AIM OF THE WORK

Attempt to apply to the Italian data the analysis presented in:

1) An Empirical Site-Classification Method for Strong-Motion Stations in Japan Using H/V Response Spectral Ratio.

Zhao, Irikura, Zhang, Fukushima, Somerville, Asano, Ohno, Oouchi etc..
2006 BSSA Vol 96/3 (914 - 925)

2) Site Classification using horizontal-to-vertical Response Spectral Ratios and its impact when deriving empirical ground-motion prediction equations.

Fukushima, Bonilla, Scotti, Douglas
2007 JEE Vol 11 (712-724)

SITE CLASSIFICATION

STATE OF THE ART

Based on PREDOMINANT PERIOD of H/V SA ratios

ZHAO et al. (2006)

JAPAN ROAD ASSOCIATION

CAT.	PERIOD T (sec)
SCI	T < 0.2
SCII	0.2 <= T < 0.4
SCIII	0.4 <= T < 0.6
SCIV	T >= 0.6

AUTOMATIC CLASSIFICATION
SITE CLASSIFICATION INDEX (SI)

FUKUSHIMA et al. (2007)

CAT.	PERIOD T (sec)
SC1	T < 0.2
SC2	0.2 <= T < 0.6
SC3	T >= 0.6
SC4	Generic Rock
SC5	Generic Soil

AUTOMATIC CLASSIFICATION
MANUAL CONTROL

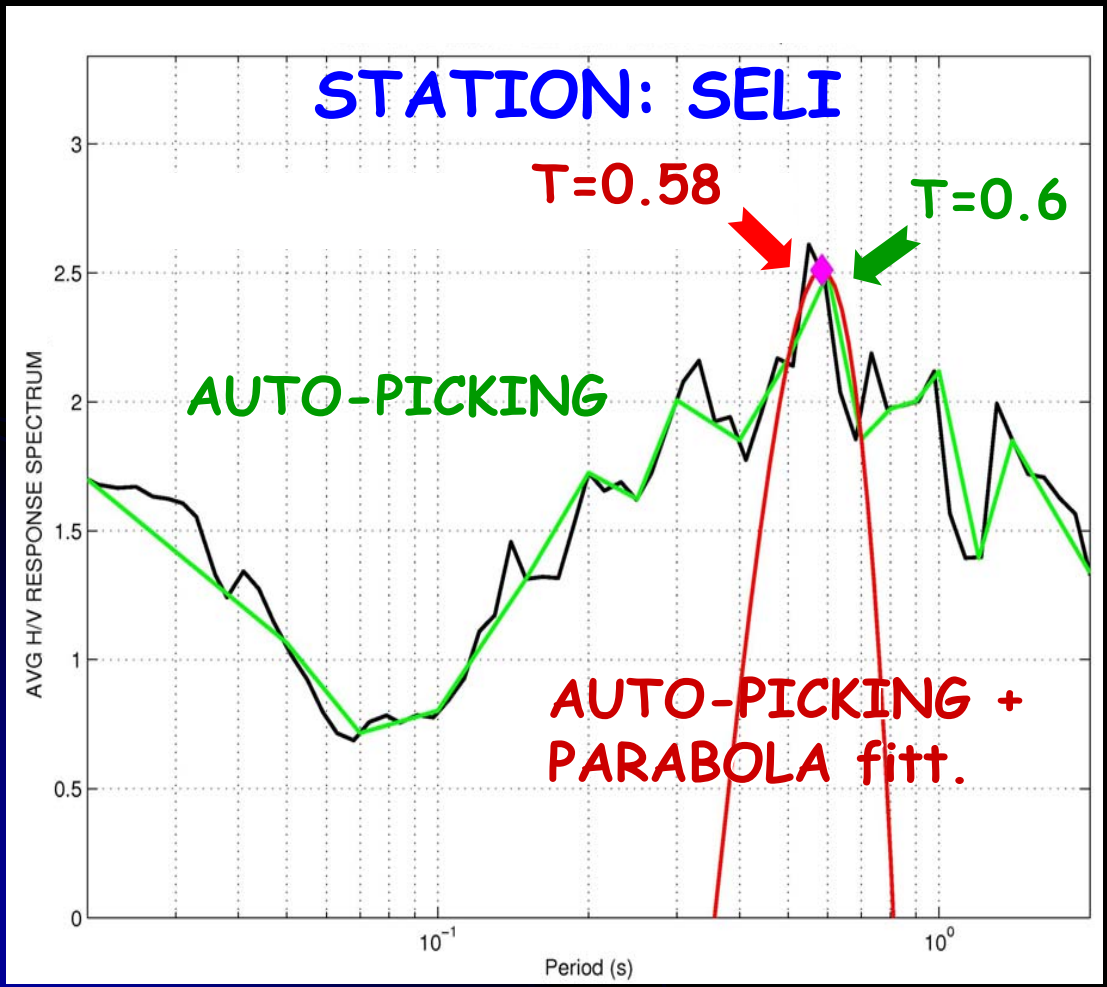
OUR APPLICATION

CAT.	PERIOD T (sec)
SCI	T < 0.2
SCII	0.2 <= T < 0.4
SCIII	0.4 <= T < 0.6
SCIV	T >= 0.6
SCV	T unknown & orig. AB site
SCVI	T unknown & orig. CD site
SCVII	Unknown

