Archaeomorphology and Agrimensores: problem or opportunity?

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Abstract

This paper argues that the works of the Agrimensores are of value in studying the practicalities of land measurement in the Roman world. It discusses ways in which the Agrimensores might be used, not only based on a strict literal reading of the texts, but on the practical circumstances in which these works could be used. The paper combines the statements of the Agrimensores with evidence from Roman literary and legal sources and from archaeology. It uses the colony Arausio, modern Orange in southern France, as a case study.

The paper concludes that the works of the Agrimensores was based on real situations, examples of which can be found in the map of Arausio. The Agrimensores therefore attempted to give general instructions based on situations they had encountered in the field. Sometimes these seem overly schematic or abstract, but this matches the style of Roman legal writing. It is true that the works of the Agrimensores have often been misused in scholarly research, but the paper argues that these texts can be of great value when used in combination with archaeological evidence and other legal and technical texts. Thus, these works can be used to gain a better understanding of the practicalities of Roman land measurement.

Keywords Agrimensores, Arausio, centuriation, land disputes, incolae.

Introduction

As is often stated, it is difficult to use the writings of the Agrimensores as direct evidence of ancient Roman land measurement techniques. It has even been stated that we should ‘discard old hypothesis based on strict interpretations of the writings of the Roman agrimensores or later texts’ (Landscape Archaeology Conference, panel abstract). I agree that the way in which these treatises have been used in the past is not conducive to a greater understanding of the exact nature of Roman land surveying and of the circumstances of the specific locations that have been studied in the past.

Nevertheless, I think that the writings of the Agrimensores are extremely important in our study of the Roman landscape. They can tell us much about the way the Romans understood the landscape. The Agrimensores provide a unique written source from the Roman period: a manual of instruction for mensores, whose primary task was to carry out accurate measurements of land, to solve land disputes, and to assign plots of land to individual settlers in colonies (Campbell 2000, lii-liii). It is to be expected that the case studies described in an instruction manual would closely reflect the situations that a (trainee) mensor could expect to find on the ground, and we therefore cannot dismiss the text as merely theoretical or philosophical, with no connection to reality.

In this paper I will try to find a more suitable way in which the Agrimensores should be used, which is not only based on a strict literal reading of the texts, but on the practical circumstances in which they could be used. The paper will attempt to combine the often unclear statements of the Agrimensores with evidence from Roman literary and legal sources and from archaeology. On the one hand, the theory presented in the manuals, for example on the different types of land dispute, finds confirmation in legal texts, such as the Digest. On the other hand, the theory about different
Fig. 1: The centuriation grids of Arausio. Source: Chouquer & Favory 2001, 324.
types of trees and soils, specific types of boundary
and categories of dispute, and the challenges of
measuring in uneven terrain, can be corroborated
by archaeological research. This paper will use
the colony Aenusio, modern Orange in southern
France, as a case study.

Distributions at Aenusio

One of the most impressive documents regarding
land measurement systems is the surviving land
register of Aenusio. This consists of a large num-
ber of small fragments of a map, measuring 7.56
metres long by 5.90 metres high. The map displays
both geographical features and information about
the amount of land subject to tax. It is generally
recognized that there were three different centu-
ration grids in the territory of Aenusio, called A,
B and C (fig. 1). However, only a few fragments of
the map have been preserved, and the survival of
traces in the landscape varies from area to area.
In some areas, such as the territory covered by
centuriation grid Orange B, a close relationship
have be attested between archaeomorphology,
geomorphology and agrarian field systems (Jung
2000), but this is not always the case.

The grids have been reconstructed according
to the traditional methods, e.g. aerial photography
and studies of maps, surviving roads, field bound-
daries and other elements of the landscape that
fit a Roman centuriation system, as well as the
toponymy in the area. However, the limited nature
of the evidence has led to enormous scholarly
debate about how the centuriations depicted on
the map should be matched to the contemporary
landscape.

