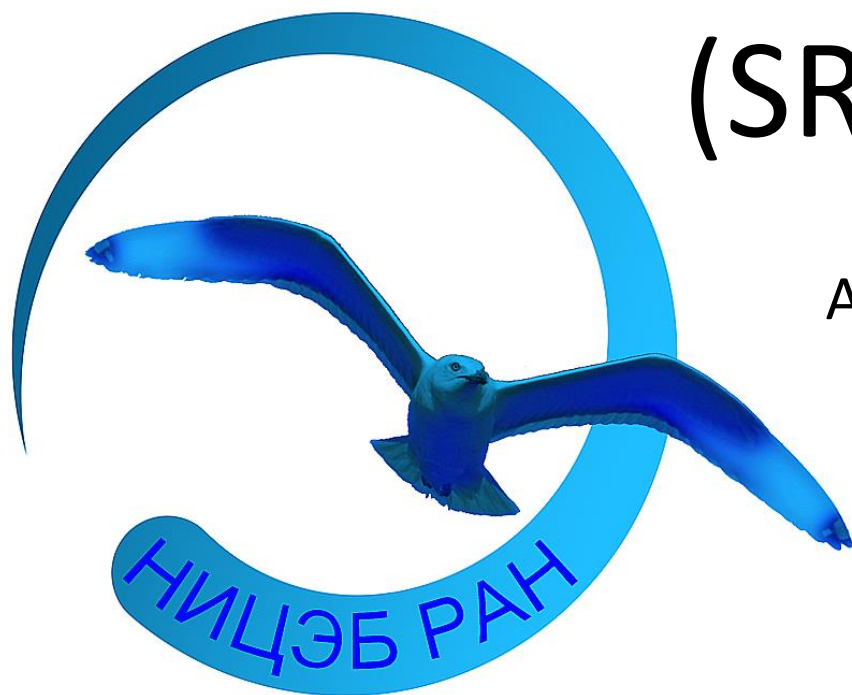


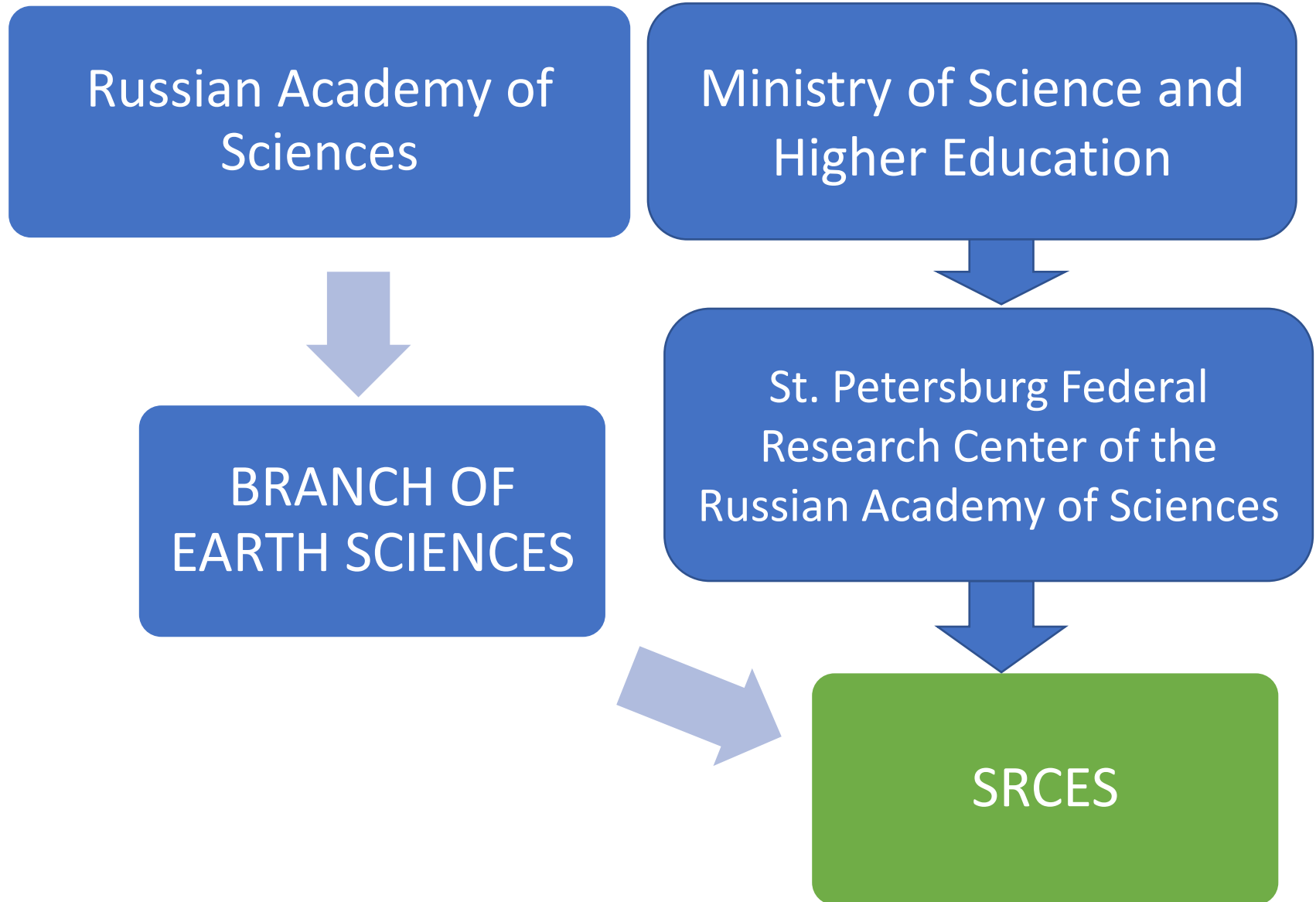
# Scientific Research Center for Environmental Safety Russian Academy of Sciences (SRCES)

Andrei Tronin – director





# Head organizations





# SRCES structure

- Chemical divisions
- Remote sensing lab
- Bio-electronic lab
- Eco-economic lab
- Microbiological lab
- Ecosystem rehabilitation lab
- Anthropogenic ecosystems lab
- Waste lab

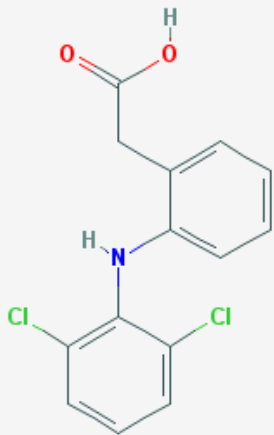


# Main issues of Environmental Safety

- “New and unknown” pollutants, migration and transformation – pollutants life cycle
- Ecosystem health, anthropogenic load on ecosystems, ecosystem reaction on the load, risk analysis, climate change
- Ecosystem rehabilitation
- The Economy of ecosystems

