



## **Baltic Earth Panel Discussion at the 7<sup>th</sup> Study Conference on BALTEX, Borgholm, Sweden, 12 June 2013**

Summary from audio recording by Marcus Reckermann. original audio recording available through MR.

### **Panel members**

**Jüri Elken**, Physical Oceanographer from Tallinn University of Technology and Director of Marine Systems Institute in Tallinn, Estonia; formally worked together with the late Wolfgang Krauss (one of the BALTEX initiators) from IfM Kiel. He has been a BALTEX Science Steering Group member for many years.

**Marie-Jose Gaillard**, Palaeo-Ecologist at Kalmar University, Sweden; her expertise is in vegetation and land cover changes in the past (holocene, ca. 11.000 years); she is particularly interested in the interfaces vegetation-humans-climate. Her connection to BALTEX is through BACC II where she is a lead author of Chapter 6: Attributing causes of regional climate change.

**Markus Meier**, Professor of Physical Oceanography at Stockholm University and SMHI, Sweden; he started as PhD student of Wolfgang Krauss and an early BALTEX student; he is particularly interested in coupled physical-biogeochemical processes and climate variability, and climate variability and change; he is currently the chair of the Baltic Earth Interim Science Steering Group (BE-ISSG).

**Anders Omstedt**, Professor of Physical Oceanography at University of Gothenburg, Sweden; he has been active in BALTEX from very beginning (also as Science Steering Group member), and organized the 1<sup>st</sup> Study Conference Visby 1995; his scientific interests are water and heat budget of the Baltic Sea, nutrient and carbon cycling and the Baltic Sea acid-base balance.

**Jan Polcher**, Laboratoire de Météorologie Dynamique du CNRS in Paris, France and GEWEX-GHP co-chair; his experience in coordinating the AMMA project on regional climate and hydrological processes in Africa taught him much on how climate and society and economical systems interact.

**Anna Rutgersson**, Professor of Meteorology, with a particular interest in atmospheric forcing of the Baltic Sea region; she is a lead author of BACC II Chapter 2: Climate change during the last 200 years, and presently co-chair of BEISSG.

**Martin Visbeck**, Professor of Physical Oceanography at Geomar Kiel, Germany, Speaker of Future Ocean, and member of the Future Earth transition team; his particular interest is in the integration of marine, natural and social sciences.

The discussion was introduced and moderated by **Benjamin Smith**, Professor at Lund University, Sweden, and an ecologist and ecosystem modeler, primarily interested in terrestrial ecosystem functioning and interactions with climate, with a particular focus on the contribution of population and community processes to ecosystem dynamics; he has been member of the BALTEX Science Steering Group member, and is currently member of the BEISSG.

The panel discussion was divided in a question and answer part, with Ben asking specific questions to panel members; then an open discussion part including the audience, which was encouraged to share questions and opinions on Baltic Earth. Ben stressed that the scientific and outreach focus of Baltic Earth is still in development and any input is welcome.

## Initial questions to panelists

**Q1:** “Earth System Science”, is this a buzz word for what was done already in BALTEX Phase II or is it a fundamental change?

**Markus Meier:** There will be changes. We need to widen up the science. Some components have been missing. We were successful in developing regional coupled climate models, atmosphere, sea ice and ocean on the physical side; some success already in integrating system components of biogeochemistry in the sea, but an interactive land-vegetation is missing in the model systems, there are many more examples. So we have started to work towards Earth System Science, but we should continue, we are not finished.

**Q2:** Anders, you were the BSSG chair when BSSG constituted a group of young scientists to work up a new programme. Is it a revolution these youngsters have come up with, has it completely overturned the BALTEX traditions and experiences, or was it in line what the BSSG expected?

**Anders Omstedt:** Of course you never know what you get when you ask a group of young people, but I am completely satisfied with the result, we fully rely on this group, there are so many good scientists in it, so I am very pleased.

**Q3:** Jan, do you have any experience in the transition process GEWEX has undergone which can be pointed out to Baltic Earth as guidance?

**Jan Polcher:** Most RHPs (Regional Hydroclimate Projects) and GEWEX in general have moved from a sheer physical perspective to a more physical-human combination; how the human system interacts with the physical world. What Markus Meier showed in his presentation certainly goes into that direction, and I would support to do that. Societies are in need of this evaluation of the combined factors of human economic changes and climate change.

**Q4:** Marie-Jose, you are the newcomer to the group with a new field of research relevant for Earth System Science on the regional scale, bringing in environmental issues. Do you see BALTEX or Baltic Earth as something to contribute to and get something back, and if so, do you have an example?

