Geophysical Research Abstracts
Vol. 15, EGU2013-12640, 2013
EGU General Assembly 2013

Detecting soil erosion using UAVs: Case study in Navarra, N-Spain

Niels Anders (1), Saskia Keesstra (1), Rens Masselink (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

Soil loss after heavy rainfall events is a major issue in many regions of the world. Mapping preferential flow paths increases the insight in the hydrological connectivity and geomorphological functioning of a landscape. The detection of geomorphological change and the understanding of the processes responsible are essential for proper land management to prevent soil loss and degradation. Traditionally, Digital Elevation Models (DEMs) and airphotos (acquired by satellites or manned flight campaigns) are useful tools for analyzing landscapes at one specific moment in time, however, they often lack the temporal component for short term change analysis due to high acquisition costs. Unmanned Aerial Vehicles (UAVs) may be used as a flexible remote sensing framework for high-resolution data acquisition and the monitoring of landscape properties: UAVs can be used to generate digital surface models with both a high spatial and temporal resolution at any desired location and moment. In this study we applied a UAV for the detection of geomorphological changes due to rainfall in an agricultural catchment (2 km2) in Navarra, Northern Spain. A MAVinci fixed-wing airplane, equipped with a 16 megapixel Panasonic GX1 digital camera, was used to generate multiple datasets of aerial photos within a time span of two weeks. These photos were automatically mosaicked to create high-resolution orthophotos and digital surface models. Ground control points were measured with d-GPS to improve and evaluate horizontal and vertical accuracy of the surface models. The results show topographic changes that can be attributed to geomorphological activity, in particular rill formation and soil loss resulting from overland flow. We conclude that UAV-based photogrammetry is a valuable tool for the detection of short term and fine scale geomorphological change. In future research we suggest introducing other sensors, such as near-infrared and temperature, which, in combination with the high spatial accuracy, allows investigations related to surface roughness and water infiltration.