

ITCER Workshop, Oct 11th to 12th 2023



Expert Workshop on GBIF Data Publication in Africa

ITCER research data and ITCER photomonitoring datasets with images

Gerhard Rambold





ITCER:

- Environmental Research
 - Biodiversity → Field, Laboratory
 - Ecology → Field, Laboratory
 - Human health → Field, Laboratory (?)

ITCER:

- Environmental Research

- Field → Samples → Data
- Laboratory → Samples → Data
- Data node → Data publication
- Seminar → Information and outreach
- Video Conferences → Information and outreach
- Journals → Scientific publication

- Biomes in Kenya (examples):
 - Grassland (Savannah)
 - Woodland (Rainforests)



- Biomes in Siaya County (example)



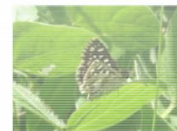
Research and Teaching Activities



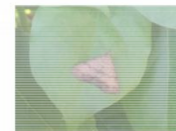
- Monitoring
 - **Vegetation (Plants)**
 - Animals
 - Microbiomes (Fungi, Bacteria)
- Gathering Contextual Data
- Grassland Maintenance Experiments: gathering biomass

Research and Teaching Activities

- Monitoring on defined vegetation plots
 - Alpha diversity of organisms



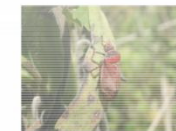
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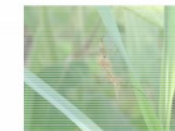
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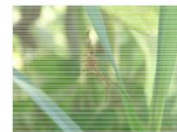
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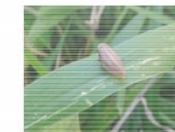
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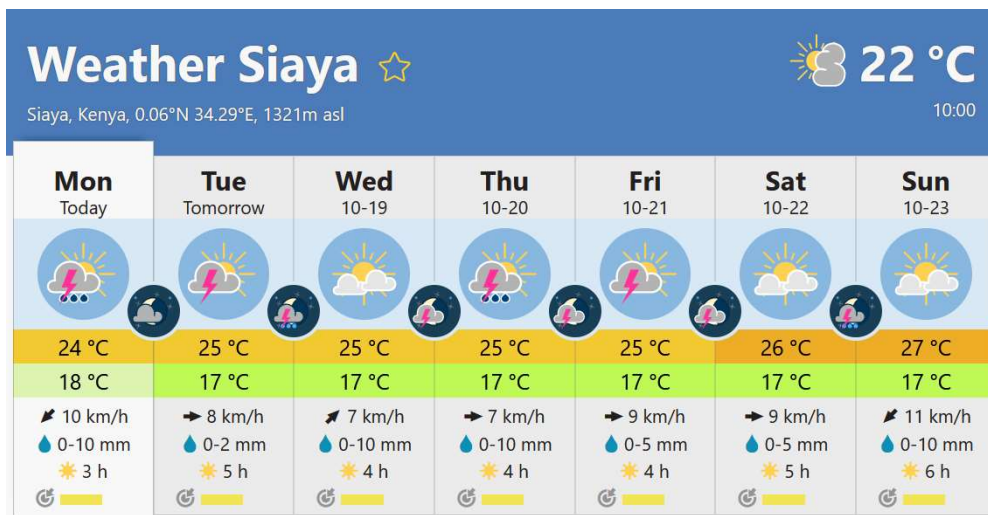
Research and Teaching Activities



- Monitoring
 - **Vegetation (Plants)**
 - **Animals**
 - Microbiomes (Fungi, Bacteria)
- Gathering Contextual Data → Geocoordinates
- Gathering environmental samples

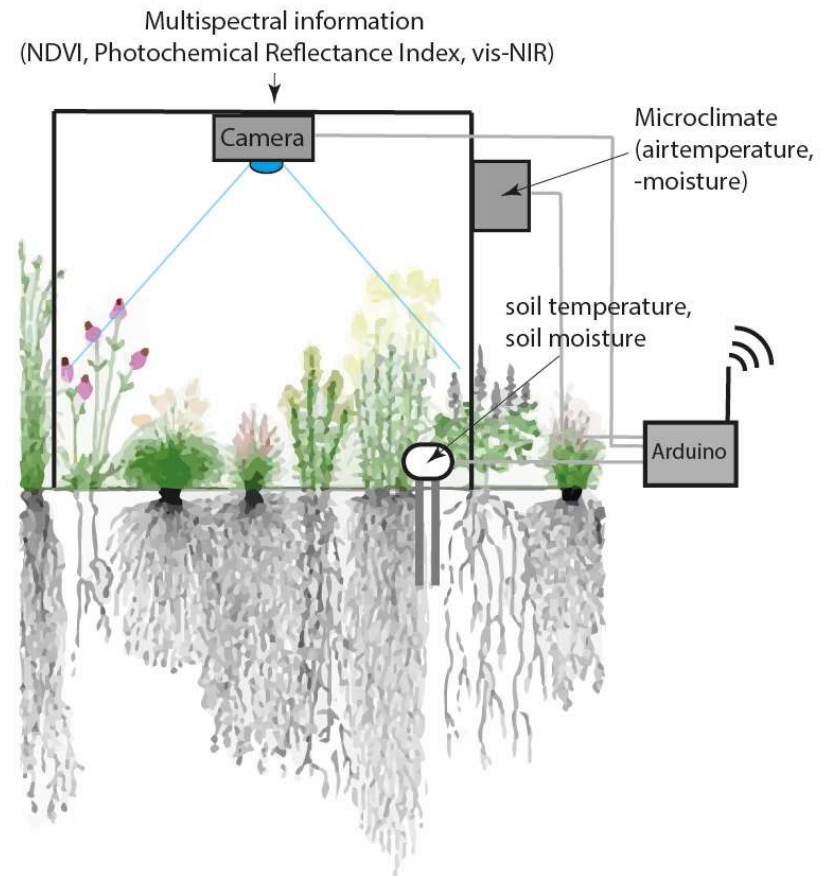
Research and Teaching Activities

- Gathering Contextual Data (Weather Station)



Research and Teaching Activities

- Grassland Maintenance Experiments
 - Monitoring Station
 - Environmental conditions (soil and atmosphere)
 - Vegetation productivity
 - Alpha diversity of plant and animal species



Data Products

- Alpha diversity of organisms on standardised plots
- Storage and transfer of image data



- Biomes:
 - Macrobiome
 - Microbiome

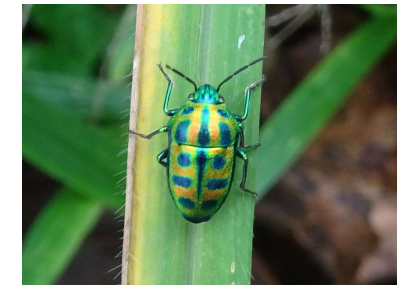
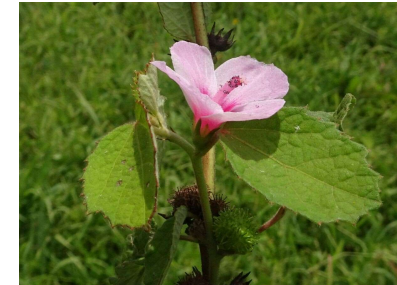


- Biomes:

- Macrobiome

- Plants

- Animals



- Microbiome

- Fungi

- 'Protists'

