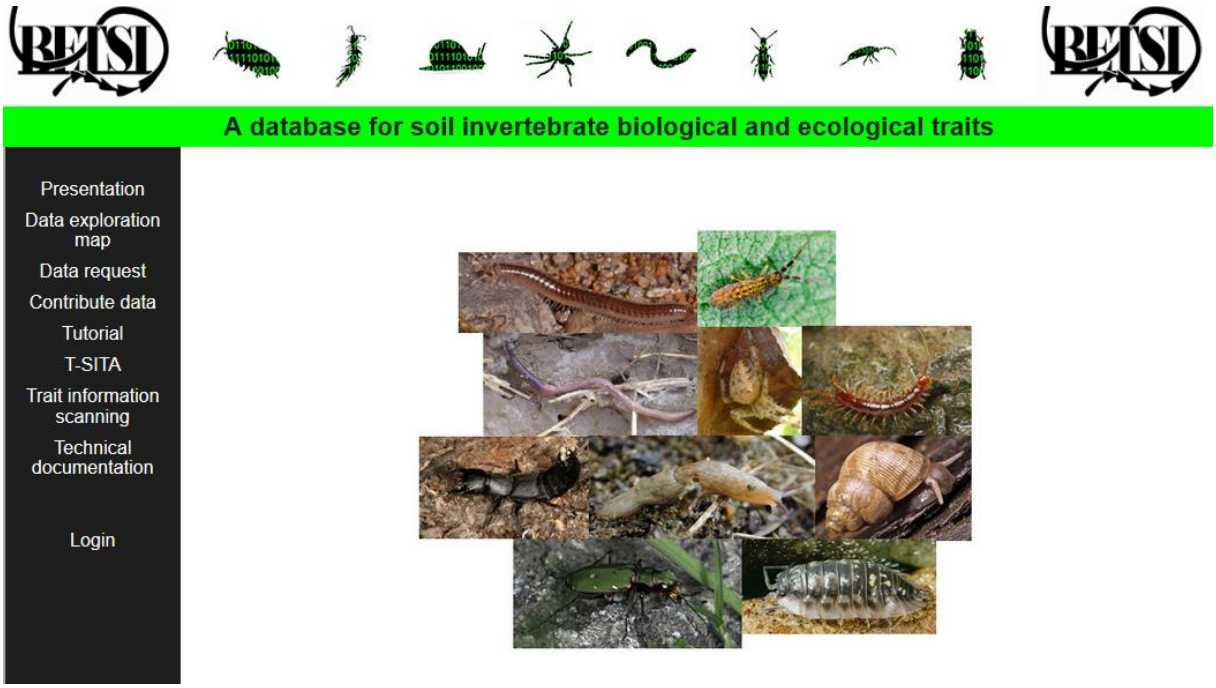
BETSI database tutorial



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1 Presentation

The BETSI database contains data about traits for soil invertebrate. Users have the possibility to interact with the BETSI database through a web interface. The URL address is: http://betsi.cesab.org/. By the interface you can mostly contribute to the database by inserting some data or request data.

2 Contribute to database

Templates are files which allow users to put their data in a database compatible format before their insertion in the database.

There are five templates depending on the nature of the data you want to insert (Figure 1). Four of them allow the insertion of data coming from field experiments. It could be data concerning site(s) (=plots) and parcel(s), soil and fauna. Fauna data can be taxonomical inventories or measured trait values from sampled specimens. The fifth template is dedicated to the insertion of trait data coming from literature for which sampling information is missing. For example, trait values are not associated with a site or they are not associated with a number of measured specimens.

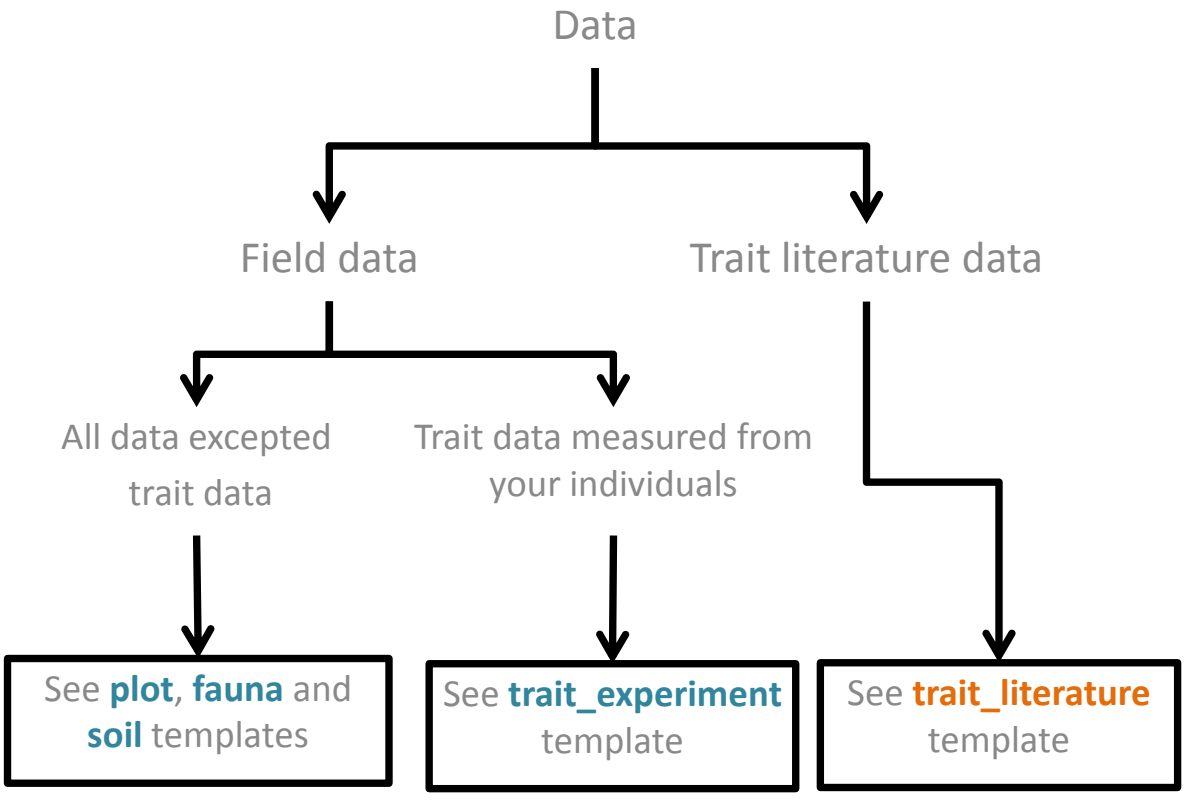


Figure 1. Decisional tree of template choice according to the nature of your data

According to the nature of data you want to insert, please follow the decisional tree to choose the adapted template (Figure 1). The empty templates and examples of filled templates are available on the BETSI FTP server at the following URL: ftp.cesab.org following the path : Base de donnees/Templates.

- 140409_inchargecollector_datasetname_plot.csv
- 140409_inchargecollector_datasetname_soil.csv
- 140409_inchargecollector_datasetname_fauna.csv
- 140409_inchargecollector_datasetname_trait.csv
- 140409_coder_datasetname_trait_literature.csv

To have access to the FTP server use the identifier: **betsi** ; the password: **Tr@1tBets1** ; the port: **21**.

2.1 Template format

Be careful, when manipulating the templates, **always use Open Office** or a free open access program which allows the same flexibility. **Do not use Microsoft Excel**. Templates must be saved as **Text CSV (.csv)**, encoded in **UTF-8**, with the **{Tab}** field separator and **no text separator** (Figure 2).

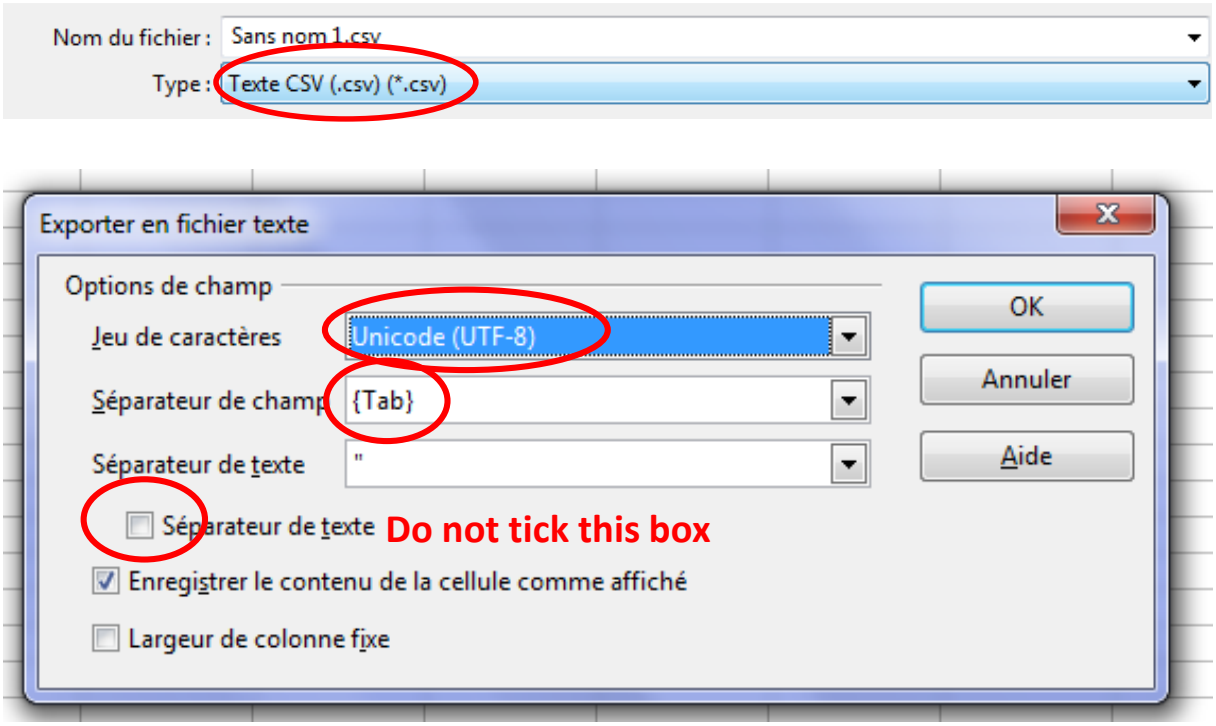


Figure 2. How to respect the format of the templates

2.2 Field experiment data templates

All of these templates are designed to insert data coming from field experiments. They could be plot, fauna, fauna trait or soil data. They were designed to match with a unique sampling. It means that it must gather data from a set of parcels, which are associated to a unique source (*e.g.* an article, a book) on a given time period.

When you want to insert some data coming from field experiments you **must** fill:

- the plot template (**MANDATORY**) which gives information on the sampled site(s) and the parcel(s).
- one of the two following templates : fauna or soil. Fauna template contains fauna data except trait data. Soil template contains soil data.

- the trait_experiment template is **NON MANDATORY**. It contains trait data which have been obtained from fauna samples informed in the fauna template. As a consequence, the insertion of the trait_experiment template requires the fauna template insertion.

