Using Weather Buoys

Subject: The focus is science.

Grade Level: 4th Grade

Learning Time: 1 ½ Hours

Lesson Summary: Students will view powerpoint and video to learn ways scientists gather data for weather predictions.

Overall Concept: How can we use the ocean as a way to help understand our weather? How is weather information collected?

Specific Concepts: Scientists use a variety of tools to collect data for weather predictions. Scientists moor buoys out in the ocean to help collect data for weather predictions. A variety of organizations help with the gathering of the information.

Focus Questions: How is information gathered? Who gathers this information? Which tools are used to collect this information? What type of information is gathered on a buoy mooring trip?

Objective: Students will learn how weather information is gathered and how buoys are used in this process. Students will increase their understanding of weather and weather data gathering with the use of pre/post tests where understanding will increase with each student.

Background Information: Students in the fourth grade have been studying weather as part of an IB unit. They have some understanding of how data is gathered, but they are still confused about basic concepts. For example, they have a basic understanding that precipitation is rain, but some still don't understand that precipitation can also take other forms. This is one of the misconceptions they have related to weather.

Materials: Powerpoint presentation with pictures and examples, video, pre and post test.

Teacher Preparation: I had to construct the powerpoint presentation as well as the pre/post test. I also had to set up projector and schedule time with my colleagues to teach this lesson, for I am in the second grade and the students are in fourth grade. I had to spend time collaborating with the fourth grade teachers, Ms. Weber and Ms. Christenberry.

Key Words: buoy, precipitation, deploy

Lesson Procedure:

Teachers will first give the pretest as a way to understand what is known and not known about the gathering of weather information. Next, the two classes will gather in a common area and the powerpoint will be used to present information about weather data and using buoys. Students will read aloud the separate slides related to the subject. As the information is presented, the teacher will pose questions and add more information as necessary to clarify specific points related to the presented information. As a wrap up, teacher will quickly review the pretest and ask students whether there is better understanding on certain concepts.

National Science Education Standards: Science and Technology Standards –

TABLE 6.5. SCIENCE AND TECHNOLOGY STANDARDS

LEVELS K-4	**LEVELS 5-8**	**LEVELS 9-12**
Abilities to distinguish between natural objects and objects made by humans Abilities of technological design Understanding about science and technology	Abilities of technological design Understanding about science and technology	Abilities of technological design Understanding about science and technology

Ocean Principle: The ocean and humans are connected. Students will understand that, by using the ocean and the weather buoy, scientists have a better understanding of weather and weather patterns. The ocean is a major influence on weather and climate.

Students will make a connection between how the ocean buoy is used to collect information that is used to predict weather. Students will understand that the ocean is very much responsible for weather patterns. Also, students will understand what scientists do on the ocean in terms of research and technological study.

State Standards: 4.2-1 Demonstrate how scientific tools, such as microscopes, telescopes, and cameras, can be used to gather accurate information for making scientific comparisons of objects and events.
4.2-2 Discuss and give examples of how technologies, such as computers and medical X-rays, have improved the lives of people.

Reflection and Critique:
I want to do several more follow up lessons related to weather and the ocean to make a better connection between the two. The students have a better understanding of how the ocean is used to gather information, but they do not understand that the ocean and weather is connected. I want to teach a lesson related to how the ocean affects coastal areas. For example, the reason we see a desert on one side of a mountain range and green fields on the other side is because of ocean winds and precipitation in the wind traveling over the ocean. Also, I plan on creating some lessons related to how ocean, rain and water cause erosion. We are participating in a Greener School program and would like to use the school grounds as a way to teach about erosion. Furthermore, I have discussed with the teachers about addressing

some basic principals related to sink, float, and density. Students need to understand the affect salt has on ocean water.

How Is Weather Information Collected?

By Steven King

Where Do We Begin?

- So you turn on the tv to check the weather for the day. The meteorologist says, “Cloudy with the chance of meatballs.” Hey wait, that can’t be right.

