

# Documents



The EPISODES Platform document repository is a database of documents, such as peer-reviewed papers, books, theses, technical reports etc, associated with the data, technological/production processes, methodologies and Episodes included in the EPISODES web platform.

You are welcome to propose new publications that could be included in the Document Repository - see [the last section](#) for instruction how to do this.

## Navigating to Document Repository

There are 3 different ways to access the EPISODES Platform documents Repository:

- From the EPISODES web platform home page, by clicking on the 'Documents' tag, as shown in the left frame of [Figure 1](#) (indicated by a red field). The User has now entered the **Home Page** of the EPISODES Platform documents.
- From any of the AH Episodes, by clicking on the 'See more information in Document Repository' at the bottom of the **'Data'** section, as indicated in the red field in the right frame of [Figure 1](#). The User has now entered the selected **Episode's** document repository base (see the [AH Episodes chapter](#)).
- From any of the Applications provided by the platform, by clicking on the link below 'REFERENCES' field, in the Application's description pages (see the 'Test User Guide Application' chapter). The User has now entered the selected **Application's** document repository base (see the [Applications chapter](#)).

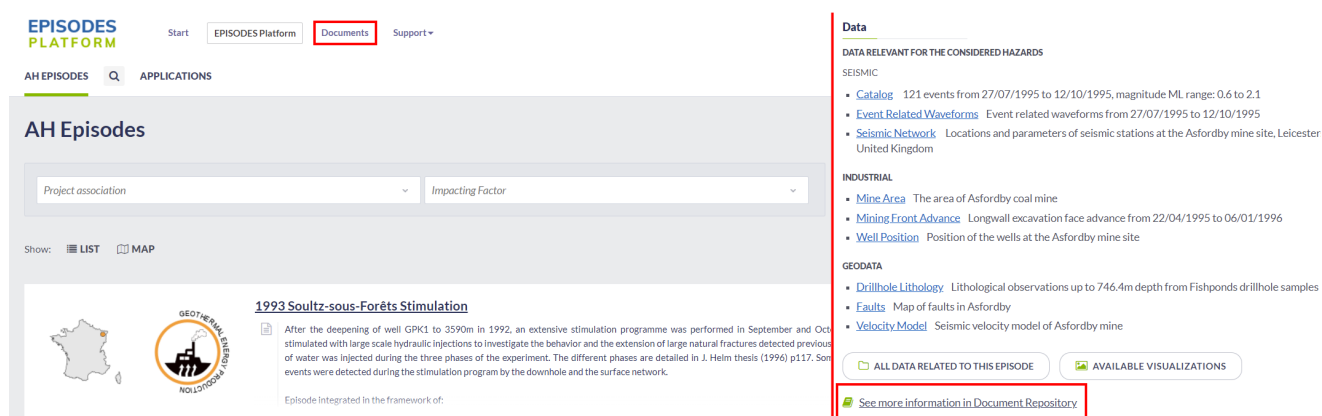


Figure 1. Access to the Documents Repository on EPISODES Platform.

## Document Repository main view

[Figure 2](#) demonstrates how the Document Repository web page looks like within the EPISODES Platform. The 'About' page is shown in [Figure 2](#), containing contact information and useful links, that can be accessed by clicking on the text in blue fonts, found into the green boxes in [Figure 2](#). The choices provided to the User, (tabs in red boxes, indicated by the numbers in [Figure 2](#)) are the following:

- 'Search Repository' allows for quick (text) search or advanced search based on different parameters (further described in [Document search subsection](#))
- 'Browse Repository' provides an alternative search tool, that allows for searching within specific categories of items e.g. Episode, Year, Subject, Creators, Applications references or material acknowledging the EPISODES Platform (further described in [Browsing by category subsection](#))
- Information on how-to-cite EPISODES Platform
- Links to other EPISODES Platform documents including terminology files, data policy documents, this User Guide etc.

