Original

Rauser, F.; Schmidt, A.; Sonntag, S.; Suesser, D.:

ICYESS2013: Uncertainty as an example of interdisciplinary language problems

In: Bulletin of the American Meteorological Society (2014) AMS

DOI: 10.1175/BAMS-D-13-00271.1

MEETING SUMMARIES

ICYESS2013

Uncertainty as an Example of Interdisciplinary Language Problems

BY FLORIAN RAUSER, ANDREAS SCHMIDT, SEBASTIAN SONNTAG, AND DIANA SÜSSER

Here we report on the first Interdisciplinary Conference of Young Earth System Scientists (ICYESS), which focused on understanding and interpreting uncertainty. Funded by a variety of German research organizations and hosted by the climate research cluster KlimaCampus of the University of Hamburg, ICYESS was organized and chaired by young Earth system scientists, partially from the graduate School of Integrated Climate System Sciences (SICSS) as well as the Young Earth System Scientists (YESS) community. The ICYESS followed upon a series of graduate conferences of the northern German excellence clusters for marine and climate research and extended the focus to more disciplines and an international audience. A big portion of the available travel money was spent to enable young scientists from Africa and Asia to join ICYESS, a move that enabled discussions on the North–South gap in climate science and politics from the inside and was highly beneficial toward the idea of a global community of young Earth system scientists.

AFFILIATIONS: RAUSER AND SONNTAG—Max Planck Institute for Meteorology, Hamburg, Germany; SCHMIDT—University of Hamburg, Hamburg, Germany; SÜSSER—Helmholtz Centre Geesthacht, Geesthacht, Germany
CORRESPONDING AUTHOR: Florian Rauser, Max Planck Institute for Meteorology, Bundesstraße 53, Hamburg 22089, Germany
E-mail: florian.rauser@mpimet.mpg.de

DOI:10.1175/BAMS-D-13-00271.1

In final form 25 February 2014

INTERDISCIPLINARY CONFERENCE OF YOUNG EARTH SYSTEM SCIENTISTS (ICYESS): UNDERSTANDING AND INTERPRETING UNCERTAINTY

WHAT: The first ICYESS workshop brought together about 100 early-career natural and social scientists from Europe, Africa, Asia, America, and Australia to discuss the common problem of uncertainty in Earth system sciences and its implications for science in general as well as for science communication.
WHEN: 22–25 September 2013
WHERE: Hamburg, Germany

WHY DO WE NEED TO TALK ABOUT UNCERTAINTY? The motivation of the ICYESS was foremost to enable interdisciplinary capacity building in the diverse field of Earth system science and to improve the exchange between the variety of scientific disciplines that are part of it. The conference focus on uncertainties in Earth system sciences was chosen as a focal point to illustrate the problems that appear when historically and methodologically very distant sciences try to work together. There are a multitude of causes for uncertainties in different research fields and they are often multiplied in interdisciplinary research. Examples include:

- limited understanding of physical, chemical, and biological processes and interactions;
- finite resources in modeling, observation, and analysis;

- uncertainties in the context of Earth system governance; and
- uncertainties in environmental impacts, their perception, and communication.

These types of uncertainties and their consequences are dealt with in our daily scientific work; they are explicit focus, implicit motivation, boundary condition, or constraint to our work. However, the explicit effort to conceptualize these uncertainties and to talk about them to other scientists who do not know the context of uncertainties is something scientists should do more often, and ICYESS2013 was a place to start this process. To ensure high-quality scientific exchange at the conference, we conducted an interactive review process of the abstracts in advance, with a lot of volunteers from the community of Young Earth System Scientists. This process included detailed feedback on how to improve the abstract and the corresponding presentation from at least two reviewers, for both rejected and accepted abstracts. It was brought to the attention of all participants to identify what type of uncertainty is part of their respective scientific work: if it is just the uncertainty of what we do not know in a given science, the uncertainty of empirical results, theoretical uncertainty of input into models, societal uncertainty of drivers for future scenarios, or the way society perceives and deals with both empirical and normative uncertainty (e.g., concerning appropriate political measures).

