

## Baltic Sea region: New state of the art reports on climate and Earth system research

The comprehensive collection of articles recently published in the international journal *Earth System Dynamics* documents the current state of knowledge of climate and Earth system research in the Baltic Sea region. The spectrum of topics ranges from the ecosystems of the Baltic Sea, to the influence of humans on the environment, to a detailed inventory of current knowledge on climate change and its impact, as well as the reliability of future scenarios.

The Baltic Sea is a marginal sea under pressure. Climate change, eutrophication, overfishing, inputs of contaminants and the heritage of dumped chemical and conventional munitions in the sea are putting pressure on the Baltic Sea ecosystem. This is leading to many changes such as water warming and acidification, increasing flooding, seabed and coastal erosion, oxygen depletion, pollution, harmful algal blooms, invasion of alien species, decline in fish stocks and overall biodiversity. The Baltic Earth Assessment Reports (BEARs) now available provide a scientific assessment of the current situation of the Baltic Sea, making it easier for littoral states to adapt measures to achieve good ecological status.

The authors of the collection of articles belong to the international scientific network Baltic Earth, which is dedicated to Earth system research in the Baltic Sea region. In a total of ten review articles, the BEARs address the topics of salinity, biogeochemistry, natural hazards and meteorological extreme events, sea level and ecosystems, each also with reference to climate change. Three reports deal with methodological approaches to modeling processes in the atmosphere and ocean and with scenario calculations. Another detailed report summarizes the current knowledge on climate change as well as its impact in the Baltic Sea region. The special interactions between humans and climate change are also the subject of one of the reports.

### **Concisely summarized**

The special feature of the ten BEARs is that they summarize the currently available scientific knowledge in a concise form and support it with references. This makes it easier for scientists, decision-makers and interested laypersons to access these topics. The collection of articles is the continuation and expansion of the 2008 and 2015 state of the art assessment reports on regional climate change and its impact on the Baltic Sea region (BACC) published in book form.

"Since the last Assessment Report, we have been able to significantly expand our pool of observational data and also make progress in climate modeling," says Prof Markus Meier of the Leibniz Institute for Baltic Sea Research Warnemünde (IOW), and editor of the BEARs. "This will enable us to produce improved projections of future conditions in the

Baltic Sea region and reduce remaining uncertainties in the statements."

Climate change impact models, which are designed to calculate the effects of projected atmospheric and oceanographic changes on the environment and ecosystems, can especially benefit from this development. But the complexity of the interconnections, and consequently the models, remains a major challenge. "In addition to climate change, there are a multitude of man-made factors that directly affect the environment, but also interact and are in turn affected by climate change," says Dr Marcus Reckermann of the International Baltic Earth Secretariat at the Helmholtz-Zentrum Hereon, and co-editor of the BEARs. "We have provided a first inventory of this complex web of interrelationships. Existing model-based approaches should be supplemented and further developed in the coming years," Reckermann said.

### **About Baltic Earth**

Baltic Earth is an international scientific network that aims to improve understanding of the Baltic Sea region's Earth system as a basis for science-based management in the face of climate, environmental and human impacts in the region. The international Baltic Earth Steering Group consists of scientists from all Baltic Sea countries, chaired by Prof Markus Meier of the Leibniz Institute for Baltic Sea Research Warnemünde. Baltic Earth is coordinated by the International Baltic Earth Secretariat at the Helmholtz-Zentrum Hereon.

### **Caption:**

Researchers collect data. Based on this data, they can describe the state of the Baltic Sea. Photo: IOW/ Toralf Heene

### **Further information**

Website Baltic Earth

<https://baltic.earth>

The BEAR reports, written in English, are freely available at Earth System Dynamics:

[https://esd.copernicus.org/articles/special\\_issue1088.html](https://esd.copernicus.org/articles/special_issue1088.html)

### **Contact**

Christoph Wöhrle

Helmholtz-Zentrum Hereon

Communication and Media

Tel. +49 (0) 4152 87-1648

Mob. +49 (0) 171 8064979

presse@hereon.de

Berit Recklebe

Leibniz Institute for Baltic Sea Research Warnemünde

Department of Physical Oceanography and Instrumentation

Phone +49 (0) 381 5197 111

berit.recklebe@io-warnemuende.de