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SO FAIR - A generic tool for publishing observation data within an ecosystem of interoperable services

Hervé Squidadant, Mario Adam, Mikael Faucheux, Ophélie Fovet, Christophe Geneste, Tom Loree, Thierry Morvan, Laurent Ruiz, Zahra Thomas

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<https://hal.inrae.fr/hal-04236491>

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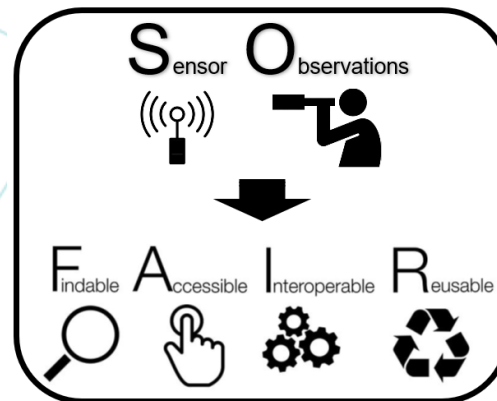
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SO FAIR - A generic tool for publishing observation data within an ecosystem of interoperable services



2nd TERENO-OZCAR Conference 2023

28 september 2023

Herve Squidant, Mario Adam, Mikael Faucheux, Ophelie Fovet, Christophe Geneste, Tom Loree, Thierry Morvan, Laurent Ruiz & Zahra Thomas.

> Context

- Maturity of FAIRisation of geographic data
 - 2000: OGC W* S standards
 - 2007: INSPIRE directive
 - 2009 : SDI
 - 2010 → ... : Platforms + communities + ...
 - ... birth of the spatial open data ecosystem
- Late start for the "liberation" of temporal data
 - 2006: Standard SOS "orphaned by its WMS"
 - 2015: New OGC SensorThings standard
 - 2016: FROST Server
 - 2021 : SensorThings as input of Theia/OZCAR IS
- Complexity of configuring a temporal open data service
- Compartmentalization between FAIR services for "geographic" AND "temporal" data

➤ Question

How to **publish** temporal datas **simply** and **integrate** them into an ecosystem of pre-existing services ?



➤ Our answer

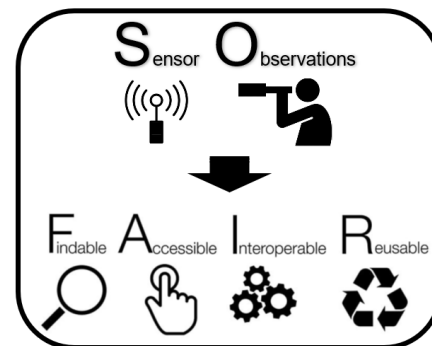
By initiating an internal working group with a mix of different skill profiles : metrologist, scientist, FAIR data scientist, API developer, service deployer / infrastructure manager, ...



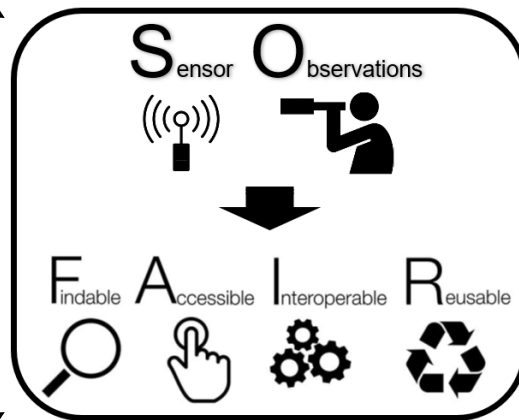
To work together to define a methodological, technical and human chain for routing data from the sensor to the ecosystem of FAIR data services based on subsidiarity as we made before with INSPIRE SDI and geographical data sharing.



The project SO FAIR -> Sensor Observations to FAIR data



SO FAIR middleware service



➤ The SO FAIR project

1 Creating a SensorThings service
→ api.geosmas.fr/<MyInstance>/v1.0

2 Configuring a SensorThings service

- Things
- Sensors
- ObservedProperties
- Thesaurii
- ...

3 Feeding datas to service

- Automatic : Lora, ...
- Semi-automatic : Outputs from proprietary software
- Manual : upload CSV
- ...

4 Connection to the service ecosystem

- Automated generation of INSPIRE metadata and OGC layers in SDI
- Dataverse Metadata

Automated generation of web-based tools for viewing and downloading time series, with or without spatial inputs.



