

Physical collections of ISRIC World Soil Information

Stephan Mantel, Luis de Sousa, Jorge Mendes de Jesus, Paul van Genuchten

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Content



About ISRIC

ISRIC physical collections (soil reference collection)

- Purpose & value
- Collection management
- Use and accessibility
- Metadata standards

ISRIC history and collections



Founded in 1966 as the 'International Soil Museum' (linked to the FAO soil map of the world project); initiative of the ISSS, adopted by UNESCO General Council (1964)

In the museum, students and scientists would be able to learn from these different types of soils from around the world. In addition, the museum could act as an international reference centre for soil data.

Became the "International Soil and Information Reference Centre" (ISRIC) in 1984

ISC World Data Centre for Soils (since 1989)



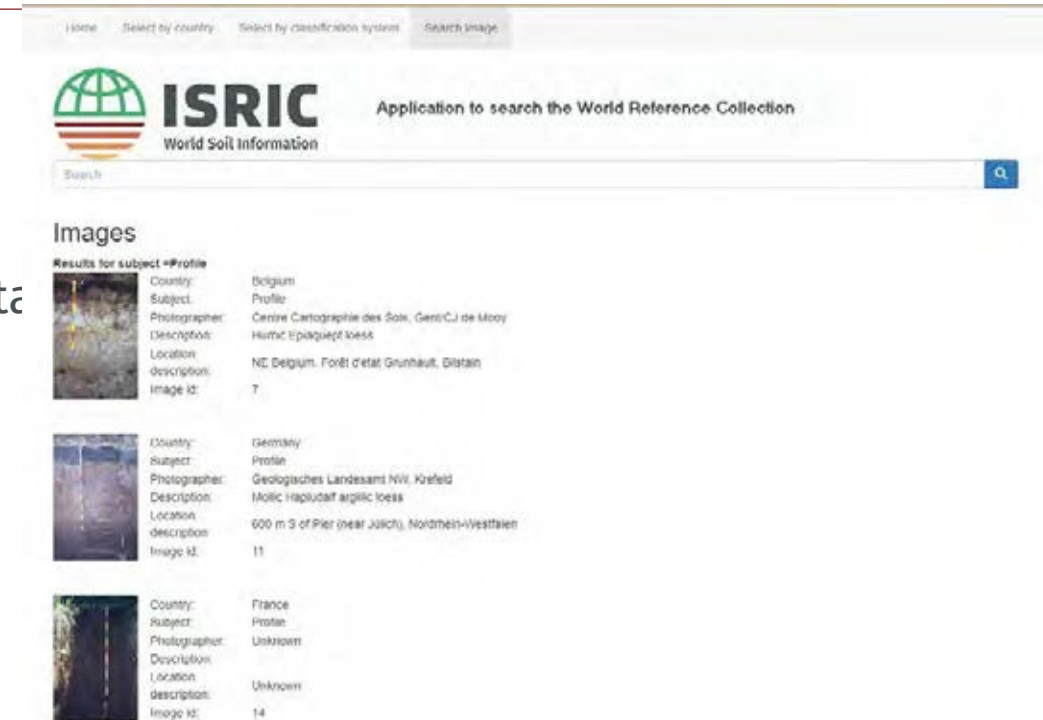
**International
Science Council**



World Soil Reference Collection



- Unique collection of soil materials:
 - 1100 soil monoliths (> 75 countries)
 - 5000 soil samples with physical and chemical data
 - 3500 thin sections
 - photographic documentation
- Collected and analysed in a **consistent** way
- 75% is considered as **reference** soils: complete description, monolith with accompanying sample material, data from certified, reference lab, characteristic of the map units of the FAO Soil Map of the world.
- Used for a wide variety of purposes across the world (research & education)



World Soil Reference Collection



ISRIC Soil Library for maps and reports



Objects	Nr
Maps	15970
Reports	9120
Links	351
Books	246



The screenshot shows the ISRIC World Soil Information website interface. At the top, there is a navigation menu with links for Home, About soil, Data, Museum, Library, Training, Work with us, Projects, and About ISRIC. A search bar is located on the right. Below the navigation, there is a section for "Search Library and map collection" with a search input field. The search results display a list of items, including a soil map of Kenya. The map details are as follows:

ISIRI	6336
Title	Exploratory Soil Map and Agroclimatic Zone Map of Kenya. Scale 1: 1,000,000. Exploratory Soil Survey Report no. E-1. Republic of Kenya.
Author(s)	Sombroek, W.G., Braun, H.M.H.
Publisher(s)	Ministry of Agriculture, National Agricultural Laboratories, Nairobi.
Publication year	1982
Regions	Africa
Countries	Kenya
Library holding	KE 1982.03
Document type	report
Full text	View document
Map(s)	View map
Zoomable map	View map



Purpose and use of soil reference collections



Document the environment through physical samples, description and analysis

Vital for understanding soils, properties and functions

Provides clues about formation, variation, functions, and human influence

Base-line against which new observations can be compared and to produce predictive models

E.g. impact of land management, acid rain, pollution, climate change

Safeguarding soil reference profiles; providing the basis for taxonomy.

