

 **CONSIGLIO NAZIONALE DELLE RICERCHE**
PROGETTO FINALIZZATO GEODINAMICA

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**ATLAS OF ISOSEISMAL MAPS
OF ITALIAN EARTHQUAKES**

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The Garfagnana earthquake of September 7, 1920.

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On September 7, 1920 at 5:55 a.m. GMT., a very strong earthquake destroyed a vast area of the Garfagnana and Lunigiana regions and the high valleys of the Secchia, Enza, Parma and Taro Rivers.

In the ENEL and Carrozzo et al. Catalogues, this event is respectively reported with an epicentral intensity of X and IX-X degrees MCS.

It was not particularly difficult to find information for the reconstruction of the effects of this earthquake, since this historical period is certainly among the best for historical seismologic research in Italy.

On the contrary, difficulties were encountered in: defining homogeneous areas from the point of view of the effects, and therefore, of the intensity; verifying the maximum epicentral intensity; and individuating both punctual and areal anomalies in the territorial seismic response.

The strategy of the research was based on two types of operations: one carried out on the sources of information, and another consisting of the verification and integration of this information in the localities hit by the phenomenon.

Three principal types of sources were utilized: technical and scientific reports on the macroscopic effects of the earthquake; macroseismic questionnaires and the Bollettino Sismico (Seismic Bulletin); and newspapers. The data available on the area that underwent destructive effects derive mainly from the first type of source, particularly from a report by De Stefani, a detailed description of the damage in a small area located at the eastern margin of the epicentral zone by G. Tasatti, and from a note made by A. Raddi.

This information was compared to the one given in the Bollettino Sismico del Reale Ufficio di Meteorologia e Geodinamica (UMG) (The Seismic Bulletin of the Royal Bureau of Meteorology and Geodynamics), derived from the macroseismic questionnaires. The description by De Stefani is the most complete and reliable one, since its author was in the epicentral area (Pieve Fosciana) when the earthquake hit. By transforming the description into numerical parameters, a preliminary map indicating the severity of the effects with isolines was drawn. Afterwards, field work in the region was carried out in order to:

- test the reliability of the distribution of the damage by checking the building typologies and the degree of repair, reinforcement, or rebuilding after 1920 within the ancient inhabited centers (in addition to direct observations, oral testimonies from on-site questioning of the inhabitants proved useful);
- assign the corresponding degrees of the MCS scale to the preliminary numerical parameters; and
- verify and interpret some relevant anomalies.

The information deduced from the macroseismic questionnaires has contributed principally to the delimitation of the areas with an intensity equal to or less than the VI degree MCS. The questionnaires allowed us to carry out some important verifications regarding the quality and quantity of the information in the macroseismic bulletins. It was especially useful to check, and in some cases to correct, the attributions of intensity; in other cases it was necessary to regard these attributions with caution, since the compilers of the questionnaires had not provided them with the descriptions of the effects.

The information that reached the UMG from localities where the earthquake was not felt (and which do not appear in the Seismic Bulletin) integrates usefully into the scheme of the distribution of effects indicated in the enclosed map.

Finally, consulting local newspapers has allowed a verification of much of the information related to the epicentral areas, especially in those zones where evident propagation anomalies or local seismic response anomalies were present.

Some photographs, taken from private collections or from periodicals, have contributed further to the calibration of the description of effects reported in the different sources utilized. The resulting macroseismic field, seen in figure shows a pre-

ferential propagation of energy in the NNW-SSE direction.

In the mesoseismal zone, one can distinguish two areas with an intensity higher than VII MCS, separated by a narrow strip characterized by pronounced attenuation. A stronger degree of attenuation has also been individuated from the epicentral area to Reggio Emilia, approximately corresponding to the valley of the Enza River.

Finally, one can see two extensive anomalies: one at the inside of the VI degree isoseismal area, centered NW of Ferrara, with an increment of the values of intensity; and the other at the inside of the V degree isoseismal area, lying between Genoa, Piacenza and Alessandria, with an attenuation of intensity.

On the map, some punctual anomalies can also be seen, the description of which lies beyond the scope of this study.

According to Eva et al. the seismicity of the Garfagnana region is due to a tensional fault system parallel to the axis of the Apennines, which was the cause of the foundering along the Tyrrhenian side of the range.

