**Resolving time among non-stratified short-duration contexts on a radiocarbon plateau: possibilities and challenges from the AD 1480–1630 example and northeastern North America**

Sturt W. Manning,Jennifer Birch, Megan Anne Conger, Samantha Sanft

**Appendix**

We list some examples of the OxCal runfiles for the models employed in the paper.

The OxCal runfiles for the models shown in Figure 2A and Figure 2B follow:

Plot()

 {

 Sequence()

 {

 D\_Sequence("Site 1 House A central post")

 {

 R\_Simulate("Ring 1, 1440",1440,20);

 Gap(10);

 R\_Simulate("Ring 11, 1450",1450,20);

 Gap(10);

 R\_Simulate("Ring 21, 1460",1460,20);

 Gap(10);

 R\_Simulate("Ring 31, 1470",1470,20);

 Gap(10);

 R\_Simulate("Ring 41, 1480",1480,20);

 Gap(10);

 R\_Simulate("Ring 51, 1490",1490,20);

 };

 Interval("Use Timber",N(1,1));

 Date("Date Estimate House A construction");

 };

 Phase()

 {

 Sequence("Site 1 House A WM and Interval constraint U(0,60)")

 {

 Boundary("=Date Estimate House A construction");

 Phase ("Short-lived Samples Site 1 House A WM + Int")

 {

 R\_Date("Date 1a",350,20);

 R\_Date("Date 2a",350,20);

 R\_Date("Date 3a",340,20);

 R\_Date("Date 4a", 340,20);

 Date("Date Estimate House A WM");

 Interval("end WM + max site",U(0,60));

 };

 Boundary("End Site 1 House A WM");

 };

 Sequence("Site 1 House A No WM & No Int")

 {

 Boundary("Start Site 1 House A No WM");

 Phase ("Short-lived Samples Site 1 House A No WM & No Int")

 {

 R\_Date("Date 1b",350,20);

 R\_Date("Date 2b",350,20);

 R\_Date("Date 3b",340,20);

 R\_Date("Date 4b", 340,20);

 Date("Date Estimate House A No WM & No Int");

 };

 Boundary("End Site 1 House A No WM & No Int");

 };

 };

 };

Plot()

 {

 Sequence()

 {

 D\_Sequence("Site 1 House A central post")

 {

 R\_Date("Ring 1, 1440",489,20);

 Gap(10);

 R\_Date("Ring 11, 1450",469,20);

 Gap(10);

 R\_Date("Ring 21, 1460",405,20);

 Gap(10);

 R\_Date("Ring 31, 1470",413,20);

 Gap(10);

 R\_Date("Ring 41, 1480",387,20);

 Gap(10);

 R\_Date("Ring 51, 1490",330,20);

 };

 Interval("Use Timber",N(1,1));

 Date("Date Estimate House A construction");

 };

 Phase()

 {

 Sequence("Site 1 House A WM and Interval constraint LnN(ln(20),ln(2))")

 {

 Boundary("=Date Estimate House A construction");

 Phase ("Short-lived Samples Site 1 House A WM + Int")

 {

 R\_Date("Date 1a",350,20);

 R\_Date("Date 2a",350,20);

 R\_Date("Date 3a",340,20);

 R\_Date("Date 4a", 340,20);

 Date("Date Estimate House A WM");

 Interval("end WM + max site",LnN(ln(20),ln(2)));

 };

 Boundary("End Site 1 House A WM");

 };

 Sequence("Site 1 House A No WM & No Int")

 {

 Boundary("Start Site 1 House A No WM");

 Phase ("Short-lived Samples Site 1 House A No WM & No Int")

 {

 R\_Date("Date 1b",350,20);

 R\_Date("Date 2b",350,20);

 R\_Date("Date 3b",340,20);

 R\_Date("Date 4b", 340,20);

 Date("Date Estimate House A No WM & No Int");

 };

 Boundary("End Site 1 House A No WM & No Int");

 };

 };

 };

OxCal code for the models shown in Figures 4A and 4B follows:

Plot()

 {

 //Hypothetical wood charcoal sample start of site life-cycle, site 1480-1510

 D\_Sequence("Charcoal A")

