**Supplementary Table 1: Compilation of AMS radiocarbon data published for Late Middle Palaeolithic levels of archaeological sites in Iberian caves and rock shelters.**

|  |  |  |  |  |  |  |  |  |  |  |  |  |  |
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| **Name of site** | **Lab code** | | **Convent.age** | | | **Calibrated age** | | **Material** | **Treat-ment a** | **Layer/**  **sample** | **Culture b** | **References** | **Comment** |
|  |  | | **14C yr BP** | | **std. dev.** | **Cal yr BP; 95.4%-interval** | |  |  |  |  |  |  |
|  |  | |  | |  | **from** | **to** |  |  |  |  |  |  |
| Abric Romani | NzA-2312 | | 43500 | | 1200 | 49589 | 45005 | charcoal |  | B | MO | Vaquero, 1997; Carbonell et al., 2000 | LMP before ~42 ka cal BP |
|  | NzA-2313 | | 40600 | | 900 | 45858 | 42805 | charcoal |  | D | MO | ditto |
|  | OxA-12025 | | 39060 | | 350 | 43467 | 42390 | charcoal | AF | B | MO | Camps and Higham, 2012 |
|  |  | |  | |  |  |  |  |  |  |  |  |  |
| Antón, Cueva | OxA-20882 | | 31070 | | 170 | 35370 | 34606 | charcoal | ZR | I-k | MO | Zilhao et al., 2016 | LMP between ~35.5 and ~37 ka cal BP, but layer I-k yielded low number of artefacts |
|  | OxA-26346 | | 31790 | | 270 | 36259 | 35077 | charcoal | XR | I-k top | MO | ditto |
|  | OxA-22625 | | 32330 | | 250 | 36860 | 35635 | charcoal | XR | I-k base | MO | ditto |
|  | OxA-22019 c | | 32390 | | 280 | 37129 | 35611 | charcoal | XR | II-a | AS | ditto | Ages providing terminus post quem are overlapping |
|  | OxA-20881 c | | 31150 | | 170 | 35455 | 34666 | charcoal | ZR | II-b | AS | ditto |
|  | OxA-21244 c | | 32890 | | 200 | 37731 | 36319 | charcoal | XR | II-b | AS | ditto |
|  |  | |  | |  |  |  |  |  |  |  |  |  |
| Arbreda | AA-3777 | | 34100 | | 750 | 40345 | 36570 | charcoal | ABA | I | MO | Soler Subils et al., 2008 | Timing of LMP is unclear, because of high variability of dating results and overlap with dates for Proto-Aurignacian level H. Dates on bone tend to be younger than dates on charcoal. Independent age control is needed. |
|  | AA-3776 | | 39400 | | 1400 | 46400 | 41416 | charcoal | ABA | I | MO | ditto |
|  | AA-3778 | | 41400 | | 1600 | 48813 | 42682 | charcoal | ABA | I | MO | ditto |
|  | OxA-19994 | | 38350 | | 400 | 43017 | 41926 | charcoal | XR | I | MO | Maroto et al., 2012 |
|  | OxA-3731 | | 44560 | | 2400 | ... | 44947d | bone | AI | I | MO | Soler Subils et al., 2008 |
|  | OxA-21663e | | 32100 | | 450 | 37331 | 34990 | bone | AF\* | I | MO | Wood et al., 2014 |
|  | OxA-21703e | | 32300 | | 450 | 37710 | 35220 | bone | AF\* | I | MO | ditto |
|  | OxA-21704 | | 39200 | | 1000 | 45029 | 41825 | bone | AF\* | I | MO | ditto |
|  | OxA-21702 | | 44400 | | 1900 | ... | 45310d | bone | AF\* | I | MO | ditto |
|  | OxA-21662 | | 37300 | | 800 | 42968 | 40353 | bone | AF\* | I | MO | ditto |
|  |  | |  | |  |  |  |  |  |  |  |  |  |
| Arrillor | OxA-21986f | | 44900 | | 2100 | ... | 45488d | bone | AF | Lmc | MO | Higham et al, 2014 | LMP before ~45 ka cal BP. |
|  | OxA-22654 | | <46800 | |  |  |  | bone | AF | Lamc | MO | ditto |
|  | OxA-22655f | | 45600 | | 2300 | ... | 45779d | bone | AF | Lamc | MO | ditto |
