



Trace metal (Hg, Pb, Cd, Cu, Ni, Mn, Fe, Co) distribution in Eastern-Atlantic surface waters

Reflection of natural and anthropogenic sources by comparing data from 1990 and 2005

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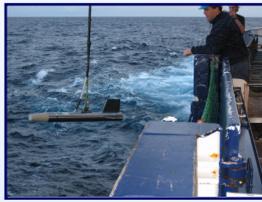
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Objectives of the project

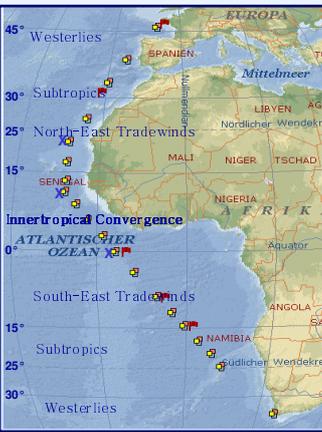
1. Intercalibration of several analytical methods in the framework of GEOTRACES
2. Distribution of trace elements and the comparison to a dataset from 1990
3. Mercury distribution under consideration of the main oceanic regimes, and meteorological systems, including an oceanic region which is affected by high Saharan dust deposition

Sampling and methods

On Polarstern cruise ANT XXIII/1 seawater surface samples were taken with the „Fish“ in the eastern Atlantic.

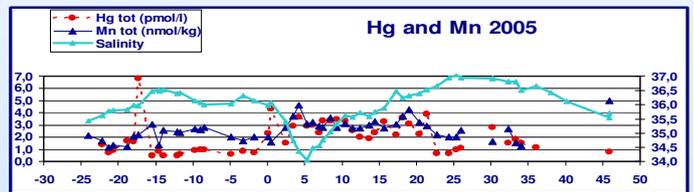


Concentrations of Pb, Cd, Cu, Ni, Mn, Fe, Co were analysed in filtered (<0.4µm) and unfiltered samples, after liquid-liquid extraction with APDC / DDDC and enrichment with GF-AAS in the home laboratory.



Total mercury (Hgtot) concentrations were directly analysed on board by using cold vapour technique with Hg-amalgamation on a gold net and the determination by fluorescence detection.

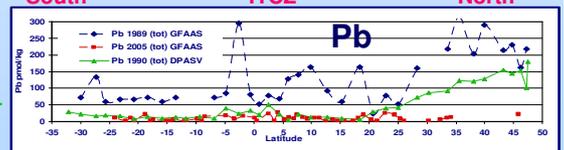
From 23°N to 0° total Hg, (Hgtot) concentrations are well correlated to the distribution of manganese in the surface water. They are ranging between 2.0 and 4.5 pmol/L on a higher level, which is due to Sahara dust input by North-East trade winds. Southward and northward of these area Hgtot concentrations decrease to very low levels of 0.5-3.0 pmol/L. **South ITCZ North**



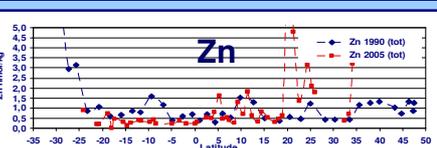
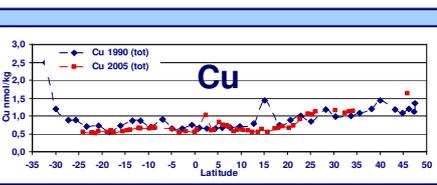
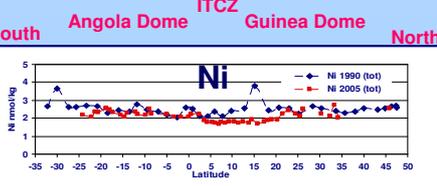
Total lead (Pb) concentrations are ranging between 5-20 pmol/kg with slightly increasing values in the Intertropical Convergence Zone (ITCZ). In 1989 concentrations were by factor 2 higher in this region, while maximum values (factor 10-15 higher) were obtained in the North Atlantic. This is related to anthropogenic atmospheric Pb input by the prevailing westerly wind directions from the industrialised areas of northern America. 15 years later, most of the Pb was removed from surface waters by scavenging. **South ITCZ North**

*Pohl et al 1993: J Mar Systems

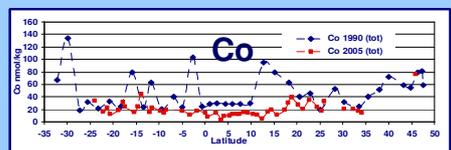
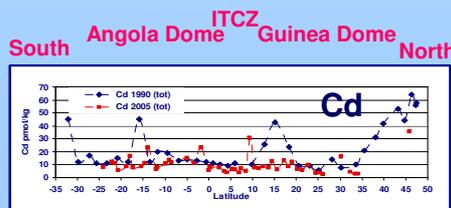
**Helmers & R. v. d. Loeff, 1993: J. Geophys Res



Ni, Cu, and Zn concentrations are nearly identical between 1990 and 2005, with slightly increasing values in the northern hemisphere. Like Cd, increasing values were registered in the seasonal upwelling regions of the "Guinea- & Angola Dome" during spring. **South Angola Dome ITCZ Guinea Dome North**



For **Cd and Co** atmospheric input from African deserts can be neglected. For both elements it seems that different regional upwelling systems are responsible for the fluctuations of the surface concentrations. **South Angola Dome ITCZ Guinea Dome North**



Fe and Mn data show nearly identical concentrations between 1990 and 2005. Since both elements are mainly of terrigenous origin these results are possibly due to the composition of atmospheric transported dust, from different sources. Also residence times and seasonal effects in the water column have to be taken into account. **South ITCZ North**

