

Development of an In Situ Analyzer Based on Sequential Injection Analysis and Liquid Waveguide Capillary Flow Cell for the Determination of Dissolved Reactive Phosphorus in Natural Waters

Zeming Yang ^{1,2}, Cai Li ^{1,3,*}, Zhenzhao Zhang ¹, Guixin Lu ¹, Zifeng Cai ¹ and Wenxi Cao ¹

¹ State Key Laboratory of Tropical Oceanography, South China Sea Institute of Oceanology, Chinese Academy of Sciences, Guangzhou 510301, China; zmyang@scsio.ac.cn (Z.Y.); zhangzhenzhao@scsio.ac.cn (Z.Z.); 11363996@qq.com (G.L.); caizifeng@scsio.ac.cn (Z.C.); wxcao@scsio.ac.cn (W.C.)

² University of Chinese Academy of Sciences, Beijing 100049, China

³ Southern Marine Science and Engineering Guangdong Laboratory (Guangzhou), Guangzhou 511458, China

* Correspondence: liclaire@scsio.ac.cn

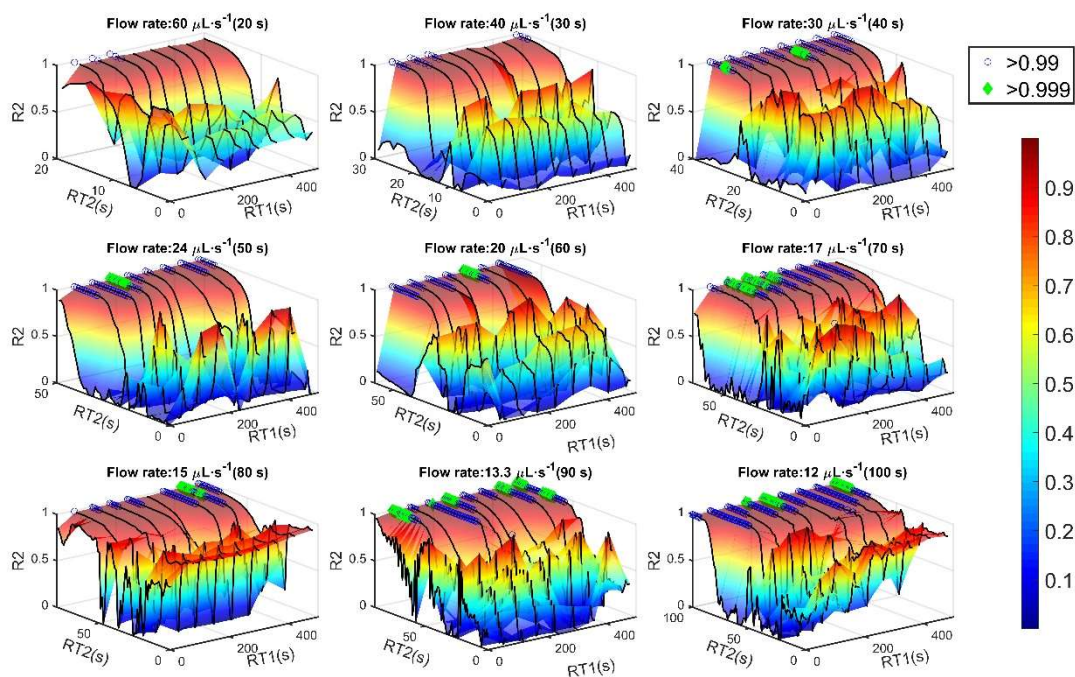


Figure S1. R^2 values of curve fittings for different reaction times and push speeds.

