

Agreement INGV-DPC 2007-2009

Project S4: ITALIAN STRONG MOTION DATA BASE

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<http://esse4.mi.ingv.it>

Appendix # D

Spectral classification of ITACA stations

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1. Scope

According to Zhao et al. (2006) and Fukushima et al. (2007) a site classification scheme is adopted based on the predominant period of the station site. The site predominant period is identified from the average horizontal-to-vertical (H/V) spectral ratios of the 5%-damped response spectra of accelerograms of ITACA. For each station, the geometric mean of acceleration response spectra is computed using a selected database including events with Mw >4.0 and R > 200 km. The site classification is made looking at the period where the spectral peak occurs (see Figure 1). There are four options when the average curve shows a clear peak (exceeding a threshold of 2), the period intervals being defined by the values 0.2, 0.4 and 0.6 sec (CL-I to CL-IV corresponding respectively to the first four period intervals shown in Figure 1). When the average spectral ratio has a flat behaviour and no peak exceeds the value of 2, the station is classified as CL-V. This is a very important class because it implies absence of amplification of horizontal motions and is indicative of hard rock stations. The last two cases are attributed when (CL-VI) a broad amplification or multiple peaks occur at periods T > 0.2 s, and (CL-VII) many peaks are everywhere including the range T < 0.2 sec.

