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The Winter Solstice as a Roman Cultural Fingerprint from the Mythical Origins of Rome to Augustus

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ABSTRACT

The winter solstice shaped Rome and its landscape from the ancestral cult of Saturnus as primordial god of the Roman territory before the city's founding to its use by Augustus as one of the signs of his multiple celestial and solar connections. The important feasts around this date are well known and, in this paper, we propose to demonstrate how some significant public monuments, possibly from the origins of Rome and certainly from during Augustus's reign, are oriented towards the winter solstice sunrise or sunset. To demonstrate the importance and truly cultural sense of these observations we show how the solstitial orientation is dominant in the cities founded or significantly rebuilt under Augustus. The winter solstice appears then as a powerful and stable cultural marker that traverses the history of the city of Rome, links Augustus with the origins of the city as a kind of new founder – as was already known through other evidence – and connects any provincial cities with Rome to show the depth of their commitment to her as a part of a common world view.

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Introduction

Ancient societies established a two-way relationship with their environment. On the one hand, space, as part of their environment, imposed a series of constraints on human action. On the other hand, they interpreted that space in accordance with their cultural framework (Knapp and Ashmore 1999; Ashmore 2008; Sprajc 2018).

In the present paper we focus on the cultural implications of a recurrent choice in Roman city design. To begin with, it must be remembered that the founding of cities was the most relevant characteristic of the Roman expansion in the West. Many of those cities were built or reformed at the time of Augustus with a high degree of standardisation (Laurence, Esmonde Cleary, and Sears 2011), implying the general use of a grid of orthogonal streets (Gros and Torelli 2007; Abad, Keay, and Ramallo 2006; Kaiser 2011). For most areas in this region, this was the first time large-scale urbanism was known. The creation of Roman cities, in particular Roman colonies, as was the case for Rome itself with the huge number of legends and cults related to it, implied relevant religious, ritual, and symbolic considerations (Briquel 2008; Woodward and Woodward 2004) because the new city was viewed as a

small portion of the Urbs itself in the area to be controlled (*quasi effigies parvae simulacraque Romae*, Aulus Gellius 16.13.9).

In the foundation ritual, the officials established a terrestrial image of the heavens (*templum*) in which the gods were 'ordered' and 'oriented' starting from north in a clockwise direction. This procedure implied certain 'astronomical' orientations and the determination of areas in which to make these observations, something never fully recognised by previous research in Rome itself. Apparently, such an area, the *auguraculum*, was present in other cities, such as Bantia (Torrelli 1966), Marzabotto (Gottarelli 2003), Cosa (Brown 1951), Pollentia and Tarraco (Mar and Roca 1998; Salom 2006). It should be noted that according to the above account, the *auguraculum* should be cardinally oriented but the orientation of the city itself can be otherwise.

In the Roman texts we can also read practical considerations about the founding of cities. For example, Vitruvius (*de Architectura* I, 6) states that the new cities had to be built considering the location and the prevailing winds. However, according to the *Agri-mensores* one way to obtain the orientation of the new city would be to follow the course of the sun by directing the streets (*decumani*) towards a particular

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sunrise (e.g. Frontinus *De limit.*, 10.20–11.6 Th; 11.9–14 Th; see González-García and Magli 2015; and Espinosa-Espinosa and González-García 2017 for a recent review).

These rites and the techniques to establish the directions of the founding lines might appear fossilised in the orientation of the Roman towns. However, until nearly a decade ago, the only analysis available was that of Le Gall (1975), who denied the relevance of astronomy, basing his work mainly on very few (14) data scattered from York, in Great Britain (at 54 degrees of latitude north) to Cuicul, in Algeria (36 degrees). It is difficult to extract significant information on solar orientations from data with such a widespread variation in latitude due to the significant effect of the geographic coordinates on sunrise (see, for example, Rodríguez-Antón et al. 2019).

In this paper we examine this question, integrating for the first-time research developed during the last ten years in the western provinces of the Roman Empire with new data from Rome itself and mainly from its ritual, political and cultural core – the Capitoline hill and the Forums – considering the remains related to the more ancient layouts of the city and the particular attention that Augustus paid to this area in the framework of his Imperial ideology.

We will first present the orientation of areas in Rome's core that were rebuilt at the time of Augustus. We will then show that one of the most repeated orientations for the cities built or rebuilt at the time of Augustus is linked to the winter solstice. Further, we will present an overview of the connections of Augustus with the sun. Finally, such lines of thought will provide support to some of the ideas proposed to explain the peculiar orientations of the cities built at the time of Augustus in the West.

