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Correlating Contamination Levels of Potentially Toxic Elements with Foraminiferal Distribution Patterns in Lagos Lagoon (Nigeria)

Nisan Sariaslan¹, Michael Martínez-Colón², Ivory S. Council², Tesleem O. Kolawole³, Martin R. Langer¹, and Olugbenga T. Fajemila³

¹Institut für Geowissenschaften, Rheinische Friedrich-Wilhelms-Universität, Bonn, Germany (nisan.sariaslan@uni-bonn.de)

²School of the Environment, Florida A&M University, Tallahassee, USA

³Department of Geological Sciences, Osun State University, Osogbo, Nigeria

Sediments across Lagos Lagoon have been sampled and analyzed to investigate the extent and distribution of Potentially Toxic Elements (PTEs). The bioavailable fraction of PTEs have been evaluated to explore the relationship between PTE concentration and the spatial distribution, composition, abundance, and species richness of benthic foraminifera biotas. The sediments have been found to show a wide range reflecting a diffuse contamination, where Contamination and Enrichment Factor suggest low to extremely polluted sediments. Our survey of the benthic foraminifera inhabiting Lagos Lagoon revealed diverse assemblages of benthic taxa, species-specific distribution patterns, gradients of species richness and abundance, and a disjunct distribution of agglutinated and hyaline-perforate/porcelaneous taxa along a pronounced salinity gradient. All PTE total concentrations have been shown to positively correlate with mud and Total Organic Carbon (TOC) and two of the most abundant agglutinated taxa, *Ammotium salsum*, and *Trochammina sp. 1*, according to our correlation matrix analysis. Moreover, both species display significant positive correlations with Cr_{F4} - $Co_{F2-F3-F4-total}$ - $Cu_{F4-total}$ - $Ni_{F3-F4-total}$ - $Al_{F4-total}$ - $Fe_{F3-F4-total}$ - $Zn_{F3-F4-total}$. On the other hand, both foraminifers correlate negatively with Pb_{F4} - Se_{F3} - Se_{total} . The overall significant positive correlation of these PTEs suggests that they behave as micronutrients when complexed with organic matter. No significant positive correlation with none of the PTEs in any fraction was found for neither species richness nor for the most abundant hyaline perforate species (*Ammonia aoteana*). Some PTE fractions were found to correlate either positively or negatively with individual foraminifera species, suggesting that they function as either micronutrients and/or stressors. The resulting Contamination Factor of the PTE total concentrations shows that only a few sample sites can be classified as “moderately” polluted for Cr, Zn, and Cu, and that all sampled sites are classified as “highly polluted” for Se. The highest concentrations for Cr, Cu, Ni, and Zn were found towards the industrialized western part, an area that is characterized by moderate to high diversity but low abundances of benthic foraminifera.