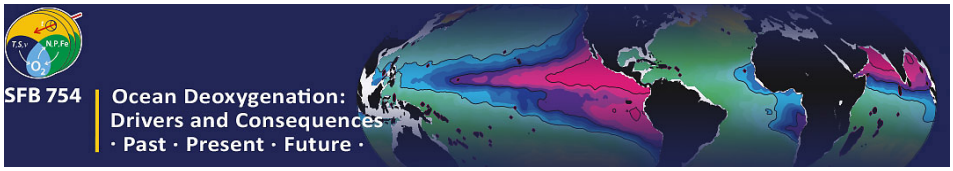

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Potential complexity of zooplankton responses to deoxygenation: very small oxygen differences matter

Monday, 3 September 2018 15:30 (15)

Significant variability in zooplankton abundances and distributions, associated with very small differences in oxygen concentration and temperature, were documented at midwater depths within the strong oxygen minimum zone of the Eastern Tropical North Pacific in Jan – Feb 2017. First, a towed hydrographic profiler, the Wire Flyer, was deployed on ~50 km long transects between 325–650m or 525-850m depths. Locations of midwater features showing oxygen gradients were identified for targetted zooplankton sampling. Horizontally-sequenced zooplankton samples along with hydrographic data were then collected with a MOCNESS net system towed through the feature at a constant depth (either ~430m or ~800m). Day and night vertically-stratified tows were also done for several depth intervals and locations. Species abundances and distributions (copepods, euphausiids, fish), and total zooplankton biomass, were analyzed relative to depth and oxygen. Horizontally-sequenced tows showed strong differences in abundances of particular species associated with very small changes in oxygen concentration even though the sampling depth remained relatively constant. Vertically-stratified tows provided broader context for the full range of a species habitat including diel vertical migration. Respiration measurements of key species collected live in Tucker trawls at these same locations determined their physiological tolerances (critical partial pressure of oxygen (Pcrit) at selected temperatures) that were related to their distributions. Plots of the Metabolic Index for selected species illuminated physiologically-suitable habitat along these transects. These results suggest substantial unexpected complexity in responses of oceanic organisms and ecosystems to predicted future deoxygenation.

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