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INTRODUCTION

Following an ambitious idea to drill a very deep borehole in Central Italy we submitted a preliminary proposal in January 2006 to the ICDP. A few months later we received a positive answer and we proposed to organize a workshop to promote the creation of an international multidisciplinary team of scientists for a drilling project in Central Italy: the MOLE drilling Project. The Workshop Proposal (submitted in January 2007) has been positively reviewed by the Science Advisory Group of the ICDP. Successively, the ICDP Executive Committee agreed to provide a financial support for the Workshop organization.

The Workshop will be held in Spoleto (Perugia, Umbria) next spring 5-8 May 2008 (see EOS call).

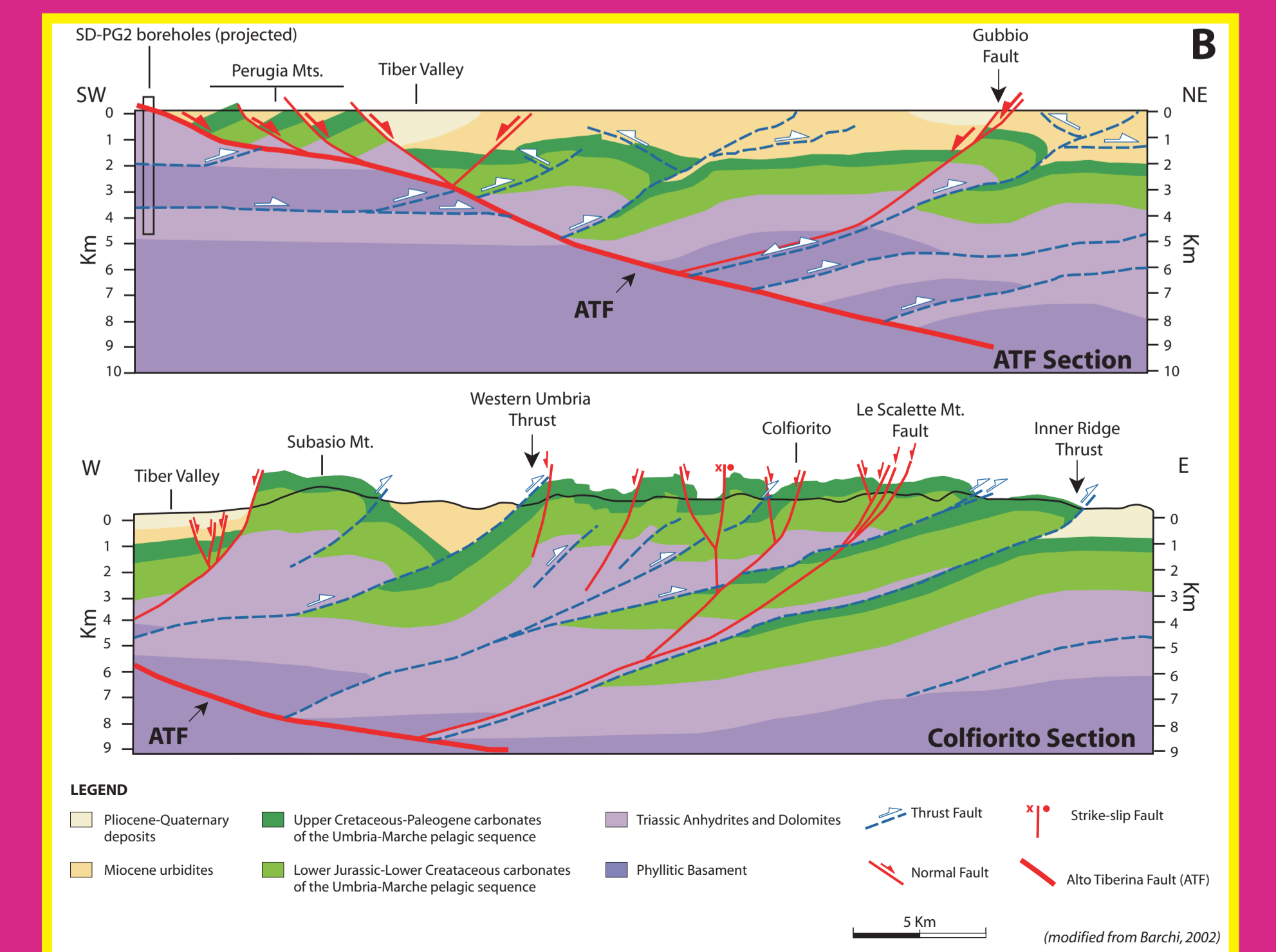
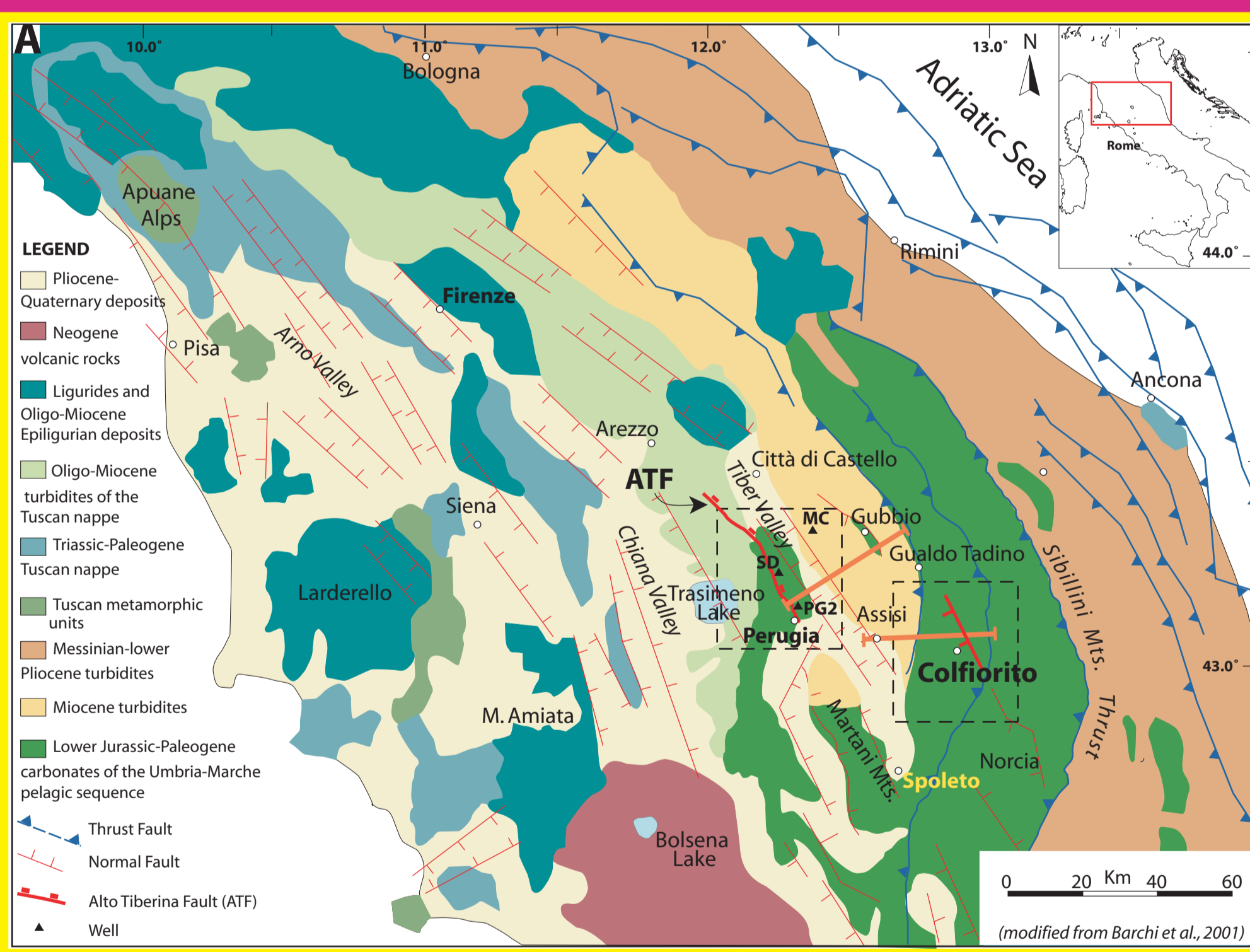
The drilling project is aimed to investigate the shallow crust and the inner structure of normal faults in Northern Apennines.

