The Potenza Valley Survey: Preliminary Report on Field Campaign 2002

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in collaboration with
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Abstract

This contribution presents the third report about the on-going survey project of Ghent University in the Adriatic valley of the River Potenza (Marches, Italy). The project investigates the settlement history of the valley, essentially between 1000 BC and AD 1000. In 2002 substantial results in the whole valley have been obtained with the help of remote sensing techniques, while the field surveys and study of surface finds have focussed on the protohistoric and Roman occupation of the coastal area. The article comprises also an introduction to geo-archaeological investigations and the use of an original GIS and presents some results concerning Stone Age finds.

INTRODUCTION

Since 2000 the Department of Archaeology at Ghent University conducts a survey project in the Central Italian region of Marches, titled *The Potenza Valley Survey*.[1] Thanks to the acquisition of additional financial support[2] in 2002 we are able to prolong this research program at least until 2006. The aims and methods of this long term-project, as well as the results of the first two field campaigns in 2000 and 2001, have been published in *BABesch*.[3]

The project's survey-area remains constricted to the circa 80 km long valley of the river Potenza in Adriatic Central-Italy (Marche). Within this broad area three test-zones for more intense fieldwork are chosen, situated in the upper Potenza valley (near Camerino), in the middle valley (near Treia) and in the lower valley (near Porto Recanati) (*fig. 1*).

As the new financial support had been obtained within the framework of an international research program, which focuses on Late Antiquity (3rd-7th centuries),[4] very special attention is now paid to this particular period. Nevertheless the original aim to measure long-term evolutions and changes between 1000 BC and AD 1000 will generally be sustained. As has been emphasized elsewhere, it is precisely such a long-term view, which allows placing the developments of ancient society in a sufficiently broad perspective. Still, other periods are not ignored, and it is intended that the analysis of the survey results will range across the whole period of human settlement.

In this report we will present some preliminary results of a substantial part of the aerial photography and the archaeological fieldwork of 2002, a first evaluation of the study of the surface finds of 2002 and a preliminary introduction into geo-archaeological work in this coastal area during 2002. The report also includes an introduction into the elaboration of GIS applications in the project and a first report on the study of Stone Age material recovered in the whole Potenza valley.

AERIAL PHOTOGRAPHY IN THE POTENZA VALLEY IN 2002

Frank Vermeulen & Jacques Semey

In earlier reports and publications[5] we have particularly stressed that active aerial photography from a low flying aircraft is one of the main detection techniques being applied in the Potenza Valley Survey. As the Ghent team has extensive experience with this kind of remote sensing and its GIS applications, and conditions for aerial photography are very favourable in the central Marche area,[6] a program of intensive flying and oblique aerial photography has been developed since 2000, with yearly campaigns of systematic detection between the months of April and September. The methodology applied here has been explained elsewhere.[7]

In 2002 we considerably increased the number of flights, in total some 20 hours of flying, particularly during the months of April, May and June.[8] In this way our Potenza collection of oblique aerial images was extended to a total of more than 4000. This resulted not so much in a spectacular

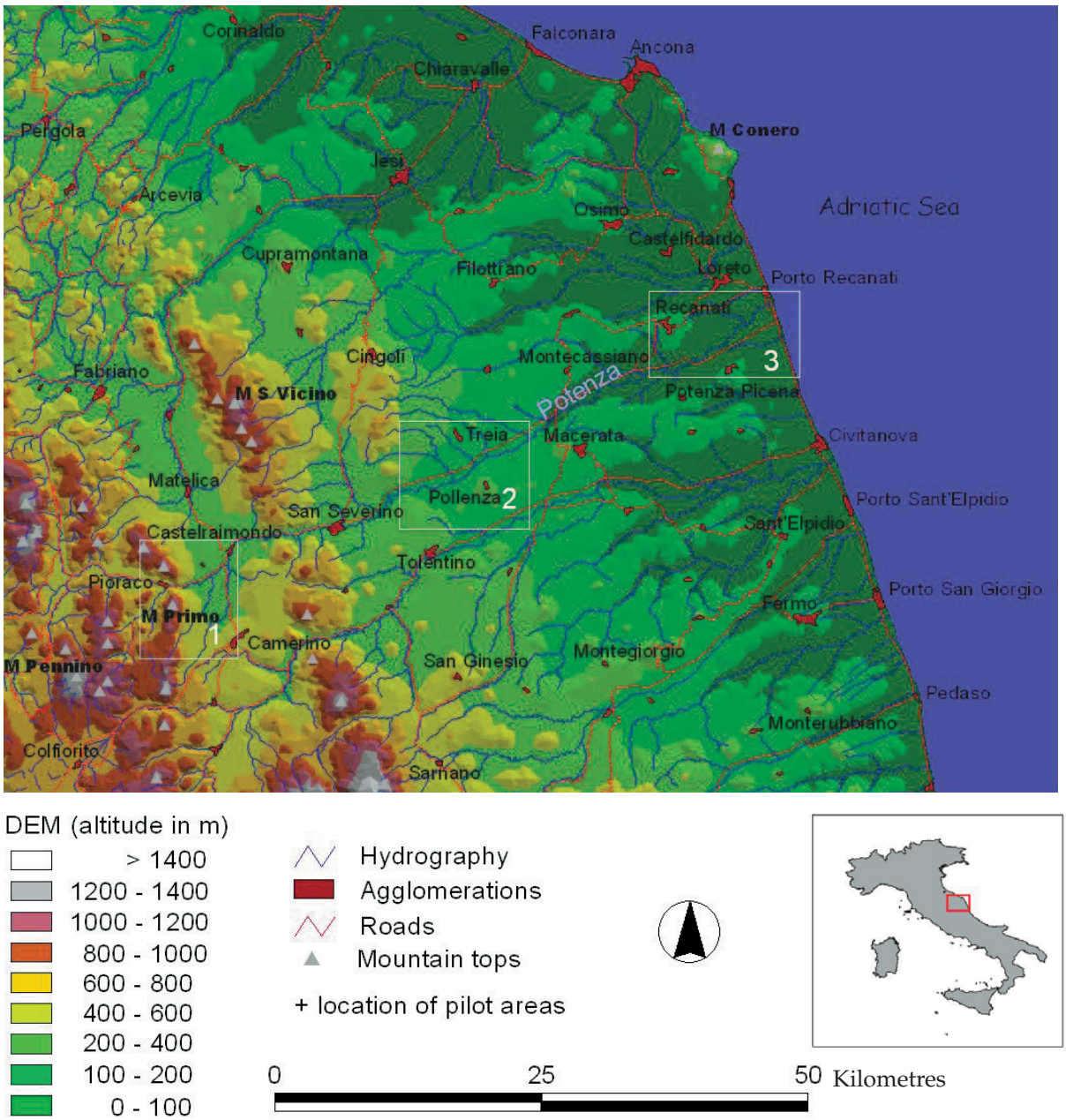


Fig. 1. Topography of the Potenza river basin and surroundings, with indication of the 3 sample zones (illustration by Tanja Goethals).

increase of the number of new possible archaeological sites and ancient field structures (such as fragments of roads, ditches, pits, …), but more in a follow up of known sites of which much new information could now be gathered. As in earlier years this follow up also concerned the many new sites that had been found during our field-walking campaigns and whose location, extent and appearance could now be investigated from another 'point of view'.

The results of this year's work are again very diverse. For reasons of briefness we will discuss here only the three types of discoveries which yielded the best information: geo-traces, proto-historic settlements and a variety of Roman structures and sites.

Fig. 2. Crop marks of a small (circa 30x20 m) villa discovered during a June flight in the Upper Potenza valley in Pioraco (photo F. Vermeulen).

To the already wide range of traces belonging to the geomorphology of the ancient landscape of the Potenza valley (terraces, traces of erosion, …) we now added a great number of paleofluvial gullies, which were distinguished as crop marks or soil marks in the arable land of the Potenza plain. Especially in the coastal area a whole series of such traces were added to those already noted. They will be of great help in the pursuit of a reconstruction of the ancient river courses near the Adriatic coast, which will be combined with the data of the corings (see below) and of the distribution of archaeological sites in the area.

The often more difficult to trace settlements of Bronze and Iron age in the valley, which form only a small group among the sites discovered through fieldwalking, were now a bit better revealed during our 2002 flights. Especially in the upper valley, near Camerino, we could plot some clear crop marks of pits and ditches seemingly associated with the small protohistoric sites that were located here by way of line walking. Such traces were e.g. distinguished at a probably early Iron Age site near Mergnano San Pietro, discovered in 2000.[9] The larger and more centralised protohistoric sites of the Monte Franco in the middle valley and Montarice in the lower valley were also regularly over flown. Crop marks and especially soil marks procure us here clear indications of the extent of the settled zone and, especially in the case of Montarice, of differences in erosion of the archaeological layers and the possible presence of a circuit wall or earthwork.[10] Their compatibility with the field survey results is striking, an assessment which will be closer examined within a GIS environment in the near future.

Again the Roman period is best documented in our aerial database. A majority of the now almost 100 new survey sites of that era discovered in the three sample zones and in some other parts of the valley are also visible from the air. In most cases amorphous soil marks photographed at the end of September coincide well with concentrations of settlement debris and ploughed up occupation layers on the surface.[11] In only very few instances, however, crop marks have also revealed linear features belonging to the walls of buildings. Great was our surprise, during a June flight over the upper valley survey zone in Pioraco, that one of the smaller line walking sites indicating a Roman settlement suddenly revealed a very clear series

Fig. 3. Crop marks of Roman buildings and street in the urban center of the municipium Trea*, discovered in May 2002 (photo F. Vermeulen).*

of linear crop marks forming the complete plan of a small villa-like structure. On fig. 2 we remark a compact rectangular building with a very symmetrical layout and several rooms centered on a central courtyard. On its southern side it could also have a portico overlooking the nearby river Potenza, situated only some 50 m south of the building. This discovery is important as it procures us not only an excellent proof of the reliability of the fieldwalking results, but gives us also the first complete (?) plan of a Roman rural settlement in the central Marche region. The surface finds indicate here an Early Imperial date but a re-survey will be needed to refine the chronology.

The most spectacular results of the flying season concern, however, the Roman town sites in the valley. Four Roman cities are located in or near the Potenza plain[12] and all of them were abandoned and not built over in medieval times. As the former urban areas are now mostly covered by arable land, we still have the opportunity to use survey techniques, such as remote sensing, on their surface and this approach was much in focus during the 2002 campaign of flying. The middle valley towns of *Septempeda* and *Ricina* revealed only a limited number of traces. Some of them seem to be connected with the town walls and suburban living quarters or cemeteries, but they are still difficult to interprete.

Our observations in the middle valley town of *Trea*, especially during a late April flight over the growing grain fields, were most satisfactory. The urban topography of the municipium of *Trea*, probably founded during the first half of the 1st century BC, is still ill-studied. Notwithstanding the start of archaeological research on the site during the late 18th century and a reactivation of scientific study since the 80's of the last century, only limited excavations have been done here. Thus far only very restricted information about the possible urban grid was assembled, indicating parts of a couple of Roman buildings and presenting a hypothesis for two street directions.[13] During our April flight, succeeded by a series of follow ups in the course of later months, we could reveal the major elements of the central part of the Roman town (*fig. 3*). Situated on a pronounced plateau this central part disclosed in remarkably clear crop marks the presence of: a partly bended *decumanus maximus* of the town, a whole network

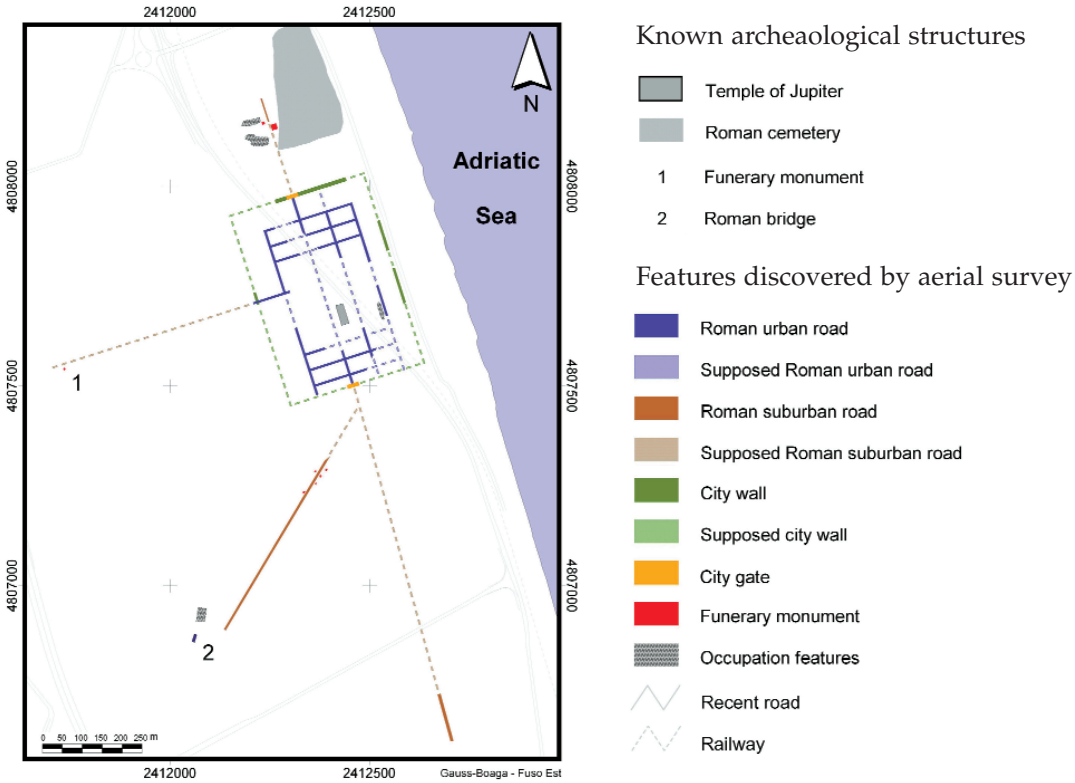


Fig. 4. The topography of Roman Potentia *and its suburban area, combining old discoveries, new aerial photography data and additional information from systematic fieldwalking (map G. Verhoeven).*

of streets parallel with or at right angles to this east-west oriented main street, the location of the forum with portico and surrounding monumental buildings and a series of other buildings (shops, houses) dispersed within this city grid. Although the urbanisation seems to be laid out in a disorderly fashion, we suspect, as is often the case in 1st century BC new cities, that some modulated system was applied here. The mapping process of these oblique photographed structures, a difficult exercise here because of the hilly topography of the site, will no doubt explain the organisation behind the city layout. During the 2003 campaign we will have to supplement this aerial information with precision measurements in the field.

The flights over the fourth city, *Potentia*, lying at the mouth of the river, were also accelerated. Again some new elements of the urban extent, street pattern, defensive architecture and the suburban context of this colonial town, founded in 184 BC, were now mapped. We started to combine these new aerial views of crop and soil marks with other remotely sensed data, such as available vertical photographs and manipulated satellite data. Within a GIS environment they were also confronted with the new information available from our field approaches, namely the archaeological fieldwalking and a first geomorphologic survey of the area (see further).[14] As our data are much more detailed we think that the plan of the urban centre and especially the suburban areas around Potentia is now much more detailed and in a sense more reliable than what was known previously (*fig. 4*) We refer first to the layout of the circuit wall of this rectangular city, the details of the inner street network and the emplacement of at least two gates (north and south). Although still no other buildings inside the town can be differentiated, we isolated some individual traces such as pits and possibly gullies. Most innovating are our discoveries by way of aerial photographs of extra-mural Roman infrastructure, such as at least three roads leaving town, two zones with funerary monuments along these roads and several discolorations indicating suburban living quarters. The details of this new vision on *Potentia* will be presented in a later publication, when more chronological data of the pottery survey and possibly the results of geophysical work during the 2003 campaign are available.[15]

THE HOLOCENE EVOLUTION OF THE COASTAL PLAIN IN THE POTENZA RIVER BASIN AND SOME GEO-ARCHAEOLOGICAL ASPECTS OF THIS STUDY AREA

Tanja Goethals, Morgan De Dapper & Beata-Maria De Vliegher

The Holocene evolution of the coastal plain

In the coastal plain of the Potenza the Holocene changes are due to an interaction of both anthropogenic changes and natural sea level changes. In the early Holocene, as a response to the Flandrian transgression, the coastline retrograded to about 4 or 5 km inland of the present coastline. The coast of Marche region was at that time an alternation of rocky promontories and pocket beaches (*fig. 5*). The shoreline did not move substantially until at least 4,000 years ago, in spite of the sediments that were transported to the sea by the meandering streams. Indeed the maximum sea level was reached in the period between 7,000 and 4,000 years ago according to Calderoni *et al*. (1996).

