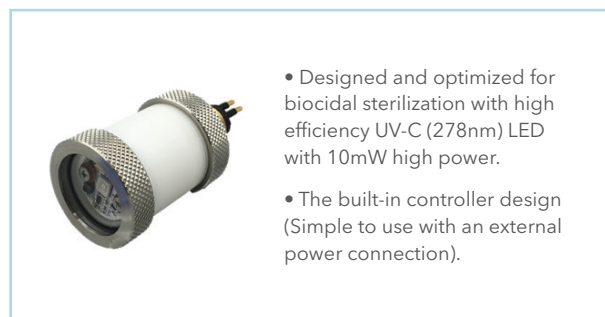


Barnakil (UV) as an effective tool against bio-fouling for Aanderaa Conductivity and Optodes in prolonged marine field deployments

Continuous monitoring of water quality in marine waters faces the arduous task of collecting accurate field data. Despite the availability of state-of-the-art water quality sensors, water quality monitoring faces biofouling challenges in the marine environment. Unlike in the past when toxic chemicals were used to combat biofouling, only non-hazardous environment solutions are permitted in most countries.

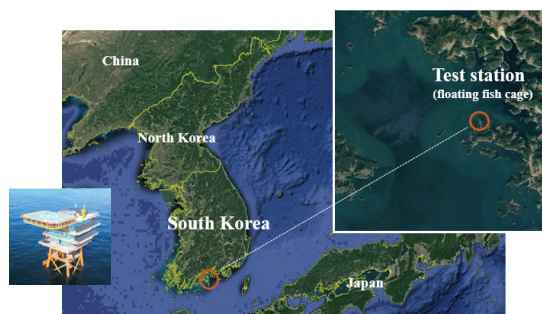
Project Scope

Depending on site conditions, type of sensors and deployment period, different forms of anti-biofouling solutions can be used. It could be mechanical wipers or simple DIY technique of using copper tape. Another alternative is the use of ultraviolet (UV) light, which is commonly used for water sterilization in the medical and food industries, killing bacteria in bulk water circulation systems. When using it against biofouling, it will be able to inhibit the growth of microscopic organisms on surfaces.

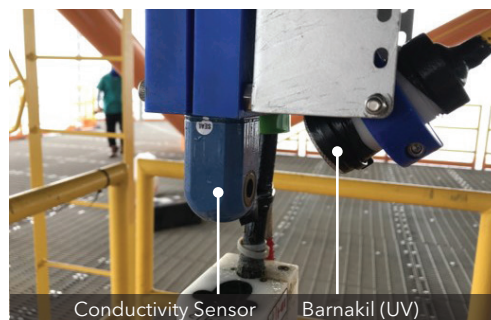


Solution

Oceantech, a high-tech South Korean company specialized in marine monitoring and research, developed a UV light based anti-biofouling device called Barnakil. It has been tested successfully with Aanderaa Conductivity and Oxygen Optodes. With Barnakil, data quality from continuous monitoring by Aanderaa water quality sensors will not be compromised. At the same time, it reduces field maintenance visits and helps to save costs.



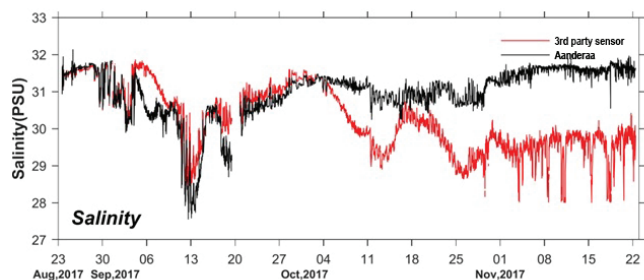
[1] Socheongcho Ocean Research Station and Namhae Island Fish Farm are testing sites for Conductivity and Optode respectively. (Source: Google Maps)



[2] Aanderaa 4319 Conductivity Sensor and Barnakil UV device on a sensor mounting before deployment. The power is supplied through AC adaptor and Barnakil is set at 100% cycles.



[3] Heavy biofouling is experienced after 3 months of deployment. However, Aanderaa Conductivity Sensor 4319 remains clear from biofouling as a result of Barnakil UV application on it.



