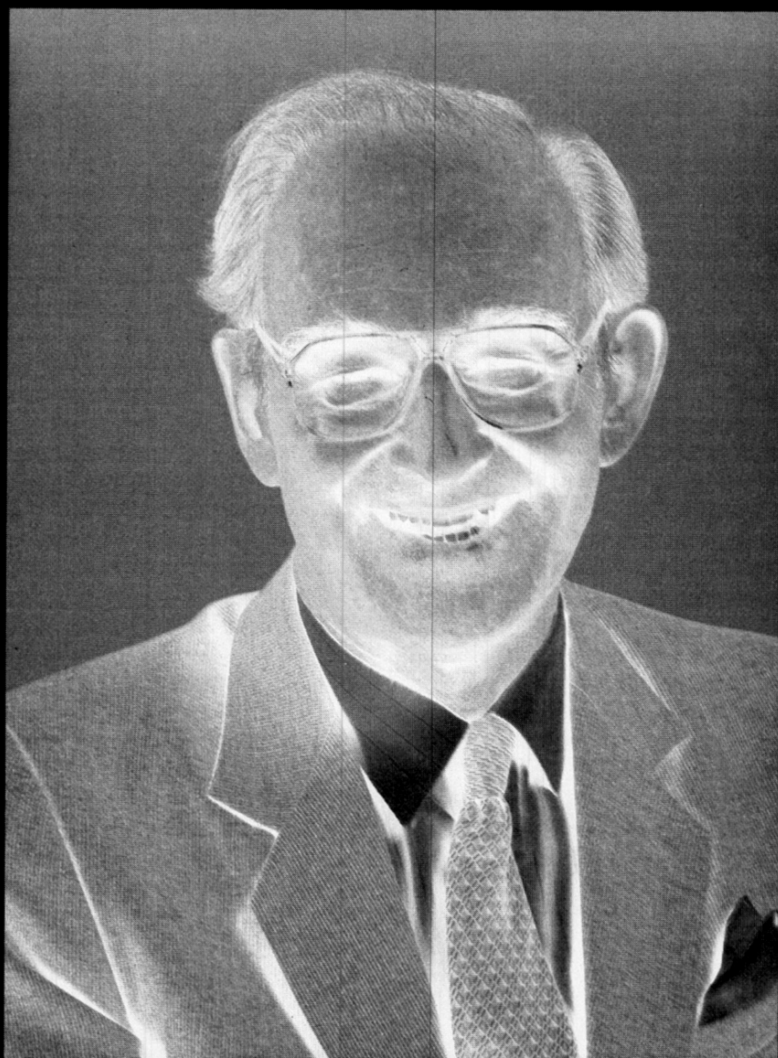




Bert Bolin and his Scientific Career

Bert Bolin was born on the 15th of May 1925 at Nyköping, 100 km south-west of Stockholm where his parents were both school teachers. Inspired by his father, Richard Bolin, who had taken a course on meteorology at the University of Uppsala in 1913, Bert already began to take records of temperature as a young boy. He soon made up his

mind that his future professional career would be in meteorology. His father took him to the headquarters of the Swedish Meteorological and Hydrological Institute in 1942 and discussed the prospects for the young man with the Deputy Director, Dr. Anders Ångström. The following year, he began studying mathematics and physics

at the University of Uppsala and also attended Professor Hilding Köhler's course in meteorology. He obtained a B.Sc. in 1946 and went on to postgraduate studies in meteorology.

During a year in military service in Stockholm in 1947, Bert Bolin came in contact with Professor C.-G. Rossby who had then been asked to return from the USA to build up meteorology in Sweden. In a short time, C.-G. Rossby was able to create the International Meteorological Institute in Stockholm (IMI), in association with the Department of Meteorology at the University, and to gather a very qualified group of scientists mainly from Europe. In this stimulating environment, Bert Bolin pursued his studies and obtained an M.Sc. in 1950. Later that year, he went to spend a year at the University of Chicago and the Institute for Advanced Study at Princeton in the USA where he came in contact with Jule Charney, Joe Smagorinsky, Norman Phillips, John von Neumann and other top scientists in the field of dynamic meteorology and numerical weather prediction. After his return to Stockholm in 1951, Bert Bolin started working towards his Ph.D. in interaction with a growing number of researchers working at or visiting the institute, including Bo Döös, Pierre Welander, Axel Wiin-Nielsen, Arnt Eliassen, Erik Palmén, Jacques Van Mieghem, Karl Hinkelmann, Chester Newton, Jerome Namias, Philip Thompson, Daniel Rex and several others. The main focus of the work at that time was dynamic meteorology and numerical weather prediction, in fact, the first real time numerical forecasts in the world were carried out in Stockholm in 1954. The theme of Bert Bolin's Ph.D. thesis, completed in 1956, was the interaction between wind and pressure fields and its application to numerical weather prediction.

