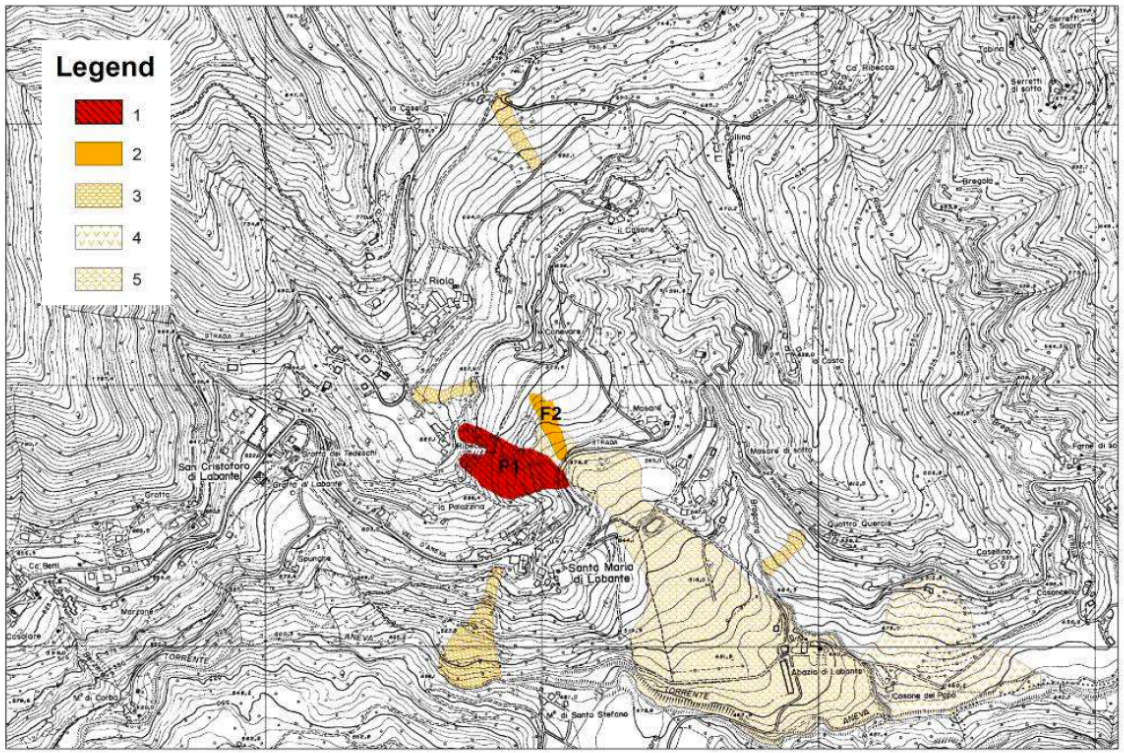


Fig. 10. Geomorphological Hazard Map of the study area. Legend: 1) Hazard class H4, very high, with mitigation works; 2) Hazard class H3, high; 3) dormant landslide body due to flow; 4) body of dormant rotational earth-slide; 5) dormant body of complex landslide; F1) Ribecco's landslide; F2) Canevare's landlside.

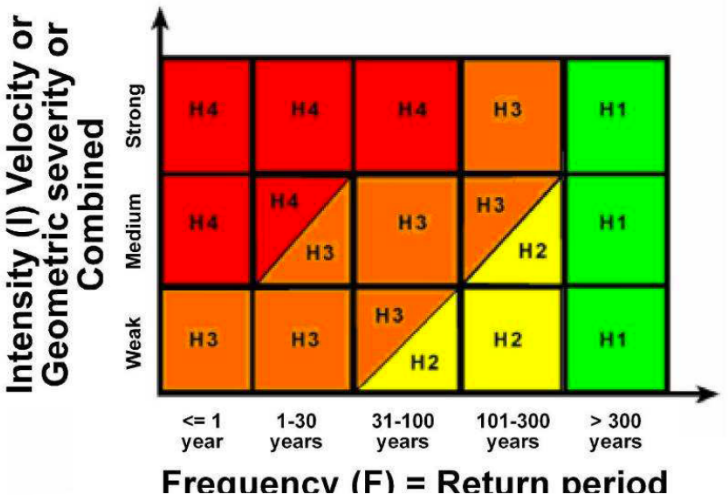


Fig. 9. Evaluation matrix for landslide hazard (from Panizza et al., 2004). H4 = very high; H3 = high; H2 = medium; H1 = residual.

Nat. Hazards Earth Syst. Sci., 12, 421–430, 2012
www.nat-hazards-earth-syst-sci.net/12/421/2012/
doi:10.5194/nhess-12-421-2012

Natural Hazards and Earth System Sciences

Considerations on geomorphological maps for territorial planning in the Modena Apennines (Northern Italy)

D. Castaldini[1], A. Ghinoi[2], and A. Maccaferri[2]

[1]Department of Earth Sciences, University of Modena and Reggio Emilia, Largo S. Eufemia 19, 41121 Modena, Italy
[2]Professional Geologist Office, Viale Caduti in Guerra 1, 41121 Modena, Italy

Fig. 8. Quick-Bird satellite image of the case study no. 3 in the valley of the Tiepido Torrent. Copyright: Digital GlobeTM, 2003, Telespazio per l'Italia.

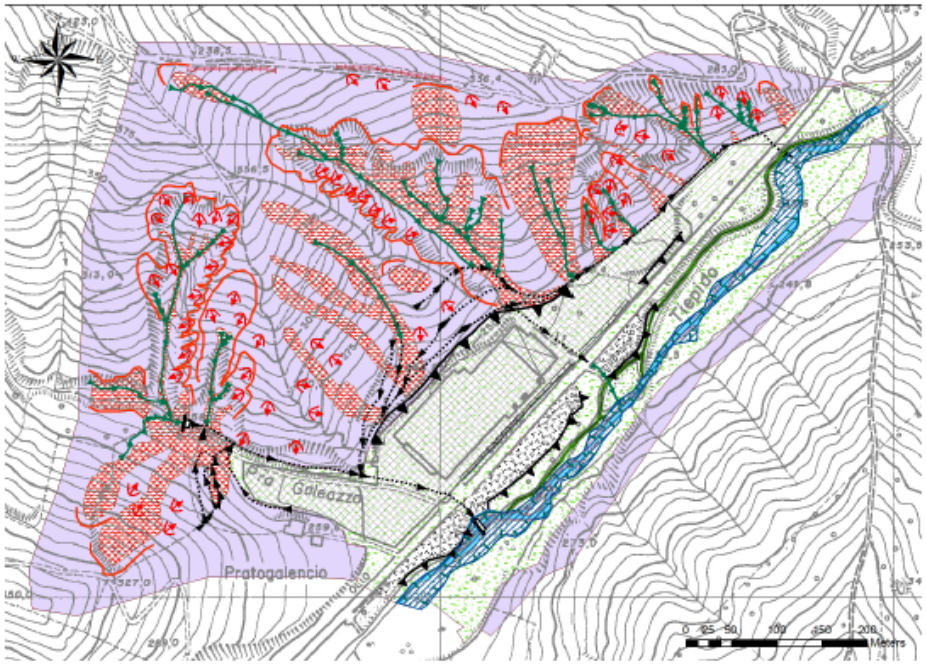


Fig. 9. Geomorphological map of the case study no. 3 in the valley of the Tiepido Torrent. For legend see Fig. 3.

