Live foraminifera from the open slope between Grand Rhône and Petit Rhône Canyons (Gulf of Lions, NW Mediterranean)

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Titre: Live foraminifera from the open slope between Grand Rhône and Petit Rhône Canyons (Gulf of Lions, NW Mediterranean)

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We present an ecological study of live (Rose Bengal stained) foraminifera from 6 deep-sea stations sampled on the open slope between the Grand Rhône Canyon and the Petit Rhône Canyon (eastern part of the Gulf of Lions, NW Mediterranean). The 6 stations describe a bathymetric transect from ~350 to ~2000 m depth. The main objective of our study is to investigate the changes of the foraminiferal density, composition and microhabitat along this transect in response to the physico-chemical conditions at and below the sediment–water interface. All our observations underline the general meso-oligotrophic character of our inter-canyon open-slope setting where low-quality organic matter originating from both marine and continental sources settles. The input of organic matter at the sediment–water interface leads to a classical succession of redox reactions within the sediment. The shallowest station (~350 m) appears as an active sedimentary environment, where coarse sediments characterized by lower-quality organic matter and biogenic material accumulate. The 550-m-deep station presents bioturbated sediments with the highest concentration of labile organic compounds. The deeper stations, between about 750 and 2000 m deep, show decreasing sedimentation rates with water depth and are characterized by a background of low-quality organic matter. The foraminiferal changes recorded along the bathymetric transect are related to a complex association of physico-chemical parameters. We think that the quality of organic matter in the surficial sediment, as expressed by the lipid concentration, is the major parameter controlling the foraminiferal distribution at our open-slope stations. From the 550- to the 2000-m-deep station, the foraminiferal standing stocks and diversity decrease with depth, as a result of the increasing scarcity of labile organic compounds at the sediment–water interface. Oxygen concentration and penetration depth and the intensity of bioturbation seem to play only a secondary ecological role. Other, putative hydro-sedimentary processes (winnowing by strong bottom currents, sand-bed deposition) appear as additional parameters controlling the foraminiferal community structure. At the 350-m-deep station, the live foraminiferal fauna can be considered as a non-equilibrium assemblage thriving in frequently disturbed and food-impoverished sediments. At the 745- and 980-m-deep stations, the occurrence of suspensivorous epibenthic/epilithic species suggests the presence of strong bottom-water current velocities and the related suspension of organic particles.