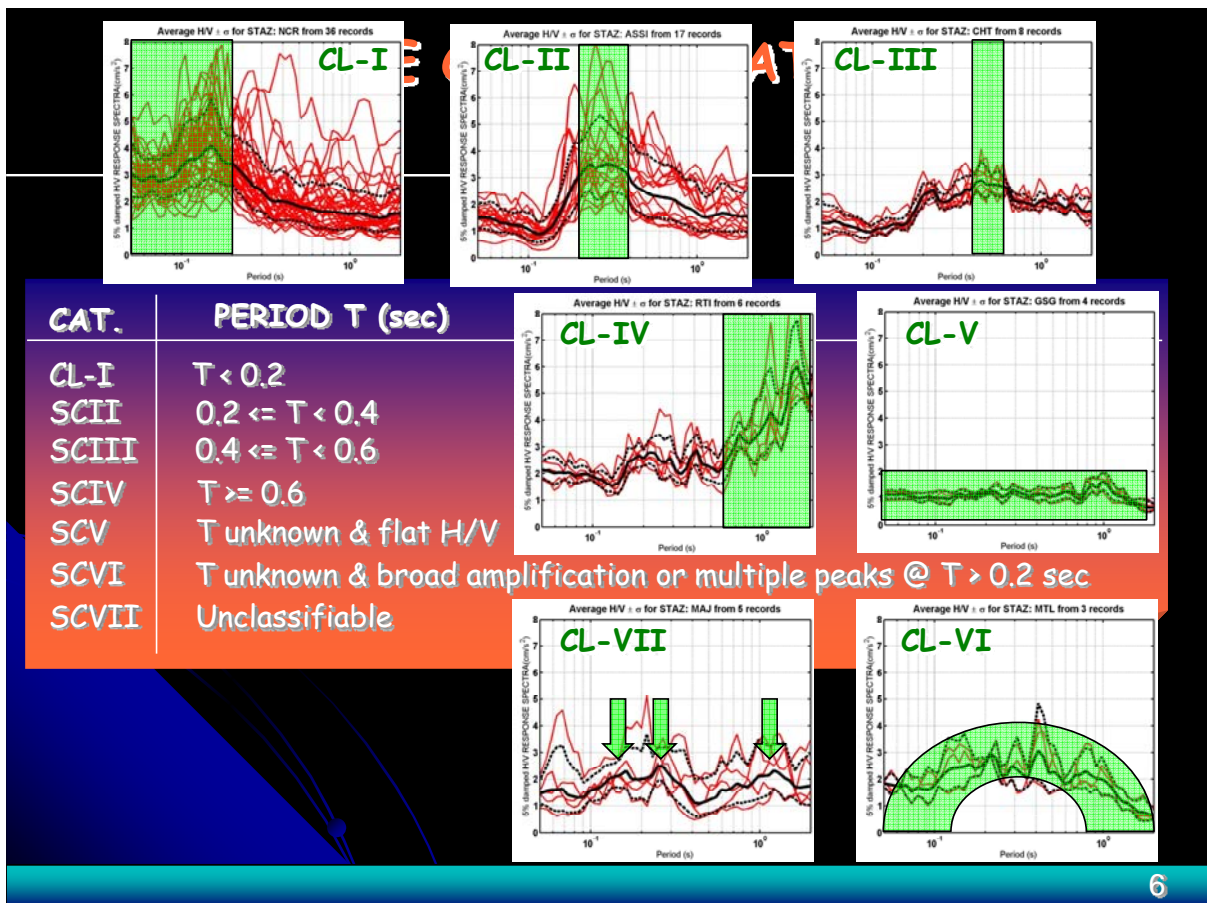


Figure 1. Site classification based on predominant period in H/V spectral ratios of 5% damped response spectra. The figure shows one example for each of the seven site classes that have been defined in the project.

2. Site classification based on the predominant period of the ITACA stations

This classification was made for accelerometer stations for which single and multiple instrumental recordings were available. Overall 209 sites were classified (see Table 1). The percentage distribution of spectral classes for ITACA sites is shown in Figure 2.

Table 1. Spectral classification for 209 ITACA sites.

Station_Code	Latitude	Longitude	Station_Name	Altitude (m)	Spectral_classification
ACR	39,48905900	16,37986000	ACRI	707	CL-II
ALD	39,92981000	16,46534900	ALBIDONA	708	CL-III
ALT	40,55611111	15,39500000	AULETTA (PETINA)	343	CL-VII
AMN	39,13672600	16,07964700	AMANTEA (CAB. ENEL)	98	CL-III
AMT	42,63246000	13,28617600	AMATRICE	950	CL-VII
ANNI	43,05339000	12,85663000	ANNIFO		CL-VII
ANP	43,60222222	13,47416667	ANCONA - PALOMBINA	47	CL-VI
ANR	43,62111111	13,51277778	ANCONA - ROCCA	48	CL-VI
ANT	42,41811000	13,07859800	ANTRODOCO	568	CL-VI
AQG	42,37347400	13,33702600	L'AQUILA - V. ATERNO - COLLE GRILLI	721	CL-VII
AQI	42,34490000	13,40090000	L'AQUILA - V. ATERNO - AQUIL PARK I	730	CL-IV
AQK	42,34496700	13,40094900	L'AQUILA - V. ATERNO - AQUIL PARK IN	726	CL-IV
AQM	42,37864300	13,34926200	L'AQUILA - V. ATERNO - IL MORO	724	CL-I
AQV	42,37722222	13,34388800	L'AQUILA - V. ATERNO - CENTRO VALLE	692	CL-II
ARI	41,15250000	15,09111111	ARIANO IRPINO	750	CL-V
ARN	41,02694444	14,46888889	ARIENZO	92	CL-II
ARQ	42,77222222	13,29444444	ARQUATA DEL TRONTO	700	CL-V
ASG	45,85583333	11,47388889	ASIAGO (ROANA)	974	CL-VII
ATN	41,62027778	13,80138889	ATINA	440	CL-II
ATP	41,64500000	13,78333333	ATINA - PRETURA ESTERNO		CL-I
AUP	46,50645400	13,25634300	AUPA	960	CL-II
AVZ	42,02745800	13,42592900	AVEZZANO	746	CL-IV
BBB	43,70944444	11,82583333	BIBBIENA	400	CL-I
BGI	40,83083333	15,06805556	BAGNOLI IRPINO	672	CL-V
BGL	43,99583100	10,57691600	BAGNI DI LUCCA	450	CL-III
BGN	44,32055556	9,99027778	BAGNONE	362	CL-VII
BNV	41,11694444	14,79750000	BENEVENTO	205	CL-II
BRB	43,95420500	11,21286700	BARBERINO DI MUGELLO	426	CL-I
BRC	46,18694444	12,55361111	BARCIS	427	CL-I
BRG	44,06833330	10,46111111	BARGA	268	CL-V
BRN	40,47194444	15,63444444	BRIENZA	691	CL-I
BRS	42,32388889	13,59027778	BARISCIANO	920	CL-II
BSC	41,00972222	15,37611111	BISACCIA	887	CL-V
BSS	42,19000000	13,84361111	BUSSI	266	CL-VII
BSZ	44,03151300	11,46733600	BORGO S. LORENZO (NUOVA)	682	CL-V
BUI	46,22166667	13,09027778	BUIA	163	CL-IV
BVG	42,93238900	12,61105600	BEVAGNA	205	CL-IV
BVN	41,24861100	15,34222200	BOVINO	605	CL-VII
CAG	43,05444400	12,82888800	CASSIGNANO		CL-I
CAMO	41,61700000	15,10200000	CASALNUOVO MONTEROTARO		CL-II