|  |  | |  | |  |  |  |  |  |  |  |  |  |
| **Name of site** | **Lab code** | **Convent.age** | | | | **Calibrated age** | | **Material** | **Treat-ment a** | **Layer/**  **sample** | **Culture b** | **References** | **Comment** |
|  |  |  | |  | |  |  |  |  |  |  |  |  |
| Beneito, Cova | Gif-TAN-89229 | 25750 | | 410 | | 30830 | 29038 | charcoal |  | D3 | MO | Iturbe and Cortell, 1987, 1992; Zilhão, 2006 | Large scatter of data placing the LMP to in between 29 and 48 ka cal BP. Inconsistencies in stratigraphy likely (cf. Zilhão, 2006) |
|  | GifA-89283 | 30160 | | 680 | | 35692 | 32946 | charcoal |  | D1 | MO | ditto |
|  | AA-1387 | 38800 | | 1900 | | 47860 | 40060 | charcoal |  | D1 | MO | ditto |
|  |  |  | |  | |  |  |  |  |  |  |  |  |
| Boquete de Zafarraya | OxA-8411 | 26300 | | 440 | | 31160 | 29540 | tooth | AG | D, UE, (Z6d) | MO | Barroso Ruíz, de Lumley, 2006; Zilhão, 2006 | Although lots of effort has been spent to date the LMP at Boquete, its timing remains unclear. Recent chronological studies suggest MO occupation before ~33.65 ka cal BP (Michel et al., 2013) or before ~46 ka cal BP (Wood et al., 2013) |
|  | OxA-8024 | 30200 | | 460 | | 35111 | 33531 | tooth | AG | D, UD, (Z4d) | MO | ditto |
|  | OxA-8999 | 33300 | | 1200 | | 40654 | 35105 | bone | AG | D, UE, (Z8b) | MO | Michel et al., 2013 |
|  | OxA-9000 | 30650 | | 650 | | 36052 | 33650 | bone | AG | D/E, UF, (Z69b) | MO | ditto |
|  | OxA-9001 | 36700 | | 1400 | | 43959 | 38647 | charcoal | ZR | D, UE (199) | MO | ditto |
|  | OxA-9002 | 34600 | | 800 | | 41114 | 37162 | charcoal | ZR | D, UE (217) | MO | ditto |
|  | OxA-23198 | >46700 | |  | |  |  | bone | AF | D, UE, (Z8os) | MO | Wood et al., 2013 |
|  | OxA-26440 | >46700 | |  | |  |  | bone | AF\* | D, UE, (Z8os) | MO | ditto |
|  | OxA-21810 | 46300 | | 2500 | | ... | 46036d | bone | AF | D, UE (ZAF2) | MO | ditto |
|  | OxA-21813 | >49300 | |  | |  |  | bone | AF\* | D/E, UF (ZAF7) | MO | ditto |
|  |  |  | |  | |  |  |  |  |  |  |  |  |
| Boja, Abrigo de la | VERA-5899 | 46500 | | +2400/-1800 | | ..d | …d | charcoal |  | OH22/2013-384 | MO | Zilhão et al., 2017 | LMP before ~44 ka cal BP |
|  | VERA-5900 | 46900 | | +2400/-1800 | | ..d | …d | charcoal |  | OH22/2013-330 | MO | ditto |  |
|  | VERA-5899 | 46500 | | +2400/-1800 | | ..d | …d | charcoal |  | OH23/2013-258 | MO | ditto |  |
|  |  |  | |  | |  |  |  |  |  |  |  |  |
| Caldeirão, Gruta do | OxA-1941 | 27600 | | 600 | | 33189 | 30749 | bone | AC | K top | MO | Zilhão, 2001 | Samples OxA-5521 and OxA-8670 are probably not reliable due to poor collagen yields (Wood et al., 2013). Timing of LMP still unclear. |
|  | OxA-5521 | 23040 | | 340 | | 27835 | 26560 | bone | AI | K base (K5) | MO | ditto |
|  | OxA-8670 | 25220 | | 200 | | 29782 | 28777 | boneg | RR | K | MO | Zilhão, 2006 |
|  |  |  | |  | |  |  |  |  |  |  |  |  |

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| **Name of site** | **Lab code** | **Convent.age** | | | **Calibrated age** | | **Material** | **Treat-ment a** | **Layer/**  **sample** | **Culture b** | **References** | **Comment** | |
