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Project S4: ITALIAN STRONG MOTION DATA BASE

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http://esse4.mi.ingv.it

Deliverable # D4

Progress report on the ongoing activity for constructing a catalogue of geological/geotechnical information at accelerometric stations

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Table of contents

1. Task 2 goals

The main goals within Task2 are:

- the development of the new standard format for station monograph;
- collection, organization and synthesis of geological, geomorphological, geotechnical and geophysical data;
- evaluation of the reliability of the existing data;
- compilation of station monographs;
- a site classification.

2. Research Units involved

All the research units are involved in the collection and elaboration of data relevant to the compilation of the monographs.
RU2 (INGV-RM1) and RU6 (UniRM1-DISG) have directly contributed in the development of the structure and content of the new monograph, and in the release of the first proposal of site classification.
Additional contributions from other RUs concern the assessment of the reliability of the existing shear wave velocity data (RU4 - PoliTO), the preparation of the geomechanical section of the new monograph (RU7 - UniSI-UniRM1-DST) and for web support to data collection and online monograph compilation (RU1 (INGV-MI).

3. The new ITACA Monograph

In the previous S6 Project (2004-2007 DPC-INGV Framework Program) a monograph was carried out, that was drawn up for many stations, that were part of the former ENEL accelerometric network. In these monographs all the ENEL documentation about geological information as well as geognostic and geophysical data was included.
Knowledge of geological and geomorphological context, and the mechanical and dynamic characteristics of the stations subsoil is fundamental for studies on the attenuation laws and the selection of accelerograms to be used as a seismic input for dynamic analyses for which a classification of the stations subsoil according to the EC8 and national code provisions is necessary. Considering the huge number of sites (over 600), this knowledge have to be rationalized and homogenized so as to arrive at a common and comparable level of information.
The station monograph carried out within the past S6 INGV Project had tried to fill the gap in the knowledge of the recording station characteristics, with the advantage of providing a first screening on the quantity and quality of available data; however the collected data included in the monograph turned out to be uneven and incomplete since a robust standard for the collection, homogenization, representation and synthesis of data was not provided. Moreover, expert judgment for assessing quality of data, especially those derived from geotechnical and geophysical tests, was not taken into consideration.
This problem has been addressed by Task 2, which has produced a new standard monograph for the ITACA stations. The new release of the station monograph is the first product of the

S4 Project (deliverable D3) and can be downloaded from the project website (http://esse4.mi.ingv.it).
The new ITACA monograph (see cover in figure 1) provides a minimum level of information, homogeneous for all station sites, including multi-disciplinary data to satisfy the needs of different users and duly considers information previously not included.
In detail, the new ITACA monograph consists in the following 12 cognitive modules, and various sub-modules (between brackets):

1) General information.
2) Geographical information (Location, Coordinates, Cartography).
3) Geomorphology (Site morphology, Landslides).
4) Geology (Cartography and fields for geological cross section and fault proximity).
5) Geomechanical information (Location of geomechanical station, Geomechanical survey, Lithotechnical map).
6) Geotechnical & Geophysical information (Test summary and location, Stratigraphic profile, In situ tests, Laboratory tests).
7) Microtremor H/V spectral ratio.
8) Earthquake H/V spectral ratio.
9) Site classification (EC8 – NTC2008) (Lithostratigraphic classification – estimated and based on in-situ measurements, Topography classification).
10) Syntesis of information (divided into Information relevant to site classification, Geological, geomorphological and geomechanical information, Other information relevant to seismic site response, Distinctive features of site response).
11) References.
12) Enclosures.

Data are in tabular, graphical and/or image form, using a standard format.

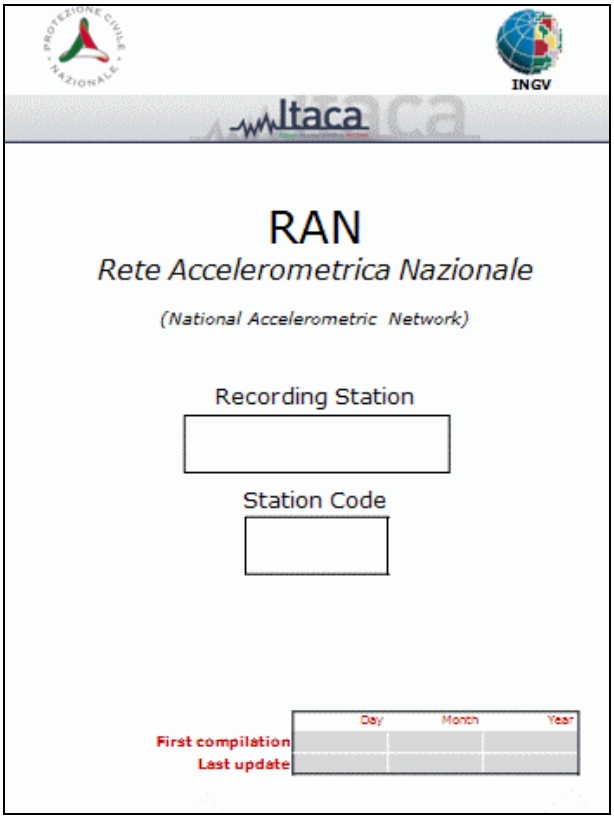


Figure 1 – New ITACA monograph cover.

The most significant upgrading are related to the geomorphology section, which includes the possibility of describing site morphology using standard geometrical conditions (e.g. plain, valley, slope, saddle, ridge, etc.) and the presence of morphogenetic processes (landslides) in the site or in the proximity of the station (Figure 2). The former can give an indication whether the site have a morphological condition prone to develop seismic amplification due to valley or topography effects, the latter suggests the presence of superficial deposits that can affect the seismic local response.
Another significant innovation is the possibility to indicate the proximity of tectonic elements. The presence of a fault can affect the level of local seismic hazard, either directly, if the fault is active and seismogenic, than indirectly, because fractures bands associated with tectonic elements, including inactive, account for the phenomena of entrapment and concentration of seismic waves (Marra et al., 2000; Rovelli et al., 2002).
Another section which summarizes geomechanical data from surveys on rock sites, with description of the rock mass conditions and related relevant parameters, has been included. Indeed, several studies have shown non-negligible seismic amplification where there are highly fractured rock masses in near-fault zones (Martino et al. 2006).
Finally, other significant improvements concern the insertion of specific sections on geotechnical and geophysical information. Particular attention has been paid to the elaboration and synthesis of these information by developing a series of modules illustrating the location of boreholes and in situ tests, the stratigraphic profile and the samples recovered (Figure 3), the results of standard in situ tests (CPT, SPT, piezometric measurements) and geophysical tests (down-hole, cross-hole, SASW, MASW, etc.) as well as those from laboratory tests for the measurements of physical (grain size distribution, Atterberg limits, unit weight, water content, etc.) and mechanical (angle of shearing resistance, undrained cohesion, shear modulus decay and damping curves, etc.) material properties. Another module of the monograph is devoted to the H/V spectral ratio determined form recordings or microtremors.
A further module is then added in which information relevant for lithostratigraphic and topographic site classification according to EC8 or NTC2008 classification scheme are reported.
In particular, site classification may be carried out upon in situ measurements or may be estimated, based on solely geological data, empirical correlations or the H/V spectral ratio (Figure 4).
All rough data used to compile the different modules of the monograph or other information that have no place within the forms, modules and sub-modules can be inserted in the annexes.
The monograph has been prepared in English language in order to make available and readable information from international scientific and technical users.
A first test of compilation was carried out for 4 station sites that had different quality and quantity of data (AQA, BOI, CLF, SSV).

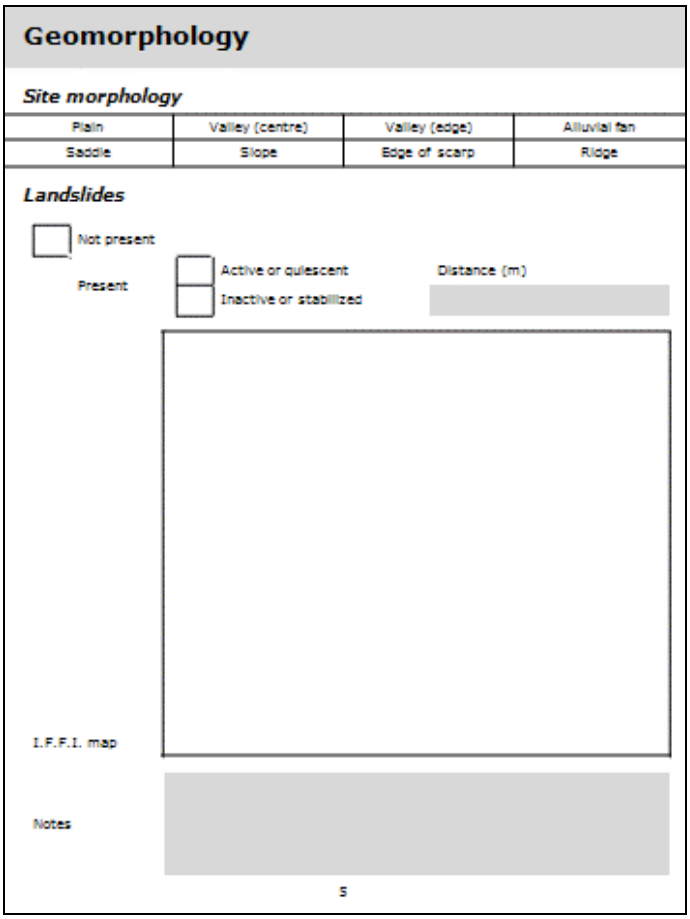


Figure 2 – New ITACA monograph: “Geomorphology” module.

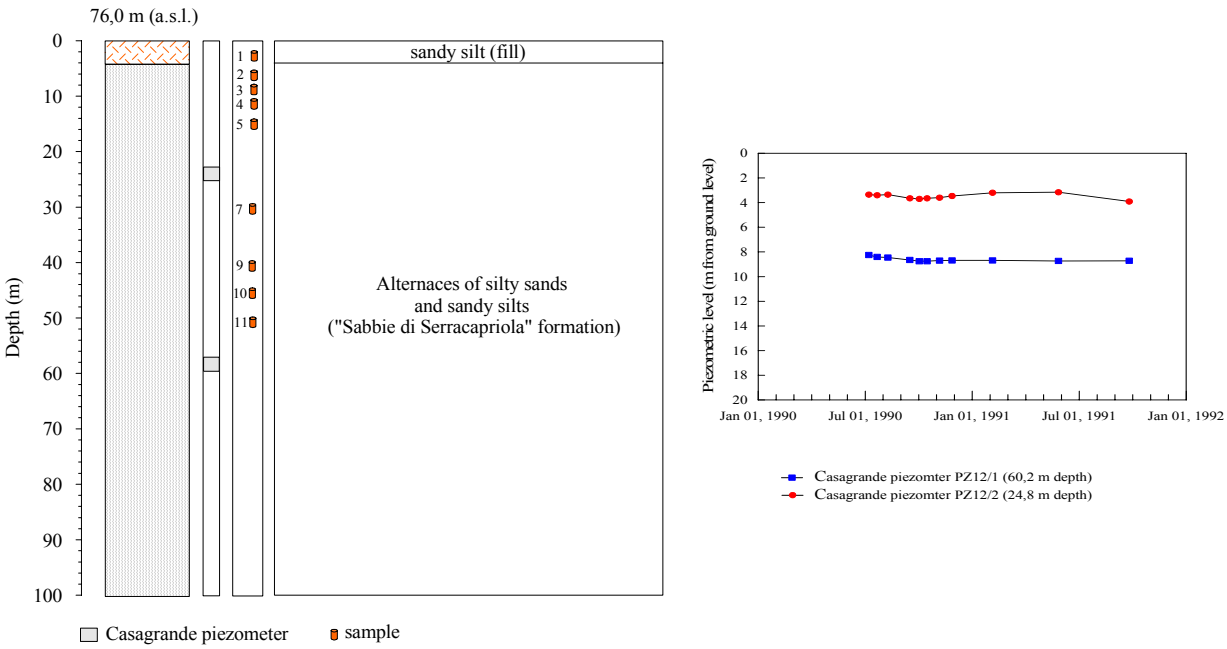
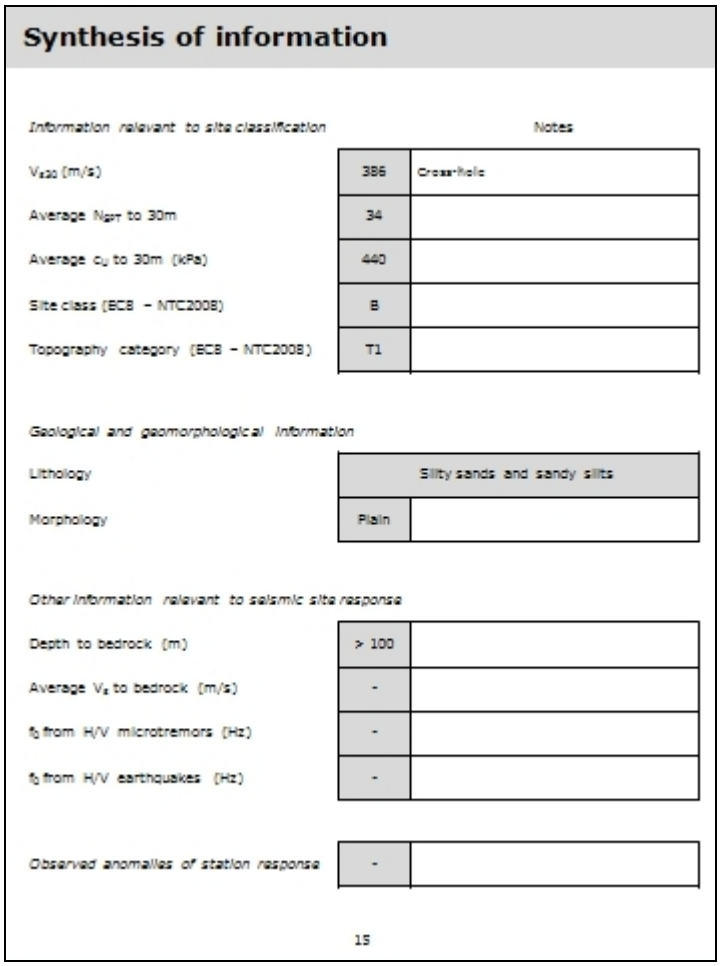


Figure 3 – San Severo (SSV) station monograph: synthetic stratigraphic profile and piezometric measurements plot, in accordance with the new graphic standard format.



Synthesis of information

Information relevant to site classification		Notes
V_{s30} (m/s)	386	Cross-hole
Average N_{SPT} to 30m	34	
Average c_u to 30m (kPa)	440	
Site class (EC8 – NTC2008)	B	
Topography category (EC8 – NTC2008)	T1	

Geological and geomorphological information		
Lithology	Silty sands and sandy silts	
Morphology	Plain	

Other information relevant to seismic site response		
Depth to bedrock (m)	> 100	
Average V_s to bedrock (m/s)	-	
f_0 from H/V microtremors (Hz)	-	
f_0 from H/V earthquakes (Hz)	-	
Observed anomalies of station response	-	

15

Figure 4 – New ITACA monograph for San Severo (SSV) station: synthesis of information relevant to site characterization, site classification and seismic site response.

