NOAA Teacher at Sea
Deborah Stringham
Onboard NOAA Ship FAIRWEATHER
July 5- July 15, 2005

Day 1: Tuesday, 5 July 2005

Daily Log
I arrived at Homer Airport at 2015 and called the FAIRWEATHER Officer on Deck (OOD) to find the location of the ship and if there was a ride available. Unfortunately, I was only able to reach answering machines. It seems all of the ship's phone lines were down. At 2230, two local girls offered me a ride to the harbor and assisted in finding where the ship was docked. By 0000, I was on board and given a tour, along with the two locals, by the FAIRWEATHER's Chief Survey Technician. The ship is 231 feet long and 42 feet in breadth and I'm amazed at how large it feels inside. I'll inhabit a single state room on the starboard side of the ship for the next ten days!

Day 2: Wednesday, 6 July 2005
Local Time: 1900

Location: in transit
Latitude: 59 02.8' N
Longitude: 152 33.6' W
Visibility: 10 nm.
True Wind Speed: 10 kts.
True Wind Direction: 235
Sea Wave Height: 1-2 ft.
Swell Wave Height: 2-3 ft.
Sea Water Temperature: 12.7 C
Sea Level Pressure: 1000.5
Sky Description: Partly Cloudy
Dry Bulb Temperature: 15.9 C
Wet Bulb Temperature: 13.9 C

Daily Log
Departed Homer at 1333, assisted with the mooring ropes, and explored facilities to orientate myself with the ship's layout. The Field Operations Officer (FOO), former Executive Officer (XO), and the XO's replacement showed me safety drill procedures for fire, abandon ship, and man over board. The crew is required to practice these drills weekly and be prepared for any such event that might occur. Everyone on board has a specific place they need to be when they hear a specific alarm.

One long wailing blast, 10 seconds or more, means fire, more than six blasts means abandon ship, and three blasts means man over board. I was also given safety tips of when to wear a hard hat, gloves, and positive buoyancy clothing. I watched the NOAA Ship FAIRWEATHER Vessel Familiarization CD on a crew computer, set up and checked my NOAA email account, and looked through maritime books in the lounge in order to familiarize myself with basic seamanship terms.

Basic Seaman Terms	**Definitions**
aft	Near or at the stern
apparent wind	The direction and force of the wind relative to a moving vessel, differing from true wind. The motion of a ship under way makes the effective wind, vary from the actual wind. Apparent wind can be indicated by a telltale or instruments.
bow	Front of the ship.
camel	Large piece of wood (ie. log) placed between ship and dock to prevent damage.
fore	Located at the front.
pitch	The alternate rise and fall of the bow of the vessel through waves.
port	When facing the front, or bow, of the ship, it is on your left hand side.
roll	The alternating motion of a boat, leaning alternately to port and starboard.
starboard	When facing the front, or bow, of the ship, it is on your right hand side.
stern (or fantail)	The after portion of the ship
true wind	The actual direction and force of the wind.

I spoke with three survey technicians about their education and where they were from and was surprised to find that two of them had graduated in Geography and one of them in Biology. Most crew aboard this ship come from coastal areas such as California, Washington, or Florida where the ocean has been a strong influence in their lives. One survey tech said that the coolest thing he's seen while surveying was when he had to stop operations because there were too many whales.

Question of the Day
How deep is 1 fathom?

Day 3: Thursday, 7 July 2005

Local Time: 1900

Location: in transit
Latitude: 55 37.5' N
Longitude: 156 17.8' W
Visibility: 10 nm.
True Wind Speed: 14 kts.
True Wind Direction: 295
Sea Wave Height: 1 ft.
Swell Wave Height: 2-4 ft.
Swell Wave Direction: 270
Sea Water Temperature: 13.1 C
Sea Level Pressure: 1007.6
Sky Description: Clear
Dry Bulb Temperature: 14.9 C
Wet Bulb Temperature: 13.0 C

NOAA Ship FAIRWEATHER, Shumagin Islands, Alaska

Daily Log

I woke up at 0300 to stand watch on the bridge with the XOs-- Shifts are usually four hours on and eight hours off. I learned how to use the Combined Wind Plotting Board Calculator to determine true wind speed and direction. I estimated wave and swell heights and direction and collected data on dry and wet bulb temperatures, latitude and longitude, barometric pressure and sky description. Weather readings are collected every hour on the bridge while en route.