The Umbria-Marche sector of Northern Apennines offers a unique opportunity to reach a complex system of normal faults among which we selected two possible targets:

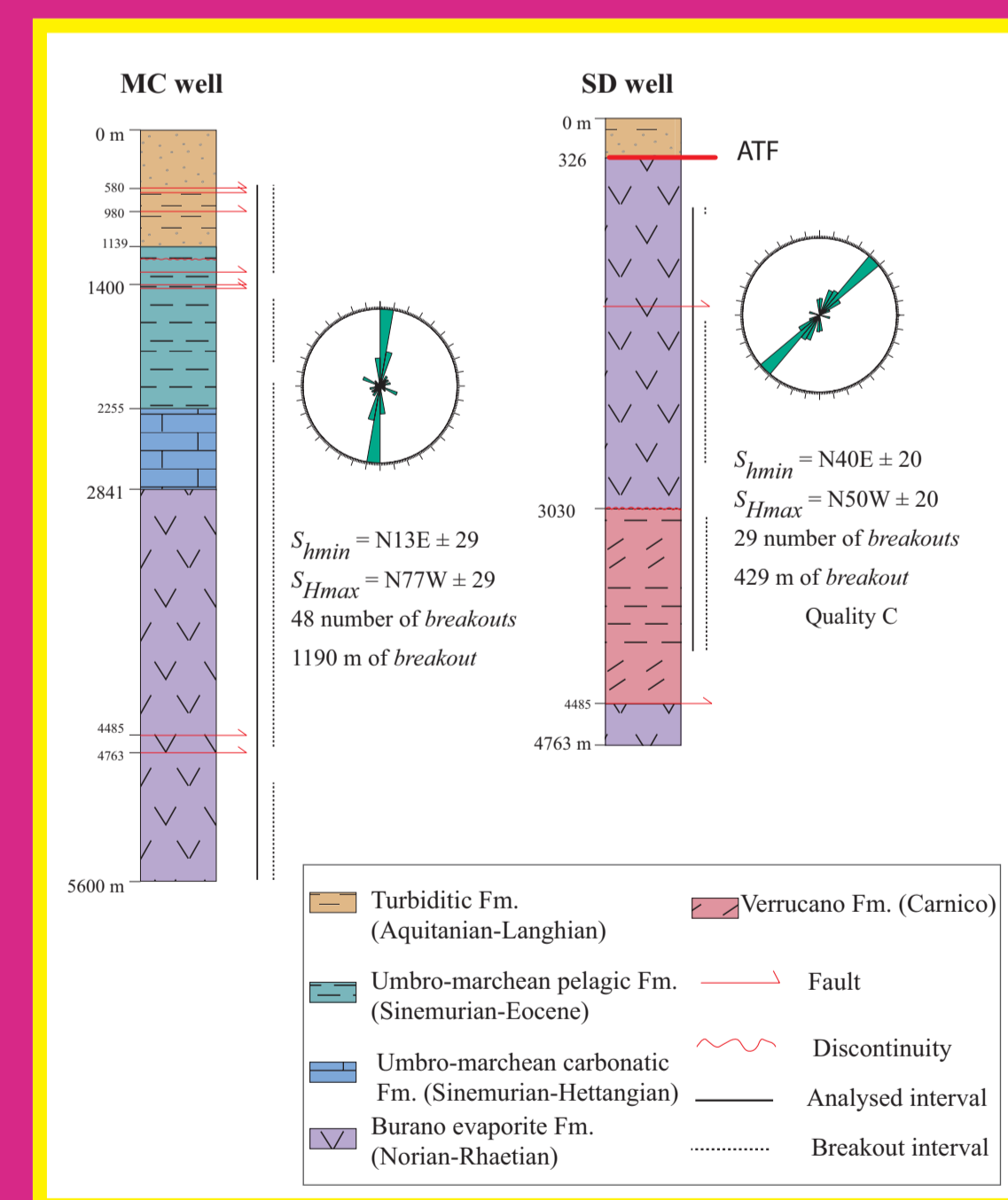
- 1) The active Colfiorito fault dipping about 45° toward SW, which ruptured during the 1997 M=6 earthquake sequence (Colfiorito fault) or
- 2) the Alto Tiberina low angle normal fault dipping 15°-25° towards ENE, which moves through a combination of aseismic creep and repeating microearthquakes, (Alto Tiberina Fault, ATF).

