Vernon Asper's Daily Reports from "Ground Zero" of the Gulf Oil Spill

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SITREP - (report for 5/15/2010)

Our cruise is winding down and we're in the process of making copies of data, cleaning and rinsing gear, and packing our boxes. While the original goal of this cruise was to use our AUVs to map hydrates and shipwrecks, the actuality of this cruise was perhaps more productive and useful than we could have imagined.

The revised goals of the cruise, once our AUV plans were abandoned, were the acquisition of baseline samples of surface sediment at several sites near the accident site for comparison with later samples, and the determination of whether or not the oil was sinking and, if so, how long it might be before it reached the seafloor. The CDOM (Colored, Dissolved, Organic Matter) fluorometer that we bought for the latter purpose worked very well and we are confident that we detected oil not only below the surface but in deep layers that are apparently advecting towards the southwest.

Our activities today include acquiring more CTDs to complete our oil plume mapping work, and a very long (7 hours, 30+ miles) transect with the Acrobat and fluorometer. All of this went well, in spite of the rather poor weather and rough seas; several photos of the operation have been posted to the ftp site. Of interest in this transect was the observation several layers of water near the surface that exhibited higher salinities than the water above them and were apparently devoid of CDOM. These pockets of water were of very limited lateral extent and we look forward to making a detailed analysis of their origin and possible impact on the degradation of the oil.

From here, we will steam towards Cocodrie with an anticipated 06:00 arrival, after which we will offload the equipment, disperse the samples and return to our offices. This has been an exciting and challenging cruise and, while we are proud of the contribution we have made toward understanding the fate of the spilled oil, we hope that this first trip to the site is not our last.

Go here for a table with all stations occupied and most activities engaged in to date.

Sincerely,
Vernon Asper and Arne Diercks

SITREP - (report for 5/14/2010)

Our weather started out pretty rough but improved steadily over the course of the day and is now quite tolerable. We continued our efforts to map the apparent deep flow of oil by extending out transect and sampling on either side of it. These data continue to support our hypothesis that the currents at depth are consistently transporting the oil to the southwest. We learned today that AXBTs (or similar disposables) dropped by a NOAA P-3 also show this flow so our confidence in this interpretation is increased. Part of the sampling today included more samples for chemical analyses of PAH (polycyclic aromatic hydrocarbons) and total CDOM. These samples have focused on the layers with the most CDOM fluorescence but several "control" samples have also been obtained in low fluorescence layers.

Our final activity of the evening was to re-occupy several of the sites where we first observed the high luorescence

values at depth. These are all very close to the accident site and all continue to show strong signals in fluorescence, beam attenuation, and oxygen. However, we noted that some of these layers have been displaced vertically so we are anxious to return to the lab where an analysis of their positions relative to sigma theta levels can be conducted.

Our plans for the final day of the cruise will take us to the end of this transect, a point 20 miles southwest of the leak site, where we will deploy the Acrobat package for a transit back in the direction of the accident site. This should last until 21:00 when we will need to start our transit back to Cocodrie, but any remaining time will be used for additional Acrobat transects across the axis of the long, southwest radial.

Several new pictures have been posted to the ftp site including several of the pCO2 sensor being deployed and in place sampling. It uses a novel floating platform to keep its intake in position just under the sea surface. These data will be interpreted by Sylvia Musielewicz at NOAA's PMEL laboratory and will be integrated into the entire cruise data set. As always, we welcome your input for prioritizing our final hours of sampling.

Go here for a table with all stations occupied and most activities engaged in to date.

Sincerely,
Arne Diercks and Vernon Asper

SITREP - (report for 5/13/2010)

Some days you have great, calm weather and smooth seas and, well, some days are like today. Not so great, nor calm, nor smooth. It wasn't awful, I've seen a lot worse, but it was enough to slow us down and to prevent us from engaging in some of our planned sampling. For example, Dongjoo, the grad student from USM, likes to use the small boat to collect his samples in order to avoid contamination from the ship. Well, it was too rough to launch the small boat and, even if we had launched it, I don't think they'd have had much fun in it today. So, instead of this approach, he used a long, plastic pole with a bottle attached to the end. I took some photos of this ritual and posted them on the ftp site. I say "ritual" because there was the ceremonial swishing and dipping, followed by pouring and capping and it was all accomplished in a very prescribed manner. But that's how real trace metal chemists are; they are necessarily paranoid about contamination and will go to whatever lengths are necessary to get the best samples possible. Dongjoo also does the spectral measurements and I posted a photo of him using the ASD (even he doesn't know what that stands for; we're swimming in acronyms) to measure the color of the sky and water.

