



International Baltic Earth Secretariat Publication No. 21, May 2022

4th Baltic Earth Conference

Assessing the Baltic Sea Earth System

Jastarnia, Hel Peninsula, Poland, 30 May to 3 June 2022

Conference programme and List of Participants



Front page photo: Beach access on Hel peninsula, Poland
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Conference Organizers and Sponsors

Institute of Oceanology, IO-PAN
Polish Academy of Sciences
Poland



Helmholtz-Zentrum Hereon
Germany



Leibniz Institute for Baltic Sea Research
Warnemünde
Germany



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4th Baltic Earth Conference

Jastarnia, Poland

30 May – 3 June 2022



DRAFT Programme

Sunday, 29 May 2022

16:00 – 18:00 Registration

Monday, 30 May 2022

8:30 – 9:50 Registration

Opening ceremony

- | | |
|-------|--|
| 10:00 | Welcome address on behalf of Baltic Earth
H.E. Markus Meier
<i>Leibniz Institute for Baltic Sea Research Warnemünde, Germany</i>
<i>Swedish Meteorological and Hydrological Institute, Sweden</i>
<i>Chair of the Baltic Earth Science Steering Group</i> |
| 10:10 | Welcome address on behalf of the local host
Jan Marcin Weslawski
<i>Institute of Oceanology, Polish Academy of Science, Director</i> |
| 10:20 | Welcome address on behalf of the City of Jastarnia
Tyberiusz Zygmunt Narkowicz
<i>Mayor of the City of Jastarnia</i> |
| 10:30 | Welcome address on behalf of Puck County
Tomasz Hermann
<i>Vice-chair of Puck County</i> |

Opening session - Keynote speeches

Chair: Karol Kuliński

- 10:40 **The Hel Peninsula – Geological structure and history**
Szymon Uścińowicz
Department of Coastal Engineering and Dynamics, Institute of Hydro-Engineering of Polish Academy of Sciences, Gdańsk, Poland
- 11:00 **Climate Change in the Baltic Sea region**
H. E. Markus Meier
Leibniz Institute of Baltic Sea Research Warnemünde, Germany
- 11:20 **Future climate change: Results from the Coupled Model Intercomparison Project Phase 6 (CMIP6)**
Torben Koenigk (online)
Swedish Meteorological and Hydrological Institute, Sweden
- 11:40 **Global climate change and the Baltic Sea ecosystem: direct and indirect effects on species, communities and ecosystem functioning**
Markku Viitasalo and Erik Bonsdorff (online)
Finnish Environment Institute SYKE, Helsinki, Finland
- 12:00 **Multiple drivers and natural and anthropogenic hazards creating risks for coastal and transitional systems - footprints of activities, pressures, effects and management responses**
Mike Elliott, A. Borja, R. Cormier (online)
Department of Biological & Marine Sciences, University of Hull, UK

Topic 1: Salinity dynamics

Chair: Kai Myrberg

- 12:20 **Salinity dynamics of the Baltic Sea**
Andreas Lehmann, K. Myrberg, P. Post (Session keynote BEAR)
- 12:40 **On drivers and uncertainties in projected future salinity of Gulf of Bothnia**
Simo Siiriä, S. Fredriksson, P. Roiha, J. Haapala, L. Arneborg
- 12:55 **Lunch**
- 14:00 **Wintertime deep-water formation/convection in the Baltic Sea: A key to understand seabed dynamics and ventilation changes over the past 150 years**
Aarno Kotilainen, M. Moros, I. Snowball, T. Neumann, K. Perner, H. E. M. Meier, T. Leipe, J. S. Damsté, R. Schneider

