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# Geophysical Survey of Ventanillas, a Prehispanic Administrative Center in the Jequetepeque River Valley, Cajamarca District, Peru

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**SEPTEMBER 2016**

**PETER N. PEREGRINE, DIRECTOR**

# **Geophysical Survey of Ventanillas, a Prehispanic Administrative Center in the Jequetepeque River Valley, Cajamarca District, Peru**

Peter N. Peregrine, Lawrence University  
September 2016

## **Final Report**

### **Abstract:**

In July 2016 a magnetic gradiometer survey was conducted at the Ventanillas site in the Cajamarca District of Peru to identify features that may have been destroyed during the creation of a soccer field in 1974. The area bulldozed for the soccer field is located in the plaza areas of two huacas, one dating to the Lambayeque period, the other to the Chimú period. The survey revealed what appear to be two walls and a group of small structures associated with the Chimú huaca. In addition, several rectangular anomalies were identified near the base of the Lambayeque huaca, which may represent tombs. It is recommended that test excavations be undertaken to affirm the survey findings.

# Contents

<b>Abstract:</b> .....	1
<b>Introduction and Context</b> .....	3
<b>Methods</b> .....	3
<b>Results of Investigations</b> .....	4
<b>Summary and Recommendations</b> .....	4
<b>References Cited</b> .....	4
<b>Figures</b> .....	5
<b>Figure 1</b> .....	5
<b>Figure 2</b> .....	6
<b>Figure 3</b> .....	7
<b>Figure 4</b> .....	8
<b>Figure 5</b> .....	9
<b>Figure 6</b> .....	10
<b>Figure 7</b> .....	11
<b>Figure 8:</b> .....	12
<b>Figure 9</b> .....	13

## Introduction and Context

Ventanillas is a large Lambayeque and Chimú administrative center located in the middle Jequetepeque River valley in the Cajamarca District of north coastal Peru (Figure 1). The site is unique in having three large adobe *huacas*, the only ones in the middle Jequetepeque valley (Figure 2). Three field seasons of excavations have been conducted by a team from Centre College and the University of Pittsburgh (Cutright and Cervantes 2011, 2014). The excavations have uncovered a variety of habitations and production areas, and have provided a general sense of the organization of the site. However, one important part of the site's administrative center—the plaza of Huaca 1—was flattened in 1974 to construct a soccer field for the village of Ventanillas (Figure 2). The purpose of the geophysical survey was to determine what, if any, architecture remained below the bulldozed surface of the soccer field.

## Methods

Initial geomagnetic survey of the Huaca 1 plaza took place between June 27 and July 1, 2016. Peregrine and two field assistants collected geomagnetic data from twenty 20 meter by 20 meter grid units covering the entire plaza. Rough terrain consisting of boulders and large cobbles from walls and structures prevented survey outside of the area flattened in 1974. The grid locations and survey area relative to the site are shown in Figure 3.

The data themselves were collected using a Geoscan FM256 differential gradiometer. This instrument consists of two magnetometers arranged one atop the other with a 0.5 meter separation. Each magnetometer measures the earth's magnetic field and the difference between the two readings, which is equivalent to the vertical gradient of the earth's magnetic field, is recorded. The instrument is sensitive enough to measure tiny variations in the earth's magnetic field, variations that might be caused by subtle soil changes or the presence of buried materials (Jones 2008:20-24). For this application sensitivity of the FM256 was set at 1.0 nanotesla, or about  $1/25,000^{\text{th}}$  of the earth's total magnetic field. Data were collected at 0.25 meter intervals along 0.5 meter spaced parallel east-west lines, for a total of 6400 individual data points for each grid unit. Complete 20 meter by 20 meter grid units were each collected at a single time, without interruption, to minimize operator error.

The raw magnetic data were downloaded from the FM256 into the Geoplot 4.0 software package, and are shown in Figure 4. The data quality was excellent, and analyses required to interpret the data proved to be quite simple. They involved (in the following order) (1) “zero mean grid” to balance the data values across the separate grids; (2) “zero mean traverse” to remove “striping” within grids caused by operator errors; and (4) “interpolation” conducted once in the Y direction to make the resolution of each pixel 0.25 meters (see Jones 2008:41-50). The image resulting from this processing are presented as Figures 5 and 6. Magnetic highs appear here as darker grays; magnetic lows as lighter grays.

## Results of Investigations

Several features of interest were identified through the geomagnetic survey. First are what appear to be two parallel walls running roughly north-east to south-west across the bulldozed area (Figures 7 and 8). These walls appear to parallel those identified by Cutright and Cervantes (2011: Figure 3) as associated with the Huaca 2 plaza. A second group of features appears to be a series of small rooms or room blocks running roughly north-west to south-east across the bulldozed area (Figures 7 and 8). Although individual rooms are not easily identified, perhaps because their walls were knocked down during bulldozing, the area clearly contains roughly rectangular or oblong clusters of anomalies, suggesting these are the remains of stone-walled rooms like those found throughout the site (Figure 9). Interestingly, such rooms are also located on the extant portion of the Huaca 2 plaza (Cutright and Cervantes 2011:13-15). Thus, it would appear that the plaza associated with Huaca 2 extends under at least the northern 2/3rds of the bulldozed area.

