

Remote Roman Fortifications: The Forts of the Kharga Oasis

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# **Remote Roman Fortifications: The Forts of the Kharga Oasis**

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## **Abstract**

Many of the Roman fortifications, built for the defense of the Empire, are still existing. We can find them distributed across the vast empire, in concentration on the borders, in the locations where it was required more authority and military control. Here we discuss the fortifications of the Kharga Oasis in Egypt. In particular, we will discuss the Qasr el-Baramoudy fort, threatened by the motion of the sand dunes.

Keywords: Archaeology, Sand Dunes, Satellite Imagery

Many of the Roman fortifications, built for the defense of the Roman Empire, are still existing. As explained in [1], we can find fortified military camps, the castra, distributed across the vast empire, and "in concentration on the borders", sometimes in locations where it was required an enforcement of Roman authority and control. In [1], ten forts are proposed. Following the list of them, we can move from South to North, from the Kharga Oasis in Egypt to the Hadrian's Wall and from East to West, from Arabia Petraea to Portugal. Let us start from the Egypt.

## **Ain Umm el-Dabadib**

In [1], we find described the Ain Umm el-Dabadib fort. This is a fort of the third- to fourth-century AD. It was built near the Kharga Oasis in Egypt, on an ancient route to the Dakhla Oasis. "Four massive rectangular towers marked the corners of the fort, making it architecturally different to any other fortress in Kharga Oasis (which had rounded towers), suggesting that it may have been a later construction. The tallest of the el-Dabadib towers, on the south-western corner, still contains remains of a spiral staircase and rises to a height of about 15m" [1]. This fort had been recently surveyed [2]. The researchers consider the fort as an "interesting case-study" of emergency surveys, with a method which allows the complete 3D acquisition of a vast and complex area in a very short time [2].

## **Kharga Oasis**

This Oasis is the southernmost of Egypt's western oases. It is rich of archaeological remains and very interesting for the study of the motion of sand dunes [3-15]. In the Oasis we find a chain of Roman installations to protect the caravan routes that crossed it. We can see the location of some of the Roman forts by means of the web site [vici.org](http://vici.org). A snapshot of the site is given in the Figure 1.

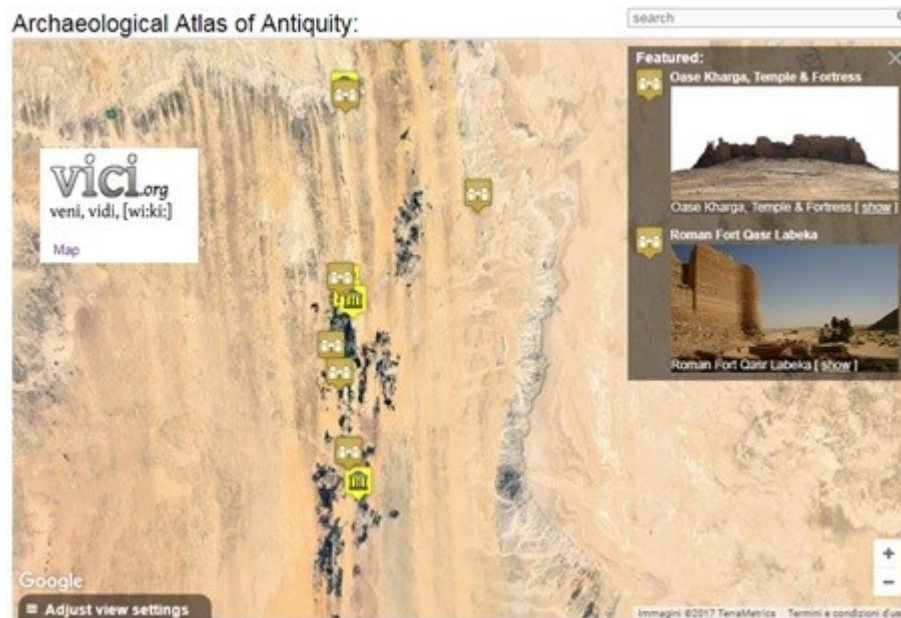


Figure 1: Snapshot of vici.org about the Roman forts of Kharga Oasis.

In [16], the Roman fortified settlements of the Oasis have been analyzed to investigate the interaction between the planning of castra and the landscape. In fact, the sites in the Kharga oasis are subjected to a prevailing wind. This wind is moving the barchans of this region, also through the oasis [15]. Therefore, in [16], the authors identified “the average azimuth of the wind by measuring the central axes of the halfmoon shaped sand dunes which characterize the landscape”. The authors have also proposed the forts of the Oasis as an example of a “weathervane orientation” of buildings and farming.

Let us remember that, in the past, an orientation of the castra as determined according to a strict relationship to the local environmental conditions was proposed by the Italian architect Gaetano Vinaccia [17-20]. In the book of 1939, Vinaccia discussed his theory on the link between the orientation of Roman cities and castra, especially in relation to the winds. Evidence of Vinaccia's theory is contained in the Latin texts, the Vitruvius's *De Architectura* and the Hyginus Gromaticus's *De Castris Romanis*.

### **Qasr el-Baramoudy**

As told in [21], in the central part of the Kharga Oasis, “gridded settlements were built around central buildings at Qasr al-Nessim and Qasr al-Baramoudy, that have never been surveyed or studied. The first is about to be swallowed by the encroaching cultivation of palm trees, and has recently suffered substantial damage. The second contains a spectacular flower-shaped pigeon tower, for which no parallel has been documented in the entire Western Desert”.

Let us consider this second fort (Qasr al-Baramoudy) in the Google Earth images (Figure 3). For this location, Google Earth is providing a rich time-series, that is, a series of images recorded at different time (actually, we have already used the time-series of Google Earth for the investigation of the motion of the barchans of the Kharga Oasis and of other locations [15, 22-27]).



