

Existing and Planned Programs of the Russian Academy of Sciences related to FUTURE

- Regional Programs
- Federal Programs
- Major study areas in the N. Pacific

Far Eastern Branch of Russian Academy of Sciences (1)

Research Program:

Comprehensive Study of the Far Eastern Seas and
Northwestern Pacific

Objectives:

Comprehensive study of properties and dynamics of water, atmosphere and lithosphere, their interactions, including process in coastal zone, to understand their influence on climate and formation of biological, mineral and energetic resources of the Far Eastern Seas and Northwestern Pacific.

Research Program:

2004-2008 and cont. by 2011

Leading agency:

V.I.Il'ichev Pacific Oceanological Institute, FEB RAS

Far Eastern Branch of Russian Academy of Sciences (2)

Projects related to FUTURE:

P1. Physical processes and climate variability of the Far Eastern Seas

Objectives:

- assessment of current status,
- understand key physical processes responsible for multi scale variability,
- formation of an effective monitoring system and unified information data base

P5. Biogeochemical study of marine ecosystems

Objectives:

- comprehensive biogeochemical studies of the Far Eastern Seas of Russia, to estimate state of marine ecosystems under natural and human impacts

Federal Program “World Ocean”

Subprogram :

Period:

Research of the nature of the World Ocean

2008-2012

1. Research and assessment of ocean role in abrupt climate changes for effective strategic planning and state safety
2. Impacts of marine environment changes on dynamics of bio-resources and necessary protection actions
3. Priority areas of World Ocean continental slope and bottom for mineral and hydrocarbon resources development
4. Research of ocean related natural hazards and their forecast
5. Possible directions of Russian marine activity under conditions of risks and challenges of globalization
6. Development of modern oceanographic equipment to study World Ocean

Federal Program “World Ocean”

Subprogram :

Research of the nature of the World Ocean

Period:

2008-2012

1. Research and assessment of ocean role in abrupt climate changes for effective strategic planning and state safety

1.1 Anomalies of ocean-atmosphere energy exchange, their relation to global ocean circulation and influence on **European climate**

1.2 Current state and variability of the **North Pacific and Far Eastern Seas**. Their role in trans-oceanic exchange and formation of stable climatic regimes and anomalies

1.3 Global climatic changes and their consequences in the **Arctic** region

Federal Program “World Ocean”

Subprogram :

Research of the nature of World Ocean

Period:

2008-2012

2. Impact of marine environment changes on dynamics of bio-resources of the Russian Seas and necessary protection actions

2.1 Marine ecosystems and technologies of biological resources protection under growing natural and anthropogenic impacts

2.2 Ecologic and economic consequences of the invasion of stranger, harmful and toxic organisms and their influence on Russian shelf ecosystem

Major Study Areas in the North Pacific

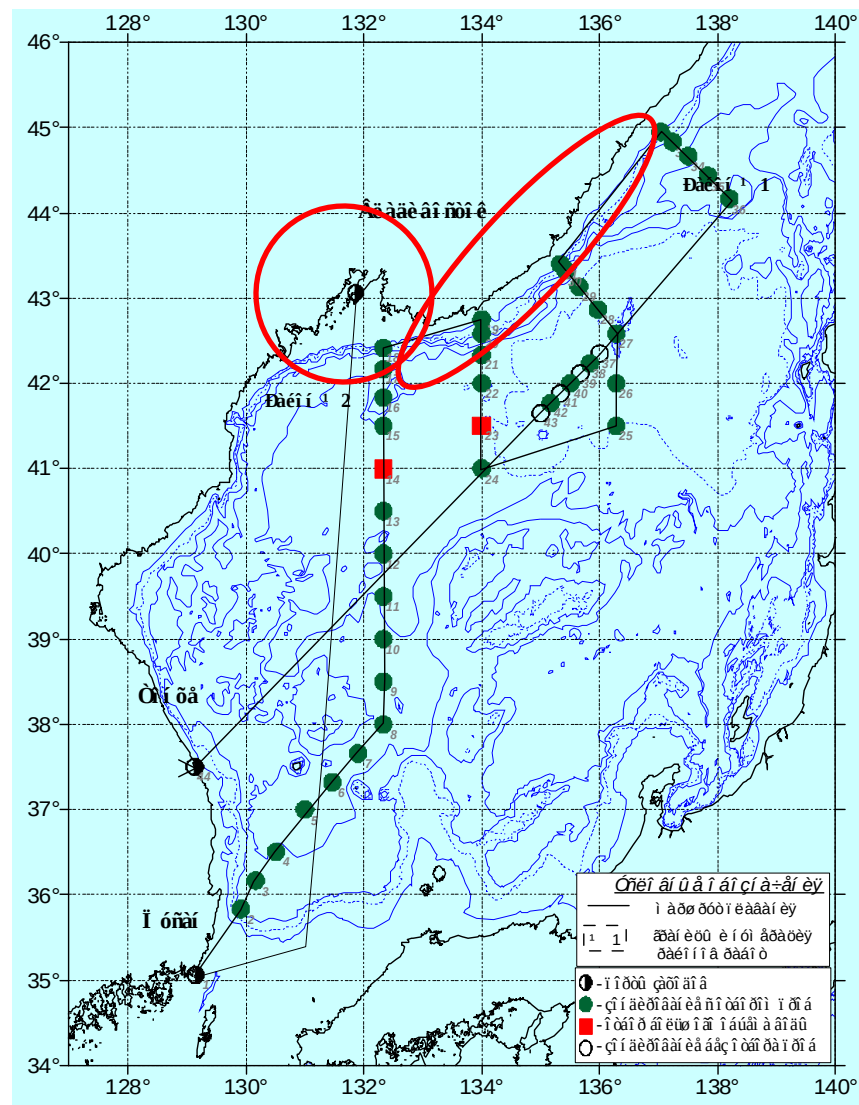
- Japan/East Sea in changes
- Critical or Fast changing coastal areas of JES
 - Peter the Great Bay
 - Primorye upwelling area
 - Tumangan River Inputs
 - Amur River Estuary

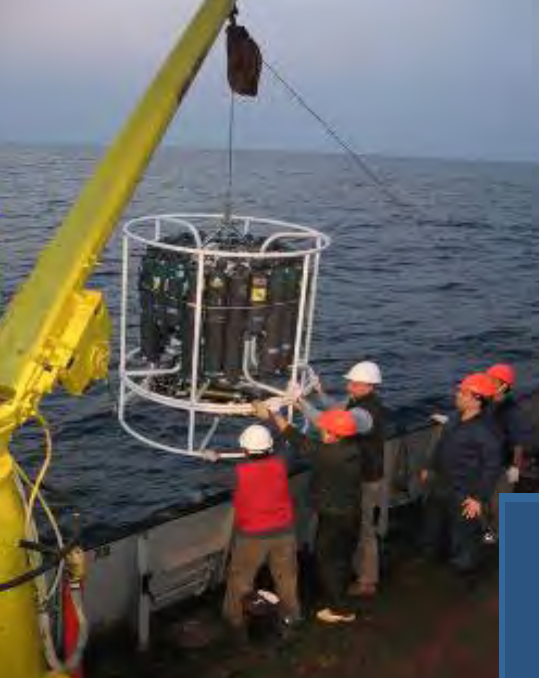
Japan/East Sea in Changes

(incl. CREAMS/PICES EAST-I program)

Main projects:

1. Monitoring for climatic changes: (water mass properties, ECS water advection, deep and bottom water formation, etc.) 2009-2010
2. Primary production multi-scale variability and its physical causes: interannual, seasonal and mesoscale
3. Geochemical processes in the bottom layer: oxygen depletion zone along continental slope
4. Physical and hydrochemical drivers of coastal ecosystem dynamics (incl. upwelling, ice formation, river discharge)