 {

 R\_Simulate("Ring 1 Charcoal A",1451,20);

 Gap(29);

 R\_Simulate("Ring 30 Charcoal A",1480,20);

 Last("L");

 };

 Sequence("Site 1 House A")

 {

 Boundary("S");

 Phase()

 {

 Date("=L");

 R\_Simulate("Date 1",1480+rand()\*30,20);

 R\_Simulate("Date 2",1480+rand()\*30,20);

 R\_Simulate("Date 3",1480+rand()\*30,20);

 R\_Simulate("Date 4",1480+rand()\*30,20);

 Date("Date 1480-1510 Site");

 Interval("Interval Site Phase",LnN(ln(20),ln(2)));

 };

 Boundary("E");

 };

 };

Plot()

 {

 //Hypothetical wood charcoal sample middle of site life-cycle, site 1480-1510

 D\_Sequence("Charcoal A")

 {

 R\_Simulate("Ring 1 Charcoal A",1466,20);

 Gap(29);

 R\_Simulate("Ring 30 Charcoal A",1495,20);

 Last("L");

 };

 Sequence("Site 1 House A")

 {

 Boundary("S");

 Phase()

 {

 Date("=L");

 R\_Simulate("Date 1",1480+rand()\*30,20);

 R\_Simulate("Date 2",1480+rand()\*30,20);

 R\_Simulate("Date 3",1480+rand()\*30,20);

 R\_Simulate("Date 4",1480+rand()\*30,20);

 Date("Date 1480-1510 Site");

 Interval("Interval Site Phase",LnN(ln(20),ln(2)));

 };

 Boundary("E");

 };

 };

OxCal code for the models shown in Figures 7A and 7B follows:

Plot()

 {

 //Hypothetical wood charcoal sample start of site life-cycle, 1480-1510

 D\_Sequence("Charcoal A")

 {

 R\_Simulate("Ring 1 Charcoal A",1451,20);

 Gap(29);

 R\_Simulate("Ring 30 Charcoal A",1480,20);

 Last("L");

 };

 Sequence("Site 1 House A")

 {

 Boundary("S");

 Phase()

 {

 Date("=L");

 R\_Simulate("Date 1",1480+rand()\*30,20);

 R\_Simulate("Date 2",1480+rand()\*30,20);

 R\_Simulate("Date 3",1480+rand()\*30,20);

 R\_Simulate("Date 4",1480+rand()\*30,20);

 Date("Date 1480-1510 Site");

 Interval("Interval Site Phase",U(0,50));

 };

 Boundary("E");

 };

 };

Plot()

 {

 //Hypothetical wood charcoal sample middle start of site life-cycle, site 1480-1510

 D\_Sequence("Charcoal A")

 {

 R\_Simulate("Ring 1 Charcoal A",1466,20);

 Gap(29);

 R\_Simulate("Ring 30 Charcoal A",1495,20);

 Last("L");

 };

 Sequence("Site 1 House A")

 {

 Boundary("S");

 Phase()

 {

 Date("=L");

 R\_Simulate("Date 1",1480+rand()\*30,20);

 R\_Simulate("Date 2",1480+rand()\*30,20);

 R\_Simulate("Date 3",1480+rand()\*30,20);

 R\_Simulate("Date 4",1480+rand()\*30,20);

 Date("Date 1480-1510 Site");

 Interval("Interval Site Phase",U(0,50));

 };

 Boundary("E");

 };

 };

OxCal code for the models shown in Figures 8A and 8B follows:

Plot()

 {

 //Hypothetical wood charcoal sample start of site life-cycle, site 1540-1570

 D\_Sequence("Charcoal A")

 {

 R\_Simulate("Ring 1 Charcoal A",1511,20);

 Gap(29);

 R\_Simulate("Ring 30 Charcoal A",1540,20);

 Last("L");

 };

 Sequence("Site 1 House A")

 {

 Boundary("S");

 Phase()

 {

 Date("=L");

 R\_Simulate("Date 1",1540+rand()\*30,20);

 R\_Simulate("Date 2",1540+rand()\*30,20);