Respect exactly the **format and universes** from the templates available on the server (csv and ods files available at Base de donnees/templates). Then fill them and delete the parts of the templates as indicated in the following procedures:

- for the plot, fauna, soil and trait _experiment template, delete the cross-shaped red area after filling the green areas with your data (Figure 3 & Figure 4)

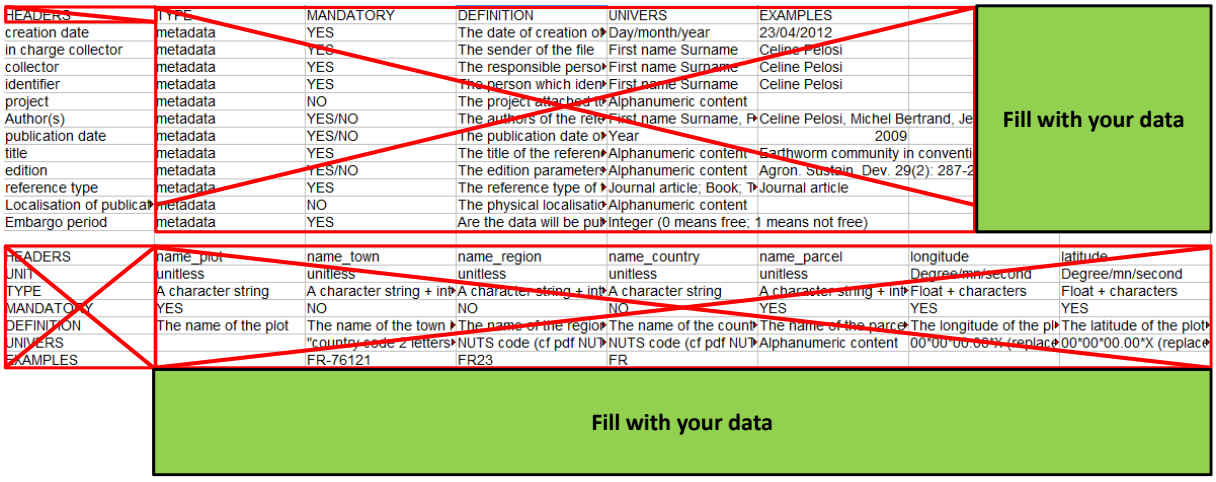
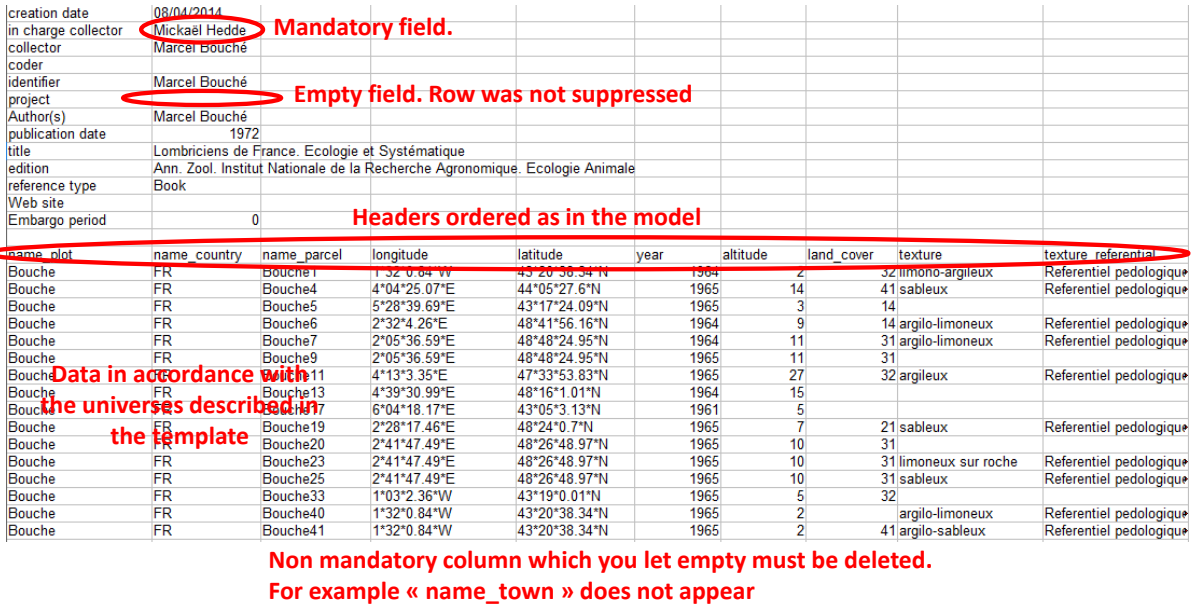


Figure 3. Procedure for deleting parts of the templates (plot, fauna and soil) after filling the green parts with your data

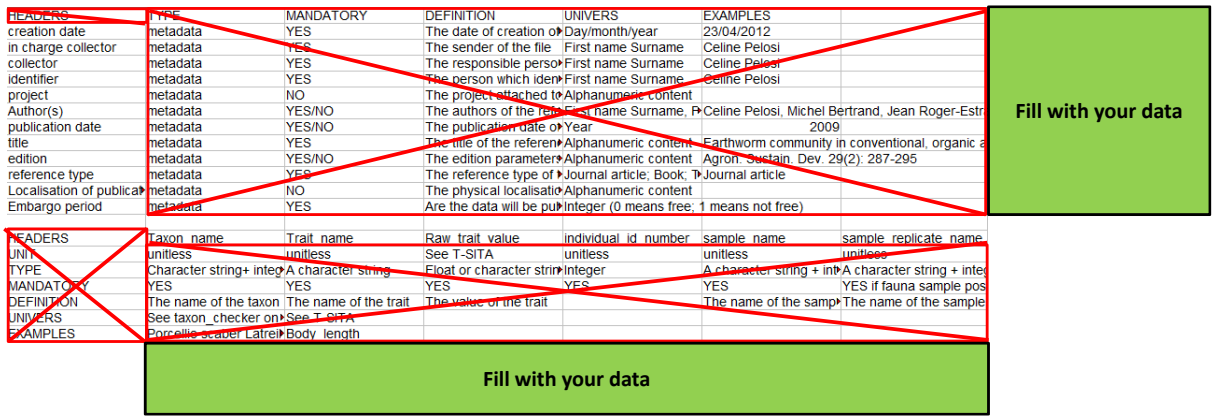


creation date	08/04/2014
in charge collector	Mickaël Hedde
collector	Marcel Bouché
coder	
identifier	Marcel Bouché
project	
Author(s)	Marcel Bouché
publication date	1972
title	Lombriciens de France. Ecologie et Systématique
edition	Ann. Zool. Institut Nationale de la Recherche Agronomique. Ecologie Animale
reference type	Book
Web site	
Embargo period	0

name_plot	name_country	name_parcel	longitude	latitude	year	altitude	land_cover	texture	texture_referential
Bouche	FR	Bouche1	1°32'0.84"W	43°26'38.34"N	1964	2	32	limono-argileux	Referentiel pedologique
Bouche	FR	Bouche4	4°04'25.07"E	44°05'27.6"N	1965	14	41	sableux	Referentiel pedologique
Bouche	FR	Bouche5	5°28'39.69"E	43°17'24.09"N	1965	3	14		
Bouche	FR	Bouche6	2°32'4.26"E	48°41'56.16"N	1964	9	14	argilo-limoneux	Referentiel pedologique
Bouche	FR	Bouche7	2°05'36.59"E	48°48'24.95"N	1964	11	31	argilo-limoneux	Referentiel pedologique
Bouche	FR	Bouche9	2°05'36.59"E	48°48'24.95"N	1965	11	31		
Bouche	FR	Bouche11	4°13'3.35"E	47°33'53.83"N	1965	27	32	argileux	Referentiel pedologique
Bouche	FR	Bouche13	4°39'30.99"E	48°16'1.01"N	1964	15			
Bouche	FR	Bouche17	6°04'18.17"E	43°05'3.13"N	1961	5			
Bouche	FR	Bouche19	2°28'17.46"E	48°24'0.7"N	1965	7	21	sableux	Referentiel pedologique
Bouche	FR	Bouche20	2°41'47.49"E	48°26'48.97"N	1965	10	31		
Bouche	FR	Bouche23	2°41'47.49"E	48°26'48.97"N	1965	10	31	limoneux sur roche	Referentiel pedologique
Bouche	FR	Bouche25	2°41'47.49"E	48°26'48.97"N	1965	10	31	sableux	Referentiel pedologique
Bouche	FR	Bouche33	1°03'2.36"W	43°19'0.01"N	1965	5	32		
Bouche	FR	Bouche40	1°32'0.84"W	43°20'38.34"N	1965	2		argilo-limoneux	Referentiel pedologique
Bouche	FR	Bouche41	1°32'0.84"W	43°20'38.34"N	1965	2	41	argilo-sableux	Referentiel pedologique

Figure 4. Example of a final plot template

- for the trait_experiment template, delete the cross-shaped red area after filling the green areas with your data (Figure 5 1 Figure 6)



HEADERS	TYPE	MANDATORY	DEFINITION	UNIVERS	EXAMPLES	
creation date	metadata	YES	The date of creation of	Day/month/year	23/04/2012	
in charge collector	metadata	YES	The sender of the file	First name Surname	Celine Pelosi	
collector	metadata	YES	The responsible perso	First name Surname	Celine Pelosi	
identifier	metadata	YES	The person which iden	First name Surname	Celine Pelosi	
project	metadata	NO	The project attached to	Alphanumeric content		
Author(s)	metadata	YES/NO	The authors of the ref	First name Surname, P	Celine Pelosi, Michel Bertrand, Jean Roger-Estr	
publication date	metadata	YES/NO	The publication date of	Year	2009	
title	metadata	YES	The title of the referen	Alphanumeric content	Earthworm community in conventional, organic a	
edition	metadata	YES/NO	The edition parameter	Alphanumeric content	Agron. Sustain. Dev. 29(2): 287-295	
reference type	metadata	YES	The reference type of t	Journal article; Book; T	Journal article	
Localisation of publica	metadata	NO	The physical localisatio	Alphanumeric content		
Embargo period	metadata	YES	Are the data will be pu	Integer (0 means free; 1 means not free)		

HEADERS	Taxon_name	Trait_name	Raw_trait_value	individual_id_number	sample_name	sample_replicate_name
UNIT	unitless	unitless	See T-SITA	unitless	unitless	unitless
TYPE	Character string+ integ	A character string	Float or character strin	Integer	A character string + int	A character string + integ
MANDATORY	YES	YES	YES	YES	YES	YES if fauna sample pos
DEFINITION	The name of the taxon	The name of the trait	The value of the trait		The name of the samp	The name of the sample
UNIVERS	See taxon_checker on	See T-SITA				
EXAMPLES	Porcellio scaber Latrei	Body_length				

Figure 5. Procedure for deleting parts of the trait_experiment template after filling the green parts with your data

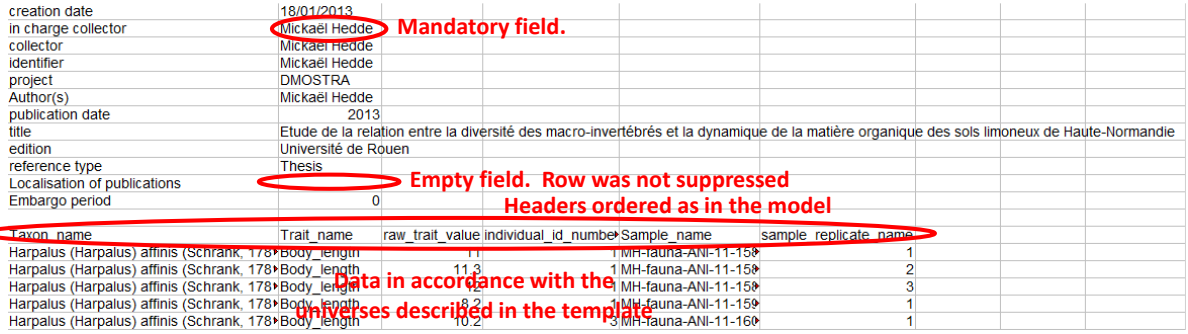


Figure 6. Example of a final trait_experiment template

Some additional advices are then given.