SITE CLASSIFICATION

AUTO-PICKING - RESULTS

Peak of a quadratic function fitted to 3 spectral points around the peak



AUTO-PICKING
T = 0.6 sec

CAT. FUKUSHIMA: **SC3**

CAT. ZHAO: **SCIV**

AUTO-PICKING + PARABOLA fitt.
T = 0.58 sec

CAT. FUKUSHIMA: **SC2**

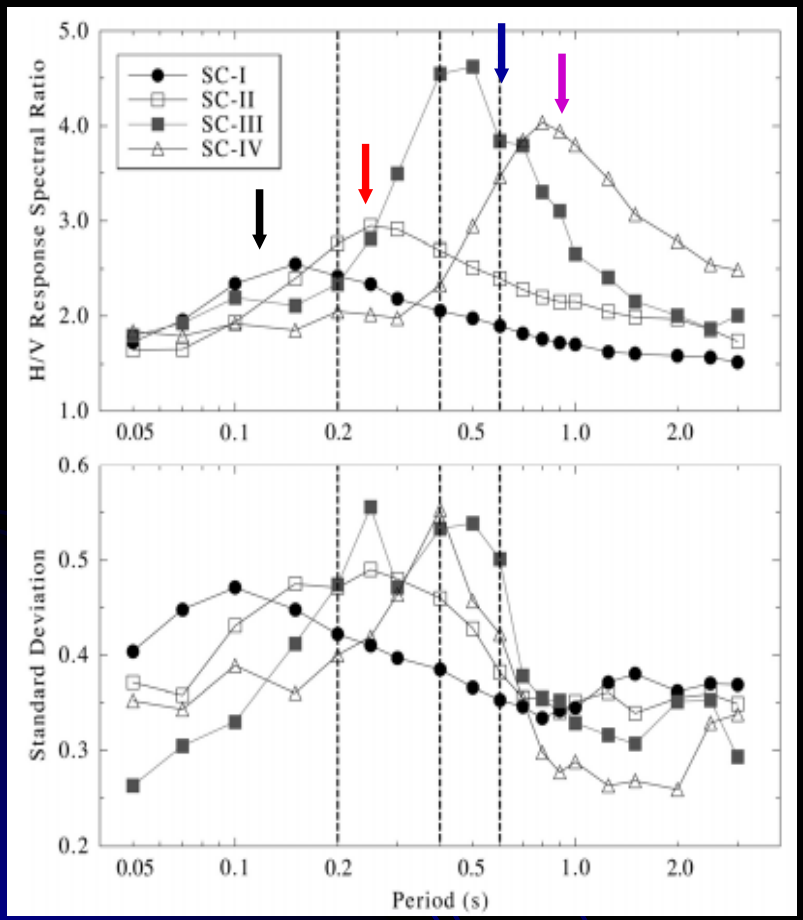
CAT. ZHAO: **SCIII**

FINAL VISUAL INSPECTION

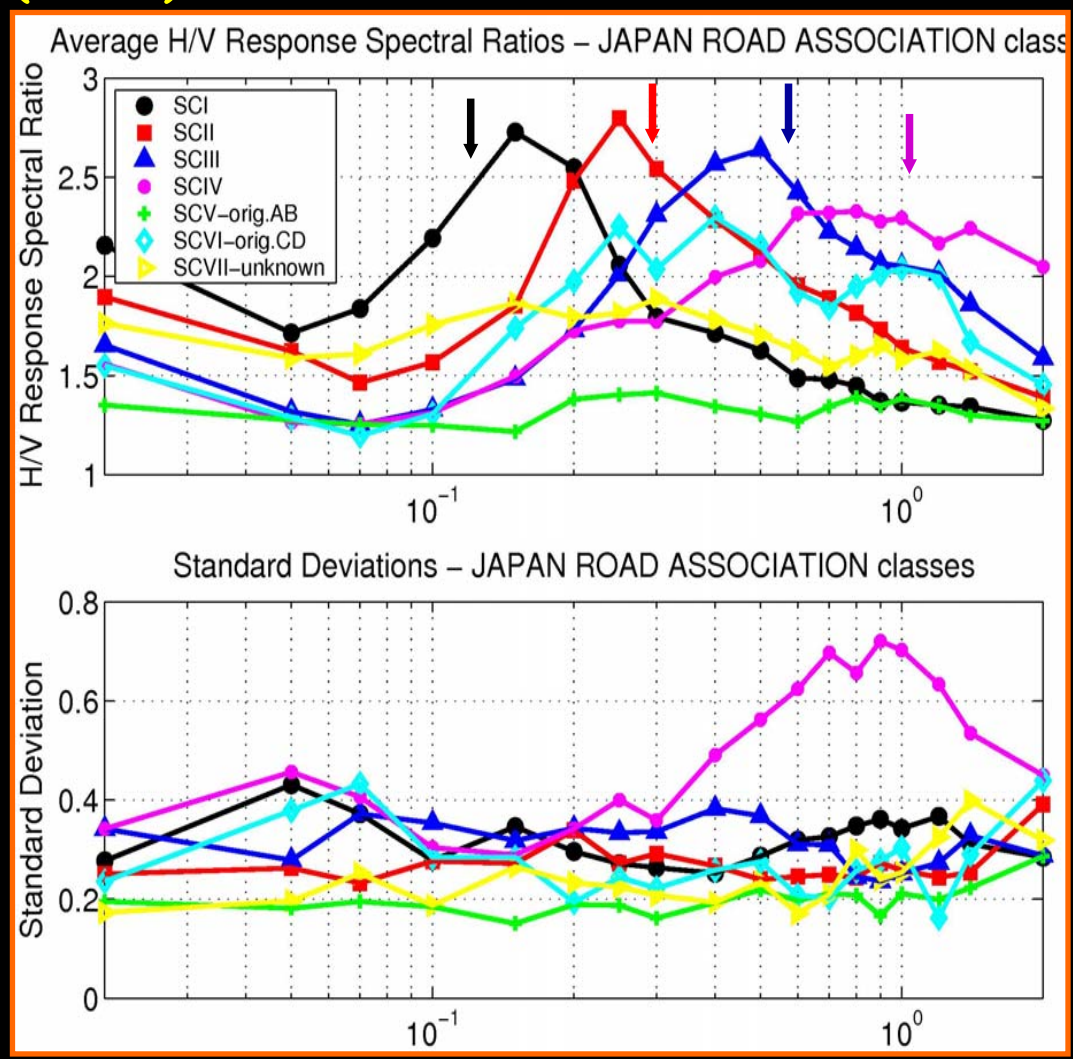
SITE CLASSIFICATION

RESULTS

ZHAO et al. (2007) CATEGORIES



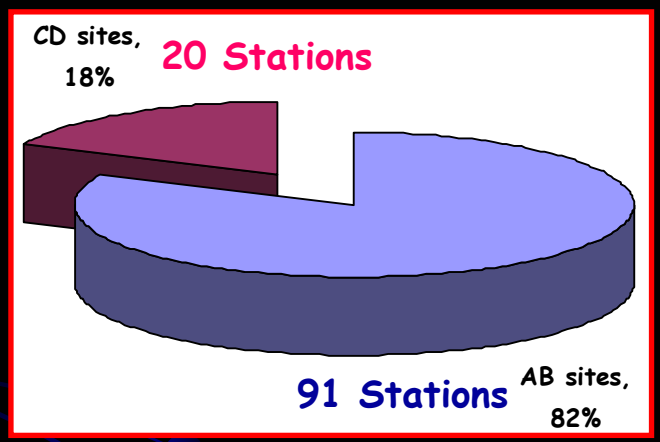
Average H/V response spectral ratio for the ZHAO et al. (2006) site classes (top) and standard deviation for each class (bottom) in natural logarithms.



