

---

# Lautaret Roche Noire DMP

Plan de gestion de données créé à l'aide de DMP OPIDoR, basé sur le modèle "ANR - DMP template (english)" fourni par Agence nationale de la recherche (ANR).

## Plan Details

<b>Plan title</b>	Lautaret Roche Noire DMP				
<b>Version</b>	First version				
<b>Fields of science and technology (from OECD classification)</b>	Earth and related environmental sciences				
<b>Language</b>	eng				
<b>Creation date</b>	2023-09-19				
<b>Last modification date</b>	2024-04-10				
<b>License</b>	<table><tr><td><b>Name</b></td><td>Creative Commons Attribution 4.0 International</td></tr><tr><td><b>URL</b></td><td><a href="http://spdx.org/licenses/CC-BY-4.0.json">http://spdx.org/licenses/CC-BY-4.0.json</a></td></tr></table>	<b>Name</b>	Creative Commons Attribution 4.0 International	<b>URL</b>	<a href="http://spdx.org/licenses/CC-BY-4.0.json">http://spdx.org/licenses/CC-BY-4.0.json</a>
<b>Name</b>	Creative Commons Attribution 4.0 International				
<b>URL</b>	<a href="http://spdx.org/licenses/CC-BY-4.0.json">http://spdx.org/licenses/CC-BY-4.0.json</a>				

## Project Details

<b>Project title</b>	Lautaret Roche Noire
<b>Acronym</b>	Lautaret
<b>Abstract</b>	<p>The research station of Lautaret Garden is a set of infrastructures and human resources at the service of alpine environmental research, spread over two sites open all year round. One is located on the campus of the University Grenoble Alpes (dept 38), the other is located at the Lautaret pass (dept 05) at an altitude of 2100m with an alpine botanical garden, experimental zone and monitored natural area. The research themes mainly developed are ecology of environments in relation with climate, socio-ecosystems, adaptation of living organisms, the physical environment and biogeochemical cycles.</p> <p>The Lautaret-Galibier site is part of the eLTER site network project under construction, itself supported at French level by the RZA (Réseau des Zones Ateliers) and OZCAR (Observatoire de la Zone Critique, Applications et Recherche) research infrastructures. This site is co-located with an AnaEE site and an associated ICOS (Integrated Carbon Observation System, research infrastructure) site.</p> <p>The Roche-Noire valley is part of the Lautaret-Galibier site, and this sub-site is candidate for the INSU (CNRS) Instrumented Site label. The data included in this data management plan mainly concern the Roche-Noire Instrumented Site but also</p>

complementary data around the site or more widely within the Lautaret-Galibier site.

It has been decided to divide this data management plan into distinct parts according to the research infrastructures concerned (some data may be included in several sections (named research products in the DMP), in which case a choice has been made depending on the theme or data organization. There is therefore a ZAA (Zone Atelier Alpes) section containing purely biodiversity data, an OZCAR section with time series and descriptive data on physical environments, an ICOS section containing all the data required for this infrastructure, an AnaEE section dealing specifically with data from experiments and forthcoming botanical collections section for garden-related data production.

## Funding

- Grenoble Alps University (UGA) :
- French National Centre for Scientific Research (CNRS) :
- Jardin du Lautaret :
- Analysis and Experimentation on Ecosystems (AnaEE-France) :
- Observatory of Earth Sciences and Astronomy of Grenoble (OSUG) :

## Start date

1980-01-01

## Partners

- LABORATOIRE D'ECOLOGIE ALPINE (CNRS, Univ. Savoie-Mont-Blanc, Univ. Grenoble Alpes)
- ENVIRONNEMENTS, DYNAMIQUES ET TERRITOIRES DE LA MONTAGNE (CNRS, Univ. Savoie Mont-Blanc)
- Jardin du Lautaret (CNRS, Univ. Grenoble Alpes)
- Institut des Géosciences de l'Environnement (CNRS, Grenoble-INP, INRAe, IRD, Univ. Grenoble Alpes)

## Research outputs :

1. Zone Atelier Alpes (Dataset)
2. Observatoires de la Zone Critique : Applications et Recherche (Dataset)
3. Integrated Carbon Observation System Research Infrastructure data (Dataset)
4. Analysis and Experimentations on Ecosystems (Dataset)
5. Lautaret Garden Botanical Collection (Collection)

## Contributors

Name	Affiliation	Roles
Forêt Jérôme	CNRS - 200710869N	<ul style="list-style-type: none"><li>• Project coordinator</li></ul>
Liger Lucie - <a href="https://orcid.org/0000-0002-2238-1065">https://orcid.org/0000-0002-2238-1065</a>	CNRS - 200710869N	<ul style="list-style-type: none"><li>• DMP manager</li><li>• Personne contact pour les données (ZAA, OZCAR data, ICOS data, AnaEE data, Botanical Collection)</li></ul>

Droits d'auteur :

Le(s) créateur(s) de ce plan accepte(nt) que tout ou partie de texte de ce plan soit

réutilisé et personnalisé si nécessaire pour un autre plan. Vous n'avez pas besoin de citer le(s) créateur(s) en tant que source. L'utilisation de toute partie de texte de ce plan n'implique pas que le(s) créateur(s) soutien(nen)t ou aient une quelconque relation avec votre projet ou votre soumission.

# Lautaret Roche Noire DMP

## 1. Data description and collection or re-use of existing data

### Zone Atelier Alpes

#### 1a. How will new data be collected or produced and/or how will existing data be re-used?

The ZAA is an extension of the RZA Research Infrastructure (RI), which aims to study mountain socio-ecosystems.

#### Data collection

Land Cover data are obtained from autonomous sensors (cameras) and plant survey data through field surveys.

#### Data re-use

The reuse of data is planned with partners such as Météo France and other scientific partners like LECA and EDYTEM. There may be other partners as well.

#### 1b. What data (for example the kind, formats, and volumes), will be collected or produced?

#### Site Name definition

A site is a study area/territory for carrying out various measurements and observations on various variables of interest.

Site names	Type of variable	Measured variable	Data kind	Data format	Data volume	Time span	Contacts
Roche Noire	Land Cover Data	Phenology snow cover	images	JPEG	100 GB	2018-ongoing	Principal investigator: Philippe Choler (LECA) Data manager: Lucie Liger (Lautaret)
Lautaret-Galibier	Plant survey Data	Phenology biomass taxonomy abundance frequency occurrence mineral content	Numeric images spatial data	CSV, JPEG, Raster.	100 MB	2018-ongoing	Principal investigator: Rolland Douzet (Lautaret) Data manager: Maxime Rome, Lucie Liger (Lautaret) Data collector: Maxime Rome, Rolland Douzet (Lautaret)

#### Other research products' data

Soil data and geophysical data described in OZCAR research product are also part of ZAA.

### Observatoires de la Zone Critique : Applications et Recherche

#### 1a. How will new data be collected or produced and/or how will existing data be re-used?

#### OZCAR Research Infrastructure

OZCAR is a Research Infrastructure (RI) dedicated to studying data related to the [Critical Zone](#) thematics.

Lautaret site is not yet a part of OZCAR RI but will submit an application to integrate the infrastructure, in the meantime, it seemed appropriate to include data relating to the critical zone in this section.

#### Data Collection

There is time series data acquired from sensors connected to a data acquisition system (with or without teletransmission), and there is also samples collected in the field (e.g., geochemical data from water samples).

#### Data Re-Use

Data from partners such as Meteo France, GisSol and other scientific partners like IGE, and EDYTEM is reused.

## 1b. What data (for example the kind, formats, and volumes), will be collected or produced?

### Site and station definitions

The Lautaret Galibier has, among its sites, an instrumented site called Roche Noire, which is a candidate for INSU (Institut National des Sciences de l'Univers) certification. On these sites, there are various stations where different variables, listed below, are measured.

