ARES TURBIDITY CHARACTERIZATION

HALIFAX, NOVA SCOTIA

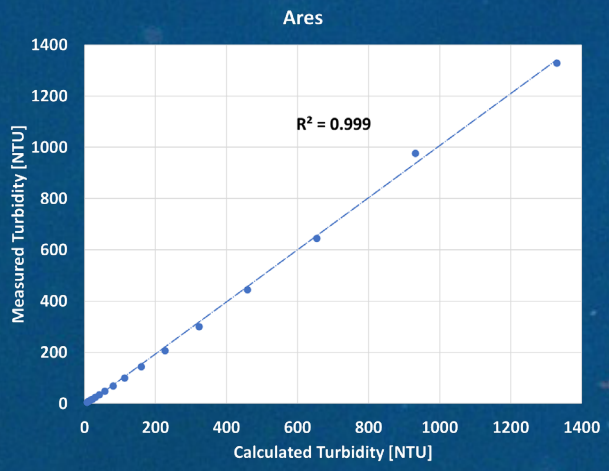
Xeos has leveraged decades of optical sensor design experience to develop a new range of water quality sensors for environmental monitoring and oceanographic research. The first sensor to be fully tested and characterized is the Ares Turbidity sensor, which uses a calibrated response to reflected light to produce a quantitative measurement of turbidity in Nephelometric Turbidity Units.

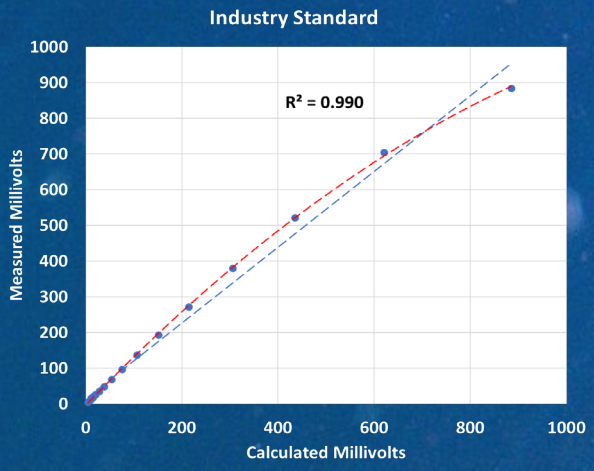
Introduction

The Xeos Ares turbidity sensor has undergone rigorous characterization to ensure the data it produces is of the highest quality. Numerous field trials in differing aquatic and marine environments have been conducted during the development of the Ares to provide a robust data set to analyze. The following encompasses the results of the Ares compared to a turbidity sensor representing the industry standard.

Linearity

Sensor linearity was determined using a dilution series. The leading competitor has a linearity of 99.0%, while the Ares has a linearity of 99.9%. A linear sensor simplifies the calibration process and reduces uncertainty in the turbidity measurement. Graph 1 and 2 display the Ares and industry standard linearity, respectively.





Temperature Sensitivity

In an optical sensor, one of the main contributions to uncertainty is the light source. Most commercial turbidity sensors use an LED as a light source, and LED output intensity varies with temperature. At lower temperatures the output power of an LED increases, which leads to a more detected scattered light.

In laboratory tests, we used a solid diffusing surface in front of each sensor, rather than a suspension that might change its properties over the 0-40 °C test range. The industry standard sensor varied by +/- 17% over the temperature range. In contrast, the Ares varied by only +/- 4%.

In the Ares we have also added a monitor photodiode that records the relative LED intensity. At the time of sensor calibration, the LED output intensity can be normalized. The relative LED intensity is then transmitted as part of each digital frame. This information can be used in post processing to scale the turbidity reading, reducing the effects of temperature even further.

Xeos Technologies Inc.
36 Topple Drive
Dartmouth, NS, Canada B3B 1L6

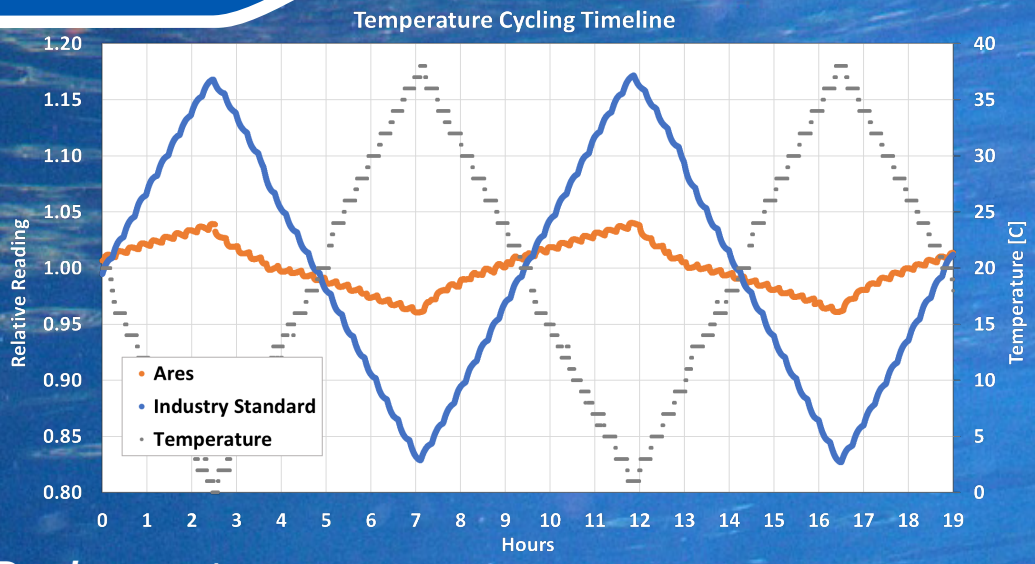
Tel: 902.444.7650
Fax: 902.444.7651
sales @xeostech.com