The location of grid B is certain: it was placed
between Aenusio and Montélimar. For A and C the
locations are less certain. Chouquer (1983) argued
that grid A was located to the north of Arles, near
Carpentras and Avignon, and therefore belonged
to the colony of Arelate, founded in 46-44 BCE
(Leveau 2010, 133-4). Grid C has two areas, one
central and one in the west, including islands in
the Rhône, the insulae Furianae. Many different in-
terpretations have been offered as to where grid C
should be inserted. Some think it does not belong
to Aenusio at all, but to Valence (Salviat 1986, 114;
Arnaud 2003, 25). Decramer et al. (2006, 99) hold
that grid C was located between grids A and B, between Carpentras and Avignon (Decramer et al.
2006, 99). However, this view is not generally ac-
cepted (Chouquer 2008, 208-9; Leveau 2010, 136).
Chouquer (Chouquer & Favory 2001; Chouquer
2015) finally suggests that C indeed belonged to
Aenusio, and was located just to the south of grid B.

The debate about the location of the grids
should be connected to the date of the centuria-
tions. The colony Aenusio was settled around 36-35
BC for veterans from the second legion Gallica.
An inscription of 77 AD records that ‘the emperor
Vespasian ... so as to restore the state lands which
the emperor Augustus had given to soldiers of the
second legion Gallica, but which for some years
had been occupied by private individuals, ordered
a survey map to be set up, with a record on each
‘century’ of the annual rental.’ For a long time it
was believed that this action of Vespasian led to
the creation of grid A, which was created by the
local magistrates, and that grids B and C were
more recent (Dilke 1971, 159-77; Rivet 1988, 275).
Piganiol thought that they were all created by
Vespasian, although they were based on an earlier
centuriation in 35 BC (Decramer et al. 2006, 93-4;
Salviat 1977). Others believe that A was made in 47
BC for the colony of Arelate and B for Aenusio in 35
BC (Moatti 1993, 91 n. 37, but see yet other views
in El Hasroufi 1994, 373; Assénat 1994/5).

Christol (2006) points out that the execution of
B and C were the same. He thinks that because
in both grids the centuriae measured 708 metres
square, they can therefore certainly be dated to
the triumviral or Augustan period (see also Chou-
quer & Favory 1992, 102). This is not necessarily
the case, since the size of centuriation grids does
not necessarily determine their date (Dall’Aglio &
Rosada 2010; Leveau 2010, 139). Christol argues
that the territory of the colony in 36/5 BC consisted
of grids B and C, although a second settlement
of veterans may have taken place around 15-10
BC (Bellet 1992, 51). Excavations near one of the

LAC2014 Proceedings | DOI 10.5463/lac.2014.20
limits of grid B have yielded finds from the late first century BC, suggesting that the grid was laid out in the Augustan period (Bel & Benoit 1986; Arnaud 2003, 25). An amphora workshop dated ca. 20-10 BC was also found within grid B (Pérez 1986; Decramer et al. 2006, 99-101; contra Chouquer 1992, 135).

Arnaud (2003, 25) suggests that the centuriations belonged to different colonies, but were kept in Arausio as a central administrative location. It is indeed clear that the centuriation grids formed part of a coordinated whole, even if the date is not entirely certain. It now seems likely the three grids were made by Vespasian. These grids covered the area from the Mediterranean up to the southern border of the colony of Valence, and cancelled all pre-existing land measurement systems in the area. However, most of Vespasian’s measurements were based on one or more measurements made in the triumviral and Augustan period (Chouquer 1983, 291; 2015; Leveau 2010, 134, 140).

Land distributions according to the Agrimensores

A complicated procedure of land distribution occurred when a colony was established, as appears from the writings of the Agrimensores. Land was assigned to new settlers, but could also be restored to the local people who had previously occupied it; in this case the land was usually assigned to these people as a whole, without assignments to individuals. Sometimes the locals received back the same land which they had held previously; sometimes they received land in a different area.