4. Existing data and collection of new information

As already said, the construction of the catalogue has started within the previous S6 Project and has lead to a first release of the station monograph. Information available for these stations derive from different sources. The most complete source of information is represented by the old ENEL monographs on recording stations, which generally include solely basic geological information, i.e. a geological map of the investigated area (scale 1: 50.000 /1:100.000) and a geological cross-section. Further information derive from the results of site investigations at selected stations that recorded the 1976 Friuli and the 1980 Irpinia earthquakes and individual site studies documented in the literature. In particular, for 17 stations that recorded the 1980 Irpinia earthquake a thorough geological and geotechnical characterization was carried out, this latter including laboratory and in situ tests such as cross-hole tests for the determination of shear wave velocity profile. The data extracted from the previous documents were then inserted in the former ITACA monographs.
In the first year of activity have been acquired all the monographs compiled in the previous S6 Project and examined all the documents (orthophotos, maps and geological cross-sections, results of geotechnical and geophysical tests, etc.) previously collected for the compilation of these monographs.

All the geological sheets at the 1:100,000 scale (from Geological Map of Italy) and all topographical sheets at 1:25,000 scale (by IGMI: Italian Geographical Military Institute) have been acquired. Besides, the collection of geological maps of greater detail for some areas of the national territory has been started. In particular, several sheets (Table 1) of the Geological Map of Italy at 1:50,000 scale (CARG Project by ISPRA: http://www.apat.gov.it/site/it-IT/Servizi_per_l'Ambiente/Carte_geologiche/Carta_Geologica_alla_scala_1_a_50.000/) and respectively lithologic and geological map at 1:25,000 scale of the Lazio and Calabria regions have been acquired.

Table 1 – Acquired geological maps at 1:50.000 scale (by ISPRA).

Sheet number	Sheet name
349	Gran Sasso d'Italia
358	Pescorocchiano
359	L'Aquila
360	Torre de' Passeri
367	Tagliacozzo
368	Avezzano
369	Sulmona
376	Subiaco
378	Scanno
389	Anagni

Ten geological reports, related to as many accelerometric stations which recorded the Irpinia 1980 earthquake, were also found. In this documents, which was prepared within the Irpinia Project by ENEL, a description of the site for each station, a geological map at 1:5,000 scale, with legend and geological cross-section, are available (an example of these new data is reported in Figure 5). Finally 126 geological forms prepared by SOGIN (SOcietà Gestione Impianti Nucleari S.p.A.) for the new digital accelerometric stations (on behalf of DPC) have been acquired. Table 2 shows the number of forms available for different regions. In these forms are given the following information:

- general data: region, province, municipality, details of location, geographic and kilometric coordinates, elevation, IGMI sheet number, reference regarding Carta Geologica d'Italia sheet in which station site is located;
- a geological map and cross-section at 1:25,000 or 1:20,000 scale;
- a geological cross-section at 1:2,000 scale;
- a legend for the geological map and cross-sections;
- a photo of the station housing;
- an ortophoto and a road map showing the station site;

The RU1 (INGV-MI) has developed specific pages on the project S4 website (http://esse4.mi.ingv.it) where it is possible data uploading to facilitate the sharing of all information collected by RUs. From the main menu, the list of the Italian region are accessible by clicking on "Station List" (Figure 6). For each region a station folder is available, in which are already uploaded the station monographs compiled in the previous S6 Project, the geological forms by DPC-SOGIN and the results of some microtremor investigations carried out in some sites.

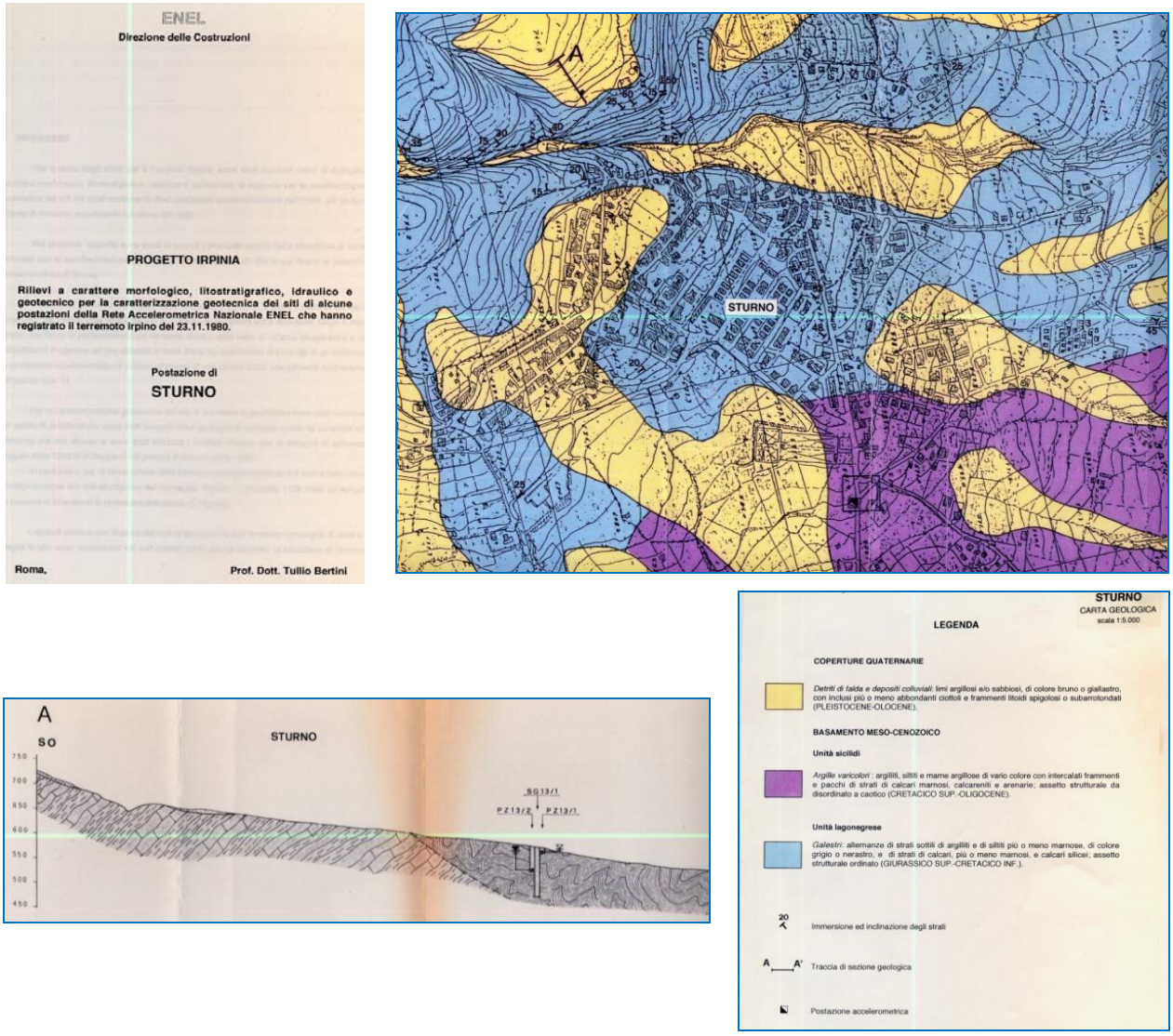


Figure 5 – Irpinia Project by ENEL: geological information from Sturno (STR) report.

Table 2 – Number of SOGIN geological reports per region.

Region	**Number of geological forms**
Abruzzo	3
Campania	4
Emilia-Romagna	17
Friuli Venezia-Giulia	7
Lazio	4
Liguria	12
Lombardia	8
Marche	5
Piemonte	13
Puglia	11
Sicilia	26
Toscana	3
Umbria	9
Veneto	4
Total	126

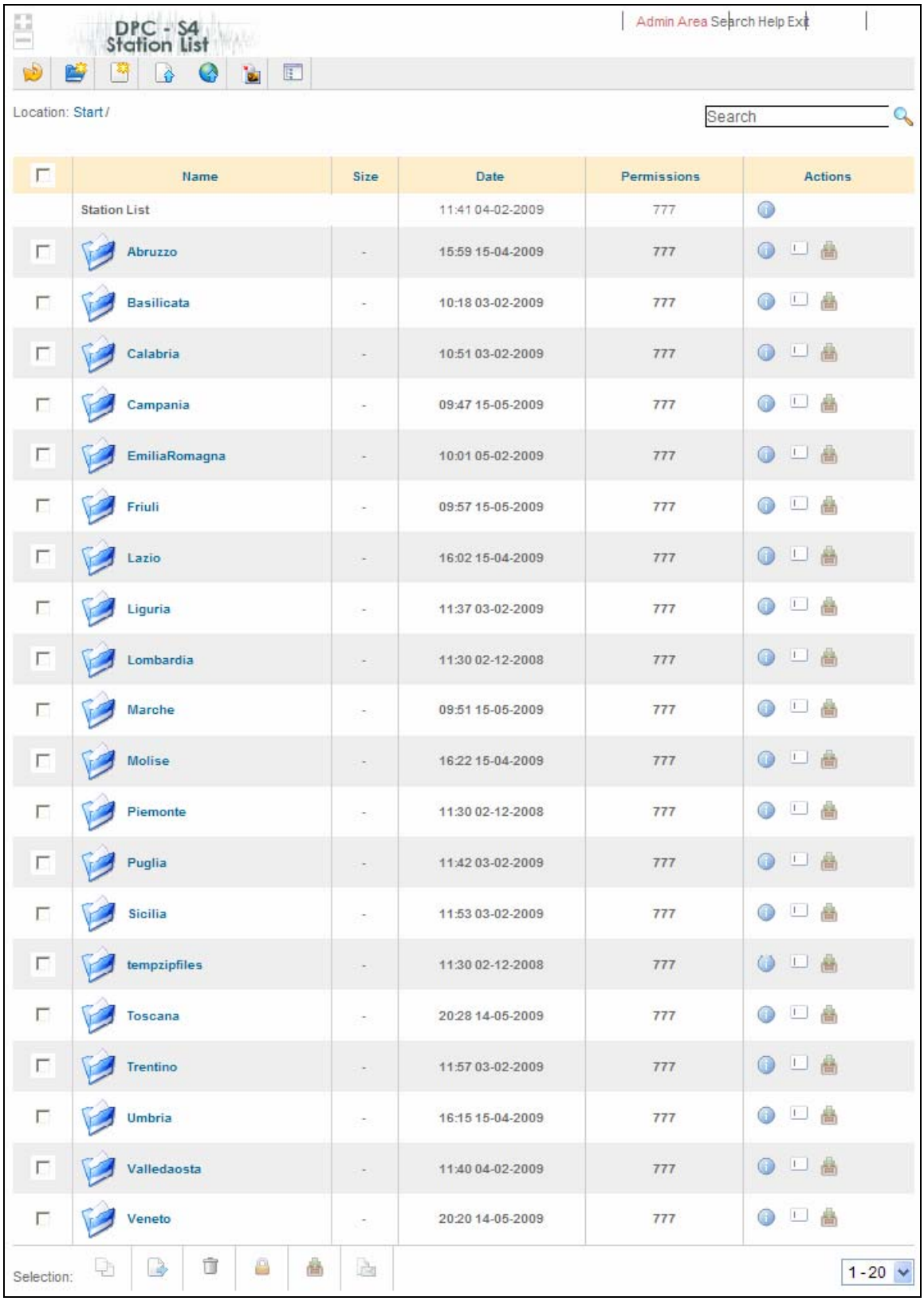


Figure 6 – S4 Project web site: station list screenshot from uploading area.

5. Evaluation of the reliability of existing data

One of the main problems encountered in analyzing the information available from different sources concerned the evaluation of the reliability of existing data, with particular reference to shear wave velocity determinations. Upon suggestion of the project coordinators it was therefore decided to critically examine data derived from two important sources of shear wave velocity data, i.e. the Irpinia and the Umbria-Marche V_S profiles, in order to look at possible inconsistencies.

As already said, after the 1980 Irpinia earthquake a major effort was undertaken by ENEL to characterize 17 stations that recorded the earthquake from the geological as well as from geotechnical point of view. Two boreholes were drilled to 100 m depth at each site and cross-hole (CH) measurements were made to profile shear wave velocity. Additional dynamic laboratory testing, such as resonant column and torsional shear tests, was also performed. In recent years, a double-check of the Irpinia Vs profiles has been carried out by comparisons at few sites in which CH tests have been performed again in the framework of other research projects such as S6 (http://esse6.mi.ingv.it/) and NERIES (http://www.neries-eu.org). In particular, it has been noticed that the results of different tests at some sites (Arienzo, Bevagna, Bagnoli Irpino, Sturno) were remarkably different. The new surveys showed much lower values of shear wave velocities for the same formations.

Following this observation, RU6 (UniRM1) and RU4 (PoliTO) were involved in assessing the reliability of the Irpinia CH tests. The first step in this direction has been to critically analyze the original reports which are available in the archive of La Sapienza University of Rome. The following comments can be made:

1) the plot of the experimental seismic traces do not show possible different interpretation if compared to the original interpretation of first arrivals of P and S-waves;
2) at some Irpinia sites the images of the material collected during borehole drillings is not consistent with the very high velocities; this is particularly true for some sites in which the cementation of gravelly deposits appears relatively weak and very high velocity of shear wave velocities are reported (higher than 1,500 m/s);
3) at some sites the alternation of uncemented and cemented layers can have induced errors in the cross-hole measurements due to critically refracted waves.

As an example, the comparison of shear wave velocity profiles carried out for the Irpinia and the S6 projects at the Sturno recording station is illustrated in figure 7. It can be observed that V_S profile from the Irpinia Project exhibits values as high as 2,200 m/s at depth of about 14 meters while V_S values from S6 Project at same depth are about 500 m/s and reach maximum value of about 1,000 m/s at 30 m depth. Near the ground surface V_s from the Irpinia Project is higher than 500 m/s whereas V_S values from S6 Project are approximately 200 m/s. These high V_S values do not seem to be realistic if a careful examination at the pictures of samples recovered from the boreholes drilled in the Irpinia Project is given. These pictures are shown in figure 8 for the samples retrieved at depth between 3 and 6 m depth.

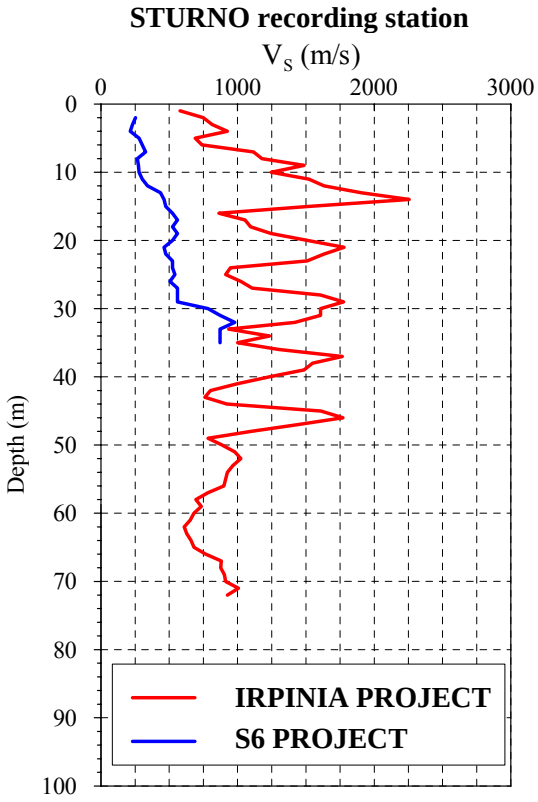


Figure 7 – V_s profiles at the Sturno recording station (STR) from different CH tests.

