

Scientists look at whether climate change is causing bigger ocean waves

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It's one of the most treacherous stretches of water in the world, where 1 million cubic feet of water a second collides with 20- or 30-foot ocean swells over a four-mile stretch of shifting sand.

A small band of pilots braves often-treacherous conditions to guide ships across the Columbia River Bar.

The pilots who work the "Graveyard of the Pacific" have a deep respect for the relentless forces they face daily as they ride out to tankers, bulk carriers, car carriers, and cargo and passenger ships standing offshore. They commute in 72-foot self-righting boats that can roll over 360 degrees as winter gales and sometimes hurricane-force storms blast out of the North Pacific.

The pilots also confirm what marine scientists have just started talking about: Ocean waves are becoming bigger and more powerful, and [climate change](#) could be the cause.

"We've been talking about it for a couple of years now," said Capt. Dan Jordan, who served in the merchant marine for 30 years before becoming a Columbia River Bar pilot. "Mother Nature has an easy way of telling us who is in charge."

Using buoy data and models based on wind patterns, scientists say that the waves off the coast of the Pacific Northwest and along the Atlantic seaboard from West Palm Beach, Fla., to Cape Hatteras, N.C., are

steadily increasing in size. And, at least in the Northwest, the larger waves are considered more of a threat to coastal communities and beaches than the rise in sea level accompanying global warming.

Similar increases in wave height have been noticed in the North Atlantic off England.

Unclear is whether the number and height of "rogue" waves beyond the continental shelf have increased. The existence of such freak waves, which can reach 100 feet or more in height and can swamp a large ship in seconds, wasn't proved until 2004, when European satellites equipped with radar detected 10 of them during a three-week period. According to some estimates, two merchant ships a month disappear without a trace, thought to be victims of [rogue waves](#).

"Obviously, this is an issue we are interested in," said Trevor Maynard of Lloyd's of London's emerging risk team, which tracks global climate change developments. "We are seeing climate change fingerprints on a lot of events."

Since the mid-1970s, buoy data show the height of the biggest waves off the Northwest coast has increased an average of about 4 inches a year, or about 10 feet total, according to Peter Ruggiero, an assistant geosciences professor at Oregon State University and the lead author of a study published recently in the journal *Coastal Engineering*.

Ruggiero and his colleagues also estimated how high a 100-year wave might be. These would be the largest waves expected to come along every 100 years. The estimate has increased 40 percent since the 1970s, from 33 feet to 46 feet. Some calculations estimate a 100-year wave might be 55 feet high, taller than a five-story building.

"We are assuming the trends will increase in the future," Ruggiero said.

The future already may be here, however.

Jordan, the Columbia River pilot, said a 44-foot wave was recorded off the river in October. In a major spring storm in 2007, a 54-foot wave was recorded.

"After that the buoy quit recording," Jordan said.

On the East Coast, a yet-to-be-published study also has showed that average wave heights have been increasing, by a couple of centimeters or so a year.

"The averages aren't very exciting," said Peter Adams, an assistant professor in the University of Florida's Department of Geological Sciences who used wind data from the past 20 to 30 years to develop a wave height model. "Given that there are 3 million waves a year, one wave every 10 seconds, it's not so alarming."

Adams said he finds it startling that the height of the biggest waves has increased nearly a foot in 10 years.

"In a lifetime, that can be profound," he said.

A scientific debate is raging over what's causing the increase in wave size. Possible causes include changing storm tracks, higher winds and more intense winter storms - all signs of global climate change.

"While these increases are most likely due to Earth's changing climate, uncertainty exists as to whether they are the product of human-induced greenhouse warming or represent variations related to natural multi-decadal climate cycles," Ruggiero's study said.

Among the weather phenomenon that could be affecting wave heights in

the Pacific, Ruggiero said, are El Nino - warmer surface temperatures in the tropical eastern Pacific - and the Pacific Decadal Oscillation - 20- to 30-year patterns of warmer or cooler surface temperatures in the Pacific.

"There is a lot of speculation, a lot of reading of tea leaves," he said.

Others are skeptical about any link to climate change.

Richard Seymour, the head of the Ocean Engineering Research Group at the Scripps Institution of Oceanography in California, said any connection between increased wave height and climate change is tenuous. In fact, Seymour said, there isn't enough data on wave heights to provide the "statistical reliability" to predict any trends.

Seymour and others said too little is known about the oceans.

"It always struck me as odd we know more about the surface of Mars than the floor of the Pacific Ocean," he said.

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