

CORRECTION

Open Access



Correction to: Two-point normalization for reducing interlaboratory discrepancies in $\delta^{17}\text{O}$, $\delta^{18}\text{O}$, and $\Delta^{17}\text{O}$ of reference silicates

Nak Kyu Kim^{1*}, Changkun Park¹ and Minoru Kusakabe²

Correction to: *J Analytical Sci Technol* 11, 51 (2020)
<http://dx.doi.org/10.1186/s40543-020-00248-0>

Following publication of the original article (Kim et al., 2020), the authors identified errors in Table 2 and Table 4. The correct tables are given below.

The author group has been updated above and the original article (Kim et al., 2020) has been corrected.

Published online: 22 February 2021

Reference

Author details

¹Division of Earth Sciences, Korea Polar Research Institute, Incheon 21990, Republic of Korea. ²Department of Environmental Biology and Chemistry,

University of Toyama, Toyama 930-8555, Japan.

The original article can be found online at <https://doi.org/10.1186/s40543-020-00248-0>.

* Correspondence: kimnk@kopri.re.kr

¹Division of Earth Sciences, Korea Polar Research Institute, Incheon 21990, Republic of Korea

Full list of author information is available at the end of the article



© The Author(s). 2021 **Open Access** This article is licensed under a Creative Commons Attribution 4.0 International License, which permits use, sharing, adaptation, distribution and reproduction in any medium or format, as long as you give appropriate credit to the original author(s) and the source, provide a link to the Creative Commons licence, and indicate if changes were made. The images or other third party material in this article are included in the article's Creative Commons licence, unless indicated otherwise in a credit line to the material. If material is not included in the article's Creative Commons licence and your intended use is not permitted by statutory regulation or exceeds the permitted use, you will need to obtain permission directly from the copyright holder. To view a copy of this licence, visit <http://creativecommons.org/licenses/by/4.0/>.

Table 2 $\delta^{17}\text{O}$ and $\delta^{18}\text{O}$ values of the waters and silicates measured in this study

Sample	Number of analysis	$\delta^{17}\text{O}_{\text{VSMOW}}$ (a)	1SD ^(b)	$\delta^{18}\text{O}_{\text{VSMOW}}$ (a)	1SD ^(b)	$\delta^{17}\text{O}_{\text{VSMOW-SLAP}}$ (c)	1SD ^(b)	$\delta^{18}\text{O}_{\text{VSMOW-SLAP}}$ (c)	1SD ^(b)	$\delta^{17}\text{O}_{\text{VSMOW-SLAP}}$ (d)	1SD ^(b)	$\delta^{18}\text{O}_{\text{VSMOW-SLAP}}$ (d)	1SD ^(b)	$\Delta^{17}\text{O}$ (e)	1SD ^(b)
Waters															
VSMOW	11	0.000	0.030	0.000	0.057	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000		
SLAP	8	-29.148	0.083	-54.477	0.155	-30.148	-57.100	-29.698	-55.500						
Silicates															
UWG2 garnet	35	3.012	0.034	5.802	0.054	3.066	5.897	3.070	5.914					-0.007	0.011
NBS28 quartz	12	4.880	0.037	9.328	0.071	4.961	9.464	4.974	9.509					0.006	0.009
San Carlos olivine	9	2.835	0.046	5.436	0.080	2.885	5.526	2.889	5.541					0.008	0.011
Stevens Klint Flint Standard	4	17.153	0.115	32.967	0.217	17.333	33.062	17.484	33.615					-0.077	0.012
Khitostrov Rock Standard	4	-12.947	0.181	-24.230	0.325	-13.282	-24.999	-13.194	-25.478					-0.046	0.009
Natural rocks															
Basalt glass	45	2.903	0.051	5.584	0.095	2.954	5.676	2.958	5.692					-0.002	0.010
Obsidian	127	4.384	0.075	8.404	0.144	4.459	8.531	4.469	8.568					-0.004	0.013
Working standard (O ₂)		-5.071		-9.618		-5.181	-9.852	-5.168	-9.803						

^(a) δ -values are expressed as per mil relative to Vienna Standard Mean Ocean Water (VSMOW)

^(b) Standard deviation (SD) means an external reproducibility for each analyses

^(c) Delta prime (δ') is defined as $10^3 \times \ln(\delta^{18}\text{O} + 1)$ by Miller (2002). The VSMOW-SLAP scaling factor (1.019) is applied to linearized delta prime values

