

VESSELS SUPPORTING OCEAN EXPLORATION AND RESEARCH

Research Vessel *Thomas G. Thompson*

Ship Specifications

Length: 273 ft (Global Class)
Draft: 17 ft
Speed: 11 knots
Range: 11,300 nm
Endurance: 60 days
Berthing: 22 crew, 38 mission personnel
Commissioned: 1991
Sonar Systems: 30 kHz Kongsberg EM 302 multibeam sonar, 3.5 kHz Knudsen 3260 sub-bottom profiler, ADCP
Other Capabilities: Designed for interoperability of projects, including full ocean depth CTDs, AUVs, and deep ocean ROVs

The R/V *Thomas G. Thompson* is owned by the U.S. Navy Office of Naval Research and is operated by the School of Oceanography at the University of Washington. The *Thompson* measures 274 feet in length and draws 19 feet with a full load. Normal cruising speed for the ship is 11 knots.

Core Capabilities

The *Thompson* is equipped for multidisciplinary research projects involving large science parties. The vessel can berth up to 36 scientific personnel, 21 officers and crew, and two marine technicians. Laboratory space includes a large dry lab, wet lab, two bioanalytical labs, and a “hydro” lab. The hydro lab is where scientists typically direct any ROV and AUV operations.

The *Thompson* has three winches, three cranes, and an A-Frame for launching scientific equipment. It is also equipped with an EM 302 multibeam sonar system, sub-bottom profiler, ADCP system, and CTD/rosette. A number of ROV and AUV systems have been deployed from *Thompson*.

OER Use

Thompson is one of the primary vessels that OER has used to support major expeditions in remote regions of the Pacific Ocean. The vast majority of these expeditions were identified through the competitive peer review proposal process. A number of expeditions investigating the [Submarine Ring of Fire](#), including both ROV and AUV operations, have been staged from *Thompson*. It also supported a joint OER-NSF expedition involving sidescan sonar and camera sled operations to the [Galapagos Spreading Center](#).

Find out more about R/V *Thomas G. Thompson* at www.ocean.washington.edu/story/RV+Thomas+G+Thompson

Explore with us at OceanExplorer.NOAA.gov



VESSELS SUPPORTING OCEAN EXPLORATION AND RESEARCH

Research Vessel *Atlantis II*

Ship Specifications

Length: 274 ft (Global Class)
Draft: 19 ft
Speed: 10 knots
Range: 17,280 nm
Endurance: 60 days
Berthing: 36 crew, 24 mission personnel
Commissioned: 1997
Sonar Systems: 12 kHz Kongsberg EM122, RDI Ocean Surveyor 75 KHz ADCP
Other Capabilities: Sole operator of HOV Alvin; can host joint ROV/AUV/HOV operations

The research vessel (R/V) *Atlantis* is owned by the U.S. Navy and operated by WHOI for the oceanographic community. It is one of the most sophisticated research vessels afloat, and it is specifically outfitted for launching and servicing the *Alvin* human occupied vehicle (HOV). The ship carries a complement of 36 crew members, science technicians, deep submergence group members, as well as a scientific party of 24 men and women for as long as 60 days. The ship operates in all of the world's oceans.

Core Capabilities

The *Atlantis* is equipped with a variety of permanent tools, including a CTD Rosette; an acoustic Doppler current profiler; a Kongsberg EM122 multibeam system. The ship is specially outfitted to support HOV

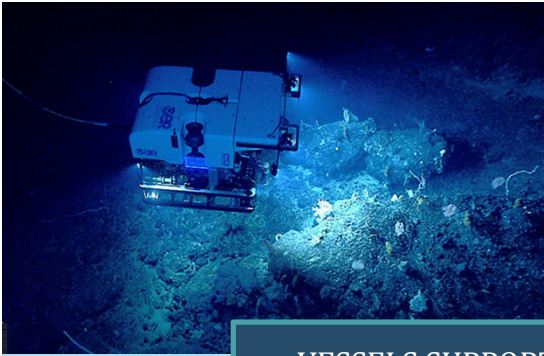
Alvin. *Alvin* carries two scientists and a pilot on dives lasting six to ten hours. Its maximum depth is 4,500 m. *Alvin*'s most recent overhaul was completed in 2013 and included an expanded sphere, additional viewports, and new lighting and camera systems. *Alvin*'s most recent overhaul was completed in 2013 and included an expanded sphere, additional viewports, and new lighting and camera systems.