In addition to these architectural features, three features of interest were identified near the north-west corner of Huaca 2, all three within survey grid 15. Two are rectangular, roughly 5 meters by 10 meters in size. On Figure 7 I have identified these as possible tombs, as they have the size, shape, and location to suggest these may be Lambayeque period elite interments (Chicoine 2011: 528). Just north of them is a semi-circular anomaly that I am unable to interpret at this point. It lies beneath what today is a road running between Huacas 1 and 2, and thus may be a modern feature associated with the road or with metal dropped from a vehicle using that road.

## Summary and Recommendations

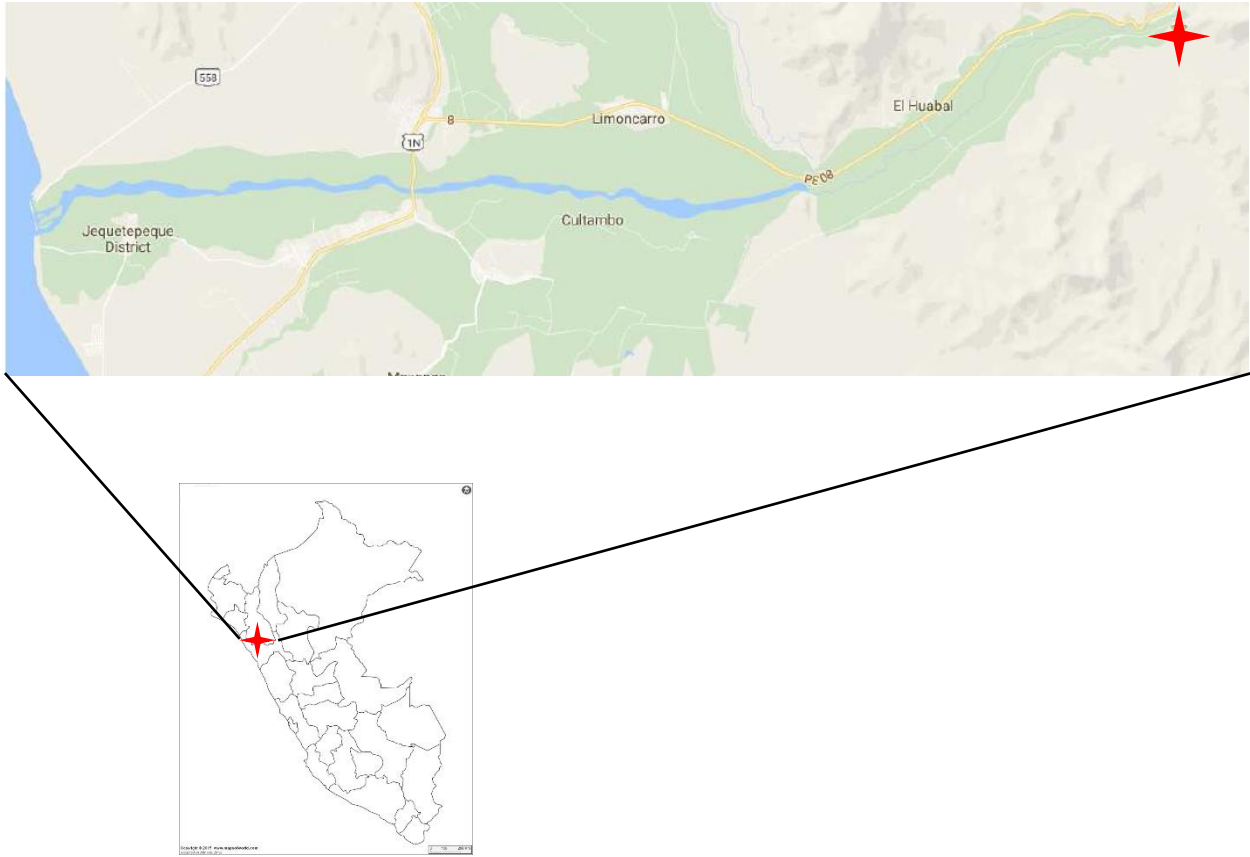
The geomagnetic survey undertaken at Ventanillas identified anomalies that suggest a large portion of the Huaca 2 plaza continues well into the northern half of the area of the site bulldozed in 1974. In particular, two plaza walls and a group of rooms appear to be preserved under the bulldozed surface. It is recommended that test excavations be performed to determine whether the interpretation of the geomagnetic data is correct. Two rectangular anomalies located near the northwest corner of Huaca 1 are interpreted as being possible Lambayeque era elite tombs. Test excavations should be conducted in these locations as well to determine what, if anything, these anomalies represent.