Methodology

The methodology employed to collect and analyse the data detailed below is based on empirical observation with different instruments and current scientific knowledge of celestial mechanics. This methodology aims at rebuilding a historic reality, i.e. the accumulated observations from generations of the people who populated the area and who based their economy on agriculture and cattle herding. Such observations gave these people a social knowledge of nature that was complemented by ritual practices timed by the cyclic seasonal changes. The empiric and scientific methodology described below is, therefore, one of the means we have at hand to identify the fingerprints in the material record of that world view.

The data for the city of Rome has been gathered from two sources. The first is the direct measurements obtained by González-García with a Suunto 360 tandem of professional compass plus clinometer of the

orientation of several structures at the city centre, and of topographic landmarks to correct the magnetic declinations. The nominal accuracy of these measurements is of $\frac{1}{4}^\circ$ in azimuth and $\frac{1}{2}^\circ$ in altitude of the horizon. For each monument we have obtained a minimum of 5 measurements, and the values shown in Table 1 are the mean of such measurements, appropriately corrected from magnetic declination by solar readings. The final error estimate is the mean standard error for such data collection.

A second source of measurements has been the UCLA Cultural Virtual Reality Laboratory data.¹ The geospatial data for most buildings of the Roman Forum were made available to the public, with 22 sites for which UTM coordinates were acquired with an accuracy to within 2 cm. After converting the UTM coordinates of two points into latitude and longitude we calculate the azimuth by (Vincenty 1975):

$$\text{Azimuth} = \arctan\left(\frac{A}{B}\right)$$

Where:

$$A = \sin(\Delta\text{long}) * \cos(\text{lat}_2);$$

$$B = \cos(\text{lat}_1) * \sin(\text{lat}_2)$$

$$- \sin(\text{lat}_1) * \cos(\text{lat}_2) * \cos(\Delta\text{long})$$

and

$$\Delta\text{long} = (\text{long}_2 - \text{long}_1).$$

The final values were compared with those obtained from the magnetic readings. The agreement between the two independent sets of data is always below 1° , indicating the consistency of our results.

Finally, for the Mars Ultor temple and the Forum of Augustus, we also rely on several archaeological maps

Table 1. Orientation of the monuments in the Roman Forum. The first column gives the name of the monument, the next four columns the orientation of the four directions. We have considered here the eastern orientation for the monuments in the Republican Forum, then the sixth column indicates the altitude of the horizon in that direction. Finally, the last column provides the astronomical declination. The Curia Iulia and the last entry for the Mars Ultor temple consider the orientation towards West. For reference, the declination for the sun for winter solstice at the time was -23.7° .

Monument	A _N (°)	A _E (°)	A _S (°)	A _W (°)	h _E (°)	δ _E (°)
Republican Forum						
<i>Aedes Saturni</i>	34.3	124.3	214.3	304.3	1¼	-23.8
<i>Aedes Concordiae</i>	33.3	123.3	213.3	303.3	1¼	-23.1
<i>Basilica Aemilia</i>	32.8	122.8	212.8	302.8	1½	-22.9
<i>Aedes Divi Iulii</i>	32.8	121.8	211.8	301.8	1¼	-22.4
<i>Aedes Castoris</i>	25.2	115.2	205.2	295.2	1½	-17.7
<i>Basilica Iulia</i>	24.2	114.2	204.2	294.2	1¼	-17.1
<i>Curia Iulia</i>	320.7	50.7	140.7	230.7	1¾W	-27.9
<i>Regia</i>	357.6	87.6	177.6	267.6	1	2.1
	34.9	124.9	214.9	304.9	2	-23.9
Forum of Augustus						
<i>Aedes Martis Ultoris</i>	320.5	50.5	140.5	230.5	6 W	-23.8

and reconstructions available. We have considered those published by Zanker (1988), Ungaro (2013), Cavallero, Delfino, and Di Cola (2017) and Ferdani et al. (2020) for the Forum of Augustus and that of Ulrich (1993) for the *Forum Iulium*.

Roman Forum

The general connection of the orientation of the Republican Forum and the Via Sacra that traverses it with the distant Alban Hills has been long recognised (Richardson 1978; Coarelli 1981). Carandini (2007) speculates that the sighting of these mountains on the south-east horizon played a significant role in the mythical founding of Rome by Romulus in the Palatine. Another instance of note is the account by Livy of the inaugural rite to enthrone Numa as the second king of Rome, where the augur is set to face 'the farthest he could see' from the *auguraculum* in the Arx (Livy 1.18). In this respect, Michels (1967, 100) indicates that the Roman *pontifices* were likely to use the *auguraculum* in the Arx to check if the Republican calendrical system was working by observing the solstices. She indicates that the location has a clear view of the eastern horizon and at winter solstice 'the sun rose over the mountains at a point to the north of Tusculum, almost in line with the Sacra Via'. She connects this observation with the date in the calendar by which the *pontifices* would know if a new intercalation should happen or not.