|  |  |  |  | |  |  |  |  |  |  |  |  | |
| Galería de las Estatuas | Beta-247626 | >45000 |  | |  |  | bone |  | GE-1 LU1 | MO | Arsuaga et al., 2017 | LMP before ~45 ka cal BP. | |
|  | OxA-21523 | 43500 | 1800 | | … | 45055d | bone | AF | GE-1 LU1 | MO | ditto |  | |
|  | Beta-247627 | >45000 |  | |  |  | bone |  | GE-1 LU2 | MO | ditto |  | |
|  | OxA-21524 | >45600 |  | |  |  | bone | AF | GE-1 LU2 | MO | ditto |  | |
|  | Beta-247628 | >45000 |  | |  |  | bone |  | GE-1 LU3 | MO | ditto |  | |
|  | OxA-21525 | 44000 | 1900 | | … | 44992d | bone | AF | GE-1 LU3 | MO | ditto |  | |
|  | OxA-24563 | 44200 | 2000 | | … | 44669d | bone | AF | GE-2 LU1b | MO | ditto |  | |
|  | OxA-24564 | >46300 |  | |  |  | bone | AF | GE-2 LU2 | MO | ditto |  | |
|  |  |  |  | |  |  |  |  |  |  |  |  | |
| Castillo,El | GifA-89144 | 39300 | 1900 | | 48261 | 40664 | charcoal |  | 20 (B2) | MO | Soto-Barreiro, 2003; Zilhão, 2006 | LMP before ~40.7 ka cal BP, if all datings are considered reliable. Bone dating with ultrafiltration yielded ages larger than 49.8 ka cal BP | |
|  | GifA-92506 | 43300 | 2900 | | ... | 43567d | charcoal |  | 20 (B2) | MO | Zilhão, 2006 |
|  | OxA-22204 | 48700 | 3400 | | ... | 49844d | bone | AF\* | 20C | MO | Wood et al., in press |
|  | OxA-22205 | 49400 | 3700 | | ... | 49875d | bone | AF\* | 20C | MO | ditto |
|  |  |  |  | |  |  |  |  |  |  |  |  | |
| Conde (Forno), Cueva del | Beta-224302 | 29750 | 300 | | 34480 | 33379 | bone |  | N20A | MO | Uzquiano Ollero et al., 2008 | Due to large scatter of dates, timing of the LMP is still unclear. Independent age control desirable. | |
|  | Beta-230416 | 37710 | 470 | | 42718 | 41391 | charcoal |  | N20A | MO | ditto |
|  | Beta-210572 | 38250 | 390 | | 42940 | 41875 | bone |  | N20A | MO | ditto |
|  |  |  |  | |  |  |  |  |  |  |  |  | |
| Cova Gran | Beta-224299 | 38640 | 440 | | 43281 | 42047 | charcoal | AAA | 1B | MO | Martínez-Moreno et al., 2010 | The sample from the uppermost LMP level 1B yielded a higher radiocarbon age than those from underlying levels 1C and 1D.  Timing of the LMP unclear. | |
|  | Beta-195430 | 32000 | 300 | | 36521 | 35198 | charcoal | AAA | 1C | MO | ditto |
|  | Beta-187423 | 32180 | 430 | | 37415 | 35105 | charcoal | AAA | 1D | MO | ditto |
|  | Beta-207575 | 32260 | 490 | | 37774 | 35110 | charcoal | AAA | 1D | MO | ditto |
|  | Beta-195431 | 33090 | 350 | | 38327 | 36362 | charcoal | AAA | 1D | MO | ditto |
|  |  |  |  | |  |  |  |  |  |  |  |  | |
| Covalejos | GrA-33811 | 43050 | 750 | | 48157 | 45005 | tooth | L | I | MO | Maroto et al., 2012 | One date only. | |
|  |  |  |  | |  |  |  |  |  |  |  |  | |
| Cuco, El | OxA-27196 | 42350 | 700 | | 47211 | 44471 | Shell | OX | X |  | Gutierrez-Zugasti et al., in press | Cultural attribution of lithics was re-evaluated and new datings were presented, placing the sequence into the LMP, dated to before ~44.5 ka cal BP. | |
|  | OxA-27115 | 46200 | 650 | | ... | 48328d | Shell | OX | X |  | ditto |
|  | Beta-382681 | >43,500 |  | |  |  | Shell |  | XII | MO | ditto |
|  | OxA-30851 | 46400 | 800 | | ... | 48227d | Shell | OX | XIII | MO | ditto |
