Impact of earthquakes and its dependence on magnitude: testing the Greek seismicity

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WORK FLOWCHART

Earthquakes (EQs) cause several types of impact. We examined impact on population (casualties, injuries) and on built environment

3. EQ Catalogue Statistics

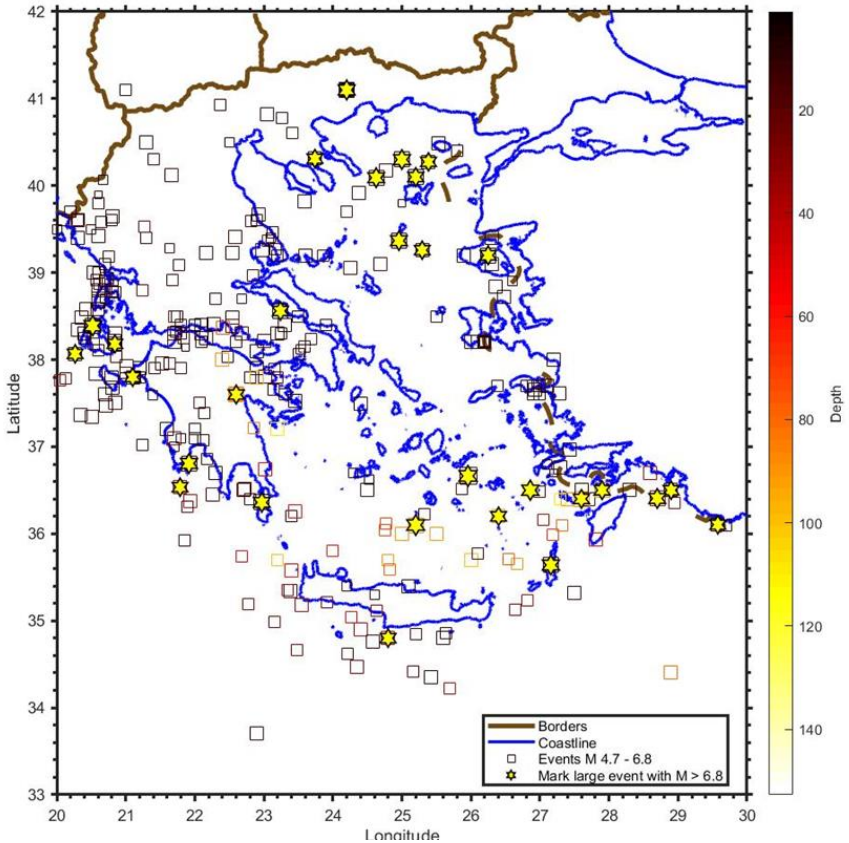
- Magnitude range: 4.5 -7.7
- Shallow EQs: 279
- Intermediate Depth EQs: 15

4. Historical EQ revision

For historical EQs after 1800 we revised the EQ impact based on the examination of little known documentary sources(i.e. EQs of Chalke 1843, Athos 1904, Chavari-Elis 1909, Kos 1933)

1. Study Area & Time Period

- Current Greek Territory
- 1800 -2019



2. Data Compilation

- Descriptive & Parametric EQ catalogues, Books, Scientific Publications, Technical Reports, Press Reports

Focal parameters taken from catalogues: University of Thessaloniki, Ambraseys 2009, ISC-GEM 2020

5. Database

We organized a database with 294 EQs.

For each EQ we inserted

- Focal parameters
- No. of casualties
- No. of injuries
- No. of damaged buildings