**Marie-Jose Gaillard:** Absolutely yes. We have something to contribute and to gain in such a programme as palaeoecologist. There is the very successful sub-programme of IGBP called PAGES (Past Changes), with links to other IGBP programmes; those who know PAGES have understood the value of having this long-term perspective for all the questions we are asking. I was very impressed by BALTEX and BACC, this should continue, using the strength of surveys, understanding knowledge; continue monitoring, it is absolutely needed for detection and attribution work, must continue and improve. What was missing in the last years? Attraction was emphasized on the Baltic Sea, the sea, not so much on catchment. This should be included more, land use as forcing as to the net effect of land use and other forcings over long prehistorical time periods; this is very important to understand the presence.

**Q5:** Martin, the concept of Grand Challenges as components in the new programme is also present in Future Earth and other new programmes. Can you help us to define what a Grand Challenge really is and how operational it can be in a programme like this.

**Martin Visbeck:** Use it in its “weak” form. In its “hard” form, a Grand Challenge is something which is really difficult which no single institution or nation can achieve. Do not expect to have the problem solved within a 3-4 years period. You may address them programmatically as long step challenges, like the water and energy cycle over the Baltic Sea region for which some aspects are not yet solved, so I would encourage you to continue this type of Grand Challenge,

**Q6:** Six Grand Challenges (GCs) to start to think about in the coming year; GCs sound like research questions, scientifically formulated; if we compare this with the challenges reported by Martin Visbeck on societal needs such as how do we feed 9 billion people; do we have a different concept of challenges, do we focus more on researchable questions in Baltic Earth?

**Anna Rutgersson:** What we have done in Baltic Earth when formulating these GCs is to enhance the link to society as compared to BALTEX and listen to society, what are the major challenges for society, and then act upon that. My opinion is that this should be a scientific programme working on scientific questions which are also relevant to society.

**Q7:** Jüri, from your experience, how can funding agencies be involved in the Grand Challenges and in the research questions?

**Jüri Elken:** Most scientists are attached (i.e. payed by) to funding agencies which are unified in e.g. BONUS, in the Baltic Sea research community. For GEWEX and Future Earth, the role is not as clear. If

we go for the whole spectrum of Earth system science in Baltic Earth it may be beyond the scope of BONUS. The problem is also that BONUS funds confined projects but Baltic Earth is about long-term research which is more than a specific project. GCs must be formulated in a way that scientists are still interested, otherwise they will not participate, but questions should be understandable for the tax payers and decision makers. I like the salinity GC, it is a very wide and relevant topic, but it needs to be explained. If it is only salinity then it is only for the students who learn how to determine salinity, but the whole story of the water and energy cycle in the atmosphere is behind this, soil moisture in the catchment, river discharge, biogeochemical processes, so the short title should be more explained in detail. The other important draft title is on natural hazards, but imagine an emergency situation when we need to act immediately, and if the title is as long as it is now, the emergency is there and the reader is dead before finishing reading the title.

## Open discussion with the audience

**Lennart Bengtsson:** I am impressed by the progress in BALTEX research since I was active. Concerning the future of the programme: Martin Visbeck's presentation was so impressive, I had to write "Amen" under my notes on his presentation. Monty Python did something on education of children: "Well kids, tomorrow we will split the atom, then we will cure all remaining diseases, and then we will fix the Black Hole in the Universe". I make the point for more "pedestrian" objectives; here is an example from my experience: first we had reasonable forecast for 2 days, then we were brave and said we should be able to make usable forecasts for 6 days... That was objective of ECMWF, now they can make 8 days. There are many remaining practical problems, for instance the flooding of rivers in the catchment basin in the recent days. We need to understand to what extent this is due to climate change or what is due to natural variability, what is caused by human activities of other kinds. Mojib Latif on TV said that it is climate change, but I am not sure that we should be sure about this; we need to investigate this much more carefully.

Another problem is sea level rise in the Baltic Sea. There is a high variability; in some cases the water level was 3m above normal, causing serious problems in the southern Baltic Sea. Also here we need to find out what the natural variability is and what climate change is. Then eutrophication is important, and a potential oil spill would be a complete disaster. So there is no lack in "pedestrian" objectives; keep the rather concrete objectives in mind, and then we can afterwards demonstrate that we were successful. You cannot say in 25 years that you have fixed these very general problems, so stay concrete with doable objectives.

