Lophelia II: Particulate Flux to Cold Water Coral Sites, September 2009 – September 2011

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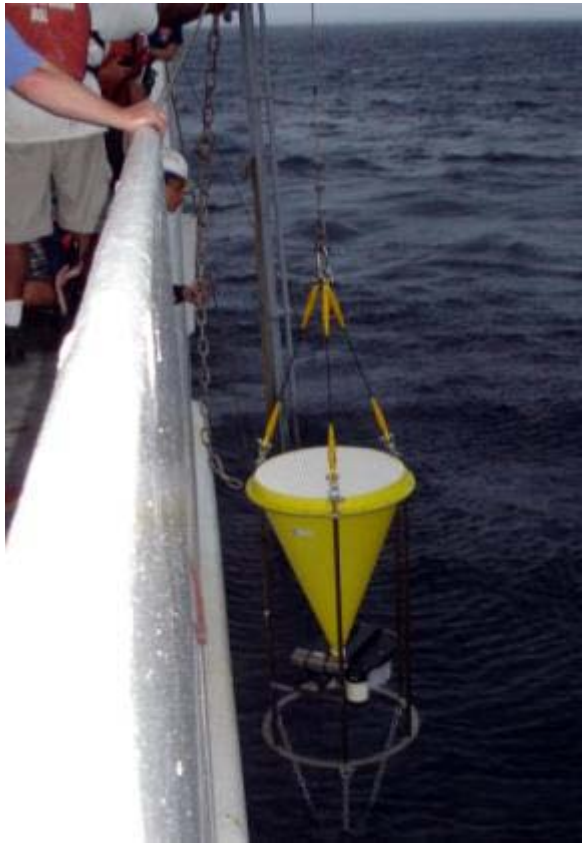
Lophelia II sediment/larval trap moorings



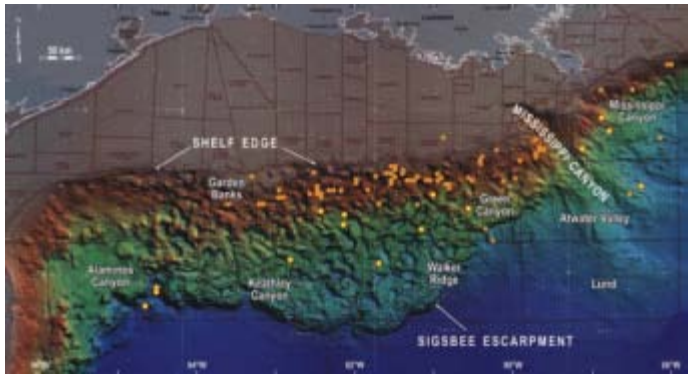
1 Steel Sphere (37")
2 chain, 3/8"
3 wire rope.1/4"
4 Current Meter
5 wire rope.1/4"
6 chain, 3/8"
7 bridle (3- 3/16"wire rope)
8 SEDIMENT TRAP MK7
9 bridle,(3-1m 3/8 chain)
10 chain, 3/8"
11 wire rope.1/4"
12 ACOUSTIC RELEASE (Benthos Tandem)
13 chain, 3/8"
14 nylon rope,3/4" alongside 24m wire rope
15 chain, 3/8"
16 ANCHOR

Fig.1 Sediment Trap Mooring 1 (Site MC-751) deployed at 28°11.64'N, 089° 47.90'W in a water depth of 442m (Jason 464 VVan, 12:36:51 on 09/01/09).

Fig.2 Sediment Trap Mooring 2 (Site VK-826) deployed at 29° 09.63'N, 088° 01.13'W in a water depth of 455m (Jason 466 VVan, 01:01:57 on 09/04/09).

Two Key Science Drivers:

- Nutrition – biogeochemical flux from the upper-ocean
- Recruitment – settling of coral (& associate) larvae



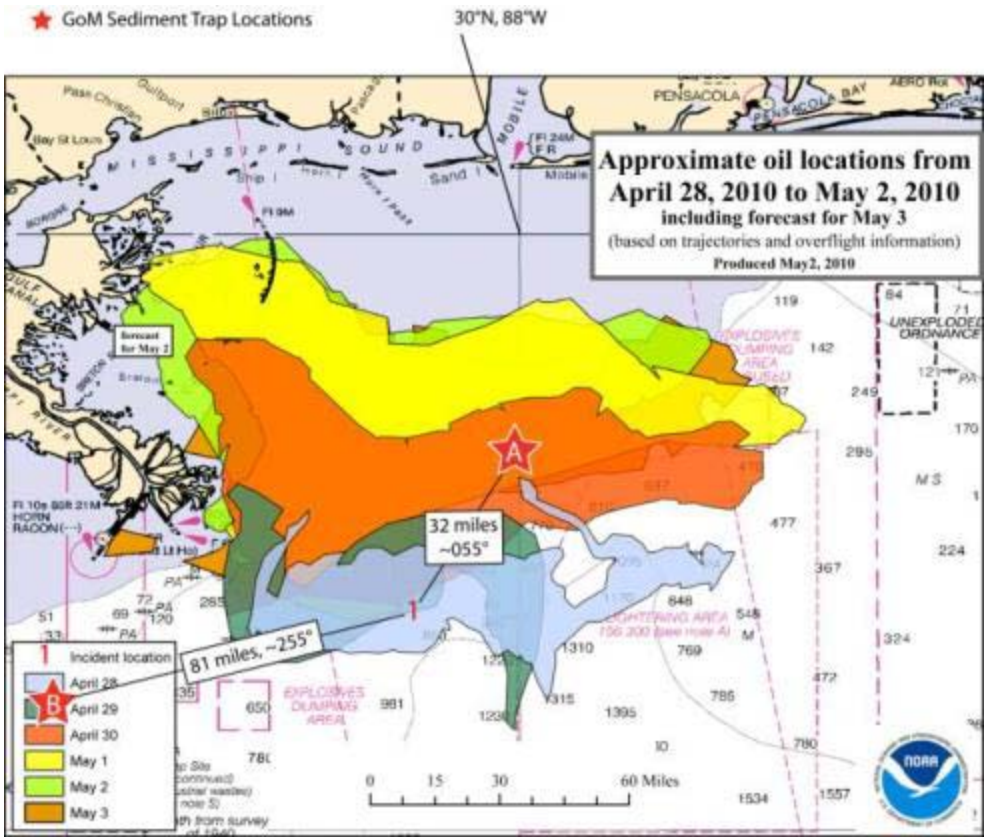
(Fisher et al.2007)

(Fisher et al.2007)

