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Promoting Accessibility in Science: What Lessons Can We Learn from the Planetary Community?

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Abstract

Nearly all planetary scientists will face the issue of an inaccessible field site or limited access to samples, so the community has developed methods of remotely exploring field sites and techniques for visualizing and interpreting complex datasets. This expertise is equally adaptable to providing access to datasets remote field locations on Earth for a diversity of students and scientists.

1. Introduction

Although nearly 1 in 5 respondents to the latest U.S. Census (2010) indicated that they had a disability, less than 10% of physical scientists identify as disabled, and this discrepancy is even larger when limited to physics and astronomy (6%) [1]. In the United Kingdom, while 15% of the science workforce identifies as disabled (similar to the percentage in the non-science workforce), there is a distinct drop-off in the cohort of disabled scientists from first degree (10% in earth/physical sciences) to doctoral (5%) to working scientist (<2% of working researchers/lecturers/professors) [2]. Planetary scientists, however, have been developing techniques and technologies to allow for studies of inaccessible remote locations that could be applied to making science classrooms and labs more inclusive by increasing accessibility.

Examples & Resources

2.1 The IAGD

The International Association for Geoscience Diversity (IAGD) is a non-profit organization created in 2008 to promote accessibility for geoscience students and professionals dealing with disabilities. The organization website (http://www.theiagd.org) includes an expanding library of resources for broadening access, promotion of accessible field experiences, and an expanding network of members connected via email and discussion forums. In June 2018 the IAGD announced the formation of a chapter in the United Kingdom – DiG-UK: more information can be found at https://theiagd.org/dig-uk/.

2.2 Tactile Models – Using 3-D

Learning to visualize in three-dimensions using two-dimensional representations (maps or images) is a skill that many students struggle with, regardless of disability. Shape models provide not only assistance in this visualization, but can also provide a tactile mode of interpretation when physically realized. Advances in 3-D printing have brought the ability to generate tactile models using topographic datasets, such as the blended HRSC-MOLA DEM for Mars. The hemispheric dichotomy can be made visible not only visually but also by feel: the southern highlands have a distinct roughness that is not apparent in the northern lowlands, even in the same model. In addition to the dichotomy, terrain models are also ideal for exercises relating volcano shape to magma viscosity and examining morphologic changes in craters with increasing diameter [3].

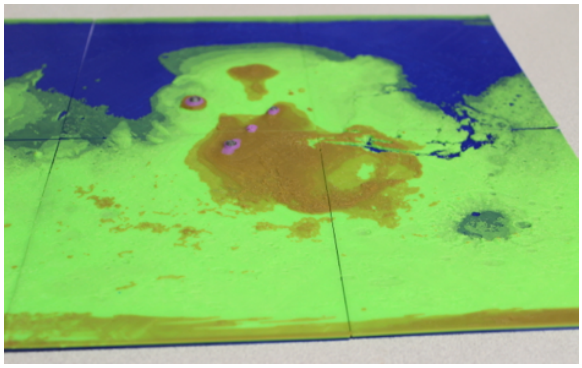

Figure 1: 3-D printed version of the HRSC-MOLA global DEM. Colors provide a visual cue while the model provides tactile cues to elevation.

2.3 Accessible Field Experiences

Many geoscientists identify field work as one of the reasons for choosing their career: providing accessible field experiences can be key for increasing participation in sciences. Technologies used to remotely examine planetary surfaces are ideal for making inaccessible field sites on Earth more accessible. Cooperative field experiences pairing mobile field partners with those who are less mobile allow both to participate in the educational experience, regardless of disability status), by examining locations they can access and sharing video information and interpretations wirelessly [4].

Figure 2. Example of student field pair communication: a remote student (upper photo) is sharing video from an inaccessible outcrop (Renvyle Point, Ireland) and discussing information about the local glacial sediments with a partner in the field van via a local area network (lower photo).

2.4 Resources from the AAS/DPS

A list of resources relevant to accessibility for astronomers and planetary scientists is available from the AAS Working Group on Accessibility and Disability at https://wgad.aas.org/access_resources. These resources include information on making presentations, websites, and publications more accessible and forthcoming recommendations for accessibility at conferences. The Professional Climate and Culture Subcommittee of the DPS is also developing a "reading list" of resources. Although focused on multiple axes of diversity and inclusion, one section of this reading list will focus on information for providing more accessible science, such as appropriate color schemes for figures in presentations and papers, "universal design" practices to make presentations compatible with screen readers and auto-captioning devices, accessibility at conferences, and links to resources such as those described above. The reading list is available from the PCCS website, and is intended as a "living document" that will be periodically updated as new resources become available.

2. Get Involved!

The expertise of planetary scientists in addressing problems of accessibility is an opportunity to help promote access to the physical sciences. Some ways that you can get involved include:

Share and publicize resources you already have: contact the PCCS if there is a resource you think should be on our reading list!

Consider accessibility in your presentations, classroom activities, and field experiences.

Connect with a community of interested individuals at the IAGD: http://www.theiagd.org, and follow @AccessibleGeo on Twitter, Facebook, and Instagram.

References

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