Supplementary Materials
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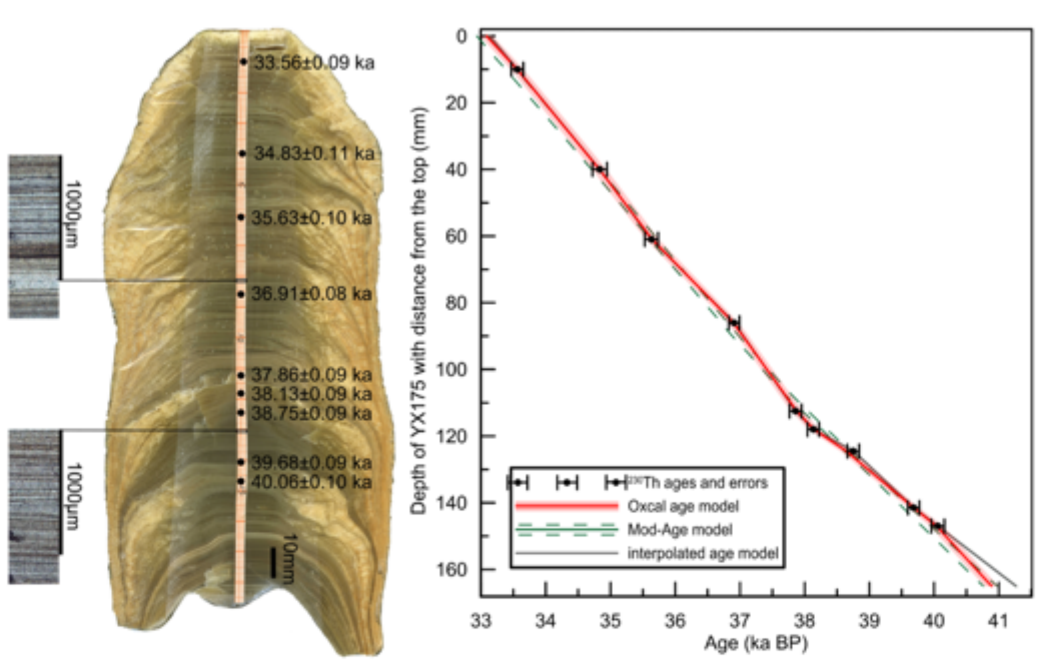

Fig. S1. Age models for stalagmite YX175. Left: polished profile of stalagmite YX175, with black dots indicating ^{230}Th dating results and errors. Two enlarged 1-mm sections on the left side show transparent/black couplets in depths from 81mm to 82mm and from 130mm to 131mm (detailed description in the text). Right: Age models for the sample. Grey line indicates interpolated age model. Red lines indicate age model computed by Oxcal model[68, 69] and green lines produced by Mod-Age model[70]. We here use Oxcal results due to its better fitting with ^{230}Th dates.