Site name	Station name	Variable type	Measured variable	Data kind	Data format	Data volume	Time span	Contacts
Roche Noire	GDA-Roof (Deponit) Garden	Atmospheric data	Aerosol & atmospheric deposition (wet & dry), snow, major ions, Ntot (total nitrogen), NH4, ...	Numeric time series	.csv	~10MB	2019 - ongoing	Principal investigator: Didier Voisin (IGE)
Roche-Noire and Aravo	100 sensors (the number of sensors is increasing)	Soil Data	Soil moisture, temperature	Numeric time series	.csv	~200MB	2002 - ongoing	Principal investigator: Philippe Choler (LECA)
Roche Noire	Meteo-Roche-Noire	Soil Data	Soil moisture, temperature	Numeric time series	.csv	~2MB	2020 - ongoing	Principal investigator: Lucie Liger (Lautaret)
	Hydro-roche-noire-amont		Water level, flow rate, conductivity, turbidity, temperature.				2020 - ongoing	Principal investigator: Lucie Liger (hydrological and physical measurements, field sensors)
	Hydro_roche-noire-exutoire		Hydrochemical variables : Major ions, H2O isotopes, dissolved organic carbon, NH4, Ntot. Quantifying pollutants (HAP-micro plastics).				+ since 2018 for water_level	Principal investigator: Didier Voisin (chemistry, Hydro_Pissou-exutoire)
Roche Noire	Hydro_roche-noire-aval	Hydrological Data		Numeric time series	.csv	~100MB	2020 - ongoing (Lauzet)	Principal investigator: David Gateuille (EDYTEM, chemistry variable)
	Hydro_Lauzet						2019 - ongoing (Pissous, NH4, Ntot.)	
	Hydro_Pissou-exutoire		For Pissous, only: water level, flow rate, conductivity, temperature, major ions, water isotops, Ntot					
Roche Noire	Nivôse Galibier	Meteorological Data	Temperature, relative humidity, wind direction, wind speed, snow depth	Numeric time series	.csv		2016 - ongoing	Data produced by Météo France <a href="https://meteo.data.gouv.fr/">https://meteo.data.gouv.fr/</a>
Lautaret-Galibier	Meteo-Laurichard	Meteorological Data	Temperature, pressure, relative humidity, wind direction, wind speed, liquid precipitation, snow depth, solar radiation.	Numeric time series	.csv	~200MB	2004 - 2010 2020 - ongoing	Principal investigator: Xavier Bodin (EDYTEM) Data manager: Emmanuel Malet (EDYTEM) Data manager: Lucie Liger (Lautaret)
	Meteo-Lautaret						2012-ongoing	
	Meteo-		Temperature,				Meteo-Lautaret (2018-ongoing for	

Roche Noire	Galibier Meteo-Petit-Galibier Meteo-Roche-Noire	Meteorological Data	relative humidity, wind direction, wind speed, liquid precipitation, snow depth, solar radiation.	Numeric time series	.csv	~200MB	2019-ongoing (Meteo-Galibier) 2020-ongoing (Meteo-Roche-Noire)	Principal investigator: Lucie Liger (Lautaret)
Roche-Noire	NA	Geophysical data	Geophysics: 5 SRT (seismic refraction tomography) profiles	2D profiles	.seg2 /.segy /.txt / .sgt / .vtk	2Go	2023	Principal investigator: Philippe Choller (LECA) Data manager: Sylvain Pasquet (IPGP), Lucie Liger (Lautaret)
Aravo	NA	Geophysical data	4 ERT (Electrical Resistivity Tomography) profiles 5 SRT profiles EM (Electromagnetic Mapping) 143 penetrometer drilling	2D profiles 2D profiles 2D profiles Numeric	.bin / .txt / .vtk seg2 /.segy /.txt / .sgt / .vtk .dat / .tiff .pd2 / .pda / .txt / .xls	10Mo 2Go 15Mo 5Mo	ERT 2021 SRT 2022 EM 2021-2023 penetrometer 2023	Principal investigator: Philippe Choller (LECA) Data manager: Sylvain Pasquet (IPGP), Lucie Liger (Lautaret)
Roche-Noire	Charmasses	Geophysical data	GPR (Ground-penetrating radar) transects : geological horizons ERT transects : Soil electric resistivity EM transect : apparent electrical conductivity	2D vertical map 2D vertical map 2D horizontal and vertical map	.doc .xls	20 MB	2018	Principal investigator: Didier Voisin, Marc Descloitres (IGE) Project member: Romain Noulette (IGE)
Roche-Noire	Charmasses	Pedological data	10 profiles : density, porosity, infiltration capacity	Numeric Document	.doc .xls	20 MB	2018 2019	Principal investigator: Didier Voisin (IGE) Project members: Romain Noulette and Auroré Rossius-Gagnon (IGE)
Roche-Noire	NA	Pedological data	soil description map	Document	.pdf	2 MB		Data produced by Gis Sol accessible <a href="#">here</a> . Geoportail / Gis Sol
Roche-Noire	NA	Pedological data	130 profiles : Texture, organic carbon, pH, N, C/N, CaCO3, Ca, Mg, NA, K, Al, Siox, Alox, Feox, Si cbd, Al cbd, Fe cbd	Numeric document	.xls .pdf .doc	10MB	2006	Principal investigator: Jérôme Poulenard (EDYTEM)
Roche-Noire	Charmasses	Geological data	Identification of the outcrops and their dip 2 coupes interpretatives oui	SIG 2D profiles	.shp .png	<20MB	2019	Principal investigator: Didier Voisin (IGE)  Principal investigator:

Roche- Noire	NA	Topographical data	MNT, LIDAR	Raster	xyz	7MB	2012	Philippe Choler (LECA) Data manager: Lucie Liger
-----------------	----	-----------------------	------------	--------	-----	-----	------	---

**Other research products' data**

Meteorological, soil, phenology (NDVI), vegetation and flux data described in ICOS research product are also part of OZCAR.

## Integrated Carbon Observation System Research Infrastructure data

### 1a. How will new data be collected or produced and/or how will existing data be re-used?

**Lautaret Roche Noire Site and ICOS stations**

ICOS (Integrated Carbon Observation System) is a European Research Infrastructure ([ESFRI](#)) for quantifying and understanding the greenhouse gas balance of the European continent and of adjacent regions ([www.icos-ri.eu](#)). It is organized in three different components (Atmosphere, Ecosystems, Oceans) and each of them is coordinated by a Thematic Centre. The Lautaret Galibier has, among its sites, an instrumented site, which is a candidate for INSU (Institut National des Sciences de l'Univers) certification called Roche Noire. On this site, there are 2 ICOS stations where different variables are measured. These stations are ecosystem component related and are labelled as one single "ICOS associated station" from 2022. Please find the registration of this station [here](#).

**Data collection**

There is time series data acquired from autonomous sensors or sensors connected to a data acquisition system.

**Data re-use**

Not Applicable (NA)

### 1b. What data (for example the kind, formats, and volumes), will be collected or produced?

Associated stations in ICOS have a minimum basic list of variables that must be collected and submitted (Eddy covariance fluxes of one greenhouse gaz (GHG), one incoming radiation variable, air temperature, relative humidity, precipitation, wind speed and direction, maximum LAI, Above Ground Biomass, soil texture and disturbances/management information) but additional variables are also possible.

Here below, the list of all the variables monitored in relation with ICOS:

Site name	Station name	Variable type	Measured variable	Data kind	Data format	Data volume	Time span	Contacts
Roche Noire	Fluxalp	Fluxes Data (continuous data)	Carbon dioxide flux, Latent Heat Flux, Sensible heat flux, Air temperature, Potential evapotranspiration (PET) , Net Ecosystem Exchange (NEE)	Numeric time series	CSV	4 MB per year (processed data), 70 GB per year (raw data)	2015-ongoing	Principal investigator: Didier Voisin (IGE) Data collector: Romain Biron (IGE) and Lucie Liger (Lautaret)
Roche Noire	Fluxalp	Vegetation Data (non-continuous data)	Biomass, LAI	Numeric time series	CSV	100 KB per year (spatialized data), 1.25 MB per year (time series)	2022-ongoing	Principal investigator: Didier Voisin (IGE) Data collector: Lucie Liger (Lautaret)
Roche Noire	Meteo- Charmasses	Vegetation Data (continuous and non-continuous data)	NDVI (NIR, Red)	Numeric time series	CSV	1.25 MB per year	2014-ongoing	Principal investigator: Didier Voisin (IGE) Data manager: Lucie Liger (Lautaret) Data collector: Romain Biron (IGE)
Roche Noire	Meteo- Charmasses	Soil Data (continuous data)	Soil moisture, soil temperature, soil conductivity, ground heat flux.	Numeric time series	CSV	1.25 MB per year	2014-ongoing	Principal investigator: Didier Voisin (IGE) Data collector: Romain Biron (IGE) and Lucie Liger (Lautaret)
Roche Noire	Meteo- Charmasses	Meteorological Data (continuous data)	Air temperature, pressure, relative humidity, wind direction, wind speed, liquid precipitation, snow depth, solar radiation: incoming/outgoing short wave, incoming/outgoing long wave, albedo, Photosynthetically active radiation (PAR)	Numeric time series	CSV	1.25 MB per year	2012-ongoing, 2018-ongoing (precipitations)	Principal investigator: Didier Voisin (IGE) Data manager: Lucie Liger (Lautaret) Data collector: Romain Biron (IGE)

#### General data volume

Total volume of processed data: 10 MB per year.

#### Other research products' data

All this data will also be sent to the RI OZCAR.

#### Continuous and non-continuous data

This will be explained later in section 2a.



## Analysis and Experimentations on Ecosystems

### 1a. How will new data be collected or produced and/or how will existing data be re-used?

#### SECTION IN PROGRESS

##### AnaEE Research Infrastructure

AnaEE France offers the scientific community, companies and civil society organisations full access to the study of terrestrial and aquatic ecosystems through its experimental platforms distributed throughout mainland France and the French overseas territories.