Aside from that, it was CTD casts all night and all day, in search of the elusive deep sea hydrocarbon plume. We had detected this earlier using the CDOM fluorometer but the signal was also there in the form of reduced oxygen and water clarity (beam attenuation). By sampling in all directions from this initial point, we determined that the plume is extending southwest of the well site so we followed it to the point where we are right now, about 20 miles away. Here, the fluorescence signal has faded but the oxygen and beam attenuation signals are still remarkably strong. What does this mean? Yet another good question. There are lots of possibilities and we'll need to analyze the numerous samples we've acquired from this plume before we can answer any of it. One possibility is that the oil (if it is oil!) in the plume is being decomposed by bacteria as it drifts slowly to the southwest. The farther out we sample it, the longer it has been drifting and the longer the microbes have had to work on it. As they work, they consume oxygen so, if this hypothesis is valid, the oxygen levels should be the mirror the hydrocarbon levels, and if this is true, at some point the oil will be used up but the depleted oxygen signal will remain. And the beam attenuation? Again, we need to analyze the samples but it's possible that it's either the microbes themselves or some particulate matter that was suspended with or by the oil. Sure, we've dumped samples from these plumes into buckets and squinted really hard but we don't see anything like sediment particles so a more definitive test is warranted and that'll have to wait for the analyses on shore.

It's interesting to note that we saw essentially no oil today, in spite of the fact that we were "downwind" of the largest

part of the oil slick as depicted on most of the maps. That mass is centered southeast of the accident site and the wind was out of the ESE today but it wasn't enough to push the oil over to our location and that means that the air was fresh and much more breathable today.

Tonight we are going to work until about midnight and then heave to and let everyone get some rest so that we can hit the decks with some renewed enthusiasm tomorrow. Weather permitting, we'll extend this line a few miles further out to the southwest and then probably turn around and repeat the close in stations to see if anything has changed there. On our last day at sea, Saturday, we plan to repeat some of the coring work to see if anything has changed at a few select sites, possibly tow the Acrobat some more, collect some more water samples for Dongjoo, and then head for Cocodrie.

That's all for tonight; tomorrow I'll describe the "interesting" pCO2 sensor that we've also been working with and we'll post more photos to the re-organized ftp site.

Until then,

Vernon

SITREP - (2nd report for 5/12/2010)

Today's highlight was the discovery of a feature that could be the most important finding of the trip. We have been hypothesizing that some of the oil that is coming out of the well is most likely not getting to the surface so we engaged in two efforts to find subsurface oil. The first effort was a shallow survey with the Acrobat that lasted all night. We towed the package in a 10 x 10 mile box around the well, surveying from the surface (6m) to 47m which was as deep as the acrobat would go. The first leg was to the south of the well and we saw no oil on the surface and no indication from the fluorometer on the Acrobat package although there was some increased fluorescence at the bottom of our survey depth, near the thermocline. At the top of the eastern leg heading north, we started seeing an increase in fluorescence just below the surface and this was related to a marked increase in oil on and near the surface so we are confident that the signal it is producing relates, at least qualitatively, to the abundance of oil.

Following the Acrobat survey, we mad a CTD cast, collected a box core, and completed the small boat and ROV sampling. The fluorometer on the CTD rosette revealed the presence of several layers of CDOM fluorescence at depths varying from 700 to more than 1300m. These layers also exhibited increased optical beam attenuation and reduced oxygen content to we decided to investigate the source of the material. We completed two more stations on the same bearing (246 degrees) but at 2.5 and then 1.25 miles from the well. Each of these revealed increasing signal so we concluded that the well was the source of the material and decided to spend the rest of the day mapping these layers. We proceeded to the south and then east of the well and the signal quickly faded so we moved around to the northwest, in very heavy oil (site 39) where the signal was also considerably reduced. As of this writing, we have completed site 39, where the signal was again present, and are about to start a CTD cast at site 40. We will report on these findings and provide more detail regarding possible mechanisms to generate these signals when we know more. Our preliminary working hypothesis is that this is hydrocarbon material that was produced by the well but that did not reach the surface, perhaps due to the deep injection of dispersants which BP has stated that they are conducting. We will continue to map these plumes with the techniques available to us but we suggest that a more thorough investigation of the composition and trajectories of this material is warranted.

As always, we have attached a table with all stations occupied and most activities engaged in to date. Two curiosities are included there; the first is a photograph of some of the ships spraying water into the air, an activity that several ships engaged in for hours, and the second is the collection of pyrosomas that were swept out of the water by the acrobat.

Please let us know if more information or other details are of interest and we will gladly provide them.

