

Administrative History of the Office of the Director, Scripps Institution of Oceanography: 1903 - 1996

Deborah Day

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SIO Office of the Director (Ritter) 1903-1923

The San Diego Marine Biological Institution, as it was first known, was established by the Marine Biological Association of San Diego in 1903 as a seaside research laboratory for the University of California's Department of Zoology by Professor William E. Ritter. Established by a select committee which included businessmen, professors and local residents, its mission was "to carry on a biological and hydrographic survey of the waters of the Pacific Ocean adjacent to the coast of Southern California; to build and maintain a public aquarium and museum; and to prosecute such other kindred undertakings as the Board of Trustees may from time to time deem it wise to enter upon."

Dr. William Emerson Ritter was a member and officer of the Association. The Association was supported by wealthy San Diegans, among them Miss Ellen B. Scripps and her brother E.W. Scripps. The purpose of the association was to secure "the foundation and endowment of a scientific institution to be known as the San Diego Marine Biological Institution."

As scientific director, Ritter was responsible not only for directing the institution's research, but also for obtaining the materiel, personnel, and financial support that made research possible. He wrote in 1905, "The only way by which such a survey can be carried on with any considerable measure of success is through an organized, salaried staff." In 1910, the staff of SIO consisted of Ritter as scientific director, two scientific assistants, a part-time librarian, the master of Alexander Agassiz, a superintendent of grounds, and six nonresident researchers. Administration of the institution was largely carried out by Ritter and included finding a permanent site in La Jolla, constructing buildings, acquiring a ship for research, and interacting with the Marine Biological Association, the University of California, and donors such as E.W. and Ellen B. Scripps.

In 1911 the San Diego Marine Biological Association arranged to transfer affairs and property of the Institution to the Regents of the University of California at Berkeley. Few details are given on exactly how the accounting transactions would be handled. However, in a letter from Charles Kofoid to William Emerson Ritter, dated December 7, 1911, Kofoid recalls a conversation with V.H. Henderson about the basis of affiliation of the San Diego Marine Biological Association with the University. Henderson, among other points suggested that: "The Comptroller of the University to be treasurer of the new corporation. It shall elect its own secretary, who will presumably be the business representative of the comptroller and handle all the funds; Mr. Henderson mentioned a revolving fund of two thousand dollars."

The relationship between the University and the station was clearly defined in the Constitution and By-Laws of the Local Board of the Scripps Institution for Biological Research. The Local Board consisted of the governor of the State, the President of the University and certain regents, the scientists then on the staff of the Institution, E.W. and Ellen Scripps, J.C. Harper, and Fred Baker. The University would control, protect and safeguard the Institution's finances including expenditures and large contributions made by donors. The Regents of the University of California at Berkeley had the final word on the appointment of the Director and Business Manager of the Institution and would retain certain "powers and jurisdiction" over the property of the Institution. Matters of scientific policy, the hiring of personnel, the management of funds were left in the hands of the Local Board of Directors. Charles Atwood Kofoid wrote a letter to William Emerson Ritter dated October 20, 1911, when Kofoid was in Berkeley helping to work out the details of the transfer of the San Diego Marine Biological Association to the University of California at Berkeley. "The matter of having this business

manager, first at least, a member also of the scientific staff, a man who might combine both business and scientific work, was discussed and seemed not impossible. In my opinion Mr. A.L. Barrows, nephew of Dean Barrows, would be an ideal man for the place -- to assume the handling of all business matters.”

In 1912 the Marine Biological Association was transferred to the Regents of the University of California and renamed the Scripps Institution for Biological Research. The name was changed because those chiefly responsible for the enterprise had become convinced that biology in the largest sense ought to be the aim of this particular foundation. The Institution's name was officially changed to Scripps Institution of Oceanography on October 14, 1925 during the first year of T. Wayland Vaughan's directorship.

From 1903-1912 the financial records of the Marine Biological Association of San Diego were kept by the Treasurer of the Association who was assisted by the Secretary of the Association in transcribing the financial details of the Association's transactions. At this time Wesley Clarence Crandall was an instructor in biology at the San Diego State Normal School who also served as Secretary of the Marine Biological Association and Captain of the R/V Alexander Agassiz.

On February 1, 1913, Wesley Clarence Crandall was named business manager to relieve Ritter of some of the administrative work. The responsibilities of the business manager at that time were to handle business matters, oversee construction of the pier and buildings, keep the buildings and grounds in repair and report to the Director. In addition to these formal responsibilities, Crandall occasionally assumed some duties of Director Ritter in his absence and undertook some scientific research for the Institution. In 1921, Crandall began to make a series of yearly reports on the Institution's affairs to Miss Scripps. A local board of directors retained "the local control of the property, and business and scientific policy."

Ritter retired in June 1923 and Thomas Wayland Vaughan was appointed the second director on February 1, 1924.

Source Materials on Ritter's tenure as Scripps Director:

Raitt, Helen and Moulton, Beatrice. *Scripps Institution of Oceanography: First Fifty Years*, The Ward Ritchie Press, 1967

Charles A. Kofoid to William E. Ritter, December 7, 1911. Charles Atwood Kofoid Papers (82-71), f. 8, p. 1.

Charles A. Kofoid to William E. Ritter, October 20, 1911. Charles Atwood Kofoid Papers (82-71), f. 8, p. 4.

SIO Office of the Director (Vaughan) 1924-1936

William Emerson Ritter retired on June 30, 1923, after serving as director of the Scripps Institution for twenty years. The search for his successor began in 1922. Ritter's first choice for the directorship was biologist Henry Bryant Bigelow of Harvard University. Ritter, in consultation with University of California President David Prescott Barrows, offered the directorship to Bigelow. Bigelow wrote to Ritter on May 23, 1922, and declined the position. The search was further complicated by questions about the mission of the Scripps Institution. In 1923, Ritter and University of California President William Wallace Campbell concluded that the Scripps Institution should be an oceanographic institution rather than one devoted broadly to biological research. Ritter suggested to President Campbell that he consider geologist Thomas Wayland Vaughan as a candidate for the directorship. In a letter from Vaughan to Ritter dated November 13, 1931, Vaughan wrote:

I think that it was you who advised the Regents of the University that the Institution after your retirement should devote its energies to oceanographic investigations and not solely to the problems of marine biology. I also think that you nominated me to the President and Regents of the University as possible successor to you.

President Campbell offered Vaughan the directorship in a telegram sent in April 1923. Vaughan accepted the position of director of Scripps Institution for Biological Research on April 30, 1923, under certain conditions.

Prior to Doctor Ritter's retirement, the Board of Regents and the President of the University of California after receiving the approval of the Scripps family, decided to convert the Institution into one for oceanographic research and having made that decision, the President of the University inquired of me if I would accept the directorship of the Institution. It was, therefore, with the understanding that the Institution should be devoted to oceanographic research that I accepted the invitation of the President of the University of California.

In a letter to President Campbell dated April 30, 1923, Vaughan wrote:

I should be glad to accept the directorship of Scripps Institution at seven thousand dollars per year if following suggestions are approved colon First term of service to begin on or about February first nineteen twenty-four semicolon Second continuance of my unfinished oceanographic studies to be part of my regular duties semicolon Third permission to devote minor part of time to completing unfinished paleontologic work bearing on oceanographic problems semicolon Fourth expenditures authorized for sufficient travel to maintain contacts with scientific institutions and individual investigators semicolon Fifth investigations at Scripps to be extended as rapidly as practicable to chemistry and bacteriology of the sea and marine sediments comma but other developments to be considered and attempted at future time if deemed desirable and circumstances are favorable semicolon Sixth efforts be made to work in coordination with other interested institutions and individuals semicolon Seventh some arrangement for publication of significant results period.

