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Contribution of natural and anthropogenic effects in the Iznik Lake bottom sediment: Geochemical and microfauna assemblages evidence

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ABSTRACT

The relationship between the distribution of benthic foraminifera with ostracoda and sediment type and geochemical environment in the Iznik Lake is discussed. The microfauna (benthic foraminifer and ostracod) were sampled in seven recent bottom sediment samples, and geochemical variables of the sediment of the same samples were measured. This study is aimed at investigating the geochemical properties of 7 bottom sediment samples analysed in 5 lines in Iznik Lake. The depths for the samples varies from 1 to 68 m. The microfauna individuals were found in very low quantity, a total of 5 species foraminifera and 11 species 10 genus ostracod were identified. The geochemical properties were found to correspond well to the sediment type and depositional environment and five different sediment/depositional environment types could be distinguished. The individuals of microfauna reveals specific faunal assemblages that are closely related to these sediment and geochemical environment types. According to the survey, sediments encountered in the formation of gypsum crystals feature when considered together with the magnetism of Iznik Lake and the surrounding area suggest that are affected by new tectonics. Again this geochemical study the magnetic properties of the heavy-mineral contents, the entire amount of magnetite and hematite and heavy-mineral content has appeared to be affected by changes in the process. The purpose of this work is to distinguish the natural (geogenic) component, originated by techtonical origin this lake, from anthropogenic contamination owing to human activity. There were relationship between microfauna assemblages and heavy metals, trace element pollutant in the bottom lake sediments. Additionally, less individuals are found in most of the sediment samples in observed (in this 7 samples), this coincidence suggests that the heavy metals within the environment can also be a cause. The reason that of heavy metals, trace element pollutants are a factor in the distribution of microfaunal assemblages of genera and species were observed.

1. Introduction

Iznik Lake in western Turkey (40°26′33″N, 29°31′33″E) (Fig. 1) is situated at 83 m a.s.l. It is approximately 32 km long (west-east) and 12 km wide (north-south), and covers an area of approx. 313 km^2 (Budakoğlu, 2000). The lake is bordered in the south by the Iznik-Mekece branch of the dextral North Anatolian fault zone with local components of dip-slip rates of approximately 1.4 mm a^{-1}, leading to steep slopes of the Kurban Mountains in the south with offset valleys and alluvial fans (Ikeda et al., 1991). The northern gently inclined slope and steep southern slope of the lake basin is interpreted as a product of the tectonic setting. The basin itself is elongated and can be divided in three sub-basins in the west, north and south (Viehberg et al., 2012) (Fig. 1). The western sub-basin has a maximum water depth of 47 m (36 m a.s.l.) and is bordered by the alluvial fan of stream Sölöz to the east. The northern sub-basin has a water depth of 62 m (21 m a.s.l.) and is divided from the southern sub-basin by a ridge at a water depth of c. 50 m (33 m a.s.l.). The southern sub-basin holds the deepest part of the lake at 82 m (1 m

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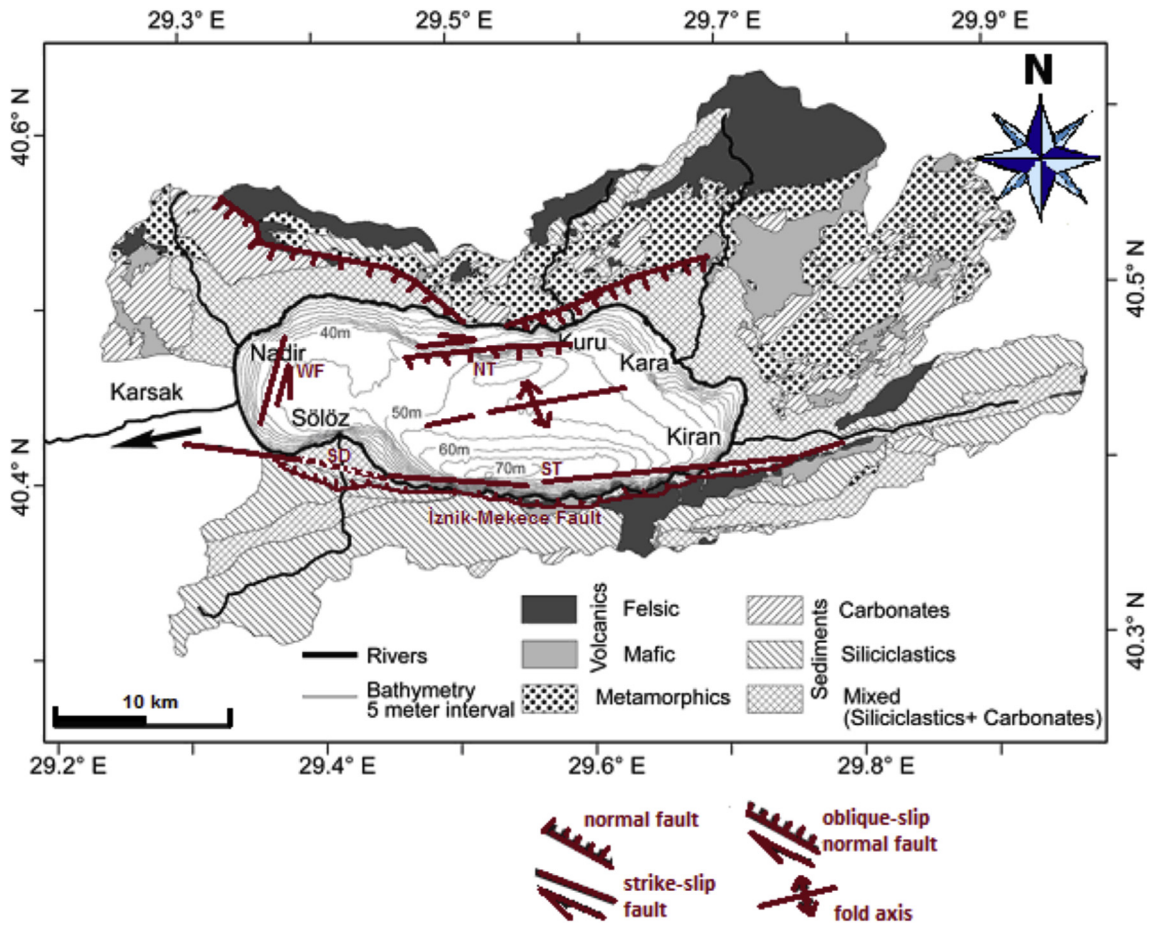

