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## 1.0 OPENING

### 1.1 Opening Remarks and Administrative Arrangements *Pempkowiak, Burkill, Urban*

#### 1.1.1 Memorials for Scientists Involved With SCOR *Burkill*

##### John Knauss

John Knauss was a participant in the first International Indian Ocean Expedition.

From [www.legacy.com](http://www.legacy.com):

John A. Knauss, the noted oceanographer whose research and advocacy helped raised alarms about the delicate state of the world's oceans, died Nov. 19, according to The Associated Press. He was 90.

After obtaining his bachelor's degree in meteorology from the Massachusetts Institute of Technology in 1946, where he studied as part of the United States Navy's V-12 program, Knauss earned a master's degree in physics from the University of Michigan and a doctorate in oceanography from the Scripps Institution of Oceanography. His work quickly become pivotal to the nascent national debate on the environment and water quality, and his pioneering work as a member of the influential Stratton Commission on the report "Our Nation and the Sea: A Plan for National Action" led to the creation of the National Oceanic and Atmospheric Administration (NOAA) and the formation of the Coastal Zone Management Act.

In 1966, Knauss worked with U.S. Sen. Claiborne Pell and Dr. Athelstan Spilhaus to create the National Sea Grant Program. Inspired by the land grant colleges model, the program continues to have a major impact on marine science, policy and management in the United States.

Knauss later went on to serve as a NOAA administrator, in addition to his many academic posts. In their statement confirming his death, the University of Rhode Island, for whom Knauss founded their graduate program in oceanography, highlights his numerous awards and honors, including the National Sea Grant Award, Rhode Island Science and Technology Award, Ocean Sciences Award from the Ocean Sciences Section of the American Geophysical Union, American Geophysical Union Athlestan Spilhaus Prize and the Ram Award of the URI Alumni Association.

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## Harry Elderfield

Harry Elderfield was a founding member of the Scientific Steering Committee for the Joint Global Ocean Flux Study (JGOFS).

Harry Elderfield (1943–2016)

(from Nature, <http://www.nature.com/nature/journal/v533/n7603/full/533322a.html>)

By Rosalind E. M. Rickaby

Geochemist who deciphered chemical signatures in the modern and ancient oceans.

Henry 'Harry' Elderfield showed how the distributions of chemicals in seawater and sediments can reveal the ocean's role in historical climate change.

Elderfield, who died on 19 April, was born in 1943, at the height of the Second World War, in North Yorkshire, UK. A few days before his birth, his father, Henry, was reported missing in action, presumed drowned, a loss that may have contributed to Elderfield's draw to the oceans as well as to the past. After obtaining a degree in chemistry from the University of Liverpool, UK, in 1965, he completed a postdoctoral fellowship at Imperial College London, in 1969, and started a lectureship at the University of Leeds, UK, even before completing his PhD.

In 1977, Elderfield headed to the University of Rhode Island in Kingston for a sabbatical year. There he met geochemists Gary Klinkhammer, John Edmond and Wallace Broecker. Discussions with these scientists would have a major influence on the research questions that he later pursued.

Back at Leeds, Elderfield's laboratory technician, Mervyn Greaves, was told to make himself useful in the lab of another faculty member, Chris Hawkesworth. Hawkesworth had established a way to analyse rare-earth metals — a group of 17 elements — in 1-gram rock samples. Elderfield's biggest scientific splash came when he and Greaves applied a modified version of this method to 50-litre samples of seawater and made the first measurements of the tiny concentrations of ten rare earths from samples collected from the North Atlantic. They were present in picomolar amounts (on the order of 10<sup>-12</sup> moles per kilogram).

Elderfield established how the composition of rare earths in a sample, and the specific properties of the elements, could be used to identify different water masses — deep water bodies from different parts of the ocean that have distinct physical properties. He also predicted — correctly — that these signatures could be extracted from the ocean sediments covering the sea floor and used to track how ocean circulation has changed over time. (The composition of rare earths in the sediment of a particular geological age reflects the composition of the elements in the ocean water at the time that the layer was formed.)

