



F. M. Spess

FRED NOEL SPIESS

1919–2006

Elected in 1985

“For significant breakthroughs in ocean engineering, including FLIP, Deep Tow, precision benthic navigation, and exotic platforms.”

BY ROBERT A. FROSCH AND WILLIAM KUPERMAN

FRED NOEL SPIESS, husband, father of five, grandfather of eight, great grandfather of three, U.S. Navy submariner, deep-sea explorer and inventor, and Professor Emeritus of Oceanography at the Marine Physical Laboratory at the Scripps Institution of Oceanography (MPL/SIO) at the University of California, San Diego, died on September 8, 2006. He was 86 years old.

Born in 1919, Fred earned his A.B. from the University of California, Berkeley, with a major in physics. From 1941 to 1946, he served in the U.S. Navy submarine force; he was awarded the Silver Star and Bronze Star for participating in 13 war patrols in enemy waters, the highest number of patrols by any individual. He remained a captain (retired) in the U.S. Naval Reserve until his death.

He left the Navy after the war “to study oceanography and make the Navy smarter,” he told a friend. He earned an M.S. in communications engineering from Harvard University (1946) and returned to the University of California, Berkeley, where he earned a Ph.D. in physics (1951). After a short stint as a nuclear engineer at Knolls Atomic Power Laboratory, Schenectady, New York, he joined MPL/SIO, where he continued to work for the rest of his career. He was director of MPL from 1958 to 1980. He spent the year 1962–1963 as acting director of SIO and was director from 1964–1965. He then was an associate director of SIO until 1980. He also served as chairman of the Scripps Graduate

Department in 1963–1964 and 1976–1977. During 1974–1975, while on leave from Scripps, he was a scientific liaison officer for the Office of Naval Research in London. He was professor of oceanography at SIO from 1961 to 1990, when he became Professor of Oceanography Emeritus. He also served from 1980 to 1988, as director of the Institute of Marine Resources, University of California.

Fred was not only a leader in oceanography, but also a deep-sea scientist, seagoing technologist, and explorer who led the development and use of new technologies for investigating the deep ocean and seafloor. He not only developed new technologies and the instruments for their implementation, but also took them to sea and used them to explore the oceans and their underlying geology. Among the instruments he developed were Deep Tow, a device that tows instruments for looking closely at the deep ocean, measuring its acoustics, and examining the seafloor, and Floating Instrument Platform (FLIP), a research platform developed by Fred (and the late Fred Fisher). Deep Tow was used in the search for the *USS Thresher*, and the platforms, vehicles, and acoustic-transponder technology he developed enabled ocean scientists to make the first accurate measurements of the deep ocean.

One example of the combination of new ocean technology and science was the discovery, under the leadership of Fred and K. McDonald, of the first superheated “black smoker” vents on the seafloor. This discovery completely revolutionized scientific models of the chemistry of seawater and introduced the idea of life-forms that could survive (perhaps even originated) in extreme conditions, temperatures as high as $\sim 400^{\circ}\text{C}$ and very high pressures. The resulting paper by Fred (the lead author) and others was published in *Science* and was awarded the Newcomb-Cleveland Prize of the American Academy for the Advancement of Science (AAAS) for the most important contribution to *Science* in 1980.

Precision measurement is central to the very definition of experimental physics. Fred led a team of scientists (including Chadwell and Hildebrand) that was able to measure directly the absolute motion of an oceanic plate. Their amazing, and reas-

suring, result was that plate motion measured on a timescale of months and years was very close to the motion measured indirectly based on marine magnetic anomalies, averages of motion over hundreds of thousands of years.