## References Cited

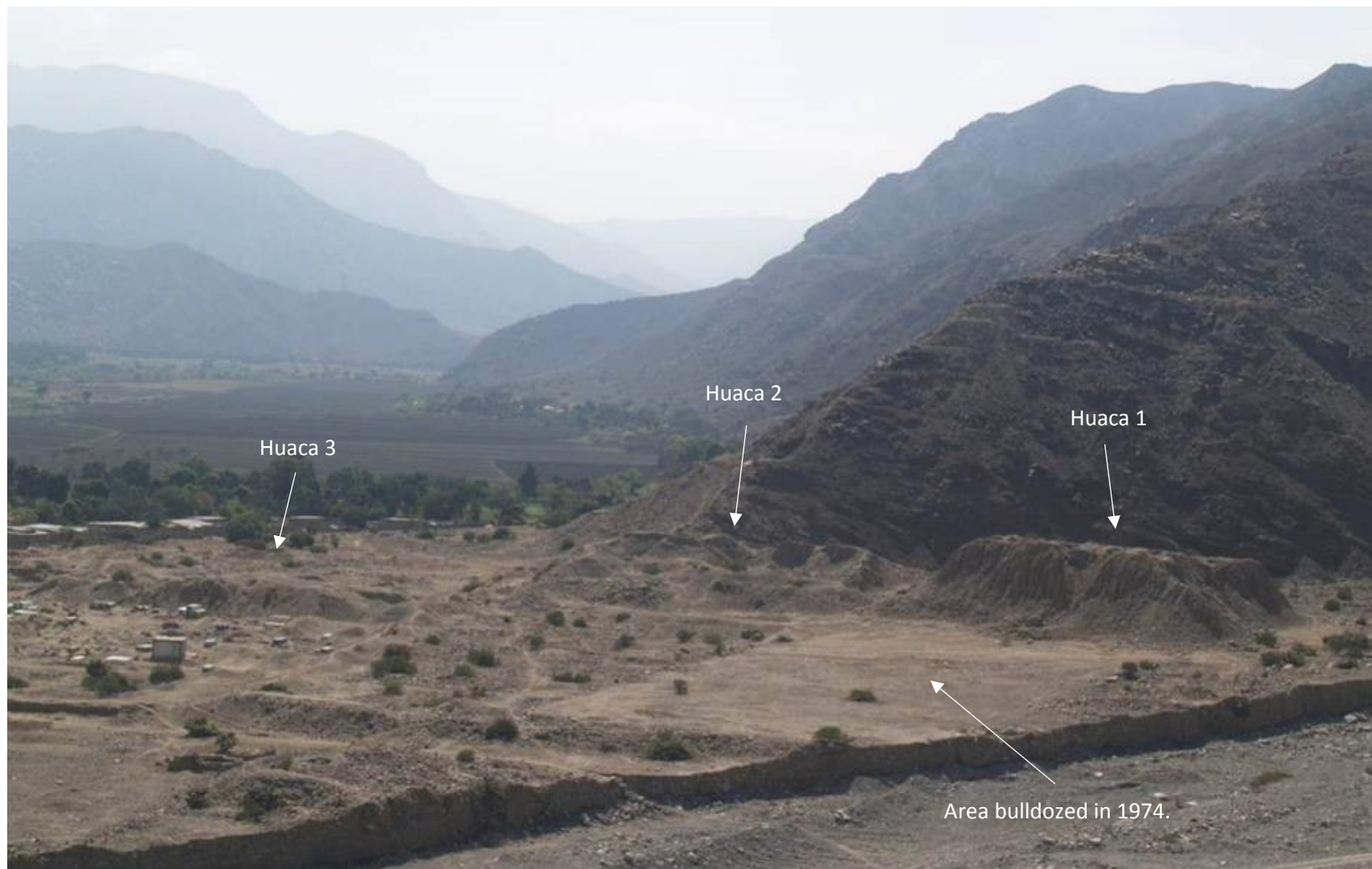
- Chicoine, David  
2011 Death and Religion in the Southern Moche Periphery. *Latin American Antiquity* 22:525-548
- Cutright, Robyn and Gabriela Cervantes Quequezana  
2011 *Informe de Investigaciones Temporada 2011, Proyecto de Investigación Arqueológica Ventanillas*. Report to the Ministry of Culture, Lima, Peru.
- 2014 *Informe de Investigaciones Temporada 2014, Proyecto de Investigación Arqueológica Ventanillas*. Report to the Ministry of Culture, Lima, Peru.
- Jones, David (ed.)  
2008 *Geophysical Survey in Archaeological Field Evaluation*. Swindon, UK: English Heritage.

# Figures

Figure 1: General location of the Ventanillas site.

