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DISS3 tutorial series:
Guidelines for compiling records of the
Database of Individual Seismogenic
Sources, version 3

108

Istituto Nazionale di
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DISS3 TUTORIAL SERIES: GUIDELINES FOR COMPILING RECORDS OF THE DATABASE OF INDIVIDUAL SEISMOGENIC SOURCES, VERSION 3

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108

Table of contents

Introduction

This document illustrates in details the raw structure of the Database of Individual Seismogenic Sources, version 3 [Basili et al., 2008; http://diss.rm.ingv.it/diss/] - hereinafter referred to as the *Database* – and is dedicated at instructing any potential contributor, outside the DISS Working Group, on how to populate it with new seismogenic sources. It is worth of notice that the primary purpose of the *Database* is to provide a seismogenic source model at regional scale. It is hence usually populated by filling in large regions at once, not record by record. Notice also that throughout this entire document: text in `Courier` is used to highlight database parameters, CAPITALIZATION is used to indicate folder names, and text in *Italics* is used to indicate file names.

Although the *Database* is handled, maintained and displayed by means of a rather complex software/hardware architecture, here we illustrate it in very basic terms with the sole scope of guiding any potential compiler in the preparation of fully-fledged seismogenic source records using basic computer aid. This includes software that usually comes in bundle with most computer operating systems or, alternatively, that can be easily found in the Internet for free. A list of the basic indispensable programs follows along with examples:

- a text editor - e.g. Notepad2 (**http://www.flos-freeware.ch/notepad2.html**);
- a raster-image editor – e.g. GIMP (**http://www.gimp.org/**);
- a desktop calculator – e.g. Java Online Calculator (http://www.motionnet.com/calculator/).

Advanced users may speed up and error proof their work by using word processors and spreadsheets, however, the final version of their files must be saved as plain text and/or raster formats, thereby losing (or being cleaned up from) the non-required information.

Geographic Information System (GIS) programs or computer mapping tools may also come in handy in preparing the geographic features that are used to display and query the *Database* records in computer screen map windows. The features illustrated here can be easily prepared with public-domain programs like, for example:

- Quantum GIS (**http://www.qgis.org/**);
- Google Earth (**http://earth.google.com/**).

These programs are available for various computer platforms. Their names and websites are provided here only as examples of existing resources at the time of preparation of this document. None of them is recommended here, nor was their use whatsoever tested in the making of the *Database*.

Before being incorporated in the *Database*, a record prepared following the prescriptions illustrated in the following sections will still require further manipulation and validation to ensure the *Database* to work properly. This additional step is warranted by the DISS Working Group (**http://diss.rm.ingv.it/diss/Credits.html**) through specifically developed software and tools. Such tools can be made available to all interested parties upon request.

These guidelines have been updated during the making and publishing of the DISS 3.1.0 [DISS Working Group, 2009; fig. 1] in June 2009 and replace the *Database* specifications described in Valensise and Pantosti [2001]; future releases and improvements of the *Database* may require slight changes from what is being described here.

1. Building blocks of the *Database*

1.1 Data categories and their properties

The *Database* contains the following three main data categories associated with mappable geographic features:

- Individual Seismogenic Sources (ISS);
- Composite Seismogenic Sources (CSS);
- Debated Seismogenic Sources (DSS).

The above data categories are independent, implying that no migration of data occurs from one to another. The first two categories can also link additional data about Active Faults and Folds (AFF).

Each record of any given data category is formed by several items:

(1)   a geographic feature (the main *Database* object, see Section 1.3);
(2)   a set of alphanumeric attributes (Section 1.4);
(3)   optional geographic features (Section 1.3) with attributes (Section 1.4) - only ISS and CSS;
(4)   a commentary (Section 1.5);
(5)   a set of pictures, supplemented by a title and a caption (Section 1.6);
(6)   a list of pertinent references (Section 1.7).

Figure 1. Map view of the latest release of the *Database* (DISS 3.1.0) on Google Earth.

Items (1) and (2) are mandatory and must be consistent with one another; without them the *Database* record does not exist. It is also recommended that all fields in item (2) are properly filled in, that is to say, no "NULL" values can be assigned to them. Items from (3) to (6) are optional yet they may be strongly recommended, depending on the stage of development in a geographic area of *Database* expansion. All items are stored in different files with different formats. Specifications about how to construct each item and the file formats will be illustrated in Sections 1.3-1.8. Links between files are established by relational tables and/or by intrinsic file naming. These links are controlled by the DISS-ID, a seven-character code with the following format:

CCTT###

where

- CC is a two-character ISO 3166-1 code for names of officially recognized countries (**http://www.iso.org/iso/country_codes/iso_3166_code_lists.htm**);
- TT is a two-character code that identifies the type of data:

6

o IS for Individual Seismogenic Source;
o CS for Composite Seismogenic Source; and
o DS for Debated Seismogenic Source;
- ### is an ordinal between 1 and 999 (including leading zeroes).

For example, the DISS-ID of an Italian Composite Seismogenic Source could be: *ITCS079*. The number selected for each source does not need to follow any specific criterion provided that is unique. Notice that since the whole *Database* revolves around the DISS-ID, particular attention must be paid when assigning a code to a new record.

