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Amelia Carolina Sparavigna (Department of Applied Science and Technology, Politecnico di Torino)

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Abstract

Here we discuss the orientation of the urban planning of two Roman towns in Germany, Kastell Kesselstadt and Mogontiacum, the Roman Mainz. As all the Roman military camps and coloniae, these towns were planned according to an ideal pattern, based on a grid of parallel and perpendicular streets. Using a software giving the sunrise azimuths on satellite maps, we show that Kastell Kesselstadt and Mogontiacum have the main axis of the grid oriented along the direction of the sunrise on the summer solstice, that is, that the towns have a solstitial orientation.

Keywords: Archaeology, Archaeoastronomy, Solar Orientation, Solstices, Urban Planning, Satellite Images, Google Earth.

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Amelia Carolina Sparavigna

Politecnico di Torino

Here we discuss the orientation of the urban planning of two Roman towns in Germany, Kastell Kesselstadt and Mogontiacum, the Roman Mainz. As all the Roman military camps and coloniae, these towns were planned according to an ideal pattern, based on a grid of parallel and perpendicular streets. Using a software giving the sunrise azimuths on satellite maps, we show that Kastell Kesselstadt and Mogontiacum have the main axis of the grid oriented along the direction of the sunrise on the summer solstice, that is, that the towns have a solstitial orientation.

Keywords: Archaeology, Archaeoastronomy, Solar Orientation, Solstices, Urban Planning, Satellite Images, Google Earth.

It is generally known that the Roman surveyors based the planning of their new towns on a regular grid of parallel and perpendicular streets. Actually, the surveyors were applying to the towns the same layout that they used for the military camps, the "castra", and for the limitation (centuriation) of the land [1]. For what concerns the orientation of the grid of the streets, that is the orientation of the main of them, the Decumanus, many scholars, such as the Italian architect Gaetano Vinaccia for instance, proposed a strict relationship to the local environmental conditions [2-5]. Besides the scholars that argued the Decumani oriented according to the opportunity and environmental conditions of the places, other scholars have proposed the possibility of a solar or astronomical orientation of them [6-9].

As specified by Francis Haverfield in his book on the ancient town-planning [6], it is possible that the orientation of the Decumanus could have been established towards the sunrise on the day of the foundation, according to a ritual of Italic or Etruscan origin [10]. For this reason, the orientation of the Decumanus of the Roman towns could span the range of sunrise azimuths between the extremal directions on solstices, directions that Columella, the most important writer on agriculture of the Roman Empire, mentioned as the "oriens brumalis" (southern sunrise, winter solstice) and the "oriens aestivalis" (northern sunrise, summer solstice) [11].

Actually, several examples of Roman towns and forts oriented along the sunrise on solstices exist [12-19], possessing as a consequence a grid of streets with a solstitial orientation. Since, in many cases, the solstitial orientation is close to the best possible choice with respect to the geographical position of the site, we can argue that this orientation could have been used to add a symbolic meaning to the geolocal site. This could be also the case of two Roman towns in Germany: Kastell Kesselstadt and Mogontiacum, the Roman Mainz. Besides having a strategic position, these towns had probably a solstitial orientation too. Using a software which is giving the sunrise azimuths on satellite maps, we can see that these towns were oriented along the direction of the sunrise on the summer solstice. For this reason, we like to add them to the towns mentioned in the Refs.12-19.

Kastell Kesselstadt

Kastell Kesselstadt was a Roman fort of Upper German-Raetian Limes. It corresponds to the center of the old town of Hanau-Kesselstadt in the Main-Kinzig-Kreis in Hessen. The Roman fort was situated on a slight elevation on the northern bank of the river Main. Today it is covered by the center of Kesselstadt, as well as by a part of the Philippsruhe Castle. As explained in [20], the place of the fort was determined for its strategic position.

By the first half of the 19th century, due to the name of the town (Kessel-Kastell), the presence of a Roman fort was considered as highly probable. First, some Roman tombs were found and studied during the construction of the Frankfurt-Hanauer Eisenbahn in 1847. Further excavations and studies led to the map given in the Figure 1 [20], with the Roman fort covering an almost square area of 375 × 375 meters.



