

# Variations spatio-temporelles de la signature en isotopes stables ( $\delta^{13}\text{C}$ et $\delta^{15}\text{N}$ ) des eaux du Danube et des communautés marines sur les côtes roumaines de la mer Noire

par

Daniela BANARU & Mireille HARMELIN-VIVIEN (1)

**RÉSUMÉ.** - Le Danube, deuxième grand fleuve d'Europe, influence la sédimentation et la vie marine dans l'ensemble de la mer Noire. L'étude montre, à travers les valeurs des isotopes stables de  $\delta^{15}\text{N}$  et  $\delta^{13}\text{C}$ , l'impact des fluctuations saisonnières (crue-étiage) des apports de matière organique particulaire (MOP) du fleuve sur les différents compartiments trophiques marins (MOP de l'eau marine, sédiment, macro-invertébrés et poissons) le long des côtes roumaines de la mer Noire. Au total, 670 analyses ont été effectuées sur les échantillons collectés dans 38 stations localisées dans le nord, le centre et le sud des côtes roumaines en octobre 2004 et mai-avril 2005. L'influence des eaux du Danube sur les communautés marines côtières se fait plus sentir dans le nord que dans le sud de ces côtes et est plus forte au printemps qu'en automne. La signature du Danube semble influencer plus particulièrement celles des amphipodes, des copépodes et des polychètes, ainsi que celles de certains poissons, sprat, sevruga (*Acipenser stellatus*), indiquant une utilisation plus importante du carbone d'origine terrestre par ces organismes que par les autres organismes analysés. Les signatures isotopiques des organismes marins de mer Noire analysés présentent des valeurs en  $\delta^{15}\text{N}$  et  $\delta^{13}\text{C}$  plus élevées que celles qui sont rapportées dans la littérature pour des organismes similaires dans d'autres mers.

**ABSTRACT.** - Spatial and temporal variations of stable isotope ( $\delta^{13}\text{C}$  and  $\delta^{15}\text{N}$ ) signatures of Danube waters and marine communities on the Black Sea Romanian coasts.

Coastal marine zones located in front of large rivers are of major biological interest. The Danube is the second largest river in Europe after the Volga and represents 58% of the freshwater inputs to the Black Sea. Its delta, located between the North of Romania and the South of Ukraine, has a great impact on the sedimentation and marine ecosystems in the Black Sea. The objective of the present study was to estimate the impact of the seasonal fluctuations of the Danube particulate organic matter (POM) on the various marine trophic compartments (POM sea water, sediment, macro-invertebrates and fish) along the Romanian coasts. The ratios of the stable isotopes of carbon ( $^{13}\text{C}/^{12}\text{C}$ ) and nitrogen ( $^{15}\text{N}/^{14}\text{N}$ ) allowed the identification of organic matter sources and the analysis of trophic webs. 670 analysis of stable isotopes of the particulate organic matter (POM) of the Danube water as well as marine POM, marine sediments and marine organisms (macrophytes, polychaetes, bivalves, gastropods, amphipods, macrurids, brachyurids and fishes) has been carried out on samples taken in 38 stations from the Northern, Central et Southern areas of the Romanian coasts in October 2004 and April-May 2005. The POM of the Danube presented average values of  $\delta^{13}\text{C}$  (-27.61‰) and  $\delta^{15}\text{N}$  (4.39‰), lower than those of the marine POM of the Black Sea ( $\delta^{13}\text{C}$  = -24.98‰ and  $\delta^{15}\text{N}$  = 7.08‰). In the sea, the sediment presented average values decreasing from the North ( $\delta^{13}\text{C}$  = -20.02‰ and  $\delta^{15}\text{N}$  = 9.93‰) to the South ( $\delta^{13}\text{C}$  = -23.59‰,  $\delta^{15}\text{N}$  = 7.65‰). Among invertebrates, stable isotope values depended on their trophic level and aptitude to consume the terrestrial POM brought by the river. The lowest values were found in polychaetes, copepods and amphipods, and the highest ones in macrurids, brachyurids and gastropods. Among the fish species studied, the lowest values of  $\delta^{13}\text{C}$  and  $\delta^{15}\text{N}$  were observed in starry sturgeon (*Acipenser stellatus ponticus*) and sprat (*Sprattus sprattus*), while the highest values was found in beluga sturgeon (*Huso huso*). These differences were explained mainly by differences in diet. Preliminary results showed a strong influence of the Danube particulate organic matter on the marine compartments of the Romanian coasts. The river influence decreased from the North to the South and was higher in spring when the river was flooding.

Key words. - Danube - Black Sea - Stable isotopes - Terrestrial organic matter - Marine organisms.

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(1) Centre d'océanologie de Marseille, Université de la Méditerranée, UMR CNRS 6540, Station Marine d'Endoume, 13007 Marseille, FRANCE. [banaru@com.univ-mrs.fr]