Moorings-of-Opportunity: A New Capability to Obtain Large Volumes of Groundtruthing Data for Color Satellites

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SIMBIOS Project Office Team

Problem

+ Limited amount of *in situ* data available for SeaWiFS match-ups

+ Dedicated optical moorings are expensive

Project Solution

+ Demonstrate that a mooring-of-opportunity (BTM) can be used to provide high frequency match-up data

BERMUDA TESTBED MOORING

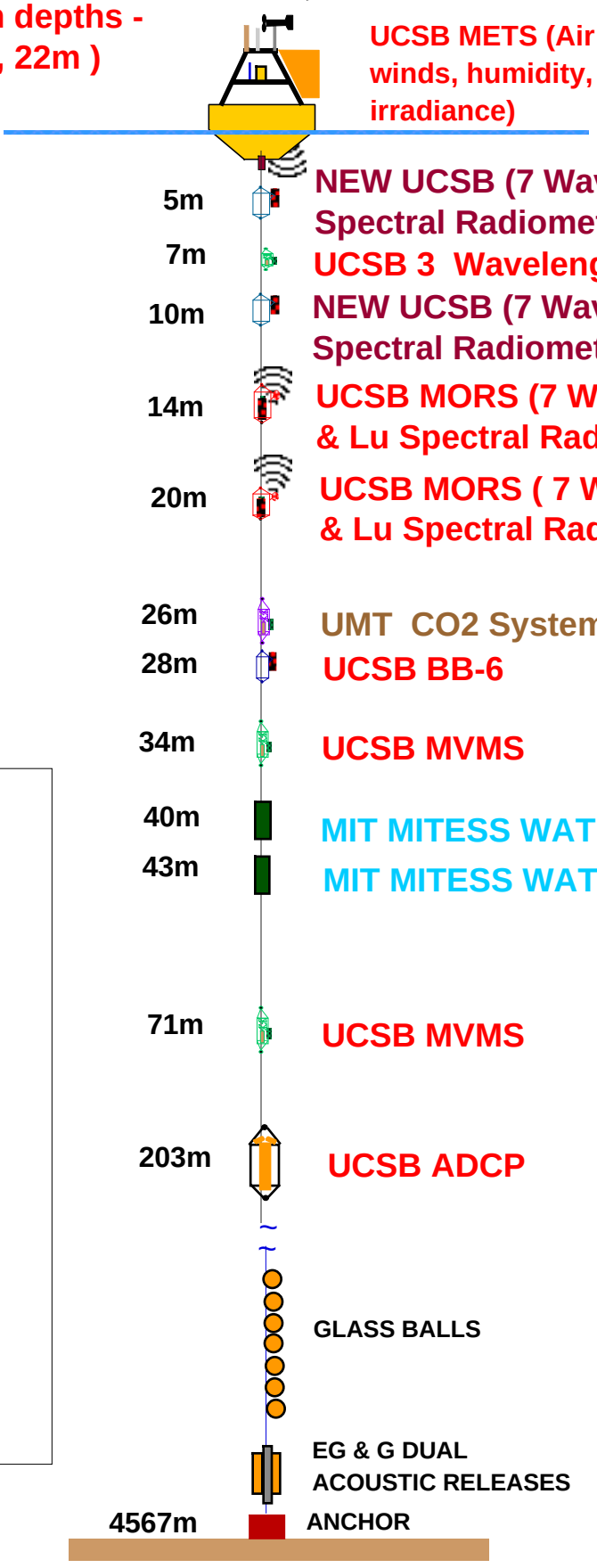
Deployment #12
July 29 1999 -
Nov. 2 1999

31° 42.54' N
64° 08.80' W

ARGOS Data Transmission with Acoustic Modem Subsurface Telemetry (From depths - surface, 7m, 14m, 22m)

UCSB 7 wavelength Ed SPECTRAL RADIOMETER

UCSB METS (Air and water temp, winds, humidity, bar press., irradiance)



Temperature Measurments

TidBit 1m
TSKA 3m
TSKA 8m
TidBit & SeaBird 14m
TidBit & SeaBird 20m
MVMS 34m
TSKA 45m
TSKA 55m
MVMS 71m
TSKA 99m
TSKA 150m
ADCP 203m
TSKA 250m
TSKA 750m

