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Artificial Intelligence for Improved Baltic Sea Protection

Innovative Monitoring Concept for the Eckernförde Bay Receives State Funding

March 4, 2024 / Kiel. Artificial intelligence will help improve the monitoring of the ecological condition of the Eckernförde Bay in the future. The linking and analysis of large data sets enable more precise forecasts and warnings, for example, of impending fish kills   . A digit al representation of the bay could also make it possible to test hypothetical scenarios and measures to improve the environmental condition in advance. For this innovative project, jointly developed by GEOMAR and Kiel University, Schleswig- Holstein's Minis ter of Digitalization, Dirk Schrödter, presented a grant of €750,000 on Friday.

– Joint Press Release of the GEOMAR Helmholtz Centre for Ocean Research Kiel, Kiel University, and the State Chancellery of Schleswig-Holstein –

The bays of Schleswig-Holstein's Baltic coast are not in good ecological condition. Seasonal oxygen-depleted zones are expanding, leading to more frequent mass fish kills. The data used to assess the state of the environment is currently often based on so-called "discrete" measurements, i.e. water samples are taken on site and then taken to the laboratory for analysis. Results can take days or even months to become available.

In the future, artificial intelligence will be used to collect, assess and develop measures to improve environmental conditions in near-real time: The pilot project INSYST (INtelligent SYSTem for Coastal Water Monitoring using Artificial Intelligence), jointly developed by GEOMAR Helmholtz Centre for Ocean Research Kiel and the University of Kiel (CAU), aims to implement this innovative monitoring concept specifically for the Eckernförde Bay. Dirk Schrödter, Schleswig-Holstein's Minister for Digitalisation, has now awarded the project a grant of €750,000 from the state's AI strategy.

"Environmental protection, digitalisation and artificial intelligence are inextricably linked," says Digitalisation Minister Dirk Schrödter. "AI and data are at the centre of our efforts to make Schleswig-Holstein a digital flagship region. To achieve this goal, we are prom, p.28T-Holstein. (o)1 arogiT4e (iT4e (iT4

Professor Dr Katja Matthes, Director of GEOMAR, emphasises the groundbreaking importance of the project: "The funding of this project is an important step towards more effective protection of the Baltic Sea. The integration of artificial intelligence into marine monitoring concepts is a promising approach, but one that has hardly been used so far. With INSYST, we can make a decisive and innovative contribution to the development of such concepts, which will help to protect and preserve our marine ecosystems in the future".

"We are very pleased about the successful funding decision by the state. It is a special recognition of the fact that we at Kiel University can use our innovative methods and research in artificial intelligence to contribute to solving societal challenges such as improving the health of the oceans and better assessing risks in the future," said Professor Dr Ralph Schneider, Vice-President of Kiel University.

"For the project we will use the data from the Boknis Eck time series station," says project leader Dr Helmke Hepach, environmental scientist at GEOMAR, who is responsible for the data collection together with Professor Anja Engel and Professor Hermann Bange. Since 1957, Boknis Eck has been regularly sampled monthly for a variety of physical, chemical and biological parameters. For several years, these series of measurements have been supplemented by sensor data from a permanently installed underwater observatory, which can be accessed live via a data cable. After the loss of the sensor structure in summer 2019, it will now be reinstalled at Boknis Eck. In addition, a small-scale computer model of the Baltic Sea is available at GEOMAR, which provides a good representation of the physical parameters in Eckernförde Bay.

"Conventional statistical methods cannot be applied to these large data sets," says Professor Olaf Landsiedel from the University of Kiel, who is responsible for the AI methodology in the project, "this is where artificial intelligence comes in." Not only can AI link and make use of these large data sets, but it also becomes more accurate as the data sets grow. By combining the data with various AI methods, an assessment of the state of (i)2.6 (l)2.6 (l). .9 ( )]TJ -0.004 Tw --6 (ous)-2 ( )0.5o.6 (B)J -0.004 T6-(