

## Supplementary Tables

### $\delta^{18}\text{O}$ water isotope in the iLOVECLIM model (version 1.0) – Part 3: a paleoperspective based on present-day data-model comparison for oxygen stable isotopes in carbonates.

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Table S1 (part 1): compilation of 74  $\delta^{18}\text{O}$  calcite measurements and drip water data of speleothems and 19  $\delta^{18}\text{O}$  data of ice core from the literature. Closest model data points for the  $\delta^{18}\text{O}$  in precipitation,  $\delta^{18}\text{O}$  calcite and atmospheric temperature are also indicated.

| Site Name                 | Latitude | Longitude | Elevation (m) | $\delta^{18}\text{O}$ in precipitation (‰) | iLOVECLIM $\delta^{18}\text{O}$ in precipitation (‰) | Late Holocene $\delta^{18}\text{O}$ calcite (‰) | 2 $\sigma$ error | iLOVECLIM $\delta^{18}\text{O}$ calcite (‰) | Cave temperature (°C) | iLOVECLIM Temperature (°C) | References                                                 |
|---------------------------|----------|-----------|---------------|--------------------------------------------|------------------------------------------------------|-------------------------------------------------|------------------|---------------------------------------------|-----------------------|----------------------------|------------------------------------------------------------|
| Attahohle                 | 50,80    | 7,44      | 308           | -8,92                                      | -2,84                                                | -6,25                                           |                  | -2,38                                       | 9,40                  | 13,62                      | Niggemann et al., 2003                                     |
| B-7                       | 49,00    | 7,00      | 185           | -8,37                                      | -2,84                                                | -5,63                                           |                  | -2,38                                       | 9,40                  | 13,62                      | Niggemann et al., 2003                                     |
| Botuverá Cave             | -27,22   | -49,16    | 230           |                                            |                                                      | -3,17                                           | 0,96             | -4,84                                       |                       |                            | Cruz et al., 2005; Wang et al., 2007                       |
| Brown's Folly mine        | 51,38    | 2,30      | 180           |                                            |                                                      | -4,50                                           |                  | -3,28                                       |                       |                            | Baldini et al., 2005                                       |
| Buca della Renella        | 44,00    | 10,00     | 300           |                                            |                                                      | -3,79                                           | 0,90             | -2,55                                       |                       |                            | Drysdale et al., 2006                                      |
| Buckeye Creek Cave        | 37,98    | -80,40    | 600           |                                            |                                                      | -6,17                                           | 0,28             | -2,36                                       |                       |                            | Springer et al., 2008; Hardt et al., 2010                  |
| Bunker Cave               | 51,37    | 7,66      | 184           | -7,90                                      | -2,84                                                | -5,70                                           |                  | -2,38                                       | 10,50                 | 13,62                      | Riechelmann, 2010; Riechelmann et al., 2011                |
| Cango                     | -33,38   | 22,22     |               | -5,44                                      | -2,88                                                | -5,40                                           |                  | -3,03                                       | 17,50                 | 16,62                      | Talma and Vogel, 1992                                      |
| Cascayunga Cave           | -6,07    | -77,18    | 900           |                                            |                                                      | -7,30                                           | 0,74             | -5,97                                       |                       |                            | Reuter et al., 2009                                        |
| Ceremosjna cave           | 45,00    | 21,00     | 530           |                                            |                                                      | -6,93                                           |                  | -1,95                                       |                       |                            | Kacanski et al., 2001                                      |
| Chauvet cave              | 44,23    | 4,26      | 240           | -6,80                                      | -1,53                                                |                                                 |                  |                                             | 13,20                 | 15,00                      | Genty et al., 2006                                         |
| Clamouse                  | 44,00    | 5,00      | 800           | -6,20                                      | -1,53                                                | -4,90                                           |                  | -2,35                                       | 14,50                 | 18,77                      | Plagnes et al., 2002                                       |
| Cold Air Cave             | -24,02   | 29,11     | 1375          | -4,00                                      | -6,13                                                | -4,08                                           | 1,34             | -7,40                                       | 18,80                 | 21,35                      | Holmgren et al., 1999; 2003                                |
| Cold Water Cave           | 43,47    | -91,97    | 356           |                                            |                                                      | -6,32                                           | 0,32             | -5,83                                       |                       |                            | Denniston et al., 1999                                     |
