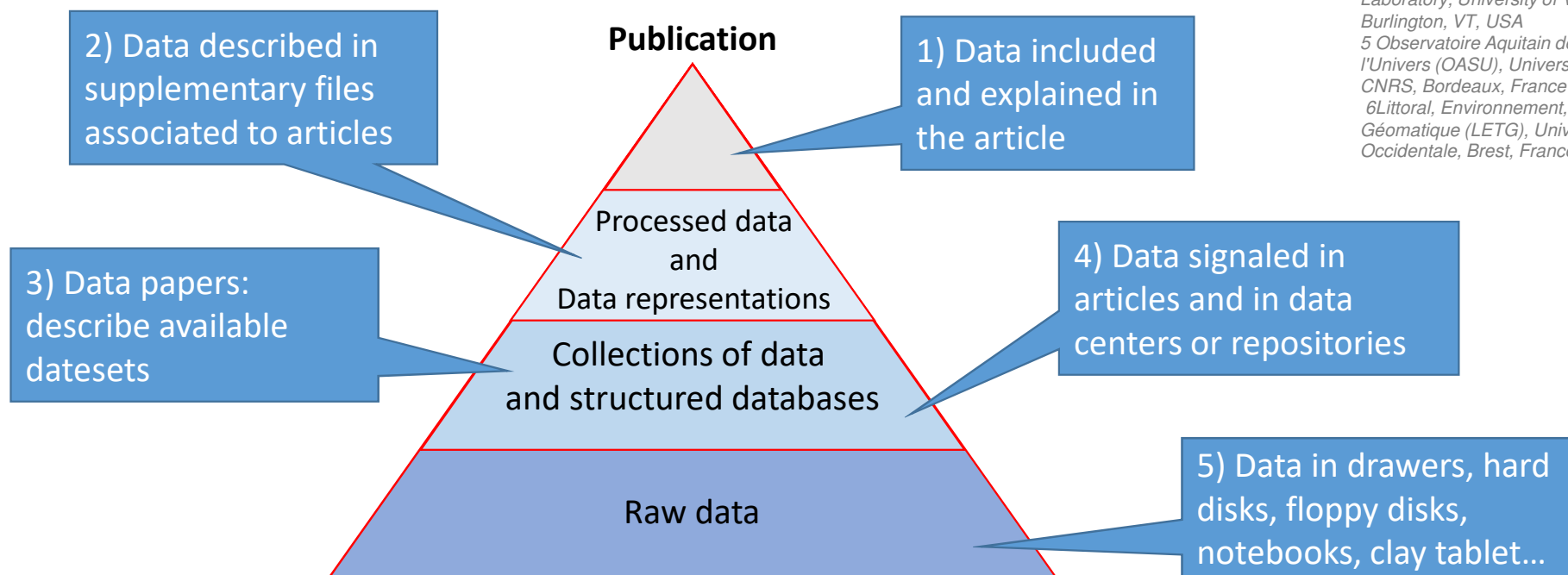


Fabien Arnaud¹, Cécile Pignol¹, Bruno Galabertier¹, Xavier Crosta², Isabelle Billy², Elodie Godinho³, Karim Bernardet³, Pierre Sabatier¹, Anne-Lise Develle¹, Rosalie Bruel^{1,4}, Julien Penguen⁵, Pascal Calvat⁵, Pierre Stéphan⁶, and Mathias Rouan⁶

1 Environment Dynamics and Territories of the Mountain (EDYTEM), Université Savoie Mont-Blanc, CNRS, Chambéry, France
fabien.arnaud@univ-savoie.fr
 2 Environnements et paléoenvironnements océaniques et continentaux (EPOC), Université de Bordeaux, CNRS, Bordeaux, France
 3 Division Technique de l'Institut des Sciences de l'Univers (DT-INSU), CNRS, La Seyne-sur-Mer, France
 4 Rubenstein Ecosystem Science Laboratory, University of Vermont, Burlington, VT, USA
 5 Observatoire Aquitain des Sciences de l'Univers (OASU), Université de Bordeaux, CNRS, Bordeaux, France
 6 Littoral, Environnement, Télédétection, Géomatique (LETG), Université de Bretagne Occidentale, Brest, France

The pyramid of data: general case



Adapted from Report on integration of data and publications. Opportunities for data exchange (Relly et al., 2011)

Findable . Accessible .
Interoperable . Reusable .

How to turn kilos of mud into megabytes of data?

10 years of efforts in curating lake sediment cores and their associated results

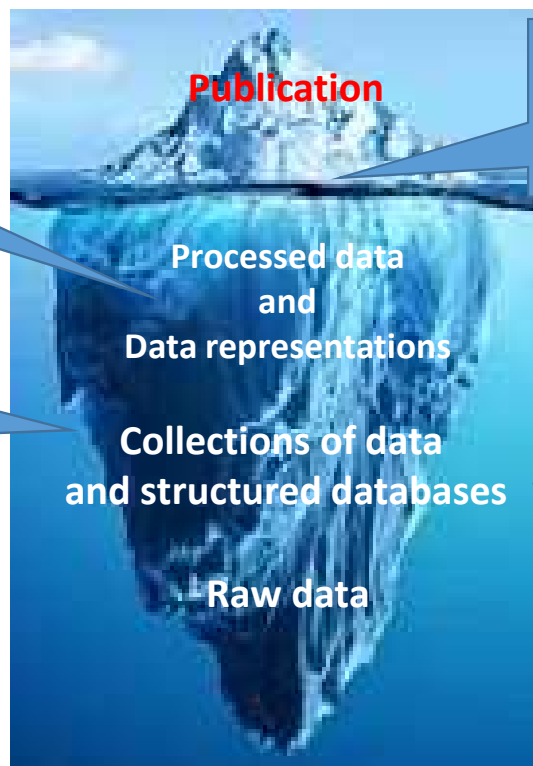
Publications are just the emerged tip of a huge iceberg of « frozen » data



**Findable . Accessible .
Interoperable . Reusable .**

2) Data described in supplementary files associated to articles

3) Data papers: describe available datasets



1) Data included and explained in the article

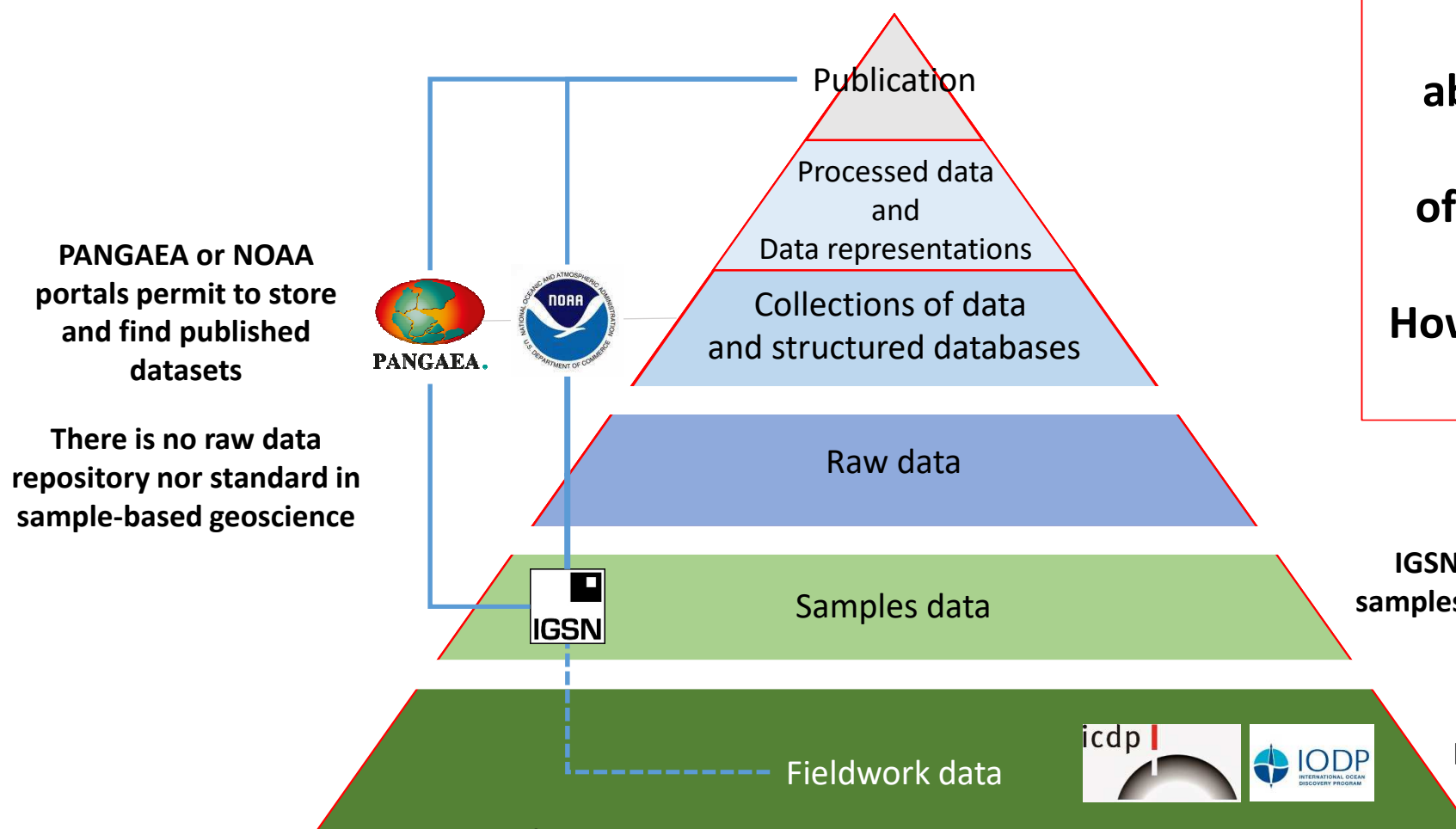
4) Data signaled in articles and in data centers or repositories