2.2.1 Metadata

see Figure 4 & Figure 6

- Metadata (first rows before the data matrix) must be **exactly** the same in all the templates coming from a same source (= one sampling)
- Fill the metadata fields in accordance with the **format** and **universe** given for each field. Sometimes no universe or format was specified for a column. Feel free to fill it with the content you want (alphanumeric content).
- Respect the **metadata box format**. You must fill all the mandatory fields. You can fill the non-mandatory fields. If some of them stay empty do not delete rows.
- Fill necessarily the **title** and **reference_type**. Fill the following fields: publication_date, edition and authors when the reference_type is: Journal article, Book, Thesis, Conference proceedings, Newspaper article, Book section, Magazine article, Edited book, Report, Manuscript, Conference paper or Classical works. If the reference_type is different from this list, you can fill these three fields but there are not mandatory any longer.

2.2.2 Data matrix

see Figure 4 & Figure 6

- Respect the **headers** of the columns and their **order**
- When a column is **mandatory** you are obliged to fill it. When a column is non-mandatory you can **delete** it but without changing the **order** of other columns.
- Fill the fields in accordance with the **format** and **universe** given for each field. Sometimes no universe or format was specified for a column. Feel free to fill it with the content you want (alphanumeric content)

2.2.2.1 Plot

GPS coordinates and town names

GPS coordinates must be expressed in the **WGS84 datum** in degree/minute/second. The format is then: 00°00'00.00''X where X is letter indicating a cardinal point. To facilitate the GPS coordinates management in the database, all the special characters must be replaced by *. The final format is then: **00*00*00.00*X**.

You can use google earth to find the GPS coordinates of your parcel. Before ticking off your parcel, please choose degree/minute/second in the window after clicking on Tools/Options (Figure 7).

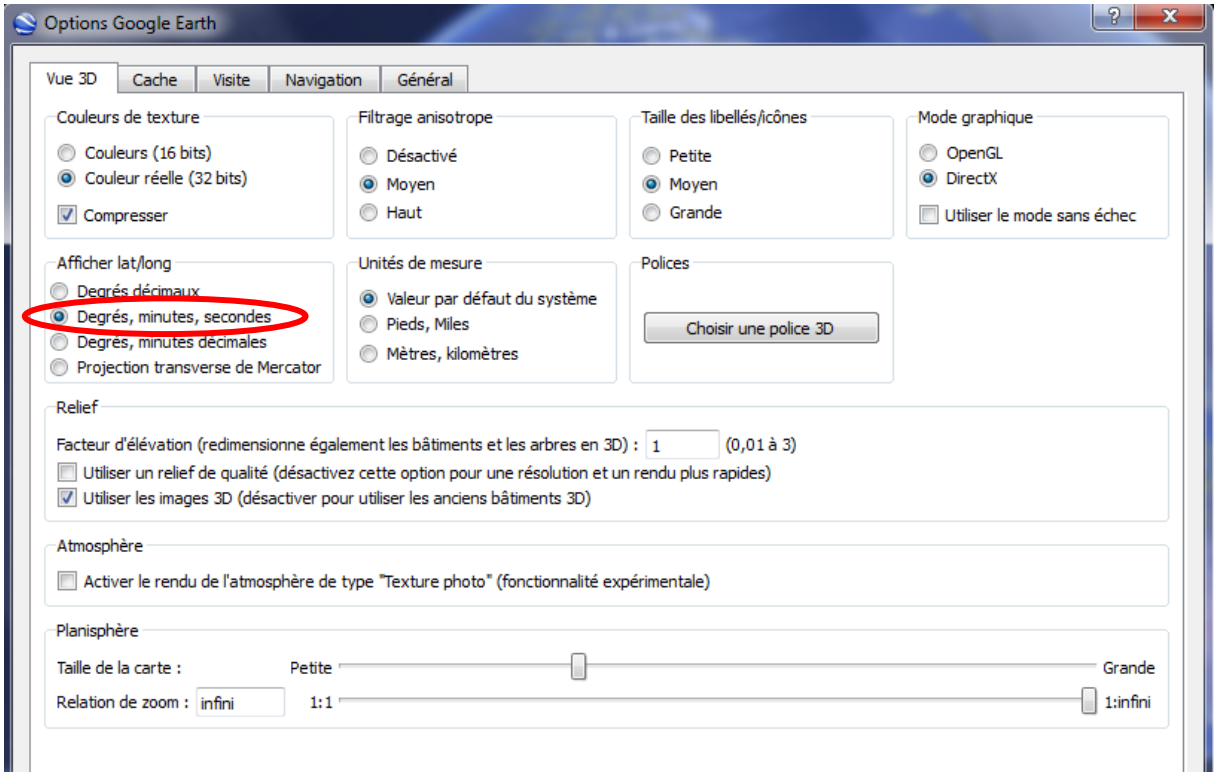


Figure 7. Window of options in google earth software

If you do not have the GPS coordinates of your parcel, enter the GPS coordinates of the centroid of the town including your parcel. You can then use the 'Geolocalisation' tool of the BETSI database interface following the path: Data template support/Geolocalisation. Construct a csv file (UTF-8, tab) with a vertical list of your town names, **only French town names are allowed**. Put a header entitled "town" (Figure 8) with a vertical list of your town names. Then upload it and click on the ok button.

A
town
Versailles
Rouen
Vandoeuvre-lès-nancy
Villeneuve d'Ascq
Montpellier

Figure 8. Example of a file of town names before checking by the town file to transform

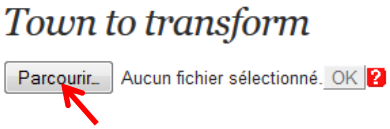


Figure 9. How to proceed with a file of town names before checking by the town file to transform

The produced file (Figure 10) contains your town name list on the left below the "town" header, the country/INSEE code (name_town in the template) below the "code" header and the longitude and latitude in the database format. If a cell is empty, it means either that the town name is not in the BETSI database or you write it with too many mistakes (*e.g.* accent).

A	B	C	D
town	code	longitude	latitude
Versailles	FR-78646	2*07*03.88*E	48*48*06.18*N
Rouen	FR-76540	1*05*31.82*E	49*26*27.16*N
Vandoeuvre-lès-nancy	FR-54547	6*09*51.49*E	48*39*27.98*N
Villeneuve d'Ascq	FR-59009	3*09*08.50*E	50*37*56.52*N
Montpellier	FR-34172	3*52*05.20*E	43*36*46.40*N

Figure 10. A file of town names after transformation by the town file to transform

The 'Geolocalisation' tool allows also you to obtain GPS coordinates and town names from country/INSEE codes.

Plot measures and year

Plot template contains information on sites and parcels on which fauna and soil samples have been done. Associated measures to a parcel can be there (*e.g.* temperature_chronic_mean_annual, land_cover). For each parcel, a year is needed. It indicates when these associated measures have been obtained. They are not constrained by the sampling period (cf. sample_date_start or sample_date_end of soil or fauna samples). It

can concern a different year of the sampling period. Furthermore, you can insert associated measures from different years for a same parcel. For example (Figure 11), in 1966, pluvio_chronic_mean_annual and temperature_chronic_mean_annual were measured for the parcel "Bouche1". In 1964, only pluvio_chronic_mean_annual was estimated. There could be only a unique measure per year. So if you enter another pluvio_chronic_mean_annual for the parcel "Bouche1" in 1964, only the last value inserted will be memorized.

name_plot	name_country	name_parcel	longitude	latitude	year	pluvio_chronic_mean_annual	temperature_chronic_mean_annual
Bouche	FR	Bouche1	1*32*0.84*W	43*20*38.34*N	1964	200	
Bouche	FR	Bouche1	1*32*0.84*W	43*20*38.34*N	1966	220	25

Figure 11. Example of the first columns of a plot template

The plot file must contain all the parcels and their mandatory measures, in which soil or fauna samples have been done.

2.2.2.2 Fauna/soil/trait_experiment

Sample names

Samples names (mandatory field sample_name or the combination of mandatory sample_name and non_mandatory sample_replicate_name if your replicate identifier is not included in your own sample_name) must be **unique** in the database. The best way to create unique samples names is to respect the following protocol:

- Put your **first initials** (first name, surname) at the beginning of the sample name
- Sample names must be different from the fauna template to the soil template. After the first initials, put **soil** if the sample concerns the soil template or **fauna** if the sample concerns the fauna template. Put then your **own identifier**. If your own identifier do not distinguish replicates of the same sample, put then the **replicate identifier.**

As a conclusion the final format is: First initial first name First initial surname – fauna or soil – own identifier – (replicate identifier).

For example, if I (Benjamin PEY) want to insert the following fauna sample whose I identified **BIOTECHNOSOL**, I will fill the sample_name field by: **BP-fauna-BIOTECHNOSOL** in the fauna template.

If I have two replicates for this sample, I have two solutions: either I include my replicate identifier in my sample_name: **BP- fauna -BIOTECHNOSOL-1** and **BP- fauna -**

BIOTECHNOSOL-2 and I do not fill the sample_replicate_name column (Figure 12). Or I fill two rows with the same sample_name **BP- fauna -BIOTECHNOSOL** but I fill the sample_replicate_name by **1** on for first row and by **2** for the second row (Figure 12). In both cases, the two replicates must be deployed on two distinct rows.

sample_name	sample_replicate_name
BP-fauna-BIOTECHNOSOL	1
BP-fauna-BIOTECHNOSOL	2

sample_name	sample_replicate_name
BP-fauna-BIOTECHNOSOL-1	
BP-fauna-BIOTECHNOSOL-2	

Figure 12. Examples of creation of sample names

Samples names must be **identical** between fauna template and trait_experiment template in so far as trait data from trait_experiment template are obtained from specimens coming from the fauna samples.

Taxonomy

The taxonomy used in the BETSI database results from the assembly of several taxonomies such as Fauna Europeae, Taxref and Blackmore. The taxon names in your templates must be exactly the same as those in the database. To test if your name is correct you have two solutions. First you can check taxon name one by one by the **taxon checker**. Go to the Data Request/Taxon checker by the BETSI database interface. Then click on the empty field. Type the first letters of the taxon and then select it on the list. When clicking on it, it appears in the field separated by a semicolumn. Following the semicolumn, you can type another first letters of another taxon and select it on the list (Figure 13).

