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ENTERTAINMENT BUILDINGS IN THE ROMAN EMPIRE: A QUANTITATIVE APPROACH

1. Introduction

The goal of the project described in the present paper is collecting data about theaters, amphitheaters, circuses and stadiums all over the Roman Empire in order to create a geo-database containing all the available information on the entertainment buildings with a deeper analysis and a broader data collection regarding the circuses. The work was conducted using open source software, such as QGIS, which is an open source geographic information system that allows for detailed spatial analysis and data management, and the results are published online on several platforms in order to exemplify a case study in data-oriented low-footprint archaeological research:

1) as an independent website (https://archeolucia.geocontext.info/#/map);
2) within the OpenHistoryMap platform as navigable dataset located on the map[1];
3) as data source in the OpenHistoryMap data index[2];
3) as raw dataset available via standard APIs on GitHub (https://github.com/Archeolucia/theatres);
4) as a metadata enhanced dataset on Zenodo (https://zenodo.org/record/8426059)[3].

The need to create this geo-database arises by the number of Roman entertainment buildings and the potentialities offered by GIS and geographical data analysis tools to interact, query and analyze such historical structures as well as answer new or unsolved questions. At last, a freely consultable tool, represents an opportunity for scholars and interested public to deepen their research works.

2. Types of entertainment buildings

During the Classical era in Greece, theater shows and sporting events were already popular forms of entertainment. However, it was during the expansion of the Roman Empire that entertainment became a significant tool for spreading

[1] https://map.openhistorymap.org/#filter=source:F6655FZP.

[2] https://index.openhistorymap.org/sources/F6655FZP.

[3] With this kind of dissemination the data is freely accessible for studies and consultation by scholars and an interested public. The licenses are in general CC-0, as well as an intrinsic CC-BY for academic reuse, for which Zenodo produced a DOI: https://doi.org/10.5281/zenodo.8426058.

Roman culture to new territories. This led to the construction of entertainment buildings throughout the empire, including theaters, amphitheaters, and circuses. While certain types of these structures were more prevalent in specific regions, at least one of these entertainment venues could be found in most areas. The circuses were composed by an oblong track ending with a curved side divided by median wall called *spina*. The distance between the two *metae* was at least 200 m, but the total length could be more than 600 m (Humphrey 1986). This typology of building was used to host chariots races as shown in several mosaics and sculptural reliefs. Archaeological studies show that the first stable *carceres* date back to the IV century BCE, while the masonry seats were built in Ceasar's Time (Humphrey 1986). This kind of building is the less attested in the Roman territories; circuses are present in Rome and in Spain but rare in other areas especially in the eastern regions (Humphrey 1986).

In the eastrern provinces it is easier to find a stadium instead of a circus. Even if the shape of the stadium reminds the one of the circus there are many differences between the two typologies. The stadium measures exactly 1 stadion, a Greek unit of measure corresponding to 180 meters. The origins of this kind of building are Greek as it was used to host sports events. The most ancient stadium is the one in Olympia in Greece, and it is famous because in this stadium the ancient Olympic Games were held (Humphrey 1986).

The theaters are more widespread than circuses and stadiums in the Roman Empire; this type of entertainment building has its origin in Greece to host comedy and tragedies. Theaters shows were very appreciated also by the Romans who adopted this kind of building. At first the Roman theaters were wooden temporary buildings, the first masonry theater is the one in Bologna and dates back to 88 BCE (Ortalli 1986). The amphitheaters are structures designed to host gladiator games; the first masonry amphitheater is the one of Pompeii and dates back to 70 BCE (Bomgardner 2000). Temporary wooden structures are attested at least since the II century BCE, but the amphitheaters became part of the urban landscape from the I century BCE (Golvin 2002). Amphitheaters are widespread all over the Roman Empire and they are often well preserved making it easy to study this kind of buildings.