5) Data in drawers, hard disks, floppy disks, notebooks, clay tablet...

[Adapted from Report on integration of data and publications. Opportunities for data exchange \(Relly et al., 2011\)](#)

How to turn kilos of mud into megabytes of data? 10 years of efforts in curating lake sediment cores and their associated results

The pyramid of data: case of field-based (geo)sciences



**Samples and field data
are the
absolutely necessary
foundations
of the whole pyramid**

**However, they are often
poorly banked**

How to turn kilos of mud into megabytes of data? 10 years of efforts in curating lake sediment cores and their associated results

The pyramid of data: case of field-based (geo)sciences

Would be great to have
dedicated tools to bank
data from fieldwork to
the lab!

bases

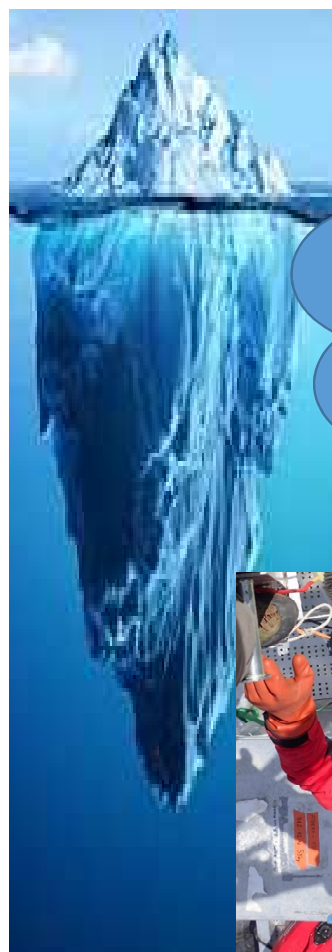
Raw data

Samples data

Fieldwork data

Although, they are the
absolutely necessary
foundations
of the whole pyramid:

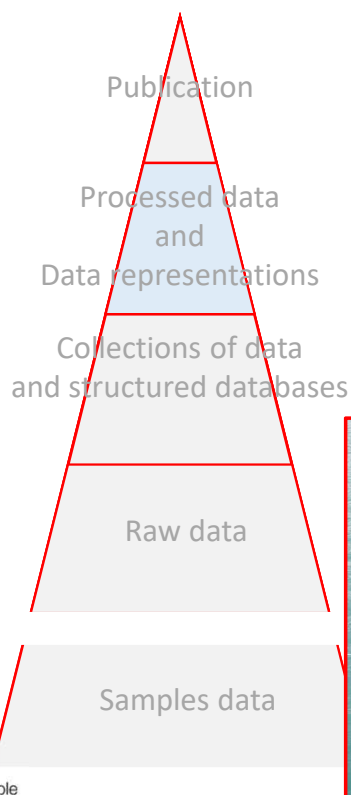
Samples and field
data are often barely
within the iceberg
itself...



How to turn kilos of mud into megabytes of data?

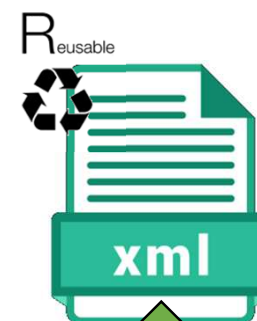
10 years of efforts in curating lake sediment cores and their associated results

➔ Catching fieldwork data at the source: CoreBook Android App.



Functions to help field operations (navigate, find older coring locations, placement of anchors, display of parallel cores)

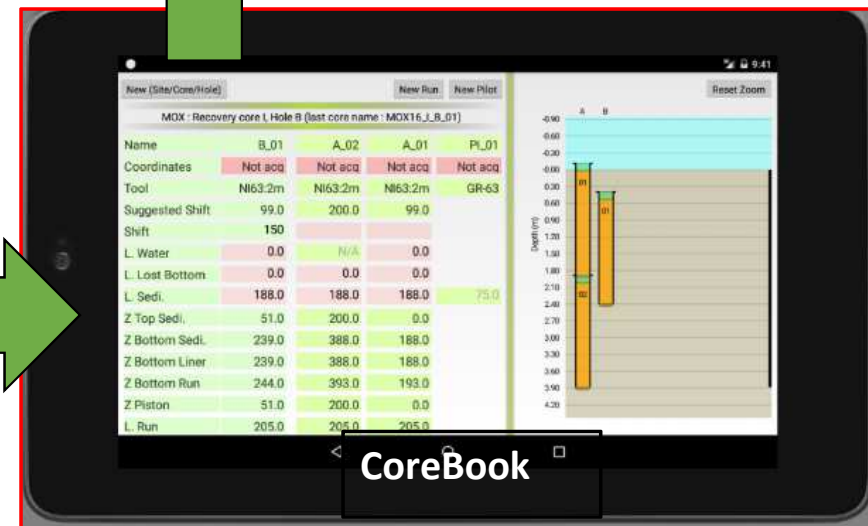
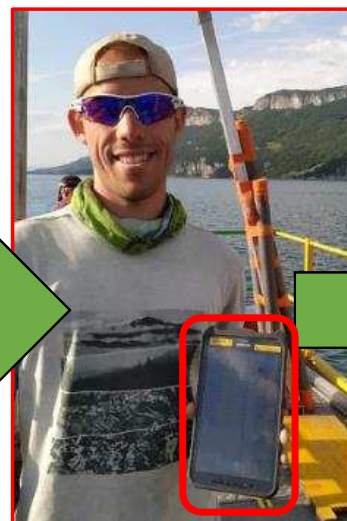
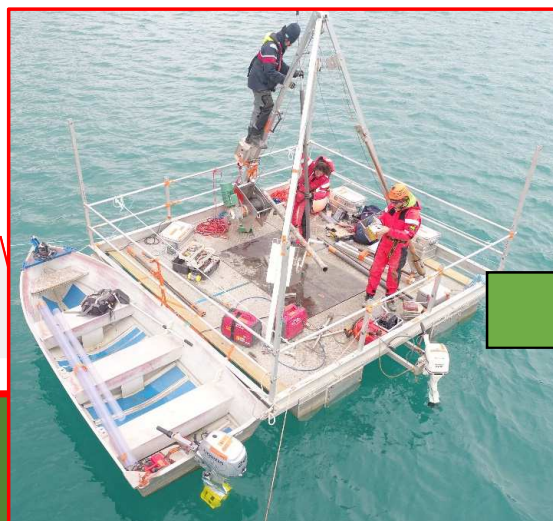
Operator-friendly Data filling



