

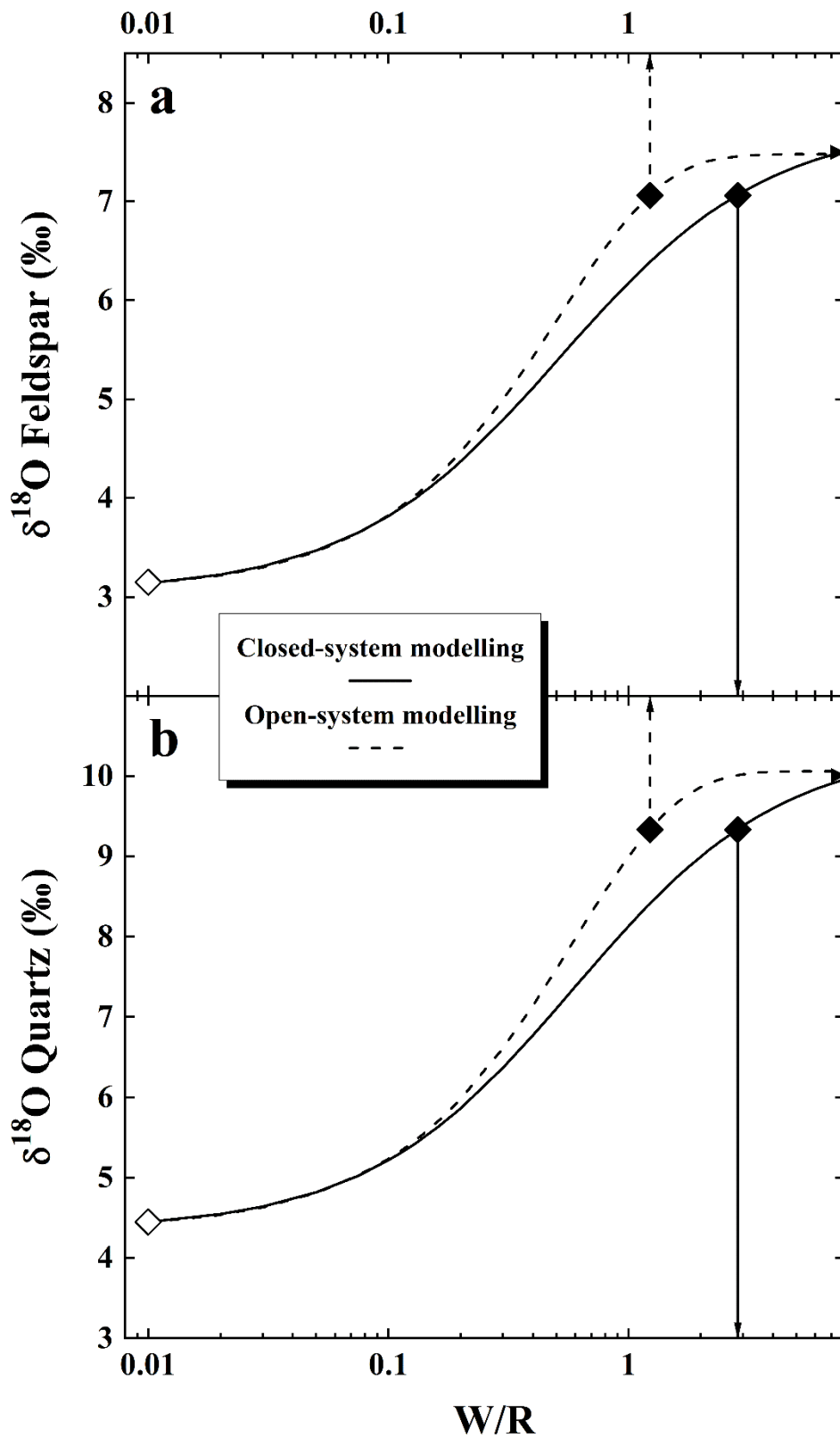
Supplementary material for

Theoretical inversion of fossil hydrothermal systems with oxygen isotopes of constituent minerals partially re-equilibrated with externally infiltrated fluids

