**The Holocene lake-evaporation history of the afro-alpine Lake Garba Guracha in the Bale Mountains, Ethiopia based on δ18O records of sugar biomarkers and diatoms**

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*Supplementary Data-*

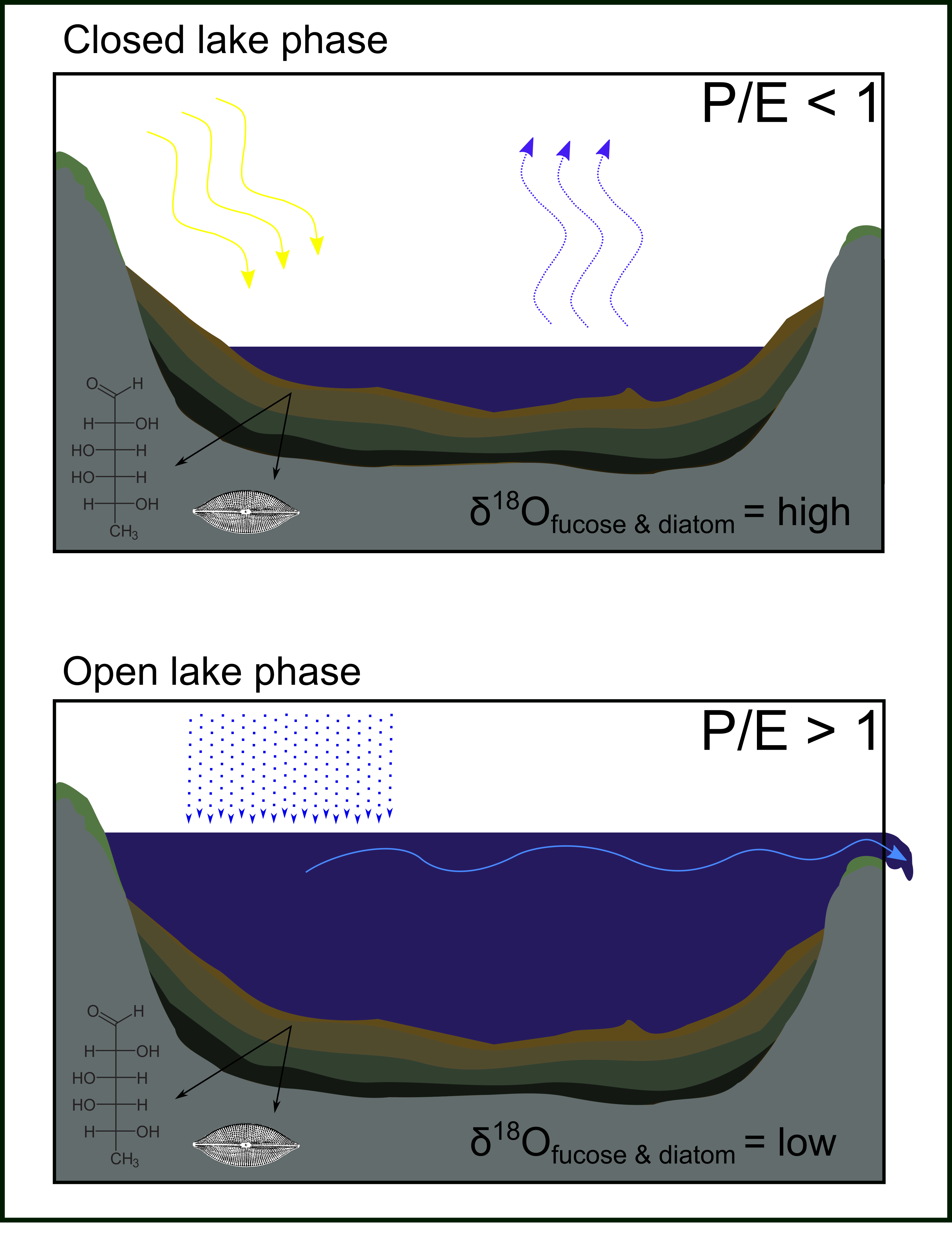
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**Table 1:** Measured δ18Odiatom values in the Garba Guracha sediment core: calculated contamination (ccont), δ18O values corrected for contamination (δ18OAl2O3corr), and standard deviation SD (δ18O s.d. N).

