

on the Atlantic Ocean by inducing substantial changes in the wind- and buoyancy-driven circulation, as well as in the site and intensity of water mass transformation, so that the strength and character of the Atlantic thermohaline circulation (THC) core are substantially influenced. The latter, for instance, could have important implications for the slowing of the THC that some climate models predict as a response to anthropogenic climate change. Also, it is now realized that climate variations associated with the NAO have a wide range of effects on North Atlantic ecosystems, including the large-scale distribution pattern and population of fish and shellfish, the production of zooplankton, plant phenology, and the growth, reproduction, and demography of many terrestrial animals.

Eos: How do you think the exponential growth in NAO research will affect long-time researchers in the field, and how do you expect that a generation of newer scientists will affect future study directions, priorities, goals, and the timeline of advancements in NAO study?

Hurrell: The strength of this book lies in its multidisciplinary content. Increasing the awareness among and the interactions between researchers in different disciplines will undoubtedly further insights into many critical issues, such as the response of ecosystems to climate variability and change. Overall, the increase in NAO research contributes to a better understanding of the different ways by which climate variability plays itself out. The rise in interest in climate prediction has led to renewed interest

in the NAO and the "rediscovery" of earlier work. The renewed recognition of the existence of this organized climate pattern, even if not periodic in time, helps organize the thinking about factors affecting future climate as well as interpreting past climate, such as revealed through examination of the proxy record.

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—JONATHAN LIFLAND, AGU Science Writer

ABOUT AGU

Shackleton Receives 2002 Maurice Ewing Medal

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Nicholas Shackleton was awarded the Ewing Medal at the AGU Fall Meeting Honors Ceremony, which was held on 8 December 2002, in San Francisco, California. The medal is given for significant original contributions to the scientific understanding of the processes in the ocean; for the advancement of oceanographic engineering, technology, and instrumentation; and for outstanding service to marine sciences.

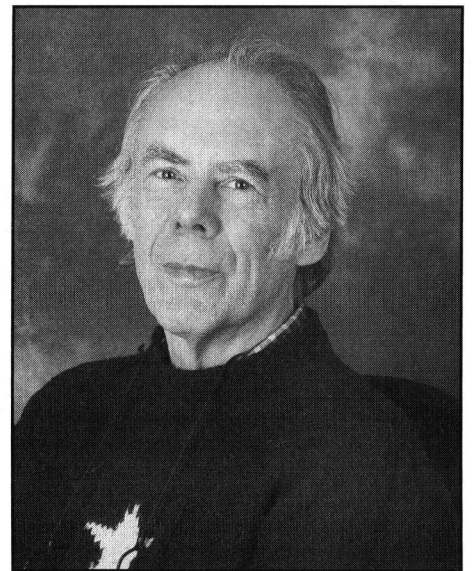
Citation

"Professor Sir Nicholas Shackleton, as he is now entitled to be known, received a Ph.D. from Cambridge University in 1967 with a thesis entitled *The Measurement of Paleotemperatures in the Quaternary Era*. As part of this work, he developed methods in stable isotope mass spectrometry that included redesigning and rebuilding a mass spectrometer to be capable of analyzing very small samples. The importance of this technical breakthrough to the nascent science of paleoceanography cannot be underestimated. However, it is through the insightful use of this technology that Nick earned his scientific 'spurs': His first big impact on our scientific thinking was in a comparison of the oxygen isotopes in shells of deep-sea benthic and planktonic foraminifera taken from the same tropical Pacific core samples. In this study, he showed that the glacial-interglacial range of isotopic values in shells of species living near the ocean surface and those that lived at great depth were very similar. From this, he deduced that the primary isotopic signal being measured must be dominated by changes in global ice volume, rather than by changes in water temperature. This elegant and simple experiment

laid to rest a long, and at times acrimonious, debate as to which of these two factors was dominant.

