



Automatic sampler using passive DGT devices for water analysis : analytical performance

For many years, monitoring of the marine environment has been carried out using specific analytical techniques based on the spot sampling of waters. This type of sampling generates significant logistical costs and therefore makes high frequency sample collection difficult.

A new and easier sampling technique emerged with the development of DGT® technology coupled with the automatic sampler THOË® developed by AEL/LEA and built by TECHNICAP.

The technical performance of this new technique has been compared to the spot sampling of waters for dissolved metal pollutants.

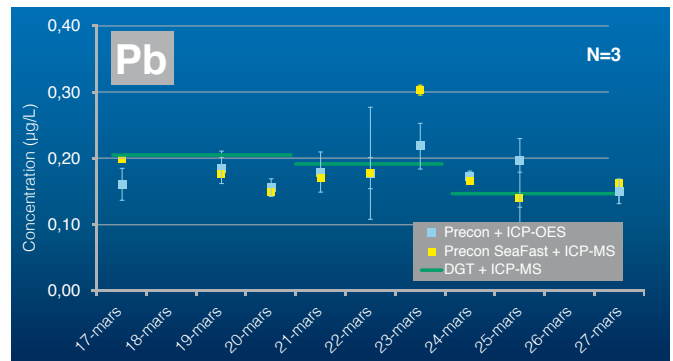
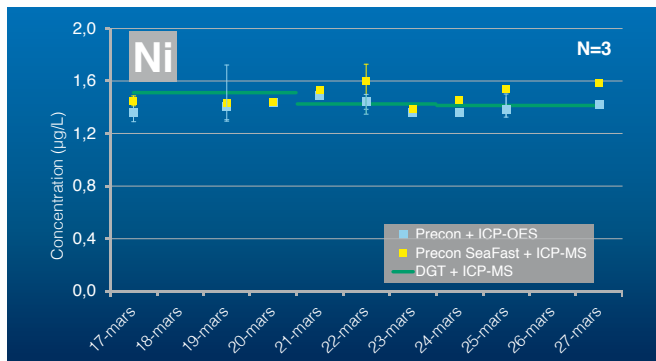
In the given example, results from the monitoring of the harbor of Noumea (New-Caledonia) using several automatic samplers demonstrate the remarkable similarity in the determined concentrations compared with the usual methodology, but with the advantage of obtaining concentration time series and without the typical logistical constraints.

The 3 methods for the analysis of dissolved metals



Passive sampling with DGT® devices coupled with an automatic sampler THOË and ICP-MS analysis	Spot sampling, off-line preconcentration and ICP-OES analysis (Moreton, et al, 2009)	Spot sampling, on-line preconcentration (SeaFAST®) and ICP-MS analysis
Simultaneous sampling protocol		
Triplicate DGT devices sequentially exposed for 3 days each	9 spot samples collected in triplicate over a 9 day period	9 spot samples collected in triplicate over a 9 day period
Sample treatment		
Chelex® binding layer (iminodiacetate) Elution in 4 ml of 1M HNO3 solution	250 x preconcentration using Dionex® OnGuard II M 1cc (iminodiacetate) cartridges and elution with 2M HNO3 solution	10 x preconcentration using SeaFAST® (iminodiacetate) column and elution with 1M HNO3 solution
Analytical instrumentation		
Perkin Elmer NexION® 350 ICP-MS	Varian® 730 ICP-OES	Perkin Elmer NexION® 350 ICP-MS

Results for dissolved Ni et Pb



The similarities are particularly high for Ni and in good agreement for Pb. Concentration variations observed with spot sampling over time are generated by the influence of tidal movements, whereas concentrations determined by DGT® correspond to average concentrations calculated over the exposure period (3 days).

Since this study, 5 automatic sampling device have been successfully deployed in routine to monitor dissolved metal concentrations in the marine environment around an industrial effluents outfall.