

Quarry Site near Karla

Satellite Remote Sensing & Historical Aerial Surveying

A GeoEye-1 image from 4 May 2010 was used for satellite remote sensing at a Neolithic site designated by us as the “Quarry Site,” because of its proximity to a modern quarry (Figure 1). The satellite image has an off-nadir angle of 9.9° and a ground sampling distance (GSD) of 0.50 m (panchromatic) and 1.80 m (multispectral). In addition to the satellite imagery, two aerial photographs were used for remote sensing: (1) one from 23 August 1960 with a scale of 1:15,000; and (2) one from 1971 (exact date unknown) with a scale of 1:10,000 (Figure 2).

The “Quarry Site” stands at the eastern edge of a fairly level agricultural plain east of the modern town of Velestino and the National Road. The local foothills of Mt. Pelion stand meters away from the site. There is also a major quarry in the vicinity that has probably impacted the archaeological remains, as well as a military base to the southeast. Various streams, irrigation channels and roads leading to Volos pocket the terrain. Besides the quarry and military base, there are a modest amount of modern constructions including large industrial installations (especially toward the south). Magoula Visviki (Velestino 4) is a little more than 1 km toward the southwest. The quarry has had a major impact on the local topography around the Neolithic site. This is best seen in the 1960 aerial photograph, where there is quarry activity but on a very modest scale compared to today. Also, many more streams pocketed the terrain in the 1960s than today. Cultivation in the region is predominantly wheat and other low standing vegetation. Elevations range from 60-80 masl around the target site.

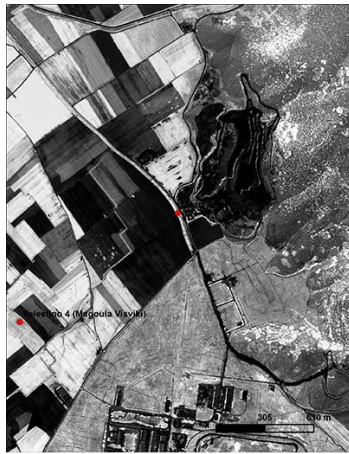
Beyond the visible architectural remains in the satellite imagery, nothing else was extracted from this site from remote sensing (Figures 3-4). If we are dealing with a house, or a complex of small building, and not a magoula, then this would explain the difficulty in extracting surface anomalies from the satellite imagery. This is also well justified since even the excavated relics are located at least 3m below the current surface of the ground indicating a high erosion and alluvium deposition at the particular section of the landscape. Most of the other surface anomalies in a 1 km radius around Kanalia 2 are hydrological features (blue) from former stream beds and/or seasonal flooding. A handful of anomalies have roughly circular forms (yellow), but this may be from concentrations of water. A few others are likely from agricultural activity, such as former plow lines (brown).



Figure 1. "Quarry Site" from a 4 May 2010 GeoEye-1 image



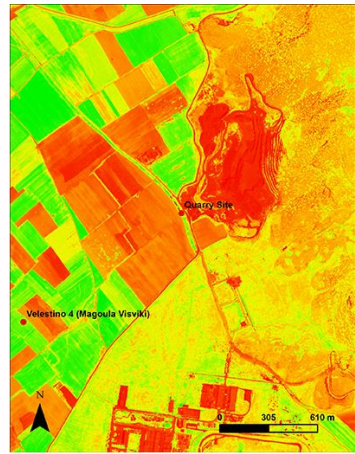
Figure 2. Aerial photograph of “Quarry Site”: (left) 23 August 1960; (right) 1971