The change of emphasis from biology to oceanography directly affected Francis Bertody Sumner, a longtime Scripps faculty member and distinguished biologist who was conducting genetic research using a population of field mice. The oceanographic program made support for Sumner's ten-year research investigations on *Peromyscus* problematic. Vaughan accepted the position of director with the understanding that he could use funds hitherto allocated for the *Peromyscus* studies for physical oceanography. Campbell wrote Vaughan on October 31, 1923:

I shall do my very best to carry out the policy concerning Dr. Sumner which you and Dr. Ritter and I agreed upon as desirable last April, June, and July. I greatly prefer, on general principle, that Dr. Sumner's investigations be conducted on the campus in Berkeley. I think this is their natural locus. His work should enjoy advantages here which are not available in La Jolla. Further, the resources which provide the financial foundation for his researches at La Jolla should be available for other assignment, in accordance with the policies which you and I agreed upon last spring.

The plan to move Sumner to the University of California at Berkeley was opposed by senior members of the Berkeley Department of Zoology.

Thomas Wayland Vaughan began his term of office on February 1, 1924.

On October 19, 1925, Vaughan received notice from the University of California Board of Regents that the name of the Institution was changed from the Scripps Institution of Biological Research to Scripps Institution of Oceanography. Sumner came to the inevitable realization that in order to stay at Scripps he would have to change his investigations from biological to oceanographic studies, however, the actual change took many years. Sumner received a three year grant from the Carnegie Institution of Washington in 1927 that enabled him to synthesize and publish all the work he had done on *Peromyscus*. In 1930 Sumner finally decided to concentrate his research exclusively on fish. The question of the continuation of Sumner's genetic research

occupied a great deal of Vaughan's time during his administration and expressed his views in letters to Berkeley administrators. This created difficulties in 1930 when University of California President Robert Gordon Sproul assumed office. Sumner also resisted the candidacy of Harald Ulrik Sverdrup as Vaughan's successor in 1936.

Sumner was not Vaughan's only administrative problem. After taking office Vaughan immediately abolished the Office of the Business Manager and assumed the management of both the business and scientific work of the Institution. This decision was opposed by Wesley C. Crandall, the business manager, and it disturbed the local board of directors at Scripps. In his first report to the President of the University, dated July 1, 1924, Vaughan stated that "W.C. Crandall, former Business Manager, resigned at the end of April, after a long term of faithful service. He preferred resigning to being transferred to other work under the Office of the Comptroller of the University." Crandall became business agent for Ellen Scripps and thus continued to be involved to some degree in the Institution's affairs.

Tillie Genter arrived at Scripps Institution of Oceanography in 1919. She worked as a Secretary and Librarian during Vaughan's administration and for a number of years during Ritter's time. Staff members remember that she "always knew where everything was, carefully budgeted the meagre funds, and virtually ran the Institution in her quiet and efficient way." Miss Genter's job was described in 1926. "Besides acting as general secretary and librarian of the institution she also has charge of the Institution's accounts."

When Vaughan took office he learned that from 1903 to 1912, when Scripps Institution became a part of the University of California, it was governed by a Board of Directors, which included William Emerson Ritter and Fred Baker and the Institution's benefactors Ellen Browning Scripps, Edward Willis Scripps and Jacob C. Harper. Although the board transferred its power to the Regents of the University of California at Berkeley in 1912, it continued to meet and discuss matters of scientific policy, hiring of personnel and the management of funds. Vaughan wrote President Campbell:

After I reached La Jolla I became aware of conditions about which I knew nothing at the time I accepted the directorship of the Institution. I found out that there was an old Board of Directors of the Scripps Institution and that Dr. Fred Baker was the chairman of it. He seemed to have some feeling about the abolition of the Board. I also found out that Mr. E.W. Scripps felt that the old Board of Directors of the Institution had been badly treated by President Wheeler and he gave this as one of the reasons for his withdrawing his support of the Institution.

I also soon found out that there was distinct local antagonisms to the Scripps Institution and that I needed a certain amount of local support in order to overcome it. I might say more about the local antagonism but I think that is not necessary.

After a time I became aware of certain antagonisms to the Institution at Berkeley. I think you are probably sufficiently informed about this.

The problem was to counteract the feelings which had developed against the Institution and also to build out the contacts of the Institution and thereby try to accomplish the purpose of the Institution more efficiently than could be done without rather widely extended support. In order to accomplish this object it seemed desirable to take into the Advisory Committee all of the old members of the Board of Directors of the Institution, and try to bring into the Committee representatives of those departments in the University of California which might reasonably be expected to be interested in the work of the Institution.

The advisory board was appointed by President Campbell in consultation with Vaughan in December 1926. Meetings were held twice a year at Scripps Institution and Vaughan made a point to visit with individual members during the year. Board members generally discussed the affairs of the Institution and current research programs.

The financial affairs of the Institution took up much of Vaughan's time over the years. When he arrived at Scripps in 1924 the assured annual budget of the Institution was \$39,000 dollars per year. When he left Scripps in 1936 the annual budget was over \$80,000 dollars. Funding for the Institution's annual budget was provided by the Scripps family and the State of California. Vaughan corresponded regularly with the Scripps family seeking additional support for the Institution and to the President of the University of California requesting increased state support. Vaughan considered it very important to maintain a good ongoing relationship with the Scripps family. All requests to the family were directed to Ellen Browning Scripps's attorney, Jacob C. Harper. Vaughan wrote to Harper on October 16, 1931:

The question at issue is what role the Scripps Institution may play in an international program for the study of the oceanography of the Pacific. You know that President Sproul is willing to try to continue the increase in the income of the Scripps Institution until the Institution can play a full man's part in the larger program. What the Scripps may do is of course for them to decide. It has been my hope that they would continue their increase in the support of the Institution until the Institution will be placed on a parity with Woods Hole. It is not necessary that this should be done all at once. I bear in mind your recent letter regarding the continuation of the "step-up" and possible special contributions for roads, tennis-court, etcetera.

Ellen B. Scripps provided substantial support to the Institution from its beginning until her death in 1932. She also provided an endowment of \$400,000 dollars for the Institution. After Edward Willis Scripps's death in 1926 and the settlement of estate litigation, his son and heir, Robert Paine Scripps was in a position to provide some funds to support Scripps. Robert Scripps also served as executor of his aunt's estate. Ellen B. Scripps had three principal philanthropic interests. She provided funds for the Scripps Institution of Oceanography, the Scripps Memorial Hospital and Metabolic Clinic, and Scripps College. Miss Scripps's long term philanthropic commitments made it difficult for her to increase her support of Scripps Institution of Oceanography as Vaughan wished.

During the 1920s, some of the department heads took on administrative duties in addition to their research. W.E. Allen was in charge of microscopes and supplies, G.F. McEwen was in charge of oceanographic instruments, and Percy S. Barnhart was in charge of collections and museums. Ship operations was the responsibility of E.G. Moberg, who was "in charge of boat."

The Institution suffered financial difficulties during the depression. The University of California's economic and financial condition was grave, and appropriations and benefactions to Scripps were drastically reduced. The University of California Regents appointed Vaughan to an official administrative post for the academic year July 1, 1933, to June 30, 1934. Vaughan was to assist administrators at Berkeley in their efforts to control the University budgetary expenses at Scripps and Berkeley campuses.

Vaughan felt that it was very important to secure a vessel for the Institution that could handle long voyages. He presented his case to Robert Scripps and was reassured that as soon as the economy improved he would provide a research vessel to Scripps. Vaughan wrote to President Sproul:

The principal deficiency of the Institution as regards its progress is its lack of a vessel which can make rather long-continued voyages on the high seas. I will here report to you the substance of a conversation which I had with Mr. R.P. Scripps when I saw him in Washington on April 28. He told me that because of business uncertainty he felt that he should not at present undertake any large financial commitment. This in substance was a repetition of what he had told you and of what he had written me in one or more letters. He said, however, that it was his intention, just as soon as the present economic clouds break, to provide a research vessel of the kind contemplated. I am also in hopes that, as soon as the economic situation will permit, the step up in the income of the Scripps Institution may be resumed, and that we may realize the income which you, President Campbell, and the Scripps' have set as the goal. I also hope that we may be

able to get something more than the anticipated \$100,000 per year, so as to permit the allocation of between \$30,000 and \$35,000 per year to the operation of the vessel.

