Bio-optics data from R/V Atlantis II cruises AII-119-4, AII-119-5 in the North Atlantic in 1989 (U.S. JGOFS NABE project)

Website: https://www.bco-dmo.org/dataset/2584
Version: final
Version Date: 1995-06-29

Project
» U.S. JGOFS North Atlantic Bloom Experiment (NABE)

Program
» U.S. Joint Global Ocean Flux Study (U.S. JGOFS)

Contributors	Affiliation	Role
Davis, Curtiss	Naval Research Laboratory	Principal Investigator
Trees, Charles C.	San Diego State University (SDSU)	Principal Investigator
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Dataset Description

Bio Optics Data

Methods & Sampling

Curtiss Davis - Bio Optical Profiler Data, AII-119/4

Charles Trees - Bio-Optical data (60 variables at One-meter resolution), AII 119/5

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Parameters

Parameter	Description	Units
event	Event number from event log	MMDDhhmm
sta	Station number from event log	dimensionless
cast	Cast number from event log	dimensionless
year	Year, from event log	YYYY
mon	Month, from event log	MM
day	Day, from event log	DD

time	Time, local time, from event log	hhmm
lat	Latitude from event log	decimal degrees
lon	Longitude from event log	decimal degrees
pts_per_meter	number of original points per one meter bin	count
ed_410	downwelling spectral irradiance at depth	uW/cm^2/nm
ed_441	downwelling spectral irradiance at depth	uW/cm^2/nm
ed_488	downwelling spectral irradiance at depth	uW/cm^2/nm
ed_520	downwelling spectral irradiance at depth	uW/cm^2/nm
ed_550	downwelling spectral irradiance at depth	uW/cm^2/nm
ed_560	downwelling spectral irradiance at depth	uW/cm^2/nm
ed_589	downwelling spectral irradiance at depth	uW/cm^2/nm
ed_633	downwelling spectral irradiance at depth	uW/cm^2/nm
ed_656	downwelling spectral irradiance at depth	uW/cm^2/nm
ed_671	downwelling spectral irradiance at depth	uW/cm^2/nm
ed_683	downwelling spectral irradiance at depth	uW/cm^2/nm
ed_694	downwelling spectral irradiance at depth	uW/cm^2/nm
ed_710	downwelling spectral irradiance at depth	uW/cm^2/nm
depth	bin averaged sample depth	meters
tilt	instrument tilt (range -45 to 45)	degrees
roll	instrument roll (range -45 to 45)	degrees
lu_410	upwelling spectral radiance at depth	uW/cm^2/nm/str
lu_441	upwelling spectral radiance at depth	uW/cm^2/nm/str
lu_488	upwelling spectral radiance at depth	uW/cm^2/nm/str
lu_520	upwelling spectral radiance at depth	uW/cm^2/nm/str
lu_550	upwelling spectral radiance at depth	uW/cm^2/nm/str
lu_633	upwelling spectral radiance at depth	uW/cm^2/nm/str
lu_656	upwelling spectral radiance at depth	uW/cm^2/nm/str
lu_683	upwelling spectral radiance at depth	uW/cm^2/nm/str
eu_410	upwelling spectral irradiance at depth	uW/cm^2/nm
eu_441	upwelling spectral irradiance at depth	uW/cm^2/nm
eu_488	upwelling spectral irradiance at depth	uW/cm^2/nm
eu_520	upwelling spectral irradiance at depth	uW/cm^2/nm
eu_550	upwelling spectral irradiance at depth	uW/cm^2/nm
eu_589	upwelling spectral irradiance at depth	uW/cm^2/nm
eu_671	upwelling spectral irradiance at depth	uW/cm^2/nm
eu_694	upwelling spectral irradiance at depth	uW/cm^2/nm
trans	light transmission from 25 cm transmissometer	% transmission
fluor	stimulated fluoresence	floro units 0 to 100
par	Photosynthetically available radiation at depth	quanta/sec/cm^2
temp	CTD temperature	degrees C
cond	CTD conductivity	mmho/cm

