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A MATHEMATICAL TOOL FOR SIMULATING THE DISPERSION OF NORM RELEASES IN THE MARINE ENVIRONMENT: APPLICATION TO THE WESTERN ALBORAN SEA

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A numerical model which simulates the dispersion of NORM radionuclides in the marine environment has been developed and applied to the western Alboran Sea.

The model consists of a hydrodynamic module, which operates off-line, and the dispersion module itself. The hydrodynamic module consists of two models: a 2D barotropic model which provides instantaneous tidal currents and a 3D baroclinic model which provides the long-term residual currents. Calculated currents are stored in files which are later read by the dispersion model. Calculated tidal and residual currents have been compared with measurements in the area. In particular, the well known Western Alboran Gyre is reproduced by the model.

The dispersion model essentially solves the advection-diffusion equation using finite difference techniques. Interactions of dissolved radionuclides with suspended particles have been neglected in this case, given the low particle concentrations present in the western Alboran Sea and Strait of Gibraltar.

The model has been applied to simulate ²²⁶Ra releases from hypothetical phosphate fertilizer industries located in both the Spanish and Moroccan coasts. It is a useful tool to assess the effects of planned releases of NORM radionuclides in the marine environment.