In order to find true wind, one must find the bearing and speed of the ship from a GPS unit and correlate that on the plotting board. Then, apparent wind speed and bearing are taken from an anemometer and plotted on the board. When the board is spun and the two points are aligned vertically, one can correlate those points to find the true bearing and the difference between those two points give true wind speed in knots.

While on the bridge, I also learned the reference system that crew members use to indicate another ship, landmark, or object in the ocean. For example, if a light is spotted at 45 degrees from the bow of the ship, then one would say, "There is a light, broad on Starboard Bow." If the light were on the portside at 270 degrees, then one would report, "There is a light, broad on Port Beam." The 360 degrees view is actually broken into bearing points. A point equals 11 ¼ degrees and there are 32 points in all. During my watch, I was able to spot whales at both of the locations mentioned above.

Question of the Day

What is hydrography and why is it important?

Answer from Previous Day

1 fathom equals six feet.

Day 4: Friday, 8 July 2005

Local Time: 1900

Location: Eagle Harbor, Shumagin Islands, AK
Latitude: 55 06.9' N
Longitude: 160 06.9' W
Visibility: 10 nm
True Wind Speed: 11kts
True Wind Direction: 140
Sea Wave Height: 0-1
Swell Wave Height: none
Swell Wave Direction: none
Sea Water Temperature: 10.7
Sea Level Pressure: 1006.6
Sky Description: partly cloudy
Dry Bulb Temperature: 20.5 C
Wet Bulb Temperature: 15.5 C

Small vessel launch off of FAIRWEATHER. Vessel conducts multi-beam sonar scans and collects sound velocity data.

Daily Log

I Woke up early again to stand watch on the bridge, but was informed by the XO that I would be out on a launch at 0800. He suggested I go back to bed and get ready for the day since it would probably be a long one. At 0800, the crew met on the fantail (stern of the ship) to discuss safety precautions, then the vessels were lowered over the side of the ship, where all of the equipment and crew were loaded, then placed in the water. Normally, the boat would head to a section of the coast, in this case the Shumigan Islands, to begin sound velocity casts, but our boat was having generator and engine troubles so we had to head back to the ship shortly after we departed. The captain, or commanding officer, gave me a book titled, How to Read a Nautical Chart, and briefly explained why ships travel the "great circle". I read sections of the book and learned about Gnomonic versus Mercator projections.

On a Mercator projection, where latitudes and longitudes cross each other at right angles, a straight line is not the fastest course. This type of projection is best used for coastal sailing and is where the "great circle" comes in to play as the shortest route.

On the other hand, the Gnomonic projection is best used for open passage sailing. The latitude lines are seen as curved and the longitude lines are straight. On this type of projection the shortest distance is a straight line.

Question of the Day

Why do sailors refer to the sides of their boats as port side and starboard side?

Answer from Previous Day

Hydrography is the science that deals with the measurement and description of the physical features of bodies of water and their littoral land areas. Its primary use is for nautical charting, but it is also important for port and harbor maintenance, coastal engineering, coastal zone management, and offshore resource development.

Day 5: Saturday, 9 July 2005

Local Time: 1900

Location: Eagle Harbour, Shumagin Islands, AK
Latitude: 55 06.8' N
Longitude: 160 06.9' W
Visibility: 10 nm.
True Wind Speed: 16 kts.
True Wind Direction: 340
Sea Wave Height: 1 ft.
Swell Wave Height: none
Swell Wave Direction: none
Sea Water Temperature: 12.0 C
Sea Level Pressure: 1011.5 mb
Sky Description: Partly Cloudy
Dry Bulb Temperature: 15.5 C
Wet Bulb Temperature: 12.5 C


Stringham pulling line up for bottom samples.

Daily Log

Today, I was assigned to go on a bottom sampling launch. The purpose of these launches is to collect floor samples to determine the nature of the sea floor. The instrument used is called a bottom sampler and looks like a large heavy metal pipe about a foot in length and four inches in diameter. There is a large metal spring attached to the top of it along with a scooping mechanism that clamps shut when it hits the sea floor. On the other end, is an O-ring where a line can be strung through and attached to a pulley.


Bottom Sampling Device

First, the designated sampling locations are decided by where they lie in relation to the coast. There are collection standards that regulate where sampling can occur and how often. If the region is deemed anchorage, then samples may be taken 1200 meters apart. If the region is not considered anchorage, then the samples need to be spaced 2000 meters apart. Using a Digital Terrane Model (DTM), the survey technician chooses an arbitrary point and fans out from there, choosing collection locations in accordance with the regulations above.