SO FAIR API service

<https://geosas.fr/sofair-dev/api>

1 Creating a SensorThings service
→ `api.geosas.fr/<MyInstance>/v1.0`

2 Configuring a SensorThings service

- Things
- Sensors
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5 Automated generation of web-based tools for viewing and downloading time series, with or without spatial inputs.



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➤ SO FAIR API Service

➤ New standard



➤ A python implementation of the OGC API



➤ deployed in a beta version

<https://geosas.fr/sofair-dev/api/>

A screenshot of a web browser showing the GeosAS.fr API service interface. The browser address bar displays "https://geosas.fr/sofair-dev/api/processes?f=html". The page header includes the GeosAS.fr logo and a breadcrumb trail "Home / Processes". The main heading is "Processes in this service". Below this is a table with two columns: "Name" and "Description". The first row is highlighted with a yellow border and a yellow circle containing the number "1".

Name	Description
SensorThings API creation	This function allows you to create a new instance of a SensorThings service that is immediately accessible online.
Setting up the sensorthings service	This function uploads an XLSX file to create the various objects in the SensorThings service: Things, Sensors, Observed Properties, Locations, Features Of Interest and Datastreams.
Upload observations	This function uploads observations from CSV or XLSX file to the SensorThings service.
Publishes a SensorThings service in an IDG	This process publishes INPIRE-compliant layer and metadata from a SensorThings service to a Spatial Data Infrastructure.
Create SensorThings geographic portal	This function automatically generates a URL pointing to a map portal displaying chronicles of observations from the SensorThings service provided.



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Bonn - 28 september 2023

Powered by pygeoapi 0.16.dev0

The screenshot displays the web interface for creating a new instance of the SensorThings API. The browser address bar shows the URL `https://geosas.fr/sofair-dev/create-instance`. The page title is "Admin / Création d'une instance SensorThings". A sidebar on the left contains navigation links for "Accueil", "Création", "Configuration", "Données", "I.D.G.", "Viewers", "GitHub", "About", and "Configuration Test". The main content area is titled "Création" and contains a form with the following fields:

- Créateur**: A form with two input fields, "Name" and "Email".
- Service API**: A dropdown menu currently showing "FROST". A list of options is visible below the dropdown, including "FROST" and "STEAN".
- URL**: A text field containing the URL `https://frost.geosas.fr/`.
- Titre**: A text field containing the text "Exemple : Observatoire de Recherche en Environnement AgrHyS".
- Résumé**: A large text area for entering a summary.

A "Créer" button is located at the bottom of the form. The footer of the page includes the copyright information "© 2023, geosas.fr" and the version "release v1.5.0". The logo "GéoSAS.fr" is in the bottom right corner.

