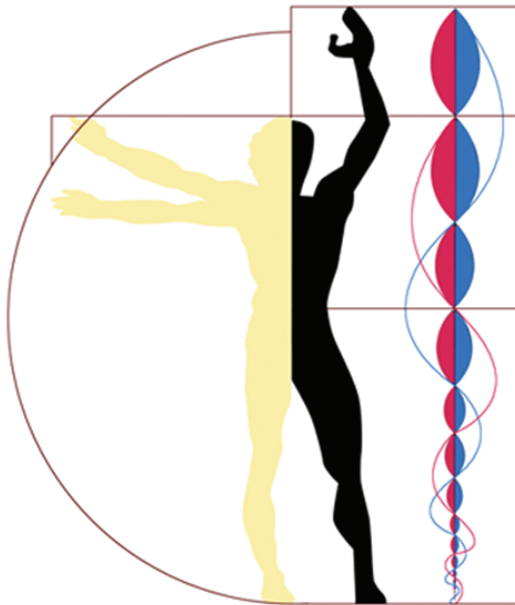


Fabbrica della Conoscenza

XIII Forum Internazionale di Studi

Le Vie dei
Mercanti

Carmine Gambardella



HERITAGE and TECHNOLOGY

Mind Knowledge Experience

Fabbrica della Conoscenza numero 56
Collana fondata e diretta da Carmine Gambardella

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The volume has been included in the series Fabbrica della Conoscenza, founded and directed by Carmine Gambardella, after an anonymous peer-review by two members of the Scientific Committee.

Carmine Gambardella

**HERITAGE and TECHNOLOGY
Mind Knowledge Experience**

Le Vie dei Mercanti _ XIII Forum Internazionale di Studi

Carmine Gambardella

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Mind Knowledge Experience

Le Vie dei Mercanti

XIII Forum Internazionale di Studi

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Il Progetto "Ecoturismo urbano per la fruizione sostenibile dei Beni Culturali in Campania", in attuazione degli Obiettivi Operativi 2.1 e 2.2 del Programma Operativo FESR Campania 2007/2013 per la realizzazione e/o il potenziamento, nel territorio della regione, di forti concentrazioni di competenze scientifico tecnologiche, di alto potenziale innovativo, intende favorire la concentrazione di competenze scientifico-tecnologiche finalizzata a rafforzare la competitività dei sistemi locali e delle filiere produttive regionali non solo nei settori dei servizi associati al turismo e beni culturali ma anche in settori ad altissima tecnologia che possano rappresentare una svolta tecnologica e culturale all'approccio innovativo per lo Sviluppo sostenibile in aree ad altissima vocazione turistica.

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Heritage
Tangible and intangible dimensions
History
Culture
Collective Identity
Memory
Documentation
Management
Communication for Cultural Heritage
Architecture
Surveying
Representation
Modelling
Data Integration
Technology Platforms
Analysis
Diagnosis and Monitoring Techniques
Conservation
Restoration
Protection
Safety
Resilience
Transformation Projects
Technologies
Materials
Cultural landscapes
Territorial Surveying
Landscape Projects
Environmental Monitoring
Government of the Territory
Sustainable Development

HERITAGE and TECHNOLOGY
Mind Knowledge Experience
Le Vie dei Mercanti
XIII Forum Internazionale di Studi

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Peer review

Scholars has been invited to submit researches on theoretical and methodological aspects related to Heritage and Technology, and show real applications and experiences carried out on this themes.

Based on blind peer review, abstracts has been accepted, conditionally accepted, or rejected.

Authors of accepted and conditionally accepted papers has been invited to submit full papers. These has been again peer-reviewed and selected for the oral session and publication, or only for the publication in the conference proceedings.

Conference report

357 abstracts received from:

Albania, Argentina, Australia, Benin, Brazil, Bulgaria, Canada, Croatia, Egypt, France, Greece, Iraq, Israel, Italy, Japan, Latvia, Malta, Mexico, Norway, Poland, Portugal, P.R. China, Russia, Slovakia, Spain, Turkey, United Kingdom, USA.

More than 500 authors involved.

291 papers published.

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Gilda EMANUELE

Preface

The theme of the thirteenth Forum “Le Vie dei Mercanti” aims to investigate the complex relationship that develops between technological innovation, knowledge, enjoyment and protection of cultural heritage and the landscape. This leads to the need for an international multidisciplinary comparison in order to explore the questions and issues that are being debated not only in academia, but also among those who govern, manage and control Public Administrations, Institutions and businesses.

The subtitle specifies the macro areas: Mind, intended as both speculative thought as well as the preparation of a methodological process; the subject who investigates, establishes an inescapable destiny with the object analyzed at different scales of analysis, from the architectural structure and design, to the infrastructure and the landscape; Knowledge, as the historicizing of the state of the art reached by the disciplinary skills, integrated with those of material culture, humus generative of innovation for the formation of a human capital that continues to grow; Experience, the representation and sharing of results obtained with good practices, exemplary and paradigmatic, as patrimonial value for humanity to achieve a better quality of life and places created working with Art.

The conference is open to multidisciplinary experiences on one or more of the proposed themes. Scholars are invited to present research on either the theoretical and methodological aspects or concrete applications carried out on these issues.