 R\_Simulate("Date 3",1540+rand()\*30,20);

 R\_Simulate("Date 4",1540+rand()\*30,20);

 Date("Date 1540-1570 Site");

 Interval("Interval Site Phase",LnN(ln(20),ln(2)));

 };

 Boundary("E");

 };

 };

Plot()

 {

 //Hypothetical wood charcoal sample middle of site life-cycle, 1540-1570

 D\_Sequence("Charcoal A")

 {

 R\_Simulate("Ring 1 Charcoal A",1526,20);

 Gap(29);

 R\_Simulate("Ring 30 Charcoal A",1555,20);

 Last("L");

 };

 Sequence("Site 1 House A")

 {

 Boundary("S");

 Phase()

 {

 Date("=L");

 R\_Simulate("Date 1",1540+rand()\*30,20);

 R\_Simulate("Date 2",1540+rand()\*30,20);

 R\_Simulate("Date 3",1540+rand()\*30,20);

 R\_Simulate("Date 4",1540+rand()\*30,20);

 Date("Date 1540-1570 Site");

 Interval("Interval Site Phase",LnN(ln(20),ln(2)));

 };

 Boundary("E");

 };

 };

OxCal code for Example 1 (v), Example 2 (iv), Example 3 (iii) and Example 4 (ii) of the models run for Figure 10 are listed below.

In all cases, for versions (i), (ii), (iii), (iv) and (v) the respective Interval lines should read:

1. Interval(); or remove the Interval line altogether
2. Interval(U(0,120);
3. Interval(U(0,80);
4. Interval(LnN(ln(20),ln(2)));
5. For Examples 1 & 2: Interval(N(15,7.5));

and for Examples 3 & 4: Interval(N(20,10));

Note: Example 4 (iii) in Figure 10 employs Interval(U(0,100)); because Interval(U(0,80)); or Interval(U(0,90)); usually would not give satisfactory Convergence values.

Example 1 (v):

Plot()

 {

 Phase()

 {

 Sequence()

 {

 Boundary();

 Phase("1448-1477")

 {

 R\_Date("1450",416,12);

 R\_Date("1455",399,11);

 R\_Date("1460",393,11);

 R\_Date("1465",389,11);

 R\_Date("1470",381,12);

 R\_Date("1475",375,12);

 Date("Date Phase 1448-1477");

 Interval(N(15,7.5));

 };

 Boundary();

 };

 Sequence()

 {

 Boundary();

 Phase("1478-1507")

 {

 R\_Date("1480",372,12);

 R\_Date("1485",368,11);

 R\_Date("1490",359,12);

 R\_Date("1495",352,11);

 R\_Date("1500",349,11);

 R\_Date("1505",350,10);

 Date("Date Phase 1478-1507");

 Interval(N(15,7.5));

 };

 Boundary();

 };

 Sequence()

 {

 Boundary();

 Phase("1508-1537")

 {

 R\_Date("1510",353,8);

 R\_Date("1515",345,8);

 R\_Date("1520",337,8);

 R\_Date("1525",320,7);

 R\_Date("1530",306,8);

 R\_Date("1535",304,7);

 Date("Date Phase 1508-1537");

 Interval(N(15,7.5));

 };

 Boundary();

 };

 Sequence()

 {

 Boundary();

 Phase("1538-1567")

 {

 R\_Date("1540",307,7);

 R\_Date("1545",311,8);

 R\_Date("1550",310,7);

 R\_Date("1555",316,8);

 R\_Date("1560",328,8);

 R\_Date("1565",324,8);

 Date("Date Phase 1538-1567");

 Interval(N(15,7.5));

 };

 Boundary();

 };

 Sequence()

 {

 Boundary();

 Phase("1568-1597")

 {

 R\_Date("1570",325,8);

 R\_Date("1575",332,8);

 R\_Date("1580",335,8);

 R\_Date("1585",332,8);

 R\_Date("1590",332,8);

 R\_Date("1595",343,8);

 Date("Date Phase 1568-1597");

 Interval(N(15,7.5));

 };

 Boundary();

 };

 Sequence()

 {

 Boundary();

