

## Journal of Archaeological Science: Reports

### Fire use and waste management in an Iberian Iron Age village: Geoarchaeological insights into midden formation processes

Laura Tomé\* <sup>1,2</sup>, Eneko Iriarte <sup>3</sup>, Antonio Blanco-González <sup>4</sup>, Enrique Fernández-Palacios <sup>1,2</sup>, María Martín-Seijo<sup>5</sup>, Ángel Carrancho<sup>6</sup>,  
Antonio V. Herrera-Herrera <sup>1,7</sup>, Carolina Mallol <sup>1,2,8</sup>

**\*LT is the corresponding author: [lhernant@ull.edu.es](mailto:lhernant@ull.edu.es)**

<sup>1</sup>Archaeological Micromorphology and Biomarkers Laboratory (AMBI Lab), Instituto Universitario de Bio-Organica “Antonio González”, Universidad de La Laguna, 38206, Tenerife, Spain

<sup>2</sup>Área de Prehistoria, Departamento de Geografía e Historia, Facultad de Humanidades, Universidad de La Laguna, 38206, Tenerife, Spain

<sup>3</sup>Laboratorio IsoTOPIK-Laboratorio de Evolución Humana, Departamento de Historia, Geografía y Comunicación, Facultad de Humanidades y Comunicación, Universidad de Burgos, 09001, Burgos, Spain

<sup>4</sup>Research Group PREHUSAL, Departamento de Prehistoria, Historia Antigua y Arqueología, Facultad de Geografía e Historia, Universidad de Salamanca, 37002, Salamanca, Spain

<sup>5</sup>Instituto de Ciencias del Patrimonio (INCIPIT), Consejo Superior de Investigaciones Científicas (CSIC), Edificio Fontan, Bloque 4, Monte Gaias, s/n. 15707 Santiago de Compostela, Spain

<sup>6</sup>Área de Prehistoria, Departamento de Historia, Geografía y Comunicación, Universidad de Burgos, 09001, Burgos, Spain

<sup>7</sup>Departamento de Química, Unidad Departamental de Química Analítica, Facultad de Ciencias, Universidad de La Laguna, 38206, Tenerife, Spain

<sup>8</sup>Interdisciplinary Center for Archaeology and the Evolution of Human Behaviour (ICArEHB), Universidade do Algarve, Campus de Gambelas, Edifício 1, 8005-139, Faro, Portugal

## SUPPLEMENTARY MATERIAL

### S1) Description of Gas Chromatography - Mass Spectrometry (GC-MS) equipment conditions

A (5%phenyl)-methylpolysiloxane bonded fused silica capillary column (HP-5ms; 30m×0.25mm, 0.25-μm filmthickness, AgilentTechnologies) was employed for analyte separation. The helium flow was set at 1.0 mL/min.

- **For fraction 1 (*n*-alkanes)**, the column temperature was initially set at 70 °C for 2 minutes, followed by a gradual increase to 140 °C at a rate of 12 °C per minute. Subsequently, the temperature was further raised to 320 °C at a rate of 6 °C per minute and held at this temperature for 16 minutes. The entire run duration was 53.83 minutes. The multimode injector (MMI) was maintained at 70 °C for 0.85 minutes and then rapidly increased to 300 °C at a rate of 720 °C per minute. A 1 μL standard sample was injected in split mode with a 5:1 split ratio. The mass spectrometer (MS) operated in full scan mode, covering a mass range from  $m/z$  40 to 580. For the mass spectrometer, the transfer line, ion source, and quadrupole were set at temperatures of 280 °C, 230 °C, and 150 °C, respectively. Electron ionization was employed with an energy of -70 eV.
- **For fractions 2, 3, 4, 5 and 6 (aromatics, ketones, alcohols, fatty acids and other compounds)**, The GC oven was programmed with an initial temperature of 70 °C, which was held for 2 minutes. Subsequently, the temperature was ramped up to 140 °C at a rate of 12 °C per minute and further increased to 320 °C at a rate of 3 °C per minute, where it was maintained for 15 minutes. The multimode injector (MMI) was operated in a 5:1 split ratio, starting at 70 °C for 0.85 minutes and then rapidly heated to 300 °C at a rate of 720 °C per minute. For the mass spectrometer (MS), the transfer line, ion source, and quadrupole were set to temperatures of 280 °C, 230 °C, and 150 °C, respectively. Electron ionization was utilized with an energy level of -70 eV, and the analyzer operated in full scan mode, covering the mass range from  $m/z$  40 to 580.

## SUPPLEMENTARY MATERIAL

### S2) OEP and ACL calculation formulas

- **OEP (27–33)** =  $(n\text{-C}_{27} + n\text{-C}_{29} + n\text{-C}_{31} + n\text{-C}_{33}) / (n\text{-C}_{26} + n\text{-C}_{28} + n\text{-C}_{30} + n\text{-C}_{32})$
- **ACL (25–33)** =  $(C_i * [C_i]) / \sum [C_i]$ ;  $C_i$  is the concentration of each  $n$ -alkane with  $i$  carbon atoms,  $25 < i < 33$

## SUPPLEMENTARY MATERIAL

**S3)** Description of the microfacies units (MFU) that were identified through micromorphological analyses (c/f<sub>63μm</sub>). Their correlation with microfacies types (MFT) and Biomarker Samples (see Figure 5) is also indicated.

| Midden 1         |     |                  |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           |
|------------------|-----|------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Microfacies Unit | MFT | Biomarker Sample | Description                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               |
| 1                | 6   | 10, 9            | <p>Massive/complex<br/> Brown silty-clayey micromass, grano-striated and undifferentiated<br/> Single spaced porphyric, compact<br/> <b>Porosity:</b> vughs (5-10%), planes (5-10%), channels (5%), moldic voids (5%)<br/> Horizontal bedding at the bottom of the MFU<br/> Diffuse upper contact<br/> <b>Components:</b></p> <ul style="list-style-type: none"> <li>- Very abundant silt-sized unidentified charred plant matter</li> <li>- Abundant charcoal, sand-sized. Subrounded. Some are partially charred, with traces of orange (decayed) organic matter</li> <li>- Calcitic-crystallitic wood ash, reworked (subrounded and rounded aggregates)</li> <li>- Few degraded and dismembered earth-based construction materials, likely MFT 5 or MFT 2 (mudbrick/earthen floor), with moldic voids and clay coatings around coarse fraction components, mainly quartz grains. Identified at the bottom of the MFU</li> <li>- Orthic clay nodule. Gradual boundaries, typic</li> </ul> <p><b>Lithology:</b> very abundant subrounded and subangular quartz (ranging from silt-sized to coarse sand-sized), abundant subangular slate (sand-sized), very abundant mica-group minerals (silt-sized and sand-sized)</p> |

## SUPPLEMENTARY MATERIAL

|   |    |      |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          |
|---|----|------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| 2 | 6  | 9, 8 | <p>Complex: massive, intergrain microaggregate, fibrous<br/>           Calcitic-crystallitic<br/>           Double spaced porphyric, compact<br/> <b>Porosity:</b> vughs (10-15%), complex packing voids (10-15%), chambers (5%), small horizontal and vertical planes (5%)<br/>           Diffuse upper contact<br/> <b>Components:</b></p> <ul style="list-style-type: none"> <li>- Very abundant calcitic-crystallitic wood ash, mostly reworked (subrounded ash aggregates)</li> <li>- Very abundant silt-sized unidentified charred plant matter</li> <li>- Abundant charcoal. Sand-sized and fine gravel-sized, subrounded</li> </ul> <p><b>Lithology:</b> very abundant subrounded and subangular quartz (ranging from silt-sized to coarse sand-sized), abundant subangular slate (sand-sized), very abundant mica-group minerals (silt-sized and sand-sized)</p>                                                                                                                                                                                                |
| 3 | 10 | 8,7  | <p>Complex: massive, laminar<br/>           Calcitic-crystallitic, dusty<br/>           Double spaced porphyric, compact<br/>           Subhorizontal parallel bedding<br/>           Ferruginous, laminar and thin infillings<br/> <b>Porosity:</b> vughs (10-15%), chambers (10-15%), planes (vertical, horizontal) (5-10%), channel (&gt;5%)<br/>           Sharp upper contact<br/> <b>Components:</b></p> <ul style="list-style-type: none"> <li>- Very abundant calcitic-crystallitic ash</li> <li>- Abundant orange organic matter laminations</li> <li>- Very abundant silt-sized unidentified charred plant matter</li> <li>- Very abundant charcoal, subrounded. There are some fine, laminar accumulations of charcoal. Other fragments are bigger (coarse sand to fine gravel), and fractured</li> <li>- Earth-based construction material fragment (likely MFT2 or MFT5; earthen floor or mudbrick) embedded at the top of the MFU. Well-preserved, with moldic voids, vughs, and vesicles. Poorly developed clay coatings around quartz grains.</li> </ul> |

## SUPPLEMENTARY MATERIAL

|   |    |   |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      |
|---|----|---|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
|   |    |   | <ul style="list-style-type: none"> <li>- Anorthic clay nodules. Sharp boundary. Typic, inequigranular. Brown silty-clayey groundmass.</li> </ul> <p><b>Lithology:</b> very abundant subrounded and subangular quartz (ranging from silt-sized to coarse sand-sized), subangular slate (sand-sized), mica-group minerals (silt-sized and sand-sized)</p>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              |
| 4 | 11 | 7 | <p>Complex: Spongy with platy domains<br/>           Calcitic-crystallitic<br/>           Single spaced porphyric, compact<br/>           Abundant ferruginous infillings and coatings in voids<br/>           Subhorizontal/parallel bedding<br/> <b>Porosity:</b> vughs (10-15%), complex packing voids (5-10%) chambers (5-10%), horizontal and vertical planes (5-10%)<br/>           Diffuse upper contact<br/> <b>Components:</b></p> <ul style="list-style-type: none"> <li>- Very abundant calcitic-crystallitic ash. Well preserved. Massive, subhorizontally bedded</li> <li>- Very abundant silt-sized unidentified charred plant matter</li> <li>- Very abundant charcoal, of variable sizes (ranging from fine sand to coarse sand). Subrounded. Some fissured; others intact. Appears fractured and bedded. Some are partially charred, with visible orange decayed organic matter around them</li> <li>- Abundant anorthic clay nodules. Sharp boundary. Typic. Inequigranular. Brown silty-clayey groundmass. Likely fragments of earth-based construction materials (mudbrick, clay floors MFT 2a/2b)</li> <li>- Calcined tooth</li> </ul> <p><b>Lithology:</b> subrounded and subangular quartz (ranging from silt-sized to medium sand-sized), subangular slate (sand-sized), mica-group minerals (silt-sized and sand-sized)</p> |
| 5 | 10 | 7 | <p>Massive<br/>           Calcitic-crystallitic, dusty<br/>           Double spaced porphyric, compact<br/> <b>Porosity:</b> vughs (10-15%), complex packing voids (5-10%), chambers (5-10%), channels (5%)</p>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      |

