



The termination of the Holocene Humid Period in West Africa: Abrupt climatic changes, local fluctuations and regional trends

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Numerous attempts have been made to couple the important socioeconomic developments in West Africa throughout the last 4000 years with climatic changes that took place in the course of the termination of the African Holocene humid period. However, the timing and magnitude of climatic changes documented in West African palaeo-records often show strong regional variations and the extent to which they reflect changes in global atmospheric circulations or local, site-specific conditions remains unclear.

We present multiproxy data generated from lake sediment cores taken along a N-S transect from the Sahelian zone to the coastal zone of West Africa (ca. 13°-7°N). Of particular interest is the understanding of the history and origin of the Dahomey Gap, a savanna corridor interrupting the zonal West African rain forest between c. 0°-3°E. High-resolution pollen data and sedimentary geochemistry from Lac Sélé in southern Benin (7° N) indicate that the Dahomey Gap did not exist during the mid Holocene and instead a semi-evergreen rainforest prevailed. The savanna gap became established at the onset of the Late Holocene due to an abrupt climatic change towards drier climatic conditions between ca. 4500 and 3400 cal. yr BP, which led to a rapid deterioration of the rain forest. A return to wetter climatic conditions between ca. 3300 to 1100 cal. yr BP resulted in a short rise in the lake level and a renewed spread of forests into the savanna. After ca. 1100 cal. yr BP the lake level dropped again and drier environmental conditions promoted the establishment of an open savanna within the Dahomey Gap, which persists until present.

The African Holocene humid period is also well documented in lake sediment cores from NE-Nigeria, where rising lake levels and a subsequent spread of southern Guinean and Sudanian tree taxa can be recorded for the onset of the Holocene. However, at Lake Tilla (Nigeria, c. 10°N) palynological and palaeolimnological data suggest that the humid period terminated in a gradual decline in precipitation from c. 7800 cal. yr BP. This aridification trend intensified after c. 4200 cal.yr BP and continued until present. At the Manga Grasslands (Nigeria, c.13°N), 300 km north of Lake Tilla, the gradual climatic deterioration began about 2000 years later, at c. 5700 cal. yr BP, with a strong shift towards drier climates at c. 3500 cal. yr BP. The use of multiple pollen profiles from four dune depressions in the Manga Grassland region revealed differences in timing of vegetational changes of up to 1000 years, which might have been caused by specific local conditions such as variations in the relative height of the water table. These lags between climate and vegetation or lake level change are likely to be common to West African sites and suggest that we should be cautious when attempting to invoke global teleconnections or linking climate with socioeconomic changes using the limited palaeoecological data currently available for this continent.