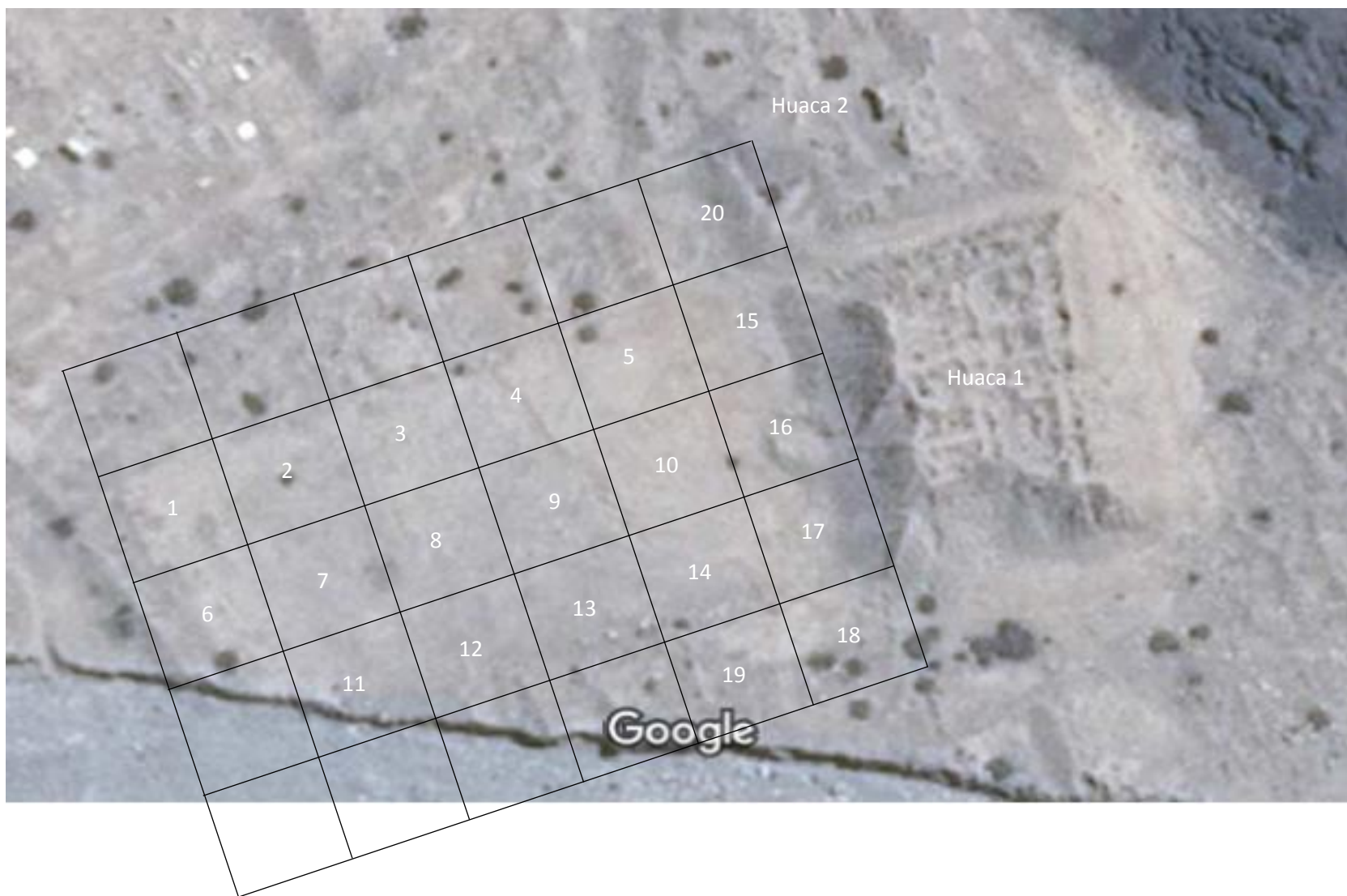


**Figure 2:** Oblique photo of the Ventanillas, showing the three *huacas* and the flattened area in the plaza area of Huaca 1.