## SUPPLEMENTARY MATERIAL

|   |    |    |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          |
|---|----|----|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
|   |    |    | <p>Diffuse upper contact</p> <p><b>Components:</b></p> <ul style="list-style-type: none"> <li>- Very abundant calcitic-crystallitic ash</li> <li>- Very abundant silt-sized unidentified charred plant matter</li> <li>- Very abundant charcoal, of variable sizes (ranging from fine sand to coarse sand). Subrounded. Some fissured.</li> </ul> <p><b>Lithology:</b> very abundant subrounded and subangular quartz (ranging from silt-sized to medium sand-sized), subangular slate (sand-sized), mica-group minerals (silt-sized and sand-sized)</p>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 |
| 6 | 11 | 6g | <p>Complex: Spongy with platy domains</p> <p>Calcitic-crystallitic</p> <p>Double spaced porphyric, compact</p> <p><b>Porosity:</b> vughs (10-15%), chambers (5-10%), complex packing voids (5-10%), planes (5%)</p> <p>Few ferruginous infillings and coatings in voids</p> <p>Diffuse upper contact</p> <p><b>Components:</b></p> <ul style="list-style-type: none"> <li>- Very abundant calcitic-crystallitic ash. Well preserved, massive</li> <li>- Very abundant silt-sized unidentified charred plant matter</li> <li>- Very abundant charcoal, of variable sizes (ranging from fine sand to coarse sand). Subrounded and rounded, some fissured</li> <li>- Anorthic clay nodules, typic and inequigranular, with sharp boundaries. Brown silty-clayey groundmass. Likely fragments of earth-based construction materials (mudbrick, clay floors MFT 5 or MFT 2)</li> </ul> <p><b>Lithology:</b> very abundant subrounded and subangular quartz (ranging from silt-sized to medium sand-sized), subangular slate (sand-sized), mica-group minerals (silt-sized and sand-sized)</p> |
| 7 | 10 | 6f | <p>Massive/platy microstructure</p> <p>Calcitic-crystallitic</p> <p>Single spaced porphyric, compact</p> <p>Random c/f related distribution</p>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          |

## SUPPLEMENTARY MATERIAL

|   |    |    |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    |
|---|----|----|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
|   |    |    | <p>At the top, microlaminations: intercalations of massive ash and brown/reddish undifferentiated silty-clayey laminations</p> <p><b>Porosity:</b> vughs and vesicles (10-15%), planes (10-15%), chambers (5-10%), channels (5-10%)</p> <p>Diffuse upper contact</p> <p><b>Components:</b></p> <ul style="list-style-type: none"> <li>- Very abundant calcitic-crystallitic ash, massive</li> <li>- Very abundant silt-sized unidentified charred plant matter</li> <li>- Very abundant charcoal, of variable sizes (ranging from fine sand to coarse sand). Subrounded and rounded. Some fissured</li> <li>- Anorthic clay nodules, typic and inequigranular, with sharp boundaries. Brown silty-clayey groundmass. Likely fragments of earth-based construction materials (mudbrick, clay floors MFT 5 or MFT 2)</li> <li>- Calcined, fissured bone</li> </ul> <p><b>Lithology:</b> abundant subrounded and subangular quartz (ranging from silt-sized to medium sand-sized), subangular slate (sand-sized), mica-group minerals (silt-sized and sand-sized)</p> |
| 8 | 10 | 6e | <p>Massive/fibrous</p> <p>Calcitic-crystallitic, dusty</p> <p>Single spaced porphyric, compact</p> <p><b>Porosity:</b> vughs and vesicles (10-15%), planes (10-15%), chambers (5-10%), channel (5-10%)</p> <p>Calcium carbonate hypocoatings on some of the voids, weakly developed</p> <p>Diffuse upper contact</p> <p><b>Components:</b></p> <ul style="list-style-type: none"> <li>- Very abundant calcitic-crystallitic ash, massive</li> <li>- Very abundant silt-sized unidentified charred plant matter</li> <li>- Very abundant charcoal, of variable sizes (ranging from fine sand to coarse sand). Subrounded, angular and rounded. Some fissured. Intact, elongated, and thin silt and sand-sized charcoal fragments, likely chaff</li> <li>- Burnt orange/brown bone. Angular and intact.</li> <li>- Amorphous orange organic matter fine laminations.</li> </ul>                                                                                                                                                                                      |

## SUPPLEMENTARY MATERIAL

|   |    |       |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   |
|---|----|-------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
|   |    |       | <ul style="list-style-type: none"> <li>- Few, fine sand-sized anorthic nodules, typic and inequigranular, with sharp boundaries. Brown silty-clayey groundmass. Likely fragments of earth-based construction materials (mudbrick, clay floors MFT 5 or MFT 2)</li> </ul> <p><b>Lithology:</b> abundant subrounded and subangular quartz (ranging from silt-sized to medium/coarse sand-sized), subangular slate (sand-sized), mica-group minerals (silt-sized and sand-sized)</p>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 |
| 9 | 11 | 6d/6c | <p>Complex: Spongy with platy domains<br/>           Calcitic-crystallitic<br/>           Single spaced porphyric, compact<br/>           Diffuse bedding</p> <p><b>Porosity:</b> vughs (10-15%), planes (10-15%), channels (5-10%), chambers (5-10%), pseudomorphic voids (5-10%)<br/>           Ferruginous laminar infillings<br/>           Diffuse upper contact</p> <p><b>Components:</b></p> <ul style="list-style-type: none"> <li>- Very abundant calcitic-crystallitic ash, massive</li> <li>- Very abundant silt-sized unidentified charred plant matter</li> <li>- Very abundant charcoal, of variable sizes (ranging from fine sand to coarse sand). Subrounded, angular and rounded. Some fissured Overall, very good preserved</li> <li>- Anorthic nodules, typic and inequigranular, with sharp boundaries. Brown silty-clayey groundmass. Likely fragments of earth-based construction materials (mudbrick, clay floors MFT 5 or MFT 2)</li> <li>- <i>In situ?</i> Bedded charred plant material accumulation, with pseudomorphic voids and elongated fine charcoal fragments</li> <li>- Angular quartz fragment with developed clay coating</li> </ul> <p><b>Lithology:</b> abundant subrounded and subangular quartz (ranging from silt-sized to medium/coarse sand-sized), subangular slate (sand-sized), mica-group minerals (silt-sized and sand-sized)</p> |

## SUPPLEMENTARY MATERIAL

|           |    |       |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          |
|-----------|----|-------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>10</b> | 10 | 6c/6b | <p>Complex: massive, platy<br/>         Calcitic-crystallitic, dusty<br/>         Single spaced porphyric, compact<br/>         Subhorizontal bedding<br/> <b>Porosity:</b> vughs (10-15%), planes (10-15%), chambers (5-10%), pseudomorphic voids (5-10%)<br/>         Diffuse upper contact<br/> <b>Components:</b></p> <ul style="list-style-type: none"> <li>- Very abundant calcitic-crystallitic ash, massive</li> <li>- Very abundant silt-sized unidentified charred plant matter</li> <li>- Very abundant charcoal, of variable sizes (ranging from fine sand to coarse sand). Subrounded, angular and rounded. Some fissured</li> <li>- Anorthic nodules, typic and inequigranular, with sharp boundaries. Brown silty-clayey groundmass. Likely fragments of earth-based construction materials (mudbrick, clay floors MFT 5 or MFT 2)</li> <li>- Few orange/brown burnt bone, coarse sand-sized, angular</li> </ul> <p><b>Lithology:</b> abundant subrounded and subangular quartz (ranging from silt-sized to medium/coarse sand-sized), subangular slate (sand-sized), mica-group minerals (silt-sized and sand-sized)</p> |
| <b>11</b> | 10 | 6b/6a | <p>Complex: massive, platy<br/>         Calcitic-crystallitic/brown silty-clayey micromass, dusty<br/>         Single spaced porphyric, compact<br/> <b>Porosity:</b> vughs (10-15%), planes (10-15%), pseudomorphic voids (10-15%), chambers (5%)<br/>         Granotubules<br/>         Diffuse upper contact<br/> <b>Components:</b></p> <ul style="list-style-type: none"> <li>- Very abundant calcitic-crystallitic ash, massive</li> <li>- Very abundant silt-sized unidentified charred plant matter</li> <li>- Very abundant charcoal, rounded and subrounded, sand-sized. There are fine sand-sized charred, elongated charcoal fragments, likely chaff</li> </ul>                                                                                                                                                                                                                                                                                                                                                                                                                                                              |

## SUPPLEMENTARY MATERIAL

|    |    |      |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               |
|----|----|------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
|    |    |      | <ul style="list-style-type: none"> <li>- Abundant anorthic nodules, typic and inequigranular, with sharp boundaries. Brown silty-clayey groundmass. Likely fragments of earth-based construction materials (mudbrick, clay floors MFT 5 or MFT 2)</li> <li>- Few yellow/orange bone fragments, fine sand-sized, subangular</li> </ul> <p><b>Lithology:</b> abundant subrounded and subangular quartz (ranging from silt-sized to medium/coarse sand-sized), subangular slate (sand-sized), mica-group minerals (silt-sized and sand-sized)</p>                                                                                                                                                                                                                                                                                                                                                                                                |
| 12 | 10 | 6a/5 | <p>Complex: massive, platy<br/>           Calcitic-crystallitic, dusty<br/>           Single spaced porphyric, compact<br/> <b>Porosity:</b> vughs (10-15%), planes (10-15%), chambers (5-10%)<br/>           Diffuse upper contact<br/> <b>Components:</b></p> <ul style="list-style-type: none"> <li>- Very abundant calcitic-crystallitic ash, massive</li> <li>- Very abundant silt-sized unidentified charred plant matter</li> <li>- Very abundant charcoal, rounded and subrounded, sand-sized</li> <li>- Abundant anorthic nodules, typic and inequigranular, with sharp boundaries. Brown silty-clayey groundmass. Likely fragments of earth-based construction materials (mudbrick, clay floors MFT 5 or MFT 2)</li> </ul> <p><b>Lithology:</b> abundant subrounded and subangular quartz (ranging from silt-sized to medium/coarse sand-sized), subangular slate (sand-sized), mica-group minerals (silt-sized and sand-sized)</p> |
| 13 | 10 | 5    | <p>Massive<br/>           Calcitic-crystallitic/brown silty-clayey micromass, dusty<br/>           Single spaced porphyric, compact<br/> <b>Porosity:</b> vertical planes (10-15%), subhorizontal planes (5-10%), vughs (5-10%), chambers (5%), pseudomorphic voids (5%)<br/>           Subhorizontal bedding<br/>           Sharp upper contact<br/> <b>Components:</b></p> <ul style="list-style-type: none"> <li>- Very abundant calcitic-crystallitic ash, massive</li> </ul>                                                                                                                                                                                                                                                                                                                                                                                                                                                             |

