Università dell'Aquila

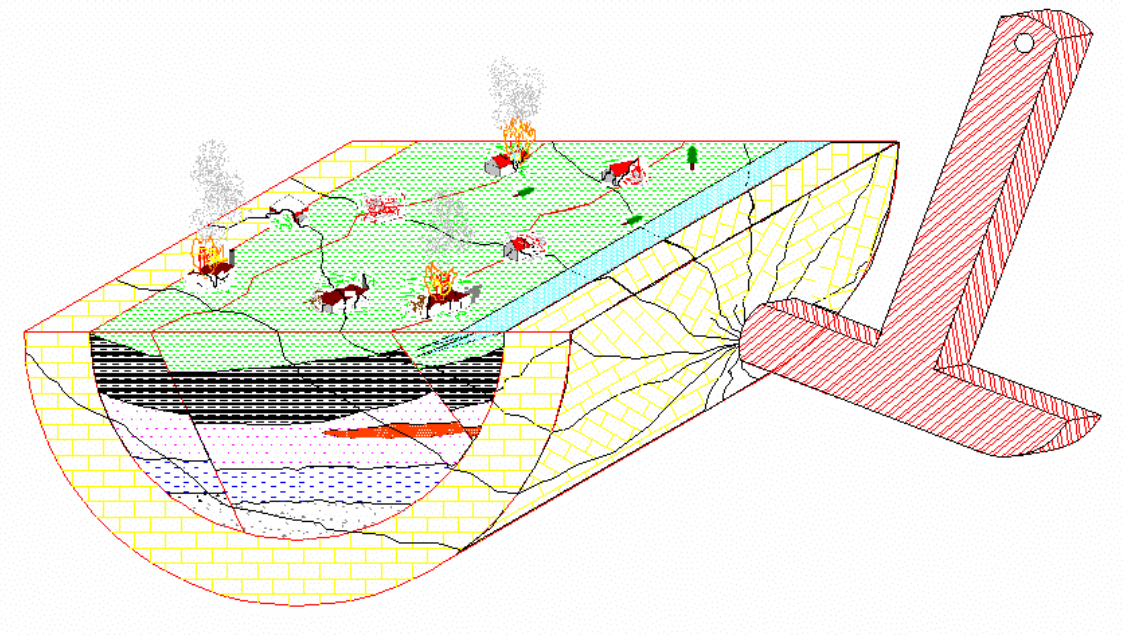
Gruppo Geotecnico Dipartimento DISAT

Calabrese, Marchetti, Monaco, Totani

MISURE DI Vs (Go) mediante DILATOMETRO SISMICO

Prof. Silvano Marchetti

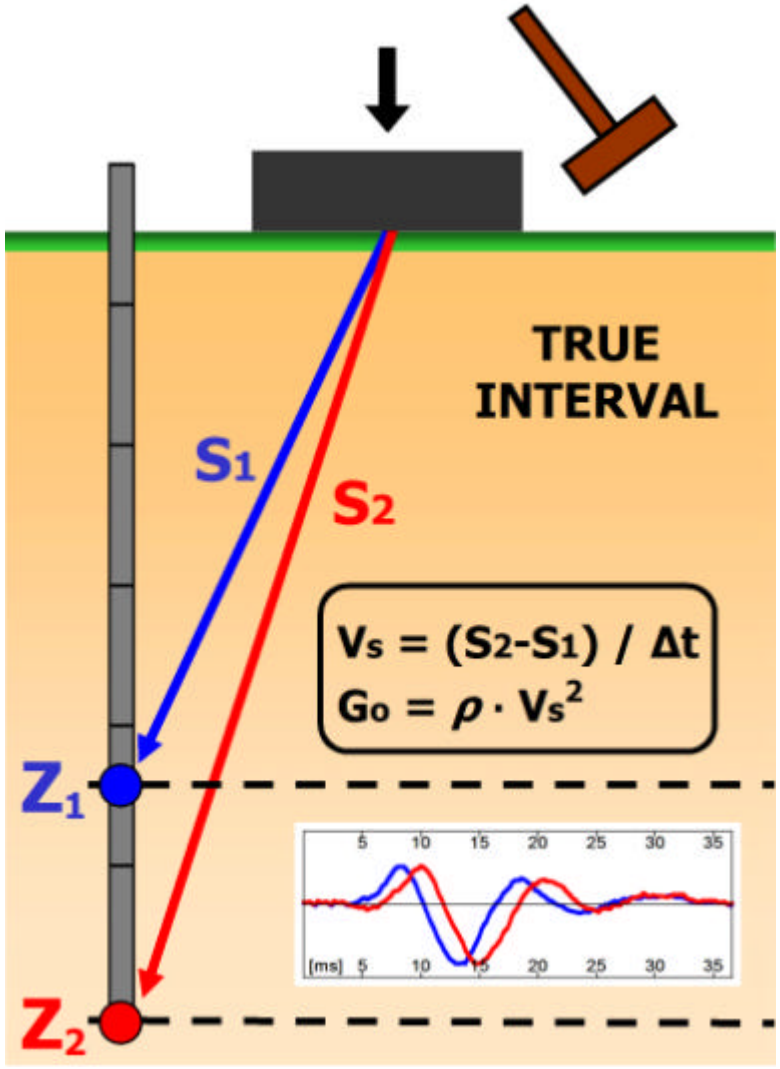
Risposta sismica locale



- Vs (Go): mattoni basilari risposta sismica
- Condividere esperienza SDMT dal 1999

Mayne (1999) "Small- and Large-Strain Soil Properties from Seismic Flat Dilatometer Tests", Proc. Pre-failure Deformation Characteristics of Geomaterials, Jamiolkowski et al. editors, Torino.

DILATOMETRO SISMICO



SDMT **<u>Combinazione S - DMT</u>**

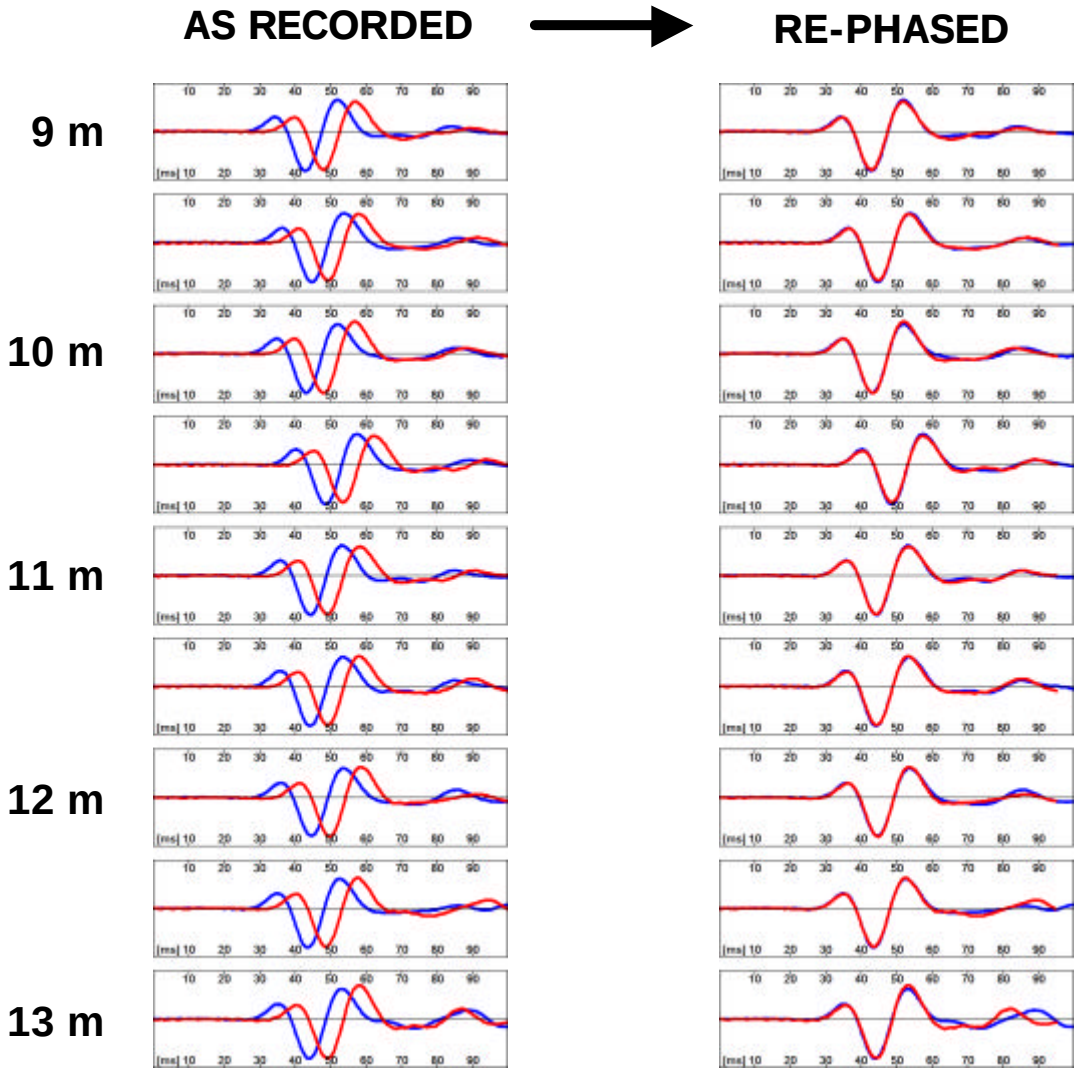
2 ricevitori
- **No primo arrivo…**
- **Stesso impulso**

