Archaeoastronomy and Ancient Technologies **2014**, 2(1), 1-7; http://aaatec.org/art/a_sak3

Archaeoastronomy and Ancient Technologies

www.aaatec.org ***ISSN 2310-2144***

Desert Kites and Stone Circles of the Syrian Desert in Satellite Images

Amelia Carolina Sparavigna

Department of Applied Science and Technology, Politecnico di Torino (Polytechnic University of Turin), Corso Duca degli Abruzzi, 24, Turin, 10129, Italian Republic;

E-mail: amelia.sparavigna@polito.it

Abstract

Covering a large portion of the Middle East is an arid land that we know as the Syrian Desert. This harsh environment is characterized by expansive lava fields: the harraat. If we observe these volcanic features from space, we discover that they are crossed by various stone structures, called "desert kites", that were Neolithic-period traps for game, theoretically. Several stone circles are visible in this region, too - like so many Stonehenges dispersed throughout the desert landscape. Equivalently to the holonymous English site, some of them could have functioned as observatories in antiquity. We can analyze their orientations according to sunrise/sunset azimuths by employing freely available software which works with Google Maps.

Keywords: Satellite Imagery, Google Earth, Google Maps, Syrian Desert, Harraat, Stone Circles, Sunrise/Sunset Azimuths, Sun Observatories, Software.

Introduction

The Syrian Desert is an arid land extending from the northern Arabian Peninsula to the eastern Jordan, southern Syria, and western Iraq, largely covered by lava fields, the "harraat", of two volcanoes. One field is that of the Jabal al-Druze, the other is the Harrat Ash Shaam including the Es-Safa volcano, in the South of Syria [1].

This desert was considered in the past as a barrier between Levant and Mesopotamia. However, if we observe it from space, we discover that this harsh environment was probably quite populated in ancient times. We can conclude this fact from some huge stone structures, the "desert kites" (see Figure 1), that can be easily seen in the images recorded by satellites. These structures were firstly observed by pilots of the Royal Air Force in the 1920s, flying over the desert. These pilots named them "kites", because their lines reminded of kites used by children to play, but in fact they are huge hunting traps [2,3].

Besides the desert kites, there are also abundant archaeological evidence of Neolithic communities because thousands of tumuli, stone fences and circles are covering large areas of harraat [1]. Sometimes, we can see these stone structures and kites together as shown in the Figure 2. Several of the sites dispersed in the desert landscape are circles with a radial structure inside. These circles

are therefore referred to by archaeologists as "wheels" [4]. Their diameters range from 25 meters to 70 meters.

Proposed as "Stonehenges" of the Middle East [5], and compared with the Nazca lines as possible geoglyphs with astronomical alignments [4], in this paper we will investigate if some of them can be ancient primitive sun observatories too. However, before discussing this hypothesis, let us talk shortly about the desert kites.

