

Broadscale physical and nutrient kriged data, five year summary from R/V Endeavor, R/V Albatross IV, R/V Oceanus in the Gulf of Maine and Georges Bank, WHOI from 1995-2004 (GB project)

Website: <https://www.bco-dmo.org/dataset/2297>

Version: 1

Version Date: 2010-03-12

Project

» [U.S. GLOBEC Georges Bank](#) (GB)

Program

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

Contributors	Affiliation	Role
Mountain, David	National Oceanic and Atmospheric Administration (NOAA)	Principal Investigator
Townsend, David W.	University of Miami	Principal Investigator
Copley, Nancy	Woods Hole Oceanographic Institution (WHOI)	Technician, BCO-DMO Data Manager
Taylor, Maureen	National Oceanic and Atmospheric Administration (NOAA)	Technician

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Coverage

Spatial Extent: N:42.5 E:-65.5 S:40 W:-70.5

Temporal Extent: 1995 - 2004

Dataset Description

Modeling study performed at WHOI using Broad-scale cruise data. Thumbnail images of the broad-scale data, processed using kriging techniques, are displayed here. Clicking on the thumbnail image will open a new browser window displaying the original, large image. Matlab data files are also accessible on these pages by clicking on the appropriate link. Matlab data files are of kriged values for Georges Bank with 2385 grid points. Note that on some browsers it will be necessary to hold down the "shift key" before clicking on the link in order to download the data to a file. Otherwise the data are loaded into your browser. Unless your browser knows what to do with Matlab binary data, it is best to download the whole file.

Thumbnail images were created from the original Matlab generated images using the mogrify utility in a single batch operation prior to serving. The thumbnail image page, however, is created each time it is viewed so that the most recent images are incorporated in the served data.

These maps were created using EasyKrig 3.0 (D. Chu, WHOI, 2004, http://globec.whoi.edu/software/kriging/easy_krig/easy_krig.html) by Nancy Copley, WHOI. All data were treated anisotropically, i.e., the variable of interest changes more rapidly in one direction than in another, essentially stretching the effect. In this case the x:y ratio was 2:1 and the rotation was 45 degrees for alignment with the Bank. These parameters were chosen based upon known circulation and geography of Georges Bank. When plotting the station locations as circles on the maps, only those stations containing data are shown. Some datasets are quite sparse, e.g. ammonia at 50-100m.

Nutrients: nitrates & nitrites (NO₃/NO₂), ammonia (NH₄), silica (SiOH₄), phosphates (PO₄) (Townsend et al, U. Maine):

Data are available for 1997-1999, for January through June except:

1997: no January or June data

1998: no January data

The same colorbar range was used for the nutrient maps (nitrates/nitrites, ammonia, phosphates, silicates) as D. Townsend used in his plots, located on the GLOBEC website at: http://globec.whoi.edu/jg/info/globec/gb/nut_phyto%7Bdir=globec.whoi.edu/jg/dir/globec/gb/data=grampus.umeoce.maine.edu/jg/serv/globec/nut_phyto.html0%7D?

Chlorophyll-a values for 1995-1996 (February through July 1995 and January through June 1996) are from the ctd_hydrography; the 1997-1999 data are from D. Townsend's nutrient data. The color range is given as both 0-6 and 0-10 in order to make both large and small scale variations more clearly visible.

Nutrient and chl-a data were averaged from 3 depth strata: 0-15m, 15-50m, and 50-100m. There were usually one or two bottle samples in each range.

Biovolume data from bongo net displacement volumes is from D. Mountain, Jack Green and Joe Kane,

NMFS:<http://globec.whoi.edu/jg/serv/globec/gb/broadscale/bongovols.html0%7Bdir=globec.whoi.edu/jg/dir/globec/gb/broadscale/info=globec.whoi.edu/jg/info/globec/gb/broadscale/bon>

Temperature, fluorometry, salinity and density stratification values were kriged from data provided by D. Mountain at <http://globec.whoi.edu/jg/dir/globec/gb/broadscale/> under ctd_hydrography.

The density stratification was calculated by first finding the density of each station and depth for which there was a temperature and salinity using a Matlab mfile function called [sw_dens.m](#). Then the mean density was calculated for the depth strata 0-15 meters and for 50-100 m. If the maximum depth of a station was less than 50 m, the mean of 25-50m was used as the deep value. The difference is the stratification index.