Soil monoliths are used for education in the world soil museum

Reference soil samples: site and soil description and soil chemical and physical properties.
Sample material is available for research on request (e.g. pre- and post Chernobyl comparison, heavy metal content, DNA analyses, pollen research).



Monolith preparation



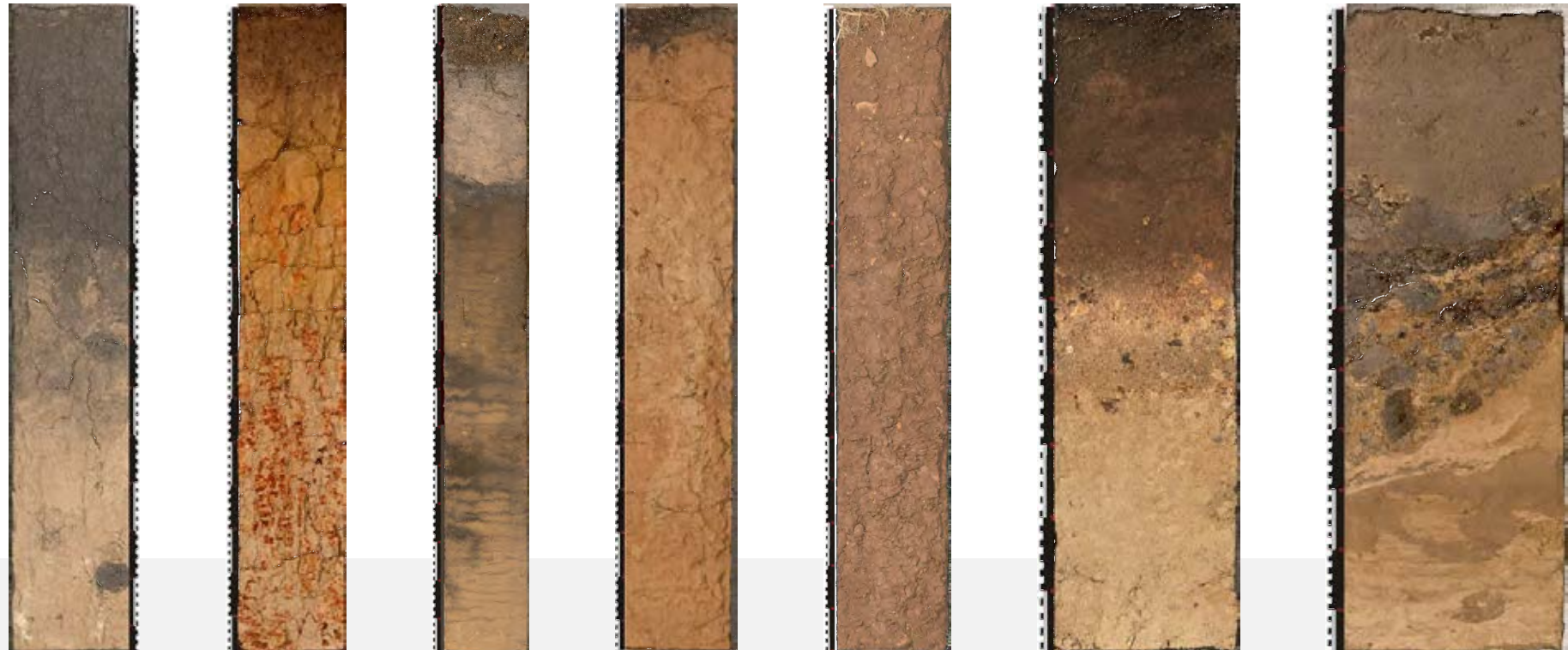
Undisturbed soil columns, sampled from a profile wall, are impregnated with a glue to conserve the soil for display purposes.



Monolith photography and assessment



- High-resolution photograph taken from each monolith in the collection
- Physical state monitored. Monoliths RDF (Radio-frequency identification) chipped.
- Unique identifier of all objects (monoliths, samples and thin sections) is based on the country (two digit ISO country code) and follow number. E.g. NL 041





Soil sample registration, archiving and analysis



- Reference soil samples stored in new containers, labelled, barcoded, registered.
- New samples processed, send to Kellogg Soil Survey lab of the USDA-NRCS, US for chemical analyses. Physical analyses done in Wageningen



