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)

Part of the Terrestrial and Aquatic Ecology Commons

**Recommended Citation**


This Presentation is brought to you for free and open access by W&M ScholarWorks. It has been accepted for inclusion in Presentations by an authorized administrator of W&M ScholarWorks. For more information, please contact scholarworks@wm.edu.
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 distribution, but because of the inversion method used to determine the size distribution, it is difficult to distinguish two 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 RIPScam 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 PICS 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.

**CONCLUSIONS**

- Using multiple instruments with various capabilities provides a more complete picture of the particle size distribution and their associated settling velocities.
- Both PICS and ADV in study 1 do a reasonable job of describing the mean/efective Ws when U=20 cm/s. All observers suspended sediment suspension is insufficient to provide valid ADV estimates when using the modified Reynolds flux method.
- ADVs, however, provide long-term continuous estimates of Ws when it is impossible to deploy other instruments (for example during episodic events).
- PICS overestimates the mean or efective Ws because it is limited by pixel resolution. ADVs are likely better based towards particles which are larger and denser and thus produce stronger acoustic backscatter.
- Combination of the LISST, which is better at resolving smaller particles, and the RIPScam, which is better at resolving larger particles, does a reason job in describing the “total” distribution. However neither of these instruments are capable of direct measurement of Ws.
- Addition of LISST to PICS can help resolve contribution of the smaller particles particularly in the low stress periods.

**REFERENCES**