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Enviromental data in archaelogy – On the Road to a Robust Lab Workflow

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Lab Introducing

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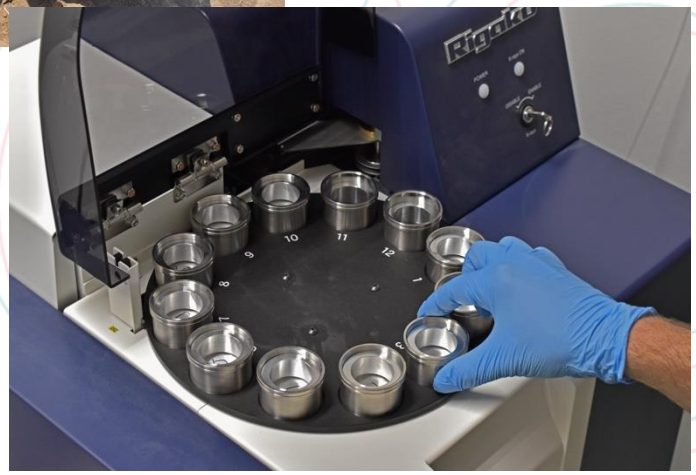
Lab Focus – Human Imprint in the Soil

- Field
  - Sampling design
  - Sample collection
- Analysis
  - Anthropogenic soils and sediments
  - Geochemistry
  - Portable OSL
  - Hyperspectral data



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Lab Ecosystem in Numbers

- 9 People (4 primary, 5 part time)
- 3 050 samples were taken in the field in 2025
- 6 764 samples were analysed in 2025
- 3 lab rooms
- 2 shipping containers
- Founded in 2023 as a part of CETA (Centre for Field Archaeology, University of Hradec Králové)

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Why we need FAIR Data?

- Systematic and transparent data management
- Prevents data loss
- Saves time and resources
- Improves data quality and consistency
- Enables effective collaboration
- Increases scientific impact and reuse

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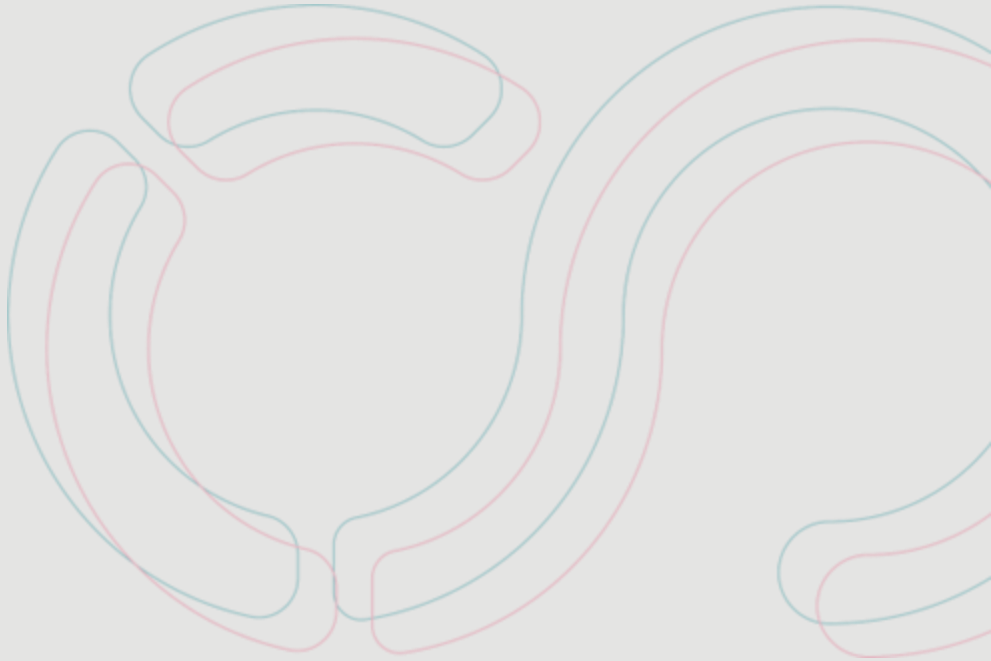
Lab Workflow: Past and current state



