Geophysical Research Abstracts
Vol. 15, EGU2013-12588, 2013
EGU General Assembly 2013

Evaluating RGB photogrammetry and multi-temporal digital surface models for detecting soil erosion

Niels Anders (1), Saskia Keesstra (1), and Manuel Seeger (2)

(1) Soil Physics and Land Management, Wageningen University, The Netherlands (niels.anders@wur.nl), (2) Physical Geography, University of Trier, Germany

Photogrammetry is a widely used tool for generating high-resolution digital surface models. Unmanned Aerial Vehicles (UAVs), equipped with a Red Green Blue (RGB) camera, have great potential in quickly acquiring multi-temporal high-resolution orthophotos and surface models. Such datasets would ease the monitoring of geomorphological processes, such as local soil erosion and rill formation after heavy rainfall events. In this study we test a photogrammetric setup to determine data requirements for soil erosion studies with UAVs. We used a rainfall simulator (5 m2) and above a rig with attached a Panasonic GX1 16 megapixel digital camera and 20mm lens. The soil material in the simulator consisted of loamy sand at an angle of 5 degrees. Stereo pair images were taken before and after rainfall simulation with 75-85% overlap. Acquired images were automatically mosaicked to create high-resolution orthorectified images and digital surface models (DSM). We resampled the DSM to different spatial resolutions to analyze the effect of cell size to the accuracy of measured rill depth and soil loss estimations, and determined an optimal cell size (thus flight altitude). Furthermore, the high spatial accuracy of the acquired surface models allows further analysis of rill formation and channel initiation related to e.g. surface roughness. We suggest implementing near-infrared and temperature sensors to combine soil moisture and soil physical properties with surface morphology for future investigations.