The shape of the VII-VIII isoseismal area with a NW-SE trend is consistent with effects greater than VII MCS outside of this trend, and especially, the existence of a transverse attenuated area directed towards Reggio Emilia, cannot be easily interpreted, assuming that there exists only one fracture with dip slip motion striking NW-SE.

We believe that a contribution to a better understanding of the 1920 earthquake in the Garfagnana region will come, perhaps in the near future, from the analysis of the original seismograms and from the solution of the focal mechanism.

The Blake formula are Km. 6 for the more superficial part of the seismic source and Km. 16 for the deeper part. Application of the Shebalin model leads to a fault surface of breakage of about Km². 250, which corresponds to a macroseismic equivalent of magnitude (ME) of 6.0, agreeing with the value calculated by the Galanopoulos formula for the affected area.

The following is a comparison of the values of some of the parameters of this earthquake, reported respectively in the ENEL and Carrozzo et al. Catalogues, and in the present study.

Year	Mo	Da	Ho	Mi	Lat	Long	De	I	Me	Mk	Mp	Epic. area
1920	09	07	05	55	44°15'	10°17'	18	X		6.2	6.1	Garfagnana
1920	09	07	05	55	44°15'	10°17'	10	IX-X		6.1		
1920	09	07	05	55	44°15'	10°17'		IX	6.0	6.2		Garfagnana

List of shocked localities:

Locality	Latit.	Long.	I (MCS)
Abano	45°22'	11°47'	V
Abbiategrosso	45°24'	08°55'	IV
Acqui Terme	44°41'	08°28'	II
Adria	45°03'	12°03'	IV
Agliano	44°10'	10°15'	IX
Aiola	44°10'	10°08'	VII
Alassio	44°00'	08°10'	III
Albareto di Borgotaro	44°27'	09°42'	VI
Albenga	44°03'	08°13'	III
Albiano (LU)	44°11'	10°13'	VII-VIII
Albiano (MS)	44°11'	10°13'	IX
Alfonsine	44°30'	12°03'	III
Ameglia	44°04'	09°52'	VI
Antisciana	44°07'	10°23'	VIII
Antognano	44°12'	10°12'	VIII-IX
Aosta	45°44'	07°19'	II
Arezzo	45°44'	07°19'	II
Arcigliano	44°11'	10°11'	IX
Assisi	43°04'	12°37'	III-IV
Asola	45°13'	10°15'	VI-VII
Asolo	45°48'	11°55'	III
Aulla	44°13'	09°58'	VIII
Bagni di Lucca	44°01'	10°35'	VII
Bagni di Montecatini	43°53'	10°46'	VI-VII
Bagno di Romagna	43°50'	11°58'	III

