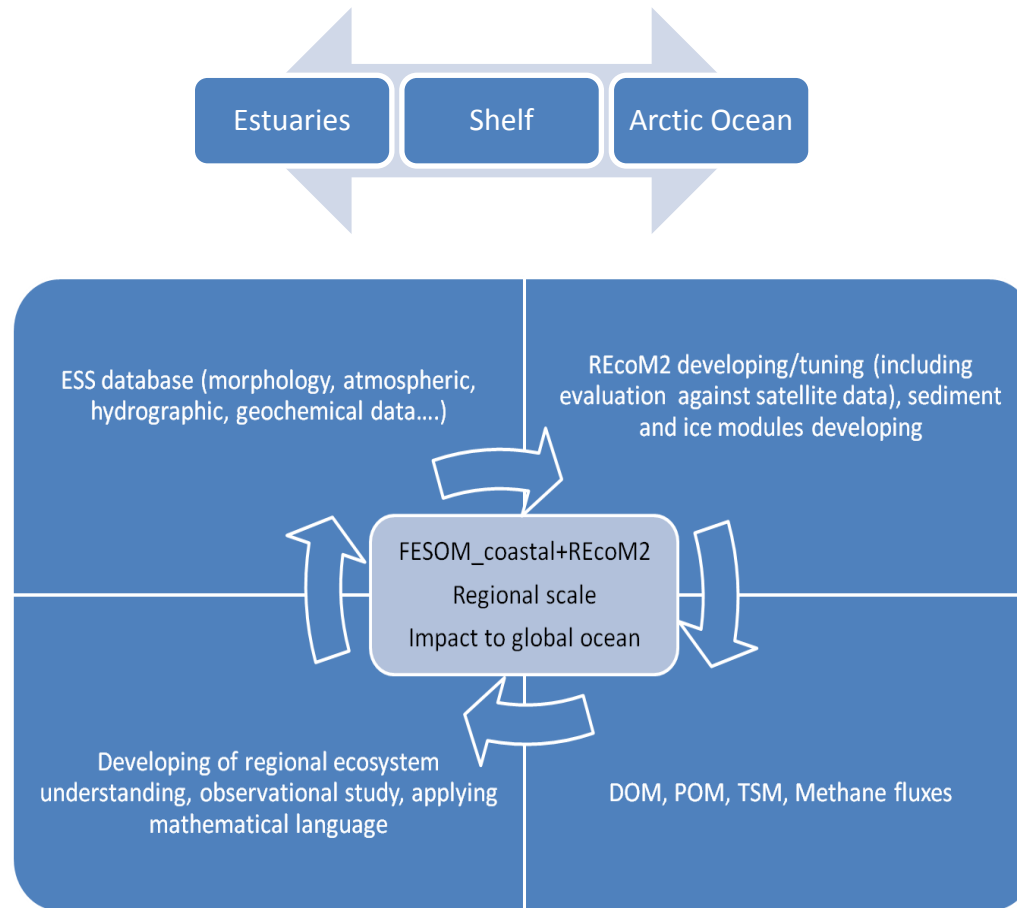# Planning project

DFG Research Unit: East Siberian Shelf (ESS) in a changing climate conditions

❑ A Research Unit is made up of a team of researchers working together on a research project which, in terms of thematic focus

❑ Research Units provide the staff and material resources required for carrying out intensive, medium-term cooperative projects (generally six years)

❑ Research Units often contribute to establishing new research directions

❑ Funding opportunities for Research Units are subject to the same principles as research grants

❑ Up to 10 sub-project in frame of one project

❑ Significant amount of the resources should be given to the Universities

❑ The support from Russian side is very desirable, but not necessary

DFG +RFBR: 1-4 years, the same text of the project, flexible mechanisms of the financial support

❑ Spokesperson should be a full loading university teacher, significant part of the resources should be given to the universities

❑ No deadline for the submission, but our deadline – February 2017

Planning project

DFG Research Unit: East Siberian Shelf (ESS) in a changing climate
ESS: shelf of the Laptev, East-Siberian and Chukchi Seas

Planning project

The preliminary list of sub-projects:

1.Circulation on the shelf; variability of physical fields; sea ice dynamics; 'connection' with the Arctic Ocean, FESOM_coastal developing and coupling with FESOM finite volume version. Arctic circulation with a particular focus on the ESS using global FESOM, particular focus on a shelf break area, prediction of extreme events at the ESS

 Alexey Androsov (Alexey.Androsov@awi.de)

2. Geochemical input of the East-Siberian Shelf: DOM, POM, TSM fluxes, methane bubble fluxes; REcoM2 developing/tuning

Gesine Mollenhauer, Gesine.Mollenhauer@awi.de

3. Geochemical input of the East-Siberian Shelf: methane bubble fluxes module

Vikram Unnithan, v.unnithan@jacobs-university.de

4. Development of numerical modules for the Lena Delta region

Vera Fofonova, Vera.Fofonova@awi.de

5. Developing of regional-Arctic ecosystem understanding

Anna Pasternak, Ekaterina Abramova

? More subprojects

Planning project

1. **Connect with responsible person**

2. **Write 1-3 pages using plan:**

❑ Do your research interests, ideas and plans fit to the project?