sal	CTD salinity calculated from conductivity	dimensionless
sigma	calculated density	dimensionless
e_410	spectral irradiance above sea surface	uW/cm^2/nm
e_520	spectral irradiance above sea surface	uW/cm^2/nm
e_589	spectral irradiance above sea surface	uW/cm^2/nm
e_683	spectral irradiance above sea surface	uW/cm^2/nm
cast_type	either up or down profile for given cast	
E_sfc	spectral irradiance above sea surface at nominal wave length of 456nm	uW/cm^2nm^-1*10^-3
Kd_411	diffuse attenuation coefficient for Ed_411	m^-1*10^-4
Ed_411	downwelled irradiance at wave length of 411	uW/cm^2nm^-1*10^-4
Kd_440	diffuse attenuation coefficient for Ed_440	m^-1*10^-4
Ed_440	downwelled irradiance at wave length of 440	uW/cm^2nm^-1*10^-4
Kd_486	diffuse attenuation coefficient for Ed_486	m^-1*10^-4
Ed_486	downwelled irradiance at wave length of 486	uW/cm^2nm^-1*10^-4
Kd_519	diffuse attenuation coefficient for Ed_519	m^-1*10^-4
Ed_519	downwelled irradiance at wave length of 519	uW/cm^2nm^-1*10^-4
Kd_530	diffuse attenuation coefficient for Ed_530	m^-1*10^-4
Ed_530	downwelled irradiance at wave length of 530	uW/cm^2nm^-1*10^-4
Kd_548	diffuse attenuation coefficient for Ed_548	m^-1*10^-4
Ed_548	downwelled irradiance at wave length of 548	uW/cm^2nm^-1*10^-4
Kd_588	diffuse attenuation coefficient for Ed_588	m^-1*10^-4
Ed_588	downwelled irradiance at wave length of 588	uW/cm^2nm^-1*10^-4
Kd_631	diffuse attenuation coefficient for Ed_631	m^-1*10^-4
Ed_631	downwelled irradiance at wave length of 631	uW/cm^2nm^-1*10^-4
Kd_654	diffuse attenuation coefficient for Ed_654	m^-1*10^-4
Ed_654	downwelled irradiance at wave length of 654	uW/cm^2nm^-1*10^-4
Kd_669	diffuse attenuation coefficient for Ed_669	m^-1*10^-4
Ed_669	downwelled irradiance at wave length of 669	uW/cm^2nm^-1*10^-4
Kd_695	diffuse attenuation coefficient for Ed_695	m^-1*10^-4
Ed_695	downwelled irradiance at wave length of 695	uW/cm^2nm^-1*10^-4
K_par	diffuse attenuation coefficient for E_par	m^-1*10^-4
E_par	underwater photosynthetically available radiation	uE/m^2/sec*10^-4
Ku_410	diffuse attenuation coefficient for Eu_410	m^-1*10^-4
Ku_440	diffuse attenuation coefficient for Eu_440	m^-1*10^-4
Eu_440	upwelled irradiance at wave length of 440	uW/cm^2nm^-1*10^-4
Ku_487	diffuse attenuation coefficient for Eu_487	m^-1*10^-4
Eu_487	upwelled irradiance at wave length of 487	uW/cm^2nm^-1*10^-4
Ku_520	diffuse attenuation coefficient for Eu_520	m^-1*10^-4
Ku_549	diffuse attenuation coefficient for Eu_549	m^-1*10^-4
Eu_549	upwelled irradiance at wave length of 549	uW/cm^2nm^-1*10^-4