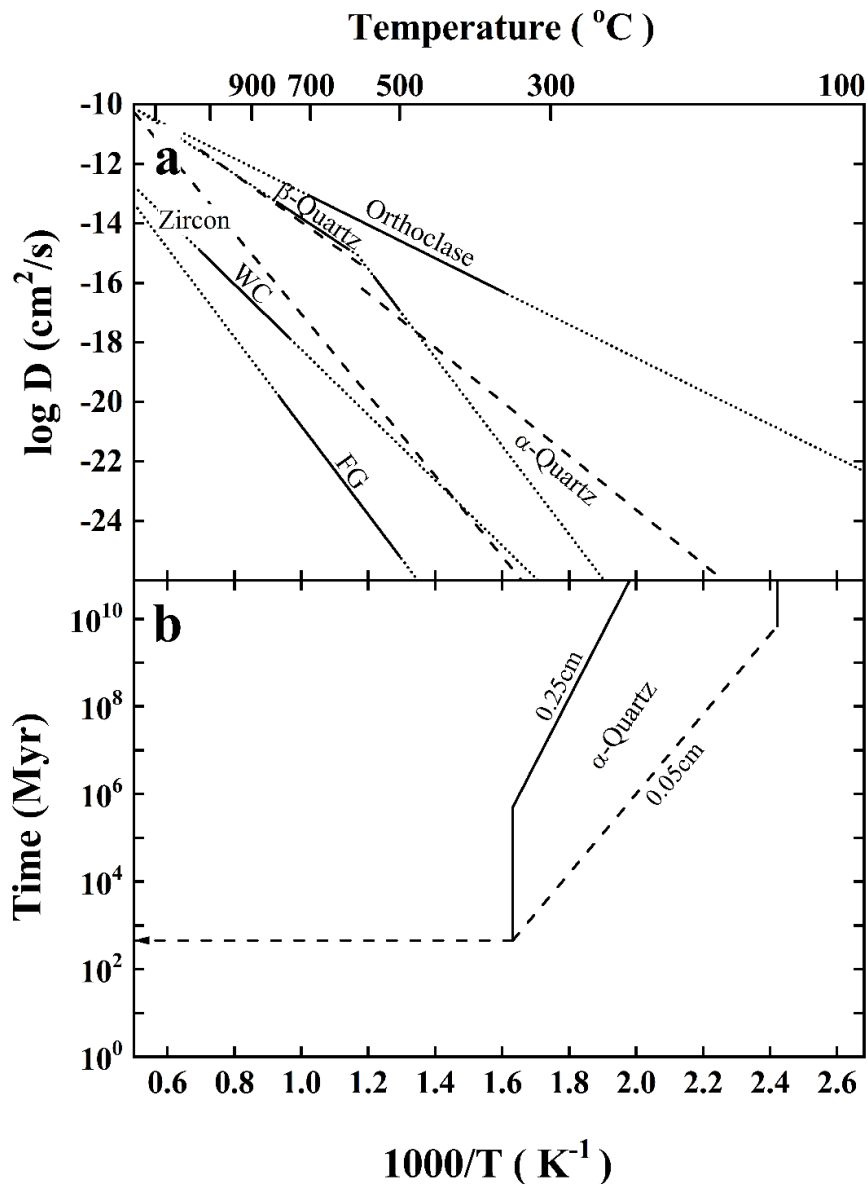
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supplementary Figure 1 The external infiltration of magmatic water with gneissic country rock (sample 01TZS05) intruded by the Tianzhushan granitoid pluton granitoid. The observed and initial $\delta^{18}\text{O}$ values refer to supplementary Tables 1 and 2, respectively.



supplementary Figure 2 (a) Arrhenius plot of oxygen diffusion in minerals under wet conditions. Dashed lines are theoretical calculations (Zheng & Fu 1998), dotted lines with solid segments are experimentally determined. For zircon, WC is from Watson & Cherniak (1997) and FG is from Fortier & Giletti (1989), respectively. Quartz data are from Giletti & Yund (1984), and orthoclase is after Giletti *et al.* (1978). (b) Oxygen diffusive modelling for quartz with two radii (solid line based on experimentally determined parameters, whereas dashed line based on theoretical ones). Model of a spherical crystal is adopted, and arrowed line denotes the timescale required for quartz of sample 01TZS05 to diffuse oxygen with an externally infiltrated magmatic water.

supplementary Table 1 Oxygen isotopes of granitoids and gneisses from the Dabie orogen in central-eastern China¹

