

Definitive Results of Archaeoacoustic Analysis at Alatri Acropolis, Italy

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ABSTRACT: Our research group has used archaeoacoustic methodology over the last seven years. Archaeoacoustics has enabled us to explain some of the enigmas of ancient archaeological sites that were not previously possible to explain through other methods. Our hypothesis suggests the exposure to certain non-audible vibrations could have a significant effect on the psyche of those who came for prayer or rituals, facilitating access into a mystical state. Archaeoacoustic methodology was utilised to study Alatri acropolis in Italy. The cathedral of Alatri is located at the highest point in the town of Alatri which sits on top of a Cyclopean temple. We sought to understand why this temple was built in this location. Using a number of protocols we discovered very strong and significant low vibrations (seismic waves) continuously emitted originating from below the ground. Even though ancient people did not possess the same equipment we have today, they would have been aware of the conditions required to achieve such a mystical state, perhaps by simply sensing they were closer to God in a given location. The seismic waves appear to arise from a geological fault located on the side of the hill where the town has stood since ancient times. The presence of such seismic frequencies increases the effect of any rituals by enhancing the psyche of the participants due to their influence on human brain waves. This suggests the builders of this temple had some knowledge of their effect and offers a possible explanation as to why the temple was built on this particular hill and not on any of the surrounding hills.

KEYWORDS: archaeoacoustics, Alatri, polygonal walls, low frequency sound, infrasound

Introduction

Natural sound phenomena were utilised by some civilizations to enhance their rites and ceremonies, indeed some ancient structures were modelled in a certain way to enable the vibrations produced there to di-

rectly influence the mind towards a particular state of consciousness.

[6,7,8,10,11,12,13,14,15,16,17,18,19,20,21,22,23,24,25,26,27,34]

In earlier research, SBRG demonstrated a relationship between mechanical or natural vibrations originating from resonance phe-

¹ Note. Super Brain Research Group (SBRG) is an international and interdisciplinary team of researchers, researching the archaeoacoustic properties of ancient sites and temples throughout Europe and Asia (www.sbrg-searchgoup.eu).

nomenon at some temples and brain activity. Natural low vibrations with an absence of high pressure can have a positive influence on human health and some people can perceive very low-frequency sounds as a sensation rather than a sound. Infrasound may also cause feelings of awe or fear in humans and given it is not consciously perceived, it may give the appearance that strange or supernatural events are taking place^[33]. It is therefore possible to hypothesize that wherever there is a concentration of natural low vibrations, ancient populations considered these sites to be “sacred”^[7]. Through archaeoacoustic analysis, it is possible to demonstrate there was some knowledge of acoustic phenomena in the past, which could for example have been used to enhance ancient rituals [6,7,8,10,11,12,13,14,15,16,17,18,19,20,21,22,23,24,25,26,27,34].

The historical town of Alatri was analysed from this point of view and with preliminary results published in 2015^[15].

In this article the definitive results of this four year research project are presented along with three different research methodologies.

The Ancient Town of Alatri, Italy

Alatri is a small town located in the Frosinone province district, Lazio (Fig. 1). The city of Alatri was built around a small hill, surrounded by megalithic walls and whose remains are mostly visible today. The acropolis is at the heart of the historic centre, on the top of the hill (Fig. 2). The internal perimeter of the acropolis is defined by huge limestone walls forming a polygonal shape which measures 500 meters in length and a maximum of 15.4 meters in height. In addition, the external walls draw a perimeter of 2km made of different stone blocks layers that can be up to 3 meters in height^[32].

What is striking is about the huge polygonal “Cyclopean walls” is the way the megalithic blocks fit together without the use of mortar, it is impossible to insert a sheet of paper between the joints. The exact date the acropolis was constructed is unknown: some believe the walls were built by the Romans or Latins, others that its origin dates to a pre-roman period, there is however no consensus^[29].



Fig. 1 – The location of Alatri, Italy.



Fig. 2 – Alatri town as viewed from a neighbouring hill, the cathedral is clearly visible.