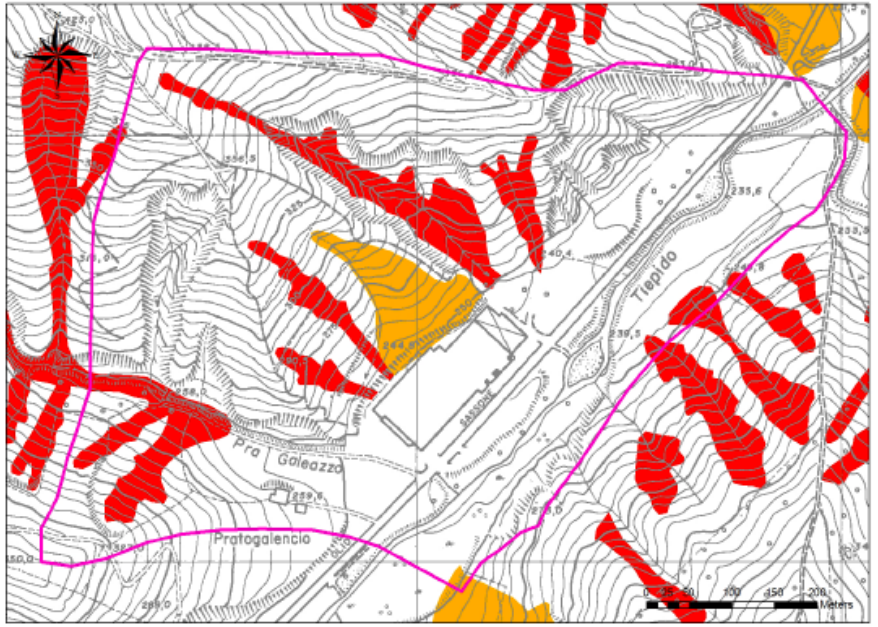


Fig. 10. PTCP Hydrogeological Hazard map of the case study no. 3 (Provincia di Modena, 2009). For legend see Table 1; purple line: boundary of the Fig. 9 Geomorphological map.

An important consideration, in relation to territorial planning, is that the PTCP Hydrogeological Hazard Maps should be used just as a "base document", which requires more necessary detailed deepening at the municipal scale, accomplished through accurate geomorphological mapping, at least for the areas that are going to be urbanized.

Il Quaternario
Italian Journal of Quaternary Sciences
21(1B), 2008 - 267-278

RECENT MORPHOLOGICAL CHANGES OF THE RIVER PANARO (NORTHERN ITALY)

Doriano Castaldini* & Alessandro Ghinoi*

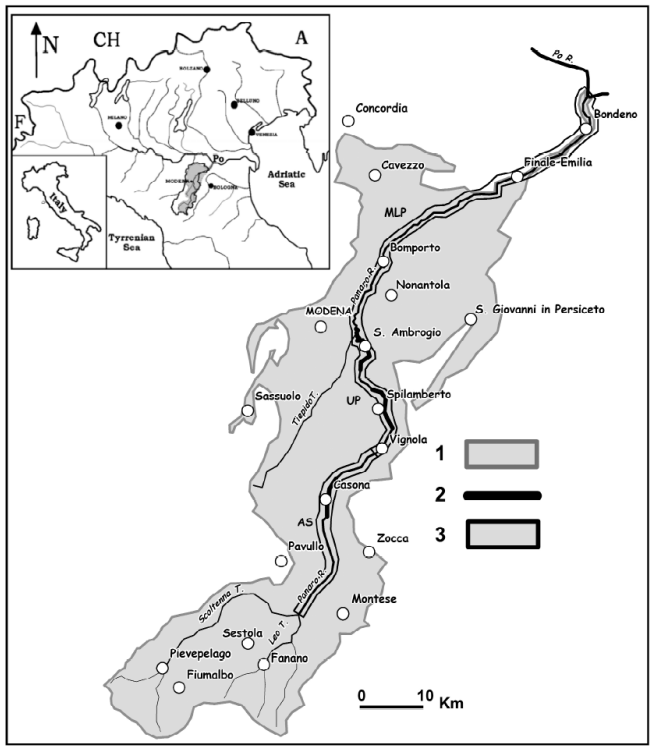
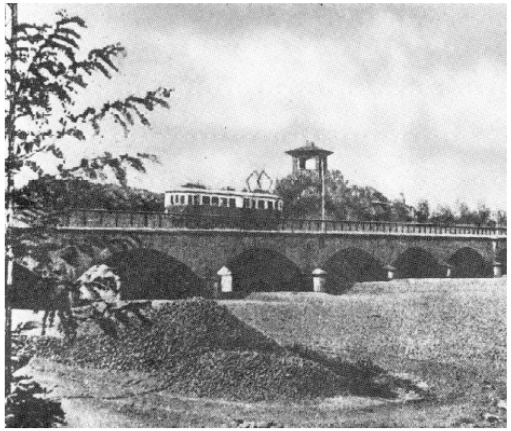
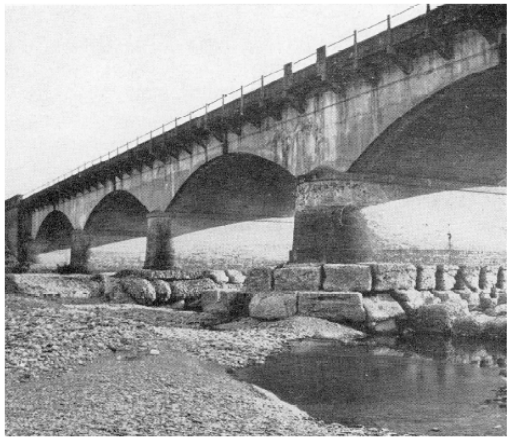


Fig. 1 - Location of the study area. Legend: 1) basin of the River Panaro; 2) stretches of the River Panaro shown as examples near Casona, Spilamberto and S. Ambrogio; 3) Sectors of the River Panaro (AS: Apennine sector; UP: upper part of the plain; MLP: mid-lower part of the plain).



A) 1930



B) 1967

C) 2004

Fig. 4 - The R. Panaro channel at the bridge of Spilamberto: A) in the 1930 circa (by PELLEGRINI M. *et al*., 1979); B) in the 1967 (by PELLEGRINI M. & ROSSI, 1967); C) in the 2004 (photo by D. Castaldini).