Bagnolo Mella	45°26'	10°11'	V	Castiglione di Garfagnana	44°09'	10°25'	VIII-IX
Bagnone	44°19'	10°00'	VIII	Castiglione de' Pepoli	44°08'	11°10'	VI-VII
Bardolino	45°33'	10°44'	II	Castiglione delle Stiviere	45°23'	10°30'	IV
Barga	44°04'	10°29'	VII-VIII	Cavola	44°24'	10°32'	VIII
Bargecchia	44°07'	10°26'	VIII-IX	Cavriago	44°42'	10°32'	V
Bastia	44°16'	10°03'	VIII	Cecina	43°19'	10°31'	IV
Belgioioso	45°10'	09°19'	V	Cecciola	44°23'	10°11'	VII-VIII
Benabbio	44°00'	10°36'	VII	Cerageto	44°10'	10°24'	VIII
Berceto	44°31'	09°59'	VI-VII	Cerreto Alpi	44°19'	10°15'	VII
Bettola	44°33'	10°32'	IV	Cerretoli	44°07'	10°23'	VIII
Bibbiano	44°40'	10°28'	V	Certaldo	43°33'	11°02'	V
Bibola	44°11'	09°59'	VIII	Cervia	44°16'	12°21'	III
Bientina (PI)	43°43'	10°37'	VI-VII	Cesena	44°08'	12°15'	IV
Bologna	44°30'	11°20'	V	Ceserano	44°11'	10°03'	VII-VIII
Bondeno	44°53'	11°25'	V	Cevoli	44°01'	10°38'	VI-VII
Bordighera	43°47'	07°40'	III	Chiappa	44°06'	09°49'	VI
Borghetto Lodigiano	45°13'	09°30'	IV-V	Chiavari	44°19'	09°19'	VI
Borgo a Mozzano	43°59'	10°36'	VII	Chiesina Uzzanese	43°50'	10°43'	V
Borgo S. Lorenzo	43°57'	11°23'	V	Chiozza	44°09'	10°26'	VIII-IX
Borsigliana	44°13'	10°18'	VIII	Cingoli	43°22'	13°13'	II
Bozzano	43°51'	10°21'	VI-VII	Cinquecerri	44°21'	10°20'	VII
Brescia	45°33'	10°13'	II	Città di Castello	43°27'	12°14'	IV
Brisighella	44°13'	11°46'	IV	Civago	44°15'	10°29'	VIII
Busana	44°22'	10°19'	VII	Cocciglia	44°02'	10°40'	VI-VII
Busto Arsizio	45°37'	08°51'	III	Codigoro	44°50'	12°06'	IV
Buti	43°44'	10°35'	VI	Codiponte	44°11'	10°09'	VII
Calavorno	44°01'	10°32'	VI	Codogno	44°10'	09°42'	IV-V
Calci	43°44'	10°31'	V	Collagna	44°21'	10°17'	VII
Calcinaia	43°41'	10°37'	VII	Colle	44°07'	10°22'	VIII
Calice al Cornoviglio	44°15'	09°50'	VI	Collegnago	44°14'	10°09'	VIII-IX
Calizzano	44°14'	08°07'	IV	Colle Val d'Elsa	43°25'	11°08'	V
Camaiore	43°56'	10°18'	VI-VII	Colognola	44°12'	10°17'	VIII
Campiano	44°18'	12°12'	VI-VII	Comacchio	44°42'	12°11'	IV
Campi Bisenzio	43°49'	11°08'	V	Compiano	44°32'	10°21'	VI-VII
Camporaghena	44°18'	10°10'	VIII-IX	Compione	44°20'	10°03'	VIII
Camporgiano	44°09'	10°20'	VIII-IX	Conti	44°05'	10°27'	VII
Campori	44°08'	10°25'	VIII-IX	Copparo	44°54'	11°50'	IV
