

Baltic Earth

Earth System Science and Outreach for the Baltic Sea Region



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 **Helmholtz-Zentrum
Geesthacht**

Centre for Materials and Coastal Research

Baltic Earth -

Earth system science for the Baltic Sea region



Baltic Earth

Earth System Science for the Baltic Sea Region

Vision of the programme

To achieve an improved Earth System understanding of the Baltic Sea region

- **Interdisciplinary and international**
- **Holistic view** on the Earth system of the Baltic Sea, processes in the **atmosphere**, on **land** and in the **sea** and also in the **anthroposphere**
- “**Service to society**” in the respect that **thematic assessments** provide an overview over knowledge gaps
- **Education** (summer schools)
- Inherits the **BALTEX** network of scientists and infrastructures

Baltic Earth SSG members



Anna Rutgersson
Sweden



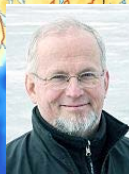
Jari Haapala
Finland



Kai Myrberg
Finland



Sergey Zhuravlev
Russia



Anders Omstedt
Sweden



Piia Post
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Juris Aigars
Latvia



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Marcus Reckermann



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Baltic Earth

Earth System Science for the Baltic Sea Region

Secretariat

International Baltic Earth Secretariat (IBES)

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International Baltic Earth Secretariat
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"@")



For details on IBES staff, [click here](#)

Publications

Website etc.

The International Baltic Earth Secretariat (IBES) as a focal support point for Baltic Earth is located at the [Helmholtz-Zentrum Geesthacht](#) (until 1 November 2010: GKSS Research Centre) in Geesthacht, Germany. The Baltic Earth Secretariat's tasks cover in particular:

- to support the Baltic Earth Science Steering Group, Working Groups and Panels in their activities, and to provide preliminary reviews of their work,
- to maintain connections with all participating research groups and with all operational data and numerical modelling centres for Baltic Earth,
- to prepare for international Baltic Earth meetings, workshops, seminars and conferences, and to provide assistance for reports by Baltic Earth scientists and to international research groups and the research and public community at large, and
- to inform participants about ongoing activities which may be of relevance to their work.

Events

Since January 2002, GKSS (Helmholtz-Zentrum Geesthacht as of 1 November 2010) has been the only sponsor of the International BALTEX (now: Baltic Earth) Secretariat, covering salaries for the staff members, infrastructure and travel support.

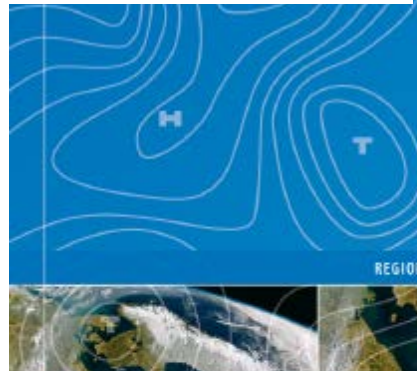
Infrastructure

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Website etc.

Events



Ostseeküste im
Klimawandel

Ein Handbuch zum Forschungsstand

Eos, Vol. 95, No. 13, 1 April 2014

EOS
EARTH OBSERVATION
BIG TRANSACTIONS AMERICAN GEOPHYSICAL UNION

VOLUME 95 NUMBER 13
1 April 2014
PAGES 109–116

An Earth System Science Program for the Baltic Sea Region

PAGES 109–110

From Russia in the east to Sweden, Denmark, and Germany in the west, reaching south to the tips of the Czech Republic, Slovakia, and Ukraine, the Baltic Sea watershed drains nearly 20% of Europe (see Figure 1). In the highly populated south, the temperate climate hosts intensive agriculture and industry. In the north, the landscape is boreal and rural. In the Baltic Sea itself, complex bathymetry and stratification patterns as well as extended hypoxic and anoxic deep waters add to the diversity. Yet in recent history, the differences across the Baltic Sea region have been more than physical: In the mid-20th century, the watershed was split in two.

The rise of the Iron Curtain in the wake of World War II had a tremendous effect on the exchange of scientific information in the region, driving a wedge between a mature research community and a strong scientific infrastructure. Building on this pre-Cold War history, soon after the Berlin Wall fell, the Baltic Sea Experiment (BALTEX) began, a project intended to promote research and outreach activities concerning the meteorology, hydrology, oceanography, regional climatology, and, in its latter phase, biogeochemistry of the Baltic Sea region. This project, in turn, helped reforge the connections between the research communities from the east and the west.

Now, after 20 years of successful research networking, BALTEX (1990–2013) has been succeeded by Baltic Earth, an expanded program with a revised focus on Earth system science. Relaunching in June 2013, Baltic Earth is inviting interested scientists to collaborate and contribute to its implementation.