| Corchia                   | 44,00    | 10,22     | 1300          | -7,40                                      | -1,56                                                | -4,34                                           |                  | -2,55                                       | 7,50                  | 20,09                      | Zanchetta et al., 2007                                     |
| Crag                      | 52,23    | -9,44     | 60            | -5,60                                      | -2,45                                                | -3,52                                           |                  | -2,47                                       | 10,40                 | 15,37                      | McDermott et al., 1999; Baldini et al., 2005               |
| Cueva del Diablo          | 18,18    | -99,92    | 1030          |                                            |                                                      | -8,30                                           | 0,52             | -5,16                                       |                       |                            | Bernal et al., 2011                                        |
| Cueva del Tigre Perdido   | -5,94    | -77,31    | 1000          |                                            |                                                      | -7,09                                           | 0,70             | -5,97                                       |                       |                            | van Breukelen et al., 2008                                 |
| Dongge Cave               | 25,28    | 108,08    | 680           |                                            |                                                      | -7,68                                           | 0,50             | -7,93                                       |                       |                            | Yuan et al., 2004; Dykoski et al., 2005; Wang et al., 2005 |
| Ernesto                   | 45,96    | 11,65     | 1165          | -9,60                                      | -1,51                                                | -7,60                                           |                  | -2,55                                       | 6,70                  | 20,38                      | McDermott et al., 1999                                     |
| Flint Ridge–Mammoth cave  | 37,00    | -86,00    |               | -5,94                                      | -3,98                                                | -5,10                                           |                  | -5,38                                       | 13,50                 | 23,44                      | Harmon et al., 1978                                        |
| Frankcombe                | -42,52   | 146,45    | 360           | -5,70                                      | -4,08                                                | -4,00                                           |                  | -3,02                                       | 8,30                  | 12,50                      | Goede et al., 1990                                         |
| Grotta di Carburangeli    | 38,15    | 13,20     | 22            | -6,00                                      | -1,77                                                | -6,10                                           |                  | -3,22                                       | 19,40                 | 22,00                      | Frisia et al., 2006                                        |
| Grotte de Clamouse        | 43,70    | 3,60      | 75            | -6,20                                      | -1,53                                                | -5,26                                           |                  | -2,35                                       | 14,50                 | 18,77                      | McDermott et al., 1999                                     |
| Gunung Buda National Park | 4,03     | 114,80    | 150           |                                            |                                                      | -9,34                                           | 0,28             | -6,43                                       |                       |                            | Partin et al., 2007                                        |
| Han-sur-Lesse cave        | 50,13    | 5,16      | 180           | -7,50                                      | -3,40                                                | -5,65                                           |                  | -3,28                                       | 9,00                  | 15,07                      | Verheyden et al., 2006; Genty et al., 2006                 |
| Harrison's                | 13,17    | -59,50    |               | -3,30                                      | -5,20                                                | -4,20                                           |                  | -8,20                                       | 26,60                 | 30,11                      | Mickler et al., 2004                                       |
| Heshang Cave              | 30,45    | 110,42    | 294           |                                            |                                                      | -8,19                                           | 0,74             | -7,93                                       |                       |                            | Hu et al., 2008                                            |
| Hölloch Cave              | 47,00    | 10,00     | 1440          | -11,80                                     | -1,56                                                | -8,02                                           |                  | -2,55                                       | 3,50                  | 16,00                      | Wurth et al., 2004                                         |
| Hoti Cave                 | 23,08    | 57,35     | 800           | -1,00                                      | -2,72                                                | -4,88                                           | 1,3              | -5,87                                       | 23,00                 | 31,45                      | Neff et al., 2001                                          |
| Huangye Cave              | 33,58    | 105,12    | 1650          |                                            |                                                      | -8,67                                           | 0,40             | -8,46                                       |                       |                            | Tan et al., 2011                                           |
| Jeita Cave                | 32,93    | 35,64     | 100           |                                            |                                                      | -4,80                                           |                  | -3,99                                       |                       |                            | Verheyden et al., 2008                                     |
| Jerusalem West Cave       | 31,78    | 35,15     | 700           |                                            |                                                      | -4,84                                           | 0,30             | -3,99                                       |                       |                            | Frumkin et al., 1999                                       |