Bert Bolin soon became a key staff member at IMI and the University Department of Meteorology and was given several important responsibilities including the running of the scientific journal *Tellus* published by the Swedish Geophysical Society. When C.-G. Rossby left for the USA on a sabbatical year in 1956, Bert Bolin was placed in charge of the Institute. Soon after his return to Stockholm in 1957, C.-G. Rossby died suddenly and Bert Bolin was the natural successor. With able assistance from other staff members, including Pierre Welander and Erik Eriksson, he took over the leadership of the institute. It took a few more

years until the University acquired a permanent chair of meteorology—C.-G. Rossby's position was a personal one. In 1961, Bert Bolin became the first holder of the new position which he then held for almost 30 years.

After Bert Bolin finished his Ph.D. in 1956, C.-G. Rossby advised him to move into another research area: atmospheric chemistry and questions specifically related to the residence time of pollutants in the atmosphere. That is when his interest in the carbon cycle started. It has remained close to his heart ever since. His many fundamental contributions to our understanding of the carbon cycle have involved cooperation with a number of other scientists from Erik Eriksson, Charles Keeling and Walter Bischof in the early years to Berrien Moore, Anders Björkström and Kim Holmén more recently.

Between 1965 and 1967, Bert Bolin spent almost two years as Scientific Director of the European Space Research Organization in Paris, where he was mainly concerned with the coordination of the scientific interests in the initial development of the early European satellites and the planning and construction of a permanent rocket-launch site at Kiruna in northern Sweden. During this period, Bo Döös acted as Director of IMI and Professor in the University Department.

In the mid 1960s, Bert Bolin became deeply involved in the creation of the Global Atmospheric Research Programme (GARP), that was developed within the framework of ICSU after an initiative (in 1962) by Jule Charney. This effort was stimulated by the success of numerical weather prediction and meteorological satellites and was aimed at providing a better understanding of the global weather system in order to enable improved predictions of weather and climate. The real starting point of GARP was a very successful planning conference held at Skepparholmen close to Stockholm in 1967 at which Bert Bolin played a major role as organizer and stimulator. It was a very natural choice when he was chosen as the first chairman of the Joint Organizing Committee for GARP set up later that same year jointly by ICSU and WMO. Many other leading atmospheric scientists were of course involved in the creation of GARP and have contributed to it and to its successor, the World Climate Programme (WCP), over the years. However, there is no doubt that Bert Bolin has made a fundamental contribution

to the organization of international cooperation in weather and climate research. As a matter of fact, the first major planning effort for global climate research was organized in 1974 at Wik, close to Stockholm, with Bert Bolin as organizer and chairman.

In the late 1960s, the acidification problem began to be unraveled, to a large degree because of pioneering work by Svante Odén at the Swedish University of Agricultural Research in Uppsala. During the period 1961–1963, as visitor to IMI, he was analyzing the precipitation chemistry data collected by Erik Eriksson and his colleagues and noticed a systematic change in the chemical climate with increasing amounts of sulfur and a lowering of the pH. These results were first made public at a conference organized by the Swedish Natural Science Research Council in 1967. On the initiative of Bert Bolin, the acidification problem was chosen at the topic of Sweden's case study to the 1972 UN Conference on the Human Environment, in Stockholm. Under Bert Bolin's inspiring leadership, a group of scientists, including among others Svante Odén, Carl Olof Tamm, Lennart Granat and Henning Rodhe, prepared the first comprehensive description of this serious environmental problem. It is not surprising that the report describing a completely new concept, as this was, met with some scepticism. Bert Bolin's factual and passionate defence of the new ideas went a long way to convincing the critics.

ICSU's environmental committee (SCOPE) is another organization that has greatly benefitted from Bert Bolin's competence. He has played a leading role in its project on Biogeochemical cycles and acted as editor of four major SCOPE reports, the most well-known ones being Report No. 13: *The Global Carbon Cycle* and Report No. 29: *The Greenhouse Effect, Climatic Change, and Ecosystems*. This latter review formed the basis for the much-quoted conclusions regarding the prospects for climate change reached by scientists and politicians at a meeting in Villach, Austria, in 1985.