XML exchange file Ready for input into a database



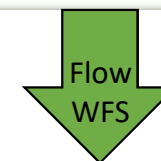
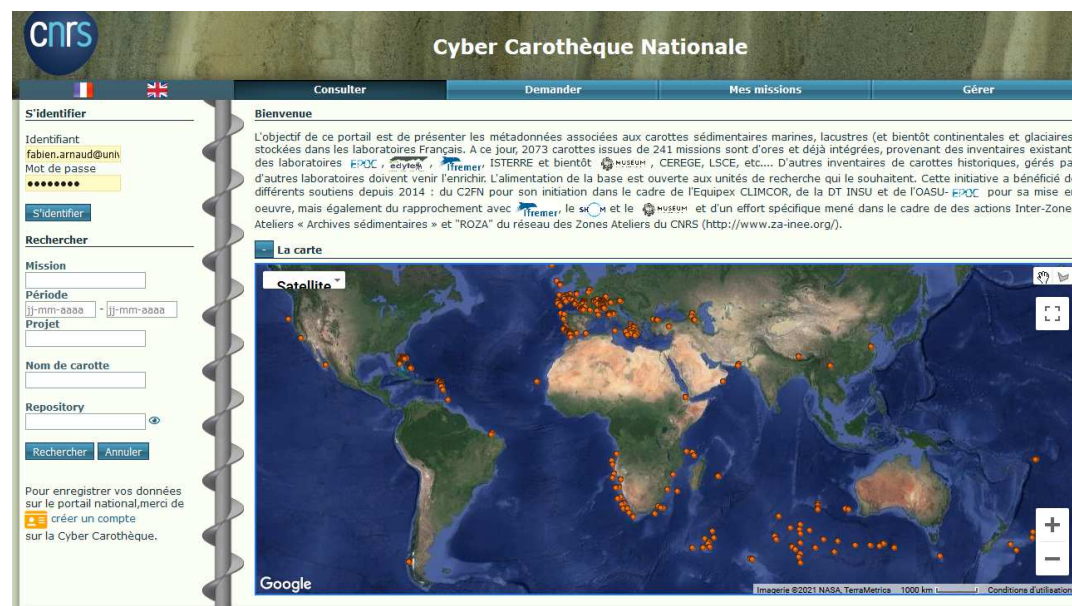
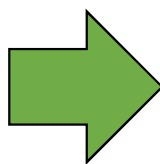
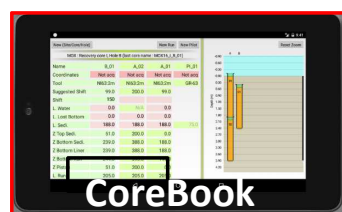
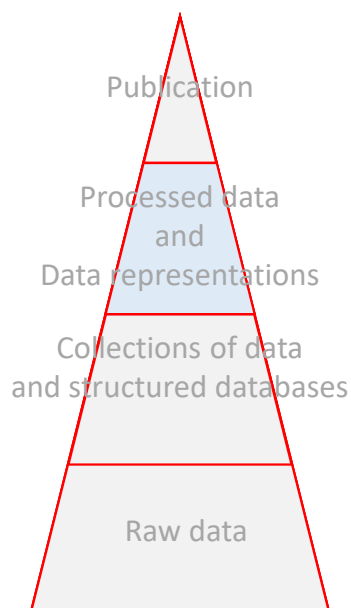
Fieldwork data





How to turn kilos of mud into megabytes of data? 10 years of efforts in curating lake sediment cores and their associated results

➔ Banking and displaying fieldwork data: the National Cyber-core repository
([Cyber-carothèque nationale](#))



Export geographical point & fielddata for GIS SYSTEM

Samples data

Fieldwork data

How to turn kilos of mud into megabytes of data? 10 years of efforts in curating lake sediment cores and their associated results

Banking and displaying fieldwork data: the National Cyber-core repository ([Cyber-carothèque nationale](#))

Zoom

Search by zone

All referenced surveys

Mission	Année	Chef de mission	PI(s) des prélèvements (liste non exhaustive)	Par	Prélèvement
KERGUELEN200601/12/06	2006	Fabien Arnaud	Fabien Arnaud		2 Carotte(s)
PALAS 2006	2006	Fabien Arnaud	Fabien Arnaud		16 Carotte(s) 4 Échantillon(s) de terrain
PALAS19-GUYNEMER	2019	Fabien Arnaud	Fabien Arnaud		15 Carotte(s) 4 Échantillon(s) de terrain
PALAS19-MYTHOS	2019	Jostein Bakke	Jostein Bakke		32 Carotte(s) 15 Échantillon(s) de terrain
PALAS2014	2014	Fabien Arnaud	Pierre Sabatier, Jerome Poulenard, Jostein Bakke		21 Carotte(s)

All referenced cores and samples

How to turn kilos of mud into megabytes of data? 10 years of efforts in curating lake sediment cores and their associated results

➔ Banking and displaying fieldwork data: the National Cyber-core repository
([Cyber-carothèque nationale](#))

Mission information

Mission PALAS19-GUYNEMER

Description

Fichier source Corebook

XML
source file

Code
Début de mission 27-11-2019 06:00
Fin de mission 27-11-2019 18:00

Description

Projet PALAS
Contexte scientifique

Link to project: permit
to display all
surveys/cores within
the same project

Connaissances préliminaires

Commentaire

Confidentialité Publique

Remerciements

DOI
URL
CSR

Automatic survey
report with DOI
(under development)

Participants

Chef foreur [Arnaud Fabien](#)
Chef de mission [Arnaud Fabien](#)

Acknowledgement of
crew members with
determined role and
ORCID identification

PI(s) des prélèvements (liste non exhaustive)
[Arnaud Fabien](#)

Financier

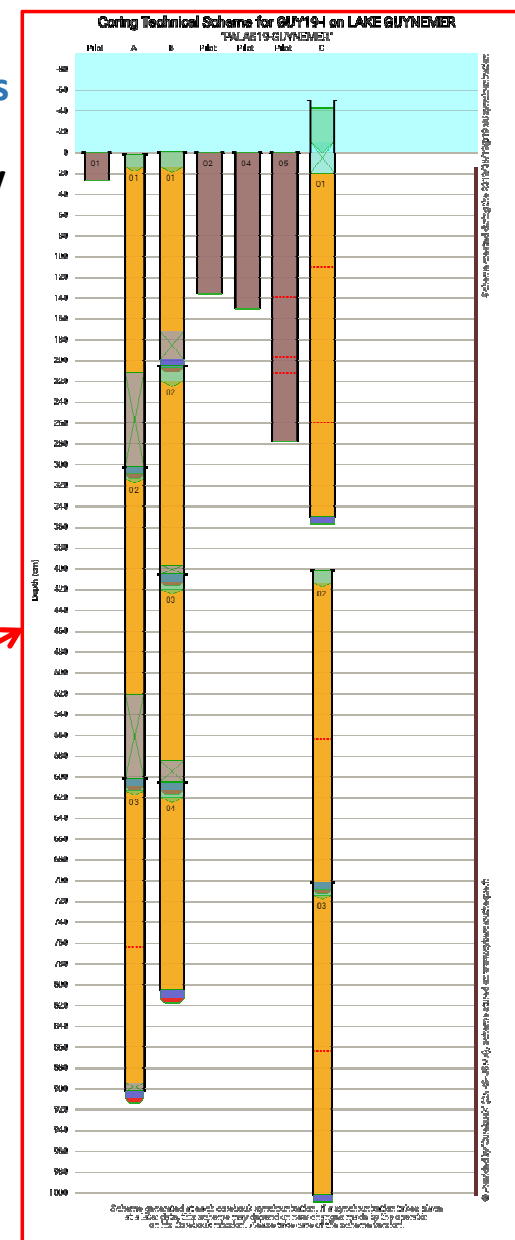
Aucun(e)

Documents liés

GUY19-I-Pil-05-20191223-141634.jpg
GUY19-I-Pil-05-20191223-141716.jpg
GUY19-I-Pil-05-20191223-141736.jpg
[GUY19-I.20190619-195534.Coring.Schema.png](#)
GUY19-I-B-01-20191201-064036.mp4
EPGUY19-01-20191204-113555.jpg
EPGUY19-01-20191204-113630.jpg

Any additionnal
document (pictures,
sounds, videos) taken
with CoreBook App.