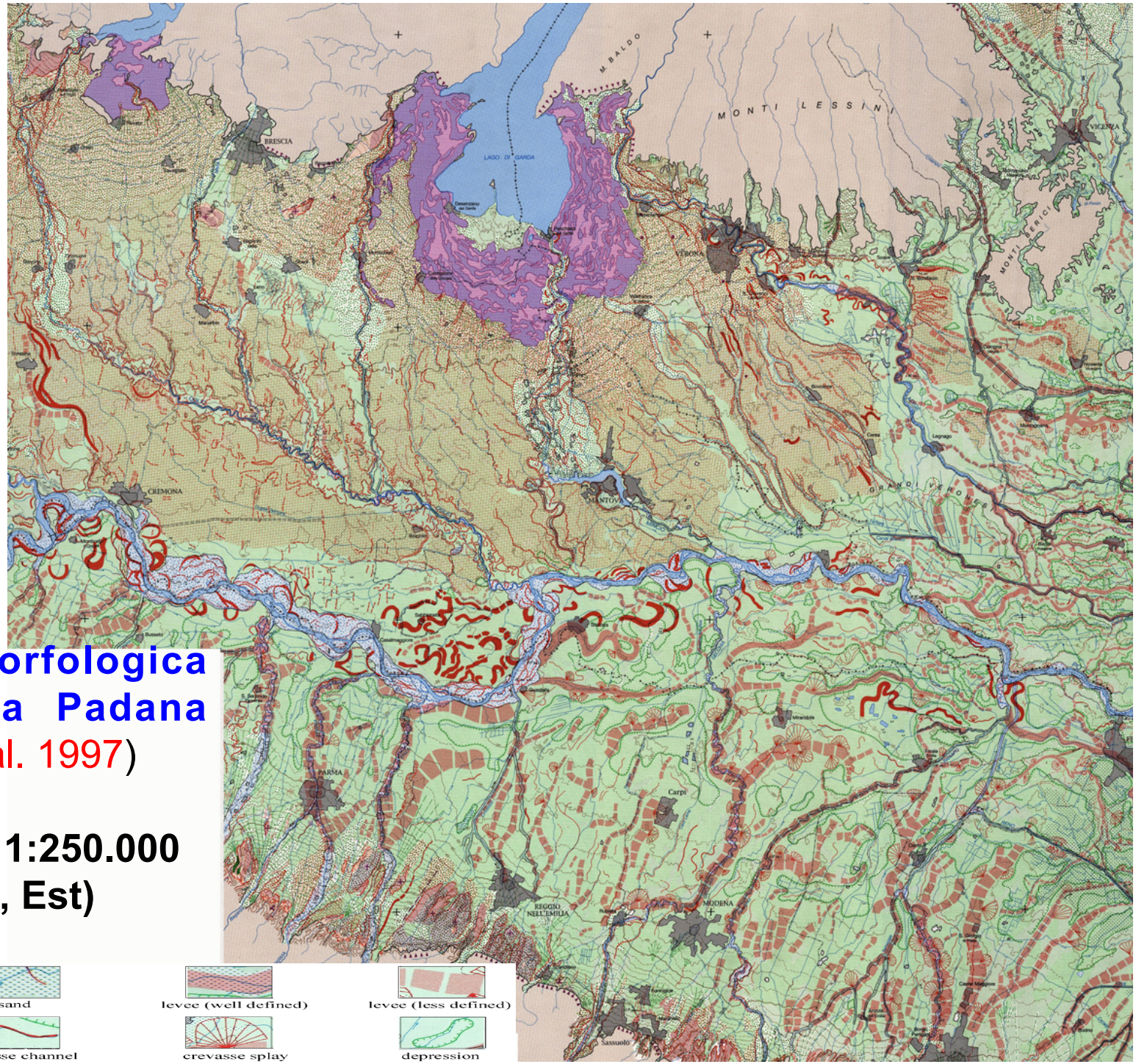
Fig. 7 - Aerial photograph of the R. Panaro near S. Ambrogio, east of Modena. It flows from the left (south) to the right (north); meander cut-offs carried out in the early 1970s are evident (photo by D. Castaldini).

Foto dall'aereo del F. Panaro presso S. Ambrogio, a est di Modena. Il fiume scorre da sinistra

Table 2 -Length reduction of the R. Panaro, following meander cut-offs, in the mid-lower sector of the plain where it flows elevated over the plain within artificial embankments.

Riduzione in lunghezza del F. Panaro in seguito ai tagli di meandro nella media-bassa pianura dove il fiume scorre pensile tra argini artificiali.

Age of cutoffs	
19th century	*7.5 km*
20th century	*3 km*
Total reduction	*10.5 km*
Present-day length	*70 km*
Length before cutoffs	*80.5 km*
Reduction (%)	*13%*



Carta Geomorfologica della Pianura Padana

(Castiglioni et al. 1997)

3 fogli a scala 1:250.000
(Ovest, centro, Est)

