Data Set S1

Data sources	Zhang et al. (2021a)	Zhang et al. (2021a)	Zhang et al. (2021a)	Zhang et al. (2021b)	Zhang et al. (2021a)	Zhang et al. (2021a)
Sample no.	YN190503-3	Yunnan site 4	1901G04	20QP-2	YN190504-1	Yunnan site 5
Sample type	free gases	free gases	free gases	free gases	free gases	free gases
Sampling site	Qingping	Qingping	Qingping	Qingping	Eli	Eli
Longitude (E)	101.44	101.44	101.44	101.43	101.41	101.41
Latitude (N)	23.32	23.32	23.32	23.32	23.47	23.47
Temperature (^{o}C)	62.5	62.5	62.5	62	53.9	53.9
CO_2 [vol.%]	54.0	96.3	99.3	91.1	29.4	44.3
CH_4 [vol.%]	1.32	0.45	0.08	0.30	3.96	1.94
N_2 [vol.%]	38.0	1.32	0.50	5.60	65.6	52.0
O_2 [vol.%]	6.30	0.04	0.11	2.90	0.04	0.10
Ar [vol.%]	0.3700	0.0258	0.0120	0.1000	1.0034	0.8080
He [ppmv]	42	18	19	82	244	181
CO_2/N_2	1.42	72.97	198.60	16.27	0.45	0.85
N_2/He	9844	742	275	740	2727	2657
N_2/Ar	103	51.2	41.7	56.0	65.4	64.4
He/Ar	0.0113	0.0698	0.1583	0.0820	0.0243	0.0224
$^{4}He/^{20}Ne$	3.26	103	6.10	3.40	17.9	24.1
$^{3}He/^{4}He$ (absolute ratio)	7.34E-06	8.09E-06	7.24E-06	6.98E-06	6.95E-06	6.60E-06
Rm/Ra (Ra)	5.31	5.85	5.24	5.05	5.03	4.77
Rc/Ra (Ra)	5.68	5.87	5.44	5.44	5.10	4.82
Mantle fraction (%)	65.07	73.07	64.78	61.87	62.54	59.42
Crust fraction (%)	25.20	26.65	30.04	28.80	35.71	39.29
Air fraction (%)	9.73	0.28	5.18	9.32	1.75	1.29
MORB mantle He (%)	70.97	73.28	67.92	67.96	63.65	60.19
^{4}He in spring water [cm^3 STP g^{-1} H_2O]	3.22E-07	1.50E-07	1.52E-07	6.32E-07	1.99E-06	1.48E-06
mantle-fraction of ^{4}He	0.6678	0.6896	0.6392	0.6395	0.5989	0.5664
mantle-fraction of ^{3}He	0.9988	0.9989	0.9987	0.9987	0.9984	0.9982
^{4}He in mantle fluid [cm^3 STP g^{-1} H_2O]	2.15E-07	1.04E-07	9.72E-08	4.04E-07	1.19E-06	8.40E-07
upward fluid flow rate [mm yr^{-1}]	237	544	463	111	32	39
total ^{3}He flux [atoms m^{-2} s^{-1}]	2.57E+08	2.84E+08	2.26E+08	2.27E+08	1.91E+08	1.67E+08
total ^{4}He flux [atoms m^{-2} s^{-1}]	3.27E+13	3.50E+13	3.01E+13	3.01E+13	2.71E+13	2.50E+13
mantle-fraction of ^{3}He flux [atoms m^{-2} s^{-1}]	2.56E+08	2.83E+08	2.26E+08	2.26E+08	1.90E+08	1.67E+08
crustal-fraction of ^{3}He flux [atoms m^{-2} s^{-1}]	3.00E+05	3.00E+05	3.00E+05	3.00E+05	3.00E+05	3.00E+05
mantle-fraction of ^{4}He flux [atoms m^{-2} s^{-1}]	2.18E+13	2.41E+13	1.92E+13	1.93E+13	1.62E+13	1.42E+13
crustal-fraction of ^{4}He flux [atoms m^{-2} s^{-1}]	1.09E+13	1.09E+13	1.09E+13	1.09E+13	1.09E+13	1.09E+13