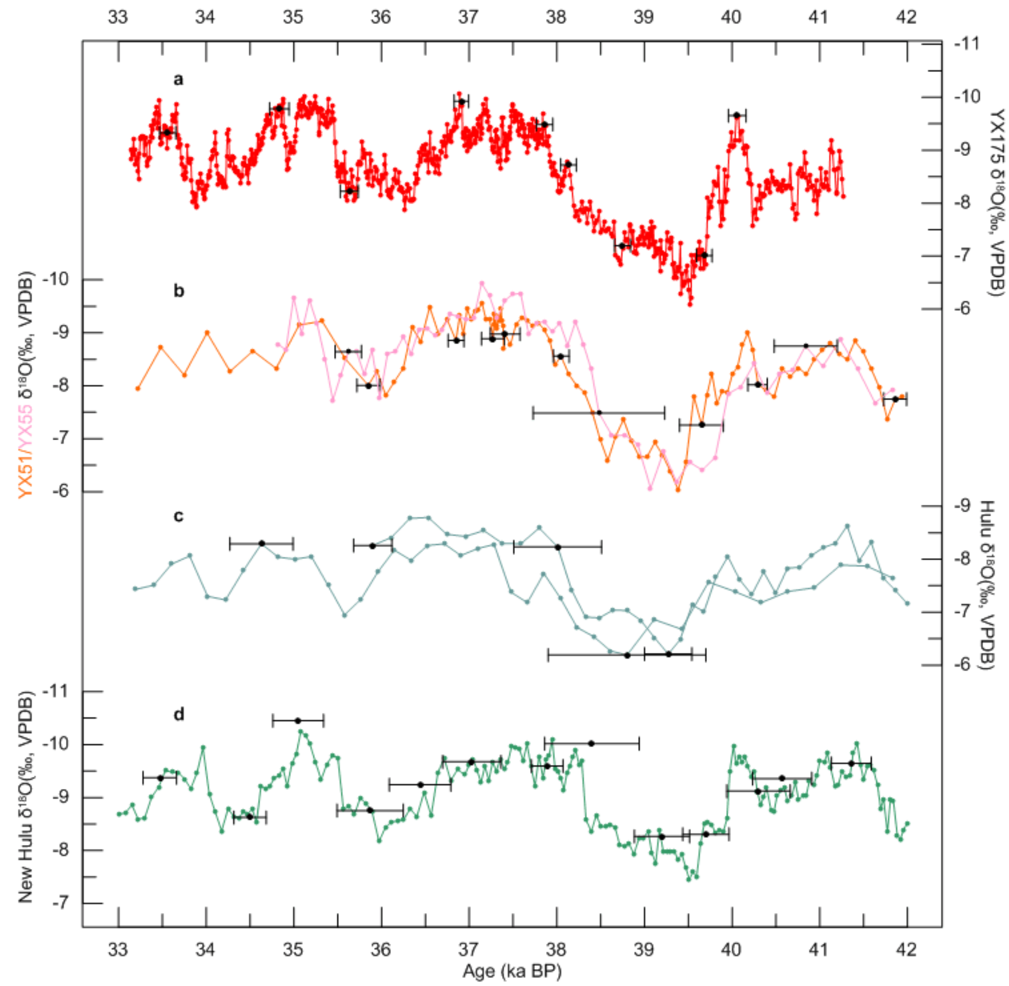

Fig. S2. Comparison of Chinese stalagmite records from 42 to 33 ka BP. $\delta^{18}O_{calcite}$ records of (a) YX175 and (b) YX51 and YX55[15], and records from Hulu Cave[12] (c) and its revised version[27] (d).

