THE UNIVERSITY OF ATHENS HELLENIC MACROSEISMIC DATABASE FOR HISTORICAL EARTHQUAKES

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Seismology without boundaries

Introduction

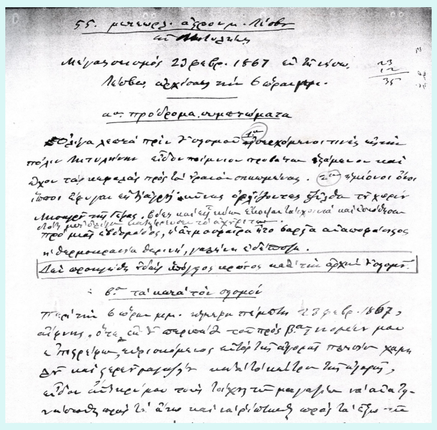
During the last decade, a systematic study of historical earthquakes leading to the quantification of earthquake effects in terms of macroseismic datapoints (MDPs) and, consequently, to earthquake parameters, has been carried out in the Laboratory of Seismology of the University of Athens. For each earthquake, the available background information has been evaluated and the corresponding macroseismic intensities assessed in terms of EMS98. A considerable amount of MDPs has contributed to the European Macroseismic Database, through European initiatives. Based on the structure of the European Database, a local version was designed, incorporating historical earthquakes of the period 1000-1899, mainly from the eastern Aegean area. The Hellenic Macroseismic Database (HMD) includes 97 events with Ix≥7 (694 MDPs) and 1053 events with Ix<7 (1205 MDPs). The complete European earthquake list for the period 1000-1900 and related background dataset (AHEAD - Archive of Historical Earthquake Data http://www.emidius.eu/AHEAD/) was established in the frame of NERIES project (NA4). It was later updated in the frame of SHARE project (European Earthquake Catalogue – SHEEC).

The Seismological Data

The macroseismic intensities data provided in the database originate from a number of published historical earthquake studies, dedicated to specific areas or specific earthquakes:

1. Taxeidis (2003) is an integrated study on the historical earthquakes of the Eastern Aegean, from antiquity to 1899. This study is based on original archive material, contemporary newspaper reports, historical and seismological compilations and presents a critical consideration of a large number of earthquakes and their macroseismic intensity distributions, based on recently adopted criteria and methodologies. Most importantly, the procedure of intensity assessment is transparent through the whole study period. Based on the fact that the material available varies with time and space, a thorough evaluation was performed on each source of information used for macroseismic intensity assessment. Four main periods of earthquakes are presented in separate chapters: antiquity-1000, 1001-1500, 1501-1800, 1801-1899. Each chapter contains a lengthy introduction on the historical context of the period, the population distribution, local structural tradition and the consequence of earthquakes on the population. Finally, for 23 earthquakes with more than 10 MDPs, earthquake parameters (epicentral coordinates, equivalent moment magnitude, azimuth and dimensions of seismogenic fault) were calculated using the Boxer method (Gasperini & Ferrari 2000).
2. The Kefallinia 1767 and Lefkada 1769 earthquakes (Kouskouna et al. 1993, Makropoulos & Kouskouna 1994) present in detail all the steps of a complete investigation of historical earthquakes, from interpretation of archive material to macroseismic intensity distribution.
3. The Larisa 1892 earthquake (Kouskouna 2001) was not included in the existing catalogues of historical earthquakes. Based on contemporary seismological reports and local newspapers, intensity distribution and earthquake parameters are assessed.
4. The Atalanti 1894 earthquakes characterize the transition from historical to instrumental seismology in Greece. Makropoulos & Kouskouna (1994) reevaluated exisiting sources and newspaper material for the reassessment of intensities .

In all studies the intensities are assessed in EMS92. Details are provided on the place names and their renaming throughout the centuries.



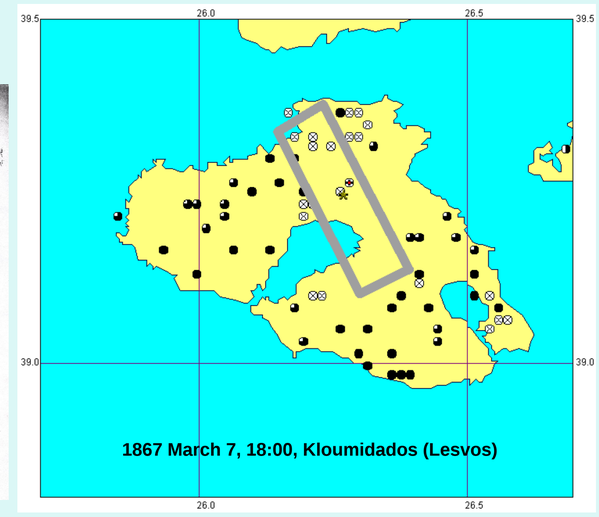
1768, Ιουνίου 10, Πλωμάρι Λέσβου

Από ένα ομόλογο που φυλάσσεται στο αρχείο του Ιερού ναού του Αγίου Ιωάννου του Θεολόγου, στο Μεγαλοχώρι της επαρχίας Πλωμαρίου της Λέσβου, προκύπτει ότι έγινε ένας βλαβερός σεισμός στην περιοχή του Πλωμαρίου τη χρονική περίοδο γύρω στις 10 Ιουνίου 1768.