|  |  |  |  | |  |  |  |  |  |  |  |  | |
| **Name of site** | **Lab code** | **Convent.age** | | **Calibrated age** | | | **Material** | **Treat-ment a** | **Layer/**  **sample** | **Culture b** | **References** | | **Comment** |
|  |  |  | |  | | |  |  |  |  |  | |  |
| Ermitons, Cueva de los | OxA-3725 | 33190 | 600 | | 38886 | 36026 | bone |  | IV | MO | Maroto, 1993; Zilhão, 2006 | | The new dating study suggests an earlier time of MO occupation probably before ~43 ka cal BP. |
|  | GrA-33813 | 40580 | 550 | | 45167 | 43182 | tooth | L | IV | MO | Maroto et al., 2012 | |
|  | GrA-33814 | >45000 |  | |  |  | bone | L | IV | MO | ditto | |
|  |  |  |  |  | |  |  |  |  |  |  | |  |
| Esquilleu, Cueva del | AA-29664 | 12050 | 130 | 14264 | | 13563 | bone |  | III | MO | Zilhão, 2006; Jordá Pardo et al., 2008 | | Although ultrafiltration has been employed, bone from level III gave very young 14C ages. The same applies for charcoal from levels IV and V, but these samples were run with a mild pretreatment only and it is uncertain, if all contaminants were eliminated. From level VI downwards, the majority of samples date the MO occupation to before ~42.5 ka cal BP. Since a lot of scatter remains, the timing of the uppermost LMP at Esquilleu is still unclear. |
|  | OxA-19967 | 19300 | 100 | 23546 | | 22950 | bone | AF | III | MO | Maroto et al., 2012 | |
|  | OxA-19968 | 19310 | 80 | 23528 | | 22984 | bone | AF | III | MO | ditto | |
|  | OxA-19246 | 20810 | 110 | 25446 | | 24637 | bone | AF | III B | MO | ditto | |
|  | GrA-35064 | 22840 | 280 | 27636 | | 26505 | charcoal | A | IV | MO | ditto | |
|  | GrA-35065 | 30250 | 500 | 35286 | | 33508 | charcoal | A | V | MO | ditto | |
|  | AA-37883 | 34380 | 670 | 40539 | | 37068 | charcoal |  | VI | MO | Zilhão, 2006; Jordá Pardo et al., 2008 | |
|  | GrA-33816 | 40110 | 500 | 44690 | | 42924 | charcoal | ABA | VI | MO | Maroto et al., 2012 | |
|  | OxA-19965f | 43700 | 1400 | 49885 | | 45135 | bone | AF | VI | MO | ditto | |
|  | OxA-19966f | 44100 | 1300 | 49948 | | 45602 | bone | AF | VI | MO | ditto | |
|  | AA-37882 | 36500 | 830 | 42471 | | 39524 | charcoal |  | XIf | MO | Zilhão, 2006; Jordá Pardo et al., 2008 | |
|  | Beta-149320 | 39000 | 300 | 43325 | | 42415 | charcoal |  | XIII | MO | ditto | |
|  | OxA-20318 | 53400 | 1300 | 56647 | | 51095 | charcoal | XR | XVII | MO | Maroto et al., 2012 | |
|  | OxA-20319 | >58600 |  |  | |  | charcoal | XR | XVII | MO | ditto | |
|  | OxA-X-2297-31 | 49400 | 1300 | 52647 | | 47095 | charcoal | XR | XVII | MO | ditto | |
|  | OxA-20320 | 52600 | 1200 | 55529 | | 50459 | charcoal | XR | XVII | MO | ditto | |  |
|  |  |  |  |  | |  |  |  |  |  |  | |  |
| Fuentes de San Cristobal | OxA-8589 | 27200 | 1000 | 33735 | | 29465 | charcoal | RR | O | ? | Zilhão, 2006 | | The first set of samples stems from levels O and P with uncertain cultural attribution (Zilhão, 2006; Maroto et al., 2012). The dating study by Maroto et al. (2012) yielded ages older than ~41 ka cal BP for the typologically well constrained levels E and F. |
|  | OxA-8524 | 36050 | 550 | 41755 | | 39575 | charcoal | RR | O | ? | ditto | |