Canigiano	44°11'	10°23'	VIII-IX	Corazzano	43°37'	10°52'	VI
Cannara	43°00'	12°35'	III	Coreglia Antelminelli	44°04'	10°31'	VI-VII
Canevare	44°12'	10°46'	VI-VII	Corfino	44°11'	10°23'	VIII
Capannoli	43°35'	10°41'	VI	Coriano	44°20'	10°26'	VIII
Capannori	43°50'	10°34'	VII	Corniglio	44°28'	10°05'	VI-VII
Capoli	44°12'	10°15'	IX	Correggio	44°46'	10°47'	V
Capraia	44°09'	10°28'	IX	Corsanico	43°55'	10°18'	VI-VII
Careggine	44°07'	10°19'	VII-VIII	Cremona	45°08'	10°01'	V
Camagnola	44°51'	07°53'	III	Crevalcore	44°43'	10°09'	IV
Carmignano	44°58'	11°55'	IV-V	Crodo	46°13'	08°19'	III
Carpaneto Piacentino	44°55'	09°47'	V-VI	Cutigliano	44°06'	10°45'	VI
Carpì	44°47'	10°53'	V-VI	Dalli	44°14'	10°17'	VIII-IX
Carpineta (LU)	44°05'	10°02'	IX	Dicomano	43°53'	11°31'	IV-V
Carpinetti (RE)	44°27'	10°31'	VII	Empoli	43°43'	10°57'	VI-VII
Carrara	44°03'	10°04'	VII	Equi Terme	44°10'	10°09'	VII-VIII
Carrodano	44°14'	09°39'	VI	Erba	45°49'	09°14'	III
Casalbuttano	45°15'	09°58'	V	Erbezzo	45°38'	11°00'	IV
Casalmaggiore	44°59'	10°25'	V	Fabriano	43°20'	12°54'	II
Casatico	44°09'	10°19'	VIII-IX	Fanano	44°12'	10°48'	VI-VII
Casciana (LU)	44°11'	10°09'	VIII-IX	Fauglia	43°34'	10°31'	VI
Casciana Terme	43°31'	10°37'	V	Ferrara	44°50'	11°37'	V
Cascianella (LU)	44°10'	10°18'	VIII-IX	Ferriere	44°39'	09°30'	V-VI
Cascina	43°41'	10°33'	VI	Figline	?	?	IV
Cascine di Buti	43°44'	10°37'	V	Filattiera	43°37'	11°28'	VIII
Casola	44°12'	10°10'	VIII-IX	Filecchio	44°03'	10°30'	VII
Castagneto	44°24'	10°14'	VII	Filetto	44°18'	09°58'	VIII
Castagnola	44°10'	10°15'	VIII-IX	Fiorenzuola	44°56'	09°55'	V
Calstelfiorentino	43°36'	10°58'	VI	Finale Emilia	44°50'	11°18'	IV
Castelfranco di Sotto	43°42'	10°45'	V-VI	Firenze	43°47'	11°15'	V
Casteggio	45°01'	09°07'	V	Fiumalbo	44°11'	10°39'	VII
Castelletto	44°13'	10°16'	IX	Fivizzano	44°14'	10°07'	IX
Castelnovo ne' Monti	44°26'	10°24'	VI	Fonzaso	46°01'	11°48'	II
Castelnuovo Garfagnana	44°07'	10°25'	VI-VII	Forcoli	43°36'	10°42'	VI-VII
Castelnuovo Misericordia	43°27'	10°27'	V	Forlì	44°13'	12°03'	V
Castel S. Pietro	44°24'	11°35'	V	Fornaci di Barga	44°03'	10°28'	VII
Castelvecchio Pascoli	44°05'	10°28'	VII	Forno	44°05'	10°11'	VII
Castiglioncello	44°13'	10°11'	VII	Fornovo	44°41'	10°06'	V