The coastline started to move seawards 4,000 years ago. In the 3rd century BC the coastline was rectilinear, with sandy-gravely beach ridges in a direct line with the cliffs, and with coastal lagoons and swamps behind those beach ridges (Ortolani/ Alfieri 1979). The reason for this infilling with sediments, according to Coltorti (1997), was the first systematic land reclamation and following soil erosion in the middle courses of the river during the Bronze and Iron Ages. According to Butzer (1982) slash-and-burn was gradually replaced by sedentary agriculture. The transported fine sediments were trapped at the river mouth by the beach ridges and settled in the lagoons. Stagnating waters in the swamps engendered malaria.

Roman roads were constructed on the beach of the internal lagoons, because the beaches of the bays themselves were not stable and could be pierced during storm tides. Roman ports such as Cupra Marittima, Torre di Palma and Martinsicuro (Truentum) were constructed at the base of the cliffs, in areas not influenced by river dynamics (Alfieri 1983). At that time the coastal plain was covered with thick forests, which were cut down from the 15th century onwards for land reclamation (Baldetti *et al*. 1983). Most sedimentation took place during the Roman Age and the early Middle Ages, diminishing afterwards due to anti-erosion measures and the decline of the population and natural reforestation after the 'barbaric invasions'. This sedimentation filled the lagoons and swamps, turning them gradually into dry land.

From the 16th century to the end of the 19th century, the coastline again moved seawards at a fast pace, because of the deforestation for land reclamation of the entire periadriatic zone. The total distance travelled by the coastline amounts in some places of the Marche region to more than 500m (Coltorti 1997). The result was that almost all cliffs became inactive, at their base beaches appear, with urban centres, such as the town of Porto Recanati at the mouth of the Potenza. The initial core of this town now lies 150m inland (Coltorti 1997). The only active cliffs are present along the Monte Conero massif and in the north of the Marche region. Many coastal swamps, amongst them the ones of the Potenza river, are filled up with sediments; forests are cut down; and many rivers are diverted and/or straightened. The anti-erosion measures and reforestation of the slopes with the 'alberata' system stopped the progression of the coastline in the 20th century. The trend even inverted, so that the coastline now has to be protected against erosion.

A specific geo-archaeological approach in pilot area 3: river movements

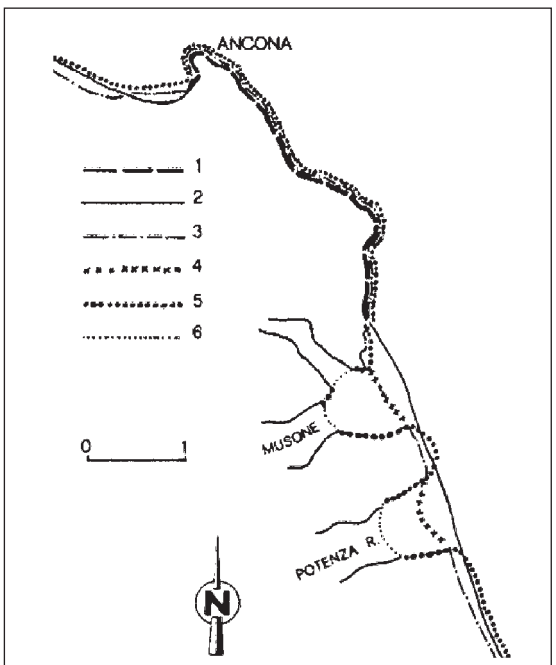
Pilot area 3 (*fig. 6*) is focused on the coastal plain of the river Potenza. Deposition predominates here on a regional and long-term scale. As a consequence river terraces are mostly buried under the nearly flat coastal plain. Some remains of older marine terraces may be present. In the case of the Potenza, the coastal plain near the mouth is about 3 km wide, while the distance between the interfluves is only about 7 km wide. Near the coast old beach ridges, parallel to the coast, are buried beneath clayey flood-sediments. In between these old beach ridges and the present ones, the homogenous loamy clay to clayey loam sediments point to the earlier presence of a coastal lagoon.

Three sites are fundamentally important in this pilot area: the protohistoric site of Montarice, the Roman town of *Potentia*, abandoned in late classical-early medieval times, and the medieval town Potenza Picena, probably founded by the former inhabitants of *Potentia*.

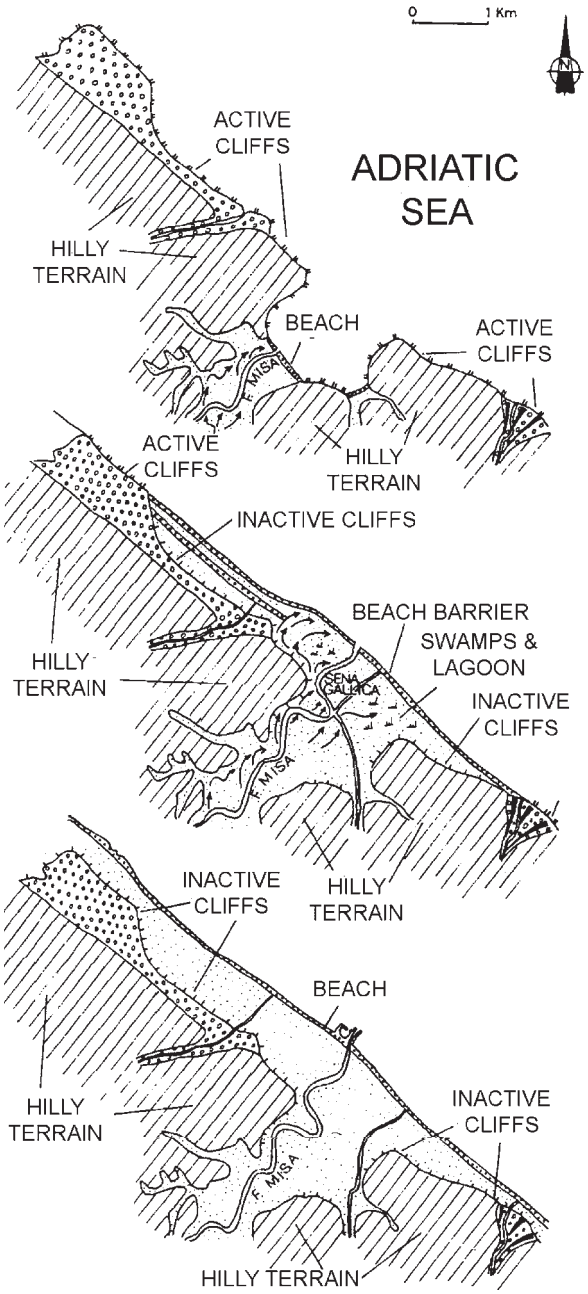
1 The Montarice site, founded in the Bronze Age but important to the Iron Age Piceni culture as well (see further), was only recently ploughed up and discovered at the end of the interfluve between the river Potenza and the river Musone to its north. The site is probably a kind of *oppidum*, a pre-urban circumvallated site. It is situated on a nearly flat surface of about 4.2 hectares large, covered with a fluvial gravel bed and marine clays, and with steep slopes

bordering the entire plateau except on the NE-side. The steep slope at the SW-side is probably due to the recent construction of the motorway Bologna-Pescara, but the others seem natural. Consequently, the defence of the site could be secured by the raising of only two walls, on the afore-mentioned NE- and SW-sides; the other slopes, covered with slope-waste material and probably overgrown with a spiny bush-vegetation, provided natural defence. Moreover, the site enjoys ample view on the coastal plain of the Potenza.

2 The Roman town of *Potentia* was founded in 184 BC at the coast, but is now situated about



1&2 - Present-day active cliffs and sandy coastline.
3&4 - Active cliffs and sandy coastline during the 3rd century BCE.
5&6 - Active cliffs and pockets of beaches during the Flandrian transgression



Beach and barrier beach
Alluvial plain
Swamps and coastal lagoons
Pleistocene marine terraces
Upper Pleistocene alluvial fans
Hilly terrain

Fig. 5. Holocene evolution of the coastal plains in the Marche region. The inset exhibits the position of the coastline during the main Holocene phases; the main figure illustrates the geomorphological effects of Holocene changes in the coastal plain of the river Misa, analogous to the river Potenza (after Coltorti 1997).

Fig. 6. Topography and situation of pilot area 3.
The indication of archaeological sites discovered by way of field survey is preliminary (map T. Goethals).

400m inland, proving again the progression of the coastline since Roman times. It seems that it was located almost completely on a large beach ridge.

3 Potenza Picena is situated on an isolated hilltop, a typical position for the medieval 'incastellamento' movement, when protection against attackers was the main concern.

The river Potenza nowadays flows at the foot of the northern interfluve and the Montarice site, displaced to the very north of the coastal plain. However, the river has been displaced in historical times. Indeed, a Roman bridge remained in the coastal plain of the Potenza, at the locality 'Casa dell'Arco', 1.5 km south of the actual bed.

The research hypotheses stated that the Potenza in protohistory would have been roughly in the same position as nowadays, would then have been displaced to the south to flow under the Roman bridge, and would only recently have been diverted again, possibly with the purpose of reclaiming coastal land (*fig. 7*).

The protohistoric hypothesis is based upon the fluvial terrace, one of the few terraces in situ, and the morphology of the SE-slope of the Montarice plateau: the gradient of this slope is 33°, which is about the maximum gradient that can be established by natural causes in loose sediments. This feature leads to think that this slope has probably been the undercut bank on the outside of a Potenza meander bend for some time before the Roman Age. This would have provided the protohistoric site with extra protection and water supply.

The Roman hypothesis leans basically on the presence of the Roman bridge at Casa dell'Arco. An augering beneath this bridge indeed revealed a fluvial type profile. Radiocarbon dating of the sediments pointed out that the Potenza would have flowed under this Roman bridge until the late Middle Ages. Another argument is the position of the two now buried beach ridges investigated by augerings: they have an opening more southwards than the present river mouth. That these beach ridges already existed during Roman Ages is proved by the fact that the Roman town of *Potentia* is built on top of the northern beach ridge, and that the wall of a Roman pottery furnace found in 2002 by the Ghent survey team is built on a more southern beach ridge (the base material for this ceramics production was of course the lagunar clay). These beach ridges have also been subject to floods during Roman Ages and later, as a clay layer was deposited on top.

In the late Middle Ages and early Renaissance, large tracts of land in the Marchean coastal plains were reclaimed (Cencini/Varani 1991; Nanni/

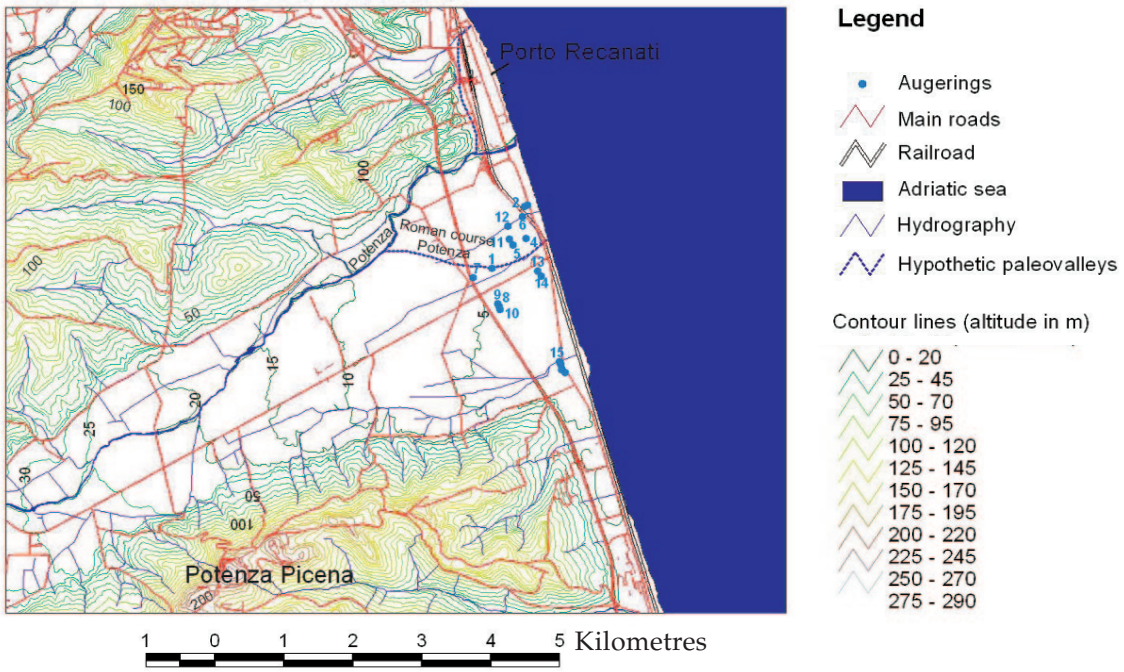


Fig. 7. Topography of the Potenza river mouth and hypothetic paleocourses of the Potenza, with indications of augerings made in 2002 (map T. Goethals).

Vivalda 1987). This probably applies to the Potenza as well. Buli & Ortolani (1947) mention the consent of Pope Gregorius IX (1170-1241) given to the inhabitants of Porto Recanati to make the Potenza, Musone and Aspio rivers debouch together. At the new mouth, a new harbour would be built. The project was abandoned in 1474, but it is likely that already some diversion of the Potenza was caused by this human intervention.

From the previous remarks it is obvious that many arguments support the hypothesis. However, a detailed mapping of the coastal plain by means of augering and geo-electrical measurements should further clarify the mechanisms and processes. It is clear that further new information on the coastal evolution and diversions of the river Potenza are very important to understand long range settlement dynamics in the area.

THE SEPTEMBER 2002 ARCHAEOLOGICAL FIELD SURVEY IN THE COASTAL AREA OF THE POTENZA VALLEY

Frank Vermeulen & Catharina Boullart

The area investigated during the 2002 campaign is situated in the lower valley of the Potenza, near its mouth. The transect of some 25 km², to be field-walked over two summer campaigns,[16] is bordered by the medieval rooted hilltop towns of Potenza Picena and Recanati. It includes the strategic proto-historic hilltop site of Montarice and the Roman colony *Potentia* lying near the original river mouth. The location of both central sites in this area, as well as the immediate contact with the all important coastline are the main reasons for choosing this study area as third intensive sample zone. The general landscape features of this coastal zone are described above.[17]

The methodology of fieldwork in this third sample zone was similar as in the two other survey areas, situated respectively in the upper and middle valleys of the river Potenza.[18] This year however we could make use of excellent, recently published (2000) maps of the Regione delle Marche on a 1/10,000 scale. As these are also available in a digital format this was very helpful for the introduction of the data in the GIS.

As much effort went into the intensive intra-site surveys of *Potentia* and Montarice (see further), the total surface covered by our line-walking was limited this year to a mere 2.57 km² (257 ha). This relatively small area is foremost situated on the southern foot slopes of the valley and in the area of the river plain closest to the coastline. Both central sites excluded, we could however define some 30 new and formerly unknown sites, mostly on the basis of comparatively higher sur-

face artefact density or by the presence of certain surface anomalies. All potential chronologically diagnostic artefacts, all feature sherds (rims, bases, handles), all prehistoric pottery, and all lithic artefacts encountered were collected during the routine field survey and treated as a group according to field number. The still preliminary processing of all archaeological material[19] and a first apprehension of the main topographical aspects of the sites and of some of the off-site finds, leads to a series of limited observations. As the prehistoric and medieval periods are still very under-represented we will not yet discuss them here.

The coastal plain in protohistoric times and intra-site prospection at Montarice

No major sites older than the Roman Age were found in the coastal plain itself. A few small groupings of protohistoric pottery found there must still be evaluated before any firm conclusions are possible. It is probable that such sites are now buried too deep to be found by superficial prospection, but further geomorphologic corings in the plain are needed.

The eastern extension of the hilly ridge bordering the plain to its south, the Monte dei Priori, yielded some protohistoric finds. It concerns at least two small concentrations of protohistoric pottery, some bones and charcoal, found in a greyish layer of organic soil. This material is ploughed up and seems to indicate *in situ* structures. The finds suggest the presence of settlement structures on the upper north-east oriented slope of the Monte dei Priori. The location is interesting as it procures a fine view over the plain and the coastline, but the chronology of the *impasto* pottery found here is still problematic. The site could well be a topographic counterpart of the site of Montarice.