3. State of the art

There are several studies and books about the entertainment buildings during the Roman Empire subdivided by types, such as the works conducted by R.G. Chase (2002) and by J.H. Humphrey (1986) for circuses, by J.-C. Golvin (2002) for amphitheaters, and by P. Ciancio Rossetto and G. Pisani Sartorio for theaters (1994). The literature on Roman entertainment buildings is vast, reflecting their central role in Roman society. Studies often explore various facets including their architectural design, construction

techniques, geographical distribution, and the sociopolitical dynamics they facilitated. Scholarly conferences have hosted panels focusing on the evolution of entertainment buildings through the Roman Empire. These discussions often emphasize changes in architectural styles and their implications for understanding Roman cultural and political shifts. Despite extensive research, gaps remain in the understanding of the regional diversity of entertainment buildings throughout the Empire. Every year new data and new discoveries become part of the discourse but, obviously, the depth of the knowledge of each building is different. Some samples are well preserved and studied, others are almost unknown or even still not located.

These studies have already been collected in several publications and websites. Some of these contain information of specific categories of buildings where each element is described and located. An example is the website 'The Ancient Theatre Archive' (https://ancienttheatrearchive.com/), a non-profit educational project of the Whitman College, USA (last update 12/24/2017). Each item is linked to an information sheet where data as date of construction, location, dimension, seating capacity, pictures, and plans are available. Two other websites have been created by the Generaldirektion Kulturelles Erbe Rheinland-Pfalz, Landesarchäologie Mainz. These two projects, started in 2011, deal with theaters (https://www.theatrum.de) and amphitheaters (https://www.amphi-theatrum.de). In both cases a topographical list of the monuments is available and for every monument a web page containing information, pictures and bibliography is accessible. The two works are extremely useful and interesting but they are two different and non-communicating projects, equipped with maps but without reusable and data-oriented geo-databases.

This project was conceived out of a will to bridge significant gaps in our understanding of Roman entertainment architecture, noticing there has been no unified effort to compile this information comprehensively. By gathering all known data on 387 entertainment buildings (specifically 197 amphitheatres, 76 circuses, 11 stadia, 103 theatres) throughout the Roman Empire into a single accessible database, this project fills a critical gap in Roman architectural studies. It not only enhances our understanding of Roman entertainment venues but also sets a precedent for future archaeological and historical data management. This database is expected to be a reusable and expandable resource for ongoing and future research, potentially sparking new insights into the socio-economic and cultural dynamics of the Roman Empire.

4. Workflow

The initial phase of the research involved a thorough examination of existing literature regarding entertainment structures from the Roman era. The body of knowledge in this area is extensive and continues to grow, providing a

robust foundation for categorizing such historical structures into four distinct types: amphitheaters, theaters, circuses, and stadiums. A comprehensive list of these known structures was compiled from the available data. For each listed building, it was imperative to pinpoint its exact geographic location. This was achieved by analyzing Mapbox Satellite as well as Bing Maps satellite imagery for structures that are still visible today, allowing for the precise input of coordinates (using WGS84 Coordinate System) into our database. However, numerous historical buildings, although recognized and recorded in earlier research, remain obscured beneath modern constructions. For these partially or completely lost buildings, the location were estimated relying on contemporary historical sources and previous archaeological studies on the same areas as well as excavation and survey reports where available. These coordinates, while not visually verified, were based on the most reliable scholarly interpretations available.

Furthermore, some structures, despite being documented in historical records or identified through archaeological findings such as statues or inscriptions, have either vanished or have yet to be discovered. In such cases, the coordinates provided were not verified; instead, a territorial analysis, consisting in a mix of staellite imagery analysis and the evaluation of local sources speaking of the area or of nearby areas, was conducted to propose a probable location. Although these coordinates are speculative, they are grounded in a careful assessment of historical context and geographical clues.

