



Science and Art: Looking for New Visualization Method for Seismic Waves

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The presented work tried to set up a new experimental method to display seismic records and raise the awareness on the impact of human induced earthquakes in a novel and beautiful way.

The first visualization and measurements of seismic waves can be traced back to the Chinese scientist Zhan Heng, in 132 A.D. It already functioned on the basis of a pendulum and indeed, from that time on, seismometers have exploited the concept of the pendulum for recording and visualizing seismic waves.

In the presented work a JRC scientific research group and a visual artist jointly collaborated to set up laboratory experiments to evaluate the feasibility of a new visualization technique for seismic records, in order to draw attention to the human induced earthquakes. This novel interdisciplinary approach allowed exploring different concepts and methods, considering the fundamentals of seismology, in order to find new visualisation techniques. The destructive power of earthquakes is well known and the capability of small waves of creating devastation is often underestimated. Humans often violate the ground we are standing on and the effects of activities such as mining, fracking or gas extraction, contributing to improving human wellbeing, can have unexpected negative effects.

After several laboratory experiments, testing different techniques, setups of vibrating table, camera settings and lights, a visualization method based on replaying chosen seismic records on a shaking table with a polycarbonate box with a thin layer of water on top, was chosen. Each seismic record was converted in displacement per time, allowing the shaking table to process these data. The resulting simulation of seismic waves on the shaking table set in motion the surface of the liquid. On their turn, these liquid waves cast rapidly moving shadows that were captured by a camera, with more than 1000 frames per simulation data set. The results were extraordinary from an aesthetic point of view.

This approach for sensitising people on the impact of human induced earthquakes has the value of translating earthquakes with water waves, a process which people are more familiar with. The produced images are particularly effective in communicating effects of human induced earthquakes. They are aesthetically very beautiful and permit to convey a dreary message through a lovely mean. The photographs that resulted from this research were exhibited in museums and scientific and institutional venues, more than 40.000 people in one month visited the main exhibition at the National Museum for Science and Technology 'Leonardo da Vinci' in Milan, leading to an engagement of the public on the topic.

With the aim of improving the proposed visualization method, this experimental activity can now take into account an extended number of earthquake records involving other research groups and institutions in the next implementation phases.

This joint collaboration between science and art was made possible by the JRC SciArt project, an initiative of the European Commission, which wants to promote a closer collaboration between science and art.