



Diachronical soil surveys: a way to quantify long term diffuse erosion

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The loess belt of Western Europe is a high-risk area regarding diffuse erosion. It is due to the climate and the topography but also to the soil type. Loamy soils are naturally highly sensitive to diffuse erosion. Hence, these soils are very fertile. So, they are intensively cultivated which increases their sensitivity to erosion. Sheet erosion is an erosion type strongly represented in these regions. Contrarily to the concentrated form of erosion which happens more brutally, sheet erosion needs long-term observation time-scales, which remains rare.

In Belgium, a soil map was established in 1956. This map is quite detailed and notably informs about the different horizons which are in the profile (ploughed horizon, eluvial horizon, clay included between the horizons, carbonate-free loess horizon, and all these were characterised by drainage class) and their depth. It was based on a dense augering network across the country (one point every 75 meters).

A new augering campaign was done again in 2014. It consisted in one observation every 50 meters on an agricultural watershed of 124 hectares located in the centre of Belgium. This catchment has been cultivated since the 14th century and is representative of the local context (gentle slope (3-8%), plot size (mean value of 10 ha), ...). We compared the two soil maps produced on this site with a 58years time lapse.

Results show that the large majority of the watershed falls from upslope soils with weak erosion to slope soils with strong erosion. The soil thickness diminished in some zones to 1m10 (minimum estimation) of erosion. This comparison shows that very few upslope soils are preserved.

On the other hand, the areas where colluviums were present to the full depth stay at the same place in the main thalweg of the watershed. Other areas on the watershed seem to be subject to a (minimum estimation) of 40cm of sediments deposition. Large areas in the watershed suffered from erosion and came to deposition areas as the clay horizon is no longer observed under the colluviums. It can be highlighted that soil depths were worryingly lost during 58 years of tillage and that some soils were converted to colluviums which is of lower agronomical quality than the original soils which had a clay horizon below to keep water.

Diachronical soil survey offers an unique insight of long term diffuse erosion and should demonstrate the importance of preserving soils even in regions where agricultural yields are not (yet) affected by erosion.