Vaughan set high goals for Scripps Institution and every year the scope of these goals broadened. He proposed to the Berkeley administration over the years that Scripps upgrade the scientific staff, secure a new oceanographic vessel from the Scripps family, build a new aquarium, repair the sea wall, pier and roads, expand the laboratory building and the library. Vaughan was successful in laying the groundwork for many of these items but was frustrated by the lack of University funding for them.

Vaughan personally contributed over \$19,000 to the Scripps Institution. The money was used to make improvements to the Institution that Vaughan felt were important. For instance, he donated money to improve the stark grounds around the director's house and on another occasion he offered to pay a raise in salary to an assistant whose workload had increased.

When Vaughan arrived at Scripps he worked to improve the pier, water tank, roads and grounds of the Institution. He was an avid gardener and gave considerable attention to the landscaping of the Scripps campus. Vaughan consulted with organizations and experts from all over the world seeking advice on the right selection, grouping and planting of suitable trees and shrubs that would flourish in San Diego. He corresponded about the matter with the Sydney Botanical Gardens, the Royal Society House, in Australia: with Guy Fleming of the Torrey Pines Park, Walter Swingle of the U.S. Department of Agriculture, Kate O. Sessions and with Elmer Drew Merrill, Dean of the College of Agriculture, University of California, Berkeley. Extra plantings sent to him from Australia and elsewhere were given to local nurseries. He also studied landscaping in his spare time and gave talks to local groups and organizations on the subject. President Campbell wrote to Vaughan:

You have indeed been most generous in making payments for the improvements of the grounds and premises at La Jolla supplemental to those which have come from the budget of the Institution and from Miss Scripps by special gift. The Regents will be duly informed of all of the facts at their meeting, on the second Tuesday in August. It is also most kind and generous of you to undertake the obligation of contributing to the improvements of the grounds at La Jolla the sum of \$750 in the academic year beginning today, as described in your letter of June the twenty-second.

Vaughan supported the scientific staff at Scripps. He wanted to continue hiring outstanding scientists from other universities and emphasized to President Campbell the importance of securing funds from the University and outside sources to do so. Funding limitations forced Vaughan to concentrate on hiring younger scientists. President Campbell wrote to Vaughan about a conversation he had with Robert Scripps concerning this topic:

I also made it clear to him that we could not secure the services of the best type of men for the staff of the Institution unless they could be assured of permanency of employment under good conditions; that is, therefore, not only desirable but really necessary that the funds from the outside sources, say from himself and his aunt, be assured for a long period of time; otherwise Director Vaughan would be fanning the air. He saw this point.

The interactions between Scripps and the Berkeley administration were somewhat strained due to the distance between the campuses. Vaughan was sometimes criticized by Berkeley for implementing plans without consultation. Vaughan perceived this strain as a stumbling block to his program. He asked the President of the University and other administrators to visit the Scripps campus more often to actually see what improvements were necessary. Vaughan disagreed with the requirements for course credits established at Berkeley and was concerned with how they would affect the hiring of student assistants at Scripps. Vaughan wrote to Dean Charles Bernard Lipman on July 31, 1926:

"Our work concerns the ocean and we are endeavoring to apply different sciences to the study of the ocean. A science cannot be applied to the interpretation of the ocean until a person understands the phenomena with which he is dealing and the knowledge cannot be acquired at Berkeley.

If it is to be made a requirement of the Graduate Division that any person must previously spend one year at Berkeley before coming to Scripps Institution that will automatically eliminate most of our graduate assistants because most of the applicants for the assistantships at the Scripps Institution are from students outside of the University of California. Naturally when we need an assistant we cannot wait a year to have that student tested at Berkeley.

During Vaughan's directorship, Scripps Institution of Oceanography scientists worked in four fields of oceanography: physiology, chemistry, biology and geology. Vaughan encouraged his scientific staff to select special areas of oceanographic study and concentrate on these research efforts exclusively. Vaughan himself spent many active years stimulating oceanographic investigations in the Pacific and was appointed by Professor Joji Sakurai to be chairman of the Pacific Science Association's International Committee on the Oceanography of the Pacific. He wrote to Harry L. Smithton on December 7, 1929:

I think that I can say with entire propriety that it is hoped that a large program of oceanographic research can be developed for the United States and that the work in both the Pacific and Atlantic oceans will be placed on a parity. There is, furthermore, the general problem of international cooperation in oceanographic research in which the United States should undertake the share appropriate to its size and power.

Up to 1927, Scripps Institution had been very successful in receiving on a continuous basis quantities of data from many different sources. Sea surface temperature records were received from the U.S. Navy, the Coast and Geodetic Survey, and the Bureau of Lighthouses. The Los Angeles Steamship Company and other steamship companies allowed Scripps to use their vessels to collect sea bottom samples. Scripps shared data taken by R/V CARNEGIE and raised funds to employ her for two years operation, however these plans were changed when R/V CARNEGIE tragically sank. Other useful data was collected on Scripps' only research vessel SCRIPPS. The Southern Edison Company established a fund in cooperation with other light and power companies to support investigations in physical oceanography and marine meteorology to carry out the extended plan on long range weather forecasting. Vaughan wrote to Captain W.E. Parker on July 12, 1927:

In reply to your remarks regarding my interest in marine bottom samples, I will say that marine sediments is my own particular specialty in oceanography. I have, as I believe you know, requested each one of the ships of the Coast and Geodetic Survey operating in the Pacific to collect as many specimens of marine bottom deposits as is practicable under the restrictions which limit the activities of the vessels. What I am trying to do is to build up a sufficient collection of marine bottom deposits to make a possible mapping of the deposits on the bottom of the Pacific Ocean off the west coast of America from Alaska to the Canal Zone. I now have at the Scripps Institution all of the samples which have been collected by the Coast and Geodetic Survey off the west coast of America beginning with the voyage of the SURVEYOR.

I have for the current season requested that the PIONEER, GUIDE, and DISCOVERER collect samples for the Scripps Institution so as to help carry out the program which I have outlined above and also make possible the study of the marine bottom deposits around the Hawaiian Islands.

Vaughan pushed to get more in depth information from the Coast and Geodetic Survey, Weather Bureau and the Hydrographic Office and in frustration he wrote to the President of the Marine Biological Laboratory, Woods Hole, Frank Rattray Lillie:

Notwithstanding the activities of certain individuals and certain good work in special lines being done by several institutions, the United States is not keeping pace with the oceanographic research in a number of other countries. I think that the trouble lies not so much with the Governmental bureaus as with the chief administrative officers of our Government and with Congress. I am going to take occasion to discuss the situation with a number of people in California and I hope that means may be devised whereby our Navy, Coast and Geodetic Survey, and Weather Bureau may do things which they are not at present able to do because of the lack of rather small appropriations for specific purposes.

In 1925 Vaughan corresponded at length with many prominent scientists around the country in his efforts to establish a journal of oceanography to be published at Scripps Institution. Vaughan's major concern was to see that data collected at Scripps be published under one cover with oceanographic data from other sources. Despite his efforts to garner support for the journal, the idea was rejected by David White of the National Research Council. Vaughan then consulted with President Campbell and proposed that the University of California Press publish the material as a series of technical and nontechnical papers as bulletins of the Scripps Institution. Vaughan wrote to President Campbell:

I concur with you in your suggestion and recommend... that the publication fund contributed by Mr. E.W. Scripps be used for the publication of the bulletins until it has been exhausted and that thereafter the University pay out of its publication fund for the publication of the bulletins of the Institution as it pays for the publication of scientific contributions from other departments of the University.

