Heavy Metal Enrichment in laminated lake sediments from N-Germany and N-Poland: Geochemical background, enrichment history and land surface changes

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For three lake sediment records, situated in rural environments in NE-Germany (Lake Tiefer See) and N-Poland (Lake Czechowskie, Lake Głęboczek), we present a detailed heavy metal enrichment history with sub-decadal resolution for the last 200 years. We determine the local and specific geogenic background values on the base of heavy-metal analysis of pre-industrial sediments and different sediment types (e.g. calcareous gyttja, organic gyttja etc.). These results provide means to calculate and quantify anthropogenic heavy metal accumulations and enrichment factors as well as to define regional measures for a state of reference, reflecting natural conditions without human impact.

All three lakes show a similar pattern of relatively low heavy metal concentrations and only Pb, Zn and Cd show a clear parallel pattern of enrichment starting around 1850. This heavy metal enrichment mainly results from atmospheric input due to increasing industrialization within the framework of the Industrial Revolution. Highest concentrations of Cd, Zn, and Pb occur around 1960 to 1980 and thereafter a clear pattern of declining anthropogenic input is registered.

This data is supplemented by calculations of mass accumulation rates to determine heavy metal input to the lakes for the past 200 years. For Lake Czechowskie the heavy metal input to the lake is compared to an on average five year resolved pollen record that reflects changes in land use and vegetation.