

REPORT OF MODEL TASK TEAM

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The meeting of the MODEL Task Team was held from 0830-1230 hours on October 7, 2001. The Co-Chairmen, Drs. Bernard A. Megrey and Michio J. Kishi, called the meeting to order and welcomed the participants (*MODEL Endnote 1*). The Task Team reviewed the draft agenda and it was adopted (*MODEL Endnote 2*).

Report card

The Task Team was asked to discuss its activities in light of the goals of the CCCC Program and the terms of reference for MODEL. There was lively discussion on the accomplishments of MODEL over the past several years. MODEL was charged with advancing conceptual/theoretical and modeling studies and supporting the activities of BASS and REX by developing modeling tools. The development of the NEMURO model was seen as a major accomplishment, and that is currently serving as the foundation and basis of collaborations with BASS and REX. NEMURO, as a modeling tool, addresses all of the CCCC central scientific issues at some level. MODEL has collaborated with BASS by developing a working linkage between the lower tropic level NEMURO with a model of higher trophic level interactions in the subarctic gyre systems. MODEL has collaborated with REX by developing a linkage between NEMURO and a herring growth model. In both of these examples, the goal is to understand issues related to the four main Central Scientific Questions from the CCCC/GLOBEC Implementation Plan:

- *Physical forcing*: What are the characteristics of climate variability? Can interdecadal patterns be identified? How and when do they arise?
- *LTL response*: How do primary and secondary producers respond in productivity, and in species and size composition, to climate variability in

different ecosystems of the subarctic Pacific?

- *HTL response*: How do life history patterns, distribution, vital rates, and population dynamics of higher trophic level species respond directly and indirectly to climate variability?
- *Ecosystem interaction*: How are subarctic Pacific ecosystems structured? Is it solely through bottom-up forcing, or are there significant intra-trophic level and top-down effects?

The conclusion was that, compared to 5 years ago, MODEL has made excellent and significant progress towards the ultimate goal of the CCCC Program: *to forecast the consequences of climate variability on the ecosystems of the subarctic Pacific.*

MODEL achievements to date

- Held a successful series of workshops:
 - MODEL Workshop on *Strategies for coupling higher and lower trophic level marine ecosystem models*, October 11, 2000, Hakodate, Japan (in conjunction with PICES IX)
 - BASS/MODEL Workshop on *Quantification of a food web model for the subarctic gyre systems*, March 5-6, 2001, Honolulu, Hawaii, U.S.A.
 - BASS/MODEL Workshop to *Review ecosystem models for the subarctic Pacific gyres*, October 5, 2001, Victoria, British Columbia, Canada (in conjunction with PICES X)
 - MODEL/REX Workshop to *Include higher trophic levels in the PICES NEMURO model*, October 6, 2001, Victoria, British Columbia, Canada (in conjunction with PICES X)
- Published Scientific Reports No. 15 (2000) and No. 17 (2001)

- Submitted two proposals to funding agencies outside of PICES:
 - Proposal on *Impact of climate change of marine fish production in the subarctic North Pacific Ocean* to the National Center for Ecosystem Analysis and Simulation (not funded)
 - Proposal on *Developing an ecosystem model to predict changes in the North Pacific associated with climate change to the Heiwa Nakajima Fund* (funded)
- Implemented several improvements to NEMURO
 - Addition of diagnostic calculations (P/B, C/B, Ecotrophic Efficiency)
 - Validation to Station P
 - Addition of zooplankton vertical migration
 - Effect of including a microbial loop approximation
 - Sensitivity analysis and data assimilation (Station A7)
 - Addition of carbon fluxes
 - Acquired SST time-series (1951-1988) from Station P
 - Acquired equations to permit calculation of light at the surface
 - Modify primary production equations to explicitly include MLD to permit simulation regime shift scenarios
- Developed alternative formulation of NEMURO equations (Dr. Vladimir Zvalinski, Russia)
- Extend NEMURO model
 - Add Fe limitation to phytoplankton production
 - Add microbial food web
 - Split ZL into copepods and euphausiids
 - Add sinking rate of phytoplankton to detritus pool
 - Parameterize NEMURO to a coastal region
 - Continue developing methods to link NEMURO to ECOPATH/ECOSIM
 - Continue developing methods to link NEMURO to models of fish growth
- Carry out NEMURO diagnostics
 - Validate model output against data for station A7 and the Bering Sea
 - Perform side-by-side comparison of the NEMURO Box Model and NEMURO MATLAB model to same equations and data
- Develop spatially explicit approach
- Modify NEMURO as required to accommodate BASS and REX needs
- Work toward embedding NEMURO into larger scale 3-D ocean model
- Establish links with other programs such as GODAE, WCRP, CLIVAR