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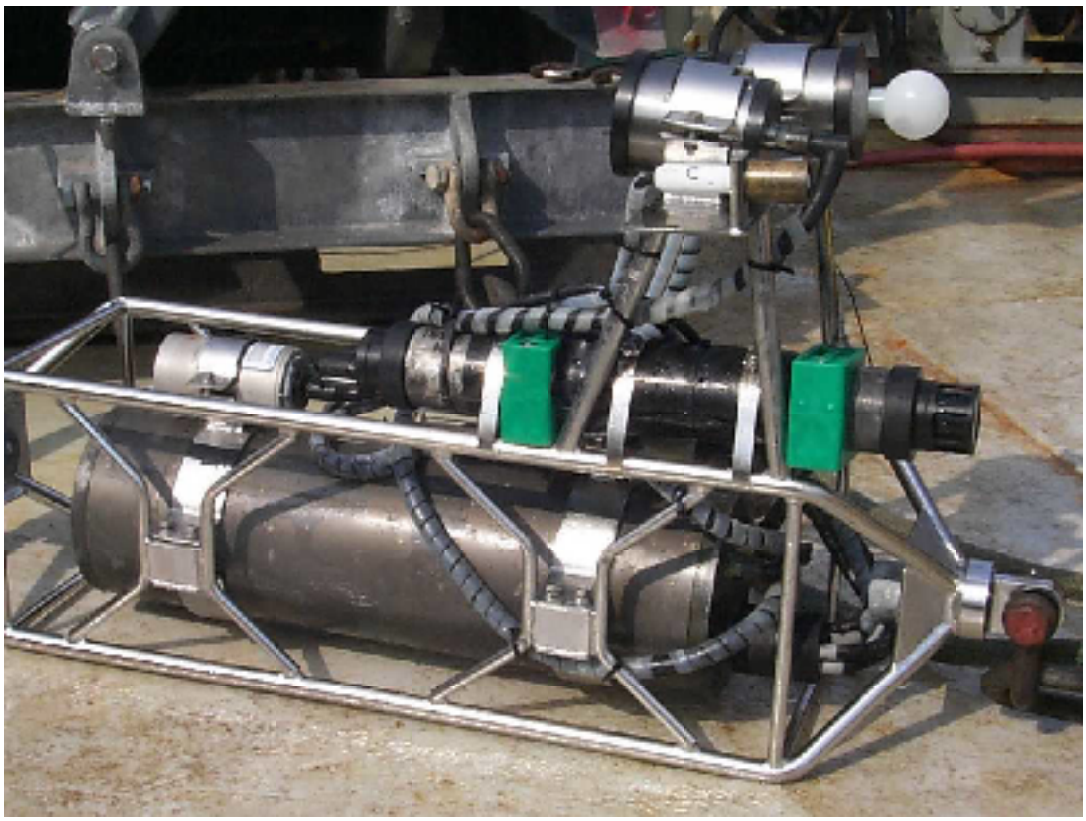