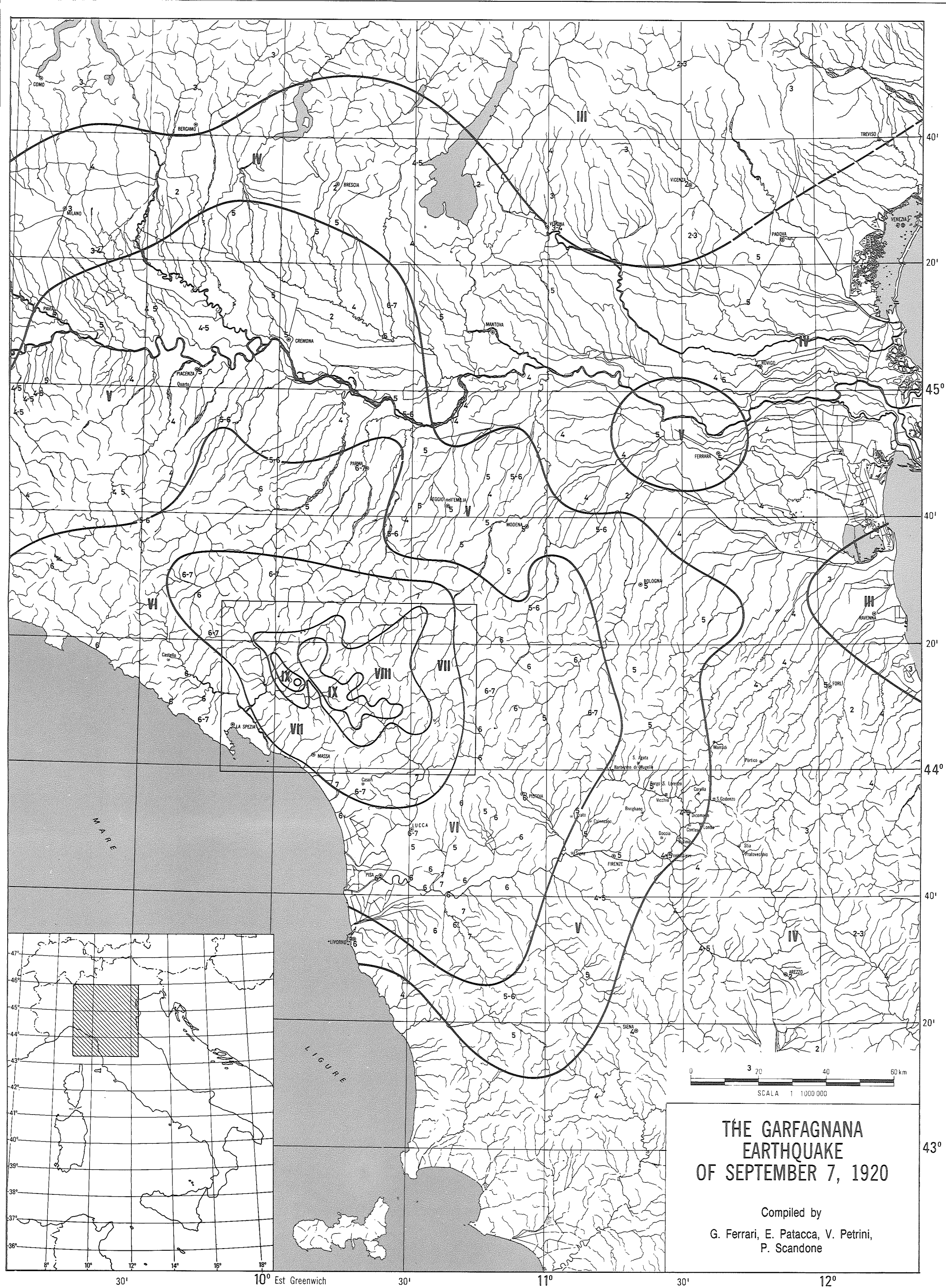
Forte dei Marmi	43°58'	10°10'	VII	Migliarina	44°20'	09°55'	V-VI
Fosciandora	44°07'	10°28'	VIII	Milano	45°28'	09°11'	III
Fosdinovo	44°08'	10°01'	VI	Mineo	37°16'	14°41'	I
Frabosa Soprana	44°17'	07°48'	IV	Minerbio	44°37'	11°29'	IV
Frassinoro	44°18'	10°34'	VII	Minucciano	44°10'	10°12'	V-VIII
Fucecchio	43°44'	10°49'	VI	Mirandola	44°53'	11°04'	IV
Galciana	45°53'	11°03'	VI	Modena	44°33'	10°55'	V
Galleno	43°46'	10°43'	VI	Molazzana	44°04'	10°25'	V-VI
Galliciano	44°04'	10°26'	VI	Molina di Quosa	43°48'	10°25'	VI
Garlasco	45°12'	08°55'	IV	Mologno	44°04'	10°27'	VII
Gavinana	44°03'	10°49'	VII	Mommio (LU)	43°55'	10°17'	VI
Gavirate	45°51'	08°43'	II	Mommio (MS)	44°15'	10°12'	VIII
Gazoldo degli Ippoliti	45°12'	10°35'	V	Moncigoli	44°13'	10°05'	IX
Gazzano	44°16'	10°30'	VII	Mondovì	44°23'	07°49'	III
Gazzolo	44°26'	10°18'	VII	Monselice	45°14'	11°45'	V
Genova	44°25'	08°54'	VI	Monsummano	43°52'	10°49'	VI
Ghivizzano	44°02'	10°31'	VI-VII	Montecastello	43°38'	10°42'	V-VI
Giuncheto	43°29'	11°55'	VII-VIII	Montecatini	43°53'	10°46'	V
Giuncugnano	44°13'	10°15'	IX	Montecreto	44°15'	10°43'	VII
Gorfigliano	44°09'	10°15'	VIII	Montecurto	44°14'	10°04'	X
Gragna	44°14'	10°16'	IX	Montefiore	44°13'	10°12'	V-VII
Gragnana	44°12'	10°16'	VIII	Montese	44°16'	10°57'	VI
Gragnanella	44°07'	10°23'	VIII	Monti	44°15'	10°01'	IX
Gramolazzo	44°10'	10°14'	VIII-IX	Monticiano	43°08'	11°11'	IV
Grassina	43°43'	11°18'	V	Montigiano	43°54'	10°21'	VI
Grezzano	44°01'	11°24'	III	Monza	45°35'	09°16'	IV
Guastalla	44°55'	10°39'	IV	Monzone	44°10'	10°08'	VII
Guardistallo	43°19'	10°38'	V	Morrone	43°32'	10°40'	VI-VII
Guiglia	44°26'	10°58'	V-VI	Mortara	45°15'	08°44'	IV
Iesi	43°31'	13°14'	II	Mulazzo	44°19'	09°53'	VI-VII
Impruneta	43°41'	11°15'	IV-V	Naggio	44°10'	10°20'	VII
Isola	44°10'	10°26'	VIII	Nicciano	44°11'	10°17'	VIII-IX
Isola della Scala	44°16'	11°00'	V	Nigone	44°25'	10°18'	VII
Laiatico	43°28'	10°44'	V	Novi Ligure	44°46'	08°47'	V
La Lima	44°04'	10°46'	VI	Olivola	44°14'	10°02'	IX
Lama Mocogno	44°18'	10°44'	VII-VIII	Oneglia	43°53'	08°02'	III
Lamporecchio	43°49'	10°54'	VI	Orzaglia	44°11'	10°19'	VIII-IX
