

## Investigating Episodic Contaminant Transport in Estuaries

### Challenge

Seasonal and episodic events such as tidal and wind driven-currents, rainstorms, channel dredging and ship activity may lead to the resuspension of sediments and significant changes in the concentration of dissolved oxygen, chemical contaminants and nutrients in coastal waters. The consequences of event-driven chemical variability include eutrophication, hypoxia, harmful algal blooms and fisheries disruption. This project will employ a combination of traditional survey techniques and innovative towed instruments to characterize the changes in water and sediment quality in estuaries.



### Science

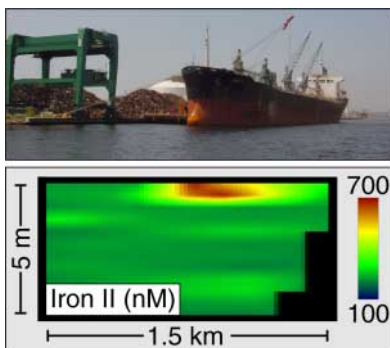
#### Approach

To characterize contaminant transport, researchers used traditional survey techniques (e.g., sediment traps) as well as a new sensor package (the XZ-Profiler, at right) custom designed, in part, for this project. The sensor package can be towed behind an underway vessel (in undulating or depth-keeping mode), allowing for continuous measurements of copper, iron, nitrate, nitrite, phosphate and ammonium as well as salinity, temperature, dissolved oxygen, pH, chlorophyll and turbidity. At the same time, Acoustic Doppler Current Profiler surveys were used to better characterize spatial circulation patterns. In this way, plumes of resuspended contaminants could be tracked and represented in three dimensions.



#### Results

- Field tests have confirmed the viability and utility of the newly developed sensor package, which is now commercially available (for details, see "Application").
- This research provides strong evidence that plumes of resuspended contaminants are important sources of toxics and nutrients in estuaries. The adjacent figure shows 2D data depicting an iron plume observed emanating from a point source at a scrap iron loading facility in Providence, Rhode Island.



### Application

#### The Effect of Episodic Events

As part of this project, researchers will perform real-time, in situ analyses of water properties before and after two storms: one during the summer and one during the winter. It is hoped that these data will illuminate the effect of episodic events such as storms and dredging operations.

#### On the Market

The XZ-Profiler includes instruments developed by SubChem Systems, Inc. and WET Labs, Inc. as well as a Sea-Bird Electronics CTD sensor. The tow body was manufactured by Sea Sciences. The entire system is available from SubChem Systems, a principal partner on the CICEET project.

### Project Essentials

**Title:** Developing and applying a new in situ technology for the investigation of episodic contaminant transport events within estuaries

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