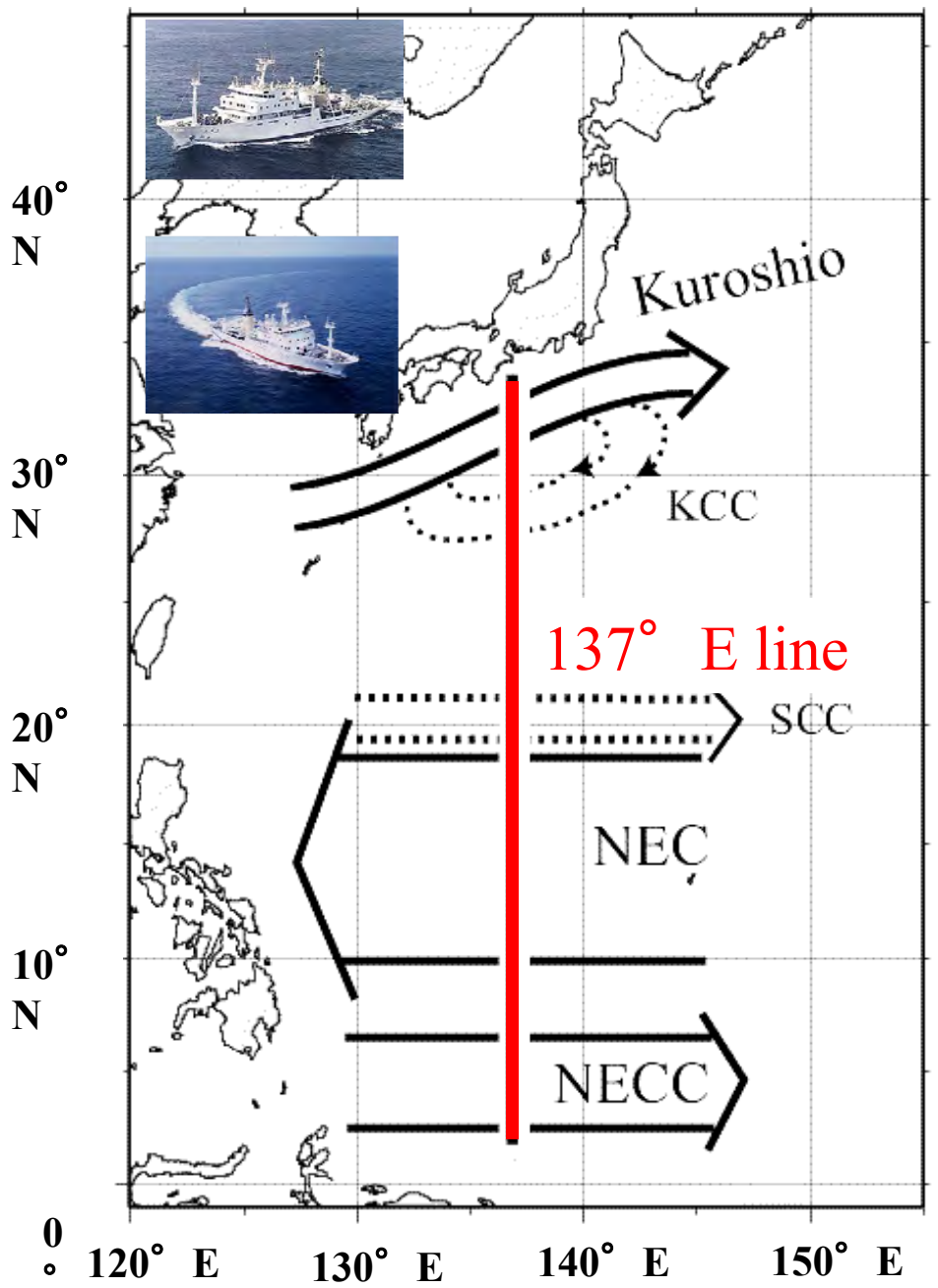
FUTURE related activities in Japan: their Status and Future

Hiroaki Saito, AORI, UT

Monitoring



Location of the repeat-line and its history in brief

1967-
Routine hydrographic observation started by JMA

1983 -
pCO_2 measurements in winter started by MRI

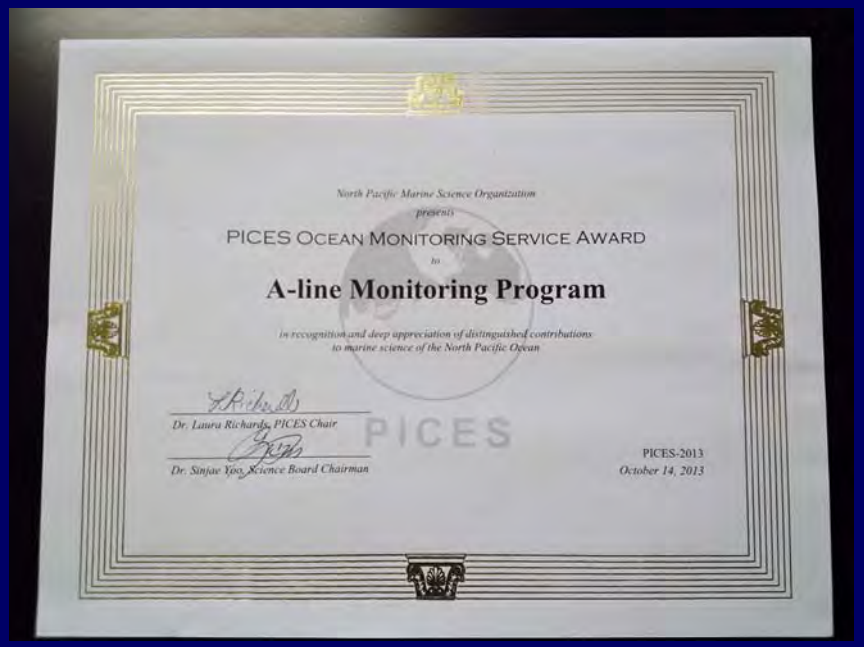
1989 -
pCO_2 observation in winter and summer started by JMA

1994 -
WOCE P09 one-time cruise:
precise TCO_2 analyses started by MRI

2003 -
pCO_2 and TCO_2 observations in 4 seasons started by MRI and JMA

A-Line monitoring

- since 1988
- 5 – 7 times/year
- T, S, currents, Chla, nutrients, Norpac-net, FCM, etc



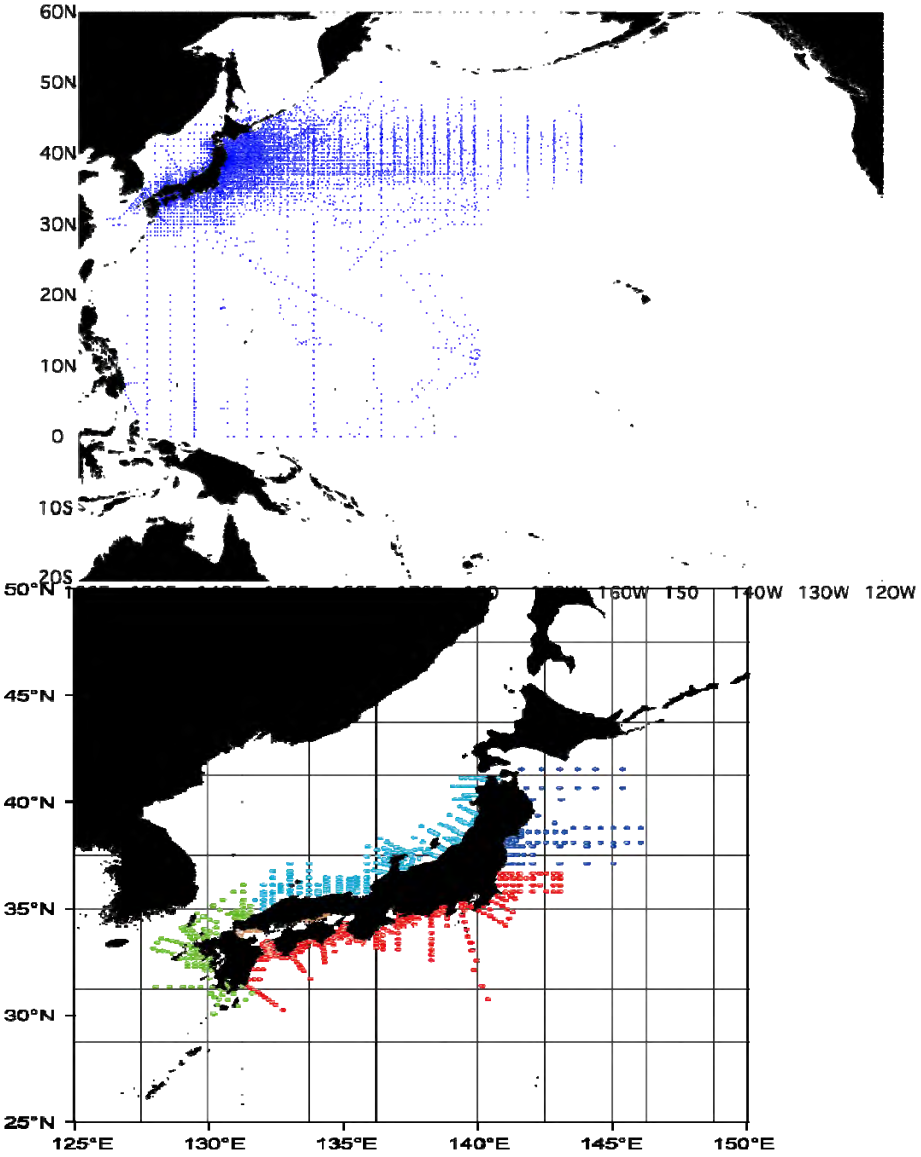
FRA

For retrospective data analysis

Fisheries, HABs,

Zooplankton archive of FRA

aka Odate collection



Period 1958-
NORPAC net 0-150 m
larval-fish net (surface tow)
More than 60,000 samples
+7000 per year

Interdisiplinary projects

Many on-going projects in Japan are interdisciplinary, have links between physical-chemical-biological sciences, or natural science and society, i.e., AICE-SOFE, COVE-SOFE style science plans they have.

