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Leonard Johnson and His Impact on Research in the Polar Regions

Kurzfassung

Der Beitrag gibt einen Überblick über das polarwissenschaftliche Werk Leonard Johnsons, der von der POLLICHIA mit der Georg von Neumayer-Medaille 2001 geehrt wurde. Im Anhang belegt eine Auswahl aus den über 200 Veröffentlichungen Leonard Johnsons die Breite und Palette seines wissenschaftlichen Werks.

Abstract

The contribution gives an outline of Leonard Johnson's achievement in polar research. He was awarded the Neumayer medal in 2001 by POLLICHIA. In the appendix a selection from Leonard Johnson's more than 200 publications shows the wide range of his scientific work.

Résumé

L'exposé donne un aperçu des exploits dans le domaine de l'exploration des régions polaires accomplis par Leonard Johnson, qui a été décoré de la médaille Georg von Neumayer 2001 par POLLICHIA. Une sélection des plus de 200 publications dans l'appendice montre toute la gamme de son œuvre scientifique.

Keywords

Polar Research, Arctic, Antarctic, Volcanism, Tectonism

1. Introduction

Maybe it is typical for his long affiliation with the US navy and the Office of Naval Research (ONR) that neither his birthday, nor his social security number or birthplace appear on his vita, but as you will find out later from himself he is a true US citizen with one of their characteristic traits, namely never to accept that a problem cannot be solved. That is why Americans usually and early succeed when Europeans still hesitate because of being afraid to make a mistake.

Leonard Johnson's academic education is in geology, with a bachelor from Williams in 1953 which could give a hint of his age, later in marine geology with a master from New York University in 1965 and a dr. phil. from the University of Copenhagen/Denmark in 1975. We should have crossed paths at that time because then I was working at another, rather young Danish University, but that was located in Jutland and kept better contacts to the Danish Geological Survey than to the old and famous University of Copenhagen, so we did not meet at that time, but only a few years later when I had moved to the University of Oslo and when Leonard Johnson together with Professor Preben Gudmandsen from DTH took the initiative for a major conference on future Arctic Research, where much of what later was accomplished, was developed in terms of ideas and proposals. This meeting set also the stage for the Swedish Ymer expedition to the ice-covered waters north of Svalbard, the first major European efforts to use a conventional ice-breaker for doing research in the central Arctic Ocean.

Leonard Johnson's professional life began with his service in the US Navy 1953–1957 and I assume he was not an officer thoughout the entire time, but that he began as all other mortals with some lower rank, but he obviously quickly rose though the ranks to accept responsibilities. He then served as a scientist at the most famous institution of the world devoted to marine geo-sciences, namely Lamont-Doherty Geological Observatory (as it was called in those early days, LDGO) where he worked closely together with Bruce Heezen and Maurice Ewing and where he met probably several of his peers with whom he later shared ideas, expeditions and publications. From LDGO he moved in 1965 to the Office of Naval Research (ONR) to pursue a highly distinguished career which kept him for 20 years at this important funding agency for marine sciences and from where he could do much good to move polar research. In 1994, after serving as director of ONR Geoacoustics and Arctic Division, he quit and was tempted into some jobs in academia and in industry, but he kept his interest and impact on polar sciences at a high level.

Education	1953	B. A. (Geology), Williams College
	1965	M. S. (Marine Geology), New York University
	1975	Dr. phil. (Marine Geology), University of Copenhagen
Professional Experience	1953–1957	Officer U. S. Navy
	1957–1965	Assistant Scientist, Lamont-Doherty Earth Observatory
	1965–1975	Research Oceanographer, U. S. Naval Oceanographic Office
	1975–1980	Project Scientist, Arctic Programs, Office of Naval Research
	1980–1986	Program Manager, Arctic Sciences, Office of Naval Research
	1986–1994	Director, Geo-Acoustics/Arctic Division Office of Naval Research
	1994–1996	Senior Research Scientist, Geochemical and Environmental Research Group (GERG) Texas A&M
	1998–2000	President J B Technologies
	since 1996	Research Scientist, Univ. of Alaska Fairbanks

Table 1: Leonard Johnson – Education and Professional Experience

As part of his job he was naturally involved in a number of national and international venues. He was involved in the US-initiative RAISE, in NAD (chair of EXCOM) in the early nineties, in the DOE Arctic emergency, prevention, preparedness and response (EPPR) and in AMAP of the Arctic Council, to name a few examples. He participated in IASC WG on Marine Geology. Naturally he also acted as convener and organizer of numerous meetings and workshops.

2. Scientific Accomplishments

Leonard Johnson's scientific heritage and legacy which we do not expect to be completed yet, is documented in over 200 scientific papers, reports and abstracts which he was able to produce despite his very heavy administrative work load. Many of the papers have been published in some of the finest international journals, I counted seven in Nature and many contributions in Deep-Sea Research. The scientific themes (as well as the selection of co-authors) change through time, from sedimentological ones to bathymetric descriptions of newly charted regions of the ocean floor, to geophysical and geological studies of sediment distributions and special features of the ocean crust, to more technical (submarine cable failures) and political aspects of deep-sea exploration to scientific perspectives and planning as well as to environmental issues. Based on the accumulated publication record, I have compiled a few statistics which shed an interesting light on the person of Leonard Johnson.