Methods & Sampling

See cruise reports for information on original data used to create the kriged maps.

NOTE: There appears to be a decrease in the sensitivity of the fluorometer beginning in June 1997 (It may have begun earlier but the data is too variable to tell).

It appeared to remain about the same until January of 1999 where it declined again and became only about 1/3 - 1/4 the sensitivity of what it was in 95 and 96.

There does not appear to be a further change during 1999 although again it is hard to tell. (E.D.,8/05)

Data Processing Description

VARIABLE STRUCTURE

There are two structures: "para" and "data", where structure "para" contains all parameters including "load data", "variogram", "kriging", and "display", and structure "data" contains the input ("in") and output data ("out") structures.

1. PARAMETERS

VARIABLE NAME	DESCRIPTION
para	Parameters Structure
.home_dir	home directory
.optim	flag of optimization tool box
.dataprep	Data Preparation parameters
.filename	input filename
.fileID	File ID for the data set
.x_norm	normalization factor for variable 1
.y_norm	normalization factor for variable 2
.z_norm	normalization factor for variable 3
.x_offset	coordinate offset for variable 1
.y_offset	coordinate offset for variable 2
.z_offset	coordinate offset for variable 3
.latlonfac	conversion factor between longitude/latitude (deg) and x/y (length)
.reduct_fac	data reduction factor
.filter_type	filter type
.filter_supt	filter support
.transform_index	index of data transformation model
.vario	(Semi-)Variogram/Correlogram parameters
.model	model index of variogram/correlogram
.sill	sill
.lscl	relative length scale
.nugget	nugget
.powr	power
.hole	scale of hole effect
.range	range of modeling
.res	resolution of the lag
.angle	anisotropy angle
.ratio	anisotropy aspect ratio
.ang_res	angle resolution of 2D variogram/correlogram
.para_file	parameter filename
.krig	Kriging parameters
.xmin	minimum x-coordinate
.xmax	maximum x-coordinate
.dx	resolution in x direction
.ymin	minimum y-coordinate
.ymax	maximum y-coordinate
.dy	resolution in y direction
.zmin	minimum z-coordinate
.zmax	maximum z-coordinate
.dz	resolution in z direction
.model	kriging model index
.scheme	kriging scheme index
.blk_nx	horizontal block size (only for point-block kriging)
.blk_ny	vertical block size (only for point-block kriging)
.srad	kriging search radius
.kmin	minimum kriging points
.kmax	maximum kriging points
.elim	relative error limit
.batch_file_proc	flag for batch file processing
.batch_data_file	file that contains a list of input data filename(s) for batch processing
.grid_file	filepath and filename of the customized grid file

2. OUTPUT AND INPUT DATA

VARIABLE NAME	DESCRIPTION
data	Data Structure
.in	Input data
.dim	dimension of the input data
.var1	x-coordinates of raw data after duplicated data and nan's removed
.var2	y-coordinates of raw data after duplicated data and nan's removed
.var3	z-coordinates of raw data after duplicated data and nan's removed
.var	raw data after duplicated data and nan's removed
.x	x - coordinates after initial manipulation (reduction, normalization)
.y	y - coordinates after initial manipulation (reduction, normalization)
.z	z - coordinates after initial manipulation (reduction, normalization)
.v	data after initial data processing (reduction)
.tv	transformed data from data.in.var.
.tv	transformed data from data.in.v
.out	Output data
.vario	Data output from semi-variogram/correlogram computation
.c0	variance
.lag	lag of semi-variogram (correlogram)
.gammah	semi-variogram
.cnt	count of data pairs at each lag
.ang	angle array for 2D semi-variogram/correlogram
.x	x-axis of 2D semi-variogram/correlogram
.y	y-axis of 2D semi-variogram/correlogram
.lag_theo	lag used in model-based variogram/correlogram
.gammah_theo	model-based semi-variogram
.gammah2d	2D semi-variogram
.krig	Data output from kriging
.nx	output data dimension: nx * ny for 2D and nx * ny * nz for 3D
.ny	output data dimension: nx * ny for 2D and nx * ny * nz for 3D
.nz	output data dimension: nx * ny * nz for 3D
.xg	normalized grided x-coordinate
.yg	normalized grided y-coordinate
.zg	normalized grided z-coordinate
.gx	normalized grided x-coordinates for customized grids
.gy	normalized grided y-coordinates for customized grids
.gz	normalized grided z-coordinates for customized grids
.Xg	2D/3D x-coordinate matrix
.Yg	2D/3D y-coordinate matrix
.Zg	2D/3D z-coordinate matrix
.Vg	2D/3D data from kriging at (Xg, Yg)
.Eg	2D/3D kriging variance at (Xg, Yg)
.lg	reshaped 1D representation of the 2D/3D variable Cg
.eg	reshaped 1D representation of the 2D/3D variable Eg
.gv	kriging results at the customized grids (gx, gy, gz)
.ge	kriging variance at the customized grids (gx, gy, gz)
.ls	predicted observed data from Double Kriging cross-validation
.ljk	predicted observed data from leave-one-out cross-validation
.ek	normalized residual array in Q1 and Q2 cross-validations
.q1	value of Q1 cross validation
.q2	value of Q2 cross validation