Baltic Earth and the Legacy of BALTEX

Although Baltic Earth will face new challenges, it has been given a head start by its

heriting the BALTEX network of people and institutions; its infrastructure, including the BALTEX secretariat, conferences, workshops, and publication series; and its scientific legacy [Reckermann et al., 2011, and references therein]. Like its progenitor, Baltic Earth aims to contribute to the understanding of regional energy, water, and matter fluxes and their effects on the regional climate. Thus, the vision of Baltic Earth is to achieve an improved Earth system understanding of the Baltic Sea region, with a more holistic view that encompasses processes in the atmosphere, land, sea, and anthroposphere.

From its very beginning, BALTEX had been part of and contributed to the Global Energy and Water Exchanges Project (GEWEX), within the World Climate Research Programme (WCRP), and Baltic Earth will continue this legacy.

In the coming years, the efforts of Baltic Earth will be guided by specific grand challenges defined by the program that pose major interdisciplinary research questions that studies of the Baltic Sea region can help answer. Thematic assessments of particular research topics compiled by expert groups, such as the BALTEX Assessment of Climate Change for the Baltic Sea Basin (BACC; <http://www.baltic-earth.eu/BACC2>) [see Reckermann et al., 2008] will help Baltic Earth scientists identify gaps in current knowledge and will guide the development plans to address these grand challenges.

Baltic Sea Environment Proceedings

Climate change in the Baltic Sea HELCOM thematic assessment



Helsinki Commission

Baltic Marine Environment Protection Commission

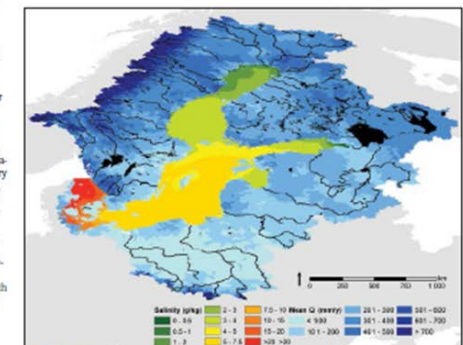


Fig. 1. The Baltic Sea drainage basin together with the spatial variability in annual mean water discharge (Q) calculated with the Hydrological Predictions for the Environment (HYPER) model [Reckermann et al., 2012] and with annual mean sea surface salinity in the Baltic Sea. This salinity diagram shows the gradient from high (red) to low (green) salinities, calculated with the Roscoff Centre Ocean model [Meier et al., 2012]. Courtesy of René Capot, Swedish Meteorological and Hydrological Institute.





Baltic Earth

Earth System Science for the Baltic Sea Region

Secretariat

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[1st Baltic Earth
Multiple drivers
system changes
Baltic Sea region
Nida, Curonian Spit
Lithuania
13 - 17 June 2016](#)

[BACC II](#)

 **Helmholtz-Zentrum
Geesthacht**
Centre for Materials and Coastal Research

The BALTEX/Baltic Earth Publication Library

[Compilation of BALTEX/Baltic Earth Publications \(pdf\)](#)

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- 876 BALTEX/Baltic Earth Conference presentations
- 55 International BALTEX Secretariat Publication Series issues
- 9 International Baltic Earth Secretariat Publication Series issues

Attention: Please, send an e-mail as well, if you wish to edit or delete an existing publication entry.

For any questions or suggestions, you may have, contact [Silke Köppen at the Baltic Earth Secretariat](#)

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Publications

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Baltic Earth programmes
the objectives of
programme are
continuously
"BALTEX" or

[Baltic Earth](#)

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Geesthacht](#)

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Baltic Earth

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Publications

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Events

1st Baltic Earth Conference
Multiple drivers for Earth system changes in the Baltic Sea region
 Nida, Curonian Spit, Lithuania
 13 - 17 June 2016

BACC II

 **Helmholtz-Zentrum Geesthacht**
 Centre for Materials and Coastal Research

Announcements



[BALTIX Website](#)



Extending the knowledge of the regional Earth system in the Baltic Sea region

Baltic Earth stands for the vision to achieve an improved Earth system understanding through interdisciplinary research. This means that the research disciplines of BALTIX continue to be relevant, but a more holistic approach is needed. In the coming years, a major means will be scientific assessments of particular grand research challenges represent interdisciplinary research. A major means will be scientific assessments of particular grand research challenges represent interdisciplinary research. A major means will be scientific assessments of particular grand research challenges represent interdisciplinary research.

A science plan is currently being developed to a continuously on-going definition of core research questions which are identified and Challenges for research. These will be identified at conferences and by assessment working groups (following the BACC approach). Research foci are p... earth will communicate with stakeholders and research funding agencies to promote fur...

NEWS



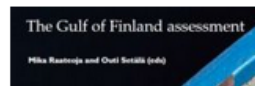
Baltic Earth Seminar at Fehmarnbelt Days 2016 "Exchanges between the North and Baltic Seas - A scientific overview".
 Presentations online [here...](#)



North Sea Climate Change Assessment now online available as [Open Access](#)! Congratulations for this tremendous effort!