There is a majority of papers on Arctic problems (mainly on morphology, tectonic and structural history, volcanism), with 10% on Antarctic themes, but also 40% on non-polar problems, for example on the Mediterranean, North Atlantic or tropical Pacific and Indian oceans. Basically he has published on all major ocean basins. However, there is no question that scientifically most important contributions deal with the Arctic Ocean and the Nordic Seas around Iceland. Although 75% of his contributions have appeared in US-journals, 25% have appeared abroad, also in other languages (ranging from Icelandic, Danish, German, French to Russian). It is interesting to note that his publication record documents how he successively established contacts to abroad, in the early days for a navy man no easy task, for example to publish together with Russians.

In the early days of his affiliation with Lamont-Doherty Geological Observatory there was obviously a very close and at first dominating relationship with Bruce Heezen. Later the distribution of co-authors changed with time and themes.

To give you a feel for the diversity of themes I have compiled one page of references out of the 200 of Leonard Johnson; I am not sure if I made the right selection or set correct priorities, but I think it gives you an idea of what I mean with the diversity of

Science Statistics	Arctic 50% Antarctic 10% non-polar 40%				Foreign journals 25% US journals 75%		
First Publication with foreign co-authors	1971 France	1973 Denmark	1975 Canada	1979 Norway	1980 Iceland	1981 Germany	1983 Russia
Countries of publication	Australia Canada Denmark France Ecuador (Galapagos)			Germany Greenland Iceland Japan Mexico	Monaco Norway Russia/SU The Netherlands UK		

Table 2: Leonard Johnson – Statistics of his Publication Record

themes, the excellency of the international journals, the co-author distribution, the widespread internationality of Leonard Johnson's science contacts. One has naturally to realize that his scientific activities in general cover a time span from when the Arctic Ocean research had remained almost stagnant since the great accomplishments of Fridtjof Nansen more than 100 years ago, to the time when morphology, tectonic structure, history of sedimentation, properties of the modern oceanography and ice cover are known in ever increasing detail.

3. Science Project and Policy Accomplishments

Coming from one of the major funding agencies for polar research Leonard Johnson took substantial influence on developing science policy questions and major science initiatives. Going through the list of publications it is evident that he took a major interest (including providing funding through his channels) in, and I am only selecting polar examples, but I think they are typical of Leonard Johnson's vision and ability to involve the right people, both in the US and abroad:

- FRAM Ice Drift Stations during the late seventies,
- GEBCO Charts of the Arctic and of the Antarctic,
- IUGS-CMG Whither the Oceanic Geosciences, Heidelberg 1983,
- MIZEX Marginal Ice Zone Experiments during the eighties,
- NAD Nansen Arctic Drilling in the nineties,
- ANWAP Arctic Nuclear Waste Assessment Program,
- RAISE towards the end of the last century.

4. Perspectives

I think I have shown very dry and factual that Leonard Johnson is a very accomplished polar researcher whom we owe much in terms of science progress and much in terms of visions for marine sciences.

Now there is one additional aspect which I have alluded to, but which I would like to mention specifically here at the end of my talk: Leonard Johnson's heydays were during a time when American dominance ruled the scientific world and when we had a continuous drain from Europe to the "Mekka" of science. Leonard Johnson always had the courage against this drain also to fund European researchers and much excellent collaboration occurred. The degree of collaboration has decreased to a certain degree in modern times, not because our continents are less friendly towards each other, but because Europe has gained more confidence and more collaboration is occurring at the inner European level. We experienced the new politics in the Eastern countries probably more intensely than our US colleagues, also this aspect drains time and energy from the intense collaboration between the US and Europe. This must not be seen negatively because many new possibilities have developed as a consequence, both for Europeans and for our US colleagues and we sincerely hope that we are all steering towards a peaceful century with much progress for science. However, by proposing Leonard Johnson for this medal which carries the name of one of the great European polar science policy makers in the early part of the last century we wanted to highlight also this beneficial aspect of Leonard Johnson's activities, and this implies not only Germany, but many partners from other European countries.

5. Gifts to Leonard Johnson

Towards the end I want to deliver two gifts to Leonard Johnson which may remind him of this day:

• New Arctic (IBCAO = International Bathymetric Chart of the Antarctic Ocean) chart, singed personally by the entire working group responsible for it, and marking his contribution to change the state of knowledge from F. Nansens chart to the modern information systems;

• Piece of the grave rocks of Lt Comm De Long which I collected personally from the grave site in the Lena Delta in central North Siberia. The American ship "Jeanette" under the leadership of LtComm DeLong means the beginning of the systematic exploration of the Arctic Ocean and henceforth, through this medal and the occasion today we can also thank the old courageous American polar explorers who suffered a dreadful fate in the Lena Delta, but who left us a legacy and inspiration for future polar research.



Fig. 1: Leonard Johnson (left) and Jörn Thiede (right) – Reflections about Georg von Neumayer and perspectives of modern polar research in Bad Dürkheim 2001.

