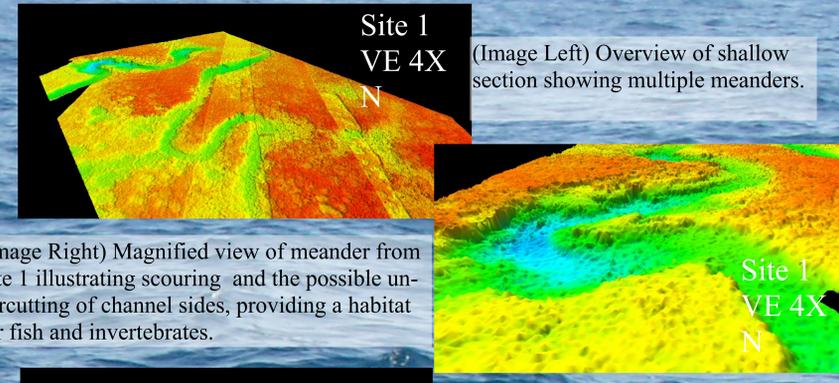
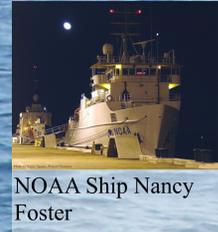
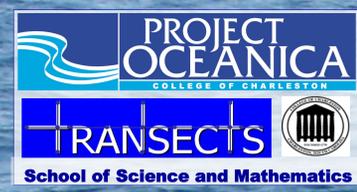


SONAR CHARACTERIZATION OF A RELICT MEANDERING RIVER CHANNEL IN THE MID-CONTINENTAL SHELF

Alison Deary, Brian RC Kennedy, Leslie Sautter PhD.
College of Charleston, Charleston, SC.



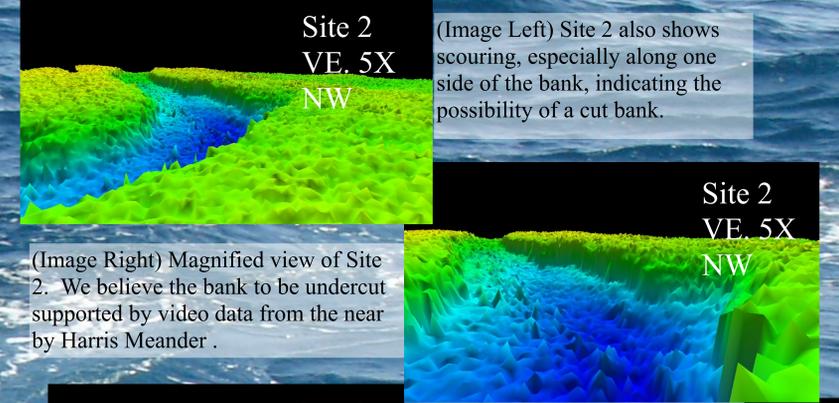
Background:
During a 2004 College of Charleston Transect cruise aboard the R/V *Savannah*, a meandering river channel was discovered using sidescan sonar. In November 2006 this site, the Transect River Channel, was surveyed extensively using multibeam sonar, aboard the NOAA Ship NANCY FOSTER. The relict channel is at least 4 km in length and lies at 20-25 m water depth on the mid-continental shelf off the coast of Charleston, SC. The morphology of the Swiggle Meander (in the shallowest section of the mapped channel) was investigated using CARIS HIPS/SIPS mapping program. Sediment grab samples were used to ground truth the survey data while determining ratio of lithogenics to biogenics. Sediment grain size analysis also served to determine the distribution of hardground and soft-sediment areas. A section southeast of our area, the Harris Meander, has ROV and live video data that were used to observe the biodiversity.



Acknowledgments:
Chris Stubbs, Dan Boles, Loren Danese, CARIS, SC DNR, NOAA, Scott Harris The crew of the *Nancy Foster*. Coastal Carolina University

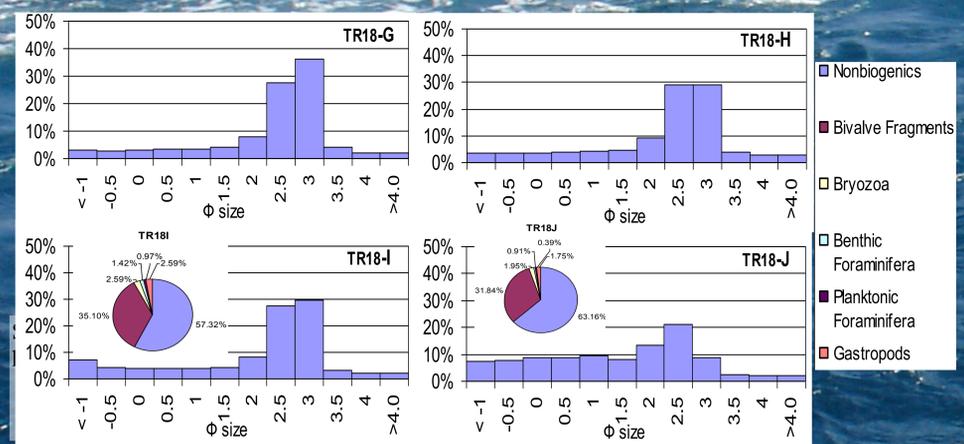
Methods:

- ◆ Data collection aboard the NOAA vessel NANCY FOSTER using SIM RAD and CARIS
- ◆ Cleaning of the produced GIS map using CARIS
- ◆ Drying of the sediment samples in a Desiccator
- ◆ Separation of the collected sediment samples by phi sizes from -1.0 to 4.0 to determine the percent weight of biogenics of the sediment samples and subdividing the biogenic component into benthic and planktonic foraminifera, gastropods, bivalves, and bryozoa.



