MULTIBEAM MAPPING OF THE TRANSECT MEANDERS ON THE SOUTH CAROLINA CONTINENTAL SHELF OFF CHARLESTON, SC

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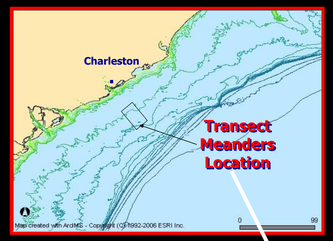
A Transect Program Seafloor Mapping training cruise was conducted aboard the NOAA ship Nancy Foster on January 30-31, 2008. Using a Simrad multibeam sonar system, a 5 km^2 area on the continental shelf was mapped north of the previously identified Transect Meanders. Data were collected by CofC undergraduate students, and processed using Caris HIPS 6.1 software. Water depths in the area range from 18-24 meters. The feature of greatest interest is the massive sand body which lies adjacent to the previously studied area. This newly mapped portion of the Transect Meanders will be used to build on earlier work that supports evidence for a possible ancient shore line, which is now below 20 meters of water. Also, because of hardground exposures found in the meander channels, these data aid in mapping and understanding fish habitats along the South Carolina coast.

METHODS

- Multibeam data acquired using Simrad 1002 onboard the NOAA Ship *Nancy Foster*
- Data cleaned and processed using Caris HIPS 6.1
- Sediment grain size analysis acquired from Nancy Foster cruise '07 (Murphy, 2007)



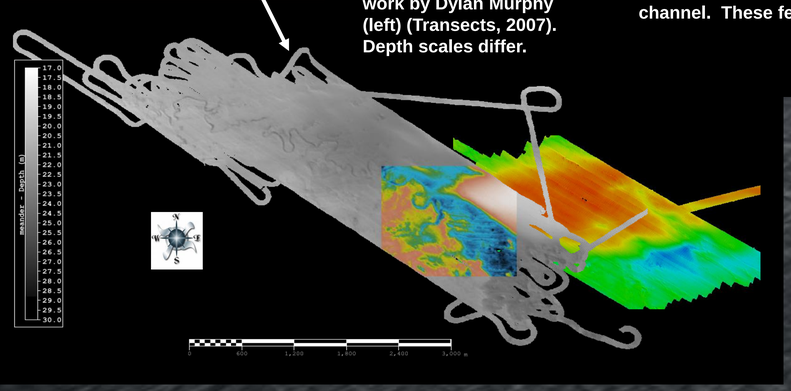


Figure 1.

Left: Map showing the area of data collection for the Transects Meander.

Below: Overlay of Transect '08 data (right) and previous work by Dylan Murphy (left) (Transects, 2007). Depth scales differ.

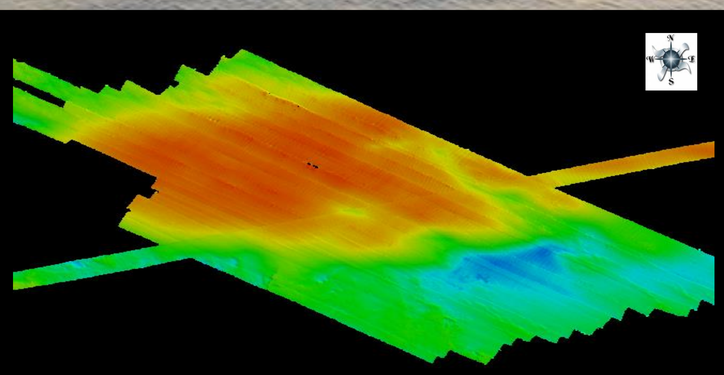
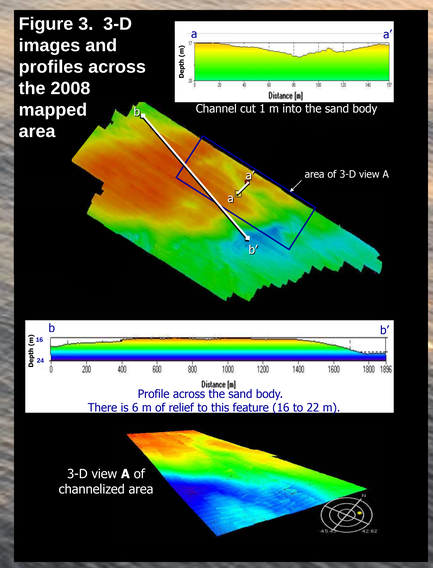


