Determination of trace orthophosphate in water of Lake Biwa (Japan) by ion chromatography

M. MARUO*[1], M. ISHIMARU[1], Y. AZUMI[1], K. OHYAMA[1] AND H. OBATA[2]

[1]The University of Shiga Prefecture, Shiga 522-8533, Japan (*correspondence: maruo@ses.usp.ac.jp)

[2]The Universiy of Tokyo, Chiba 277-8564, Japan (obata@aori.u-tokyo.ac.jp)

Background of determination method of nanomolar orthophosphate in lake water

For the determination of soluble reactive phosphorous (SRP) in water, spectrophotometry of reduced form of phosphomolybdate was widely used. However, this method has problems concerning intereference of As(V) with phosphomolybdate. Moreover, both polyphosphates and organic phosphorous compounds in natural water are hydrolyzed and release orthophosphate, which causes overestimation of orthophosphate in water. Although detection limit of this method can be improved at some tens of nmol/L to 1 nmol/L levels by using liquid waveguide capillary cell[1], the problems on interference of above described compounds and CDOMs remain[2].

Ion chromatographic determination method of orthophosphate in water has a high advantage to avoid interfrerences of other components. Detection limit could be improved by decreasing bachground conductivity and injecting large volume of sample waters. This combination method was applied to measure orthophosphate in waters of phosphorous limiting lake (Lake Biwa, Japan: mesotrophic).

Results and discussion

We obtained a vertical profile of orthophosphate (2 – 140 nmol/L) in Lake Biwa. There is a contamination problem on determination of trace-level (around 0.3 nmol/L) phosphate, but this method has a potentioal to determine 0.1 nmol/L level of orthophophate, that was close to the minimum values in lake water obtained by steady-state radiobioassy [3]. By comparing the concentrations of SRP in bottom waters with those of orthophosphate by this method, we found that orthophosphate occupied almost below half values of SRP values.

[1] Anagnostou & Sherrell (2008) *Limnol. Oceanogr Methods* **6**, 64-74. [2] Zimmer & Cutter (2012) *Limnol. Oceanogr Methods* **10**, 568-580. [3] Hudson et al. (2000) *Nature* **406**, 54-56.