A blue and white research vessel named 'PELICAN' is shown from a low angle, moving through the ocean. The ship has a white superstructure with a radar dome and an American flag. The name 'PELICAN' is written in white on the blue hull. In the background, another large ship, possibly an offshore supply vessel, is visible on the horizon under a clear blue sky.

**Results from RV Pelican cruise, May 5-9, 2010:
DIC concentration and $\delta^{13}\text{C}$ profiles of benthic sediments**

Sampling:

Luke MacKay

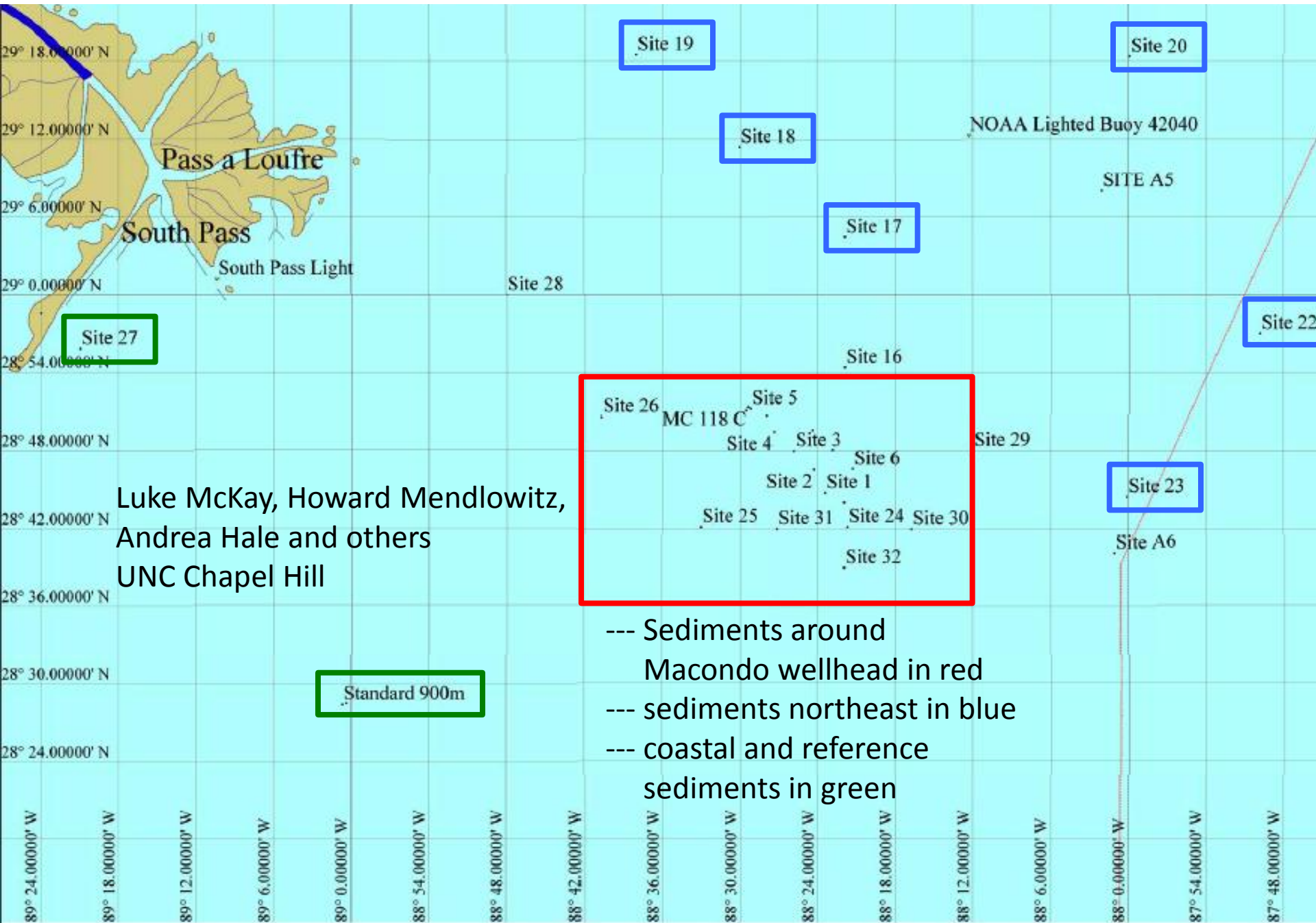
Core slicing:

**Luke MacKay, Kai Ziervogel, Dan Hoer, Dan Albert,
Howard Mendlovitz, Lisa Nigro & Tingting Yang?**

DIC concentration and delta13C:

Howard Mendlovitz and Andrea Hale

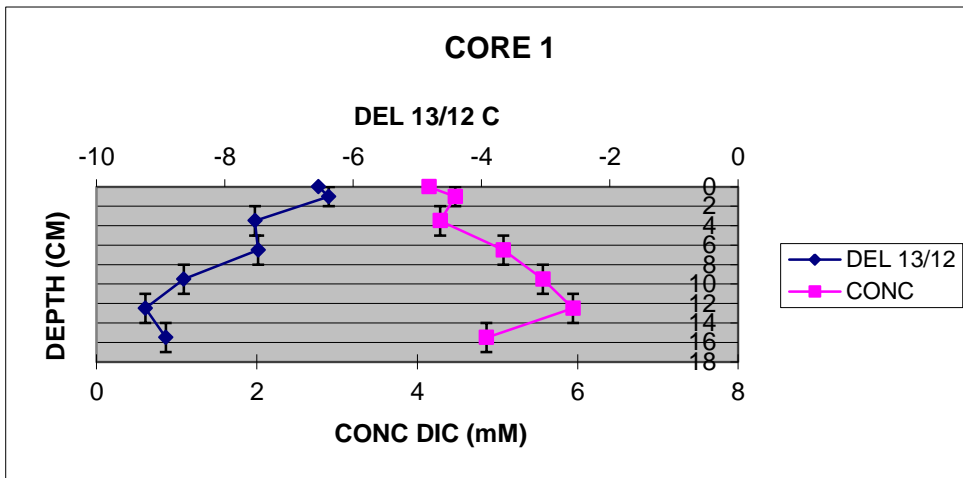
Results from RV Pelican cruise, May 5-9, 2010: DIC conc. & $\delta^{13}\text{C}$ profiles of benthic sediments



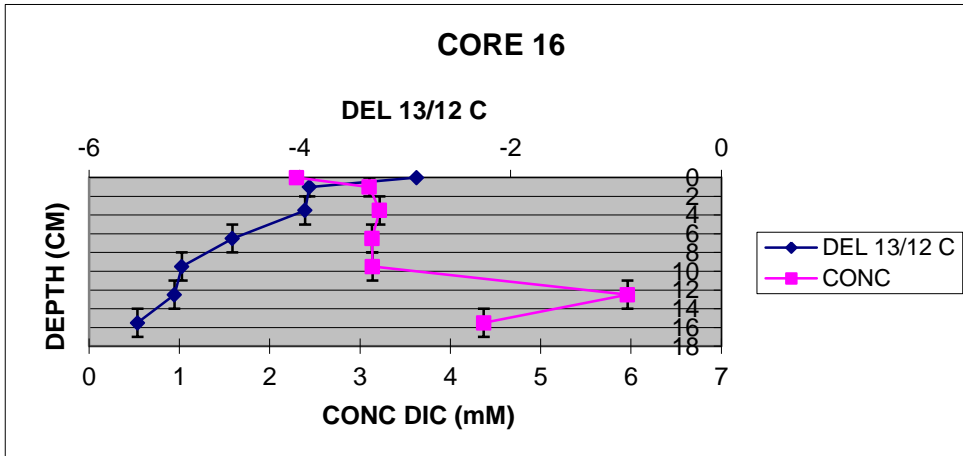
Luke McKay, Howard Mendlowitz,
Andrea Hale and others
UNC Chapel Hill

- Sediments around Macondo wellhead in red
- sediments northeast in blue
- coastal and reference sediments in green

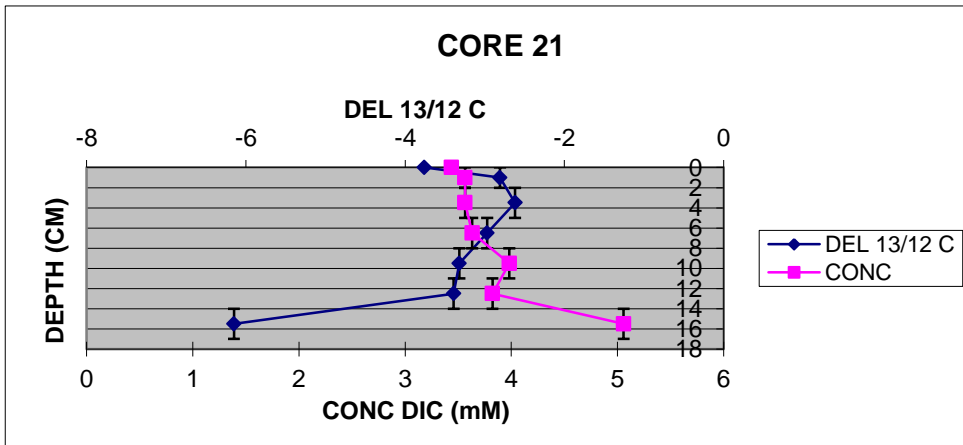
Cores with visible DIC and delta13C signature of biomass remineralization