Figure 2. Mapped area of the Transect '08 cruise. This area lies east of the 2007 area (Fig. 1). Depth scale is shown to the right. Dominating the image is a large sand body that may be a remnant of an ancient shoreline when sea level was ~20 m below today's. Also present is a possible tidal inlet or channel. These features are shown in 3-D and profile views in Figure 3.

Figure 3. 3-D images and profiles across the 2008 mapped area



RESULTS

- The large sand body is composed primarily of poorly sorted medium to coarse sand (Murphy, 2007).
- The meanders (mapped in 2007) which run to the west of the sand body range from 21-25 m in depth, and the channel which cuts into the sand body is 20-21 meters in depth.
- The channel appears to cut almost all of the way through the sand body, and based on profile a-a' the channel cuts through 1 m of the sand body.
- Profile b-b' shows that the southeast side of the sand body has very sharp relief, while the northwest side of the sand body tends to be flatter and very low relief..

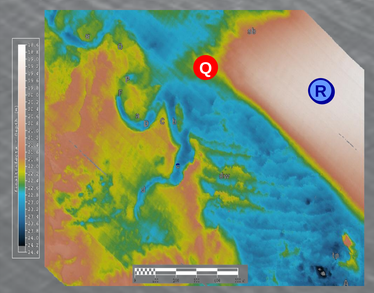
DISCUSSION

- After post-processing of the 2008 multibeam data, it became apparent that there was a possible tidal inlet or channel located on the large sand body.
- This massive sand body is possibly a remnant of a submerged barrier island or large offshore bar from when sea level was located in this mid-shelf area.
- Steepness of the southeast side of the sand body (based on profile b-b') could be due to increased erosion from paleo longshore drift and wave action, or could possibly be due to erosion from the meander.
- More areas of the Transect Meander region need to be mapped to examine the full extent of the meandering channel and the adjacent sand body. Additional sediments and video of the seafloor will aid in further habitat characterization as well as help determine the paleo-environmental information.

BACKGROUND of TRANSECT MEANDERS

- Previous multibeam and sidescan sonar mapping by CofC Transect students of the mid-shelf region revealed a meandering channel – possibly a streambed or tidal creek – that is incised into into semi-lithified biogenic limestone.
- Research in 2007 of this area indicates that there are possible oxbows that have lithified into the hardground substrate indicating further river channel processes (Meany 07).
- The meander area closely resembles meanders found adjacent to estuaries of the present South Carolina coast, but to date, no marsh or mud sediments have been found (Meany 07).
- Coarse and medium sands dominate the sediments of this region and often form megaripples that appear to migrate and may infill channels.

Figure 4. Locations and grain size analysis of sediment grab samples Q and R collected on 2007 Transect cruise (Murphy, 2007).



Sieve Interval	Phi Size (φ)	Size Classification
> 2.00	< -1.0	gravel
1.41 – 2.00	-0.5	very coarse sand
1.00 – 1.41	0.0	
0.71 – 1.00	0.5	coarse sand
0.50 – 0.71	1.0	
0.35 – 0.50	1.5	medium sand
0.25 – 0.35	2.0	
0.177 – 0.25	2.5	fine sand
0.125 – 0.177	3.0	
0.088 – 0.125	3.5	very fine sand
0.063 – 0.088	4.0	

Wentworth scale is used for sizing sediment grains based on phi

ACKNOWLEDGEMENTS

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- Previous data analysis by CofC grad Dylan Murphy (Murphy 07) and Keith Meany (Meany 07)