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Infrasound Propagation with Realistic Terrain and Atmospheres Using a Three-Dimensional Finite-Difference Time-Domain Method

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Infrasound observations and complimentary numerical simulations have shown that infrasound propagation is strongly influenced by topography within approximately 10 km from the source. Recent computational efforts using ray theory have shown that topographic influence extends over hundreds of km and is especially strong when considering propagation through the troposphere. Wind and temperature gradients also have a strong influence on propagation at these distances, which suggests that both topography and 3-D atmospheric structure need to be accounted for in long range waveform modeling. Here we show preliminary results from numerical simulations of linear acoustic propagation through a moving, inhomogeneous atmosphere using an in-development 3-D finite difference time-domain (FDTD) propagation code. We compare our synthetic waveforms in two and three dimensions with existing community infrasound propagation codes and discuss future developments, including open source licensing. Lastly, we present preliminary results from applying this code to the Humming Roadrunner experiments and similar data sets.