Interview with students and lecturers about the Askö Summer School...
 A short note by the Baltic Sea Centre of Stockholm University ...

Assessment Report of the Gulf of Finland published

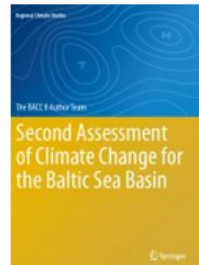


The Finnish Environment Institute SYKE has published an assessment of the Gulf of Finland, compiling the research results of over a hundred Finnish, Russian and Estonian researchers. The over 300-page publication includes recent information on issues such as eutrophication, hazardous substances, invasive species, noise, maritime traffic, and plastic waste. The publication is the most important result of the Gulf of Finland Year arranged by the countries. The publication includes for

Upcoming Events

For past events look [here...](#)

The BACC Blog



BACC I (2008) download



Events

Summer Schools

Workshops and Seminars

Topical Conferences

Baltic Earth Conferences



International advanced PhD course on

**Impact of climate change
on the marine environment
with special focus
on the role of changing extremes**

co-organized by the
"Baltic Ecosystem Adaptive Management" (BEAM) and Baltic
Earth programmes and funded by BEAM



Askö Laboratory, Trosa, Sweden

24 - 30 August 2015

A Doctoral Students Conference

**Challenges for Earth system science
in the Baltic Sea region:
From measurements to models**

co-organized by the
the University of Tartu and Baltic Earth



**University of Tartu and Vilsandi Island
Estonia**

10 - 14 August 2015



Events

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Topical Conferences

Baltic Earth Conferences



FINNISH METEOROLOGICAL INSTITUTE



Baltic Earth

Baltic Earth Workshop on

Natural hazards and extreme events in the Baltic Sea region

Finnish Meteorological Institute, Dynamicum, Helsinki

30-31 January 2014



Gulf of Finland
Year 2014

Baltic Earth - Gulf of Finland Year 2014 Modelling Workshop on

Using modelling as a tool to ensure sustainable development of the Gulf of Finland-Baltic Sea ecosystem

A scientific workshop in support of the Gulf of Finland Declaration

Finnish Environment Institute (SYKE), Helsinki 24-25 November 2014



Gulf of Finland
Year 2014



Baltic Earth

An open Baltic Earth PhD seminar in connection to the Gulf of Finland Final Scientific Forum

Exchange processes between the Gulf of Finland and other Baltic Sea basins

Tallinn, Estonia, 19 November 2015

Events

Summer Schools

Workshops and Seminars

Topical Conferences

Baltic Earth Conferences



**Climate modelling and impacts
from the global to the regional
to the urban scale**

An international scientific seminar

10 March 2015

Holcim Auditorium
HafenCity Universität

Überseeallee 16, 20457 Hamburg, Germany

Scope of the seminar is to give an overview over the current state of research in the fields of global and regional climate modelling, and the impacts on the regional and urban scales.

Posters related to the seminar topic are invited to be presented. Poster abstract and registration deadline is 2 March 2015. There are no fees involved.

This open seminar is organised in connection with the 4th Baltic Earth Science Steering Group Meeting by the International Baltic Earth Secretariat at Helmholtz-Zentrum Geesthacht in cooperation with HafenCity Universität Hamburg (HCU) and the Cluster of Excellence CliSAP of Hamburg University, which stands for „Integrated Climate System Analysis and Prediction“.

Baltic Earth is the research network for Earth system science in the Baltic Sea region. www.baltic-earth.eu

HCU | HafenCity Universität
Hamburg



clisap



Max-Planck-Institut
für Meteorologie

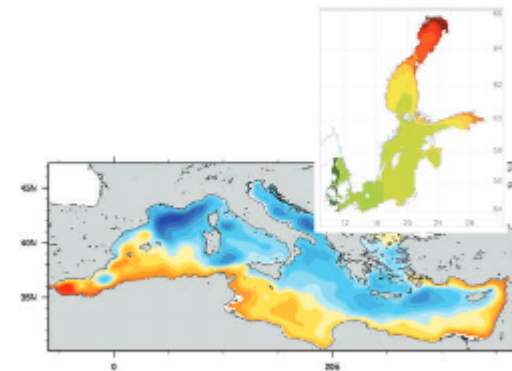
Helmholtz-Zentrum
Geesthacht
Zentrum für Material- und Küstenforschung