**Mikko Alestalo:** I would like to follow Lennart's line and add one more practical problem, that is snow. We had 4 severe winters in a row and have been drowning in snow for the past 4 winters in Helsinki; is this natural variability or is it something new? This is something to be tackled. There are hints and signs: the Arctic Ocean is warming; early winter precipitation in Eurasia has been very strong lately, and late spring- early summer precipitation has been very weak. So there are signs which have been observed; so I would like to add the severe winters in a row to Lennart's list.

**Jerzy Dera:** BALTEX for the first time linked hydro-meteorological science with physical oceanographic science; the first phase achievements were good and clear. But now Baltic Earth is wider which is very good, so many more aspects must be taken into account e.g. agriculture, fisheries, traffic, etc. Everything is linked and dependent on the other, so I recommend all these other kinds of science to be involved in this programme.

**Jan Polcher:** My comment on “pedestrian” objectives: I like it, but be warned: it is limited in its vision. If you fix yourself a concrete objective, it means you know where the vulnerabilities are but the issue is we don’t know where the vulnerability of our society is. E.g. if the current floods in Germany are linked to the changes in land use, we didn’t know that, and it’s not an improved weather forecast which is going to help, but changing our habits concerning land use is going to solve the problem. We also need fundamental research on the state of the environment and its sensitivity to climate extremes or change; this is not easy to frame in a pedestrian way...

**Martin Visbeck:** Put the focus on solvable objectives, pass solutions out of the science community; make assessments of ongoing phenomena, use the global framework of climate services; combine the science with the ability of the services to pass on knowledge.

**Zbigniew Kundzewicz:** BALTEX was dominated by ocean sciences, but for Baltic Earth, land is very important, so I am glad to see extremes as a GC. Floods are the major hydrological extreme in the Baltic Sea region, and it’s nice to see the interdisciplinary approach.

**Sten Bergström:** Firstly, what happened to the idea of data centers, precipitation data, radar data? My second comment: The most costly event in the Baltic Sea region in the past 20 year was the Copenhagen flood of 2011. 150mm rain in 2h; 1 billion € in 2h for insurance companies. We need to look at extreme events at higher temporal resolutions than 24 h, maybe down to hours or even minutes; this is what is costly for megacities. So focus on extremes, not only river flow but also extreme precipitation.

**Anders Omstedt:** We are now much more open-minded with data, they are much more distributed among institutions, also for freely available. Hydrology data need to be considered also in the future; but we must rely on national institutes and the community because it costs so much to do this, and we hope SMHI takes the lead on hydrographical data to be freely available.

**Sten Bergström:** Yes, that is already decided, next year (forced by the EU).

**Markus Meier:** The data centres still exist but are sleeping; we plan to re-establish data centres with meta-databases; many other data centres are now available e.g. in BONUS; we should link the different initiatives.

**Anna Rutgersson:** We should identify gaps in the data, make sure they are filled in order to be able to fulfill the GCs.

**Viesbeck:** WCRP and Future Earth subscribe to fully open data policies, data should be free and openly shared around the world, this is also an EU directive.

**Anna Rutgersson:** I agree that extreme precipitation is an important subject to be taken up in Baltic Earth.

**Ragnar Elmgren:** I am an outsider but admirer of BALTEX; I would like to take up Visbeck’s idea of “co-design” of the research; scientists preparing GCs on extremes etc. should talk to politicians and NGOs on what they see as big problems. If you frame the GC as answers to societal problems, then you can explain why we need the basic science, why we need to fill data gaps; politicians want to know why the data gaps must be filled; make GCs more obvious as efforts to answer the needs of society, then you get a better chance for funding.

**Barry Broman:** Share data from the beginning, build this into education.

**Jan Polcher:** I would like to challenge Martin, we cannot co-design our science, we don't know where our vulnerability to climate change is; vulnerability depends on the structure of economy and society; 150 mm is no big deal in Bombay but in Copenhagen; so for them it's difficult to ask the right questions. Our research should identify the challenges of climate change for our society.

**Hans-Jörg Isemer:** There is a new EU funding scheme which may be interesting for Baltic Earth: Joint Programming Initiatives (JPIs); 2 of 10 may be relevant for Baltic Earth, one on seas and oceans, one on climate. Ministries and financial agencies in the countries design these programmes, so leading scientists should be in close contact to national funding agencies, and look at the objectives and issues.

