Geophysical Research Abstracts
Vol. 16, EGU2014-10669-2, 2014
EGU General Assembly 2014


# Immersive 3D geovisualisation in higher education

Andrea Philips, Ariane Walz, Andreas Bergner, Thomas Graeff, Maik Heistermann, Sarah Kienzler, Oliver Korup, Torsten Lipp, Wolfgang Schwanghart, and Gerold Zeilinger
Institute of Earth and Environmental Science, Potsdam University, Germany

Through geovisualisation we explore spatial data, we analyse it towards a specific questions, we synthesise results, and we present and communicate them to a specific audience (MacEachren & Kraak 1997). After centuries of paper maps, the means to represent and visualise our physical environment and its abstract qualities have changed dramatically since the 1990s – and accordingly the methods how to use geovisualisation in teaching. Whereas some people might still consider the traditional classroom as ideal setting for teaching and learning geographic relationships and its mapping, we used a 3D CAVE (computer-animated virtual environment) as environment for a problem-oriented learning project called "GEOSimulator". Focussing on this project, we empirically investigated, if such a technological advance like the CAVE make 3D visualisation, including 3D geovisualisation, not only an important tool for businesses (Abulrub et al. 2012) and for the public (Wissen et al. 2008), but also for educational purposes, for which it had hardly been used yet.

The 3D CAVE is a three-sided visualisation platform, that allows for immersive and stereoscopic visualisation of observed and simulated spatial data. We examined the benefits of immersive 3D visualisation for geographic research and education and synthesized three fundamental technology-based visual aspects: First, the conception and comprehension of space and location does not need to be generated, but is instantaneously and intuitively present through stereoscopy. Second, optical immersion into virtual reality strengthens this spatial perception which is in particular important for complex 3D geometries. And third, a significant benefit is interactivity, which is enhanced through immersion and allows for multi-discursive and dynamic data exploration and knowledge transfer.

Based on our problem-oriented learning project, which concentrates on a case study on flood risk management at the Wilde Weisseritz in Germany, a river that significantly contributed to the hundred-year flooding in Dresden in 2002, we empirically evaluated the usefulness of this immersive 3D technology towards learning success. Results show that immersive 3D geovisualisation have educational and content-related advantages compared to 2D geovisualisations through the mentioned benefits. This innovative way of geovisualisation is thus not only entertaining and motivating for students, but can also be constructive for research studies by, for instance, facilitating the study of complex environments or decision-making processes.