Arabia: from craters to stone circles - di Amelia Carolina Sparavigna

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Geologically, Arabia lies on a tectonic plate of its own, the Arabian Plate, which is moving away from Africa, creating the Red Sea, and crushing northward with the Eurasian plate. The Romans subdivided this peninsula in three regions. One was the Arabia Petraea covering a wide region comprising the southern Syria, Jordan, the Sinai Peninsula and the north-western Saudi Arabia. Arabia Petraea was a Roman province, with Petra as capital. The other two regions were the Arabia Deserta, the desert interior of the peninsula and the Arabia Felix, corresponding to the modern Yemen, which enjoys a more temperate climate [1-3].

The Arabian peninsula has a central plateau, the Nejd, sloping eastward from the mountains along the coast of the Red Sea, to the shallow waters of the Persian Gulf, with a crescent of sand and gravel deserts to the southeast. The huge deserts are the stony Nejd in the north, the Dahna and the sands of Rub' Al-Khali. Ranges of mountains run parallel to the Red Sea coast on the west and at the south-eastern end of the peninsula.

Most of the Arabian rivers are wadis, that is rivers which are dry except during the rainy season. The presence of seasonal aquifers creates the oases, when the flow of water reaches the surface of the desert. Under the sand of deserts, in 1932, oil was found. It could then happen that Arabia is imagined with a stereotype of sand-and-gravel deserts, punctured by oases and oil-wells, neglecting a quite important aspect of the region. This is the volcanic nature of the Arabian Shield, the geological name for much of the western Arabian peninsula. The Western Arabia is not only covered with sand, it is also clad with vast fields of lava. In Arabic, these lava fields are known as harraat (singular, harrah; before a name, harrat). Harraith together are creating large alkali basalt regions, covering some several thousand of square kilometers [4].

In 1256 an eruption threatened the city of Madinah, covering previous lava flows. The lava field near Madinah, which is known as Harraith is due to a volcanic activity of two million years which is still active. The most recent eruptions on the Arabian Peninsula occurred in 1937, on a harraith near the town of Dhamar, in the north of Yemen. Before that, in 1846 an eruption took place on a small island. By counting the number of eruptions that have occurred on the northern Harraith, volcanologists estimate that, during the past 4,500 years, there have been 13 major eruptions, one every 346 years, on average [4]. The Arabian peninsula is then subjected to hazards coming from volcanic eruptions and from much more frequent earthquakes.

A survey with Google Maps shows the extensive lava fields covering the peninsula. Satellite imagery reveals the extent of harraats, with different colors of magma extruded in past epochs. Jet-black indicates the most recent flows. White areas are also observable, revealing places covered by silt and salt, which are residues of seasonal lakes, created by the lava flows that blocked some wadi rivers.

In Arabia, the maar craters, the landforms created by explosive eruptions, are huge: an explosion, generated by the mixture of basaltic magma with subterranean water, produced the maar crater of al-Wahbah on the western margins of Harraith Kashib. According to [4], it is the Harraith Khaybar which is having the most distinctive volcanic scenery in all of Arabia, with the white cones of Jabal Bayda’ and Jabal Abyad.

As a result of their detailed harraith research on-site work, Camp and Roobol discovered a new continental rift activity [5,6], corresponding to a long volcanic system, the Makkah–Madinah–Nufud line, created by an active mantle up-welling. According to these researches, there is a fracture with crustal rifting in Arabia, which is much more recent of the Red Sea rift.

Figure 1 shows some of the craters in Arabia: one of them is crossed by a road and a town, As Sayl, inside. The image has a town, As Sayl, inside. The image from Google Maps, enriched with image processing methods, as discussed in Ref. 7 and 8. Several other volcanic cones can be observed. One cone is attracting the attention because of its almost perfect shape and a close valley full of sand, with a crescent moon shape (see Figure 2, low panel). In fact, zooming the images to observe more details of the cone and its closer area, we can see small
circles with diameters ranging from 10 to 15 meters, with a mound of stones inside. Knowing that near Tiliba Lake, worship places were composed by cairns of stones inside stone enclosures [9], I searched other such structures near the region of the crescent-moon valley, in particular, those which are clearly man-made. Figure 2 shows the result of this search, limited to the area with high-resolution satellite imagery; the markers are denoting the positions of stone circles. Of course, Figure 2 is not claiming to be exhaustive: some places have to be marked in this map. The figure is just trying to determine a rough distribution of these places. Figure 3 shows in more detail the positions of stone circles on a landform which seems a peninsula on a lake of sand. The following Figure 4 gives some pictures of these stone circles.

After searching with Google for details and references about possible stone circles in Arabia, some interesting web pages have been found. These pages show the archaeological evidence of the Neolithic period in Arabia. Among the Neolithic structures there are stone circles and "desert kites", which were kite-shaped Neolithic stone fences, probably used as animal traps. There is also abundant archaeological evidence of Neolithic communities over harrata of Rahat and Khaybar, where thousands of tumuli and stone fences, keyhole-shaped, kite-shaped and circular, cover extensive areas [4]. The absolute time period of Neolithic in Arabia was 11,000-5,750 before present. For the bulk of the peninsula the term Neolithic is used to cover the period from 8,000 to 5,750 before present [10].

