Ambio - The first 50 years

Bo Söderström

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Ambio will commemorate 50 years of publication all through 2021. This editorial begins by announcing how we will celebrate our first 50 years and concludes by looking back on some of our achievements so far.

UPCOMING CELEBRATIONS

50th anniversary collection of thematic articles

The evolution of scientific themes published in *Ambio* from 1972 to 2019 based on the most commonly used keywords is visualized in Fig. 1. The clusters of keywords suggested four major themes: (1) air and water pollution and their effects on biota; (2) acidification and eutrophication with a particular geographical focus on countries in northern Europe; (3) climate change effects on species and ecosystems, and 4) human-environment relations, environmental protection and conservation of natural resources. A separate keyword analysis—where different keywords were colour-coded by time—showed a clear gradient from keywords often used in our first two three decades of publishing in the upper part of Fig. 1 (themes 1 and 2), and keywords more frequent after the turn of the millenium in the lower part, particularly in the lower left part (themes 3 and 4).

One of the main activities planned for our 50th volume is that we will highlight some of our most influential papers over the years in a collection of anniversary thematic articles. The editors used the keyword analysis in Fig. 1 to identify themes that will serve as the chapters in our 50th volume (described below and summarized in Table 1). Environmental problems such as decomposition of the *ozone layer* and *acidification* of lakes and forests were topical issues in the 1970s until the 1990s. Other challenges

such as *environmental contaminants* and *eutrophication* of water bodies, in particular of the Baltic Sea, became a prominent research theme already in the 1980s. During the past 30 years, *agricultural land-use*, *climate change impacts*, and *biodiversity conservation* have been recurrent topics. Since the turn of the millenium, *urbanization* and the *Anthropocene* have risen in importance, a testament to the pervasive effects we humans have on our environment.

With the themes decided on we had the delicate problem of selecting which articles – among the more than 4000 published – that best represent the different themes. One often used criterion to determine the scientific impact is the number of citations an article has received. According to Web of Science (from Clarivate Analytics), 15 articles have been cited more than 400 times (Table 2). The most cited *Ambio* article of all time – “The Anthropocene: Are humans now overwhelming the great forces of nature?” written in 2007 by Will Steffen, Paul J. Crutzen and John R. McNeill – has 1112 citations in Web of Science and 3055 citations in Google Scholar. Many of our authors have repeatedly chosen *Ambio* as the most suitable and visible outlet for their research. Frequent publication within *Ambio* is another criterion for selecting articles and authors to commemorate when we celebrate our anniversary. Table 3 lists our most proliferate authors over these 50 years. We began by collecting the 16 most cited articles from each of our five decades of publishing. We strived to have two to four influential articles per theme listed in Table 1. Then all Associate Editors and members of the Advisory Board gave input on which articles they thought best represented the nine themes. We quite soon reached consensus on which papers best reflect the most influential articles and authors over our 50 years of publication.

Fig. 1 (a) Networked figures from VOSviewer (<https://www.vosviewer.com>) showing 116 keywords used 50 times or more between 1972 and 2019 across 3522 *Ambio* publications (research articles, reviews and perspectives) listed in Scopus. The size of the circle represents the number of times the keyword was used, and the position relative to others indicates how often they co-occur, with the colours and ovals indicating clusters of keywords that often occurred in combination

Table 1 Topical themes in *Ambio* through time as identified from analyses of keywords used in research papers, reviews and perspectives (see Fig. 1)

Theme	Time period
Ozone layer	1972–1990s
Acidification	1972–1990s
Environmental contaminants	1970s to today
Eutrophication	1980s to today
Agricultural land-use	1980s to today
Biodiversity conservation	1990s to today
Climate change impacts	1990s to today
Urbanization	2000s to today
Anthropocene	2000s to today
Solutions-oriented research	2010s to today

However, we also recognize that citations alone is a somewhat insufficient criterion for a journal interested in reaching a wide readership within academia and outside. We risk neglecting articles that may have had a proportionately greater impact outside academia. Such an omission would poorly account for *Ambio's* strong focus on multi- or interdisciplinary research intended to deliver explicit management or policy recommendations. One crude way of measuring impact outside the academic world is to compare how many citations our articles had in Google Scholar to Web of Science. Unlike Web of Science, Google Scholar also includes citations from book chapters and the grey literature (Haddaway et al. 2015). Among the 80 most cited articles, all articles having >100% more citations in Google Scholar were assembled in a new dataset. This exercise led us to the identification of one final, tenth theme: *solutions-oriented research* in agriculture, aquaculture and forestry.

