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The use of a floating desalination plant to treat harmful algal blooms

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Abstract

Harmful Algal Blooms (HABs) have significant ecological and economic effects on the marine environment and use. In recent years, researchers have been increasingly developing and testing methods to treat and control HABs. Most of these methods involve applying clays, chemicals, or solid substances to a HAB-affected area.

The authors of this paper suggest using floating desalination plants to treat or control red tides. HAB producing dinoflagellates have been shown to be sensitive to physical and chemical changes in the environment, such as changes in temperature and salinity. The typical response of dinoflagellates is to form cysts that then settle out of the water column.

The discharges from a floating desalination plant can rapidly change the temperature and salinity in the water column, that could be expected to induce encystment in the dinoflagellates and effectively ending a HAB. The discharges include hypersaline water, freshwater, and heated warmer. By discharging the heated freshwater at a low depth in the water column, due to its lower density than seawater, the discharge would move upward towards the surface. Since the hypersaline water would be more dense than seawater, by discharging it at the surface, the hypersaline water would sink. The discharges from a floating desalination plant would stress the red tide with surfacing warmer freshwater and sinking hypersaline water and the dinoflagellates should encyst in response to these disturbances.

These temperature and salinity changes that could be created by a floating desalination plant would be achieved without the discharge of chemicals or other materials that could have other detrimental environmental impacts. A good aspect of this is that with continued mixing, the water would return to ambient temperature and salinity relatively quickly with minimal effect on the marine environment. Since the dinoflagellates have been shown to react quickly to environmental changes, the discharges may not have to be extremely hot or hypersaline or with very low salinity. Bench-scale and field tests would be establish the temperature and salinity ranges needed for optimal HAB treatment and control.

Biography

KEVIN C. OWEN has earned a MS. In Biological Oceanography from the Florida Institute of Technology, a M.S. in Environmental Sciences and a M.A. in Biology from the State University of New York in Buffalo, and a B.A. in Biology and Geology from the State University of New York at Binghamton. He is the Health, Safety, and Environmental Manager of the Port Dolphin Energy LNG Deepwater Port project for Höegh LNG, an international LNG shipping company. He has over 20 technical publications and conference presentations.