



## *Careers at Sea* *Conducting Science on the JOIDES Resolution*

The *JOIDES Resolution* is a 471-foot-long research ship with the equipment and technology to drill deep into the ocean floor and recover sediment and rock samples called cores. The cores contain a variety of chemicals, minerals, fossils, and other evidence that provides information about Earth's history. Some expeditions on the *JOIDES Resolution* place equipment called ACORKs into the ocean floor to collect other types of data such as temperature, pressure, and seismic activity. Depending on the data collected, we can learn about plate tectonics, climate change, earthquakes, extinction events, and other earth processes.

The ship has been to many ocean regions around the world depending on the type of science being conducted. Each expedition is about two months long and the people onboard work around the clock in 12 hour shifts, seven days a week. A variety of experts are essential for a successful expedition including scientists, technicians, mechanics, cooks, doctors, drillers, engineers, and captains to name a few. The scientists who sail must apply to be selected for an expedition. Some scientists may only sail once in their career. Many of the other people, however, sail every-other expedition, so they work for two months and then have two months off.

During the *Careers at Sea* activity, you will explore some of the jobs at sea and learn how real science is accomplished aboard the *JOIDES Resolution*. Your goals during this activity are to:

- ✓ Identify at least 4 careers at sea
- ✓ Demonstrate that collaboration and teamwork are essential for conducting science
- ✓ Explain how a range of different jobs are valued and play an important role for conducting science
- ✓ Consider a career at sea for yourself
- ✓ Demonstrate an understanding of the scientific process
- ✓ Demonstrate an understanding of the importance of learning multi-disciplines

## Careers at Sea List

Applications Developer plans and writes custom software applications for the lab instruments to collect data, store it in a database, and allow scientists to retrieve the data for their research; trains scientists and staff to use software applications

Captain directs all ship functions, drives and navigates the ship, and ensures the safety of everyone on board

Chief Cook manages the kitchen and cooking staff, orders and keeps track of food, plans meals, cooks, and cleans the kitchen (galley)



Doctor prepares for different medical situations such as rescuing victims of heart attack or stroke and treating broken arms and cut fingers, calls helicopters in for emergency transport, trains the staff in CPR, handles seasickness and common health problems such as colds, skin conditions, and allergies, and keeps track of locations of the nearest hospitals on land

Driller controls machinery that keeps the drilling equipment stable and balanced when the ship is moving from side to side, and makes sure the drilling equipment is at the right location to send pipe and drill bit to the bottom of the ocean

Educator/Teacher works with scientists, engineers, and technicians to learn about the expedition, and communicates the science to students, educators, and the public by coordinating video conferences, seminars, and educational activities

Engineer designs, builds, and tests mechanical and electronic tools needed for scientific drilling and measurement operations, and provides engineering support during drilling



Expedition Project Manager leads the project team that plans and carries out the expedition, conducts research, participates in education activities, and manages research activities during the expedition to make sure the scientific goals are met

Imaging Specialist/Photographer photographs every core, documents each expedition by taking pictures of the staff, scientists, operations, and celebrations, helps the scientists with imaging systems, and takes photos of broken equipment so it can be repaired properly

Lab Officer/Assistant Lab Officer manages the marine laboratory specialists and research specialists, makes sure the labs are prepared and functioning well for the scientists to do their work, and helps scientists with their work



Marine Computer Specialist makes sure all of the computers and databases on the ship work, teaches scientists how to use the computer equipment on board, and tests new computer programs and technologies

Marine Instrumentation Specialist keeps equipment working in the labs, trains staff on board to use equipment, sets up and tests tools that take measurements, performs inspections, fixes broken equipment, helps design new equipment for scientists, and makes sure that data is accurate



Marine Curatorial Specialist manages collecting, handling, sampling, storing, and shipping all cores aboard the ship, teaches staff how to collect data from the cores, and keeps track of samples taken by the scientists in a database

Marine Laboratory Specialist helps process cores as they come on deck, works in the chemistry, core description, geophysics, paleomagnetism, microbiology, paleontology, and X-ray labs to test and examine cores, cuts and polishes seafloor rocks for study using a microscope, makes sure labs are stocked with the correct materials, chemicals, and tools, and helps scientists analyze samples using the scientific instruments in the ship labs



Naval Architect helps redesign the ship when it needs to be fixed or upgraded, oversees and plans the rebuilding process, and makes sure the ship meets research requirements for different expeditions

Offshore Installation Manager in charge of drilling operations, including safety, fire fighting, fueling, and navigation at and around the drill sites, manages ordering for the ship's drilling supplies, and works with the entire drill team to problem solve when a situation happens



Operations Superintendent oversees drilling operations during expeditions to make sure the scientific goals are achieved, communicates the needs of the scientists to the ship's drilling crew, keeps records of daily operations, and deals with shipboard equipment maintenance and repair

