NEtwork of Research Infrastructures for European Seismology

Deliverable D10
NA4 European Earthquake Catalogue
1000-1963, M > 5.8
(June 2010)

Activity: Distributed Archive of Historical Earthquake Data
Activity number: NA4

Deliverable: European Earthquake Catalogue (1000-1963), M>5.8
Deliverable number: D10

Responsible activity leader: Massimiliano Stucchi
Responsible participant: INGV, BGS, IGC, ITSAK, ETHZ
Author: M. Stucchi, A. Rovida, A.A. Gomez Capera, R. Musson, Ch. Papaioannou, J. Batllo
with the collaboration of: M. Locati, P. Albini, C. Mirto, D. Viganò, A. Cassera, A. Roca, R. Tatevossian

Sixth Framework Programme
EC project number: 026130
Abstract
1. Introduction
2. Events with MDPs
3. Events without MDPs
4. Structure of the catalogue
5. Hints for the users
6. Conclusion
References

App. 1 - Relations and coefficients obtained from the calibration or from the literature
App. 2 - Format of the NA4 European Earthquake Catalogue

Abstract. The NA4 European Earthquake Catalogue (EEC) 1000-1963, M > 5.8, includes 933 events covering an area approximately comprised between 13°W to 30°E (lon), 35°N to 65°N (lat). For the time-window 1000-1899 the earthquake list has been obtained from the “preferred” entries, coded with “p”, of the NA4 inventory (Deliverables D1 and D6). These entries represent the selection of the most significant datasets among the inventoried ones, supporting each of the 640 earthquakes classified as “large”. For the time window 1900-1963 the procedure is similar, with the addition that for this time-window also the instrumental datasets have been considered (see Deliverable D8); the number of earthquakes is 293. 622 events out of the 933 have macroseismic data points (MDPs); the parameters of about 610 events have been determined with three methods based on the use of MDPs: i) Boxer (Gasperini et al., 1999); ii) MEEP, developed within NA4 (see Deliverable D3); iii) BW, proposed by Bakun and Wentworth (1997). The MEEP software has been improved in 2010 with the addition of a “bootstrap” procedure, that now allows supplying a measure of uncertainty. The coefficients of each method were first calibrated in the five NA4 regions (Deliverable D5 part 1): Aegean, Iberia, Italy (Alpine belt), Great Britain, Switzerland; in 2010 they were totally revised (see App. 1). Then, an attempt has been performed to calibrate the three methods in the Stable Continental Region, including France, Germany, Scandinavia, Poland, Slovakia, Hungary, Czech Republic and Lower Austria. For Vrancea, only, data did not allow a calibration. For the remaining 311 events the parameters were assessed by expert judgment, on the basis of the information provided by the root, if any, or from the available parametric catalogues. The availability of multiple determinations for the same event, and the lack of criteria for assessing the “best” one, gives the users a catalogue with all the available information. In other words, NA4 EEC does not indicate a preferred value of the parameters, does not propose weights and does not average the values. Although traditional users would prefer a catalogue with one “default” set of parameter values, only, such values usually neglect the epistemic uncertainty in the data. Just as practice in seismic hazard has had to come to terms with uncertainty in strong ground motion prediction, so now it is beginning to come to terms with uncertainty regarding seismicity. Thus, NA4 EEC prefers to show the inherent variability of the parameters, allowing users the ability to include this in models. NA4 EEC is available at http://emidius.mi.ingv.it/neries NA4/catalogue/; the parameters are found on the map obtainable by clicking on the corresponding symbol in the EEC column.

1. Introduction.
One of the most popular tool for seismic hazard assessment is the parametric earthquake catalogue, that is, a list of earthquake parameters - such as time of occurrence, location, magnitude, depth, etc. - that can be used as input for current computer codes. While in the case of instrumentally recorded events the parameters are determined from waveforms, in the case of historical events such parameters are determined either from intensity data points or from the effects accounts; in the latter case it is performed according to mostly unreported procedures. Each national or regional earthquake catalogue adopts individual procedures; the NA4 European Earthquake Catalogue has been compiled re-assessing the earthquake parameters according to uniform procedures from the best possible supporting datasets. The NA4 European Earthquake Catalogue 1000-1963, M > 5.8 covers an area approximately comprised between 13°W to 30°E (lon), 35°N to 65°N (lat) (Fig. 1). The selection with respect to M ≥ 5.8 is not final. As the scope of NA4 was to re-assess the earthquake parameters, including Mw, a preliminary selection was made on the basis of the M values supplied by the current catalogues. It may follow that some of the earthquakes included in this catalogue will have M ≤ 5.8, while a few with Mw slightly > 5.8 (after re-assessment) may be missing.
For the time-window 1000-1899 the earthquake list has been obtained from the “preferred” entries of the NA4 inventory (Deliverables D1 and D6). These entries represent the selection of the most significant datasets supporting the 640 earthquakes classified as “large”. The NA4 inventory classifies the datasets (roots) according to their level (type and quality, see Deliverable D8). The distribution of the entries per root level RL is given in Tab. 1 and Fig. 1.

Table 1. Amount and percentage (over the total) of the entries according to their root level in the time-window 1000-1899 (NA4 regions are: Aegean, Iberia, Italy (Alpine belt), Great Britain, Switzerland).

<table>
<thead>
<tr>
<th>Type</th>
<th>RL</th>
<th>Number of earthquakes with M &gt; 5.8</th>
<th>%</th>
<th>N. of eq. in the NA4 reg.</th>
<th>% in the NA4 reg.</th>
<th>N. of eq. outside NA4 reg.</th>
<th>% outside NA4 reg.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Eq with MDPs</td>
<td>11</td>
<td>183</td>
<td>516</td>
<td>80.6</td>
<td>495</td>
<td>21</td>
<td>3.3</td>
</tr>
<tr>
<td></td>
<td>12</td>
<td>27</td>
<td></td>
<td></td>
<td></td>
<td>12</td>
<td>1.9</td>
</tr>
<tr>
<td></td>
<td>13</td>
<td>306</td>
<td></td>
<td></td>
<td></td>
<td>33</td>
<td>5.2</td>
</tr>
<tr>
<td></td>
<td>14</td>
<td>0</td>
<td></td>
<td></td>
<td></td>
<td>4</td>
<td>0.6</td>
</tr>
<tr>
<td>Eq. without MDPs</td>
<td>21</td>
<td>12</td>
<td>45</td>
<td>7.0</td>
<td>12</td>
<td>19</td>
<td>3.3</td>
</tr>
<tr>
<td>with a report, only</td>
<td>22</td>
<td>33</td>
<td></td>
<td></td>
<td></td>
<td>33</td>
<td>5.2</td>
</tr>
<tr>
<td>known from a parametric catalogue</td>
<td>31</td>
<td>75</td>
<td></td>
<td></td>
<td></td>
<td>58</td>
<td>9.1</td>
</tr>
<tr>
<td></td>
<td>32</td>
<td>4</td>
<td>79</td>
<td>12.3</td>
<td>21</td>
<td>3.3</td>
<td>58</td>
</tr>
<tr>
<td>Total</td>
<td>640</td>
<td>640</td>
<td>100</td>
<td>528</td>
<td>82.5</td>
<td>112</td>
<td>17.5</td>
</tr>
</tbody>
</table>

Figure 1. Geographical distribution of the earthquakes in the NA4 catalogue, according to their root level in the time-window 1000-1899.
For the time window 1900-1963 the procedure has been similar, with the addition that for this time-window also the instrumental datasets have been considered (see Deliverable D8). The number of earthquakes is 293. The relevant figures and data distribution are proposed in Tab. 2 and Fig. 2.

Table 2. Amount and percentage (over the total) of the entries according to their root level in the time-window 1900-1963.

<table>
<thead>
<tr>
<th>Type</th>
<th>RL</th>
<th>Number of earthquakes with M&gt;5.8</th>
<th>%</th>
<th>N. of eq in the NA4 reg.</th>
<th>% in the NA4 reg.</th>
<th>N. of eq. outside NA4 reg.</th>
<th>% outside NA4 reg.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Eq with MDPs</td>
<td>11</td>
<td>21</td>
<td>106</td>
<td>104</td>
<td>36.2</td>
<td>2</td>
<td>0.7</td>
</tr>
<tr>
<td></td>
<td>12</td>
<td>5</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>13</td>
<td>80</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>14</td>
<td>0</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Eq. without MDPs</td>
<td>21</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>with a report, only</td>
<td>22</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>known from a parametric catalogue</td>
<td>30</td>
<td>103</td>
<td>187</td>
<td>126</td>
<td>63.8</td>
<td>61</td>
<td>20.8</td>
</tr>
<tr>
<td></td>
<td>31</td>
<td>60</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>32</td>
<td>24</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Total</td>
<td>293</td>
<td>293</td>
<td>100</td>
<td>230</td>
<td>78.5</td>
<td>63</td>
<td>21.5</td>
</tr>
</tbody>
</table>

Figure 2. Geographical distribution of the earthquakes in the NA4 catalogue, according to their root level in the time-window 1900-1963.
As a whole, the NA4 catalogue 1000-1963, M > 5.8, contains 933 earthquakes; the distribution of the entries per root level is presented in Tab. 3 and Fig. 3.

