

Table S1 Stratigraphic data of eleven composite sections in Qiangtang basin

Formation	Depth/m (top)	Depth/m (Bottom)	Age/Ma (top)	Age/Ma (Bottom)	Density	Compaction coefficient	Porosity	Lithofacies	Paleo-sea level/m	Error/m	Paleo-water depth/m	Error/m
Duxue Mt.												
T3j	4759.85	5617.85	216	219	2710	0.71	0.7	1	40	20	250	250
Unconformit	4759.85	4759.85	214	216	2710	0.71	0.7	2	30	10	0	0
T3nd	4259.85	4759.85	205	214	3200	0.51	0.1	2	50	10	5	5
Unconformit	4259.85	4259.85	172	205	3200	0.51	0.1	2	70	20	0	0
J2q	4034.85	4259.85	165.5	172	2684	0.54	0.6	1	90	10	50	50
J2b	2931.95	4034.85	163.3	165.5	2699	0.63	0.66	1	95	5	100	100
J2x	2635.95	2931.95	160.1	163.3	2670	0.36	0.54	1	80	10	50	50
J3s	1499.91	2635.95	157	160.1	2710	0.71	0.7	1	70	15	100	100
J3b	519.4	1499.91	149	157	2720	0.51	0.63	1	100	10	10	10
Unconformit	519.4	519.4	42	135	2720	0.51	0.63	2	150	50	0	0
E2k	0	519.4	33.9	42	2700	0.51	0.63	2	200	5	5	5
Shuangquan Lake												
T3j	7505.17	8203.47	216	219	2710	0.71	0.7	1	40	20	250	250
Unconformit	7505.17	7505.17	214	216	2710	0.71	0.7	2	30	10	0	0
T3nd	6771.17	7505.17	205	214	3200	0.51	0.1	2	50	10	5	5
Unconformit	6771.17	6771.17	172	205	3200	0.51	0.1	2	70	20	0	0
J2q	5954.17	6771.17	165.5	172	2720	0.51	0.63	1	90	10	50	50
J2b	5049.02	5954.17	163.3	165.5	2710	0.71	0.7	1	95	5	100	100
J2x	4779.72	5049.02	160.1	163.3	2687	0.48	0.6	1	80	10	50	50
J3s	3184.2	4779.72	157	160.1	2710	0.71	0.7	1	70	15	100	100
J3b	1871.7	3184.2	149	157	2715	0.56	0.64	1	100	10	10	10
J3K1x	780	1871.7	135	149	2705	0.51	0.62	2	140	30	10	10
Unconformit	780	780	41.6	135	2705	0.51	0.62	2	150	50	0	0
E2+3y	340	780	32.6	41.6	3200	0.51	0.1	2	200	10	5	5
Unconformit	340	340	4	32.6	3200	0.51	0.1	2	150	50	0	0
N2sq	0	340	2.5	4	2710	0.71	0.7	2	75	5	10	5

Heihuling												
T3z	6734.69	7579.83	216	219	2700	0.39	0.56	1	-20	5	10	10
Unconformit	6734.69	6734.69	214	216	2700	0.39	0.56	2	30	10	0	0
T3nd	6532.64	6734.69	205	214	3200	0.51	0.1	2	50	10	5	5
Unconformit	6532.64	6532.64	172	205	3200	0.51	0.1	2	70	20	0	0
J2q	4799.46	6532.64	165.5	172	2695	0.47	0.6	1	90	10	50	50
J2b	4139.44	4799.46	163.3	165.5	2710	0.71	0.7	1	95	5	100	100
J2x	3637.01	4139.44	160.1	163.3	2681	0.38	0.55	2	80	10	50	50
J3s	2958.71	3637.01	157	160.1	2683	0.51	0.6	1	70	15	100	100
J3b	2218.11	2958.71	149	157	2693	0.45	0.59	1	100	10	10	10
J3K1x	721.26	2218.11	135	149	2705	0.51	0.62	2	140	30	10	10
Unconformit	721.26	721.26	41.6	135	2705	0.51	0.62	2	150	50	0	0
E2k	212.14	721.26	33.9	42	2700	0.51	0.65	2	200	5	5	5
Unconformit	212.14	212.14	31.9	33.9	2700	0.51	0.65	2	175	5	0	0
E2s	0	212.14	28.4	31.9	2700	0.51	0.65	2	150	5	5	5
Nadigangri												
T3nd	3282.05	4133.84	205	217	3200	0.51	0.1	2	50	10	5	5
Unconformit	3282.05	3282.05	172	205	3200	0.51	0.1	2	70	20	0	0
J2q	2728.73	3282.05	165.5	172	2700	0.42	0.57	1	90	10	50	50
J2b	2352.88	2728.73	163.3	165.5	2704	0.65	0.67	1	95	5	100	100
J2x	1513.48	2352.88	160.1	163.3	2700	0.46	0.58	1	80	10	50	50
J3s	1230.75	1513.48	157	160.1	2710	0.7	0.7	1	70	15	100	100
J3b	1036.64	1230.75	149	157	2656	0.29	0.5	1	100	10	10	10
J3k1x	696.88	1036.64	135	149	2690	0.39	0.56	2	140	30	10	10
Unconformit	696.88	696.88	42	135	2690	0.39	0.56	2	200	50	0	0
E2k	312.94	696.88	33.9	42	2700	0.51	0.65	2	200	5	5	5
Unconformit	312.94	312.94	31.9	33.9	2700	0.51	0.65	2	175	5	0	0
E2s	0	312.94	28.4	31.9	2700	0.51	0.65	2	150	5	5	5

Changshui River

T3z	3482.79	6635.91	201	208	2700	0.39	0.56	1	-20	5	10	10
Unconformit	3482.79	3482.79	165.5	201	2700	0.39	0.56	2	50	10	0	0
J2b	2712.67	3482.79	163.3	165.5	2710	0.71	0.7	1	95	5	100	100
J2x	2250.47	2712.67	160.1	163.3	2681	0.38	0.55	1	80	10	50	50
J3s	1564.41	2250.47	157	160.1	2683	0.51	0.6	1	70	15	100	100
J3b	602	1564.41	149	157	2693	0.45	0.59	1	100	10	10	10
Unconformit	602	602	41.6	149	2693	0.45	0.59	2	175	75	0	0
E2+3y	0	602	32.6	41.6	3200	0.51	0.1	2	200	10	5	5

Amugang

J2q	5030.94	6717.06	165.5	172	2695	0.47	0.6	1	90	10	50	50
J2b	3785.09	5030.94	163.3	165.5	2707	0.68	0.69	1	95	5	100	100
J2x	2589.6	3785.09	160.1	163.3	2712	0.48	0.61	1	80	10	50	50
J3s	1874.86	2589.6	157	160.1	2710	0.71	0.7	1	70	15	100	100
Unconformit	1874.86	1874.86	42	157	2720	0.51	0.63	2	215	15	0	0
E2k	293.62	1874.86	33.9	42	2700	0.51	0.65	2	200	5	5	5
Unconformit	293.62	293.62	31.9	33.9	2700	0.51	0.65	2	175	5	0	0
E2s	0	293.62	28.4	31.9	2700	0.51	0.65	2	150	5	5	5

Zuerkenwula Mt.

T3j	7389.94	7792.44	205	210	2710	0.71	0.7	1	-25	5	250	250
Unconformit	7389.94	7389.94	174	205	2710	0.71	0.7	2	40	5	0	0
J2q	6227.42	7389.94	165.5	172	2699	0.45	0.6	1	90	10	50	50
J2b	4119.68	6227.42	163.3	165.5	2705	0.58	0.64	1	95	5	100	100
J2x	3458.64	4119.68	160.1	163.3	2682	0.39	0.56	1	80	10	50	50
J3s	2642.52	3458.64	157	160.1	2696	0.6	0.65	1	70	15	100	100
J3K1x	1623.62	2642.52	135	157	2693	0.44	0.58	2	120	20	10	10
Unconformit	1623.62	1623.62	51	135	2693	0.44	0.58	2	150	50	0	0
E1-2t	833.55	1623.62	31	51	2720	0.51	0.63	2	200	20	15	5
E2-3y	289.35	833.55	30	31	2650	0.27	0.49	2	175	2	20	5
Unconformit	289.35	289.35	26.5	30	2650	0.27	0.49	2	160	15	0	0
N1c	0	289.35	19.6	26.5	3200	0.51	0.1	2	153	2	10	5

Dangmagang

T3T	7571.03	8833.19	201	210	2710	0.71	0.7	2	-20	5	100	100
Unconformit	7571.03	7571.03	174	201	2710	0.71	0.7	2	40	5	0	0
J2q	4777.39	7571.03	165.5	172	2699	0.45	0.6	1	90	10	50	50
J2b	3769.68	4777.39	163.3	165.5	2702	0.61	0.66	1	95	5	100	100
J2x	3496.35	3769.68	160.1	163.3	2688	0.38	0.55	1	80	10	50	50
J3s	2792.83	3496.35	157	160.1	2689	0.46	0.59	1	70	15	100	100
J3K1x	1147.05	2792.83	135	157	2695	0.41	0.57	2	120	20	10	10
Unconformit	1147.05	1147.05	51	135	2695	0.41	0.57	2	150	50	0	0
E1-2t	356.98	1147.05	31	51	2720	0.51	0.63	2	200	20	15	5
Unconformit	356.98	356.98	4.5	31	2720	0.51	0.63	2	130	50	0	0
N2q	0	356.98	2.6	4.5	2720	0.51	0.63	2	75	5	20	5

Quemo Co

T3b	4290.2	4549.18	214	216.5	2707	0.69	0.69	1	25	5	110	90
T3bg	3807.34	4290.2	212	214	2677	0.37	0.54	2	20	5	10	10
T3e	3209.61	3807.34	201	212	3027	0.44	0.23	2	-15	5	10	5
Unconformit	3209.61	3209.61	174	201	3027	0.44	0.23	2	45	5	0	0
J2q	2474.5	3209.61	165.5	172	2714	0.5	0.62	1	90	10	50	50
J2b	2035.78	2474.5	163.3	165.5	2706	0.63	0.67	1	95	5	100	100
J2x	1641.84	2035.78	160.1	163.3	2680	0.39	0.56	1	80	10	50	50
J3s	1173.89	1641.84	157	160.1	2690	0.55	0.63	1	70	15	100	100
J3K1x	0	1173.89	135	157	2691	0.41	0.57	2	120	20	10	10

Biluo Co

T3R	6069.28	6234.52	201	212	2644	0.33	0.53	1	-15	5	10	10
T3J1s	5793.34	6069.28	190	201	2720	0.71	0.6	1	50	5	250	250
J1q?	4544.34	5793.34	172	190	2587	0.39	0.538	1	45	5	10	10
J2s	4101.81	4544.34	165.5	172	2624	0.5	0.58	1	90	10	285	265
J2b	3172.95	4101.81	163.3	165.5	2719	0.71	0.588	1	95	5	100	100
J2x	2786.22	3172.95	160.1	163.3	2640	0.45	0.46	1	80	10	50	50

J3s	1925.82	2786.22	157	160.1	2720	0.71	0.6	1	70	15	100	100
Unconformit	1925.82	1925.82	102.6	157	2720	0.71	0.6	2	160	40	0	0
K2a	1199.47	1925.82	96.1	102.6	2640	0.51	0.45	2	225	25	10	5
Unconformit	1199.47	1199.47	42	96.1	2640	0.51	0.45	2	215	15	0	0
E2k	0	1199.47	33.9	42	2640	0.51	0.45	2	200	5	5	5

Dazhuoma

T3a	3191.8	4662.08	210	215	2634	0.45	0.483	1	20	5	10	10
T3d	2694.72	3191.8	201	210	2638	0.51	0.468	1	-15	5	50	50
Unconformit	2694.72	2694.72	174	201	2638	0.51	0.468	2	45	5	0	0
J2q	1764.72	2694.72	165.5	172	2644	0.5	0.483	1	90	10	50	50
J2b	983.26	1764.72	163.3	165.5	2704	0.63	0.57	1	95	5	100	100
J2x	610.72	983.26	160.1	163.3	2648	0.39	0.465	1	80	10	50	50
J3s	260.72	610.72	157	160.1	2720	0.66	0.6	1	70	15	100	100
Unconformit	260.72	260.72	102.6	157	2720	0.55	0.6	2	160	40	0	0
K2a	0	260.72	96.1	102.6	2640	0.51	0.45	2	225	25	10	5