## SUPPLEMENTARY MATERIAL

|    |    |   |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             |
|----|----|---|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
|    |    |   | <ul style="list-style-type: none"> <li>- Very abundant silt-sized unidentified charred plant matter</li> <li>- Very abundant charcoal rounded and subrounded, sand-sized. Some are elongated and laminar, bedded, resembling chaff</li> <li>- Abundant anorthic nodules, typic and inequigranular, with sharp boundaries. Brown silty-clayey groundmass. Likely fragments of earth-based construction materials (mudbrick, clay floors MFT 5 or MFT 2)</li> <li>- Disorthic, typic clay nodules, inequigranular. Medium and coarse sand-sized</li> <li>- Few orange bone fragments, fine and medium sand-sized, subangular</li> </ul> <p><b>Lithology:</b> abundant subrounded and subangular quartz (ranging from silt-sized to medium/coarse sand-sized), subangular slate (sand-sized), mica-group minerals (silt-sized and sand-sized)</p>                                                              |
| 14 | 11 | 5 | <p>Complex: spongy, massive<br/>           Calcitic-crystallitic<br/>           Single spaced porphyric, compact<br/> <b>Porosity:</b> vughs (10-15%), chambers (5%), vertical planes (5%)<br/>           Subhorizontal bedding<br/>           Weakly developed ferruginous infillings<br/>           Sharp upper contact<br/> <b>Components:</b></p> <ul style="list-style-type: none"> <li>- Very abundant calcitic wood ash. Masive, apparently intact</li> <li>- Abundant silt-sized unidentified charred plant matter</li> <li>- Abundant charcoal. Mostly rounded and subrounded, coarse sand-sized. Some are elongated and laminar, bedded, resembling chaff</li> <li>- Orange bone, subangular</li> </ul> <p><b>Lithology:</b> subrounded and subangular quartz (ranging from silt-sized to medium/coarse sand), subangular slate (sand-sized), mica-group minerals (silt-sized and sand-sized)</p> |

## SUPPLEMENTARY MATERIAL

|           |    |     |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 |
|-----------|----|-----|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>15</b> | 6  | 5/4 | <p>Massive<br/>Brown silty-clayey micromass, undifferentiated<br/>Double spaced porphyric, compact<br/><b>Porosity:</b> vughs (5-10%), chambers (5%), vertical planes (5%)<br/>Sharp upper contact<br/><b>Components:</b></p> <ul style="list-style-type: none"> <li>- Reworked calcitic ash</li> <li>- Abundant silt-sized unidentified charred plant matter</li> <li>- Charcoal mostly rounded and subrounded, sand-sized. Some are elongated and laminar</li> </ul> <p><b>Lithology:</b> very abundant subrounded and subangular quartz (ranging from silt-sized to medium/coarse sand), subangular slate (sand-sized), very abundant mica-group minerals (silt-sized and sand-sized)</p>                                                                                                                                                                                                                                                                                                                                    |
| <b>16</b> | 11 | 4   | <p>Complex: spongy, massive<br/>Calcitic-crystallitic<br/>Single spaced porphyric, compact<br/><b>Porosity:</b> vughs (5%), chambers (5%), vertical and horizontal planes (5%)<br/>Subhorizontal bedding<br/>Weakly developed ferruginous infillings<br/>Sharp upper contact<br/><b>Components:</b></p> <ul style="list-style-type: none"> <li>- Very abundant calcitic wood ash. Massive, apparently intact</li> <li>- Abundant silt-sized unidentified charred plant matter</li> <li>- Anorthic nodules, typical and inequigranular, with sharp boundaries. Brown silty-clayey groundmass. Likely fragments of earth-based construction materials (mudbrick, clay floors MFT 5 or MFT 2)</li> <li>- Few subrounded, fine/medium sand-sized charcoal. There is a coarse sand-sized charcoal embedded in the upper contact</li> </ul> <p><b>Lithology:</b> subrounded and subangular quartz (ranging from silt-sized to medium/coarse sand), subangular slate (sand-sized), mica-group minerals (silt-sized and sand-sized)</p> |

## SUPPLEMENTARY MATERIAL

|           |    |     |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              |
|-----------|----|-----|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>17</b> | 10 | 4/3 | <p>Complex: massive, platy, intergrain microaggregate<br/>           Calcitic crystallitic/brown silty-clayey micromass, undifferentiated<br/>           Single spaced and double spaced porphyric, compact<br/> <b>Porosity:</b> vertical and subhorizontal parallel planes (15-20%), vughs (5-10%), chambers (5%)<br/>           Subhorizontally bedded, with recurrent intercalations of compact and bedded sediments, and looser, integrain microaggregate patches<br/>           Granotubules<br/>           Diffuse upper contact<br/> <b>Components:</b></p> <ul style="list-style-type: none"> <li>- Abundant calcitic-crystallitic ash, massive</li> <li>- Very abundant silt-sized, unidentified charred plant matter</li> <li>- Abundant charcoal, rounded, subangular and subrounded, sand-sized. Mostly fissured</li> <li>- Anorthic nodules, typic and inequigranular, with sharp boundaries. Brown silty-clayey groundmass. Likely fragments of earth-based construction materials (mudbrick, clay floors MFT 5 or MFT 2)</li> </ul> <p><b>Lithology:</b> abundant subrounded and subangular quartz (ranging from silt-sized to medium/coarse sand-sized), subangular slate (sand-sized), mica-group minerals (silt-sized and sand-sized)</p> |
| <b>18</b> | 6  | 3   | <p>Complex: massive, platy, spongy<br/>           Brown silty-clayey micromass, undifferentiated<br/>           Double spaced porphyric, compact<br/> <b>Porosity:</b> vughs (10-15%), planes (5-10%), chambers (5-10%), pseudomorphic voids (5%)<br/>           Localized subhorizontal bedding<br/>           Granotubules<br/>           Diffuse upper contact<br/> <b>Components:</b></p> <ul style="list-style-type: none"> <li>- Abundant calcitic-crystallitic ash, reworked</li> <li>- Very abundant silt-sized unidentified charred plant matter</li> <li>- Abundant charcoal, subangular and subrounded, sand-sized. Some are elongated and laminar, resembling chaff</li> <li>- Orange bone fragments, subrounded, sand-sized. Some fissured.</li> </ul>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          |

## SUPPLEMENTARY MATERIAL

|    |   |     |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             |
|----|---|-----|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
|    |   |     | <b>Lithology:</b> very abundant subrounded and subangular quartz (ranging from silt-sized to medium/coarse sand-sized), subangular slate (sand-sized), very abundant mica-group minerals (silt-sized and sand-sized)                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        |
| 19 | 6 | 2/1 | <p>Massive<br/>Brown silty-clayey micromass, undifferentiated<br/>Double spaced porphyric, compact<br/><b>Porosity:</b> vughs (10-15%), chambers (5-10%), planes (5%), pseudomorphous voids (5%)<br/>Granotubules<br/>Diffuse upper contact<br/><b>Components:</b></p> <ul style="list-style-type: none"> <li>- Abundant reworked calcitic ash (subrounded aggregates). In some cases, it is present in thin, bedded patches</li> <li>- Very abundant silt-sized unidentified charred plant matter</li> <li>- Abundant charcoal, subangular and subrounded, sand-sized</li> <li>- Anorthic nodules, typic and inequigranular, with sharp boundaries. Brown silty-clayey groundmass. Likely fragments of earth-based construction materials (mudbrick, clay floors MFT 5 or MFT 2)</li> <li>- Disorthic, inequigranular and typic nodules, sand-sized</li> </ul> <p><b>Lithology:</b> very abundant subrounded and subangular quartz (ranging from silt-sized to medium/coarse sand-sized), subangular slate (sand-sized), very abundant mica-group minerals (silt-sized and sand-sized)</p> |
| 20 | 6 | 1   | <p>Complex: massive, platy<br/>Brown silty-clayey micromass, undifferentiated<br/>Double spaced porphyric, compact<br/><b>Porosity:</b> subhorizontal and vertical planes (10-15%), vughs (5-10%), chambers (5%)<br/>Granotubules<br/><b>Components:</b></p>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                |

## SUPPLEMENTARY MATERIAL

|  |  |  |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     |
|--|--|--|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
|  |  |  | <ul style="list-style-type: none"><li>- Abundant calcitic wood ash, reworked (subrounded aggregates)</li><li>- Very abundant silt-sized unidentified charred plant matter</li><li>- Abundant charcoal, subrounded and rounded, sand-sized. Some display a thin, elongated shape</li><li>- Anorthic nodules, typic and inequigranular, with sharp boundaries. Brown silty-clayey groundmass. Likely fragments of earth-based construction materials (mudbrick, clay floors MFT 5 or MFT 2)</li><li>- Subangular pottery fragment at the top</li></ul> <p><b>Lithology:</b> abundant subrounded and subangular quartz (from silt-sized to medium/coarse sand-sized), subangular slate (sand-sized), very abundant mica-group minerals (silt-sized and sand-sized)</p> |
|--|--|--|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|

## SUPPLEMENTARY MATERIAL

| Midden 2         |     |                  |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 |
|------------------|-----|------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Microfacies Unit | MFT | Biomarker Sample | Description                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     |
| 1                | 6   | 2b               | <p>Complex: Massive and intergrain microaggregate<br/> Brown silty-clayey micromass, grano-striated<br/> Single spaced porphyric, compact<br/> <b>Porosity:</b> compound packing voids (10-15%), channels (10-15%)<br/> Diffuse horizontal bedding<br/> Localized clay coatings around coarse fraction<br/> Diffuse upper contact</p> <p><b>Components:</b></p> <ul style="list-style-type: none"> <li>- Few reworked calcitic wood ash (subrounded and rounded aggregates)</li> <li>- Abundant silt-sized unidentified charred particles</li> <li>- Abundant sand-sized charcoal fragments, rounded and subrounded</li> <li>- Unburnt light-yellow bone fragments, subangular</li> <li>- Sand-sized disorthic, typic clay nodules</li> <li>- Degraded earth-based construction material in the bottom of the microfacies</li> <li>- Abundant organic, bedded orange tissues. Possibly bark tissue</li> </ul> <p><b>Lithology:</b> very abundant subangular quartz sand (fine-medium-coarse), subangular slate sand, subangular mica-group minerals (silt-sized and sand-sized), few quartzite (sand-sized)</p> |
| 2                | 7   | 2b               | <p>Intergrain microaggregate<br/> Brown silty-clayey micromass (very scarce), undifferentiated, mixed with calcitic-crystallitic micromass<br/> Enaulic, loose<br/> <b>Porosity:</b> complex packing voids (25-30%), channels (5%)<br/> Diffuse upper contact</p> <p><b>Components:</b></p> <ul style="list-style-type: none"> <li>- Reworked calcitic wood ash (subrounded and rounded aggregates)</li> </ul>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  |

