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Interactive comment on "Variability of the Asian summer monsoon during the penultimate glacial/interglacial period inferred from stalagmite oxygen isotope records from Yangkou cave, Chongqing, Southwestern China" *by* T. -Y. Li et al.

T. -Y. Li et al.

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Received and published: 10 April 2014

Dear Editor: Enclosed please find an electronic copy of our revised manuscript "Stalagmite-inferred variability of the Asian summer monsoon during the penultimate glacial/interglacial period" by Li et al. (CP-2003-170). We would like to submit it as an article to the special issue entitled "Western Pacific paleoceanography - an ocean history perspective on climate variability at orbital to centennial scales". The material in this submission includes: (1) main text, (2) six figures, and (3) one table. None of the material has been published or is under consideration elsewhere, including the

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Interactive Discussion

Discussion Paper

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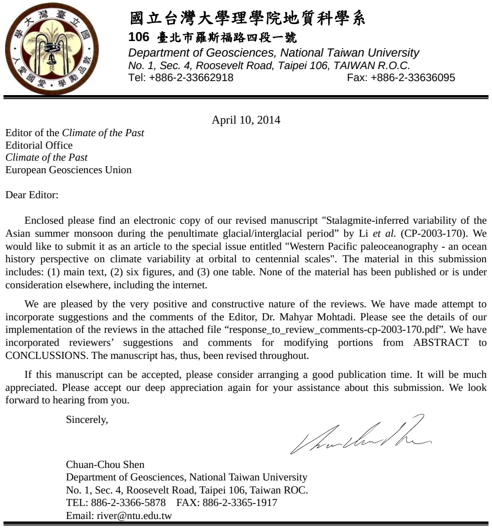
Interactive comment on Clim. Past Discuss., 9, 6287, 2013.



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April 10, 2014

Editor of the *Climate of the Past*
Editorial Office
Climate of the Past
European Geosciences Union

Dear Editor:

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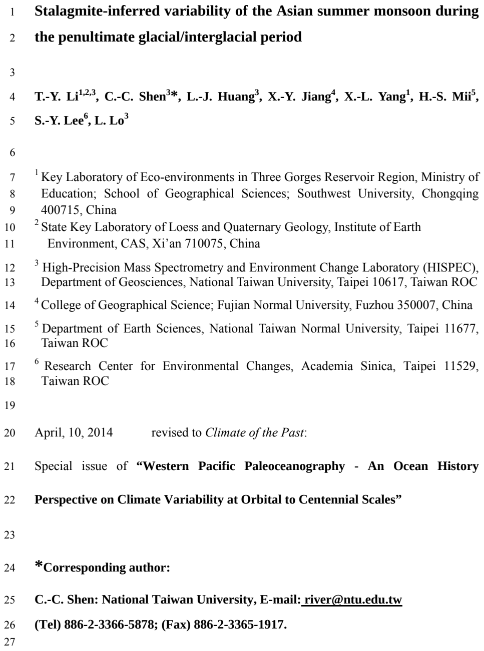
Fig. 1.



Stalagmite-inferred variability of the Asian summer monsoon during the penultimate glacial/interglacial period

T.-Y. Li[1,2,3], C.-C. Shen[3]*, L.-J. Huang[3], X.-Y. Jiang[4], X.-L. Yang[1], H.-S. Mii[5], S.-Y. Lee[6], L. Lo[3]

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April, 10, 2014 revised to *Climate of the Past*:

Special issue of **"Western Pacific Paleoceanography - An Ocean History Perspective on Climate Variability at Orbital to Centennial Scales"**

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Fig. 2.

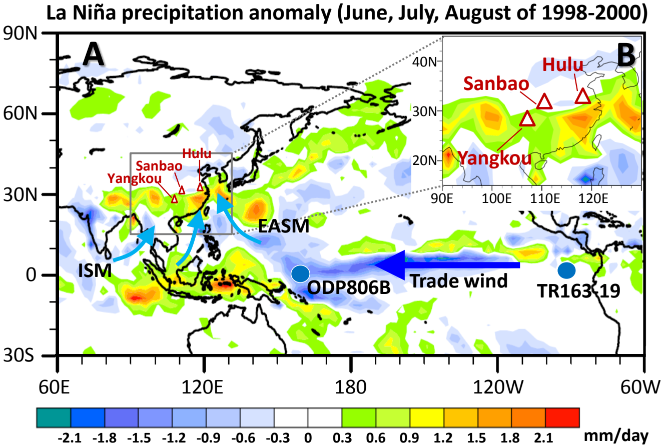

Fig. 3.