- 14:15 **Turbulent mixing in the Slupsk Furrow: Microstructure observations in 2019-2021**
Anna Bulczak, D. Rak, W. Walczowski
- 14:30 **First SMOS Sea Surface Salinity dedicated products over the Baltic Sea**
Verónica González-Gambau, E. Olmedo, C. González-Haro , A. Turiel, A. García-Espriu, C. Gabarró, P. Alenius, L. Tuomi, M. Arias, R. Catany, D. Fernández, R. Sabia
- 14:45 **Revisiting the challenge of Sea Surface Salinity satellite retrievals in the Baltic Sea**
Rafael Catany, P. Alenius, V. González-Gambau, L. Tuomi, P. Roiha, E. Olmedo, C. González-Haro, A. Turiel, A. García-Espriu, D. Fernández, R. Sabia
- 15:00 **Topic 1 Open Discussion**
Chair: Andreas Lehmann and Kai Myrberg

Topic 2: Biogeochemical functioning

Chair: Beata Szymczycha

- 15:15 **Biogeochemical functioning of the Baltic Sea**
Karol Kuliński, G. Rehder, E. Asmala, A. Bartosova, J. Carstensen, B. Gustafsson, P. O. J. Hall, C. Humborg, T. Jilbert, K. Jürgens, H. E. M. Meier, B. Müller-Karulis, M. Naumann, J. E. Olesen, O. Savchuk, A. Schramm, C. P. Slomp, M. Sofiev, A. Sobek, B. Szymczycha, E. Undeman
(Session keynote, BEAR)
- 15:35 **Break**
- 16:05 **The marine CO₂ system in the estuaries of the Vistula and Oder Rivers – Structure, variability and potential implications for the Baltic Sea**
Marcin Stokowski^{ECS}, B. Schneider, G. Rehder, A. Winogradow, B. Szymczycha, J. Carstensen, K. Kuliński
- 16:20 **Controls of air-sea CO₂ exchange in the Baltic Sea under high and low wind-speed conditions**
Lucía Gutiérrez-Loza, E. Nilsson, M. Wallin, E. Sahlée, **A. Rutgersson**
- 16:35 **An estimate of the net carbon production in the Bothnian Sea during the spring bloom using carbon system data**
Martti Honkanen^{ECS}, B. Schneider, H. Pettersson, S. Otto, J. Seppälä, L. Laakso, G. Rehder

Chair: Juris Aigars

- 16:50 **Robustness of trophic network and carbon flows in coastal freshwater-impacted pelagic system: focus on lower food webs and seasonal aspects**
Astra Labuce^{ECS}, I. Jurgensone, A. Ikauniece
- 17:05 **Nitrogen fixation in the Baltic Sea evaluated using long-term, high-resolution pCO₂ records and N₂, Ar measurements from a cargo ship**
Bernd Schneider, G. Rehder, O. Schmale
- 17:20 **Oxygen dynamics in the Baltic Sea: A budget**
Lev Naumov^{ECS}, T. Neumann, H. E. M. Meier
- 17:35 **Hypoxia in seasonally stratified coastal basins – the 2018 Gulf of Riga case and future projections**
Stella-Theresa Stoicescu^{ECS}, J. Laanemets, T. Liblik, M. Skudra, O. Samlas, I. Lips, U. Lips
- 17:50 End of Plenary Day 1
- 19:00 **Ice Breaker**

Tuesday, 31 May 2022

Chair: Karol Kuliński

- 09:00 Special lecture:
The BALTEX/Baltic Earth programs: Excursions and returns
Anders Omstedt and Hans von Storch

Topic 2: Biogeochemical functioning *continued*

- 09:20 **Short-term variability of benthic nutrient, carbon, and oxygen fluxes in the coastal zone – The importance of the environment and macrofaunal communities**
Marc J Silberberger, **Z. Borawska^{ECS}**, B. Szymczycha, M. Szczepanek, A. Winogradow, M. Kędra
- 09:35 **Riverine Phosphorus Transport Assessment**
Alberto Elizalde, G. Romero Mujalli, T. Stacke, J. Hartmann, S. Hagemann

