

PREVIOUS CLIMATIC SHIFTS DEPRIVED OCEANS OF OXYGEN



Dead zones — massive stratified columns of oxygen-deprived water — could become the new normal in oceans around the world as global temperatures continue to rise. New research, published this week in the journal PLOS ONE, links ancient climate change to dead zone expansion.

“Our modern ocean is moving into a state that has no precedent in human history,” explained study author Sarah Moffitt, a postdoctoral researcher at the University of California, Davis. “The potential for our oceans to look very, very different in 100-150 years is real.”

Moffitt and her colleagues looked at marine sediment cores from all over the world to build a model of the ancient ocean during the last period of global glaciation, between 10,000 and 17,000 years ago. The world’s glaciers were rapidly melting during this time period.

Models of the ancient ocean showed a rapidly warming climate at the end of the last ice age resulted in expansive regions of low-oxygen water. The evidence suggests history may be repeating itself.

“This is a global story that knits these regions together and shows that when you warm the planet rapidly, whole ocean basins can lose oxygen very abruptly and very extensively,” Moffitt said.

Pockets of oxygen deprived water occur naturally in the world’s oceans. In fact, these hypoxic zones are essential to marine life. Though these deep wells of cold water are low in oxygen, they’re high in nutrients.

A process called upwelling pushes these pockets to the surface where they mix with oxygen-rich surface water. Upwelling brings nutrients to the surface, feeding the plankton that fuel complex marine food chains.

But large and especially self-contained columns of oxygen-deprived water can be dangerous, trapping and asphyxiating the types of marine life nature-lovers, fishermen and seafood-eaters hold most dear. Researchers have surmised climate change could encourage larger dead zones — a buildup of coastal hypoxic pockets, reluctant to mix with surface water.

Global warming raises the temperature of ocean water, making it less efficient at absorbing oxygen at the surface and delivering it to the lower depths.

Dead zone events have become more frequent and pronounced along the Pacific coast in recent years, but it has been difficult for science to say definitively whether global warming was to blame. The new research by Moffitt and her colleagues proves there is a historic precedent for this kind of phenomenon — and it’s not necessarily a pretty one.

“It is important that oxygen appears on our ‘radar screen’ as we look into the future, for oxygen loss in the ocean exerts critical control on the numbers, types and distributions of fish and shellfish that we harvest,” Lisa Levin, an oceans expert at the University of California at San Diego, told the Guardian.

“By understanding the coupling in the past between the global climate system and oxygen in the ocean,” Levin added, “we are better prepared to adapt human activities to future changes in oxygenation.

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