Xeos Technologies Inc.

www.xeostech.com

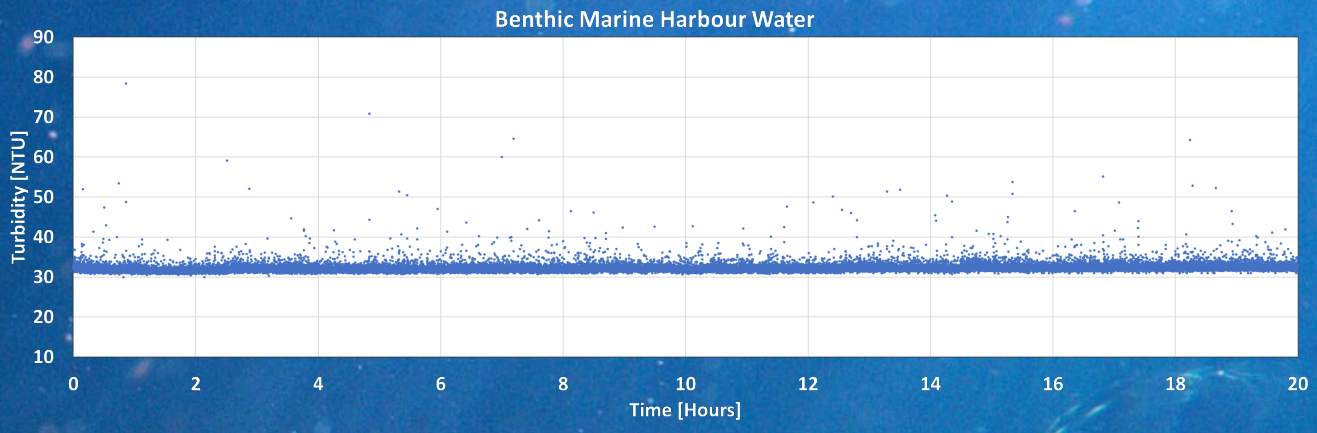
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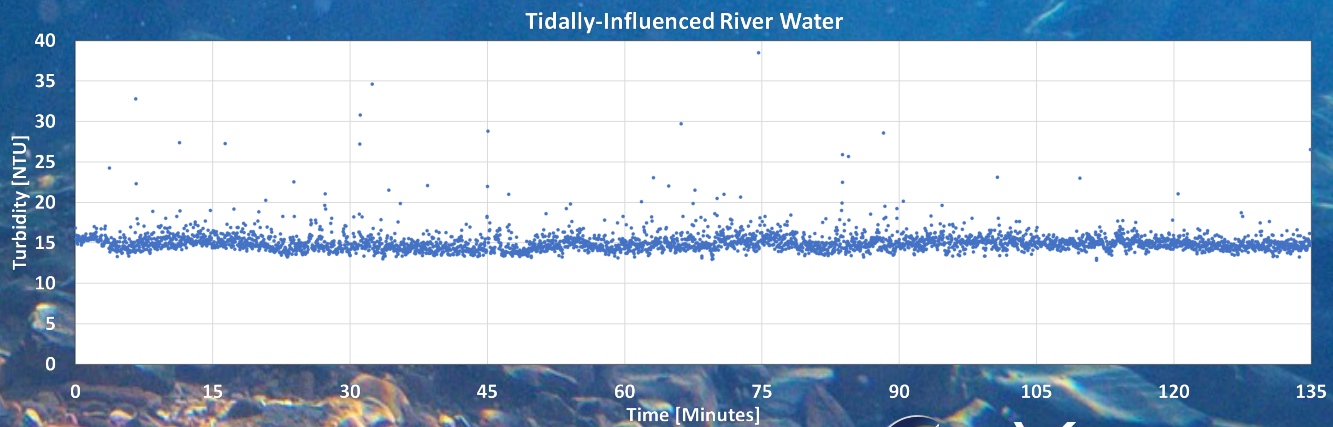
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Field Deployments

Field data from two winter deployments are presented below. The first is from the Stella Maris benthic platform in Halifax Harbour and the second is from the tidally influenced Gaspereau River. Both show stable and naturally variable turbidity. The river data represents before, during, and after high tide. A subtle decrease in variability can be seen at the end of the river data as the flow increases.





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Dartmouth, NS, Canada B3B 1L6

Tel: 902.444.7650
Fax: 902.444.7651
sales @xeostech.com

Xeos Technologies Inc.

www.xeostech.com