ECOSUPPORT General Assembly 2010
Hörsalen, SMHI, Norrköping 15 October 2010

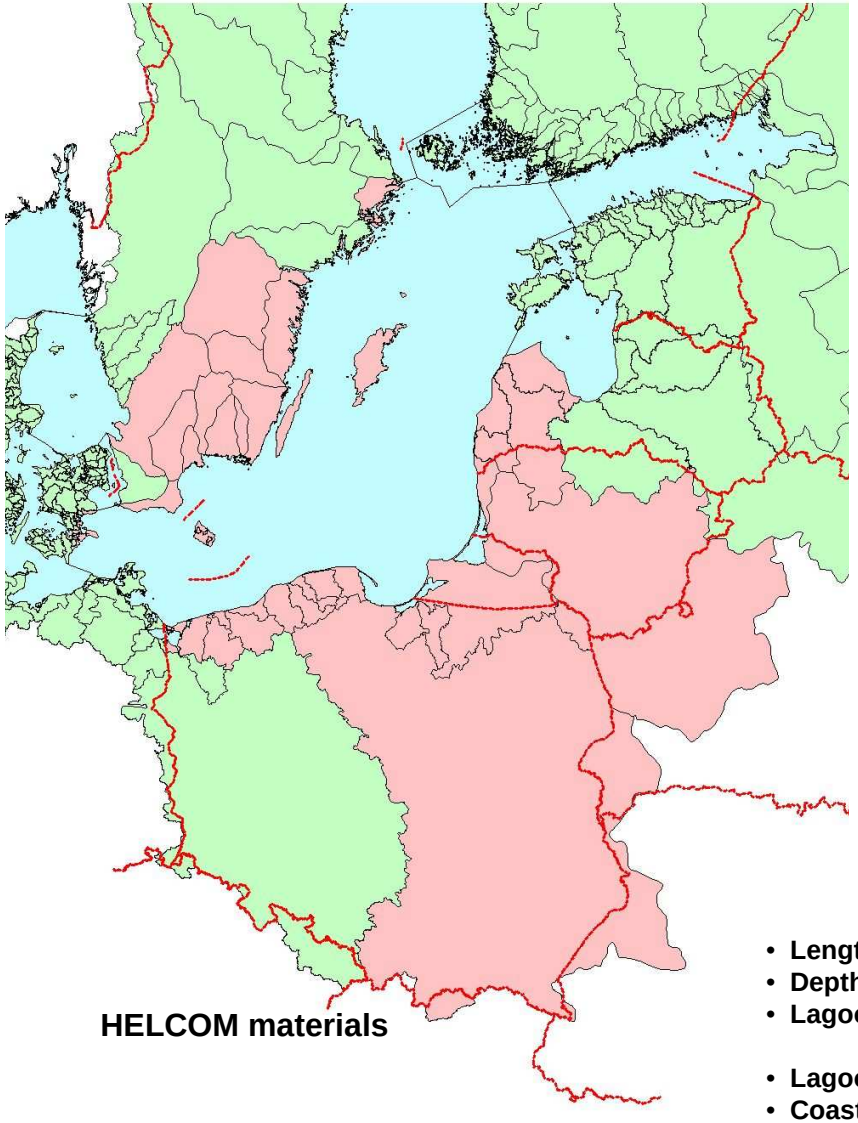
The investigation is supported by Russian Fund for Basic Researches, grant 08-05-92421

ECOSUPPORT in Kaliningrad: Up-today results of WP4

by Boris Chubarenko

Laboratory for Coastal Systems Study
Atlantic Branch of P.P.Shirshov Institute of Oceanology
Kaliningrad, Prospect Mira, 1; chuboris@mail.ru

ECOSUPPORT General Assembly 2010,
Hörsalen, SMHI, Norrköping 15 October 2010



HELCOM materials

The Vistula Lagoon

Vistula Lagoon:

- **Length - 90 km, width - 2÷11km**
- **Depth: 0.5 ÷ 5.2 m, 2.7 m (average)**
- **Lagoon area: 838 km^2**
  (Russia 56%, Poland 44%)
- **Lagoon water volume: 2.3 km^3**
- **Coastal line – 270 km**
- **Salinity: 0.1÷6.5, 3.2 PSU (average)**
- **Average retention time: 45 days**

Drainage basin:

- **Catchment area: 23871 km^2**
  (Russia 42%, Poland 58%)
- **Watershed capacity – 15 cm a^{-1}**
- **Rivers: *Pregolia* (44%, 50÷600 m^3/s)**
  ***Prokhladnya, Elblag, Paslka, Nogat, Nelma, etc*.**
- **Population: 1.2 millions**
- **Nutrient load (1996-2002), t a^{-1} :**
  Tot N – 14500, Tot P - 950

"ECOSUPPORT in Kaliningrad: up-today results of WP4" by Boris Chubarenko

WP4: Impact on socioeconomic and regional development, case studies

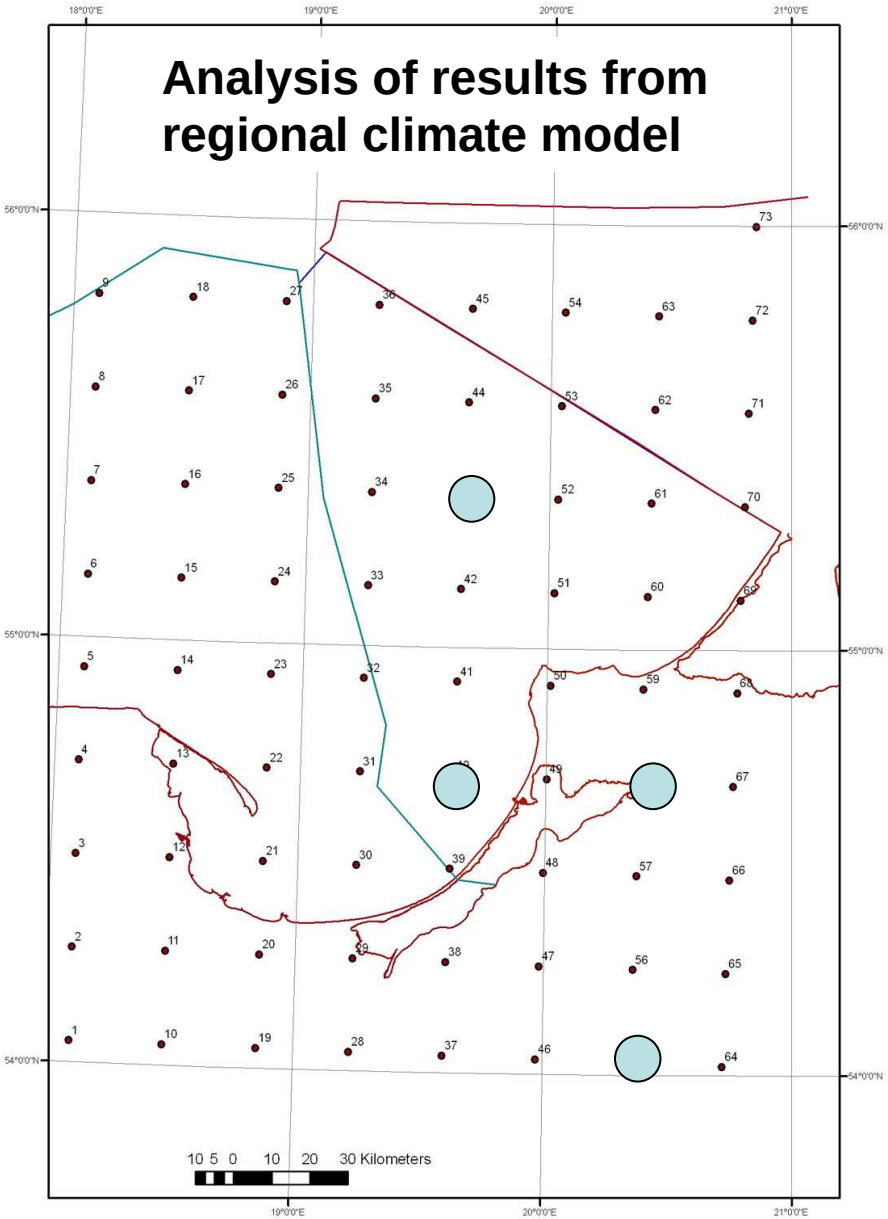
T4.2: Impacts on Vistula Lagoon (1-33) (ABIORAS)