The experimental platforms of the Lautaret garden correspond to a set of infrastructures (natural meadows, experimental garden, nursery, laboratories and air-conditioned greenhouses) allowing the study of alpine grassland ecosystems according to various themes (ecology, physiology, soils, water, snow, physics and atmosphere, geology, landscapes, social sciences....).

##### Data collection

This section contains specific data from experimentation on short and long term research projects.

It can be data from autonomous sensors and sensors connected to a data acquisition system, as well as through field surveys, remote sensing, material samples analysis but always connected to an experimentation.

##### Data re-use

The reuse of data is planned with scientific project partners.

### 1b. What data (for example the kind, formats, and volumes), will be collected or produced?

This part is not divided by site or station like the other RI but by experimentation project.

##### Experimentation projects data

Experimentation name	localisation	Variable type	Measured variable	Data kind	Data format	Data volume	Time span	Contacts
Alpages-Volants Transalp	2 gradients (Lautaret and Alpe d'Huez) with 3 sites each including 35 plots.	Plant survey	Plant community composition soil cover total vegetation cover	Numeric	CSV	~100MB	2017-ongoing	PI: Tamara Muenkemuller (LECA) Project member: Fanny Domanget (LESSEM) Data manager: Julien Renaud (LECA) Data manager : Jean-Christophe Clement (CARRTEL)
		Soil data	pesence of stones  eDNA based soil releves Soil functions (OC, N, P) and fluxes (CO2, CH4, N2O)					
Alpages-Volants Transalp	2 gradients (Lautaret and Alpe d'Huez) with 3 sites each.	Atmospheric data	Atmospherical pressure Air temperature Relative humidity	Numeric time series	csv	~10MB	2017-ongoing	PI: Tamara Muenkemuller (LECA) Data manager : Lucie Liger (Lautaret)
		Soil data	Water Content Soil temperature					
Alpalga	Vallon Roche Noire	Samples Imaging data	Snow samples microscopes images	DOC TIF, JPG FASTA			2021-2025	Eric Marechal
		Genomic data	ADN sequencies					
Tabouret	Plant nursery	Phenology	morphological trait	numeric csv imaging	csv	~20MB	2023-2025	Florian Boucher + Camille Voisin
		Soil data	adapptive value					
Carmine	Percolatron	Phenology	Soil chemical analysis				2022-ongoing	Muriel Raveton + Marion Deville
		Soil data						
Torgen	Plant Nursery Arboretum	Phenology					2022-ongoing	André Evette + Juliette Rousset
		Soil data	Water Content Soil temperature					
Warm	Warm-Hi Warm-Lo	Botanical Survey	NDVI				2017-ongoing	Sandra Lavorel
		Phenology						
Lucses							2021-ongoing	Sandra Lavorel
SECOS	Percolatron	Soil data Botanical survey Metabolomic Water analysis Gas analysis					2023-2024	Jeremy Puissant

## Lautaret Garden Botanical Collection

### 1a. How will new data be collected or produced and/or how will existing data be re-used?

#### Lautaret Botanical Collection

Lautaret Garden is involved in botanical collection management :

Living Plant collection: plants living in Lautaret Garden bedding and rockery coming from seedlings or sown seeds from garden or wild sampling.

Herbarium collection: herbarium specimens from various botanists or structure and from research projects such as Phyloalps.

Seeds collection: from the harvest of the garden's botanists mostly in the Alps (and a few other places).

#### Data Collection

There is a database of living plants from Lautaret Garden, a collection of herbarium sheets and numeric data describing harvested seeds.

### 1b. What data (for example the kind, formats, and volumes), will be collected or produced?

Localisation	Variable type	Measured variable	Data kind	Data format	Data volume	Time span	Contacts
World tempered mountainous area	Living plant collection	- Plant table : accession ID(ACCID), plant form (ACCT), state (ACCSTA), entry date, exit date, provenance, donator, origin localisation (state, localisation, coordinates), garden localisation	Physical Plants	BDD XLS	1500 inputs (200 dead) 60Mo	2018 - ongoing	Data manager: Maxime Rome (Lautaret)
		- Taxon table (data re-used) : family, gender, species, descriptor name, variety or sub-species, geographical repartition					
Alps and more	Herbarium collection	herbarium sheets (general herbarium,PhyloAlps collection, specific collection) + plant genus and family lists	Physical herbarium specimens + numeric	Paper + XLS	40000 specimens (5300 for PhyloAlps) + 1Mo	~1800 - ongoing	PI: Maxime Rome (Lautaret)
		herbarium inventory + numerical sheets (PhyloAlps)	numeric	CSV, JPG	1To	2009-ongoing (phyloalps)	Data Manager: Maxime Rome, Christophe Perrier (Lautaret)
		Lautaret Lichen collection + inventory	physical specimens +numeric	Plastic box + XLS	450 specimens + 1Mo	~1950	
Alps	Index Seminum	J.Asta Lichen collection	physical specimens	envelope in box	4000 to 10000 specimens +0	1970-2000	
		taxa (genus species subspecies variety, author) collection type locality, region, coordinates harvest's date disponibility	Physical Seeds	XLS	~1700 samplings accessible	15 floating years	Data Manager: Maxime Rome (Lautaret) Collector: Rolland Rouzet, Christophe Perrier, Pascal Salze (Lautaret)

## 2. Documentation and data quality

### Zone Atelier Alpes

#### 2a. What metadata and documentation (for example the methodology of data collection and way of organising data) will accompany the data?

##### Metadata and documentation

###### Current state

###### Plant survey data

In the field, the GPS point is recorded on botanist's telephone, along with an audio recording of the botanical surveys.

Plant occurrence, abundance, phenology and frequency datas are directly integrated with SIMETHIS (interface for contributor) into Silene PACA portal managed by the Conservatoire Botanique Alpin. This data portal is part of the national portal on biodiversity : SINP (Système d'information de l'inventaire du patrimoine naturel) linked to the INPN (Inventaire National du Patrimoine National). Metadata should follow the Silene standards for data submission.

- Silene code for data usage: [https://cms.silene.eu/wp-content/uploads/2020/02/charte\\_silene.pdf](https://cms.silene.eu/wp-content/uploads/2020/02/charte_silene.pdf)
- Silene standards for data submission: <https://silene.eu/ressources-documentaires/standard-donnees/> (compatible with SINP standards)
- SINP metadata standards: <https://inpn.mnhn.fr/programme/donnees-observations-especes/references/standard-echange>

*Other plant data (except data into Silene DB)*

- In the field, the GPS point is recorded on a telephone, along with an audio recording of the botanical surveys
- A standardized csv file is filled in and updated with the dataset's metadata for possible use with Geoflow tools to create xml metadata sheets.

*Land Cover data*

For these variables, there are several metadata recording techniques described below:

- Fieldbook (paper): intervention and maintenance onsite.
- Field feedback form: filling in this form with the fieldbook info after each field mission (stored on the cloud).
- Measurement station sheet: descriptive sheet of measurement stations with GPS coordinates, creation date, information on installed sensors (type, , location, installation date, measurement frequency), photos, names of contacts, type of power supply, type of data transmission, links to data (stored on the cloud).
- A standardized csv file is filled in and updated with the dataset's metadata for possible use with Geoflow tools to create xml metadata sheets

**Next state**

*Plant Survey data into Silene DB*

The occurrence data should be automatically published from the SINP to GBIF (Global Biodiversity Information Facility).

- GBIF metadata standards: <https://inpn.mnhn.fr/programme/donnees-observations-especes/references/standard-echange>

*Land Cover data and Plant data (other than Silene DB)*

In order to publish in OSUG geonetwork, the metadata should be conform to the ISO 19115/Inspire standard. In order to automatize this implementation, a [Geoflow workflow](#) written in R could be used where metadata is described in CSV files.

## 2b. What data quality control measures will be used?

**Data quality control**

Currently, data is not subjected to a quality control check; instead, raw data is directly stored on the UGA cloud.

Regarding plant survey data: there is a verification process where individuals manually review the data to identify any inconsistencies (done by CBNA).

## Observatoires de la Zone Critique : Applications et Recherche

### 2a. What metadata and documentation (for example the methodology of data collection and way of organising data) will accompany the data?

**Current state**

*Hydrological, soil and meteorological data*

For these variables, there are several metadata recording techniques described below:

- Fieldbook (tablet): intervention, manual measurements, calibrations, maintenance (stored with field equipment).
- Field feedback form: filling in this form with the fieldbook info after each field mission (stored on the cloud).
- Measurement station sheet: descriptive sheet of measurement stations with GPS coordinates, creation date, information on installed sensors (type, variables measured, location, installation date, measurement frequency), photos, names of contacts, type of power supply, type of data transmission, links to data (stored on the cloud), if available.
- Field Protocols: protocols for experiments, measurements, maintenance, data recovery and equipment use, as well as technical manuals for equipment, stored on the cloud.
- A standardized csv file is filled in and updated with the dataset's metadata for possible use with Geoflow tools to create xml metadata sheets

*Chemistry variables*

Regarding chemistry variables, different metadata and documentation are applied depending on the involved laboratory: IGE or EDYTEM.