The relational tables (Section 1.8) are as follows:

- Active Faults and Folds (AFF): links optional geographic features (item 3) with *Database* records;
- Assign Pictures (AP): links pictures, titles, and captions (item 5) with *Database* records;
- Assign References (AR): links references of one *Database* record with the References List records;
- References List (RL): contains all references of the *Database* (item 6).

1.2 File system and naming conventions

The file naming conventions of the *Database* prescribe that each file name be unique, so that no conflicts arise when storing all files in a single folder. However, for the sake of clarity and easier manual scrolling of files in computer screen views, we suggest storing files in a tree-like hierarchical folder structure like that illustrated in Figure 2. This structure comprises two main folders: DATA and LITERATURE. DATA contains files with geographic features and alphanumeric attributes ISS, CSS, DSS and AFF (see Sections 1.3 and 1.4). LITERATURE contains the subfolders TXT and PIC and the relational tables AP, AR, and RL (see Section 1.8). TXT contains all commentaries (see Section 1.5). PIC contains a variable number of subfolders named according to the DISS-ID; each subfolder contains a variable number of pictures and captions (see Section 1.6).

Folders and files contained in LITERATURE follow simple but strict naming rules. Text files contained in LITERATURE>TXT are named according to the DISS-ID of the parent *Database* record, followed by the string "COM" and the file extension ".txt". For example, the full name of the file containing the commentary of the Italian Composite Seismogenic Source *ITCS079* should look like this: *ITCS079COM.txt*.

Subfolders contained in LITERATURE>PIC are also named according to the DISS-ID of the parent *Database* record. Each subfolder contains a variable number of pictures and captions as raster and text files respectively. Raster and text files are named according to the DISS-ID of the parent *Database* record followed by the single character "F", for figure, and an ordinal between 1 and 99 including the leading zero if needed. Caption file names are also followed by the string "CAP". Raster files take an appropriate extension according to the used raster file format, preferably JPEG files with the ".jpg" extension. Caption file names are followed by the ".txt" extension. For example, the full names of a file pair containing the seventh picture of the Italian Composite Seismogenic Source of the example above should look like these: *ITCS079F07.jpg* and *ITCS079F07CAP.txt*. Picture titles are stored in a column of the AP table.

1.3 Geographic features specifications

Each type of seismogenic source is represented in map view by a polygonal feature with a variable number of nodes. Node locations are identified by a pair of geographic coordinates, latitude and longitude, in decimal degrees with positive values for North/East and negative values for South/West. Precision is set to the fourth decimal, i.e. about 10 meters, which accommodates well the accuracy needed for mapping seismogenic sources. Reference datum should be WGS84. A different datum, coordinate system, units and data formatting are allowed provided that correct specifications are included in an accompanying document.

Each type of seismogenic source has a core feature and ancillary features. The core feature has to be accurately mapped and to be consistent with the parameters supplied for the seismogenic source. Once the core features and the parameters are supplied and validated, the ancillary features are generated automatically by a computer program. Properties and requirements of the core features for the three types of seismogenic sources are illustrated below. ISS and CSS also take in optional geographic features when available. They are the traces of surface-breaking faults and traces of fold axes identified by a supplemental