Sincerely,

Vernon Asper and Arne Diercks
Aboard RV Pelican

SITREP - (1st report for 5/12/2010)

Today we made what may turn out to be one of the most important discoveries of the trip. Or it could be nothing; it's too early to tell. As I've mentioned earlier, we are most interested in the oil that is NOT at the surface and that it therefore not visible to satellites or aircraft. Because we are the first scientists on the scene (and apparently the only ones so far), we have the opportunity to survey the area surrounding the well using the techniques at hand, including the Acrobat profiling towed vehicle that I described last night. This process went very well and we were able to confirm that the signal did, in fact, increase when oil was visible to observers on deck and it decreased when no oil was apparent. Following the completion of a complete, 10 x 10 mile box around the well, we made a normal station at a point southwest of the well, including sampling for trace metals, a box core and a CTD with the fluorometer attached. Unlike other casts, this one recorded the presence of several layers of "material" at depths from 700 to over 1300m. Intrigued by this discovery, we decided to try to map this feature to see if it was emanating from the well, so we lowered the CTD at sites 2.5 and then 1.25 miles from the well. As expected, the signals (fluorescence, oxygen depletion, and beam attenuation, which is a measure of water clarity) all increased as we approached the well. We spent the rest of the day acquiring samples to the south, southeast and then northwest of the well and concluded that the highest signals are to the southwest.

What is causing this signal? We'd really like to know but probably won't be able to determine that answer conclusively during this cruise. For one thing, we can't even tell if it's caused by particles or "dissolved" substances. I put "dissolved" in quotes because oceanographers use an arbitrary definition of what dissolved means: anything that will pass through a 0.45 micron filter is so small that we consider it to be dissolved, although lots of chemists would argue with that. The point here is that organic material, like oil, doesn't really dissolve in water but it can act like it has and be advected by the flow of water over long distances. On the other hand, as we've seen at the surface, oil can coagulate and start to sink so it can act as a particle in that sense, and it's ultimate fate will depend, at least in part, on how it acts. So, we plan to continue the mapping effort to see if the material is settling, advecting, dissolving, diffusing, or what. As I write this, we are completing our 40thlowering of the CTD package so we are generating a lot of data.

Also of note today was the odd collection of nearly a dozen pyrosomas that were attached to the acrobat when we recovered it this morning. These are named for the latin pyro (fire) and soma (body) because they are one of the most bioluminescent organisms in the ocean and are quite impressive to see at night. Well, when they aren't dead and drooped over your sampling equipment.

We were very close to the operation at the accident site all day so we were able to observe their activities and noted that two of the vessels were spraying some kind of liquid, presumably water, into the air for hours on end. It looked like they had their firefighting equipment in operation but why they were aiming the torrent into the air and why for so long remains a mystery.

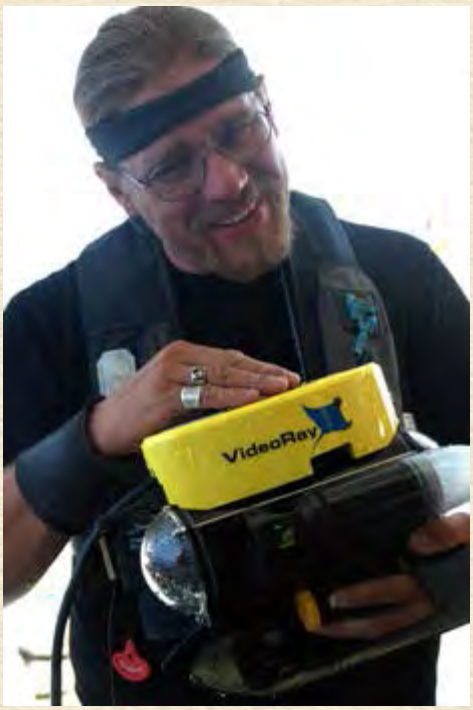
We have been inundated by requests for the freshest oil we can find at the surface, mostly from chemists who want to characterize it so that it can be tracked and traced back to its source. To obtain this oil, we went to the source, the area where the least disturbed oil is reaching the surface. Ordinarily, this would be the site of considerable skimming and even burning activity but a fair swell (maybe 3-5') was running today and the boom vessels were unable to work so we did not interfere with their activity. To sample this material, we used a bucket over the side and scooped the floating oil into glass vials (lots of them) for delivery to whomever requests a sample. Well, within reason; the supply is not unlimited!

We will continue the CTD mapping effort tonight and continue with coring and other water sampling in the morning.

We need to leave the site on Saturday evening so we have just 3 more days in which to sample and that time will go very quickly.