IGE: There is a field notebook and Excel sheets in which information on the collection, preparation and follow-up of samples is noted, such as sample name, sample date, sample site, sample location, pH, conductivity and temperature at the time of sampling, where the samples are stored, the date on which they were analysed, as well as specific remarks on the collection, preparation and follow-up of samples. In addition, for precipitation chemistry (i.e., major ions, Ntot and water isotopes), there is also the mass of water collected.

EDYTEM: The researchers generate a field report, and then An Excel file with a section dedicated to recording sampling anomalies. There is also a Word file describing the field conditions during sample collection. In the future, electronic notebooks will be set up to enable this information to be shared.

#### *Geophysical data*

Scanned field notebook with acquisition parameter and profil position and/or a .txt document containing acquisition parameter for each profil.

For data stored in the OZCAR hydrogeophysical database a pdf file is added to data with acquisition parameters, localisation and other useful infos to use datas.

#### **Next state**

Metadata will adhere to the Theia/OZCAR metadata model, commonly known as the Theia/OZCAR pivot format, while observed variables will be named in accordance with the Theia/OZCAR thesaurus.

The pivot format comprises three integral components: Observatory description (adhering to the Dublin Core standard), Dataset description (conforming to the ISO 19115/Inspire standard), and Observation description (following the Observation & Measurement standard).

<b>Pivot format section</b>	<b>Components</b>
Observatory description	<ol style="list-style-type: none"><li>1. Identification: Name, Title and Description</li><li>2. Fundings</li><li>3. Contacts</li></ol>
Dataset description	<ol style="list-style-type: none"><li>1. Identification : Dataset title, Description,</li><li>2. Thematic: GEMET Inspire Theme, Topic Category (ISO 19115)</li><li>3. Keywords</li><li>4. Spatial Extent</li><li>5. Temporal Extent</li><li>6. Access and use constraints</li><li>7. Contacts</li></ol>
Observation description	<ol style="list-style-type: none"><li>1. Sampling feature of interest : Station name, Location</li><li>2. Variable: name, unit and description</li><li>3. Acquisition Procedure: Processing information, Sensor Information</li><li>4. Observation: Temporal extent</li><li>5. Result: Time series data</li></ol>

For more in-depth information about the metadata pivot format, kindly refer to the following link:

<https://theia-ozcar.gricad-pages.univ-grenoble-alpes.fr/doc-producer/producer-documentation.html#modele-de-donnees-pivot>

For more in-depth information about the Thesaurus of THEIA/OZCAR, kindly refer to the following link:

<https://theia-ozcar.gricad-pages.univ-grenoble-alpes.fr/doc-producer/producer-documentation.html#thesaurus-theia-ozcar-categories-et-noms-de-variables>

---

## **2b. What data quality control measures will be used?**

### **Data quality control**

**Initial Calibration:** Before deployment in the field, measurement instruments, such as autonomous sensors or those connected to a data acquisition system, are calibrated under controlled laboratory conditions. This typically involves using reference sources to adjust and calibrate the instruments.

**Regular Maintenance:** Sensors are subject to wear and drift over time. Regular maintenance is performed to ensure that the instruments remain accurate. This may include periodic adjustments and sensor replacements if necessary.

**Field Checks:** Some instruments, such as those measuring water height (pressure or radar), water conductivity, wind direction, precipitation, etc., can be checked in the field using manual spot measurements. This allows for the quick detection and correction of any drift or anomalies.

**Field Instrumentation Tracking Sheet:** A tracking sheet is completed for each station, site, or group of sensors for every intervention, whether in the field or remotely. This sheet may include actions taken, issues detected, maintenance operations, etc. It is internally shared to ensure a record of interventions.

**Cleaning and Validation:** Data is cleaned to identify outliers, maintenance periods, drifts, etc. This process is performed

using R routines with operator verification at each step for hydrological and meteorological data.

Quality Control: Quality control is conducted in the field and during the cleaning/validation process. It includes inter-station variable comparisons. In the future we will integrate a data quality code to rate the quality level.

#### *Chemistry variables*

Regarding chemistry variables, different quality processing methods are applied depending on the involved laboratory: IGE or EDYTEM.

IGE: For ions, the ionic balance is checked, and in the future the conductivity balance will be checked as well.

EDYTEM: The type of control applied depends on the type of pollutant. Generally speaking, laboratory blanks and field blanks are used to ensure that the samples are not contaminated. For plastics, field blanks and laboratory blanks are used. In other words, we check that the equipment used in the laboratory does not contaminate the samples (because the pollutants are everywhere). For HAP, only laboratory blanks are used and extractions are made from certified samples (which are done regularly as part of the laboratory's analytical routine) to check that the results are valid. The blanks are included in the variable analyses, unlike the certified samples.

## **Integrated Carbon Observation System Research Infrastructure data**

### **2a. What metadata and documentation (for example the methodology of data collection and way of organising data) will accompany the data?**

#### **Metadata and documentation taken during field operation**

There is a field notebook and monitoring Excel sheets in which information on the data collection and follow-up of sensors and data is noted: investigator name, date and hour, variable names, location, as well as observations regarding the condition of stations and sensors are documented. Additionally, any actions taken during data collection, such as cleanings, specific operations, or interventions performed, are also documented.

#### **Metadata and documentation for ICOS associated stations**

ICOS has two different kinds of data for associated stations, continuous et non-continuous:

- Continuous data is time series including fluxes data (i.e., turbulent fluxes, storage fluxes, and concentrations) and meteorological data. It must be submitted after a pre-processing with a timestep of 30 minutes and a level 2 quality check defined by ICOS as Final Fully Quality Controlled Observational Data.
- Non-continuous associated stations data includes: station team description, site general description, sensors metadata, ancillary data (i.e., all the biological, disturbance and other observations that are done at the site and useful to interpret the fluxes). The ancillary data are expressed as annual statistics.

Continuous data must be submitted per single sensor at halfhourly resolution. The variable names used in the submission must be composed by a variable code and three numeric digits separated by underscore (\*). The list of the possible variable codes (to be used in the data file) and units [are available here](#). The two first numeric digits identify the position of the sensors according to on a horizontal and vertical axis. The third digit identifies a variable measured in the same position (horizontally and vertically ) but with different sensors. The three digits identify univocally the variable submitted and link it to the sensor:

(\*) Variable code: VAR\_H\_V\_R

VAR = is the official variable code, only alphabetic characters and underscores, all capital.

H = horizontal position index, integer number

V = vertical position index, integer number

R = replicate index, integer number

Continuous data can be formatted either as Excel file (both .xls and .xlsx) or comma separated value files (.csv). The file structure must include only one header line with the variable codes. Missing data must be reported as -9999. Decimal separator in case of csv files must be the point. To see more about other specifications please check the "Associated stations requirements" tab and the "Data format" section [here](#).

All non-continuous data are submitted using the ICOS Associated station specific BADM templates (named ASSICOSBADM, [available here](#)), except for some group of variables where the ICOSBADM system must be used ([available here](#)). To know more about pre-processing of other non-continuous data please check the "Associated stations requirements" tab and the "Metadata and Ancillary data" section [here](#).

All the data (continuous and non-continuous) must be submitted, on a yearly basis, through the PI Area of the ICOS ETC portal at [www.icos-etc.eu](http://www.icos-etc.eu). To enter in the PI Area, an account is needed, created only for the official PI.

Variables can be submitted in three different ways: 1) using the BADM templates and files (available [here](#)) that can be submitted in the PI Area, 2) using the web form in the Online BADM tool available in the PI Area or, 3) using the ICOS ETC Upkeep Tool APP, available for Android. Lautaret ICOS station uses the first way to submit data.

### **2b. What data quality control measures will be used?**

### **Data quality control**

Quality control checks are carried out to eliminate any anomalies in relation to reasonable ranges of values. Problems linked to snow on the sensors are also eliminated. For precipitation, there is a visual rather than automatic critical examination to look for inconsistencies, identify inconsistent periods manually and remove them. For NDVI, the data is always corrected because it is often too noisy.

Flux time series data is processed by Eddy-covariance. There is an automated quality check flag system when applying this calculation. When transitioning from a resolution of 20Hz to 30 minutes, there are assumed hypotheses, so statistical tests need to be conducted to assess these hypotheses. Based on the results, quality flags are assigned to data: 0 = reliable, 1 = moderately reliable, and 2 = unreliable. After this stage, the data is considered as ICOS Final Fully Quality Controlled Observational Data (Level 2).