➤ SO FAIR API Service

➤ Un nouveau standard

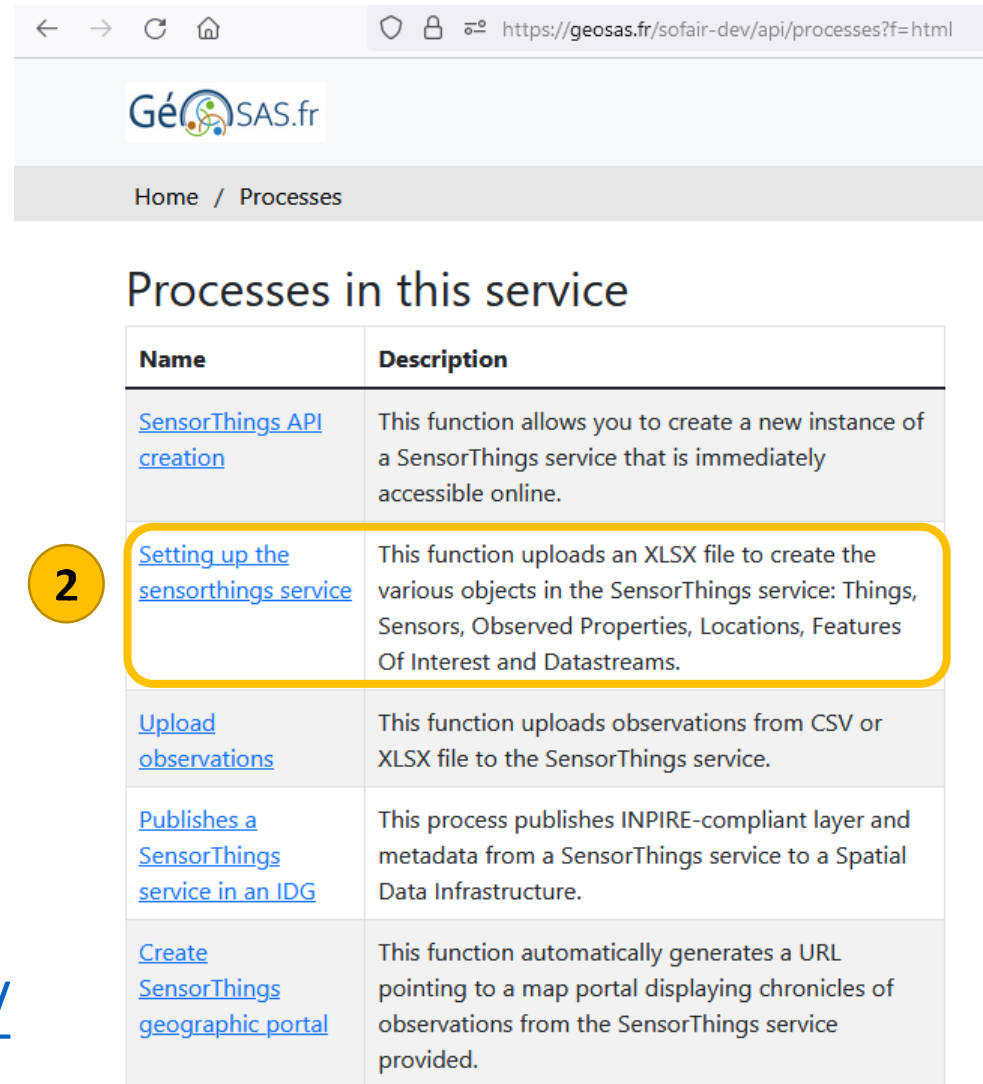


➤ Une implémentation de l'API OGC en python



➤ Déployée en mode bêta

<https://geosas.fr/sofair-dev/api/>



GeosAS.fr

Home / Processes

Processes in this service

Name	Description
SensorThings API creation	This function allows you to create a new instance of a SensorThings service that is immediately accessible online.
Setting up the sensorthings service	This function uploads an XLSX file to create the various objects in the SensorThings service: Things, Sensors, Observed Properties, Locations, Features Of Interest and Datastreams.
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2



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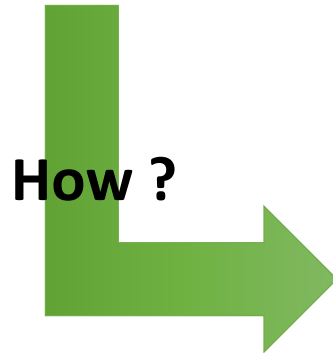
Bonn - 28 september 2023

Powered by  pygeoapi 0.16.dev0

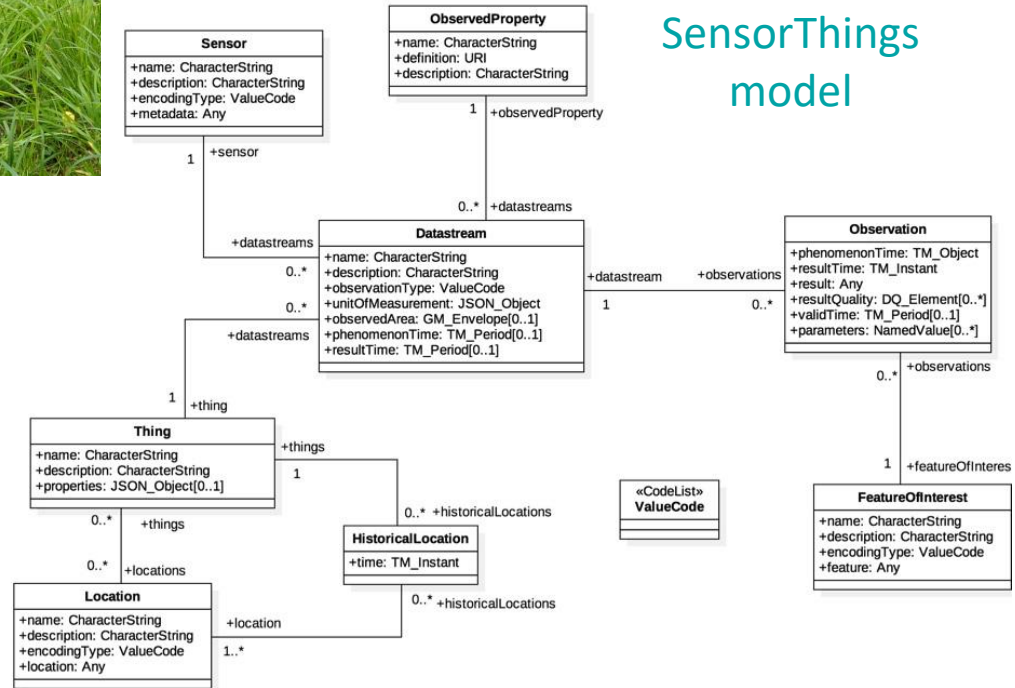
➤ From environmental observatory to SensorThings Model