- Bacteria, Archaea



Research and Teaching Activities

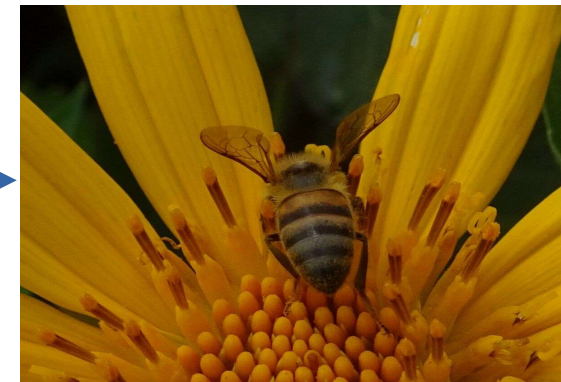


- Data Analysis

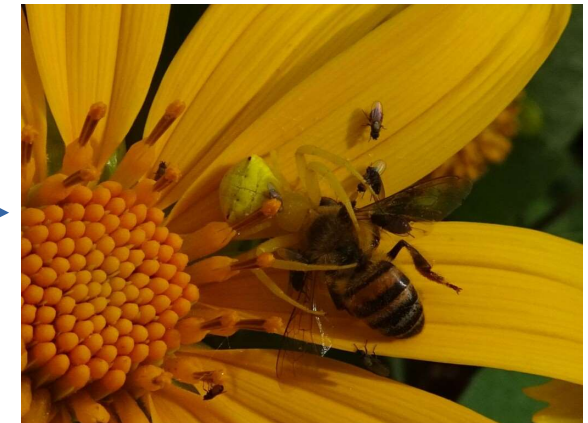
- Species identification by

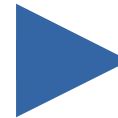
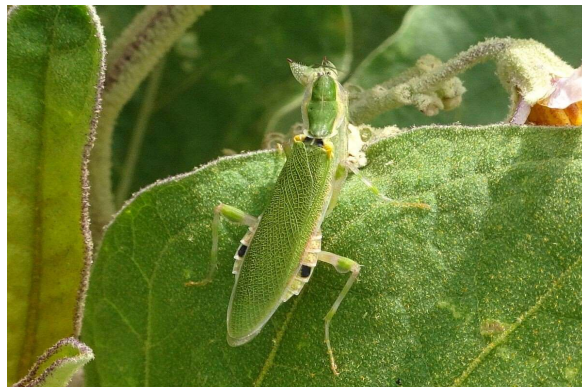
- Macrophenotypic traits (macrophotography)
 - Microphenotypic traits (microphotography of environmental samples)
 - Genotypic traits (DNA species barcoding of environmental samples)

- Interactions
- Networks



- Interactions
- Networks





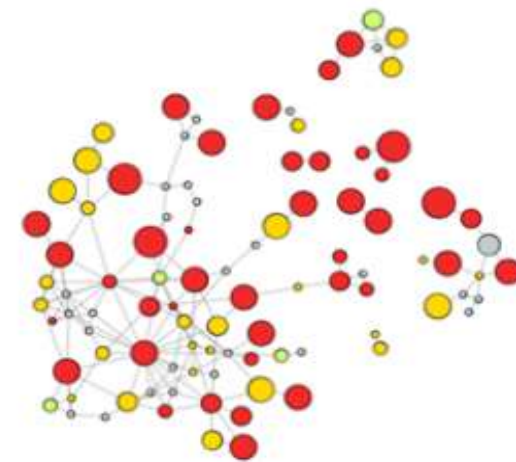
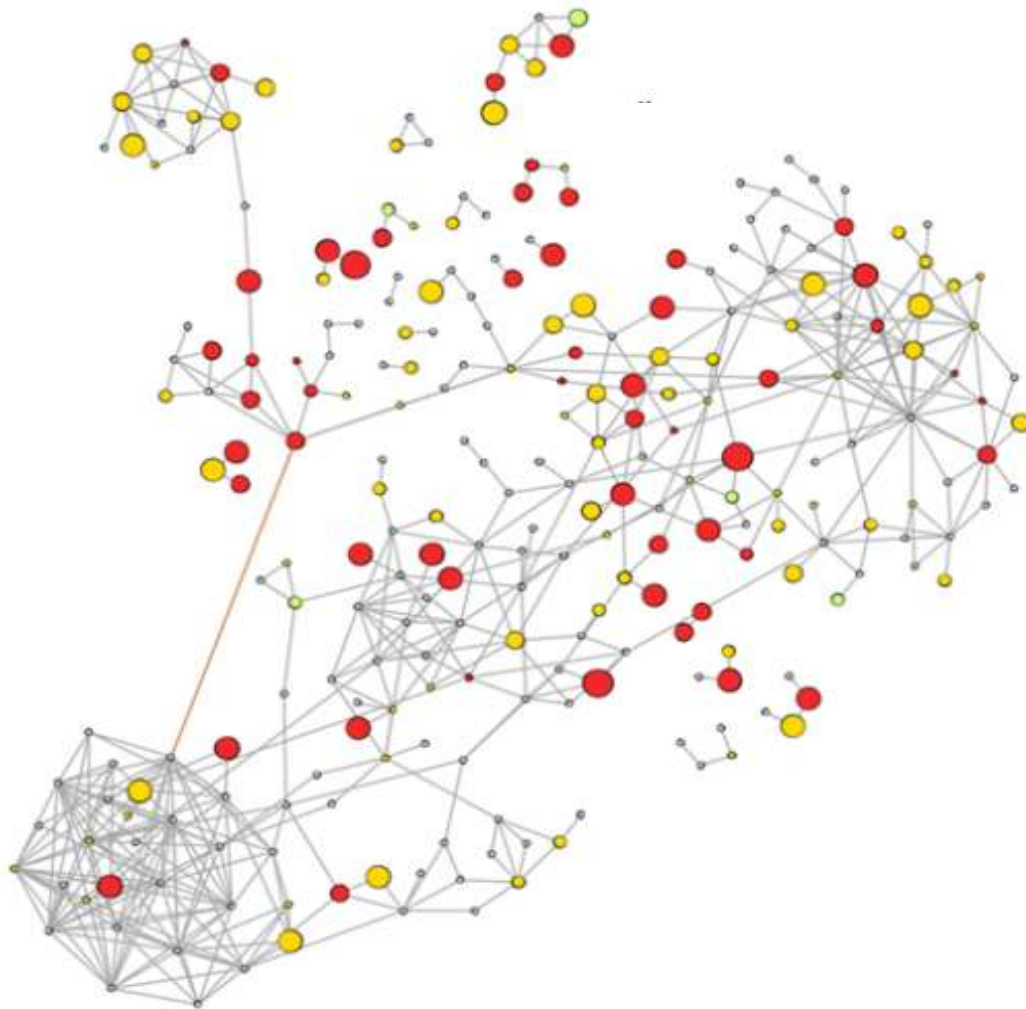
Research and Teaching Activities



- **Data Analysis**

- Network analyses of

- Macrobiome(s) (recording interactions from species photo records)
 - Microbiome(s) (modelling of betadiversity data)



- Interactions
- Networks

Research and Teaching Activities



- Monitoring
 - **Vegetation (Plants)**
 - **Animals**
 - Microbiomes (Fungi, Bacteria)
- Gathering Contextual Data → Geocoordinates
- Gathering environmental samples

Research and Teaching Activities

- Universal Unique Identifier (UUID) and Operation design code (ODC) [optional]

for determination of sample identity and origin

- **Labels** attached to **containers** of environmental **samples**



Research and Teaching Activities



- Data Analysis
 - Species identification by
 - Macrophenotypic traits (macrophotography)
 - Microphenotypic traits (microphotography of environmental samples)
 - Genotypic traits (DNA species barcoding of environmental samples)

Research and Teaching Activities



- Monitoring
 - Vegetation (Plants)
 - Animals
 - **Microbiomes (Fungi, Bacteria)**
- Gathering Contextual Data → Geocoordinates
- Gathering environmental samples

Research and Teaching Activities



- **Data Analysis**

- Alpha- and betadiversity of

- Macrobiome(s) (elementary statistics from species photo records)

- Microbiome(s) (elementary statistics from DNA community barcoding)

Research and Teaching Activities

- Universal Unique Identifier (UUID) and Operation design code (ODC) [optional]