When applicable: link
to the sketches of
parallel corings



How to turn kilos of mud into megabytes of data?

10 years of efforts in curating lake sediment cores and their associated results

➔ Banking and displaying fieldwork data: the National Cyber-core repository
([Cyber-carothèque nationale](#))

Sample (core) information

Description

N° IGSN **TOAE0000000078**

Site / Station **GUY19-I**

Nom **GUY19-I-A-03**

Matériel **Sédiment**

Type de prélèvement **Carotte (recouvrement)**

Environnement **Étendue d'eau (douce) naturelle - Lac**

Plateforme

Profondeur bathymétrique (m) **94**

Altitude (m) **131.0**

zone(s) **French Southern and Antarctic Lands, France**

Lieu **LAKE GUYNEMER**

Point GPS (WGS84, DD) **-49.11344500 69.02049300**

Date **28-11-2019 16:01**

Nom du carottier **U-NIEDERREITER 63-3m (EDY)**

Nom de la configuration **2-NIED63-3m PO/TC (EDY)**

Diamètre intérieur (mm) **63**

Longueur du prélèvement (m) **2.93**

Longueur matière récupérée (m) **2.81**

Époque géologique

PI **Fabien Arnaud**

Sondeur/Foreur en chef

Commentaire

IGSN unique
identifiant

Codified usual name :
Site-Year-Station-Hole-Section

Where is the core
stored?

Link to coring tool
information

Children
subsamples

Mission

Mission **PALAS19-GUYNEMER**

DOI / CSR

Début de mission **27-11-2019 06:00**

Fin de mission **27-11-2019 18:00**

Projet **PALAS**

Code projet (Reference)

Chef de mission **Fabien Arnaud**

Sondeur/Foreur en chef **Fabien Arnaud**

Repository

Repository **Environnements, DYnamiques et Territoires de la Montagne (EDYTEM)**

Documents liés

Aucun(e)

Sous-prélèvements associés

Export csv

Nom	Parent	IGSN	Profondeur supé
GUY19-I-A-03-A Section	GUY19-I-A-03 Carotte (recouvrement)	TOAE00000000582	
GUY19-I-A-03-B Section	GUY19-I-A-03 Carotte (recouvrement)	TOAE00000000583	

How to turn kilos of mud into megabytes of data?

10 years of efforts in curating lake sediment cores and their associated results

Banking and displaying fieldwork data: the National Cyber-core repository (cyber-carothèque nationale)

Coring tools information

Configuration des outils

ID	1 Nom de la configuration	2 Mode	3 Lien mécanique	4 Type Carottier	5 Carottier	6 Extracteur (core catcher)	7 Couronne	8 Trousse coupante / ogive	9 Dernière MAJ	10 Unité
107	1-UwPILOT90 (EDY)	Gravitaire	Câble	Interface	U-PILOT 90 (EDY)	Aucun(e)	Aucun(e)	Aucun(e)	2019-04-03 15:45:52	EDYTEM
106	1-UwPILOT63 (EDY)	Gravitaire	Câble	Interface	U-PILOT 63 (EDY)	Aucun(e)	Aucun(e)	Aucun(e)	2019-04-03 15:45:44	EDYTEM
105	1-NES (EDY)	Under development: #2 and #4 are common with CGI international standard for borehole drilling methods -- Mapping of both is ongoing							2019-04-03 15:45:22	EDYTEM
104	2-USI								2019-04-08 15:43:08	EDYTEM
103	2-USI (EDY)								2019-04-08 15:43:44	EDYTEM
102	2-NIE (AFRI EDY)	Fonçage	Câble	stationnaire	90-2m (EDY AFRI)	NIEDERREITER 90 (AFR) Sph	Aucun(e)	90 2m TC (AFR)	2019-04-08 15:44:31	EDYTEM
101	2-NIED90-2m PO/TC (AFRI EDY)	Battage-Fonçage	Câble	Piston stationnaire	U-NIEDERREITER 90-2m (EDY AFRI)	8 (cm) NIEDERREITER 90 (AFR) PO	Aucun(e)	4 (cm) NEIDERREITER 90 2m TC (AFR)	2019-04-08 15:45:01	EDYTEM
100	2-NIED63-3m PO/TC (EDY)	Battage-Fonçage	Câble	Piston stationnaire	U-NIEDERREITER 63-3m (EDY)	7 (cm) NIEDERREITER 63 PO	Aucun(e)	4 (cm) NEIDERREITER 63 2m/3m TC	2019-04-08 15:45:40	EDYTEM

Normalised description of any coring/drilling tool + its configuration

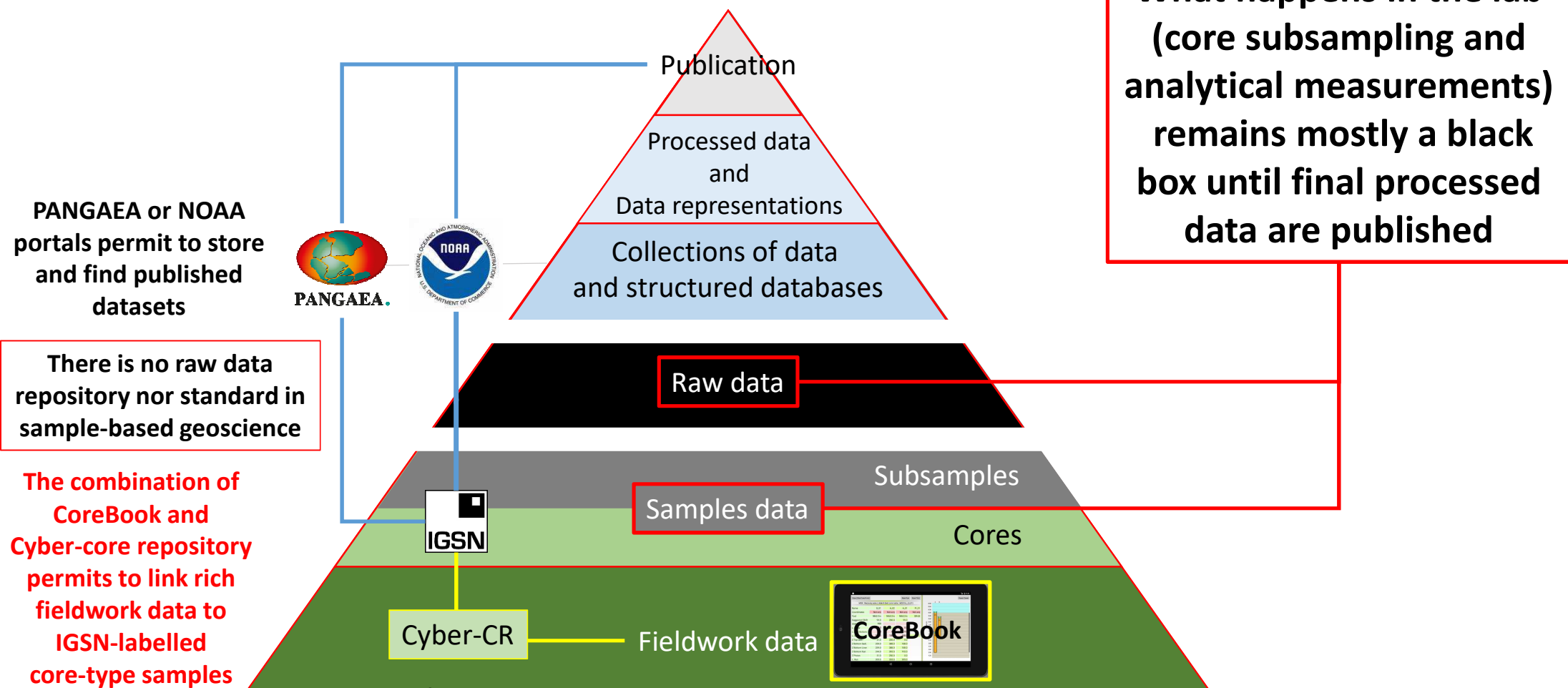
- 1- Name of the configuration
- 2- Mode (energy for penetration)
- 3- Link to the energy source
- 4- Type of corer
- 5- Usual name of the corer
- 6- Type of core catcher (if any)
- 7- Type coring bit (if any)
- 8- Type of cutting shoe (if any)
- 9- Latest update
- 10- Corer's owner

Configuration used to take GUY19-I-A-03

How to turn kilos of mud into megabytes of data?