Reality in the field



Information system



SensorThings model



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Iterative teamwork



Scientists

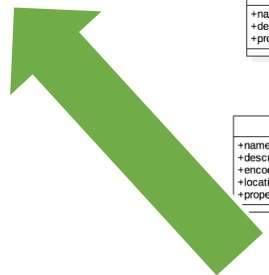
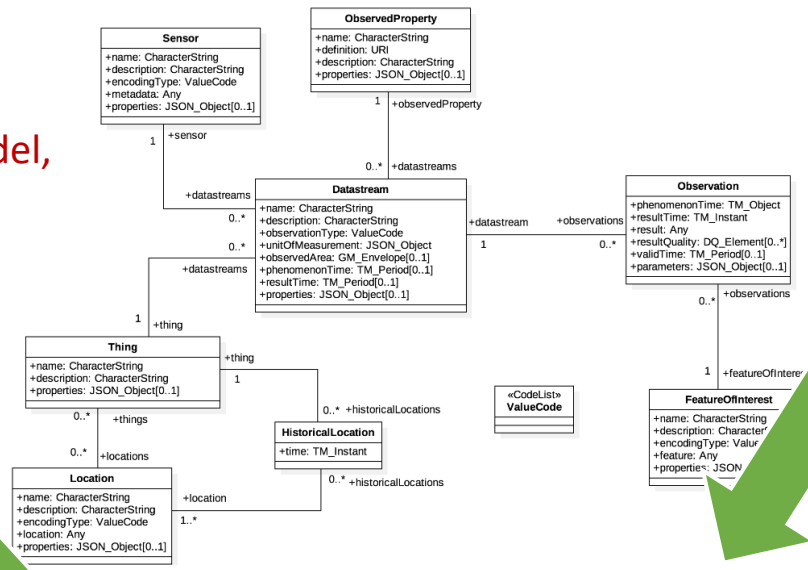
- Need to understand the model,
- Involvement in the choice of concepts and thesaurus definitions.

Metrologist, sensor installer

- Need to understand the model,
- Knowledge of observatory site, sensors, observed properties and data path.



Sensorthings model



FAIR data scientist

- Good knowledge of the model, services & tools,
- Facilitating role to extract knowledge from the scientist and the metrologist.



➤ SO FAIR API Service

➤ New standard

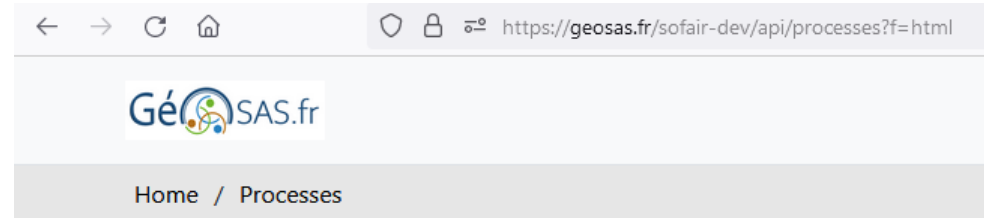


➤ A python implementation of the OGC API



➤ deployed in a beta version

<https://geosas.fr/sofair-dev/api/>



Processes in this service

Name	Description
SensorThings API creation	This function allows you to create a new instance of a SensorThings service that is immediately accessible online.
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3 Upload observations	This function uploads observations from CSV or XLSX file to the SensorThings service.
Publishes a SensorThings service in an IDG	This process publishes INPIRE-compliant layer and metadata from a SensorThings service to a Spatial Data Infrastructure.
Create SensorThings geographic portal	This function automatically generates a URL pointing to a map portal displaying chronicles of observations from the SensorThings service provided.

