

SHORTER CONTRIBUTION

On the oxygen deficit in the Baltic deep water

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Fonselius (1962, 1967, 1969) has shown that the mean stability in the 50–100 m layer in the Baltic has slightly increased during part of this century, and he considers this to be one of the causes of the oxygen deficit, and consequent formation of H_2S , in the deep water.

The influence of temperature on the stability in the areas under consideration is much less important than that of salinity. However, the temperature has a direct effect on the oxygen content of the water. During the present century the temperature of the Baltic deep water has increased considerably (Fonselius, loc. cit.). The increase is at least $2^\circ C$ in the Bornholm basin, $1.4^\circ C$ in the East Gotland basin, and $1^\circ C$ in the Landsort Deep. The rise of temperature should affect the oxygen content of the water in at least two ways. First, the saturation in equilibrium with the atmosphere will decrease with rising temperature, and this would lower the original oxygen content by 2.5–5%. Second, the rate of oxygen consumption increases by about 7% per $^\circ C$ rise of temperature, corresponding to at least 15% in the Bornholm basin,

11% in the East Gotland basin, and 7% in the Landsort Deep.

The correlation between temperature and oxygen content is demonstrated by Fig. 1, showing oxygen content versus temperature in the Landsort deep water, and by Fig. 2, showing oxygen content of the Landsort deep water versus temperature in the Bornholm deep water. Even if the scatter is large there is a clear correlation, especially in Fig. 2. This is quite plausible, since the temperature of the deep water in the Bornholm basin determines the rate of oxygen consumption during the passage there. The data represented in the diagrams have been extracted from Fonselius (1969).

Though the present results do not imply that other factors can be disregarded, they indicate that the rise of temperature is one of the reasons for the present oxygen deficit in the Baltic deep water, and the consequent formation of H_2S .

This investigation was initiated by discussions with professor B. Kullenberg.

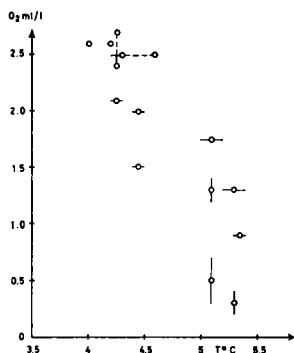


Fig. 1. Oxygen content vs. temperature of the Landsort deep water.

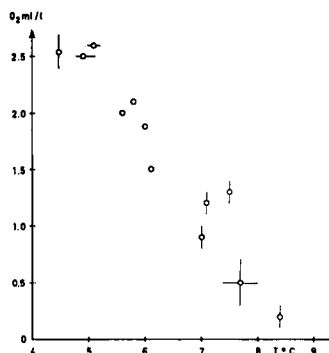


Fig. 2. Oxygen content of the Landsort deep water vs. temperature of the Bornholm deep water.

REFERENCES

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