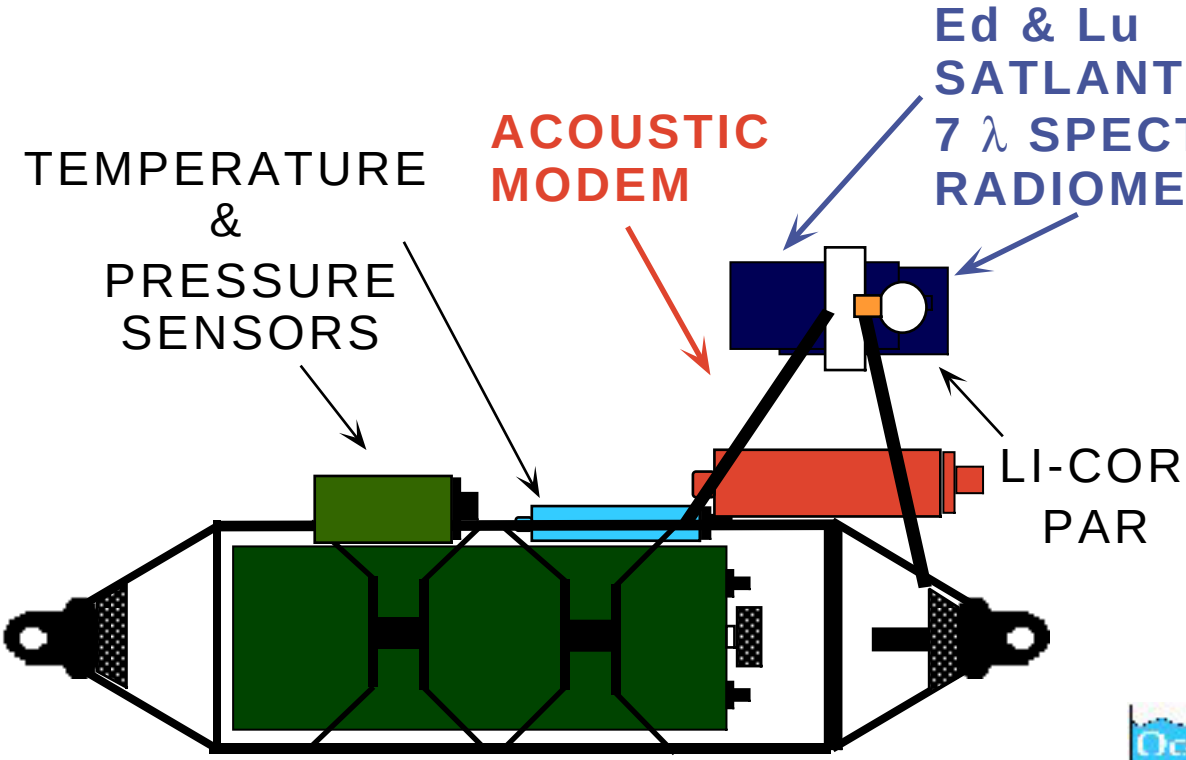
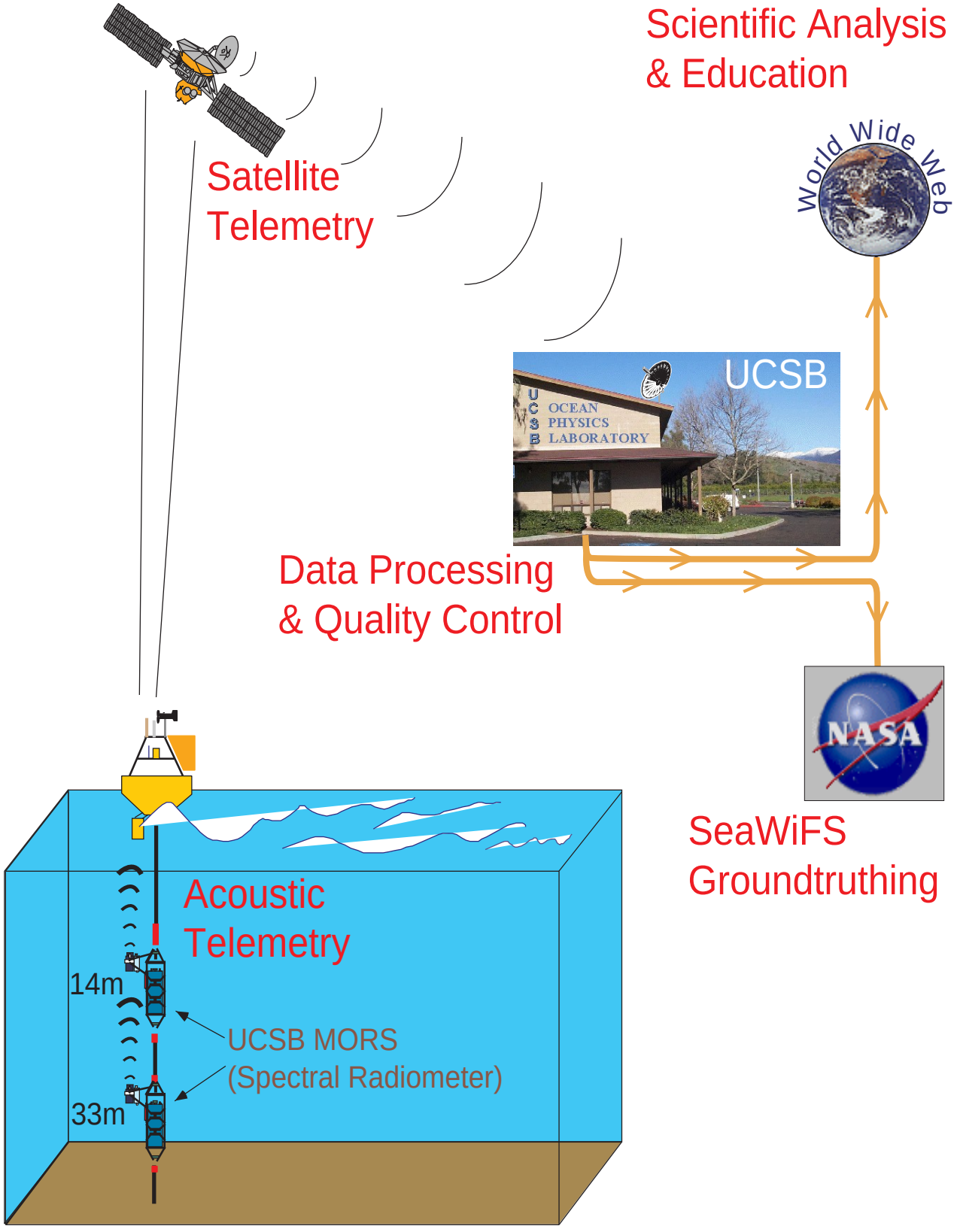
Moored Optical Radiometer System (MORS)






