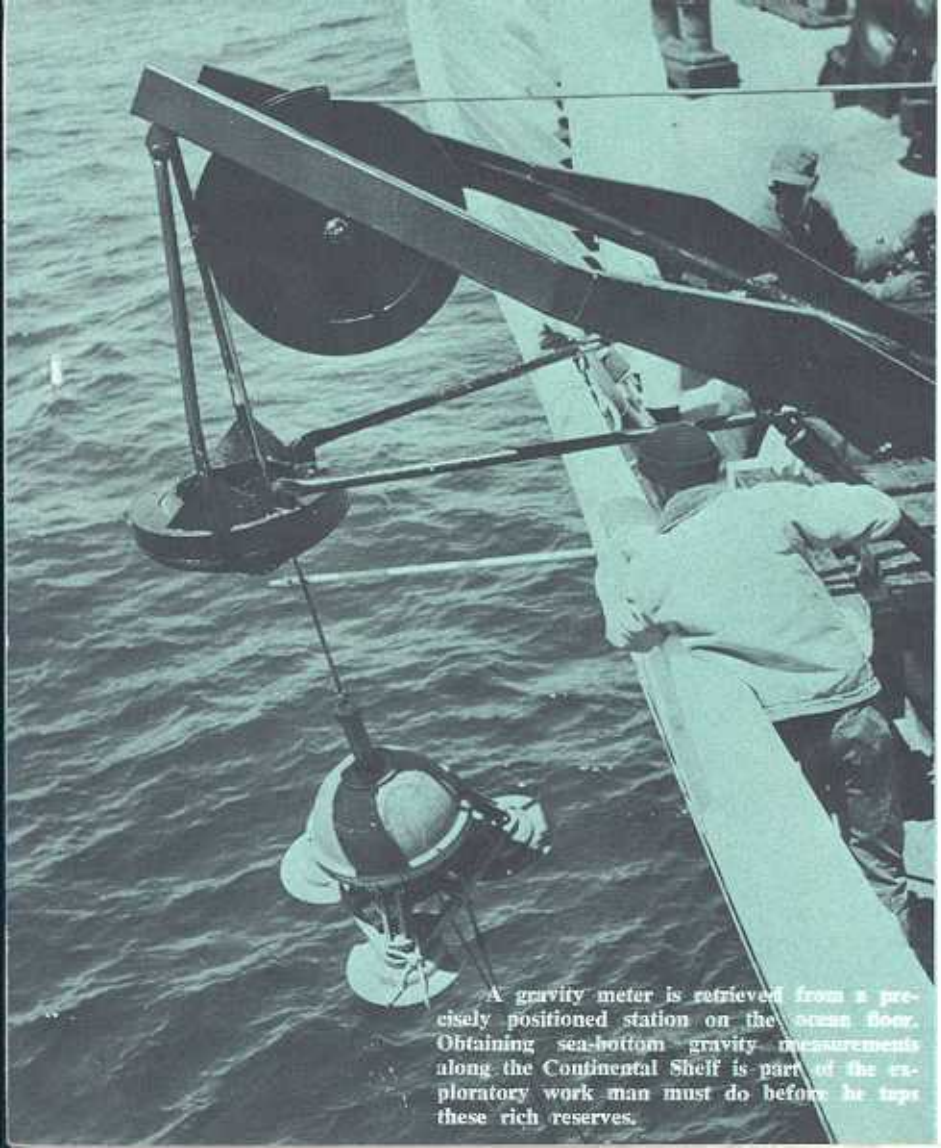
U.S. DEPARTMENT OF COMMERCE
Environmental Science Services Administration

Welcome Aboard!

USC&GSS Mt Mitchell MSS22



A gravity meter is retrieved from a precisely positioned station on the ocean floor. Obtaining sea-bottom gravity measurements along the Continental Shelf is part of the exploratory work man must do before he taps these rich reserves.

Welcome Aboard!

A message from the Captain:

On behalf of the officers and men of the USC&GSS *Mt Mitchell* I welcome you aboard. I hope your visit will be both enlightening and enjoyable.

Oceanography is one of the fastest-growing and most productive scientific activities in the world today. I hope you will leave our ship with a greater appreciation for, and knowledge of, this science of the seas.

The officers and crew of the *Mt Mitchell* are at your disposal and will gladly answer any questions concerning the ship and her activities.

