

program, down \$70 million; and \$584 million for research into new and emerging environmental science, including a \$24.7 million increase for the agency's Science to Achieve Results grants program.

Eos will examine the proposed budgets for individual U.S. federal science agencies in upcoming issues of the newspaper. For more information, visit <http://www.whitehouse.gov/omb/budget> and <http://www.whitehouse.gov/administration/eop/ostp>.

www.whitehouse.gov/administration/eop/ostp.

—RANDY SHOWSTACK, Staff Writer

## In Brief

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**NOAA moving forward with scientific integrity policy** The U.S. National Oceanic and Atmospheric Administration (NOAA) is moving forward with an agency-wide scientific integrity policy and has released a draft policy to all of NOAA's employees for their review and comment, NOAA administrator Jane Lubchenco said on 8 February.

The draft policy lays out guidance for scientific conduct at the agency, encourages scientists to publish their data and findings, provides whistle-blower protection, encourages NOAA scientists to be leaders in the scientific community, and explicitly states that NOAA science managers and supervisors "must never suppress, alter or otherwise impede the timely release of scientific or technological findings or conclusions," Lubchenco said at a meeting of the Union of Concerned Scientists' board of directors.

The draft policy "focuses on the conditions for creating a climate where science is

encouraged, nurtured, respected, rewarded, and protected. The policy is about creating the conditions for enabling first-rate science and guarding against attempts to undermine or discredit it. And the policy is about the key role of science in informing policy," she said.

Lubchenco said the agency will release a draft for public comment after incorporating comments from NOAA employees on the draft policy. The U.S. Department of the Interior released its scientific integrity guidelines on 1 February, following the issuance, on 17 December 2010, of White House guidelines for federal agencies.

**Nominations requested for U.S. science medals** Scientists can help recognize the contributions of colleagues by submitting nominations for the National Medal of Science and the National Medal of Technology and Innovation, which are the highest honors the president bestows in science, technology, and innovation.

The National Medal of Science, the nation's highest honor for American scientists and engineers, is given to individuals deserving special recognition for outstanding contributions to knowledge, or the total

impact of their work, in the chemical, physical, biological, mathematical, engineering, or behavioral sciences. Nominations and three letters of support must be submitted by 31 March. For more information, contact program manager Mayra Montrose at [nms@nsf.gov](mailto:nms@nsf.gov) or +1-703-292-8040, or visit <http://www.nsf.gov/od/nms/medal.jsp>.

The National Medal of Technology and Innovation, the nation's highest honor for technological achievement, is given to individuals, teams, companies, or divisions for their outstanding contributions to the nation's economic, environmental, and social well-being through the development and commercialization of technology products, processes, and concepts; technological innovation; and strengthening of the nation's technological workforce. Nominations and six letters of support also must be submitted by 31 March. For more information, contact program manager Richard Maulsby at [nmti@uspto.gov](mailto:nmti@uspto.gov) or +1-571-272-8333, or visit [http://www.uspto.gov/about/nmti/Nomination\\_Guidelines\\_page.jsp](http://www.uspto.gov/about/nmti/Nomination_Guidelines_page.jsp).

—RANDY SHOWSTACK, Staff Writer

## G E O P H Y S I C I S T S

### Owen Martin Phillips (1930–2010)

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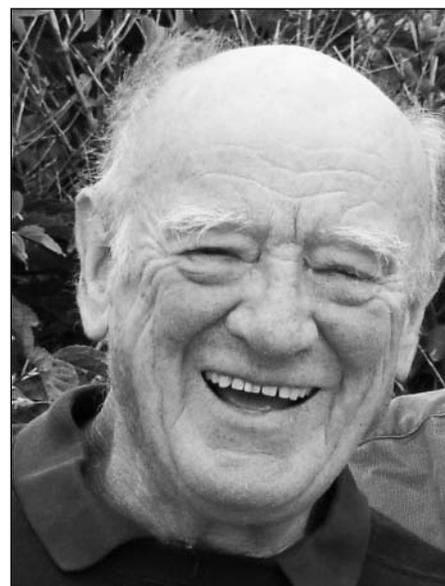
Owen Martin Phillips, a pioneer in geophysical fluid dynamics, died at home on 13 October 2010 in Chestertown, Md., at the age of 79. To his many friends and colleagues, Phillips was an inspirational and gracious person who combined a deep intellect, a lively spirit, and a generous heart that matched his passionate interest in the geophysical sciences.