Data Set S1 *(continued)*

Data sources	Zhang et al. (2021b)	Zhang et al. (2021a)	Zhang et al. (2021a)	Zhang et al. (2021a)	Zhang et al. (2021a)	Zhang et al. (2021b)
Sample no.	20LYZ-2	Dashujiao	1901G06	Xisa	Yunnan site 3b	20WN-2
Sample type	gas	free gases	free gases	free gases	free gases	gas
Sampling site	Laoyaozhai	Dashujiao	Xisa	Xisa	Yuanjiang	Yuanjiang
Longitude (E)	101.10	101.27	101.00	101.00	101.90	101.90
Latitude (N)	23.04	22.81	23.21	23.21	23.51	23.52
Temperature (^{o}C)	24	43.5	48	48	77.8	77.8
CO_2 [vol.%]	2.8	70.2	3.80	9.14	1.31	2.10
CH_4 [vol.%]	–	0.19	0.53	0.24	5.30	10.20
N_2 [vol.%]	89.6	28.4	94.4	90.1	89.3	85.1
O_2 [vol.%]	6.50	0.83	0.07	0.02	0.58	1.10
Ar [vol.%]	1.0000	0.6802	1.2440	1.1800	1.6228	1.4000
He [ppmv]	35	97	74	66	772	1402
CO_2/N_2	0.03	2.47	0.04	0.10	0.01	0.02
N_2/He	25600	2956	13755	13705	992	609
N_2/Ar	89.6	41.7	75.9	76.3	55.0	60.8
He/Ar	0.0035	0.0142	0.0059	0.0056	0.0476	0.1001
$^{4}He/^{20}Ne$	0.60	28.1	3.60	66.0	76.4	64.4
$^{3}He/^{4}He$ (absolute ratio)	4.05E-06	2.26E-06	3.04E-07	3.18E-07	4.30E-08	5.80E-08
Rm/Ra (Ra)	2.93	1.63	0.22	0.23	0.03	0.04
Rc/Ra (Ra)	–	1.64	0.14	0.23	0.03	0.04
Mantle fraction (%)	30.00	20.08	1.43	2.58	0.09	0.22
Crust fraction (%)	17.02	78.82	89.77	96.97	99.52	99.32
Air fraction (%)	52.99	1.10	8.80	0.45	0.38	0.46
MORB mantle He (%)	–	20.29	1.57	2.59	0.09	0.22
^{4}He in spring water [cm^3 STP g^{-1} H_2O]	1.30E-07	7.88E-07	5.56E-07	5.35E-07	7.30E-06	1.32E-05
mantle-fraction of ^{4}He	–	0.1910	0.0147	0.0243	0.0012	0.0029
mantle-fraction of ^{3}He	–	0.9901	0.8641	0.9138	0.2671	0.4671
^{4}He in mantle fluid [cm^3 STP g^{-1} H_2O]	–	1.50E-07	8.20E-09	1.30E-08	8.71E-09	3.79E-08
upward fluid flow rate [mm yr^{-1}]	–	56	65	68	6.7	3.7
total ^{3}He flux [atoms m^{-2} s^{-1}]	–	4.26E+07	3.09E+06	4.87E+06	7.82E+05	1.08E+06
total ^{4}He flux [atoms m^{-2} s^{-1}]	–	1.88E+13	1.54E+13	1.56E+13	2.08E+13	2.08E+13
mantle-fraction of ^{3}He flux [atoms m^{-2} s^{-1}]	–	4.21E+07	2.67E+06	4.45E+06	2.09E+05	5.03E+05
crustal-fraction of ^{3}He flux [atoms m^{-2} s^{-1}]	–	4.20E+05	4.20E+05	4.20E+05	5.73E+05	5.73E+05
mantle-fraction of ^{4}He flux [atoms m^{-2} s^{-1}]	–	3.59E+12	2.27E+11	3.79E+11	2.48E+10	5.96E+10
crustal-fraction of ^{4}He flux [atoms m^{-2} s^{-1}]	–	1.52E+13	1.52E+13	1.52E+13	2.07E+13	2.07E+13