 Phase("1598-1627")

 {

 R\_Date("1600",347,7);

 R\_Date("1605",369,7);

 R\_Date("1610",360,8);

 R\_Date("1615",354,7);

 R\_Date("1620",334,7);

 R\_Date("1625",332,7);

 Date("Date Phase 1598-1627");

 Interval(N(15,7.5));

 };

 Boundary();

 };

 Order("Order");

 };

 };

Example 2 (iv):

Plot()

 {

 Phase()

 {

 Sequence()

 {

 Boundary();

 Phase("1448-1477")

 {

 R\_Date("1450",416,12);

 R\_Date("1455",399,11);

 R\_Date("1460",393,11);

 R\_Date("1465",389,11);

 R\_Date("1470",381,12);

 R\_Date("1475",375,12);

 Date("Date Phase 1448-1477");

 Interval(LnN(ln(20),ln(2)));

 };

 Boundary();

 };

 Sequence()

 {

 Boundary();

 Phase("1478-1507")

 {

 R\_Date("1480",372,12);

 R\_Date("1485",368,11);

 R\_Date("1490",359,12);

 R\_Date("1495",352,11);

 R\_Date("1500",349,11);

 R\_Date("1505",350,10);

 Date("Date Phase 1478-1507");

 Interval(LnN(ln(20),ln(2)));

 };

 Boundary();

 };

 Sequence()

 {

 Boundary();

 Phase("1508-1537")

 {

 R\_Date("1510",353,8);

 R\_Date("1515",345,8);

 R\_Date("1520",337,8);

 R\_Date("1525",320,7);

 R\_Date("1530",306,8);

 R\_Date("1535",304,7);

 Date("Date Phase 1508-1537");

 Interval(LnN(ln(20),ln(2)));

 };

 Boundary();

 };

 Sequence()

 {

 Boundary();

 Phase("1538-1567")

 {

 R\_Date("1540",307,7);

 R\_Date("1545",311,8);

 R\_Date("1550",310,7);

 R\_Date("1555",316,8);

 R\_Date("1560",328,8);

 R\_Date("1565",324,8);

 Date("Date Phase 1538-1567");

 Interval(LnN(ln(20),ln(2)));

 };

 Boundary();

 };

 Sequence()

 {

 Boundary();

 Phase("1568-1597")

 {

 R\_Date("1570",325,8);

 R\_Date("1575",332,8);

 R\_Date("1580",335,8);

 R\_Date("1585",332,8);

 R\_Date("1590",332,8);

 R\_Date("1595",343,8);

 Date("Date Phase 1568-1597");

 Interval(LnN(ln(20),ln(2)));

 };

 Boundary();

 };

 Sequence()

 {

 Boundary();

 Phase("1598-1627")

 {

 R\_Date("1600",347,7);

 R\_Date("1605",369,7);

 R\_Date("1610",360,8);

 R\_Date("1615",354,7);

 R\_Date("1620",334,7);

 R\_Date("1625",332,7);

 Date("Date Phase 1598-1627");

 Interval(LnN(ln(20),ln(2)));

 };

 Boundary();

 };

 Order("Order");

 };

 };

Model 3 (iii):

Plot()

 {

 Phase()

 {

 Sequence()

 {

 Boundary();

 Phase("1448-1487")

 {

 R\_Date("1450",416,12);

 R\_Date("1455",399,11);

 R\_Date("1460",393,11);

 R\_Date("1465",389,11);

 R\_Date("1470",381,12);

 R\_Date("1475",375,12);

 R\_Date("1480",372,12);

 R\_Date("1485",368,11);

 Date("Date Phase 1448-1487");

 Interval(U(0,80));

 };

 Boundary();

 };

 Sequence()

 {

 Boundary();

 Phase("1488-1527")

 {

 R\_Date("1490",359,12);

 R\_Date("1495",352,11);

 R\_Date("1500",349,11);

 R\_Date("1505",350,10);

 R\_Date("1510",353,8);

 R\_Date("1515",345,8);

 R\_Date("1520",337,8);

 R\_Date("1525",320,7);

 Date("Date Phase 1488-1527");

