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viral abundance distribution in deep waters of the Northern of South China Sea

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Little is known about the vertical distribution and interaction of viruses and bacteria in the deep ocean water column. The vertical distribution of viral-like particles and bacterial abundance was investigated in the deep water column in the South China Sea during September 2005 along with salinity, temperature and dissolved oxygen. There were double maxima in the ratio of viral to bacterial abundance (VBR) in the water column: the subsurface maximum located at 50-100 m near the pycnocline layer, and the deep maximum at 800-1000 m. At the subsurface maximum of VBR, both viral and bacterial abundance were maximal in the water column, and at the deep maximum of VBR, both viral and bacterial abundance were low, but bacterial abundance was relatively lower than viral abundance. The subsurface VBR maximum coincided with the subsurface chlorophyll maximum while the deep VBR maximum coincided with the minimum in dissolved oxygen (2.91mg L-1). Therefore, we hypothesize that the two maxima were formed by different mechanisms. The subsurface VBR maximum was formed due to an increase in bacterial abundance resulting from the stimulation of abundant organic supply at the subsurface chlorophyll maximum, whereas the deep VBR maximum was formed due to a decrease in bacterial abundance caused by more limitation of organic matter at the oxygen minimum. The evidence suggests that viruses play an important role in controlling bacterial abundance in the deep water column due to the limitation of organic matter supply. In turn, this slows down the formation of the oxygen minimum in which oxygen may be otherwise lower. The mechanism has a great implication that viruses could control bacterial decomposition of organic matter, oxygen consumption and nutrient remineralization in the deep oceans.