**Table S2.1.** Input values used in the calculation for the *Column 1*. The parameter name refers to the *PTloop* input file *PTlin*.

|  |  |  |
| --- | --- | --- |
| **Description** | **Parameter name** | **Value and further comments** |
| ***ROCK 1*** |  |  |
| Name Rock1 | SAMP | altered MORB *(after Staudigel et al., 1996)* |
| Thickness (m) | THIC | 1000 |
| Density (kg/m3) | DENS | 3300 |
| Starting bulk δ18O | BULO | 9.0 |
| Fluid phase to be fractionated | FLUI | water.fluid *(named as in the thermodynamic database)* |
| Transferred fluid fraction to Rock2 | INTE *(1st value)* | 0.00001, 0.5, 0.99999 *(NI, PI, HI)* |
| Fluid fraction leaving the system | INTE *(2nd value)* | 0.99999, 0.5, 0.00001 *(NI, PI, HI)* |
| Thermodynamic database | THDB | tc55 *(distributed with Theriak-Domino 04.02.2017)* |
| Oxide wt% list | SYST | SiO2 TiO2 Al2O3 FeO Fe2O3 MnO MgO CaO Na2O K2O |
| Starting bulk composition (oxide wt%) | BULK | 43.47 1.06 14.74 5.98 0.00 0.00 6.32 12.22 1.96 0.53 |
| Starting moles of water | NH2O | 0.58 *(set as saturation)* |
| Moles of structural oxygen | NOFI | ? *(automatically calculated by Theriak)* |
| Moles of excess carbon | NCFI | 0.063 |
| Moles of excess oxygen | NEXO | 0.00 |
| ***ROCK 2*** |  |  |
| Name Rock 2 | SAMP | terrigenous sediment (*Plank and Langmuir, 1998)* |
| Thickness (m) | THIC | 175 |
| Density (kg/m3) | DENS | 2800 |
| Starting bulk δ18O | BULO | 25 |
| Fluid phase to be fractionated | FLUI | water.fluid *(named as in the thermodynamic database)* |
| Fluid fraction leaving the system | INTE | 1 |
| Thermodynamic database | THDB | tc55 *(distributed with Theriak-Domino 04.02.2017)* |
| Oxide wt% list | SYST | SiO2 TiO2 Al2O3 FeO Fe2O3 MnO MgO CaO Na2O K2O |
| Starting bulk composition (oxide wt%) | BULK | 49.80 0.60 14.70 7.30 0.00 0.00 3.10 3.50 3.10 3.60 |
| Starting moles of water | NH2O | 0.44 *(set as saturation)* |
| Moles of structural oxygen | NOFI | ? *(automatically calculated by Theriak)* |
| Moles of excess carbon | NCFI | 0.00 |
| Moles of excess oxygen | NEXO | 0.00 |
| ***Common parameters*** |  |  |
| Oxygen isotope fractionation factors | DODB | DBOXYGEN2.0.3 *(Vho et al., in review)* |
| Solid phase(s) to be fractionated | FRAC | GARNET *(named as in the thermodynamic database)* |
| ***P-T path parameters*** |  |  |
| T (°C) and P (bar) of a fixed step | STEP | 350 13000 |
| T (°C) and P (bar) of a fixed step | STEP | 400 16000 |
| T (°C) and P (bar) of a fixed step | STEP | 500 20000 |
| T (°C) and P (bar) of a fixed step | STEP | 600 23000 |
| T (°C) and P (bar) of a fixed step | STEP | 700 26000 |
| Nb. of intermediate temperature steps | STPT | 16 |
| Nb. of intermediate pressure steps | STPP | 16 |

**Table S2.2.** Input values used in the calculation for the *Column 2*. The parameter name refers to the *PTloop* input file *PTlin*.

