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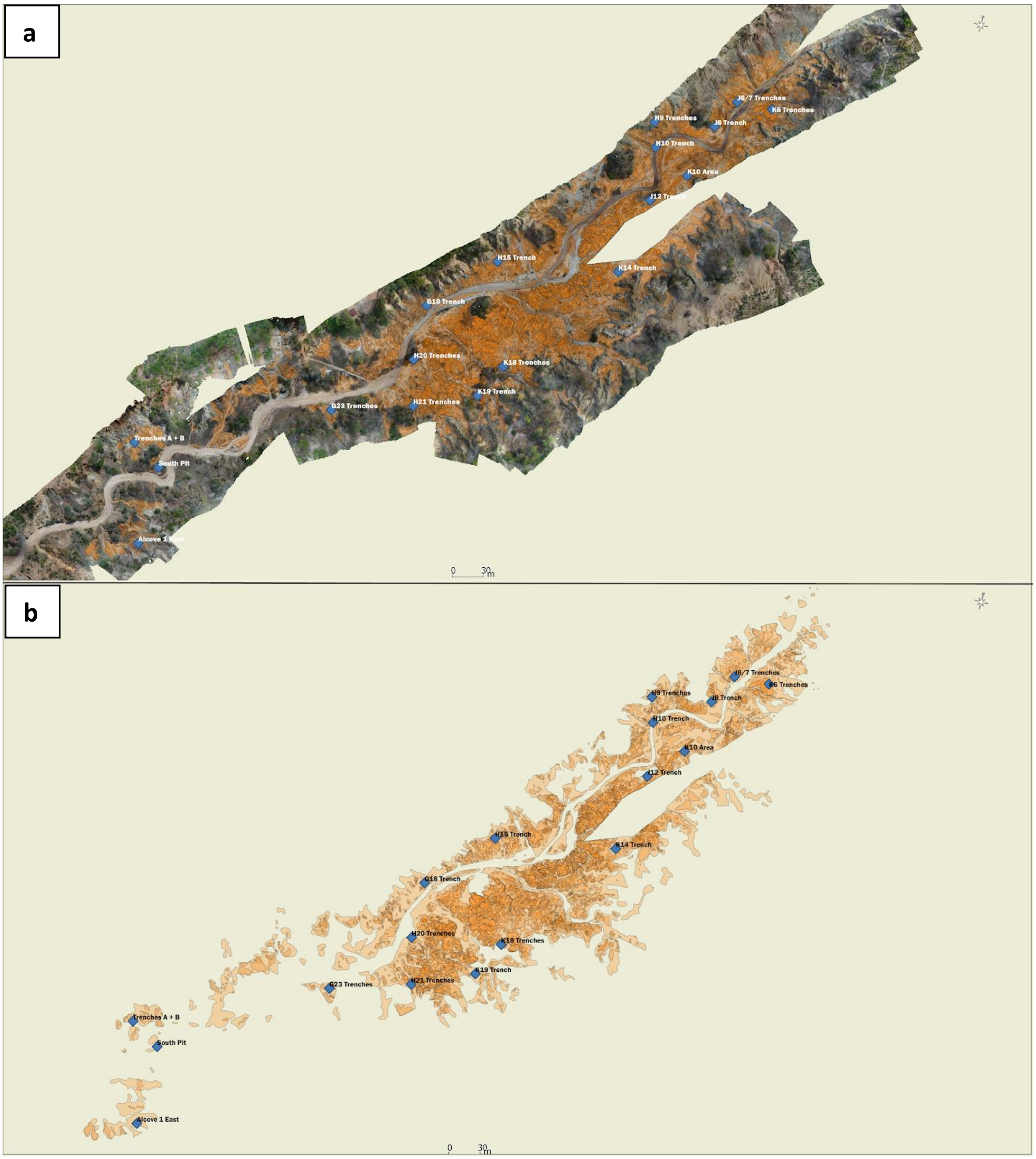

Figure 1: (a) Distribution/density overlay projected on orthomosaic. (b) Distribution/density overlay without orthomosaic. In both (a) and (b), approximate locations of previous excavations are represented by blue diamonds. The methods are described below.

Qualitative assessment of stone tool density/distribution

The orthomosaic was used to construct a qualitative assessment of the distribution of artefacts and raw material on the surface. Mixed accumulations of raw material and artefacts are visible in clusters of various sizes; these clusters were encircled and shaded in semi-transparent orange overlays covering the total extent of each cluster using QGIS (version 3.4). A layering system was used to reflect the density of accumulations across the korongo, resulting in a nested appearance of the accumulations on the map with six layers to account for variable densities. Density was estimated based on the distance between artefacts and raw material on the surface. The first shaded layer was applied to areas in which artefacts and raw material were approximately a metre apart. Each subsequent layer was applied to reflect increasingly dense clusters, with the sixth layer (with the most saturated colour) reflecting the densest accumulations.