Table 3. Total amount and percentage (over the total) of the entries according to their root level in the time-window 1000-1963.

<table>
<thead>
<tr>
<th>Type</th>
<th>RL</th>
<th>Number of earthquakes with M &gt; 5.8</th>
<th>%</th>
<th>N. of eq in the NA4 reg.</th>
<th>% in the NA4 reg.</th>
<th>N. of eq. outside NA4 reg.</th>
<th>% outside NA4 reg.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Eq with MDPs</td>
<td>11</td>
<td>204</td>
<td>66.8</td>
<td>599</td>
<td>64.2</td>
<td>23</td>
<td>2.5</td>
</tr>
<tr>
<td></td>
<td>12</td>
<td>32</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>13</td>
<td>386</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>14</td>
<td>0</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Eq. without MDPs</td>
<td>21</td>
<td>12</td>
<td>4.8</td>
<td>12</td>
<td>1.3</td>
<td>33</td>
<td>3.5</td>
</tr>
<tr>
<td>with a report, only</td>
<td>22</td>
<td>33</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>known from a parametric catalogue</td>
<td>30</td>
<td>103</td>
<td>28.4</td>
<td>147</td>
<td>15.8</td>
<td>119</td>
<td>12.8</td>
</tr>
<tr>
<td></td>
<td>31</td>
<td>135</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>32</td>
<td>28</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Total</td>
<td></td>
<td>933</td>
<td>100</td>
<td>758</td>
<td>81.2</td>
<td>175</td>
<td>18.8</td>
</tr>
</tbody>
</table>

Figure 3. Geographical distribution of the earthquakes in the NA4 catalogue, according to their root level in the time-window 1000-1963.

In the following we describe the criteria adopted for assessing the parameters, with reference to the type of root.
2. Events with MDPs
The parameters of the 622 earthquakes whose roots have MDPs have been determined with three methods based on the use of macroseismic data points: i) Boxer (Gasperini et al., 1999); ii) MEEP, developed within NA4 (see Deliverable D3); iii) BW, proposed by Bakun and Wentworth (1997). The MEEP software has been improved in 2010 with the addition of a “bootstrap” procedure, now allowing to supply a measure of uncertainty.

2a. NA4 Regions. The coefficients of each method have been first calibrated in the five NA4 regions (Deliverable D5 – part 1): Aegean, Iberia, Italy (Alpine belt), Great Britain, Switzerland. The input consists of several events with good instrumental parameters and good MDPs, collected and validated in a homogeneous format. The calibration and validation procedures described in Deliverable D5 have been revised in 2010, after the first phase of application to the historical earthquakes. Special attention has been devoted to: i) adopting the most suitable conversion of the “inappropriate” intensity assessments (F, D, etc.); ii) comparing different calibration coefficients for each method and selecting the most reliable one; iii) ensure the consistency among the results of the three methods in the case of events with one MDP, only; etc. The new coefficients are reported in App. 1.

The coefficients were then applied to 599 earthquakes in the five regions, that is, to about 67% of the events (Fig. 4). Special attention has been devoted to earthquakes with one or few MDPs, only.

![Figure 4. Geographical distribution of the earthquakes processed using the coefficients of the five NA4 regions.](image)
The Boxer method determines Mw with the Sibol model when the number and the distribution of MDPs is sufficiently good; in the other cases it supplies Mw determined from Io according to a Mw(Io) relation the coefficients of which, shown in App. 1, also come from the calibration procedure. Boxer determines Io for all the events: therefore, we have decided to compute Mw(Io) for all events, in addition to the three Mw values from the three methods and with the exception of the clearly offshore events.

Some results are presented in Figures 5 and 6. Although the dispersion looks high in some cases and some improvements in the calibration might be needed, such dispersion seems to represent, in a way clearer than ever, the epistemic uncertainty connected with the process. Results are also compared with the Mw values provided by the current parametric catalogues or derived from them. It can be seen that in most cases the current values seem higher than the average values obtained within this initiative.

The complete set of results is available at http://emidius.mi.ingv.it/neries_NA4/.

---

Figure 5a - Aegean area: plot of Mw values determined from MDPs compared with those from Papazachos & P., 2003.
### Figure 5b - Swiss area: plot of Mw values determined from MDPs compared with those from ECOS, 2002

### Figure 6a. Earthquake of 1804.08.25 (Iberian area). Full set of parameters.
2b. Earthquakes outside the NA4 regions. An attempt has been performed to calibrate the three methods in the Stable Continental Region, including France, Germany, Scandinavia, Poland, Slovakia, Hungary, Czech Republic and Lower Austria. The epicentres of the earthquakes used for calibration (including some from the NA4 UK area) are presented in Fig. 7. Results in terms of Mw are presented in Fig. 8.
Figure 8 – Stable Continental Region: plot of $M_w$ values determined from MDPs for the events of Figure 7, compared with the instrumental ones and those taken from CENEC (Grünthal et al., 2009).

The relevant coefficients have then been used for processing the earthquakes in Fig. 9. Some results are shown in Fig. 10. and Fig. 11.

As the definition of the attenuation regions is far from being precise, events which may belong to two bordering regions have been processed according to two calibrations.

For the Vrancea earthquakes no calibration is so far available, owing to a lack of sufficient events with both macroseismic and instrumental data.

Figure 9. Earthquakes possibly belonging to Stable Continental Region and to Vrancea. Squares with two colors indicate events processed according to two calibrations.
Figure 10 – Stable Continental Region: plot of Mw values determined from MDPs for some of the relevant events of Fig. 9, compared with those taken from CENEC (Grünthal et al., 2009).

Figure 11 – Earthquake of 1756.02.18 (Düren area); complete set of parameters.
3. Events without MDPs
The events of this type are 311 (Tab. 3 and Fig. 3). For these events the parameters are to be assessed by expert judgment, on the basis of the information provided by the root, if any.

Events with some background information. There are 45 events with a root of type 2, that is, with some explicit background information. In such cases the parameters from the current catalogues have been considered and a comment has been added to assess whether the background information supports the current parameters or whether it suggests some changes.

Fig. 12 supplies an example of an earthquake at the border between today Poland and Slovakia, the location of which is coherent with the source, while Mw shows some uncertainty.

![Figure 12](image)

In this case the comment is:

"The epicentre provided by Pagaczewski (1972) seems reliable. As for magnitude, the compiler assessed $I_0 = 7-8$ and $h = 40$ km, based on the area over which the earthquake was felt; on the basis of this CENEC provides Mw 5.7. Considering the highest intensity data points from the map ($I = 7$), Boxer would assess $I_0 = 7$. With the Mw($I_0$) relationship for Stable Continental Region we obtain $M_w = 5.00 \pm 0.13$; this value has to be considered as the lowest Mw limit."

Events taken from other parametric catalogues. There are further 266 events known from a parametric catalogue, only. Out of them, 135 come from catalogues supplying references and, therefore, can be investigated further, in principle at least; 28 come from catalogues that do not supply references. Additionally, 103 entries in the time-window 1900-1963 come from instrumental catalogues (mostly Makropoulos et al., 1992).

For such events there are two alternatives only; a) to search for some background information; b) to select the most reliable set of parameters, according to some rule.

Figure 13 and 14 provide two examples of case a). In the case of the 1571, Romania event (Fig. 13), the only available information comes from Transylvania, although it is far from being exhaustive. Three compilers propose varied solutions for location and magnitude. In this case the comment is:

"Contradictory location and size. This is a typical case of an event that in principle could have been originated either in Transylvania or in the Vrancea area. As all the data come from Transylvania the epicentre by Shebalin et al. (1974) seem more reliable. With $I_0 = 8$, we obtain: $M_w = 5.62 \pm 0.34$ (Alp. belt) $M_w = 5.75 \pm 0.13$ (Stable cont.)."
In the case of the 1280, Zadar (Dalmatia) earthquake a quick investigation showed that the effects were probably overestimated (Fig. 14).

**Fig. 13** – Contradictory locations and magnitude for the 1571 earthquake in Romania, and background information retrieved.

**Fig. 14** – Parameters of the 1280 earthquake at Zadar and background information retrieved.
In this case the comment is:

“For this earthquake a change of date to 1280 April 05 is proposed. The source tells nothing more than that an earthquake strongly felt in Zadar (I = 5 EMS98 at Zadar ?). The event is either to be located offshore (Mw ≤ 6) or near Zadar (Mw ≤ 4.5)”.

4. Structure of NA4 EEC

The availability of multiple determinations for the same event, and the lack of criteria for assessing the “best” one, prompted the building of a catalogue containing all the available parameters.

Actually, as for lat, lon, depth, Mw, Io and related uncertainties, most traditional and current earthquake catalogues supply only one set of such parameters for each event, with little or no reference to the background data and to the methods according to which they have been processed.

