Temporal changes in nickel and vanadium concentrations and in condition index and metallothionein levels in three species of molluscs following the “

The petroleum spilt by the tanker “Erika” contained environmentally high concentrations of nickel (45 mg kg−1) and vanadium (83 mg kg−1). Our aim was to show that nickel and vanadium concentrations in marine organisms could be used as tracers of their exposure to oil deposits along the coast. Two biomarkers were determined, condition index (CI) and metallothionein levels. Samples were collected monthly from January to May 2000 from five sites along the coast of Vendée and Loire Atlantique: (1) Lérat, (2) La Govelle, (3) Saint Gildas, (4) La Bernerie and (5) La Fosse. Among benthic invertebrates, mussels Mytilus edulis (filter-feeders), periwinkles Littorina littorea (grazing-feeders) and dogwhelks Nucella lapillus (carnivora, bivalve predators) were selected. In addition, mussels were collected from a control site, Fier d'Ars (Ré Island). The species chosen as bioindicators have responded to the presence of oil in their environment by accumulating nickel and vanadium. The bioaccumulation of vanadium occurred early one month after oil spill whereas nickel bioaccumulation was deferred, probably as a consequence of a lower stability of vanadylporphyrins compared to nickelporphyrins which are known in particular for their role in stabilizing emulsions (film at the water/oil interface). Interspecific differences may be explained by different food habits: periwinkles grazed contaminated algae; mussels as filter-feeders retained particles and colloids from the water column; dogwhelks fed on mussels. Spatio-temporal changes of nickel and vanadium concentrations may result from (i) the arrival of new oil slicks, (ii) the action of cleaning of the coasts contributing to the re-suspension of petroleum. In all of the three species, few changes of the CI were observed from site to site. CI variations were linked to sexual ripening in mussels. Mussels originating from the control site showed MT concentrations significantly lower than those in specimens from impacted sites. The highest MT concentrations were observed in January and February, and then a consistent decrease was registered in March and May. MT concentrations in periwinkles increased very significantly in March and May. An increase in MT concentrations was also shown at this period in dogwhelks. Depending on the species, positive correlations were shown between MT and nickel and/or vanadium concentrations.

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