MapCoast Technology Tools for Subaqueous Soil Mapping

Report for New Technology Demo – by Maggie Payne and Jim Turenne.

A Side Scan sonar survey onboard the MapCoast Pontoon Boat.

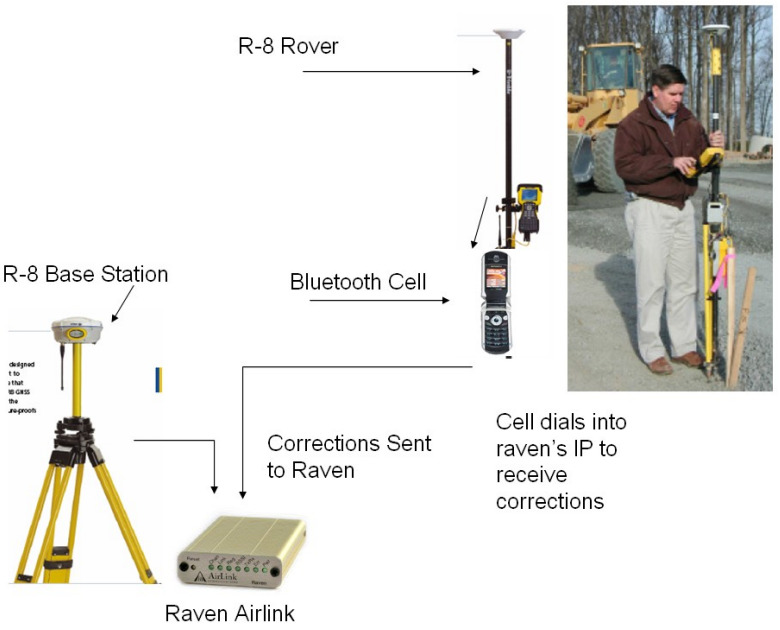
RTK GPS – Real Time Kinematic Surveying

- Centimeter vertical accuracy
  - Known base location makes accuracy possible. OPUS Solution to get NAVD-88
- Used in bathymetric surveying
  - Currently can survey within 1-3 miles of base.
  - With Airlink Raven cell phone link can survey within 30 miles of base.
  - Used for mapping shallow areas and tide-correction.

4800 and R-8 Models used.

Left: 4800 setup, middle: rover interfaced with fathometer, right: Tide Gauge.

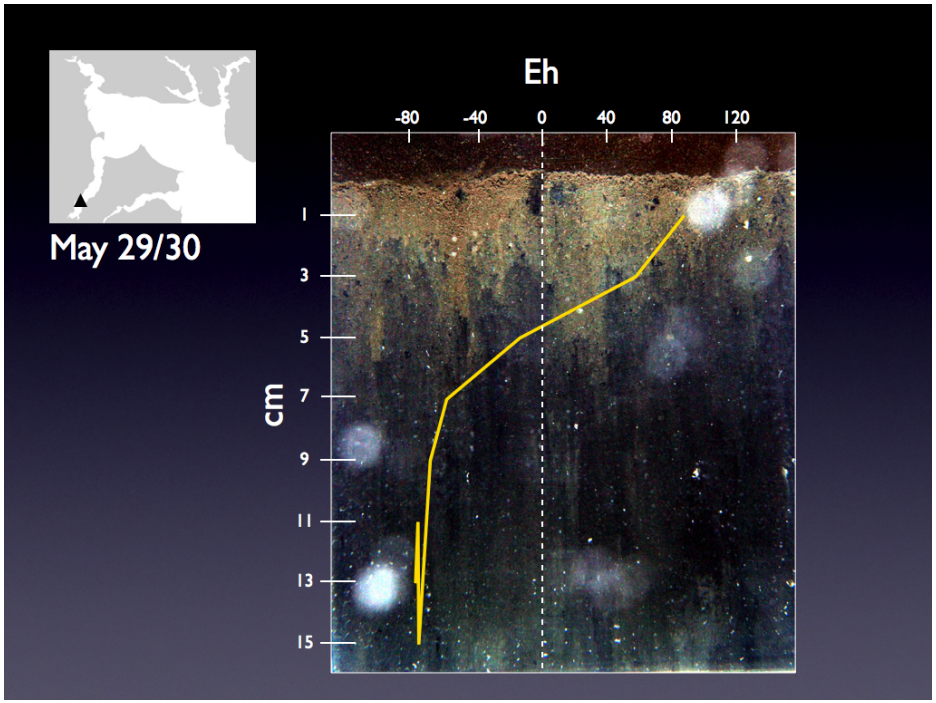
"Turenne Terrain Navigator"



Cell Modem Link – allows for surveying up to 30 miles from base!