FLIP is a 700-ton research platform that can be towed to sea, upended, and ballasted with seawater. It then becomes a large spar buoy with a 300-foot draft and incredible stability in very high waves and swells. For example, in 30-meter swells, it has a vertical motion of less than 1 meter. Carrying a crew of five and a research team of 11, FLIP can operate for 30 days without resupply. Moored or adrift, it provides an extremely stable, acoustically quiet platform for ocean observation and experiments and has been particularly useful for acoustic studies. This unique vessel remains in use as “a wonderfully successful and quiet platform, which was built for virtually nothing and has enriched our knowledge of the oceans for four decades,” said Walter Munk, an emeritus professor of oceanography at Scripps Institution of Oceanography.

In 1989 Fred led the development of a wireline re-entry system to carry research instruments from the deck of a ship through 5,000 meters of seawater and into seafloor boreholes previously drilled as part of deep-sea scientific drilling programs. He continued to lead the refinement and use of this capability, with a 2001 expedition on *R/V Revelle* installing the first wireline thermistor strings in drill holes to study the circulation of fluids in the Earth’s crust.

Fred Spiess was elected to the National Academy of Engineering (NAE) in 1985 “for significant breakthroughs in ocean engineering, including FLIP, Deep Tow, precision benthic navigation, and exotic platforms.” He was a fellow of the American Geophysical Union (AGU), the Acoustical Society of America (ASA), and the Marine Technical Society (MTS). He served as president of the Ocean Science Section of the AGU and served on the Ocean Studies Board of the National Research Council. He was also a member of the Maritime Historical Society, the Society for Industrial Archaeology, the Scholia Club of Sand Diego, Sigma Xi, and Phi Beta Kappa.

Fred was awarded the John Price Wetherill Medal by the

Franklin Institute in 1965, the Distinguished Achievement Award by MTS in 1971, the Robert Dexter Conrad Award by the U.S. Navy in 1974, the Newcomb-Cleveland Prize (mentioned above) by AAAS in 1980, the Maurice Ewing Medal by AGU and the U.S. Navy in 1983, the Pioneers of Underwater Acoustics Medal by ASA in 1985, the MTS/Lockheed Award for Ocean Science and Engineering in 1985, the Secretary of the Navy Distinguished Public Service Award in 1991, and the Distinguished Technical Achievement Award of the IEEE Oceanic Engineering Society in 2006.

After 20 years as director of MPL, Fred assumed other senior management positions in the University of California system. In his eighth decade, he was asked to lead the planning of the academic program at the new University of California campus at Merced, a task he performed most effectively—a testament to his unending energy and sense of service to the academic community. Just a few months before his death, he undertook an NSF proposal to reinvent FLIP as a large-platform prototype for the future ocean observing system.

Fred resided in La Jolla, California. He was married for 60 years to the late Sally Whitton Spiess who was a tireless supporter of his work at Scripps, the Marine Physical Laboratory, UC San Diego, and the community at large. One of their last joint projects was the restoration of the historic Old Scripps Building, which was designed by Irving Gill and was one of the original buildings of the institution. Both Fred and Sally were active members of their church, the Union Congregational Church of La Jolla. Sally was the mainstay of the social ministries of the church, and Fred was moderator during 1984–1985 and financial secretary for many years. They are survived by their five children: Katherine Dallaire of Chester, New Hampshire; Mary Elizabeth De Jong of San Francisco, California; Morgen Spiess of Seattle, Washington; Helen Spiess Shamble of Santa Clara, California; and Peggy DeLigio Spiess of Eugene, Oregon; four sons-in-law; eight grandchildren; and three great grandchildren.

Fred Spiess will be remembered and missed by his many colleagues in oceanographic science, technology, and engineering. He was not only an ingenious inventor and a

pathbreaking contributor to ocean science and technology, but also a gentle, smiling, wise, and witty colleague and friend who was always ready to help. Of all his accomplishments, Fred was most proud of his students, postdoctoral students, and the three generations of ocean scientists he mentored. The words of Tom Brokaw in his book, *The Greatest Generation*, aptly apply to Fred Spiess, "...duty, honor, love of family and country, service, achievement and courage gave us the world we have today" If we continue that tradition, those values can also lead to the world we want tomorrow.