Langhirano	44°37'	10°16'	VII	Ospedaletto	43°41'	10°25'	VIII
Lari	43°34'	10°36'	VI	Ostiano	45°13'	10°15'	IV
La Spezia	44°06'	09°49'	VI	Palagnana	44°00'	10°22'	V
Lastra a Signa	43°46'	11°07'	IV	Palaia	43°36'	10°46'	VI
Latignano	43°39'	10°33'	V	Palanzano	44°26'	10°11'	VI-VII
Levanto	44°10'	09°37'	VI	Pallanza	45°56'	08°33'	II
Licciana Nardi	44°16'	10°02'	VIII	Palleggio	44°02'	10°39'	VI-VII
Ligonchio	44°19'	10°21'	VIII	Palleroso	44°07'	10°27'	VIII
Limano	44°03'	10°41'	VI-VII	Parma	44°48'	10°20'	VI-VII
Limestre	44°03'	10°49'	VII	Pavia	45°11'	09°10'	V
Livignano	44°12'	10°19'	VIII-IX	Pavullo nel Frignano	44°20'	10°50'	VI
Livorno	43°33'	10°19'	VI	Peccioli	43°33'	10°43'	VI
Lizzano	44°05'	10°47'	VI	Pellegrino	44°44'	09°56'	VI
Loiano	44°16'	11°19'	VI	Pergola	43°34'	12°50'	III
Lorenzana	43°32'	10°32'	V	Pesugia	43°06'	12°23'	IV
Lucca	43°50'	10°30'	VI-VII	Pescia	43°54'	10°41'	VI
Lucchio	44°02'	10°43'	VI-VII	Petrognano	44°10'	10°19'	VIII-IX
Lugo	44°25'	11°55'	IV	Petrognola	44°12'	10°17'	VIII
Luscignano	44°12'	10°09'	V-VIII	Piacenza	45°03'	09°42'	V
Macerata	43°18'	13°27'	II	Pianacci	44°10'	10°23'	IX
Magenta	45°28'	08°53'	III-V	Piazza al Serchio	44°11'	10°17'	IX
Magliano	44°13'	10°15'	V-VIII	Pienza	43°05'	11°41'	III-IV
Mammiano	44°03'	10°47'	VI	Pietrasanta	43°57'	10°14'	VII
Maranello	44°32'	10°52'	V	Pieve a Elici	43°53'	10°20'	VI
Marciana Marina	42°48'	10°12'	II	Pievefosciana	44°08'	10°25'	VIII
Marina di Carrara	44°03'	10°04'	VII	Pieve Pelago	44°12'	10°09'	VII
Marina di Massa	44°01'	10°07'	VI	Pieve S. Lorenzo	44°12'	10°12'	IX
Marina di Pisa	43°40'	10°17'	VI	Pieve S. Paolo	43°50'	10°33'	VII-VIII
Massa	44°01'	10°07'	VII	Pieve S. Vincenzo	44°23'	10°13'	VIII
Massa di Sassorosso	44°10'	10°24'	V-VIII	Pignone	44°11'	09°43'	VI
Massarosa	43°52'	10°20'	V-VI	Pinerolo	44°53'	07°20'	?
Massa Superiore	45°00'	11°19'	V-VI	Pisa	43°43'	10°24'	VI
Melegnano	45°21'	09°19'	III-V	Pistoia	43°56'	10°55'	VI
Mercato Saraceno	43°58'	12°12'	IV	Piteglio	44°02'	10°46'	VI
Merizzo	44°16'	09°59'	IX	Po	44°15'	10°10'	VIII-IX
Metra	44°12'	10°13'	IX	Poggibonsi	43°29'	11°08'	V
Mezzana	44°10'	10°08'	VII	Poggio	44°09'	10°21'	VIII-IX