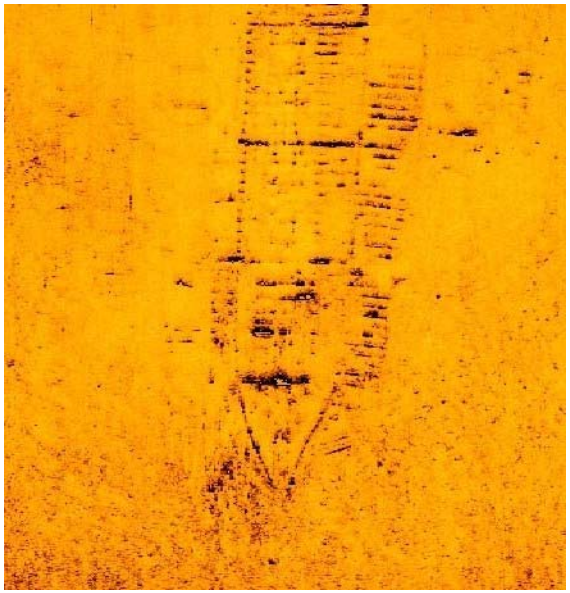
SPI – Sediment (soil) profile imaging camera

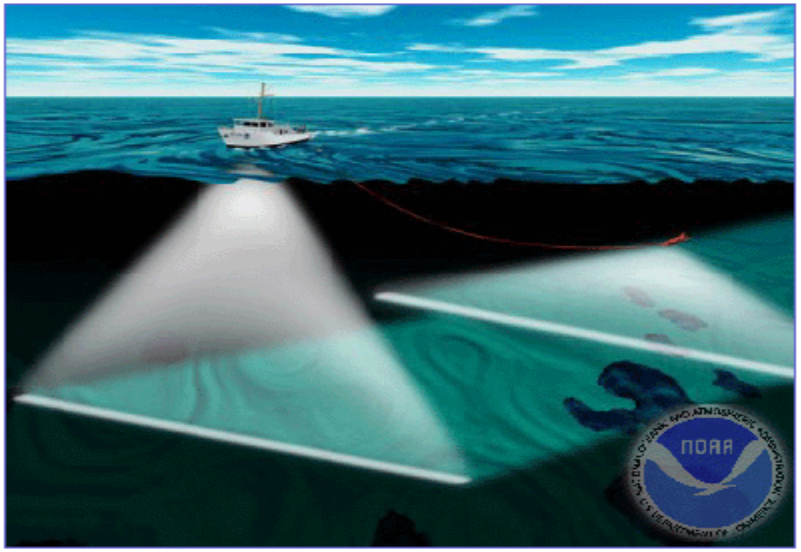
- Provides high resolution image of upper 10 to 15 cm of soil surface
- Identify oxidized surface
- Assess benthic habitat and soil health.