|  |  |  |
| --- | --- | --- |
| **Description** | **Parameter name** | **Value and further comments** |
| ***ROCK 1*** |  |  |
| Name Rock1 | SAMP | fresh MORB *(Gale et al., 2013)* |
| Thickness (m) | THIC | 1000 |
| Density (kg/m3) | DENS | 3300 |
| Starting bulk δ18O | BULO | 5.7 |
| Fluid phase to be fractionated | FLUI | water.fluid *(named as in the thermodynamic database)* |
| Transferred fluid fraction to Rock2 | INTE *(1st value)* | 0.00001, 0.5, 0.99999 *(NI, PI, HI)* |
| Fluid fraction leaving the system | INTE *(2nd value)* | 0.99999, 0.5, 0.00001 *(NI, PI, HI)* |
| Thermodynamic database | THDB | tc55 *(distributed with Theriak-Domino 04.02.2017)* |
| Oxide wt% list | SYST | SiO2 TiO2 Al2O3 FeO Fe2O3 MnO MgO CaO Na2O K2O |
| Starting bulk composition (oxide wt%) | BULK | 50.47 1.68 14.70 10.43 0.00 0.00 7.58 11.39 2.79 0.16 |
| Starting moles of water | NH2O | 0.65 *(set as saturation)* |
| Moles of structural oxygen | NOFI | ? *(automatically calculated by Theriak)* |
| Moles of excess carbon | NCFI | 0.00 |
| Moles of excess oxygen | NEXO | 0.00 |
| ***ROCK 2*** |  |  |
| Name Rock 2 | SAMP | carbonate sediment *(Plank, 2014)* |
| Thickness (m) | THIC | 75 |
| Density (kg/m3) | DENS | 2800 |
| Starting bulk δ18O | BULO | 25 |
| Fluid phase to be fractionated | FLUI | water.fluid *(named as in the thermodynamic database)* |
| Fluid fraction leaving the system | INTE | 1 |
| Thermodynamic database | THDB | tc55 *(distributed with Theriak-Domino 04.02.2017)* |
| Oxide wt% list | SYST | SiO2 TiO2 Al2O3 FeO Fe2O3 MnO MgO CaO Na2O K2O |
| Starting bulk composition (oxide wt%) | BULK | 32.36 0.40 8.78 2.91 0.00 0.00 1.45 23.16 1.96 1.66 |
| Starting moles of water | NH2O | 0.20 *(set as saturation)* |
| Moles of structural oxygen | NOFI | ? *(automatically calculated by Theriak)* |
| Moles of excess carbon | NCFI | 0.41 |
| Moles of excess oxygen | NEXO | 0.00 |
| ***Common parameters*** |  |  |
| Oxygen isotope fractionation factors | DODB | DBOXYGEN2.0.3 *(Vho et al., in review)* |
| Solid phase(s) to be fractionated | FRAC | GARNET *(named as in the thermodynamic database)* |
| ***P-T path parameters*** |  |  |
| T (°C) and P (bar) of a fixed step | STEP | 350 13000 |
| T (°C) and P (bar) of a fixed step | STEP | 400 16000 |
| T (°C) and P (bar) of a fixed step | STEP | 500 20000 |
| T (°C) and P (bar) of a fixed step | STEP | 600 23000 |
| T (°C) and P (bar) of a fixed step | STEP | 700 26000 |
| Nb. of intermediate temperature steps | STPT | 16 |
| Nb. of intermediate pressure steps | STPP | 16 |

