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2016 Data collected for Resistivity, Magnetic Susceptibility and Sediment Characterization of the York River Estuary, VA in Support of the Empirical Investigation of the Factors Influencing Marine Applications of EMI (Year 2 of SERDP Project MR-2409)


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Title:

2016 Data collected for Resistivity, Magnetic Susceptibility and Sediment Characterization of the York River Estuary, VA in Support of the Empirical Investigation of the Factors Influencing Marine Applications of EMI (Year 2 of SERDP Project MR-2409)

Authors:

Massey, Grace M. Friedrichs, Carl T.

Orcid IDs:

0000-0001-7936-1586 (GMM)

Location (place name):

York River, VA

Location (bounding box coordinates):

37° 07 23' N, 076° 09 12'W; 37° 13 33' N, 076° 18 28'W; 37° 39 12' N, 076° 54 00'W;
37° 34 54' N, 076° 59 24'W

Start Date:

2016 June 17

Abstract:

The objective of this component of the Strategic Environmental Research and Development Program (SERDP) Project MR-2409 was to conduct field measurements to aid in the determination of the electromagnetic induction (EMI) response to the water column and underlying sediments in the York River estuary, which includes water column and sediment properties similar to many underwater environments of interest to unexploded ordinance detection. Data and samples from a standard suite of hydrographic and sedimentological measurements, as well as electrical resistivity and magnetic susceptibility, were collected and analyzed for each location. These cruises provided opportunities to obtain information that is being used to quantify the unique marine contributions to the early time TEM noise, including conductivity variations in the water and variability in bottom sediment properties in real marine environments, for use in the parallel modeling and electromagnetic-induction sensor work ongoing in the same project. Data collected during Year 1 (2014) of this project were used to select the appropriate locations to provide a range of conductivity and sediment conditions. This

work was used to choose appropriate locations during Year 2 (2016) of this project, described in this report, to field-test the EMI sensor arrays. (Note that there was a delay of several months between the end of Year 1 work and the start of Year 2 work. Thus the Year 2 final report is dated more than 12 months after the Year 1 final report.)

Description of Data:

Field data were collected at a series of sites along the York River estuary. The Station log and data tables used in the final report can be found in the Excel file “SERDP EMI_Sediment Station Log and Data Tables”. “Site Location Figure from Google Earth.png” is figure with the station location indicated using Google Earth that is included in the final report. The salinity at these sites ranged from < 1 PSU to > 22 PSU. At three of the sites, the seafloor sediment type consisted of mostly mud and silt and the other three were more fine sand and sandy mud. Figure 1 shows the seven sample locations marked on the map with orange triangles. The three sample locations in the high salinity regime, near the mouth of the river, are identified as Goodwin Island (GI), Gloucester Point (GP) and Naval Weapons Station (NWS). They are located 4.2, 13.7 and 13.8 km upriver from the mouth of the York River. The data folders associated with these locations are: YR160805_GoodwinIsland_sand and YR160701_Gloucester Point_mud. The mid-salinity regime stations are identified as Clay Bank (CB) and Ferry Pier (FP), located 27.3 km and 31.7 km respectively. The data folders associated with these locations are: YR160623_ClayBank_mud_aborted, YR160624_ClayBank_mud, and YR160714_Ferry Point_sand. The low-salinity regime stations in the Pamunkey River, the southern tributary of the York, are identified as West Point (WP), Pamunkey Sand (PS) and Pamunkey Mud (PM). They are located 56.1, 62.2 km and 67.6 km from the mouth of the York. The data folders associated with these location are: YR160706_Pamunkey and West Point_mud, YR160721_Pamunkey_sand and Ferry Point 2_sand. An additional station, Naval Weapon Station (NWS) in lower reach of the river was visited. The data folder associated with this station is YR160920_Naval Weapons Station_mud. Each data folder name includes YR, for York River, and the date the samples were collected in a YYMMDD format.

In each data folder, there is a scan of the field logbook, called “logbook.pdf” and two folders, “Sediment” and “Water Column”. Each of these folders contains a folder of the raw and processed data, including Matlab script if used, for each parameter that was sampled and processed at that location. In the Sediment folder, the parameter folders include: Grain Size, GUST, Magnetic Susceptibility, Resistivity, Water Content and XRAY. In the Water Column folder, the parameters include (with instrument make, model and serial number if appropriate): HOBO water level U20-001-01-TI S/N 10684035 , RDI 1200 KHz ADCP S/N 602, YSI Castaway CTD and TSS.

The “compare all” includes the Matlab m-files and data files used to create figures comparing all of the locations. Methodologies for data collection and processing can be found in the associated Final Report.

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Subject Keywords:

Acoustic backscatter; conductivity temperature and depth sensor; CTD; Acoustic Doppler Current Profiler; ADCP; TSS; Total Suspended Solids; Sediment Grain Size; Sediment GUST erodibility; Sediment Magnetic Susceptibility; Sediment Resistivity; Sediment Water Content; and Sediment X-RAY

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