[πηγή: Χουτζαίος Γεώργιος (1998) σελ.132]

Ο σεισμός αυτός δεν εντοπίστηκε σ' άλλες σεισμολογικές μελέτες ή σεισμολογικούς καταλόγους.

Ημερομηνία	Περιοχή	$I_{max, EMS}$	φ (°N)	λ (°E)
1768, Ιουνίου 10	Πλωμάρι Λέσβου	5-6	38.983	26.367



The Database

The structure of the Hellenic Macroseismic Database (HMD) was implemented according to the philosophy and guidelines of the European database within the framework of NERIES and SHARE projects.

The first step for the implementation and presentation of the HMD was the creation of a dedicated website hosted within the servers of the Department of Geology & Geoenviroment of the University of Athens (http://macroseismology.geol.uoa.gr). All data, maps and images in the HMD are printable and downloadable in .xls, .kml, .pdf and image formats.

Website Structure

The advantage of MIDOP application is that it allows the user to construct a website through a variety of options concerning the undermentioned:

- Place Name (PlaceNameGreek, PlaceNameText, PlaceNameWeb etc.)
- Map Layout (DEM, colors, legends, symbols)
- Earthquake Parameters (magnitude and depth, if available)

HMD layout and content

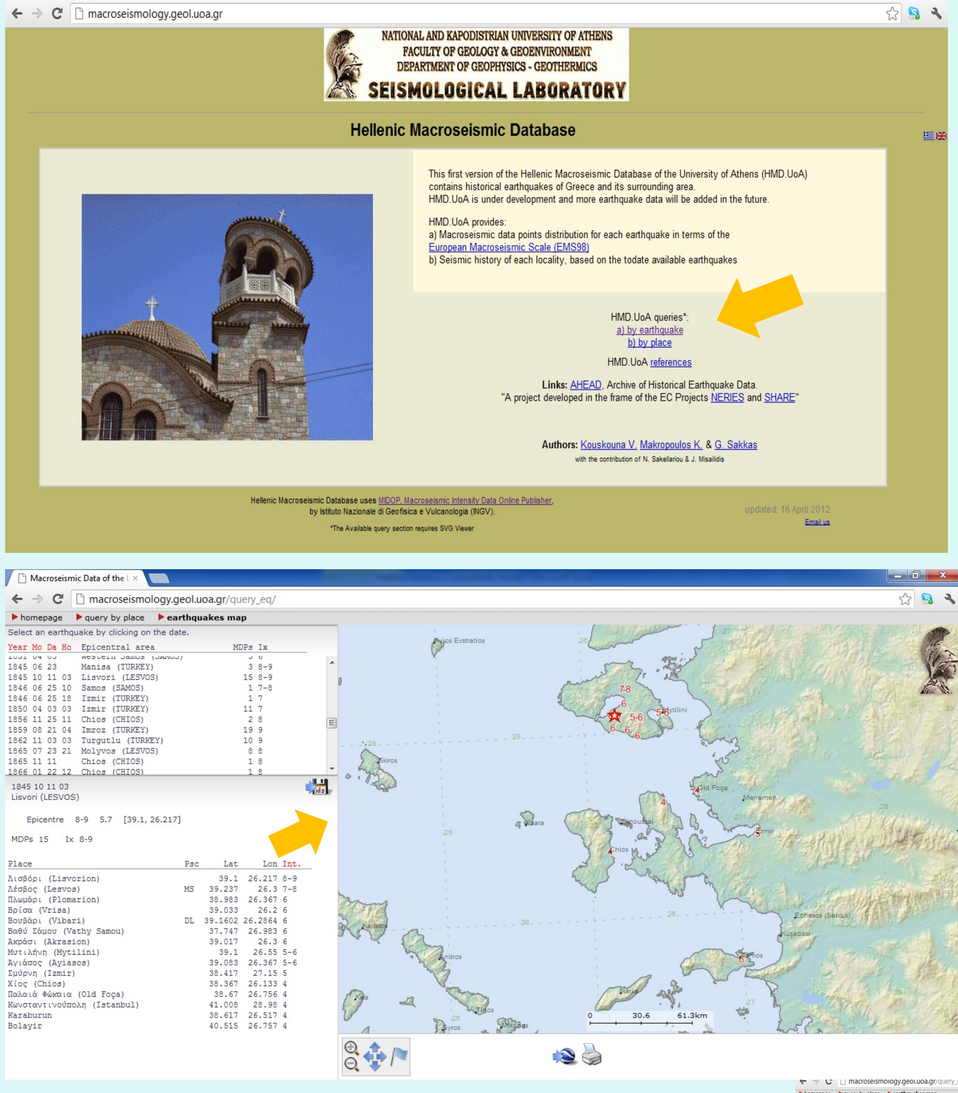
HMD was constructed according to the specifications and requirements of the open software MIDOP (Locati & Cassera 2010). The main procedure requires the following:

- List of earthquakes
- List of intensity datapoints for each earthquake
- PC development used for re-generating the website files, equipped with a development webserver (Apache, PHP and MySQL).