In contrast, the NA4 catalogue supplies several values of such parameters, derived from:

a) the three methods described above (BW, Boxer, MEEP), using the adopted calibration coefficients;

b) Io, in the case of Mw(Io);

c) from expert judgment (case of events of type 2 and 3);

d) from selected set of instrumental parameters (for 80 events, in addition to the 103 ones for which instrumental parameters only are available).

In addition, the parameters taken from the most reliable parametric catalogue(s) of the relevant area are also compiled, as a reference. The synthetic format of NA4 EEC is given in Table 1. The complete format is given in App. 2, with the parameters of three events as examples.

Table 1 – Synthetic format of NA4 EEC.

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Description</th>
<th>From</th>
</tr>
</thead>
<tbody>
<tr>
<td>Time</td>
<td>Year, month, day, etc.</td>
<td>NA4 inventory</td>
</tr>
<tr>
<td>Macroseismic data</td>
<td>Area of Imax, data source, Nr of MDPs, Imax</td>
<td>NA4 inventory</td>
</tr>
<tr>
<td>From MDPs: Boxer</td>
<td>Lat, Lon, Io, Mw, unc.</td>
<td>Boxer, relev. calibr.</td>
</tr>
<tr>
<td>From MDPs: Bakun &amp; W.</td>
<td>Lat, Lon, Mw, unc.</td>
<td>Bakun &amp; W., relev. calibr.</td>
</tr>
<tr>
<td>From MDPs: MEEP</td>
<td>Lat, Lon, depth, Mw, unc.</td>
<td>MEEP, relev. calibr.</td>
</tr>
<tr>
<td>From Io</td>
<td>Mw = f(Io), unc.</td>
<td>Io, relev. Mw(Io) relat.</td>
</tr>
<tr>
<td>From studies w/o MDPs</td>
<td>Lat, Lon, depth, Io, Mw, unc.,</td>
<td>Expert judgement</td>
</tr>
<tr>
<td>Instrumental</td>
<td>Source, Lat, Lon, depth, Mw, type of Mw</td>
<td>Instrum. catalogues</td>
</tr>
<tr>
<td>Current eq. par. (1)</td>
<td>Source cat. 1, Lat, Lon, Io, Mw, unc., type of Mw</td>
<td>Parametric catalogue 1</td>
</tr>
<tr>
<td>Current eq. par. (2, opt.)</td>
<td>Source cat. 2, Lat, Lon, Io, Mw, unc., type of Mw</td>
<td>Parametric catalogue 2</td>
</tr>
<tr>
<td>Comment</td>
<td>Overall comment</td>
<td>EEC contributors</td>
</tr>
</tbody>
</table>

NA4 EEC is available at [http://emidius.mi.ingv.it/neries_NA4/catalogue/](http://emidius.mi.ingv.it/neries_NA4/catalogue/) where the basic data are shown (Fig. 15) and the parameters are found on the map obtainable by clicking on the corresponding symbol in the EEC column (Fig 16).
Fig. 15 – Layout of the NA4 European Earthquake Catalogue (EEC). Clicking on the globes of column EEC the map with the parameters appears (Fig. 16).

Fig. 16 – Layout of data and parameters for the earthquake of 1531 near Lisbon.
5. Hints for the users
As mentioned above, NA4 EEC does not indicate a preferred value of the parameters, does not propose weights and does not average the values. Although traditional users would prefer a catalogue with one “default” set of parameter values, only, such values usually neglect the epistemic uncertainty in the data. Just as practice in seismic hazard has had to come to terms with uncertainty in strong ground motion prediction, so now it is beginning to come to terms with uncertainty regarding seismicity. Thus, NA4 EEC prefers to show the inherent variability of the parameters, allowing users the ability to include this in models.

It is true, however, that the results to date show a large variability of cases, with reference to either the parameters determined by the three methods or their match, or mismatch, with the available catalogues. This is an inevitable issue with parameter determination from macroseismic data; where data sets are irregular (e.g. from offshore or coastal earthquakes) or simply poor, different procedures will react to the distribution of MDPs in different ways. To help the users, a first hand classification in term of a matrix based on the match of parameters determined by the three methods and their correlation with the ones from the available catalogues can be suggested (Tab. 2).

Table 2. - Definition of the EEC parameters class.

<table>
<thead>
<tr>
<th>Parameters from MDPs</th>
<th>good match</th>
<th>some not reliable</th>
<th>all different</th>
<th>mostly unreliable</th>
<th>not determined</th>
</tr>
</thead>
<tbody>
<tr>
<td>match with the avail. catalogues</td>
<td>A</td>
<td>B</td>
<td>C</td>
<td>D</td>
<td>E</td>
</tr>
<tr>
<td>good for all</td>
<td>1</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>good for some</td>
<td>2</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>not good for all</td>
<td>3</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>impossible (being determined by exp. judgment)</td>
<td>4</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

In the following some examples are illustrated (Fig. 17).

Figure 17a. – Example of parameters class A1.
The epicentral locations and the magnitude values according to all methods are in good agreement. Magnitudes are lower than the current one.

**Class: A2**

*Figure 17b. – Example of parameters class A2.*

All epicentral locations coincide with the only macroseismic datapoint; Mws are different. The current epicentre is located far from the datapoint probably according to expert judgement.

**Class: B4**

*Figure 17c. – Example of parameters class B4.*
Both the epicentral locations from MEEP and Boxer are similar to the current one; the epicentre from BW is out of the area of maximum intensities. Magnitudes from both MEEP and BW are very high, not reliable.

**Class: C3**

---

The obtained epicentres are quite different and, although off-shore (except Boxer), far from the different current locations. The obtained magnitudes are in good agreement but none of them is as high as the current one.

**Class: D4**

---

**Figure 17d. – Example of parameters class C3.**

**Figure 17e. – Example of parameters class D4.**
6. Conclusion
The NA4 European Earthquake Catalogue 1000-1963, M > 5.8, contains 933 events; for more than 600 of them the earthquake parameters have been determined with three methods based on the use of MDPs: i) Boxer (Gasperini et al., 1999); ii) MEEP, developed within NA4 (see Deliverable D3); iii) BW, proposed by Bakun and Wentworth (1997). The coefficients of these methods have been calibrated in six European regions according to homogeneous procedures. The corresponding dataset represents the result of the largest initiative ever performed, at European scale, to determine earthquake parameters according to homogeneous procedures.

Following the choice of supplying all determinations instead of indicating a preferred value, or averaging the values according to some weights, the catalogue has an innovative structure. The work can be continued as calibrations can be improved. In addition, earthquakes with M < 5.8, also inventoried in the frame of NA4, can be processed.

Part of this work will be performed in the frame of the EU project “SHARE” (Seismic Hazard Harmonization in Europe).

References
Instituto Geografico Nacional, 2010. Macroseismic data of Spanish earthquakes, compiled and made available to the public in the frame of the activities of the EU NERIES project, NA4 module "A Distributed Archive of Historical Earthquake Data". http://www.emidius.eu/IGN/
Thessaloniki Macroseismic Database, 2010. Macroseismic Data of the University of Thessaloniki, compiled and made available to the public in the frame of the activities of the EU NERIES project, NA4 module "A Distributed Archive of Historical Earthquake Data". http://www.emidius.eu/AUTH/
App. 1 - Relations and coefficients obtained from the calibration process or selected from the literature *(in yellow those adopted)*

### a. Aegean

<table>
<thead>
<tr>
<th>BW</th>
<th>Reg</th>
<th>Code</th>
<th>Source</th>
<th>Relation [I = I (Mw, D)]</th>
<th>st. dev.</th>
<th>Relation [Mw = Mw (I, D)]</th>
<th>h (km)</th>
</tr>
</thead>
<tbody>
<tr>
<td>AE</td>
<td>BWLit</td>
<td>Papazachos and Papaioannou (1997)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>MEEP</th>
<th>Q</th>
<th>C</th>
<th>alpha</th>
<th>K</th>
<th>Date</th>
<th>Comment</th>
</tr>
</thead>
<tbody>
<tr>
<td>AE</td>
<td>320</td>
<td>2.50</td>
<td>0.004</td>
<td>3.00</td>
<td>April 2009</td>
<td>Report NA4, April 2009</td>
</tr>
<tr>
<td>AE</td>
<td>410</td>
<td>2.54</td>
<td>0.009</td>
<td>2.70</td>
<td>March 2010</td>
<td>Gomez Capera</td>
</tr>
</tbody>
</table>