How Do We Collect Information?

- When we take weather information, we use several instruments to gather what we need. Let's start with something easy. How do we know how much it rains? We use rain gauges. Rain gauges collect rain in a graduated cylinder. The cylinder allows a scientist a means of measuring the amount of rain in inches.

Precipitation

- The moisture in the air is known as precipitation. In can come in the form of rain, sleet, freezing ice, or snow.

Measuring Wind

Anemometers are used to measure the speed and the strength of the wind. The small cups at the top of the anemometer catch the wind and measure the speed of the wind. The number of revolutions are counted and this is the wind speed.

My Mission

Teacher At Sea

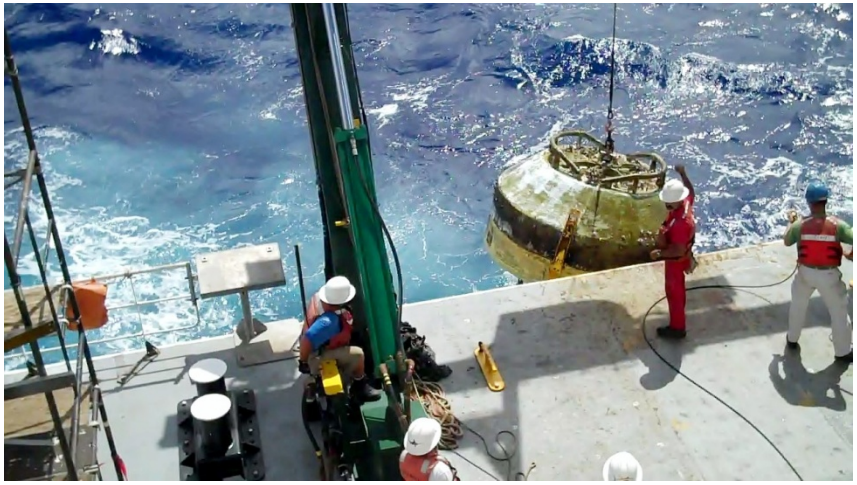
- This summer I traveled to Oahu to be part of a buoy deployment mission sponsored by Woods Hole Oceanographic Institute and NOAA. We traveled on the Kilo Moana, a research vessel used by the University of Hawaii.

We departed on the Kilo Moana from Honolulu, Oahu.

Deployment of Buoy

Our job was to retrieve the old weather buoy and deploy a new one.

Here is the new buoy.



Why Do We Use Buoys?

Scientific Instruments

- The buoy had a wide range of instruments connected directly to it as well as attached to ropes and cables which descended two miles to the bottom of the ocean.