|  | OxA-8590 | 36000 | 1900 | 45026 | | 36567 | charcoal | RR | P | MO? | ditto | |
|  | OxA-19145 | 38650 | 600 | 43663 | | 41860 | charcoal | ZR | E | MO | Maroto et al., 2012 | |
|  | GrA-33817 | 39290 | 490 | 44024 | | 42399 | charcoal | ZR | F | MO | ditto | |
|  | GrA-33904 | 37330 | 490 | 42531 | | 41018 | charcoal | ZR | F | MO | ditto | |
|  |  |  |  |  | |  |  |  |  |  |  |  | |

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| **Name of site** | **Lab code** | **Convent.age** | | **Calibrated age** | | **Material** | **Treat-ment a** | **Layer/**  **sample** | **Culture b** | **References** | **Comment** |
|  |  |  |  |  |  |  |  |  |  |  |  |
| Gorham’s Cave | Beta-196785 | 26070 | 360 | 30963 | 29488 | charcoal | ABA | IV | MO? | Finlayson et al., 2006 | The young radiocarbon dates reported by Finlayson et al. (2016) for level IV have been subject to strong debate concerning sedimentological cultural attribution of finds, and pretreatment technique. Previous studies suggested that MO occupation at Gorham's cave date back to before ~33.7 ka cal BP (OxA-8541), which acc. to Zilhão (2006), stems from the uppermost securely Middle Palaeolithic levels (CON 19 and 18). Except of OxA-7979, all other dates for these and underlying levels were older than ~43.8 ka cal BP. |
|  | Beta-185344 | 27020 | 480 | 32197 | 30205 | charcoal | ABA | IV | MO? | ditto |
|  | Beta-196784 | 28360 | 480 | 33515 | 31335 | charcoal | ABA | IV | MO? | ditto |
|  | OxA-10230 | 32330 | 390 | 37552 | 35370 | charcoal | RR | IV | MO | Pettitt et al., 2000; Zilhão, 2006 |
|  | OxA-10295 | 34600 | 900 | 41263 | 36942 | charcoal | RR | trench 7 | MO | ditto |
|  | OxA-7857 | 32280 | 420 | 37573 | 35246 | charcoal | RR | CON 16 | MO | ditto |
|  | OxA-205 | 47900 | 2100 | ... | 49893d | charcoal |  | CON 18 | MO | ditto |
|  | OxA-7979 | 23800 | 600 | 29343 | 26965 | charcoal | RR | CON 18 | MO | ditto |
|  | OxA-7791 | 42200 | 1100 | 48313 | 43701 | charcoal | RR | CON 18 | MO | ditto |
|  | OxA-8541 | 31900 | 1400 | 39994 | 33688 | charcoal | RR | CON 19 | MO | ditto |
|  | OxA-8542 | 42800 | 2100 | ... | 43786d | charcoal | RR | CON 19 | MO | ditto |
|  | OxA-8525 | 43800 | 1300 | 49838 | 45280 | charcoal | RR | CON 19 | MO | ditto |
|  | OxA-8526 | 46700 | 1900 | ... | 49637d | charcoal | RR | CON 19 | MO | ditto |
|  | OxA-6075 | 45300 | 1700 | ... | 46139d | charcoal | ZR | CON 22 | MO | ditto |
|  | OxA-7790 | 51700 | 3300 | ... | 49963d | charcoal | RR | CON 22d | MO | ditto |
|  |  |  |  |  |  |  |  |  |  |  |  |
| Güelga, Abrigo de la | Beta-172343 | 32460 | 440 | 37935 | 35464 | bone | CE | 1 (D int.) | CH? | Menéndez Fernández et al., 2005 | The presumably Châtelperronian levels 1, 2 (interior), 4a and 4b (exterior), were originally dated to between 32.5 to 37.9 ka cal BP. A bone from level 2 has been recently dated to 41.4 to 46.5 ka cal BP. The MO occupation took place before 45.5 ka cal BP. Age underestimation of the Beta-samples is likely. |
|  | Beta-172344 | 30210 | 340 | 34833 | 33725 | bone | CE | 2 (D int.) | CH? | ditto |
|  | Beta-172345 | 29950 | 310 | 34622 | 33576 | bone | CE | 4a (D ext.) | CH? | ditto |