The second writer in the Agrimensores called Hyginus explains why it is so important to have a clear system of measurement: ‘If the nature of the locality permits, we should follow the system; but if not, we ought to stick as closely as possible to our system. ... If we act otherwise, each individual will have his own measurements, the decumani will be called by their proper name, similarly the kardines, the land will be bounded by markers, and nothing will be lacking except a system in the work, which will have a standing among experts’ (Hyg. 2, 145.12-18, 22-23). This will then ensure that no complaints will arise.

Land was usually also assigned to the town in common: this ‘will belong to the city itself, and it may not be sold or alienated from public ownership’. It was to be ‘used for its support’, e.g. woods and public pasture land. There was also land granted to the ordo decurionum of the town, also defined as pasture and woodlands (Hyg. 2, 147.3-4; 155.46-157.2). Other land was not allocated, because it was not needed for individual settlers, and could be granted to all the landholders as common pasture land; other land was granted to individual farms as pasture land, although it still belonged to the colony and the holders had to pay rent for it (Hyg. 2, 157.20-29).

Fig. 2: A typical centuria, as depicted on the Arausio map. Source: Piganiol 1962, 157.

1 The line numbers in references to the Agrimensores refer to the edition of Campbell 2000.
The map of Arausio

All the different types of land described by Hyginus are clearly visible on the maps of Arausio. Land marked EX TR (ex tributario, i.e. withdrawn from tribute-paying status) was assigned to veteran settlers, who did not have to pay tribute; at Arausio they may have received 33 1/3 iugera each (Piganiol 1962, 56). Land marked REL COL remained in the hands of the colony; often these were pasture lands available for rent. In grid A land marked RP appears, i.e. rei publicae. This belonged to the Roman state; by the time grid B was made, these lands had been apparently taken over by the colony. SVBS were subseciva, areas either at the edge of a territory where a whole centuria could not be completed, or in the middle of centuriated land where a natural feature limited the agricultural use of the land. Fig. 2 shows a typical centuria, of which 10 iugera have been assigned to settlers.

Three different types of land were left to the colony, and rented out at different rates. The list shows how many iugera of each type existed, the price per iugerum, and the total income this brought into the colony’s treasury. It then lists the names of the people renting the land; in this case all the land was rented by Maccius Gratus and Maccius Maternus.

An interesting group marked on the map are the Tricastini, the original inhabitants of the area. They were granted the right to keep some of their own lands. Centuriation grid B is the only one that records land TRIC RED, i.e. Tricastinis redditia. Much debate has focused on when the Tricastini were granted the use of their land. They had apparently been given Latin status when the colony was founded and were granted colonial status by the Flavians, meaning that they now received Roman citizenship. Some scholars think therefore that the Tricastini received land in the Flavian period, and that grid B was created for this reason, because only this records land TRIC RED (Piganiol 1962, 55). It would make more sense, however, if their position had been clarified soon after their defeat, and that the measurements identifying their land had been made earlier. Perhaps this occurred in Caesar’s time, when many indigenous peoples were given Latin rights (Salviat 1977, 116).

Of the surviving parts of the inscription, covering 245 centuriae, 53.1% was assigned, 36.2 restored to the Tricastini, and 10.7 left to the colony. It seems that not a very large amount of land was taken from the Tricastini; only a relatively small number of settlers was established at Arausio, so that much of the confiscated land was not needed. The lands assigned to colonists were mostly fertile, low-lying areas in the Rhône valley, while the lands of the Tricastini were mostly in the less fertile mountainous areas. The modern landscape of the area is indeed quite hilly and mostly covered in forest. This indicates that the Tricastini were deprived of their most valuable land; still, some centuriae assigned to veterans are located in the middle of the area traditionally belonging to the Tricastini. In general, we can see that the theory of land measurement as presented in the Agrimensores confirms the picture on the ground, as indicated by the Arausio map.