Membership and selection of MODEL Co-Chairman

The term of MODEL Co-Chairman, Dr. Michio Kishi, was lapsing, and there was discussion as to who might take his place. It was mentioned that MODEL needed to maintain the momentum in its activity, and it would be advantageous to select someone with a solid background of past model activities, goals, and interactions with other components of the CCCC Program. The Chairman of the Science Board and the Co-Chairmen of the CCCC Implementation Panel would approach a few individuals to see if they might be interested.

Dr. Toshio Katsukawa was introduced as a new member representing Japan. Ms. Patricia Livingston (U.S.A.) resigned and Dr. Thomas C. Wainwright volunteered to serve and will be recommended to the CCCC Implementation Panel.

MODEL plans

- Plan and conduct
 - An inter-sessional MODEL/REX Workshop to build a NPZF (nutrient-phytoplankton-zooplankton-fish) version of the PICES NEMURO model (*REX Endnote 2*)
 - An inter-sessional BASS/MODEL workshop on *Using models to test hypothesis on effects of climate change on the North Pacific subarctic gyre system* to complete work on linking NEMURO to ECOPATH/ECOSIM (*BASS Endnote 3*)

MODEL recommendations

- Convene a joint MODEL/REX Workshop in January 2002, in Nemuro, Japan, to extend the NEMURO model to include herring and perhaps other planktivorous fish species (*REX Endnote 2*). PICES to support travel of two people to attend the workshop. No travel request will be made for the PICES Eleventh Annual Meeting in Qingdao, People's Republic of China.
- Encourage opportunities for more CCCC Task Team interaction to coordinate and implement their plans. At PICES XI, Task Team meetings should not overlap in time.
- Begin communication between MODEL and GLOBEC Focus Group 3 (Modeling and Forecasting) to plan a joint meeting in Qingdao. A topic of mutual interest (i.e.

open ocean-coastal coupling or methods to couple LTL-HTL models) should be determined via e-mail by the summer of 2002.

- Request access to the PICES server to post and access working documents related to MODEL activities.
- Ms. Patricia Livingston to be replaced by Dr. Thomas C. Wainwright as the U.S. member on the MODEL Task Team.
- Dr. Michio J. Kishi (Japan) to be replaced by Dr. Francisco E. Werner (U.S.A.) as MODEL Co-Chairman. Dr. Megrey will remain as Co-Chairman for one more year to provide some continuity in the work of the Task Team, at which point a new Co-Chairman from the western Pacific should be appointed.

MODEL Endnote 1

Participation List

Members:

Toshio Katsukawa (Japan)
Michio J. Kishi (Japan, Co-Chairman)
Bernard A. Megrey (U.S.A., Co-Chairman)
Vadim V. Navrotsky (Russia)
Yury I. Zuenko (Russia)

Observers:

Gennady A. Kantakov (Russia)
Sukyung Kang (Korea)
Hiroaki Saito (Japan)
Jake Schweigert (Canada)
Igor I. Shevchenko (Russia)
S. Lan Smith (Japan)
Thomas C. Wainwright (U.S.A.)
Francisco E. Werner (U.S.A.)

MODEL Endnote 2

MODEL Meeting Agenda

1. Review accomplishments in 2001
Introduction of new members
Overview of BASS/MODEL joint Workshop on *Quantification of a food web model for the subarctic gyre system*
Overview of BASS/MODEL joint Workshop at PICES X
Overview of REX/MODEL joint Workshop at PICES X
Review of inter-sessional activities
Proposals submitted and funded
2. Discuss plans for 2002
Plans for MODEL/REX Nemuro Workshop
Discuss need for joint workshop(s) with REX, MONITOR, or BASS
Proposed inter-sessional activities
MODEL workshop theme for 2002
3. Requests for travel to future meetings
4. Discuss possible joint activities with the GLOBEC-INT modeling efforts at the GLOBE Open Science Meeting in Qingdao
5. Other business
6. Selection of new Co-Chairman