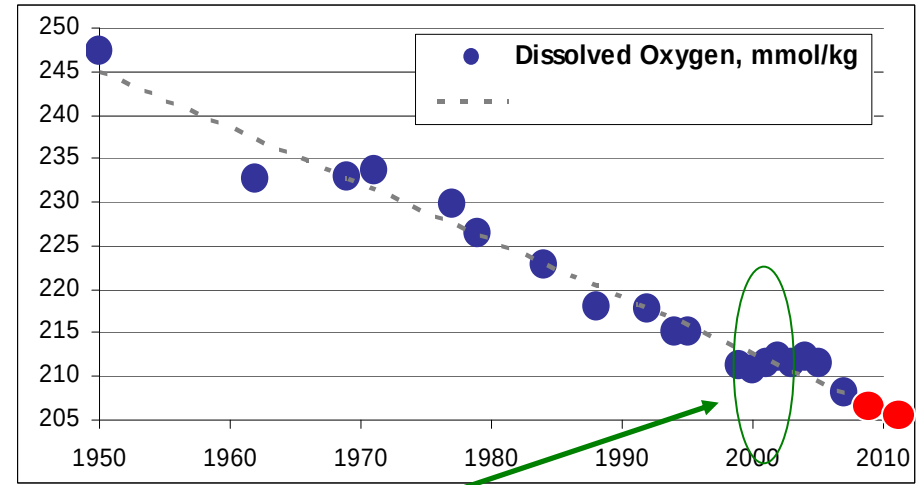
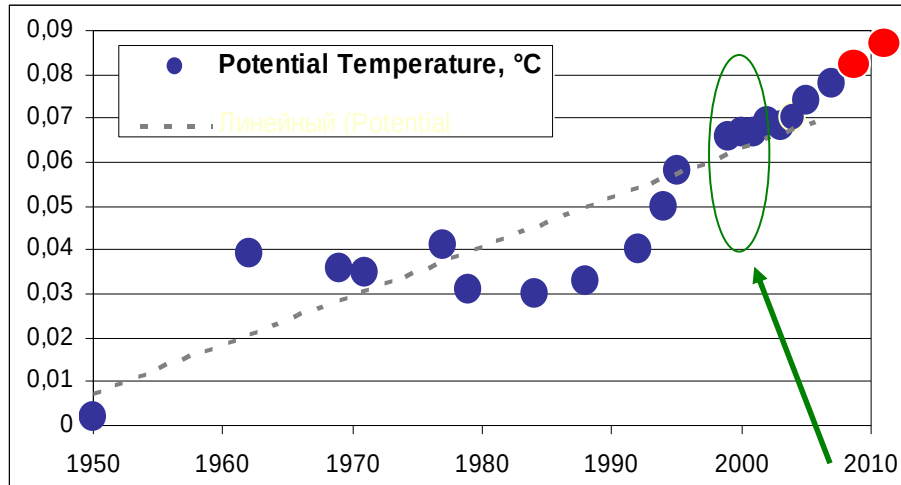
CREAMS/PICES
EAST-I program
time series for JES
Now with plankton!



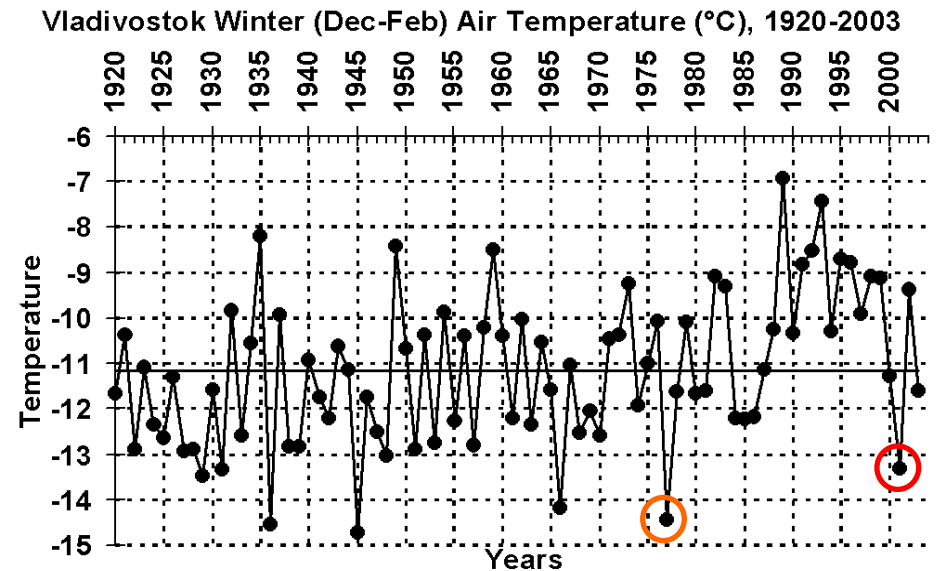
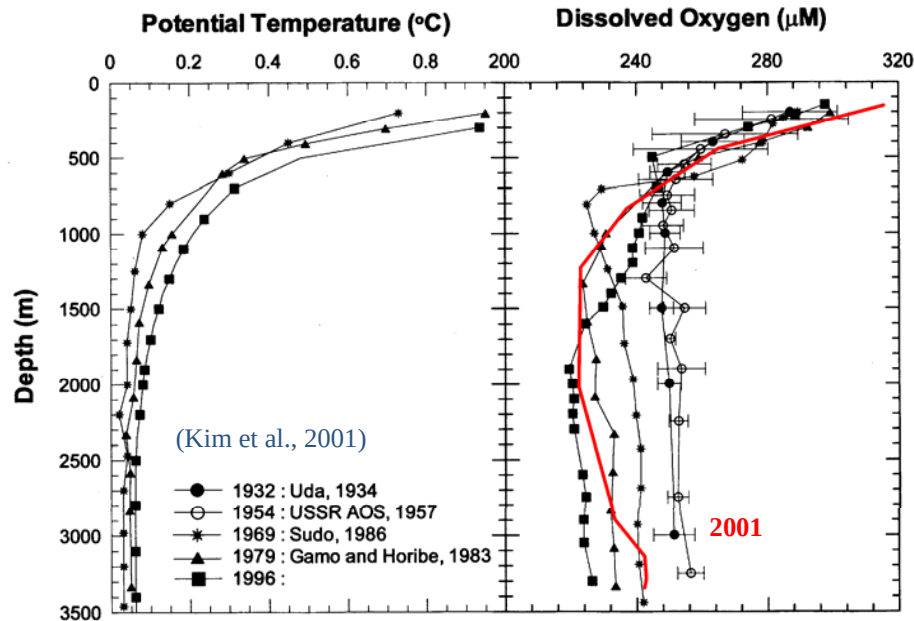
JES in Changes: activities of 2010

- Ga46 cruise (Feb-Mar, winter processes)
- Ga47 cruise (May, bottom water renewal)
- KH-10-02 cruise (Jun-Jul, Asian GEOTRACES)
- La51 cruise (Aug, shelf/slope deep basin bio)
- La53 cruise (Oct, NE JES)

Bottom water changes 1950-2010- keep warming



Ventilation of 2001



Critical or Fast changing coastal areas of Northern JES

A satellite map of the Northern Japan Sea Ecosystem (JES) showing the coast of Japan and the surrounding waters. Four specific areas are highlighted with white circles: Peter the Great Bay, Tumangan River, Upwelling Area, and Amur River Estuary. A white arrow points to the Amur River Estuary area in the top right corner.

