



CISOCUR - Hydrodynamic circulation in the Curonian Lagoon inferred through stable isotope measurements and numerical modelling

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The spatial pattern of the hydrodynamic circulation of the Curonian lagoon, the largest European coastal lagoon, is still little understood. In absence of automatic current registration data all the existing models relied mostly on such data as water levels leaving high level of uncertainty.

Here we present CISOCUR, a new project financed by the European Social Fund under the Global Grant measure. The project applies a new methodology that uses the carbon stable isotope (SI) ratio of C12 and C13 that characterize different water sources entering the lagoon and may be altered by internal kinetic processes. Through the tracing of these isotope ratios different water masses can be identified. This gives the possibility to validate several hypotheses of water circulation and validate hydrodynamic models. In particular it will be possible to 1) trace water masses entering the lagoon through the Nemunas and the Klaipėda strait; 2) test the hypothesis of sediment transport mechanisms inside the lagoon; 3) evaluate the importance of physical forcing on the lagoon circulation. The use of a hydrodynamic finite element model, coupled with the SI method, will allow for a realistic description of the transport processes inside the Curonian lagoon. So the main research goal is to apply the stable isotope tracers and a finite element model to determine the circulation patterns in the Curonian lagoon.

Overall, the project will develop according to 4 main phases:

- 1) A pilot study to measure the isotope composition of different carbon compounds (dissolved and suspended) in different water bodies that feed water into the central lagoon. Through this pilot study the optimal study sites for the seasonal campaign will be identified as well.
- 2) Seasonal field campaigns in the monitoring stations identified in phase 1 to measure the carbon isotope ratio.
- 3) Development of a model that describes the kinetics of carbon isotopes and its transformation.
- 4) Application of a hydrodynamic model that includes the kinetic model and uses the data in order to describe the overall circulation patterns in the Curonian lagoon.

Project activities will be carried out as common co-ordinated effort of field an SI group and the modeling group that will have to calibrate the hydrodynamic model. In this way the expertise of different groups (physicists and oceanographers) will result in added value, providing the best available expertise along the eastern coast of the Baltic.