



Abrupt or not abrupt - biodiversity affects climate-vegetation interaction at the end of the African Humid Period

Martin Claussen (1,2), Sebastian Bathiany (1), Victor Brovkin (1), and Thomas Kleinen (1)

(1) Max-Planck-Institut für Meteorologie, Hamburg, Germany (martin.claussen@mpimet.mpg.de, +49-(0)40-41173350), (2) CEN, Hamburg University, Germany

Palaeo-climate and ecosystem data derived from the sediment record from Lake Yoa (Ounianga Kebir, North-East Tchad) have been interpreted as support for a weak interaction between climate and vegetation without abrupt changes in precipitation climate and vegetation coverage over the last 6000 years. However, interpretation of these data has neglected potential effects of plant diversity on the stability of the climate - vegetation system. Here, we use a conceptual model that represents plant diversity in terms of moisture requirement; some plant types are sensitive to changes in precipitation thereby leading to an unstable system with the possibility of abrupt changes, while other plant types are more resilient with gradual system changes. We demonstrate that plant diversity tends to attenuate the instability of the interaction between climate and sensitive plant types, while it reduces the stability of the interaction between climate and less sensitive plant types. Hence, despite large sensitivities of individual plant types to precipitation, a gradual decline in precipitation and mean vegetation cover can occur. The present study offers a new interpretation for reconstructed shifts in vegetation and climate in northern Africa at the end of the African Humid Period. It focusses on the ecosystems in semi-arid climate, but the principle that plant diversity can affect the stability of climate-vegetation interaction may generally apply.