OER Use

OER has conducted missions on the *Atlantis* in support of the Extended Continental Shelf (ECS) project, partnership projects with the Bureau of Ocean Energy Management, and projects funded through OER's Federal Funding Opportunities. Examples of OER supported expeditions on the *Atlantis* include: [2014](#) and 2012 ECS mapping; 2006 [Expedition to the Deep Slope](#); 2004 [Gulf of Alaska](#); 2003 [Mountains in the Sea](#); 2003 [Windows to the Deep](#); 2002 [Galapagos Rift](#); 2002 [Exploring Alaska's Seamounts](#).

Find out more about R/V *Atlantis II* at www.whoi.edu/main/ships/atlantis

Explore with us at OceanExplorer.NOAA.gov



VESSELS SUPPORTING OCEAN EXPLORATION AND RESEARCH

NOAA Ship *Okeanos Explorer*

Ship Specifications

Length: 224 ft (Ocean Class)
Draft: 17 ft
Speed: 10 knots
Range: 9600 nm, 45° N to 45° S
Endurance: 40 days
Berthing: 26 crew, 20 mission personnel
Commissioned: August 13, 2008
Sonar Systems: Kongsberg EM 302 multibeam sonar, Knudsen 3260 sub-bottom profiler, Kongsberg EK-60 single-beam sonar
Other Capabilities: Cutting-edge telepresence technology and fully integrated with ROV *Deep Discoverer*

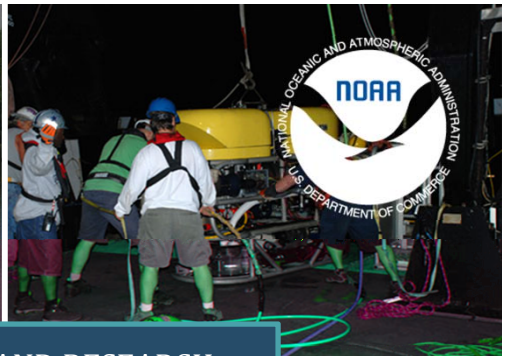
Okeanos Explorer, “America’s Ship for Ocean Exploration,” is on a global mission to explore the depths of Earth’s last frontier. Operated by the National Oceanic and Atmospheric Administration (NOAA), the *Okeanos Explorer* is the only federal vessel dedicated to collaborative, systematic exploration of unknown and poorly known areas of our world ocean. Relying on the inputs of a [collaborative process](#) with partners and stakeholders, expeditions are planned and executed in priority deep ocean areas to provide a foundation of standards-based, publicly accessible [data](#) that meets the current and future needs of as many stakeholders as possible, and catalyze follow-on research and management activities. The [telepresence](#)-enabled vessel operates with an open, collaborative participation model that enables interested scientists, students and marine resource managers to participate in real-time from shore, and allows broader audiences to follow the exploration live online.

Core Capabilities

Okeanos utilizes cutting edge deep-water technologies to explore and characterize unknown or poorly known areas, features, and ocean phenomena as deep as 6000 m. *Okeanos* is equipped with a Kongsberg EM 302 multibeam sonar, a Knudsen 3260 sub-bottom profiler, and a Kongsberg EK-60 single-beam sonar. During mapping operations the sonars continuously record seafloor bathymetry, seabed backscatter, and water column backscatter data, collecting valuable environmental intelligence around the clock including during transit operations. *Okeanos* also uses a CTD rosette carousel that can be outfitted with additional sensors to characterize the water column. [ROV Deep Discoverer \(D2\)](#), is OER’s dedicated, fully integrated, 6,000 m capable dual-body ROV system. *D2* is outfitted with two HD video cameras, a downward-looking still camera, a CTD, and four specially designed adjustable swing arms with LED lights to attain optimal lighting. *D2* also has a 200 lbs scientific payload for additional sensors. During operations the ship’s VSAT satellite dish allows the ship to stream up to 20 mbps of data and information (including three HD video feeds) to shore, enabling scientists to join the exploration from anywhere with an internet connection.