|  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| Sample ID | Depth  [cm] | | Age  [cal. BP] | | Al2O3 | SiO2 | δ18O | δ18O  [‰] | | δ18O | δ18O mean  [‰] | δ18O s.d. S | δ18O s.d. N | Ccont | δ18O  Al2O3corr  [‰] | 18Ocorr [‰] |
| BAL-01 | 105 | | 931 | | 0.91 | 98.46 | 41.59 | 41.54 | |  | 41.57 | 0.04 | 0.03 | 5.51% | 43.39 | -1.82 |
| BAL-02 | 135 | | 1442 | | 1.89 | 96.89 | 40.77 | 40.40 | |  | 40.58 | 0.26 | 0.18 | 11.43% | 44.49 | -3.91 |
| BAL-03 | 185 | | 2136 | | 0.95 | 98.74 | 40.38 | 41.41 | | 40.98 | 40.93 | 0.51 | 0.42 | 5.76% | 42.80 | -1.87 |
| BAL-04 | 245 | | 2962 | | 1.16 | 98.58 | 40.41 | 40.81 | | 40.48 | 40.57 | 0.21 | 0.17 | 6.97% | 42.83 | -2.27 |
| BAL-05 | 283 | | 3508 | | 1.01 | 97.88 | 43.05 | 42.37 | |  | 42.71 | 0.48 | 0.34 | 6.10% | 44.81 | -2.10 |
| BAL-06 | 343 | | 4259 | | 0.60 | 98.59 | 42.11 | 41.51 | |  | 41.81 | 0.42 | 0.30 | 3.61% | 42.99 | -1.18 |
| BAL-07 | 363 | | 4540 | | 0.79 | 99.04 | 40.83 | 40.35 | |  | 40.59 | 0.34 | 0.24 | 4.79% | 42.11 | -1.52 |
| BAL-08 | 403 | | 5167 | | 0.72 | 99.13 | 41.23 |  | |  | 41.23 |  |  | 4.35% | 42.64 | -1.41 |
| BAL-09 | 503 | | 6601 | | 1.51 | 98.07 | 38.22 | 38.16 | |  | 38.19 | 0.04 | 0.03 | 9.08% | 40.97 | -2.78 |
| BAL-10 | 523 | | 6875 | | 0.63 | 98.68 | 37.29 | 37.19 | |  | 37.24 | 0.07 | 0.05 | 3.80% | 38.31 | -1.06 |
| BAL-11 | 582 | | 7680 | | 0.38 | 99.29 | 36.48 | 36.18 | |  | 36.33 | 0.21 | 0.15 | 2.30% | 36.94 | -0.61 |
| BAL-12 | 632 | | 8407 | | 0.66 | 98.71 | 36.39 | 35.63 | | 36.42 | 36.40 | 0.02 | 0.01 | 4.01% | 37.49 | -1.09 |
| BAL-13 | 680 | | 9225 | | 0.62 | 98.95 | 35.90 | 36.27 | |  | 36.09 | 0.26 | 0.19 | 3.72% | 37.08 | -0.99 |
| BAL-14 | 720 | | 9757 | | 1.53 | 96.43 | 35.97 | 35.60 | |  | 35.79 | 0.26 | 0.18 | 9.24% | 38.38 | -2.59 |
| BAL-15 | 784 | | 10296 | | 2.28 | 95.74 | 35.61 | 35.70 | |  | 35.66 | 0.06 | 0.04 | 13.74% | 39.69 | -4.03 |
| BAL-16 | 804 | | 10457 | | 0.97 | 98.51 | 37.03 | 37.33 | |  | 37.18 | 0.21 | 0.15 | 5.86% | 38.85 | -1.67 |
|  |  | |  | | *EDX* | *EDX* | *single measurements* | | | | *statistics* | | | *final corrected values* | | |
| Heavy fraction (>2.5g/cm3)  (for Contamination Correction) | | | | |  | Al2O3 | SiO2 | | δ18O | |
| BAL-01 | 105 | | 931 | |  | 16.05 | 70.55 | | 10.38 | |
| BAL-05 | 283 | | 3508 | |  | 16.04 | 67.82 | | 10.18 | |  | | | | | | |  |  | | |  | |
| BAL-09 | 503 | | 6601 | |  | 17.61 | 66.53 | | 10.41 | |  | | | | | | |  | |  |  | |
|  |  | | |  | mean: | 16.57 | 68.30 | | 10.32 | |
|  |  | | |  |  | 0.1657 |  |  | | |
|  |  | | |  |  | *for % cont* | | | | |
|  | |  | | |  | | |