SITE CLASSIFICATION

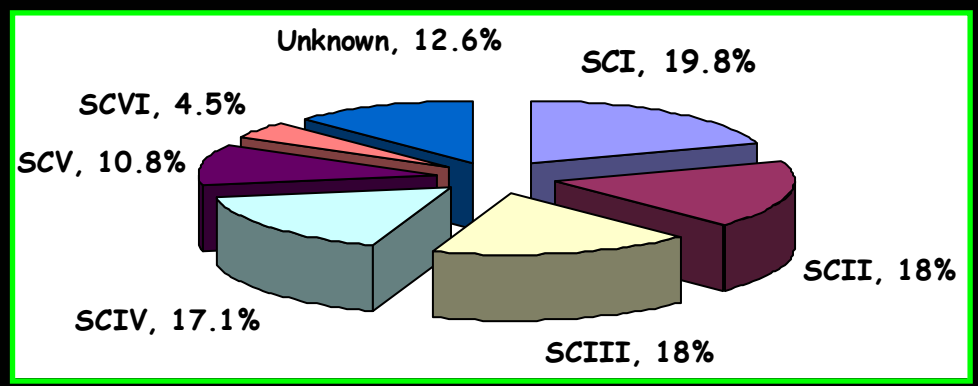
RESULTS - STATISTICS

ORIGINAL SITE CATEGORIES

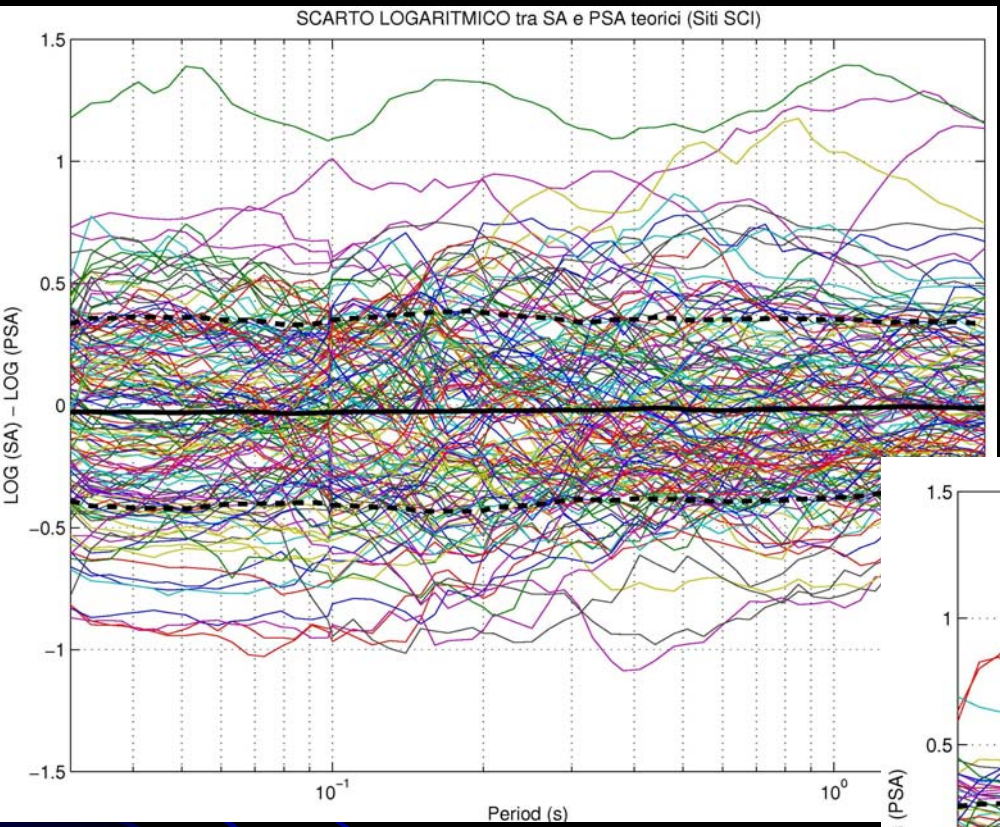


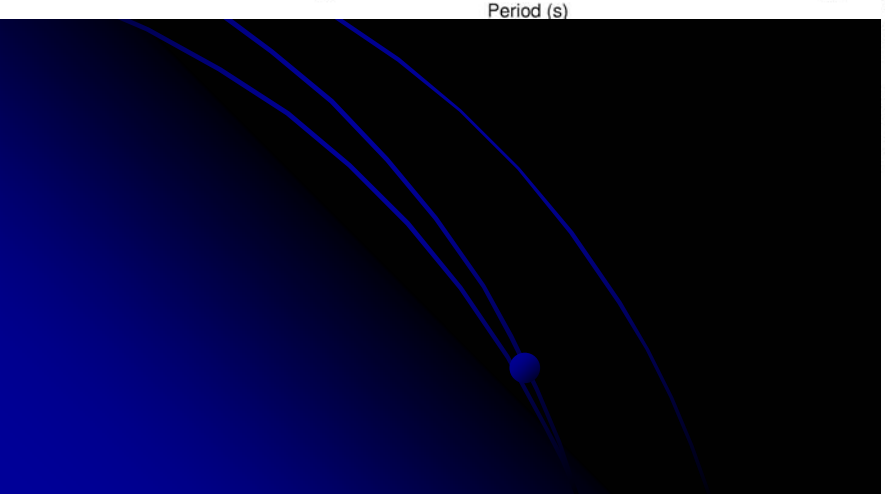
ZHAO et al. (2006)

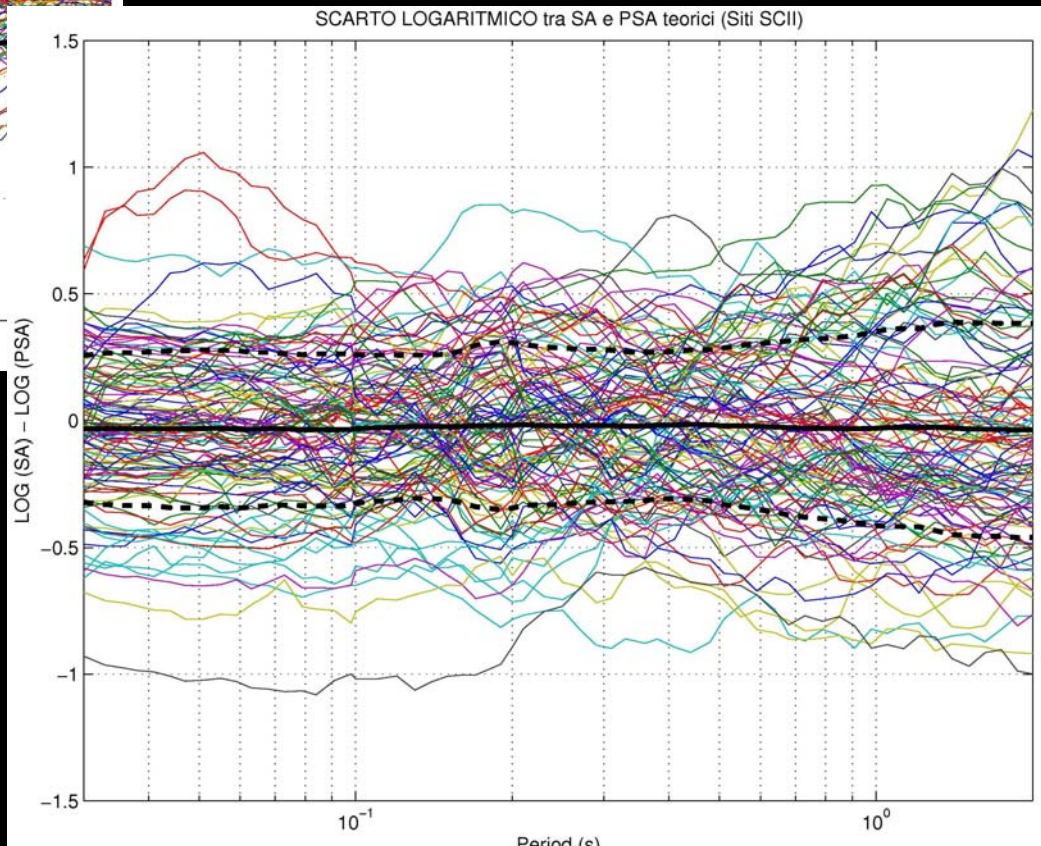
	SCI	SCII	SCIII	SCIV	SCV	SCVI	Unknown
AB	19	19	16	11	11	3	12
CD	3	2	4	7	0	2	2