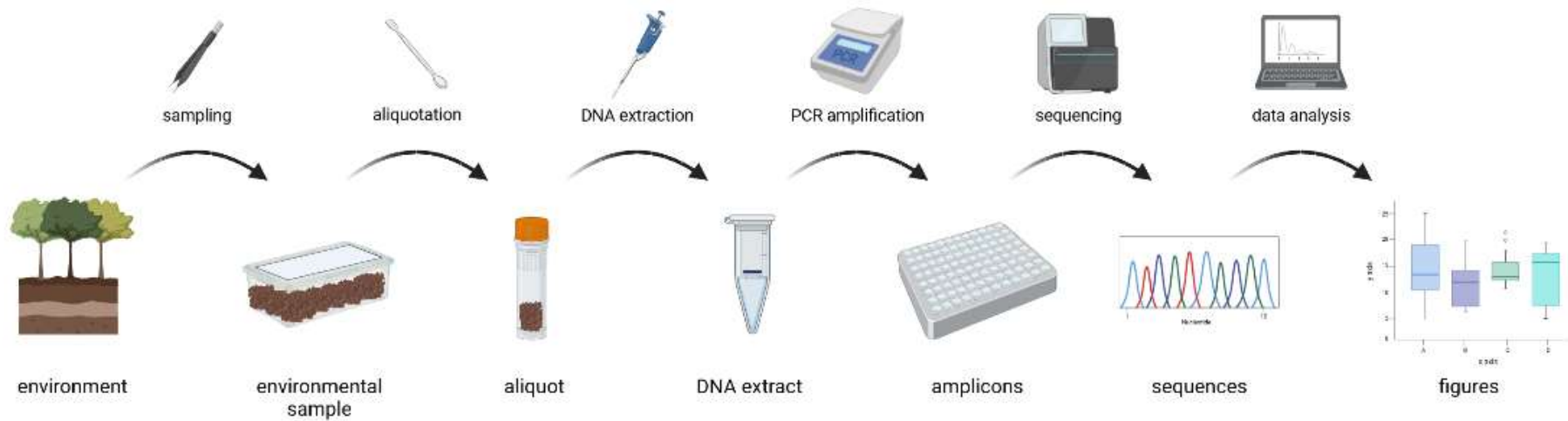
for determination of sample identity and origin