09:50 **Investigation of the potential use of the N₂/Ar ratio for the estimation of the seasonal and spatial variability of denitrification and anammox in the water column of the Baltic Proper**
Marta Borecka, A. Winogradow, K. Kozirowska-Makuch, P. Makuch, M. Diak, K. Kuliński, J. Pempkowiak[†], B. Szymczycha

10:05 **Microphytobenthos in sandy permeable sediment of the Southern Baltic Sea: laboratory study of potential primary production and respiration quantified with oxygen microelectrodes**
Werna Werna^{ECS}, S. Forster

10:20 **Topic 2 Open Discussion**
Chair: Karol Kuliński, Beata Szymczycha and Juris Aigars

10:35 Break

Topic 3: Natural hazards and extreme events

Chair: Martin Stendel

11:05 **Natural hazards and extreme events in the Baltic Sea region**
Anna Rutgersson, E. Kjellström, J. Haapala, M. Stendel, I. Danilovich, M. Drews, K. Jylhä, P. Kujala, X. Guo Larsén, K. Halsnæs, I. Lehtonen, A. Luomaranta, E. Nilsson, T. Olsson, J. Särkkä, L. Tuomi, N. Wasmund
(Session keynote, BEAR)

11:25 **Compound Extreme Events in the Coastal zone: A study case at the city of Halmstad**
Kevin Dubois^{ECS}, Dahl Larsen MA, Drews M, Nilsson E, Rutgersson A

11:40 **On future development of Marine Heat Waves in Gulf of Bothnia**
Simo Siiriä, A. Erkkilä, S. Fredriksson, J. Haapala

11:55 **Major controls on storm surge flooding: Sea level rise, climate or coastal landforms? Insights from the coastal sedimentary record of southern Baltic Sea**
Karolina Leszczyńska, K. Stattegger, D. Moskalewicz, R. Jagodziński, M. Kokociński, P. Niedzielski, W. Szczuciński

12:10 **Directional variation of return periods of water level extremes in the Gulf of Riga, Baltic Sea**
Rain Männikus^{ECS}, T. Soomere

12:25 **Topic 3 Open Discussion**
Chair: Anna Rutgersson and Martin Stendel

12:40 **Lunch**

 Topic 4: Sea level dynamics and coastal erosion

Chair: Anders Omstedt

- 13:40** **Sea level dynamics and coastal erosion in the Baltic Sea region**
Ralf Weisse, I. Dailidienė, B. Hünicke, K. Kahma, K. Madsen, A. Omstedt,
K. Parnell, T. Schöne, T. Soomere, W. Zhang, E. Zorita (*Session keynote, BEAR*)
- 14:00** **Baltic Sea level extremes from synthetic low-pressure systems**
Jani Särkkä, J. Räihä, M. Rantanen, M. Kämäräinen, K. Jylhä
- 14:15** **Development of sea level quantiles in an ensemble of future projections for the Baltic Sea**
Hagen Radtke, C. Dieterich†
- 14:30** **Occurrence of the pressure forced SWL changes in the Klaipėda Strait, SE Baltic Sea**
Laura Nesteckyte^{ECS}, L. Kelpšaitė-Rimkienė, K. Myrberg
- 14:45** **A new approach to sea level bias correction using neural networks**
Magnus Hieronymus
- 15:00** **Attribution of coastline changes in the southern and eastern Baltic Sea to climate change driven modifications of main coastal drivers**
Maris Eelsalu, T. Soomere, K. Parnell, M. Viška
- 15:15** End of Plenary Day 2
- 16:00** **Excursion**

Wednesday, 1 June 2022

 Topic 4: Sea level dynamics and coastal erosion *continued*

Chair: Kevin Parnell

- 09:00** **Natural and anthropogenic factors shaping the shoreline of Klaipėda, Lithuania**
Vitalijus Kondrat, I. Šakurova, E. Baltranaitė, **L. Kelpšaitė-Rimkienė**