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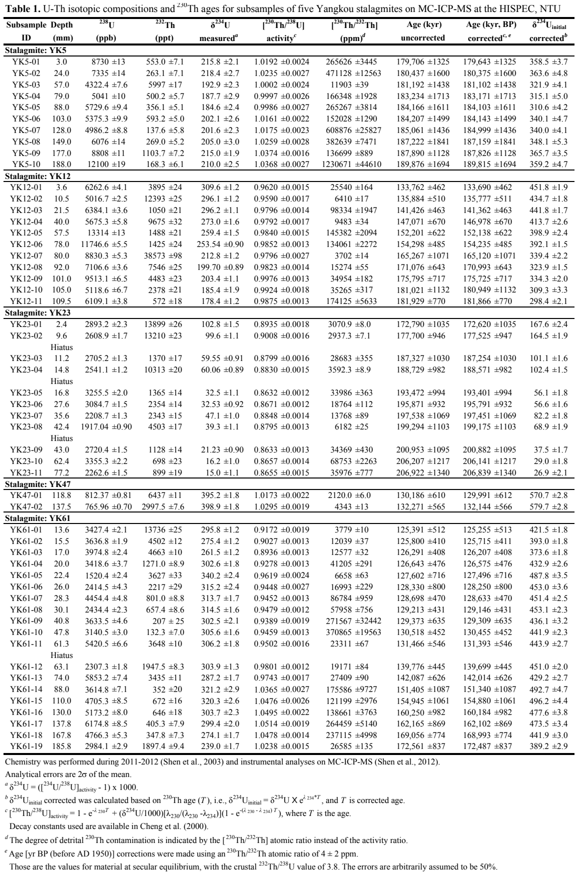


Table 1. U-Th isotopic compositions and ^{230}Th ages for subsamples of five Yangkou stalagmites on MC-ICP-MS at the HISPEC, NTU

