Table 1 (Appendix)

Results of analyses performed by laboratories: 14C: Abo/Aarhus, CIRCE, CIRCe, ETHZ, Poznan, RICH, Milano-Bicocca and OSL: Milano-Bicocca and IRAMAT-CRP2A Bordeaux

Labor Codes -correspond to codes given by laboratories;

Samples – sub-samples and different fractions analyzed correspond to names shown in Figures 3 to 7.

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| **Fraction**  % | **δ13C**  **‰** | **δ18O**  **‰** | **%C** | **method** | **Sample (grain size range)** | **Reaction time** |

Fraction % -- fraction of total sample (where applicable)

δ13C and δ18O –stable isotopes analysis (where applicable)

% C—carbon content (where applicable)

|  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **Labor Code** | **Sample** | **14C age** | **1σ** | **Fraction**  % | **δ13C**  **‰** | **δ18O**  **‰** | **%C** | **method** | **Sample (grain size range)** | **Reaction time** |
| **#1 Finnish Mortar** |  |  |  |  |  |  |  |  |  |  |
| Åbo (Nagu 009Li) AA88083 | ABO\_L | 445 | 51 | 0.940 | -10.2 |  | 3.10 | 14C / 5% H3PO4 | lime lump,  fraction 46-75 µm | |
| Åbo (MDIC 1) AAR22287.1 | ABO\_1.1 | 463 | 25 | 0.154 | -13.9 |  | 8.67 | 14C / 85% H3PO4 | 46-75 µm | |
| AAR21043.1 | ABO\_1.2 | 482 | 25 | 0.273 | -11.1 |  |  |  | 46-75 µm |  |
| AAR21043.2 | ABO\_1.3 | 529 | 25 | 0.210 | -8.3 |  |  |  | 46-75 µm |  |
|  | ABO\_wood | **515** |  |  |  |  |  |  |  |  |
|  | CIRCE\_1\_susp | 628 | 29 |  |  |  |  |  |  |  |
|  | CIRCE\_1\_sand | 548 | 21 |  |  |  |  |  |  |  |
| ETH-62275 | ETHZ\_1.1 | 495 | 50 |  |  |  |  | 14C / H3PO4 | 46-75 µm | 1 - 3 sec |
|  | ETHZ\_1.2 | 395 | 50 |  |  |  |  |  | 46-75 µm | 4 - 6 sec |
|  | ETHZ\_1.3 | 569 | 59 |  |  |  |  |  | 46-75 µm | 6 - 9 sec |
|  | ETHZ\_1.4 | 535 | 57 |  |  |  |  |  | 46-75 µm | 10 - 12 sec |
| Poznań  MDIC 1/80-100/2s | POZN\_1.1 | 610 | 35 |  |  |  |  | 14C / H3PO4 | 80-100 µm | 0-2 sec fraction |
| MDIC 1/80-100/14s | POZN\_1.2 | 640 | 30 |  |  |  |  | 14C / H3PO4 | 80-100 µm | 2-14 sec fraction |
| MDIC 1/sus1 | POZN\_1.3 | 630 | 50 |  |  |  |  |  |  |  |
| MDIC1/sus2 | POZN\_1.4 | 505 | 30 |  |  |  |  |  |  |  |
| MDIC 1/sus2/2sek | POZN\_1.5 | 510 | 30 |  |  |  |  |  |  |  |
|  |  |  |  |  |  |  |  |  |  |  |