In 1982, Elderfield moved to St Catharine's College at the University of Cambridge, UK. Here he was one of the first to realize how isotopes that decay radioactively over time could be used to solve marine geochemical puzzles. With Martin Palmer, who had been a student of Elderfield's at Leeds, he developed the strontium isotope curve for seawater for the past 75 million years. Analysing the ratios of strontium isotopes taken from sediments of known age, the pair mapped the changes in the isotopic ratio in the ocean over time.

This isotopic curve, recorded globally in limestone, shows the shifting effects of continental weathering and hydrothermal vents. These sea-floor features spew spectacular plumes of geothermally heated water and chemicals into the ocean, and are the major suppliers of strontium to the ocean. Strontium isotope stratigraphy, a term coined by Elderfield to describe the mapping of strontium isotopes in layers of rock, is now widely used to date sediments. It has also proved useful for climate scientists. Weathering pulls carbon dioxide out of the atmosphere and vents release the gas, so the strontium isotope curve provides a proxy for tectonic processes that are crucial to the carbon cycle.

In 1985, Elderfield's group participated in a cruise that produced the first photographs of a hydrothermal vent called the TAG vent site (P. A. Rona et al. *Nature* 321, 33–37; 1986). This was the first vent discovered in the Atlantic Ocean or indeed on any slow-spreading mid-ocean ridge. (In subsequent years, Elderfield explored the role of vents in ocean chemistry, as well as fluid flow through the sea floor.)

Around the same time, Elderfield and Edmond, who then was at the Massachusetts Institute of Technology (MIT) in Cambridge, arranged sabbaticals in each others' labs. But as a result of slightly haphazard planning they never overlapped in the same place. At MIT, Elderfield instead spent much of his time with the palaeochemist Edward Boyle, who was then trying to relate the chemistry of the shells of foraminifera, single-celled organisms known as protists, to the chemistry of the seawater in which they lived.

In the shell material, foraminiferal calcite, trace metals of similar size sometimes replace calcium; even trace anions can take the place of the carbonate ion. Elderfield pioneered the exploitation of these 'mineralogical mistakes' to gain insight into past ocean compositions. He established, for instance, that the temperature of the ocean at the time that the foraminifera formed can be inferred from the magnesium–calcium ratio in shells. This ratio provides a way to distinguish between the shifts in oxygen isotopes in the shells caused by changes in ocean temperature from those caused by changes in the size of Earth's polar ice sheets. Ultimately, Elderfield helped to reveal the independent history of changes in global temperature from the waxing and waning of Earth's ice sheets over thousands or millions of years.

Harry was a warm, playful, family man. He had a mischievous sense of humour and a taste for fine art, music, wine and unusual spirits. He also had an incredible knack of teasing sense out of disorder — or in his words, of finding the “really interesting” trends in “unascrivable scatter”.

I was one of his PhD students in the 1990s. On one tumultuous day I discovered that another group had reported findings similar to those at the heart of my PhD. Harry dissipated my fears with one sentence: “It just shows you are doing exciting science.” After a pause and a wry smile,

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he added, “But let's do it better”.

## Roland Schlich

Roland Schlich was a SCOR Nominated Member from France.

(from <http://www.egu.eu/news/233/obituary-roland-schlich-19322016/>)

Roland Schlich, executive secretary (2002–2004), treasurer (2005–2015), and one of the founders of the European Geosciences Union, passed away on 28 April 2016 of illness.

