



## **Open-AR-Sandbox: An open-source Augmented Reality platform for geoscience**

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Augmented Reality Sandboxes are recently becoming increasingly popular as interactive exhibition pieces, teaching aids and toys. These AR Sandboxes consist of a box of sand that can be freely sculpted by hand. The topography of the sand is constantly scanned with a depth camera and a computed image is projected back onto the sand surface, augmenting the sandbox with digital information. The functionality of these Sandboxes is commonly limited to the visualization of topography with contour lines and colors, as well as water simulations on the digital terrain surface.

We have developed Open-AR-Sandbox, an Augmented Reality sandbox designed specifically for the use in geoscience. In addition to the visualization of topography it is able to show geologic subsurface information such as the outcropping lithology. Utilizing a 3-dimensional geological model of the subsurface and the current topography of the sand, the software identifies the outcropping lithology in each location in the sandbox and projects it directly onto the sand surface in real time. This dynamic and interactive geological map is a huge benefit for teaching geological mapping and Structural Geology due to its easy and intuitive operation. The relations of subsurface structures, topography and outcrop can be explored in a playful and comprehensible way.

We use the open-source geomodelling tool GemPy for the construction of geological models and the visualization of the lithologies. Just as GemPy, Open-AR-Sandbox is written in Python and is published under an LGPL v3.0 open-source license. Its modular structure makes it easy to develop new sandbox application and enables the integration with other software tools and libraries.

The source code is available at [https://github.com/cgre-aachen/open\\_AR\\_Sandbox](https://github.com/cgre-aachen/open_AR_Sandbox) and further information can be found on <http://gempy.rocks>.