Amplificato + digitalizzato in profondità

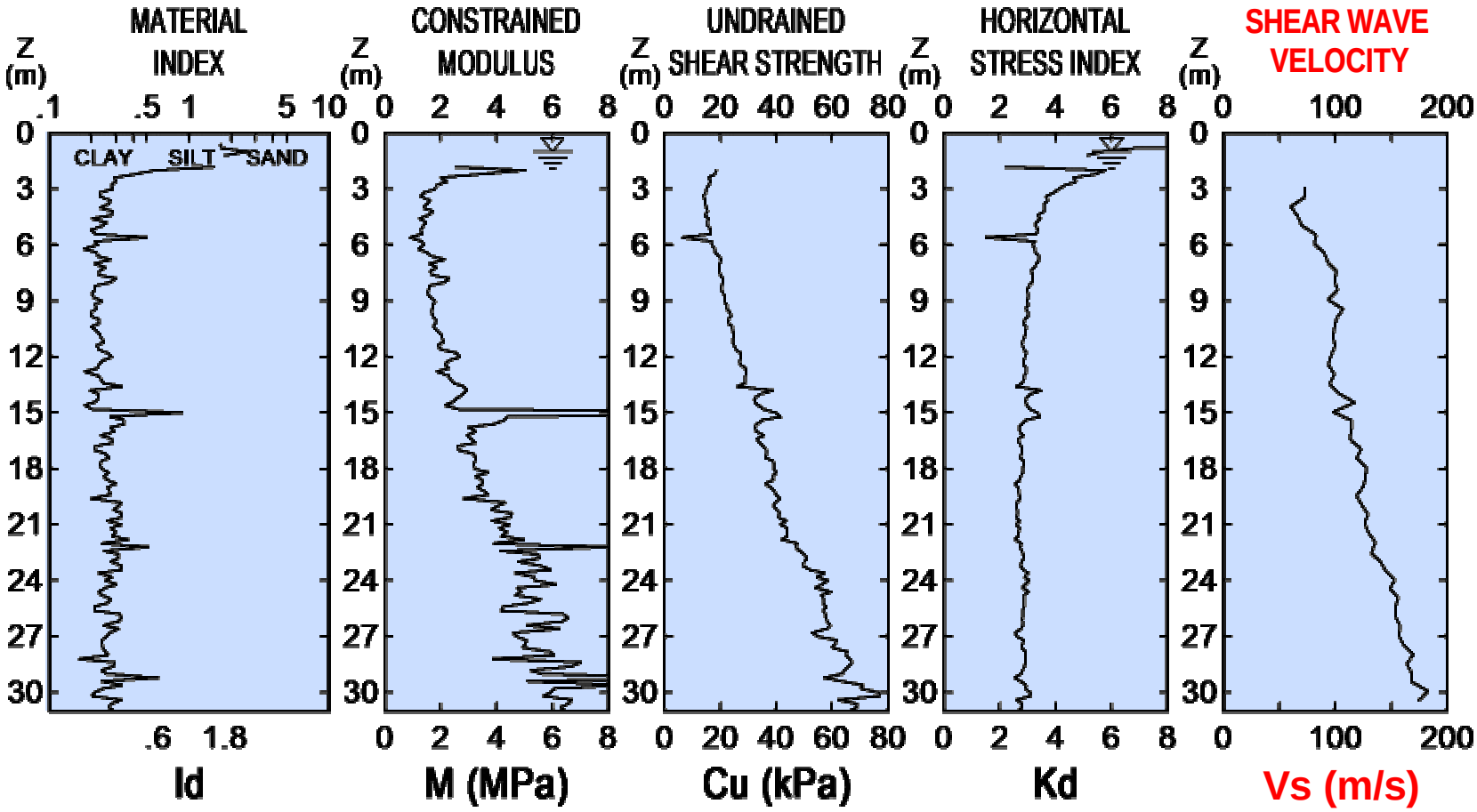
No foro – aderenza – indip. operatore (e interpret.)

Rapida & economica

SDMT at Fucino (June 2004)