EGU President Hans Thybo, who worked closely with Schlich for many years, says:

“Roland Schlich was a main contributor to the development of EGU, where he brought in his long-term experience as treasurer and chief executive of the EUG [European Union of Geosciences], as well as his experience from efficiently leading the organisation of the biannual meetings of the EUG in Strasbourg for many years. I recall with great pleasure the day when the two chief executives of EUG and EGS [European Geophysical Society], Roland Schlich and Arne Richter, met to find a way to unite these two organisations. In particular I remember the picture of these two competitors sitting united on a red sofa smoking a cigar as a symbol of the future relations. After the merge, they shared for some years the responsibilities as executive secretary until Roland took over the post of treasurer, which he held until last year. His broad understanding of accounting soon gave us an overview of the economic status of EGU, while he efficiently steered the finances. His vision was to ensure that EGU should have a strong financial basis to secure the Union against consequences of potential economic catastrophes. Roland was clearly the classic, responsible treasurer who always provided conservative budgets, that for a long time guaranteed substantial surplus. On a personal note, Roland had his own humoristic and discrete approach to other people. He had an immense taste for quality wines and it was a privilege to be guided through his superb wine cellar. EGU owes much to Roland for his fundamental contribution to building the organisation.”

Schlich was one of the founding members, treasurer (1981–1996), and chief executive (1996–2004) of EUG, an organisation that merged with EGS in 2002 to establish the EGU. He was instrumental in the unification process of EUG and EGS. Schlich kick started discussions with the then EGS Executive Secretary Arne Richter to reach a preliminary merger agreement, and then officially signed the EGU into existence, together with other EGU founding members, on 7 September 2002 in Munich. He remained part of the EGU Executive until last year.

In an interview for the EGU newsletter published in 2012, Schlich cited early career scientists as an inspiration for his work at the EGU, and highlighted his strong support for the EGU General Assembly travel grants scheme. “Young people often remember the first time they present in

public. To me, this is the best publicity we can make for our organisation and one of the most important contributions we can make to the scientific process.”

Schlich completed his engineer diploma in geophysics and geology at the University Louis Pasteur (Institut de Physique du Globe de Strasbourg, now Ecole et Observatoire des Sciences de la Terre) in 1956. After a stint working for an oil company, his research career started at the Centre National de la Recherche Scientifique (CNRS) with an expedition to the Antarctic during the International Geophysical Year (1957–1958). In charge of the geomagnetic programme, he wintered at the Charcot Station with meteorologist Jacques Dubois and glaciologist Claude Lorius in a small aluminium hut buried under the ice, located some 320 km inland, in the vicinity of the south magnetic pole.

Thybo recalls: “On leaving for Antarctica, Roland’s future wife Michelle gave him an 8mm movie camera with a large supply of film as a present. The recordings from Antarctica have formed the basis for a splendid movie about the pioneering scientific activities in the harsh polar environment.” The documentary, *365 Days Under Antarctic Ice* by Djamel Tahy, is a register Schlich spoke fondly of.

Later, in 1968, Schlich moved into the fields of marine geology and geophysics and launched a long-term research programme in the Southern Indian Ocean. He received a Doctor of Science from the Université Pierre et Marie Curie (Paris VI) in 1974 with a thesis on the Structure, Age and Evolution of the Indian Ocean. He was head of the CNRS Marine Geophysical Laboratory (1972–1980) and served as deputy director for the Institut de Physique du Globe de Paris (1976–1979). He moved to the University of Strasbourg and served as director for the Ecole et Observatoire de Physique du Globe de Strasbourg (1980–1996). Between 1960 and 1998 he produced more than 180 scientific contributions, and supervised dozens of students.

Roland Schlich was a key figure in the history of European geosciences in general and the EGU in particular. The Union will be forever grateful for the work Schlich did to get the EGU up and running and to promote geoscientific discussion in Europe. He will be remembered fondly for his scientific achievements, passion for the geosciences, and forward-thinking attitude, as well as for his enthusiastic story-telling and good sense of humour.

## **1.2 Approval of the Agenda (see Tab 0)**

*Burkill*

The agenda can be rearranged at the meeting to accommodate the schedules of presenters and to add items to it.