ID that is simply an ordinal number. The full identification code of these features is composed by the relevant DISS-ID and the feature ID.
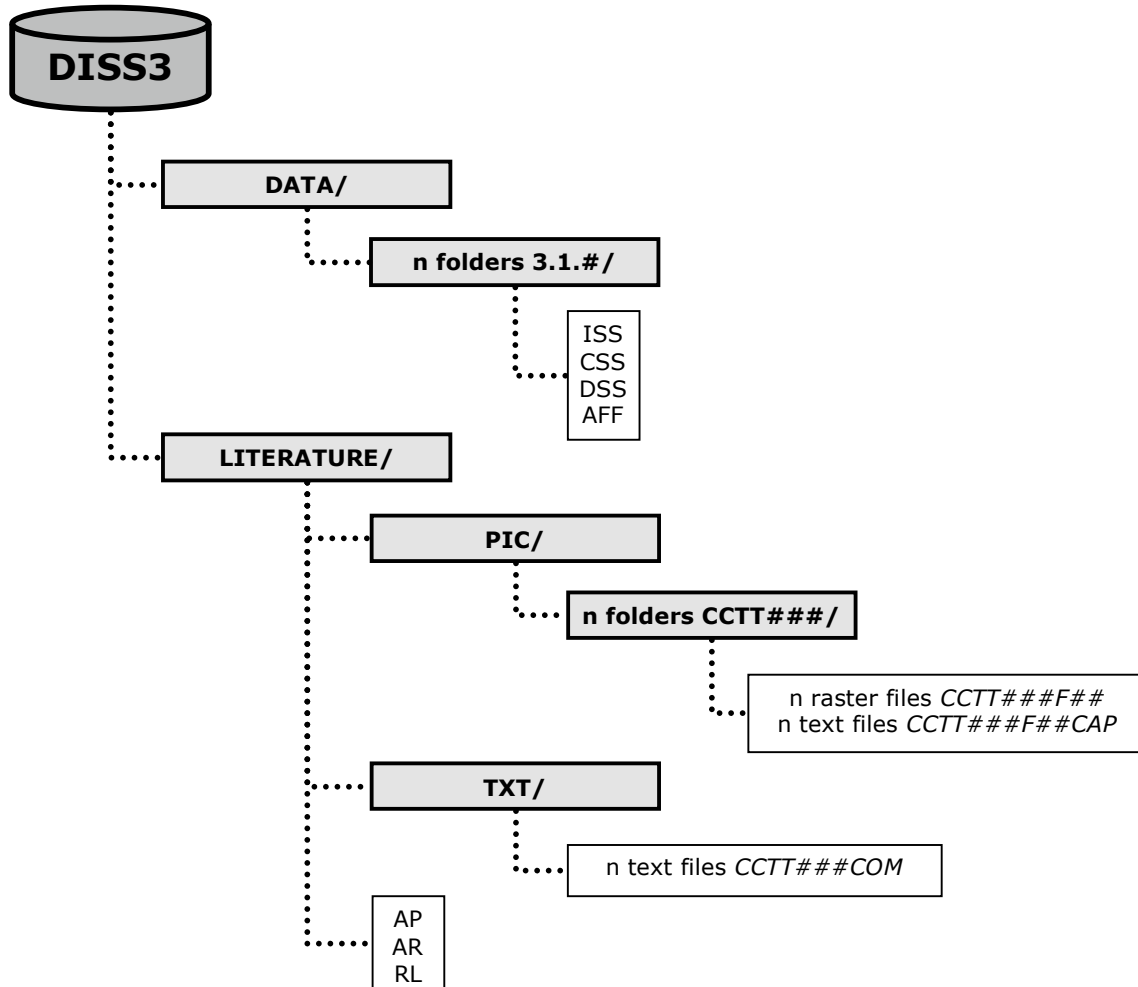

Figure 2. Hierarchical structure of the *Database* file system. Shaded rectangles are folders; white rectangles are files or file groups. The "n" child folders of "DATA" contain different data updates identified by *Database* version numbering.

A file containing the necessary information to map any of the geographic features illustrated below should look like the following:

```
N
latitude1; longitude1
latitude2; longitude2
.........; ..........
latitudeN; longitudeN
```

where N is the total number of nodes that make up the geographic feature and each subsequent line contains a coordinates pair of consecutive nodes. The above information can be simply supplied through a delimited text file (e.g. TAB-delimited, CSV); it is advised to adopt the same delimiter when supplying many of such files.

ISS (fig. 3) – A polygon with four nodes and four sides at right angles, i.e. a rectangle. One pair of sides is parallel to fault length; the other pair is parallel to fault width. Distance between nodes must be respectively equal to fault length and to fault width multiplied by the cosine of the dip angle. Node geographic locations must be given in consecutive order clockwise from the upper-left corner of the fault for

an observer standing in front of it. Therefore, a sequence of nodes should be: upper left; upper right; lower right; lower left.
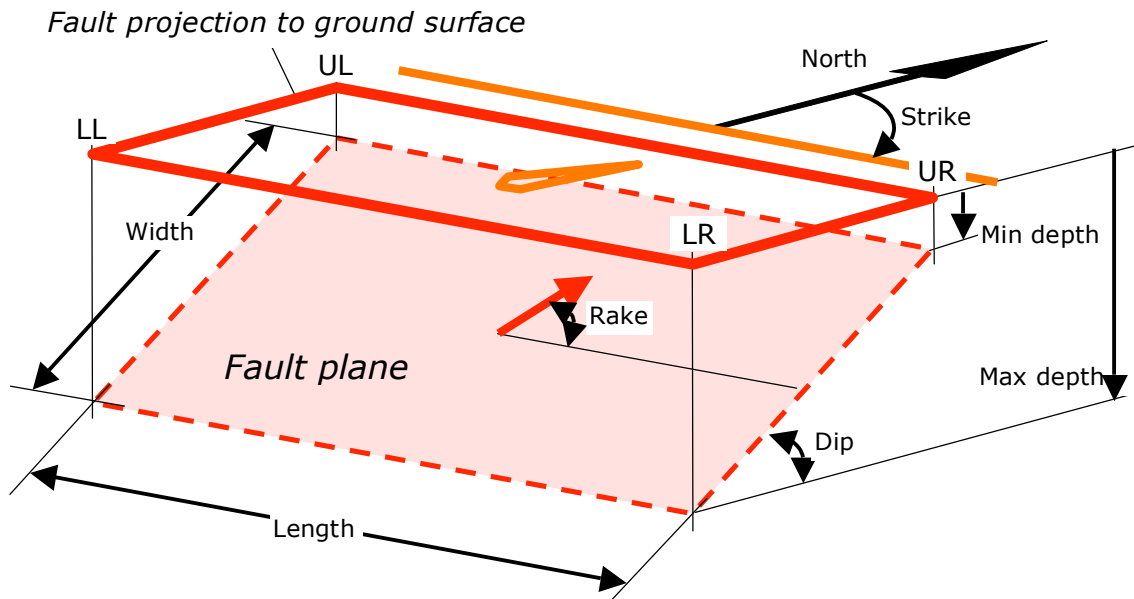

Figure 3. Schematic representation of an ISS. The fault projection to ground surface – red polygon – is delimited by consecutive Upper Left (UL), Upper Right (UR), Lower Right (LR), Lower Left (LL) corners. The orange lines are ancillary geographic features calculated automatically from the fault geometry and parameters. The fundamental parameter attributes are also shown (see Section 1.4).