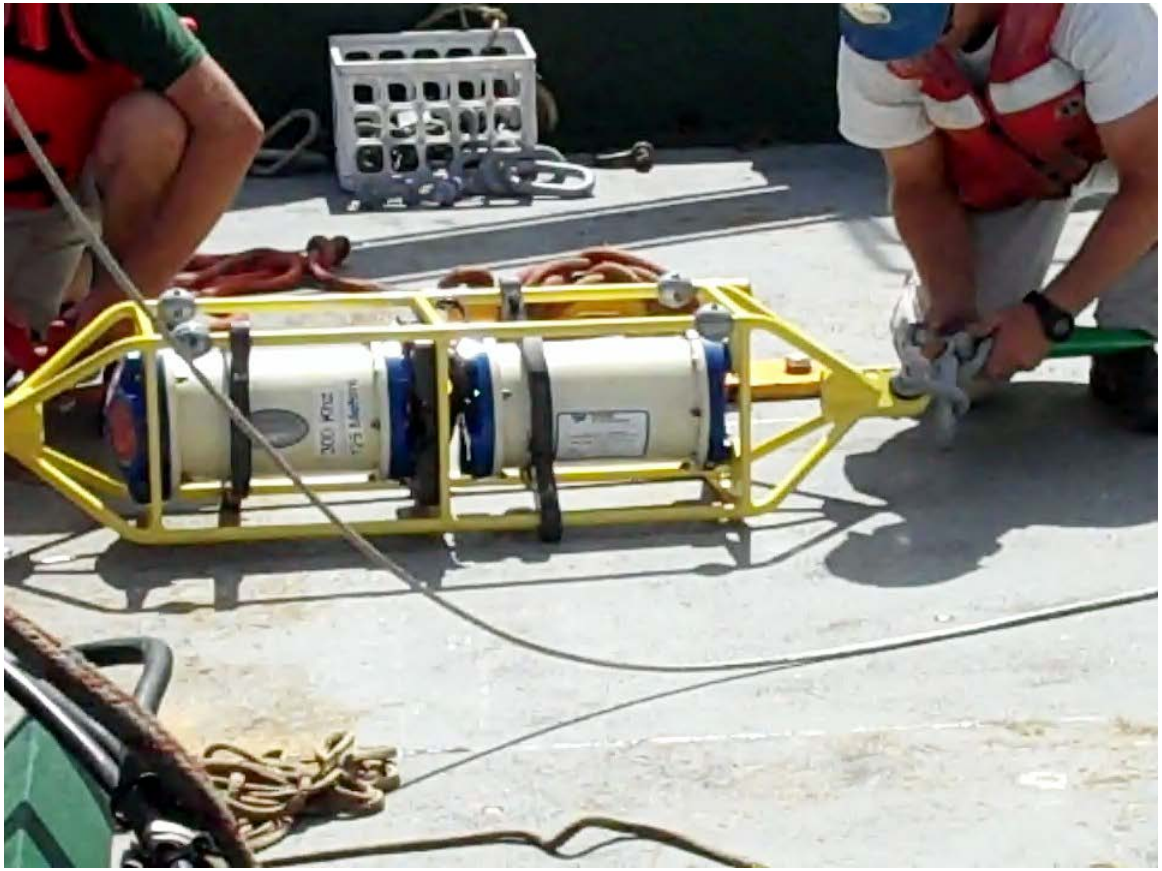
Instruments are being retrieved.

The Deployment of the New Buoy

The Crane and Scientists

- Crane operators, merchant marines, and scientists all worked in concert to release the new buoy into the Pacific Ocean. Many people with wide ranges of education helped place this flotation into the ocean.

You can see the crane tilting the buoy for its release into the ocean.



New data collection instrument.

This instrument was attached to a cable attached to the main buoy. It was then released into the water and is now dangling beneath the deployed buoy. As we speak, new life is growing on the sides of this instrument.

Other scientific interests included the old instruments.

Not only did scientists concern themselves with the recorded information on the scientific equipments retrieved from the instruments, but marine biologists were also interested in what was growing on the instruments themselves. It was interesting to see what type of life exists two miles below the ocean surface!

Picture of the new buoy.