MEXT Project

The Study of Kuroshio Ecosystem Dynamics for Sustainable Fisheries

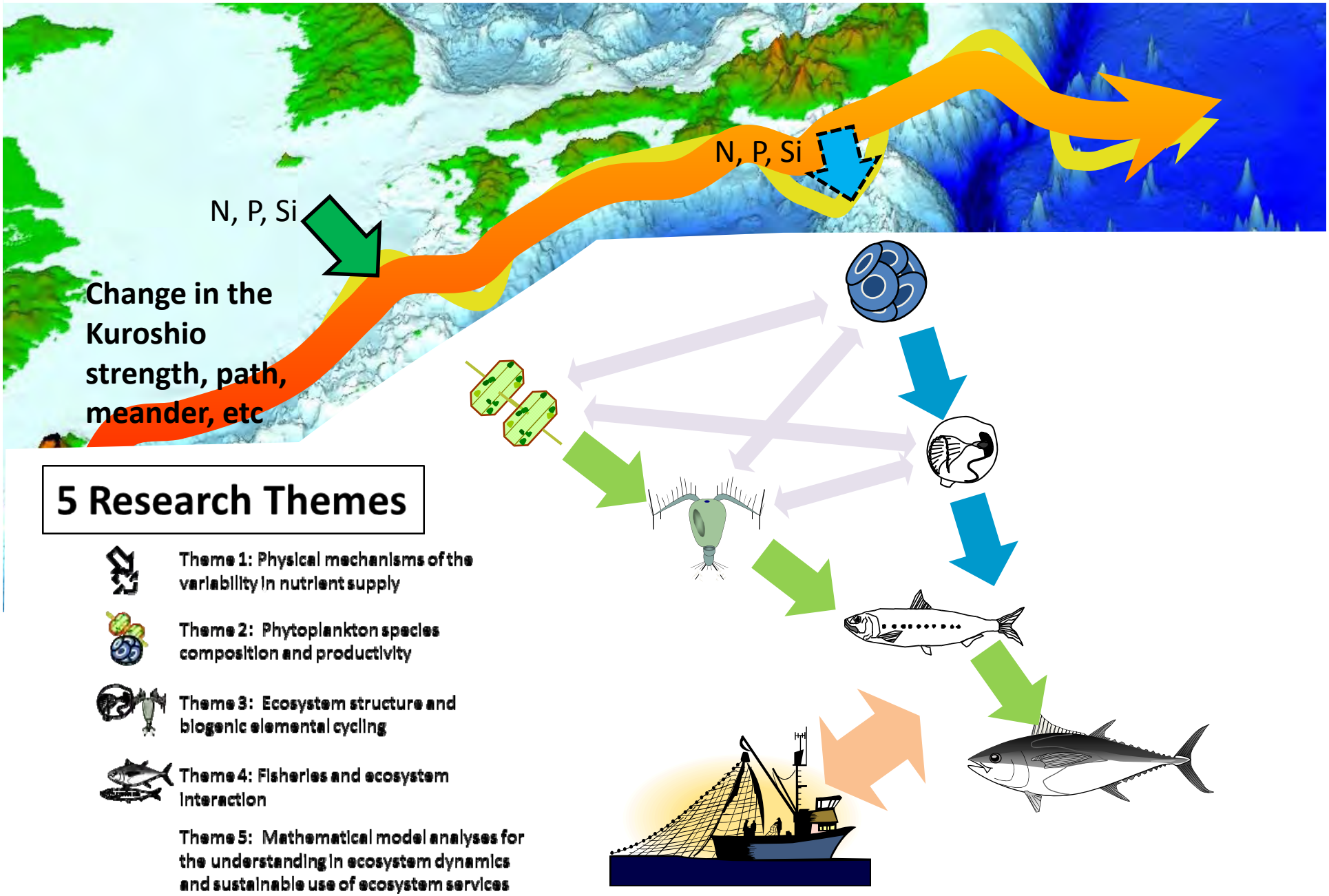
SKED（2011-2020）

Goal of SKED

1. **Understanding the mechanisms of nutrient supply**
2. **Understanding the impact of Kuroshio fluctuation on ecosystem structure and production.**
3. **Resolve Kuroshio Paradox**
4. **Finding a way for sustainable fisheries**

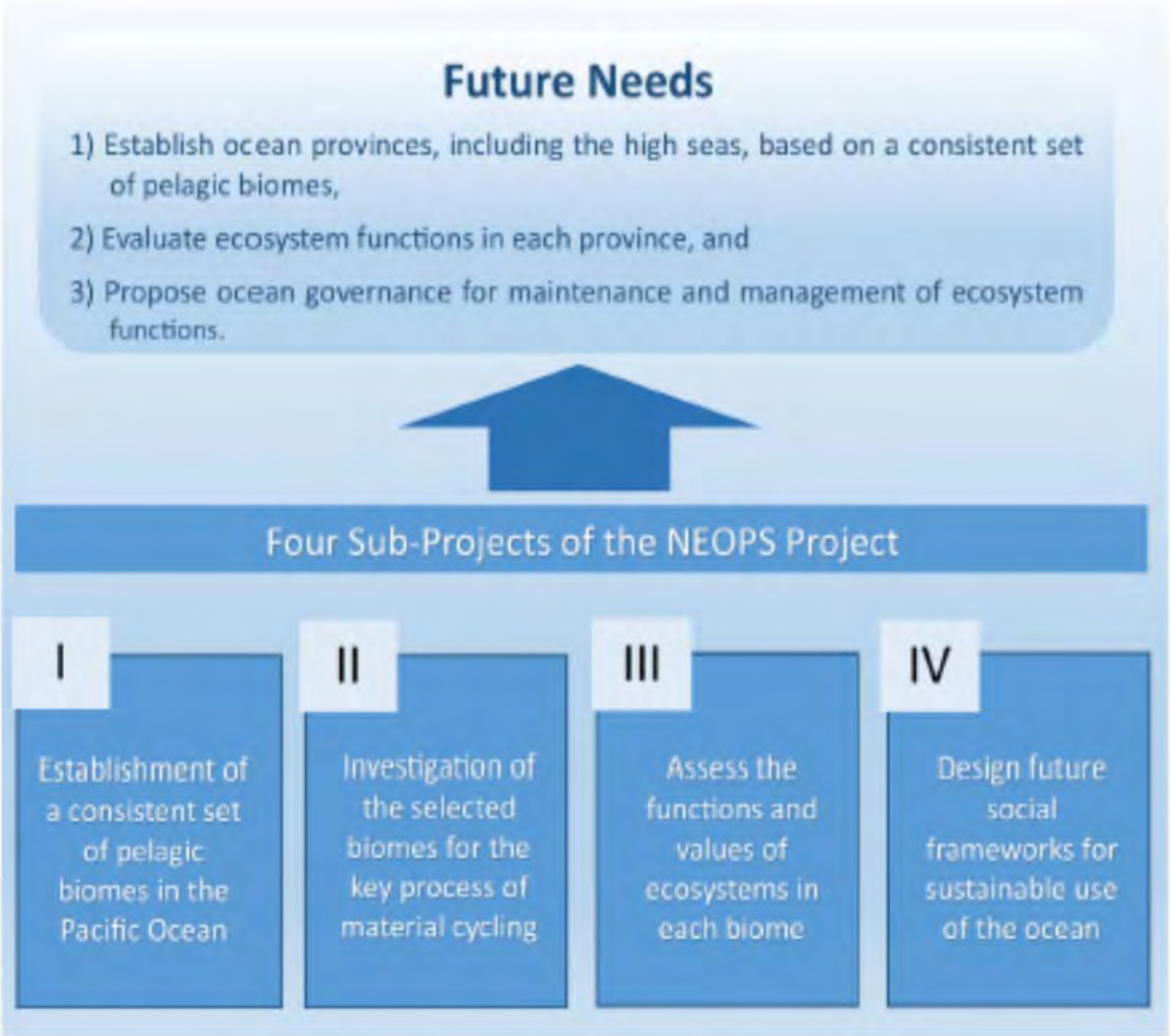
Ecosystem based fisheries management for sustainable fisheries.
Win-win strategy for conservation and fisheries.

Understanding the structure and control factors of Kuroshio ecosystem



NEOPS
New Ocean Paradigm
on Its Biogeochemistry, Ecosysytem and Sustainable Use

New Ocean Paradigm on Its BGC, Ecosystem and Sustainable Use



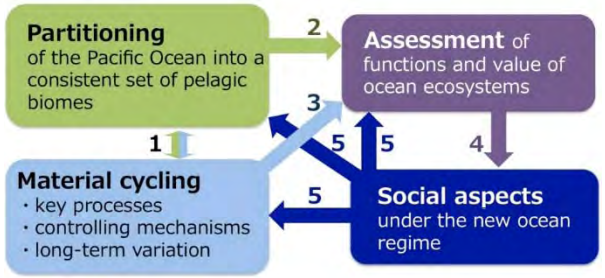


Fig. 1. Contribution of NEOPS project to sustainable ocean management.

Ocean domain based on productivity

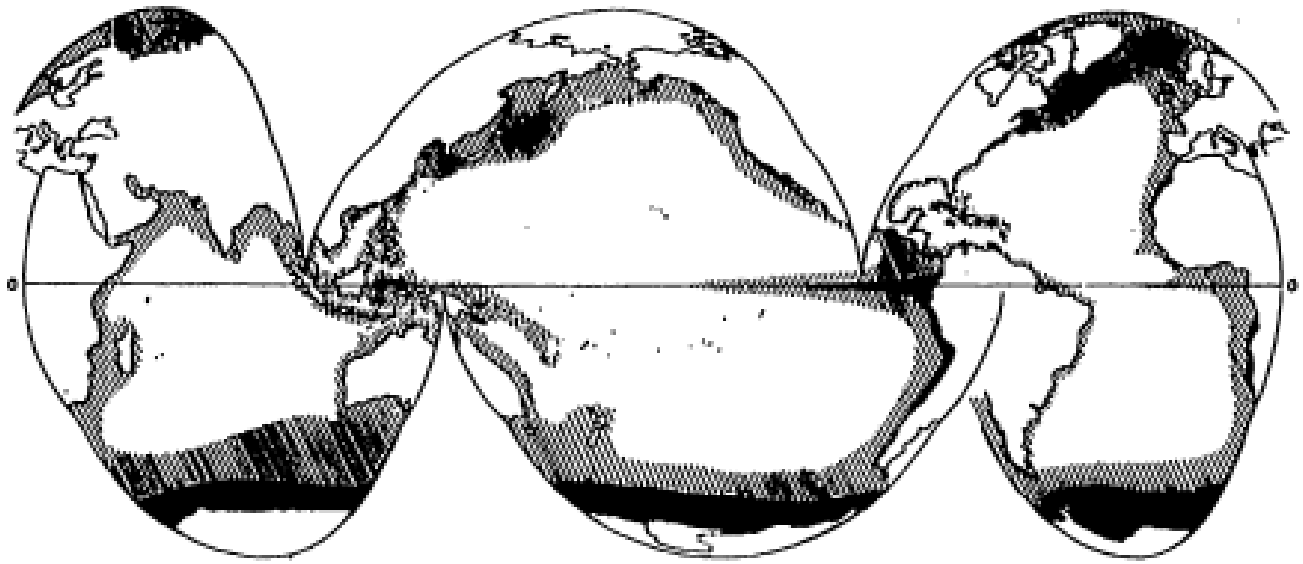
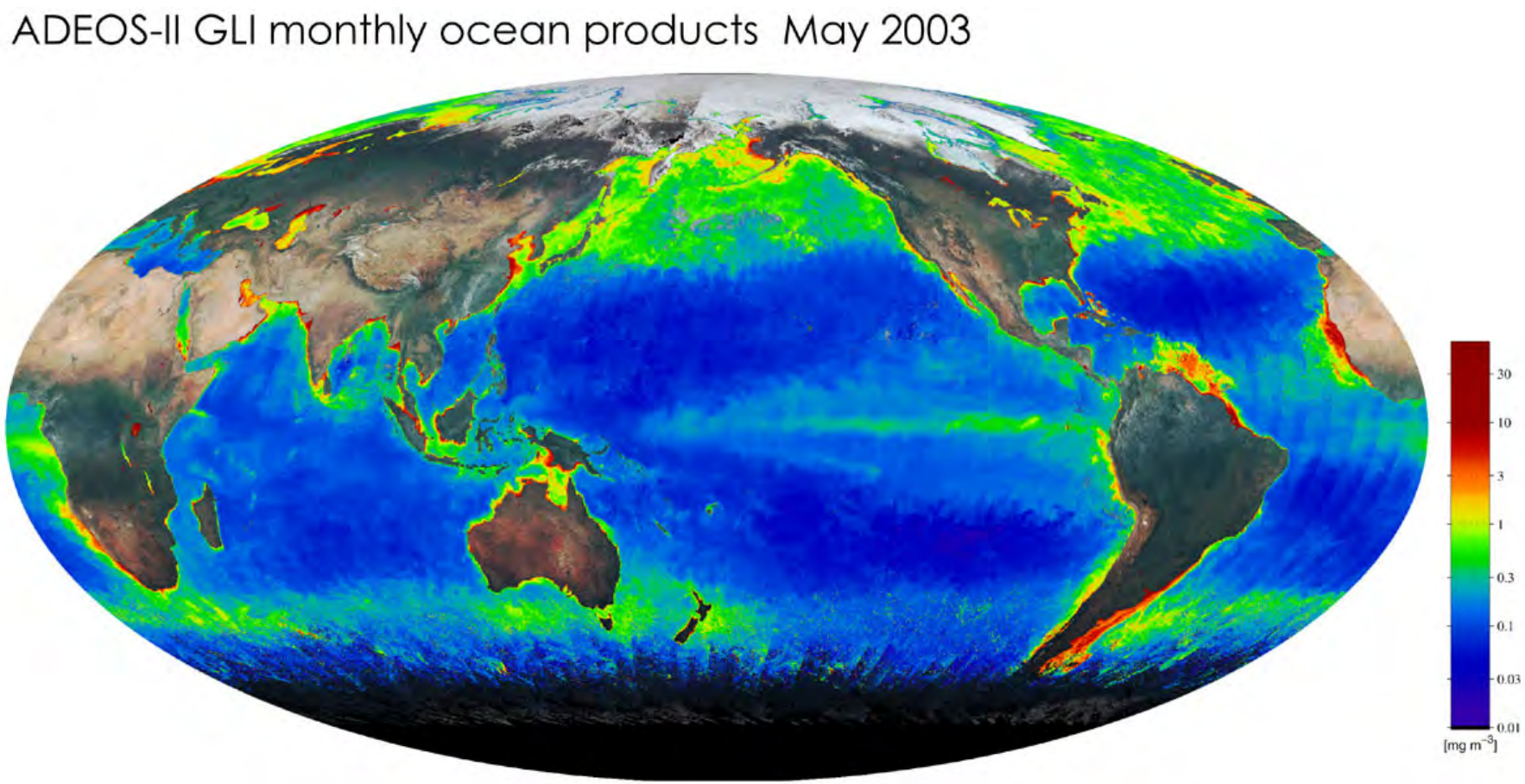


