

Discrete phytoplankton, HPLC, flow cytometry, and nutrient data from GLOBEC NEP mesoscale cruises in the Northeast Pacific from 2000-2002 (NEP project)

Website: <https://www.bco-dmo.org/dataset/3097>

Version: 2010-07-23

Project

» [U.S. GLOBEC Northeast Pacific](#) (NEP)

Program

» [U.S. GLOBal ocean Ecosystems dynamics](#) (U.S. GLOBEC)

Contributors	Affiliation	Role
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Dataset Description

Phytoplankton, HPLC, flow cytometry, and nutrient data were collected by SLOWDROP optical profilers, underway, and CTD's. SLOWDROP optical profilers provided high resolution vertical profiles of temperature, salinity, and density along with bio-optical properties. The underway component focused on the assessment of the spatial and temporal variability in phytoplankton biomass and physiology. Discrete samples for chlorophyll fluorometric determinations, pigment analysis, partial absorption, and nutrients were collected by CTD cast.

Methods & Sampling

SLOWDROP optical profiling:

"We deployed a free-fall profiling system to provide high resolution vertical profiles of temperature, salinity, density (using Sea-Bird 911 CTD), along with bio-optical properties based on multi-wavelength absorption and attenuation (Wetlabs ac-9) as well as multi-wavelength fluorescence. These profiles were conducted as the optical drifters were recovered in order to provide water column assessments of the optical properties detected by the surface drifters. The optical instruments on the SLOWDROP profiler also provide calibration for the ac-9 and fluorometers used on the SeaSoar.

Underway optical properties:

The assessment of the spatial and temporal variability in phytoplankton biomass and physiology was achieved principally by gathering a continuous record of phytoplankton in vivo fluorescence, variable fluorescence, and water absorption and attenuation, using a 10-AU Turner Designs fluorometer, a Chelsea fast Repetition Rate fluorometer, and a Wetlabs ac-9 in a flow-through mode during SeaSoar survey periods.

CTDs:

In addition to the continuous records, discrete samples for chlorophyll fluorometric determinations, pigment analysis, particle absorption, and nutrients were collected every hour during the SeaSoar mesoscale survey (approximately every 10 nm) and every half hour during fine scale surveys. Samples for phytoplankton specific

determination were collected at selected locations and preserved with formaldehyde."

(from W0005 cruise report. Other specific cruise-related acquisition information can be found with cruises W0008, T0205 and R0208)

Data Processing Description

For all parameters, 'nd' used for 'no data'.

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Data Files

File
phytoplankton.csv (Comma Separated Values (.csv), 551.76 KB) MD5:d04af1e3e5a7e199511537fc820a05a2 Primary data file for dataset ID 3097

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Parameters

Parameter	Description	Units
dataset	which cruise; which instrument	nd
year	Year	YYYY
yrday_utc	day of year; universal coordinated time; Jan. 1 = 1;	unitless
year_utc	Year (UTC)	YYYY
month_utc	Month (UTC)	mm
day_utc	Day (UTC)	dd
time_utc	time of day; universal coordinated time; 24-hour time	HHMM
lat	latitude; North is Positive; South is negative	decimal degrees
lon	longitude; East is Positive; West is negative	decimal degrees
platform	sample source	unitless
cast	Cast number	unitless
bottle	Bottle number	unitless
depth	depth the sample was taken	meters
temp	temperature	degrees C
sal	salinity	psu
flvolt	fluorescence	volts
chl_samp_no	Chlorophyll-a sample number	unitless
chl_a	Chlorophyll-a concentration from Turner AU fluorometer	micrograms/liter
phaeo	phaeopigment concentration from Turner AU fluorometer	micrograms/liter
nut_samp_no	nutrient sample number	unitless
PO4	Phosphate concentration	micromoles/liter
NO3_NO2	Nitrate plus nitrite concentration (aka 'nitrates')	micromoles/liter

SiOH_4	silicate concentration	micromoles/liter
NO2	Nitrite concentration	micromoles/liter
NH4	Ammonia concentration	micromoles/liter
NO3	nitrate concentration	micromoles/liter
HPLC_samp_no	High Performance Liquid Chromatography sample number	unitless
chl_c3	Chlorophyll-c3 concentration	micrograms/liter
cpyllda	Chlorophyllide-a concentration	micrograms/liter
chl_c1_c2	chlorophyll-c1 and -c2 concentration	micrograms/liter
fucox_but	19'-but-fucoxanthin concentration	micrograms/liter
fuco	fucoxanthin concentration	micrograms/liter
fucox_hex	19'hexanoyloxyfucoxanthin concentration	micrograms/liter
vxnthin	violaxanthin concentration	micrograms/liter
diadinox	diadinoxanthin concentration	micrograms/liter
alloxan	alloxanthin concentration	micrograms/liter
monadoxanth	monadoxanthin concentration	micrograms/liter
diatoxanth	diatoxanthin concentration	micrograms/liter
lutein	lutein concentration	micrograms/liter
zxnthin	zeaxanthin concentration	micrograms/liter
chl_b	Chlorophyll-b concentration	micrograms/liter
chla_1k_hplc	Chlorophyll-a like concentration from HPLC	micrograms/liter
chl_a_hplc	Chlorophyll-a concentration from HPLC	micrograms/liter
phaeo_hplc	phaeophytin concentration from HPLC	micrograms/liter
carot1	Carotene 1 concentration	micrograms/liter
carot2	Carotene 2 concentration	micrograms/liter
abs_samp_no	particulate absorption spectra sample number	unitless
aph	absorption coefficient due to phytoplankton at 676 nm	m ⁻¹
phyto_samp_no	Phytoplankton sample number	unitless
flowcyt_no	flow cytometer sample number	unitless
synecho	synechococcus	cells/ml
EukPhy	eukaryotic phytoplankton	cells/ml
diatoms	diatoms	cells/ml
OBact	only bacteria - not Synechococcus	cells/ml
VHDNA	very high DNA	cells/ml
LowDNA	low DNA	cells/ml
OHiDNA	only high DNA	cells/ml
flags	comment flags: 0=no comment available; 9=comments available	unitless
comments	flag description	unitless
cruise	cruise identifier	unitless