3. Example

To plot the kriging map using your own program, load the output file saved from easy_krig3.0 and then type:

```
>>pcolor(data.out.krig.Xg,data.out.krig.Yg,data.out.krig.Cg);  
>>colorbar;shading interp
```

to plot a kriging image, or

```
>>pcolor(data.out.krig.Xg,data.out.krig.Yg,data.out.krig.Eg);  
>>colorbar;shading interp
```

to plot the kriging variance image. The structured variable "data.out.krig.Xg" means "out" is a substructure under "data", "krig" is a substructure of "out", and "Xg" is a member (2d array) of the substructure "krig". All substructures and members of the primary structures "data" and "para" are listed and explained above (note that only part of those parameters may be useful to the users).

Last modified: May 18, 2005

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Data Files

File
broadscale_summary.csv (Comma Separated Values (.csv), 8.07 KB) <small>MDS:d5bc8844992d0e666b5d5973736dc022</small>
Primary data file for dataset ID 2297

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Parameters

Parameter	Description	Units
biovol	Bongo net displacement volume	cc/m2
chl_a	Chlorophyll-a pigment	milligrams per meter cubed (mg/m3) or micrograms per liter (g/l)
density	Density stratification index	density of deep (25-50m) minus density of shallow (0-15m)
flvolt	Fluorometer voltage measurement	volts
NH4	Ammonium	microM (micromolar) or g-at NH3-N/l
NO3_NO2	Nitrate and Nitrite	microM (micromolar) or microgram-at NO3-N and NO2-N/l
PO4	Orthophosphate	microM (micromolar) or g-at PO4-P/l
sal	Salinity	practical salinity units
SiOH_4	Orthosilicic Acid	Si(OH)4 microM(micromolar) or g-at Si(OH)4-Si/l
temp	Temperature	degrees Centigrade
press	Pressure	decibars

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Instruments

Dataset-specific Instrument Name	CTD profiler
Generic Instrument Name	CTD - profiler
Generic Instrument Description	The Conductivity, Temperature, Depth (CTD) unit is an integrated instrument package designed to measure the conductivity, temperature, and pressure (depth) of the water column. The instrument is lowered via cable through the water column. It permits scientists to observe the physical properties in real-time via a conducting cable, which is typically connected to a CTD to a deck unit and computer on a ship. The CTD is often configured with additional optional sensors including fluorometers, transmissometers and/or radiometers. It is often combined with a Rosette of water sampling bottles (e.g. Niskin, GO-FLO) for collecting discrete water samples during the cast. This term applies to profiling CTDs. For fixed CTDs, see https://www.bco-dmo.org/instrument/869934 .

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Deployments

EN276

Website	https://www.bco-dmo.org/deployment/57413
Platform	R/V Endeavor
Report	http://globec.who.edu/globec-dir/reports/en276/EN276.pdf
Start Date	1996-01-10
End Date	1996-01-22
Description	broad-scale

lab_WHOI_broadscale_summary

Website	https://www.bco-dmo.org/deployment/58040
Platform	WHOI
Start Date	2004-10-01
End Date	2004-12-31
Description	kriged maps from Broadscale cruise data were created using kriging software created by D. Chu. Methods & Sampling Modeling study performed at WHOI using Broadscale cruise data