Table S2 Age constraints from biostratigraphy of strata in Qiangtang basin

Biluo Co

Units	Era	Biostratigraphy/ Zircon U-Pb age
E2k		
K2a		102-75 Ma
J3s	Late Jurassic	Coral: <i>Axosmilia</i> sp., <i>Thamnateria</i> ? sp.
J2x	Callovian	Bivalve: <i>Propeamussium</i> (<i>P.</i>) <i>heptacostatum</i> Wen, <i>Meleagrinella</i> sp., <i>Camptonectes</i> (<i>C.</i>) <i>auritus</i> (Schlotheim), <i>Camptonectes</i> (<i>C.</i>) sp.
J2b	Bathonian	<p>Brachiopoda: <i>Burmihynchia gutta</i> Buckman, <i>Burmihynchia hyalaiensis</i> Buckman, <i>Burmihynchia costata</i> Buckman, <i>Moquella arcuata</i> Jin, Sun et Ye, <i>Holcothyris orbicularis</i> Buckman, <i>Burmihynchia obessa</i> Buckman, <i>Burmihynchia ovalis</i> Buckman, <i>Holcothyris angulata</i> Buckman, <i>Holcothyris subovalis</i> Buckman, <i>Holcothyris concava</i> Buckman, <i>Holcothyris delta</i> Buckman, <i>Holcothyris trigonalis</i> Buckman, <i>Holcothyris rostrata</i> Buckman, <i>Holcothyris dubia</i> Buckman, <i>Cererithyris lingularis</i> (Jin, Sun et Ye), <i>Cererithyris richardsoni</i> (Muir-Wood), <i>?Sphaeroidothyris</i> sp., <i>Wattonithyris moquensis</i> (Jin, Sun et Ye)</p> <p>Bivalve: <i>Spondylopecten</i> (<i>S.</i>) <i>subpunctatus</i> (Monster), <i>Spodylopecten</i>? sp., <i>Corbulomima</i>? sp., <i>Protocardia</i> sp. or, cf. <i>striatula</i> (Sowerby), <i>Tancredia</i> (<i>T.</i>) cf. <i>gibbosa</i> Lycett, <i>Liastrea birmanica</i> Reed, <i>Ceratomya</i> sp., <i>Camptonectes</i> sp., <i>Gryphaea</i> sp., <i>Propeamussium</i> sp., <i>Plagiostoma cardiiformis</i> J. Sowerby, <i>Pholadomya</i> (<i>Bucardiomya</i>) <i>lirata</i> (J. Sowerby)</p> <p>Ammonite: <i>Homoeoplanulites</i> sp.</p> <p>Coral: <i>Pamiroseris</i>? sp., <i>Thamnasteria</i>? sp.</p>
J2s	Aalenian-Bajocia	<p>Ammonite: <i>Sonninia</i> cf. <i>mesacantha</i> Waagen, <i>Sonninia</i> sp., <i>Callyphylloceras</i> cf. <i>disputabilis</i> (Zittel), <i>Dosetensia</i> sp., <i>Lytoceras</i> sp., <i>Stephanoceras</i> cf. <i>boffmanni</i> Schmidtili, <i>Fonntanesia</i> sp., <i>Sonninia</i> cf. <i>pseudotuberculata</i> Dorn, <i>Sonninia</i> cf. <i>adicra</i> Waagen, <i>calliphylloceras</i> sp., <i>Zetoceras</i> sp., <i>Oppelia</i> sp., <i>Dorsetensia</i> sp., <i>Witchellia</i> sp.</p> <p>Brachiopoda: <i>Rhynchonelloidea</i> cf. <i>pararuthenensis</i> Sun et Zhang, <i>Cererithyris richardsoni</i> (Muir-Wood), <i>Cererithyris lingularis</i> (Jin, Sun et Ye), <i>Holcothyris concava</i> Buckman, <i>?Holcothyris luchiangensis</i> Reed, <i>Moquella arcuata</i> Jin, Sun et Ye, <i>Zeilleria</i> sp., <i>Rhynchonelloidella platiloba</i> (Muir-Wood), <i>Rhynchonelloidella trigonalis</i> (Muir-Wood), <i>Rhynchonelloidella wattonensis</i> Muir-Wood</p> <p>Bivalve: <i>Actinostreon</i> sp., <i>Anisocardia</i> (<i>A.</i>) <i>rostrata</i> (Sowerby), <i>Anisocardia</i> sp., <i>Actinostreum gregareum</i> (J. Sowerby), <i>Actinostreum</i> sp., <i>Astarte</i> cf. <i>elegans</i> Sowerby, <i>Ceratomya wimmisensis</i> (Gillieron), <i>Corbula</i> sp., <i>Liostrea</i> cf. <i>birmanica</i> (Reed), <i>Meleagrinella braamburiensis</i> (Phillips),</p>

		<p><i>Meleagrinella</i> sp., <i>Myopholas multicostata</i> (Agassiz), <i>Pholadomya</i> (<i>Bucardioga</i>) <i>lirata</i> (J. Sowerby), <i>Pholadomya</i> (<i>Bucardiomya</i>) sp., <i>Pholadomya</i> sp. nov., <i>Plagiostoma amdoense</i> Wen, <i>Pleuromya uniformis</i> (J. Sowerby), <i>Pleuromya</i> sp., <i>Pleuromya</i> sp. nov., <i>Propeamusium</i> (<i>P.</i>) <i>heptacostatum</i> Wen, <i>Propeamusium</i> (<i>P.</i>) sp. nov., <i>Pseudolimea duplicata</i> (J. de C. Sowerby), <i>Pseudolimea</i> sp., <i>Pseudotrapegium cardiforme</i> (Deshayes), <i>Pseudopecten</i> (<i>Echinopecten</i>) <i>barbatus</i> (J. Sowerby), <i>Trigonia</i> ? sp., <i>Eutolium</i> (<i>E.</i>) sp., <i>Enotolium</i> (<i>E.</i>) <i>coneolum</i> (Young and Bird), <i>Propeamusium</i> (<i>P.</i>) <i>laeviradiatum</i> (Waagen) ?, <i>Propeamusium</i> (<i>P.</i>) <i>pumilum</i> (Lamarck), <i>Lopha</i> sp.</p> <p>Coral: <i>Chaetetes</i> (<i>Pseudoseptifer</i>) sp., <i>Epistreptophyllum</i>? sp., <i>Stylosmilia michelini</i> Edwards et Haime, <i>Cladophyllia turbinata</i> (Giegory), <i>Epistreptophyllum diatritum</i> Wu, <i>Epistreptophyllum</i>? sp.</p>
J1q	Toarcian	<p>Bivalve: <i>Anisocardia</i> (<i>Anisocardia</i>?) <i>caudata</i> (Lycett), <i>Anisocardia</i> (<i>Anisocardia</i> ?) <i>minima</i> (J. Sowerby), <i>Anisocardia</i> sp., <i>Bakevellia</i> sp., <i>Camptonectes</i> sp., <i>Corbula</i> (<i>Bicorbula</i>) <i>yanshipingensis</i> Wen, <i>Corbula</i> sp., <i>Cuspidaria</i>? <i>ibbetsoni</i> (Morris) (, <i>Cuspidaria</i> ? sp. nov., <i>Gervillella</i> cf. <i>orientalis</i> (Douville), <i>Grammatodon</i> (<i>Grammatodon</i>) <i>minimus</i> (Lackenby), <i>Grammatodon</i> (<i>Grammatodon</i>) sp., <i>Liostrea birmanica</i> (Reed), <i>Lucina cardioides</i> d' Archiac, <i>Nicaniella</i> sp., <i>Protocardia</i> (<i>Protocardia</i>) <i>linkaensis</i> Wen, <i>Protocardia</i> (<i>Protocardia</i>) <i>lingulata</i> (Lycett), <i>Protocardia</i> (<i>Protocardia</i>) <i>stricklandi</i> (Morris et Lycett), <i>Protocardia</i> (<i>Protocardia</i>) sp., <i>Rollierella tenuidentata</i> (Wellnhofer), <i>Rollierella</i>? sp., <i>Tancredia</i> sp., <i>Thracia</i> sp., <i>Inoceramus</i> (<i>Inoceramus</i>) sp.</p> <p>Fish: <i>Actinoptorygii</i></p> <p>Ammonite: <i>Cleviceras</i> sp., <i>Phylloceras</i> sp., <i>Dactylioceras</i> sp., <i>Catacoeloceras</i> sp., <i>Erycites</i> sp., <i>Lytoceras</i> cf. <i>fimbriatum</i>, ?<i>Pelyplectus</i> sp., <i>Ptycharietites</i> sp., <i>Schlotheimiidae</i>, <i>Arietitidea</i>, <i>Psiloceratacae</i>, <i>Oxynoticeratidae</i>, <i>Hildoceratacae</i></p> <p>Brachiopoda: <i>Piarorhynchia</i> sp., <i>Cirpa</i> sp., ?<i>Homocorhynchia</i> sp.</p>
T3J1s	Late Triassic-Jurassic	<p>Brachiopoda: <i>Mentzeliopsis</i> sp., <i>Caucasorhynchia</i>? sp., <i>Crurirhynchia</i> cf. <i>baqenae</i> Ching, Sun et Ye, <i>Eoseptaliphoria</i> cf. <i>prolongata</i> Ching, Sun et Ye, <i>Cincta</i> sp., <i>Euxinella</i>? sp., <i>Adygella</i> sp.</p> <p>Ammonite: <i>Dumortiera</i> sp.</p> <p>Bivalve: <i>Lima</i> cf. <i>chinensis</i> Loczy, <i>Enantiostreon</i> sp., <i>Mysidiopteria</i> cf. <i>qinghaiensis</i> Chen et Zhang, <i>Plagiostoma</i>? sp., <i>Tancredia</i> (<i>Palaeomya</i>)? sp.</p> <p>Coral: <i>Tiaradendron</i>? sp., <i>Aulastraea</i>? sp., <i>Margarophyllia</i>? sp.</p> <p>Sponge: <i>Hodsia</i> cf. <i>caucasica</i> Moisseiev</p>
T3R	Late Triassic	<p>Bivalve: <i>Trigonia</i> (<i>Kumatrigonia</i>) <i>huhxilensis</i> Lu, <i>Chlamys</i> sp., <i>Plagiostoma</i>? sp., <i>Meleagrinella</i>? sp., <i>Gervillella</i>? sp., <i>Thracia</i>? sp., <i>Ostrea</i>? sp., <i>Plicatula</i>? sp.</p> <p>Brachiopoda: <i>Mentzeliopsis</i> sp., <i>Caucasorhynchia</i>? sp., <i>Pseudhatorella</i>? sp., <i>Cirpinae</i> sp., <i>Adygella</i> sp.</p>

Biostratigraphy is from Institute of Tibetan Geological Survey (2006), Geological report of the 1:250, 000 regional geological survey in Angdaer Co area (in Chinese) 209 pp.