Sincerely,

Edwin K. McCaffrey
CAPT. NOAA
Commanding Officer
USC&GSS *Mt Mitchell*

The USC&GSS *Mt Mitchell* is one of a fleet of oceanographic survey vessels used by ESSA, the Environmental Science Services Administration, to improve man's understanding and uses of the physical environment. Designated Medium Survey Ship (MSS) 22, the *Mt Mitchell* is operated by the Coast and Geodetic Survey and commanded by officers of the ESSA Commissioned Corps.

The class II survey ship is 231 feet long overall, with a 42-foot beam and a displacement of 1,798 long tons.* The *Mt Mitchell* was designed for hydrographic surveys and some oceanographic operations. Echo-sounding equipment aboard the *Mt Mitchell* can profile ocean depths from shoal water to 36,000 feet, or about seven miles.

The ship's position at sea can be established with a high degree of accuracy. A HI-FIX electronic positioning system is capable of fixing the ship's position within 100 feet at ranges up to 150 miles. The *Mt Mitchell* is also fitted with Loran A and Loran A/C receivers, which continuously monitor the ship's position at ranges up to 1,200 miles from shore transmitters. The ship has two radars. One is a surface search radar which provides true or relative motion reflections of prominent objects for a radius of 60 nautical miles; it is fitted with an automatic relative plotter which presents simultaneously true motion on the radar unit and relative motion on the automatic plotter. The second radar is used for buoy tracking and surveying.

Other navigation aids include a radio direction finder; an electromagnetic log, which measures ship speed and distance covered; a forward- and side-scanning sonar echo-ranging system; and a gyro compass and gyro pilot system. There are numerous communications facilities, from medium through very high frequencies. The *Mt Mitchell* also carries three electronic positioning systems for shore station installation. A single sideband transceiver and a 2-kw portable diesel generator are supplied for each shore station.

The *Mt Mitchell* carries three 25-foot survey launches, all equipped with depth-recording and electronic positioning systems for precise inshore survey operations, a 26-foot motor whaleboat, and a 24-foot motor lifeboat. A 28-foot landing craft type boat is used to ferry equipment and supplies ashore—it takes both ship and shore parties to conduct a hydrographic survey. The ship can also handle the buoys, meters, and telemetry needed to make systematic current measurements.

The ship's oceanographic capability includes trackline depth and magnetic field, surface and upper-air meteorological observations, and bathythermographic measurements down to 2,700 feet. Her on-station capability includes Nansen bottle water sampling, bottom dredging, sediment grab and core sampling, tidal measurements, and various laboratory activities. Special equipment which can be used by the ship includes the seismic reflection profiler, which shows sub-bottom geologic structure; a gravity meter that is lowered to the ocean floor to measure the strength and direction of the earth's gravity field; the thermoprobe, which measures heat flow from the earth's crust into the lower levels of the ocean; and various sea-air interaction sensors—*e.g.*, the windfinding radar and other sensors installed aboard the *Mt Mitchell* during the Barbados Oceanographic and Meteorological Experiment (BOMEX).

The primary mission of the *Mt Mitchell* is coastal hydrographic surveys, gathering information on shoreline, depths, and currents for the Coast and Geodetic Survey's nautical chart series. The *Mt Mitchell's* hydrographic work also contributes to a new series of bathymetric maps showing detailed relief of the Continental Shelf. The *Mt Mitchell* has also proved to be a very useful platform for marine environmental research. An early "test bed" for some BOMEX equipment and sensors, the *Mt Mitchell*

* In the same generation of survey ship, the class I USC&GSS *Oceanographer* and *Discoverer* are 303 feet long, with a 52-foot beam, and displace 3885 long tons; the class III USC&GSS *McArthur* and *Davidson* are 175 feet long, with a 38-foot beam, and displace 995 long tons.

was one of the experiment's on-station ships.

The *Mt Mitchell* has a range of 8,000 nautical miles and a maximum speed of 14.5 knots, and can be provisioned for 24-day periods at sea. Her ice-strengthened hull permits operations in floe ice, and she is fully air-conditioned for crew comfort and efficiency in warmer latitudes. Diesel engines delivering 1,200 shp each to the twin, controllable-pitch screws provide ship propulsion. A 200-bhp diesel engine drives a tunnel bow thruster that delivers 5,000 pounds of thrust to either port or starboard, greatly improving the low-speed maneuverability and station-keeping qualities of the ship.

