

# Artificial intelligence applications for remote sensing data in coastal seas

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## Summary

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*Advancing and extending the AI applications on remote sensing satellite imagery on coastal areas.*

Research field:	Information and Communication Technology
Supervisors:	Sander Rikka Sven Nõmm
Availability:	This position is available.
Offered by:	School of Information Technologies School of Science Department of Software Science Department of Marine Systems
Application deadline:	Applications are accepted between November 16, 2020 00:00 and December 16, 2020 23:59 (Europe/Zurich)

## Description

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Artificial intelligent based techniques, both machine- or deep learning, have gained popularity in recent years in every possible domain of technology. Deep learning techniques have proven to be particularly useful tool in remote sensing and big data applications. However, there is still need for specific applications in environmental domain, e.g. wave field information, sea ice information, harmful algae information models and more.

Coastal regions where large part of population lives and most of the recreational activities take place are in need for accurate estimations and predictions of many environmental parameters. Combining satellite imagery, in situ measurements and numerical modelling data together with deep learning techniques would be the focus for the applicant.

With the Copernicus Sentinel satellites program, size of daily downloadable satellite images reach to tens, if not hundreds of gigabytes for a single day. Deep learning methods could become appropriate way to solve research questions. Using neural networks on satellite imagery would be the key subject of the PhD position.

The PhD position would be necessary for both scientific and socio-economic reasons. A better knowledge of deep learning models on environmental data would lead to more reliable understanding of nature around us in the changing climate. It would also help the deep learning community that would gain new insights on how to further develop existing architectures for higher accuracy.

Exploring possible applications based on freely available Copernicus data would also lead to a safer sea-environment for everybody. The applicant would work on methods that are not only useful around the Baltic Sea but could well be exported to other areas and markets promoting entrepreneurship. Furthermore, possible outcomes of the positions, e.g. automatic ice chart, would make navigation in sea ice safer and cheaper.

The main subject is to advance artificial intelligent applications for satellite imagery to accurately estimate and predict physical parameters of water environments in coastal regions (of the Baltic Sea). The applicant will take advantage of in situ measurements, remote sensing satellite imagery, numerical modelling results and big data to achieve the objective. The specific aims (but not limited to) are: make use of open data satellite imagery to develop artificial intelligent based model (1) for wave field parameters; (2) sea ice parameters; (3) development of neural networks if none of the existing is not suitable; (4) put the developed neural networks into practical use.

### Responsibilities and tasks:

- set up neural networks for mentioned models
- analyzing data
- publishing

### Qualifications

MSc in Information Technology, Earth Sciences, Physics, Mathematics.

**The applicants should fulfill the following requirements:**

- curiosity towards finding things out
- broad interest in information technologies, earth sciences, engineering, mathematics and physics
- some knowledge of artificial intelligent background and how to set up necessary models



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