Electrical resistivity tomography and magnetometry surveying of a ~500-1532 CE Manteño culture archeological site close to Puerto Lopez, Ecuador

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Abstract

Geophysical methods are very useful in archeological prospection by providing an inexpensive, non-invasive view of the subsurface, and, helping the archeologists to better target their excavation efforts. Ecuador's past is very rich, with many archeological sites still unexplored. Manteño culture prevailed in the province of Manabí in a series of large coastal towns and along the river valleys and ridges of the Chongón-Colonche coastal mountains of what is now Ecuador from around 500 CE to 1532 CE. They were one of the last prehistoric cultures and the Inca Empire never conquered them directly, which meant their culture developed independently. Thousands of carefully arranged stone foundation have been documented across the abrupt landscape that has been intentionally modified for large scale agriculture. In this work, we present the results of Electrical Resistivity Tomography (ERT) and magnetometry surveys at the Río Blanco archeological area close to the coastal city of Puerto Lopez. The area includes one of the largest unexcavated archeological remains known in Ecuador. It consists of alluvial terraces modified by the Manteño people scattered with numerous ruins. The archeological structures are often delimited by buried rock blocks that sometimes outcrop in the surface. We made 2 $\frac{1}{2}$ D ERT with dipole-dipole array configuration and ground magnetometry surveys at three locations which were identified earlier by archeologists as buried buildings, with one of them being previously partially excavated. The measurement grid for each structure was designed according to their size. For magnetometry, a base station measurement was taken after finishing each survey line in order to be able to remove diurnal variations from the magnetometry readings. All tested structures showed internal variations within them related to differences in electrical resistivity and magnetic susceptibility. According to our preliminary interpretation, some of these anomalies are from the wall rocks and some suggest the presence of buried objects as well as potential locations of fireplaces. The locations of the buried objects are intended to be later verified by archeological excavation.

ERT AND MAGNETOMETRY SURVEYING OF A ~500-1532 CE MANTEÑO CULTURE ARCHEOLOGICAL SITE CLOSE TO PUERTO LOPEZ, ECUADOR

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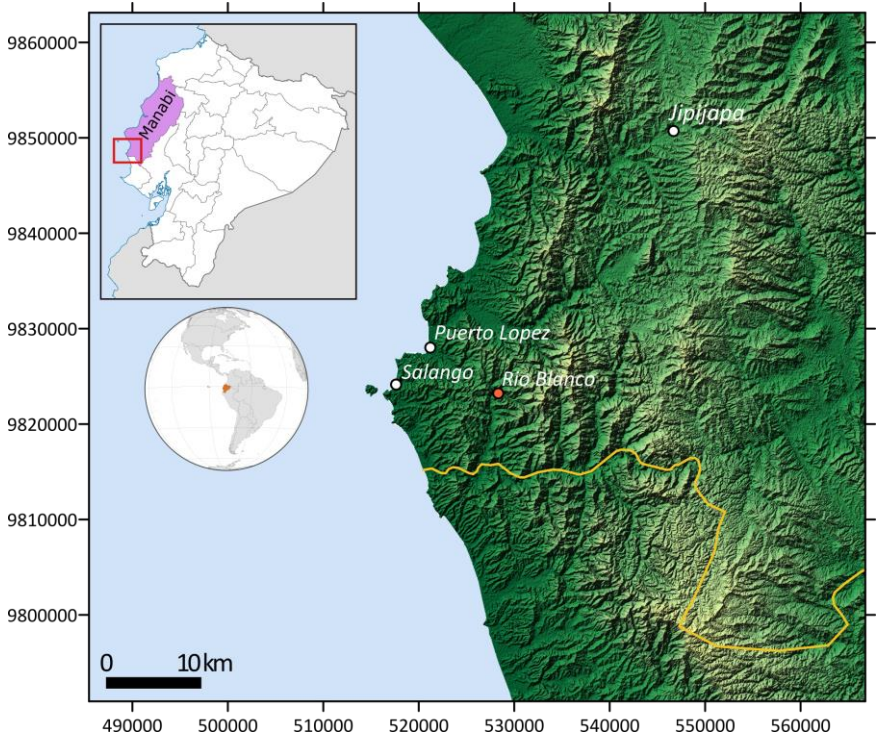
AGU FALL MEETING



