Goodbye Tropicana, Hello Improved Infrasound Propagation Analysis!

Planned explosions in an urban environment are rare occurrences, so when the implosion of the Tropicana hotel took place on October 9, 2024, Las Vegas residents saw it as a chance to celebrate. In true Vegas fashion, the implosion was accompanied by a fireworks display and drone show as the city said farewell to one of the Strip's original properties. But for principal investigator Melissa Wright, the Tropicana implosion was a chance for an exciting new beginning.

In her fiscal year 2025 Site-Directed Research and Development (SDRD) project "Improving Infrasound Propagation Analysis with Ambient Noise Level Retrievals," Melissa Wright is setting out to improve the accuracy of prompt diagnostics with urban infrasound and atmospheric datasets. Melissa's goal is to leverage urban datasets from the Tropicana implosion event along with the multiyear Las Vegas Array (LV Array) to develop a technique of extracting atmospheric properties from ambient pre-detonation conditions.

The LV Array was a group of 11 infrasound sensors that were positioned throughout Las Vegas from 2019 to 2022, including three Clark County Fire Stations, one North Las Vegas Fire Station, one Las Vegas Fire Station, two NNSS locations, the Las Vegas National Weather Service, the Las Vegas Water District, and two private residences. For the Tropicana implosion, four Clark County Fire Stations were added to the reestablished LV Array locations to get surrounding coverage of the implosion signal. Preliminary results indicated that the implosion of the Tropicana's two towers was observable in almost all the infrasound stations across the Las Vegas valley. With further analysis to eliminate signal noise, that detectability is expected to increase to all stations.

Since the Tropicana implosion, Melissa and her team have focused on the LV Array, which is the primary dataset for this analysis. The dataset had to be assembled, organized, and moved to a centralized hard drive to streamline the process of analysis. The team is now working to pull out atmospheric features and the associated infrasound signals to begin the process of developing an inverse model to characterize the atmosphere of a propagating infrasound signal.

Because of her project's early success, Melissa submitted an abstract to the Seismological Society of America and hopes to present her work at their 2025 meeting in April. As Melissa and her team continue with their stellar work, we wish them the best of luck!
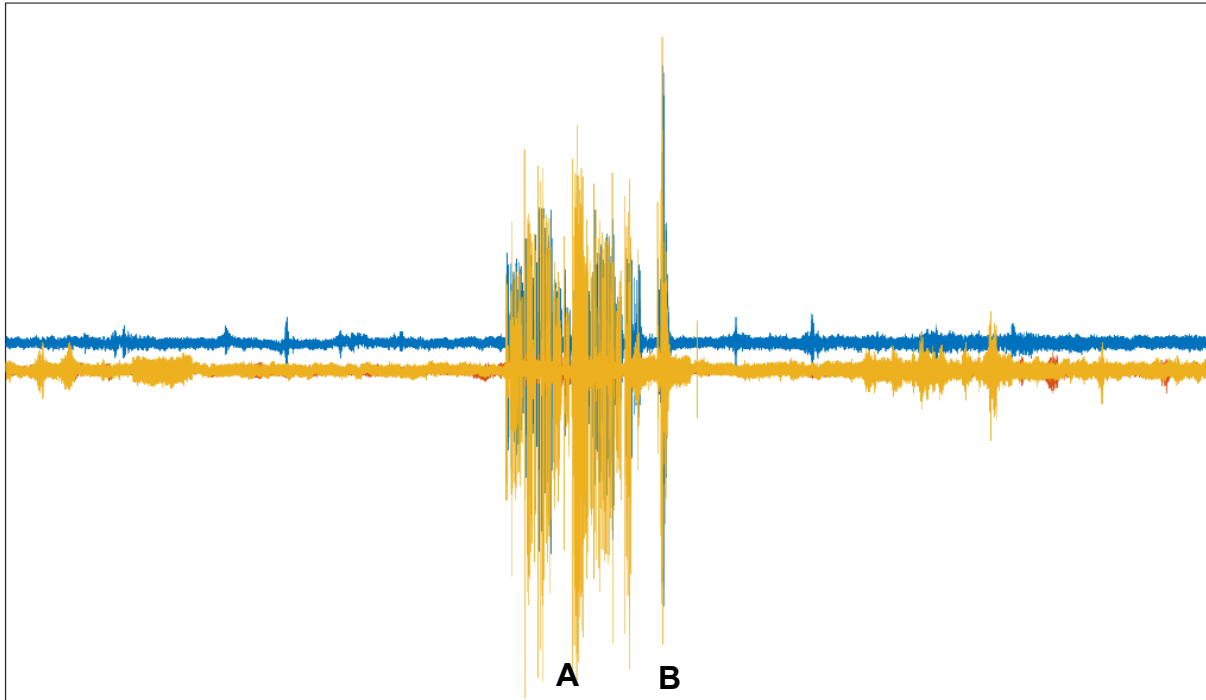
Figure 1: A quick look at several of the closer infrasound sensors during the implosion of the Tropicana Hotel. Region A notes the pre-implosion fireworks show and Region B notes the Tropicana implosion.
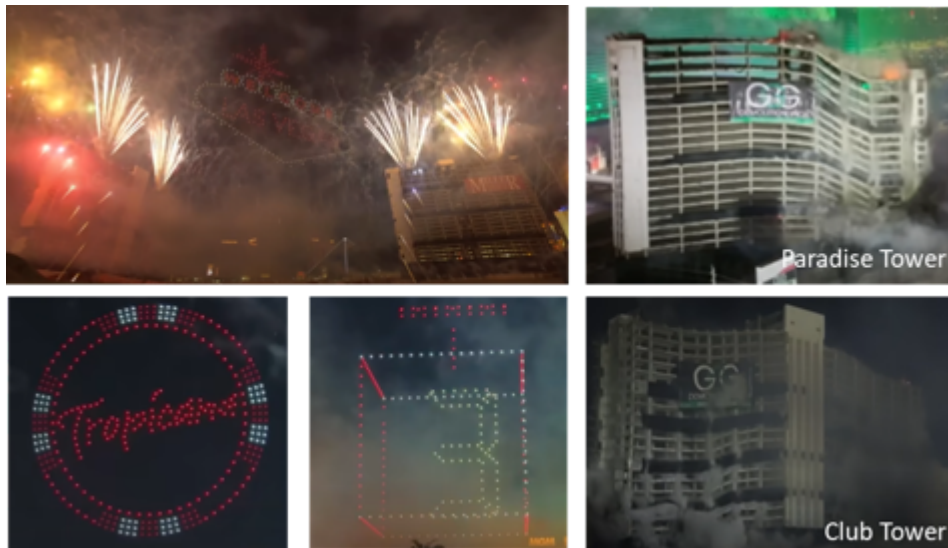

Figure 2: Implosion images from YouTube: https://www.youtube.com/watch?v=4iqpn4Ld2XQ, https://www.youtube.com/watch?v=KZmqMjeTrWI&t=336s