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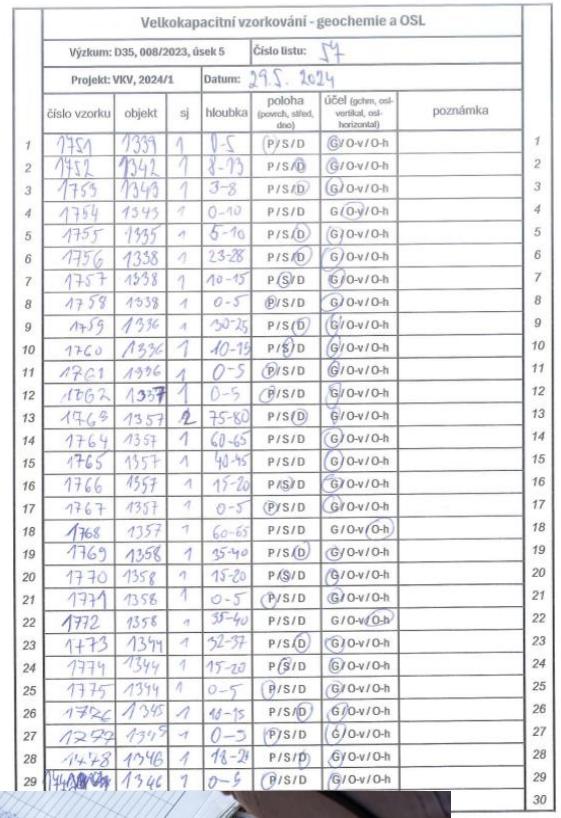
Quality Data Begin in the Field

- Clear field documentation enables seamless digitalization
- Redundant documentation increases reliability
- Standardized field forms and metadata ensure comparability
- Mandatory core metadata must always be recorded (location, context, date, project...)



Velkokapacitní vzorkování - geochemie a OSL

Výzkum: D35, 008/2023, úsek 5 | Číslo listu: 57

Projekt: VKV, 2024/1 | Datum: 29.5. 2024

	číslo vzorku	objekt	sj	hloubka	poloha (povrch, střed, dno)	účel (gchm, osl-vertikal, osl-horizontal)	poznámka	
1	1751	1337	1	0-5	P/S/D	G/O-v/O-h		1
2	1752	1342	1	8-13	P/S/D	G/O-v/O-h		2
3	1753	1343	1	3-8	P/S/D	G/O-v/O-h		3
4	1754	1345	1	0-10	P/S/D	G/O-v/O-h		4
5	1755	1335	1	5-10	P/S/D	G/O-v/O-h		5
6	1756	1338	1	23-28	P/S/D	G/O-v/O-h		6
7	1757	1338	1	10-15	P/S/D	G/O-v/O-h		7
8	1758	1338	1	0-5	P/S/D	G/O-v/O-h		8
9	1759	1336	1	20-25	P/S/D	G/O-v/O-h		9
10	1760	1336	1	10-15	P/S/D	G/O-v/O-h		10
11	1761	1336	1	0-5	P/S/D	G/O-v/O-h		11
12	1762	1337	1	0-5	P/S/D	G/O-v/O-h		12
13	1763	1357	1	75-80	P/S/D	G/O-v/O-h		13
14	1764	1357	1	60-65	P/S/D	G/O-v/O-h		14
15	1765	1357	1	40-45	P/S/D	G/O-v/O-h		15
16	1766	1357	1	15-20	P/S/D	G/O-v/O-h		16
17	1767	1357	1	0-5	P/S/D	G/O-v/O-h		17
18	1768	1357	1	60-65	P/S/D	G/O-v/O-h		18
19	1769	1358	1	35-40	P/S/D	G/O-v/O-h		19
20	1770	1358	1	15-20	P/S/D	G/O-v/O-h		20
21	1771	1358	1	0-5	P/S/D	G/O-v/O-h		21
22	1772	1358	1	35-40	P/S/D	G/O-v/O-h		22
23	1773	1349	1	32-37	P/S/D	G/O-v/O-h		23
24	1774	1344	1	15-20	P/S/D	G/O-v/O-h		24
25	1775	1344	1	0-5	P/S/D	G/O-v/O-h		25
26	1776	1345	1	10-15	P/S/D	G/O-v/O-h		26
27	1777	1345	1	0-5	P/S/D	G/O-v/O-h		27
28	1778	1346	1	18-23	P/S/D	G/O-v/O-h		28
29	1779	1346	1	0-5	P/S/D	G/O-v/O-h		29
								30