6. Publications of Leonard Johnson
(selection of himself)

(1966) (jointly with: ECKHOFF, O. B.): Bathymetry of the North Greenland Sea. – Deep Sea Res., **13**: 1161–1173

(1967) (jointly with: HEEZEN, B. C.): The Arctic Mid-Oceanic Ridge. – Nature, **215**: 724–725

(1967) (jointly with: HEEZEN, B. C.): The Morphology and Evolution of the Norwegian-Greenland Sea. – Deep Sea Res., **14**: 755–771

(1969) (jointly with: HEEZEN, B.): Mediterranean Undercurrent and Microphysiography west of Gibraltar. – Bulletin Institut Oceanographique, Monaco, **67**: No. 1382, 95pp.

(1969) (jointly with: HEEZEN, B.): Natural Hazards to Submarine Cables. – Ocean Engineering, **1**: 535–553

(1969) (jointly with: SCHNEIDER, E. D.): Depositional Ridges in the North Atlantic. – Earth and Planet, Sci. Letters, **6**: 416–422

(1971) (jointly with: VOGT, P. R. & SCHNEIDER, E. D.): Morphology of the northeastern Atlantic and Labrador Sea. – Deutsche Hydrogr. Z., **24**: 50–73

(1972) (jointly with: SOUTHHALL, J. R., YOUNG, P. W. & VOGT, P. R.): The Origin and Structure of the Iceland Plateau and Kolbeinsey Ridge. – J. Geophys. Res., **77**: 5688–5696

(1973) (jointly with: EGLOFF, J., CAMPSIE, J., RASMUSSEN, M., DITTMER, F. & FREITAG, J.): Sediment Distribution and crustal structure of the southern Labrador Sea. – Bull. Geol. Soc. Denmark, **22**: 7–24

(1973) (jointly with: VOGT, P. R.): Mid-Atlantic Ridge From 47°–51°N. – Bull. Geol. Soc. Amer., **84**: 3443–3462

(1975) (jointly with: MCMILLAN, N. J. & EGLOFF, J.): The Continental Margin of East Greenland. – In: YORATH, C. J., PARKER, E. R. & GLASS, D. J. (Eds.): Canadas Continental Margins and Offshore Petroleum Exploration. – Petrol. Geol., Memoir **4**: 205–224

(1975) (jointly with: MCMILLAN, N. J. & EGLOFF, J.): The Continental Margin of East Greenland. – In: YORATH, C. J., PARKER, E. R. & GLASS, D. J. (Eds.): Canadas Continental Margins and Offshore Petroleum Exploration. – Petrol. Geol., Memoir **4**: 205–224)

(1975) (jointly with: MCMILLAN, N. J., RASMUSSEN, M., CAMSIE, J., DITTMER, F.): Sedimentary Rocks Dredged From the Southwest Greenland Continental Margin. – In: YORATH, C. J., PARKER, E. R. & GLASS, D. J. (Eds.): Canadas Continental Margins and Offshore Petroleum Exploration. – Petrol. Geol., Memoir **4**: 391–410

(1979) GEBCO Bathymetric chart. – Canadian Hydrographic Service, Sheet 5.17 (Arctic)

(1981) GEBCO Bathymetric chart. – Canadian Hydrographic Service, Sheet 5.18 (Antarctic)

(1981) (jointly with: VANNEY, J. R., ELVERHOI, A. & LA BRECQUE, J.): Morphology of the Weddell Sea and Southwest Indian Ocean. – Deutsche Hydrogr. Z., **34**: 263–272

(1982) (jointly with: SRIVASTAVA, S., CAMPSIE, J. & RASMUSSEN, M.): Occurrences of volcanic rocks in the Labrador Sea environs and their relation to the evolution of the Labrador Sea. – In: JOHNSON, G. L., SRIVASTAVA, S., CAMPSIE, J. & RASMUSSEN, M.: Current Research Part B, Canadian Geol. Survey Paper 88–IB: 7–20

(1985) (jointly with: JAKOBSSON, S. P.): Structure and Petrology of the Reykjanes Ridge between 62°55' and 63°48'N. – J. Geophys. Res.

(1990): Morphology and Plate Tectonics, A Comparison of the Polar Oceans. In: BLEIL, U. & THIEDE, J. (Eds.): Geological History of the Polar Oceans, Arctic versus Antarctic. – In: NATO ASI Series C 308, Kluwer, Acad. Publ. Dordrecht: 11–29

(1990) (jointly with: GRANTZ, A. & WEBER, J. R.): Bathymetry and physiography of the Arctic. In: GRANTZ, A. JOHNSON, G. L. & SWEENEY, J. F. (Eds.): Arctic Vol. Decade of North American Geology – Geol. Soc. Amer.: 63–77

(1994) (jointly with: POGREBITSKY, J. & MACNAB, R.): Observations on Arctic Paleoceanography based on Plate Tectonics. – In: JOHANNESSEN, O. M. MUENCH, R. D. & OVERLAND, J. E. (Eds.): The Polar Oceans and their role in shaping the global environment. – Geophys. Monograph., Amer. Geophys. Union, **85**: 285–294

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