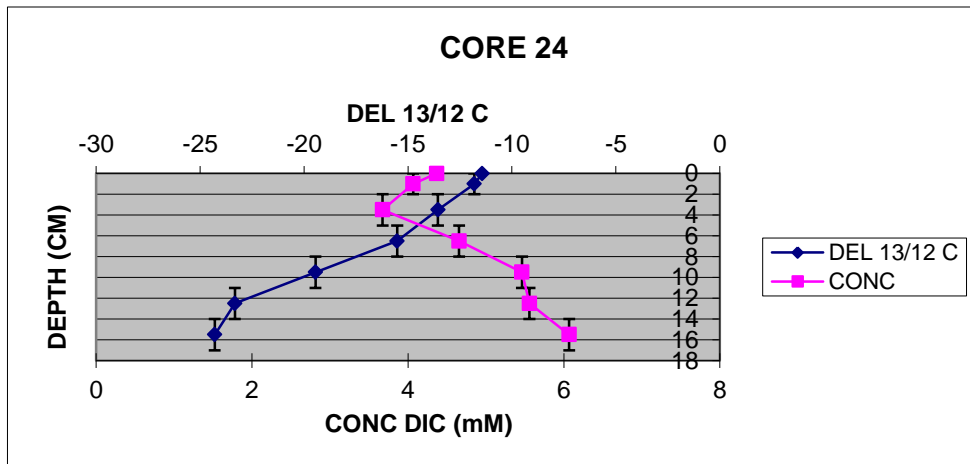
“Standard” location
35 nM southwest of WH
917 m depth
28°45.388 N; 88°27.743 W



Core 16
Station 19
Near MS coast
64 m depth
29°18.548 N; 88°38.054 W



Core 21
Station 24
1605 m depth, 1.9 nm to GZ
28°42.150 N; 88°21.729 W



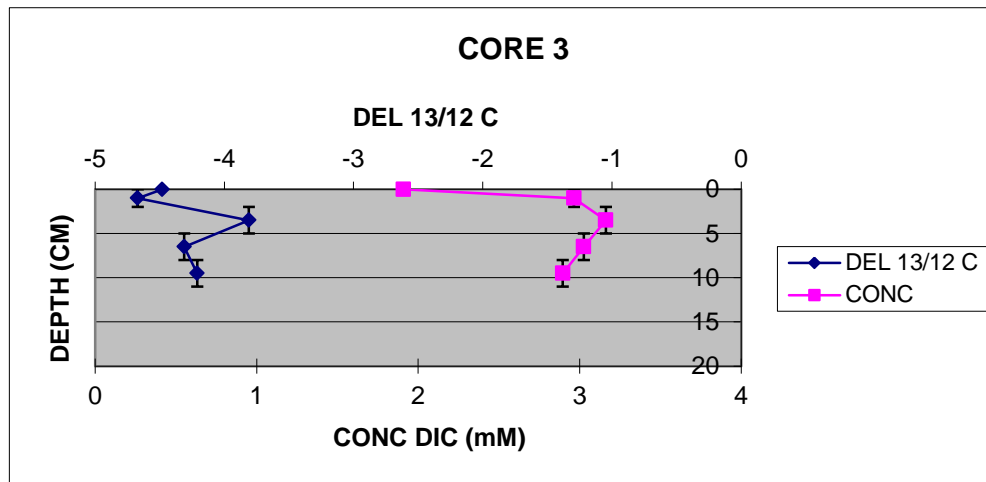
Cores with strong DIC and delta13C signature of biomass remineralization

Core 24
 Station 27
 Near South Pass
 17 m depth
 28°55.783 N; 89°20.949 W

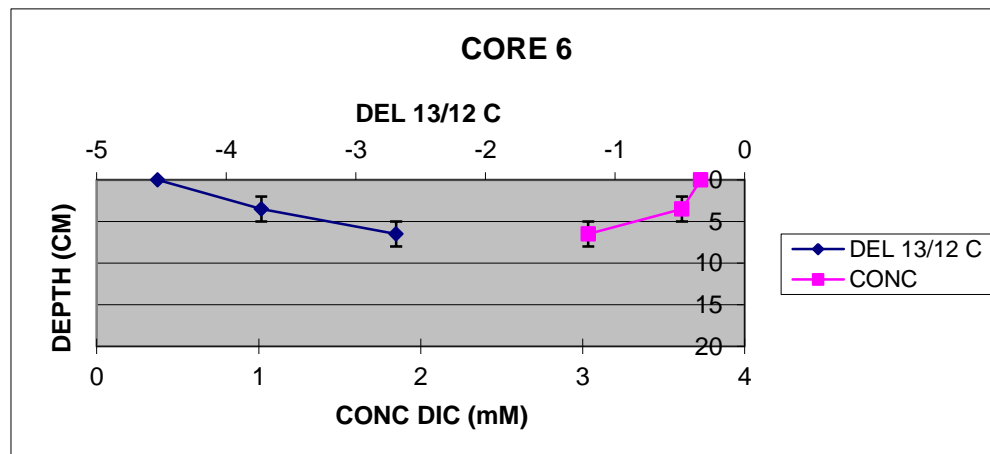
At the Standard station alias core 1, 35 nm southwest of wellhead, the DIC concentration is higher than at the well head, 5 to 6 mM, and $\delta^{13}\text{C}$ of DIC is centered around -7 to -9‰. The DIC concentration increases with depth, and the $\delta^{13}\text{C}$ depletion becomes stronger (10 – 16 cm depth), indicative of an increasing signature of biomass remineralization at depth, and bioturbation in the upper sediments above 10 cm which attenuates DIC concentrations and $\delta^{13}\text{C}$. Similar patterns for found for a shelf site, core 16 near the MS coast, and also for a deep site near the well head, core 21.