Subsample ID	**Depth (mm)**	**^{238}U (ppb)**	**^{232}Th (ppt)**	**δ^{234}U measured^a**	**[^{230}Th/^{238}U] activity^c**	**[^{230}Th/^{232}Th] (ppm)^d**	**Age (kyr) uncorrected**	**Age (kyr, BP) corrected^{c,e}**	**δ^{234}U$_{initial}$ corrected^b**
Stalagmite: YK5									
YK5-01	3.0	8730 ±13	553.0 ±7.1	215.8 ±2.1	1.0192 ±0.0024	265626 ±3445	179,706 ±1325	179,643 ±1325	358.5 ±3.7
YK5-02	24.0	7335 ±14	263.1 ±7.1	218.4 ±2.7	1.0235 ±0.0027	471128 ±12563	180,437 ±1600	180,375 ±1600	363.6 ±4.8
YK5-03	57.0	4322.4 ±7.6	5997 ±17	192.9 ±2.3	1.0002 ±0.0024	11903 ±39	181,192 ±1438	181,102 ±1438	321.9 ±4.1
YK5-04	79.0	5041 ±10	500.2 ±5.7	187.7 ±2.9	0.9997 ±0.0026	166348 ±1928	183,234 ±1713	183,171 ±1713	315.1 ±5.0
YK5-05	88.0	5729.6 ±9.4	356.1 ±5.1	184.6 ±2.4	0.9986 ±0.0027	265267 ±3814	184,166 ±1611	184,103 ±1611	310.6 ±4.2
YK5-06	103.0	5375.3 ±9.9	593.2 ±5.0	202.1 ±2.6	1.0161 ±0.0022	152028 ±1290	184,207 ±1499	184,143 ±1499	340.1 ±4.7
YK5-07	128.0	4986.2 ±8.8	137.6 ±5.8	201.6 ±2.3	1.0175 ±0.0023	608876 ±25827	185,061 ±1436	184,999 ±1436	340.0 ±4.1
YK5-08	149.0	6076 ±14	269.0 ±5.2	205.0 ±3.0	1.0259 ±0.0028	382639 ±7471	187,222 ±1841	187,159 ±1841	348.1 ±5.3
YK5-09	177.0	8808 ±11	1103.7 ±7.2	215.0 ±1.9	1.0374 ±0.0016	136699 ±889	187,890 ±1128	187,826 ±1128	365.7 ±3.5
YK5-10	188.0	12100 ±19	168.3 ±6.1	210.0 ±2.5	1.0368 ±0.0027	1230671 ±44610	189,876 ±1694	189,815 ±1694	359.2 ±4.7
Stalagmite: YK12									
YK12-01	3.6	6262.6 ±4.1	3895 ±24	309.6 ±1.2	0.9620 ±0.0015	25540 ±164	133,762 ±462	133,690 ±462	451.8 ±1.9
YK12-02	10.5	5016.7 ±2.5	12393 ±25	296.1 ±1.2	0.9590 ±0.0017	6410 ±17	135,884 ±510	135,777 ±511	434.7 ±1.8
YK12-03	21.5	6384.1 ±3.6	1050 ±21	296.2 ±1.1	0.9796 ±0.0014	98334 ±1947	141,426 ±463	141,362 ±463	441.8 ±1.7
YK12-04	40.0	5675.3 ±5.8	9675 ±32	273.0 ±1.6	0.9792 ±0.0017	9483 ±34	147,071 ±670	146,978 ±670	413.7 ±2.6
YK12-05	57.5	13314 ±13	1488 ±21	259.4 ±1.5	0.9840 ±0.0015	145382 ±2094	152,201 ±622	152,138 ±622	398.9 ±2.4
YK12-06	78.0	11746.6 ±5.5	1425 ±24	253.54 ±0.90	0.9852 ±0.0013	134061 ±2272	154,298 ±485	154,235 ±485	392.1 ±1.5
YK12-07	80.0	8830.3 ±5.3	38573 ±98	212.8 ±1.2	0.9796 ±0.0027	3702 ±14	165,267 ±1071	165,120 ±1071	339.4 ±2.2
YK12-08	92.0	7106.6 ±3.6	7546 ±25	199.70 ±0.89	0.9823 ±0.0014	15274 ±55	171,076 ±643	170,993 ±643	323.9 ±1.5
YK12-09	101.0	9513.1 ±6.5	4483 ±23	203.4 ±1.1	0.9976 ±0.0013	34954 ±182	175,795 ±717	175,725 ±717	334.3 ±2.0
YK12-10	105.0	5118.6 ±6.7	2378 ±21	185.4 ±1.9	0.9924 ±0.0018	35265 ±317	181,021 ±1132	180,949 ±1132	309.3 ±3.3
YK12-11	109.5	6109.1 ±3.8	572 ±18	178.4 ±1.2	0.9875 ±0.0013	174125 ±5633	181,929 ±770	181,866 ±770	298.4 ±2.1
Stalagmite: YK23									
YK23-01	2.4	2893.2 ±2.3	13899 ±26	102.8 ±1.5	0.8935 ±0.0018	3070.9 ±8.0	172,790 ±1035	172,620 ±1035	167.6 ±2.4
YK23-02	9.6	2608.9 ±1.7	13210 ±23	99.6 ±1.1	0.9008 ±0.0016	2937.3 ±7.1	177,700 ±946	177,525 ±947	164.5 ±1.9
	Hiatus								
YK23-03	11.2	2705.2 ±1.3	1370 ±17	59.55 ±0.91	0.8799 ±0.0016	28683 ±355	187,327 ±1030	187,254 ±1030	101.1 ±1.6
YK23-04	14.8	2541.1 ±1.2	10313 ±20	60.06 ±0.89	0.8830 ±0.0015	3592.3 ±8.9	188,729 ±982	188,571 ±982	102.4 ±1.5
	Hiatus								