Until tomorrow,

Vernon



SITREP - (2nd report for 5/11/2010)

We remain pleased that the weather is much better than forecast and we continue to work productively. Our team was frustrated in the early morning hours by two box cores that failed to recover any sediment in 1336m of water and we finally gave up and hove to at about 04:00 but were up and working again by 7:30. Our first station (site 29) was 9.6 miles northeast of ground zero and had medium oil (heavy sheen, patches of emulsified oil) on the surface. After sampling there, we launched the Acrobat (profiling towed vehicle) and programmed its control computer to command it to cycle from the surface to 50m. After some trial and error on wire out, tow speed, and vehicle trim, we settled on a program that results in profiles from 6m down to 54m. The CDOM (Colored Dissolved Organic Matter) fluorometer on the Acrobat records more signal at depth (>40m) than near the surface and this layer of fluorescing material has sparked considerable interest. The Acrobat transect ended at station 30 (5 miles ESE of GZ) where the oil was somewhat heavier. We have some excellent photographs of the surface sheen and emulsified oil with our ROV in the photo for scale and we also have video of the oil from underneath as well as video of the aggregates.

From this station, we again made an Acrobat transect to station 24, passing between the drill ship (Discoverer Enterprise) and the drilling platform. We were in radio contact during this transit and were not discouraged from passing through, relatively close to the activity. At station 24 (1.9 miles due south of GZ), we accomplished our usual sampling regimen in water that was remarkably clear and blue but there were some very large aggregates at and beneath the surface.

Our core sample was successful and contained only one crustacean (this is near the sample that had previously contained several) and experts who have looked at the photos suggest that it is probably a deep sea amphipod.

Following our sampling at station 24, we again launched the Acrobat and are now in the process of making a large box

completely around GZ. Using 9 mile legs and towing at 5 knots, we anticipate completing the box by around 06:00 Note that this is our speed through the water so that Acrobat flies properly and our SOG varies by 1.5+ knots depending on the very significant currents in the area.

In general, we found the concentrations of oil surprisingly low compared to the maps we have been receiving and the amount of time the oil has been flowing. Clearly, our view is limited and the oil is very patchy but we have been maintaining a vigilant watch for oil and make notes when it is in our area. We will report on observations throughout the night on our next (5/12) sitrep.

As always, I have attached a .pdf file listing all of our stations to date as well as the samples acquired at each.

Regards,
Vernon Asper and Arne Diercks

SITREP - (1st report for 5/11/2010)

We remain pleased that the weather is much better than forecast and we continue to work productively. Wind has been generally light and the seas have been favorable but we are beginning to pick up some swell from the south that complicates our deck operations. Our team was frustrated in the early morning hours by two box cores that failed to recover any sediment in 1336m of water and we finally gave up and hove to at about 04:00 but were up and working again by 7:30. Our first station (site 29) was 9.6 miles northeast of ground zero and had medium oil (heavy sheen, patches of emulsified oil) on the surface. After sampling there, we launched the Acrobat for the first time. This is a towed vehicle that has a movable plane on its bow that allows it to climb and descend through the upper water column as it is towed behind the ship. It has the normal CTD (Conductivity = salinity, Temperature, and Depth) sensors but we also put our CDOM fluorometer on it as well. As noted in previous emails, this sensor is intended to provide indications of the presence or absence of oil through a fluorescence process. By towing it through the water, we obtain a two dimensional cross section of the oil distribution. We plan to tow this between all sampling stations and we are currently

towing it around Ground Zero in a box with 9 mile legs, a process that should take all night. I get the first watch to I'm here from 22:00 until 02:00 when Max will take over. The watch isn't all that hard; just watch the computer screen, change log files now and then, check the tow lines, and go out on deck to check for surface oil now and then. Oh, and drink coffee; I think that's required.

On the way to our close-in sampling site, we towed the Acrobat essentially right over GZ but never saw any significant oil. We actually went between the huge drilling platform and the drill ship, both of which are drilling relief holes and no one seemed to mind. It's clear that BP isn't trying to keep "prying eyes" away from this site.

At each station, we are using our little ROV to get video of the oil aggregates and whatever else is in the water. Surprisingly, although the poor little thing (you can easily pick it up with one hand!) gets a lot of oil on it, this oil wipes off easily and doesn't seem to stain anything. I'm not sure if that's because of the dispersant effects or what but it's a pleasant surprise. We're seeing a good number of fish at various depths and, as before, they don't seem to mind the oil.

But the aggregates! Wow, they're amazing. I think I mentioned before that I did my Ph.D. dissertation on natural organic aggregates called "marine snow". Well, these "oil aggregates" look exactly like the natural ones so I'm convinced that some of the same processes are involved and that a lot of what we learned by studying the behavior of the natural ones will apply to these oil aggregates. For one thing, they're both composed of stuff that normally floats but, when aggregated and ballasted, it sinks. Well, today, the aggregates are huge; not the cute little puffy ones that we saw earlier but big (up to a meter long!), thin strands of stringy oil. I really wanted you to see this, so I've attaché a photo of it. Okay, so they're not all that pretty; oil usually isn't. But they are most likely really important for the oil removal process so we're looking forward to learning more about how they form and what happens to them.

