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OPENFABRIC CERAMIC DATABASE: AN OVERVIEW

LINK AL DATASET: 10.13131/UNIPI/28K2-HN40

Abstract: As Open Data are becoming an essential part of archaeologic research, many databases have been created, even if, still nowadays, a high number of data related to research remains unpublished. Archaeological pottery, both with archaeologic or archeometric approach, is the main focus of various of those databases, providing valuable information about this complex and resistant material to be used for comparisons or re-used in further studies. In this framework of sharing knowledge, the Open Fabric database was created to organize and make available the archaeologic and archeometric data collected from potteries found in Tuscan contexts, embracing a historical period going from Late Antiquity to Early Renaissance. Five classes of samples have been analysed, namely coarse wares, fine wares, building materials, transport vessels and glazed vessels. The archeometric techniques applied to each class have been chosen selecting the most suitable according to the samples' characteristics and to the different archaeological questions raised from the research. Archeometric techniques available so far are minero-petrographic analysis carried on with a petrographic optical microscope, Raman Spectroscopy, X-ray Spectrometry and Cathodoluminescence. Those can be implemented and integrated in the future to enlarge the database and offer a wider and more complete set of data. The Open Fabric database, available on MOD repositories, is briefly described in the following short article to help future users approaching the pottery field.

Keywords: Database; Archaeometric analysis; Pottery; Archeometry

1. Introduction

In the latest years, the study of ancient potteries, together with many other archaeologic branches, could benefit from the web resources and from the evolving Open Data policies allowing a wider spread of the information produced in universities and research facilities (Castro & Korte, 2015; Wilkinson et al., 2016). For scholars, data coming from research over ancient pottery sherds (i.e. location, typologies, characteristics) are a powerful resource, as they can be used for comparisons with new pieces or reused to enlarge the research samples (Gattiglia, 2015).

Still nowadays, despite the general trend to make data available, a great amount of those information are not shared. In many cases data are only partially published in journal articles to support the main thesis, or not published at all in other cases. Nevertheless, in the recent years, many databases (see Gattiglia, 2018 for a more exhaustive summary) have been created dealing with archaeological pottery focused on different areas and encompassing various aspects of this heterogeneous and common material, which is regarded as an important indicator of past societies (tab. 1).

In this expanding framework, Open Fabric has been created as a part of the author's PhD project focusing on Tuscan territories. It is a sample-oriented database aiming to integrate

Database name	Interested area	Number of ceramic samples (*)	Information	Reuse possibility	Link
FACEM	Mediterranean	> 300 fabrics	Archeologic information Interactive map of finding and production site Picture of ceramic paste Petrography (not available for every sample)	Licence: CC BY NC ND	https://facem.at
Archeometry of Sicilian Pottery	Sicily	27 fabrics	Description and picture of the fabric containing the info about original vessels.	n. a.	https://sites.google.com/site/archaeometrypottery/
Roman Amphorae	Europe, Mediterranean, Asia Minor	> 200 typologies	Archaeologic information Petrography 3D model	Licence: CC BY SA	http://archaeologydataservice.ac.uk
Amphorae ex Hispania	Spain	92 typologies	Typological features, Archaeologic information Paste and petrographic description, when available	All rights reserved	http://amphorae.icac.cat
ceraDAt	Mediterranean and Middle East	>1000 samples	NAA chemical analysis Archaeologic information	Permission to be asked	https://www.ceradat.net
FLEPOSTORE	Flemish region	108	Archaeologic information Ceramic paste Thin section images Interactive map of finding and production site	Licence: CC BY NC SA	https://flepostore.ugent.be

tab. 1. Example of existing databases and their characteristics.

