



Parc national
des Ecrins

Camera Traps

From PNE to Costa Rica



Zygène de la petite coronille
© Donovan Maillard / Parc national des Ecrins

Parc national des Ecrins

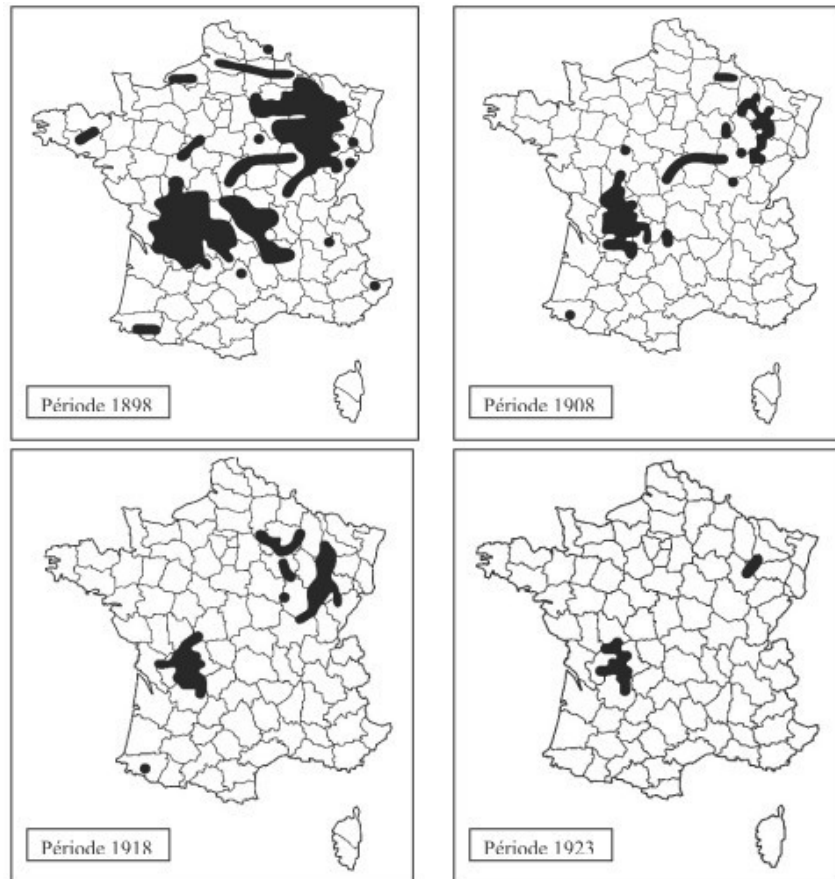


1

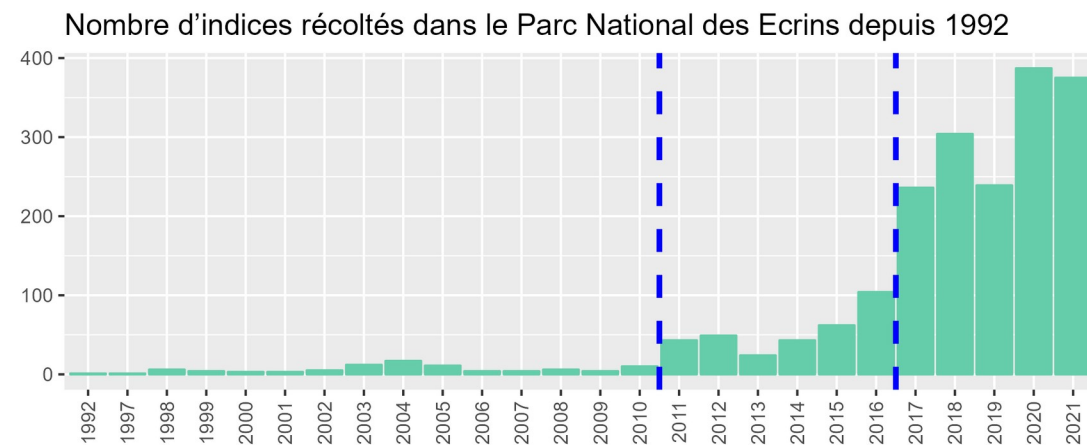
Wolf in PNE



Wolf in PNE



Wolf was eradicated from France in ~1937
and returned in French Alps since 1992.
1997 in PNE