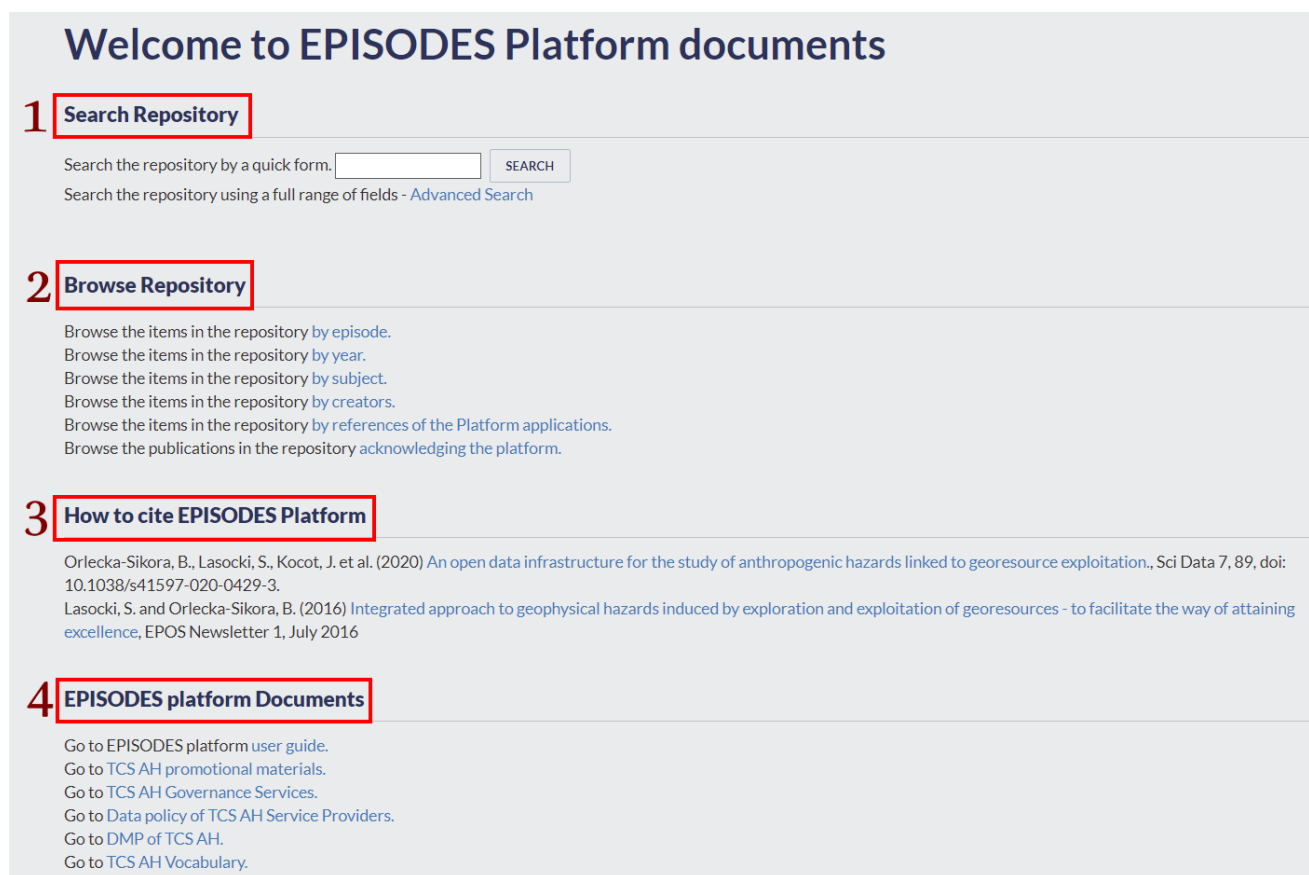


Figure 2. Document Repository web page within the EPISODES Platform.

