

Supplementary Information

***In Situ* Chemical Analysis of Red Rock Art Pigments from Inhuma (Piauí, Brazil) Using pXRF and PCA**

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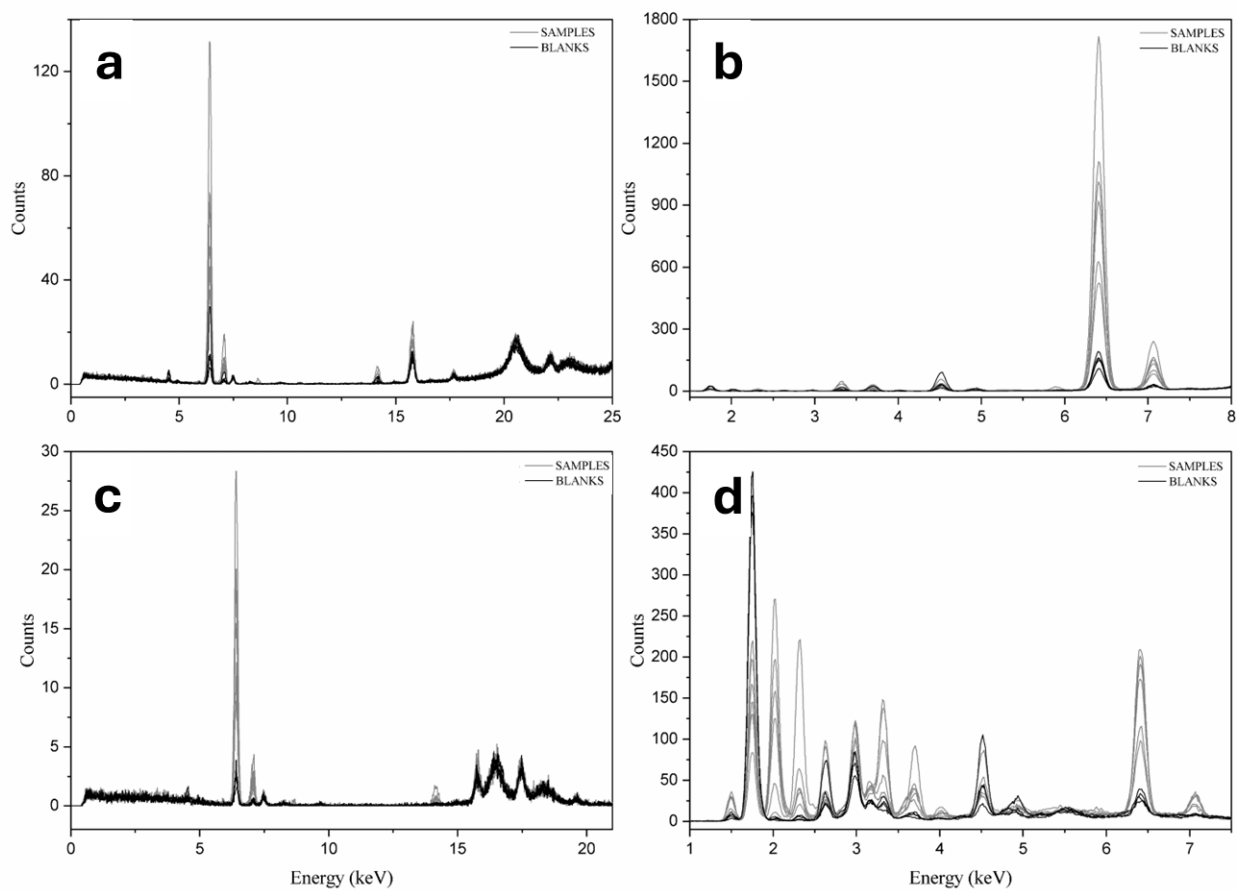


Figure S1. X-ray fluorescence spectra (p-XRF) of samples from the six archaeological sites on the four filters: (a) main, (b) low, (c) high, (d) light. Spectra of samples SAP-07, EM1-03, EMA-10, FEM-01, FI-05, and T1-06, respectively, are represented by the gray line and overlaid on the analytical blanks of the six corresponding sites (black line).

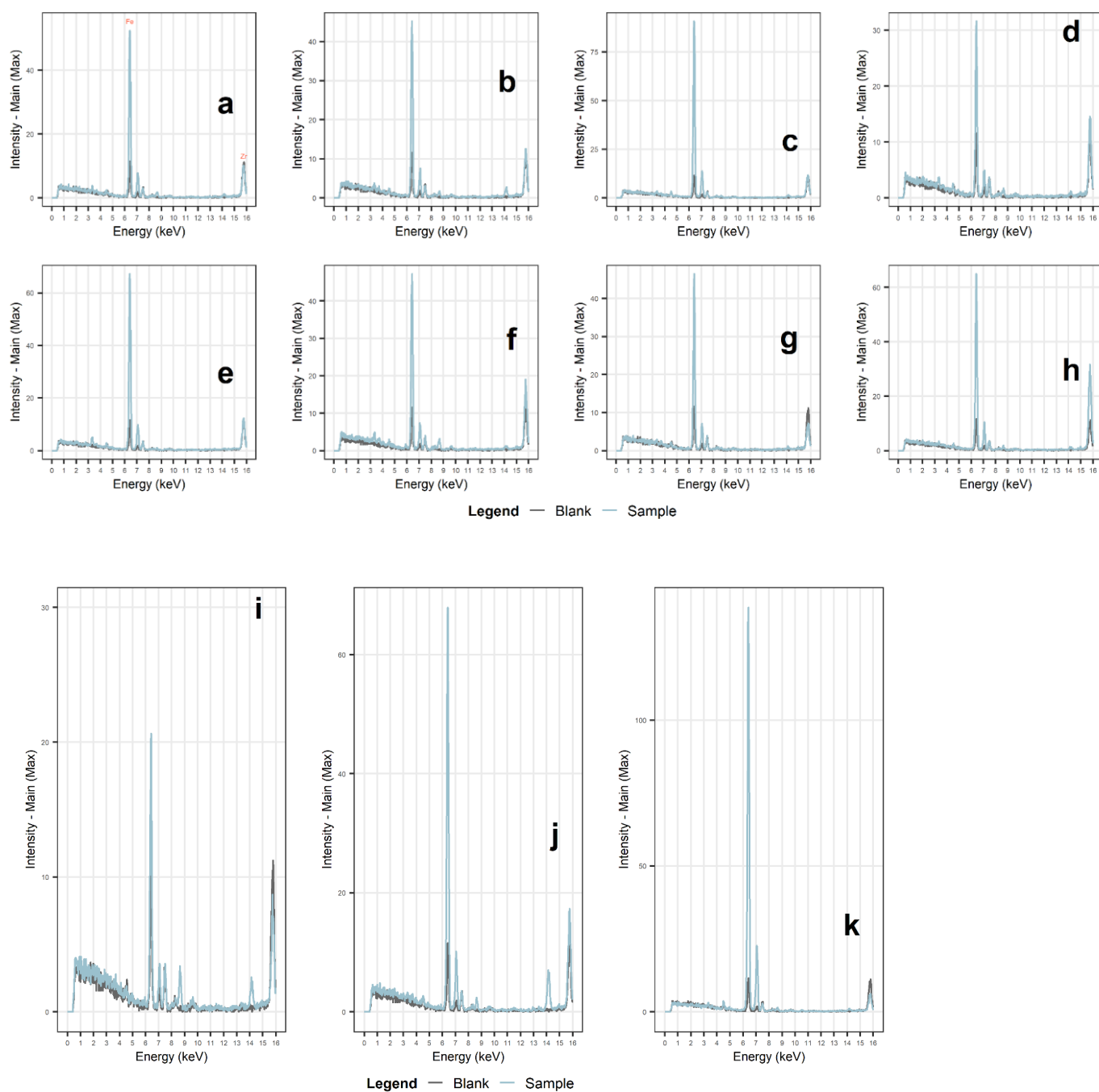


Figure S2. X-ray fluorescence spectra (p-XRF) of samples from the Ema Site, obtained with the main filter. Spectra of samples (a) EMA-01, (b) EMA-02, (c) EMA-03, (d) EMA-04, (e) EMA-05, (f) EMA-06, (g) EMA-07, (h) EMA-08, (i) EMA-09, (j) EMA-10, (k) EMA-11, represented by the blue line and overlaid on the analytical blank EMA-00 (black line).