Instruments

Dataset-specific Instrument Name	AC 9
Generic Instrument Name	AC 9
Dataset-specific Description	The WetLabs ac-9 instrument was part of the flow-through system for gathering a continuous record of phytoplankton in vivo fluorescence, variable fluorescences and water absorption and attenuation. (from cruise W0005 cruise report)
Generic Instrument Description	"The WET Labs AC-9 is a type of in-situ spectrophotometer that simultaneously determines the spectral transmittance and spectral absorption of water over nine wavelengths. The unit offers compact size, high precision, and excellent stability in providing a method for determining the absorption (a(l)) and beam attenuation (c(l)) coefficients. The AC-9 employs a 25-cm pathlength for effective measurement of the cleanest natural waters. The unit is also available in a 10-cm pathlength configuration." (more from WET Labs)

Dataset-specific Instrument Name	CTD Sea-Bird 911
Generic Instrument Name	CTD Sea-Bird 911
Dataset-specific Description	There was a CTD 911 deployed on the SLOWDROP as well as a CTD provided by the ship and used for CTD surveys.
Generic Instrument Description	The Sea-Bird SBE 911 is a type of CTD instrument package. The SBE 911 includes the SBE 9 Underwater Unit and the SBE 11 Deck Unit (for real-time readout using conductive wire) for deployment from a vessel. The combination of the SBE 9 and SBE 11 is called a SBE 911. The SBE 9 uses Sea-Bird's standard modular temperature and conductivity sensors (SBE 3 and SBE 4). The SBE 9 CTD can be configured with auxiliary sensors to measure other parameters including dissolved oxygen, pH, turbidity, fluorescence, light (PAR), light transmission, etc.). More information from Sea-Bird Electronics.

Dataset-specific Instrument Name	Fast Repetition Rate Fluorometer
Generic Instrument Name	Fast Repetition Rate Fluorometer
Dataset-specific Description	For these data, the FRRf was part of the flow-through system and used during SeaSoar surveys.
Generic Instrument Description	An FRRf is used for measuring the fluorescence of a sample of phytoplankton photosynthetic competency (Fv/Fm).

Dataset-specific Instrument Name	SLOWDROP Optical Profiler
Generic Instrument Name	SLOWDROP Optical Profiler
Dataset-specific Description	This free-falling profiling system provided high resolution vertical profiles of temperature, salinity, density (using associated CTD), along with biooptical properties. In addition, the optical instruments on the SLOWDROP profiler also provided calibration for the ac-9 and fluorometers used on the SeaSoar.
Generic Instrument Description	The SLOWDROP Optical Profiler is a free-falling instrument package that "has a Sea-Bird 911+ CTD, two multiwavelength absorption meters (WetLabs ac-9), and a multiexcitation spectrofluorometer (WetLabs SAFIRE) as its basic configuration. The package is deployed on a loose data tether, with sufficient buoyancy on the package to obtain descent rates of 15-20 cm/s. These slow descent rates allow data acquisition on centimeter spatial scales and result in multiparameter characterization of small-scale features." (Cowles, et al., 1998) References: Cowles, T.J., et al., 1998. Small-scale Planktonic Structure: Persistence and Trophic Consequences. Oceanography, Vol. 11(1), pp. 4-9.

Dataset-specific Instrument Name	Turner Designs Fluorometer -10-AU
Generic Instrument Name	Turner Designs Fluorometer 10-AU
Dataset-specific Description	This instrument was part of the flow-through system measuring in vivo fluorescence, variable fluorescence, and water absorption and attenuation during SeaSoar survey periods. (From W0005 Cruise report.)
Generic Instrument Description	The Turner Designs 10-AU Field Fluorometer is used to measure Chlorophyll fluorescence. The 10AU Fluorometer can be set up for continuous-flow monitoring or discrete sample analyses. A variety of compounds can be measured using application-specific optical filters available from the manufacturer. (read more from Turner Designs, turnerdesigns.com, Sunnyvale, CA, USA)