- Peter the Great Bay ESD
- Primorye upwelling area
- Tumangan River Inputs
- Amur River Estuary

Amur River Estuary

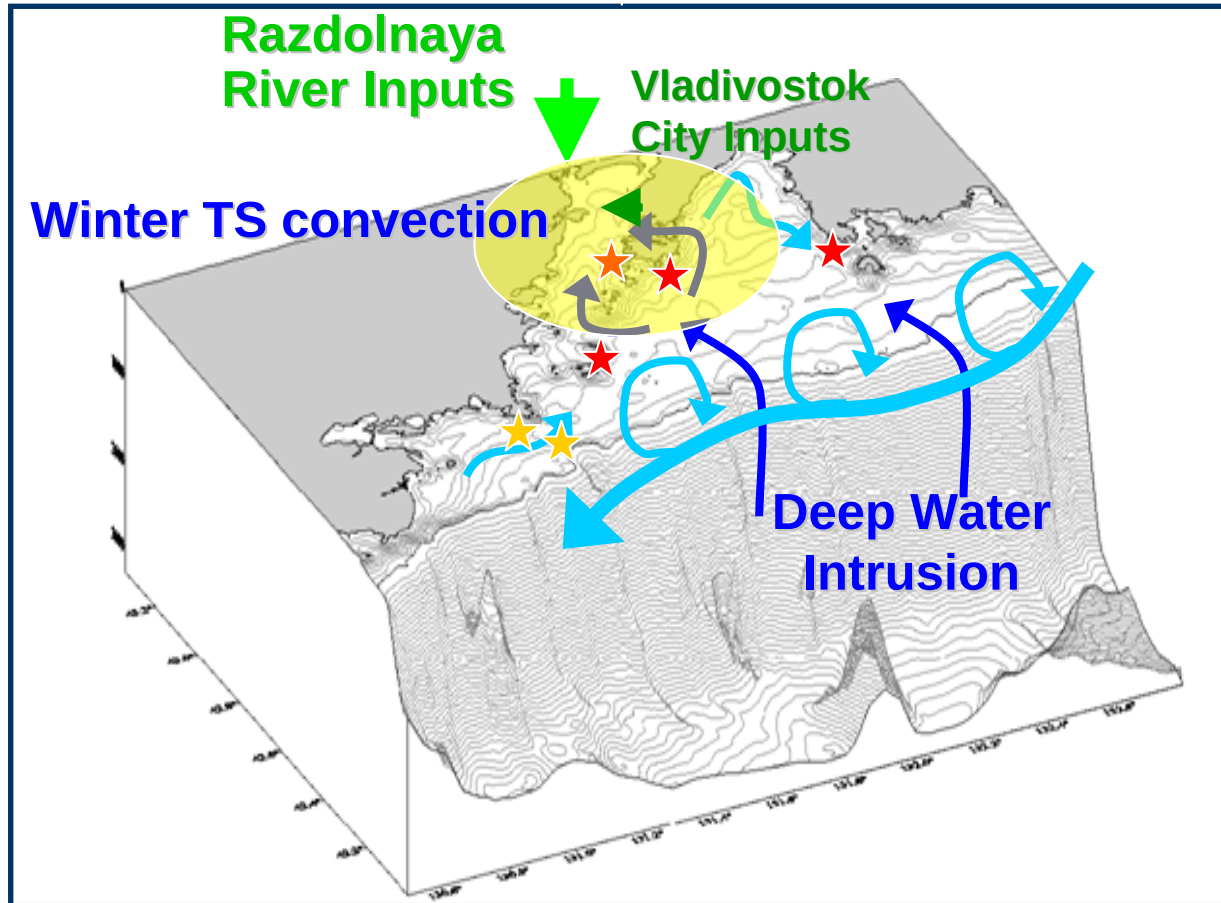
Peter the Great Bay
Ecosystem Dynamics

Upwelling Area

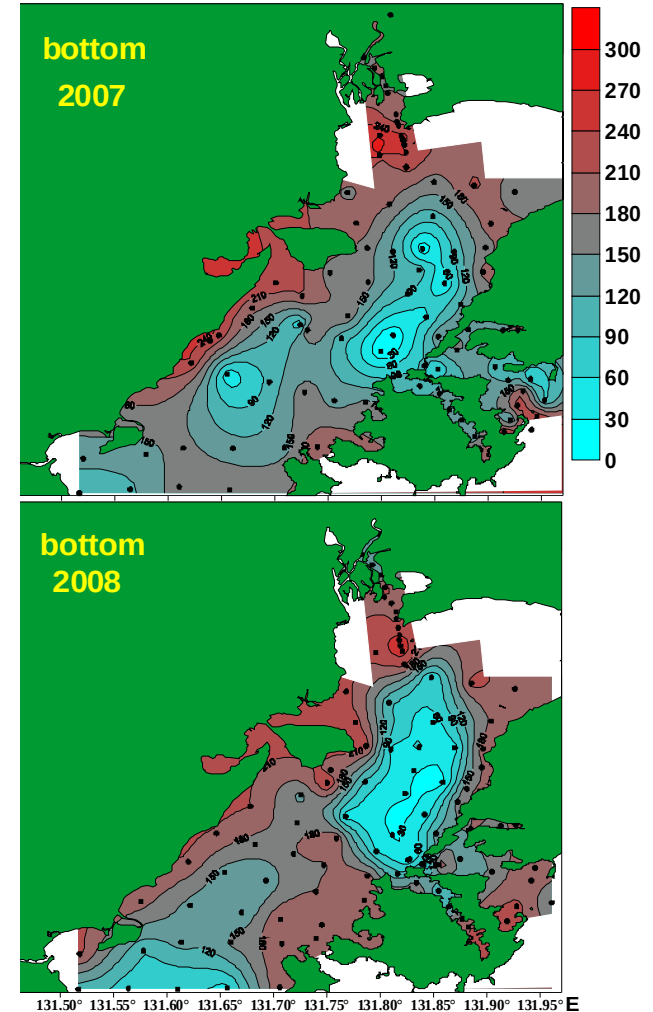
Tumangan River

Peter the Great Bay Ecosystem Dynamics:

2010: winter processes, ventilation, ice impacts on bio



Key questions: eutrophication, hypoxia formation and ventilation processes under natural and anthropogenic impacts