Tomorrow, we'll continue our station work with more coring, water sampling, ocean color measurements, ROV ops and all the rest. As always, please let me know if you have comments, questions or suggestions.

Regards from 5 miles east of ground zero, steaming north,

Vernon

SITREP - (2nd report for 5/10/2010)

In spite of the new techniques put into play today, which always require some adjustments before they run smoothly, we were able to get a lot done. The most significant observation today was the presence of hundreds of dead velella (by the wind sailors). These aren't all that common in the Gulf so it was a surprise to see so many of them in one place and all dead.

Of course we cannot conclude that they were killed by the oil but you can see in the photos on the ftp site that there was clearly oil associated with them.

Our most significant new activity today was the collection of water samples for trace metal analysis. The intent for these samples is to determine if the oil contributes small amounts of metals to the water, and if so, whether these metals can be used as tracers for the oil plume. It is conceivable that the dispersants will coagulate the oil and cause it to sink, leaving behind clear water with elevated levels of trace metals.

Collection of these samples requires the sampler (Dongjoo Joung, a graduate student at USM) to use a mall, inflatable boat to sample at a distance from the ship in order to avoid contamination from the ship. These samples will be analyzed using a mass spectrometer and will be compared with those taken later in the year to see what the long term effects of the oil may be.

We also deployed the HARP (High Frequency Acoustic Recording Package) at the MC118 observatory site. This

package was provided by John Hildebrand at Scripps Institute of Oceanography and Chris Garsha met us at the ship and showed us how to deploy the gear. This package will remain on the seafloor for at least several months after which it will be recovered and the records downloaded and analyzed. Although all sound is recorded, the focus of the science will be to monitor marine mammals to determine the extent to which they are being affected by the spill.

As always, I have attached a .pdf file listing all of our stations to date as well as the samples acquired at each. In addition, photos of all events have been posted to the ftp site for your use. We are expecting the weather to worsen over the next few days so weare working all night to meet as many of our objectives as possible before work on deck is impossible. Please let us know if you have questions or if the attachments fail to come through again.

Regards,
Vernon Asper and Arne Diercks

SITREP - (1st report for 5/10/2010)

This has been a very busy day and it promises to be a very long night. We started out our sampling close to the river mouth but this time ongjoo Joung used the ship's "safe boat" to get away from the contamination of the ship to collect some samples for trace metal analysis. After acquiring some other samples there, we steamed east to a point that was southeast of the delta and here we found a very interesting site: lots and lots of dead velella (by the wind sailors). These "jellies" have a triangular sail that is very stiff and which crosses their body diagonally. Like Portuguese Man O War, they look like a single organism but are actually a colony of animals living in collaboration, each doing its own part. These are not rare animals but I had never seen anywhere near this many and especially not dead. We took lots of pictures (on the ftp site) of them in the water (with oil globules) and on deck.

We took more cores and collected more water but then had the privilege of deploying the HARP: High frequency Acoustic Recording Package at a site about 8 miles northeast of ground zero. It was built by some engineers at Scripps Institute of Oceanography and is intended to monitor the sounds made by marine mammals to determine whether they are stressed by the spill and associate activities. It will remain in place for at least several months, after which it will be recovered and its data downloaded and analyzed.

Our plan for later tonight (well, actually this morning, it's after 3:00 as I'm writing this) was to deploy the "Acrobat" but the corer just came up empty from 1300 meters so we are sending it back down for another try. The Acrobat is a very nice package that is towed on the end of a long cable that has several wires inside. It has a moveable wing on the front so that, as it's towed, it cycles from the surface to about 75m depth and then back to the surface again, all automatically by computer control. This action generates cross sections of all of the parameters that you're measuring which, in our case, will be temperature, salinity and a "CDOM" fluorometer. CDOM is "Colored, Dissolved, Organic Matter" and hydrocarbons fall into this category. It works by shining a light on the water in front of it but this light is a very specific wavelength that causes hydrocarbons to glow (fluoresce) at a different wavelength that is detected and recorded. We're really looking forward to seeing how it acts in the water under the oil plume so I'll let you know tomorrow how that goes.