**Table S2.3.** Input values used for the ultramafic fluid influx as in the *PTloop* input file *Fluid\_in*.

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| **P (bar)** | **T (°C)** | **Mass of input fluid (kg)** | | | **δ18O (‰ vs. VSMOW)** |
|  |  | ***150 m*** | ***300 m*** | ***600 m*** |  |
| 13000 | 350 | 0 | 0 | 0 | - |
| 14500 | 375 | 0 | 0 | 0 | - |
| 16000 | 400 | 0 | 0 | 0 | - |
| 16800 | 420 | 0 | 0 | 0 | - |
| 17600 | 440 | 0 | 0 | 0 | - |
| 18400 | 460 | 0 | 0 | 0 | - |
| 19200 | 480 | 7800 | 15600 | 31200 | 4.5 |
| 20000 | 500 | 0 | 0 | 0 | - |
| 20600 | 520 | 0 | 0 | 0 | - |
| 21200 | 540 | 0 | 0 | 0 | - |
| 21800 | 560 | 0 | 0 | 0 | - |
| 22400 | 580 | 0 | 0 | 0 | - |
| 23000 | 600 | 0 | 0 | 0 | - |
| 23600 | 620 | 0 | 0 | 0 | - |
| 24200 | 640 | 0 | 0 | 0 | - |
| 24800 | 660 | 25350 | 50700 | 101400 | 4.5 |
| 25400 | 680 | 0 | 0 | 0 | - |
| 26000 | 700 | 0 | 0 | 0 | - |

**Table S2.4.** Input values used in the calculation for the *mantle wedge hydration*. The parameter name refers to the *PTloop* input file *PTlin*.

|  |  |  |
| --- | --- | --- |
| **Description** | **Parameter name** | **Value and further comments** |
| ***ROCK 1*** |  |  |
| Name Rock1 | SAMP | PeridotiteV1 *(Walter, 1998)* |
| Thickness (m) | THIC | 333333 |
| Density (kg/m3) | DENS | 3150 |
| Starting bulk δ18O | BULO | 5.5 |
| Fluid phase to be fractionated | FLUI | water.fluid *(named as in the thermodynamic database)* |
| Transferred fluid fraction to Rock2 | INTE *(1st value)* | 0.99999 |
| Fluid fraction leaving the system | INTE *(2nd value)* | 0.00001 |
| Thermodynamic database | THDB | tc55 *(distributed with Theriak-Domino 04.02.2017)* |
| Oxide wt% list | SYST | SiO2 TiO2 Al2O3 FeO Fe2O3 MnO MgO CaO Na2O K2O |
| Starting bulk composition (oxide wt%) | BULK | 44.50 0.00 3.59 8.10 0.0 0.0 39.22 0.00 0.00 0.00 |
| Starting moles of water | NH2O | 0.00 |
| Moles of structural oxygen | NOFI | ? *(automatically calculated by Theriak)* |
| Moles of excess carbon | NCFI | 0.00 |
| Moles of excess oxygen | NEXO | 0.00 |
| ***ROCK 2*** |  |  |
| Name Rock 2 | SAMP | PeridotiteV2 *(Walter, 1998)* |
| Thickness (m) | THIC | 1666667 |
| Density (kg/m3) | DENS | 3150 |
| Starting bulk δ18O | BULO | 5.5 |
| Fluid phase to be fractionated | FLUI | water.fluid *(named as in the thermodynamic database)* |
| Fluid fraction leaving the system | INTE | 1 |
| Thermodynamic database | THDB | tc55 *(distributed with Theriak-Domino 04.02.2017)* |
| Oxide wt% list | SYST | SiO2 TiO2 Al2O3 FeO Fe2O3 MnO MgO CaO Na2O K2O |
| Starting bulk composition (oxide wt%) | BULK | 44.50 0.00 3.59 8.10 0.0 0.0 39.22 0.00 0.00 0.00 |
| Starting moles of water | NH2O | 0.00 |
| Moles of structural oxygen | NOFI | ? *(automatically calculated by Theriak)* |
| Moles of excess carbon | NCFI | 0.00 |
| Moles of excess oxygen | NEXO | 0.00 |
| ***Common parameters*** |  |  |
| Oxygen isotope fractionation factors | DODB | DBOXYGEN2.0.3 *(Vho et al., in review)* |
| Solid phase(s) to be fractionated | FRAC | none |
| ***P-T path parameters*** |  |  |
| T (°C) and P (bar) of a fixed step | STEP | 550 20000 |
| T (°C) and P (bar) of a fixed step | STEP | 570 20600 |
| Nb. of intermediate temperature steps | STPT | 1 |
| Nb. of intermediate pressure steps | STPP | 1 |