The project is motivated by the need to answer to fundamental issues concerning:

- 1) the geophysical and geochemical processes controlling normal faulting during moderate-to-large seismic events (3-4 km borehole) or
- 2) the low angle normal fault mechanical paradox (5-6 km borehole).

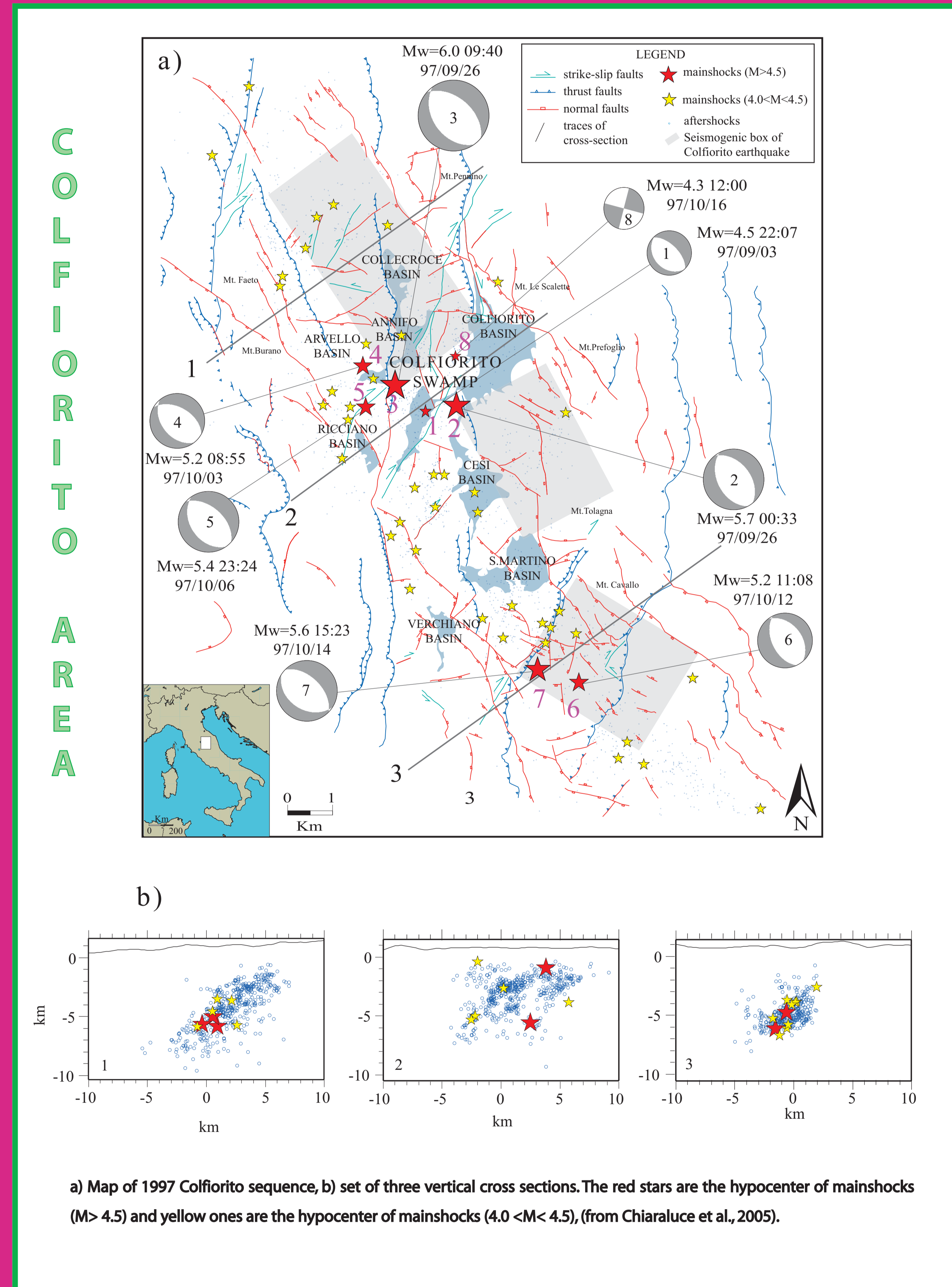


Stratigraphy and borehole breakouts in two wells of the ATF area.



