



Blind Comparisons Of Shear-Wave Velocities At Closely-Spaced Sites In San Jose, California

Proceedings of a Workshop held at the US Geological Survey, Menlo Park, May 3, 2004

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PREFACE

Shear-wave velocities within several hundred meters of Earth's surface are important in specifying earthquake ground motions for engineering design. Not only are the shear-wave velocities used in classifying sites for use of modern building codes, but they are also used in site-specific studies of particularly significant structures. Many are the methods for estimating sub-surface shear-wave velocities, but few are the blind comparisons of a number of the methods at a single site. The word "blind" is important here and means that the measurements and interpretations are done completely independent of one another. Stephen Hartzell of the USGS office on Golden, Colorado realized that such an experiment would be very useful for assessing the strengths and weaknesses of the various methods, and he and Jack Boatwright of the USGS office in Menlo Park, California, in cooperation with Carl Wentworth of the Menlo Park USGS office found a convenient site in the city of San Jose, California. The site had good access and space for conducting experiments, and a borehole drilled to several hundred meters by the Santa Clara Valley Water District was made available for downhole logging. Jack Boatwright asked David Boore to coordinate the experiment. In turn, David Boore persuaded several teams to make measurements, helped with the local logistics, collected the results, and organized and conducted an International Workshop in May, 2004. At this meeting the participants in the experiment gathered in Menlo Park to describe their measurements and interpretations, and to see the results of the comparisons of the various methods for the first time. This Open-File Report describes the results of that workshop. One of the participants, Michael Asten, offered to help the coordinator prepare this report. Because of his lead role in pulling the report together, Dr. Asten is the lead author of the paper to follow and is also the lead Compiler for the Open-File Report.

It is important to recognize that most of the participants in the experiments contributed at their own expense. It is gratifying that many people recognized the importance of the experiment and were willing to volunteer their time and resources. We thank them for this effort.

This Report is organized in three parts: the first part is a paper summarizing the results of the Workshop, and presenting some conclusions regarding the various methods; the second part is a compilation of those documents describing the experiments that were presented at the meeting (a few of the reports have had minor post-meeting revisions, but with only one exception noted later, none of the models were changed). The final part of this Report is a compilation of the presentations from the meeting--- these are largely in the form of Powerpoint files. No attempt has been made by the compilers to edit the material in parts 2 and 3. It is included here as is for the benefit of the reader.

Workshop held at the US Geological Survey, Menlo Park, May 3, 2004

ATTENDEES: Michael Asten
Jack Boatwright
Jim Bay
Dave Boore
Carola di Allesandro
Alfredo Fernandez-Leon
Stephen Hartzell
Koichi Hayashi
Tom Holzer
Rob Kayen
Dominik Lang
Glenn Rix
Walt Silva
Rob Steller
John Tinsley
Carl Wentworth
Rob Williams

CONTRIBUTORS IN ABSENTIA

Jim Gibbs
Yin-Cheng Lin
W.J. (Bill) Stephenson
Ken Stokoe

CONTENTS

Preface and Workshop Attendees

Part 1:

Asten, M.W. and Boore, D.M., Comparison of shear-velocity profiles of unconsolidated sediments near the Coyote borehole (CCOC) measured with fourteen invasive and non-invasive methods

Part 2: Papers & Summaries

Method#	Authors	Title
1	Wentworth, C.M. and Tinsley, J.C.	Geology, stratigraphy and detailed Velocity Structure of the Coyote Creek borehole, Santa Clara Valley, California
4	Williams, R.A., Stephenson, W.J., Odum, J.K., and Worley, D.M.	P- and S-wave Seismic Reflection and Refraction Measurements at CCOC
5	Bay, J., Gilbert, J., Park, K., and Sasankul, I.	Shear Wave Velocity Profiling Using Spectral Analysis of Surface Waves (SASW) at William Street Park & Coyote Creek Borehole San Jose, CA
6	Kayen, R.	The spectral analysis of surface waves measured at William Street Park, San Jose, California, using swept-sine harmonic waves
7, 14	Stephenson, W.J.	Comparison of ReMi, and MASW Shear-wave velocity techniques with the CCOC borehole to 100 m, Santa Clara Valley
9	Hayashi, K.	The result of surface wave method in the Coyote Creek borehole (William Street Park)
10	Sungsoo Yoon, S., and Rix, G.	Active and passive surface wave measurements at the William Street park site, using f-k methods
11	Asten, M.W.	An assessment of information on the shear-velocity profile at Coyote Creek, San Jose, from SPAC processing of microtremor array data
12	Hartzell, S., Carver, D., Seiji, T., Kudo, K., and Herrmann, R. B.	Shallow shear-wave velocity measurements in the Santa Clara Valley; comparison of SPAC and FK methods
13	Lang, D.H. and Schwarz, J.	A contribution to the CCOC Blind Comparison Experiment

refers to Method number defined in Table 1, Part 1.

Part 3: Slide presentations

Schedule for the May 3, 2004 CCOC Vs comparison meeting at the USGS, Menlo Park, CA				
Time	Paper#	Presenter	Files provided?	Topic
9:00A		Dave Boore		Welcome, introduction
9:15A	1	Carl Wentworth		history of SCVWD- USGS project
9:30A	1	John Tinsley	yes	geologic logging of CCOC hole
9:45A	1	Rob Steller	yes	P-S suspension logging surface source-dh
10:00A	2	Dave Boore (for Jim Gibbs)	yes	receiver logging
10:15A	3	Tom Holzer		SCPT
10:30A		break		
11:00A	5	Jim Bay	yes	SASW
11:15A	6	Rob Kayen		SASW
		Ken Stokoe & Yin-Cheng		SASW (tabled in absentia)
	8	Lin	yes	
11:30A	9	Koichi Hayashi	yes	MASW and SPAC hi-res
11:45A	4	Rob Williams	yes	reflection/refraction MASW/refraction-
12:00P	4,7,14	Rob Williams (for Bill Stephenson)	yes	microtremor
12:15P		lunch		
1:15P	10	Glenn Rix	yes	FK
1:30P	11	Michael Asten	yes	SPAC
1:45P	13	Steve Hartzell		FK and SPAC
2:00P	12	Dominik Lang		Ellipticity
2:15P		break		
2:45P	Part 1	Dave Boore	yes	Comparisons, Discussion
3:15P		Dave Boore		Discussion/Conclusions
4:00P		finish		

refers to Method number defined in Table 1, Part 1.

Part 4: Spreadsheet of all surface-wave models