

## Biomonitoring in the Cassidaigne Canyon (NW Mediterranean): the resilience and recovery of deep-sea benthic foraminifera at a bauxite industrial waste site

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During an environmental survey performed in autumn 2016, living (stained) benthic foraminiferal faunas were investigated at 16 stations sampled within the Cassidaigne Canyon (NW Mediterranean Sea) and surrounding area. For many decades, industrial bauxite residues of red mud have drained into the canyon via a submarine pipe, causing physical disturbance and chemical contamination. In January 2016, solid waste disposal ceased and was replaced with the dumping of a low-density liquid effluent. Stations investigated in this paper are located between 265–2500 m water depth from the shelf break to the deeper basin and from a distance between 4–70 km from the pipe outlet. At many sites, surface sediment is characterized by historical deposits of red mud and their geochemical imprints. Our ecological observations at the 725 m-depth station closest to the Cassidaigne Canyon submarine pipe show the highest concentration of the opportunistic and stress-tolerant species *Bulimina marginata* d'Orbigny, 1826, commonly identified as a recolonizer of disturbed areas. At the other fifteen stations, foraminiferal standing stocks and simple diversity (S) decrease with decreasing food input to the seafloor and increasing water depth. There, foraminiferal composition is characterized by a minor contribution of stress-tolerant species and echoes the overall meso-oligotrophic patterns of a relatively stable ecosystem. Our study clearly shows that in September 2016, 10 months after a historical shift in discharged industrial wastes (from dense red mud to liquid effluent), foraminiferal diversity close to the pipe outlet in the Cassidaigne Canyon remains altered, but appears to be slowly recovering.

Keywords: Benthic foraminifera, Bauxite residues, Cassidaigne Canyon, Resilience