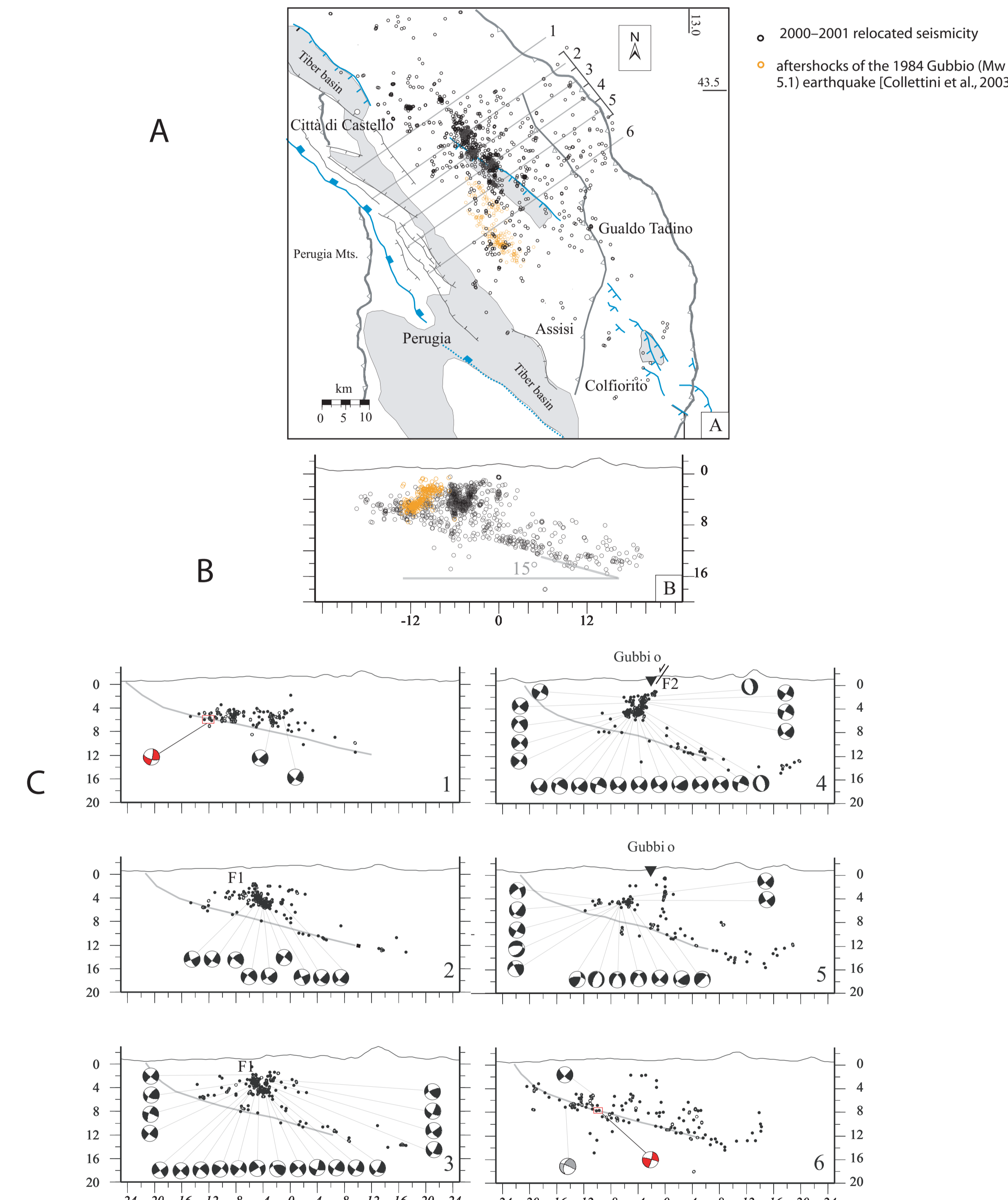
SCIENTIFIC OBJECTIVES

- 1) to collect extremely important information concerning composition, structure, mechanical and physical properties of the shallow crust in the region;
- 2) to sample the fault core in order to investigate the mineral composition, the mechanical and rheological properties of the fault zone materials;
- 3) to determine the active stress field around and within the fault zone;
- 4) to measure the pore-elastic properties and to better understand fluid circulation at seismogenic depth;
- 5) to install borehole instruments in order to create a permanent geophysical and geochemical deep observatory;
- 6) to promote the deployment of permanent geophysical and geochemical networks at the Earth surface in the area;
- 7) to collect data and observations for better understanding and forecast the occurrence of repeated main shocks sequences.



