

Multiscale variability of the oxygen depletion in the areas of freshwater influence

Summary

The main aim of the project is to investigate the processes driving oxygen depletion in areas of freshwater influence in the various spatio-temporal scales, from decadal to synoptic-scale in time and from sea/basin scale to submesoscale. State-of-the-art in-situ measurements and numerical simulations will be used. Supervisor: Taavi Liblik. Co-supervisor: Germo Väli.

Research field:	Earth sciences
Supervisors:	Dr. Germo Väli Dr. Taavi Liblik
Availability:	This position is available.
Offered by:	School of Science Department of Marine Systems
Application deadline:	Applications are accepted between May 03, 2021 00:00 and May 31, 2021 23:59 (Europe/Zurich)

Description

Hypoxia/anoxia in the coastal ocean has spread during recent decades. Hypoxia is evoked by anthropogenic activities and a mix of natural physical, biogeochemical and biological processes. The PhD project deals with the oxygen depletion in the area of freshwater influence, mostly in the Baltic Sea. One of the main reasons for the extreme oxygen depletion (hypoxia, anoxia) in the Baltic Sea is eutrophication created by the excess of nutrients.

The main purpose of the study is to investigate the processes driving oxygen depletion in the various spatio-temporal scales. Long-term time series will be analyzed to study the effects of decadal climate variability and internal variability of the sea, and eutrophication on oxygen depletion. Likewise, inter-annual, seasonal variability will be addressed. Historical observations, available modeling reanalysis products, and proxies from the sediment records will be used to build the time series. Synoptic and (sub)mesoscale processes altering the oxygen depletion will be investigated using high-resolution data collected by research vessels, by an underwater glider, and moorings. Likewise, data from the high-resolution model (GETM) simulations will be used in the analysis.

The PhD student will work in the team of the Division of Marine Physics (DMP) at TalTech and will collaborate with the connections established by the DMP around the world. He/she will participate in autonomous measurement activities and research cruises onboard vessel(s) and (international) projects related to the PhD project, such as JERICO-S3, PRG602, and others.

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Applicants should fulfil the following requirements:

He/She will participate in monitoring cruises (up to 5 days, timing and load negotiable) and work with autonomous observation platforms. Likewise, he/she will work with the datasets of numerical modeling. The PhD student must be



ready to participate in seminars/conferences/workshops/project meetings abroad. The successful applicant is expected to have MSc in Natural Sciences (Earth Sciences, Physics, Mathematics, or a similar field). Basic programming skills and understanding (e.g. Python or MatLab) is required. Knowledge about FORTRAN and Linux/Unix systems is an advantage.



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