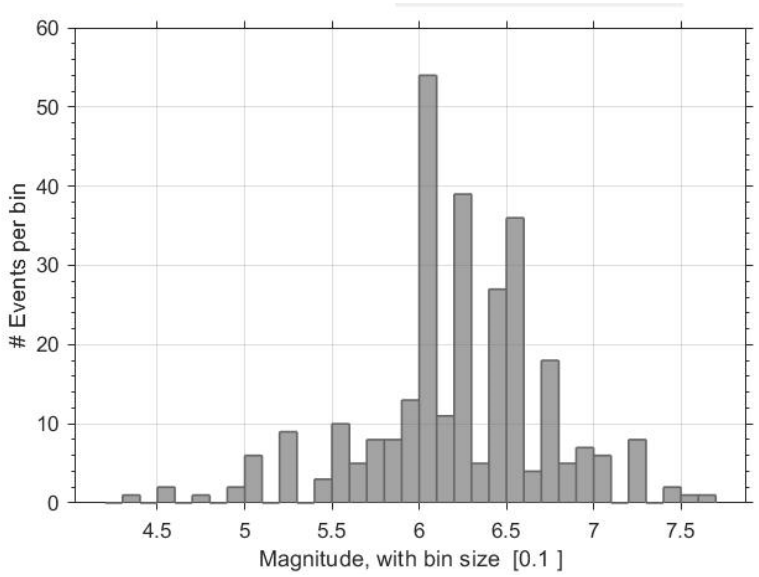
DATA ANALYSIS

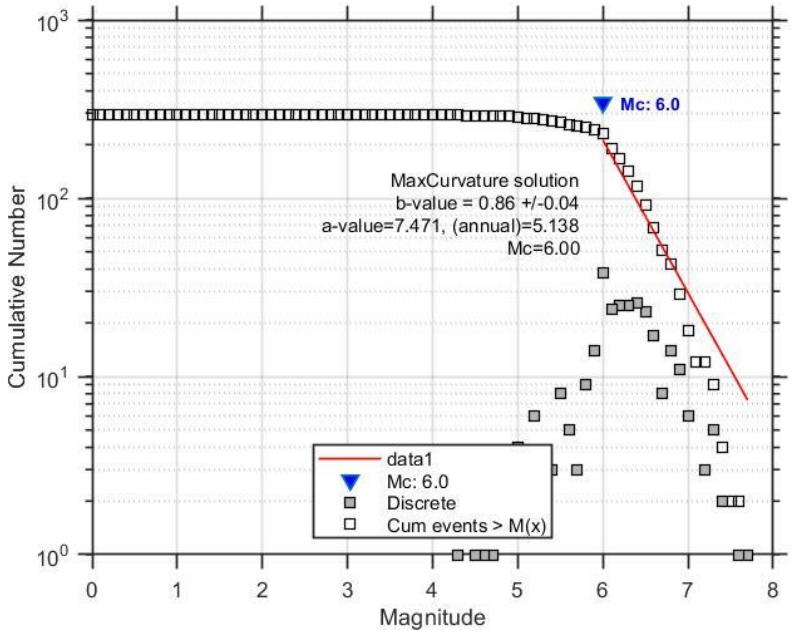
Catalogue analysis

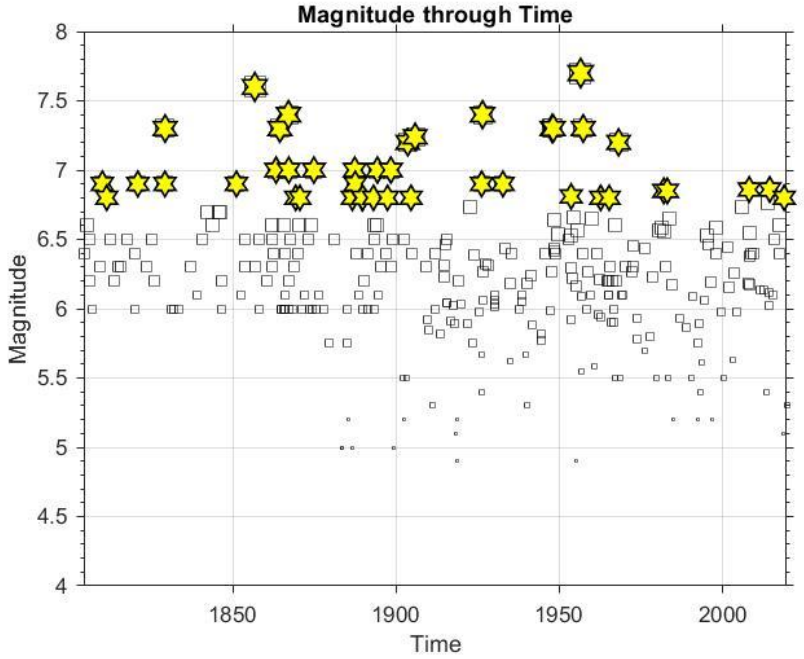
This analysis has been made with the use of Z-Map Software Tools (Wiemer 1995, 2011).

We observed that the EQs that have some kind of impact are more frequent at the range 6.0-6.5.

The b-value is relatively low since the catalogue is dominated by high magnitude EQs.