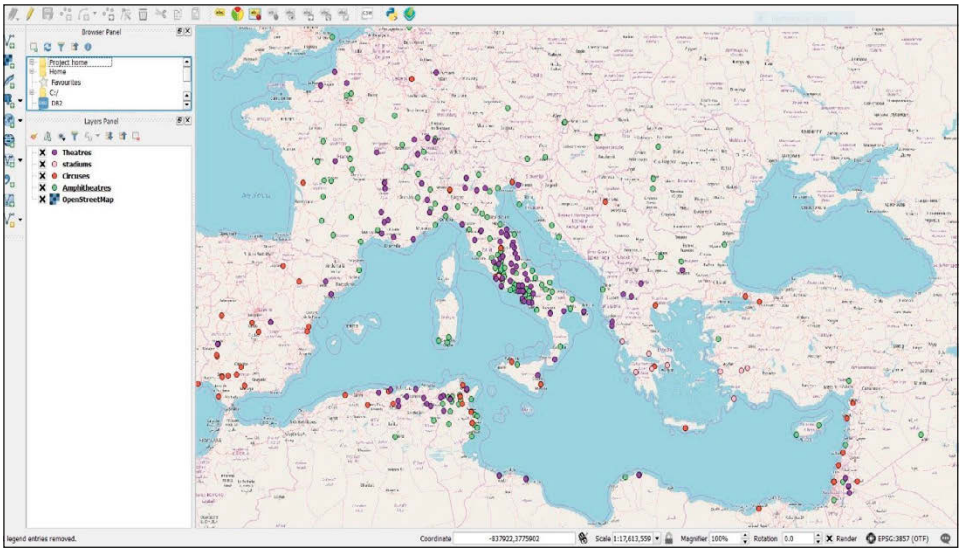

Fig. 1 – The collected information visualized in QGIS environment.

All the gathered data was systematically organized into a geo-database using QGIS software. This database includes fields for coordinates, name, city, country, and indicators of whether a building is located or visible.

As the focus of the present work was manly on circuses, the related information sheet is more detailed than the others structures. The database fields for the circuses are, in addition to the previously mentioned: overall width, overall length, track width, track length, capacity (number of spectators that the building could host), if the circus is palatial or not, year of construction (if known) and century of construction (if known) (Fig. 1). The second part of the work for related to the publication of the collected information within a webGIS service. Using a geocontext, a tool for static publishing of geographic information the database information was exported. The tool allows to generate a web map using the Maplibre library starting from GeoJSON files and a few simple descriptors. It is possible to choose the base map, the label of each element ad to customize the legend.

5. Results and future applications

The result of the project is a geo-database with 388 structures of known Roman entertainment buildings and the related information. All information is contextualized and georeferenced in order to allow geospatial analyses and studies. For instance, the geo-database was used to make some analysis on the distribution of the circuses, the main focus of the project, taking into account information such as the date of construction and the position. A first notable result is the number of the circuses. Published and historical sources allowed to recognize seventy-six circuses all over the Roman Empire, and more than those counted in previous works (Humphrey 1986). Among these, forty-four circuses are certainly located, and twenty-eight of them are preserved (Fig. 2). Furthermore, it is remarkable that these circuses, except

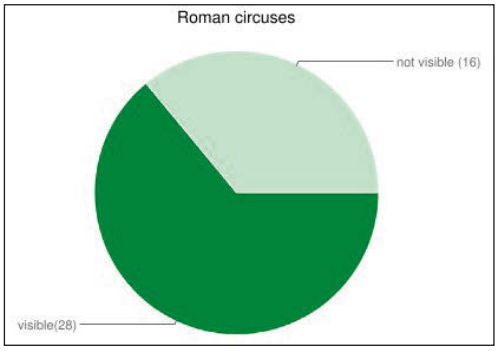

Fig. 2 – Chart of visible and not visible circuses.