SDMT RESULTS – Fucino



Repeatability of Vs

Each Vs corresponds to a blow of the hammer

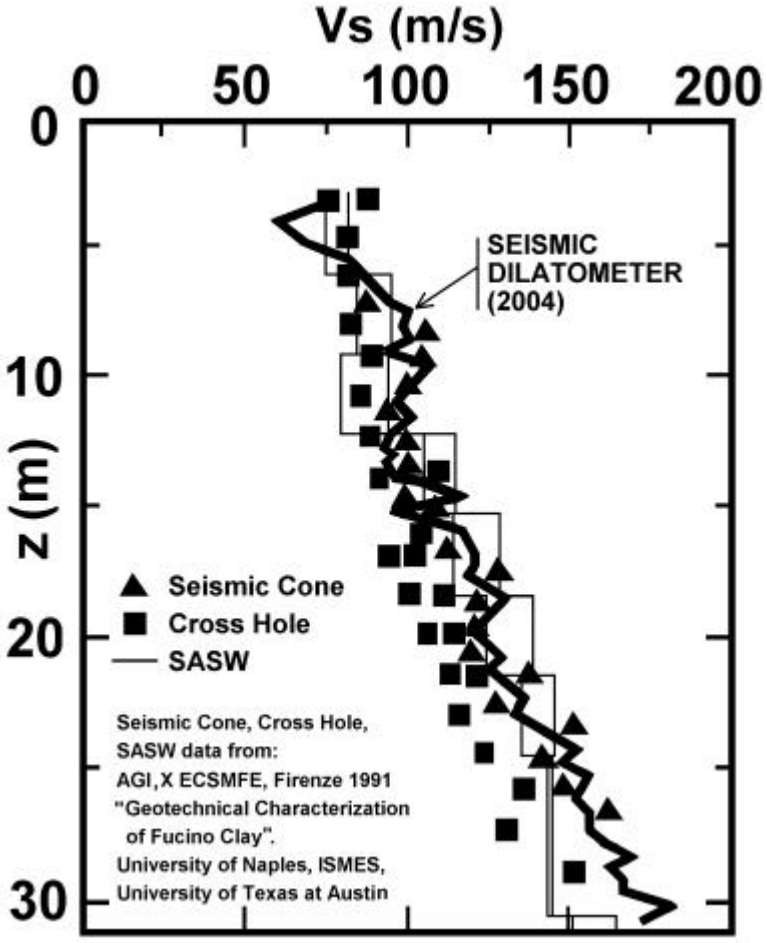
Differences of Vs: 1 m/s

Fucino

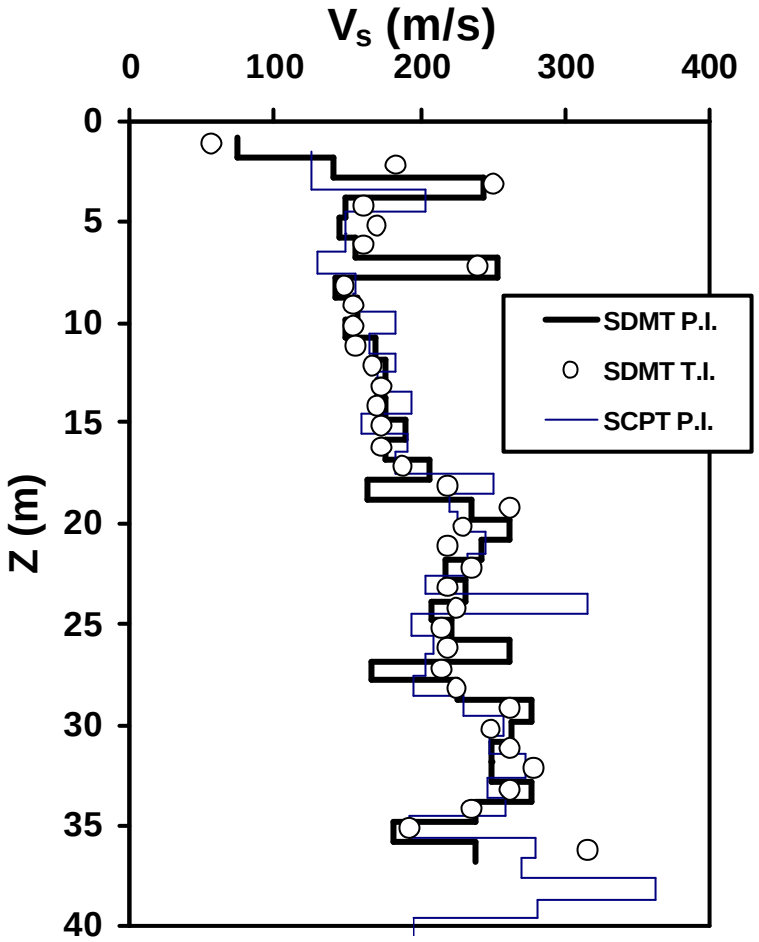
Z [m]	Vs [m/s]		
10.0	101	101	
10.5	99	99	
11.0	98	98	
11.5	99	100	
12.0	97	96	
12.5	94	94	
13.0	99	99	
13.5	95	95	
14.0	103	103	
14.5	117	117	117
15.0	98	98	98
15.5	115	115	
16.0	114	114	
16.5	113	113	
17.0	122	123	
17.5	119	119	
18.0	128	128	
18.5	127	127	
19.0	125	125	
19.5	119	119	
20.0	124	124	124

Comparisons Vs-SDMT

Fucino Research Site

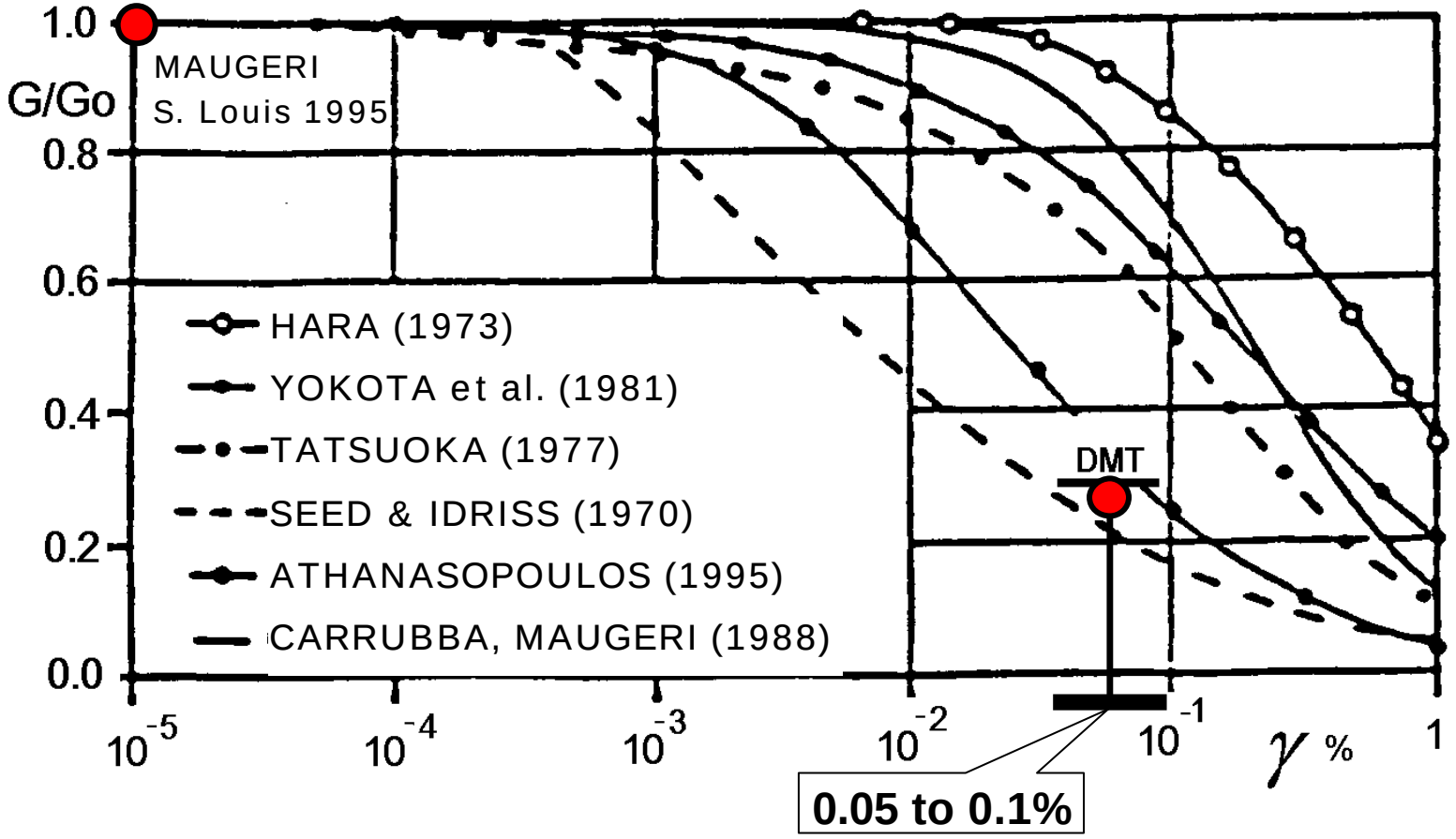


Venezia - Treporti



Hammer

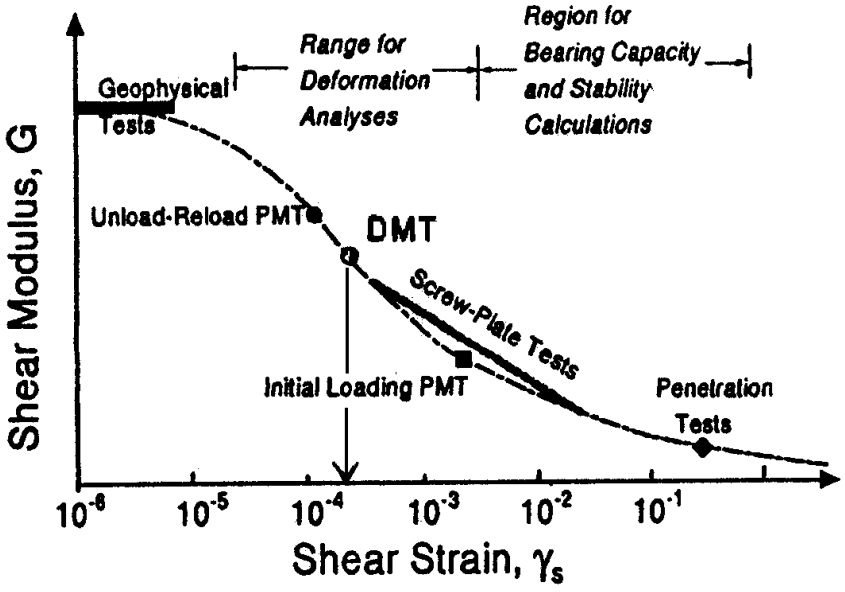
SDMT misura, oltre Go, un modulo a “deformazioni operative” (cedimenti statici fondazioni)