MANTEÑO CULTURE 500 CE TO 1532 CE

One of the largest unexcavated archeological remains known in Ecuador



E. Avilés

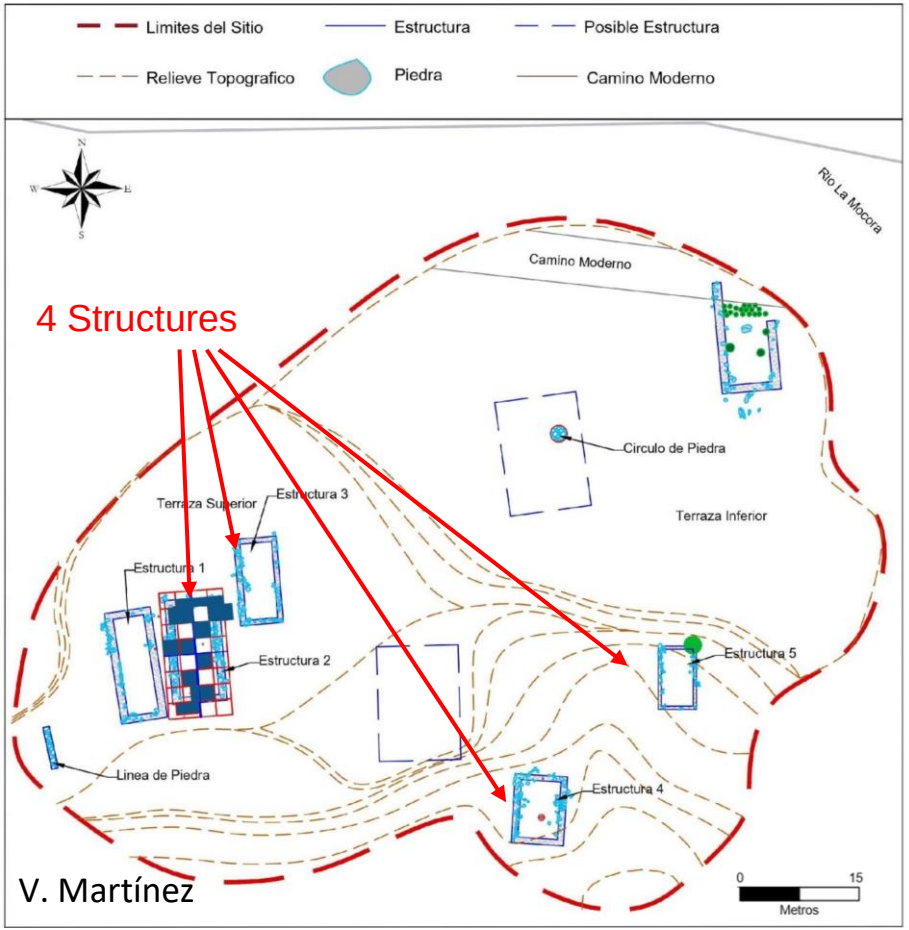
Manteño Culture, U-shaped seat

Matthew Helmer,/NGS.