- 09:15 **Natural conditions, human impact and future challenges for coastal protection at the Southern Baltic Sea Coast**
Piotr Szmytkiewicz, N. Bugajny, K. Furmańczyk
- 09:30 **Effects of climate change on coastal hydrodynamics focusing the South-Western Baltic Sea – a modelling approach**
Htun Sone^{ECS}, N. Dreier, E. Nehlsen, P. Fröhle
- 09:45 **Evaluation of UAV LiDAR for monitoring of coastal cliffs**
Paweł Terefenko, A. Giza, J. Śledziowski
- 10:00 **Coastal erosion, protection structures and subsequent shoreline effects**
Joanna Dudzińska-Nowak
- 10:15 **Topic 4 Open Discussion**
Chair: Anders Omstedt and Kevin Parnell
- 10:30 **Break**

Topic 5: Regional variability of water and energy exchanges

Chair: Piia Post

- 11:00 **Variability of water column properties in a downwelling prevailing area**
Taavi Liblik, K. Salm, S.-T. Stoicescu, O. Samlas, G. Väli, J. Laanemets, U. Lips
(Session keynote)
- 11:20 **Upwelling characteristics in the Gulf of Riga (Baltic Sea) – multiple data source approach**
Maris Skudra, G. Väli, L. Gulbe
- 11:35 **Argo floats as virtual moorings in Southern Baltic**
Waldemar Walczowski, M. Merchel, D. Rak, P. Wieczorek
- 11:50 **Topic 5 Open Discussion**
Chair: Piia Post and Taavi Liblik

Topic 6: Human impacts and their interactions

Chair: Hans von Storch

- 12:05 **Human impacts and their interactions in the Baltic Sea region**
Marcus Reckermann, A. Omstedt, T. Soomere, J. Aigars, N. Akhtar, M. Bełdowska, J. Bełdowski, T. Cronin, M. Czub, M. Eero, K. P. Hyytiäinen, J.-P. Jalkanen, A. Kiessling, E. Kjellström, K. Kuliński, X. Guo Larsén, M. McCrackin, H. E. M. Meier, S. Oberbeckmann, K. Parnell, C. Pons-Seres de Brauwer, A. Poska, J. Saarinen, B. Szymczycha, E. Undeman, A. Wörman, E. Zorita
(Session keynote BEAR)
- 12:25 **120 years of research on benthic habitats, human-induced threats and climate change affecting the Puck Lagoon – A literature review**
Michał Gintowt^{ECS}, L. Kotwicki
- 12:40 **Anthropogenic impact of mobile ground-contact fishing on the biogeochemistry of the Baltic Sea surface sediments Part II: Long-term effects on iron sulfide authigenesis**
Mary A. Zeller, P. Roeser, J. Kallmeyer, J. Rooze, D. Clemens, M. Schönke, P. Feldens, S. Sommer, M. E. Böttcher
- 12:55 **Topic 6 Open Discussion**
Chair: Marcus Reckermann and Hans von Storch
- 13:10 **Lunch**

Topic 7: Sustainable management options

Chair: Anna Rutgersson

- 14:10 **The global challenge of the sustainable management of seas and shores**
Tarmo Soomere (Session keynote)
- 14:30 **Beyond sustainability and ICZM: The future for management of Baltic Sea coasts**
Kevin E. Parnell, T. Soomere
- 14:45 **ROPEWALK - a digitization project for three centuries of weather observations on board of Danish ships**
Martin Stendel, A. J. Kronegh
- 15:00 **Topic 7 Open Discussion**
Chair: Tarmo Soomere and Anna Rutgersson
- 15:15 **Poster speed talks (1 slide, 1 min)**

15:45	Break
16:15	General Open Discussion Part 1 <i>Chair: Markus Meier and Karol Kuliński</i>
17:45	End of Plenary Day 3
18:00	Young Scientist's event