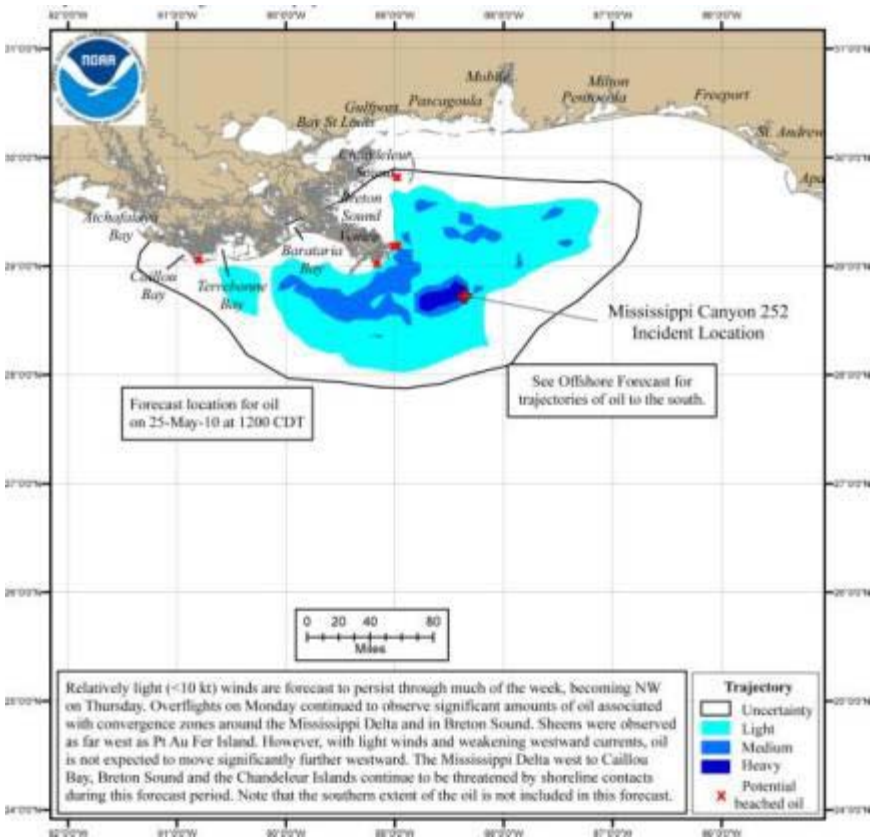
(Photo: E.Cordes)