Strong hypoxia event occurred in 2007 and 2008 summer off Vladivostok

Impacts of ice formation and melting processes

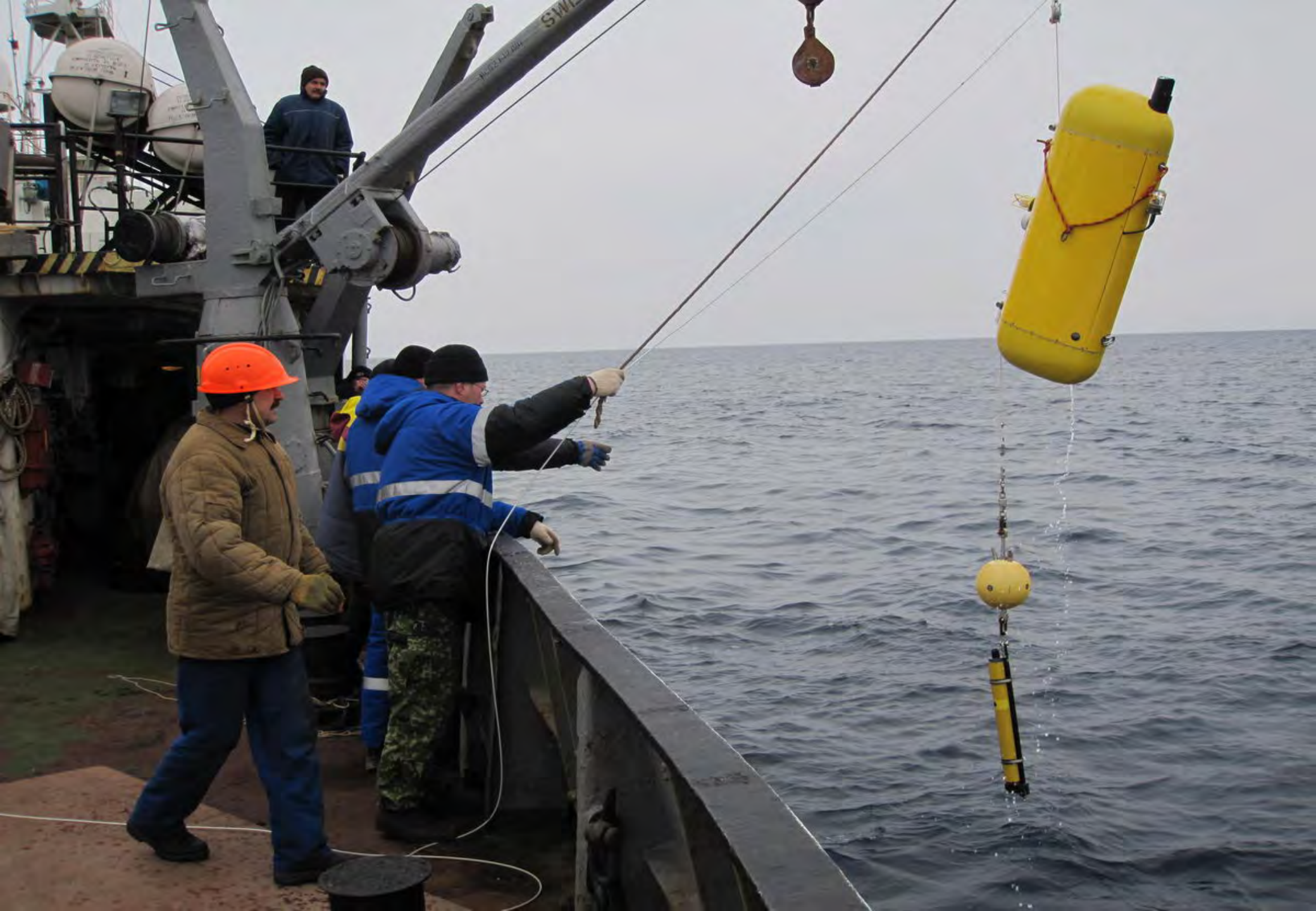


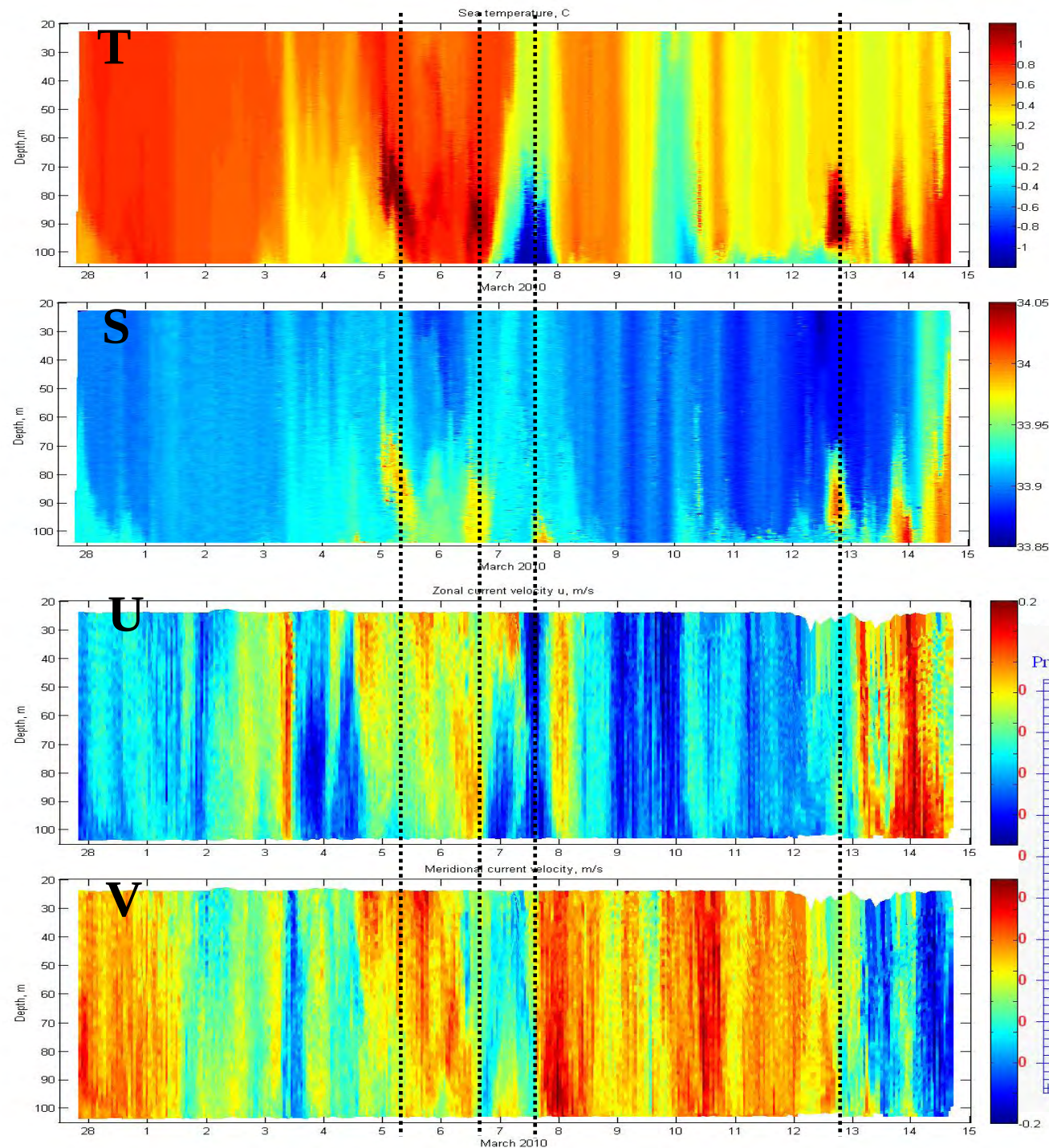
Передача данных и команд в реальном времени



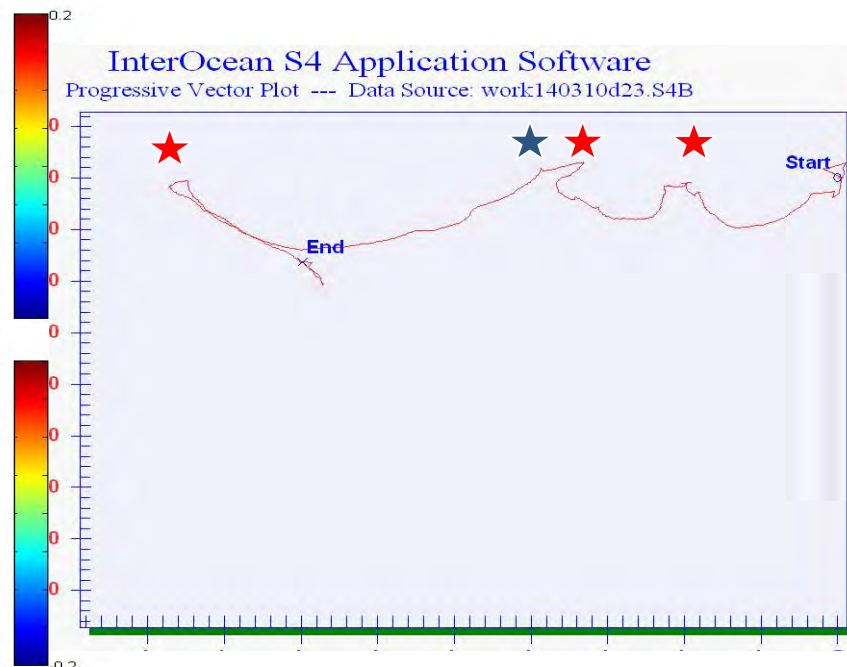
АЗК «Аквалог»