## Document search

### Advanced document search

Figure 4 and Figure 5 show some of the fields that the User may complete for getting access to the items he/she wishes. There are comprehensive instructions of how to fill the fields. These information can be shown/hidden after switch the small blue button at the right of each field from "?" to "-" and vice versa (Figure 3.1). The User may also select between "All of" Any of" the inserted terms, by clicking on the small arrow at the left of the filling space. The User can also select terms from specific lists as shown in Figure 3.2. He/she may tick box(es) shown in the red frames of Figure 3.2, corresponding to the terms written next to those boxes. Additional filtering can be applied by clicking on the arrows shown in the green frames of Figure 3.2. Instructions for completing the required fields is always provided after clicking on the question mark tab (blue "?" symbol), at the right hand side of each tab. After all input data have been set, the user may either click on the "Search" button to commit searching , or on the "Reset the form" button to clear all the selected fields (these two buttons are located both at the top and bottom of the screen, e.g. at the top of Figure 3.1).

## Advanced Search

Don't panic! Just leave the fields you don't want to search blank. [Click here for a simple search.](#)



Documents: all of



Title: all of



Creators: all of



Abstract: all of



Date: Enter a date or date range.  
Examples: "1985-", "2001-05-17-2002-05-16", "-1980-11"



Uncontrolled Keywords: Enter a term or terms to search for.  
all of



Subjects:



Inducing technology  
...Conventional hydrocarbon extraction  
...General about inducing technology types  
...Geothermal energy production  
...Open pit mining  
...Other inducing technology types  
...Reservoir impoundment  
...Unconventional hydrocarbon extraction  
...Underground mining  
...Underground storage of fluids  
Methodology  
...Method and procesing

Any of these

Project:



EPOS-IP  
...LACQ FIELD: conventional hydrocarbon extraction  
...ASFORDBY: underground coal mining  
...BOBREK MINE: Seismicity linked to longwall mining  
...CZORSZTYN: Shallow water reservoir  
...EMILIA ROMAGNA: cavone oil field  
...GISOS-SOLVEY: underground solution mining  
...GROSS SCHOENEBECK: Geothermal energy production experiment  
...MONTEYNARD: water reservoir  
...NORTHWICH: underground salt extraction cavities  
...OKLAHOMA: conventional and unconventional hydrocarbon extraction and wastewater injection  
...PREESALL MINE: underground salt extraction cavities

Any of these

☐ Article ☐ Conference or Workshop Item



Figure 3.1. Advanced search interface - upper part in the Document Repository.

|  |  |                      |
|--|--|----------------------|
| Department:                            | all of ▼   | <input type="text"/> |
| Editors:                               | all of ▼   | <input type="text"/> |
| Status:                                | <input type="checkbox"/> Published<br><input type="checkbox"/> In Press<br><input type="checkbox"/> Submitted<br><input type="checkbox"/> Unpublished  |                      |
| Refereed:                              | No Preference ▼  |                      |
| Journal or Publication Title:          | all of ▼   | <input type="text"/> |
| access to IS-EPOS Platform repository: | <input type="checkbox"/> Unlimited<br><input type="checkbox"/> Limited<br><input type="checkbox"/> None  |                      |
| Application references:                | <div> <input type="checkbox"/> Source Location           <input type="checkbox"/> Risk Assessment         </div> <div> <input type="checkbox"/> Moment Tensor Inversion           <input type="checkbox"/> Inter-event Time Distribution Analysis         </div> <div> <input type="checkbox"/> Spectral Analysis           <input type="checkbox"/> Autocorrelation         </div> <div> <input type="checkbox"/> Completeness Magnitude Estimation           <input type="checkbox"/> Cross Correlation         </div> <div> <input type="checkbox"/> Seismic Hazard Assessment           <input type="checkbox"/> Coefficient of Randomness         </div> <div> <input type="checkbox"/> Stress Inversion           <input type="checkbox"/> Stationarity test         </div> <div> <input type="checkbox"/> Magnitude Conversion           <input type="checkbox"/> Fracture Network Models - Mechanical Stresses         </div> <div> <input type="checkbox"/> GMPE         </div> |                      |
| Type:                                  | <input type="checkbox"/> Text <input type="checkbox"/> Video<br><input type="checkbox"/> Spreadsheet <input type="checkbox"/> Audio<br><input type="checkbox"/> Slideshow <input type="checkbox"/> Archive<br><input type="checkbox"/> Image <input type="checkbox"/> Other  |                      |
| Retrieved records must fulfill:        | all of these conditions ▼  |                      |
| Order the results:                     | by author's name ▼   |                      |

Figure 3.2. Advanced search interface- lower part in Documents Repository.