In June 1927, the President of the National Academy of Sciences appointed a Committee on Oceanography to share in a worldwide program of oceanographic research and plan the initial development of an Atlantic coast institution. The committee included William Bowie, Edwin Grant Conklin, Benjamin Minge Duggar, John Campbell Merriam, Vaughan and Chairman Lillie. As a member of the Committee on Oceanography Vaughan was instrumental in establishing Woods Hole Oceanographic Institution. He provided helpful advice, knowledge and insight into the costs and fundamentals of running an oceanographic institution. Lillie and Vaughan corresponded frequently on the subject and at one point Vaughan expressed his preference that the new Institution be established in Chesapeake instead of Woods Hole. He later conceded that Woods Hole was the better choice. In a letter to Lillie dated November 15, 1927, Vaughan recommended a list of capable men whom he felt could direct the proposed Institution. Vaughan highly recommended Henry Bigelow for the directorship and in June 1930 the Committee on Oceanography appointed Bigelow director of Woods Hole. Vaughan prepared the estimate of \$3,000,000 dollars for the Woods Hole project and after several years of consideration by the Committee on Oceanography Vaughan's estimate was adopted and the money was obtained from the Rockefeller Foundation. Vaughan had solicited foundation support for important improvements at Scripps, and the foundation agreed to appropriate \$40,000 dollars for the laboratory building addition on the premise that the laboratory accommodate visiting investigators. Vaughan was greatly disappointed. He had hoped to receive more funds from the foundation in order to keep Scripps in parity with Woods Hole. However, the foundation reasoned that Scripps did not need greater support since the Institution's income was already stabilized by the Scripps family contributions.

During his administration, Vaughan served on numerous committees and traveled extensively. He attended the Third Pacific Science Congress in Japan in 1926 and the Fourth Pacific Science Congress in Java in 1929. He attended many meetings in Washington, D.C. for the National Research Council and the National Academy of Sciences Committee on Oceanography, Storrow Fellowship Committee and chaired its Subcommittee on International Cooperation in the Study of Oceanographic Problems. In 1932-33 at the request of the National Academy on Sciences, Vaughan was asked to prepare a report on international aspects of oceanography. He went around the world visiting oceanographic institutions and became acquainted with their personnel, facilities and special interests. He served on the National Research Council's International Committee on Oceanography of the Pacific and was chairman of its Committee on Submarine Configuration and Oceanic Circulation.

Vaughan found his administrative duties at Scripps to be both challenging and tiresome. He was concerned when he could not find the time to work on his own research. Vaughan wrote to President Campbell on May 14, 1925:

I believe that I have told you that I have derived no financial advantage from coming to the Scripps Institution. In fact I have been put to greater expense than I had estimated before coming here, as the Institution did not have funds available for a number of things which I believed should be done and I have paid for these things myself. Also my scientific work has been at a decided disadvantage at the Scripps Institution and from the present drift of things the prospect is not good for recovering what I have lost.

Vaughan's own research efforts at Scripps were a continuation of earlier projects from the Geological Survey which included research on extinct and living species foraminifera and marine bottom deposits. His progress in his studies was slow and he was disappointed that he couldn't contribute more of his time and energy to them. Vaughan wrote to President Sproul on May 10, 1932:

Since I have been at Scripps Institution, although I have done a great deal on foraminifera and have been able to associate with me several people who have produced researches of value, I have not been able to do so much as I had hoped to do. Because of the conditions above stated regarding the corals and foraminifera it had been my intention to return to Washington after retirement from the Scripps Institution and to resume work on those groups of organisms. My old place at the National Museum has been held for me, and, if finances should permit, it was agreeable to the officials of the Geological Survey that I should resume in Washington researches of the kind above indicated.

We are anxious to get your mature judgement as result of a number of years as administrator in that institution as to whom might be considered a suitable person for the directorship. You are so familiar with the different persons working in the lines involved in the Scripps program that you can undoubtedly give us good comparative statements of their availability and respective qualifications.

At the time of the search for the new director Vaughan invited Professor Bjorn Helland-Hansen, director of the Geophysical Institute of Bergen, Norway, to visit Scripps. Helland-Hansen visited in October 1935 and Vaughan told the search committee that his visit made an important contribution in the selection process of his successor. Vaughan wrote to President Sproul:

[Bjorn Helland-Hansen] and I spent some time discussing the program of the Scripps Institution and possible arrangements for my successor. I am sorry that you did not see him. However, he saw Vice-President Deutsch in Berkeley and he told me that he intends, before he leaves the United States for Norway, to write a letter to Vice-President Deutsch conveying the suggestions that he has to make regarding my successor, and also expressing opinions about some features of the Institution. I was gratified to have him tell me that for dynamical oceanography the Scripps Institution is definitely the foremost place in America. He particularly praised McEwen and Moberg, and was enthusiastic about several of our younger men.

Vaughan conferred with colleagues and friends, Frank Lillie, Henry Bigelow and John Merriam on Institution affairs and the search for a director. He wrote to Bigelow:

My successor, I think, should be some one who will take the lead in going to sea and who will take the lead in the preparation of reports on the broad oceanographic features of the Pacific. From one meeting which I had with the committee appointed by the President of the University, it appeared to me that the members of the committee are sympathetic with the general purpose

which I have had in my development of the Scripps Institution, and it appeared that the committee would be favorable to making an attempt to continue the policy. Detailed adjustments within the Institution would be necessary, but I think that they should offer no great difficulty.

Vaughan provided a list of possible candidates to the search committee during the selection process and personally recommended Harald Ulrik Sverdrup as his successor. Vaughan wrote to Louderback:

If we could get a leader such as Sverdrup associated with McEwen, Moberg, and some of the younger men such as Revelle and Fleming, within a short time I think that the Institution would shoot forward more rapidly than has been possible during the formative periods.

Vaughan retired from the directorship of Scripps on August 31, 1936, and returned to Washington D.C. Sverdrup became director on September 1, 1936.

Source Materials on Vaughan's tenure as Scripps Director:

The records of the SIO Office of the Director, 1924-1936 (Vaughan) [Scripps Archives collection AC 11] consist of 3 record center cartons (3.75 linear feet) of material. The provenance of the collection has been lost and the original file arrangement disturbed. The provenance and arrangement section of the guide provides further information. The collection is divided into three series, correspondence, subject files, and speeches and reports. The correspondences series includes correspondence, minutes, budget reports, and proposals and memoranda. This series has been arranged in chronological order. Within this series, in Box 3, folders 106-121, dated 1935 to 1936 are many letters exchanged by Vaughan and the search committee concerning Vaughan's replacement. Information of the landscaping of Scripps Institution of Oceanography can be found in Box 1, f12, "Correspondence, September 1925," and Box 1, f13, "Correspondence, October 1925." Two gardening books kept by Vaughan are in his personal papers (MC 14). The subject files series includes correspondence on organizations, committees, and miscellaneous interests that document Vaughan's work with the National Research Council. The folders have been arranged alphabetically within the series. Box 3, f131, "NAS Committee on Oceanography," [1927-April, 1935], documents the By-Laws of the Woods Hole Oceanographic Institution and contains correspondence on the establishment of the eastern Institution. The speeches and reports series consist of Vaughan's published and unpublished scientific papers, speeches and reports, and is in chronological order. Folder titles with incorrect inclusive dates were annotated by the processor by using brackets in order to clarify true folder contents.