| Jhumar Cave               | 18,87    | 81,87     | 600           |                                            |                                                      | -4,24                                           | 0,88             | -7,51                                       |                       |                            | Sihna et al., 2007                                         |
| Jiuxian Cave              | 33,57    | 109,10    | 1495          |                                            |                                                      | -8,80                                           | 1,50             | -7,79                                       |                       |                            | Cai et al., 2010                                           |
| Kaite cave                | 43,03    | -3,65     | 860           |                                            |                                                      | -6,20                                           |                  | -2,56                                       |                       |                            | Dominguez-Villar et al., 2008                              |
| Katerloch                 | 47,08    | 15,55     | 900           | -8,80                                      | -1,51                                                |                                                 |                  |                                             | 8,80                  | 14,00                      | Boch et al., 2009                                          |
| Kesang Cave               | 42,87    | 81,75     | 2000          |                                            |                                                      | -7,50                                           | 1,78             | -10,10                                      |                       |                            | Cheng et al., 2012                                         |
| Korallgrottan             | 64,89    | 14,16     | 570           | -12,00                                     | -6,71                                                | -8,98                                           | 0,56             | -3,93                                       | 1,00                  | 3,83                       | Sundqvist et al., 2007                                     |
| La Garma cave             | 43,43    | -3,66     | 75            | -6,10                                      | -1,87                                                | -4,24                                           |                  | -2,56                                       | 12,10                 | 18,35                      | Baldini, 2007; Jackson 2009                                |
| La Mine Cave, N-Tunisia   | 36,03    | 9,68      | 975           | -6,20                                      | -0,32                                                |                                                 |                  |                                             | 19,50                 | 23,00                      | Genty et al., 2006                                         |
| Liang Luar Cave           | -8,53    | 120,43    | 550           |                                            |                                                      | -6,18                                           | 0,40             | -4,53                                       |                       |                            | Griffiths et al., 2009                                     |
| Lianhua Cave              | 29,48    | 109,53    | 455           |                                            |                                                      | -3,96                                           | 1,40             | -7,93                                       |                       |                            | Cosford et al., 2009                                       |
| Little Trimmer cave       | -34,57   | 146,24    | 460           | -5,68                                      | -2,82                                                | -3,80                                           |                  | -3,31                                       | 9,50                  | 19,83                      | Desmarchelier and Goede, 1996                              |

Table S1 (part 2)

|                                     |        |         |      |        |        |       |       |        |       |       |                                               |
|-------------------------------------|--------|---------|------|--------|--------|-------|-------|--------|-------|-------|-----------------------------------------------|
| Mt. Arthur                          | -41,28 | 172,63  | 685  |        |        | -6,14 | 0,28  | -3,29  |       |       | Hellstrom et al., 1998                        |
| Mystery Cave                        | 43,62  | -92,30  | 332  |        |        | -6,98 | 0,42  | -5,83  |       |       | Denniston., 1999                              |
| Nahal Qanah                         | 32,15  | 35,10   | 260  | -5,00  | -1,93  | -5,30 |       | -3,99  | 19,00 | 24,96 | Frumkin et al., 1999                          |
| New St Michael's cave               | 36,15  | -5,35   | 400  | -5,00  | -1,61  | -5,00 |       | -2,92  | 18,30 | 21,13 | Matthey et al., 2008                          |
| NWSI north-west of the South Island | -42,00 | 172,00  | 700  |        |        | -3,20 | 0,30  | -3,17  |       |       | Williams et al., 2010                         |
| Okshala                             | 67,00  | 15,00   | 200  |        |        | -7,06 |       | -3,93  |       |       | Linge et al., 2009                            |
| Pere Noel                           | 50,13  | 5,16    | 180  | -5,50  | -3,40  | -4,65 |       | -3,28  | 9,60  | 15,07 | Verheyden et al., 2000                        |
| Pink Panther Cave                   | 32,08  | -105,17 | 1300 |        |        | -4,17 | 0,52  | -6,88  |       |       | Asmerom et al., 2007                          |
| Poleva Cave                         | 44,72  | 21,75   | 390  |        |        | -8,46 | 0,82  | -1,95  |       |       | Constantin et al., 2007                       |
| Postojna                            | 45,77  | 14,22   | 529  | -9,20  | -1,51  | -6,70 |       | -2,55  | 8,00  | 20,38 | Horvaticic et al., 2003                       |
| Qunf Cave                           | 17,17  | 54,30   | 650  |        |        | -0,69 | 0,70  | -4,18  |       |       | Fleitmann et al., 2007                        |
| Rana                                | 67,54  | 13,00   | 280  | -10,00 | -6,71  | -7,43 |       | -3,93  | 2,80  | 3,83  | Linge et al., 2001                            |
| Refugio                             | 36,50  | -4,67   | 625  | -5,00  | -1,61  | -4,47 |       | -2,92  | 17,50 | 21,13 | McMillan et al., 2006; Baldini et al., 2007   |