Figure 1 - The Roman fort (Courtesy, Haselburg-mueller, Wikipedia)

As told in [20], the Jakob-Rullmann-Strasse corresponds essentially to one of the main streets of the fort. Let us consider this street as the old Decumanus, in order to investigate the possibility of a solstitial orientation of Kastell Kesselstadt (actually the Figure 1 is suggesting an orientation towards the oriens aestivalis, that is, the northern sunrise on summer solstice). To verify this orientation we can use some software applications which can give us information about time and azimuth of sunrise and sunset. Very useful are those applications that are showing solar azimuths on satellite images: among them, we have Sollumis at sollumis.com and SunCalc at suncalc.net that we have largely used in the previous works on the Roman towns. Here we use SunCalc. First of all, let us see the orientation of Jakob-Rullmann-Strasse: the result is given in the Figure 2.



Figure 2 - Thanks to SunCalc.net, we can see that the direction of sunrise on June 21 is coincident with a part of the Jakob-Rullmann-Strasse. The yellow line represents the direction of the sunrise, the red one that of the sunset. The orange arc shows the apparent motion of the sun in the sky.



Figure 3 - Using the SunCalc simulation on the satellite map and the Figure 1, we can have SunCalc applied to the Roman fort as in the right panel.

From the Figure 2 we can see that a part of the Jakob-Rullmann-Strasse is oriented along the sunrise on the summer solstice. In the case that this part of the street is also a part of the main street of the Roman town, we can argue that the town had a solstitial orientation.

We can also use a satellite image, as in the Figure 3, left panel, and mix it with the map in the Figure 1: we have the Roman fort of Kastell Kesselstadt displaying the abovementioned orientation.

Mogontiacum, the Roman Mainz

Mainz has a Roman precursor, the castrum of Mogontiacum, founded by the Roman general Drusus in 13/12 BC [21]. For what concerns the name of the castrum, in [21] it is told that it was derived from that of a Gallic god. The "Roman soldiers defending Gallia had adopted the Gallic god Mogons (Mogounus, Moguns, Magonino)", "the great one", similar to Latin "magnus", the god of "might" personified [21].

As explained by [21], Mogontiacum was an important military town, probably due to its strategic position at the confluence of the Main and the Rhine. The civil town grew up between the fort and the river (Figure 4), and became the provincial capital of Germania Superior. Let us repeat for Mogontiacum the approach we did for the Figure 3; the result is given in the Figure 5. It seems that the axis of the fort and of the civil town was oriented along the sunrise on the summer solstice.

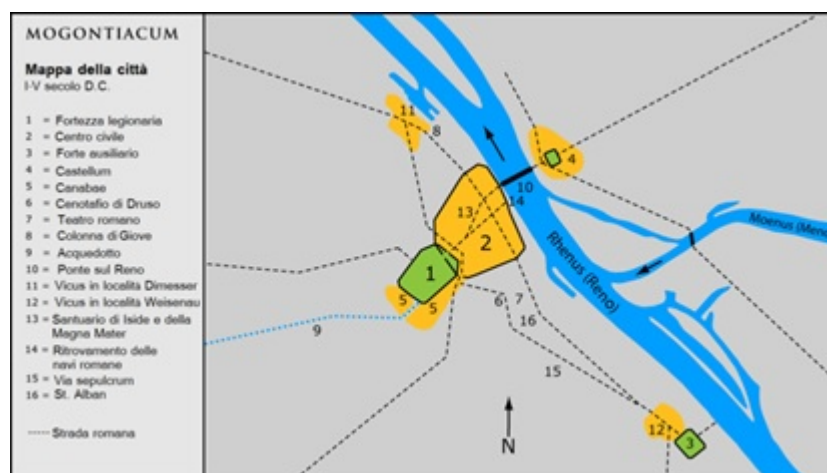


Figure 4 - Map of Mogontiacum. In it, 1 is the fort and 2 the civil town (Courtesy, DaniDF1995, Wikipedia).



Figure 5 – Using SunCalc, we see that the axis of the fort and of the civil town is oriented along the sunrise on the summer solstice.

Kastell Kesselstadt and Mogontiacum have an evident strategic position, which is conditioning their orientation. However, as we have seen using the SunCalc software they had also a solstitial orientation. Probably, they were deduced with this specific orientation to add a symbolic meaning to the site, linking the fort to the period of the year when the sun is more powerful and strong, that is, "magnus", perhaps in honor of the god of the "might" personified.

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