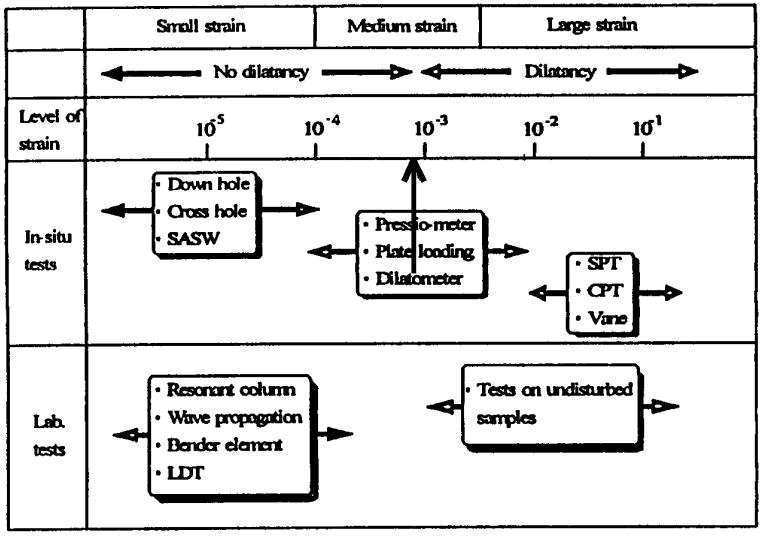
Due punti aiutano a scegliere la curva G - g

γ - Range for DMT Modulus

Mayne – Insitu 2001, Bali



Ishihara – Insitu 2001, Bali



DMT FOR LIQUEFACTION

• Factors (SH) making DMT + sensitive to compaction and + accurate settlements :are known to affect "liquefiability"

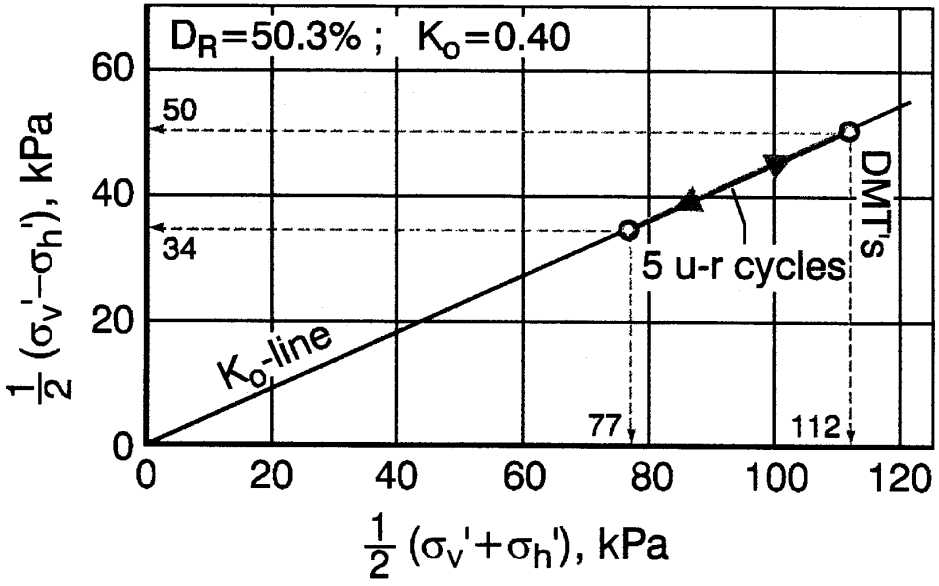
> **Jamiolkowski's res. group (S.F. 1985): "*reliable predictions [of liquefiability] in complex stress-history deposits require the development of some new in situ device [other than CPT or SPT] more sensitive to the effects of past stress and strain histories*".**

•Less disruptive insertion in loose sand

Clean sand is safe against Liquefaction (M=7.5 earthquakes) if Kd > :

Seismicity of the area	amax/g	Kd,min
Nonseismic	/	1.7
Low seismicity	0.15	4.2
Average seismicity	0.25	5.0
High seismicity	0.35	5.5

SENSITIVITY of PENETRATION RESISTANCE and $K_{D\text{-}DMT}$ to PRESTRAIN



	I_D (-)	K_D (-)	E_D (MPa)	M_D (MPa)	q_D (MPa)
Before	2.62	1.98	29.0	30.3	16.0
After	2.41	2.38	31.8	37.8	16.4