HMD Structure:

The database consists of four tables created in Microsoft Access and transformed to MySQL format:

- The earthquake catalogue table (date and origin time, epicentral area, number of MDPs, maximum intensity)
- The Macroseismic Intensity Data table (place names, characterization code for each place, geographical coordinates, macroseismic intensity)
- The Map reference places (place name, geographical coordinates, country, zoom level, geographical area)
- The Macroseismic Earthquake Studies table (full references)



The homepage of HMD raises two different queries available to the user:

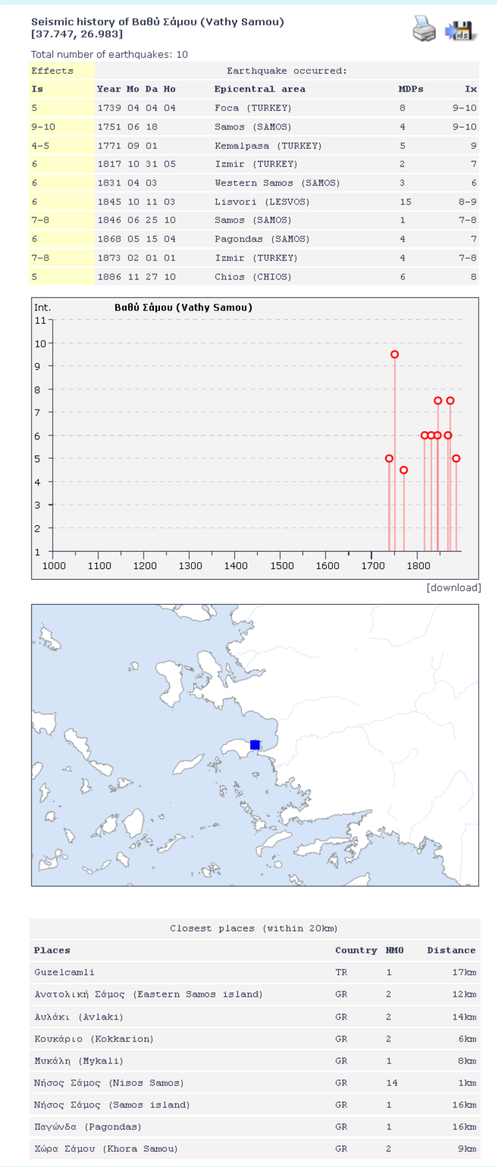
a) by earthquake

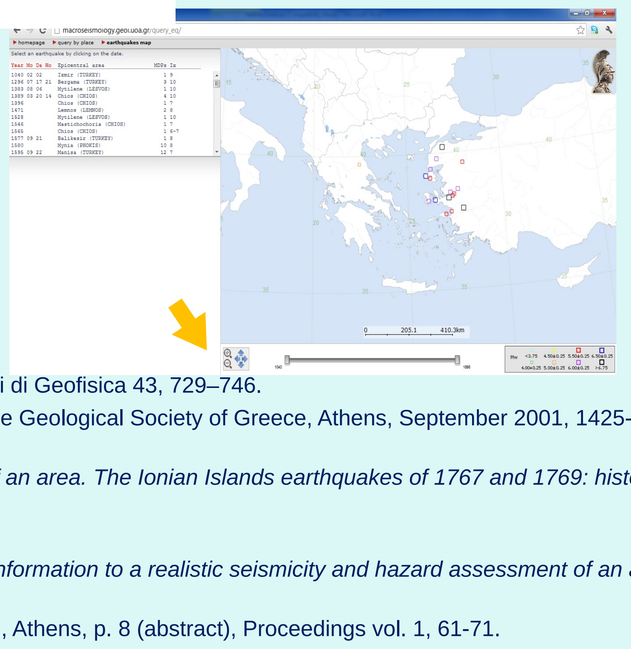
b) by place

This feature allows navigation and search either in the earthquake catalogue section by studying the earthquake and MDPs catalogues, or by studying the earthquake history of each locality.

Information on the date and origin time of the earthquake, the epicenter and the MDPs are presented on the left side of the screen.

Specific information, such as studies or images (e.g. isoseismal map from an older study), for each earthquake may be uploaded in .pdf format.





The maps are created in such a manner that the user can zoom in or out for more detail, depending on his needs.

The query by place feature allows the user to study the complete earthquake history of each locality.

Conclusions

The Hellenic Macroseismic Database is open to continuous updating, through recently reappraised historical earthquakes.

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