10-9-2015

**Added Value of Combining Multiple Optical and Acoustic Instruments When Characterizing Fine-Grained Estuarine Suspensions**

Grace M. Cartwright  
*Virginia Institute of Marine Science*

Carl T. Friedrichs  
*Virginia Institute of Marine Science*

Lawrence P. Sanford

S. Jarrell Smith

Follow this and additional works at: [https://scholarworks.wm.edu/presentations](https://scholarworks.wm.edu/presentations)

**Recommended Citation**

**ADDED VALUE OF COMBINING MULTIPLE OPTICAL AND ACOUSTIC INSTRUMENTS WHEN CHARACTERIZING FINE-GRAINED ESTUARINE SUSPENSIONS**

Grace M. Cartwright\(^1\), Carl T. Friedrichs\(^1\), Lawrence P. Sanford\(^2\) and S. Jarrell Smith\(^3\)

\(^1\)Virginia Institute of Marine Science, College of William & Mary, \(^2\)University of Maryland, \(^3\)Engineer Research and Development Center, U.S.A.E.

Email: graham@vims.edu, cfried@vims.edu, lisanford@umes.edu, jarrell.smith@erd.usace.army.mil

Download via publications link at: www.vims.edu/chsd

---

**ABSTRACT**

Various optical and acoustic instruments have specific advantages and limitations for characterizing suspensions, and when used together more information can be obtained than with one instrument alone. The LISST 100X, for example, is a powerful tool for estimating particle size distributions, but because of the inversion method used to determine the size distribution, it is difficult to distinguish two dominant populations that peak close to one another, especially among larger grain sizes. In the York River estuary, VA, additional information obtained through the deployment of a Remote Imaging Camera System and an ADV along with the LISST 100X allowed differentiation between populations of resilient pellets and fines in suspension close to the bed and how the populations varied over a tidal cycle. A second example of instrument pairing providing additional information was the use of a PIV video imaging system in the York River to verify the conditions under which use of the ADV Reynolds flux method was valid for estimating settling velocity of suspended particle populations.

**MOTIVATION**

Identify the contribution of multiple particle types to the suspended distribution and thus to the effective settling velocity (\(W_s\) as measured by the ADV).

**STUDY SITE**

- Clay Bank area on York River Estuary
- A micro-tidal (1.7 to 1 meter) tributary of the Chesapeake Bay, VA
- In secondary channel at 7.5 meter depth

**REFERENCES**

- cartwright, g.m., fridrichs, c.t., and smith, s.j., 2010. Fine sediment dynamics in dredge plumes. PhD Thesis, School of Marine Science, College of William & Mary.
- smith, s.r., 2013. Fine sediment dynamics in the Chesapeake Bay, Remote Imaging Camera System (2013)

**REFERENCES**

- cartwright, g.m., fridrichs, c.t., and smith, s.j., 2010. Fine sediment dynamics in dredge plumes. PhD Thesis, School of Marine Science, College of William & Mary.
- smith, s.r., 2013. Fine sediment dynamics in the Chesapeake Bay, Remote Imaging Camera System (2013)

---

**ACTUAL TEXT FOR THE DOCUMENT**

**MOTIVATION**

Identify the contribution of multiple particle types to the suspended distribution and thus to the effective settling velocity (\(W_s\) as measured by the ADV).

**STUDY SITE**

- Clay Bank area on York River Estuary
- A micro-tidal (1.7 to 1 meter) tributary of the Chesapeake Bay, VA
- In secondary channel at 7.5 meter depth

**REFERENCES**

- cartwright, g.m., fridrichs, c.t., and smith, s.j., 2010. Fine sediment dynamics in dredge plumes. PhD Thesis, School of Marine Science, College of William & Mary.
- smith, s.r., 2013. Fine sediment dynamics in the Chesapeake Bay, Remote Imaging Camera System (2013)