**S1 Supporting Information**

## On the chronological structure of the Solutrean in Southern Iberia

**Appendix A - Bayesian modelling results for each archaeological site**

**Central Portugal**

**Caldeirão**

****

**Lagar Velho**

****

**Vale Almoinha**

****

**Salemas**

****

**Southern Portugal**

**Vale Boi**

**Southwestern Spain**

**Gorham’s**

****

**Nerja**

****

**Bajondillo**

****

**Southeastern Spain**

**Ambrosio**

****

**La Boja**

****

**Mallaetes**

****

**Parpalló**

****

**Cendres**

****

**S1B - Bayesian CQL Codes**

**Central Portugal**

**Caldeirão**

Options()

 {

 Resolution=20;

 };

 Plot()

 {

 Outlier\_Model("General",T(5),U(0,4),"t");

 Sequence("CALDEIRAO")

 {

 Boundary("1");

 Phase("Gravettian / Jb")

 {

 R\_Date("OxA-5542", 26020, 320)

 {

 Outlier("General", 0.05);

 };

 };

 Boundary("2");

 Boundary("3");

 Phase("Solutrean? / I")

 {

 R\_Date("OxA-1940", 22900, 380)

 {

 Outlier("General", 0.05);

 };

 };

 Boundary("4");

 Boundary("5");

 Phase("Middle Solutrean / H")

 {

 R\_Date("OxA-2511", 20530, 270)

 {

 Outlier("General", 0.05);

 };

 R\_Date("OxA-1939", 19900, 260)

 {

 Outlier("General", 0.05);

 };

 };

 Boundary("6");

 Boundary("7");

 Phase("Upper Solutrean / Fc")

 {

 R\_Date("OxA-2510", 18840, 200)

 {

 Outlier("General", 0.05);

 };

 };

 Boundary("8");

 Boundary("9");

 Phase("Upper Solutrean / Fa")

 {

 R\_Date("ICEN-295", 21200, 2300)

 {

 Outlier("General", 0.05);

 };

 R\_Date("OxA-1938", 20400, 270)

 {

 Outlier("General", 0.05);

 };

 };

 Boundary("11");

 Boundary("12");

 Phase("Magdalenian / Fa-Eb")

 {

 R\_Date("ICEN-71", 15170, 740)

 {

 Outlier("General", 0.05);

 };

 R\_Date("ICEN-70", 14450, 890)

 {

 Outlier("General", 0.05);

 };

 };

 Boundary("13");

 };

 Sequence()

 {

 Boundary("=5");

 Date("Caldeirao Middle Solutrean");

 Boundary("=6");

 };

 Sequence()

 {

 Boundary("=7");

 Date("Caldeirao Upper Solutrean");

 Boundary("=8");

 };

 Sequence("Total")

 {

 Boundary("=5");

 Date("Caldeirao");

 Boundary("=8");

 };

 };

**Lagar Velho**

Options()

 {

 Resolution=20;

 };

 Plot()

 {

 Outlier\_Model("General",T(5),U(0,4),"t");

 Sequence("LAGAR VELHO")

 {

 Boundary("1");

 Phase("Gravettian / 1")

 {

 R\_Date("OxA-ID303", 22390, 280)

 {

 Outlier("General", 0.05);

 };

 };

 Boundary("2");

 Boundary("3");

 Phase("Proto-Solutrean / 6")

 {

 R\_Date("OxA-8420", 21180, 240)

 {

 Outlier("General", 0.05);

 };

 R\_Date("Sac-1561", 21380, 810)

 {

 Outlier("General", 0.05);

 };

 R\_Date("OxA-8418", 22180, 180)

 {

 Outlier("General", 0.05);

 };

 };

 Boundary("4");

 Boundary("5");

 Phase("Middle Solutrean / 9")

 {

 R\_Date("OxA-8419", 20200, 180)

 {

 Outlier("General", 0.05);

 };

 };

 Boundary("6");

 };

 Sequence()

 {

 Boundary("=5");

 Date("Lagar Velho Middle Solutrean");

 Boundary("=6");

 };

 };

**Vale Almoinha**

Options()

 {

 Resolution=20;

 };

 Plot()

 {

 Outlier\_Model("General",T(5),U(0,4),"t");

 Sequence("VALM")

 {

 Boundary("Start VALM");

 Phase("VALM")

 {

 R\_Date("ICEN-71", 20380, 150)

 {

 Outlier("General", 0.05);

 };

 R\_Date("OxA-5676", 19940, 180)