## SUPPLEMENTARY MATERIAL

|   |   |    |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                |
|---|---|----|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
|   |   |    | <ul style="list-style-type: none"> <li>- Abundant silt-sized unidentified charred particles</li> <li>- Burnt and unburnt orange bone fragments, subangular, sand-sized</li> <li>- Orange, amorphous organic tissues on pores</li> <li>- Very abundant wood charcoal, subrounded and rounded, mainly coarse sand-sized</li> <li>- Semi-burnt wood fragments, coarse sand-sized, subrounded</li> </ul> <p><b>Lithology:</b> subangular quartz sand (medium and coarse, very abundant), subangular quartz fine gravel (abundant), subangular slate sand (few), subangular quartzite sand (few), angular mica-group minerals (abundant, fine sand and silt-sized), sandstone (few)</p>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             |
| 3 | 6 | 2b | <p>Massive<br/>Brown silty-clayey mixed with calcitic-crystallitic micromass, grano-striated<br/>Single spaced porphyric, compact<br/>Diffuse horizontal bedding</p> <p><b>Porosity:</b> complex packing voids (10-15%), small horizontal planes (10-15%), channels (5%), chambers (5%)<br/>Calcium carbonate hypocoatings around voids, moderately developed<br/>Diffuse upper contact</p> <p><b>Components:</b></p> <ul style="list-style-type: none"> <li>- Abundant reworked calcitic wood ash (subrounded and rounded aggregates)</li> <li>- Very abundant silt-sized unidentified charred particles</li> <li>- Abundant burnt and unburnt orange bone, subrounded, sand-sized</li> <li>- Very abundant subrounded charred wood fragments, sand-sized (some subangular)</li> <li>- Very abundant subrounded charcoal fragments</li> <li>- Orange organic tissue</li> <li>- Brown silty-clayey disorthic typic nodules, with elongated voids and small planes</li> </ul> <p><b>Lithology:</b> subangular quartz sand (fine-medium-coarse, very abundant), subangular coarse quartz-sand (abundant), subangular slate sand (few), angular mica-group minerals (very abundant, fine sand and silt-sized)</p> |

## SUPPLEMENTARY MATERIAL

|   |   |    |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             |
|---|---|----|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| 4 | 6 | 2b | <p>Massive<br/>Brown silty-clayey and calcitic-crystallitic micromass, grano-striated<br/>Double spaced porphyric, compact<br/><b>Porosity:</b> compound packing voids (15-20%), planes (5-10%)<br/>Softly developed clay coatings around coarse fraction<br/>Diffuse upper contact<br/><b>Components:</b></p> <ul style="list-style-type: none"> <li>- Very abundant charcoal fragments, rounded, sand-sized</li> <li>- Reworked calcitic wood ash (subrounded and rounded aggregates)</li> <li>- Very abundant silt-sized unidentified charred plant particles</li> <li>- Semi-burnt wood fragment, subangular</li> <li>- Burnt and unburnt orange bone fragments, subangular, sand-sized</li> <li>- Yellow anorthic, typic clay nodules</li> </ul> <p><b>Lithology:</b> subangular coarse quartz sand (very abundant), subangular medium-fine quartz sand (very abundant), subangular sand-sized slate (few), angular mica-group minerals (abundant, fine sand-sized and silt-sized)</p> |
| 5 | 7 | 2b | <p>Bridged grain/intergrain microaggregate microstructure<br/>Scarce micromass, calcitic-crystallitic/light brown silty-clayey<br/>Enaulic, loose<br/><b>Porosity:</b> complex packing voids (30-35%), planes (5-10%)<br/>Clay coatings around coarse fraction<br/>Diffuse upper contact<br/><b>Components:</b></p> <ul style="list-style-type: none"> <li>- Very abundant reworked calcitic wood ash (subrounded and rounded aggregates)</li> <li>- Very abundant silt-sized unidentified charred plant particles</li> <li>- Very abundant sand-sized, rounded charcoal fragments</li> <li>- Anorthic, fine sand-sized typic clay nodule</li> <li>- Semi-burnt wood subrounded fragment</li> </ul>                                                                                                                                                                                                                                                                                         |

## SUPPLEMENTARY MATERIAL

|   |   |    |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            |
|---|---|----|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
|   |   |    | <p><b>Lithology:</b> very abundant subangular sand-sized quartz sand (of all sizes, from fine to coarse sand), subangular sand-sized slate (few), angular mica-group minerals (very abundant, fine sand-sized and silt-sized)</p>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          |
| 6 | 6 | 2a | <p>Massive<br/>           Calcitic-crystallitic/brown silty-clayey micromass, grano-striated<br/>           Single spaced porphyric, compact<br/> <b>Porosity:</b> complex packing voids (10-15%), planes (5%), channels (5%)<br/>           Clay coatings around coarse fraction<br/>           Diffuse upper contact<br/> <b>Components:</b></p> <ul style="list-style-type: none"> <li>- Very abundant reworked calcitic wood ash (subrounded and rounded aggregates)</li> <li>- Very abundant silt-sized unidentified charred plant particles</li> <li>- Very abundant sand-sized, rounded and subangular charcoal fragments</li> <li>- White, subrounded, unburnt bone fragments</li> <li>- Angular, gravel-sized charred wood fragment</li> <li>- Burnt and unburnt sand-sized orange bone fragments</li> <li>- Anorthic and typic sand-sized clay nodules</li> <li>- Orange, amorphous organic matter</li> </ul> <p><b>Lithology:</b> subangular/angular coarse quartz sand (very abundant), subangular medium-fine quartz sand (very abundant), subangular sand-sized slate (few), angular mica-group minerals (very abundant, fine sand-sized and silt-sized)</p> |
| 7 | 7 | 2a | <p>Massive<br/>           Calcitic-crystallitic/brown silty-clayey micromass, grano-striated<br/>           Double spaced porphyric, compact<br/> <b>Porosity:</b> complex packing voids (15-20%), channels (5%, with calcium carbonate hypoc coatings)<br/>           Weakly developed clay coatings around coarse fraction<br/>           Diffuse bedding</p>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            |

## SUPPLEMENTARY MATERIAL

|   |   |    |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           |
|---|---|----|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
|   |   |    | <p>Diffuse upper contact</p> <p><b>Components:</b></p> <ul style="list-style-type: none"> <li>- Very abundant reworked calcitic wood ash (subrounded and rounded aggregates)</li> <li>- Very abundant silt-sized unidentified charred plant particles</li> <li>- Very abundant sand-sized, rounded and subangular charcoal fragments</li> <li>- Abundant coarse-sand to gravel-sized charcoal fragments</li> <li>- Semi-burnt charred wood fragments, subrounded</li> <li>- Disorthic, sand-sized typic clay nodules</li> <li>- Abundant rounded burnt and unburnt orange-brown bone fragments, sand-sized. Some are bigger (gravel-sized), but appear fragmented</li> <li>- White/light-yellow bone fragments, subangular and subrounded, unburnt. Sand-sized</li> <li>- Amorphous, orange organic tissue, associated with channels</li> <li>- Yellow anorthic and typic clay nodules, sand-sized</li> </ul> <p><b>Lithology:</b> very abundant subangular and angular sand-sized quartz sand (of all sizes, from fine to coarse sand), abundant subangular quartz fine gravel, subangular sand-sized slate (few), gravel-sized slate (few), subangular/angular quartzite (coarse sand), angular mica-group minerals (very abundant, fine sand-sized and silt-sized)</p> |
| 8 | 6 | 2a | <p>Massive</p> <p>Brown and calcitic-crystallitic silty-clayey micromass, grano-striated</p> <p>Single spaced porphyric, compact</p> <p><b>Porosity:</b> complex packing voids (10-15%), vertical planes (5%)</p> <p>Clay coatings around coarse fraction</p> <p>Diffuse bedding</p> <p><b>Components:</b></p> <ul style="list-style-type: none"> <li>- Abundant reworked calcitic wood ash (subrounded and rounded aggregates)</li> <li>- Very abundant silt-sized unidentified charred plant particles</li> <li>- Very abundant subrounded and subangular charcoal fragments (from fine sand to coarse sand-sized)</li> <li>- Disorthic typic clay nodules, fine sand-sized</li> <li>- Abundant burnt and unburnt sand-sized subrounded orange bone fragments</li> </ul>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                |

## SUPPLEMENTARY MATERIAL

|    |   |        |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   |
|----|---|--------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
|    |   |        | <ul style="list-style-type: none"> <li>- Amorphous, orange organic matter</li> </ul> <b>Lithology:</b> fine subangular quartz sand (fine-medium-coarse, very abundant), subangular/angular coarse quartz-sand (abundant), subangular slate sand (few), angular mica-group minerals (abundant, fine sand and silt-sized)                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           |
| 9  | 8 | 2a     | Complex/massive<br>Calcitic-crystallitic/brown silty-clayey micromass, grano-striated<br>Single spaced porphyric, compact<br><b>Porosity:</b> complex packing voids (10-15%), planes (5-10%), channels (5-10%), chambers (5-10%), vughs (10-15%)<br>Calcium carbonate hypocoatings on some of the voids, particularly around channels and some vughs<br>Granotubules<br>Sharp upper contact<br><b>Components:</b> <ul style="list-style-type: none"> <li>- Calcitic wood ash, reworked (subrounded aggregates). Compact ash patches at the bottom of the MFU</li> <li>- Very abundant unidentified silt-sized charred plant particles</li> <li>- Very abundant subrounded and subangular charcoal fragments, of variable sizes. From fine sand to coarse sand and fine gravel-sized</li> <li>- Earth-based construction material fragments. Likely MFT 1b, MFT 2 and/or MFT 5 floor/mudbrick fragments.</li> </ul> <b>Lithology:</b> very abundant subangular and angular sand-sized quartz (of all sizes, from fine to coarse sand), subangular abundant quartz fine gravel, subangular sand-sized slate (few), subangular gravel-sized slate (few), angular mica-group minerals (very abundant, fine sand-sized and silt-sized) |
| 10 | 9 | 1b, 1a | Massive<br>Reddish brown silty-clayey micromass, grano-striated. In some areas, light yellow clayey micromass<br>Single spaced porphyric, compact                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 |

## SUPPLEMENTARY MATERIAL

|  |  |  |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          |
|--|--|--|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
|  |  |  | <p>Random distribution</p> <p><b>Porosity:</b> horizontal and vertical planes (10-15%), vughs (10-15%), channels (5%), elongated voids (5%)</p> <p>Calcium carbonate hypocoatings on channels and some vughs</p> <p>Granotubules</p> <p><b>Components:</b></p> <ul style="list-style-type: none"> <li>- Abundant earth-based construction materials, fragmented: likely MFT 5, MFT 1b and MFT 2 floor/mudbrick fragments</li> <li>- Unidentified silt-sized charred plant particles</li> <li>- Abundant typic clay nodules, anorthic and disorthic</li> </ul> <p><b>Lithology:</b> very abundant subangular/angular sand-sized quartz (of all sizes, from fine to coarse sand), abundant subangular quartz fine gravel, subangular sand-sized slate (few), subangular gravel-sized slate (few), angular mica-group minerals (very abundant, fine sand-sized and silt-sized), subangular gravel-sized quartzite (few)</p> |
|--|--|--|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|