**Table 2:** Measured δ18Ofuc values in the Garba Guracha sediment core: δ18Ofuc (δ18Ofuc) and standard error mean SEM (SEM).

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| Sample ID | Depth min  [cm] | Depth max  [cm] | Depth mean  [cm] | Age  [cal. Yr. BP] | δ18Ofuc  [‰] | SEM  [‰] |
| 26169 | 70 | 79 | 75 | 356 | 33.25 | 0.50 |
| 26170 | 80 | 89 | 85 | 531 | 30.02 | 0.02 |
| 26171 | 90 | 99 | 95 | 715 | 32.06 | 0.23 |
| 26172 | 100 | 109 | 105 | 931 | 33.21 | 0.16 |
| 26173 | 110 | 119 | 115 | 1124 | 33.98 | 0.36 |
| 26174 | 120 | 129 | 125 | 1296 | 33.81 | 0.34 |
| 26175 | 130 | 139 | 135 | 1442 | 33.19 | 0.37 |
| 26176 | 140 | 149 | 145 | 1588 | 34.31 | 0.33 |
| 26177 | 150 | 159 | 155 | 1716 | 34.17 | 0.07 |
| 26178 | 160 | 169 | 165 | 1850 | 33.19 | 0.10 |
| 26179 | 170 | 179 | 175 | 1997 | 33.35 | 0.60 |
| 26180 | 180 | 189 | 185 | 2136 | 35.37 | 0.76 |
| 26181 | 190 | 199 | 195 | 2280 | 34.10 | 0.54 |
| 26182 | 200 | 209 | 205 | 2411 | 34.21 | 0.35 |
| 26183 | 210 | 219 | 215 | 2550 | 32.30 | 0.38 |
| 26184 | 220 | 229 | 225 | 2694 | 33.41 | 0.55 |
| 26185 | 230 | 239 | 235 | 2824 | 32.99 | 0.18 |
| 26186 | 240 | 249 | 245 | 2962 | 33.53 | 0.32 |
| 26187 | 250 | 259 | 255 | 3121 | 31.42 | 0.42 |
| 26188 | 260 | 267 | 264 | 3251 | 33.77 | 0.62 |
| 26189 | 268 | 277 | 273 | 3391 | 34.34 | 0.58 |
| 26190 | 278 | 287 | 283 | 3508 | 33.62 | 0.48 |
| 26191 | 288 | 297 | 293 | 3631 | 34.80 | 0.18 |
| 26192 | 298 | 307 | 303 | 3764 | 34.30 | 0.19 |
| 26193 | 308 | 317 | 313 | 3887 | 32.99 | 0.10 |
| 26194 | 318 | 327 | 323 | 3993 | 33.65 | 0.29 |
| 26195 | 328 | 337 | 333 | 4111 | 30.66 | 0.68 |
| 26196 | 338 | 347 | 343 | 4259 | 32.87 | 0.32 |
| 26197 | 348 | 357 | 353 | 4402 | 31.38 | 0.40 |
| 26198 | 358 | 367 | 363 | 4540 | 29.68 | 0.66 |
| 26302 | 378 | 387 | 383 | 4862 | 34.51 | 0.56 |
| 26303 | 388 | 397 | 393 | 5006 | 32.20 | 1.36 |
| 26304 | 398 | 407 | 403 | 5167 | 27.94 | 0.41 |
| 26305 | 408 | 417 | 413 | 5326 | 32.17 | 0.87 |
| 26306 | 418 | 427 | 423 | 5472 | 34.98 | 0.57 |
| 26307 | 428 | 437 | 433 | 5616 | 30.80 | 0.85 |
| 26308 | 438 | 447 | 443 | 5761 | 29.25 | 0.84 |
| 26309 | 448 | 457 | 453 | 5897 | 29.47 | 0.42 |
| 26310 | 458 | 467 | 463 | 6028 | 30.61 | 0.69 |