P.P. Shirshov Oceanol. Inst. RAS

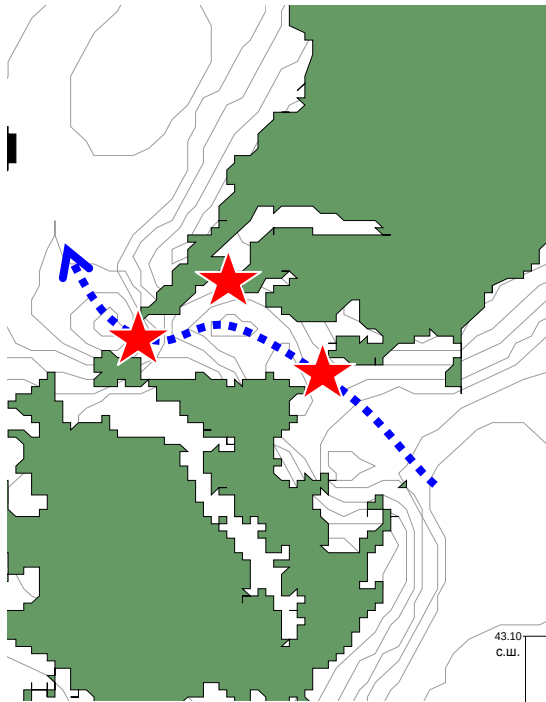




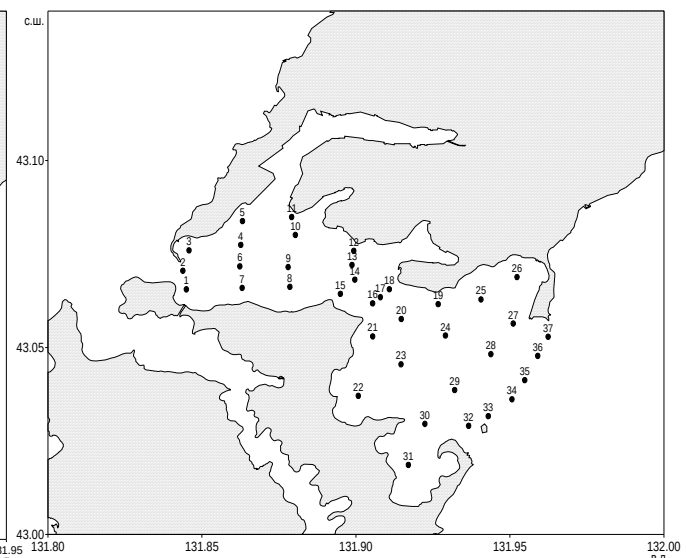
High salinity water transport was associated with eddy like currents along slope of the Peter the Great Bay



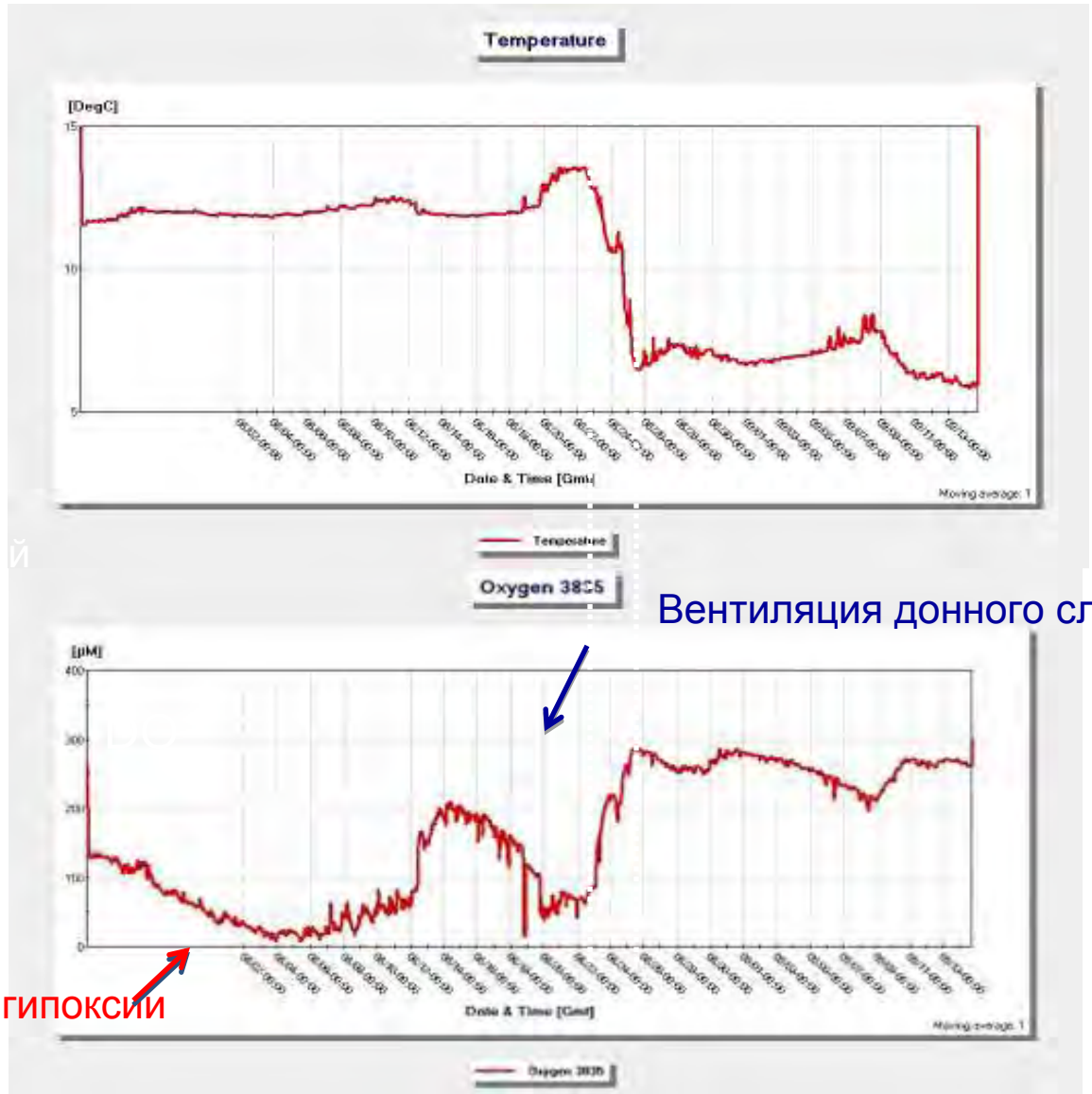
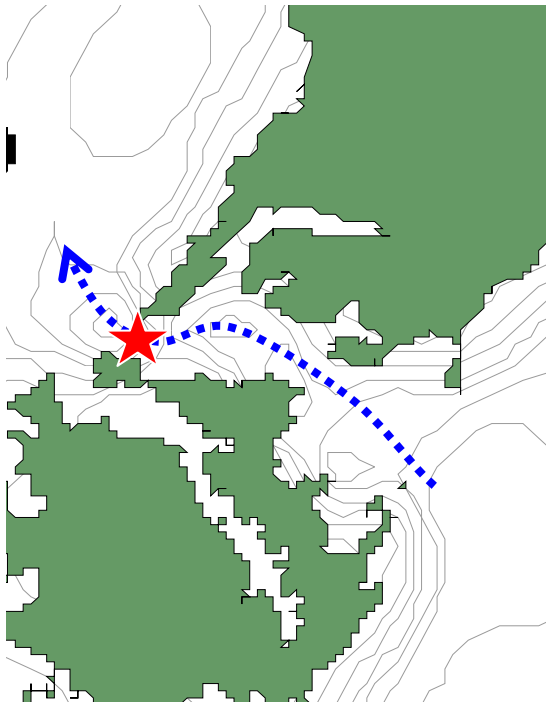
APEC-2012 Coastal Constructions Impacts: water exchange of Amursky and Ussuriysky Bays



- СТД- съемки
- Кратковременные и
долговременные
постановки



Bosfor Vostohchny Strait: Formation and abrupt removal of hypoxia (23.07-14.09. 2009)