Physio-Géo

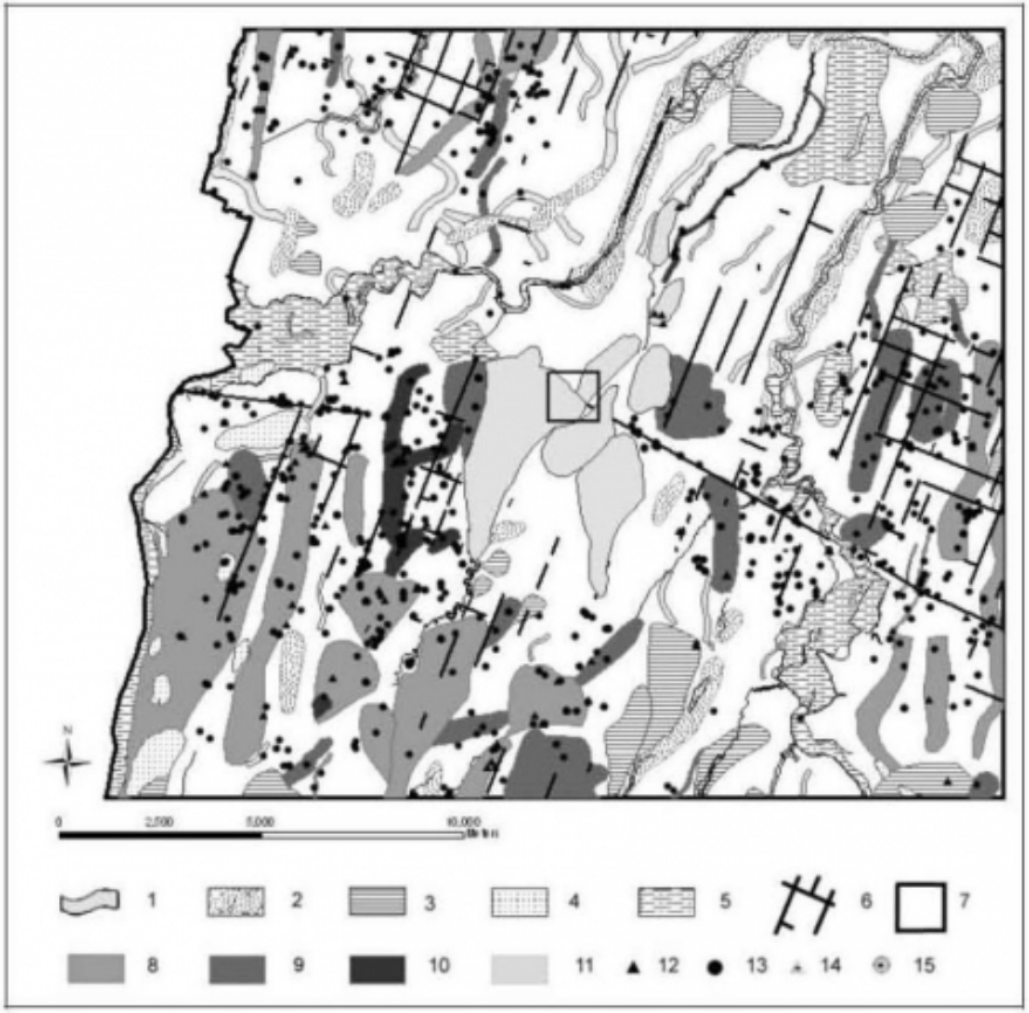
Géographie, physique, et environnement

Volume 1 | 2007 :
Varia 2007
Articles

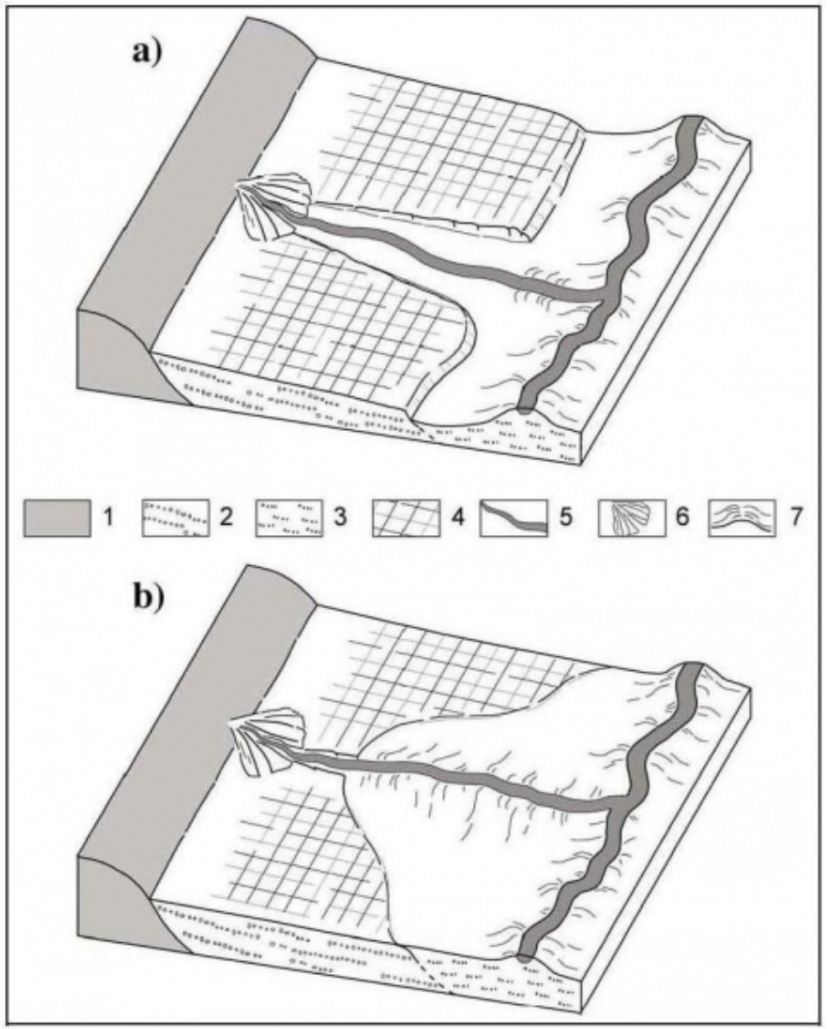
Geo-archaeological aspects of the Modena plain (Northern Italy)

Doriano Castaldini, Andrea Cardarelli, Maurizio Cattani, Mario Panizza et Daniela Piacentini

p. 33-60



1: paleoriver at the plain level. 2: fluvial ridge. 3: alluvial fan and crevasse splay. 4: area with traces o abandoned braided streams. 5: Depression. 6: centuriation. 7: boundary of Mutina (Modena roman town). 8: Neolithic and Bronze Ages fluvial form. 9: Iron Age fluvial form. 10: Roman fluvial form. 11: Early Middle Ages fluvial form. 12: surface Roman site. 13: surface Early Middle Ages site. 14: buried Roman site. 15: buried Early Middle Ages site.



a: Roman Age. b: present. 1: Apenninic margin. 2: pre-Roman alluvional plain. 3: Roman and post-Roman alluvional plain. 4: Roman centuriation system. 5: River. 6: alluvional fan. 7: fluvial ridge

