**Supplemental Text 1: Materials and methods**—**Airborne lidar: Teyuna - Ciudad Perdida and the Upper Buritaca River Basin.**

*Instrumentation*

In March of 2019 an area of approximately 671 hectares was scanned with airborne lidar by the National Geographic Society. This area is located in the Upper Buritaca River basin and encompasses Teyuna-Ciudad Perdida,G-1, G-2, B-201, B-202, and B-203 (Giraldo 2010). Approximately 5.05 billion total returns in the point clouds were obtained and out of the 500 points per square meter targeted, 298.28 points per square meter were recorded with a vertical accuracy of 5-30cm. The time of the year was ideal since it corresponds to the end of the dry season in northern Colombia when tree and ground foliage is less dense, maximizing the rate of ground returns from the lasers. A Riegl VUX-1LR instrument with a Multiple-Time-Around (MTA) capability and configured to Dual Configuration was mounted to a Bell 206L3 Long Ranger helicopter that flew at the height of 152m and speed of 20.57m per second. Aircraft altitude and positional data were measured using an Applanix AV410 IMU sensor at a rate of 200Hz. The scan angle was 110°-degree FOV and a swath sidelap of 50%, with a pulse rate of 820kHz. Known topographic benchmarks located on the aforementioned archaeological sites and conforming to the Coordinate system Bogota\_UTM\_Zone\_18N were used to assess the accuracy of each aircraft sortie.

*Methods and Postprocessing*

The airborne lidar dataset was postprocessed in two stages. First, the classification of the lidar point clouds dataset was classified into two discrete classes, ground and vegetation. LAStools software suite version 180911 and ArcGIS PRO 2.5 were utilized for processing, developing a workflow that followed parameters equivalent to those established by authors such as Evans and colleagues (2013) and Lasaponara and colleagues. (2011). This helped account for errors caused by different environmental situations such as intricate canopy with dense understory, low vegetation on steep slopes, and terrain with abrupt changes. Building on the workflows designed by Isenburg (2013), Evans and colleagues., (2013), Verhagen (2012), and Prufer and colleagues (2015) for mountainous forested areas, the raw point cloud was subdivided into 300 square meter tiles, classified and filtered, using the following tools from LAStools: LASground\_new, LASnoise, and LASclassify. For each of these tools, the parameters were set up to the specific conditions of the steep topography and dense canopy of the Upper Buritaca area, yielding a classification that accurately discriminates bare earth from vegetation. The bare earth point cloud (average density of 25 points per square meter) was extracted and processed into a 30 cm resolution DTM, from which hill shade and slope gradient models were produced employing ArcGIS Pro.

Second, OBIA was used to produced one unsupervised and two supervised classifications were to detect prospective prehispanic anthropogenic areas. To conduct the OBIA classifications it was necessary to translate the fieldwork knowledge of the Sierra Nevada de Santa Marta into four variables akin to Ecognition 9.4 processing parameters. The first variable, *slope*, measures the degree of relative flatness or steepness of the topography. Archeologists have consistently found how structures like stone terraces and foundation rings transformed previously steep terrains into flat surfaces on top of which the Tairona lived (Serje 1984). They have also observed these structures in naturally flat areas (Cadavid and Herrera 1985). Moreover, according to colonial sources, the Tairona had extensive maize, bean, squash, and manioc fields in the peripheries of their settlements on steep yet passable terrain (Herrera 1984, 1985; Castellanos 1586). Based on ethnographic observations on contemporary indigenous and *campesinos* agriculture practices, Rodríguez Osorio (2020) has documented maize and manioc crops on relatively steep terrain–7°<25°. A 0°<25° gradient was established as a suitable slope for ancient settlements and/or croplands based on this information.

The second variable, *relief*, computes variations in ground surface elevation of the research area. With this information, we can start assessing whether prospective areas of ancient land use and occupation were located on round, flat, or crest-like landforms, which may have been an essential factor affecting the choices made by the ancient societies of the SNSM regarding habitation and economic land use. Although archaeologists have largely pointed out the ubiquity of ancient settlements across the massif (Cadavid and Herrera 1985; Serje 1987; Bahn et al. 1974), information is lacking on the relationship between their location and the types of landforms where they are found.

 The third variable, *shape,* refers to the masonry structure's morphology and layout. Data from surveys and intensive research at CP strongly suggest that the ancient SNSM architecture ranges from relatively circular/oval to elongated contour terraces, that may conspicuously modify or follow the landforms underpinning them. Finally, *size* measures the extent and density of prospective pre-Hispanic land use and occupation with respect to areas that do not fall under this category. This variable allowed us to filter out relatively isolated areas smaller than 3 m2 that even when they met the other three conditions would hardly correspond to an ancient settlement or agricultural field.

To apply said classifier algorithms, we adapted the variables above to the following Ecognition 9.4 processing parameters: *mean* of the values for slope and relief extracted from the slope gradient and the hillshade models; *Max. diff.* or the maximum difference between mean values of these models; *area* or the number of pixels comprising the resulting image-objects; *length/width*, which calculates the ratio between length and width in each image-object; *compactness* index, which computes the "closeness" of pixels clustered in an image-object by comparing it to a circle; and *density* or the spatial distribution of an image-object’s pixels (Ecognition, 2010; Bialas, 2015). These parameters allowed us to conduct a multi-resolution image segmentation (MRS) that yielded the Image-Objects, grounding the three classifications. The MRS shows a high sensitivity to local terrain variations, producing Image-Objects that are more homogeneous, optimizing their analysis and classification (Drăguţ and Blaschke 2006; Macmillan and Shary 2009; Ryherd and Woodcock 1996; Verhagen and Drăguţ 2012). For the present dataset, a scale parameter of 35, a shape value of 0.5, and a compactness value of 0.5 yielded segments that represent adequately homogeneous areas in terms of slope, shape, compactness, and the local variance of such variables.

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