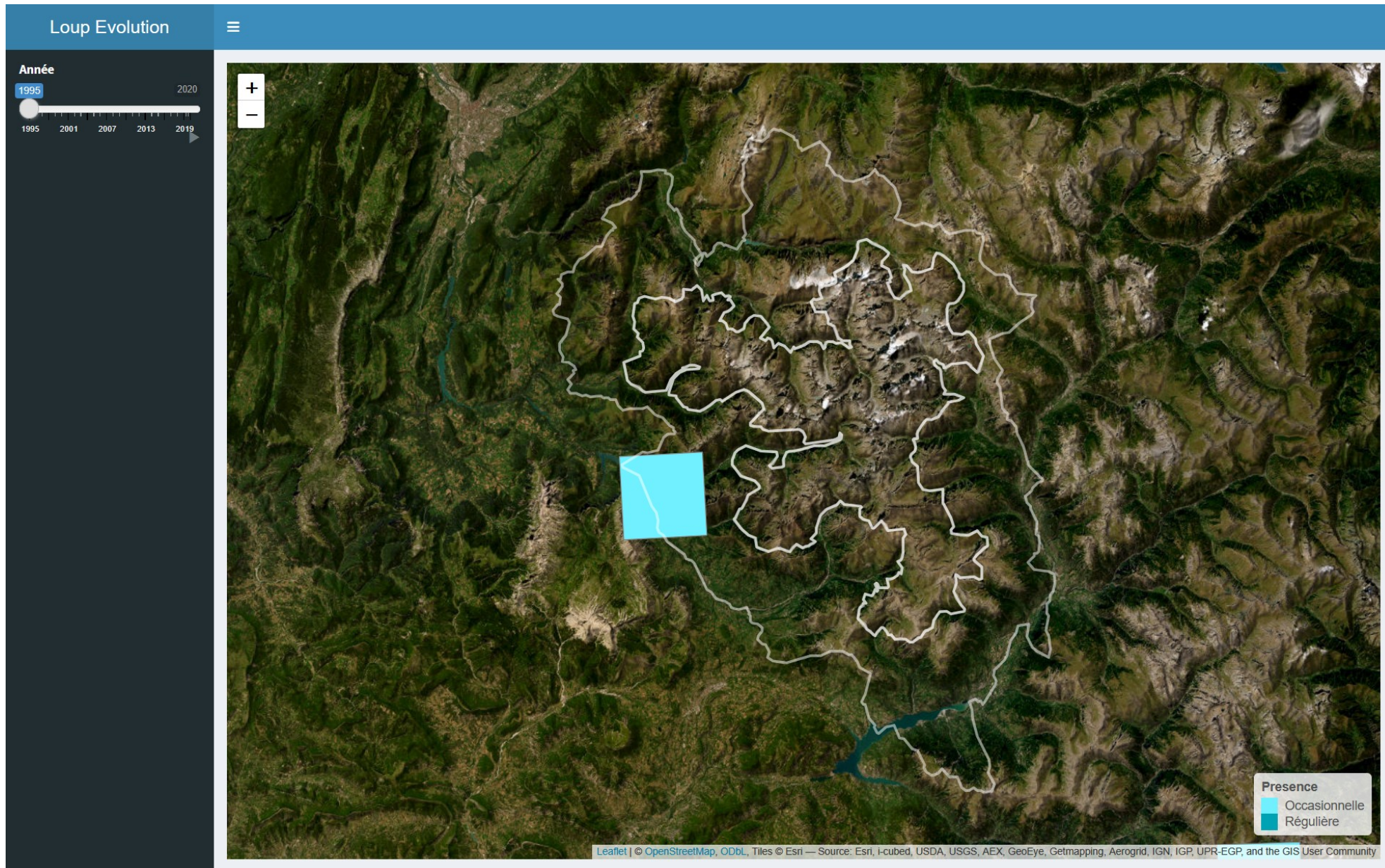


Wolf in PNE

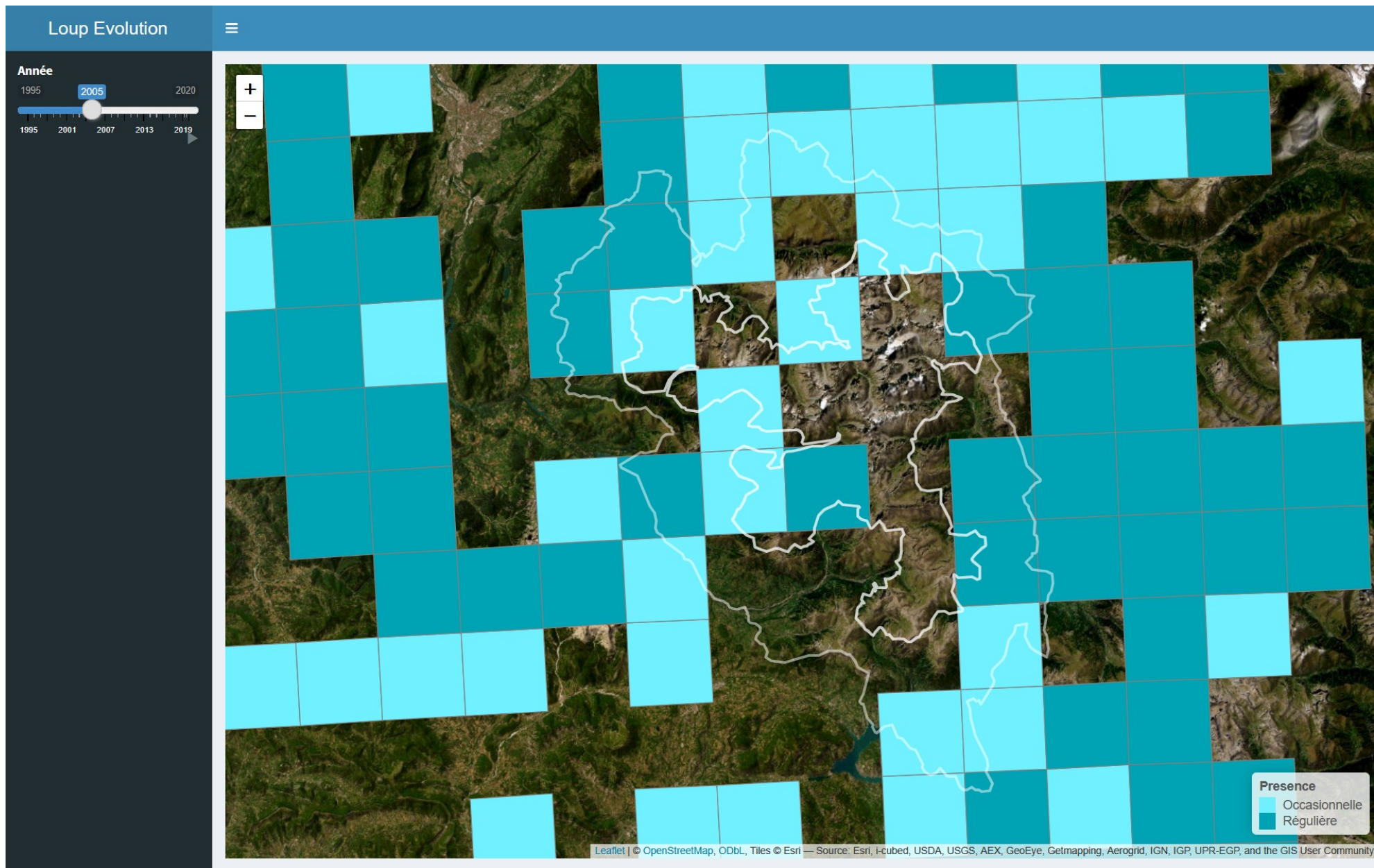


<https://loup-france-evolution.sk8.inrae.fr/>

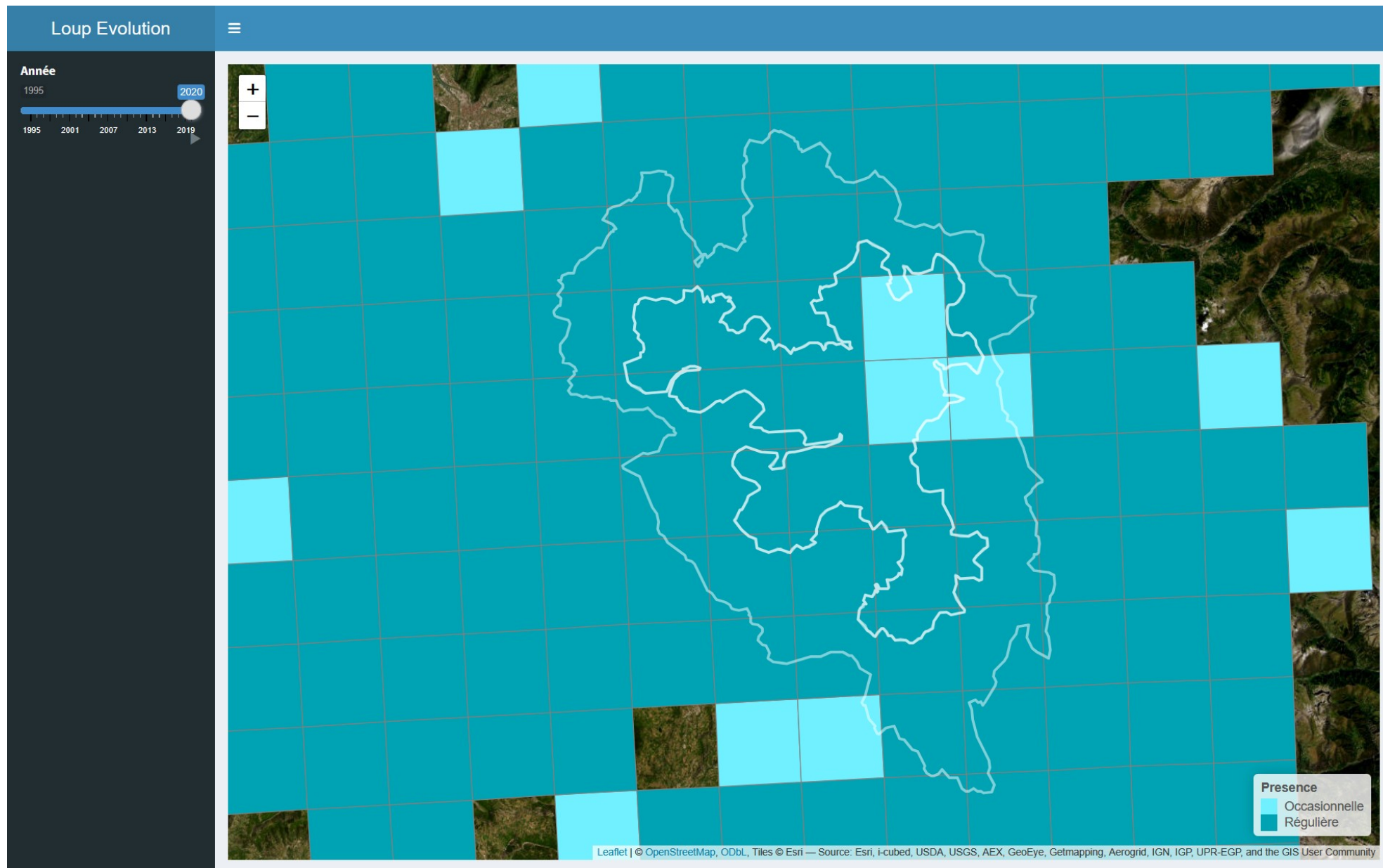
Wolf in PNE



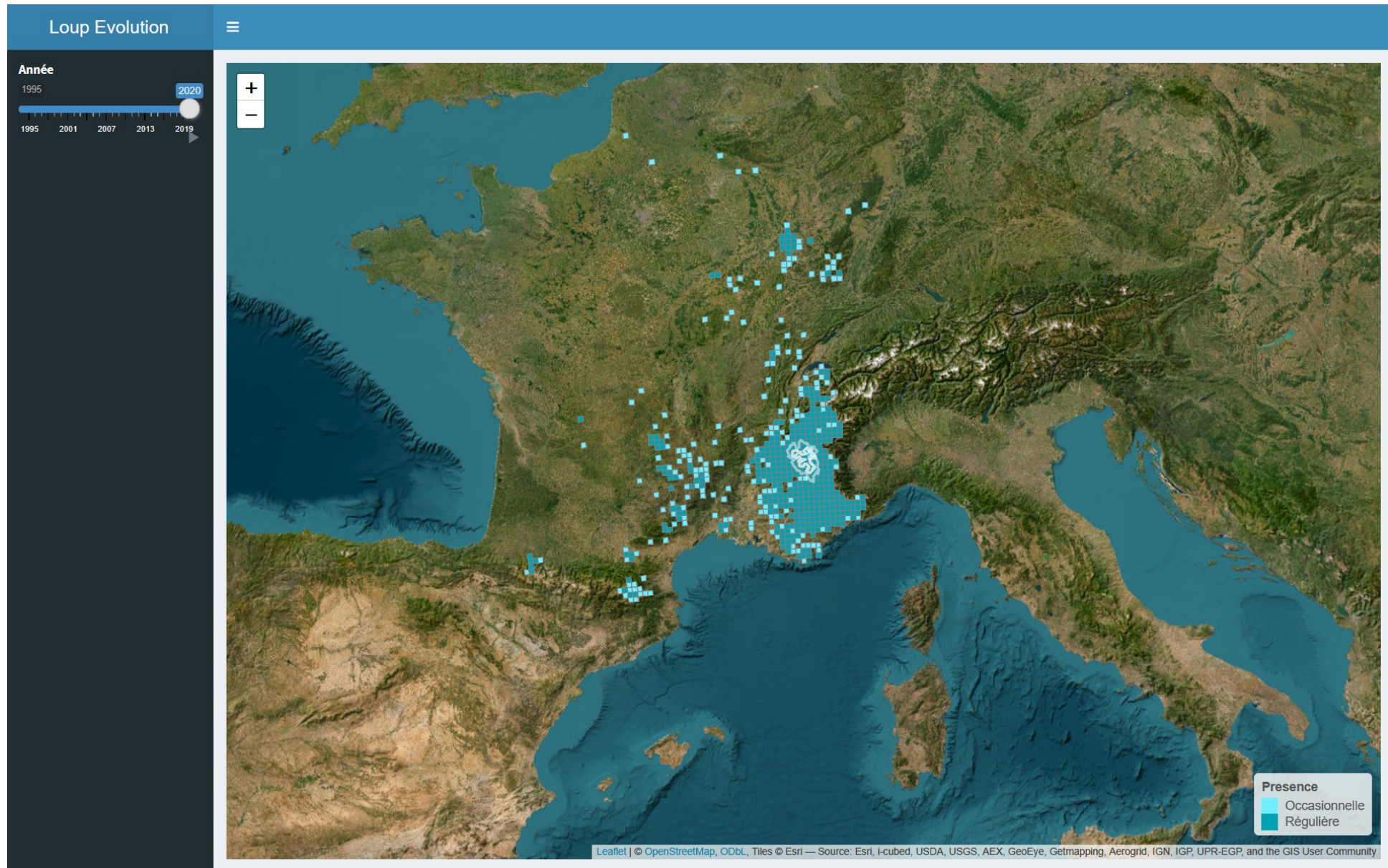
Wolf in PNE



Wolf in PNE



Wolf in PNE



Wolf in PNE



Corentin Esmieu



Wolf in PNE



Wolf in PNE



Constats Tableau de bord

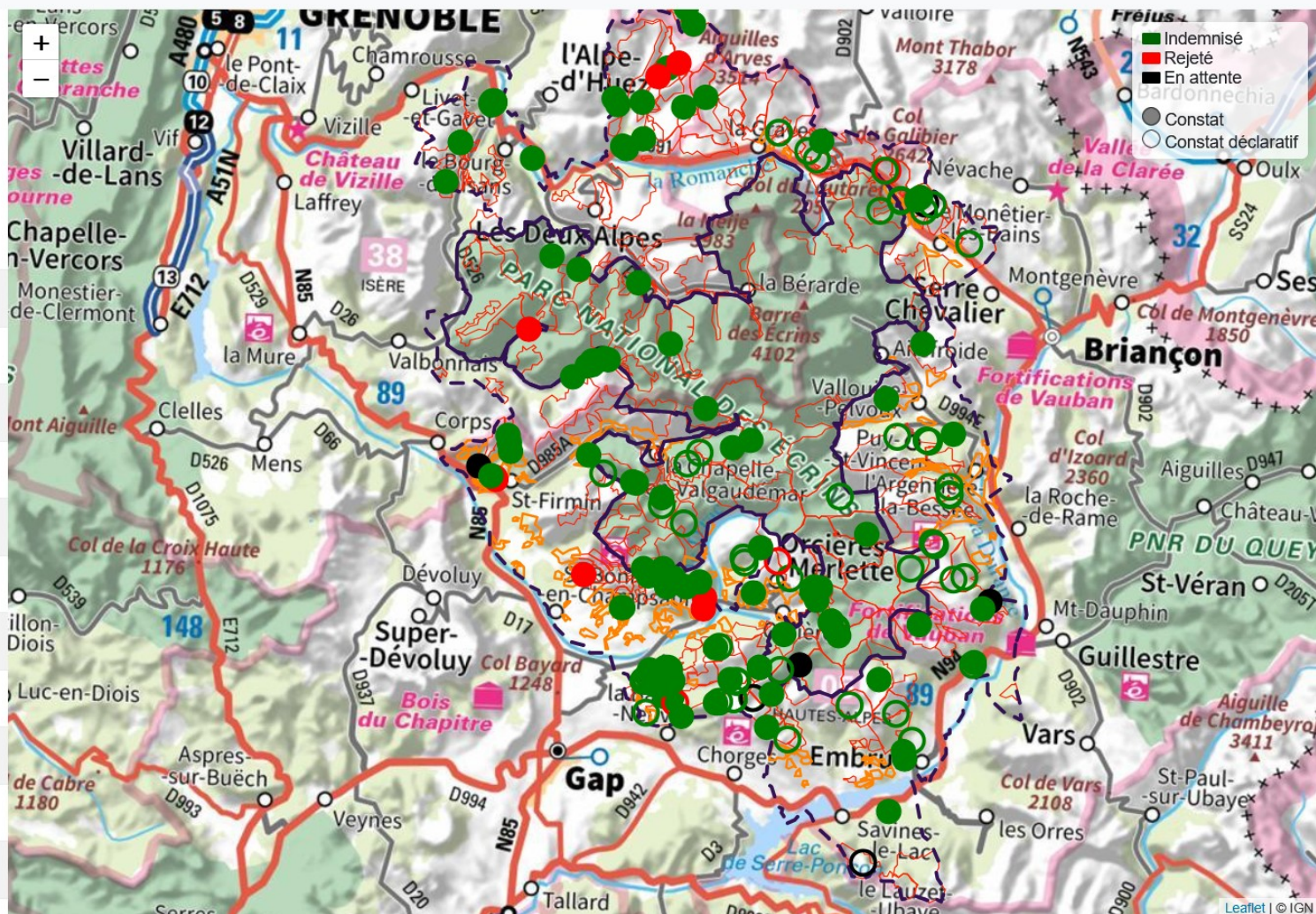
Camille Monchicourt

Constats

[Filtrer](#) [Télécharger les données](#)

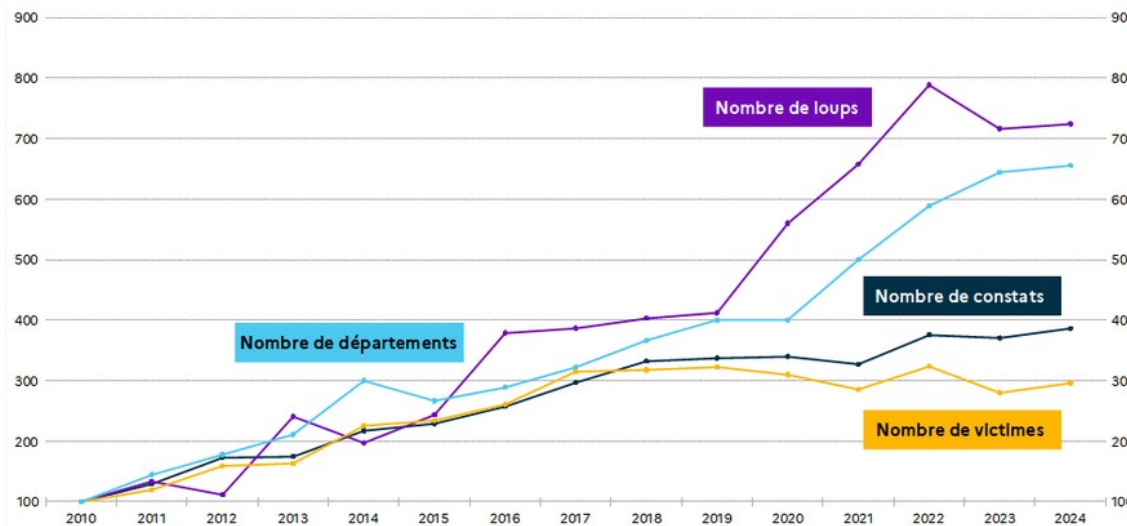
[+ Ajouter un constat](#) [↻](#)

Date attaque	Type d'animaux			
2025-10-08	Ovins			
2025-10-06	Ovins			
2025-10-05	Ovins			
2025-10-05	Ovins			
2025-10-02	Ovins			
2025-10-01	Ovins			
2025-09-30	Ovins			
2025-09-30	Ovins			
2025-09-29	Ovins			
2025-09-28	Ovins			
2025-09-28	Ovins			



Wolf in PNE

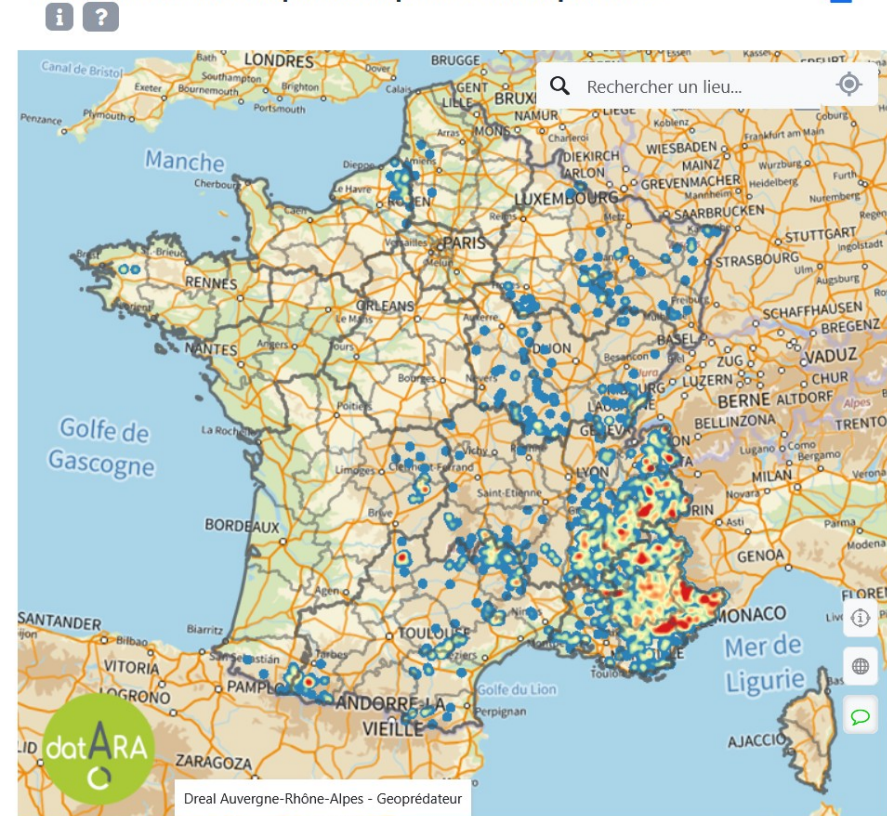
Évolution comparée du nombre de constats et de la population lupine
(base 100 en 2010)



Usage conflict :

- Nature protection
- Pastoralism (sheeps mainly)
- Hikers
- Tourism

Concentration des attaques de loups en France depuis 2010



<https://pna-loup.developpement-durable.gouv.fr/bilans-de-dommages-a12.html>

Camera trap in PNE



Camera trap in PNE



CameraName

59°F 15°C

06-08-2018 1

S49-31 ? (Mâle dominant de la meute Valbonnais de 2016 à 2021)



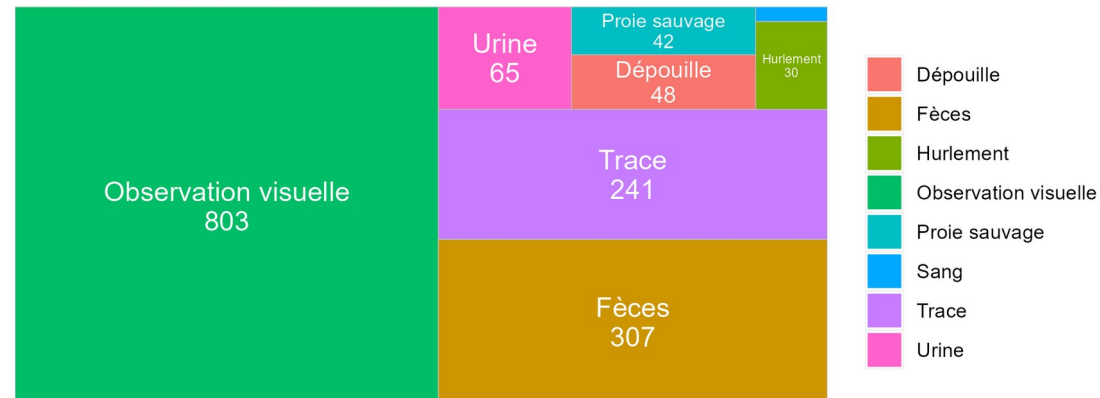
18°C

MOULTRIECAM

11 SEP 2016 12:03 pm

Watch – Visual observations – Confirmation
 Reproduction - Behaviour / Ethology
 Number of individuals
 Global knowledge
 Individual monitoring / Follow / CMR
 No protocols

Répartition des types d'indices entre 2017 et 2021



**OBSERVATION VISUELLE par piège
photographique**

RAPPEL
Ce formulaire doit être adressé à l'antenne régionale du réseau (ONCFS Gap, ONCFS Gerstheim, ONCFS Gères, ONCFS Prades, Oncfs Coudes, PN Mercantour Nice), ainsi qu'au coordinateur départemental (DDT).

1. IDENTITÉ DU (DES) CORRESPONDANT(S) ET DE L'OBSERVATEUR

		CORRESPONDANTS		OBSERVATEUR	
		N°1	N°2	Nom	
Nom	JORDANA			Téléphone	JORDANA Regis
Organisme	PNE				0660 19 49 14
Date de recueil					

2. DATE ET LIEU DE L'OBSERVATION (*situer sur une carte au 1/25000ème*)
Le : jour mois année

Département : 05 Commune : Apre les Corps lieu dit : Station des Vachers

3. RELEVÉ D'AUTRE(S) INDICE(S) (*compléter les formulaires correspondants*)
☐ Urine/sang ☐ Empreinte(s) ☐ Proie sauvage ☐ Excrément-poil ☐ Hurllement

4. CIRCONSTANCES DE L'OBSERVATION
☒ Piège photo

5. PHOTOGRAPHIES REALISEES

Date	Heure	N photos	N loups	Commentaires
24-03-17	20h28	2	1	
27-03-17	23h16	2	2	
03-04-17	00h32	3	1	
03-04-17	22h36	5	2	

6. AVIS DU (DES) CORRESPONDANT(S)

LYNX	LOUP	GRAND CANIDÉ INDÉTÉRMINÉ	CHIEN	INDÉTÉRMINÉ	AUTRE (à préciser)
☐	☒	☐	☐	☐	

Camera trap in PNE

GeoNature - Parc National des Écrins

camille.monchicourt

Quoi ?

Taxon

Taxon(s) recherché(s):
Canis lupus Linnaeus, 1758

Avancé

Quand ?

Date min

Date max

Où ?

Communes

Secteurs

Natura 2000

Aires de protection de biotope

Réserves naturelles nationales

Rechercher

Taxon	Date obs	JDD	Observateur
Loup gris, Loup	26-09-2024	Prestation d'invent	Anne BOUNIAS-D
Loup gris, Loup	23-09-2024	Prestation d'invent	Anne BOUNIAS-D
Loup gris, Loup	28-09-2022	Réseau grands pré	Guilhem Barneix
Loup gris, Loup	21-09-2022	Réseau grands pré	REY Bruno
Loup gris, Loup	18-09-2022	Reseau grands pré	Jean-Philippe Teln
Loup gris, Loup	17-09-2022	Reseau grands pré	Rodolphe Papet
Loup gris, Loup	17-09-2022	Reseau grands pré	Michel Bouche
Loup gris, Loup	15-09-2022	Reseau grands pré	Rodolphe Papet
Loup gris, Loup	03-09-2022	Reseau grands pré	Michel Bouche
Loup gris, Loup	31-08-2022	Reseau grands pré	Jean-Philippe Teln
Loup gris, Loup	27-08-2022	Reseau grands pré	Jean-Philippe Teln
Loup gris, Loup	21-08-2022	Réseau grands pré	louvreterie
Loup gris, Loup	16-08-2022	Reseau grands pré	Michel Bouche
Loup gris, Loup	15-08-2022	Reseau grands pré	Jean-Philippe Teln
Loup gris, Loup	15-08-2022	Reseau grands pré	Jean-Philippe Teln
Loup gris, Loup	14-08-2022	Reseau grands pré	Michel Bouche
Loup gris, Loup	13-08-2022	Reseau grands pré	Jean-Philippe Teln
Loup gris, Loup	07-08-2022	Reseau grands pré	Jean-Philippe Teln
Loup gris, Loup	07-08-2022	Reseau grands pré	Jean-Philippe Teln

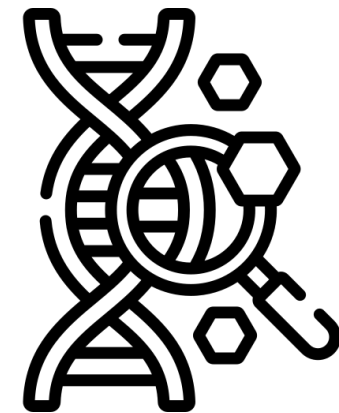
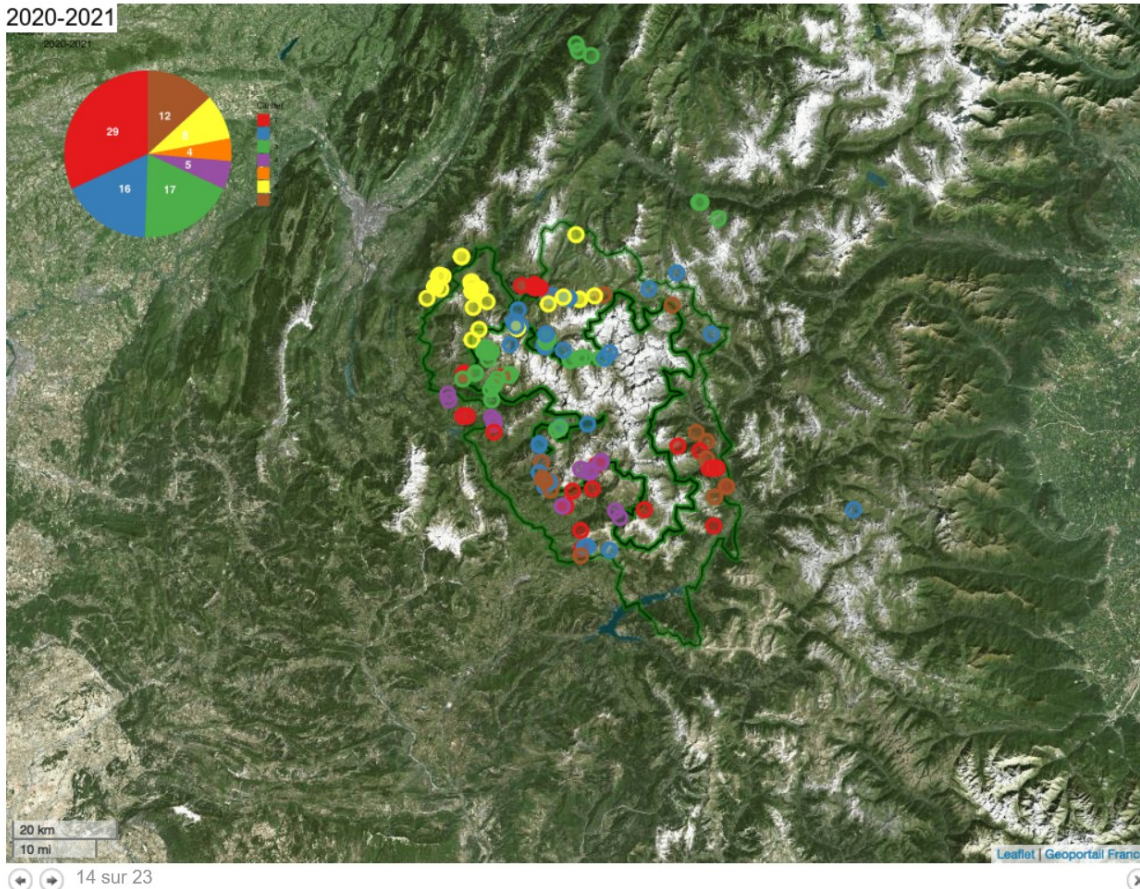
1 selected / 2231 total

Importer Télécharger

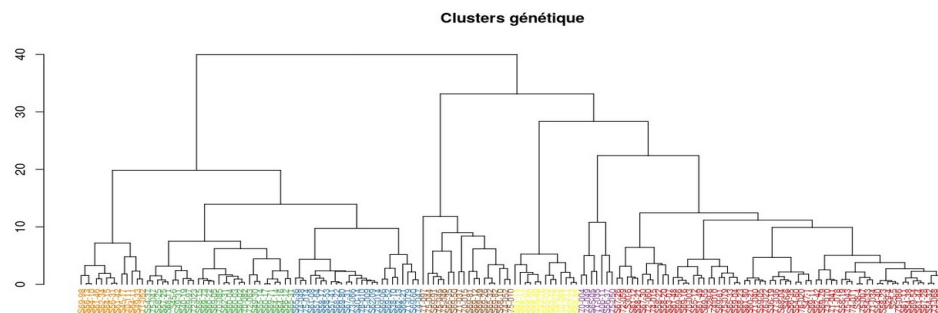
Indices, observations visuelles et pièges photo > Réseau Loup-Lynx > GeoNature PNE > SINP-INPN > GBIF