## SUPPLEMENTARY MATERIAL

### S4) Microfacies types (MFT) previously identified and characterized by Tomé et al. (2024) at Cerro de San Vicente

| Microfacies Type | Description                                                                                                                                                                                                                                                                                                  | Layer Type                 |
|------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------------------------|
| 1                | Deposit made of homogeneous, light-yellow silty-sandy clay and sand-sized quartz grains.                                                                                                                                                                                                                     | Construction layer         |
|                  | <b>1a:</b> Fine quartz sand with 10-15% light-yellow silty-sandy clay. Thin, horizontally layered deposits (around or less than 1 cm).                                                                                                                                                                       |                            |
|                  | <b>1b:</b> Coarse quartz sand and 30-35% light-yellow silty-sandy clay, with iron staining. Thick deposits (ranging between 2-3 cm) with random c/f related distribution.                                                                                                                                    |                            |
| 2                | Compact deposit composed of homogeneous, massive brown silty-sandy clayey groundmass (60-65%) with sand-sized quartz inclusions. Vughs are the most common porosity type. Moldic voids, horizontal layering and clay lining are also recurrent features.                                                     | Construction layer         |
|                  | <b>2a:</b> Dark brown, homogeneous silty-sandy clayey groundmass with sand-sized quartz and slate inclusions. Abundant vughs and moldic voids and clay coatings. Compact and massive. Thickness ranges between 2 and less than 1 cm.                                                                         |                            |
|                  | <b>2b:</b> Massive deposits of light brown silty-sandy clayey groundmass, with sand-sized quartz and slate inclusions. Abundant planes and other desiccation features. Vughy porosity. Thickness ranges between 5 and around 1 cm.                                                                           |                            |
| 3                | Compact and massive deposit, composed of heterogeneous silty-sandy clayey groundmass with orthic and disorthic clay nodules. Thick deposit, raging between 5 and 2 cm.                                                                                                                                       | Construction layer         |
|                  | <b>3a:</b> Heterogeneous silty-sandy clayey groundmass (15-20%), with abundant orthic and disorthic clay nodules. Compact, massive, and mostly well-preserved. Recurrent components are earth-based construction materials and mineral temper fragments.                                                     |                            |
|                  | <b>3b:</b> Thick, disturbed deposits composed of heterogeneous light brown silty-sandy clayey groundmass (40-50%) with abundant orthic and disorthic clay nodules. Channels, chambers, and planes are the most abundant porosity type, usually presented with strongly developed calcium carbonate coatings. | Decayed construction layer |
| 4                | Deposit composed of reworked calcitic ash patches and charcoal fragments and compact silty-sandy clays. Main components include charcoal, unidentified silt-sized charred plant material and calcitic ash.                                                                                                   | Activity layer             |
| 5                | Compact light yellow silty-sandy clayey groundmass (20-25%), with abundant sand-sized quartz and slate grains. Abundant vughs and moldic voids. Poorly developed clay coatings.                                                                                                                              | Mudbrick                   |

## SUPPLEMENTARY MATERIAL

**S5)** Quantitative record of distribution patterns for each phytolith observed in thin sections from Midden 2 and correspondence to their respective microfacies unit (MFU)

| Midden 2         |          |           |             |     |
|------------------|----------|-----------|-------------|-----|
| Microfacies Unit | Isolated | Clustered | Articulated | Sum |
| 1                | 12       | 63        | 11          | 86  |
| 2                | 15       | 4         | 0           | 19  |
| 3                | 51       | 78        | 65          | 194 |
| 4                | 16       | 0         | 16          | 32  |
| 5                | 6        | 0         | 0           | 6   |
| 6                | 33       | 5         | 0           | 38  |
| 7                | 33       | 5         | 25          | 63  |
| 8                | 7        | 3         | 0           | 10  |
| 9                | 12       | 4         | 0           | 16  |
| 10               | 10       | 0         | 0           | 10  |

## SUPPLEMENTARY MATERIAL

**S6)** Phytolith morphotype quantification in thin sections from Midden 2 and correspondence to their respective microfacies unit (MFU). RON: Rondel; BIL: Bilobate; POL: Polylobate; TRZ: Trapezoid; CRE: Crenate; ELO\_ENT: Elongate entire; ELO\_SIN: Elongate sinuate; ELO\_DET: Elongate dentate; ACU\_BUL: Acute bulbosus; BLO: Blocky; PAP: Papillate; ACI: Acicular; SPH\_PSI: Spheroid psilate; SPH\_ORN: Spheroid ornate; SPH\_ECH: Spheroid echinate; TAB: Tabular; OVA\_FAC: Ovate facetate; UNK: Unknown.

| Midden 2 |     |     |     |     |     |         |         |         |         |     |     |     |         |         |         |     |         |            |     |
|----------|-----|-----|-----|-----|-----|---------|---------|---------|---------|-----|-----|-----|---------|---------|---------|-----|---------|------------|-----|
| MFU      | RON | BIL | POL | TRZ | CRE | ELO_ENT | ELO_SIN | ELO_DET | ACU_BUL | BLO | PAP | ACI | SPH_PSI | SPH_ORN | SPH_ECH | TAB | OVA_FAC | hat-shaped | UNK |
| 1        | 8   | 1   | 0   | 5   | 2   | 24      | 12      | 25      | 7       | 0   | 2   | 0   | 0       | 0       | 0       | 0   | 0       | 0          | 0   |
| 2        | 2   | 0   | 0   | 0   | 0   | 10      | 1       | 2       | 0       | 2   | 0   | 0   | 1       | 1       | 0       | 0   | 0       | 0          | 0   |
| 3        | 41  | 4   | 0   | 6   | 0   | 78      | 26      | 18      | 5       | 3   | 2   | 1   | 1       | 0       | 1       | 4   | 3       | 0          | 1   |
| 4        | 3   | 0   | 0   | 0   | 1   | 10      | 5       | 8       | 3       | 0   | 0   | 1   | 0       | 1       | 0       | 0   | 0       | 0          | 0   |
| 5        | 0   | 0   | 0   | 0   | 1   | 1       | 0       | 2       | 0       | 0   | 0   | 0   | 0       | 0       | 0       | 1   | 0       | 0          | 1   |
| 6        | 13  | 1   | 0   | 0   | 1   | 6       | 7       | 1       | 2       | 0   | 1   | 1   | 1       | 1       | 0       | 2   | 0       | 1          | 0   |
| 7        | 15  | 0   | 1   | 2   | 0   | 6       | 2       | 29      | 2       | 0   | 0   | 0   | 0       | 0       | 0       | 2   | 1       | 1          | 2   |
| 8        | 4   | 1   | 0   | 1   | 0   | 1       | 0       | 3       | 0       | 0   | 0   | 0   | 0       | 0       | 0       | 0   | 0       | 0          | 0   |
| 9        | 8   | 1   | 0   | 4   | 0   | 6       | 4       | 0       | 2       | 0   | 0   | 0   | 0       | 1       | 0       | 0   | 0       | 0          | 0   |
| 10       | 0   | 0   | 0   | 0   | 0   | 3       | 3       | 0       | 1       | 0   | 0   | 0   | 0       | 1       | 0       | 1   | 0       | 0          | 0   |

## SUPPLEMENTARY MATERIAL

### S7.1) Charcoal taxa, longest side size, and their correspondence to microfacies units (MFU)

| Midden 1         |                              |        |
|------------------|------------------------------|--------|
| Microfacies Unit | Taxon                        | Size   |
| 2                | <i>Quercus</i> sp. evergreen | 4 mm   |
| 2                | <i>Quercus</i> sp. evergreen | 4 mm   |
| 3                | <i>Quercus</i> sp. evergreen | 2 mm   |
| 4                | <i>Quercus</i> sp. evergreen | 2.5 mm |
| 5                | <i>Quercus</i> sp. deciduous | 4 mm   |
| 6                | <i>Quercus</i> sp. evergreen | 2 mm   |
| 7                | <i>Quercus</i> sp. evergreen | 4.5 mm |
| 8                | <i>Quercus</i> sp. evergreen | 4 mm   |
| 8                | <i>Quercus</i> sp. evergreen | 5 mm   |
| 8                | <i>Quercus</i> sp. evergreen | 2 mm   |
| 8                | <i>Quercus</i> sp. deciduous | 1.5 mm |
| 9                | Dicot                        | 4 mm   |
| 11               | <i>Quercus</i> sp.           | 5 mm   |

## SUPPLEMENTARY MATERIAL

|           |                              |             |
|-----------|------------------------------|-------------|
| <b>16</b> | <i>Quercus</i> sp. evergreen | 8 mm        |
| <b>17</b> | <i>Quercus</i> sp.           | 1 mm        |
| <b>17</b> | <i>Quercus</i> sp. deciduous | 3 mm        |
| <b>19</b> | <i>Quercus</i> sp.           | 300 $\mu$ m |
| <b>20</b> | <i>Quercus</i> sp.           | 3 mm        |

# SUPPLEMENTARY MATERIAL

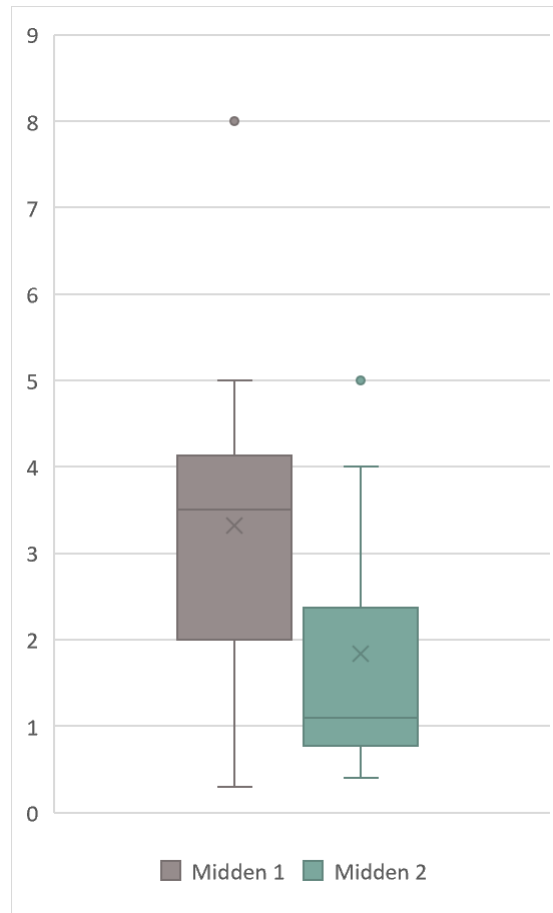
| Midden 2         |                              |        |
|------------------|------------------------------|--------|
| Microfacies Unit | Taxon                        | Size   |
| 2                | <i>Quercus</i> sp. evergreen | 5 mm   |
| 2                | <i>Quercus</i> sp. evergreen | 2 mm   |
| 3                | <i>Quercus</i> sp. evergreen | 800 µm |
| 3                | <i>Coniferae</i>             | 900 µm |
| 3                | <i>Quercus</i> sp. evergreen | 5 mm   |
| 3                | <i>Quercus</i> sp. evergreen | 2 mm   |
| 3                | <i>Coniferae</i>             | 400 µm |
| 3                | <i>Pinus</i> sp.             | 4 mm   |
| 3                | <i>Pinus</i> sp.             | 2 mm   |
| 4                | <i>Coniferae</i>             | 500 µm |
| 5                | <i>Coniferae</i>             | 1 mm   |
| 6                | <i>Quercus</i> sp. evergreen | 1.2 mm |
| 6                | <i>Quercus</i> sp. evergreen | 900 µm |
| 6                | <i>Quercus</i> sp.           | 900 µm |