Don Giuseppe Capone was the first to explore the hypothesis that Alatri and its acropolis were built following geometrical

and astronomical lines. In the 1980s, the local monk who served the church-seminary of Alatri for many years, studied further the archaeo-astronomical origins of the town. His observations were confirmed by Antony F. Aveni, professor of Astronomy and Anthropology at Colgate University (USA) in an article in collaboration with Don Capone in 1985 ^[1].

The fundamental concept inspiring the monk had its roots in the religious culture of the ancient Indo-Europeans. They used the sun as a point of reference by which they fixed certain points on the horizon. This principle appears to have been followed by the builders of the Cyclopean walls. Capone identified a “privileged point” which is located behind the northern wall, at the center of the acropolis. Using this point, he was able to establish that the North-East corner of the acropolis outlines a direction which indicates the rising sun at the summer solstice and that the eastern and western sides are parallel, oriented North-South. In addition, the monk noticed that several doors surrounding the city were located in strategic points and in mutual relation to one another as well as with the map of the city ^[29].

The Cyclopean walls extend along a North-South axis centered on a solitary rock outcrop, a sacred space reserved for religious purpose located a little higher than the acropolis, a veritable “altar of sacrifice”. This rock outcrop (the so-called “*navel*” of the town) appears to be in the center of the ancient city, and is now located outside of the cathedral which was built over the remains of the ancient Temple of the Sun ^[1,2,3,4]. Perhaps this outcrop was used as a reference point during the construction of the city? This appears to be a plausible as several astronomical observations support

this: in the early morning during the summer solstice, it is possible to see the sun rise from the rocky outcrop facing north; the corner of the Cyclopean walls casts a shadow that points directly to the outcrop. Additionally, the east side of the wall turns out to be a fundamental unit of linear measure used in the construction of the acropolis; all the gates and archways in the external wall (with one exception) lay equidistant from the outcrop at three times the length of the eastern inner wall (Fig. 3).

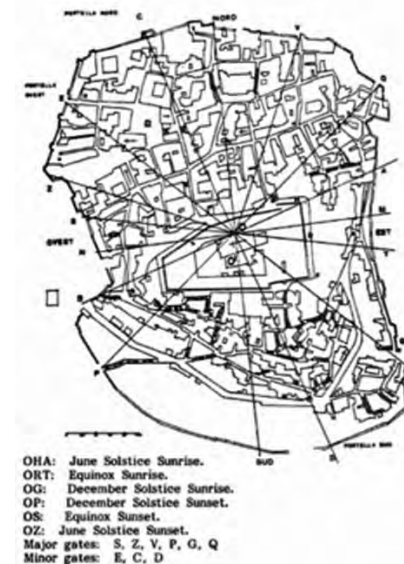


Fig. 3 – The map of Alatri with its astronomical and geometrical indications (Capone, 1982).

Furthermore, the builders of the acropolis divided it into quadrants centered on the outcrop. At the summer solstice sunset, the sun illuminates the city gate of the superior northwest quadrant and its shadow heads directly toward this outcrop. Another gate, “*Porta Minore*” located in the right inferior quadrant attracts further attention: it is a trilithon doorway also called the “*Gate of three phallus*” for a symbol carved over it. On the morning of the equinox in March and December the sun lights the steps that led to the door drawing a perfect rectangular shape outside the gate ^[1,2,3,4] (Fig. 4).



Fig. 4 – The Minor Gate at the equinox, with the sun lighting up the stairs, drawing a perfect rectangle on the stones in front of it. Over the gate are three phallus carved on the stone architrave. (Courtesy of Ornello Tofani, Italy).

Based on our archaeoacoustic experience throughout Europe

[6,7,8,9,10,11,12,13,14,15,16,17,18,19,20,21,22,23,24,25,26,27,34]

we decided to analyze this site starting from the rocky outcrop. Our purpose was to discover why the acropolis was built on that particular hill and not on another of the surrounding hills. Maybe this hill met certain criteria of sanctity for the architect, if so why did he consecrate the acropolis with such characteristics?