Fig. 1. Theoretical representation of relative productivity of ocean areas. Heavy shading indicates very productive areas, light shading moderately productive regions. (After Sverdrup, 1955.)

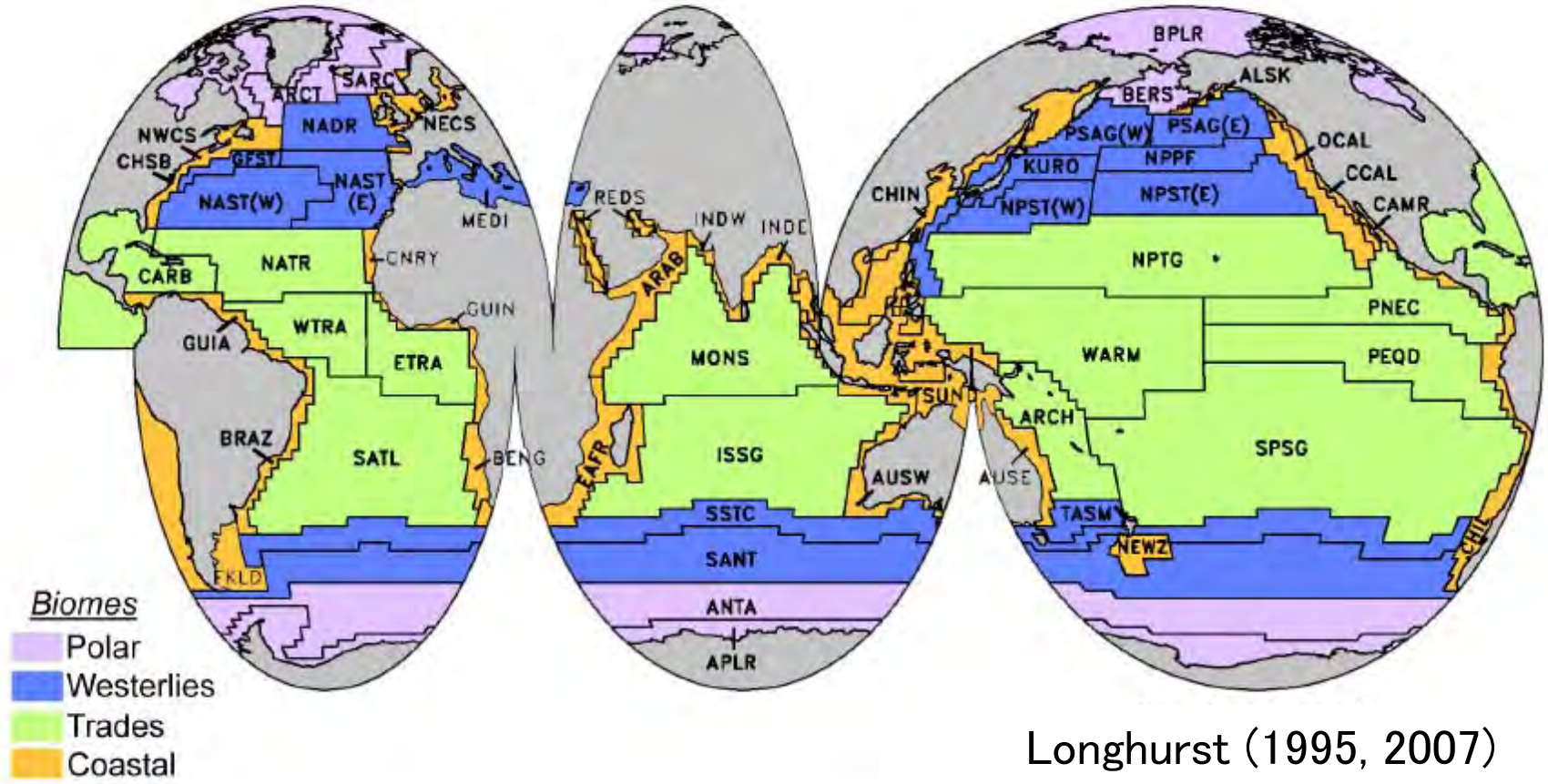
(Sverdrup 1955)

Ocean domains based on productivity



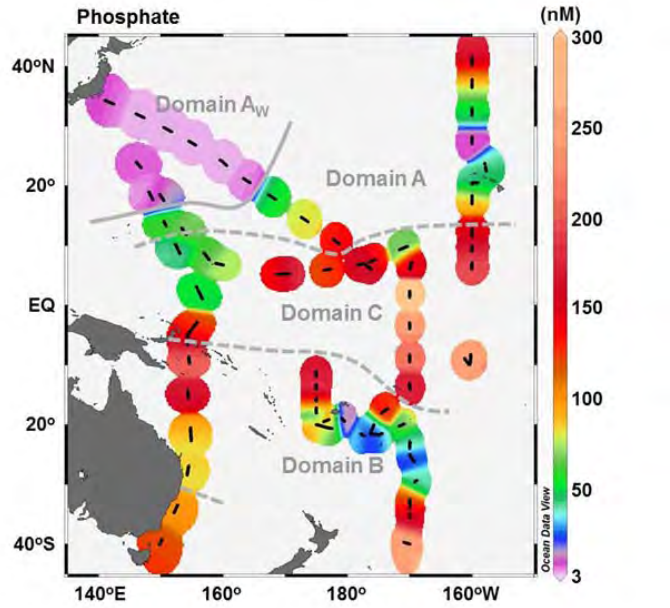
EORC of JAXA

Ocean Biomes by Longhurst



Longhurst (1995, 2007)

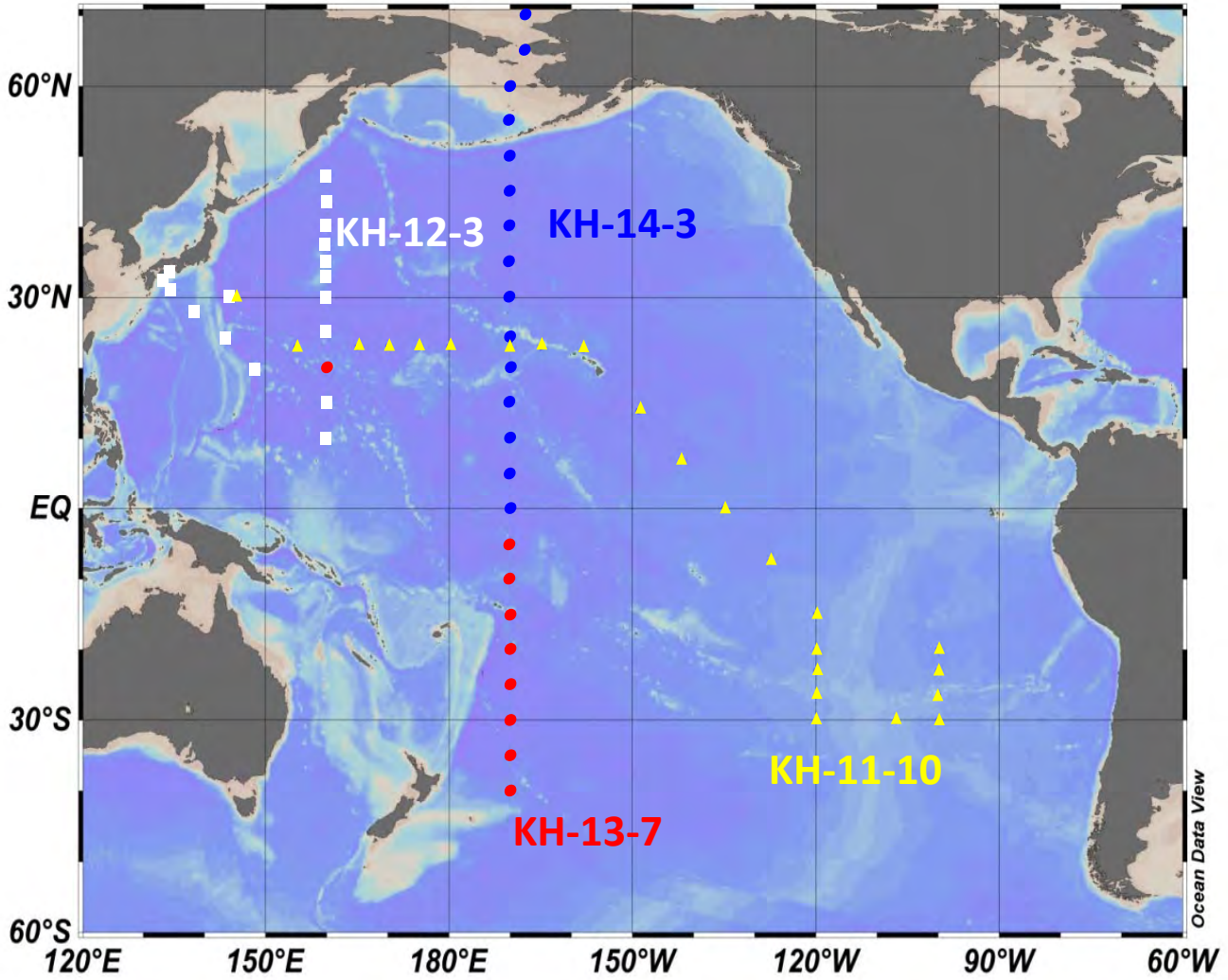
New colormetric technique revealed presence of new ocean province (P depleted region<0.003 μM)



Detection limits are 1-2 order higher for PO4, NO3, Si(OH)4 than conventional methods.