Once the bottom sampling is underway, the boat will use a Global Positioning System (GPS), to locate where a sample will be taken from. The survey technician will open the scooping mechanism and lower it over the side of the boat. When the bottom sampler hits the bottom, it will be brought back to the surface where the sample, if any, will be analyzed and recorded. If no sample is retrieved after three attempts, then the sea floor is recorded as hard. Survey technicians use abbreviated terms to describe the bottom samples. For example: crs S = coarse sand, brk Sh = broken shells, gy M = gray mud, med P = medium pebbles.

Question of the Day

Why is looking at the nature of the seafloor material important?

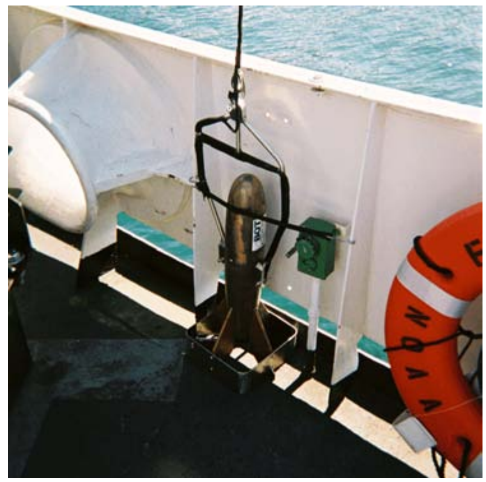
Answer from Previous Day

In the early days of sailing, the steering board was on the right hand side and the side of the ship that was usually tied up to port was the left hand side. Sailors began calling the right side of the ship (when facing front) the starboard side and the left hand side of the ship port.

Day 6: Sunday, 10 July 2005

Local Time: 1100

Location: Eagle Harbour, Shumagin Islands, AK
Latitude: 55 06.9’ N
Longitude: 160 06.9’ W
Visibility: 10 nm
True Wind Speed: 7 kts.
True Wind Direction: 328
Sea Wave Height: none
Swell Wave Height: none
Swell Wave Direction: none
Sea Water Temperature: 11. 7 C
Sea Level Pressure: 1015.4 mb
Sky Description: Partly Cloudy
Dry Bulb Temperature: 19.0 C
Wet Bulb Temperature: 15. 0 C



“FISH” Collects sound velocity data while vessel is moving.

Daily Log

This morning, I assisted a survey technician entering the bottom sampling data we collected on yesterday’s launch. I also read through training materials about the SeaBat Mutlibeam Survey System and learned how the system works.

“FISH” winch. Instrument attached collects sound velocity data.

Basically, there are six parts to the system: the multibeam sonar, data acquisitioning software, beacon receiver, SeaBird Water Column Profiler, Velocity Probe, and data processing software. When activated, the system generates “pings” that are transmitted through the water column. Those “pings” collide with targets and return echo signals to the receiver. The hydrophones convert the pressure from the echo into an electrical signal. The signal is amplified and the software processes it and displays the information on the computer.

In order to understand SONAR, one must also understand sound. Sound isproduced by a vibrating source that causes compression waves which are detectable pressure changes. The speed of the propagation depends on the medium it is traveling through. For instance, sound travels about 390 meters per second in air and 1500 meters per second in water. The velocity of sound in water is dependent on three main factors: salinity, temperature, and pressure.

I interviewed an Ensign on the crew this afternoon about the career paths she had taken to be a part of NOAA. She received her bachelor degree in Marine Studies with an emphasis in marine mammals. She was investigating the Peace Corps and the Navy when she came across NOAA and decided to enroll in their three month officer’s basic training. After three months of studying radar and navigation, she was assigned to the FAIRWEATHER for two years at sea. After her two years are complete, should she decide to continue, she will then be assigned to a three year term in a land-based position. In order to qualify for officer’s training, one needs a bachelor’s degree in any science or engineering related field.

Question of the Day
What does SONAR stand for?

Answer from Previous Day
Looking at the nature of the sea floor is important because of implications relating to anchoring, dredging, structure construction, pipeline and cable routing, and fisheries habitat.

Day 7: Monday, 11 July 2005

Local Time: 1500

Location: Shumagin Islands, AK
Latitude: 55 17.7’ N
Longitude: 160 32.1’ W
Visibility: 8 n.m.
True Wind Speed: 12 kts.
True Wind Direction: 190
Sea Wave Height: 1 ft.
Swell Wave Height: none
Swell Wave Direction: none
Sea Water Temperature: 11.7 C
Sea Level Pressure: 1014.0 mb
Sky Description: Cloudy, Drizzle
Dry Bulb Temperature: 11.5 C
Wet Bulb Temperature: 10.0 C


Shumagin Islands, AK --on shore in Eagle Harbor.