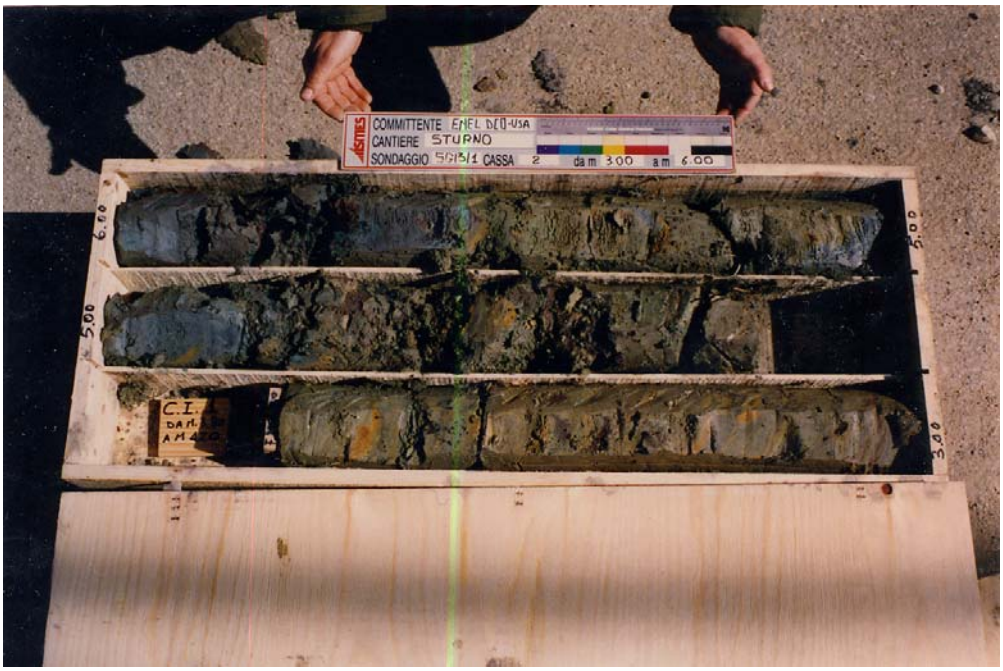


Figure 8 – Sturno recording station (STR): samples recovered from boreholes drilled for the Irpinia Project at depths between 3 and 6 m.

Moreover, resonant column tests carried out on samples recovered at 4 m and 10 m depth show G_0 values approximately equal to 1,100 MPa corresponding to $V_S \approx 220$ m/s which is much lower than V_S from cross hole testing at the same depth ($V_S \approx 900$ m/s). All the above observations question the quality of V_S data for the Sturno station determined from the Irpinia Project.

As already mentioned, similar considerations can be done for other stations such as Arienzo, Bagnoli Irpino and Bisaccia. In these cases no additional V_S profiles are available for comparison but the examination of the samples pictures recovered from boreholes and the analysis of the results of resonant column tests, which again show much lower values of V_S than those measured form in situ CH tests, lead to similar doubts as for Sturno station.
In conclusion, on one hand it is not possible to assert a final judgment on the results of CH tests from Irpinia Project just on the basis of visual inspection of the photos of the soil extracted during boring. Nevertheless, the errors reported for tests, where a quantitative comparison was possible, are quite consistent and poses serious doubts on the reliability of some others Irpinia Project V_S profiles. In this respect it is suggested to carry out some additional in situ tests on those sites showing inconsistencies for the determination of the V_S profile in order to better validate available V_S data.
Also the dataset of shear wave velocity profiles obtained by USGS at the Umbria-Marche recording stations using SASW method has been analysed to provide a quality assessment. The RU6 Uni-RM1 has made available the SASW dataset from the joint collaboration between PEER and La Sapienza University of Rome (Kayen et al., 2008), currently available at the url: http://pubs.usgs.gov/of/2008/1010/, and has promoted initiatives to critically discuss data analysis and elaboration whereas the RU4 (PoliTO) has been working on the validation of the V_S data, with special reference to the inversion technique.
In particular, the work carried out by RU4 (PoliTO) revealed for several sites marked inconsistencies with respect to the two following aspects:

1) the experimental dispersion curves from different testing configuration at the same site were not consistent in several cases;
2) the fitting between the experimental dispersion curve and the numerical dispersion curve for the last iteration of the inversion process were not satisfactory at several sites.

These observations led to the decision during the meeting of S4 Project in October 2008 of rejecting entirely the results because they were considered not reliable. The constructive interaction with researchers at USGS led to the reinterpretation of the experimental data accounting for the error that was introduced by phase unwrapping and USGS issued in April 2009 a new version of the report in which some errors were corrected. An example of the original dispersion curves and the modified ones is reported in figure 9. However, it has been decided to include in the ITACA database only the information related to V_{S30} obtained from these SASW tests (for sites where borehole seismic tests are not available) while the shear wave velocity profiles will not be reported in ITACA database because they are not considered reliable.

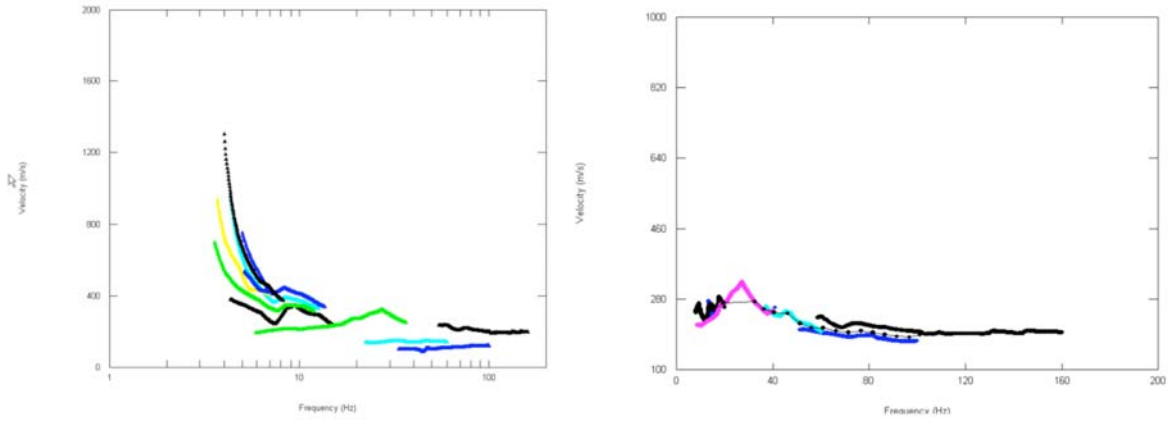


Figure 9 - Experimental dispersion curves from SASW tests at Colfiorito Site: a) original interpretation (USGS, 2008); b) revised interpretation (USGS, 2009).

6. Activities carried out after the April 6th, 2009 L'Aquila earthquake

After the L'Aquila earthquake occurred on April 6th 2009, components of RU2 and RU6 were involved in a joint working group GEER (Geo-Engineering Extreme Events Reconnaissance) - AGI (Associazione Geotecnica Italiana).
One of the main contribution of RU2 and RU6 on this reconnaissance work consisted in surveys on recording stations as reported in the GEER document (http://www.geerassociation.org/GEER_Post%20EQ%20Reports/Italy_2009/italy_2009_index.html) and summarized hereafter.
The L'Aquila main event of April 6th, 2009 was recorded by 56 digital strong motion instruments, 14 of which are in the Abruzzo region as shown in Figure 12. Figure 13 shows the locations of four instruments located on the hanging wall of the fault near L'Aquila, three NW of the city in an array with one reference rock station (AQG, figure 14) and other two on recent alluvium (AQA; AQV, figure 14), and one station near the city center on Pleistocene breccias deposit (AQK). The other 42 instruments that recorded the mainshock are generally located in portions of the Apennines NW and SE of the source region, as shown in Figure 15. All stations listed in table 3 have digital accelerometers, principally Altus Etna and K2 devices with 24-bit A/D converters.

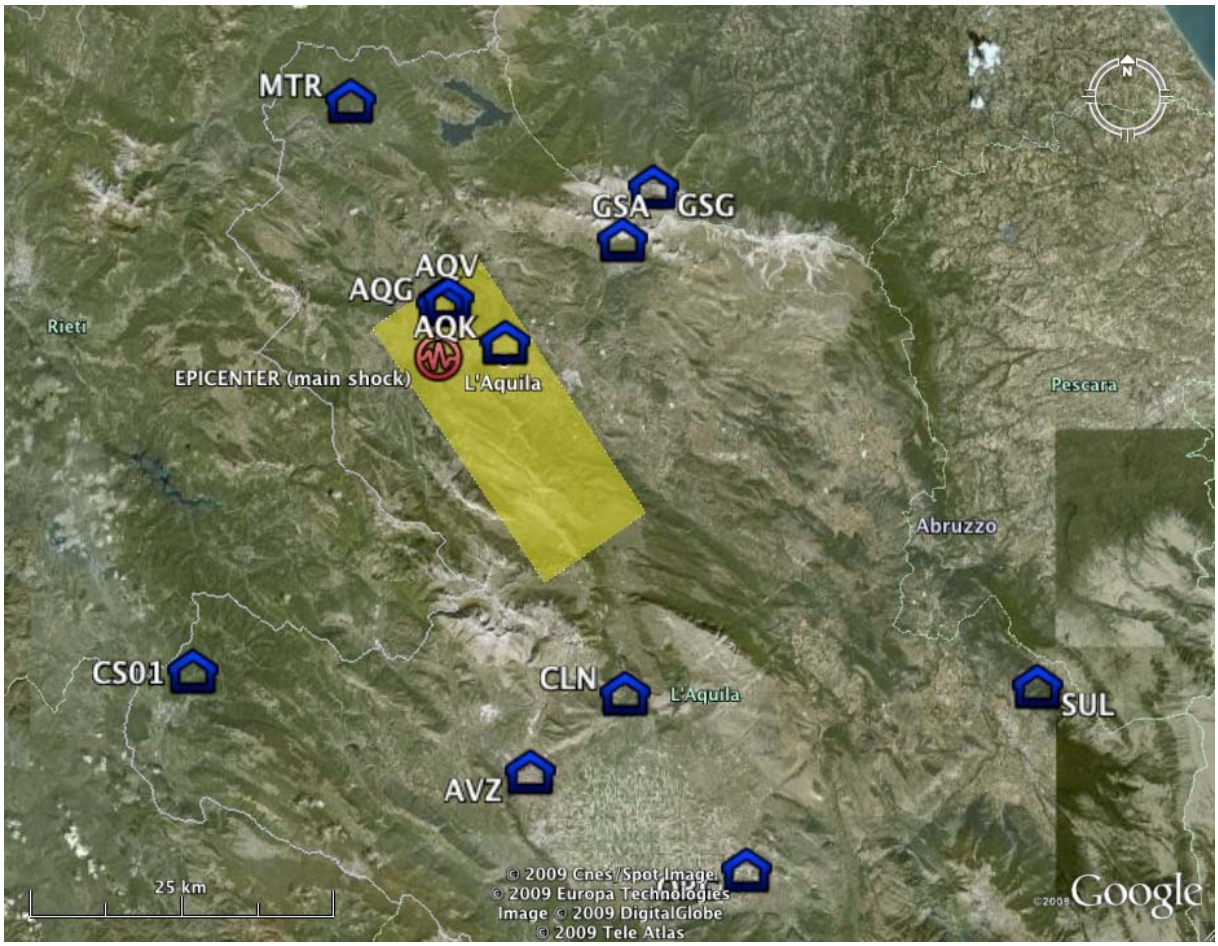


Figure 12 - Locations of accelerometric sations in Abruzzo region that recorded the 6 April 2009 main shock and of a preliminary fault plane surface, shown in yellow.

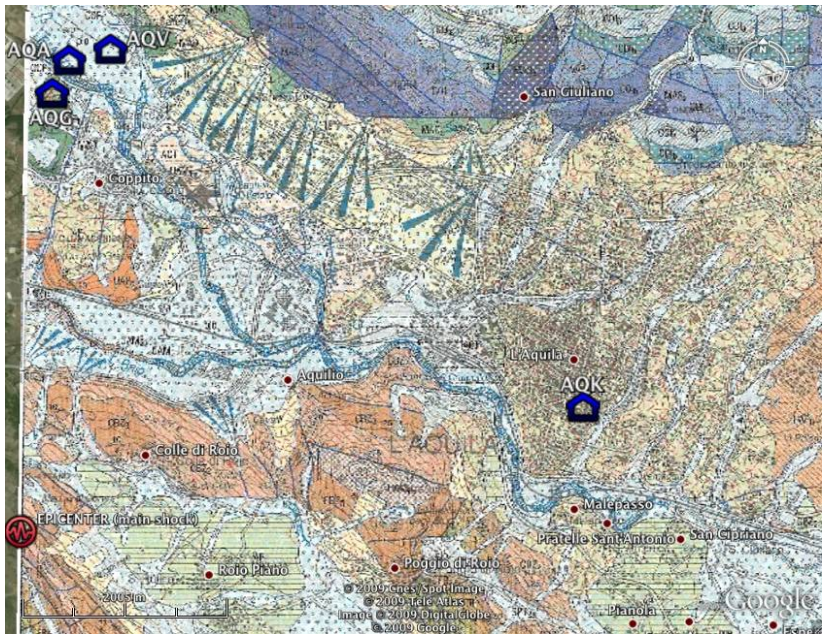


Figure 13 - Location of instruments on hanging wall near L'Aquila overlayed on Geological Map at 1:50,000 scale.

Figure 14 – AQV (left) and AQG (right) RAN stations near L'Aquila town.

Table 1 lists attributes of the 56 digital accelerometer stations that recorded the mainshock, including location, surface geology and instrument housing type. Surface geologic descriptions are preliminary in many cases, being based on relatively large-scale maps (1:100.000) by Servizio Geologico d'Italia. We generally prefer to classify surface geology using relatively local smaller-scale maps, which will take additional time to locate for most of the stations. However, some sites have been classified using 1:25,000 and 1:5,000 scale maps, and those results are shown in Table 1 where available. Furthermore, relatively local 1:25,000 maps have been retrieved for the near-source region (unpublished INGV and DPC internal files), and classifications for instruments in those areas are derived using the local maps. In the GEER-AGI report a preliminary assessment of V_{S30} values following the protocols by Scasserra et al. 2009, were also estimated for all these recording stations. The EC8 classification is based on a lithological map using the methodology described in the paragraph 8.

Figure 15 - Locations of instruments that recorded 6 April 2009 mainshock.

Table 3 – RAN Accelerometric stations that recorded April 6th earthquake mainshock: geological setting and preliminary site classification.