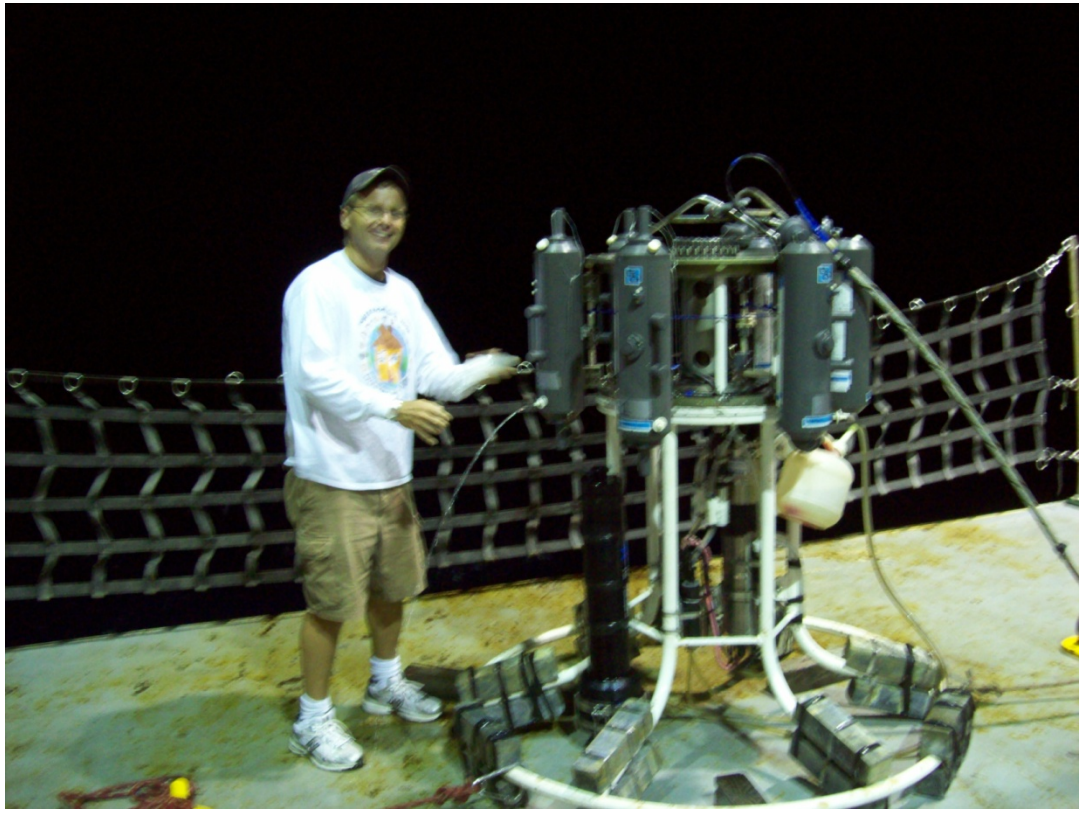
The old buoy and new buoy were in the water simultaneously so that the scientists could compare the old instruments to the new instruments and calibrate the data collected. Those were the quietest days on the mission, for the scientists had little for us to do. They were busy using their computers to compare what was being collected by both buoys.

Other aspects of the mission.

Every evening a rosette was released into the ocean and was allowed to descend deep into the cold, dark depths. Water samples were taken as the instrument descended, and then the rosette came back to the surface. Water samples were collected by many of us on the ship. Scientists will use the information collected to extrapolate findings.

