



A comparative study between YSI ProDSS probe and fluorometric technique for Chlorophyll *a* measurement

Lakshay Sachdeva¹ and Hsiao-Chun Tseng^{2*}

¹Delhi Technological University, New Delhi, 110042, India

²Institute of Marine Environment and Ecology, National Taiwan Ocean University, Keelung, 20224, Taiwan

Introduction

Chlorophyll, a vital biochemical component responsible for photosynthesis, primarily exists as chlorophyll *a* in phytoplankton. Studying phytoplankton concentration helps assess water body's health, composition, and detection of indicator pollutants, including phosphorus and nitrogen.

High level of nutrients
(mainly Phosphorus and Nitrogen)

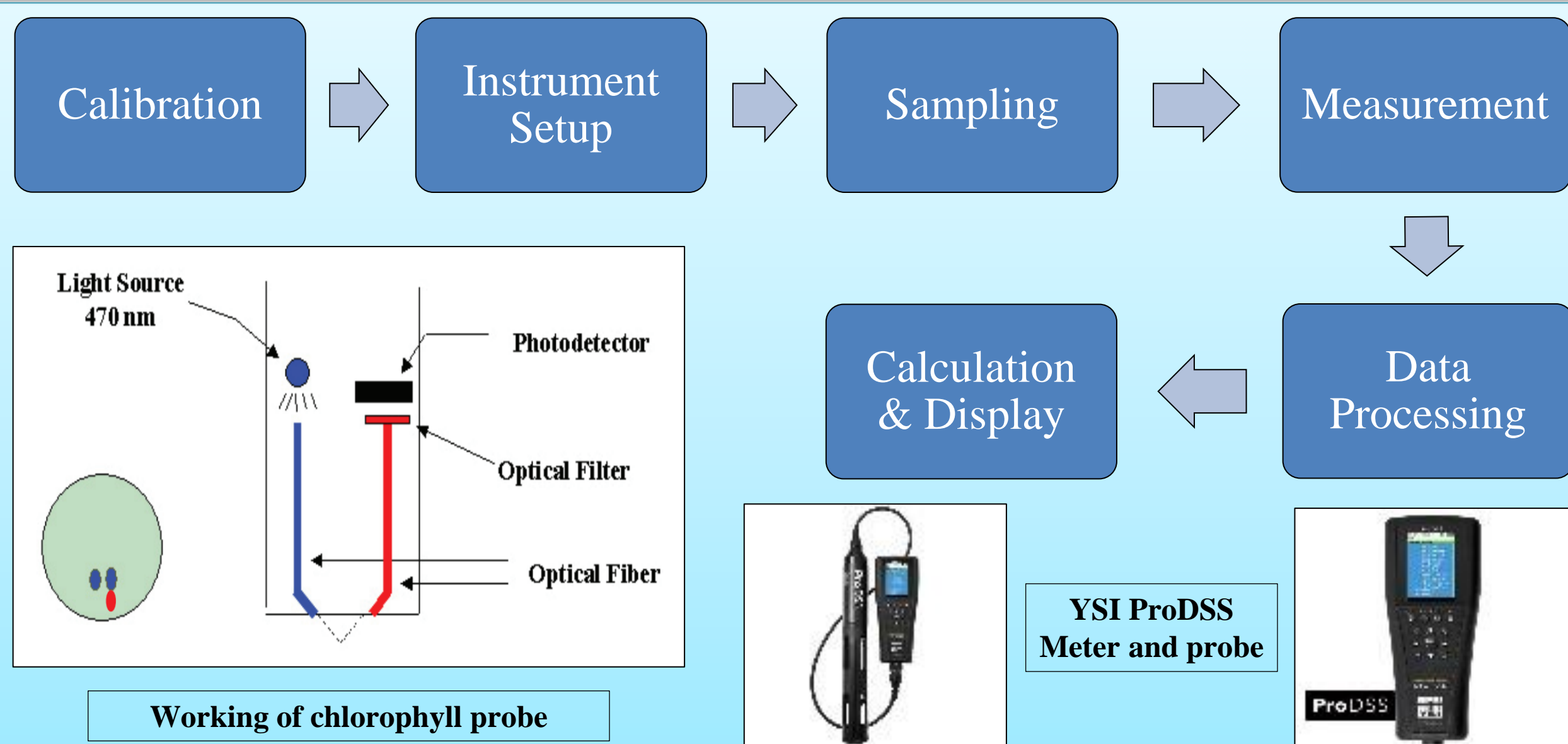
Excess amount of algae
(Indicated by high conc. of chlorophyll)

