

Precipitation and evaporation changes during these 20,000 years at Anatolia Plateau, Turkey

Kaoru Kashima[1]; Kotaro Hirose[2]; Masaaki Yamaguchi[3]; Hiro'omi Tsumura[4]

[1] Earth and Planetary Sci., Kyushu Univ.; [2] Geoscience, Sci, Osaka City Univ; [3] Frontier Sci. Univ. Tokyo; [4] Dept. Museum Science, NMJH.

<http://paleobio.geo.kyushu-u.ac.jp/kashima/kashima.html>

Our study demonstrates the importance of detailed lithostratigraphic and biostratigraphic analyses of deposits of lake-side terraces and alluvial fans in attempts to identify fluctuations of climate characteristics such as precipitation and evaporation rates, and of local conditions for water balance changes in the central part of Turkey during the last 20,000 years.

In mid-latitude regions, the patterns of lake level changes are more complex. The limnological studies indicated at high lake levels broadly correspond to the glacial maximum (Street and Grove, 1979). In the Middle East, the major shifts in lake-level regime occurred near the glacial maximum, that is, at approximately the same time as the North American sequence (eg. Begin et al. 1974.), although dating evidence is incomplete. Although there are numerous papers about reconstructions of fluctuations of paleo-limnological environments during last 30,000 ~ 20,000 years especially in Africa and North America (Street and Grove, 1979), there have been fewer extensive studies undertaken of inland lake sediments to reconstruct those changes in Turkey.

The Konya Basin and Lake Tuz basin are located about 100 km away from Lake Tuz. Sedimentological surveys were carried out to discuss climatic focusing of alluvial fan and lake shoreline regimes during the late Quaternary (Roberts, 1982, 1983, 1995). The series of sediment cores and sections with ¹⁴C ages have been used to build up a lithostratigraphic sequence at the fan margin in order to examine the relationships between alluvial, lacustrine and archeological sediments. The basin, now dry, was occupied by an extensive lake between 23,000 and 17,000 years ago. After then, the lake fragmented into a number of subbasins became either marshes or playas. The sequence of Konya confirms that most recent period of high-lake levels was of the last glacial age, which is similar to other Near East regions (Roberts, 1982, 1983, 1995).

Drilling surveys have been done in the basins by several institutes in the 1990's to reconstruct continuous palaeo-environmental histories for a long range. The projects were multidisciplinary research programs using geologic, physical, chemical, and biological investigations in lake sediments to interpret past environmental reconstruction during the Middle to Late Quaternary. Especially, diatom assemblages from the cores presumed oscillations of lake salinity changes during the Late Quaternary, based on the strong relationship between living diatom compositions and lake salinity in inland saline lakes in Turkey.

Lake Tuz basin and the Konya basin, central part of the Anatolian Plateau, Turkey, had two high lake level stages dated as about 20,000~17,000 years ago and about 13,000 years ago. At the high lake stages, water level rose more than 15m higher than the present lake level, and the lake area spread widely to near the southern edge of the basin, as inferred by lithologic and chronological investigation of drilling cores. In the Holocene, lake level fell and the south east part of the basin became extensive lake terraces.

The lake level changes during the Holocene were more sensitive at smaller lakes, like Lake Seyfe and the Kültepe basin. Three times of high level stages, dated about 7000 ~ 5500years BP, 4300 years BP and 2500 ~ 2000 years BP, were presumed by drillings of sediments.

Alluvial fans have formed along the edge of the upland area on the terraces in the Holocene. Stratigraphy and dating of the fan deposits show the fluctuations in the depositional rates of the fans. Major formative stages of the fans are dated about 7000 ~ 5500years BP and 2500 ~ 2000 years BP, and several times of minor stages (probably 4300 years BP and 3000 years BP) occurred between the two major stages. Our archaeological research shows that there are strong relationships between the distributions of archaeological sites of this area and the above geo-environmental histories.