**Martin Visbeck:** Yes, BONUS is great but expand on this. JPIs are to streamline national funding schemes and research capabilities towards joint objectives on the European level, this is also what Baltic Earth attempts to do; they are asking scientists where the funding should go; they are looking for input at collective level, so for Baltic Earth it would be good to have clear vision of research needs and communicate that to JPIs for discussions; co-design is dialogue.

**Tarmo Soomere:** Baltic Earth should develop principles which can be used everywhere, aim at much higher levels, provide some science for the world.

**Anders Omstedt:** The Baltic Sea community has been arrogant; the world does not need to learn from us, we should be humble; others also do good things, maybe better.

**Bernd Schneider:** Who will implement the science plan? In BALTEX Phase II, biogeochemistry was not well acknowledged. How will you improve this in Baltic Earth?,

**Markus Meier:** There are Working Groups (WGs) around the GCs, and WG chairs and co-chairs are members of the SSG; progress within each group will be discussed; WGs and GCs with no activity will be dropped. We want to be active, we want scientists to be involved in the GCs, and we want more scientists and disciplines to join.

**Kai Myrberg:** Concerning stakeholder interactions, an advantage of Baltic Earth is the cooperation with the EU and with Russia; the EU is very interested to collaborate with Russia and new challenges. Secondly, there is a coalition of the Baltic Sea states and the Gulf of Finland Year. Contact the Baltic Sea ambassadors, they give money, I have experience.

**Anders Omstedt:** I would like to respond to Bernd Schneider: Science plans are important as they create a vision, but this takes time; many people opposed the inclusion of biogeochemistry in the BALTEX Phase II science and implementation plan, but in the past 10 years there were tremendous improvements in addressing these issues in the BALTEX community, so be patient, it takes a while.

**Gregor Rehder:** Biogeochemistry was not a BALTEX issue in the beginning, for historical reasons, so the question is how do we cover all relevant disciplines for Earth system science? BALTEX has been very strong in the field of hydrology, oceanography, meteorology, and has a good standing in the community, something to build on. But we need to grow and include experts from the other disciplines. This implies the danger of losing focus, but on the other hand there is the need to open up. So how do you do both?

**Martin Visbeck:** Excellent question. Strike that balance smartly. Don't take on areas where you don't have the depth to do yourself. This means you may have to forge new partnerships; there are communities in the Baltic Sea area that can do that work. I read the GCs as invitation for new communities to contribute; if not this is dangerous because you soon lose credibility in the community.

**Uldis Bethers:** Will Baltic Earth involve hydrogeology? Deep groundwater is an important issue.

**Marcus Meier:** I am absolutely against any walls, we should make flexible GCs, and make the research agenda according to the problems of society, and try to give concrete answers. In principle all disciplines are included in Earth system science, also of course hydrogeology. Other research communities should be engaged to contribute and collaborate with the existing Baltic Earth community. Of course interdisciplinary communication is not easy as I know it from experience; we speak different languages; it is nevertheless important to present the science in the right way.

### Final statements of panelists

**Marie-Jose Gaillard:** Baltic Earth should continue and improve the BALTEX work in terms of scientific understanding, but also on communication and outreach etc. It is phantastic what has been done in this respect. It should also include risks and adaptation, involve socio-economic sciences; a true co-design of the programme would work in an ideal world, but don't be naïve in this, be careful. Outreach, communication and education have been phantastic in BALTEX, continue and improve it, but become known better outside your own community.

**Jüri Elken:** Define the scope of disciplines more explicit. E.g., economics are a quite popular topic in BONUS; lots of successful proposals treated economic issues. Regarding stakeholder involvement I recommend flexible informal networks, as things are progressing quite fast. There will be a BONUS scientific update this autumn, and there have been some consultations. Also JPIs are relevant and important; at the moment the call design for 2014 is going on. Finally I would like to recommend what Hans von Storch said: go for low-cost high-interest actions like BACC.

**Anders Omstedt:** I wish the new programme good luck.

**Martin Visbeck:** I like Baltic Earth; I am impressed by the process. Keep your ambitious goals but be realistic on implementation targets.

**Markus Meier:** Thanks for the extremely nice discussion; my wish for Baltic Earth is: be as active as possible, the success depends on you.

**Anna Rutgersson:** Keep the scientific relevance but also broaden the scientific community. This is a big challenge which we need to discuss further.

**Jan Polcher:** I congratulate you for the transition to Baltic Earth. Widening the community is a good and important move and I'm sure that GEWEX and GHP will be happy to welcome you under the new identity. Also open up to the human sciences; help understand vulnerability and what type of information is needed and available how this information can be used.