SWIFT: Surface Wave Instrument Float with Tracking

Test Deployment in the Marginal Ice Zone

Narrator: The icy waters of the Arctic north of Barrow, Alaska, are a major change in conditions from the mouth of the Columbia River, where SWIFT drifters spent the summer of 2013 measuring waves, winds, and currents.

SWIFT was developed by APL-UW's Jim Thomson. In September of 2013, graduate student Seth Zippel took SWIFT to the Arctic.

Seth Zippel: I'm walkin' on the ocean!

The first time the SWIFT is in the Arctic — it went great.

Narrator: This was the first test of SWIFT 3.0 — the Arctic version of the SWIFT.

Zippel: It's kind of beefed up for the Arctic. We've made the hull all aluminum instead of plastic.

Narrator: Seth put the drifter in a patch of open water in strong wind conditions.

Zippel: And it was also cold enough for the ice to start freezing. So normally, when it's cold and there are no waves, it's a calm surface like a lake. In this energetic condtion with all these waves, it almost looks like a slush or some people would call it 'grease ice'.

It was really like a slush the SWIFT was sitting in. What I was really excited for, it drifted in and you could see the wave response really well. There were these high-frequency waves with all this texture. And then there's almost a line drawn right in the water and you could see the waves were really smooth that were propagating into that grease ice. So the little bits of ice and slush that were in that patch of water were actually stopping the high frequency waves from getting through and then the waves that are getting through are modulated a little bit.

Narrator: Excited by the science, Seth always kept the price tag in mind.

Zippel: It's probably like 60 grand for each SWIFT. My biggest concern was getting it back!

Narrator: The SWIFT emerged encrusted in ice, but in good working order.

Zippel: It was only in for two hours and it was totally frozen over on top — a couple of inches of ice. And it was sea ice and that's salt water , which is a lot colder than freshwater ice.

I was really excited to see it to be honest. I thought it was really cool looking.

Narrator: Cool looking and communicating findings despite the cold and the very northerly location.

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Zippel: All the instrument's data are sent to the central brain — this processor that's running some of our processing code — and then it emails it back to us here at APL. And that's something we weren't sure would work at high latitudes. The satellite connections would be at 76 degrees North and that worked great. We were receiving emails the whole time the SWIFT was out there taking data.

Narrator: The plan is to take more SWIFT drifters back to the Arctic in 2014 — to the marginal ice zone — where the ocean meets the edge of the ice pack. The prime objective is a better understanding of ocean surface waves in the presence of sea ice, in particular, how melting ice might lead to a larger ocean, which in turn creates bigger waves and increased navigation dangers.

Zippel: Understanding that response will help with wave predictions in the Arctic. So as the ice melts, there's a lot more boats navigating through the Beaufort, the Chuchki, going through the Northwest Passage, and it's certainly a dangerous environment especially near the ice. And if you can make better predictions based on your knowledge of the physics between the waves, ocean, and ice interaction, you can definitely improve safety in those regions.

This is APL The Applied Physics Laboratory at the University of Washington in Seattle.