|  | Beta-186766 | 29020 | 260 | 33800 | 32518 | bone | CE | 4b (D ext.) | CH? | ditto |
|  | COL2014 | 37429 | 302 | 42324 | 41399 | bone | CE | 2 (D int.) | CH? | Menéndez et al., 2014 |
|  | OxA-27958 | 40300 | 1200 | 46461 | 42273 | bone | AF | 2 (D int.) | CH? | Higham et al., 2014 |
|  | OxA-20122 | 47400 | 2700 | ... | 49734d | bone | AF | 4b (D ext.) | MO | Quesada López, Menéndez Fernández, 2009 |
|  | OxA-20124 | 48500 | 3500 | ... | 49814d | bone | AF | 4b (D ext.) | MO | ditto |
|  | OxA-19244f | 43700 | 800 | 48989 | 45498 | bone | AF | 9 (D int.) | MO | ditto |
|  | OxA-19245f | 44300 | 1200 | 49950 | 45854 | bone | AF | 9 (D int.) | MO | ditto |
|  |  |  |  |  |  |  |  |  |  |  |  |

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| **Name of site** | **Lab code** | **Convent.age** | | **Calibrated age** | | **Material** | **Treat-ment a** | **Layer/**  **sample** | **Culture b** | **References** | **Comment** |
|  |  |  |  |  |  |  |  |  |  |  |  |
| Higueral de, Sierra Valleja, Cueva del | OxA-12270 | 20780 | 80 | 25355 | 24665 | charcoal | ZR | V | MP | Jennings et al., 2009 | Several inconsistencies exist between 14C and luminescence dating results. For example the uppermost 14C sample is very young and much younger than the OSL age estimates for overlying layer IV. More dates are necessary to define the timing of the LMP at this site. |
|  | OxA-12362 | 32840 | 210 | 37687 | 36265 | charcoal | ZR | VI | MP | ditto |
|  | OxA-12271 | 33950 | 200 | 38911 | 37905 | charcoal | ZR | VII | MP | ditto |
|  | OxA-12272 | 37220 | 290 | 42178 | 41255 | charcoal | ZR | VII | MP | ditto |
|  | OxA-13280 | 52400 | 2100 | 59080 | 48804 | charcoal | RR | VIII | MP | ditto |
|  | OxA-13279 | 56800 | 2900 | 69191 | 52141 | charcoal | RR | VIII | MP | ditto |
|  | OxA-13417 | >42900 |  |  |  | charcoal | ZR | VIII | MP | ditto |
|  |  |  |  |  |  |  |  |  |  |  |  |
| Jarama VI | Beta-56640 | 23380 | 500 | 28590 | 26605 | charcoal |  | JVI.1 | MO | Jordá et al., 2007 | New radiocarbon ages and luminescence age estimates fort he seuence at Jarama strongly suggests that the previous Beta 14C ages age underestimated the time of occupation (cf. Wood et al. 2013, Kehl et al. 2013). The MO occupation most probably ended before 50 ka cal BP. |
|  | Beta-56639 | 32600 | 1860 | 41956 | 33750 | charcoal |  | JVI.2 | MO | ditto |
|  | Beta-56638 | 29500 | 2700 | 43915 | 29049 | charcoal |  | JVI.3 | MO | ditto |
|  | OxA-21714 | >50200 |  |  |  | bone | AF | JVI.1 | MO | Wood et al. 2013 |
|  | OxA-X-2310-22 | 49400 | 3700 | ... | 49875d | bone | AF | JVI.2.2 | MO | ditto |
|  | OxA-X-2290-56 | >47000 |  |  |  | bone | AF | JVI.3 | MO | ditto |
|  |  |  |  |  |  |  |  |  |  |  |  |
| Labeko Koba | Ua-3034 | 26575 | 505 | 31449 | 29602 | bone |  | IX upper | ? | Arrizabalaga, 2000 | Level IX is represented by very poor assemblages. The Châtelperronian occupation at labeko Koba probably occurred before 40.5 ka cal BP |
|  | Ua-3325 | 29750 | 700 | 35339 | 32214 | bone |  | IX upper | ? | ditto |
|  | Ua-3324 | 34215 | 1265 | 41635 | 36049 | bone |  | IX lower | CH | ditto |