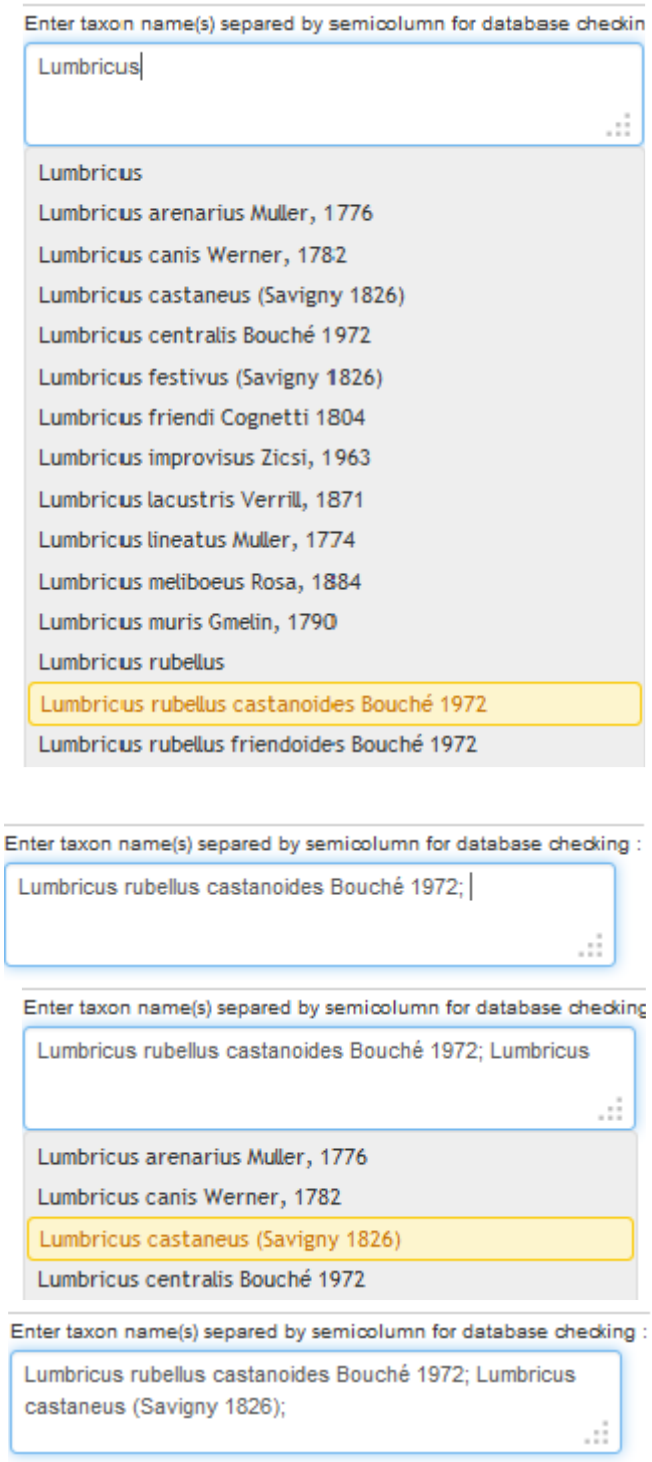


Figure 13. Operating of the taxon checker box

The second way allows checking several taxons in one go. Construct a csv file (UTF-8, tab) with a vertical list of your taxon names. Put a header entitled “Taxon_name” (Figure 14).

A	B
Taxon_name	
Amara (Amara) tibialis (Paykull 1798)	
Nebria (Nebria) salina Fairmaire & Laboulbène 1854	
Nebria (Nebria) brevicollis (Fabricius 1792)	
Notiophilus rufipes Curtis 1829	
Trechus (Trechus) quadristriatus (Schrank 1781)	
Stomis (Stomis) pumicatus (Panzer 1796)	
Poecilus (Poecilus) cupreus (Linnaeus 1758)	
Poecilus (Poecilus) versicolor (Sturm 1824)	
Poecilus (Macropoecilus) kugelanni (Panzer 1797)	
Calathus (Neocalathus) melanocephalus (Linnaeus 1758)	
Amara (Amara) communis (Panzer 1797)	
Amara (Amara) aenea (De Geer 1774)	
Anisodactylus (Anisodactylus) binotatus (Fabricius 1787)	
Pseudoophonus (Pseudoophonus) rufipes (De Geer 1774)	
Harpalus (Harpalus) affinis (Schrank 1781)	
Harpalus (Harpalus) tardus (Panzer 1797)	

Figure 14. Example of a file of taxon names before checking by the taxon file to transform

Then upload it by the taxon file to transform and click on the ok button (Figure 15). A file will be produced. Open it.

Figure 15. How to proceed with a file of taxon names before checking by the taxon file to transform

The produced file (Figure 16) contains your taxon name list on the left below the "taxon_name_original" header and the corresponding taxon name in the BETSI database below the "taxon_name_corrected". If a cell is empty, it means either that the taxon_name is not in the BETSI database or you write it with too many mistakes (*e.g.* punctuation). Please check it on the taxon_checker to find a synonymous or your mistake.

A	B
taxon_name_original	taxon_name_corrected
Amara (Amara) tibialis (Paykull 1798)	Amara (Amara) tibialis (Paykull, 1798)
Nebria (Nebria) salina Fairmaire & Laboulbène 1854	
Nebria (Nebria) brevicollis (Fabricius 1792)	Nebria (Nebria) brevicollis (Fabricius, 1792)
Notiophilus rufipes Curtis 1829	Notiophilus rufipes Curtis, 1829
Trechus (Trechus) quadristriatus (Schrank 1781)	Trechus (Trechus) quadristriatus (Schrank, 1781)
Stomis (Stomis) pumicatus (Panzer 1796)	Stomis (Stomis) pumicatus (Panzer, 1796)
Poecilus (Poecilus) cupreus (Linnaeus 1758)	
Poecilus (Poecilus) versicolor (Sturm 1824)	Poecilus (Poecilus) versicolor (Sturm, 1824)
Poecilus (Macropoecilus) kugelanni (Panzer 1797)	Poecilus (Macropoecilus) kugelanni (Panzer, 1797)
Calathus (Neocalathus) melanocephalus (Linnaeus 1758)	
Amara (Amara) communis (Panzer 1797)	Amara (Amara) communis (Panzer, 1797)
Amara (Amara) aenea (De Geer 1774)	Amara (Amara) aenea (De Geer, 1774)
Anisodactylus (Anisodactylus) binotatus (Fabricius 1787)	Anisodactylus (Anisodactylus) binotatus (Fabricius, 1787)
Pseudoophonus (Pseudoophonus) rufipes (De Geer 1774)	Pseudoophonus (Pseudoophonus) rufipes (De Geer, 1774)
Harpalus (Harpalus) affinis (Schrank 1781)	Harpalus (Harpalus) affinis (Schrank, 1781)
Harpalus (Harpalus) tardus (Panzer 1797)	Harpalus (Harpalus) tardus (Panzer, 1797)

Figure 16. A file of taxon names after transformation by the taxon file to transform

Remark: **Do not use** taxon_names coming from the Fauna Europeae website, because punctuation was not similar as those of the BETSI database.

Methods

We advise you to insert as much as you can a **unique combination of extraction_type, sampling_strategy, chemical_product, soil_extraction** fields for each soil or fauna template.

Indeed, the fauna template must have **different** couple of **extraction_type** and **sampling_strategy** fields (e.g. chemical_extraction/random or Pitfall trap /transect). But for a couple, **chemical_product** and **soil_extraction** fields must be **unique**. In other words, you cannot insert in a same template fauna, samples made for example by chemical_extraction/random but with two chemical products (formalin et AITC). You have to insert them on two different templates.

It is also true for the soil template. Insert as many extraction_type and sampling_strategy fields couple you want but with a unique chemical_product and soil_extraction fields couple each.

Trait measurements

The trait_experiment template allows you to insert trait measures of the fauna individuals you sampled. The trait for which you did some measures must be described in the **T-SITA** (Thesaurus for Soil Invertebrate Trait-based Approaches). To check if it exists in it, go the Data Request/Trait by the BETSI database interface. It must appear in the **numerous** trait part. Please put the **exact label** of the trait from this interface in your template (*e.g.* Body_length but not Body length or Body-length, Figure 17).

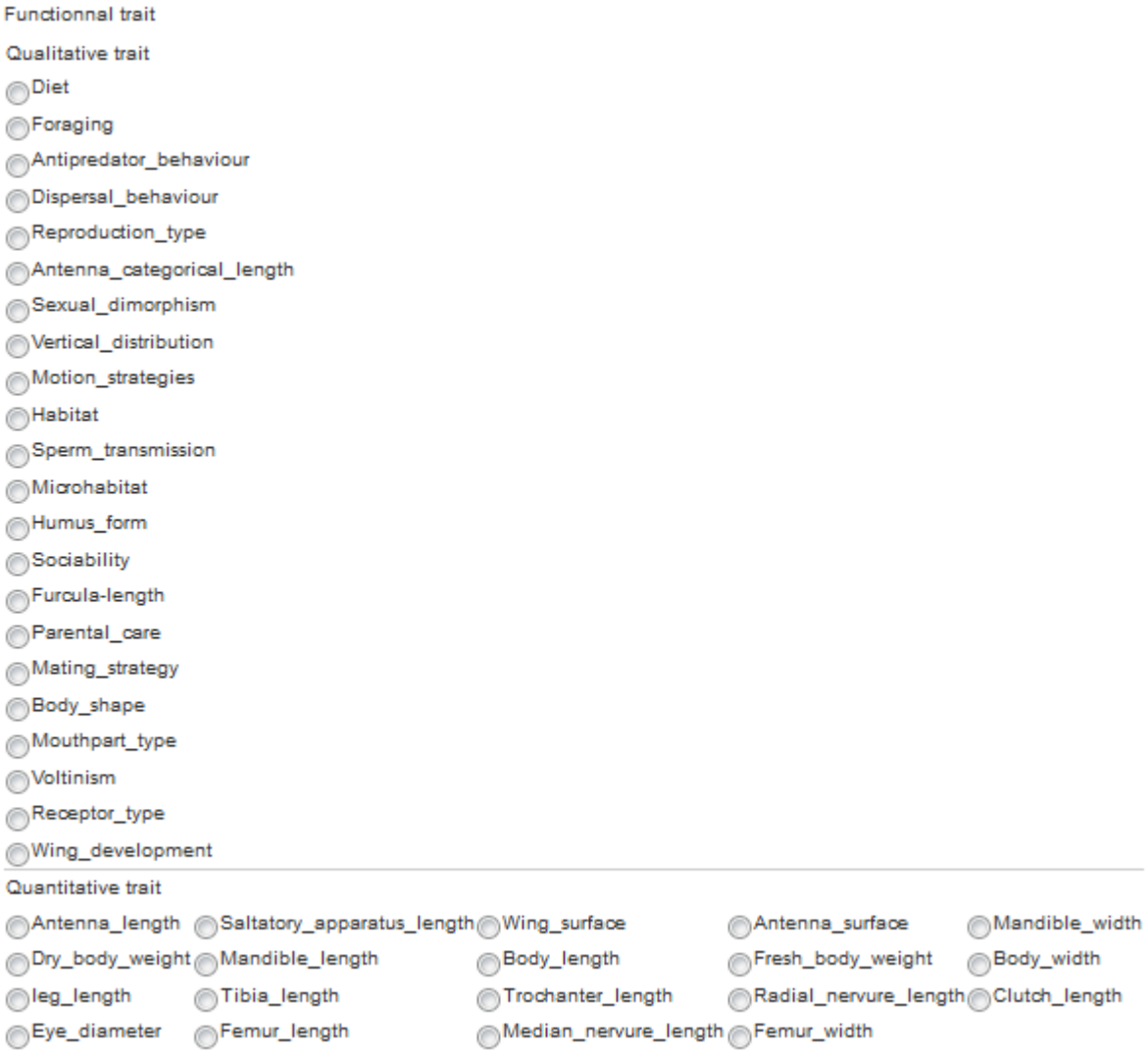


Figure 17. List of traits available on the BETSI database interface (Data request/Trait data)

One crucial thing to understand is that all the **sample names** (or combination of sample_name and sample_replicate_name, see sample_names part above) you entered in this template must correspond to the sample_names you enter in the fauna template. Indeed, the trait measures were done on individuals coming from fauna samples. Finally, for a same sample, you could have measured the same trait on several individuals. To contribute to the uniqueness of your measures, please enter the individual_id_number. In our example, the user has measured the body_lenght of two individuals of Harpalus (Harpalus) affinis (Schrank, 1781) from a same sample MH-fauna-ANI-11-158-1 (Figure 18).