| RICH 21855  (HCl-200)  RICH-21855.1.1 | RICH\_1.1 | 493 | 34 | 0.005 | -24.7 |  |  | 14C / HCl |  | stepwise dissolution |
| RICH-21855.1.2 | RICH\_1.2 | 497 | 33 | 0.005 | -23.4 |  |  |  |
| RICH-21855.1.3 | RICH\_1.3 | 568 | 33 | 0.007 | -20.9 |  |  |  |
| RICH-21855.1.4 | RICH\_1.4 | 496 | 31 | 0.029 | -19.3 |  |  |  |
| RICH-21855.1.5 | RICH\_1.5 | 493 | 31 | 0.028 | -12.5 |  |  |  |
| RICH-21855.1.6 | RICH\_1.6 | 498 | 30 | 0.130 | -7.9 |  |  |  |
| RICH-21855.1.7 | RICH\_1.7 | 604 | 36 | 0.328 | -20.3 |  |  |  |
| RICH-21855.1.8 | RICH\_1.8 | 592 | 32 | 0.277 | -11.9 |  |  |  |
| Milano OSL | MIL\_OSL | 1040\* | 70 |  |  |  |  | OSL: 990±70AD |  | OSL (14C age simulated) |
| Milano 1C 14C | MIL\_C14 | 159 | 75 |  |  |  |  | 14C / 85% H3PO4 | <500 µm | 0-15 sec fraction |
| **#2 Mallorca Burial Lime** |  |  |  |  |  |  |  |  |  |  |
| Åbo  MDIC2 AAR22284.1 | ABO\_2.1 | 2378 | 25 | 0.053 | -24.7 | -13.0 | 10.50 | 14C / 85% H3PO4 | 46-75 µm | 0-8 sec |
| MDIC 2.2 AAR22284.2 | ABO\_2.2 | 2826 | 25 | 0.479 | -13.8 | -3.5 |  |  | 46-75 µm | 8-18 sec |
| MDIC 2.3 AAR22284.3 | ABO\_2.3 | 2792 | 27 | 0.079 | -18.6 | -9.7 |  |  | 46-75 µm | 18-86 sec |
| CIRCE IC2\_susp | CIRCE\_2\_susp | 3258 | 23 |  |  |  |  |  | Suspension from 2f<500 µm |  |
| CIRCE IC2\_BIS\_susp | CIRCE\_2BIS\_susp | 3052 | 23 |  |  |  |  |  |  |  |
| CIRCE IC2\_sand | CIRCE\_2\_sand | 3246 | 29 |  |  |  |  |  |  |  |
| CIRCe IC2\_SG1 | CIRCe\_2\_SG1 | 3157 | 44 |  |  |  |  |  | upper suspended fraction | |
| ETH-70605 | ETHZ\_2a.1 | 2345 | 144 |  |  |  |  | 14C / H3PO4 | 45-63 µm | 1 - 3 sec |
| fraction < 500 µm | ETHZ\_2a.2 | 2354 | 78 |  |  |  |  |  | 45-63 µm | 4 - 6 sec |
|  | ETHZ\_2a.3 | 2827 | 79 |  |  |  |  |  | 45-63 µm | 6 - 9 sec |
|  | ETHZ\_2a.4 | 3241 | 82 |  |  |  |  |  | 45-63 µm | 10 - 12 sec |
| ETH-62276 | ETHZ\_2b.1 | 2530 | 53 |  |  |  |  |  | No sieving | 1 - 3 sec |
| 2f<500um | ETHZ\_2b.2 | 2848 | 53 |  |  | a |  |  | No sieving | 4 - 6 sec |
|  | ETHZ\_2b.3 | 3464 | 67 |  |  |  |  |  | No sieving | 6 - 9 sec |
|  | ETHZ\_2b.4 | 3654 | 70 |  |  |  |  |  | No sieving | 10 - 12 sec |
| ETH-62276 | ETHZ\_2c.1 | 3000 | 53 |  |  |  |  |  | No sieving | 1 - 3 sec |
| 2F (original) | ETHZ\_2c.2 | 3121 | 53 |  |  |  |  |  | No sieving | 4 - 6 sec |
|  | ETHZ\_2c.3 | 3002 | 64 |  |  |  |  |  | No sieving | 6 - 9 sec |
