

2018 Report of the Bolin Centre External Science Advisory Group

8 January 2019

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1. Overview

The External Science Advisory Group (ESAG) attended the 10th annual Bolin Days presentations on 21-22 November 2018. The ESAG met on 23 November to discuss findings and recommendations. Co-directors Nina Kirchner and Alistair Skelton were present ex-officio for a portion of these discussions. ESAG members Chen, Jansen, Kohfeld, and Pierrehumbert were present at the Bolin Days and ESAG meeting. Findings were conveyed verbally by ESAG members Kohfeld, Chen, and Pierrehumbert to the Bolin Centre Directorate. A summary of findings and recommendations is provided below.

2. Bolin Days Presentations – Summary and Recommendations

Bolin Days opened with presentations about the historical development of the Centre, introduced the importance of Bolin's work, and the initial aims of the centre. Of particular interest was the message conveyed by a quote from Bert Bolin to the Swedish Research Council in 1969, suggesting the need for a broader consideration of climate science within the Bolin Centre: "*We scientists aren't here just to enjoy ourselves with what we think is fun. We can do that anyway, but we also have a responsibility to see what the societal implications are of our science.*"

This year's Bolin Days presentations involved sessions of four, integrative research topics that included: Arctic climate, impacts of extreme weather events and climate change, climate and environment, and climate and biota. The ESAG noted that the change from research area to topic-based sessions resulted in an overall, more engaging presentation of research within the Bolin Centre. The caliber of talks was generally very high, and speakers attempted to speak to a broader audience than their own research areas. It also resulted in higher and more consistent attendance when compared with the 2017 and earlier Bolin Days.

The meeting also included a special session by members of the MERGE (Modelling the Regional and Global Earth System) Strategic Research Area from Lund University, University of Gothenburg, Rossby Centre/SMHI, Linnaeus University, Chalmers University of Technology and Royal Institute of Technology. This session described research and modeling development activities encompassing climate-biosphere interactions (S1), paleoclimate and land cover changes (S2), aerosol-cloud dynamics (S3), and statistics (S4). The ESAG noted potential opportunities for collaborative development between the Microclimate and Biodiversity research within the Bolin Centre and researchers using the Lund-Potsdam-Jena General Ecosystem Simulator (LPJ-GUESS) and the regional Earth System model coupling LPJ-GUESS with the Rossby Centre Atmosphere model (RCA-GUESS). Another joint interest and possible cooperation lies in applications of the Earth System model EC-Earth.

Bolin Days Recommendations

The ESAG unanimously appreciated the new topic-based approach but also noted that it resulted in the absence of some research areas traditionally associated with the Bolin Centre. This is to be expected to a certain extent, but the ESAG would encourage yearly topics be rotated to highlight different areas of Bolin research excellence. Some examples include research on large-scale climate system dynamics, Earth system models, climate prediction, and large scale atmospheric and oceanic circulation and their interactions.

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Second, while a move away from siloed presentations made the Bolin Days more engaging, the ESAG noted difficulty with gaining an overview of the performance of individual research areas (e.g., what resources go to these groups, and how are those resources utilized?), new developments within the Centre and the university (e.g., funding awards to 10 new integrative projects in late 2017), and potential challenges facing the young researchers. The ESAG suggests that next year's Bolin days include (a) brief one-page reports on the Research Areas highlighting their resources, activities, independent funding, and publications; (b) a session highlighting the development of collaboration with units outside of the Bolin Centre (e.g., Stockholm Resilience Centre, the Museum, Academic units of Economics, Political Science, Social Sciences, and History), as such a session may assist in identifying cross-cutting activities well-placed to exploit new funding activities (see below); (c) a meeting between the ESAG and Bolin Centre students to learn of any student concerns, challenges, and suggestions.

Finally, although ESAG recognized significant strides towards presenting talks that were understandable by a broader audience, some speakers still struggled with communicating disciplinary jargon and equations. The ESAG suggests interdisciplinary communication could be made more successful by placing a ban on all acronyms during presentations.

3. Challenges – Funding. The Bolin Centre is set to lose $\frac{1}{2}$ of its funding in 3 years and faces uncertainty in terms of its future evaluation and sources of funding. Indeed, if new funding is not obtained, the ESAG sees challenges with the model of spreading reduced funding over all areas that the Centre is currently supporting. The original funding through the Swedish Research Council was for basic research, but future sources of funding may be routed through more applied funding mechanisms (e.g., VINNOVA) focused on innovation. The following questions remain open:

- *How and when will future evaluations of the Bolin Centre science occur, and what metrics will be used to determine success?*
- *How well-positioned is the Bolin Centre to capture applied science funding (and is this desirable)?*
- *How will future evaluation of Strategic Research Areas consider the co-existence of MERGE and the Bolin Centre (complementary, competitive, or interlinked and indispensable)?*

4. Challenges – Integration and Communication. Any multi-disciplinary institution will face challenges of integrating research units, and the Bolin Centre is no exception. Last year, the ESAG noted the challenge of integrated two separate institutions (Bolin and Ekoklim) into one centre with shared goals and mission. The ESAG noted stronger coherence demonstrated in the presentations, although one ESAG member noted that the integration of new units (i.e., Ekoklim) still requires much more work to benefit from potential synergies, and that the nature of this integration may become even more vital as the funding situation of the Centre changes. All ESAG members agreed that this is a work in progress and are looking forward to seeing the development of the 10 newly funded integrative projects initiated at the end of 2017.