Station_Code	Latitude	Longitude	Station_Name	Altitude (m)	Spectral classification
CASA	41,73900000	14,84600000	CASACALENDA		CL-III
CAST	41,70100000	14,73200000	CASTELLINO DEL BIFERNO		CL-VII
CAT	37,44694444	15,04666667	CATANIA (PIANA)	10	CL-IV
CDI	37,49411000	14,64298800	CASTEL DI IUDICA	471	CL-VI
CDR	45,95888889	12,98416667	CODROIPO	42	CL-II
CDS	41,78714000	14,11187000	CASTEL DI SANGRO	932	CL-VII
CESM	43,00466500	12,90333200	CESI MONTE		CL-II
CESV	43,00388800	12,90111100	CESI VALLE		CL-I
CHT	42,36982700	14,14780900	CHIETI	109	CL-III
CLC	43,02938800	12,89127700	COLFIORITO CASERMETTE		CL-I
CLF	43,03589800	12,92053800	COLFIORITO	753	CL-IV
CLG	37,21163600	14,52077000	CALTAGIRONE	531	CL-VII
CLN	42,08522400	13,52072200	CELANO	803	CL-VII
CLT	40,89833333	15,43861111	CALITRI	595	CL-III
CMM	41,86832000	14,44984000	CASTIGLIONE MESSER MARINO	1.137	CL-IV
CNG	45,88305556	12,28833333	CONEGLIANO 5	63	CL-IV
CNV	45,96898700	12,44904500	CANEVA	101	CL-II
CONT	42,40900000	12,76600000	CONTIGLIANO		CL-V
COR	39,11772200	16,38002000	CORACI (CAB. ENEL)	879	CL-IV
COS	39,28907000	16,25768300	COSENZA (NUOVA)	376	CL-II
CPS	42,27200000	13,75800000	CAPESTRANO	585	CL-III
CSAD	43,00700000	12,59100000	CASTELNUOVO (ASSISI)		CL-II
CSC	42,71888889	13,01333333	CASCIA	677	CL-V
CSN	44,13700500	12,24140800	CESENA	100	CL-II
CSN0	41,52305556	13,86361111	CASSINO - SANT'ELIA		CL-VI
CSR	42,75500000	13,00416667	CASCIA - PETRUCCI	617	CL-IV
CSV	42,29750000	13,62916667	CASTELNUOVO (SAN PIO)	819	CL-VI
CSZ	39,30416667	16,24722222	COSENZA	240	CL-IV
CTC	43,46305556	12,25305556	CITTÀ DI CASTELLO	308	CL-VII
CVL	39,81685300	16,19475400	CASTROVILLARI	483	CL-VII
CVT	44,00527778	11,93750000	CIVITELLA DI ROMAGNA	226	CL-II
DCM	43,89123500	11,51801100	DICOMANO	200	CL-I
FAZ	44,29801600	11,89074600	FAENZA (NUOVA)	71	CL-III
FHC	42,76111111	13,21027778	FORCA CANAPINE (ARQUATA TRONTO)	1.473	CL-II
FIE	43,80725100	11,29438500	FIESOLE	351	CL-VII
FLT	46,01944444	11,91194444	FELTRE	305	CL-I
FOR	44,19940900	12,04191600	FORLI' (NUOVA)	77	CL-IV
FORC	42,96100000	12,95200000	FORCELLA		CL-II
FRC	46,22111111	12,99666667	FORGARIA CORNINO	216	CL-III
FRE	44,12928000	11,39785000	FIRENZUOLA	457	CL-III
FRR	38,05111111	16,13250000	FERRUZZANO (AFRICO NUOVO)	18	CL-III
GBB	43,35700000	12,60200000	GUBBIO	407	CL-II
GBP	43,31381600	12,58955000	GUBBIO PIANA		CL-II