Ku_588	diffuse attenuation coefficient for Eu_588	m^-1*10^-4
Eu_588	upwelled irradiance at wave length of 588	uW/cm^2nm^-1*10^-4
Ku_631	diffuse attenuation coefficient for Eu_631	m^-1*10^-4
Eu_631	upwelled irradiance at wave length of 631	uW/cm^2nm^-1*10^-4
Ku_670	diffuse attenuation coefficient for Eu_670	m^-1*10^-4
Eu_670	upwelled irradiance at wave length of 670	uW/cm^2nm^-1*10^-4
Kl_412	diffuse attenuation coefficient for Lu_412	m^-1*10^-4
Lu_412	upwelled radiance at wave length of 412	uW/cm^2nm^-1sr^-1*10^-5
Kl_441	diffuse attenuation coefficient for Lu_441	m^-1*10^-4
Kl_488	diffuse attenuation coefficient for Lu_488	m^-1*10^-4
Kl_521	diffuse attenuation coefficient for Lu_521	m^-1*10^-4
Lu_521	upwelled radiance at wave length of 521	uW/cm^2nm^-1sr^-1*10^-5
Kl_550	diffuse attenuation coefficient for Lu_550	m^-1*10^-4
Kl_589	diffuse attenuation coefficient for Lu_589	m^-1*10^-4
Lu_589	upwelled radiance at wave length of 589	uW/cm^2nm^-1sr^-1*10^-5
Kl_710	diffuse attenuation coefficient for Lu_710	m^-1*10^-4
Lu_710	upwelled radiance at wave length of 710	uW/cm^2nm^-1sr^-1*10^-5
Kl_685	diffuse attenuation coefficient for Lu_685	m^-1*10^-4
Lu_685	upwelled radiance at wave length of 685	uW/cm^2nm^-1sr^-1*10^-5
beam	beam attenuation coefficient	millivolts

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Instruments

Dataset-specific Instrument Name	Bio-Optical Profiling System
Generic Instrument Name	Bio-Optical Profiling System
Dataset-specific Description	Optical data was collected with a Bio-Optical Profiling System (BOPS) an updated version of the BOPS originally developed by Smith et al. (1984). The heart of the BOPS is a Biospherical instruments MER-1048 Spectroradiometer which measures up and downwelling spectral irradiance and upwelling spectral radiance. The MER-1048 also has sensors for Photosynthetically Available Radiation (PAR), depth, tilt and roll. In addition, temperature and conductivity are measured with a Sea-Bird CTD, chlorophyll fluorescence is measured with a Sea Tech fluorometer and bean transmission with a Sea Tech 25-cm transmissometer. The Mer-1048 acquires all the data 16 times a second, averages it to four records a second and sends it up the cable to a deck box and a Compaq-286 computer which stores the data on the hard disk. Additionally, a deck cell measures the downwelling surface irradiance in four spectral channels. Also surface PAR was measured continuously using a Biospherical Instruments QSR-240 Integrating PAR sensor. The profile data was filtered to remove obvious data spikes and then binned into one-meter averages.
Generic Instrument Description	Bio-Optical Profiling System (BOPS) is an updated version of the BOPS originally developed by Smith et al. (1984) and is used to collect optical data. The heart of the BOPS is a Biospherical instruments MER-1048 Spectroradiometer which measures up and downwelling spectral irradiance and upwelling spectral radiance. The MER-1048 also has sensors for Photosynthetically Available Radiation (PAR), depth, tilt and roll. In addition, temperature and conductivity are measured with a Sea-Bird CTD, chlorophyll fluorescence is measured with a Sea Tech fluorometer and beam transmission with a Sea Tech 25-cm transmissometer. The Mer-1048 acquires all the data 16 times a second, averages it to four records a second and sends it up the cable to a deck box and a Compaq-286 computer which stores the data on the hard disk. Additionally, a deck cell measures the downwelling surface irradiance in four spectral channels. Also surface PAR is measured continuously using a Biospherical Instruments QSR-240 Integrating PAR sensor. The profile data is commonly filtered to remove obvious data spikes and then binned into one-meter averages. Raymond C. Smith, Charles R. Booth, and Jeffrey L. Star, "Oceanographic biooptical profiling system," Appl. Opt. 23, 2791-2797 (1984).

Dataset-specific Instrument Name	QSR-240
Generic Instrument Name	Biospherical QSR-240 surface PAR
Dataset-specific Description	Also surface PAR was measured continuously using a Biospherical Instruments QSR-240 Integrating PAR sensor.
Generic Instrument Description	Shipboard radiometer with a PAR spectral response (400-700nm) designed to monitor surface irradiance during underwater light profile measurement. Hemispherical collector measuring 2-pi scalar irradiance.