One quite interesting web page is Ref.11: the author, pen-name KenGrook, is discussing his researches of the Neolithic stone structures, using the satellite imagery. He found stone circles and other figures all situated at the peaks of hills or at the edges of plateaus. In [11], an article is reported, published in 1977 by the Sydney Morning Herald, telling that "enigmatic circular stone formations, reminiscent of those found in Europe, are scattered throughout this arid country on hilltops and valleys remote from human habitation. The rings are formed by stone walls that are 30 to 60 centimeters tall and range in diameter from five meters to more than 100 meters. No legends cast light on their origins or purpose and theories are myriad. Amateur archaeologists have noted that many of the rings have "mounds" more appendages that sometimes stretch out for hundreds of meters across the wilderness. ... The English-language daily newspaper Arab News has speculated that a cluster of stone rings 60 km north of the Red Sea port of Jeddah may be ancient grave sites. The walls were too low to have served as sheep or goat pens, the newspaper reasoned. Mr. Ron Worl, of the US Geological Survey [12], ... concluded that the stone rings could be the desert equivalent of rock carvings, an equivalent of rock carvings... signposts that point the way to freshwater springs or caravan routes. Several of the "tails" led to water or old desert paths” [11-13].

After his survey with satellite, the author of [11] noted that only basic shapes were used and that these structures are not distributed evenly or at random. They appear most often along what must have been travel routes, usually found at prominent points of sorts (see for instance, Figure 3).

In [11], the different shapes of these Neolithic structures are listed: stone circles, often perfectly round with a cairn at the centre, stone circles with triangles, triangles and mounds of two kinds, round with flat top or with a depression or hole in the middle. In fact, as observed in [11], some mounds may be small volcano vents or craters and from satellite imagery only, it is hard to tell whether they are man-made or geological features. Other structures have the shape of needles, lines or tails. There are enclosures, sometimes with round structures or irregulars: according to [11], these enclosures were very old dwelling and/or livestock areas.

Arabia is also spotted by the so-called "desert kites". Soon after air travel began over the Arabian peninsula pilots reported these big structures, and perhaps, this is why these objects result as quite deeply studied [4,14,15]. Several area in Jordan, Saudi Arabia, Syria and Iraq are covered with these man-made prehistoric kites, that sometimes are spanning kilometers of desert. Some researchers date them to Neolithic periods [14,15], and agree on the fact that they were used as hunting traps, to herd game in the ending enclosure of the kite.

Desert kites are basically triangular shapes with one end opened. It consist of two converging more or less straight walls, that create a funnel. Each ends with a narrow passage to a sort of wide entrance. Typically, there are two, three or more circular enclosures on the edge of this corral. There are archaeological rock art images defining these structures as hunting traps [16] and depicting the triangular "walls" of kites, that lead to ending enclosure. These walls are low and not able to stop any game. These walls are not walls at all: they are the basements, in rocky harraat, to stick some poles in the ground and build a fence with branches. Moreover, as told in [15a], these hunting traps where not designed to just capture and then kill animals, but also for the conservation of food, keeping the game alive, in small huts at the end of the kites. "What we have here is evidently a first attempt of domestication of animals ... We probably do not speak of real domestication, but a step between hunting and organized intentional raising of animals" [16]. Of course, some scholars do not agree with such conclusions [14].

Another interesting point is raised [16]. In the Khaybar area, there are remains at Neolithic villages very close to the hunting desert kites. Linking the desert kite with the remains of houses and village could...
be then a mistake, because wild animals are avoiding places where people live. Khaybar area is full with ancient burial structures, sometimes placed inside the desert kites. A possible conclusion [16] is that these burial mounds are from later periods, quite after the creation of the desert kites that could be placed in the early Neolithic times, when people settled and started to domesticate animals. These conclusions on burial places and kites have been obtained just using satellite images. It seems then that satellites can make a portrait of a form of collective hunting in its early stages of evolution into animal domestication.

As we concluded in [9], the use of Google Maps or in general of satellite services devoted to the analysis of "landscapes and built environments", can give useful information for archaeological and historical studies, for those locations well-preserved and not destroyed by natural or human activities.

References

Amelia Carolina Sparavigna
Dipartimento di Fisica, Politecnico di Torino
Corso Duca degli Abruzzi 24, Torino, Italy

Articoli recentemente pubblicati in Archeologia sperimentale [archivio]:

Faience: the ceramic technology of ancient Egypt - by Amelia Carolina Sparavigna
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Portraits of Leonardo da Vinci - by Amelia Carolina Sparavigna
Figure captions
Figure 1: Some craters in Arabia. One of them has a road and a town, As Sayl, inside. Coordinates and scales are give in each panel. The images have been obtained after enhancing the Google Maps corresponding images.
Figure 2: The lower panel shows an almost perfect volcanic cone and a near valley which seems a crescent moon. The upper panel shows the locations of stone circles and other stone enclosures. The position of the volcanic cone is inside the white square.
Figure 3: Positions of some stone circles.
Figure 4: Some stone circles