SiteName	Province	Analysed samples
Arezzo_Pionta	AR	10 coarse-cooking wares and 4 fine-table wares
Empoli	FI	4 fine-table wares
Firenze_P_Vecchio	FI	19 coarse- cooking wares
Firenze_Via_dei_Castellani	FI	6 fine-table wares
Montescudaio	PI	6 fine-table wares
Parlascio	LU	5 fine-table wares
Pisa_ex_lab_Gentili	PI	10 coarse-cooking wares
Pisa_S_Eufrasia	PI	1 coarse-cooking wares
Pisa_Santa _Cristina	PI	4 fine-table wares
Pisa_Via_Cavalca	PI	4 coarse-cooking wares
Pisa_Via_Sapienza	PI	6 coarse-cooking wares
Populonia	LI	4 fine-table wares, 1 unidentified
S_Lucia	FI	2 coarse-cooking wares
San_Genesio	PI	40 coarse-cooking wares, 9 fine-table wares
San_Miniato	PI	3 coarse-cooking wares
Siena_Santa_Maria_della_Scala	SI	5 fine-table wares
Stibbiolo	PI	3 fine-table wares
Villa_Vetti	FI	26 building materials 7 coarse-cooking wares

tab. 2. Name of the archaeological contexts where the analysed samples were found and number of analysed samples per class.

the archaeological data with the results of archeometry for the determination of production areas, raw material sources, and the technological levels of the workshops. As archeometry is becoming an increasingly important discipline, allowing to answer archaeological questions (Giorgio, 2018; Odelli, 2021), the database aims to make those data available and downloadable. Thanks to Open Fabric, the archeometric information resulting from pottery analysis, together with their excavation site coordinates and provenance hypothesis, are made available and downloadable for scholars willing to compare and reuse those data to improve research.

Data collected are partially coming from published research and partially from unpublished ones. In the first case, a reference to the article (or articles) is provided, in the second case, the label "unpublished" is added. The unpublished material inevitably presents a major degree of uncertainty, especially on dating and archeometry interpretation, but it is important to allow people to consciously use them, to have a wider and more complete dataset, avoiding that some data remain locked in someone's computer.

The Open Fabric pottery database (see Supplementary Materials) is available on Mappa Open Data repositories under CC BY SA licence (https://creativecommons.org/). This licence is clearly shown on the homepage and allows to re-use the dataset completely, or just part of it, provided that the author is cited and that is "shared alike" or shared under the same conditions.

2. Materials and methods

2.1 Dataset:

The dataset represents the key to the whole project, as the samples and what obtained from their analysis are the core and main focus of the whole project. The corpus of the dataset is composed of 348 ceramic sherds, coming from different archaeological campaigns (Bruttini, 2013; Cantini et al., 2004; 2007; 2010; 2014; 2016; 2018; Fatighenti et al., 2016; Raneri et al., 2018) carried on in Tuscany (see tab. 2). The selection encompasses different kind of context,

from private habitations to religious buildings where various typologies of potteries were found and made available for further analysis, after a first archaeological observation and description. The main aim was to cover different scenarios scattered through Tuscan regional territory to offer various and articulate comparisons for further studies.

2.2 Archeometric techniques

Among various possibilities (Odelli, 2021) four archeometric techniques have been chosen, according to the nature of samples, the research aims, which varied according to the samples' characteristics, and the instrumentation availability. These four techniques, which can be implemented in the future, are:

- Minero-petrographic analysis performed on thin sections with petrographic polarized optical microscope. (Quinn, 2013; Montana, 2020).
- Micro-Raman Spectroscopy performed on body and glaze (when present) of the samples. The pottery sherds were examined without any preparation. (Vandenabeele, 2004).
- Portable X-ray Spectrometry performed on body and glaze (when present) of the samples. The pottery sherds were analysed on smoothed body surface and on the flat glaze. (Shackley, 2011).
- Microscopy Cathodoluminescence performed on both thin sections and thick sections of pottery sherds (Chapoulie et al., 2016).

The experimental conditions may vary from sample to sample and are specified in the metadata, and paradata, which are downloadable together with the qualitative and quantitative archeometric information.

2.3 User's interface

As Codd already stated in the 70s, the user should not know the structure of the database but should be capable of interacting with it through an interface (Codd, 2002).

The interface dedicated to the user of Open Fabric database is schematically as presented in fig. 1.

The ideal space is divided in three sections according to their main function.