Taxon_name	Trait_name	raw_trait_value	individual_id_number	Sample_name	sample_replicate_name
Harpalus (Harpalus) affinis (Schrank, 1781)	Body_length	11	1	MH-fauna-ANI-11-158	1
Harpalus (Harpalus) affinis (Schrank, 1781)	Body_length	11.3	2	MH-fauna-ANI-11-158	1
Harpalus (Harpalus) affinis (Schrank, 1781)	Body_length	12	1	MH-fauna-ANI-11-158	2
Harpalus (Harpalus) affinis (Schrank, 1781)	Body_length	8.2	2	MH-fauna-ANI-11-158	2
Harpalus (Harpalus) affinis (Schrank, 1781)	Body_length	10.2	1	MH-fauna-ANI-11-159	1

Figure 18. Example of a trait_measurement template

2.2.3 Back-up

Before inserting, please name all of your templates following the format:

Date of dispatch_Creator name_Plot name_template nature.csv

Ex : 130121_Pelosi_LaCage_plot.csv

130121_Pelosi_LaCage_fauna.csv

130121_Pelosi_LaCage_soil.csv

130121_Pelosi_LaCage_trait_experiment.csv

2.3 Literature trait data template

Trait_literature template is designed to insert trait data which have no enough details (how much individuals were measured, location of samples) to be inserted by the field experiment templates (see above). This template has been designed to insert both numerical and textual information about traits from different sources.

Respect exactly the **format and universes** from the template available on the server (csv and ods files available at Base de donnees/templates). Then fill it and delete the parts of the template as indicated in the following procedure. Delete the cross-shaped red area after filling the green areas with your data (Figure 19 & Figure 20).

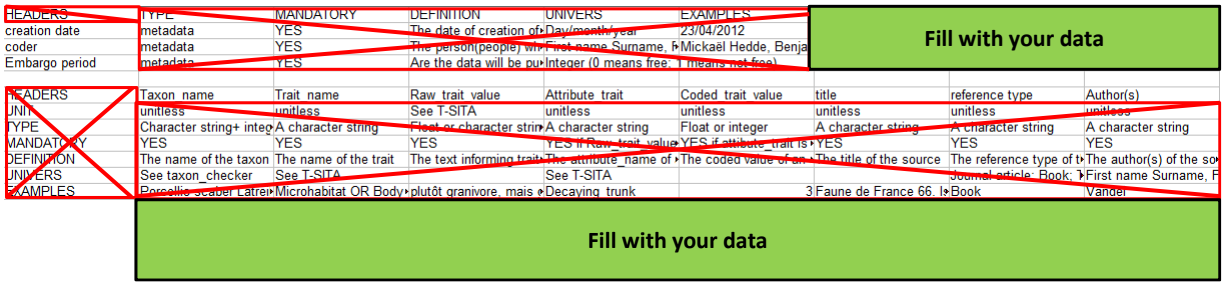


Figure 19. Procedure for deleting parts of the trait_literature template after filling the green parts with your data

creation date	30/09/2013						
coder	Florence Dubs						
taxon_name	Trait_name	Raw_trait_value	Attribute_trait	Coded_trait_value	title	reference type	Author(s)
Porcellio scaber Latreille, 1804	Microhabitat	Très commune dansles régions littorales	Ant_hill	2	Faune de France 66. Isopodes Terrestres	Book	Vandel
Oniscus asellus Linnaeus, 1758	Microhabitat	Biotope représenté pasr les forêts de ba	Anthropic_detritus	2	Faune de France 66. Isopodes Terrestres	Book	Vandel
Oniscus asellus Linnaeus, 1758	Microhabitat	0. asellusis a wide-ranging species stro	Anthropic_detritus	2	Woodlice in britain and Ireland Distributior	Book	Harding & Sutton
Philoscia muscorum (Scopoli, 1763)	Microhabitat	It has a strong preference for grassy site	Anthropic_detritus	2	Woodlice and waterlice in Britain and Irela	Book	Gregory
Porcellio scaber Latreille, 1804	Microhabitat	Très commune dansles régions littorales	Anthropic_detritus	2	Faune de France 66. Isopodes Terrestres	Book	Vandel
Ligidium hypnorum (Cuvier, 1792)	Microhabitat	This hygrophilous species thrives in wat	Decaying_trunk	2	Woodlice and waterlice in Britain and Irela	Book	Gregory
Oniscus asellus Linnaeus, 1758	Microhabitat	Biotope représenté pasr les forêts de ba	Decaying_trunk	2	Faune de France 66. Isopodes Terrestres	Book	Vandel
Oniscus asellus Linnaeus, 1758	Microhabitat	Tolerant of a very wide range of condition	Decaying_trunk	3	Woodlice	Book	Oliver, Meechan
Oniscus asellus Linnaeus, 1758	Microhabitat	0. asellusis a wide-ranging species stro	Decaying_trunk	2	Woodlice in britain and Ireland Distributior	Book	Harding & Sutton
Oniscus asellus Linnaeus, 1758	Microhabitat	Found under dead logs, dead leaves, an	Decaying_trunk	2	Monographs on the Isopods of North Amer	Book	Harriet
Philoscia muscorum (Scopoli, 1763)	Microhabitat	Fort ubiquiste, elle est surtout commun	Decaying_trunk	2	Faune de France 66. Isopodes Terrestres	Book	Vandel
Philoscia muscorum (Scopoli, 1763)	Microhabitat	This species is characteristic of ungraz	Decaying_trunk	2	Woodlice in britain and Ireland Distributior	Book	Harding & Sutton
Philoscia muscorum (Scopoli, 1763)	Microhabitat	It has a strong preference for grassy site	Decaying_trunk	2	Woodlice and waterlice in Britain and Irela	Book	Gregory
Porcellio scaber Latreille, 1804	Microhabitat	Diverse, in most habitat types including	Decaying_trunk	3	Woodlice	Book	Oliver, Meechan
Porcellio scaber Latreille, 1804	Microhabitat	It was found along the shores of lakes a	Decaying_trunk	3	Biology of the Isopoda of Michigan	Book	Hatchett
Porcellio scaber Latreille, 1804	Microhabitat	It is widely distributed and abundant, fou	Decaying_trunk	3	Woodlice in britain and Ireland Distributior	Book	Harding & Sutton
Porcellio scaber Latreille, 1804	Microhabitat	In woodland, grazed grassland and heat	Decaying_trunk	2	Woodlice and waterlice in Britain and Irela	Book	Gregory
Porcellio scaber Latreille, 1804	Microhabitat	Found under dead leaves and stumps, u	Decaying_trunk	2	Monographs on the Isopods of North Amer	Book	Harriet
Trichoniscus pusillus Brandt, 1833	Microhabitat	Favoured sites include supralittoral coas	Decaying_trunk	2	Woodlice and waterlice in Britain and Irela	Book	Gregory
Trichoniscus pusillus Brandt, 1833	Microhabitat	Humicole typique qui se rencontre dans	Decaying_trunk	2	Faune de France 64. Isopodes Terrestres	Book	Vandel
Philoscia muscorum (Scopoli, 1763)	Microhabitat	It has a strong preference for grassy site	Faeces	2	Woodlice and waterlice in Britain and Irela	Book	Gregory

Figure 20. Example of a final trait_literature template

2.3.1 Metadata

- When you fill the coder field, please respect carefully the **format** "first name surname". If coders are two or more separate them by a comma and order them **alphabetically**.
- Please carefully respect **format** and **universe** of metadata fields. If not, data doubloon can be produced. For example if you enter your name as "Benjamin PEY" for information A and you enter the same information A later in another template with another name format "B. PEY", data will be duplicated.
- **Embargo period** (years) allows you to make private the data of your template for the year number you enter from the creation date of your template. During this period, only you have access to the data of the template. After this period, data will be free-available for all users of the BETSI database.

2.3.2 Data matrix

- Respect the **headers** of the columns and their **order**
- When a column is **mandatory** you are obliged to fill it. When a column is non-mandatory **do not delete it** event if it stays empty.
- The trait for which you want to insert some measures must be described in the T-SITA (Thesaurus for Soil Invertebrate Trait-based Approaches). To check if it exists go the Data Request/Trait by the BETSI database interface. It must appear in the **numerous** or **textual** trait parts. Please put the **exact label** of the trait from this interface in your template (*e.g.* Body_length but not Body length or Body-length)
- Remember that each row must contain fields of the source (title, authors…) which identify from which source, data have been derived for informing traits. Fill necessarily the **title** and **reference_type**. Fill the following fields: publication_date, edition and authors when the reference_type is: Journal article, Book, Thesis,

Conference proceedings, Newspaper article, Book section, Magazine article, Edited book, Report, Manuscript, Conference paper or Classical works. If the reference_type is different from this list, you can fill these three fields but there are not mandatory any longer.

- Fill the fields in accordance with the **format** and **universe** given for each field.
- **Trait units** are available in the T-SITA at the following URL: http://t-sita.cesab.org/Thesauform/BETSI_viz.jsp

When you deal with **numerical** traits, please fill all the fields except the "attribute_trait" and the "coded_trait_value" which must be empty (Figure 21). The "Raw_trait_value" field corresponds to the **value** of the numerous trait. Usually one source can present two values for a same trait by taxon (for example Bouché's book presents a minimum and a maximum body length for a species). Insert one value by row by taxon_name/trait couple. As a consequence if you have two values, insert them on two different rows. In our example, we insert two body lengths (50 and 30) for Ailoscolex lacteospumosus Bouché, 1969 coming from the same source (Bouché, 1972) (invisible on the screen capture, Figure 21).

creation date	09/09/2013			
coder	Benjamin Pey, Mickael Hedde			
Taxon_name	Trait_name	Raw_trait_value	Attribute_trait	Coded_trait_value
Ailoscolex lacteospumosus Bouché, 1969	Body_length	50		
Ailoscolex lacteospumosus Bouché, 1969	Body_length	30		
Ailoscolex lacteospumosus Bouché, 1969	Fresh_body_weight	550		
Ailoscolex lacteospumosus Bouché, 1969	Fresh_body_weight	350		
Ailoscolex lacteospumosus Bouché, 1969	Body_width	9		
Ailoscolex lacteospumosus Bouché, 1969	Body_width	3		
Allolobophora (Gatesona) chaetophora chaetophora Bouché, 1972	Body_length	190		
Allolobophora (Gatesona) chaetophora chaetophora Bouché, 1972	Body_length	170		

Figure 21. Example of a trait_literature template with numerous traits

When you deal with a **textual** trait, fill all the fields (Figure 22). The "Raw_trait_value" field corresponds to the original text. This text informs one or several attributes of a trait. By analogy with several values for numerical traits, insert **one row by attribute** for a couple taxon_name/trait. In our example the same text informs the "litter" and "decaying_trunk" attributes of the "microhabitat" trait for Ligidium hypnorum (Cuvier, 1792). Search **exact labels of attributes** on the BETSI database interface (Data request/Trait) by clicking on textual traits. All the hierarchical attributes of a trait appear (Figure 23). Then put the **coded value** of each attribute. Fuzzy coding rules are available on the FTP server (see above).