Scientific Analysis
& Education
World Wide Web
Satellite
Telemetry
UCSB
OCEAN
PHYSICS
LABORATORY
Data Processing
& Quality Control
NASA
SeaWiFS
Groundtruthing
Acoustic
Telemetry
14m
33m
UCSB MORS
(Spectral Radiometer)

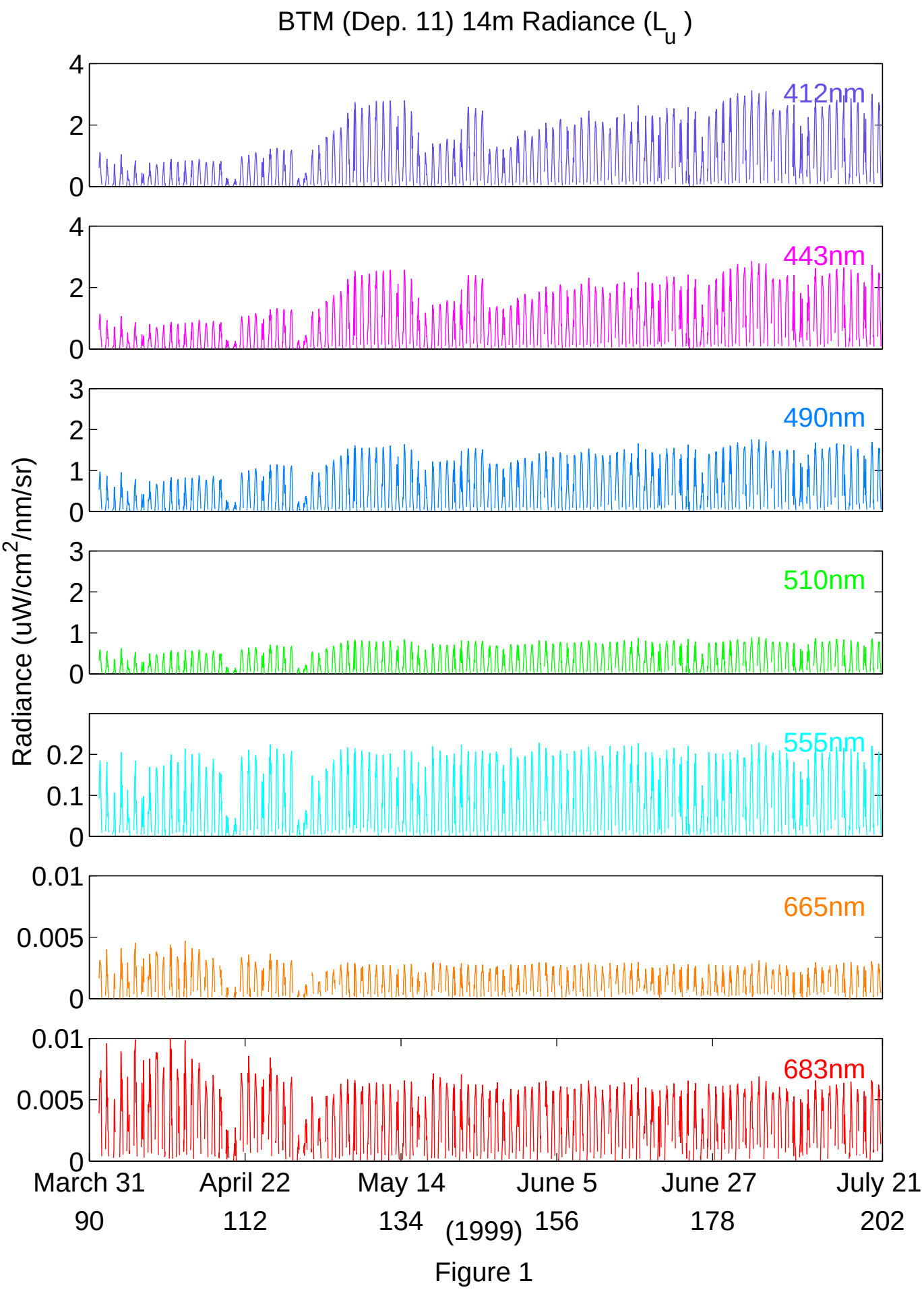
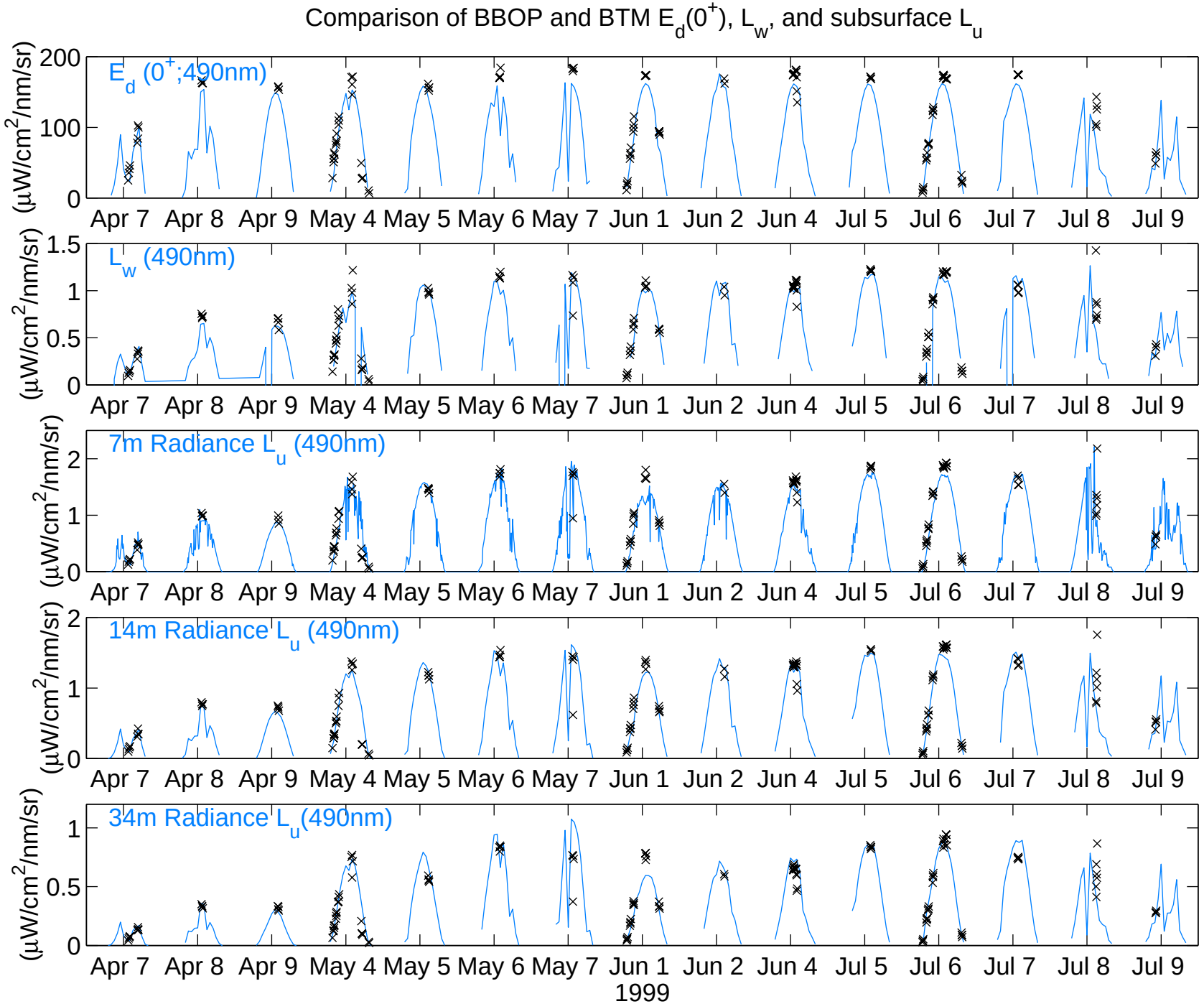