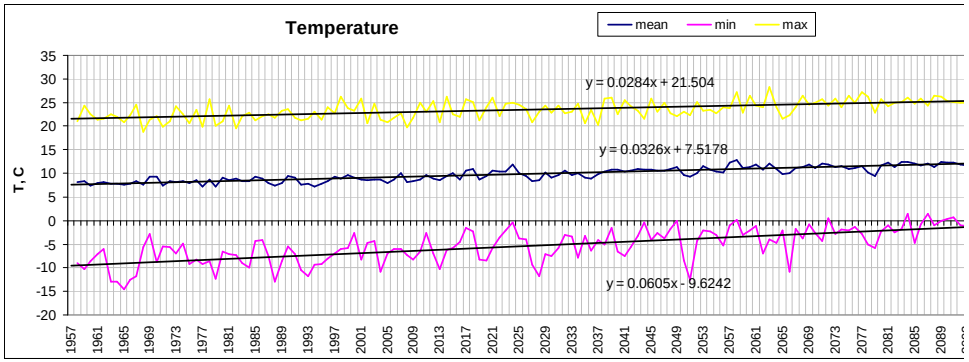
Objective: **To assess the impact of climate change on the ecosystem in a coastal lagoon and on the socioeconomic local development**

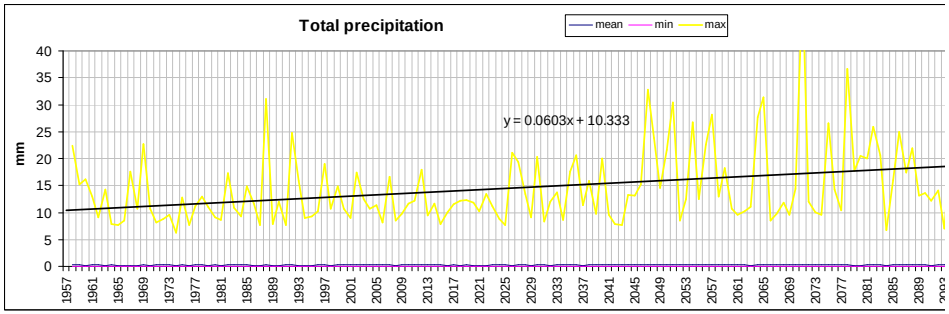
Directions of work:

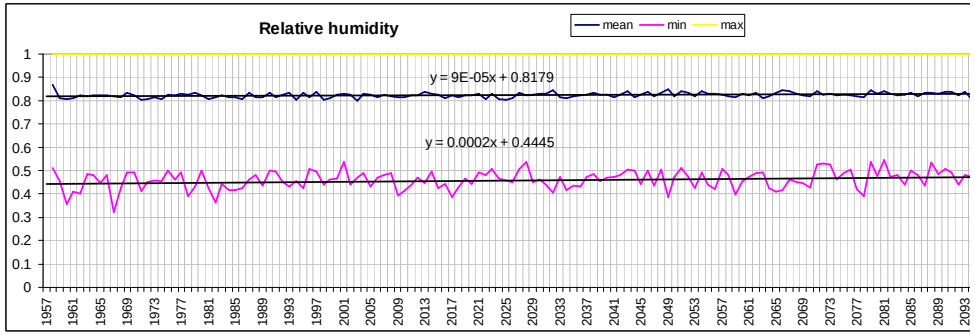
1. **Analysis of control run and scenarios for Kaliningrad area**
2. **First steps in modeling of the Vistula Lagoon**
3. **Work with socio-economic issues**