Thursday, 2 June 2022

Topic 8: Analysing and modeling past and future climate changes

Chair: Markus Meier

09:00	Atmospheric regional climate projections for the Baltic Sea Region until 2100 Ole B. Christensen , E. Kjellström, C. Dieterich†, M. Gröger, H.E.M. Meier <i>(Session keynote BEAR)</i>
09:20	The impact of Atlantic Multidecadal Variability on North European climate Florian Börgel ^{ECS} , T. Neumann, C. Frauen, H.E. M. Meier
09:35	Changing impact of the large-scale atmospheric circulation on the climate variability of the Baltic Sea in winters 1950/51–2020/21 Andreas Lehmann , P. Post
09:50	Changes in cloudiness cause a changing seasonality in the Baltic Sea region Piia Post , M. Aun
10:05	Chironomid-based reconstruction of July average temperatures of Postglacial in Northern Europe: New training sets from Eastern Europe and their application Varvara Bakumenko ^{ECS}
10:20	Marine heat waves in past and future climate Matthias Gröger , F. Börgel, S.-E. Brunnabend, C. Dutheil, U. Gräwe, M. Hieronymus, H.E.M. Meier, T. Neumann, H. Radtke, J. Su
10:35	Break

Chair: Ole B. Christensen

11:05 **Simulated climate in the Baltic Sea region in a standalone atmospheric RCM and in an atmosphere-ocean model: evaluation and future climate change**
Erik Kjellström, G. Nikulin, Minchao Wu, O. B. Christensen, M. Gröger, H.E.M. Meier (*online*)

11:20 **Three new wave hindcasts for the Baltic Sea using different atmospheric forcing**
Nikolaus Groll

11:35 **Probabilities of wind velocity and wind wave parameters over the Baltic Sea based on 44-year long hindcast data**
Witold Cieřlikiewicz, A. Cupiař

11:50 **Physicochemical changes in the southern Baltic Sea in 1959 – 2019 forced by the climate change**
Tamara Zalewska, M. Saniewski, A. Grajewska, B. Łapeta, A. Wochna, M. Marosz, D. Biernacik

12:05 **Future sea ice conditions for maritime traffic in the northern Baltic Sea**
Per Pemberton, L. Lind, A. Jönsson, L. Arneborg, L. Axell, M. Hieronymus

12:20 **Topic 8 Open Discussion**
Chair: Markus Meier and Ole B. Christensen

12:35 **Lunch**

13:35 **Poster speed talks (1 slide, 1 min)**

14:05 **Poster Session with Break**

Topic 9: Comparing marginal seas

Co-organized by the Marginal Seas Task Group,
Deep-time Digital Earth (DDE), IUGS Big Science Program

Chair: Jan Harff

16:05 **The Marginal Salish Sea as an Urban Sea – Comparisons with the Baltic Sea**
H. Gary Greene, John R. Delaney, Anna A. Sulc (*Session keynote, online*)

16:25 **A National “Urban Sea” Initiative: Full characterization leading to integrated, long-term stewardship strategies**
John R. Delaney, Anna A. Sulc, H. Gary Greene (*online*)

- 16:40 **Modeling regional sedimentary sequence in the north of south China Sea in late Pleistocene**
Jinpeng Zhang^{ECS}, Wenbo Du, J. Dudzinska-Nowak, J. Miluch, Shiming Dong, Yufeng Wang, Yuan Cheng, Xing Qian (*online*)
- 16:55 **Marginal seas under threat: The emerging pollutant perspective coast**
Joanna J. Waniek, B. Gaye, K. Fisch, C. Deich, D. E. Schulz-Bull (*online*)
- 17:10 **Ancient land-sea connections in Mpondoland, on the South African Wild**
Hayley C. Cawthra, I. E. Esteban, J. Pargeter, J., E. C. Fisher (*online*)
- 17:25 **Reconstruction of morphological evolution of the Baltic Sea and the North Sea during the Last Glacial Cycle**
Wenyan Zhang, J. Miluch, C. Denker (*online*)
- 17:40 **The Impact Matrix: A simple tool to estimate the antropogenic pressure on marginal seas**
Marcus Reckermann
- 17:55 **Topic 9 Open Discussion**
Chair: Jan Harff and Markus Meier
- 18:10 End of Plenary Day 4
- 19:30 **Conference Dinner**