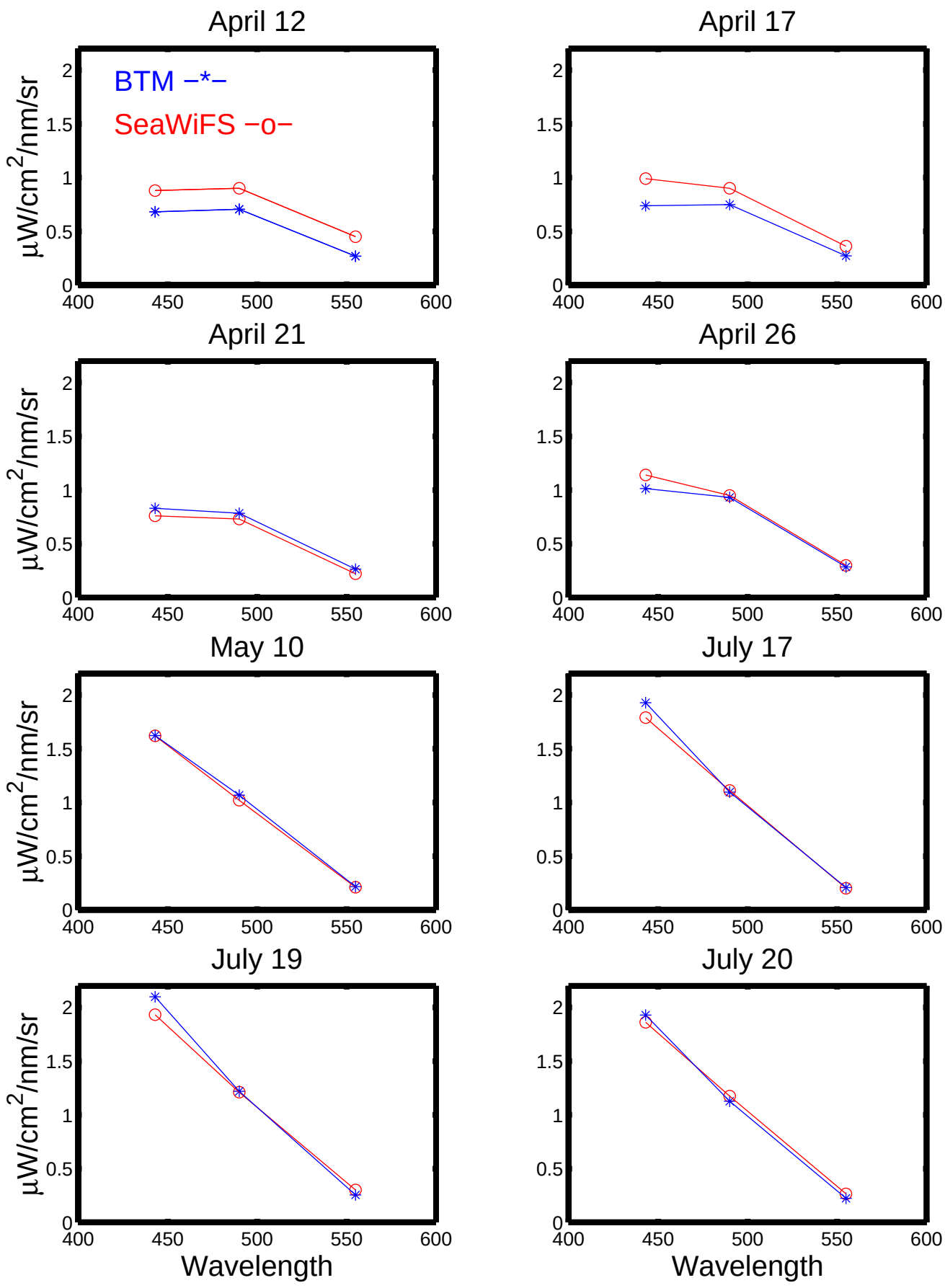
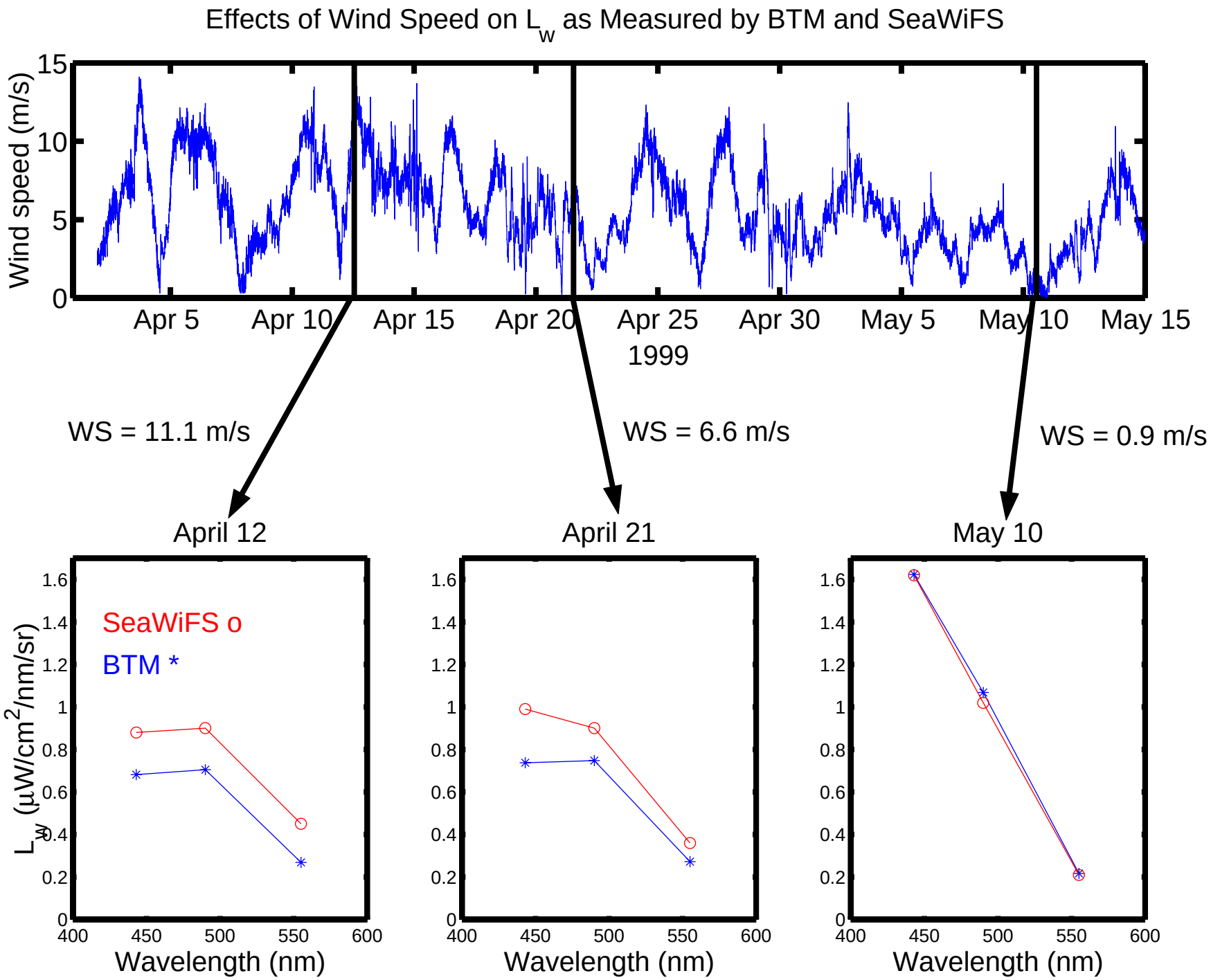