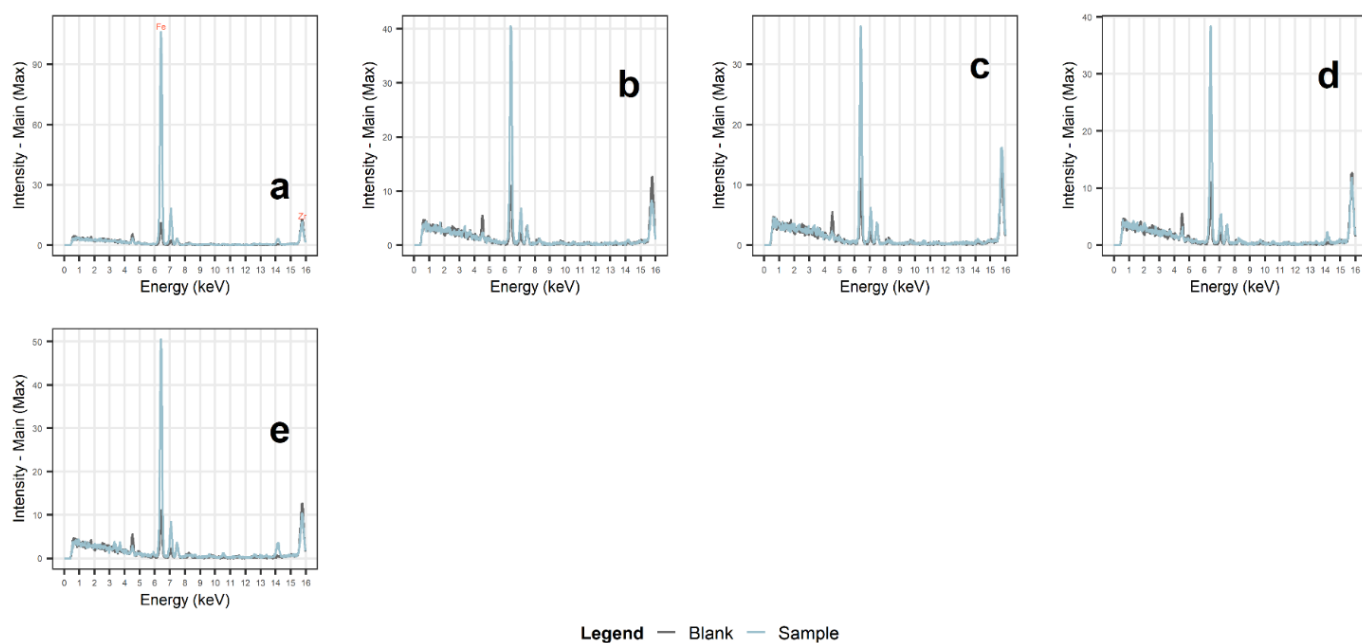


Figure S3. X-ray fluorescence spectra (p-XRF) of samples from the EMA 1 Site, obtained with the Main filter. Spectra of samples (a) EM1-01, (b) EM1-02, (c) EM1-03, (d) EM1-04, (e) EM1-05, represented by the blue line and overlaid on the analytical blank EM1-00 (black line).

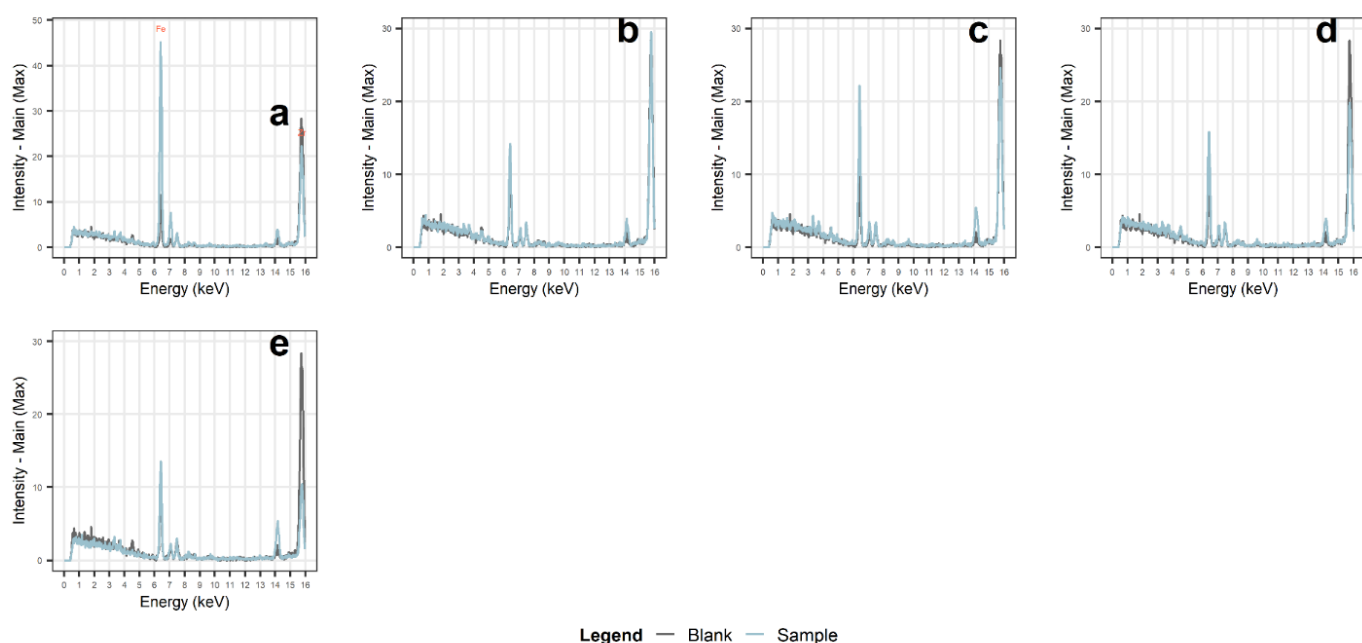
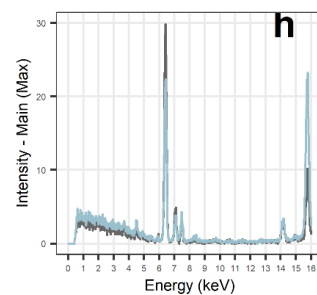
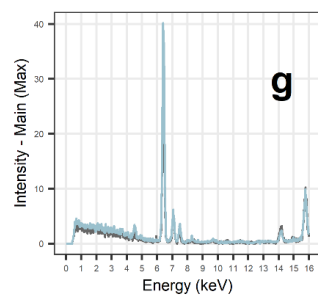
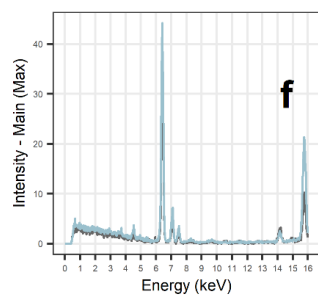
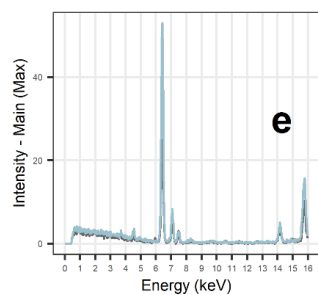
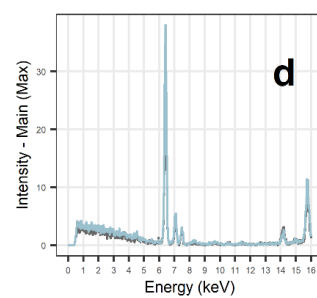
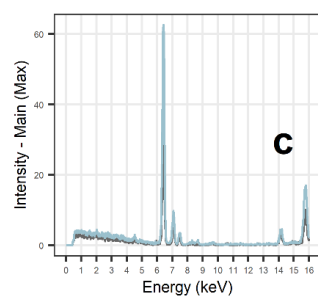
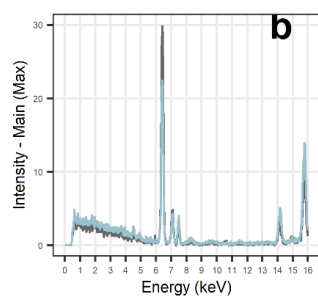
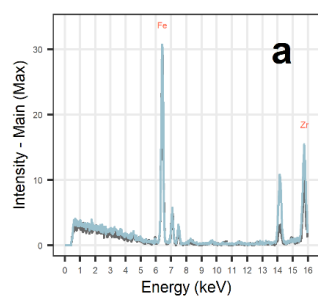
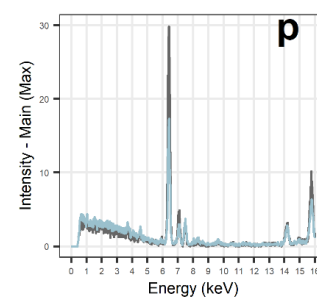
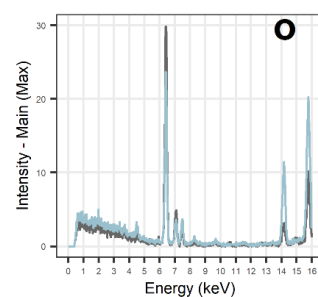
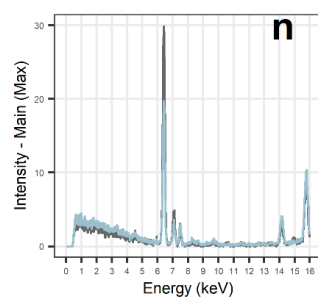
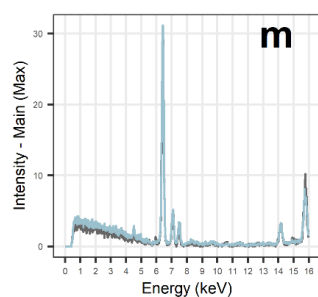
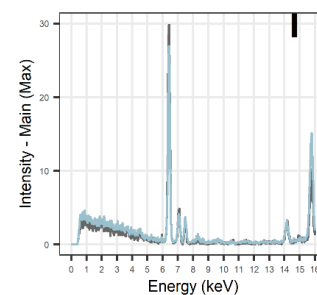
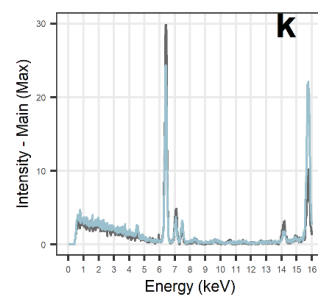
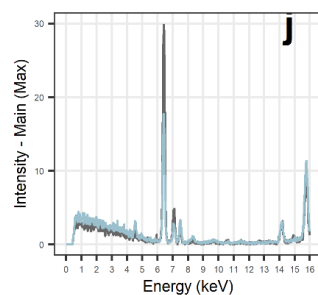
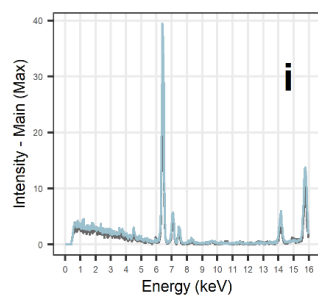


Figure S4. X-ray fluorescence spectra (p-XRF) of samples from the Furna da Ema Site, obtained with the Main filter. Spectra of samples (a) FEM-01, (b) FEM-02, (c) FEM-03, (d) FEM-04, (e) FEM-05, represented by the blue line and overlaid on the analytical blank FEM-00 (black line).