 Interval(U(0,80));

 };

 Boundary();

 };

 Sequence()

 {

 Boundary();

 Phase("1528-1567")

 {

 R\_Date("1530",306,8);

 R\_Date("1535",304,7);

 R\_Date("1540",307,7);

 R\_Date("1545",311,8);

 R\_Date("1550",310,7);

 R\_Date("1555",316,8);

 R\_Date("1560",328,8);

 R\_Date("1565",324,8);

 Date("Date Phase 1528-1567");

 Interval(U(0,80));

 };

 Boundary();

 };

 Sequence()

 {

 Boundary();

 Phase("1568-1607")

 {

 R\_Date("1570",325,8);

 R\_Date("1575",332,8);

 R\_Date("1580",335,8);

 R\_Date("1585",332,8);

 R\_Date("1590",332,8);

 R\_Date("1595",343,8);

 R\_Date("1600",347,7);

 R\_Date("1605",369,7);

 Date("Date Phase 1568-1607");

 Interval(U(0,80));

 };

 Boundary();

 };

 Sequence()

 {

 Boundary();

 Phase("1608-1647")

 {

 R\_Date("1610",360,8);

 R\_Date("1615",354,7);

 R\_Date("1620",334,7);

 R\_Date("1625",332,7);

 R\_Date("1630",328,8);

 R\_Date("1635",306,7);

 R\_Date("1640",299,7);

 R\_Date("1645",273,7);

 Date("Date Phase 1608-1647");

 Interval(U(0,80));

 };

 Boundary();

 };

 Order("Order");

 };

 };

Example 4 (ii)

Plot()

 {

 Phase()

 {

 Sequence()

 {

 Boundary();

 Phase("1463-1502")

 {

 R\_Date("1465",389,11);

 R\_Date("1470",381,12);

 R\_Date("1475",375,12);

 R\_Date("1480",372,12);

 R\_Date("1485",368,11);

 R\_Date("1490",359,12);

 R\_Date("1495",352,11);

 R\_Date("1500",349,11);

 Date("Date Phase 1463-1502");

 Interval(U(0,120));

 };

 Boundary();

 };

 Sequence()

 {

 Boundary();

 Phase("1503-1542")

 {

 R\_Date("1505",350,10);

 R\_Date("1510",353,8);

 R\_Date("1515",345,8);

 R\_Date("1520",337,8);

 R\_Date("1525",320,7);

 R\_Date("1530",306,8);

 R\_Date("1535",304,7);

 R\_Date("1540",307,7);

 Date("Date Phase 1503-1542");

 Interval(U(0,120));

 };

 Boundary();

 };

 Sequence()

 {

 Boundary();

 Phase("1543-1582")

 {

 R\_Date("1545",311,8);

 R\_Date("1550",310,7);

 R\_Date("1555",316,8);

 R\_Date("1560",328,8);

 R\_Date("1565",324,8);

 R\_Date("1570",325,8);

 R\_Date("1575",332,8);

 R\_Date("1580",335,8);

 Date("Date Phase 1543-1582");

 Interval(U(0,120));

 };

 Boundary();

 };

 Sequence()

 {

 Boundary();

 Phase("1583-1622")

 {

 R\_Date("1585",332,8);

 R\_Date("1590",332,8);

 R\_Date("1595",343,8);

 R\_Date("1600",347,7);

 R\_Date("1605",369,7);

 R\_Date("1610",360,8);

 R\_Date("1615",354,7);

 R\_Date("1620",334,7);

 Date("Date Phase 1583-1622");

 Interval(U(0,120));

 };

 Boundary();

 };

 Sequence()

 {

 Boundary();

 Phase("1623-1662")

 {

 R\_Date("1625",332,7);

 R\_Date("1630",328,8);

 R\_Date("1635",306,7);

 R\_Date("1640",299,7);

 R\_Date("1645",273,7);

 R\_Date("1650",252,7);

 R\_Date("1655",239,7);

 R\_Date("1660",233,7);

 Date("Date Phase 1623-1662");

 Interval(U(0,120));

 };

 Boundary();

 };

 Order("Order");

 };

 };