 {

 Outlier("General", 0.05);

 };

 };

 Boundary("End VALM");

 };

 Sequence()

 {

 Boundary("=Start VALM");

 Date("VALM");

 Boundary("=End VALM");

 };

 };

**Salemas**

Options()

 {

 Resolution=20;

 SD2=TRUE;

 };

 Plot()

 {

 Outlier\_Model("General",T(5),U(0,4),"t");

 Sequence("Salemas")

 {

 Boundary("1");

 Phase("Early Upper/Middle Paleolithic")

 {

 R\_Date("ICEN-379", 24820, 550)

 {

 Outlier("General", 0.05);

 };

 R\_Date("ICEN-383", 23830, 580)

 {

 Outlier("General", 0.05);

 };

 R\_Date("ICEN-384", 20740, 470)

 {

 Outlier("General", 0.05);

 };

 };

 Boundary("2");

 Phase("Upper Solutrean")

 {

 R\_Date("ICEN-376", 20250, 320)

 {

 Outlier("General", 0.05);

 };

 R\_Date("ICEN-385", 19220, 300)

 {

 Outlier("General", 0.05);

 };

 R\_Date("ICEN-367", 17770, 420)

 {

 Outlier("General", 0.05);

 };

 };

 Boundary("3");

 };

 Sequence()

 {

 Boundary("=2");

 Date("Salemas Upper Solutrean");

 Boundary("=3");

 };

 };

**Southern Portugal**

**Vale Boi**

Options()

 {

 Resolution=20;

 };

 Plot()

 {

 Outlier\_Model("General",T(5),U(0,4),"t");

 Sequence(VALE\_BOI)

 {

 Boundary("1");

 Phase("Gravettian / D")

 {

 R\_Date("Wk-26803", 21859, 186)

 {

 Outlier("General", 0.05);

 };

 R\_Date("Wk-26802", 20570, 158)

 {

 Outlier("General", 0.05);

 };

 };

 Boundary("2");

 Sequence("Upper Solutrean")

 {

 R\_Date("Wk-26800", 20620, 160)

 {

 Outlier("General", 0.05);

 };

 R\_Date("Wk-26802", 20570, 158)

 {

 Outlier("General", 0.05);

 };

 R\_Date("Wk-24765", 19533, 92)

 {

 Outlier("General", 0.05);

 };

 Curve("Marine13","Marine13.14c");

 Delta\_R("LocalMarine",265,107);

 R\_Date("Wk-17840", 18859, 90)

 {

 Outlier("General", 0.05);

 };

 Curve("IntCal13","IntCal13.14c");

 R\_Date("Wk-31087", 20339, 161)

 {

 Outlier("General", 0.05);

 };

 };

 Boundary("3");

 Boundary("4");

 Phase("Magdalenian")

 {

 R\_Date("Wk-31088", 15660, 86)

 {

 Outlier("General", 0.05);

 };

 };

 Boundary("5");

 };

 Sequence()

 {

 Boundary("=2");

 Date("Vale Boi Upper Solutrean");

 Boundary("=3");

 };

 };

**Southwestern Spain**

**Gorham’s**

Options()

 {

 Resolution=20;

 };

 Plot()

 {

 Outlier\_Model("General",T(5),U(0,4),"t");

 Sequence("GORHAM'S")

 {

 Boundary("1");

 Phase("Mousterian / IV")

 {

 R\_Date("Beta-196775", 24010, 320)

 {

 Outlier("General", 0.05);

 };

 R\_Date("Beta-196773", 26400, 440)

 {

 Outlier("General", 0.05);

 };

 R\_Date("Beta-196776", 30560, 720)

 {

 Outlier("General", 0.05);

 };

 };

 Boundary("2");

 Boundary("3");

 Phase("Upper Solutrean / III")

 {

 R\_Date("Beta-184042", 18440, 80)

 {

 Outlier("General", 0.05);

 };

 R\_Date("Beta-181893", 16420, 60)

 {

 Outlier("General", 0.05);

 };

 };

 Boundary("4");

 Boundary("5");

 Phase("Magdalenian / IIIA")

 {

 R\_Date("Beta-181896", 13870, 80)

 {

 Outlier("General", 0.05);

 };

 R\_Date("Beta-185343", 10880, 80)

 {

 Outlier("General", 0.05);

 };

 R\_Date("Beta-181895", 12460, 100)

 {

 Outlier("General", 0.05);

 };

 R\_Date("Beta-184047", 12640, 100)