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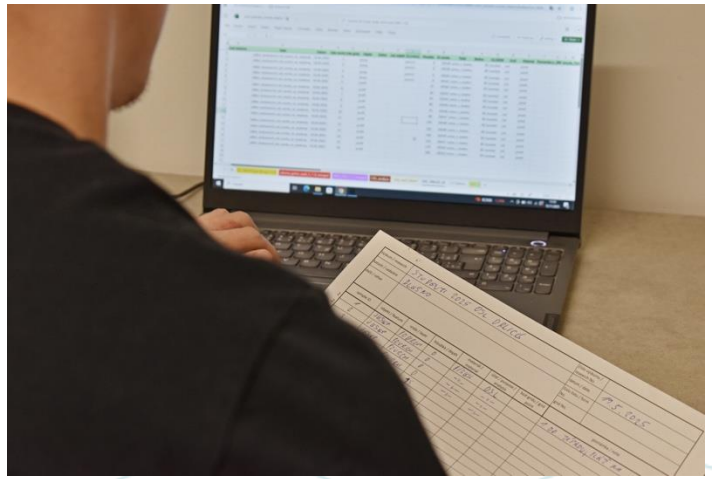
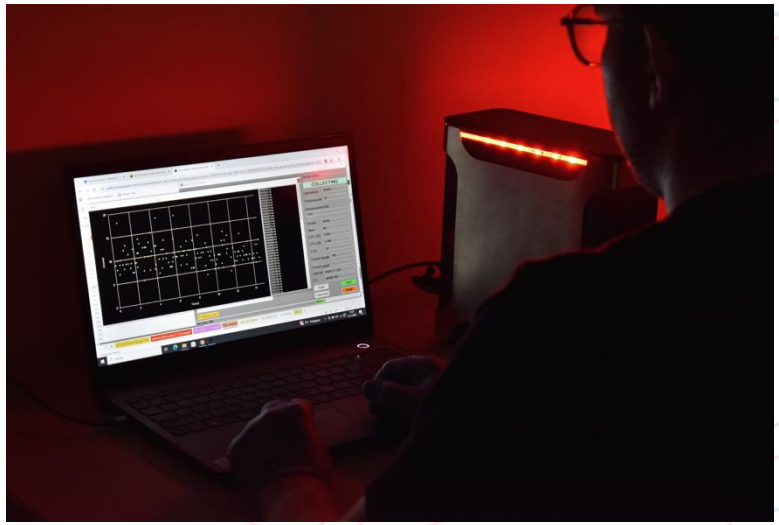
First steps in the Lab

- Drying samples
- Digitalization of field paper documentation
  - All metadata are in a single shared file
  - Sample receive a unique lab ID
- Archiving of the documentation
  - A clear and consistent folder structure
  - txt; csv; png; jpg, pdf, xlsx
- Standardized labeling of samples, bags, and boxes