Friday, 3 June 2022

Chair: Marcus Reckermann

- 09:00 Special lecture:
Systems and processes – My perception of the legacy of Klaus Hasselmann’s approach to environmental science
Hans von Storch
- 09:20 **General Open Discussion Part 2**
Chair: Markus Meier and Karol Kuliński
- 10:00 **Wrap-Up and Farewell**
- 10:15 End of Conference

Posters

Poster authors are requested to prepare a 1min - 1 slide introduction to their poster. These speed talks will be held on Wednesday and Thursday afternoons.

The dedicated poster session is on Thursday 2 June in the afternoon after the second speed talk slot.

All posters are on display during the whole conference.

Poster sequence is first author alphabetically within topics.

Topic 1: Salinity dynamics

- 1-1 Investigating the properties of small- and medium-size saltwater inflows into the Baltic Sea**
Leonie Barghorn^{ECS}, H. Radtke, G. Väli, H. E. M. Meier
- 1-2 Changes of Mixed Layer Depth in the Baltic using in situ and model data**
Kacper Nowak^{ECS}, A. Bulczak
- 1-3 Results from the first year-long continuous glider deployment in the Baltic: the importance of small scale processes on physical and biological dynamics**
Bastien Y. Queste, L. C. Biddle, S. Swart, O. Petersson, A. K. Mazur, M. Melin
- 1-4 Wind-controlled transport of saltwater in the southeastern Baltic Sea: a model study**
Gerho Väli, V. Zhurbas

Topic 2: Biogeochemical functioning

- 2-1 Benthic coastal buffers against climatic and eutrophication extremes**
Sara Benelli, R. Brzana, H. Kendzierska, M. Magri, M. Bartoli, U. Janas
- 2-2 Micron-scale biogeography of seawater biofilm colonies at solid substrata affected by organic matter transformation in the Baltic Sea**
Katarzyna Boniewicz-Szmyt, M. Grzegorzczak, S.J. Pogorzelski
- 2-3 Short-term vs. long-term rewetting affects nutrient and nitrous oxide release: Comparison of two coastal peatlands on the Baltic Sea**
Anne Breznikar^{ECS}, J. W. Dippner, G. Jurasinski, G. Rehder, M. Voss
- 2-4 Manganese biogeochemistry in boreal estuaries affected by acidic and metal-rich drainage: the roles of bacterial communities and water chemistry**
Changxun Yu, S. Turner, E. Högfors-Rönholm, S. Huotari, M. Lopez-Fernandez, A. Shchukarev, J.-F. Boily, P. Österholm, J. Virtasalo, M. Dopson, M. E. Åström