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Tighremt Aslim_ Aguddim Taliwin: cases study in the Draa Valley

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1. Abstract

Ait Atta, Ait Sedrate, Ait Yafalmane are only a few of the Berber clans that have found the perfect habitat to develop their community in the area protected by the height of the High Atlas Mountains and encircled by the cities of Ouarzazate, Errachidia and Zagora.

In fact, in this area the Berber tribes, sedentary and native, have merged with the Arab ones, foreign and nomadic, to create one social and cultural community which is very rich and complex.

The buildings that rise in this desert area, named Ksour and Tighremt, are directly linked with local culture which represent, in some way, the emblem because both the technique and the materials are derived from the area. The presence of four big rivers, still rich in water, the fertility of the ground and the composition of the soil, this means that the technique of rammed earth can be used. This technique is useful for building wide, impressive, sumptuous buildings made with very poor local and renewable materials.

Recently, in this area, many survey campaigns have been made involving many operators to make a documentation of the architectural heritage.

The objective of this study is the systematic organization of the surveys, more than twenty tighremt and ksour, and at the same time, the elaboration of one strategy for the divulgation and valorisation of the heritage. Probably the mere survival of those buildings, really sensitive to the weather factors and the lack of maintenance, is linked more to local and global awareness than to concrete ideas of restoration.

Keywords: High Atlas, Aguddim, Berber, Tighremt, Survey

2. Themes and objectives of the research

Our work is part of a field of research, which has already been developed and tested and has two objectives: an overall reflection on the spontaneous architecture linked to the Berber culture in the Maghreb and the production of new surveys. The first objective concerns the theme of the Moroccans tighremt the latest chapter in a story that began over a decade ago with the cataloguing and analysis of the fortified granaries in southern Tunisia. In fact, the spontaneous architecture of the Maghreb is inextricably linked to the territory and it is the physical evidence of a culture now relegated to small territorial enclaves. The intense changes that these regions have suffered in recent years represent a critical step for the management of multiculturalism in these territories and for the preservation of an extremely fragile heritage. The preservation of this architectural heritage is at the basis of the second objective. In fact this tries to describe, with very detailed surveys, often assigned to laser instruments, the quality and quantity of the elements which characterize this architecture. The work here presented is a synthesis of the research conducted at the Mediterranean University of Reggio Calabria, Department of Architecture and Territory, by Marinella Arena and Paola Raffa. Measurements involved students of the Final Synthesis Laboratory "Mediterranean City" (2012) coordinated by prof. Massimo Giovannini, and students of the Atelier of Thesis "Central High Atlas: Ksour & Tighremt" (2014) coordinated by Marinella Arena and Paola Raffa.



The surveys, covered the four major rivers of the High Atlas: Ziz, Todra, Dades and Draa. In the valley of the Draa 26 ksour and tighremt were detected. (Fig.1) The wide documentation obtained, inserted only in part in this study, is the basis for some reflections on the morphology of the recurring elements in the architecture of rammed earth.

3. The Draa Valley

The Draa river [1] flow along the valleys of High Atlas Mountains. Here we can find six lush green oases, Mezguita, Tinzouline, Ternata, Fezouata, Ktaoua and Mahamid el Ghizlane, where the Berber tribes which were mixed with Arab ones in the past are living. (Fig. 2)

The Draa valley, at the beginning, is narrow and winding, in fact the river carves its path through the Djebel Sarhro, here the space for the oases is very small. After the town of Agdz, the valley widens and gives rise to six vast oases. The river is perennial, after the floods of the sixties a dam was built in 1975, this is located along the lake and regulates the flow of water in the Draa. Downstream of the oasis of M'Hamid, the Draa continues its journey under the soil.

Historically, the flow of water has always been controlled a by so-called "barrage", barrier systems that allow diversion of the water to direct it into the fields and the palm groves. The "barrage" are determined by the morphology of the land: they are present where the valley narrows, and they are very important points of both geographical and social for the territory. Going on from north to south we can recognize: Barrage Mounseur Eddahbi, Barrage Taliwin, Barrage Tansikht, Barrage Agdz, Barrage Barrage Azghat Bounou. To protect the barrage there are often isolated round towers or small square forts, "aguddim". Tighremt, also known as "kasbah" an Arab term, are vernacular constructions built completely with earth, straw and water, according to the technique of rammed earth. They are dotted along the Draa River and are a strong, and at the same time fragile, a testimony of Berber culture. In In this paper I try to make a sort of comparison between the typology of aguddim, end tighremt using the two cases of study of Taliwin and Aslim.

4. Anthropic elements in the Draa Valley

The structure of the oases is made up of a few elements that are derived directly by context: the presence of the Draa water; the heights of the High Atlas Mountains, the Sarhro and Bani mountains (Fig. 3); the six oases where lush palm trees protect cereal crops from excess sun; the cultural and social development of these places.