# “New and unknown” pollutants pharmaceutical substances in natural water

## *Diclofenac*



**Diclofenac (DCF)** - a non steroidal anti-inflammatory drug

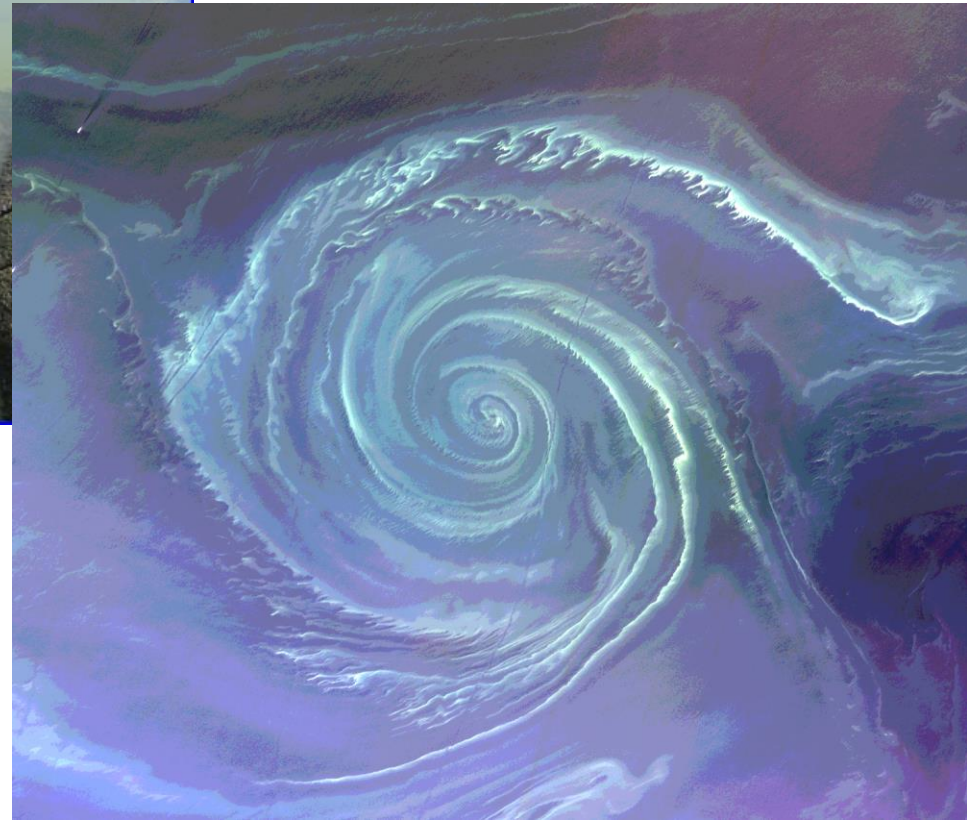
**Statistical data:** the consumption of DCF in St. Petersburg is estimated as 700 kg per year in all forms. This translates to 850 ng/L in sewage.