CSS (fig. 4) – A polygon with a variable number of nodes. The polygon has two long sides parallel to fault length and two short sides parallel to fault width. Node geographic locations must be given in consecutive order clockwise from the upper-left corner of the fault for an observer standing in front of it. The long sides must run close to the fault upper and lower edges. When mapping the long sides, allow the variability/uncertainty in the location and dip/depth/width of the source to be taken into account. Distance between nodes may vary between 5 and 20 km. It is recommended that distance be close to the minimum for shorter/well-known/lower-magnitude sources, whereas for longer/poorly-known/higher-magnitude sources it could be closer to the maximum. Short sides simply connect homologous long-side terminations, usually at almost right angles. A termination can be motivated by one of the following two reasons: (1) the fault dies out, or (2) the fault parameters change significantly.

DSS – A free-form polygon surrounding the tectonic structure under consideration.

AFF – A free-form polyline mapped closely along the trace of an active fault or fold axis and having a variable number of nodes. Distance between nodes depends on data availability and mapping accuracy.

1.4 Attribute specifications

Attributes are data organized in tabular form. Each column, or field, of the table is an attribute. Each row, or record, of the table is uniquely linked to a geographic feature. Compilers of *Database* records must provide this unique link. Those using a GIS program will find this easier because GISs embed this link automatically into their files.

A file of attributes can be as simple as a delimited text file (e.g. TAB-delimited, CSV). Each field representing an attribute is then treated as one of the variables listed in Table 1. A text qualifier, such as the double quote character, should be used to encapsulate text strings. The use of spreadsheets may be useful to speed up the compilation of attribute tables; however, compilers should not incorporate any information different from plain text as that information will be lost when saving the final version of the file in the required simple text format. Numerical values are treated as indicated in the parameter specifications. NULL

values are not allowed. Detailed accounts and examples on characterizing the parameters of seismogenic sources are given in Basili et al. [2008] and Burrato et al. [2008].
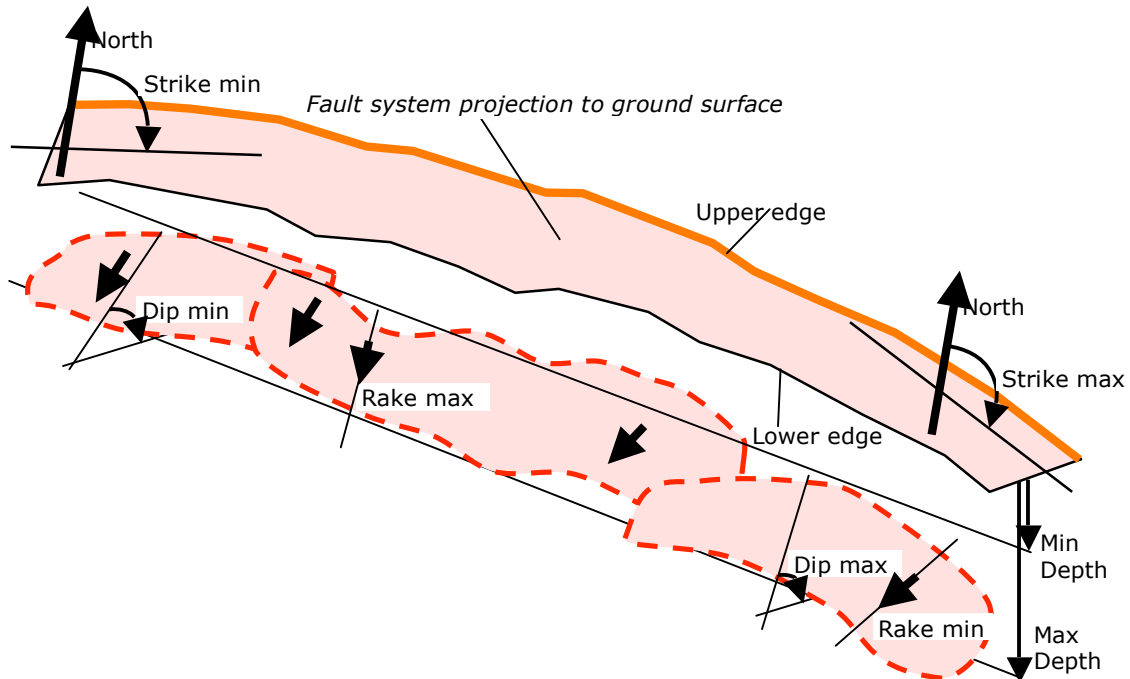

Figure 4. Schematic representation of a CSS. A polygon encloses the fault system projection to ground surface. The orange line is an ancillary geographic feature calculated automatically from the fault system geometry and parameters. The fundamental parameter attributes are also shown (see Section 1.4).