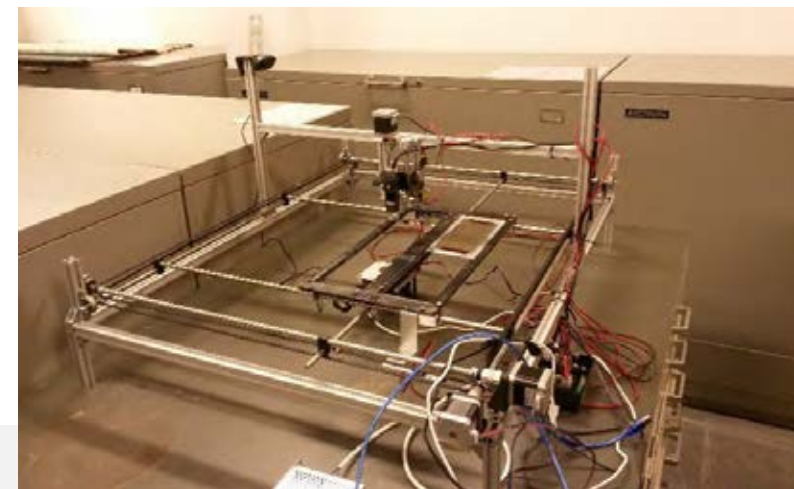
Micromorphology collection

Micromorphological collections at ISRIC:

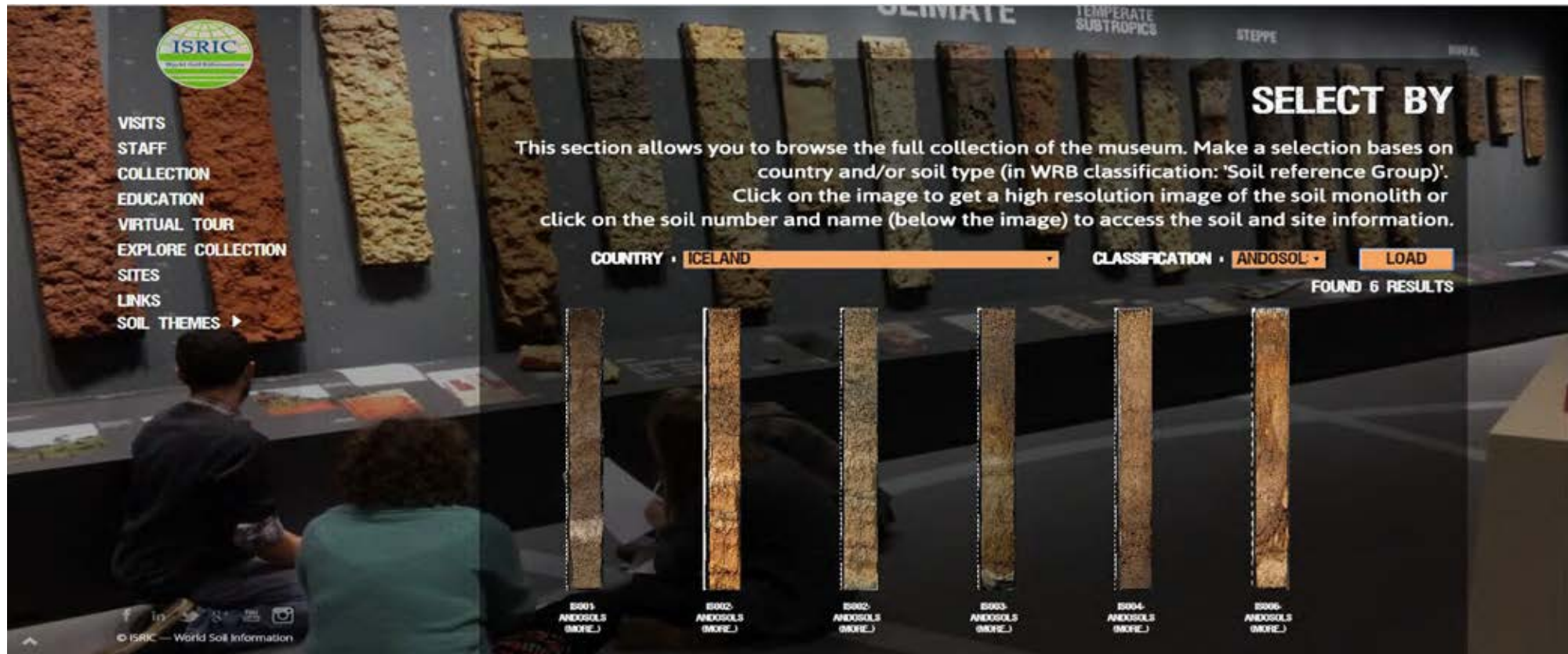
- Thin sections related to the reference collection
- Orphaned collection of thin sections from various institutions

Accessibility:

- On request inspection and loan
- Digitization of thin sections from reference collection
- Verification of documentation (also in the process of scanning)
- Data imported in the institutional database WoSIS.
- Investigate new technologies to make the thin sections available to users (remotely controlled inspection)



The World Soil Reference Collection



<https://wsm.isric.org>

Collection management



Much and continued work to fill gaps created by incomplete procedure in acquisition in the past.

