DOI: 10.2436/15.1000.02.24

Conclusions

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Maps are an important output of research, both on a micro-regional and on a large scale. This belief underlies one of the commitments undertaken by the TIR-FOR project: to provide high quality data in constructing a map of the Roman world, updating the content and enabling a comprehensive thematic and diachronic view. Consequently, to ensure a thorough scientific approach, we believe the authors of TIR-FOR should be the very archaeologists who are working in the territory, as suggested by the Symposium's title.

The presentation of the digital platform for the map of the Roman world by the Catalan team emphasised that it is an open, interactive digital map and gazetteer, designed to provide access to a large amount of information, beyond its own, through links to other applications and websites. But it is also equipped with an advanced search facility that allows thematic and chronological maps to be created on demand. This project may have been reformulated but it retains the spirit of collaboration between countries that has characterised TIR-FOR since it began a hundred years ago. Now, however, this project has been renewed, based on teamwork with everyone using the same digital tool. Such a transnational approach brings up essential issues, both cultural and evolutionary, which need to be taken into account.

One fundamental contribution made by the digital TIR-FOR project has been the unification of criteria. The fact that everyone uses the same digital platform to enter data from all the provinces in the Roman world forces the various national teams to classify their data according to common criteria. Researchers have to adjust their archaeological information to an established, common interpretation, namely the criteria of the TIR-FOR application. Researchers are also asked to consider how the system could be improved. In adapting the platform's criteria to the particular situation of each region, they need to be adjusted to reflect the cultural multiplicity and long evolution of the Roman world. The result, however, is incredibly valuable because all the data entered are standardised, both on the map and in the gazetteer. This makes the map extraordinarily reliable. The thematic and chronological maps produced by the digital TIR-FOR provide an evolutionary view of the Roman world with unprecedented accuracy. This is precisely one of the project's research strengths. Moreover, all the data are available for use in any other research. Thanks to these common criteria, we have created a new and universally applicable research tool.

The Italian team has provided us with an historical assessment of map drawing in Antiquity, as well as interesting reflections regarding these these maps, such as which reality was being represented, which concepts were applied, at what scale and with what errors. In contrast to the maps of Antiquity, the team highlights the fact that greater precision is needed when producing digital maps, explaining the requirements entailed and the problems of precisely transitioning from the paper to the digital TIR.

The Romanian team's new digital TIR is a clear example of cartographic research. Based on the paper publications, the team's aim has been

to bring the project into the digital era, with the new methodology this entails. After completing the digital TIR map of Dacia, they concluded they had achieved a new view of the borders and therefore of the history of Roman occupation in the province. They now intend to publish the volume on paper. They also plan to start the FOR of the legionary camp of Potaisa, an important site they've been excavating for 50 years and for which there is a wealth of data, which the FOR will enable them to map.

In Barbaricum also has its place within the TIR as we have detailed information on this area from various classical authors as well as archaeology, data which can be mapped. With the computerisation of the TIR-FOR, in order to integrate the Barbaricum data they have had to be adapted to the systems established for the Roman world, but without losing the specific characteristics of the sites, cultural areas and chronological evolution *per se*. Roman imports had essentially been mapped but recent archaeological work has unearthed important discoveries regarding Barbarian relations with the Romans, such as battlefields, votive deposits and buildings constructed under Roman influence. All this is being reflected on the map to provide a new view of the mechanisms and routes taken by the influx of Roman imports into Barbaricum, as well as helping us to refine our knowledge of how such peripheral cultures evolved.

The Tunisian team is working on the TIR for Tunisia in parallel with the archaeological map. This is producing a map that is much more faithful to the actual Roman situation than the French topographical charts from the 19th century. The new TIR includes the advances made by archaeology, with improved reliability. It therefore provides much more insight into how the region was structured in Roman times.

As the Greek contributors rightly point out, "the amount of information contained in the TIR indexes allows any researcher of the Roman world to easily access the data needed for his or her own study", while digitisation "has converted the TIR project from a static into a dynamic one". As we have already mentioned, the new online TIR enables views of the Roman world that are more faithful to reality, as well as being able to interact with the data to give rise to new research. The Greek authors provide two wonderful examples from Epirus and Aitolia-Akarnania, where the settlement structure and exploitation of the territory changed radically with the Roman conquest, an evolution that is clearly reflected in the maps.