Note: dl to be used in the application: 0.5 and 2.0

### Boxer: Sibol Coefficients

<table>
<thead>
<tr>
<th>Intensity</th>
<th>Coeff. a</th>
<th>Coeff. B</th>
<th>Coeff. C</th>
<th>st. dev. of regr.</th>
<th>weight norm.</th>
<th>factor deg. of freedom of regr.</th>
<th>Date</th>
<th>Comment</th>
</tr>
</thead>
<tbody>
<tr>
<td>AE</td>
<td>2.0</td>
<td>1.37392</td>
<td>0.18275</td>
<td>0.00000</td>
<td>0.2195</td>
<td>16.2000</td>
<td>3</td>
<td>April 2009</td>
</tr>
<tr>
<td></td>
<td>3.0</td>
<td>3.16855</td>
<td>0.08826</td>
<td>0.01938</td>
<td>0.2584</td>
<td>51.1250</td>
<td>13</td>
<td></td>
</tr>
<tr>
<td></td>
<td>4.0</td>
<td>4.02939</td>
<td>0.06906</td>
<td>0.01615</td>
<td>0.2939</td>
<td>105.4706</td>
<td>14</td>
<td></td>
</tr>
<tr>
<td></td>
<td>5.0</td>
<td>5.08576</td>
<td>0.07371</td>
<td>0.00000</td>
<td>0.2345</td>
<td>53.3158</td>
<td>17</td>
<td></td>
</tr>
<tr>
<td></td>
<td>6.0</td>
<td>5.83892</td>
<td>0.04663</td>
<td>0.00000</td>
<td>0.2357</td>
<td>26.2308</td>
<td>11</td>
<td></td>
</tr>
<tr>
<td></td>
<td>7.0</td>
<td>6.10379</td>
<td>0.04030</td>
<td>0.00000</td>
<td>0.3406</td>
<td>19.1429</td>
<td>5</td>
<td></td>
</tr>
<tr>
<td></td>
<td>8.0</td>
<td>6.57308</td>
<td>0.00791</td>
<td>0.00000</td>
<td>0.4240</td>
<td>7.8000</td>
<td>3</td>
<td></td>
</tr>
<tr>
<td>AE</td>
<td>2.0</td>
<td>5.50000</td>
<td>0.00000</td>
<td>0.00000</td>
<td>0.0000</td>
<td>11.0000</td>
<td>0</td>
<td>March 2010</td>
</tr>
<tr>
<td></td>
<td>3.0</td>
<td>2.61421</td>
<td>0.15072</td>
<td>0.00000</td>
<td>0.2971</td>
<td>33.2857</td>
<td>12</td>
<td></td>
</tr>
<tr>
<td></td>
<td>4.0</td>
<td>2.98181</td>
<td>0.15889</td>
<td>0.00000</td>
<td>0.3528</td>
<td>72.7059</td>
<td>15</td>
<td></td>
</tr>
<tr>
<td></td>
<td>5.0</td>
<td>5.04675</td>
<td>0.07599</td>
<td>0.00000</td>
<td>0.2454</td>
<td>48.2500</td>
<td>14</td>
<td></td>
</tr>
<tr>
<td></td>
<td>6.0</td>
<td>5.77298</td>
<td>0.05020</td>
<td>0.00000</td>
<td>0.2157</td>
<td>30.8182</td>
<td>9</td>
<td></td>
</tr>
<tr>
<td></td>
<td>7.0</td>
<td>5.86321</td>
<td>0.05767</td>
<td>0.00000</td>
<td>0.3084</td>
<td>20.5000</td>
<td>4</td>
<td></td>
</tr>
<tr>
<td></td>
<td>8.0</td>
<td>7.39472</td>
<td>-0.07137</td>
<td>0.00000</td>
<td>0.3545</td>
<td>9.0000</td>
<td>2</td>
<td></td>
</tr>
<tr>
<td></td>
<td>9.0</td>
<td>6.70000</td>
<td>0.00000</td>
<td>0.00000</td>
<td>0.0000</td>
<td>0.0000</td>
<td>0</td>
<td></td>
</tr>
</tbody>
</table>

### Boxer: Mw(lo)

<table>
<thead>
<tr>
<th>Relation</th>
<th>St. dev.</th>
<th>Date</th>
<th>Comment</th>
</tr>
</thead>
<tbody>
<tr>
<td>AE</td>
<td>Mw = 4.517 + 0.242 lo</td>
<td></td>
<td></td>
</tr>
<tr>
<td>AE</td>
<td>Mw = 2.243 + 0.522 lo</td>
<td>0.34</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Relation</th>
<th>Date</th>
<th>Comment</th>
</tr>
</thead>
<tbody>
<tr>
<td>AE</td>
<td>April 2009</td>
<td>Report NA4, April 2009</td>
</tr>
<tr>
<td>AE</td>
<td>March 2010</td>
<td>Gomez Capera</td>
</tr>
</tbody>
</table>
### b. Iberia

#### BW

<table>
<thead>
<tr>
<th>Reg Code</th>
<th>Source</th>
<th>Relation ( I = I(Mw, D) )</th>
<th>st. dev.</th>
<th>Relation ( Mw = Mw(I, D) )</th>
<th>h (km)</th>
<th>Date</th>
<th>Comment</th>
</tr>
</thead>
<tbody>
<tr>
<td>IB BW(MI)</td>
<td>NA4</td>
<td>( I = 2.419 + 1.184^*Mw - 0.0003^<em>R - 2.564^</em>\log(R) )</td>
<td>0.60</td>
<td>( Mw = (I - 2.419 + 0.0003^<em>R + 2.564^</em>\log(R)) / 1.184 )</td>
<td>10</td>
<td>April 2009</td>
<td>Report NA4, April 2009</td>
</tr>
<tr>
<td>IB BW(MI)</td>
<td>NA4</td>
<td>( I = -0.544 + 1.98^*Mw - 0.0036^<em>R - 2.793^</em>\log(R) )</td>
<td>0.72</td>
<td>( Mw = (I + 0.544 + 0.0036^<em>R + 2.793^</em>\log(R)) / 1.98 )</td>
<td>10</td>
<td>March 2010</td>
<td>Gomez Capera</td>
</tr>
</tbody>
</table>

#### MEEP

<table>
<thead>
<tr>
<th>Q</th>
<th>C</th>
<th>alpha</th>
<th>K</th>
<th>Date</th>
<th>Comment</th>
</tr>
</thead>
<tbody>
<tr>
<td>IB</td>
<td>950</td>
<td>2.38</td>
<td>0.003</td>
<td>3.30</td>
<td>April 2009 Report NA4, April 2009</td>
</tr>
<tr>
<td>IB</td>
<td>700</td>
<td>2.32</td>
<td>0.009</td>
<td>1.90</td>
<td>Sept. 2009 Batllo</td>
</tr>
<tr>
<td>IB</td>
<td>600</td>
<td>2.62</td>
<td>0.005</td>
<td>7.80</td>
<td>March 2010 Tatevosian</td>
</tr>
<tr>
<td>IB</td>
<td>850</td>
<td>2.33</td>
<td>0.004</td>
<td>2.10</td>
<td>March 2010 Batllo/Alves</td>
</tr>
<tr>
<td>IB</td>
<td>620</td>
<td>2.33</td>
<td>0.004</td>
<td>3.70</td>
<td>April 2010 Batllo/Alves</td>
</tr>
</tbody>
</table>

**Note:** \( dI \) to be used in the application: 0.1 and 2.0

#### Boxer: Sibol Coefficients

<table>
<thead>
<tr>
<th>Intensity</th>
<th>Coeff. a</th>
<th>Coeff. B</th>
<th>Coeff. C</th>
<th>st. dev. of regr.</th>
<th>weight norm. factor</th>
<th>deg. of freedom of regr.</th>
<th>Date</th>
<th>Comment</th>
</tr>
</thead>
<tbody>
<tr>
<td>IB 2.0</td>
<td>2.90825</td>
<td>0.07783</td>
<td>0.00000</td>
<td>0.2412</td>
<td>22.5000</td>
<td>16</td>
<td>April 2009 Report NA4, April 2009</td>
<td></td>
</tr>
<tr>
<td>3.0</td>
<td>3.38110</td>
<td>0.07073</td>
<td>0.00000</td>
<td>0.2512</td>
<td>20.4211</td>
<td>17</td>
<td></td>
<td></td>
</tr>
<tr>
<td>4.0</td>
<td>2.89200</td>
<td>0.04926</td>
<td>0.04067</td>
<td>0.1813</td>
<td>24.0833</td>
<td>9</td>
<td></td>
<td></td>
</tr>
<tr>
<td>5.0</td>
<td>4.97347</td>
<td>0.06432</td>
<td>-0.01335</td>
<td>0.0000</td>
<td>18.6667</td>
<td>0</td>
<td></td>
<td></td>
</tr>
<tr>
<td>IB 2.0</td>
<td>2.85938</td>
<td>0.06310</td>
<td>0.01302</td>
<td>0.2187</td>
<td>19.5882</td>
<td>14</td>
<td>April 2010 Gomez Capera</td>
<td></td>
</tr>
<tr>
<td>3.0</td>
<td>3.07089</td>
<td>0.07889</td>
<td>0.00759</td>
<td>0.2185</td>
<td>18.8889</td>
<td>15</td>
<td></td>
<td></td>
</tr>
<tr>
<td>4.0</td>
<td>3.29328</td>
<td>0.10437</td>
<td>0.00000</td>
<td>0.1680</td>
<td>59.3333</td>
<td>13</td>
<td></td>
<td></td>
</tr>
<tr>
<td>5.0</td>
<td>4.02975</td>
<td>0.08854</td>
<td>0.00000</td>
<td>0.1466</td>
<td>42.2857</td>
<td>5</td>
<td></td>
<td></td>
</tr>
<tr>
<td>6.0</td>
<td>4.20781</td>
<td>0.13788</td>
<td>-0.00967</td>
<td>0.0000</td>
<td>46.6667</td>
<td>0</td>
<td></td>
<td></td>
</tr>
<tr>
<td>7.0</td>
<td>4.19353</td>
<td>0.12244</td>
<td>0.00000</td>
<td>0.0000</td>
<td>26.5000</td>
<td>0</td>
<td></td>
<td></td>
</tr>
<tr>
<td>8.0</td>
<td>4.66038</td>
<td>0.08430</td>
<td>0.01049</td>
<td>0.1749</td>
<td>40.1500</td>
<td>17</td>
<td></td>
<td></td>
</tr>
<tr>
<td>9.0</td>
<td>5.63151</td>
<td>0.14275</td>
<td>0.00000</td>
<td>0.2246</td>
<td>22.6250</td>
<td>6</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