 {

 Outlier("General", 0.05);

 };

 R\_Date("Beta-196777", 12540, 100)

 {

 Outlier("General", 0.05);

 };

 };

 Boundary("6");

 };

 Sequence()

 {

 Boundary("=3");

 Date("Gorhams Upper Solutrean");

 Boundary("=4");

 };

 };

**Nerja**

Options()

 {

 Resolution=20;

 };

 Plot()

 {

 Outlier\_Model("General",T(5),U(0,4),"t");

 Sequence()

 {

 Boundary("1");

 Phase("Gravettian / V13")

 {

 R\_Date("BETA-131576", 24480, 110)

 {

 Outlier("General", 0.05);

 };

 R\_Date("BETA-189080", 24200, 200)

 {

 Outlier("General", 0.05);

 };

 };

 Boundary("2");

 Boundary("3");

 Phase("Lower Solutrean / V9")

 {

 R\_Date("GifA-102021", 21140, 190)

 {

 Outlier("General", 0.05);

 };

 };

 Boundary("4");

 Boundary("5");

 Phase("Middle Solutrean / 8K+L")

 {

 R\_Date("UBAR-158", 18420, 530)

 {

 Outlier("General", 0.05);

 };

 };

 Boundary("6");

 Phase("Solutreo-Gravettian / 8c")

 {

 R\_Date("UBAR-98", 17940, 200)

 {

 Outlier("General", 0.05);

 };

 };

 Boundary("7");

 Boundary("8");

 Phase("Magdalenian")

 {

 R\_Date("UBAR-155", 12190, 150)

 {

 Outlier("General", 0.05);

 };

 R\_Date("UBAR-156", 12130, 130)

 {

 Outlier("General", 0.05);

 };

 R\_Date("UBAR-154", 11930, 160)

 {

 Outlier("General", 0.05);

 };

 };

 Boundary("9");

 Phase("Epipaleolithic")

 {

 R\_Date(10860, 160)

 {

 Outlier("General", 0,05);

 };

 R\_Date(10040, 40)

 {

 Outlier("General", 0,05);

 };

 };

 Boundary("10");

 };

 Sequence()

 {

 Boundary("=3");

 Date("Nerja Lower Solutrean");

 Boundary("=4");

 };

 Sequence()

 {

 Boundary("=5");

 Date("Nerja Middle Solutrean");

 Boundary("=6");

 };

 Sequence()

 {

 Boundary("=6");

 Date("Nerja Solutreo-Gravettian");

 Boundary("=7");

 };

 Sequence("Total")

 {

 Boundary("=3");

 Date("Nerja");

 Boundary("=7");

 };

 };

**Bajondillo**

Options()

 {

 Resolution=20;

 };

 Plot()

 {

 Outlier\_Model("General",T(5),U(0,4),"t");

 Sequence("Bajondillo")

 {

 Boundary("1");

 Phase("Aurignacian / Bj11")

 {

 Age("MAD-2559", N(28019, 2334))

 {

 Outlier("General", 0.05);

 };

 Age("MAD-2482", N(26013, 2777))

 {

 Outlier("General", 0.05);

 };

 };

 Boundary("2");

 Phase("Gravettian / Bj10")

 {

 Age("MAD-2470", N(24344, 2653))

 {

 Outlier("General", 0.05);

 };

 };

 Boundary("3");

 Boundary("4");

 Phase("Middle Solturean / Bj9")

 {

 R\_Date("AA-34710", 19990, 480)

 {

 Outlier("General", 0.05);

 };

 Age("MAD-2405", N(18701, 2154))

 {

 Outlier("General", 0.05);

 };

 };

 Boundary("5");

 Boundary("6");

 Phase("Soltureo-Gravettian / Bj8")

 {

 Age("MAD-3926", N(17582, 1521))

 {

 Outlier("General", 0.05);

 };

 };

 Boundary("7");

 Phase("Solutreo-Gravettian / Bj7")

 {

 Age("MAD-3927", N(16438, 1497))

 {

 Outlier("General", 0.05);

 };

 };

 Boundary("8");

 Boundary("9");

 Phase("Epipaleolithic / Bj4-3")

 {

 R\_Date("Ua-18269", 7475, 80)

 {

 Outlier("General", 0.05);

 };

 R\_Date("Ua-21999", 7325, 65)

 {

 Outlier("General", 0.05);

 };

 };

 Boundary("10");

 };

 Sequence()

 {

 Boundary("=4");