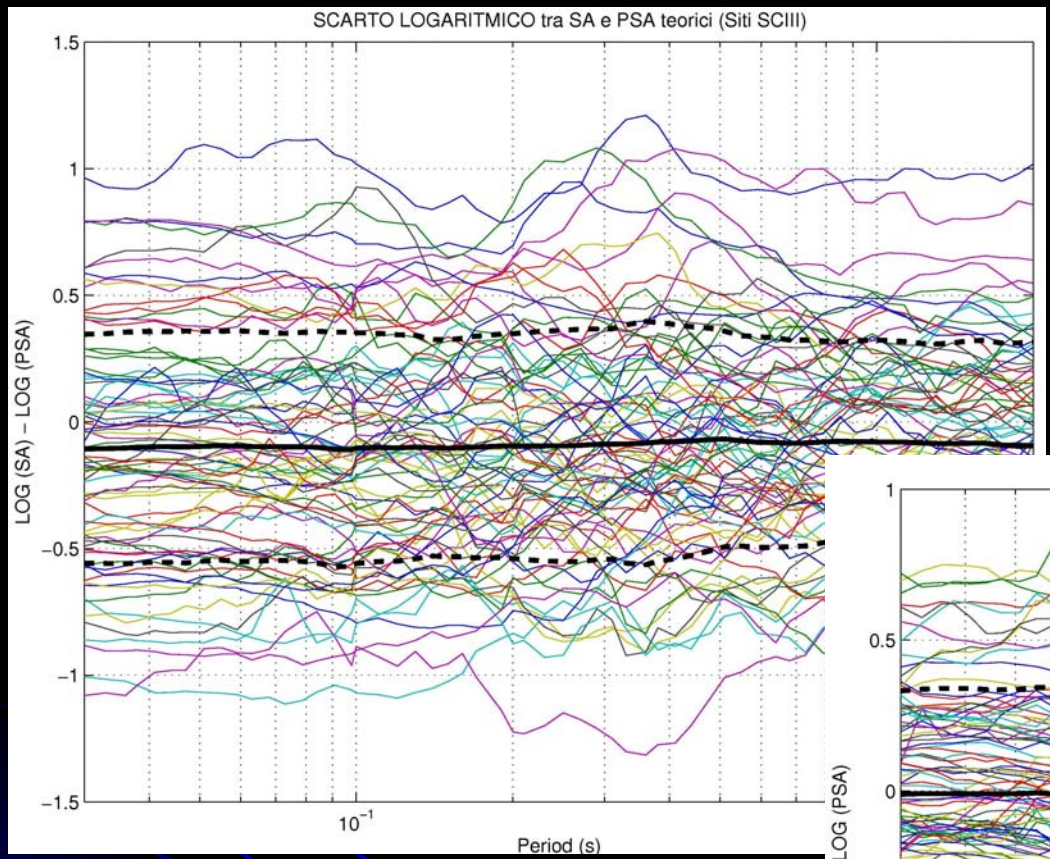
EXPECTED AMPLIFICATION

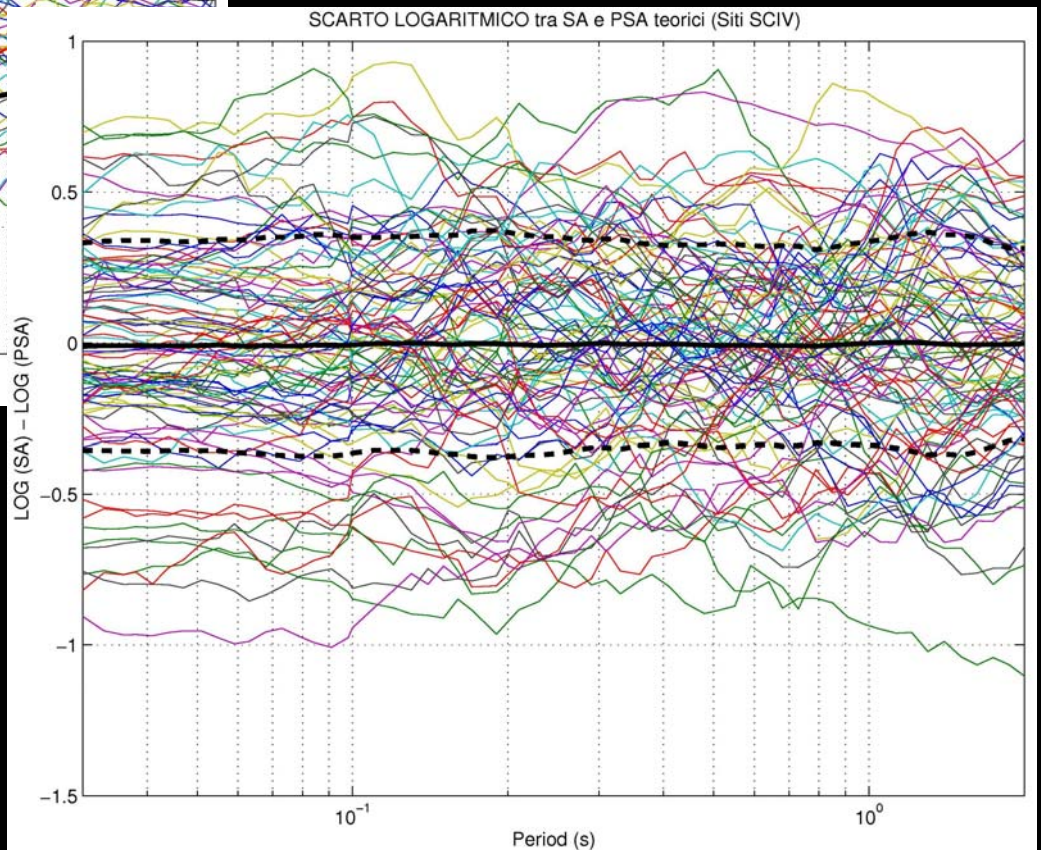




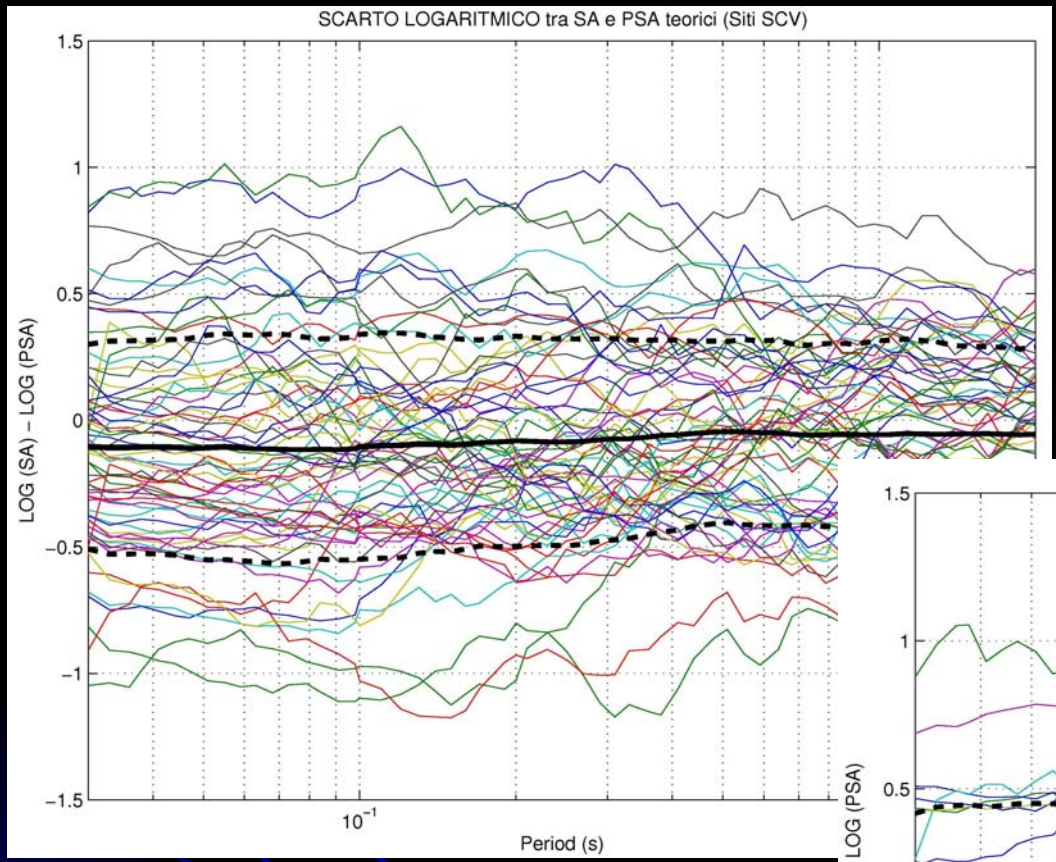


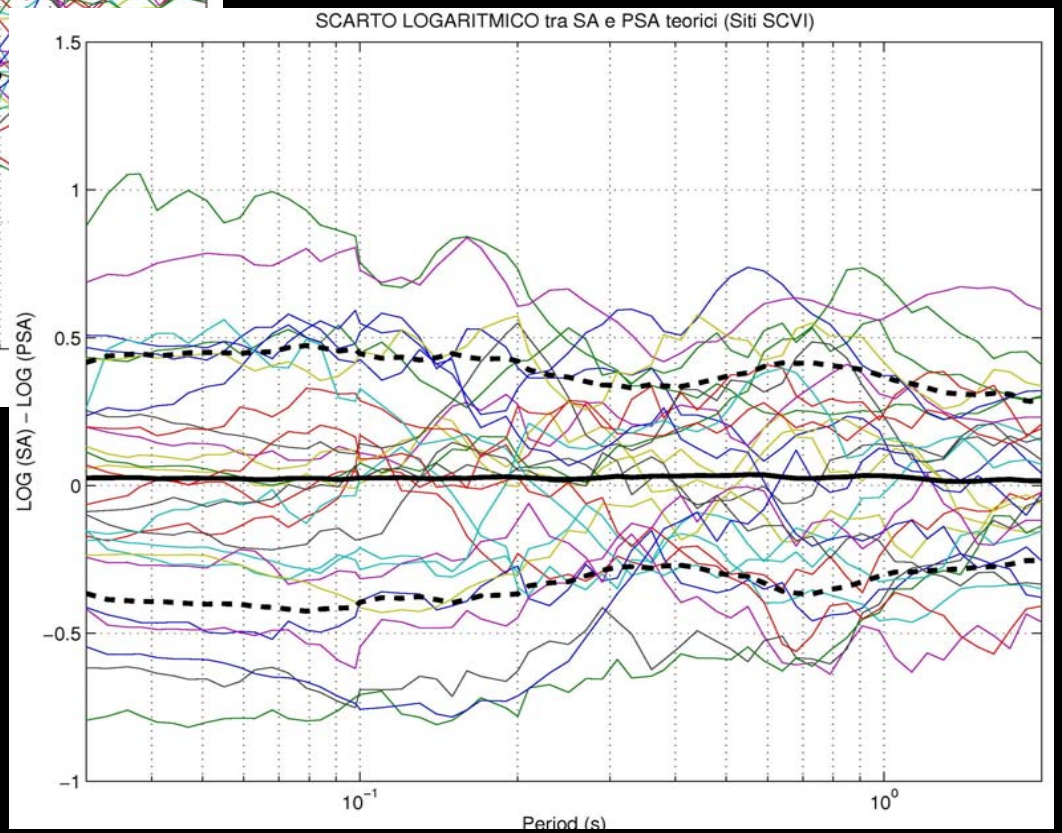
EXPECTED AMPLIFICATION





EXPECTED AMPLIFICATION





Can the H/V spectral ratio be used as a site tranfer function?

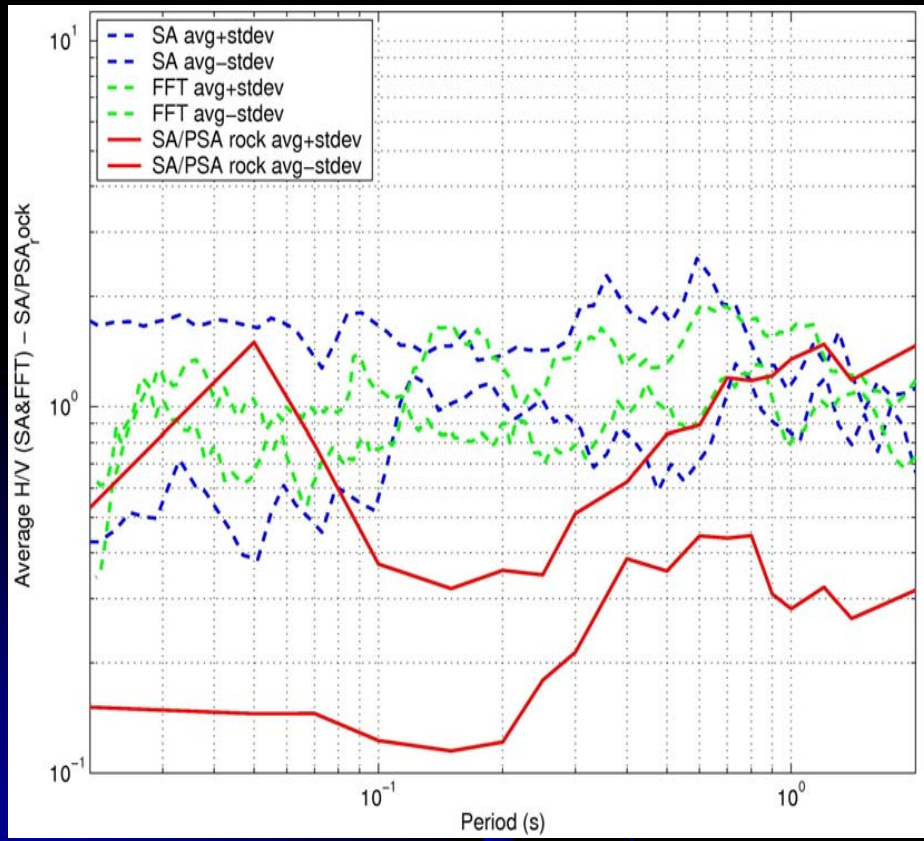