Figure 2: The location of the fort in an image of 2011 (Courtesy Google Earth). On the right, the fort of Qasr el-Baramoudy.

Let us consider three images from the series (2002, 2011 and 2016), given in the Figure 3. The images had been enhanced using the GIMP Retinex filter. This filter allows to process the images to imitate the perception of human vision [28,29]. This filter – we used that of GIMP, the GNU Image Manipulation Program – is enhancing the relative position of the fort and sand dunes. In this manner, we can evaluate the motion of them, as we proposed in [15,22,23]. Of the Figure 3, we use the images of 2002 and 2016. The two images are merged in the Figure 4. The front of the sand dune is marked in red, to have a better comparison. As we can see, the dune moved on 65 meters in 14 years.

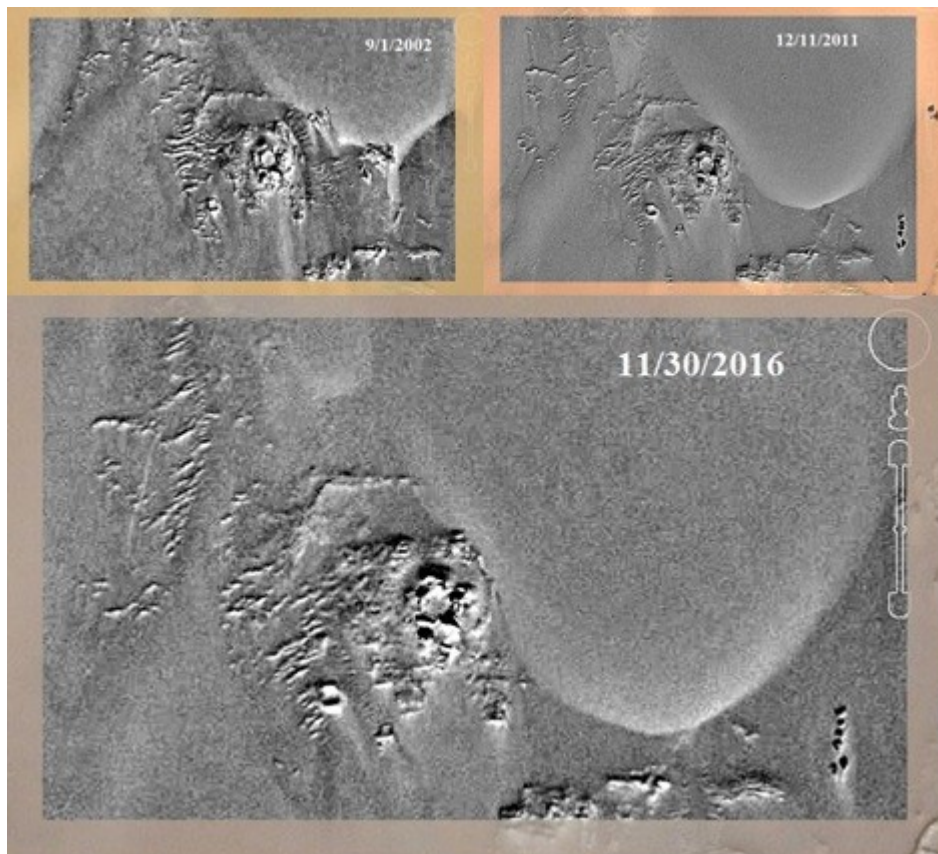
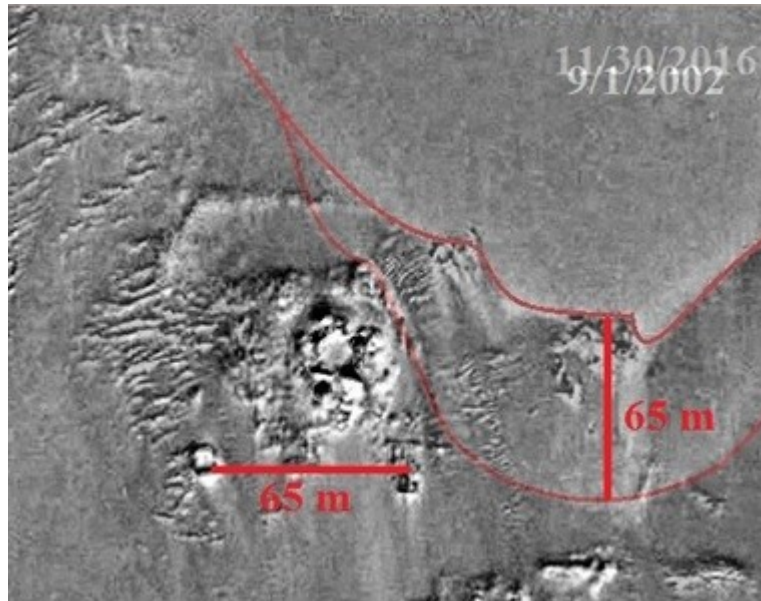


Figure 3: Three images from the time-series of Google Earth of Qasr el-Baramoudy. The images have been

enhanced by means of the GIMP Retinex filter.



**Figure 4: The image of 2002 and 2016 are superimposed to compare the position of the dune and measure the motion of the sand. It moved on 65 meters in 14 years.**

According to [21], the Kharga Oasis, "its chain of Late Roman installations, the caravan routes that crossed this and the smaller southern oases and their natural characteristics have no parallel among the other WHS (World Heritage Sites) recognised in Egypt". However these sites could disappear in the next future for several reasons. One is the motion of the dunes, as we have deduced from the Figure 4, where we see one of this Roman installations, the Qasr el-Baramoudy, threatened by the sand.

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