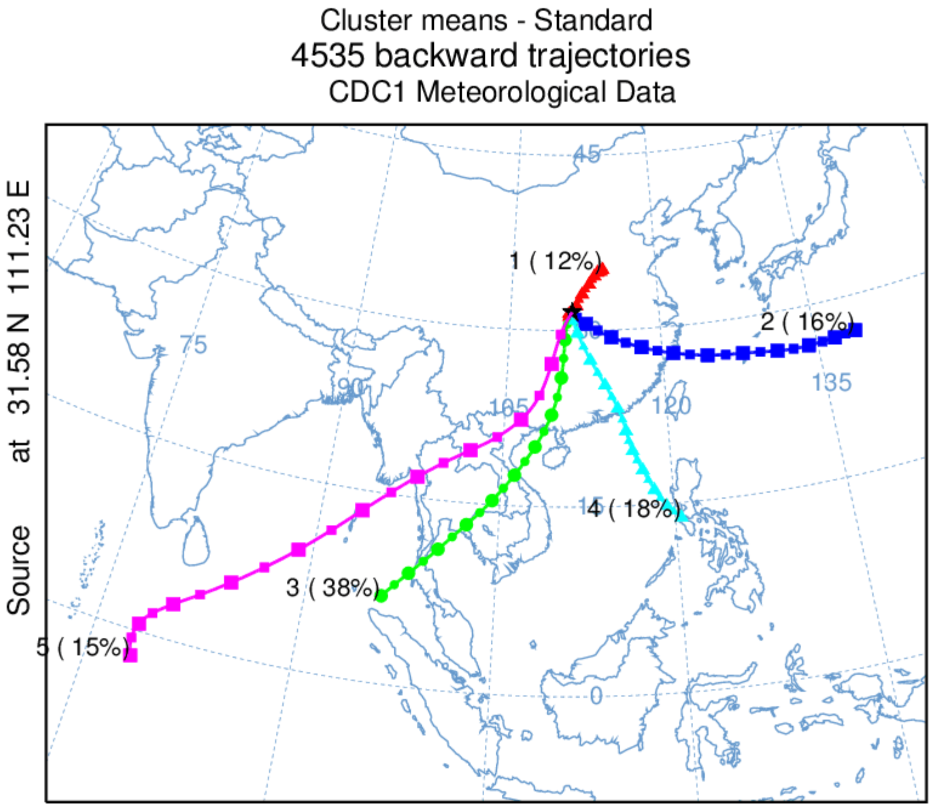

Fig. S3. Air mass trajectories to Yongxing Cave. The backward trajectories were computed for the low-level wind parcels at 1500 m a.g.l. (above ground level) for a time period of 240 hours at 6-hour intervals from 1983 and 2012 (MJJA) in HYSPLIT version 5.0 (Hybrid Single-Particle Lagrangian Integrated Trajectory model[71]). It clearly reflects the source regions during summer monsoon season, when the EASM air travels from the Pacific Ocean and as far west as the Indian Ocean and Bay of Bengal.

Table S1. ^{230}Th dating results of stalagmite YX175

Sample ID (depth mm)	^{238}U (ppb)	^{232}Th (ppt)	^{230}Th / ^{232}Th (atomic x10^{-6})	δ^{234}U* (measured)	^{230}Th / ^{238}U (activity)	^{230}Th Age (yr) (uncorrected)	^{230}Th Age (yr) (corrected)	^{230}Th Age (yr BP)*** (corrected)	δ^{234}U$_{Initial}$** (corrected)
YX175-10	560 ±1	1940 ±39	1770 ±36	381.1 ±1.6	0.3718 ±0.0006	33696 ±77	33625 ±92	33561 ±92	419 ±2
YX175-40	594 ±1	876 ±18	4381 ±89	408.7 ±1.9	0.3915 ±0.0009	34928 ±110	34899 ±112	34834 ±112	451 ±2
YX175-61	602 ±1	1069 ±22	3656 ±74	389.8 ±1.7	0.3937 ±0.0008	35734 ±100	35697 ±103	35632 ±103	431 ±2
YX175-86	500 ±0	161 ±4	23607 ±560	574.2 ±1.5	0.4612 ±0.0008	36981 ±83	36976 ±83	36911 ±83	637 ±2
YX175-112.5	709 ±1	155 ±3	35122 ±793	555.1 ±2.0	0.4654 ±0.0008	37928 ±94	37924 ±94	37859 ±94	618 ±2
YX175-118	688 ±1	1447 ±29	3309 ±67	405.2 ±1.5	0.4220 ±0.0006	38239 ±84	38197 ±89	38133 ±89	451 ±2
YX175-124.5	503 ±1	466 ±9	8776 ±179	612.0 ±1.5	0.4928 ±0.0009	38831 ±91	38815 ±92	38750 ±92	683 ±2
YX175-141.5	650 ±1	82 ±2	65210 ±1753	592.0 ±1.7	0.4962 ±0.0008	39750 ±89	39748 ±89	39683 ±89	662 ±2
YX175-147	597 ±1	194 ±4	24961 ±572	569.2 ±1.5	0.4928 ±0.0009	40129 ±100	40123 ±100	40058 ±100	637 ±2

U decay constants: $\lambda_{238} = 1.55125\text{x}10^{-10}$ yr^{-1} [67] and $\lambda_{234} = 2.82206\text{x}10^{-6}$ yr^{-1} [66]. Th decay constant: $\lambda_{230} = 9.1705\text{x}10^{-6}$ yr^{-1} [66]. * $\delta^{234}\text{U} = ([^{234}\text{U}/^{238}\text{U}]_{\text{activity}} - 1)\text{x}1000$. ** $\delta^{234}\text{U}_{\text{initial}}$ was calculated based on ^{230}Th age (T), i.e. $\delta^{234}\text{U}_{\text{initial}} = \delta^{234}\text{U}_{\text{measured}} \text{ x } e^{\lambda 234 \text{x} T}$. *** Corrected ^{230}Th ages assume the initial ^{230}Th/^{232}Th atomic ratio of $(4.4 \pm 2.2) \times 10^{-6}$. Those are the values for a material at secular equilibrium, with the bulk earth ^{232}Th/^{238}U value of 3.8. Errors are 2σ analytical errors. ***B.P. stands for "Before Present" where the "Present" is defined as the year 1950 A.D.