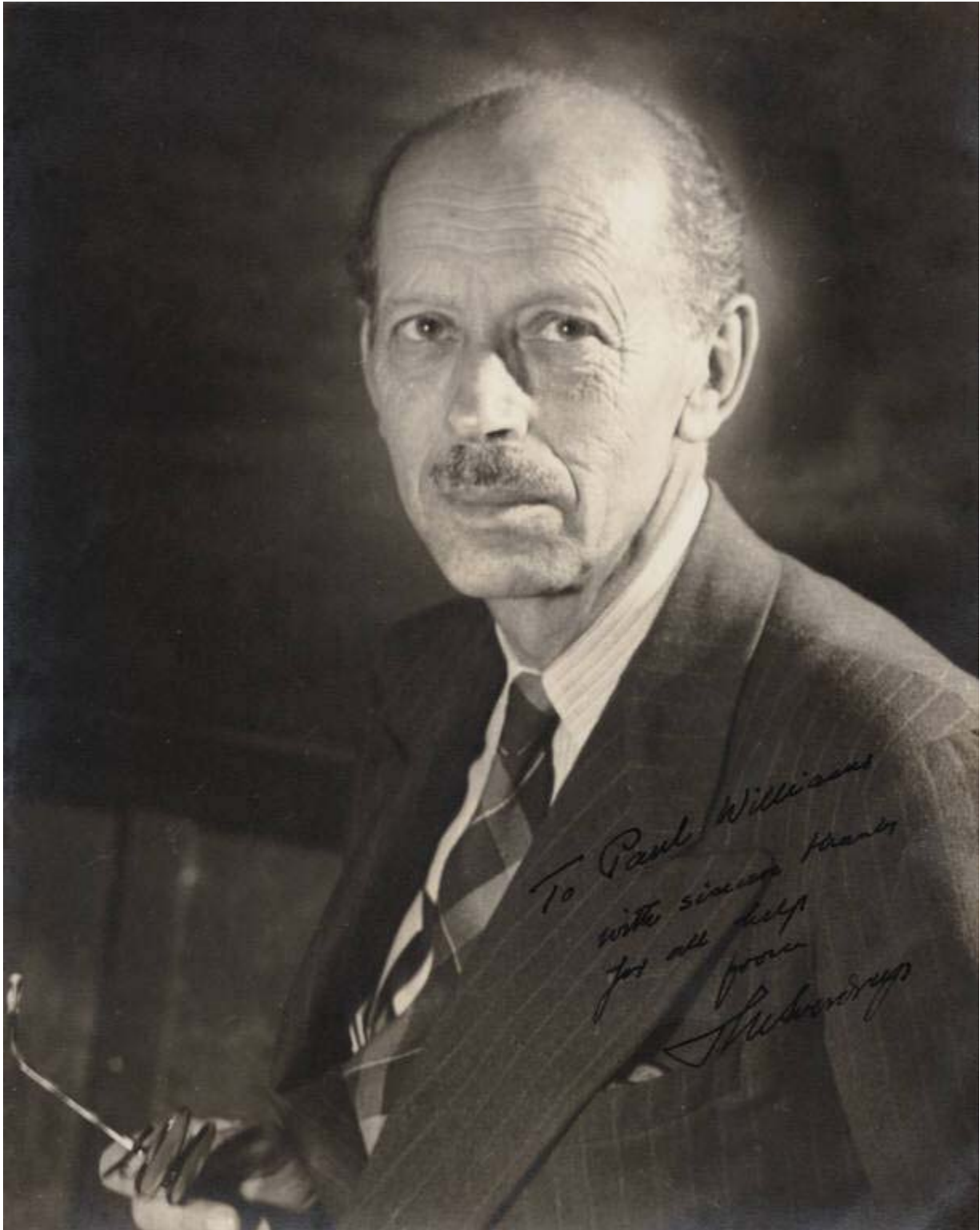


# Harald Ulrik Sverdrup Biography

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Harald Sverdrup, 1946

Harald Ulrik Sverdrup was born in Sogndal on November 15, 1888 into a distinguished Norwegian family of theologians, jurists and professors with connections to the Grieg family.