Find out more about NOAA Ship *Okeanos Explorer* at oceanexplorer.noaa.gov/okeanos

Explore with us at OceanExplorer.NOAA.gov



VESSELS SUPPORTING OCEAN EXPLORATION AND RESEARCH

NOAA Ship *Nancy Foster*

Ship Specifications

Length: 187 ft (Regional Class)

Draft: 11.2 ft

Speed: 10.5 knots

Range: 3,500 nm

Endurance: 15 days

Berthing: 22 crew, 15 mission personnel

Commissioned: May 10, 2004

Sonar Systems: Kongsberg EM 710, Reson 7125 SV2, Teledyne RDI Ocean Surveyor 150kHz ADCP

Other Capabilities: Designed for interoperability of projects including mapping missions, CTD work, AUVs, and small ROVs

NOAA Ship *Nancy Foster* is a multi-purpose vessel operated by the National Oceanic and Atmospheric Administration. It has a 15 day endurance and a range of 3,500 nautical miles with an 10.5 knot cruising speed. The ship carries a complement of 22 crew members, technicians, and engineers as well as a up to 15 members of a scientific party.

Core Capabilities

Operations include the characterization of habitats and fauna in coastal waters, bathymetric surveys, physical and chemical oceanography studies, maritime heritage surveys, and pollution assessments. The vessel employs state of the art navigation, propulsion, and mission systems resulting in high quality and efficient data collection through multibeam sonars, split beam sonars, and a vast array of oceanographic and atmospheric sensors. Additional capabilities include water and sediment sampling, net towing, sub-bottom

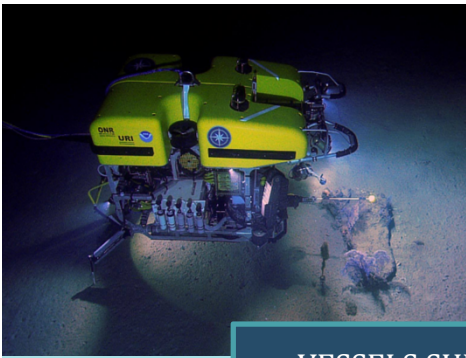
profiling, diving with air and NITROX, AUV and ROV support with dynamic positioning, small boat operations, and buoy servicing. In 2015, the Foster was outfitted with a new Kongsberg EM 710 multibeam system which will allow mapping operations to be conducted to depths up to 2,000 meters.

OER Use

OER has used *Foster* to support numerous expeditions related to the competitive peer review process and BOEM-USGS-OER partnership in the Western Atlantic and Gulf of Mexico. Given its size and capabilities, *Foster* operations are relatively shallow in comparison to *Brown* and *Okeanos Explorer*. Most OER-sponsored *Foster* expeditions involve smaller ROVs and multibeam mapping in shallow waters. Example s of Foster expeditions include: 2012 [Mid-Atlantic Canyons](#), [2009](#) and [2008](#) joint BOEM-USGS-OER Lophelia Expeditions in the Gulf of Mexico; and 2006 [South Atlantic Bight](#). OER also provided base funding in the early 2000s during the ship's conversion to increase the ship's exploration capabilities.

Find out more about NOAA Ship *Nancy Foster* here: www.moc.noaa.gov/nf/

Explore with us at OceanExplorer.NOAA.gov



VESSELS SUPPORTING OCEAN EXPLORATION AND RESEARCH

Exploration Vessel *Nautilus*

Ship Specifications

Length: 211 ft (Ocean Class)
Draft: 14.75 ft
Speed: 10 knots
Range: 13,000 nm, 45° N to 45° S
Endurance: 40 days
Berthing: 17 crew, 31 mission personnel
Commissioned: August 13, 2008
Sonar Systems: Kongsberg EM 302 multibeam sonar, Knudsen 3260 sub-bottom profiler, an EdgeTech 4200 MP CHIRP side-scan sonar
Other Capabilities: Integrated telepresence technology, a complete production studio and fully integrated with ROVs *Hercules* and *Argus*

Ocean Exploration Trust's vessel, E/V *Nautilus*, is one of only two dedicated ships of exploration in the world. The ship is outfitted for a two-tiered approach to exploration. First the team uses a multibeam sonar system to map unknown areas of the seafloor. Once the data is analyzed and targets are chosen, they use remotely operated vehicles (ROVs) to collect video footage and a variety of samples.