Station_Code	Latitude	Longitude	Station_Name	Altitude (m)	Spectral_classification
GLD	41,50972222	14,75694444	GILDONE	755	CL-V
GRD	42,17850500	14,17985100	GUARDIAGRELE	702	CL-I
GRG1	41,25833333	13,83277778	GARIGLIANO - FREE FIELD 1	5	CL-IV
GRM	40,31027778	15,88527778	GRUMENTO NOVA	575	CL-VII
GRR	37,72611111	15,16277778	GIARRE	240	CL-IV
GVD	45,61000000	10,38361111	GAVARDO (GAZZINO - VALLIO TERME)	315	CL-I
LARI	41,80500000	14,91900000	LARINO		CL-V
LDP	42,03916900	14,18263000	LAMA DEI PELIGNI	780	CL-V
LNS	42,56500000	12,98416667	LEONESSA	950	CL-VI
LPR	38,46815100	14,95690300	LIPARI	67	CL-IV
LRG	40,02111111	15,89000000	LAURIA GALDO	739	CL-I
LRS	40,04611111	15,83500000	LAURIA	425	CL-VI
LSN	41,85277778	15,36000000	LESINA	7	CL-I
LVN	40,78481300	15,30462600	LAVIANO	558	CL-IV
MAJ	46,18233900	13,06892200	MAJANO (NUOVA)	214	CL-VII
MCS	43,99436600	12,10744100	MERCATO SARACENO (NUOVA)	190	CL-II
MFG	38,18881200	15,54062700	MESSINA FORTE GONZAGA	199	CL-VII
MLC	45,81277778	10,85305556	MALCESINE	77	CL-VII
MNF	43,06277778	13,18472222	MONTE FIEGNI (FIASTRA)	642	CL-V
MRL	40,75822100	15,47856500	MURO LUCANO	779	CL-IV
MRS	43,94444444	12,18055556	MERCATO SARACENO	190	CL-VII
MRT	40,78944444	14,76277778	MERCATO S. SEVERINO	155	CL-IV
MRV	40,36135900	15,82648200	MARSICO VETERE	747	CL-II
MSS1	38,20694444	15,51583333	MESSINA 1	456	CL-II
MTL	43,24949700	13,00842800	MATELICA	365	CL-VI
MZZ	38,23412300	15,24513500	MILAZZO (NUOVA)	125	CL-IV
NAS	38,11861111	14,78611111	NASO	470	CL-II
NCB	43,10277700	12,80527700	NOCERA UMBRA BISCONTINI		CL-I
NCM	43,14917000	12,79722200	NOCERA UMBRA SALMATA		CL-V
NCO	38,55304300	15,93804300	NICOTERA (SCUOLA)	271	CL-VII
NCR	43,11158300	12,78466600	NOCERA UMBRA	478	CL-I
NCS	37,75111111	14,40027778	NICOSIA	780	CL-II
NCT	38,97500000	16,31388889	NICASTRO	246	CL-IV
NOCE	43,12000000	12,79200000	NOCERA UMBRA P.I.		CL-I
NOT	36,90000000	15,06833333	NOTO	171	CL-IV
NRC	42,79138889	13,09638889	NORCIA	609	CL-VII
NRN	42,51500000	12,51916667	NARNI	300	CL-IV
NVL	44,84194444	10,73055556	NOVELLARA	23	CL-IV
NVR	38,01633100	15,13192700	NOVARA DI SICILIA	550	CL-I
NZZ	44,78222222	8,35694444	NIZZA MONFERRATO	165	CL-VI
ORC	41,95360600	13,64234600	ORTUCCHIO (NUOVA)	732	CL-I
PCH	36,71083333	15,09111111	PACHINO	47	CL-I
PGG	42,32222222	13,54000000	POGGIO PICENZE	760	CL-IV