To our knowledge, no author has previously directly linked the two facts: the visibility of the Alban Hills with the sky that can be seen above them from the

Roman Forum and its general layout (see Figure 1 and Table 1). Figure 1a presents a general layout of the Republican Forum at the time of Augustus and that the appearance today (Figure 1b) is the result of a complex historical process. We would like to point out that despite the apparent lack of a common orientation for the different buildings, there are two main guidelines that help in explaining most of the buildings of the Forum (see Table 1). The green line in Figure 1c explains the layout of the buildings on the SW side of the Forum (*Aedes Castoris* and *Basilica Iulia*). They show a general orientation of c. 115° which could be forced by the presence of the Palatine hill to its back and the need to accommodate to it. However, such a direction also coincides with sunrise at the end of January. Interestingly, the dedication in 495 BCE of the temple to Castor and Pollux as protectors of Rome was celebrated on 27 January (Scullard 1981, 65–68). Also worthy of consideration is the fact that the orientation of a large section of the Via Appia was recently related to Castor and Pollux (Magli et al. 2014). The second orientation, the red orthogonal grid in Figure 1c, accommodates most of the remaining buildings (*Aedes Divi Iulii*, *Basilica Aemilia*, *Aedes Concordiae* and the *Aedes Saturni*) and would coincide in the south-east with the orientation towards the winter solstice sunrise. Such a sunrise would be seen on top of the Alban Hills, notably Mount Cavo (Figure 1d).

The *Arx auguraculum* (the alleged remains of which can be seen in Figure 2a; Arata 2010), on the secondary summit of the Capitoline hill, was specifically designed to observe the flight of the birds towards east, with an overarching view of the Roman Forum,

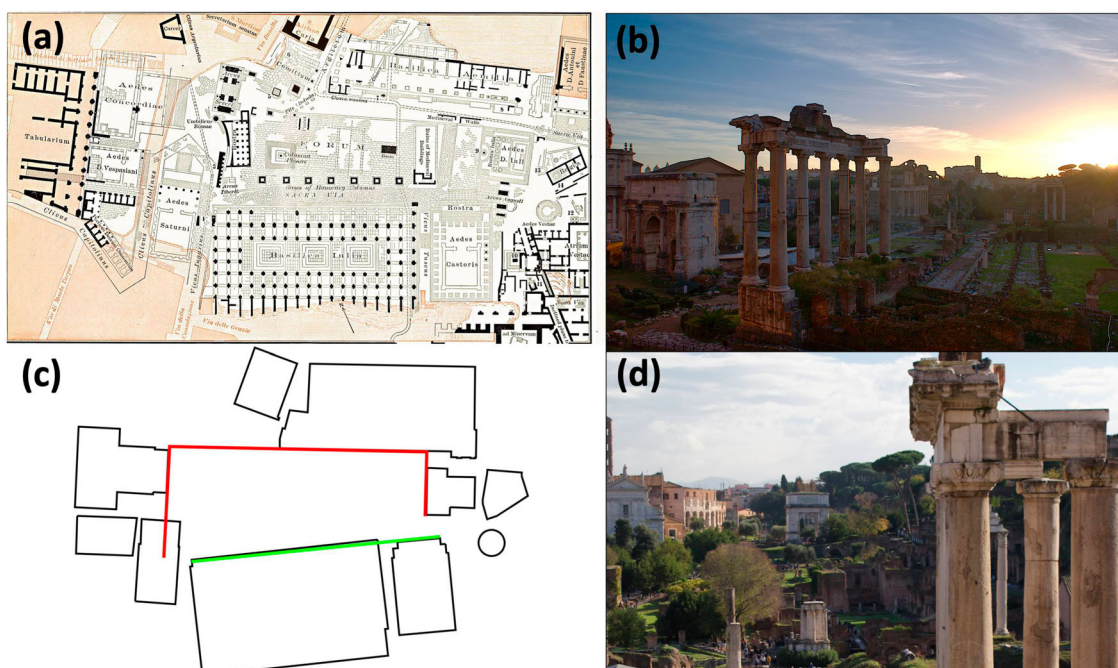


Figure 1. (a) Ground Plan of the Republican Forum at the time of Augustus. (b) Present day view of the Forum. (c) The main guiding lines of the general plan. (d) The farthest horizon is seen beyond the Sacra Via towards the Alban Hills in the southeast.