Analysis of results from regional climate model



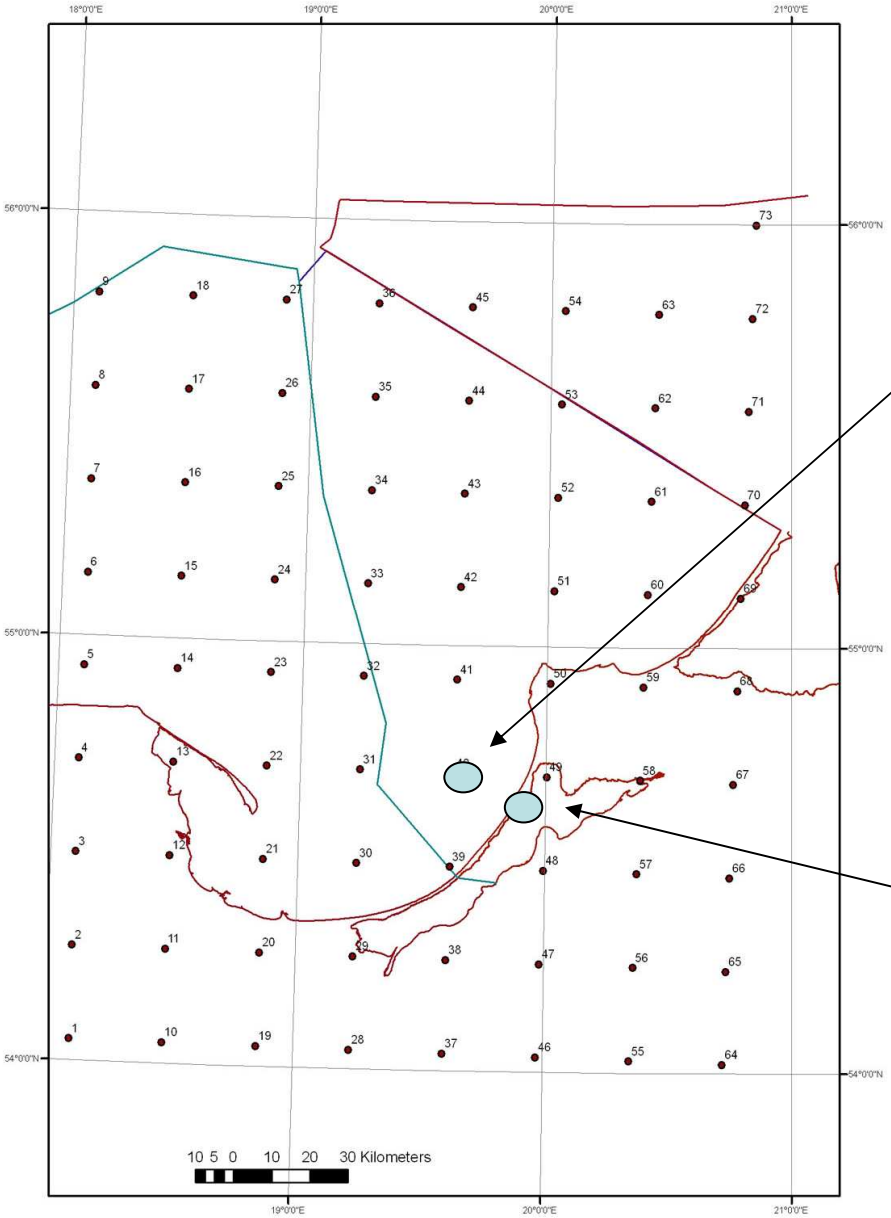


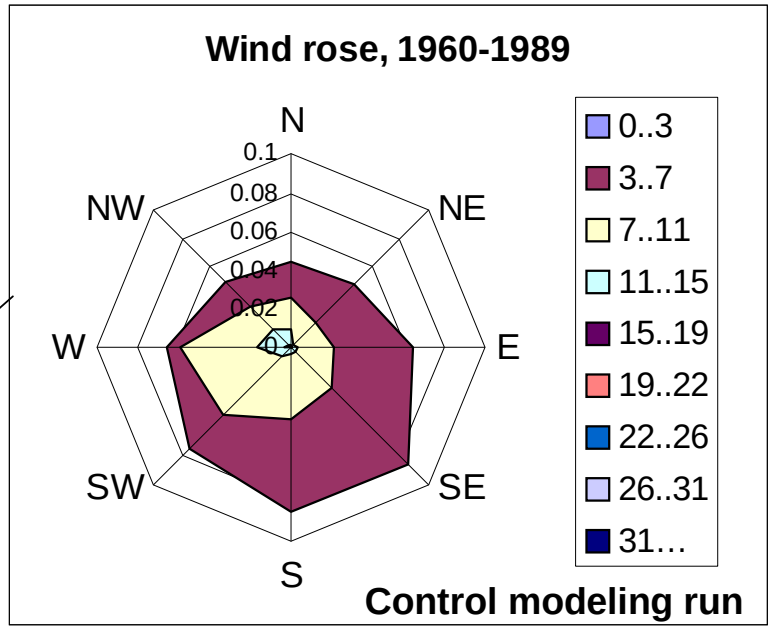


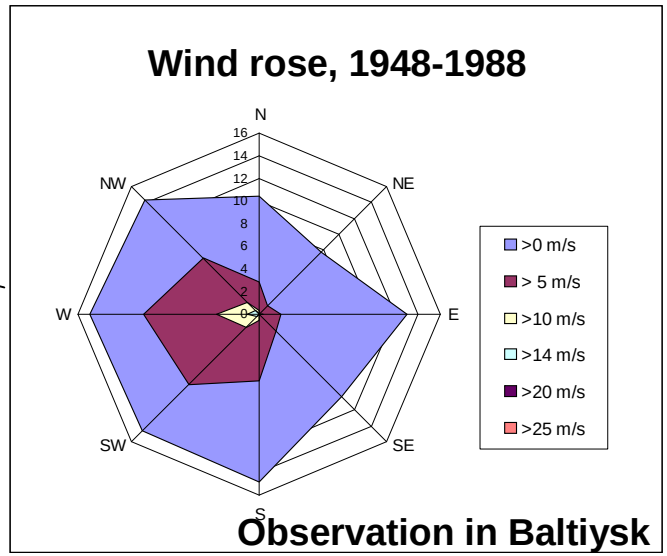


ERA40 downscaled to 25 km with RCA,
ECHAM5 A1B_3 downscaled to 25 km with RCAO,
HadCM3ref A1B downscaled to 25 km with RCAO (we got it from Anders Hoglund)

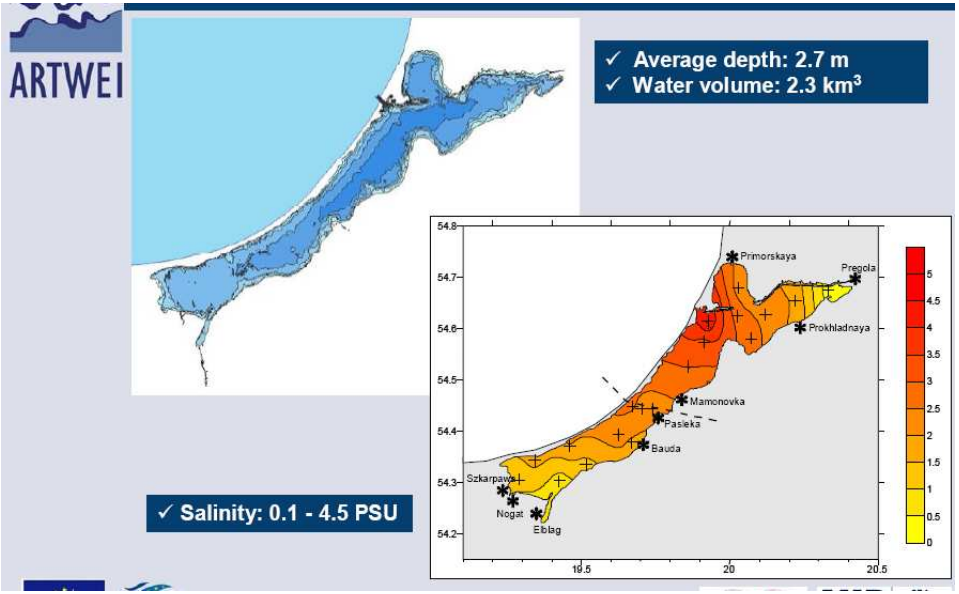
"ECOSUPPORT in Kaliningrad: up-today results of WP4" by Boris Chubarenko


18°0'0"E
19°0'0"E
20°0'0"E
21°0'0"E
56°0'0"N
55°0'0"N
54°0'0"N
10 5 0 10 20 30 Kilometers

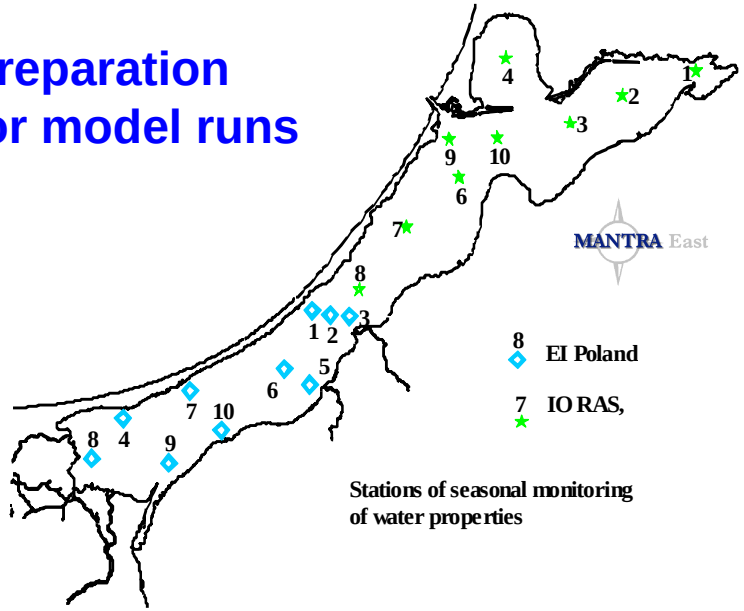

Wind rose, 1960-1989
N
NE
E
SE
S
SW
W
NW
0.1
0.08
0.06
0.04
0.02
0
0..3
3..7
7..11
11..15
15..19
19..22
22..26
26..31
31…
Control modeling run