| 26199 | 468 | 477 | 473 | 6174 | 29.85 | 0.26 |
| 26200 | 478 | 487 | 483 | 6311 | 29.71 | 0.84 |
| 26201 | 488 | 497 | 493 | 6449 | 30.87 | 0.43 |
| 26202 | 498 | 507 | 503 | 6601 | 30.50 | 0.61 |
| 26203 | 508 | 517 | 513 | 6748 | 30.33 | 0.45 |
| 26204 | 518 | 527 | 523 | 6875 | 31.04 | 0.33 |
| 26205 | 528 | 537 | 533 | 6987 | 31.67 | 0.10 |
| 26206 | 538 | 547 | 543 | 7109 | 30.75 | 0.23 |
| 26207 | 548 | 557 | 553 | 7267 | 29.68 | 0.13 |
| 26208 | 558 | 566 | 562 | 7413 | 27.83 | 0.11 |
| 26209 | 567 | 576 | 572 | 7557 | 30.41 | 0.30 |
| 26210 | 577 | 586 | 582 | 7680 | 26.92 | 0.21 |
| 26211 | 587 | 596 | 592 | 7806 | 26.63 | 0.39 |
| 26212 | 597 | 606 | 602 | 7945 | 27.26 | 0.06 |
| 26213 | 607 | 616 | 612 | 8107 | 27.19 | 0.38 |
| 26214 | 617 | 626 | 622 | 8258 | 26.82 | 0.07 |
| 26215 | 627 | 636 | 632 | 8407 | 28.88 | 0.71 |
| 26216 | 637 | 646 | 642 | 8595 | 24.73 | 0.17 |
| 26217 | 647 | 656 | 652 | 8791 | 26.31 | 0.26 |
| 26218 | 657 | 664 | 661 | 8952 | 26.98 | 0.14 |
| 26219 | 665 | 674 | 670 | 9077 | 28.09 | 0.27 |
| 26220 | 675 | 684 | 680 | 9225 | 30.20 | 0.17 |
| 26221 | 685 | 694 | 690 | 9392 | 29.23 | 0.23 |
| 26222 | 695 | 704 | 700 | 9512 | 30.16 | 0.54 |
| 26223 | 705 | 714 | 710 | 9642 | 31.75 | 0.68 |
| 26225 | 725 | 734 | 730 | 9838 | 28.65 | 0.81 |
| 26226 | 735 | 744 | 740 | 9923 | 29.81 | 0.37 |
| 26227 | 745 | 754 | 750 | 9995 | 30.25 | 1.40 |
| 26228 | 755 | 758 | 757 | 10060 | 33.21 | 0.75 |
| 26229 | 759 | 768 | 764 | 10124 | 34.47 | 0.96 |
| 26231 | 779 | 788 | 784 | 10296 | 35.85 | 0.19 |
| 26232 | 789 | 798 | 794 | 10377 | 36.20 | 0.42 |
| 26233 | 799 | 808 | 804 | 10457 | 33.71 | 0.79 |
| 26234 | 809 | 818 | 814 | 10537 | 33.28 | 0.74 |
| 26235 | 819 | 828 | 824 | 10613 | 31.50 | 0.93 |
| 26236 | 829 | 838 | 834 | 10693 | 31.65 | 1.32 |
| 26237 | 839 | 842 | 841 | 10749 | 27.12 | 0.71 |
| 26238 | 863 | 872 | 868 | 10967 | 29.87 | 0.68 |
| 26239 | 873 | 882 | 878 | 11040 | 32.15 | 0.24 |
| 26241 | 893 | 902 | 898 | 11186 | 34.05 | 0.71 |



**Fig. 5:** A schematic figure of evaporative enrichment of lake water in open and closed lake systems.

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**Fig. 6:** Scanning Electron Microscope picture of the diatom sample 26186 (245 cm depth)