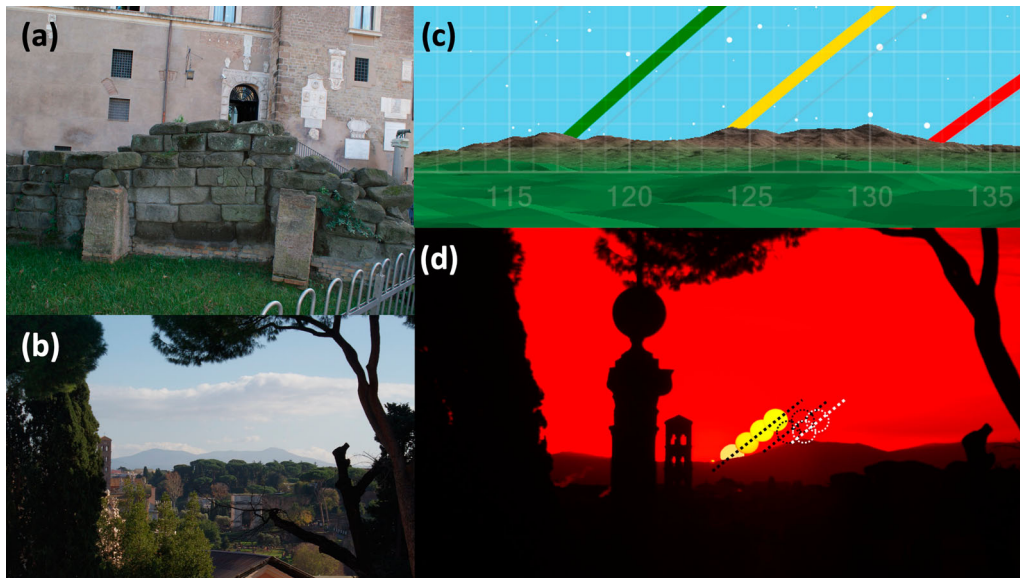


Figure 2. (a) The alleged remains of the Arx auguraculum. (b) The view from this site opens directly towards the Alban Hills. (c) Digital elevation model of the horizon towards the Alban Mountains, the winter solstice sunrise at the time of use indicated as a yellow line. (d) Observed sunrise from this area on 9 December^h, 2018. The present solstice sunrise would happen nearly 2 degrees to the south (right in the image), indicated by the empty black circles. The winter solstice sunrise at the time of Augustus is indicated by the open white circles.

where most public, political and religious events happened in Republican Rome, particularly the announcement of the character of the days of the months (Magdelain 1990). This was a perfect site for the observation towards the Alban Hills (Figure 2b) where Roman tradition places Alba Longa, the mother city of Rome and sacred area for the whole Latin confederation. Our calculations and the digital elevation model (Figure 2c) of the area, rendered here with the Horizon software, indicate that this direction is oriented towards the winter solstice sunrise (Figure 2d). There we show the sunrise on 9th December, that occurs 12 days before the winter solstice. The present-day solstice sunrise would happen nearly 2 degrees to the south (right of the image), indicated by the empty black circles. Sunrise at the change of Era is indicated by the white circles. This change is small but noticeable, indicating that such a shift, possibly linked to the lunar-based Republican year, could have been used to herald the introduction of an intercalary month the following year. For a comprehensive description of the Roman Republican calendar see Michels (1967), Hannah (2005) and Rüpke (2011); and for a more recent account on the Julian reform see Feeney (2007).

A text by Cicero clearly stresses the importance of this line of sight between the Capitolium and Mount Cavo for the augurs, to the point of pulling down parts of a building that obstructed its visibility. For example, the augurs were proposing to take observations from the citadel, and they ordered Tiberius Claudius Centumalus, who owned a house upon the Caelian Hill, to pull down such parts of the building

as obstructed the augurs' view by reason of their height (Cicero, *De officiis*, 3.66; trans. W. Miller).

Finally, we highlight the importance of the Regia (Coarelli 1992, 56–79). This is a complex building which underwent an elaborate process of evolution. However, at the time of Augustus it was designed with two main axes. The principal one, parallel to the main entrance of the Vesta temple, has a cardinal orientation, compatible with the sunrise on the equinox. The second has an orientation parallel to the main orientation of the Forum, and therefore towards the winter solstice sunrise. These observations indicate how several emblematic buildings related to the mythical origins of Rome, although considerably modified through time, retained a highly symbolic general orientation during the Republican period.