The coastal core (core 24) from 17 m depth at South Pass shows the strongest biomass remineralization signature of this type. Its DIC concentration increases with depth from 4 to 6 mM, and its $\delta^{13}\text{C}$ profile changes from -12‰ at the surface to -25‰ at 16 cm depth.

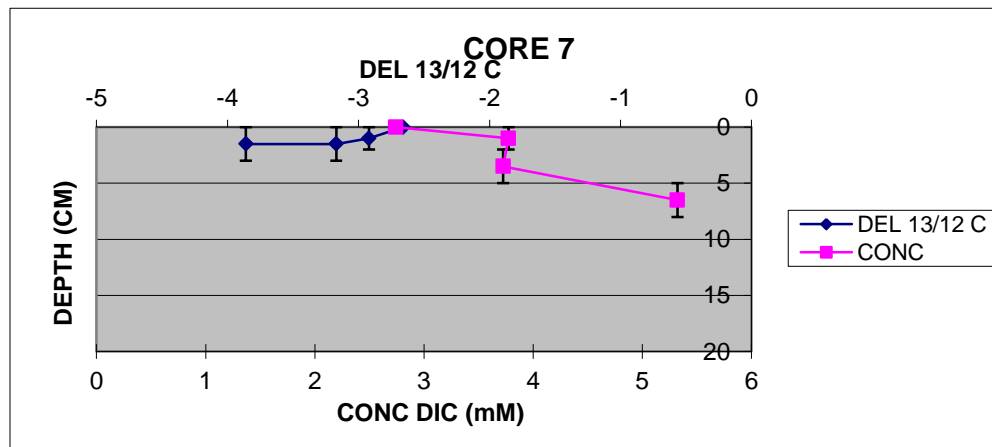
DIC-poor cores around the Macondo wellhead I



Core 3
Station 1
1459 m depth, 1 mile to GZ
28°50.645 N; 88°26.548 W

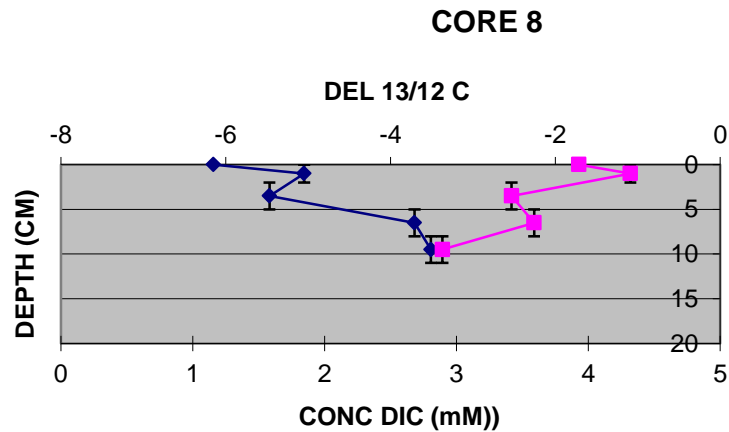


Core 6
Station 2
1380 m depth, 3 miles to GZ
28°46.557 N; 88°24.293 W



Core 7
Station 3
1315 m depth, 5 miles to GZ
28°47.988 N; 88°25.825 W

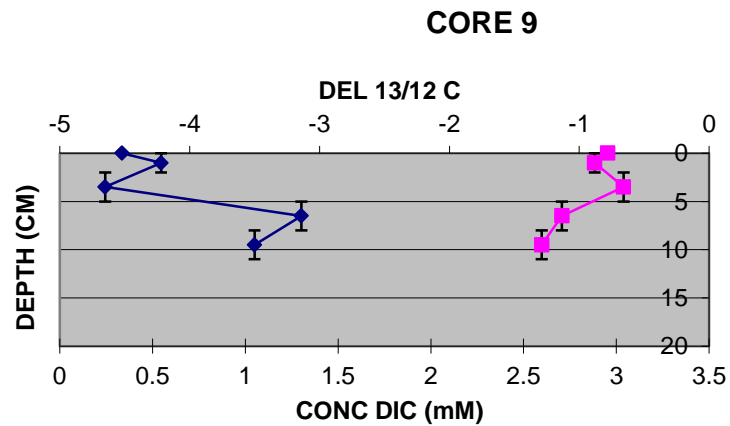
DIC-poor cores around the Macondo wellhead II



