



US Army Corps
of Engineers®

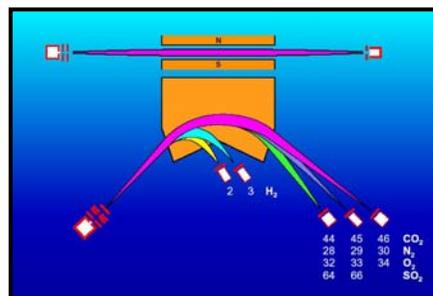
Engineer Research and
Development Center

Organic Geochemical Measures of Long-term, Watershed-scale Processes

Description ERDC's Environmental Laboratory conducts biogeochemical analyses of undisturbed sediment cores to reconstruct long-term changes at the watershed scale. The U.S. Army Corps of Engineers uses these analyses to reconstruct the 100-year biological history of aquatic systems and their watersheds. This information is then used to determine the cumulative long-term effects of the Corps' numerous civil works projects and management practices.

Capabilities EL uses recalcitrant anthropogenic contaminants with known sources as conservative tracers to assess impacts on aquatic systems. Analogously, in-depth knowledge of the biosynthetic origins of plant and microbial natural products, their diagenesis in aquatic systems, and their presence in time-stratified sedimentary deposits are used to reconstruct autochthonously derived material from the aquatic system as well as allochthonously derived material from adjacent catchment areas.

Supporting Technology Scientists in ERDC's Environmental Laboratory use state-of-the-science analytical methods (e.g., high performance liquid chromatography - electrospray ionization - tandem mass spectrometry, gas chromatography - ion trap mass spectrometry, and compound-specific mass spectrometry) to structurally and isotopically identify organic molecules in sediments and determine their biosynthetic origins. Once identified, biomarkers for specific biological taxa are used to reconstruct biological conditions at various points in the sedimentary stratigraphic history. Directions and rates of change are inferred by comparing biomarkers between strata (depositional time series).



Benefits Biogeochemical analyses of undisturbed sediment cores allow the U.S. Army Corps of Engineers to reconstruct long-term changes at the watershed scale. This technology allows the Corps to monitor its civil works projects and management practices, and thus sustain the nation's water resources and wetlands.

Success Stories ERDC-EL is currently analyzing sediments and watershed samples from the rapidly urbanizing West Point Reservoir watershed on the Alabama-Georgia state line. Initial results show sediments from the reservoir itself are dominated by biomarkers for in situ algal production, while those of the catchments in the various land use areas are unique.

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