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Units	Era	Biostratigraphy/ Zircon U-Pb age
K2a		102-75 Ma
J3s	Oxfordian	Bivalve: <i>Camptoneetes</i> (<i>Camptochiamys</i>) <i>yanshipngensis</i> wen, <i>Meleagrinnella jiangmaiensis</i> wen, <i>Modious</i> sp., <i>Modiolus glaucus</i> (d,orbigny), <i>liostrea duliformias</i> (Schlotheim) Brachiopoda: <i>Bumirhynchia hpalaiensis</i> Buckman, <i>B. ovalis</i> Buckman, <i>B. sp.</i> , <i>B. asiatica</i> Buckman, <i>B. flabilis</i> Ching. <i>B. gutta</i> Buckman
J2x	Callovian	Bivalve: <i>Mactromya</i> cf. <i>qinghaiensis</i> wen, <i>Modious glaucus</i> (d. orbigag), <i>M. imbrictus</i> (Sowerby) <i>Liostrea birmanica</i> (Reed), <i>L. sp.</i> , <i>Lopha</i> sp., <i>L. cf. tifoensis</i> Cox, <i>Gervillella</i> cf. <i>siliqua</i> (Eudes-Deslongchamps), <i>Parvamussium subpersonatum</i> (Vacek), <i>Tancredia triangularis</i> Chen wen, <i>Astarte</i> cf. <i>elegans</i> Sowerby , <i>Plagiostoma</i> cf. <i>biiniensis</i> Cox Brachiopoda: <i>Pseudonelania</i> sp. Sponge: <i>Peronidella minor</i>
J2b	Bathonian	Brachiopoda: <i>Bumirhynchia asiatica</i> Buckman, <i>B. gutta</i> Buckman, <i>Holcothyrus luchiangensis</i> Reed, <i>Tuloto moides</i> cf. <i>antiqua</i> Pan, <i>Lioplacdes</i> sp., <i>Lufengospira</i> ? Sp. Bivalve: <i>Vaugonia yanshipingensis</i> wen, <i>Parvamussium</i> , <i>Subpersonatum</i> (Vacek), <i>Myophorella huhxilensis</i> wen, <i>Mactromya qinghaiensis</i> wen, <i>Modiolus yunnanensis</i> Chen, <i>Liostrea birmanica</i> (Read), <i>Camptonectes</i> (<i>Camptonectes</i>) (Read), <i>Camptonectes</i> (<i>Camptonectes</i>) <i>Lens</i> (Swarby), <i>Astarte</i> sp., <i>A. cf. elegans</i> Swarby, <i>Modiolus glaucus</i> (d. orbigiy), <i>M. imbricatus</i> (Sowerby). <i>Pseudolimea dmpicata</i> (Sowerby), <i>Corbula yanshipingensis</i> wen, <i>P. cf. Channon</i> Cox. <i>Meleagrinnella jiangmaiensis</i> wen. <i>M. cf. braamburiensis</i> (Phillips). <i>Mytilus</i> sp., <i>Trigonia</i> sp., <i>Protocardia</i> sp., <i>Gervillella</i> sp., <i>Psilunio chao</i> (Grabau), <i>P. cf. globitriangularia</i> (ku), <i>Gresslya</i> sp., <i>Inoperna</i> cf. <i>sowerbyana</i> (d'orbigny) Ammonite: <i>Dorsetensia</i> sp. Crinoid: <i>Pentacrinus</i> sp. Sponge: <i>Parastrom-atopora</i> sp. Insects: <i>Mesoblatti-na</i> sp., <i>Celocolens</i> sp., <i>Sinosmylites</i> sp.
J2q	Bajocian	Brachiopoda: <i>ptyctorhynchia duogeoensis</i> — <i>Tubithris tibetica</i> ; <i>Cymatrhynchia densecosta</i> — <i>Monsardithyrus aentricosa</i>
T3d	Rhaetian	Bivalve: <i>Trigonia</i> sp., <i>Modiolus</i> sp., <i>Gervillella</i> sp., <i>Liostrea</i> sp. Plants: <i>Pterophyllum</i> cf. <i>ptilum</i> Harris, <i>Equisetites</i> sp., <i>Neocolamites</i> sp.
T3a	Norian	Ammonite: <i>Baucaulticeras</i> cf. <i>baucaultian</i> um (o. orb.), <i>Augulaticeras</i> cf., <i>Lacunatum</i> (Buckman), <i>Dumortieria multicostata</i> Buckman

		<p>Bivalve: <i>Cardium (Tulongcadium) negum</i>, <i>Myrphoria (Costoria) mansuyi</i>, <i>Cardium (Tulongocadium) zangense</i>, <i>Modiolus</i> sp., <i>Bakevellia</i> sp., <i>Permophorus emeinsis</i> Chen et Zhang, <i>Astarte</i> sp., <i>Brachidontes (Arcomytilus) bathonicus</i> (M.etL.) <i>Pseuotrapeiium Coriformis</i>(Deslongchamps) <i>Lophavulsua</i> Chen; <i>Lophagregares</i> (Sow.); <i>Plagiostoma</i> sp., <i>Xov. Corbula</i> cf., <i>attenuata</i> Lycett; <i>Astarte changduensis</i> chen;</p> <p>Plants: <i>Equisetia</i> sp., <i>Danaeopsis fecunda</i>, <i>Eguisetites arenacm</i>, <i>Clathropteris menisciodes</i>, <i>Neoculamites</i> sp., <i>Clathropteris meniscioides</i> Brongniart, <i>Clathropttris</i> sp., <i>Pterophyllum aeguale</i> (Brongniart, Nathorst, <i>Taeniopterei Leclerei</i> (zelller) <i>Tainiopteris Ledeei</i> zelller, <i>podozamites lanceolatus</i> (Lindleyetlntton) Braun, <i>Hgrcanopteris</i> sp., <i>Ologamltes</i> sp.</p> <p>Sporopollen: <i>Ovalipollis ovalis krutzsch</i>, <i>Lunzisporites</i> sp., <i>Comcavisporites</i> sp., <i>Kyrtomisoris speciosus</i> Madler, <i>Cyathidites australis</i> Couper, <i>Concavisporites toralis</i> (leschik) Nilsson, <i>Lunzisporites Lun zensis</i> Bharadwajet singh, <i>Protopinus</i> sp., <i>Dictyophyuidites mortoni</i> (de Jersey) Playford et Dettmann, <i>Protohaploxypinus</i> sp., <i>Osmundacidites weumanii</i> Couper, <i>O. breviformis</i> Rrutzsch, <i>Kraeuselisporites punctatus</i> Jansonius, <i>Punctatisporites</i> sp., <i>Psophosphaera</i> sp., <i>Cyathidites minor</i> Couper</p>
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Biostratigraphy is from Institute of Tibetan Geological Survey (2003), Geological report of the 1:250, 000 regional geological survey in Zigetang Co area (in Chinese) 335 pp.

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Units	Era	Biostratigraphy/ Zircon U-Pb age
E2k		
J3b	Kimmeridgian	<p>Bivalve: <i>Protocardia qinghaiensis</i>, <i>Myopholas multicostata</i>, <i>Pleuromya alduini</i>, <i>Radulopecten fibrosus</i>–<i>Protocardia (Protocardia) qinghaiensis</i>–<i>Placunopsis</i> cf. <i>socialis</i></p> <p>Brachiopoda: <i>Monticlarella</i> cf. <i>striocincta</i></p> <p>Coral: <i>Montlivaltia</i> sp., <i>Epistreptophyllum</i> sp., <i>Epismilia</i>?, <i>Stylosmilia haputi</i>, <i>Stylosmilia</i> sp., <i>Styina donggoensis</i>, <i>S. subramosa</i>, <i>Thecosmilia magna</i></p>
J3s	Oxfordian	<p>Bivalve: <i>Myopholas multicostata</i>–<i>Radulopecten</i> cf. <i>vagans</i>–<i>Protocardia (P.) stricklandi</i></p> <p>Gastropod: <i>Nerinella</i> sp., <i>N. fallax</i>, <i>Lewinskia varioplicata</i>, <i>Cylindrobullina</i> cf. <i>patruelina</i>, <i>Ataphrus</i> cf. <i>folcoi</i>, <i>Ampullina</i> sp.</p> <p>Coral: <i>Epistreptophyllum cylindratum</i>, <i>E.?</i> sp., <i>Complexastraea kachensi</i>, <i>Dungulia?</i> sp., <i>Montlivaltia</i> sp., <i>Trocharaea?</i> sp.</p> <p>Brachiopoda: <i>Rhynchonelloidella trigonalis</i>, <i>Rhynchonelloidea pararuthensis</i>, <i>Moeschia granulate</i>, <i>Pentithyris vulgaris</i>, <i>Kutchithyris</i> cf. <i>tibetica</i>, <i>K. cf. denggenensis</i>, <i>Kutchithyris olivaeformis</i></p>
J2x	Calloviaian	<p>Bivalve: <i>Chlamys (Radlopecten) tipperi</i></p>

J2b	Bajocian-Bathonian	Brachiopoda: <i>Tubithyris whatleyensis</i> ; <i>Burmihynchia</i> – <i>Holcothyris</i> Bivalve: <i>Camptonectes</i> (<i>C.</i>) <i>auritus</i> – <i>Anisocardia caudate</i> Coral: <i>Thecosmilia</i> sp.
J2q	Toarcian-Bajocian	Bivalve: <i>Margaritifera</i> (<i>Qiyangia</i>) <i>loxos</i> , <i>M. (Qiyangia) lilingensis</i> , <i>M. (Qiyangia)</i> cf. <i>lilingensis</i> , <i>Pseudocardinia kweichouensis</i> , <i>P. dakangensis</i> , <i>P. sibileconchaiformis</i> Ma, <i>Camptonectes</i> sp., <i>Entoliam</i> sp., <i>Placunopsis</i> ? sp., <i>Ostreacea</i> sp.
T3nd		216±4.5 Ma (Wang et al., 2008a), 220.4±2.3 Ma (Fu et al., 2010)
T3j	Norian	Conodont: <i>Neohinleodella kobayashii</i> , <i>Epigondolella bidentata</i> Bivalve: <i>Indopecten</i> sp. Coral: <i>Margarosmilia</i> 、 <i>Stylosmilia</i> Brachiopoda: <i>Rhaetinopsis</i> cf. <i>zadoensis</i> , <i>Amphicijina</i> sp., <i>A. intermedia</i> , <i>Koninckina leonhardi</i> , <i>Zeilleria lingulata</i>

Biostratigraphy is from Institute of Tibetan Geological Survey (2006), Geological report of the 1:250, 000 regional geological survey in Chaduokangri area (in Chinese) 486 pp.

Shuangquan Lake

Units	Era	Biostratigraphy/ Zircon U-Pb age
N2sq	Late Miocene	Wang et al., 2001; Zhao et al., 2001
E2+3y		46.6-31.5 Ma (Institute of Tibetan Geological Survey, 2003)
J3x	Kimmeridgian-Berriasian	Bivalve: <i>Anisocardia</i> (<i>Antiquicyprina</i>) <i>trapezoidalis</i> , <i>A. triangularis</i> , <i>A. sp.</i> , <i>Camptonectes</i> (<i>Camptonectes</i>) <i>clathratus</i> , <i>Chlamys</i> sp., <i>Lopha zadoensis</i> , <i>Miyagipecten laevis</i> , <i>Neocrassina</i> (<i>Pressastarte</i>) sp. , <i>Placunopsis</i> sp., <i>Protocardia</i> (<i>Protocardia</i>) <i>linkaensis</i> , <i>P. (Protocardia) qinghaiensis</i> , <i>P. (Protocardia) sp.</i> , <i>Pseudolimea duplicata</i> , <i>Pteria plana</i> , <i>Radulopecten</i> sp., <i>Pseudolimea</i> sp. Gastropod: <i>Ampullina</i> cf. <i>canaliculata</i> , <i>A. sp.</i> , <i>Naricopsina</i> cf. <i>jingguensis</i>
J3b	Oxfordian-Kimmeridgian	Bivalve: <i>Chlamys</i> sp., <i>Radulopecten fibrosus</i> , <i>R. tipperi</i> , <i>R. cf. tipperi</i> , <i>R. cf. baimaensis</i> , <i>R. sp.</i> , <i>Anisocardia</i> (<i>Antiquicyprina</i>) <i>minima</i> , <i>A. (Antiquicyprina)</i> ? sp., <i>A. (Antiquicyprina) triangularis</i> , <i>Modiolus trigonus</i> , <i>M. imbricatus</i> , <i>M. sp.</i> , <i>Miyagipecten laevis</i> , <i>M. cf. laevis</i> , <i>Myopholas multicostata</i> , <i>M. cf. yunnanensis</i> , <i>Liostrea birmanica</i> , <i>Lopha</i> cf. <i>rastllaris</i> , <i>Protocardia</i> (<i>Protocardia</i>) <i>linkaensis</i> , <i>P. (Protocardia) lingulata</i> , <i>P. (Protocardia) qinghaiensis</i> , <i>P. (Protocardia) sp.</i> , <i>Pseudotrapezium cordiforme</i> , <i>Pseudolimea</i> sp., <i>Placunopsis</i> cf. <i>socialis</i> , <i>Platymoidea</i> sp., <i>Pleuromia alduini</i> , <i>Pinna</i> sp., <i>Pteria plana</i> , <i>Inoperna sowerbyana</i> , <i>Gryphaea</i> (<i>Africogryphaea</i>) sp., <i>Gervilla</i> sp., <i>Camptonectes</i> (<i>Camptonectes</i>)