The Agrimensores on land disputes

The Agrimensores have much to say about land disputes and how the correct measurement of land could help to solve these. The most common disputes were those about the ownership of land, either between two individuals, between individuals and towns, or between different towns. In such cases a mensor could be called in to determine the exact location and size of the plots under dispute. The works of the Agrimensores are clearly intended as instruction manuals for people who measure land, especially in conflict situations. It would therefore make sense to take them seriously, since they can tell us how what kind of approach the Romans took in solving such conflicts.

Frontinus discusses in detail the different types of land dispute. There were two main types: conflicts about boundary (finis) and about site (locus), but he subdivides these into fifteen smaller categories (Frontinus, 5-9). It is not always clear exactly what the differences were between the catego-
ries, but some types of dispute clearly occurred often. Very important was dispute about ‘boundary markers’, where two neighbours disagreed about the position of the markers on their land (Ag. Urb. 27.42-29.2). Sometimes it was difficult to see what constituted a boundary marker, e.g. when markers had been put up to denote an area used for sacrifices. Many different types of markers could be used, including natural elements, so it was not always easy to see whether something was a marker or not. People could also exchange lands, so that the boundary became unclear (Ag. Urb. 31.5-14; Diod. Sic. 107.17-109.9, 24-36, 111ff; Hyg. 1, 81.6-36, 93.23-95.39). It is clear that the exact definition of what was a boundary stone was very important, since the incorrect placement of such stones could easily give rise to legal disputes. It would not always be possible to check the correct situation on a map.

Another important conflict concerned ownership (proprietas). This occurred when people had been assigned separate tracts of forested land in private ownership, far away from their own farms, in which case it may have become unclear who owned which forest. Many disputes revolved around people using land belonging to the colony, and gradually appropriating it as their own. People would for example usurp land that had been set aside to maintain public works. A dispute about subseciva could occur when someone occupied subseciva which had not been assigned to him or did not pay rent on the use of subseciva (Ag. Urb. 43.32-45.6; 45.7-20; Hyg. 1, 99.26-32). There was also the right to access communal pasture, which could also be occupied by private individuals (Ag. Urb. 37.8-21). The distinction between these different types of dispute seems to us of little practical use and apparently overlapped, but to Frontinus at least there were clear differences between each of them.

Theory and practice of land measurement

Even if there was no dispute, the nature of the terrain could make land measurement very complicated: ‘In one spot there might be mountains in the way, in another a river or embankments or a quagmire, with frequent unevenness in broken ground, often also areas of cultivated land’ (Frontinus 13.21-3). It sometimes occurred that ‘landholders have by agreement ceded an entire terrace to those occupying the land below, because of difficulties of terrain, since it was increased in size by the land beneath it, and were happy to place boundary markers along the top of the ridge, following no principle’, as Agennius Urbicus describes (31.1-4).

The map of Arausio clearly shows the difficulties of land measurement. For example, it shows rivers and roads in various places, with the land around it measured and assigned. However, it was of course not possible in such cases to assign the settlers neat square blocks, as in a centuriation on perfectly flat land (Leveau 1999). Small islands in rivers were usually not assigned; this may have been due to variable nature of rivers in antiquity and the impracticality of cultivating such land, as well as their possible unsuitability for agriculture. Book 41 of the Digest talks at great length about rivers changing their course and the changes in

Fig. 3: Centuria with a river cutting through the assigned land. Source: Piganiol 1962, 206.
land ownership which this entailed. It was not unthinkable that a large part of the riverbank, assigned to an individual, would simply be washed away; no compensation for this was available. Gaius states: ‘If, wholly abandoning its natural bed, a river begins to flow along another course, the original bed becomes the property of those with holdings on the former banks to the extent of those holdings along the bank ... If the new bed occupies the whole of some person’s land, then, even though the river returns (later) to its original bed, the man whose land it was, strictly speaking, has no right in the newly abandoned bed, because the relevant piece of land ceased to exist with the loss of its shape and form, and since the erstwhile owner has no neighbouring land, he cannot have any interest in the bed by right of proximity.’ Gaius does say, however, that ‘it is scarcely likely that this argument would prevail’ (Gaius, Dig. 42.1.7.5).

