

Jörg-Olaf Wolff

## Fahrbach received the 2007 Georg Wüst Prize

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Prof. Dr. Georg Wüst

Dr. Eberhard Fahrbach

Dr. Eberhard Fahrbach received the Georg Wüst Prize 2007 at the European Geophysical Union (EGU) General Assembly in Vienna, Austria, April 2007. The biannual prize is given for outstanding contributions to the general field of oceanography and is sponsored by the German Society for Marine Research and Ocean Dynamics. The following is a transcript of the citation followed by the response by Dr. Eberhard Fahrbach.

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### Citation

The Georg Wüst Prize is awarded for outstanding contributions to oceanic research in any marine discipline regardless of the nationality of the scientist. Specifically, it is meant to honor excellent mid-career scientists, thus targeting a group missed by the ‘outstanding lifetime achievements’ awards or those directed explicitly at bright ‘young scientists’. It is the intent that this honor will further inspire the recipient to tackle the demanding tasks that are imposed in directing current and future research in oceanography.

The German Society for Marine Research (Deutsche Gesellschaft für Meeresforschung, DGM) awards this biennial prize with the generous sponsorship of the international Springer Journal Ocean Dynamics.

The inaugural presentation of the Georg Wüst Prize was presented at the 2005 EGU General Assembly in Vienna by

Prof. Arnold L. Gordon, Lamont-Doherty Earth Observatory of Columbia University and I to Dr. Stephen Rintoul, CSIRO, Hobart, Australia.

This year the Georg Wüst Prize is presented to Dr. Eberhard Fahrbach of the Alfred-Wegener-Institute, Bremerhaven, Germany.

Before discussing the achievements of Eberhard Fahrbach, I first quote from Arnold's statement at the 2005 presentation concerning Georg Wüst's achievements.

Georg Wüst, born 15 June 1890, brought descriptive oceanography into the modern era. Through a careful analysis of each hard-won observational data point that passed his meticulous quality control procedures, he probed into the secrets of the ocean, contributing to several research areas. He is best known for his Atlantic Ocean studies, where with great insight and skill he combined water mass analysis by means of the temperature–salinity relationship and the core method, with the dynamic approach of geostrophic balance, to reveal the nature of the deep Atlantic's stratification and circulation.

Coming now to Eberhard Fahrbach, I quote from the nomination letter:

Eberhard Fahrbach has covered a wide range of studies to understand the ocean as an essential component of the climate and ecosystem. He conducted his investigations according to the tradition established by Georg Wüst as a combination of well-planned field work and careful analysis of the obtained data. He carried out studies on the dynamics of coastal and equatorial upwelling processes ranging from internal waves to the equatorial current system. After switching to polar oceanography, he focussed his work on the circulation and watermass formation in the Atlantic sector of the Southern Ocean and the Greenland Sea. He dedicated significant efforts to design and build up observation systems in the polar oceans by stimulation of international cooperation and launching new technical developments. Beyond his research he proved his leadership by serving in key international committees and conducting numerous cruises.

As we all know, no scientist can work so hard and be successful in science without the loving and enduring support of his family. So, with this prize, the oceanographic community also honors and specifically thanks his wife, Karin Fahrbach, for her support of his endeavours over the last 30 years.

I do hope that a good part of the prize money will be spent on a romantic dinner with Karin in a first class restaurant in Paris, Rome or Vienna.

The prize consists of a 3-D laser-engraved picture of the old meteor in a glass block, a prize certificate, a honorary lifetime membership of the German Society of Marine Research and a prize money of 1,500 €.

Congratulations Eberhard!

Prof. Dr. Jörg-Olaf Wolff, President of the German Society of Marine Research and Chief Editor of *Ocean Dynamics*

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## Response

First, let me express my sincere gratitude to the Deutsche Gesellschaft für Meeresforschung, Ocean Dynamics, the Springer-Verlag and last but not the least to Jörg Wolff for demonstrating their high esteem to my work as an oceanographer by selecting me for the Georg Wüst Prize. Next to my family, oceanography was the focus of my life during the last 35 years. Because even science is not always fun, such a formal appreciation is very reassuring to be on the right track.

To be honoured by the Georg Wüst Prize suggests taking a closer look on Georg Wüst himself. Most of his work is reflected in a direct or indirect way as basic knowledge in textbooks. Everybody knows his illustrative three-dimensional block diagram of the Atlantic circulation, which was redrawn many, many times. As for me, I have had the occasion to meet Georg Wüst once in Kiel during the very early years of my career. Of stronger impact was that I was trained in his spirit by several of his former students in Kiel. Even beyond Kiel in a later state, one of his students had a deep impact on my work. It was Arnold Gordon who fully set the scene in Antarctic oceanography when I moved from tropical to polar oceanography in 1986.

