

Understanding oxygen depletion on the Oregon coastal shelf

October 9 2013

Each spring, the winds off Oregon shift, changing ocean currents and spurring the onset of the upwelling season, an approximately 4 month period where cold, nutrient-rich, oxygen-depleted deep water is driven into the coastal region. In recent decades, measurements have shown that the concentration of oxygen in the waters off Oregon has been decreasing. More recently, seasonal hypoxia has become a concern. Although this long-term decline is well documented, the details of the annual and seasonal variability in the concentration of dissolved oxygen on the shelf are not. Using moored sensors installed off the coast of Oregon for three seasons, from 2009 to 2011, Adams et al. measured the properties of the water, including changes in the current as well as the temperature, salinity, and concentration of dissolved oxygen. They find that although the seasonal upwelling initiates the annual reduction in dissolved oxygen, it is also responsible for staving off widespread anoxia.

To understand the effect of upwelling on coastal conditions, the authors analyzed their observations for trends that occurred on a range of time scales, from subtidal to tidal to interannual. They find that because the cold [deep water](#) is low in dissolved [oxygen](#) and because the introduction of nutrients spurs biological productivity, the onset of upwelling leads to oxygen depletion. However, upwelling also causes enhanced flushing and mixing, which prevents the oxygen from dropping as low as it otherwise would. Upwelling-induced flushing and mixing limit the annual [oxygen depletion](#) to just 30 percent of what it should be if the infiltration of cold deep water and biological respiration were the only factors.

The authors find that changes in the winds along the coast cause weekly variability in the concentration of dissolved oxygen, while monthly variability can be caused by fluctuations in the atmospheric jet stream.

More information: Adams, K. and Barth, J. Temporal variability of near-bottom dissolved oxygen during upwelling off central Oregon, *Journal of Geophysical Research-Oceans*, DOI: [10.1002/jgrc.20361](https://doi.org/10.1002/jgrc.20361), 2013 [onlinelibrary.wiley.com/doi/10 ... /jgrc.20361/abstract](https://onlinelibrary.wiley.com/doi/10.1002/jgrc.20361/abstract)

Provided by American Geophysical Union

Citation: Understanding oxygen depletion on the Oregon coastal shelf (2013, October 9) retrieved 21 September 2024 from <https://phys.org/news/2013-10-oxygen-depletion-oregon-coastal-shelf.html>

This document is subject to copyright. Apart from any fair dealing for the purpose of private study or research, no part may be reproduced without the written permission. The content is provided for information purposes only.