*Supplementary information for:*

The environmental impact of a pre-Columbian city based on geochemical insights from lake sediment cores recovered near Cahokia

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Table S1. Age model

|  |  |  |  |
| --- | --- | --- | --- |
| Depth (cm) | Min 95% | Max 95% | Best (yr BP\*) |
| 0 | -68 | -63 | -65 |
| 1 | -65 | -62 | -63 |
| 2 | -63 | -60 | -61 |
| 3 | -61 | -58 | -59 |
| 4 | -59 | -56 | -57 |
| 5 | -57 | -54 | -55 |
| 6 | -55 | -52 | -53 |
| 7 | -53 | -50 | -51 |
| 8 | -50 | -48 | -49 |
| 9 | -48 | -45 | -47 |
| 10 | -46 | -43 | -44 |
| 11 | -43 | -40 | -42 |
| 12 | -41 | -37 | -39 |
| 13 | -38 | -34 | -36 |
| 14 | -36 | -31 | -33 |
| 15 | -33 | -27 | -30 |
| 16 | -31 | -23 | -27 |
| 17 | -28 | -19 | -23 |
| 18 | -25 | -15 | -20 |
| 19 | -22 | -10 | -16 |
| 20 | -20 | -5 | -12 |
| 21 | -17 | 0 | -8 |
| 22 | -14 | 5 | -4 |
| 23 | -11 | 10 | 0 |
| 24 | -8 | 16 | 4 |
| 25 | -5 | 21 | 9 |
| 26 | -2 | 27 | 13 |
| 27 | 1 | 33 | 18 |
| 28 | 5 | 39 | 22 |
| 29 | 7 | 45 | 27 |
| 30 | 11 | 51 | 32 |
| 31 | 14 | 58 | 37 |
| 32 | 17 | 64 | 42 |
| 33 | 20 | 71 | 47 |
| 34 | 23 | 77 | 52 |
| 35 | 27 | 84 | 57 |
| 36 | 30 | 90 | 62 |
| 37 | 34 | 97 | 67 |
| 38 | 37 | 103 | 72 |
| 39 | 40 | 110 | 77 |
| 40 | 44 | 116 | 82 |
| 41 | 47 | 122 | 87 |
| 42 | 51 | 128 | 92 |
| 43 | 55 | 135 | 97 |
| 44 | 58 | 140 | 102 |
| 45 | 62 | 147 | 107 |
| 46 | 66 | 152 | 112 |
| 47 | 70 | 158 | 117 |
| 48 | 74 | 164 | 122 |
| 49 | 78 | 170 | 127 |
| 50 | 82 | 176 | 132 |
| 51 | 85 | 182 | 137 |
| 52 | 89 | 187 | 142 |
| 53 | 93 | 192 | 147 |
| 54 | 97 | 198 | 151 |
| 55 | 101 | 203 | 156 |
| 56 | 105 | 209 | 161 |
| 57 | 109 | 214 | 166 |
| 58 | 113 | 219 | 171 |
| 59 | 117 | 225 | 176 |
| 60 | 121 | 230 | 180 |
| 61 | 125 | 235 | 185 |
| 62 | 129 | 240 | 190 |
| 63 | 134 | 245 | 195 |
| 64 | 138 | 249 | 199 |
| 65 | 142 | 254 | 204 |
| 66 | 146 | 259 | 209 |
| 67 | 150 | 264 | 213 |
| 68 | 154 | 268 | 218 |
| 69 | 158 | 273 | 223 |
| 70 | 163 | 277 | 227 |
| 71 | 167 | 282 | 232 |
| 72 | 171 | 287 | 236 |
| 73 | 176 | 292 | 241 |
| 74 | 180 | 296 | 245 |
| 75 | 185 | 300 | 249 |
| 76 | 189 | 304 | 254 |
| 77 | 193 | 309 | 258 |
| 78 | 197 | 314 | 263 |
| 79 | 202 | 319 | 267 |
| 80 | 206 | 323 | 271 |
| 81 | 211 | 327 | 275 |
| 82 | 215 | 331 | 280 |
| 83 | 219 | 335 | 284 |
| 84 | 224 | 339 | 288 |
| 85 | 228 | 343 | 292 |
| 86 | 233 | 347 | 296 |
| 87 | 237 | 351 | 300 |
| 88 | 241 | 354 | 304 |
| 89 | 246 | 358 | 308 |
| 90 | 250 | 362 | 312 |
| 91 | 254 | 366 | 316 |
| 92 | 258 | 370 | 320 |
| 93 | 262 | 373 | 324 |
| 94 | 266 | 377 | 327 |
| 95 | 270 | 380 | 331 |
| 96 | 275 | 384 | 335 |
| 97 | 279 | 388 | 338 |
| 98 | 283 | 392 | 342 |
| 99 | 287 | 396 | 346 |
| 100 | 291 | 399 | 349 |
| 101 | 295 | 403 | 353 |
| 102 | 299 | 406 | 356 |
| 103 | 303 | 409 | 359 |
| 104 | 308 | 412 | 363 |
| 105 | 312 | 415 | 366 |
| 106 | 317 | 418 | 370 |
| 107 | 321 | 421 | 373 |
| 108 | 325 | 424 | 376 |
| 109 | 329 | 428 | 379 |
| 110 | 333 | 431 | 383 |
| 111 | 337 | 434 | 386 |
| 112 | 341 | 437 | 389 |
| 113 | 345 | 441 | 392 |