Daily Log
Last night, some of the crew, including myself, went ashore while anchored in Eagle Harbor. I was eager to learn of the geology of the Shumagin Islands, but have had no opportunity to take samples from shore. It is not so much the composition of the rocks that I'm interested in as the process and time frame of which they formed. I collected both rounded pebbles from the beach and oxidized, angular fragments from a cliff face. I'm extremely impressed by the magnitude of folding, faulting, and glaciation process that are apparent--even from the deck of the ship many miles away. Upon inquiring, I have discovered that there is only one crew member who has any geologic text on the area and she is not on board for this leg.

This morning, I was once again assigned to a launch that would collect bottom samples, but the unfortunate event of well-developed seas and high winds drove us back to the ship. Our sunny weather for the past two days is definitely at an end and our bottom sampling is postponed until further notice.


Returning to ship due to stormy seas.

On this leg, the ship does not have any tide stations to install, but I inquired as to how that affects data collection anyway. Tide stations are used as vertical control on water depths. The Chief Survey Technician said that local tidal data is collected from a primary station on Sand Point and vertical corrections are made to the hydrographic survey data as it is collected. If the data were not corrected to the Mean Lower Low Water (MLLW), the depths displayed on hydrographic charts could mislead ships navigating in shallow waters.

Question of the Day
Why is knowledge of atmospheric sciences helpful in navigating ships?

Answer from Previous Day
SONAR stands for Sound Navigation and Radar. Essentially, the purpose is to emit sound waves and capture their echo as they bounce off of the sea floor or other objects to determine shape, position, and/or location. Marine organisms use a similar type feature to detect prey.

Day 8: Tuesday, 12 July 2005

Local Time: 1600
Location: in transit
Latitude:54 45.9' N
Longitude: 160 14.8' W
Visibility: 10 nm
True Wind Speed: 19kts
True Wind Direction: 290
Sea Wave Height: 2 ft.
Swell Wave Height: 4-6 ft.
Swell Wave Direction: 250
Sea Water Temperature: 10.6 C
Sea Level Pressure: 1004.5 mb
Sky Description: partly cloudy
Dry Bulb Temperature: 15.3 C
Wet Bulb Temperature: 12.5 C

Daily Log

Today, is a quiet day aboard the FAIRWEATHER. There are no vessel launches to join, but it is a good opportunity for me to work on lesson plan ideas. I've been most interested in the bottom sampling operations and why it is important to understand the nature of the sea floor for anchorage. I found a very helpful seaman text that should provide good direction for a lesson plan.

Earlier in the leg, a crew member and survey tech exchanged with a member of a contractor for NOAA that acquisitions hydrographic data using airplanes. The airplanes essentially have two beams, one that hits the top of the water and one that penetrates to the sea floor. The data is then compared and the difference between them equals the water depth. The survey tech said that there are some benefits and limitations to the use of airplanes.

Benefits are that it can collect data much more quickly than our ship. Our ship travels at ten knots, but the airplane can fly over a hundred knots and cover many more miles. The airplane can also collect data in shallow water and pinpoint water depth over shallow rocks whereas the ship cannot. Also, Surveyors do not have to stay at sea for weeks at a time and can go home to dry land at the end of the day.

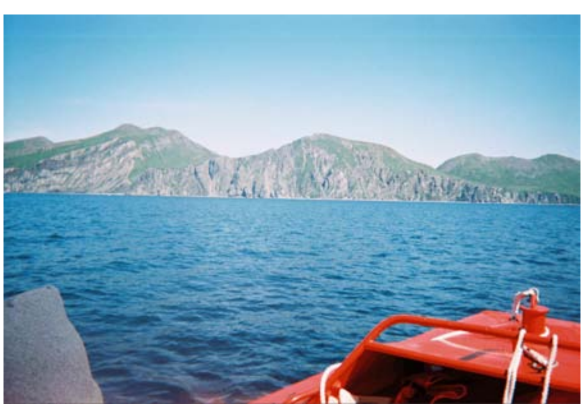
On the other hand, limitations of the airplane include lower resolution because the plane is flying so fast. Choppy seas or kelp forests impede data collection, as is true for data acquisition from the ship as well, and the planes cannot collect data from deep waters.

Question of the Day

What type of sea floor is best for anchoring one's ship?