Table 2 The most highly cited articles published in *Ambio* ranked according to Web of Science

Authors	Year	Title	Web of Science ^a	Google Scholar ^b
Steffen W., et al.	2007	The Anthropocene: Are humans now overwhelming the great forces of nature ¹	1112	3055
Folke C., et al.	2002	Resilience and sustainable development: Building adaptive capacity in a world of transformations ²	983	3527
Nihlgård B.	1985	The ammonium hypothesis: An additional explanation to the forest dieback in Europe ³	855	879
Cassman K.G., et al.	2002	Agroecosystems, nitrogen-use efficiency, and nitrogen management ⁴	774	1666
Galloway J.N., & E.B. Cowling	2002	Reactive nitrogen and the world: 200 years of change ⁵	759	1655
Mergler D., et al.	2007	Methylmercury exposure and health effects in humans: A worldwide concern ⁶	701	1132
Wania F., & D. Mackay	1993	Global fractionation and cold condensation of low volatility organochlorine compounds in polar regions ⁷	651	1062
Almer B., et al.	1974	Effects of acidification on Swedish lakes ⁸	633	653
Scheulhammer A.M., et al.	2007	Effects of environmental methylmercury on the health of wild birds, mammals, and fish ⁹	548	946
Steffen W., et al.	2011	The Anthropocene: From global change to planetary stewardship ¹⁰	528	1423
Lindberg S., et al.	2007	A synthesis of progress and uncertainties in attributing the sources of mercury in deposition ¹¹	527	795
Gadgil M., et al.	1993	Indigenous knowledge for biodiversity conservation ¹²	504	1638
Rabalais N.N.	2002	Nitrogen in aquatic ecosystems ¹³	445	962
Helle E., et al.	1976	PCB Levels Correlated with Pathological Changes in Seal Uteri ¹⁴	415	446
Schofield C.L.	1976	Acid precipitation: Effects on fish ¹⁵	408	415

^aAs of February 13, 2020; ^bAs of September 29, 2020; ¹[https://doi.org/10.1579/0044-7447\(2007\)36%5b614:TAAHNO%5d2.0.CO;2](https://doi.org/10.1579/0044-7447(2007)36%5b614:TAAHNO%5d2.0.CO;2); ²<https://doi.org/10.1579/0044-7447-31.5.437>; ³Retrieved from www.jstor.org/stable/4313090; ⁴<https://doi.org/10.1579/0044-7447-31.2.132>; ⁵<https://doi.org/10.1579/0044-7447-31.2.64>; ⁶[https://doi.org/10.1579/0044-7447\(2007\)36%5b3:meahei%5d2.0.co;2](https://doi.org/10.1579/0044-7447(2007)36%5b3:meahei%5d2.0.co;2); ⁷Retrieved from www.jstor.org/stable/4314030; ⁸Retrieved from www.jstor.org/stable/4312039; ^{9,10} <https://doi.org/10.1007/s13280-011-0185-x>; ¹¹[https://doi.org/10.1579/0044-7447\(2007\)36%5b19:asopau%5d2.0.co;2](https://doi.org/10.1579/0044-7447(2007)36%5b19:asopau%5d2.0.co;2); ¹²Retrieved from www.jstor.org/stable/4314060; ¹³Retrieved from www.jstor.org/stable/4315222; ¹⁴Retrieved from www.jstor.org/stable/4312230; ¹⁵Retrieved from www.jstor.org/stable/4312222

Table 3 The most proliferate authors in *Ambio*

Author	No. of <i>Ambio</i> papers	First publication	Latest publication	Theme
Terry V. Callaghan	43	1995	2020	Arctic ecosystem change
Margareta Johansson	31	1992	2019	Arctic ecosystem change
Torben R. Christensen	25	1999	2017	Arctic ecosystem change
Carl Folke	24	1989	2014	Urbanization, Resilience, Anthropocene
Terry D. Prowse	20	2006	2011	Arctic ecosystem change
Olof Lindén	19	1987	2013	Coastal ecosystems
Mats Olsson	19	1986	2003	Environmental contaminants
Per Angelstam	19	2003	2019	Forest ecosystems
Anders Bergman	18	1982	2005	Environmental contaminants
Malin Falkenmark	17	1986	1999	Fresh water scarcity