## Search results

Both quick and 'Advanced Search' options (see [Figure 2](#), Field 1 and [previous subsection](#)) return results as depicted in [Figure 3.3](#). This contains additional choices:

- Field 1. The User may modify the present search or perform a new one by selecting 'Refine search' or 'New search', respectively.
- Field 2. Select mode of sorting the results. The available options for setting the order of the results are available after clicking on the small arrow, just before the 'Reorder' tab, and they are: by year (ascending or descending), by author's name and by document title.
- Field 3. The list of references can be exported in several different formats, selected from the small arrow just before 'Export' tab, such as ASCII, BibTeX, HTML, just to name a few.
- Field 4. The results of the search are shown in the screen. Clicking on the blue text in Field 4, [Figure 3.3](#), will lead to the screen similar with the one displayed in [Figure 8](#).
- Field 5. In the cases where the document is available, clicking on Field 5, will download a .pdf copy of the respective material.

**"Groningen"**

Displaying results 1 to 8 of 8. **1**  
[Refine search](#) | [New search](#)

Order the results: by year (most recent first) **2** REORDER

Export 8 results as: ASCII Citation **3** EXPORT

RSS 2.0 RSS 1.0 Atom

1. Leptokaropoulos, Konstantinos Michail and Staszek, Monika and Cielesta, Szymon (2016) *A review on fluid-injection induced seismicity with emphasis on Hydraulic Fracturing*. Working Paper. IG PAS, IG PAS.
2. Muntendam-Bos, A. G. and Roes, J. P. A. and de Waal, J. A. (2015) *A guideline for assessing seismic risk induced by gas extraction in the Netherlands*. The Leading Edge. pp. 672-677. DOI: [10.1190/tle34060672.1](#) Item not available from this repository.
3. van Thienen-Visser, K. and Breunese, J.N (2015) *Induced seismicity of the Groningen gas field: History and recent developments*. The Leading Edge. pp. 664-671. DOI: [10.1190/tle34060664.1](#) Item not available from this repository.
4. Bourne, S. J. and Oates, Stephen and Bommer, Julian J. and Dost, Bernard and van Elk, Jan and Doornhof, Dirk (2015) *A Monte Carlo Method for Probabilistic Hazard Assessment of Induced Seismicity due to Conventional Natural Gas Production*. Bulletin of the Seismological Society of America, 105 (3). pp. 1721-1738. DOI: [10.1785/0120140302](#) Item not available from this repository.
5. Bommer, Julian J. and Dost, Bernard and Edwards, Benjamin and Stafford, Peter J. and van Elk, Jan and Doornhof, Dirk and Ntinalexis, Michail (2015) *Developing an Application-Specific Ground-Motion Model for Induced Seismicity*. Bulletin of the Seismological Society of America, 106 (1). pp. 158-173. DOI: [10.1785/0120150184](#) Item not available from this repository.
6. Kraaijpoel, Dirk and Dost, Bernard (2013) *Implications of salt-related propagation and mode conversion effects on the analysis of induced seismicity*. Journal of Seismology, 17 (1). pp. 95-107. DOI: [10.1007/s10950-012-9309-4](#) Item not available from this repository.
7. van Eck, Torild and Goutbeek, Femke and Haak, Hein and Dost, Bernard (2006) *Seismic hazard due to small-magnitude, shallow-source, induced earthquakes in The Netherlands*. Engineering Geology, 87 (1-2). pp. 105-121. DOI: [10.1016/j.enggeo.2006.06.005](#) Item not available from this repository.
8. van Gelderen, Martin and Haagmans, Roger and Bilker, Mirjam (1999) *Gravity changes and natural gas extraction in Groningen*. Geophysical Prospecting, 47 (6). pp. 979-993. DOI: [10.1046/j.1365-2478.1999.00159.x](#) Item not available from this repository. **4**

Displaying results 1 to 8 of 8. **1**  
[Refine search](#) | [New search](#)

Order the results: by year (most recent first) **2** REORDER

Figure 3.3. Search engine results after request for the keyword 'Groningen'.