His father was Johan Edvard Sverdrup, and his mother was Maria Vollan. The Sverdrup children included Harald's brother Leif, who had a distinguished career in the United States as an engineer, founder of the St. Louis firm Sverdrup and Parcel, and a military career as an engineering general under Douglas MacArthur.

Harald Sverdrup attended the military academy in Oslo from 1907-1908. He enrolled at the University of Oslo in "Physical Geography and Astronomy" and in 1911 was offered an assistantship with the preeminent meteorologist, Vilhelm Bjerknes whose work was funded by the Carnegie Institution of Washington. Bjerknes's other students included Carl-Gustaf Rossby and Theodore Hesselberg. Sverdrup followed Bjerknes to Leipzig where he completed his dissertation on North Atlantic trade winds in 1917. His dissertation was later published in German as *Der Nordatlantische Passat*.

Wartime conditions in Germany drove the Norwegians back to Bergen, and Sverdrup accepted a post as chief scientist on Roald Amundsen's Arctic Expedition on R/V Maud. The expedition left Norway in 1918 for a three to four year cruise which stretched to seven and a half years. Sverdrup's experiences in the Arctic, and especially these years on R/V Maud formed his character. Years later he recalled the experience.

"On the Maud...I spent considerable time in theoretical studies of tidal currents. Although there were periods when I was so completely absorbed in the work that weeks and months passed quickly, there were other periods when I wondered and worried for fear I had made some elementary mistake, for fear the new investigations were suffering from some systematic errors, for fear our new instruments did not perform as they should or that my theories were unsound. In such periods there was no one to consult, no literature to look up. Thinking back now I find myself again walking the deck of our vessel, turning the questions over in my mind, trying to find some flaw in my reasoning. In the end I always had to tell myself that, right or wrong, I was doing my best and would have to go on doing so, hoping that I was on the right track."

During this seven and a half years in the Arctic, Sverdrup left the vessel twice. He lived for eight months with the Chukchi people of Siberia, an experience he later described in a book, *Hos Tundra-Folket*, published by Gyldendal in Oslo in 1938. He visited the Carnegie Institution in Washington as research fellow while awaiting repairs to R/V Maud's propeller. During this period, Sverdrup made valuable contacts with American scientists and visited many laboratories and universities including a visit to the Scripps Institution of Oceanography in 1925.

The Maud expedition was not successful in its chief aims, but Sverdrup made it a success by working up expedition observations into scientific reports that contributed to dynamic oceanography and arctic science. He was personally responsible for contributing over two thirds of the entire Maud expedition report. His work resulted in seminal publications in oceanography, earned him a reputation as a seasoned arctic scientist, and gave him important insights into the physical oceanography of currents. His later publications in both meteorology

and oceanography dealt with the application of physical principles to conditions in the sea and atmosphere including trade winds, tides, currents and circulation in the Arctic and Pacific. While he was still a young man, he was acknowledged as one of two or three scientists in the world with comprehensive knowledge in the field of oceanography.

In 1926, Sverdrup accepted a chair in meteorology at the Geophysical Institute in Bergen. On June 8, 1928 he married Gudrun Bronn in Oslo and adopted her daughter Anna Margrethe. In 1930, Sverdrup was offered a position at the Department of Terrestrial Magnetism at the Carnegie Institution which, had he accepted, would have led to an appointment as first director of the Woods Hole Oceanographic Institution. Sverdrup declined the position because he wished to complete expedition reports and work up other data in Norway. In 1931 he accepted a research professorship at the Christian Michelsens Institute and led scientists of the Wilkins-Ellsworth North Polar Submarine Expedition on Nautilus. He spent two months sledding across Spitsbergen in 1934 with H.W. Ahlmann studying boundary layer processes.