Upload observations in SensorThings API

3

The screenshot shows the 'Admin So FAIR' interface for 'Alimentation en données'. The page title is 'Admin / Alimentation en données' and it includes a 'GitHub' button. A navigation menu on the left lists 'Accueil', 'Création', 'Configuration', 'Données', 'I.D.G.', 'Viewers', 'GitHub', 'About', and 'Configuration Test'. The main content area has tabs for 'Excel/CSV', 'Bdd/Postgres', 'API', and 'Logiciel propriétaire'. The 'Excel/CSV' tab is active, displaying the heading 'Transfert de données via un fichier Excel' and a sub-heading 'Ici vous pouvez alimenter en données votre API SensorThings en important un fichier de données au format XLSX. Des exemples de fichiers de données sont disponibles en téléchargement.' Below this is a form for data transfer with a 'Service' dropdown set to 'ORE AgrHyS', an 'Importer' button for the file, and a 'Transférer' button for the data. To the right, an 'Exemples' section contains a table of data files.

	Nom	Fichier	Auteur	Création
AG	Données météo Agri4cast	agri4cast_src.csv	Tom Lorée	22 juin 2022
EF	Données Station Météo EFELE	efele_data_meteo.csv	Tom Lorée	1 mars 2023

© 2023, geosas.fr release v1.5.0

➤ SO FAIR API service

➤ New standard



➤ A python implementation of the OGC API



➤ deployed in a beta version

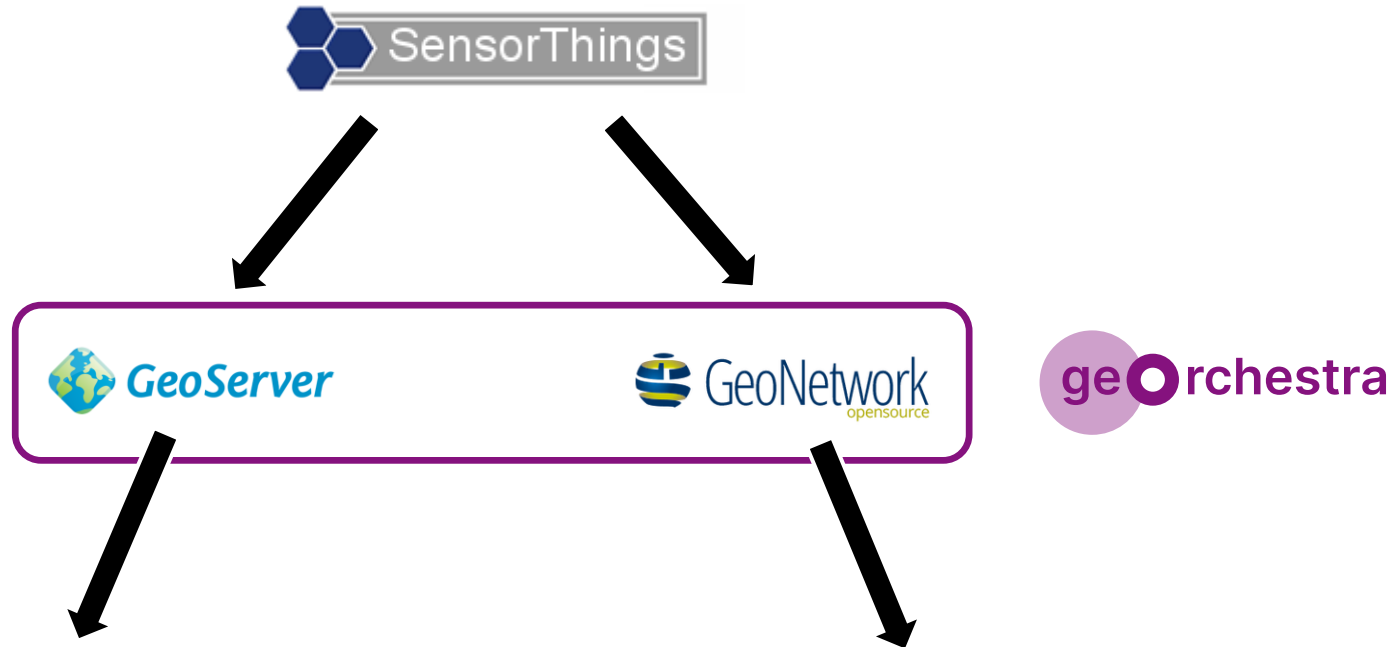
<https://geoslas.fr/sofair-dev/api/>

4

A screenshot of a web browser showing the "Processes in this service" page on geoslas.fr. The browser address bar shows "https://geoslas.fr/sofair-dev/api/processes?f=html". The page header includes the Geoslas.fr logo and a breadcrumb "Home / Processes". The main content is a table with two columns: "Name" and "Description". The table lists several API processes, with the entry "Publishes a SensorThings service in an IDG" highlighted by a yellow border. A yellow circle with the number "4" is overlaid on the left side of the table.