Different scenarios of Summer-Fall 2008 and 2009

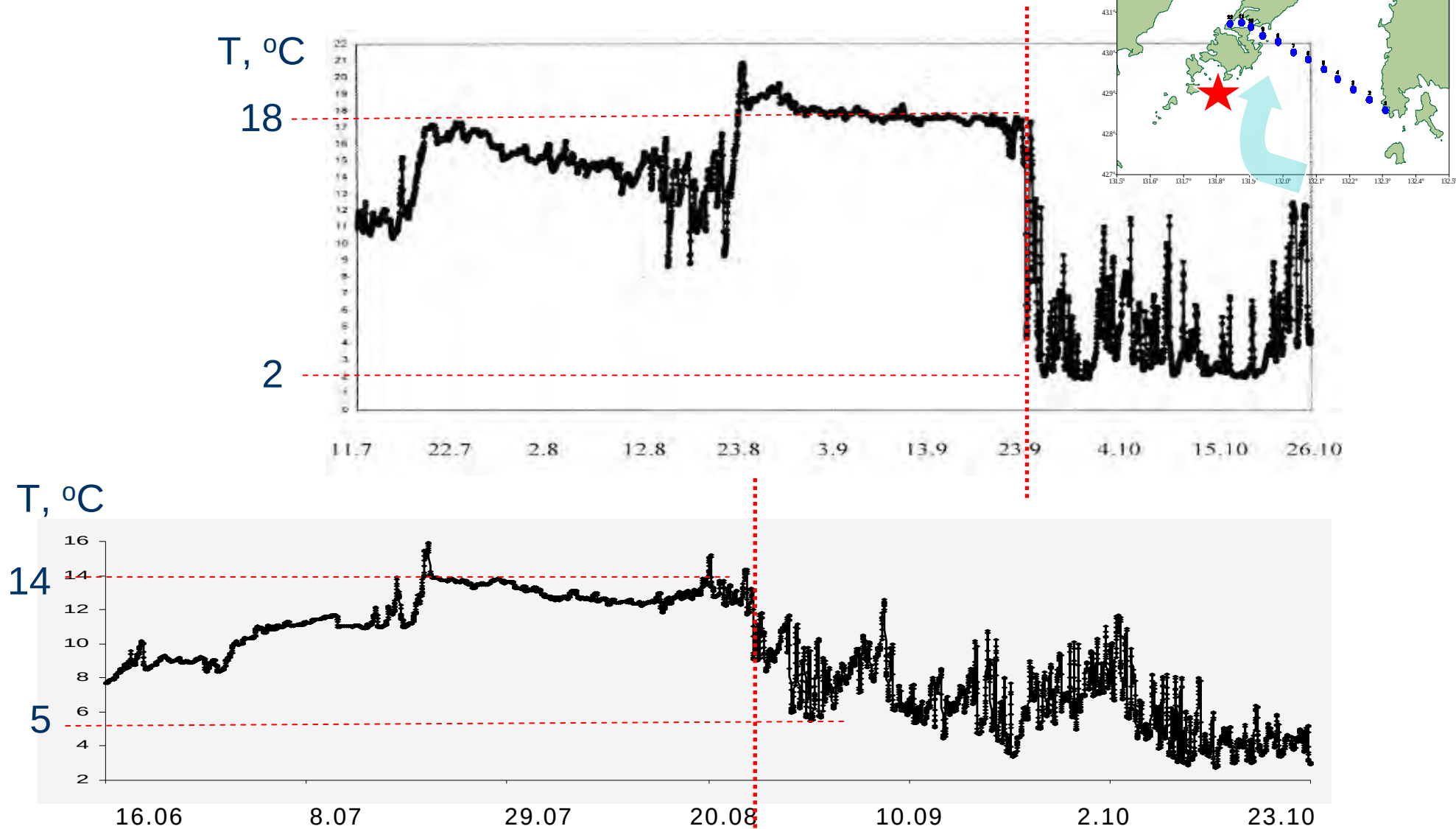


Рис. 9. Изменение температуры в придонном слое южной части пролива Старка 26.06-23.10.2009.

Critical or Fast changing coastal areas of Northern JES

- Peter the Great Bay ESD
- Primorye upwelling area
- Tumangan River Inputs
- Amur River Estuary

Peter the Great Bay
Ecosystem Dynamics

Amur River Estuary

Upwelling Area

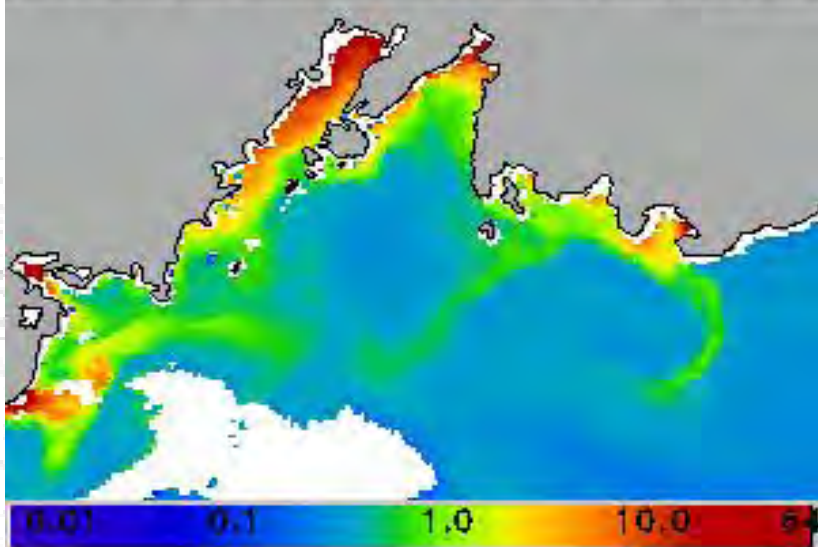
Tumangan River



2008/08/04 03:43(GMT)(0.01~64mg/m3)

130°

44°



134°

135°

136°

(RAW)