Deepwater Horizon: April 20, 2010 and Its Immediate Aftermath

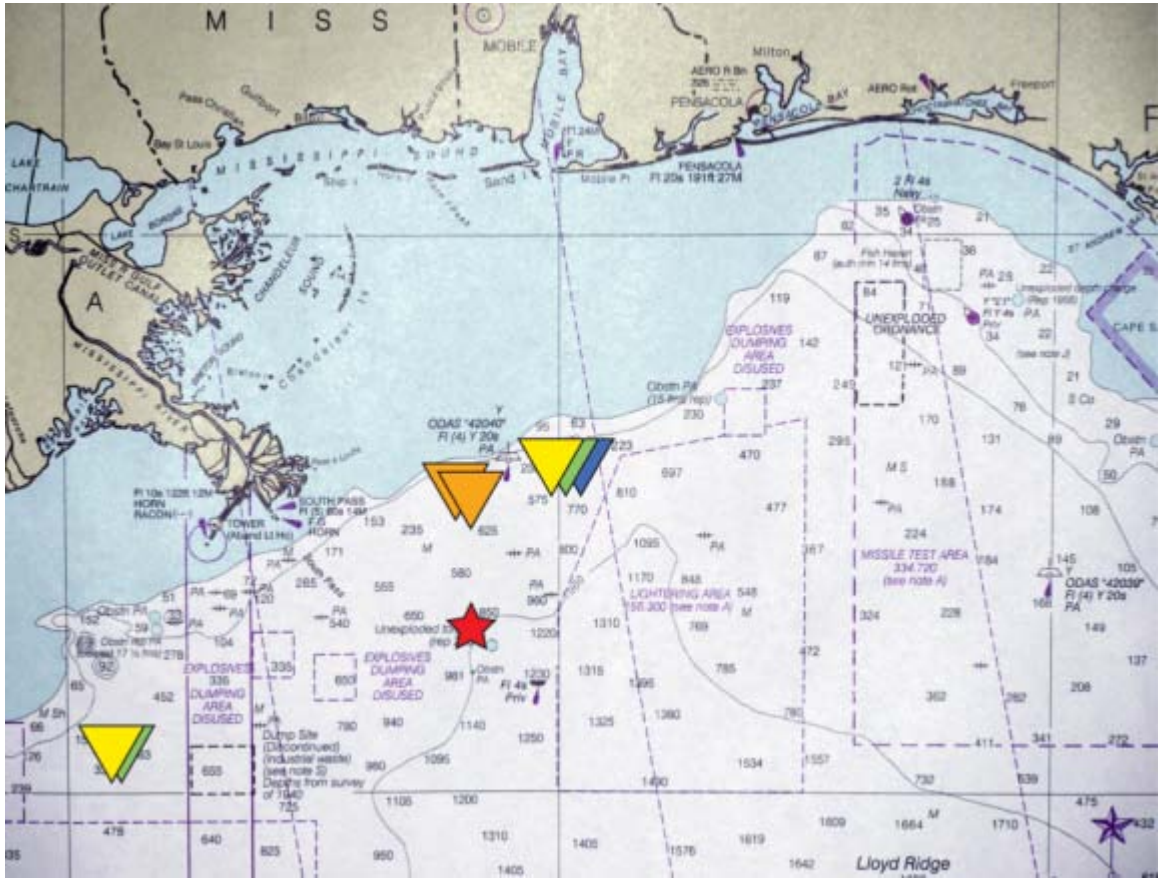
Surface slicks @ 5/2/2010



Surface slicks @ 5/24/2010



2 Years of Time-Series in Progress September 2009 – September 2011



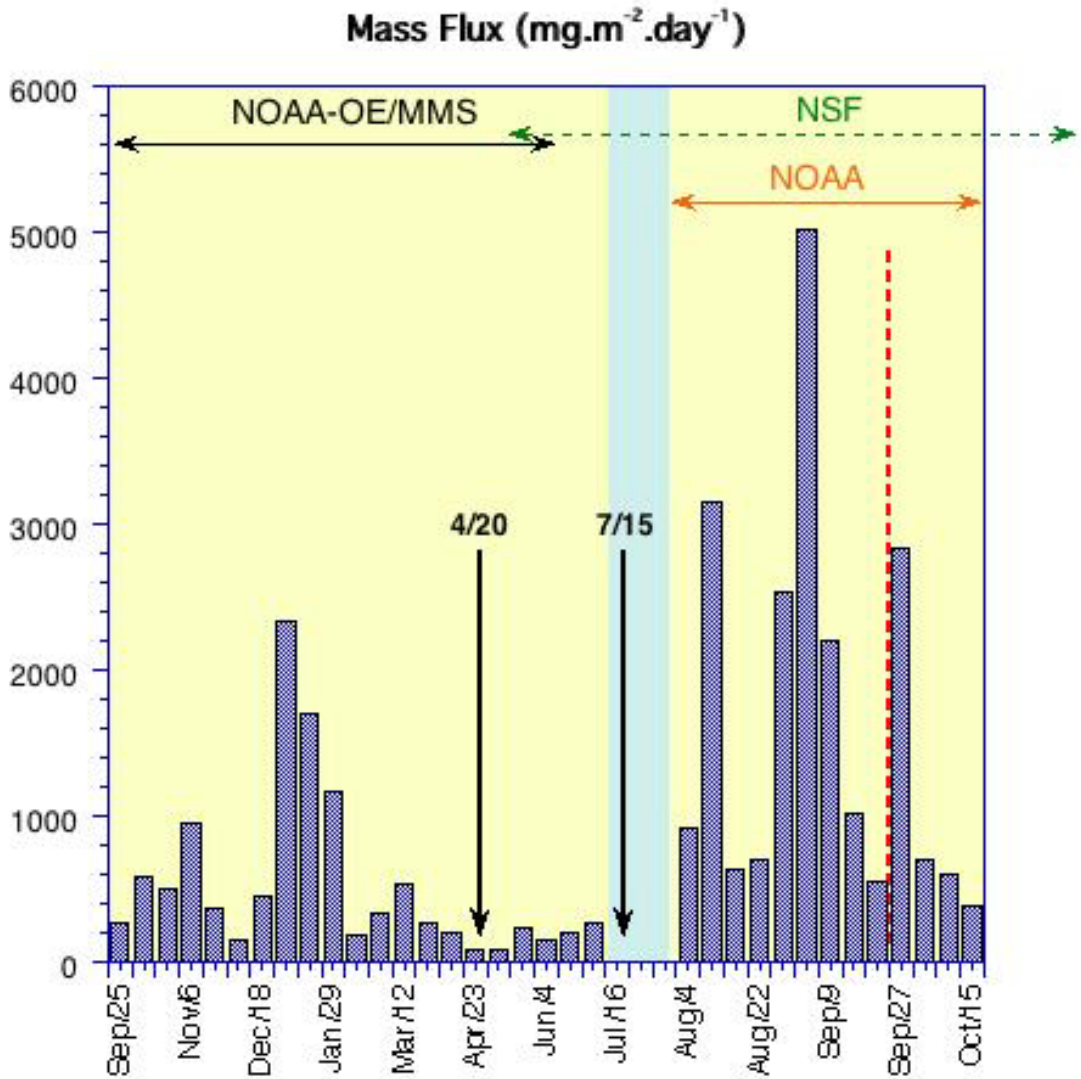
NOAA-OE & MMS
September 2009 – July 2010

NSF Rapid
June 2010 – January 2011

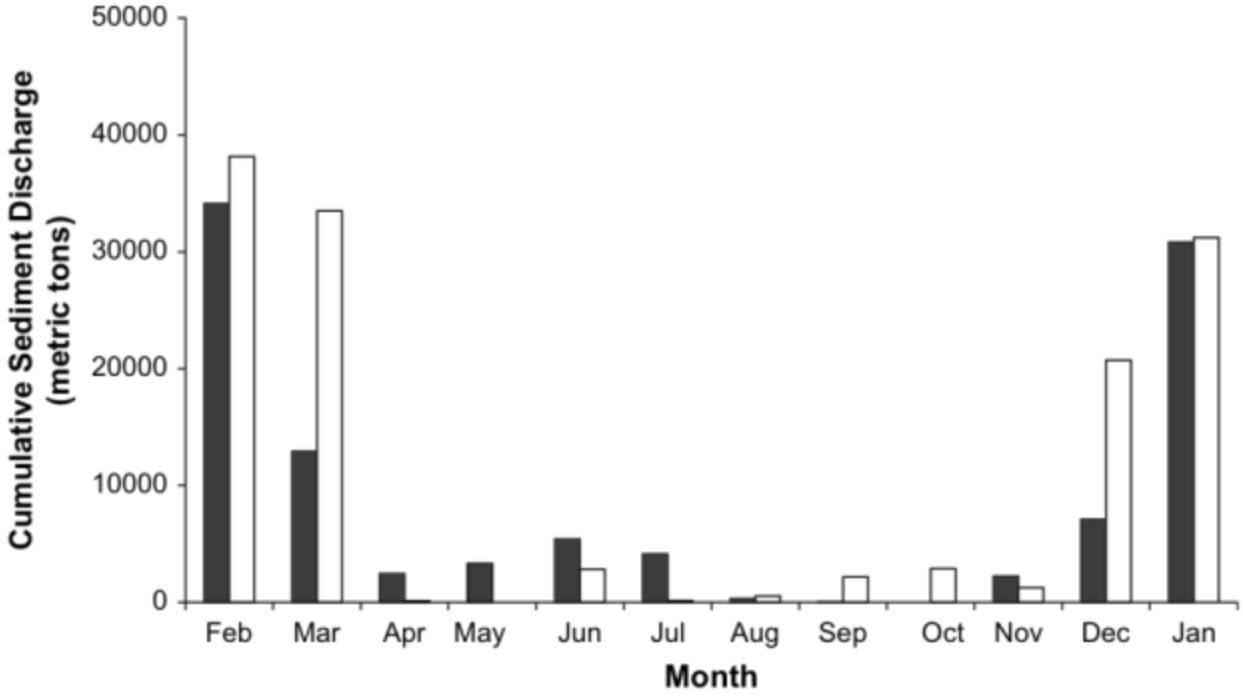
NOAA-NRDA
March 2011 – September 2011

NOAA-NRDA
July 2010 – October 2010

Mass Flux (Northern Gulf ~500m)