|  | ETHZ\_2c.4 | 2911 | 66 |  |  |  |  |  | No sieving | 10 - 12 sec |
| Poznań  MDIC 2/80-100/2s | POZN\_2 | 2381 | 60 |  |  |  |  | 14C / H3PO4 | fraction 80-100 µm | 0-2 sec fraction |
| RICH-20350 | RICH\_2.1 | 2978 | 30 | 0.219 | -24.0 |  |  |  | bottom of layer 15 | |
| RICH-20391 | RICH\_2.2 | 3187 | 30 | 0.257 | -22.0 |  |  |  |  |  |
| RICH-20392 | RICH\_2.3 | 3259 | 30 | 0.295 | -21.8 |  |  |  |  |  |
| RICH-20393 | RICH\_2.4 | 3252 | 30 | 0.230 | -21.6 |  |  |  |  |  |
| RICH 15b (HCl-7) |  |  |  |  |  |  |  |  |  |  |
| RICH-20509 | RICH\_2b.1 | 2732 | 31 | 0.066 | -26.5 |  |  |  |  |  |
| RICH-20510 | RICH\_2b.2 | 2888 | 32 | 0.062 | -23.3 |  |  |  |  |  |
| RICH-20511 | RICH\_2b.3 | 3011 | 31 | 0.060 | -23.9 |  |  |  |  |  |
| RICH-20512 | RICH\_2b.4 | 3053 | 31 | 0.054 | -23.2 |  |  |  |  |  |
| RICH-20513 | RICH\_2b.5 | 3171 | 31 | 0.191 | -21.7 |  |  |  |  |  |
| RICH-20514 | RICH\_2b.6 | 3204 | 31 | 0.279 | -22.9 |  |  |  |  |  |
| RICH-20515 | RICH\_2b.7 | 3287 | 31 | 0.289 | -22.2 |  |  |  |  |  |
| RICH 15t (HCl-4) |  |  |  |  |  |  |  |  |  | |
| RICH-20368 | RICH\_2c.1 | 3220 | 29 | 0.236 | -16.0 |  |  |  | top of layer 15 | |
| RICH-20394 | RICH\_2c.2 | 3595 | 30 | 0.258 | -17.4 |  |  |  |  |  |
| RICH-20395 | RICH\_2c.3 | 3848 | 30 | 0.252 | -16.2 |  |  |  |  |  |
| RICH-20396 | RICH\_2c.4 | 4045 | 30 | 0.255 | -16.5 |  |  |  |  |  |
| RICH-20557 | RICH\_2c.5 | 2691 | 31 | 0.053 | -18.0 |  |  |  |  |  |
| RICH-20558 | RICH\_2c.6 | 3174 | 31 | 0.063 | -18.4 |  |  |  |  |  |
| RICH-20559 | RICH\_2c.7 | 3278 | 32 | 0.066 | -20.8 |  |  |  |  |  |
| RICH-20560 | RICH\_2c.8 | 3401 | 32 | 0.059 | -17.7 |  |  |  |  |  |
| RICH-20561 | RICH\_2c.9 | 3403 | 32 | 0.192 | -17.3 |  |  |  |  |  |
| RICH-20562 | RICH\_2c.10 | 3571 | 78 | 0.203 | -18.5 |  |  |  |  |  |
| RICH-20563 | RICH\_2c.11 | 4110 | 32 | 0.364 | -18.3 |  |  |  |  |  |
|  | RICH\_charcoal | 2336 | 30 |  |  |  |  |  |  |  |
|  | RICH\_bone | 2442 | 30 |  |  |  |  |  |  | |
| Milano14C  2A lumps | MIL\_2\_L | 2749 | 39 |  |  |  |  | 14C / 85% H3PO4 | lumps extracted from fraction > 500 µm | 0-15 sec fraction |
| 2A | MIL\_2\_sus | 2688 | 27 |  |  |  |  | 14C / 85% H3PO4 | <500 µm | 0-15 sec fraction |
| 2A fine |  |  |  |  |  |  |  | 14C / 85% H3PO4 | <500 µm | 0-15 sec fraction |