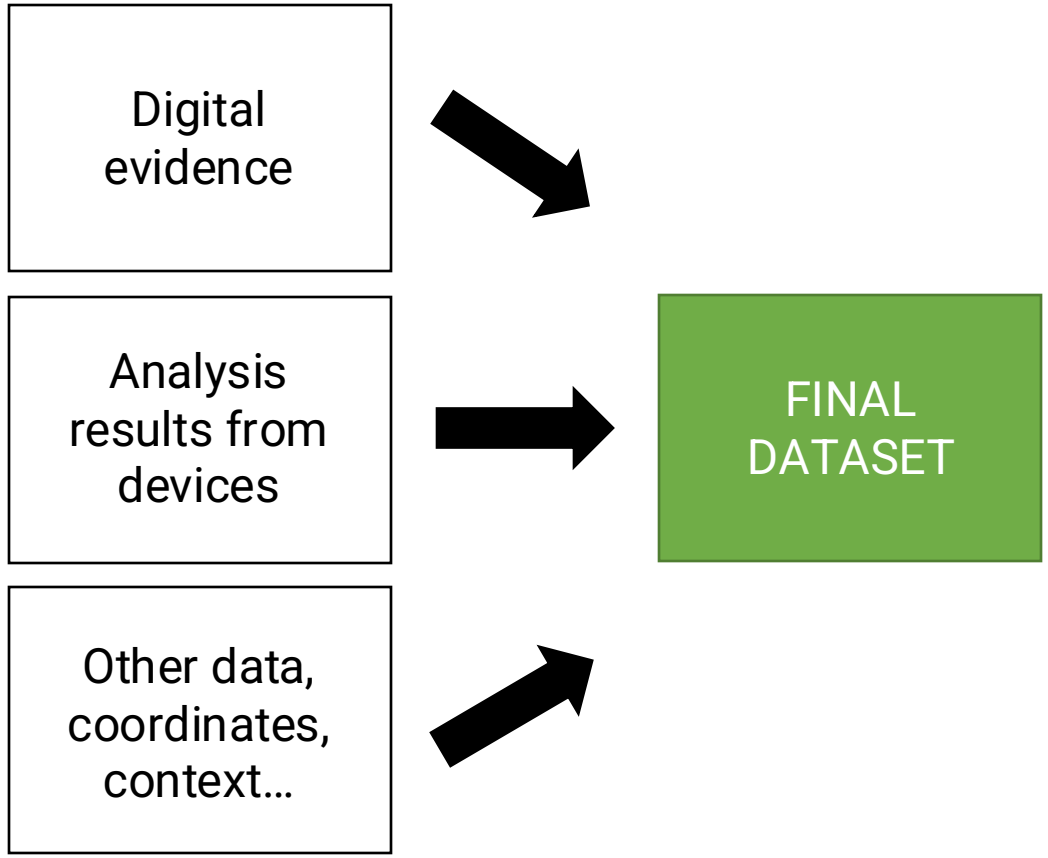


Lab Processes and Analysis

- Sample preparation
  - Grindind, pressing, drying, seeving...
- Analyses
  - WD XRF, ED XRF, POSL, spectroradiometry…
  - ➡ Archiving analysis results in structured folders
- All preparation and analytical steps are recorded in the digital evidence



Final dataset



- Final outputs include comprehensive datasets with metadata
- The creation of the final dataset is still time-consuming and requires better data unification to improve efficiency

