

Wave Breaking in Mixed Seas

Narrator: Surfers are always out to catch the perfect wave. The Applied Physics Laboratory is fielding tiny “wavecams” to study waves breaking at the ocean surface.

Jim Thomson: Wave breaking is the key term that controls the evolution of waves on the ocean surface. So the wind blows and that makes waves and then wave breaking is what takes the energy out of the waves.

Narrator: Principal Investigator Jim Thomson is looking for any patterns that may emerge from the seemingly random interaction of wind and water.

Thomson: We use a variety of platforms – the primary one is right behind me here. These are drifters. We deploy them from the ship and then we let them go freely. They’re untethered. They collect all their data on board.

Narrator: Moving beyond measurements, Thompson is attaching electronic eyes to his platforms – to balloons for a birdseye view of the big picture and on the surface from the drifters moving along with the waves.

Video is recorded by small GoPro high definition cameras: wavecams.

Thomson: The real advantage is being able to understand the spatial distribution of these things. So these drifters, you can see, are small. They make a measurement just at a point.

But up on the mast of the drifter, we have a GoPro video camera and it’s running in HD. It has a very wide field of view. It’s a fisheye lens and that allows us to see the whole ocean surface for several tens of meters surrounding the buoy. And that allows us to see the rest of what’s going on. With the GoPro we can see how big was the wave that just broke. How long was that crest that just broke? How long was there a breaking crest that has foam and has white water? How long was that there? And then we relate it to the turbulence we measure in the water.

A big practical application of this is to understand how much, how many waves, and how much wave energy will end up at a coastline where we can surf on it, where it will cause erosion, where it might be harnessed for energy – all of those applications.”

Narrator: After a successful deployment in the Strait of Juan de Fuca, the APL-UW scientists next take their wavecams 1200 miles out into the Pacific Ocean in search of new and greater understanding of the forces at work in waves.