Many partial information sources (excel sheets) for parts of the collection: integration required

Accountability and traceability of what is where and who did/does what is limited

SPECTRUM 5.0 policies and procedures are under study and will be formulated for management of our collection

Use and accessibility of the reference collections



Use and accessibility of collections

Soil samples: material made available for relevant research
-decisions on ad-hoc basis, limited quantity, above a minimum threshold of sample left, only for new and relevant research. A finite resource.

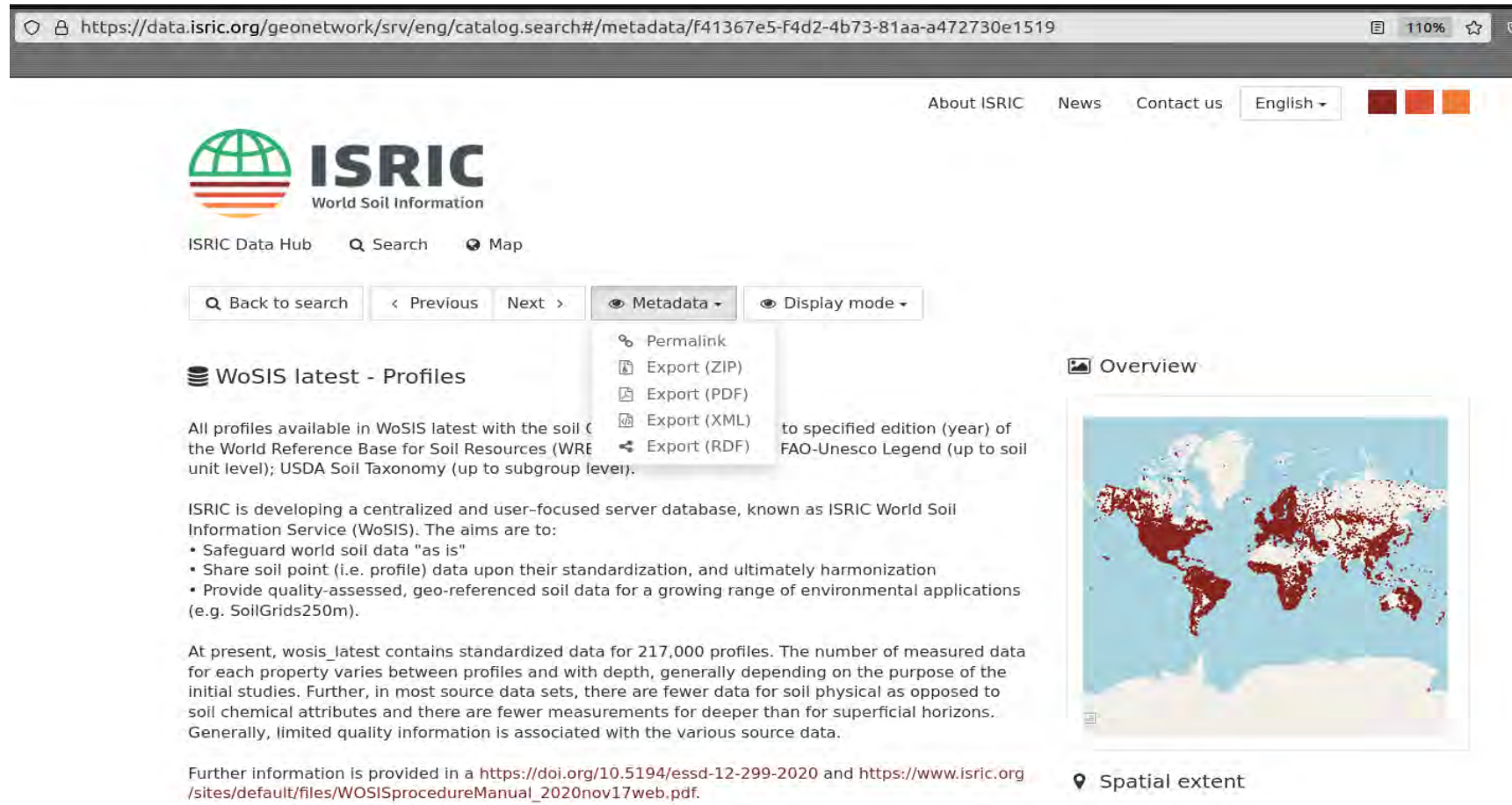
Monoliths: display in the world soil museum. Monolith store can be accessed on request, monolith loan to other museums when they meet exposition standards (under contract and insurance). Some objects are on long term loan.

Thin sections: On request inspection and loan.

Metadata of spatial datasets

- ISRIC maintains a catalogue of spatial datasets via data.isric.org
- [Data.isric.org](http://data.isric.org) is a generic ISRIC catalogue implementing **iso19139** standard for (spatial) metadata, with **Dublin Core** metadata via an oai-pmh endpoint (geonetwork)
- For every metadata record a DOI is created.
- Museum monolith collection as part of WOSIS dataset. WOSIS dataset with a specific DOI.