10 years of efforts in curating lake sediment cores and their associated results

The pyramid of data: case of field-based (geo)sciences



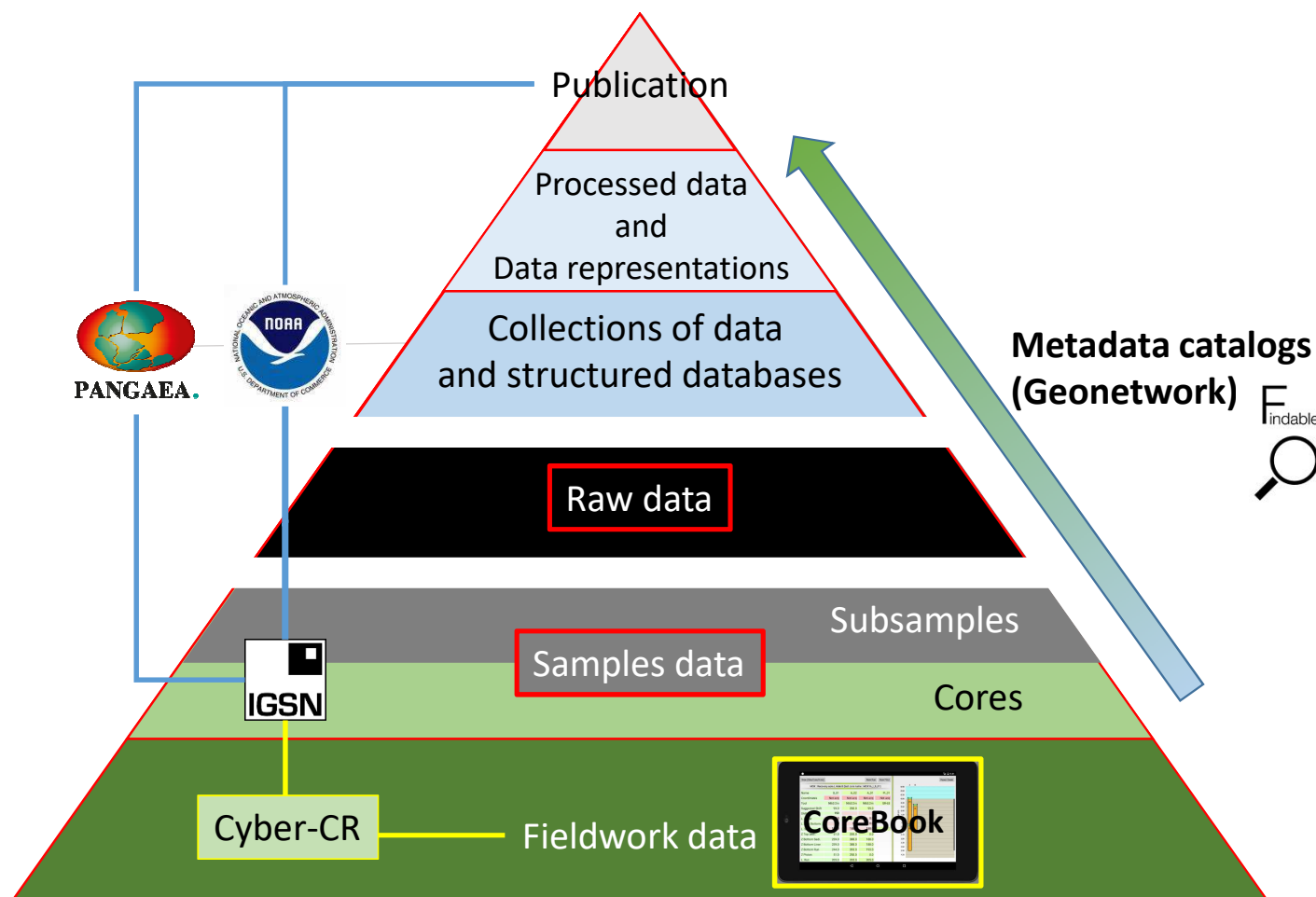
Remaining challenges are :

- 1) Curating core handling and subsampling data
- 2) Keeping track of previous operations (coring, subsampling, sample treatment) while analytical measurements are performed, together with analysis metadata

Ongoing attempts

- 1) Attempt to prolongate the cyber-core repository using [Collec-Science software](#) (not discussed here)
- 2) Prototype of an organised [Paleo-database for basic data](#) : ROZA

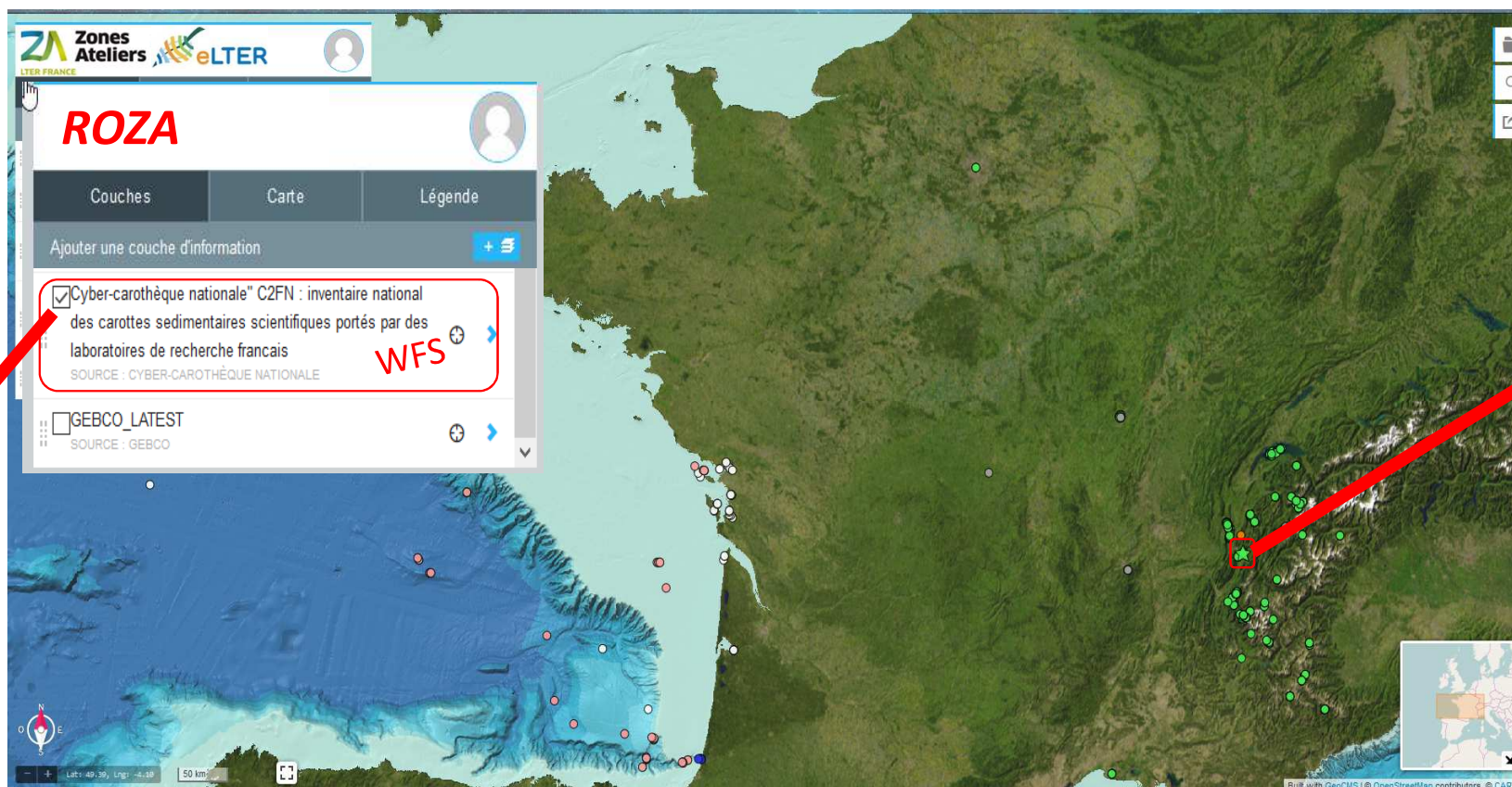
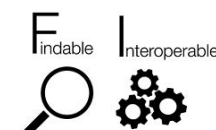
The pyramid of data: case of field-based (geo)sciences



