U.S. NAVAL OCEANOGRAPHIC OFFICE

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Formerly the U.S. Navy Hydrographic Office (name officially changed on July 10, 1962) the Naval Oceanographic Office is located about six miles from Washington, D.C. in Suitland, Maryland. From quite rude beginnings as the Depot of Charts and Instruments in 1830, its position today ranks as the largest collector, repositor, and distributor of navigational and oceanographic information in the world. The Depot of Charts and Instruments was set up as the Hydrographic Office in 1866 along the lines suggested by Matthew Fontaine MAURY, who had been Officer in Charge since 1842. In 1884, the first of many Branch Hydrographic Offices was opened to facilitate dissemination of navigational information to the Fleet.

The advent of World War II tripled the number of ships assigned to hydrographic work. These were chiefly conversions from attack cargo and fleet minesweeper types, and were instrumental in obtaining the detailed charts required by the Navy for assault landing operations. Events during and after the war demonstrated that an increased understanding of the oceanographic environment in which the Fleet operates was indispensable to modern naval warfare, and additional scientific and research functions in oceanography *per se* (as opposed to hydrography) were accordingly assigned to the Office.

Fourteen ships are presently under the technical control of the Oceanographic Office, and about 1 500 oceanographers, engineers, geologists, geographers, and draftsmen, technicians, and lithographers are employed at the Office.

Oceanographic Distribution Offices are located in Ogden, Utah, and Philadelphia, Pennsylvania. Branch Oceanographic Offices are located in Wilmington, Seattle, San Francisco, Honolulu, Yokosuka (Japan), Chicago, New Orleans, Cristobal (Panama), Baltimore, Norfolk, New York, Boston, and Galveston. Air Navigation Offices are located similarly throughout the country and the world, as are private sales agents.

Mission

The mission of the Oceanographic Office is to enhance the combat readiness of the Fleet by providing oceanographic and navigational data, determining of requirements and translating these into programs of research and related effort, and evaluating and otherwise supporting associated programs for the Navy and the Department of Defense. Although the Office is particularly responsive to Fleet needs, a considerable portion of its endeavors are in support of national programs in oceanography. This is coordinated by the Inter-Agency Committee on Oceanography (ICO) of the Federal Council for Science and Technology. Both the Chairman of the ICO, Assistant Secretary of the Navy James H. WAKELIN, and Oceanographer of the Navy and Commander of the Naval Oceanographic Office, Rear Admiral Edward C. STEPHAN (*), have stressed the reciprocity of the contributions in this cooperative enterprise. Thus, while the Navy contributes substantially to the national program, it is itself the beneficiary of information obtained by other member agencies. The national ocean-wide survey program, for example, to which the Navy contributes, provides to the Navy much needed bathymetric, acoustic, magnetic, gravimetric, and biological information from others involved in the same program.

Organization

Two major Departments comprise the nucleus of the Office the *Marine Sciences* and the *Technical Production Departments*. Under the Marine Sciences Department are the Computation, Oceanographic Analysis, Oceanographic Prediction, Marine Surveys, Navigational Science, and Oceanographic Development Divisions, as well as the Oceanographic Data Center and the Instrumentation Center. The Maritime Safety Division, responsible for issuing Notices to Mariners among its other duties, and the Nautical Chart, Aeronautical, and Lithographic Divisions make up the Technical Production Department. Providing the administrative support necessary are the Offices of Education and Training, Distribution Control, Supply, Comptroller, and the Management, Military Personnel, Civilian Personnel, and Administrative Services Offices. The Office of the Commander of the Oceanographic Office and the Planning Office complete the organizational structure.

Programs

Descriptions of the various programs being undertaken must necessarily be brief in this limited space. The impact of certain of the programs cannot therefore be appraised here; but it should be stated that all are efforts of considerable importance.

(*) Succeeded by Rear Admiral Denys W. KNOLL, on 20 August, 1963.

Forecast Central at the Oceanographic Office monitors teletype and facsimile information from ships at sea. Some of the data received in this manner are synoptic bathythermographs, sea surface temperature, wave height reports, etc. Outgoing oceanographic charts are transmitted daily via Primary Fleet Facsimile Broadcast. Additional information pertaining to ship routing, a technique developed at the Office, are also transmitted.

Techniques of forecasting, developed and improved over the years, culminated in 1958 in conception of the Anti-Submarine Warfare Environmental Prediction System (ASWEPS). ASWEPS was devised to provide the Fleet with first-hand reliable forecasts of oceanographic parameters known to affect ASW performance. Charts similar to weather maps are made available to operating ASW forces; two-hour to thirty-day environmental forecasts are converted to ranges and settings required by various sonar and weapons systems.