In 1936 Sverdrup was named director of the Scripps Institution of Oceanography, a position he accepted for a period of three, later extended to five, years. He was committed to turn the then remote marine station into a world class oceanographic institution. He began by convincing Robert P. Scripps to replace the institution's damaged vessel with a ship fit for sea, R/V E.W. Scripps. He significantly increased the institution's budget by convincing both Mr. Scripps and University of California President Robert Gordon Sproul to increase their annual contributions to the budget. He organized the staff to make the first comprehensive hydrographic survey of the Gulf of California. He and coauthors Richard H. Fleming and Martin W. Johnson wrote *The Oceans: Their Physics, Chemistry and General Biology*, the first modern textbook in oceanography. It became the basis for the first graduate curriculum in oceanography, developed by Sverdrup and his staff at the Scripps Institution of Oceanography. The textbook was so important that wartime security considerations delayed its publication, and after publication its export was restricted.

Sverdrup greatly enhanced the reputation of the Scripps Institution of Oceanography both within and beyond the University of California. In order to accomplish the goals he had for Scripps, Sverdrup had to rebuild the relationship between the Scripps Institution of Oceanography and the University of California. The institution had a dubious reputation both at the Berkeley and Los Angeles campuses. A great deal of the trouble was caused distance and the occasional failure of Scripps to follow the routines of the university business office and registrar, but there were also doubts expressed by UC Berkeley and Los Angeles faculty about the quality of instruction at Scripps. Sverdrup attacked this problem by keeping in close touch with University of California President Robert Gordon Sproul and by making weekly, sometimes bi-weekly trips to the Los Angeles campus. Sverdrup routinely attended faculty meetings at UCLA. He met with UCLA deans and faculty, and developed a relationship with the Department of Physics. He built a relationship with physicist Vern O. Knudsen who served as UCLA's Dean of the Graduate Division (1932-1938) and later became chancellor. He gave talks on hydrodynamics, meteorology, oceanography, and polar exploration at UCLA and to UCLA alumni at the University Club. He sent Scripps students to take UCLA courses and he kept a sharp eye on doctoral committees that often included both UCLA and SIO faculty. This

dedication to administrative and faculty duties paid off handsomely for Scripps. This was the situation in 1939.



Harald Sverdrup, 1938

The invasion of Norway in April 1940 put an end to Sverdrup's plan to return home, and on May 1, 1940 he wrote to President Sproul requesting that his temporary appointment as SIO Director become permanent. He turned his attention to organizing war work both at SIO and at

UCLA. Several of Sverdrup's colleagues from Bergen were in the United States. Carl-Gustaf Rossby, the eminent meteorologist was at MIT. Jacob Bjerknes and Jorgen Holmboe were at UCLA where they, together with Harald Sverdrup and others comprised the newly created Department of Meteorology. Sverdrup and his Norwegian colleagues were asked to establish a training school for military meteorologists at UCLA. They quickly organized a curriculum with 1940 upper division courses included Synoptic Meteorology taught by Bjerknes, Dynamic Meteorology taught by Holmboe and Interaction between the Sea and Atmosphere taught by Sverdrup.

The UCLA Department of Meteorology and the Scripps Institution of Oceanography were able to train over 1200 military weather officers between 1941 and 1945. UCLA trained the weather warriors, and a small selection of the very talented were sent to La Jolla for an additional course on surf forecasting following methods devised by Sverdrup and his graduate assistant Walter Munk. These officers did the weather forecasts and surf predictions for allied landings in Normandy, North Africa, and the South Pacific -- work credited by the American military for having saved the lives of many thousands of allied soldiers, sailors and airmen.