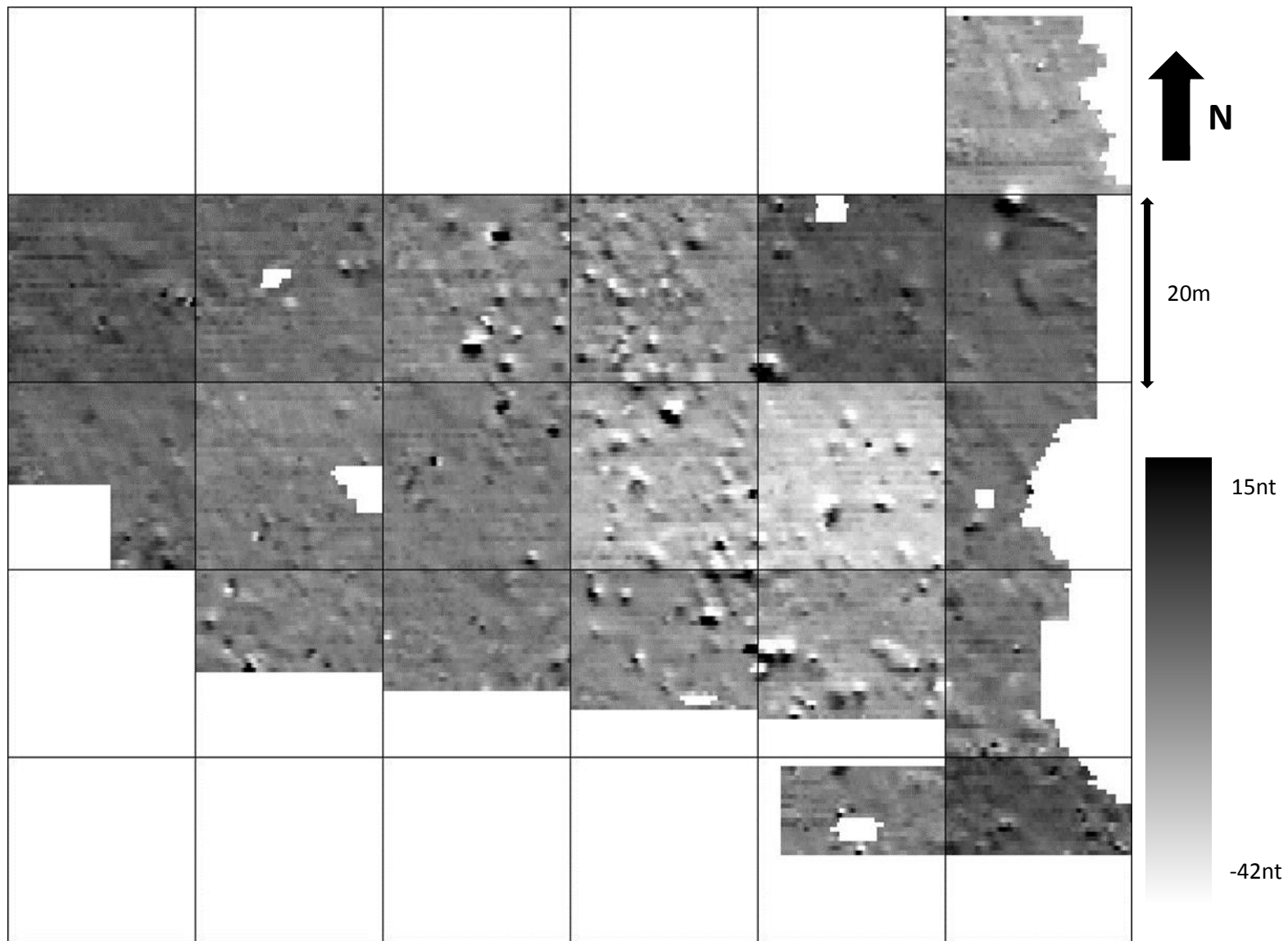




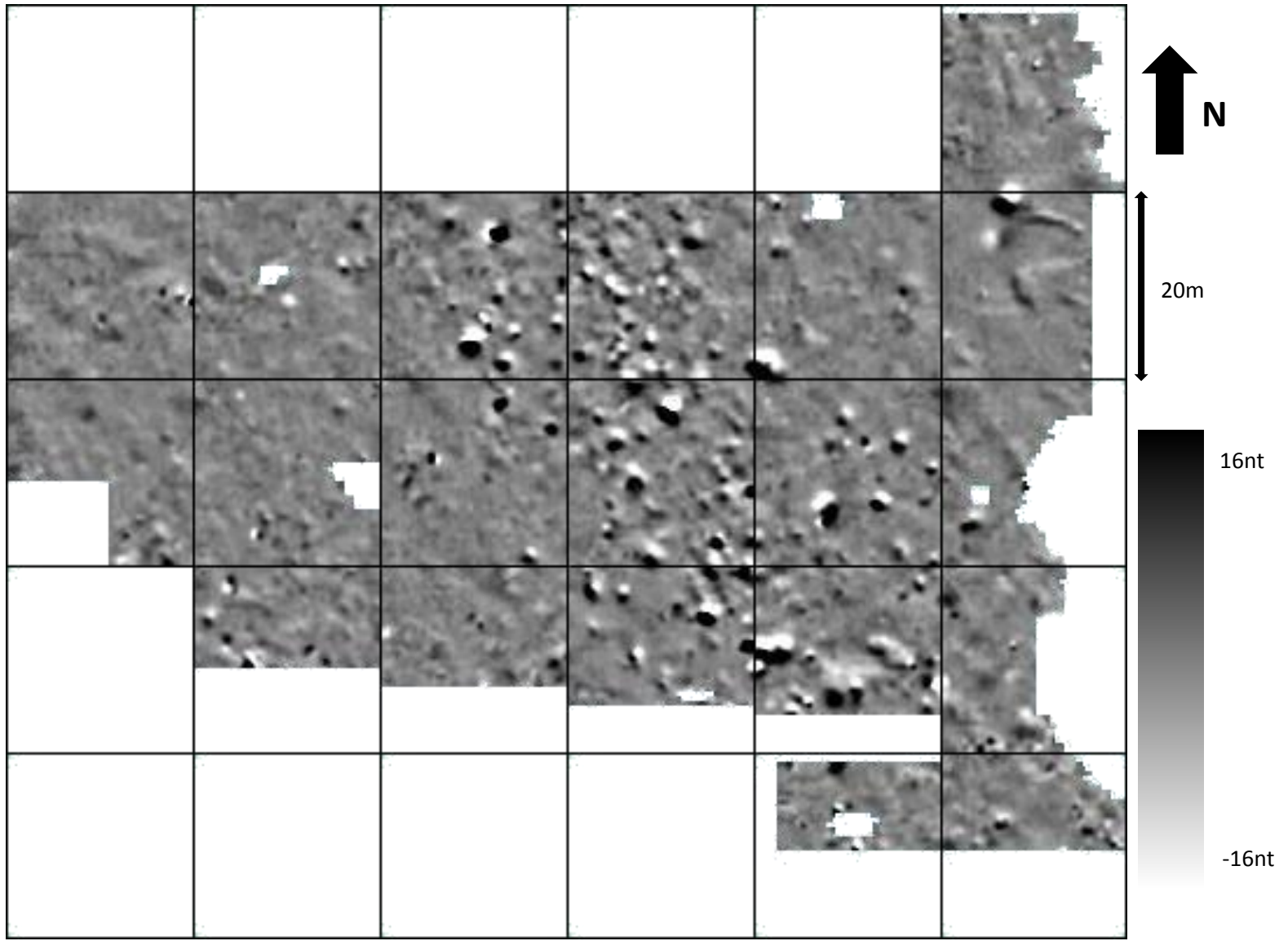
**Figure 3:** Aerial photo of the flattened Huaca 1 plaza area