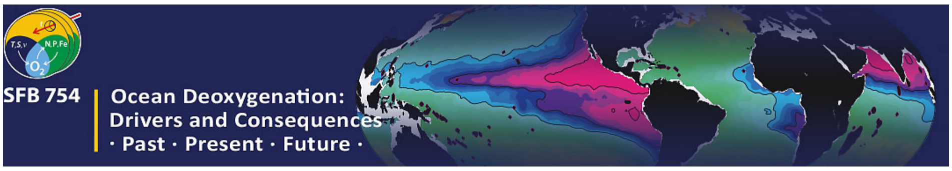


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# Deep Maximum of Virus-Bacterial Ratio in Oxygen Minimum Zone in the South China Sea: Preliminary Evidence for Viral Control of Bacterial Depletion of Oxygen

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The oxygen minimum zone (OMZ) in deep water column of the oceans is over hundreds of years old and receive constant supply of organic matter from water above, but oxygen does not reach anoxia. Bacterial respiration is largely responsible for oxygen consumption in the OMZ and hence, any process that limits bacterial abundance and respiration contributes to the variation of OMZ. We hypothesize that viruses play an important role in limiting bacterial abundance in the OMZ and regulating the consumption of oxygen in the OMZ. We tested the hypothesis during a cruise conducted in September 2005 in the deep South China Sea. The results revealed the double maxima in the ratio of viral to bacterial abundance (VBR) in the water column: the deep maximum at 800-1000 m in the OMZ and the subsurface maximum located at 50-100 m near the subsurface chlorophyll maximum (SCM) layer. At the deep maximum of VBR, both viral and bacterial abundance were reduced with viral abundance being reduced less than bacterial abundance, whereas at the subsurface maximum of VBR, both viral and bacterial abundance increased to the maximum, with viral abundance increasing more than bacterial abundance. The evidence suggests that the two VBR maxima are formed due to different mechanisms. When abundant supply of organic matter at the chlorophyll maximum increases bacterial growth, viral abundance is stimulated and can increase faster, resulting in the VBR maximum. In contrast, in the OMZ, organic matter has been consumed and limits bacterial growth, but viruses are less limited by organic matter and continue to infect bacteria, leading to the maximum VBR. Such viral control of bacterial abundance is a potential mechanism responsible for slowing down the decrease to anoxia in oxygen in OMZ. Our finding provide a piece of evidence that viruses are an important player in controlling bacterial abundance when bacterial growth is organics-limited, and thus, regulate decomposition of organic matter, oxygen consumption and nutrient remineralization in the deep oceans.

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