#	Station				Geology			Site Classification	Housing
	Code	Name	Latitude	Longitude	Description	Age	Available geological map scale	Subsoil category (* solely lithologically-based)	
1	ANT	ANTRODOCO	42,418	13,079	limestone	Triassic	100000	B*	Cabin
2	AQK	Aquil PARK ing.	42,345	13,401	conglomerate	Pleistocene	25000	B*	Tunnel
3	ASS	ASSISI	43,075	12,604	limestone and marls	Cretaceous	100000	A*	Structure Basement
4	AVL	AVELLINO	40,923	14,787	coarse volcainc material	Holocene	100000	B*	Cabin
5	AVZ	AVEZZANO	42,027	13,426	lacustrine Alluvium	Pleistocene	100000	B*	Structure Basement
6	BDT	BADIA TEDALDA	43,707	12,188	limestone and sanstone	Eocene	100000	A*	Structure Basement
7	BNE	BENEVENTO	41,128	14,785	fluvio-lacustrin conglomerate, sand and clayey sand	Pleistocene	25000	B*	Cabin
8	BBN	BIBBIENA	43,748	11,821	limestone	Miocene	100000	A*	Cabin
9	BOJ	BOJANO	41,484	14,472	Fluvial-lacustrin deposit: clayey-sandy silts	Pleistocene	25000	B*	Structure Basement
10	CMB	CAMPOBASSO	41,563	14,652	limestone	Miocene	5000	A*	Cabin
11	CSO1	CARSOLI 1	42,10	13,088	sandstone	Miocene	25000	A*	Cabin
12	CNM	CASALNUOVO MONTEROTARO	41,618	15,105	breccias	Miocene	100000	B*	Cabin
13	CSS	CASSINO	41,486	13,823	limestone	Eocene	100000	A*	Cabin
14	CDS	CASTEL DI SANGRO	41,787	14,112	sandstone with clay	Miocene	100000	A*	Cabin
15	CMR	CASTELMAURO	41,833	14,712	limostone and marls	Miocene	100000	A*	Cabin
16	CTL	CATTOLICA	43,955	12,736	gravel and sands	Pleistocene	100000	B*	-
17	CLN	CELANO	42,085	13,521	limestone	Cretaceous	25000	A*	Cabin
18	CER	CERIGNOLA	41,260	15,910	sands	Pleistocene	100000	B*	Cabin
19	CHT	CHIETI	42,37	14,148	gray clay and marls	Pleistocene	25000	B	Structure Basement
20	FMG	FIAMIGNANO	42,268	13,117	Breccias	Miocene	100000	A*	Structure Basement
21	FOR	FORLI'	44,199	12,042	sand, gravels, and clay	Pleistocene	100000	C	Cabin
22	GNL	GENZANO DI LUCANIA	40,843	16,033	sand and conglomerates	Pleistocene	100000	A*	Cabin
23	GSA	GRAN SASSO (Assergi)	42,421	13,519	limestone	Eocene	100000	A*	Structure Related
24	GSG	GRAN SASSO (Lab. INFN galleria)	42,46	13,55	limestone	Eocene	100000	A*	Tunnel
25	ISR	ISERNIA	41,611	14,236	Fluvial-lacustrin deposit silt and clay with gravel	Pleistocene	5000	C*	-
26	AQV	L'AQUILA - V. Aterno - Centro Valle	42,377	13,344	fluvial alluvium coarse	Holocene	25000	B	Cabin
27	AQG	L'AQUILA - V. Aterno - Colle Grilli	42,373	13,337	limestone	Cretaceous	25000	A*	Cabin
28	AQA	L'AQUILA - V. Aterno - F. Aterno	42,376	13,339	fluvial alluvium coarse	Holocene	25000	B*	Cabin
29	LSS	LEONESSA	42,558	12,969	marly limestone	Jurassic	100000	A*	Cabin
30	MNM	MANFREDONIA	41,634	15,911	limestone	Jurassic	100000	A*	-
31	MMP1	MOMPEO 1	42,249	12,748	limestone	Jurassic	25000	A*	Structure Basement
32	MNG	MONTE S. ANGELO	41,704	15,958	limestone	Jurassic	100000	A*	-
33	MTR	MONTEREALE	42,524	13,245	sandstone	Miocene	100000	A*	Cabin
34	NAP	NAPOLI Ovest	40,799	14,18	sand and silt	Holocene	100000	C*	Cabin
35	ORC	ORTUCCHIO	41,954	13,642	limestone	Cretaceous	100000	A*	Structure Basement
36	PTF	PETRELLA TIFERNINA	41,696	14,702	clay and marly calys (argille scagliose)	Cretaceous	25000	B*	Cabin
37	PIC	PIANCASTAGNAIO	42,85	11,685	volcanic rock (ignimbrite)	Pliocene	100000	B*	Cabin
38	PDM	PIEDIMONTE MATESE	41,355	14,385	debris poorly cemented	Holocene	100000	C*	-
39	RIC	RICCIA	41,483	14,838	limestone and marly limestone	Miocene	100000	B*	-
40	SCM	S. CROCE DI MAGLIANO	41,711	14,984	debris	Holocene	100000	B*	Cabin
41	SEP	S. ELIA A PIANISI	41,625	14,88	sandstone	Miocene	5000	A*	Cabin
42	SDG	S. GIOVANNI ROTONDO	41,709	15,733	limestone	Jurassic	100000	A*	-
43	SSR	S. SEVERO	41,691	15,374	sandy silt and silty sand	Pliocene	25000	B°	-
44	SBM	SAN MARINO	43,934	12,449	limestone	Miocene	100000	A*	Structure Basement
45	SNS	SANSEPOLCRO	40,243	15,550	alluvium	Pleistocene	100000	C*	Cabin
46	STL	SATRIANO DI LUCANIA	40,541	15,642	limestone, marls and siliceous deposits	Cretaceous	100000	A*	Cabin
47	SCP	SERRACAPRIOLA	41,807	15,165	sands	Pleistocene	100000	B*	Cabin
48	SPO	SPOLETO	42,734	12,741	conglomerate	Pleistocene	100000	A*	-
49	SPC	SPOLETO (cantina)	42,743	12,74	lacustrin deposit	Pleistocene	100000	C*	-
50	STN	STURNO	41,018	15,112	clay and marls	Oliogocene	2000	A*	Cabin
51	SBC	SUBIACO	41,913	13,106	limestone	Miocene	100000	A*	Cabin
52	SUL	SULMONA	42,089	13,934	limestone	Cretaceous	25000	A*	Cabin
53	TLS	TELESE TERME	41,222	14,53	limestone	Cretaceous	100000	A*	Cabin
54	TMO	TERMOLI	41,989	14,975	gravels and conglomerates	Pleistocene	100000	B*	Cabin
55	VRP	VAIRANO PATENORA	41,333	14,132	conglomerates	Pleistocene	100000	A*	Cabin
56	VIE	VIESTE	41,877	16,165	limestone	Miocene	100000	A*	-

7. New monograph compilation

The ITACA database currently contains information about 616 accelerometric stations. To start the new monograph compilation it has been decided to adopt the following criterion: from the database, stations that recorded seismic events with $M_L \geq 5.0$ (164 stations) were selected; from this subset those which recorded the 1980 Irpinia-Basilicata earthquake (19 stations) were finally extracted.
The examination of the morfology, by using google maps, and the presence of landslides in the sites of the 19 stations, by consulting the maps produced by the IFFI Project (Inventory of Italian Landslides: http://193.206.192.244/cartanetiffi/) (see an example in figure 10) was also taken into account. Following this compilation, six stations (BGI – Bagnoli Irpino, BSC – Bisaccia, BVN – Bovino, CLT – Calitri, STR – Sturno, TRR – Tricarico) were found to be located near or in the proximity of active / quiescent landslides also of considerable size (> 700,000 m^2).
The compilation of 15 new monographs has been completed and will be included in the ITACA database.
The compilation activity has been organized according to the diagram of Figure 11, which shows the task of the four involved Research Units (RU1, RU2, RU6, RU7). Based on the suggestion of the International Evaluation Committee, a web-form for the online monographs compilation has developed by the RU1 (INGV-MI). Through the project web site it is possible to insert text, figures and parts of documents in a specific area. The system automatically builds up all these elements in the pdf monograph. Afterwards all the information can be called back for a review and a possible change. Part of the compilation has been automated since some information provided into the monograph ("General information" and "Geographical information") are already present in the ITACA database and can be obtained through a simple extraction procedure. The online compilation is currently being tested.

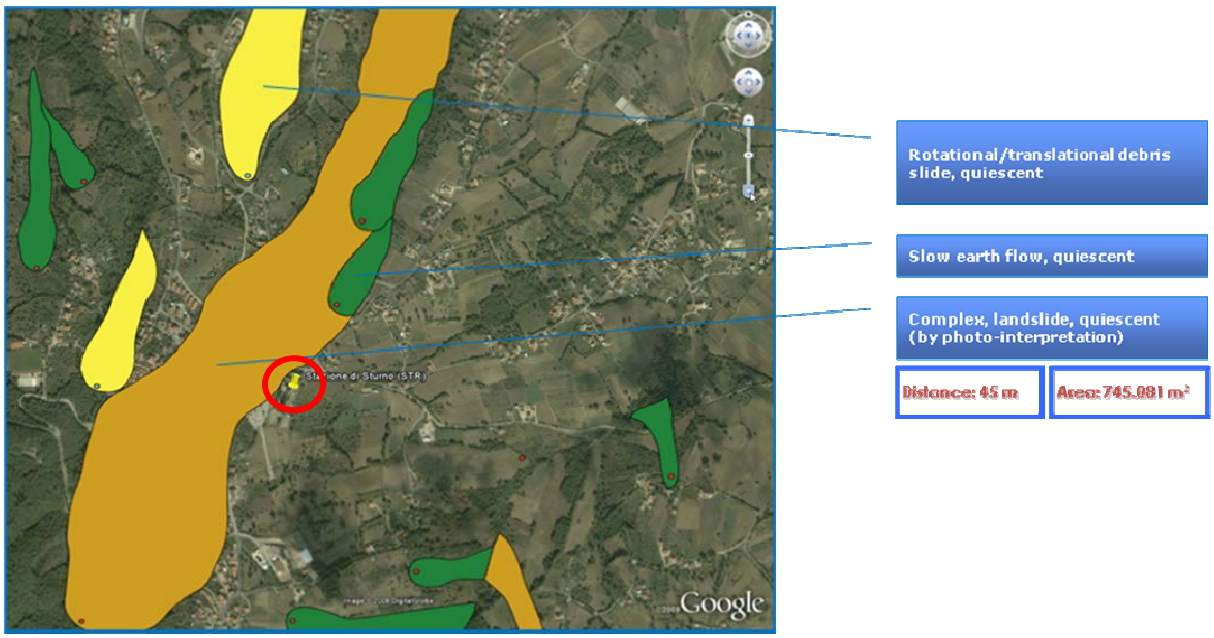


Figure 10 – Sturno recording station (STR): landslides from IFFI Project in the proximity of the ITACA site (red circle).

Modules	Automatic	RU2 INGV-RM1	RU6 UniRM1 ing	RU1 INGV-MI	RU7 UniSI (UniRM1 geo)
General Information	■				
Geographical Information	■	■			
Geomorphology		■			
Geology		■			
Geomechanical Information					■
Geotechnical & Geophysical Information			■		
Microtremor H/V spectral ratio				■	
Earthquake H/V spectral ratio		■			
Site Classification (EC8 – NTC2008)		■	■		
Synthesis of information		■	■		
References		■	■		

Figure 11 – Modules by each Research Unit involved in the monograph compilation.

8. Subsoil classification of the ITACA sites

This activity was requested by the project coordinators since it was necessary to have an early version of the recording stations classification in order to interface the ITACA database with the REXEL software for the selection of natural accelerograms compatible with NTC2008 proposed reponse spectra.
Since the compilation of the monographs is ongoing and, at the same time, a cataloging for all the 616 ITACA stations was immediately needed, a preliminary classification based solely on geological data available at a homogeneous level for all the sites was undertaken. Using a lithological map by INGV (unpublished), at a national scale (1:100,000), this goal has been achieved. This map derives from the Geological Map of Italy at 1:100,000 scale, by merging different geological formations, based on lithological and geological age criteria, in several lithological units. Each unit was attributed an EC8 subsoil class (Figure 16).
The limits of this type of “geological” classification are well known, as it allows only a approximate level of knowledge, but, as already mentioned, it was dictated by the urgency to set up a first classification.
This classification based on lithological map was subsequently "corrected" using:

a) detailed geological data;
b) a geological "expert" evaluation;
c) H/V microtremors measurements;
d) photos of the sites;
e) Vs_{30} values from down-hole and cross-hole tests.

Main problems have been encountered where the site studied is near a geological limit between two different soil categories detached from two classes (eg. A and C; figure 18), the thickness of cover, rested on bedrock, is less than 20 m (figure 19) or landslides of some importance are present (see figure 10).

At the end of the first year activity a first classification (version 1.1; see table 4 at the end of this paragraph) according to the EC8-NTC2008 subsoil categories for all ITACA stations has been produced, which will be used in the ITACA-REXEL interfacing.
As can be noted in the table 4 V_{S30} values are available for very few stations which are denoted without asterisk in the "subsoil category" column.
A comparison between the classification only lithologically-based and that one with "corrections" (proposed classification) is shown in Figure 20. In the two "pie" charts the number of stations within each subsoil category are given. In chart A, the data refer to the distribution of stations in the various subsoil categories obtained considering the lithological map by INGV. In chart B the distribution considering the lithological corrected classification is illustrated.
The same data are better compared in the histogram in figure 20. The histogram shows that in the lithological corrected classification an important increase of stations on subsoil B type as well as a decrease of A and C types is found with respect to the lithological classification. Besides, there is a slight increase of stations of D and E types.

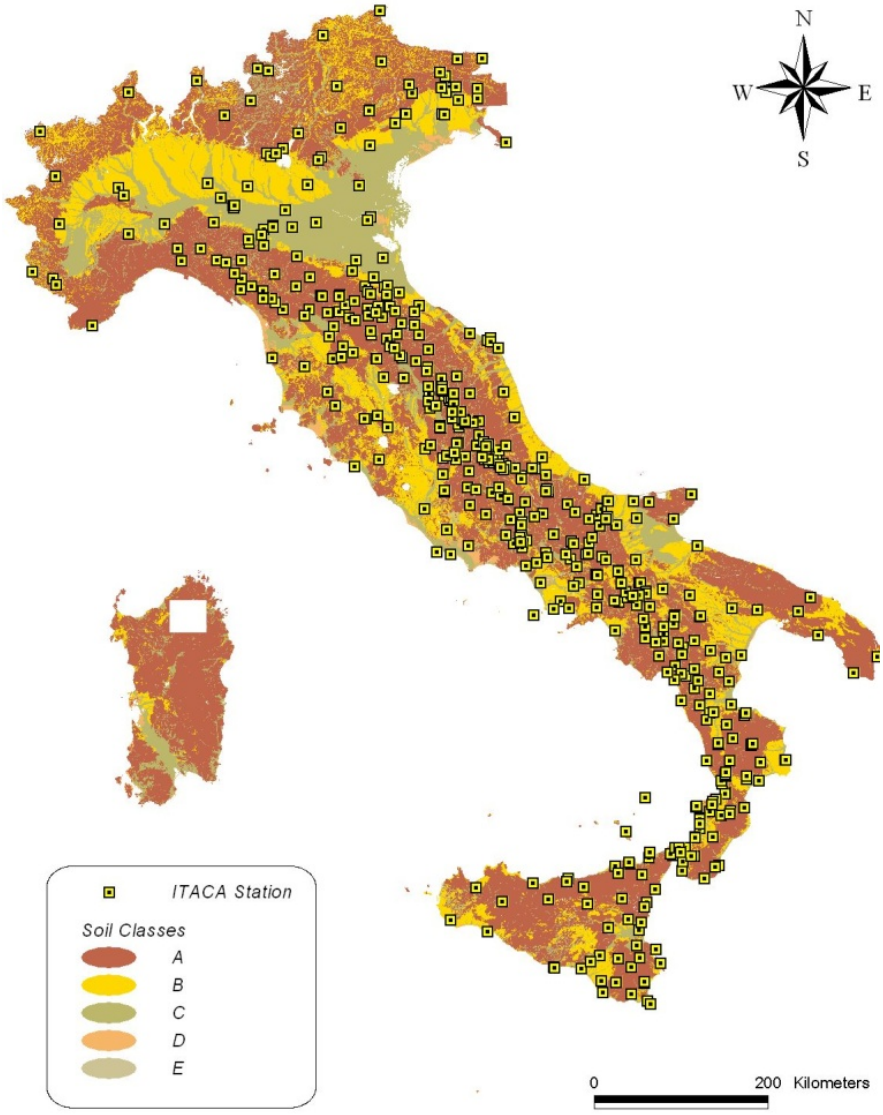


Figure 16 – Lithological map at 1:100,000 scale by INGV: site location of the ITACA stations. The hole in the north of Sardinia region is due to a lack of the geological sheet.

