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VIMS 2019 Potomac River Estuary Data in Support of: Improved Penetrometer Performance in Stratified Sediment for Cost-Effective Characterization, Monitoring and Management of Submerged Munitions Sites (SERDP project: MR18-1233)

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Description

This work complements the efforts by the Virginia Tech Department of Civil & Environmental Engineering in SERDP MR18-1233, as described in the project's final report (Stark et al, 2020) and in the Master's thesis by Dennis Kiptoo (Kiptoo, 2020). Previous work on this project, conducted in the York River during 2018-2918 worked to improve calibration of the Bluedrop free fall penetrometer (FFP) with high resolution sampling of a variety of sediment types (Massey et al, 2020a). Calibration methods developed (Kiptoo, 2020) were used to rapidly identify different sediment types from a grid of 59 Bluedrop PPF stations sampled on the morning of August 5, 2019 on the Potomac River in Wades Bay, just down river from Mallows Bay Park in Nanjemoy, MD. The Bluedrop FFP was deployed numerous times at each station, and the data were retained and processed by Virginia Tech. The Bluedrop stations were arranged in a grid of 8 transects (A-H) perpendicular to shore, spaced ~200 meters apart. Each transect had 5 to 10 stations, depending the on distance of the first one from the shore line, also spaced ~200 meters apart, with stations identified as A1, A2 etc. along the transect. Exact locations for these stations, along with the water depth and temperature at the station, were collected with the GPS onboard the R/V Pintail, are described in the VIMS data report CHSD-2020-02 (Massey et al, 2020b). Detailed methodologies, including data processing, station maps and figures from the processed data can also be found in the report.

Four distinct sediment types were identified from the Bluedrop FFP results, and the identified regions of these sediment types are indicated on the station map in the data report. A sediment sampling station was selected within each of the regions identified. One sediment station (corresponding to Bluedrop stations C1, G3, G6 and D6, was sampled each day over a period of 4 days from August 5-8, 2019, respectively. At each of the sites, a GOMEX box core was used to collect several sediment grab samples of which sub-cores were collected to minimize edge effects that would disturb the sediment/water interface. At each site, the top ten centimeters, if possible, from two 4" diameter sub-cores were sliced in 1 cm increments and combined for later analysis in the lab for grain size (sand, silt, and clay) distribution (data stored under Grainsize) as well as percent moisture and percent volatile content by loss on ignition at 550 degree C (data stored under Moisture). Two additional 4" diameter cores were analyzed for sediment erodibility using a GUST Microcosm (data stored under GUST), and two rectangular cores were imaged by digital X-ray analysis (data stored under Xray). Salinity and temperature profiles were collected at each site with a Sontek Castaway CTD (data stored under CTD).

At each muddy sediment station (C1, G3, and G6), several gravity core samples were collected. One core was imaged by digital X-ray analysis (data stored under Xray) and sliced and analyzed for grain size (sand, silt, and clay) distribution (data stored under Gravity Core). The other gravity cores samples were retained by Virginia Tech personnel for analyses done in their lab (Kiptoo, 2020). The gravity core would not penetrate sufficiently into sandy sediment, therefore there are no gravity cores for D6. Digital X-ray images were taken from a core from each site after it was sliced lengthwise (data stored under Xrays). The cores were then subsampled in 5 cm intervals and analyzed for grain size (sand, silt, and clay) distribution (data stored under grain size). Additional gravity cores were retained by Virginia Tech Personnel from each site for later analysis at their lab. At D6, samples were also collected for Virginia Tech personnel using the GOMEX grab.

Acoustic Doppler Current Profiler (ADCP) transect data were collected on August 6th. One ADCP transect was collected along each Bluedrop transect perpendicular to the river flow (A-H). ADCP can be used to look at the general velocity flow field around the sediment sample station as well as provide an approximate measure of the bathymetry along the transects. Chirp transects were collected on the same day as ADCP transects along the numbered transects (1-10), and the data were retained by Virginia Tech personnel.

FILES ARE AVAILABLE AT: https://doi.org/10.25773/hg68-xf88

File Description

File Name	Description
photos	photos including gravity cores
PR190805	Includes field logbook, photos, and folders with raw and processed data (including scripts where applicable) for CTD, Grain Size, Gravity Core, GUST, Moisture, and X-ray
PR190806	Includes field logbook, photos, and folders with raw and processed data (including scripts where applicable) for ADCP transects, CTD, Grain Size, Gravity Core, GUST, Moisture, and X-ray
PR190807	Includes field logbook, photos, and folders with raw and processed data (including scripts where applicable) for CTD, Grain Size, Gravity Core, GUST, Moisture, and X-ray
PR190808	Includes field logbook, photos, and folders with raw and processed data (including scripts where applicable) for CTD, Grain Size, GUST, Moisture, and X-ray

Keywords

Potomac River, CTD, Sediment Grain Size, GUST erodibility, Sediment Percent Moisture, Sediment X-ray cores, ADCP transects, ADCP anchor stations, Gravity core, boxcore, Bluedrop

Associated Publications

Kiptoo, Dennis K. (2020), In-situ geotechnical characterization of soft estuarine surficial sediments using a portable free fall penetrometer. Data. University Libraries, Virginia Tech. https://doi.org/10.7294/YZRV-QJ06

Massey, Grace M., Cristin L. Wright and Carl T. Friedrichs (2020) VIMS 2018-2019 York River Estuary Data in Support of: Improved Penetrometer Performance in Stratified Sediment for Cost-Effective Characterization, Monitoring and Management of Submerged Munitions Sites (SERDP project: MR18-1233) (2020). Data. William & Mary. https://doi.org/10.25773/2rze-fg21

Stark, Nina, Grace M. Massey and Carl T. Friedrichs (2020) Improved Penetrometer Performance in Stratified Sediment for Cost-Effective Characterization, Monitoring and Management of Submerged Munitions Sites (SERDP project: MR18-1233 Final Report). Will be available at:

https://serdp-estcp.org/Program-Areas/Munitions-Response/Munitions-Underwater/MR18-1233/MR18-1233

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