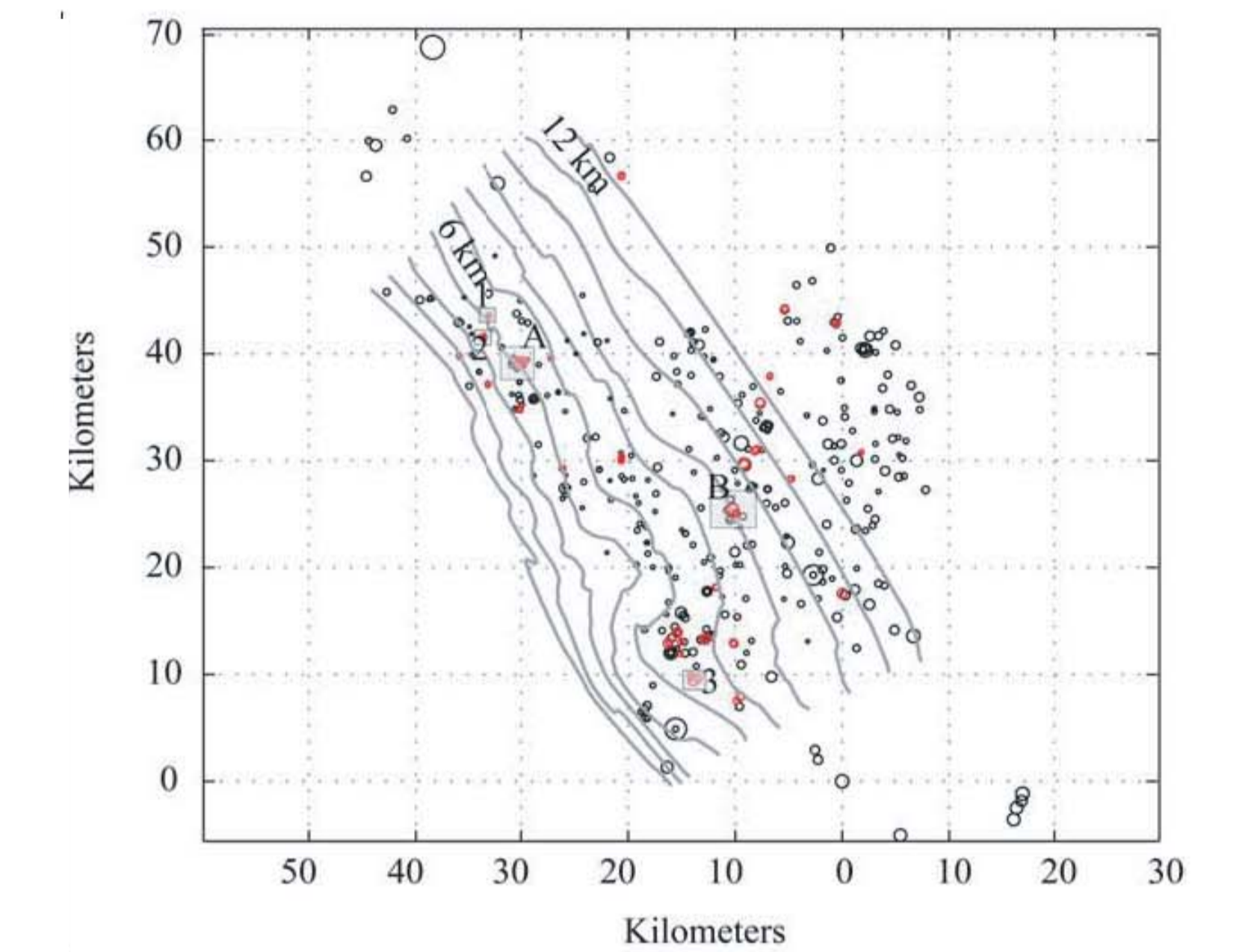
a) Map of 1997 Colfiorito sequence, b) set of three vertical cross sections. The red stars are the hypocenter of mainshocks (M>4.5) and yellow ones are the hypocenter of mainshocks (4.0<M<4.5), (from Chiaraluca et al., 2005).