Georg Wüst was born on June 15, 1890 in Posen, Germany (now Poznań in Poland). He studied mathematics, physics, geography, oceanography and meteorology in Berlin from 1910 to 1914. Moving with a background in physics into oceanography gave him a special qualification for the upcoming change in oceanography from a geographical descriptive science to a physical science.

He was awarded his Ph.D. in 1914 under the direction of Alfred Merz, with a thesis entitled "Ocean Evaporation" (*Verdunstung auf dem Meere*) bringing to our minds that the need for understanding the freshwater cycle is not really a new idea and that it might take more than a century to solve a well-known problem. He had to interrupt his scientific career during the First World War when he served from 1914 to 1918 in the military as a meteorologist. After the war, he returned to Berlin and stayed from 1919 to 1944 at the Institut und Museum für Meereskunde in Berlin.

In Berlin, Alfred Merz was planning since 1910 an extensive global field study to determine the deep vertical circulation nowadays called meridional overturning circulation. However, the war stopped the plans, but Merz took them up again with the strong support from Georg Wüst. The political situation in the 1920s was helpful to their plans because the German Navy had well-recognized the significant advantages in being able to show up internationally in spite of restrictions of the Versailles Treaty, and the political system saw the possibility to polish up again the German reputation by a significant scientific achievement. Obviously, the arguments about social relevance of science change, but good data and findings stay. In spite of the positive support from many politicians, the available funds were much smaller than needed for a global survey and in consequence the plans were reduced to a basin wide expedition.

During this period, Wüst played a significant role by introducing the dynamical method into German oceanography, which he had learned in Bergen during a stay in 1913. His basic contribution to the debate of its usefulness, published in 1924, was to compare direct current measurements mainly carried out by Pillsbury on the “Blake” and geostrophic calculations from the Florida current to prove that the dynamical method provides realistic current estimates. Based on these findings, Merz, together with Wüst, designed the cruise plan for the Meteor Atlantic Expedition (Deutsche Atlantische Expedition auf dem Forschungsschiff “Meteor”). It is surprising to note that in his future work, he mostly applied the core methods to derive water mass circulation from hydrographic measurements.

From 1925 to 1927, he participated at the Meteor Expedition. After the death of the expedition leader and his teacher Alfred Merz shortly after the beginning of the expedition, Wüst took over as chief oceanographer.

The Atlantic expedition was the first systematic study of an entire ocean basin reaching from the Antarctic to the tropics. It remains one of the most extensive oceanographic surveys ever undertaken. From the wealth of data collected, Wüst constructed cross-sectional profiles that revealed the Atlantic’s temperature and salinity stratification and the deep-current pattern. The 10 moored stations to obtain direct current measurements did not help much because of the high noise level.

He shared the work to interpret the data with Albert Defant who in between had become director of the Institut für Meereskunde in Berlin. Defant described the ocean’s troposphere, whilst Wüst described the stratosphere, the deep sea. He documented the data and methods in a perfect way long before the word meta-data was invented. His property maps and section drawings served for decades as examples for oceanographic data presentation.

His studies were not restricted to the Atlantic Ocean. In 1929, he obtained his habilitation with a thesis on stratification and deep circulation in the Pacific Ocean (Die Schichtung und Tiefenzirkulation des Pazifischen Ozeans). In 1938, he was in charge of the International Gulf Stream expedition on “Altair”. One more time, he had to go to war. During World War II, he had an advisory position to the Navy command but could continue scientific work during that time.

After the war, he got a professorship in Kiel, built up again the destroyed Institute for Marine Research at Kiel and was the institute’s director from 1946 until he retired in 1959. From 1960 to 1964, he was a visiting professor at Lamont Geological Observatory of the Columbia University and from 1965 to 1967 a guest professor at the University of Bonn.

Georg Wüst died on Nov. 8, 1977, Erlangen, Germany.

So what can we still learn from him with the experience of a long career of more than 57 years and 112 publications:

1. Systematic surveys and careful handling of the data are the indispensable basis to understand the ocean. The station grid of the Meteor expedition served for many later cruise plans as an example. He would have loved Bob Dickson’s iAOOS or Karen Heywood’s SASSI hedgehog.
2. Good data and findings last longer than the arguments to obtain funding. He would smile on some of our arguments towards funding agencies.
3. Think globally and deep. He studied the ocean from the Antarctic to the Arctic and from the Caribbean to the Mediterranean and the Baltic. He would have been annoyed by requirements as to focus on the North Atlantic or to neglect the deep ocean.
4. Keep your mind open for new technology and methods. He would have been pleased to see our efforts to measure the MOC by moorings or to test if gliders or tomography would yield the similar transports through Fram Strait as a picked current meter fence.

Finally, let me note that a successful life in field going oceanography is not possible in isolation. I am not able to mention the many people who brought me to the point where I am today such as teachers, advisors, colleagues, technical and logistical supporters, ships’ crew and last but not the least my wife, Karin, who quite often had to tolerate with admirable patience that oceanography plays a dominating role in my life. To all of them, I owe my deepest thanks.

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