# SUPPLEMENTARY MATERIAL

|   |                                  |        |
|---|----------------------------------|--------|
| 6 | <i>Quercus</i> sp. deciduous     | 2 mm   |
| 6 | <i>Quercus</i> sp. evergreen     | 3.5 mm |
| 7 | <i>Quercus</i> sp. evergreen     | 1.5 mm |
| 7 | <i>Coniferae</i>                 | 1 mm   |
| 7 | <i>Pinus</i> sp.                 | 700 µm |
| 9 | cf. <i>Quercus</i> sp. evergreen | 4 mm   |
| 9 | <i>Coniferae</i>                 | 500 µm |
| 9 | <i>Coniferae</i>                 | 500 µm |

## SUPPLEMENTARY MATERIAL

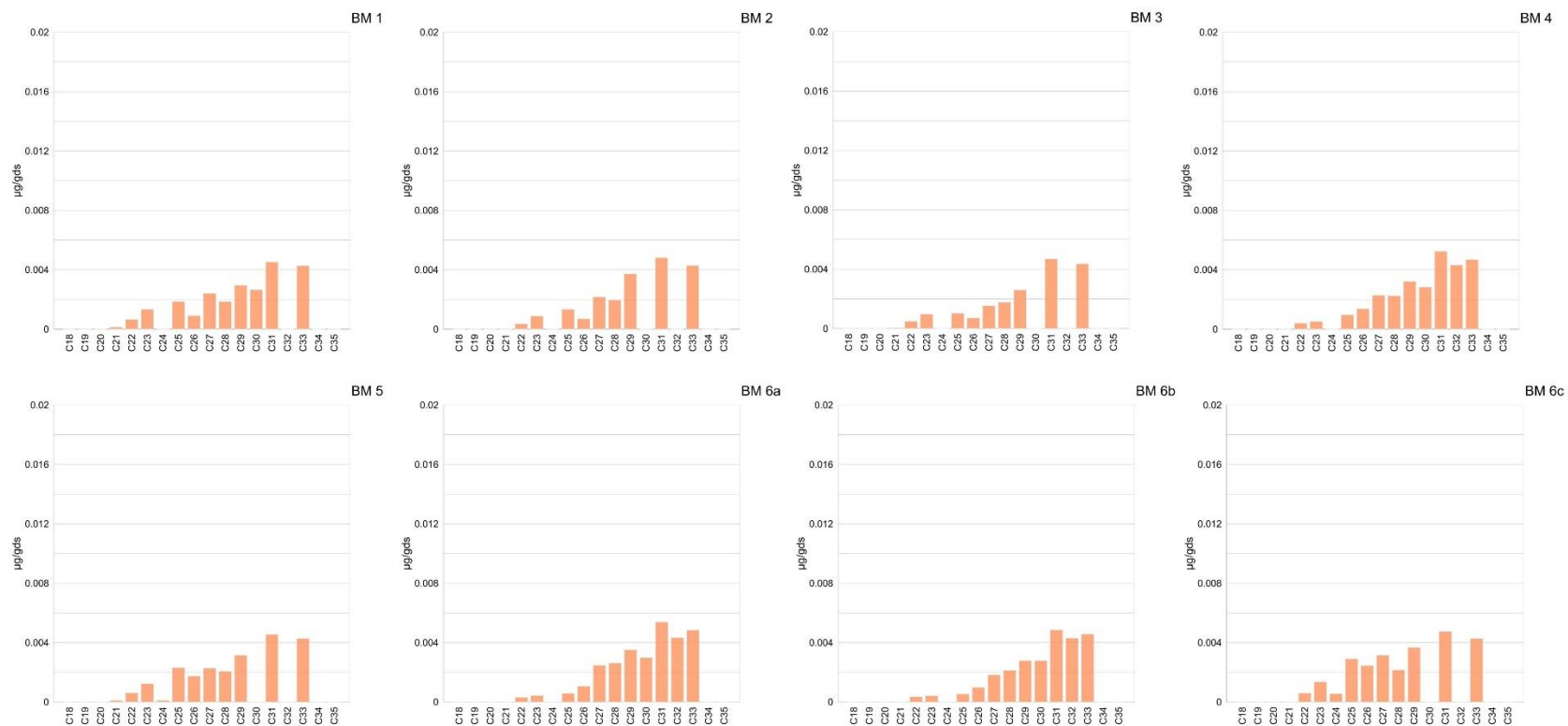
### S7.2) Boxplot graph of the size of taxonomically identified charcoals



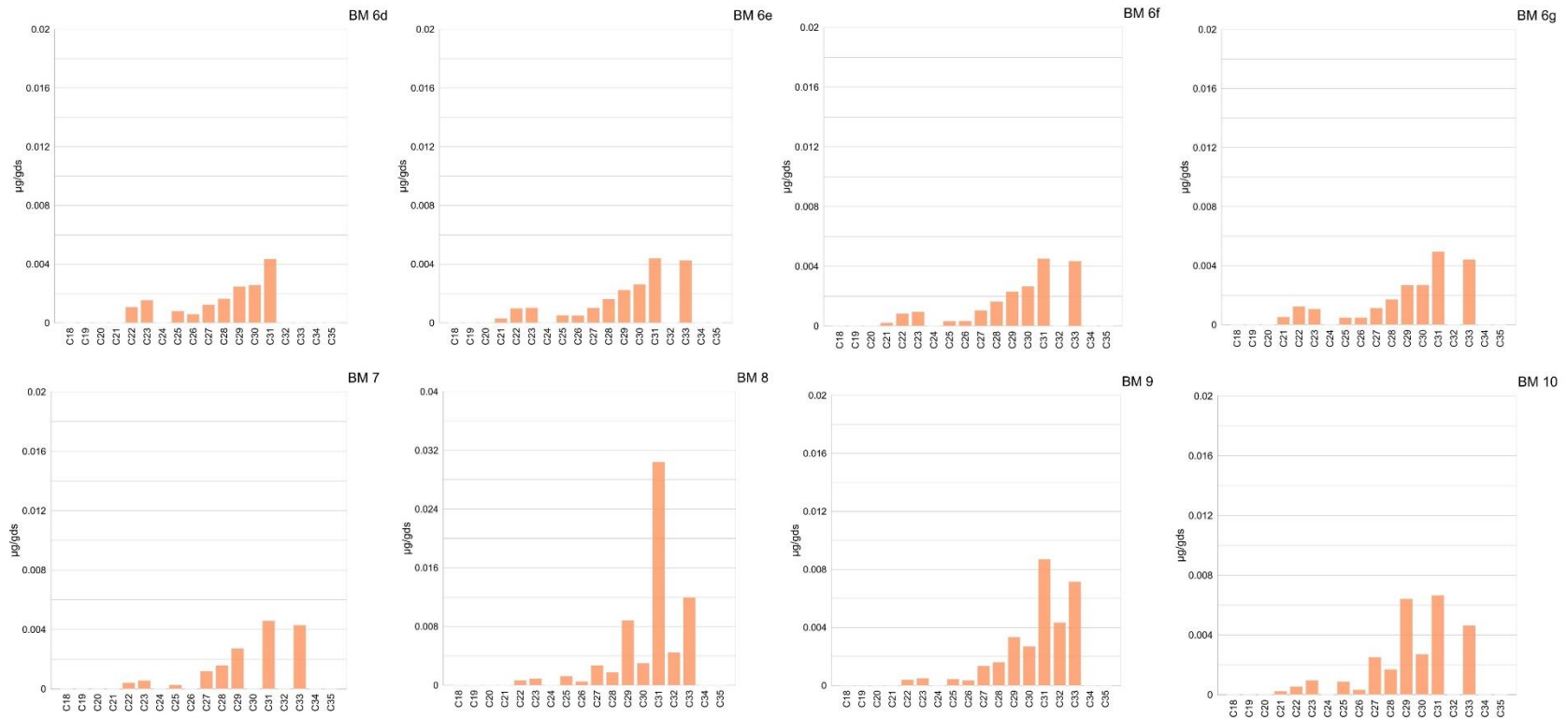
## SUPPLEMENTARY MATERIAL

### S8) Sedimentary *n*-alkane histograms of each biomarker sample from Midden 1 and Midden 2

#### S8.1) Midden 1

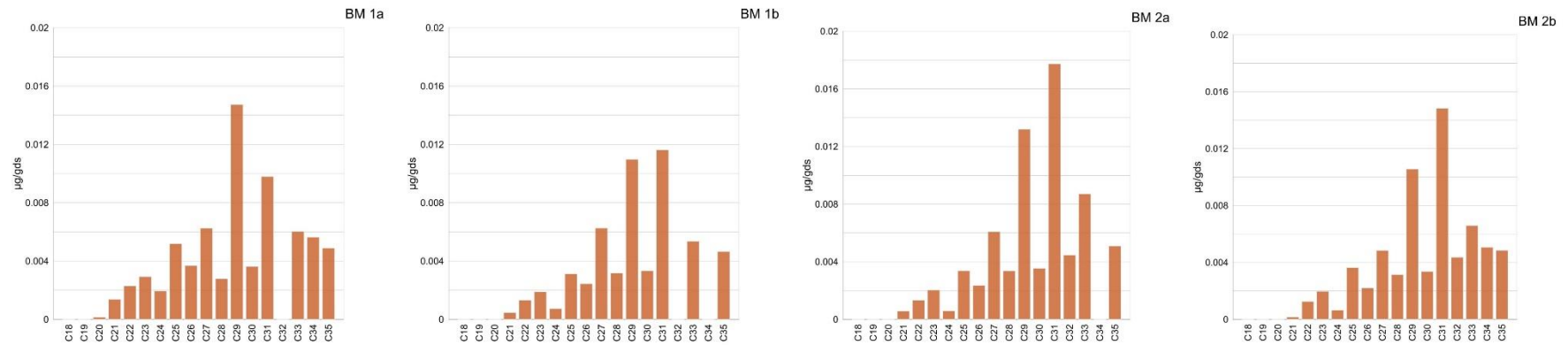


## SUPPLEMENTARY MATERIAL



## SUPPLEMENTARY MATERIAL

### S8.2) Midden 2



## SUPPLEMENTARY MATERIAL

**S9)** Total *n*-alkane concentration (in µg per grams of dried sample), OEP and ACL values of each biomarker sample

| Midden 1         |                                                  |      |       |
|------------------|--------------------------------------------------|------|-------|
| Biomarker Sample | Total <i>n</i> -alkane concentration<br>(µg/gds) | OEP  | ACL   |
| 1                | 0.02                                             | 2.62 | 29.56 |
| 2                | 0.02                                             | 5.67 | 29.69 |
| 3                | 0.01                                             | 5.30 | 29.95 |
| 4                | 0.03                                             | 1.43 | 30.11 |
| 5                | 0.02                                             | 3.73 | 29.25 |
| 6a               | 0.03                                             | 1.47 | 30.19 |
| 6b               | 0.02                                             | 1.38 | 30.32 |
| 6c               | 0.03                                             | 3.44 | 28.96 |
| 6d               | 0.02                                             | 1.67 | 29.16 |
| 6e               | 0.02                                             | 2.51 | 30.24 |
| 6f               | 0.02                                             | 2.63 | 30.34 |
| 6g               | 0.02                                             | 2.69 | 30.23 |
| 7                | 0.01                                             | 8.08 | 30.45 |
| 8                | 0.07                                             | 5.52 | 30.72 |
| 9                | 0.03                                             | 2.28 | 30.82 |
| 10               | 0.02                                             | 4.26 | 29.90 |

