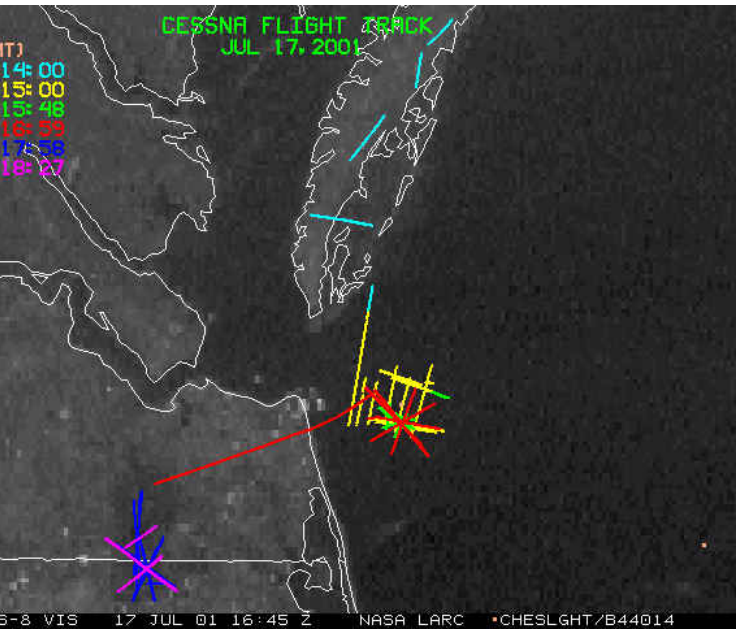
CLAMS: July 17, 2001



OV-10

- 10 kft leg mouth of bay to east of COVE
- 3 kft reverse leg
- 600 ft daisy at NE waypoint
- 600 ft crop-duster over COVE
- 600 ft tack se to nw COVE to bay bridge

T/O = 1623 UTC
Land=1812 UTC

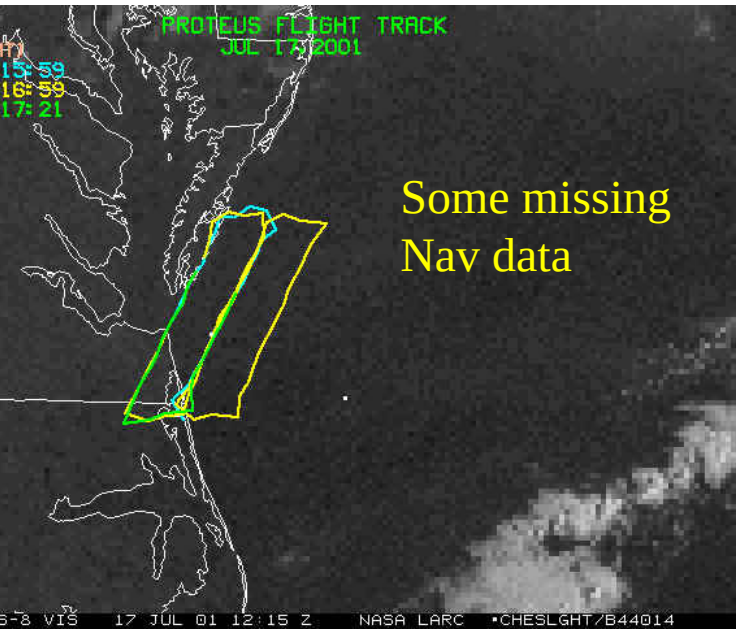


CESSNA

- 12kft crop-duster (PP) , tracks 90° toPP
- 200 ft rosette
- 12 kft rosette
- Dismal swamp tracks

T/O = 1330 UTC
Land=1800UTC

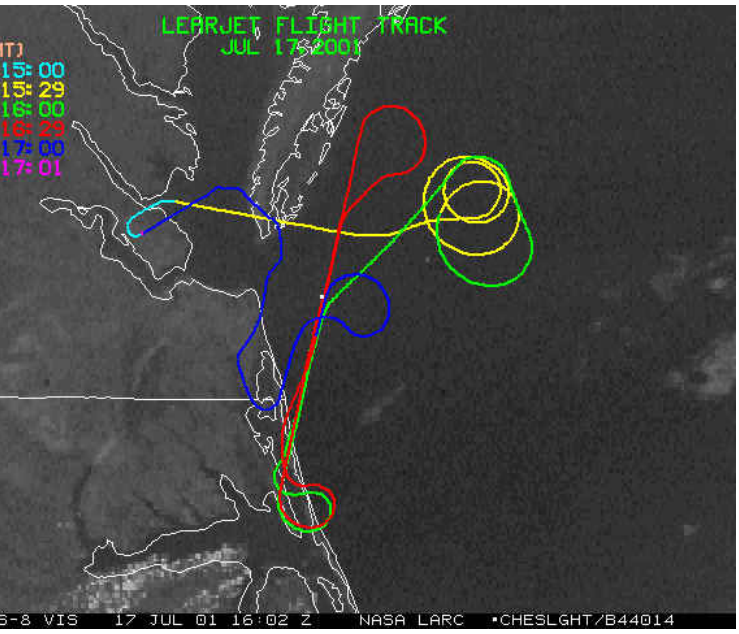
CLAMS: July 17, 2001



PROTEUS

- COVE profile (2-55 kft)
- Mapping pattern (55 kft)
- Wallops Profile (55-2 kft)

T/O = 1431 UTC
Land=1832 UTC



Lear Jet

- Tracks at 40 kft parallel toTERRA overpass with LAABS (A-band)

T/O = 1500 UTC
Land=1800 UTC