 Date("Bajondillo Middle Solutrean");

 Boundary("=5");

 };

 Sequence()

 {

 Boundary("=6");

 Date("Bajondillo Solutreo-Gravettian");

 Boundary("=8");

 };

 Sequence("Total")

 {

 Boundary("=4");

 Date("Bajondillo");

 Boundary("=8");

 };

 };

**Southeastern Spain**

**Ambrosio**

Options()

 {

 Resolution=20;

 };

 Plot()

 {

 Outlier\_Model("General",T(5),U(0,4),"t");

 Sequence("AMBROSIO")

 {

 Boundary("1");

 Phase("Upper Solutrean / IV")

 {

 R\_Date("Gif-9884", 21520, 120)

 {

 Outlier("General", 0.05);

 };

 };

 Boundary("2");

 Boundary("3");

 Phase("Solutreo-Gravettian / II")

 {

 R\_Date("Gif-A-95576?", 20150, 200)

 {

 Outlier("General", 0.05);

 };

 R\_Date("Gif-A-95577", 19950, 210)

 {

 Outlier("General", 0.05);

 };

 R\_Date("Gif-A-II.6", 19300, 190)

 {

 Outlier("General", 0.05);

 };

 R\_Date("Gif-9883", 19250, 70)

 {

 Outlier("General", 0.05);

 };

 R\_Date("Gif-A-II.2", 19170, 190)

 {

 Outlier("General", 0.05);

 };

 R\_Date("Gif-A-II.4", 19110, 90)

 {

 Outlier("General", 0.05);

 };

 R\_Date("GifA-A-II.9", 13740, 140)

 {

 Outlier("General", 0.05);

 };

 };

 Boundary("4");

 };

 Sequence()

 {

 Boundary("=1");

 Date("Upper Solutrean");

 Boundary("=2");

 };

 Sequence()

 {

 Boundary("=3");

 Date("Solutreo-Gravettian");

 Boundary("=4");

 };

 };

**La Boja**

Options()

 {

 Resolution=20;

 };

 Plot()

 {

 Outlier\_Model("General",T(5),U(0,4),"t");

 Sequence()

 {

 Boundary("1");

 Phase("")

 {

 R\_Date("VERA-5789", 27620, 230)

 {

 Outlier("General", 0.05);

 };

 };

 Boundary("2");

 Boundary("3");

 Phase("Lower Solutrean")

 {

 R\_Date("Vera-5366", 20980, 120)

 {

 Outlier("General", 0.05);

 };

 R\_Date("Vera-5213", 20980, 110)

 {

 Outlier("General", 0.05);

 };

 };

 Boundary("4");

 Boundary("5");

 Phase("Upper Solutrean")

 {

 R\_Date("Vera-5365", 19390, 100)

 {

 Outlier("General", 0.05);

 };

 };

 Boundary("6");

 Boundary("7");

 Phase("Solutreo-Gravettian / B1+B2")

 {

 R\_Date("VERA-5364b", 17430, 70)

 {

 Outlier("General", 0.05);

 };

 R\_Date("VERA-5364", 16990, 70)

 {

 Outlier("General", 0.05);

 };

 R\_Date("VERA-5788", 16580, 70)

 {

 Outlier("General", 0.05);

 };

 };

 Boundary("8");

 Boundary("9");

 Phase("Post Solutrean")

 {

 R\_Date("VERA-5212", 12965, 40)

 {

 Outlier("General", 0.05);

 };

 };

 Boundary("10");

 };

 Sequence()

 {

 Boundary("=3");

 Date("La Boja Lower Solutrean");

 Boundary("=4");

 };

 Sequence()

 {

 Boundary("=5");

 Date("La Boja Upper Solutrean");

 Boundary("=6");

 };

 Sequence()

 {

 Boundary("=7");

 Date("La Boja Solutreo-Gravettian");

 Boundary("=8");

 };

 Sequence("Total")

 {

 Boundary("=3");

 Date("La Boja");

 Boundary("=8");

 };

 };

**Parpalló**

Options()

 {

 Resolution=20;

 };

 Plot()

 {

 Outlier\_Model("General",T(5),U(0,4),"t");

 Sequence("PAP")

 {

 Boundary("1");

 Sequence("Lower/Middle Solutrean")

 {

 R\_Date("Birm-520", 20166, 380)

 {

 Outlier("General", 0.05);

 };

 R\_Date("BM-859", 20490, 900)

 {

 Outlier("General", 0.05);

 };

 };

 Boundary("2");

