1st International INQUA-IGCP 567 Workshop on Earthquake Archaeology and Palaeoseismology, 7–13 September 2009, Ancient Roman City of *Baelo Claudia* (Cádiz, Spain).

The aim of this joint meeting, involving the IGCP 567 (Earthquake Archaeology) and the Focus Group on Paleoseismology and Active Tectonics of the INQUA Commission on Terrestrial Processes was to stimulate comparative discussion on earthquake ground effects and archaeological seismic records in order to elaborate a comprehensive classification for the future cataloguing and parametrization of ancient known and unknown earthquakes. The final goal of this kind of collaborative workshops is the further integration of archeoseismological data in Macroseismic Scales such as the Environmental Seismic Intensity Scale ESI-2007 developed by the former INQUA Subcommission on Paleoseismology (President A. Michetti) and approved by the General Assembly of INQUA celebrated during the XVII INQUA Congress (2007, Cairns, Australia).

The workshop was initially an INQUA activity proposal approved in the business meeting of the former subcommisssion held in Cairns (Australia). The organizers of the workshop, P.G. Silva (USAL, Spain) and K. Reicherter (RTWH Aachen, Germany) in agreement with A.M. Michetti (President of the INQUA F.G. on Paleoseismology) and M. Sintubin (Leader IGCP 567) implemented this activity as a joint meeting within the agenda of these two international research programmes. The workshop was held in the Ancient Roman City of *Baelo Claudia* (Cádiz, Spain), were relevant ground and architectural deformations caused by ancient earthquakes (1st and 3rd Centuries AD) are spectacularly recorded (Silva et al., 2005; 2009). The activities of the workshop also included a successful two-days Field Training Course on Archaeoseismology and Paleoseismology.

This joint meeting was attended by 101 researchers from eighteen different countries (Austria, Belgium, Czech Republic, Germany, Greece, Hungary, Iran, Israel, Italy, Japan, Lithuania, Norway, Portugal, Russia, South Korea, Sweden, Spain and USA). The event was also economically supported by different Institutions, such as the Museum of *Baelo Claudia* (Junta de Andalucía, Spain), the Spanish Geological Survey (IGME), the Spanish Open University (UNED), the Spanish Association for Quaternary Research (AEQUA), the RWTH Aachen University (Germany), and the University of Salamanca (Spain). Specific economic support was given by the ICSU Spanish Commission (Subprogram of International Complementary Actions: ACI Committees -INQUA Committee- ACI2008-0276) and by the German Von Humboldt Institute. Nineteen young scientists and researchers from developing countries were granted by the INQUA Project #0811(4), IGCP 567 (5), AEQUA (6) and the Workshop Organization (3). Three invited speakers (J. McCalpin, T. Rockwell and N. Mörner) received travel grants.

The scientific production during the five days of the meeting resulted in fifty one scientific contributions, twenty seven oral presentations and twenty four in poster format. All the contributions were collected in an abstract volume of 186 pp entitled *"Archaeoseismology and Palaeoseismology in the Alpine-Himalayan Collisional Zone"* (R. Pérez López, C. Grüztner, J. Lario, K. Reicherter and P.G. Silva, Eds.) ISBN: 978-84-7484-217-3. Additionally a Field-Trip Guide Book (J. Lario et al., Eds.) and a Field Training Course Notebook (J.L. Giner et al., Eds.) were published and edited in full-colour by the Spanish Geological Survey (IGME). The Field Trip-Guide Book (96 pp.) collects the data, pictures,

and explanations regarding to the three field-trips developed during the workshop: (1) Archaeoseismology of Baelo Claudia (Leaders P.G. Silva and K. Reicherter); (2) Landslides and Tectonic scarps in the Bolonia Bay (Leaders T. Fernández-Steeger et al.); (3) Quaternary Tectonics in the Gibraltar Strait Area (Leaders P.G. Silva et al.). The Field Training Course Notebook (65 pp.) collects a detailed methodology of structural analysis applied to archaeoseismological research, including several working-maps and eight full-colour comprehensive file-sheets of the more common Earthquake Archaeological Effects (EAE), whose development and classification was presented by the Spanish Working Group during the workshop. Detailed referencing to the documentation resulted from this event is included in the reference list at the end of this report.

The workshop was subdivided in four main thematic sessions on Paleoseismology (Chairmen: J. McCalpin & K. Reicherter), Archaeoseismology (Chairmen: M. Sintubin & K. Hinzen), Earthquake Ground Effects (Chairmen: A. Michetti & P.G. Silva) and Active Tectonics (Chairmen: T. Rockwell & I. Papanikolaou) plus a general poster session (Chairmen: R. Pérez López & C. Grüztner). Two introductory key notes were presented after the opening ceremony by E. Vittori - A.M. Michetti: *INQUA Key note on Earthquake Ground Effects during Moderate Events: L'Aquila 2009 Event Case history and the application of the ESI 2007 scale*, and M. Sintubin: *IGCP-567 Key note on Archaeoseismology, past, present and future*.. During the different sessions several thematic conferences by outstanding invited speakers were successfully produced on Fault Trenching (T. Rockwell, USA), Paleoseismology (J. McCalpin, USA), Archaeoseismological modelling (K. Hinzen, GER), Active Faulting (I.D. Papanikolaou, GRE), Tsunami records (A. Vött, GER), Parametrization of Paleoearthquakes (R. Tatevossian, RUS) and Seismically induced liquefaction (N. Mörner, SWE), among others. The development of the workshop resulted in a detailed overview on the state of the art of the different disciplines involved in these two emergent scientific approaches to earthquake research, illustrated by presentations coming from different parts of the world. From debates developed during the different sessions it is clear that the application of computer modelling and LIDAR techniques to the seismically induced features is the next step to be applied to this kind of investigations, since they provide a detailed imaging and a very accurate data processing for different seismic (real and hypothetical) scenarios. Also during the meeting a specific key note on "Cataloguing earthquake environmental effects" (L. Guerrieri & S. Porfido) provided an overview on the progress of the INQUA Project#0811: "A global catalogue and mapping of earthquake environmental effects". Several contributions dealt with the application of the ESI-2007, developed within the framework of INQUA during the past inter-congress period (2003-2007), to different recent and ancient earthquakes around the world.