On the left bank, near the Potenza River mouth the aerial surveys of our team in 2000 and subsequent preliminary fieldwalking identified a major protohistoric site at Montarice, on a promontory north of the actual river mouth. In a field of sunflowers were revealed different linear traces (*fig. 8*), some of which probably belong to the ancient enclosure of this imposing protohistoric site. A short field check of the general topography and of some of the internal traces and spots indicates that this site with known Bronze Age occupation[20] and the recording of 'sporadic Iron Age material' by Lollini in 1976,[21] was no doubt also very important in the Iron Age.[22] This circa 4.2 ha large pre-urban structure had possibly a role to play in the control of the river mouth and of the Adriatic shore by a local Piceni-elite. The resemblance with the situation at Montedoro di Scapezzano,[23] near the river Cesano, is striking. Both sites fit in the reiterate cohesion between old river mouths and neighbouring protohistoric altitude settlements which is observed along the Middle-Adriatic coastline and can be connected with the maritime commercial routes of the Greek merchants.[24] In the case of Montarice a direct connection can be sought for with the Greek coastal settlement at Numana, located only 14 km northwards.

During the September 2002 campaign in this area we investigated the plateau-site of Montarice more in detail and the presence in the ploughed field of great numbers of protohistoric coarse ware, Piceni-bucchero wares and even Greek wares was clearly confirmed. Near the north-eastern and south-eastern corners of the plateau we observed zones with large pebbles, which might represent ploughed up remains of a circumvallation. The ceramic material, but also bones and building material (including wattle and daub), was collected in a very systematic way in view of intra-site dispersion analysis and is now being processed. We can however already discuss some preliminary results here.

Although ceramic and other material was present all over the plateau, denser concentration zones are marked on fig. 9. These zones, with the high number of 300 to 600 sherds per 30x30 square (picked up by 3-4 persons in maximum 30 minutes time), are mostly situated at the northern and southern edge of the hilltop. The very summit of the hill seems to have suffered much from ploughing activity, which could explain the decrease in artefacts towards the centre of the plateau.

Bearing in mind the sheer quantity of early finds we suspect that the Montarice plateau has only recently been subjected to deep ploughing and levelling, within the context of its modern agricultural use.[25] This could explain why the edges still hold a very significant number of artefacts, exceeding by far a normal surface distribution for protohistoric finds.[26] In this respect the picture at Montarice seems at first sight different from Montedoro, where atmospheric influences, but most of all an intense agricultural activity, wiped out almost all traces.[27] In ancient times the hilltop sides were probably much more articulated, a situation still visible at Montarice where an earthwork remains in the eastern half of the hillside edges. A detailed confrontation of the aerial photographs, intra-site survey results, pottery identifications and planned geomorphologic

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observations and topographical measurements will no doubt shed more light on the organisation and evolution of human occupation at this site.

At the southern edge of this plateau remnants of an old entrance road are still visible. On the old IGM map (Loreto 118), designed in 1892 and adjusted in 1948, a road is drawn leading from the more inland Burchio hill to Montarice. Both clearly individualized hilltops have later been further separated by the construction of the Adriatic motorway. It is however not to be excluded that this road can go back to pre-medieval and even pre-Roman times.

Besides the general abundance of Bronze and Iron Age pottery on the plateau itself,[28] other interesting surface scatters were observed. Below the steep edge on the slope facing the actual Potenza River south of the Montarice hill, a dark greyish zone of earth mixed with many artefacts could easily be distinguished. Most pottery found here, including many imports, seems to belong to the Iron Age. Two interpretations are possible: we may deal with a normal outflow of soil material from the plateau in a gully colluvium, but it could also be an isolated unit located on a former terrace on the south slope with particularly rich pottery contexts.

Fig. 8. The protohistoric site of Montarice from the air: crop marks and soil marks (photos J. Semey & F. Vermeulen).

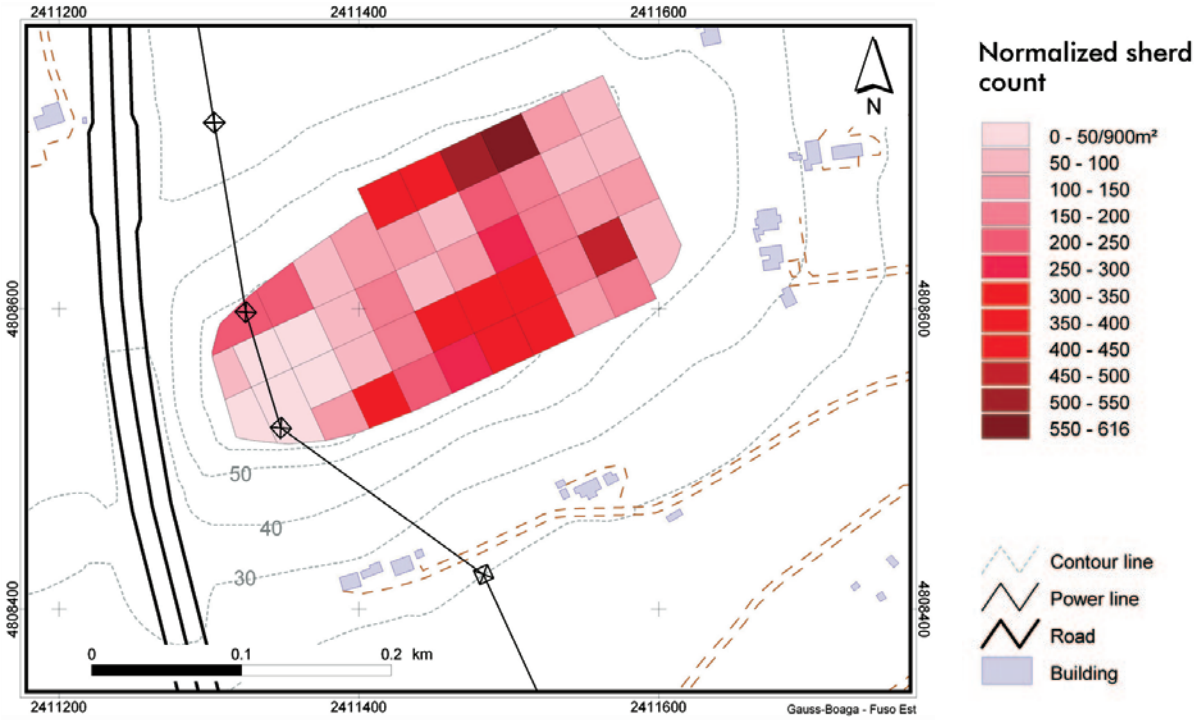


Fig. 9. Sherd density plan of the September 2002 fieldwalking on the site of Montarice (map G. Verhoeven).

Intra-site prospection of Potentia and the hinterland of a Roman coastal town

The Roman colony of *Potentia* was founded in 184 BC.[29] It is located on a beach ridge near the mouth of the river Potenza south of actual Porto Recanati. Since its first identification by Alfieri[30] important scientific work has been done on the site: large scale rescue-excavations on one of its cemeteries,[31] excavations on the north-eastern corner of *Potentia*,[32] a study of some important aerial photographic indications of its regular street grid,[33] a bibliographical synthesis and analysis of monuments and inscriptions[34] and since the mid-eighties systematic excavations in its monumental centre. The Soprintendenza Archeologica delle Marche discovered here a Republican temple for Jupiter, surrounded by a portico and other buildings of Republican and Imperial age.[35]

The excavations in the city centre confirm the regular layout of the late Republican town and only slight changes during early Imperial times. They also show a great vitality of the town during the 2nd century AD, followed by a 3rd century crisis (less finds, less graves), which could partly be caused by an ecological decline and the formation of marches in the formerly well-organized and centuriated agrarian valley-bottom near the Potenza-mouth. During the economic revival of the late 3rd and 4th century AD the central town area was reorganized. The coin series suggests a positive atmosphere until the beginning of the 5th century, followed by a clear decline. The youngest archaeological finds are dated in the 7th century AD.

As the ongoing digs in *Potentia* affect only its monumental centre, archaeological evaluation of changing size and density of the urban settlement can only be approached by way of survey-techniques. Since we are fortunate that the town site is devoid of too many modern disturbances - only a coastal road and railway and a couple of houses cover it - we can be confident that in the course of this project much information about its topography and evolution will become available. For this, several techniques of research are being developed, such as systematic aerial photography (see above), GIS-analysis of other remotely sensed data and soon also geophysical prospection. One of the most reliable ways to study the city's extent, however, is through the use of intensive surveys based upon line walking and through the study of surface material. This approach will allow us in *Potentia* not only to establish the changing boundaries of the urban occupation, but also to identify the character of some quarters and to evaluate the changing density patterns.

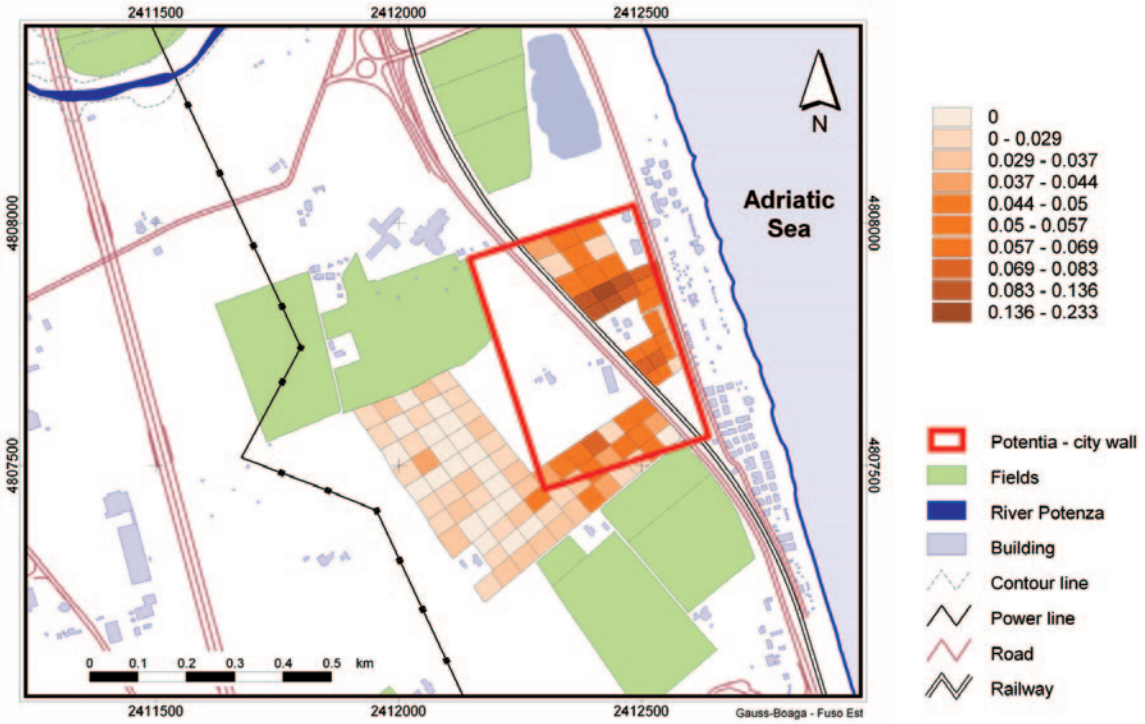


Fig. 10. Roman sherd density plan of the September 2002 fieldwalking on the Potentia *site and its suburban area (map G. Verhoeven).*

Part of this summer's terrain work was focused on an intense general city survey. The whole urban area of the ancient town, currently under ploughing, was subdivided in regular units (on average 40x40 m) and large samples of datable ceramics and other artefacts were collected in a systematic way. As on Montarice, every square of the grid was walked by 3-4 persons in maximum 30 minutes time. A protected (not-ploughed) part of the site, as well as the areas with modern disturbances, could not be investigated in this way.

The first available distribution maps, showing sherd density in and around the presumed habitation centre (*fig. 10*), already reveal the differences in occupation density in several sectors of town. Their chronological and functional significance should now be further analysed. Several tracts of the street pattern, known from our aerial photographs, were well identified on the ground, mostly as clear concentrations of river pebbles. The survey results were also indicative for the precise localisation of a north and a south gate in the circuit wall, most likely built with blocks of limestone, and of small parts of the northern circumvallation.

Further study of the collected materials is awaited before conclusions about the Republican to Late Antique evolutions of the city can be made. This intensive field survey of *Potentia* is carried out in close collaboration with a geomorphologic team in order to take into account biases induced by physical processes at the site, such as erosion and riverside sedimentation. The latter are predominantly present on the southern and eastern sides of town. Geo-archaeological mapping and analysis by Morgan De Dapper and his team will be supported by a series of augerings inside the urban area and near its fringes to establish possible reasons for (changing) city size, taking into account river course fluctuations, specific soil conditions and sea level change.

The survey results of fields surrounding the urban site of *Potentia* were most relevant for our knowledge of the suburban and rural hinterland of town. Immediately to the north of the colony, an *extra muros* settlement area could well be distinguished. It borders the Roman coastal road identified on our aerial photographs and was lined with one or probably two funerary monuments, of which we found clear surface indications in the shape of many fragments of limestone. Excavations in the 1960's and 1970's have indicated that this area was further extended with a large cemetery, used between the 2nd century BC and the 4th century AD.[36]

The Roman road, which we discovered from the air in 2000, leaving the presumed southern gate in a south-western direction to the Roman bridge at Casa dell'Arco, was well recognized in the field. It is bordered by at least five funerary monuments of which we found clear surface indications: fragments of architectural blocks of marble and limestone, some fine and common Roman pottery and especially many fragments of amphora sherds. The latter were probably foremost used here as building materials. Immediately north of this road, which possibly linked *Potentia* to the nearby town of *Pausulae*, we located several suburban settlement zones. Finally, also along the Roman coastal road leading from *Potentia* to the south, which we discovered from the air in May 2002, we now located several suburban settlements. The fine chronology of these needs to be further established.

The survey data from the remainder of the territory of *Potentia*, at some distance from town, are still limited (see above). Nevertheless, systematic line walking procured already some 15 new settlement sites and possible settlement sites of Roman date. Added to some seven settlement sites known from earlier research and chance discoveries in the area[37] this brings the total of probable Roman farms in the neighbourhood of Potentia to more than 20. Although it is clearly too early to come to conclusions about the site distribution in the landscape – a second field season involving all landscape types is needed in this wide area – some preliminary remarks can already be made.

A first emerging pattern is that of a series of coastal sites lined along the Roman coastal road to the south and mostly situated on top of ancient beach ridges. It is clear that at least some of these settlements are partly linked to amphora production. On one site, identified in the 1970's as a 'Roman villa',[38] we now clearly recognised remains of amphora production in the shape of walling of possible workshop structures and a thick layer of oven residues and partly over baked amphora fragments. On other sites the concentrations of amphora fragments in the surface scatters was so dense that again production and/or at least a secondary re-use of amphorae for construction activities seems evident.

A second important observation is that, contrary to the protohistoric situation, Roman farm sites were also found in the coastal plain itself. Although their number could have been restricted, this seems to indicate that we must leave the general assumptions that such sites were or buried too deep to be found by superficial prospection, or not present at all. It seems that the Roman centuriation of the plain and other land improvements has made this fertile but easily flooded valley floor widely available for habitation and systematic agricultural exploitation. Further surveys combined with geomorphologic corings and ancient land evaluation are awaited before any firm conclusions can be drawn here.

Thirdly we can already notice that some villas and larger rural settlements are located on the foot slopes of the hills, just outside the centuriated agricultural plain. One of them, located at the foot of the Monte dei Priori, has an extension of more than 110 m and revealed indications for wealth (a great variety of building materials, much fine pottery, a local aqueduct, etc.) and a long occupation continuity, from late Republican times into the late Roman period (5th-6th century). This occurrence of late rural presence in the territory seems to confirm some form of city-occupation at *Potentia* into the early 7th century AD. As the processing of the surface finds is still in its initial phase, it is still too early to evaluate the finer chronology of this distribution pattern.

PRELIMINARY DISCUSSION OF THE FINDS OF FIELD CAMPAIGN 2002

Patrick Monsieur, Hélène Verreyke & Catharina Boullart

Introduction

The field campaign 2002 was concentrated on the intra-site surveys of two known sites in the lower Potenza valley, namely the ancient town of *Potentia* and the pre- and protohistoric site of Montarice. Systematic survey was also conducted in the broad basin of the lower valley, but was not yet completed. Therefore, the presentation of the material collected during the 2002 campaign is focused on the finds of these intra-site surveys. The other material of the lower valley will be discussed in the 2003 preliminary report, when the survey of this region will be completed. We will however also do some preliminary observations about a series of finds from smaller sites in the area.

The intra-site survey of Montarice yielded a great amount of Bronze and Iron Age material, as well as some finds of the Roman period. The Bronze Age ceramics consist of elaborately decorated pottery like S. Paolina di Filottrano ceramics and a wide range of peculiar forms, from horned handles to perforated spouts. Among Iron Age finds, an appreciable quantity of black glazed pottery turned up, most of them of Greek origin.

This pottery bares a great variety of decorations, some of them undoubtedly indicating black- and red-figured vases. The finds confirm the known importance of this hill site. The analysis of the results of this intra-site survey will contribute to establish the degree of conservation of the site and will help to explain internal differentiations of the site.