Metadata of spatial datasets



The screenshot shows a web browser window displaying the ISRIC website. The address bar shows the URL: <https://data.isric.org/geonetwork/srv/eng/catalog.search#/metadata/f41367e5-f4d2-4b73-81aa-a472730e1519>. The page header includes navigation links for "About ISRIC", "News", "Contact us", and a language dropdown set to "English". The ISRIC logo, "World Soil Information", is prominently displayed. Below the logo, there are navigation options for "ISRIC Data Hub", "Search", and "Map". A search bar contains the text "Back to search". A navigation menu includes "Previous", "Next", "Metadata", and "Display mode". The "Metadata" menu is open, showing options: "Permalink", "Export (ZIP)", "Export (PDF)", "Export (XML)", and "Export (RDF)". The main content area is titled "WoSIS latest - Profiles" and contains text about the data profiles, their standardization, and availability. A list of aims for the service is provided. A paragraph describes the current data content, including the number of profiles and the types of data. At the bottom, there are links for further information. On the right side, there is an "Overview" section with a world map showing the spatial extent of the data, and a "Spatial extent" section with a location pin icon.

ISRIC Data Hub Search Map

Back to search Previous Next Metadata Display mode

Permalink
Export (ZIP)
Export (PDF)
Export (XML)
Export (RDF)

WoSIS latest - Profiles

All profiles available in WoSIS latest with the soil (to specified edition (year) of the World Reference Base for Soil Resources (WRE to specified edition (year) of unit level); USDA Soil Taxonomy (up to subgroup level); FAO-Unesco Legend (up to soil unit level)).


ISRIC is developing a centralized and user-focused server database, known as ISRIC World Soil Information Service (WoSIS). The aims are to:

- Safeguard world soil data "as is"
- Share soil point (i.e. profile) data upon their standardization, and ultimately harmonization
- Provide quality-assessed, geo-referenced soil data for a growing range of environmental applications (e.g. SoilGrids250m).

At present, wosis_latest contains standardized data for 217,000 profiles. The number of measured data for each property varies between profiles and with depth, generally depending on the purpose of the initial studies. Further, in most source data sets, there are fewer data for soil physical as opposed to soil chemical attributes and there are fewer measurements for deeper than for superficial horizons. Generally, limited quality information is associated with the various source data.

Further information is provided in a <https://doi.org/10.5194/essd-12-299-2020> and https://www.isric.org/sites/default/files/WOSISprocedureManual_2020nov17web.pdf.

Overview



Spatial extent

<https://data.isric.org/geonetwork/srv/eng/catalog.search#/metadata/f41367e5-f4d2-4b73-81aa-a472730e1519>

Embedded image metadata


- All images published by ISRIC include metadata embedded in the image file.
- Monolith Picture Collection to be released as a dataset. With associated profile information, image licensing and astribution.
- Possible 25816 tags with 16503 unique tag names. IPTC/XMP also supports Dublin Core

The tables listed below give the names of all tags recognized by ExifTool. They contain a total of 25816 tags, with 16503 unique tag names.

Tag Table Index						
IPEG	Leaf	PanasonicRaw	BMP	ELAC	WTV	
EXIF	Minolta	SigmaRaw	RFC	Dng	DICOM	
IPTC	Motorsola	Lytro	PIC1	Nvidia	FITS	
XMP	Nikon	JRE	ENC	Opus	HTML	
GPS	NikonCustom	FlashPix	MNG	Theora	Fdm	
GeoTIFF	NikonCapture	MFF	ELF	AFE	Torrent	
ELLS	Nintendo	Stm	DyVu	Audible	EXE	
ICC_Profile	Chiyomi	Scalado	DFX	MPC	LNK	
ErastM	Panasonic	GoPro	OpenXR	MPEG	Font	
Photoshop	Pentax	Qualcomm	ZISRAW	MTS	VCard	
Apple	PhaseOne	Ipeg4000	MBC	H264	Text	
NikonSettings	Recotex	JSON	LIP	QuickTime	RSRC	
Canon	Sony	CHOP	MJEG	Exif	Rawtor	
CanonCustom	Samsung	ELIST	PCX	Mitroska	ZIP	
CanonCRD	Fujifilm	APPLE	PJP	MOI	RTE	
Canon	Sigma	ACCF	ESP	MXF	OOKML	
DJI	Sony	DarwinCore	PhotoCD	IV	Work	
ELIS	SonyILCE	PhotoStation	Radstone	Flash	ISO	
ExifTool	Unknown	PhotoMechanic	EFM	SmI	MacOs	
GE	DNG	Microsoft	ELF	Red	Extra	
HP	CanonRaw	GMF	PostScript	RIF	Compendio	
ICC	ExcelsiorRaw	MIF	ID3	AIF	Shortcuts	
Kodak	MinoltaRaw	GIF	ITC	ASF	RMS	

Embedded image metadata

UPLOAD ANOTHER IMAGE




Metadata takes **9.34 KB (76.1%)** of this image and **includes location data**. To protect your privacy, download this image without metadata by clicking the button below.