Table 1. Set of variables used for the definition of attributes.

Variable type	Description
Char(n)	Text string of *n* characters.
Date	Date in the format *dd/mm/yyyy* (day/month/year).
Decimal(n,m)	Real number of *n* digits total (decimal separator included) and *m* decimal places.
Integer	Four-byte integer number.
Logical	Logical variable taking the values True (*T*) or False (*F*).
Smallint	Two-byte integer number.

Rounding to the indicated number of decimals is strongly recommended for avoiding undesired decimal truncations. Special attention should also be paid to units, for they may become the source of large numerical errors.

The three types of seismogenic sources (ISS, CSS, DSS) have five common attributes, as shown in Table 2, and a variable number of specific attributes, shown in Table 3 for ISS and Table 4 for CSS; these attributes are separated into three sections: parameters, qualifiers, and notes. The keys for qualifier coding are illustrated in Table 5. The DSS table has no specific attributes. The AFF attributes are illustrated in Table 6; AFF also functions as a relational table for it includes optional geographic features linked to ISS and/or CSS.

Table 2. Common attributes for ISS, CSS, and DSS.

Field name	Variable	Description
IDSource	*Char(7)*	The DISS-ID assigned to the record.
SourceName	*Char(64)*	Seismogenic source name, taken from local geographical names based on the location of the source.
CompiledBy	*Char(64)*	Name(s) of the compiler(s) of the record.

LatestUpdate	*Date*	Date of the last update of the record.	
Preferred	*Logical*	Logical value used to indicate if the record complies with predefined requirements. It can be used for generating automated selections or controlling show/hide options of records.	

Table 3. ISS specific attribute definition.

Parameters			
Field name	**Variable**	**Description**	**Units**
Length	*Decimal(6, 1)*	Source length measured along its strike.	km
Width	*Decimal(6, 1)*	Source width measured along its dip.	km
MinDepth	*Decimal(6, 1)*	Value of the minimum depth of the source, or depth of the upper edge, from sea level.	km
MaxDepth	*Decimal(6, 1)*	Value of the maximum depth of the source, or depth of the lower edge, from sea level.	km
Strike	*Smallint*	Value of the source direction, between $0-2\pi$ clockwise from north following the right hand rule.	degrees
Dip	*Smallint*	Value of the dip angle between $0-\pi/2$ from the horizontal.	degrees
Rake	*Smallint*	Value of the hanging-wall sense of movement between $0-2\pi$ measured counterclockwise from the strike direction.	degrees
AvgDispl	*Decimal(5, 2)*	Average displacement of the source referred to a single earthquake.	m
SlipRateMin	*Decimal(5, 2)*	Minimum value of slip as a function of time (slip rate).	mm/year
SlipRateMax	*Decimal(5, 2)*	Maximum value of slip as a function of time (slip rate).	mm/year
RecIntMin	*Smallint*	Minimum value of the average recurrence time between successive large earthquakes.	year
RecIntMax	*Smallint*	Maximum value of the average recurrence time between successive large earthquakes.	year
LatestEq	*Char(24)*	Date or age of the most recent earthquake associated with the source, if known.	
ElapsedTime	*Smallint*	Time elapsed since the last known earthquake associated with the source, until the year 2000.	year
PenultimateEq	*Char(24)*	Date or age of the penultimate earthquake associated with the source, if known.	
Mag	*Decimal(3, 1)*	Value of earthquake magnitude in the moment magnitude scale (Mw).	scalar

Qualifiers		
Field name	**Variable**	**Description**
LengthQ	*Smallint*	Qualifier of the length.
WidthQ	*Smallint*	Qualifier of the width.
MinDepthQ	*Smallint*	Qualifier of the minimum depth.
MaxDepthQ	*Smallint*	Qualifier of the maximum depth.
StrikeQ	*Smallint*	Qualifier of the strike angle.
DipQ	*Smallint*	Qualifier of the dip angle.
RakeQ	*Smallint*	Qualifier of the rake angle value.
AvgDisplQ	*Smallint*	Qualifier of the average displacement.
SlipRateQ	*Smallint*	Qualifier of the slip rate interval.
RecIntQ	*Smallint*	Qualifier of the recurrence time interval.
MagQ	*Smallint*	Qualifier of the moment magnitude value.
LocationQ	*Smallint*	Qualifier of the location (notice: the location is that implied by the linked geographic feature).

Short notes		
Field name	**Variable**	**Description**
LengthN	*Char(80)*	Short note about how the length was determined.
WidthN	*Char(80)*	Short note about how the width was determined.
MinDepthN	*Char(80)*	Short note about how the minimum depth was determined.