Fig. 1 Localization of 26 ksour, tighremt and aguddim in Draa valley



Fig. 2 The Draa river



Fig. 3 The Draa valley: Diebel Bani

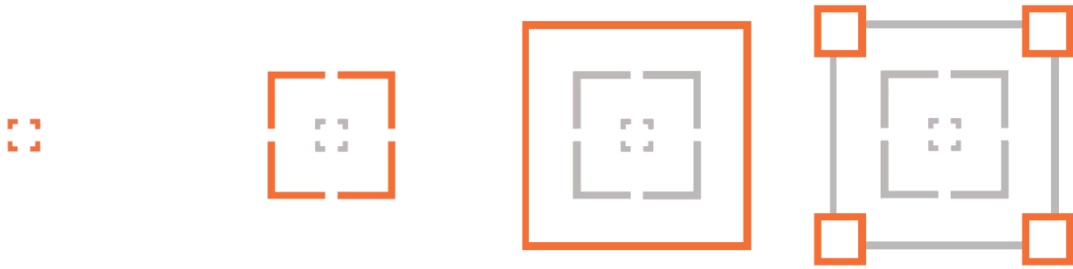


Fig. 4 The structure of the tighremt

In these areas the anthropic elements are the small rural fortified towns that are called “ksour” and which contain some common elements: the mosque, the square, the collective bathrooms, the collective barns, houses and the “dominating houses”. The latter are indicated by different terms, the most well-known is “kasbah” but we can also use the Berber term “tighremt”, in this case more appropriate. Outside the ksar we often find the mausoleum where the founder of the community rests, the “marabut”, and all around is the cemetery. Scattered throughout the territory, there are, however, individual settlements, tighremt, that have not been incorporated in a ksar, and which have maintained their shape. Around them there are some elements that increase their geographical importance: the fields, areas for threshing grain, the mosque “masjid”, the wells or, in some cases, real “qanat”. In other cases, the isolated buildings are the watchtowers, “aguddim”, for managing the most valuable asset, the water of the Draa, or for the defense of borders between oases or for the protection of the barrages. In other cases, you can find small buildings that were used by the mills to grind grain products. (Fig. 5)

5. Tighremt

The tighremt consists of a very simple plan: the square courtyard is surrounded by perimeter walls supported by corner turrets. It is important to note that the Maghreb architecture is introflexed, and does not show its wealth and typology externally. In fact walking in the Tunisian medina or in the Imperial cities of Morocco, we can hardly distinguish one house from the other nor can we imagine the richness and complexity of the interior. In the Draa Valley, and in the whole region of the High Atlas, the typology of the tighremt is everted and it is shown clearly on the outside.

The tighremt, in fact, are fortified buildings, they are not granaries, such as “igerm” in the Middle Atlas areas, but rather “rural fortified houses”. The issue of territorial control, the need for continuous defense, as we have seen, springs from conflicts of Berber tribes, and interference from nomadic Arab tribes who raided the territory. Furthermore the Draa Valley is one of the trade routes between the African coast and sub Saharan areas.

