***Subsurface Imaging in Urban Environments: Utilizing Distributed Acoustic Sensing in Downtown Reno***

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# Abstract

The urban landscape of Downtown Reno, situated within the seismically active Truckee Meadows basin, presents significant challenges for subsurface geological characterization due to extensive urbanization and infrastructure development. This study addresses the critical need for detailed subsurface mapping in a region where existing fault delineation and shear wave velocity studies are sparse, particularly in the central Reno-area basin. Utilizing Distributed Acoustic Sensing (DAS) technology, this research employs microtremor ambient noise data recorded over a 12-km dark fiber line for seven days. The data is processed through cross-coherence interferometry and dispersion curve analysis to create a shear wave velocity model along the entire length of the DAS line, revealing previously undocumented subsurface structures. These findings align closely with existing geological databases, including microgravity, known faults, and depth to bedrock variations, validating the accuracy of the DAS-derived shear wave velocity model. This research enhances seismic hazard analysis and mitigation strategies in the Reno metropolitan area by refining existing shear wave velocity models and demonstrates the efficacy of dark fiber DAS technology in predicting basin structure and informing future seismic design practices.