**Chemical analysis:** The average determined concentration was in the influent 480 ng/L, in the effluent 443 ng/L.

# “New and unknown” pollutants **blue-green algae**



Landsat-8 18 July 2018  
Gulf of Finland

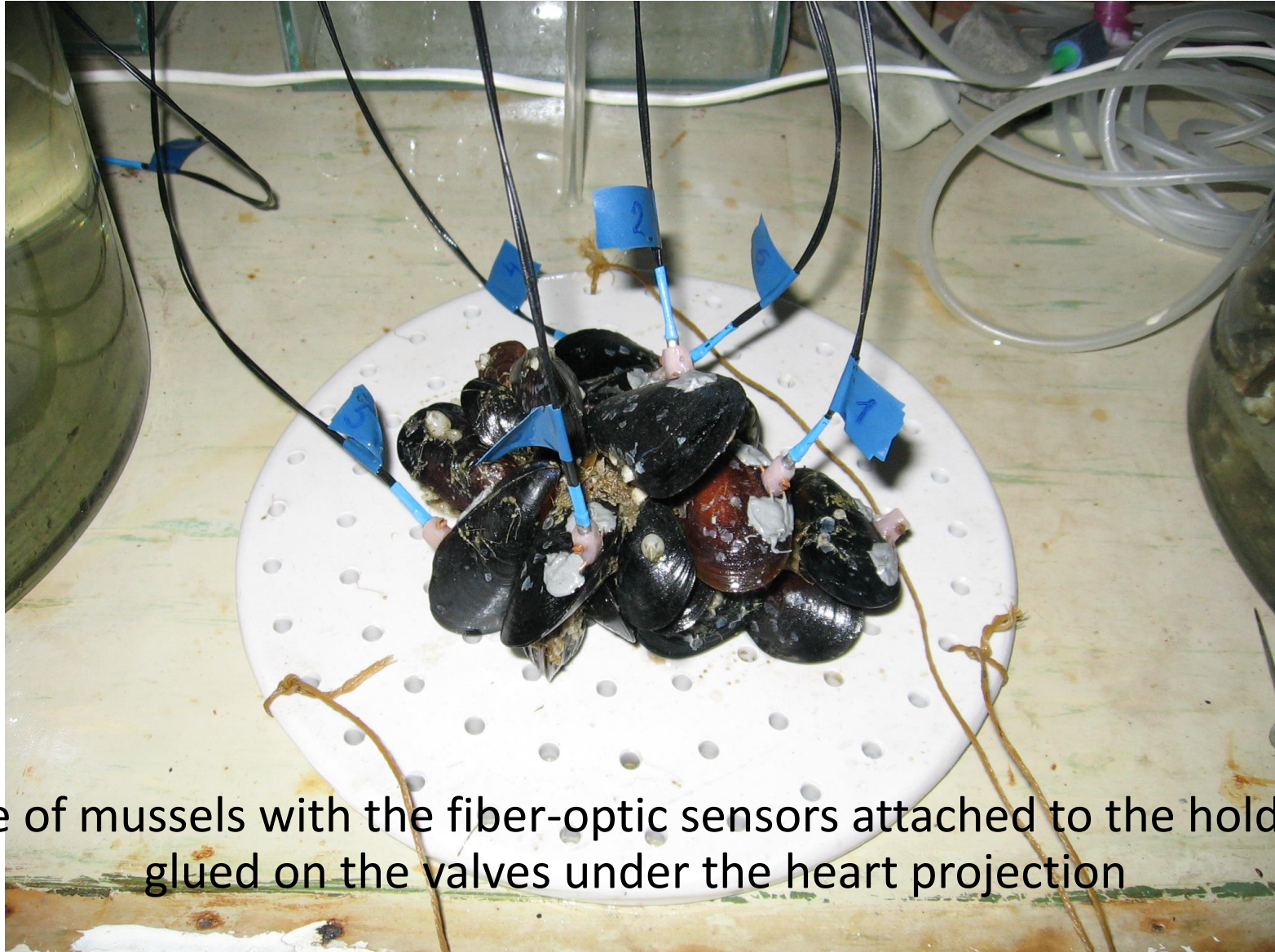


**harmful algae blossom  
generates:**

- 1) Neurotoxines (anatoxin a)**
- 2) Hepatotoxines as microcystins**
- 3) “odorants” (geosmine, MIB etc.)**



