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GeoProVE – How to use Virtual Reality for Geophysics Education

Joeri Brackenhoff[1], **Paula Rulff**[1], Jinqiang Chen[1], Pierre-Olivier Bruna[1], Alexandros Daniilidis[1], Arend-Jan Krooneman[2], Yosua Pranata Andoko[2], and Arno Freeke[2]
[1]Delft University of Technology, Faculty of Civil Engineering and Geosciences, Applied Geophysics and Petrophysics, Delft, Netherlands
[2]Delft University of Technology, NewMedia Centre, Delft, Netherlands

Geophysics education is often challenging, as it entails explaining complicated physical processes that take place inside the Earth. Because these processes happen below the surface of the Earth, it can be difficult for students to connect to the material and understand what is happening. As a result, it is hard for students to make the link between the abstract explanation of the processes to the physical measurements that are performed during fieldwork.

A novel way to close the gap between theory and fieldwork is the use of Virtual Reality or VR. VR allows a student to fully immerse themselves into a digital twin of reality and to experience and visualize processes that are invisible in real life. This is the purpose of Geoscience Processes Virtual Education or GeoProVE. In this application, we have developed a fully immersive and interactive scenario where a student can learn about Ground Penetrating Radar or GPR. The use performs a GPR measurement along a line and is guided with questions to understand how the data are acquired and why specific patterns arise. One of the major features is the ability to pull the subsurface out of the ground, to see how the waves propagate through the subsurface and interact with objects, such as pipes and the water table, in the subsurface. Several setups with increasing complexity are shown to the students, with a strong emphasis on challenge-based learning through a scoring system.

Aside from the GPR scenario, a scenario focused on offshore 3D seismics is also in development for GeoProVE, with the aim to create additional scenarios focused on ERT and geothermal applications. GeoProVE is intended to become fully open source so other developers can contribute to the knowledge base. The application has shown positive engagement from students for geophysics education. We will demonstrate the development of GeoProVE along with its main features.