- **Labels** attached to **containers** of environmental **samples**



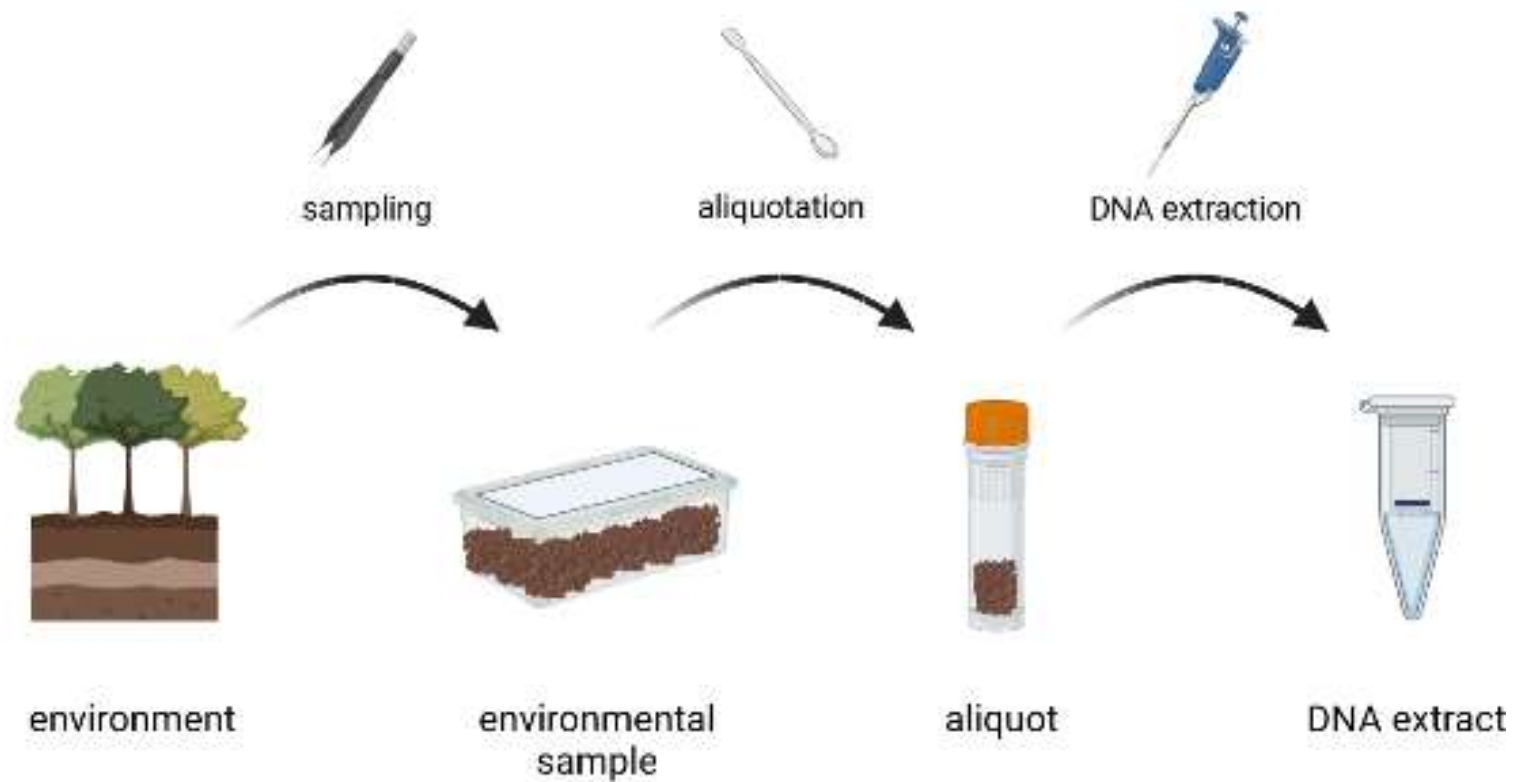
Research and Teaching Activities

- Metabarcoding Workflow Overview



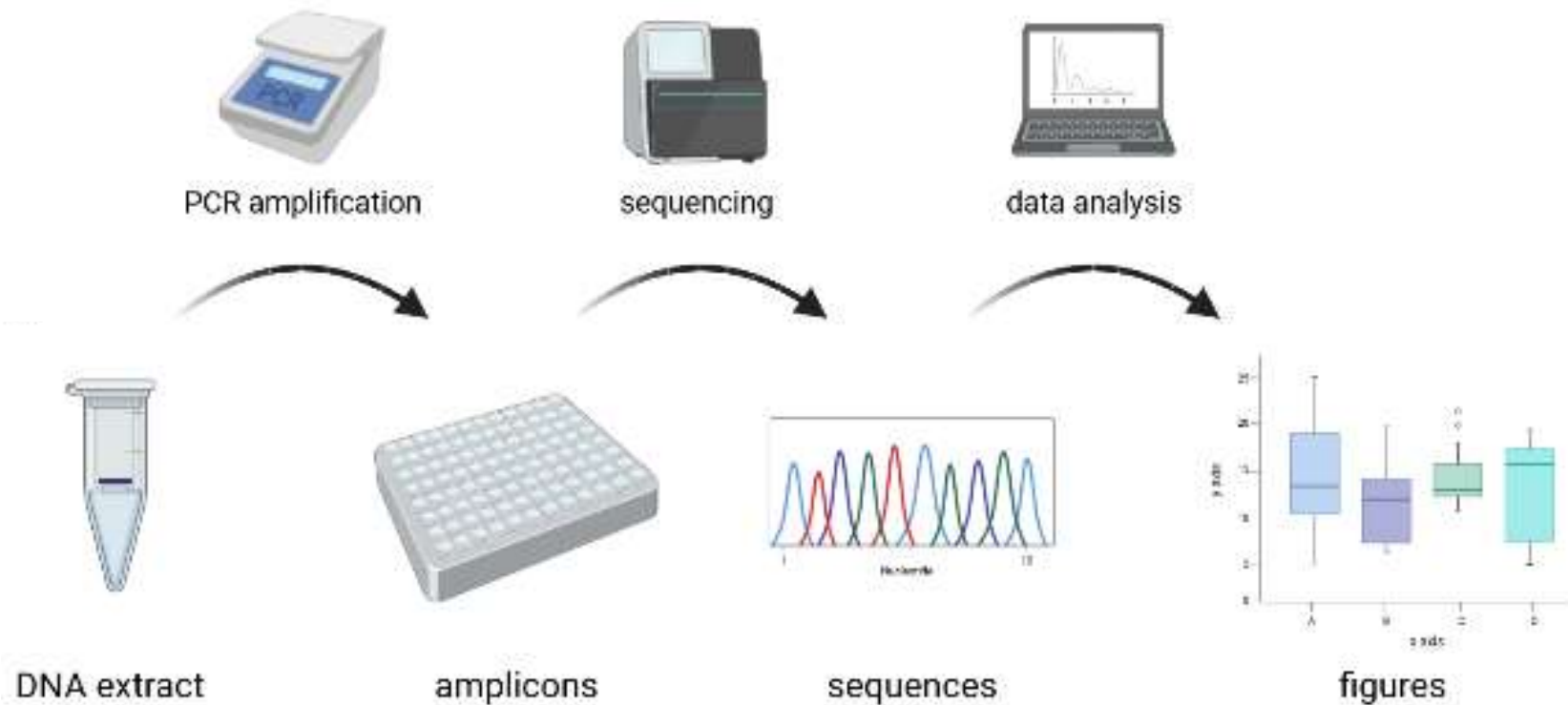
Research and Teaching Activities

- Metabarcoding Workflow Overview



Research and Teaching Activities

- Metabarcoding Workflow Overview



Research and Teaching Activities

- Research objects
 - Siaya township
 - altitude 1200–1300 m ASL
 - dump sites
 - different types of plastic
 - Mycobiomes on/in
 - plastic particles
 - surrounding soil

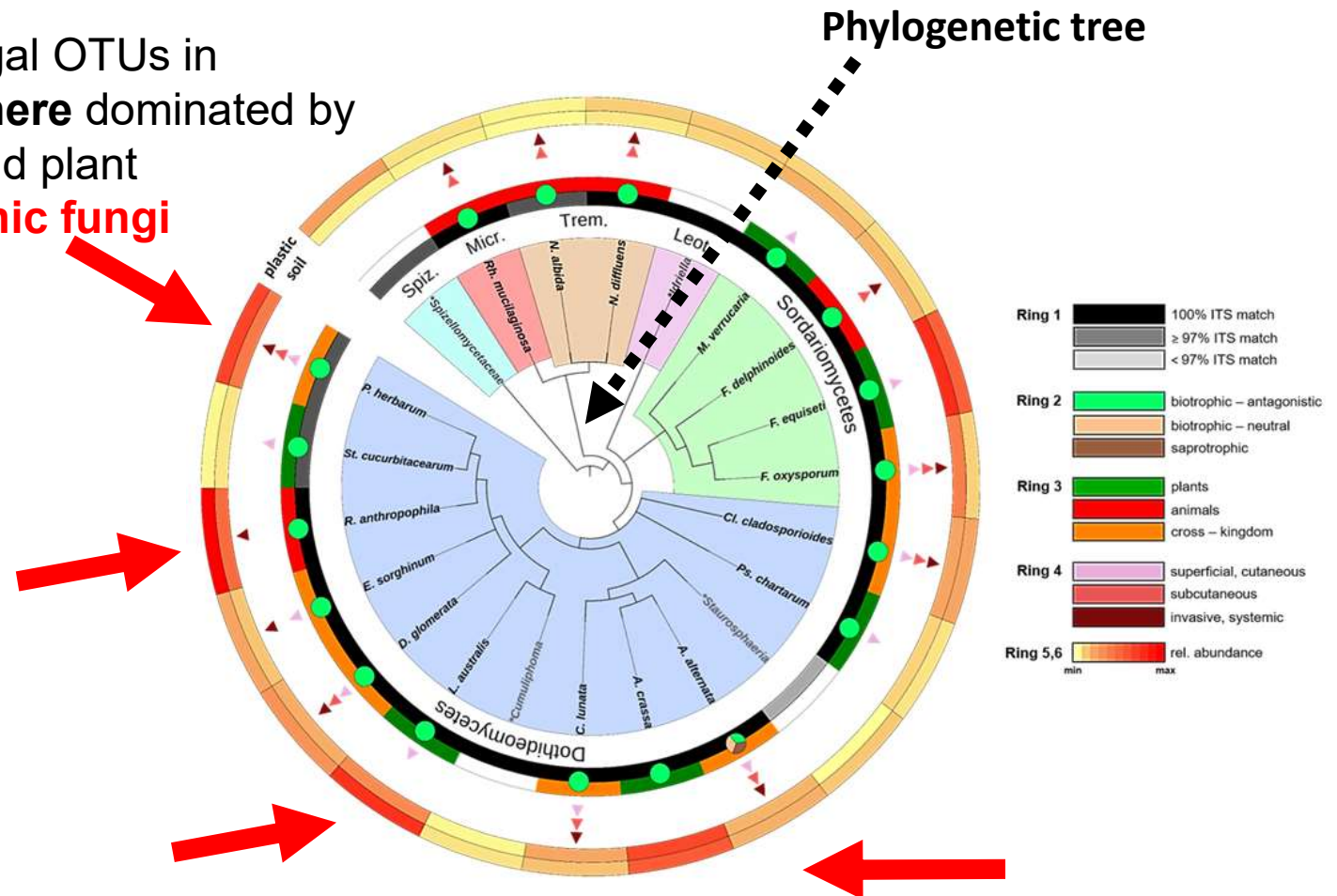


Research and Teaching Activities

- Mycobiomes

- Findings

- Most fungal OTUs in **plastisphere** dominated by animal and plant **pathogenic fungi**