11

MaxDepthN	*Char(80)*	Short note about how the maximum depth was determined.	
StrikeN	*Char(80)*	Short note about how the strike was determined.	
DipN	*Char(80)*	Short note about how the dip was determined.	
RakeN	*Char(80)*	Short note about how the rake was determined.	
AvgDisplN	*Char(80)*	Short note about how the average displacement was determined.	
SlipRateN	*Char(80)*	Short note about how the slip rate was determined.	
LatestEqN	*Char(80)*	Short note about how the most recent earthquake was determined.	
ElapsedTimeN	*Char(80)*	Short note about how the elapsed time was determined.	
PenultimateEqN	*Char(80)*	Short note about how the penultimate earthquake was determined.	
RecIntN	*Char(80)*	Short note about how the recurrence interval was determined.	
MagN	*Char(80)*	Short note about how the moment magnitude was determined.	
LocationN	*Char(80)*	Short note about how the location was determined (notice: the location is that implied by the linked geographic feature)	

Table 4. CSS specific attribute definition.

Parameters			
Field name	**Variable**	**Description**	**Units**
MinDepth	*Decimal(6, 1)*	Value of the minimum depth of the source, or depth of the upper edge, from sea level.	km
MaxDepth	*Decimal(6, 1)*	Value of the maximum depth of the source, or depth of the lower edge, from sea level.	km
StrikeMin	*Smallint*	Minimum value of the source direction, between 0-2π clockwise from north following the right hand rule.	degrees
StrikeMax	*Smallint*	Maximum value of the source direction, between 0-2π clockwise from north following the right hand rule.	degrees
DipMin	*Smallint*	Minimum value of the dip angle between 0-π/2 from the horizontal.	degrees
DipMax	*Smallint*	Maximum value of the dip angle between 0- π/2 from the horizontal.	degrees
RakeMin	*Smallint*	Minimum value of the hanging-wall sense of movement between 0-2π measured counterclockwise from the strike direction.	degrees
RakeMax	*Smallint*	Maximum value of the hanging-wall sense of movement between 0-2π measured counterclockwise from the strike direction.	degrees
SlipRateMin	*Decimal(5, 2)*	Minimum value of slip as a function of time.	mm/year
SlipRateMax	*Decimal(5, 2)*	Maximum value of slip as a function of time.	mm/year
MaxMag	*Decimal(3, 1)*	Maximum value of earthquake magnitude in the moment magnitude scale (Mw).	scalar

Qualifiers		
Field name	**Variable**	**Description**
MinDepthQ	*Smallint*	Qualifier of the minimum depth.
MaxDepthQ	*Smallint*	Qualifier of the maximum depth.
StrikeQ	*Smallint*	Qualifier of the strike angle interval.
DipQ	*Smallint*	Qualifier of the dip angle interval.
RakeQ	*Smallint*	Qualifier of the rake angle interval.
SlipRateQ	*Smallint*	Qualifier of the slip rate interval.
MaxMagQ	*Smallint*	Qualifier of the maximum moment magnitude.

Short notes		
Field name	**Variable**	**Description**
MinDepthN	*Char(80)*	Short note about how the minimum depth value was determined.
MaxDepthN	*Char(80)*	Short note about how the maximum depth value was determined.
StrikeN	*Char(80)*	Short note about how the strike interval was determined.

DipN	*Char(80)*	Short note about how the dip interval was determined.
RakeN	*Char(80)*	Short note about how the rake interval was determined.
SlipRateN	*Char(80)*	Short note about how the slip rate interval was determined.
MaxMagN	*Char(80)*	Short note about how the maximum moment magnitude was determined.

Table 5. Qualifier codes.

Code #	Abbreviation	Code description
1	*LD*	*Literature Data* (used data are taken from a published source).
2	*OD*	*Original Data* (original data obtained in field surveys, modeling or other data source, presented for the first time within DISS).
3	*ER*	*Empirical Relationships* (data obtained through an existing empirical relationship; most commonly used: Wells and Coppersmith, 1994).
4	*AR*	*Analytical Relationships* (data obtained through an existing analytical relationship; most commonly used: Kanamori and Anderson, 1975).
5	*EJ*	*Expert Judgment* (data obtained as an expert judgment by the compiler).

Table 6. Active faults and folds.

Field name	Variable	Description
IDSourceIS	*Char(7)*	Identification code (DISS-ID) of the ISS with which the active fault or fold is associated.
IDSourceCS	*Char(7)*	Identification code (DISS-ID) of the CSS with which the active fault or fold is associated.
ID	*Integer*	Fault or fold identification code; an ordinal number between 001 and 999 (including the leading zeroes when necessary).
Type	*Char(8)*	One of the following two text strings: "Fault" or "Fold" to indicate whether the geographic feature described is an active fault or active fold.
Name	*Char(64)*	A name that is reminiscent of the location of the geographic feature.
Reference	*Char(254)*	A list of references used to identify and map the active fault or fold.

1.5 Commentary specifications

Commentaries are free-form text files. However, we make recommendations about editing and content that may help improving file handling, readability, and consistence.