Analysis of impact data

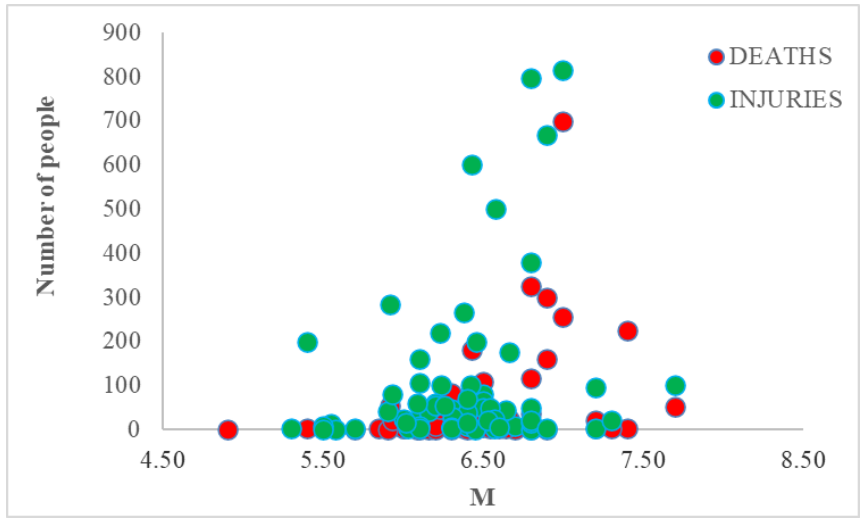
The examination of the dependence of impact data on EQ size has been made by organizing a series of diagrams as follows:

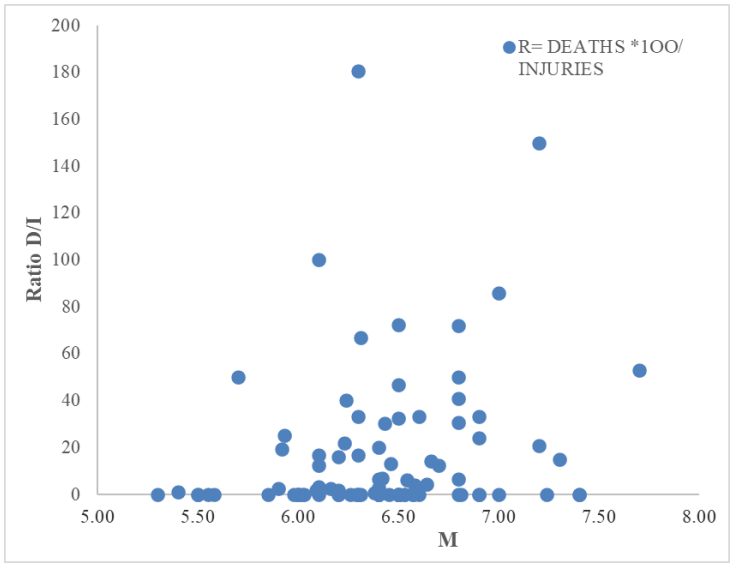
- No. of buildings/ M
- No. of casualties/M
- No. of injuries/M
- R/ M