		<p>sp., <i>C. (Camptonectes) yanshipingensis</i>, <i>Corbula</i> sp., <i>Cuspidaria?</i> <i>minleana</i></p> <p>Brachiopoda: <i>Rutorhynchia jioshanensis</i>, <i>R. biplicata</i>, <i>R. elongata</i>, <i>Praelacunosella renngarteni</i>, <i>Holcothyris tanggulaica</i>, <i>Avonothyris gigantean</i>, <i>Thurmannella acuticosta</i>, <i>Dorsoplicatthyris prolifera</i>, ?<i>Aromasithyris balinensis</i>, ? <i>Lacunosella cracoviensis</i>, ? <i>L. truncata</i>, <i>Septaliphoria</i> sp., <i>S. compta</i>, <i>Burmihynchia</i> sp.; <i>B. asiatica</i>, ? <i>B. gutta</i></p> <p>Coral: <i>Schizosmilia</i> cf. <i>rollirri</i>, <i>Stylosmilia</i> cf. <i>crassithec</i>a, <i>Pseudocoenia?</i> sp.</p> <p>Gastropod: <i>Ampullina</i> cf. <i>canaliculata</i></p> <p>Ammonite: <i>Perisphinctidas</i>, <i>Progeronia</i> sp., <i>Alligaticeras</i> sp., <i>irgatosphinctes</i> sp., <i>V. cf. subfrequens</i>, <i>V. denseplicatus</i>, <i>V. cf. kutianus</i> vhlig, <i>V. cf. frequens</i>, <i>Aulacoshinctes</i> sp., <i>Anisocardia?</i> sp., ?<i>Parabolerias</i> sp., <i>Prceispinctes</i> sp., <i>Pcrispincten</i> sp., ?<i>Spiticeras</i> sp. , <i>Subplanites</i> sp.</p>
J3s	Oxfordian	<p>Bivalve: <i>Rudulopecten scarburgensis</i>, <i>Camptonectes?</i> sp., <i>C. (Camptochlamys) yanshipingensis</i>, <i>Enlolium denissum</i>, <i>Falcimylilus jurensis</i>, <i>Pectinacea</i> sp., <i>Modiolus imbricatus</i>, <i>Anisocardia (Antiquicyprina)?</i> sp., <i>Liostrea birmanica</i>, <i>Lopha</i> sp., <i>Astarte subcardibermis</i>, <i>Ceratomya</i> cf. <i>concertrice</i>, <i>Camptonectes (C.) lens</i>, <i>Coniomya</i> cf. <i>sulcata</i>, <i>Chlamys (Radulopecten) vagans</i>, <i>Gryphaea</i> cf. <i>emiensis</i>, <i>Pseudolimea</i> cf. <i>dnplicata</i></p> <p>Brachiopoda: <i>Burmihynchia luchungensis</i>, <i>Burmihynchia qunguipliata</i>, <i>Burmihynchia luchungensis</i>, <i>Holcothyris pinguis</i> var <i>luchungensis</i>, <i>Burmihynchia</i> sp., <i>B. trilobata</i>, <i>B. thlobata</i>, “<i>Avonothyris</i>” cf. <i>distorta</i></p> <p>Coral: <i>Stylosmilia tingriensis</i></p>
J2x	Callovian	<p>Bivalve: <i>Anisocardia (Antiquicyprina) loweana</i>, <i>Camptonectes (Camptochlamys) yanshipingensis</i>, <i>Myopholas multicostata</i>, <i>Modiolus</i> sp., <i>Protocardia (P.) strecklandi</i>, <i>P. (P.) linkaensis</i>, <i>P. (P.) qabdoensis</i>, <i>Radulopecten tipper</i>, <i>Chlamy (Radulopecten) tipper</i>, <i>C. (R.) vagans</i></p>
J2b	Bathonian	<p>Bivalve: <i>Bakevella</i> sp., <i>Camptonectes (Camptochlamys) rosimon</i>, <i>Ceratomyopsis striata</i>, <i>Chlamys (Radulopecten) tipperi</i>, <i>C. sp.</i>, <i>Gryphaea (Bilobissa) bilobata</i>, <i>Miyagipecten laevis</i>, <i>Modiolus glaucus</i>, <i>M. sp.</i>, <i>Myopholas</i> sp., <i>Placunopsis</i> cf. <i>socialis</i>, <i>Protocardia (Protocardia) lingulata</i>, <i>Pseudotrapezium cordiforme</i>, <i>Radulopecten</i> cf. <i>baimaensis</i>, <i>R. cf. vagans</i>, <i>R. sp.</i></p> <p>Brachiopoda: <i>Holcothyris</i> sp., <i>H. tanggulaic</i>, <i>H. golmudensis</i>, <i>Burmihynchia</i> sp., <i>Rhynchonelloid ella</i> sp.</p>
J2q	Toarcian-Bajocian	<p>Bivalve: <i>Qiyangia–Pseudocardinia</i>; <i>Camptonectes</i>, <i>Entolioim</i> sp.</p>
T3nd		216±4.5 Ma (Wang et al., 2008a), 220.4±2.3 Ma (Fu et al., 2010)
T3j	Norian	<p>Bivalve: <i>Chlamys (Praechlamys) dingriensis</i>, <i>C. cf. biformatus</i>, <i>Indopecten</i> sp., <i>Plagiostoma</i> sp. <i>Astarte</i> sp.</p> <p>Coral: <i>Margarosmilia zogangensi</i>, <i>Promargarosmilia markamensis</i>, <i>Paradistichophyllm</i> sp.</p> <p>Conodont: <i>Epigondolella bidentata</i></p>

Biostratigraphy is from Institute of Tibetan Geological Survey (2006), Geological report of the 1:250, 000 regional geological survey in Buruo Co area (in Chinese) 311 pp.

Heihuling

Units	Era	Biostratigraphy/ Zircon U-Pb age
E2s	Eocene-Oligocene	
E2k	Eocene	
J3x	Tithonian-Berriasian	Bivalve: <i>Paranipplononaia</i> cf. <i>paucisulcata</i> , <i>Lamprotula</i> sp. <i>Protocardia</i> sp., <i>Nippononaia</i> aff. <i>wakinoensis</i> , <i>Gervillella</i> sp., <i>Trigonioides</i> sp., <i>Laevitrigonia gibbosa</i> , <i>Peregrinoconcha yunnanensis</i> , <i>Peregrinoconcha perlonga</i> , <i>Myopholas multicostata</i> , <i>Cypricardia</i> cf. <i>loweana</i> , <i>A. spitiensis</i> Gastropod: <i>Galaba</i> sp, <i>planorbis</i> sp.
J3b	Kimmeridgian-Tithonian	Bivalve: <i>Astarte subdeprella</i> , <i>A. subminma</i> , <i>A. cf. mandawaensis</i> , <i>A. subcardiformis</i> , <i>Entolium cingulatum</i> , <i>Gervillella orientalis</i> , <i>G. cf. siliqua</i> , <i>Homomya</i> cf. <i>cressiusscula</i> , <i>Liostrea</i> cf. <i>blanfordi</i> , <i>Modiolus</i> cf. <i>yunnanensis</i> , <i>Myopholas multicostata</i> , <i>Peregrinoconcha</i> sp. <i>Plagiostoma amdoense</i> Brachiopoda: <i>Bihenithyris vectumarginata</i> , <i>Burmihynchia cuneata</i> , <i>Turmanella rotunda</i> Ammonite: <i>Virgatosphinctes frequens</i> , <i>V. lemoinei</i> Coral: <i>Stylosmilia crassitheca</i> , <i>S. catenula</i> , <i>Epistreptopyllum cylindratum</i> , <i>Thecosmilia?</i> <i>Shuanghuensis</i> , <i>T. cf. costuta</i> , <i>T.? tibetana</i>
J3s	Oxfordian	Bivalve: <i>Anisocardia</i> (<i>Anitiquicyprina</i>) <i>trapezoidelis</i> , <i>Arcomytillus myanrongensis</i> , <i>Astarte</i> cf. <i>elegans</i> , <i>A. cf. subminina</i> , <i>Buchia blanfordiana</i> , <i>Chlamys</i> (<i>Radulopecten</i>) <i>tipperi</i> , <i>C. (R.) baimaensis</i> , <i>C. (R.) vagans</i> , <i>Camptonectes</i> (<i>Camptonectes</i>) <i>lens</i> , <i>Entolium mangqiongensis</i> , <i>E. xizangensis</i> , <i>Gervillella</i> cf. <i>siliqua</i> , <i>Homomya gibbosa</i> , <i>Inoperna sowerbyana</i> , <i>I. qibbosa</i> , <i>Myopholas</i> cf. <i>manderaensis</i> , <i>Plagiostoma</i> cf. <i>biniensis</i> , <i>Pseudolimea duplicata</i> , <i>Pleuromya uniformis</i> , <i>Pholadotrapezium cordiformis</i> , <i>Pseudotrapezium cordiformis</i> , <i>Pronoella pindiroensis</i> , <i>Quenstedtia</i> cf. <i>rahmuensis</i> Brachiopoda: <i>Avonthyris distorta</i> , <i>A. gigantean</i> , <i>Burmihynchia asiatica</i> , <i>B. cuneata</i> , <i>B. shanensis</i> , <i>Carainirhynchia rossica</i> , <i>Holcothyris tanggulaica</i> , <i>H. golmudensis</i> , <i>Lobothyris nwquensis</i> , <i>Rutorhynchia jieshanensis</i> , <i>R. biplicata</i> , <i>R. quadplicata</i> , <i>Thurmanella rotunda</i> Ammonite: <i>Blanfordiceras cricki</i> , <i>Aulacosphinctes hollandi</i> , <i>Haplophyceras aculeatum</i> , <i>Parabdiceras</i> sp., <i>Virgatosphinctes multifasciatus</i> , <i>V. haydeni</i> , <i>V. dacquei</i> , <i>V. frequens</i> , <i>V. contiguous</i> , <i>V. subfrequens</i> , <i>V. broilii</i>
J2x	Callovia	Brachiopoda: <i>Lobothyris deflecta</i> , <i>Burmihynchia cuneata</i> Bivalve: <i>Chlamys</i> (<i>Radulopecten</i>) <i>vagens</i> , <i>C. (R.) tipperi</i> , <i>C. (R.) baimaensis</i> , <i>Modiolus inbricatus</i> , <i>Gervillella</i> cf. <i>siliqua</i> , <i>Lopha zadoensis</i> , <i>L. cf. costata</i> , <i>Arcomytillus nierongensis</i> , <i>Myopholas multicostata</i> , <i>Protocardia sticklandi</i> Coral: <i>Complexastraea kachensis</i> , <i>Thcosmilia shuanghuensis</i>

J2b	Bathonian	Bivalve: <i>Lopha</i> cf. <i>costata</i> , <i>Chlamys</i> (<i>Radulopecten</i>) <i>barmaensis</i> , <i>C. (R.) vagans</i> , <i>Gervillella</i> cf. <i>siliqua</i> , <i>Peregrinoconcha yunnanensis</i> , <i>Plagiostoma</i> cf. <i>biiniensis</i> Ammonite: <i>Dolikephalites tipicus</i> ? Brachiopoda: <i>Burmihynchia asiatica</i> , <i>B. shonensis</i> , <i>Avonothyris distorta</i> , <i>Kallirhynchia robusta</i>
J2q	Bajocian	Bivalve: <i>Chlamys</i> (<i>Radulopecten</i>) <i>tipperi</i> Cox , <i>Pleurohya alduini</i> (Brong) , <i>Plagiostoma</i> sp., <i>Camptonectes</i> (C.) sp., <i>Pleuromya</i> cf. <i>fengdengensis</i> , <i>P. cf. dercurtatus</i> , <i>Camptonectes</i> (C.) <i>laminatus</i> , <i>Chlamys</i> (<i>Radulopecten</i>) cf. <i>matapwensis</i> , <i>Corbula</i> cf. <i>kidugalloensis</i> , <i>Modiolus imbricatus</i> , <i>Protocardia</i> cf. <i>hepingxiangensis</i> Brachiopoda: <i>Burmihynchia gutta</i> , <i>Holcothyris subovalis</i> , <i>H. trigomaris</i>
T3nd		216±4.5 Ma (Wang et al., 2008a), 220.4±2.3 Ma (Fu et al., 2010)
T3z	Carnian-Norian	Bivalve: <i>Halobia plicata</i> , <i>H. superbescens</i> Plants: <i>Neocalamites</i> sp. Sporopollen: <i>Aratrisporites</i> sp. , <i>Chasmetoosporites</i> sp., <i>Biretisporites</i> sp., <i>Araucariacites</i> sp.

