

Temporal distribution of long-lived radionuclides in marine sediments at Southern Coast of Spain

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This communication describes the studies carried out at the southern coast of Spain, area of special interest as an accidental release of transuranides occurred near the seaside in 1966. Sediment samples were taken by a box-corer and a shipek-grab at this area in 1985. The vertical distribution of radionuclides were performed in these corers, further searches on sediments chronology give a wide spectrum of the historical deposition of radionuclides.

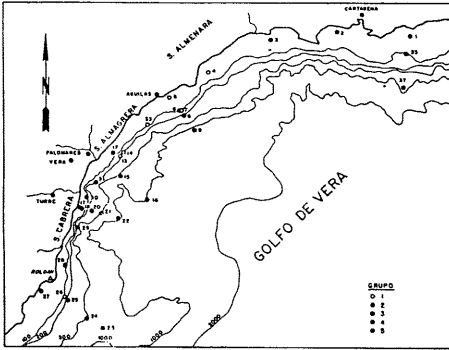


FIGURE 1 : SAMPLING SITES.

The profiles of transuranides distribution show an increase of concentration at the southern of the Almanzora river mouth, processes involved in this fact are investigated.

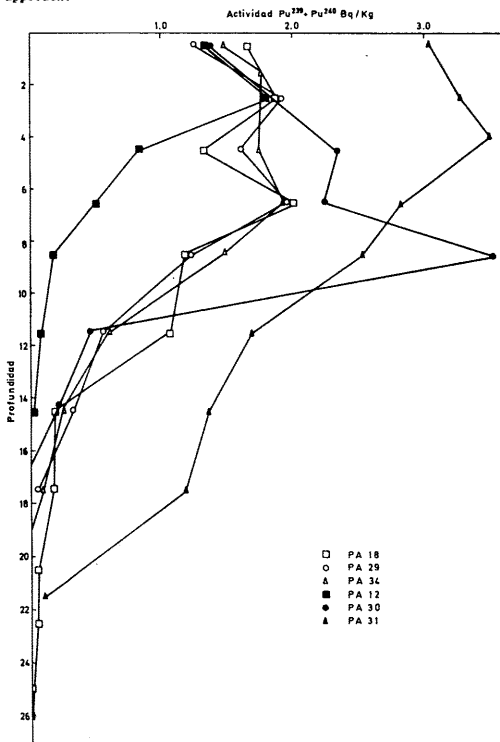
The accuracy of radiochemical transuranides analysis was checked by analyzing standard material and duplicated samples

METHODOLOGY

The area chosen for the study was the southern coast of Spain, including the coastal area of Palomares, between Cape of Falos and Cape of Gata. Samples were collected at 50, 100, 200, 500 and 1000m-depth. Sediments were sampled by a new desing box-corer and each core was extruded in slides of 1cm thick.

Pu²³⁹+Pu²⁴⁰ and Am²⁴¹ were analyzed by radiochemical separation techniques and measured by α-spectrometry, Pb²¹⁰, Pb²¹⁴ and Cs¹³⁷ were measured by γ spectrometry with Ge intrinsic detector.

The Pb²¹⁰ method has been applied to study the chronology of sediments. The model of Robbins has been assumed as a first approach.



GRAPHIC 1 : CONCENTRACION DE PU EN FUNCION DE LA PROFUNDIDAD EN EL NUCLEO.

RESULTS AND CONCLUSIONS

The results of the radionuclides analysis of some sediment corers are showed in the figures.

The studies about differences between inventories of the stations and the processes controlling these, will contribute to the knowledge of transuranides behaviour in Mediterranean sea.

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Biosystematic analysis in the study of environmental radiocontamination in marine ecosystems

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The distribution and circulation of radionuclides in marine ecosystems is regulated - as well as by physical-chemical factors - by the biological population, and often in a highly specific manner. Plankton and coastal benthos play a different role in these processes, given also the special hydrological conditions of the neritic zone, which is more affected by continental contributions.

This paper reports the methodological approach used in studying radiocontamination in a 20 Km-wide tract of sea extending from the Po River Delta to Cattolica. This research is part of a wider program sponsored by the Emilia Romagna Region for studying marine conditions in this area, especially as regards pollution.

The main purpose of our research is to evaluate the role that macrobenthic organisms play in the circulation of radionuclides in this stretch of sea, which is particularly influenced by the Po, whose waters are those chiefly responsible (in quantitative terms) for the conditions of environmental deterioration in the area (eutrophication, etc.).

Generally, in determining the levels of radiocontamination in an environment, one is limited to gathering certain biological samples, which are then identified taxonomically and prepared for the radiometric analyses, without going on to study the environmental context in which the species that have been collected live. This type of approach cannot be adopted in studying the circulation of radionuclides in a given environment, since it doesn't provide information on the space-time and trophic connections among the species, knowledge of which is fundamental to an effectively utilisable description of the radionuclide distribution.

The first essential point is to define, even in approximative terms, the demographic structure of the populations, particularly for the species that are quantitatively important in the area studied; this is necessary on one hand because of the different part that each group plays in the assumption of radionuclides, and on the other for evaluating the "state of health" of the population in question.

This type of information can be found thanks to the biometrics of the animals which are to be prepared for the radiometric procedures. We determined the population structure of all those species which were subsequently subjected to radiometry.

In the species in which it is possible, we go on to examine the "gut-content", so as to have as good an understanding as possible of the trophic role that the particular species sustains in the environment being considered. Remember that all the species in a given area were gathered homogeneously within a limited space and time precisely so as to respect any trophic relationships and thus be able to reconstruct them.

An efficient analysis of the contents of the alimentary canal is not possible for all species, and in some cases it is necessary to go by data in the literature regarding the species' potential diet. We were however able to examine successfully *Astropecten irregularis* and *Philine aperta*, obtaining among other things interesting information on the animal population of the specific area with respect to small species.

The study of the fauna, limited for technical reasons to the macro invertebrates, is important in characterizing the environment; in addition, it furnishes accurate information regarding the probable role of the animal population in the circulation of radionuclides.

In the area studied there are various type of macrobenthic associations: from highly simplified zoocoenoses close to the coast to complex biocoenotic structures further off-shore, with a characteristic distribution of the different communities (Parisi et al., in preparation).

In addition to the distributive aspects of the species subjected to radiometric research, the data on the zoocoenoses is essential to an understanding of the different role that such communities may play in the circulation of radionuclides. This examination requires that they be interpreted in terms of the presence of filter-feeders, predators and scavengers, keeping in mind that there are no large herbivores in the area, given the absence of phytomacrobenthos. The former are fundamental in transferring radionuclides from the water to the sediment (as occurs in zoocoenoses where Bivalves predominate); the latter two instead are important in the fine redistribution of radionuclides in the sediment.