



Benthic foraminifera as bio-indicators of drill cutting disposal in tropical east Atlantic outer shelf environments

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We present a study of benthic foraminiferal faunas from the outer continental shelf off Congo (tropical West Africa), with the aim to determine the impact of the discharge of oily drill cuttings on the sea floor environment, to judge the regenerating capacity of the benthic ecosystem, and to investigate the possibility to develop an environmental monitoring method for open marine continental shelf environments, based on benthic foraminifera. We studied the spatial distribution and microhabitats of living and dead foraminiferal faunas, sampled in April 2003, 4 years after the end of disposal activities, in the upper 3 cm of the sediment at 9 stations (about 180 m depth) offshore Congo, that were subject to various degrees of pollution by oily cuttings from 1993 until 1999. Our results describe a zonation of foraminiferal faunas in the 750 m around the former disposal sites. At the immediate vicinity of the discharge points (within 70 m), faunas are characterized by low foraminiferal densities. Faunas between 70 m and 250 m of the disposal sites have very high foraminiferal densities, with high percentages (about 80%) of opportunistic taxa such as *Bulimina aculeata*, *Bulimina marginata*, *Textularia sagittula*, *Trifarina bradyi* and *Bolivina* spp. Between 250 and 750 m from the disposal site, foraminiferal densities decrease, and the percentages of opportunistic species are lower (40-60% of indicator species). These results show that 4 years after the cessation of oily cutting disposal, strong environmental impact is limited to the 250 m around the disposal sites. We used these data to develop a quantitative pollution index, values of which are strongly correlated to distance to the disposal site. This foraminiferal index offers the possibility to quantify the impact of anthropogenic eutrophication in continental shelf environments, but its validity must be tested in other continental shelf environments.

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