YK23-05	16.8	3255.5 ±2.0	1365 ±14	32.5 ±1.1	0.8632 ±0.0012	33986 ±363	193,472 ±994	193,401 ±994	56.1 ±1.8
YK23-06	27.6	3084.7 ±1.5	2354 ±14	32.53 ±0.92	0.8671 ±0.0012	18764 ±112	195,871 ±932	195,791 ±932	56.6 ±1.6
YK23-07	35.6	2208.7 ±1.3	2343 ±15	47.1 ±1.0	0.8848 ±0.0014	13768 ±89	197,538 ±1069	197,451 ±1069	82.2 ±1.8
YK23-08	42.4	1917.04 ±0.90	4503 ±17	39.3 ±1.1	0.8795 ±0.0013	6182 ±25	199,294 ±1103	199,175 ±1103	68.9 ±1.9
	Hiatus								
YK23-09	43.0	2720.4 ±1.5	1128 ±14	21.23 ±0.90	0.8633 ±0.0013	34369 ±430	200,953 ±1095	200,882 ±1095	37.5 ±1.7
YK23-10	62.4	3355.3 ±2.2	698 ±23	16.2 ±1.0	0.8657 ±0.0014	68753 ±2263	206,207 ±1217	206,141 ±1217	29.0 ±1.8
YK23-11	77.2	2262.6 ±1.5	899 ±19	15.0 ±1.1	0.8655 ±0.0015	35976 ±777	206,922 ±1340	206,839 ±1340	26.9 ±2.1
Stalagmite: YK47									
YK47-01	118.8	812.37 ±0.81	6437 ±11	395.2 ±1.8	1.0173 ±0.0022	2120.0 ±6.0	130,186 ±610	129,991 ±612	570.7 ±2.8
YK47-02	137.5	765.96 ±0.70	2997.5 ±7.6	398.9 ±1.8	1.0295 ±0.0019	4343 ±13	132,271 ±565	132,144 ±566	579.7 ±2.8
Stalagmite: YK61									
YK61-01	13.6	3427.4 ±2.1	13736 ±25	295.8 ±1.2	0.9172 ±0.0019	3779 ±10	125,391 ±512	125,255 ±513	421.5 ±1.8
YK61-02	15.5	3636.8 ±1.9	4502 ±12	275.4 ±1.2	0.9027 ±0.0013	12039 ±37	125,800 ±410	125,715 ±411	393.0 ±1.8
YK61-03	17.0	3974.8 ±2.4	4663 ±10	261.5 ±1.2	0.8936 ±0.0013	12577 ±32	126,291 ±408	126,207 ±408	373.6 ±1.8
YK61-04	20.0	3418.6 ±3.7	1271.0 ±8.9	302.6 ±1.8	0.9278 ±0.0013	41205 ±291	126,643 ±476	126,575 ±476	432.9 ±2.6
YK61-05	22.4	1520.4 ±2.4	3627 ±33	340.2 ±2.4	0.9619 ±0.0024	6658 ±63	127,602 ±716	127,496 ±716	487.8 ±3.5
YK61-06	26.0	2414.5 ±4.3	2217 ±29	315.2 ±2.4	0.9448 ±0.0027	16993 ±229	128,330 ±800	128,250 ±800	453.0 ±3.6
YK61-07	28.3	4454.4 ±4.8	801.0 ±8.8	313.7 ±1.7	0.9452 ±0.0013	86784 ±959	128,698 ±470	128,633 ±470	451.4 ±2.5
YK61-08	30.1	2434.4 ±2.3	657.4 ±8.6	314.5 ±1.6	0.9479 ±0.0012	57958 ±756	129,213 ±431	129,146 ±431	453.1 ±2.3
YK61-09	40.8	3633.5 ±4.6	207 ± 25	302.5 ±2.1	0.9389 ±0.0019	271567 ±32442	129,373 ±635	129,309 ±635	436.1 ±3.2
YK61-10	47.8	3140.5 ±3.0	132.3 ±7.0	305.6 ±1.6	0.9459 ±0.0013	370865 ±19563	130,518 ±452	130,455 ±452	441.9 ±2.3
YK61-11	61.3	5420.5 ±6.6	3648 ±10	306.2 ±1.8	0.9502 ±0.0016	23311 ±67	131,466 ±546	131,393 ±546	443.9 ±2.7
	Hiatus								
YK61-12	63.1	2307.3 ±1.8	1947.5 ±8.3	303.9 ±1.3	0.9801 ±0.0012	19171 ±84	139,776 ±445	139,699 ±445	451.0 ±2.0
YK61-13	74.0	5853.2 ±7.4	3435 ±11	287.2 ±1.7	0.9743 ±0.0017	27409 ±90	142,087 ±626	142,014 ±626	429.2 ±2.7
YK61-14	88.0	3614.8 ±7.1	352 ±20	321.2 ±2.9	1.0365 ±0.0027	175586 ±9727	151,405 ±1087	151,340 ±1087	492.7 ±4.7
YK61-15	110.0	4705.3 ±8.5	672 ±16	320.3 ±2.6	1.0476 ±0.0026	121199 ±2976	154,945 ±1061	154,880 ±1061	496.2 ±4.4
YK61-16	130.0	5173.2 ±8.0	646 ±18	303.7 ±2.3	1.0495 ±0.0022	138661 ±3763	160,250 ±982	160,184 ±982	477.6 ±3.8
YK61-17	137.8	6174.8 ±8.5	405.3 ±7.9	299.4 ±2.0	1.0514 ±0.0019	264459 ±5140	162,165 ±869	162,102 ±869	473.5 ±3.4
YK61-18	167.8	4766.3 ±5.3	347.8 ±7.3	274.1 ±1.7	1.0478 ±0.0014	237115 ±4998	169,056 ±774	168,993 ±774	441.9 ±3.0
YK61-19	185.8	2984.1 ±2.9	1897.4 ±9.4	239.0 ±1.7	1.0238 ±0.0015	26585 ±135	172,561 ±837	172,487 ±837	389.2 ±2.9