## **Analysis and Experimentations on Ecosystems**

### **2a. What metadata and documentation (for example the methodology of data collection and way of organising data) will accompany the data?**

#### **Metadata and documentation**

The metadata associated with the experiment project datasets uses the INSPIRE-ISO 19115 standard. The datasets metadata is described on CSV files. Information detailing the context in which the data was obtained is joined in addition to the general metadata.

Some projects have their own DMP (ANR Transalp Project, ANR Alpalga project), available on request.

Specific metadata according to AnaEE-France data policy : [https://www.anaee-france.fr/images/documents/Politique\\_des\\_donnees\\_AnaEE-France/2021.02.22\\_Politique\\_de\\_donn%C3%A9es\\_AnaEE.pdf](https://www.anaee-france.fr/images/documents/Politique_des_donnees_AnaEE-France/2021.02.22_Politique_de_donn%C3%A9es_AnaEE.pdf)

Project dataset name	Specific Metadata and documentation
Transalp (Alpages-Volants)	/
Alpalga	sampling data in laboratory notebook
Tabouret	document integrating harvesting, sowing and follow-up information

### **2b. What data quality control measures will be used?**

Same data quality control as other section for same data type.

For specific measurements, contact the project PI or data manager.

## **Lautaret Garden Botanical Collection**

### **2a. What metadata and documentation (for example the methodology of data collection and way of organising data) will accompany the data?**

#### **Living plant collection**

Each new plant sampled in the wild, purchased from nursery or seed sown is a new row in the "Introduction" table.

Database 4D implemented in 2018 with an annual update for each updated bedding during the season.

Each new plant (just planted in the garden or old one in an updated bedding) is integrated as a new "accession file" in 4D DB

The number of "Introduction" is given to a pool of same taxa/origin of seeds sown and follow the seedlings until it is planted in the Garden (label, n° in introduction table, n° of accession file in the DB). n° as YY-XXX

Plants can have 3 different origin : From a garden or unknown, with direct tracking from wild smpling, with indirect tracking from a garden and before wild sampling.

#### **Next state**



Use Botalista database + integrate te IPEN identifier with the sampling in natura

### **Herbarium collection**

File inventory of plant genus and family present in the general herbarium.

PhyloAlps database / inventory file with : Provider\_Name; Scientific\_Name; Taxon\_family; NCBI\_ID; Herbarium\_voucher; Plant\_developmental\_stage; Sampling\_Collector; Sampling\_Organisation; Sampling\_date; Sampling\_location; Sampling\_long\_x; Sampling\_lat\_y; Extraction\_code; Extract\_weight\_(mg); Extract\_concentration; Sequencing\_date; Sequencing\_organization; Sequencing\_ID

PhyloAlps numerical sheets will be integrated within research infrasructure ReColnat <https://explore.recolnat.org/>

File inventory of Lautaret Lichens with barcode and identification number + description (sample localisation,...)

Scientific article : *Lichens alpins : restauration et étude de la collection de la Station Alpine Joseph Fourier (Université Grenoble Alpes, France)*

### **Index Seminum**

In the field, the GPS point, taxa and locality are recorded on the cristal bag contraining the plant.

An excel files contains the whole list of seeds sampled in natura or in the garden for each raw the number of accession, GPS point, taxa, years of sampling, quantity left.

The GPS point is given for a population (same geographical area and altitude)

Pots containing seeds ar identified by accession's number + taxa + locality and located in a seedbank at 4°C in Lautaret greenhouse in Grenoble.

For seeds sampled in the garden there is also a tracking of earlier origin

No protected plants are sampled. To comply with the Rio and Nagoya convention, seed exchanges are carried out on a non-profit basis.

No APA demands are done for seeds samplig.

---

### **2b. What data quality control measures will be used?**

No specific control over collections.

## **3. Storage and backup during the research process**

### **Zone Atelier Alpes**

#### **3a. How will data and metadata be stored and backed up during the research?**

##### **Storage and backup**

Plant data are stored on the UGA cloud (SUMMER storage solution), images for land cover data are stored in a team-shared directory (SUMMER storage solution).

Regarding plant survey data, an online entry is created using a fill-in form on the Silene database (SIMETHIS) from audio field recordings.

Lautaret leverages storage and backup solutions provided by the SUMMER infrastructure at Grenoble Alpes University (UGA). This system is designed to guarantee elevated data security and availability:

- SUMMER Storage: Provided by UGA University, SUMMER offers backup on a remote site with a 30-day history and synchronous replication, providing redundancy for data on two geographically distant sites. This robust architecture is based on Netapp@ servers.

---

#### **3b. How will data security and protection of sensitive data be taken care during the research**

##### **Contact information**

The contact point information in this Data Management Plan, such as names, first names, and email addresses of contributors, are considered personal data. Therefore, we will obtain the agreement of the individuals involved; they will

have the opportunity to decline, modify, or request the deletion of their information.

## Observatoires de la Zone Critique : Applications et Recherche

### 3a. How will data and metadata be stored and backed up during the research?

#### Atmospherical, meteorological, hydrological, and soil time series data

##### 1a) Teletransmitted data

Concerns the following measuring stations : Meteo-Petit-Galibier, Meteo-Galibier, Meteo-Roche-Noire, Meteo-Lautaret, Hydro-Lauzet, connected either by ethernet network, 4G connection, or wifi network (Lautaret-Galibier: wifi network + 4G).

Data transmission is carried out by Loggernet software which stores data in a repository dedicated to Jardin du Lautaret, called "Loggernet-SAJF" and being a SUMMER storage solution. The automatic transfer occurs at regular intervals (10', 1h, or 24h).

##### 1b) Manually collected data

Concerns the others measuring stations with no connection or stand-alone sensors.

Data is stored on the sensor's internal memory or on the acquisition unit. Then, manual transfer is performed via a field tablet at regular intervals and finally manual backup of this raw data is ensured within 48 hours on the data manager's UGA Cloud directory (SUMMER storage solution).

##### 2) Processing and storage

Data cleaning and validation is performed by the data manager. Validated data is then manually backed up on the data manager's UGA Cloud directory.

#### Geophysical data

Data are recorded on the computer used to take the measurements and transferred in the lab computer. Data are also stored on the Drive Google "Aravo" managed by Philippe Choler (LECA).

Next state > Data will be stored on the OZCAR hydrogreophysical database (developed by SNO H+ and referenced in Theia-OZCAR).

#### Hydrochemical variables

Regarding chemistry variables, different storage methods are applied depending on the involved laboratory: IGE or EDYTEM.

- EDYTEM: The data is stored locally on the PI's PCs, with a copy on an external hard disk, in addition to a copy on the lab's server (Université Savoie Mont Blanc).
- IGE: The storage is done in a team-shared directory on the UGA Cloud (SUMMER storage solution).

#### Store and backup solution

Lautaret leverages storage and backup solutions provided by the SUMMER infrastructure at Grenoble Alpes University (UGA). This system is designed to guarantee elevated data security and availability:

- SUMMER Storage: Provided by UGA University, SUMMER offers backup on a remote site with a 30-day history and synchronous replication, providing redundancy for data on two geographically distant sites. This robust architecture is based on Netapp@ servers.

### 3b. How will data security and protection of sensitive data be taken care during the research

#### Contact information

The contact point information in this Data Management Plan, such as names, first names, and email addresses of contributors, are considered personal data. Therefore, we will obtain the agreement of the individuals involved; they will have the opportunity to decline, modify, or request the deletion of their information.

## Integrated Carbon Observation System Research Infrastructure data

### 3a. How will data and metadata be stored and backed up during the research?

### Storage and backup

Data, except Fluxalp station rawdata, is teletransmitted by Loggernet software to an IGE data repository (SUMMER storage solution.) The automatic backup process includes storage on the acquisition unit, automatic transfer at regular intervals (10', 1h, or 24h). Regarding Fluxalp station data, the eddy covariance calculation is automatically performed on-site, then results are teletransmitted; whereas raw data is collected manually afterwards.

Validated data is stored locally on the Principal Investigator's PC and in a IGE shared directory (SUMMER storage solution), with the intention of being stored on the [ICOS carbon portal](#).

Lautaret leverages storage and backup solutions provided by the SUMMER infrastructure at Grenoble Alpes University (UGA). This system is designed to guarantee elevated data security and availability:

SUMMER Storage: Provided by UGA University and used by IGE, SUMMER offers backup on a remote site with a 30-day history and synchronous replication, providing redundancy for data on two geographically distant sites. This robust architecture is based on Netapp@ servers.

---

### 3b. How will data security and protection of sensitive data be taken care during the research

#### Contact information

The contact point information in this Data Management Plan, such as names, first names, and email addresses of contributors, are considered personal data. Therefore, we will obtain the agreement of the individuals involved; they will have the opportunity to decline, modify, or request the deletion of their information.

