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Journal of Remote Sensing & GIS

Editorial

3D Printing in Geology and Geophysics: A New World of Opportunities in Research, Outreach, and Education

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EDITORIAL

3D printing is an additive manufacturing process with applications that range from industrial manufacturing to home hobbyists. The versatility of this technology allows scientists and engineers to create three-dimensional physical representations of their digital models.

This is particularly of interest to the geoscience community where 3D models are commonly required to study and explain processes that take place beneath the Earth's surface. Although the most obvious applications of 3D printing are prototyping and manufacturing (e.g. in experimental design of rock physics experiments), 3D printing is also useful to generate outreach-oriented educational displays (e.g. topography of different types of volcanos). In addition, 3D printing allows us to physically represent scientific concepts that are otherwise very difficult to visualize due to their "hidden" nature (like complex fault geometry or the layers of the Earth). Furthermore, technological advances open up the opportunity to use 3D printing in experimental research projects itself, to build more realistic models for experiments or enable experiments that would otherwise be cost prohibitive.

We are welcoming submissions to a Research Topic in LONGDOM in Earth Science that aims to highlight the broad application of 3D printing for research, outreach, and education within geology and geophysics. Possible topics could include, efforts to advance the understanding of geophysical concepts, novel 3D printing techniques from design to manufacture, its utility in experimental research, implementation of 3D printed models in university teaching, furthering inclusivity of the visually impaired, and extension to other complementary technologies such as virtual or augmented reality (VR / AR). To emphasize the tangibility and accessibility of this technology, this Research Topic will be accompanied by a collection of 3D printable models files. The upload of at least one supplemental 3D printable digital file (.stl, .obj or equivalent) is encouraged at the time of submission of the manuscript.

Applying three-dimensional (3D) printing technology to a geoscience classroom provides an alternative way to teach students. This brief report describes an educational innovation for the geoscience classroom by 3D printing technology to develop structural interpretation skill in high education level.

3D printing models are constructed based on student interpretation through three different software packages. The observations in this study indicate that the ability to create the 3D models based on digital seismic data can enhance structural interpretation skill of students. The benefit of freely orientating and viewing in different angles of the 3D models leads to a construction of cognitive abstract space and spatial visualization ability. Therefore, 3D printing technology plays an important role in changing and developing the geoscience education system.

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Received: March 05, 2021; **Accepted:** March 19, 2021; **Published:** March 26, 2021

Citation: Li S (2021) 3D Printing in Geology and Geophysics: A New World of Opportunities in Research, Outreach, and Education. J Remote Sens GIS. 10:e117.