The area of *Potentia* was also subjected to an intense intra-site survey. The surveyed area incorporated the ancient town, as established through aerial photography and ongoing excavations, as well as the region west of it. The finds, building materials, pottery and glass were naturally more abundant *intra muros* than in the western survey section outside the town. Building materials include purely constructional material, such as hexagonal tiles and a tegula used for erecting columns, and decorative building materials like tesserae, stucco and pieces of fresco. The pottery finds show the full chronological range of the existence of the ancient town of *Potentia*. The Republican period is well represented by Campana ware[39] and amphorae. The Early and High Imperial periods are represented by North Italian and Eastern terra sigillata (including stamped examples), terra sigillata medio-adriatica, thin walled pottery, plain and coarse wares and numerous types of amphorae of Italic and Aegean origin. The Late Imperial period yielded imported table wares like African Red Slip and Late Roman C, African lamps and late Roman amphorae of North African and Aegean origin. All the finds, building material and pottery, are closely related to the finds of the excavations in the north-eastern corner of Potentia conducted in 1967 and 1971 by L. Mercando and will be systematically confronted with them.[40]

Current research and methodology

Pottery analysis of survey material needs to be based on datable pottery sequences. Well dated regional reference sites are thus crucial for the identification, typology and chronology of the survey material. The archaeological sites of the lower valley of the Potenza river and of the Marches in general are fundamental archaeological sources not only for the pottery analysis of the PVS but for the whole of the Adriatic. Important Bronze Age and Iron Age settlements in the Marches are Moscosi di Cingoli (Macerata), S. Paolina di Filottrano (Ancona) and Colle dei Cappuccini in the city of Ancona. The extensive excavations conducted in Ancona prove this city to be of main importance throughout prehistorical and historical times. The amphitheatre of Ancona revealed important information about the Greek colonization of the town and its development in the Roman period. Of importance, regarding the Late Imperial period, are 267 graves of a paleochristian burial-ground excavated at the Piazza Stamira in Ancona dated in the 4th and 5th century AD.[41] Rather well dated are the graves of the La Pineta necropolis, which is situated north of *Potentia*.[42] Between 1967 and 1971 the Soprintendenza Archeologica delle Marche excavated several sites which were endangered by agricultural activities. These sites, San Benedetto del Tronto, Cone di Arcevia, Castelfidardo, Cesano di Senigallia and Porto Recanati (*Potentia*), were published meticulously by L. Mercando.[43] Although these sites were damaged by agricultural activities destroying a great deal of the stratigraphic sequences, they remain of great importance for our knowledge of the Roman and Late Imperial period[44] in the Marche. As already mentioned, the intra-site excavation in the north-east quarter of the ancient town of *Potentia* is a crucial reference for the finds of the intra-site survey and will continuously be confronted with our results. The *villa* in Osimo at Monte Torto (Ancona)[45] and the *domus* in Suasa (Ancona)[46] were excavated more recently and thus provide useful dating agents. Of considerable importance for the early medieval period is the cemetery of Castel Trosino, dating from the late 6th to the middle of the 7th century AD.[47]

Material from the late antique and early medieval period requires special attention. Firstly there are the phenomena of imitation of imported wares from the late 4th century AD onwards. Imitation of African tableware in coarse or plain ware, with or without slip occur frequently.[48] Secondly there is the interesting interaction or alternation of the North African and eastern economic trade market, visible in the presence of specific pottery types.[49] It is rewarding to investigate this transitional period in view of the position of the Marche in the Gothic-Byzantine war (AD 535-553) and the arrival of the Longobards (AD 568). H. Verreyke started a doctoral thesis on the research of late antique and early medieval occupation patterns and trade routes in the Northern Adriatic, where pottery analysis is the main tool for answering questions regarding this subject. The intra-site survey of *Potentia* yielded al lot of late Roman pottery. A number of sherds was immediately identifiable as imported tableware and amphorae, while further study will need to be carried out on pottery classes like

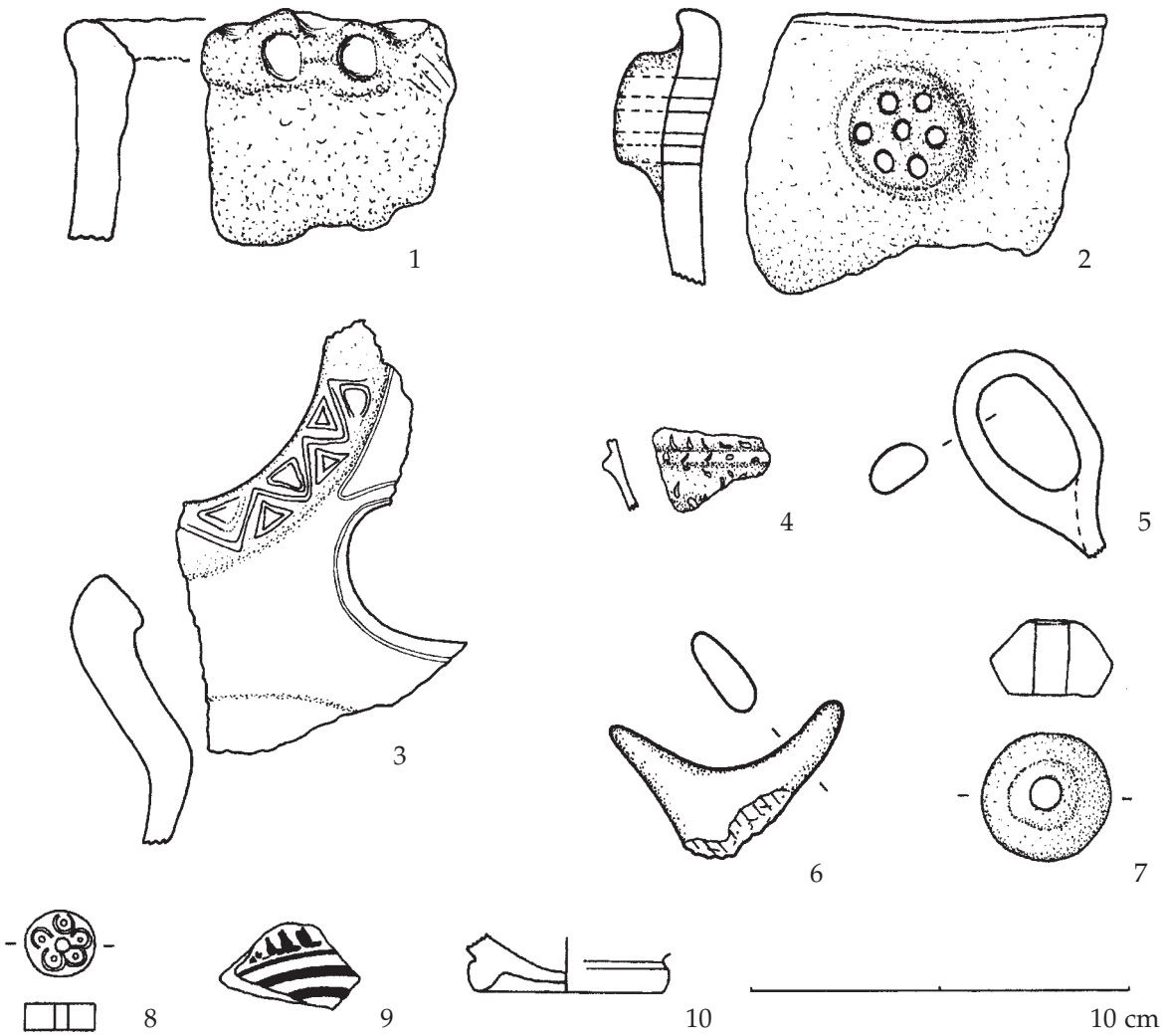


Fig. 11. Bronze and Iron Age: pottery, spindle whorl, bone or ivory disc and Greek imports from Montarice.

coarse wares (local, regional and imports) and imitations of imported wares. The identification of these groups opens the possibility to refine the date of sites where fine ware is absent.

The increasing and unexpected variety of amphorae finds, the difficulties of identification of the fragments, the need of comparison with complete or better preserved examples from the necropolis of La Pineta, the problems concerning the Adriatic origin of several types and finally the discovery of a production site near *Potentia* during the survey of 2002[50] urges to a new orientation in the study of this class of pottery. A new research program on amphorae will be worked out in the near future, focussing on Adriatic productions versus Italic and Aegean imports.

Due to the enormous number of finds recovered during the 2002 campaign, the approach of the processing of the pottery was adjusted. The pottery was sorted in three classes: the bulk, diagnostic sherds and diagnostic sherds ready to be analysed. This third class was studied in detail, and a selection will be presented further on. The results of the pottery analysis are linked with the field observations through a Microsoft Access program. This database is based on three fields of information: the field form, the pottery analysis and the pottery identification. The chronological evolution of occupation patterns, based on dated finds, will be visualised by means of GIS (Geographical Information System) carried out by G. Verhoeven. An additional campaign in April 2003 was necessary to process all diagnostic sherds and to study the finds more in detail.[51]

The finds from the intra-site surveys on Montarice and Potentia

Montarice

As has been mentioned earlier in this report, the only excavation at Montarice yielded mostly Bronze Age material.[52] Also during the PVS survey obvious Bronze Age diagnostic material has been picked up on the total surface of the hill site. A peculiar find was an impasto fragment with cordon decoration (*fig. 11.1*) as has also been found at Monte Ingino[53] and a twisted handle for which a reference is obtained at Bachero di Cingoli.[54] In the middle of the southern edge of Montarice a fragment with perforated spout (*fig. 11.2*) with a reference at Cortine[55] was collected. D. Lollini[56] as well as R. Peroni[57] suggest a Sub-Apennine date (Recent Bronze Age - 13th century BC). In the north-western corner of Montarice we found part of a pointed horned handle with well defined semicircular sides, carrying typical Apennine incised decoration (*fig. 11.3*). Similar finds occurred at Moscosi di Cingoli,[58] Montefrancolo di Pollenza[59] and Monte Ignino.[60] It is referred to as the S. Paolina di Filottrano type[61] and can be dated at the end of the Middle Bronze Age. Another type of Apennine decoration consists of incised motives filled with bone or chalk powder (*fig. 11.4*). Similar finds were done at Monte Ignino[62] and at the settlement site of Fonte Maggio in the Biferno Valley.[63]

There is no specific mention of Iron Age material in the report of Lollini's excavation on Montarice, although she mentions the continuity of occupation in this period.[64] Apparently, two black-figured sherds and one red-figured sherd, now displayed in the Archaeological Museum of Ancona, were found in the vicinity.

The PVS survey has clearly confirmed an important human presence on the hill during the Iron Age. Typical finds are elements of black-burnished buccheroïde wares. Several looped handles (*fig. 11.5*) from globular *kantharos*-like beakers match very well with examples from Cartofaro.[65] Also carinated wall fragments with their typical sharp edges are present. Of course most of the material of the Iron Age consists of plain and coarse ware, but they are not always distinguishable of Bronze Age material. This also applies to horned handles (*fig. 11.6*) and cylindrical ones and wall sherds with lugs.[66] It is our aim to establish a basic typology of the material in order to achieve a satisfying identification for Bronze and Iron Age on the site. Also spindle whorls, of which a well-preserved plain example was discovered during the survey (*fig. 11.7*), are difficult to date objects when not found in context, as there seems to be little typological evolution.[67]

Among materials other than ceramics we can present a little bone disk (*fig. 11.8*),[68] with central perforation and a decoration of circles and dots. References to this kind of decoration on bone, ivory or horns and antlers (and even on bronze) can be found in abundance in Piceno,[69] e.g. at Monte Primo di Pioraco, Monte Croce Guardia di Arcevia, Monte Giove di Penna S. Andrea, Bachero and Moscosi di Cingoli and Colle dei Cappuccini in the city of Ancona.[70] The same decoration is also present on the Piceni black burnished buccheroïde ware we found during the field campaign 2001 at the foot of Monte Franco di Pollenza (late 7th or first half 6th century BC).[71]

Montarice yielded also a reasonable number of imported wares, Greek and South-Italic in Greek tradition (Daunian and Messapian). Diagnostics and wallsherds of black glazed and black- and red-figured pottery suggest a chronology from the 6th until the 4th centuries BC. A wallfragment with floral band (*fig. 11.9*) of an archaic stemmed kylix can be dated in the second half of the 6th century BC. Several similar decoration motives are typical on Laconian ceramics,[72] but an Attic provenance should not be excluded. Indeed, a closer look to the fabric in the near future should lead to a more definitive conclusion, since the condition of survey material could have altered its nature. The profile of the ring-base (*fig. 11.10*), the decoration (*fig. 12*) and the diameter of an Attic skyphos point to a date in the 5th century BC.[73] An amphora handle and a rim, probably of the mushroom type, suggest a date in the 4th or 3rd centuries BC.[74]

Montarice revealed also indications for Roman occupation. Some black gloss sherds and Lamboglia 2 or Dressel 6a amphorae fragments refer to the Late Republican period. The Augustan and Tiberian age is represented by a precious millefiori glass fragment (*fig. 17*) and a North Italian terra sigillata wallsherd of a beaker, probably a Dragendorff 11.

Potentia

Pottery
- *Roman Republican*

The survey intra muros revealed several black gloss sherds.[75] A rim of a plate F2233 can be dated in the 2nd century BC, whereas a rim fragment of a *pyxis* F7544 can only be assigned a general date

Fig. 12. Attic skyphos from Montarice.

in the 2nd or 1st century BC.[76] A reasonable number of amphorae fragments date from the 1st century BC. Several types of Italic origin, respectively for olive oil and wine can be distinguished: the Brindisian amphorae (*fig. 13.1*) and their imitations or followers called 'ovoidali adriatiche', the Lamboglia 2 and her follower the Dressel 6a, both difficult to distinguish when remaining in a fragmentary state. Some fragments of rims and spikes are to be compared with those found in the production site of Cologna Marina on the south coast of Le Marche (*fig. 13.2*).[77] The fragments also much resemble those found in the production site near *Potentia* that was discovered during this campaign. As in the examples of Cologna Marina the fabric contains nodules of 'chamotte'. The transition and/or coexistence of the Lamboglia 2 and Dressel 6a amphorae is situated around 50 BC. Some amphorae fragments can be identified as part of Greek Hellenistic amphorae, maybe of Cnidian and Rhodian origin. One handle fragment of a Coan amphora dates from the 2nd century or the first quarter of the 1st century BC (*fig. 13.3*). Some ceramic bungs of amphorae or *opercula* were picked up, two of them intact and of different types. The first type is a disk with a knob. Relief lines divide the surface of the disk in triangular zones, sometimes filled with an eroded letter or a sign. The second type is massive and has a conical profile ending in a broad knob. It is not clear which types of amphorae they have shut, but we suspect the first *operculum* type belonging to Lamboglia 2 as they occur regularly on Delos. The destruction dates of 88 and 69 BC of this site need to be stressed (*fig. 13.4*). A base of an *unguentarium*, probably of local origin, is of the 2nd or 1st century BC, possibly even of Augustan age (*fig. 13.5*).[78] At this very moment no survey material was recognised as certainly earlier than the time of the foundation of the colony in the first quarter of the 2nd century BC.