A joint
HyMex-Baltic Earth
Workshop

HyMeX



**Joint regional climate system
modelling for the
European sea regions**



ENEA
Rome, Italy
5-6 November 2015

**Announcement
and Call for Papers**

Events



Summer Schools

Workshops and
Seminars

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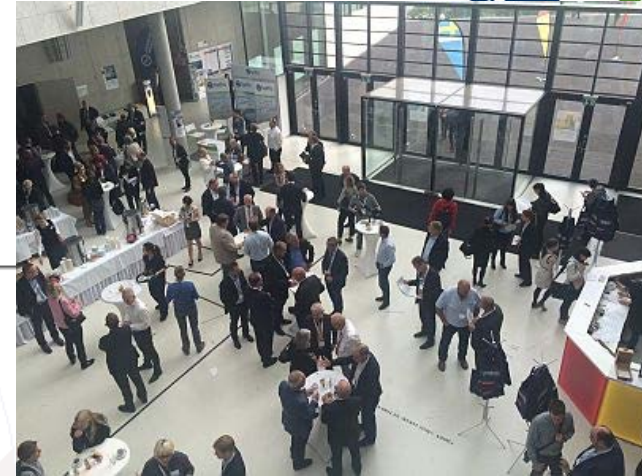
Baltic Earth
Conferences



**FEHMARNBELT
DAYS 2016**
HAMBURG
20-22 SEPTEMBER

**Exchanges between the North and Baltic Seas –
A scientific overview**

HafenCity University Hamburg, Germany
21 September, 9 – 12:30



Joint Baltic Earth-ESA Workshop on
**Remote Sensing applications
in the Baltic Sea region**

Helsinki, Finland

29-31 March 2017

Events

Summer Schools

Workshops and
Seminars

Topical Conferences

**Baltic Earth
Conferences**

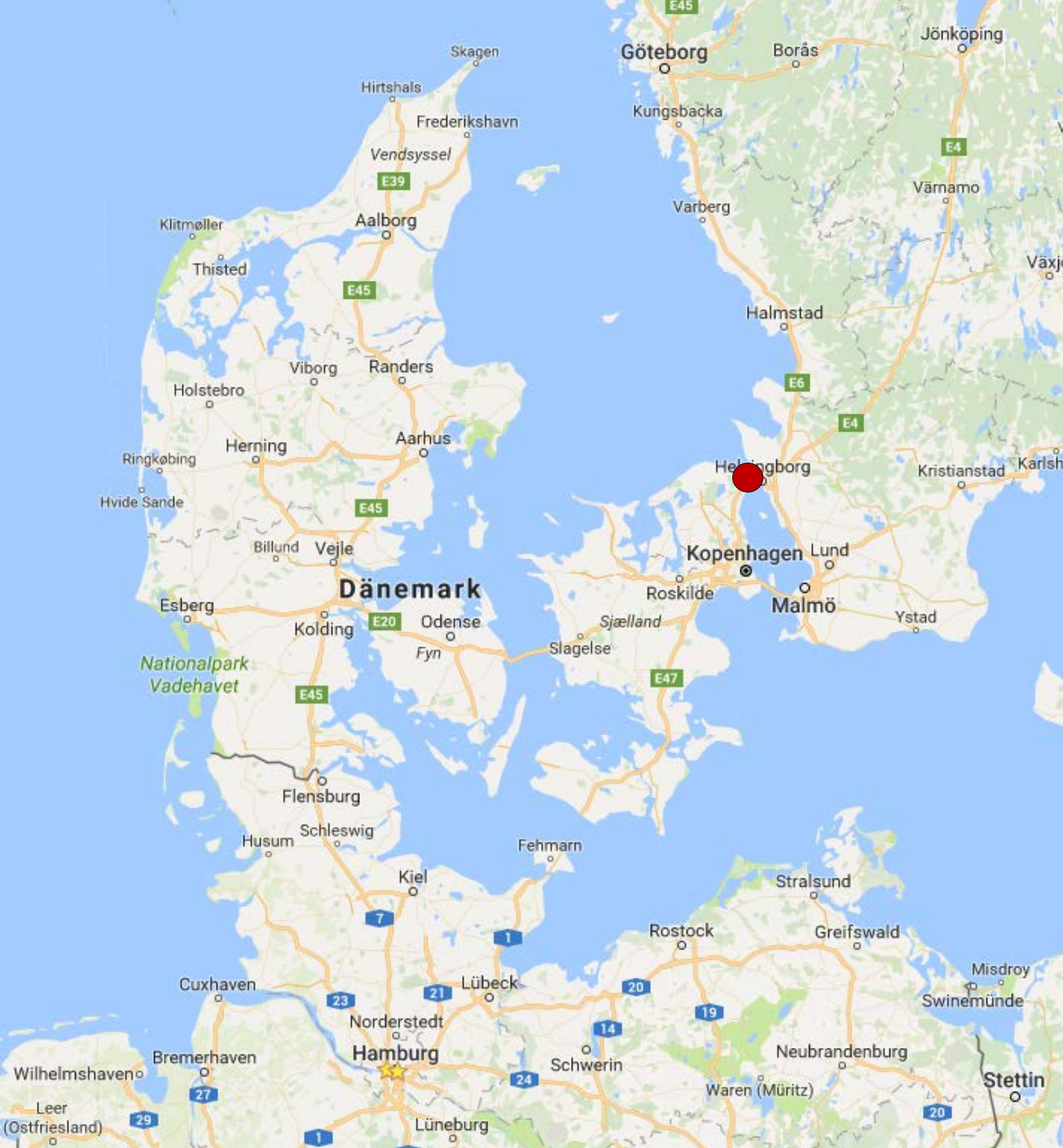
1st Baltic Earth Conference Nida, Curonian Spit, Lithuania 13 - 17 June 2016