#### Boxer: Mw(lo)

<table>
<thead>
<tr>
<th>Relation</th>
<th>St. dev.</th>
<th>Date</th>
<th>Comment</th>
</tr>
</thead>
<tbody>
<tr>
<td>IB Mw = 7.950 - 0.450 lo</td>
<td>April 2009</td>
<td>Report NA4, April 2009</td>
<td></td>
</tr>
<tr>
<td>IB Mw = 2.080 + 0.465 lo</td>
<td>0.35</td>
<td>Sept. 2009</td>
<td>Gomez Capera</td>
</tr>
<tr>
<td>IB Mw = 2.826 + 0.349 lo</td>
<td>0.25</td>
<td>March 2010</td>
<td>Gomez Capera</td>
</tr>
</tbody>
</table>
## C. Italy

### BW

<table>
<thead>
<tr>
<th>Reg</th>
<th>Code</th>
<th>Source</th>
<th>Relation [I = I (Mw, D)]</th>
<th>st. dev.</th>
<th>Relation [Mw = Mw (I, D)]</th>
<th>h (km)</th>
<th>Date</th>
<th>Comment</th>
</tr>
</thead>
<tbody>
<tr>
<td>IT</td>
<td>BW(Lit)</td>
<td>Pasolini et al., 2008</td>
<td>[I = 5.862 + 2.460 \times Mw - 0.0086 \times (R - h) - 1.037 \times \ln(R) - \ln(h)]</td>
<td>0.87</td>
<td>[Mw = (I - 5.862 + 0.0086 \times (R - h) + 1.037 \times \ln(R) - \ln(h)) / 2.460]</td>
<td>3.91</td>
<td>April 2009</td>
<td>Report NA4, April 2009</td>
</tr>
<tr>
<td>IT</td>
<td>BW(Lit)</td>
<td>Gomez Capera</td>
<td>[I = 2.343 + 1.346 \times Mw - 2.865 \times \log(x)]</td>
<td>0.72</td>
<td>[Mw = (I - 2.343 + 2.865 \times \log(x)) / 1.346]</td>
<td>-</td>
<td>August 2008</td>
<td>Used only for offshore events</td>
</tr>
<tr>
<td>IT</td>
<td>BW(MI)</td>
<td>NA4</td>
<td>[I = 2.181 + 1.654 \times Mw - 0.011 \times R - 3.252 \times \log(R)]</td>
<td>0.64</td>
<td>[Mw = (I - 2.181 + 0.011 \times R + 3.252 \times \log(R)) / 1.654]</td>
<td>10</td>
<td>April 2009</td>
<td>Report NA4, April 2009</td>
</tr>
</tbody>
</table>

### MEEP

<table>
<thead>
<tr>
<th>Q</th>
<th>C</th>
<th>alpha</th>
<th>K</th>
<th>Date</th>
<th>Comment</th>
</tr>
</thead>
<tbody>
<tr>
<td>IT</td>
<td>300</td>
<td>1.50</td>
<td>0.009</td>
<td>2.10 April 2009</td>
<td>Report NA4, April 2009</td>
</tr>
</tbody>
</table>

**Note:** \(dI\) to be used in the application: 0.1 and 2.0

### Boxer: Sibol Coefficients

<table>
<thead>
<tr>
<th>Intensity</th>
<th>Coeff. a</th>
<th>Coeff. B</th>
<th>Coeff. C</th>
<th>st. dev. of regr.</th>
<th>weight norm. factor</th>
<th>deg. of freedom of regr.</th>
<th>Date</th>
<th>Comment</th>
</tr>
</thead>
<tbody>
<tr>
<td>IT</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>2.0</td>
<td>2.72168</td>
<td>0.06502</td>
<td>0.02294</td>
<td>0.2543</td>
<td>18.5385</td>
<td>10</td>
<td>April 2009</td>
<td>Report NA4, April 2009</td>
</tr>
<tr>
<td>3.0</td>
<td>2.91254</td>
<td>0.05820</td>
<td>0.02368</td>
<td>0.2919</td>
<td>55.7222</td>
<td>15</td>
<td></td>
<td></td>
</tr>
<tr>
<td>3.9</td>
<td>25.81147</td>
<td>-0.86902</td>
<td>0.00000</td>
<td>0.0000</td>
<td>7.0000</td>
<td>0</td>
<td></td>
<td></td>
</tr>
<tr>
<td>4.0</td>
<td>2.66605</td>
<td>0.15810</td>
<td>0.00000</td>
<td>0.2011</td>
<td>88.8889</td>
<td>16</td>
<td></td>
<td></td>
</tr>
<tr>
<td>5.0</td>
<td>3.72208</td>
<td>0.03952</td>
<td>0.02307</td>
<td>0.2298</td>
<td>73.8125</td>
<td>13</td>
<td></td>
<td></td>
</tr>
<tr>
<td>6.0</td>
<td>4.29467</td>
<td>0.00505</td>
<td>0.02452</td>
<td>0.1619</td>
<td>120.7143</td>
<td>4</td>
<td></td>
<td></td>
</tr>
<tr>
<td>7.0</td>
<td>4.45819</td>
<td>0.15915</td>
<td>0.00000</td>
<td>0.2482</td>
<td>117.0000</td>
<td>4</td>
<td></td>
<td></td>
</tr>
<tr>
<td>8.0</td>
<td>3.66031</td>
<td>0.19864</td>
<td>0.00884</td>
<td>0.0000</td>
<td>86.6667</td>
<td>0</td>
<td></td>
<td></td>
</tr>
<tr>
<td>9.0</td>
<td>5.14999</td>
<td>0.23878</td>
<td>0.00000</td>
<td>0.0000</td>
<td>16.5000</td>
<td>0</td>
<td></td>
<td></td>
</tr>
<tr>
<td>IT</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>2.0</td>
<td>3.14332</td>
<td>0.0680</td>
<td>0.01442</td>
<td>0.2739</td>
<td>11.4946</td>
<td>90</td>
<td>March 2010</td>
<td>CPTI04</td>
</tr>
<tr>
<td>2.50</td>
<td>3.35407</td>
<td>0.0549</td>
<td>0.01611</td>
<td>0.2460</td>
<td>11.9048</td>
<td>60</td>
<td></td>
<td></td>
</tr>
<tr>
<td>3.0</td>
<td>3.36459</td>
<td>0.0541</td>
<td>0.01698</td>
<td>0.2753</td>
<td>20.7390</td>
<td>246</td>
<td></td>
<td></td>
</tr>
<tr>
<td>3.50</td>
<td>3.44765</td>
<td>0.0491</td>
<td>0.01776</td>
<td>0.2852</td>
<td>18.4626</td>
<td>144</td>
<td></td>
<td></td>
</tr>
<tr>
<td>4.0</td>
<td>3.32285</td>
<td>0.0597</td>
<td>0.01816</td>
<td>0.2633</td>
<td>25.2230</td>
<td>284</td>
<td></td>
<td></td>
</tr>
<tr>
<td>4.50</td>
<td>3.40390</td>
<td>0.0529</td>
<td>0.02044</td>
<td>0.2876</td>
<td>25.7730</td>
<td>138</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
### Boxer: Sibol Coefficients