Manteña mask made with gold sheets

STONE-WALLED STRUCTURES ON ALLUVIAL TERRANES

Rio Blanco river valley

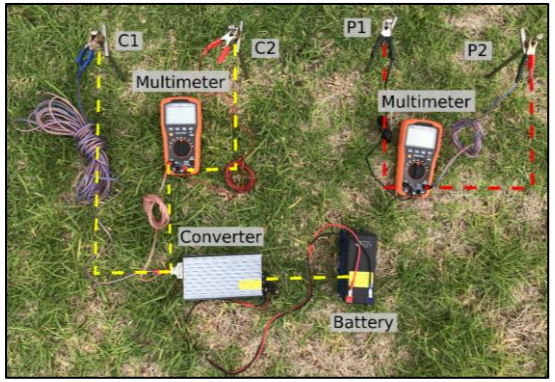


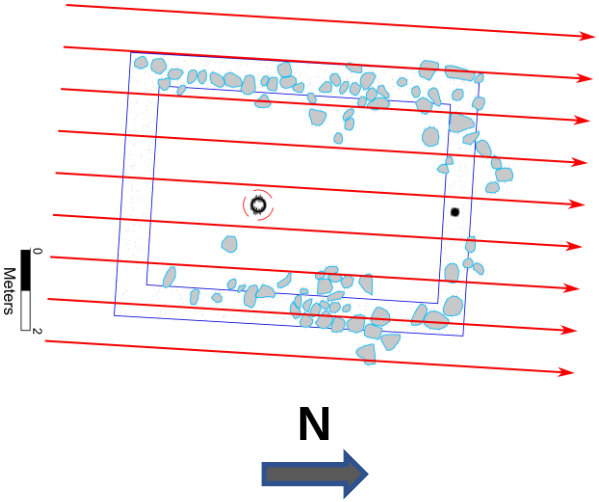
Archeological site N4C4-086



MAGNETOMETRY AND ERT

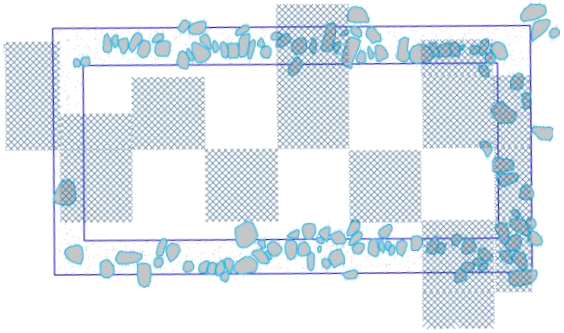
- Geometrics proton-precession magnetometer model G-856AX
- Garage-build ERT equipment