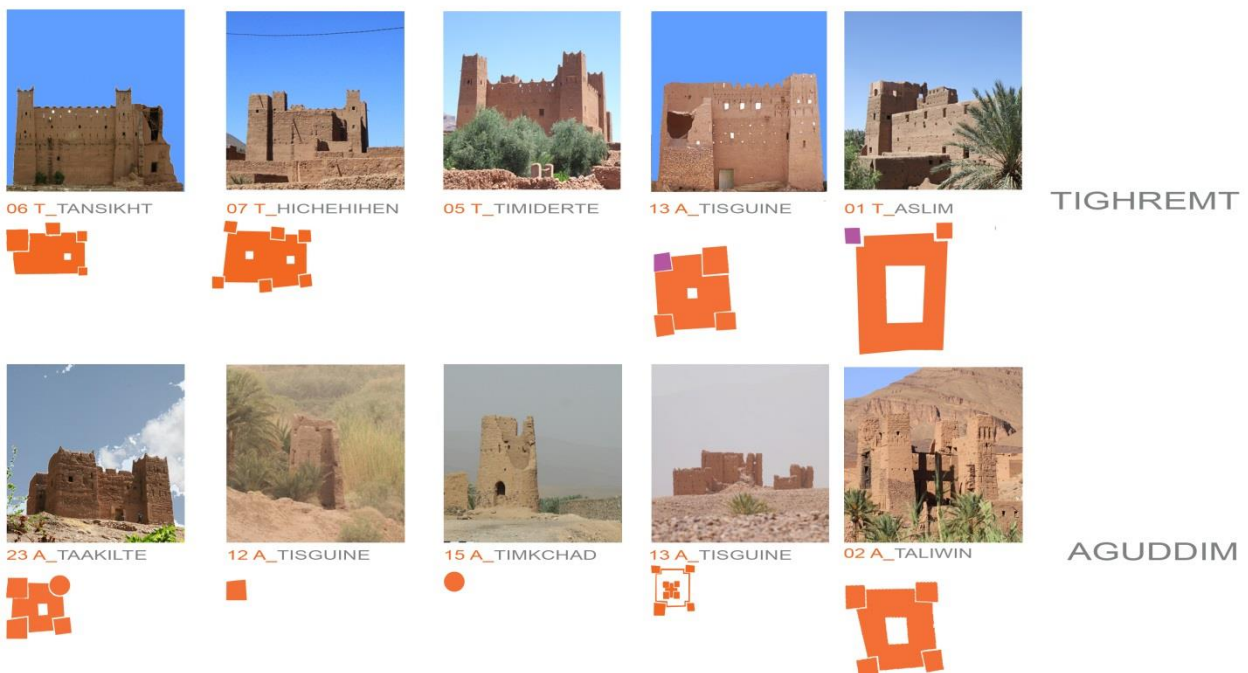


Fig. 5 Tighremt and aguddim in the Draa valley

