Geophysical Research Abstracts
Vol. 13, EGU2011-1311, 2011
EGU General Assembly 2011

Orientation patterns of stone pavements: from field experiments to a physically-based model and towards laboratory experiments

Michael Dietze and Arno Kleber
Technische Universität Dresden, Institute of Geography, Dresden, Germany

Stone pavements are peculiar features of warm and cold arid environments. Their commonly invoked role as indicators of surface stability and maturity is in prominent contrast with their rapid recovering from disturbance. Motivated by this contradiction, we found ubiquitous, preferred clast orientation patterns at both, recovering sites and the modern stone pavement. Typically, clast length axes are concentrated at two modes, separated by an angle of approximately 70 ° which is symmetric to slope aspect.
Based on these findings, we developed a physical model, which explains lateral transport and deposition of clasts within the interval of empirical separation angles. This angle is a function of a dragging force (e.g. unconcentrated overland flow and surficial creep), underground roughness and clast geometry. A step further is to reduce stone pavement formation to laboratory conditions. We present our concept to retrieve empirical data for the model parameters and discuss their influence on orientation angles.
Our results imply that surfaces with a stone pavement cover are not at all stable landforms but should be used with care as clues for chronostratigraphy. Furthermore, our field observations have revealed a special, yet unknown geomorphological process in arid environments. The combined modelling and experimenting approach may yield quantitative description of this process.