 Boundary("3");

 Sequence("Upper Solutrean")

 {

 R\_Date("BM-861", 18080, 800)

 {

 Outlier("General", 0.05);

 };

 };

 Boundary("4");

 Boundary("5");

 Phase("Solutreo-Gravettian")

 {

 R\_Date("Birm-521", 17896, 340)

 {

 Outlier("General", 0.05);

 };

 R\_Date("OxA-22651", 19020, 100)

 {

 Outlier("General", 0.05);

 };

 };

 Boundary("6");

 Boundary("7");

 Phase("Magdalenian")

 {

 R\_Date("Birm-519", 13960, 200)

 {

 Outlier("General", 0.05);

 };

 R\_Date("OxA-22629", 18510, 100)

 {

 Outlier("General", 0.05);

 };

 };

 Boundary("8");

 };

 Sequence()

 {

 Boundary("=1");

 Date("Parpallo Lower/Middle Solutrean");

 Boundary("=2");

 };

 Sequence()

 {

 Boundary("=3");

 Date("Parpallo Upper Solutrean");

 Boundary("=4");

 };

 Sequence()

 {

 Boundary("=5");

 Date("Parpallo Solutreo-Gravettian");

 Boundary("=6");

 };

 Sequence("Total")

 {

 Boundary("=1");

 Date("Parpallo");

 Boundary("=6");

 };

 };

**Mallaetes**

Options()

 {

 Resolution=20;

 };

 Plot()

 {

 Outlier\_Model("General",T(5),U(0,4),"t");

 Sequence()

 {

 Boundary("3");

 Phase("Lower Solutrean / VI")

 {

 R\_Date("MalladetesVI", 21710, 650)

 {

 Outlier("General", 0.05);

 };

 };

 Boundary("4");

 Boundary("5");

 Phase("Middle Solutrean / Va")

 {

 R\_Date("MalladetesVa", 20140, 460)

 {

 Outlier("General", 0.05);

 };

 };

 Boundary("6");

 Boundary("7");

 Phase("Upper Solutrean / III")

 {

 R\_Date("MalladetesIII", 16300, 1500)

 {

 Outlier("General", 0.05);

 };

 };

 Boundary("8");

 Boundary("9");

 Phase("Solutreo-Gravettian / II")

 {

 R\_Date("MalladetesII", 19370, 105)

 {

 Outlier("General", 0.05);

 };

 };

 Boundary("10");

 };

 Sequence()

 {

 Boundary("=3");

 Date("Mallaetes Lower Solutrean");

 Boundary("=4");

 };

 Sequence()

 {

 Boundary("=5");

 Date("Mallaetes Middle Solutrean");

 Boundary("=6");

 };

 Sequence()

 {

 Boundary("=7");

 Date("Mallaetes Upper Solutrean");

 Boundary("=8");

 };

 Sequence()

 {

 Boundary("=9");

 Date("Mallaetes Solutreo-Gravettian");

 Boundary("=10");

 };

 Sequence("Total")

 {

 Boundary("=3");

 Date("Mallaetes");

 Boundary("=10");

 };

 };

**Cendres**

Options()

 {

 Resolution=20;

 };

 Plot()

 {

 Outlier\_Model("General",T(5),U(0,4),"t");

 Sequence()

 {

 Boundary("1");

 Phase("Gravettian")

 {

 R\_Date("Beta-155606", 24080, 150)

 {

 Outlier("General", 0.05);

 };

 R\_Date("Beta-14283", 21230, 180)

 {

 Outlier("General", 0.05);

 };

 };

 Boundary("2");

 Boundary("3");

 Phase("Upper Solutrean / XIII")

 {

 R\_Date("Beta-118026", 18920, 180)

 {

 Outlier("General", 0.05);

 };

 R\_Date("Beta-118027", 18750, 130)

 {

 Outlier("General", 0.05);

 };

 };

 Boundary("4");

 Boundary("5");

 Phase("Solutreo-Gravettian / XII")

 {

 R\_Date("Beta-118024", 17230, 130)

 {

 Outlier("General", 0.05);

 };

 };

 Boundary("6");

 };

 Sequence()

 {

 Boundary("=3");

 Date("Upper Solutrean");

 Boundary("=4");

 };

 Sequence()

 {

 Boundary("=5");

 Date("Solutreo-Gravettian");

 Boundary("=6");

 };

 Sequence("Total")

 {

 Boundary("=5");

 Date("Cendres");

 Boundary("=6");

 };

 };