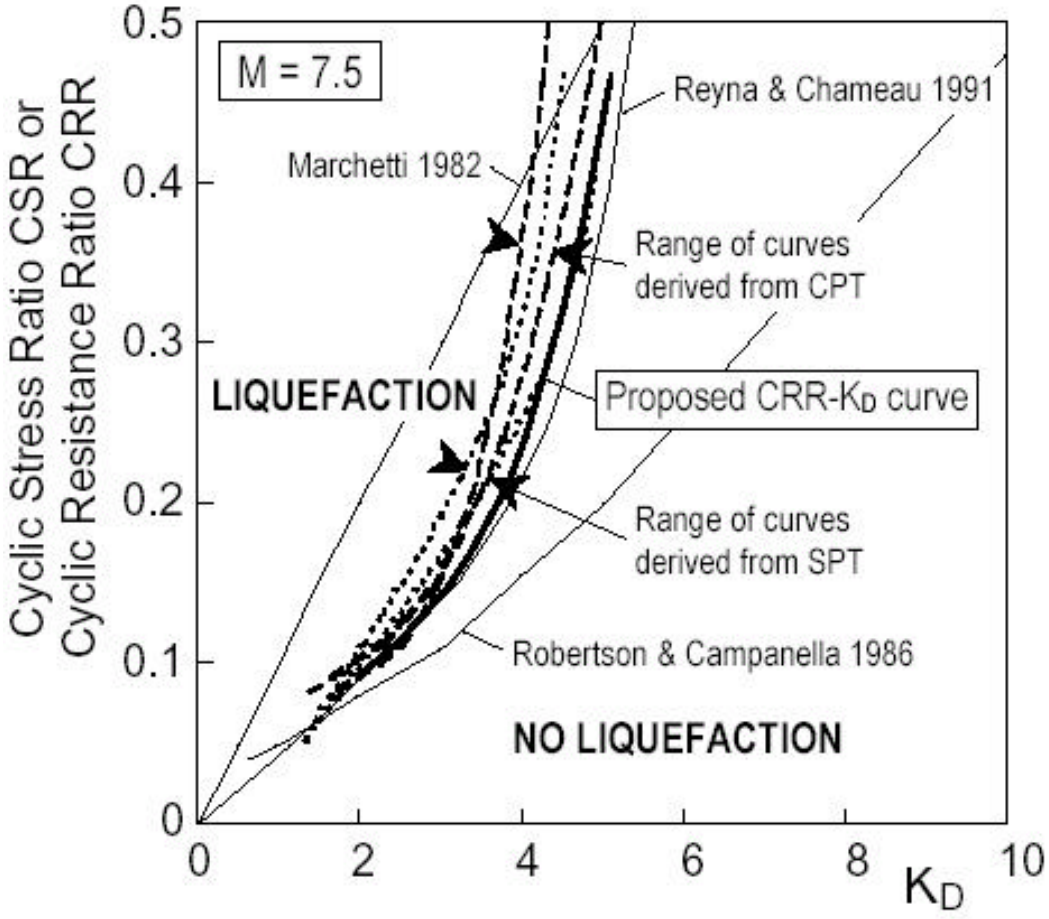
+20% Kd increase

+3% Penetr. resist. increase

Calibration Chamber

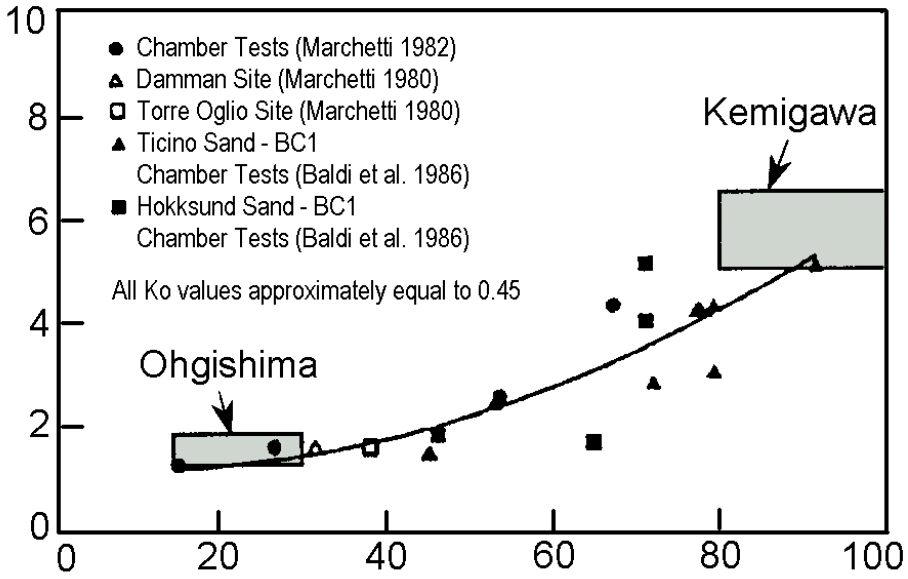
Jamiolkowski Res. group

Curve CRR-Kd per stimare liquefacibilità mediante DMT con procedura di Seed-Idris

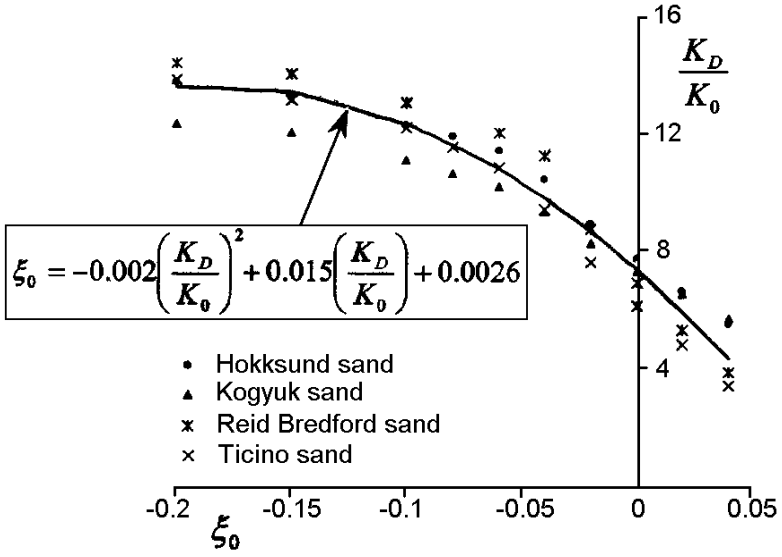


Monaco et al., Osaka 2005

Correlations Kd-Dr and Kd - x



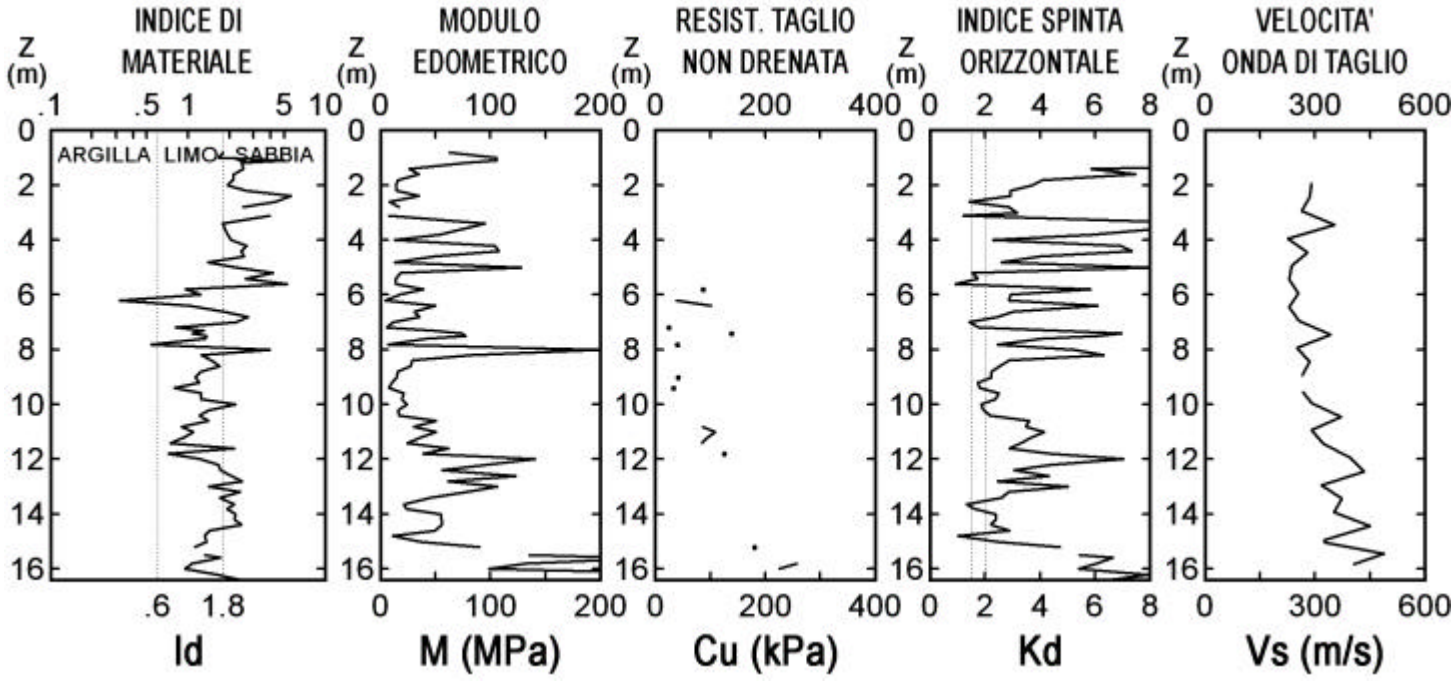
Correlation K_D -D_r for NC uncemented sands (Reyna & Chameau 1991), also including Ohgishima and Kemigawa datapoints obtained by Tanaka & Tanaka (1998) on high quality frozen samples



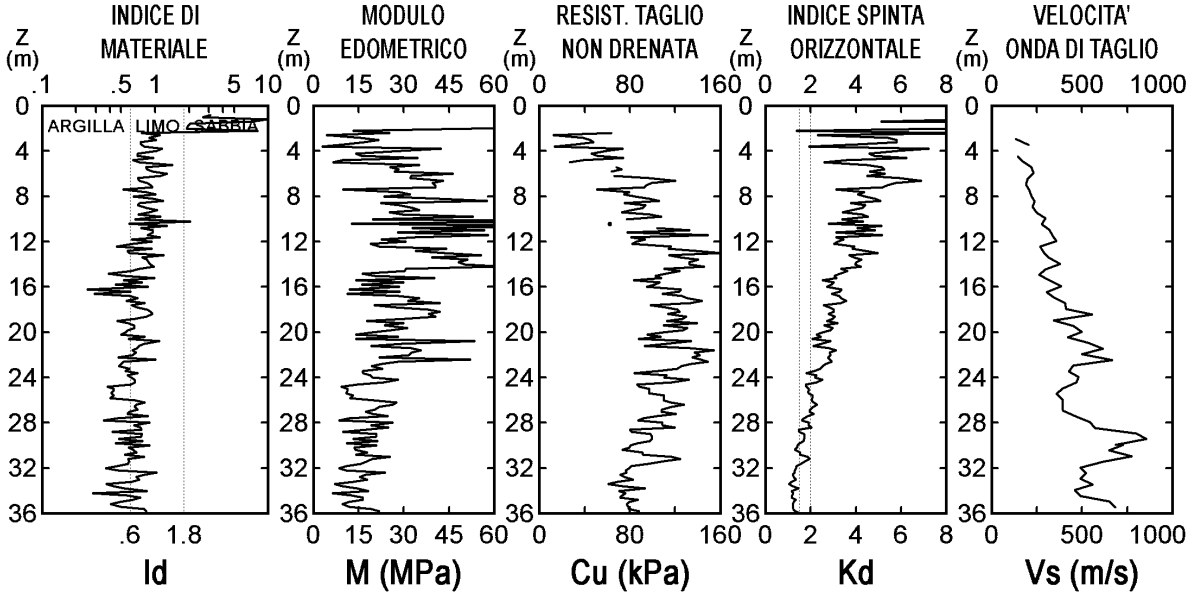
Average correlation K_D - in situ state parameter ξ_o (Yu 2004)