|  | OxA-22563 | 37800 | 900 | 43665 | 40637 | bone | AF | IX lower | CH | Wood et al., 2014 |
|  | OxA-22562 | 38100 | 900 | 43990 | 41010 | bone | AF | IX lower | CH | ditto |
|  | OxA-22561 | 38000 | 900 | 43890 | 40886 | bone | AF | IX lower | CH | ditto |
|  | OxA-22560 | 37400 | 800 | 43046 | 40446 | bone | AF | IX lower | CH | ditto |
|  | OxA-22564 | 37900 | 900 | 43782 | 40762 | bone | AF\* | IX lower | Pre-CH | ditto |
|  |  |  |  |  |  |  |  |  |  |  |  |
| Lezetxiki | OxA-22021 | 29250 | 320 | 34045 | 32681 | bone | AF | III | AU/MO | Maroto et al., 2012 | Level III represents a mixed assemblage. Datings are either between 32.7 and 39.4 ka cal BP (expected for Aurignacian) or > 46.5 ka (Mousterian) |
|  | OxA-21838 | 30830 | 380 | 35567 | 34078 | bone | AF | III | AU/MO | ditto |
|  | OxA-21837 | 34550 | 100 | 39416 | 38675 | bone | AF | III | AU/MO | ditto |
|  | OxA-21715 | >46500 |  |  |  | bone | AF | III | AU/MO | ditto |
|  | OxA-22627 | >46700 |  |  |  | bone | AF | III | AU/MO | ditto |
|  |  |  |  |  |  |  |  |  |  |  |  |
|  |  |  |  |  |  |  |  |  |  |  |  |
| **Name of site** | **Lab code** | **Convent.age** | | **Calibrated age** | | **Material** | **Treat-ment a** | **Layer/**  **sample** | **Culture b** | **References** | **Comment** |
|  |  |  |  |  |  |  |  |  |  |  |  |
| Los Casares | COL4208.1.1 | 39494 | 850 | 44899 | 42175 | charcoal | AAA | c | MO | Alcaraz-Castaño et al., 2017 | One radiocarbon date only but backed by terminus post quem from layer d |
|  | U/Th, S3 | 48052 | 187 |  |  | calcite |  | d0 | AS | ditto |
|  |  |  |  |  |  |  |  |  |  |  |  |
| Mirón, El | GX-27112 | 41280 | 1120 | 47269 | 42951 | charcoal |  | W10 (130) | MP | Straus et al., 2002 | One radiocarbon date only |
|  |  |  |  |  |  |  |  |  |  |  |  |
| Morín, Cueva | GrA-33823 | 29380 | 260 | 34038 | 32975 | charcoal |  | 10 | CH | Maroto et al., 2012 | Timing of CH is still unclear. The MO probably dates to >44 ka cal BP |
|  | GifA-92263 | 36590 | 770 | 42432 | 39734 | charcoal |  | 10 | CH | Zilhão, 2006 |
|  | OxA-19083 | 41800 | 450 | 46022 | 44406 | charcoal | ZR | 11 | MO | Maroto et al., 2012 |
|  | OxA-19459f | 43600 | 600 | 48343 | 45648 | charcoal | XR | 11 | MO | ditto |
|  |  |  |  |  |  |  |  |  |  |  |  |
| Moros de Gabasa | Gr-12809 | 46500 | 4400 | ... | 48661d | charcoal |  | e | MO | Blasco et al., 1996; Montes et al., 2001 | One radiocarbon date only |
|  |  |  |  |  |  |  |  |  |  |  |  |
| Oliveira, Gruta da | GrA-10200 | 31900 | 200 | 36255 | 35325 | boneg |  | 8 | MO | Zilhão, 2001 | 14C on burnt bone is unreliable, but data are in broad agreement with independent age control (Hoffmann, 2013). It remains unclear, if level 8 documents one of the latest occupation by Mousterian culture |
|  | OxA-8671 | 32740 | 420 | 38205 | 35880 | boneg | RR | 8 | MO | ditto |
|  | GrA-9760 | 38390 | 480 | 43169 | 41855 | boneg |  | 9 | MO | ditto |
|  | Beta-111967 | 40420 | 1220 | 46658 | 42323 | boneg |  | 9 | MO | ditto |
|  | OxA-8672 | 42900 | 120 | 46510 | 45640 | boneg | RR | 11 | MO | ditto |
|  |  |  |  |  |  |  |  |  |  |  |  |