**Multiple drivers for Earth system changes
in the Baltic Sea region**



Second Announcement and Call for Papers



ference

Baltic Earth Science Plan and Grand Challenges



- Flexible science plan with a continuously on-going definition of core research questions which are identified to be key scientific issues, so-called “**Grand Challenges**” (GCs)
- New Grand Challenges will be identified at conferences and by using **assessments of existing research** by dedicated working groups. Grand Challenges are envisaged to be research foci for periods of about 3-4 years (then terminated or updated).
- The human impact will be assessed at all levels, wherever possible and senseful



Currently: 6 Grand Challenges

- GC1: Salinity dynamics
- GC2: Land-Sea biogeochemical linkages
- GC3: Natural hazards and extreme events
- GC4: Sea level and coastal dynamics of the Baltic Sea
- GC5: Regional variability of water and energy exchanges
- GC6: Multiple drivers of regional Earth system changes



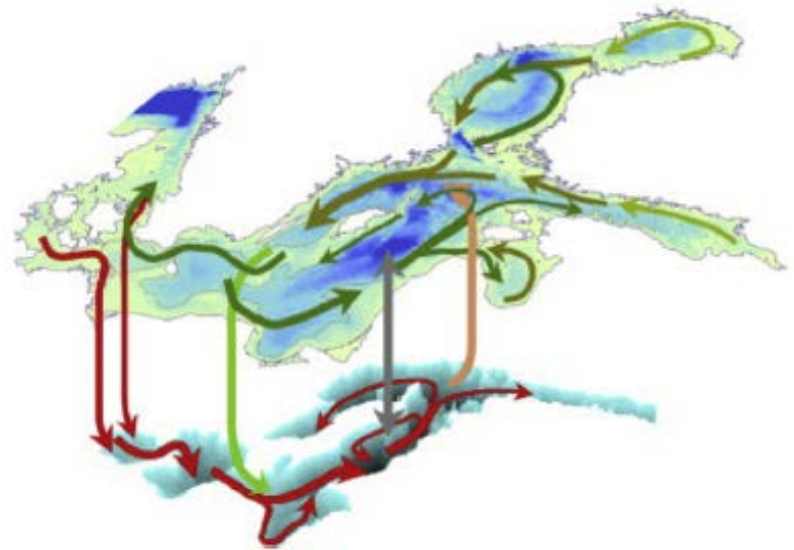
GC1: Salinity dynamics in the Baltic Sea

Andreas Lehman, GEOMAR

Kai Myrberg, FMI

Piia Post, University of Tartu

- Interrelation between decadal/climate variability and salinity.
- Water mass exchange and major Baltic inflows
- Regional salinity distribution/variability and associated circulation patterns (including salinity fluxes between the coastal areas and the open sea and within the sub-basins).



GC2: Land-Sea biogeochemical linkages

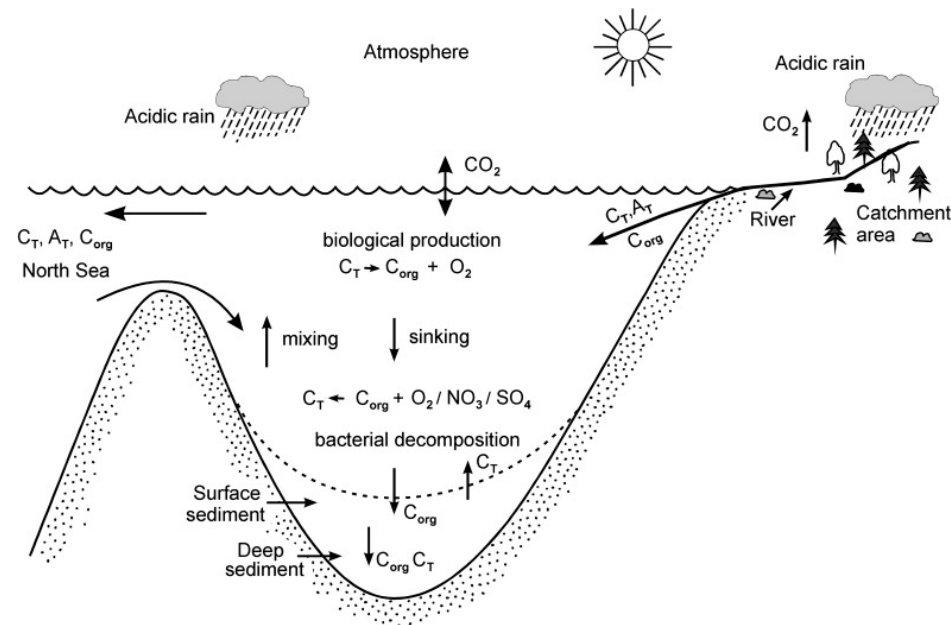


Gergor Rehder, IOW

Karol Kulinski, IO-PAN

Benjamin Smith, Lund University

- C, N, P cycles studies for the understanding primary production mechanism and organic matter transformations in the Baltic Sea
- Transformations and pathways of terrestrial organic matter, influence of the terrestrial input on the carbonate system
- extension of the databases with the missing terrestrial loads data of the key chemical substances (e.g. Neva River).