How to turn kilos of mud into megabytes of data? 10 years of efforts in curating lake sediment cores and their associated results

« French Zones Ateliers » are the French contribution to the international *Long Term Environmental Research* (eLTER) network

ROZA = Retro-Observatory of Zones Ateliers portal



All Marines, continentals and ice 's cores by harvesting WFS From Cyber Core Repository

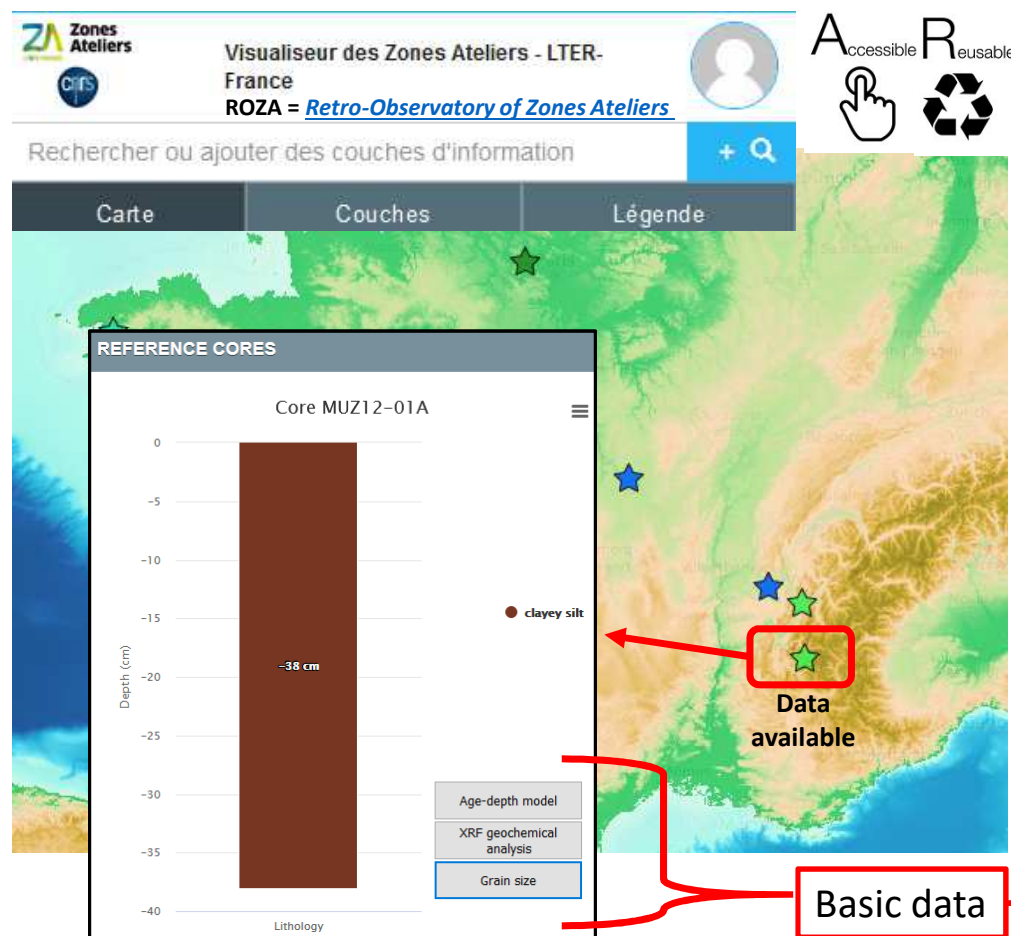


★ = Basic Data available

GeoCMS

How to turn kilos of mud into megabytes of data?

10 years of efforts in curating lake sediment cores and their associated results

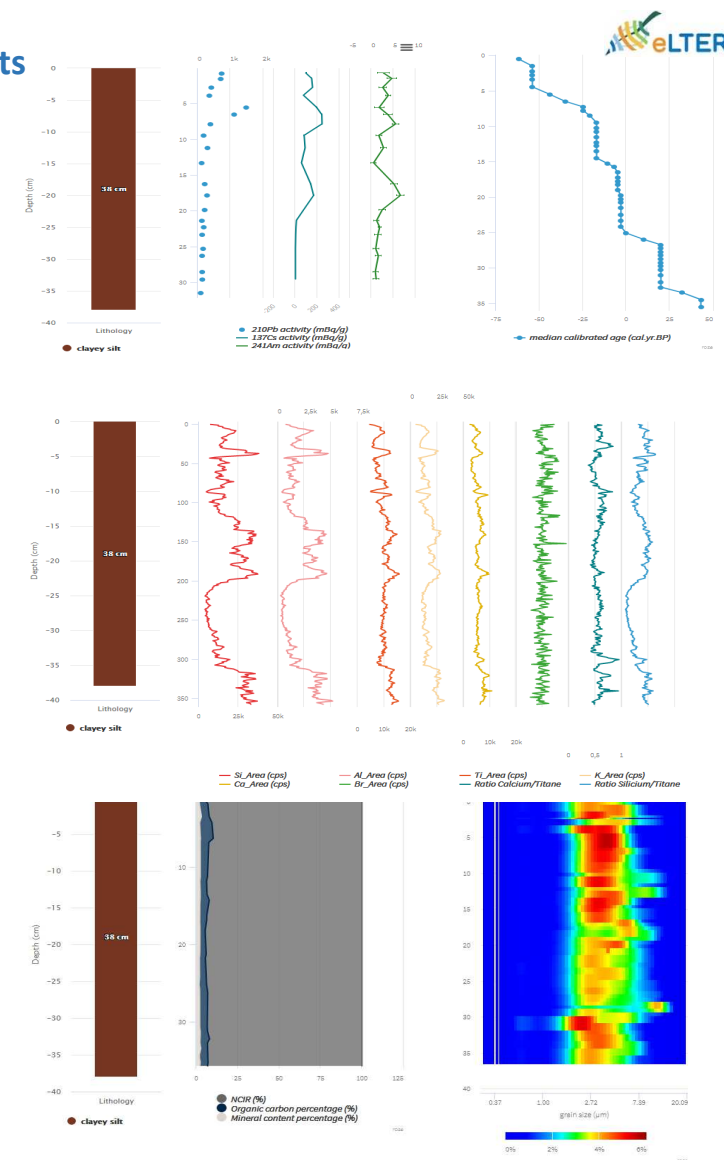


Dating information

XRF core scanner

Loss on Ignition & Grainsize

Basic data



➔ ROZA aims at providing homogenised basic data to promote the re-use of sites, samples and data within the ZA network