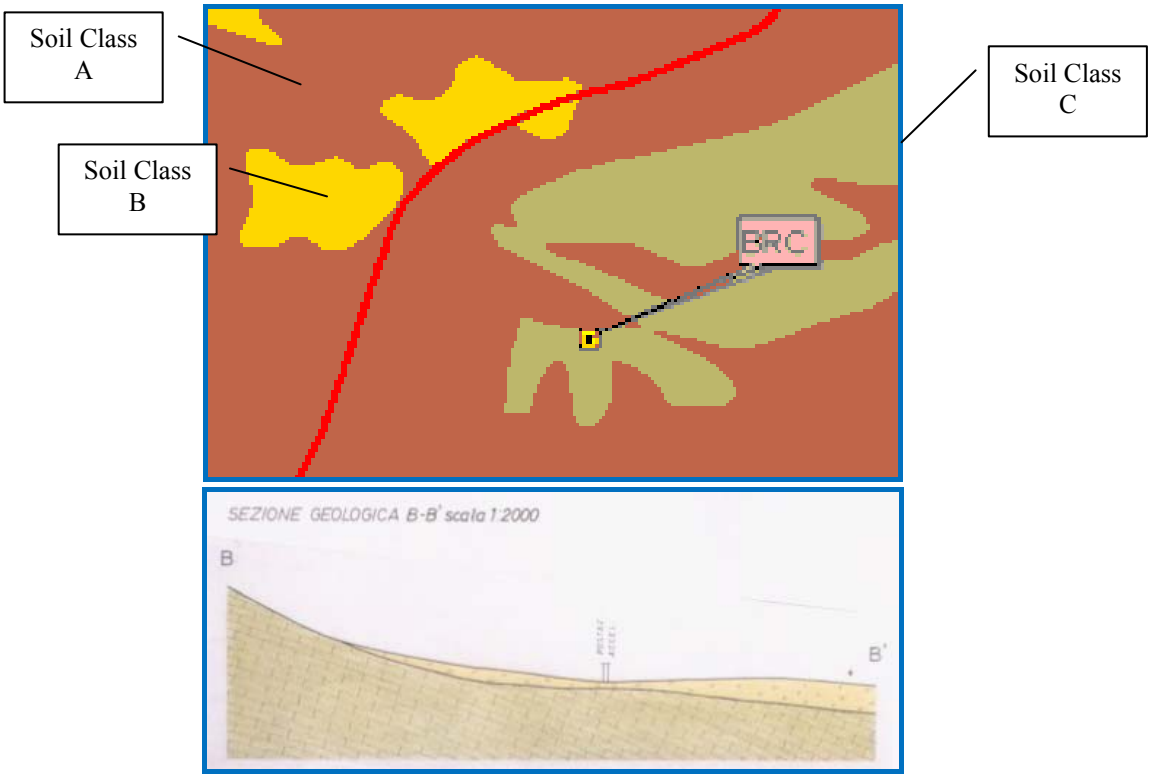


Figure 18 – Site classification using "Soil Classes" Map by INGV: problem derived from site location near a lithological limit. In this case BRC station is upon C type, but considering the geological cross-section and H/V data (flat response at this site) an A soil for site classification was proposed. Probably a site location shifting is present.

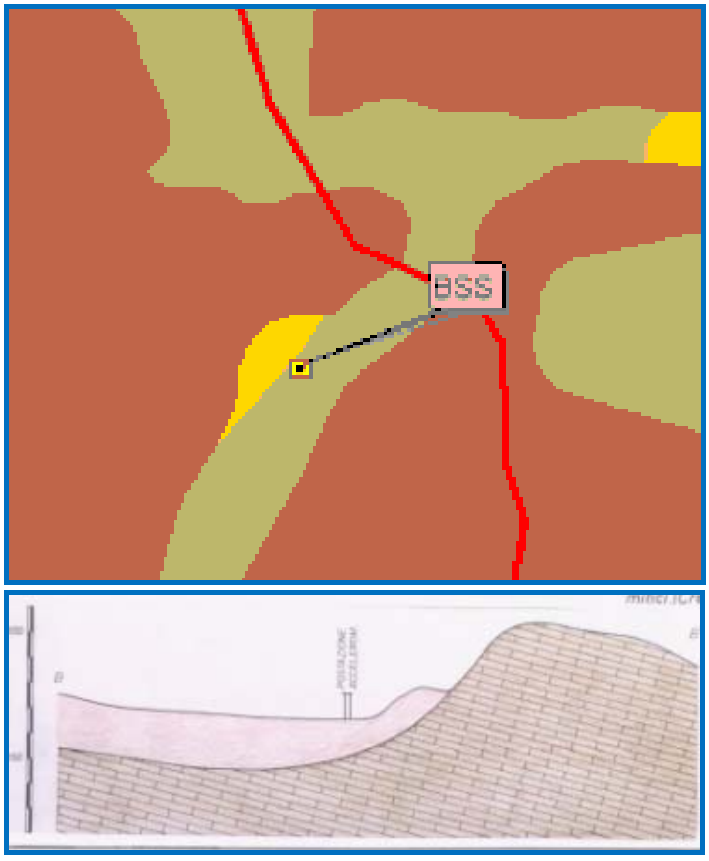


Figure 19 – Site classification using "Soil Classes" Map by INGV: problem derived from thickness of cover upon bedrock. In this case BSS station is upon C type, but considering the geological cross-section in which the thickness of recent alluvium/lacustrine deposit is less than 20 m an E type for site classification was proposed.

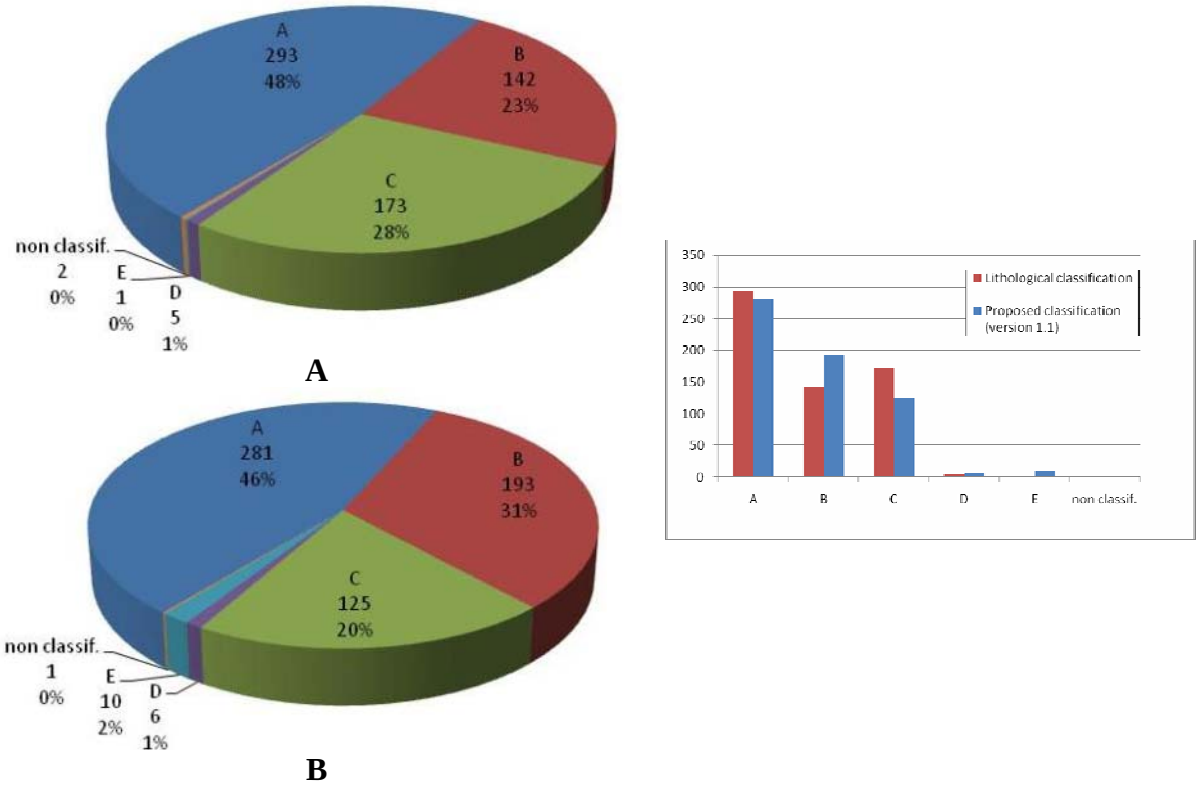


Figure 20 – Comparison between Site Classification obtained from a lithologically-based without (A) and with (B) corrections distribuition.

Finally, a comparison between the "lithological-corrected" site classification and the classification according to the predominant period for about 209 stations that have multiple (107 stations) and single (102 stations) records (Di Alessandro et al. 2008) has been carried out. A clear link between the stations in A category (rock) and the stations classified as CL-V, i.e. with a flat H/V, has been singled out. This correlation is strong if only stations with multiple records are considered, and provides a number of stations in B and C category when also the single record stations are introduced in the comparison.

Table 4 –RAN recording stations site classification (version 1.1).

Station code	Latitude (N)	Longitude (E)	Station name	Altitude (m)	Subsoil category
ACR	39,48905900	16,37986000	ACRI	707	A*
ALC	37,97444444	12,95805556	ALCAMO	303	A*
ALD	39,92981000	16,46534900	ALBIDONA	708	A*
ALF	44,50138889	12,03305556	ALFONSINE	6	C*
ALT	40,55611111	15,39500000	AULETTA (PETINA)	343	A
AMN	39,13672600	16,07964700	AMANTEA (CAB. ENEL)	98	A*
AMT	42,63246000	13,28617600	AMATRICE	950	A*
ANC	43,62027778	13,51611111	ANCONA	92	A*
ANNI	43,05339000	12,85663000	ANNIFO		B*
ANP	43,60222222	13,47416667	ANCONA - PALOMBINA	47	C

ANR	43,62111111	13,51277778	ANCONA - ROCCA	48	B
ANT	42,41811000	13,07859800	ANTRODOCO	568	B*
ANT0	43,58361111	13,51305556			A*
ANZ	41,44972222	12,62638889	ANZIO	10	C*
APR	46,15444444	10,15805556	APRICA	1.210	C*
AQA	42,37553000	13,33929800	L'AQUILA - V. ATERNO - F. ATERNO	693	B*
AQF	42,38053900	13,35474000	L'AQUILA - V. ATERNO - FERRIERA	836	B*
AQG	42,37347400	13,33702600	L'AQUILA - V. ATERNO - COLLE GRILLI	721	A*
AQI	42,34490000	13,40090000	L'AQUILA - V. ATERNO - AQUIL PARK I	730	B*
AQK	42,34496700	13,40094900	L'AQUILA - V. ATERNO - AQUIL PARK IN	726	B*
AQM	42,37864300	13,34926200	L'AQUILA - V. ATERNO - IL MORO	724	A*
AQP	42,38368600	13,36859800	L'AQUILA - V. ATERNO - M. PETTINO	1.193	A*
AQT1	42,37805556	13,34555556	L'AQUILA - V. ATERNO - PONTICELLO 1		C*
AQT2	42,37805556	13,34555556	L'AQUILA - V. ATERNO - PONTICELLO 2		C*
AQV	42,37722222	13,34388800	L'AQUILA - V. ATERNO - CENTRO VALLE	692	B
ARE	38,56294300	16,21143300	ARENA (CAB. ENEL)	534	B*
ARI	41,15250000	15,09111111	ARIANO IRPINO	750	B*
ARL	41,05706800	14,54292800	AIROLA	504	B*
ARN	41,02694444	14,46888889	ARIENZO	92	A
ARO	43,46630100	11,88286800	AREZZO (NUOVA)	345	A*
ARQ	42,77222222	13,29444444	ARQUATA DEL TRONTO	700	A*
ARR	41,14176200	15,08204200	ARIANO IRPINO	644	B*
ART	43,83472222	7,85138889	ARMA DI TAGGIA	10	C*
ARZ	43,46444444	11,88916667	AREZZO	300	A*
ASG	45,85583333	11,47388889	ASIAGO (ROANA)	974	A*
ASS	43,07498200	12,60414100	ASSISI	390	A*
ATC	41,62250000	13,79416667	ATINA - COLLE		A*
ATM	41,60250000	13,78555556	ATINA - MONTE PRATO		A*
ATN	41,62027778	13,80138889	ATINA	440	A*
ATP	41,64500000	13,78333333	ATINA - PRETURA ESTERNO		A*
ATQ	41,64500000	13,78333333	ATINA - PRETURA PRIMO PIANO		A*
ATR	41,64500000	13,78333333	ATINA - PRETURA PIANO TERRA		A*
ATS	41,64083333	13,79361111	ATINA - SERBATOIO		A*
ATS0	41,64083300	13,79361100	ATINA SERBATOIO		A*
ATT	41,64500000	13,78333333	ATINA - PRETURA TERRAZZA		A*
AUG	37,24158900	15,23996400	AUGUSTA (CAB. ENEL)	53	A*
AUL	44,20875900	9,97307000	AULLA	176	A*
AUP	46,50645400	13,25634300	AUPA	960	B*
AVL	40,92266000	14,78720000	AVELLINO	423	B*
AVS	46,29193300	13,05580000	AVASINIS - TRASAGHIS	206	C*
AVT	40,31972222	17,70361111	AVETRANA	32	A*
AVZ	42,02745800	13,42592900	AVEZZANO	746	B*
BBB	43,70944444	11,82583333	BIBBIENA	400	C
BBN	43,74764600	11,82142800	BIBBIENA (NUOVA)	471	A*
BCC	42,81295300	12,91629400	BORGO CERRETO - CAMPO SPORTIVO	355	B*