Information on the history of Scripps Institution of Oceanography during Vaughan's administration is presented in a number of books. Helen Raitt and Beatrice Moulton, *Scripps Institution of Oceanography: the First Fifty Years* (The Ward Ritchie Press, 1967), and Elizabeth Noble Shor, *Scripps Institution of Oceanography: Probing the Oceans 1936-1976* (San Diego: Tofua Press, 1978), provide excellent overviews of Vaughan's directorship. Francis Bertody Sumner's career at Scripps is discussed in his autobiography, *The Life History of an American Naturalist* (Lancaster, Pennsylvania: Jaques Cattell Press, 1945), and by William R. Provine in his article, "Francis B. Sumner and the Evolutionary Synthesis," and William Coleman and Camille Limoges, editors, *The Studies in History of Biology* (Johns Hopkins University Press, 1979). The book *Twenty-eight Years in the Life of a University President*, George A. Pettitt, University of California, 1966 provides a full account of Robert Gordon Sproul's presidency and information on the depression years read at The Sixty-ninth Commencement, 1932. Researchers should consult *Scripps Institution of Oceanography: Annual Reports of the Director* (Berkeley: The University Press), for the years that Vaughan served as director. Mrs. Shor also wrote an interesting paper on "The Role of T. Wayland Vaughan in American Oceanography" for the Third International Congress on the History of Oceanography, Mary Sears and Daniel Merriman, editors, *Oceanography The Past*, (Springer-Verlag, New York, 1980). As the Provenance and Arrangement section notes, additional records of the SIO Office of the Director, 1924-1936 (Vaughan) can be found in the **SIO Biographical Files** (Scripps Archives collection AC 5) and in the **SIO Subject Files** (Scripps Archives collection AC 6). The Scripps Archives also holds a small quantity of Vaughan's personal papers dated 1901-1951 (Scripps Archives collection MC 14), but Vaughan contributed the bulk of personal papers to the Smithsonian Archives. These have been described in a guide titled *T. Wayland Vaughan Papers, 1908-1947* and Undated, Reference Number 1050102 (Smithsonian Institution Archives, January 1979). The diaries of Mary Bennett Ritter, wife of Scripps's founder and first director, describe Ritter's meetings and negotiations with Vaughan at the time of Vaughan's appointment. The Diaries are dated 1919-1935 and are housed at the Scripps Archives (accession 81-27). Letters exchanged by Vaughan and Roger Revelle can be found in the **Roger Randall Dougan Revelle Papers, Scripps Archives** (Scripps Archives collection MC 6). These letters mainly concern Revelle's work as Vaughan's graduate assistant and student during the early 1930's. Letters from Vaughan to members of the faculty can be found in the **Denis Llewellyn Fox Papers** (Scripps Archives collection MC 10) in the Scripps Archives under "Vaughan" and under "SIO Office of the Director." The **Martin Wiggo Johnson Papers** (Scripps Archives collection MC 12) at the Scripps Archives also include a few letters exchanged by Johnson and Vaughan. The archives holds several photographs of Thomas Wayland Vaughan in its general photography collection, and the **Tillie Genter collection** (Scripps Archives collection 83-68 and 83-72) includes several photographs of Vaughan and photographs of the Scripps campus, which show the "fruits" of Vaughan's gardening efforts. Tillie Genter's budget work is described in UC Departmental Budget Form dated academic year, 1925-26. SIO Subject Files, "Budget 1924-25," Sheet B.

SIO Office of the Director (Sverdrup), 1936-1948

Scripps Institution of Oceanography director Thomas Wayland Vaughan announced his impending retirement in 1935, and University of California President Robert Gordon Sproul appointed a search committee for a new director. The committee was chaired by Berkeley geologist George D. Louderback, and members included Sproul, Charles Bernard Lipman, Dean of the Graduate Division, and University of California Vice President Monroe E. Deutsch. The committee consulted Vaughan on candidates. Vaughan invited Professor Bjorn Helland-Hansen, director of the Geophysical Institute of Bergen, Norway, to visit Scripps Institution of Oceanography in October 1935 to report on the institution and suggest candidates. Bergen was the preeminent international center for the study of physical oceanography, meteorology and geophysics at that time.

Helland-Hansen recommended Norwegian oceanographer and arctic explorer Harald Ulrik Sverdrup as a candidate for the directorship in conversation with Deutsch in Berkeley and also in his November 18, 1935 report. Vaughan enthusiastically endorsed his candidacy, and Helland-Hansen returned to Bergen in December to help persuade Sverdrup to take the position. President Robert Gordon Sproul wrote Sverdrup offering him the directorship on March 20, 1936. The appointment was to be for a period of three years, as Sverdrup could obtain leave from his position in Bergen for that term only. Sverdrup cabled his reply accepting the position on April 9, and his letter of acceptance followed the cable on April 11.

Sverdrup arrived in La Jolla, California on August 23, 1936 and assumed the directorship on September 1. The Scripps Institution of Oceanography was founded in 1903 as a marine biological station with the support of the Scripps Family. In 1912, it became part of the University of California with a broad biological program, and in 1925 it adopted an oceanographic program. In 1936 the station was in transition. It had an annual budget of \$89,000, derived from gifts of the Scripps Family matched by university funds. It had suffered a number of cutbacks during the depression. The staff numbered twenty-four including seven faculty members and two instructors. There was one ship, R/V Scripps, capable of only coastal cruises. The Director of the Scripps Institution of Oceanography reported to the President of the University of California. The institution offered graduate degrees through the Berkeley campus, but the number of graduate students was quite small.

Sverdrup intended to turn the remote marine station into an oceanographic institution, a vision endorsed by Sproul and Vaughan, if not by the entire SIO faculty. While Sverdrup found the faculty and staff talented, he considered the budget and campus facilities inadequate. He wanted to replace the institution's vessel with a modern ship. He found the curriculum weak, and he was distressed by the lack of an institution-wide research program.

On November 13, 1936, the Institution's only ship, R/V Scripps, burned at its berth. Sverdrup turned to Robert Paine Scripps who donated a schooner, R/V E.W. Scripps, to the institution in 1937. Sverdrup loaded this ship with oceanographic instruments he had brought with him from Bergen. Sverdrup persuaded Mr. Scripps to increase the family's annual subscription to the institution, and he convinced Sproul to match that figure.

Sverdrup organized regular faculty luncheons to improve communications. He decided to unify the staff and focus the institutional research program by undertaking an oceanographic expedition to the Gulf of California. He personally led the first Gulf of California Expedition in 1939 and oversaw a second expedition to the gulf the following year. These expeditions comprise the first hydrographic survey of the Gulf of California.

Sverdrup addressed the problem of strengthening the curriculum of the Scripps Institution of Oceanography by writing a book. The curriculum and the quality of graduate students at SIO had been criticized by university faculty at Berkeley and at the new southern campus, the University of California, Los Angeles (UCLA). Sverdrup's effort to revise and update the curriculum began in 1939 when he and two SIO coauthors, Richard Howell Fleming and Martin W. Johnson, began writing the first comprehensive textbook in oceanography, *The*

Oceans: Their Physics, Chemistry and General Biology. While the war delayed publication of the book until 1942, it was used as the foundation of the revised Scripps curriculum.

Sverdrup developed close contacts with UCLA beginning in 1936 in an effort to reduce the academic isolation of the Scripps Institution of Oceanography and position it within the overall academic and research program of the University of California. Sverdrup was an active member of the UCLA Academic Senate, and he gave a number of lectures on campus and at the faculty club. He got to know physicist Vern Oliver Knudsen, who served as UCLA's Dean of the Graduate Division and later became chancellor. Knudsen and Sverdrup worked closely together as SIO became administratively part of UCLA in 1938. While Sverdrup continued to have a reporting relationship with President Sproul, he also kept in close touch with Knudsen, especially on issues concerning faculty and curriculum.

By 1940, Sverdrup had made tremendous progress at Scripps. Its budget had been increased significantly. It had a new ship, and its Gulf of California expedition reports were commended by oceanographers. The curriculum had been completely revised, and the institution was attracting better quality students. Walter H. Munk came to SIO from the California Institute of Technology in 1939 to study under Sverdrup, and Roger Revelle returned to SIO from a postdoctoral year at Bergen to take up a position as instructor in 1937. Faculty and administrators at both Berkeley and UCLA remarked on the great improvements at the institution. Sverdrup also succeeded in convincing Sproul to renovate campus housing at the institution.

