Satellite Remote Sensing of Ocean Salinity

Calibrating *Aquarius* Sea Surface Salinity Measurements with In Situ Data

Narrator:
The view from a two-meter surfboard under tow in the Pacific...

On-board instruments measure near-surface salinity.

Bill Asher:
Salinity is an indicator of ocean processes – a tracer of ocean water motion.

Narrator:
APL-UW Oceanographer Bill Asher links ocean salinity not only to ocean currents, but temperature and evaporation – key elements of climate and climate change.

This is why it's important to measure salinity as accurately as possible – traditionally using ships and buoys. And now by surfboard and by satellite

Asher:
There's a new satellite in orbit called *Aquarius* and it uses an L-band microwave radiometer.

Narrator:
Aquarius coverage is global but relatively shallow.

Asher:
The radiometric penetration depth of microwaves used to measure salinity is a few centimeters at most – meaning these radiometers are measuring salinity at the very top of the ocean surface.

Narrator:
By contrast, the towed surfboard takes salinity readings at depths from five centimeters to two meters.

APL-UW scientists believe their salinity measurements at depth can help calibrate *Aquarius* data from space by factoring out a key variable in ocean salinity: fresh water.

Asher:
You might imagine as rain falls on the ocean that it makes the ocean fresher and that fresher water is less dense. You get these lenses of fresh water overlaying the salty water down below it.

Narrator:
Fresh water on the sea surface could "spoof" the shallow satellite readings.

The deeper APL-UW surfboard measurements go into computer models aimed at allowing *Aquarius* scientists to factor in transient freshwater gradients.

Ruth Branch:
We found one patch that was five kilometers large. It's not the same size as an *Aquarius* pixel but it's large enough to corrupt an *Aquarius* pixel measurement. So the *Aquarius* scientists need to be able to flag those pixels as areas where there has been rain and those pixels are bad. Our data tells them which data they shouldn't trust.

Asher:
When the satellite flies overhead and takes a picture of a particular region of ocean, you need to know how many near-surface salinity gradients there are, how large they are in terms of extent and in terms of the magnitude of the salinity gradient – so that you know if they're going to affect the calibration of the satellite.