<table>
<thead>
<tr>
<th>Intensity</th>
<th>Coeff. a</th>
<th>Coeff. B</th>
<th>Coeff. C</th>
<th>st. dev. of regr.</th>
<th>weight norm. factor</th>
<th>deg. of freedom of regr.</th>
<th>Date</th>
<th>Comment</th>
</tr>
</thead>
<tbody>
<tr>
<td>4.60</td>
<td>3.31972</td>
<td>0.0597</td>
<td>0.01877</td>
<td>0.2713</td>
<td>10.4848</td>
<td>30</td>
<td></td>
<td></td>
</tr>
<tr>
<td>5.00</td>
<td>3.44807</td>
<td>0.0703</td>
<td>0.01695</td>
<td>0.2754</td>
<td>27.6503</td>
<td>180</td>
<td></td>
<td></td>
</tr>
<tr>
<td>5.50</td>
<td>3.83897</td>
<td>0.0679</td>
<td>0.01340</td>
<td>0.3201</td>
<td>20.4179</td>
<td>64</td>
<td></td>
<td></td>
</tr>
<tr>
<td>6.00</td>
<td>4.02290</td>
<td>0.0437</td>
<td>0.01714</td>
<td>0.3620</td>
<td>30.4457</td>
<td>89</td>
<td></td>
<td></td>
</tr>
<tr>
<td>6.50</td>
<td>3.89861</td>
<td>0.0614</td>
<td>0.01664</td>
<td>0.3428</td>
<td>25.8333</td>
<td>51</td>
<td></td>
<td></td>
</tr>
<tr>
<td>7.00</td>
<td>3.96195</td>
<td>0.0506</td>
<td>0.01904</td>
<td>0.3144</td>
<td>42.1273</td>
<td>52</td>
<td></td>
<td></td>
</tr>
<tr>
<td>7.50</td>
<td>4.50698</td>
<td>0.0816</td>
<td>0.01049</td>
<td>0.2558</td>
<td>30.8077</td>
<td>23</td>
<td></td>
<td></td>
</tr>
<tr>
<td>8.00</td>
<td>4.66038</td>
<td>0.0843</td>
<td>0.01049</td>
<td>0.1749</td>
<td>40.1500</td>
<td>17</td>
<td></td>
<td></td>
</tr>
<tr>
<td>8.50</td>
<td>5.92602</td>
<td>0.0912</td>
<td>0.00000</td>
<td>0.1973</td>
<td>29.8750</td>
<td>6</td>
<td></td>
<td></td>
</tr>
<tr>
<td>9.00</td>
<td>5.63151</td>
<td>0.1427</td>
<td>0.00000</td>
<td>0.2246</td>
<td>22.6250</td>
<td>6</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

### Boxer: Mw(Io)

<table>
<thead>
<tr>
<th>Relation</th>
<th>St. dev.</th>
<th>Date</th>
<th>Comment</th>
</tr>
</thead>
<tbody>
<tr>
<td>IT</td>
<td>Mw = 1.831 + 0.500 Io</td>
<td>0.34 April 2009</td>
<td>Report NA4, April 2009</td>
</tr>
<tr>
<td>IT</td>
<td>Mw = 2.18 + 0.430 Io</td>
<td>0.34 March 2010</td>
<td>CPTI04</td>
</tr>
</tbody>
</table>
d. Switzerland

<table>
<thead>
<tr>
<th>Reg Code</th>
<th>Source</th>
<th>Relation [I = I (Mw, D)]</th>
<th>st. dev.</th>
<th>Relation [Mw = Mw (I, D)]</th>
<th>h (km)</th>
<th>Date</th>
<th>Comment</th>
</tr>
</thead>
<tbody>
<tr>
<td>CH</td>
<td>BW(MI)</td>
<td>NA4</td>
<td>0.78</td>
<td>Mw=(I-0.094+0.0007<em>R+3.057</em>log(R))/1.93</td>
<td>10</td>
<td>April 2009</td>
<td>Report NA4, April 2009</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Q</th>
<th>C</th>
<th>alpha</th>
<th>K</th>
<th>Date</th>
<th>Comment</th>
</tr>
</thead>
<tbody>
<tr>
<td>CH</td>
<td>1800</td>
<td>2.58</td>
<td>0.001</td>
<td>2.80</td>
<td>April 2009</td>
</tr>
<tr>
<td>CH</td>
<td>2280</td>
<td>2.61</td>
<td>0.002</td>
<td>1.7</td>
<td>March 2010</td>
</tr>
</tbody>
</table>

Note: dl to be used in the application: 0.1 and 1.0

<table>
<thead>
<tr>
<th>Intensity</th>
<th>Coeff. a</th>
<th>Coeff. B</th>
<th>Coeff. C</th>
<th>st. dev. of regr.</th>
<th>weight norm. factor</th>
<th>deg. of freedom of regr.</th>
<th>Date</th>
<th>Comment</th>
</tr>
</thead>
<tbody>
<tr>
<td>CH 2.0</td>
<td>3.78845</td>
<td>0.04826</td>
<td>0.00000</td>
<td>0.3610</td>
<td>21.8000</td>
<td>8</td>
<td>April 2009</td>
<td>Report NA4, April 2009</td>
</tr>
<tr>
<td>3.0</td>
<td>3.78522</td>
<td>0.06349</td>
<td>0.00000</td>
<td>0.2764</td>
<td>42.2308</td>
<td>11</td>
<td></td>
<td></td>
</tr>
<tr>
<td>4.0</td>
<td>3.68597</td>
<td>0.08364</td>
<td>0.00000</td>
<td>0.3413</td>
<td>57.5882</td>
<td>15</td>
<td></td>
<td></td>
</tr>
<tr>
<td>5.0</td>
<td>4.44374</td>
<td>0.06161</td>
<td>0.00000</td>
<td>0.2007</td>
<td>73.1000</td>
<td>8</td>
<td></td>
<td></td>
</tr>
<tr>
<td>6.0</td>
<td>4.97757</td>
<td>0.04223</td>
<td>0.00000</td>
<td>0.2751</td>
<td>33.0000</td>
<td>2</td>
<td></td>
<td></td>
</tr>
<tr>
<td>7.0</td>
<td>3.33181</td>
<td>0.25350</td>
<td>0.00000</td>
<td>0.0000</td>
<td>29.0000</td>
<td>0</td>
<td>March 2010</td>
<td>Gomez Capera</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Mw(lo)</th>
<th>Relation</th>
<th>St. dev.</th>
<th>Date</th>
<th>Comment</th>
</tr>
</thead>
<tbody>
<tr>
<td>CH</td>
<td>Mw = 3.835 + 0.190*lo</td>
<td>0.23</td>
<td>April 2009</td>
<td>Report NA4, April 2009</td>
</tr>
<tr>
<td>CH</td>
<td>Mw = 1.600 + 0.531*lo</td>
<td>0.23</td>
<td>January 2010</td>
<td>Gomez Capera</td>
</tr>
</tbody>
</table>
### e. Great Britain

#### BW

<table>
<thead>
<tr>
<th>Reg Code</th>
<th>Source</th>
<th>Relation [I = I (Mw, D)]</th>
<th>st. dev.</th>
<th>Relation [Mw = Mw (I, D)]</th>
<th>h (km)</th>
<th>Date</th>
<th>Comment</th>
</tr>
</thead>
<tbody>
<tr>
<td>UK BW(Ic3)</td>
<td>NA4_Ic3</td>
<td>$M_w = 0.874<em>I + 0.497</em>\ln(R) + 0.00034*R - 1.453$</td>
<td>0.45</td>
<td>$ML = (1 - 3.31 + 1.22*\ln(R))/1.28$</td>
<td>0.45</td>
<td>2009 April</td>
<td>Report NA4, April 2009</td>
</tr>
<tr>
<td>UK BW(Ic3)</td>
<td>NA4_Ic3</td>
<td>$I = 0.17 + 1.54<em>M_w - 0.016</em>R - 0.585*\log(R)$</td>
<td>0.66</td>
<td>$M_w = (I - 0.17 + 0.016<em>R + 0.585</em>\log(R))/1.54$</td>
<td>3.5</td>
<td>2010 March</td>
<td>Gomez Capera</td>
</tr>
<tr>
<td>UK BWLt</td>
<td>Musson, 2005</td>
<td></td>
<td>0.45</td>
<td>$ML = (1 - 3.31 + 1.22*\ln(R))/1.28$</td>
<td>0.45</td>
<td>2009 April</td>
<td>Report NA4, April 2009</td>
</tr>
<tr>
<td>UK BW(Ic3)</td>
<td>NA4_Ic3</td>
<td>$I = 0.17 + 1.54<em>M_w - 0.016</em>R - 0.585*\log(R)$</td>
<td>0.66</td>
<td>$M_w = (I - 0.17 + 0.016<em>R + 0.585</em>\log(R))/1.54$</td>
<td>3.5</td>
<td>2010 March</td>
<td>Gomez Capera</td>
</tr>
</tbody>
</table>

#### MEEP

<table>
<thead>
<tr>
<th>Q</th>
<th>C</th>
<th>alpha</th>
<th>K</th>
<th>Date</th>
<th>Comment</th>
</tr>
</thead>
<tbody>
<tr>
<td>UK</td>
<td>720</td>
<td>1.57</td>
<td>0.003</td>
<td>7.20</td>
<td>April 2009 Report NA4, April 2009</td>
</tr>
<tr>
<td>UK</td>
<td>665</td>
<td>1.37</td>
<td>0.003</td>
<td>2.70</td>
<td>March 2010 MEEP 2.0 User Guide</td>
</tr>
</tbody>
</table>