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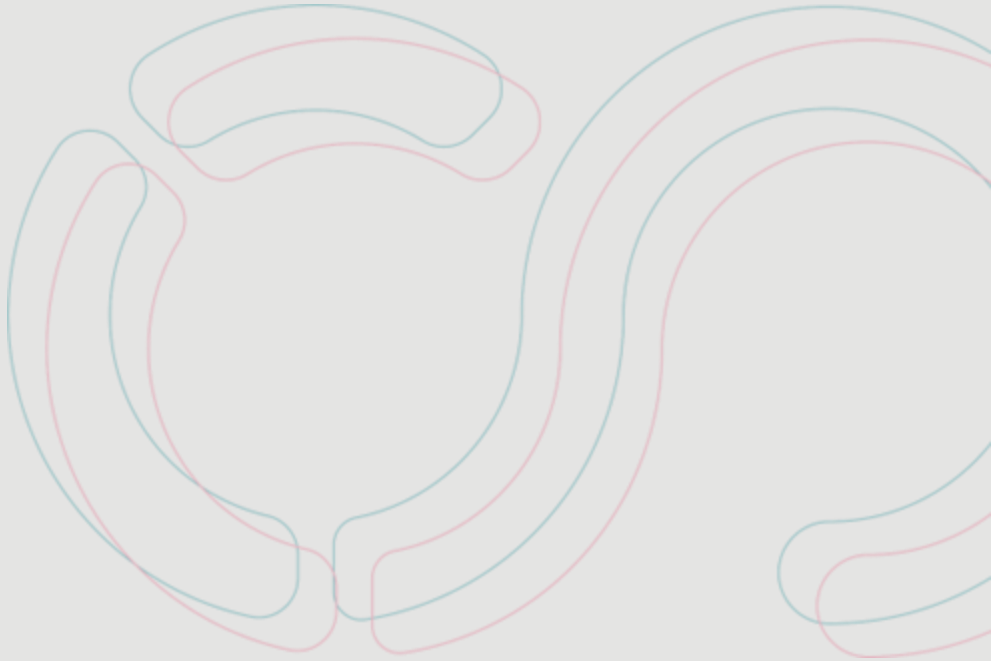
New Lab Workflow: In Progress



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Our journey to New Lab Workflow

Internal contacts

Face to face, online meetings, lab visit, emails, Loop

Open Science Office, Project Department, IT

External contacts

EOSC, Discord, DS community meetings

colleagues from archaeology related fields

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Future Lab Workflow

ensure work procedures that will lead to **data fairification** both in the laboratory and externally,

development of methodologies, education of all colleagues

creation of a **comprehensive data workflow** in line with **FAIR**, **NDI,** and **EOSC** standards

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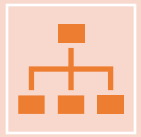
Summary of New Lab Workflow

- Sample and metadata recording
- Automation and standardisation
- Persistent identification
- Integration and interoperability
- Open formats
- Sustainability and openness

- ELN, file naming, backup
- Kadi4Mat, partially automated metadata creation, CCMM, controlled vocabularies/ontologies
- (internal/external) PID/DOI
- integration with the NRP
- standard open formats, supporting reuse, licence
- workflow will be released as open-source, cooperation, collaboration

Mini-project

fairification will be time-consuming and labor-intensive



we plan to apply for a mini-project (outputs of project Open Science II)

proper workflow, methodology, and datasets

two mini-projects will be requested from our university (departments of the Phil. Faculty)

teamwork across the university (CETA, PD, IT, OSD, faculty)

Where we are now

- A basic analysis of the data and its status has been carried out, with further analysis to follow.
- We have prepared a request for an opinion from the working group („PS HUMA“).
- We are educating ourselves (EOSC events, webinars, self-study).
- We are actively seeking opportunities to present our procedures and collect feedback (miniproject, OS Award, Archeovault – focus groups, Poster Session etc.)

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Open Science at the University of Hradec Kralove

"Open Science is currently in the Phoenix phase, which has swept through institutions."