During the 1980s, a need has become more and more evident for a deeper collaboration between geoscientists (meteorologists, oceanographers, hydrologists, geologists, etc.) and biologists (ecologists, microbiologists, etc.) in advancing our understanding of the global environmental system and of the way mankind is now imposing

fundamental changes of it. This has led to the formation of the largest international research effort even undertaken: The International Geosphere Biosphere Programme (IGBP). Bert Bolin chaired an ICSU working group during the years 1985–86, that led to the decision by ICSU in 1986 to launch this major program. His broad scientific knowledge and unique organizational talent have made him a central personality in this continued work.

The latest, but probably not the last, major contribution of Bert Bolin on the international scene has been as chairman of the Intergovernmental Panel on Climate Change (IPCC) set up in 1988 by WMO and UNEP. It is still early to judge the success of this panel; the three reports produced by IPCC in 1990 under Bert Bolin's guidance are now being used as a basis in negotiations for a climate convention in preparation for the UN Conference on Environment and Development to be held in Brazil in 1992.

At the national Swedish level, Bert Bolin has played a no less important role. It would be too much to try to mention all his contributions in this context. Let me just mention that he has been a very active member of the Royal Swedish Academy of Sciences since 1962, the Swedish Natural Science Research Council 1971–1980 and the Scientific Advisory Board to the Swedish Government since 1983. Since 1986, he has served as Advisor on science policy to the Prime Minister of Sweden. He has also served as Dean of the Faculty of Sciences at Stockholm University and been a member of various committees at the University, the National Environment Protection Board, etc.

It is not surprising that Bert Bolin has received several prestigious prizes and honorary awards. The major ones are the IMO Prize from the World Meteorological Organization in 1981, the Rossby medal from the American Meteorological Society in 1984 and the Tyler Prize from the University of Southern California in 1988.

In the present context, it is also pertinent to emphasize Bert Bolin's contributions as Executive Editor of *Tellus* between 1952 and 1957 and as Editor since 1958. After the division of the journal into two series in 1983, Bert Bolin remained Editor of the A-series (Dynamic Meteorology and Oceanography) while Henning Rodhe became Editor of the B-series (Chemical and Physical

Meteorology). Under Bert Bolin's able guidance, the journal has maintained a high scientific standard and become one of the main international journals in the field of atmospheric and oceanic sciences.

An obvious question to ask at this stage is: What about the University Department? With all these external activities, how much has he been seen by colleagues and students in the department? It is true that he has been away a lot. But when he has been "at home", his presence has been very stimulating indeed. You walk into his office or meet in the coffee room and bring up a scientific or organisational problem. In very short time, Bert has grasped the question, reformulated it in a more pregnant way and offered a solution that often turns out to be fruitful and forward-looking. His lectures and seminars are always clear and he has a rare ability to transmit his enthusiasm for the subject to the listener. His many international activities have also implied a lot of external stimulating contacts for us.

As the Director of the International Meteorological Institute in Stockholm, Bert Bolin has seen many visitors from abroad come and spend periods of varying length at the institute. Frequent visitors during the later decades have been Lennart Bengtsson, Bob Charlson, Bob Cook, Paul Crutzen, Ian Galbally, Jim Holton, Ivar Isaksen, Berrien Moore and many others.

Bert Bolin has now formally retired from the University. His position as Professor of

Meteorology at the University has been taken over by Hilding Sundqvist. Henning Rodhe, Professor of Chemical Meteorology since 1980, has succeeded Bert Bolin as Director of the International Meteorological Institute in Stockholm. A third position as Professor of Atmospheric Physics, is held by Georg Witt. The current research work at the Institute is organized in four main sections:

- Dynamic meteorology and geophysical fluid dynamics (led by Hilding Sundqvist)
- Chemical meteorology and biogeochemistry (led by Henning Rodhe)
- Atmospheric physics (led by Georg Witt)
- Atmospheric aerosol science (led by Jost Heintzenberg)

Despite Bert Bolin's formal retirement, we are convinced that he will continue to participate in an active and constructive way in the scientific work of the institute and that the international scientific community will see him carry on his important work for several more years.

We, colleagues and friends of Bert Bolin, at the institute as well as elsewhere, wish him good luck for the future with more time for family, folk-dancing and choir-singing. Thank you Bert, for all you have achieved!

Henning Rodhe
Stockholm, March 1991

The following list contains a selection of Bert Bolin's scientific publications (out of a total number of about 100 papers). For a more detailed account of Bert Bolin's scientific career, the reader is referred to an interview, made by Hessam Taba, published in WMO Bulletin, vol. 37, No. 4 (October) 1988.

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