Core Capabilities

The *Nautilus* Exploration Program focuses on three main areas of marine science: biology, geology, and archeology. No matter what area a particular cruise focuses on, the *Nautilus* is ready for whatever they may come across in the depths of the sea. Cutting-edge telepresence technology enable the ship to broadcast

high definition video from the seafloor to anyone on shore in near-real time.

Nautilus's sonar systems can efficiently map the seafloor in waters up to 7,000 meters deep. The EM302 multibeam sonar collects bathymetric data, surface sediment characteristics, and water column data, while the Knudsen 3260 collects data on the geological structure beneath the seafloor. The data these sonars collect help identify areas or features of interest for ROV dives. The dual body 4,000 m ROV system, ROVs *Hercules* and *Argus*, is the workhorse of the *Nautilus* Exploration Program. *Hercules* is equipped with two manipulator arms for collecting samples and recovering artifacts.

OER Use

The *Nautilus* operates similar tools and technology as NOAA Ship *Okeanos Explorer*. Through their global reach, robust internship and fellowship programs, and extensive outreach and education efforts, the *Nautilus* Program is a complementary investment in the future of understanding our largely unknown ocean, and in the development of emerging ocean leaders, scientists, policymakers and educators.

Find out more about Exploration Vessel *Nautilus* at www.NautilusLive.org

Explore with us at OceanExplorer.NOAA.gov



VESSELS SUPPORTING OCEAN EXPLORATION AND RESEARCH

NOAA Ship Ronald H. Brown

Ship Specifications

Length: 274 ft (Global Class)
Draft: 17 ft
Speed: 11 knots
Range: 11,300 nm
Endurance: 60 days
Berthing: 29 crew, 31 mission personnel
Commissioned: July 19, 1997
Sonar Systems: 12 kHz Kongsberg EM122, RDI Ocean Surveyor 75 KHz ADCP
Other Capabilities: Designed for interoperability of projects including full ocean depth CTDs, AUVs, and deep ocean ROVs

NOAA Ship *Ronald H. Brown* is a largest oceanographic research vessel in the NOAA fleet. Operated by NOAA's Office of Marine and Aviation Operations, the *Brown* is staffed with 29 crew and can carry up to 31 scientists. It has a 60 day endurance and a range of 11,300 nautical miles with an 11 knot cruising speed. Since being commissioned in July 1997, the *Brown* has worked in every ocean basin.

Core Capabilities

Numerous on-board instruments are used to collect and assess scientific data from above and below the ocean surface. The *Brown* is equipped with a variety of permanent tools, including a CTD/Rosette; an acoustic Doppler current profiler; a series of wet and dry

laboratories; and a full ocean depth Kongsberg EM122 multibeam system for seabed mapping. The *Brown* also has a sophisticated suite of meteorological sensors that continuously collect data while the ship is underway. The *Brown* also has a series of cranes, winches, and a rear mounted A-frame that accommodate heavy scientific gear such as remotely operated vehicles, benthic landers, moorings, and buoys.

OER Use

OER has conducted expeditions on the *Brown* in support of Extended Continental Shelf mapping, the joint BOEM-USGS-OER partnership, and the competitive peer review proposal process. Examples of OER expeditions staged from the *Brown* include: [2013 Mid-Atlantic Canyons expedition](#), 2010 [post-Deepwater Horizon investigations of Gulf of Mexico deepwater corals](#); 2007 [Gulf of Mexico Chemosynthetic Communities](#); 2004 [Return to the Titanic](#); 2004 [Mountains in the Sea](#); 2003 [Puerto Rico Trench](#); [2003 U-166](#); 2003 [Gulf of Mexico Deep Sea Medicines](#).

Find out more about NOAA Ship *Ronald H. Brown* at www.moc.noaa.gov/rb/index.html

Explore with us at OceanExplorer.NOAA.gov