Sample number	$\delta^{18}\text{O}$ Zircon (‰)			$\delta^{18}\text{O}$ Quartz (‰)			$\delta^{18}\text{O}$ Alkali feldspar (‰)			GPS data
	Measured	Ave	1SD	Measured	Ave	1SD	Measured	Ave	1SD	
Hepeng pluton (HP) ²										
Granitoid										
01HP04	4.55, 4.54	4.55	0.01	7.69	7.69	/	6.42	6.42	/	31°13'37", 116°45'25"
01HP05	4.64, 4.60	4.62	0.03	5.92, 6.06	5.99	0.10	1.99	1.99	/	31°12'42", 116°47'28"
Sidaohe (SDH)										
Gneiss ³										
00DB63	-0.59, -0.67, -0.64	-0.63	0.04	3.11, 2.91	3.01	0.14	1.77	1.77	/	31°22'12", 115°04'09"
00DB64	-1.75, -1.51	-1.63	0.17	2.53, 2.51	2.52	0.01	1.22	1.22	/	31°22'12", 115°04'09"
Tianzhushan/Yuexi pluton (TZS)										
Granitoid ⁴										
03TZ01	4.98	4.98	/	8.14	8.14	/	7.00	7.00	/	30°50'41", 116°17'14"
03TZ02	5.18	5.18	/	8.01	8.01	/	7.08	7.08	/	30°50'31", 116°18'09"

03TZ03	5.57	5.57	/	8.53	8.53	/	5.99	5.99	/	30°50'39", 116°19'05"
03TZ05	5.83	5.83	/	9.16	9.16	/	7.80	7.80	/	30°48'25", 116°20'45"
03TZ06	5.54	5.54	/	/	/	/	3.76	3.76	/	30°46'41", 116°20'45"
03TZ08	5.56	5.56	/	8.50	8.50	/	2.14	2.14	/	30°45'42", 116°20'34"
03TZ09	5.44	5.44	/	8.81	8.81	/	7.40	7.40	/	30°44'20", 116°22'02"
03TZ10	5.14	5.14	/	7.95	7.95	/	6.50	6.50	/	30°43'25", 116°23'08"
03TZ11	5.40	5.40	/	8.33	8.33	/	6.69	6.69	/	30°43'23", 116°26'52"
03TZ12	5.08	5.08	/	7.93	7.93	/	6.27	6.27	/	30°45'22", 116°26'06"
03TZ16	4.41	4.41	/	7.48	7.48	/	4.18	4.18	/	30°43'51", 116°28'02"
03TZ17	5.09	5.09	/	7.98	7.98	/	6.44	6.44	/	30°44'26", 116°27'11"
03TZ18	4.94	4.94	/	7.85	7.85	/	6.47	6.47	/	30°44'35", 116°27'07"
03TZ19	5.47	5.47	/	8.28	8.28	/	6.22	6.22	/	30°44'33", 116°27'27"
03TZ20	5.29	5.29	/	8.17	8.17	/	6.10	6.10	/	30°43'56", 116°27'26"
03TZ22	5.44	5.44	/	8.26	8.26	/	7.58	7.58	/	30°44'46", 116°29'08"
02TZ01	5.32	5.32	/	7.90	7.90	/	5.82	5.82	/	30°43'45", 116°26'49"
02TZ02	5.37	5.37	/	8.36	8.36	/	6.70	6.70	/	30°43'40", 116°26'47"

02TZ03	5.17	5.17	/	8.18	8.18	/	6.02	6.02	/	30°43'28", 116°26'53"
02TZ04	5.37	5.37	/	8.26	8.26	/	3.35	3.35	/	30°43'22", 116°27'19"
02TZ05	5.00	5.00	/	7.96	7.96	/	2.32	2.32	/	30°43'38", 116°27'47"
Gneiss ³										
01TZO5	0.33, 0.31	0.32	0.01	9.33	9.33	/	7.06	7.06	/	30°43'24", 116°26'51"
01TZO7	-3.78, -3.71	-3.75	0.05	0.29, 0.14, 0.34	0.26	0.10	-0.26, -0.01	-0.14	0.18	30°42'06", 116°29'13"

¹Plutons are alphabetically tabulated throughout this study.

²Abbreviation labelled in Fig. 1, and that after / denotes alternative name adopted by other authors.

³From Wei & Zhao (2017).

⁴After Xu *et al.* (2005) and Zhao *et al.* (2007).