Reconstructing paleo- and initial landscapes using a multi-method approach in hummocky NE Germany

Marijn van der Meij (1,2), Arnaud Temme (2,3), Michael Sommer (1,4)

(1) Institut für Bodenlandschaftsforschung, Leibniz-Zentrum für Agrarlandschaftsforschung, Müncheberg, Germany, (2) Soil Geography and Landscape group, Wageningen UR, Wageningen, Netherlands, (3) Institute for Alpine and Arctic Research (INSTAAR), University of Colorado, Boulder, CO, USA, (4) Institute of Earth and Environmental Sciences, University of Potsdam, Potsdam, Germany

The unknown state of the landscape at the onset of soil and landscape formation is one of the main sources of uncertainty in landscape evolution modelling. Reconstruction of these initial conditions is not straightforward due to the problems of polygenesis and equifinality: different initial landscapes can change through different sets of processes to an identical end state. Many attempts have been done to reconstruct this initial landscape. These include remote sensing, reverse modelling and the usage of soil properties. However, each of these methods is only applicable on a certain spatial scale and comes with its own uncertainties.

Here we present a new framework and preliminary results of reconstructing paleo-landscapes in an eroding setting, where we combine reverse modelling, remote sensing, geochronology, historical data and present soil data. With the combination of these different approaches, different spatial scales can be covered and the uncertainty in the reconstructed landscape can be reduced.

The study area is located in north-east Germany, where the landscape consists of a collection of small local depressions, acting as closed catchments. This postglacial hummocky landscape is suitable to test our new multi-method approach because of several reasons: i) the closed catchments enable a full mass balance of erosion and deposition, due to the collection of colluvium in these depressions, ii) significant topography changes only started recently with medieval deforestation and recent intensification of agriculture and iii) due to extensive previous research a large dataset is readily available.