IMPLEMENTATION OF A NOVEL ELUTION PROTOCOL FOR MONOMETHYLMERCURY APPLIED TO DIFFUSIVE GRADIENT IN THIN FILM: A CASE STUDY IN THE PERUVIAN COASTAL ZONE

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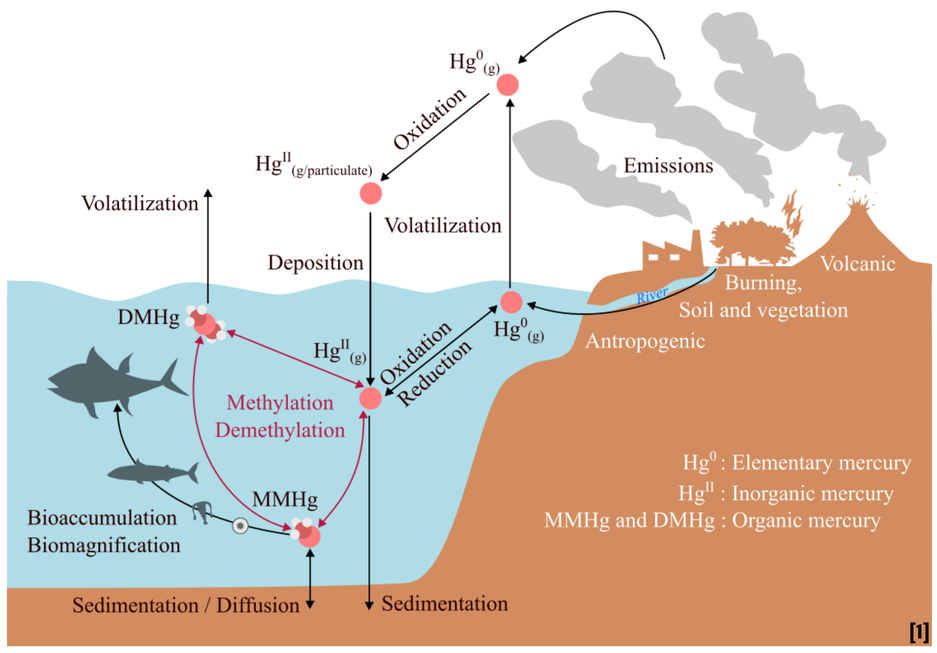
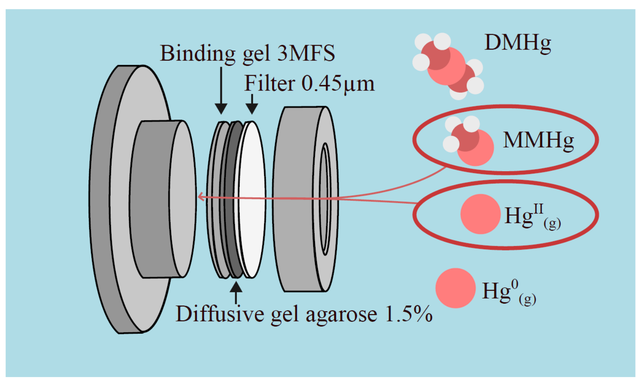
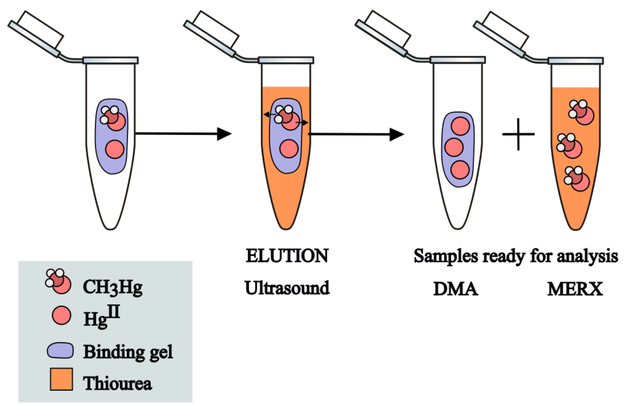
Diffusive gradient in thin film for mercury



[1]