Sverdrup's personal situation changed dramatically on April 9, 1940 when Norway surrendered to the Nazis. He decided not to return to Norway, and his request to Sproul to extend his term as director was approved. Two of Sverdrup's Bergen colleagues, Jacob Bjerknæs and Jørgen Holmboe, were at UCLA building a department of meteorology. The three Scandinavians worked together within the University of California to develop a training program in military meteorology for American officers under the leadership of Carl- Gustaf Rossby. The three also collaborated beginning in 1943 in an effort to found an Institute of Geophysics at UCLA.

The war had a significant impact on the Scripps Institution of Oceanography. It made oceanographic expeditions to the Pacific impossible. In 1941, the institution's only research vessel was turned over to the University of California Division of War Research (UCDWR) for use in sonar research. The number of students declined as young men joined the service after 1941, and naval reserve officers on the faculty including Roger Revelle and Marston Sargent, left SIO for active service.

Sverdrup reorganized Scripps to undertake a number of research programs in support of the war effort during World War II. Scripps undertook research on fouling organisms relevant to the navy and research on oceanic currents connected with efforts to save pilots downed in the Pacific. Significant research on sonar and acoustics was undertaken at UCDWR, and several SIO faculty were involved in this effort. Sverdrup and his student Walter Munk had repeated difficulties maintaining the security clearances necessary to work at UCDWR. Sverdrup applied for American citizenship, but was still barred from visiting UCDWR and other navy-supported laboratories in San Diego. Sverdrup and Munk developed a method of predicting surf conditions and taught this to military meteorologist at courses offered at Scripps. These methods were used by the military meteorologists Sverdrup trained to predict surf conditions for Allied landings in North Africa, Normandy and in the Pacific.

The work Scripps did during the war did much to convince the U.S. Navy that it should continue to fund basic research in oceanography. The navy contracted with the University of California to undertake a program of wartime research that was continued after 1946 with funding from the Bureau of Ships and the Office of Naval Research (ONR). Sverdrup began postwar planning in 1943, convinced that geophysical research would expand significantly in the United States after the war and that funding from the navy would vastly expand opportunities for oceanographic research. Sverdrup worked closely with Roger Revelle who moved from the Navy Hydrographic Office to the Office of Naval Research in August 1946 as head of its Geophysics Branch. Their first priority was to expand the academic fleet.

Sverdrup was one of several scientists and fisheries experts who met beginning in 1946 to investigate the problem of the depletion of the sardine in California waters. They successfully lobbied the California Legislature to approve a special tax on commercial sardine landings that could support fisheries research. This was the beginning of the California Cooperative Oceanic Fisheries Investigation (CalCOFI). Beginning in October 1946, CalCOFI funds were used to support a program of oceanographic cruises to collect synoptic oceanographic data all along the coast of California. Roger Revelle facilitated the acquisition of three former government vessels which were transferred to SIO and used for the CalCOFI cruises. Scripps went from no vessels in 1944 to four vessels in 1947.

While the postwar outlook for oceanography was good, Sverdrup found this period very challenging. In 1947 he remarked in a speech celebrating the university's Charter Day,

During the year just before the war, we made a conscious effort to push the work out to sea, but since we were cut off from undertaking any work at sea during the many years of war, we have now to develop that program again nearly from scratch, and we have again to make a large part of the activity at this Institution truly oceanographic.

Sverdrup described a lack of clear lines of authority between the SIO Director's Office, the Comptroller's Office at UCLA, and the UC Office of the President. "It appears that there exists throughout the University a definite cleavage between the academic activity and the business offices of the University," he wrote in 1948. Such problems were mostly avoided at SIO "because the Director was appointed the representative of the Business Office, such that he would in the last line have the responsibility in both academic matters and business matters. An arrangement of that nature placed a considerable burden on him, but the advantages have been pretty obvious."

On January 30, 1947, Sverdrup announced that he planned to resign as director and return to Norway. During his last year at Scripps, he worked to bring Roger Revelle back to the institution from the navy, and he advocated the appointment of Revelle as his successor. By the time of Sverdrup's departure, Scripps had grown tremendously. The staff had expanded to two hundred and fifty. The budget approached a million dollars. The institution had four ships, a large number of applicants for its graduate program, and a severe shortage of laboratories and other facilities.

Sverdrup is often credited by oceanographers for transforming the Scripps Institution of Oceanography into a world-class research center and foremost American graduate school in oceanography. Many of the students who received doctorates at SIO during the Sverdrup years went on to establish new oceanographic programs and institutions. Historians have noted that it was during Sverdrup's years at SIO that the center for oceanographic research shifted from the North Sea nations to the United States.

During the Sverdrup years, the office of the director was located in the Old Scripps Building. Sverdrup was assisted by a secretary, Tillie Genter. Miss Genter kept the institution's double entry account books until 1947, when the first computer accounting records were established. Elizabeth Shor noted that "some say that the establishment was then actually run by Sverdrup's secretary Tillie Genter." Genter's workload increased significantly during the war years. In 1946, however, she became seriously ill. Tillie Genter also did the paperwork associated with registering students at the institution. SIO Librarian Ruth Ragan typed the manuscript for *The Oceans*. Carl I. Johnson served as Sverdrup's assistant in buildings and grounds.

Sverdrup and his family lived in the Director's House on the grounds of the Scripps Institution of Oceanography throughout his years as director.

Source Materials on Sverdrup's tenure as Scripps Director:

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

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

Raitt, Helen and Beatrice Moulton. *Scripps Institution of Oceanography: First Fifty Years*. San Diego: Ward Ritchie Press, 1967.

Revelle, Roger. "The Age of Innocence and War in Oceanography." *Oceans Magazine* 1, no. 3 (1969), 6-16.

Scheiber, Harry N. "California Marine Research and the Founding of Modern Fisheries Oceanography: CALCOFI's Early Years, 1947-1964." *Reports of the California Cooperative Fisheries Investigations*, 31 (1990), 63-83.

Scheiber, Harry N. "California Marine Research and the Founding of Modern Fisheries Oceanography: CALCOFI's Early Years, 1947-1964." *Reports of the California Cooperative Fisheries Investigations*, 31 (1990), 63-83.

Shor, Elizabeth N. *Scripps Institution of Oceanography: Probing the Oceans 1936 to 1976*. San Diego: Tofua Press, 1978.

SIO Office of the Director (Eckart, 1948 – 1950)

Carl Henry Eckart became SIO's fourth director in 1948. He was also director of the Marine Physical Laboratory, formerly the University of California Division of War Research, which was made a part of SIO at that time. Roger Randall Dougan Revelle was appointed SIO's first associate director in the same year. As during Vaughan's administration, some administrative duties fell to division heads. Norris Rakestraw, head of Chemical Oceanography, was in charge of student affairs. Marston C. Sargent, head of Marine Botany, was in charge of personnel. Several permanent committees were formed to formulate and implement policies regarding the budget, space, facilities, curriculum, the library, publications, public relations, seminars and lectures, student employment, and ship operations. Eckart resigned as director of SIO in 1950 to devote more time to his research.

SIO Office of the Director (Revelle, 1950 - 1961)

Roger Randall Dougan Revelle was appointed acting director in 1950, and then director in July 1951. Research continued to expand at SIO following World War II with an increase in federal funding, additions of vessels to the research fleet, and new facilities to support the growing number of graduate students. Administration, however, had remained unchanged, and plans were begun for reorganization. Revelle wrote to UC President Robert Gordon Sproul, "With the growth of the Scripps Institution and the increase in the scope of its activities, it has become increasingly apparent that our present system of organization, inherited from the pre-war years, is clumsy and undesirable." Nonacademic organization, he wrote, "following tradition, was set up in many rather small independent divisions, reporting either directly or through the Business Manager to the Director, or in the case of Accounting and Personnel, directly to state-wide officers."

