



Establishing quantitative relations between mammalian communities, climate regimes, and vegetation density - A diversity-based reference model and case study

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A considerable diversity of hominin taxa is described from the Pleistocene of sub-Saharan Africa. Inner-African range expansions of these taxa are primarily addressed by morphological comparisons of the hominin specimens and systematic interpretation of the results. Considering hominin expansion patterns as being at least co-determined by ecology and environment requires an assessment of respective features of paleo-communities as well as features of the environments with which they are associated.

Challenges in validation and integration of reconstructions of hominin environments and ecologies can be met with well-organized recent reference models. Modelling the present day situation permits to assess relevant variables and to establish interactions among them on a quantitative basis. In a next step such a model can be applied to classify hominin paleoenvironments, for which not all data sources are available. An example for this approach is introduced here.

In order to characterize hominin environments in sub-Saharan Africa, we assessed sets of variables for composition, structure and diversity of the large mammal communities, climate (temperature and precipitation), and vegetation in African national parks. These data are applied to analyse correlations between faunal communities and their environments on a quantitative basis. While information on large mammal communities is frequently available for hominin localities and regional climate features are addressed on the basis of abiotic proxies, information on paleoflora and vegetation is mostly lacking for the Plio-Pleistocene in sub-Saharan Africa. A quantitative reference model therefore offers new options for reconstructions. A recent reference model moreover permits to quantify descriptive terms like 'savanna'. We will introduce a reference model for sub-Saharan Africa and demonstrate its application in the reconstruction of hominin paleoenvironments.

The corresponding quantitative characterization of Pleistocene specialized herbivore communities permits to infer habitat features. The hominin locality Makuyuni permits to study two successive fossil communities and changes occurring. Both fossil horizons are associated with either hominin specimens and/or artifacts. Therefore, hominins persist in the habitats in view of a changing environment.