Updating the Augmented Reality Sandbox for Geophysics, Structural Geology and Stratigraphy

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One of the challenges for students of geosciences is learning to read geological maps, interpret structural geology, and understand the link between geology and geophysical properties. Augmented Reality (AR) sandboxes are interactive visualization tools that are becoming increasingly popular to demonstrate various earth processes.

An AR sandbox consists of a box filled with white sand and uses a Kinect 3D camera to continuously scan the topography of the sand surface. The topographic view of the structures sculpted by the user is then blended with digital information and a computed image is projected back onto the sand surface. Due to their intuitive operation, AR Sandboxes serve as a powerful science outreach and communication tool by making abstract concepts easy to see through the leveraging of playful learning and visualization, offering huge potential for teaching geological and geophysical principles.

Several versions of AR Sandboxes have been developed for a whole range of scenarios, spanning a wide variety of Earth Science topics and learning environments. The most common scenarios are from physical geography, hydrology and ecology. Their underlying data models stay at or close to the surface, making it hard to incorporate geological models.

Recently, an Open-AR-Sandbox software was published by researchers at the Institute for Computational Geoscience and Reservoir Engineering (CGRE), RWTH Aachen University, Germany. With this AR Sandbox, geological models can be projected onto real sand and the relations of subsurface structures, topography and outcrop can be explored in an AR environment.

We tested the Open-AR-Sandbox software after successfully installing and running a conventional AR sandbox software. The combination of the Sandbox and GemPy geomodelling tool offers unique 3D interactive modelling solutions to explore geoscientific data and processes, with linkages to other software tools. We can use the AR sandbox to project a variety of geophysical measurement data onto the sand surface, offering an interactive experience that integrates geological and geophysical data. The Open-AR-Sandbox is, therefore, an innovative tool in geoscience education for the public as well as the classroom because of its benefits for teaching geological mapping, structural geology and geophysics.