GC3: Natural hazards and extreme events in the Baltic Sea region



Jaari Haapala, FMI

Anna Rutgersson, Uppsala University

Martin Stendel, DMI,

- Society is very sensitive to extreme geophysical events that have severe implications for human life, generate economic losses and influence ecosystems.
- A natural disaster links extreme geophysical events to ecosystems and society (in particular weaknesses in ecosystems and society)
- Understanding the underlying causes of natural disasters increases the ability to predict the occurrence and severity and may save human lives as well as mitigate economic losses.



Photos: Martin Stendel and Finn Majlergaard

GC4: Sea Level and Coastal Dynamics

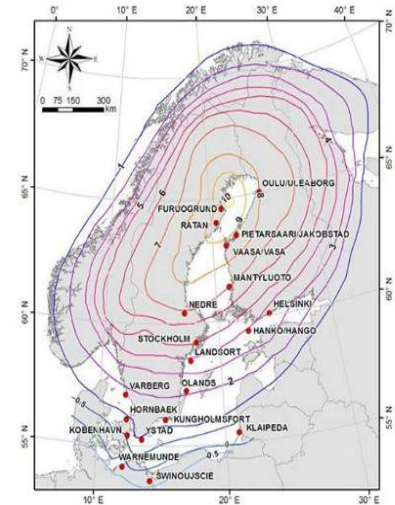
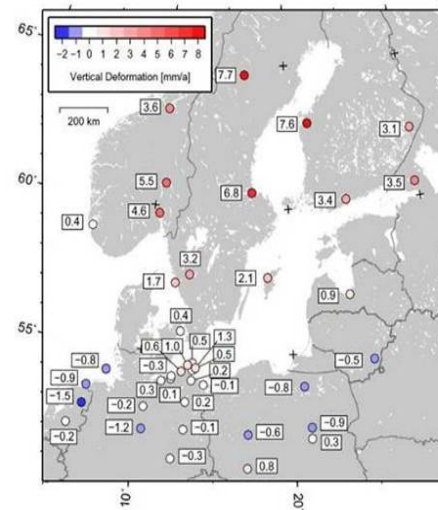


Ralf Weisse, HZG

Anders Omstedt University of Gothenburg

Birgit Hunicke, HZG

- Future sea level changes on time scales from seasons to decades (mean and extreme sea levels)
- A systematic comparison of tide-gauges and high resolution satellite products. more high-resolution ocean and atmosphere-ocean regional simulations of the Baltic Sea are becoming available.
- Consistent analysis of all data sets is needed.



Estimations of crustal deformation rates in the Baltic Sea Region derived by different methods. From Richter et al. (2011) and Harff et al. (2010).

