UTILITY OF THE HVSR METHOD FOR DAM AND LEVEE ASSESSMENT

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The Horizontal-to-Vertical-Seismic-Ratio (HVSR) method has proven as an efficient tool for determining depth to bedrock and other shallow interfaces using single-station seismic measurements. Theoretical and practical understanding of the method are incomplete. Many questions remain with regard to site conditions that constrain use of the method, as well as the types of waves (e.g., surface waves or shear) that compose the seismic noise field in various circumstances. Despite these uncertainties, there is reason to believe that HVSR might be useful for dam and levee assessment. Williams et al. (SAGEEP 2020) report using HVSR to estimate bulk shear wave velocities at a mine embankment as a means of assessing levee compaction to identify zones of weakness and possible failure. The U.S. Army Engineer Research and Development Center (ERDC) in cooperation with Boston College has recently initiated a multiyear study to assess possible applications of HVSR for assessment and triage of dams and levees. In the first year of this study, we have acquired measurements at several sites in Louisiana, Mississippi, and Tennessee. These measurements have been intended to improve our understanding of the factors that control acquisition of useful HVSR measurements at dams and levees, including seismic noise conditions, geologic structure, and seasonal variations. We hope to improve our understanding on possible use of HVSR to distinguish between predominant sediment type zones along a dam or levee (e.g., clay vs. sand), to provide real-time data at vulnerable levee segments that might alert stakeholders of pending failure or use of HVSR to estimate blanket thickness of areas within a levee to identify zones where sand boils might develop. In this presentation we will summarize our results from Year 1 and project likely goals for subsequent years of the project.