

TEMPORAL CHANGES OF SITE RESPONSE IN THE CENTRAL TOKYO AREA: A POSSIBLE SITE-CITY INTERACTION CASE ?

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Many cities are established on soft soils, with a high building density. The possible feedback of multiple Soil-Structure Interaction (called "SCI", Site-City Interaction) on site response has been investigated over the last 3 decades with various approaches (numerical simulation, reduced scale laboratory experiments, full scale analogs). Their results consistently indicate the plausibility of significant effects on ground motion, with an overall decrease of the average ground motion in specific frequency bands. However, such effects could never be unambiguously proved with real earthquake recordings in real cities. The long collection of strong motion observations in the Kanto area was thus used to investigate possible time changes in site response, using event-specific site terms derived from Generalized Inversion Techniques for 106 KiK-net, K-NET or JMA accelerometric stations in the Kanto area (average of 136 recordings from 1996 to 2018). Most of these sites do not exhibit any temporal change, except those located close to the redevelopment areas of Tokyo, where many new high-rise buildings were recently erected, which exhibit a significant reduction of low-frequency amplification (up to a factor of 3). Considering the correspondence between high-rise building frequencies (< 1 Hz) and site frequencies (fundamental mode < 0.2 Hz in relation with 3 km thick sediments, and largest amplification around 0.5 - 1 Hz in relation to softer soils at shallow depth), such a decrease appears to be consistent with the outcomes of all kinds of SCI investigations carried on the last three decades. The presentation will finally discuss the additional investigations to be performed to confirm (or eliminate) this intriguing consistency with the SCI interpretation.