Revelle proposed reorganizing nonacademic staff into five functional divisions in order to reduce the number of people reporting directly to the Director: Business, Marine Facilities, Information, Research Services, and the Library. His memo was followed by a proposal from C. Earle Short and John D. Isaacs in which they defined the purpose of the Director's Office, or Central Administration, as "to administer, foster and support the research and instructional program of the Institution." The Director's Office was to include the director, "the Chief Administrator of the Institution;" the director of the Institute of Marine Resources and the assistant to the director, both of whom would advise and assist the director "in problems of operation and management;" the assistant director-administrative; and the business manager.

In 1956, graduate education began at the new University of California at La Jolla, later renamed the University of California at San Diego. Revelle helped found the campus, and its first undergraduate college was named for him. Administrative and academic functions at SIO, which had formerly been managed by UC Berkeley and then UCLA, were transferred to UCSD. Revelle established an administrative council in 1957 to advise the director "on any matters concerning the organization and operation of the Institution, and to carry out such other duties as he may delegate to it." Jeffery Dean Frautschy was named assistant director of SIO in 1958. In September 1961, Revelle left SIO to become the first science advisor to the U.S. Secretary of the Interior.

SIO Office of the Director (Spiess, 1961 - 1965)

Fred Noel Spiess was named acting director and then appointed director three years later when Revelle resigned the position. Reorganization plans continued for both academic and nonacademic staff and were finalized by Spiess in a memo to the SIO staff in 1962. He wrote of the Director's Office:

This is one of the two major support groups in SIO and, budgetarily, is divided into three parts. The administrative office supports the Director in broad policy, budget planning and control and other central office functions. An institution-wide research subdivision supports some professors-at-large, the curatorial and diving officer positions, special developments group, and common research support facilities. The third group is the Aquarium-Museum which comes immediately under the cognizance of the Assistant Director.

SIO Office of the Director (Nierenberg, 1965 - 1992)

William Aaron Nierenberg was appointed SIO's seventh director on July 1, 1965. Nierenberg was also vice chancellor of marine science, professor of physics and geophysics, and dean of SIO's graduate program. An expert in low-energy nuclear physics and underwater sound, Nierenberg had received his doctorate at Columbia University where he worked on the Manhattan Project. He had established both the Atomic Beam Laboratory at the University of California at Berkeley and the Atomic Beam Research Group at the Lawrence Radiation Laboratory, and had held numerous domestic and international appointments. He came to Scripps Institution of Oceanography at a time of increasing public interest in the oceans. For oceanography to develop fully as a field, however, Nierenberg felt it was necessary to improve funding and to invest in engineering, equipment, buildings, ships, and personnel. While director, he supervised a five-fold increase in SIO's budget, obtaining funding from federal, state, and private sources. He expanded the graduate education program and started an applied ocean sciences program, which stressed both engineering and oceanography. Among the first to recognize the value of satellites and computers in oceanography, Nierenberg started the first use of large-scale computers aboard research vessels at SIO, obtained remote access to the CRAY Supercomputer at UCSD, and established the first remote sensing satellite facility at an oceanographic research center.

"I try to start one new project each year," he said. Among these were the JOIDES Deep Sea Drilling Project, which was operated by SIO, and NORPAX, or North Pacific Experiment, which studied the impact of the air-ocean interface on short-term climatic changes. Many new research vessels and buildings were added during Nierenberg's administration. Notable among these was R/V Melville, the first in a series of research vessels designed specifically for oceanographic work. Nierenberg increased cooperative programs with other institutions and strengthened ties with outside organizations and agencies at local, state, national, and international levels. His awareness of the scientific political climate helped keep SIO at the forefront of scientific advances.

Nierenberg, however, described his own primary role as that of advocate for the SIO faculty and staff. He believed SIO owed its success to its "hundreds of varied research programs, its bright, young, hard-working

students, and its mission-oriented laboratories." According to his successor, Edward A. Frieman, Nierenberg "brought the institution to the forefront of modern science by spearheading innovative programs, initiating new technologies for oceanography, and recruiting outstanding faculty and staff."

Working with Nierenberg during the first years of his administration were Associate Directors Fred Noel Spiess (1965-1980), Andrew A. Benson (1966-1970), and George G. Shor, Jr. (1968-1991), and Assistant Director Jeffery Dean Frautschy (1958-1980). One associate director, Shor, spent "a substantial part of his time as the day-to-day operating head of the Institution," working on ship operations, contracts and grants, as director of Sea Grant, and other research and administrative duties. The other associate director, Spiess, worked nearly full-time as director of the Marine Physical Laboratory. Assistant Director Frautschy worked nearly full-time on Coastal Commission matters and later as director of Sea Grant.

In 1973, the National Science Foundation awarded a grant to the University of California to undertake a study of "research management improvement of University and Federal funding agencies' relationships." The study included an in-depth review of SIO organization and management conducted by Arthur B. Jebens of the UCSD Management Systems staff. Jebens interviewed nearly one hundred and fifty SIO researchers, administrators and technical support staff regarding the internal organization and management of SIO, and the funding, management and interrelationships of technical support and administrative services. While the report emphasized "the major management problem areas" along with "some tentative recommendations for action", Jebens wished to point out that:

SIO is an institution with an enviable record of accomplishment and reputation that has given it a unique role in the field of oceanography. . . .The very informality of its management has been an important factor in its past accomplishments. The challenge that now faces SIO is whether it can effectively introduce a new minimal level of modern management into its operations to cope with the demands that are being placed upon it in the highly competitive and changing fields of oceanographic research. At the same time it is essential that SIO retain those qualities that gave it strength, quality and character in its early decades of operations.

Jebens described the SIO director as representing "the focal point of leadership, both technically and administratively" for SIO, and "an integral part of [the] personal and professional lives" of the SIO staff. The director's time appeared to be "fully occupied in handling the external representation matters of major consequence to Scripps and dealing with a few of the daily and weekly internal crises within Scripps." He described the Director's Office staff, however, as "only partially effective in providing support for his leadership role." Jebens recommended making several changes in the organization of administrative and technical support services. He suggested assigning two associate directors full-time to Research Management and to Academic and Student Affairs, two full-time assistant directors, one to Technical Support and Ship Operations and one to Business and Financial Management, and appropriate support staff for each role. He also recommended relocating five personnel from the UCSD main campus to SIO to create the positions of associate director--administration, business administrator, budget and contracts and grants administrator, planning administrator, and operations administrator.

After reviewing the report with Nierenberg in January 1974, Jebens reported that Nierenberg "had a very favorable general reaction to the report," although in the general management area, "he felt that the report tended to explain matters as a result of accident and historical development when in fact it resulted from subtle and behind-the-scenes management planning from the Director's Office or campus administration." Nierenberg also disliked the title of "associate director - research management" and suggested that "program or project development" would be more acceptable to researchers. He also preferred to use the title "associate director" for administration duties that cut across program areas, while "assistant director" should be used for more specialized assignments. Finally, he felt strongly that he should not delegate final authority in administrative matters, but that SIO personnel be "free to come to him for reconsideration or final decision on matters."

Several of Jebens' recommendations were implemented in the year following his Reconnaissance Report, but as Jebens pointed out, "there was no question that each of these steps included adaptations and modifications that marked them as 'Made by SIO' and not imposed by external general campus management fiat." A new position of deputy director was established as a general support role with broad institutional responsibilities. Charles J. Merdinger was appointed deputy director in 1974. Two new associate director positions were created for Administration and for Ship Operations and Technical Support. Warren S. Levin and Robert L. Fisher were appointed, respectively, to these positions. Fred N. Spiess and George G. Shor, Jr. continued as associate directors of the Marine Physical Laboratory and of Research Programs and Development. Jeffery Dean Frautschy continued in his role as assistant director. Eleanor tum Suden worked as assistant to the director for academic personnel and foreign affairs.

In addition to the associate director--administration, four other personnel were transferred to SIO "as part of an office co-location process intended to provide decentralized administrative capability at our Institution:" George Leonard Matson as business administrator, Thomas A. Murphy as operations administrator, Robert W. Oakes as budget and planning administrator, and Norman Sattler as contracts and grants administrator. The co-location project, however, did not fare as well as expected. While the relocated staff "were welcomed as additional resources to the Institution. . . a combination of personality factors and administrative developments aggravated a difficult situation." After a year, most of the new staff had returned to the main campus, including Associate Director Warren S. Levin. The Contracts and Grants office remained at SIO.

