



Determination of Site Response in Lefkada Town (W. Greece) by Ambient Vibration Measurements

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Lefkada together with the nearby Ithaki, Cephalonia, and Zakynthos islands are considered the most active areas of shallow seismicity in the Aegean Sea and the surrounding continental area. During instrumental times Lefkada Island has suffered from several earthquakes with magnitudes in the range 6.0-6.5. These events caused similar geotechnical damage consisting of rock fall, massive landslides, liquefaction, lateral spreading, and harbor quay wall failures. Therefore, the hazard was updated to a peak ground acceleration of 0.36g in the current Greek Antiseismic Code. However, site-effects may increase the response beyond the provisions of local Codes or Standards. Especially in urban areas, like the Lefkada town, which is located on soft soil layer, waves of seismic events can be major amplified. It is therefore strongly recommended to determine possible site-effects and furthermore enforce the proposed microzonation of Lefkada town to enhance the standard of seismic hazard analysis. This study presents results of ambient noise measurements carried out in 78 locations in the town of Lefkada. The horizontal-to-vertical spectral ratios of ambient noise were used to approximate the fundamental resonance frequencies of the subsurface and their associated amplitudes. Additionally, we calculated the site responses with respect to the reference site and compared the results with those obtained from the H/V technique. The fundamental frequency and the corresponding amplification factor were calculated for each site. Under the assumption that the ambient noise H/V spectral ratios coincide with the amplification levels at the dominant frequency of the site response functions, the fundamental frequencies and amplification factors were compiled on ARC-INFO GIS software and corresponding detailed maps were developed. Predominant ambient noise frequencies range between 1-6 Hz, with the majority of sites exhibiting frequencies between 1.5-3.0 Hz. This distribution is in agreement with results obtained in previous studies of earthquake and microtremor recordings in the town of Lefkada. Additionally, the response spectrum of the 14-8-2003 Lefkada earthquake recorded at the local Hospital exhibits similar to the H/V peak frequency, implying that the PGA of 0.42g during the 14-8-2003 strong earthquake was likely the result of resonance phenomena due to the local site response.