Tillage erosion as the main driver of in-field yield patterns in an intensively used hummocky landscape

Lena Katharina Öttl, Marc Wehrhan, Florian Wilken, Michael Sommer, Peter Fiener

Angaben zur Veröffentlichung / Publication details:

Öttl, Lena Katharina, Marc Wehrhan, Florian Wilken, Michael Sommer, and Peter Fiener. 2019. "Tillage erosion as the main driver of in-field yield patterns in an intensively used hummocky landscape." Geographical Research Abstracts 21 (EGU2019-9102).
https://ui.adsabs.harvard.edu/#abs/2019EGUGA..21.9102O/abstract.

Geophysical Research Abstracts
Vol. 21, EGU2019-9102, 2019
EGU General Assembly 2019

Tillage erosion as the main driver of in-field yield patterns in an intensively used hummocky landscape

Lena Katharina Öttl (1), Marc Wehrhan (2), Florian Wilken (1), Michael Sommer (2), and Peter Fiener (1)

(1) University of Augsburg, Institute of Geography, D-86159 Augsburg, Germany, (2) Leibniz Centre for Agricultural Landscape Research ZALF e.V., D-15374 Müncheberg, Germany

Hummocky landscapes under intensive arable use are substantially affected by erosion processes. Especially in areas of limited precipitation and highly mechanized large field farming, tillage erosion causes substantial soil erosion that can distinctively exceed water erosion. In consequence, truncated soil profiles can be found on hilltops and steep slopes, whereas colluvial material is accumulated in depressions and along downslope field boarders. We are testing the hypotheses that tillage erosion substantially affects in-field crop yield patterns and that this effect is more pronounced in dry years or regions. The Enhanced Vegetation Index (EVI), derived from RapidEye data (5 m x 5 m raster), and the Topographic Position Index (TPI), derived from a high-resolution digital terrain model, serve as proxies for crop yield and erosional status, respectively. The amount of erosion was also estimated with the tillage erosion component of the model SPEROS-C. Data from the Quillow catchment (size: 291 km2; mean annual precipitation: 500 mm) in North-East Germany were used to analyse the interrelation between EVI, TPI and modelled tillage erosion in dry versus wet years and along a precipitation gradient within the catchment. Our findings clearly indicate that the most eroded areas had the lowest EVI values, while the highest EVI values were found in the depositional positions. Moreover, it can be recognized that the differences in yields between hilltop positions and depressions (lower field boarders) are more pronounced in dry years. Overall, this study underlines the substantial effect of tillage erosion on crop yields in hummocky landscapes under highly mechanised arable cultivation.