Fig. 1. The main structural elements of Iznik Lake superimposed on the bathymetric map with 10 m contour interval (modified by Öztürk et al., 2009; Viehberg et al., 2012).

a.s.l.). Iznik Lake has only one surficial water outlet in the west, the river Karsak, which is today regulated by the General Directorate of State Hydraulic Works of Turkey (DSI). Five major streams drain the lake catchment area, which are the main contributors to the water balance of the lake. The Kiran, Kuru and Kara flow into the northern sub-basin and the Sölöz and Nadir streams that flow into the western sub-basin (Fig. 1).

The extension of the North Anatolian Fault line in the Marmara Sea was formed when E-W trending tectonic trough on it was filled with water. It has a height of 85 m above sea level. The deepest point of the lake whose length increases from north to south is close to the south shore surrounded by steep slopes with 70 m. The lake is fed by streams running down from the nearby mountains. It has mostly fresh water and the surplus water flows into Karsak Stream and the Gulf of Gemlik on the west shore. The water level which rises in spring recedes towards summer and reaches the lowest level in the winter months. The water levels may exhibit variations within the range of 50–60 m depending on the season. The highest level is experienced in May and the lowest in December. Surface water temperature varies between 11 and 25 °C in relation to seasons. As for deep water, it has a constant temperature of 4-5 °C. Although the water of the lake is fresh, it is not suitable for the irrigation of cultivated land. Currently, carp farming is practiced in the lake, which is surrounded by olive and fruit groves, and vegetable fields.

The objective of this work is to investigate the spatial variations of the processes that effect recent sedimentation in Iznik Lake basin, and hence is a prerequisite for future palaeolimnological interpretations of long sediment records to better understand the in-lake geochemical processes and their potential signals stored in the sediment column. In addition, it is also of importance for biological and ecological studies focusing on benthal/benthos community dynamics.

In the studies (Meriç et al., 2009; Nazik et al., 2011), the current bottom sediment with 28 sampling of Iznik Lake sediments covering the distribution of sediments, bottom sediments of the microfaunal (benthic foraminifera and ostracoda) determined the environment in which assemblages changes have been introduced. The aim of this study; of lake located in the south of the parallel and perpendicular to the fault by selecting five lines and even seven stations inorganic sediment geochemistry multi-element analysis results will be evaluated. The main objective of this study is interdisciplinary (micropaleontological, geochemical and statistical) using an approach to characterize bottom sediment.

Geochemical investigations, major elements, heavy metals, trace, trace earth and rare earth element values in question were identified aimed to investigate the factors that control the geochemical characteristics and them. In this study for the first time, the microfauna findings of previous studies (Meriç et al., 2009; Nazik et al., 2011) with the geochemical properties of sediments have been evaluated by taking into account the structural discontinuity planes of the lake periphery. Such as exploration of terrestrial pollution in the lake and the main geochemical distribution pattern in the lake, as an anthropogenic or natural (geogenic) component. The relationship between the geochemical parameters with microfauna demonstrated by the correlation.

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