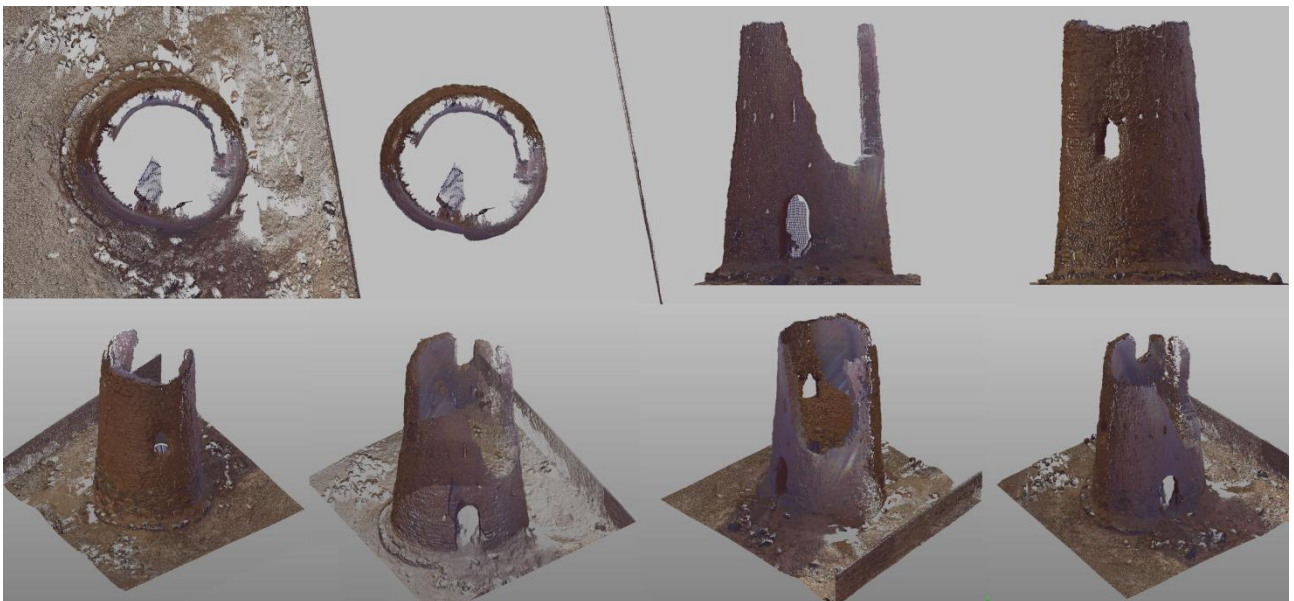
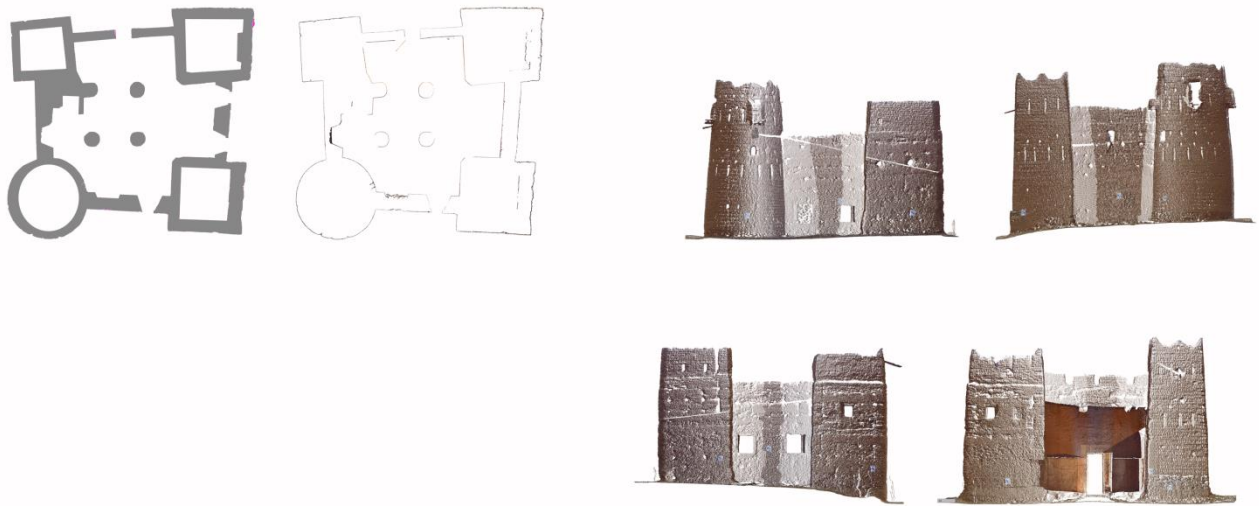
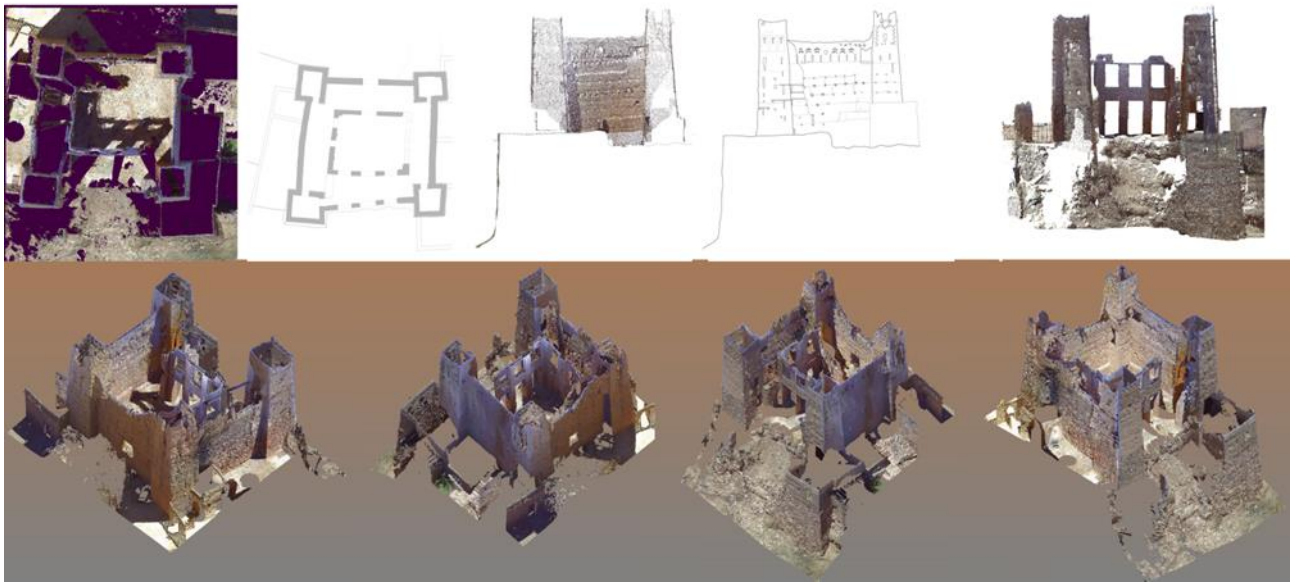