Data Set S1 *(continued)*

Data sources	Zhou et al. (2020)	Zhou et al. (2020)	Zhou et al. (2020)	Zhou et al. (2020)
Sample no.	Zhou-2020-1	Zhou-2020-2	Zhou-2020-3	Zhou-2020-4
Sample type	free gases	free gases	free gases	free gases
Sampling site	Yuanjiang	Yuanjiang	Yuanjiang	Yuanjiang
Longitude (E)	101.90	101.90	101.90	101.90
Latitude (N)	23.52	23.52	23.52	23.52
Temperature (^{o}C)	93	76	77.6	80.6
CO_2 [vol.%]	0.78	0.20	1.27	0.54
CH_4 [vol.%]	5.57	3.75	4.87	4.18
N_2 [vol.%]	89.5	94.1	86.8	92.4
O_2 [vol.%]	0.08	0.01	0.11	0.01
Ar [vol.%]	0.8800	0.5700	1.1700	1.4700
He [ppmv]	802	887	969	1007
CO_2/N_2	0.01	0.00	0.01	0.01
N_2/He	1121	1065	900	921
N_2/Ar	102	165	74.2	62.9
He/Ar	0.0911	0.1556	0.0828	0.0685
$^{4}He/^{20}Ne$	68.1	61.4	57.4	62.0
$^{3}He/^{4}He$ (absolute ratio)	5.53E-08	6.91E-08	6.91E-08	6.91E-08
Rm/Ra (Ra)	0.04	0.05	0.05	0.05
Rc/Ra (Ra)	0.04	0.05	0.04	0.05
Mantle fraction (%)	0.20	0.32	0.31	0.32
Crust fraction (%)	99.37	99.20	99.17	99.20
Air fraction (%)	0.44	0.49	0.52	0.48
MORB mantle He (%)	0.20	0.33	0.31	0.32
^{4}He in spring water [cm^3 STP g^{-1} H_2O]	8.38E-06	8.33E-06	9.14E-06	9.58E-06
mantle-fraction of ^{4}He	0.0027	0.0043	0.0041	0.0042
mantle-fraction of ^{3}He	0.4505	0.5665	0.5550	0.5599
^{4}He in mantle fluid [cm^3 STP g^{-1} H_2O]	2.25E-08	3.56E-08	3.72E-08	3.98E-08
upward fluid flow rate [mm yr^{-1}]	5.8	5.8	5.3	5.1
total ^{3}He flux [atoms m^{-2} s^{-1}]	1.04E+06	1.32E+06	1.29E+06	1.30E+06
total ^{4}He flux [atoms m^{-2} s^{-1}]	2.08E+13	2.08E+13	2.08E+13	2.08E+13
mantle-fraction of ^{3}He flux [atoms m^{-2} s^{-1}]	4.70E+05	7.49E+05	7.15E+05	7.30E+05
crustal-fraction of ^{3}He flux [atoms m^{-2} s^{-1}]	5.73E+05	5.73E+05	5.73E+05	5.73E+05
mantle-fraction of ^{4}He flux [atoms m^{-2} s^{-1}]	5.58E+10	8.89E+10	8.48E+10	8.65E+10
crustal-fraction of ^{4}He flux [atoms m^{-2} s^{-1}]	2.07E+13	2.07E+13	2.07E+13	2.07E+13

Data Sources:

1. Zhang, M., Xu, S., Zhou, X., Caracausi, A., Sano, Y., Guo, Z., et al. (2021a). Deciphering a mantle degassing transect related with India-Asia continental convergence from the perspective of volatile origin and outgassing. Geochimica et Cosmochimica Acta, 310, 61–78. https://doi.org/10.1016/j.gca.2021.07.010
2. Zhang, M., Guo, Z., Xu, S., Barry, P. H., Sano, Y., Zhang, L., et al. (2021b). Linking deeply-sourced volatile emissions to plateau growth dynamics in southeastern Tibetan Plateau. Nature Communications, 12(1), 4157. https://doi.org/10.1038/s41467-021-24415-y
3. Zhou, X., Wang, W., Li, L., Hou, J., Xing, L., Li, Z., et al. (2020). Geochemical features of hot spring gases in the Jinshajiang-Red River fault zone, Southeast Tibetan Plateau. Acta Petrologica Sinica, 36(7), 2197–2214. https://doi.org/10.18654/1000-0569/2020.07.18

Data Set S1. Reference data compiled from Zhang et al. (2021a, 2021b) and Zhou et al. (2020).