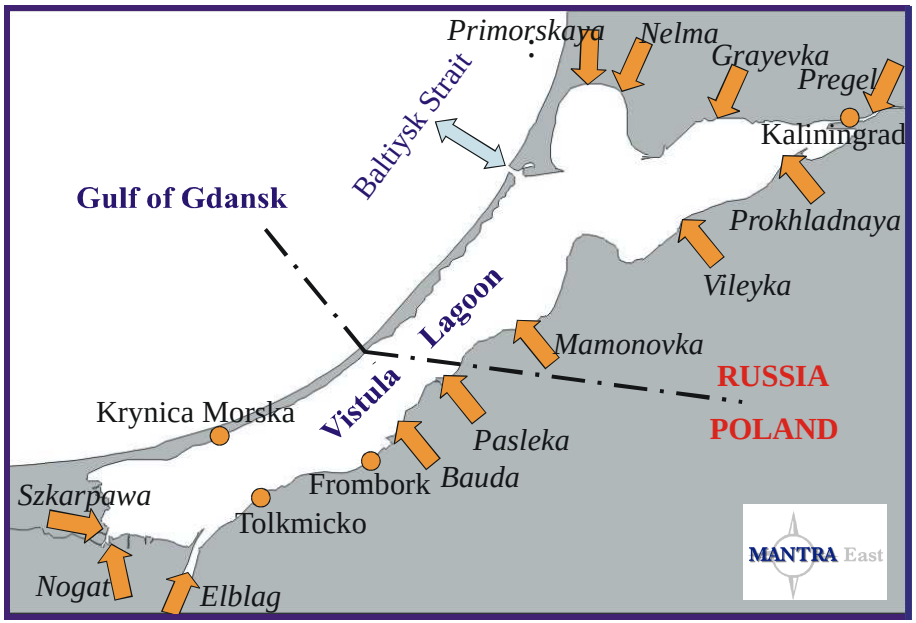

Wind rose, 1948-1988
N
NE
E
SE
S
SW
W
NW
16
14
12
10
8
6
4
2
0
>0 m/s
> 5 m/s
>10 m/s
>14 m/s
>20 m/s
>25 m/s
Observation in Baltiysk

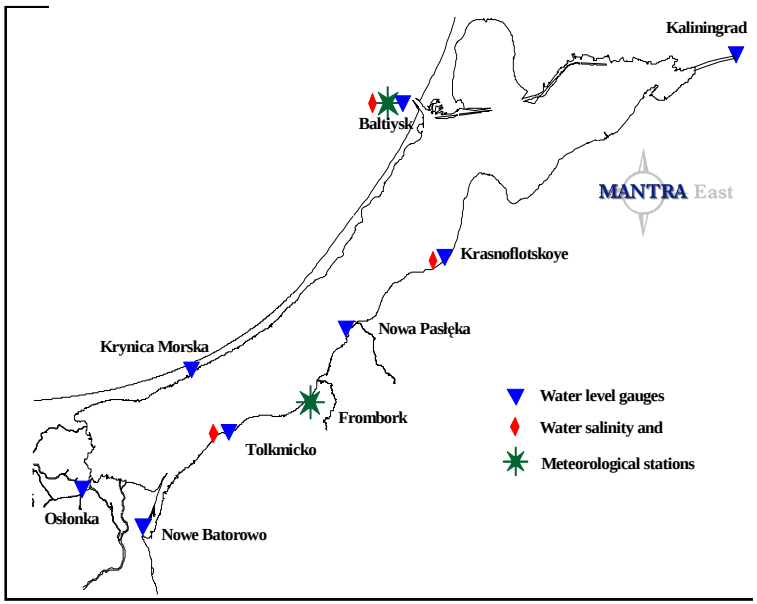
ECOSUPPORT General Assembly 2010,
Hörsalen, SMHI, Norrköping 15 October 2010