GC5: Regional variability of water and energy exchanges in the Baltic Sea region

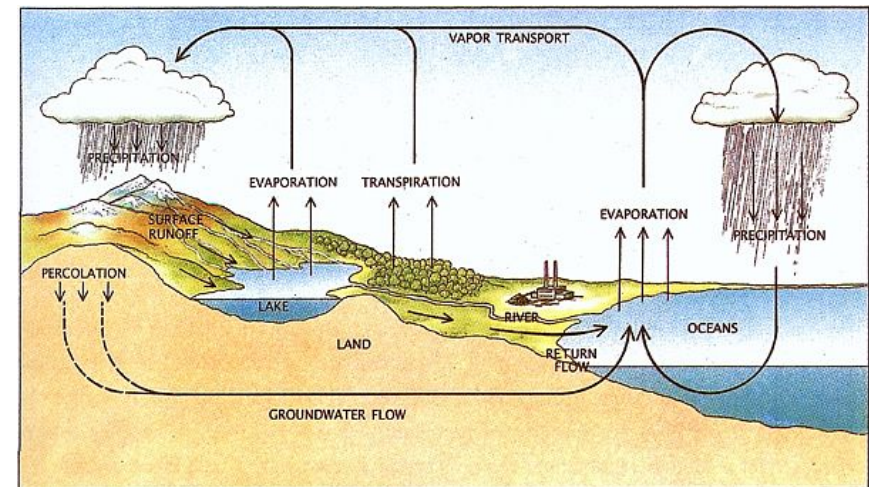


Sergej Zhuravlev, Saint-Petersburg State University

Irina Partasenok, Centre for Hydrometeorology

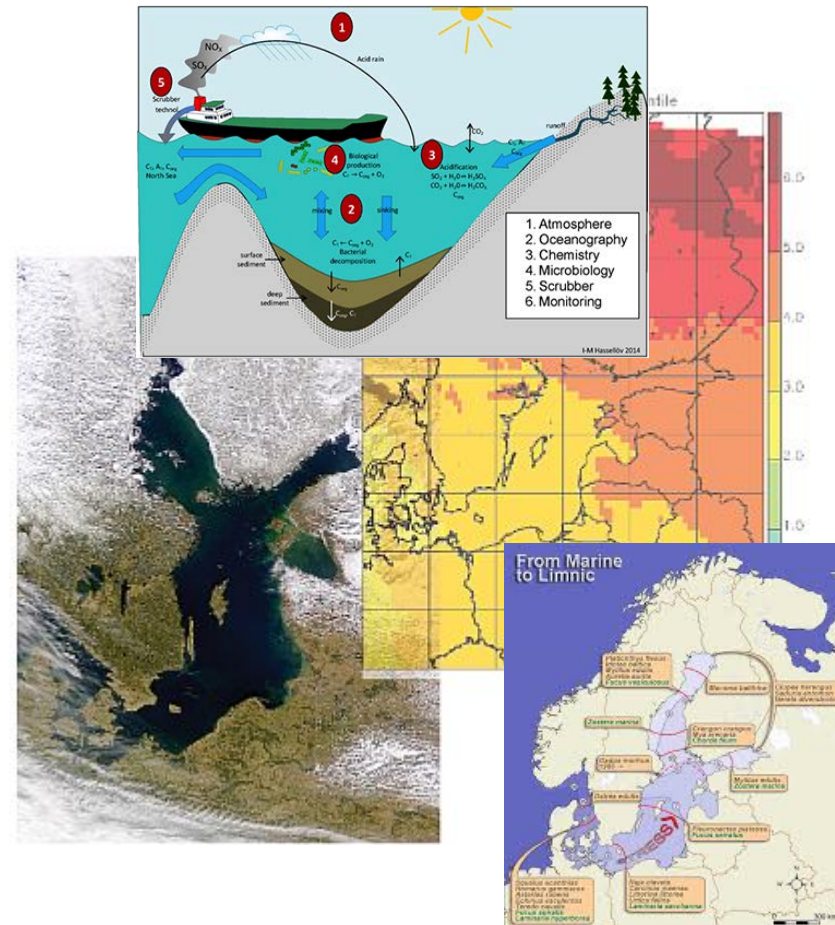
Franz Berger, DWD

- The observation of atmospheric processes
- The diagnosis of natural variability of energy and water components.
- The improved description and modelling of atmospheric processes
- The extended and continuous evaluation of atmospheric processes with conventional meteorological/hydrological observations.
- The modelling/prediction of short- and long-term water and energy exchanges.