Research and Teaching Activities

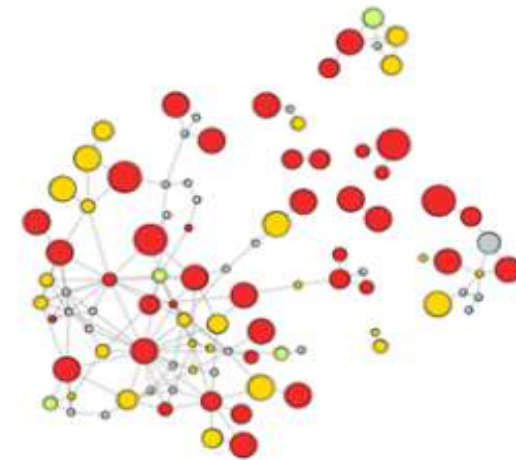
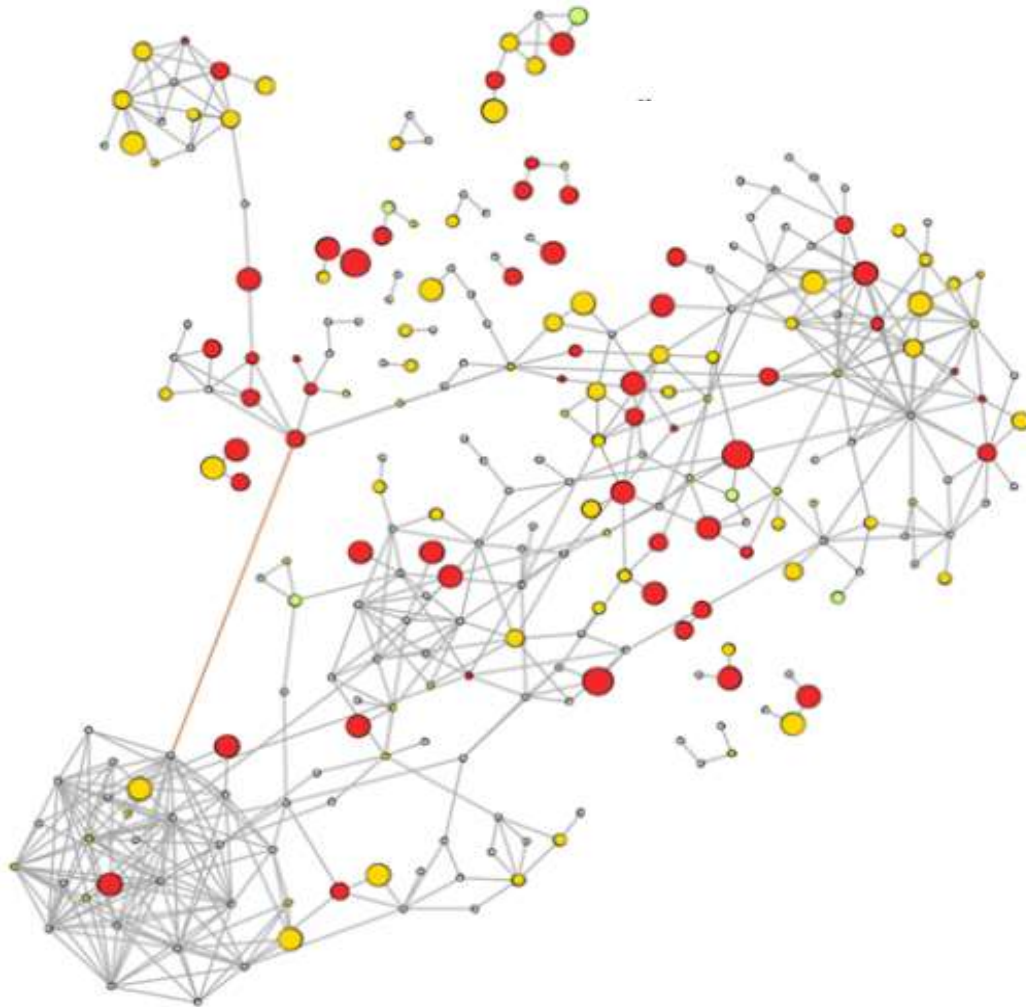


- **Data Analysis**

- Network analyses of

- Macrobiome(s) (recording interactions from species photo records)

- Microbiome(s) (modelling of betadiversity data)



- Interactions
- Networks

Monitoring Data Basics



- Data flow
 - Schema
 - Protocol
 - Physical and digital object locations
 - Plots
 - Databases
 - Image repositories

- Image names from camera



DSC02322.JPG



DSC02323.JPG