Dataset-specific Instrument Name	SeabirdCTD
Generic Instrument Name	CTD Sea-Bird
Dataset-specific Description	A Sea-Bird CTD was used to measure temperature and conductivity.
Generic Instrument Description	Conductivity, Temperature, Depth (CTD) sensor package from SeaBird Electronics, no specific unit identified. This instrument designation is used when specific make and model are not known. See also other SeaBird instruments listed under CTD. More information from Sea-Bird Electronics.

Dataset-specific Instrument Name	SeaTech Fluorometer
Generic Instrument Name	Sea Tech Fluorometer
Dataset-specific Description	A Sea Tech fluorometer used to measure chlorophyll fluorescence.
Generic Instrument Description	The Sea Tech chlorophyll-a fluorometer has internally selectable settings to adjust for different ranges of chlorophyll concentration, and is designed to measure chlorophyll-a fluorescence in situ. The instrument is stable with time and temperature and uses specially selected optical filters enabling accurate measurements of chlorophyll a. It can be deployed in moored or profiling mode. This instrument designation is used when specific make and model are not known. The Sea Tech Fluorometer was manufactured by Sea Tech, Inc. (Corvalis, OR, USA).

Dataset-specific Instrument Name	SeaTech Transmissometer
Generic Instrument Name	Sea Tech Transmissometer
Dataset-specific Description	A Sea Tech 25-cm transmissometer was used to measure bean transmission with.
Generic Instrument Description	The Sea Tech Transmissometer can be deployed in either moored or profiling mode to estimate the concentration of suspended or particulate matter in seawater. The transmissometer measures the beam attenuation coefficient in the red spectral band (660 nm) of the laser lightsource over the instrument's path-length (e.g. 20 or 25 cm). This instrument designation is used when specific make and model are not known. The Sea Tech Transmissometer was manufactured by Sea Tech, Inc. (Corvalis, OR, USA).

Dataset-specific Instrument Name	Spectroradiometer
Generic Instrument Name	Spectroradiometer
Dataset-specific Description	A Biospherical instruments MER-1048 Spectroradiometer measures up and downwelling spectral irradiance and upwelling spectral radiance. The MER-1048 also has sensors for Photosynthetically Available Radiation (PAR), depth, tilt and roll.
Generic Instrument Description	A Spectroradiometer or Spectraradiometer is an instrument that measures the intensity and nature of electromagnetic radiation. An ocean color radiometer makes the measurements in a manner optimized for the determination of ocean chlorophyll concentration.

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Deployments

AII-119-4

Website	https://www.bco-dmo.org/deployment/57737
Platform	R/V Atlantis II
Start Date	1989-04-17
End Date	1989-05-11
Description	early bloom cruise; 17 locations; 60N 21W to 46N 18W **Methods & Sampling** PI: Curtiss Davis of: Jet Propusion Laboratory dataset: Bio Optical Profiler Data dates: April 25, 1989 to May 08, 1989 location: N: 47.0112 S: 46.2827 W: -20.1635 E: -19.0353 project/cruise North Atlantic Bloom Experiment/Atlantis II 119, leg 4 ship: R/V Atlantis II JGOFS North Atlantic Bloom Experiment Bio-Optical profiling observations R/V Atlantis II, 25 April - 10 May 1989November 07, 2002 Data Description: Optical data was collected with a Bio-Optical Profiling System (BOPS) an updated version of the BOPS originally developed by Smith et al. (1984). The heart of the BOPS is a Biospherical instruments MER-1048 Spectroradiometer which measures up and downwelling spectral irradiance and upwelling spectral radiance. The MER-1048 also has sensors for Photosynthetically Available Radiation (PAR), depth, tilt and roll. In addition, temperature and conductivity are measured with a Sea-Bird CTD, chlorophyll fluorescence is measured with a Sea Tech fluorometer and bean transmission with a Sea Tech 25-cm transmissometer. The Mer-1048 acquires all the data 16 times a second, averages it to four records a second and sends it up the cable to a deck box and a Compaq-286 computer which stores the data on the hard disk. Additionally, a deck cell measures the downwelling surface irradiance in four spectral channels. Also surface PAR was measured continuously using a Biospherical Instruments QSR-240 Integrating PAR sensor. The profile data was filtered to remove obvious data spikes and then binned into one-meter averages. Reference: Smith, R.C., C.R. Booth, and J.L. Star, Oceanographic bio-optical profiling system. Applied Optics, 23, 2791-2797, 1984