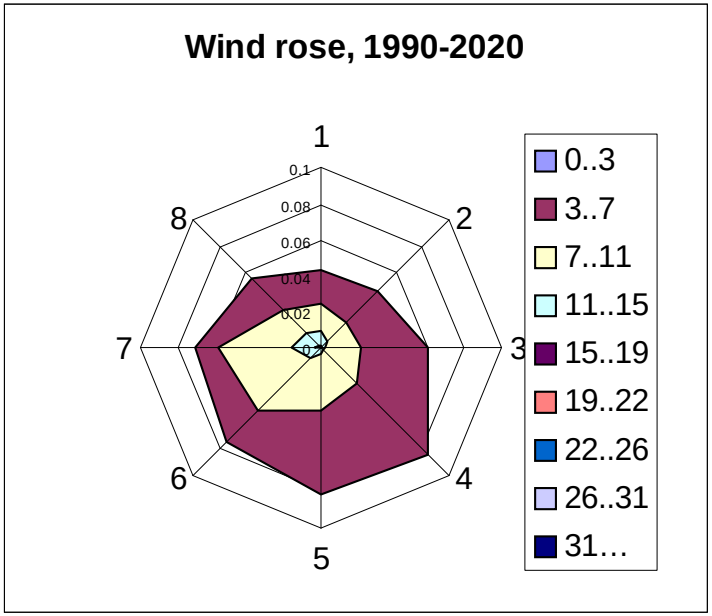
Preparation for model runs

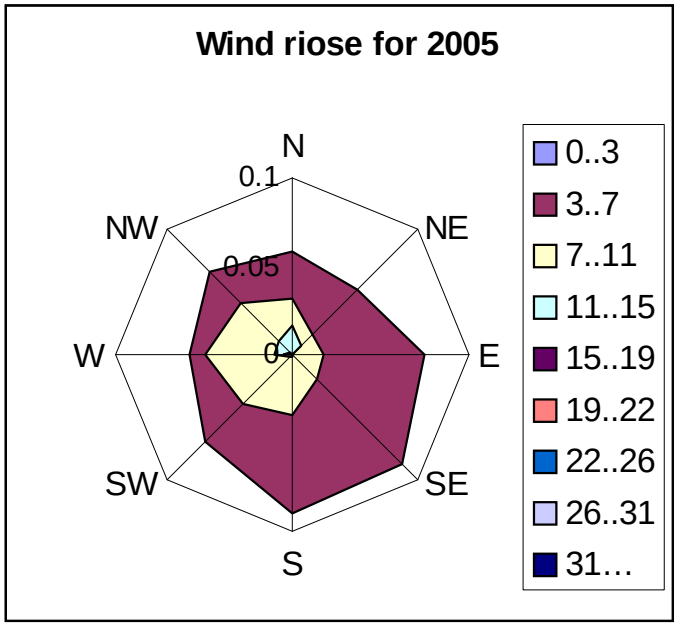


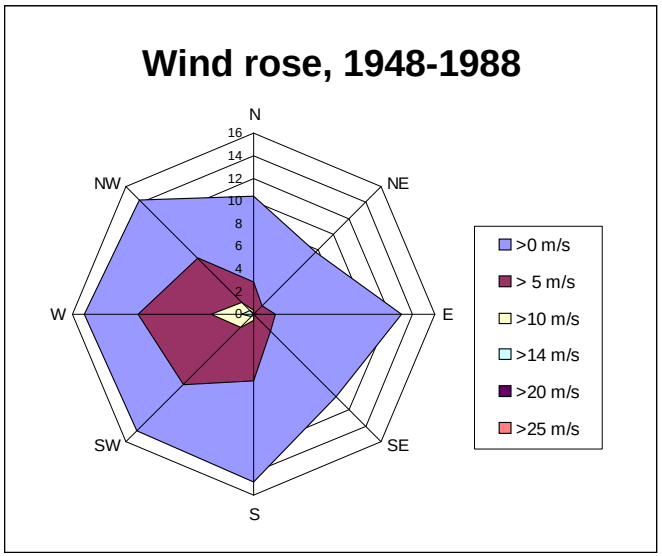




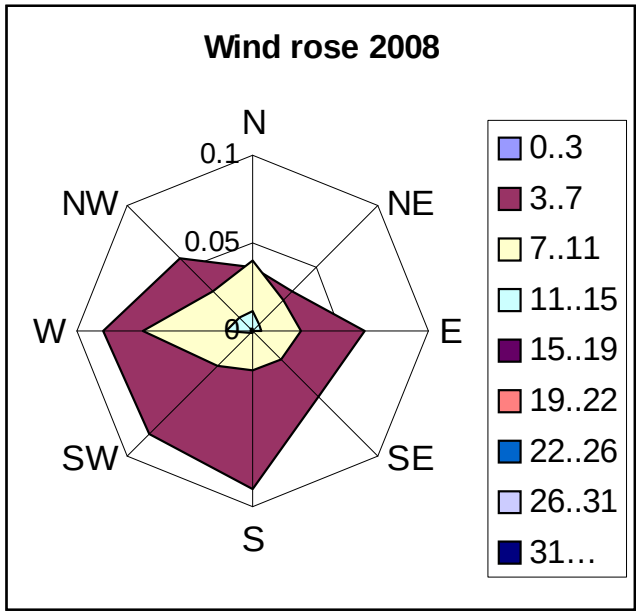
"ECOSUPPORT in Kaliningrad: up-today results of WP4" by Boris Chubarenko