[4] Aanderaa Conductivity Sensor 4319 continues to provide quality measurements as compared to 3rd party sensor because of Barnakil application which results in minimal biofouling on the sensor.

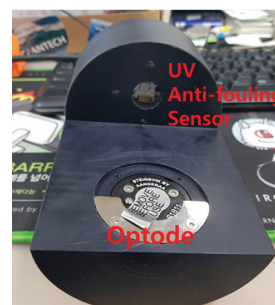
“With Barnakil, data quality from continuous monitoring by Aanderaa water quality sensors will not be compromised. At the same time, it reduces field maintenance and helps to save costs.”

Results

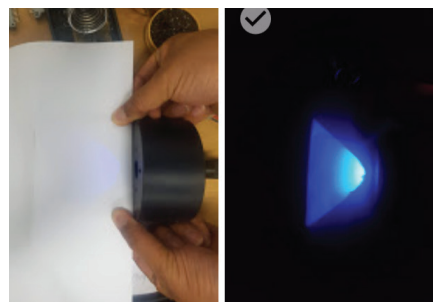
To demonstrate the effectiveness of the Barnakil, Aanderaa Conductivity Sensor 4319 and a 3rd party Conductivity Sensor were tested in Socheongcho Ocean Research Station (ORS) (Figure 1 and 2) in the northwest coast of Korea. Aanderaa’s Conductivity Sensor was equipped with the Barnakil while the 3rd party sensor was not. In Figure 3, after 3 months of testing Aanderaa’s conductivity shows no signs of biofouling drift and has provided reliable data, while the 3rd party sensor exhibits the effects of bio-fouling after the first month.

In another test, the Barnakil was integrated together with Aanderaa’s 5730 Optode (Figure 5 and 6). The device was installed in highly nutrient rich fish farm waters in Namhae Island, South Korea. It is deployed at 1 meter from water surface, allowing plentiful sunlight for biofouling growth on the optode (Figure 7). After almost 3 months of deployment without any maintenance, data gathered by the optode shows minimal effects from biofouling. This shows Barnakil has been effective in combating biofouling on Aanderaa Optode (Figure 8).

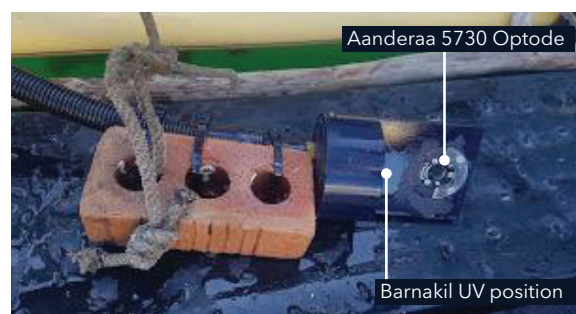
For more information and questions please contact us at aanderaa@xylem.com.



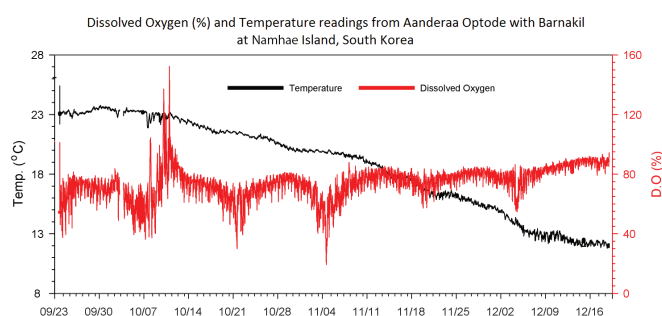
[5] Aanderaa 5730 Optode (LEFT) was integrated with Barnakil UV sensor (RIGHT).



[6] Extent of Barnakil’s UV beam covering Aanderaa’s Optode which helps to prevent biofouling.



[7] Barnakil with 5730 Optode was deployed at depth 1m for 3 months in fish farm in Namhae Island, South Korea. The power is supplied through AC adaptor and Barnakil is set at 100% cycles.



[8] Aanderaa 5730 Optode readings shows very little effects of biofouling as a result of Barnakil application on it.