

# **Water Matters: Elemental Abundances in Sediment Cores Need to be Corrected for Porosity**

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Recent technologies allow sediment cores to be analyzed for their elements centimeter by centimeter using X-Ray Fluorescence scanning. The results of such scans have been published based on measurements made on the surface of fresh, wet sediment. However, physical property measurements, especially those of bulk density and moisture, show significant variations in the amount of water present in the sediment pore space. The presence of pore water has the effect of reducing the measured concentration of elements that reside only in the solid grains. My study has derived corrections for the porosity variations based on scanning of the wet cores and subsequent dry samples. In the Black Sea cores investigated, the correction in elemental abundance is substantial because much of the sediment has been deposited in repetitive events resulting in individual layers in which the water content increases substantially from bottom to top. The water variations in these single layers are as large as the overall water variation from the bottom to the top of the core. The corrected measurements allow us to distinguish unique compositions for glacial age deposits, those that accumulated during the delivery of melt water in repetitive pulses, the sediments belonging to the post-glacial warming period of the Bølling/Allerød and early Holocene, and those when the Black Sea became salty following its connection with the Mediterranean Sea eight thousand years ago.