| **# 3**  **Basel Mortar** |  |  |  |  |  |  |  |  |  |  |
| Åbo MDIC 3 AAR22285.1 | ABO\_3.1 | 1820 | 25 | 0.360 | -16.6 | -11.1 | 6.63 | 14C / 85% H3PO4 | lime lump, fraction 46-75 µm | 0-14 sec |
| AAR22285.2 | ABO\_3.2 | 2470 | 26 | 0.420 | -9.3 | -7.3 |  |  |  | 14-750 sec |
| CIRCE IC3\_susp | CIRCE\_3\_susp | 2682 | 22 |  |  |  |  |  |  |  |
| CIRCE IC3\_sand | CIRCE\_3\_sand | 2992 | 23 |  |  |  |  |  |  |  |
| CIRCe IC3\_SG1 | CIRCe\_3\_SG1 | 2107 | 24 |  |  |  |  |  | upper suspended fraction | |
| CIRCe IC3\_SG2 | CIRCe\_3\_SG2 | 2179 | 49 |  |  |  |  |  | lower suspended fraction | |
| CIRCe IC3\_SG1R | CIRCe\_3\_SG1R | 2084 | 24 |  |  |  |  |  | upper suspended fraction duplicate | |
| CIRCe IC3\_P | CIRCe\_P | 1648 | 24 |  |  |  |  |  | lime lump | |
| ETH-62278 | ETHZ\_3.1 | 1746 | 50 |  |  |  |  | 14C / H3PO4 | 45-63 µm | 1 - 3 sec |
|  | ETHZ\_3.2 | 1966 | 51 |  |  |  |  |  | 45-63 µm | 4 - 6 sec |
|  | ETHZ\_3.3 | 2864 | 66 |  |  |  |  |  | 45-63 µm | 6 - 9 sec |
|  | ETHZ\_3.4 | 3773 | 67 |  |  |  |  |  | 45-63 µm | 10 - 12 sec |
|  | ETHZ\_3\_charcoal | 1313 | 22 |  |  |  |  |  |  |  |
| Poznań  MDIC 3/80-100/2s | POZN\_3.1 | 1491 | 50 |  |  |  |  | 14C / H3PO4 | fraction 80-100 µm | 0-2 sec fraction |
| MDIC 3/80-100/14s | POZN\_3.2 | 1735 | 50 |  |  |  |  | 14C / H3PO4 | fraction 80-100 µm | 2-14 sec fraction |
| MDIC 3/susp/63-80/1sek | POZN\_3.3 | 2200 | 60 |  |  |  |  | 14C / H3PO4 | fraction 63-90µm from suspension | 1 sec |
| MDIC 3/susp/  80-100/1sek | POZN\_3.4 | 2760 | 70 |  |  |  |  | 14C / H3PO4 | fraction 90-100 µm from suspension | 1 sec |
| MDIC 3/40-63/1sek | POZN\_3.5 | 1860 | 100 |  |  |  |  | 14C / H3PO4 | fraction 40-63 µm | 1 sec |
| MDIC 3/63-80/1sek | POZN\_3.6 | 1710 | 60 |  |  |  |  | 14C / H3PO4 | fraction 63-80 µm | 1 sec |
| MDIC3/sus1 | POZN\_3.7 | 3270 | 35 |  |  |  |  |  |  |  |
| MDIC3/sus1R | POZN\_3.8 | 2195 | 30 |  |  |  |  |  |  |  |
| MDIC3/sus2R | POZN\_3.9 | 2245 | 30 |  |  |  |  |  |  |  |
| MDIC3/sus2+1 | POZN\_3.10 | 3165 | 35 |  |  |  |  |  |  |  |
| MDIC3/sus3+4 | POZN\_3.11 | 4220 | 35 |  |  |  |  |  |  |  |
| MDIC3/80-100/5h/2sek | POZN\_3.12 | 2200 | 30 |  |  |  |  |  |  |  |
| MDIC 3 ch | POZN\_charcoal | 1345 | 30 |  |  |  |  |  |  |  |