showing the survey grids. Unnumbered grids were not surveyed.



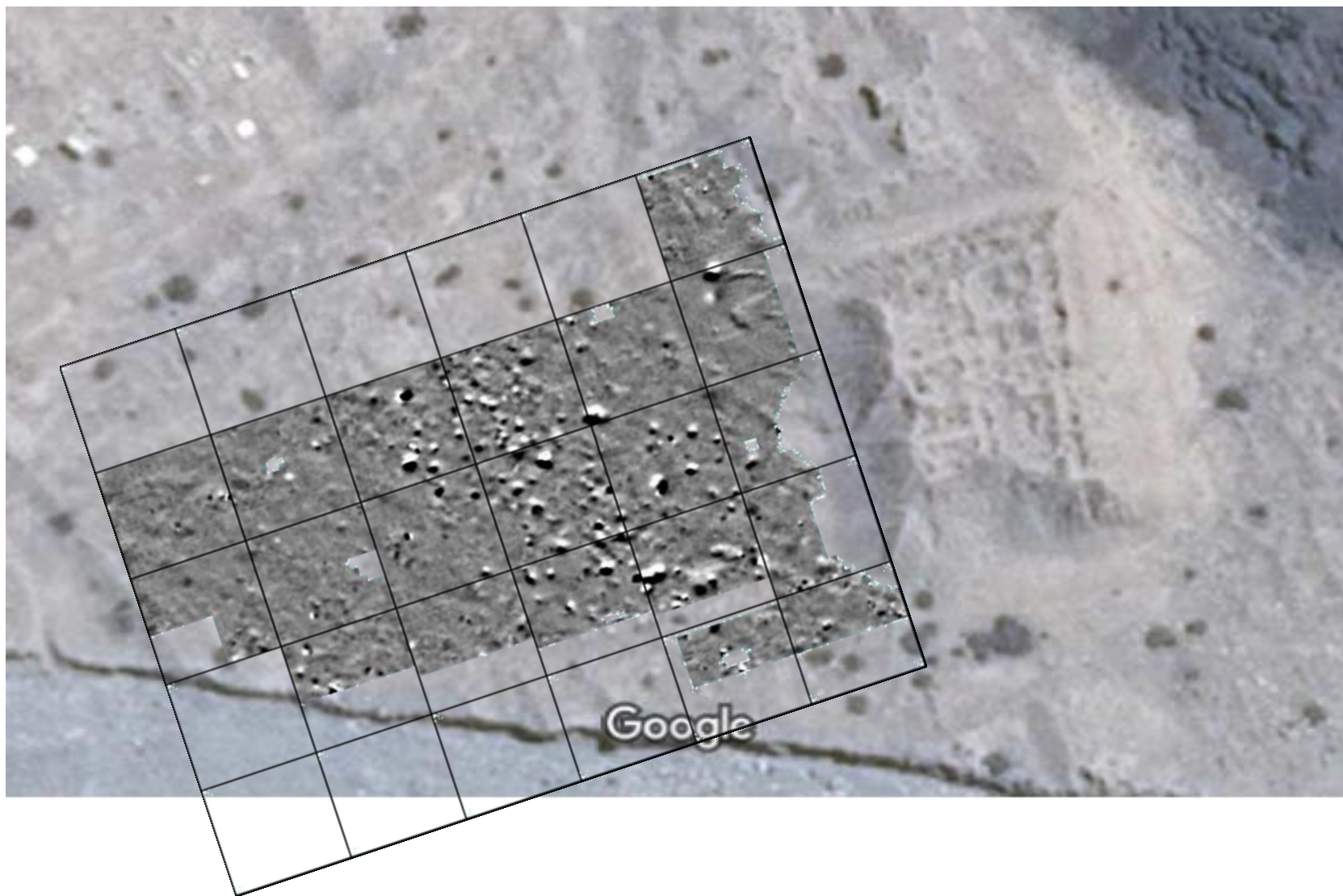
**Figure 4:** Raw Ventanillas gradiometer data.