Fig. 5 Aguddim 02_Taliwin Fig. 6 Aguddim 23_Taakilte Fig. 7 Aguddim 15_Timckchad

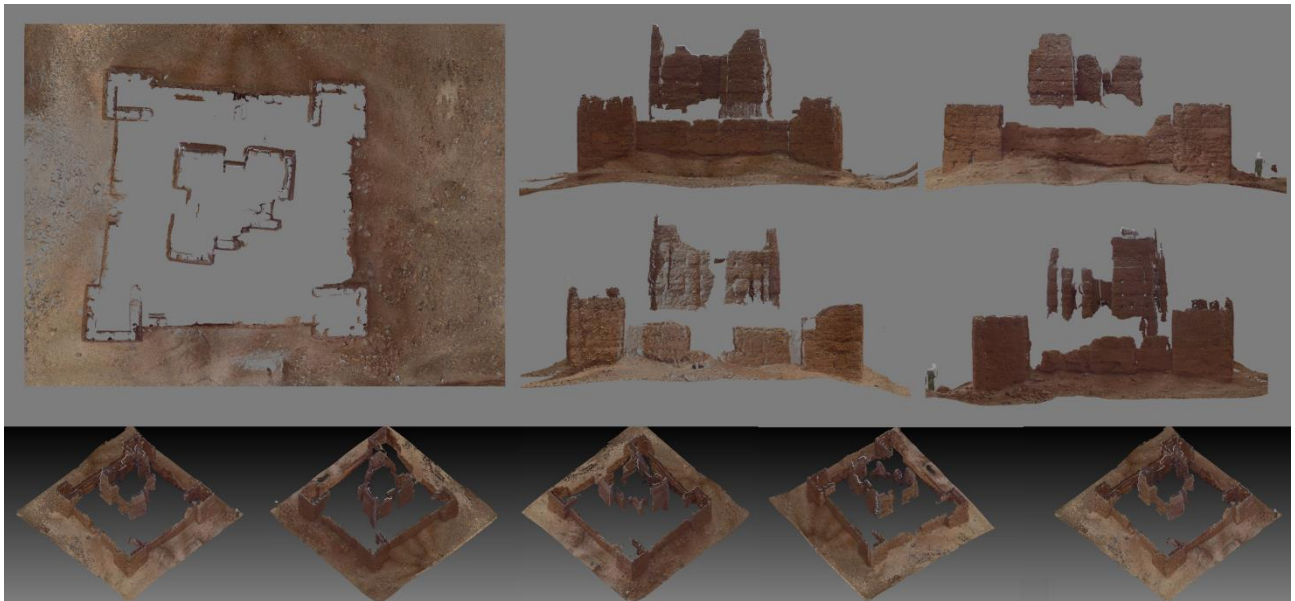


Fig. 8 Aguddim 13_Tisguine

fortified farm, often located within the oasis, or in the immediate vicinity. The large tighremt, often an expression of the power of the Cadi, supported by the colonial power, and placed on the high ground to dominate the territory and to demonstrate its strength and power. In other instances the tighremt are the so-called "dominant homes" placed within a ksar [3]. The tighremt, in fact, has high walls, up to five levels, and rises among the houses that make up the urban fabric of the ksar. In this regard we must make a small clarification. (Fig.5) The isolated tighremt are often the basis for the formation of ksour, in fact they constitute the first core. Around this architecture there are other tighremt, one or two, and then the more modest homes, "taddart" [4], which have one or two levels with small courts often covered. All of them are enclosed by boundary walls interspersed with defensive and structural turrets. It is important to note that all around the tighremt enclosure walls are often made to define the area of relevance and which, at a later date, are filled by other homes. The internal distribution of the tighremt has at ground floor level the rooms for storing grain, "ahano", stables, and of course, the stairs leading to the upper floors. The first level revolves around the court, usually covered and very small. Around the court are small rooms for family life during the hot summer days. Upstairs there is the terrace and other rooms utilized during the winter months. The central court, for its

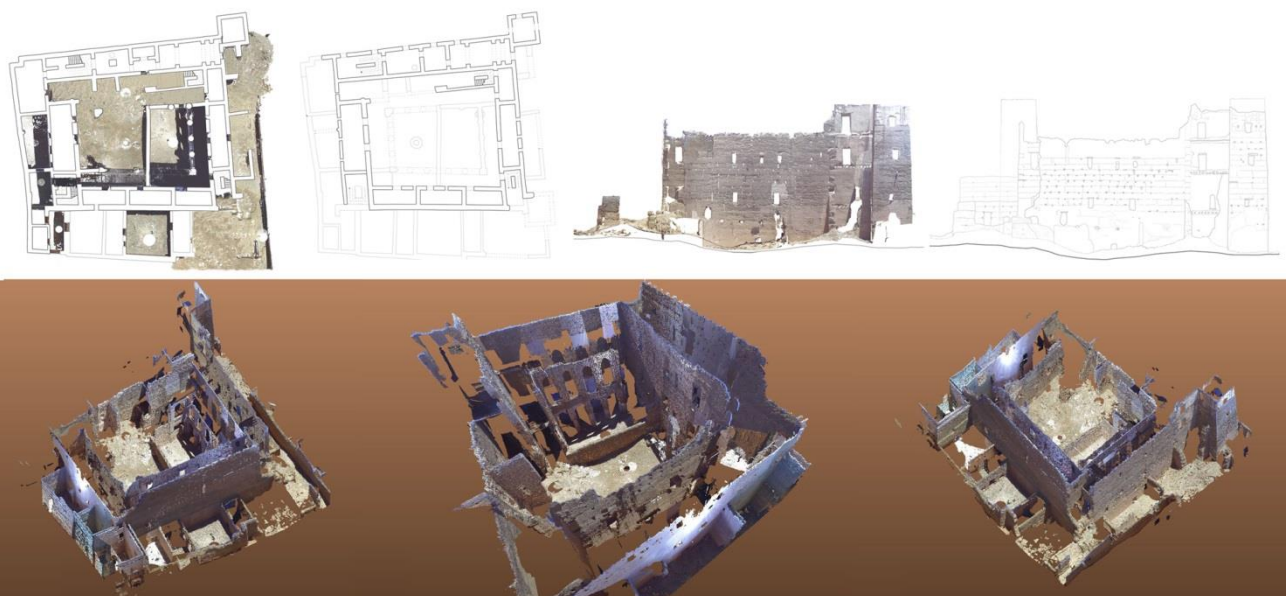


Fig. 9 Tighremt 01_Aslim

size and for the coverage, often elevated above the floor of the terrace, serves as a fireplace. It is capable of eliminating the hot air and cooling the entire home. The terrace is surrounded by a perimeter wall, 1.8 m high, which protects the privacy of the residents and gives access to the rooms situated on the top level and to the corner turrets. As we said before, the structure of the tighremt can be summed up in a few elements where the squared shape is predominant. The court, "taddawārit" in fact is usually squared and very small in the isolated tighremt and those which are placed inside the ksour. The court appears long in the great tighremt belonging to local Cadi. The dimension of the court is confirmed by the size of the turrets that are on average 3/4 meters wide. The perimeter walls, "agadir", reaffirm the morphology of the court and stand apart from this 2/3 metres as much as is allowed from the thin wooden structure that forms the attics. The rooms themselves are positioned against the perimeter walls that are often completely closed on the lower floors and only show some openings on the second or third level.

The technique of construction, actually very simple, includes the use of pisè, "llōh", for the realization of the first levels with blocks equal to 1.2 m wide, 0.8 m high and 0.6 m depth. The blocks are made of pisè work and dictate the dimension of the construction. The arrangement of the blocks and their overlap often generates small rectangular windows, "isirr", useful for ventilation, while the size and structure of the blocks is well visible because of the holes left by the ribs in wood. The top of the perimeter wall is built with bricks of raw earth, "ottob", which often create geometric designs, "lasseriff". These are real emblems of the Tamazight culture. In fact they seem to follow the geometrical decorations present in all Berber art that Gabriel Camps dates back to the Carthaginian culture.

