

Jörg-Olaf Wolff

## Rintoul received the 2005 Georg Wüst Prize

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Dr. Stephen R. Rintoul received the inaugural Georg Wüst Prize at the “grand opening ceremony” of the European Geophysical Union (EGU) General Assembly in Vienna, Austria, April 2005. 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 citations by Prof. Dr. Arnold Gordon and myself followed by the response by Dr. Stephen R. Rintoul.

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### 1 Citations

Before Prof. Wolff will present the prize, let me tell you a few things about Georg Wüst.

It was late 1960; I applied to several graduate schools to study physical oceanography. I'm not quite sure why I was so adamant on that course of study, but the ocean's role in Earth's climate always fascinated me. I was admitted to MIT, but to study coastal [beach] processes –not exactly what I wanted. I got a call from Columbia University, its Lamont Geological Observatory, as it was called then [current name: Lamont-Doherty Earth Observatory]. I went to visit. I asked could one really study physical oceanography at a geological institution? I was assured by Jack Nafe that the answer was Yes. Unknown to me was that Doc Ewing, the Lamont Director, realizing he just couldn't drain the ocean to get a sharper view of the sea floor, decided to

add the field of physical oceanography to Lamont research endeavors. He acquired a Ford Foundation Fellowship to fund a graduate student to study under a famous German physical oceanographer, who recently retired from the oceanography institute in Kiel, Prof. Dr. Georg Wüst. I began my studies with Dr. Wüst in 1961, helping him with his study of the stratification and circulation of the Caribbean Sea.

I gained a lot from Dr. Wüst, and we became good friends. I visited him often once he returned to Germany in 1964; first at the University of Bonn where he taught for a year, and then at his retirement home in Erlangen until the time of his death in 1977.

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. His primary source of information was the magnificent data set obtained during the “Deutsche Atlantische Expedition”, the South Atlantic Meteor Expedition of 1925–1927, in which he guided the oceanography work. Tracing the southward flow of the multiple layers of North Atlantic Deep Water and of the compensatory northward flow of Antarctic waters Georg Wüst presented the first clear picture of the Atlantic’s meridional circulation, including the presence of deep western boundary currents, which so places its stamp upon the global ocean and climate.

I learnt from Dr. Wüst to seek the “big picture”, but to value every valid data point. Today we average all data into neat boxes—the good and the bad data. While such gridded data has much value in this age of numerical models, one wonders if those few valid data points that don’t quite fit in with the other data actually expose a discovery, a discovery that would not have escaped Georg Wüst’s keen eye.

It was now 1965 and I was now a Ph.D., and being considered for a faculty position at Columbia. A member of the faculty said I was too young and immature to be appointed to the faculty. Dr. Wüst helped me again, by saying that age is a problem that solves itself. He was right, though I’m still not sure time can solve a state of immaturity.

Prof. Dr. Arnold Gordon, Lamont-Doherty Earth Observatory of Columbia University, New York.

As vice-president of the German Society of Marine Research (DGM) and Chief-Editor of the international scientific journal *Ocean Dynamics* of the Springer group, I have the honor and distinct pleasure to present the

inaugural Georg Wüst Prize to my colleague and friend Dr. Stephen R. Rintoul from Australia.

We have established this prize to honor outstanding and active scientists in the general field of oceanography—people with visions, courage and the proven potential to lead the field of oceanography into the future. Amongst the field of nominees, all highly distinguished scientists, Stephen Rintoul appeared to be the “primus inter pares”, the best among equally qualified persons.

Stephen Rintoul has become the pre-eminent authority on the circulation of the Southern Ocean and its role in the total Earth system. He is a very active physical oceanographer and his expertise in leading major observational programs, undertaking sophisticated analysis and contributions across a wide range of fields has resulted in an outstanding international reputation and publication record. His modern and quantitative description of the meridional circulation of both the Atlantic Ocean and the Southern Ocean follows the tradition initiated by Wüst a century earlier.

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 1, 500 €.

Congratulations Steve!

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

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## 2 Response

I am very honoured to be awarded the Georg Wüst prize. My oceanographic education more or less started with Wüst. I was introduced to Wüst’s book and the core layer method in the first few weeks of graduate school. His colour plates provided a powerful illustration of the spreading patterns of the water masses of the Atlantic Ocean and are still vivid in my mind.

Wüst was a pioneer in the inference of basin–scale circulation patterns based on careful and insightful analysis of water mass properties. Much of his circulation scheme for the deep Atlantic is still valid today. He identified the southward spreading of three types of NADW and the compensating northward flow of southern origin water at intermediate and abyssal depths. He also clearly recognized the phenomenon of westward intensification of ocean currents, at all depths in subtropical latitudes, although the theoretical explanation of the phenomenon was not discovered for several more decades.

Having spent many months at sea myself, I have immense respect for what Wüst and the other scientists of the Meteor expedition were able to achieve.

Wüst was careful to use the word spreading (“Ausbreitung”) rather than flow. He was well aware of the limitations of the core layer method: the tongues did not

allow the rate of ocean currents to be inferred, or the role of advection and mixing to be distinguished. To make more progress, additional information is required.

I learned a lot about how to approach such problems from another scientist with a Germanic surname starting with the letter W: Carl Wunsch. While Wüst and Wunsch may at first seem to bring very different approaches to oceanography, both men were interested in extracting as much information as possible from hard-won observations of the ocean. My approach to oceanography continues to be inspired by the example of scientists like Wüst and Wunsch: from Wüst, an emphasis on the careful collection and analysis of the best observations we can make; from Wunsch, an appreciation for the power of combining models and observations in a quantitative and rigorous manner.

I would like to thank the Deutsche Gesellschaft für Meeresforschung, Springer and Ocean Dynamics for presenting me with the inaugural Georg Wüst prize. I would also like to thank my colleagues in Hobart and elsewhere for everything I have learned from them and for making oceanography a fun and exciting adventure. Finally, I thank my wife Lois and children Max and Jack, for their patience with my long absences. It is not easy being a sea-going oceanographer's wife or child. And there are few things more wonderful than to return and see them waiting on the wharf when the ship ties up in port.

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