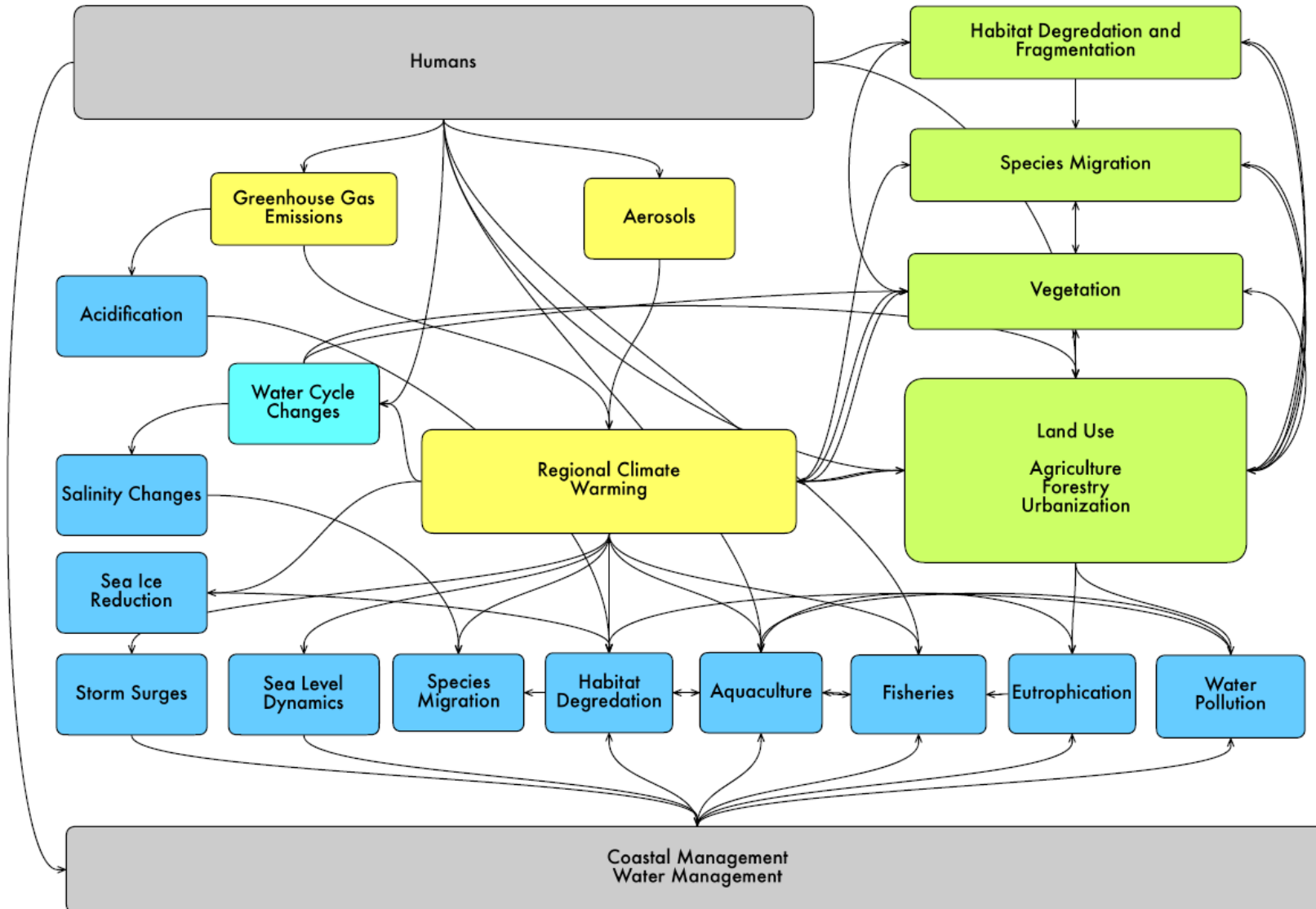


Marcus Reckermann, Helmholtz-Zentrum Geesthacht
Juris Aigars, University of Latvia
Anneli Poska, Lund University

- A mixture of interwoven factors, such as regional climate change, eutrophication, pollution, fisheries, hydrographic engineering, agricultural and forestry practices and land cover change are responsible for the current situation and of potential importance as drivers of future changes.
- There is a need for increased cooperation among researchers having specialised knowledge of different components of the coupled biophysical-societal system.
- Key disciplines include meteorology and climate science, oceanography, hydrology, marine, terrestrial and freshwater ecology, microbiology and biogeochemistry, economists, human geographers, political scientists and engineers.



GC6: Multiple drivers of regional Earth system changes



Baltic Earth Science Plan 2017



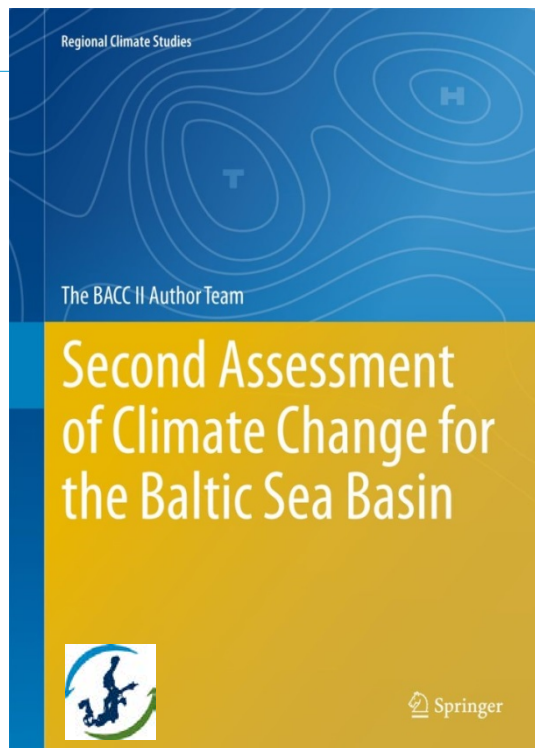
International Baltic Earth Secretariat Publication No. 11, February 2017

Baltic Earth Science Plan 2017



Baltic Earth Assessment of Climate Change for the Baltic Sea region (2015)

Second Assessment of Climate Change for the Baltic Sea region (BACC II)



**New book following the format of BACC I as OPEN ACCESS,
7 years after**

- What we currently know about climate change and its impacts in the Baltic Sea region
- Compiled by 141 authors from 12 countries
- Science Steering Group
- Peer reviewed
- Open Access with Springer

In preparation, based on BACC II:

Extended summaries of the scientific material

- In all 9 languages of the Baltic Sea region plus English (Danish, Swedish, Finnish, Russian, Estonian, Latvian, Lithuanian, Polish, German)
- Understandable for non-scientists
- Emphasizing on regional conditions