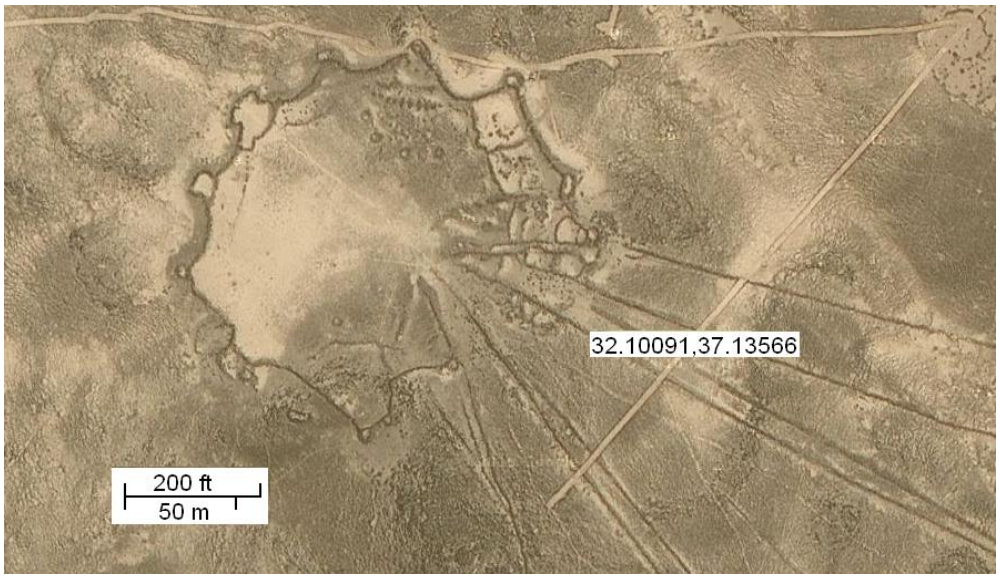

Fig.1 - The wonderful structure of a "desert kite" in Jordan, as it can be observed with Google Earth. It is approximately 150 meters across. The coordinates of the site are also given.

Fig.2 - Desert kites and stone circles together in an image of Google Earth. The figure is also giving the coordinates.

Desert Kites

We usually imagine our ancestors, before they settled down, as people simply hunting and gathering for food, but this is not true. The "desert kites" are the remains of an ancient hunting technique based on stone-walled traps, the construction of which surely involved several people for long times. The desert kites were used to push large herds of animals into some enclosures, or, in the worst case, to fall off from steep cliff edges [2]. The simplest structure of a desert kite has a triangular shape, consisting of two very long, low walls built of stones and arranged in a V-shape, like a funnel, ending as a corral. Typically, a desert kite possesses two, three or more small circular enclosures on the perimeter of its corral, as we can easily see in the Figures 1 and 2.

Hunters pushed the game between the walls, trapping then the animals into the end of the structure. It is usually considered that animals were slaughtered there "en masse" [6-7]. The faunal remains found in these sites are rare, and are including gazelle, Arabian oryx, and other species that are now rare or driven to extinction in the Levant. According to [7], it was the overuse of desert kites a possible cause of extinction of several species.

Some ancient rock art images show these hunting traps [3], depicting some hunters pushing the game in the corral. These images are also showing the original structure of the "walls" of the kites. Let us note that these walls are low and then not able to stop any game. In fact, the walls are not walls at all: they are the basements, in the rocky harraat, where stick some poles and build a fence with branches, producing a visual effect as a barrier for the animals.

Some scholars [6,7] are telling that the kites were used for the slaughter of animals, but there are also different opinions. For instance, Reference 8 is telling that these hunting traps where not only designed to just capture and then kill animals, but also for the conservation of food, keeping the game alive, in the small enclosures at the end of the kites. Therefore, the kites could have been the first step from hunting to the intentional breeding of animals [8,9]. In any case, let us stress that other scholars do not agree with such conclusions [10].

It impresses the number of kites that we can still identify: it is seems to be in the thousands, distributed on the Arabian and Sinai peninsulas and, northward, as far as Turkey. Over a thousand have been recorded in Jordan alone [6]. The earliest desert kites are dated to the Pre-Pottery Neolithic B period of 9th-11th millennia BP. It is the radiocarbon analysis on charcoal within the kite pits helping to date the site [6].

As we discussed in a paper on Arabia [11], an interesting fact is necessary to note [8]. In the Khaybar area, Arabia, there are some remains of Neolithic villages very close to the hunting desert kites. Linking the "desert kites" with "human villages" could be a mistake, because wild animals are avoiding places where people live. Since the Khaybar area is full with ancient burial structures, sometimes placed inside the desert kites, a possible conclusion is that these burial mounds are more recent than the desert kites [8]. Of course, because this conclusion is coming from the observation of satellite images, a research on-site is in any case necessary.

