OUR EARTH

Games for Geoscience

Chris Skinner and Kelly Stanford

Games are a popular way for people to spend their spare time, but they can also provide useful tools to communicate and teach geoscience. The SeriousGeoGames Lab has engaged thousands with geosciences through the Earth Arcade and virtual reality gaming.

Games are powerful. They have the ability to transport people to new worlds, invoking imaginations and creating emotional connections like no other medium can. Geoscience-based games have the potential to involve a diverse audience in the Earth and environmental sciences, providing effective, and fun, engagement in topics such as climate change and disaster management.

In 2014, the SeriousGeoGames Lab was established to explore how games and gaming technology can be used to enhance teaching, research, and communication in the geosciences. The SeriousGeoGames Lab creates new games by combining new technology, such as virtual reality (VR), with real research data. For example, *Flash Flood!* uses GPS surveys of the Thinhope Burn valley in northern England before and after a flood event in 2007 to construct a flash flood scenario that can be explored in VR. In this way, users can witness the landscape changes caused by a flash flood event and discover why they are so difficult to forecast.

To showcase the games, SeriousGeoGames Lab have used an exhibit called the Earth Arcade at multiple events and festivals across the UK, including at the Natural History Museum, enabling connections and communication to thousands of people, most of whom do not have a geoscience background. The Earth Arcade is also being used to trial a card game (*Resilience*), designed to involve the wider public with the complex issues that surround flood risk management in a changing climate. A global test of *Resilience*, which

can be downloaded and printed at home, is currently underway to determine how combining gaming with sci-art impacts the level of public engagement with geoscience issues. In two months almost 400 people have downloaded *Resilience*, and it is hoped that similar games will be developed, not just as engagement tools but also for educational purposes in schools and universities.

The success of the SeriousGeoGames Lab, and other geoscience-based games projects, led to the organisation of the Games for Geoscience session and Geoscience Games Night at the European Geoscience Union General Assembly in 2018 and 2019. The sessions aim to bring together all researchers using geoscience-based games of all types (board, card, roleplay, video, and street games), demonstrating their value, and hopefully inspiring others to try games in their work.

Several geoscience game developers are also exploiting mainstream games like *Minecraft*, *Top Trumps*, and *Catan*, for geoscience education and communication (such as *Catan: Climate Change*). Furthermore, mainstream games themselves are now developing geoscience-based add-ons, such as the 2019 *Gathering Storm* add-on for *Civilization VI* that incorporates natural hazards and climate change. With global sales in excess of 5.5 million copies, games like *Civilization VI* can bring geoscience topics to a far larger and more diverse audience than we could ever hope for.

Chris Skinner✉ and Kelly Stanford
Energy and Environment Institute, University of Hull,
Hull, UK

✉e-mail: c.skinner@hull.ac.uk

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Competing interests

The authors declare no competing interests.