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GEOTRACES intercalibration exercises and development of reference materials for the community

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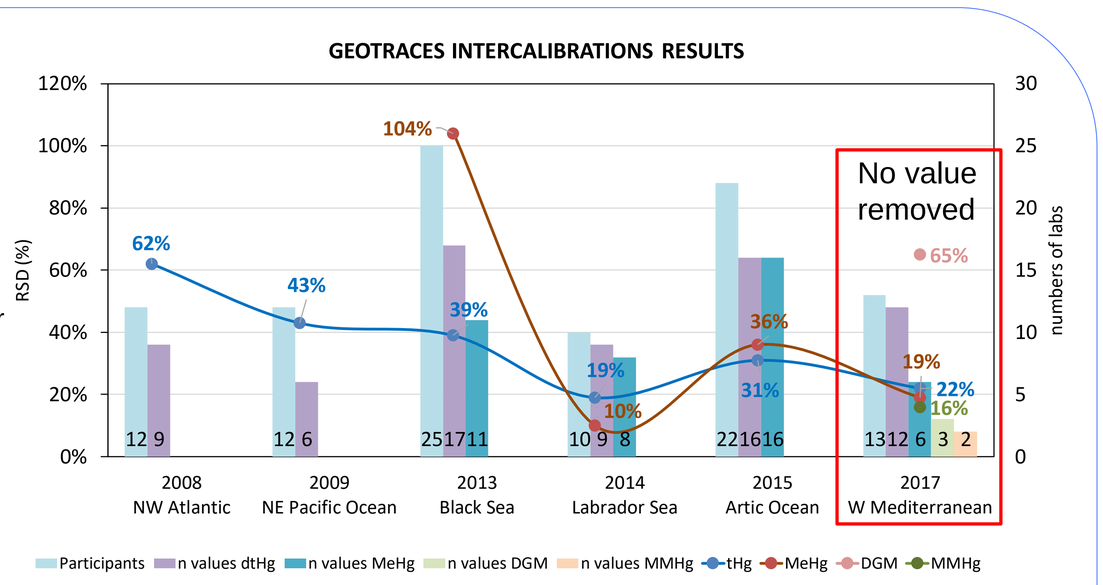
Context and objectives

Mercury pollution presents a serious threat to human and ecosystem health because of its bioaccumaluation and bioamplification capacities. Mercury is one of the least concentrated elements in the oceans, making precise measurements still challenging today. We need to be able to measure and interpret variability in mercury concentrations in the ocean, which is often as low as 10%.

Intercalibration exercises can only adress analytical bias and only stable Hg species. That is why we organized the 2017 GEOTRACES intercalibration cruise to include all Hg species and procedures from sampling to analysis. Here we present the results obtained during the GEOTRACES intercalibration exercises of the last 10 years with a focus on the last 2017 GEOTRACES cruise.

Reminder

Fig1: Results of GEOTRACES intercomparison during last 10 years (RSD% of analytical datas for MeHg and tHg, the participating laboratories and the n values considered)



- ✓ Importance of cleaning procedure *(Lamborg et al. 2012)*
- ✓ Only experienced labs are able to measure Hg species in seawater
- ✓ Intercalibration exercises based on preserved samples can only address total mercury (tHg) and total methylmercury(MeHg)
- ✓ No temporal evolution of MeHg and tHg was detected
- ✓ Needs to be further improved

2017 GEOTRACES INTERCALIBRATION CRUISE FOR MERCURY SPECIES IN SEAWATER
MARSEILLES - JUNE 11 - 23 2017

Why Mediterranean Sea?