Regards,

Vernon

SITREP - (report for 5/9/2010)

Today ’s activity focused on the exchange of personnel and equipment during a brief port call. We arrived in Cocodrie

at around 6:00am and left for the USM facility at the Stennis Space Center (3 hours' drive each way) in preparation for the next leg of the cruise. Planned sampling activities include:- towed Acrobat profiling vehicle fitted with CDOM fluorometer intended to produce two dimensional sections of physical properties as well as a qualitative indication of the presence of hydrocarbons.

- HARP, a seafloor-mounted acoustic monitoring device that will be placed in the research section of MC118 where it will record marine mammal calls for later analyses

- ASD, a multispectral sensor that will be used to measure the intensity and color of light from the sun and reflected from the sea surface; these data will be used to ground-truth NASA over-flights that are scheduled to start tomorrow

- CO2 sensor, a large sensor intended for buoy mounting but, in our case, will be suspended from the side at each station

- Trace metal sampling to determine whether trace metals can be used to track the dispersal of the hydrocarbons.

- An ROV to measure the concentration of oil aggregates at various depths in the upper water column

- Box coring for more samples and with additional subsampling for specific programs.

- Other water sampling to fulfill requests from various investigators.

As these samples are acquired, I will provide more detail and will provide some background on the individuals for whom the samples are being taken. As of this writing, we are en route to our first station near the Southwest Pass of the Mississippi River with an anticipated 07:00 arrival. At this station, we will use the small boat to collect baseline surface water samples for trace metal analyses and we will test some of the other gear to assure that it is ready for the deeper stations later in the morning.

As always, please let us know if we can better serve the needs of scientists interested in helping with these studies.

Regards,

Arne and Vernon

SITREP - (2nd report for 5/8/2010)

This was an interesting day, with some surprises, including the announcement that the dome that was intended to capture the escaping oil had been clogged by the formation of gas hydrates. The irony of this report is that our Gulf of Mexico Gas Hydrates Consortium has been studying this phenomenon for nearly 10 years at a nearby site with funding from NOAA, MMS, DOE, and support from NIUST. As you probably know, hydrates are formed when, under the right conditions of temperature and pressure, gas and water combine to form a crystal lattice that resembles white ice. This material forms spontaneously in nature as well as inside pipes and equipment placed on the seafloor during hydrocarbon recovery efforts. Our studies have focused on investigating the rates of formation, the stability, and the composition of the hydrates as well as the interaction between the chemistry and the biological community living in proximity to the hydrates on the seafloor. Scientists from around the world have collaborated in this endeavor and an impressive array of novel sensors and sampling equipment have been developed and deployed at this site, including some that remain in place.

After our last core of the day yesterday, we once again hove to, this time at a site 20 miles due east of the Deepwater Horizon site. At that time (midnight), the winds were calm and no oil or odor were evident. At 04:00, however, the winds picked up from the west and a sheen of oil arrived and, along with it, a distinctive hydrocarbon odor. From there to our next station, sited at 2 miles due south of the DH rig, we recorded observations of the oil characteristics every 15 minutes (see attached "oil observations" table). As this table records, we passed through some areas of high concentrations of oil while others were moderate or clear. The skimmer fleet was north of us during this transit so we

presume that the oil was even heavier in that area. This was truly an impressive sight. While the skimmer fleet is doing an amazing job of containing the oil, a considerable amount of it remains in a large slick that is extremely unpleasant to see or smell. I sincerely hope that the BP team is able to continue to keep this oil under control and that none of it ends up on and Gulf Coastbeaches!

Following this transit, we acquired cores at 4 additional sites starting near the DH rig (site 24) and progressing in to a site near the SouthwestPass of the Mississippi River (site 27). Nothing anomalous was seen in or on any of these sediment cores with the possible exception of roughly 6 dead euphausids at site 24. Although this is an unusual find and we see no definitive link to the oil, we do intend to follow up on this observation by acquiring an additional sample from this location for the express purpose of carefully preserving such organisms for further study.

The shallow site (27) was in only 17m of water and was adjacent to one of the areas in Louisiana where oil had been reported as washing ashore. Our intent here was to investigate whether oil had also been deposited on the seafloor but we saw none either on the surface or on the sediments. This site is characterized by rather fresh water (11ppt salinity) due to the river discharge both to the west and to the east. It can be expected that this discharge will displace the ocean surface water and help to buffer the shoreline from oil deposition except during strong southerly winds.

We are currently headed back to Cocodrie (expected eta 06:30) where we will exchange personnel and pick up new equipment for the second leg. This will include a towed package (Acrobat) with CDOM fluorometer tuned to detect hydrocarbons, an ROV for investigating subsurface oil aggregates, a multispectral sensor for ground-truthing NASA flyovers, an innovative pCO2sensor, an acoustic recorder intended to monitor marine mammals, and a collection of supplies for preserving plankton, water, and sediment samples. We hope to be paving the way for future, more detailed investigations of all critical aspects and impacts of this event.