Legend — Blank — Sample



Legend — Blank — Sample

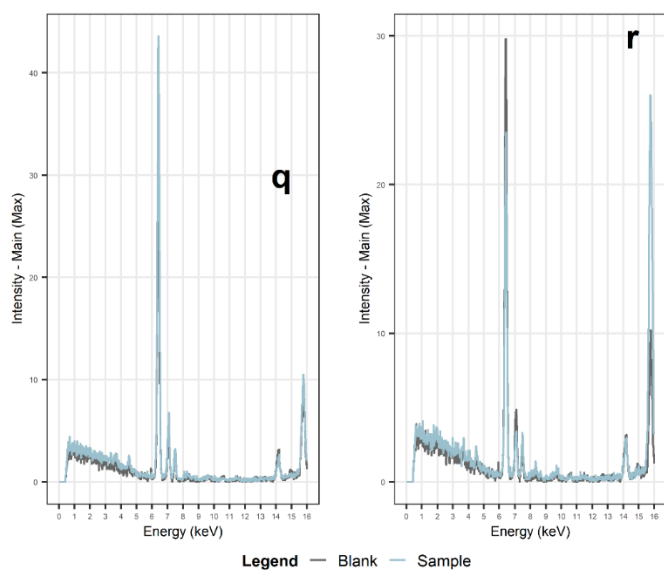


Figure S5. X-ray fluorescence spectra (p-XRF) of samples from the Furna dos Índios Site, obtained with the Main filter. Spectra of samples (a) FI-01, (b) FI-02, (c) FI-03, (d) FI-04, (e) FI-05, (f) FI-06, (g) FI-07, (h) FI-08, (i) FI-09, (j) FI-10, (k) FI-11, (l) FI-12, (m) FI-13, (n) FI-14, (o) FI-15, (p) FI-16, (q) FI-17, (r) FI-18, represented by the blue line and overlaid on the analytical blank FI-00 (black line).

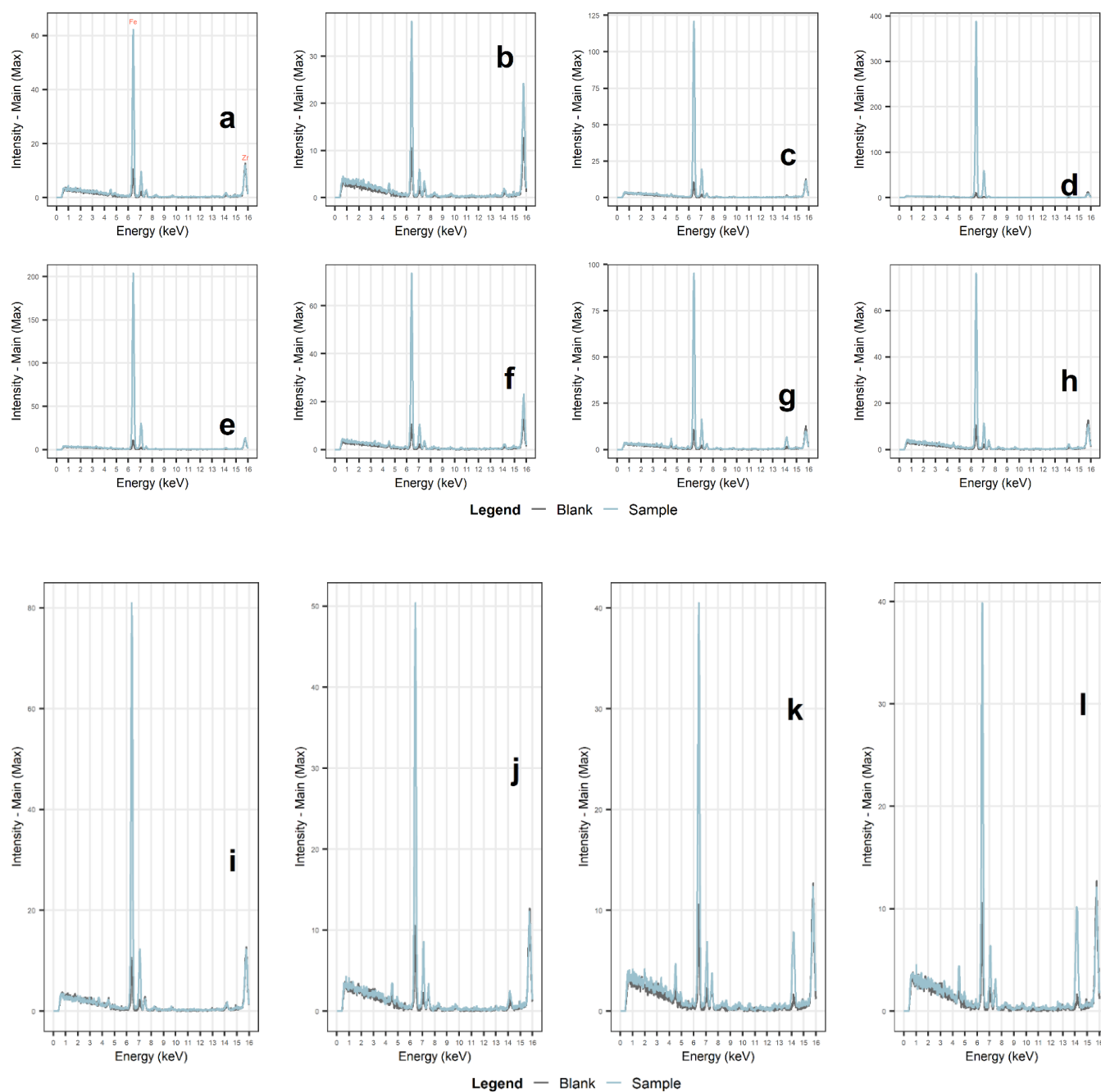


Figure S6. X-ray fluorescence spectra (p-XRF) of samples from the Torres 1 Site, obtained with the Main filter. Spectra of samples (a) T1-01, (b) T1-02, (c) T1-03, (d) T1-04, (e) T1-05, (f) T1-06, (g) T1-07, (h) T1-08, (i) T1-09, (j) T1-10, (k) T1-11, (l) T1-12, represented by the blue line and overlaid on the analytical blank T1-00 (black line).