Wolf in PNE

2020-2021



- Meutes = PP + expertise
- Clusters de gènes qui s'alimente et se diversifie, donc adaptable et plus durable



Camera trap in PNE



Camera trap in PNE

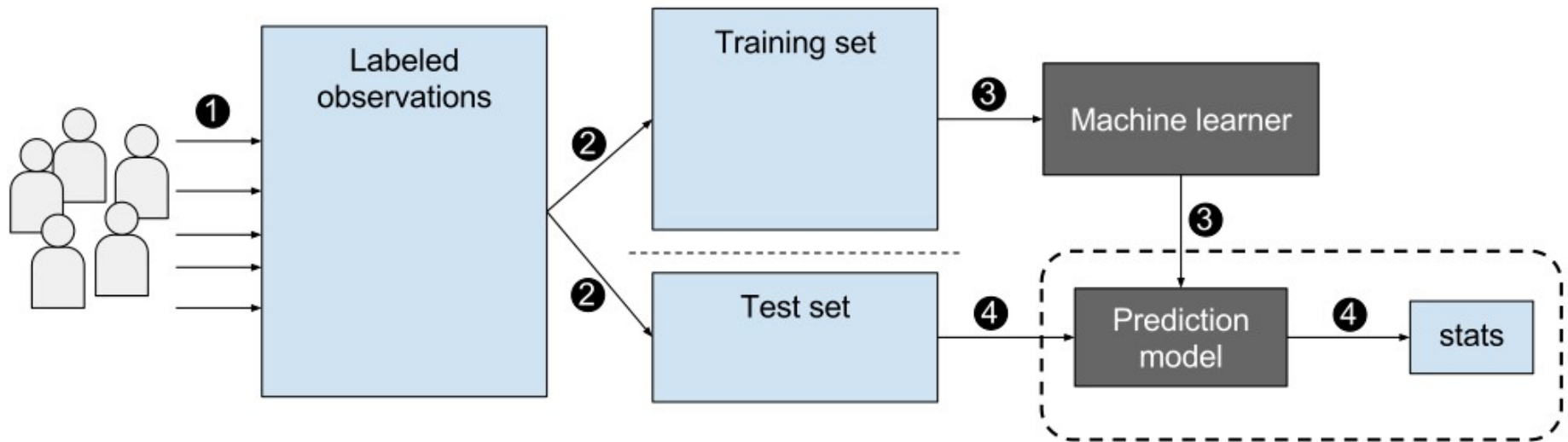
The top screenshot shows a file manager window with the path 'serveur sur emb-nas / Medias / 0000 / la ferme'. It displays a list of JPEG files: MFDC0201.JPG, MFDC0208.JPG, MFDC0209.JPG, MFDC0249.JPG, MFDC0250.JPG, MFDC0252.JPG, MFDC0257.JPG, MFDC0303.JPG, and MFDC0312.JPG.

The bottom screenshot shows a file manager window with the path 'serveur sur emb-nas / Medias / 0.PP OLIVIER / PP Lauzerot'. It displays a list of MP4 files. A 'Propriétés' dialog box is open, showing the following information:

Propriétés		
Général		
Noms	IMG_0003.MP4, IMG_0009.MP4, IMG_0010.MP4, I...	
Type	vidéo MPEG-4 (video/mp4)	
Contenus	13 éléments, totalisant 1,0 Go	
Dossier parent	smb://emb-nas/serveur/Medias/0.PP%20OLIVIE...	

Where ? When ?
What ? Why ?

AI ? Deep learning, machine learning



ARTIFICIAL INTELLIGENCE

Simulates human intelligence



MACHINE LEARNING

Learns from data

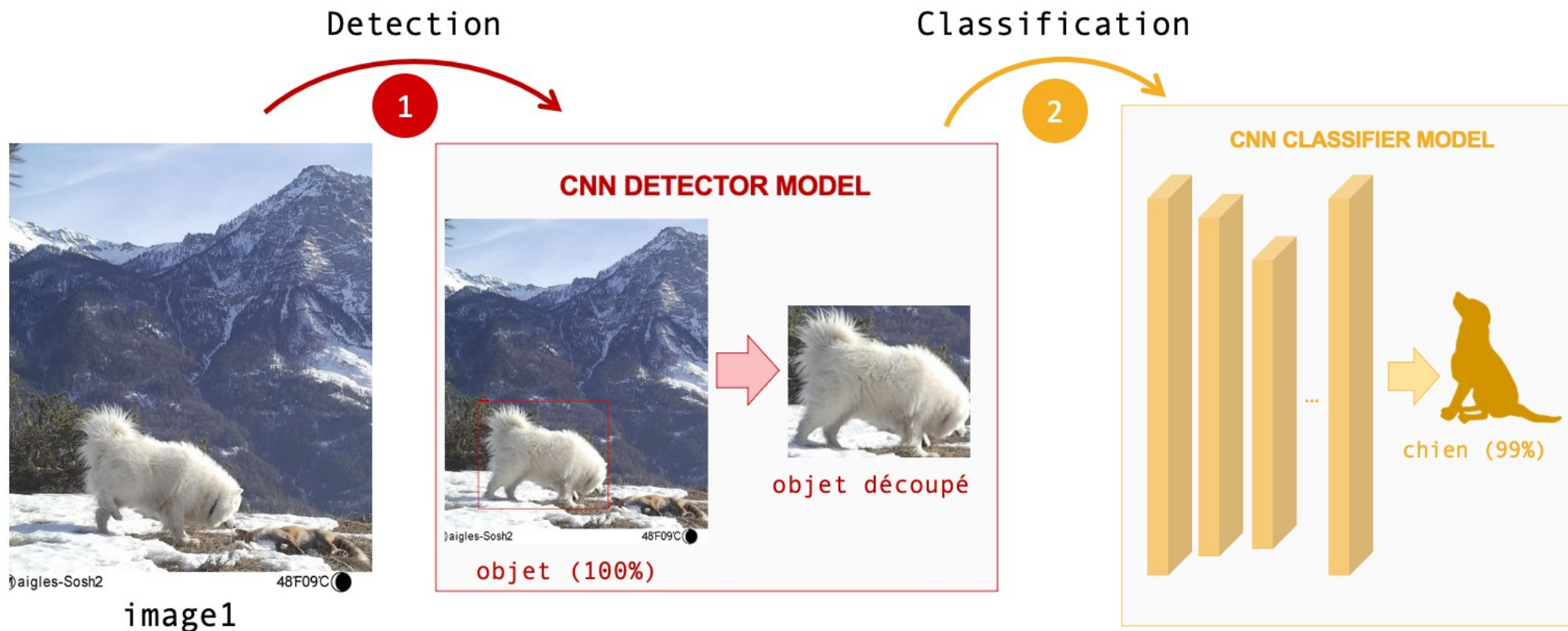


DEEP LEARNING

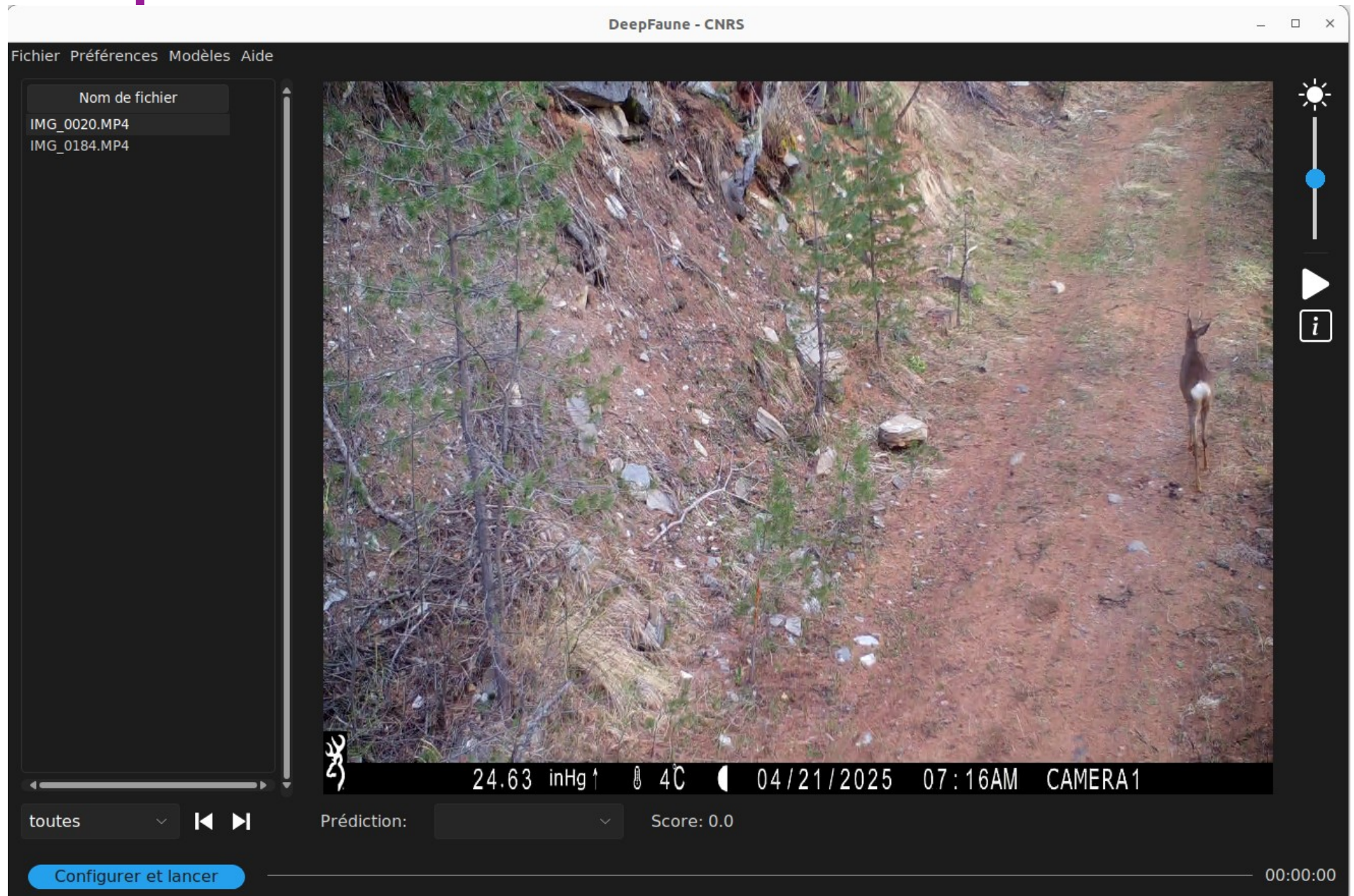
Uses neural networks

SUBSET

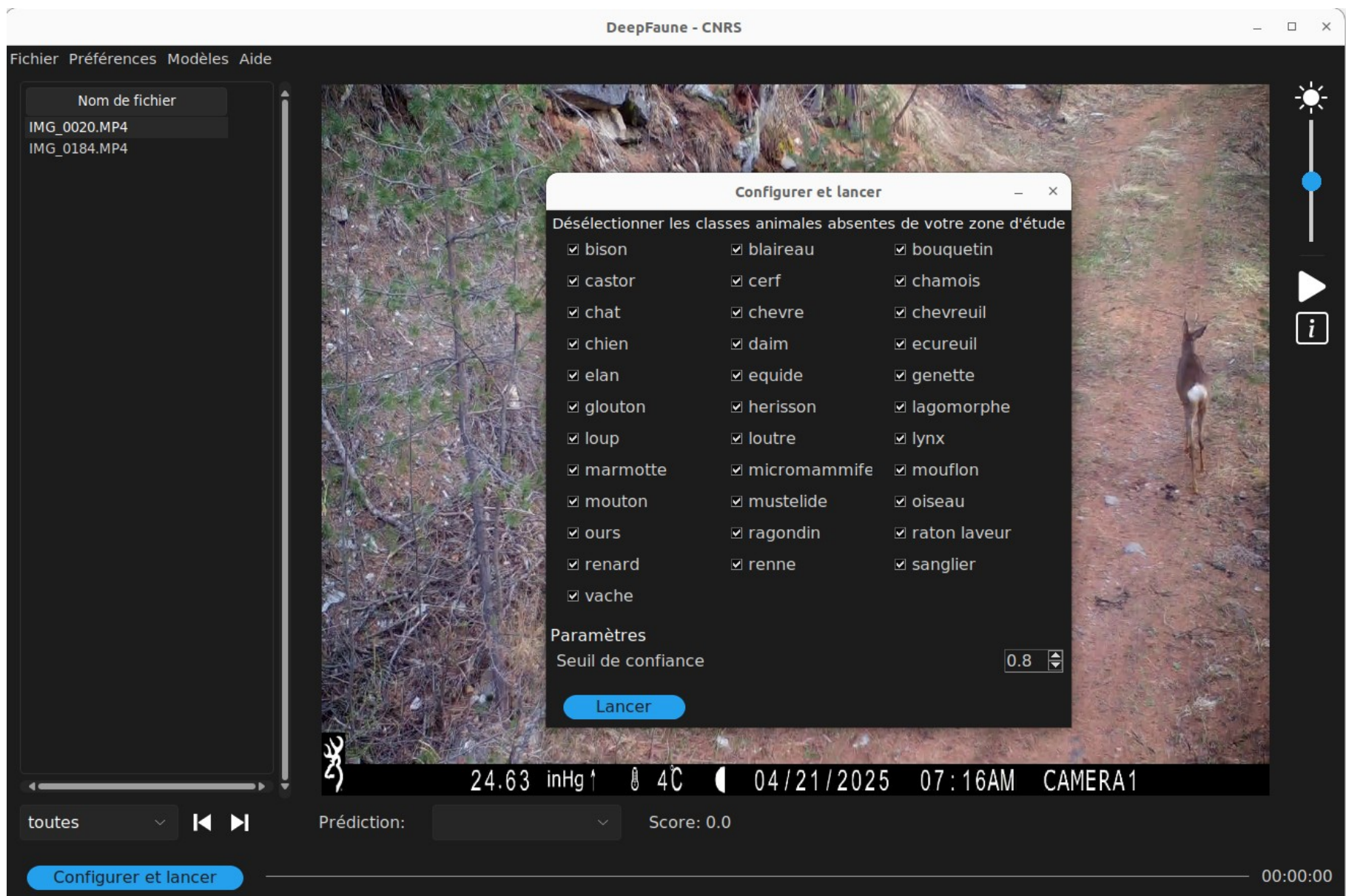
DeepFaune



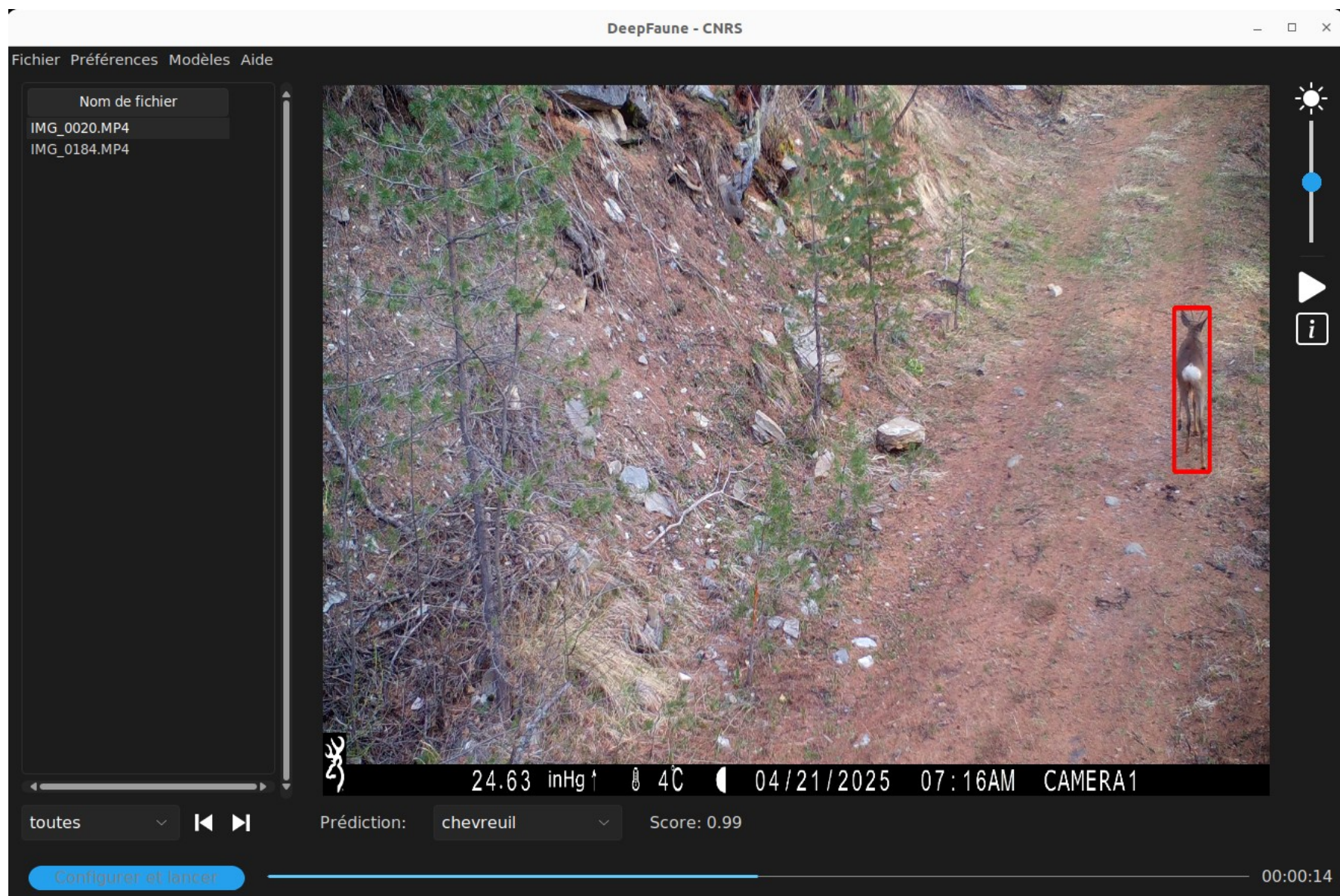
DeepFaune



DeepFaune



DeepFaune



DeepFaune

deepfaune.csv - LibreOffice Calc

Fichier Édition Affichage Insertion Format Styles Feuille Données Outils Fenêtre Aide

Libération Sans 10 pt G I S A

A1 f. Σ = filename

	A	B	C	D	E	F	G	H	I	J
1	filename	date	segnum	predictionbase	scorebase	prediction	score	top1	humancount	
2	/home/theo/Documents/SCIENTIFIQUE/piege_photo/Belle Aigrette/relevé du 03.06.2025/IMG_0020.MP	2025-04-21 07:16:39	1	chevreuil	0.99	chevreuil	0.99	chevreuil	0	
3	/home/theo/Documents/SCIENTIFIQUE/piege_photo/Belle Aigrette/relevé du 03.06.2025/IMG_0184.MP	2025-04-29 19:50:34	2	chevreuil	0.99	chevreuil	0.99	chevreuil	0	
4										
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41										

deepfaune

Camtrap DP

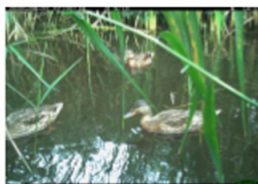
(A)