Each of the thematic chapters listed in Table 1 will consist of three parts: An *Ambio* editor provides a background and historical context for the original articles in an **Editorial**; one (or more) of the authors behind the selected

articles provides a personal reflection on the impact the article had from a professional and/or scientific viewpoint in a **Behind the paper**; and, finally, one or more peers reflects on the legacy of the articles today in a **Perspective**,

i.e. how have these articles helped reframe policy targets or new standards, what is the current status of the research field, and what are the next challenges?

All three parts of each theme will be simultaneously published and added to a special page called “50th Anniversary Collection” in the journal updates section on our website¹. We will present one new theme in each regular issue, beginning with “Ozone layer” in the January 2021 issue and ending with “Solutions-oriented research” in the January 2022 issue.

When reading these articles, it will become clear that there is a strong overrepresentation of men among the authors of selected articles (only 35 of 144 authors are women). We are aware of this bias and it reflects the historically skewed gender balance that is at least somewhat improved today compared to before the turn of the millennium. Among the selected articles, there is only one pioneer woman author prior to 1997 (Malin Falkenmark), but since then the average proportion of women authors has been 22%. Clearly there is still room for improvement. Among *Ambio* Associate Editors and Advisory Board members we have achieved gender balance during the last 10 years.

Free access to influential articles published during the 2010s

During 2021 we will also celebrate the diversity of influential articles published over the past 10 years, i.e. from the time of *Ambio*’s transition to the publisher Springer in January 2010. One article per week on our website will be promoted by making it free access and added to our journal updates section¹. We have perused all of the 1212 *Ambio* papers published during this period to select some of the most innovative and important ones, while at the same time avoiding overlap with the thematic articles of the “50th Anniversary Collection”. The selection process was based on the following criteria: the highest number of citations in Web of Science (top 200), highest number of full-text downloads in Springer Link (top 50 with > 5000 downloads), and the highest Altmetric score (top 50). These three datasets were merged into one from which we made a subjective selection with the aim of promoting three to eight articles from each publication year during the 2010s. The dominant themes of these articles are ecosystem services (13 papers), urbanization (8), biodiversity conservation (6), Anthropocene (4), agriculture (4), forestry (4), and eutrophication (4).

The inception and future of *Ambio*

In the first issue of our 50th volume, our Advisory Board member Sverker Sörlin, professor in environmental history, will provide a perspective article on the inception of *Ambio* – *A Journal of the Human Environment* following the first United Nations Conference on the Human Environment held in Stockholm on June 5–16, 1972 (also known as the Stockholm Conference). Professor Sörlin will also present a portrait of some of our most notable and prominent authors through time; from Paul J. Crutzen – who in 1975 was awarded the Nobel Prize in Chemistry for his work on the formation and decomposition of ozone – to Carl Folke and his work on social-ecological systems and resilience thinking (Sörlin 2021). We will end our celebrations with another perspective article providing an outlook of what role we would expect *Ambio* to play in the coming decades. Both these perspective articles as well as the 50th Anniversary Collection Papers will be assembled and published in a commemorative book “*Ambio* - the first 50 years” in time for the Stockholm +50 conference to be held by UN in Stockholm in May 2022.

ACHIEVEMENTS SO FAR

Measuring the success of a journal

It presents something of a challenge to select the parameters that capture how a journal has developed over time. Figure 2 shows some of the most often used indices for measuring journal performance, and from these it is clear that *Ambio* experiences a very positive trend since 2010 when we transitioned from Allen Press to Springer as publishers. The number of submissions has more than doubled only over the past five years (Fig. 2a). Both the quantity and the quality of submissions have increased. Notably, the percentage of uncited articles in *Ambio* over a three-year window has decreased from 40 to 13 % between 2010 and 2018². This is likely due to the increase in high quality submissions, but also a testament of the hard work of our editors and reviewers to process manuscripts into publishable articles with clear policy and management recommendations. In recognition of the increasing number of high quality submissions, we will publish 30% more articles in 2021 compared to 2019 (Fig. 2b). After having published six to eight regular issues per year since our beginning in 1972, we decided to become a monthly journal in 2019. This will reduce the queue of articles waiting to be assigned an issue. Articles published in our journal are accessed by many researchers, as testified by a

¹ <https://www.springer.com/journal/13280/updates/18009732>.