## Browsing by category

The 'Browse' option (Field 2, Figure 2) gives the user the opportunity to perform a special searching in the repository, by selecting specific categories comprising several fields. Filtering of items can be done by year, subject, division or author. All of these filtering processes lead to identical searching tools as the one demonstrated right on for the 'subject' case (Figure 4.1). The main category selected here (subject) is further divided into sub-categories, corresponding to more specialised filters of grouping the repository items. The User may click in the links (blue fonts, Figure 4.1) in order to get access to each specific group. The number in the parenthesis indicates the amount of document available in each category.

# Subject

Please select a value to browse from the list below.

- [Subject Areas \(881\)](#)
  - [Inducing technology \(570\)](#)
    - [Conventional hydrocarbon extraction \(78\)](#)
    - [General about inducing technology types \(19\)](#)
    - [Geothermal energy production \(137\)](#)
    - [Open pit mining \(1\)](#)
    - [Other inducing technology types \(6\)](#)
    - [Reservoir impoundment \(71\)](#)
    - [Unconventional hydrocarbon extraction \(160\)](#)
    - [Underground mining \(160\)](#)
    - [Underground storage of fluids \(6\)](#)
  - [Methodology \(840\)](#)
    - [Method and procesing \(663\)](#)
      - [Collective properties of seismicity \(238\)](#)
        - [Clustering and migration \(44\)](#)
        - [Source size distribution \(51\)](#)
        - [Stationarity testing \(10\)](#)
      - [Probabilistic seismic hazard analysis - stationary \(68\)](#)
        - [Aggregated solution \(15\)](#)
        - [Path and site effects \(26\)](#)
        - [Source effect \(19\)](#)
      - [Probabilistic seismic hazard analysis – time-dependent \(23\)](#)
      - [Source parameter estimation \(83\)](#)
      - [Stress field modeling \(33\)](#)
        - [Evolution of stress field changes \(6\)](#)
        - [Principal stresses from focal mechanisms \(5\)](#)
        - [Technology induced stress field redistribution \(5\)](#)
      - [Technology-seismicity interaction \(101\)](#)
    - [Other-additional study \(191\)](#)
  - [Region \(522\)](#)
    - [Australia \(25\)](#)
      - [Copper Basin \(22\)](#)
      - [New South Wales \(1\)](#)
    - [Brazil \(6\)](#)
    - [Acu area \(4\)](#)

Figure 4.1. Subject categorization of the items in the document repository.

When selecting one of the given categories, the screen shown in [Figure 4.2](#) appears. First, the list of references can be exported in several different formats, selected from field 1, [Figure 4.2](#), such as ASCII, BibTeX, HTML, just to name a few. The directory selected and its branches are displayed in field 2, [Figure 4.2](#). The User may click in the links (blue text, [Figure 4.1](#)) in order to get access to each specific group. The number in the parenthesis indicates the amount of document available in each category. Field 3, [Figure 4.2](#), shows the grouping mode of the items, i.e. 'Item Type', 'Creators' (e.g. authors), etc. In Field 4, [Figure 4.2](#), the User may select among the different types of documents, appended after 'jump to'. The items are classified according to this order and the User can be immediately transferred to a specific category by clicking on one of the links in field 4, [Figure 4.2](#). Finally the User may select any of the items provided to the list (below 'Articles', in [Figure 4.2](#)), by clicking on the link indicated by blue text (e.g. the one shown in Field 5, [Figure 4.2](#)).

Access to the previous screen can be obtained after clicking on the "Up a level" tag, shown in the top left corner of [Figure 4.2](#).

