



FORAMS 2006

Distribution and ecology of benthic foraminifera in the vicinity of Guadiana River (northern Gulf of Cadiz)

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A comprehensive knowledge of the ecology and the distribution of modern foraminifera is essential for ecological and environmental interpretations of modern and ancient environments. The aim of this work is to investigate the distribution and the ecology of living (stained) benthic foraminifera (>63 μ m), revealing the environmental conditions, based on a set of samples collected in February 2001 on the Guadiana shelf, between 12 and 90 m water depth.

The study area is located in the Northern Gulf of Cadiz, in the vicinity of the Guadiana estuary mouth. The region is characterised by waves of low to medium energy, with the prevailing onshore wave conditions inducing a net annual drift from W to E. Oceanographically, it is influenced by North Atlantic Surface Water, a strong southeasterly inflow over the continental shelf, which occurs in the upper 300 m of the water column. Morphologically, this shelf is complex and influences the sediment distribution, with a succession of terraces between 30 and 50 m delimiting a sandy inner shelf from a muddy middle shelf.

The stained benthic foraminifera fauna from the Guadiana continental shelf (abundance > 5%) is diverse and occupies a variety of niches. *Bolivina ordinaria* is the most abundant species with values of 50%, occurring at different depths with no relation to sediment type. *Cribronion gerthi* and *Eggerelloides scaber* showed higher abundances (7.25 and 8.5%, respectively) at water depths around 20m, associated with a mixture of coarse sediments and mud. *Spiroloxostoma croarae* showed the same behaviour; however, the highest abundance of 20% was observed at 36m water depth. *Bolivina dilatata*, *Brizalina spathulata*, *Nonionella iridea* and *Nonionella stella* were most commonly found above 45m water depth, associated with mud and sandy mud. Around 40m water depth, *Rectuvigerina phlegeri* and *Saccammina atlantica* showed the higher abundances to the east of the Guadiana River mouth, associated with sandy mud sediments. In general, the number of benthic foraminifera per 10cm³ increased seaward and had the lowest values near the Guadiana River mouth.

The observed living benthic foraminiferal faunas are similar to total assemblages described by other studies in the same and adjacent areas (Mendes *et al.*, 2004. *Mar. Micro.*, 51: 171-192), although the abundance and distribution of the same species are different. The higher percentages of *B. ordinaria* and *N. iridea* compared with total assemblages described by Mendes *et al.* (2004) could be related to the different dates of sample collection, suggesting that the variation in abundance of these species could be related to reproductive periods. The biocenoses of *C. gerthi* and *E. scaber* had similar distributions to total assemblages, indicating that they live in this area and are not affected by transport. Species such as *Planorbulina mediterraneensis*, described by Mendes *et al.* (2004) in shallow areas, showed lower abundances (<3%) in the present study, indicating that only some species are affected by tidal or wave-induced currents, depending on weight and form. The observed east-west asymmetry in the distribution of *R. phlegeri* could be related to the sediment type and also the high values of organic matter observed in connection with this species by Villanueva & Cervera (1999. *Bol. Inst. Esp. Oceanogr.*, 15(1-4): 191-202) in the northeastern Gulf of Cadiz.

The continuation of this work is essential to understand why and in which way the surficial distribution of living benthic foraminifera reflects the environmental conditions of this area.

Studies were sponsored by the Foundation for Science and Technology (FCT), grant SFRH/BD/18342/2004, by CRIDA project (POCTI/P/MAR/15289/99) and complementary work by IMCA project (POCI/CLI/60192/2004).