Station_Code	Latitude	Longitude	Station_Name	Altitude (m)	Spectral_classification
PGL	43,69555556	12,49833333	PEGLIO	465	CL-III
PIT	43,98964700	10,94455200	PISTOIA	537	CL-I
PLL	38,02444444	15,65444444	PELLARO (CAB. ENEL)	80	CL-II
PMI	38,35537700	15,85329200	PALMI	340	CL-VII
PNC	42,84888889	11,70555556	PIANCASTAGNAIO	760	CL-II
PNN	43,81722222	12,26138889	PENNABILLI	525	CL-III
PNR	44,87777778	7,34444444	PINEROLO	355	CL-VII
PNS	42,84555556	11,68666667	PIANCASTAGNAIO (NATALI)	740	CL-II
PNT	41,49861111	13,68277778	PONTECORVO	115	CL-VII
PSC	41,81204200	13,78919600	PESCASSEROLI	1.242	CL-V
PSR	45,94931800	13,01413100	PASSARIANO	86	CL-II
PST	43,92638889	10,87694444	PISTOIA	100	CL-I
PTL	43,42666667	12,44861111	PIETRALUNGA	672	CL-I
PTT	38,13441500	14,97504900	PATTI - CABINA PRIMARIA	150	CL-IV
PTT1	38,14750000	14,97000000	PATTI	27	CL-IV
PTZ	40,64823900	15,80811000	POTENZA	766	CL-I
PVS	43,66888889	12,04388889	PIEVE SANTO STEFANO	442	CL-I
PZZ	38,73444444	16,15888889	PIZZO CALABRO	21	CL-I
RCC	41,28750000	13,97972222	ROCCAMONFINA	613	CL-II
RCU	38,12141800	15,66627400	REGGIO CALABRIA	128	CL-IV
RIP	42,26500000	13,59916667	RIPA (FAGNANO)	661	CL-IV
RNR	40,92722222	15,66888889	RIONERO IN VULTURE	673	CL-V
RSN	39,57064800	16,63016100	ROSSANO	433	CL-II
RTI	42,43027778	12,82111111	RIETI (CAB. ENEL)	380	CL-IV
SCF	42,26472222	13,99777778	SCAFA	128	CL-IV
SCI	38,25581700	15,71467900	SCILLA	81	CL-III
SCL	39,77388889	15,80333333	SCALEA	2	CL-VI
SCRO	41,71000000	14,99000000	S. CROCE DI MAGLIANO		CL-IV
SCV	41,30636200	14,88044600	S. MARCO DEI CAVOTI	715	CL-VI
SDN	39,70820600	16,04610300	S. DONATO DI NINEA	775	CL-II
SELE	42,88921600	12,92797500	SELLANO EST		CL-III
SELI	41,62100000	14,87500000	S. ELIA A PIANISI		CL-III
SELW	42,88621000	12,92180600	SELLANO OVEST		CL-VII
SEM	46,48555556	10,26888889	SEMOGO	1.350	CL-II
SER	43,07117900	12,95313700	SERRAVALLE DI CHIANTI		CL-V
SGV	39,26334400	16,68976200	S. GIOVANNI IN FIORE	1.166	CL-III
SLC	40,39107100	15,63266200	SALA CONSILINA	1.040	CL-III
SMAP	41,86900000	15,01100000	S. MARTINO IN PENSILIS		CL-IV
SMC2	45,01861111	10,63222222	S. MATTEO DELLE CHIAVICHE - 2	20	CL-IV
SMT	46,33972222	13,06138889	SOMPLAGO CENTRALE - CUNICOLO POMPE	413	CL-V
SNG	43,68500000	13,22666667	SENIGALLIA	100	CL-IV
SNN	41,83250000	15,57222222	SANNICANDRO GARGANICO	220	CL-II
SPA	40,03531600	16,33453600	S. PAOLO ALBANESE	856	CL-I