^(d) δ -values are obtained from linearized delta values after normalization by the scaling factor

^(e) Deviation of $^{17}\text{O}/^{16}\text{O}$ ratio of sample is estimated as: $\Delta^{17}\text{O} = \delta^{17}\text{O}_{\text{VSMOW-SLAP}} - 0.52278 \times \delta^{18}\text{O}_{\text{VSMOW-SLAP}} + 0.040$

Table 4 Literature data of $\Delta^{17}\text{O}$ and recalculated $\Delta^{17}\text{O}$ relative to different assigned reference lines

Sample	n	Literature data					Recalculated $\Delta^{17}\text{O}^a$				References
		$\Delta^{17}\text{O}$	SD	SEM	λ_{RL}	γ_{RL}	$\lambda_{\text{RL}=0.5305}$	$\lambda_{\text{RL}=0.528}$	$\lambda_{\text{RL}=0.5278}$	$\lambda_{\text{RL}=0.5273}$	
		(‰)	(1 σ)	(1 σ)			$\gamma_{\text{RL}=0}$	$\gamma_{\text{RL}=0}$	$\gamma_{\text{RL}=-0.040}$	$\gamma_{\text{RL}=-0.099}$	
UWG2 garnet	38	-0.022	-	0.027	0.52	-	-0.076	-0.062	-0.021	0.041	Franchi et al. (1999)
	94	0.02	-	-	0.5263	-	-0.004	0.010	0.051	0.113	Kusakabe and Matsuhisa (2008)
	20	0.03	-	-	0.5248	-	-0.051	-0.037	0.004	0.065	Ahn et al. (2012)
	17	-0.008	0.029	-	0.5270	-0.07	-0.095	-0.081	-0.039	0.022	Tanaka and Nakamura (2013)
	5	-0.102	0.007	0.003	0.5305	-	-0.113	-0.098	-0.057	0.005	Pack and Herwartz (2014)
	16	-0.021	0.024	0.006	0.5280	-	-0.036	-0.022	0.019	0.081	Young et al., (2014)
	50	0.013	0.027	0.003	0.52	-	-0.047	-0.033	0.008	0.070	Ali et al. (2016)
	20	-0.017	0.010	0.002	0.5247	-	-0.050	-0.036	0.005	0.067	Starkey et al. (2016)
	2	-0.004	0.003	0.002	0.528	-	-0.008	0.007	0.049	0.111	Young et al. (2016)
	16	0.047	0.005	-	0.5272	0.282	-0.060	-0.046	-0.005	0.057	Miller et al. (2020) ^b
	68	0.049	0.008	-	0.5273	-0.089	-0.060	-0.046	-0.005	0.057	Miller et al. (2020) ^c
	9	-0.071	0.005	-	0.528	-	-0.085	-0.071	-0.030	0.032	Wostbrock et al. (2020)
	7	-0.062	0.001	-	0.528	-	-0.077	-0.063	-0.021	0.040	Ghoshmaulik et al. (2020)
35	-0.007	0.011	-	0.528	-0.040	-0.061	-0.046	-0.007	0.057	This study	
NBS28 quartz	28	0.014	-	0.025	0.52	-	-0.072	-0.049	-0.007	0.056	Franchi et al. (1999)
	20	0.01	-	-	0.5263	-	-0.025	-0.003	0.039	0.102	Kusakabe and Matsuhisa (2008)
	13	0.04	-	-	0.5248	-	-0.080	-0.059	-0.017	0.046	Ahn et al. (2012)
	18	0.007	0.024	-	0.5270	-0.07	-0.100	-0.076	-0.034	0.030	Tanaka and Nakamura (2013)
	13	-0.104	0.008	0.002	0.5305	-	-0.100	-0.076	-0.034	0.030	Pack and Herwartz (2014)
	20	0.035	0.025	0.006	0.52	-	-0.062	-0.039	0.003	0.066	Ali et al. (2016)
	9	0.012	0.012	0.004	0.5247	-	-0.039	-0.016	0.026	0.090	Starkey et al. (2016)
	5	0.072	0.007	-	0.5272	0.282	-0.048	-0.025	0.017	0.081	Miller et al. (2020) ^b
	3	0.060	0.004	-	0.5273	-0.089	-0.064	-0.040	0.002	0.065	Miller et al. (2020) ^c
	13	-0.059	0.004	-	0.528	-	-0.083	-0.059	-0.017	0.047	Wostbrock et al. (2020)
	9	-0.059	0.006	-	0.528	-	-0.083	-0.059	-0.017	0.047	Ghoshmaulik et al. (2020)
	12	0.006	0.009	-	0.528	-0.040	-0.058	-0.035	0.006	0.071	This study
	San Carlos olivine	2	0.007	-	0.019	0.52	-	-0.042	-0.029	0.012	0.073
7		0.12	-	-	0.5263	-	0.090	0.103	0.144	0.205	Kusakabe and Matsuhisa (2008)
21		0.01	-	-	0.5248	-	-0.079	-0.066	-0.025	0.036	Ahn et al. (2012)
20		-0.006	-	-	0.5270	-0.07	-0.097	-0.084	-0.043	0.019	Tanaka and Nakamura (2013)
35		-0.103	0.008	0.001	0.5305	-	-0.107	-0.094	-0.053	0.009	Pack and Herwartz (2014)
24		-0.004	0.028	0.006	0.528	-	-0.017	-0.004	0.037	0.099	Young et al. (2014)
30		-0.036	0.007	0.001	0.528	-	-0.054	-0.041	0.000	0.061	Pack et al. (2016) ^d
5		-0.039	0.007	0.003	0.528	-	-0.051	-0.038	0.003	0.065	Pack et al. (2016) ^e
5		0.055	0.084	0.038	0.52	-	0.000	0.013	0.054	0.116	Ali et al. (2016)
19		-0.012	0.010*	0.002*	0.5247	-	-0.040	-0.028	0.013	0.075	Starkey et al. (2016) ^f
9		-0.014	0.010*	0.003*	0.5247	-	-0.044	-0.031	0.010	0.071	Starkey et al. (2016) ^g
17		0.000	0.005	0.001	0.528	-	-0.013	0.000	0.041	0.102	Young et al. (2016)
12		-0.054	0.008	-	0.528	-	-0.069	-0.055	-0.014	0.048	Sharp et al. (2016)
9		0.054	0.008	-	0.5272	0.282	-0.050	-0.039	0.002	0.064	Miller et al. (2020) ^{b, f}
33		0.056	0.009	-	0.5273	-0.089	-0.051	-0.038	0.003	0.064	Miller et al. (2020) ^{c, g}
18	-0.058	0.005	-	0.528	-	-0.071	-0.058	-0.017	0.045	Wostbrock et al. (2020)	