| Rio grande do Norte                 | -5,60  | -37,73  | 100  |        |        | -1,75 |       | -6,32  |       |       | Cruz et al., 2009                             |
| Sanbao Cave                         | 31,67  | 110,43  | 1900 |        |        | -8,78 | 0,28  | -7,79  |       |       | Wang et al., 2008; Dong et al., 2010          |
| Savi                                | 45,61  | 13,88   | 441  | -7,28  | -1,51  | -6,40 |       | -2,55  | 12,30 | 20,38 | Frisia et al., 2005                           |
| Sofular Cave                        | 41,42  | 31,93   | 700  |        |        | -8,08 | 0,46  | -2,82  |       |       | Fleitmann et al., 2009                        |
| Soreq Cave                          | 31,45  | 35,03   | 400  | -5,00  | -1,93  | -5,36 | 0,38  | -3,99  | 20,30 | 24,96 | Bar-Matthews et al., 2003                     |
| Søylegrotta                         | 65,70  | 14,00   | 280  | -10,00 | -6,71  | -7,30 |       | -3,93  | 2,80  | 3,83  | Lauritzen and Lundberg, 1999                  |
| Spannagel                           | 47,09  | 11,67   | 2347 | -11,30 | -1,51  | -7,69 |       | -2,55  | 1,90  | 14,00 | Mangini et al., 2005; Vollweiler et al., 2006 |
| Spring Valley Caverns               | 43,75  | -92,41  | 397  |        |        | -6,37 | 0,82  | -5,83  |       |       | Denniston et al., 1999                        |
| Tzabnah cave                        | 20,74  | -89,47  | 20   |        |        | -5,23 | 1,12  | -5,69  |       |       | Medina-Elizade et al., 2010                   |
| Uamh an Tartair                     | 58,15  | -4,98   | 220  | -7,10  | -2,62  | -4,70 |       | -2,48  | 7,20  | 14,83 | Fuller et al., 2008                           |
| Ursilor Cave, Pădurea               | 46,32  | 22,25   | 482  | -10,30 | -1,04  | -7,80 |       | -1,95  | 9,81  | 20,02 | Onac et al., 2002                             |
| Victoria Fossil Cave                | -36,97 | 140,75  | 75   | -4,98  | -3,09  | -4,80 |       | -2,73  | 16,80 | 14,87 | Desmarchelier et al., 2000                    |
| Villars cave                        | 45,50  | 0,50    | 175  | -6,33  | -1,53  |       |       |        | 12,20 | 15,00 | Genty et al., 2006                            |
| Wah Shikar Cave                     | 25,25  | 91,87   | 1290 |        |        | -5,85 | 1,02  | -11,83 |       |       | Sihna et al., 2007                            |
| Yok Balum cave                      | 16,20  | -89,07  | 366  |        |        | -3,80 |       | -5,44  |       |       | Douglas et al., 2012                          |
| Oregon cave                         | 42,10  | -123,41 | 1300 |        |        | -8,84 | 0,3   | -5,33  |       |       | Ersek et al., 2012                            |
| Lapa grande cave                    | -14,42 | -44,37  |      |        |        | -6,32 | 0,98  | -8,00  |       |       | Strikis et al., 2011                          |
| Agassiz Ice Cap                     | 80,25  | -76,00  | 1618 | -27,89 | -15,52 |       |       |        |       |       | Fisher et al., 1995                           |
| BYRD                                | -80,00 | -120,00 | 1530 | -32,50 | -35,79 |       |       |        |       |       | Blunier and Brook, 2001                       |
| Camp century                        | 77,18  | -61,13  | 1887 | -29,33 | -16,55 |       | 2,33  |        |       |       | Johnsen et al., 1972                          |
| Devon                               | 75,33  | -82,50  | 1800 | -28,01 | -15,57 |       | 0,44  |        |       |       | Fisher et al., 1979                           |
| DomeC                               | -74,65 | 124,17  | 3240 | -47,10 | -21,33 |       | 1,50  |        |       |       | Lorius et al., 1979                           |
| EDC                                 | -75,00 | 123,00  | 3240 | -49,80 | -21,58 |       | 11,39 |        |       |       | Jouzel et al., 2007                           |
| GISP                                | 72,58  | -38,48  | 3208 | -35,00 | -16,56 |       | 1,06  |        |       |       | Grootes et al., 1997                          |
| GRIP                                | 72,57  | -37,62  | 3232 | -35,12 | -16,56 |       | 1,64  |        |       |       | Johnsen et al., 1997                          |
| NGRIP                               | 75,10  | -42,32  | 2917 | -35,39 | -17,04 |       | 0,78  |        |       |       | NGRIP 2004                                    |
| EDML                                | -75,00 | 0,00    | 2892 | -44,50 | -29,42 |       |       |        |       |       | EPICA 2006                                    |
| Taylor Dome                         | -77,80 | 158,72  | 2365 | -39,79 | -26,85 |       | 3,13  |        |       |       | Steig et al., 1998                            |
| Vostok                              | -78,00 | 106,00  | 3488 | -55,10 | -23,95 |       | 7,62  |        |       |       | Petit et al., 1999                            |
| Dome F                              | -77,32 | 39,70   | 3810 | -55,06 | -21,92 |       | 0,51  |        |       |       | Kamawura 2007                                 |
| Guliya Ice Core                     | 35,28  | 81,48   | 6200 | -14,23 | -9,59  |       | 2,44  |        |       |       | Guliya et al., 1997                           |
| Renland                             | 72,00  | -25,00  | 2350 | -27,00 | -11,55 |       |       |        |       |       | Johnsen et al., 1992                          |
| Huascaran                           | -9,11  | -77,61  | 6050 | -18,42 | -1,44  |       | 1,35  |        |       |       | Thompson et al., 1995                         |
| Sajama                              | -18,10 | -68,97  | 6540 | -16,63 | -2,14  |       | 1,49  |        |       |       | Thompson et al., 1998                         |
| Illimani                            | -16,62 | -67,77  | 6350 | -16,60 | -2,14  |       |       |        |       |       | Ramirez et al., 2003                          |
| Dunde                               | 38,00  | 96,00   | 5325 | -10,60 | -14,64 |       |       |        |       |       | Thompson et al., 1989                         |

Table S2 (Part 1, planktonic foraminifers): compilation of foraminifer's  $\delta^{18}\text{O}$  data from the literature.

| Core Name       | Latitude | Longitude | Depth (m) | Citation                           | species                                                  | Control quality                       | $\delta^{18}\text{O}$ Calcite (Late Holocene) |
|-----------------|----------|-----------|-----------|------------------------------------|----------------------------------------------------------|---------------------------------------|-----------------------------------------------|
| MD84-551        | -55,01   | 73,17     | 2230      | Pichon et al., 1992                | Planktic                                                 | C14                                   | 3,10                                          |