Table 1: Agisoft Photoscan processing parameters for Isimila map

General	
Aligned cameras	4493 of 4719
Camera pixel size	0.0025
Coordinate system	WGS* 84 (EPSG**::4326)
Rotation angles	yaw, pitch, roll
UAV camera specifications	
Sensor size (mm)	13.2 x 8 mm
Focal length (mm)	8.8 mm/24 mm (35 mm equivalent)
Field of view	84º
Image Size (pixels)	4096 x 2160
Effective pixels	20 Megapixels
Image data capture parameters	
Flight altitude	40 m
Average flight velocity	4 m/s
Ground sample distance	1.6 cm / pixel
Image footprint	60 x 31 m
Total surface	1.533 km^2
Alignment parameters	
Alignment accuracy	High
Pair pre-selection	Generic, reference
Key point limit	40 000
Tie point limit	0 (no limit)
Matching time	1 day, 6 h
Alignment time	6 h, 55 min

Table 1 continues on p.3

Sparse point cloud	
Points	11,793,184 of 14,774,717
RMS reprojection error	0.210155 (0.095 pixels)
Max reprojection error	0.602782
Mean key point size	4.2633 pix
Effective overlap	4.91484
Dense point cloud	
Quality	High
Depth Filtering	Aggressive
Points	334,902,987
Dense cloud generation time	13 h, 31 min
Digital elevation model	
Size	60,102 x 58,866
Pixel size	3.33 cm/pixel
Source data	Dense cloud
Interpolation	Enabled
Orthomosaic	
Size	100,505 x 95,235
Pixel Size	1.31 cm/pixel
Channels	3, uint8
Coordinate system	WGS 84 (ESPG::4326)
Blending mode	Mosaic
Enable colour correction	no
Enable hole filling	no
Software	
Version	1.4.1
Platform	Windows 10 x64

**World Geodetic System 1984*

***European Petroleum Parameter System*

Agisoft Photoscan 1.4.1 workflow for creation of Isimila map

1. **UAV photo location data:** Flight data from the uncrewed/unmanned aerial vehicle (UAV), including GPS coordinates, altitude, yaw, pitch, and roll, were manually embedded into the photos extracted from the survey videos.

2. **Import and calibration:** All photos were imported into Photoscan version 1.4.1. Camera calibration information was set based on the specifications of the UAV camera: frame camera type, focal length of 8.8 mm and camera pixel size of 0.00252687 mm. A GPS z-offset of 40 m was input to correct for the differential between the UAV altitude and the real-world elevation.

3. **Coordinate system:** Coordinate system was set at geographic, WGS-84 (EPSG::4326) to mirror the UAV coordinate system.

4. **Sparse point cloud creation:** Photos were aligned and a sparse point cloud was generated using high-accuracy settings. Because the photos had been previously embedded with GPS coordinates, both generic and referenced pair pre-selection settings were chosen. The key point limit was set to 40 000 points, and the tie point limit was set to 0. Adaptive camera modelling was selected.

5. **Sparse point cloud refinement:** Floating outlier points were manually selected and removed using the free-form selection tool. The gradual selection tool was used to screen for tie points that were outside of the desired RMS reprojection error limit of 0.6. The points above the 0.6 threshold were selected and then deleted, which equated to roughly 10% of the original point cloud. Areas of the point cloud outside of the reconstruction area were deleted using manual free-form selection.

6. **Camera optimisation:** The ‘optimise cameras’ procedure was run following removal of these points, with all calibration parameters selected (f, cx,cy,k1-k4, b1-b2, p1-p4).

6. **Dense point cloud creation:** The dense point cloud was created with high-quality and aggressive depth filtering settings.

7. **Dense point cloud refinement:** Refinement of the dense point cloud was performed using the free-form selection tool, removing poorly reconstructed vegetation areas on the periphery, areas outside the reconstruction, and any remaining outlier clusters.

8. **Dense point cloud classification:** The dense point cloud was classified into ground, building and vegetation points. Ground points were auto-classified using the default parameters (max angle 15°, max distance 1.0 m, cell size 50 m). Vegetation points were classified manually using the free-form selection tool and the select by colour tool.

9. **Digital elevation model (DEM) creation:** The DEM was created using the dense point cloud for greater accuracy than when using a mesh reconstruction. Points classified as vegetation were not used in creation of the surface. Interpolation was enabled.

10. **Orthomosaic creation:** The orthomosaic was created as a geographic projection, with the DEM set as the projection surface, using the default mosaic blending mode.

11. **Final refinement:** Using the assign images tool, the orthomosaic was aesthetically refined. Edges were smoothed, intrusions (such as persons accidentally walking into the flight path) were removed, and any remaining areas not needed in the final map were removed.