Thus, even if technically the man who lost his land when a river changed its course to run over it, would not have any right to land if the river changed its bed again. But it would be likely – but not certain! – that in such a situation, a judge would take into account the position of the man who had lost his land, and his interests for the future, and assign him the land he had held before. However, in the Digest the situation is fairly simple: the river takes a new course and then returns to its old course. In reality rivers would change their courses and not return to the old bed, in which case people had no right to compensation; or they would change course several times in different ways, and would not just take away all the land of one owner, but small parts of the lands of several owners. All this made the situation more complicated than the law could prescribe, in which case a mensor had to step in to solve the ensuing conflicts.

The Digest also discusses what happens to islands that appear in rivers, e.g. because the river creates an extra loop (thus cutting away part of someone’s land), or by alluviation in the river bed: ‘if it appears in the midstream of the river, it is the common property of those who have holdings on either bank of the river, ... but if it lies to one side of the river rather than the other, it belongs only to those who have holdings on that bank’ (Dig. 41.1.7.3; see 41.1.30.2). Clearly there could be disputes about whether an island was exactly in the middle or more to one side of the river bed! Gaius also states that ‘if the force of the river should detach part of your land and bring it down to mine, it obviously remains yours’ (Dig. 41.1.7.2), but does not explain how this works in practice; how could you keep track of which land had ended up where, and how could you access it if it was on someone else’s land, perhaps on the other side of the river?

Rivers were also very important in the landscape of Arausio; the map depicts many of them. Fig. 3 shows an example of a river cutting through the assigned land. Most of the land was assigned, and the rest was rented by two women, Iulia Severa and Iulia Materna. If the river would change its course complicated disputes could arise between the various people who had been assigned land, and also between landowners and those who rented land. At least those who rented could simply rent other land elsewhere if the land had washed...
away. The owners had no such option, at least not in all cases (Leveau 2010, 133).

Sometimes land was set aside to accommodate changes in the river’s course. The *mensores* could decide to leave some *iugera* in a *centuria* unassigned and leave the rest free for a river. Fig. 4 shows *centuria* D XVIII VK IV, which has a river running through it, but has been wholly assigned to settlers. One assumes that possible changes in the river would cause problems, but apparently this was not seen as a problem. It may be that the river was very narrow – much more so than it appears to be on the map – in which case it was not necessary to reserve space for it.

The river Rhône flowed through the territory of *Arausio*; several islands in the river were part of the colony’s land. Fig. 5 depicts some islands in the river, the *insulae Furianae*. Twenty-five *iugera* were assigned to the river (*fluminis*), while 8 and 2/3 were set aside for the *fossa Augusta*, a canal perhaps dug by the instructions of the emperor. There was also land for a *vicus*, a small settlement.

As we saw above, hills could also be problematic for land measurement; much of the territory was quite hilly. In many *centuriae* most of the land remained in the hands of the colony, available for rent. The values varied according to the quality of the land: *centuria* DD XIV VK V has 162 *iugera* assigned to settlers; of the remaining 38 *iugera*, 37 are rented out at 9 *asses* per *iugerum* – this rent is quite high, and the fact that most of the land was assigned shows that this was in general good land. On the other hand in *centuria* DD XII VK IV only 60 and 2/12 were assigned, with 139 and 10/12 remaining for rent at only 4 *asses* per *iugerum*. Clearly the land here was of much lower quality, even though the two *centuriae* were close to each other.

**Conclusion**

We may conclude that the works of the *Agrimensores* are of value in studying the practicalities of land measurement in the Roman world. It seems clear that their content was based on real situations, of which examples can be encountered in the map of *Arausio*. The *Agrimensores* therefore attempted to give general instructions based on situations they had encountered in the field. Sometimes these seem to us overly schematic or abstract, but this matches the style of Roman legal writing. It is true that the works of the *Agrimensores* have often been misused in scholarly research, but I think that in combination with archaeological evidence and other legal and technical texts, we should continue to use these works to gain a better understanding of Roman land measurement techniques.
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