

Report of the External Scientific Advisory Group (ESAG) of the Bolin Centre for Climate Research

1. Meeting

On the 21st November 2014, the ESAG met for the first time in its present constellation and with its new mandate. Members present: Johannes Oerlemans (Utrecht University, *Chair*), Eystein Jansen (University of Bergen), Anders Lindroth (Lund University), Natalie M Mahowald (Cornell University), Raymond Pierrehumbert (University of Chicago).

Unfortunately, Susan Lozier (Duke University) was unable to attend.

2. Mandate

The ESAG focuses on the quality of the science performed by the Bolin Centre. More specifically, its role is

- (i) to advise the Bolin Centre on its strengths, weaknesses and opportunities;
- (ii) to connect the Bolin Centre internationally to organized networks of climate and future Earth research.

3. Presentation of the ESAG

On the 18th November, the ESAG presented itself to the BS Scientific community. The members gave a series of lectures in their own fields of speciality.

4. Information available

The Bolin Centre operates with a fairly open management structure. A great deal of information can be found on the web pages of the Bolin Centre, and this has provided the ESAG with useful information about the basic structure, the collaborating institutes within and outside Stockholm University, definition and leadership of the research areas, the research school, etc.

In addition to this, the ESAG was offered the opportunity to participate in the Bolin Days. On 19-20 November a series of presentations by research-area leaders, permanent staff, post-docs and PhD students gave an impressive overview of the research undertaken at the Bolin Centre. The lectures and the posters provided very valuable information to the ESAG.

The social event on Thursday evening was very much appreciated and gave another opportunity to mingle and have informal discussions with the scientific community of the Bolin Centre.

5. Strengths and weaknesses

The ESAG is impressed by the overall breadth and quality of the research performed by the Bolin Centre and its collaborators. The division of the research into six research areas has been done in a meaningful way, and provides a workable structure. Some projects clearly evolve *across* the borders of these areas, which is regarded as positive. The research areas provide structure, but do not seem to hinder research initiatives.

Particular strong points of the science of the Bolin Centre are:

- a) Observational studies and modelling often go hand in hand. This lifts process studies to a higher level and should be fostered.
- b) The international orientation is outstanding. There is collaboration with many foreign institutions, which increases the quality of research, the visibility of the Centre in the 'scientific landscape', and the possibilities to find partners for future fund raising. The international orientation is also reflected in the many nationalities of the employees; they seem to come from all corners of the world.
- c) The ESAG is very positive about the *Arctic dimension* of the research programme. The Centre is a major global actor in terms of executing Arctic science. Some fascinating science is going on, and it offers great possibilities to increase awareness among the public and sponsors.
- d) The Bolin Centre is highly active in the organization of many workshops and summer courses.
- e) The character of research projects is diverse; it ranges from fundamental process studies to applied research directly linked to practical questions.
- f) There are many outreach activities with which the Bolin Centre has put itself (and the science questions concerning climate change and sustainable Earth issues) on the map. This includes educational activities for young people as well as presentations at professional events (like the AGU Assembly).

Points that need attention / action:

- a) The Bolin Centre collects unique datasets, some of which are very large. The capacity to organize an efficient and user-friendly databank is too limited. Archiving of the data cannot be left over to international databanks only. The ESAG proposes that action is taken to increase the capacity.
- b) The use of large numerical models, notably Earth-system models, in the Bolin Centre has increased strongly over the past few years. The ESAG has the impression that the support from software engineers and scientific programmers is not always adequate in the sense that the capacity is too limited. The ESAG suggests that this capacity is enlarged.
- c) The Centre applies a relatively wide range of complex Earth System Models. The choice may appear ad hoc, and due to the large recourses required, it would be wise to revisit the selection of models and define a model strategy for the centre.

Points that need consideration:

- a) Ultimately the results of process studies need to find their way into Earth system models. This always is a difficult step with which research centres around the world struggle. The ESAG suggests that the Bolin Centre develops a strategy to contribute. The Bolin Centre and its collaborating institutions could make a difference here, because all the ingredients are present.

- b) The ESAG has noted that the use of remote sensing data (from satellites), and research on remote sensing techniques was not very well represented during the Bolin Days. Perhaps this is coincidence; perhaps remote sensing is a weaker component of the research programme. The ESAG suggests that the role of remote sensing in the research programmes as well as in the educational programmes is evaluated, and, when needed, strengthened.
- c) The research school does not seem to have a well-defined curriculum. The PhD students take courses as needed. This could be master courses or specialized summer courses, depending on the background and needs of individual students. Nevertheless, a compulsory course (not necessarily long) for all PhD students enrolling into the research school would have some advantages. Network building and ideas for multi-disciplinary work could naturally evolve. The ESAG suggest that this is considered.

6. Wish list for the next ESAG meeting

The idea of having the annual ESAG meeting together with the Bolin Days was a very good one. For the next meeting basically the same format would be appreciated. However, it does not appear useful to have the presentation of the ESAG members once more (perhaps again in 2016). Although the organization of the Bolin Days is not an ESAG matter, we want to suggest that the introductions to the research areas can be very short, or left out altogether. Making a programme that is less structured may help to prevent people popping in and out all the time. One might also consider to have less talks and take a full afternoon for poster viewing (in a larger facility), eventually preceded by 1-minute introductions.

For its next meeting, the ESAG would like to have:

- i. A list and short description of top-10 events of the past year. This could be successful expeditions, a media-event, but also scientific publications that are expected to have a large impact.
- ii. A list of international grants (e.g. ERC) and honours / awards obtained by members of the Bolin Centre.
- iii. Access (link) to recently completed PhD theses.
- iv. A separate meeting with PhD students and young researchers to gain more insight into their working conditions and the general ambience within which they work.