Biostratigraphy is from Institute of Tibetan Geological Survey (2005), Geological report of the 1:250, 000 regional geological survey in Heihuling area (in Chinese) 294 pp.

Nadigangri

Units	Era	Biostratigraphy/ Zircon U-Pb age
E2s	Eocene-Oligocene	
E2k	Eocene	
J3K1x	Tithonian-Berriasian	Sporopollen: <i>Classopollis triangulus</i> , <i>C. annulatus</i> , <i>C. tristriatus</i> , <i>C. parvus</i> , <i>C. qiyangensis</i> , <i>C. classoides</i> , <i>C. major</i> , <i>C. monostriams</i> , <i>C. spp.</i> , <i>Chasmatosporites spertus</i> , <i>Ch. minor</i> , <i>Ch. hiams</i> , <i>Ch. sp.</i> , <i>Cycadopites nitidus</i> , <i>Cy. giganteus</i> , <i>Cy. sp.</i> , <i>Cy. medius</i> , <i>Kluhrisporites</i> sp. , <i>K. variegates</i> , <i>Discisporites</i> sp., <i>D. psilatus</i> , <i>Undulatisporites</i> sp., <i>Converrucosporites</i> sp. , <i>Stereisporites europaeus</i> , <i>Lycopodium</i> sp., <i>L. pseudoannotinus</i> , <i>To-disporites minor</i> , <i>Orites</i> sp., <i>Osmundacidites</i> sp., <i>O. wellmanii</i> , <i>Cyathidites minor</i> , <i>Densioisporites microugulus</i> , <i>Punctatisporites</i> sp., <i>C. wariverrucatus</i> , <i>Deltoidospora psilostomu</i> , <i>Lygodium</i> <i>porites</i> sp.
J3b	Kimmeridgian-Tithonian	Bivalve: <i>Arcomytilum</i> cf. <i>bathonicus</i> Morris et Lycett), <i>Astare tuotuoheensis</i> Wen, <i>Myophorella</i> sp., <i>Corbula</i> sp. Sporopollen: <i>Classopollis annulatus</i> , <i>C. parvus</i> , <i>C. qiyangensis</i> , <i>C. classoides</i> , <i>C. monostriams</i> , <i>Chasmatosporites spertus</i> , <i>Caytonipollenites</i>

		<p><i>pailidus</i> , <i>Cycadopites reticulatus</i>, <i>C.cripartites</i>, <i>C. giganteus</i>, <i>C.typicus</i> , <i>C. follicularis</i> , <i>Honosulcites</i> sp. , <i>Eucommiidites</i> sp., <i>Huhrisporites</i> sp., <i>Stereisporites</i> cf. <i>granuius</i>, <i>S.europacus</i>, <i>Todisporites minor</i>, <i>Osmundacidites</i> sp. , <i>O orbiculatus</i>, <i>Apiculatisporites</i> sp., <i>Cyathidites minor</i>, <i>Concavissinisovites</i> sp.</p>
J3s	Oxfordian	<p>Bivalve: <i>Chlamys (Radulopecten) tipperi</i> Cox, <i>Ch. (R.) vagans</i> (Sowerby), <i>Ch. (R.)cf. tipperi</i> Cox, <i>Ch. (R.)gigantea</i> (sp. nov.), <i>Astarte togtonheensis</i> Wen, <i>A. elegans</i> Sowerby, <i>A. kenti</i> Cox , <i>Mactromya qinghaiensis</i> Wen, <i>Protocardia Stricklandi</i> (Morris et Lycett), <i>Inoperne sowerbyana</i> (dorbigny) (, <i>Entolium</i> sp., <i>Anisocardia</i> sp., <i>Gervillella qing haiensis</i> Wen, <i>Camptonectes (Camptonectes)yanshipingensis</i> Wen, <i>Modiolus</i> sp., <i>Melengrinella</i> cf. <i>braanmburiensis</i> (Phillips), <i>Arcomytilus</i> sp., <i>Mytolus</i> sp., <i>Anisocardia</i> sp., <i>Pleuromya fengdengensis</i> Chen, <i>Myopholas</i> cf. <i>manderaensis</i> Cox, <i>Anisocardia</i> (Anitiquicyprina)sp., <i>Pseudolimea</i> sp.</p> <p>Sporopollen: <i>Classopollis annulatus</i> , <i>C. parvus</i> , <i>C. multistriatus</i> , <i>C. torosus</i> , <i>C. qiyangensis</i> , <i>C. classoides</i> , <i>C. major</i> , <i>C. monostriatus</i> , <i>Chasmatosporines apertus</i> , <i>C. minor</i> , <i>C. hiams</i> , <i>C. elegans</i> , <i>Hunanpollerites callosus</i> , <i>Perinpollenites</i> sp. , <i>Calialas porites danpieri</i>, <i>Pilasporites mancidus</i> , <i>Ceuebropollenites</i> sp., <i>C. carlylensis</i> , <i>Pinuspallenites</i> sp., <i>Pristinuspalienites</i> sp. , <i>Cycadopites</i> sp., <i>C. foolicularis</i> , <i>Honosulcites</i> sp., <i>Eucommiidites</i> sp., <i>Kluhrispovites pseud oreticulatus</i> , <i>Ischyosporites crateris</i> , <i>Discisporites</i> sp., <i>D. radius</i> , <i>D. psilatus</i> , <i>Granulatasporites petinus</i> , <i>Granulatisporites</i>, <i>G. minor</i> , <i>Stereisporites incertus</i> , <i>S. congregatus</i> , <i>Lycopodiumsporites</i> sp., <i>Todisporites gramulatus</i> , <i>Osmundacidites</i> sp. , <i>Asseretospora</i> sp., <i>Annulispora</i> sp., <i>Cyathidites minor</i> , <i>Calamospora nathorstii</i> , <i>Reticulatasporites clatmatus</i></p> <p>Ammonite: <i>Virgatosphinctes multifasciatus</i> Uhlig, <i>V. haydeni</i> Unlig, ? <i>Paraboliceras</i> sp. , <i>Blanfordiceras cricki</i> (Uhlig) , <i>Haplophyoceras aculeatum</i> Zhang, <i>Virgatosphinctes dacquie</i> Steiger</p> <p>Brachiopoda: <i>Holcothyris golmudensis</i> Ching , Sun et Ye, <i>Lobothyris moquensis</i> Ching , Sun et Ye</p> <p>Foraminifera: <i>Verneullinoides</i> sp., <i>Ophthalmidium</i> sp., <i>Varalophthalidium</i> sp., <i>Ammodiscus</i> sp., <i>Turritelesia</i> sp., <i>Gandinella</i> sp., <i>Lenticulina</i> sp., <i>Marginulina</i> sp., <i>Nodosaria</i> sp.</p>
J2x	Callovian	<p>Brachiopoda: <i>Burmihynchia trilobata</i> Ching. Sun et Ye, <i>B. flabilis</i> Ching. Sun et Ye, <i>Lobothyris deflecta</i> Ching. Sun et Ye, <i>Stenogmus pentagonalis</i>, <i>Ivanoviella</i> cf. <i>steinbensis</i></p> <p>Bivalve: <i>Protocardia stricklandi</i> (Morris et Lycett), <i>Anisocotdia (Anisocordia)</i> sp., <i>Chlamys (Radulopecten)cf. tipperi</i> Cox , <i>Protocardia stricklandi</i> (Morris et Lycett) , <i>Myopholas multicostata</i> (Agassiz), <i>Chlamys (Raduloptcten)tipperi</i> Cox , <i>Mactromya qinghaiensis</i> Wen, <i>Anisocardia (Anitiquicyprina)trapezoidalis</i> Wen, <i>Modiolus imbricatus</i> (Sowerby), <i>Anisocardia (Anisocardia)togtomheensis</i> Wen</p> <p>Sporopollen: <i>Classopollis triangelus</i>, <i>C. annulatus</i>, <i>C. tristriatus</i>, <i>C. parvus</i>, <i>C. qiyangensis</i>, <i>C. qiyangensis</i>, <i>C. classoides</i>, <i>Psophosphaera</i> sp., <i>Cycadopites nitidus</i>, <i>Eucommiidites</i> sp., <i>Lycopodiumsporites</i> sp., <i>Osmundacidites wellmanii</i>, <i>Cyathidites minor</i>, <i>Densoisprites microrugulatus</i>, <i>Leiotriletes</i> sp.</p>
J2b	Bathonian	<p>Bivalve: <i>Camptonectes</i> sp., <i>Pholadomya (Bucardiomya)</i> sp., <i>Rudolopecten shuanghuensis</i> Wen, <i>Pholadomya</i> sp., <i>Plagiostoma</i> sp., <i>Ceratomya</i></p>