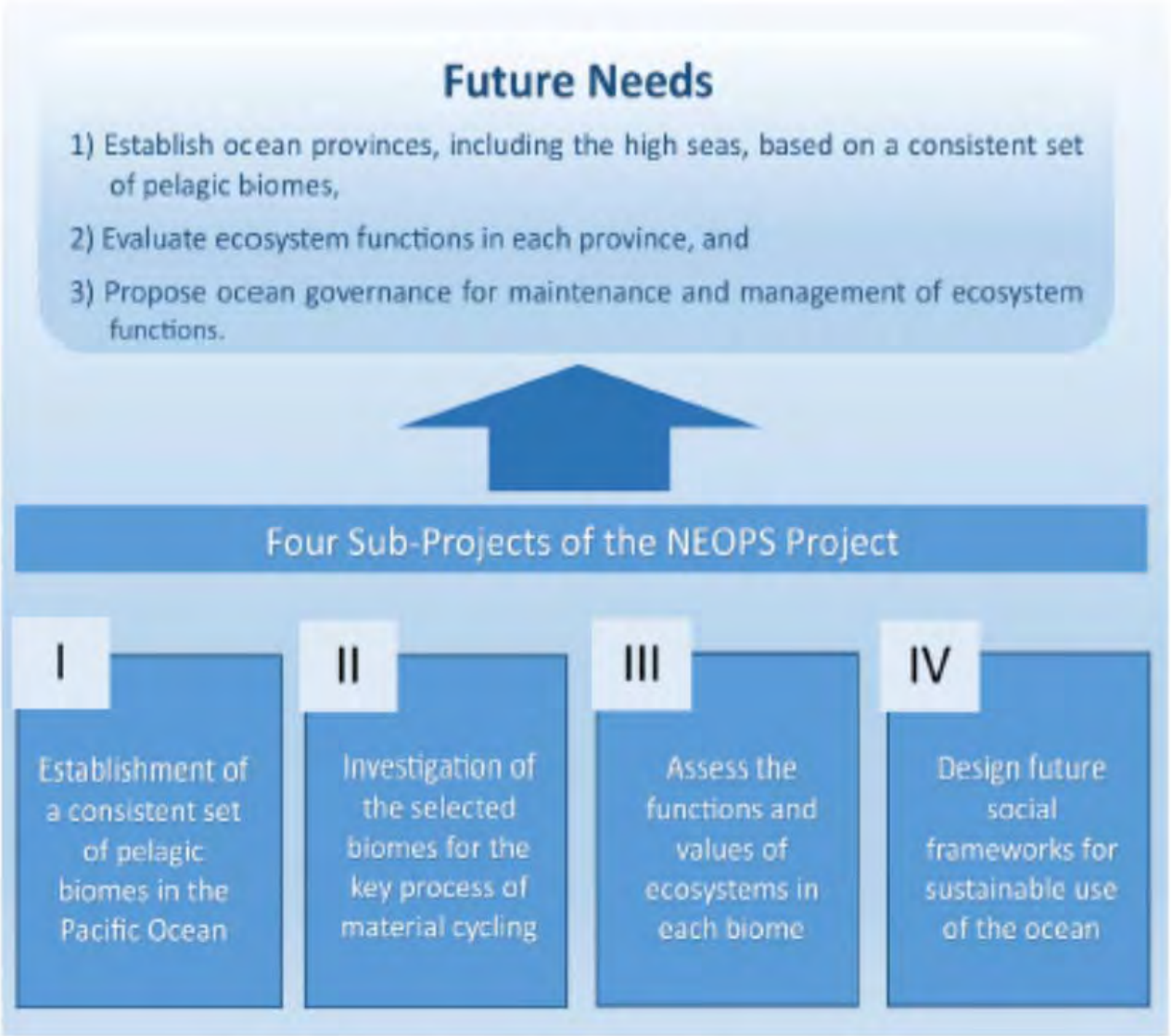
Next Generation Sequencer for biodiversity

Establishing New Ocean Provinces



NEOPS
New Ocean Paradigm
on Its Biogeochemistry, Ecosysytem and Sustainable Use

New Ocean Paradigm on Its BGC, Ecosystem and Sustainable Use



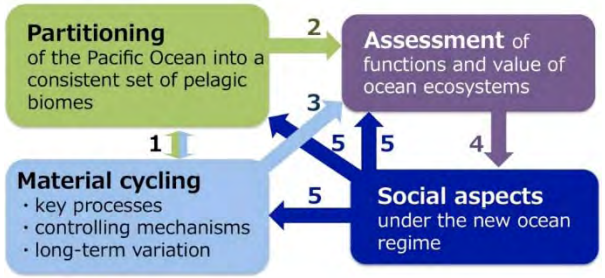


Fig. 1. Contribution of NEOPS project to sustainable ocean management.

NEOPS
New Ocean Paradigm
on Its Biogeochemistry, Ecosysytem and Sustainable Use

Using Game Theory to Model Cooperative Behavior in Transboundary Marine Fisheries

1: Multispecies Dynamic Model for cooperative behavior

- Systematic review of world's 10 largest marine fisheries (~30% of 2011 global catch) to assess number of "players", accuracy of existing game theory models
- Looks beyond single-species models to encompass broader range of ecosystem services
- Abstract prepared for JSFS meeting in Hakodate (30 March 2014)

2: Cooperative Behavior in Areas of Limited Governance

- Draws on FAO's FishStatJ database and governance index to identify areas prone to illicit fishing activities
- Considers balloon effects of control activities
- Seminar presentation planned for 18 April 2014

The Great Eastern Japan Earthquake and Tsunami


ICRC, AORI, UT, at Otsuchi Town
March 11, 15:53, 2011

On June 8, 2011
Geospatial Information Authority of Japan

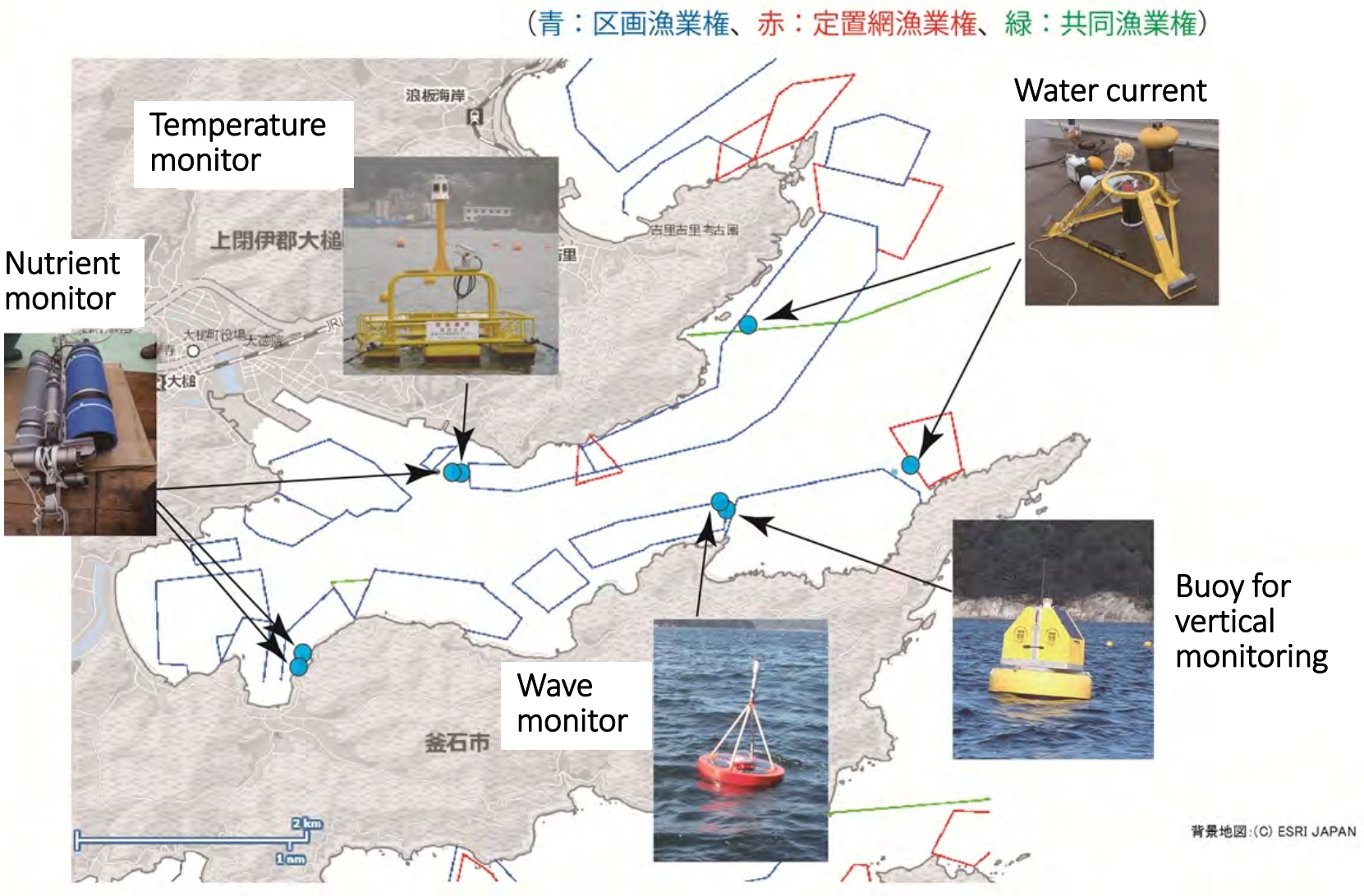
Tohoku Ecosystem-Associated Marine Sciences (TEAMS)

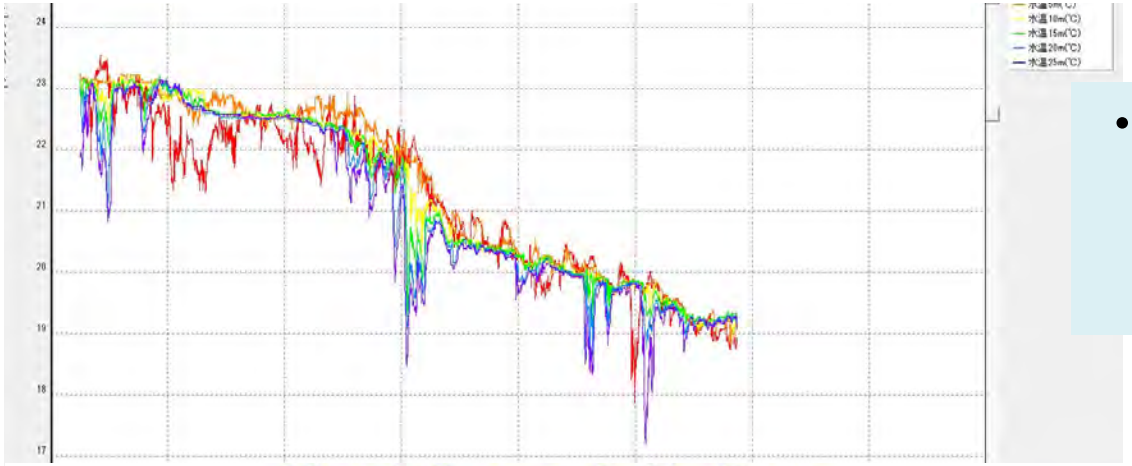
http://www.i-teams.jp/e/ ← TEAMS
http://www.agri.tohoku.ac.jp/teams/english/index.html ←TohokuUniv
http://teams.aori.u-tokyo.ac.jp/ ←AORI

- Started in January 2012.
- Supported by MEXT for ten years. Initially, 1 bilion yen/ year
- Aim: To clarify the impact of the earthquake and tsunami on the ecology and resources of living organisms in the coastal area, as well as elucidation of the subsequent recovery process. Highlighting the steps needed to restore the fishing industry.