To summarize, in a template and so on for a same coder or a unique coders assembly, several rows can have the same taxon_name, trait_name, raw_trait_value and source fields

(title, reference_type, edition, publication_date, authors) but cannot possess the same attribute_trait. This avoids that a same coder/unique coders assembly codes information about a trait twice. Otherwise two different coders/ unique coders assembly (necessarily from two templates as one template can have only one coder/coder assembly) can code the same information (same source) about the same trait for a taxon_name.

creation date	30/09/2013			
coder	Florence Dubs			
taxon_name	Trait_name	Raw_trait_value	Attribute_trait	Coded_trait_value
Ligidium hypnorum (Cuvier, 1792)	Microhabitat	This hygrophilous species thrives in waterlogged habitats and is tolerant of temp	Decaying_trunk	2
Ligidium hypnorum (Cuvier, 1792)	Microhabitat	This hygrophilous species thrives in waterlogged habitats and is tolerant of temp	Litter	2
Ligidium hypnorum (Cuvier, 1792)	Microhabitat	Bord de ruisseaux et des mares, les marécages, les mousses humides etc. Ab	Moss	3
Ligidium hypnorum (Cuvier, 1792)	Microhabitat	Autour des habitations, dans les jardins et dans les forêts humides sous la mou	Moss	3
Ligidium hypnorum (Cuvier, 1792)	Microhabitat	This hygrophilous species thrives in waterlogged habitats and is tolerant of temp	Moss	2
Philoscia muscorum (Scopoli, 1763)	Microhabitat	Fort ubiquiste, elle est surtout commune dans les bois sous les écorces, les m	Moss	2
Trichoniscus pusillus Brandt, 1833	Microhabitat	Endroits très humides mousse humide des forêts, autour de fontaines, sources	Moss	3

Figure 22. Example of a trait_literature template with a textual trait

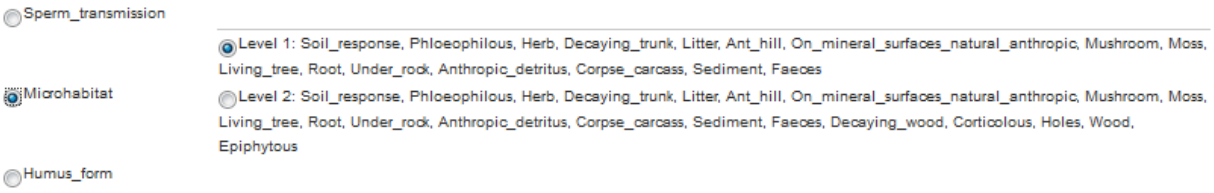


Figure 23. Hierarchized categories of the textual « microhabitat » trait

You can fill both numerical and textual traits in a same template.

2.3.3 Back-up

Please name all of your templates following the format:

Date of dispatch_Creator_trait_literature.csv

Ex : 130121_Pelosi_trait_literature.csv

2.4 Template insertion

When you have put your data into the templates, please contact a BETSI database administrator. He will check that all your templates are correct and then insert them into the database.

Contacts: mickael.hedde@versailles.inra.fr

benjamin.pey@versailles.inra.fr

2.5 Data mistakes

After insertion, if you realize that you have made a mistake or you have forgotten to put some information in your template(s), do not worry.

Correct or add/suppress the data in the template(s), except if your mistakes concern the **creation_date**, **collector** or **parcel_name** fields for the field experiment templates and the **creation_date** and **coder** fields for the trait_literature template. When correcting your template(s) please entirely **conserve the previous right data**.

When correction is done, rename your templates exactly as previously but change the insertion date by the new one (except if you correct the template the same day you insert those with mistakes). Then contact a BETSI database administrator again. He will check that all your templates are correct and then insert them into the database. All of your data will be deleted and replaced by the new ones in the new inserted template(s). Again, that is why it is crucial to **conserve the previous right data** in your new corrected templates.

If you made a mistake on the **creation_date**, **collector**, **coder** or **parcel_name** fields please contact first a BETSI database administrator before modifying your templates. Modifications of such fields require other protocols.

In fact, before each data reinsertion, all of your data will be deleted and replaced by the new ones in the new inserted template(s) except for: the **creation_date**, **collector**, and **parcel_names** fields for the field experiment templates and the **creation_date** and **coder** fields for the trait_literature template.

Futhermore, **measures** characterizing the parcels (*e.g.* pluvio_chronic_mean_annual, land_cover) were deleted and replaced only if you do not change the corresponding year of the parcel (template plot). Indeed, if you change only the associated measures for a parcel and not the year field, old data will be replaced by the new ones. But if you change the year field of a parcel, **new data will be added but old data will not be deleted**. That mechanism allows having several values of a same measure on several years for a unique parcel (*e.g.* several land_use on several years for a parcel). For deleting **old data of a parcel**, please contact a BETSI database administrator.

3 Request database

Four kinds of requests exist in the database:

- The first one aims at consulting some of the **field experiment data** on fauna (no trait data) and soil data by browsing a **map**.
- The second one aims at consulting the **field experiment data** on fauna (no trait data), soil data and measurement of traits of individuals.
- The third one aims at consulting all the **trait data**. Those data come from literature and from field experiments measurements of trait and of soil.
- The fourth aims at requesting the **taxonomy**

3.1 Field experiment data map exploration

This kind of request aims at exploring some of the data coming from field experiments. Each sample (soil/fauna) inserted in the BETSI database must be linked to a parcel which must have some GPS coordinates. As consequence, each sample is geolocalised.

Go to data “exploration map” by the BETSI database interface. You can then visualize all samples of the BETSI database on a map (Figure 24).

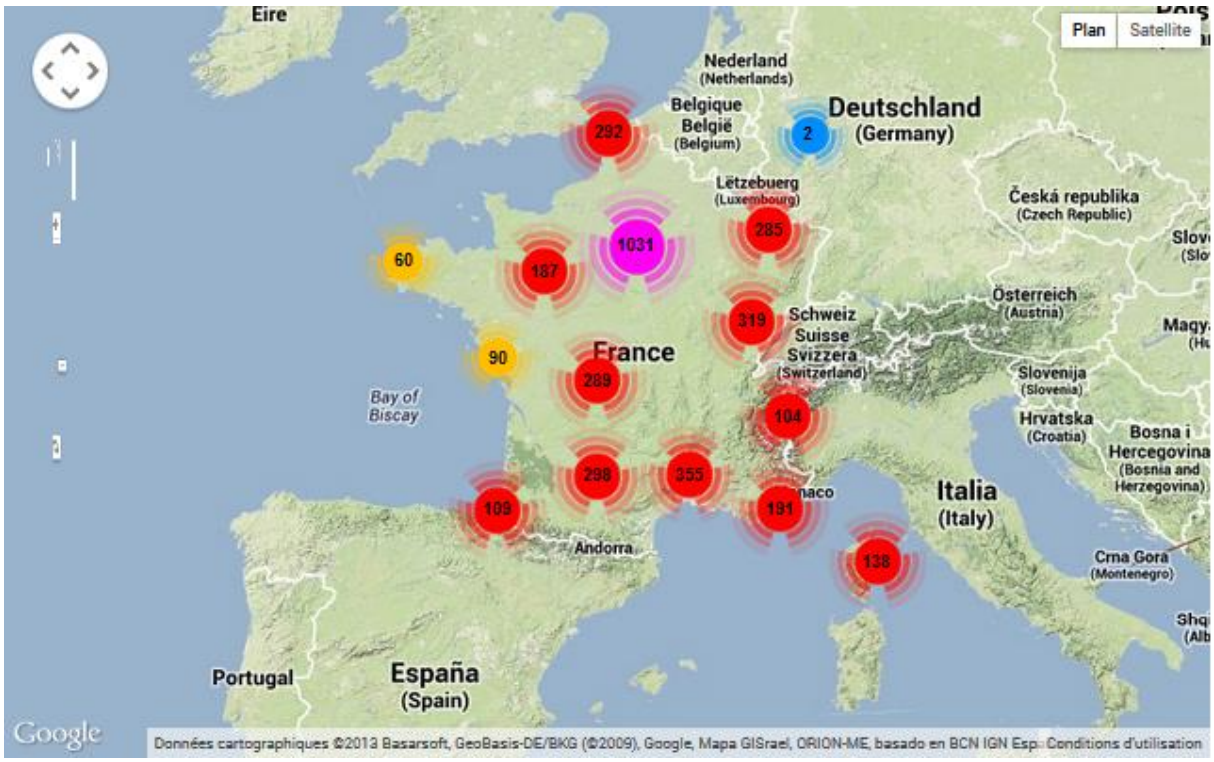


Figure 24. Visualization of samples of the BETSI database on a map

Zoom as much as you can on an entity point on the map. Then if you click on it a window appears. It indicates the details of the samples located at this point. The number is the internal identifier of the sample in the database. When the sample is red written, it is a soil sample. When it is green written it is a fauna sample (Figure 25).

Figure 25. Entity point of the representation of BETSI database samples on the map

If you click on it, a new tab appears. It gives you some information about this sample (Figure 26 & Figure 27).

Metadata

In charge collector :	*Marcel Bouché*
Collector :	*Marcel Bouché*
Creation date :	*07/10/2013*
Source :	*Marcel Bouché (1972) Lombriciens de France. Ecologie et Systématique Ann. Zool. Institut Nationale de la Recherche Agronomique. Ecologie Animale. 671 p.*
Latitude :	*1°03'30.57"E*
Longitude :	*46°09'39.42"N*
Plot :	*Bouche*
Parcel :	*Bouche685*
Town :	*Unknown*
Region :	*Unknown*
Sampling date start :	*21/04/1968*
Sampling date end :	*21/04/1968*
Extraction type :	*soil hand sorting*
Sample layer :	*TS*
Soil extraction :	*yes*
Chemical product :	*no*

Soil invertebrate

Octolasium cyaneum (Savigny 1826)
Aporrectodea giardi giardi (Ribeaucourt, 1910)
Lumbricus friendi Cognetti 1804
Lumbricus castaneus (Savigny 1826)
Aporrectodea caliginosa caliginosa (Savigny 1826)

Figure 26. Information given by the map exploration for a fauna sample (green written)

Metadata

In charge collector :	*Marcel Bouché*
Collector :	*Marcel Bouché*
Creation date :	*07/10/2013*
Source :	*Marcel Bouché (1972) Lombriciens de France. Ecologie et Systématique Ann. Zool. Institut Nationale de la Recherche Agronomique. Ecologie Animale. 671 p.*
Latitude :	*1°03'30.57"E*
Longitude :	*46°09'39.42"N*
Plot :	*Bouche*
Parcel :	*Bouche685*
Town :	*Unknown*
Region :	*Unknown*
Sampling date start :	*21/04/1968*
Sampling date end :	*21/04/1968*
Extraction type :	*soil hand sorting*
Sample layer :	*TS*

Parcel measures

vegetation (unitless):	*Pelouse pâturée par des moutons*
texture_referential (unitless):	*Referentiel pedologique français*
texture (unitless):	*sableux*
land_cover (unitless):	*32*
altitude (m):	*23*

Soil measures

NA (g kg-1):	*9*
Nitrogen (g kg-1):	*3.36*
Organic carbon (g kg-1):	*31.4*
pH (unitless):	*5.3*

Figure 27. Information given by the map exploration for a soil sample (red written)

3.2 Field experiment data request

This kind of request aims at exploring data coming from field experiments. Data will be presented **by parcel** and **by year** you select. Additionally, you can request data from these parcels. Furthermore, you can request fauna (taxonomical inventories or measured trait values from sampled specimens) and soil data sampled in these parcels.

To perform a request on field experiment data, go to Data **Request/Experiment** by the BETSI database interface.

To run a request, you have to select **at least one taxon**, **one contribution type** and one **data integration type** (Figure 28). **Taxons** can be selected by ticking one or several boxes of soil invertebrate groups or/and by selecting one or several taxon(s) in the "Enter taxon name(s) separated by semicolumn" box. This box works as the taxon_checker previously described (see part 2.2.2.2 taxonomy). The **contribution type** indicates the way that fauna from samples was estimated. For example, activity means that fauna came from samples that estimated fauna by their activities. It must be fauna coming from pitfall traps. Finally, the **integration type** let you the choice of the way you want that fauna data (no trait data) for a parcel and a year will be integrated for the request display.