## **1.3 Report of the SCOR President**

*Burkill*

The SCOR President will present a report at the meeting that describes his activities on behalf of SCOR since the 2014 SCOR Annual Meeting in Bremen, Germany.

#### 1.4 Report of SCOR Executive Director

*Urban*

This has been another busy year for the SCOR Secretariat. SCOR-supported groups continue their good work.

**Finances**—SCOR is accomplishing its goal of reducing its cash balance. Dues income is on track for this time of year. Income from dues is important for funding the central administration of SCOR, namely the costs of the Secretariat and the annual SCOR meetings. Dues also fund some costs of working groups and other SCOR activities that are not funded from grants. SCOR depends on grant funding for large-scale research projects, ocean carbon activities, and some working groups.

**National Members**—The number of countries involved in SCOR has remained stable this year. There was some rotation of Nominated Members (see Tab 8).

**Publications and Outreach**—The SCOR Web site is the major vehicle for providing up-to-date information about SCOR to the international ocean science community and I make changes to the site several times each week, as I receive new information. The site is checked for “dead links” monthly. SCOR activities yielded many publications in the primary literature and other venues this year, as noted in Tab 8. Because SCOR’s reputation is largely affected by the quality of documents resulting from SCOR activities, I spend a significant amount of my time writing, reviewing, and/or editing publications.

SCOR had a booth at the Ocean Sciences meeting in New Orleans in February 2016. The booth provided an opportunity for SCOR-sponsored projects to gain visibility. SCOR paid to have five posters formatted by a professional graphic artist and printed as roll-up banners. One was for SCOR and the four others for SCOR projects. The booth provided an opportunity for these projects to distribute information and to meet with people who dropped by. It was obvious this year that participants did not pick up much written materials, but were attracted by the video display and the booth provided a place for people to find me to discuss working groups, working group proposals, and other SCOR business. Elena Masferrer Dodas (Executive Officer of the GEOTRACES project) managed the booth overall and coordinated a staffing schedule of volunteers from SCOR-sponsored projects and working groups. Because several SCOR groups met in conjunction with the Ocean Sciences meeting, I was able to help with logistics and/or attend meetings of the IMBER SSC, WG 141, WG 142, and WG 145.

The SCOR Twitter account has 137 followers (as of 1 August 2016), up from 78 followers in November 2015. I Tweet news items that I think would interest the broader community. There is almost no overlap between SCOR’s Twitter followers and people on the SCOR email list.

**Meetings**—In the 9 months between the 2015 and 2016 SCOR annual meetings, 6 SCOR working groups met (WGs 140, 141, 142, 145, 146, and 149). The Scientific Steering Committees of GlobalHAB, IMBER, IQOE, and SOOS also met.

**Outreach to Scientists from Developing Nations and Capacity-Building Activities**—SCOR continues to invest funding and effort in expanding our capacity-building activities. In addition to the continuation of the travel grant program, SCOR appoints up to three SCOR Visiting Scholars each year. The third of four annual Research Camps was held at the University of Namibia (UNAM) campus in Henties Bay this year. This concept grew out of Kurt Hanselmann's two visits to UNAM as a SCOR Visiting Scholar and a subsequent grant from the Agouron Institute to SCOR for this activity.

I met with scientists at the Ocean University of Sri Lanka in mid-December 2015 to follow up on an earlier visit to discuss the participation of institutions in Sri Lanka in the Second International Indian Ocean Expedition (IIOE-2) and in SCOR more generally.

**Service to International Ocean Research Projects**—SCOR helps SCOR-sponsored research projects in many different ways, including providing funds from the U.S. National Science Foundation, the U.S. National Aeronautics and Space Administration, and other sources, providing travel support for developing country scientists and scientists from countries with economies in transition to special events of the projects, providing IPO-type support until an IPO can be funded, providing access to the Conference Manager software for management of open science meetings, and leasing the GoToMeeting audio conferencing system for the projects.