| 114 | 349 | 445 | 395 |
| 115 | 353 | 448 | 399 |
| 116 | 356 | 451 | 402 |
| 117 | 360 | 455 | 405 |
| 118 | 364 | 458 | 408 |
| 119 | 368 | 461 | 411 |
| 120 | 372 | 464 | 414 |
| 121 | 376 | 468 | 417 |
| 122 | 380 | 472 | 421 |
| 123 | 384 | 474 | 424 |
| 124 | 388 | 477 | 427 |
| 125 | 392 | 481 | 430 |
| 126 | 396 | 485 | 433 |
| 127 | 400 | 488 | 437 |
| 128 | 404 | 492 | 440 |
| 129 | 408 | 495 | 443 |
| 130 | 413 | 499 | 446 |
| 131 | 417 | 503 | 450 |
| 132 | 421 | 506 | 453 |
| 133 | 425 | 510 | 456 |
| 134 | 429 | 513 | 460 |
| 135 | 434 | 517 | 463 |
| 136 | 438 | 520 | 466 |
| 137 | 443 | 523 | 470 |
| 138 | 447 | 527 | 473 |
| 139 | 451 | 531 | 477 |
| 140 | 456 | 534 | 480 |
| 141 | 460 | 538 | 484 |
| 142 | 464 | 542 | 488 |
| 143 | 468 | 546 | 491 |
| 144 | 472 | 550 | 495 |
| 145 | 476 | 553 | 499 |
| 146 | 481 | 556 | 503 |
| 147 | 484 | 560 | 506 |
| 148 | 489 | 563 | 510 |
| 149 | 493 | 567 | 514 |
| 150 | 496 | 570 | 518 |
| 151 | 500 | 574 | 522 |
| 152 | 504 | 577 | 527 |
| 153 | 508 | 581 | 531 |
| 154 | 512 | 585 | 535 |
| 155 | 516 | 589 | 540 |
| 156 | 519 | 593 | 544 |
| 157 | 523 | 596 | 548 |
| 158 | 526 | 600 | 553 |
| 159 | 530 | 604 | 558 |
| 160 | 533 | 608 | 562 |
| 161 | 537 | 612 | 567 |
| 162 | 541 | 617 | 571 |
| 163 | 544 | 621 | 576 |
| 164 | 548 | 624 | 581 |
| 165 | 552 | 628 | 586 |
| 166 | 556 | 632 | 590 |
| 167 | 559 | 636 | 595 |
| 168 | 563 | 640 | 600 |
| 169 | 566 | 644 | 605 |
| 170 | 570 | 648 | 609 |
| 171 | 574 | 652 | 614 |
| 172 | 578 | 656 | 619 |
| 173 | 582 | 660 | 623 |
| 174 | 586 | 664 | 628 |
| 175 | 590 | 668 | 633 |
| 176 | 593 | 673 | 637 |
| 177 | 597 | 677 | 642 |
| 178 | 601 | 682 | 647 |
| 179 | 605 | 686 | 651 |
| 180 | 609 | 691 | 656 |
| 181 | 613 | 695 | 660 |
| 182 | 617 | 700 | 665 |
| 183 | 621 | 704 | 669 |
| 184 | 625 | 709 | 674 |
| 185 | 629 | 713 | 678 |
| 186 | 633 | 718 | 683 |
| 187 | 637 | 722 | 687 |
| 188 | 641 | 727 | 692 |
| 189 | 646 | 733 | 696 |
| 190 | 650 | 738 | 701 |
| 191 | 654 | 743 | 705 |
| 192 | 659 | 748 | 710 |
| 193 | 663 | 753 | 714 |
| 194 | 667 | 758 | 719 |
| 195 | 672 | 763 | 723 |
| 196 | 676 | 768 | 728 |
| 197 | 681 | 773 | 732 |
| 198 | 685 | 778 | 736 |
| 199 | 690 | 783 | 741 |
| 200 | 694 | 787 | 745 |
| 201 | 698 | 792 | 750 |
| 202 | 702 | 797 | 754 |
| 203 | 707 | 802 | 759 |
| 204 | 712 | 806 | 763 |
| 205 | 716 | 811 | 767 |
| 206 | 721 | 816 | 772 |
| 207 | 724 | 820 | 776 |
| 208 | 729 | 825 | 781 |
| 209 | 733 | 830 | 785 |
| 210 | 738 | 835 | 790 |
| 211 | 743 | 840 | 794 |
| 212 | 748 | 844 | 799 |
| 213 | 752 | 849 | 803 |
| 214 | 757 | 853 | 808 |
| 215 | 762 | 858 | 812 |
| 216 | 767 | 863 | 817 |
| 217 | 771 | 867 | 821 |
| 218 | 776 | 872 | 826 |
| 219 | 780 | 876 | 830 |
| 220 | 785 | 881 | 835 |
| 221 | 790 | 887 | 840 |
| 222 | 795 | 892 | 844 |
| 223 | 800 | 896 | 849 |
| 224 | 804 | 901 | 853 |
| 225 | 809 | 905 | 858 |
| 226 | 814 | 910 | 863 |
| 227 | 818 | 915 | 868 |
| 228 | 823 | 920 | 872 |
| 229 | 828 | 925 | 877 |
| 230 | 833 | 930 | 882 |
| 231 | 838 | 935 | 887 |
