

GLOBAL MARINE RADIOACTIVITY DATABASE (GLOMARD)

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In response to the request of Member States and under the IAEA's mandate, the IAEA Marine Environment Laboratory (MEL) in Monaco has established and maintains a Global Marine Radioactivity Database (GLOMARD).

It is a vast project compiling radionuclide measurements taken in the marine environment. It consists of systematic input of all radionuclide concentration data available for sea water, sediment, biota and suspended matter.

The GLOMARD is therefore a powerful tool for the researchers of MEL as it integrates the results of analyses in most of the areas of the marine environment which have been investigated.

The database serves the following important functions :

- Provides a snap-shot of activities at any time, which may used as a baseline for any impact assessment studies,
- Provides immediate and up-to-date information on the levels of radioactivity in the world's seas in different environmental matrices,
- Permits investigation of temporal trends in environmental levels of radionuclides and identifies gaps in available information.

In practice, these data are analysed and used for the production of graphs representing mainly the vertical concentration of radionuclides in sediment or the geographic location of zones where radioactive pollution is present.

The latest developments in the GLOMARD concern the representation of geographical location of marine radioactive pollution, which is not an easy task. The measurements used are the results of analyses of marine samples collected during scientific cruises to different parts of the world's seas and oceans. Therefore, in order to represent a global picture of the world's seas, a specific software interpolates isolines representing the radionuclide concentration over seas.

The software "Surfer" is used to this effect. However, MEL has recently acquired a Geographical Information System (GIS). This software, when interfaced with the GLOMARD reformed under Oracle 7, allows a greater precision in the interpolation procedures and 3D images.

The aim of the project using the GIS is to allow Member States to consult the GLOMARD via the Internet and also to create maps from the data contained in GLOMARD through the MEL website.

As part of GLOMARD, IAEA-MEL has developed a database for main anthropogenic radionuclides in marine samples collected in the NW Pacific Ocean and its marginal seas around Japan. This database is based on marine radioactivity data which were compiled by Japan Chemical Analysis Center (JCAC). The data offered from JCAC were converted and missing information was added at IAEA-MEL. Additional important data were also input into the database through a literature survey. The total number of data is now about 20,000 for all samples.

The distributions of radionuclides in surface sea water and surface layer sediment were investigated using data sets installed in the database. Evaluation of data was also carried out for the

vertical profiles of radionuclide concentrations, radionuclide inventories and their isotopic activity ratios in both sea water columns and sediment cores.

Generally the concentrations of ^{90}Sr , ^{137}Cs (Fig.1) and $^{239,240}\text{Pu}$ in marine samples collected around Japan show a tendency to decrease year by year. The influence of the Chernobyl accident in 1986 can be observed only for ^{137}Cs in surface sea water and macro-algae. Data evaluation for the radionuclide distributions around Japan have revealed the ranges of the concentrations and the average values in surface sea water and surface layer sediment. The vertical profiles of ^{90}Sr and ^{137}Cs in sea water columns show a gradual decrease in concentration with increasing depth, contrasting with those of $^{239,240}\text{Pu}$ which show a subsurface maximum at depth of around 700 m. On the other hand, the concentrations of all the radionuclides in sediment cores generally tend to decrease with increasing depth. The inventories of ^{90}Sr , ^{137}Cs and $^{239,240}\text{Pu}$ in sea water and sediment were estimated for several periods since the beginning of the 1980's up to date. The isotopic activity ratios of the radionuclide inventories in sediment cores are quite different from those in the sea water columns, reflecting the difference in removal of the radionuclides from sea water to the bottom sediment.

Finally these data were compared with data sets obtained from the first Japanese-Korean-Russian joint expedition conducted in 1994. No significant differences can be seen between the two sets of data. The data collected and evaluated here will be input into GLOMARD to be evaluated with the GIS software.

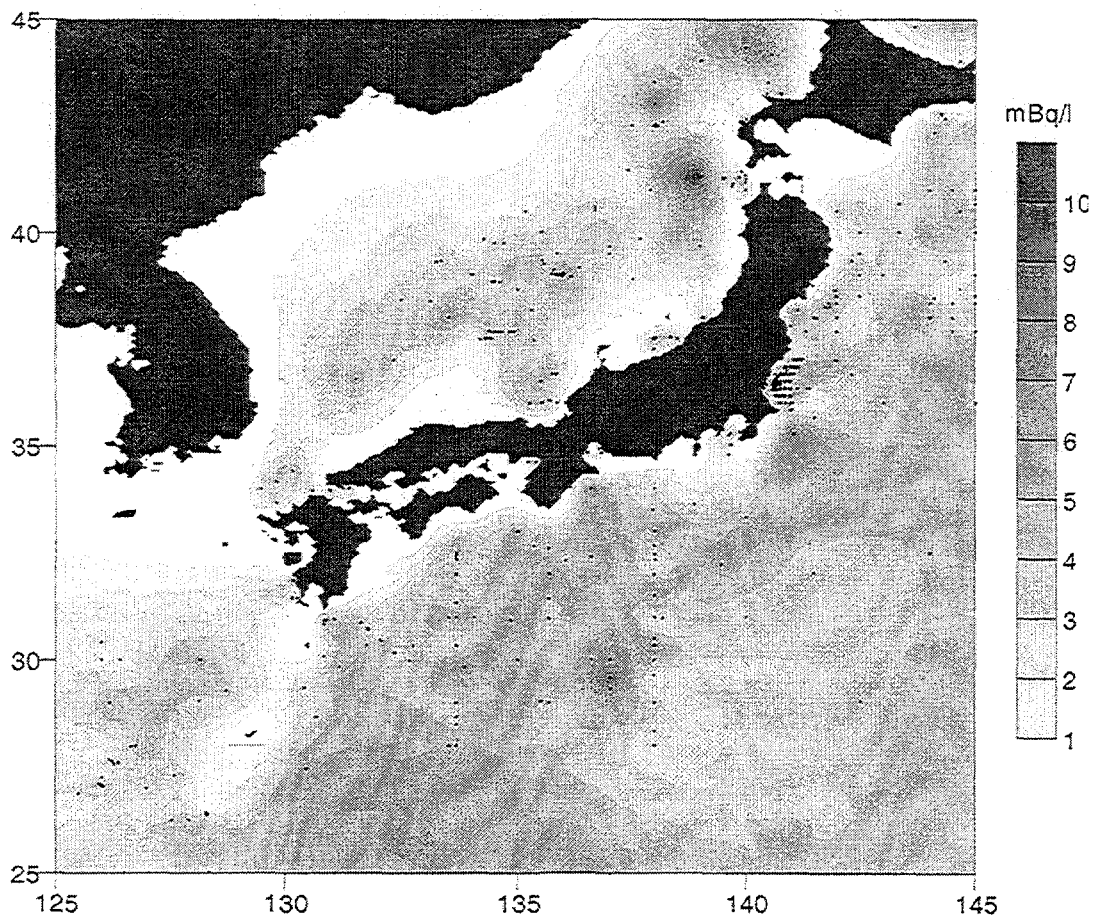


FIG. 1. The distribution of the ^{137}Cs concentrations in surface seawater collected around Japan (1986-1996).