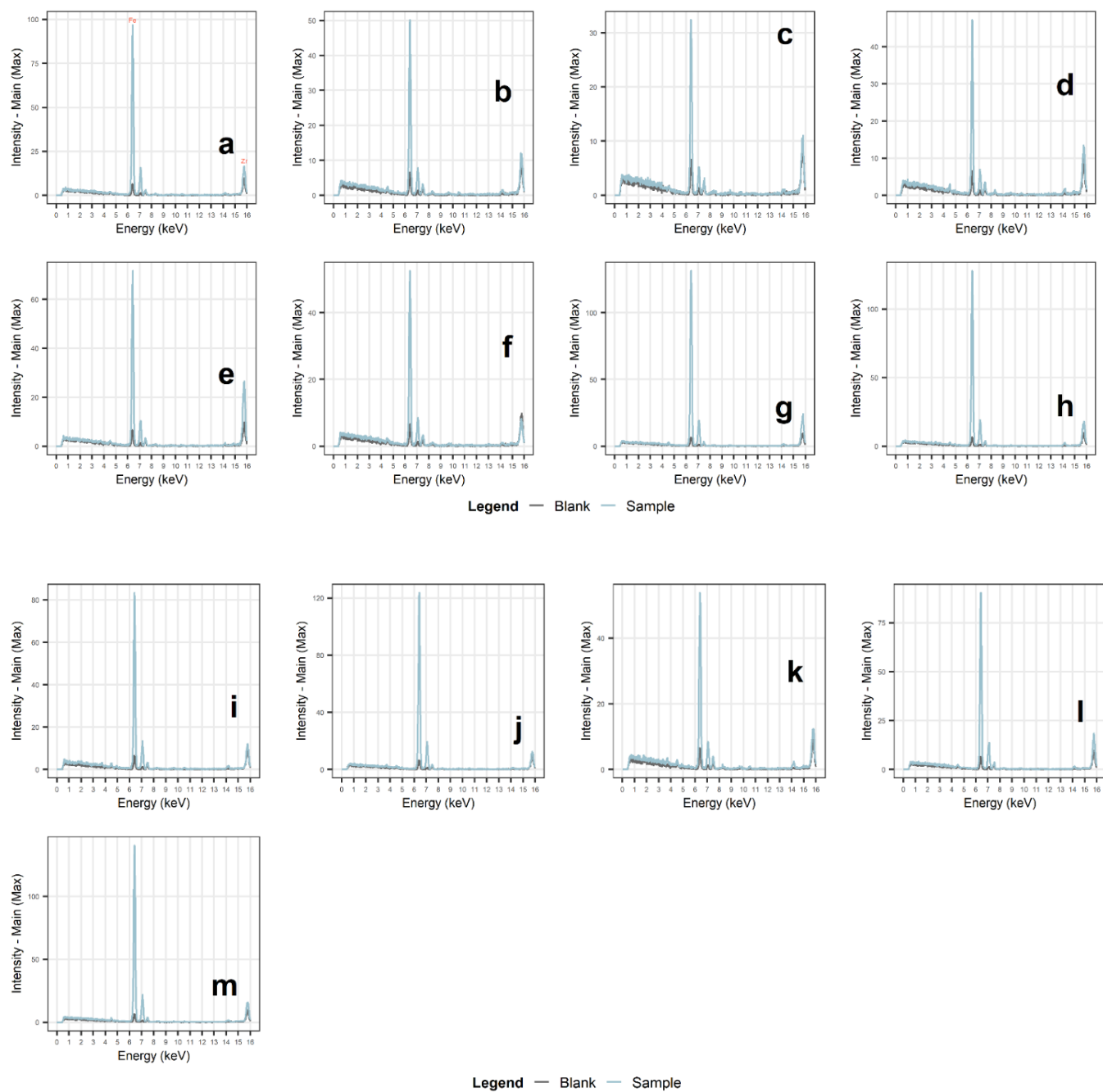


Figure S7. X-ray fluorescence spectra (p-XRF) of samples from the Apertados Site, obtained with the Main filter. Spectra of samples (a) SAP-01, (b) SAP-02, (c) SAP-03, (d) SAP-04, (e) SAP-05, (f) SAP-06, (g) SAP-07, (h) SAP-08, (i) SAP-09, (j) SAP-10, (k) SAP-11, (l) SAP-12, (m) SAP-13, represented by the blue line and overlaid on the analytical blank SAP-00 (black line).

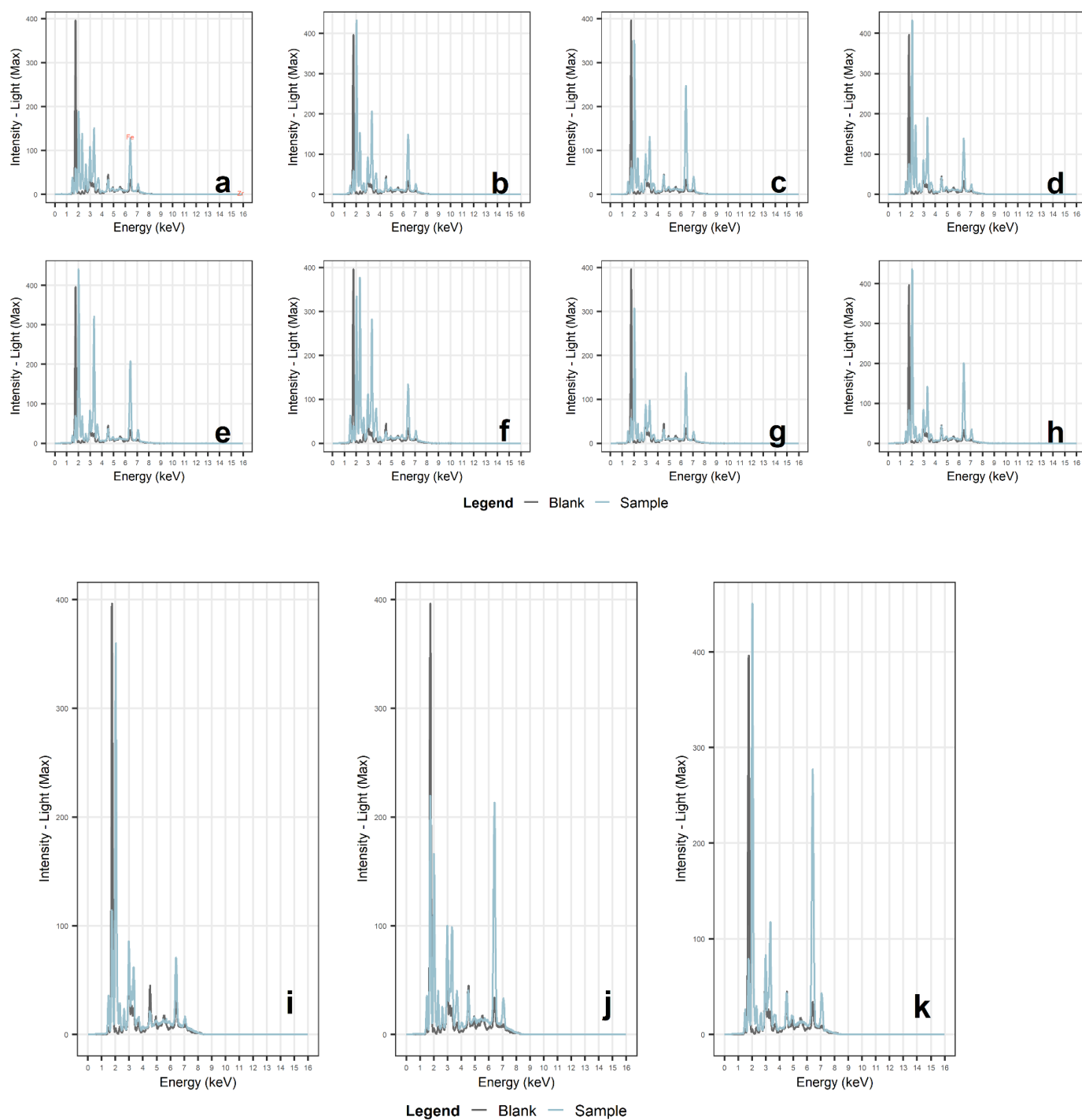


Figure S8. X-ray fluorescence spectra (p-XRF) of samples from the EMA Site, obtained with the Light filter. Spectra of samples (a) EMA-01, (b) EMA-02, (c) EMA-03, (d) EMA-04, (e) EMA-05, (f) EMA-06, (g) EMA-07, (h) EMA-08, (i) EMA-09, (j) EMA-10, (k) EMA-11, represented by the blue line and overlaid on the analytical blank EMA-00 (black line).

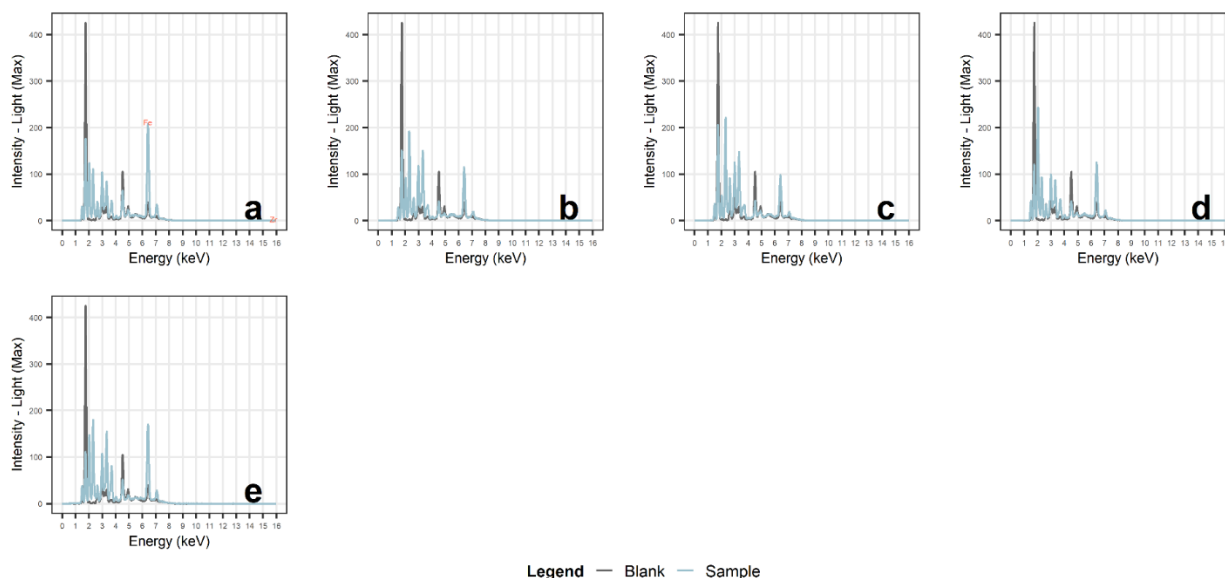


Figure S9. X-ray fluorescence spectra (p-XRF) of samples from the EMA 1 Site, obtained with the Light filter. Spectra of samples (a) EM1-01, (b) EM1-02, (c) EM1-03, (d) EM1-04, (e) EM1-05, represented by the blue line and overlaid on the analytical blank EM1-00 (black line).