Answer from Previous Day

Understanding atmospheric sciences is important in navigating ships because the weather affects the ships course and ability to conduct business or research every day. Understanding such basic concepts as weather fronts, air mass characteristics, large scale wind systems (ie. Polar Easterlies), and weather phenomenon (ie. hurricanes) can be life saving when out at sea.



View from vessel during bottom sampling operations. Shumagin Islands, AK.

Stringham on shore, Eagle Harbor, Shumagin Islands, AK.

Day 9: Wednesday, 13 July 2005

Local Time: 1000

Location: in transit
Latitude: 52 44.1’N
Longitude: 156 45.3’W
Visibility: 10 nm
True Wind Speed: 10 kts.
True Wind Direction: 270
Sea Wave Height: none
Swell Wave Height: 6 ft.
Swell Wave Direction: 220
Sea Water Temperature: 11.0 C
Sea Level Pressure: 1008.0
Sky Description: partly cloudy
Dry Bulb Temperature: 14.0 C
Wet Bulb Temperature: 12.5 C

Daily Log

Last night, the ship received word that a tsunami buoy had gotten loose and needed to be retrieved in waters to the south. So, heading to the farthest waters south that the FAIRWEATHER has seen since March, the ship made its way to the last known location of the buoy. I stood watch on the bridge from 0400 until 0800 and no sight of the buoy had been taken on RADAR or by person. At about 0830, the buoy was spotted and operations to retrieve it were commenced. A smaller vessel with four crew members was launched to aid in the retrieval and the A- frame on the fantail was rigged to pull the large instrument aboard. By 0930 the buoy was captured and hoisted onto deck and by 1030 it was securely fastened to the fantail. The issue of pulling aboard several thousand meters of the buoy’s rope took several more hours after that. Whew!

Stringham photographing tsunami buoy recovery.

The December 26, 2004 Indonesia tsunami “traveled at 700 kilometers per hour to rear up like a hydra onto shores, sweeping away some 225,000 lives and millions of livelihoods across 12 nations,” Madhusree Mukerjee reported in the March 2005 issue of Scientific American. That historic tsumani event raised a lot of concern regarding the early warning systems that are in place for tsunami events. Unlike the Indian Ocean, the Pacific Ocean is known to have a well established warning system in place, but efforts are being to taken to ensure that we know as much as possible about possible tsunamis in the Pacific Ocean. Tsunami buoys are located extensively along the major coastlines of countries neighboring the Pacific Ocean and the data collected from those buoys is carefully analyzed and recorded.

Ships similar to the FAIRWEATHER, in the NOAA fleet, usually perform routine maintenance and retrieval of buoys. The FAIRWEATHER has been looked at for this purpose, but never actually engaged in the process. This is the first time the FAIRWEATHER has taken part in tsunami buoy retrieval.

Question of the Day
What does the Indonesian tsunami, Alaska 1964 earthquake, and hydrographic survey have in common?

Answer from Previous Day

The best types of sea floor to anchor a ship are mud/clay or sandy, mud combinations. Firm sand is okay, but loose sand, soft mud, rocks, and grassy/kelp areas should be avoided.

Day 10: Thursday, 14 July 2005

Local Time: 1730

Location: U.S. Coast Guard Dock, Kodiak, AK
Latitude: 57 48.6' N
Longitude: 152 21.9' W
Visibility: 10 nm
Sky Description: partly cloudy

NOAA Ship FAIRWEATHER docked at US Coast Guard Station, Kodiak, AK.

Daily Log
The ship has reached Kodiak, AK and has docked at the U.S. Coast Guard Station. Preparations are already underway for an inspection and the departure of crew members and arrival of returning or new crew members. The next leg will focus on fisheries research so preparations of the winches for nets is underway.

I'm a little wistful in returning to shore. I've grown accustomed to the rocking of the ship and have thoroughly enjoyed my entire experience aboard the FAIRWEATHER. I'm amazed at the autonomy of the ship and the crew aboard. I'm walking away with valuable and useful information that can be applied in laboratory experiments in the classroom and can hardly wait to implement them.

Tonight, I spend my last night aboard the ship and tomorrow morning depart for a day ashore Kodiak and then a long flight home. What an amazing experience this has been!

Kodiak, AK

Answer from Previous Day
Believe it or not, the Indonesian tsunami and Alaska 1964 earthquake are important to hydrographic survey. Plates shifting near Indonesia created the large tsunami that traveled so far and decimated so many villages. The 1964 earthquake, also caused by shifting plates, creating likewise devastating effects. This impacts hydrographic survey, because the navigation charts printed before 1964 would not show the rise in sea floor of over 30 feet that occurred because of the shifting plates!