		<p><i>concentrica</i> (Sowerby), <i>Undulatula?</i> Sp., <i>Mytilus</i> sp., <i>Pleuromya</i> cf. <i>uniformis</i> (Sowerby), <i>Astarte elegans</i> (Sowerby), <i>Pseudolimea duplicate</i> (Sowerby), <i>Protocardia</i> sp. , <i>Entolium</i> cf <i>laevis</i> Wen</p> <p>Brachiopoda: <i>Burmihynchia gutta</i> Buckman, <i>B. hpalaiensis</i> Buckman, <i>Holcothyris angulata</i> Buckman, <i>B. obessa</i> Buckman, <i>B. asiatica</i> Buckman, <i>Holcothyris luchiangensis</i> Reed, <i>Holcothyris liuwanensis</i> Sun, <i>Holcothyris rostrata</i> Buckman, <i>Burmihynchia ovalia</i> Buckman, <i>B. costata</i> Buckman, <i>Tanggularella rotunda</i> (Ching, Sun et Ye), <i>Holcothyris trigonaris</i> Buckman, <i>H. golmudensis</i> Ching, Sun et Ye, <i>Kutchithyris</i> sp., <i>Burmihynchia</i> sp., <i>Holcothyris</i> sp., <i>Burmihynchia lobata</i> Ching. Sun et Ye, <i>Burmihynchia quinquiplicata</i> Ching Sun et Ye , <i>B. lobata</i> Ching Sun et Ye , <i>B. flabilis</i> Ching Sun et Ye , <i>Holcothyris a ngwlata</i> Buekman , <i>Avonothyris distorta</i> Ching Sun et Ye, <i>A. subpentagona</i> Ching Sun et Ye, <i>Burmihynchia</i> cf. <i>lobata</i> Ching Sun et Ye</p> <p>Sporopollen: <i>Classopollis</i> sp., <i>Psophosphaera</i> sp., <i>Monosulcites</i> sp., <i>Psophosphaera</i> sp., <i>Araucariacites</i> sp., <i>Inaperturollenites</i> sp., <i>Cyathidites</i> sp., <i>Foveosporites</i> sp., <i>Cycadopites</i> sp., <i>Pinuspollenites</i> sp., <i>Callialaspollites</i> sp., <i>Lygodiumsporites</i> sp., <i>Deltoidospora</i> sp., <i>Leiotriletes</i> sp., <i>Classopollis annulatus</i>, <i>C. qiyangensis</i>, <i>C. major</i>, <i>C. monostriams</i>, <i>Chasmatosporimas</i> sp. , <i>perinopolleniles</i> sp., <i>Cycadopites</i> sp., <i>Stereisporites</i> cf. <i>granuius</i>, <i>Lycopodiumsporites paniculatcides</i>, <i>L. pseuoannotinus</i>, <i>Osmundacidites</i> sp. , <i>Cyathidites</i> sp.</p>
J2q	Bajocian	<p>Bivalve: <i>Parainoceramus matsumotoi</i> Hayami, <i>Parainoceramus</i> cf. <i>lunaris</i> Hayami, <i>Yokoyamajna globosa</i> Hayami, <i>Astarte delicata</i> Fan, <i>A. cf. voltzii</i> Goldfuss, <i>Fimbra regularis</i> (Fan), <i>Hiatella arenicola</i> (Terquem), <i>H. fabacea</i> (Terquem), <i>Luciniola cingulata</i> (Terquem), <i>L. problematica</i> (Terquem), <i>Protocardia trasversa</i> Fan, <i>Palaeonucula</i> cf. <i>navis</i> (Piette), <i>Pleuromya</i> cf. <i>dercurtatus</i> (Phillips), <i>Protocardia?</i> sp., <i>Pleuromya</i> sp., <i>Protocardia</i> sp., <i>Cuspiolaria?</i> sp. , <i>Pleuromya</i> cf. <i>fengolegensis</i> Chen</p>
T3nd		216±4.5 Ma (Wang et al., 2008a), 220.4±2.3 Ma (Fu et al., 2010)

Biostratigraphy is from Institute of Tibetan Geological Survey (2005), Geological report of the 1:250, 000 regional geological survey in Jiang'aidarina area (in Chinese) 375 pp.

Changshui River

Units	Era	Biostratigraphy/ Zircon U-Pb age
E2+3y		41.6-32.6 Ma
J3b	Kimmeridgian-Tithonian	<p>Bivalve: <i>Radulopecten gerzensis</i> Wen, <i>Liostrea</i> sp., <i>Lopha</i> sp., <i>Birmanica lobata</i> Ching Sun et Ye, <i>Birmanica flabilis</i> Ching Sun et Ye, <i>Holcothyris</i> sp., <i>Kallirhynchia</i> sp.</p>

J3s	Oxfordian	<p>Bivalve: <i>Chlamys laevis</i> Wen, <i>Chlamys (Radulopecten)</i> sp., <i>Pseudolimea</i> sp., <i>Chlamys (Radulopecten)</i> cf. <i>tipperi</i> Cox, <i>Chlamys (Radulopecten)</i> cf. <i>Vagans</i> (Sow.), <i>Astarte elegans</i> Sowerby, <i>Liostrea</i> cf. <i>birmanica</i> (Read), <i>Pseudotrapezium cardiforme</i> (Deshayes), <i>Parvamussium</i> cf. <i>subpersonatum</i> (Vacrck), ?<i>Chlamys (Radulopecten)</i> sp., <i>Grammatodo</i> cf. <i>minutus</i> Fan, <i>Liostrea</i> sp., <i>Goniocora</i> cf. <i>annulata</i> Roniewicz, <i>Epistreptophyllum</i> cf. <i>cornutiformis</i> (Gregory), <i>Chlamys (Radulopecten)</i> <i>tipperi</i> Cox, <i>Chlamys (Radulopecten)</i> cf. <i>vagans</i> (Sow.), <i>Chlamys laevis</i> (Wen), ?<i>Liostrea</i> cf. <i>blanfordi</i> Cox, <i>Ostrea</i> cf. <i>calceola</i> Zieten, ?<i>Plagiostoma</i> sp., <i>Catella</i> sp., <i>Anisocardia</i> (A.) <i>triangularis</i> (Bean), <i>Chlamys (Radulopecten)</i> cf. <i>tipperi</i> Cox</p> <p>Brachiopoda: <i>Rutorhynchia jieshanensis</i> — <i>Lacunosella trilobatiformis</i></p> <p>Ammonite: <i>Progeronia</i> sp., <i>Allgaticeras</i> sp., <i>Perisphinctidae</i>, <i>Progeronia</i></p>
J2x	Callovian	<p>Brachiopoda: <i>Stenognus pentagonalis</i>, <i>Ivanoviella</i> cf. <i>steinbessi</i>, <i>Stenognus</i> sp., <i>Apatecosia</i> cf. <i>nutiensis</i> Bague, <i>Kutchithyris tibetica</i> Shi, <i>Kutchithyris</i> sp., <i>Bihenithyris</i> sp., <i>Apatecosia</i> sp., <i>Bihendubirhynchia</i> sp.</p> <p>Bivalve: <i>Protocardia striatula</i>, <i>Modiolus bipartitus</i>, <i>Pteroperna burensis</i>, <i>Astarte multiformis</i>, <i>Anisocardia tenera</i>, <i>Liostrea</i> (Latinvda). <i>alimena</i> (Orbigny), <i>Lopha costata</i> (Sowerby), <i>Gervillella</i> cf. <i>siliqua</i> (Eudes-Desl), <i>Protocardia</i> sp., <i>Protocardia qinghaiensis</i> Wen, <i>Spondyloprcten</i> sp., <i>Pleuromya uniformis</i> (Sowerby), <i>Chlamys</i> cf. <i>laevis</i> Wen, <i>Quensledia</i> cf. <i>laevigata</i> (Phillips), <i>Phaladomya</i> sp., <i>Spondyloprcten</i> cf. <i>palinurus</i> (d'Orbigny), <i>Chlamys</i> sp.</p> <p>Ammonite: <i>Aspidoceras aff. blakei</i> Spath</p>
J2b	Bathonian	<p>Brachiopoda: <i>Rhy. trigonalis</i> Muir-Wood, <i>Cymatorhynchia</i> sp., <i>Burmishynchia</i> sp., <i>Lobothyris</i> sp., <i>Cymatorhynchia densecosta</i>, <i>Bur. trilobata</i> Ching. sunet Ye, <i>Avonothyris distorta</i> Ching. sunet Ye, <i>Thurmanella penptychia</i> Ching. sunet Ye, <i>Kallirhynchia</i> sp., <i>Lacunaerhynchia</i> sp., <i>Rhy. platiloba</i> Muir-Wood, <i>Rhy. praecusor</i> Roche, <i>Holcothyris gigantea</i>, <i>Kutchithyris jooraensis</i> Kitchen, <i>Cy. Cymatophorinorides</i></p> <p>Bivalve: <i>Corbula</i> cf. <i>tanganyicensis</i> Cox, <i>Chlamys (Radulopecten)</i> <i>tipperi</i> Cox, <i>Astarte pindiroensis</i> Cox, <i>Radulopecten baimaensis</i> Wen, <i>Lopha</i> sp., <i>Plagiostoma</i> sp., <i>Astarte</i> sp., <i>Endolium</i> cf. <i>corneolum</i> (Young et Bird), <i>Plagiostoma</i> cf. <i>subcardiformis</i> (Groppin), <i>P. sp.</i>, <i>Liostera</i> sp., <i>Gryphea</i> cf. <i>lituola</i> La mark, <i>Camptonectes</i> cf. <i>auritus</i> (Sowerby)</p> <p>Ammonite: <i>Pseudoperisphinctes</i> sp.</p>
T3z	Carnian-Norian	<p>Bivalve: <i>Sulcocythere subovata</i> (Zheng), <i>Halohia plicata</i>, <i>H. superbescens</i></p> <p>Sporopollen: <i>Cadargasporites granulatus</i>, <i>Psophosphaera</i></p>

Biostratigraphy is from Institute of Tibetan Geological Survey (2005), Geological report of the 1:250,000 regional geological survey in Duogecuoren area (in Chinese) 269 pp.

Amugang

Units	Era	Biostratigraphy/ Zircon U-Pb age
E2s	Eocene-Oligocene	
E2k	Eocene	
J3s	Oxfordian	Bivalve: <i>Entolium xizangensis-Radulopecten fibrosus</i> assemblage zone Brachiopoda: <i>Thurmanells robusta-Rutorhynchia bipticata</i> assemblage zone Ammonite: <i>Progeronia-Alligaticeras</i> assemblage zone Sporopollen: <i>Classopollis annulatus-Lygodiumsorites</i> assemblage zone
J2x	Callovian	Bivalve: <i>Chlamhys(Radulopectus) tipper-Bositra buchii</i> assemblage zone Sporopollen: <i>Cyathidites-Neoruistria-Minerisporitesri-chardsoni</i> assemblage zone
J2b	Bathonian	Bivalve: <i>Camptonectes(C.)laminatus--Liostrea bimanica</i> assemblage zone Brachiopoda: <i>Burmihynchia-Holcothyris</i> abundance zone
J2q	Bajocian	Brachiopoda: <i>Lacunarhynchia lungchiangensis-Monsardithyris trineata</i> assemblage zone

Biostratigraphy is from Institute of Tibetan Geological Survey (2005), Geological report of the 1:250, 000 regional geological survey in Tu Co area (in Chinese) 290 pp.

Zuerkenwula Mt.

Units	Era	Biostratigraphy/ Zircon U-Pb age
N1c		26.5-19.6 Ma
E2-3y		31-30 Ma
E1-2t	Eocene	Sporopollen: <i>Lycopodiumsporites, Toro-isporis, Deltoidospora, Podocarpidites, Pinuspollenites, Piceapollis, Cedripites, Rackiapollis, Tsugaopollenites, Classopollis, Ephedripites, Abietineaepollenites, Caryapollenites, Spo-rapollis, Juglanspollenites, Betulaepollenites, Momipites, Alnipollenites, Ostryoiipollenites, Quercoidites, Tricolporopollenites, Cupuliferoipollnites, Ulmipollenites, Jianghanpollenites, Celtispolienites, Labitricolpites, Pentapollenites, Meliaceoidites, Pokrovskaja, Tubulifloridi-tes, Tricolpopollenites, Rutaceoipollis, Euphorbiacites, Sapindaceidites, Rhoipites, Elaea-gnacites, Scabiosapollis, Undulatioporites, Osmundacidites, Polpodiisporites</i>

