

Analysis of Paleoclimatic Conditions of Arjan Lake in Fars Province Using Oxygen Isotope Analysis

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Introduction

Understanding the current climate change conditions and planning for the future requires the knowledge of paleoclimatic conditions which has been studied less in Iran. Although there are diverse methods to detect these changes, to select the proper one, the range of time period, environmental conditions and data access should be taken into account.

Materials and methods

One suitable method of studying paleoclimatic conditions is oxygen isotope analysis. This research aims to identify climate change in Arjan Lake located in the southwest of Iran on the basis of geological proofs. To achieve the aim, a process is carried out. First, 9 cores were taken at depths of 1 to 3 meters in the study area. Second, sediment sections were divided into 5 centimeters for counting the Ostracoda shells. Third, in order to determine the exact age of the sediments, the method of C₁₄ was applied in 3 samples in the different depths of the lake. And finally, the isotope values were measured using 22 samples at different depths of the lake.

Results and discussion

The results of the research based on the oxygen analysis represents 12 climatic zones during 11 thousand years ago. Negative isotopic values indicated a cooler and wetter climate compared with the present time. The results also shows that there is a sharp gradient in isotopic extreme values indicating climate fluctuations in the study area. C¹³ & O¹⁸ values shows that the lake experienced warmer and drier conditions in 11 thousand years ago. The driest and coldest periods were distinguished in 2020-2213 and 4261 years ago, respectively.

Conclusion

Climate fluctuations in the study area might be linked with changes in the atmospheric general circulation and regional elements determined temperature based on the isotopic values of calcite. This can offer a clearer picture of the past climatic conditions.

Keywords: Climate Change – Holocene - $\delta^{18}\text{O}$ & δC^{13} - climate zone scheme-Arjan lake

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