6. Student Spotlight: Adam Mangel, Clemson University

Adam Mangel is working toward a May 2016 graduation with a Ph.D. from the Department of Environmental Engineering and Earth Sciences (EEES) at Clemson University. He is a Clemson Distinguished Graduate Fellow and Clemson EEES Environmental Scholar for his applied research in ground penetrating radar (GPR). Adam's work is driven by the world's thirst for water, one of humankind's greatest natural resources. Although water is readily available in some areas, clean water can be difficult to obtain given the continuing effects of anthropogenic and natural contaminants such as pesticides, fertilizers, and organic solvents. With this in mind, he has been motivated to advance GPR technology, which is noted for being noninvasive as well as an efficient data acquisition system.

Throughout his doctoral degree, Adam has created a clearer window into the subsurface, enabling him to more successfully image flow paths through the unsaturated zone where many of these contaminants reside. This work was most recently presented at the 2015 AGU Annual Meeting. One of his most notable papers, "High-Resolution Time-Lapse Monitoring of Unsaturated Flow Using Automated GPR Data Collection" (NS44A-03), discussed the development of a "GPR robot" that allows data to be collected up to 900 times faster than the conventional technique. This apparatus is equipped with a 1000-MHz antenna, mounted to a rail, and controlled by a desktop computer. Automated data acquisition using this system has incredibly simplified the ability to quickly create higher-resolution images of the subsurface. Thanks to this method, Adam has been able to more easily perform time-lapse monitoring of flow paths with incremental precision.

With the upcoming AGU–Society of Exploration Geophysicists joint hydrogeophysics workshop, Adam recalls his experience at the 2012 workshop hosted at Boise State University. Prior to the event, organizers invited attendees to investigate a cross-hole GPR data set for porosity information. At the time, Adam was early in his graduate career with minimal experience in borehole tomography. However, he decided to take a leap; he wrote his own program to process the data and presented his inversion results at the workshop, where he reluctantly received the "Worst Inversion Award." Discouraged at first, Adam quickly realized the value of this opportunity because this drew many attendees to his poster to discuss methods for improvement on his work, and he was also praised by the near-surface community for challenging himself. As valuable as success is in research, it can sometimes be more valuable to share with others methods that do not solve the problem at hand.

Through his experiences, the comradery within the near-surface community has motivated Adam to propel his research further with each AGU meeting he attends. He has acquired a passion for teaching and always looks forward to the conversations he'll have with new and seasoned colleagues inside and out of the Moscone Center in San Francisco. For those interested in his work or GPR hydrology applications or who are wondering where he got his incredible tie, feel free to contact Adam Mangel. Adam's other 2015 AGU papers include "Resolving Precipitation-Induced Water Content Profiles Through Inversion of Dispersive GPR Data" (H13E-1595) and "Time-Lapse Monitoring of Two-Dimensional Non-uniform Unsaturated Flow Processes Using Ground-Penetrating Radar" (H53C-1674).