Abstract

The record of palaeovegetation dynamics in Africa generally extends back to 30000 yr BP, and longer records, where they do exist, tend to be characterised by hiatuses, giving a broken slide-show of vegetation dynamics in the past. A few specific sites on, for example, Mount Kenya and the Burundi Highlands in the equatorial tropics offer much longer and continuous records. Pollen analysis of lake, peat, swamp sediments and other materials have largely formed the basis of vegetation and climatic reconstruction on the continent. These pollen diagrams indicate depression of highland vegetation to lower altitudes relative to their positions today, fragmentation of lowland forests, and concomitant expansion of grassland prior to 14000 yr BP, with maximum impact occurring between 22000 and 14000 yr BP. The period 14000 to 10000 yr BP was a time of transition, with vegetation recovering to present-day distributions by 10000 yr BP. These are generalisations, and significant differences do occur from region to region; in particular, vegetation change in southern Africa has been largely asynchronous with the rest of the African continent, save for the peak of the last glacial maximum at 18000 yr BP. Based on the changes in vegetation, the period prior to 14000 yr BP is viewed as less humid (with exceptions in southern Africa) and cooler than present, with maximum aridity and temperature depressions (estimated to be between 4 and 7°C lower than today, occurring between 22000 and 14000 yr BP. A climatic amelioration followed thereafter, reaching optimal warm and humid conditions at about 10000 yr BP in the equatorial regions, and about 2000 to 5000 yr later in the subtropical regions. Temperature has been generally viewed as being the major factor driving climate change. Following the recent discovery, from polar ice cores, that atmospheric CO2 concentrations have also changed through time, current palaeovegetation studies have focused on both pollen and, to probe the physiological effect of changing atmospheric CO2 on vegetation, on bulk and compound-specific stable carbon isotope analysis of organic sediments. These studies have yielded much valuable information on the relationship between the climatic drivers of vegetation change, namely, temperature, precipitation and atmospheric CO2 changes. They suggest that CO2 rather than temperature was the main driving force of vegetation change in the tropics during the glacial-interglacial period, and that vegetation may have responded much more sensitively to humidity changes based on physiological responses to lowered CO2 concentrations. These conclusions are supported by modelling experiments, and indicate that previous estimates of temperature depression in the tropics are overestimated and need to be revised in light of these new discoveries.