Expedition Log for IODP Expedition 313
Week 1
New Jersey Shallow Shelf

11th May 2009

Co-chief scientist Greg Mountain provides an insight into life (and accents!) on board the Lift Boat Kayd

We are an odd sight no matter how you see us. Imagine 60 miles out from New York, standing at the rail of a cruise liner and passing a barge standing 30 ft in the air (photo 1), lights on against the dark sky, looking like some Star Wars Imperial Walker missing a leg and strangely out at sea. But the Lift Boat *Kayd* is home for the next 3 months to a wide range of inhabitants. Even starfish and crabs have moved in as our camera-equipped remote vehicle has found them sheltered along the edges of our 3 enormous feet standing firmly on the sand, 100 feet down. Topside there are 45 of us - the ship's captain and crew, the DOSECC drillers, the ESO staff, and the 5 scientists, all working efficiently in tight but well-designed spaces, here for one purpose: to collect as much core as possible from 3 slender holes each drilled one half mile into the seabed.

Photo 1. The Lift Boat *Kayd* at work on the New Jersey shelf (*Photo: Alan Delahunty©DOSSEC*).

The ship's crew sailed this unusual craft up from the Gulf of Mexico. The journey took them 20 days, leaving their more familiar area of doing support work for the offshore exploration industry, but bringing with them the hospitality, spicy shrimp and distinctive, lilting drawl of the Bayou. They maneuvered the *Kayd* over this pre-determined spot, set its feet down and slowly raised us up to a height safely above the waves. To those who've worked at sea there's a touch of the familiar rocking motion of a ship, though greatly subdued, like when tied at a dock, and the constant sea breeze and drone of machinery reminds us of where we are.

The DOSECC drillers are from the American west, though previous jobs have taken them to remote areas of the world drilling on land and lakes, from the equator to the Siberian Arctic. Their two teams work in 12-hr shifts, providing the single-most precious product of our labors - drill cores that contain a record of sea-level change going back 40 million years or more. To do this they operate an industry-standard, portable drill rig outfitted with specially-designed coring tools that through experience have been tuned to gather as much of the drilled material as possible for scientific analysis. Despite the heft and dimensions of both the men who do this work and the drill rig they operate, they are dwarfed by the cranes and legs of the *Kayd* that tower overhead, like curious figures standing guard and leaning in for a closer look.

The ESO staff are from Britain, Germany and France, all speaking English with accents that vary nearly as much within their native lands as between them. Their jobs begin with taking the cores handed off by the drillers in 10 ft plastic liners, cleaning and marking, cutting and archiving, being the first hands to touch this sediment for countless eons. A carefully arranged set of 20 ft shipping containers, delivered from Europe and loaded on the *Kayd* 2 weeks ago in Atlantic City,

house the equipment and people who then do the preliminary work on the cores. The core splitting and range of sampling that follows will be done next Fall at the core repository in Bremen, Germany. For now, the only routine sampling is to analyze the chemical properties of water that will change with time, acquired by siphoning it from small holes drilled through the core liners, or squeezed from 5 cm samples taken from the ends of individual core sections. Through-the-liner measurements of several important properties can be done, and ESO staff in the container 'next door' to the chemistry container does just this. ESO personnel in another container stand ready for when coring is finished so they can run the 'logging' stage of analysis. That will be in a week or so from now when tools will be lowered into the borehole and make electrical and acoustic measurements of the sediments all the way to the bottom of the hole.

To maintain a smooth operation and keep up with constant arrival of cores on deck, 24/7, additional ESO staff maintain a complex computer network and database that records more information than one might think possible. This requires expertise in both computer software and electrical hardware, and a thorough knowledge of the shorebased computer database our results will be integrated with. To maintain 24-hr coordination between drilling operations and science progress, ESO has two of its own drilling engineers serve as links between the mud-strewn rig floor and the computer-laden operations van. This van is like the others, a 20 ft container stuffed with people and computers, directly across from the core curation container. This 15 ft divide between facing containers has become known as 'Main Street' (photo 2) that has its own form of 'rush hour' roughly 20 - 24 times each day as a new core comes on deck. At the head of it all, ESO maintains an offshore, in-the-air office to manage this complex project. Headquarters is confined to a 4ft length of table in the ESO van across from the chemistry container. You're apt to see a laptop showing a spreadsheet of today's drilling progress shoved aside to make room to analyze a faulty coring mechanism brought in from the rig floor, while deadlines to order computer replacements are ticking away if they are to be shipped in time to make the next supply vessel transfer. It can be a dizzying experience to take in until the psyche becomes focused on the daily routine, and distractions of the land-based world fall away.

Photo 2. ‘Main Street’ on the *Kayd (Photo: Alan Stevenson©ECORD/IODP)..*

The scientific staff onboard *Kayd* is a subset of the entire 22 member science party. We won't meet all together until next Fall when the cores are split and analyzed at the core repository in Bremen, Germany. We come from 11 different countries and have been selected to participate by our respective national science committees. There's room on the *Kayd* for only 4 or 5 at a time, and only those specialties that can record data or make observations without splitting the cores are included in this phase of the project. The sedimentologist takes small samples from the open lower end of each core and uses years of experience and those shreds of evidence to judge where we are in our downward journey. Cores arrive with no regard to night or day, and there aren't enough scientists to capture the data round-the-clock. Hence we work on 12hr shifts

opposite specialists from the ESO staff who mirror our efforts extracting and measuring pore water chemistry and making remotely sensed measurements of physical properties of the cores still in plastic liners. A microbiological study is searching for evidence of bacterial life in the sediments we drill. Then there's the chief scientist who doubles as a sedimentologist half of each day, and juggles that with the remaining wakeful hours to advise the ESO drilling engineer of approaching changes in rock type that may require a change in drilling strategy. In addition there are the chores of daily reports, weekly reports, daily meetings and spontaneous discussions of efficiency and protocol that can always be improved as we gain experience in working in this unusual setting. Fatigue can be a daunting challenge when core recovery rate is high; it's what we all want, but it strains people and machines. To keep things manageable, we all work on assigned schedules rotating on and off the platform.

The supply boat *Rana Miller* provides these weekly transfers, bringing water, food and personnel each Wednesday (photo 3). Predictably, all arrive fresh but changes set in. And all arrive in the same dramatic fashion. Recall that we're 30 ft off the water and there's no gangway, no ladder, no helipad. To get on or off you get a ride in a basket, safely tied in but suspended by a crane 80 ft or more off the water. Not much different than a delivery of fresh lettuce. The *Rana Miller* comes 60 miles from Staten Island, New York, and even its seasoned crew standing on her rolling deck crane their heads upwards in disbelief that such an odd craft can be so far out to sea. But its home for now.

Photo 3. The supply vessel *Rana Miller* arriving at the *L/B Kayd* to drop off equipment and personnel (*Photo: David McInroy©ECORD/IODP*)