DSC02324.JPG



DSC02325.JPG



DSC02327.JPG



DSC02330.JPG



DSC02332.JPG



DSC02345.JPG



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DSC02350.JPG



DSC02351.JPG



DSC02352.JPG



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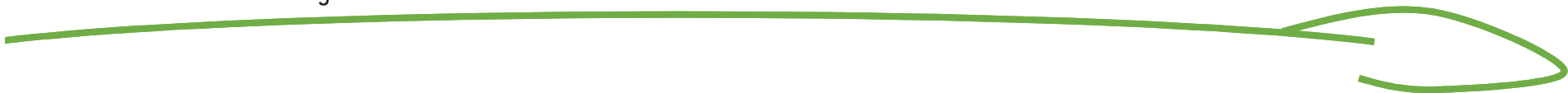


Raw images

Image IDs



Image Repository

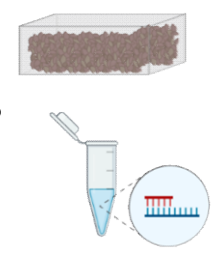


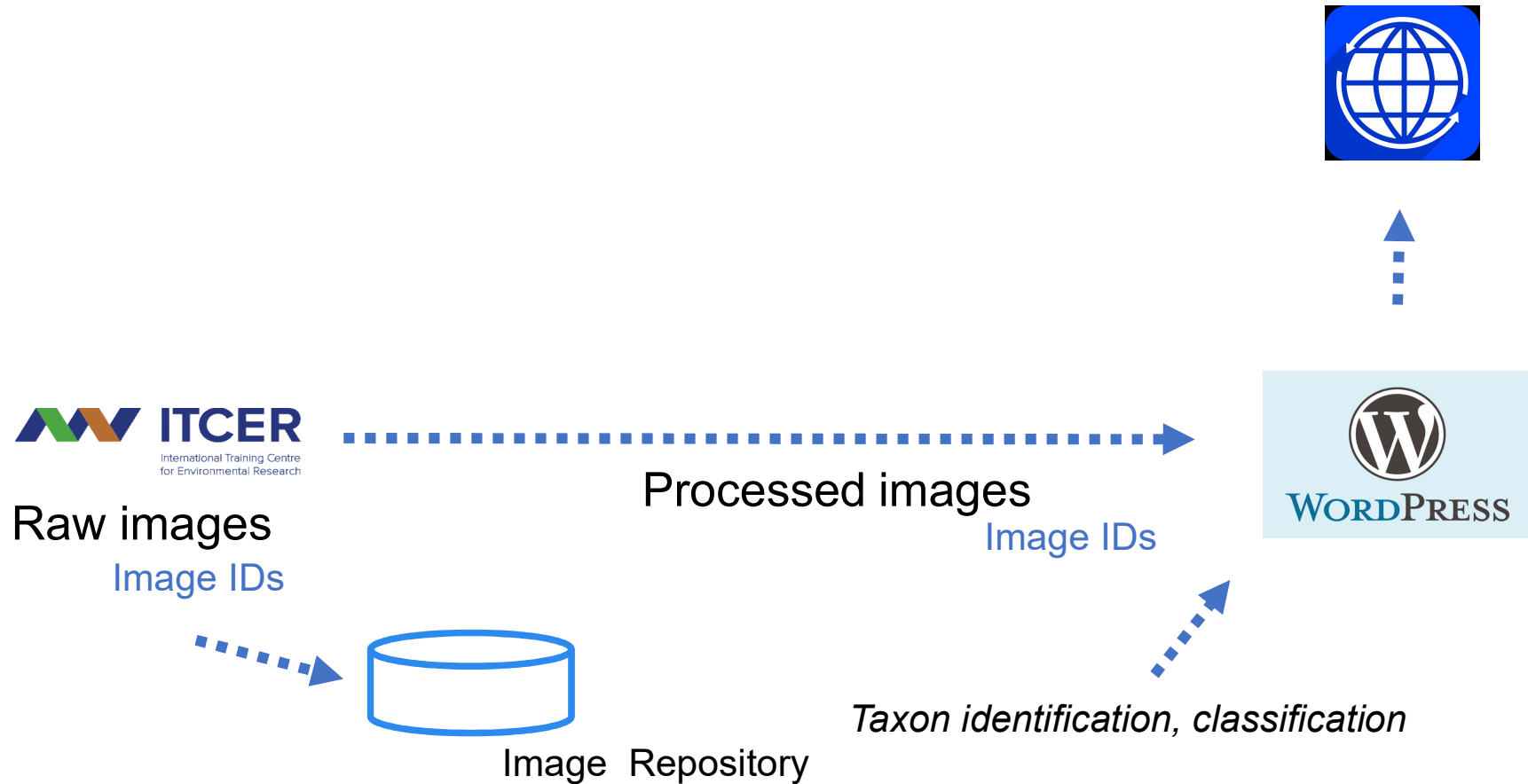
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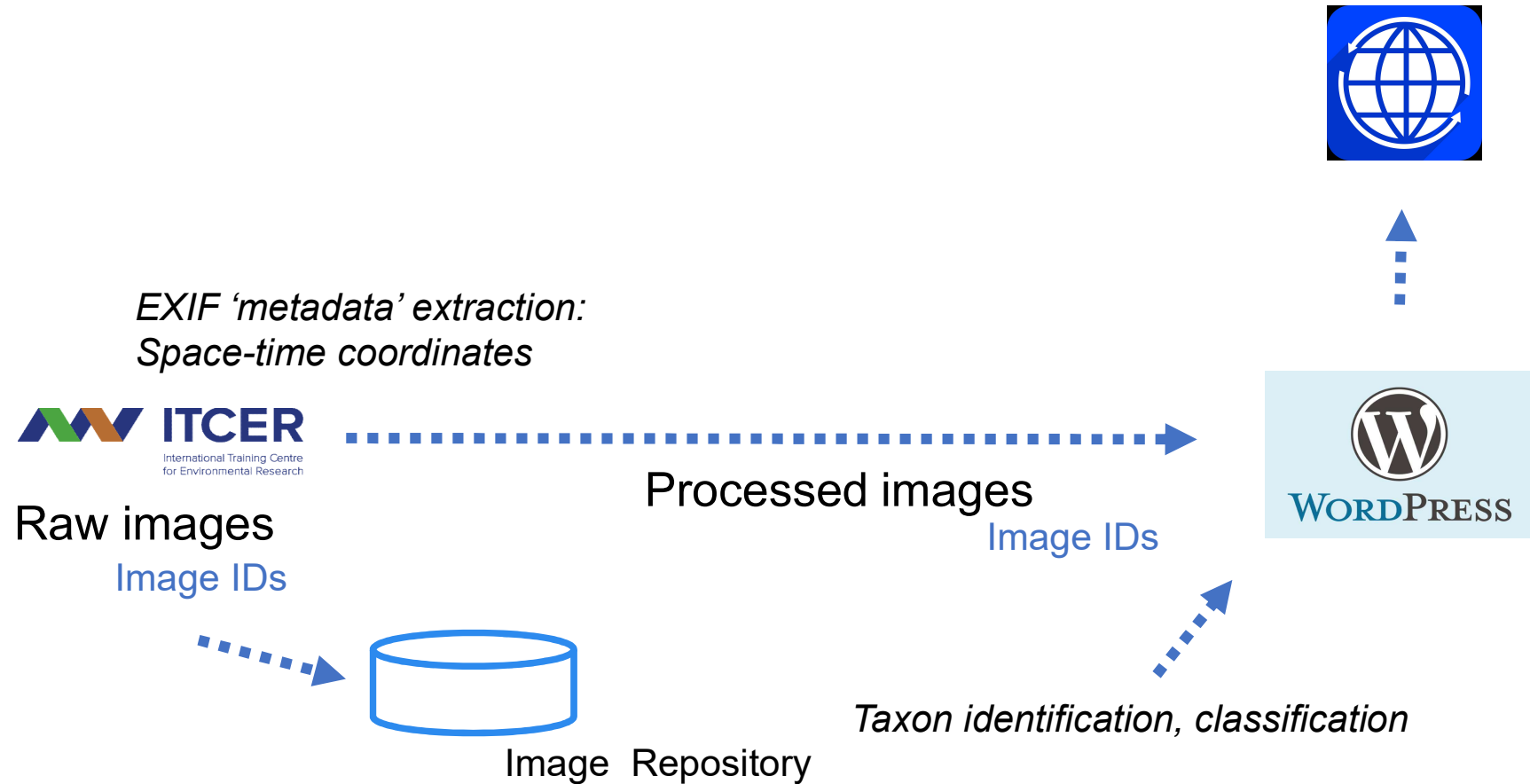