| 232 | 842 | 940 | 892 |
| 233 | 847 | 945 | 896 |
| 234 | 852 | 951 | 901 |
| 235 | 856 | 956 | 906 |
| 236 | 862 | 961 | 911 |
| 237 | 867 | 967 | 916 |
| 238 | 872 | 973 | 921 |
| 239 | 877 | 979 | 927 |
| 240 | 883 | 984 | 932 |
| 241 | 887 | 990 | 937 |
| 242 | 892 | 996 | 942 |
| 243 | 897 | 1001 | 947 |
| 244 | 902 | 1007 | 953 |
| 245 | 907 | 1013 | 958 |
| 246 | 911 | 1018 | 963 |
| 247 | 916 | 1023 | 968 |
| 248 | 921 | 1030 | 974 |
| 249 | 926 | 1036 | 979 |
| 250 | 931 | 1042 | 985 |
| 251 | 936 | 1047 | 990 |
| 252 | 941 | 1054 | 996 |
| 253 | 946 | 1060 | 1001 |
| 254 | 951 | 1067 | 1007 |
| 255 | 957 | 1073 | 1012 |
| 256 | 962 | 1079 | 1018 |
| 257 | 967 | 1085 | 1023 |
| 258 | 973 | 1092 | 1029 |
| 259 | 978 | 1099 | 1035 |
| 260 | 984 | 1105 | 1040 |
| 261 | 989 | 1112 | 1046 |
| 262 | 995 | 1119 | 1052 |
| 263 | 1000 | 1125 | 1057 |
| 264 | 1005 | 1131 | 1063 |
| 265 | 1011 | 1138 | 1069 |
| 266 | 1017 | 1144 | 1075 |
| 267 | 1023 | 1151 | 1081 |
| 268 | 1028 | 1158 | 1086 |
| 269 | 1033 | 1165 | 1092 |
| 270 | 1039 | 1172 | 1098 |
| 271 | 1044 | 1179 | 1104 |
| 272 | 1050 | 1186 | 1110 |
| 273 | 1055 | 1193 | 1116 |
| 274 | 1061 | 1200 | 1122 |
| 275 | 1066 | 1207 | 1128 |
| 276 | 1072 | 1214 | 1134 |
| 277 | 1077 | 1221 | 1140 |
| 278 | 1083 | 1228 | 1146 |
| 279 | 1088 | 1235 | 1152 |
| 280 | 1094 | 1242 | 1158 |
| 281 | 1100 | 1249 | 1164 |
| 282 | 1105 | 1256 | 1170 |
| 283 | 1111 | 1263 | 1176 |
| 284 | 1117 | 1270 | 1182 |
| 285 | 1122 | 1277 | 1188 |
| 286 | 1128 | 1285 | 1194 |
| 287 | 1134 | 1292 | 1200 |
| 288 | 1139 | 1299 | 1207 |
| 289 | 1144 | 1306 | 1213 |
| 290 | 1150 | 1314 | 1219 |
| 291 | 1155 | 1321 | 1225 |
| 292 | 1161 | 1328 | 1231 |
| 293 | 1166 | 1336 | 1237 |
| 294 | 1171 | 1343 | 1244 |
| 295 | 1176 | 1350 | 1250 |
| 296 | 1182 | 1357 | 1256 |
| 297 | 1187 | 1364 | 1262 |
| 298 | 1192 | 1371 | 1268 |
| 299 | 1198 | 1378 | 1275 |
| 300 | 1203 | 1385 | 1281 |
| 301 | 1208 | 1392 | 1287 |
| 302 | 1213 | 1399 | 1293 |
| 303 | 1219 | 1406 | 1300 |
| 304 | 1224 | 1413 | 1306 |
| 305 | 1228 | 1421 | 1312 |
| 306 | 1233 | 1429 | 1318 |
| 307 | 1238 | 1436 | 1325 |
| 308 | 1244 | 1444 | 1331 |
| 309 | 1250 | 1451 | 1337 |
| 310 | 1255 | 1459 | 1343 |
| 311 | 1260 | 1466 | 1350 |
| 312 | 1264 | 1474 | 1356 |
| 313 | 1268 | 1481 | 1362 |
| 314 | 1273 | 1489 | 1369 |
| 315 | 1278 | 1496 | 1375 |
| 316 | 1283 | 1504 | 1381 |
| 317 | 1288 | 1512 | 1387 |
| 318 | 1292 | 1519 | 1394 |
| 319 | 1297 | 1527 | 1400 |
| 320 | 1302 | 1534 | 1406 |
| 321 | 1306 | 1542 | 1413 |
| 322 | 1311 | 1550 | 1419 |
| 323 | 1316 | 1558 | 1425 |
| 324 | 1322 | 1566 | 1431 |
| 325 | 1327 | 1573 | 1438 |
| 326 | 1333 | 1581 | 1444 |
| 327 | 1338 | 1588 | 1450 |
| 328 | 1342 | 1596 | 1456 |
| 329 | 1347 | 1604 | 1463 |
| 330 | 1352 | 1612 | 1469 |
| 331 | 1356 | 1620 | 1475 |
| 332 | 1361 | 1628 | 1482 |
| 333 | 1366 | 1636 | 1488 |
| 334 | 1372 | 1643 | 1494 |
| 335 | 1377 | 1651 | 1500 |
| 336 | 1383 | 1659 | 1507 |
| 337 | 1388 | 1667 | 1513 |
| 338 | 1393 | 1675 | 1519 |
| 339 | 1398 | 1683 | 1526 |
| 340 | 1403 | 1691 | 1532 |