ALTOTIBERINA FAULT AREA

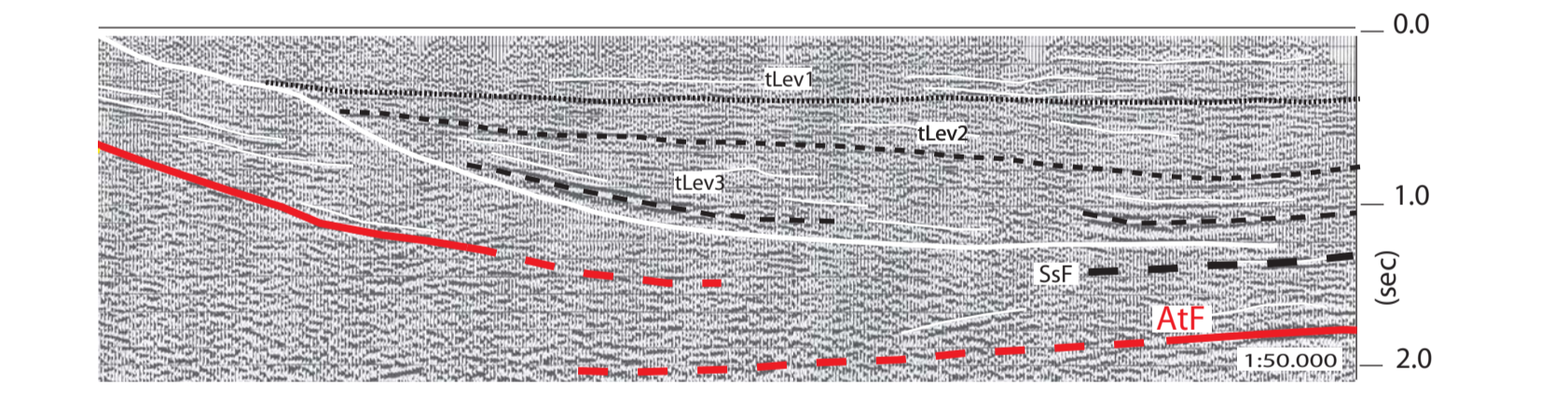


(A) Map of the area and seismic sections location. (B) Vertical cross section perpendicular to the Apenninic chain showing both the relocated composite seismicity and the 1984 Gubbio seismicity. (C) Six vertical cross sections showing the seismicity distribution and the available fault plane solutions computed for the 2000-2001 data. Their positions are shown in (A) together with the width used to plot hypocenters. The heavy grey lines plotted in each cross section represent the trace of the ATF fault as imaged on the depth-converted seismic reflection profiles (modified from Chiaraluca et al., 2007).

ALTOTIBERINA FAULT AREA



Map view distribution of the 621 earthquakes (black open circles) located within 500 m of the ATF detachment surface represented by the isobaths (solid black lines). The red circles represent the multipliers. Minor grey squares labeled 1, 2, and 3 show the locations of the repeaters (from Chiaraluca et al., 2007).



Seismic commercial profile (ENI) crossing the Tiber Basin north of Città di Castello (courtesy by M.G. Ciaccio in GNDT, Final Report 07/2006 - coordinated by Massimo Cocco).

LOW ANGLE NORMAL FAULTS IN THE WORLD

- 1) Dixie Valley - Nevada Ms= 6.8
- 2) Eastern Papua New Guinea (Solomon Sea ocean basin), M=6.2
- 3) Basin and Range Province (Utah, Idaho)
- 4) Basin and Range Province Death Valley

EOS CALL

ICDP Workshop Announcement
MOLE Drilling Project
(Multidisciplinary Observatory and Laboratory of Experiments along a Drilling in Central Italy)
Perugia (Italy), May 5-8, 2008