- Roman Imperial

Because of the sheer quantity of material from the Early and High Imperial period that was recovered during the city survey, only a minor part of the finds was submitted to a preliminary study. Nevertheless it seems that not much fragments of 'pareti sottili' and lamps were picked up. This might be explained by a lack of visibility due to their fragmentary condition and maybe to the colour of the fabric. On the other hand the terra sigillata is rather well represented, most of it from Northern Italy. Eastern sigillata is only present in very small wall fragments. Several pieces of terra sigillata medio-adriatica were also identified, some of them decorated with brown bands. Three stamps are recognised on the bottom fragments of unidentifiable terra sigillata plates. Two of them are readable, on two lines and dating from the Augustan age: L TETTI / SAMIA and SEX / ANNI with palm and crown (*fig. 14.1*). A production centre of *L. Tettius Samia* is localised in Faenza. We can imagine that the ports of the Adriatic played an important role in the export of his products that are widespread, even to the fringes of the Empire as in *Iudaea* or in *Belgica*.[79] A rimfragment with an appliqué of a palmet belongs to a Dragendorff 17b plate (*fig. 14.2*), middle Augustan to the end of the 1st century AD. A wallfragment with an appliqué of a volute seems to match with Forma XXIX, 4 of G. Pucci, dating from the first half of the 1st century AD (*Fig. 14.3*).[80] An interesting rimfragment of a thin walled beaker can be compared with a Campanian model Tipo 2/389. As was expected different fragments of Firmalampen (*fig. 14.4*) turned up, and two rimfragments of type Loeschke Ic.[81] Roman plain and coarse wares are hard to identify. We could make some links with pottery types from sites like Castelfidardo, Cone di Arcevia and Porto Recanati (*Potentia*). Amongst the identifiable pottery stands out the plain ware vessel with a rim decorated 'a ditate' as found in Porto Recanati (*Potentia*) (*fig. 14.5*). Also two pieces of a type of coarse ware with a ribbed rim and impressed decoration below the rim, were collected. This kind of pot-

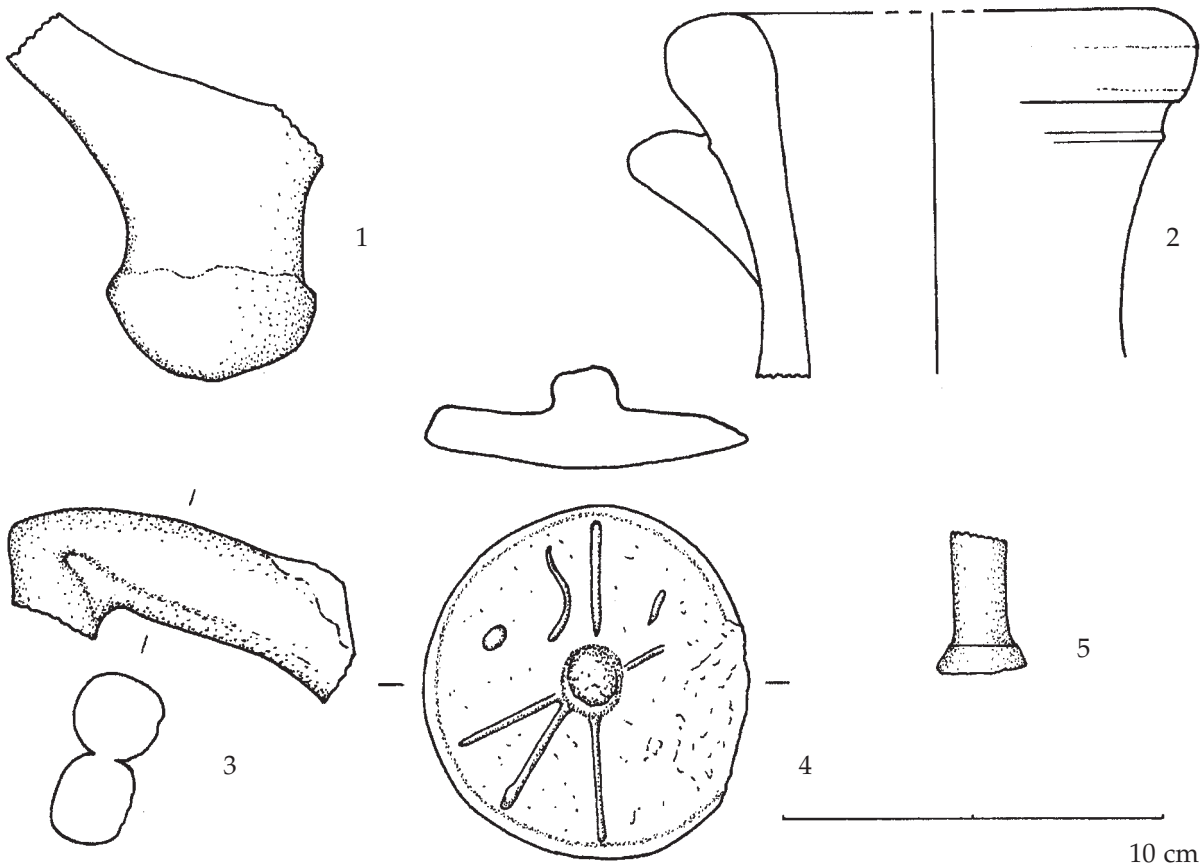


Fig. 13. Roman Republican: Adriatic and Greek amphorae, operculum *and* unguentarium *from* Potentia.

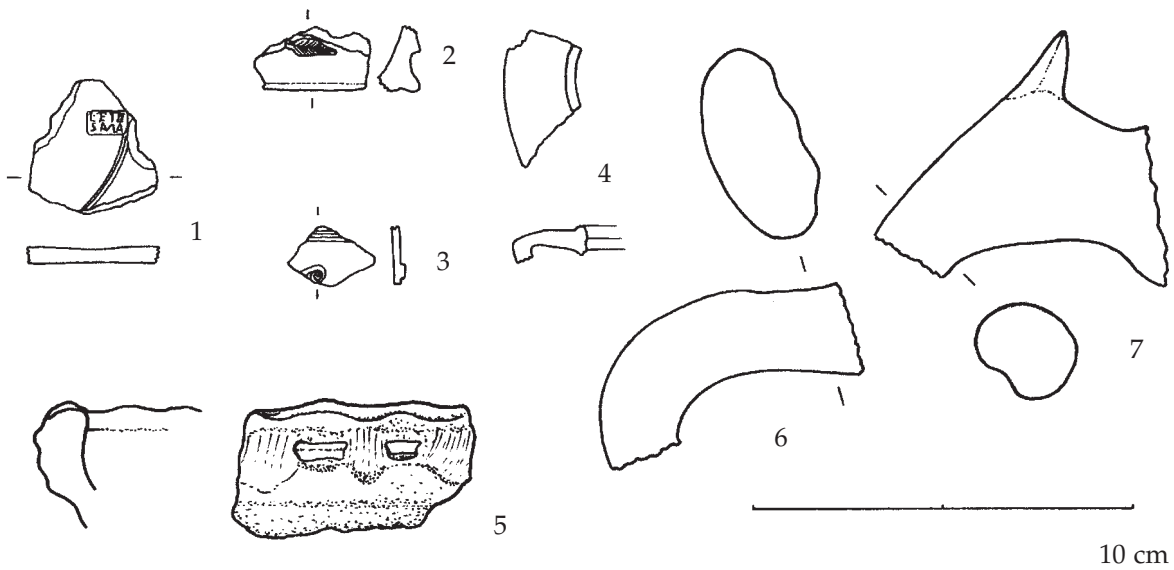


Fig. 14. Roman Imperial: terra sigillata, Firmalamp, plain ware 'a ditate', Forlimpopoli and Cretan amphorae from Potentia.

tery with a dark red, brown to grey fabric was also uncovered in Porto Recanati (*Potentia*).[82] A great variety of jug fragments offers possibilities to build up a typological series. Amphorae are abundant, and at least 8 types are to be distinguished. As in the Republican period three main groups can be made. There seem to be local and regional production, exemplified by Dressel 6a wine-amphorae that continue to be produced in the Early Imperial period, and probably also a new type with a funnel rim, 'a collo ad imbuto', sometimes labelled as 'Picenean' amphorae, used for the transport of olives and olive-oil. Possibly Dressel 6a amphorae were also produced in the Northern Adriatic, which is certainly the case for Dressel 6b olive-oil amphorae. The latter type is also a common find in *Potentia*. Two stamps on the rim, not yet deciphered, can be assigned to this amphora type. The fabric and the filler of some Dressel 2-4 amphorae point also to a local production, not surprising since this 'Coan' type of wine amphora is the most imitated in the ancient world. Two wall sherds betray the presence of Campanian 'black sand' Dressel 2-4 wine-amphorae. In the later 1st century AD a new type of wine-amphora with a small ring-base appeared, the Forlimpopoli-type, most probably the follower of the Dressel 6a. First produced in Forlimpopoli, its success seemed to have unchained lots of imitations in different regions of ancient Italy. As survey material they are very difficult to distinguish from plain ware (*fig. 14.6*).[83] Finally the Aegean imports continued. Very common in the Roman empire, from the Augustan age onwards, is a new, smaller type of Rhodian amphora, fragments of which occur regularly in *Potentia*. In fragmentary state there can be confusion with the amphora type Knossos 66, maybe also Rhodian and as the form suggests used for transport of fish-products. Another wide-spread Greek amphora, but less common, is of Cretan origin and very peculiar with its horned handles. Two well-preserved examples were already discovered in the necropolis of La Pineta. The Amphore Crétoise 4 or Dressel 43 is a wine-amphora mainly produced in the 1st century AD (*fig. 14.7*).

- Late imperial

The 2002 field campaign of the Potenza Valley Survey was very fruitful regarding the search for late Roman presence in the Marche. Many types of late Roman pottery came to light. But as mentioned before, further research will be necessary to analyse the imported wares and their regional imitations. Different types of African Red Slip production C and D were found, mostly in the northern, eastern and southern part of the intra-site survey, that is to say inside the boundaries of ancient *Potentia*. A large bowl ARS C type Hayes 45B is an example of the production of the 3rd to the first quarter of the 4th century AD (*fig. 15.1*). Several pieces of ARS D type Hayes 61B were collected. This type of flat-based dish was very common in the 5th century AD. Hayes 61 was often imitated in regional productions from the late 4th century AD onwards (*fig. 15.2*). An ARS C deep dish type Hayes type 84 with a grooved rim and an exterior wall decorated with feather rouletting dates from the 5th century AD (*fig. 15.3*). Also kitchenware executed in ARS was found, namely a part of a plate or lid type Hayes 182.[84] Several smaller pieces of African Red Slip bear stamps, if not useful for the typological identification they are fundamental for chronology. The full decorative program of African stamp types is present: a palm Hayes Type 3, concentric circles Hayes Type 27, concentric circles Hayes Type 36 combined with two crescents Hayes Type 74, a grille-pattern Hayes Type 69, a square decorated internally with concentric circles Atlante type 36 and a rosette Hayes Type 44B combined with a palm (type unclear) (*fig. 15.5-15.10*).[85] All stamp types were dated from the second half of the 4th century to the 5th century AD and were applied on ARS production D. Concerning tableware the African Red Slip is clearly the most abundant. We also came across several rim fragments, which resemble Late Roman C ware type 3[86] (*fig. 15.11-15.12*). This type of pottery from the eastern Mediterranean was imported in Italy mainly in the second half of the 5th to the first half of the 6th century AD.[87] Of considerable importance are also two fragments of late Roman lamps Hayes type II or Atlante X, most probably of African origin. This type of lamp is dated from the late 4th to the 6th and even the 7th century AD, whether or not in regional imitations.[88] The first fragment consists of a part of the handle and the rim of the disk. The rim is decorated with a triangle motif (Ennabli D8) alternated with a square combined with a circular motif (Ennabli A4) (*fig. 15.4*).[89] The second fragment consists of a part of the nozzle and a part of the disk. The rim of the disk is decorated with a ribbed motif for which no exact parallels were found yet.

Finally different types of amphorae were distinguished. Most of them can only be assigned a general date in the 3rd to 5th century AD. Several spikes and rims surely belong to so-called *spatheia*,

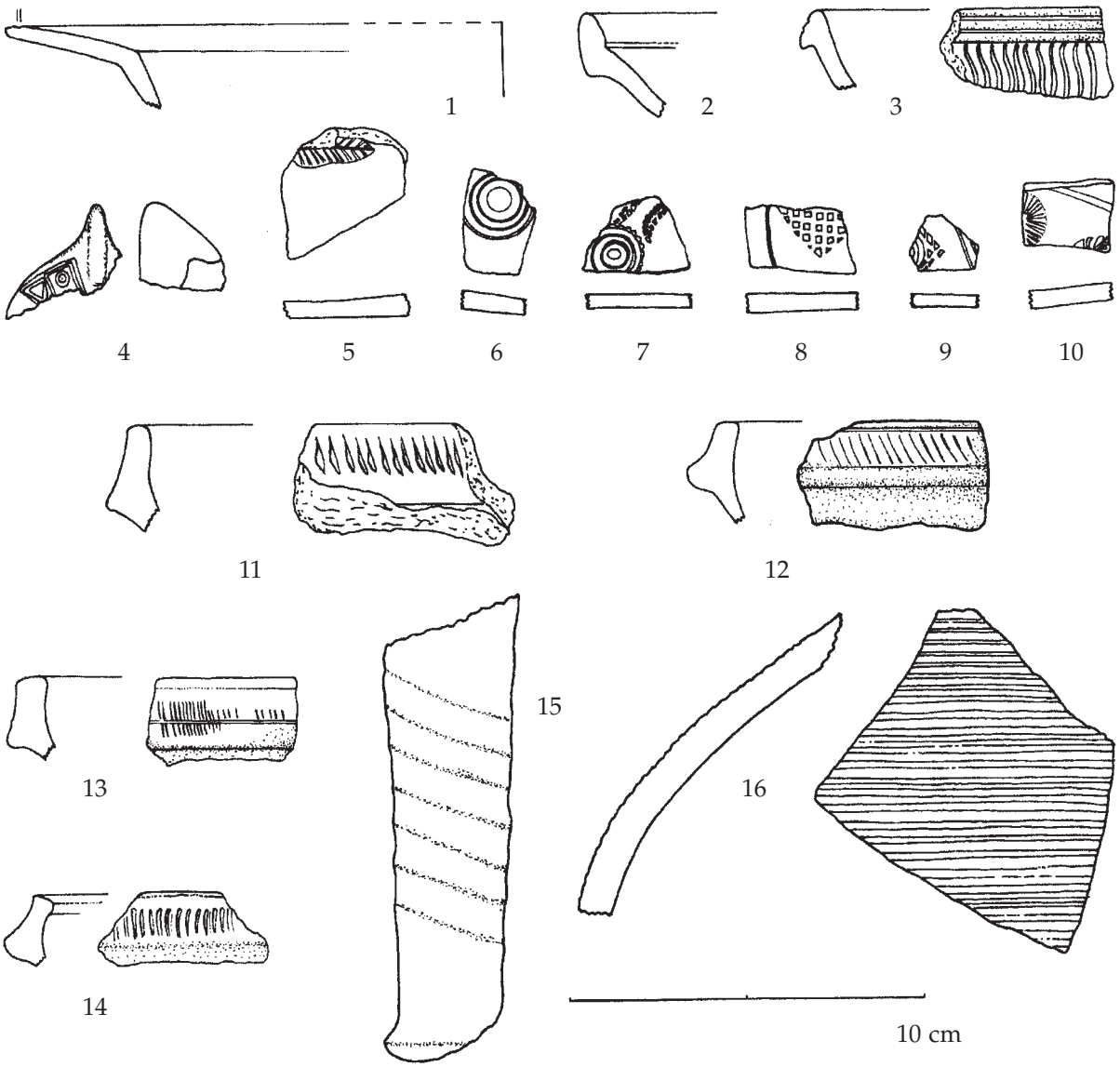


Fig. 15. Late Imperial: African Red Slip ware, African lamp, tableware in Late Roman C tradition, spatheion *and Late Roman 2 or 5/6 amphorae from* Potentia.

small fusiform amphorae originating of *Africa*, maybe transporting fish-products. Several of them already came to light in the excavations of Cone di Arcevia and in those of the north-eastern sector of *Potentia* (*fig. 15.13*). But some rims could be classified in the group of African 'cylindrical' amphorae clustering around the type Keay XXV. Late Roman 1 amphorae, most probably of Cilician or Cypriot origin, are represented by some typical handle fragments. A number of wheel-ridged or combed wall sherds can be ascribed to the bag-shaped Late Roman 5/6 of Egyptian origin or to Late Roman 2 amphorae. The first was undoubtedly used for the transport of wine, but what the latter transported remains unclear. The fabric, a gritty, hard-fired, orange-red clay, the creamy white slip and the inclination of the shoulder fragment makes an attribution to the Egyptian type more probable (*fig. 5.14*).[90]

Building material

Two hexagonal tiles where found in the eastern area of *Potentia* in two adjacent blocks.[91] This

kind of tiles was used as flooring. Apparently this technique was used during the Roman period, in the Marche, in Emilia-Romagna and Veneto.[92] In Suasa (Ancona) six different types of hexagonal tiles were distinguished. Our examples match type D or the elongated variant F of Suasa (*fig. 16.1*).[93] Besides black and white *tesserae*[94] the survey also yielded a bright blue glass paste mosaic cube.[95] The black and white *tesserae* much resemble the floor decoration of room O in the southern building in the north-eastern area of *Potentia*, excavated by Mercando.[96] In the northern section of the intra-site survey a triangular *tegula* was found like those used for the construction of columns in the portico of the central temple area of *Potentia*.[97] Amongst the finds were also pieces of stucco, sometimes painted in a dark red, dark blue or purple.[98] One of the tiles bore the stamped inscription TI[. Apparently there are two possibilities to reconstruct the name: TI[BERI PANSIANA] or TI[BERI CLAUDI PANSI] (*fig. 16.2*). If this reading is correct the tile has its origin in the Northern Adriatic, most probably in the Po-valley, and considering that the figlina Pansiana was in imperial possession it can be dated in the first half of the 1st century AD. The type seems to occur at different places in the Marche.[99]

Other finds

Different fragments of glass were discovered. A green-glass broad combed handle belongs to a typical square or cylindrical bottle, Ising forms 50 or 51, to be dated in the 1st or 2nd century AD. Some bottoms of glass *unguentaria* can be compared with the material of the necropolis of La Pineta. No parallel was found for a blue glass handle. A fragment of a gorgeous blue-white 'millefiori' pillar-moulded bowl (cf. Isings form 3), dating from the first half of 1st century AD turned up at the hill-side of Montarice (*fig. 17*).[100] Next to the Roman road located on aerial photographs two marble or white limestone fragments of a profiled basis from a presumed funerary monument where found. They resemble much to a profiled base discovered in the north-eastern sector of the city.[101]

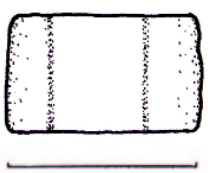
GIS AND ITS APPLICATIONS IN THE POTENZA VALLEY SURVEY PROJECT

Geert Verhoeven

Reading this contribution, one must yet be convinced that the amount of gathered information in the Potenza Valley Survey is substantial. Managing such quantities of - almost all geographically linked - data has become much easier with the introduction of GIS (Geographic Information System). Linking spatial data to non-spatial (attribute) data, GIS has become a commonly used management and analysis tool in a lot of disciplines, for at least the last fifteen years.