ROZA : standardised data & metadata template

Usual name

IGSN

Usage license

NOMCAROTTE	POU14P1w	SESAR IGSN	IGSN:EDYFER0025	LICENCE UTILISATION (Creative Commons)	CC-BY-NC-SA
METADONNEES / REFERENCES					
Version fichier Reference EDYTEM_XRF_data_12/06/2015					
WHAT KIND OF ANALYSE	XRF core scanning				
WHERE / LAKE	Poule				
WHO / NAME RESEARCHER	Pierre Sabatier				
WHEN	25/01/2016				
WHY	Application	PALAS			
DOI					
Tube lenght (mm)	890				
Top sediment (mm)	38				
Bottom sediment (mm)	889				
Sediment lenght (mm)	851				
Tube Diameter	63mm				
INSTRUMENT & SETTINGS					
Source	AVAATECH Core Scanner				
Voltage (kV)	10	30	50		
Intensity (mA)	1,2	0,75			
LiveTime (s)	30	30			
Step (mm)	1	1			
Measured Area (Crosscore*DownCore)	15*1	15*1			
Filter	No filter	Pd-Thin	Cu		
ELEMENTS concerned :					
Al_Area		Cu_Area	Ag_Area		
Si_Area		Zn_Area	Ba_Area		
P_Area		Ga_Area			
S_Area		Br_Area			
Cl_Area		Rb_Area			
K_Area		Sr_Area			
Ca_Area		Y_Area			
Ti_Area		Zr_Area			
Cr_Area		Nb_Area			
Mn_Area		Mo_Area			
Fe_Area		Pb_Area			
Rh_Area		Bi_Area			
Standards (Yes/No, Local Number, Certified standards Names)	YES	134	MESS-3, SARM-4		
Operator	Anne-Lise develle (orcid:00000328244106)				
Processing softwares	Winaxil, Winaxilbatch (Avaatech)				



Ongoing effort

When possible, use thesaurus/controlled vocabularies (CHEBI; IUPAC; QUTD; ...) to provide unambiguous variables and units (interoperability)

Sample characteristics
(from Cyber-core repository)

Measurements settings

Measurement variables
(here: list of elements)

Operator's acknowledgement
(with ORCID)

➔ Referenced in
metadata catalogs

Promote visibility & interoperability by metadata geocatalogue (ISO19.115)*



Feature variables catalogue

Feature catalog

Thesaurus / Vocabulary (multi-language)



GENERAL	- Agroecology Q - Biodiversity Q - Farming practices Q - Catchment Q - Hydrology Q
INSPIRE	- Géologie Q - Habitats_and_biotopes Q - Land_use Q
GEMET	- recherche scientifique Q - donnée environnementale Q - recherche sur l'environnement et développement Q - étude de milieu Q - données géoréférences Q - banque d'échantillons de l'environnement Q - échantillonnage Q - technique d'échantillonnage Q - sédimentologie Q - sédimentation Q - glacier Q - vase Q - argile Q - datation Q - spectroscopie Q - élément chimique Q
ENVTHES	- environmental analysis Q - experimental research Q - biodiversity Q - core Q - cores Q - sampling date and time Q - sampling parameter Q - sediment Q - sediment chemistry Q - chemical analysis Q
NCBI	- Pinus Q - Rumex Q - Plantago Q
LINKED_EARTH	- flood frequency Q - age modele Q

Link with
vocabulary

Measurement
variables

Fluorescence X



* Create by R workflow « Geoflow »

EGU 2021 : ESS13.9 EDI Managing Geochemical Data from Field to Lab to Publication to Archive


 Zones Ateliers

LTSER France Metadata Node

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Visualiser

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 Logo

Aucune évaluation ★

 Voir tous les commentaires

 Ajouter votre commentaire

Étendue spatiale

 Étendue spatiale

Étendue temporelle

Date de création

 2020-11-13

Fourni par


 Zones Ateliers

Mis à jour :

Téléchargements et liens


 Zone Atelier Alpes

 LTSER-ZAA <http://www.za-alpes.org/>

 Ouvrir le lien


 LTSER Zone Atelier Alpes - Mastersite Lautaret-oisans

 LTSER-site <https://deims.org/79d6c1df-570f-455f-a929-6cfe5c4ca1e9>

 Ouvrir le lien

GitHub API


 LTER France Metadata Node

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[En savoir plus ...](#)

 ou



Lac de la Muzelle - Carottage Muz12-I – Plant cover and erosion dynamics : impacts of pastoral activities and climatic changes over the last 1600 years - 2017 – (IGSN:IEFRA00A4)

The reconstruction of human and climate-driven Earth-shaping dynamics is important for understanding past human/environment interactions and for helping human societies that currently face global changes. However, it is often challenging to distinguish the effects of the climate from human activities on environmental changes such as erosion dynamic and plant cover. Here we evaluate an approach based on DNA metabarcoding used on lake sediments to provide high-resolution reconstruction of plant cover and livestock farming history over the last 1600 years. By comparing these data with reconstructions of erosive event frequency and glacier fluctuations, we can show that the erosion dynamic was primarily driven by climatic changes. The tree/shrub cover decreasing and the associated development of grazing activities in the last 500 years had no noticeable impacts on the erosive event frequency. However, this period corresponds to the development of herbaceous plants with different and various ecological preferences, which shows the presence of a mosaic landscape. Tracking plants using lake sediment DNA (lake sedDNA) is an emerging and promising method for tracing past plant cover dynamic and better understand the roles of climatic changes and human activities on landscape changes. Composite coring sequence : site Muz12-I – avril 2012 (IGSN:IEFRA00A4). The sequence covered period from 303 to 2012 -year). LTER platform Lautaret-Oisans / Zone Atelier Alpes

Téléchargements et liens

 Zone Atelier Alpes LTER-ZAA http://www.za-alpes.org/	Ouvrir le lien
 LTER Zone Atelier Alpes - Mastersite Lautaret-oisans LTER-site https://deims.org/79d6c1df-570f-455f-a929-6cfe5c4ca1e9	Ouvrir le lien

powered by GeoNetwork 3.6.0.0

[À propos](#)
[Github](#)
[API](#)



Harvesting (CSW)

Aperçu



Logo

Aucune évaluation ★

-
-

Étendue spatiale

Étendue spatiale

Étendue temporelle

Date de création

2020-11-13

Fourni par



Mis à jour :



[Discover eLTER Data](#)
[Visualization Time Series Data](#)
[Discovery Service](#)



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Section de carottage MUZ12-01A - LAC DE LA MUZELLE, Date carottage (04/2012)

Core MUZ12-01A is the first run/section (0-36cm) of the MUZ12-I sequences (Maximum DEPTH, sediment/rock: 2.835 m)

Keywords : climate, Holocene, montane lake, Floods, LTER Zone Atelier Alpes ZAA, Projet ROZA

Keywords (Analytics) :

XRF,
 DRY-MATTER,
 LOI,
 GRAIN SIZE,
 RADIOCARBON,
 SHORT LIVED RADIONUCLIDES,
 PHOTOGRAPHY

Spatial extent
 • France 44.90069400 6.00669400
 Spatial extent

Temporal extent
Creation date
 2017-07-01
Period
 Sun Apr 01 2012 00:00:00 GMT+0200 ► Sun Apr 01 2012 00:00:00 GMT+0200
Provided by

Updated:

Diapositive 17

f1

faarn; 29/04/2021

Achievements

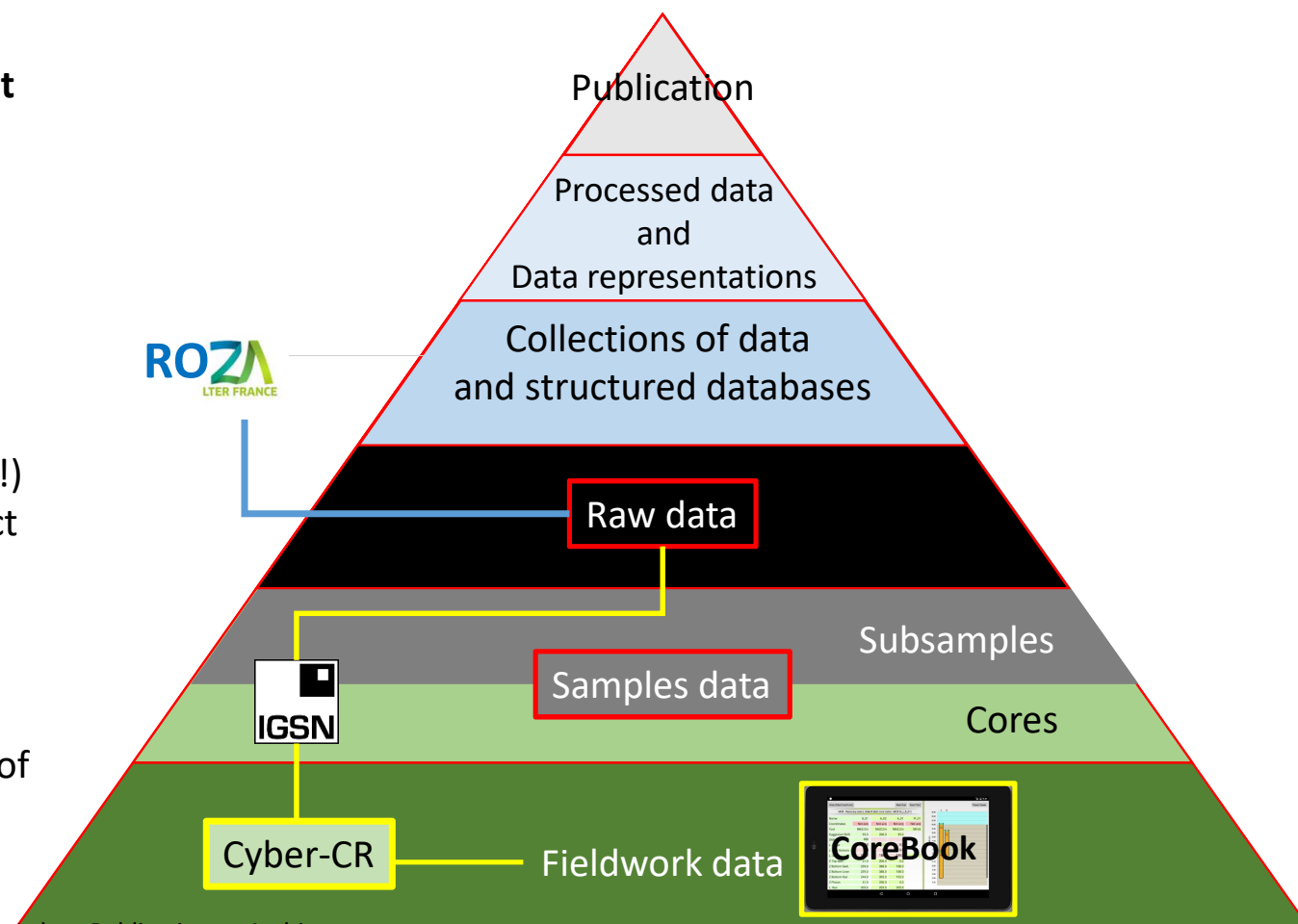
With ROZA, it is possible to get a dataset that is linked to its:

- measurement metadata (LTER catalogue)
- sample data (IGSN)
- Fieldwork data (Cyber-Core repository)

Remaining challenges are :

- **ROZA is just a prototype** (with lot of flaws!)
- Propose an user-friendly workflow to inject data
- Deal with sub-samples (currently, only the core level is treated)
- Extend the database (only 4 cores...)
- **Include treated data**: age-models instead of dating data → **SERAC**

The pyramid of data: case of field-based (geo)sciences

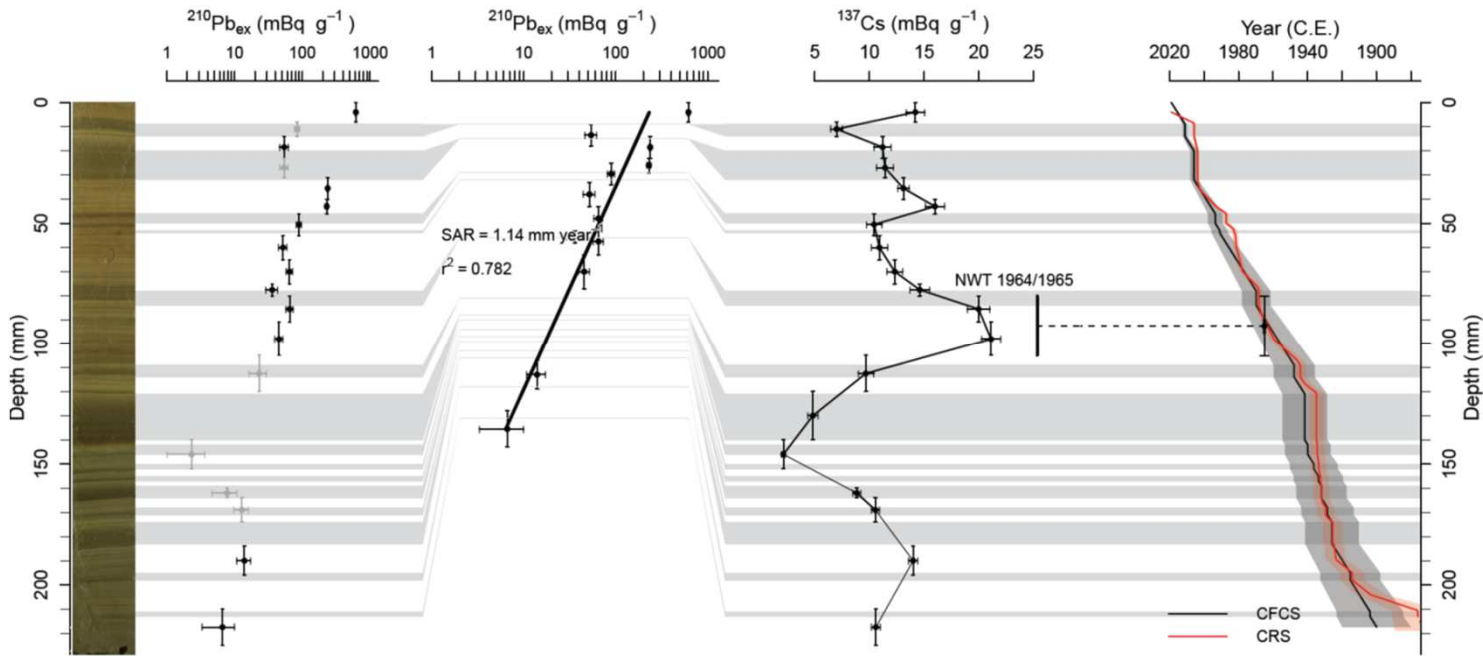


Metadata fields including IGSN and cyber-core repository references

ROZA-like standardised data template

SERAC

Standardised data representation



Standardised treated data with reproducible protocol

[Bruel and Sabatier, 2020, Journal of Env. Radioactivity](#)

How to turn kilos of mud into megabytes of data?

10 years of efforts in curating lake sediment cores and their associated results

On the road to be



Corebook

- Gathers standardised fieldwork data

Cyber-core repository

- Banks fieldwork data
- Links rich fieldwork data with IGSN

IGSN

- Provides unique identifier for upper levels

ROZA

- **Standardised dataset linked with:**
- measurement metadata (LTER catalogue)
- sample data (IGSN)
- Fieldwork data (Cyber-Core repository)

SERAC provides:

- A **publishable** standardised representation of radionuclide data
- A standardised age model file with a **reproducible** protocol
- **Links to underlying levels of the pyramid**



In the case of radionuclide dating, it is possible to link all levels of the pyramid

Limits



- ROZA is just a prototype, not used in routine
- Not yet satisfying management of subsamples
- No generalised use of Lab. Information systems
- No ongoing projects to standardize other types treated of paleo-data
- **Needs more integration within international projects**