**Figure 5:** Processed Ventanillas gradiometer data.

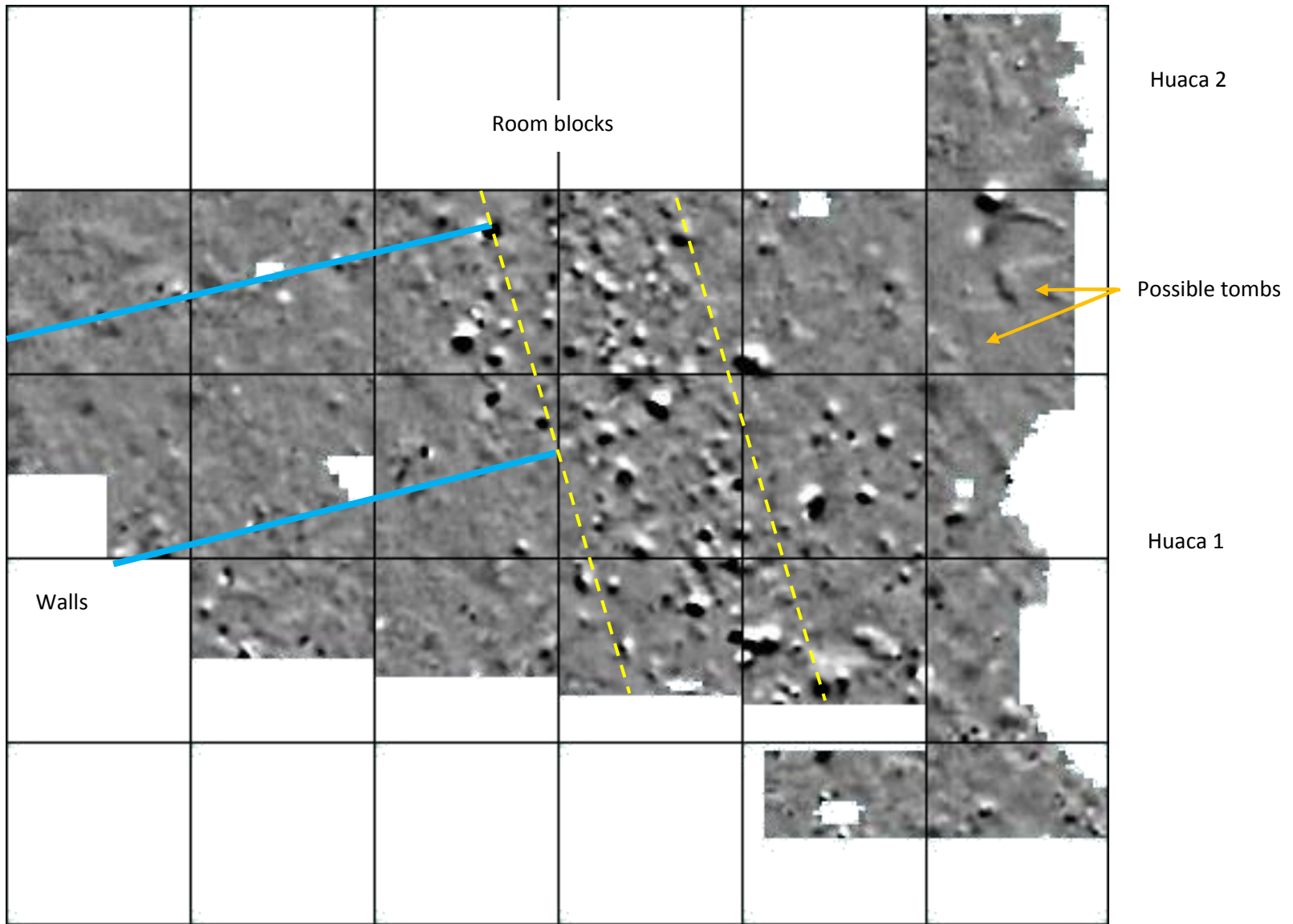


**Figure 6:** Ventanillas gradiometer data superimposed on aerial image of the survey area.

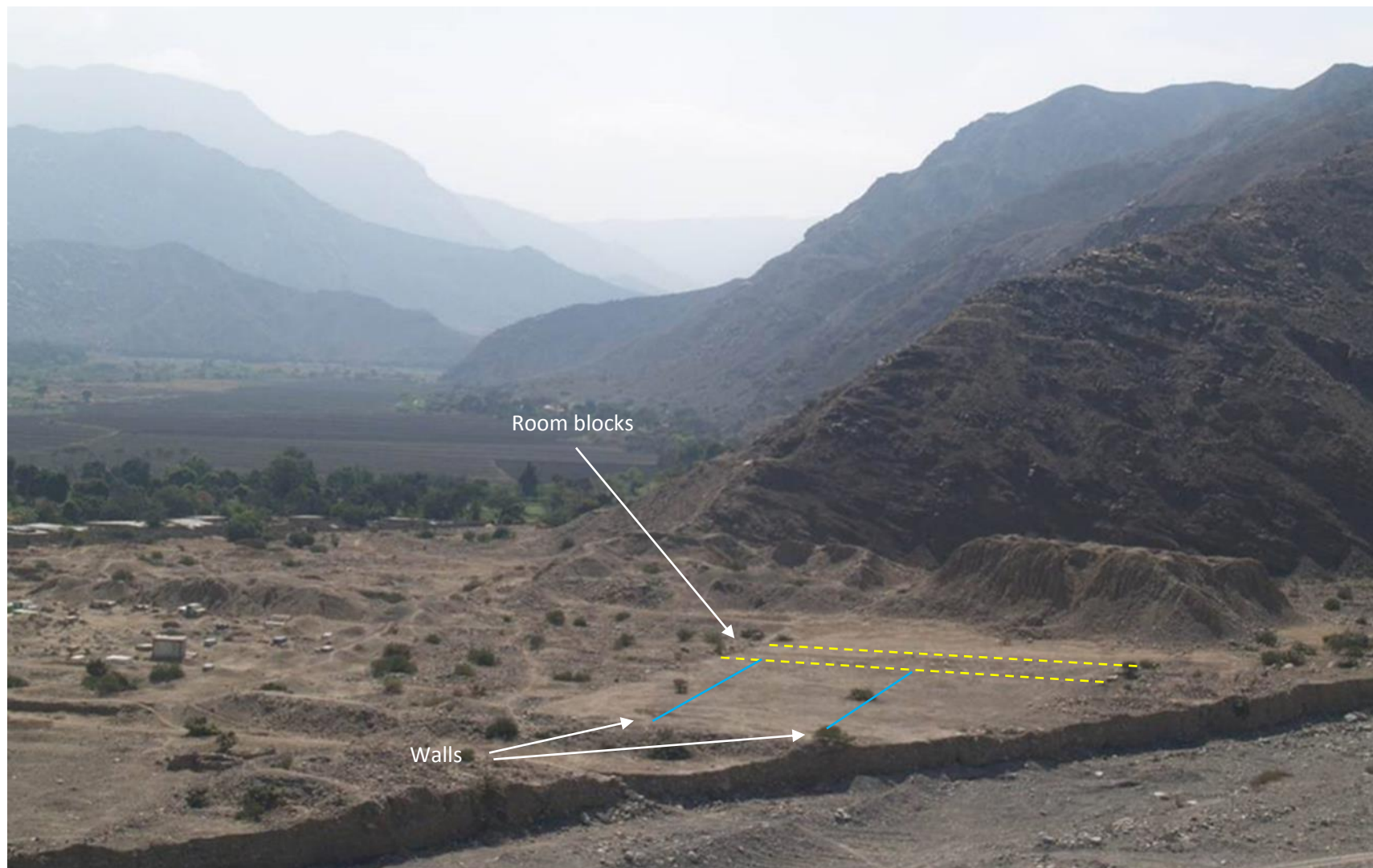




**Figure 7:** Interpreted Ventanillas gradiometer data.



**Figure 8:** Interpreted oblique photo of the Ventanillas survey area.



**Figure 9:** 2016 excavation of a stone-walled structure in the Huaca 2 plaza at Ventanillas.