Structure of the GIS

From the beginning of the project, it was the aim to incorporate all gathered field, aerial, geomorphological and historical survey data into a GIS-context. In fact, before data could be managed and analyses computed, the building of the GIS had to occur. Working with different researchers in different disciplines, each of them with own particular data, a centralization of all information seemed to be necessary. Therefore, one central PC was purchased and configured to contain all possible data in an orderly and easy accessible way. On this computer,[102] a new disk partition - called Potenza Valley Survey - was created, which afterwards became subdivided into different directories and several subdirectories (*fig. 18*). Besides functional considerations, the total structure was also determined by the GIS-software used (ESRI ArcView 3.2). In this structure, four broad categories can be distinguished: 'GIS-data', 'GIS-projects', 'Non-GIS-data' and 'Temporary files'. The latter is only used in the making and adaptation of files.



5 cm 1

2

Fig. 16. Roman building material: hexagonal floortile and North-Adriatic stamped rooftile from Potentia.

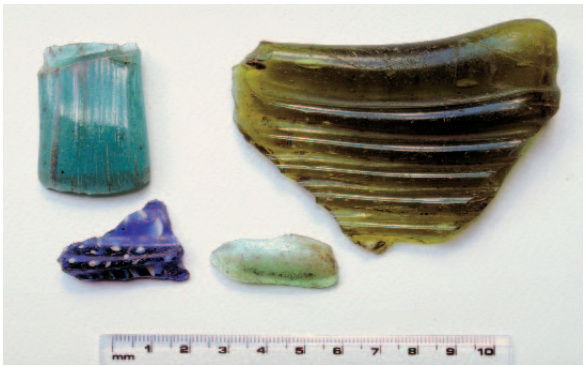


Fig. 17. Roman glass finds: 'millefiore' vessel from Montarice; handles of globular flask and of square or cylindrical bottle and bottom of unguentarium *from* Potentia.

GIS-data contains four subdirectories. The first, 'Databases', still contains several individual databases, although they should lead to one, all-embracing database. 'Vector data' is split in different geographical areas: 'World', 'Europe', 'Italy' and 'Regione Marche'. The latter contains - not surprisingly - most files. Using digitised topographical maps (scale 1/10,000, CAD-format) from the Regione Marche, different individual layers (land-use, contour lines, recent habitation, rivers, lakes, etc.) were created. Where needed, manual digitizing (with digitizer tablet or on-screen) completed the vector data.

However, spatial data can also be stored as raster, a fundamentally different format. In ArcView, a distinction is made between raster images and raster maps, also called grids. This division was adapted in the PVS-data structure. Till now, the number of grids is very limited (some DEMs and distance grids). In consequence, a further subdivision was not performed yet, in contrast with the subdirec-

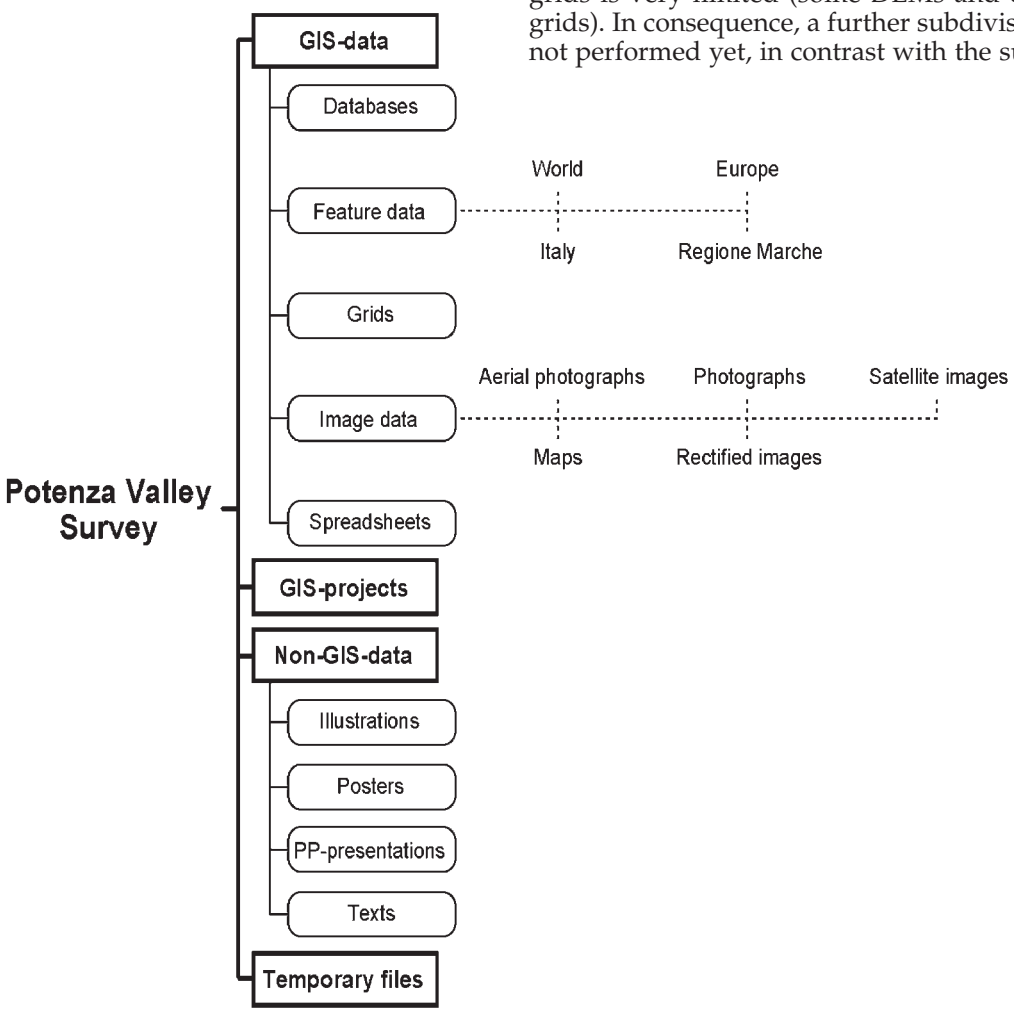


Fig. 18. Directory structure of the central PVS PC.

tory 'Image data'. Besides the huge collection of aerial photographs and on-ground photographs (mostly of artefacts), we have some scanned maps (topographical, orthophoto and cadastral), a few satellite images and a - fast expanding - number of rectified images as well. At last, some spreadsheets, generated by analysing various figures, complete the GIS-data at present.

The different ArcView-projects that are - and will be - made with all survey data are stored in the folder 'GIS-projects'.

Finally, 'Non-GIS-data' serves as a directory to hold various kinds of data about the survey project: 'Illustrations', 'Posters', 'PowerPoint presentations' and 'Texts' that were created with the PVS as subject.

Metadata and quality control

The results one can obtain using a GIS largely depend upon the quality of the (spatial) data that are used. After all, it is possible to have 'error free' attribute data (in terms of the method employed), but impossible to have 'error free' spatial data. There will always be differences between the multi-dimensional reality and our representations of it. Therefore, the weakest part of almost every GIS is the entering of spatial information.[103] Quality-affecting factors that can be mentioned are the accuracy and precision of the source data, the interpolation methods employed, the scale of the data, the georeferencing system used, the data collection technique and the sampling strategy that are applied, the process of scanning and digitizing, etc. In this respect, two items are of the utmost importance: metadata and quality control.

Metadata are a description of objects, documents or services which may contain data about their form and content. It can be seen as 'data about the data' and describes the content, quality, condition and other characteristics of data. It provides us with information about the who, what, when, where, why and how of a data set. In a GIS, metadata are often neglected. Unjustly so, because archaeological research is often undertaken by researchers using digital data created by others. The former have limited understanding about the limitations or purpose of that data. Therefore, documenting your data can be helpful to others and yourself (even the person who digitized the data, may forget items like the precision and the accuracy of the data, the area it covers, the date of creation, etc.) In consequence, proper metadata is critical in preserving the usefulness of data over time and it is crucial to supply all kinds of GIS-data with this information.

Different metadata standards exist. In the PVS, the geospatial data (any data with a geographical component) is documented using the Federal Geographic Data Committee's (FGDC) Content Standard for Digital Geospatial Metadata, which the Federal Geographic Data Committee approved in June 1998.[104] To build FGDC–compliant metadata, an easy-to-use application called the ArcView Metadata Collector was achieved (*fig. 19*), allowing to create metadata for any data type supported by ArcView.[105]

Besides metadata, quality control is another important topic in the PVS-GIS, because no map stored in a GIS is completely error-free. Data stored in a GIS have been collected in the field, have been classified, digitized, interpolated. During this process, errors are constantly generated. Error itself can be defined as the discrepancy between a given value and its true value (e.g. in reality a hill is 300m high, while the value 298m is stored in the GIS-data. This reveals an error of 2m). Using spatial data in a GIS-operation implies that errors in the input will propagate to the output of the operation. In this respect, the resulting output is a function of the input values and inaccurate input values will automatically affect the computed results.[106]

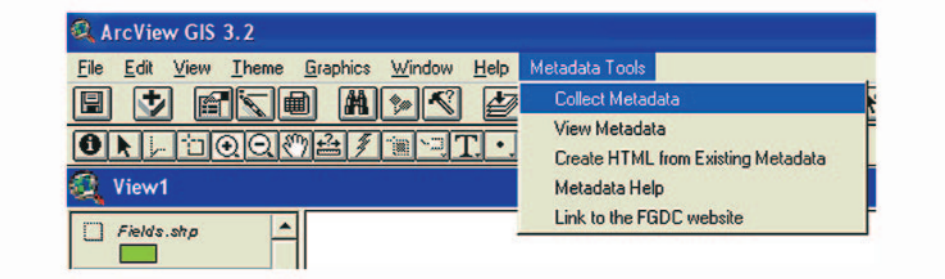


Fig. 19. The drop-down menu which appears in ArcView 3.x after installing the Metadata Collector.

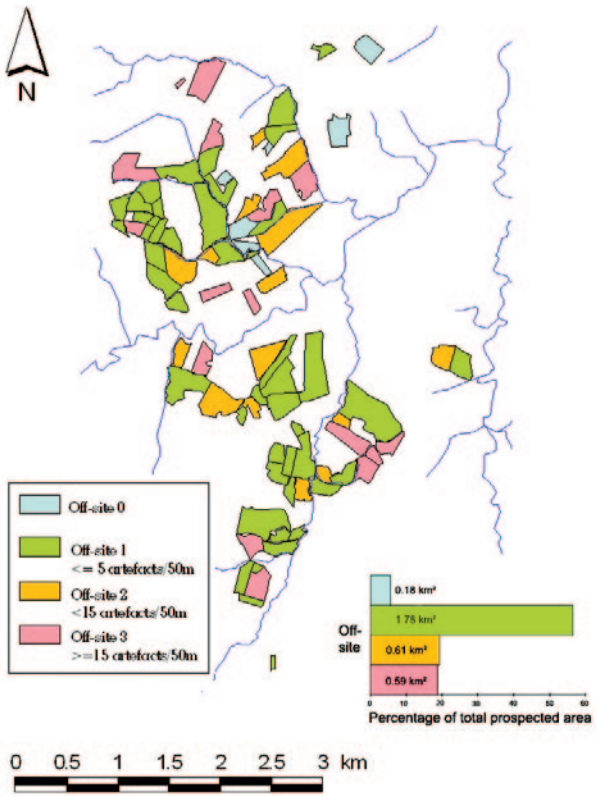


Fig. 20. GIS mapping of the off-site density of surface artefacts in sample zone 1 (Upper Potenza Valley).

Therefore, it is significant to test the accuracy of some digital maps. One example is the *Digital Elevation Model* or DEM. In the majority of GIS-data sets, the DEM is the most important layer. Besides giving information about the height, it is also used to generate slope and aspect and it serves as well as basis for *cost path analysis*, *distance calculations* etc. As a consequence, it is the fundamental basis to study the topographical features of archaeological sites.

To construct a usable DEM, an interpolation algorithm must be applied. Some digitized high points or contour lines always form the basis of the DEM, but they do not form a continuous surface with height values yet. To retrieve this, an interpolation method is run and will give the places without data a figure that represents the height at that place. However, different interpolation methods produce different terrain values. We must surely accept that the final DEM will be an approximation of a continuous phenomenon, but how closely this approximation reflects reality can be calculated.[107]

Presently, the accuracy of the DEM applied for the first sample zone was calculated. This control occurred on the basis of two tests: a qualitative and a quantitative one. In the qualitative test, the digitized contour lines were checked visually by generating a TIN (*Triangulated Irregular Network*),[108] where a closer look at the characteristic points and lines, the hillshaded relief as well as the slopes and aspects revealed some profound errors, owed to the manual labelling. Afterwards, a quantitative test was run. Eleven different interpolation methods[109] were executed. The predicted elevations for a given DEM were compared to some reference points (none of them was located on a contour line) and the discrepancy between both was calculated. With these figures, a global RMSE (*Root Mean Square Error*, which is mathematically the same as standard deviation) could be calculated for a given DEM. This procedure was repeated for each interpolation. Subsequently, different errors could be compared and the lowest RMSE revealed the preferable DEM. In the near future, homogeneous computations will be used to create the DEMs for the second and the first sample zone. Furthermore, it is also hoped some more digital files can be tested on their accuracy, as these tests really give a.good idea of the quality of the files one is working with.

First analytical results

Setting up the GIS and on-going data-research are the main reasons why the GIS-analyses are still very limited and temporary till now. The executed computations presented here are all applicable to the first sample zone, the upper Potenza valley.[110] The analyses were divided into two parts: analyses of data linked with the cadastral maps and analyses of the environmental characteristics. The first part covered items as the calculation of the precise prospected area (3,2 km²), the determination of the proportional ratio of the visibility classes (19,6% bad; 3,4% moderate; 77% good) and the computation of the proportional ratio of the fields with erosion (29,9%). Furthermore, a *chi-squared test of goodness-of-fit* revealed for a *significance level* $\alpha = 0{,}05$ that sites are equally distributed across fields with and without erosion. A determination of the off-site proportions (0 = 5,7%; 1 = 56,5%; 2 = 19,2%; 3 = 18,6%)[111] as well as a calculation and visualization of the total and periodical site density (total = 17,19 sites/km²; pre- and protohistoric = 3,13 sites/km²; Roman = 13,75 sites/km²; medieval and post-medieval = 1,12 sites/km²) complete this first

part. One can notice the high density of Roman sites. However, a further subdivision per period is needed and was obtained during the writing of this article.

The second part deals with the relation between the sites and the environmental characteristics as height, slope, distance to the nearest water source, etc. In an archaeological GIS, analysis of such environmental characteristics can occur in two different ways: the *contextual analysis*, which brings together the context of sites and the finds and analyses them without any proof (e.g. *site catchment analysis*) and the *locational analysis*, identical to the contextual analysis, except the attempt to prove the hypothesis.[112] It was the latter kind of analysis that was performed. All the analyses are based on a study by Hodder and Orton.[113] They examined the distribution of 173 Iron Age coin finds in relation to Roman road locations in central and southern England. Using manual methods of pre-GIS days, they performed a statistical analysis which revealed a significant association between the coin distribution and the Roman road network. With GIS, such analyses can be executed a lot faster and with results that are even more precise and accurate.

The distance to the nearest waterway was the first examined background feature. To illustrate, the first step is to create a distance grid, where every cell holds a figure that represents the distance of that cell to the nearest waterway. This grid serves as a background distribution. The distance of the sites to the nearest waterway can be extracted from this background distribution. Subsequently, the following question may be asked: is this a normal sample of the background or is the localisation of the sample cells (the sites) unusual in relation with our general background values (the study area)? Therefore, both the background and the sample values were plotted cumulatively and the *Kolmogorov-Smirnov one-sample* test computed. This test statistically compares the sample distribution against the background distribution and tells the researcher if the sample of site locations differs significantly from the total background. If it does, one can accept that the sites were placed in relation to the examined feature. If the difference between the two cumulative curves does not reach a critical value, one can accept that sites were placed at random considering the background feature.