In the practice, HVSR is often used (and sometime probably misused) as an estimate of the site response.

Nobody knows to what extent this is correct since the identity is not demonstrated theoretically.

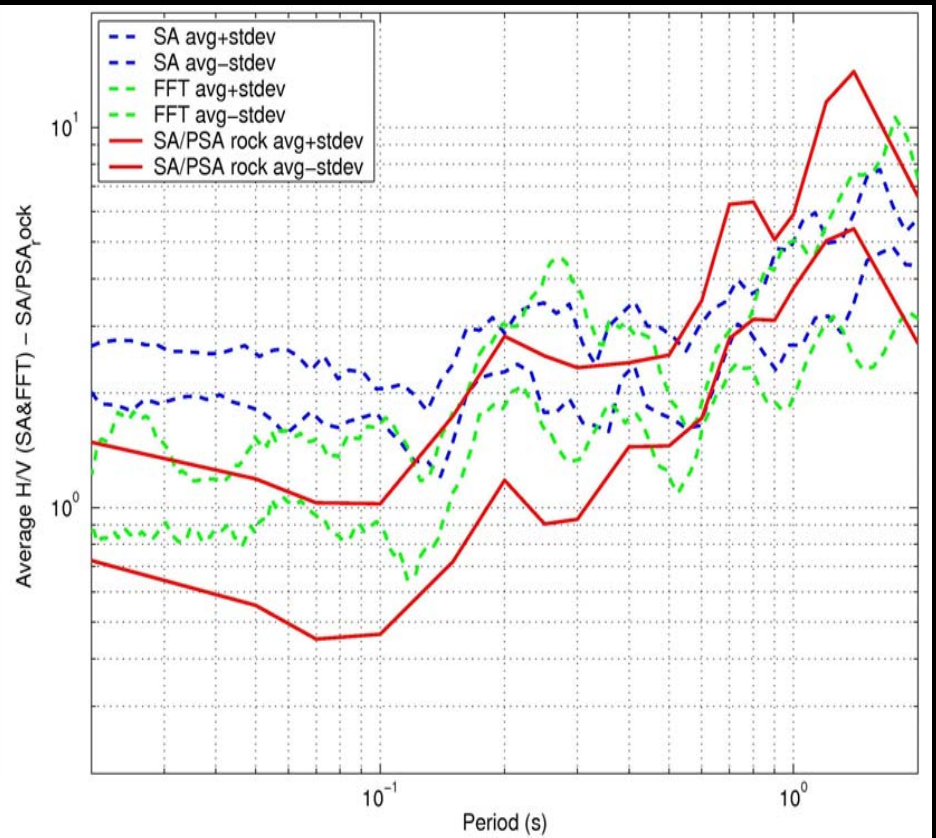
The aim of the work is to use the Italian strong motion data bank to infer quantitative indications on related uncertainties.