The winter solstice evokes the remote times under the rule of Saturn when there were no cities. The importance of the period was marked by a complex set of rituals held for different gods around that period (Perfigli 2009, 297–300). Centred on Saturnus, the Capitoline hill was originally called *Mons Saturnius* (Varro, *Lingua Latina* 5.52), and the surrounding ancient population was ruled by the kings Janus and Saturn. The latter was considered as the giver of agriculture and other markers of civilisation (Vergil, *Aeneid*, 8.314 ss). The cult of Saturn is attested from 497 BC, with a temple inaugurated on 17 December and heavily modified under Augustus. Those times were commemorated in the Saturnalia, the festival in honour of Saturn held as a movable feast in December on which date the consecration of the *Aedes Saturni* was also celebrated (Scullard 1981, 205–7; for the

religious importance of the regulation of time in the festival calendar described by Ovid in his *Fasti* see Pasco-Pranger 2006). One of the attributes of this poorly known festival is the turning upside-down of social conventions. Such characteristics, together with the solstitial date, recall a triple original moment (the solstice thus may recall a ‘start of times’ in a three-folded way) for the hierarchic society after the action of this god setting the time in place, on the date from which nature starts to awake, and for the city itself (Briquel 2008; Versnel 1993; Dolansky 2011).

Certainly, the mythical founding of Rome was celebrated on 21 April, with the *Parilia*, but from the spatial point of view we must highlight a small area in the Forum where we find the *Aedes Saturni*, the *mundus* – the place where Rome was founded (Coarelli 1992, 199–226) – which worked as a device linking the underworld with the sky as a ritual *axis mundi* (Bettini 2011, 82). In addition, at the time of Augustus the *milliarium aureum* was located next to the façade of the temple and indicated in golden letters the distance to the principal towns of the Empire (King 2010, 465–6). Therefore, we may argue that this area was considered the start of the order in space, time and society linked to the founding of the Urbs and in contrast with the previous anomic cosmos and society.

We may find such a scheme reproduced on a regional scale, considering most of ancient Latium, centred on Mount Cavo, with Rome at its periphery. Mount Cavo, in the Alban Hills, was the location of the *Iuppiter Latiaris* sanctuary. This was the place where the Latin peoples gathered annually to commemorate their alliance (Pasqualini 1996). It was also where the mythic founders of Rome came from. Therefore, the winter solstice sunrise alignment between Rome and the Alban Hills connects the city to its origins. The orientation of the *Regia*, considered to be the house of the kings, may also reflect this fact.

Parallels in Roman Italy and the Western Provinces

Moving on to consider the western provinces of the Roman Empire, our working hypothesis, based on the accounts of Vitruvius and the *Gromatici* reviewed above, is that the orientation of the main axes of a city, or their main public buildings, faces towards points on the horizon where sunrise or sunset could be sighted at particular times in the year. In fact, the actual observation might not have been needed at the time of laying out of the city grid. So, it wasn’t necessary to have borne witness to the phenomenon, but that knowledge of the compass points would have been sufficient (Orfila Pons et al. 2020; Rodríguez-Antón et al. 2019).

In recent years there have been two types of effort to understand the issues at stake, either by focusing on case studies or by trying to identify common

patterns from massive data collection. However, the individual cases cannot afford an overview as they can simply be considered as singular cases. The first area where we may try to establish if the model sketched out above was implemented elsewhere is for the other Roman cities founded and reformed in Italy. This was first attempted by Magli (2008) for 38 cities, where he found two patterns in their *decumanus* that seem to indicate the actual use of the winter solstice sunrise and the equinoxes to plan the Roman cities. This was later expanded at individual sites, such as Aosta (Bertarione and Magli 2015) or Norba (González-García and Magli 2015).

In the last decade we have undertaken a project to measure a comprehensive set of orientations of Roman city grids in the west of the Roman empire. We now have a database of up to more than 200 towns. Figure 3 summarises the main findings so far for the 92 cities founded or rebuilt during Augustus’s reign and where we find the clearest astronomical orientation (González-García et al. 2019). The x-axis indicates the declination value of the eastern end of the *decumani*. The y-axis provides a measure of the statistical significance of the concentrations found in the histogram. A value of 0 means that the concentration is as expected if the orientation was random towards any point in the horizon. Vertical lines are guiding lines to indicate the sun’s path on the solstices (solid vertical lines: winter at -24° , summer at 24°), or on the equinox (vertical dotted line at 0°). The extreme lunar positions are indicated for reference as vertical dashed lines. The horizontal dotted line at a value of 3 indicates the limit above which we may consider that the concentrations are statistically significant. The largest concentration is that connected with the orientation towards the winter solstice sunrise, with also significant orientations towards the cardinal points and summer solstice. Such a result suggests that, during the time of Augustus, the scheme already hinted at in Rome was frequently implemented in the provinces. Thus, the two types of studies, survey-like and in-depth, complement each other by