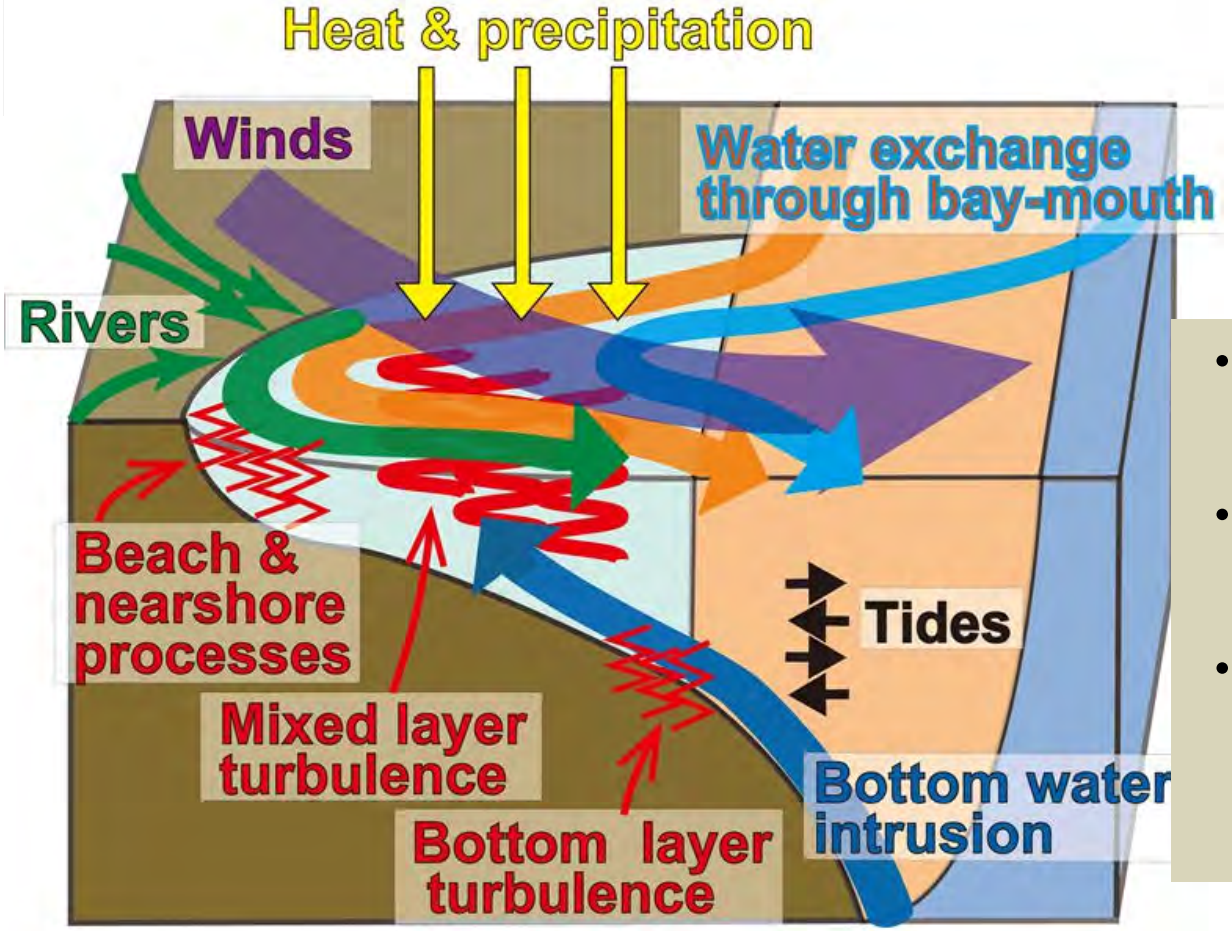
東北マリンサイエンス拠点形成事業
ー海洋生態系の調査研究ー
Tohoku Ecosystem-Associated Marine Sciences, since FY2011

Sensors introduced into Otsuchi Bay





- Real time monitoring of water temperature at six different layers.

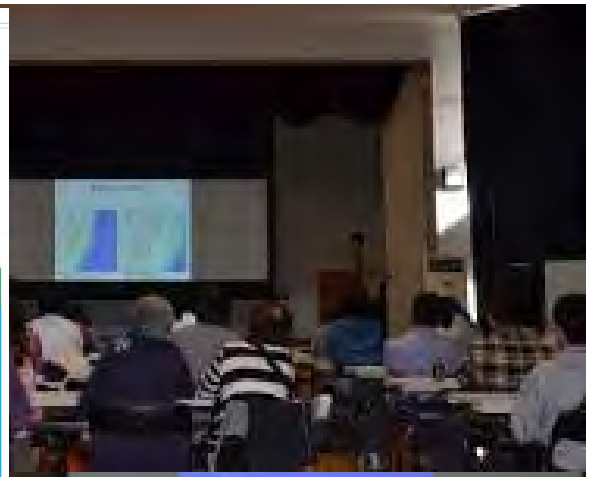


- For construction of physical model.
- Linkage with biological processes
- Sending nformation to cell phones of fishers

Outreach


東京大学大気海洋研究所公開講座
大槌の海は今!?
私たちは、今も大槌の海で調査を続けています。
津波の後、大槌の海がどうなっているのか、わかった事をお伝えします。
【第一部】
参加型イベント
12:30～14:30
□展示標本観察（広瀬雅人）
□星砂探し（福田秀樹）
□チリメンモンスター（西部裕一郎）
【第二部】
講演会
14:30～17:30
14:30～ ウミガメやマンボウ、海鳥の話（佐藤克文）
15:00～ アワビやウニの話（河村知彦）
15:30～ マグロやサケの話（北川貴士）
16:00～ 海の汚染や環境について（福田秀樹）
16:30～ 大槌の海を調べる一大研究プロジェクト（木暮一啓）
17:00～ 国際海洋研究都市おおつちプロジェクト（碇川大槌町長）
槌町中央公民館 3 階大会議室
対象：海の中に興味がある子どもからお年寄りまで / 漁業者など海で働く方
参加料：無料（自由に入場・退席できます）
問い合わせ：東京大学大気海洋研究所国際沿岸海洋研究センター
Tel: 0193-42-5611
東京大学大気海洋研究所国際沿岸海洋研究センター 共催：大槌町 / 東北マリンサイエンス拠点形成事業 / 岩手海洋研究コンソーシアム

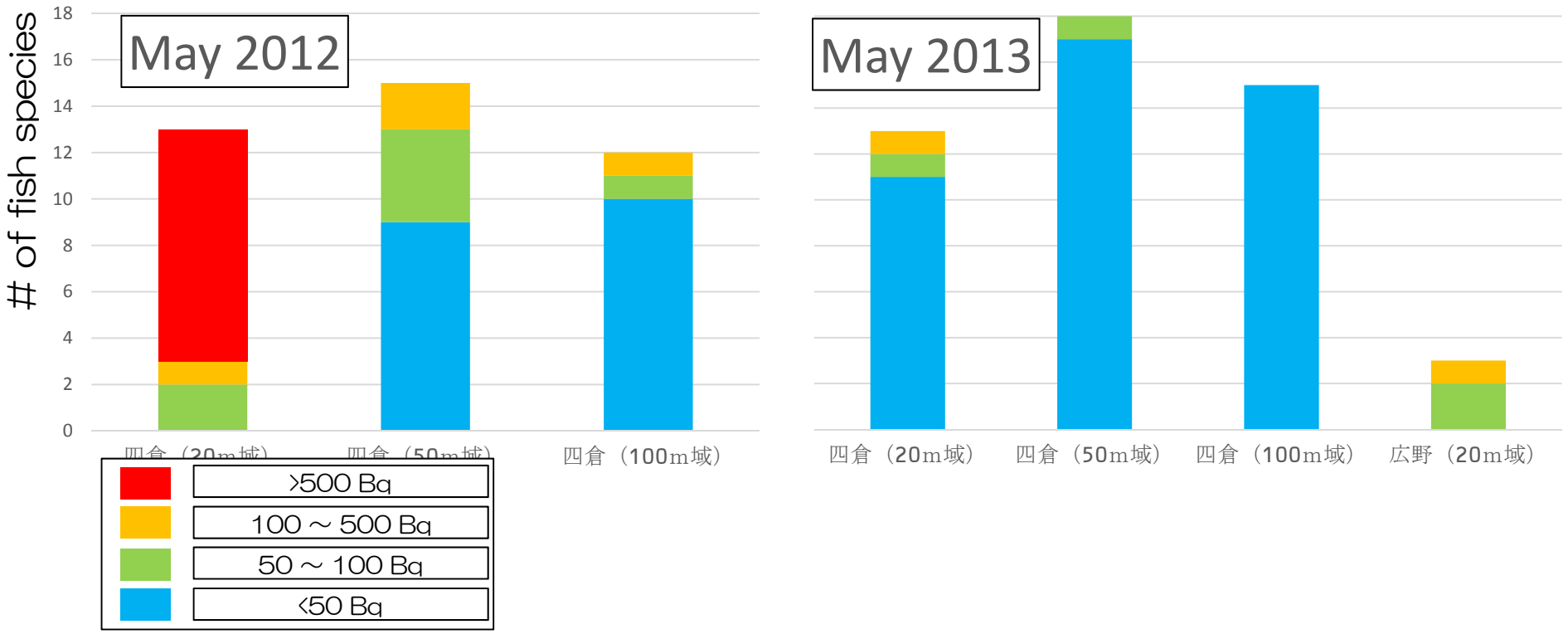

こんにちは
メーユです！
プロジェ
グランメーユ
大槌の復興から世界へひろがる海洋研究




市民公開講座「さーもん・かふえ2012」
三陸サケの復興を願って

Radioactive contamination from TEPCO, F1NPS

Cs contamination of demersal fish off Yotsukura, Fukushima prefecture (geometric mean)



- 20m zone: 11 fishes were over food regulation level (100 Bq/ww kg) in 2012. Only 1 species in 2013 (common skate) （193 Bq/kg-wet）