EXPECTED AMPLIFICATION vs H/V

POOR AGREEMENT



GOOD FIT



CAT.	PERIOD T (sec)
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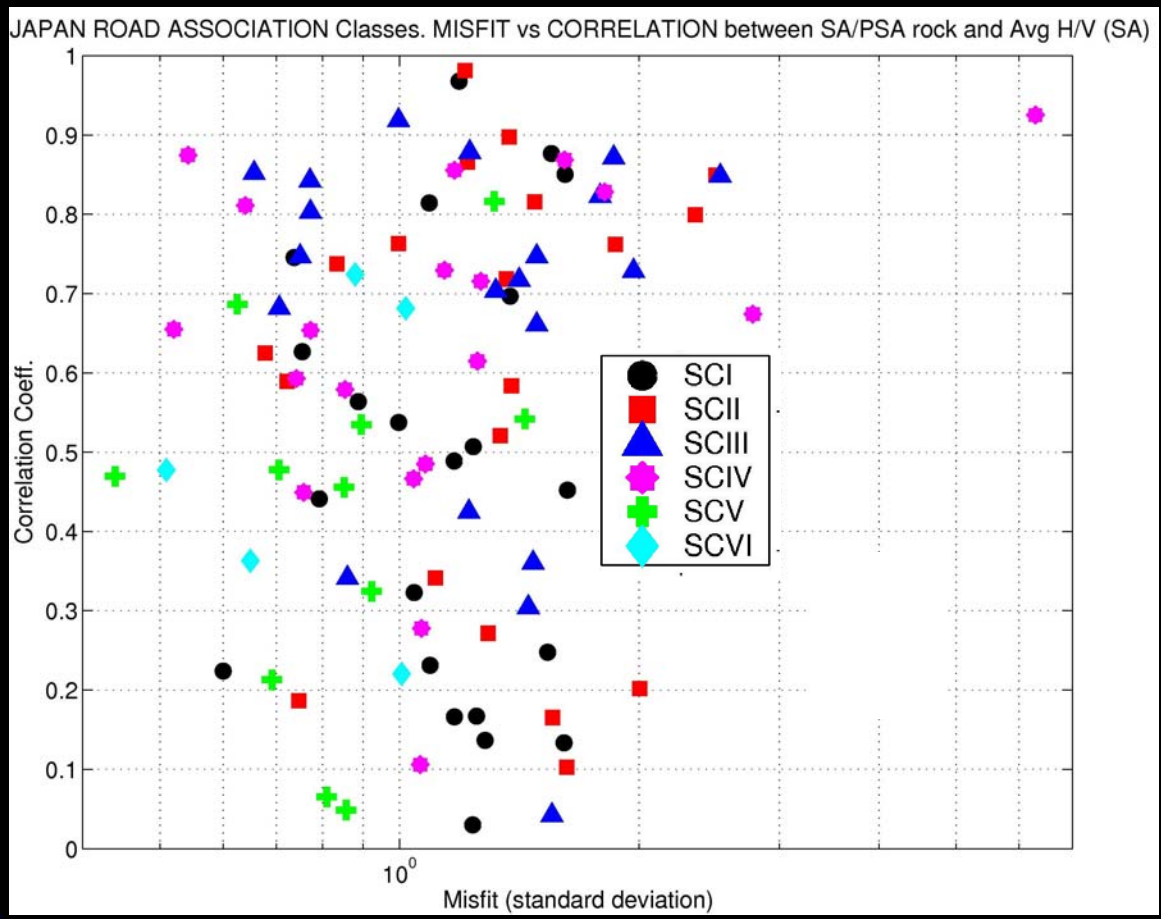
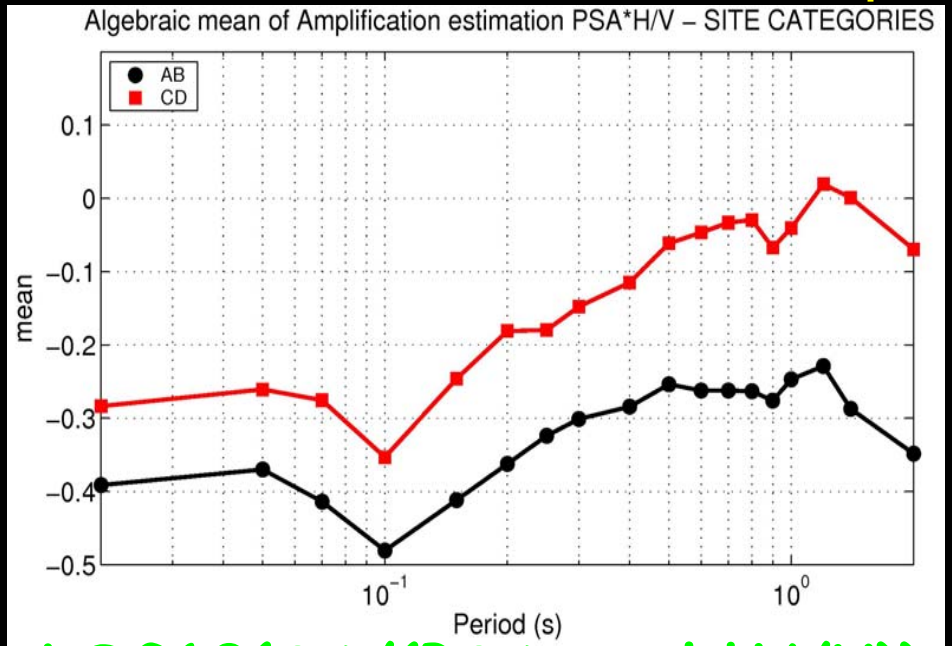
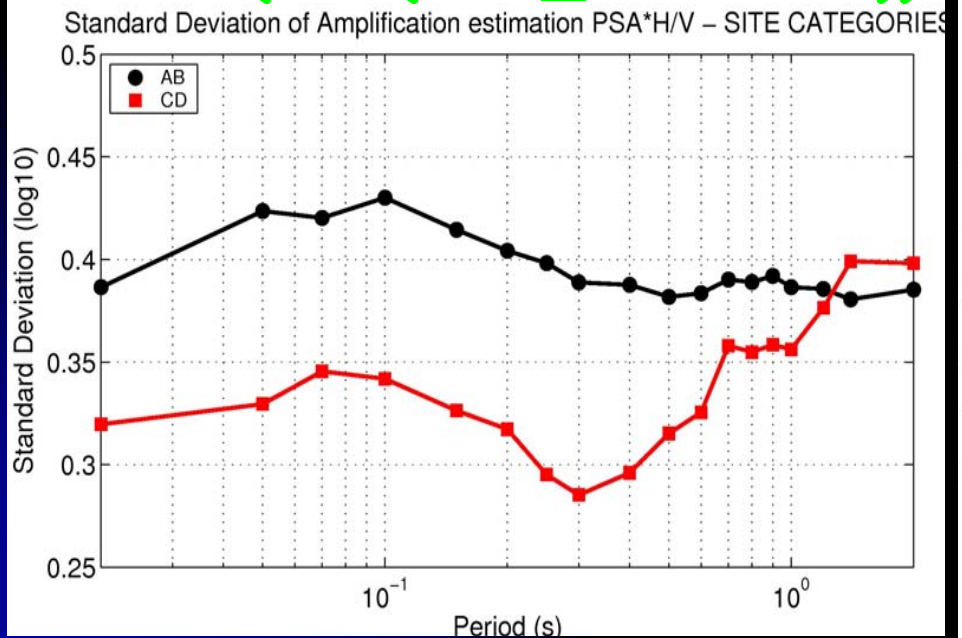
SCIII	0.4 <= T < 0.6
SCIV	T >= 0.6
SCV	T unknown & orig. AB site
SCVI	T unknown & orig. CD site
SCVII	Unknown