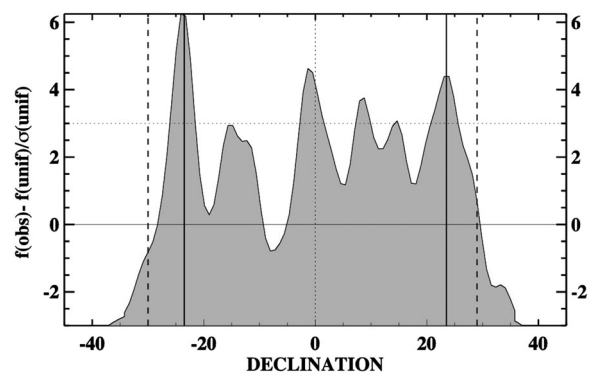


Figure 3. Histogram for 92 Roman towns founded or rebuilt at the time of Augustus in the western provinces.

providing a detailed picture on the role of astronomy in the orientation and location of cities and public buildings in Roman towns.

Discussion: Augustus the Sun and Back to Rome

To understand the implications of these results, we must go back to Augustus and Rome. There are ample references by contemporary authors to the alleged identification of Augustus with Apollo, the sun god. Accordingly, we can surmise that Augustus politically exploited this from the beginning of his career, possibly to connect to the Golden Age when gods walked amongst humans (Espinosa-Espinosa, González-García, and García-Quintela 2021).

Suetonius (*Augustus* 94.4 and 6) refers to the dreams of Atia and Octavian, Augustus's parents, announcing the cosmic, solar, and Apollonian dimensions of their son. The purpose of linking Augustus with Apollo was twofold: first relating Augustus with a solar god and second introducing this construction among the people of Greek culture largely distributed in the eastern part of the Empire (see Suetonius *Augustus* 29.1–3, 70.1–2; Pliny *Historia Naturalis* 36.13; Horace *Carmina* 4.5.5–8; Virgil *Aeneid* 8.720–3; *Monumentum Ancyranum* 19.1; Rehak 2006, 93; Hoff 1992, 229–32). These ideas were very new in Rome, and they contrasted with the secondary role of the sun and the moon in the Republican religion (Schilling 1979, 371–88; Hijmans 2009, 483–4).

Augustus's birthday is relevant in this discussion. He was born on 23 September 63 BCE (Suetonius, *Augustus* 5.1; Cassius Dio 56.30.5.), a date which, at the time of the Principate following the Julian reform of the calendar, corresponded to the autumn equinox. Numerous sources refer to the political, religious and cosmological significance attributed to this date, known as the *dies natalis Augusti* and converted into *dies ferialis* by Augustus himself. The deep cultural implications of this fact are presented in a detailed way in some recent works (Espinosa-Espinosa and González-García 2017; Espinosa-Espinosa, González-García, and García-Quintela 2021). The date 23 September became an important feast in the Roman liturgical calendar and was celebrated in the cities of the Empire on the 23 and 24 September (Gradel 2002, 239–50).

In the same line of argument, we should include the connection of Augustus with Capricorn. Although, according to his birthday, the zodiac sign of the *Princeps* should be Libra, the choice of Capricorn seems to be related to the cosmological significance attributed to this sign. At the time of Augustus, Capricorn held the sun during winter solstice, the cultural implications of which we already know (Manilius *Astro-nomica* 4.254–6; Macrobius *Saturnalia* 1.21.15–6). In

addition, Capricorn was linked to the beginning of a new era of peace and prosperity, which is why it is usually represented with the cornucopia (Barton 1995, 50; Angelova 2015, 34–5). The starting point of this association seems to lie in the alleged presence of Saturn in Capricorn during the birth of the world (Macrobius *Dream of Scipio* 1.21.24–6; Porphyry *The Cave of the Nymphs* 22–3). In this respect, according to Macrobius (*Sat.* 1.16.17), during the reign of Saturn, identified with the sun (Macrobius *Saturnalia* 1.11.8), there were no wars. Indeed, as stated above, the *Saturnalia* were celebrated some days before winter solstice just before the sun entered Capricorn (Macrobius *Saturnalia* 1.2.9 and 1.10.23–4; Porphyry *The Cave of the Nymphs* 23). According to Macrobius (*Saturnalia* 1.7.32; 1.11.48–9), this practice owes its origin to the fact that under the reign of Saturn, humanity passed from a life in darkness to an enlightened existence. In fact, there are multiple examples in the Augustan poetry of a true revival of the cult of Saturnus and the ideology related to him used to exalt Augustus (Brisson 1992), and his government after the battle of Actium (Barton 1995; Schmid 2005, 19–36; Green 2014). In this way, the symbolism of Capricorn combines, in the Roman mind, the situation of the world prior to the founding of Rome, remembered in the religious architecture, and the urban rites on the winter solstice. In such a way, Augustus incorporates all these symbolisms, acting himself as a new founder of Rome (Abry 1988).