Project / Study

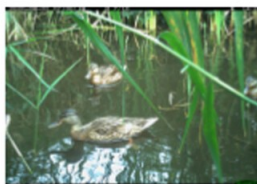
Deployment
29b7d356
from T1 to T1000



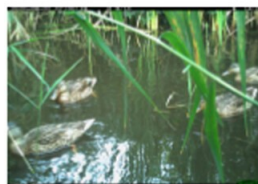
Media file
59b38bc6 at T200



Media file
cc50edaa at T201

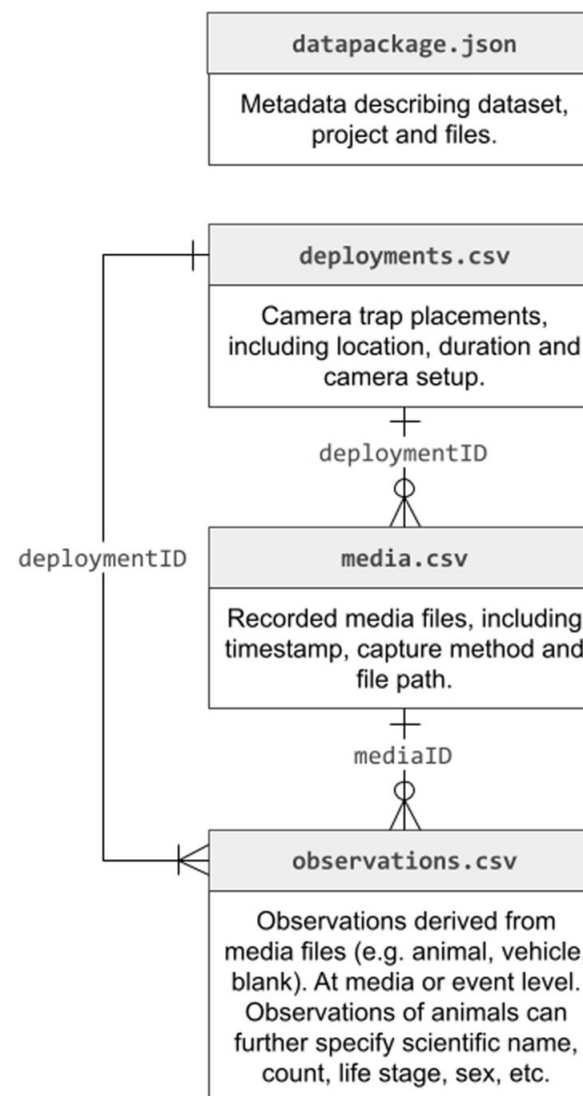


Media file
0966e552 at T202



observation ID	observation Level	media ID	event Start	event End	scientificName	count
obs1	media	59b38bc6	T200	T200	Anas platyrhynchos	3
obs2	media	cc50edaa	T201	T201	Anas platyrhynchos	4
obs3	media	0966e552	T202	T202	Anas platyrhynchos	4
obs4	event		T200	T202	Anas platyrhynchos	5

(B)



Camera Trap Data Package (Camtrap DP) is a community-developed data exchange format for camera trap data.

<https://camtrap-dp.tdwg.org/>

<https://zslpublications.onlinelibrary.wiley.com/doi/10.1002/rse2.374>

Les besoins des utilisateurs



Gestion du stockage des médias



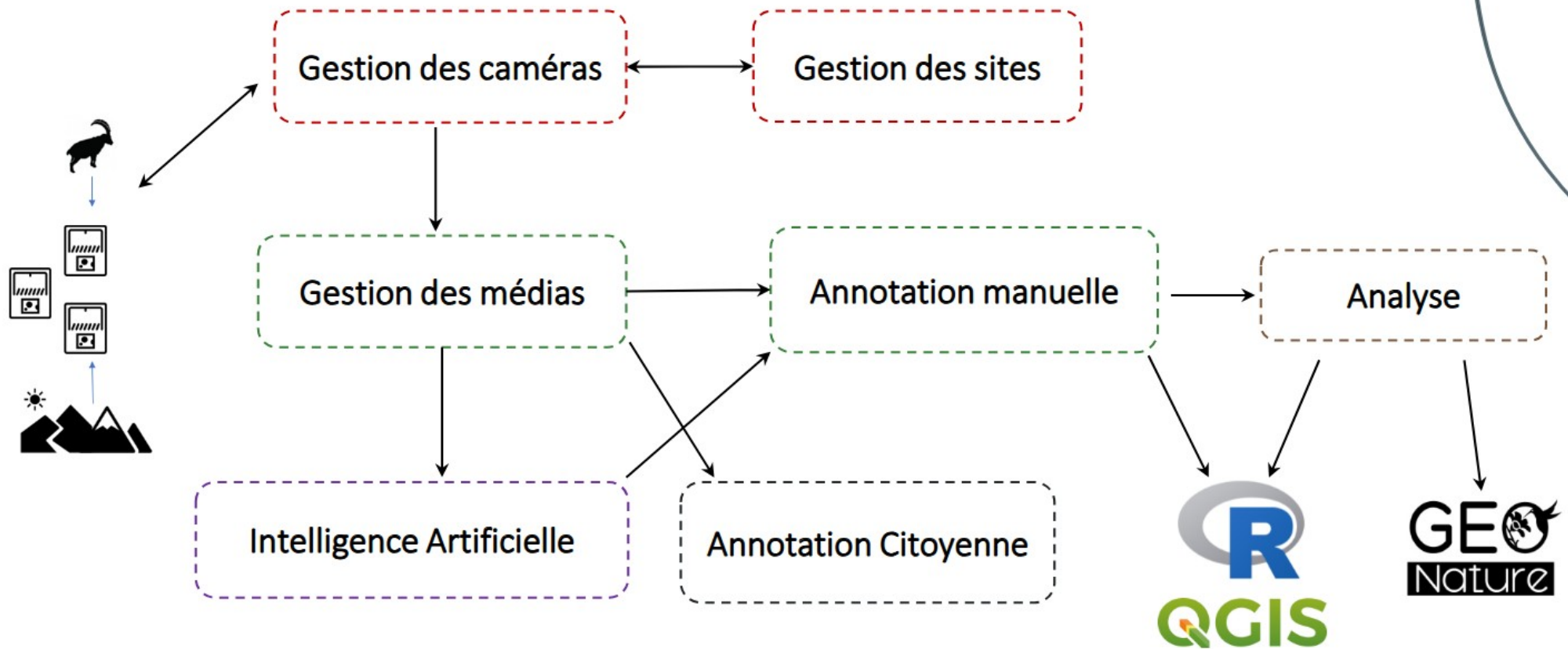
Gain de temps pour le traitement des médias



Gestion des pièges photographiques

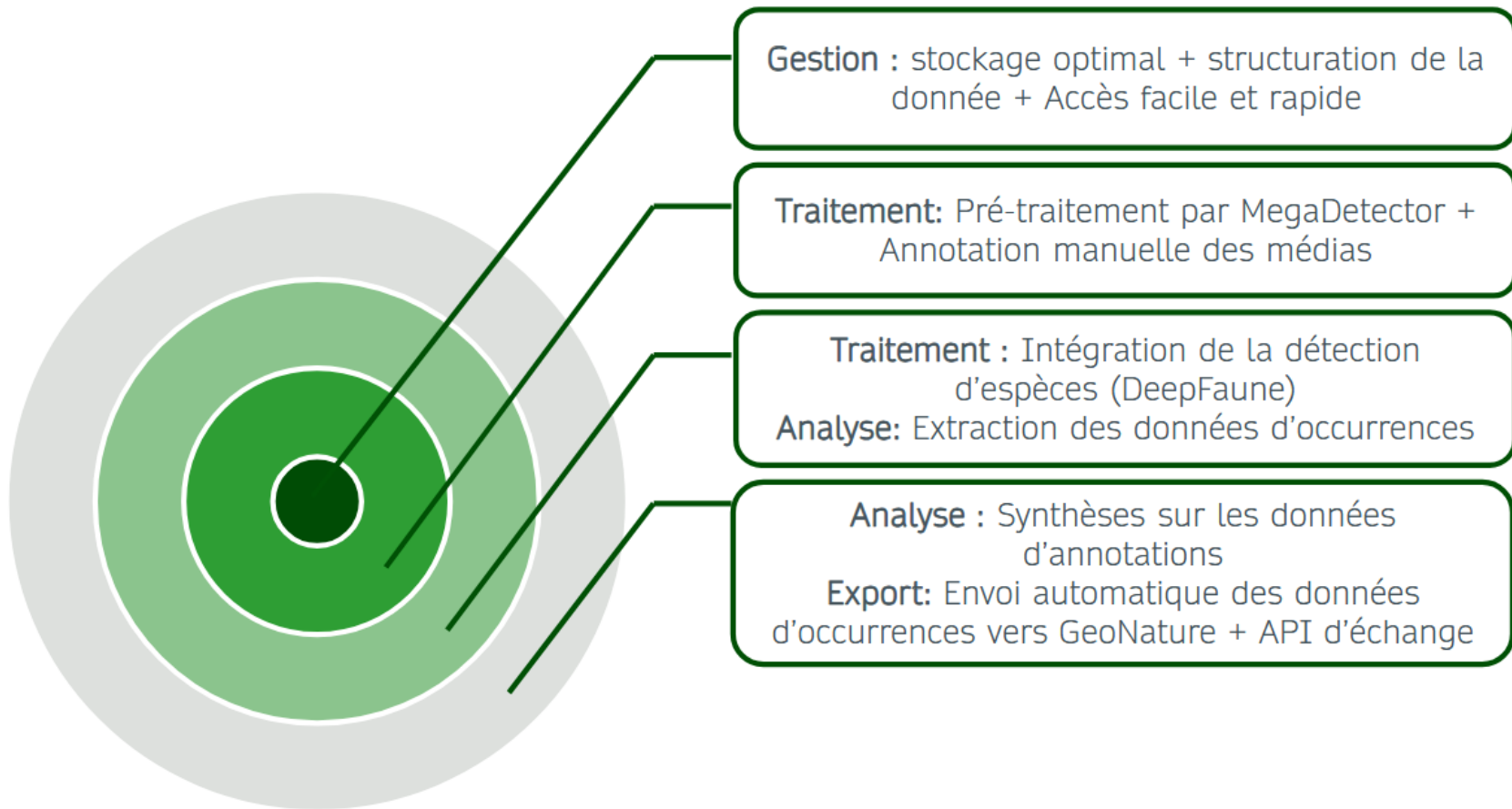
<https://geonature.fr/documents/2022-09-NS-Mathilde-Leclerc-GeoCam-Gestion-donnees-biodiversite-pieges-photographiques.pdf>

Architecture fonctionnelle de GeoCam



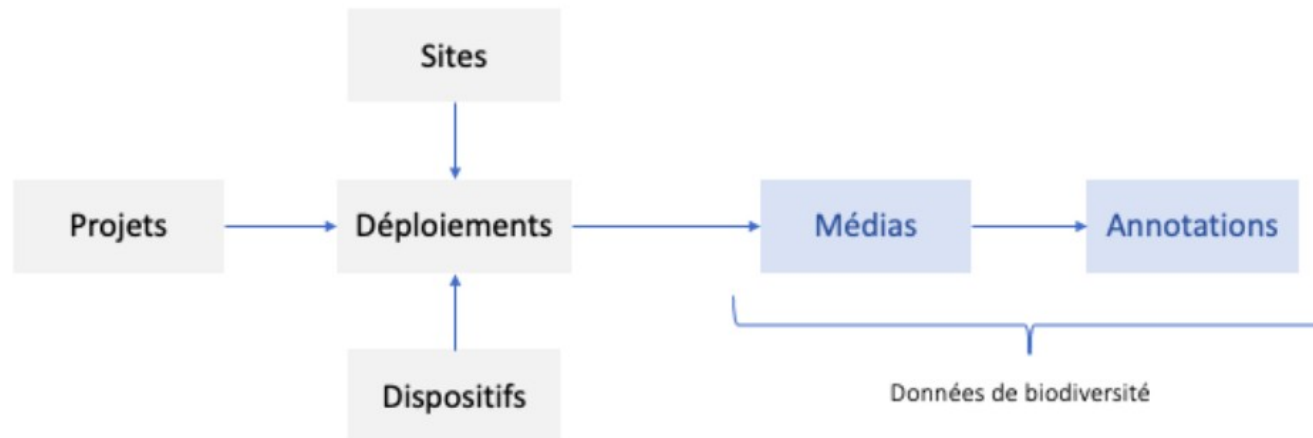
<https://geonature.fr/documents/2022-09-NS-Mathilde-Leclerc-GeoCam-Gestion-donnees-biodiversite-pieges-photographiques.pdf>

Etapes de développement de GeoCam



<https://geonature.fr/documents/2022-09-NS-Mathilde-Leclerc-GeoCam-Gestion-donnees-biodiversite-pieges-photographiques.pdf>

Structure des données



<https://geonature.fr/documents/2022-09-NS-Mathilde-Leclerc-GeoCam-Gestion-donnees-biodiversite-pieges-photographiques.pdf>

Statistics

70

MEDIA FILES

7

SITES

7

DEVICES

62

OBSERVATIONS

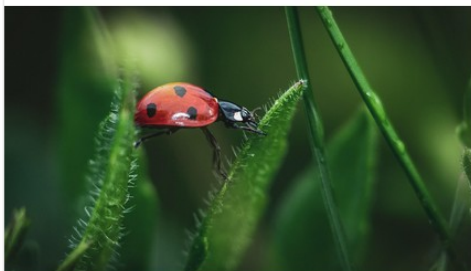
My projects

NEW PROJECT



Test_2025

2025-10-01 / 2025-10-31



No media file



Deployment: 1

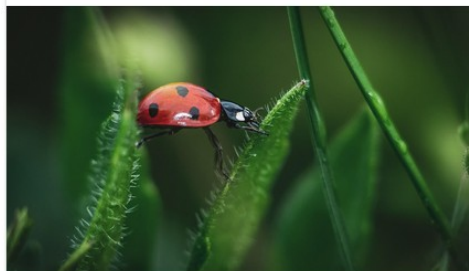
Site: 1

Device: 1



test theo

No duration provided



Media files: 4



Deployments: 2

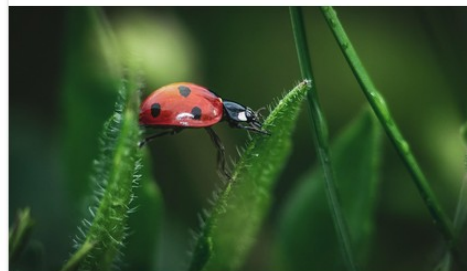
Sites: 2

Device: 1



test date

No duration provided



No media file



Deployment: 1

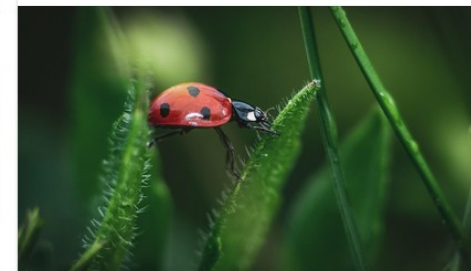
Site: 1

Device: 1



capra ibex

2025-04-01 / 2026-06-13



No media file



No deployment

No site

No device

Deployments (2)

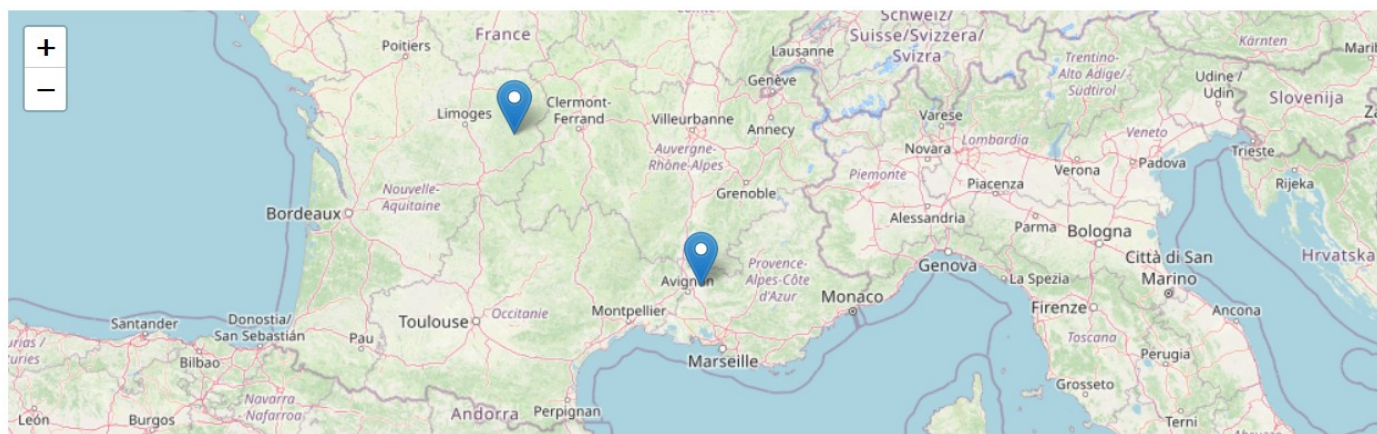
+ NEW DEPLOYMENT

Nom
 Start date
 End date
 Site
 Dispositif



Name	Start date	End date	Site name	Device name	Import media files	Delete this deployment
Automone combe bidule	22/09/2025	30/09/2025	bidule	Piege photo 1	+	×
lala	09/07/2025	05/08/2025	Peyrelevade	Piege photo 1	+	×

Study area



demo.ecosecrets.natural-solutions.eu/project/15/deployment/24/details

ECOSECRETS USER DOCUMENTATION EN

Home > test theo > Automone combe bidule > Capture d'écran du 2025-09-15 16-25-46.png

Automone combe bidule

DETAILS MEDIA FILES

Import media files

Drag/drop or click to import 100 files (maximum)

CANCEL SAVE

Deploy gallery

Start date End date Class Order Family Genus Species

278 Observations

4 photos

Capture d'écran du 2025-0...

Capture d'écran du 2025-0...

Capture d'écran du 2025-0...

Capture d'écran du 2025-0...





Start date 

End date 

Class

Order

Family

Genus

Species





METADATA

☐ Empty media

×

Order

⊗

Accipitriformes

⊗

Genus

Accipitridae

⊗

Milvus



Number of individuals

Milvus milvus

⊗

1

1

SAVE AND CONTINUE

And elsewhere ?

Megadetector
Pytorch-Wildlife
SpeciesNet
Wildlife Insight
TrapTagger
Zamba
AddaxAI
Animl
CamTrap
CamTrap Detector
Camelot
Timelapse
WildTrax
Zooniverse
Agouti
Animal Detect

<https://github.com/agentmorris/MegaDetector/blob/main/megadetector.md#local-tools-that-run-megadetector-and-other-models>

And elsewhere ?

