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Title: OPTICAL DISSOLVED OXYGEN SENSORS IMPROVE DATA, MINIMIZE DOWNTIME

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There are generally three methods for measuring dissolved oxygen in surface waters: Winkler titration; membrane covered electrochemical sensors; and newly developed optical-based sensors. The optical technology for measuring Dissolved Oxygen (DO) is becoming well accepted due to advantages over membrane-based sensors, and excellent correlation to Winkler titrations. This paper will present a comparison of the various strengths and weaknesses of the current methods, with a focus on accuracy and resistance to biofouling over long-term deployments. Comparative data from impartial studies will be presented.

Optical sensors rely on lifetime-based fluorescence to measure DO levels *in-situ*. A lumiphore is illuminated with a blue LED, becomes excited, and emits back a red luminescent light with a lifetime that is inversely proportional to DO levels.

Optical technology has many advantages over membrane electrodes. Optical sensors are especially accurate below 2 ppm—a range in which most membrane sensors routinely give poor results. When monitoring anoxia in open bodies of water, achieving accurate readings below 2 ppm allows researchers to reliably characterize nutrient-related hypoxic zones.

Optical DO sensors require almost no maintenance other than an occasional cleaning with a soft cloth. The sensing element is long-lived—in some cases requiring replacement only once every 5 years. Optical sensors exhibit fast response with little or no drift over long deployments, minimizing the need for frequent maintenance and calibration. Users of optical DO sensors report that cost of ownership is drastically reduced, quality of data is improved, and potential for user error is virtually eliminated.