**Note:** dl to be used in the application: 0.1 and 1.0

#### Boxer: Sibol Coefficients

<table>
<thead>
<tr>
<th>Intensity</th>
<th>Coeff. a</th>
<th>Coeff. B</th>
<th>Coeff. C</th>
<th>st. dev. of regr.</th>
<th>weight norm. factor</th>
<th>deg. of freedom of regr.</th>
<th>Date</th>
<th>Comment</th>
</tr>
</thead>
<tbody>
<tr>
<td>UK</td>
<td>2.0</td>
<td>1.78417</td>
<td>0.06393</td>
<td>0.02404</td>
<td>0.0068</td>
<td>6.2500</td>
<td>1</td>
<td>April 2009 Report NA4, April 2009</td>
</tr>
<tr>
<td></td>
<td>3.0</td>
<td>2.11746</td>
<td>0.09871</td>
<td>0.00000</td>
<td>0.1167</td>
<td>52.8462</td>
<td>11</td>
<td></td>
</tr>
<tr>
<td></td>
<td>4.0</td>
<td>2.41146</td>
<td>0.10227</td>
<td>0.00000</td>
<td>0.1411</td>
<td>87.6000</td>
<td>13</td>
<td></td>
</tr>
<tr>
<td></td>
<td>5.0</td>
<td>3.57644</td>
<td>0.06216</td>
<td>0.00000</td>
<td>0.2052</td>
<td>121.6000</td>
<td>3</td>
<td></td>
</tr>
<tr>
<td></td>
<td>6.0</td>
<td>4.40412</td>
<td>0.00005</td>
<td>0.00000</td>
<td>0.1426</td>
<td>30.3333</td>
<td>1</td>
<td>March 2010 Gomez Capera</td>
</tr>
</tbody>
</table>

#### Relation

<table>
<thead>
<tr>
<th>Relation</th>
<th>St. dev.</th>
<th>Date</th>
<th>Comment</th>
</tr>
</thead>
<tbody>
<tr>
<td>UK</td>
<td>$M_w = 0.330 + 0.667 I_o$</td>
<td>April 2009</td>
<td>Report NA4, April 2009</td>
</tr>
<tr>
<td>UK</td>
<td>$M_w = 0.135 + 0.649 I_o$</td>
<td>0.41</td>
<td>March 2010 Gomez Capera</td>
</tr>
</tbody>
</table>
f. Stable continental regions

<table>
<thead>
<tr>
<th>Reg Code</th>
<th>Source</th>
<th>Relation [I = I (Mw, D)]</th>
<th>st. dev.</th>
<th>Relation [Mw = Mw (I, D)]</th>
<th>h (km)</th>
<th>Date</th>
<th>Comment</th>
</tr>
</thead>
<tbody>
<tr>
<td>SCR</td>
<td>BW(MI)</td>
<td>I = 3.414 + 1.287<em>Mw - 0.0020</em>R - 2.363*log(R)</td>
<td>0.58</td>
<td>Mw = (I - 3.414 + 0.0020<em>R + 2.363</em>log(R))/1.287</td>
<td>10</td>
<td>June 2010</td>
<td>Gomez Capera</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Q</th>
<th>C</th>
<th>alpha</th>
<th>K</th>
<th>Date</th>
<th>Comment</th>
</tr>
</thead>
<tbody>
<tr>
<td>625</td>
<td>1.36</td>
<td>0.008</td>
<td>2.00</td>
<td>June 2010</td>
<td>Gomez Capera</td>
</tr>
</tbody>
</table>

Note: dl to be used in the application: 0.1 and 1.0

<table>
<thead>
<tr>
<th>Intensity</th>
<th>Coeff. a</th>
<th>Coeff. B</th>
<th>Coeff. C</th>
<th>st. dev. of regr.</th>
<th>weight norm. factor</th>
<th>deg. of freedom of regr.</th>
<th>Date</th>
<th>Comment</th>
</tr>
</thead>
<tbody>
<tr>
<td>SCR</td>
<td>2.0</td>
<td>1.40683</td>
<td>0.04015</td>
<td>0.05451</td>
<td>0.0866</td>
<td>22.1250</td>
<td>5</td>
<td>June 2010</td>
</tr>
<tr>
<td>3.0</td>
<td>1.80441</td>
<td>0.03537</td>
<td>0.05129</td>
<td>0.1388</td>
<td>164.0769</td>
<td>10</td>
<td></td>
<td></td>
</tr>
<tr>
<td>4.0</td>
<td>1.89580</td>
<td>0.04726</td>
<td>0.04477</td>
<td>0.1911</td>
<td>313.3571</td>
<td>11</td>
<td></td>
<td></td>
</tr>
<tr>
<td>5.0</td>
<td>2.41148</td>
<td>0.04509</td>
<td>0.03898</td>
<td>0.1803</td>
<td>191.5455</td>
<td>8</td>
<td></td>
<td></td>
</tr>
<tr>
<td>6.0</td>
<td>4.67049</td>
<td>0.04426</td>
<td>0.00000</td>
<td>0.1660</td>
<td>69.4000</td>
<td>3</td>
<td></td>
<td></td>
</tr>
<tr>
<td>7.0</td>
<td>5.70000</td>
<td>0.00000</td>
<td>0.00000</td>
<td>0.0000</td>
<td>8.0000</td>
<td>0</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Mw(lo)</th>
<th>Relation</th>
<th>St. dev.</th>
<th>Date</th>
<th>Comment</th>
</tr>
</thead>
<tbody>
<tr>
<td>SCR</td>
<td>Mw = -0.239 + 0.749*Io</td>
<td>0.13</td>
<td>June 2010</td>
<td>Gomez Capera</td>
</tr>
</tbody>
</table>
### App. 2 - Format of the NA4 European Earthquake Catalogue