HOW DID WE TALK ABOUT UNCERTAINTY? The conference tried to ameliorate the language problem that permeates any interdisciplinary discussion of what uncertainty means by enabling a maximum amount of interaction and discussion. The default way of presenting the research of the participants was to give a 3-min pitch in plenary and to have a poster session afterward. The 3-min limit—while initially difficult to accept for many science disciplines—led to streamlined and focused presentations on the key point of each participant's research. Another focus of the conference was to integrate and find innovative ways to present, for example, nonlinear presentations, such as Prezi's virtual storytelling approach, twin talks where the presenters are exchanged between talks, and Pecha Kucha—a classical presentation with the twist of automatic fixed slide transitions every 20 s. These presentations were an integral part of all sessions and emphasized that scientific exchange should not always be reduced to the same series of presentation and poster sessions that we are so commonly seeing in other science conferences. While the innovative presentations were executed flawlessly and with big success, it is our opinion that the search for a perfect presentation format is far from over. One presentation attempted to include gesture control (via Kinect) into a Powerpoint presentation—a forward-looking yet still difficult attempt to get behind technology barriers in getting one's point across. As a conclusion of the chosen formats we highly recommend the format of "pitch plus poster" for interdisciplinary conferences, as it encourages participants to think about the essence of their research and how to convey it in a precise and additionally exciting way. At the same time it provides space to discuss the research and its methods in detail with experts from the same field in the subsequent poster session. We embedded this exchange into a framework of guest lectures by experienced senior scientists of different fields (Eli Tziperman, professor of Oceanography and Applied Physics at Harvard University; Richard Tol, professor of Economics at the University of Sussex; and Joyeeta Gupta, professor of Climate Change Law and Policy at the Vrije Universiteit Amsterdam), and organized further input during a panel discussion with Alexander Otto (ECI Research Fellow on Climate Decisions, University of Oxford), Inge Paulini (Secretary General of the German Advisory Council on Global Change), Michael Pregernig (professor at the Institute of Environmental Social Sciences and Geography, Albert-Ludwigs-University Freiburg), and Hauke Schmidt (researcher at the Atmosphere in the Earth System, Max Planck Institute for Meteorology).

WHAT MAKES EARTH SYSTEM SCIENCE SO UNCERTAIN (SOMETIMES)? Very early into the conference it was identified that one key challenge in discussing uncertainty—besides the mentioned language problem—is the twofold nature of uncertainty: it can be inherent in the input into scientific thinking, and it can start to exist within scientific arguments. This can best be explained in the famous climate change temperature scenarios and their impacts for the twenty-first century: there is inherent uncertainty in the input into climate models with respect to emissions, but there is also a large uncertainty in the response of climate models with respect to given emissions. Moreover, the climate impact models are from yet a different discipline and include another level of uncertainty, only to be folded back into today's decision horizon by a normative choice of how we deal with future damages. For this example, the different influences

can be disentangled in public discussions with a bit of precision, but the same type of problem appears in many fields where interdisciplinary research tries to model the interaction of anthropogenic systems and the Earth. While not new, an essential conclusion of the conference is that every result presented for interdisciplinary research should include an explicit discussion on uncertainty. Researchers should explain how they deal with input, normative or system-imminent uncertainties, and which uncertainties could be reduced by better scientific understanding of methods or involved processes. The expertise of the social sciences on how different societies make decisions under different uncertainties can then be used to inform societal decision-making processes together with results from the natural sciences. In the end, society has to learn to better decide given uncertainty, because some uncertainties of Earth system science will never go away.

WHAT DOES IT MEAN FOR THE FUTURE?

Being received as a successful first conference, the need was voiced by many participants to increase the number of events like the ICYESS to enable our new generation of interdisciplinary researchers to hone our skills at interdisciplinary communication and work. One very specific suggestion was to develop an "Earth system" basic curriculum, which would include most major concepts of all involved disciplines and could reduce the influence of the language problem and improve interdisciplinary communication. We encourage the international community to enable specific interdisciplinary and international meetings for early-career scientists to build capacity for a future where joined research benefits from mutual understanding and a common language.

WEB RESOURCES. Details on the presentations can be found online (http://icyess.eu).

Details on participants and further plans of YESS can be found online (http://yess-community.org).

ACKNOWLEDGMENTS. We acknowledge funding from the Körber Foundation and support from the Cluster of Excellence "CliSAP" (EXC177) via the graduate school SICCS, Universität Hamburg, funded through the German Research Foundation (DFG), the German Climate Consortium, the Center for a Sustainable University (KNU), and Copernicus Meetings and Publications. Moreover, we are thankful for the support of various types from MARUM/GLOMAR, Future Ocean/ISOS, the University of Hamburg, and the Earth System Governance Project.