| RC13-259        | -53,88   | -4,93     | 1754      | Charles et al., 1991               | Neogloboquadrina pachyderma dextralis and/or sinistralis | isotopic events                       | 2,94                                          |
| MD07-3128       | -52,66   | -75,57    | 1032      | Caniupán et al., 2011              | Neogloboquadrina pachyderma sinistralis                  | C14                                   | 1,07                                          |
| RC13-271        | -51,99   | 4,52      | 3634      | Charles et al., 1991               | Neogloboquadrina pachyderma dextralis and/or sinistralis | C14                                   | 2,76                                          |
| TN057-10-11     | -47,10   | 5,92      | 4390      | Hodell et al., 2000                | Neogloboquadrina pachyderma                              | Martinson et al., 1987                | 2,70                                          |
| RS147-GC07      | -45,15   | 146,28    | 3300      | Sikes et al., 2009                 | Bulloides                                                | C14                                   | 0,95                                          |
| 181-1119        | -44,76   | 172,39    | 396,2     | Carter et al., 2004                | Bulloides                                                | C14                                   | 1,40                                          |
| RC11-120        | -43,52   | 79,87     | 3193      | Rickaby and Elderfield, 1999       | Bulloides                                                | Martinson et al., 1987                | 1,92                                          |
| MD84-527        | -43,49   | 51,19     | 3262      | Pichon et al., 1992                | Neogloboquadrina pachyderma sinistralis                  | C14                                   | 1,99                                          |
| ODP Site 1172A  | -42,96   | 49,93     | 2621      | Nuernberg and Groeneveld, 2006     | Bulloides                                                | Tuning Shackleton, 1990               | 2,15                                          |
| ODP1090         | -42,92   | 56,70     | 3701      | Hodell et al., 2003                | Bulloides                                                | Tuning isotope                        | 1,56                                          |
| TN057-6         | -42,90   | 8,90      | 3751      | Hodell et al., 2000                | Bulloides                                                | Martinson et al., 1987                | 1,56                                          |
| P69             | -40,40   | 178,00    | 2197      | Nelson and Campbell, 2009          | Bulloides                                                | Interpolated from dated tephra layers | 0,40                                          |
| MD03-2611       | -36,73   | 136,55    | 2420      | Calvo et al., 2007                 | Bulloides                                                | C14                                   | 0,41                                          |
| ABS             | -36,32   | 19,47     | 2488      | Martinez-Mendez et al., 2010       | Bulloides                                                | C14                                   | 0,13                                          |
| MD96-2077       | -33,17   | 31,25     | 3781      | Bard and Rickaby, 2009             | G.inflata                                                | Tuning LR04                           | 0,43                                          |
| KNR159-5-36 GGC | -27,52   | -46,47    | 1268      | Carlson et al., 2008               | G.ruber                                                  | C14                                   | -0,95                                         |
| MD96-2048       | -26,17   | 34,02     | 660       | Caley et al., 2011                 | G.ruber                                                  | Tuning LR04                           | -1,51                                         |
| MD06-3018       | -23,00   | 166,15    | 2470      | Russon et al., 2011                | G.ruber                                                  | Tuning LR04                           | -1,20                                         |
| GeoB10285       | -20,10   | 9,19      | 2209      | Schneider et al., 1995             | G.ruber                                                  | Imbrie et al., 1984                   | -0,63                                         |
| MD96-2094       | -20,00   | 9,27      | 2280      | Stuut et al., 2002                 | G.inflata                                                | Martinson et al., 1987                | 0,30                                          |
| ODP180-1109     | -9,51    | 151,57    | 2211      | Takahashi et al., 2001             | G.ruber                                                  | Martinson et al., 1987                | -1,90                                         |
| GeoB 10038-4    | -5,94    | 103,25    | 1819      | Mohtadi et al., 2010               | G.ruber                                                  | C14                                   | -2,74                                         |
| TR163-31B       | -3,62    | -83,97    | 3210      | Patrick and Thunell, 1997          | G.ruber                                                  | C14                                   | -1,33                                         |
| 10029-4         | -1,50    | 100,13    | 964       | Mohtadi et al., 2010               | G.ruber                                                  | C14                                   | -2,95                                         |
| V21-29          | -1,05    | -89,35    | 712       | Koutavas and Lynch-Stieglitz, 2003 | G. sacculifer                                            | C14                                   | -1,45                                         |
| MW91-15         | -0,02    | 158,94    | 2311      | Patrick and Thunell, 1997          | G.ruber                                                  | C14                                   | -2,33                                         |
| TR163-22        | 0,01     | -92,40    | 2830      | Lea et al., 2006                   | G.ruber                                                  | C14                                   | -1,45                                         |
| RC17-177        | 2,00     | 159,00    | 2600      | Imbrie et al., 1992                | Planktic                                                 | Imbrie et al., 1984                   | -2,04                                         |

Table S2 (part 2, planktonic foraminifers)

|                  |       |         |      |                              |                                         |                                                            |       |
|------------------|-------|---------|------|------------------------------|-----------------------------------------|------------------------------------------------------------|-------|
| MD03-2707        | 2,50  | 9,39    | 1295 | Weldeab et al., 2007         | G.ruber                                 | C14                                                        | -2,29 |