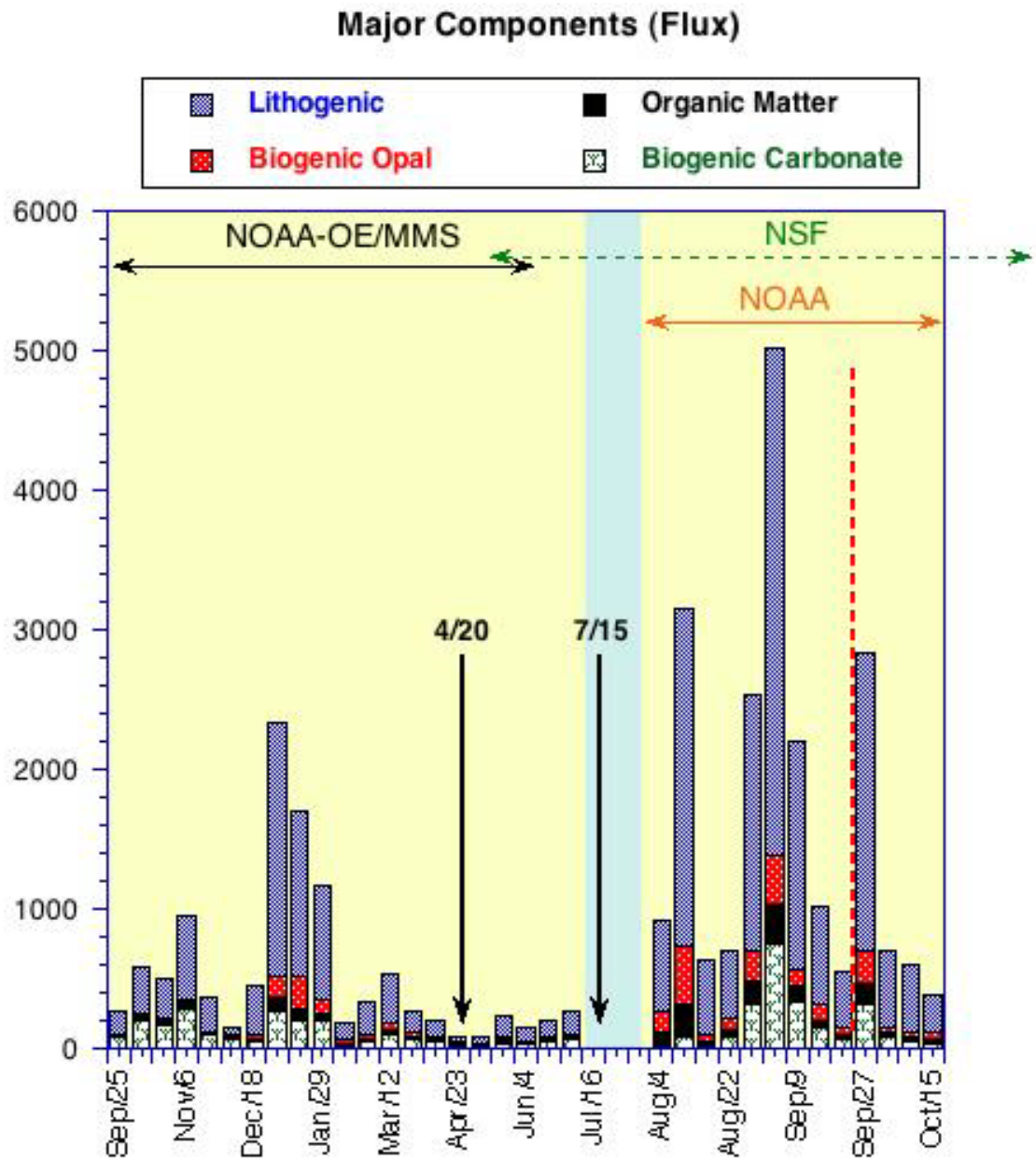


Mississippi Sediment Discharge



(Snedden et al.2007)

