

# **LOW-COST DC RESISTIVITY INSTRUMENT DESIGN FOR HUMANITARIAN GEOPHYSICS**

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Geoscientists Without Borders<sup>®</sup> is tasked with supporting humanitarian problems around the world that can be addressed through geophysical methods. One important component of this is creating a project or workflow that can have both a meaningful impact on the community, and that can also be sustained locally long after the formal project is over. A major challenge with this goal is that most geophysical instruments are generally orders of magnitude too costly to purchase in the developing world, and alternative solutions must be developed. In this Phase II project the Colorado School of Mines (CSM) is collaborating with the University of Abomey-Calavi in Benin (UAC) to develop purpose-built low-cost instrumentation to conduct hydrogeophysical surveys. The surveys using these instruments will focus on finding: (1) new fresh water sources; and (2) characterizing zones where saline water is encroaching on their freshwater supply. The increasing availability of off-the-shelf components, such as CPU micro-controllers (e.g., Arduino, Raspberry Pi) and integrated sensing circuit boards (i.e., magnetometers, GPS, accelerometers), as well as basic circuit components, is rapidly enabling the development of new types of low-cost and open-source geophysical hardware. While offering neither the same sensitivity nor robustness as instruments developed by leading geophysical manufacturers, these low-cost hardware solutions do allow for geophysical data acquisition at a precision and accuracy sufficient for many-to-most hydrogeophysical surveying tasks. In the first stage of this project we focus on the task of designing and building a set of geophysical field instruments commonly applied to hydrological problems, beginning with a DC resistivity box. In this talk we present the initial instrument designs, build, and field test results to date. The true test of the instruments will be testing their effectiveness on-site in Benin with UAC in June 2019.