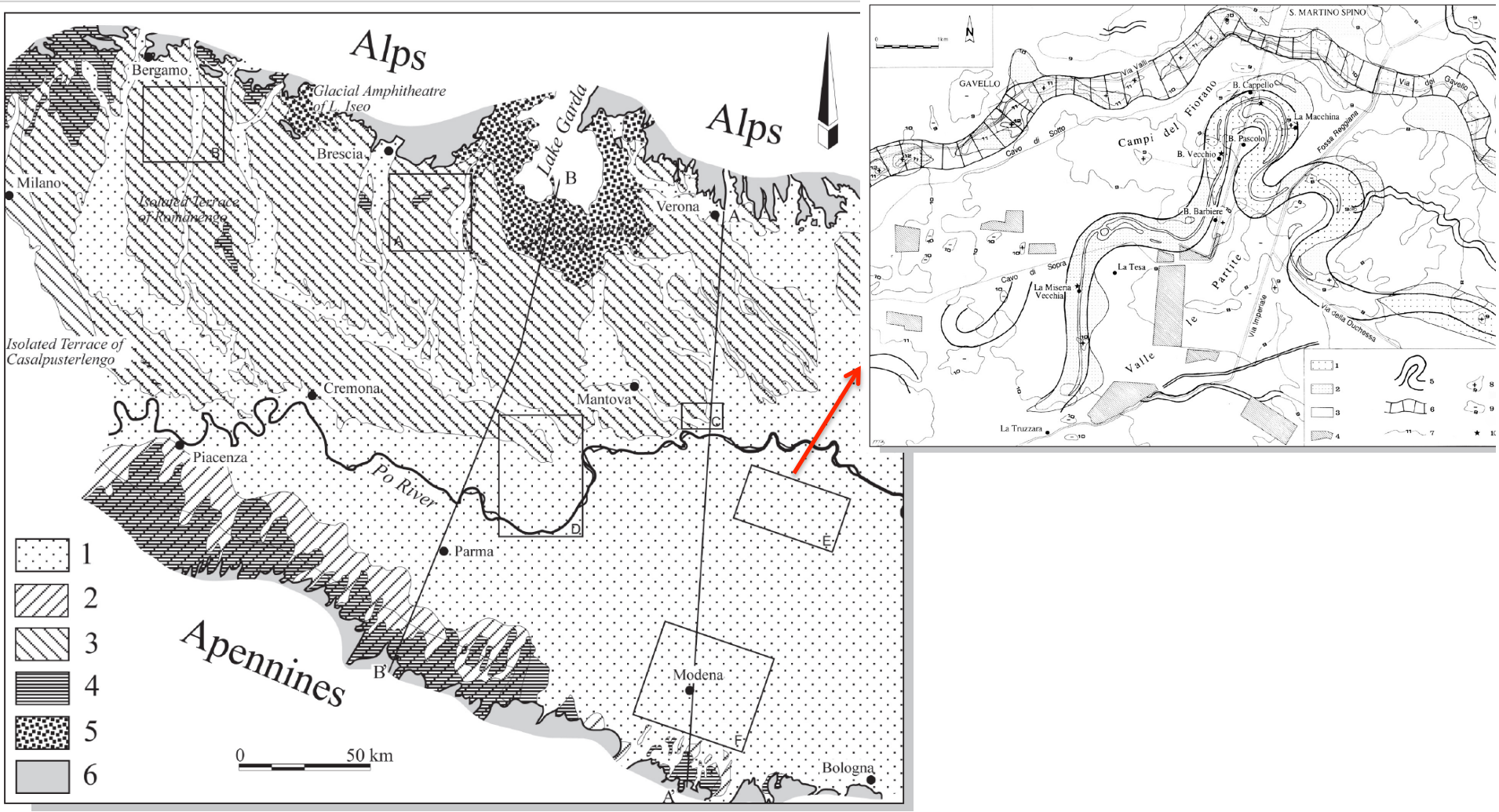
OL' MAN RIVER 2009

GEO-ARCHAEOLOGICAL ASPECTS OF RIVERS AND RIVER PLAINS (ARGU 5)

MORGAN DE DAPPER, FRANK VERMEULEN, SARAH DEPREZ & DEVI TAELMAN (EDS.)

SOME NOTES ON GEOMORPHOLOGICAL AND ARCHAEOLOGICAL ASPECTS IN THE CENTRAL PO PLAIN (NORTHERN ITALY)

D. Castaldini, M. Marchetti & A. Cardarelli



The archaeological remains have revealed that this palaeo-course of the R. Po was already active in the Bronze Age. In the Iron Age the riverbed had become a small watercourse that nonetheless maintained some vitality throughout the Roman period. The moment in which the complete extinction of the channel took place, remains unknown.

Storia di Carpi

Volume I

La città e il territorio dalle origini al XIV secolo

Storia di Carpi

Volume primo

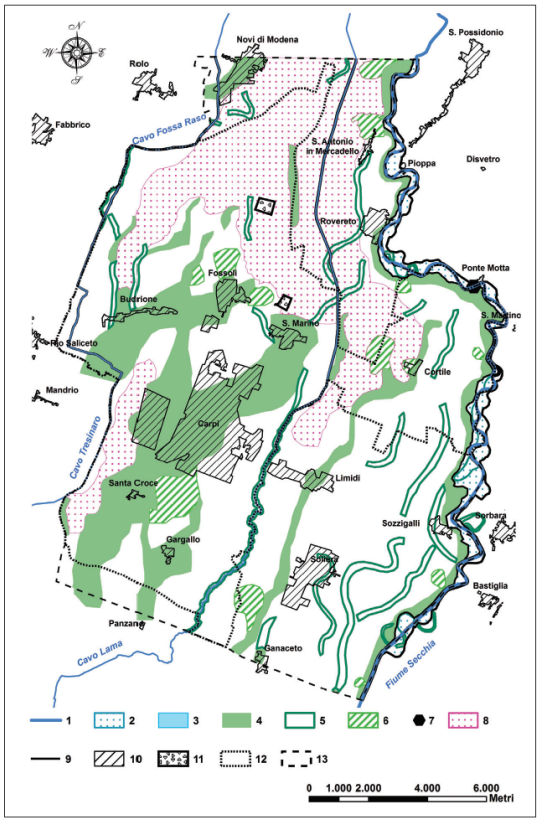
La città e il territorio dalle origini al XIV secolo

a cura di Pier Paolo Bonacini, Anna Maria Ori

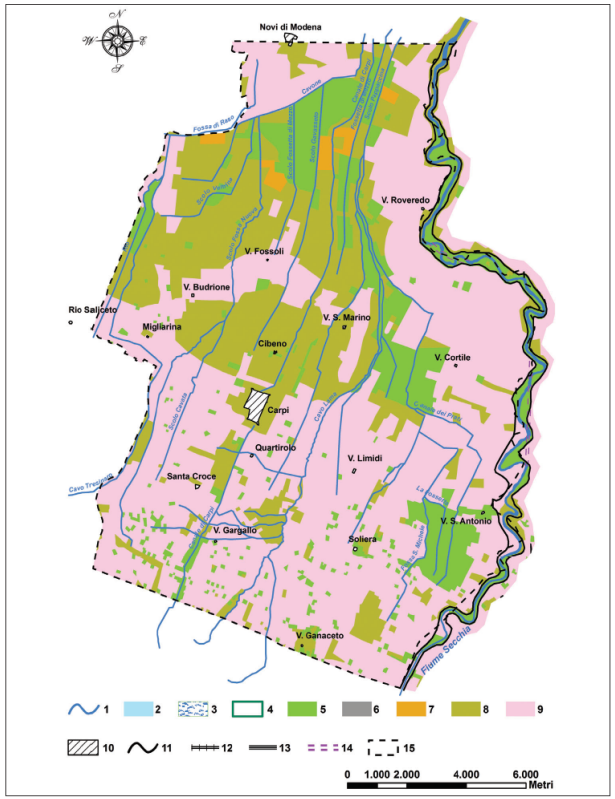
Geomorfologia ed evoluzione del territorio di Carpi dal XIX secolo all'attuale

Doriano Castaldini e *Alessandro Ghinoi*

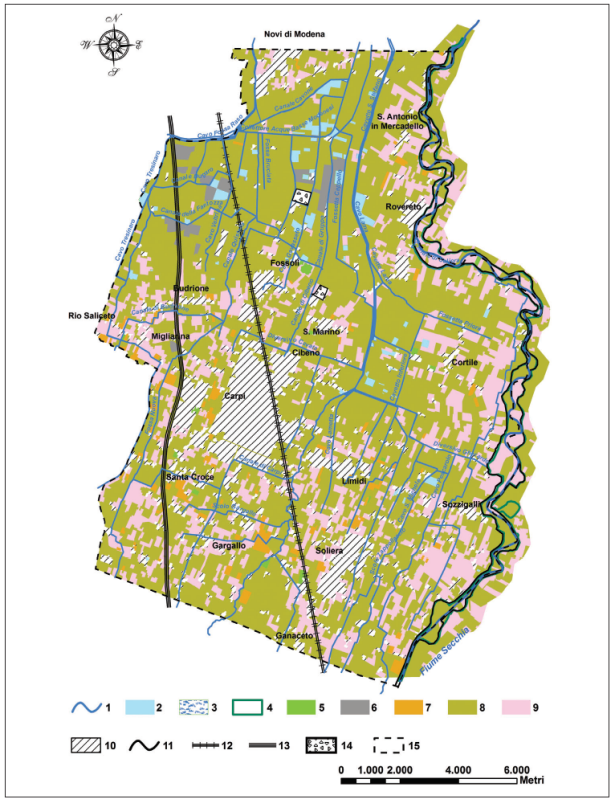
2008



Tav. 7. Carta geomorfologica. Legenda: 1) corso d'acqua principale; 2) area golenale; 3) specchio d'acqua artificiale; 4) dosso fluviale; 5) paleoalveo a livello della pianura; 6) ventaglio di esondazione; 7) sito di principale deviazione fluviale; 8) area altimetricamente depressa ("valle"); 9) argine artificiale; 10) area urbana; 11) discarica di rifiuti solidi urbani; 12) limite dell'area di studio; 13) limite del territorio comunale di Carpi.