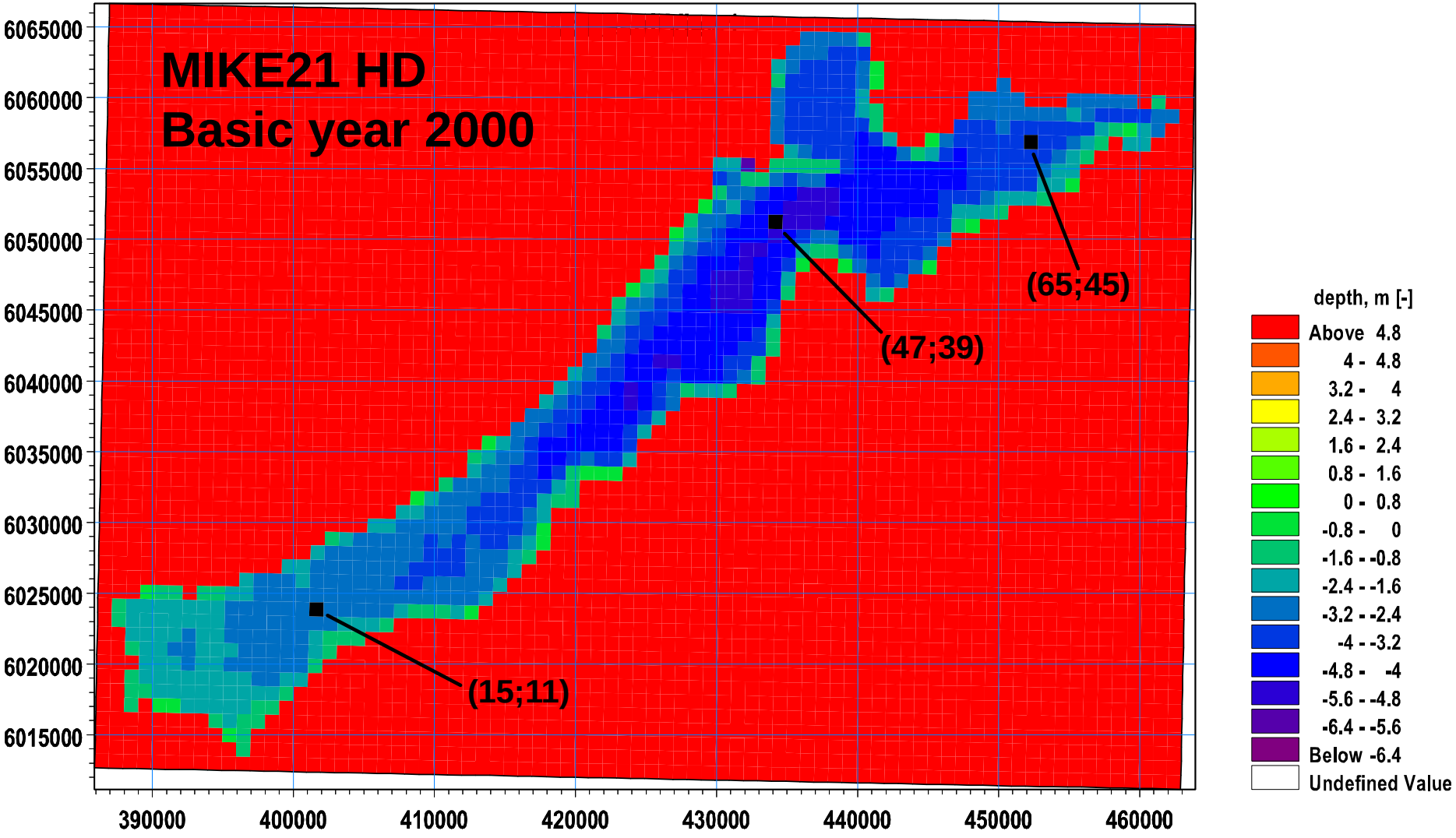


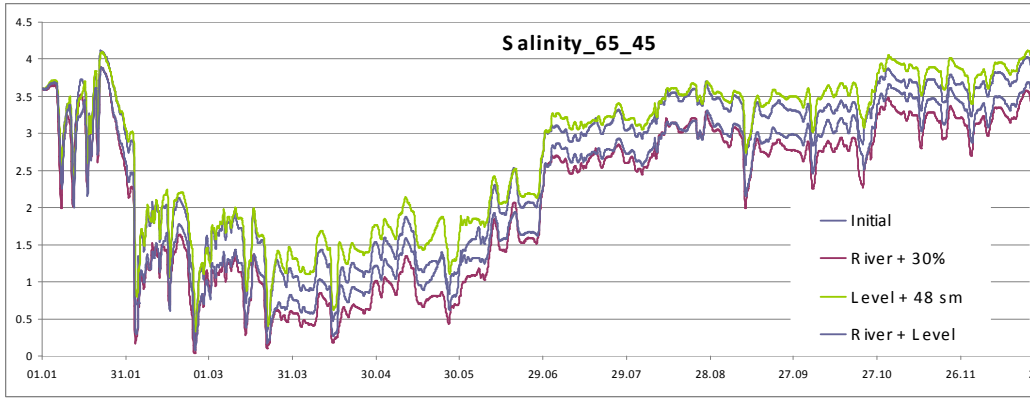


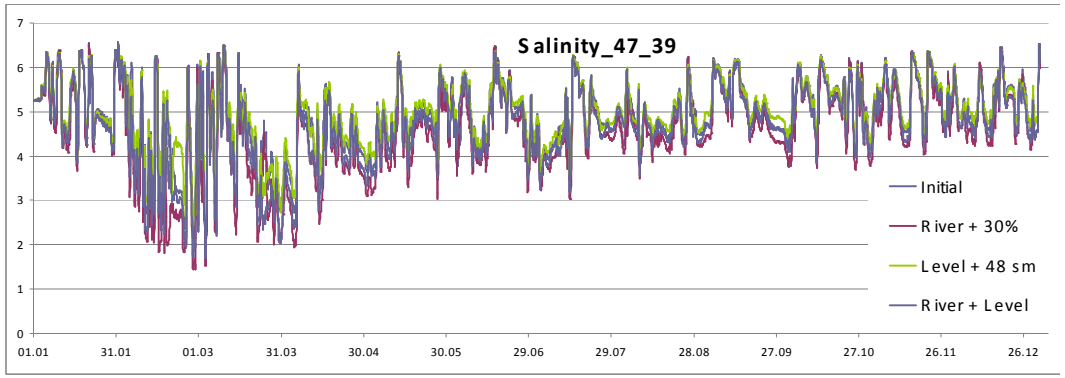


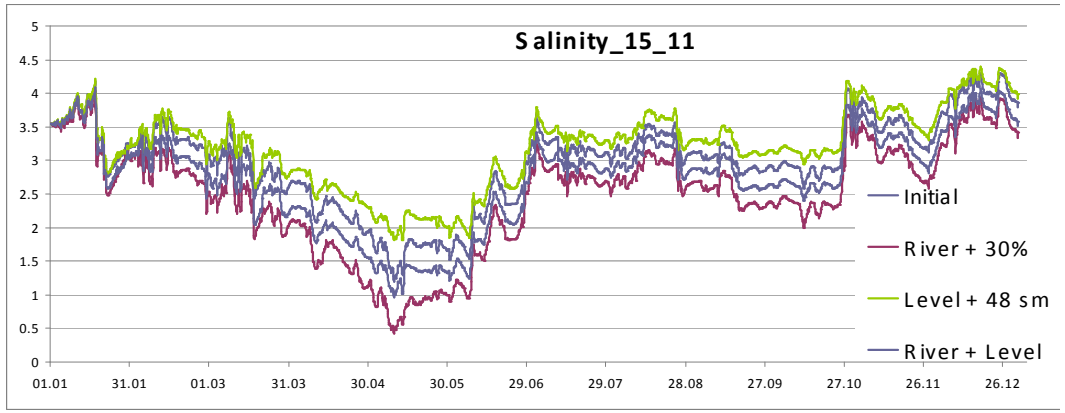
“Typical year”?




MIKE21 HD
Basic year 2000
(65;45)
(47;39)
(15;11)
6065000
6060000
6055000
6050000
6045000
6040000
6035000
6030000
6025000
6020000
6015000
390000
400000
410000
420000
430000
440000
450000
460000
depth, m [-]
Above 4.8
4 - 4.8
3.2 - 4
2.4 - 3.2
1.6 - 2.4
0.8 - 1.6
0 - 0.8
-0.8 - 0
-1.6 - -0.8
-2.4 - -1.6
-3.2 - -2.4
-4 - -3.2
-4.8 - -4
-5.6 - -4.8
-6.4 - -5.6
Below -6.4
Undefined Value





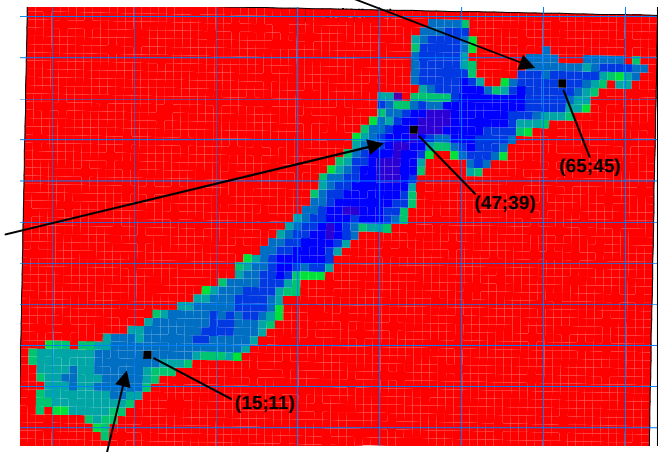


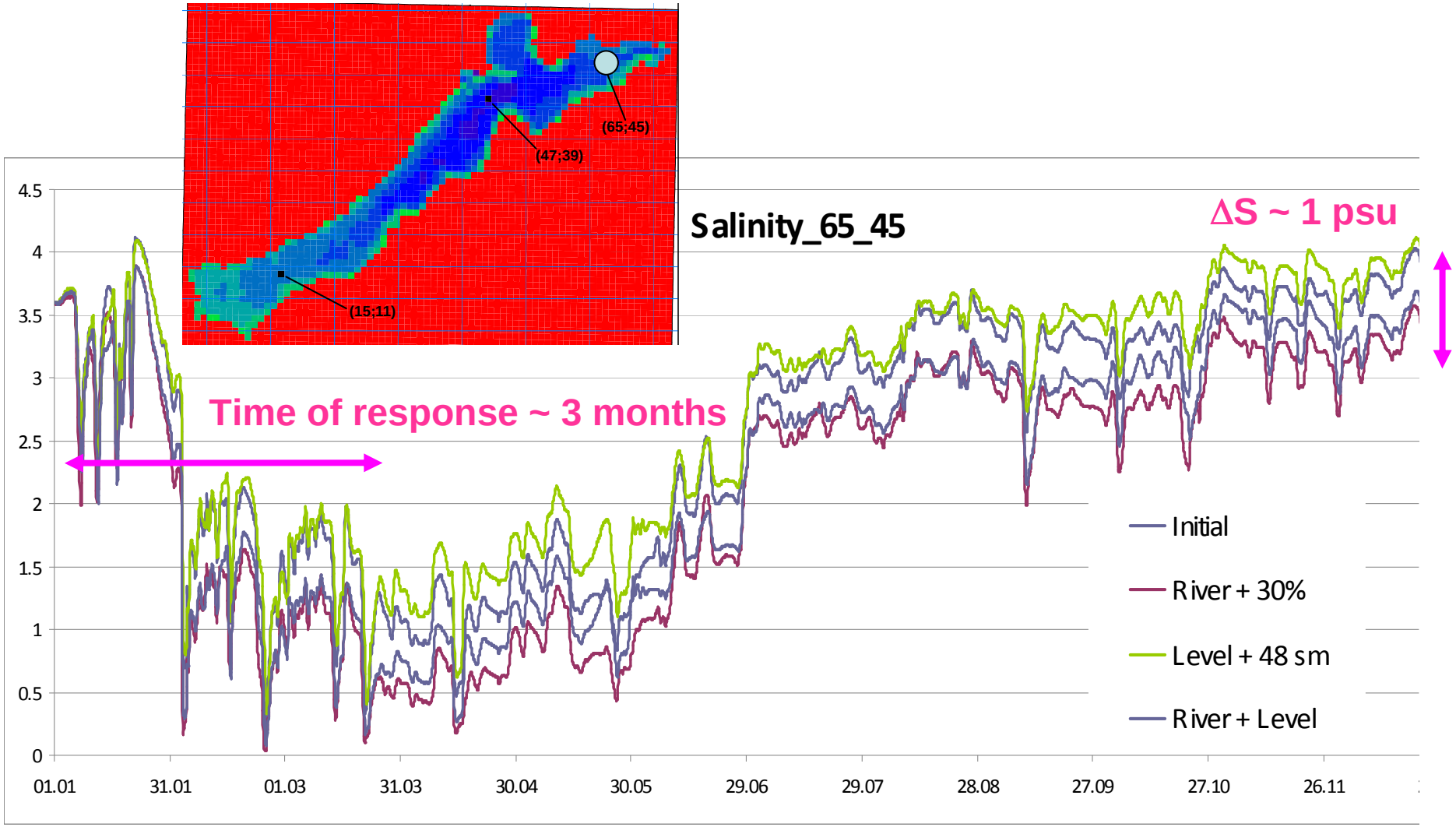
Sensitivity example:

(1): H = h + 48 cm

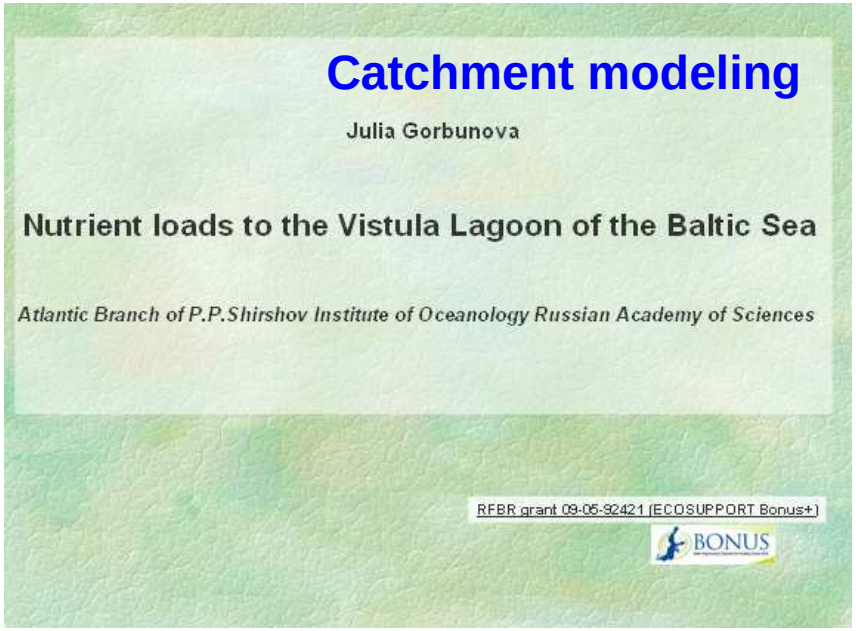
(2): $Q_{riv} = Q_{riv}$ +30%

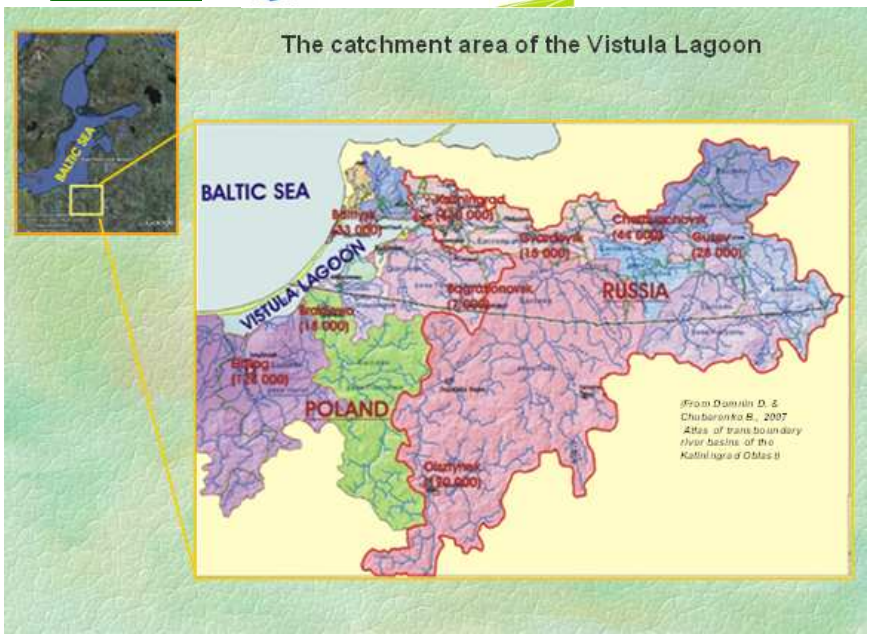
(3): (1) + (2)

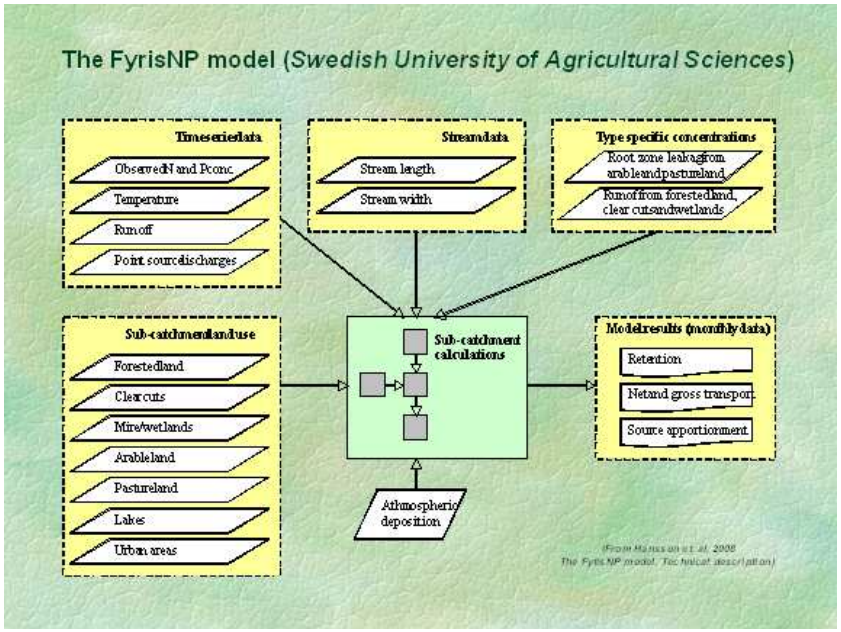


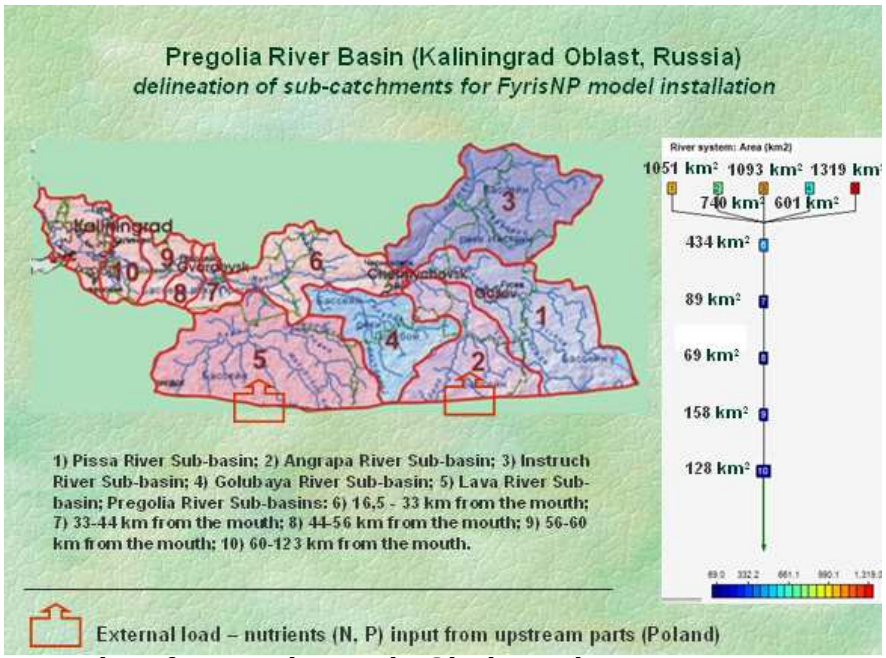

(65;45)
(47;39)
(15;11)
Salinity_65_45
ΔS ~ 1 psu
Time of response ~ 3 months
4.5
4
3.5
3
2.5
2
1.5
1
0.5
0
01.01
31.01
01.03
31.03
30.04
30.05
29.06
29.07
28.08
27.09
27.10
26.11
Initial
River + 30%
Level + 48 sm
River + Level

