The NOAA FISHERIES NAVIGATOR

Tech Advances Enable Fishermen to Track Seafloor Temps Wirelessly

Fishermen know that ocean temperatures influence when and where certain marine species can be found from year to year. However, much of the data currently available on ocean temperatures in the Northwest Atlantic reflects the temperature at the surface of the ocean, not at the bottom where many commercially harvested marine species are found.

This sea surface temperature data is commonly collected from satellite images, surface drifters, and oceanic buoys. Similarly, sounding machines installed on many fishing vessels only read the temperature of the water just below the vessel.

Ocean bottom temperatures can vary greatly from the sea surface temperatures above, and even a few degrees difference can affect the behavior of marine species. Thus, bottom temperature can be an extremely useful tool for fishermen trying to selectively and efficiently target certain species.

And because water temperatures can have such strong effects on patterns of distribution, this information also is critical for scientific assessments of fish stocks and marine ecosystems, particularly when ocean climates are changing rapidly.

Research collaboration networks such as the Northeast and Mid-Atlantic Regional Associations of Coastal and Ocean Observing Systems (NERACOOS and MARACOOS), working with many other partners, have begun collecting bottom temperature information from a few sub-surface buoys already in place on the ocean floor.

They also are deploying more sophisticated autonomous underwater gliders that cruise the ocean at all depths, recording data on temperature, salinity, and other dynamic features of the sea. Fishermen who set or tow their gear across the bottom of the Northwest Atlantic hundreds of times annually can be another important source of this bottom temperature data.


NOAA photo

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The Environmental Monitors on Lobster Traps Project, familiar to many fishermen as eMolt, is a collaboration of industry people, scientists, and academics to monitor the physical environment of the Gulf of Maine and the Southern New England shelf.

Since early 2001, in a series of phases funded primarily by the Northeast Consortium, nearly 100 lobstermen from all of the major lobster associations in New England, Maine, Massachusetts, Downeast, and Atlantic Offshore, have recorded more than five million hourly records of temperature.

Through NOAA Fisheries Service's Northeast Fisheries Science Center, the Gulf of Maine Lobster Foundation, and the Marine Science Department at Southern Maine Community College (SMCC), the mission of the eMOLT project primarily is motivated by lobster science and the need to document environmental conditions. But, the vast eMOLT database also is accessible to the general public.

Additionally, NOAA Fisheries' Northeast Cooperative Research Program's (NCRP) Study Fleet includes 30 vessels in the Northeast and Mid-Atlantic groundfish, squid, and scallop fisheries that are equipped with temperature loggers on their gear.

Over several years, this group has collected more than two million bottom temperature and location records during more than 30,000 commercial fishing tows.

NCRP scientists are now combining bottom temperature and fish capture data gathered during surveys and Study Fleet trips to improve distribution maps of key commercial species.

Temp-depth probe

Until recently, the only inexpensive bottom temperature-depth recording tools readily available to fishermen were devices that had to be removed from the fishing gear and hooked up to a data reader to download the data and reprogram the probe.

This task was problematic at sea, so probes were retrieved on a monthly basis to download the data so it could be added to GPS location files. Unless fishermen had expensive net systems equipped with temperature sensors, they were not able to view the data immediately. This resulted in data lags and only allowed for retrospective data analysis rather than real-time data use.

In 2011, to give fishermen a better tool to access real-time bottom temperature information, NCRP funded the development of a wireless temperature-depth (TD) probe through the Aquatec Group LTD.

The new probe can transmit temperature and depth information wirelessly from the fishing gear as it is hauled to the surface to a computer located onboard without removing the probe from the gear.

This new technology allows fishermen to view data on a monitor in the wheelhouse and make correlations between the temperature data they are seeing and the marine species they are catching. With this information, they can alter their fishing strategies to be more selective and efficient.

Ten of the wireless TD units are currently being tested by eMOLT and Study Fleet participants, and the feedback has been extremely positive. Another 10 units are currently being manufactured for additional distribution and data collection.

During the testing, the eMOLT project has already discovered more about what happens to lobster gear in certain current situations than was known previously.

Some Study Fleet participants use bottom-temperature data to help predict where they may encounter certain species they wish to avoid, such as dogfish. As fishermen become more familiar with the data they are acquiring, they also can use it to target desired species.

Both eMOLT and the NCRP are sharing this important data with NOAA's Integrated Ocean Observing Systems (IOOS), NERACOOS, and MARACOOS. This additional information can help oceanographic modelers better assess and improve models developed through earlier technology and develop new models to forecast not only wave heights and current directions but also ocean bottom temperatures.

Fine-tuning these models and forecasts can help oceanographers provide useful information to end users for strategic decisions and selective fishing practices.

Integrating catch data with fishing gear depth and temperature information also may facilitate and verify ecosystem modeling approaches that are greatly needed to better understand ocean dynamics and how they affect marine species.

The real-time data provided by the wireless TD probe is an important step in this direction and provides another tool to better understand our changing ocean.

For more information on the eMOLT program, e-mail Jim Manning at <James.Manning@noaa.gov>. For more information on NCRP initiatives, e-mail John Hoey at <John.Hoey@noaa.gov>.

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