3. Cs contamination in cod

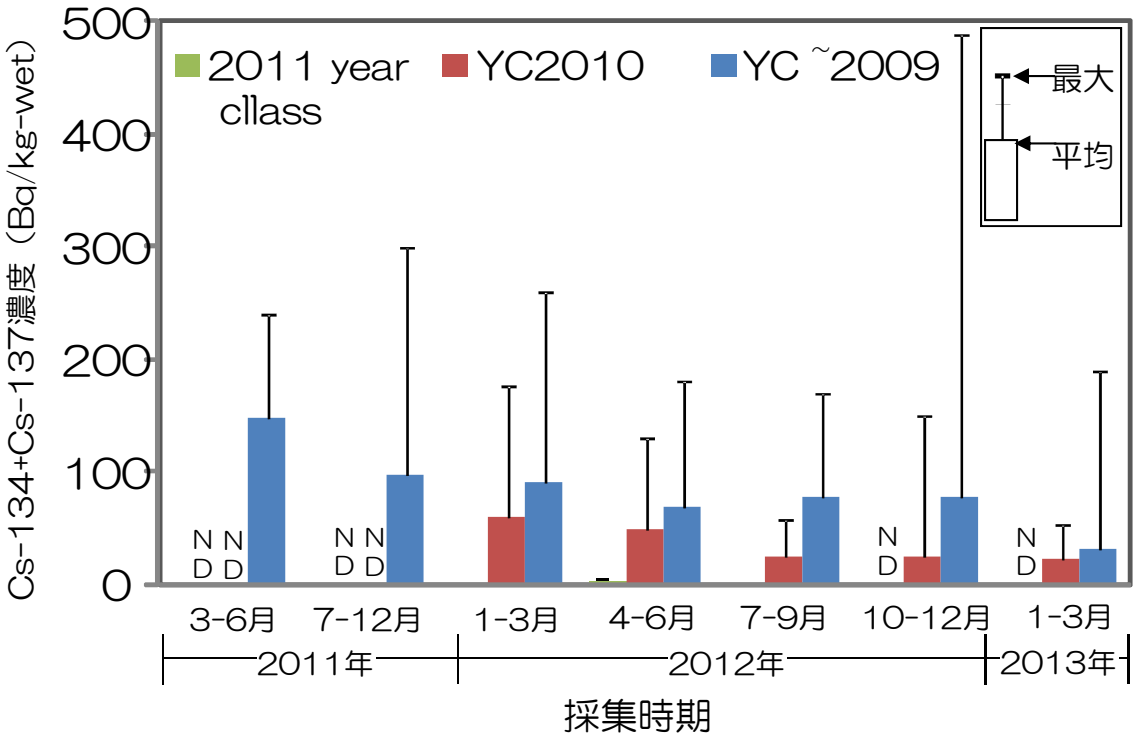
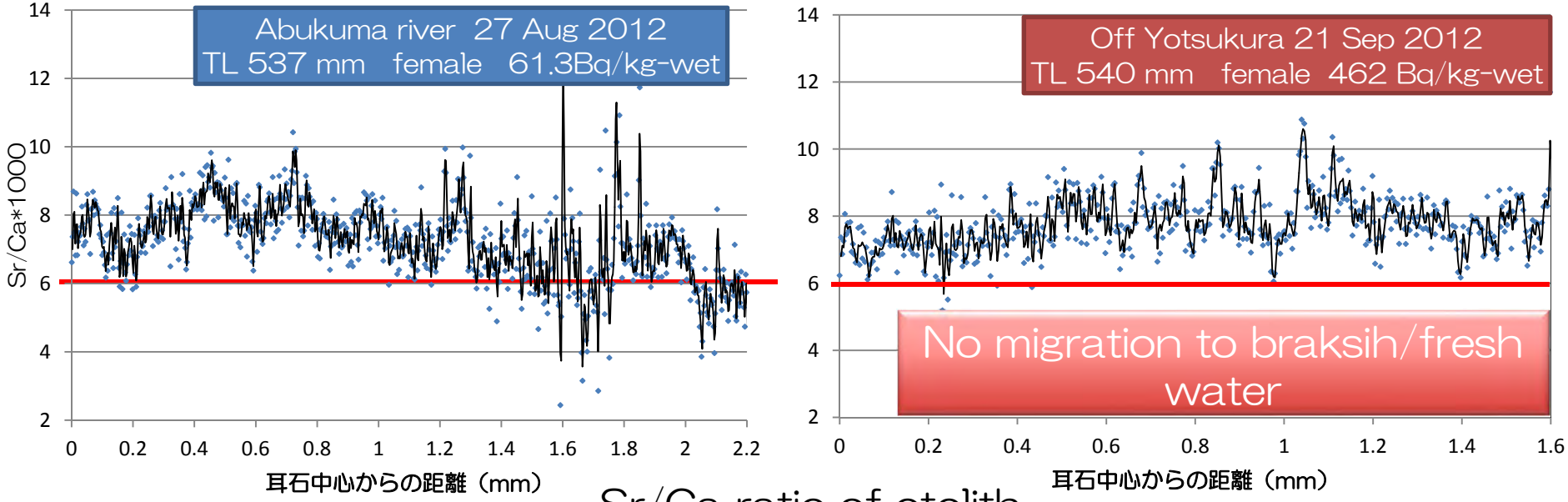


図. 年級別Cs濃度の時系列変化

- Low Cs contamination of 2011YC
- Cs level of 2009 YC, 2010YC gradually decrease.
- Cod (and olive flounder) Cs level of 2012+ YC were low, suggesting Cs contamination after 2012 from water and prey were in low level.

4. Cs contaminatin of sea bass: Does migration into fresh water increase contamination level?



Sr/Ca ratio of otolith

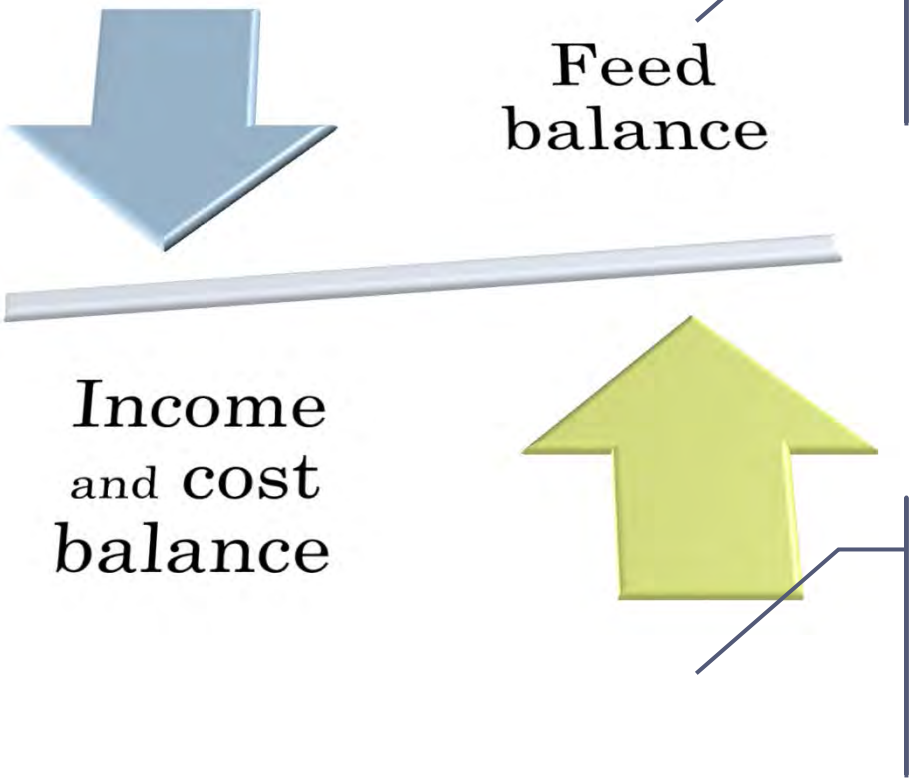
- Cs contamination of fishes distributed in blakish water are not always high. Large variability in Cs level in sea bass, Kurodai sea bream.
- Cs level of prey organisms of sea bass is comparable to salt water region.
- Sr/Ca stable isotope ratio shows no clear relationship between Cs level and migration behavior into river.

◆ Limited specimen with high Cs level in sea bass and black sea bream are not due to the utilization of brakish/fresh water region.

Utilization of natural scientific knowledge to fisheries management

Optimum capacity of scallop in Mutsu Bay

TASC Total allowable Scallop Catch
[:Feed / Business management simulation]