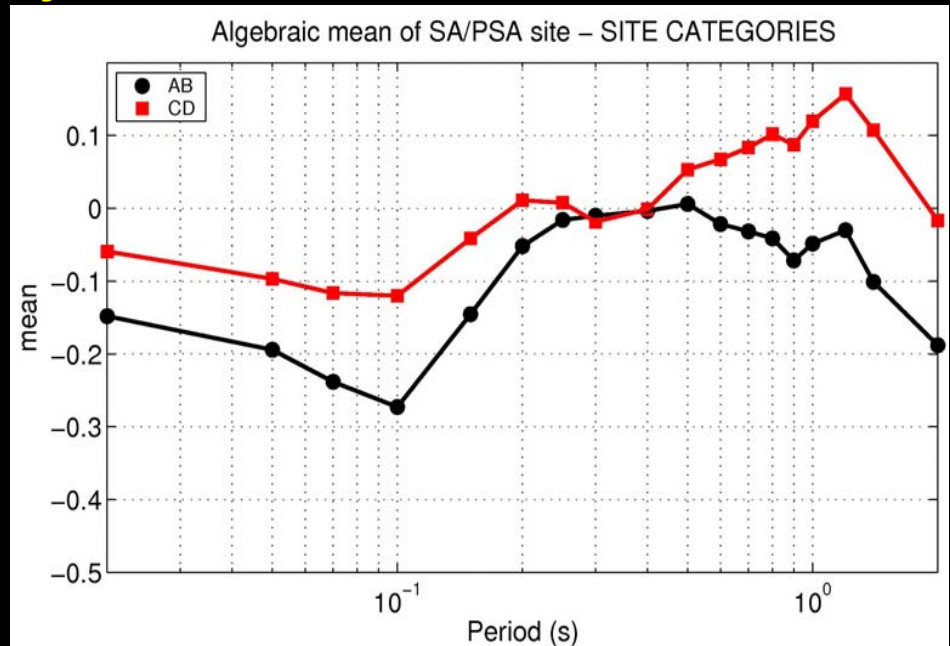


Can we use H/V as a proxy for transfer function?

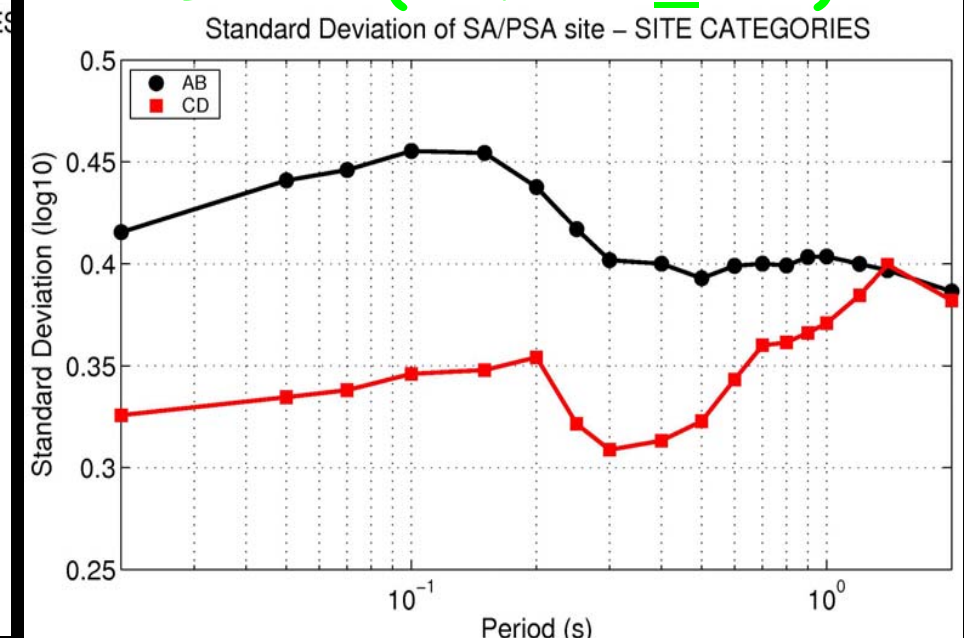


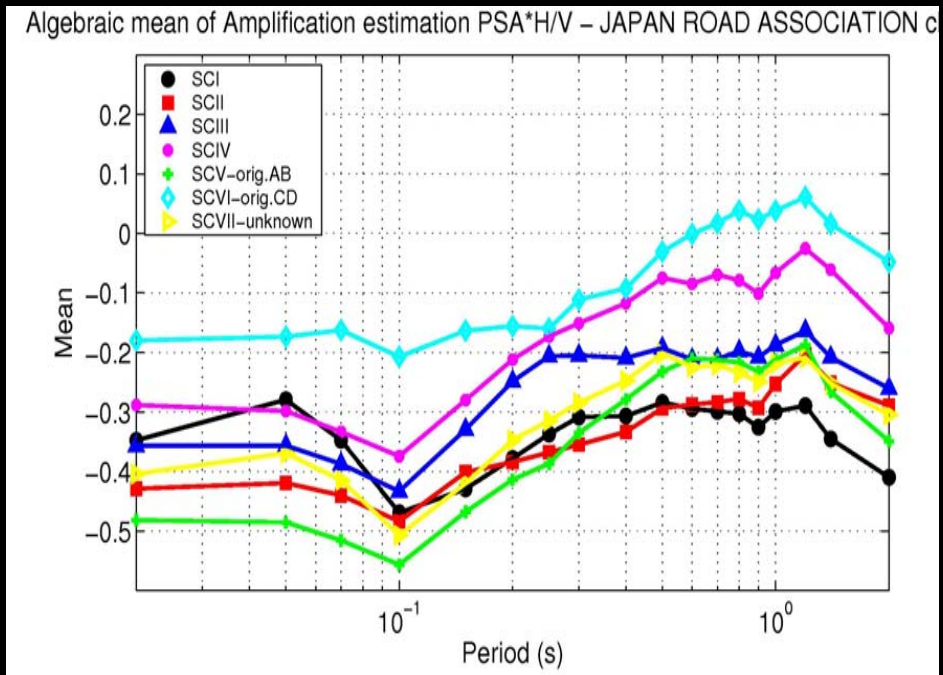
LOG10(SA/(PSA_rock*H/V))