Mass Flux Is Dominated by Lithogenics



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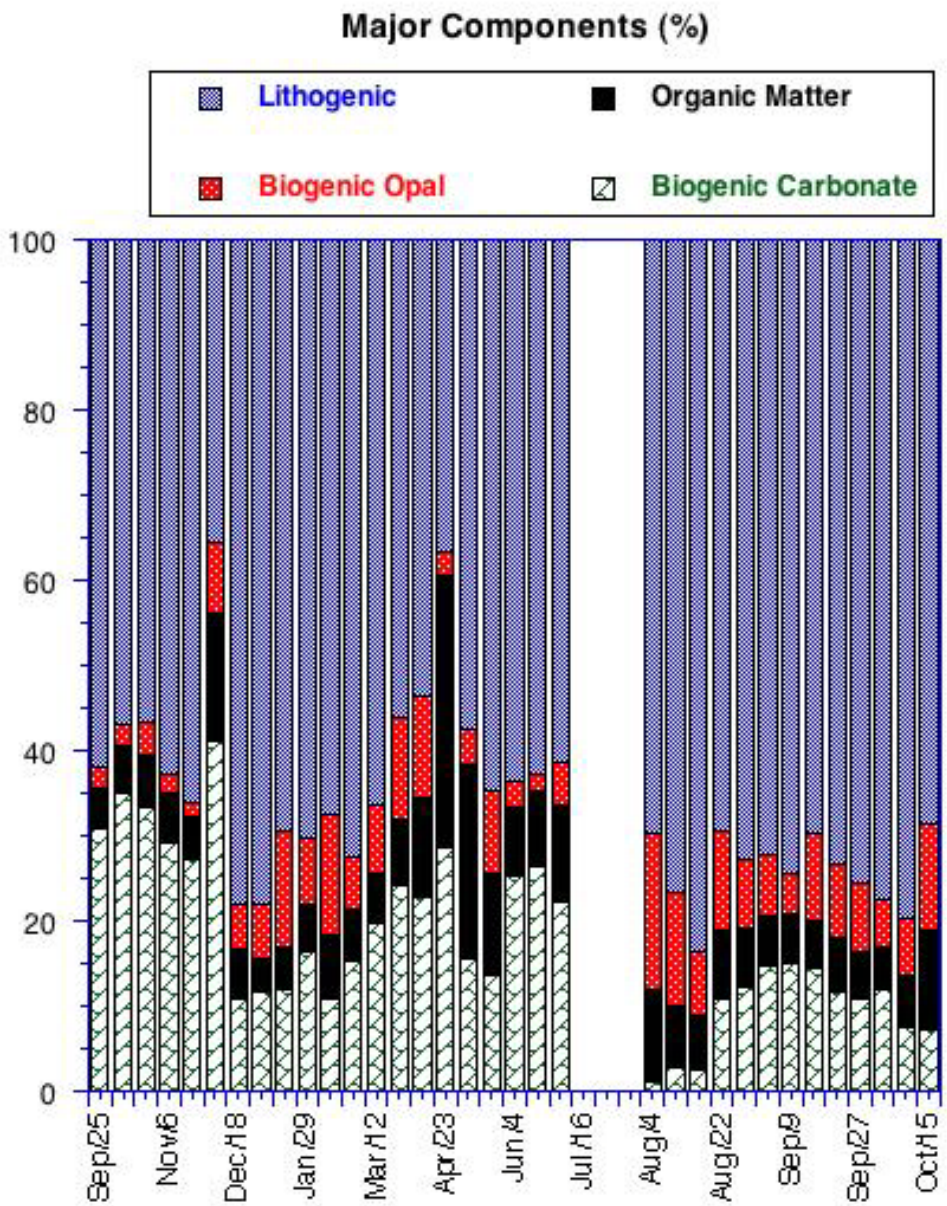
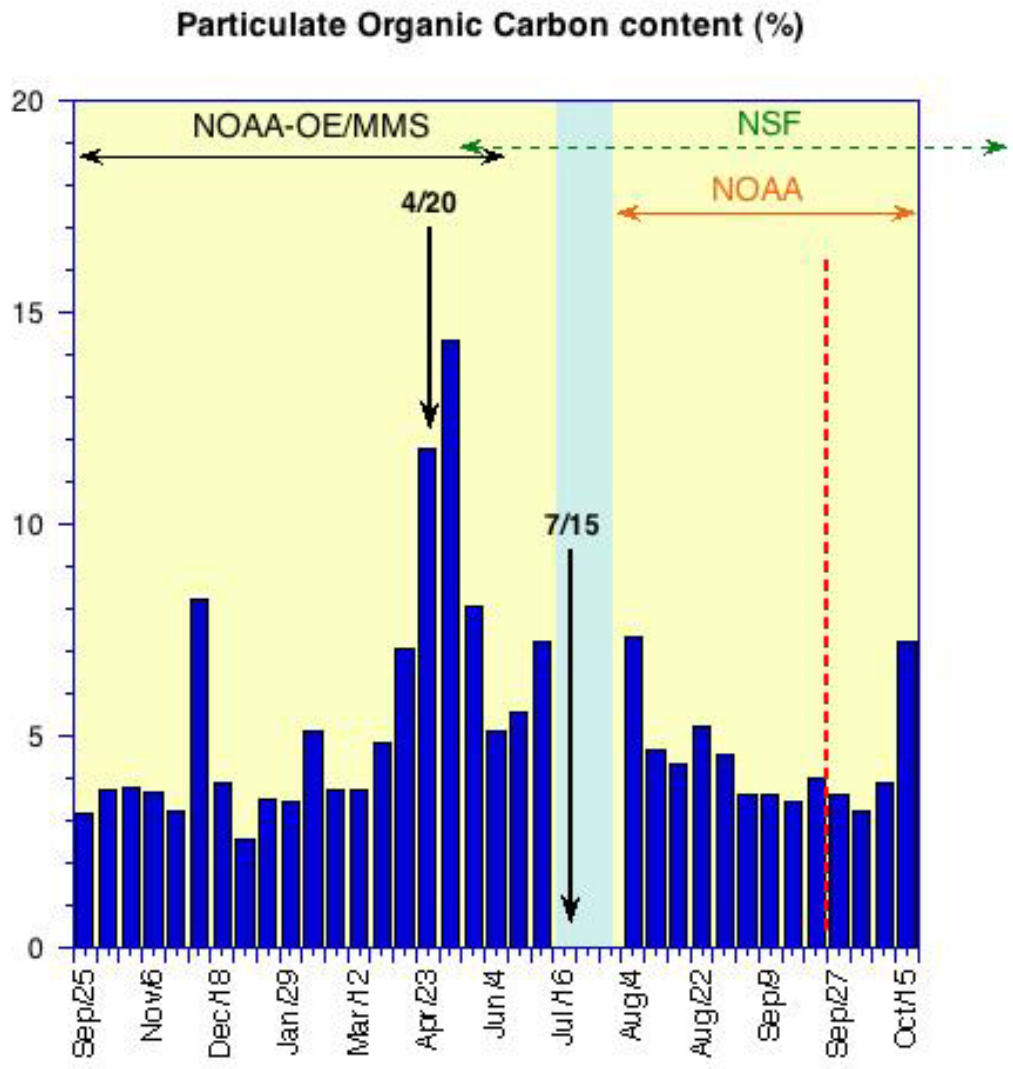
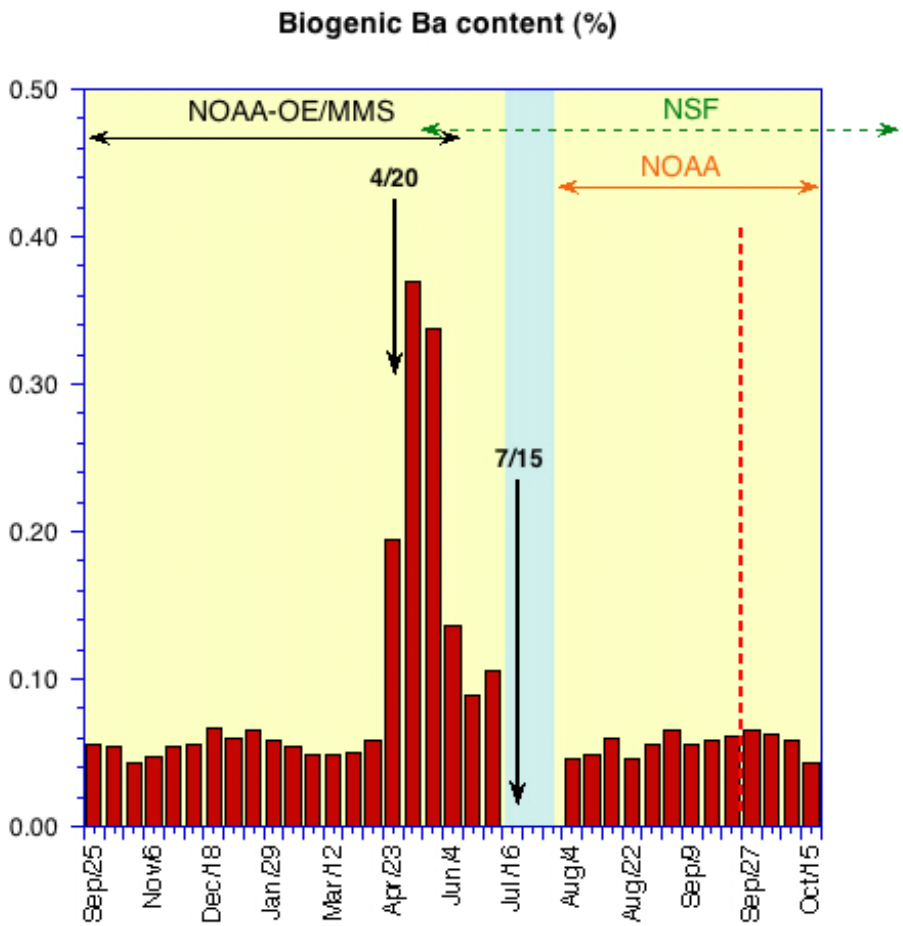


