Using Ambient Vibration Array Techniques

for Site Characterization

Monday, 21^{st} Nov. 2005 to Friday, 25^{th} Nov. 2005
Université Joseph Fourier Grenoble, France

In recent years, the number of research papers dealing with ambient vibration analysis methods has increased considerably. Clearly, the interest in these methods originates from both the economical attractive cost benefit ratio and the straightforward data acquisition. Being a non-destructive passive technique, these methods also complement geotechnical and/or active geophysical methods within highly populated regions.

Within the SESAME project ("Site EffectS assessment using AMbient Excitation", EU-Project EVG1-CT-2000-00026) detailed research has been accomplished to identify the capabilities and limitations of ambient vibration analysis techniques. Within this context a set of software tools has been developed to ease the processing and interpretation of ambient vibration wave field recordings.

The main findings of the SESAME project however show, that ambient vibration array analysis techniques have to be applied with care. It requires not only a careful measurement, but especially the interpretation and the inversion of analysis results need a (self-)critical review. From these conclusions it has been agreed among SESAME-partners, that it is highly necessary to distribute the software tools together with adequate training.

The main purpose of this course is to achieve the necessary understanding among the course participants for the problems related to these techniques. By doing so, we try to enable a correct usage of the software tools and to avoid misuse of these methods ("black-box usage"). The course fees are intended to support current and future improvements of the software package, distributed under an open source and free license.

Contributions

organized by	LGIT and IGUP
hosted by	UJF-Grenoble
presented by	Cécile Cornou, Matthias Ohrnberger, Marc Wathelet
supported by	SESAME (EU-Project EVG1-CT-2000-00026) and Sismovalp (Interreg IIIB, Alpine Space)

Course outline

	Monday	
13:30	Reception and welcome	
14:00-14:45	Physical background of ambient vibrations	Lecture
14:45-15:00	Coffee break	
15:00-17:15	Basic array processing concepts (frequency wavenumber, f–k)	Lecture

	Tuesday	
9:00-10:30	Array geometry and f–k response	Lecture
10:30-10:45	Coffee break	
10:45-12:15	Array geometry and f–k response	Exercises
12:15-14:00	Lunch break	
14:00-15:30	Signal database software (GEOPSY)	Tutorial
15:30-15:45	Coffee break	
15:45-17:15 . . .	Conventional f–k processing	Exercises

	Wednesday	
9:00-10:30	High resolution f–k (Capon's method)	Lecture and Exercise
10:30-10:45	Coffee break	
10:45-12:15	Spatial autocorrelation method (SPAC)	Lecture and Exercise
12:15-14:00	Lunch break	
14:00-15:30	Dispersion curve (DC) inversion	Lecture
15:30-15:45	Coffee break	
15:45-17:15 . . .	DC inversion	Tutorial
20:00-. . .	Workshop Dinner	

	Thursday	
9:00-10:30	DC inversion	Exercise
10:30-10:45	Coffee break	
10:45-12:15	Discussion of inversion results	Moderated discussion
12:15-14:00	Lunch break	
14:00-15:30	Array analysis and DC inversion of test data sets I	Exercise
15:30-15:45	Coffee break	
15:45-17:15 . . .	Array analysis and DC inversion of test data sets II	Exercise

	Friday	
9:00-10:30	Discussion of results from data sets	Moderated discussion
10:30-10:45	Coffee break	
10:45-12:15	Summary of SESAME findings	Lecture
12:15-14:00	Lunch break	
14:00-...	Departure of Participants	Open discussion