- 2-5 Enrichment of the sea surface microlayer in organic matter and the occurrence of phytoplankton blooms**
Violetta Drozdowska, J. Stoń-Egiert, K. Kuliński, I. Niedźwiecka-Wróbel, J. Piskozub, M. Kitowska, P. Markuszewski, P. Makuch, L. Bielecka, I. Złoch
- 2-6 Modeling the impact of agriculture on coastal waters on the example of the Bay of Puck**
Dawid Dybowski^{ECS}, M. Janecki, A. Nowicki, L. Dzierzbicka-Głowacka
- 2-7 Riverine Phosphorus Transport Assessment**
Alberto Elizalde, G. Romero Mujalli, T. Stacke, J. Hartmann, S. Hagemann
- 2-8 Nitrogen cycle in the Baltic Proper: metagenomic approach**
Michał Grabski^{ECS}, E. Kotlarska, A. Łuczkiwicz, G. Węgrzyn, B. Szymczycha
- 2-9 Assessment of temperature influence on remineralization of sediment-derived DOC from the Baltic Sea depositional area**
Monika Lengier^{ECS}, B. Szymczycha, K. Kuliński
- 2-10 Influence of the shoots density of *Zostera marina* on the bioturbation activity of macrofauna**
Natalia Anna Miernik^{ECS}, U. Janas, H. Kendzierska
- 2-11 Flux dynamics of CO₂, CH₄ and N₂O in a highly degraded coastal peatland during transition from drained to inundated conditions by rewetting with brackish water**
Daniel Lars Pönisch^{ECS}, A. Breznikar, C. N. Gutekunst, G. Jurasinski, M. Voss, G. Rehder
- 2-12 Baltic Sea coastal peatland water stimulates growth of benthic diatoms along the sea-land ecocline**
Lara R. Prella^{ECS}, U. Karsten
- 2-13 Microphytobenthos composition along the Baltic Sea shore-peatland ecocline (the Heiligensee and Hüttelmoor nature reserve, Germany)**
Ekaterina Volkova^{ECS}, M. Dressler, L. Prella, U. Karsten
- 2-14 Multi isotope investigation of distinct coastal sediments affected by submarine groundwater discharge, southern Baltic Sea**
Catia M. E von Ahn^{ECS}, B. Szymczycha, P. Escher, I. Schmiedinger, U. Struck, J. Rooze, S. Vogler, M. E. Böttcher

Topic 3: Natural hazards and extreme events

- 3-1 Sea Level Rise Impact on Compound Flood Risk in Coastal Klaipėda City**
Erika Čepienė^{ECS}, L. Dailidytė, E. Stonevičius, I. Dailidienė
- 3-2 Evaluation of droughts' distribution and intensity using satellite data**
Laurynas Klimavičius, E. Rimkus
- 3-3 Model-based soil moisture during droughts in Lithuania**
Viktorija Mačiulytė^{ECS}, E. Rimkus

- 3-4 Extreme event in the Coastal zone - a multidisciplinary approach for better preparedness**
Anna Rutgersson, M. Drews, K. Dubois, K. Haelsnaes, P. Karami, J. Mård, E. Nilsson

Topic 4: Sea level dynamics and coastal erosion

- 4-1 Analysis on cohesive cliff erosion using high-resolution AUV field measurements at Stohler Cliff, Schleswig-Holstein (Germany)**
Tanita Averages^{ECS}, C. Winter
- 4-2 Coastal sea level along the Polish coast: Comparison of altimetry and tide gauge observations in 1995-2020**
Anna Bulczak
- 4-3 BRACER Coast: Establishing Joint Research on Coastal Protection and Erosion Control in the Baltic Sea Region**
Norman Dreier, P. Fröhle
- 4-4 Theoretical maximum and minimum sea levels and the probability of their occurrence at selected Baltic tide gauge stations**
Tomasz Wolski, B. Wiśniewski
- 4-5 Erosion assessment using remote sensing data: A case study of Latvian Coastline**
Valters Žeižis, V. Zandersons, E. Grebešs

Topic 5: Regional variability of water and energy exchanges

- 5-1 Towards a water-isotope framework of the Baltic Sea**
Michael E. Böttcher, I. Schmiedinger, A.-K. Jenner, C. M.E. von Ahn, J. Westphal
- 5-2 Radiation budget at the Baltic Sea surface in 2010-2021**
Tomasz Zapadka, D. Stoltmann

Topic 6: Human impacts and their interactions

- 6-1 Beach litter composition along the southern coast of the Baltic Sea (2015-2021)**
Agnieszka Grajewska^{ECS}, T. Zalewska, J. Maciak, M. Iwaniak
- 6-2 Sediment stratigraphy studies reveal variable POP concentration trends in the Baltic Sea environment**
Ville Junttila, H. Vallius, P. Ruokojärvi, N. Perkola, V-P. Vartti, J. Mannio (Kai Myrberg)

