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# Future changes in oxygen ventilation pathways related to 21st century deoxygenation

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Observed changes in oxygen inventory over the past 50 years have revealed that the oxygen in the ocean is continuously decreasing. Climate models predict a further decline by the end of the 21st century. Deoxygenation in the ocean interior in response to climate change results from an imbalance of oxygen consumption and oxygen ventilation. Most analyses have focused so far on the balance between changes in solubility induced by warming and changes in AOU which gather changes in circulation and oxygen consumption. Here, we propose an alternative view by focusing on oxygen fluxes at the base of the mixed layer. Changes in oxygen ventilation are decomposed into a solubility and circulation driven parts. Moreover changes in oxygen ventilation are decomposed into changes in advection, vertical mixing and eddy mixing. Changes in respiration are estimated from the fluxes of organic matter at the base of the mixed layer. We present regional estimates of these changes in a Coupled Model Intercomparison Project 5 (CMIP5) climate change simulation. Our results show that: 1) reduction in ventilation leading to deoxygenation represents a small fraction of natural oxygen ventilation. It is partially compensated by a decrease in respiration. 2) Global ocean deoxygenation is predominantly driven by changes in diffusive oxygen fluxes across the mixed layer. 3) Latitudinal patterns of deoxygenation are only marginally controlled by patterns of ventilation changes.