POC Content Peaked in Late April 2010

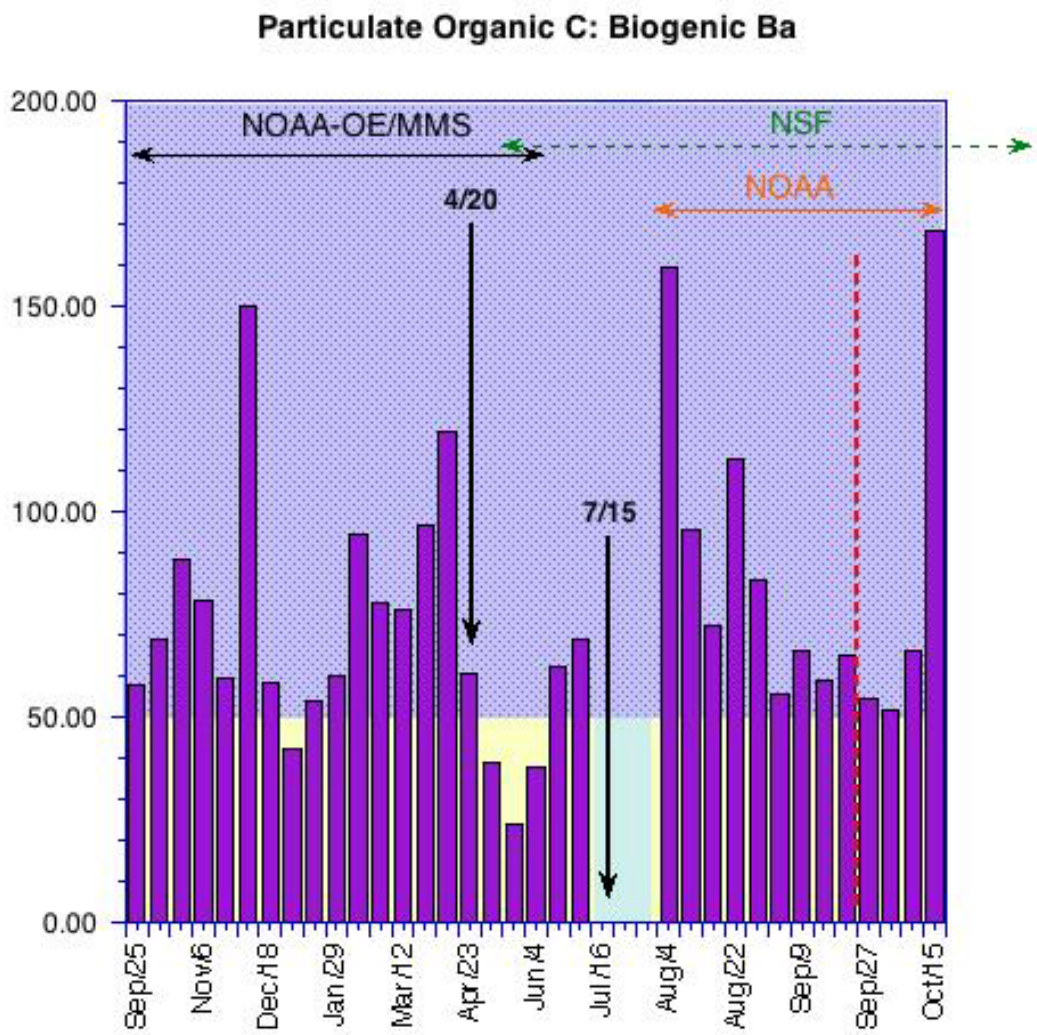
But ramp-up & decrease both decoupled from DWH timeline?