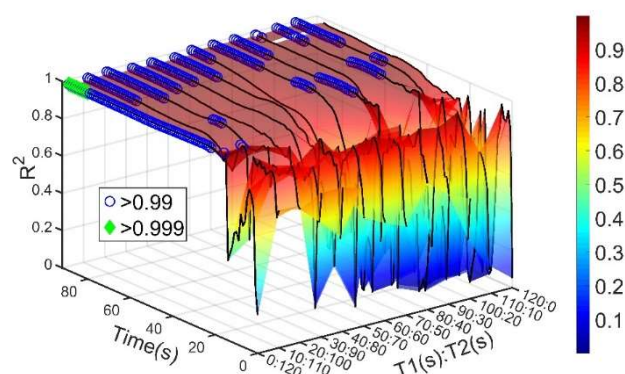


Figure S2. R^2 values of curve fittings for different T1:T2 ratios and a total reaction time of 120 s.

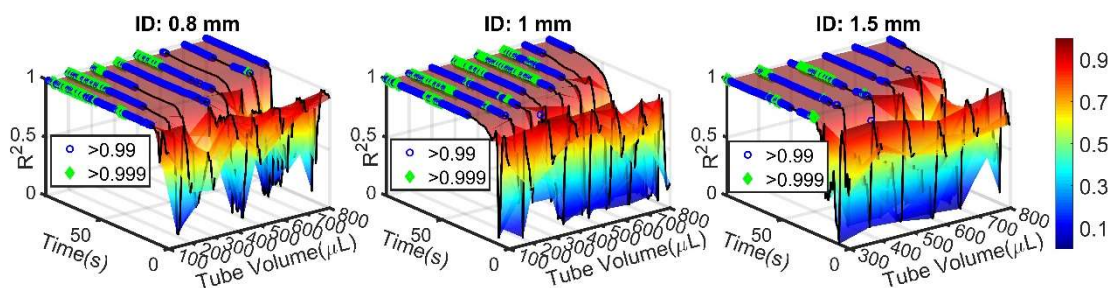


Figure S3. R^2 values of curve fittings for different reaction coil lengths and IDs.

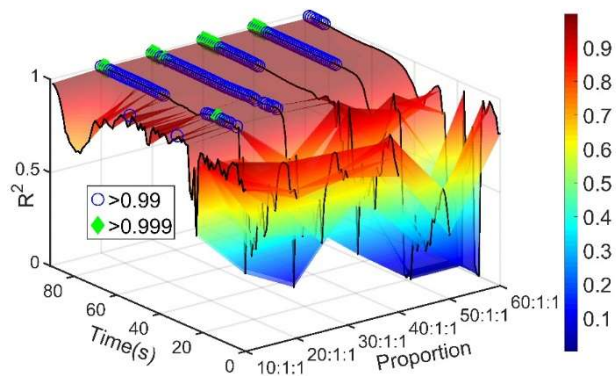


Figure S4. R^2 values of curve fittings for different sample-to-reagent ratios.

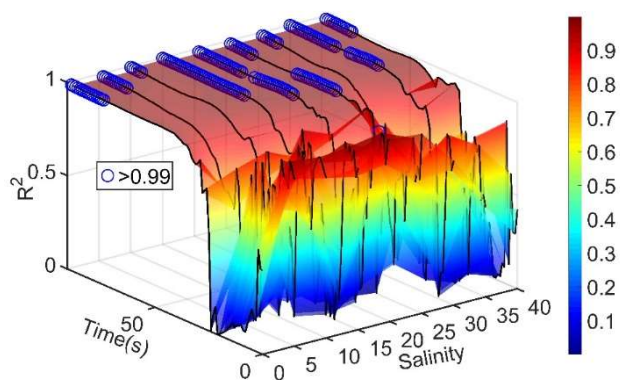


Figure S5. R^2 values of curve fittings for different salinities.