AII-119-5

Website	https://www.bco-dmo.org/deployment/57738
Platform	R/V Atlantis II
Start Date	1989-05-15
End Date	1989-06-06
Description	late bloom cruise; 31 locations; 61N 22W to 41N 17W **Methods & Sampling** PI: Charles Trees of: San Diego State University dataset: Bio-Optical data (60 variables at One-meter resolution) dates: May 18, 1989 to June 06, 1989 location: N: 59.535 S: 46.27 W: -20.785 E: -17.6933 project/cruise: North Atlantic Bloom Experiment/Atlantis II 119, leg 5 ship: Atlantis II references: Mueller, J.L. 1991. Integral method for irradiance profile analysis. Center for Hydro-Optics and Remote Sensing Memo. 007-91. San Diego State University, San Diego, CA, 10 pp. Mueller, J.L. & R.W. Austin. 1995. Ocean Optics Protocols for SeaWiFS Validation, Rev. I. NASA Tech Memo 104566, Volume 25, Chapter 6; Analytical Methods, p. 49-52.

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Project Information

U.S. JGOFS North Atlantic Bloom Experiment (NABE)

Website: http://usjgofs.whoi.edu/research/nabe.html

Coverage: North Atlantic

One of the first major activities of JGOFS was a multinational pilot project, North Atlantic Bloom Experiment (NABE), carried out along longitude 20° West in 1989 through 1991. The United States participated in 1989 only, with the April deployment of two sediment trap arrays at 48° and 34° North. Three process-oriented cruises where conducted, April through July 1989, from R/V *Atlantis II* and R/V *Endeavor* focusing on sites at 46° and 59° North. Coordination of the NABE process-study cruises was supported by NSF-OCE award # 8814229. Ancillary sea surface mapping and AXBT profiling data were collected from NASA's P3 aircraft for a series of one day flights, April through June 1989.

A detailed description of NABE and the initial synthesis of the complete program data collection efforts appear in: Topical Studies in Oceanography, JGOFS: The North Atlantic Bloom Experiment (1993), Deep-Sea Research II, Volume 40 No. 1/2.

The U.S. JGOFS Data management office compiled a preliminary NABE data report of U.S. activities: Slagle, R. and G. Heimerdinger, 1991. U.S. Joint Global Ocean Flux Study, North Atlantic Bloom Experiment, Process Study Data Report P-1, April-July 1989. NODC/U.S. JGOFS Data Management Office, Woods Hole Oceanographic Institution, 315 pp. (out of print).

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Program Information

U.S. Joint Global Ocean Flux Study (U.S. JGOFS)

Website: http://usjgofs.whoi.edu/

Coverage: Global

The United States Joint Global Ocean Flux Study was a national component of international JGOFS and an integral part of global climate change research.

The U.S. launched the Joint Global Ocean Flux Study (JGOFS) in the late 1980s to study the ocean carbon cycle. An ambitious goal was set to understand the controls on the concentrations and fluxes of carbon and associated nutrients in the ocean. A new field of ocean biogeochemistry emerged with an emphasis on quality measurements of carbon system parameters and interdisciplinary field studies of the biological, chemical and physical process which control the ocean carbon cycle. As we studied ocean biogeochemistry, we learned that our simple views of carbon uptake and transport were severely limited, and a new "wave" of ocean science was born. U.S. JGOFS has been supported primarily by the U.S. National Science Foundation in collaboration with the National Oceanic and Atmospheric Administration, the National Aeronautics and Space Administration, the Department of Energy and the Office of Naval Research. U.S. JGOFS, ended in 2005 with the conclusion of the Synthesis and Modeling Project (SMP).

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Funding

Funding Source	Award
National Science Foundation (NSF)	unknown NABE NSF

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