(go here for links to pdf files of site locations and locations oil observations.)

Please let me know if you have any questions.

Vernon

SITREP - (1st report for 5/8/2010)

Today we continued our coring and covered a much wider area than yesterday but at lower sampling resolution. We started a transect at a point due east of the Mississippi River Delta and took core samples roughly ever 30 miles. Following this, we turned southwest to a point at the same latitude as the Deepwater Horizon spill (28°N) but 20 miles to the east. During the entire transect (108 n.m. total length), we watched diligently for signs of oil on the surface and noted when we could and could not detect an oil odor.

Based on the various maps and satellite images available to us, we were expecting to encounter a considerable amount of oil in this area but instead, found none except for a thin sheen at the station northwest of our present position (site 22 in the attached table). At that site, there was a distinct oil odor and a very faint but visible sheen on the surface. This sheen was only apparent when the surface tension was broken by our instruments or the side of the ship. At our current site, we can discern no sheen (well after sunset) and only a very faint oil odor, in spite of being within 20 miles of the spill site. The wind has been nearly calm all day and is currently from the southeast at 9 knots with flat seas.

Our plan for tomorrow is to traverse back towards the spill site and acquire more cores to the north and west, in areas where the latest projections predict the presence of oil on the surface. In the evening, we will set course for Cocodrie where we will exchange personnel and pick up equipment on Sunday morning in preparation for our second leg next week. This work will involve more water sampling and the use of new sensors including a Wetlabs fluorometer intended to detect oil at depth. We will perform transects in every direction outside the main cleanup area, to avoid conflicts with the skimming vessels, to investigation the potential advection of oil at depth.

The attached table and map image list all of the stations visited to date, including the 4 widely separated cores obtained

today.

Vernon Asper and Arne Diercks

SITREP - (report for 5/7/2010)

Today we continued our coring and covered a much wider area than yesterday but at lower sampling resolution. We started a transect at a point due east of the Mississippi River Delta and took core samples roughly ever 30 miles. Following this, we turned southwest to a point at the same latitude as the Deepwater Horizon spill (28°N) but 20 miles to the east. During the entire transect (108 n.m. total length), we watched diligently for signs of oil on the surface and noted when we could and could not detect an oil odor.

Based on the various maps and satellite images available to us, we were expecting to encounter a considerable amount of oil in this area but instead, found none except for a thin sheen at the station northwest of our present position (site 22 in the attached table). At that site, there was a distinct oil odor and a very faint but visible sheen on the surface. This sheen was only apparent when the surface tension was broken by our instruments or the side of the ship. At our current site, we can discern no sheen (well after sunset) and only a very faint oil odor, in spite of being within 20 miles of the spill site. The wind has been nearly calm all day and is currently from the southeast at 9 knots with flat seas.

Our plan for tomorrow is to traverse back towards the spill site and acquire more cores to the north and west, in areas where the latest projections predict the presence of oil on the surface. In the evening, we will set course for Cocodrie where we will exchange personnel and pick up equipment on Sunday morning in preparation for our second leg next week. This work will involve more water sampling and the use of new sensors including a Wetlabs fluorometer intended to detect oil at depth. We will perform transects in every direction outside the main cleanup area, to avoid conflicts with the skimming vessels, to investigation the potential advection of oil at depth.

Please let us know if you have any questions.

Regards,

Vernon Asper and Arne Diercks

SITREP - (2nd report for 5/6/2010)

Ray Highsmith asked that we provide a SITREP each evening, describing our accomplishments for the day. Following is a narrative of our observations as well as a table listing the locations, samples taken, and other observations. If we are missing any critical details, please let us know so that we can include them in the next SITREP.

We had another very productive day on board the Research Vessel Pelican and have acquired all of the sediment samples that were our highest priority and we are now moving on to collect those that had been assigned lower priorities. We started by sampling along a transect from “ground zero” (the Deepwater Horizon platform) northwest towards the MC118 hydrates observatory site, acquiring box cores of sediment every 2 miles along the way. Each box core was photographed, described, and subsampled for several analyses to be performed by investigators at UNC, USM and elsewhere. While we are unable to perform chemical analyses on board the ship, none of the samples were obviously contaminated by oil. However, there were many places where we did experience heavy concentrations of oil on the surface.

Most of the areas were characterized by what we are calling “oil aggregates” which are apparently the result of the action of the dispersant on the floating oil. These aggregates are tan in color (see attached 6897), closely resemble natural, organic aggregates, and range in size from a few mm to more than a cm. They were distributed throughout the upper water column, indicating that the dispersants seem to be accomplishing the goal of preventing the floating oil from reaching the coastline.