SDMT Studio Pilota Benevento

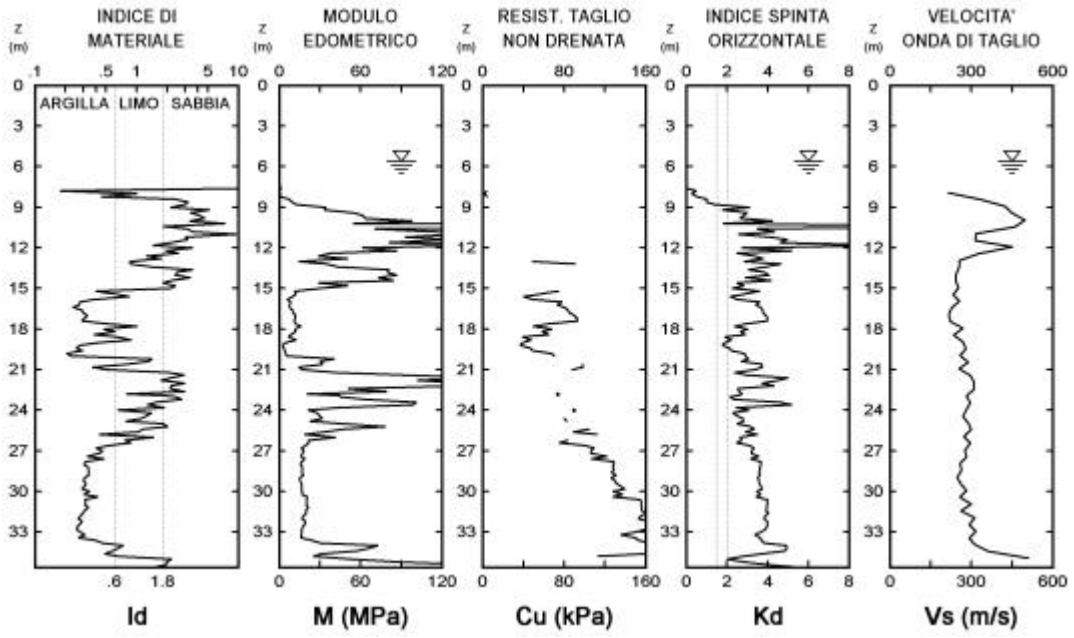
GNDT - Proff. Vinale e Simonelli



SDMT Nucleo
Diga di Camastra

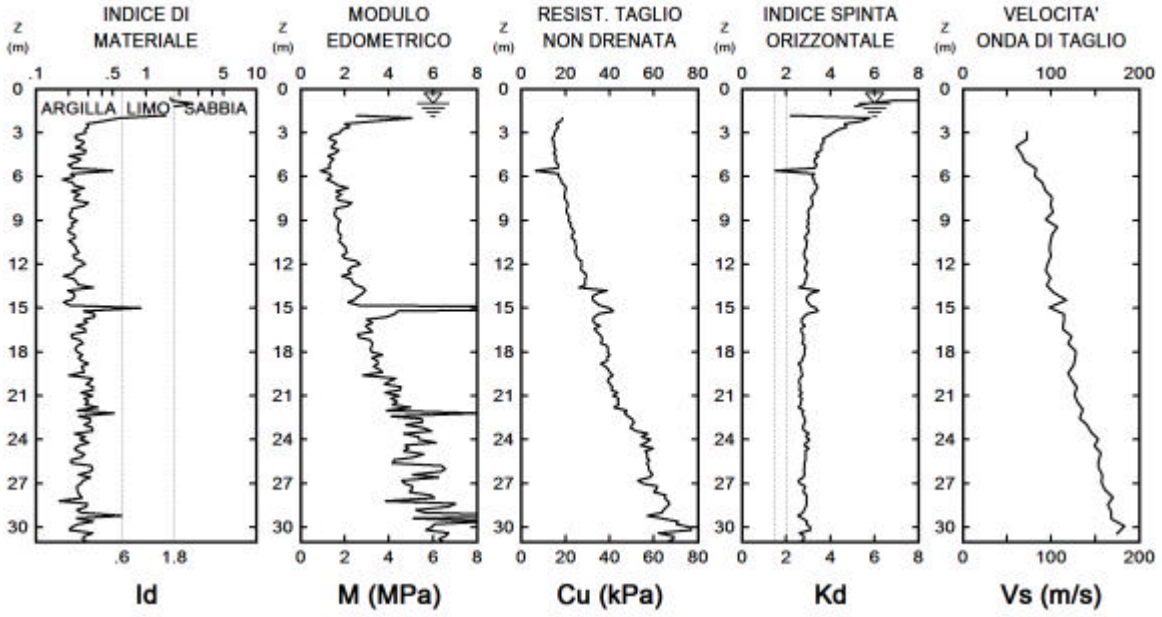


SDMT a Cassino
FFSS alta velocità



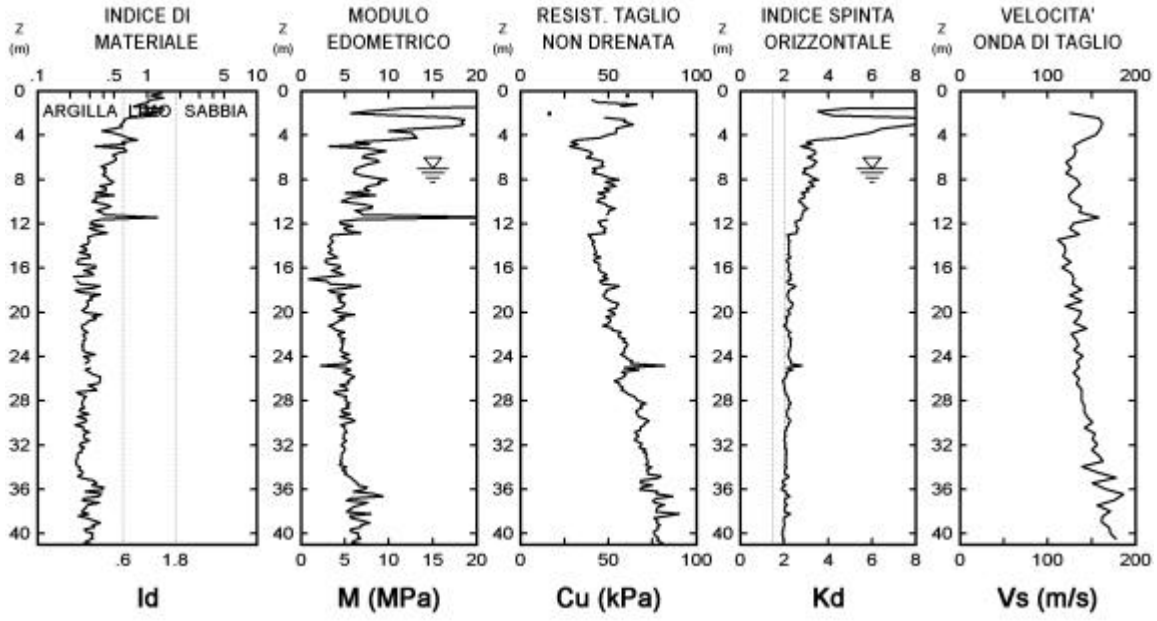
SDMT Fucino

Centro Telespazio

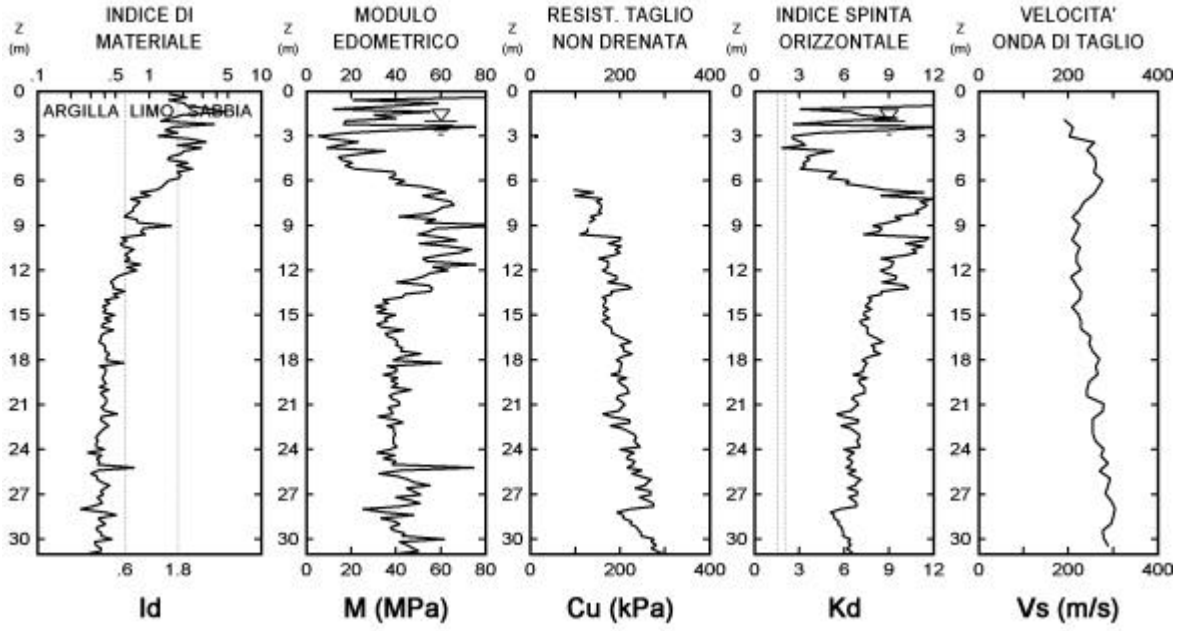


SDMT

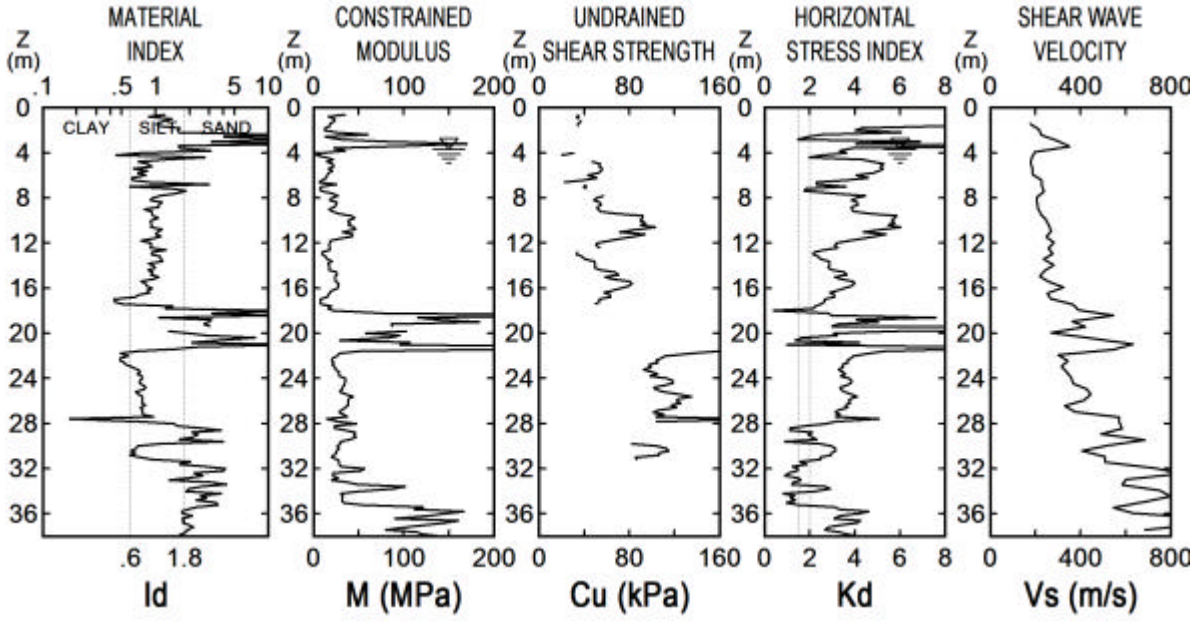
ST Microelectronics CATANIA



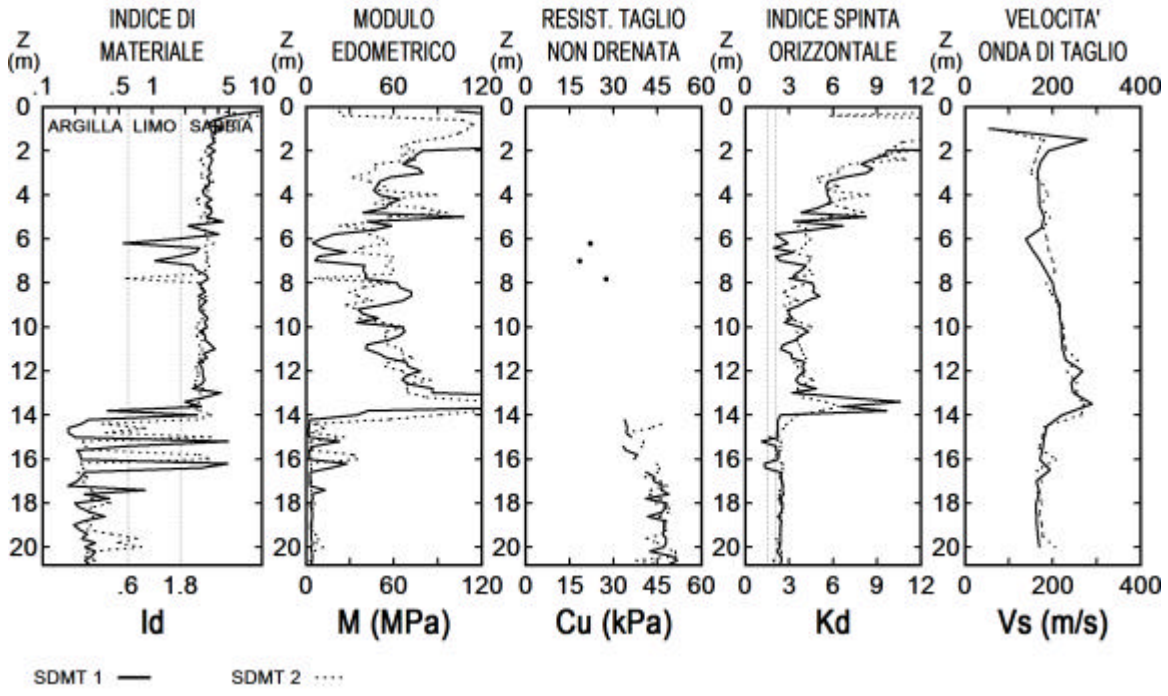
SDMT
Villa Comunale
Bellini di Catania