Name	Description
SensorThings API creation	This function allows you to create a new instance of a SensorThings service that is immediately accessible online.
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➤ Creating Métadatas and layers in SDI



- View/download/request by OGC W*S
- Solves the problem of large number of Things or Features
- Increase SensorThings API visibility in the INSPIRE platform ecosystem via multiple harvesting mechanisms
- Openness to other standard, other catalog?

➤ SO FAIR API service

➤ New standard



➤ A python implementation of the OGC API



➤ deployed in a beta version

<https://geosas.fr/sofair-dev/api/>

5

A screenshot of a web browser showing the "Processes in this service" page on GeosAS.fr. The browser address bar shows "https://geosas.fr/sofair-dev/api/processes?f=html". The page header includes the GeosAS.fr logo and a breadcrumb "Home / Processes". The main content is a table with two columns: "Name" and "Description". The table lists several API processes, with the last one, "Create SensorThings geographic portal", highlighted with a yellow border. A yellow circle with the number "5" is overlaid on the left side of the table.

Name	Description
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➤ Dynamic creation of a cartographic web portal

- Automatic URL generation

e.g. : <https://geosas.fr/mviewer-dev/?config=/apps/efele/config2.xml>

- co-visualization of spatial data / temporal data



SO FAIR Portal

Dashboard of deployed ST services

The screenshot displays the SO FAIR Portal dashboard. At the top, there is a search bar and a user profile for 'JD Trifon Ivanov'. The main dashboard area features three summary cards: 'Instances' (14), 'Propriétés observées' (229), and 'Données' (156 029 029). Below these is a section for 'Services SensorThings' with a search icon. The services are organized into a grid of cards, each representing a different service with its own API URL and status indicators for Configuration, Données, Métadonnées, and Viewer.

Service	API URL	Configuration	Données	Métadonnées	Viewer
agrhyS	https://api.geosass.fr/agrhyS/v1.0/	OK	OK	OK	OK
batelev	https://api.geosass.fr/batelev/v1.0/	OK	OK	OK	OK
rennesmetro	https://api.geosass.fr/rennesmetro/v1.0/	OK	OK	OK	OK
agri4cast	https://api.geosass.fr/agri4cast/v1.0/	OK	OK	OK	OK
safran	https://api.geosass.fr/safran/v1.0/	OK	OK	OK	OK
selune	https://api.geosass.fr/selune/v1.0/	OK	OK	OK	OK
wsci	https://api.geosass.fr/wsci/v1.0/	OK	OK	OK	OK
efele	https://api.geosass.fr/efele/v1.0/	OK	OK	OK	OK

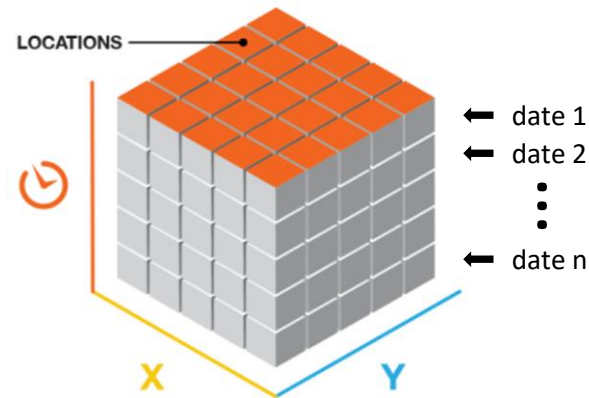
- Simple access to API functions
- Embedded in the API URL : <https://geosass.fr/sofair-dev/>

➤ Prospects

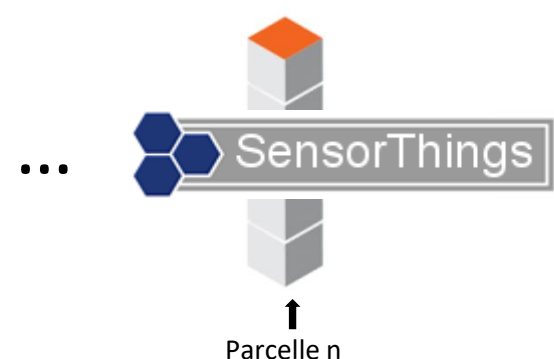
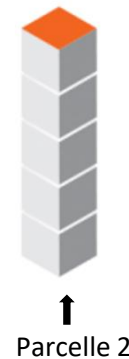
SO FAIR, missing link Spatial and temporal data Infrastructures - S&TDI ?