In this way, the relation of the sites (per main period) and isolated finds to the following environmental characteristics was determined: elevation, slope and aspect; distance to the waterways, to the Potenza, the springs and the total hydrographical network; distance to the nearest road, to the nearest flint; view on the Potenza. Some relations did occur (e.g. the isolated Stone Age artefacts were obviously linked to the springs and the Roman sites to the contemporary rural roads), but generally spoken, no specific connection between the environmental characteristics and the sites could be deduced for the moment, partly due to the fact that - as underlined before - the periods were too broadly delineated for detailed analyses.

Prospects

In the near future, more and new analyses should replace these preliminary results, although the small number of sites for some periods will make analysis - even in the future - problematical.

For the moment, a new kind of analysis is in progress: rectifying oblique aerial photographs to map all crop, soil and shadow marks.[114] It is proposed to combine this highly significant new information with the other data, received from the field, geomorphological and historical surveys.[115] In this way, the capabilities and advantages GIS offers will be completely expressed in the PVS-project.

ANALYSIS OF LITHIC ARTEFACTS FROM THE POTENZA VALLEY SURVEY. PRELIMINARY REPORT

Philippe Crombé, Izabel Devriendt & Griet Vanheddeghem

Introduction

In 2002, all lithic artefacts recovered during the survey campaigns of 2000, 2001 and 2002 in three different core regions of the Potenza valley (Upper, Middle and Lower Potenza) have been analysed in terms of morpho-typology, raw material and physical condition (weathering). Altogether 2573 artefacts could be studied, among which 355 tools, the majority (ca. 65%) originating from the Middle Potenza area. In this first paper some preliminary results from the lithic analysis will be presented. A more detailed report will be published later.

Site distribution

From a chronological point of view, all three core areas yielded artefacts belonging to different chronological stages of the Stone Ages. In the present state of analysis there are strong indications of a Middle Palaeolithic and Neolithic/Chalcolithic

occupation of the valley; the Late Palaeolithic and Mesolithic evidence on the other hand is still very discrete. Although several concentrations of lithic artefacts could be mapped, which might correspond to former camp or settlement sites, it is currently not possible to attribute these to a specific period. Indeed, it should be emphasised that all 'sites' were surveyed only once, hence the number of surface finds is still relatively low. At best one or two diagnostic artefacts are present, but considering that most localities may have been re-occupied at different stages, these cannot be used to date the assemblage as a whole. In order to gain more detailed information on site dimension, site chronology and site function further field work should be organised.

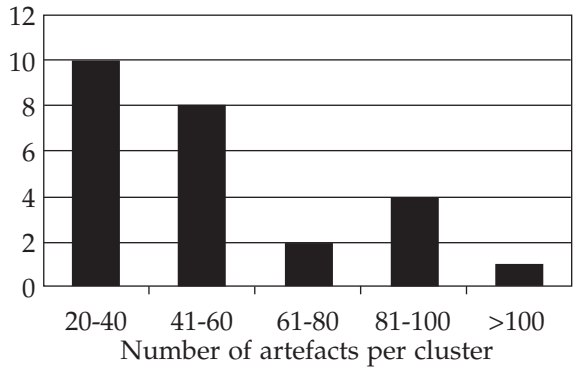


Table 1. Number of field clusters according to the amount of lithic artefacts found at the surface.

In total, 25 fields yielded clusters of lithic artefacts (*table 1*). Most clusters contain less than 60 artefacts. So far only one site situated in the Middle Potenza yielded a considerable number of finds (287 sp.). A detailed analysis of the spatial distribution of these clusters, using GIS, is currently in preparation, hence the total number of detected sites is not yet known. Indeed, it should be taken into account that several close-lying clusters may belong to one single occupation site. The vast majority of clusters was found in the Middle Potenza area, surveyed in the summer of 2001. The lower density of lithic concentrations in the Upper and Lower Potenza (respectively 2 and 1 cluster) probably can be partly explained by post-depositional processes, which are more active in these parts than in the Middle Potenza. In the hilly Upper Potenza with its steep ridges colluvial deposits may partly or completely cover prehistoric sites, especially in the low-lying parts of the landscape. In the Lower Potenza on the other hand sites may be sealed by fluviatile and marine deposits. Furthermore it should be stressed that field survey in this part of the study area is not yet finished; so far research has been focussed on two specific locations, i.e. the Montarice hill and the southern border of the Potenza. The remaining part of the Lower Potenza will be surveyed in the summer of 2003.

Awaiting the results of a detailed spatial analysis, it is already evident that the majority of prehistoric sites is situated along the Potenza river and its tributaries. In most cases prehistoric man settled on or in the immediate vicinity of gravel terraces, from which flint nodules of relatively good quality could be extracted.

Description of the lithic finds

Raw material

All recovered artefacts are made in flint. On the basis of colour, texture, cortex and weathering a distinction between two main flint types can be made.
- *Type 1*: flint of fine-grained texture, generally homogeneously red to light brownish coloured, with strongly weathered and rolled cortex, which is often very thin (few millimetres). Some artefacts are more heterogeneous in colour, presenting a dominantly red colour spotted with lighter areas. Many artefacts in this flint type display a colour patina, mainly pink but incidentally also whitish. A colourless patina (gloss) also occurs frequently, either in combination with a colour patina or alone. In both instances, the gloss covers the entire surface of the artefact, indicating that it was formed as a result of a chemical weathering rather than a physical weathering (aeolien gloss). The frequent presence of frost damages, often patinated prior to the knapping, indicates that this flint type most likely originates from outcrops of secondary flint, e.g. former river terraces.
- *Type 2*: flint of fine to very fine-grained texture, beige to weakly brown-greyish coloured spotted with large white inclusions, provided with an intensively weathered cortex. Some artefacts present a weak blue-white patina. Although no evident traces of frost cracking are observed, the origin of this flint type is probably also situated in secondary outcrops.

Both flint types are absolutely predominant within all assemblages of the Potenza valley. A minority of artefacts is made of other flint variants, mostly of fine-grained texture, which present different colours (deep black with lighter spots, brownish or beige to whitish translucent flint).

Typology and chronology

- *Middle Palaeolithic*

Type	**Upper**	**Middle**	**Lower**
Levallois-product			
- flake	5	3	5
- blade			1
Middle Palaeolithic points			
- Mousterien point	1	1	
- Levallois point		1	
Middle Palaeolithic scrapers	4	5	4
Middle Palaeolithic cores			
- discoid core	1	10	2
- Levallois core	2	2	3
Handaxes	1	2	
Scrapers	17	16	3
Retouched flakes	50	141	18
Retouched blade(let)s	11	12	1
Becs (gravers) & borers	2	3	1
Burins	3	2	1
Various	1	1	1
Backed blade(let)s	1	2	
Truncated and backed blade(let)s	5	3	
Microliths		2	
Arrowheads			
- leaf-shaped	1	3	
- tanged	3	2	2
- tanged and barbs		3	
- lozenge-shaped	1	1	
Combined tools	1		
Indeterminated tool (fragments)	6	16	2
Cores	16	43	8
Core rejuvenation products	10	6	3
Flakes	275	1254	287
Blades	6	5	2
Bladelets	60	78	2
Debris	24	24	7
Potlid	3		
Chips	21	12	
Hammerstones		2	
Retouched chips	1		
"Utilized" tools	3	30	
Total	535	1685	353

Table 2. Typological list of all lithic artefacts found in the three surveyed areas of the Potenza valley.

In total 53 artefacts could be assigned to the Middle Palaeolithic on the basis of technological and typological attributes. These include a number of typical Levallois products, such as 13 Levallois flakes with facetted or dihedral butt (*fig. 21.1*), 1 Levallois blade, 1 Levallois point and 7 Levallois cores (*fig. 21.4*). Among the latter is a very large specimen displaying all typical attributes of a Levallois core: plano-convex section, centripetal dorsal preparation, facetted platform, large Levallois flake negative. In addition to these Levallois cores, a number of discoid cores (13 sp.) are reported. Furthermore a few retouched artefacts display Middle Palaeolithic affinities. Some side-scrapers with scaled retouches may be of Middle Palaeolithic date (*fig. 21.3*). More convincing evidence includes two Mousterien points (*fig. 21.2*), of which one is made on a Levallois flake, and three bifacially worked artefacts. One of the latter (*fig. 21.5*) can clearly be determined as a small hand-axe made on a large flake. The majority (ca. 2/3) of these Middle Palaeolithic artefacts is heavily weathered i.e. covered by a gloss and/or colour patina formed after the manufacturing and use of the artefact. Hence, it can be assumed that other non-diagnostic artefacts presenting a similar patination can be of Middle (or even Late) Palaeolithic age too.

The best parallels for the Middle Palaeolithic artefacts from the Potenza valley are found within the Riss-Würm interglacial and Würmian assemblages, as found at various locations in the Marche region (Peretto 1990), such as Erbarella (Ancona) and Ponti di Crispiero (Macerata). These assemblages are characterised by the occurrence of a considerable number of Levallois implements, a good percentage of which is transformed to simply retouched tools.

- *Late Palaeolithic/Mesolithic*

Except for a few isolated finds, no clear evidence of human occupation in these phases are reported in the collected surface finds from the Potenza. The nearly total absence of Late Palaeolithic finds is not at all surprising, since it is generally accepted that the population density in the whole of Italy at that time, in particular from the Aurignacian/Uluzzian till the Early Epigravettian (-16,000 BP), was extremely low (Mussi 2001, 209, 219). The only find that can be tentatively attributed to the Late Palaeolithic (*fig. 22.6*) is a patinated distal blade fragment with flat to oblique irregular retouches along both sides. The absence of clear Final Epigravettian/Mesolithic sites on the other hand most likely reflects biases in recovery, since it is clear that the smaller dimensions of the lithic industry, in particular of microliths, hinders the surface detection. So far the surveys only yielded two microlith finds - a crescent (*fig. 22.7*) and an undetermined fragment.

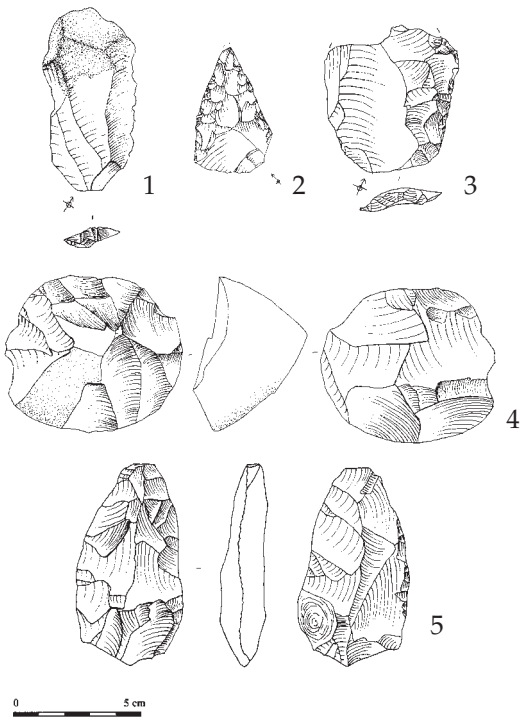


Fig. 21. Middle Palaeolithic artefacts from the Potenza Valley Survey.

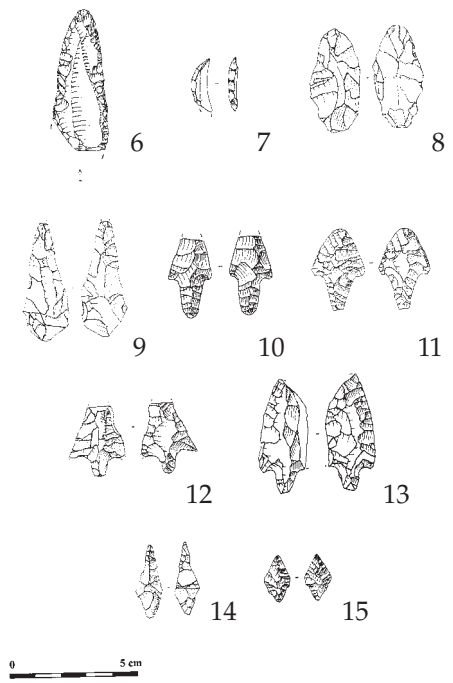


Fig. 22. Late Palaeolithic to Chalcolithic artefacts from the Potenza Valley Survey.

- Neolithic/Chalcolithic

The clearest evidence of human presence in the Potenza valley during the Neolithic/Chalcolithic is formed by a series of 16 flint arrowhead finds and pottery fragments. The arrowheads, all made by flat bifacial retouch, can be further classified typologically into four leaf-shaped (*fig. 22.8-9*), seven tanged (*fig. 22. 10-11*), three weakly barbed (*fig. 22.12-13*) and two lozenge-shaped specimens (*fig. 22.14-15*). Most of these projectiles have been found isolated, although some were collected within artefact concentrations and thus may indicate the presence of Neolithic settlement sites. The most convincing Neolithic site was found close to the southern edge of the Potenza river in the Upper area. The concentration of lithic and ceramic finds corresponds with a somewhat low-lying oval zone of darker grey earth and is threatened by modern gravel extraction. Another potentially Neolithic settlement location is situated north of the river in the Middle Potenza area. Here the so far largest surface assemblage was collected, including some 287 flint artefacts and a few ceramic finds. Here too the concentration coincides with an area of very dark greyish sandy clay, which may correspond to an old occupation layer being ploughed up. In the vicinity of this site, at Recanati 'Fontenoce' and Treia 'S. Maria in Selva' (Lollini s.a.), two Late Neolithic settlements have been excavated in earlier times, belonging respectively to the Diana and Ripoli culture. On both sites several arrowheads, comparable to our surface finds, have been reported. Also lots of artefacts in obsidian were found on these sites. It is surprising that this raw material is completely missing in the surface collection of the three surveyed areas.

ACKNOWLEDGEMENTS

The 2002 field survey was carried out within the Regione delle Marche and the PVS-team is very grateful to the Soprintendenza Archeologica delle Marche and especially to Soprintendente Dott. Giuliano de Marinis and Dottoressa Edwige Percossi, Ispettrice for the area, for their support and expertise. We also thank Dottoressa Mara Silvestrini for her help with the determination of prehistoric pottery.

In addition to the signatories of this article, the PVS-team of 2002 included: Joris Angenon, Sophie Dralans, An Van den Bremt, Maarten Weyler, Lieven Verdonck, Paul De Paepe, Julie Van Kerckhove, Nele Eggermont, Floor Van der

Meeren, Charlotte Denolf, An De Waele, Julie Luyts and Wouter Dhaeze.

The director of the project wishes to thank all participating members of the team and explicitly all voluntary archaeologists and students of archaeology and geography for their great and enthusiastic efforts.

NOTES

1 The project is directed by Prof. Frank Vermeulen and the principal archaeological investigators on the Belgian side include Catharina Boullart, Patrick Monsieur, Hélène Verreyke and Geert Verhoeven (Department of Archaeology, Ghent University, Belgium). For the geomorphological aspects close collaboration is obtained with a team headed by Prof. Morgan De Dapper and including Dr. Beata De Vliegher and Tanja Goethals (Department of Geography, Ghent University) and Prof. Dr. Paul De Paepe (Department of Geology, Ghent University). The study of prehistoric stone artefacts was organised under supervision of Prof. Dr. Ph. Crombé (Department of Archaeology, Ghent University). The Soprintendenza Archeologica delle Marche actively supports the programme while additional help is supplied by the Universities of Macerata (Department of Archaeology) and Camerino (Department of Geology).

2 A substantial grant was obtained from the Belgian Federal Government (IUAP - PIA V/09). Other financial support comes from the Fund of Scientific Research – Flanders and from Ghent University (BOF-funds).

3 Vermeulen/Boullart 2001; Vermeulen/Monsieur/Boullart 2002.

4 It is the five year project 'Urban and rural transformation in the western and eastern Roman empire. Interdisciplinary archaeology of late antique and early medieval times' in collaboration with the universities of Leuven, Leiden and Louvain-La-Neuve.

5 Vermeulen/Boullart 2001, Vermeulen/Monsieur/Boullart 2002, Vermeulen 2002a.

6 To explore this potential further a series of flights were also organised above the more southern Marche valleys of the rivers Tenna and Aso, in close collaboration with a field survey team of the University of Pisa directed by Prof. M. Pasquinucci. Although results were also good here, particularly in the Tenna area, it is clear that the archaeological harvest in the Potenza valley is more impressive.