The internal tighremt decoration, is concentrated on the upper floors it is decorated with horseshoe shaped arches. The arches in the Maghreb often have no structural function as has been pointed out many times by Titus Burckhardt, in his book *The Art of Islam*, in fact, arch type and materials make them unsuitable for a structural function. The arches have a rather formal and aesthetic value. They are often interrupted by a wooden element that acts as a chain, and also the characteristic protruding shape of the arch is due to the arrangement of the wooden supporting structures.

The structure within the court is entrusted to the wooden beams of palm and a small wooden boards arranged so as to form small projections on which the bricks that form the decorations are arranged. The wooden structure, within the court is hidden by plaster, "tamassalt", which covers and protects it from rainwater.

6. Aguddim Taliwin

The guard towers, along the Draa Valley, are located on the borders of the oases, where the valley narrows and allows the construction of the barrage, which control the flow of water. The Berbers call these buildings "Aguddim". The structure of Taliwin, and its location, shown the role that this plays in the territory. Indeed, we can define this tighremt as a real guard tower built to protect the barrage of the same name. Its perched position allows you to see the landscape, the slots on the two turrets, which are on the mountain side, confirm the defensive purposes of this architecture. The building is very small. Built on a square base of 14 meters, has four corner towers of regular shape. Its morphology confirm that the turret is the constructive form of the entire structure. In fact, each turret measure 3.5 meters and the wall that separates them is 7 meters long, the distance between one turret and the other is equal to two modules. The towers are also still intact, they rise on the upstream side to 10 m while, on the side facing towards the Draa Valley, they are supported by extensive ramparts. The towers are also attached to the wall structure with small wooden beams, arranged obliquely. The survey, carried out with the laser scanner, measure the deformations that the entire structure has suffered as a result of washout and subsidence of the land.

Furthermore it has been verified that the outer walls have a variable section, which passes from 90 cm at the base, to 55 cm for the body of the wall, up to 25 cm at the conclusion. The court, now partially collapsed, is slightly rectangular shaped, 5.3 to 6 meters wide, has three bays on each side, originally decorated with pointed arches. The main entrance, which faces on a small square, is located approximately 1.5 metres from ground level, and is protected by a brattice, a small projecting compartment, arranged on axis with the doorway. The decoration is partially visible on the south side of the building where the typical small narrow windows are decorated with letters of Tifinagh. (Fig.5,6,7,8)

7. Tighremt Aslim

The Tighremt Aslim, rises on the border of the Mezquita Oasis, closer to the small centre of Aslim than to the newest one of Agdz. The Tighremt is protected from view by a little centre; this latter is made up of small houses built on rammed earth that lie close to the street that leads to the Draa Gorges. The Tighremt is placed near the edge of the oasis like the great kasbah which is built very close, just a few metres to the north, and also the one of Cadì Ali in Aslim. Near Agdz the Draa makes a loop flowing around Djebel Kissane where the palm grove grows on one side drawing radial paths through the street to the river. This tighremt has a typical squared plan with four corner turrets. The impressive exterior walls, very high, are

surrounded by many lower small rooms. The north façade confines with a little garden which divides it from mosque.

Only one turret remains complete and it maintains the north-east corner of the kasbah; while the south-east turret has completely collapsed and the last two are barely visible. The building develops around a courtyard with concentric thick walls, of about 70 cm. The distance between the axis of the columns and the innermost wall is about 2 metres, but this last is detached from the outermost wall by 2.5 metres. Only the north facade has an extra wall which generates two big rooms and a staircase. Observing from the outside it is possible to note that, probably, all the exterior walls were decorated with the characteristic triangular acroteria. Those last were placed on the top of the wall to fix the stratum of canes which makes a sort of cornice. On the North, East and West facades, five windows have been opened while the South side is completely closed. The perimetric walls have no signs of decors, except for the "skifa" one, and they show the constructive patterns lot made by cubes of rammed earth and by the holes of scaffolding.

The access to the kasbah is placed on the South side along the street that goes to the oasis. This kind of entrance, called "skifa" in Tamazight language, does not allow you to see the interior of the house from the door and originally it was decorated by one lancet arch now destroyed. The interior floors are almost absent and it is possible to individuate only the location of the staircases which are behind the turrets in the four corners of the plan. The inside of the kasbah, despite many collapses, still allows a good understanding of the plan and of the typologies. In fact it is possible to evaluate the shape of the courtyard, a rectangle 12.5 metres long and 8.7 metres wide, and the decorative apparatus: the court has four arcades on the short side and five on the long one. The arches, placed on two levels, measure 5 metres on the ground floor and 4,5 metres on the first level, while intercolumniation is 2,2 metres. The shape of the arches is still easy to perceive despite their deeply deformed appearance caused by ground subsidence and by the rammed earth instability. The lancet arcs have the typical structure of Maghreb ones and are enclosed by a rectangular frame. Every arch, which has a clear span of about 1,4 metres, is interrupted at the impost by a little rafter of wood which was useful to sustain the scaffolding. Similar arches have been surveyed in the in the Cadi Ali kasbah in Tamnougalt, a few kilometer from this site. The courtyard, which appears divided in two parts by a wall added recently, is wider than the others and this fact, combined with the presence of two wells, indicate the richness of the kasbah. This survey is part of a broader research, which contains the cataloging of more than forty ksour, tighremt and kasbah and the survey of twenty exempla performed with manual measurement and 3D laser scanner techniques. (Fig. 9)