Upon reaching the MC188 site, for example, we found a several acre patch of very thick, colorful bands of oil that apparently had not received any application of dispersant yet (see attached 6915). This site is more than 40 miles from the closest point of land so this oil presents no immediate danger but it was surprising to see so much oil 10 miles northeast of ground zero while the areas in between had less.

Our next station was 10 miles due north of ground zero and the next 10 miles north of that. In both cases, we saw no oil either at the surface or in the sediments. We decided to make a transect towards Chandeleur Island where we had heard oil was washing ashore. We visited two stations in 150m and then in 64m and again, no oil was detected. By this time, it was quite late and our coring team needed a break so we ceased operations until tomorrow. Our plans for the next two days will include a much wider scale of sampling, starting with a transect to the east and then a return, parallel transect moving due west towards ground zero and then back to Cocodrie on Saturday night.

I have attached a table (in MS Word format) showing the locations of all samples obtained to date, the type of sample, the bearing and range to the sample site from the Deepwater Horizon platform, and some comments on the type of oil (if any) observed on the surface. We will be happy to provide more detail or other information as required so please let us know how we can help this effort.

Regards,

Vernon Asper and Arne Diercks

NIUST Scientist

SITREP - (1st report for 5/6/2010)

We are still in the vicinity of Ground Zero and are continuing to collect sediment samples on several transects from the spill site to points north and west. We are looking for the effects of the oil with seems to be leaving the surface and settling towards the seafloor at an unknown rate. I have attached two photos: The first (6891) shows the NIUST team in action, recovering the box corer. This is a very heavy device that is more complicated than it looks and these guys are experts at making it work so we have had 100% success in obtaining useful cores. Each core takes about 2-3 hours because of the time it takes to lower this device to 1500m, recover it, remove the box from beneath it, sub-sample the mud in the box, clean all of the excess mud up, and re-load it for the next core. Pictured are, from left to right, Chris Berkey (the freelance photojournalist who has promised to give us copies of his excellent photos), Matt Lowe (from Ole Miss; a genius at getting things into and out of the water), Dr. Arne Diercks (USM grad and current employee, also Chief Scientist for the cruise), and Andy Gossett (also Ole Miss; can make anything or make anything work). These guys are all masters at what they do and the coring operation always runs safely and without a hitch.

The second photo (6887) shows the surface of the water at the current sampling location. Okay, so it's not all that photogenic but it gives you a really good idea of what we're seeing out here. On the surface is a very light sheen of oil, as you'd expect to see with an oil spill. Along with that are the tan clumps of oil ranging in size from pea to pancake. Some of these can be very filamentous in shape but others are just ragged clumps of oil, appearing almost as if there were some kind of fiber involved. Most interesting to us, however are the smaller clumps (I'm calling them oil aggregates) that appear below the surface. It's counter-intuitive to see "oil" sink below the surface but you have to remember that this isn't motor oil, it's crude oil and there are all kinds of compounds in it, including many that are heavier than water. Apparently, the dispersants that they are spreading on the surface (using C-130's and ancient DC-3s that have been retrofitted with turbo-prop engines) are causing this oil to coagulate into these relatively large clumps. This reduces the amount of surface area, which causes drag, for the amount of oil volume, so if they're heavier than water, they'll sink more rapidly than they would have, had they not aggregated. The question is, what happens to this oil after it leaves the surface? How rapidly does it sink? How far down has it been able to travel so far? What effect is it having on the midwater ecosystem? What will its ultimate fate be? We are planning to bring some novel gear along next time to investigate some of these questions but it's clear that some long term monitoring will be required to address many of these issues.

One of the instruments that we'll bring along next time is a small (some call it "micro") Remotely Operated Vehicle (ROV). We'll use this to qualitatively describe the concentration of oil aggregates in the surface layer down to about 75m, which is as far as it can go. We'll also be looking at the plankton in the water and maybe even the nekton (fish) if any come around. In addition, NIUST has a really large ROV that is capable of placing and recovering relatively large instruments on the sea floor and we expect to have that on site in the weeks to come but not for the next leg.

A final note: I've been surprised by the total absence of dead animals out here. Granted, it's an "oligotrophic" environment (blue water, low nutrients, sparse concentration of anything living) but still, I was expecting to see the occasional dead fish, oiled bird, rotting jellyfish. Instead, we've seen flying fish that skim along the surface, and schools of needle fish and others that seem oblivious to the oil and that's a surprise. It's still early so the toxic effects may not have had their full effect but this clearly demands some closer investigation.

I'll try to post a daily report; please let me know if you have specific questions.

Regards from "ground zero"

Vernon

Contact: Carol B. Lutken