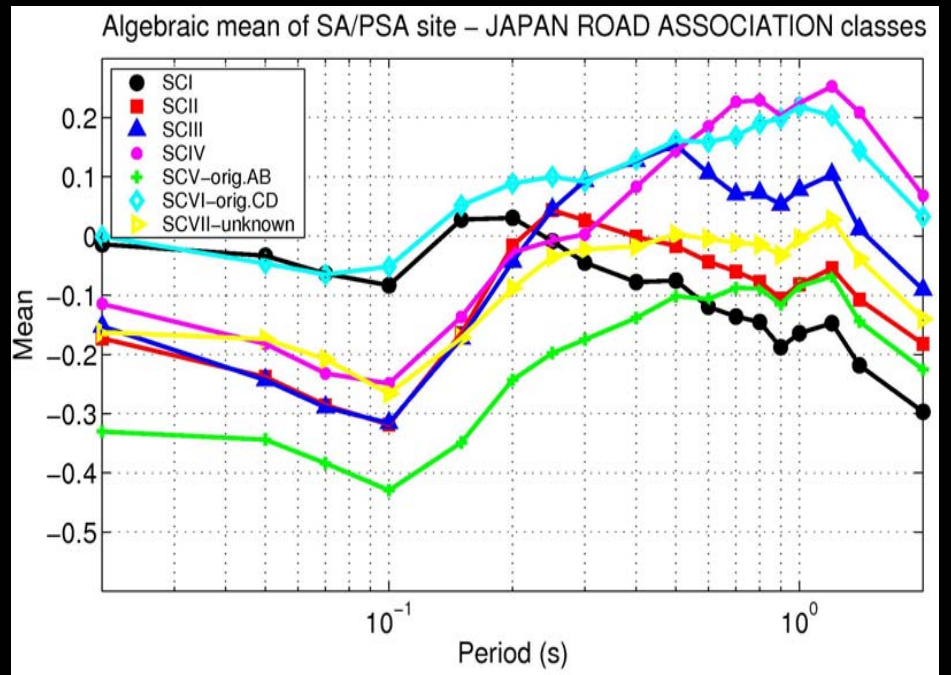


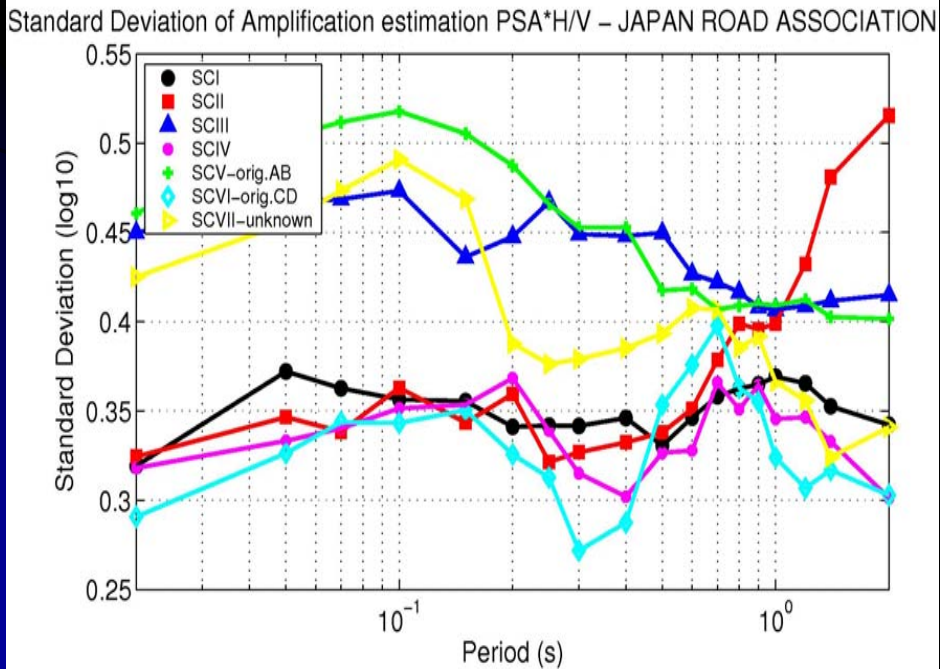


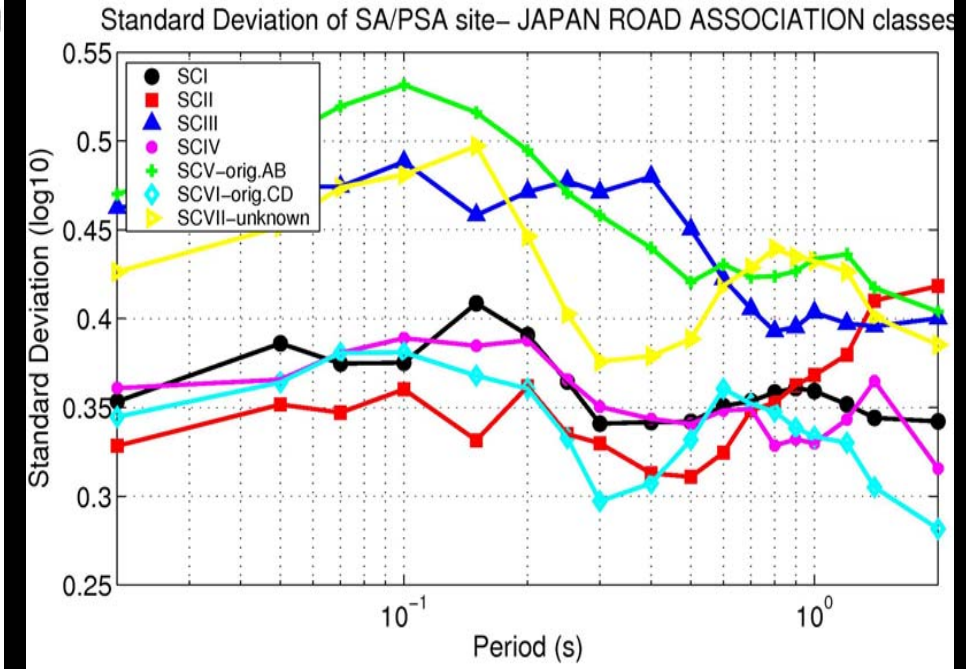
LOG10(SA/PSA_site)




Algebraic mean of Amplification estimation PSA*H/V – JAPAN ROAD ASSOCIATION c
SCI
SCII
SCIII
SCIV
SCV–orig.AB
SCVI–orig.CD
SCVII–unknown
Mean
Period (s)


Algebraic mean of SA/PSA site – JAPAN ROAD ASSOCIATION classes
SCI
SCII
SCIII
SCIV
SCV–orig.AB
SCVI–orig.CD
SCVII–unknown
Mean
Period (s)


Standard Deviation of Amplification estimation PSA*H/V – JAPAN ROAD ASSOCIATION
SCI
SCII
SCIII
SCIV
SCV–orig.AB
SCVI–orig.CD
SCVII–unknown
Standard Deviation (log10)
Period (s)


Standard Deviation of SA/PSA site– JAPAN ROAD ASSOCIATION classes
SCI
SCII
SCIII
SCIV
SCV–orig.AB
SCVI–orig.CD
SCVII–unknown
Standard Deviation (log10)
Period (s)