

Joint Press Release, September 10, 2025

Helmholtz-Zentrum Hereon

Leibniz Institute for Baltic Sea Research Warnemünde

How does light change in the sea? European research initiative investigates changing underwater light conditions

September 10, 2025 / Hamburg. Today, the two-day kick-off meeting for the international “Joint Action on Changing Marine Lightscales” launched by JPI Oceans started in Hamburg with more than 50 participating researchers. The initiative aims at a better understanding of changing light conditions in the ocean and how this impacts marine ecosystems. Two projects are taking up work under the umbrella of a joint knowledge hub. The ISOLUME project coordinated by the [Leibniz Institute for Baltic Sea Research Warnemünde \(IOW\)](#) focuses primarily on ocean darkening; the ALANIS project, led by the [Helmholtz-Zentrum Hereon](#), mainly addresses nocturnal light pollution.

Underwater light conditions are of fundamental importance for life in the ocean. The entire photosynthesis-based marine productivity is determined by the availability of sunlight, and many organisms use light for orientation and as a cue for their behaviour. However, lightscales in the sea are increasingly changing because of human activities: On the one hand, the oceans are becoming darker – for instance due to sediments, which have been stirred up or washed in from terrestrial sources, or due to intensified algal growth stimulated by climate change and eutrophication. On the other hand, increasing pollution from artificial light sources in coastal regions can be observed at night. JPI Oceans’ “Joint Action on Changing Marine Lightscales” is therefore pooling expertise across Europe under the umbrella of a joint knowledge hub to systematically investigate the effects of such changes on marine life and ecosystem services for the first time. The consortium is funded with a total of approx. 4 million euros over a period of three years.

At the two-day kick-off event currently underway at the Climate Service Center Germany (GERICS) in Hamburg, around 50 researchers from 13 primarily European countries are exchanging ideas about their respective research approaches. In presentations, workshops, and roundtable discussions, they are identifying areas of overlap and steps for jointly developing recommendations for policymakers and society. The aim is to develop synergies between the two projects and ensure close networking among all partner institutions.

ISOLUME: Changes in natural light penetration in the oceans

The ISOLUME project (short for “IndicatorS Of changing Lightscales in Underwater Marine Ecosystems”) brings together eleven partner institutions from seven countries and is coordinated by IOW Director Oliver Zielinski. It focuses on the question of how light penetration in marine ecosystems has changed over decades and will continue to change in the future.

For the first time, the project takes into account all four dimensions of marine lightscales: location, time, intensity, and spectrum. The causes and consequences of ocean darkening, as well as nocturnal light pollution, will be analysed both on a large scale for European sea basins and on a smaller scale using regional case studies. The research approach combines trend analyses of historical data series, some of which go back decades or even centuries, with data from current marine optical remote sensing and oceanographic in-situ measurements; various modelling approaches will allow future scenarios to be projected up to 2050.

“For one thing, we want to gain a better understanding of the complex interplay of all factors that contribute to ocean darkening and influence its impact on marine life. Furthermore, the scientific findings of ISOLUME will be used to advance effective monitoring and management strategies that can help mitigate the problem,” emphasizes project coordinator Oliver Zielinski on the occasion of the kick-off meeting in Hamburg. According to the IOW director, this will be achieved through the consistent involvement of external partners from European countries, politics, industry, and other stakeholders.

ALANIS: Impacts of artificial light on pelagic coastal ecosystems

At the same time, the ALANIS project (short for “Impacts of **A**rtificial **L**ight **A**t **N**ight on pelagic ecosystems **I**n **E**uropean **S**eas”), led by Rüdiger Röttgers at the Helmholtz-Zentrum Hereon, is being launched. ALANIS brings together eight partner institutions from six European countries. They are focusing on the little-researched question of how light pollution caused by artificial light sources – from port facilities and shipping routes to coastal cities – is changing the marine environment. The researchers are investigating how artificial light spreads underwater and what effects this has on the behaviour of organisms such as zooplankton.

Field experiments will be carried both in higher latitudes with relatively turbid coastal waters, for example in Norwegian fjords and the Baltic Sea, and in the very clear waters of the Mediterranean Sea near Crete. The focus is on the diurnal vertical migration of zooplankton. These mostly microscopic crustaceans remain in deeper, dark layers of the sea during the day and rise to the surface at night to feed on phytoplankton. As the light increases at dawn, they migrate back to deeper water to protect themselves from predators. Both, additional artificial light and increasing ocean darkening, could influence this behaviour and thereby ultimately the productivity of zooplankton and phytoplankton.

“We want to find out whether and how the additional light generated by human activities at night affects the marine environment,” says Rüdiger Röttgers. “The ALANIS funding enables us to take a comprehensive look at this factor with regard to European waters and make an initial assessment of its possible effects, which we intend to summarize in a sensitivity atlas for all European marginal seas,” the project coordinator concludes.

Partner institutions involved in the “Changing Marine Lightscapes” knowledge hub

In addition to the IOW and Hereon, the following partner institutions are involved: Brandenburg University of Applied Sciences (THB), Hellenic Centre for Marine Research (HCMR), Institute of Oceanology of Polish Academy of Sciences (IOPAN), Leibniz Institute Freshwater Ecology and Inland Fisheries (IGB), Norwegian Institute for Water Research (NIVA), Plymouth Marine Laboratory, Scottish Association for Marine Science (SAMS), SINTEF Norway, University of Bergen, University College Cork, University of Galway, University of Greifswald, University of Malta, University of Plymouth, University of Tromsø

About JPI Oceans

The **J**oint **P**rogramming **I**nitiative **H**ealthy and **P**roductive **S**eas and **O**ceans (JPI Oceans) is an intergovernmental platform that pools and coordinates marine and ocean research in Europe. Its aim is to use scientific resources more efficiently, promote synergies, and develop solutions to pressing societal challenges related to the oceans. In Germany, JPI Oceans is supported by the Federal Ministry of Education and Research. (More information: <https://www.jpi-oceans.eu>)

Press Contacts:

Dr. Kristin Beck (IOW) | phone: +49 (0)381 – 5197 135 | presse@io-warnemuende.de
Christoph Wöhrle (Hereon) | phone: +49 (0)4152 – 87 1648 | presse@hereon.de