## Analysis and Experimentations on Ecosystems

### 3a. How will data and metadata be stored and backed up during the research?

Each project / experimentation partner manages storage during the project in its own way.

For data acquired by UAR Lautaret, raw data are stored in UGA Cloud file dedicated to the experimentation on going and these documents are used :

- Fieldbook: intervention, manual measurements, calibrations, maintenance (stored with field equipment)
- Field feedback form: filling in the document with field notebook info after each field mission (stored on the cloud)
- Measurement station sheet: descriptive sheet of measurement stations with GPS coordinates, creation date, information on installed sensors (type, variables measured, location, installation date, measurement frequency), photos, names of contacts, type of power supply, type of data transmission, links to data (if available) (stored on the cloud)
- Field Protocols: protocols for experiments, measurements, maintenance, data recovery and equipment use, as well as technical manuals for equipment available on the cloud.

Project dataset name	Storage and backup
Transalp (Alpages-Volants)	Plant community composition : local database created by LECA and saved by OSUG eDNA : internal database created by AEEM (LECA)
Alpalga	Service fourni par le CEA et l'UGA, sauvegardes fréquentes.
Tabouret	Drive + external and internal hard drives

---

### 3b. How will data security and protection of sensitive data be taken care during the research

The contact point information in this Data Management Plan, such as names, first names, and email addresses of contributors, are considered personal data. Therefore, we will obtain the agreement of the individuals involved; they will have the opportunity to decline, modify, or request the deletion of their information.

## Lautaret Garden Botanical Collection

### 3a. How will data and metadata be stored and backed up during the research?

#### **Living plant collection**

The database 4D is installed on a local machine CHBI-SAJF-W4D, with an annual licence (not updated for several years). The database is backed up automatically on a second hard drive in the local machine and also in a repository managed by UGA (IT team) (SUMMER)

The Introduction file is stored on P server (SUMMER solution) : P:\SAJF\Commun\Jardin du Lautaret depuis 2023\Inventaire pépinière depuis 2023 - GD

#### **Herbarium collection**

The physical herbarium specimens are organized and stored in an UGA building near Lautaret Garden Office, the inventory is stored in C. Perrier computer.

List of plant genus and family: Document shared between C. Perrier, R. Douzet and M. Rome in a Google Drive and backed up in C. Perrier computer.

PhyloAlps database: <http://phyloalps.org/>

#### **Index Seminum**

The Index Seminum file is stored in a repository managed by UGA (SUMMER) : Z:\SAJF\ARCHIVES\Rolland\Index Seminum  
The file is updated annually with 150 new taxa sampled in natura

#### **Store and backup solution**

Lautaret leverages storage and backup solutions provided by the SUMMER infrastructure at Grenoble Alpes University (UGA). This system is designed to guarantee elevated data security and availability:

- SUMMER Storage: Provided by UGA University, SUMMER offers backup on a remote site with a 30-day history and synchronous replication, providing redundancy for data on two geographically distant sites. This robust architecture is based on Netapp@ servers.

### 3b. How will data security and protection of sensitive data be taken care during the research

#### **Plant sampling**

No plant under specific protection are sampled in natura

#### **Contact information**

The contact point information in this Data Management Plan, such as names, first names, and email addresses of contributors, are considered personal data. Therefore, we will obtain the agreement of the individuals involved; they will have the opportunity to decline, modify, or request the deletion of their information.

## 4. Legal and ethical requirements, code of conduct

### Zone Atelier Alpes

#### 4a. If personal data are processed, how will compliance with legislation on personal data and on security be ensured?

In order to comply with the General Data Protection Regulation (GDPR), we have implemented the following actions:

- Obtain the agreement of individuals concerned by personal data regarding contact information.
- An email will be sent once per year reminding them of the possibility to modify or delete their personal information.

---

**4b. How will other legal issues, such as intellectual property rights and ownership, be managed? What legislation is applicable?**

**Intellectual property**

*Data Sharing Policy*

As the data produced by the Lautaret is funded by public subsidies, in accordance with the Law for a Digital Republic (LOI n° 2016-1321 du 7 octobre 2016 pour une République numérique), they are obligated to be open and accessible, and they are made available as soon as the processing is done (usually on an annual basis). The data is freely reusable, with the condition of acknowledging its authors according to the sentences indicated here below.

**License**

The data is disseminated under the Creative Commons Attribution 4.0 License (CC BY 4.0): the data is freely reusable, with the condition of citing its authors. The acknowledging sentence which should appear in publications using Lautaret data and products can be one of these two options :

"This research was carried out using the data of the Lautaret Garden-UAR 3370 (Université Grenoble Alpes, CNRS, 38000 Grenoble, France)."

"This research was carried out using the infrastructure and data of the Lautaret Garden-UAR 3370 (Université Grenoble Alpes, CNRS, 38000 Grenoble, France)."

---

**4c. What ethical issues and codes of conduct are there, and how will they be taken into account?**

The only ethical concern revolves around the appropriate handling of personal information, including names, first names, and institutions' names. The treatment of such data is outlined in detail in response to question 4a.

---

**Observatoires de la Zone Critique : Applications et Recherche**

**4a. If personal data are processed, how will compliance with legislation on personal data and on security be ensured?**

In order to comply with the General Data Protection Regulation (GDPR), we have implemented the following actions:

- Obtain the agreement of individuals concerned by personal data regarding contact information.
- An email will be sent once per year reminding them of the possibility to modify or delete their personal information.

---

**4b. How will other legal issues, such as intellectual property rights and ownership, be managed? What legislation is applicable?**

**Intellectual property**

*Data Sharing Policy*

As the data produced by the Lautaret is funded by public subsidies, in accordance with the Law for a Digital Republic (LOI n° 2016-1321 du 7 octobre 2016 pour une République numérique), they are obligated to be open and accessible, and they are made available as soon as the processing is done (usually on an annual basis). The data is freely reusable, with the condition of acknowledging its authors according to the sentences indicated here below.

**Licenses**

The data will be disseminated under the Creative Commons Attribution 4.0 License (CC BY 4.0): the data will be freely reusable, with the condition of citing its authors. The acknowledging sentence which should appear in publications using Lautaret data and products can be one of these two options :

"This research was carried out using the data of the Lautaret Garden-UAR 3370 (Université Grenoble Alpes, CNRS, 38000 Grenoble, France)."

"This research was carried out using the infrastructure and data of the Lautaret Garden-UAR 3370 (Université Grenoble Alpes, CNRS, 38000 Grenoble, France)."

---

**4c. What ethical issues and codes of conduct are there, and how will they be taken into account?**

The only ethical concern revolves around the appropriate handling of personal information, including names, first names, and institutions' names. The treatment of such data is outlined in detail in response to question 4a.

---

**Integrated Carbon Observation System Research Infrastructure data**

**4a. If personal data are processed, how will compliance with legislation on personal data and on security be ensured?**

In order to comply with the General Data Protection Regulation (GDPR), we have implemented the following actions:

- Obtain the agreement of individuals concerned by personal data regarding contact information.
- An email will be sent once per year reminding them of the possibility to modify or delete their personal information.

---

**4b. How will other legal issues, such as intellectual property rights and ownership, be managed? What legislation is applicable?**

**Intellectual property**

*Data Sharing Policy*

As the data produced by the RI ICOS is funded by public subsidies, in accordance with the Law for a Digital Republic, they are obligated to be open and accessible. These data are made open as soon as possible, and no authentication is required to access public data.

**Licenses**

The data is disseminated under the Creative Commons Attribution 4.0 License (CC BY 4.0): the data is freely reusable, with the condition of citing its authors. Detailed information about the acknowledgment sentence and how to cite ICOS data can be found in the following link: [ICOS data citation](#)

---

**4c. What ethical issues and codes of conduct are there, and how will they be taken into account?**

The only ethical concern revolves around the appropriate handling of personal information, including names, first names, and institutions' names. The treatment of such data is outlined in detail in response to question 4a.

---

**Analysis and Experimentations on Ecosystems**

**4a. If personal data are processed, how will compliance with legislation on personal data and on security be ensured?**

In order to comply with the General Data Protection Regulation (GDPR), we have implemented the following actions:

- Obtain the agreement of individuals concerned by personal data regarding contact information.

---

**4b. How will other legal issues, such as intellectual property rights and ownership, be managed? What**

#### legislation is applicable?

According to AnaEE-France Data policy :

The descriptive metadata of the experiments are freely accessible at the end of the project. They are available on the AnaEE-France portal.

Data sets (DP, DU, DB) produced with AnaEE-France services and by their users are intended to be freely reused in accordance with Open Data principles. Anyone can have free access to the data, with the sole obligation of quoting the origin of the dataset and the date of the last update. Data producers (service managers and service users) undertake to apply this principle to the data they generate.