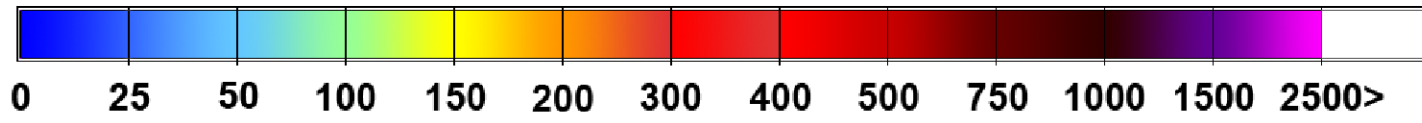
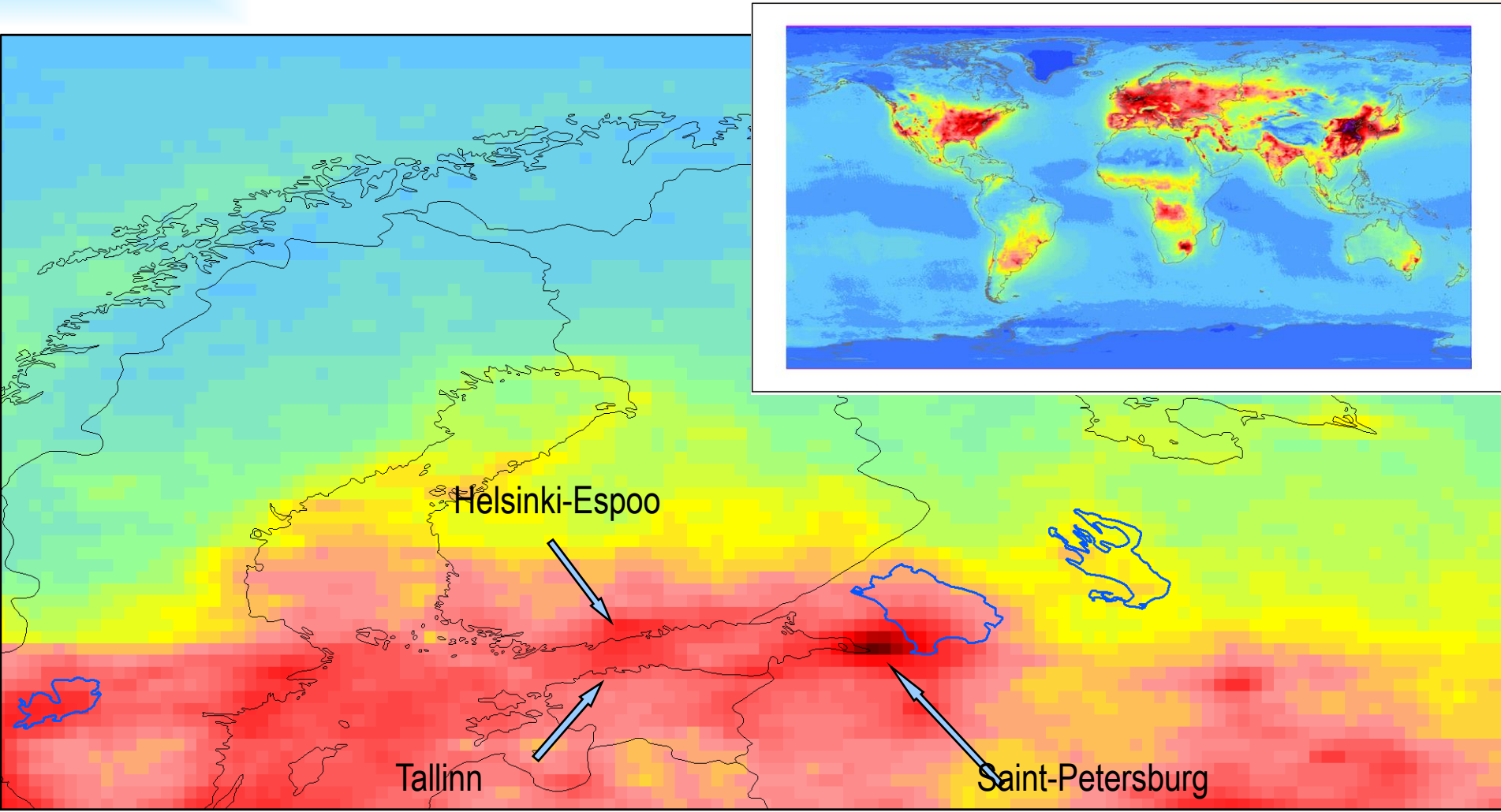
## Ecosystem health. Biomonitoring of water quality



Druse of mussels with the fiber-optic sensors attached to the holders glued on the valves under the heart projection