BCL	38,18222222	15,23333333	BARCELLONA P. GOTTO (MILAZZO)	26	B*
BCN	40,63434600	15,38237600	BUCCINO	660	C*
BCT	42,81561100	12,91538300	BORGO CERRETO - TORRE	370	A*
BDA	44,51055556	9,62833333	BEDONIA - PISCINE	530	B*
BDG	44,50805556	9,11888889	BEDONIA (GALLARETO)		A*
BDT	43,70677200	12,18803600	BADIA TEDALDA	795	A*
BGI	40,83083333	15,06805556	BAGNOLI IRPINO	672	A
BGL	43,99583100	10,57691600	BAGNI DI LUCCA	450	A*
BGN	44,32055556	9,99027778	BAGNONE	362	B
BGR	43,88951100	11,99129100	BAGNO DI ROMAGNA	556	A*
BLS	41,58166667	13,80222222	BELMONTE CASTELLO		A*
BND	44,48888889	9,76888889	BEDONIA	477	C*
BNE	41,12755600	14,78488200	BENEVENTO (NUOVA)	221	B*
BNO	41,11972222	14,79472222	BENEVENTO - OSPEDALE	208	B*
BNT	37,78080200	14,84471800	BRONTE	925	B*
BNV	41,11694444	14,79750000	BENEVENTO	205	B*
BOI	41,48083333	14,47277778	BOIANO	495	C*
BOJ	41,48445100	14,47210300	BOJANO (NUOVA)	537	B*
BRA	46,00388889	9,76000000	BRANZI	825	C*
BRB	43,95420500	11,21286700	BARBERINO DI MUGELLO	426	A*
BRC	46,18694444	12,55361111	BARCIS	427	A*
BRG	44,06833330	10,46111111	BARGA	268	A*
BRH	44,20888889	11,76333333	BRISIGHELLA	150	B*
BRM	44,12888889	11,11750000	BRASIMONE (CAMUGNANO)	842	A*
BRN	40,47194444	15,63444444	BRIENZA	691	B
BRO	38,60277778	16,34277778	BROGNATURO	770	A*
BRR	44,50833333	9,98888889	BERCETO (RABBONI)	813	C*
BRS	42,32388889	13,59027778	BARISCIANO	920	B*
BRT	44,50805556	9,98777778	BERCETO	812	A*
BRZ	44,38083333	6,97000000	BERSEZIO	1.590	B*
BSA	41,00924700	15,35827100	BISACCIA (NUOVA)	934	A*
BSC	41,00972222	15,37611111	BISACCIA	887	A
BSL	43,95666667	11,37694444	BORGO S. LORENZO	197	B*
BSM	44,12083333	11,14166667	BRASIMONE - CENTRALE	890	A*
BSS	42,19000000	13,84361111	BUSSI	266	E*
BSZ	44,03151300	11,46733600	BORGO S. LORENZO (NUOVA)	682	A*
BTT	41,99833333	13,54305556	BORGO OTTOMILA	652	C*
BTT2	41,99833333	13,54305556	BORGO OTTOMILA - 2 (CELANO)		B*
BUI	46,22166667	13,09027778	BUIA	163	C
BVG	42,93238900	12,61105600	BEVAGNA	205	B*
BVM	37,93150000	15,93600000	BOVA MARINA	184	A*
BVN	41,24861100	15,34222200	BOVINO	605	B
BZZ	42,33750000	13,46611111	BAZZANO	597	C*
CAG	43,05444400	12,82888800	CASSIGNANO		A*
CAMO	41,61700000	15,10200000	CASALNUOVO MONTEROTARO		B*

CAS	47,04944444	12,12722222	CASERE (PREDOI)	1.590	A*
CASA	41,73900000	14,84600000	CASACALENDA		B*
CAST	41,70100000	14,73200000	CASTELLINO DEL BIFERNO		B*
CAT	37,44694444	15,04666667	CATANIA (PIANA)	10	B*
CATP	37,52762600	15,08040000	CATANIA PARCO GIOENI	155	A*
CDA	45,15833333	9,70222222	CODOGNO (AGENZIA)	60	B*
CDG	45,15833333	9,69805556	CODOGNO	60	B*
CDI	37,49411000	14,64298800	CASTEL DI IUDICA	471	B*
CDM	42,00277778	14,19972222	COLLE DI MACINE	793	A*
CDN	45,95888889	12,98416667	CODROIPO (NUOVA)	42	B*
CDR	45,95888889	12,98416667	CODROIPO	42	B*
CDRV1	42,81760000	12,91400000	CERRETO DI SPOLETO CEDRAV-1 (Master)	542	A*
CDRV2	42,81671900	12,91465000	CERRETO DI SPOLETO CEDRAV-2 (Slave-a	545	A*
CDRV3	42,81772600	12,91488000	CERRETO DI SPOLETO CEDRAV-3 (Last)	542	A*
CDS	41,78714000	14,11187000	CASTEL DI SANGRO	932	A*
CESM	43,00466500	12,90333200	CESI MONTE		A*
CESV	43,00388800	12,90111100	CESI VALLE		B*
CGL	43,53527778	12,62916667	CAGLI	277	A*
CHT	42,36982700	14,14780900	CHIETI	109	B
CLA	46,27217900	12,51455000	CLAUT	513	A*
CLC	43,02938800	12,89127700	COLFIORITO CASERMETTE		B*
CLF	43,03589800	12,92053800	COLFIORITO	753	D
CLG	37,21163600	14,52077000	CALTAGIRONE	531	B*
CLL	43,47879800	11,26910400	CASTELLINA IN CHIANTI	687	A*
CLM	40,43553200	15,38344100	CORLETO MONFORTE	703	B*
CLN	42,08522400	13,52072200	CELANO	803	A*
CLP	40,91694444	15,43805556	CALITRI - PITTOLI	600	A*
CLT	40,89833333	15,43861111	CALITRI	595	B
CLV	37,81833333	13,89000000	CALTAVUTURO	620	A*
CML	40,74698300	13,90129200	CASAMICCIOLA	171	B*
CMM	41,86832000	14,44984000	CASTIGLIONE MESSER MARINO	1.137	B*
CMO	46,09115000	13,51476600	CASTELMONTE	605	A*
CNA	45,97222222	12,43583333	CANEVA CENTRALE - POZZO	150	A*
CNB	40,87527778	15,32694444	CONZA - BASE	450	B*
CNC	41,07750000	14,02416667	CANCELLO ARNONE	7	D*
CNF	44,11052300	10,41111900	CASTELNUOVO DI GARFAGNANA	306	A*
CNG	45,88305556	12,28833333	CONEGLIANO 5	63	B*
CNM	41,61822500	15,10451700	CASALNUOVO MONTEROTARO (NUOVA)	462	B*
CNP	40,87111111	15,30750000	CONZA - PIANA	443	B*
CNT	41,90000000	12,48333333	CANTERNO - CENTRALE		C*
CNV	45,96898700	12,44904500	CANEVA	101	C*
CNV0	40,87166667	15,32916667	CONZA - VETTA	594	A*
CONT	42,40900000	12,76600000	CONTIGLIANO		A*
COP	40,37823500	16,04064400	CORLETO PERTICARA	775	A*
COR	39,11772200	16,38002000	CORACI (CAB. ENEL)	879	A*

COS	39,28907000	16,25768300	COSENZA (NUOVA)	376	A*
CPC	44,92333333	11,87555556	COPPARO (COCCANILE)	2	C*
CPP	44,89361111	11,82916667	COPPARO	4	C*
CPS	42,27200000	13,75800000	CAPESTRANO	585	A*
CR1	40,88972222	15,29638889	CAIRANO 1	455	B*
CR2	40,88694444	15,31222222	CAIRANO 2	450	A*
CR3	40,88666667	15,33416667	CAIRANO 3	438	A*
CR4	40,88611111	15,34805556	CAIRANO 4	443	A*
CRA	39,28888800	16,24555500	COSENZA (Ragonesi) (cab. ENEL)	315	A*
CRC	41,45972222	14,71944444	CERCEMAGGIORE	926	A*
CRD	46,52500000	12,11805556	CORTINA D'AMPEZZO	1.550	A*
CRG	46,24611111	8,34000000	CREGO (CRODO)	625	B*
CRL	37,81805556	13,29388889	CORLEONE	600	A*
CRN	39,07750000	17,11138889	CROTONE (MONTEDISON)	60	B*
CRO	43,26784100	11,98055000	CORTONA	371	A*
CRP1	45,05027778	9,88000000	CAORSO PAESE 1	44	C*
CRP2	45,05027778	9,88000000	CAORSO PAESE 2	44	C*
CRR1	42,81972222	12,91722222	CERRETO DI SPOLETO - COMUNE 1	557	A*
CRR2	42,81972222	12,91722222	CERRETO DI SPOLETO - COMUNE 2	557	A*
CRR3	42,81861111	12,91694444	CERRETO DI SPOLETO - PALAZZO NOBILI	545	A*
CRS	45,07361111	9,87027778	CAORSO - CENTRALE	45	C*
CRT	39,07750000	17,12666667	CROTONE	9	C
CRV	40,70777778	17,65166667	CAROVIGNO	144	A*
CS2	45,07361111	9,87027778	CAORSO CENTRALE - QUOTA 37,73	38	C*
CS3	45,07361111	9,87027778	CAORSO CENTRALE - QUOTA 39,00	39	C*
CS4	45,07361111	9,87027778	CAORSO CENTRALE - QUOTA 61,70 - 1	62	C*
CS5	45,07361111	9,87027778	CAORSO CENTRALE - QUOTA 61,70 - 2	62	C*
CS6	45,07361111	9,87027778	CAORSO CENTRALE - QUOTA 90,00	90	C*
CSA	43,00799700	12,59058100	CASTELNUOVO (ASSISI)	188	B*
CSAD	43,00700000	12,59100000	CASTELNUOVO (ASSISI)		C*
CSC	42,71888889	13,01333333	CASCIA	677	A*
CSC1	42,81722222	12,91500000	CERRETO DI SPOLETO - CONSERVATORIO 1	500	A*
CSC2	42,81722222	12,91500000	CERRETO DI SPOLETO - CONSERVATORIO 2	500	A*
CSD	42,75305556	12,00416667	CASTEL VISCARDO	488	B*
CSE1	45,07361111	9,87027778	CAORSO CENTRALE - EMERGENZA 1		C*
CSE2	45,07361111	9,87027778	CAORSO CENTRALE - EMERGENZA 2		C*
CSF	46,28111111	11,43722222	CASTEL DI FIEMME (CAPRIANA)	950	C*
CSI	42,71888889	13,01333333	CASCIA - PRONTO INTERVENTO		A*
CSL	40,63166667	16,92805556	CASTELLANETA	227	B*
CSN	44,13700500	12,24140800	CESENA	100	B
CSN0	41,52305556	13,86361111	CASSINO - SANT'ELIA		B*
CSO	42,09625200	13,08346000	CARSOLI	653	A*
CSP	44,37777778	11,58000000	CASTEL SAN PIETRO TERME	99	B*
CSR	42,75500000	13,00416667	CASCIA - PETRUCCI	617	B*
CST	45,65916667	11,90166667	CASTELFRANCO 5	42	B*

CST1	42,82027778	12,91750000	CERRETO DI SPOLETO - TEATRO 1	550	A*
CST2	42,82027778	12,91750000	CERRETO DI SPOLETO - TEATRO 2	550	A*
CST3	42,82027778	12,91750000	CERRETO DI SPOLETO - TEATRO 3	550	A*
CSV	42,29750000	13,62916667	CASTELNUOVO (SAN PIO)	819	B*
CSZ	39,30416667	16,24722222	COSENZA	240	B*
CTC	43,46305556	12,25305556	CITTÀ DI CASTELLO	308	C
CTD	42,38750000	12,94750000	CITTADUCALE	485	B*
CTN	38,91555556	16,58833333	CATANZARO	377	A*
CTS	43,48500000	12,22361111	CITTA' DI CASTELLO (REGNANO)	297	C*
CTV	38,34983100	16,08051300	CITTANOVA	469	B*
CTZ	38,94073500	16,58507500	CATANZARO (PONTEGRANDE)	489	A*
CVD	46,08805556	13,23194444	CIVIDALE DEL 6	126	B*
CVL	39,81685300	16,19475400	CASTROVILLARI	483	A*
CVM	42,99409100	11,28230500	CIVITELLA MARITTIMA	352	A*
CVT	44,00527778	11,93750000	CIVITELLA DI ROMAGNA	226	B*
DCM	43,89123500	11,51801100	DICOMANO	200	C
DMN	44,31500000	7,27111111	DEMONTE	770	C*
EBO	40,54027778	14,98916667	EBOLI	18	B*
FAZ	44,29801600	11,89074600	FAENZA (NUOVA)	71	B*
FDF	38,78915800	16,30006200	FILADELFIA (CIMITERO)	654	A*
FGV	43,60145600	11,41161900	FIGLINE VALDARNO	345	A*
FHC	42,76111111	13,21027778	FORCA CANAPINE (ARQUATA TRONTO)	1.473	A*
FIE	43,80725100	11,29438500	FIESOLE	351	A*
FLD	38,77963300	16,29089500	FILADELFIA (CAB.ENEL)	591	B*
FLP	46,02444444	11,91833333	FELTRE (PASQUER)	275	C*
FLT	46,01944444	11,91194444	FELTRE	305	A*
FMC	40,88138889	15,25500000	TEORA - CONTRADA FIUMICELLO		B*
FMG	42,26802800	13,11722000	FIAMIGNANO	1.071	A*
FNP	38,01722222	14,16472222	FINALE DI POLLINA	62	A*
FNZ	44,30416667	11,88722222	FAENZA	28	B*
FOR	44,19940900	12,04191600	FORLI' (NUOVA)	77	C
FORC	42,96100000	12,95200000	FORCELLA		A*
FRC	46,22111111	12,99666667	FORGARIA CORNINO	216	C
FRE	44,12928000	11,39785000	FIRENZUOLA	457	A*
FRL	44,21111111	12,07777778	FORLI'	2	B*
FRN	44,68555556	10,10777778	FORNOVO	275	A*
FRR	38,05111111	16,13250000	FERRUZZANO (AFRICO NUOVO)	18	B*
FRS	44,72527778	10,09166667	FORNOVO (SANT'ANDREA)	200	A*
FRZ	38,03794667	16,08746333	FIRENZUOLA	420	A*
FSMI	42,95350200	12,69961000	FOLIGNO S. MARIA INFRAPORTAS		C*
FST	44,11750000	11,37750000	FIRENZUOLA (SANTERNO)	420	C*
FVZ	44,23824700	10,13108900	FIVIZZANO	429	E
GAI	45,65927500	10,61626500	GAINO (TOSCOLANO MADERNO)	398	B*
GBB	43,35700000	12,60200000	GUBBIO	407	A*
GBP	43,31381600	12,58955000	GUBBIO PIANA		B*