Core 8

Station 6

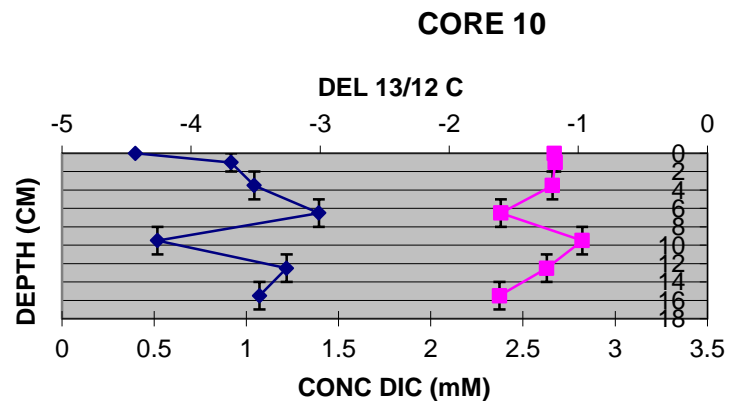
1459 m depth, 2 miles to GZ
28°46.612 N; 88°21.285 W



Core 9

Station 7

1202 m depth, 4 miles to GZ
28°48.074 N; 88°22.849 W

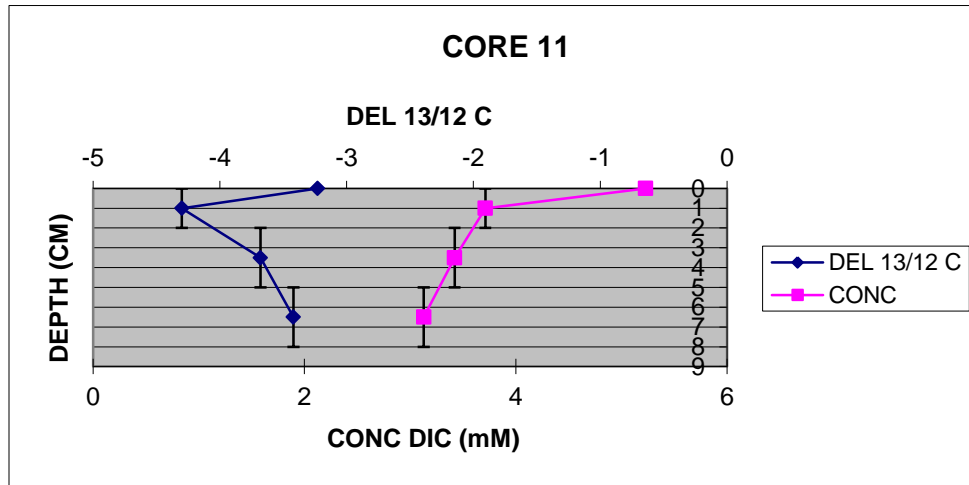


Core 10

Station 8

942 m depth, 6 miles to GZ
28°49.581 N; 88°24.411 W

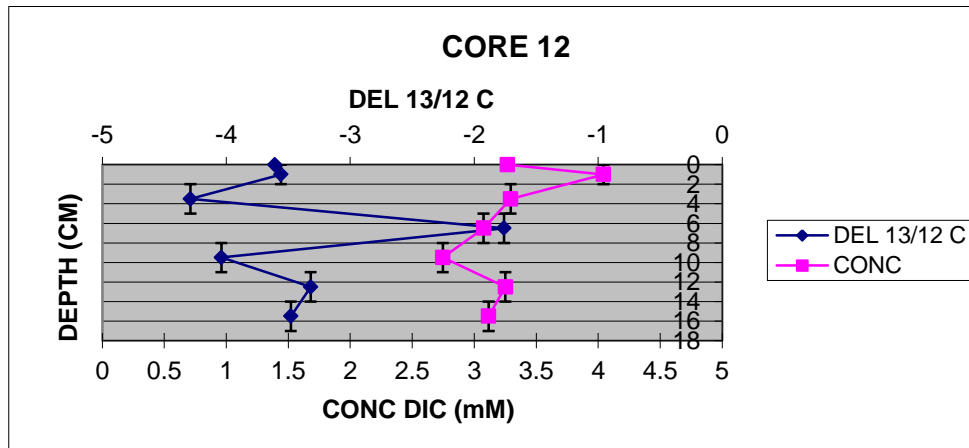
DIC-poor cores around the Macondo wellhead III