The growing importance of the Arctic and Antarctic regions stresses the need for oceanographic information from these areas. Especially in the Arctic, ice prediction capabilities are required for a variety of reasons, including the increasing role of the nuclear submarine. All nuclear submarine cruises have been accompanied by scientists from the Oceanographic Office, as are the majority of cruises on Navy and Coast Guard icebreakers both in the Arctic and Antarctic. The application of earth satellites to aid in certain of these observations, such as ice cover studies, is presently under investigation.

Although administered by the Oceanographic Office, funds are jointly provided by the Navy, Department of Commerce, Department of Interior, Treasury Department, the National Science Foundation, and the Atomic Energy Commission.

The Office has recently dedicated the Oceanographic Instrumentation Center (OIC), located in the same building as the Data Center at the Naval Station Annex. OIC is designed to serve all organizations participating in the oceanographic program of the nation, and will contain facilities for development, maintenance, and test and evaluation of oceanographic instruments. Under development at this time are improved shipboard wave recorders, electronic bathythermographs, a shipboard survey system, and sound velocimeters. It is the intent of the Oceanographic Office to have the Center provide advice and assistance to all activities using oceanographic instruments.

One of the greatest drawbacks to the expansion of the nation's oceanographic programs has been the chronic lack of suitable ships. Until recently, all of the Navy's ships used for this purpose have been conversions from other types. The ship construction program in TENOC (Ten Years of Oceanography — the Navy's official plan for oceanography) will replace 8 of the present 14 ships assigned to the Oceanographic Office over the next ten years. It will also add additional ships besides the replacements. (TENOC plans also for the construction by the Navy of oceanographic research ships to be contracted to various private institutions supported by the Office of Naval Research). The types of ships planned for addition to the existing oceanographic fleet are shown in the table.

Research programs are being undertaken in wave hindcasting, wave heights, thermocline prediction, thermal structure, heat budget, ice drift computation, sonar analysis, biological fouling, ship routing, synoptic analysis, harbor analog systems.

Types of additional ships planned for the Oceanographic Office

Ship Class	No.	Tonnage	Use	Complement	Remarks
AGS-193	4	4 100	Coastal Surveys	250 crew 8 scientists	2 existing ships to be replaced by this class
AGS-226	* 5	2 500	World Ocean Surveys	40 crew 34 scientists	1 existing ship to be replaced by this class
AGS-214	* 7	1 375	Military Surveys	26 crew 15 scientists	5 existing ships to be replaced by this class
AGOR-185	* 6	1 375	Applied Research	26 crew 15 scientists	First 2 ships of this class will be operational in spring, 1963

(*) Operated and manned for the Navy by Military Sea Transportation Service.

Project *Magnet* employs 2 specially configured aircraft equipped with airborne magnetometers to measure the intensity and direction of the earth's magnetic field on a complete world-coverage basis. Operation *Deep Freeze* includes oceanographic observations, bathymetry, and measurements of magnetic intensity in the Antarctic. The Office publishes oceanographic atlases, charts, tables, texts, special reports, plotting sheets, handbooks, etc. Specialized technical courses offered in the Office of Education and Training are conducted for office personnel and Naval and Marine Corps personnel, as well as for foreign officers. Foreign officers from Greece, China, Indonesia, Japan, Korea, Turkey, Burma, and Brazil have participated in these extensive programs. The Office has developed specialized survey and positioning techniques. A publication studying the application of bathymetric features to positioning and navigation will be published shortly. Developments in the field of missile range recovery techniques, navigational and geodetic satellites, radar plotting, and magnetic airborne detection have moved apace. The Office has, and is, in the forefront in development of nautical and aeronautical cartographic materials and techniques.

The above-mentioned programs are by no means exhaustive. No mention is made of the hundreds of new charts and publications of all kinds published yearly, or of data exchange programs, management functions in oceanography, planning operations, sea testing facilities, cooperative programs with industry and universities, or, indeed, of some of the outstanding problems that face us. It would be very desirable, for example, to devise some four-dimensional method of display for oceanographic forecasting techniques (latitude, longitude, depth and time). The solution to this and other problems is being attacked.

It is axiomatic in today's world that defense of our country takes priority over other goals. But the Navy takes active note of the beneficial

effect on military preparedness of oceanography performed essentially for peaceful purposes, such as sea mining fisheries research, atomic waste disposal, desalinization of sea water, and, of course, of the work done in basic research. Side effects of these programs can — and have been — of major importance to military applications of oceanography (and vice versa). The Naval Oceanographic Office looks towards the day when attempts at an understanding of the oceans will provide for the betterment of all mankind.