\*Years before AD 1950 (yr BP).

|  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| |  |  |  |  |  |  |  | | --- | --- | --- | --- | --- | --- | --- | | Table S2. United States census records of human populations | | | | | | | | Year (AD) | Chouteau  77 km2 | Edwardsville  51 km2 | Collinsville  38 km2 | Nameoki  57 km2 | Total  population | Population  per km2 | | 2010 | 8226 | 37657 | 36265 | 12685 | 94833 | 425.26 | | 2000 | 8010 | 33731 | 32954 | 11186 | 85881 | 385.12 | | 1990 | 7792 | 26665 | 29842 | 12492 | 76791 | 344.35 | | 1980 | 8627 | 23249 | 27158 | 13606 | 72640 | 325.74 | | 1970 | 8521 | 18166 | 26373 | 13872 | 66932 | 300.14 | | 1960 | 6194 | 15975 | 20122 | 9210 | 51501 | 230.95 | | 1950 | 3458 | 13459 | 15082 | 9230 | 41229 | 184.88 | | 1940 | 2311 | 11194 | 12311 | 6669 | 32485 | 145.67 | | 1930 | 1391 | 11252 | 12084 | 21817 | 46544 | 208.72 | | 1920 | 818 | 9281 | 12084 | 11110 | 33293 | 149.30 | | 1910 | 768 | 8705 | 10607 | 6050 | 26130 | 117.17 | | 1900 | 875 | 6907 | 5812 | 2834 | 16428 | 73.67 | | 1890 | 954 | 4844 | 5224 | 1558 | 12580 | 56.41 | | 1880 | 1004 | 4133 | 4577 | 1466 | 11180 | 50.13 | | 1870 |  | 2193 |  |  | 2193 | 9.83 | | 1860 |  | 53 |  |  | 53 | 0.24 | | 1850 |  | 677 |  |  | 677 | 3.04 | |



Figure S1. Magnetic susceptibility data from the sediment cores measured at 0.2 cm intervals. Magnetic susceptibility peaks and visually distinctive layers are used to stratigraphically correlate (colored lines) between the individual drives to develop a composite core depth. Core A-12 and core E-13 were analyzed in this study and dated with eight radiocarbon dates.



Figure S2. X-ray diffraction spectra for selected sediment sub-samples from above (A12 14.75 cm; A12 26 cm), within (E13 D2 60-61 cm [212.5 cm]), and below (E13 D3 60-61 cm [314.5 cm]) the disturbance layer detected from AD 1150 to 1220.