"In the mid-1970s, Nick was a key player in an effort to map the sea surface temperatures of the last glacial maximum (CLIMAP) and to provide a 'snapshot' of the glacial world that would be of use to global climate modelers. Not only did his efforts provide the chronostratigraphy that enabled such a reconstruction to be achieved in all the ocean basins sampled; he also helped link the land record to the terrestrial record through the study on near-shore cores containing both foraminifera and pollen. Another important outcome of this collaborative effort was a demonstration that the 'pacemaker' of long-term climate change has been changes in the Earth's orbit. Nick was a co-author with Jim Hays and John Imbrie on the seminal paper that convincingly showed the linkage between orbital and climatic changes. Without the global ice volume proxy record for which Nick was responsible, it would have been much more difficult to make this breakthrough in pursuit of a theory that had been waiting in the wings for a century or more. The establishment of the link between the Earth's orbital variations and the record of climate change has also permitted the use of calculated changes in the orbital parameters to serve as a geologic metronome that can be used to 'tune' our geologic time scale. The development of these tuned time scales is now being undertaken by Nick as well as by several other scientists. Such improvements in chronostratigraphy will open the doors to a more reliable evaluation of geochemical fluxes, rates of evolution, and rates of myriad other geologic processes.

"There is an additional characteristic of Nick's career that is only obvious by carefully considering his bibliography of published works, or from knowing him personally. He has not only been a leader in the field of paleoceanography since its very beginning, but he has also been the leading mentor of young paleoceanographers and collaborator with paleoceanog-



raphers of all ages. His advice, his support, and his willingness to share both data and ideas have enhanced the productivity and the advancement of the field as a whole. His critical eye for good ideas and good work has been evidenced in his appreciation and support of the work of others. Many of our community of paleoceanographers acknowledge that the first boost in their confidence and in their career came when Nick Shackleton took their efforts seriously.

"I think that 'Doc' Ewing would have been among the first to applaud Nick receiving this honor. In the mid-1970s, Nick was an associate researcher at Lamont-Doherty, only shortly after Doc stepped down as director. It reflects well on Lamont-Doherty and its scientists that they recognized his worth even before such recognition occurred in the University of Cambridge."

—THEODORE C. MOORE, JR., University of Michigan, Ann Arbor

Response

"Mr. President, ladies and gentlemen, the first important stimulus toward my scientific success came from the opportunity to work on some of the hundreds of deep-sea sediment cores

that were collected by Maurice Ewing. Like Rick Fairbanks, whom I am pleased to follow as recipient of the Ewing Medal, I am proud to be associated with the Lamont-Doherty Earth Observatory (admittedly having chalked up fewer years there than Rick), yet I am one who arrived too late to have been associated with Maurice Ewing himself. I did, however, have contact with two early members of Ewing's team—David Ericson and Goesta Wollin. As a researcher at the University of Cambridge, I am grateful both to Lamont and to the NSF for the fact that this collection is open to all serious researchers. Jim Hays both introduced me to Lamont and taught me to learn from the cores by looking at them ever more carefully.

"As many of you know, my life has two important strands: one as a clarinetist and one as a scientist. Both music and science are for me intensely human activities, and both have found me innumerable friends. Musical interaction can be very intense but is nonverbal, and one can find oneself surprisingly ignorant of the true personality of a fellow musician with whom one is quite close musically. In contrast, I find

that I have made many true friends through science, and the annual Fall Meeting of the American Geophysical Union brings together more of my friends than any other event in the calendar. For that reason, it is a very special privilege to be honored by AGU, and I sincerely thank the Union for this medal as well as the many friends who are present for the occasion. I especially thank Ted Moore for his generous citation, and I am very pleased that Ted is also recognized today, because I regard Fellowship of the AGU as a solid and unbiased assessment of real quality. Ted introduced me to ocean drilling aboard the *Glomar Challenger* and this, combined with several cruises on *JOIDES Resolution*, have provided one major current in my scientific career. The other has been the study of the Quaternary, initially as part of a research group based on pollen analysis and firmly situated in a university botany department.

"This curious association (I knew nothing of plants) forced me to be extremely interdisciplinary. As I have wandered between physics (the undergraduate training that enabled me to make good stable isotope measurements);

musical acoustics (that enabled me to teach John Imbrie something about the response of nonlinear systems); archaeology (tracing seasonality in the occupation of sea caves by prehistoric peoples); and time-series analysis (creating truly accurate time scales through tens of millions of years), I have transferred ideas from one subdiscipline to another in ways that probably explain why nobody succeeded in tempting me away from Cambridge.

"I have mentioned a few people by name and I would like to mention one more: I have been extremely lucky that Mike Hall has remained happy looking after my mass spectrometers for so many years. To the extent that some of my friends are also my competitors, many know that I could more readily be vanquished if Mike were not with me, and indeed more than one of my friends has tried to tempt him away. I mention no more individuals but end by thanking my very many colleagues and friends, both present and absent, for sharing the pleasure of doing satisfying science."

—NICHOLAS SHACKLETON, University of Cambridge