A dataset is open when the data has been processed, verified and annotated with the appropriate appropriate metadata. Users acknowledge that datasets will be automatically and without delay archived in the AnaEE-France storage areas and made available to the public.

The datasets produced may be licensed. The license to be used for data produced by AnaEE-France services should be the 'Open License' (LO 2.0, ODBL equivalent to CC-BY). All of AnaEE-France's activities, and in particular the production of the production of data, the AnaEE-Fr license would be the most appropriate. CC-BY 4.0 license would be recommended.

---

#### 4c. What ethical issues and codes of conduct are there, and how will they be taken into account?

The only ethical concern revolves around the appropriate handling of sensitive information, including names, first names, and email addresses of contributors, are considered personal data. The treatment of such data is outlined in detail in response to question 4a.

### Lautaret Garden Botanical Collection

#### 4a. If personal data are processed, how will compliance with legislation on personal data and on security be ensured?

In order to comply with the General Data Protection Regulation (GDPR), we have implemented the following actions:

- Obtain the agreement of individuals concerned by personal data regarding contact information.

---

#### 4b. How will other legal issues, such as intellectual property rights and ownership, be managed? What legislation is applicable?

##### Intellectual property

###### *Data Sharing Policy*

As the data produced by the Lautaret is funded by public subsidies, in accordance with the Law for a Digital Republic (LOI n° 2016-1321 du 7 octobre 2016 pour une République numérique), they are obligated to be open and accessible, and they are made available as soon as the processing is done (usually on an annual basis). The data is freely reusable, with the condition of acknowledging its authors according to the sentences indicated here below.

##### Licenses

The data will be disseminated under the Creative Commons Attribution 4.0 License (CC BY 4.0): the data will be freely reusable, with the condition of citing its authors. The acknowledging sentence which should appear in publications using Lautaret data and products can be one of these two options :

"This research was carried out using the data of the Lautaret Garden-UAR 3370 (Université Grenoble Alpes, CNRS, 38000 Grenoble, France)."

"This research was carried out using the infrastructure and data of the Lautaret Garden-UAR 3370 (Université Grenoble Alpes, CNRS, 38000 Grenoble, France)."

---

#### 4c. What ethical issues and codes of conduct are there, and how will they be taken into account?

The only ethical concern revolves around the appropriate handling of sensitive information, including names, first names, and email addresses of contributors, are considered personal data. The treatment of such data is outlined in detail in response to question 4a.

## 5. Data sharing and long-term preservation

### Zone Atelier Alpes

#### 5a. How and when will data be shared? Are there possible restrictions to data sharing or embargo reasons?

There is no restrictions to data sharing nor embargo.

##### **Data sharing**

###### *Current state*

Currently, data is accessible only upon request.

Plant occurrence data is visible (spatial data degraded) in the [Silene portal](#) based on Geonature-Atlas and part of SINP or in the "expert" version accessible on registration, with viewing and downloading (csv, geojson, shapefile) in the [Silene Expert portal](#). Selection can be made by municipality (Villar-d'Arène + Le Monétier-les-Bains) and by data producer (Jardin du Lautaret).

###### *Next state*

Data integrated in Silene / SINP should be available in GBIF data infrastructure : <https://www.gbif.org/fr/>

For the next stage, no decisions have been made yet. Land Cover data and Survey data (except occurrence data) could be published in Research Data Gouv data repository (RDG), in a thematic data repository (e.g., InDoRES, EasyData), or into the OSUG Geonetwork.

#### 5b. How will data for preservation be selected, and where data will be preserved long-term (for example a data repository or archive)?

##### **Data preservation**

For the moment, all data is stored without any selection process. However, in the future, there will be a sorting process before storing photos.

At the current time, there is no long-term preservation solution. However, all necessary technological guarantees and measures are in place to ensure at least medium-term storage.

#### 5c. What methods or software tools are needed to access and use data?

##### **Access Tools**

Standard spreadsheet software for CSV, image viewers for JPEG, and GIS software for Shapefile.

#### 5d. How will the application of a unique and persistent identifier (such as a Digital Object Identifier (DOI)) to each data set be ensured?

##### **Current state**

There is one dataset associated with a DOI: the soil temperature dataset, which is partially funded by the ZAA and described in the OZCAR data section, along with the associated [DOI](#), published in RDG data repository.

##### **Next state**

As mentioned in section 5a, when data will be published in the cited data repositories (i.e., InDoRES, GBIF, RDG), a DOI will be associated to every dataset.



## Observatoires de la Zone Critique : Applications et Recherche

### 5a. How and when will data be shared? Are there possible restrictions to data sharing or embargo reasons?

There is no restrictions to data sharing nor embargo.

#### Current state

##### Data Sharing Options

- Validated data is shared via the UGA cloud (accessible to anybody with a link): [UGA Cloud Link](#) (Share on a yearly basis).
- Annual publication of validated data (only a portion of it) on the RDG (Research Data Gouv) data repository is currently in progress <https://doi.org/10.57745/OCVYG3>
- Raw and validated data can be requested from researchers (Lucie Liger, and Didier Voisin or David Gateuille for Chemistry variables).
- Charmasses / Fluxalp data : <https://gricad-gitlab.univ-grenoble-alpes.fr/lautaret/fluxalp/>

#### Next state

Data will be accessible on the Theia/OZCAR web portal: <https://in-situ.theia-land.fr/>

The data download service will be available in the near future. Users will have the option to download data in CSV and NetCDF formats. Data downloading will require user authentication through Data Terra Single Sign-On authentication. Authentication allows producers to access download statistics for their data.

This data will also be indexed in the Theia/OZCAR Geonetwork metadata catalog. That will ensure its visibility at the european scale through [eLTER data integration portal](#).

##### Geophysical data

Data will be published on the OSUR (Observatoire des Sciences de l'Univers de Rennes) [hydrogeophysical database](#); however, account creation and authentication is required for data access.

### 5b. How will data for preservation be selected, and where data will be preserved long-term (for example a data repository or archive)?

#### Data preservation and selection criteria

The data resulting from observations, such as long-term datasets, are explicitly designated for preservation. At the current time, there is no long-term preservation solution. However, all necessary technological guarantees and measures are in place to ensure at least medium-term storage.

### 5c. What methods or software tools are needed to access and use data?

#### Access Tools

Standard Spreadsheet software for CSV and XLSX, text editors for TXT, and GIS software for Shapefile.

### 5d. How will the application of a unique and persistent identifier (such as a Digital Object Identifier (DOI)) to each data set be ensured?

#### Current state

A DOI currently exists only for soil temperature data <https://doi.org/10.57745/OCVYG3>, with the future goal of obtaining DOIs for additional datasets.

#### Next state

Work is underway with anaeefrance's data team to publish the meteorological and hydrological time series datasets produced by Lautaret (target : RDG/UGA/OSUG).

Assigning DOI, through the workflow of data imported into Theia/OZCAR IS is not yet available. It may be considered in the long term. If the dataset already has a DOI, this DOI will be mentioned in the metadata record on the Theia/OZCAR portal.

## **Integrated Carbon Observation System Research Infrastructure data**

### **5a. How and when will data be shared? Are there possible restrictions to data sharing or embargo reasons?**

There is no restrictions to data sharing nor embargo.

#### **Data sharing**

Data will be available on the ICOS website (currently not accessible) either through the [ICOS data portal](#) or through this [web page](#) where data is organized in a table by sites and by variables. The data will be soon accessible under the station name 'Lautaret', and for the following variables:

- NEE\_VUT\_REF (NEE = Net ecosystem exchange)
- TA\_F (TA = Air Temperature)
- LE\_F\_MDS (LE = Latent Heat Flux)
- H\_F\_MDS (H = Sensible Heat Flux)
- GPP\_DT\_VUT\_REF (GPP = Gross Primary Production)
- RECO\_DT\_VUT\_REF (RCO = Ecosystem Respiration)

The first letters correspond to the variable names. The remainder denotes technical details involved in the preparation and calculation of these variables.

Please note that an ICOS data portal login is required for data downloads.

Data can also be provided upon request.

### **5b. How will data for preservation be selected, and where data will be preserved long-term (for example a data repository or archive)?**

#### **Data preservation and selection criteria**

All ICOS data resulting from observations is explicitly designated for preservation. At the current time, there is no long-term preservation solution. However, all necessary technological guarantees and measures are in place to ensure at least medium-term storage.

### **5c. What methods or software tools are needed to access and use data?**

#### **Access Tools**

Standard spreadsheet software for CSV.

### **5d. How will the application of a unique and persistent identifier (such as a Digital Object Identifier (DOI)) to each data set be ensured?**

All data deposited in ICOS will be integrated into a dataset that encompasses all associated stations at the European level and is referenced by a single [global DOI](#).

## **Analysis and Experimentations on Ecosystems**

### **5a. How and when will data be shared? Are there possible restrictions to data sharing or embargo reasons?**

Data other than that produced by Lautaret is dependent of PI choices.