| RICH (HCl-200)  RICH-21845.2.1 | RICH\_3.1 | 1816 | 35 | 0.004 | -29.9 |  |  | 14C / HCl |  |  |
| RICH-21845.2.2 | RICH\_3.2 | 1816 | 33 | 0.007 | -26.5 |  |  |  |  |
| RICH-21845.2.3 | RICH\_3.3 | 1856 | 32 | 0.027 | -22.1 |  |  |  |  |
| RICH-21845.2.4 | RICH\_3.4 | 1991 | 32 | 0.025 | -20.5 |  |  |  |  |
| RICH-21845.2.5 | RICH\_3.5 | 2100 | 34 | 0.122 | -18.6 |  |  |  |  |
| RICH-21845.2.6 | RICH\_3.6 | 2856 | 32 | 0.289 | -16.0 |  |  |  |  |
| RICH-21845.2.7 | RICH\_3.7 | 3343 | 34 | 0.255 | -26.3 |  |  |  |  |
| RICH-21845.2.8 | RICH\_3.8 | 3995 | 38 | 0.187 | -24.0 |  |  |  |  |
| RICH (H3PO4)  RICH-76 | RICH\_3a.1 | 2659 | 32 | 0.523 | -13.6 |  |  |  |  |  |
| RICH-76 | RICH\_3a.2 | 4435 | 33 | 0.168 | -12.6 |  |  |  |  |  |
| RICH-76 | RICH\_3a.3 | 4212 | 34 | 0.168 | -12.8 |  |  |  |  |  |
| RICH-76 | RICH\_3a.4 | 4548 | 37 | 0.077 | -17.6 |  |  |  |  |  |
| RICH-76 | RICH\_3a.5 | 8240 | 51 | 0.065 | -14.3 |  |  |  |  |  |
| Milano OSL | MIL\_3OSL | 1960\* | 200 |  |  |  |  | OSL: 218±179AD |  | OSL (14C age simulated) |
| Milano 3B lumps 14C | MIL\_3\_L | 3266 | 44 |  |  |  |  | 14C / 85% H3PO4 | lumps extracted from fraction > 500 µm | 0-15 sec fraction |
| Milano 3b 14C | MIL\_3 | 3014 | 30 |  |  |  |  | 14C / 85% H3PO4 | fraction <500 µm | 0-15 sec fraction |
| IRAM OSL | IRAM\_OSL | 1793\* | 179 |  |  |  |  | OSL: 130±200AD | OSL | OSL (14C age simulated) |
| **# 4 Roman cocciopesto** |  |  |  |  |  |  |  |  |  |  |
| Abo MDIC 4 AAR 22286.1 | ABO\_4 | 712 | 25 | 0.372 | -17.2 |  | 7.20 | 14C / 85% H3PO4 | lime lump, fraction ? | 0-30 sec |
| CIRCE IC4\_susp | CIRCE\_4\_susp | 979 | 23 |  |  |  |  |  |  |  |
| CIRCE C4\_sand | CIRCE\_4\_sand | 1024 | 27 |  |  |  |  |  |  |  |
| CIRCe IC4\_SG1 | CIRCe\_4\_SG1 | 1063 | 24 |  |  |  |  |  | upper suspended fraction | |
| CIRCe IC4\_SG2 | CIRCe\_4\_SG2 | 1056 | 24 |  |  |  |  |  | lower suspended fraction | |
| CIRCEe IC4\_SG1R | CIRCe\_4\_SGR | 1070 | 22 |  |  |  |  |  | upper suspended fraction duplicate | |
| ETH-62279 | ETHZ\_4.1 | 844 | 49 |  |  |  |  | 14C / H3PO4 | 63-32 µm | 1 - 3 sec |
|  | ETHZ\_4.2 | 879 | 48 |  |  |  |  |  | 63-32 µm | 4 - 6 sec |
|  | ETHZ\_4.3 | 1025 | 59 |  |  |  |  |  | 63-32 µm | 6 - 9 sec |
|  | ETHZ\_4.4 | 877 | 59 |  |  |  |  |  | 63-32 µm | 10 - 12 sec |
|  | ETHZ\_4a.1 | 946 | 57 |  |  |  |  |  | <32 µm | 1 - 3 sec |