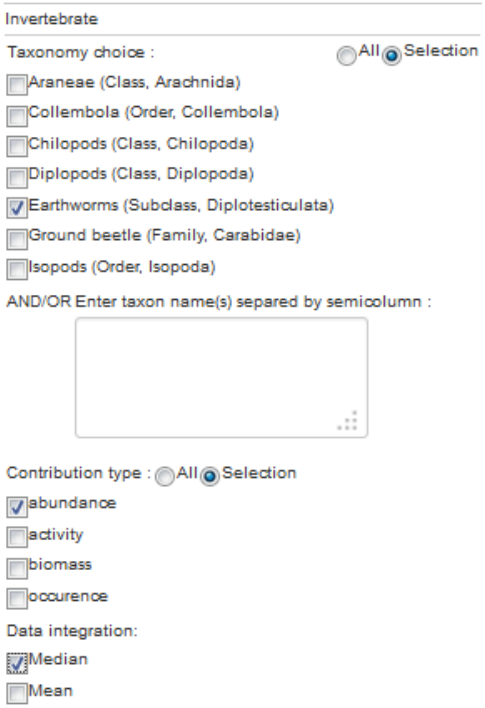


Figure 28. Taxon, contribution type and data integration type mandatory choices during the request procedure

Then you have to select the year(s) you are interested in. Please **do not** request on **all years** by default. Then you can select some **soil data** (Figure 29).

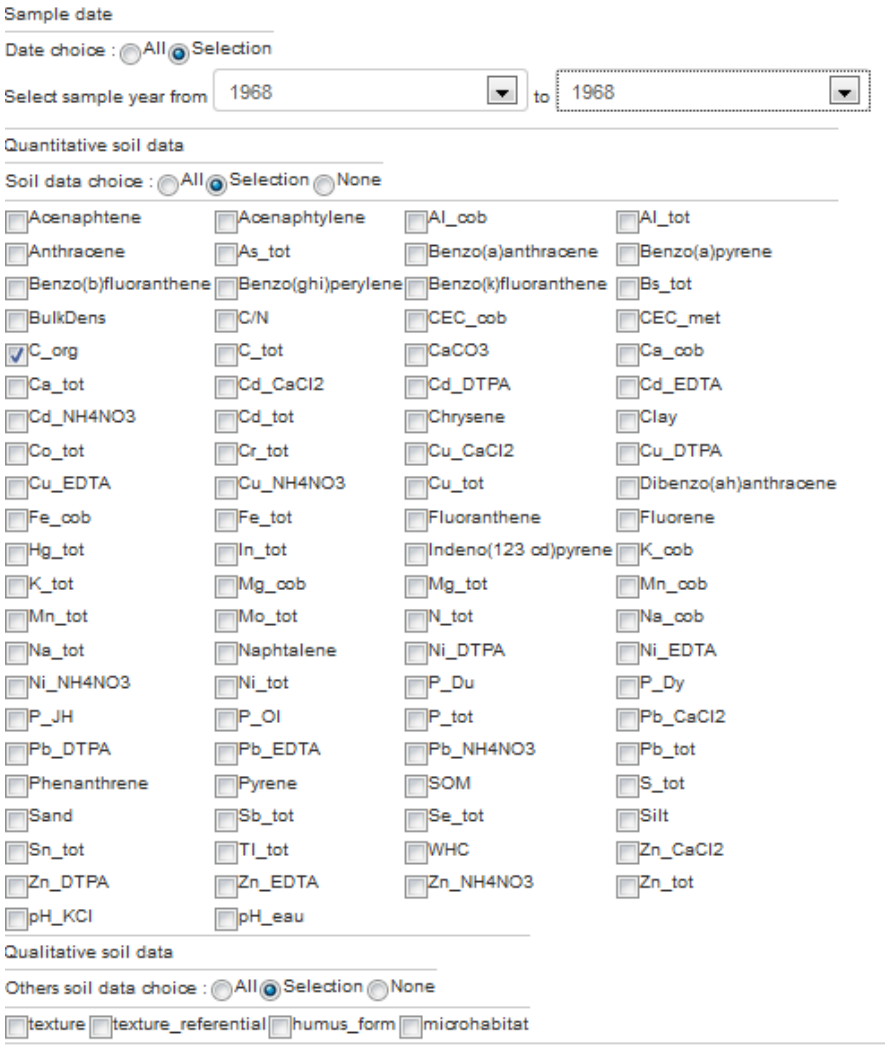


Figure 29. Years and soil data choices during the request procedure

Then you can select **data associated to the parcels**. Finally you can select **trait data** measured from the fauna samples of the parcel(s) sampled during the year and for the soil invertebrates groups you selected (Figure 30).

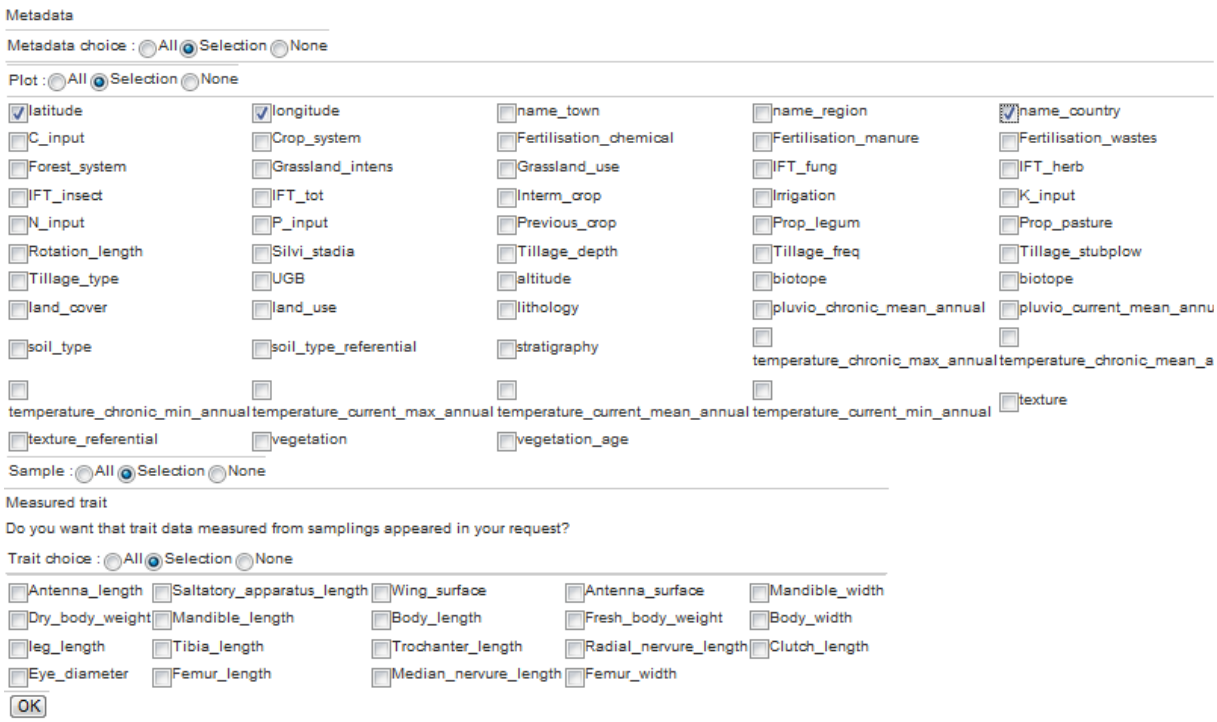


Figure 30. Parcels data and trait measurements data choices during the request procedure

When done, click on the “Ok” button. A window appears. Open or save the file, it is the result of your request (Figure 31). It presents by parcel and by year, all of the data you previously selected (Figure 32).

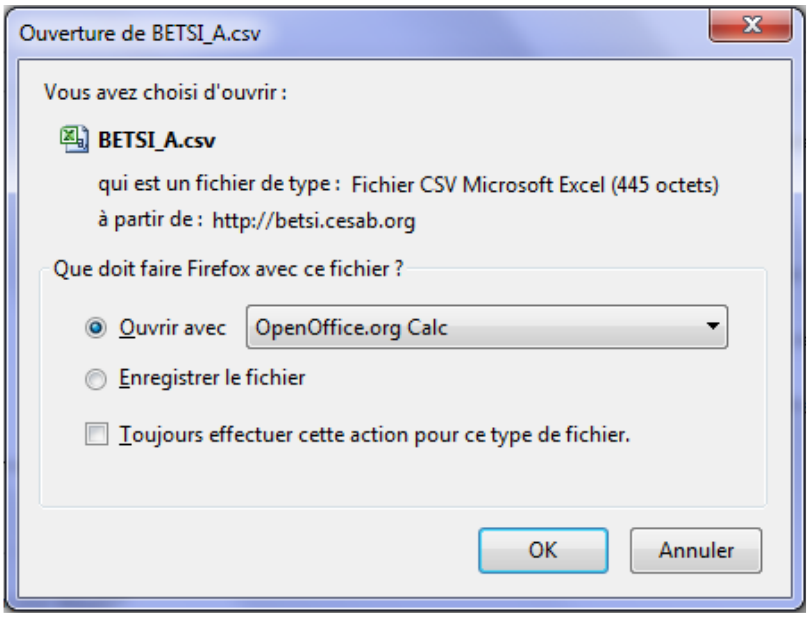


Figure 31. Window for downloading the result file of the field experiment data request

	name_plot	Bouche	Bouche	Bouche	Bouche	Bouche	Bouche
	name_parcel	Bouche264	Bouche346	Bouche349	Bouche350	Bouche351	Bouche352
	Year	1968	1968	1968	1968	1968	1968
	Season						
Source information	Reference	Marcel Bouché (1972) L	Marcel Bouché (1972) L	Marcel Bouché (1972) L	Marcel Bouché (1972) L	Marcel Bouché (1972) L	Marcel Bouché (1972) L
	In charge collector	Marcel Bouché	Marcel Bouché	Marcel Bouché	Marcel Bouché	Marcel Bouché	Marcel Bouché
Plot information	latitude	0°06'41.55"W	2°05'36.59"E	2°05'36.59"E	2°05'36.59"E	4°56'47.87"E	4°48'41.85"E
	longitude	45°19'58.63"N	48°48'24.95"N	48°48'24.95"N	48°48'24.95"N	47°19'51.45"N	47°18'14.25"N
Soil information	sample_layer	TS	TS	TS	TS	TS	TS
	integration_type	median	median	median	median	median	median
	Organic carbon,C_org, g	39.4	123.67	7.38	0	81.48	40.83
Soil invertebrate informa	extraction_type	soil hand sorting	soil hand sorting	soil hand sorting	soil hand sorting	soil hand sorting	soil hand sorting
	observation_type	abundance	abundance	abundance	abundance	abundance	abundance
	integration_type	median	median	median	median	median	median
	Zophoscolex (Zophosco	0	0	0	0	0	0
	Zophoscolex (Zophosco	0	0	0	0	0	0
	Vignysa popi Bouché, 1	0	0	0	0	0	0
	Scherotheca (Scherothe	0	0	0	0	0	0
	Scherotheca (Opothedri	7	0	0	0	0	0
	Proctodrilus antipai voge	0	0	0	0	0	0
	Ethnodrilus aveli Bouch	0	0	0	0	0	0
	Eiseniella tetraedra tetra	0	0	0	0	0	0
	Proctodrilus antipai anti	0	0	0	0	0	0
	Eisenia fetida (Savigny,	0	0	0	9	0	0
	Diporodrilus pilosus pilo	0	0	0	0	0	0
	Scherotheca (Opothedri	0	0	0	0	0	0
	Phretima diffrengens (B	0	0	0	0	0	0

Figure 32. Example of the BETSI_A file for request on field data for earthworms in 1968

3.3 Trait data request

This kind of request aims at obtaining trait affinities by *a priori* defined trait categories per taxon. Such affinities are calculated from all trait data of the database (from literature and field experiment).

To perform a request on trait data, go to Data Request/Trait by the BETSI database interface.

Select at least **one taxon**. Taxons can be selected by ticking one or several boxes of soil invertebrate groups or/and by selecting one or several taxon(s) in the “Enter taxon name(s) separated by semicolumn” box. This box works as the taxon_checker previously described (see part 2.2.2.2 taxonomy).

Then select **one** and **only one trait** (qualitative or quantitative) or **preference** (soil or site). For **textual** traits, you can choose the accuracy level of the trait categories (Figure 23). When done, click on the “Ok” button.