REMOVE METADATA

Location

Altitude	282 m Above Sea Level
Latitude	50 deg 37' 0.12" N
Longitude	5 deg 55' 0.01" E



50°37'00.1"N 5°55'00.0"E
Limbourg, Belgium
View larger map

Image metadata

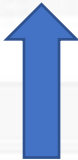
Name	BE-001.jpg
File size	12.3 KB (12570 bytes)
File type	JPEG
MIME type	image/jpeg
Image size	32 x 148 (0.005 megapixels)
Color space	sRGB
Created	July 21, 2021 06:13

Copyright

Artist	Theo Jacob
Copyright	https://creativecommons.org/licenses/by/4.0/ /legalcode
By-line	ISRIC - World Soil Information
Copyright notice	https://www.isric.org/about/data-policy

HistoryWhen	2022-08-24 14:58:06 +0200
ImageDescription	ISRIC monolith picture BE-001. WRB-2016 classification: Alisol. WOSIS profile_id: 69872. profile_uuid: be1771fe-b8f2-11e4-90de-8851fb5b4e87
ImageHeight	148

SpecialInstructions	Full profile report: https://isis.isric.org/monoliths/reference-soil-be001
SubfileType	Reduced-resolution image
ThumbnailImage	Binary data 3268 bytes



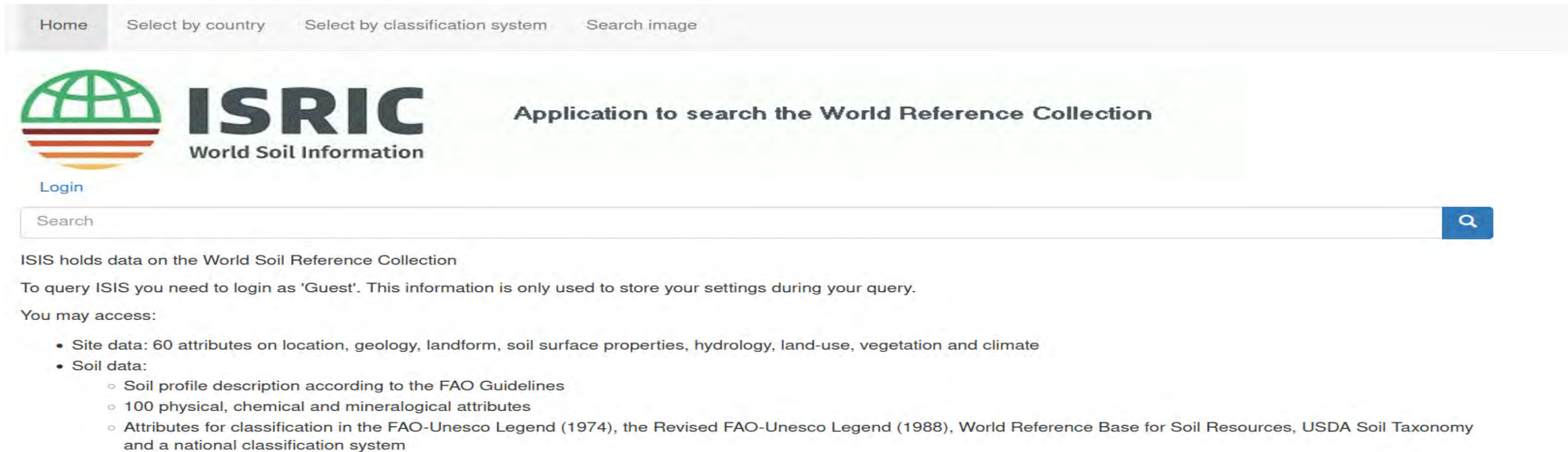
<https://isis.isric.org/monoliths/reference-soil-be001>

Embedded image metadata

- All images associated with URL that can be used as DOI
- <https://isis.isric.org/monoliths/reference-soil-be001> has soil profile information related to picture
- Not the best URI as we include country names (that may change)
- Looking into implementing better URL structure (new ISRIC policy)


Collection objects metadata

- Partially advertised on the web via <https://isis.isric.org>
- Currently no common metadata format.
- No harvest or query endpoint.