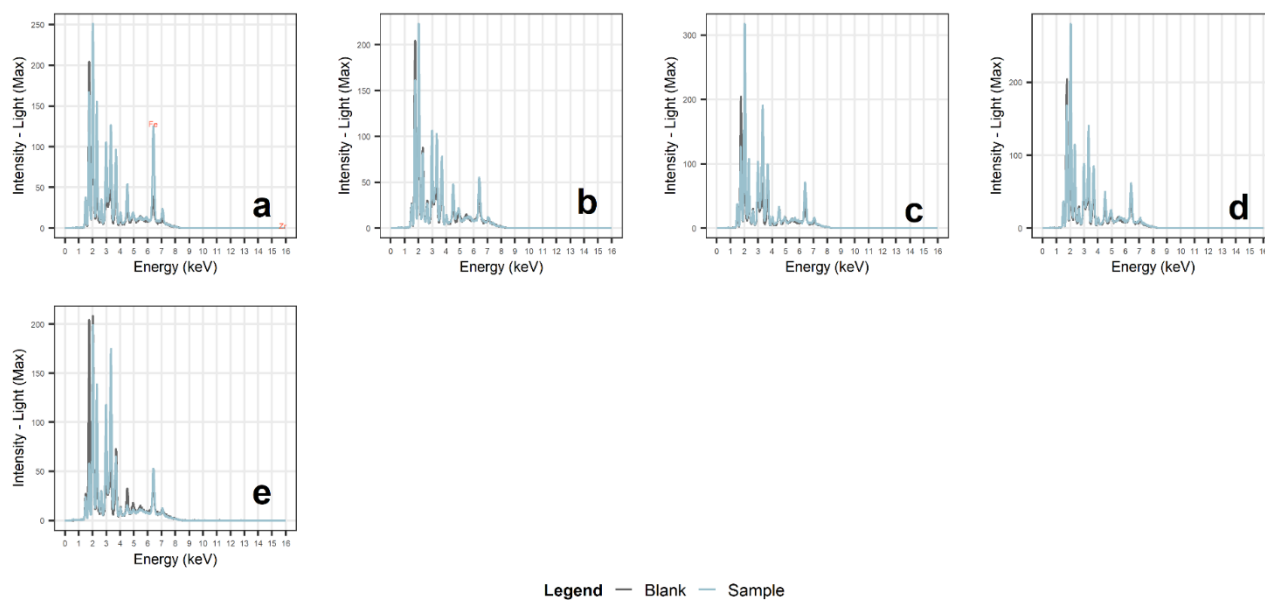
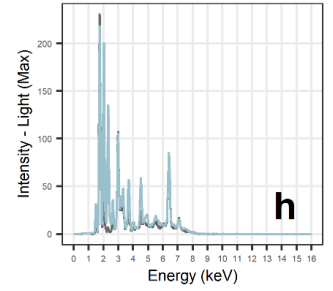
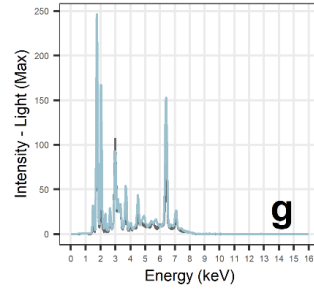
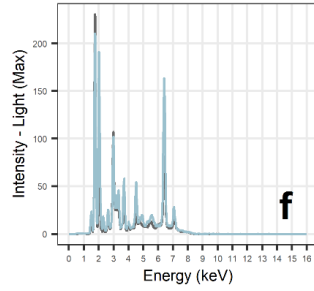
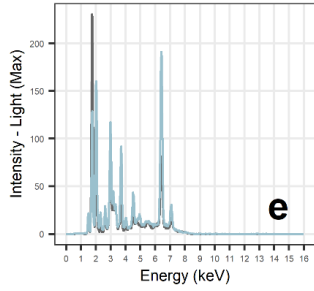
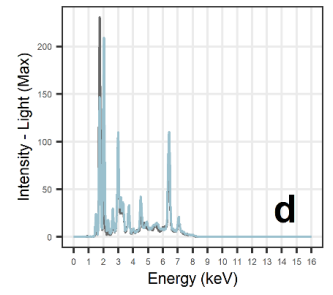
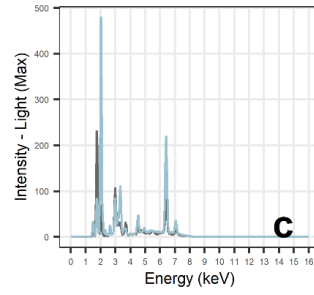
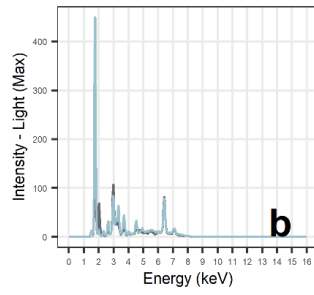
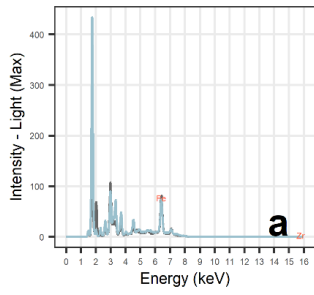
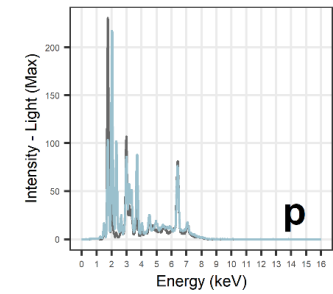
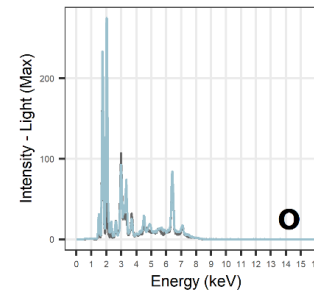
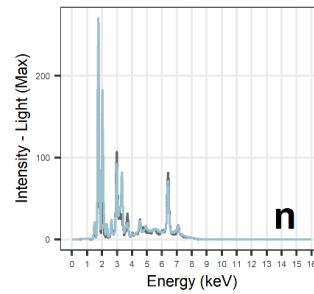
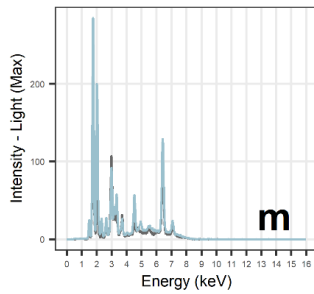
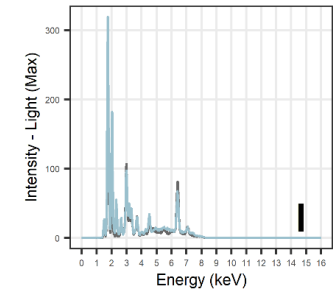
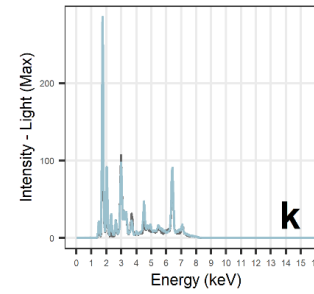
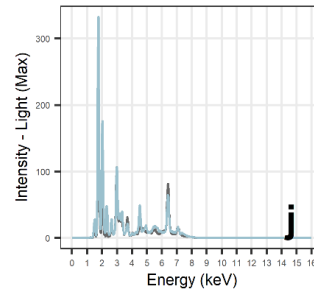
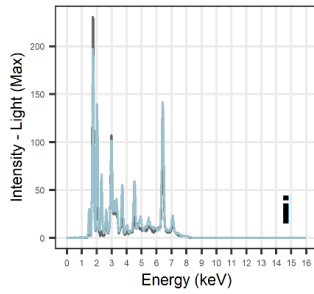


Figure S10. X-ray fluorescence spectra (p-XRF) of samples from the Furna da Ema Site, obtained with the Light filter. Spectra of samples (a) FEM-01, (b) FEM-02, (c) FEM-03, (d) FEM-04, (e) FEM-05, represented by the blue line and overlaid on the analytical blank FEM-00 (black line).



Legend — Blank — Sample



Legend — Blank — Sample

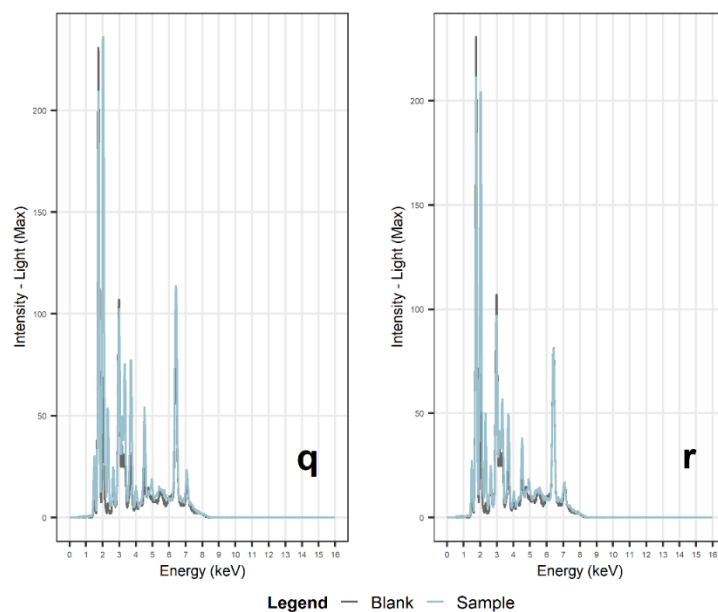


Figure S11. X-ray fluorescence spectra (p-XRF) of samples from the Furna dos Índios Site, obtained with the Light filter. Spectra of samples (a) FI-01, (b) FI-02, (c) FI-03, (d) FI-04, (e) FI-05, (f) FI-06, (g) FI-07, (h) FI-08, (i) FI-09, (j) FI-10, (k) FI-11, (l) FI-12, (m) FI-13, (n) FI-14, (o) FI-15, (p) FI-16, (q) FI-17, (r) FI-18, represented by the blue line and overlaid on the analytical blank FI-00 (black line).