3.3.1 Textual traits

Once you clicked on the “ok” button, a new tab appears which allow you to choose the **weighting of sources** by clicking either on the “plus” or on the “minus” buttons (Figure 33). The sources are those which bring information about the trait of interest for the soil invertebrate taxons you selected before. When done, click on the “ok” button again.

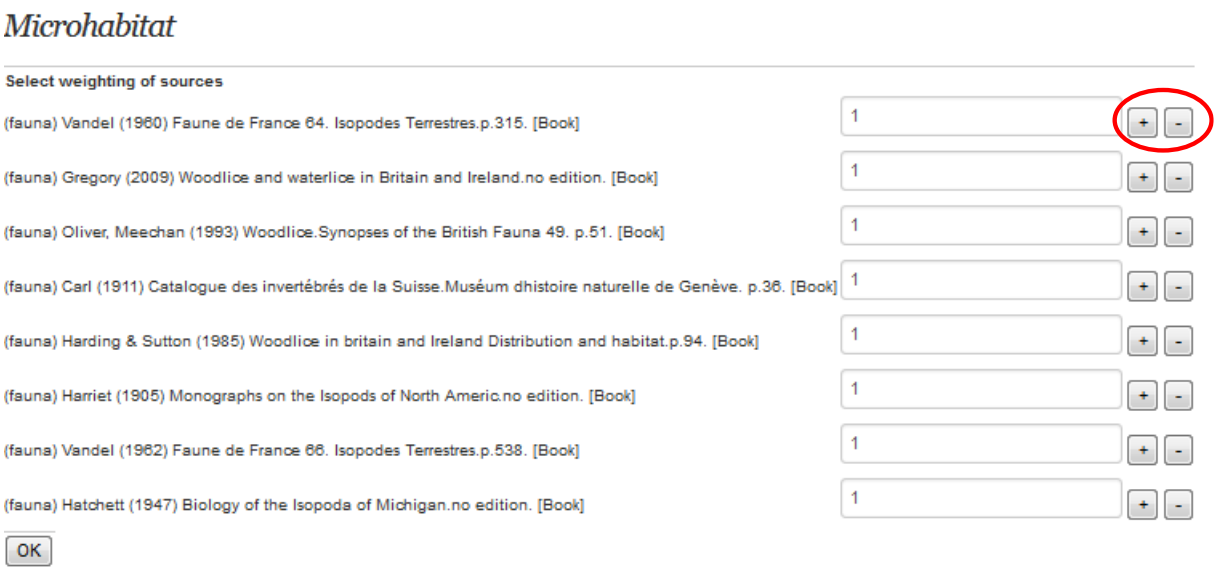


Figure 33. Example of the weighting of sources of microhabitat trait for isopods

3.3.2 Numerous traits and preferences

Once you click on the "ok" button, a new tab appears which allow you to choose (i) the **trait categories boundaries** and their **values** and (ii) the **weighting of sources**.

Numerous traits and preferences are both informed by numerical values in the BETSI database. This window allows you to choose the **boundaries** and the **values** of categories for such traits and preferences. You can click either on the "plus" or on the "minus" buttons to respectively add or delete a boundary. Then put the value of each boundary in the corresponding box (Figure 34). To know the unit of a trait, go the **T-SITA** (Thesaurus for Soil Invertebrate Trait-based Approaches) by the database interface and search the trait of interest.

You can choose the **weighting of sources** by clicking either on the "plus" or on the "minus" buttons (Figure 34). The sources are those which bring information about the trait of interest for the soil invertebrate taxons you selected before.

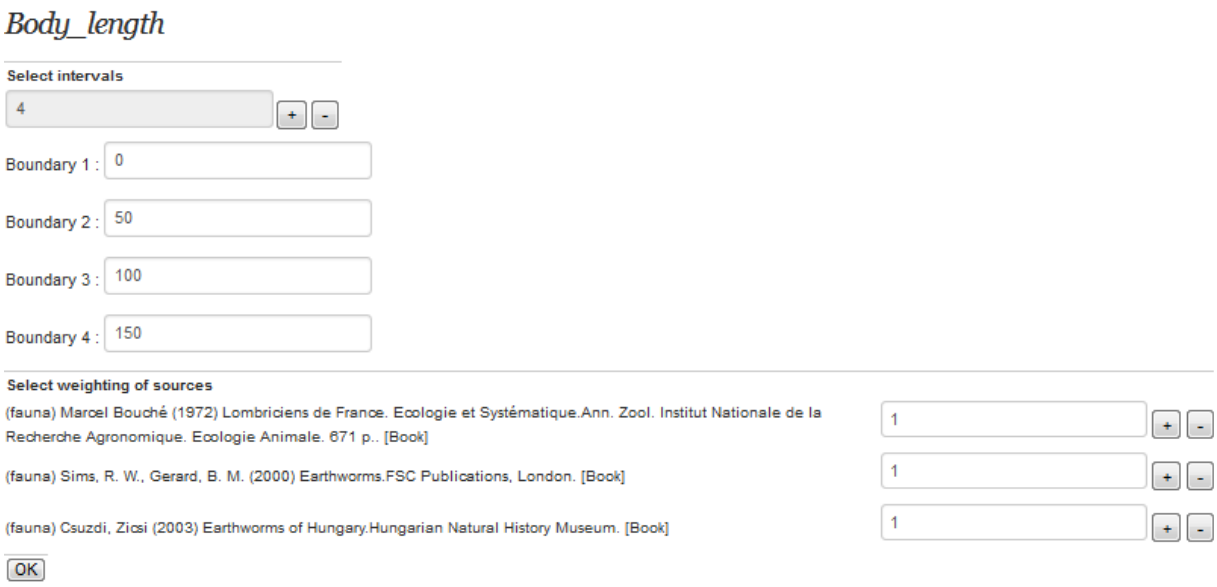


Figure 34. Example of the boundary number and values choices and the weighting of sources of body length trait for earthworms

When done, click on the “ok” button again.

Remark: for the soil and sites preferences, the sources are identified as being a couple of a source concerning fauna and another concerning soil or site (they can be the same or not). Indeed, the term in brackets (soil or fauna, site) inform you on the nature of the data used from this source in your current request.

3.3.3 Final files

Once you clicked on the “ok” button, a window appears (Figure 35). Save the archive file, it is the result of your request. It contains two files.

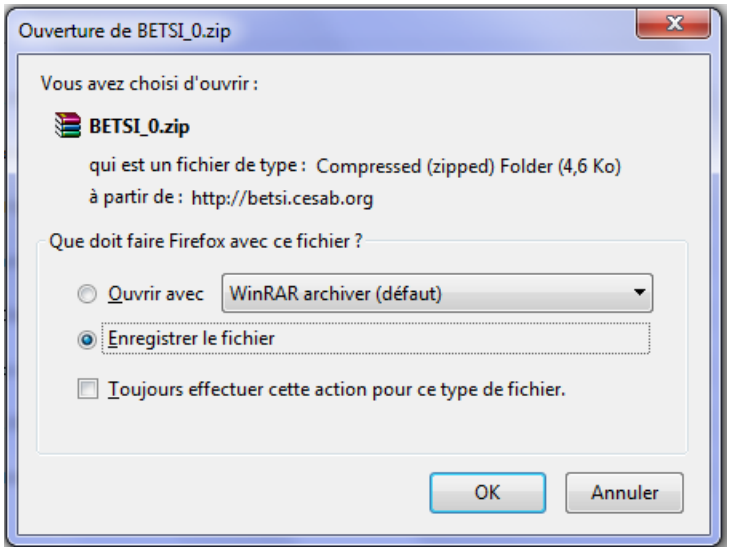


Figure 35. Window for downloading the result archive file of the trait data request

The first '**BETSI_A**' gives you the detailed information that has been extracted for calculating the trait affinities by trait categories for the trait and taxon(s) you selected (Figure 36). The second '**BETSI_B**' gives you the trait affinities by trait categories for the trait and the taxon(s) you selected (Figure 37). The sum of trait affinities by taxon (by row) is equalled to 100%.

taxon_name	trait_name	raw_trait_value	attribute_trait	coded_trait_value	source_soil	source_fauna
Ailoscolex lacteospumosus Bouché, 1969	Body_length	30				Marcel Bouché (1972) Lombriciens de France.
Ailoscolex lacteospumosus Bouché, 1969	Body_length	50				Marcel Bouché (1972) Lombriciens de France.
Allolobophora (Gatesona) chaetophora chaetophora Bouché, 1972	Body_length	170				Marcel Bouché (1972) Lombriciens de France.
Allolobophora (Gatesona) chaetophora chaetophora Bouché, 1972	Body_length	190				Marcel Bouché (1972) Lombriciens de France.
Allolobophora (Panoniona) bartoli bartoli (Bouché, 1970)	Body_length	60				Marcel Bouché (1972) Lombriciens de France.
Allolobophora (Panoniona) bartoli bartoli (Bouché, 1970)	Body_length	120				Marcel Bouché (1972) Lombriciens de France.
Allolobophora burgondiae Bouché, 1972	Body_length	80				Marcel Bouché (1972) Lombriciens de France.
Allolobophora burgondiae Bouché, 1972	Body_length	75				Marcel Bouché (1972) Lombriciens de France.
Allolobophora chlorotica chlorotica (Savigny 1826)	Body_length	80				Marcel Bouché (1972) Lombriciens de France.
Allolobophora chlorotica chlorotica (Savigny 1826)	Body_length	50				Marcel Bouché (1972) Lombriciens de France.
Allolobophora chlorotica chlorotica (Savigny 1826)	Body_length	80				Sims, R. W., Gerard, B. M. (2000) Earthworm
Allolobophora chlorotica chlorotica (Savigny 1826)	Body_length	30				Sims, R. W., Gerard, B. M. (2000) Earthworm
Allolobophora cupulifera Tétry 1937	Body_length	50				Marcel Bouché (1972) Lombriciens de France.
Allolobophora cupulifera Tétry 1937	Body_length	35				Marcel Bouché (1972) Lombriciens de France.
Allolobophora moravica Pizl & Houskova, 1993	Body_length	190				Marcel Bouché (1972) Lombriciens de France.
Allolobophora moravica Pizl & Houskova, 1993	Body_length	95				Marcel Bouché (1972) Lombriciens de France.

Figure 36. Example of the BETSI_A file for a trait data request on earthworm body length

Body_length	[0;50[	[50;100[	[100;150[
Haplotaxis gordioides (Hartman, 1821) (non validé)	0	0	0
Microscolex dubius (Fletcher, 1887)	33.3333333333	66.6666666667	0
Vignysa popi Bouché, 1970	0	0	0
Hormogaster pretiosa Michaelsen, 1899	0	0	0
Allolobophora burgondiae Bouché, 1972	0	100	0
Allolobophora cupulifera Tétry 1937	50	50	0
Allolobophora moravica Pizl & Houskova, 1993	0	25	75
Allolobophora oculata (Hoffmeister, 1843) (non validé)	33.3333333333	66.6666666667	0
Allolobophora pereli Bouché, 1972	33.3333333333	66.6666666667	0
Microscolex phosphoreus (Dugès, 1837) (non validé)	100	0	0
Allolobophora satchatelli Bouché, 1972 (non validé)	50	50	0
Allolobophora tiginosa Bouché, 1972	0	100	0
Allolobophora zicsii Bouché, 1972	0	100	0

Figure 37. Example of the BETSI_B file for a trait data request on earthworm body length

3.4 Request on taxonomy

This kind of request aims at exploring the taxonomy inserted in the BETSI database. To perform a request on taxonomical data, go to Data Request/Taxon checker. The working of the taxon checker has been already explained din the part 2.2.2.2 taxonomy.

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