Core 11

Station 4

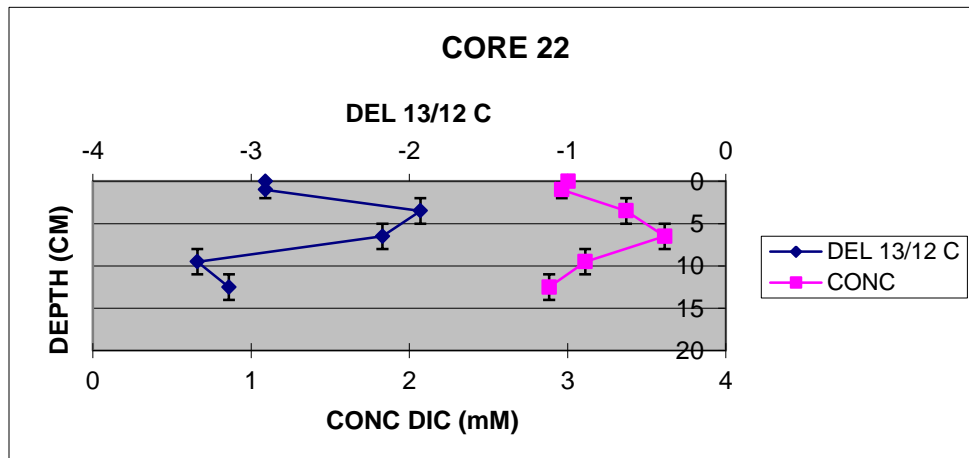
1138 m depth, 7 miles to GZ
28°49.454 N; 88°27.378 W



Core 12

Station 5

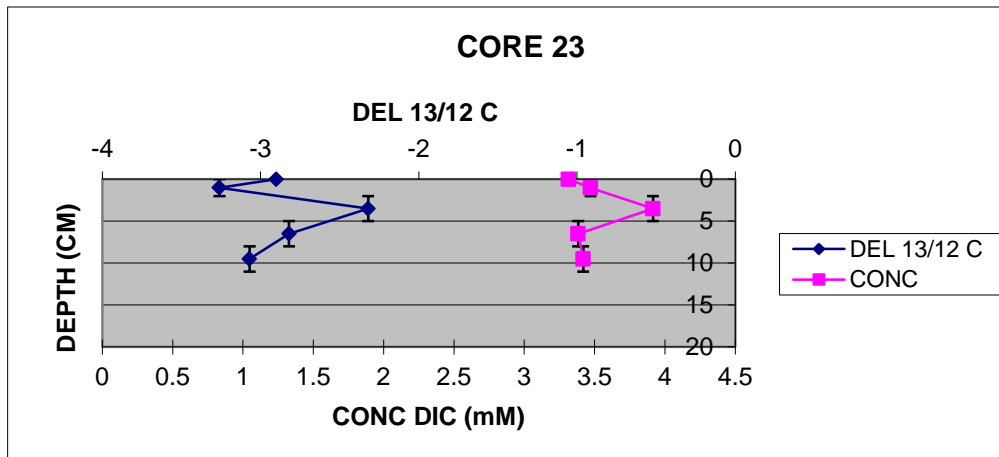
879 m depth, 9 miles to GZ
28°51.179 N; 88°29.194 W



Core 22

Station 25

1360 m depth
28°42.159 N; 88°33.043 W



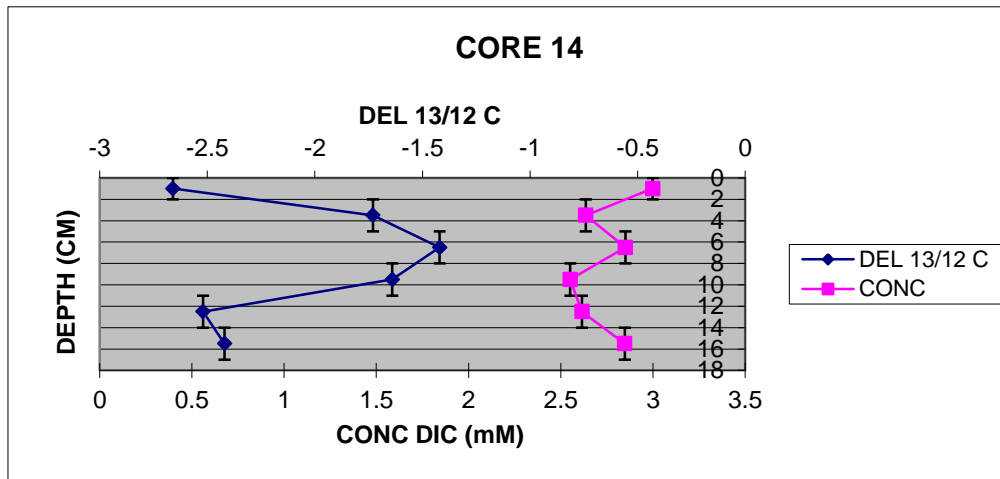
DIC-poor cores around the Macondo wellhead IV