The cosmological ideology of Augustus had a variety of physical manifestations. These include the large-scale production of objects with iconographic elements that were representative of the imperial ideas, especially images of the constellation or the decoration of the breastplate of the statue of Augustus of Prima Porta, with the cosmic representation of the new ideology of victory (Zanker 1988, 188–92). In this context, three Roman buildings stand out amongst the Augustan architecture. The most sophisticated structure is the monumental Horologium Augusti that was dedicated in 10 BCE (Plinius *Historia Naturalis* 36.72–73; Rehak 2006, 62–95; Hannah 2011; Frischer 2017). In addition to this is the Ara Pacis Augustae, dedicated on 30 January 9 BCE, which has alleged astronomical connections (*Monumentum Ancyranum* 12; Rehak 2006, 96–137; Delgado Delgado 2016; Tiede 2016). Finally, the Pantheon contained solar elements during the time of Hadrian, although there are doubts as to their original importance at the time of Augustus (Cassius Dio 53, 27, 2–3; Plinius *Historia Naturalis* 36.38; Hannah and Magli 2011; Lanziano and Virgili 2016).

In the same vein, a very special chapter is represented by the obelisks brought from Egypt, which retained their original solar symbolism but were updated with the Augustan imperial ideology. One

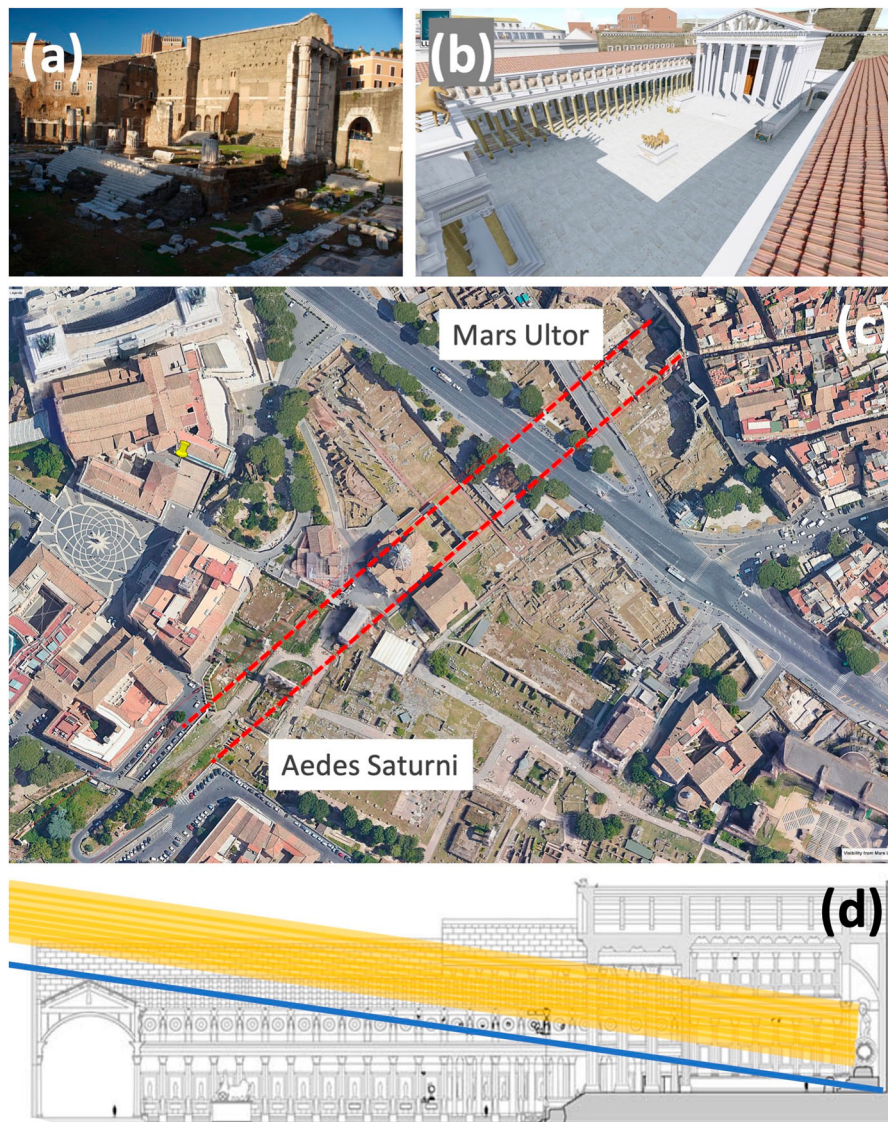


Figure 4. (a) The Mars Ultor temple remains at the Forum of Augustus today. (b) Reconstruction of the Forum and its forecourt, from 'Art of Empire: Forum of Augustus', accessed 27 April 2021, <https://moniquewebber.omeka.net/items/show/31>. (c) The temple of Mars Ultor is facing the area of the Aedes Saturni. (d) Reconstruction of the section of the Forum plus the temple and the illumination events (for details, see text).

of them was used as the gnomon of the Horologium Augusti. The one adorning the Piazza dei Popolo was taken to Rome in the year 10 BCE to be placed in the Circus Maximus, with an inscription presenting it as having been dedicated by Augustus to the sun. Pliny (*Historia Naturalis* 36.14.69–71, 15.72–4) discusses the technical prowess involved in transporting the obelisks to Rome, and their solar symbolism. As Gregory (2012, 24) states: 'In erecting obelisks in the Roman ritual landscape, Augustus proclaimed his authority as the legitimate mortal embodiment of divine solar power'.

We would like to add a fourth element here, the Augustan Forum itself, and particularly the temple of Mars Ultor that dominates it (Figure 4a and an ideal reconstruction in Figure 4b). We have measured the orientation of the Augustan Forum (Table 1) and the azimuth of the general layout in the direction,

from the inside out of the Mars Ultor temple is towards 231° . This orientation is perpendicular to that of the Iulian Forum, as the new project by Augustus was directly connected to this one (Ungaro 2013). However, it should be noted that the Mars Ultor temple is not facing the Venus Genetrix one, nor the Curia Iulia, the main two buildings of the previous project. As can be seen in Figure 4c, it is directly facing the area from where the Aedes Saturni could be seen, and perhaps the Iuppiter Optimus Maximus temple on the Capitoline hill, symbolically linking this area to the most sacred one in Rome from its origins.