EN261

Website	https://www.bco-dmo.org/deployment/57401
Platform	R/V Endeavor
Start Date	1995-02-10
End Date	1995-02-20
Description	broad-scale

EN263

Website	https://www.bco-dmo.org/deployment/57403
Platform	R/V Endeavor
Report	http://globec.who.edu/globec-dir/reports/en263/EN263.pdf
Start Date	1995-03-13
End Date	1995-03-24
Description	broad-scale

EN265

Website	https://www.bco-dmo.org/deployment/57405
Platform	R/V Endeavor
Start Date	1995-04-11
End Date	1995-04-22
Description	broad-scale

AL9505

Website	https://www.bco-dmo.org/deployment/57371
Platform	R/V Albatross IV
Report	http://globec.who.edu/globec-dir/reports/al9505/al9505rot.pdf
Start Date	1995-05-09
End Date	1995-05-18
Description	broad-scale

AL9506

Website	https://www.bco-dmo.org/deployment/57372
Platform	R/V Albatross IV
Report	http://globec.who.edu/globec-dir/reports/al9506/al9506new.html
Start Date	1995-06-05
End Date	1995-06-15
Description	broad-scale

AL9508

Website	https://www.bco-dmo.org/deployment/57373
Platform	R/V Albatross IV
Report	http://globec.who.edu/globec-dir/reports/al9508/a9508rp2.HTM
Start Date	1995-07-10
End Date	1995-07-20
Description	broad-scale

EN278

Website	https://www.bco-dmo.org/deployment/57414
Platform	R/V Endeavor
Start Date	1996-02-13
End Date	1996-02-25
Description	broad-scale

EN282

Website	https://www.bco-dmo.org/deployment/57415
Platform	R/V Endeavor
Start Date	1996-04-08
End Date	1996-04-20
Description	broad-scale

AL9607

Website	https://www.bco-dmo.org/deployment/57376
Platform	R/V Albatross IV
Report	http://globec.who.edu/globec-dir/reports/al9607/AL9607.pdf
Start Date	1996-06-03
End Date	1996-06-13
Description	broad-scale

AL9605

Website	https://www.bco-dmo.org/deployment/57375
Platform	R/V Albatross IV
Report	http://globec.who.edu/globec-dir/reports/a9605/a9605.html
Start Date	1996-05-06
End Date	1996-05-17
Description	broad-scale

AL9701

Website	https://www.bco-dmo.org/deployment/57378
Platform	R/V Albatross IV
Report	http://globec.who.edu/globec-dir/reports/a9701/cral9701.htm
Start Date	1997-01-13
End Date	1997-01-20
Description	broad-scale

OC317

Website	https://www.bco-dmo.org/deployment/57451
Platform	R/V Oceanus
Start Date	1998-02-06
End Date	1998-02-19
Description	broad-scale

EN319

Website	https://www.bco-dmo.org/deployment/57426
Platform	R/V Endeavor
Report	http://globec.who.edu/globec-dir/reports/en319/en319rept.html
Start Date	1999-02-21
End Date	1999-03-04
Description	process zooplankton vital rates

OC322

Website	https://www.bco-dmo.org/deployment/57454
Platform	R/V Oceanus
Report	http://globec.who.edu/globec-dir/reports/oc322/oc322.html
Start Date	1998-04-15
End Date	1998-04-27
Description	broad-scale

AL9806

Website	https://www.bco-dmo.org/deployment/57384
Platform	R/V Albatross IV
Report	http://globec.who.edu/globec-dir/reports/a9806/a9806.html
Start Date	1998-05-13
End Date	1998-05-22
Description	broad-scale

AL9808

Website	https://www.bco-dmo.org/deployment/57385
Platform	R/V Albatross IV
Report	http://globec.who.edu/globec-dir/reports/a9808/a9808.html
Start Date	1998-06-16
End Date	1998-06-26
Description	broad-scale

AL9901

Website	https://www.bco-dmo.org/deployment/57386
Platform	R/V Albatross IV
Report	http://globec.who.edu/globec-dir/reports/a9901/a9901.html
Start Date	1999-01-12
End Date	1999-01-24
Description	broad-scale

OC336

Website	https://www.bco-dmo.org/deployment/57459
Platform	R/V Oceanus
Report	http://globec.who.edu/globec-dir/reports/oc336/oc336cruise-report.html
Start Date	1999-02-11
End Date	1999-02-23
Description	broad-scale