Pognana	44°15'	10°08'	VIII-IX	Signa	43°47'	11°06'	IV
Polinago	44°21'	10°43'	VI	Sillano	44°13'	10°18'	VIII-IX
Pomaranco	42°18'	10°52'	V	Sillicagnana	44°10'	10°21'	VII
Ponsacco	43°37'	10°38'	VI	Sillico	44°08'	10°27'	VII-VIII
Pontassieve	43°46'	11°26'	IV-V	Soliera	44°44'	10°55'	VIII-IX
Ponte a Cappiano	43°45'	10°46'	VI	Sommocolonia	44°06'	10°29'	VIII
Ponte all'Ania	44°02'	10°30'	VII	Sondrio	46°10'	09°52'	II
Ponte a Moriano	43°55'	10°32'	VI	Spezia	44°06'	09°49'	V-VI
Ponteccio	44°14'	10°16'	VIII-IX	Spicciano	44°13'	10°08'	IX
Potadera	43°40'	10°38'	VI	Stazzema	44°00'	10°19'	VII
Pontone	44°26'	10°29'	VII-VIII	Stiava	43°54'	10°19'	VI-VII
Pontremoli	44°23'	09°53'	VII	Succiso	44°22'	10°12'	VIII
Popiglio	44°03'	10°45'	VI	Suzzara	44°59'	10°45'	IV
Porcari	43°50'	10°37'	VI-VII	Taggia	43°52'	07°51'	IV
Porciglia	44°05'	10°21'	VII-VIII	Taranto	40°27'	17°48'	I
Portolongone	42°46'	10°24'	III	Taranto	46°13'	13°13'	II
Portomaggiore	44°42'	11°48'	IV	Tavernelle	44°18'	10°04'	VIII-IX
Porretta Terme	44°09'	10°59'	V	Tenerano	44°09'	10°06'	VII-VIII
Portoferraio	42°49'	10°19'	IV-V	Terenzano	44°13'	10°09'	VIII
Posara	44°14'	10°06'	VII	Terrarossa	44°14'	09°58'	VII
Poviglio	44°23'	10°14'	V	Terriciola	43°31'	10°41'	VI
Prato	43°53'	11°06'	V	Tivoli	41°58'	12°48'	I
Puglianella	44°08'	10°19'	VIII	Tirano	46°13'	10°10'	II
Pugliano	44°12'	10°12'	VIII-IX	Tiglio	44°04'	10°30'	VII-VIII
Quarto	43°45'	11°20'	VI	Toano	44°23'	10°34'	VII
Quercia	44°14'	10°00'	VIII-IX	Torriglia	44°31'	09°09'	VI
Quiesa	43°51'	10°21'	VI	Tortona	44°54'	08°52'	V
Ramiseto	44°25'	10°17'	VII	Tramonti	44°09'	02°03'	IX
Reggio Emilia	44°42'	10°38'	V	Tramonte di Brancoli	43°56'	10°33'	?
Regnano	44°13'	10°13'	IX	Trassilico	44°03'	10°24'	VI
Renzano	44°12'	10°12'	VIII-IX	Trento	46°04'	11°07'	II
Reusa (Rensa)	44°13'	10°10'	IX	Tresana	44°15'	09°55'	VI
Riomarina	42°49'	10°26'	VI	Treviglio	45°31'	09°36'	II
Rimini	44°04'	12°34'	IV	Ugliancaldo	44°10'	10°11'	IX
Rio nell'Elba	42°49'	10°24'	III	Vagli di Sopra	44°07'	10°16'	IX
Rivergaro	44°54'	09°36'	IV	Vagli Sotto	44°07'	10°17'	VIII-IX
Roccalberti	44°09'	10°20'	VIII-IX	Valdagno	45°39'	11°18'	III
Rocca Pelago	44°12'	10°36'	?	Vallombrosa	43°44'	11°33'	IV