5. Challenges – Modeling Development. ESAG noted that strong model development and coordination was a compelling strength of the MERGE SRA, one that could be more strongly developed within the Bolin Centre. MERGE appears to have been more successful at making model development a stronger component of the SRA, taking a program-wide view of how model components can be readily integrated. A joint Swedish framework in climate modeling appears desirable, building on the strong combined competence at the Bolin Centre, MERGE, and with SMHI as a joint partner for both.

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6. Recommendations. The ESAG suggested the following recommendations to further build the international profile, identify areas where innovation-focused funding could be explored, develop collaborations that will create added benefits between the Bolin Centre and other organizations, and shape the identity of the Bolin Centre and develop “climate awareness” within the new funding constraints and evolving societal demands on research in Climate Change.

- ***Increase international visibility and engagement of Bolin Centre members.*** The ESAG encouraged continued efforts by the Bolin Directorate to provide incentives for Bolin Centre members to engage in international activities such as multiple working groups and assessment reports of the Intergovernmental Panel on Climate Change (IPCC), the Intergovernmental science-policy Platform on Biodiversity and Ecosystem Services (IPBES), and the International Union for Conservation of Nature (IUCN) activities focused on climate change, as a means of raising the international visibility of Bolin Centre in engagement activities.
- ***Identify areas suited to position the Bolin Centre in exploiting funding opportunities in Innovation.*** Any movement toward innovation- and stakeholder-based funding requires engagement of scientists who have traditionally worked on fundamental, basic research questions. ESAG members noted that some of the existing research presented is already exploiting big data and cloud solutions. Furthermore, initiatives were noted that are increasing individual links between SMHI and Bolin Centre researchers. Efforts could be made to further identify and promote these types of efforts. The Bolin Climate Arena could be a platform for this (see below).
- ***Develop links with public sector and political leaders.*** Sweden’s new Climate Act commits the country to reach net-zero greenhouse gas emissions by 2045, indicating a strong ambition to reach important international climate targets by Swedish politicians. The Bolin Centre may be well-positioned to investigate the natural biogeochemical processes that create opportunities and provide challenges for meeting this goal. The Bolin Centre could benefit from developing stronger connections within political arenas and engage with other disciplines on the climate, energy, policy nexus.
- ***Develop and seek seed funding for the Climate Arena.*** The Bolin Climate Arena has been designed to identify stakeholders interested in using climate knowledge for addressing climate research questions. Although still in its infancy, the Climate Arena workshop in May, 2018 identified 13 external partners. The ESAG encourage further development of this area of the Bolin Centre as a means of increasing collaborative projects between stakeholders and Bolin researchers, and to pursue seed funding (e.g., MISTRA, VINNOVA) to support these efforts.
- ***Develop/establish relationship with MERGE.*** As a strategic research area funded under the same funding initiative as the Bolin Center in 2018, MERGE faces the same uncertainties, and both MERGE and the Bolin Centre may face the question: “Why does Sweden have two separate SRAs focused on climate science?” The ESAG recognized the strategic benefit of inviting MERGE to the Bolin Days to assess overlaps and collaborative opportunities and encourages further exploration of possible joint opportunities and activities (eg. Collaborations between the downscaling efforts, terrestrial C-cycle, and biodiversity work at the Bolin Centre and LPJ-GUESS and WRF modeling work at MERGE). This could lead to a more successful argument that both centres are complementary and inherently necessary.
- ***Broader Mission development for the Bolin Centre.*** The Bolin Centre was built on a foundation of fundamental, basic research, introducing a structural model of “bottom-up” as opposed to “top-down” organization of research areas and individual projects. In the past few years, the Centre has become more interdisciplinary through the incorporation of new units, now faces potential changes to the funding model, and is entering a changing political climate in which climate-related research and engagement with the public is vital. The ESAG suggests that this is an important time for the

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Bolin Centre to revisit their mission to better encompass these changes, to steer a path for how units can be integrated successfully, to establish their research priorities, to develop a funding strategy, and to consider how best to reposition themselves in this evolving landscape.

- 7. Final Remarks.** The Ceilidh remained excellent. The ESAG was pleased with the expansion to include Swedish repertoire and looks forward to the building complexity in the coming year.