Many other war related research projects were undertaken in San Diego. The institution contributed research on currents relevant to efforts to rescue downed pilots in the Pacific. Research was also conducted on fouling organisms. Work on sonar, sound in the sea and subjects related to submarine warfare were undertaken by scientists working at the University of California Division of War Research (UCDWR) located in San Diego. Sverdrup was initially active at UCDWR, but his status as a citizen of an occupied country caused security clearance problems. For this reason, he applied for and received American citizenship. Despite these problems, Sverdrup was able to influence research in this field through Roger Revelle, a Scripps doctoral student and navy reserve officer, who oversaw the work of UCDWR as a naval officer in the Bureau of Ships and served as principal liaison officer between the navy and the National Defense Research Committee. By the end of the war, there was a close working relationship between the Scripps Institution of Oceanography and the U.S. Navy and the navy was determined to continue to support research in oceanography and other sciences after the war.

Beginning in 1943, Rossby, Sverdrup, Bjerknes Holmboe, and UCLA physicist Joseph Kaplan began thinking about science during the postwar period. They all agreed that wartime programs in meteorology should be preserved. Some of them, notably Rossby, felt that broad training in geophysics should be built on the foundation of meteorology. Demobilized military meteorologists should not be allowed to return to their prewar jobs, but should rather be encouraged to find professional appointments in geophysics/meteorology or use the G.I. Bill to complete their graduate education in geophysics. Sverdrup was instrumental in planning the postwar expansion of oceanography. He also participated in discussions that led to the establishment of the Institute of Geophysics at UCLA.

The war changed the Scripps Institution of Oceanography and Harald Sverdrup. In 1941 there was no military organization in the United States trained to evaluate oceanographic information from a strategic or tactical viewpoint. After the war, Sverdrup had the first graduate

oceanographic program in the U.S., a corps of well trained young oceanographers, the full support of the U.S. Navy and the University of California. He also participated in planning meetings for a significant, state funded, project to study the disappearance of the sardine from California waters, the beginnings of CalCOFI (California Cooperative Oceanic Fisheries Investigation).

Sverdrup announced his intention to leave California in 1948 to return to Norway where he became head of the Norwegian Polar Institute and professor of geophysics at the University of Oslo. Before he left La Jolla, he supported Roger Revelle as his successor as director of the Scripps Institution of Oceanography.

Sverdrup had a very active career upon his return to Norway. He returned to the Arctic, he reformed the Norwegian curriculum and chaired the 1952 Norwegian relief program in India. He received many awards and honors in his lifetime and at the time of his death in 1957, he was ranked in the first place among the world's oceanographers.

#### **References:**

Baker, D. James. "The Oceans 50th Anniversary." *Oceanography* 5, no. 3 (1992): 154-155.

Bates, Charles C. And John F. Fuller. *Americans Weather Warriors*. College Station: Texas A&M University Press, 1986.

Devik, Olaf. Minnetale Over Professor Harald U. Sverdrup holdt I den mat.-naturv. Klases mote den 11te April 1958. Oslo: Det Norske Videnskaps-Akademi I Oslo Arbok 1958, 25.

Friedman, Robert Marc. *The Expeditions of Harald Ulrik Sverdrup: Contexts for Shaping an Ocean Science*. La Jolla: Scripps Institution of Oceanography UCSD, Ritter Fellowship Lecture, 1994.

Levin, Sheldon M. "Norwegians Led the Way in Training Wartime Weather Officers," *EOS, Transactions, American Geophysical Union* 78, no. 52 (December 30, 1997), 609 et. seq. "

Mills, Eric L. "The Oceanography of the Pacific: George F. McEwen, H.U. Sverdrup and the Origin of Physical Oceanography on the West Coast of North America." *Annals of Science* 48 , no. 3 (1991): 241-266 .

Munk, Walter. "The Ocean "Bible": Reminiscences." *Oceanography* 5, no. 3 (1992), 155-157.

Namias, Jerome. "The Early Influence of the Bergen School on Synoptic Meteorology in the United States." *Pure and Applied Geophysics, Bergeron Memorial Volume*, 119 (1980/81), 491-500.

Namias, Jerome. "The History of Polar Front and Air Mass Concepts in the United States: An Eyewitness Account." *Bulletin of the American Meteorological Society* 64, no. 7 (July 1983), 734-755.