Stone circles

As shown in the Figure 2, we can see the Syrian desert disseminated with circular stone structures and mounds. On these stone structures, an interesting discussion was published in 2010 [5]. Reference 5 is reporting that Robert Mason, archaeologist of the Royal Ontario Museum, discovered and studied several tombs and stone circles near the Deir Mar Musa al-Habashi monastery. From stone tools found there, he deduced that it is likely that these features date in the

Middle East's Neolithic Period, roughly ranging from 8500 BC to 4300 BC. In Western Europe, the first structures built of stone date back approximately to 4500 BC. The Syrian stone circles are then quite older than these European sites. Therefore, it is possible that the stone circles travelled, as the agriculture, from the Near East to Europe.
Another archaeologist, E. Banning of the University of Toronto, considered possible that the landscape identified by Mason could be an example, in the Neolithic period, of burial practices out of the settlement, that is, an off-site cemetery [5].

Fig.3 - Stone circles with radial structures inside as we can see them in the Google satellite imagery.

The satellite images are revealing so many structures in the Syrian Desert, that probably, it is impossible to investigate all of them. We can easily check by ourselves the existence of these stone circles, using Google Earth or Google Maps or Acme Mapper for instance. Let us stress then that these satellite map services are excellent to reveal the stone landscape of the past.
The Figure 3 is showing stone circles with radial structures inside. There are also complexes composed by several stone circular enclosures (a collection of images is given at the site [12]).

Some possible solar orientations

It is natural to compare the stone circles of the Syrian Desert with the circles of Europe. Among these European sites we find the ancient solar observatories of Stonehenge and Goseck: because these well-known examples have a circular shape, a bias could occur that all ancient observatories had a circular form, but this is not true. The solar observatory of Chankillo in Peru, for instance, is a more or less straight line of towers on a hill [13,14]. Therefore, structures connected in some manner with the sun's path across the sky can have quite different shapes.

In the Syrian Desert we find wheels having radial structures and stone alignments: were they also used as observatories of the apparent motion of the sun? To answer, let us compare their lines with the directions of sunset and sunrise on winter and summer solstices. Some software, developed for solar energy applications, is available for our purposes. Among the many Web sites providing solar information, we have http://www.sollumis.com/, that gives a plot of the sun azimuths on Google maps, on any day of the year. Figure 4 shows an example of the use of sollumis.com: in the image there is a stone circle and the solar directions there on the solstices. It seems that there is a good agreement between sun azimuths and the circle features.

In the Syrian Desert, besides the wheels, there are alignments of stones. An example is shown in the Figure 5: these stones are aligned with the sunrise on the winter solstice, as can be easily determined by using sollumis.com. Other examples of alignment with sunrise/sunset on solstices are given at Reference 15.

At a first glance then, the proposal of Reference 5 of some "Stonehenges" in the Middle East seems to be reliable. Of course, it is necessary to tell that the local horizon can alter the direction of apparent sunrise and sunset and therefore an on-site evaluation is required. Moreover, the original alignment of stones could have been different from that observed today, that is, it could have been altered during time by the local population, that could have created their own rudimental solar observatories using the ancient stones. It is therefore difficult to give any conclusion on the age of the stone circle layouts by an observation from satellites [15].

Since the comparison of the orientation of structures, natural or human, with the solar directions is fundamental for all the solar energy applications, it is easy to find some freely available software on the Web designed for this purpose. Here we used the sollumis.com software because it is the most intuitive and gives immediately the solar directions on the satellite map. In this manner, everyone can analyze the orientation on any building observed by satellites, as we did for the stone structures of the Syrian Desert.

Conclusions

The paper discussed the desert kites and stone circles of the Syrian Desert. Since this area is large and rich of stone structures, the satellite images, and in particular those of Google Earth, can help the archaeological researches in mapping all of them. Moreover, these images allow creating some pictures of the human landscape, and related activities, during the early stages of civilization. We have also discussed the possibility that some stone structures had an orientation with the sun azimuths, using a freely available software working on the Google Maps.

