



**Międzynarodowa Środowiskowa Szkoła Doktorska**  
przy **Centrum Studiów Polarnych**  
w Uniwersytecie Śląskim w Katowicach

ul. Będzińska 60  
41-200 Sosnowiec  
tel. +48 32 368 93 80  
polarknow@us.edu.pl  
www.mssd.us.edu.pl



**Title of PhD project:** The impact of changing light regimes on the functioning of marine coastal ecosystems.

**The leading unit:** Institute of Oceanology, Polish Academy of Sciences.

**Requirements:**

- 1) Master's degree in the field of Oceanography, Marine Biology, Physics, or similar.
- 2) Knowledge of research topics related to Marine Bio-physics.
- 3) Good computing skills and knowledge of (or willingness to learn) basic programs used in data analysis and visualization (e.g. ArcGis, Statistica, R, Matlab), experience with Python programming is an asset
- 4) Ability to work effectively in English.
- 5) Ability to work at sea, diving and motorboat licenses are welcome.

**Tasks description:**

1. Getting to know and preparing scientific equipment for field and laboratory measurements.
2. Preparation and planning of laboratory experiments on the study of photoreactivity of marine organisms.
3. Preparation, organization, and conducting field measurements in the coastal waters.
4. Collection and processing of in situ and satellite data necessary for analysis.
5. Data analysis.
6. Preparation of scientific publications and conference presentations.
7. Regular reporting of work progress.
8. Assistance in the scientific activities of the Marine Physics Department of IOPAN.

**Abstract:**

Light is the basis of life in the oceans. Through evolution, marine organisms have developed the ability to adapt to natural light conditions—intensity, spectral composition, and light cyclicity. In recent years, the light landscape of the seas, especially in coastal zones, has undergone significant changes in two ways.

The first phenomenon is the so-called Coastal Darkening - a long-term decrease in water transparency caused by factors related to climate change (e.g., more intense precipitation, temperature increase, melting glaciers) and human activity (e.g., activities increasing erosion,



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changes in the use of catchments). A decrease in light availability negatively affects photosynthetic organisms such as phytoplankton, seagrasses, and macroalgae, as well as animals dependent on light for obtaining food and orientation.

The second process is the increase in artificial light at night (ALAN), especially in urbanized coastal areas. This phenomenon disrupts the biological rhythms of marine organisms that are not evolutionarily adapted to night light and have limited photoacclimatization capabilities.

Although the causes of these phenomena are different, both affect the same processes - they modify the intensity, composition, and cycle of light available in the water column, which is important not only for primary production and food webs but also for the orientation, reproduction, feeding, and migration of organisms. These changes can lead to profound transformations of marine communities. The subject of the proposed doctoral project will be to investigate and quantify changes in the Baltic Sea light landscape and to estimate their impact on selected aspects of the functioning of the marine ecosystem. The project includes the measurements of the optical properties of water and their comparison with historical data, mapping of areas exposed to artificial light at night, and analysis of its spectral and temporal characteristics. Laboratory and in situ studies on the photoreactivity of selected marine organisms are also planned.

### **Other information:**

The work will be carried out under supervision of:

dr hab. Mirosław Darecki prof IOPAN ([darecki@iopan.pl](mailto:darecki@iopan.pl)) , Institute of Oceanology, Polish Academy of Sciences

And dr hab. Joanny Stoń-Egiert prof. IOPAN ([aston@iopan.pl](mailto:aston@iopan.pl)), , Institute of Oceanology, Polish Academy of Sciences

The IEDS office: + 48 32 3689380, [polarknow@us.edu.pl](mailto:polarknow@us.edu.pl)

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