Despite this, the Aedes Saturni was possibly not visible from the Mars Ultor temple due to the presence of the surrounding porticoes, particularly the meridional one. The area is now under the Via dei Fori Imperiali and a clear reconstruction of this area is not possible (Ungaro 2013). Considering the different

reconstructions for the height of this section it might have been possible that the winter solstice sunset would have played a relevant role, illuminating the *cella* of the temple. Figure 4d provides a reconstruction of the Forum section plus the temple following Cavallero, Delfino, and Di Cola (2017). It allows an evaluation of the illumination of the statues of Mars and Venus located at the rear of the temple's *cella*. The blue solid line indicates the altitude of the sun during winter solstice at the time it would be in line with the temple's orientation. At that moment it would be seen directly illuminating the cult images of the gods in the *cella* of the temple (yellow area). Most probably such images were only entirely illuminated by the sun at that time of the year, again indicating the significance of the winter solstice in the Roman ideology.

Conclusion

The sky, as part of the landscape, belonged to the environment of the Roman towns in general and it was embedded in the Roman world view from the mythical origins of the Urbs itself. Interestingly, the past behaviour of the part of the environment above the horizon line is quite well known and can be reliably reconstructed today. In this regard, the systematic study of the relationship of the built environment with the horizon and the rising and setting of the heavenly bodies provides a useful tool to grasp the concepts that ancient populations might have worked with. The need to erect temples and towns in accordance with a culturally perceived cosmic order prompted several ancient societies to interact with their environment in particular ways (e.g. the Egyptians, Belmonte and Shaltout 2009).

The prominence of the winter solstice in the orientation of different elements of Roman towns, particularly at the time of Augustus, establishes a set of deeply interesting symbolic relations with cosmological implications. First, it connects Augustus with the origins of Rome, establishing him as a new founder. Second, the cultural use of the associations of Apollo with the sun, well-established for Greece but less so for Rome, and the Egyptian obelisks, legitimises Augustus's power for some of the most prominent cultures in the eastern part of the Empire. Finally, the imposing urban development in the western part, with the prevalence of the winter solstice orientation, links those towns with Augustus, but at the same time with Rome.

The semantic Latin play between *urbs* and *orbis*, town and world, finds thus a material expression synchronising dozens of towns in vast territories under the same temporal landmark loaded with ideological connotations.

Note

1. <http://dlib.etc.ucla.edu/projects/Forum/> accessed April 23rd 2021.

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