ESG

Workshop on Effects of Surface Geology on Seismic Motion

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Pierre-Yves Bard *and the SESAME team*

THE EU SESAME PROJECT : PRESENTATION, LATEST RESULTS AND PERSPECTIVES

Pierre-Yves BARD[1] and the SESAME team

(1) LGIT/LCPC, Grenoble Observatory, Maison des géosciences, BP 53 X, 38041 Grenoble Cedex, France

Recent years have seen many studies using ambient vibration measurements for a priori estimations of site effects: assessing the actual reliability of such results is a major challenge for engineering seismologists in order to both foster their use and prevent their misuse, for an improved, cost-effective and reliable risk mitigation. Such an assessment has been one of the major objectives of the SESAME project (**S**ite **E**ffect**S** assessment using **AM**bient **E**xcitations), a European funded project gathering more than 70 scientists and engineers from 12 different teams in Europe.
Two techniques - the very simple H/V technique ("Nakamura"), and the more advanced array technique – have been thoroughly considered under different viewpoints, in order to a) better understand their physical basis, b) assess their actual meaning in view of site effect estimation, and c) propose user guidelines and processing software to ensure a correct use.
The overall architecture of the 3-year project (2001-2004) is first briefly presented. On the upstream side, the project tries to fill the gap concerning the understanding of the real nature of noise, especially in urban areas, with a comparison between noise synthetics and noise observations in a number of real sites. On the technical side, series of investigations are carried out to clearly identify the key points in each of these techniques and their reliability, and to clearly assess the conditions under which they have to be performed: experimental conditions for the measurements, and processing techniques as well. Finally, on the downstream side, after having shown that these techniques do provide useful information when applied with care, we will offer a framework for reliable measurements by proposing user guidelines that could form the basis for a quality label.
Then the main accomplishments and findings at the time of the meeting will be reported. They may be summarized as follows:

H/V technique
- Test on instruments and sensors, and thorough tests on experiemental conditions, highlighting the (bad) influence of wind and of "soft" soil-sensor coupling
- A first version of a platform free H/V software, including a Graphical User Interface.
- A data base gathering earthquake and noise recordings for a large number of European sites

Array technique
- Field measurements with (very) dense arrays at 5 test sites (Grenoble, Liège, Basel, Colfiorito, Volvi/Thessaloniki) and at a number of other locations.
- A specific "Cap" software gathering several array processing techniques (f-k, MUSIC, SPAC) to derive the dispersion curves from the array data
- Improvements in the inversion of the velocity profile thorugh the neighbourhood algorithm and a "guess mode" concept relaxing the assumption of fundamental mode Rayleigh wave

Noise wavefield and simulation

- A "NOISE" program package allowing to simulate random anthropic noise (microtremor) in arbitrary 3D media
- Various preliminary simulation results seemingly indicating the predominance of local, surface sources in actual microtremors

The project is not yet finished, and it certainly does not pretend to answer all the issues regarding noise measurements. It is hoped however that the scientific outcomes and the resulting practical recommendations and guidelines, freely distributed through the SESAME web site http://SESAME-FP5.obs.ujf-grenoble.fr, will be helpful for site effect assessment and improved seismic risk mitigation, especially in developing countries. Considering the thorough assessment work also undertaken by other groups and countries about the H/V technique, it is also hoped that all these results may be discussed within the ESG group, and the conclusions merged into a single document that could be endorsed by the whole group, and widely disseminated to voice the "official" thoughts of the scientific community on the capabilities and limitations of the H/V technique.

Corresponding Author: Dr. Pierre-Yves Bard
LGIT/LCPC
Maison des Géosciences
BP 53
38041 Grenoble Cedex
FRANCE.

Telephone: +33 476 828 061

E-Mail: pierre-yves.bard@obs.ujf-grenoble.fr