Table S1. 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/m^3)	DENS	3300
Starting bulk $\delta^{18}O$	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	SiO_2 TiO_2 Al_2O_3 FeO Fe_2O_3 MnO MgO CaO Na_2O K_2O
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/m^3)	DENS	2800
Starting bulk $\delta^{18}O$	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	SiO_2 TiO_2 Al_2O_3 FeO Fe_2O_3 MnO MgO CaO Na_2O K_2O
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. 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/m^3)	DENS	3300
Starting bulk $\delta^{18}O$	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	SiO_2 TiO_2 Al_2O_3 FeO Fe_2O_3 MnO MgO CaO Na_2O K_2O
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/m^3)	DENS	2800
Starting bulk $\delta^{18}O$	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	SiO_2 TiO_2 Al_2O_3 FeO Fe_2O_3 MnO MgO CaO Na_2O K_2O
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 S3. 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)			$\delta^{18}O$ (‰ 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 S4. 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/m^3)	DENS	3150
Starting bulk $\delta^{18}O$	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	SiO_2 TiO_2 Al_2O_3 FeO Fe_2O_3 MnO MgO CaO Na_2O K_2O
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/m^3)	DENS	3150
Starting bulk $\delta^{18}O$	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	SiO_2 TiO_2 Al_2O_3 FeO Fe_2O_3 MnO MgO CaO Na_2O K_2O
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