



OSIL

*Environmental Instruments
and Systems*

Seabed Frames used to Assess Sediment Mobility in Nigeria

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Application
Note*

The OKLNG project was created to oversee the development of a natural gas liquefaction facility and marine terminal in the Olokola Free Trade Zone in Nigeria. The complex will process liquid natural gas and, it is hoped, will better link the oil and gas sector with the Nigeria economy. The project's partners include British Gas, Shell, Chevron and NNPC and the gas processed will be supplied from their onshore and offshore fields.

GEMS (Geotechnical Engineering and Marine Surveys) were employed by OKLNG in July 2005 to perform an extensive metocean study around the prospective site in Olokola. The application was concerned with monitoring the liquid mud fields present off the Nigerian coast by collecting directional wave, tide and current data to meet design and operational criteria.



OKLNG Site in Olokola, Nigeria

Turbidity and near-bed current also needed to be monitored to assess the mobility of the sediment, the reasons behind its movement and why it eventually settles. These factors are all essential to the project so that the rate of dredging infill and dredging maintenance requirements can be calculated, along with the assessment of the seabed's conditions for piling and construction.

The primary equipment deployed by GEMS for the duration of the project was three octagonal Seabed Mounting Frames, built for GEMS by OSIL. OSIL then fitted each 316 stainless steel frame

with a Nortek Acoustic Wave and Current (AWAC) Profiler. Wave, tide and current data profiles were collected by GEMS using the AWACs at two to three different locations from April 2006 until February 2008 when the monitoring project was completed.

A combination of YSI 600 and 6600 Multiparameter Sondes and SonTek Pulse Coherent ADCPs from OSIL, were also deployed by GEMS to collect the necessary turbidity and near-bed current data. The PCADCP was chosen by OSIL because of its ability to measure fine scale currents with 1cm increments in bin depths. The instruments were used to assess sediment transportation within certain boundary current conditions and were recovered in September 2007.



YSI 6600

OSIL's Seabed Mounting Frames are manufactured to be as versatile as possible and can be customised for any application's needs. They are available in a variety of dimensions and designs and come complete with PVC clamps designed to mount an array of instrumentation to the frames including various ADCPs, sensors and Multiparameter Sondes. The larger frames have a diameter of approximately 2m and are designed to deploy multiple sensors on board at varying heights. This allows parameters such as turbidity to be measured at alternating depths above the seabed.

The lowest height for a frame is 300mm, which was used by GEMS in Nigeria, as it is highly trawl-resistant and able to maintain station. The area surrounding the proposed LNG site was subject to





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OSIL Seabed Mounting Frame
mounted with Nortek AWAC

abnormally high fishing activity. This included commercial trawlers in the deeper waters, approximately 15m in depth, and local fisherman in the shallower waters. OSIL's unique, streamlined design ensured that the frames remained secure on the seabed and were not caught on any trawl nets or chains. GEMS were very impressed with the construction of the frames as Richard Davies, Metocean Manager explains, *"the frames proved very stable in these arduous conditions and a high level of data was secured."*

The Seabed Mounting Frames and mounted AWACs were serviced at monthly intervals and were diver recovered. Servicing was essential to ensure that the collected data was delivered to the client's design consultant in the necessary time. This efficiency also allowed the design of the complex to continue simultaneously with the monitoring programme.

OSIL specialise in providing their customers with customised system solutions for their applications. Because of their position and knowledge of the

industry, OSIL are able to collate the most appropriate equipment for each project and compile it into the most suitable system for the customer. GEMS' requirements for the OKLNG monitoring project included monitoring current in water with a depth of up to 50m. With a wide variety of current meters available, Richard Williams, OSIL's Managing Director, explains that they chose the AWAC because, *"the Nortek AWAC is the best way to collect wave and current data in these types of environments."*

The combination of the OSIL Frames and Nortek AWACs has been so successful for GEMS that they have recently ordered further frames for contracts in West Africa and the Middle East. Improvements to the systems design were discussed between GEMS and OSIL, which lead to OSIL designed gimbals, Sonardyne LRTs and pop-up floats being added to the frames to provide an even more efficient system for their clients.

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