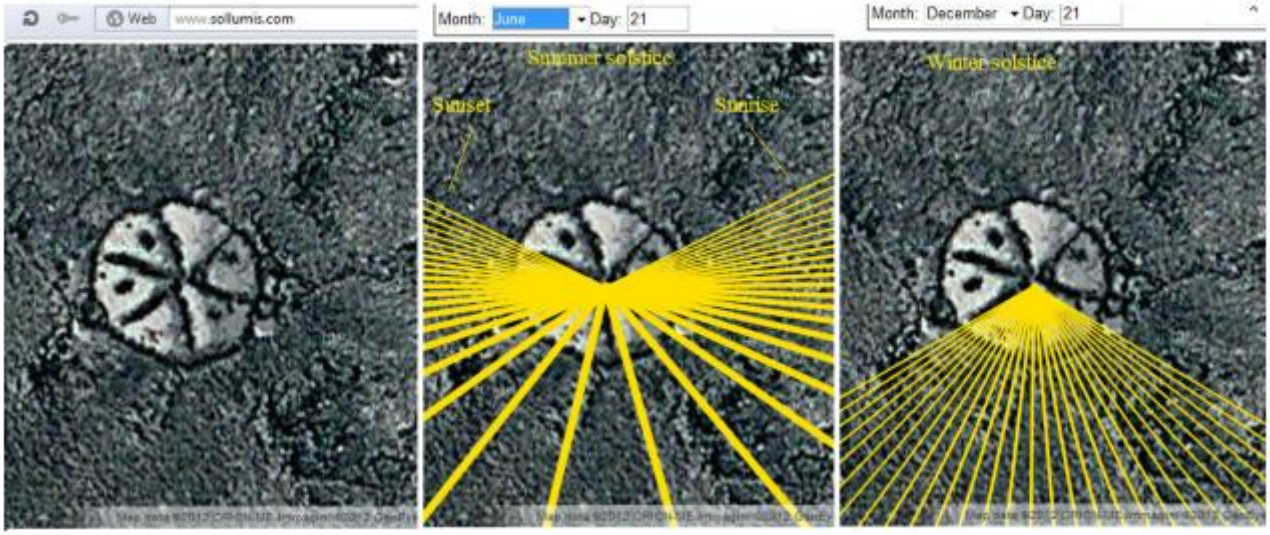

Fig.4 - This is one of the stone structure of Syrian Desert. The image shows the solar direction during the day. "The lines on the drawing show the direction and height (altitude) of the sun throughout the day. Thicker and shorter lines mean the sun is higher in the sky. Longer and thinner lines mean the sun is closer to the horizon", according to Sollumis.com, at http://www.sollumis.com/. On the left, the site as it appears in the Google Maps. In the middle, the direction of the sun on the summer solstice, choosing the center of the circle for observation. We see that, at sunrise, the sun is passing near the dot. At the sunset the direction is that of a line. In the image on the right, we see the direction of the sun on winter solstice. At sunrise, the line is passing between dots. The sunset has the direction of a radius (images have been obtained from original provided by Google Maps and sollumis.com).