The MOLE drilling proposal strives to investigate the inner structure of normal faults and the shallow crust in the Northern Apennines. The project is motivated by the need to answer fundamental issues on geophysical and geochemical processes controlling normal faulting during moderate to large seismic events and on the low angle normal fault mechanical paradox. Drilling the Umbria-Marche sector of the Northern Apennines offers the unique opportunity to reach a seismogenic fault: either the 45° dipping Colfiorito Fault which ruptured in a M6 earthquake in 1997, or the 20° dipping normal Alto Tiberina Fault, which moves through creep and microearthquakes. The project aims to collect novel data while drilling and to monitor an active fault zone through a multidisciplinary observatory at depth.

During the upcoming workshop, to be held in Perugia, Italy, May 5-8, 2008, including a half-day field trip to potential drilling sites, the science rationale behind the project will be reviewed by invited speakers. Scientific targets and technical challenges will be discussed to plan the drilling project and develop a draft full proposal.

Interested parties are welcome to submit an application to the Scientific Organizing Committee (mole.workshop@ingv.it) no later than January 15, 2008, including name, affiliation, brief summary of research interests, relevant expertise, intended contribution. Selected participants will be invited on the basis of their research interests related to the project goals and will be notified in February 2008. Limited travel and participation funding is available for up to 40 scientists; preference will be given to those from ICDP member countries.

In addition to ICDP, the workshop is sponsored by the Istituto Nazionale di Geofisica e Vulcanologia, Roma. More information is available at: <http://mole.icdp-online.org> and <http://www.ingv.it/servizi-e-risorse/archivio-congressi/convegni-2007/MOLE>.

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