① Ecological view

Feed environment

1) primary production
2) inflow of organic substances

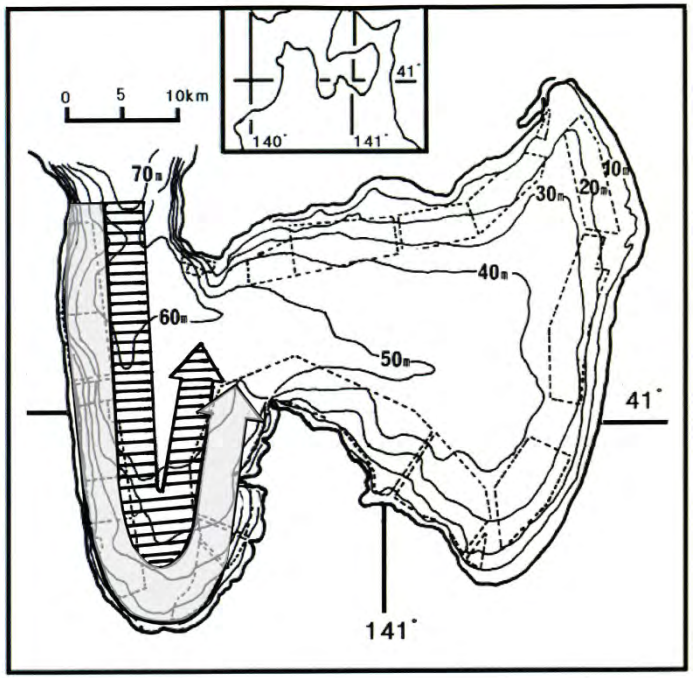
TASC quantity

② Business Management view

Income and cost simulation

1) price function
2) cost analysis

Optimum capacity as ecological analyze



Yoshida, Kosaka (2002) Aomori Fisheries research center

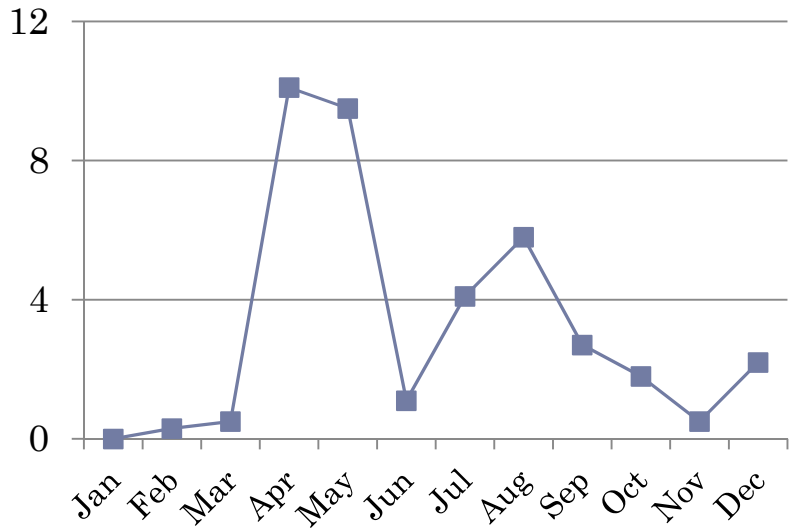


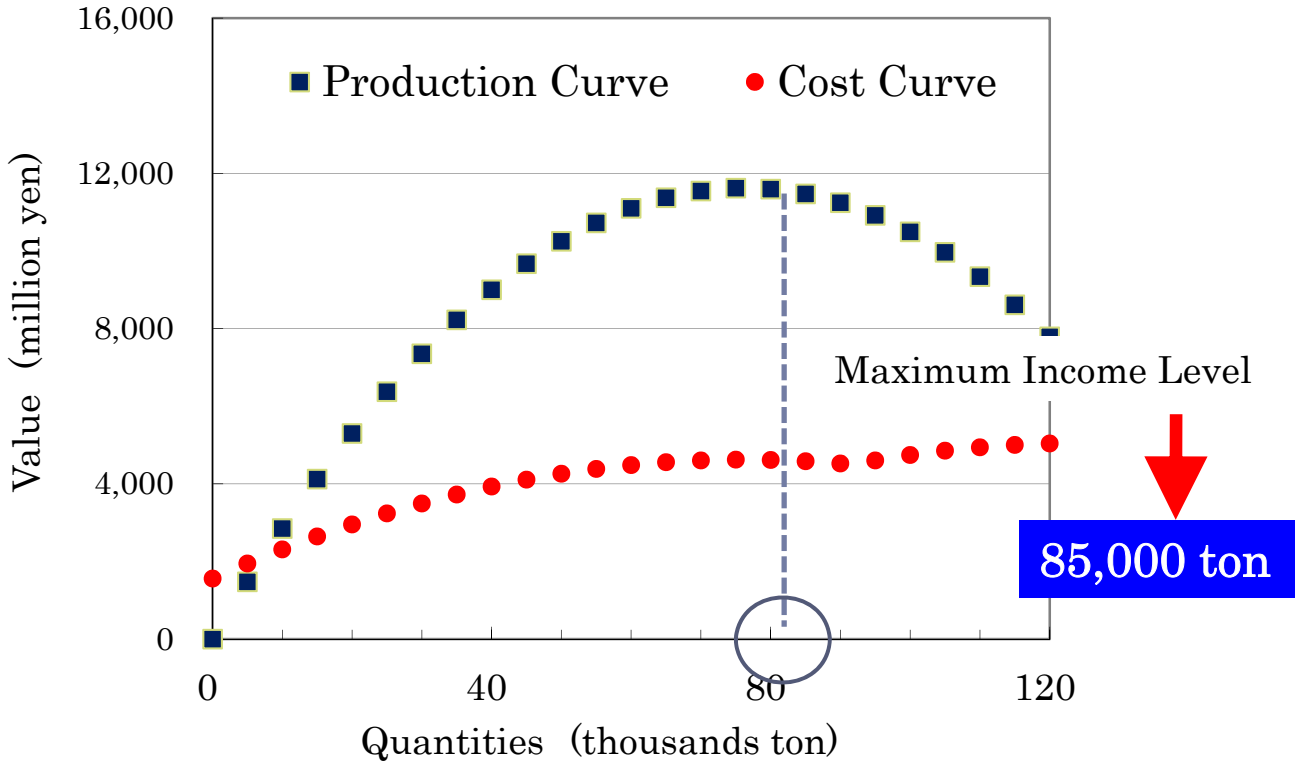
Fig change of inflow organic and primary production

Ecological analyze
1) primary production
2) inflow of organic substances

Total Allowable Scallop Culture capacity
83,711(ton)+5,860(ton)=89,571(ton)
Primary Inflow

Optimum capacity as business management

Income and cost simulation
1) Production function
2) Cost analysis



Process to agreement with stakeholders

Prefectural government

Researchers

Meeting 23times

Fisheries cooperative Association

Sectional meeting

Meeting 20 times

20 Fisheries cooperative Association

Participants : 840 peoples

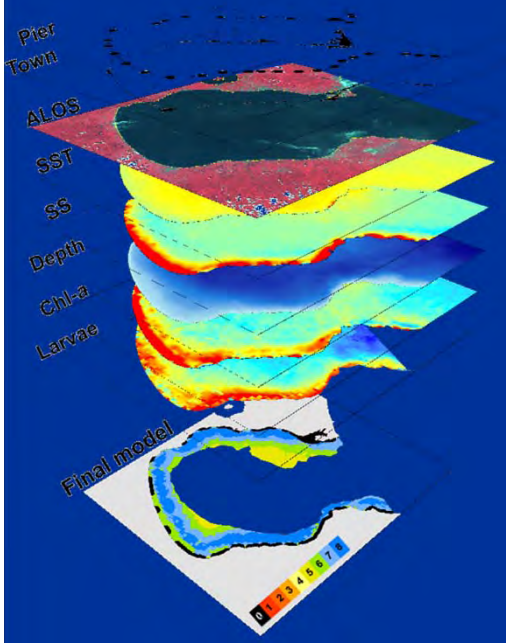
All concerned : 1,291 fishers

Agreement 90,000ton / year

函館マリンバイオクラスター
hakodate-marine-bio.com

Faculty of Fisheries Hokkaido University 1907

Development of integrated coastal fisheries information system for sustainable fisheries in southern Hokkaido, Japan



Sei-Ichi Saitoh[1,2], Toru Hirawake[1], I Nyoman Radiarta[1,3], Tomonori Isada[1], Robinson Mugo[1,4], Fumihiro Takahashi[2], Ichiro Imai[1], Yasunori Sakurai[1], Michio J. Kishi[1], Masaaki Wada[5], Toshiyuki Awaji[6,7], and Yoichi Ishikawa[7]

ssaitoh@salmon.fish.hokudai.ac.jp

[1] Graduate School of Fisherise Sciences, Hokkaido University
[2] Green & Life Innovation, Inc
[3] Research Center for Aquaculture, Agency for Marine and Fisheries Research, Jakarta, Indonesia
[4] Kenya Marine and Fisheries Research Institute, Kenya.
[5] School of Systems Information Science, Future University-Hakodate
[6] Data Research Center for Marine-Earth Sciences, JAMSTEC

Daily basis Data Flow to Fishermen

Earth Simulator

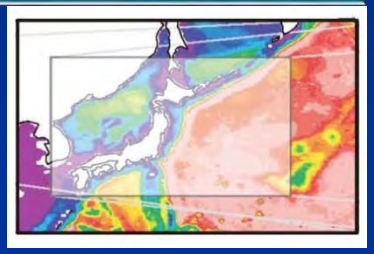
Buoy

Satellite

Meteorological

Data Assimilation

JAMSTEC

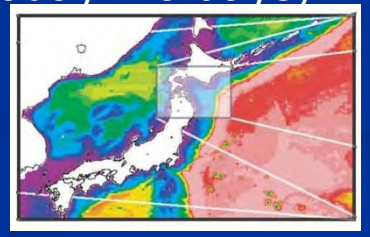


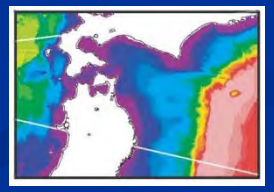
Boundary condition
(once / month)

京都大学 KYOTO UNIVERSITY

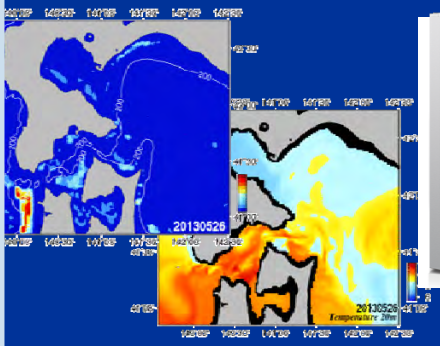
Kyoto Univ.

Model Output
(Today + 5 days)





Prediction Map using spatial model
(Today + 3 days advance)



Internet/Cloud

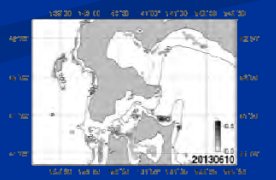
Web Users

Hokkaido Univ.