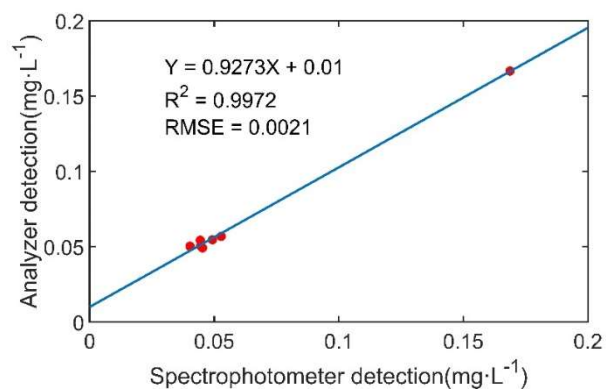


Figure S6. Comparison of the analyzer and spectrophotometer detection results.

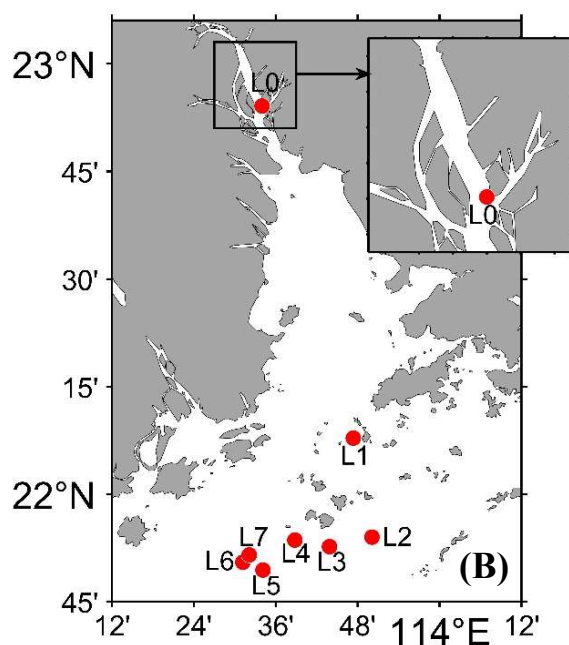
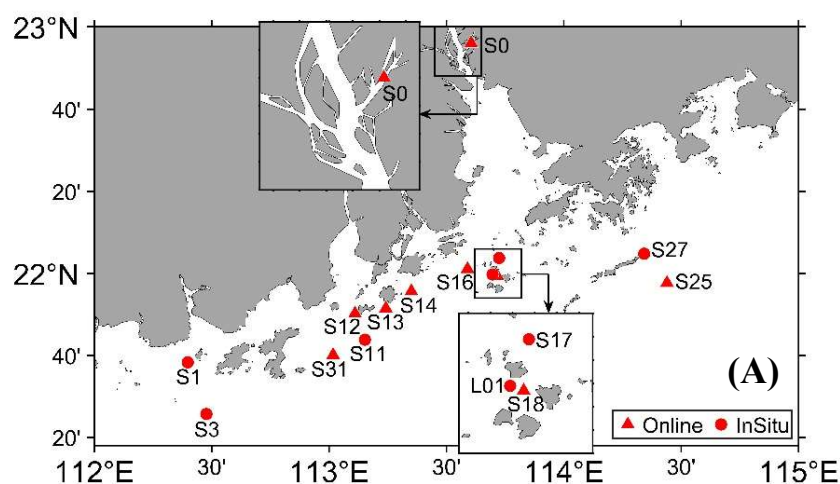


Figure S7. Locations of the stations on the two cruises. (A): “Healthy Ocean” cruise; (B) “Instrument Acceptance” cruise.

LOD calculation method:

The LOD is calculated by the following equation:

$$\text{LOD} = \frac{3S_0}{k}$$

Where S_0 is the standard deviation of the blank samples for multiple parallel determinations, and k is the slope of the standard curve.

With this analyzer, the S_0 ($n = 10$) is 0.0011 and k is 2.39 (the concentration unit is $\text{mg}\cdot\text{L}^{-1}$ of the standard curve), so the LOD is about $1.4 \mu\text{g}\cdot\text{L}^{-1}$ and its corresponding molar concentration is 14.7 nM (the molecular weight of PO_4^{3-} is 95).