Station_Code	Latitude	Longitude	Station_Name	Altitude (m)	Spectral classification
SPL	42,73611111	12,73694444	SPOLETO	365	CL-II
SPM	42,72166667	12,75166667	SPOLETO (MONTELUCCO)	775	CL-II
SPS	39,34020600	16,44912000	SPEZZANO DELLA SILA (CAMIGL.)	1.305	CL-III
SRB	44,86638889	10,45527778	SORBOLO	27	CL-III
SRC0	46,22638889	12,99833333	S. ROCCO	420	CL-I
SRT	37,16277778	15,03027778	SORTINO	445	CL-IV
SSA	38,16890000	15,78990000	S. STEFANO IN ASPROMONTE	780	CL-VII
SSG	43,58666667	12,08305556	SANSEPOLCRO GRAGNANO	521	CL-II
SST	44,23222222	10,76750000	SESTOLA	1.002	CL-II
SSV	41,67944444	15,38611111	S. SEVERO	78	CL-VI
STF	43,90811200	11,79445700	S. SOFIA	642	CL-V
STG	41,56666667	14,23250000	S. AGAPITO	405	CL-I
STR	41,02083333	15,11500000	STURNO	575	CL-III
STS	43,94222222	11,90527778	S. SOFIA	268	CL-VI
SVN	37,68308600	15,12996600	S. VENERINA	294	CL-II
SVT	42,39694444	13,31361111	S. VITTORINO (L'AQUILA)	700	CL-I
TAO	37,85235200	15,28628300	TAORMINA	261	CL-II
TDG	40,79722222	14,38305556	TORRE DEL GRECO	178	CL-IV
TLM1	46,38250000	12,98166667	TOLMEZZO CENTRALE - DIGA AMBIESTA 1	536	CL-III
TOR	38,04438700	14,81464000	TORTORICI	554	CL-I
TPA	38,67364500	15,88919200	TROPEA	93	CL-II
TRC	46,22611111	13,20972222	TARCENTO	230	CL-I
TRF	38,26432400	15,63419400	TORRE FARO	3	CL-II
TRG	45,52527778	11,13444444	TREGNAGO	499	CL-I
TRN	42,55305556	12,60055556	TERNI	112	CL-II
TRR	40,61888889	16,15638889	TRICARICO	650	CL-VI
TRT	44,89250000	8,88250000	TORTONA	210	CL-I
TTP	42,01694444	14,16916667	TARANTA PELIGNA	450	CL-II
UMB	43,25388889	12,25611111	UMBERTIDE	617	CL-I
VBM	38,71377600	16,12387100	VIBO MARINA	56	CL-II
VBV	38,67787200	16,10653300	VIBO VALENTIA	546	CL-I
VGD1	44,11916667	10,30194444	VAGLI CENTRALE - BASE DIGA 1	560	CL-VII
VGG	39,96611111	16,04916667	VIGGIANELLO	370	CL-VI
VGL	44,11000000	10,28972222	VAGLI - PAESE	587	CL-III
VLB	41,75916667	13,98888889	VILLETTA BARREA	980	CL-II
VSE	42,11111111	14,70972222	VASTO (EUROPA)		CL-III
VSS	41,87750000	16,16555556	VIESTE	7	CL-VII
VTI	36,94777778	14,51861111	VITTORIA	162	CL-VII
VZZ	37,16361111	14,75472222	VIZZINI	655	CL-VI
ZCC	44,32416667	10,97083333	ZOCCA	652	CL-VI

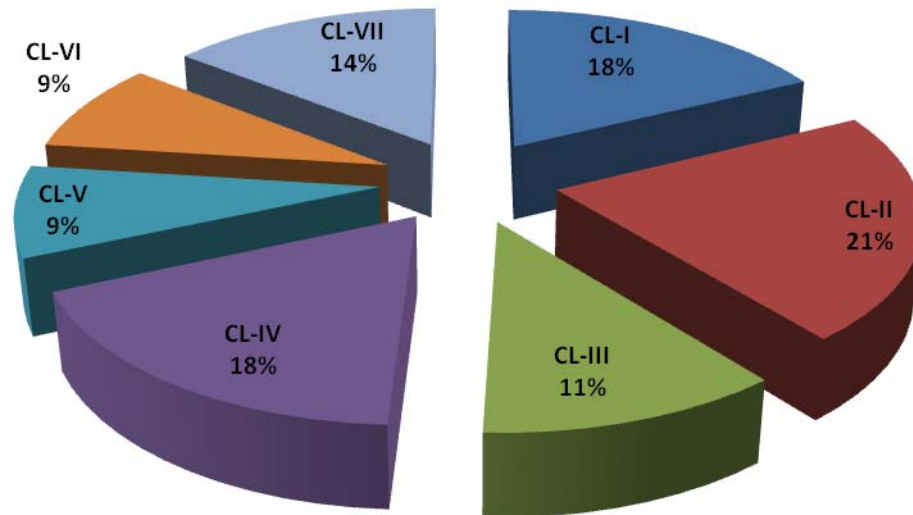


Figure 2. Percentage distribution of different spectral classes for ITACA sites with single or multiple recordings.

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