The screenshot shows the ISIS World Soil Information website. At the top, there is a navigation bar with links for 'Home', 'Select by country', 'Select by classification system', and 'Search image'. Below this is the ISIS logo, which consists of a green globe with orange and red horizontal stripes, followed by the text 'ISRIC World Soil Information'. To the right of the logo is the text 'Application to search the World Reference Collection'. Below the logo is a 'Login' link. A search bar with the placeholder text 'Search' and a magnifying glass icon is positioned below the login link. The main content area contains the following text: 'ISIS holds data on the World Soil Reference Collection', 'To query ISIS you need to login as 'Guest'. This information is only used to store your settings during your query.', and 'You may access:'. Under 'You may access:', there is a list of data types: 'Site data: 60 attributes on location, geology, landform, soil surface properties, hydrology, land-use, vegetation and climate' and 'Soil data:'. The 'Soil data' section is further detailed with three bullet points: 'Soil profile description according to the FAO Guidelines', '100 physical, chemical and mineralogical attributes', and 'Attributes for classification in the FAO-Unesco Legend (1974), the Revised FAO-Unesco Legend (1988), World Reference Base for Soil Resources, USDA Soil Taxonomy and a national classification system'.

Home Select by country Select by classification system Search image

 **ISRIC**
World Soil Information

Application to search the World Reference Collection

Login

Search 

ISIS holds data on the World Soil Reference Collection

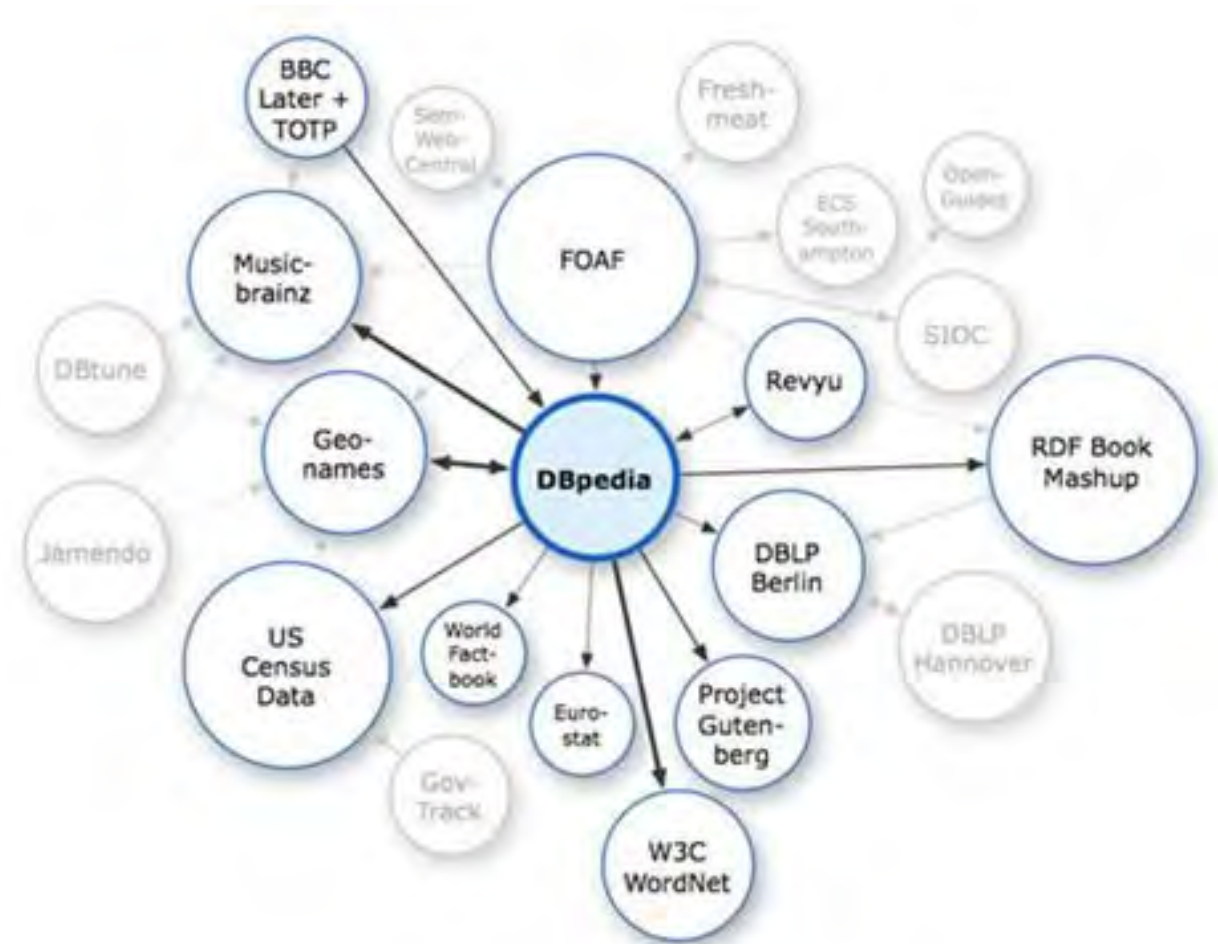
To query ISIS you need to login as 'Guest'. This information is only used to store your settings during your query.