ECOSUPPORT General Assembly 2010,
Hörsalen, SMHI, Norrköping 15 October 2010









"ECOSUPPORT in Kaliningrad: up-today results of WP4" by Boris Chubarenko

Socio-economic issues

Attitudes to climatic changes in everyday management practice at the level of Kaliningrad region municipalities

K.V. Karmanov[1], B.V. Chubarenko[1], D.Domnin[1] and A. Hansson[2]

1- Atlantic Branch of P.P.Shirhov Institute of Oceanology of Russian Academy of Sciences, 236020, Prospect Mira, 1, Kaliningrad, Russia chuboris@mail.ru
2 - Linköping University, Department of Thematic Studies, Linköping, Sweden

Questionnaire according to methodic of Linkoping University

SMHI OCEANOGRAPHY Report Series No. 104, 2010

Socio-economic issues

Administrative unit	Strategic development direction							
	Amber mining and processing	Energetics	Industrial production	Agriculture	Food industry	Marine and ground transport	Recreation and tourism	Environment preservation
Kaliningrad UD			B			A	C	
Ladushkin UD							A	
Mamonovo UD			B			A	C	
Pionerskiy UD						A	B	
Svetliy UD			B			A		
Sovetsk UD			A					
Yantarny UD	A						B	
Bagrationovsky MA				A			B	
Baltiysky MA			C	D		A	B	E
Gvardeysky MA			A	D	B	C	E	
Guryevsky MA			A	C			B	D
Gusevsky MA			A	B				
Zelenogradsky MA			C	B		D	A	
Krasnoznamensky MA		C	B	A			D	
Nemansky MA		D	A	B			E	C
Nesterovsky MA			B	A				
Ozersky MA				A				
Polessky MA				A	B			
Pravdinsky MA				A				
Svetlogorsky MA			B	C			A	
Slavsky MA			B	A			C	
Chernyakhovsky MA			C	B		A	D	
Kaliningrad region			III(5)	I(7)		II(6)		
Coastal municipalities				III(5)		I(5)	II(3)	
Inland municipalities			II/(4)	I/(4)		III(1)		
Popularity	1	2	15	15	2	8	15	3

Legend

A	1st strategic direction
B	2nd strategic direction
C	3rd strategic direction
D	4th strategic direction
E	5th strategic direction

I(5)	development direction of 1st priority(number of municipalities considering this direction 1st strategic)
II(4)	development direction of 2nd priority
III(3)	development direction of 3rd priority
	coastal municipalities
	inland municipalities

The strategies of socioeconomic development for municipalities [Andriashkina & Domnin, 2009]

Which extent do they depends on climate changes?

Plan for nearest future

1. Continue with estimation of changes in Vistula Lagoon on the basis of simulations for typical year and through whole data set (… 2010)

2. The luck is in application of biogeochemical model.

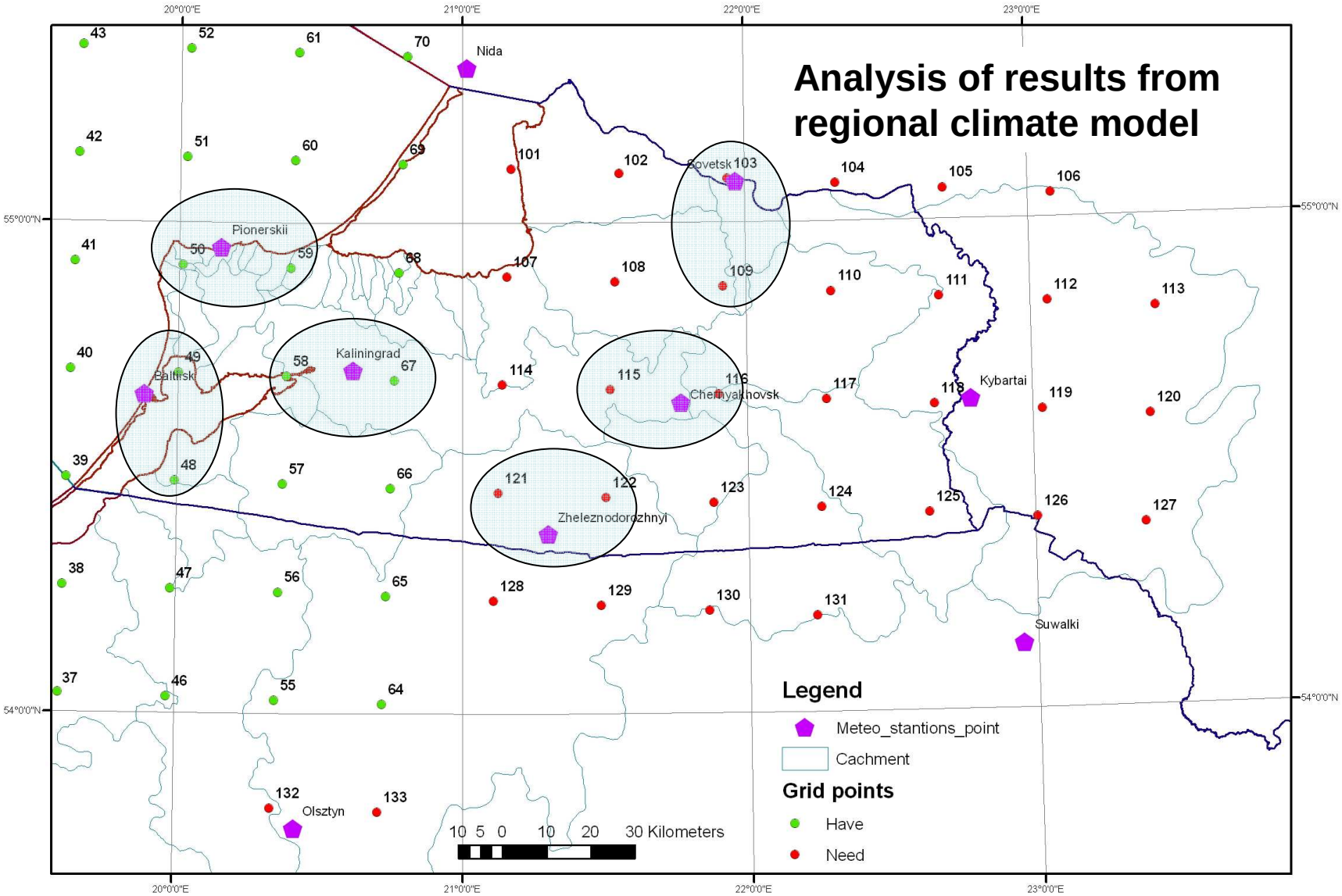
   Previous idea to use MIKE EU didn't work due to expire of license and a need to pay for new one + all updates from previous license.

3. Continue to analyse the socioeconomic issues

4. Finding the time scale when regional model mainly represent the local conditions

5. Application of HYPE to Pregolia River catchment using existed data

ECOSUPPORT General Assembly 2010,
Hörsalen, SMHI, Norrköping 15 October 2010



"ECOSUPPORT in Kaliningrad: up-today results of WP4" by Boris Chubarenko