|  | ETHZ\_4a.2 | 896 | 49 |  |  |  |  |  | <32 µm | 4 - 6 sec |
|  | ETHZ\_4a.3 | 998 | 59 |  |  |  |  |  | <32 µm | 6 - 9 sec |
|  | ETHZ\_4a.4 | 1030 | 58 |  |  |  |  |  | <32 µm | 10 - 12 sec |
| Poznan  MDIC 4/40-63/2s | POZN\_4.1 | 930 | 40 |  |  |  |  | 14C / H3PO4 | 40-63 µm | 0-2 sec fraction |
| MDIC 4/80-100/susp | POZN\_4.2 | 1110 | 30 |  |  |  |  | 14C / H3PO4 | 80-100 µm from suspension | whole reaction |
| MDIC 4/susp/  71-100/1sek | POZN\_4.3 | 2650 | 150 |  |  |  |  | 14C / H3PO4 | 71-100 µm from suspension | 1sec |
| MDIC 4/80-100/1sek | POZN\_4.4 | 1380 | 80 |  |  |  |  | 14C / H3PO4 | 80-100 µm | 1sec |
| MDIC4/40-63/3-5sek | POZN\_4.5 | 775 | 30 |  |  |  |  | 14C / H3PO4 | 40-63 µm | 3-5 sec |
| RICH (HCl-7)  RICH-21531.1.1 | RICH\_4.1 | 954 | 35 | 0.063 | -20.6 |  |  | 14C / HCl |  |  |
| RICH-21531.1.2 | RICH\_4.2 | 988 | 36 | 0.076 | -18.7 |  |  |  |  |
| RICH-21531.1.3 | RICH\_4.3 | 981 | 34 | 0.075 | -18.9 |  |  |  |  |
| RICH-21531.1.4 | RICH\_4.4 | 1090 | 34 | 0.074 | -18.3 |  |  |  |  |
| RICH-21531.1.5 | RICH\_4.5 | 1116 | 34 | 0.258 | -20.1 |  |  |  |  |
| RICH-21531.1.6 | RICH\_4.6 | 1228 | 33 | 0.264 | -19.6 |  |  |  |  |
| RICH-21531.1.7 | RICH\_4.7 | 1540 | 34 | 0.190 | -18.9 |  |  |  |  |
| RICH (HCl-200)  RICH-21531.2.1 | RICH\_4a.1 | 1108 | 29 | 0.010 | -21.9 |  |  | 14C / HCl |  |  |
| RICH-21531.2.2 | RICH\_4a.2 | 1300 | 30 | 0.008 | -21.2 |  |  |  |  |
| RICH-21531.2.3 | RICH\_4a.3 | 1002 | 29 | 0.024 | -21.9 |  |  |  |  |
| RICH-21531.2.4 | RICH\_4a.4 | 1024 | 29 | 0.014 | -19.4 |  |  |  |  |
| RICH-21531.2.5 | RICH\_4a.5 | 979 | 29 | 0.038 | -17.4 |  |  |  |  |
| RICH-21531.2.6 | RICH\_4a.6 | 1048 | 29 | 0.100 | -19.8 |  |  |  |  |
| RICH-21531.2.8 | RICH\_4a.7 | 1136 | 30 | 0.340 | -22.6 |  |  |  |  |
| RICH-21531.2.7 | RICH\_4a.8 | 1215 | 29 | 0.259 | -19.9 |  |  |  |  |
| RICH (H3PO4)  RICH-21531.3.2 | RICH\_4b.1 | 1102 | 33 | 0.158 | -25.4 |  |  | 14C / H3PO4 | |  |
| RICH-21531.3.4 | RICH\_4b.2 | 1388 | 35 | 0.122 | -26.1 |  |  | 14C / H3PO4 | |  |
|  | RICH\_charcoal | **1739** | 32 |  |  |  |  |  |  |  |
| Milano  OSL |  |  |  |  |  |  |  | OSL | not enough quartz | |
| Milano 14C | MIL\_4\_14C | 903 | 32 |  |  |  |  | 14C / 85% H3PO4 | fraction <500 µm | 0-15 sec fraction |