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Detrital U-Th/He Thermochronology of the Late Cenozoic Core Sediments in the Lake Qinghai Basin, Northeastern Tibetan Plateau and Its Implication for Provenance

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The (U-Th)/He thermochronometry of apatite or zircon has been used as a new technique to study the tectono-thermal history of mountains and tracing sources of sedimentary basins in recent years. In 2005, a 1100 m long core was obtained from the southern offshore in the lake Qinghai, which can extend to Middle Miocene (about 10 Ma) inferred from paleomagnetism. Here we apply detrital zircon (U-Th) /He thermochronometry to shed light on the provenance of the sediments in the Lake Qinghai. Zircon He ages were measured from six samples, which were collected mostly from the paleomagnetic boundaries. All samples were measured at Department of Geology, University of Kansas. Preliminary age determinations of 17 zircon grains show a large range in ages, from Early Cretaceous (106 Ma) to Late Permian (255 Ma), mostly concentrated Late Triassic and Jurassic period (Table 1). There are no significant age differences from the upper to lower sediments in the core, which suggested that the source stratigraphy was effectively constant during the approximately 10 million years of deposition. The zircon He ages also reveals that these samples hadn't undergone their higher closure temperature. Compared with regional stratigraphy, we inferred that the detrital sediments are originated from the adjacent Qinghai Nan Shan (Mountains).

Key words: Detrital U-Th/He Thermochronology, Lake Qinghai Basin, provenance

Table 1 (U-Th/He) analytical data for single grain of zircon in EL Core

Depth (m)	Sample	mass (ug)	U (ppm)	Th (ppm)	He (nmol/g)	147Sm (ppm)	[U]e	Th/U	Ft	Age (Ma)	err. (Ma)
153.15	EL88-1	3.94	218.0	121.0	258.1	1.8	245.9	0.56	0.75	255.4	1.14
153.15	EL88-2	4.92	101.0	44.8	103.1	1.1	111.3	0.44	0.76	222.2	1.02
153.15	EL88-3	3.24	135.9	80.7	128.1	1.9	154.5	0.59	0.72	209.0	0.94
231.01	EL130-1	9.57	164.1	71.7	192.5	0.9	180.6	0.44	0.80	241.9	1.10
231.01	EL130-2	10.80	109.2	75.4	104.9	1.0	126.5	0.69	0.81	187.4	0.81
231.01	EL130-3	5.28	84.3	43.7	67.5	1.8	94.3	0.52	0.76	172.2	0.79
385.48	EL216-1	8.95	276.2	11.9	275.5	0.2	279.0	0.04	0.81	222.4	1.10
385.48	EL216-2	3.20	413.7	159.9	211.1	5.1	450.5	0.39	0.72	119.0	0.55
463.42	EL257-1	4.32	259.5	137.9	257.9	3.8	291.3	0.53	0.74	217.2	0.97
463.42	EL257-2	4.63	39.0	53.8	51.9	0.8	51.4	1.38	0.74	247.3	1.07
463.42	EL257-3	3.70	18.7	11.9	9.1	0.5	21.4	0.64	0.74	106.1	0.73
733.31	ELB157-1	6.08	110.1	96.5	122.0	1.0	132.3	0.88	0.77	216.8	0.92
733.31	ELB157-2	2.20	66.3	47.4	56.2	0.4	77.2	0.72	0.69	191.6	0.95
733.31	ELB157-3	4.51	96.0	55.7	73.8	1.1	108.8	0.58	0.75	164.3	0.74
1073.14	ELB305-1	2.25	96.3	83.9	74.7	2.1	115.6	0.87	0.69	170.8	13.67
1073.14	ELB305-2	4.70	176.6	112.6	164.4	1.5	202.5	0.64	0.75	196.8	15.74
1073.14	ELB305-3	2.63	196.1	141.8	166.8	3.9	228.8	0.72	0.69	192.0	15.36

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