# SUPPLEMENTARY MATERIAL

| Midden 2         |                                                  |      |       |
|------------------|--------------------------------------------------|------|-------|
| Biomarker Sample | Total <i>n</i> -alkane concentration<br>(µg/gds) | OEP  | ACL   |
| 1a               | 0.07                                             | 3.64 | 29.00 |
| 1b               | 0.06                                             | 3.82 | 29.27 |
| 2a               | 0.07                                             | 3.33 | 29.81 |
| 2b               | 0.07                                             | 2.82 | 29.72 |

# SUPPLEMENTARY MATERIAL

**S10)** Lipid compounds identified in the archaeological bulk sediment samples and their estimated concentration (in ng per grams of dried sample, ng/gds)

| Midden 1                            |       |       |       |        |       |       |         |       |       |        |       |       |      |       |       |       |
|-------------------------------------|-------|-------|-------|--------|-------|-------|---------|-------|-------|--------|-------|-------|------|-------|-------|-------|
| Compound                            | 1     | 2     | 3     | 4      | 5     | 6a    | 6b      | 6c    | 6d    | 6e     | 6f    | 6g    | 7    | 8     | 9     | 10    |
| Glycerol                            | 48.47 |       | 18.47 | 20.71  | 12.87 |       |         | 21.72 |       |        | 29.90 |       |      |       |       |       |
| 1-Monopalmitin                      | 7.75  |       |       | 132.03 | 19.71 | 29.05 | 1307.01 | 6.72  |       |        |       |       |      |       |       |       |
| 1-Monostearin                       |       |       |       | 4.82   |       |       | 279.06  |       |       |        |       |       |      |       |       |       |
| 1-Undecanol (C <sub>11</sub> -OH)   |       |       |       |        | 3.11  |       |         |       |       |        |       |       |      |       |       |       |
| 1-Dodecanol (C <sub>12</sub> -OH)   |       |       |       |        | 6.36  |       |         |       |       |        |       |       |      |       |       |       |
| 1-Hexadecanol (C <sub>16</sub> -OH) |       |       |       |        | 30.11 |       |         |       | 11.26 | 241.37 | 25.28 |       |      | 32.68 | 13.36 |       |
| 1-Octadecanol (C <sub>18</sub> -OH) |       |       |       |        | 12.02 |       |         |       |       | 107.23 | 11.22 |       |      | 13.30 |       |       |
| Dehydroabietic acid                 |       | 4.96  |       |        |       |       |         |       | 2.95  |        |       |       |      |       |       |       |
| Nonanoic acid (C <sub>9:0</sub> )   | 21.57 | 33.79 | 5.84  | 11.42  | 12.82 |       | 914.09  | 33.72 | 13.51 | 44.46  | 27.85 | 49.40 | 8.62 | 57.91 |       | 54.55 |

# SUPPLEMENTARY MATERIAL

|                                               |        |        |       |        |       |       |         |       |        |        |       |        |       |        |       |       |
|-----------------------------------------------|--------|--------|-------|--------|-------|-------|---------|-------|--------|--------|-------|--------|-------|--------|-------|-------|
| Decanoic acid (C <sub>10:0</sub> )            | 7.08   |        |       | 4.22   | 2.76  |       | 125.85  |       |        |        | 4.63  |        |       | 7.89   |       | 9.40  |
| Dodecanoic acid (C <sub>12:0</sub> )          | 26.45  | 32.94  | 7.08  | 31.73  | 12.75 |       | 903.01  | 14.79 | 13.10  |        | 22.40 |        | 7.58  | 19.28  |       | 21.12 |
| Tetradecanoic acid (C <sub>14:0</sub> )       | 19.84  | 21.36  | 4.88  | 12.12  |       |       | 494.59  | 8.14  | 11.51  |        | 8.42  |        | 6.13  | 13.95  |       | 12.40 |
| Pentadecanoic acid (C <sub>15:0</sub> )       | 5.73   |        |       | 3.57   |       |       |         |       |        |        |       | 31.39  |       | 10.02  |       | 8.67  |
| Hexadecanoic acid (C <sub>16:0</sub> )        | 138.79 | 195.88 | 69.51 | 8.88   |       | 0.71  | 8581.79 | 74.75 | 149.89 | 170.94 | 91.53 | 155.58 | 74.32 | 121.93 | 30.52 | 98.19 |
| Heptadecanoic acid (C <sub>17:0</sub> )       |        |        | 0.25  | 132.03 | 0.25  | 0.31  | 0.37    |       |        |        |       |        |       |        |       |       |
| Octadecanoic acid (C <sub>18:0</sub> )        | 235.75 | 319.62 | 98.76 |        | 22.81 | 14.55 | 5604.18 | 68.21 | 50.14  | 73.92  | 34.34 | 67.15  | 22.24 | 46.28  |       | 40.40 |
| Oleic acid (C <sub>18:1</sub> 9- <i>cis</i> ) |        | 11.75  |       |        |       |       | 392.59  |       |        |        |       |        |       |        |       |       |
| Eicosanoic (C <sub>20:0</sub> )               | 6.48   | 7.08   |       |        |       |       |         |       | 24.91  |        |       |        |       |        |       | 6.22  |
| Docosanoic (C <sub>22:0</sub> )               |        | 6.05   |       |        |       |       |         |       |        |        |       |        |       |        |       |       |

# SUPPLEMENTARY MATERIAL

| Midden 2                 |      |      |      |      |
|--------------------------|------|------|------|------|
| Compound                 | 1a   | 1b   | 2a   | 2b   |
| 2-Pentadecanone          |      | 5.11 |      |      |
| 2-Octadecanone           |      |      |      | 0.15 |
| Stigmasta-3,5-dien-7-one |      | 1.59 |      |      |
| $\gamma$ -Sitosterone    |      | 1.72 |      |      |
| Friedelan-3-one          | 1.31 | 7.61 |      | 0.52 |
| Cholesterol              |      | 2.76 |      | 0.54 |
| Glycerol                 |      |      | 0.27 |      |
| 1-Monopalmitin           |      |      | 0.17 | 0.65 |
| 1-Monostearin            |      |      |      | 0.47 |
| Friedeline               |      |      |      | 0.58 |
| 1-Hexadecanol            |      |      |      | 2.70 |

# SUPPLEMENTARY MATERIAL

|                                         |       |       |       |       |
|-----------------------------------------|-------|-------|-------|-------|
| 1-Octadecanol                           |       |       |       | 0.42  |
| Dehydroabiatic acid                     |       |       |       | 20.53 |
| Tetradecanoic acid (C <sub>14:0</sub> ) |       | 12.08 |       | 0.52  |
| Pentadecanoic acid (C <sub>15:0</sub> ) |       | 7.44  |       |       |
| Hexadecanoic acid (C <sub>16:0</sub> )  | 6.81  | 44.82 | 20.88 | 14.09 |
| Octadecanoic acid (C <sub>18:0</sub> )  | 11.34 | 4.99  | 29.70 | 18.80 |
| Eicosanoic (C <sub>20:0</sub> )         |       |       | 3.49  |       |
| Docosanoic (C <sub>22:0</sub> )         |       |       | 3.11  |       |
| Tetracosanoic (C <sub>24:0</sub> )      |       |       | 1.54  |       |

## SUPPLEMENTARY MATERIAL

**S11)** Mineralogical (XRD) composition of the midden samples from Cerro de San Vicente. Data is presented in weight percentage (% wt)

| Midden 1      |            |        |               |          |         |      |            |       |              |                 |          |
|---------------|------------|--------|---------------|----------|---------|------|------------|-------|--------------|-----------------|----------|
| Sample number | Depth (mm) | Quartz | Clay minerals | Feldspar | Calcite | Lime | Actinolite | C     | Fluorapatite | Hydroxylapatite | Fe oxide |
| 0             | 400        | 24.66  | 35.39         | 38.03    | 1.92    | 0    | 0          | 0     | 0            | 0               | 0        |
| 2             | 380        | 34.47  | 18.34         | 29.85    | 9.29    | 0    | 1.72       | 5.28  | 1.05         | 0               | 1.3      |
| 4             | 360        | 14.75  | 9.32          | 24.11    | 47.39   | 0.69 | 0          | 0     | 1.39         | 2.39            | 0        |
| 6             | 340        | 15.22  | 7.32          | 5.33     | 33.91   | 0.39 | 0          | 35.64 | 1.08         | 1.1             | 0        |
| 8             | 320        | 14.32  | 5.76          | 7.62     | 61.14   | 0    | 0          | 8.19  | 1.47         | 1.51            | 0        |
| 10            | 300        | 10.68  | 3.95          | 8.84     | 70.57   | 1.73 | 0          | 0     | 2.14         | 2.09            | 0        |
| 12            | 280        | 14.96  | 5.8           | 6.53     | 66.38   | 0.97 | 0          | 1.47  | 1.95         | 1.95            | 0        |
| 14            | 260        | 11.5   | 2.43          | 7.83     | 71.34   | 1.31 | 0          | 2.2   | 1.69         | 1.69            | 0        |
| 16            | 240        | 11.85  | 20.31         | 2.72     | 61.59   | 0.79 | 0          | 0     | 1.27         | 1.48            | 0        |
| 18            | 220        | 4.73   | 2.09          | 2.57     | 52.79   | 0    | 0          | 35.01 | 1.31         | 1.5             | 0        |