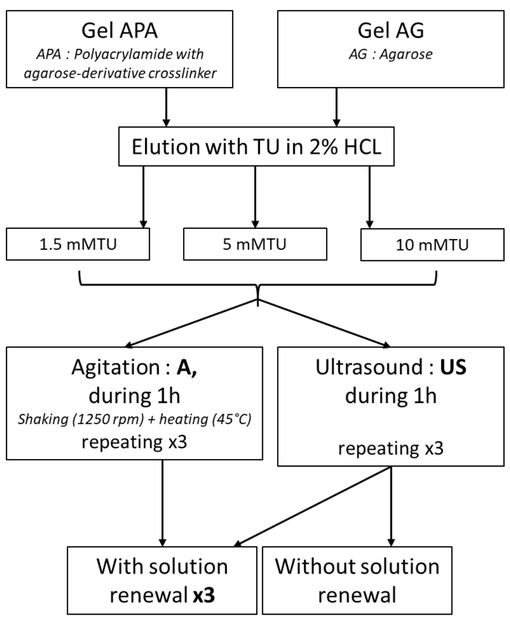


Relationship between[2] :

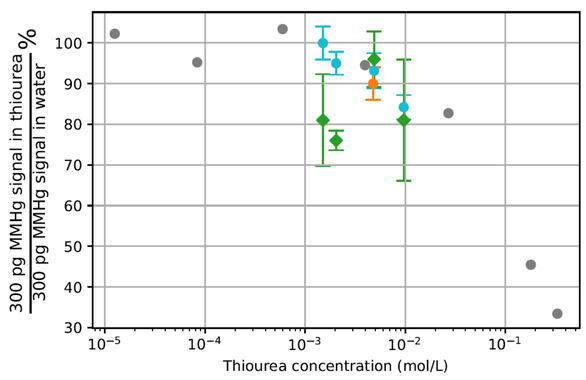
- Deployment time (t);
- Concentration in the medium (C);
- Mass accumulated by the binding gel (M);
- Diffusion coefficient (D);
- Diffusion membrane thickness (g);
- Sensor area (A).

$$C = \frac{M \times \Delta g}{D \times A \times t}$$

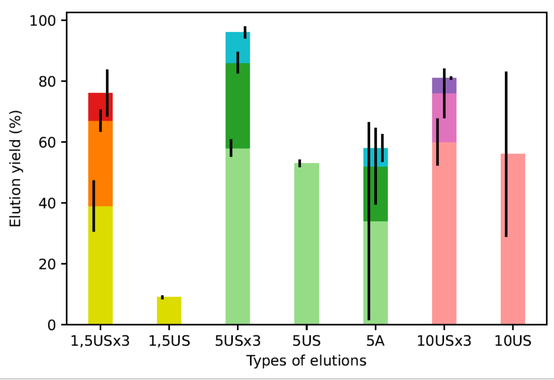
Optimization of binding gel elution protocol



