Inverse models for Pseudocalanus moultoni and Pseudocalanus newmani distributions on Georges Bank in 1997 from WHOI, Woods Hole MA (GB project)

Website: https://www.bco-dmo.org/dataset/2401
Version: final
Version Date: 2011-11-01

Project
» U.S. GLOBEC Georges Bank (GB)

Program
» U.S. GLOBal ocean ECosystems dynamics (U.S. GLOBEC)

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Table of Contents

- Dataset Description
- Data Files
- Parameters
- Deployments
- Project Information
- Program Information
- Funding

Dataset Description

Inverse models for *Pseudocalanus moultoni* and *P. newmani* distributions on Georges Bank in 1997

D.J. McGillicuddy, Jr. and A. Bucklin

Physical and biological controls on the springtime distributions of *Pseudocalanus moultoni* and *P. newmani* on Georges Bank are examined by assimilating observations into a coupled physical-biological model. Monthly snapshots of abundance are derived from U.S. GLOBEC Georges Bank broad-scale surveys during 1997. The forward problem is posed as an advection-diffusion-reaction equation for the copepod concentration. The adjoint method of data assimilation is used to invert for the biological sources and sinks implied by the observed changes in abundance between surveys and the flow during the intervening period. Based on this analysis, the two species appear to have distinct population centers in the late winter/early spring: *P. moultoni* on the northwest flank of the Bank and *P. newmani* on the Northeast Peak and the southern tip of Browns Bank. As the growing season progresses, the clockwise circulation around Georges Bank blends reproducing (but not interbreeding) animals from the two source regions, causing their distributions to overlap by early summer. The springtime evolution of Pseudocalanus distributions in this region is driven by a complex mixture of hydrodynamic transport and species-specific population dynamics, including both growth and mortality.

The animation shows observed abundances of *P. moultoni* (top) and *P. newmani* (bottom). The moving panels between them display the inverse model results through time, with their horizontal position proportional to the dates between January and June.

For more information see:
McGillicuddy, D.J. and A. Bucklin, 2002. Intermingling of two *Pseudocalanus* species on Georges Bank. Journal of Marine Research, **60**, 583-604.

[table of contents | back to top]

Data Files

File	
feb_jun_mn_nm_v2.fli	(FLIC, 3.11 MB) MD5:e67c759a303e679ecab8fb299c258348
Model results animation (fli)	

[table of contents | back to top]

Parameters

Parameters for this dataset have not yet been identified

[table of contents | back to top]

Deployments

lab_WHOI-pseudocal

Website	https://www.bco-dmo.org/deployment/58055
Platform	WHOI
Start Date	1999-01-01
End Date	2011-11-01
Description	model results

[table of contents | back to top]

Project Information

U.S. GLOBEC Georges Bank (GB)

Website: http://globec.whoi.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.

[table of contents | back to top]

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).

[table of contents | back to top]

Funding

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

[table of contents | back to top]