# SUPPLEMENTARY MATERIAL

|    |     |       |       |       |       |      |      |      |      |      |   |
|----|-----|-------|-------|-------|-------|------|------|------|------|------|---|
| 20 | 200 | 34.47 | 18.34 | 29.85 | 9.29  | 0    | 1.72 | 5.28 | 1.05 | 0    | 0 |
| 22 | 180 | 25.61 | 18.34 | 6.33  | 47.37 | 0.61 | 0    | 0    | 0    | 1.72 | 0 |
| 24 | 160 | 23.69 | 8.46  | 12.26 | 52.42 | 0    | 0    | 0    | 0    | 3.16 | 0 |
| 26 | 140 | 13.02 | 12.79 | 9.84  | 61.57 | 0    | 0    | 0    | 0    | 2.79 | 0 |
| 28 | 120 | 11.45 | 25.85 | 29.69 | 29.74 | 0    | 0    | 0    | 1.69 | 1.57 | 0 |
| 30 | 100 | 10.58 | 15.28 | 13.71 | 56.77 | 0.92 | 0    | 0    | 0    | 2.74 | 0 |
| 32 | 80  | 13.41 | 8.89  | 19.02 | 55.81 | 0    | 0    | 0    | 0    | 2.88 | 0 |
| 34 | 60  | 25.04 | 33.23 | 19.57 | 19.41 | 0    | 0    | 0    | 0    | 2.76 | 0 |
| 36 | 40  | 20.06 | 20.29 | 41.59 | 18.07 | 0    | 0    | 0    | 0    | 0    | 0 |
| 38 | 20  | 33.4  | 32.09 | 16.77 | 17.75 | 0    | 0    | 0    | 0    | 0    | 0 |
| 40 | 0   | 33.76 | 21.6  | 13.86 | 28.73 | 0    | 0    | 0    | 0.92 | 1.15 | 0 |

# SUPPLEMENTARY MATERIAL

| Midden 2      |            |        |               |          |         |      |            |   |              |                 |          |
|---------------|------------|--------|---------------|----------|---------|------|------------|---|--------------|-----------------|----------|
| Sample number | Depth (mm) | Quartz | Clay minerals | Feldspar | Calcite | Lime | Actinolite | C | Fluorapatite | Hydroxylapatite | Fe oxide |
| 1a            | 0          | 53.68  | 21.13         | 21.83    | 3.36    | 0    | 0          | 0 | 0            | 0               | 0        |
| 1b            | 50         | 48.39  | 27.14         | 20.63    | 2.54    | 0    | 0          | 0 | 0            | 0               | 0        |
| 2a            | 100        | 39.52  | 17.93         | 31.09    | 11.46   | 0    | 0          | 0 | 0            | 0               | 0        |
| 2b            | 150        | 29.8   | 18.96         | 42.39    | 8.85    | 0    | 0          | 0 | 0            | 0               | 0        |

## SUPPLEMENTARY MATERIAL

**S12)** Geochemical (XRF) composition of the midden samples from Cerro de San Vicente. Data is presented in weight percentage (% wt)

| Midden 1      |            |                  |                                |                                |      |                  |                   |     |                  |     |                               |                 |     |
|---------------|------------|------------------|--------------------------------|--------------------------------|------|------------------|-------------------|-----|------------------|-----|-------------------------------|-----------------|-----|
| Sample number | Depth (mm) | SiO <sub>2</sub> | Al <sub>2</sub> O <sub>3</sub> | Fe <sub>2</sub> O <sub>3</sub> | CaO  | K <sub>2</sub> O | Na <sub>2</sub> O | MgO | TiO <sub>2</sub> | Br  | P <sub>2</sub> O <sub>5</sub> | SO <sub>3</sub> | LOI |
| 0             | 400        | 69.4             | 14.7                           | 3.8                            | 3.3  | 3.1              | 1.6               | 0.8 | 0.6              | 1.7 | 0.5                           | 0               | 3.0 |
| 2             | 380        | 64.1             | 13.1                           | 3.3                            | 11.5 | 2.8              | 1.4               | 0.8 | 0.5              | 0.9 | 1.3                           | 0               | 4.2 |
| 4             | 360        | 47,9             | 8.9                            | 2.4                            | 30.4 | 2.3              | 0.8               | 1.0 | 0.4              | 2.5 | 2.8                           | 0.1             | 3.5 |
| 6             | 340        | 40,4             | 7.9                            | 2.1                            | 38.7 | 2.0              | 0.7               | 1.1 | 0.3              | 3.1 | 3.1                           | 0.1             | 3.6 |
| 8             | 320        | 31,3             | 7.3                            | 2.0                            | 48.2 | 1.8              | 0.6               | 1.2 | 0.3              | 3.0 | 3.6                           | 0.1             | 4.4 |
| 10            | 300        | 29,7             | 6.6                            | 1.7                            | 48.0 | 1.6              | 0.6               | 1.4 | 0.3              | 3.0 | 3.7                           | 0.1             | 4.3 |
| 12            | 280        | 31,3             | 7.5                            | 2.8                            | 44.8 | 2.0              | 0.6               | 1.4 | 0.4              | 2.9 | 3.6                           | 0.1             | 3.6 |
| 14            | 260        | 20,8             | 5.1                            | 1.5                            | 60.8 | 1.3              | 0.4               | 1.4 | 0.3              | 3.4 | 4.4                           | 0.1             | 3.2 |
| 16            | 240        | 23,8             | 6.4                            | 2.1                            | 53.3 | 1.4              | 0.4               | 1.3 | 0.3              | 3.7 | 4.0                           | 0.1             | 3.5 |
| 18            | 220        | 21,8             | 6.5                            | 2.0                            | 56.8 | 1.5              | 0.4               | 1.3 | 0.3              | 3.6 | 5.1                           | 0.1             | 3.1 |

# SUPPLEMENTARY MATERIAL

|    |     |      |      |     |      |     |     |     |     |     |     |     |     |
|----|-----|------|------|-----|------|-----|-----|-----|-----|-----|-----|-----|-----|
| 20 | 200 | 26,5 | 7.5  | 2.3 | 49.2 | 1.8 | 0.5 | 1.3 | 0.4 | 3.1 | 4.6 | 0.1 | 2.9 |
| 22 | 180 | 38,8 | 9.2  | 2.3 | 37.9 | 2.3 | 0.7 | 1.8 | 0.4 | 3.3 | 2.5 | 0.1 | 3.8 |
| 24 | 160 | 43,5 | 10.5 | 2.7 | 31.5 | 2.3 | 0.8 | 1.9 | 0.5 | 2.9 | 2.6 | 0.1 | 4.2 |
| 26 | 140 | 39,6 | 8.4  | 2.1 | 37.8 | 2.1 | 0.8 | 1.4 | 0.4 | 3.0 | 3.8 | 0.1 | 3.8 |
| 28 | 120 | 46,0 | 10.3 | 2.5 | 30.3 | 2.3 | 0.9 | 1.4 | 0.5 | 2.7 | 2.6 | 0,1 | 4.2 |
| 30 | 100 | 41,0 | 9.3  | 2.8 | 32.5 | 2.2 | 0.8 | 1.4 | 0.4 | 2.8 | 4.4 | 0.1 | 3.9 |
| 32 | 80  | 44,4 | 9.2  | 2.1 | 32.0 | 2.1 | 0.9 | 1.8 | 0.4 | 2.9 | 3.7 | 0.1 | 4.1 |
| 34 | 60  | 61,9 | 13.2 | 3.1 | 11.8 | 2.8 | 1.4 | 1.1 | 0.6 | 2.2 | 1.8 | 0   | 3.7 |
| 36 | 40  | 60,2 | 12.1 | 2.9 | 15.4 | 2.6 | 1.2 | 1.1 | 0.5 | 2.0 | 1.6 | 0   | 4.4 |
| 38 | 20  | 64,7 | 13.6 | 4.5 | 8.8  | 2.8 | 1.3 | 0.9 | 0.6 | 1.7 | 0.8 | 0   | 3.6 |
| 40 | 0   | 61,3 | 12.4 | 3.4 | 14.0 | 2.5 | 1.1 | 0.9 | 0.5 | 2.3 | 1.1 | 0   | 4.0 |

# SUPPLEMENTARY MATERIAL

| Midden 2      |            |                  |                                |                                |     |                  |                   |     |                  |     |                               |                 |     |
|---------------|------------|------------------|--------------------------------|--------------------------------|-----|------------------|-------------------|-----|------------------|-----|-------------------------------|-----------------|-----|
| Sample number | Depth (mm) | SiO <sub>2</sub> | Al <sub>2</sub> O <sub>3</sub> | Fe <sub>2</sub> O <sub>3</sub> | CaO | K <sub>2</sub> O | Na <sub>2</sub> O | MgO | TiO <sub>2</sub> | Br  | P <sub>2</sub> O <sub>5</sub> | SO <sub>3</sub> | LOI |
| 1a            | 0          | 69.6             | 15.0                           | 4.3                            | 3.2 | 2.8              | 1.2               | 0.8 | 0.6              | 1.6 | 0.7                           | 0.1             | 3.8 |
| 1b            | 50         | 69.0             | 16.7                           | 4.4                            | 2.3 | 2.9              | 1.3               | 0.8 | 0.7              | 1.2 | 0.4                           | 0.1             | 3.5 |
| 2a            | 100        | 68.3             | 13.6                           | 4.4                            | 5.7 | 2.7              | 1.1               | 0.8 | 0.5              | 1.5 | 1.0                           | 0.1             | 4.9 |
| 2b            | 150        | 71.5             | 12.8                           | 3.4                            | 4.1 | 2.9              | 1.5               | 0.7 | 0.5              | 1.5 | 0.8                           | 0.1             | 3.8 |

## SUPPLEMENTARY MATERIAL

### S13) Results of principal component analysis of geochemical data from Midden 1 sediment samples

| Element (oxide)                | Communality | Principal Component |
|--------------------------------|-------------|---------------------|
| Al <sub>2</sub> O <sub>3</sub> | 0.97        | 0.99                |
| SiO <sub>2</sub>               | 0.97        | 0.99                |
| Na <sub>2</sub> O              | 0.95        | 0.98                |
| K <sub>2</sub> O               | 0.94        | 0.97                |
| TiO <sub>2</sub>               | 0.92        | 0.96                |
| Fe <sub>2</sub> O <sub>3</sub> | 0.82        | 0.90                |
| MgO                            | 0.34        | -0.58               |
| Br                             | 0.85        | -0.92               |
| P <sub>2</sub> O <sub>5</sub>  | 0.87        | -0.93               |
| CaO                            | 0.98        | -0.99               |

## SUPPLEMENTARY MATERIAL

**S14)** Rock-magnetic results from two representative samples. **A)** and **C)** Progressive isothermal remanent magnetization (IRM) acquisition curves. **B)** and **D)** Thermomagnetic curves up to 700 °C. Upper panels correspond to sample CSV2-22 (wood ash-rich) and lower panels to sample CSV2-0 (earth-based construction material-rich sample). Heating (cooling) cycles are indicated in red (blue) in thermomagnetic curves along with arrows and their intensities of magnetization. Note that IRM curve of panel c is not saturated to 1 T, indicating the presence of a high coercivity mineral (hematite). See section 3.4. in the main text for further explanation.

