

# Probing for pollution at Mission 31

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Credit: Thinkstock

When Northeastern assistant professor Loretta Fernandez was a kid, she "wanted to be Jacques Cousteau" (her words, her emphasis). She wanted to live on *The Calypso*, the boat from which the legendary ocean explorer would set out on his epic underwater journeys.

So when the opportunity to take her research to Mission 31—the monthlong experiment in underwater living led by Cousteau's grandson, Fabien Cousteau—Fernandez didn't bat an eyelash.

As I wrote in a news@Northeastern story recently, Fernandez uses these crazy-simple contraptions to collect crazy-important data about marine pollution. And despite their simplicity, these contraptions—which consist of a piece of metal covered by a strip of plastic—she does some heavy duty math to extract the stories they have to tell about the ocean.

Here's how it works, in case you don't want to go read the other story right away: Organic pollutants are typically large, hydrophobic molecules and so are the fatty tissues of living organisms. Since like-tends-to-dissolve-like, those pollutants tend to end up in the organisms that hang out in the water. You know, the fish... that we eat. So, yes, those pollutants eventually end up in us, too.

The molecules in Fernandez' plastic strips are also large and hydrophobic, so pollutants collect inside them at about the same rate as they do in fish.



The passive samplers Loretta Fernandez uses consist of a wire frame covered in a thin sheet of plastic. Credit: Mariah Tauger.

For Mission 31, which just wrapped up today, Fernandez sent down two separate experiments. The first was a time series analysis which will allow her to confirm the mathematics that she's been relying on for this particular type of plastic.

There have been a lot of independent calculations to add confidence to the numbers, but no one has done a good experimental analysis to confirm them yet. "Usually we don't do these types of experiments," Fernandez said, "because to send divers down four times in a month is expensive and hard." But the Mission 31 team was already down there and it wasn't much skin off their backs to set up the experiments for her.

(This might be a good time to mention that Fernandez doesn't dive. She never was able to achieve that childhood dream of becoming Jacques Cousteau... or even a diver... because, well, she gets motion sickness and is afraid of the water. She still goes out on the boats though, but that means "scopolamine patches everywhere and I still end up, you know, heaving over the side in between setting samplers up." Just another reason why Mission 31 was so useful for her!)

The second experiment is perhaps a little more exciting from a layperson's perspective. In this one, she had the "aquonauts" (the scientists living under the sea for Cousteau's 31-day mission) set up samplers at three different depths on the reef. This provides a lot of "sampler mass" in which to collect organic contaminants.

"We'll just see what sort of [organic contaminants](#) we see in this otherwise pristine environment," Fernandez said. She expects that some

of the things she sees will be residual oil compounds from the Gulf oil spill and the dispersants that were used to break up that oil. While the Conch Reef where the experiments were carried out isn't in the gulf per se, it does get an influx of Gulf waters so it's highly probable that Gulf contaminants will end up here as well.

Fernandez' samplers are decidedly easy to set up and once in place require very little oversight. As she said, "they really are passive samplers." This video is proof:

Provided by Northeastern University

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