J2-3x	Kimmeridgian	Bivalve: <i>Meleagrinnella nienixionglaensis</i> Wen, <i>Radulopecten fibrosus</i> (Sowerby), <i>Miyagipecten lavis</i> (Wen), <i>Placunopsis duriuscula</i> (Phillips), <i>P. sp.</i> , <i>Bakevella</i> (<i>Bakevella</i>) <i>waltoni</i> (Lycett) <i>Gervillella qinghaiensis</i> Wen, <i>G. orientalis</i> (Douvillie), <i>G. cf. siliqua</i> (Eudes-Deslongchamps), <i>Plagiostoma cf. channoni</i> Cox, <i>Pseudolimea duplicata</i> (Sowerby), <i>Lopha maliensis</i> Tong, <i>Modiolus (Modiolus) imbricatus</i> Sowerby, <i>Protocardia qinghaiensis</i> Wen, <i>Corbicellopsis laevis</i> (Sowerby), <i>Unicardiopsis cf. acesta</i> (d'Orbigny), <i>Quenstedtia cf. oblita</i> Greppin, <i>Q. cf. dingriensis</i> Wen, <i>Mactromya qinghaiensis</i> Wen, <i>M. gibbasa</i> (Morris et Lycett), <i>Astarte togtonheensis</i> Wen, <i>A. cf. elegans</i> Sowerby, <i>Tancredia triangularis</i> Wen, <i>Pseudotrapezium cordiforme</i> (Deshayes), <i>Anisocardia (Anisocardia) togtonheensis</i> Wen, <i>A. (Antiquicyprina) cf. trapezoidalis</i> Wen, <i>Pholadomya cf. carinata</i> Goldfuss, <i>Pleuromya uniformis</i> (Sowerby), <i>Playtmyoidea sp.</i>
J3s	Oxfordian	Bivalve: <i>Chlamys sp.</i> , <i>Protocardia sp.</i> , <i>Astarte sp.</i> , <i>Myopholas sp.</i> , <i>M. multicostata</i> , <i>Camptonectes sp.</i> , <i>Parvamussium subpersonectum</i> ; <i>Gervillella sp.</i> , <i>Modiolus sp.</i> , <i>Ostrea sp.</i> , <i>Plagiostoma sp.</i> , <i>Entolium</i> , <i>Corbula</i> , <i>Palaeoneilo sp.</i>
J2x	Callovian	Bivalve: <i>Astarte sp.</i> , <i>Anisocardia sp.</i> , <i>Myopholas manderaensis</i> , <i>Liostrea birmanica</i> , <i>Trigonia sp.</i> , <i>Lopha sp.</i> , <i>Falcimylus jurensis</i> , <i>Mytilus sp.</i> , <i>Corbula sp.</i>
J2b	Bathonian	Bivalve: <i>Protocardia sp.</i> , <i>P.cf.stricklandia</i> (M.& L.), <i>P.cf.qinghaiensis</i> Wen, <i>Liostrea cf.blanfordi</i> Cox, <i>Anisocardia triangularis</i> (Bean), <i>A.minima</i> (Sow), <i>A.rostrata</i> (Sow), <i>Astarte cf.ayersi</i> Cox, <i>Entolium sp.</i> , <i>E.cf.disciforme</i> (Schubler), <i>E.cf.demissum</i> (Phillips), <i>Gervillella qinghaiensis</i> Wen, <i>G.cf.siliqua</i> (Eudes-Deslongchamps), <i>Lopha sp.</i> , <i>L.cf.costata</i> (Sow), <i>Camptonectes sp.</i> , <i>Modiolus sp.</i> , <i>M.anatinus</i> (Smith), <i>Parainoceramus cf.lunaris</i> Hayami, <i>Cerithium cosligerum</i> Pille, <i>Falcimylus cf.tifoensis</i> Cox, <i>Lucina cutieri</i> Cox, <i>Sphaeriola madridi</i> (O'Archiac)
J2q	Bajocian	Bivalve: <i>Mytilus sp.</i> , <i>Modiolus sp.</i>
T3j	Norian	Bivalve: <i>Neomegalodon boeckhi</i> (Hoernes), <i>Quemocuomegalodon orientus</i> Yao, Sha et Zhang gen. et sp. nov. , <i>Q. longitatus</i> Yao, Sha et Zhang gen. et sp. nov., <i>Palaeocardita sp.</i>

Biostratigraphy is from Institute of Tibetan Geological Survey (2003, 2004), Geological report of the 1:250, 000 regional geological survey in Wulanwula (228 pp.) and Chibuzhang Co area (39 pp.) (in Chinese).

Quemo Co

Units	Era	Biostratigraphy/ Zircon U-Pb age
J2-3x	Kimmeridgian	Bivalve: <i>Meleagrinnella nienixionglaensis</i> Wen, <i>Radulopecten fibrosus</i> (Sowerby), <i>Miyagipecten lavis</i> (Wen), <i>Placunopsis duriuscula</i> (Phillips), <i>P. sp.</i> , <i>Bakevella</i> (<i>Bakevella</i>) <i>waltoni</i> (Lycett) <i>Gervillella qinghaiensis</i> Wen, <i>G. orientalis</i> (Douvillie), <i>G. cf. siliqua</i> (Eudes-Deslongchamps), <i>Plagiostoma cf. channoni</i> Cox, <i>Pseudolimea duplicata</i> (Sowerby), <i>Lopha maliensis</i> Tong, <i>Modiolus (Modiolus) imbricatus</i> Sowerby, <i>Protocardia qinghaiensis</i> Wen, <i>Corbicellopsis laevis</i> (Sowerby), <i>Unicardiopsis cf. acesta</i> (d'Orbigny), <i>Quenstedtia cf. oblita</i>

		Greppin, <i>Q. cf. dingriensis</i> Wen, <i>Mactromya qinghaiensis</i> Wen, <i>M. gibbasa</i> (Morris et Lycett), <i>Astarte togtonheensis</i> Wen, <i>A. cf. elegans</i> Sowerby, <i>Tancredia triangularis</i> Wen, <i>Pseudotrapezium cordiforme</i> (Deshayes), <i>Anisocardia</i> (<i>Anisocardia</i>) <i>togtonheensis</i> Wen, <i>A. (Antiquicyprina) cf. trapezoidalis</i> Wen, <i>Pholadomya cf. carinata</i> Goldfuss, <i>Pleuromya uniformis</i> (Sowerby), <i>Platymyoidea</i> sp.
J3s	Oxfordian	Bivalve: <i>Palaeonucula</i> sp., <i>Mesosacella morrisi</i> (Deshayes), <i>M. wenquanensis</i> Sha, Fursich, Smith et Wang, <i>Nuculana (Praesacella) cf. ovum</i> (Sowerby), <i>Grammatodon (Grammatodon) cf. clathratum</i> (Leckenby), <i>Pinna</i> sp., <i>Meleagrinella</i> sp., <i>Pteria cf. plana</i> (Morris et Lycett), <i>Miyagipecten laevis</i> (Wen), <i>Radulopecten tipperi</i> Cox, <i>R. vagans</i> (Sowerby), <i>R. tripartitus</i> Sha, Fursich, Smith et Wang, <i>R. fibrosus</i> (Sowerby), <i>R. pamirensis</i> Wen, <i>R. gerzensis</i> Wen, <i>Camptonectes (Camptonectes) auritus</i> (Schlotheim), <i>C. (C.) laminatus</i> (Sowerby), <i>C. (Camptochlamys) clathratus</i> (Roemer), <i>C. (Annulinectes) obscurus</i> (Sowerby), <i>Propeamussium (Propeamussium) cf. pumilum</i> (Lamarck), <i>Placunopsis cf. subelongata</i> (d'Orbigny), <i>Placunopsis cf. socialis</i> Morris et Lycett, <i>P. duriuscula</i> (Phillips), <i>Gervillella qinghaiensis</i> Wen, <i>G. siliqua</i> (Eudes-Deslongchamps), <i>G. sp.</i> , <i>Bakevella? sp.</i> , <i>Aguilerella</i> sp., <i>Pseudolimea duplicata</i> (Sowerby), <i>P. tjubegatanica</i> (Repman), <i>P. sp.</i> , <i>Plagiostoma cf. channoni</i> Cox, <i>Lopha cf. tifoensis</i> Cox, <i>L. cf. maliensis</i> Tong, <i>Liostrea cf. jiangjinensis</i> Wen, <i>L. cf. birmanica</i> (Reed), <i>L. cf. blanfordi</i> Cox, <i>Plicatula</i> sp., <i>Modiolus (Modiolus) imbricatus</i> Sowerby, <i>M. (M.) cf. trigonus</i> Chen, <i>Myophorella? sp.</i> , <i>Protocardia stricklandi</i> (Morris et Lycett), <i>P. qinghaiensis</i> Wen, <i>Mactromya cf. qinghaeensis</i> Wen, <i>Astarte togtonheensis</i> Wen, <i>A. cf. elegans</i> Sowerby, <i>A. cf. maliensis</i> Tong, <i>Astartoides gambaensis</i> Wen et Lan, <i>A. cf. dingriensis</i> Wen, <i>Anisocardia (Anisocardia) rostrata</i> (Sowerby), <i>A. (A.) cf. channoni</i> Cox, <i>A. (A.) togtonheensis</i> Wen, <i>A. (A.) sp.</i> , <i>A. (Antiquicyprina) cf. trapezoidalis</i> Wen, <i>Pseudotrapezium cordiforme</i> (Deshayes), <i>Amiodon fengdengensis</i> (Chen), <i>A. cf. khoratensis</i> (Hayami), <i>Platymyoidea</i> sp., <i>Myopholas multicostata</i> (Agassiz), <i>M. percostata</i> Douville, <i>Pleuromya cf. uniformis</i> (Sowerby), <i>P. subelongata</i> (d'Orbigny), <i>P. sp.</i>
J2x	Callovian	Bivalve: <i>Palaeonucula</i> sp., <i>Pinna? sp.</i> , <i>Meleagrinella cf. braamburiensis</i> (Phillips), <i>Radulopecten tipperi</i> Cox, <i>R. vagans</i> (Sowerby), <i>R. pamirensis</i> Wen, <i>R. sp.</i> , <i>Placuopsis duriuscula</i> (Phillips), <i>Bakevillia (Bakevillia) waltoni</i> (Lycett), <i>Gervillella qinghaiensis</i> Wen, <i>Costigervillia minima</i> Wen, <i>Lopha cf. tifoensis</i> Cox, <i>Liostrea jiangjinensis</i> Wen, <i>Pteria plana</i> Roemer, <i>Pteroperna costatula</i> (Deslongchamps), <i>P. sp.</i> , <i>Modiolus (Modiolus) imbricatus</i> Sowerby, <i>Vaugonia cf. yanshipingensis</i> Wen, <i>Protocardia (P.) qinghaiensis</i> Wen, <i>P. (P.) stricklandi</i> (Morris et Lycett), <i>Corbicellopsis cf. laevis</i> (Sowerby), <i>Unicardiopsis amdoensis</i> Wen, <i>Corbula yanshipingensis</i> Wen, <i>C. kidugalloensis</i> Cox, <i>C. sp.</i> , <i>Astarte cf. elegans</i> Sowerby, <i>A. sp.</i> , <i>Anisocardia (Anisocardia) cf. channoni</i> Cox, <i>A. (A.) rostrata</i> (Sowerby), <i>Pseudotrapezium cordiforme</i> (Deshayes), <i>Amiodon cf. khoratensis</i> (Hayami), <i>Thracia togtonheensis</i> Wen
J2b	Bathonian	Bivalve: <i>Liostrea birmanica</i> , <i>Ceratomya undalat</i> , <i>C. concentrica</i> , <i>Grammatodon (Grammatodon) clathratum</i> , <i>Pinna tibetica</i> , <i>P. nyainrongensis</i> , <i>Radulopecten tipperi</i> , <i>Protocardia hepingxiangensis</i> , <i>Liostrea jiangjinensis</i> , <i>L. zadoensis</i> , <i>Lopha maliensis</i> , <i>L. baqenensis</i> , <i>Entolium nienixionglaensis</i> , <i>Praeexogyra cf. acaminata</i> , <i>Radulopecten shuanghuensis</i> , <i>Gervillella qinghaiensis</i> , <i>Pteria problematica</i> , <i>Modiolus (Modiolus) trigonus</i> , <i>Mactromya qinghaiensis</i> , <i>Neomiodon yanshipingensis</i> , <i>Anisocardia (Anisocardia) togtonheensis</i> , <i>A. (Antiquicyprina) trapezoidalis</i> , <i>Pholadomya socialis qinghaiensis</i> Ammonite: <i>Choffatia madani</i> Spath, <i>C. baluchistanensis</i> (Noetling), <i>C. cf. balinensis</i> (Neumayr), <i>C. sp.</i> , <i>Macrocephalites cf. macrocephalus</i> (Scholth.), <i>Dolikhphalites cf. typicus</i> (Blake), <i>Kinkelini-ceras</i> sp., <i>Planisphinctes? sp.</i> , <i>Planisphinctes</i> sp., <i>Procerites cf. schloenbachi</i>

		Grossouvre
J2q	Bajocian	Bivalve: <i>Psilunio chaoi</i> Grabau, <i>P. lateriplanus</i> Ma, <i>P. thailandicus</i> (Hayami), <i>P. sinensis</i> Gu, <i>Lamprotula</i> (<i>Eolamprotula</i>) sp., <i>Undulatula perlonga</i> Gu, <i>U. ptychorhyncha</i> Gu, <i>Cuniopsis</i> cf. <i>johannisbohmi</i> (Frech), <i>Solenaia tanggulaensis</i> Wen, <i>Unio</i> cf. <i>obrutschewi</i> Martinson, <i>Margaritifera isfarensis</i> Chernyshev
T3e	Norian-Rhaetian	
T3bg	Norian	Bivalve: <i>Halobia superbescens</i> — <i>H. disperseinsecta</i> ; <i>Amonotis togtonheensis</i> — <i>Cardium</i> (<i>Tulongocardium</i>) <i>xizhangensis</i> Ammonite: <i>Nodotibetites</i> cf. <i>nodosus</i> — <i>Paratibetites</i> cf. <i>wheeleri</i>
T3b	Carnian	Bivalve: <i>Halobia superbescens</i> — <i>H. disperseinsecta</i>

Biostratigraphy is from Institute of Tibetan Geological Survey (2004), Geological report of the 1:250, 000 regional geological survey in Chibuzhang Co area (in Chinese) 39 pp.