➔ able to publish spatio-temporal data in a variety of complementary representations :

- using time series of georeferenced raster or vector layers

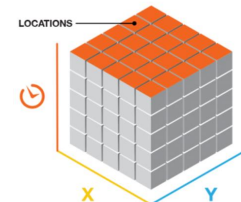
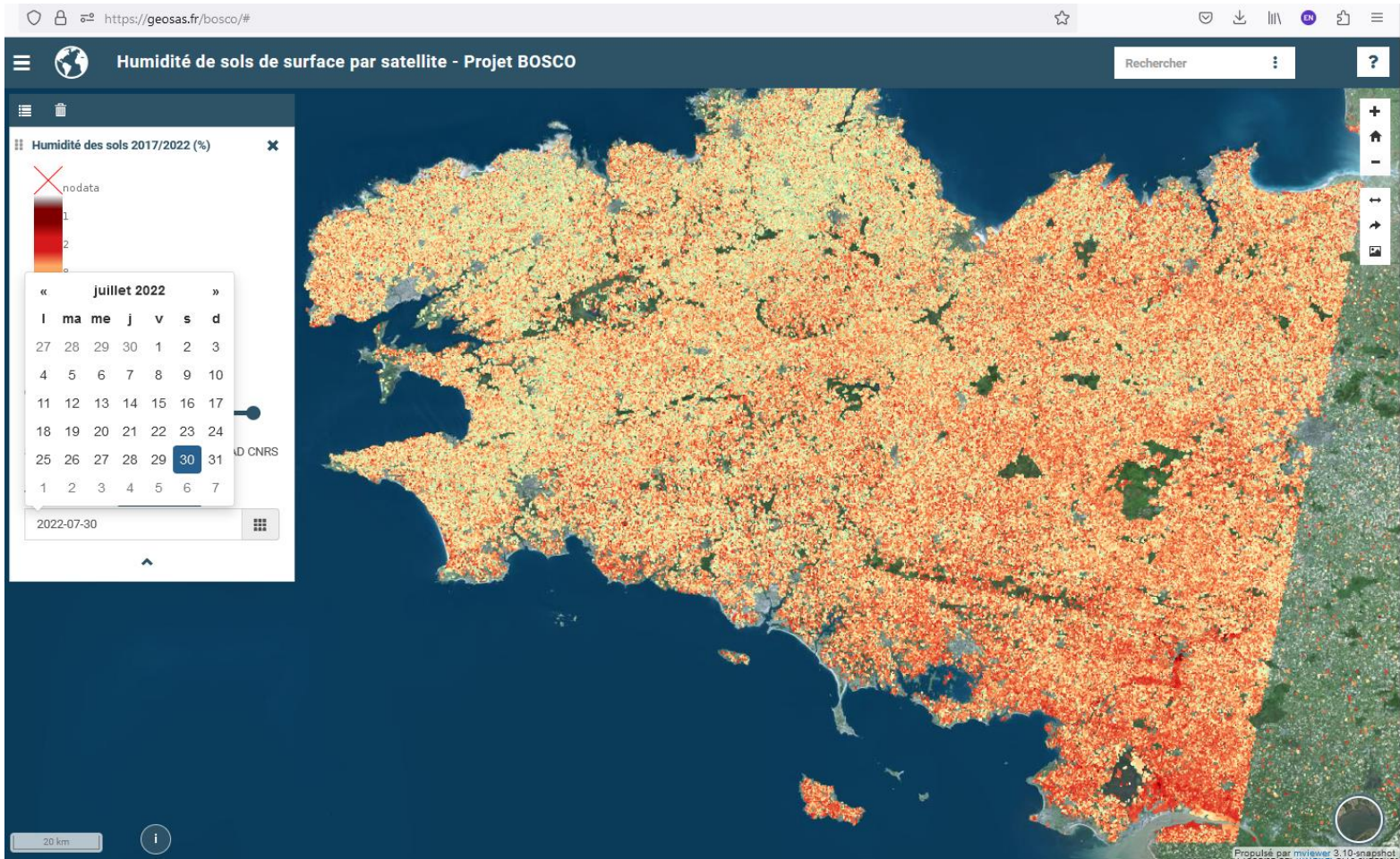