GEL	37,08416667	14,26888889	GELA (AGENZIA)	12	C*
GLD	41,50972222	14,75694444	GILDONE	755	A*
GLL	41,66111111	13,79777778	GALLINARO		A*
GLT	43,23310100	12,78900100	GUALDO TADINO	621	B*
GMB	38,16666667	15,82694444	GAMBARIE (S. STEFANO)	1.305	A*
GNL	40,84331500	16,03311900	GENZANO DI LUCANIA		A*
GRD	42,17850500	14,17985100	GUARDIAGRELE	702	A*
GRG1	41,25833333	13,83277778	GARIGLIANO - FREE FIELD 1	5	C
GRG2	41,25833333	13,83277778	GARIGLIANO - FREE FIELD 2	5	C
GRM	40,31027778	15,88527778	GRUMENTO NOVA	575	B*
GRN	41,81250000	13,31833333	GUARCINO	1.200	A*
GRR	37,72611111	15,16277778	GIARRE	240	B*
GRS	45,36972222	7,28000000	GROSCAVALLO	1.060	B*
GSA	42,42068900	13,51936200	GRAN SASSO (LAB. INFN ASSERGI)	1.062	A*
GSG	42,46000000	13,55000000	GRAN SASSO (LAB. INFN GALLERIA)	1.200	A*
GSN	41,30166667	14,44583333	GIOIA SANNITICA	275	B*
GTR	38,44805500	15,91805500	GIOIA TAURO (CAB. ENEL)	20	B*
GVD	45,61000000	10,38361111	GAVARDO (GAZZINO - VALLIO TERME)	315	A*
GVR	45,57888889	10,43638889	GAVARDO	196	B*
ISD	45,27333333	10,96833333	ISOLA DELLA SCALA	31	B*
ISG	42,50333333	13,64972222	ISOLA DEL GRAN SASSO	433	B*
ISI	36,79776000	14,89235700	ISPICA	276	A*
ISP	42,50361111	13,64972222	ISOLA DEL GRAN SASSO-CABINA PRIMARIA	435	B*
LARI	41,80500000	14,91900000	LARINO		A*
LCA	37,11416667	13,91250000	LICATA (AGENZIA)	11	C*
LCT	37,10944444	13,92805556	LICATA	7	A*
LDP	42,03916900	14,18263000	LAMA DEI PELIGNI	780	A*
LGN	40,13111100	15,75849600	LAGONEGRO	809	C*
LMT	38,88722222	16,25750000	LAMEZIA TERME	9	C*
LMZ	38,91867100	16,25281100	LAMEZIA TERME (S.EUFEMIA)	63	C*
LNG	44,65555556	10,31305556	LANGHIRANO (LESIGNANO BAGNI)	207	C*
LNM	40,87833333	15,19194444	LIONI - MACELLO		A*
LNS	42,56500000	12,98416667	LEONESSA	950	B*
LNT	37,28841000	15,00225900	LENTINI	117	A*
LOD	45,30722222	9,50400000	LODI	80	B*
LPD1	42,01861111	14,16916667	LAMA DEI PELIGNI		C*
LPR	38,46815100	14,95690300	LIPARI	67	A*
LRG	40,02111111	15,89000000	LAURIA GALDO	739	A*
LRN	41,79802300	14,91743300	LARINO	503	A*
LRS	40,04611111	15,83500000	LAURIA	425	A*
LSN	41,85277778	15,36000000	LESINA	7	B*
LSS	42,55824300	12,96889400	LEONESSA (NUOVA)	1.065	A*
LTC	41,41750000	12,80638889	LATINA CENTRALE - COLONNA TERMICA	5	C*
LTN1	41,41750000	12,80638889	LATINA - CENTRALE 1	5	C*
LTN2	41,41750000	12,80638889	LATINA - CENTRALE 2	5	C*

LTP	41,41750000	12,80638889	LATINA CENTRALE - PILE C A P	5	C*
LTR	40,08765000	16,00948300	LATRONICO		A*
LVN	40,78481300	15,30462600	LAVIANO	558	A*
LVR	43,49996600	10,41260100	LIVORNO	295	A*
MAA	46,18666667	13,06944444	MAJANO - ASCENSORE	169	B*
MAD	46,36444444	9,36000000	MADESIMO	1.510	B*
MAI	46,18666667	13,07333333	MAIANO	164	C
MAJ	46,18233900	13,06892200	MAJANO (NUOVA)	214	B*
MAP	46,18666667	13,06944444	MAJANO - PRATO	169	B*
MAR	40,67561700	16,58278500	MATERA	410	A*
MAT	46,18666667	13,06944444	MAJANO - PIANO TERRA	169	B*
MCN	41,33929400	14,66354000	MORCONE	665	A*
MCR	43,79916667	12,44833333	MACERATA FELTRIA	290	A*
MCS	43,99436600	12,10744100	MERCATO SARACENO (NUOVA)	190	A*
MDC	44,48500000	11,64027778	MEDICINA	21	C*
MDG	44,15972222	11,78777778	MODIGLIANA	197	B*
MDT	44,13472222	11,83000000	MODIGLIANA (TREBBIO)	574	A*
MFG	38,18881200	15,54062700	MESSINA FORTE GONZAGA	199	A*
MJS	46,17805556	13,06250000	MAJANO - SAN MARTINO		B*
MLC	45,81277778	10,85305556	MALCESINE	77	B*
MLD	44,11750000	12,07083333	MELDOLA	126	B*
MLL	40,84340700	15,01105300	MONTELLA	671	C*
MLR	40,24022700	15,86313800	MOLITERNO		D*
MLT	38,61027778	16,07083333	MILETO	363	B*
MLZ	38,23194444	15,24388889	MILAZZO	53	E*
MMB	42,35888889	11,52972222	MONTALTO CENTRALE - BASE REATTORE	7	C*
MMP	42,24855000	12,74855400	MOMPEO	474	A*
MN4	42,35888889	11,52972222	MONTALTO CENTRALE - MOD N4	7	C*
MNC1	42,35888889	11,52972222	MONTALTO DI CASTRO - CENTRALE 1	7	C*
MNC2	42,35888889	11,52972222	MONTALTO DI CASTRO - CENTRALE 2	7	C*
MND	41,63833333	15,89166667	MANFREDONIA	55	A*
MNE	42,35888889	11,52972222	MONTALTO CENTRALE - PEDESTAL	7	C*
MNF	43,06277778	13,18472222	MONTE FIEGNI (FIASTRA)	642	A*
MNP	42,25027778	14,03888889	LETTOMANOPPELLO	270	A*
MNS	45,25277778	11,72277778	MONSELICE	5	B*
MNT	43,13972222	11,18333333	MONTICIANO	361	A*
MRA	39,98711000	15,73094000	MARATEA	535	A*
MRC	41,34388889	14,69166667	MORCONE	403	B*
MRD	44,88833333	11,07277778	MIRANDOLA	18	C*
MRH	41,34138889	16,19250000	MARGHERITA DI SAVOIA	3	C*
MRL	40,75822100	15,47856500	MURO LUCANO	779	A*
MRM	39,88320500	15,98955500	MORMANNO	919	A*
MRN	44,88638889	11,07277778	MIRANDOLA (NAPOLI)	18	C*
MRR	44,06194444	11,60250000	MARRADI	370	A*
MRS	43,94444444	12,18055556	MERCATO SARACENO	190	B*

MRT	40,78944444	14,76277778	MERCATO S. SEVERINO	155	B
MRV	40,36135900	15,82648200	MARSICO VETERE	747	A*
MSC	42,52611111	13,34638889	MASCIONI (CAMPOTOSTO)	1.332	A*
MSR	39,07695800	16,78974000	MESORACA (FILIPPA) (CAB. ENEL)	495	A*
MSS1	38,20694444	15,51583333	MESSINA 1	456	B*
MSS2A	38,20856100	15,51596600	MESSINA 2 (NUOVA)	475	A*
MST	37,92555556	14,36361111	MISTRETTA	925	A*
MTC	41,49027778	13,81277778	MONTECASSINO (CASSINO)	512	A*
MTL	43,24949700	13,00842800	MATELICA	365	B*
MTM	46,19500000	13,53138889	MONTEMAGGIORE (SAVOGNA)	965	A*
MTR	42,52402100	13,24479600	MONTEREALE	975	A*
MTV	43,53277778	11,55694444	MONTEVARCHI	143	C*
MZR	37,65277778	12,61083333	MAZARA DEL VALLO	17	B*
MZZ	38,23412300	15,24513500	MILAZZO (NUOVA)	125	C*
NAD	40,87175000	14,28001000	NAPOLI EST	139	B*
NAP	40,79925500	14,17960700	NAPOLI OVEST	205	C*
NAS	38,11861111	14,78611111	NASO	470	A*
NCB	43,10277700	12,80527700	NOCERA UMBRA BISCONTINI		C*
NCH	38,96277778	16,31361111	NICASTRO (LAMEZIA TERME)	175	C*
NCM	43,14917000	12,79722200	NOCERA UMBRA SALMATA		C*
NCO	38,55304300	15,93804300	NICOTERA (SCUOLA)	271	A*
NCR	43,11158300	12,78466600	NOCERA UMBRA	478	E
NCR2	43,11158300	12,78466600	NOCERA UMBRA 2		E
NCS	37,75111111	14,40027778	NICOSIA	780	B*
NCT	38,97500000	16,31388889	NICASTRO	246	C*
NIC	38,55304000	15,93804600	NICOTERA (CAB. ENEL)	272	A*
NIC0	38,55333333	15,93361111	NICOTERA	180	A*
NIM	38,54416600	15,93500000	NICOTERA MARINA (CAB. ENEL)	25	C*
NOCE	43,12000000	12,79200000	NOCERA UMBRA P.I.		A*
NOR	42,79244200	13,09242200	NORCIA LE CASTELLINA		B*
NOT	36,90000000	15,06833333	NOTO	171	A*
NRA	42,79583333	13,08861111	NORCIA - ALTAVILLA		C
NRC	42,79138889	13,09638889	NORCIA	609	B
NRI	42,78861111	13,09694444	NORCIA - INA CASA		D*
NRM	42,79527778	13,08472222	NORCIA - MULINO		D
NRN	42,51500000	12,51916667	NARNI	300	A*
NRO	42,79750000	13,08388889	NORCIA - ORELLI		B*
NRP	42,76916667	13,09694444	NORCIA - PANIFICIO		B*
NRZI	42,78141600	13,09700000	NORCIA ZONA INDUSTRIALE		C
NSC	37,15138889	14,39138889	NISCEMI	319	B*
NTE	36,90959500	15,06923700	NOTO (AREA ENEL)	235	A*
NVL	44,84194444	10,73055556	NOVELLARA	23	B*
NVR	38,01633100	15,13192700	NOVARA DI SICILIA	550	A*
NVR0	38,01634600	15,13191900	NOVARA DI SICILIA (CAB. ENEL)	638	A*
NZZ	44,78222222	8,35694444	NIZZA MONFERRATO	165	B*

OPB	40,86916667	15,20722222	OPPIDO BALZATA		A*
ORC	41,95360600	13,64234600	ORTUCCHIO (NUOVA)	732	A*
ORT	41,95611111	13,64583333	ORTUCCHIO	662	B*
PAGA	42,36000000	13,46000000	PAGANICA		C*
PCB	42,55666667	13,33638889	POGGIO CANCELLI (BASE DIGA)	1.298	A*
PCH	36,71083333	15,09111111	PACHINO	47	A*
PDM	41,35535400	14,38537600	PIEDIMONTE MATESE	340	C*
PGA	40,56859200	15,77885800	PIGNOLA	1.018	A*
PGC	42,55861111	13,33916667	POGGIO CANCELLI (CAMPOTOSTO)	1.334	B*
PGG	42,32222222	13,54000000	POGGIO PICENZE	760	B*
PGL	43,69555556	12,49833333	PEGLIO	465	B*
PGN	41,45194444	13,79083333	PIGNATARO	58	B*
PIC	42,85037600	11,68497500	PIANCASTAGNAIO	832	B*
PIT	43,98964700	10,94455200	PISTOIA	537	A*
PLB	42,06333333	12,76472222	PALOMBARA SABINA	350	A*
PLC	40,18250000	16,65916667	POLICORO	26	C*
PLL	38,02444444	15,65444444	PELLARO (CAB. ENEL)	80	B*
PLM	38,36388800	15,85833333	PALMI (CAB. ENEL)	350	B*
PLN	37,99333333	14,14611111	POLLINA	700	A*
PLP	45,82833333	7,03000000	PLANPINCIEUX (COURMAYER)	1.580	B*
PLS	42,08250000	12,76472222	PALOMBARA SABINA S.S.636	265	A*
PLT	39,00234200	16,31933800	PLATANIA (CAB. ENEL)	748	A*
PLZ	37,06834700	14,90975600	PALAZZOLO ACREIDE	657	A*
PMI	38,35537700	15,85329200	PALMI	340	A*
PNC	42,84888889	11,70555556	PIANCASTAGNAIO	760	A*
PNM	44,37995100	9,88165000	PONTREMOLI	355	C*
PNN	43,81722222	12,26138889	PENNABILLI	525	B*
PNR	44,87777778	7,34444444	PINEROLO	355	B*
PNS	42,84555556	11,68666667	PIANCASTAGNAIO (NATALI)	740	C*
PNT	41,49861111	13,68277778	PONTECORVO	115	A*
PO11	45,25833333	8,19833333	TRINO CENTRALE - AREA PO1	155	B*
PO12	45,25833333	8,19833333	TRINO CENTRALE - AREA PO2	155	B*
POPL	42,15700000	13,84200000	POPOLI		C*
PPL	36,68341800	15,13377500	PORTOPALO DI CAPO PASSERO (CAB. ENEL	43	A*
PRC	42,51111111	13,40972222	PROVVIDENZA CENTRALE - SALA TURBINE	1.030	A*
PRCI	42,87833300	13,03916600	PRECI		A*
PRF	44,82527778	10,31194444	PARMA (FORNACE)	48	C*
PRI	44,76944444	10,28277778	PARMA (ILSEA)	83	C*
PRM	43,97833333	11,78250000	PREMILCUORE	450	B*
PRN	40,87138889	15,18666667	PROCISA NUOVA		B*
PRP	42,51444444	13,40305556	PROVVIDENZA CENTRALE - POZZO PIEZOME	1.344	A*
PRS	40,54027778	14,98916667	PERSANO	28	B*
PRV	42,51444444	13,40305556	PROVVIDENZA CENTRALE - CAMERA VALVOL	1.278	A*
PRZ	41,37916667	14,11388889	PRESENZANO	130	C*
PSC	41,81204200	13,78919600	PESCASSEROLI	1.242	A*