7 See particularly Vermeulen/Boullart 2001 and Vermeulen 2002a.

8 During the month of April both authors of this text were responsible for the photography, while F.V. took the pictures during the other months of aerial detection.

9 Vermeulen/Boullart 2001.

10 See below: contribution of Vermeulen/Boullart.

11 See particularly Vermeulen 2002a.

12 We regard the sites of *Dubios* and *Prolaquaeum* (Pioraco) in the Apenine area of the Potenza as road stations and not as real urban centers.

13 See especially: Bejor 1977, Moscatelli 1985 and 1988, Fabrini 1990, Paci 1999 and Marengo 2000. Especially some aerial photo-interpretations by Moscatelli (1988) should be mentioned here.

14 A main part of this GIS analysis was done by Geert Verhoeven.

15 See also the contribution about the fieldwork below: Vermeulen/Boullart.

16 A second prospection campaign in the same zone is awaited for the late summer of 2003. The preliminary distribution map will then be completed and published.

17 See contribution by Goethals, De Dapper and De Vliegher.

18 See Vermeulen/Boullart 2001, Vermeulen, Monsieur and Boullart 2002.

19 See contributions by Monsieur, Verreyke, Boullart and by Crombé, Devriendt, Vanheddegem.

20 Unpublished small-scale excavation by Lollini (Soprintendenza delle Marche) in 1976. See also Percossi Serenelli 1985.

21 Percossi Serenelli 1985, 134.

22 See also: Percossi Serenelli 1995, 41.

23 Baldelli 1991a, Baldelli 1991b, Baldelli 2001 and Luni 1992.

24 Luni 1992, 336-337.

25 Already in 1945 the top of this hill was flattened, but at that time Alfieri did not have any indication of protohistoric finds (Cass. 4, fasc. 3).

26 Vermeulen/Boullart, 2001, 11.

27 Baldelli 1991, 73.

28 See contribution by Monsieur, Verreyke, Boullart.

29 See for most recent assesment of the town data: Paci 1999; Percossi Serenelli 2001.

30 Alfieri 1947.

31 Mercando 1974b.

32 Mercando 1979.

33 Moscatelli 1987.

34 Paci 1995 and 1999.

35 Percossi 1995 and 2001.

36 Mercando 1974b.

37 We have almost finalised a complete inventory of old discoveries made in the three sample areas of this survey project of which data are available in the regional archaeological literature and archives. A gazetteer of these finds from the period concerned (1000 BC-1000 AD) will be published in the near future.

38 Mercando 1979.

39 See the separate study by J. Van Kerckhove in *BABesch* 2004.

40 Mercando 1979.

41 Pignocchi 1998; Luni 1991, 38, 39.

42 Mercando 1974b.

43 Mercando 1979.

44 The *villae rusticae* of Castelfidardo and Cone di Arcevia were occupied, or re-occupied, during the 4th and the first half of the 5th century AD and produce important reference material on the subject of late Roman pottery. Amongst the finds were terra sigillata medio-adriatica, African Red Slip, Late Roman C, *spatheia*, coarseware and coins.

45 Pignocchi 2001.

46 Dall'Aglio 1988.

47 Paroli 1995. Amongst the finds were coins, African Red Slip and *spatheia*.

48 Fontana 1998.

49 Reynolds 1995.

50 See contribution by Vermeulen and Boullart.

51 Many thanks to J. Angenon, who is responsable for the drawings of the material. The campaign of 2002 could rely on the experience of two years of processing the survey finds. The accuracy of the pottery analysis benefits from the continuity of the team. Moreover several studies were made concerning relevant subjects like the Roman villae in the Marche, a ceramics analysis of the Campana finds of the PVS and GIS applications in the Potenza valley. The pottery analysis also benefits from

ongoing research-programs on the subjects of Piceni settlements in the Marche (Catharina Boullart) and late antique and early medieval occupation patterns and trade routes (Hélène Verreyke) and amphorae from the PVS (Patrick Monsieur). Fundamental is the collaboration with the Soprintendenza Archeologica delle Marche which will hopefully be expanded in the future.

[52] See contribution by Vermeulen and Boullart. Unpublished small-scale excavation by Lollini (Soprintendenza delle Marche) in 1976. See also Percossi Serenelli 1985.

[53] Malone/Stoddart 1994, 124, fig. 4.21-1, 3.

[54] Lollini 1979, 199, fig. 6.6.

[55] Lollini 1979, 183, fig. 2.11.

[56] Lollini 1979, 179.

[57] Peroni 1959, 111.

[58] Silvestrini/Pignocchi 1999, 37, fig. 5.5.

[59] Lollini 1979, 200, fig. 7.45.

[60] Malone/Stoddart 1994, 120, fig. 4.17-71.

[61] Silvestrini/Pignocchi 1999, 30.

[62] Malone/Stoddart 1994, 120, fig. 4.17.

[63] Barker 1995, 135, fig. 54.

[64] Lollini 1991, 126.

[65] Silvestrini Lavagnoli/Cazzella 1981, 153, fig. 2.

[66] Bronze Age: Horned handles of Moscosi di Cingoli: Silvestrini/Pignocchi 1999, 37, fig. 5.2, 3 and 5.2.4. Horned handles of Monte Ingino: Malone/Stoddart 1994, 121, fig. 4.18-25. Lugs: Negroni Catacchio/Massari/Raposso 1999, 327, fig. 11; Negroni Catacchio/Cardosa/Domanico 1999, 433, fig. 7A; Bailo Modesti 1999, 448, fig. 8B. Iron Age: Horned handles of Ancona: Lollini 1956, fig. 9.7 and 11.7. Lugs at Monte Giove: D'Ercole/Cosentino/Mieli 2001, 341, fig. 85, 96, 97, 99 and 114.

[67] Bronze Age: Bachero di Cingoli: Lollini 1979, 199, fig. 6.26. Iron Age: Colle dei Cappuccini (Ancona): Lollini 1956, fig. 10.10 and 11.10; Eroi 2001, 195, fig. 76-79. Cartofaro. Silvestrini Lavagnoli/Cazzella 1981, 157, fig. 39 and 40. Sirollo: Lollini 1985, fig. 15.10.

[68] Diameter: 1,7 cm, thickness 0,7 cm.

[69] Lollini 1956, 260, footnote 53.

[70] Monte Primo di Pioraco: Lollini 1979, 186, fig. 3A2. Monte Croce Guardia di Arcevia: Lollini 1979, 188, fig. 4.3. Monte Giove di Penna S. Andrea: D'Ercole/Cosentino/Mieli 2001, 341, 342, fig. 111. Bachero: Lollini 1979, 199, fig. 6.3. Moscosi di Cingoli: De Marinis 2001, 47 fig. 28, 187 fig 32; Silvestrini/Pignocchi 1999, 44, fig. 9.8. Colle dei Cappuccini (Ancona): Lollini 1956, 259, fig. 14.

[71] Vermeulen/Monsieur/Boullart 2002.

[72] Stibbe 1972, fig. 126.2 and 127.2.

[73] There is a close parallel with an example of the Athenian Agora, dated around 480 BC: Sparkes/Talcott 1970, 259, nr. 337, fig. 20.337; Stamires/Vanderpool 1950, 390, fig. 25 nr. 33.

[74] Cf. types MGS IV or V: Van der Mersch 1994, 74, 77; see in last instance: Liko 2001, 265, fig. 1-c; see also Percossi 1995, 41.

[75] J. Vankerckhove was so kind to provide the information. We already referred to the results of her study of the black gloss ware in this volume. For the black gloss pottery found in recent excavations in the centre of the city: Frapiccini 2001; Paci 2001, 101-102; Percossi Serenelli 2001, 42-45. Older excavations in the north-eastern sector: Mercando 1979, passim.

[76] For these two fragments and the material to be compared, see J. Van Kerckhove in *BABesch* 2004 (n° 9 and 13).

[77] Brindisian amphorae and 'ovoidale adriatiche': Baldacci 1972, fig. 1-3; Cipriano/Carre 1989, 68-80. Lamboglia 2 and Dressel 6a: Brecciaroli Taborelli 1984; Tchernia 1986, 53-55; Cipriano/Carre 1989, 80-88, especially fig. 12 with rims and spikes from the production of Cologna Marina. For a recent *status quaestionis* on the study of Adriatic amphorae: Starac 2001.

[78] Coan amphora: Grace 1965. Amphorae bungs: Lilli 1994-1995; Gobbo 1998. Type 1: Delos: Bruneau 1970, pl. 46, n° D134-142. Type 2: Stefanini 1994-1995, 47, n°12 and fig. 16 (Senigallia); Mercando 1979, fig. 91 (San Benedetto del Tronto). Local production of unguentaria is attested in Aesis/Iesi, suspended in the first decennia of the 1st century AD: Brecciaroli Taborelli 1998, 214-216, especially fig. 113, n° 625b; cf. also Falconi Amorelli 1975, tav. LXXIII, n° 25.

[79] L. TETTI SAMIA: Mercando 1979, 219, n°21, fig. 133 (*Potentia*); Fortini 1990, 52, n° 41, 63, fig. 15 (Cupra Marittima); De Visscher *et al.* 1955, 112, n° 19, fig. 28 (*Alba Fucens*); Hayes 2000 (Hrvar); Crowfoot/Crowfoot/Kenyon 1957, 296-297, n° 5, fig. 68 (*Iudaea*/Samaria); Vanvinckenroye 1985, 21-25, fig. 5, 6 (*Belgica*/Tongeren); SEX ANNI: Fortini 1990, 10, n° 3, fig. 1 (Cupra Marittima).

[80] Dragendorff 17b: Mazzeo Saracino 1985, 201-202, n°18, tav. LXII, 2; cf. Malone/Stoddart 1994, 200, fig. 6.12, n° 17; Forma XXIX, 4: Pucci 1985, 393, tav. CXXVIII, 7.

[81] Tipo 2/389: Ricci 1985, 299, tav. XCVI, 6, tav. CXL, 6. Lamps in *Potentia*: Ramadori 2001, passim.

[82] Plain ware decorated 'a ditate': Mercando 1979, 253 fig. 162t, 254 fig. 164c. Coarse ware: Mercando 1979, 200 fig. 117f-g, 227 fig. 141g-h, 247 fig. 157q.

[83] Dressel 6a: Carre 1985, 205-218; Cipriano/Carre 1989, 85-88. Dressel 6b: Carre 1985, 219-225; Bezeczky 1987, 6-21. Dressel 2-4: Campanian and other imitations: Panella/Fano 1977; Carre 1985, 226-228; Aldini 1978, 242-243, fig. 3, a. Forlimpopoli amphorae: Aldini 1978; Carre 1985, 228-231. Amphorae 'a collo ad imbuto': Carre 1985, 232-234; Bezeczky 1987, 34-36; Mercando 1979, fig. 138, 139 and 176. Rhodian: Empereur/Picon 1989, 224-225; Robinson 1959, 20. F94; Monsieur/Braeckman 1995, 294-295, fig. 1, n° 4; Monsieur 2001, 74, fig. 11; Hayes 1983, 151, type 25, fig. 24, A66 (fish-products?); Toniolo 1991, 34, fig. 30, 35 and fig. 31 (fish-products?). Amphore crétoise 4/Dressel 43: Marangou-Lerat 1995, 85-89; Hayes 1983, fig. 26-27; Toniolo 1991, 34, fig. 29; Mercando 1974b, tombs 40 and 52.

[84] Hayes type 45B: Hayes 1972, 62-65, fig. 11; Atlante 1981, 63-64, tav. XXVIII. Hayes type 182: Hayes 1972, 201, fig. 35; Atlante 1981, 213, tav. CV3-5. Hayes type 61B: Hayes 1972, 100-107, fig. 16 and 17; Atlante 1981, 83, 84, tav. XXXIV, XXXV. Hayes type 84: Hayes 1972, 132, fig. 23; Atlante 1981, 69, tav. XXIX.

[85] Rosette Hayes type 44B: Hayes 1972, 239, fig. 41; Atlante 1981, 129 n° 183, tav. LVIII. Grille-pattern Hayes type 69: Hayes 1972, 241, fig. 42, Atlante 1981, 125 n° 31, tav. LVI. Crescent Hayes type 74: Hayes 1972, 243, fig. 42m. Atlanta 1981, 128 n° 138, tav. LVIII. Concentric circles Hayes type 36: Hayes 1972, 237, fig. 40u-v; Atlante 1981, 125 n° 36, tav. LVI. Concentric circles Hayes type 27: Hayes 1972, 235, fig. 39y; Atlante 1981, 125 n° 11, tav. LVI. Palm type 3: Hayes 1972, 229, fig. 38 and 39; Atlante 1981, 127 n° 112, tav. LVII. Palm stamp types: Hayes 1972, 229-233, fig. 38 and 39; Atlante 1981, 127, 128, tav. LVII(b) and LVIII(a).

[86] Hayes 1972, 329-338, fig. 67-69.

[87] Martin 1998.

[88] Hayes 1972, 310-315. Atlante 1981, 184-207.
[89] Ennabli 1976, 256.
[90] Typology and discussion of late Roman amphorae: Riley 1979. *Spatheia* and 'cylindrical' amphorae: Joncheray 1975; Keay 1984; Monsieur 1991; Mercando 1979, fig. 10c and g, fig. 14a and fig. 15 (Cone di Arcevia), fig. 120q and fig. 182 (*Potentia*). Late Roman 1: Empereur/Picon 1989, 236-243. Late Roman 5/6: Empereur/Picon 1989, 243; Robinson 1959, 68, n° K108, pl. 15: Athenian agora context middle 3rd century AD, probably the earliest dated Late Roman 5/6.
[91] The hexagonal tiles where found in the eastern part of the intra-site survey.
[92] Marche: Potentia: Mercando 1979, 266, 267, fig. 178c. Cone di Arcevia: Mercando 1979, 94, fig. 5. Castelfidardo: Mercando 1979, 136, fig. 49; Mercando 1981; Quiri 1985; Mercando 1989. Emilia-Romagna: Scagliarini 1989, 14, fig. 11, 12. Veneto: Dall'Aglio/De Maria 1988, 141.
[93] Dall'Aglio/De Maria 1988, 143, fig. 29, 5 and 7.
[94] The *tesserae* where spotted at the northern and southern areas of *Potentia*.
[95] This piece of mosaic was found in the northern area of *Potentia*.
[96] Mercando 1979, 191, fig. 109.
[97] Percossi Serenelli 2001, 30, fig. 5.
[98] The stucco was mainly found in the northern and eastern areas of *Potentia*.
[99] Pelliconi 1983, 226-229, n° 22.12-13 and n° 22.16; Fortini 1984, 110, 121-125, n° 11, fig. 3, 11-12; Matijasic 1983. Necropolis of La Pineta: Mercando 1974b, tomb 85, fig. 335h and 341.
[100] Forms 50 and 51: Isings 1957, 63-69. *Unguentaria*: Mercando 1974a, passim; Percossi Serenelli 2001b, 160-161, fig. 78-80. 'Millefiori': Painter 1988, 51, n°27, cf. Isings 1957, 17-21.
[101] Mercando 1979, 267, fig. 164 and 178.
[102] Hardware: Intel Pentium 4: 2.4 GHz; 512 RAM; 75 GB hard disk; 1.44 MB floppy drive; Samsung CD-R/RW 48x/16x/48x, several printers. Software: Microsoft Windows XP; Microsoft Office XP; ESRI ArcView 3.2 + 3D Analyst & Spatial Analyst; Airphoto 2.20; Minitab 13; Adobe Photoshop 7.0. It is also worth underlining that, besides this central PC, every member of the PVS-team has his/her own PC, sometimes with some important peripheral instruments: digitizer tablet CalComp 9500; A3-scanner: EPSON 1640 XL; slide scanner Canoscan 2700F.
[103] Voorrips 1998, 255.
[104] Federal Geographic Data Committee 1998.
[105] http://www.csc.noaa.gov/metadata/text/download.html
[106] Heuvelink 1993, 23-25.
[107] Hageman/Bennett 2000, 114-115.
[108] This is a vector-based structure, composed of a set of triangular facets.
[109] Exponential, Circular, Spherical, Gaussian and Linear Ordinary Kriging; Universal Kriging - with linear and quadratic drift-; Spline; Inverse Distance Weighting; Trend and TIN.
[110] A detailed report of all analyses, including the computation of the DEM, can be read in Verhoeven 2002.
[111] Off-site 0: 0 artefacts /50m; 1: <=5 artefacts/50m; 2: <15 artefacts/50m and off-site 3: >=15 artefacts/50m.
[112] Fisher 1999, 8.
[113] Hodder/Orton 1976, 226-229.
[114] To execute this, Airphoto 2.20 is used. Designed by Irwin Scollar, this software is specifically developed to rectify archaeological images made with handheld uncalibrated cameras (Scollar 2002, 167).
[115] See contribution by Vermeulen and Boullart.

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