The screenshot displays the EPOS Thematic Core Service Anthropogenic Hazards interface. At the top, the subject is "Methodology > Method and processing > Probabilistic seismic hazard analysis – time-dependent". Below this, there is a navigation bar with "Up a level" and "Export as" options (ASCII Citation, BibTeX, HTML, etc.). A red box labeled '1' highlights the "EXPORT" button. Below the navigation bar, a tree structure shows the hierarchy of subject areas: "Subject Areas (23)" > "Methodology (23)" > "Method and processing (23)" > "Probabilistic seismic hazard analysis – time-dependent" > "(23)". A red box labeled '2' highlights this tree structure. Below the tree structure, there is a "Group by" section with "Item Type" and "Creators" options. A red box labeled '3' highlights the "Creators" option. Below the "Group by" section, there is a "Jump to" section with "Article", "Book Section", "Conference or Workshop Item", and "Thesis" options. A red box labeled '4' highlights the "Article" option. Below the "Jump to" section, the number of items at this level is shown as 23. Below this, the "Article" section lists several articles with their titles, authors, and DOIs. A red box labeled '5' highlights the first article: "Maximum likelihood estimate of b in the formula logN=a-bM and its confidence limits. Bulletin of the Seismological Society of America, 43, pp. 237-239. Aki, Keiiti (1965)".

Figure 4.2. Details of Subject Areas->Methodology->Method and processing category.

## Document summary

Each document in the repository (either found with [search](#) or [browsing by category](#)) has its own summary page, as displayed in [Figure 5](#). The title, authors and information on the publication (Journal, issue, etc) is shown together with an abstract. The official DOI and URL are also available (shown in the red boxes, [Figure 5](#)), where the User may click in order to visit the official Journal website and download the selected article.



# Why earthquakes correlate weakly with the solid Earth tides: Effect of periodic stress on the rate and probability of earthquake occurrence

Beeler, Nick and Lockner, David (2003) *Why earthquakes correlate weakly with the solid Earth tides: Effects of periodic stress on the rate and probability of earthquake occurrence*. Journal of Geophysical Research, 108 (B8). DOI: <https://doi.org/10.1029/2001JB001518>

Full text not available from this repository.

Official URL: <http://dx.doi.org/10.1029/2001JB001518>

## Abstract

We provide an explanation why earthquake occurrence does not correlate well with the daily solid Earth tides. The explanation is derived from analysis of laboratory experiments in which faults are loaded to quasiperiodic failure by the combined action of a constant stressing rate, intended to simulate tectonic loading, and a small sinusoidal stress, analogous to the Earth tide. Event populations whose failure times correlate with the oscillating stress show two modes of response; the response mode depends on the stressing frequency. Correlation that is consistent with stress threshold failure models, e.g., Coulomb failure, results when the period of stress oscillation exceeds a characteristic time  $t_n$ ; the degree of correlation between failure time and the phase of the driving stress depends on the amplitude and frequency of the stress oscillation and on the stressing rate. When the period of the oscillating stress is less than  $t_n$  the correlation is not consistent with threshold failure models, and much higher stress amplitudes are required to induce detectable correlation with the oscillating stress. The physical interpretation of  $t_n$  is the duration of failure nucleation. Behavior at the higher frequencies is consistent with a second-order dependence of the fault strength on sliding rate which determines the duration of nucleation and damps the response to stress change at frequencies greater than  $1/t_n$ . Simple extrapolation of these results to the Earth suggests a very weak correlation of earthquakes with the daily Earth tides, one that would require  $>13,000$  earthquakes to detect. On the basis of our experiments and analysis, the absence of definitive daily triggering of earthquakes by the Earth tides requires that for earthquakes,  $t_n$  exceeds the daily tidal period. The experiments suggest that the minimum typical duration of earthquake nucleation on the San Andreas fault system is  $\sim 1$  year.

[error in script]

|                               |   |
|-------------------------------|---|
| <b>Item Type:</b>             | Article   |
| <b>Uncontrolled Keywords:</b> | earthquake probability, stress triggering, earthquake nucleation  |
| <b>Subjects:</b>              | <a href="#">Methodology</a> > <a href="#">Method and procesing</a> > <a href="#">Probabilistic seismic hazard analysis - time-dependent</a> |
| <b>Project:</b>               | IS-EPOS project   |

Figure 5. Details of particular item stored in the Document Repository.

## Proposing new publications

If you know of any publication that might be related to any of the [AH Episodes](#) or [Applications](#) provided by the EPISODES Platform and that could be added to the Document Repository, please use the [Platform's contact form](#) to send us DOI or a link to the publication.

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