Megadetector (Microsoft AI for Earth) = Detecting object (animal, person, vehicle / empty)

SpeciesNet (Google AI for Nature / Wildlife Insights) = Classifier based on Megadetector
Trained on 65 millions images / Recognize about 2000 species

Pytorch-Wildlife
Wildlife Insight
TrapTagger
Zamba

Local solution, hard to share, centralize and organize ?
SAAS online solution ? Depending on Google or other ?
Open source mainly
SMART / EarthRanger ?

And elsewhere ?

Everything I know about ML and camera traps

[View on GitHub](#)

Overview

This is a list of everything I know about machine learning and camera traps, which is presumably just a subset of what's out there... [email me](#) with updates, or submit pull requests. Help me keep this page up to date! And tell me what I got wrong about your software and your papers!

Maintained by [Dan Morris](#). Disclosure of what I work on: I contribute to several projects on ML for camera traps (particularly, [MegaDetector](#), [SpeciesNet](#), and [Wildlife Insights](#)) and an open repository for conservation data ([lila.science](#)). And since I've disclosed that, I can say that although I don't filter papers for this list based on whether they use stuff I've worked on, I *do* use this list as a way of tracking how those systems are being used, so in the "papers" sections, you will see tags for a few things I want to track.

Table of Contents

- [Camera trap systems using ML](#)
- [Systems in active development](#)

And elsewhere ?

Table of Contents

- Camera trap systems using ML
 - Systems in active development
 - Systems that appear to be less active
 - Systems that appear not to exist any more
- OSS repos about ML for camera traps
 - Active repos
 - Less active repos
- Publicly-available ML models for camera traps
- Smart camera traps
- Manual labeling tools people use for camera traps
 - Review papers about labeling tools
 - Tools in active development
 - Tools that appear to be less active
 - Non-camera-trap-specific labeling tools that people use for camera trap data
- Post-hoc analysis tools people use for camera trap data
- Camera trap ML papers
 - Papers with summaries
 - Papers I haven't read yet
 - Papers that use LILA data but mostly aren't about camera traps
- Data sources for camera trap ML
- Metadata standards for camera trap data
- Further reading
- Places to chat about this stuff

And elsewhere ?

Command line open source tools



DISCUSSION / AI FOR CONSERVATION / 3 March 2025

We are releasing SpeciesNet



Stefan Istrate

@stefan_istrate | he/him

Machine Learning Researcher & Nature Photographer. Building conservation tech for biodiversity monitoring at Wildlife Insights.



GROUPS

AI for Conservation

Camera Traps

RELATED INVENTORY CONTENT



And elsewhere ?

Command line open source tools

📖 README

📄 Code of conduct

👤 Contributing

📄 Apache-2.0 license

🔒 Security

✎ ⋮

Running SpeciesNet

Setting up your Python environment

The instructions on this page will assume that you have a Python virtual environment set up. If you have not installed Python, or you are not familiar with Python virtual environments, start with our [installing Python](#) page. If you see a prompt that looks something like the following, you're all set to proceed to the next step:

```
(speciesnet) c:\>
```

Installing the SpeciesNet Python package

You can install the SpeciesNet Python package via:

```
pip install speciesnet
```

If you are on a Mac, and you receive an error during this step, add the "--use-pep517" option, like this:

```
pip install speciesnet --use-pep517
```

To confirm that the package has been installed, you can run:

```
python -m speciesnet.scripts.run_model --help
```

You should see help text related to the main script you'll use to run SpeciesNet.

Running the models

The easiest way to run the ensemble is via the "run_model" script, like this:

```
python -m speciesnet.scripts.run_model --folders "c:\your\image\folder" --predictions_json "c:\your\output\file.json"
```


And elsewhere ?

Command line open source tools

```

camille@costa-rica: ~/Documents/DEV/speciesnet
Requirement already satisfied: executing>=1.2.0 in ./venv/lib/python3.12/site-packages (from stack_data->ipython->yolov5<7.0.12,>=7.0.8->speciesnet) (2.2.1)
Requirement already satisfied: asttokens>=2.1.0 in ./venv/lib/python3.12/site-packages (from stack_data->ipython->yolov5<7.0.12,>=7.0.8->speciesnet) (3.0.0)
Requirement already satisfied: pure-eval in ./venv/lib/python3.12/site-packages (from stack_data->ipython->yolov5<7.0.12,>=7.0.8->speciesnet) (0.2.3)
(venv) camille@costa-rica:~/Documents/DEV/speciesnet$ python -m speciesnet.scripts.run_model --folders /home/camille/Documents/PP/02-CERRA/ --predictions_json /home/camille/Documents/PP/02-CERRA-speciesnet.json
/home/camille/Documents/DEV/speciesnet/venv/lib/python3.12/site-packages/yolov5/utils/general.py:34: UserWarning: pkg_resources is deprecated as an API. See https://setuptools.pypa.io/en/latest/pkg_resources.html. The pkg_resources package is slated for removal as early as 2025-11-30. Refrain from using this package or pin to Setuptools<81.
import pkg_resources as pkg
Downloading 6 files: 0%|          | 0/6 [00:00<?, ?it/s]Downloading from https://www.kaggle.com/api/v1/models/google/speciesnet/pyTorch/v4.0.1a/1/download/info.json...
100%|          | 399/399 [00:00<00:00, 1.92MB/s]
Downloading from https://www.kaggle.com/api/v1/models/google/speciesnet/pyTorch/v4.0.1a/1/download/geofence_release.2025.02.27.0702.json...
Downloading from https://www.kaggle.com/api/v1/models/google/speciesnet/pyTorch/v4.0.1a/1/download/always_crop_99710272_22x8_v12_epoch_00148.pt...
Downloading from https://www.kaggle.com/api/v1/models/google/speciesnet/pyTorch/v4.0.1a/1/download/taxonomy_release.txt...
0.00/214M [00:00<?, ?B/s]
Downloading from https://www.kaggle.com/api/v1/models/google/speciesnet/pyTorch/v4.0.1a/1/download/always_crop_99710272_22x8_v12_epoch_00148.labels.txt...
0%|          | 0.00/343k [00:00<?, ?B/s]Downloading from https://www.kaggle.com/api/v1/models/google/speciesnet/pyTorch/v4.0.1a/1/download/README.md...
100%|          | 119/119 [00:00<00:00, 366kB/s]
100%|          | 250k/250k [00:00<00:00, 522kB/s]
100%|          | 343k/343k [00:00<00:00, 678kB/s]
100%|          | 5.03M/5.03M [00:01<00:00, 4.95MB/s]
100%|          | 214M/214M [00:10<00:00, 21.2MB/s]
Downloading 6 files: 100%|          | 6/6 [00:11<00:00, 1.88s/it]
I1013 18:10:59.811558 139445927514240 classifier.py:109] Loaded SpeciesNetClassifier in 24.26 seconds on CPU.
I1013 18:11:00.585568 139445927514240 detector.py:99] Loaded SpeciesNetDetector in 0.77 seconds on CPU.
I1013 18:11:01.038336 139445927514240 ensemble.py:71] Loaded SpeciesNetEnsemble in 0.45 seconds.
Detector preprocess : 100%|          | 22/22 [01:23<00:00, 3.79s/it]
Detector predict : 100%|          | 22/22 [01:23<00:00, 3.79s/it]
Classifier preprocess : 100%|          | 22/22 [01:23<00:00, 3.79s/it]
Classifier predict : 100%|          | 3/3 [01:23<00:00, 27.80s/it]
Geolocation : 100%|          | 22/22 [01:23<00:00, 3.79s/it]
I1013 18:12:24.437238 139445927514240 utils.py:501] Saving predictions to `/home/camille/Documents/PP/02-CERRA-speciesnet.tmp.ad4f5089-9cf8-4c26-a45a-ba63a239de88.json`.
I1013 18:12:24.439078 139445927514240 utils.py:503] Moving `/home/camille/Documents/PP/02-CERRA-speciesnet.tmp.ad4f5089-9cf8-4c26-a45a-ba63a239de88.json` to `/home/camille/Documents/PP/02-CERRA-speciesnet.json`.
(venv) camille@costa-rica:~/Documents/DEV/speciesnet$

```

And elsewhere ?

Command line open source tools

```
file:///home/camille/Documents/PP/02-CERRA-speciesnet.json

JSON  Données brutes  En-têtes
Enregistrer Copier Tout réduire Tout développer Filtre le JSON

▼ predictions:
  ▼ 0:
    filepath: "/home/camille/Documents/PP/02-CERRA/07310020.JPG"
    ▼ classifications:
      ▼ classes:
        0: "b1352069-a39c-4a84-a949-60044271c0c1;aves;;;bird"
        1: "f1675b99-08c4-46d4-a281-e7b8e2104a24;aves;passeriformes;turdidae;;;turdidae family"
        2: "84f9a83d-224c-4c68-b23a-d42064dcc73a;aves;passeriformes;turdidae;turdus;merula;common blackbird"
        3: "d5f41e40-03b5-466b-a269-d0dddab44cb5;aves;passeriformes;turdidae;turdus;philomelos;song thrush"
        4: "f1856211-cfb7-4a5b-9158-c0f72fd09ee6;;;blank"
      ▼ scores:
        0: 0.3523
        1: 0.2949
        2: 0.1007
        3: 0.0362
        4: 0.0333
    ▼ detections:
      ▼ 0:
        category: "1"
        label: "animal"
        conf: 0.2319
        ▼ bbox:
          0: 0.1907
          1: 0.2809
          2: 0.0305
          3: 0.0657
        prediction: "b1352069-a39c-4a84-a949-60044271c0c1;aves;;;bird"
        prediction_score: 0.784
        prediction_source: "classifier+rollup_to_class"
        model_version: "4.0.1a"
  ▼ 1:
    filepath: "/home/camille/Documents/PP/02-CERRA/07310021.JPG"
    ▼ classifications:
      ▼ classes:
        0: "f1856211-cfb7-4a5b-9158-c0f72fd09ee6;;;blank"
        1: "f2d233e3-80e3-433d-9687-e29ecc7a467a;mammalia;;;mammal"
        2: "a04c522f-8ca1-4c09-85b5-a0f29b8466a8;mammalia;cetartiodactyla;cervidae;muntiacus;muntjac species"
        3: "d372cda5-a8ca-4b7b-97ed-4e4fab9c9b4b;mammalia;cetartiodactyla;suidae;sus;scrofa;wild boar"
        4: "96d478d5-30c4-4857-81de-9ac46d132800;mammalia;cetartiodactyla;cervidae;rusa;unicolor;sambar"
      ▼ scores:
        0: 0.9721
        1: 0.0038
        2: 0.0026
        3: 0.0025
        4: 0.0019
    detections: []
    prediction: "f1856211-cfb7-4a5b-9158-c0f72fd09ee6;;;blank"
    prediction_score: 0.9721
    prediction_source: "classifier"
    model_version: "4.0.1a"
  ▼ 2:
```


And elsewhere ?

Command line open source tools

```
(venv) camille@costa-rica:~/Documents/DEV/megadetector$ python -m megadetector.detection.run_detector --image_dir /home/camille/Documents/P
P/02-CERRA --output_dir /home/camille/Documents/PP/02-CERRA/MD/ "MDV5A"

Model v5a.0.1 already exists and is valid at /tmp/megadetector_models/md_v5a.0.1.pt
Running detector on 22 images...
PyTorch reports 0 available CUDA devices
GPU available: False
/home/camille/Documents/DEV/megadetector/venv/lib/python3.12/site-packages/yolov5/utils/general.py:31: UserWarning: pkg_resources is deprec
ated as an API. See https://setuptools.pypa.io/en/latest/pkg_resources.html. The pkg_resources package is slated for removal as early as 20
25-11-30. Refrain from using this package or pin to Setuptools<81.
  import pkg_resources as pkg
Loading PT detector with compatibility mode classic
Loaded image size 1280 from model metadata
Using model stride: 64
PTDetector using device cpu
Fusing layers...
Fusing layers...
Model summary: 733 layers, 140054656 parameters, 0 gradients, 208.8 GFLOPs
Model summary: 733 layers, 140054656 parameters, 0 gradients, 208.8 GFLOPs
100%|██████████████████████████████████████████████████████████████████████████████| 22/22 [01:08<00:00, 3.10s/it]
On average, for each image,
- loading took 0.06 seconds, std dev is 0 seconds
- inference took 3 seconds, std dev is 0.8 seconds
```

And elsewhere ?

Command line open source tools



AddaxAI

Simplifying camera trap
image analysis with AI

tinamou 0.645



tinamou 0.863



tinamou 0.910



Peter van Lunteren, Founder of Addax Data Science



How would I describe myself? I'm an optimistic, methodical, results-oriented, tech-savvy ecologist with a passion for developing data-driven solutions that improve the quality of ecological research. In addition to founding Addax, I have worked for several conservation initiatives over the past ten years and currently serve with four: [Smart Parks](#), conserving endangered wildlife through cutting-edge technologies, [Sensing Clues](#), providing nature conservation organisations with data-driven tools, [Inclusion Foundation](#), supporting village communities in Uganda with a basic income, and [CV4Ecology](#), where I teach ecologists to analyse large image, audio, or video datasets using computer vision.

I've also created the open-source AI platform [AddaxAI](#), which enables annotation, training, and deployment of custom models for automated species detection. The goal is for ecologists to be able to focus more of their time on conservation efforts and less time reviewing camera trap images. I am also a reviewer for the [Journal of Open Source Software](#) (JOSS), contributing to the peer review of open-source projects. My hope is that AddaxAI will make a significant contribution to open sourcing, open access, and open science.

See my [LinkedIn](#) and [ResearchGate](#) for more information about me and my [GitHub](#) for information on my software projects.

AddaxAI

AddaxAI v6.19 - Simple mode

To advanced mode Español Sponsor project Reset values

 Which folder do you want to analyse? ?

...o/02-Cerro_Bella_Vista

 Which species identification model do you want to use? ?

Global - SpeciesNet - Google

 Which species are present in your project area? ?

☐ Species 1
☐ Species 2
☐ Species 3
☐ Species 4
☐ Species 5
☐ Species 6



By Addax Data Science. More conservation technology? Visit addaxdatascience.com

AddaxAI v6.19 - Simple mode

Al modo avanzado Français Patrocine proyecto Restablecer valores

 ¿Qué carpeta quieres analizar? ?

no hay carpeta seleccionada

 ¿Qué modelo de identificación de especies quiere utilizar? ?

Global - SpeciesNet - Google

 ¿Qué especies están presentes en la zona de su proyecto? ?

☐ Species 1
☐ Species 2
☐ Species 3
☐ Species 4
☐ Species 5
☐ Species 6



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AddaxAI

AddaxAI v6.19 - Advanced mode

To simple mode

Español



Sponsor project

Reset values

DeployHelpAbout

Step 1: Select folder

...o/02-Cerro_Bella_Vista ✓

Change folder?

Step 2: Analysis

MegaDetector 1000 Redwood

Global - SpeciesNet - Google

Identification options

Show model information

Show

Location

gional taxa and allow all species to be

Detection confidence threshold

0.20

Don't process subdirectories

☐

Use custom image size

☐

Use absolute paths in output file

☐

Disable GPU processing

☐

Process images, if present

☒

Image options

Use checkpoints while running

☐

Checkpoint frequency

Par. ex.: 500

Continue from last checkpoint file

☐

Process videos, if present

☒

Video options

Don't process every frame

☒

Sample frames every N seconds

1

Step 3: Annotation (optional)

Manually verify results

Start

Step 4: Post-processing (optional)

Destination folder

...xai_speciesnet_results

Browse

Separate files into subdirectories

☐

Visualise detections and blur people

☒

Visualization options

Draw bounding boxes and confidences

☒

Select line width and font size

Medium

Blur people

☒

Crop detections

☐

Create maps and graphs

☒

Export results and retrieve metadata

☒

Export options

Output file format

CSV

Confidence threshold

0.3

Start post-processing

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AddaxAI

```
{
  "info": {
    "format_version": 1.4,
    "detector": "converted_from_predictions_json",
    "addaxai_metadata": {
      "version": "6.19",
      "custom_model": false,
      "custom_model_info": {}
    }
  },
  "detection_categories": {
    "1": "animal",
    "2": "bird",
    "3": "blank",
    "4": "temminck's tragopan",
    "5": "south american coati",
    "6": "nasua species",
    "7": "no cv result"
  },
  "classification_categories": {
    "0": "bird",
    "1": "blank",
    "2": "animal",
    "3": "temminck's tragopan",
    "4": "south american coati",
    "5": "nasua species",
    "6": "no cv result"
  },
  "classification_category_descriptions": {
    "0": "b1352069-a39c-4a84-a949-60044271c0c1;aves;;;;;bird",
    "1": "f1856211-cfb7-4a5b-9158-c0f72fd09ee6;;;;;blank",
    "2": "1f689929-883d-4dae-958c-3d57ab5b6c16;;;;;animal",
    "3": "27b1b1e7-5ffa-4165-95db-9f3e75e4c4e5;aves;galliformes;phasianidae;tragopan;temminckii;temminck's tragopan",
    "4": "1d3bbcaa-f81a-41d9-8904-5cc8a505af32;mammalia;carnivora;procyonidae;nasua;nasua;south american coati",
    "5": "30448820-af33-461d-bdb2-9478ac2a97ab;mammalia;carnivora;procyonidae;nasua;nasua species",
    "6": "f2efdae9-efb8-48fb-8a91-eccf79ab4ffb;no cv result;no cv result;no cv result;no cv result;no cv result;no cv result"
  },
  "images": [
    {
      "file": "07310020.JPG",
      "detections": [
        {
          "category": "2",
          "conf": 0.7840008810162544,
          "bbox": [
```

AddaxAI

results_detections.csv — LibreOffice Calc

Fichier Édition Affichage Insertion Format Styles Feuille Données Outils Fenêtre Aide