Since the text will be later processed by programs that do not preserve font styles and formatting, the writer should use only plain text. Adding a line break after the 80th character position may improve readability and reformatting, but is not mandatory. To ensure correct transfer and subsequent display of special characters (those beyond the 128th position in the ASCII/ANSI character map) the UTF-8 encoding should be used. The text editor suggested in the Introduction has this capability.

As for the content, we suggest splitting the text into a few sections. The first section introduces the regional seismotectonic context of the seismogenic source. A section illustrating how each parameter was estimated and the choices that were made should follow along with a discussion or a list of comments and open questions about the seismogenic source reliability and possible alternative solutions. To further enhance the commentary, add a few summaries of published papers, especially those appearing in journals that cannot be accessed easily or are written in a language different from English. An empty line should separate the different sections. Capitalization can be used to highlight section titles. The use of a word processor may be useful to correct spelling and grammar; however, the writer should not incorporate any information different from plain text into the commentary as that information will be lost when saving the final version of the file in the required plain text format.

The link between a Commentary and its parent *Database* record is handled intrinsically by the file name and the DISS-ID. Special care should then be used when naming such files by following instructions given in Section 1.2.

1.6 Picture specifications

A picture, as the *Database* intends it, is not just a figure. It is instead a digital document that may represent a variety of things, like maps, diagrams, photos, drawings or even text that cannot be transferred into a plain text file (e.g. a photo of an epigraph saying something about an earthquake). A picture is made up by the following three items:

- title – a string of text of maximum 254 characters, spaces included, that illustrates concisely but exhaustively the picture content;
- figure – a raster file, usually of less then 1 Mb;
- caption – a text which points out what is important in the figure.

Notice that when a figure is taken from a published paper it should include the original caption or legend. A figure can also be made up by multiple paper figures. Annotations or lettering can also be added. Image resolutions should be adjusted as to have a good readability and fast loading when the picture is displayed in a computer screen. Yet, it should also be of good quality when printed out. As a rule of thumb, image resolution should be set to 200 DPI. This means that an uncompressed file (e.g. TIF) of an image of 800x600 pixels (equivalent to a print size of 4x3 in or 10.16x7.62 cm) would have a size of ca. 60 KB if black and white (1 BPP), ca. 480 KB if grayscale (8 BPP), and ca. 1.4 MB if 16.7-million colors (24 BPP). The file size will decrease dramatically by using a compressed format such as JPEG. In this case we recommend a compression ratio not lower than 80% to preserve good image quality while saving disk space and loading time.

It is strongly recommended that compilers verify and honor the copyright of any published material they intend to use.

The caption should inform about what in the figure is important with respect to the seismogenic source. The picture title is stored in a field of the AP relational table (see Section 1.8). Alternatively, it could be stored in a text file following the same naming conventions as the caption file, apart from having the string "CAP" substituted by the string "TTL". Be aware that the title must be maximum 254 characters long even if it is stored in a file; otherwise the title string will be truncated when loaded into the *Database*.

1.7 References specifications

During the course of compiling a *Database* record it is usual – and in fact very appropriate - to support arguments by reference to published work. These references may be from work presented in scientific journals, technical reports, books, research theses, geologic/tectonic maps or material from the Internet. A reference gives the full details of the source item and should enable it to be traced. All work used and/or cited in any element that makes up a *Database* record must appear in the references list. It is advisable that references that may help with a better understanding of the *Database* record or that provide an alternative solution or scientific view for that record be listed in the references. The *Database* handles this task by use of two relational tables: the References List table and the Assign References table (see Section 1.8). The first lists all references; the second links individual references with *Database* records. When a user queries any of the ISS, CSS, and DSS tables all relevant citations are automatically extracted from References List and displayed.

1.8 Relational tables specifications

The AP, RL, and AR files contain data organized in tabular form. Each column, or field, of these tables is either an attribute of the picture/reference or a link to *Database* records through the DISS-ID. Compilers of *Database* records must provide this unique link in all these files.

These relational tables can be as simple as delimited text files (e.g. TAB-delimited, CSV). Each field is then treated as one of the variables listed in Tables 7, 8 and 9. A text qualifier, such as the double quote character, should be used to encapsulate text strings. The use of spreadsheets may be useful to speed up the compilation of these tables; however, compilers should not incorporate any information different from plain text since that information will be lost when saving the final version of the file in the required simple text format.

Specifications for the AFF table were given in Sections 1.3 and 1.4 for it contains geographic features and attributes directly related with ISS and CSS tables.

Table 7. Assign Pictures (AP) table.

Field name	Variable	Description
IDSource	*Char(7)*	Identification code (DISS-ID) of the ISS/CSS/DSS with which the picture is associated.
IDFigure	*Char(3)*	Identification code of the figure composed of the letter F (for figure) and an ordinal number between 01 and 99 (including the leading zero if needed).
FigureTitle	*Char(254)*	A text string serving as the picture title.
FigureCode	*Char(10)*	String concatenation of the IDSource and IDFigure codes.

Table 8. Assign References (AR) table.

Field name	Variable	Description
IDSource	*Char(7)*	Identification code (DISS-ID) of the ISS/CSS/DSS with which the cited reference is associated.
Ref#	*Smallint*	Code reference as in the CodeReference field of the RL table.

