



Stable Isotope Sample Prep Training for the USACE Detroit District

ERDC Dredging Operations Technical Support Program (DOTS)

U.S. ARMY CORPS OF ENGINEERS

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Response Summary:

The USACE Detroit District (LRE) has been working to expand their capability to both collect and prepare sediment samples for a range of geochemical analyses. As part of this effort in FY19, LRE purchased specialized laboratory equipment, a muffle furnace capable of reaching temperatures of 1000°C (1832°F) to expand their sediment preparatory capabilities to include preparing samples for stable isotope analysis. LRE requested the assistance of CHL researcher Dr. Heidi Wadman to train them on the new furnace, as well as the preparatory techniques, for these analyses.

Period of Performance:

August 31 – September 3, 2020.

Benefits of the Response to the USACE Dredging/Navigation Program:

Without accurate determination of the source(s) of sediment infilling navigational regions, it is impossible to focus erosion abatement efforts on the specific regions of a catchment that are responsible for the sediment accumulating in the downstream sinks. Various sedimentary geochemical analyses, including the absolute and relative concentrations of stable isotopes such as ^{15}N and ^{13}C , are used by the larger scientific community to help pinpoint the source(s) of accumulating sediment. These analyses require specialized collection and sample processing techniques, including the use of carbon-clean sampling and processing protocols. By performing the sample collections and pre-analysis preparations internally with trained personnel, LRE will be able to utilize advanced geochemical techniques at a lower cost, as much of the labor will be completed in-house. These analyses will further their ability to source infilling sediments, and refine sediment mitigation techniques in the identified regions, hopefully reducing future dredging costs.

Deliverable:

For this response, the goal was to train LRE personal both on the safe operation of the muffle furnace, and the related carbon-clean sample processing. Unfortunately, during the initial operation of the furnace, it quickly became apparent that the furnace was not working properly and, in fact, was a safety hazard in that the door did not seal properly and instead the high temperatures were melting the furnace's exterior. Seal adjustments made by Wadman and LRE personnel were unable to rectify this issue, and training on the furnace was delayed indefinitely until the furnace can be repaired or replaced by the manufacturer. Accordingly, the remainder of the site visit focused on the sample preparation techniques so that LRE would be prepared when the furnace has been repaired or replaced.



Providing environmental and engineering technical support to the U.S. Army Corps of Engineers
Operations and Maintenance navigation and dredging missions

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