Project dataset name	Data sharing
Transalp (Alpages-Volants)	During the project : data accessible on demand* During and after the project : data will be published with the publication
Alpalga	Long terme storage and publication : international public archive (NCBI)
Tabouret	Incoming : database (with access online)

---

**5b. How will data for preservation be selected, and where data will be preserved long-term (for example a data repository or archive)?**

Item dealt in 5a part

---

**5c. What methods or software tools are needed to access and use data?**

Not detailed for this section, contact PI project

---

**5d. How will the application of a unique and persistent identifier (such as a Digital Object Identifier (DOI)) to each data set be ensured?**

Project dataset name	Dataset DOI if existing
Transalp (Alpages-Volants)	Lucie : recup depuis zotero

---

## Lautaret Garden Botanical Collection

**5a. How and when will data be shared? Are there possible restrictions to data sharing or embargo reasons?**

***Living plant collection***

No restriction or embargo. Data can be shared on request for scientific needs (i.e. plant sample for DNA analysis), there is no web interface, it can be transmitted as an excel sheet extraction.

Live plants are accessible at Lautaret Garden and in its nursery.

Next state

There was a list of species online with the BGCI (Botanic Garden Conservation International ) <https://www.bgci.org/> <https://gardensearch.bgci.org/garden/3931> , but it is no longer updated.

The 4D database should be accessible online for research project

***Herbarium collection***

Original herbarium sheets ans specimens made available in the Lautaret Garden offices in Saint Martin d'Hères.

Next state

Digitized herbarium sheets available online in ReColNat <https://explore.recolnat.org/>

Herbarium inventory database should be partially available online.

***Index Seminum***

The index seminum is shared on request here : <https://www.jardindulautaret.com/recherche-scientifique/contact-scientifique/nous-contacter-pour-un-appui-a-la-recherche-scientifique-une-demande-de-renseignements-1036945.kjsp?RH=1644571349469>

The annual update is send by mail to the botanical garden Lautaret network (~300) in november.

---

**5b. How will data for preservation be selected, and where data will be preserved long-term (for example a data repository or archive)?**

To be developped

---

**5c. What methods or software tools are needed to access and use data?**

**Access Tools**

Standard Spreadsheet software for CSV and XLSX, text editors for TXT, and GIS software for Shapefile.

Living Plant database

---

**5d. How will the application of a unique and persistent identifier (such as a Digital Object Identifier (DOI)) to each data set be ensured?**

Not planned

---

## 6. Data management responsibilities and resources

### Zone Atelier Alpes

**6a. Who (for example role, position, and institution) will be responsible for data management (i.e. the data steward)?**

Projet Leader: Jérôme Forêt, CNRS Research Engineer, UAR Lautaret, Saint Martin d'Hères.

Data manager: Lucie Liger, CNRS Engineer, UAR Lautaret, Saint Martin d'Hères.

Lucie Liger, Rolland Douzet and Maxime Rome are in charge of the following aspects:

- data and metadata production
- data storage and backup
- data quality control
- data and metadata dissemination

The scientists partners at Lautaret are responsible for:

- data and metadata production
- data quality control
- data storage and backup for part of the data.

The Data Management Plan is jointly written by the Data Curator and Lautaret's data managers.

---

**6b. What resources (for example financial and time) will be dedicated to data management and ensuring that data will be FAIR (Findable, Accessible, Interoperable, Re-usable)?**

Lucie Liger, with the technical support of OSUG Data Center, AnaEE (Analyses et Expérimentations sur les Ecosystèmes continentaux, research infrastructure), RZA, Parc National des Ecrins, Conservatoire Botanique National Alpin and Cellule data UGA, facilitates general data management, the creation of DOIs, ensures data security, data storage and access, and future development of platforms/websites.

With funding from Labex OSUG 2023-2024, we benefit from a 16-month Data Curator contract. The technical service of Jardin du Lautaret and partners are involved in field data collection and data pre-processing. Lucie Liger, Rolland Douzet, Maxime Rome and other scientists of Jardin du Lautaret dedicate a portion of their time to collect, analyze, document, store and share the data.

## **Observatoires de la Zone Critique : Applications et Recherche**

### **6a. Who (for example role, position, and institution) will be responsible for data management (i.e. the data steward)?**

Projet Leader: Jérôme Forêt, CNRS Research Engineer, UAR Lautaret, Saint Martin d'Hères.

Data manager: Lucie Liger, CNRS Engineer, UAR Lautaret, Saint Martin d'Hères.

Lucie Liger and colleagues mentioned in section 1b are in charge of the following aspects:

- data and metadata production
- data storage and backup
- data quality control
- data and metadata dissemination

The scientists partners at Lautaret are responsible for:

- data and metadata production
- data quality control
- data storage and backup (for a portion of data)

The Data Management Plan is jointly written by the Data Curator and Lautaret's data managers.

### **6b. What resources (for example financial and time) will be dedicated to data management and ensuring that data will be FAIR (Findable, Accessible, Interoperable, Re-usable)?**

Lucie Liger, with the technical support of OSUG DC and Theia/OZCAR team facilitates general data management, the creation of DOIs, ensure data security, data storage and access.

With funding from Labex OSUG 2023-2024, we benefit from a 16-month Data Curator contract.

The technical service of UAR Lautaret and partners are involved in field data collection and data pre-processing.

Lucie Liger and other scientists of the Lautaret dedicate a portion of their time to collect, analyze, document, store and share the data.

## **Integrated Carbon Observation System Research Infrastructure data**

### **6a. Who (for example role, position, and institution) will be responsible for data management (i.e. the data steward)?**

- Projet Leader: Didier Voisin.
- Data manager: Lucie Liger CNRS Engineer, UAR Lautaret, Saint Martin d'Hères.
- Technical engineer: Catherine Coulaud, Pascal Salze and Romain Biron
- Flux data quality control: Jean-Martial Cohard
- General data quality control: Didier Voisin

The Data Management Plan is jointly written by the Data Curator and Lautaret's data managers.

### **6b. What resources (for example financial and time) will be dedicated to data management and ensuring that data will be FAIR (Findable, Accessible, Interoperable, Re-usable)?**

ICOS Ecosystem Thematic Center, whose data unit is responsible for technical and logistical support including data management and processing, practical manuals, technical training, and scientific coordination.  
With funding from Labex OSUG 2023-2024, we benefit from a 16-month Data Curator contract.  
The technical service of UAR Lautaret and partners are involved in field data collection and data pre-processing.  
Researchers listed in the table in section 1b dedicate a portion of their time to collect, analyze, document, store, and share the data.

## Analysis and Experimentations on Ecosystems

### 6a. Who (for example role, position, and institution) will be responsible for data management (i.e. the data steward)?

For datasets produced by Lautaret team:

Projet Leader: Jérôme Forêt, CNRS Research Engineer, UAR Lautaret, Saint Martin d'Hères.

Data manager: Lucie Liger, CNRS Engineer, UAR Lautaret, Saint Martin d'Hères.

For datasets produced by Lautaret partners team:

Project dataset name	Project Leader	Data Manager
Transalp	Tamara MÜNKEMÜLLER, CNRS Research scientist, UMR LECA, Saint Martin d'Hères	Julien RENAUD, CNRS Engineer, UMR LECA, Saint Martin d'Hères
Alpalga	Eric MARECHAL, CEA Research scientist, UMR LPCV, Grenoble	

### 6b. What resources (for example financial and time) will be dedicated to data management and ensuring that data will be FAIR (Findable, Accessible, Interoperable, Re-usable)?

Lucie Liger facilitates general data management, the creation of DOIs, data security, data storage and access.  
The technical service of UAR Lautaret and partners are involved in field data collection and data pre-processing.  
Lucie Liger and other scientists of the Lautaret dedicate a portion of their time to collect, analyze, document, store and share the data.

## Lautaret Garden Botanical Collection

### 6a. Who (for example role, position, and institution) will be responsible for data management (i.e. the data steward)?

Projet Leader: Maxime Rome, CNRS Research Engineer, UAR Lautaret, Saint Martin d'Hères.

Data manager: Lucie Liger, CNRS Engineer, UAR Lautaret, Saint Martin d'Hères.

Maxime Rome and colleagues mentioned in section 1b are in charge of the following aspects:

- data and metadata production
- data storage and backup
- data quality control
- data and metadata dissemination

The Data Management Plan is jointly written by Lautaret's data manager.

### 6b. What resources (for example financial and time) will be dedicated to data management and ensuring that data will be FAIR (Findable, Accessible, Interoperable, Re-usable)?

Lucie Liger, facilitates general data management, ensure data security, data storage and access.

The UAR Lautaret's botanists are involved in field data collection.

Scientists of the UAR Lautaret dedicate a portion of their time to collect, analyze, document, store and share the data.