Phillips was born on 30 December 1930 in Parramatta, N. S. W., Australia. In 1948 he enrolled in the University of Sydney, where he earned a B.S. in applied mathematics in 1952. That same year, he joined the Cavendish Laboratory at Cambridge University as a research student, where he began to apply to the ocean concepts in turbulent flow recently developed by Andrei Kolmogorov, G. I. Taylor, and George Batchelor. While attending the 1956 celebration of Taylor's seventieth birthday, Phillips heard Fritz Ursell declare that "the process by which ocean waves are generated by the wind cannot be regarded as known." In 1957 the *Journal of Fluid Mechanics* contained two remarkable papers offering contrasting theories for ocean wave generation. One paper,

by the applied mathematician John Miles (*J. Fluid Mech.*, 2(5), 417–445, 1957), proposed that energy transfer from the air to the sea occurs at a critical layer in the atmosphere boundary layer. The other paper, by Phillips, then 26 years old (*J. Fluid Mech.*, 3(2), 185–204, 1957), proposed that turbulent pressure fluctuations in the wind resonate with propagating ocean waves, forcing them to grow. Together these became known as the Phillips-Miles process, and it was the opening salvo in Phillips's 50-year career of innovative contributions to geophysics through fluid mechanics.

In 1957, Phillips joined the Department of Mechanical Engineering at Johns Hopkins University. He returned briefly to the United Kingdom as assistant director of research in the Department of Applied Mathematics and Theoretical Physics at Cambridge, then came back to the United States permanently in 1963 as a full professor at Johns Hopkins, becoming a U.S. citizen shortly thereafter.

By the early 1960s it became evident that further progress on upper ocean dynamics required solving the thorny problems of nonlinear wave interaction and ocean mixing. Anticipating that these topics would have broad theoretical interest as well as



Owen Martin Phillips

many practical consequences in ocean science, Phillips began to collect material for a definitive book on ocean waves and turbulence. In 1965 his monograph *Dynamics of the Upper Ocean* was awarded the Adams Prize by the Royal Society of London. Upon its official publication a year later, it quickly became a fixture on desktops throughout the oceanographic world, was republished three times, and was translated into Russian

and Chinese each twice. In 1968, Phillips was elected Fellow of the Royal Society at the age of 37. By way of decompressing after the publication of *Upper Ocean*, he published *The Heart of the Earth* in 1968, a highly original introduction to solid Earth geophysics intended for beginning scientists. Like *Upper Ocean*, *Heart* went through numerous reprintings in multiple languages and is unique in its emphasis on the scientific method as applied to geophysics—it clearly explains how geophysics is done, in addition to what is presently known about the Earth.

In addition to wave generation, the action of wind blowing over the ocean surface produces turbulence in a layer that grows with time as the result of entrainment mixing with the denser water below. In a famous laboratory experiment, H. Kato and Phillips measured the rate of entrainment in a stratified fluid as a function of the applied surface stress and derived the first scaling law for entrainment that was directly applicable to wind-induced mixing in the upper ocean, now understood to be a critical process for climate regulation (see *J. Fluid Mech.*, 37(4), 643–655, 1969).