The main field-trip of this scientific event was attended by all participants of the workshop. It was devoted to the visit and analysis of the main signatures of the well-known 1755 AD Earthquake-Tsunami Event on the littoral of the Gibraltar Strait area (Trafalgar Cape, Conilete Tower; Zahara tsunami beach), as well as to the evidence of active faulting in the area (Cabo de Gracia Fault, Hotel Flamenco Fault, Bolonia Bay area). In most of the field-trip stops fruitful discussions took place on the seismically induced origin of the observed features. The congregation of scientists from the different thematic areas included in paleoseismological and archaeoseismological studies made possible the testing of hypotheses from different points of view "on site".

The Field Training Course on Archaeoseismology and Paleoseismology Research was attended for 56 of the 101 participants, most of them young scientists and researchers of different disciplines interested in their introduction to the specific particularities of these kinds of field-investigations. The two days course was divided in specific key notes and half-journey field-works on geophysical prospecting, structural analysis and LIDAR imaging of seismically induced geological and archaeological features. All the geophysical equipment (Ground penetrating radars, multi-channel resistivimeters and LIDAR Station) were provided by the RWTH Aachen University and the Salamanca University.

The more relevant contributions to the workshop will be collected in a Special Volume of the Journal Quaternary International entitled *"Earthquake Archaeology and Paleoseismology"* edited by P.G. Silva, M. Sintubin and K. Reicherter. The steering committee for this volume is formed by C. Grüztner, R. Pérez López, I. Papanikolaou and A. Michetti. This thematic volume is presently in progress. The open access submission using the electronic submission system of Elsevier (EES) started on late October 2009 and the deadline for submission has been fixed on 31 March 2010. A link for submission is open in the usual Quaternary International editorial site. A label entitled *"Paleoseismology"* is available in the pull-down menu of the journal web-site: http://ees.elsevier.com/quatint/

During the workshop were also held the business meetings of both the INQUA F.G. on Paleoseismology and Active Tectonics, and IGCP 567, as well as the official formalization of the Spanish Working Group of the IGCP 567. In the light of the success of this event, it was decided to organize a second joint-meeting of similar characteristics during the year 2011. Dr. Ioannis Papanikolaou of the Agricultural University of Athens will be in charge of the organization of the next event.

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Alessandro Michetti (Italy), Manuel Sintubin (Belgium).
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FIGURES FOR THE TEXT.

Fig. 1. Abstract Vol. of the 1st *International Workshop on Earthquake Archaeology and Palaeoseismology.*

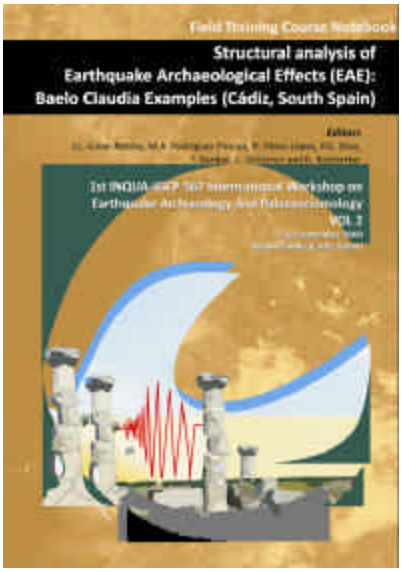

Fig. 2. Field Training Course Notebook of the 1st *International Workshop on Earthquake Archaeology and Palaeoseismology.*

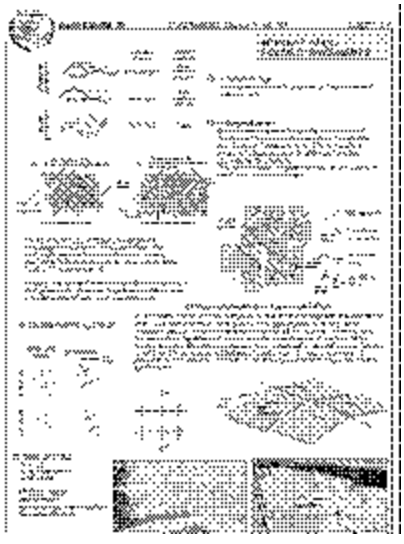

Fig. 3.Example of File-sheets included in the Field Training Course Notebook about Earthquake Archaeological Effects (From Giner et al., 2009) of the 1st *International Workshop on Earthquake Archaeology and Palaeoseismology.*