Tav. 9. Carta del territorio nella prima metà dell'Ottocento. Legenda: 1) corso d'acqua; 2) specchio d'acqua artificiale; 3) palude, acquitrino; 4) area golenale; 5) prato stabile; 6) risaia; 7) seminativo arborato; 8) seminativo semplice; 9) colture specializzate (vigneti, frutteti, pioppeti); 10) area urbana; 11) argine artificiale; 12) ferrovia; 13) autostrada; 14) progetto di taglio del fiume Secchia; 15) limite dell'area di studio.



Tav. 13. Carta del territorio attuale. Legenda: 1) corso d'acqua; 2) specchio d'acqua artificiale; 3) palude, acquitrino; 4) area golenale; 5) prato stabile; 6) risaia; 7) seminativo arborato; 8) seminativo semplice; 9) colture specializzate (vigneti, frutteti, pioppeti); 10) area urbana; 11) argine artificiale; 12) ferrovia; 13) autostrada; 14) discarica di rifiuti solidi urbani; 15) limite dell'area di studio.

nuata sino ad oggi con un marcato incremento. In particolare, Carpi, che aveva mantenuto l'estensione rinascimentale fino a tutto l'Ottocento e che nella prima metà del Novecento, dopo l'abbattimento delle mura, era cresciuta in misura limitata, a partire dalla seconda metà del XX secolo ha esteso enormemente l'area urbana, passando da 0,5 kmq del 1800 ai 9,5 attuali (Tav. 14). La ferrovia Modena-

Tav. 14. Carta dell'evoluzione dell'area urbana (residenziale e produttiva) della città di Carpi. Legenda: 1. limite dell'area urbana nel XIX secolo; 2. limite dell'area urbana nella prima metà del XX secolo; 3. limite dell'area urbana nella seconda metà del XX secolo; 4. limite dell'area urbana attuale..

AREA EPICENTRALE

Terremoti emiliani

2012

ANNALS OF GEOPHYSICS, 55, 4, 2012; doi: 10.4401/ag-6143

2012 EMILIA EARTHQUAKES

Ground effects induced by the 2012 seismic sequence in Emilia: implications for seismic hazard assessment in the Po Plain

Pio Di Manna[1,*], Luca Guerrieri[1], Luigi Piccardi[2], Eutizio Vittori[1], Doriano Castaldini[3], Andrea Berlusconi[4], Livio Bonadeo[4], Valerio Comerci[1], Francesca Ferrario[4], Roberto Gambillara[4], Franz Livio[4], Mauro Lucarini[1], Alessandro Maria Michetti[4]

ANNALS OF GEOPHYSICS, 55, 4, 2012; doi: 10.4401/ag-6114

2012 EMILIA EARTHQUAKES

The survey and mapping of sand-boil landforms related to the Emilia 2012 earthquakes: preliminary results

Andrea Ninfo[1,*], Davide Zizioli[2], Claudia Meisina[2], Doriano Castaldini[3], Francesco Zucca[2], Lucia Luzi[4], Mattia De Amicis[5]

GRUPPO NAZIONALE DI GEOFISICA DELLA TERRA SOLIDA

31° Convegno Nazionale
Atti - Tema 1: Geodinamica

MACROSEISMIC INVESTIGATION OF THE 2012 PO PLAIN SEQUENCE USING THE ESI2007 SCALE, AND COMPARISON WITH THE MCS SCALE

F. Livio[1], A.M. Michetti[1], P. Di Manna[2], A. Berlusconi[1], L. Bonadeo[1], D. Castaldini[4], V. Comerci[2], F. Ferrario[1], R. Gambillara[1] , L. Guerrieri[2], L. Piccardi[3], M. Roncoroni[1], E. Vittori[2] , E. Esposito[5] and S. Porfido[5]

3rd INQUA-IGCP-567 International Workshop on Active Tectonics, Paleoseismology and Archaeoseismology, Morelia, Mexico (2012)

EARTHQUAKE ENVIRONMENTAL EFFECTS INDUCED BY THE 2012 SEISMIC SEQUENCE IN EMILIA: IMPLICATIONS FOR SEISMIC HAZARD ASSESSMENT IN NORTHERN ITALY

Guerrieri Luca (1), Vittori Eutizio (1), Di Manna Pio (1), Piccardi Luigi (2), Castaldini Doriano (3), Berlusconi Andrea (4), Blumetti Anna Maria (1), Comerci Valerio (1), Livio Franz (4), Michetti Alessandro Maria (4)