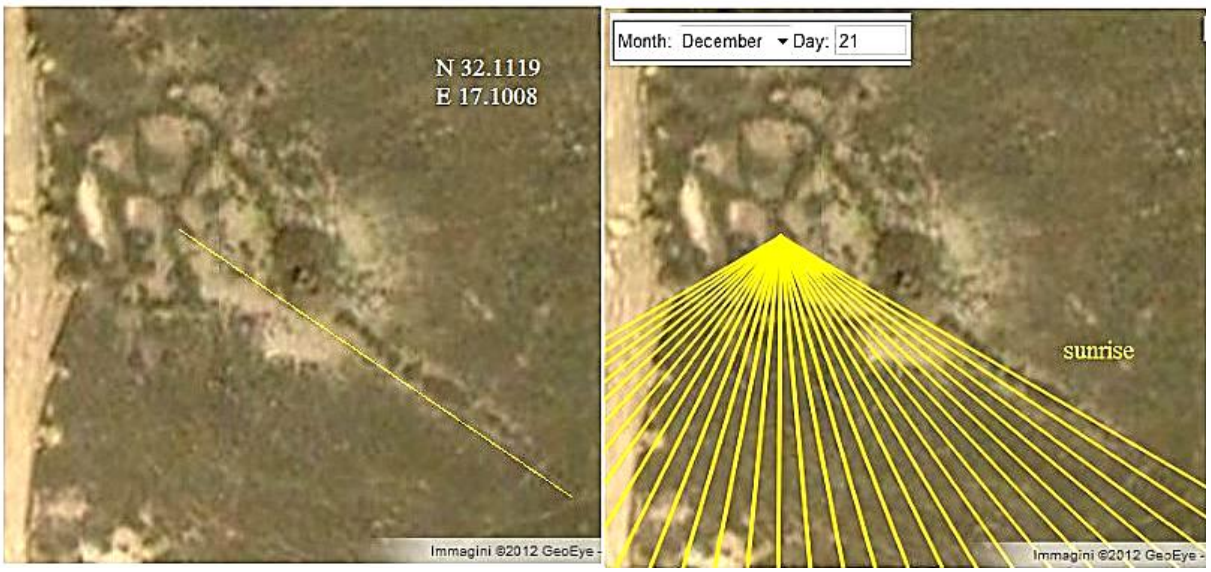

Fig.5 - This site has a line of stones which seems aligned with the sunrise on the winter solstice.

References

1. Sparavigna, A.C. Stone structures in the Syrian Desert, *arXiv***,** 2011, http://arxiv.org/abs/1106.4665 (accessed on 01.02.2014).
2. O'Hanlon, L. Mysterious desert lines were animal traps, *Discovery News*, http://news.discovery.com/history/desert-lines-hunting-tool-kites.html (accessed on 01.02.2014).
3. Harding, G.L. The Cairn of Hani, *Antiquity*, 9154, Volume 28, pp. 165-167.
4. Owen Jarus, Visible only from above, *Livescience*, http://www.livescience.com/16046-nazca-lines-wheels-google-earth.html (accessed on 01.02.2014).
5. Owen Jarus, Syria's Stonehenge: Neolithic stone circles, alignments and possible tombs discovered, *The Independent*, 2010, http://www.independent.co.uk/life-style/history/syrias-stonehenge-neolithic-stone-circles-alignments-and-possible-tombs-discovered-1914047.html (accessed on 01.02.2014).
6. Kris Hirst, K. Desert Kites, Ancient Hunting Technique Desert Kites, *About.com Guide*, http://archaeology.about.com/od/dathroughdeterms/qt/Desert-Kites.htm (accessed on 01.02.2014).
7. Bar-Oz, G.; Zeder, M.; Hole, F. *Role of mass-kill hunting strategies in the extirpation of Persian gazelle (Gazella subgutturosa) in the northern Levant*, Proceedings of the National Academy of Sciences, Early Edition, May 3, 2011, Volume 108, Issue 18, pp. 7345-7350.
8. Janežic, V. *Khaybar Desert Kites*, alsahra.org/wp-content/uploads/2009/02/khaybar-desert-kites.pdf (accessed on 01.02.2014).
9. Rosen, B.; Perevolotsky, A. The function of "Desert Kites", hunting or livestock husbandry? *Paléorient*, 1998, Volume 24, pp. 107-111.
10. Betts, A.V.G.; Helms, S. The Desert "Kites" of the Badiyat Esh-Sham and North Arabia, *Paléorient*, 1987, Volume 13, pp. 41-67.
11. Sparavigna, A.C. Arabia: from craters to stone circles, *arXiv*, 2010, http://arxiv.org/abs/1011.2111 (accessed on 01.02.2014).
12. Sparavigna, A.C. *Syrian Desert from space* https://sites.google.com/site/syriandesertsatelliteimagery/ (accessed on 01.02.2014).
13. Ghezzi, I.; Ruggles, C.L.N. The social and ritual context of horizon astronomical observations at Chankillo, *Oxford IX International Symposium on Archaeoastronomy*, Proceedings, 2011, IAU Symposium No. 278.
14. Sparavigna, A.C. The solar towers of Chankillo, *arXiv*, 2012, http://arxiv.org/abs/1208.3580 (accessed on 01.02.2014).
15. Sparavigna, A.C. Stone circles on the harraat of Syrian desert, *arXiv*, 2012, http://arxiv.org/abs/1208.2591 (accessed on 01.02.2014).