| Sima de las Palomas | OxA-10666 | 34450 | 600 | 40514 | 37459 | bone | ZR | 2e | MO | Zilhão, 2006 | 14C on burnt bone is unreliable. U series and luminescence dates for the site are in broad agreement with 14C. More data needed. |
|  | OxA-15423 | 35030 | 270 | 40230 | 38888 | boneg | ZR | 2l | MO | Walker et al., 2008 |
|  |  |  |  |  |  |  |  |  |  |  |  |
| Roca dels Bous | Ua-21494 | 16515 | 145 | 20300 | 19559 | bone |  | N 10 | MO | Martínez-Moreno et al., 2006 | The two Ua ages are the youngest recorded for the Mousterian of this compilation. It is highly likely that they are erroneous. |
|  | Ua-21493 | 18110 | 170 | 22379 | 21524 | bone |  | R3 | MO | ditto |
|  | AA-6481 | 38800 | 1200 | 45286 | 41234 | charcoal |  | R3 | MO | ditto |
|  |  |  |  |  |  |  |  |  |  |  |  |
| Sopeña, Abrigo de | GrA-39761 | 35500 | 650 | 41459 | 38784 | bone | L | XII | MO | Maroto et al., 2012 | One radiocarbon date only |
|  |  |  |  |  |  |  |  |  |  |  |  |
| **Name of site** | **Lab code** | **Convent.age** | | **Calibrated age** | | **Material** | **Treat-ment a** | **Layer/**  **sample** | **Culture b** | **References** | **Comment** |
|  |  |  |  |  |  |  |  |  |  |  |  |
| Valiña, A | GrA-3014 | 31600 | 250 | 36072 | 34936 | bone |  | III | MO | Zilhão, 2006 | One radiocarbon date only |
|  |  |  |  |  |  |  |  |  |  |  |  |
| Viña, La | GifA-99231 | 37700 | 590 | 42901 | 41198 | charcoal |  | XIII basal | MO | Fortea Pérez, 2001 | Most datings suggest occupation before 48 ka BP. Sample GifA 95550 from the interface of Mousterian and AU layer was excluded. |
| Viña, La | GifA-99230 | 48100 | 1600 | ... | 49945d | charcoal |  | XIII basal | MO | ditto |
| Viña, La | OxA-19144 | >59300 |  |  |  | charcoal | ZR | XIII basal | MO | Wood et al., 2014 |
| Viña, La | OxA-19196 | >62000 |  |  |  | charcoal | XR | XIII basal | MO | ditto |
|  |  |  |  |  |  |  |  |  |  |  |  |

a Codes for technocomplexes: MO, Mousterian; MP, Middle Paleolithic; CH, Châtelperronian; AU, Aurignacian; AS, Archaeologically sterile.

b Codes for laboratorypretreatment: AAA, acid-acid-acid; ABA, acid-base-acid; AF, collagene extract with ultrafiltration (Brock et al., 2010); AF\*,ditto with additional solvent treatment; RR, AAA treatment for carbonised residues (Brock et al., 2010); ZR, ABA (Brock et al., 2010); XR, ABOx-SC (Brock et al., 2010); L, bone collagene extraction (Maroto et al., 2012); AI and AC, as indicated in https://c14.arch.ox.ac.uk/database/db.php; A, acid only (for small delicate samples); CE, collagen extract; OX, dating of shells in vacuo with phosphoric acid (Brock et al., 2010).

c Samples providing terminus post quem for overlying layer.

d Denotes a calibrated date which may extend beyond the limit of the calibration curve (IntCal13).

e Measured on the same bone, and identified as statistical outliers by Bayesian modelling (Wood et al., 2014).

f Datings included in the pdf of ages suggested to represent the end of the LMP in Cantabrian Spain (Higham et al., 2014)

g Radiocarbon dating of burnt bone samples is suspected to be unreliable (Wood et al., 2013)

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