The *Mt Mitchell* carries two bathythermograph winches, and two oceanographic winches with three interchangeable drums each; one drum has 30,000 feet of 3/16-inch cable, another, 12,000 feet of 5/16-inch electrical cable, and the third, 6,000 feet of 3/8-inch cable.

Like other survey ships in her generation, the *Mt Mitchell* is heavily automated. One man can monitor and control the machinery and the ship from the pilot house bridge and alter control station as well as from the centralized engine room control station. Logging of all main and auxiliary engine parameters, including a bell logger, is accomplished automatically.

The USC&GSS *Mt Mitchell* is one of three class II ships of similar design. The sister ships are the USC&GSS *Fairweather* (MSS 20) and USC&GSS *Rainier* (MSS 21). These $4.3 million survey vessels were designed by the U. S. Maritime Administration to Coast and Geodetic Survey requirements, and built by Aerojet-General Shipyards, Jacksonville, Florida. The *Mt Mitchell's* keel was laid April 2, 1965. The ship was christened November 29, 1966, and commissioned March 23, 1968. Her home port is the Coast and Geodetic Survey's Atlantic Marine Center, Norfolk, Virginia. Her sister ships are based at the Pacific Marine Center, Seattle, Washington.

Class II survey ships are customarily named for some prominent physical feature in the ship's operating area. In the case of the *Mt Mitchell*, the namesake is a 6,684-foot elevation named in the 19th century for Dr. Elisha Mitchell of the University of North Carolina, who established that the North Carolina mountain was higher than New Hampshire's Mt. Washington. Dr. Mitchell died on the mountain while conducting a resurvey in 1857. In western North Carolina near the southern end of the Blue Ridge chain, Mt. Mitchell is the loftiest mountain east of the Black Hills of South Dakota.

General Description	
Length, overall	231 feet
Length, waterline	207 feet
Beam, molded	42 feet
Draft, mean full load	13 feet 10¼ inches
Draft, mean light ship	11 feet
Displacement (mean full load)	1,798 long tons
Maximum speed	14.5 knots
Range	8,000 nautical miles
Endurance	24 days
Complement	79

A *Mt Mitchell* crewman keeps a lookout from the ship's bridge. The highly automated survey vessel's propulsion powerplant can be operated from this location as well as from the centrally controlled engine room.

Mt Mitchell officers get visual fix of ship's position by sighting on prominent features ashore. Electronic position-fixing systems are used when the vessel is out of sight of land.

Oceanography at ESSA

Buoys like these, which carry a radar reflector and beacon, are used as anchored reference points during surveys. They can also be allowed to drift freely with surface currents or dragged by a submerged drogue parachute. Current velocity is obtained by tracking the float with the ship's radar.

The Coast and Geodetic Survey and the Atlantic and Pacific Oceanographic Laboratories are the principal oceanographic elements of ESSA. The interplay between the two is readily apparent. The Coast and Geodetic Survey's systematic ocean surveys produce oceanographic, geophysical, and geological data of interest to the Laboratories' programs; and the improved understanding of the marine environment developed from research has its impact on the conduct of systematic surveys.

The data-collection platforms behind ESSA's marine description and prediction programs are the ships of the Coast and Geodetic Survey fleet, ranging in size from the 303-foot, 3800-ton *Oceanographer* and *Discoverer*, down to the small pair of wire-drag specialists, *Rude* and *Heck*.

The Atlantic Oceanographic Laboratories are headquartered in Miami, Florida. The Pacific Oceanographic Laboratories are with the Coast Survey's Pacific Marine Center in Seattle, Washington. The Laboratories include small, specialized research groups such as the Joint Tsunami Research Effort, at the University of Hawaii, and the Joint Oceanographic Research Group, at the University of Washington. The objective here has been to foster productive environmental research, both as a federal sponsor and as a member of the academic community.

The USC&GSS *Mt Mitchell* is important to both the service and research aspects of ESSA's oceanographic program. The ship's hydrographic surveys improve the safety of coastal commerce, harbor operations, and recreational craft. Her part in developing detailed bathymetry of the Continental Shelf regions will help man tap these undersea reserves. Her performance as a research platform will hasten an improved understanding of the physical environment.

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