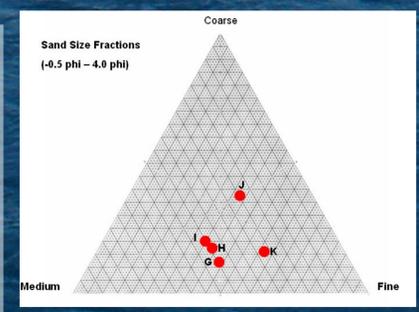
Results:

Observed a great deal of biodiversity in this habitat while the video and ROV from a nearby meander indicated a void of life in the soft sediment stretches. In the river channel, there was a high biogenic to lithogenic ratio and the most biodiversity was observed in the bivalve category. The a sinuosity index was calculated to be 2.61

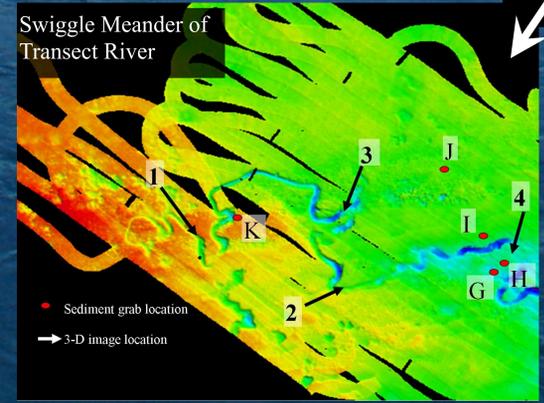


Sediment Histograms. Each sediment sample from the study area has a unimodal grain size distribution. TR18-J is interesting because it is skewed towards the larger grain size but is located outside of the meander channel, indicating the possibility of a rocky outcrop. TR18-I, located near the channel, for phi values -1.0 to 1.0, had the greatest percent biogenics, with 42.58%. In general, the sediments are moderately sorted with little silt/clay, and are dominated by fine sand.

Ternary Diagram of Coarse, Medium, and Fine Grained Sand particles: Right As shown in the histogram, TR18-J is composed mainly of coarse and fine sand grains. The other sediment samples displayed a composition of finer sand with a smaller percent of medium sand. TR18-K, located near site 1, is composed mainly of medium and fine grained sand. TR18- I, G, and H, all clustered around site 4, are composed of medium and fine grained sand.



Sieve Interval (mm)	Sieve's Phi Size (φ)	Size Class (Westworth Scale)
≥2.00	<- 1.0	GRAVEL
1.41 - 2.00	-0.5	VERY COARSE SAND
1.00 - 1.41	0.0	COARSE SAND
0.71 - 1.00	0.5	MEDIUM SAND
0.50 - 0.71	1.0	FINE SAND
0.35 - 0.50	1.5	VERY FINE SAND
0.25 - 0.35	2.0	MUD (Silt + Clay)
0.175 - 0.25	2.5	
0.125 - 0.175	3.0	
0.088 - 0.125	3.5	
0.063 - 0.088	4.0	
<0.063	>4.0	

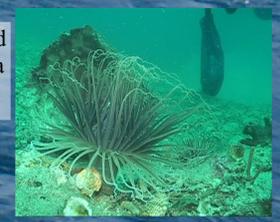


The sinuosity index is 2.61 for our section of the meander, is greater than the adjacent Harris Meander segment, with an index of 2.04.

References:

- Giddens, H and L Sautter. Habitat Characterization of an Outer Continental Shelf Hardground; Lionfish Ledge. 2004.
- Stubbs C, P Lund, and L Sautter. Ground Truthing Shelf Edge with Sidescan Sonar Imagery. 2004

Sea Anemone attached to a rocky outcrop in a megaripple field.



(image left) Invertebrate life attached to the ledge of the Harris Meander which is located just to the South of the Transect River. Also note the fish observed in the channel, using the undercut bank (below).



Discussion:

- ◆ Sediment samples were composed of silt or clay possibly indicating winnowing as a result of high velocity in the channel
- ◆ Bivalves were the most numerous of the biogenics, supporting the importance of the channel as a productive ecosystem
- ◆ Many of the animal species observed in the Harris Meander were concentrated in the channel or along the scarp
- ◆ Hard ground areas are especially important along the eastern seaboard and provide substrate to biota in areas of little relief
- ◆ Hard bottom is an important substrate for the attachment for filter feeding animals indicated by the abundance of barrel sponges
- ◆ In the Harris Meander we noted that the sandy stretches of the area were devoid of life. In one area however, a lone anemone found a rocky enclave and grew, illustrating the importance of hard bottom in the submarine environment. Due to the proximity of the Harris Meander similar benthic habitats are expected associated with the Swiggle Meander.
- ◆ The sediment analysis supported the importance of hard ground with TR18I (located near the channel) having a higher % biogenics than TR18K, which is out side the channel