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Deployments

W0005A

Website	https://www.bco-dmo.org/deployment/57598
Platform	R/V Wecoma
Report	http://globec.who.edu/nep/reports/ccs_cruises/w0005a/w0005acr.pdf
Start Date	2000-05-29
End Date	2000-06-17

W0008

Website	https://www.bco-dmo.org/deployment/57600
Platform	R/V Wecoma
Report	http://globec.whoi.edu/nep/reports/ccs_cruises/w0008acr.pdf
Start Date	2000-07-29
End Date	2000-08-17
Description	<p>Methods & Sampling SLOWDROP optical profiling: We deployed a free-fall profiling system to provide high resolution vertical profiles of temperature, salinity, and density (using Seabird 911+ CTD), along with bio-optical properties based on multi-wavelength absorption and attenuation (WET Labs ac-9), as well as multi-wavelength fluorescence. These profiles were conducted near the optical drifters in order to provide water column assessments of the optical properties detected by the surface drifters. The optical instruments on the SLOWDROP profiler also provide calibration for the ac-9 and fluorometers used on the SeaSoar. Underway optical properties This program component focused on the assessment of the spatial and temporal variability in phytoplankton biomass and physiology. This goal was achieved principally by gathering a continuous record of phytoplankton in vivo fluorescence, variable fluorescence, and water absorption and attenuation, using a 10-AU Turner Designs fluorometer, a Chelsea fast Repetition Rate fluorometer, and a WET Labs ac-9 in a flow-through mode during SeaSoar survey periods. CTD: In addition to the continuous records, discrete samples for chlorophyll fluorometric determinations, pigment analysis, particle absorption, and nutrients were collected every 2 hours during the SeaSoar mesoscale survey (approximately every 15 nm), except when over the shelf, when samples were collected every half hour. Samples for phytoplankton specific determination were collected at selected locations and preserved with formaldehyde.</p>

T0205

Website	https://www.bco-dmo.org/deployment/57595
Platform	R/V Thomas G. Thompson
Report	http://globec.whoi.edu/nep/reports/ccs_cruises/t0205cr.pdf
Start Date	2002-06-01
End Date	2002-06-17
Description	<p>Methods & Sampling CTD/Rosette: "CTD/rosette casts were made at specific stations along the survey lines when the SeaSoar system was out of the water. The CTD had dual T/C sensors, fluorometer, transmissometer, and oxygen sensor in addition to the rosette. Water samples were collected from the 10-l Niskin bottles for primary productivity, nutrients, salinity calibration and for chlorophyll extractions. Flow-through systems using near-surface seawater: We integrated T, S and chlorophyll fluorescence from the ship's flow-through system with GPS and bottom depth from the echosounder. We installed two ac-9s, a Fast Repetition Rate Fluorometer (FRRF), chlorophyll fluorometers and CDOM fluorometers into the underway flowthrough seawater system in the main lab. A vortex debubbler was connected in the seawater line. We used discrete samples from this system for analysis of particle size, nutrient concentration, and primary productivity." (from T0205 cruise report)</p>

R0208

Website	https://www.bco-dmo.org/deployment/57574
Platform	R/V Roger Revelle
Report	http://globec.whoi.edu/nep/reports/ccs_cruises/r0208cr.pdf
Start Date	2002-07-31
End Date	2002-08-19

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Project Information

U.S. GLOBEC Northeast Pacific (NEP)

Website: <http://nepglobec.bco-dmo.org>

Coverage: Northeast Pacific Ocean, Gulf of Alaska

Program in a Nutshell

Goal: To understand the effects of climate variability and climate change on the distribution, abundance and production of marine animals (including commercially important living marine resources) in the eastern North Pacific. To embody this understanding in diagnostic and prognostic ecosystem models, capable of capturing the ecosystem response to major climatic fluctuations.

Approach: To study the effects of past and present climate variability on the population ecology and population dynamics of marine biota and living marine resources, and to use this information as a proxy for how the ecosystems of the eastern North Pacific may respond to future global climate change. The strong temporal variability in the physical and biological signals of the NEP will be used to examine the biophysical mechanisms through which zooplankton and salmon populations respond to physical forcing and biological interactions in the coastal regions of the two gyres. Annual and interannual variability will be studied directly through **long-term observations** and detailed **process studies**; variability at longer time scales will be examined through **retrospective analysis** of directly measured and proxy data. Coupled **biophysical models** of the ecosystems of these regions will be developed and tested using the process studies and data collected from the long-term observation programs, then further tested and improved by hindcasting selected retrospective data series.

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Program Information

U.S. GLOBAL ocean ECosystems dynamics (U.S. GLOBEC)

Website: <http://www.usglobec.org/>

Coverage: Global

U.S. GLOBEC (GLOBAL ocean ECosystems dynamics) is a research program organized by oceanographers and fisheries scientists to address the question of how global climate change may affect the abundance and production of animals in the sea.

The U.S. GLOBEC Program currently had major research efforts underway in the Georges Bank / Northwest Atlantic Region, and the Northeast Pacific (with components in the California Current and in the Coastal Gulf of Alaska). U.S. GLOBEC was a major contributor to International GLOBEC efforts in the Southern Ocean and Western Antarctic Peninsula (WAP).

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