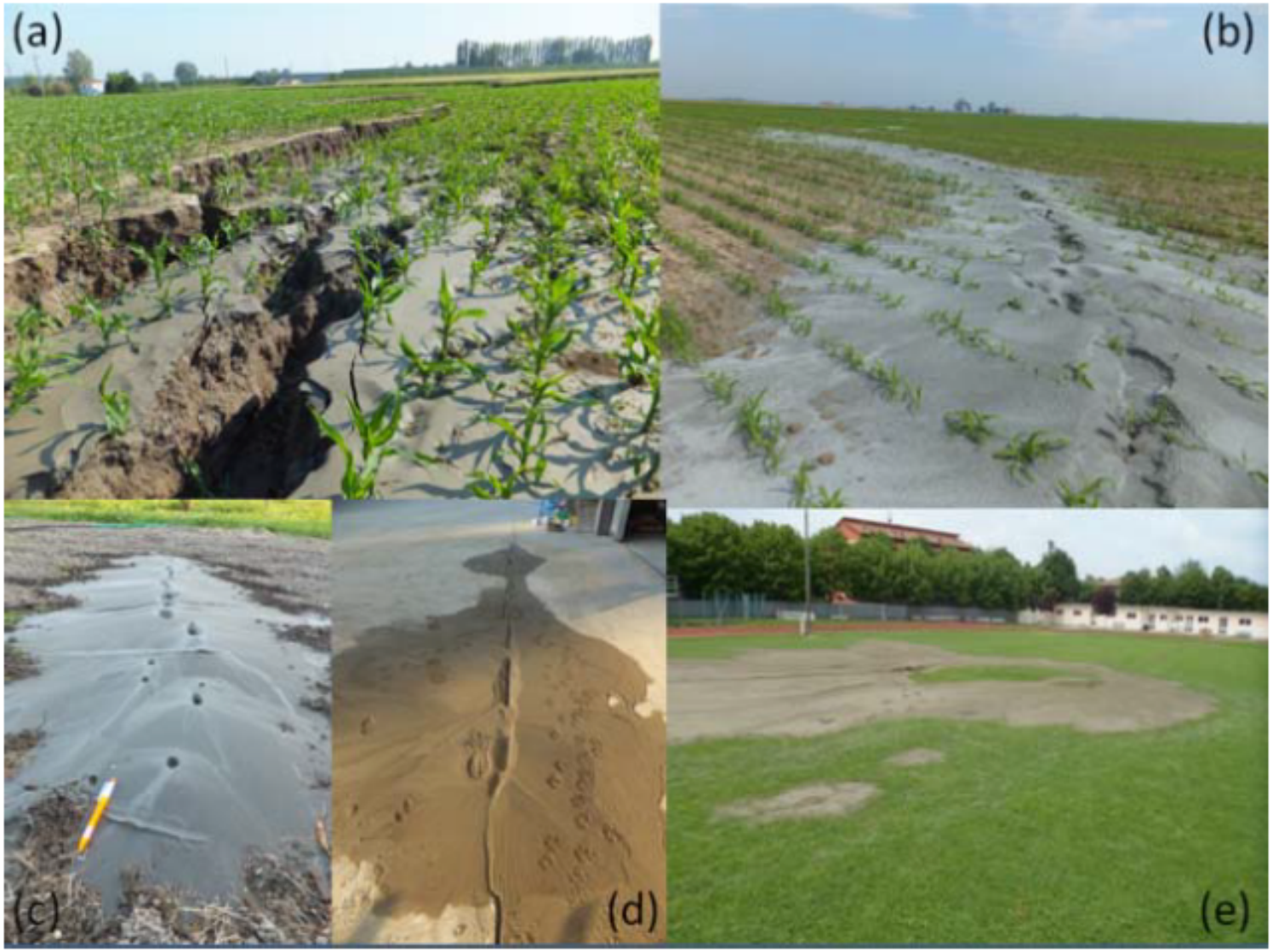
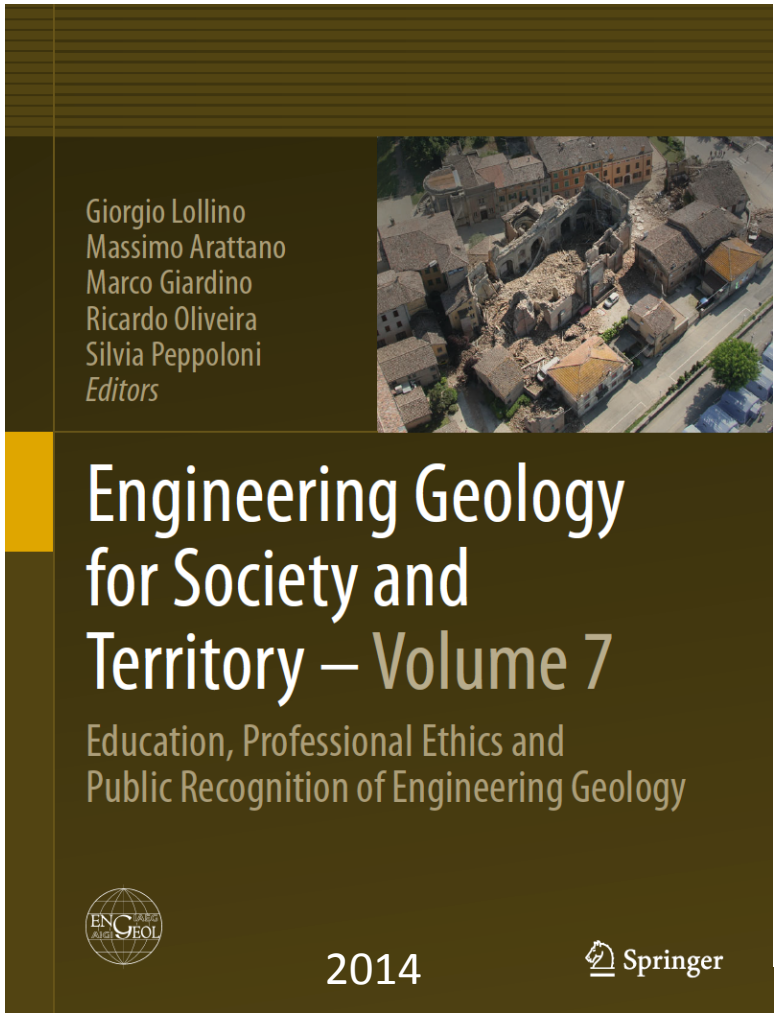


Fig. 5. Ground ruptures and associated liquefaction-type phenomena at San Carlo (a), Scortichino (b), Cavezzo (c, d) and San Felice sul Panaro (e).

Commemorate the Legacy of Ralph B. Peck
April 29 - May 4, 2013 CHICAGO
Seventh International Conference on
Case Histories in Geotechnical Engineering
and Symposium in Honor of Clyde Baker

A REPORT ON THE 2012 SEISMIC SEQUENCE IN EMILIA (NORTHERN ITALY)

Diego C. F. Lo Presti, & Mauro Sassu
University of Pisa, Department of Civil Engineering, Largo Lucio Lazzarino, 1- Pisa, Italy, 56122, Italy, d.lopresti@ing.unipi.it , tel: +39 050 2217742, fax: +39 050 2217762
Lucia Luzi & Francesca Pacor
INGV Sezione di Milano – Pavia, via Bassini 15, 20133 Milano, lucia.luzi@mi.ingv.it, tel. +39 02 23699280, fax +39 02 23699267
Doriano Castaldini & Giovanni Tosatti
University of Modena and Reggio Emilia, Department of Chemical and Geological Sciences, Largo S. Eufemia 19, 41100 Modena, doriano.castaldini@unimore.it, tel. +39 059 2055856, fax +39 059 2055887
Claudia Meisina, Davide Zizioli & Francesco Zucca
University of Pavia, Department of Earth & Environmental Sciences, via Ferrata 1 27100 Pavia, claudia.meisina@unipv.it, tel. +39 0382 985831
Giuliano Rossi
Provincia di Mantova, Progettazione della Viabilità e delle Infrastrutture, Via Principe Amedeo n. 32, Mantova giuliano.rossi@provincia.mantova.it, tel. ++390376 204285
Gilberto Saccorotti & Davide Piccinini
INGV – Sezione di Pisa Via U. della Faggiola, 32 – 56126 PISA (I) tel +39 050 8311960 saccorotti@pi.ingv.it



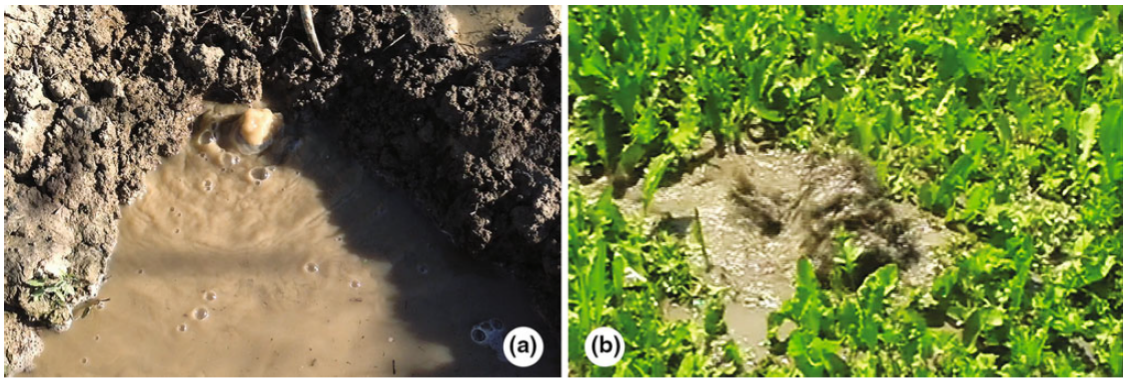


Fig. 19.2 **a** Bubbling water in a field near San Giovanni del Dosso (Mantua Province) on 16th May 2013, **b** Soil liquefaction in progress on 29th May 2012 triggered by the M_L 5.8 quake at Moglia di Gonzaga (Mantua Province). *Sources* **a** A. Zibordi; **b** L. Righi