Publications Specialist prepares data that comes from the ship labs for the publication department on shore, which publishes scientific articles so that other scientists, legislators, teachers, students, and the public can learn from scientific findings, reads and approves all the text, tables, and figures in each volume, and makes sure high-quality graphics, photos, data sets, short movies, and poster-sized illustrations are used

Radio Operator takes and sends weather data to Washington D.C. every 6 hours, sends and receives radio transmissions from shore, and repairs radio equipment

Researcher/Scientist uses the ship labs to conduct scientific research on topics related to the goals of the expedition, helps bring cores to labs, uses tools and instruments to take and analyze samples, and eventually publishes articles about the research results



Second Engineer responsible for the engines, pumps, air conditioning, electric motors, and all other systems that keep the ship running, and keeps records of all work

Second Mate responsible for navigation of the ship

Steward makes beds and takes care of the cabins and laundry for scientists, staff, and other crew members, and makes sure all ship areas are clean

Tool Pusher/Core Technician responsible for the drill floor, oversees the mechanics of the drilling process, repairs and builds tools necessary for each job, and stays educated on new technical equipment used in the drilling business

Welder uses heat to shape and attach metal pieces of equipment for building new tools, repairs broken parts, and attaches large equipment to different parts of the research area for conducting investigations





## ***Careers at Sea – Job Descriptions***

Applications Developer plans and writes custom software applications for the lab instruments to collect data, store it in a database, and allow scientists to retrieve the data for their research; trains scientists and staff to use software applications

*Skills* - computer programming, using lab instruments, math, problem solving

*Works closely with* researcher, lab officer/assistant lab officer, marine laboratory specialist, marine computer specialist

Captain directs all ship functions, drives and navigates the ship, and ensures the safety of everyone on board

*Skills* – management, mapping, navigation, technology such as GPS (global positioning system), magnetic compasses, RADAR, charts, and sextant backup to GPS

*Works closely with* second mate, second engineer, expedition project manager, researcher, radio operator, operations superintendent

Chief Cook manages the kitchen and cooking staff, orders and keeps track of food, plans meals, cooks, and cleans the kitchen (galley)

*Skills* – management, cooking, communication

*Works closely with* kitchen staff, communicate with anyone on board for diet needs, serves everyone on board

Doctor prepares for different medical situations such as rescuing victims of heart attack or stroke and treating broken arms and cut fingers, calls helicopters in for emergency transport, trains the staff in CPR, handles seasickness and common health problems such as colds, skin conditions, and allergies, and keeps track of locations of the nearest hospitals on land

*Skills* – medical school, human biology and physiology, communication, recordkeeping, leadership

*Works closely with* everyone on the ship

Driller controls machinery that keeps the drilling equipment stable and balanced when the ship is moving from side to side, and makes sure the drilling equipment is at the right location to send pipe and drill bit to the bottom of the ocean

*Skills*- technical, math, GPS (global positioning system), drilling equipment

*Works closely with* marine instrumentation specialist, technician, tool pusher/core technician, offshore installation manager, operations superintendent, engineer, captain



Educator/Teacher works with scientists, engineers, and technicians to learn about the expedition, and communicates the science to students, educators, and the public by coordinating video conferences, seminars, and educational activities

*Skills* - education, communication, writing

*Works closely with* expedition project manager, all ship's technical staff

Engineer designs and builds mechanical and electronic equipment needed for scientific drilling and measurement operations, and provides engineering support during drilling

*Skills* - technical, math, engineering, design, mechanical, scientific testing

*Works closely with* marine instrumentation specialist, tool pusher, offshore installation manager, operations superintendent, captain

Expedition Project Manager leads the project team that plans and carries out the expedition, conducts research, participates in education activities, and manages research activities during the expedition to make sure the scientific goals are met

*Skills* – research, project management, laboratory operations, communication

*Works closely with* researcher, laboratory officer, marine curatorial specialist, operations superintendent

Imaging Specialist/Photographer photographs every core, documents each expedition by taking pictures of the staff, scientists, operations, and celebrations, helps the scientists with imaging systems, and takes photos of broken equipment so it can be repaired properly

*Skills* - communication, photography, computer imaging/graphics software

*Works closely with* researcher, expedition project manager, operations superintendent, marine laboratory specialist, marine computer specialist, marine curatorial specialist

Lab Officer/Assistant Lab Officer manages the marine laboratory specialists and research specialists, makes sure the labs are prepared and functioning well for the scientists to do their work, and helps scientists with their work

*Skills* - management, communication, laboratory testing (chemical, physical, and biological)

*Works closely with* marine laboratory specialist, researcher, expedition project manager, marine curatorial specialist

Marine Computer Specialist makes sure all of the computers and databases on the ship work, teaches scientists how to use the computer equipment on board, and tests new computer programs and technologies

*Skills* - operations, technical, math, mechanical, computer, organization

*Works closely with* researcher, marine laboratory specialist, marine curatorial specialist, publication specialist



Marine Instrumentation Specialist keeps equipment working in the labs, trains staff on board to use equipment, sets up and tests tools that take measurements, performs inspections, fixes broken equipment, helps design new equipment for scientists, and makes sure that data is accurate