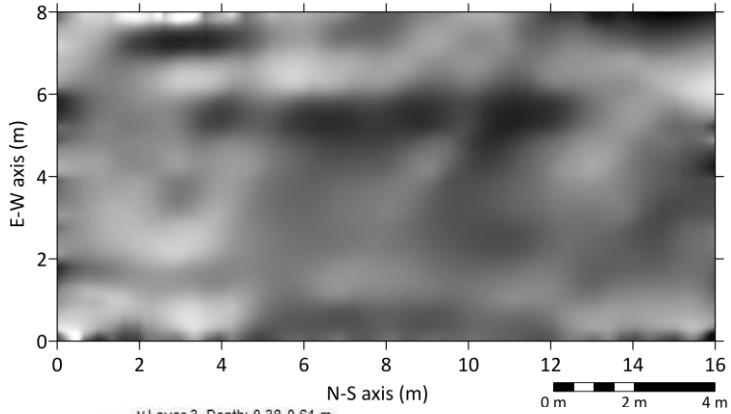
0.5 m x 1 m grid size

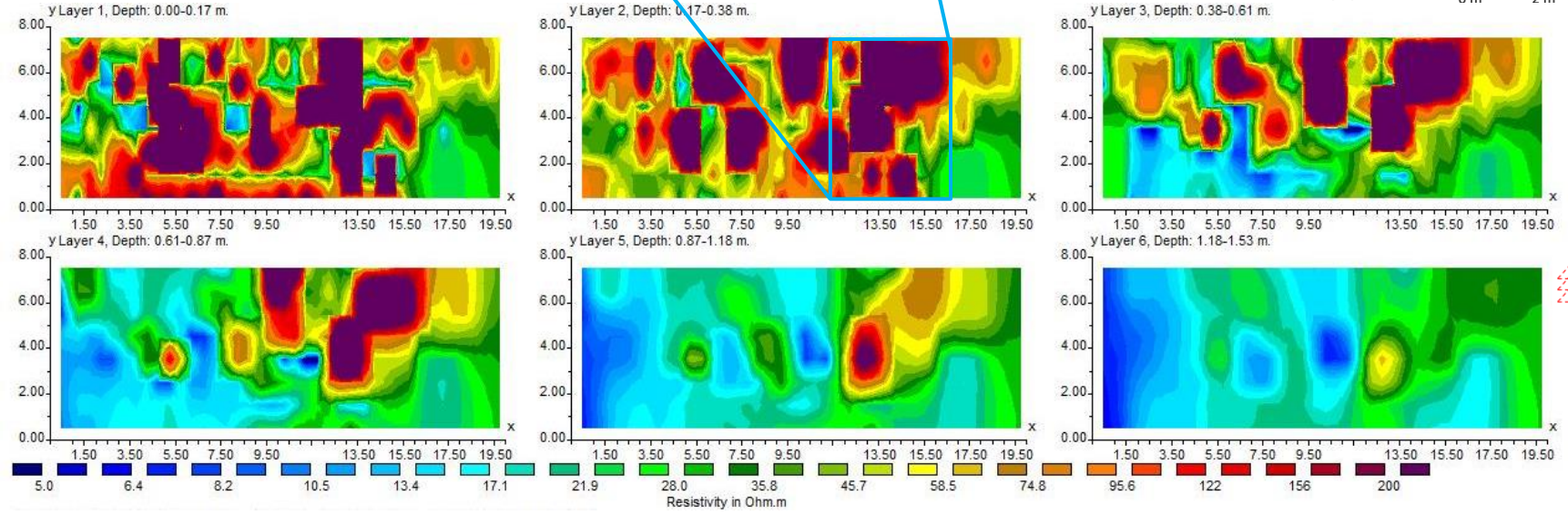
STRUCTURE 2



North

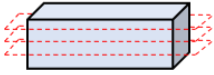
Magnetometry





ERT

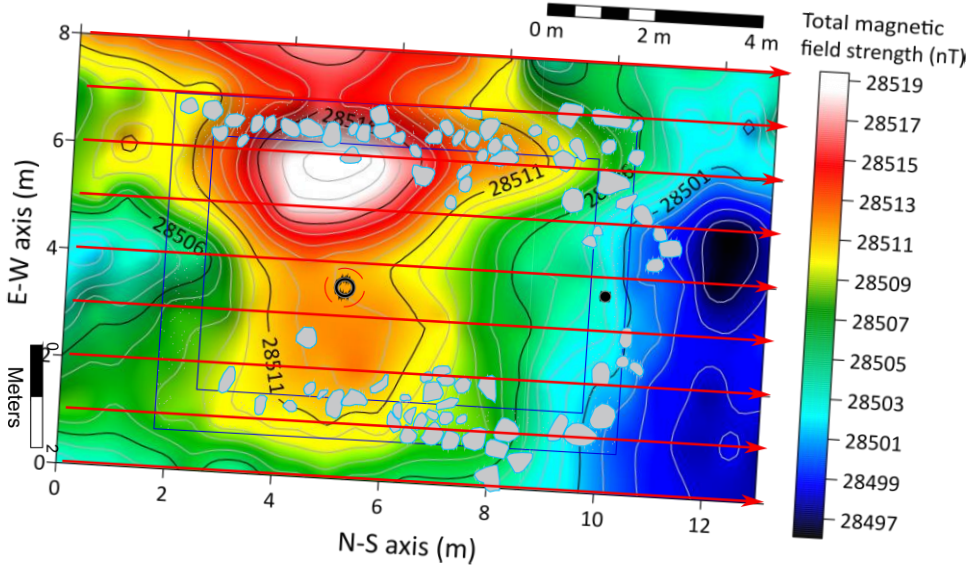
Horizontal slices through 3D



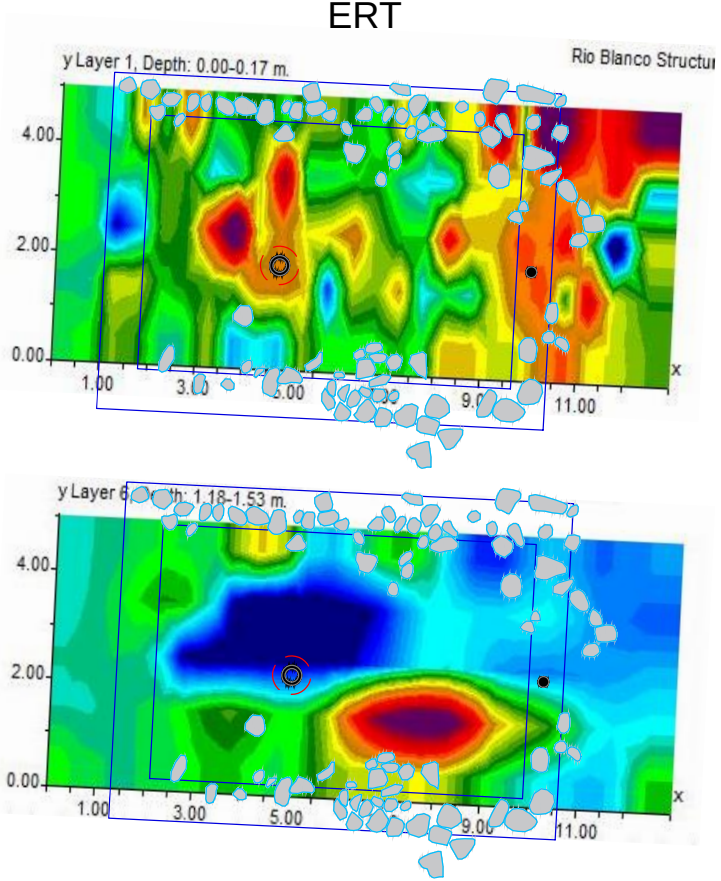
STRUCTURE 4

North

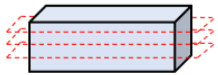
Magnetometry

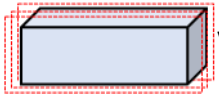


ERT



Horizontal slices through 3D