Eh
-80
-40
0
40
80
120
1
3
5
7
9
11
13
15
cm
May 29/30

Sidescan sonar

- Reflectance can identify relative hard / soft bottom





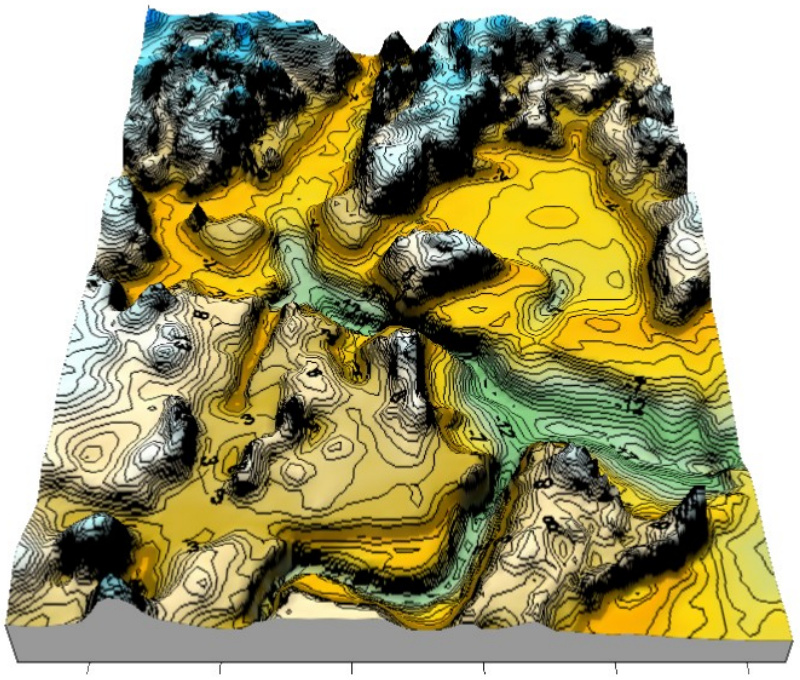
Side Scan Sonar

Used in MapCoast protocol to provide map of benthic geology habitat.

Sidescan Mosaic of Wickford Harbor

Bathymetry

- Variety of tools used to collect bathymetry data and shallow water areas – LIDAR, RTK readings, Orthometric.
- Top data need from user conference – detailed bathymetry!



YSI Meter

- Provides data on water column.
- Salinity, temp, EC, DO, etc.
- Data collected at each soil observation point added to log sheet.

Underwater Video and Still Image

- Video images or photo of bottom taken at each soil description location to provide info on habitat and bottom type.

Vibra Coring

- Used to collect soil cores.
- 3” aluminum cores.
- Up to 20 foot cores obtained.
- Pontoon Boat is rigged with tripod, moon pool.

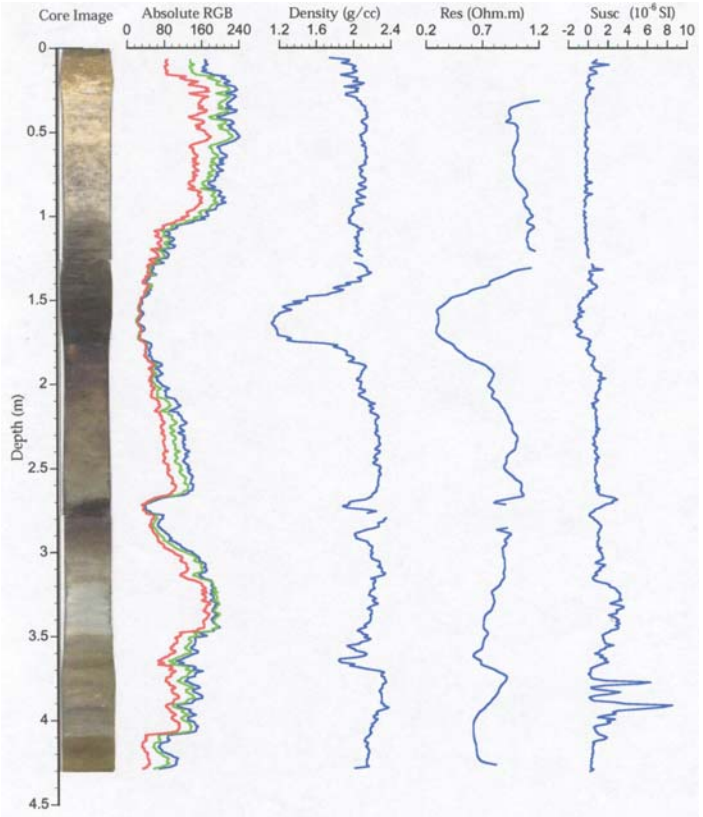
Biologic Core

- Used for soft, highly fluid soils.
- Clear tube is hammered through soil with a piston corer and retrieved for cutting.

Core Cutting

Left: a core cutting device using dual routers. Right: sheet metal sheers.

Analyzing the Cores



Geotech Core Analyzer and Data.