200.00

150.00

100.00

50.00

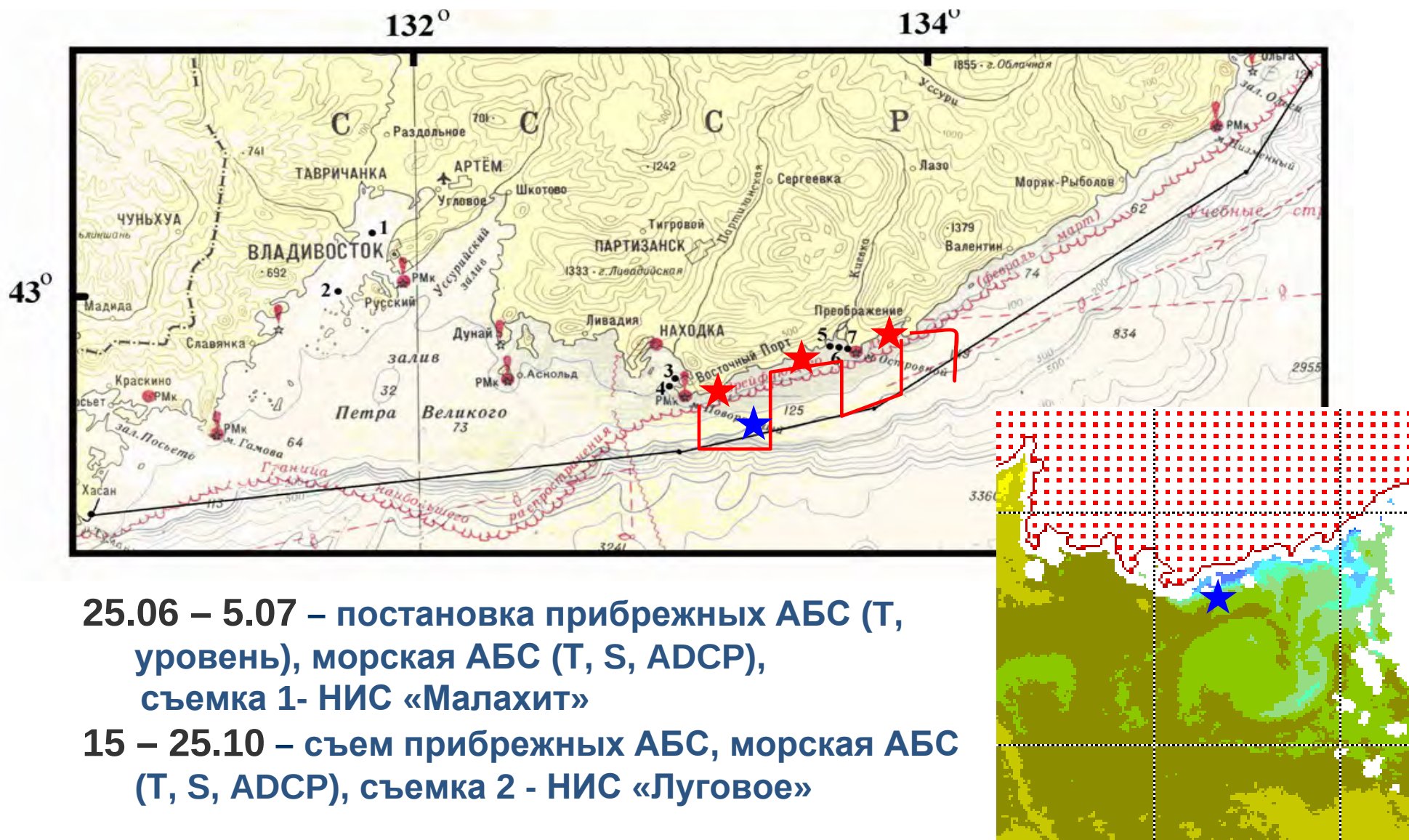
10.00

43°

42°

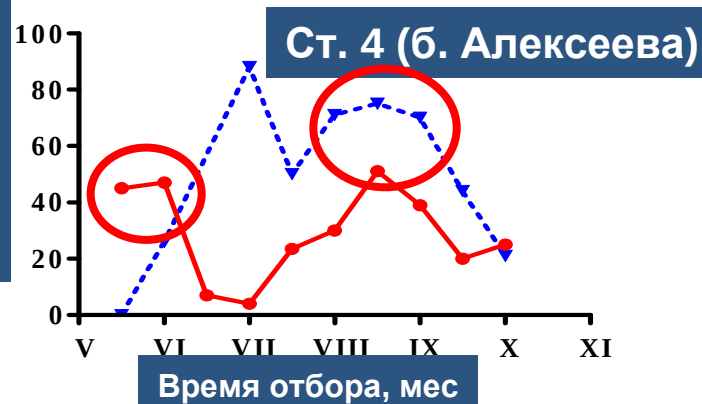
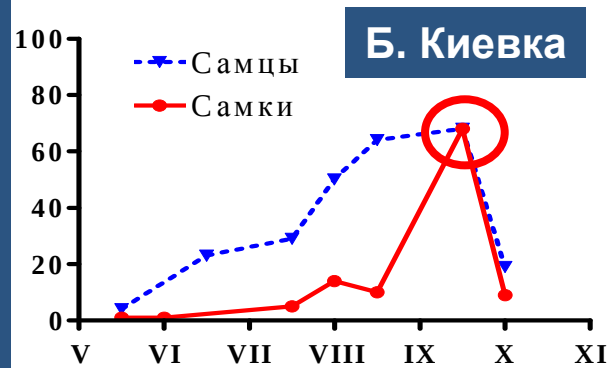
Survey Plans for Primorye Upwelling Area (2010-2012)

(Сергеев А.Ф., Тищенко П.Я.)



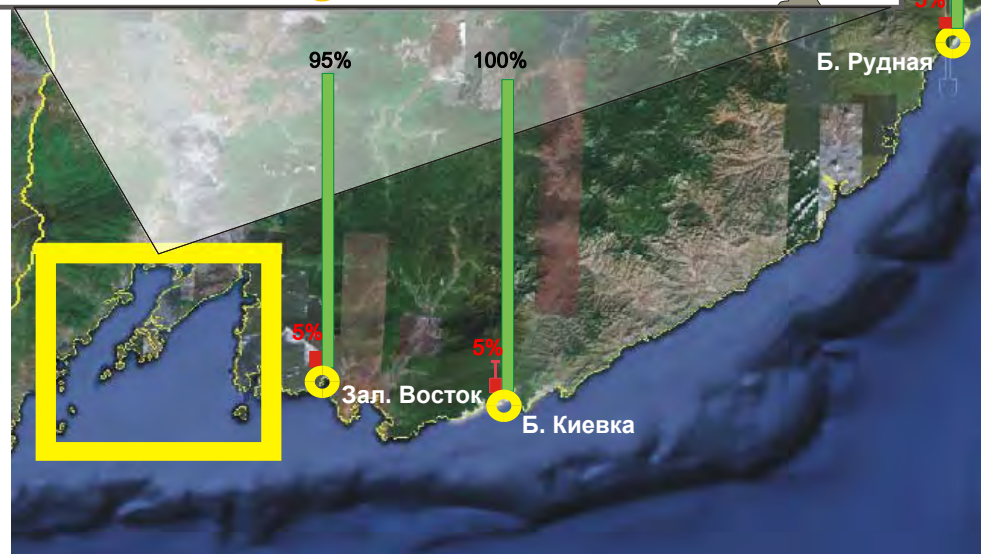
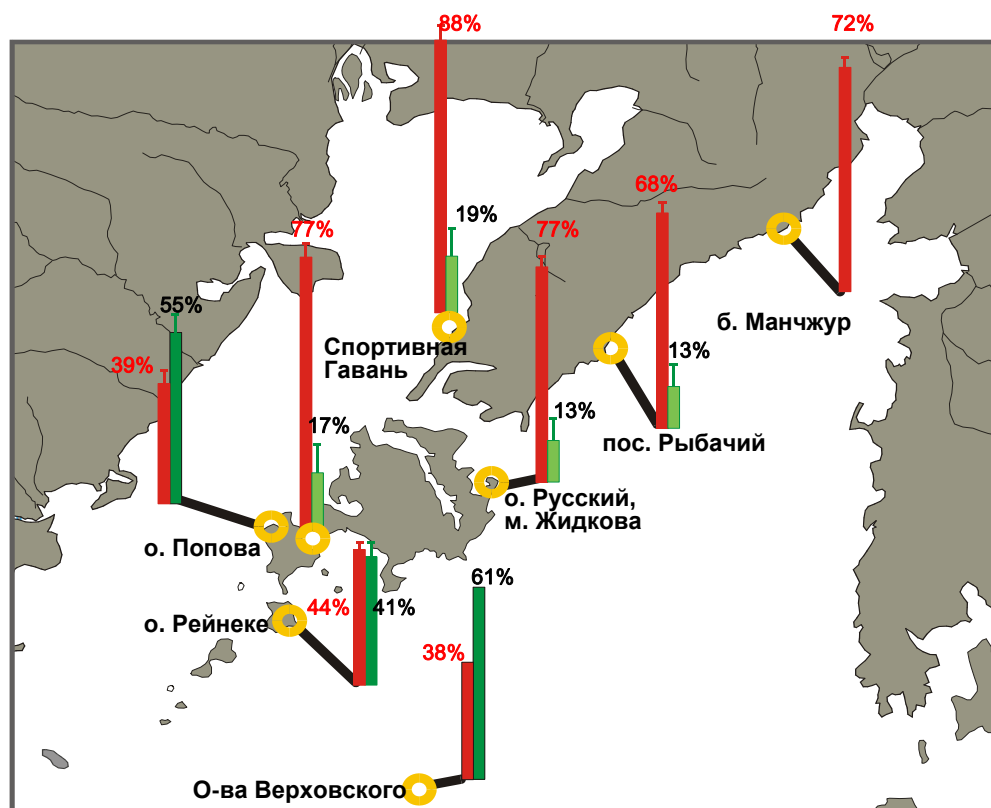
Оценка изменения состояния экосистемы залива на основе мониторинга репродуктивного цикла морских ежей

Доля самцов и самок со зрелыми половыми клетками, %



Обнаружены аномалии в сроках нереста, проявляющиеся с большей интенсивностью в последние годы в районах с высокой антропогенной нагрузкой (смещение сроков нереста с осени на весну)

Динамика созревания половых клеток у морского ежа *Strongylocentrotus intermedius*, обитающего в экологически чистом (б. Киевка), сильно загрязненном (Спортивная Гавань) и слабо загрязненном (б. Алексеева) районах Японского моря, в 2007 г.