(Hana Tomášková, Vice-Rector for Science, UHK)

- **Open Science Award 2025**
- Are there any data stewards here at all?
  - **Open Science Office** (Lenka Špičanová)
  - 2 projects **Programme Johannes Amos Comenius** (Barbora Kubátová)

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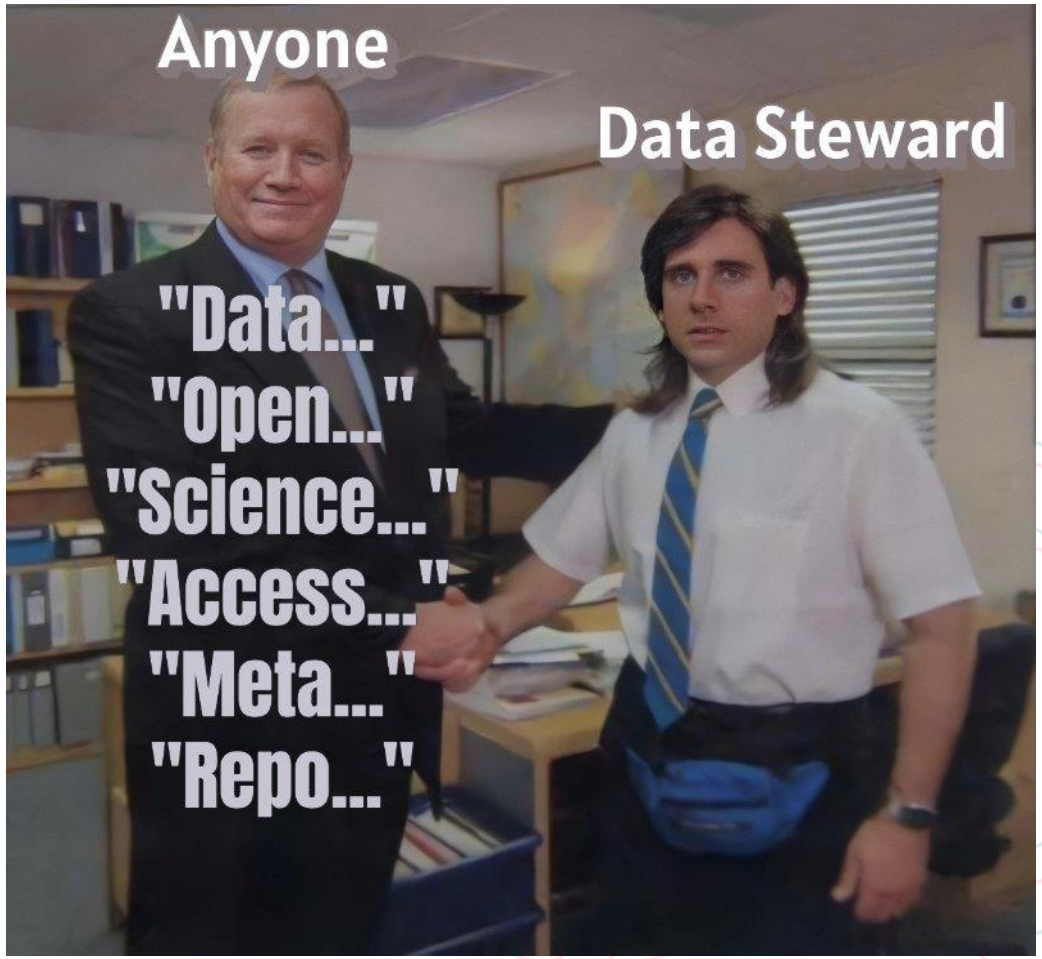
To be FAIR, or not to be FAIR

- requirements of the **financial provider/publisher vs. existing practice** (involuntary necessity) = a data steward's nightmare
- **improvement of one's own accord** = a data steward's dream
- meet our (good) practice in CETA
  - the neverending journey from datasteward/beginner to datasteward/genius
  - a slightly different kind of experiment at our experimental laboratory



Main Points

- Cooperation and communication are essential (lab team, data steward, colleagues…)
- Effective data management must start at the moment the sample originates
- Changing data practices requires structural change and affects the whole workflow
- All lab staff must understand the workflow to create data responsibly and effectively

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Thank You!

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