FORMATION MECHANISM OF THE HYPOXIC WATER IN HIUCHI-NADA, SETO INLAND SEA, JAPAN

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Oxygen in the bottom water in Hiuchi-nada, which is located in the central part of the Seto Inland Sea, Japan, is often depleted in summer. To elucidate the formation mechanism of the hypoxic water mass, detailed hydrographic observations were repeatedly conducted in summer 2002. The results show that the water was stratified and a cold dome, which corresponded oxygen depletion water, existed under the thermocline in the eastern basin of Hiuchi-nada. There was a strong correlation between temperature and oxygen concentration ($r^2 > 0.7$), suggesting that the formation of hypoxic water is strongly affected by the physical processes. By contrast, outside of the dome, the water column was well mixed by strong tidal currents and oxygen concentration was relatively high. A prominent bottom front separated these two different water masses. Estimates of geostrophic currents from the density distribution show cyclonic circulation over the edge of the cold dome, while the water was nearly stagnant in the dome. This indicates the cold dome is isolated from the surrounding water and water exchange is insufficient, so that oxygen concentration reduces in summer.

Since late 1980's, the yearly minimum of oxygen concentration has decreased in the eastern basin of Hiuchi-nada. The analysis of the long-term data of temperature shows that in this period the temperature has increased in the western basin of Hiuchi-nada, while has been in the same level in the dome (bottom water in the eastern basin). It is considered that the increase of temperature gradient further reduced water exchange between the cold dome and surrounding area, and thus decreased oxygen concentration in the dome in the last decade.