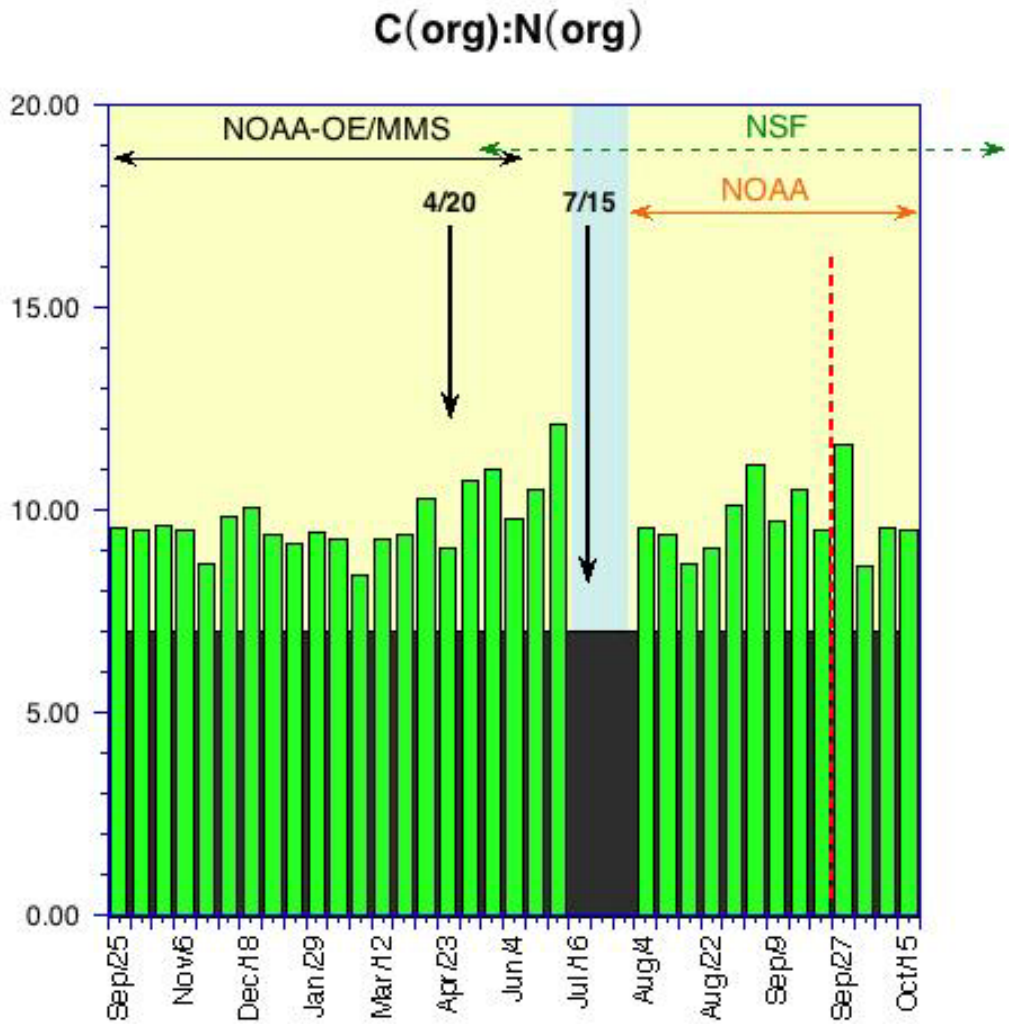
Biogenic Ba Content Mimics C_{org}



POC:Ba-Bio ratios are consistent with a primary productivity input to the traps



However, C:N ratios consistently >7 suggest refractory C_{org} is present, too



Summary 1: First Impressions

1) There is no obvious increase in mass or organic matter flux immediately apparent associated with the DWH spill.
2) The timing of both an increase and a decrease in Corg and biogenic Ba contents could be consistent with a natural “Spring Bloom” event.
3) C:N data for the same samples are not consistent with quite such a simple story ….

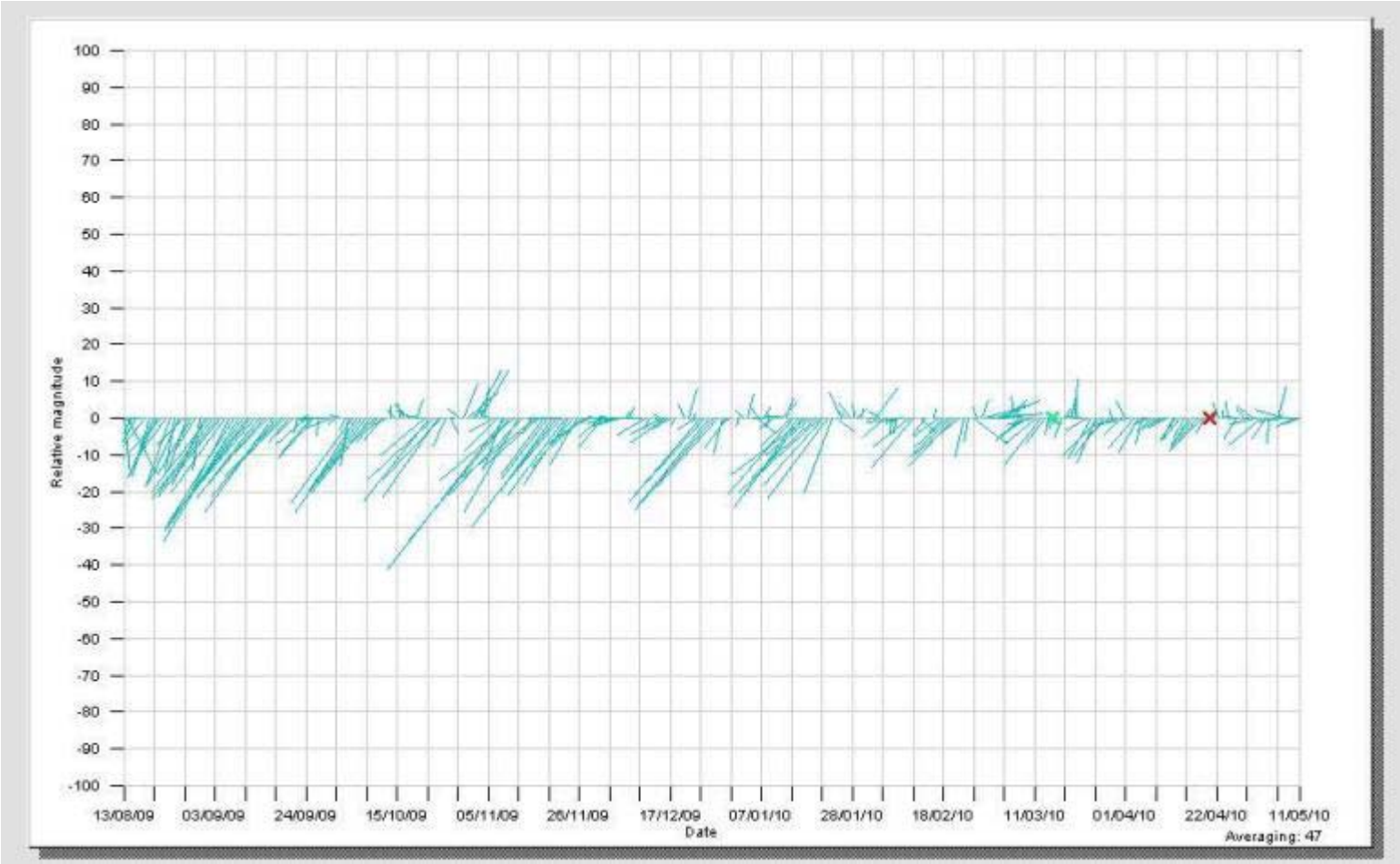
Summary 2: Important Caveats

1) This study doesn't address the fate of deep (>500m) plumes.
2) We have yet to obtain fingerprinting analyses on any samples.
3) We don't know whether the 2010 "spring bloom" was "normal."

Summary 3: Still to Come

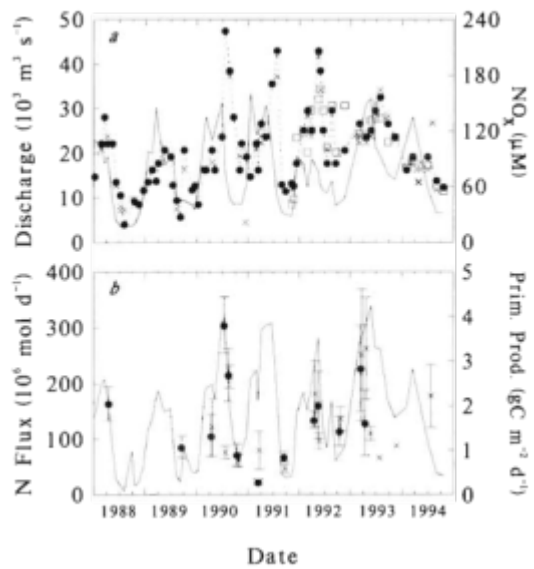
1) Time series extension (March – September 2011) that will allow inter-comparison of "Spring Bloom" periods, 2010 & 2011 and extend the full time-series to 2 years (courtesy of NRDA process).
2) Larval studies of samples that can begin now that traps have been recovered and samples split into replicate subsamples.
3) Hydrocarbon fingerprinting analyses.