-Bad odour & green scums
-Reduction in DO
-Production of toxins
-Killing of marine life

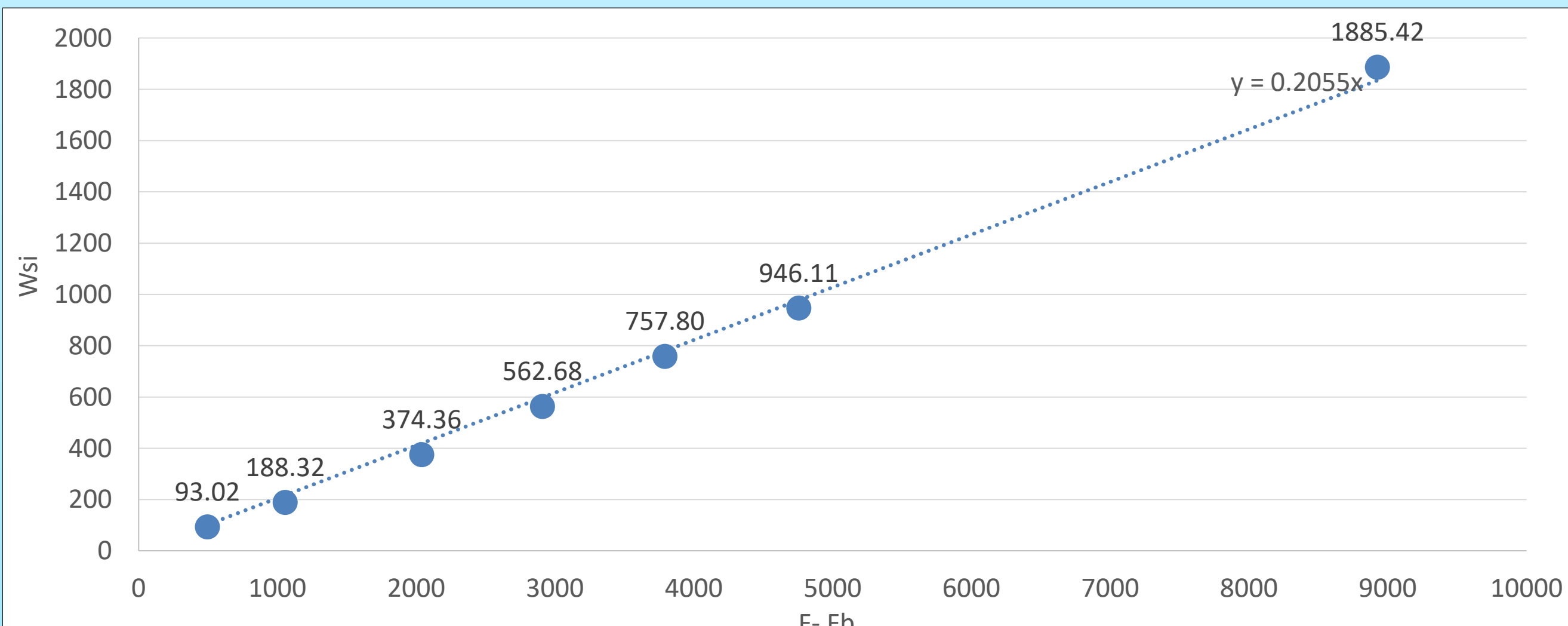
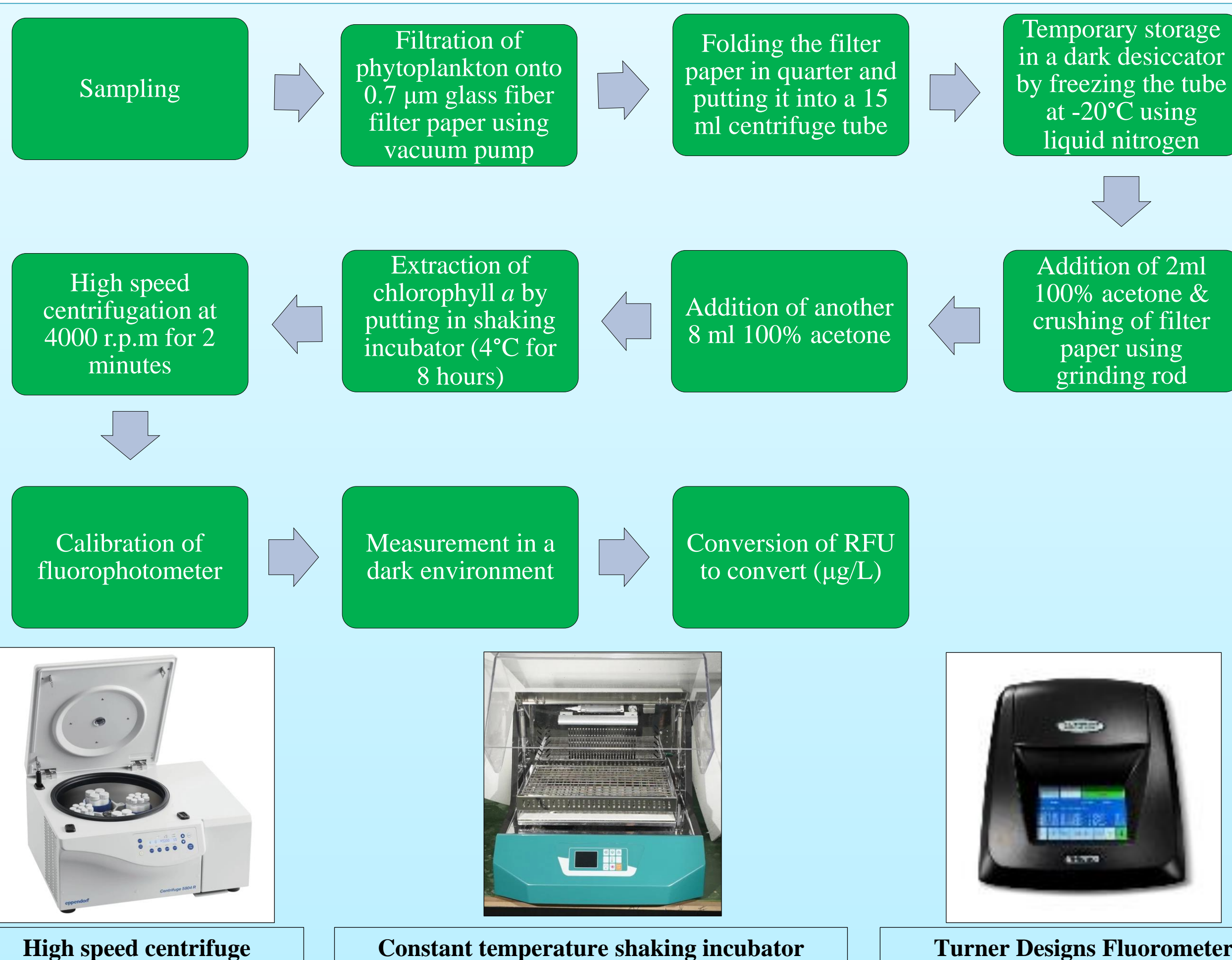
Two common methods for chlorophyll *a* measurement are the field-deployable YSI ProDSS Multiparameter Digital Water Quality Meter and the standard laboratory-based fluorometric technique. We utilize the Turner Designs Trilogy Fluorometer for this study. The YSI ProDSS is a multiparameter instrument capable of measuring various water quality parameters & the Turner Designs Trilogy is a specialized laboratory fluorometer optimized for high-sensitivity fluorescence measurements. This study compares their performance in measuring chlorophyll *a* in seawater, assessing accuracy, ease of use, and cost-effectiveness.