Районирование состояния экосистемы залива на основе мониторинга репродуктивного цикла морских ежей

Обнаружено смещение сроков нереста морских ежей по влиянием загрязнения с осени на весенне-летний период. Исследования ТОИ и ИБМ 2003-2009 гг.

На основе этого явления, разрабатывается чувствительный, экологически значимый и простой метод оценки качества морской среды доступный широкому кругу водопользователей

Красный- весенние съемки (аномальный нерест)
 Зеленый – осенние съемки (нормальный нерест-15 сент.)
 Амурский, Русский-Попова – с 2003
 Киевка с2007, Рудная, Восток , Уссур.– 2009
 Ежемесячный отбор апрель -дек. (Алексеева, Спорт-гавань – круглый год) 100-150 ежей
 80-е гг не отмечалось аномалий в Уссур заливе (Хотимченко и др. 1993)
 Изменение репродуктивного цикла донных беспозвоночных (десинхронизация, смещение сроков нереста)

Critical or Fast changing coastal areas of Northern JES

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Peter the Great Bay
Ecosystem Dynamics

Amur River Estuary

Upwelling Area

Tumangan River



Mesoscale and submesoscale water dynamics: Tumangan River Inflow – transport, mixing, enrichment, bloom



Рисунок 2 - Изображение юго-западной части залива Петра Великого, прилегающей к заливу Посьет, в видимом диапазоне спектра со сканера MODIS спутника AQUA. По максимальной интенсивности рассеяния выделяются прибрежные воды, находящиеся под влиянием стока р. Туманная, а также особенности синоптической и мезомасштабной динамики вод.

Дубина В.А.

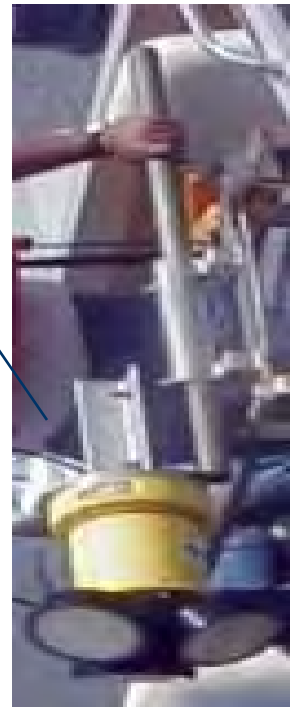


Акустический
размыкатель Benthos
(2 шт.)

Буксировка ADP250

Кассета батометров
SBE 55 ECO (4 л, 6
шт.)

Зонд SBE 19 *plus* с
датчиками T, S, DO,
Flu, Turb, PAR, Alt



Amur River Impacts on adjacent marine areas: climate variability, ecosystem dynamics, environmental quality

Goal: status, interactions and variability of major physical, chemical and biological components from microbes to higher trophic levels

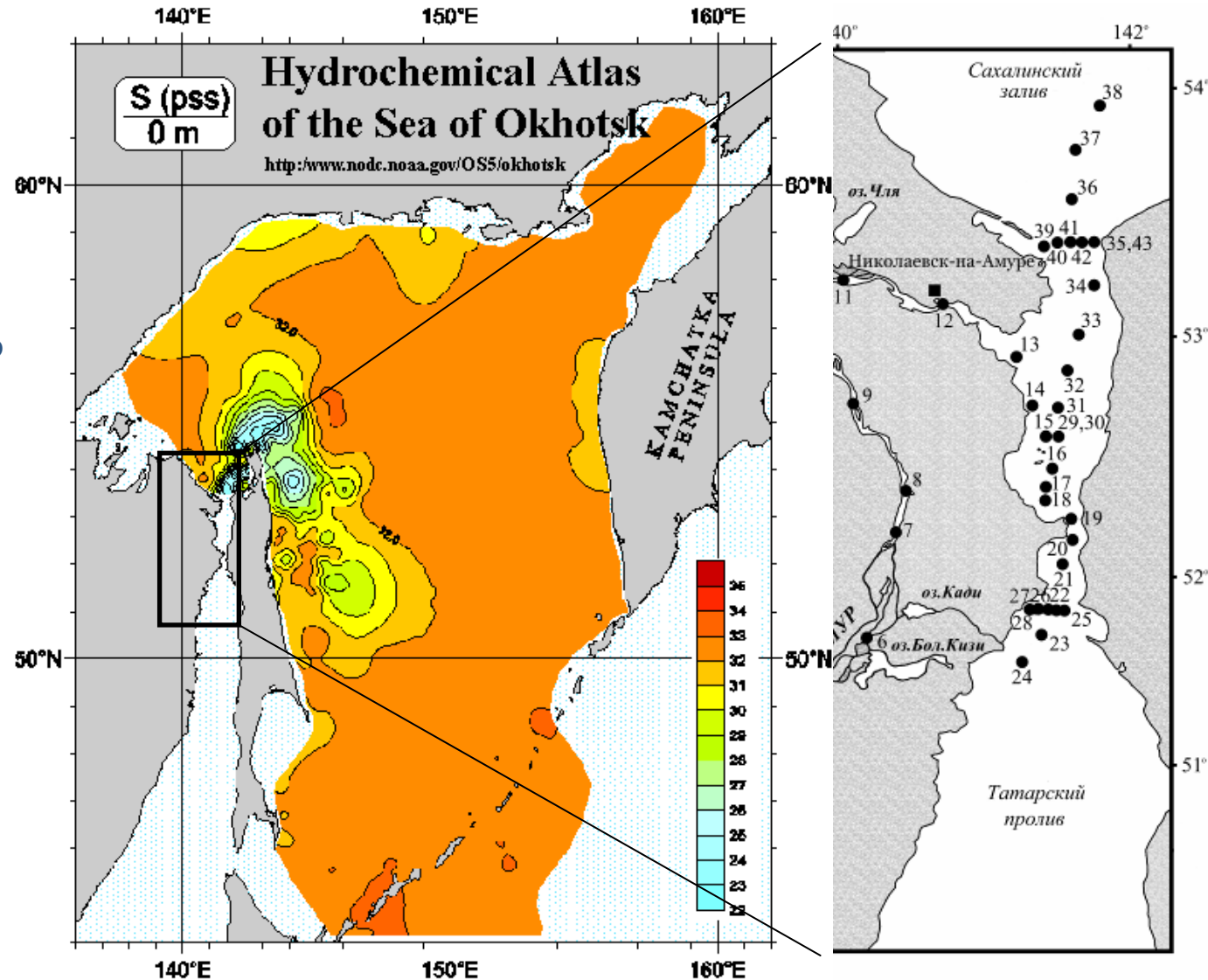
Participants: POI, IMB, IWP
FEB RAS

Completed:

5 surveys in 2005-2008,
various phases of
discharge cycle, incl. ice
winter survey

Planning:

More comprehensive
surveys, detailed sampling
in Fall 2009



Russian Research Programs in the Northwestern Pacific and its marginal seas