We were unfortunately not able to hear Andreas Külzer at the Symposium but, for the Proceedings, he sent a superb description of the *Tabula Imperii Byzantini* (TIB) project by the Austrian Academy of Sciences in Vienna, mapping the Byzantine sites, a task that has proved to be of paramount importance for both their study and preservation. The project has generated the TIB Map Application (https://data1.geo.univie.ac.at/projects/tibapp), a prototype map viewer that is still a work in progress, which functions quite similarly to the TIR-FOR application.

A map of the Adriatic Sea was also presented, produced using the AdriAtlas application (www.adriaticummare.org) and coordinated by Francis Tassaux from the Ausonius Institute of the Bordeaux Montaigne University. This is the first ever cartographic overview of the ancient Adriatic and it's extraordinary. Once again, this experience is of great interest because of its similarities to the TIR-FOR project, both in terms of purpose and technical presentation.

Continuing westwards, the Roman thoroughfares of Aquitaine also represent a magnificent cartographic contribution by Clement Coutelier and François Didierjean from the Ausonius Institute of Bordeaux Montaigne University. Prioritising accuracy, exhaustive data collection, reliability and ease of consultation, the project is in line with current trends in crowdsourcing or citizen science. Thoroughfares are a key element for any map as they represent how the territory is structured, but they also provide insight into people's movements. The application of new technologies to digital maps of Roman roads is producing innovative results and providing researchers with essential study tools thanks to these new approaches. Remaining with Roman roads, we must also praise the ambitious project Viator_e, by Pau de Soto from the Catalan Institute of Classical Archaeology, which attempts to analyse and explain the territory in economic and communication terms by mapping

the network of Roman roads in the western part of the Roman Empire.

The application of spatial analysis, modelling, 3D elevations and other cartographic resources have enabled specific studies, such as the work on population movements carried out by Jesús Ignacio Jiménez and Alicia Ruiz for the provinces of *Hispaniae*, the military settlements of north-eastern *Hispania Citerior* and the population densities of the Lower Guadalquivir. Travelling through Cappadocia, Jacopo Turchetto proposes the application of new technologies to archaeological mapping in order to extract different views and achieve a deeper understanding of the territory and how the ancients shaped the countryside. 3D reconstructions are highly expressive, improving our understanding of the dynamics of the landscape, least cost path and visibility analyses, as well as providing a useful video to raise awareness of the research.

The study of satellite imagery is aided by the analysis of ancient cartography, as in the example of Madayi (Kerala, India). This is a wonderful project studying the Roman world's trade with Asia, which could also be mapped within the TIR project under the Barbaricum concept, incorporated within the project for some time now.

We have seen case studies on cities such as *Munigua*, *Peltuinum*, *Pivernum* and *Brundisium*, and the impressive multidisciplinary studies on the *ager* of *Barcino*, the result of many decades of work, as is also the case with *Potaisa*, helping us to better understand its history. There is such detailed information on *Potaisa* that the FOR fields and even the FOR sub-files could be completed. The same can be said for the case of the Calore River valley, in the territory of the Roman city of *Telesia*. That's the secret of archaeology: important results can only be achieved after many decades of perseverance and continual work.

Analysing the ancient settlement of the Lower Guadalquivir we have also seen that, with the spatial analyses proposed, apparently similar conclusions are reached as those achieved with a succession of chronological maps. But there is one fundamental difference: these new analyses include actual figures, representing a huge advance.

Everyone agreed that maps are important; that they are not only a tool for research but an approach to history, an investigation *per se*.[1] They are a bird's-eye view that provides an analysis of the territory we want to explore. And even if we have diachronic and thematic maps, as is the case, our view of the contents of the whole territory isn't fixed but evolving and nuanced, with all its structure, movements, zones of economic exploitation, areas of control, areas of urbanisation and centuriation, symbolic areas and a long etcetera. There can be no doubt that general maps are essential in order to understand a place; they are necessary to understand a region but are also necessary to understand the global nature of a dominium such as the Roman Empire. And the *Tabula Imperii Romani* and *Forma Orbis Romani* are necessary for their precision, reliability, integrity and especially for their standardisation of data and unity of criteria.

Hence our invitation to all researchers to collaborate with the TIR-FOR project, to link data from their different projects and to complete the corresponding sheets on the TIR-FOR platform.

1. Between 2016 and 2018, the production of the TIR for Catalonia and the construction of the digital platform received aid from Spain's "Secretary of State for Research, Development and Innovation" as R&D Project HAR2015-69655-P. Aid was denied in the 2019-2021 application period because the Project was classified as "instrumental" and "mechanical" and not as research.