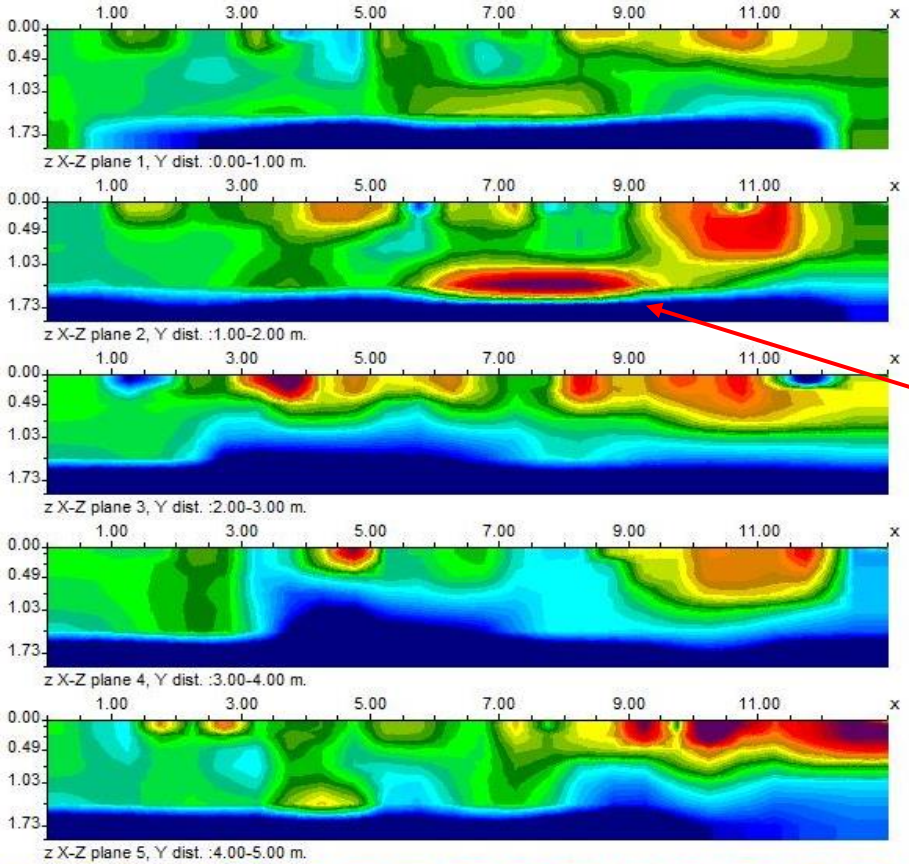


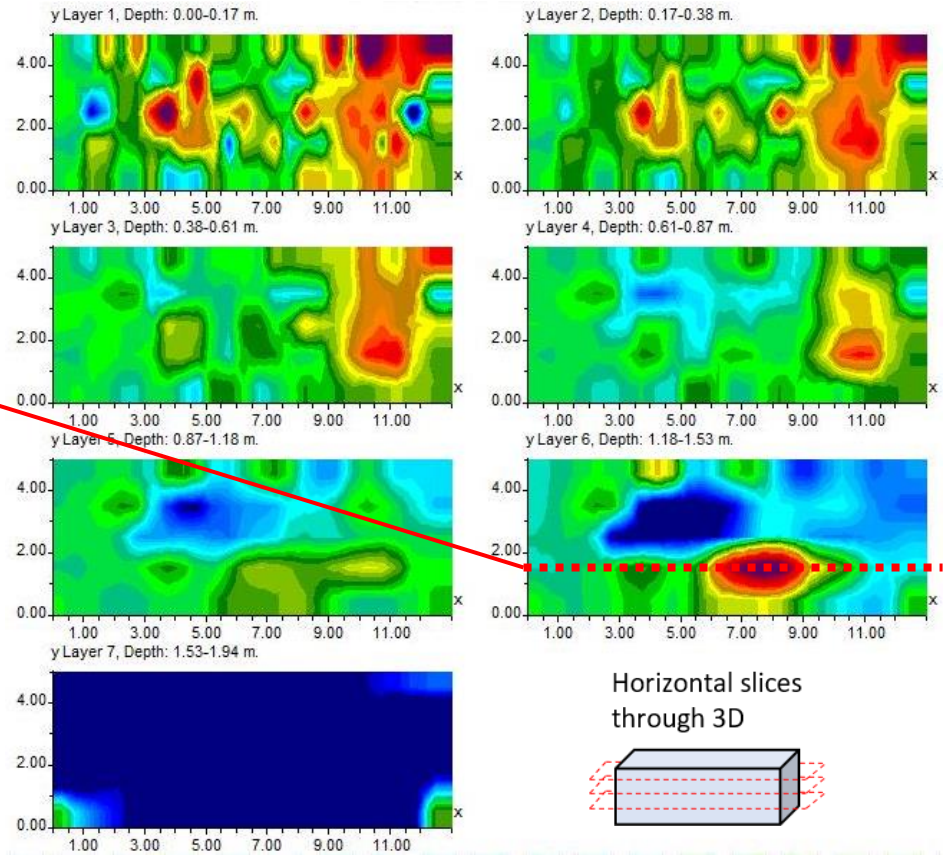
Vertical slices through 3D

STRUCTURE 4 - ERT

North

Rio Blanco Structure 4 (house 2)





Horizontal slices through 3D

X Unit Electrode Spacing 0.500m. Y Unit Electrode Spacing 1.000m. Iteration 8 data misfit 5.16%



CONCLUSIONS AND FUTURE WORK

- All tested structures showed internal variations related to differences in electrical resistivity and magnetic susceptibility, with the two bigger structures showing more features.
- According to our preliminary interpretation, some of these anomalies are from the **wall rocks**, locations of **kitchen area** and **fireplaces,** and maybe even **burials**.
- Even finer sampling grids would be desirable, or use of a gradiometer.
- Excavations on selected targets to verify.

THANK YOU!

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