



Efficient Signal Extraction From Ambient Noise Data

Martin Schimmel (1), Eleonore Stutzmann (2), and Josep Gallart (1)

(1) Institute of Earth Sciences J. Almera - CSIC, Barcelona, Spain, (2) Institut de Physique du Globe de Paris, Paris, France

Stacks of ambient noise cross-correlations are now routinely used to extract empirical Green's functions between station pairs. The success of the cross-correlations is due to waves which are recorded on both stations and which constructively sum at lag times which equal their propagation time between the station pair. Stacking cross-correlations for different time spans improves the azimuthal noise coverage and further enhances the signals. We show that the signal extraction from noise can be improved by incorporating the instantaneous phase coherency. The instantaneous phase coherence is obtained through analytic signal processing and is employed in the entire processing flow. The conventional cross-correlation is replaced by the phase cross-correlation and the linear stack by the time-frequency domain phase weighted stack. We test and discuss the performance of these techniques on theoretical and real data to show the benefits and limitations of the new and commonly used processing approaches. Our method is successfully applied to real data at both local and global scales and we show that we can clearly extract from noise data: body waves and Rayleigh waves at local scale, and minor-arc and major-arc Rayleigh wave trains at global scale.