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Description</th>
<th>From</th>
<th>Example 1</th>
<th>Example 2</th>
<th>Example 3</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Time</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Year</td>
<td>Year</td>
<td>dataset, as compiled in AHEAD</td>
<td>1382</td>
<td>1786</td>
<td>1909</td>
</tr>
<tr>
<td>Mo</td>
<td>Month</td>
<td>dataset, as compiled in AHEAD</td>
<td>05</td>
<td>02</td>
<td>04</td>
</tr>
<tr>
<td>Da</td>
<td>Day</td>
<td>dataset, as compiled in AHEAD</td>
<td>21</td>
<td>27</td>
<td>23</td>
</tr>
<tr>
<td>Ho</td>
<td>Hour</td>
<td>dataset, as compiled in AHEAD</td>
<td></td>
<td>04</td>
<td></td>
</tr>
<tr>
<td>Mi</td>
<td>Minutes</td>
<td>dataset, as compiled in AHEAD</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Macroseismic data</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Ax</td>
<td>Area of max. effects (rev. denom.)</td>
<td>AHEAD compilers</td>
<td>DOVER STRAITS</td>
<td>Silesia</td>
<td>Benavente</td>
</tr>
<tr>
<td>Root</td>
<td>Macroseism. dataset short citation</td>
<td>AHEAD compilers</td>
<td>Musson, 2008</td>
<td>Pagaczewski, 1972</td>
<td>Choffat &amp; Bens., 1912</td>
</tr>
<tr>
<td>RL</td>
<td>Root level</td>
<td>AHEAD compilers</td>
<td>11</td>
<td>22</td>
<td>11</td>
</tr>
<tr>
<td>Nmdp</td>
<td>Number of MDPs</td>
<td>AHEAD compilers</td>
<td>15</td>
<td>543</td>
<td></td>
</tr>
<tr>
<td>Ix</td>
<td>Maximum MDP intensity</td>
<td>AHEAD compilers</td>
<td>7-8</td>
<td>10</td>
<td></td>
</tr>
<tr>
<td><strong>Macroseismic location</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Lat_Bo</td>
<td>Boxer epicentral latitude</td>
<td>Boxer, adopted calibration</td>
<td>51.263</td>
<td>38.928</td>
<td></td>
</tr>
<tr>
<td>Lat_BW</td>
<td>BW epicentral latitude</td>
<td>BW, adopted calibration</td>
<td>51.413</td>
<td>39.000</td>
<td></td>
</tr>
<tr>
<td>Lat_ME</td>
<td>MEEP epicentral latitude</td>
<td>MEEP, adopted calibration</td>
<td>51.247</td>
<td>39.003</td>
<td></td>
</tr>
<tr>
<td>Lon_Bo</td>
<td>Boxer epicentral longitude</td>
<td>Boxer, adopted calibration</td>
<td>0.750</td>
<td>-8.806</td>
<td></td>
</tr>
<tr>
<td>Lon_BW</td>
<td>BW epicentral longitude</td>
<td>BW, adopted calibration</td>
<td>0.874</td>
<td>-8.734</td>
<td></td>
</tr>
<tr>
<td>Lon_ME</td>
<td>MEEP epicentral longitude</td>
<td>MEEP, adopted calibration</td>
<td>0.914</td>
<td>-8.869</td>
<td></td>
</tr>
<tr>
<td>Uep_ME</td>
<td>Uncertainty of MEEP ep. loc.</td>
<td>MEEP, adopted calibration</td>
<td>14.1</td>
<td>24.3</td>
<td></td>
</tr>
<tr>
<td>De_ME</td>
<td>MEEP Depth</td>
<td>MEEP, adopted calibration</td>
<td>20.0</td>
<td>18.0</td>
<td></td>
</tr>
<tr>
<td>UDe_ME</td>
<td>Uncertainty of MEEP depth</td>
<td>MEEP, adopted calibration</td>
<td>0.0</td>
<td>2.0</td>
<td></td>
</tr>
<tr>
<td><strong>Macroseismic size</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Mw_Bo</td>
<td>Boxer Moment magnitude</td>
<td>Boxer, adopted calibration</td>
<td>5.30</td>
<td>6.01</td>
<td></td>
</tr>
<tr>
<td>UMw_Bo</td>
<td>Uncertainty of Mw_Bo</td>
<td>Boxer, adopted calibration</td>
<td>0.52</td>
<td>0.22</td>
<td></td>
</tr>
<tr>
<td>Mw_BW</td>
<td>BW moment magnitude</td>
<td>BW, adopted calibration</td>
<td>5.58</td>
<td>5.99</td>
<td></td>
</tr>
<tr>
<td>UMw_BW</td>
<td>Uncertainty of Mw_BW</td>
<td>BW, adopted calibration</td>
<td>0.21</td>
<td>0.18</td>
<td></td>
</tr>
<tr>
<td>Parameter</td>
<td>Description</td>
<td>From</td>
<td>Example 1</td>
<td>Example 2</td>
<td>Example 3</td>
</tr>
<tr>
<td>-----------</td>
<td>-------------</td>
<td>------</td>
<td>-----------</td>
<td>-----------</td>
<td>-----------</td>
</tr>
<tr>
<td>Mw_ME</td>
<td>MEEP moment magnitude</td>
<td>MEEP, adopted calibration</td>
<td>5.80</td>
<td>6.20</td>
<td></td>
</tr>
<tr>
<td>UMw_ME</td>
<td>Uncertainty of Mw_ME</td>
<td>MEEP, adopted calibration</td>
<td>0.10</td>
<td>0.00</td>
<td></td>
</tr>
<tr>
<td>Io_Bo</td>
<td>Boxer epicentral intensity</td>
<td>Boxer, adopted calibration</td>
<td>7-8</td>
<td>10</td>
<td></td>
</tr>
<tr>
<td>Mw_Io</td>
<td>Mw from Io_Bo</td>
<td>Io_Bo, adopted Mw(Io) relation</td>
<td>5.00</td>
<td>6.31</td>
<td></td>
</tr>
<tr>
<td>UMw_Io</td>
<td>Uncertainty of Mw_Io</td>
<td>Adopted Mw(Io) relation</td>
<td>0.41</td>
<td>0.25</td>
<td></td>
</tr>
<tr>
<td>Lat_EJ</td>
<td>Lat. assigned by exp. judg.</td>
<td>NA4 catalogue compilers</td>
<td>49.700</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Lon_EJ</td>
<td>Long. assigned by exp. judg.</td>
<td>NA4 catalogue compilers</td>
<td>18.500</td>
<td></td>
<td></td>
</tr>
<tr>
<td>De_EJ</td>
<td>Depth assigned by exp. judg.</td>
<td>NA4 catalogue compilers</td>
<td>40.0</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Io_EJ</td>
<td>Io assigned by exp. judg.</td>
<td>NA4 catalogue compilers</td>
<td>7</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Mw_EJ</td>
<td>Mw assign. by exp. judg.</td>
<td>NA4 catalogue compilers</td>
<td>5.40</td>
<td></td>
<td></td>
</tr>
<tr>
<td>UMw_EJ</td>
<td>Uncertainty of Mw_EJ</td>
<td>NA4 catalogue compilers</td>
<td>0.13</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Source_Is</td>
<td>Source of instrumental hypoc.</td>
<td>Instrumental dataset</td>
<td></td>
<td>Stich et al., 2005</td>
<td></td>
</tr>
<tr>
<td>Lat_Is</td>
<td>Instrumental latitude</td>
<td>Instrumental dataset</td>
<td>38.900</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Lon_Is</td>
<td>Instrumental longitude</td>
<td>Instrumental dataset</td>
<td>-8.800</td>
<td></td>
<td></td>
</tr>
<tr>
<td>De_Is</td>
<td>Instrumental depth</td>
<td>Instrumental dataset</td>
<td>10</td>
<td></td>
<td></td>
</tr>
<tr>
<td>SourceMw_Is</td>
<td>Source of Mw_Is</td>
<td>Instrumental dataset</td>
<td></td>
<td>Stich et al., 2005</td>
<td></td>
</tr>
<tr>
<td>Mw_Is</td>
<td>Instrumental Mw</td>
<td>Instrumental dataset</td>
<td>6.00</td>
<td></td>
<td></td>
</tr>
<tr>
<td>DMw_Is</td>
<td>Uncertainty of Mw_Is</td>
<td>Instrumental dataset</td>
<td>0.10</td>
<td></td>
<td></td>
</tr>
<tr>
<td>TMw_Is</td>
<td>Type of Mw_Is</td>
<td>Instrumental dataset</td>
<td>N</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**Instr. parameters**

<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Lat_C1</td>
<td>Epicentral latitude, cat. (1)</td>
<td>catalogue (1)</td>
<td>51.100</td>
<td>49.700</td>
<td>38.900</td>
</tr>
<tr>
<td>Lon_C1</td>
<td>Epicentral longitude, cat. (1)</td>
<td>catalogue (1)</td>
<td>1.600</td>
<td>18.500</td>
<td>-8.800</td>
</tr>
<tr>
<td>Io_C1</td>
<td>Epicentral intensity, cat. (1)</td>
<td>catalogue (1)</td>
<td>7-8</td>
<td></td>
<td></td>
</tr>
<tr>
<td>De_C1</td>
<td>Depth, cat. (1)</td>
<td>catalogue (1)</td>
<td>40.0</td>
<td></td>
<td></td>
</tr>
<tr>
<td>M_C1</td>
<td>Magnitude, cat (1)</td>
<td>catalogue (1)</td>
<td>5.80</td>
<td>7.60</td>
<td></td>
</tr>
<tr>
<td>TM_C1</td>
<td>Type of M_C1</td>
<td>catalogue (1)</td>
<td>L</td>
<td>U</td>
<td></td>
</tr>
</tbody>
</table>

**Current eq. param. (2)**

<table>
<thead>
<tr>
<th>Code_C2</th>
<th>Code of the selected cat. (2)</th>
<th>AHEAD compilers</th>
<th>Grünthal et al., 2009</th>
<th>Grünthal et al., 2009</th>
<th>Vilanova &amp; Fon., 2007</th>
</tr>
</thead>
<tbody>
<tr>
<td>Lat_C2</td>
<td>Epicentral latitude, cat (2)</td>
<td>catalogue (2)</td>
<td>51.300</td>
<td>49.700</td>
<td>38.950</td>
</tr>
<tr>
<td>Parameter</td>
<td>Description</td>
<td>From</td>
<td>Example 1</td>
<td>Example 2</td>
<td>Example 3</td>
</tr>
<tr>
<td>-----------</td>
<td>-------------</td>
<td>------</td>
<td>-------------</td>
<td>-------------</td>
<td>-------------</td>
</tr>
<tr>
<td>Lon_C2</td>
<td>Epicentral longitude, cat (2)</td>
<td>catalogue (2)</td>
<td>2.000</td>
<td>18.500</td>
<td>-8.820</td>
</tr>
<tr>
<td>Io_C2</td>
<td>Epicentral intensity, cat (2)</td>
<td>catalogue (2)</td>
<td>8</td>
<td>7-8</td>
<td></td>
</tr>
<tr>
<td>De_C2</td>
<td>Depth, cat (2)</td>
<td>catalogue (2)</td>
<td>40.0</td>
<td></td>
<td></td>
</tr>
<tr>
<td>M_C2</td>
<td>Magnitude, cat (2)</td>
<td>catalogue (2)</td>
<td>5.90</td>
<td>5.80</td>
<td>6.27</td>
</tr>
<tr>
<td>TM_C2</td>
<td>Type of M_C2</td>
<td>catalogue (2)</td>
<td>W</td>
<td>W</td>
<td>W</td>
</tr>
</tbody>
</table>

**Map and comment**

**Map**

link to map and digital MDPs AHEAD compilers @ @ @

**Class**

Parameters class AHEAD compilers B3 E2 A1

**Com**

Overall comment

- The calculated epicentres are compatible, but none of them matches the current locations. The magnitudes are similar to the current ones, except that from Boxer, which is lower.

- The epicentre provided by Pagaczewski (1972) seems reliable. As for magnitude, the compiler assessed Io = 7-8 and h = 40 km, based on the area over which the earthquake was felt; on the basis of this CENEC provides Mw 5.7. Considering the highest intensity data points from the map (I = 7), Boxer would assess Io = 7. With the Mw(Io) relationship for Stable Continental Region we obtain Mw 5.00 ± 0.13; this value has to be considered as the lowest Mw limit.

- The calculated epicentres are similar, the location from Boxer is very close to the instrumental one. The magnitudes are compatible with both the current instrumental Mw and that provided by Vilanova & Fo. (2007). The M value provided by Martins & M. V. (2001) appears overestimated.

**AHEAD eq. id.**

- AHEAD compilers 14940 80566 1938600

**EN**

Event number AHEAD compilers 14940 80566 1938600