ARVI



Decorrelation Stretch



Green NDVI



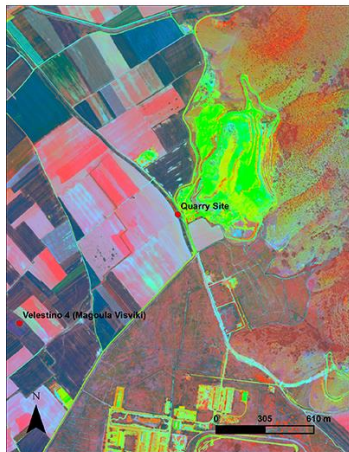
MSAVI



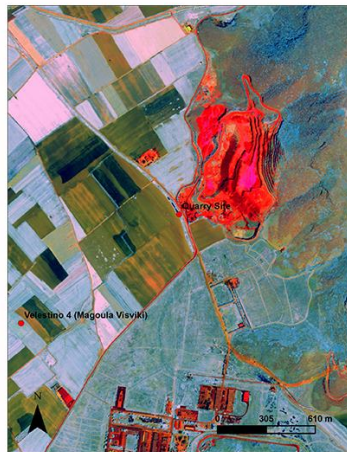
MSR



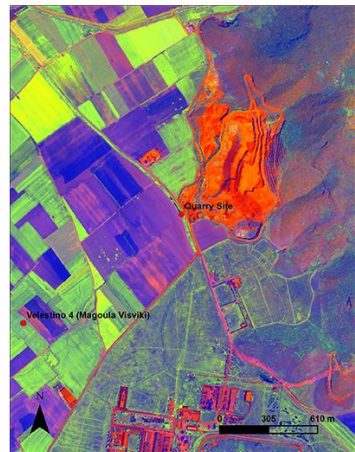
NDVI



PCA



RGB to IHS



Tasseled Cap

Figure 3. Spectral filters and vegetation indices applied to the 4 May 2010 GeoEye-1 image around “Quarry Site”

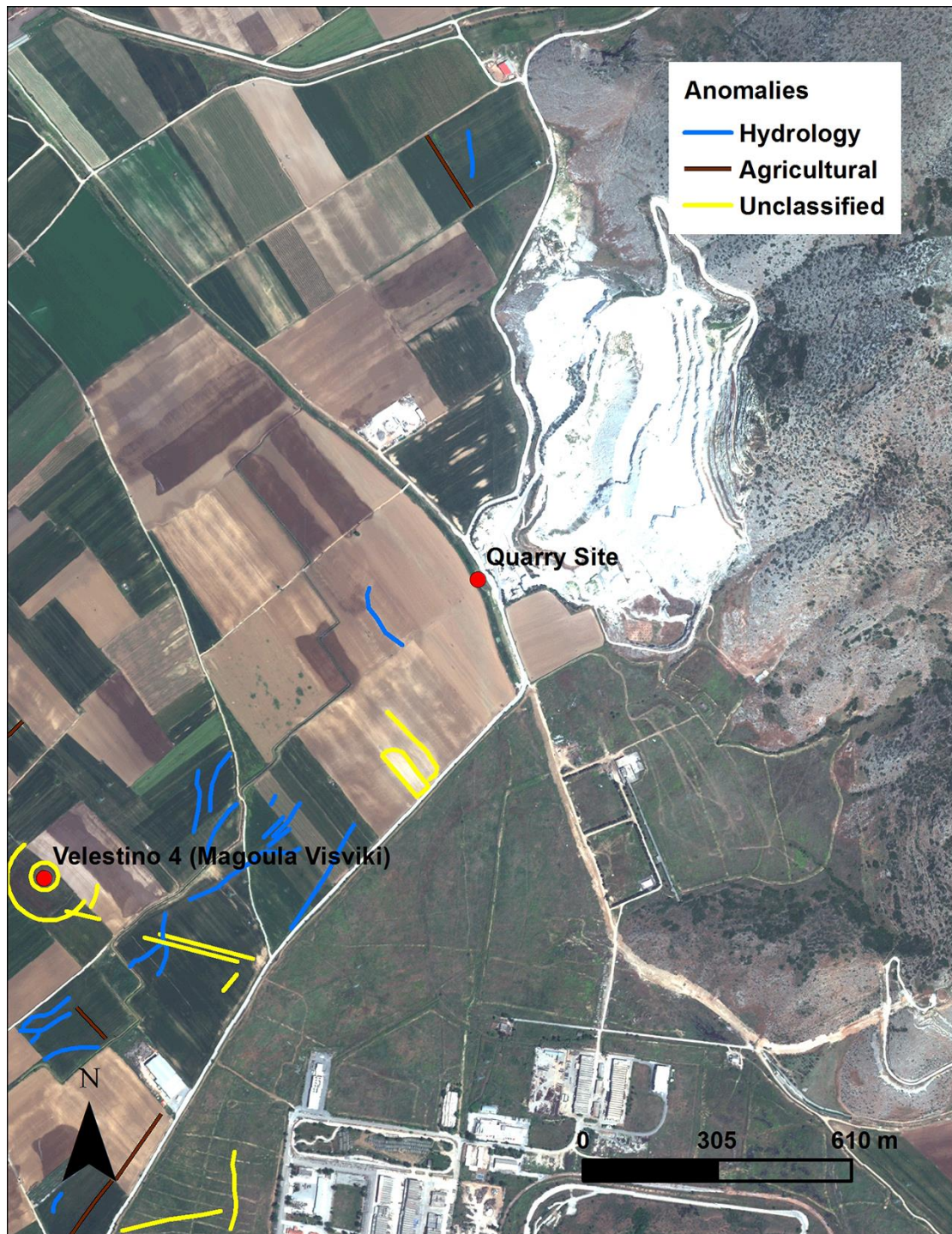


Figure 4. Surface anomalies from the 4 May 2010 GeoEye-1 image within a 1 km radius around “Quarry Site”