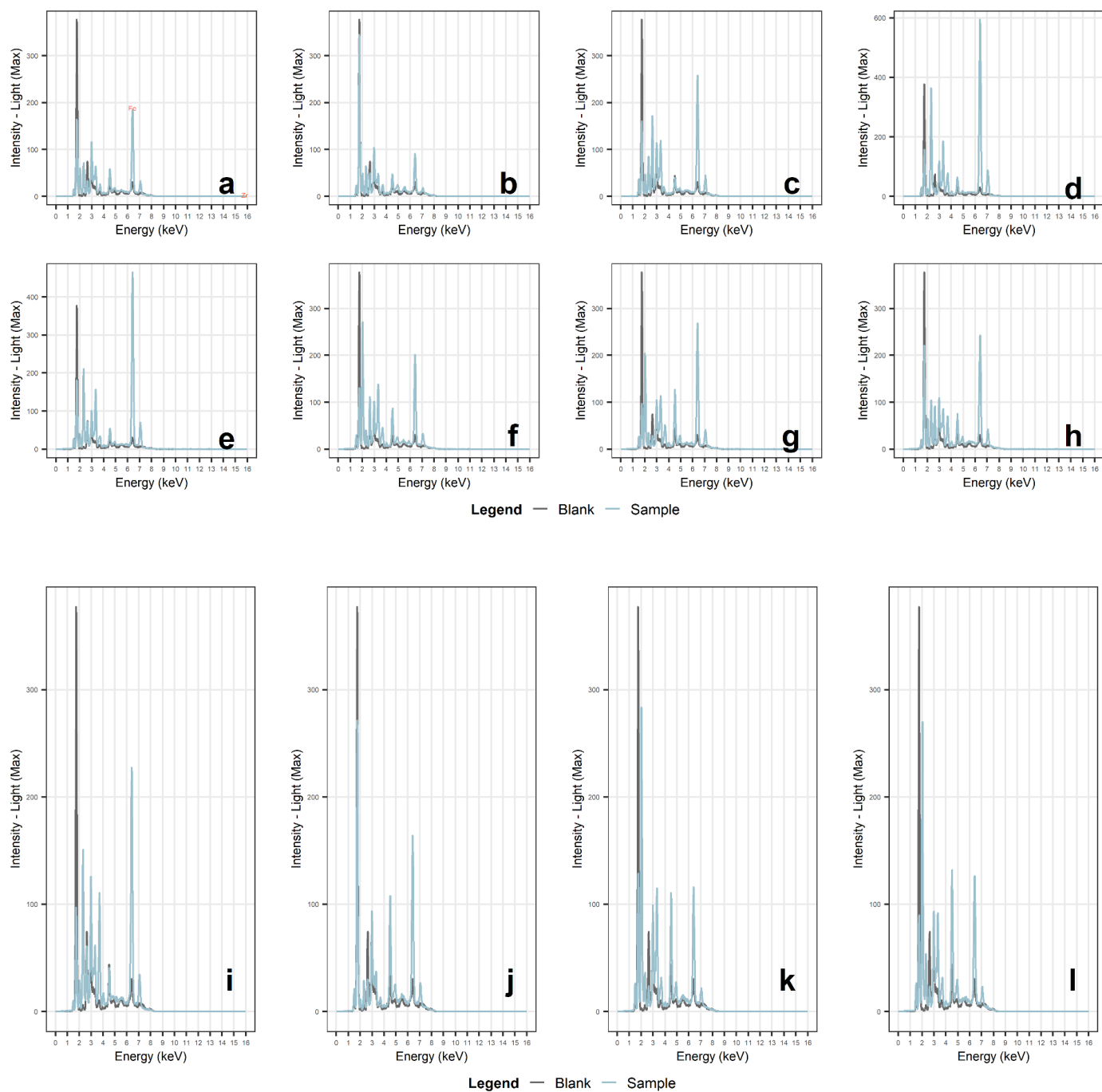


Figure S12. X-ray fluorescence spectra (p-XRF) of samples from the Torres 1 Site, obtained with the Light filter. Spectra of samples (a) T1-01, (b) T1-02, (c) T1-03, (d) T1-04, (e) T1-05, (f) T1-06, (g) T1-07, (h) T1-08, (i) T1-09, (j) T1-10, (k) T1-11, (l) T1-12, represented by the blue line and overlaid on the analytical blank T1-00 (black line).

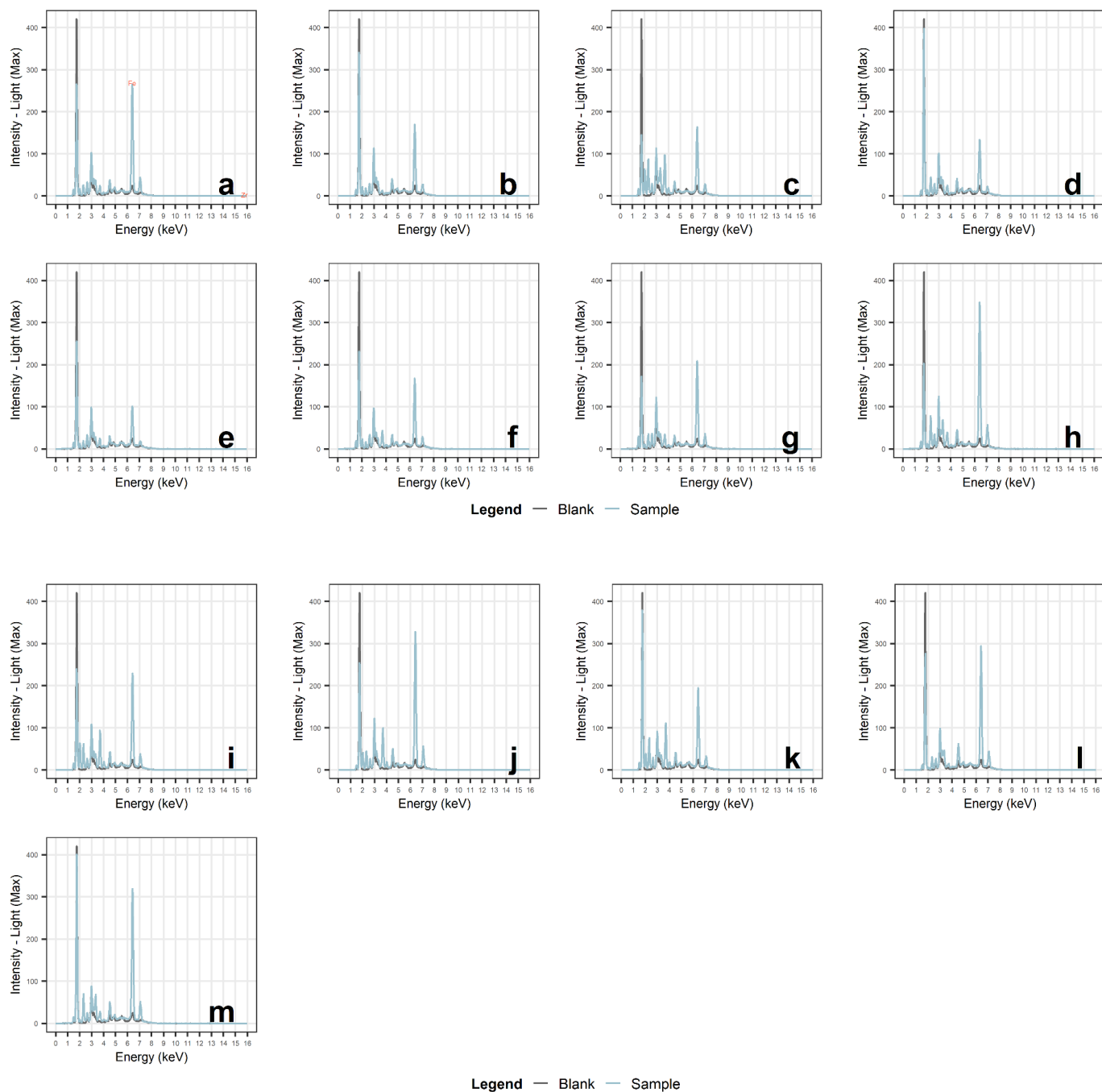


Figure S13. X-ray fluorescence spectra (p-XRF) of samples from the Apertados Site, obtained with the Light filter. Spectra of samples (a) SAP-01, (b) SAP-02, (c) SAP-03, (d) SAP-04, (e) SAP-05, (f) SAP-06, (g) SAP-07, (h) SAP-08, (i) SAP-09, (j) SAP-10, (k) SAP-11, (l) SAP-12, (m) SAP-13, represented by the blue line and overlaid on the analytical blank SAP-00 (black line).