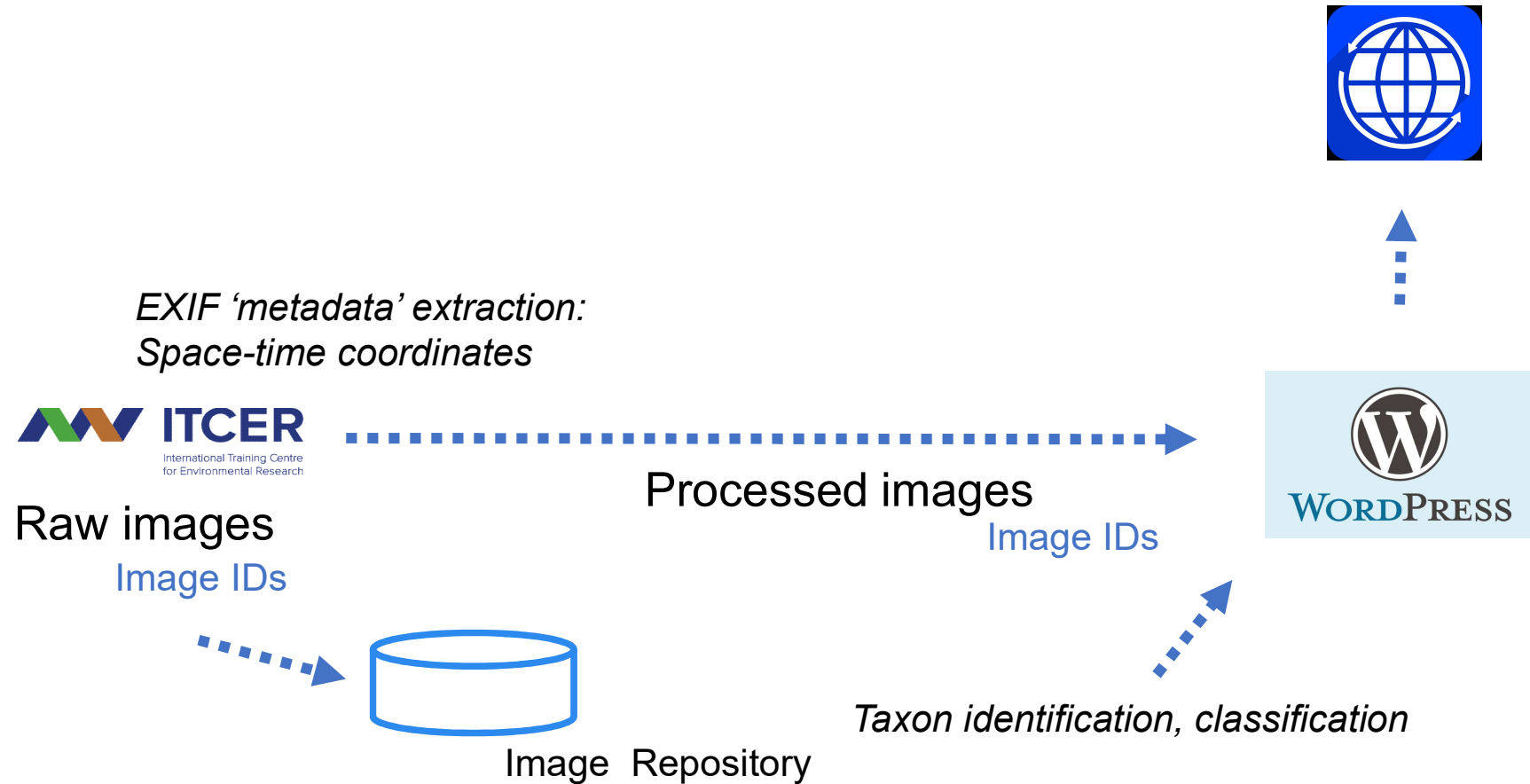
• **Physical objects**

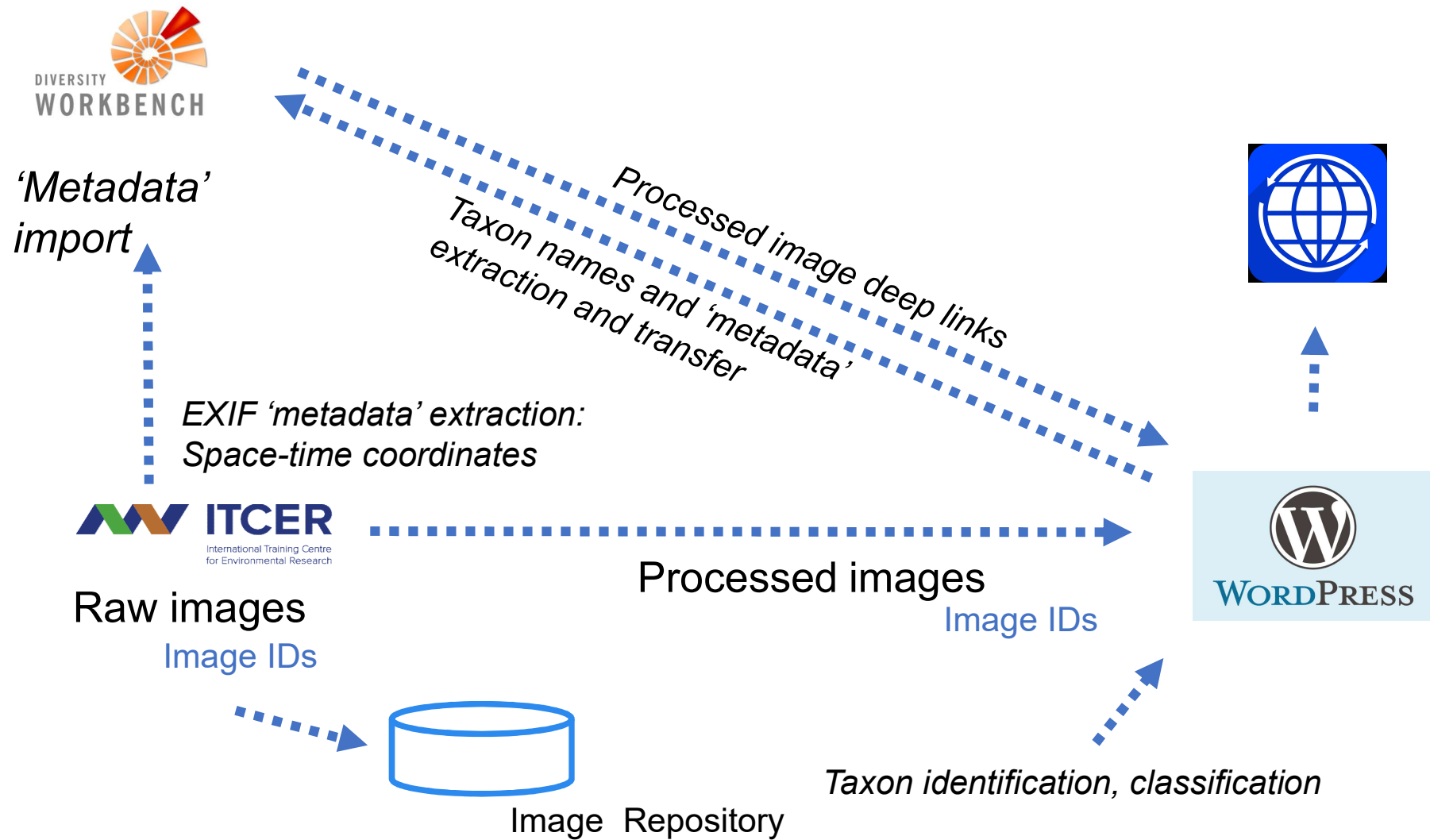
- Environmental samples
- DNA extracts, amplicons
- DNA libraries
- Sec. metabolite extracts




















- Image names after renaming and import into WordPress

<input type="checkbox"/>	 13052		 DM_DSC00765_2023-03-28-300x225.jpg
<input type="checkbox"/>	 10821		 DM_DSC08918_2023-03-11-300x225.jpg
<input type="checkbox"/>	 6304		 DM_DSC09468_2022-09-24-300x225.jpg

- Image content identification after import from camera

4	<input type="checkbox"/>	🔒 6304		🔒 DM_DSC09468_...	<i>Locris</i> cf. <i>transversa</i> (Cercopidae, Cercopinae, Locrisini) — 24.09.2022
5	<input type="checkbox"/>	🔒 6302		🔒 DM_DSC03304_...	<i>Locris</i> cf. <i>vicina</i> (Cercopidae, Cercopinae, Locrisini) — 28.10.2022

