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Late Holocene Environmental Reconstruction and Flood Records of Lake Bafa, Western Turkey

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Lake Bafa is a significant inland lake located in the Büyük Menderes River Basin near the Aegean Sea in the horst and graben system of western Turkey. Lake Bafa was part of the ancient Gulf of Latmos that was gradually filled by the prograding sediments of Büyük Menderes River during the Holocene transgression, and resulted in the creation of the Lake in the southern part. The lake is presently located 15 km from the shoreline, 2 m above sea level. It has a maximum depth of 21 m and surface area of 60 km^2.

We used multi-proxy analyses of a 4.17 m-long core extending back to ca. 2300 years from the central depo centre of the lake. The objectives are to reconstruct the environmental evolution of the Lake Bafa as it changed from a marginal marine to a lacustrine environment, and to investigate the flood records during the past 2300 yrs. The core is composed of three units: an uppermost lacustrine unit, a unit representing marine to lacustrine conditions and a lowermost marine unit. The uppermost lacustrine unit is 1 m-thick, homogenous clayey silt mud layer with relatively high total organic carbon (TOC= 2.5 – 4.5 %), high total inorganic carbon (TIC = 1.8 –4.5 %) and low detrital input (Si, K, Zr, Ti). According to AMS radiocarbon dating, it was deposited over the last 600 yrs under brackish lacustrine conditions. The underlying unit is 2 m-thick, and consists of banded mud layers with relatively low TOC (1.2-4 %) and TIC (1.2-3.5) contents and high detrital input. Its fossil content, with scarce Cardium sp. and Ammonia sp., indicates that it was deposited under brackish water conditions and represents a transition from marine to lacustrine environments. The unit was deposited between ca. 600 and 1750 yrs BP, and includes frequent flood units ranging up to 10 cm-thick fine sand- to clay-bearing coarse silt. The lowermost unit is characterized by relatively high TOC (2-5.5 %), TIC (1.5-3.5 %) contents and high detrital input. With its abundant Cardium sp. and foraminiferal content, the unit was deposited under marine conditions prior to 1750 years. The marine unit also includes records of flood events. The coarse flood sediments in both marine and transitional units are characterized by high magnetic susceptibility and high density, low TOC and TIC.

The core sequence suggests that the the prograding alluvial sediments during the late Holocene gradually closed the western mouth the intermontane Bafa Basin in the south of the ancient Gulf of Latmos, gradually converting it into a closed limnic environment. The frequent flood records during marine and transitional period supports the continuing connection with Büyük Menderes River until ca. 800 yrs BP.

Keywords: Lake Bafa, Büyük Menderes River, environmental changes, flood.