| ODP668B          | 4,77  | -20,93  | 2693 | Bird and Cali, 2002          | G.ruber                                 | isotopes                                                   | -1,43 |
| MD06-3067        | 6,51  | 126,50  | 1575 | Bolliet et al., 2011         | G.ruber                                 | C14                                                        | -2,41 |
| ODP1242          | 7,86  | -83,61  | 1364 | Benway et al., 2006          | G.ruber                                 | C14                                                        | -2,70 |
| ME005A-43JC      | 7,86  | -83,61  | 1368 | Benway et al., 2006          | G.ruber                                 | C14                                                        | -2,47 |
| MD02-2529        | 8,21  | -84,12  | 1619 | Leduc et al., 2007           | G.ruber                                 | C14                                                        | -3,00 |
| ODP769A          | 8,79  | 121,29  | 3656 | Linsley, 1996                | G.ruber                                 | C14                                                        | -2,60 |
| odp124-769A      | 8,79  | 121,29  | 3656 | Linsley et al., 1994         | G.ruber                                 | C14                                                        | -2,61 |
| PL07-39 and 43PC | 10,70 | -65,94  | 790  | Lin et al., 1997             | G.ruber                                 | C14                                                        | -1,26 |
| VM28-122         | 11,57 | -78,42  | 3623 | Schmidt et al., 2004         | G.ruber                                 | C14, Imbrie et al., 1984, U/Th                             | -1,97 |
| ODP999A          | 12,75 | -78,73  | 2827 | Schmidt et al., 2004         | G.ruber                                 | C14, Imbrie et al., 1984, U/Th                             | -1,86 |
| SCS90-36         | 18,00 | 111,49  | 2050 | Huang et al., 1997           | G. sacculifer                           | C14                                                        | -2,50 |
| BOFS31/1K        | 19,00 | -20,16  | 3300 | Elderfield and Ganssen, 2000 | G.ruber                                 | Tuning Bard et al., 1989 dated C14                         | -0,90 |
| MD02-2575        | 29,00 | -87,12  | 847  | Nuernberg et al., 2008       | G.ruber                                 | C14                                                        | -1,15 |
| EW9504-03        | 32,07 | -117,37 | 1299 | Stott et al., 2000           | Bulloides                               | C14                                                        | 0,48  |
| EW9504-04        | 32,28 | -118,40 | 1759 | Stott et al., 2000           | Bulloides                               | C14                                                        | 0,35  |
| EW9504-05        | 32,48 | -118,13 | 1818 | Stott et al., 2000           | Bulloides                               | C14                                                        | 0,46  |
| KNR140-51GGC     | 32,78 | -76,28  | 1790 | Carlson et al., 2008         | G.ruber                                 | C14                                                        | -1,71 |
| EW9504-08        | 32,80 | -118,80 | 1442 | Stott et al., 2000           | Bulloides                               | C14                                                        | 1,19  |
| 167-1014         | 32,83 | -119,98 | 1166 | Hendy and Kennett, 2000      | Bulloides                               | Martinson et al. 1987                                      | 0,26  |
| EW9504-09        | 32,87 | -119,97 | 1194 | Stott et al., 2000           | Bulloides                               | C14                                                        | 0,25  |
| MD02-2503        | 34,28 | -120,04 | 570  | Hill et al., 2006            | Bulloides                               | Tuning ODP 893 age scale (Hendy et al., 2002) which is C14 | -0,21 |
| MD01-2421        | 36,02 | 141,78  | 2224 | Oba and Murayama, 2004       | Bulloides                               | C14, tephra                                                | 0,00  |
| M25/4-KL11       | 36,75 | 17,72   | 3376 | Allen et al., 1999           | G.ruber                                 | Sedim rate, tephra, C14                                    | 0,20  |
| KH94-3, LM-8     | 38,88 | 143,37  | 2353 | Oba and Murayama, 2004       | Bulloides                               | C14                                                        | 0,73  |
| MD99-2343        | 40,50 | 4,03    | 2391 | Frigola et al., 2008         | Bulloides                               | C14                                                        | 1,43  |
| MD95-2040        | 40,58 | -9,86   | 2465 | de Abreu et al., 2003        | Bulloides                               | C14                                                        | 0,31  |
| KT90-9, 5        | 41,12 | 143,52  | 2098 | Oba and Murayama, 2004       | Bulloides                               | C14                                                        | 1,92  |
| SU92-03          | 43,20 | -10,11  | 3005 | Salgueiro et al., 2010       | Bulloides                               | C14                                                        | 0,95  |
| SU90-08          | 43,35 | -30,41  | 3080 | Grousset et al., 1993        | Bulloides                               | Martinson et al., 1987                                     | 0,29  |
| ODP851           | 46,22 | -34,30  | 3760 | Cannariato and Ravelo, 1997  | G. sacculifer                           | Orbital tuning Shackleton et al., 1995                     | -1,15 |
| ODP982           | 57,50 | -15,87  | 1145 | Venz et al., 1999            | Bulloides                               | Tuning site 677 (Shackleton et al., 1990)                  | 1,36  |
| GIK23519-5       | 64,80 | -29,60  | 1893 | Millo et al., 2006           | Neogloboquadrina pachyderma sinistralis | C14                                                        | 2,65  |

Table S2 (part 1, benthic foraminifers)

| Core Name       | Latitude | Longitude | Depth (m) | Citation                       | species                                   | Control quality                               | 6180c (Late Holocene) |
|-----------------|----------|-----------|-----------|--------------------------------|-------------------------------------------|-----------------------------------------------|-----------------------|
| TR163-19        | 2,26     | -90,95    | 2348      | Lea et al., 2002               | Uvigerina                                 | Imbrie et al., 1984                           | 3,09                  |
| NIOP 905        | 10,77    | 51,95     | 1580      | Jung et al., 2009              | C. kullenbergi                            | C14                                           | 2,22                  |
| RC13-229        | -26,00   | 11,00     | 4194      | Imbrie et al., 1992            | Benthic                                   | Imbrie et al., 1984                           | 2,60                  |
