



Local and regional oscillations of carbon and oxygen isotopes in terrestrial carbonates

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Stable isotope ratios of carbon and oxygen in sediment carbonates are used as a tool to identify climatic changes in the past [1], [2]. Carbon is more related to humidity whereas oxygen is thought to respond the temperature [2]. Nevertheless number of questions about local, regional and global scale impacts to these records is left.

In this research work carbon and oxygen isotope ratios in lacustrine carbonates are used to identify palaeoenvironmental dynamics of different locations. Samples of lacustrine carbonates were obtained from 8 sequences of different sites in Lithuania (4), Poland (1), Belarus (1) and Kaliningrad (1). Every sequence was divided into 2 cm intervals.

The study showed differences in average carbon and oxygen isotope ratios between Lithuania and other countries (Poland, Belarus and Kaliningrad). Carbon and oxygen isotope ratios in 4 sites in Lithuania are:

Ūla $\delta^{13}\text{C}$ -4.72 ± 2.11 , ‰ and $\delta^{18}\text{O}$ -9.46 ± 1.9 , ‰ ; Zervynos $\delta^{13}\text{C}$ -4.79 ± 1.82 , ‰ and $\delta^{18}\text{O}$ -9.57 ± 1.69 , ‰ ; Rudnia $\delta^{13}\text{C}$ -4.94 ± 7.53 , ‰ and $\delta^{18}\text{O}$ -9.3 ± 3.92 , ‰ ; Pauliai $\delta^{13}\text{C}$ -4.15 ± 0.67 , ‰ and $\delta^{18}\text{O}$ -9.94 ± 1.07 , ‰ :

In other countries:

Poland $\delta^{13}\text{C}$ -1.07 ± 1.94 , ‰ and $\delta^{18}\text{O}$ -7.69 ± 0.95 , ‰ ; Belarus $\delta^{13}\text{C}$ 0.97 ± 1.94 , ‰ and $\delta^{18}\text{O}$ -7.61 ± 1.42 , ‰ ; Kaliningrad $\delta^{13}\text{C}$ -1.14 ± 1.43 , ‰ and $\delta^{18}\text{O}$ -6.51 ± 1.00 , ‰ :

Average stable carbon and oxygen isotope values from four sites in Lithuania were -4.65 ‰ for carbon and -9.51 ‰ for oxygen. Despite homogeneity of average isotope signals in these four sites there are relatively large oscillations of isotopic values in Rudnia and relatively small in Pauliai. These oscillations could be related to local characteristics of particular place such as environmental conditions, water balance, input of terrigenous materials into basin, etc. Total amount of CaCO_3 could also play a significant role in reconstructing palaeoenvironment from stable isotopes and creating isomaps.

The comparison of isotope records from different locations could enable to separate local, regional and even global environment condition impact to isotopic values in the past.

1. Hammarlund, Dan, et al. "Climate and environment during the Younger Dryas (GS-1) as reflected by composite stable isotope records of lacustrine carbonates at Torreberga, southern Sweden." *Journal of Quaternary Science* 14.1 (1999): 17-28.

2. Makhnach, N., et al. "Stable oxygen and carbon isotopes in Late Glacial–Holocene freshwater carbonates from Belarus and their palaeoclimatic implications." *Palaeogeography, Palaeoclimatology, Palaeoecology* 209.1 (2004): 73-101.