8. Conclusion

In the region of the Draa Valley we surveyed more than ten tighremt, and a first cataloguing of the findings is shown. The importance of these buildings has enabled a thorough reflection on the quality of this architecture and on the conservation status of a very fragile heritage. Many of the tighremt detected, in fact, have partially collapsed, in some cases the tighremt are still inhabited but the continuous restoration that these buildings require tend to change the appearance, and to cancel out all the decorative elements which are the very delicate, and at the same time the most characteristic, of these buildings. Some texts such as "Manuel de conservation du patrimoine architectural en terre des Vallées présahariennes du Maroc", published by CERKAS in 2005, with the support of UNESCO suggest not replacing the decorations with simpler ones during restoration. It asks you to use reliable graphic sources. The instrumental surveys of these buildings allows users to record, with absolute precision, a moment in their development. It allows you to pass on the nature and morphology of the facades, the decorations and the moldings. It allows you to read the deformations that the buildings suffer due to water seepage or landslides of the sandy ground. They are therefore, essential documents for appropriate restoration so as to pass on the quality of the architecture. Furthermore the measurements have allowed new reflections on the morphology and geometry of the buildings. The study, still in progress, has tried to verify some assumptions such as the structure of the corner turrets and the courts.

The morphology of the towers and the courtyards has been compared and figure 10 shows tighremt, aguddim, and kasbah, wide isolated tighremt, and points out the system of the court and the turrets. The figure shows the schematic dimensions of the analysed elements, so the dimensional and morphological comparison is more direct.

In the drawings the correlation between the size of the tower and the court is clear. In fact the typology of the aguddim, like Taakilte, Tisguine, Taliwin and some guard turrets, do not have a common dimension, while the dimension of the tighremt, Domougni Tamekasselt, Tansik, Ouled Othmane and Moquaddem, have the court the same size as the tower, the module fluctuates around 4 metres. The courts of the more modest homes, "taddart", which are inside the ksour have one or two levels and they are 1.5 metres long and 1.3 wide as in the case of ksour Ait Hammousaid. When the size of tighremt increases, as is the case of Aslim, Tamnougalt and Tinzouline, the court widens but the dimension are comparable, a square of about 12 metres. These courtyards have in fact 5/6 arches on each side, and maintain, in the plan, the square shape of the smaller ones. (Fig. 10)

The dimensions of the plan of the turrets are very similar. They are about 4 metres long and wide, while the height could be very different. In fact some turrets are very high, about 12 metres, and others are shorter, 7-8 metres. The dimension of the turrets often depends on the location. In some cases, in fact, when the ground is steep, the turrets are utilised as buttresses and are higher.

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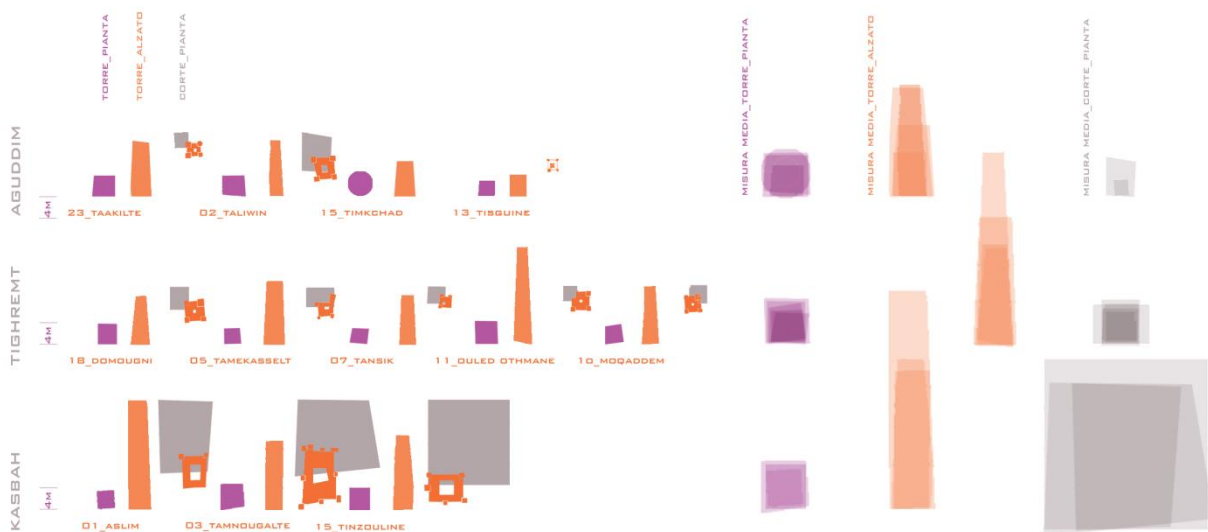


Fig. 10 Dimensional analysis of aguddim, tighremt and kasbah in the Draa valley



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