**Support of Project Offices**—SCOR currently provides partial support for three project offices, as subawards to one of SCOR's grants from NSF:

- **International Ocean Carbon Coordination Project (IOCCP)**—This office is located in Sopot, Poland, at the Institute of Oceanology of the Polish Academy of Sciences. SCOR pays the salary and benefits for the project director, Dr. Maciej Telszewski. IOC helps support the cost of the office and provides activity funding for IOCCP, and the host institution provides in-kind support.
- **GEOTRACES Data Assembly Centre**—This office is located at the British Oceanographic Data Centre. SCOR pays for some salary support and other expenses related to the office, for the GEOTRACES Data Manager. The office receives occasional support from other countries whose scientists are involved in GEOTRACES.
- **GEOTRACES International Project Office**—This office is located in Toulouse, France at the Université Toulouse III - Paul Sabatier, SCOR support pays for about half of the office cost, including some salary support for the GEOTRACES Executive Officer, Ms. Elena Masferrer-Dodas. SCOR funds are supplemented by funds from other countries whose scientists are involved in GEOTRACES.

**Partnerships With Other Organizations**—Maintaining existing partnerships and developing new ones depends on SCOR having the ability to commit funding to joint activities and to send representatives to partners' meetings. We have strong partnerships with Future Earth, IOC, PICES, POGO, and SCAR. This year, Peter Burkill and I represented SCOR at the IOC Executive Council in June. Sun Song and I will represent SCOR at PICES 25<sup>th</sup> anniversary meeting in November 2016.

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**Staffing**—Currently, I am working full-time for SCOR and Elizabeth Gross is working about one-third time as a contractor to handle many financial duties. I handle the regular duties related to the SCOR Secretariat each year, but this year I also did the following:

- Served as the project coordinator for the International Quiet Ocean Experiment (IQOE), which included planning and coordination of the first meeting of the IQOE Science Committee in March 2016, and helping develop the project’s working groups. Created Web site for the project ([www.iqoe.org](http://www.iqoe.org)).
- Served as the one of the project coordinators, with Henrik Enevoldsen of IOC, for the new GlobalHAB project, whose Scientific Steering Committee met in March 2016.
- Provide some staff support for the International Symposium Planning Committee for the International Symposium on the Indian Ocean in Goa, India on 30 Nov.-4 Dec. Since IIOE-2 now has a Joint Project Office, my level of activity in relation to this project has decreased from last year.
- Developed a SurveyMonkey questionnaire for WG 145 and developed another questionnaire of SCOR Visiting Scholars.
- Managed the review process for the SOLAS and IMBER Science Plans, with help on the IMBER plan from Erik Pihl of Future Earth.
- Managed logistics for WG 141, 142, and 145 meetings in New Orleans, and attended the meetings.
- Produced two SCOR Newsletters and the 2015 SCOR Proceedings.

I continue to manage all SCOR Secretariat activities and oversee the finances of SCOR activities, pursue new funding for SCOR activities, represent SCOR at various meetings, help edit various publications, and work on the SCOR Web site and Newsletter.

## **1.5 Appointment of an *ad hoc* Finance Committee**

***Burkill***

The Executive Committee has appointed the 2016 Ad Hoc SCOR Finance Committee before the meeting, so the committee members can receive and review SCOR financial information in advance. Participation on the Finance Committee is limited to Nominated Members who are attending the meeting, but who are not members of the SCOR Executive Committee. This ensures that a group independent from the Executive Committee and SCOR Secretariat staff can make recommendations to the Executive Committee about SCOR finances. The members of this year’s Finance Committee are Annalisa Griffa (Italy), Paul Myers (Canada), Johan Rodhe (Sweden), and Jing Zhang (Japan).

## **1.6 2016 Elections for SCOR Officers**

***Fennel***

The results of the election process for new SCOR officers will be announced at the SCOR meeting in Poland.