VK826 – Time-Series Current Meter Data (Daily averages: September 2009 – May 2010)



Primary Productivity in the Northern Gulf

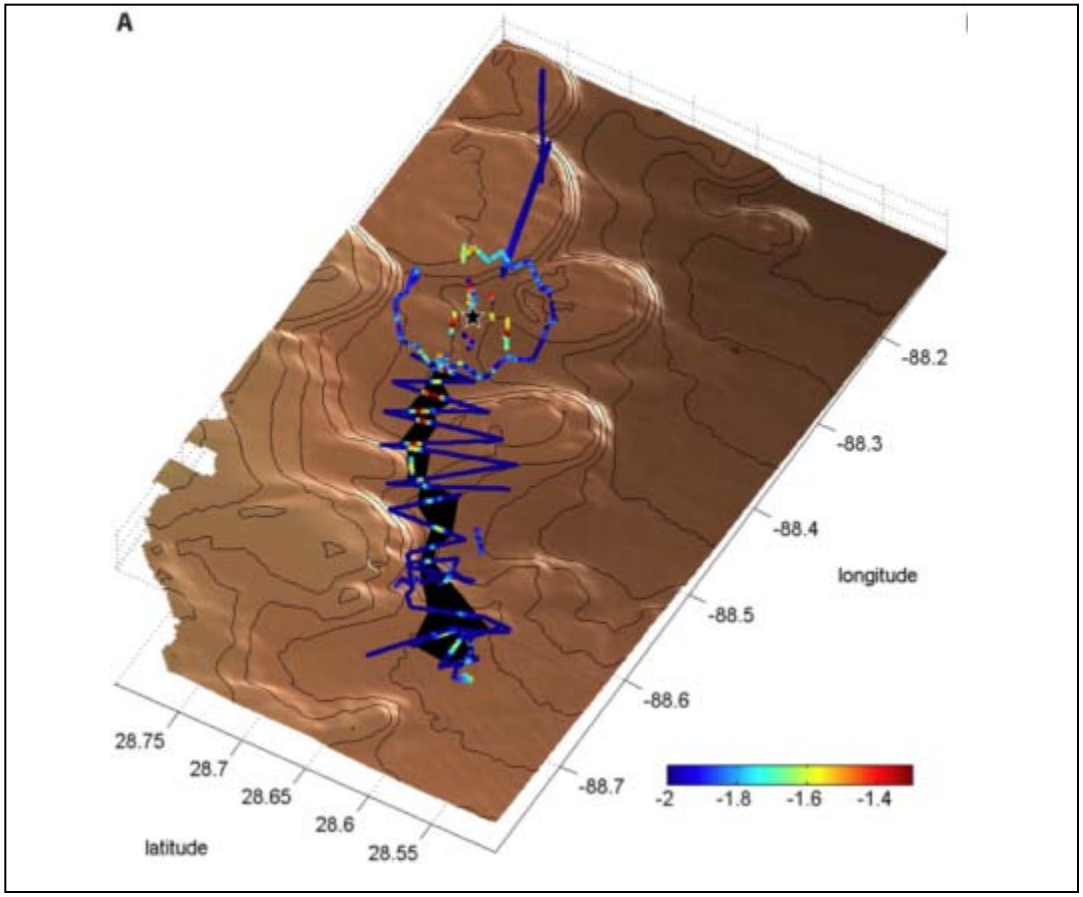
(Lohrenz et al. 1997)



Date	Mean PP Plume	Mean PP Eastern	SD Plume	SD Eastern	N Plume	N Eastern	p($T \leq t$) (2-tail)
Jul–Aug 1990	3.8	3.7	3.1	0.61	21	2	0.98
Mar 1991	0.28	0.29	0.20	0.10	10	2	0.96
Apr 1992	1.9	1.2	0.41	0.066	5	2	0.065
May 1992	3.8	1.3	2.3	0.48	3	2	0.25

These data cannot reflect on oil that

- dispersed at >500m depth
- dispersed in directions other than to north

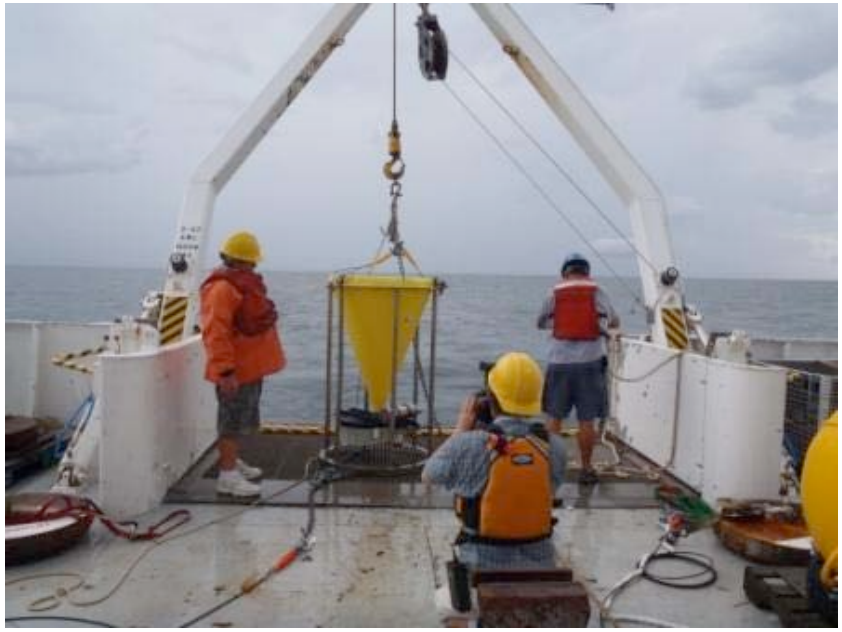


(Camilli et al. 2010)

NSF Rapid Response Cruise (June 21 – 25, 2010)

(*C.German = Virtual PI from Kiel, Germany*)

(Photo: T. Thomas)



(Photo: T. Thomas)

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