| CHN82-24-4PC    | 42,00    | -33,00    | 3427      | Imbrie et al., 1993            | Benthic                                   | Imbrie et al., 1984                           | 2,63                  |
| V19-30          | -3,00    | -83,00    | 3091      | Imbrie et al., 1994            | Benthic                                   | Imbrie et al., 1984                           | 3,40                  |
| RC13-110        | 0,00     | -96,00    | 3231      | Imbrie et al., 1995            | C. wuellerstorfi                          | Imbrie et al., 1988<br>Specmap                | 3,39                  |
| K-11            | 72,00    | 2,00      | 2900      | Imbrie et al., 1996            | Benthic                                   | Imbrie et al., 1984                           | 2,94                  |
| All107-131      | -31,00   | -38,00    | 2925      | Imbrie et al., 1997            | Benthic                                   | Imbrie et al., 1984                           | 2,76                  |
| ODP1012         | 32,28    | -118,38   | 1783      | Herbert et al., 2001           | Benthic                                   | Tuning benthic                                | 3,26                  |
| LPAZ21P         | 22,99    | -109,47   | 624       | Herbert et al., 2001           | Benthic                                   | Tuning benthic                                | 2,20                  |
| TT013-PC18      | -1,84    | -139,71   | 4354      | Murray et al., 2000            | C. wuellerstorfi                          | Imbrie et al., 1984                           | 3,27                  |
| TT013-PC72      | 0,11     | -139,40   | 4298      | Murray et al., 2000            | C. wuellerstorfi                          | Imbrie et al., 1984                           | 3,39                  |
| MD02-2575       | 29,00    | -87,12    | 847       | Nuernberg et al., 2008         | U.peregr.                                 | C14                                           | 3,00                  |
| NH22P           | 23,52    | -106,52   | 2025      | Ganeshram and Pedersen, 1998   | Uvigerina sp.                             | C14                                           | 3,40                  |
| GeoB 100384     | -5,94    | 103,25    | 1819      | Mohtadi et al., 2010           | P. wuellerstorfi                          | C14                                           | 2,30                  |
| INMD-1-14P      | 8,80     | -138,99   | 3135      | Lyle et al., 2002              | Uvigerina sp.                             | Imbrie et al., 1984                           | 3,70                  |
| Y69-106         | 2,98     | -86,55    | 2870      | Lyle et al., 2002              | Cibicides                                 | Imbrie et al., 1984                           | 2,71                  |
| Y69-71          | 0,10     | -95,65    | 2740      | Lyle et al., 2002              | Uvigerina                                 | Imbrie et al., 1984                           | 3,12                  |
| V19-27          | -0,47    | -82,07    | 1373      | Mix et al., 1991               | Cibicides                                 | Imbrie et al., 1987                           | 2,92                  |
| V19-28          | -2,37    | -84,65    | 2720      | Ninkovich and Shackleton, 1975 | Benthic                                   | Martinson et al., 1987                        | 3,20                  |
| KNR166-273GGC   | 23,75    | -79,43    | 542       | Lynch-Stieglitz et al., 2011   | C. pachyderma                             | C14                                           | 1,24                  |
| KNR166-226JPC   | 24,33    | -83,25    | 546       | Lynch-Stieglitz et al., 2011   | C. pachyderma                             | C14                                           | 1,86                  |
| KNR166-229JPC   | 24,22    | -83,30    | 648       | Lynch-Stieglitz et al., 2011   | C. pachyderma and C. wuellerstorfi        | C14                                           | 2,00                  |
| KNR166-231JPC   | 24,76    | -83,27    | 751       | Lynch-Stieglitz et al., 2011   | C. pachyderma and C. wuellerstorfi        | C14                                           | 2,09                  |
| KNR166-2127JPC  | 24,85    | -79,27    | 631       | Lynch-Stieglitz et al., 2011   | C. pachyderma                             | C14                                           | 1,31                  |
| KNR166-2132JPC  | 24,28    | -79,28    | 739       | Lynch-Stieglitz et al., 2011   | C. pachyderma, P. ariminensis, Cibici sp. | C14                                           | 1,65                  |
| TR163-22        | 0,01     | -92,40    | 2830      | Lea et al., 2006               | Uvigerina                                 | C14                                           | 3,25                  |
| ODP982          | 57,50    | -15,87    | 1145      | Venz et al., 1999              | Cibicoides sp.                            | Tuning site 677 (Shackleton et al., 1990)     | 2,25                  |
| P69             | -40,40   | 178,00    | 2195      | Weaver et al., 1998            | Uvigerina                                 | Isotopes<br>Martinson et al., 1987;<br>tephra | 3,42                  |
| IODP Site U1308 | 49,88    | -24,24    | 3883      | Hodell et al., 2008            | C. Wuellerstorfi                          | C14                                           | 2,77                  |
| ODP 984C        | 61,43    | -24,08    | 1648,5    | Praetorius et al., 2008        | C. Wuellerstorfi                          | C14                                           | 2,74                  |
| ODP980          | 55,49    | -14,70    | 2168      | Flower et al., 2000            | C. Wuellerstorfi                          | C14                                           | 2,57                  |
| AHF16832        | 31,67    | -118,18   | 1915      | Stott et al., 2000             | Cibicides mckannai                        | C14                                           | 2,60                  |
| EW9504-03       | 32,07    | -117,37   | 1299      | Stott et al., 2000             | Cibicides mckannai                        | C14                                           | 2,37                  |
| EW9504-08       | 32,80    | -118,80   | 1442      | Stott et al., 2000             | Cibicides mckannai                        | C14                                           | 2,58                  |

Table S2 (part 2, benthic foraminifers)

|                 |        |         |       |                                |                                               |                                                            |      |
|-----------------|--------|---------|-------|--------------------------------|-----------------------------------------------|------------------------------------------------------------|------|
| EW9504-09       | 32,87  | -119,97 | 1194  | Stott et al., 2000             | Cibicides mckannai                            | C14                                                        | 2,36 |