R= Deaths*100 / Injuries

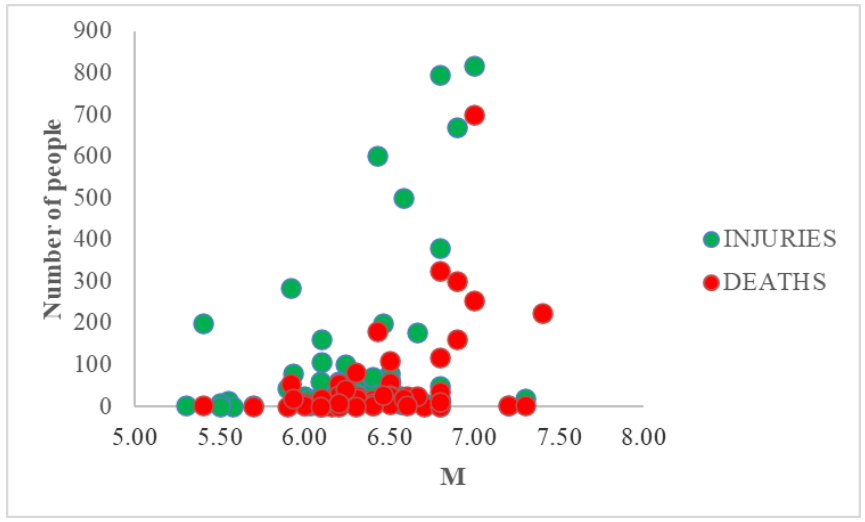
IMPACT STATISTICS- DEATHS & INJURIES

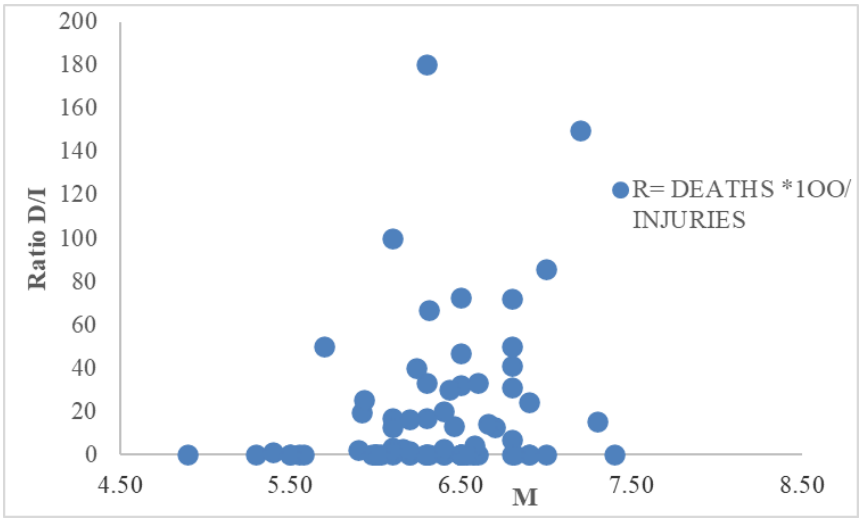
SHALLOW EQS





SHALLOW EQS (Inland <20Km from coastline)