In 1967, Johns Hopkins formed the Department of Earth and Planetary Sciences by combining the former Geology Department with faculty from the Oceanography and Mechanics departments. Phillips became its first and longest-serving chair and its main visionary. Personal accolades

during that period included the Sverdrup Gold Medal in 1974; president of the Maryland Academy of Sciences, 1979–1985; and Fellowship in the American Meteorological Society in 1980. As the second energy crisis hit the United States in the late 1970s, Phillips saw how cavalierly Americans were behaving toward an issue that directly affected their wallets and their security. In 1979 the Johns Hopkins University Press published his whimsically titled *Last Chance Energy Book*, a lively yet sobering account of the true costs and risks of energy policy negligence. It is now clear how far ahead of its time this book was.

The next chapter in Phillips's research began in the late 1980s, when he started collaborating with several Johns Hopkins geologists including Lawrence Hardie and John Ferry on the problem of how aqueous fluids infiltrate and react within permeable sedimentary and metamorphic rocks. This work culminated in 1991 in a Cambridge University Press monograph, *Flow and Reactions in Permeable Rocks*, and in 2009 in a second monograph on this subject, *Geological Fluid Dynamics: Sub-Surface Flow and Reactions*. More honors came during this period, including election to the U.S. National Academy of Engineering in 1996, Honorary Fellow of Trinity College in 1997, and finally, Fellow of AGU in 2006. In April 1998, hundreds of friends and

colleagues packed Johns Hopkins's Shriver Auditorium to hear the world's most distinguished fluid dynamics experts from around the world pay tribute to Phillips on the occasion of his retirement from active teaching duties.

Phillips was much revered for his considerable diplomatic skills and rock solid integrity as well as his professional accomplishments. On several occasions, university presidents turned to him for leadership during times of crisis. Although he was fundamentally a private man, he possessed a gracious charm and a quick sense of humor. He had limited patience for trivial things but always seemed to have time for colleagues and students. He was a person one could talk with. Apart from his own research and teaching, Phillips drew his greatest pleasures from the simple rituals in his life: family; woodworking; skipping a small sailboat across the Quissett, Mass., harbor; or just chatting with a colleague in that familiar, hallmark pose—leaning back in his chair and quietly puffing his cigar. His departure marks the end of an era, and his presence will be sorely missed.

—PETER OLSON, Department of Earth and Planetary Sciences, Johns Hopkins University, Baltimore, Md.; E-mail: olson@jhu.edu

## Honors

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**Ralph Cicerone** has been elected to a second 6-year term as president of the U.S. National Academy of Sciences beginning 1 July 2011. As president, Cicerone also serves as chair of the National Research Council, which conducts independent science, engineering, and health policy studies under a congressional charter.

The U.S. National Academy of Engineering (NAE) has elected 68 new members, including five AGU members: **Michael R. Hoffmann**, James Irvine Professor of Environmental Science, California Institute of Technology, Pasadena; former AGU

president **John Orcutt**, professor of geophysics and Distinguished Researcher, San Diego Supercomputer Center, University of California, San Diego, La Jolla; **Karsten Pruess**, senior scientist, Earth Sciences Division, Lawrence Berkeley National Laboratory, Berkeley, Calif.; **Ares J. Rosakis**, Theodore von Kármán Professor of Aeronautics and professor of mechanical engineering, and chair of the Division of Engineering and Applied Science at the California Institute of Technology; and **Mark D. Zoback**, Benjamin M. Page Professor of Geophysics, Stanford University, Stanford, Calif.

**Steven Koch** has been appointed the new director of the National Oceanic and Atmospheric Administration's (NOAA) National Severe Storms Laboratory in

Norman, Okla. Koch, who begins his new assignment in April, has been director of the Global Systems Division at NOAA's Earth System Research Laboratory in Boulder, Colo. Prior to joining NOAA, Koch was an associate professor at North Carolina State University in Raleigh and a meteorologist at NASA Goddard Space Flight Center in Greenbelt, Md.

## In Memoriam

**Thomas J. Ahrens**, 74, 24 November 2010, Fellow, Tectonophysics, 1959

**Luis Gombertoff**, 68, 13 September 2010, Space Physics and Aeronomy, 1993

**Benoît Mandelbrot**, 85, 14 October 2010, Fellow, Nonlinear Geophysics, 1986