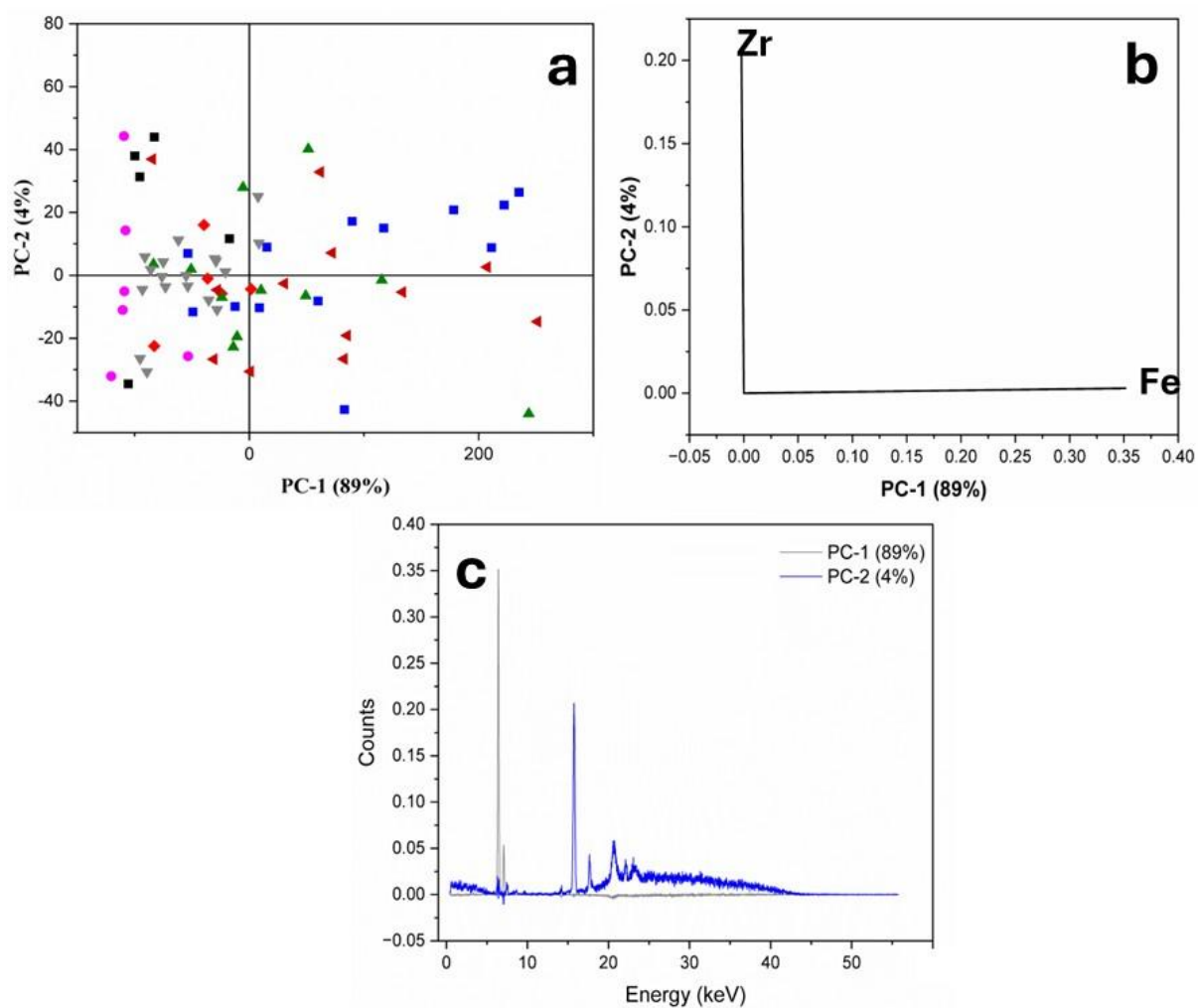


Figure S14. PCA results for the pXRF spectra obtained with the Main filter. (a) Scores plot (PC1 vs. PC2), (b) loadings line plot (PC1 vs. PC2), (c) loadings line plot for both PCs. Symbols represent the archaeological sites: ■ SAP, ◆ EM1, ▲ EMA, ■ FEM, ▼ FI, ◀ T1, ● blanks.

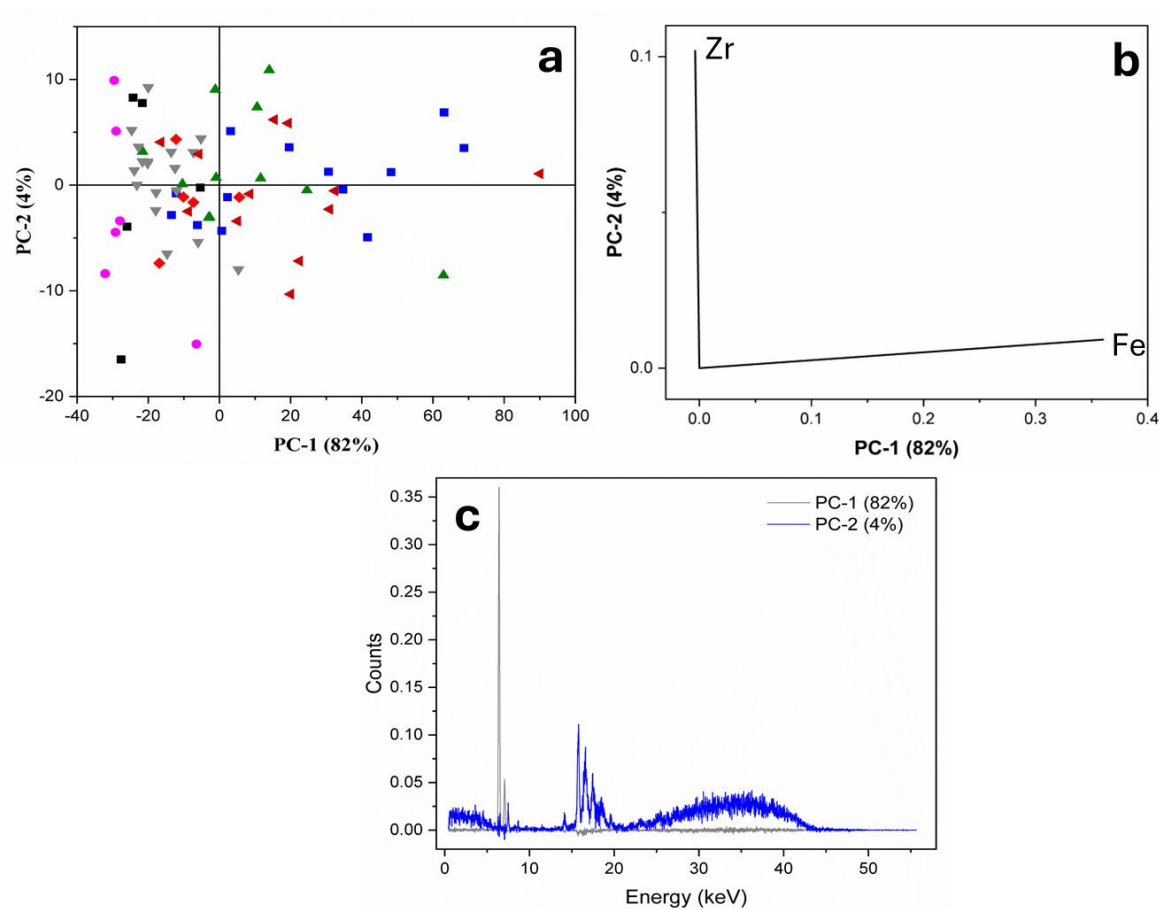


Figure S15. PCA results for the pXRF spectra obtained with the Low filter. (a) Scores plot (PC1 vs. PC2), (b) loadings line plot (PC1 vs. PC2), (c) loadings line plot for both PCs. Symbols represent the archaeological sites: ■ SAP, ◆ EM1, ▲ EMA, ■ FEM, ▼ FI, ◀ T1, ● blanks.