# Anthropogenic load on ecosystems

## Mean nitrogen dioxide concentrations 2005-2009



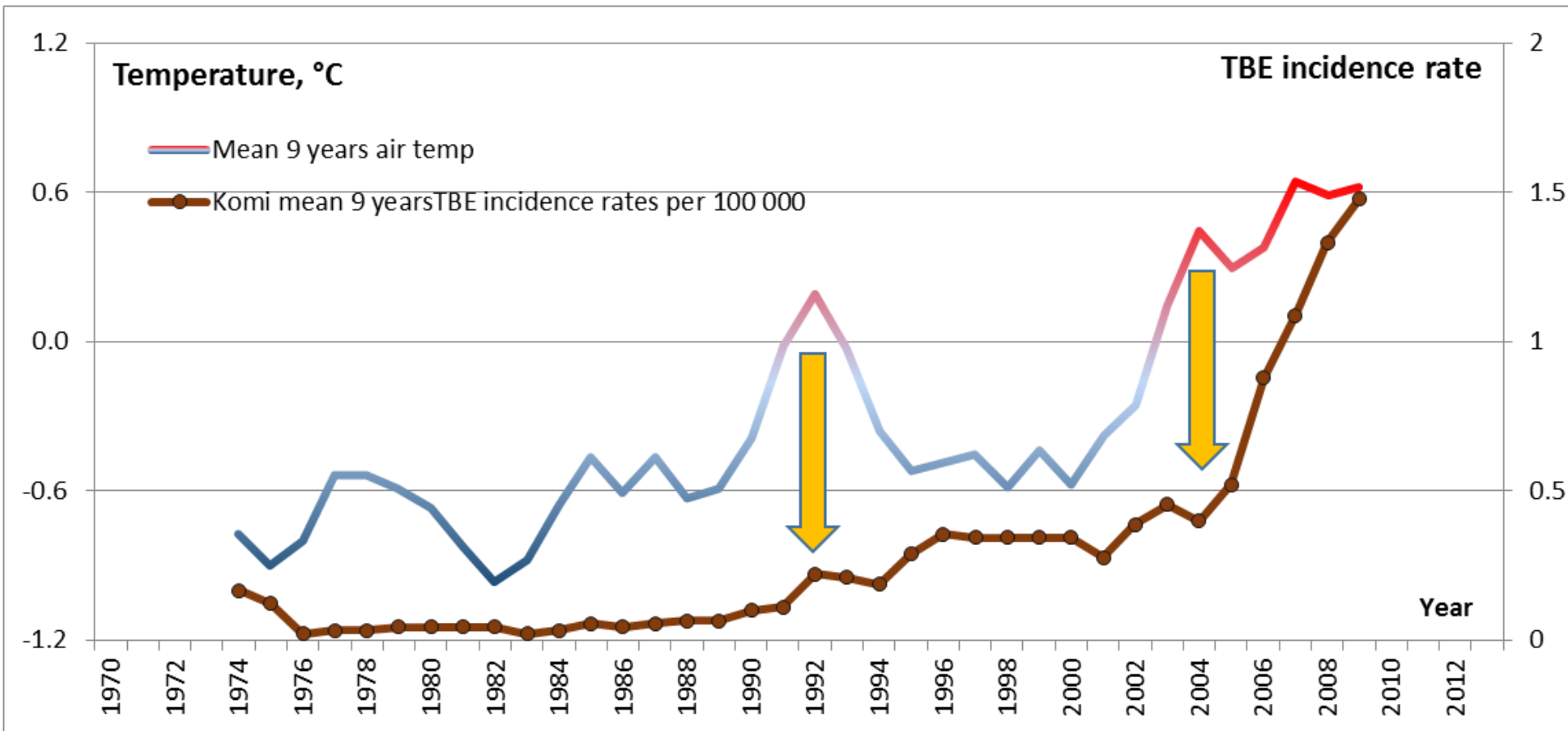
$10^{13}$  molecules/cm<sup>2</sup>





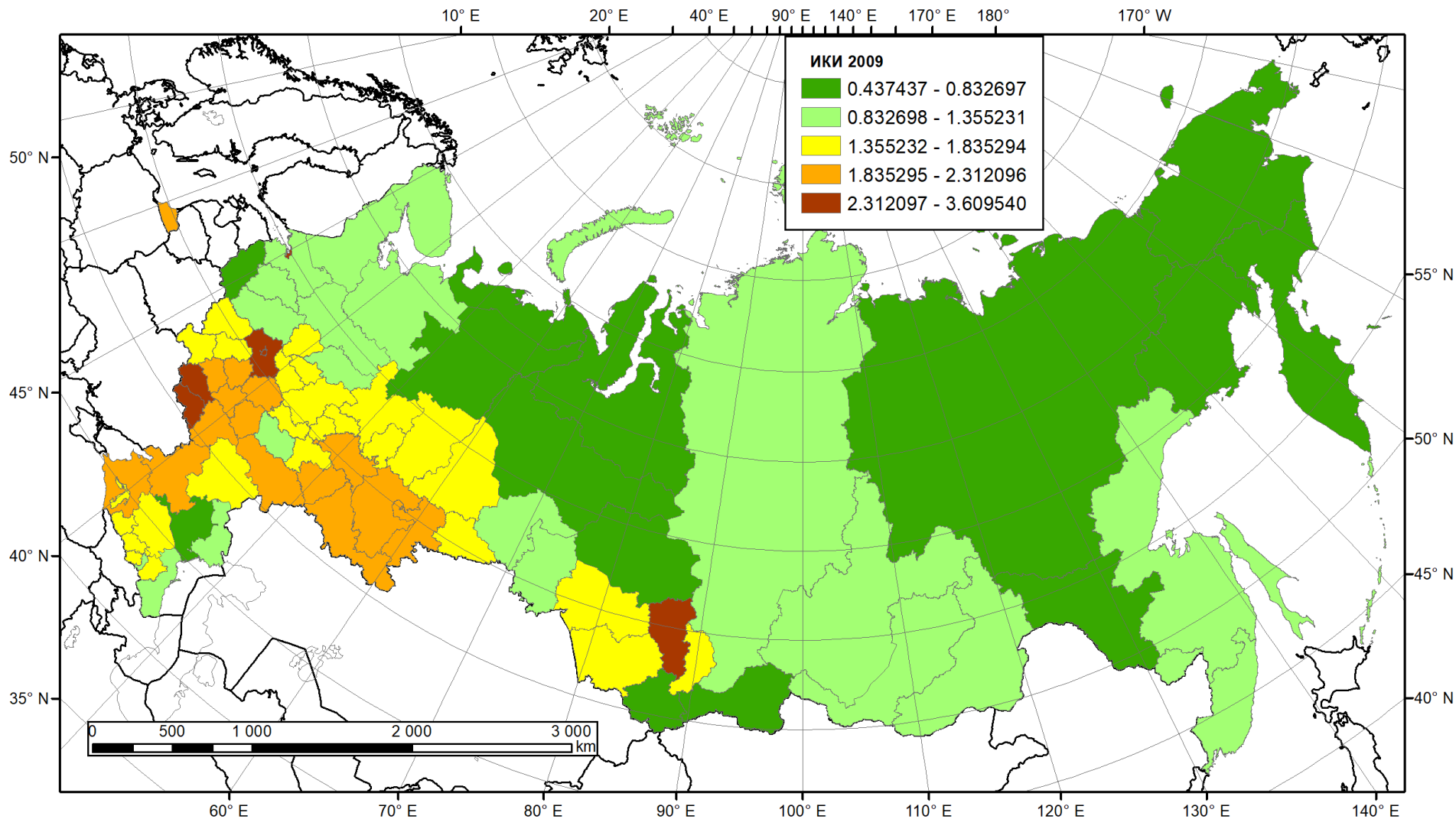
## Climate change.

Tickborne encephalitis incidence rate and yearly mean air temperature in Komi (North-east European Russia)





# Ecological safety ranking. Russian Federation, 2009



(RED – worse, GREEN - better)

Waste generation, power consumption, NO<sub>2</sub> concentration, natural ecosystems