Core 23
 Station 26
 732 m depth
 28°50.574 N; 88°40.713 W

The sediments around and near the wellhead showed consistent DIC concentration and $\delta^{13}\text{C}$ patterns (cores 3, 6, 7, 8, 9, 10, 11, 12, 22, 23) that are typical for moderately oligotrophic cores from the deeper continental margin: DIC concentrations in surficial sediments (upper 10 cm) were near 3-4 mM, and $\delta^{13}\text{C}$ values of DIC were around -3 to -4 ‰.

Note that these sites have a little more DIC than the more scattered sites east or northeast of the wellhead (cores 14, 15, 16, 17, 18, 19, 20); these have low DIC in surficial sediments (upper 16 cm), mostly around 2.5 to 3 mM, and $\delta^{13}\text{C}$ of DIC is around -2 to -3 ‰, even near -1.5 ‰ in the easternmost cores 18, 19, and 20. They appear more oligotrophic than the sites around the Macondo well head, possibly because they receive less organic import from the Mississippi river plume.

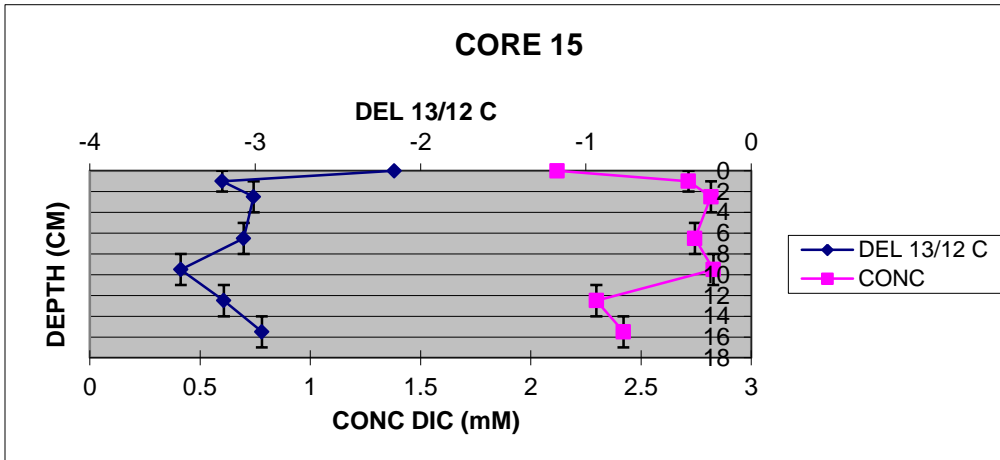
DIC-poor cores northeast of the Macondo wellhead



Core 14

Station 17

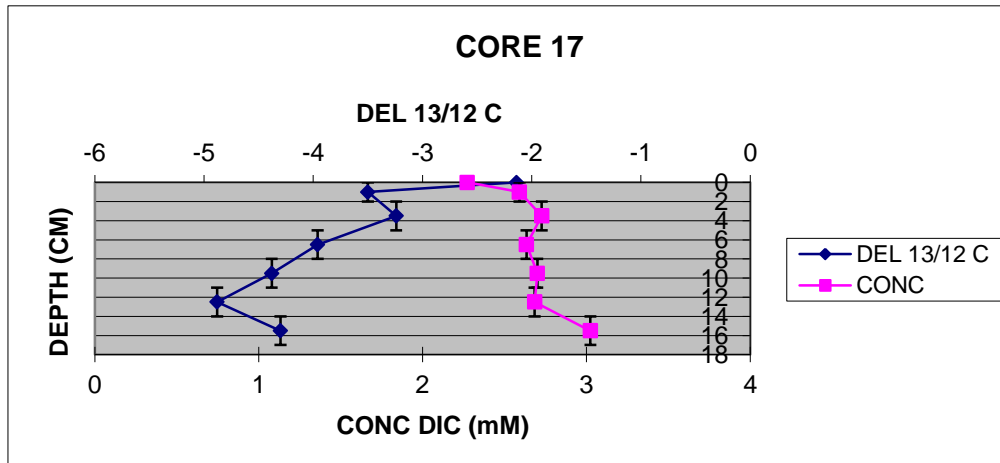
438 m depth, 21 miles to GZ
29°04.441 N; 88°21.901 W