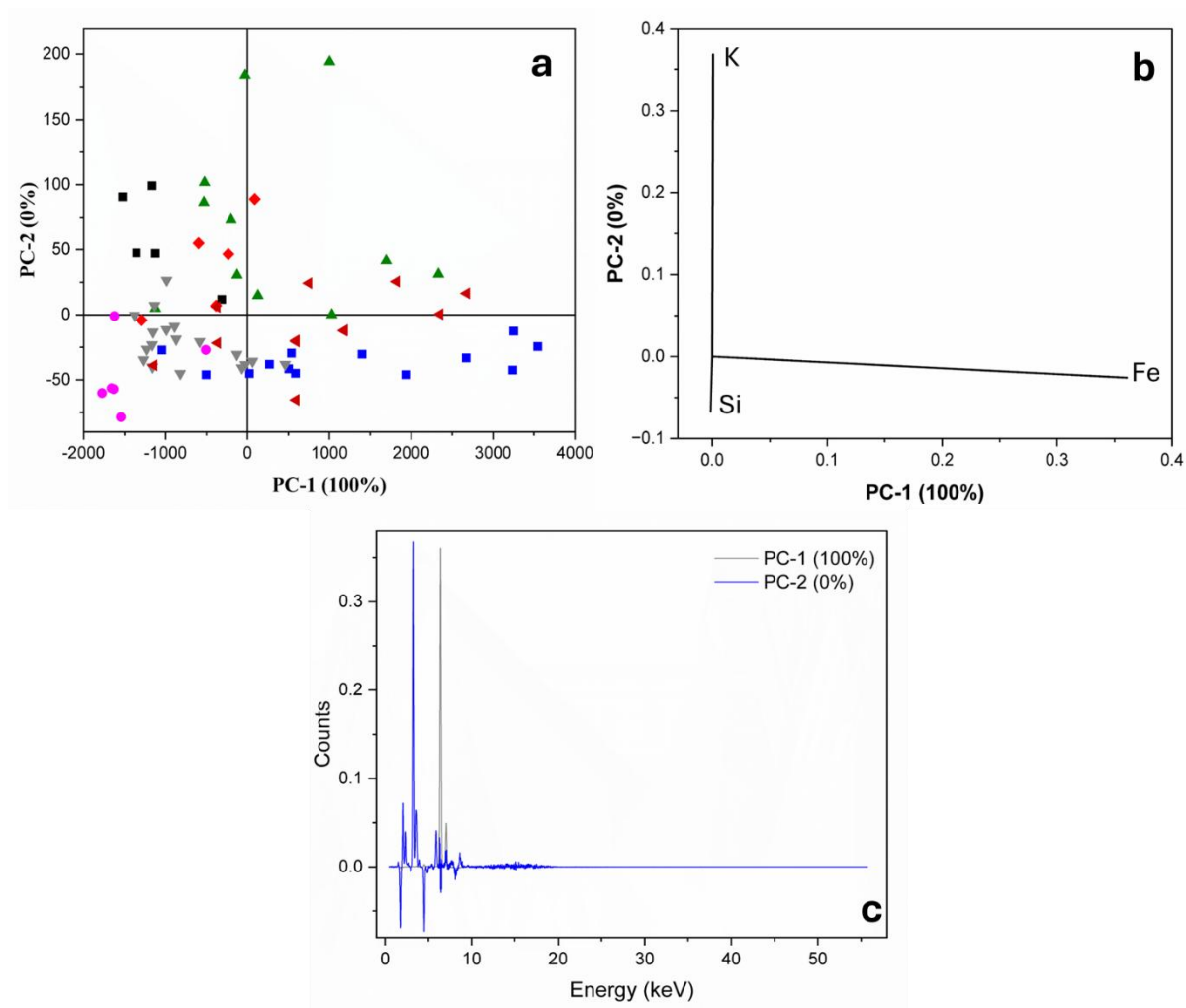


Figure S16. PCA results for the pXRF spectra obtained with the High filter. (a) Scores plot (PC1 vs. PC2), (b) loadings line plot (PC1 vs. PC2), (c) loadings line plot for both PCs. Symbols represent the archaeological sites: ■ SAP, ◆ EM1, ▲ EMA, ■ FEM, ▼ FI, ▲ T1, ● blanks.

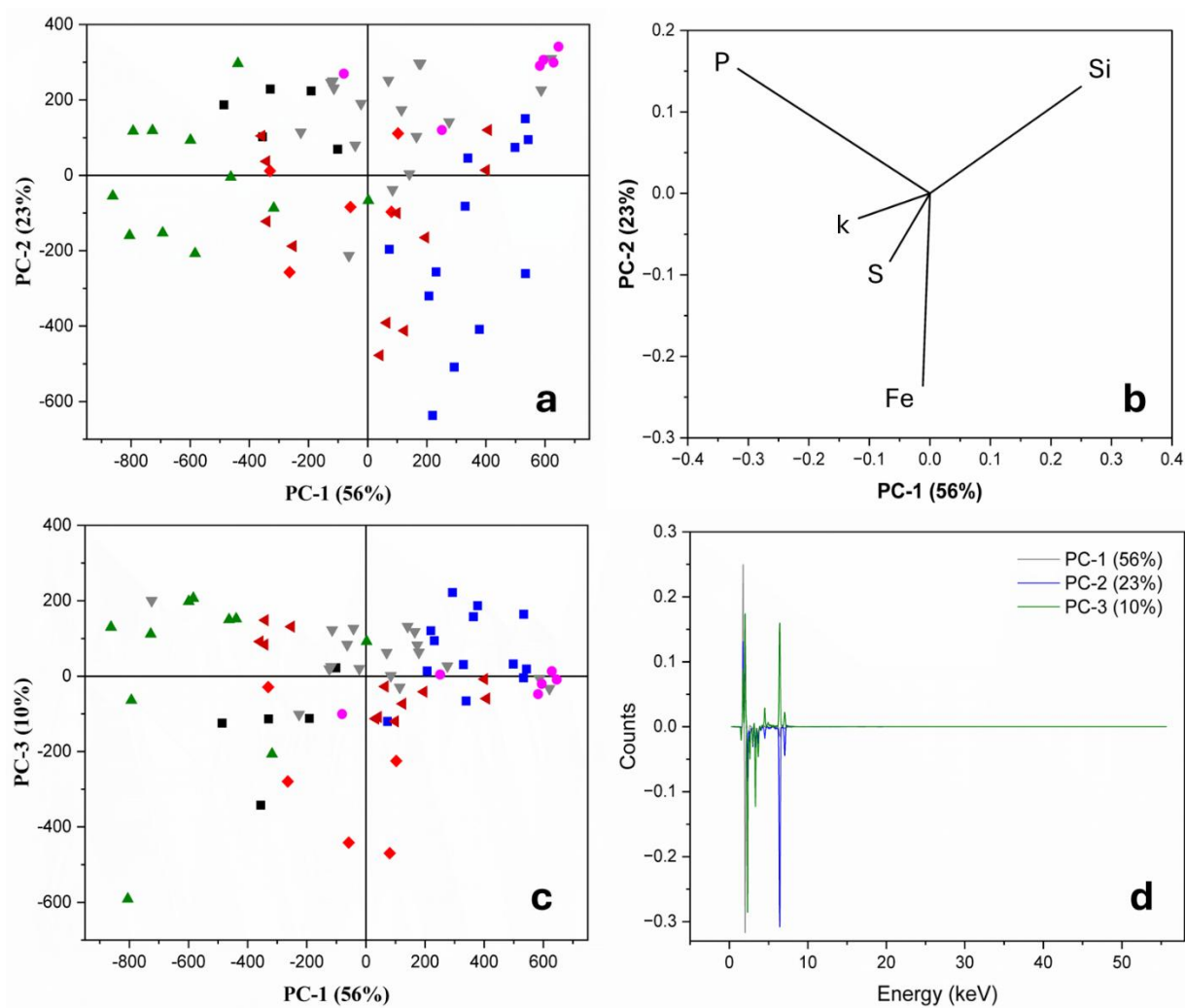


Figure S17. PCA results for the pXRF spectra obtained with the Light filter. (a) Scores plot (PC1 vs. PC2), (b) loadings line plot (PC1 vs. PC2), (c) scores plot (PC1 vs. PC3), (d) loadings line plot for all three PCs. Symbols represent the archaeological sites: ■ SAP, ◆ EM1, ▲ EMA, ■ FEM, ▼ FI, ▲ T1, ● blanks.

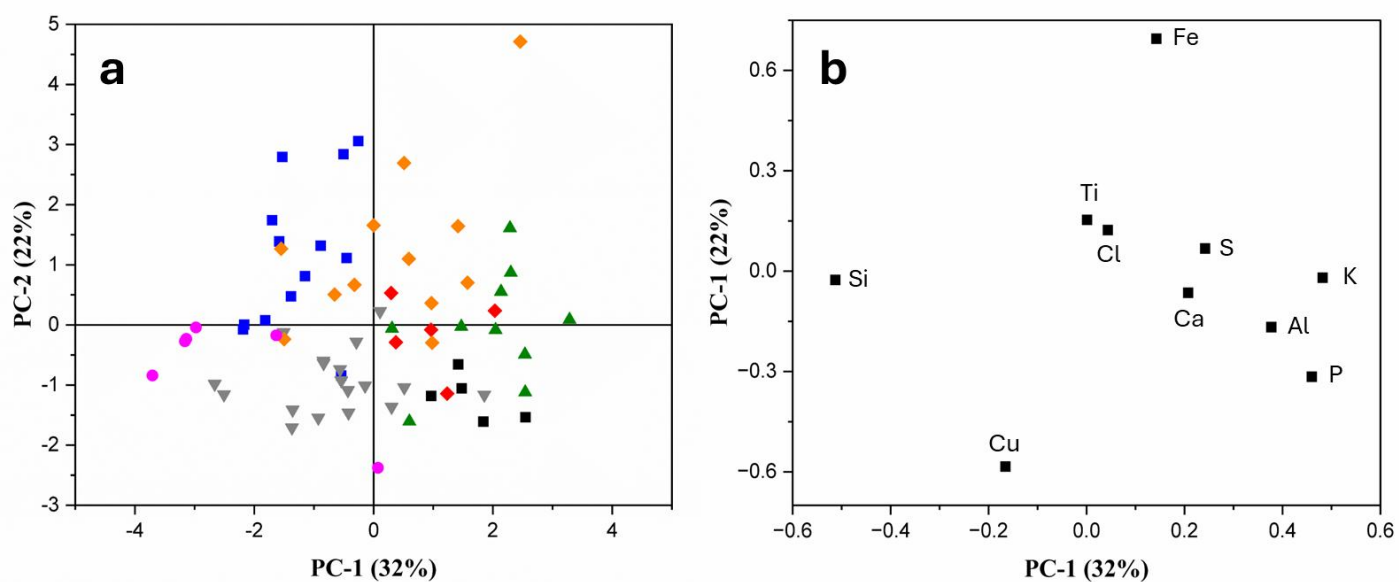


Figure S18. PCA results based on the pXRF peak intensities of rock art samples from six sites: (a) scores plot (PC1 vs. PC2), (b) 2D loadings scatter plot. Symbols represent the archaeological sites: ■ SAP, ◆ EM1, ▲ EMA, ■ FEM, ▼ FI, ▲ T1, ● blanks.