Materials & methods

YSI ProDSS Probe measurement procedure



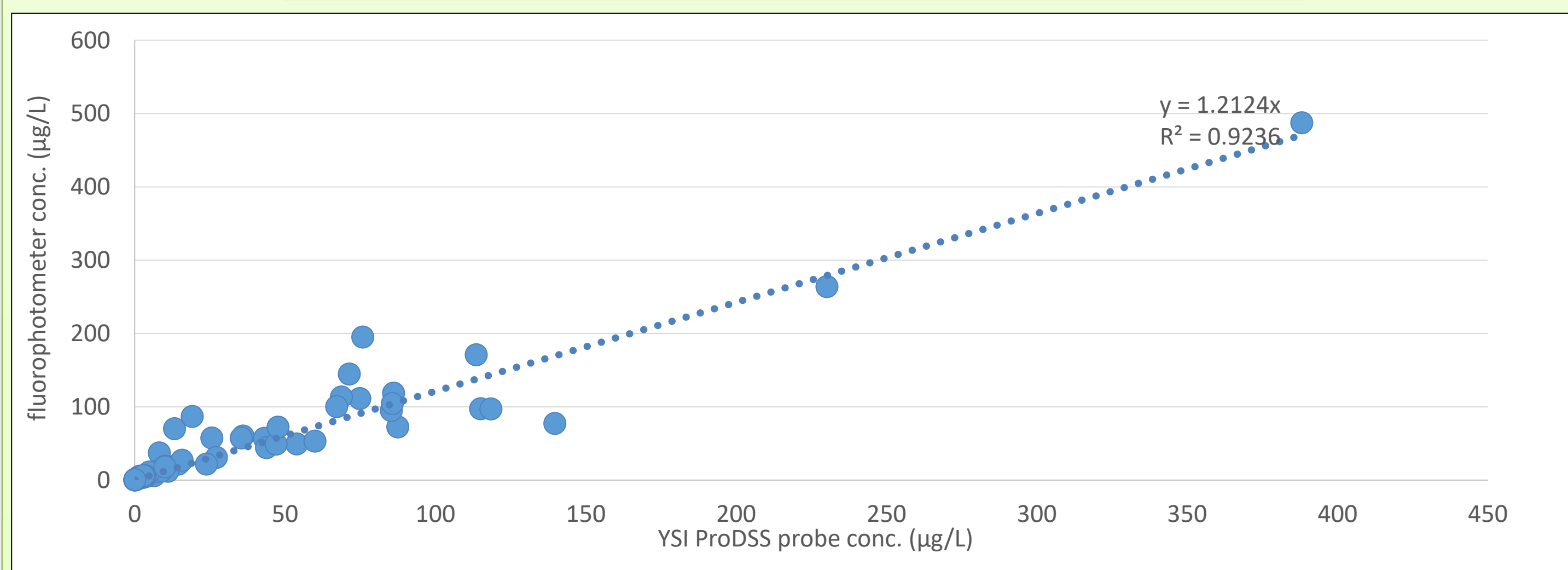
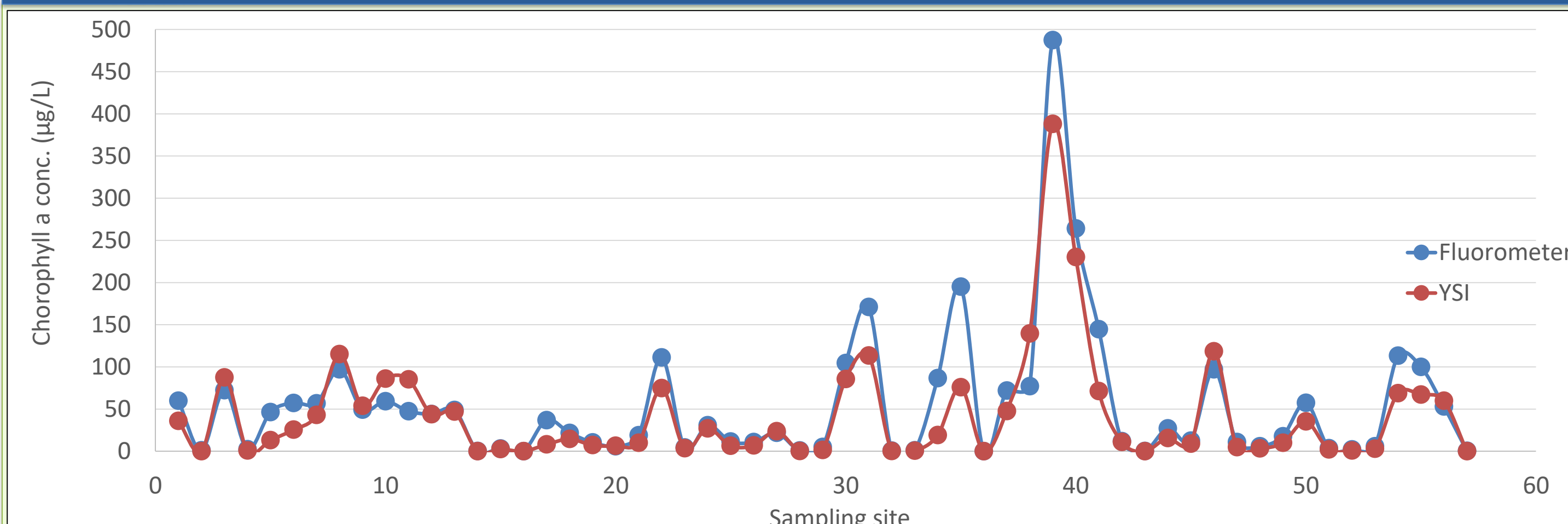
Standard fluorometer technique