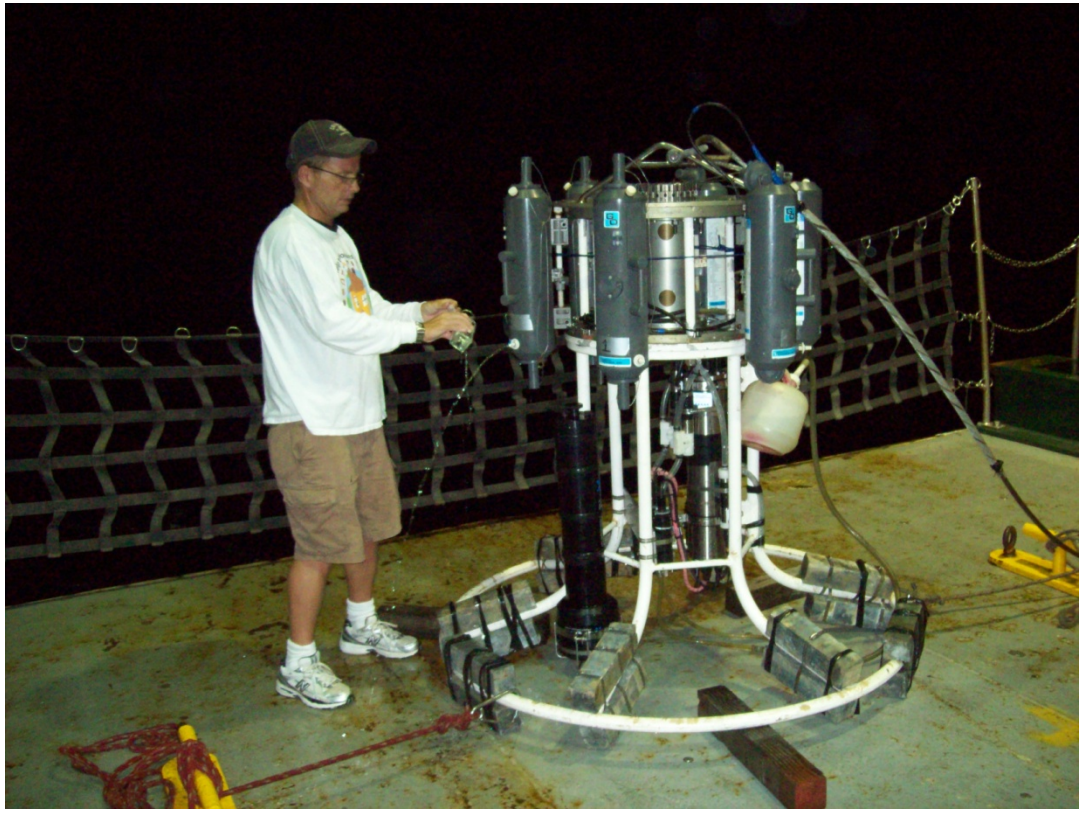
My Work

One responsibility I had was to help with the retrieval of the rosette in the middle of the night. It was daunting at first, but by the third night, I was quite comfortable staring at the dark, angry ocean as the rosette returned to the deck of the Kilo Moana. I am here collecting one of the many water samples extracted from the deepest depths of the Pacific Ocean. Don't I look like a real scientist?



So don’t take that weather report for granted!

Next time you go to the computer and get the weather for some far away region in the world, remember this is only happening because of missions like the one on went on this summer. Weather buoys and instruments are deployed and placed by scientists all the time. The next time you drive up 16th Street to Georgia Avenue, look to the east side of the road right before the traffic circle and you’ll see weather instruments attached to a pole. And somewhere there is a scientist helping that happen!



Pre and Post Test

Which item measures the amount of rain that has fallen?

A) rain measurer B) rain gauge C) rain meter D) rain detector

Which is not a type of precipitation?

A) snow B) flow C) rain D) flood

An anonemeter measures

A) wind amount B) wind speed C) wind race D) wind time

Weather buoys may **not** be found on:

A) mountains B) oceans C) seas D) lakes

A meteorologist tells us about:

A) space B) measurements C) weather D) meteors

Weather buoys collect information:

A) above the surface B) near the surface C) below the surface D) all of these areas

The Kilo Minoa works out of:

A) Hawaii B) Oahu C) California D) Honduras

Scientists used all of the following to collect information on this mission except:

A) computers B) water samples C) animals D) weather instruments

Deployment means:

A) release B) reduce C) reuse D) recycle

What can be found beneath a weather buoy?

A) instruments B) cables C) lines D) All of the above

How might a biologist be used on a trip such as this?

A) study animals growing on instruments B) study people on the ship C) study scientists on mission D) examine food eaten by scientists

How are glass flotation balls used in the mission?

A) They help with retrieval of old buoy
B) They prevent ships from crashing into buoy
C) They keep fish away from the buoy
D) They help scientists spot the buoy from the bottom of the ocean

How was a crane used on the mission?

A) It kept the scientists busy B) It helped bring in fish C) It helped deploy the buoy

Buoys were in the water at the same time so scientists could:

A) enjoy their accomplishments B) keep sharks and whales away C) compare data
E) take a break from the hard work

Who did not participate in this mission?

A) NOAA B) NASA C) Woods Hole Oceanographic Institute D) University of Hawaii

Mr. King did all of the following except:

A) swim in the ocean B) collect samples C) held the line on release of buoy D) recorded information using a camera