² Source: scimagojr.com.

Fig. 2 Development of *Ambio* between 2010 and 2019 based on data collated from Springer Nature

five-fold increase in the number of downloads of full-text articles since 2010 (Fig. 2c). Even more encouraging is that the researcher community increasingly finds it worthwhile to cite our articles (as shown in the average number of citations from articles published in *Ambio* in the past 2 years, i.e. journal impact factor, IF (Fig. 2d). Clearly, authors publishing with *Ambio* stand a good chance of reaching their target readership within the scientific community. Several other broad environmental journals, such as *Global Environmental Change* and *Science of the Total Environment*, have shown IF increases of 70–90% from 2010 to 2019, but *Ambio* stands out among comparable journals with an IF increase of 180% during the same time period (from 1.77 to 4.97; Fig. 3)

If we look at the top 50 most frequently cited journals cited within *Ambio* papers in Fig. 4, the green circles in the network show that *Ambio* papers are often cited together with other broad environmental journals such as *Environmental Science and Technology*, *Science of the Total Environment* and *Environmental Pollution*. All of these three journals are also on the top 10 list when it comes to journals citing articles published in *Ambio*. What sets *Ambio* apart from many other similar environmental journals is an interdisciplinary focus on the human and policy dimensions of environmental change. This is reflected by a disproportionate number of citations to journals such as *Ecology and Society*, *Global Environmental Change* and *Global Change Biology* (indicated by bold type in Fig. 4).

Throughout the years *Ambio* also has had a strong orientation towards conservation of biodiversity and natural resources as reflected by the many citations to journals such as *Conservation Biology* and *Biological Conservation*. Finally, and similar to the situation in many other journals, *Science* and *Nature* are cited most often in our articles apart from *Ambio* itself (can be seen from the large circles positioned close to *Ambio* in Fig. 4).

International authorship

Doing research is increasingly a collective effort, which is reflected in longer author lists and more multi-author articles over time. The median number of authors to *Ambio* articles has increased by one author per decade: from single authorship in the 1970s and 1980s, two authors in the 1990s, three authors in the 2000s, and four authors in the 2010s. Although this may be a general trend for environmental journals, for *Ambio* this development is anticipated given an increased focus on the multi- and/or interdisciplinary aspect of finding solutions to pressing problems.

We also pride ourselves for being a global journal. In 2018, 33 % of the corresponding authors came from the Nordic countries compared to 27 % from Europe outside the Nordic countries and 23 % from North America. The regional representation from Asia and Australia has remained relatively constant since the turn of the millenium (5–10 %). With the exception of a few years in the mid-

Fig. 3 Percentual changes in journal impact factors between 2010 and 2019 among the 35 journals that are cited most in *Ambio*. Data were retrieved from scimagojr.com on August 13, 2020

1990s, South America and Africa have been under-represented regions in *Ambio*. However, we recognize that the affiliation of the corresponding authors may not tell the whole story. We cannot rule out the possibility that many researchers from South America and Africa are affiliated with universities in North America or Europe. It is also evident that environmental research is increasingly an international endeavour. About half of all published articles in *Ambio* have authors from more than one country, a significant increase since the early 2000s. Regardless of the caveats of these statistics, we strongly encourage more

authors from Africa and South America to submit their best work to us.

In November 1993, the Royal Swedish Academy of Sciences and the Chinese Academy of Sciences signed an agreement for the publication of *Ambio* in Chinese. We saw this as an opportunity to collaborate with our Chinese colleagues and to participate in overcoming some of the barriers to cooperation in information dissemination. Due to budget constraints the cooperation ended in 2008, but it led to a significant increase in the number of published articles having a Chinese researcher as corresponding

Fig. 4 The top 50 most common journals cited within the 3522 *Ambio* publications from 1972 to 2019. The size of the circle represents the number of times the journal was cited, and the position relative to others indicates how often they are co-cited, with the colours indicating clusters of journals that often occurred in combination. The top 15 journals cited more than 400 times in *Ambio* are shown with bold type. The network was created using VOSviewer on data gathered from Scopus

author: an average of five per year from 1995 to 2004, compared to less than one per year 1985 to 1994, and three per year in 2005 to 2014.