Nierenberg, William A. "Harald Ulrik Sverdrup, 1888-1957." *Biographical Memoirs of the National Academy of Sciences* 69 (1996): 3-38.

Revelle, Roger. "The Age of Innocence and War in Oceanography." *Oceans*, 1 (1969):6-16.

Revelle, Roger and Walter Munk. "Harald Ulrik Sverdrup - An Appreciation." *Journal of Marine Research* 7, no. 3 (1948): 127-131.

Sager, Gunther. "In Memoriam Prof. Dr. Harald Ulrik Sverdrup." *Zeitschrift fur Meteorologie* 11, heft 9 (September 1957): 257-259.

Sakshaug, Egil and Hakon Mosby. "A Review of Norwegian Marine Biology and Oceanography until the Second World War." Trondhjem: Trondhjem Biological Station, 1996, 38 pages. [This is an English translation of, "En Oversikt over Norsk Oseanographie Historie fram til den 2. Verdenskrig" in: *Norsk Oseanografisk Komite, Norsk Oseanografi Status og Perspektiver = Norwegian Oceanography: Status and Perspectives*, edited by Egil Sakshaug, Finn-Erik Dahl and Nils-Petter Wedege. Oslo: Norsk Oseanografisk Komite: Norges Almenivitenskapelige Forskningsrad, 1976, 209-232.

Seiwell, H.R. "Military Oceanography in World War II." *Military Engineer* 39, no. 259 (1947): 202-210.

Spjeldnaes, Nils. "Harald Ulrik Sverdrup," in: *Dictionary of Scientific Biography* 13. New York: Scribner's, 1976, 166-167.

Stadtman, Verne A., editor. *The Centennial Record of the University of California*. Berkeley: University of California

Stadtman, Verne A., editor. *The Centennial Record of the University of California*. Berkeley: University of California. Berkeley: University of California, 1968, 355.

Sverdrup, Harald U. "Fridtjof Nansen som Videnskapsmann." *Norsk Geografisk Tidsskrift*, Bind III, Hefte 5-8 (1931), 306-313.

Sverdrup, Harald U. "The Gulf of California." *International Association for the Physical Sciences of the Ocean Process-Verbaux* No. 3 (1940): 170-171.

Sverdrup, Harald U. *Hvorledes og Hvorfor med "Nautilus"*. Oslo: Gyldendal, 1931, 183.

Sverdrup, Harald U. "In Response by the Medalist, Presentation of Agassiz Medal to Harald Ulrik Sverdrup." *Science* 90 (1939), p. 27.

Sverdrup, Harald U. "The Pacific Ocean." *Science* 94, no. 2439 (September 26, 1941): 287-293.

Sverdrup, Harald U. "The Place of Physical Oceanography in Oceanographic Research," *Journal of Geophysical Research* 14 (1955): 287-294.

Sverdrup, Harald U. "Physics and Geophysics with Special Reference to Problems in Physical Oceanography." Berkeley: University of California Press, 1939, 23. [This Faculty Research Lecture was delivered March 23, 1938 at UCLA.]

Sverdrup, Harald U. "Research in Oceanography: California Scientists Study the Ocean." *California Monthly* (December 1940).

Sverdrup, Harald U. "Science Puts a New Jigsaw Together.. " *Los Angeles Times Sunday Magazine*, May 21, 1939.

Sverdrup, Harald U. "Vilhelm Bjerknes in Memoriam." *Tellus* 3, no. 4 (November 1951): 217-221.

Sverdrup, Harald U. "The Work at the Scripps Institution of Oceanography." *The Collecting Net* 12, no. 2 (July 10, 1937).

Sverdrup, Harald Ulrik, Martin W. Johnson and Richard H. Fleming. *The Oceans, Their Physics, Chemistry and General Biology*. New York: Prentice Hall, 1942, 1087.

Warren, Bruce A. "Physical Oceanography in the Oceans." *Oceanography* 5, no. 3 (1992):157-159.

Wordic, J.M. "Prof. H.U. Sverdrup." *Nature* 180 (1957): 1023.