Materials and Methods

This research carried out over a four year period, used three different investigative methodologies: *full audio spectrum recording*, a *geologic device* (GeoBox SR04S3 Datasheet) to confirm the audio recording results in the infrasound range and *TRV*

technology to analyse the effect of vibrations on the brain. Our research group has used this multi investigatory method previously at various archaeological sites. This experiment was carried out over four visits in different seasons between 2013 and 2016.

The audio recording was performed following the SBRG Standard for archaeoacoustics – SBSA ^[9]. In this case the equipment consisted of a high range dynamic recorder, extended in the ultrasound and infrasound field with a sampling frequency rate of 192 kHz (Tascam DR-680); Condenser microphones with a wide dynamic range and flat response at different frequencies (Sennheiser MKH 3020, frequency response of 10Hz to 50,000 Hz) with shielded cables

(XLR Mogami Gold Edition) and gold plated connectors.

The microphones were placed at a number of different locations around the acropolis and in the surrounding area to detect any vibrations present. Low frequencies or infrasounds (seismic waves) are non-directional and because they are not easily absorbed by the soil, they travel long distances.



Fig. 5 – The recording operation in the Acropolis's "navel"

A second technology in the form a digital sensor GeoBox SR04S3 Datasheet (Fig. 6) from Italian firm SARA, used accelerometers to acquire audible frequencies specifically in the seismic range. This devise is usually used for seismological and geophysical surveys such as the Horizontal/Vertical Spectral Ratio - HVSr. The

SR04 GeoBox is designed especially for recording ambient seismic noise, but it can also record earthquakes and artificial vibrations.

TRV technology (Variable Resonance Imaging Camera), is a methodology we have used for five years. The following is a simple explanation as to how it's applied in our research and how it might be applied within the wider archaeoacoustic field. First off there is a direct correlation between emotional and functional states of the human body with precise parameters of controlled motion reflection. Until fairly recently, quantitative parameters and efficient information of the movement of the human body were not established.

Bernstein and Mira Lopez (psychodiagnostic miokinetics) ^[30] studied the micro-mobility of the human body and found that it represented a sophisticated mathematical problem. For example, it has been shown that the vertical balance of the human head is controlled by the vestibular system, described as a reflex function, but the balance of the head is also considered an extension of locomotor activity (micro-mobility of the head) controlled by this system. The analysis of this and other types of mobility reflexes provide a lot of

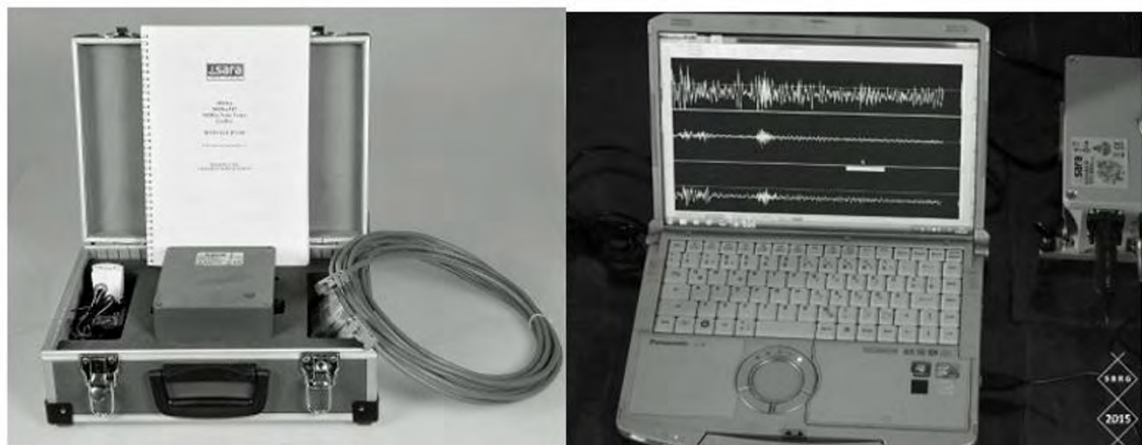


Fig. 6 – Left: GeoBox SR04S3. Right: the GeoBox connected to the computer to investigate vibrations in the acropolis.