Development of editorial policies

I took up the position as Editor-in-Chief of *Ambio* in 2010 when we also changed publisher from Allen Press to Springer. Since then, and in fruitful collaboration with our colleagues at Springer, we have continued our work to make the journal more relevant for the evolving needs of researchers and society (some of the more important developments since 2010 are presented in Fig. 5). In 2012 *Ambio* was one of the first environmental journals to introduce a double-blind review system, i.e. a system in which both authors and reviewers are anonymous throughout the review process. We received only positive feedback and therefore continued with double-blind review as one way of trying to secure a non-biased treatment of submitted papers regardless of authors' names, gender, institutions, etc. In relation to an increasing realization of the role humans play in all ecosystems, we have also aimed to increasingly promote interdisciplinarity and the role of all disciplines in understanding the environment. We have extended the representation of social sciences amongst our Associate Editors, and also revised our instructions to

authors by, for instance, requesting the inclusion of a theoretical framework where relevant.

Another change implemented in 2012 was the shift from a traditional to a hybrid journal. In other words, authors could opt to pay a fee to publish their articles as Open Access, enabling free and immediate access for anyone with a connection to the Internet. Compared to standard articles, Open Access articles are on average accessed four times more often and cited 1.6 more times within the first three years of publication (Draux et al. 2018). This shift has led to higher visibility and potentially greater impact of *Ambio* articles. In 2016, *Ambio* became one of more than 1850 Springer Nature journals taking part in the *Read and Publish Agreement* where authors affiliated with eligible institutions could read and publish *Ambio* articles at no cost to the individual authors. Currently, eleven European countries are participating in this program. Given the high implementation rate of this program, *Ambio* decided to abandon mandatory open access publishing of articles in special issues from 2019 and onwards. Today, about 40 % of all *Ambio* articles are published Open Access, which is of great benefit to all parties, be they researchers, policy-makers or laymen, interested in evidence-based environmental research.

In late 2012 we decided to replace the article category *Synopsis* with *Perspective*. The primary reasons behind this

Fig. 5 Some of the landmark editorial developments made by *Ambio* since 2010

decision were that we thought the synopses were too short to meaningfully develop arguments and that they lacked the quality assurance of a peer review submission. In contrast, *Perspectives* are full-length and peer-reviewed articles aiming to provide a forum for authors to discuss topical environmental issues, ideas, or models from a personal point of view. Papers positioned to bridge the gap between research and its implementation are particularly welcome. From the inaugural *Perspective* (Seitzinger et al. 2012) until today the new article category has been a great success, and in 2019 about 20 % of all published articles belonged to this article category. It is evident that this new article category filled a void, not least determined by the disproportionately many downloads and citations.

Peer review policies

In 2016, we decided to discontinue the Editorial Board and replace it with an Advisory Board with a clear mandate to advise and support the editors. We highly value the judgement of these prominent researchers, most of whom have been authors of several articles published in *Ambio*. As a first task the editors asked Advisory Board members to respond to some of the most pressing issues we are facing (summarized in my editorial "Steps toward making a journal more relevant", Söderström 2016). For example, how do we ensure a fast peer review of high quality in the face of increasing submission rates? What we have *not* done is to reject proportionally more manuscripts after internal editorial review. Since 2014, the internal rejection rates have remained constant at about 50 %.

In our instructions for authors we describe the process in detail: First, the Editor-in-Chief and then one of the Associate Editors assess each new submission. We will reject a manuscript after internal editorial review if (a) it does not fulfil the journal scope, e.g. is lacking a clear link between human activities and the environment; (b) it is unlikely to be of interest to a broad international readership because the scope is too narrow or if it does not provide novel insights into the subject area; (c) authors have not

convincingly argued that the general implications of the work transcend the level of the studied area (for case studies); (d) there are flaws with the methodology; (e) it is poorly presented and unclear. The internal editorial review takes on average about five days and – even though the outcome sometimes may be a disappointing rejection – the fast handling time is appreciated by our authors. Since the internal rejection rates have remained the same and the number of submissions is considerably higher (Fig. 2a), the work load of editors and reviewers has increased. Today we invite up to 2000 reviewers per year compared to less than 500 in 2010. We consider ourselves very fortunate that many researchers continue to accept our invitations to review *Ambio* manuscripts. Although we have experienced a slightly decreasing trend as of late, 35 % of our reviewers still accept our invitations to review and 78 % of reviewer reports are submitted early, i.e. before 30 days have passed. It is also interesting to note that fewer researchers recommend rejection after review (only 21 % in 2019), which may be a testament to a better editorial screening process as well as an increase in submission quality. For those manuscripts we do send out to external review, a decision is reached about 70 days after submission and the turn-around for authors to revise their manuscripts is around 50 days.