George Leonard Matson was appointed assistant director--administration in 1975. Charles J. Merdinger remained deputy director until 1979, and was succeeded by Jeffery Dean Frautschy. Fred N. Spiess and Robert L. Fisher both resigned as associate directors in 1980. Michael M. Mullin was then appointed associate director and George G. Shor, Jr. took charge of Ship Operations and Marine Technical Support. In 1982, Justin E. Langille III succeeded Jeffery Dean Frautschy as deputy director, and in 1983, George L. Matson retired and Tom Collins was appointed assistant director for Administration and Finance. Nierenberg retired in 1986, and was appointed director emeritus and professor emeritus.

SIO Office of the Director (Frieman, 1986 - 1996)

When Nierenberg retired as Scripps Director, Walter H. Munk was appointed the head of the search committee. The search committee recommended Frieman for the job with strong support from Atkinson. From July 1, 1986 until his retirement on August 31, 1996, Frieman served as the eighth director of the Scripps Institution of Oceanography, Vice Chancellor-Marine Research, UCSD and Dean of the Scripps Institution of Oceanography. His faculty appointment was Professor of Oceanography. During Frieman's tenure, Scripps was recognized by the National Research Council as the leading oceanographic institution in the United States. In 1986 Scripps had an annual budget of over sixty million dollars, more than half of which was research grants funded by the National Science Foundation (NSF) and the Office of Naval Research (ONR). It operated a fleet of six research vessels and platforms. While the institution was primarily known for research in oceanography, it also trained graduate students with funds provided mostly by the State of California.

Frieman accepted the position of director for a period of five years, but Chancellor Atkinson requested that he continue in the position in 1993, when the university experienced a fiscal crisis. Frieman's years as director were turbulent ones, encompassing the national defense buildup and SDI during the Reagan administration, followed by the collapse of the Soviet Union. These years also included the economic challenges of inflation followed by a serious recession, which impacted the budget of the State of California and its university. These events led to significant changes in national goals, especially in the area of defense and scientific research. The federal government wanted university scientific research to support national goals and improve national economic competitiveness.

The organizations that had long supported research at Scripps examined their scientific programs and made changes. ONR reexamined its mission and funded more research in littoral seas and less deep-water oceanography. Under Frieman's leadership, Scripps turned its attention toward environmental research. Frieman encouraged Scripps investigators to adopt an entrepreneurial attitude and reach out to federal agencies beyond ONR and NSF. During his directorship, many faculty and research staff members who had joined the institution at mid-century retired. Other faculty and staff opted for early retirement when the university offered incentives to reduce staff, but even with these efforts, departmental budgets were slashed in the deepest months of the recession.

Frieman initiated strategic planning and made critical new appointments focused on a new vision of the mission of the institution. He established a new research unit in atmospheric science. He strengthened Scripps programs in global climate change and positioned the institution as an honest broker of information on the controversial scientific issues of the day, including climate change and global warming. Frieman tried to expand Scripps work in satellite oceanography and space science. During his directorship, he built a new aquarium and pier. He championed funding for a new research vessel, R/V Roger Revelle. He led Scripps to create a new UCSD academic program in earth sciences leading to a bachelor's degree.

Frieman served on a number of important UCSD boards and committees. Frieman was elected a member of the Board of Trustees of the UCSD Foundation in 1987 and served on it for many years. The foundation was established to foster, encourage, and promote UCSD and to solicit, collect, acquire, manage, and invest gifts of money and property donated to UCSD. Frieman was a member of UCSD CONNECT 1987-1992. CONNECT is a UCSD/private sector local program that tries to link high-tech entrepreneurs to management skills and resources they need to succeed. Frieman was also a member from 1992 to 1995 of San Diego Dialogue, a town and gown organization chaired by William L. McGill to discuss and shape San Diego's development.

Frieman became even more active in public service during his years at Scripps. In 1991, he chaired the NASA Earth Observing System (EOS) Engineering Review Committee. EOS was a NASA program and the centerpiece of the U.S. Global Change Research Program. It was a key component in NASA's Mission to Planet Earth program. As such, it was of great interest to Frieman but also of central interest to Scripps because its scientists had participated in the earliest studies of atmospheric carbon dioxide.

The information EOS was designed to collect addressed fundamental scientific issues in climate change and global warming. In 1991 EOS was criticized for being too expensive, too late to influence policy on global change, subject to single point failure, and too narrowly structured. Some scientists suggested that Brilliant Eyes, CLIMSAT, and other programs offered better approaches to data collection than EOS. The Engineering Review Committee had to study the entire EOS system and make recommendations that addressed the criticism. The committee had a stellar membership including D. James Baker, formerly President of the Joint Oceanographic Institutions, Inc. (JOI), and Gregory H. Canavan.

The EOS Engineering Review Committee was asked to do an external engineering review of the EOS platform configuration and launch sequence. It was to analyze the budget, review technical and scientific alternatives within the program to ensure that the program would meet its scientific objectives, achieve data collection focused on global change issues, minimize annual funding requirements and technical risks, and be adaptable to changing requirements. The committee completed its report in September 1991, and Frieman testified about it before the Senate Committee on Commerce, Science, and Transportation on September 26, where he again met Senator Albert Gore Jr.

The committee recommended a complete reconfiguration of EOS-A and EOS-B into a set of smaller satellites and recommended that the program be focused more on climate change than general global change issues. NASA adopted its recommendations, and in 1992 the Committee addressed EOS funding difficulties in Congress, laying out technical alternatives to overcome the worst effects of delays. The committee continued to

be active well into 1995 reviewing changes in the EOS program and trying to assist NASA in keeping the program up to high standards despite continued delays and budgetary problems.

Frieman retired from the Scripps Institution of Oceanography, UCSD in 1996 and returned to his office at SAIC.

Source Materials on Frieman's tenure as Scripps Director:

Frieman, Edward A. "Policy for Science vs. Science for Policy: The Case of Oceanography." *Marine Technology Society Journal* 23, no. 3 (September 1989): 39-42.

Frieman, Edward A. "Scripps Institution of Oceanography, Present and Future," in: *New Directions of Oceanographic Research and Development*, edited by N. Nasu and S. Honjo. Tokyo; Berlin; New York: Springer-Verlag, 1993: 122-137.

Horgan, Denys. "New Director of Scripps reviews the Present in Order to make better Plans for the Future." *UCSD Times* 2, no. 2 (September 2-15, 1987), 1,3.

"Looking Back over the Years." *Scripps Institution of Oceanography Explorations* 3, no. 2 (1996), 28-29.

Tucker, Robert B. "Fantastic Voyage: How Scripps Explores the Limits of our Universe, An Interview with Director Edward A. Frieman." *PSA Magazine* 22, no. 10 (October 1987): 72 et. seq.

SIO Directors and their Dates of Service

William Emerson Ritter	Director September 1903 - September 1923
Francis Bertody Sumner	Acting Director September 1923 - February 1924
Thomas Wayland Vaughan	Director February 1924 - August 1936
Harald Ulrik Sverdrup	Director September 1936 - February 1948
Carl Henry Eckart	Director March 1948 - February 1950
Roger Randall Dougan Revelle	Acting Director March 1950 - July 1951; Director July 1951 - September 1961; Director on Leave October 1961 - June 1963; Director July 1963 - September 1964
Fred Noel Spiess	Acting Director October 1961 - June 1963; Director October 1964 - June 1965
William Aaron Nierenberg	Director July 1965 - June 1986
Edward Allen Frieman	Director July 1, 1986 - August 31, 1996
Wolfgang Berger	Interim Director, September 1, 1996 - December 31, 1997
Charles F. Kennel	Director, January 1, 1998 -