

Special issue:

Evaluation of the potential for large earthquakes in regions of present day low seismic activity in Europe

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Preface

Studies of long-term seismic activity in any region of the world require the longest historical perspective as possible. In most of the regions of Europe, before the XIIIth and the XIVth centuries, historical sources allow to establish a catalogue of felt earthquakes but the available data give very few information to estimate local intensities and epicentres.

Thus, the knowledge of the seismic activity begins really at this epoch and covers a time period of less than 700 years. From that time, sources from different origins (chronicles, annotations, parish registers, account registers,...) give us more details on local effects and allow reliable estimation of damages and perceptibility area of the earthquakes. It is then possible to determine the probable epicentral area of the strongest earthquakes and also to estimate their magnitude by comparison with recent earthquakes for which the magnitude has been instrumentally determined.

Recent studies showed that from their estimated magnitude, several events in western and central Europe could or should be considered as large earthquakes even if co-seismic surface ruptures are apparently unknown in the history.

It should be noted that the absence of any previous reference to a surface rupturing earthquake in stable Europe is also due to a poor inventory of potentially seismogenic faults, the seemingly relatively long recurrence intervals for similar events along a single

fault portion and also the a-priori idea in the scientific and engineering community that the occurrence of this kind of earthquakes was not possible.

Thus, fundamental problems of estimating the size of large earthquakes and the return period of major seismic events along active faults must be studied using geological investigations of Holocene and Late Pleistocene deposits.

This kind of studies, using the paleoseismic methodology, is relatively common in some very seismically active regions of the world where large earthquakes occurred frequently and where active faults are well known. In Europe, except in Italy, very few paleoseismological studies have been conducted up to the beginning of the PALEOSIS-project, supported by the European Commission for the period 1998-2000.

The surface faulting of seismic origin is the primary observation necessary to recognise historical and pre-historical large earthquakes in the field.

Severe shaking due to earthquakes can also induce surface ground cracking, sand injections, shallow local land-slips and other liquefaction figures. Furthermore, in natural caves, strong ground motions could cause speleothem fractures and dislocations. These indirect observations can provide evidence of past strong earthquakes in regions where active faults are not identified.

The purpose of the PALEOSIS-project was to develop a methodology to identify active faults in presently

low seismicity areas of Europe and to demonstrate their activity in terms of historical or pre-historical large earthquakes. The final workshop of the project was open to all scientists working in Europe in this field of research. It has been held in Han-sur-Lesse (Belgium) from March 13 to March 17, 2000. Most of the presentations have been prepared for this special issue of the Netherlands Journal of Geosciences 'Geologie en Mijnbouw'. Extended abstract of all the presentations have been published in the 'Cahiers du Centre Européen de Géodynamique et de Séismologie, vol 18 (2001)'.

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