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Edaphics, active tectonics and animal movements in the Kenyan Rift - implications for early human evolution and dispersal

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The quality of soils (edaphics) and the associated vegetation strongly controls the health of grazing animals. Until now, this has hardly been appreciated by paleo-anthropologists who only take into account the availability of water and vegetation in landscape reconstruction attempts. A lack of understanding the importance of the edaphics of a region greatly limits interpretations of the relation between our ancestors and animals over the last few million years. If a region lacks vital trace elements then wild grazing and browsing animals will avoid it and go to considerable length and take major risks to seek out better pasture. As a consequence animals must move around the landscape at different times of the year. In complex landscapes, such as tectonically active rifts, hominins can use advanced group behaviour to gain strategic advantage for hunting.

Our study in the southern Kenya rift in the Lake Magadi region shows that the edaphics and active rift structures play a key role in present day animal movements as well as the for the location of an early hominin site at Mt. Olorgesailie.

We carried out field analysis based on studying the relationship between the geology and soil development as well as the tectonic geomorphology to identify 'good' and 'bad' regions both in terms of edaphics and accessibility for grazing animals. We further sampled different soils that developed on the volcanic bedrock and sediment sources of the region and interviewed the local Maasai shepherds to learn about present-day good and bad grazing sites.

At the Olorgesailie site the rift valley floor is covered with flood trachytes; basalts only occur at Mt. Olorgesailie and farther east up the rift flank. The hominin site is located in lacustrine sediments at the southern edge of a playa that extends north and northwest of Mt. Olorgesailie. The lakebeds are now tilted and eroded by motion on two north-south striking faults. The lake was trapped by basalt flows from Mt. Olorgesailie and was released by the fault motion leading to deep river incision and exposure of the site. To the west and the north steep fault scarps bound the playa forming a natural barrier for animals.

Field observations and information from local shepherds suggest that the trachytes at the valley floor produce rather poor soils whereas the soils developed on lacustrine and alluvial sediments close to the hominin site are much more attractive grazing sites for present-day animals. This is supported by first results from soil analysis.

With a lake in the past the Olorgesailie site represents an key example of how early hominins may have used strategic advance of the landscape. While steep fault scarps blocked the northern pathway, the southern lakeshore represented one of the few accessible places for animals to be suffiently provided with nutrients and thus, was an excellent location for hominins to stalemate and hunt down prey.

Future studies will include additional sites in the central and northern Kenya rift.