You may access:

- Site data: 60 attributes on location, geology, landform, soil surface properties, hydrology, land-use, vegetation and climate
- Soil data:
 - Soil profile description according to the FAO Guidelines
 - 100 physical, chemical and mineralogical attributes
 - Attributes for classification in the FAO-Unesco Legend (1974), the Revised FAO-Unesco Legend (1988), World Reference Base for Soil Resources, USDA Soil Taxonomy and a national classification system

Collection objects metadata: the future

- Select a suitable **meta-data** ontology:
 - CDWA
 - MUSEUMDAT
 - CIDOC CRM
 - Object ID
 - Europeana Data Model (EDM)
 - ...
- **Semantic Web** approach
 - Synergies with **GloSIS** and **INSPIRE**
- New ISRIC **URI policy**
 - Information and asset identifiers;
 - Beyond web pages and projects.





ISRIC
World Soil Information



More information:

wsm.isric.org

www.isric.org



Metadata standards (Interoperability)

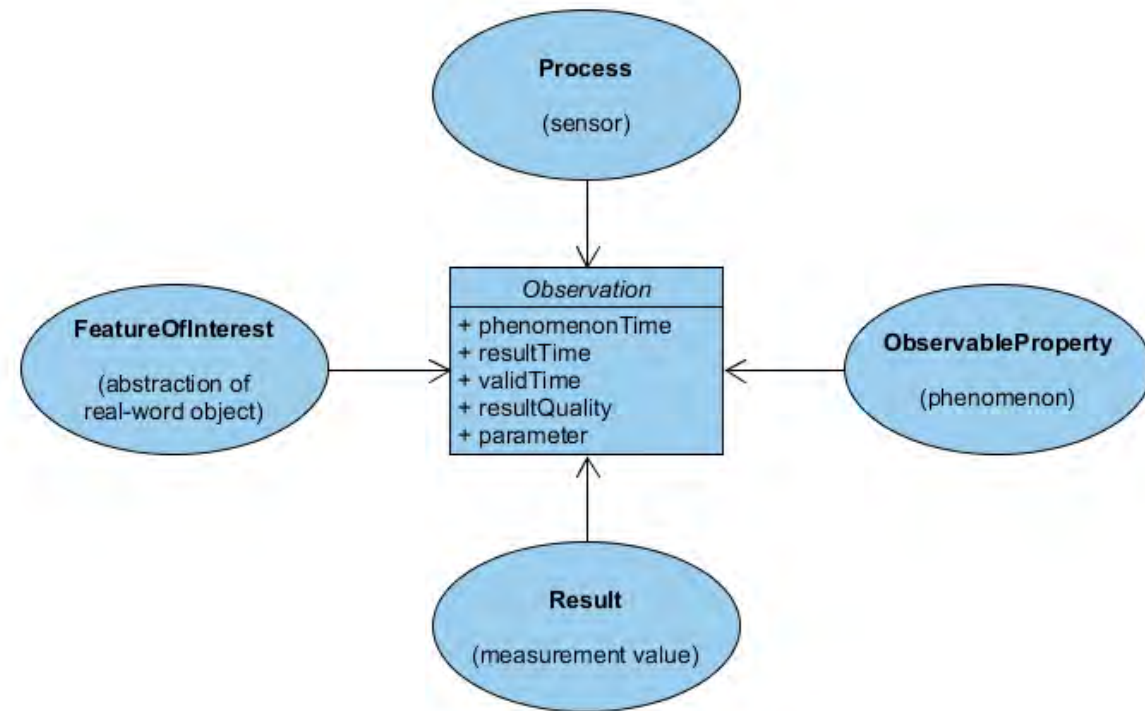
- Data structure of the metadata model (MARC, Dublin Core, iso19139 ...)
- Data value describe the codelists to be used (WRB classification)
- Data content describe how the codelist values populate the data structure (how to reference WRB within MARC/DC)
- Data format standards, how the content is encoded in a file (xml, json, rdf)

- Metadata exchange/harvest standards (oai-pmh, CSW, Opensearch)

Source: <https://www.getty.edu/publications/intrometadata/setting-the-stage/>

Dedicated standards to describe samples

- Our collections are mainly real world samples (monoliths, thin sections)
- Standards exist to describe Observations, Measurements & Samples; eg SOSA (used in GLOSIIS RDF) or OMS (used in ISO28258/INSPIRE)
- ISRIC is in the process of adopting the OMS standards in its data publications.



World Reference Base for Soil Resources

- International System for naming soils
- Governed by International Union of Soil Sciences
- A global classification system for soils, including landscape and landuse
- Based on the Legend (FAO-Unesco, 1974) and the Revised Legend (FAO, 1988) of the Soil Map of the World (FAO-Unesco, 1971-1981)
- WRB is a pdf document. Recent initiatives to publish the contents of the pdf as RDF (SKOS) so it can be referenced from metadata.

Metadata of scientific publications

- Scientific publications of ISRIC are published via the WUR library following the DataCite metadata model
- For every record a DOI is created