- Using time series associated with each geographical object



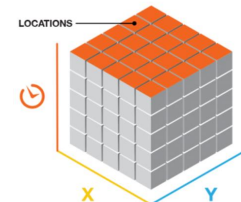
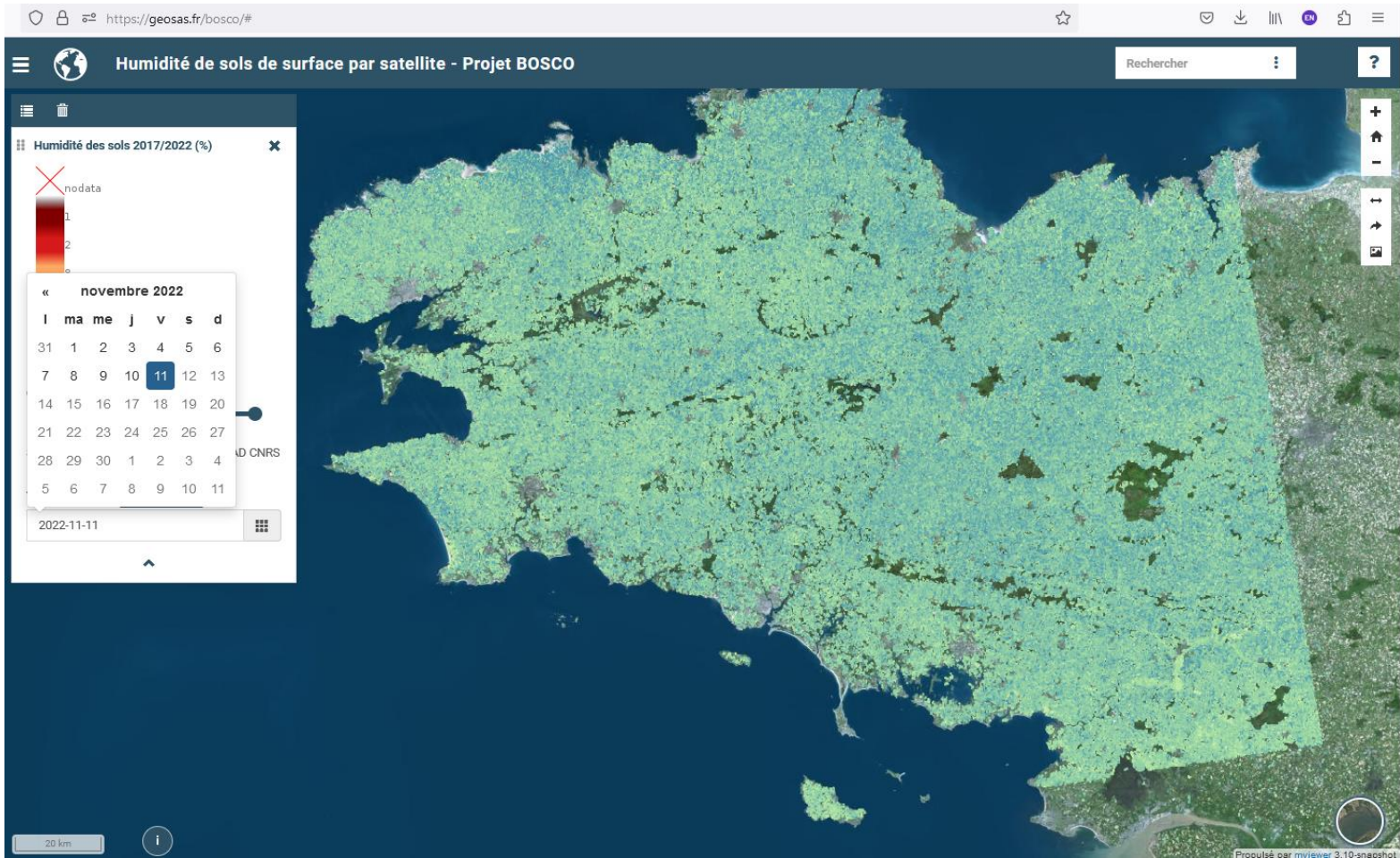
➤ Prospects : BOSCO project example

- Time series of raster images representing soil surface moisture at 10 m resolution



➤ Prospects : BOSCO project example

- Time series of raster images representing soil surface moisture at 10 m resolution



➤ Prospects : BOSCO project example

- Time series representing soil surface moisture on each crop plot



Thank you / Questions ?

Git SO FAIR project : ***<https://github.com/geosas/sofair>***

Git STEAN : ***<https://github.com/Mario-35/STEAN>***

Our research unit SDI GéoSAS : ***<https://geosas.fr>***