Geophysical Research Abstracts
Vol. 16, EGU2014-8525, 2014
EGU General Assembly 2014

Gully erosion and land degradation in the Souss Basin, southern Morocco – application of airborne and terrestrial imagery and SfM procedures

Andreas Kaiser (1), Klaus Daniel Peter (2), Christine Brings (2), Thomas Iserloh (2), Manuel Seeger (2), Hassan Ghafrani (3), Sebastian d'Oleire-Oltmanns (4,5), Irene Marzolff (4), Ali Ait Hssaine (3), and Johannes B. Ries (2)

(1) Technical University Freiberg, Soil and Water Conservation Unit, Freiberg, Germany, (2) Trier University, Physical Geography, Trier, Germany, (3) University Ibn Zohr, Department of Geography, Agadir, Morocco, (4) Goethe University, Department of Physical Geography, Frankfurt am Main, Germany, (5) University of Salzburg, Department of Geoinformatics – Z_GIS, Salzburg, Austria

Gully erosion is one major issue in soil erosion and land degradation. This major soil degradation process has affected the Souss Basin, located between the High and the Anti-Atlas, historically, and is increasing nowadays again. Since the 16th century, related to the production of sugar cane, gullies have been incising into the sedimentary fans and alluvial terraces. Today, the intensification of agro-industrial production of citrus fruit and vegetables has led to severe changes in surface geomorphology, and thus again to an increase of gully formation.
For the understanding of the dynamics and formation of gullies, a combination of methods is needed, such as characterization of the precipitation patterns and quantification of infiltration and runoff generation dynamics as well as soil erosion rates within the gully catchments. In addition, the continuous and short-term monitoring of the gully morphology is essential in order to quantify the soil loss by gully erosion. Due to the complex 3-dimensional shapes of gullies, with overhangs and bank-cuttings, their assessment is a challenge.
This paper aims at presenting a combination of terrestrial and airborne methods for quantifying the gully growth related to intensive agricultural productions in the Souss Basin (southern Morocco). Systematic series of images taken by a fixed-wing UAS are combined with detailed terrestrial images. Images were taken in different short-term to medium-term intervals of 11 months to 8 years, and 3D models were generated by means of structure from motion (SfM) algorithms. From these, gully growth volume and gully erosion rates could be quantified. In addition, the 3D visualization of the gully models – in contrast to more traditional 2.5D models common in GIS environments – allows new insights into the complex forms with undercuts, piping outlets etc and into the processes involved in their evolution.