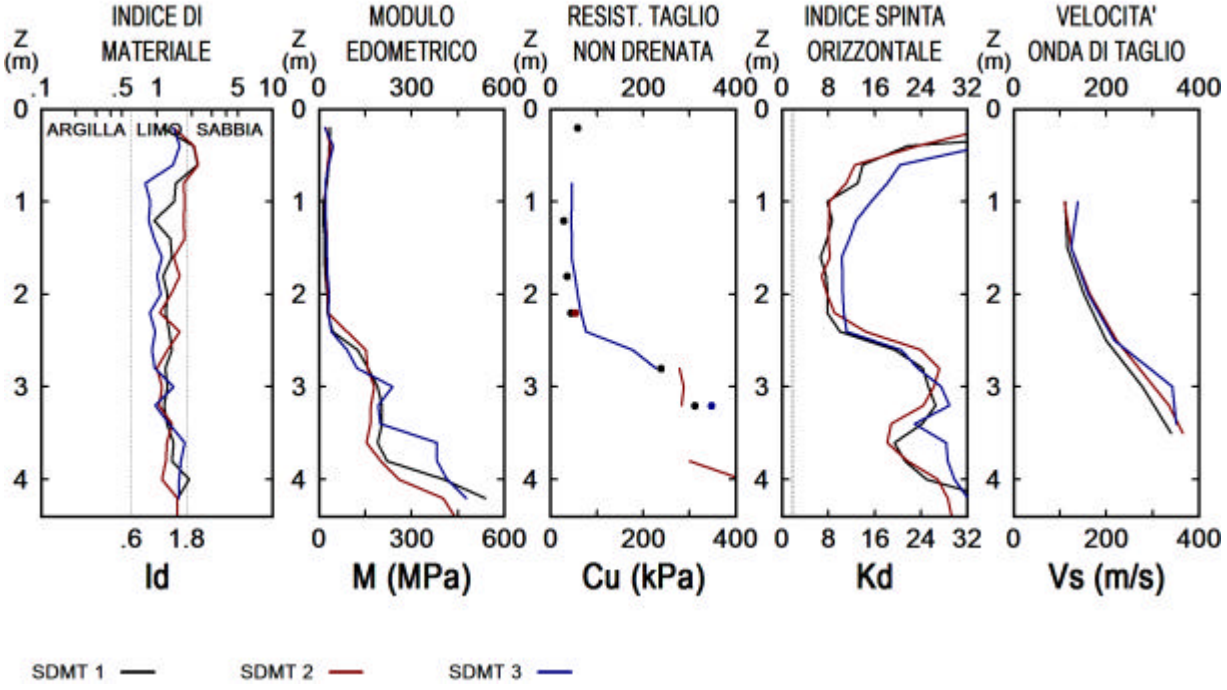
SDMT
Nuova Stazione FFSS
Alta Velocita' Bologna



SDMT
Fiumicino – Roma
Feb 2005

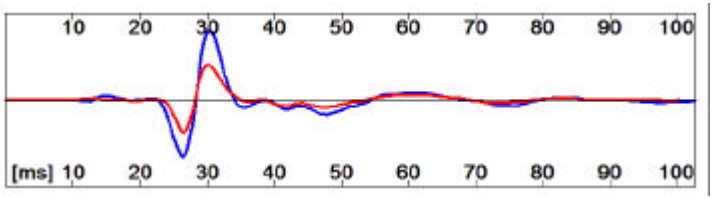


SDMT
Casilino – Roma
Apr 2005

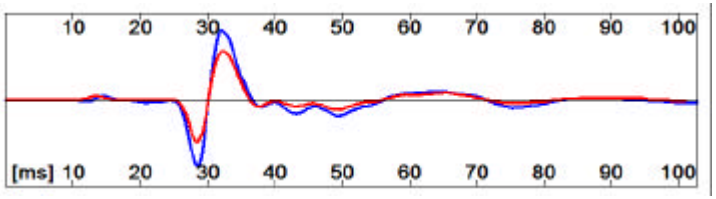


Prove SDMT Casilino

Z = 2.50 m



Z = 3.00 m



Attenuazione segnale:

- **Attenuazione geometrica**
- **Aumento di rigidezza**
- **Damping**

SDMT 1 - ripetibilità

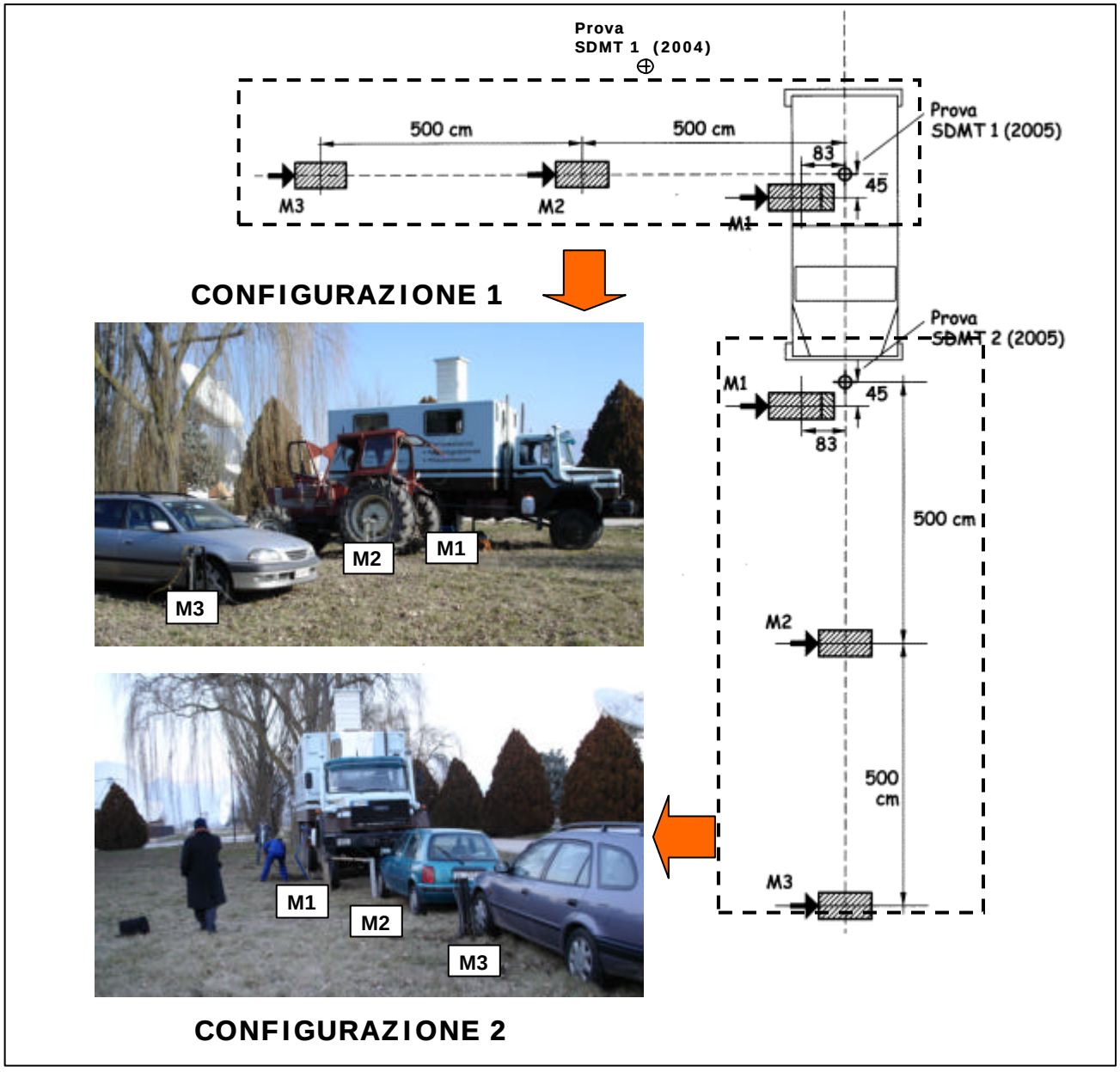
Z (m)	Vs (m/s)				
1.00	110	111	112	112	111
1.50	116	116	116	116	
2.00	152	152	152	152	
2.50	201	200	199	200	201
3.00	277	277	278	277	281
3.50	336	341	340	340	340

Recommendation by Fahey

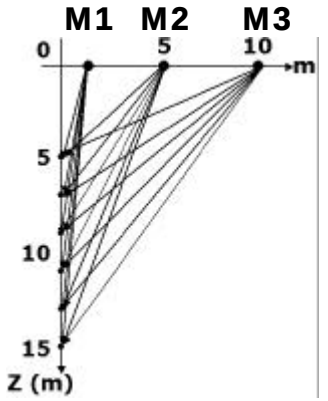
(Bali 2001)

- “*It is poor practice to perform penetration tests without Vs*”
- Perciò misuriamo Vs di routine
- Causa ordinanza, Enti (pubblici) richiedono Vs

Sorgenti a distanze diverse



Obliquità



Fucino – Telespazio
14 GEN 2004

LEGENDA

M1 = Martello 1

M2 = Martello 2

M3 = Martello 3