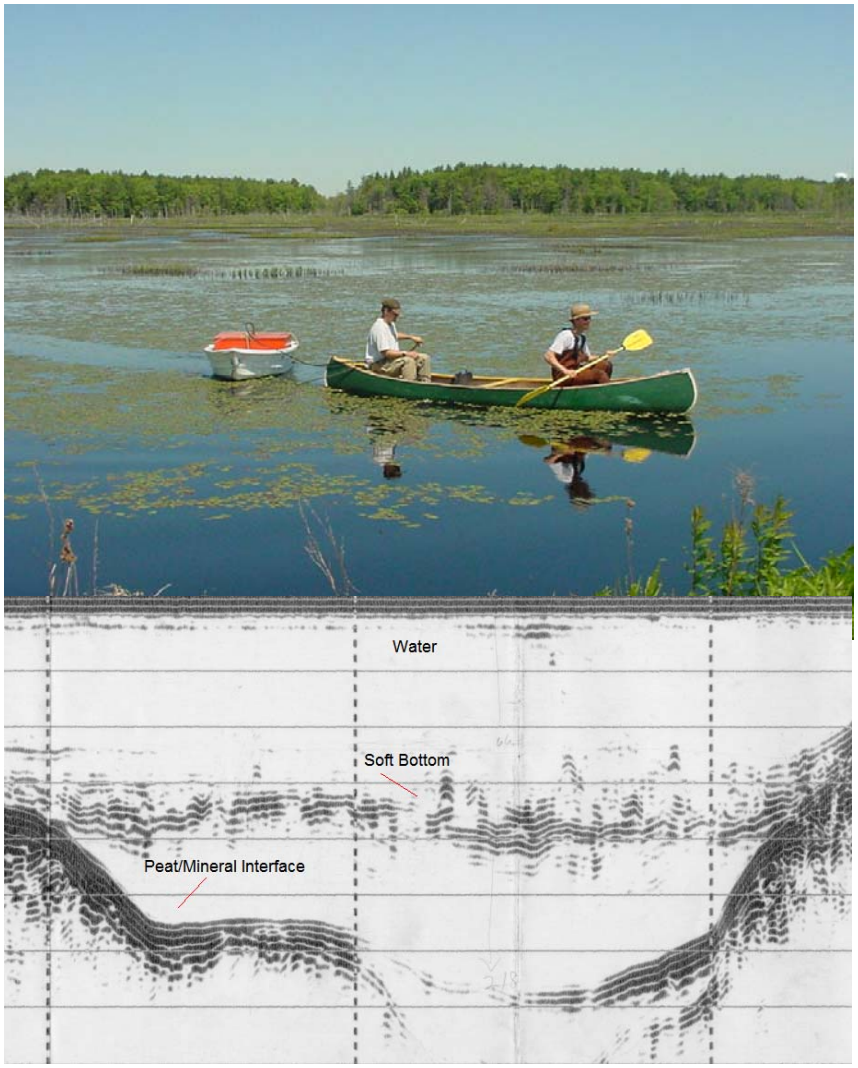
XRF Meter

- Provides data on heavy metals in soils.
- Rapid tool provides concentrations on over 20 elements.
- URI Pedology Dept. has new XRF unit.

Field Data Collection & Navigation

Tablet PC used for navigating (ArcMap, Ortho Image, Bathy, and GPS interfaced, data collection – all descriptions entered directly into pedon PC and spread sheet on boat, variety of GPS, handhelds, rugged PC, etc. Broadband connection used to connect to Internet (weather alerts!).

Ground-Penetrating Radar



Used for fresh-water subaqueous soils – bathy and subsurface

Coastal dunes and beaches – buried layers, water tables, contacts

Locate nutrient inputs

Electromagnetic Induction

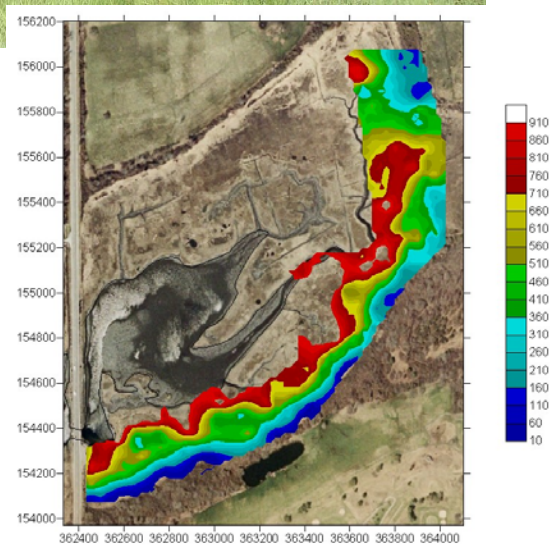
Salinity gradients for restoration efforts.

Tidal marsh mapping and organic thickness.

Salt water intrusion

Cultural resources

Soil variability.



Other technology

- Field pH and EC meters.
- Data recorded for each soil core and stored on log sheet.