

Abstract

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Impact of Water Based Drilling Fluid and Cuttings Discharge Offshore Nigeria using Sediment Profile Imaging Technology

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Sediment profile imaging (SPI) technology is an effective tool for offshore oil and gas environmental assessment and monitoring. This paper demonstrates how SPI was used to evaluate the impact on the sea floor of water based drilling fluid and cuttings discharged during drilling operations at five wellhead platforms offshore Nigeria in 2010. Pre-drill and post-drill SPI surveys were performed according to an orthogonal array of 20 nearfield stations, configured at 100 m, 200 m, 500 m, 800 m and 1,200 m distance along the cardinal directions from each platform. Three far-field reference stations were located at distances of up to 10 km from each platform. In the post-drill survey, the station array was supplemented by the addition of stations at 200 m and 500 m distance from each platform in the northwest, northeast, southeast and southwest directions.

The results of the surveys indicated that physical processes dominated the sea bottom environment in the study area which consisted of either muddy sediments with relatively well-developed and mature infaunal communities or fine sand where no traces of infauna were observed. Examination of over 2,000 pre-drill and post-drill SPI images indicated an absence of widespread nearfield accumulation of drilling solids on the sea floor. Out of the 100 stations where co-located before and after images were available for direct side-by-side comparison, only two stations located 100 m and 200 m distant from one platform yielded evidence of an episodic deposition event potentially linked with discharges from the 2010 drilling operations. No other indications of contemporaneous mud and cuttings discharges were found during the SPI survey. Comparisons are made of the use of SPI technology with the results of physical, chemical and biological sampling and testing, and predictions using CORMIX and OOC dispersion models.

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