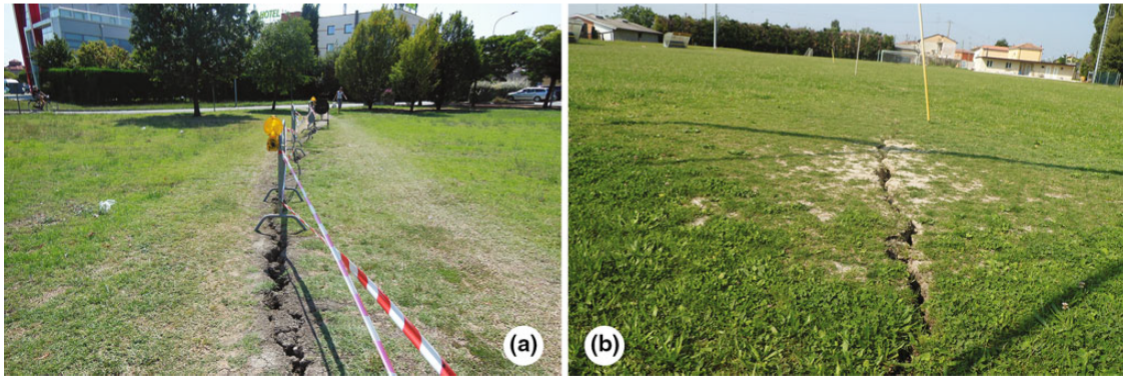


Fig. 19.3 **a** Ground crack noticed in mid-August 2013 at the outskirts of Ferrara, **b** ground crack formed by the 20th May 2012 M_L 5.9 quake across the football pitch of Mirabello (Ferrara Province). *Sources* **a** and **b** D. Castaldini

Rumours Related to the 2012 Emilia Seismic Sequence

19

Milena Bertacchini, Doriano Castaldini and Giovanni Tosatti

10th International Congress
of the Hellenic Geographical Society
22 - 24 October
Thessaloniki 2014
DEPARTMENT OF PHYSICAL AND
ENVIRONMENTAL GEOGRAPHY
School of Geology -
Aristotle University of Thessaloniki
Greece

The cartography in seismic hazard assessment and communication: the case study of the 2012 Po Plain earthquakes (northern Italy)

Castaldini D.[1], Lanfredi Sofia C.[1]

1. Department of Chemical and Geological Sciences, University of Modena and Reggio Emilia, Italy
doriano.castaldini@unimore.it , cinziasan74@hotmail.com

VII Congresso Nacional de Geomorfologia
Instituto de Geografia e Ordenamento do Território
Universidade de Lisboa 8 a 10 de Outubro 2015

VII CONGRESSO NACIONAL DE GEOMORFOLOGIA

GEOMORFOLOGIA 2015

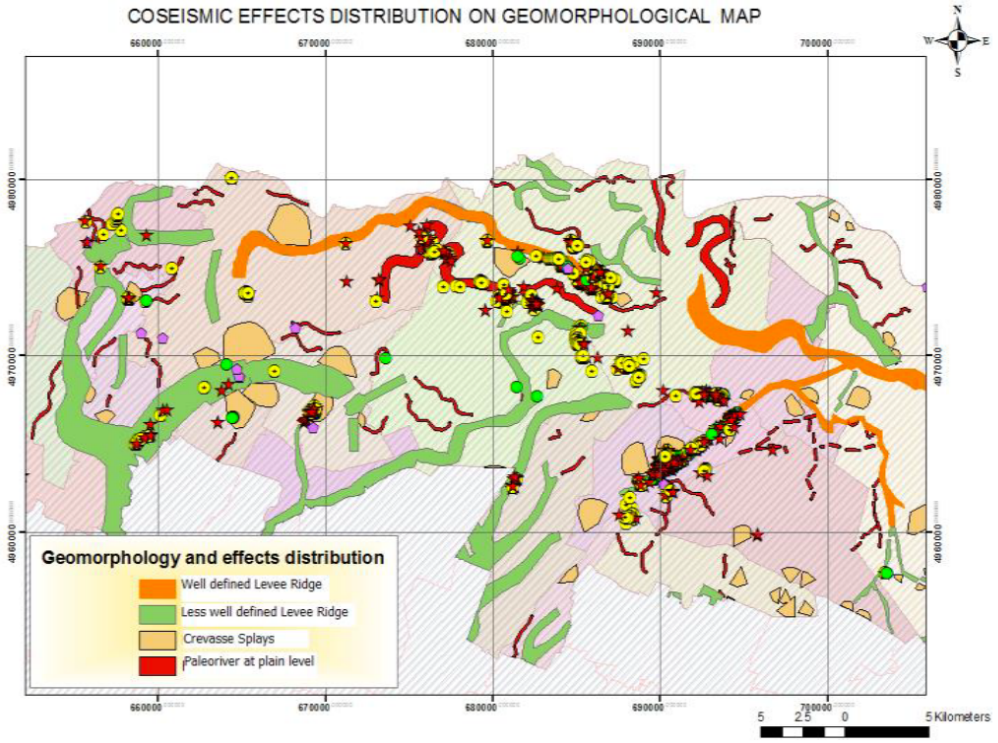
ASSOCIAÇÃO PORTUGUESA DE GEOMORFÓLOGOS
VOLUME IX

LISBOA
2015

INVENTORY OF COSEISMIC EFFECTS FOR LOCAL SEISMIC HAZARD ASSESSMENT AND COMMUNCATION. THE CASE STUDY OF 2012 EMILIA EARTHQUAKES

INVENTÁRIO DE EFEITOS CO-SÍSMICOS PARA A AVALIAÇÃO LOCAL DO RISCO SÍSMICO LOCAL E COMUNICAÇÃO. O ESTUDO DE CASO DOS SISMOS DE EMILIA 2012

Sofia, Cinzia Lanfredi, Università di Modena e Reggio Emilia, Italy, cinziasan74@hotmail.com
Castaldini, Doriano, Università di Modena e Reggio Emilia, Italy, doriano.castaldini@unimore.it



UNIMORE
UNIVERSITÀ DEGLI STUDI DI MODENA E REGGIO EMILIA

UNIMORE E IL TERREMOTO DEL 2012 IN EMILIA-ROMAGNA

Interventi e ricerche per fronteggiare l'emergenza e sostenere la ripresa

A cura di Dino Giovannini e Loris Vezzali

UNIMORE
UNIVERSITÀ DEGLI STUDI DI
MODENA E REGGIO EMILIA

Dipartimento di Scienze Chimiche
e Geologiche

GRAZIE

PER LA CORTESE ATTENZIONE