Chemistry was performed during 2011-2012 (Shen et al., 2003) and instrumental analyses on MC-ICP-MS (Shen et al., 2012).

Analytical errors are 2σ of the mean.

[a] $\delta^{234}U = ([^{234}U/^{238}U]_{activity} - 1) \times 1000$.

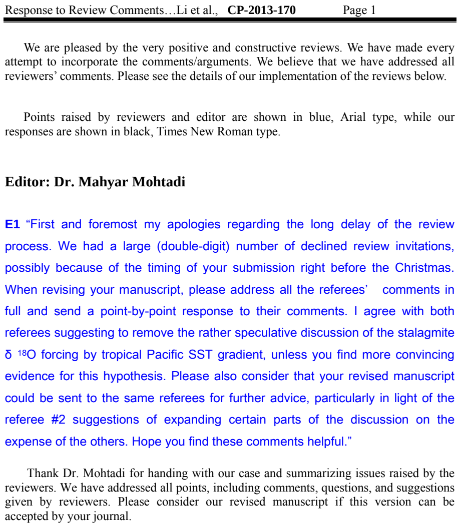
[b] $\delta^{234}U_{initial}$ corrected was calculated based on ^{230}Th age (T), i.e., $\delta^{234}U_{initial} = \delta^{234}U \times e^{\lambda_{234} * T}$, and T is corrected age.

[c] $[^{230}Th/^{238}U]_{activity} = 1 - e^{-\lambda_{230} T} + (\delta^{234}U/1000)[\lambda_{230}/(\lambda_{230} - \lambda_{234})](1 - e^{-(\lambda_{230} - \lambda_{234}) T})$, where T is the age.
Decay constants used are available in Cheng et al. (2000).

[d] The degree of detrital ^{230}Th contamination is indicated by the [^{230}Th/^{232}Th] atomic ratio instead of the activity ratio.

[e] Age [yr BP (before AD 1950)] corrections were made using an ^{230}Th/^{232}Th atomic ratio of 4 ± 2 ppm.
Those are the values for material at secular equilibrium, with the crustal ^{232}Th/^{238}U value of 3.8. The errors are arbitrarily assumed to be 50%.

Fig. 4.



Response to Review Comments…Li et al., **CP-2013-170** Page 1

We are pleased by the very positive and constructive reviews. We have made every attempt to incorporate the comments/arguments. We believe that we have addressed all reviewers' comments. Please see the details of our implementation of the reviews below.

Points raised by reviewers and editor are shown in blue, Arial type, while our responses are shown in black, Times New Roman type.

Editor: Dr. Mahyar Mohtadi

E1 "First and foremost my apologies regarding the long delay of the review process. We had a large (double-digit) number of declined review invitations, possibly because of the timing of your submission right before the Christmas. When revising your manuscript, please address all the referees' comments in full and send a point-by-point response to their comments. I agree with both referees suggesting to remove the rather speculative discussion of the stalagmite δ ^{18}O forcing by tropical Pacific SST gradient, unless you find more convincing evidence for this hypothesis. Please also consider that your revised manuscript could be sent to the same referees for further advice, particularly in light of the referee #2 suggestions of expanding certain parts of the discussion on the expense of the others. Hope you find these comments helpful."

Thank Dr. Mohtadi for handing with our case and summarizing issues raised by the reviewers. We have addressed all points, including comments, questions, and suggestions given by reviewers. Please consider our revised manuscript if this version can be accepted by your journal.

Fig. 5.

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