BTM (Dep. 11) 14m Radiance (L_u)
412nm
443nm
490nm
510nm
555nm
665nm
683nm
Radiance (uW/cm^2/nm/sr)
March 31
April 22
May 14
June 5
June 27
July 21
90
112
134
156
178
202
(1999)

Figure 1


Comparison of BBOP and BTM $E_d(0^+)$, L_w, and subsurface L_u
E_d (0^+;490nm)
L_w (490nm)
7m Radiance L_u (490nm)
14m Radiance L_u (490nm)
34m Radiance L_u(490nm)
(μW/cm²/nm/sr)
Apr 7 Apr 8 Apr 9 May 4 May 5 May 6 May 7 Jun 1 Jun 2 Jun 4 Jul 5 Jul 6 Jul 7 Jul 8 Jul 9
1999
Figure 2


Comparison between BTM and SeaWiFS L_w
April 12
April 17
April 21
April 26
May 10
July 17
July 19
July 20
BTM −*−
SeaWiFS −o−
µW/cm^2/nm/sr
Wavelength
0
0.5
1
1.5
2
400
450
500
550
600


Effects of Wind Speed on L_w as Measured by BTM and SeaWiFS
Wind speed (m/s)
15
10
5
0
Apr 5
Apr 10
Apr 15
Apr 20
Apr 25
Apr 30
May 5
May 10
May 15
1999
WS = 11.1 m/s
WS = 6.6 m/s
WS = 0.9 m/s
April 12
April 21
May 10
SeaWiFS o
BTM *
L_w (μW/cm^2/nm/sr)
1.6
1.4
1.2
1
0.8
0.6
0.4
0.2
0
400
450
500
550
600
Wavelength (nm)

Summary

*** BTM data and L_w values are in good agreement with ship profile measurements**

*** BTM L_w values compare favorably with SeaWiFS values**

*** Wind and sea-state are important factors causing discrepancies**

*** Moorings-of-opportunity can greatly improve matchup data base**

Future Activities

*** Evaluation of wind and sea-state, solar elevation, chl level, and undersampling effects**

*** Test and use new optical systems with moorings: BTM, OWS "P", MBARI,**
and LEO-15

*** Publication of new results**

Publications

Dickey et al., 1998, DSR, 45, 771-794.

Dickey et al., 1998, MWR, 126, 1195-1201.

Dickey, 1999, Instrumentation and New Technologies, Chapter 6, Assessment of the State of Marine Science and Its Contribution to Sustainable Development, IOC, submitted.

Dickey and Falkowski, 1999, Biological-Physical-Optical Interactions, The Sea, Ch 9.

McGillicuddy et al., 1998, Nature, 394, 263-265.

McNeil et al., 1999, JGR, 104, 15,537-15,548.

Stramska and Dickey, 1998, DSR, 45, 1393-1410.

Stramska and Frye, 1998, JGR, 102, 15,679-15,691.

Several OPL BTM and SIMBIOS Reports (see web site below)

Web site: www.opl.ucsb.edu/btm.html