

## ARCHAEO-GEOPHYSICAL PROSPECTION FOR A PRE-COLUMBIAN PRESENCE IN PUTUMAYO, COLOMBIA

*Paul D. Bauman, BGC Engineering Inc., Calgary, Canada*  
*Colin M. Miazga, BGC Engineering Inc., Calgary, Canada*  
*Chris L. Slater, BGC Engineering Inc., Calgary, Canada*  
*Eric H. Johnson, BGC Engineering Inc., Calgary, Canada*

Putumayo is a department (i.e., state) of southwestern Colombia, bordering on both Peru and Ecuador. In the broad narrative of pre-Columbian (i.e., before 1492) archaeology, little is known about the peoples who inhabited Putumayo. The Inca empire reached the southwestern corner of Colombia, and hundreds of fourth millennium monolithic massive stone sculptures exist in Huila Department to the north; however, Colombia's 57-year civil war and the control of Putumayo by the FARC guerilla group and narco-traffickers made the Department inaccessible to archaeologists. The 2016 peace accord between the FARC and the Colombian government of President Juan Manuel Santos created a window where archaeological investigations were deemed possible.

Following the 2016 peace accords, a resource extraction company carried out a conventional archaeological exploration program over an approximate 5 km<sup>2</sup> area in preparation for the construction of an 8-kilometer lease access road. The exploration area is in the Amazonian Piedmont, in the headwaters of the Amazon River. Of the 4000 test pits that were excavated, artifacts were found in only 80 pits. These artifacts included 1100 pottery shards and 34 lithic (stone) artifacts. Artifacts were dated from 2500 years before the present (BP) to 500 years BP. Given that many of the 4000 test pits were excavated to infill areas of known finds, the percentage of test pits discovering areas of human activity was significantly less than 2%.

In September 2018, a two-week archaeo-geophysical program was carried out in this same exploration area with the goal of assessing a relatively rapid, non-intrusive geophysical and UAV mapping approach. The objective was not to replace conventional test pitting, but instead to better focus test pitting, to "sterilize" areas of little or no cultural activity, to provide boundaries of areas of cultural activity, to reduce the number of test pits, and to estimate the maximum depth to which anthropogenic finds may be expected. Surveys included UAV photogrammetry, UAV multispectral imagery, magnetic gradiometer mapping, resistance meter mapping, terrain conductivity mapping, and ground penetrating radar mapping.

Despite the area being very large and difficult to access, all work was required to be completed within two weeks due to significant security concerns. The area was known to have landmines, booby traps, and was still largely controlled by narco-traffickers and renegade elements of the FARC. Coca cultivation was still ubiquitous; kidnapping and the murder of community leaders remained common in the area. Although we received extraordinary support from the Colombian military, we were unable to mobilize with aircraft due to concerns of being shot at. Significant ongoing flooding in the Upper Amazon Basin required our support crew to construct bridges as we moved.

Photogrammetry and multispectral imagery were extremely useful for creating base maps, but failed to identify any ancient landscape modifications such as terracing or irrigation ditches. A total of 900 m<sup>2</sup> of high resolution geophysics was surveyed. About 14.5% of this survey area showed what were interpreted as high priority geophysical anomalies. Magnetic gradiometry provided the most useful identification of high confidence anomalies. Nevertheless, all geophysical methods provided useful information. In one small area, a very high resolution 3D GPR survey identified approximately 200

diffractions that are likely related to pottery shards. Possible anthropogenic sources of the various geophysical anomalies include pits, ditches, earthen floors, burning, fire baked earth, fire baked bricks, ferro- and non-ferromagnetic metal, and chemical reactions from bacterial activity associated with anthropogenic activity.

The archaeo-geophysical program described here was executed without any access to the results of the previous intrusive archaeological investigations; in other words, this program was performed as a blind test. The initial results are encouraging, though intrusive investigations are required to fully evaluate the geophysical program. As far as we know, no such multi-method geophysical and UAV prospection program had been previously carried out in Colombia, and certainly not in Putumayo. Other organizations in Putumayo are considering using this same non-intrusive approach to precede conventional and destructive archaeological investigations.