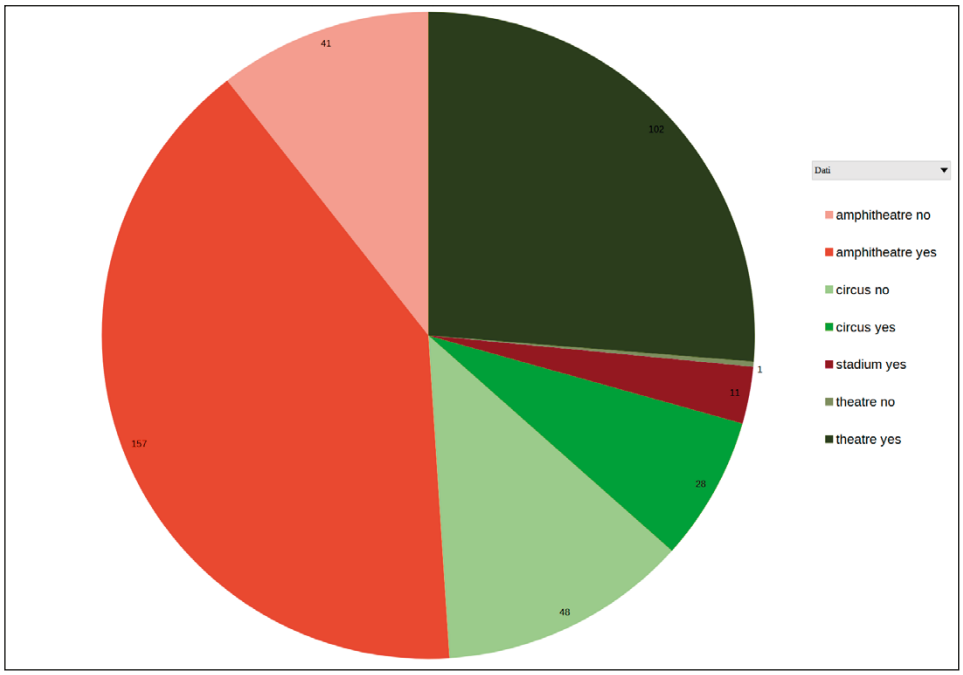

Fig. 3 – Chart of distribution of the circuses in Roman territories.

Rome are pretty rare in Italy and are widespread in Spain, where eighteen circuses are located (Fig. 3). Using webGIS or other GIS tools it is possible to measure the distance between the circus and the city walls and the proximity to the imperial Palace. The advantage of this approach would lie in its ability to precisely document monuments that might otherwise be threatened.

This project aligns with initiatives launched by the European Commission in partnership with UNESCO with the aspiration to provide accurate, timely and easily accessible information to improve the management to preserve and enhance cultural heritage (e.g. Prothego project www.prothego.eu/dissemination). The presented work is the first step in a broader and more complex analysis of entertainment buildings. In the next phase of development, the database will be enriched with additional data fields for all categories of entertainment buildings, such as theaters, amphitheaters, and stadiums. Specific attention will be paid to inserting standardized information on the date of construction and precise dimensions of each structure. This enhancement will provide a more homogeneous standard of information, allowing for more detailed comparative analyses across different types of buildings and regions. The database will allow researchers to examine the relationship between

entertainment buildings and their surrounding landscapes. This analysis can reveal how these structures were integrated into the natural topography, contributing to our understanding of Roman engineering and environmental adaptation. Further analysis can focus on the accessibility of these entertainment venues, investigating the infrastructural networks like roads and pathways that facilitated movement to and from these sites. This could shed light on the logistics and planning considerations of ancient Roman urban developers. Finally, by mapping the locations of various entertainment structures, the database will also enable studies on the role these buildings played in urban contexts. Researchers can explore how these venues influenced city layouts, public spaces, and the daily lives of citizens, reflecting their central role in social and political life. The geo-database makes it possible to easily access data such as century of construction and, obviously, location, that could be the starting point to understand phenomena as the concentration of structures in certain regions. Furthermore the relationship between entertainment and society can be further explored, particularly how spectacles and public shows were used during periods of Roman conquest and consolidation to disseminate cultural norms and reinforce political power.

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ABSTRACT

The project features the creation of a webGIS containing heterogeneous data about entertainment buildings in the whole Roman Empire: stadiums, circuses, theaters, and amphitheaters. Information available in earlier studies have been integrated with more recent historical information, modern maps, and satellite data. This geo-database of the Roman structures gives access to information such as localization, name, country, if there are any archaeological remains and if the monument is still visible. The results of the presented work are useful to 1) analyze the relationship between buildings and surrounding lands, 2) perform advanced hypothesis about the accessibility to the structures or the role of these type of buildings in the urbanistic context, 3) understand relationship between entertainment and society and 4) identify concentrations of structures in certain regions. This research is mostly focused on the study of satellite images, published and historical sources. A substantial level of attention has been dedicated to the reusability and availability of the collected data.