Liberation Sans 10 pt G I S A

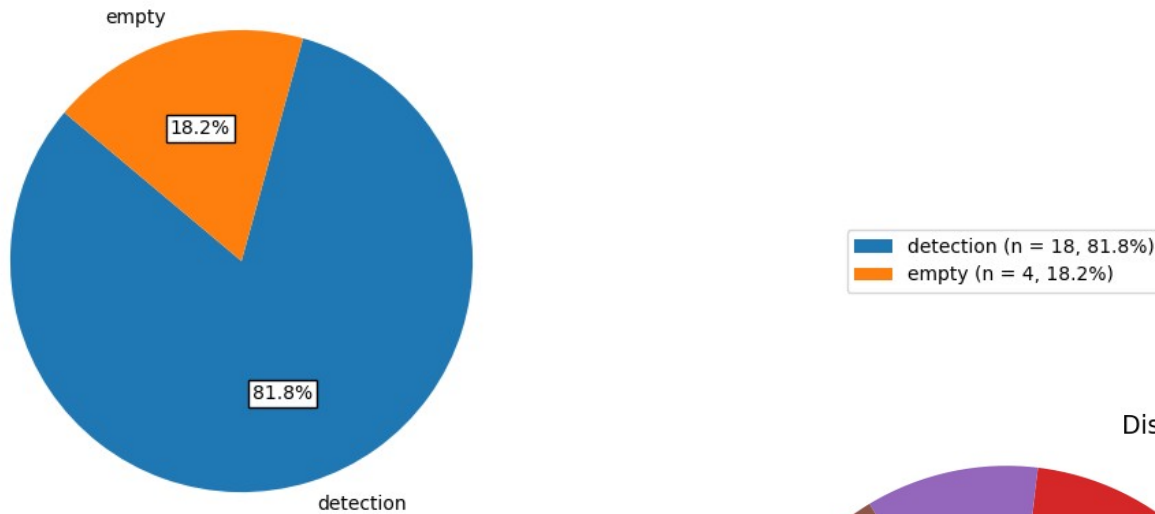
A1 fx Σ = absolute_path

	A	B	C	D	E	F	G	H	I	J	K	L	M	N
1	absolute_path	relative_path	data_type	label	confidence	human_verified	bbox_left	bbox_top	bbox_right	bbox_bottom	file_height	file_width	DateTimeOriginal	DateTime
2	C:/PNE/piege_photo/02-Cerro Bella Vista	07310020.JPG	img	bird	0.7840008810162544	False	882	974	1023	1202	3468	4624	31/07/22 09:39:15	31/07/22 10:00:00
3	C:/PNE/piege_photo/02-Cerro Bella Vista	07310022.JPG	img	bird	0.769195668399334	False	3663	2232	4184	2913	3468	4624	31/07/22 13:54:44	31/07/22 13:54:44
4	C:/PNE/piege_photo/02-Cerro Bella Vista	07310023.JPG	img	bird	0.7049725670367479	False	3801	2172	4553	2899	3468	4624	31/07/22 13:54:45	31/07/22 13:54:45
5	C:/PNE/piege_photo/02-Cerro Bella Vista	07310024.JPG	img	bird	0.6515031736344099	False	3639	2245	4432	2884	3468	4624	31/07/22 13:54:45	31/07/22 13:54:45
6	C:/PNE/piege_photo/02-Cerro Bella Vista	07310025.JPG	img	animal	0.8115458488464355	False	3675	2180	4472	2866	3468	4624	31/07/22 13:54:50	31/07/22 13:54:50
7	C:/PNE/piege_photo/02-Cerro Bella Vista	07310026.JPG	img	bird	0.7408715672791004	False	3423	2123	4175	2769	3468	4624	31/07/22 13:54:51	31/07/22 13:54:51
8	C:/PNE/piege_photo/02-Cerro Bella Vista	07310027.JPG	img	temminck's tragopan	0.7892050743103027	False	3444	2109	4218	2877	3468	4624	31/07/22 13:54:51	31/07/22 13:54:51
9	C:/PNE/piege_photo/02-Cerro Bella Vista	07310027.JPG	img	temminck's tragopan	0.7892050743103027	False	3142	2260	3511	2788	3468	4624	31/07/22 13:54:51	31/07/22 13:54:51
10	C:/PNE/piege_photo/02-Cerro Bella Vista	07310028.JPG	img	animal	0.8356372714042664	False	3123	2323	4193	3063	3468	4624	31/07/22 13:54:56	31/07/22 13:54:56
11	C:/PNE/piege_photo/02-Cerro Bella Vista	07310037.JPG	img	south american coati	0.9204840660095215	False	3679	1326	4624	1864	3468	4624	31/07/22 15:50:23	31/07/22 15:50:23
12	C:/PNE/piege_photo/02-Cerro Bella Vista	07310038.JPG	img	south american coati	0.9664590954780579	False	2864	1161	4624	1856	3468	4624	31/07/22 15:50:24	31/07/22 15:50:24
13	C:/PNE/piege_photo/02-Cerro Bella Vista	07310039.JPG	img	south american coati	0.8413597345352173	False	2638	1032	4051	1684	3468	4624	31/07/22 15:50:24	31/07/22 15:50:24
14	C:/PNE/piege_photo/02-Cerro Bella Vista	07310040.JPG	img	south american coati	0.8231638669967651	False	3484	198	4624	1762	3468	4624	31/07/22 15:50:29	31/07/22 15:50:29
15	C:/PNE/piege_photo/02-Cerro Bella Vista	07310043.JPG	img	nasua species	0.8550073504447937	False	2667	565	3722	2062	3468	4624	31/07/22 18:14:32	31/07/22 18:14:32
16	C:/PNE/piege_photo/02-Cerro Bella Vista	07310044.JPG	img	south american coati	0.9046947956085205	False	2591	636	3492	2171	3468	4624	31/07/22 18:14:33	31/07/22 18:14:33
17	C:/PNE/piege_photo/02-Cerro Bella Vista	07310045.JPG	img	south american coati	0.6540279984474182	False	2629	769	3646	2241	3468	4624	31/07/22 18:14:33	31/07/22 18:14:33
18	C:/PNE/piege_photo/02-Cerro Bella Vista	07310046.JPG	img	nasua species	0.9049462080001831	False	3245	1042	4623	2561	3468	4624	31/07/22 18:14:38	31/07/22 18:14:38
19	C:/PNE/piege_photo/02-Cerro Bella Vista	07310047.JPG	img	nasua species	0.8354796022176743	False	3700	570	4624	2491	3468	4624	31/07/22 18:14:39	31/07/22 18:14:39
20	C:/PNE/piege_photo/02-Cerro Bella Vista	07310048.JPG	img	no cv result	0.5838528871536255	False	2887	2374	3421	2599	3468	4624	31/07/22 18:14:39	31/07/22 18:14:39
21														

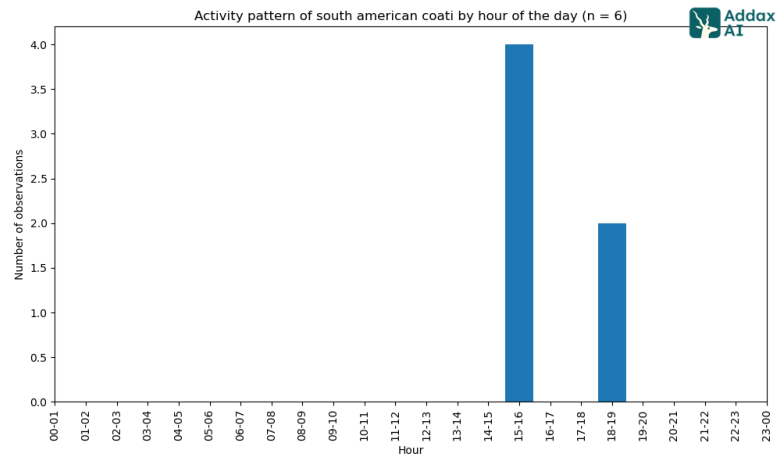
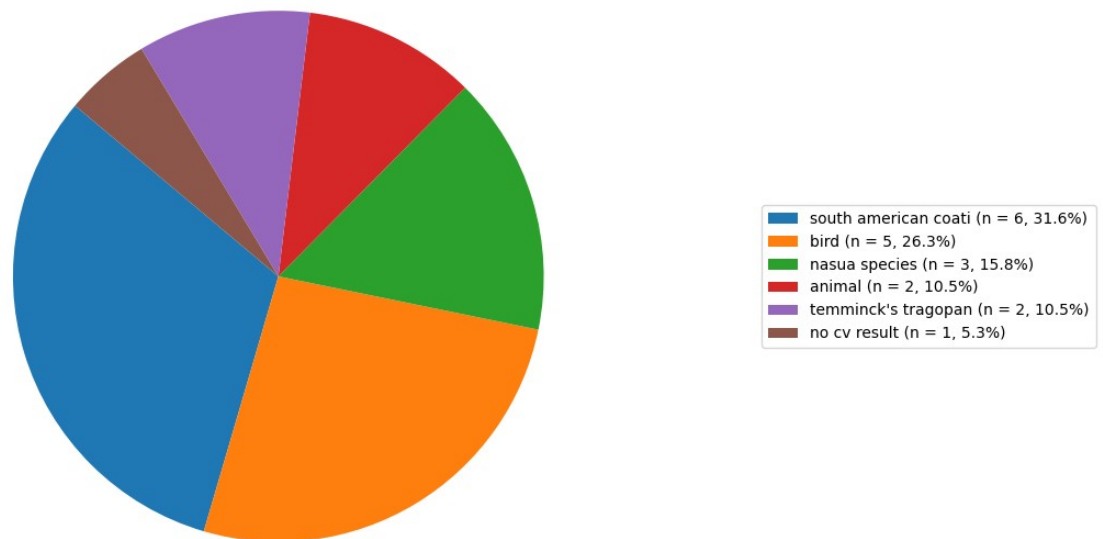
C:/PNE/piege_photo/02-Cerro Bella Vista

AddaxAI

Distribution of files (n = 22)



Distribution of detections (n = 19)



AddaxAI



AddaxAI

AddaxAI v6.19 - Advanced mode

To simple mode

Español



Sponsor project

Reset values

Deploy

Help

About

Step 1: Select folder

...rro_Bella_Vista-VIDEOS ✓

Change folder?

Step 2: Analysis

MegaDetector 1000 Redwood

Model to identify animals

None

Don't process subdirectories

☐

Use custom image size

☐

Use absolute paths in output file

☐

Disable GPU processing

☐

Process images, if present

☐

Process videos, if present

☒

Video options

Don't process every frame

☒

L Sample frames every N seconds

1

Start processing

Step 3: Annotation (optional)

Manually verify results

Start

Step 4: Post-processing (optional)

Destination folder

...VIDEOS/addaxai_results

Browse

Separate files into subdirectories

☐

Visualise detections and blur people

☒

Visualization options

Draw bounding boxes and confidences

☒

L Select line width and font size

Medium

Blur people

☒

Crop detections

☐

Create maps and graphs

☒

Export results and retrieve metadata

☒

Export options

Output file format

CSV

Confidence threshold

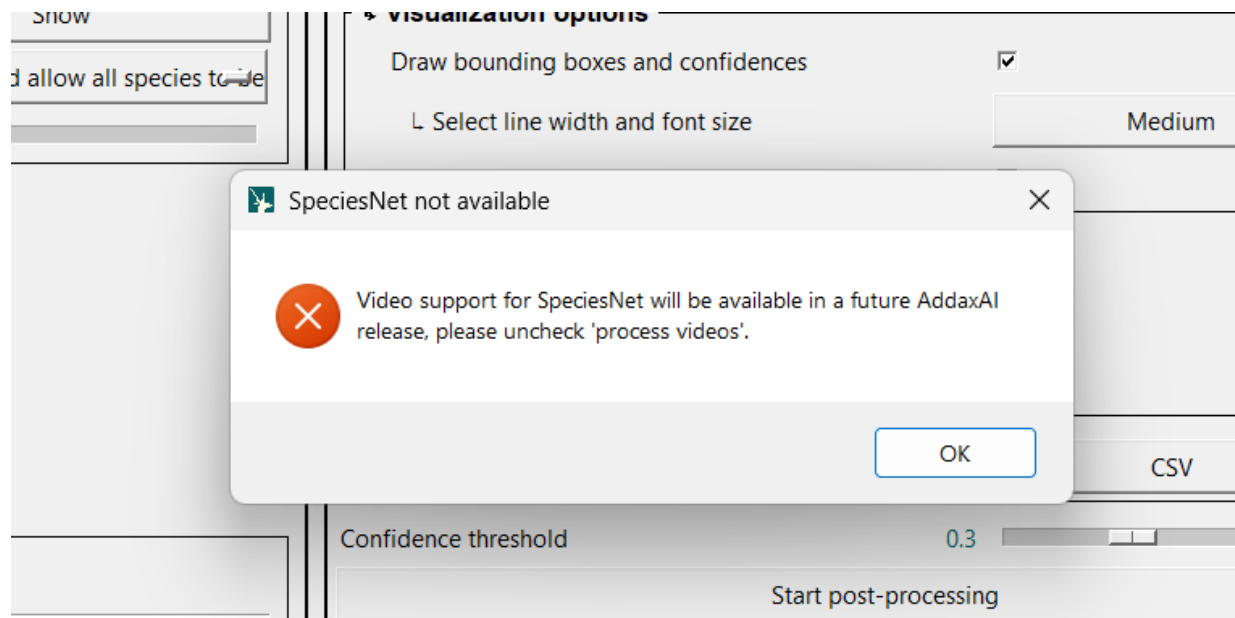
0.3

Start post-processing

By Addax Data Science. More conservation technology? Visit addaxdatascience.com

AddaxAI

	A	B	C	D	E	F	G	H	I	J	K	L	M	N	O
1	absolute_path	relative_path	data_type	label	confidence	human_verified	bbox_left	bbox_top	bbox_right	bbox_bottom	file_height	file_width	DateTimeOriginal	DateTime	DateTimeD
2	C:/PNE/piege_photo/03-Cerro_Bella_Vista-VIDEOS	02120052.MP4	vid	animal	0.777	False	1177	355	1225	412	720	1280	NA	NA	NA
3	C:/PNE/piege_photo/03-Cerro_Bella_Vista-VIDEOS	02130053.MP4	vid	animal	0.598	False	1233	430	1280	475	720	1280	NA	NA	NA
4	C:/PNE/piege_photo/03-Cerro_Bella_Vista-VIDEOS	02130057.MP4	vid	animal	0.976	False	523	206	822	416	720	1280	NA	NA	NA
5	C:/PNE/piege_photo/03-Cerro_Bella_Vista-VIDEOS	02130058.MP4	vid	animal	0.956	False	525	201	865	398	720	1280	NA	NA	NA
6	C:/PNE/piege_photo/03-Cerro_Bella_Vista-VIDEOS	02130059.MP4	vid	animal	0.968	False	600	187	838	387	720	1280	NA	NA	NA



Megadetector actual problem with AVI format: <https://github.com/agentmorris/MegaDetector/issues/182>

C:\PNE\piege_photo\03-VIDEOS

AddaxAI

AddaxAI v6.19 - Advanced mode

SpeciesNet output

Detector preprocess	: 62% #####1	32/52 [01:03<01:02, 3.12s/it]
Detector predict	: 40% ####	21/52 [01:05<01:33, 3.01s/it]
Classifier preprocess	: 40% ####	21/52 [01:05<01:33, 3.02s/it]
Classifier predict	: 29% ##8	2/7 [00:54<02:14, 26.93s/it]
Geolocation	: 62% #####1	32/52 [01:05<01:00, 3.02s/it]

Cancel

Model to identify animals: Global - SpeciesNet - Google

Identification options

Show model information: Show

Location: regional taxa and allow all species to be added

Detection confidence threshold: 0.20

Don't process subdirectories: ☐

Use custom image size: ☐

Use absolute paths in output file: ☐

Disable GPU processing: ☐

Process images, if present: ☒

Image options

Use checkpoints while running: ☐

Checkpoint frequency: Par. ex.: 500

Continue from last checkpoint file: ☐

Process videos, if present: ☐

Start processing

Sponsor project

Reset values

on (optional)

Start

processing (optional)

...VIDEOS/addaxai_results

Browse

Separate files into subdirectories: ☐

Visualise detections and blur people: ☒

Visualization options

Draw bounding boxes and confidences: ☒

Select line width and font size: Medium

Blur people: ☒

Crop detections: ☐

Create maps and graphs: ☒

Export results and retrieve metadata: ☒

Export options

Output file format: CSV

Confidence threshold: 0.3

Start post-processing

By Addax Data Science. More conservation technology? Visit addaxdatascience.com

AddaxAI

The screenshot displays the AddaxAI web interface. On the left, a sidebar contains two progress indicators: 'Postprocessing...' at 92% completion with an elapsed time of 0:00:07 and a remaining time of 0:00:01, and 'Creating graphs...' at 0% completion, currently 'In queue'. The main content area features the Addax AI logo and a 'Sponsor project' button. Below the logo, there are buttons for 'Change folder?', 'View results', and 'Again?'. The right-hand panel is divided into two sections: 'Step 3: Annotation (optional)' with a 'Start' button, and 'Step 4: Post-processing (optional)'. Step 4 includes settings for 'Destination folder' (set to '...xai_speciesnet_results'), 'Separate files into subdirectories' (unchecked), 'Visualise detections and blur people' (checked), 'Visualization options' (including 'Draw bounding boxes and confidences' checked, 'Select line width and font size' set to 'Medium', and 'Blur people' checked), 'Crop detections' (unchecked), 'Create maps and graphs' (checked), 'Export results and retrieve metadata' (checked), 'Export options' (with 'Output file format' set to 'CSV'), and a 'Confidence threshold' slider set to 0.3. A 'Start post-processing' button is at the bottom of this section. A large green checkmark is visible in the center of the main panel. At the bottom, a footer states 'By Addax Data Science. More conservation technology? Visit addaxdatascience.com'.

AddaxAI

Disque local (C:) > PNE > piege_photo > 04-Gira_N21_junio_2023-KAMUK_11 > addaxai_speciesnet_results

Rechercher dans : addaxai_speciesnet_results

Trier Afficher Choisir comme image d'arrière-plan Faire pivoter à gauche Faire pivoter à droite Détails

graphs

01130024 01170066 01170067 01220113 01220114

02030157 02030167 02030170 02130294 02130300 02170321

02200378 02210383 02210384 02210385 02210407 03010473

02210407 03010473

C:\PNE\piege_photo\04-Gira_N21_junio_2023-KAMUK_11

Parc national des Ecrins

AddaxAI

results_files.csv — LibreOffice Calc

Fichier Édition Affichage Insertion Format Styles Feuille Données Outils Fenêtre Aide

Liberation Sans 10 pt

A **B** **C** **D** **E** **F** **G**

	A	B	C	D	E	F	G
1	absolute_path	relative_path	data_type	n_detections	file_height	file_width	max_confidence
2	C:/PNE/piege_photo/06-VIDEOS	06300004.MPvid		0	720	1280	0.0854
3	C:/PNE/piege_photo/06-VIDEOS	06300006.MPvid		0	720	1280	0.228
4	C:/PNE/piege_photo/06-VIDEOS	06300008.MPvid		1	720	1280	0.341
5	C:/PNE/piege_photo/06-VIDEOS	06300009.MPvid		1	720	1280	0.636
6	C:/PNE/piege_photo/06-VIDEOS	06300010.MPvid		1	720	1280	0.953
7	C:/PNE/piege_photo/06-VIDEOS	06300013.MPvid		0	720	1280	0.2
8	C:/PNE/piege_photo/06-VIDEOS	06300014.MPvid		1	720	1280	0.966
9	C:/PNE/piege_photo/06-VIDEOS	07020022.MPvid		1	720	1280	0.725
10	C:/PNE/piege_photo/06-VIDEOS	07030023.MPvid		1	720	1280	0.986
11	C:/PNE/piege_photo/06-VIDEOS	07040026.MPvid		1	720	1280	0.948
12	C:/PNE/piege_photo/06-VIDEOS	07040027.MPvid		0	720	1280	0.106
13	C:/PNE/piege_photo/06-VIDEOS	07050030.MPvid		1	720	1280	0.983
14	C:/PNE/piege_photo/06-VIDEOS	07070036.MPvid		1	720	1280	0.313
15	C:/PNE/piege_photo/06-VIDEOS	07070038.MPvid		0	720	1280	0.182
16	C:/PNE/piege_photo/06-VIDEOS	07080039.MPvid		1	720	1280	0.41
17	C:/PNE/piege_photo/06-VIDEOS	07150069.MPvid		1	720	1280	0.948
18	C:/PNE/piege_photo/06-VIDEOS	07150070.MPvid		1	720	1280	0.962
19	C:/PNE/piege_photo/06-VIDEOS	07240094.MPvid		1	720	1280	0.342
20							
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41							

results_files

Feuille 1 sur 1 Par défaut Français (France) Moyenne : Somme: 0 100 %

results_detections.csv — LibreOffice Calc

Fichier Édition Affichage Insertion Format Styles Feuille Données Outils Fenêtre Aide