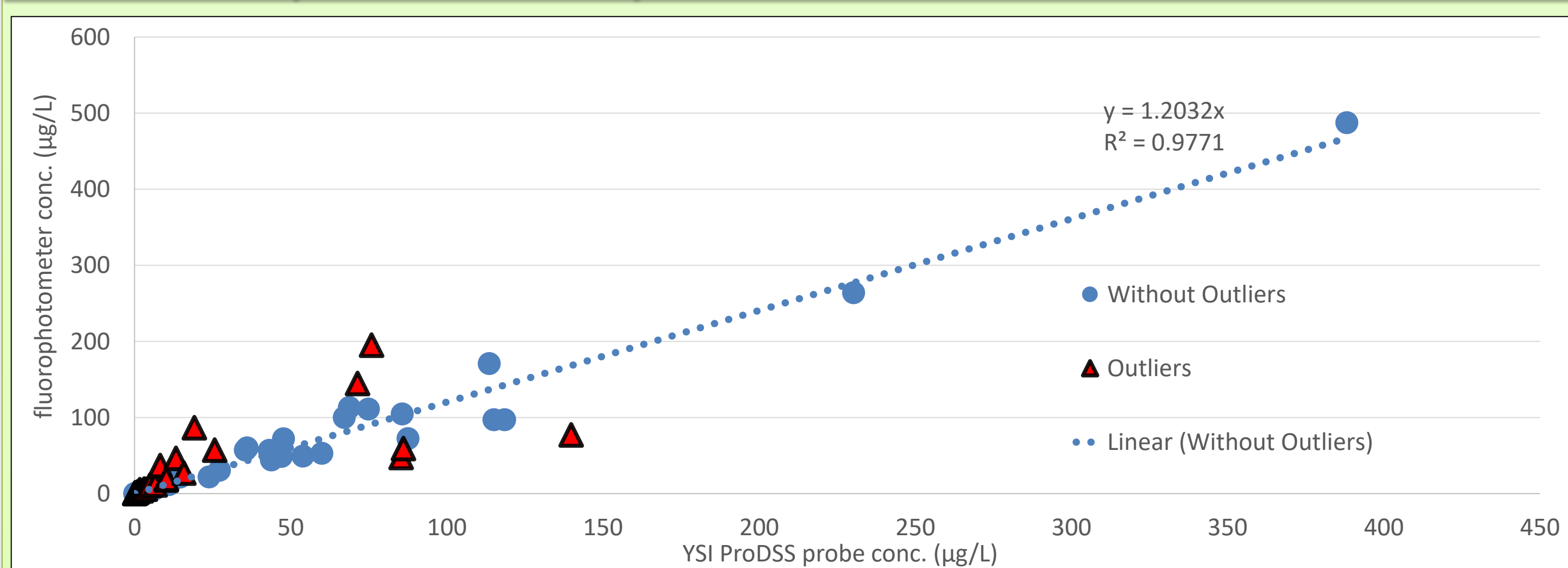
Calibration curve for fluorometer

Results & Discussions

- On measuring chlorophyll *a* in water samples from marine shrimp aquaculture farms in Yilan County, Taiwan, a percentage error of 39.96% was found between the measured values by the two methods.
- A linear relation exists between the results from the two methods & a scale factor of 1.2 is suggested.
- The use of fluorometer is not suggested below 10 µg/L values as the deviations are significantly high
- The laboratory method is also prone to interference due to foreign substances, thus giving erroneous results



Upon removing sampling sites with error above 40% (outliers), it was found that the linearity of the data became considerably better and the accuracy also increased to 77.22%



Parameter	Fluorometer	YSI ProDSS Probe
Cost	Bad	Good
Accuracy	Bad	Good
Ease of use	Bad	Good
Time saving	Bad	Good
Real time data collection	Bad	Good
Optical fouling	Bad	Good
Minimum detection limit	Bad	Good
Electromagnetic interference	Bad	Good
Less prone to human errors	Bad	Good
Portable & rugged	Bad	Good
Interference from other substances	Bad	Good
No additional equipment & reagents required	Bad	Good

Comparison of Fluorophotometer technique & YSI ProDSS probe

Conclusion

Upon comparison of the two methods with the above mentioned parameters, it can be concluded that the YSI ProDSS Probe is the better choice for chlorophyll *a* measurement as it is cost effective, time saving, easy to use and can provide real time data.

Acknowledgement

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