Core 15

Station 18

150 m depth, 30 miles to GZ
29°11.390 N; 88°30.061 W

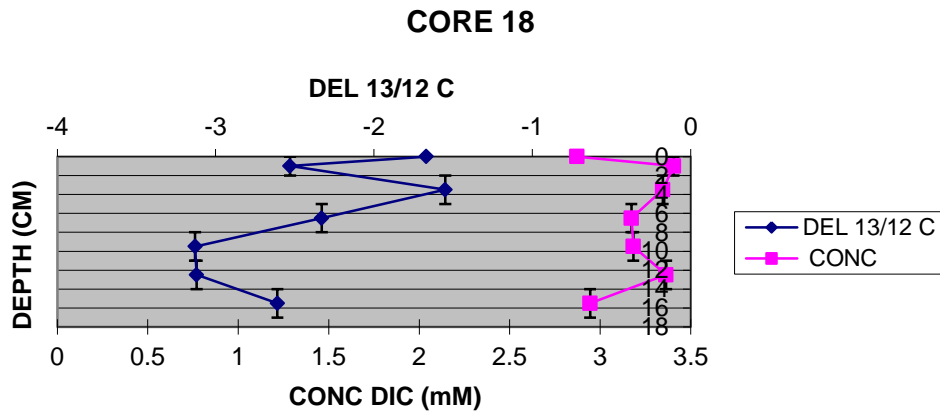


Core 17

Station 20

150 m depth
29°18.418 N; 87°59.864 W

DIC-poor cores northeast of the Macondo wellhead

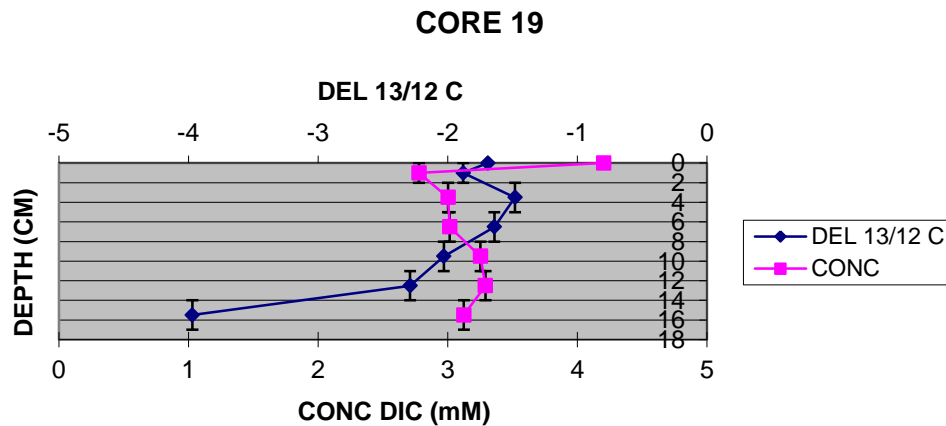


Core 18

Station 21

698 m depth

29°18.329 N; 87°25.656 W

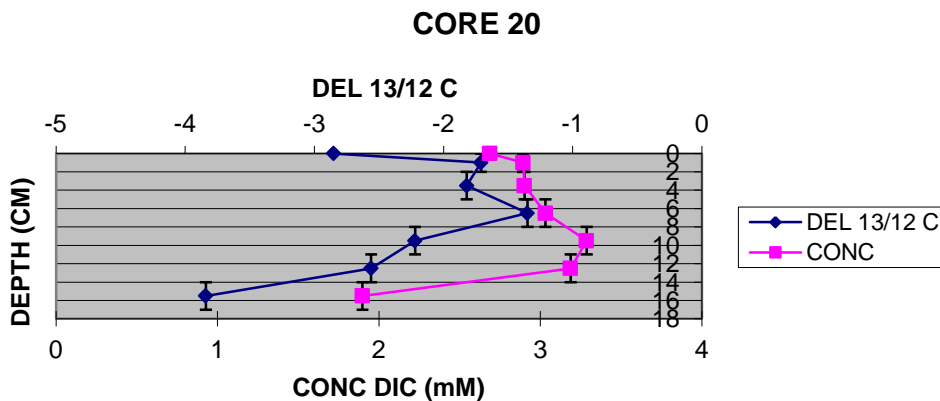


Core 19

Station 22

1621 m depth

28°56.962 N; 87°49.777 W



Core 20

Station 23

2045 m depth, 19 miles to GZ

28°44.470 N; 88°00.060 W

These DIC results show the diagenetic status of the sediments in the general area of the Macondo well head before any oil accumulated on the sediment. All sediments were reddish-ochre colored on retrieval between May 5 and 8, and did not smell of oil. No microbial flocs were visible.

Next steps: Compare to DIC concentration profiles and delta13C isotopic signatures of oil-impacted sediments!