



## **Correlation of seismic noise in frequency and time domains. Applications to site effects**

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The SPAC (Spatial autocorrelation) method to analyse ambient vibration records was introduced by Aki (1957). Currently, this method is being used for the analysis of microtremor data from an array of stations: cross-correlation functions are computed between pairs of stations in the frequency domain, and then averaged for different station pairs, at the same interstation distance but with different orientation. Recently published papers have offered new insight in this method. Chávez-García et al. (2005) have proposed that SPAC method can be used using data from a single station pair, exploiting recordings of microtremors over long times as a substitute for azimuthal averaging. Shapiro and Campillo (2005) have shown that correlation of ambient vibration between a single station pair can be used to obtain estimates of Rayleigh wave dispersion for the path between the two stations. In this paper, we present results of the analysis of microtremor measurements using a small array. We show the equivalence between the two approaches, in time and frequency domain. A simple subsoil structure allows to interpret our correlation results in time and frequency. Our results show that ambient vibration includes different types of waves, but that the coherency between any two stations is governed by the more stable propagation mode between them, surface waves in the case of a layered medium. Our results shed some light on the nature of microtremors and on the reasons why SPAC or the horizontal-to-vertical spectral ratios are useful in site response studies.