Squid fishing Association

By e-mail

FAX



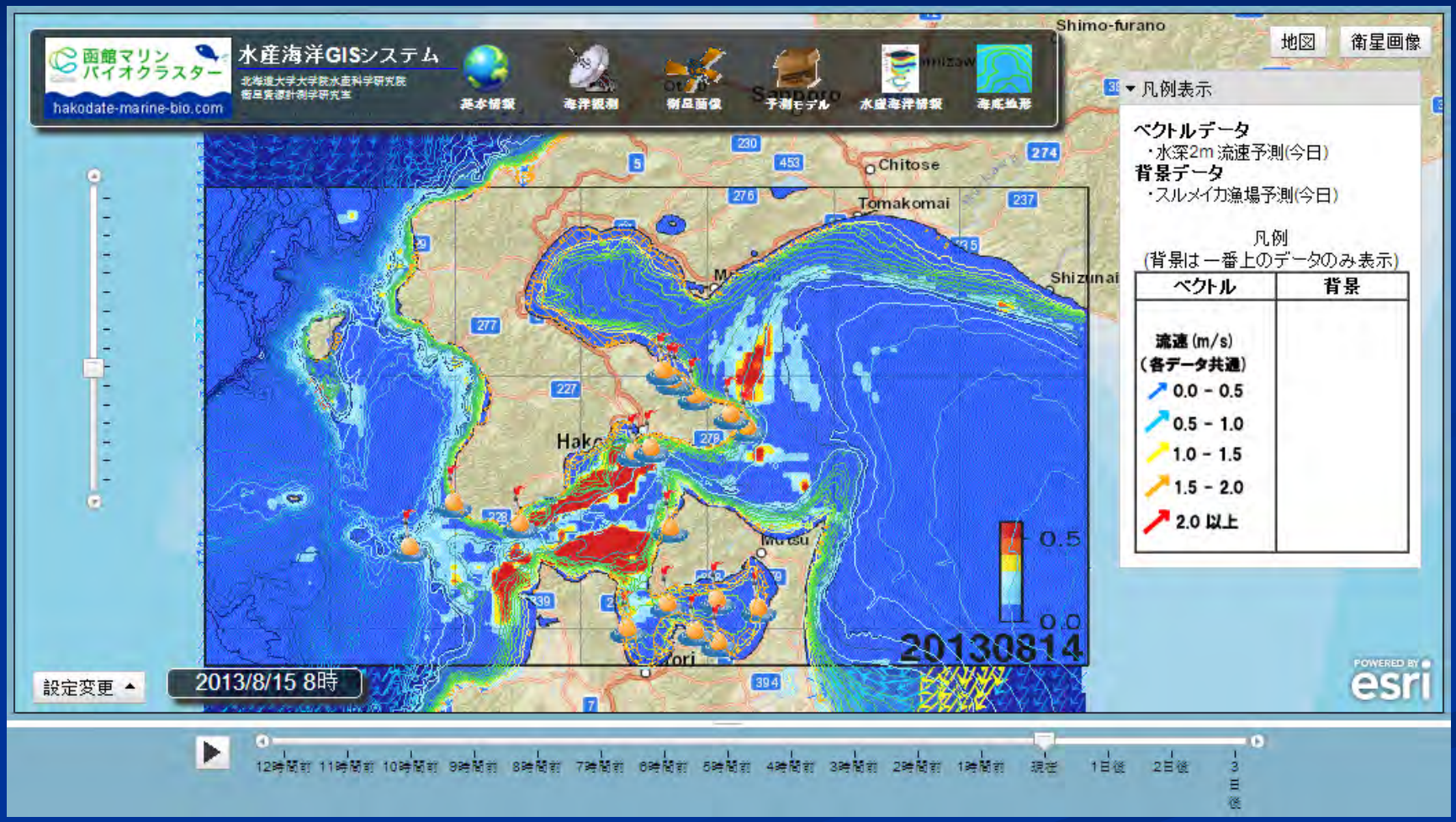
北海道大学 HOKKAIDO UNIVERSITY

Operation of Fisheries Web

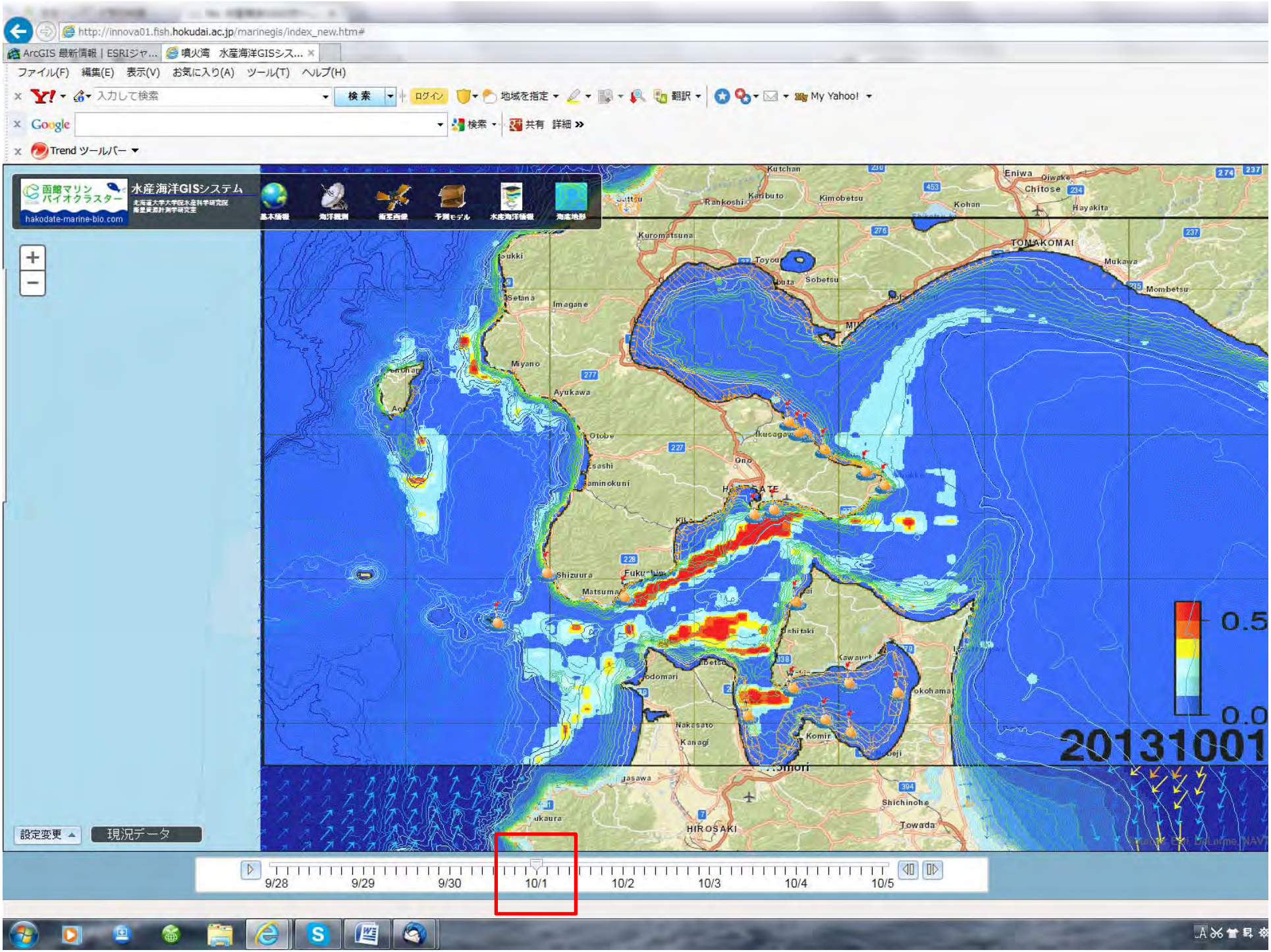
Fisheries Assoc

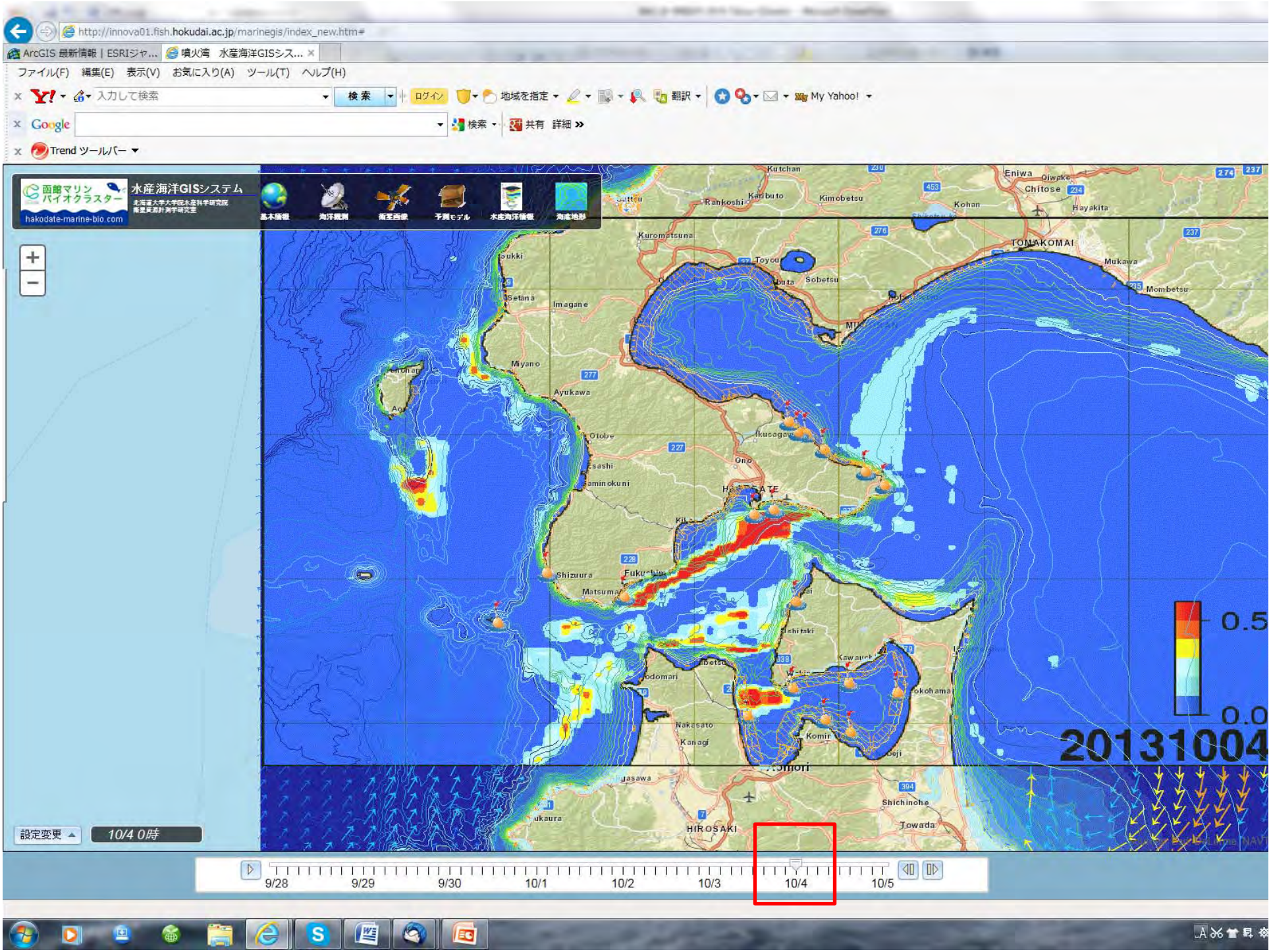
Practical application of the prediction model

Prediction map on our website



http://innova01.fish.hokudai.ac.jp/marinegis


http://innova01.fish.hokudai.ac.jp/marinegis/index_new.htm#
ArcGIS 最新情報 | ESRIジャ...
噴火湾 水産海洋GISシス...
ファイル(F) 編集(E) 表示(V) お気に入り(A) ツール(T) ヘルプ(H)
入力して検索
検索
ログイン
地域を指定
翻訳
My Yahoo!
Google
検索
共有 詳細 »
Trend ツールバー
函館マリンバイオクラスター
水産海洋GISシステム
北海道大学大学院水産科学研究院
東京東部計測学研究室
hakodate-marine-bio.com
基本情報
海洋観測
衛星画像
予測モデル
水産海洋情報
海底地形
Kutchan
Rankoshi
Kimobetsu
Kohan
Eniwa
Oiwake
Chitose
Hayakita
Kuromatsuna
Toyou
TOMAKOMAI
Mukawa
Sobetsu
Mombetsu
Setana
Imagane
Miyano
Ayukawa
Otobe
Esashi
Ono
Shizuura
Matsuma
Hakodate
Kawauchi
Yokohama
Nakasato
Kanagi
Komir
Shichinohe
Towada
HIROSAKI
0.5
0.0
20131001
設定変更
現況データ
9/28
9/29
9/30
10/1
10/2
10/3
10/4
10/5


http://innova01.fish.hokudai.ac.jp/marinegis/index_new.htm#
ArcGIS 最新情報 | ESRIジャ...
噴火湾 水産海洋GISシス...
ファイル(F) 編集(E) 表示(V) お気に入り(A) ツール(T) ヘルプ(H)
入力して検索
検索
ログイン
地域を指定
翻訳
My Yahoo!
Google
検索
共有 詳細 »
Trend ツールバー
函館マリンバイオクラスター
水産海洋GISシステム
北海道大学大学院水産科学研究院
東京海洋大学海洋環境学研究室
hakodate-marine-bio.com
基本情報
海洋観測
衛星画像
予測モデル
水産海洋情報
海底地形
Kutchan
Rankoshi
Kimobetsu
Kohan
Eniwa
Oiwake
Chitose
Hayakita
Kuromatsunai
Toyoura
Sobetsu
TOMAKOMAI
Mukawa
Mombetsu
Setana
Imagane
Miyano
Ayukawa
Otobe
Ono
HAKODATE
Shizuura
Matsumae
Hakodomari
Nakasato
Kanagi
Komi
Yokohama
Shichinohe
Towada
HIROSAKI
0.5
0.0
20131004
設定変更
10/4 0時
9/28
9/29
9/30
10/1
10/2
10/3
10/4
10/5

Faculty of Fisheries Sciences, Hokkaido University

- **Started to build in Autumn 2012 and finish in July 2014 : August 1, 2014**
- **Total tonnage: 1600 ton >(Oshoro-maru IV 1396 ton)**
- **Total length: 78 meter >(Oshoro-maru IV 72 meter)**
- **Embarkation Capacity: Officers 12, Crews 20, Researchers 7, Students 60**

R/V Shinsei Maru

December 2013

Hakodate Research Center for Fisheries and Oceans

Opening in June 2, 2014

Faculty of Fisheries Sciences, Hokkaido University

FUTURE Objectives

Objective 1 (scientific understanding)

- Answer the three key scientific questions

  more interdisciplinary projects

Objective 2. Status Reports, Outlooks, Forecasts and Engagement

- The production of *Status Reports, Outlooks and Forecasts.*
- *Engagement:*