Rocchetta di Vara	44°15'	09°45'	V-VI	Vergato	44°17'	11°07'	VI
Roggio	44°08'	10°18'	VIII	Vergemoli	44°03'	10°23'	VI
Rontano	44°06'	10°22'	VIII	Vernazza	44°08'	09°41'	VI
Salsomaggiore	44°49'	09°59'	V-VI	Valbona	44°11'	10°27'	VIII
S. Alessio	43°52'	10°29'	VII	Varliano	44°12'	10°15'	VIII-IX
Salò	45°36'	10°31'	IV-V	Ventimiglia	43°47'	07°36'	IV
S. Andrea Pelago	44°13'	10°37'	VII	Vericamo	44°20'	10°54'	VII
S. Anna Pelago	44°11'	10°33'	VII-VIII	Vercelli	45°19'	08°25'	IV
S. Arcangelo	44°04'	12°27'	II	Verona	45°26'	11°00'	III-IV
S. Casciano	43°41'	10°31'	VI	Verrucollette	44°10'	10°16'	VIII-IX
S. Cassiano	44°02'	10°38'	V-VI	Viadana	44°56'	10°31'	V-VI
S. Donnino	44°11'	10°19'	IX	Viareggio	43°52'	10°15'	VI
S. Gimignano	43°28'	11°03'	VI	Vicopisano	43°42'	10°35'	VI
S. Marcello Pistoiese	44°03'	10°48'	VI	Vicchio	43°56'	11°28'	V
S. Maria a Monte	43°42'	10°42'	VI	Vico Pancellorum	44°03'	10°42'	VI-VII
S. Martino in Rio	44°44'	10°47'	IV	Vigneta	44°13'	10°11'	X
S. Michele	44°11'	10°17'	VIII-IX	Vignola	44°23'	09°51'	VIII-IX
S. Miniato	43°41'	10°51'	VI-VII	Villa Collemandina	44°10'	10°24'	X
S. Pellegrino	44°11'	10°29'	VIII	Villafranca in Lunigiana	44°17'	09°57'	VII-VIII
S. Pietro in Campo	44°05'	10°27'	VII	Villa Minozzo	44°22'	10°28'	VIII
S. Remo	43°49'	07°46'	IV	Villetta	44°09'	10°22'	VII-VIII
S. Romano	44°10'	10°21'	VIII	Vinca	44°08'	10°09'	VII
S. Sepolcro	43°34'	12°08'	III	Voghera	45°00'	09°00'	IV-V
Sarzana	44°07'	09°58'	VII	Volterra	43°24'	10°52'	V-VI
Sassalbo	44°17'	10°12'	IX	Volongo	45°13'	10°18'	V
Sassello	44°29'	08°29'	II	Voltri	44°25'	08°54'	IV
Sassorosso	44°11'	10°24'	VIII	Vorno	43°47'	10°31'	V
Savona	44°18'	08°29'	V-VI	Virgoletta	44°18'	09°58'	VIII-IX
Scarperia	44°00'	11°21'	V	Vitoio	44°09'	10°19'	VIII-IX
Scandiano	44°36'	10°41'	V				
Senigallia	43°43'	13°13'	II				
Seravezza	44°00'	10°14'	VII				
Sermezzana	44°12'	10°13'	IX				
Sesto Fiorentino	43°50'	11°12'	III-IV				
Sestola	44°14'	10°46'	V-VI				
Siena	43°19'	11°20'	V				

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**THE GARFAGNANA
EARTHQUAKE
OF SEPTEMBER 7, 1920**

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The drainage network of this map - scale 1:1,000,000 - is the same as the "Structural Model of Italy."