❑What are they?

❑What do you need to develop your task: position, equipment, additional observations, additional human resources, invite somebody?

❑Do you have partners in Germany, in Russia in mind?

3. **Financial support from Russian side**

Russian partners

- PP Shirshov Institute of Oceanology

- Institute of Computational Mathematics and Mathematical Geophysics SB RAS

- South Federal University, faculty of Mathematic, Mechanics and Computer

Science

- Lena-Delta Nature Reserve

- Arctic and Antarctic Research Institute

- Russian State Hydrometeorological University

- Igarka Geocryology Laboratory, Permafrost Institute

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Main questions

❑ Do your research interests, ideas and plans fit to the project?

❑ What are they?

❑ What do you need to develop your task: position, equipment, additional observations, additional human resources, invite somebody?

❑ Do you have partners in Germany, in Russia in mind?

Adaptive numerical modeling of circulation, transport, and energy exchange processes in the Lena Delta region

WP 1. Start up

First very important step is a collection of the bathymetry and relief data in the area for the creation digit relief matrix for the region of the Lena Delta with information about sediment types

(a) Surveys of river cross sections at established locations (better repeated one)

(b) Surveyed longitudinal profile of the river

(d) Bathymetry surveys of the submerged channel bed

(e) Bed and bank samples providing gradations of the channel materials

(g) Suspended sediment measurements

(h) Turbidity measurements in conjunction with discharge

(i) Bedload measurements using samplers or traps in conjunction with discharge

(j) Surveys or bank pins for measuring rate of bank retreat

(k) Photos at established locations to note changes in deposition, bar features, and bank erosion

WP 2. Biological module

The large Arctic rivers, such as Lena River, provide a great way for the colonization of freshwater species that originally from temperate regions to the most northern areas. Understanding the mechanism of invasion will allows us to predict which populations may invade and their potential range of expansion.

Our aims in the present work package are:

(1) to estimate the influence of riverine from one side and seawater from another side upon pelagic fauna formation in different regions of the Lena River Delta

(2) to summarize the primary mechanisms of climate- induced biological change in northern high latitude lakes, that may be critical to the understanding and modeling the Arctic response to climate change.

WP 3. Sediment Dynamics, DOM and dissolved methane in the Lena Delta

The main questions and tasks we can summarize as follows:

a) reviewing and re-interpreting the existing data on both suspended sediment and bed material fluxes, channel processes

b) sediment rating curves – development, estimation of the rating curve parameters, their interannual variability due to variations in hydroclimatic conditions, better estimates of the contemporary fluxes;

c) sediment redistribution in the Lena Delta branches – estimates using the hierarchical channel network model; development of such GIS-based network model is in itself a potential research objective;

d) particulate organic matter – how much of the contemporary suspended sediment flux in the Lena Delta head is mineral, and how much is organic? What kind of organic matter it is? Where it originates from? Pathways?

e) quantification of the flux of permafrost organic matter into the Lena River and to assess its bioavailability

f) huge ice jams in the vicinity of the Kusur gauging station (reported by Faiko (1969)). Ice jam detection based on the remote sensing data. The effect of ice jams on water discharges, channel deformations, sediment delivery;

Despite the investigation, analysis and simulation of sedimentology processes in the Lena Delta, in this module we should also provide some estimates about the coastline/river bank degradation processes

Adaptive numerical modeling of circulation, transport, and energy exchange processes in the Lena Delta region

WP 4. Modelling efforts

•Hydrodynamics during different discharge conditions in the main freshwater

channels and subchannel

•Simulation of sedimentology processes in the Lena Delta.

•Simulation and analysis of the dynamics in the porous structures of the river bed.

This includes an optional analysis of groundwater flow.

• Simulation of the MH4 and DOM transport in the Lena Delta

•Simulation of the ice dynamics in the outlet area

•Simulation of the zooplankton community (active mixture) migration within the

main freshwater channels under the different conditions (discharge characteristics,

atmospheric forcing and etc)

WP 5. 'Question'. Testing hypothesis

- Take measurements of the water temperature and discharge rate in the small inflows close upstream Kusur

- To verify our modelling results about small inflows influence on measurements

- To consider hypothesis about unaccounted source of heat in the fall from the riverbed