Table 4 Literature data of $\Delta^{17}\text{O}$ and recalculated $\Delta^{17}\text{O}$ relative to different assigned reference lines (Continued)

Sample	n	Literature data				Recalculated $\Delta^{17}\text{O}^{\text{a}}$				References	
		$\Delta^{17}\text{O}$ (‰)	SD (1 σ)	SEM (1 σ)	λ_{RL}	γ_{RL}	$\lambda_{\text{RL}} = 0.5305$ $\gamma_{\text{RL}} = 0$	$\lambda_{\text{RL}} = 0.528$ $\gamma_{\text{RL}} = 0$	$\lambda_{\text{RL}} = 0.5278$ $\gamma_{\text{RL}} = -0.040$		$\lambda_{\text{RL}} = 0.5273$ $\gamma_{\text{RL}} = -0.099$
	8	-0.045	0.002	-	0.528	-	-0.058	-0.045	-0.004	0.058	Ghoshmaulik et al. (2020)
	9	0.008	0.011	-	0.5278	-0.040	-0.045	-0.031	0.008	0.071	This study

^a Recalculated $\Delta^{17}\text{O}$ values are from published δ -values relative to VSMOW and four different reference line as mentioned in the text

^b At Open University

^c At Georg-August-Universität Göttingen

^d At Geoscience Center (GZG), University of Göttingen

^e At Institute for Study of the Earth's Interior (ISEI), Okayama University

^f San Carlos olivine type 1

^g San Carlos olivine type 2

*Errors are given as 2 σ standard deviation or standard error of the mean
SD standard deviation; SEM = standard error of the mean

Kim, et al. Two-point normalization for reducing interlaboratory discrepancies in $\delta^{17}\text{O}$, $\delta^{18}\text{O}$, and $\Delta^{17}\text{O}$ of reference silicates. J Analytical Sci Technol. 2020;11: 51. <https://doi.org/10.1186/s40543-020-00248-0>.