| EW9504-02       | 31,25  | -117,58 | 2042  | Stott et al., 2000             | Cibicides mckannai                            | C14                                                        | 2,66 |
| EW9504-05       | 32,48  | -118,13 | 1818  | Stott et al., 2000             | Cibicides mckannai                            | C14                                                        | 2,55 |
| EW9504-04       | 32,28  | -118,40 | 1759  | Stott et al., 2000             | Cibicides mckannai                            | C14                                                        | 2,40 |
| GeoB7920-2      | 20,75  | -18,58  | 2278  | Tjallingii et al., 2008        | C. Wuellerstorfi                              | MD95-2042 on the GRIPss09sea age scale                     | 2,66 |
| KT90-9, 5       | 41,12  | 143,52  | 2098  | Oba and Murayama, 2004         | Elphidium batialis                            | C14                                                        | 2,71 |
| KH94-3, LM-8    | 38,88  | 143,37  | 2353  | Oba and Murayama, 2004         | Uvigerina senticososa                         | C14                                                        | 3,23 |
| MD01-2421       | 36,02  | 141,78  | 2224  | Oba and Murayama, 2004         | Bulimina aculeata                             | C14, tephra                                                | 3,46 |
| MD02-2503       | 34,28  | -120,04 | 570   | Hill et al., 2006              | B. argentea                                   | Tuning ODP 893 age scale (Hendy et al., 2002) which is C14 | 2,15 |
| TN057-6         | -42,90 | 8,90    | 3751  | Hodell et al., 2000            | Cibicidoides sp.                              | Martinson et al. (1987)                                    | 2,67 |
| ODP1090         | -42,92 | 56,70   | 3701  | Hodell et al., 2003            | C. wuellerstorfi                              | Venz and Hodell (2002)                                     | 2,58 |
| RS147-GC07      | -45,15 | 146,28  | 3300  | Sikes et al., 2009             | Cibicidoides sp.                              | C14                                                        | 3,26 |
| RS147-GC14      | -46,43 | 145,23  | 3360  | Sikes et al., 2009             | Cibicidoides sp.                              | Tuning LR04                                                | 2,68 |
| GeoB1720-2      | -28,98 | 13,83   | 1997  | Dickson et al., 2009           | C. Wuellerstorfi                              | Tuning LR04                                                | 2,73 |
| ODP Site 1172A  | -43,96 | 49,93   | 2621  | Nuernberg and Groeneveld, 2006 | C. Wuellerstorfi                              | Tuning Shackleton, 1990                                    | 2,60 |
| ODP Site 1170A  | -47,15 | 146,05  | 2705  | Nuernberg et al., 2004         | C. Wuellerstorfi                              | Tuning Martinson et al., 1987                              | 2,72 |
| KNR166-2-31IPC  | 24,22  | -83,30  | 751   | Came et al., 2007              | Cibicidoides spp                              | C14                                                        | 2,13 |
| OCE205-2-100GCC | 26,06  | -78,03  | 1057  | Came et al., 2007              | Cibicidoides spp                              | C14                                                        | 2,27 |
| BO94-20 PN3PC   | 28,06  | 127,55  | 1058  | Matsumoto et al., 2002         | P. wuellerstorfi                              | Visual depth (Matsumoto, 2002)                             | 2,25 |
| V20-133         | 32,58  | 140,34  | 1503  | Matsumoto et al., 2002         | P. wuellerstorfi                              | Visual depth (Matsumoto, 2002)                             | 2,69 |
| MR97-4 St.3     | 35,59  | 141,48  | 2308  | Matsumoto et al., 2002         | P. wuellerstorfi                              | Visual depth (Matsumoto, 2002)                             | 2,69 |
| KT89-18 P4      | 32,09  | 133,54  | 2700  | Matsumoto et al., 2002         | P. wuellerstorfi                              | Visual depth (Matsumoto, 2002)                             | 2,40 |
| KT92-17 PC14    | 32,40  | 138,27  | 3252  | Matsumoto et al., 2002         | P. wuellerstorfi                              | Visual depth (Matsumoto, 2002)                             | 2,83 |
| KT92-17 PC16    | 31,55  | 138,25  | 3320  | Matsumoto et al., 2002         | P. wuellerstorfi                              | Visual depth (Matsumoto, 2002)                             | 2,83 |
| SCS90-36        | 18,00  | 111,49  | 2050  | Huang et al., 1997             | C. wuellerstorfi                              | C14                                                        | 2,20 |
| MD06-3067       | 6,51   | 126,50  | 1575  | Bolliet et al., 2011           | P. wuellerstorfi and/or Cibicidoides mundulus | C14                                                        | 2,61 |
| 167-1014        | 32,83  | -119,98 | 1166  | Hendy et al., 2000             | Uvigerina spp.                                | Martinson et al., 1987                                     | 2,85 |
| GIK23519-5      | 64,80  | -29,60  | 1893  | Millo et al., 2006             | C. wuellerstorfi                              | C14                                                        | 2,60 |
| 167-1017E       | 34,54  | -121,11 | 955,5 | Kennett et al., 2000           | U. peregrina curticosta                       | C14                                                        | 2,92 |
| MD84-527        | -43,49 | 51,19   | 3262  | Pichon et al., 1992            | Benthics                                      | C14                                                        | 3,55 |
| PS2561-2        | -41,86 | 28,54   | 4465  | Krüger et al., 2008            | Fontbotia wuellerstorfi                       | Imbrie et al., 1984                                        | 3,12 |
| MD01-2378       | -13,08 | 121,79  | 1783  | Holbourn et al., 2005          | P. wuellerstorfi                              | C14                                                        | 2,34 |
| MD04-2861       | 24,13  | 63,91   | 2049  | Caley et al., 2011             | P. wuellerstorfi                              | C14                                                        | 2,36 |
| ODP1087         | -31,47 | 15,32   | 1371  | Pierre et al., 2001            | P. wuellerstorfi                              | Tuning LR04                                                | 2,49 |
| MD96-2048       | -26,17 | 34,02   | 660   | Caley et al., 2011             | P. wuellerstorfi                              | Tuning LR04                                                | 1,66 |
| SU92-03         | 43,20  | -10,11  | 3005  | Salgueiro et al., 2010         | Cibicidoides spp. + Uvigerina spp.            | C14                                                        | 3,83 |
| 130-807A        | 3,61   | 156,63  | 2804  | Zhang et al., 2007             | C. wuellerstorfi                              | Imbrie et al., 1984                                        | 2,60 |
| GeoB9526-5      | 12,44  | -18,06  | 3223  | Zarriess et al., 2011          | C. wuellerstorfi                              | C14                                                        | 2,90 |