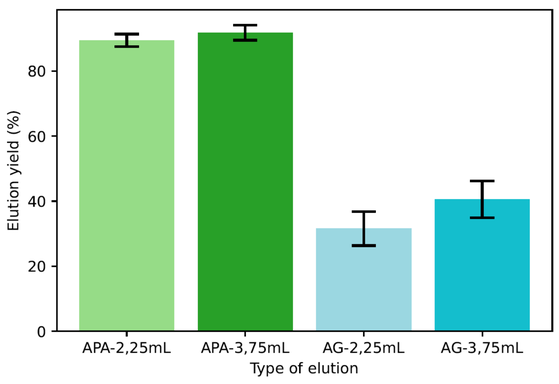
Analysis and elution yields



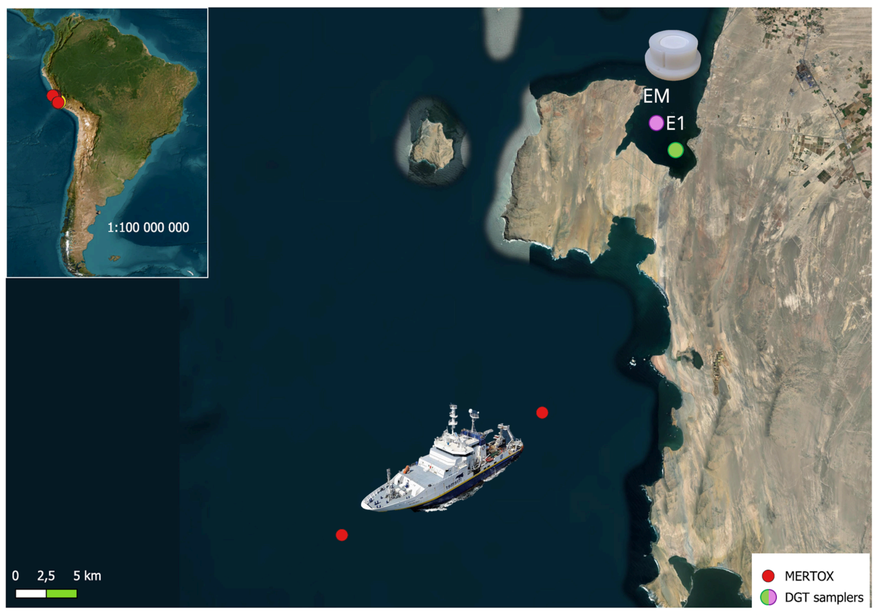
Impact of thiourea concentration and number of gel elutions

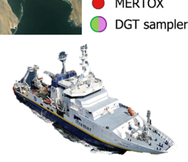


Impact of binding gel type used

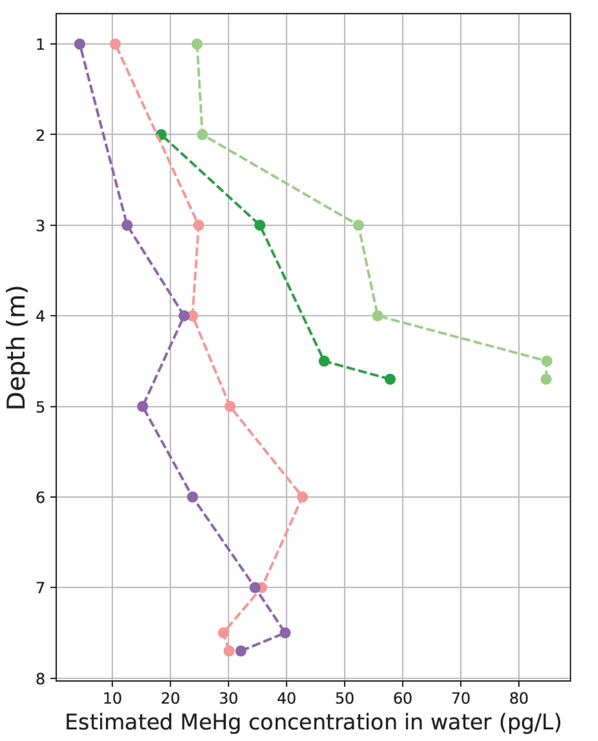


Application to the Peruvian coastal zone





Depth	Coastal Station	Offshore Station	MERTOX campaign
2 m	25 pg/L	12-25 pg/L	26 pg/L
Near sediment	58-85 pg/L	30-32 pg/L	31 pg/L (30m) 115 pg/L (300m)



CONCLUSION

- Implementation of an elution protocol for 3MFS resin gels in polyacrylamide using thiourea (5mM concentration) with ultrasonic bath for 3x1h to estimate the concentration of MeHg in water.
- Clean elution blanks and good elution and analysis yields.
- Similar results between MeHg concentrations in water estimated by DGT and those measured during an oceanographic campaign (MERTOX).

PERSPECTIVES

Use of the gels in THOË DGT autosamplers and in the TRACESENSE active sampling device for application in TERRA FORMA observatories.

References

- [1] J. West, « Degradation Pathways of Dimethylmercury in Natural Waters », 2022, Consulté le: 14 août 2023. [En ligne]. Disponible sur: https://urn.kb.se/resolve?urn=urn:nbn:se:su:diva-208846
- [2] C. Fernández-Gómez, J. M. Bayona, et S. Díez, « Comparison of different types of diffusive gradient in thin film samplers for measurement of dissolved methylmercury in freshwaters », Talanta, vol. 129, p. 486-490, nov. 2014, doi: 10.1016/j.talanta.2014.06.025.
- [3] O. Clarisse et H. Hintelmann, « Measurements of dissolved methylmercury in natural waters using diffusive gradients in thin film (DGT) », J. Environ. Monit., vol. 8, no 12, p. 1242-1247, nov. 2006, doi: 10.1039/B614560D.

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