- tHg is slightly higher than global ocean
- MeHg is rather high (~0.4 pM) at depth
- Large concentration ranges

(*Cossa et al. 2009, Heimbürger et al. 2010*)

➢ Intercomparison of tHg, MeHg (MMHg + DMHg), DGM (DMHg + Hg°), dHg and pHg, pMMHg at 3 stations coastal to off-shore

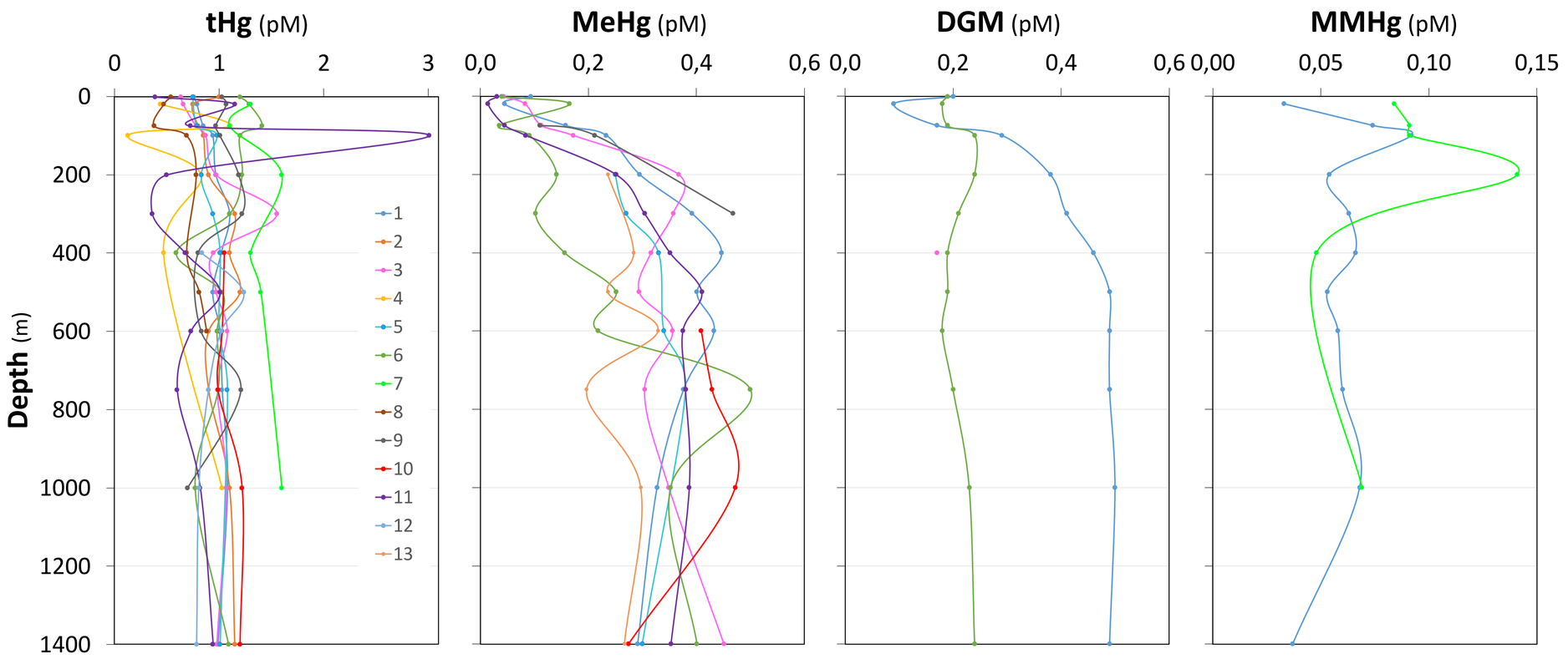


Fig2: Profiles of tHg, MeHg, DGM and MMHg in the MED during the 2017 GEOTRACES intercalibrations exercices.

2017 GEOTRACES reference seawater for ambiant tHg and MeHg concentrations

CONCLUSION AND PERSPECTIVES

- More and frequent intercalibrations needed
- All Hg species need to be addressed
- Hopeful but needs to be further improved
- **Both in-house reference materials (seawater and sediment) are now freely available for the community**

Work in progress: in-house reference material for pHg & pMMHg in marine sediment.

70 kg of marine sediment was sampled, dried at 60°C, sieved at 300 µm and ground to obtain a homogenous reference material.

Commercially available certified reference materials for Hg in seawater

Total mercury
- European Reference Materials ERM-CA 400: **82 ± 5 pM**
- Institute for Reference Materials and Measurements BCR-579: **9.5 ± 2.5 pM**

Methylmercury No certified reference material is available yet

References

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