Table 9. References List (RL) table.

Field name	Variable	Description
Authors	*Char(254)*	List of author names.
Year	*Smallint*	Year of publication.
Title	*Char(254)*	Title of the publication.
Publication	*Char(254)*	Name of the journal or other publication medium where the scientific work (e.g. article, paper, report, thesis) was published.
CodeLanguage	*Char(1)*	One-letter code indicating the original language of the publication according to the following scheme: E – English; O – Other.
CodePublication	*Char(1)*	One-letter code taking the following values: A – Abstract, B – Book, J - Journal, M – Manuscript, P – Proceedings, V – Volume, W – Website.
CodeReference	*Smallint*	An ordinal integer number between 1 and 99,999.
AvailabilityPaper	*Logical*	Logical value (T=True) or (F=False) indicating if a hard copy of the publication is available in an external archive.
AvailabilityFile	*Logical*	Logical value (T=True) or (F=False) indicating if a digital copy of the publication is available in an external archive.
FileName	*Char(22)*	Concatenation of the string converted CodeReference (including leading zeros) and an appropriate file extension (e.g. ".PDF").
FileSource	*Char(1)*	One-letter code taking the value "I" for available on the Internet or "S" for scanned from paper copy.

2. Displaying and querying the *Database*

Following appropriate manipulation and validation carried out by the DISS Working Group, the *Database* records are uploaded onto the web server and then displayed in both cartographic and alphanumeric forms. Only one *Database* exists on the server, regardless of its geographical extension.

Map viewing is handled in themes (fig. 5) to allow regional collection of data to be displayed accurately without encumbering the network service. To be displayed, a theme should cover a significant area; say that of an entire country or that of a tectonically/geographically consistent region. Within the region there should exist a good coverage of seismogenic sources. CSS are mandatory and should be compiled as first. The number of CSS is not a pre-defined but clearly they must account for most of the seismic moment released in the region covered by that theme. The number of ISS and DSS records may vary. For ISS a priority is set for the largest or more recent or better studied earthquake sources. For DSS a priority is set for those sources that better exemplify a regional study case.

The *Database* can be queried from within the map theme by selecting map objects. Queries from the alphanumeric display are carried out through the attributes or attribute combinations using standard SQL and Boolean operators or more simply by scrolling the seismogenic sources from a list.
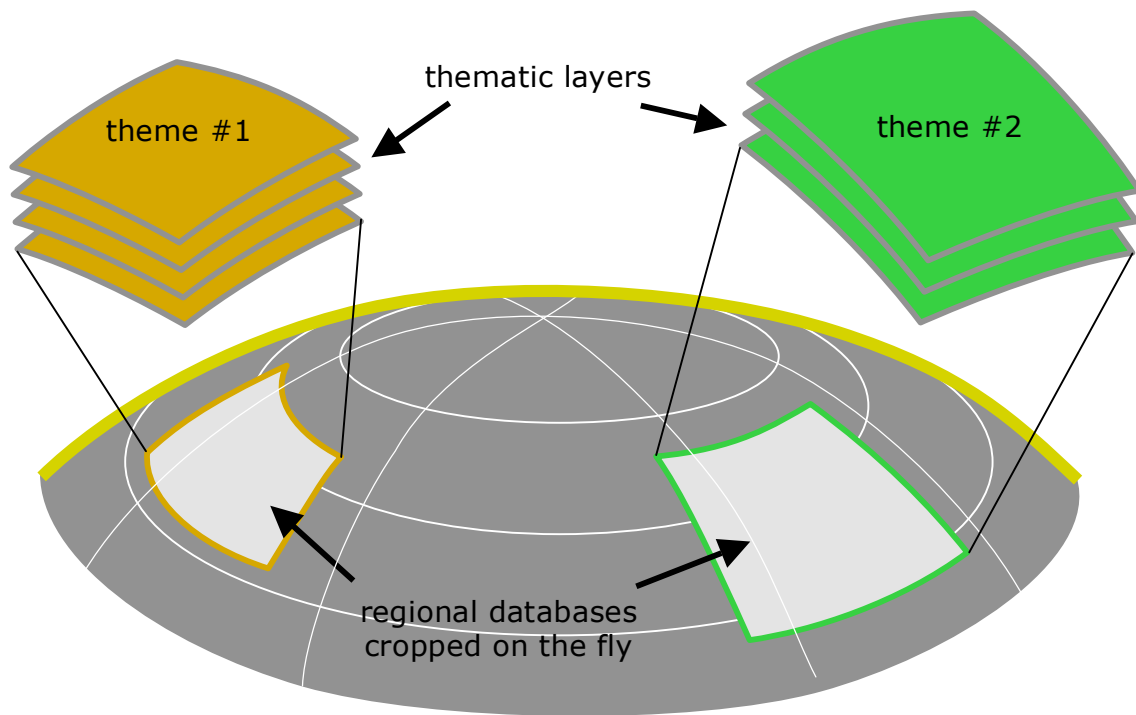
Figure 5. Sketch of the themes' display system.

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