Geophysical Research Abstracts
Vol. 18, EGU2016-10339, 2016
EGU General Assembly 2016

Landscape development in the context of soil distribution in Jordan

Bernhard Lucke
FAU Erlangen-Nürnberg, Institute of Geography, Erlangen, Germany (bernhard.lucke@gmail.com)

Processes of landscape change can be assessed by studying the distribution of soil types and their connection to climate, the geology, and land use. In this context, even in areas where no virgin soils are available, paleosols pre-dating the introduction of agriculture can be utilized for estimating potential soil development without human impact. Soil distribution in Jordan follows closely the climate and topography: specific soil orders can be found within the dry and hot subtropical, subhumid-semiarid, semiarid-arid, and arid regions. The pattern of soil and paleosol distribution in Jordan points to an important role of the geology (bedrock and relief), and of climate in their formation, both locally such as in the vicinity of the ancient site of Abila, and regionally in the whole country. In contrast, the impact of land use appears relatively limited: overall erosion has been estimated not to exceed the expected geological rate, and Jordan is considered to be in the stable state of completed geologic erosion. This is further supported by strongly varying soil properties and archaeological material on agricultural fields, which suggests that overall erosion processes during historical periods were limited. The presence of a quite uniform 4 m thick loess cover around the site of Umm el-Jimal in north-east Jordan suggests that aeolian deposits are probably the by far dominating parent material of current soils in northern Jordan. In this context, an apparent division of some soil profiles into subsoil and topsoil could correspond to dominant in-situ soil formation out of bedrock weathering at the bottom, while the upper part of the profiles could correspond to aeolian dust as main parent material. A stone line or lithological discontinuity separating these two parts of the profile might refer to a major erosion event. If true, this could indicate that current soils in Jordan might represent a mixture of at least two phases of soil development with probably differing contributions of aerosols. Alternatively (or additionally), the simultaneous occurrence of residue accumulation due to bedrock weathering at the profile bottom and of aeolian deposition on the topsoil might be the reason for different properties of the lower and upper part of soil profiles. This could explain a varying dominance of parent materials of soils forming the current land surface: assuming that erosion events cut soils at different stages of their development, the remaining solum would be derived mainly from in-situ weathering or aeolian deposition depending on the time and intensity of erosion. In this context, the evidence that is so far available from paleosols suggests that such landscape-forming erosion events largely pre-dated the agricultural use of the area.