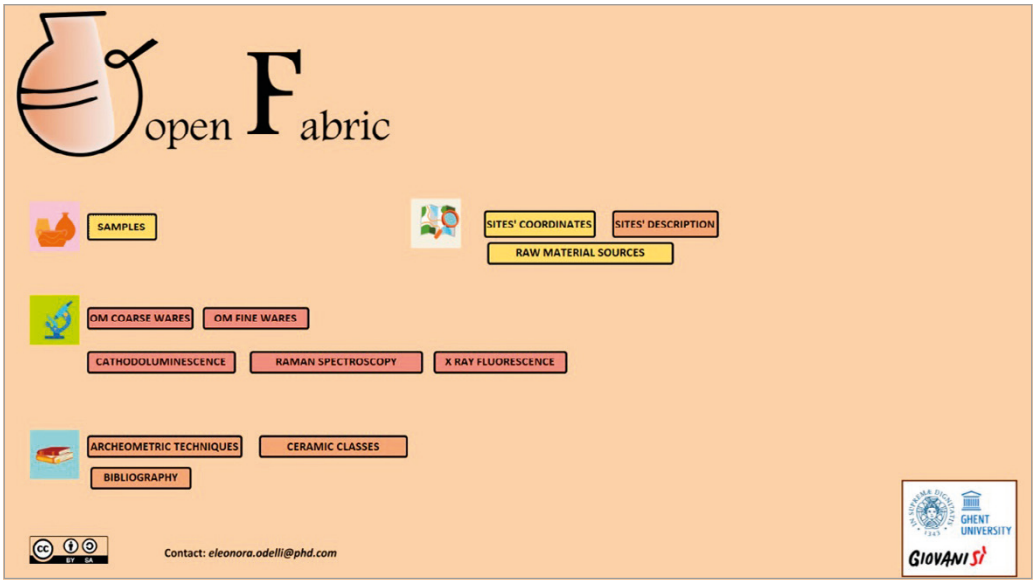

fig. 1. The interface dedicated to the user of Open Fabric database.

On the top there are the descriptive tables interfaces, in the middle part the archeometric techniques are described, while the bottom part is dedicated to more detailed explanations of potteries and techniques.

The descriptive pages on the higher part of the homepage are: (I) Samples, where all the analysed sherds are listed together with the data related to excavation site, provenance and performed analysis. (II) Sites' coordinates, given with the World Geodetic System WGS84 standard reference system to better find them within the geographical regional area. (III) Site description, where some more insights about the excavation place are given. (IV) a work-in progress chapter dealing with the possible production areas and the characteristics of their clays. In this area, mock-up samples, made of clays from known sources, and fired in known conditions, are meant to provide more straightforward comparisons with Tuscany available clay deposits.

The middle part of the homepage is dedicated to the archeometric techniques. The various approaches can be selected, and every dataset downloaded, if needed. An important space is given to the pictures as far as it concerns minero-petrographic analysis and cathodoluminescence as the visual comparison is way more powerful than the description, even when detailed. XRF and Raman spectroscopy spectra can be downloaded in *txt extension, with metadata and paradata describing the file.

The bottom part aims to give some further explanation on the mentioned fields, without the claim of being exhaustive, but to help everyone to draw a general idea, which could be completed thanks to the bibliographic references. This part contains (I) Archeometric techniques, describing the techniques used and offering references for some more in-deep study, when needed. (II) Ceramic class, to explain the definitions of classes and subclasses to avoid possible misunderstandings. (III) Bibliography with the reference in APA style, the main topics of the various articles, and DOI, when available.

On the home page of the database contacts are given in case of questions from the users and to promote further analysis and collaborations.

3. Conclusions

The Open Fabric database is available on mod repositories. All the data are supported with meta and paradata allowing the users to know exactly the measuring conditions. The published results are completed with the bibliographic reference to the articles, so that the users can read a detailed explanation of archeometric questions, scientific methods, and conclusions. All the data are available for comparisons and reuse, to produce new research with previous data. The structure of the database, created during the Pegaso scholarship by the author, can be used and reused for new original research and implemented with new materials or techniques by future researchers dealing with the rich and complex world of ancient pottery.

Acknowledgments

Eleonora Odelli acknowledges the Regione Toscana for supporting her PhD fellowship thanks to the GiovaniSì project. Thanks to F. Cantini and S. Raneri for the supervision during the whole database project and during the whole archeometric measurement.

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