PSL	41,52583333	13,78361111	POZZO SANTA LUCIA		A*
PSR	45,94931800	13,01413100	PASSARIANO	86	B*
PSS	41,74555556	13,65361111	PESCOSOLIDO		A*
PST	43,92638889	10,87694444	PISTOIA	100	A*
PTI	43,06638889	13,65611111	PETRITOLI	319	A*
PTL	43,42666667	12,44861111	PIETRALUNGA	672	A*
PTR	37,56666667	14,90972222	PATERNO'	228	A*
PTT	38,13441500	14,97504900	PATTI - CABINA PRIMARIA	150	B*
PTT0	38,13441500	14,97504900	PATTI (CAB. ENEL)	189	B*
PTT1	38,14750000	14,97000000	PATTI	27	B*
PTV	45,27527778	10,09194444	PONTEVICO	47	B*
PTZ	40,64823900	15,80811000	POTENZA	766	A*
PVS	43,66888889	12,04388889	PIEVE SANTO STEFANO	442	B
PZ1	40,63333333	15,80000000	POTENZA - SAN REMO		B*
PZ2	40,63333333	15,80000000	POTENZA - SAN VITO		B*
PZ3	40,63333333	15,80000000	POTENZA - SAN VITO ESTERNO		B*
PZ4	40,63333333	15,80000000	POTENZA - OSPIZIO		B*
PZN	38,73250000	16,15805556	PIZZO CALABRO - NUOVA	15	A*
PZS	44,18854900	10,28861000	PIAZZA AL SERCHIO	330	E
PZZ	38,73444444	16,15888889	PIZZO CALABRO	21	C*
RCA	41,58777778	13,57861111	ROCCA D'ARCE		A*
RCC	41,28750000	13,97972222	ROCCAMONFINA	613	B*
RCR	42,06722222	13,20611111	ROCCACERRO (TAGLIACOZZO)	1.124	A*
RCU	38,12141800	15,66627400	REGGIO CALABRIA	128	B*
RDD	43,49111111	11,38583333	RADDA IN CHIANTI	463	A*
RFC	42,53583333	13,40972222	RIO FUCINO (CAMPOTOSTO)	1.318	A*
RGG	39,61944444	16,17111111	ROGGIANO GRAVINA	225	B*
RGS	36,92484700	14,70325900	RAGUSA	677	A*
RIP	42,26500000	13,59916667	RIPA (FAGNANO)	661	A*
RMN	43,99527778	12,51805556	RIMINI	95	B*
RNC	43,86944444	11,60694444	RINCINE (LONDA)	453	A*
RNR	40,92722222	15,66888889	RIONERO IN VULTURE	673	B
RNV	40,92722222	15,66888889	RIONERO IN VULTURE - NUOVA	673	A*
RNV2	40,92722222	15,66888889	RIONERO IN VULTURE	673	B*
RSN	39,57064800	16,63016100	ROSSANO	433	B*
RSS	39,59055556	16,64583333	ROSSANO CALABRO	70	B*
RTI	42,43027778	12,82111111	RIETI (CAB. ENEL)	380	B*
RVR	44,90611111	9,59750000	RIVERGARO	257	B*
SAL	45,60600000	10,51800000	SALO' SCUOLA		C*
SAP	38,62517500	16,52510800	S. ANDREA APOSTOLO JONIO - (CAB. EN	390	A*
SAR	40,07459300	15,65203300	SAPRI	195	A*
SAS	45,60600000	10,51800000	SALO' SCUOLA		C*
SAV	44,24527778	7,32083333	S. ANNA (VALDIERI)	960	B*
SBC	41,91315800	13,10551800	SUBIACO	680	A*
SBR	39,69333333	16,46944444	SIBARI (TERRANOVA)	9	C*

SCC	37,51166667	13,07833333	SCIACCA	65	B*
SCF	42,26472222	13,99777778	SCAFA	128	B*
SCI	38,25581700	15,71467900	SCILLA	81	A*
SCL	39,77388889	15,80333333	SCALEA	2	B*
SCM	41,71082700	14,98374900	S. CROCE DI MAGLIANO	676	B*
SCN	41,91865500	13,87239600	SCANNO	985	C*
SCR	36,82927400	14,52718300	S. CROCE CAMERINA	139	A*
SCRO	41,71000000	14,99000000	S. CROCE DI MAGLIANO		A*
SCS	40,03527778	18,46194444	S. CESAREA TERME	30	A*
SCV	41,30636200	14,88044600	S. MARCO DEI CAVOTI	715	A*
SDC	41,71055556	13,81111111	S. DONATO VAL COMINO - SANTUARIO		A*
SDM	42,28944444	13,55777778	S. DEMETRIO NEI VESTINI	658	B*
SDN	39,70820600	16,04610300	S. DONATO DI NINEA	775	A*
SDS	41,68333333	13,79666667	S. DONATO VAL COMINO - COLLE IAVARRA		A*
SDV	45,62722222	13,89888889	S. DORLIGO DELLA VALLE	477	A*
SELE	42,88921600	12,92797500	SELLANO EST		A*
SELI	41,62100000	14,87500000	S. ELIA A PIANISI		A*
SELW	42,88621000	12,92180600	SELLANO OVEST		A*
SEM	46,48555556	10,26888889	SEMOGO	1.350	B*
SEP	41,62501900	14,88016700	S. ELIA A PIANISI	649	A*
SER	43,07117900	12,95313700	SERRAVALLE DI CHIENTI		C*
SFD	38,49719200	15,92248200	SAN FERDINANDO	53	C*
SGF	39,25861111	16,68861111	S. GIOVANNI IN FIORE (PAL)	1.050	A*
SGIU	42,37300000	13,39200000	S. GIULIANO L'AQUILA		C*
SGIUA	41,68400000	14,96400000	S. GIULIANO DI PUGLIA A		A*
SGIUB	41,68800000	14,96300000	S. GIULIANO DI PUGLIA B		A*
SGR	41,27166667	14,92638889	S. GIORGIO LA MOLARA	635	A*
SGV	39,26334400	16,68976200	S. GIOVANNI IN FIORE	1.166	A*
SLA	40,92944444	15,17583333	SANT'ANGELO DEI LOMBARDI - ALTO		A*
SLB	40,93000000	15,16611111	SANT'ANGELO DEI LOMBARDI - BASE		A*
SLC	40,39107100	15,63266200	SALA CONSILINA	1.040	A*
SLL	42,79300000	13,79300000	SELLANO		B*
SLL0	38,88388889	16,74277778	SELLIA MARINA	5	C*
SLM	44,63305556	9,40361111	SALSOMINORE	422	A*
SLP	46,81222222	11,25277778	S. LEONARDO VALPASSIRIA	725	A*
SLS	44,63166667	9,06916667	SALSOMINORE (CENTRALE)	410	A*
SMA	39,55639300	16,12507200			A*
SMAP	41,86900000	15,01100000	S. MARTINO IN PENSILIS		B*
SMAPP	41,86995000	15,00975000	S. MARTINO IN PENSILIS (san pietro)	333	B*
SMAPS	41,87090000	15,01445000	S. MARTINO IN PENSILIS (scuola)	317	B*
SMC1	45,01861111	10,63222222	S. MATTEO DELLE CHIAVICHE (VIADANA)	20	B*
SMC2	45,01861111	10,63222222	S. MATTEO DELLE CHIAVICHE - 2	20	B*
SMF	46,33972222	13,06138889	SOMPLAGO CENTRALE - FINESTRA CONDOTT	413	A*
SMG	46,33972222	13,06138889	SOMPLAGO CENTRALE - GALLERIA CAVI	413	A*
SMT	46,33972222	13,06138889	SOMPLAGO CENTRALE - CUNICOLO POMPE	413	A*

SMU	46,33972222	13,06138889	SOMPLAGO CENTRALE - USCITA GALLERIA	413	A*
SNA	40,25789400	16,24742200	SANT'ARCANGELO	315	C*
SNG	43,68500000	13,22666667	SENIGALLIA	100	B*
SNM	43,93432600	12,44929000	SAN MARINO	743	A*
SNN	41,83250000	15,57222222	SANNICANDRO GARGANICO	220	A
SNS	43,56739000	12,14337500	SANSEPOLCRO	371	C*
SNZ	40,24272200	15,55027700	SANZA	641	A*
SNZ1	45,07388889	9,89638889	S. NAZZARO 1	42	C*
SNZ2	45,07388889	9,89638889	S. NAZZARO - 2	42	C*
SPA	40,03531600	16,33453600	S. PAOLO ALBANESE	856	A*
SPC	42,74346900	12,73969300	SPOLETO (CANTINA)	134	C*
SPC0	46,33972222	13,06138889	SOMPLAGO CENTRALE - CAMERA VALVOLE	413	A*
SPD	42,51194444	13,37000000	SELLA PEDICATE (CAMPOTOSTO)	1.305	A*
SPL	42,73611111	12,73694444	SPOLETO	365	C*
SPM	42,72166667	12,75166667	SPOLETO (MONTELUCO)	775	A*
SPO	42,73358500	12,74060200	SPOLETO	476	A*
SPR	38,26725800	15,60200400	SPERONE (MESSINA) (CAB. ENEL)	145	B*
SPR0	38,26722222	15,58638889	SPERONE	102	B*
SPS	39,34020600	16,44912000	SPEZZANO DELLA SILA (CAMIGL.)	1.305	B*
SPT	41,46031200	14,49871000	S. POLO MATESE	717	A*
SRB	44,86638889	10,45527778	SORBOLO	27	B*
SRC	37,08960700	15,29252300	SIRACUSA	112	A
SRC0	46,22638889	12,99833333	S. ROCCO	420	B*
SRL	43,51694444	13,61944444	SIROLO	81	A*
SRN	38,57555556	16,33194444	SERRA SAN BRUNO	803	B*
SRP	44,84833333	10,44722222	SORBOLO (PEZZANI)	32	C*
SRT	37,16277778	15,03027778	SORTINO	445	A*
SSA	38,16890000	15,78990000	S. STEFANO IN ASPROMONTE	780	A*
SSC	42,87472500	11,87678800	S. CASCIANO DEI BAGNI	632	E
SSG	43,58666667	12,08305556	SANSEPOLCRO GRAGNANO	521	A*
SSP	43,56916667	12,14694444	SANSEPOLCRO CITTA'	337	C
SSS	44,54500000	10,78611111	SASSUOLO	118	C*
SST	44,23222222	10,76750000	SESTOLA	1.002	B*
SSV	41,67944444	15,38611111	S. SEVERO	78	B
STB	38,80403900	15,23360300	STROMBOLI (COMUNE LIPARI)	104	A*
STF	43,90811200	11,79445700	S. SOFIA	642	A*
STG	41,56666667	14,23250000	S. AGAPITO	405	A*
STL	40,54106500	15,64216900	SATRIANO DI LUCANIA	748	A*
STN	41,01835300	15,11167000	STURNO	684	A*
STR	41,02083333	15,11500000	STURNO	575	B
STS	43,94222222	11,90527778	S. SOFIA	268	B*
SVL	39,26666667	16,70611111	S. GIOVANNI IN FIORE	981	A*
SVN	37,68308600	15,12996600	S. VENERINA	294	A*
SVP	40,88527778	15,25694444	SELVA PIANA - MORRA		B*
SVT	42,39694444	13,31361111	S. VITTORINO (L'AQUILA)	700	A*

SZZ	41,49750000	13,05472222	SEZZE	286	A*
TAO	37,85235200	15,28628300	TAORMINA	261	A*
TAR	46,50027778	13,62138889	TARVISIO	790	B*
TDG	40,79722222	14,38305556	TORRE DEL GRECO	178	A*
TER	41,55416667	13,77444444	TERELLE		A*
TGG	45,56250000	11,18333333	TREGNAGO (COLLINA)	750	A*
TGN	40,39138889	15,52611111	TEGGIANO	460	C*
TLB	46,38250000	12,98166667	TOLMEZZO - BASE DIGA	468	A*
TLM1	46,38250000	12,98166667	TOLMEZZO CENTRALE - DIGA AMBIESTA 1	536	A*
TLM2	46,38250000	12,98166667	TOLMEZZO (AMBIESTA- 2)	536	A*
TLS	41,22223700	14,52997400	TELESE TERME	124	A*
TMA	38,67331000	15,89613800	TROPEA (MAMONE) (CAB. ENEL)	123	A*
TOR	38,04438700	14,81464000	TORTORICI	554	A*
TPA	38,67364500	15,88919200	TROPEA	93	B*
TRB	45,18250000	8,27750000	TRINO CENTRALE - BASAMENTO ANNULUS	130	C*
TRC	46,22611111	13,20972222	TARCENTO	230	E
TRE1	45,18250000	8,27750000	TRINO CENTRALE - ESTERNO 1	130	C*
TRE2	45,18250000	8,27750000	TRINO CENTRALE - ESTERNO 2	130	C*
TRF	38,26432400	15,63419400	TORRE FARO	3	C*
TRF0	38,26432400	15,63419400	TORRE FARO (MESSINA) (CAB. ENEL)	47	C*
TRG	45,52527778	11,13444444	TREGNAGO	499	B*
TRI1	45,18250000	8,27750000	TRINO CENTRALE - INTERNO 1	130	C*
TRI2	45,18250000	8,27750000	TRINO CENTRALE - INTERNO 2	130	C*
TRL	42,46194444	12,93222222	TERMINILLO	1.225	A*
TRM	37,99055556	13,70111111	TERMINI IMERESE	3	*
TRN	42,55305556	12,60055556	TERNI	112	B*
TRO	40,61457400	16,14220600	TRICARICO	770	B*
TRP	38,67888889	15,89916667	TROPEA	24	A*
TRQ	45,18250000	8,27750000	TRINO CENTRALE - SALA CONTROLLO SOTT	130	C*
TRR	40,61888889	16,15638889	TRICARICO	650	B
TRS	39,62972222	16,22500000	TARSIA	102	C*
TRT	44,89250000	8,88250000	TORTONA	210	A*
TRV	41,78111111	14,55055556	TRIVENTO	540	A*
TSC	42,42250000	11,86972222	TUSCANIA	190	A*
TTP	42,01694444	14,16916667	TARANTA PELIGNA	450	A*
TVR	43,71138889	11,21888889	TAVARNUZZE (IMPRUNETA)	71	C*
UGN	39,89388889	18,12388889	UGENTO	12	A*
UMB	43,25388889	12,25611111	UMBERTIDE	617	A*
VBM	38,71377600	16,12387100	VIBO MARINA	56	C*
VBV	38,67787200	16,10653300	VIBO VALENTIA	546	A*
VFC	43,15722222	12,60055556	VALFABBRICA - DIAZ C.		C*
VFF	43,15722222	12,60055556	VALFABBRICA - DIAZ F.		C*
VFP	43,15722222	12,60055556	VALFABBRICA - PIANO TERRA		C*
VFS	43,15722222	12,60055556	VALFABBRICA - SOTTOT.		C*
VGD1	44,11916667	10,30194444	VAGLI CENTRALE - BASE DIGA 1	560	E*

VGD2	44,11916667	10,30194444	VAGLI CENTRALE - BASE DIGA 2	560	C*
VGG	39,96611111	16,04916667	VIGGIANELLO	370	D*
VGL	44,11000000	10,28972222	VAGLI - PAESE	587	A*
VLB	41,75916667	13,98888889	VILLETTA BARREA	980	A*
VLC	40,58138889	17,47222222	VILLA CASTELLI	228	A*
VLF	46,46305556	10,42194444	SANTA CATERINA VALFURVA	1.520	A*
VLL	41,67250000	12,77361111	VELLETRI	180	E*
VLM	44,36472222	10,46500000	VILLA MINOZZO	661	A*
VLN	40,17194700	16,44317400	VALIANO (MONTEPULCIANO)	252	C*
VLS1	38,21638889	15,64694444			B*
VLS2	38,21755600	15,64696100	'VILLA SAN GIOVANNI - 1	144	B*
VLT	43,40166667	10,86805556	VOLTERRA	515	B*
VRP	41,33321000	14,13168500	VAIRANO PATENORA	209	A*
VSD	41,87916667	16,17111111	VIESTE (DANTE)	30	B*
VSE	42,11111111	14,70972222	VASTO (EUROPA)		B*
VSL	41,51027778	13,78027778	VILLA SANTA LUCIA		C*
VSS	41,87750000	16,16555556	VIESTE	7	B*
VST	42,11055556	14,71027778	VASTO	151	B*
VTT	36,94777778	14,51861111	VITTORIA	162	B*
VZZ	37,16361111	14,75472222	VIZZINI	655	A*
ZCC	44,32416667	10,97083333	ZOCCA	652	B*

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