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Spatial and Time Variability of Ambient Vibration H/V Frequency Peak

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The ambient vibration H/V technique is widely used nowadays in microzonation studies, because of its easy field handling and its low cost, compared to other geophysical methods. However, in presence of complex geology or lateral heterogeneity evidenced by more than one peak frequency in the H/V curve, it is difficult to interpret the results, especially when soil information is lacking. In this work, we focus on the construction site of the Baraki 40000=place stadium, located in the north-east side of the Mitidja basin (Algeria), to identify the seismic wave amplification zones. H/V curve analysis leads to the observation of spatial and time variability of the H/V frequency peaks. The spatial variability allows dividing the studied area into three main zones: (1) one with a predominant frequency around 1,5 Hz showing an important amplification level, (2) the second exhibits two peaks at 1,5 Hz and in the 4 Hz – 10 Hz range, and (3) the third zone is characterized by a plateau between 2 Hz and 3 Hz. These H/V curve categories reveal a consequent lateral heterogeneity dividing the stadium site roughly in the middle. Furthermore, a continuous ambient vibration recording during several weeks allows showing that the first peak at 1,5Hz in the second zone, completely disappears between 2 am and 4 am, and reaching its maximum amplitude around 12 am. Consequently, the anthropogenic noise source generating these important variations could be the Algiers Rocade Sud highway, located in the maximum amplification azimuth direction of the H/V curves. This work points out that the H/V method is an important tool to perform nano-zonation studies prior to geotechnical and geophysical investigations, and that, in some cases, the H/V technique fails to reveal the resonance frequency in the absence of strong anthropogenic source.