*Skills* - mechanical, electronics, math, technical, computer, communication

*Works closely with* marine computer specialist, operations superintendent, offshore installation manager, driller, engineer, captain, steward, welder, tool pusher/core technician

Marine Curatorial Specialist manages collecting, handling, sampling, storing, and shipping all cores aboard the ship, teaches staff how to collect data from the cores, and keeps track of samples taken by the scientists in a database

*Skills* - science, math, communication, computer, organization

*Works closely with* researcher, driller, engineer, welder, tool pusher/core technician, anyone new to any position on board

Marine Laboratory Specialist helps process cores as they come on deck, works in the chemistry, core description, geophysics, paleomagnetism, microbiology, paleontology, and X-ray labs to test and examine cores, cuts and polishes seafloor rocks for study using a microscope, makes sure labs are stocked with the correct materials, chemicals, and tools, and helps scientists analyze samples using the scientific instruments in the ship labs

*Skills* - chemistry, geology, microbiology, paleontology, paleomagnetism, lab instruments, lab testing, math, computers, problem solving

*Works closely with* researcher, lab officer/assistant lab officer, imaging specialist, marine computer specialist, applications developer

Naval Architect helps redesign the ship when it needs to be fixed or upgraded, oversees and plans the rebuilding process, and makes sure the ship meets research requirements for different expeditions

*Skills* - architecture, planning, budgeting, carpentry, metal work, communication

*Works closely with* offshore installation manager, researcher, operations superintendent, engineer, welder

Offshore Installation Manager in charge of drilling operations, including safety, fire fighting, fueling, and navigation at and around the drill sites, manages ordering for the ship's drilling supplies, and works with the entire drill team to problem solve when a situation happens

*Skills* - management, organization, safety, navigation, budgeting, drilling, communication

*Works closely with* tool pusher/core technician, driller, marine instrumentation specialist, operations superintendent, engineer, welder



Operations Superintendent oversees drilling operations during expeditions to make sure the scientific goals are achieved, communicates the needs of the scientists to the ship's drilling crew, keeps records of daily operations, and deals with shipboard equipment maintenance and repair

*Skills* - communication, drilling, management, science, organization, mechanical, budgeting, planning

*Works closely with* researcher, driller, engineer, welder, offshore installation manager, expedition project manager, laboratory officer

Publications Specialist prepares data that comes from the ship labs for the publication department on shore, which publishes scientific articles so that other scientists, legislators, teachers, students, and the public can learn from scientific findings, reads and approves all the text, tables, and figures in each volume, and makes sure high-quality graphics, photos, data sets, short movies, and poster-sized illustrations are used

*Skills* - communication, computer, writing, publishing, editing, graphic design, photography, database applications

*Works closely with* researcher, expedition project manager, imaging specialist, marine computer specialist, applications developer, marine laboratory specialist

Radio Operator takes/sends weather data to Washington D.C. every 6 hours, sends and receives radio transmissions from shore, and repairs radio equipment

*Skills* - computer, satellite communications, GPS, meteorology (study of the climate and weather), data collection, radio communication, radio repair

*Works closely with* captain, onshore staff, researcher, driller

Researcher/Scientist uses the ship labs to conduct scientific research on topics related to the goals of the expedition, helps bring cores to labs, uses tools and instruments to take and analyze samples, and eventually publishes articles about the research results

*Skills* - communication, science research specialty field, laboratory testing, analytical, graphical, and design

*Works closely with* laboratory officer/assistant laboratory officer, marine laboratory specialist, expedition project manager, publication specialist, imaging specialist, marine computer specialist, marine curatorial specialist, operations superintendent, engineer, captain

Second Engineer responsible for the engines, pumps, air conditioning, electric motors, and all other systems that keep the ship running, and keeps records of all work

*Skills* - mechanical, engineering, recordkeeping

*Works closely with* offshore installation manager, captain, second mate, operations superintendent



Second Mate responsible for navigation of the ship

*Skills* - navigation with and without technology, GPS, math, knowledge of latitudes and longitudes

*Works closely with* captain, radio operator, second engineer

Steward makes beds and takes care of the cabins and laundry for scientists, staff, and other crew members, and makes sure all ship areas are clean

*Skills* - customer service, cleaning, maintenance

*Works closely with* everyone on board

Tool Pusher/Core Technician responsible for the drill floor, oversees the mechanics of the drilling process, repairs and builds tools necessary for each job, and stays educated on new technical equipment used in the drilling business

*Skills* - operations, mechanical, technical, some computer and photography

*Works closely with* driller, operations superintendent, offshore installation manager, engineer, marine instrumentation specialist

Welder uses heat to shape and attach metal pieces of equipment for building new tools, repairs broken parts, and attaches large equipment to different parts of the research area for conducting investigations

*Skills* - repairing equipment, designing and building scientific equipment, math, communication

*Works closely with* second engineer, engineer, naval architect, researcher, marine instrumentation specialist, marine curatorial specialist