Liberation Sans 10 pt

A **B** **C** **D** **E** **F** **G** **H** **I**

	A	B	C	D	E	F	G	H	I
1	absolute_path	relative_path	data_type	label	confidence	human_verified	bbox_left	bbox_top	bbox_right
2	C:/PNE/piege_photo/06-VIDEOS	06300008.MPvid		animal	0.341	False	518		
3	C:/PNE/piege_photo/06-VIDEOS	06300009.MPvid		person	0.636	False	0		
4	C:/PNE/piege_photo/06-VIDEOS	06300010.MPvid		person	0.953	False	146		
5	C:/PNE/piege_photo/06-VIDEOS	06300014.MPvid		animal	0.966	False	619		
6	C:/PNE/piege_photo/06-VIDEOS	07020022.MPvid		animal	0.725	False	420		
7	C:/PNE/piege_photo/06-VIDEOS	07030023.MPvid		animal	0.986	False	0		
8	C:/PNE/piege_photo/06-VIDEOS	07040026.MPvid		animal	0.948	False	1		
9	C:/PNE/piege_photo/06-VIDEOS	07050030.MPvid		animal	0.983	False	469		
10	C:/PNE/piege_photo/06-VIDEOS	07070036.MPvid		animal	0.313	False	381		
11	C:/PNE/piege_photo/06-VIDEOS	07080039.MPvid		animal	0.41	False	1204		
12	C:/PNE/piege_photo/06-VIDEOS	07150069.MPvid		animal	0.948	False	800		
13	C:/PNE/piege_photo/06-VIDEOS	07150070.MPvid		animal	0.962	False	421		
14	C:/PNE/piege_photo/06-VIDEOS	07240094.MPvid		animal	0.342	False	1		
15									
16									
17									

results_detections

Feuille 1 sur 1 Par défaut Français (France) Moyenne : Somme: 0 100 %

06-VIDEOS

piege_photo > 06-VIDEOS >

Rechercher dar

Nouveau

Musique

Vidéos

addaxai_spec

PREZ

addaxai_spec

05-Sendero_

Ce PC

21 élément(s) 1 élément sélectionné

C:\PNE\piege_photo\06--Sendero_Catarata_2022_Julio-2-VIDEOS

Megadetector accuracy

The screenshot shows the ScienceDirect article page for 'Human vs. machine: Detecting wildlife in camera trap images' by Scott Leorna and Todd Brinkman. The page includes a left sidebar with navigation links (Outline, Highlights, Abstract, Keywords, 1. Introduction, 2. Methods, 3. Results, 4. Discussion, 5. Conclusions, Data availability, Declaration of Competing Interest, Acknowledgements, Appendix A. Appendix, Data availability, References, Show full outline, Cited by (36)), a top navigation bar with search and account options, and a right sidebar with recommended articles and article metrics. The main content area displays the article title, authors, DOI, and a highlights section.

ScienceDirect Journals & Books ? Help Search My account Sign in

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Outline Highlights Abstract Keywords 1. Introduction 2. Methods 3. Results 4. Discussion 5. Conclusions Data availability Declaration of Competing Interest Acknowledgements Appendix A. Appendix Data availability References Show full outline Cited by (36)

ELSEVIER Ecological Informatics Volume 72, December 2022, 101876

Human vs. machine: Detecting wildlife in camera trap images

Scott Leorna , Todd Brinkman

Show more

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<https://doi.org/10.1016/j.ecoinf.2022.101876> Get rights and content

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Highlights

- Microsoft AI for Earth's MegaDetector automates camera trap image processing.
- MegaDetector detected wildlife with ~95% accuracy in motion-triggered images.
- Human review outperformed MegaDetector for wildlife captured in time-lapse images.

Recommended articles

AnimalFinder: A semi-automated system for animal detection in time-lapse camera...
Ecological Informatics, Volume 36, 2016, pp. 145-151
Jennifer L. Price Tack, ..., James B. Grand

Zilong: A tool to identify empty images in camera-trap data
Ecological Informatics, Volume 55, 2020, Article 101021
Weideng Wei, ..., Jing Li

Motion vectors and deep neural networks for video camera traps
Ecological Informatics, Volume 69, 2022, Article 101657
Miklas Riechmann, ..., Stefan Rueger

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Article Metrics

Citations

Citation Indexes 35

Captures

Mendeley Readers FEEDBACK

Compared to image labels determined by manual human review, we found MegaDetector reliably determined the presence or absence of wildlife in images generated by motion detection camera settings ($\geq 94.6\%$ accuracy), however, performance was substantially poorer for images collected with time-lapse camera settings ($\leq 61.6\%$ accuracy).

Megadetector accuracy

www.sciencedirect.com/science/article/pii/S2351989422001068

View PDF Download full issue

Search ScienceDirect

Outline

Highlights

Abstract

Keywords

Abbreviations

1. Introduction

2. Methods

3. Results

4. Discussion

Funding Statement

Ethical Standards

CRediT authorship contribution statement

Declaration of Competing Interest

Acknowledgements

Appendix A. Supplementary material

Data Availability

References

Show full outline

Cited by (68)

Use of object detection in camera trap image identification: Assessing a method to rapidly and accurately classify human and animal detections for research and application in recreation ecology

Mitchell Fennell, Christopher Beirne, A. Cole Burton

Show more

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<https://doi.org/10.1016/j.gecco.2022.e02104>

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Article Metrics

Citations

Citation Indexes	68
Policy Citations	1

Captures

Mendeley Readers	138
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PLUMX View details

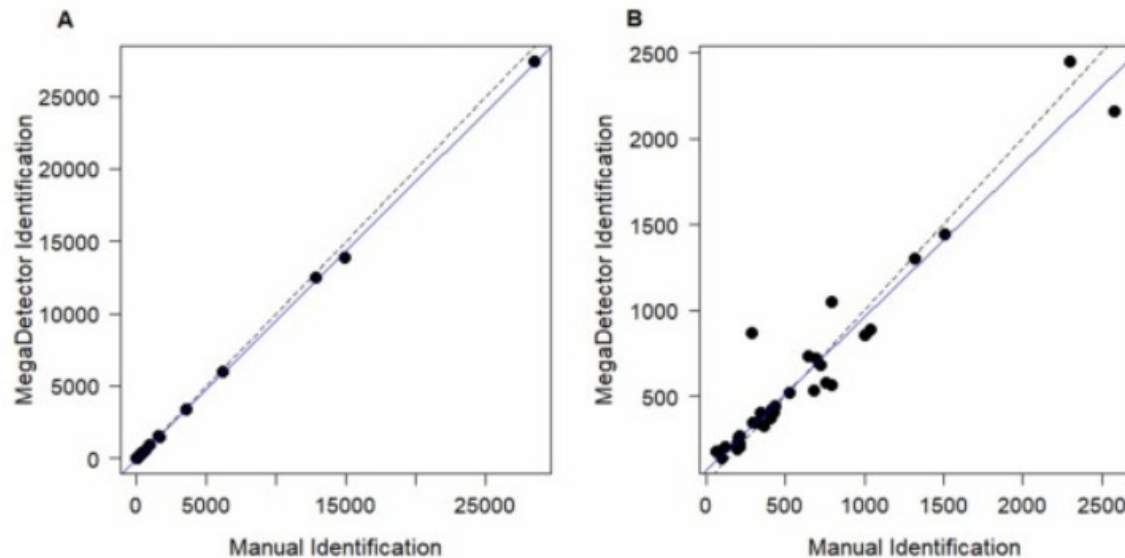
Highlights

- Object detection can increase the efficiency of camera trap image classification.
- We found an increase in efficiency of 500% over manual labeling.
- Object detection can also be used to anonymize human images from camera traps.
- We provide an example of the application of these tools to ease data processing.

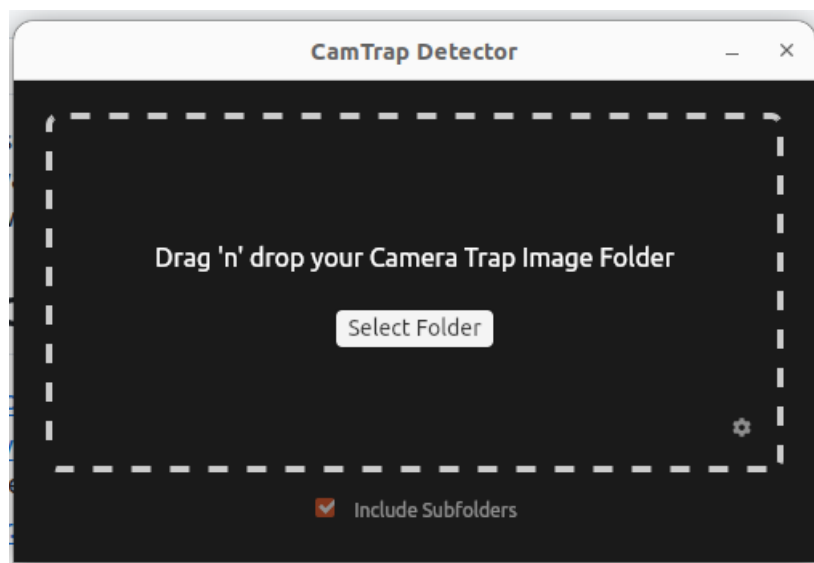
FEEDBACK

Megadetector vs Manual identification

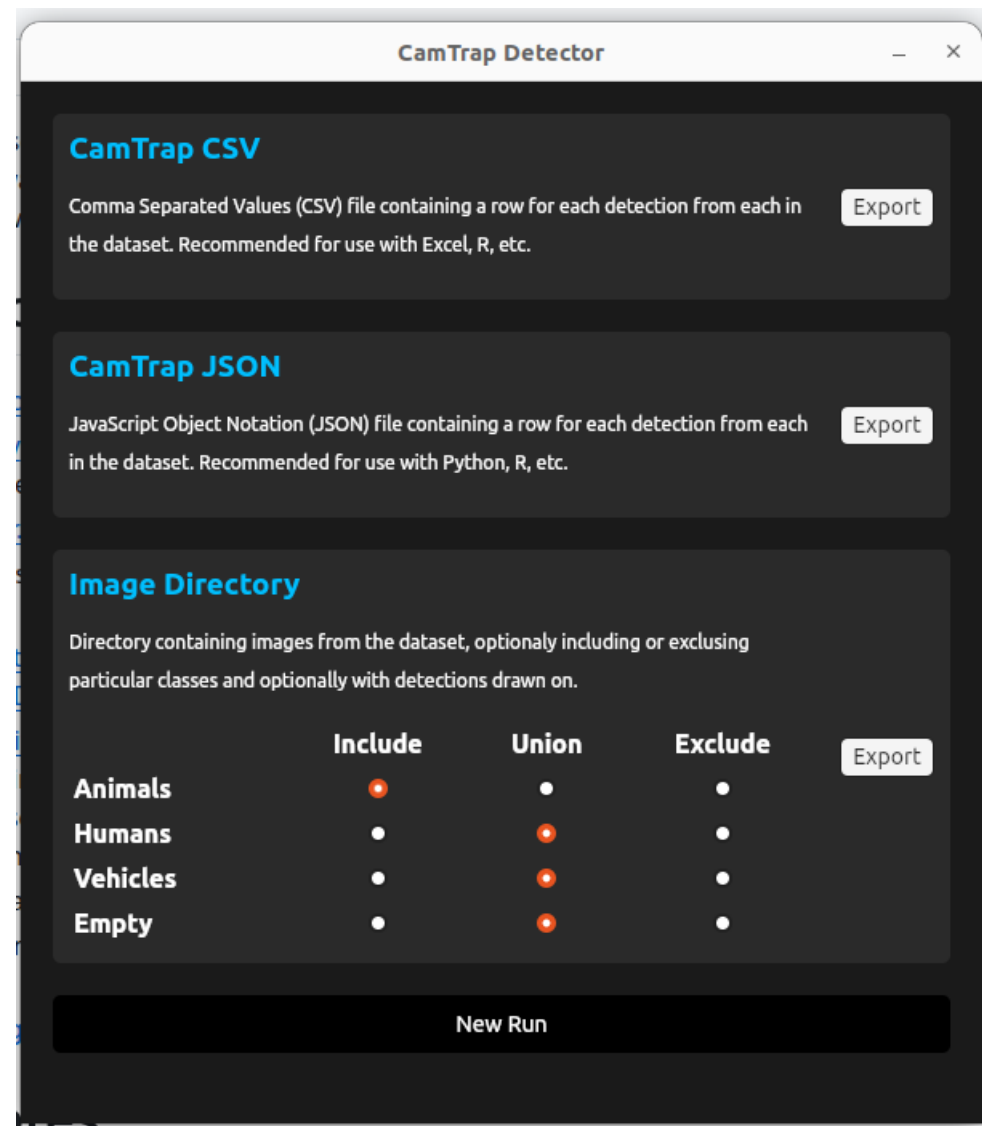
A				B			
		Manual				Manual	
		Human	No Human			Animal	No Animal
MegaDetector	Human	70,275 (94.70%)	617 (0.70%)	MegaDetector	Animal	17,654 (92.30%)	4005 (2.90%)
	No	3915 (5.30%)	84,465 (99.30%)		No	1466 (7.70%)	136,125 (97.10%)
	Human				Animal		



CamTrap Detector



	A	B	C	D	E	F	G	H	I	J	
1	file	error	image_width	image_height	x	y	width	height	category	confidence	
2	03120774.JPG								Empty		
3	08100774.JPG		4624	3468	0	598	367	808	Animal	0.11014358	
4	EK002475.JPG		3264	2448	384	1022	602	1320	Animal	0.11430959	
5	06040554.JPG		4624	3468	3280	1193	962	1064	Animal	0.39744553	
6	08100775.JPG								Empty		
7	EK002476.JPG		3264	2448	504	778	612	1575	Animal	0.13982551	
8	06040555.JPG		4624	3468	2555	1369	1135	1594	Animal	0.14528395	
9	EK002505.JPG		3264	2448	2705	569	558	822	Animal	0.10600309	
10	EK002474.JPG		3264	2448	388	1265	983	1072	Animal	0.32564476	
11	08100773.JPG		4624	3468	41	815	1665	1608	Animal	0.103108846	
12	06040556.JPG		4624	3468	934	1876	1927	1459	Animal	0.10098819	
13	03120775.JPG								Empty		
14	05310364.JPG		4624	3468	564	2332	2128	1006	Animal	0.30462396	
15	05310363.JPG		4624	3468	2204	1603	1225	1572	Animal	0.13567246	
16	08100771.JPG		4624	3468	2000	1243	2626	2082	Animal	0.3800425	
17	EK002504.JPG		3264	2448	3169	732	94	713	Animal	0.1032334	
18	08100772.JPG		4624	3468	1148	909	2133	2415	Animal	0.15662739	
19	05310362.JPG		4624	3468	3274	1277	944	1120	Animal	0.13662386	
20											
21											



Timelapse



Timelapse
from camera trap images to data

Home Download Learn ▼ FAQ More ▼ About Contact

Timelapse

Camera traps, remote cameras, field cameras and wildlife cameras are cameras strategically located in the field. They all capture activity at the camera's location over time. Each camera automatically takes an image or video at pre-set time intervals or through motion triggering. A set of cameras can easily collect thousands to millions of images.

The analyst's task. After retrieving the cameras' contents, analysts visually examine each image or video to turn it into data. Ecologists, for example, count and describe wildlife in the scene and conditions of interest (e.g., people, wildlife, weather).

The problem is that visually analyzing and encoding data from this multitude of images and videos is a painful process.

Timelapse is a free software application that helps scientists do this last visual analysis and encoding step as efficiently as possible.

What Timelapse Offers

- ✓ You define your own custom data fields to turn your images to the data you need.
- ✓ Your images can be jpeg or video files or both
- ✓ You add images as they are collected over time from any remote camera; Timelapse *automatically extracts file information* including dates, file names and file location.
- ✓ You automatically populate your fields with image metadata of your choosing.
- ✓ You efficiently inspect images through rapid image navigation, by viewing multiple images at a time, by examining details using zooming or a magnifying glass, by image enhancement, and others.
- ✓ You tailor your own efficient workflow by mixing and matching the many Timelapse facilities supporting bulk and repetitive data entry.

Timelapse

Timelapse: Helping You Analyze Images and Videos (TimelapseData.ddb)

File Edit Options View Select Sort Recognitions Window Help

Image data (All files selected)

File: IMG_033.jpg RelativePath: Station1\Deployment1a DateTime: 04-Jun-2015 07:41:51 Species: elk

Count: 1 Sequence: 6:6|7 Temperature: 15 Problem: Comment: Female

Analyst: Saul Publicity? ☒ Dark? ☐ Empty? ☐ People? ☐ Wildlife? ☒ Delete? ☐

Copy previous values

Instructions View images

2015-06-04 07:41:53 AM SPS 1M 3/3 Duplicate: 1/2

animal 97

File: 33 of 422 Select: All files Sorted by: RelativePath then by Date/Time

Quick Paste

New QuickPaste: creates a new entry
Click or shortcut key: paste entry into data fields
Right click: edit or delete the entry

New QuickPaste...