- 6-3 Environmental impact of the water exchange blocking in a shallow strait**
Taavi Liblik, F. Buschmann, E. Siht, I. Kuprijanov, G. Väli, M. Lipp, J. Laanemets, R. Eschbaum, A. Verliin, L. Saks, I. Zekker
- 6-4 Selenium in marine plankton in the Gulf of Gdansk, southern Baltic Sea**
Izabela Pałka^{ECS}, D. Saniewska, L. Bielecka, J. Kobos
- 6-5 Heavy metals transfer routes to the Baltic Sea and ecohydrological approach to their reduction**
Dominika Piwowarska^{ECS}, E. Kiedrzyńska, M. Kiedrzyński, M. Zalewski
- 6-6 Application of photoacoustics-based methodology to complex plastics, biotic and chemical seawater pollution sensing**
Paweł Rochowski, S. Pogorzelski, M. Grzegorzczak
- 6-7 Anthropogenic impact of mobile ground-contact fishing on the biogeochemistry of Baltic Sea surface sediments Part I: Short term effects from a monitored trawling experiment**
Patricia Roeser, M. A. Zeller, P. Feldens, J. Kallmeyer, D. Clemens, J. Rooze, H. Radkte, M. Schönke, I. Schmiedinger, S. Forster, S. Sommer, M. E. Böttcher
- 6-8 Benthic macroinvertebrates as reference indicators for monitoring of anthropogenic isotope ¹³⁷Cs contamination in the marine environment**
Michał Saniewski, T. Zalewska, W. Kraśniewski

Topic 7: Sustainable management options

- 7-1 An approach for monitoring strategy assessment and optimization based on the analysis of variability from an ecosystem model**
Henry C. Bittig, T. Neumann, and Gregor Rehder
- 7-2 High-resolution wave model for coastal management and engineering in the eastern Baltic Sea**
Andrea Giudici, R. Männikus, F. Najafzadeh, M. Z. Jankowski, T. Soomere, Ü. Suursaar

Topic 8: Analysing and modeling past and future climate changes

- 8-1 Climate change indicators (SE Baltic Sea, the Curonian Lagoon, Lithuania)**
Inga Dailidienė, I. Razbadauskaitė-Venskė, R. Dailidė, G. Dailidė, E. Čepienė, A. Bielskytė
- 8-2 Application of the coupled Regional Ocean Modeling System (ROMS) and the Los Alamos sea ice model (CICE) for the Baltic Sea**
Maciej Muzyka^{ECS}, J. Jakacki

Topic 9: Comparing marginal seas

Co-organized by the Marginal Seas Task Group,
Deep-time Digital Earth (DDE), IUGS Big Science Program

- 9-1 DDE Marginal Seas Task Group**
Joanna Dudzińska-Nowak, J. Harff, W. Zhang
 - 9-2 Predicting extreme dry spell risk based on probability distribution in coastal region of Tunisia**
Majid Mathlouthi, F. Lebdi
 - 9-3 Concept of Marginal Seas Database Inventory (MSDI)**
Jacub Miluch^{ECS}, J. Dudzińska-Nowak, J. Harff
 - 9-4 Integrated water vapor transport in a tropical-like cyclone over the Black Sea**
Inna Semenova, O. Panasiuk
 - 9-5 Benthic alkalinity fluxes from coastal sediments of the Baltic and North Seas: Comparing approaches and identifying knowledge gaps**
Bryce Van Dam, N. Lehmann, M. Zeller, A. Neumann, M. Lipka, V. Winde, D. Pröfrock, H. Thomas, M. E. Böttcher
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- BE-1 The Baltic Earth Assessment Reports (BEAR): Earth system knowledge for the Baltic Sea region**
Marcus Reckermann, H. E. M. Meier, Baltic Earth Science Steering Group members, BEAR lead and co-authors
 - BE-2 Climate Change in the Baltic Sea 2021 Fact Sheet**
HELCOM/Baltic Earth Expert Network Climate (EN Clime), M. Reckermann, J. Haldin, P. Kääriä, H.E. M. Meier, J. Pålsson, D. Littfass

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