Thus – despite a considerable increase in workload for our editors and reviewers – we have managed to streamline our editorial work process to continue to ensure that submissions receive constructive critique from reviewers within the same time as before. Naturally we will continue to closely monitor the situation to find ways of making our routines work even better. We take great pride in the work of our reviewers and we can repeatedly demonstrate that peer review quality delivers added value for the authors themselves.

New subtitle: A Journal of Environment and Society

The journal name *Ambio* was originally chosen because it signified the environment around us (from the Latin verb

ambulare, “walk” related with “surroundings”; Sörlin 2021). For many years the journal name was spelled with only capital letters, which was counter-intuitive given that it is not an acronym. Starting on July 1, 2015, the editors therefore decided that we should only have an initial capital letter, i.e. *Ambio*, in the print issues, on our webpage and in all communication activities. Furthermore, we strongly advised our authors only to use “*Ambio*” when citing our journal and not to include the subtitle “A Journal of the Human Environment”.

Yet, a subtitle is still helpful to clarify for scholars and others unfamiliar with *Ambio* what the journal stands for. But our current subtitle “A Journal of the Human Environment” is open for interpretation. For some the term ‘human environment’ points to social environments; others associate it with natural environments. We find both these interpretations unfortunate since *Ambio* has never been a journal that focuses on the natural or the social environment exclusively. To the contrary, it has always been the ambition to publish interdisciplinary research. After an online vote among editors and advisory board members we decided that now the time is right to change the subtitle to better capture the content of *Ambio*. Based on the majority vote we decided that the new subtitle of *Ambio* from January 2021 and onwards will be:

A Journal of Environment and Society

The new subtitle is distinct, lucid, and importantly underscores the mutual relationship between society and environment. Needless to say, individual articles could lean more heavily on either of these but in order to be an *Ambio* article, it should have some element of both, or at least demonstrate the gist of the relationship. As before you should still only use “*Ambio*” when citing our journal.

CONCLUDING WORDS

Over the years numerous scholars have published their work in *Ambio* and, thus, helped to progress scientific understanding of human–environment interactions and interconnections with relevance for environmental policy and management. As we are now entering our 50th year of publication it is only appropriate to acknowledge and celebrate our increasing number of authors and the many, many anonymous reviewers that have helped ensure the quality of our publications. *Ambio* as a journal is in a good position to inform the way society tackles some of its current major challenges. Our authors, reviewers, Associate Editors and Advisory Board members are committed to advancing our scientific understanding and finding practical solutions to social-environmental problems. With Springer Nature as our publisher we have an ideal partner to help us disseminate our findings as widely and efficiently as possible. Several other

multi-, inter- and transdisciplinary environmental research journals have appeared during recent years, but few can celebrate such a long and successful story as *Ambio*. The transition from single authors from “hard” disciplines such as physics or chemistry to more transdisciplinary topics/studies/subjects including bridging the “gap” between natural and social sciences will continue further. Our understanding of the relationship between the environment and people is challenged by uncertainty and profound transformative changes. One point in case is the current pandemic COVID-19, which gives testimony to how quickly the foundations we built our societies on can change, and with them our relation to nature (in one of the first issues of our 50th volume we will publish a special section on “Sustainability after COVID-19”). The complexity of the COVID situation as well as many of the other challenges we are facing – climate change, biodiversity loss, and environmental degradation, to mention but a few - highlights the importance of scientific journals that encompass and connect both environment and society to identify sustainable ways forward for our planet. Journals like *Ambio* will become increasingly important to present solutions-oriented research in a world that sometimes seems to change from one day to another. We are not only here to stay, we are here to further grow our influence!

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Bo Söderström (✉)

Address: The Royal Swedish Academy of Sciences, Box 50005, 104 05 Stockholm, Sweden.

e-mail: bo.soderstrom@kva.se