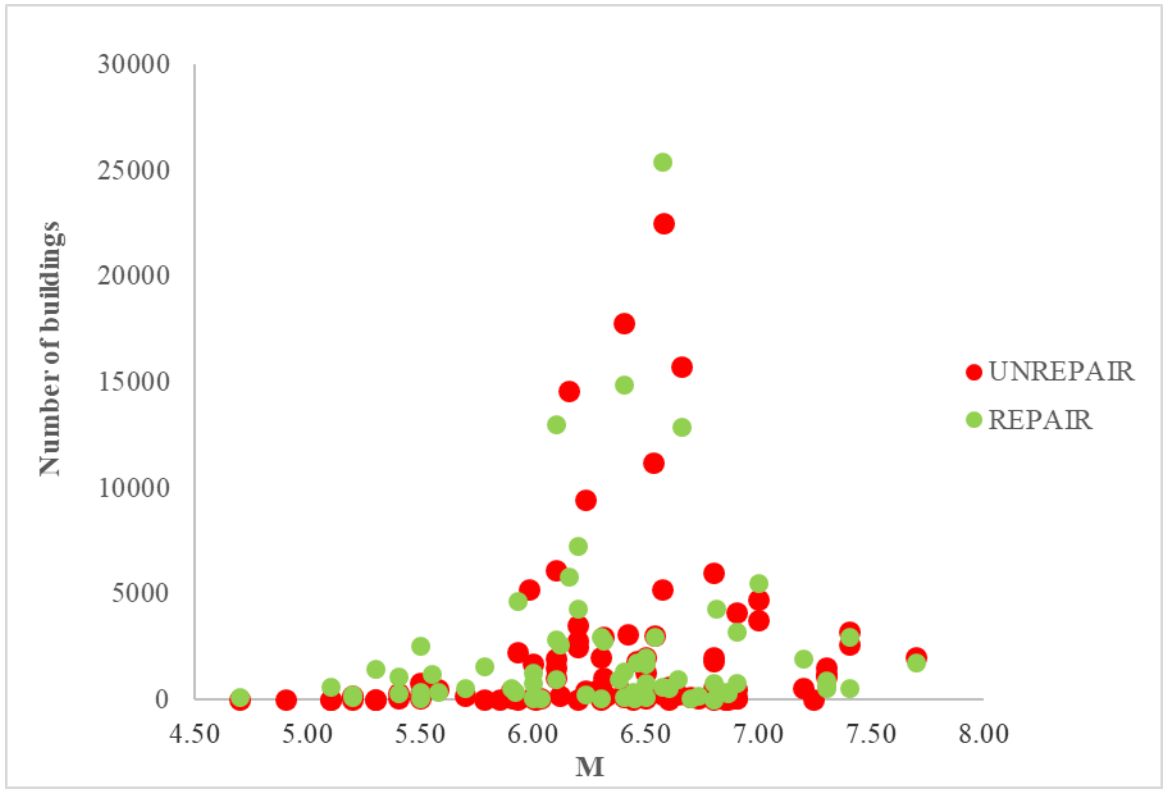




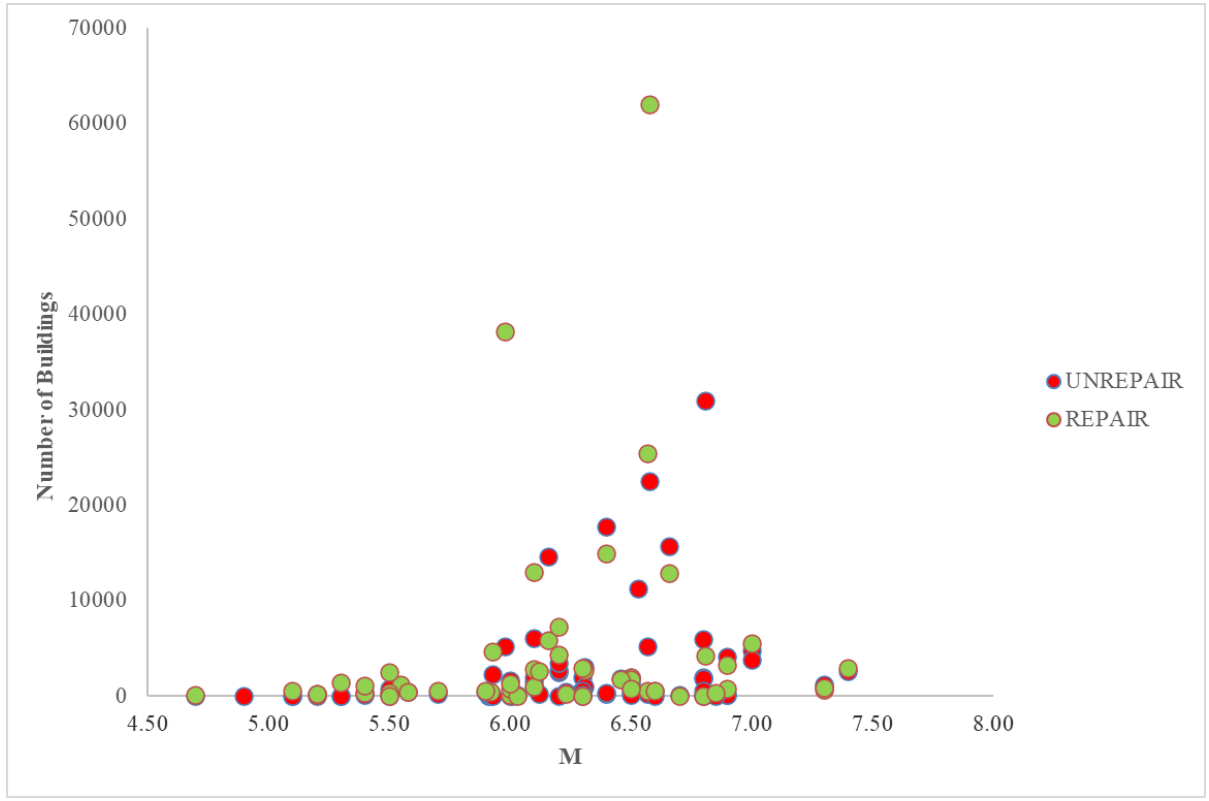
- The number of deaths and injuries increase with the increase of magnitude up to M ~6.8.
- Some large EQs (M>6.8) have relatively low numbers of casualties and injuries.
- This is due to most of these EQs occurring in less populated areas along the Hellenic arc and the North Aegean Trough.
- Some studies(i.e. Alexander 1985) suggested that R~ 33 but our results show large variation of R.

IMPACT STATISTICS-BUILDING DAMAGE

SHALLOW EQS



SHALLOW EQS (Inland <20 KM from coastline)



The results are similar with those reached for the human casualties dependence on magnitude