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# New 3D lenticular maps for teaching earth and environmental sciences

Constance Bornkampf (1), Jürgen Schmidt (1), Marcus Schindewolf (1), Stefan Bornkampf (2), Thomas Gründemann (2), and Anja Träber (2)

(1) Technical University Bergakademie Freiberg, Soil and Water Conservation Unit, Agricolastraße 22, 09599 Freiberg, constance.bornkampf@tbt.tu-freiberg.de, (2) mbmSystems GmbH, Lingnerallee 3, 01069 Dresden, info@mbmsystems.de

## 1 Introduction

Aim of the study is the devolepment of a 3D map to visualize geodynamic processes, in this case the process of soil erosion. Up to now it is possible to describe geo-dynamical processes only in a 2-dimensional form. Untrained users my have problems to understand these 2D maps. By means of the lenticular technique it is possible to show geo-dynamic processes in true-3D. There are still existing different maps for teaching (countries, continents, federal states, mountains). These maps could be a tool to visualize real-live three-dimensional structures of the world. For special issues in soil science the new maps visualize how water flows through catchment areas and the associated transport of eroded soil could be illustrated lively. Based on a multi-patented True-3D technology the new maps become an innovative and highly successful tool in the mediation of environmental subjects.

## 2 Methods

There are existing different kinds of presenting 3D maps. In case of the lenticular method the three-dimensional picture is generated by observing the object from various angle of view an the geometry of special lens-foils. The depth perception has appreciate spontaneously without optical aids being needed. The model EROSION 3D has been developed as an instrument for estimation soil loss and deposition processes, especially designed for requirements in planning practice on regional and communal scale. Since EXPO 2000 erosion prediction maps become an important tool to consult agronomist on the part of regional authorities. They are also useful for teaching students in earth and environmental sciences. The cross-linking of True-3D technology and erosion modelling provides unique capabilities in the mediation of geo-dynamic processes. With special effects the maps can adjusted for different issues. The Flip effect is helpful to visualize time-depending events, for example long-term erosion effects or siltation of reservoirs (before/after). It is also possible to apply changing languages and morphing effects.

## 3 Results

In the case study “reservoir Baderitz” the siltation of a small reservoir in Saxony/Germany was simulated. After each erosion event the relief is changing because of erosion and deposition in the long-term model. EROSION 3D has the ability to modify the relief accordingly by adapting the digital elevation model (DEM) proportional to the simulated amount of erosion or deposition. In worst-case simulation the elevation changes locally by nearly 2m after 10 years in simulation. This results in a substantial loss of storage capacity of the reservoir. The simulation provides 4 images for different stages of siltation which are merged into a True-3D Flip image.