

First study of natural and artificial radionuclides' distribution in marine mammals of the Channel

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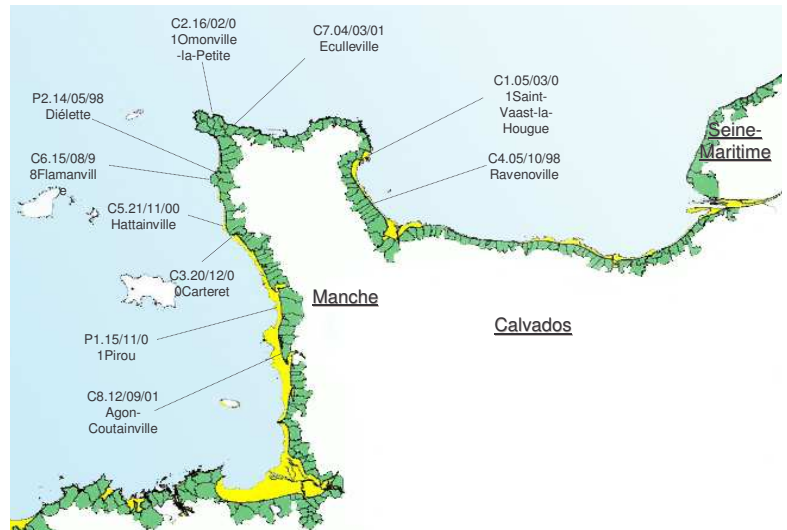
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Nuclear industry is present in several areas on the coasts of the Channel, in France and Great Britain. The radioactivity is monitored in live organisms, like seaweeds, marine invertebrates and fishes. The objective of this theme is having an information about the natural and artificial radionuclides' distribution and concentration in a few marine mammals.

The measures have been realised on ten marine mammals - two seals and eight cetaceans - found dead on Normandy coasts. Five species are concerned : *Halichoerus grypus*, *Tursiops truncatus*, *Delphinus delphis*, *Stenella coeruleoalba* and *Phocoena phocoena*. Two kilograms of muscle were taken from the animals and frozen before being reduced to powder in laboratory. The methodology used to detect the activity of radionuclides is the gamma spectrometry. The unit of measure is the Becquerel (Bq) per kilogram of fresh material.



Species	Sex	Length (cm)	Tissues	Activity [Bq/kg of fresh material]	
				Cs-137	K-40
C1 <i>Phocoena phocoena</i>	F	129	muscle	0.7	112
C2 <i>Phocoena phocoena</i>	M	121	muscle	0.6	86
C3 <i>Phocoena phocoena</i>	M	142	muscle	0.35	86
C4 <i>Phocoena phocoena</i>	F	110	liver	0.5	84
C5 <i>Stenella coeruleoalba</i>	F	190	muscle	0.25	96
C6 <i>Stenella coeruleoalba</i>	/	/	muscle	0.30	80
C7 <i>Delphinus delphis</i>	F	170	muscle	0.75	104
C8 <i>Tursiops truncatus</i>	M	156	muscle and liver	0.40	97
P1 <i>Halichoerus grypus</i>	M	172	muscle	0.25	75
P2 <i>Halichoerus grypus</i>	M	137	muscle	0.11	60

Results of analysis in ten marine mammals of the Channel

Only two gamma emitters radionuclides could have been measured : potassium 40, a natural radionuclide, and caesium 137, an artificial one. The measures of the thirteen other radionuclides are inferiors to the instruments' limits of detection.

Potassium 40 (K-40), is present in all the live organisms (between 50 and 200 Bq per kg of fresh material, in fishes for example), and particularly in the vertebrates' muscles. It's a very important element of their functioning.

Caesium 137 (Cs-137) is associated to potassium's metabolism in the live organisms. This artificial radionuclide is detected in very little concentration in this marine mammals, as in other vertebrates like fishes (inferior to 1 Bq per kg of fresh material). We can find it all over the planet because its origin results from the testings of nuclear weapons in the atmosphere during the 1960s and the 1970s. A little part of it comes from the Tchernobyl nuclear disaster and from the effluents of nuclear industry.

Conclusion

This analysis shows that only one artificial radionuclide (Cs-137) is detected in slight traces. It would be interesting to follow in the time the distribution of radionuclides in different species of marine mammals living in the Channel. We could compare it with other individuals of Atlantic's populations to evaluate the impact of nuclear industry's effluents.