EN320

Website	https://www.bco-dmo.org/deployment/57427
Platform	R/V Endeavor
Report	http://globec.who.edu/globec-dir/reports/en320new/en320mda.htm
Start Date	1999-03-10
End Date	1999-03-23
Description	broad-scale

OC341

Website	https://www.bco-dmo.org/deployment/57464
Platform	R/V Oceanus
Report	http://globec.who.edu/globec-dir/reports/oc341/reptoc341.html
Start Date	1999-04-16
End Date	1999-04-27
Description	broad-scale

AL9904

Website	https://www.bco-dmo.org/deployment/57387
Platform	R/V Albatross IV
Start Date	1999-05-19
End Date	1999-05-27
Description	broad-scale

AL9906

Website	https://www.bco-dmo.org/deployment/57388
Platform	R/V Albatross IV
Report	http://globec.who.edu/globec-dir/reports/al9906/al9906rpt.html
Start Date	1999-06-14
End Date	1999-06-24
Description	broad-scale

OC298

Website	https://www.bco-dmo.org/deployment/57444
Platform	R/V Oceanus
Report	http://globec.who.edu/globec-dir/reports/oc298/cruisereport.html
Start Date	1997-02-11
End Date	1997-02-23
Description	broad-scale

OC300

Website	https://www.bco-dmo.org/deployment/57446
Platform	R/V Oceanus
Report	http://globec.who.edu/globec-dir/reports/oc300/oc300rpt.mr7.html
Start Date	1997-03-16
End Date	1997-03-28
Description	broad-scale

OC302

Website	https://www.bco-dmo.org/deployment/57448
Platform	R/V Oceanus
Report	http://globec.who.edu/globec-dir/reports/oc302/oc302.html
Start Date	1997-04-22
End Date	1997-05-02
Description	broad-scale

AL9705

Website	https://www.bco-dmo.org/deployment/57379
Platform	R/V Albatross IV
Report	http://globec.who.edu/globec-dir/reports/al9705/al9705.html
Start Date	1997-05-19
End Date	1997-05-27
Description	broad-scale

AL9707

Website	https://www.bco-dmo.org/deployment/57380
Platform	R/V Albatross IV
Report	http://globec.who.edu/globec-dir/reports/al9707/al9707.html
Start Date	1997-06-18
End Date	1997-06-28
Description	broad-scale

AL9801

Website	https://www.bco-dmo.org/deployment/57382
Platform	R/V Albatross IV
Report	http://globec.who.edu/globec-dir/reports/al9801/al9801.html
Start Date	1998-01-07
End Date	1998-01-19
Description	broad-scale

OC275

Website	https://www.bco-dmo.org/deployment/57440
Platform	R/V Oceanus
Start Date	1996-03-11
End Date	1996-03-22
Description	broad-scale

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Project Information**U.S. GLOBEC Georges Bank (GB)**

Website: http://globec.who.edu/globec_program.html

Coverage: Georges Bank, Gulf of Maine, Northwest Atlantic Ocean

The U.S. GLOBEC [Georges Bank](#) Program is a large multi-disciplinary multi-year oceanographic effort. The proximate goal is to understand the population dynamics of key species on the Bank - Cod, [Haddock](#), and two species of zooplankton (*Calanus finmarchicus* and *Pseudocalanus*) - in terms of their coupling to the physical environment and in terms of their [predators and prey](#). The ultimate goal is to be able to predict changes in the distribution and abundance of these species as a result of changes in their physical and biotic environment as well as to anticipate how their populations might respond to climate change.

The effort is substantial, requiring broad-scale surveys of the entire Bank, and process studies which focus both on the links between the target species and their physical environment, and the determination of fundamental aspects of these species' life history (birth rates, growth rates, death rates, etc).

Equally important are the modelling efforts that are ongoing which seek to provide realistic predictions of the flow field and which utilize the life history information to produce an integrated view of the dynamics of the populations.

The U.S. GLOBEC Georges Bank [Executive Committee \(EXCO\)](#) provides program leadership and effective communication with the funding agencies.

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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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Funding

Funding Source	Award
National Science Foundation (NSF)	unknown GB NSF
National Oceanic and Atmospheric Administration (NOAA)	unknown GB NOAA

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