Monitoring Data Basics

- Legal issues

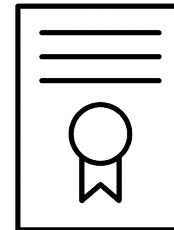
- Copyright



- Author's rights or intellectual property

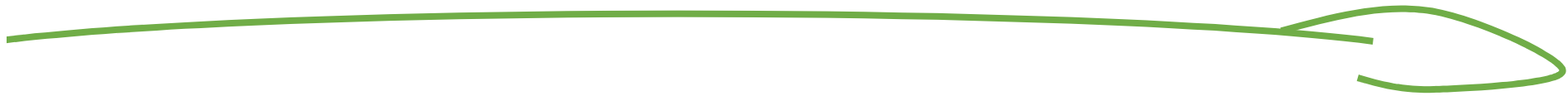


- Permits

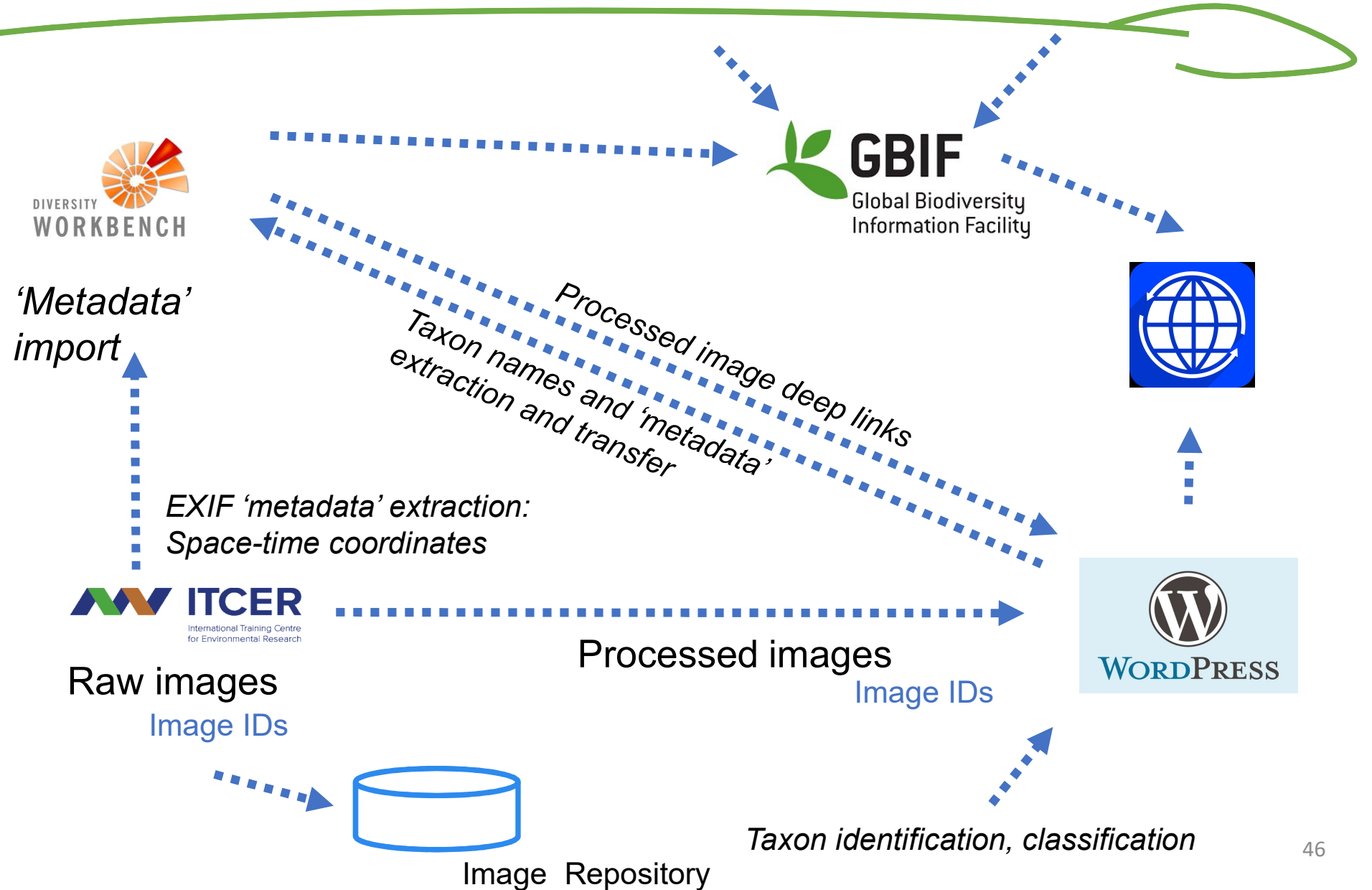


- 
- Image copyright and license

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Denice ('Deno') Ochieng Maramba	Sony DSC-HX90V, 18.2 MP, 30 × optical zoom, 7.62 cm (3.0 inch)
Denice ('Deno') Ochieng Maramba	Sony DSC-HX90V, 18.2 MP, 30 × optical zoom, 7.62 cm (3.0 inch)



Data Products



Schedule for import of tab-separated text files into DiversityCollection

Target within DiversityCollection: **Specimen**

Schedule version: 1

Lines: 2 - 42

Encoding: ANSI

Database version: 02.05.58

First line contains column definition:

Language: US

Tables

CollectionEvent (CollectionEvent)

Merge handling: **insert**

Column in table	Key	Copy	Pre	Post	File pos.	Transformations	Value	Source	Table
CollectionDay	?				7	Split at Pos. Dir. 1 ⇌		File	Database
CollectionMonth	?				7	Split at Pos. Dir. 2 ⇌		File	File
CollectionYear	?				7	Split at Pos. Dir. 3 ⇌		File	File

- Macrobiome images

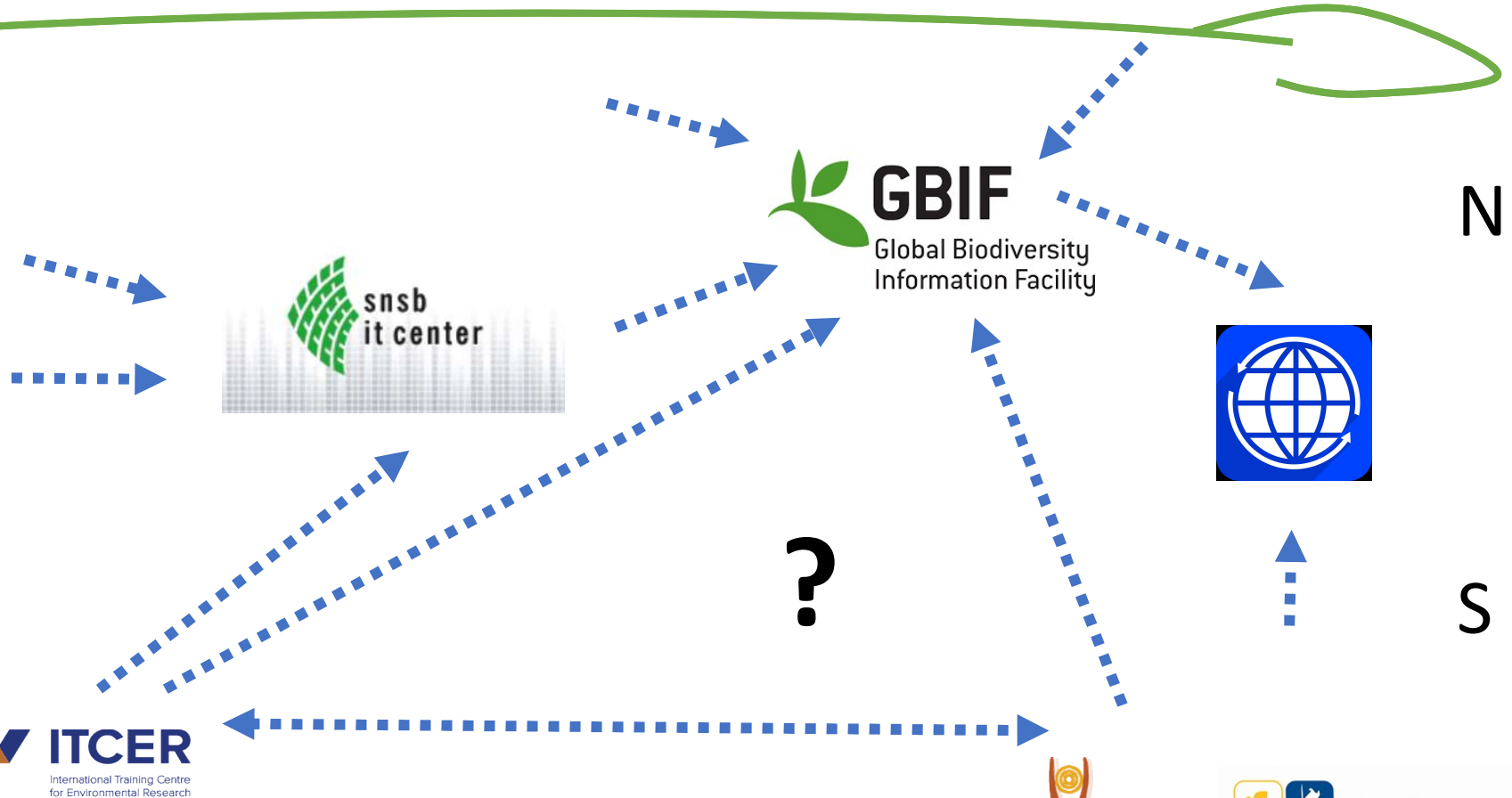
- Diversity Image Inspector

- EXIF data extraction

- Diversity Collection

- EXIF data import
- Links to images

Specimen	Part 1 StorageLocation Organism 1	Event CountryCache	Event LocalityDescription	Agent 1 CollectorsName Agent 2 CollectorsName	Agent 1 CollectorsNumber	Event CollectionDay Event CollectionMonth Event CollectionYear	Event LocalityDescription Event HabitatDescription
M-Nummern	Art	Land	Fundort	Sammler	Koll.-Nr.	Datum	Begleitbäume, Ö.
M-0275820	Cortinarius purpur...	Ungarn	Szentendre	B. Dima	DB3362	16.10.2008	Quercus petraea,
M-0275821	Cortinarius purpur...	Ungarn	SzSzB, Bátoriget	L. Albert & B. Dima	DB1339	02.10.2004	Quercus robur
M-0275822	Cortinarius purpur...	Deutschland	Kyffhäuser/Leop...	G. Schmidt-Stohn	SSt07-211	09.10.2007	Quercus
M-0275823	Cortinarius subpu...	Italien	Matschatsch	C. Rossi	Rossi4034	03.10.1998	Fagus
M-0275824	Cortinarius purpur...	Italien	S. Vito Comedo	C. Rossi	Rossi4906	22.10.2000	Picea, Castanea
M-0275825	Cortinarius purpur...	Italien	Calangianus	C. Rossi	Rossi5053	02.11.2000	Quercus suber, G



• **Digital objects**

- Streaming data
- Images
- Analysis data (matrices, diagrams)