Elk-1	ctrl-1
Bear-1	ctrl-2
Deer-1	ctrl-3
Comment: Female	ctrl-4
Comment: Male	ctrl-5

Data table

Displays the contents of the database, including changes as they occur.
The highlight row indicates the currently viewed file

Id	File	RelativePath	DateTime	img_speci
29	IMG_029.jpg	Station1\Deployment1a	2015-06-04 07:41:45	
30	IMG_030.jpg	Station1\Deployment1a	2015-06-04 07:41:46	
31	IMG_031.jpg	Station1\Deployment1a	2015-06-04 07:41:49	
32	IMG_032.jpg	Station1\Deployment1a	2015-06-04 07:41:50	
33	IMG_033.jpg	Station1\Deployment1a	2015-06-04 07:41:51	elk
422	IMG_033.jpg	Station1\Deployment1a	2015-06-04 07:41:51	
34	IMG_034.jpg	Station1\Deployment1a	2015-06-04 15:37:13	
35	IMG_035.jpg	Station1\Deployment1a	2015-06-04 15:37:14	
36	IMG_036.jpg	Station1\Deployment1a	2015-06-04 15:37:15	

Folder data

Folder data instructions Project Station Deployment

Folder: Station1

Station Name: Station1 The station name, pre

Latitude: 0.3457 The latitude of the stz

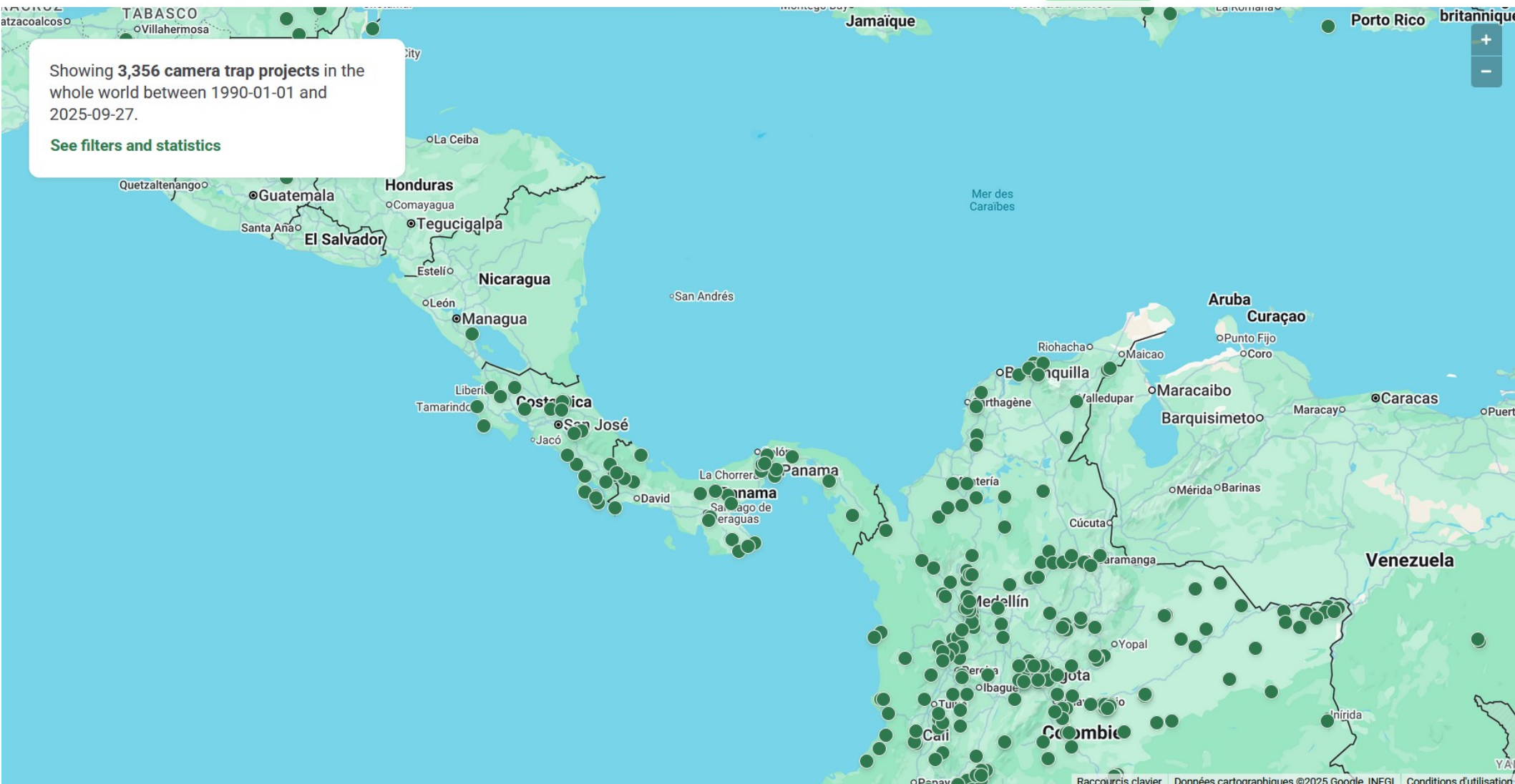
Longitude: -1.2543 The longitude of the s

Location Comments: Meadow by roadway Describe any relevant

Wildlife Insight

[Explore Data](#)[Settings](#) ▼[Sign in](#)

Showing 3,356 camera trap projects in the whole world between 1990-01-01 and 2025-09-27.

[See filters and statistics](#)

<https://app.wildlifeinsights.org/explore>

Parc national des Ecrins

65

Wildlife Insight



exclosure

Exclosure Monitoring

Osa_Conservation

17

Species



26,134

Total images



9,461

Wildlife images



24

Cameras



31

Camera deployments



Identified species

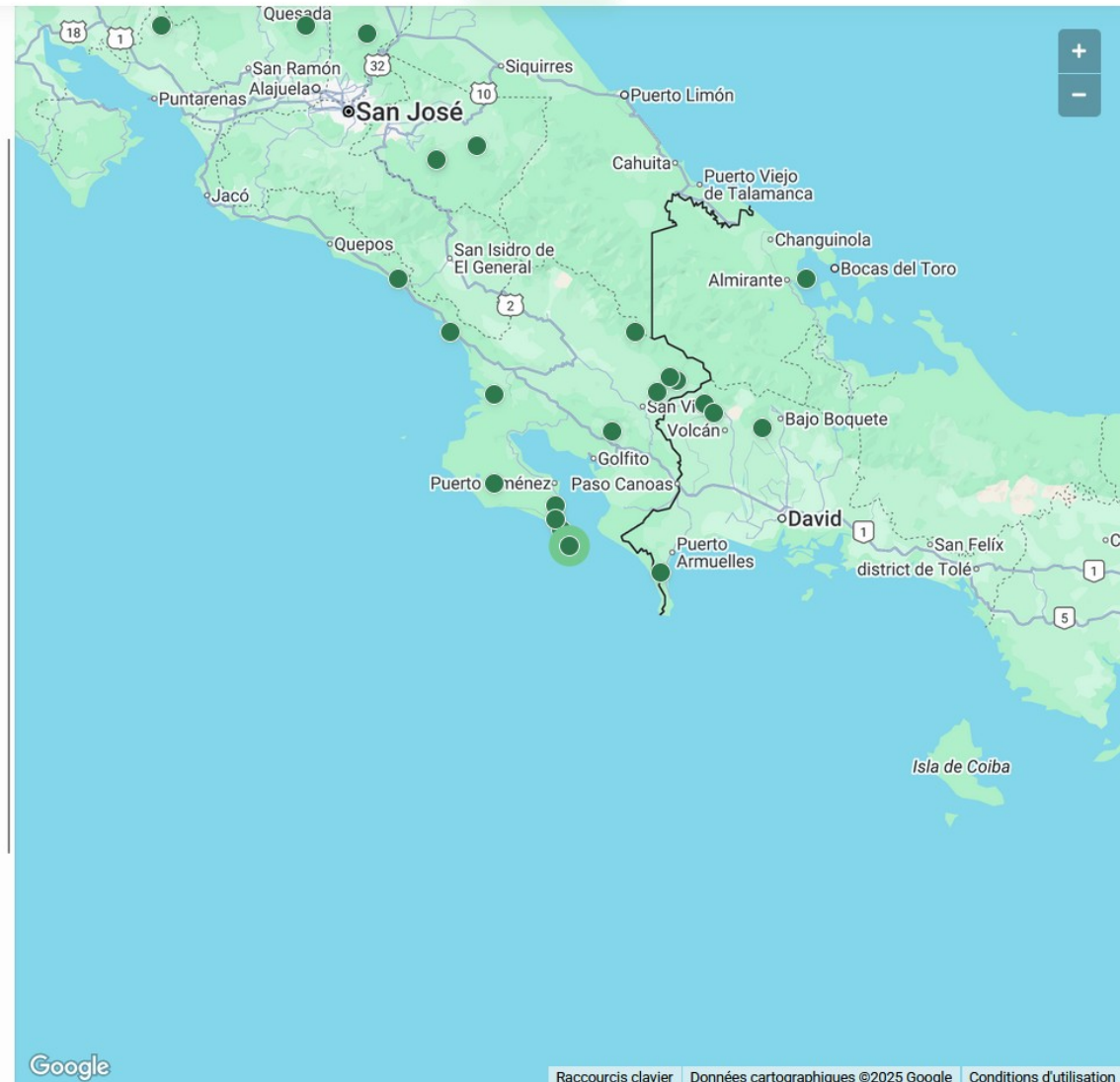
Count of images per species



Explore Data

Settings ▼

Sign in



Attendance / Frequentation



Technologies &
architecture



Mars 2024

Technologies



Pour analyser et extraire des données nous utilisons le modèle d'intelligence artificielle YOLOv8 de Ultralytics. Ce dernier est séparé en deux modèles distincts, "Detect" et "Pose". Pour la version "detect" nous avons utilisé la version entraîné sur le dataset OpenImageV7.



Brut

Photo brute prise par un piège photo.



YoloV8-detect

Photo analysée par le modèle de détection, permet de compter les animaux, les humains, estimer leurs âges et détecter leurs équipements.



YoloV8-pose

Photo analysée par le modèle de pose, permet de situer les articulations des humains, grâce à ses données nous estimons le sens de passage de ces derniers.

Attendance / Frequentation



Technologies &
architecture



Mars 2024

CLIP

CLIP est un réseau de neurones qui apprend efficacement les concepts visuels de la supervision du langage naturel. CLIP peut être appliqué en fournissant simplement les noms des catégories visuelles à reconnaître.

Sexe =
"man", "women"

Age =
children", "adolescent", "adult", "senior"

Activité =
"it's a hiker", "it's a skier", "it's a bicyclist"

+



=

```
sexe = [1,0]  
age = [0,0,1,0]  
activite = [1,0,0]
```

=

An adult man hiking

Attendance / Frequentation

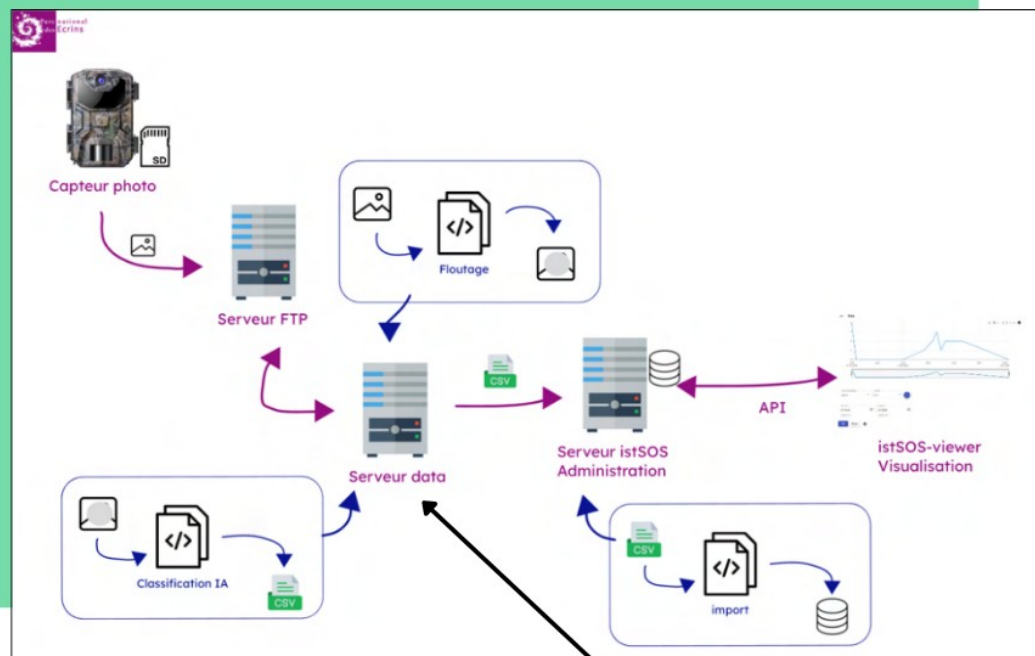


Technologies &
architecture



Mars 2024

Architecture



Les capteurs photo prennent des clichés au cours du temps

Les cartes SD sont récoltées manuellement et leurs données mise en ligne sur un serveur FTP

Nous intervenons sur le **serveur data** qui récupère les images et les floutent et les analyse grâce au modèle pour ensuite sortir un CSV

Ce dernier est envoyé au serveur istSOS permettant la visualisation des données

Attendance / Frequentation



Réalisations
techniques



Mars 2024

Modèle Pose

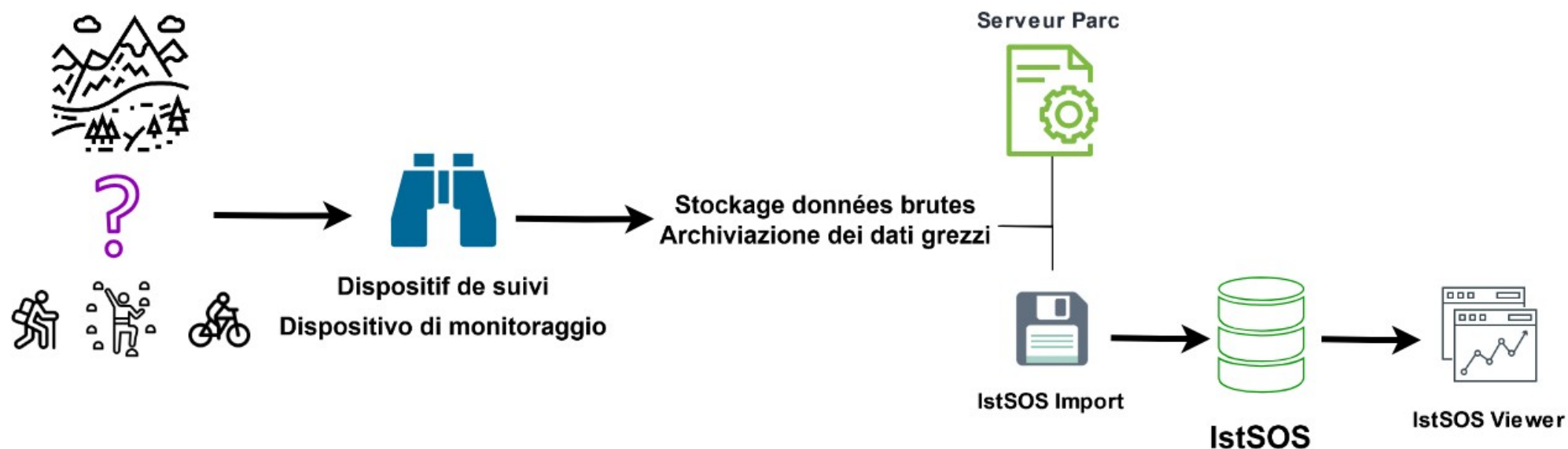
person	right	down
3.0	2.0	1.0



person	left
1.0	1.0



Attendance / Frequentation



Database Service provider Service identification Coordinates system MQTT Publisher GetObservation Configuration Proxy Configuration Offerings Procedures Virtual Procedures New procedure Observed properties Units of measures Data quality

frequency > Edit procedure Submit

Procedure:

General info

Sensor ID: 07391944096511efb420200090504e

Name: EcocompteurCrevasses

Description: Ecocompteur dalle sur le Sentier des Crevasses

Keywords: EcocompteurCrevasses

Classification

System type: instu-fixed-point

Sensor Type: Ecocompteur_dalle

Location

FOI name: ecocompteurcrevasses

EPSG: 4326

Coordinates: X: Y: Z:

Outputs

Name	Description	Definition	Uom	From	To	List
person		um:sgc:del:parameter>istoss:1.0:person	null			

Optional parameters:

Contacts (optional)

File import

Service

Procedure

EcocompteurCrevasses

Parcourir... Aucun fichier sélectionné.

File separator

,

Time zone (if date column don't specify it)

Europe/Paris

Mail (for import report)

Upload

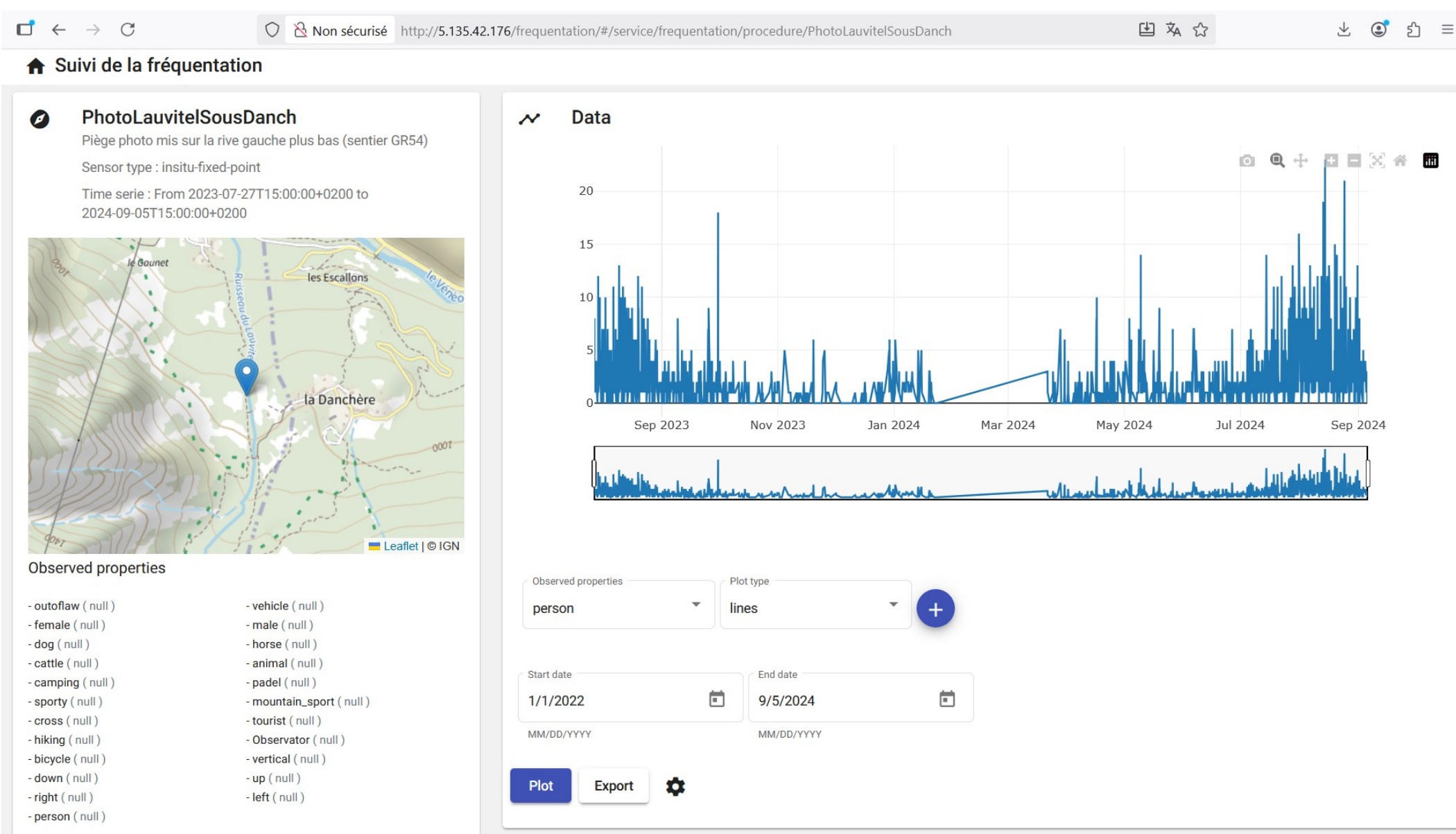
Attendance / Frequentation

Non sécurisé http://5.135.42.176/frequentation/#/

🏠 Suivi de la fréquentation

EcocompteurTaillefer		
EcocompteurTourond		
EcocompteurVallonRabioux		
EcocompteurValsenestre		
PhotoAigle		
PhotoGraviere		
PhotoLauvitelEcocompteur		
PhotoLauvitelRiveDroite		
PhotoLauvitelSousDanch		
PhotoLauvtielRiveGauche		
PhotoPrechaumette		
PhotoPreMmeCarle		
PhotoTourondCascade		
PhotoTourondEcocompteur		
PhotoTourondRefuge		
RefugePigeonnier		

Attendance / Frequentation





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Zygène de la petite coronille

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