Dangmagang

Units	Era	Biostratigraphy/ Zircon U-Pb age
N2q	Pliocene	Sporopollen: <i>Chenopodipollis</i> , <i>Graminidites</i> , <i>Cyperaceapollis</i> , <i>Quercoidites</i> , <i>Betaceopolleniteuls</i> , <i>Potamogetonacidites</i> , <i>Compositoipollenites</i>
E1-2t	Eocene	Sporopollen: <i>Lycopodiumsporites</i> , <i>Toro-isporis</i> , <i>Deltoidospora</i> , <i>Podocarpidites</i> , <i>Pinuspollenites</i> , <i>Piceapollis</i> , <i>Cedripites</i> , <i>Rackiapollis</i> , <i>Tsugaopollenites</i> , <i>Classopollis</i> , <i>Ephedripites</i> , <i>Abietineaepollenites</i> , <i>Caryapollenites</i> , <i>Spo-rapollis</i> , <i>Juglanspollenites</i> , <i>Betulaepollenites</i> , <i>Momipites</i> , <i>Alnipollenites</i> , <i>Ostryoipollenites</i> , <i>Quercoidites</i> , <i>Tricolporopollenites</i> , <i>Cupuliferoipollnites</i> , <i>Ulmipollenites</i> , <i>Jianganpollenites</i> , <i>Celtispolienites</i> , <i>Labitricolpites</i> , <i>Pentapollenites</i> , <i>Meliaceoidites</i> , <i>Pokrovskaja</i> , <i>Tubulifloridites</i> , <i>Tricolpopollenites</i> , <i>Rutaceopollis</i> , <i>Euphorbiacites</i> , <i>Sapindaceidites</i> , <i>Rhoipites</i> , <i>Elaea-gnacites</i> , <i>Scabiosapollis</i> , <i>Undulatioporites</i> , <i>Osmundacidites</i> , <i>Polpodiisporites</i>
J2-3x	Kimmeridgian	Bivalve: <i>Meleagrinnella nienxiionglaensis</i> Wen, <i>Radulopecten fibrosus</i> (Sowerby), <i>Miyagipecten lavis</i> (Wen), <i>Placunopsis duriuscula</i> (Phillips), <i>P. sp.</i> , <i>Bakevella</i> (<i>Bakevella</i>) <i>waltoni</i> (Lycett) <i>Gervillella qinghaiensis</i> Wen, <i>G. orientalis</i> (Douvillie), <i>G. cf. siliqua</i> (Eudes-Deslongchamps), <i>Plagiostoma</i> cf. <i>channoni</i> Cox, <i>Pseudolimea duplicata</i> (Sowerby), <i>Lopha maliensis</i> Tong, <i>Modiolus</i> (<i>Modiolus</i>) <i>imbricatus</i> Sowerby, <i>Protocardia qinghaiensis</i> Wen, <i>Corbicellopsis laevis</i> (Sowerby), <i>Unicardiopsis</i> cf. <i>acesta</i> (d'Orbigny), <i>Quenstedtia</i> cf. <i>oblita</i> Greppin, <i>Q. cf. dingriensis</i> Wen, <i>Mactromya qinghaiensis</i> Wen, <i>M. gibbasa</i> (Morris et Lycett), <i>Astarte togtonheensis</i> Wen, <i>A. cf. elegans</i> Sowerby, <i>Tancredia triangularis</i> Wen, <i>Pseudotrapezium cordiforme</i> (Deshayes), <i>Anisocardia</i> (<i>Anisocardia</i>) <i>togtonheensis</i> Wen, <i>A. (Antiquicyprina)</i> cf. <i>trapezoidalis</i> Wen, <i>Pholadomya</i> cf. <i>carinata</i> Goldfuss, <i>Pleuromya uniformis</i> (Sowerby), <i>Playtmyoidea</i> sp.

J3s	Oxfordian	<p>Bivalve: <i>Palaeonucula</i> sp., <i>Mesosacella morrisi</i> (Deshayes), <i>M. wenquanensis</i> Sha, Fursich, Smith et Wang, <i>Nuculana (Praesacella)</i> cf. <i>ovum</i> (Sowerby), <i>Grammatodon (Grammatodon)</i> cf. <i>clathratum</i> (Leckenby), <i>Pinna</i> sp., <i>Meleagrinnella</i> sp., <i>Pteria</i> cf. <i>plana</i> (Morris et Lycett), <i>Miyagipecten laevis</i> (Wen), <i>Radulopecten tipperi</i> Cox, <i>R. vagans</i> (Sowerby), <i>R. tripartitus</i> Sha, Fursich, Smith et Wang, <i>R. fibrosus</i> (Sowerby), <i>R. pamirensis</i> Wen, <i>R. gerzensis</i> Wen, <i>Camptonectes (Camptonectes)</i> <i>auritus</i> (Schlotheim), <i>C. (C.) laminatus</i> (Sowerby), <i>C. (Camptochlamys) clathratus</i> (Roemer), <i>C. (Annulinectes) obscurus</i> (Sowerby), <i>Propeamussium (Propeamussium)</i> cf. <i>pumilum</i> (Lamarck), <i>Placunopsis</i> cf. <i>subelongata</i> (d'Orbigny), <i>Placunopsis</i> cf. <i>socialis</i> Morris et Lycett, <i>P. duriuscula</i> (Phillips), <i>Gervillella qinghaiensis</i> Wen, <i>G. siliqua</i> (Eudes-Deslongchamps), <i>G. sp.</i>, <i>Bakevillia?</i> sp., <i>Aguilerella</i> sp., <i>Pseudolimea duplicata</i> (Sowerby), <i>P. tjubegatanica</i> (Repman), <i>P. sp.</i>, <i>Plagiostoma</i> cf. <i>channoni</i> Cox, <i>Lopha</i> cf. <i>tifoensis</i> Cox, <i>L. cf. maliensis</i> Tong, <i>Liostrea</i> cf. <i>jiangjinensis</i> Wen, <i>L. cf. birmanica</i> (Reed), <i>L. cf. blanfordi</i> Cox, <i>Plicatula</i> sp., <i>Modiolus (Modiolus) imbricatus</i> Sowerby, <i>M. (M.) cf. trigonus</i> Chen, <i>Myophorella?</i> sp., <i>Protocardia stricklandi</i> (Morris et Lycett), <i>P. qinghaiensis</i> Wen, <i>Mactromya</i> cf. <i>qinghaieusis</i> Wen, <i>Astarte togtonheensis</i> Wen, <i>A. cf. elegans</i> Sowerby, <i>A. cf. maliensis</i> Tong, <i>Astartoides gambaensis</i> Wen et Lan, <i>A. cf. dingriensis</i> Wen, <i>Anisocardia (Anisocardia) rostrata</i> (Sowerby), <i>A. (A.) cf. channoni</i> Cox, <i>A. (A.) togtonheensis</i> Wen, <i>A. (A.) sp.</i>, <i>A. (Antiquicyprina)</i> cf. <i>trapezoidalis</i> Wen, <i>Pseudotrapezium cordiforme</i> (Deshayes), <i>Amiodon fengdengensis</i> (Chen), <i>A. cf. khoratensis</i> (Hayami), <i>Platymyoidea</i> sp., <i>Myopholas multicostata</i> (Agassiz), <i>M. percostata</i> Douville, <i>Pleuromya</i> cf. <i>uniformis</i> (Sowerby), <i>P. subelongata</i> (d'Orbigny), <i>P. sp.</i></p>
J2x	Callovian	<p>Bivalve: <i>Palaeonucula</i> sp., <i>Pinna?</i> sp., <i>Meleagrinnella</i> cf. <i>braamburiensis</i> (Phillips), <i>Radulopecten tipperi</i> Cox, <i>R. vagans</i> (Sowerby), <i>R. pamirensis</i> Wen, <i>R. sp.</i>, <i>Placuopsis duriuscula</i> (Phillips), <i>Bakevillia (Bakevillia) waltoni</i> (Lycett), <i>Gervillella qinghaiensis</i> Wen, <i>Costigervillia minima</i> Wen, <i>Lopha</i> cf. <i>tifoensis</i> Cox, <i>Liostrea jiangjinensis</i> Wen, <i>Pteria plana</i> Roemer, <i>Pteroperna costatula</i> (Deslongchamps), <i>P. sp.</i>, <i>Modiolus (Modiolus) imbricatus</i> Sowerby, <i>Vaugonia</i> cf. <i>yanshipingensis</i> Wen, <i>Protocardia (P.) qinghaiensis</i> Wen, <i>P. (P.) stricklandi</i> (Morris et Lycett), <i>Corbicellopsis</i> cf. <i>laevis</i> (Sowerby), <i>Unicardiopsis amdoensis</i> Wen, <i>Corbula yanshipingensis</i> Wen, <i>C. kidugalloensis</i> Cox, <i>C. sp.</i>, <i>Astarte</i> cf. <i>elegans</i> Sowerby, <i>A. sp.</i>, <i>Anisocardia (Anisocardia)</i> cf. <i>channoni</i> Cox, <i>A. (A.) rostrata</i> (Sowerby), <i>Pseudotrapezium cordiforme</i> (Deshayes), <i>Amiodon</i> cf. <i>khoratensis</i> (Hayami), <i>Thracia togtonheensis</i> Wen</p>
J2b	Bathonian	<p>Bivalve: <i>Liostrea birmanica</i>, <i>Ceratomya undalat</i>, <i>C. concentrica</i>, <i>Grammatodon (Grammatodon) clathratum</i>, <i>Pinna tibetica</i>, <i>P. nyainrongensis</i>, <i>Radulopecten tipperi</i>, <i>Protocardia hepingxiangensis</i>, <i>Liostrea jiangjinensis</i>, <i>L. zadoensis</i>, <i>Lopha maliensis</i>, <i>L. baqenensis</i>, <i>Entolium nienixionglaensis</i>, <i>Praeexogyra</i> cf. <i>acaminata</i>, <i>Radulopecten shuanghuensis</i>, <i>Gervillella qinghaiensis</i>, <i>Pteria problematica</i>, <i>Modiolus (Modiolus) trigonus</i>, <i>Mactromya qinghaiensis</i>, <i>Neomiodon yanshipingensis</i>, <i>Anisocardia (Anisocardia) togtonheensis</i>, <i>A. (Antiquicyprina) trapezoidalis</i>, <i>Pholadomya socialis qinghaiensis</i></p> <p>Ammonite: <i>Choffatia madani</i> Spath, <i>C. baluchistanensis</i> (Noetling), <i>C. cf. balinensis</i> (Neumayr), <i>C. sp.</i>, <i>Macrocephalites</i> cf. <i>macrocephalus</i> (Scholth.), <i>Dolikhphalites</i> cf. <i>typicus</i> (Blake), <i>Kinkelini-ceras</i> sp., <i>Planisphinctes?</i> sp., <i>Planisphinctes</i> sp., <i>Procerites</i> cf. <i>schloenbachi</i> Grossouvre</p>
J2q	Bajocian	<p>Bivalve: <i>Psilunio chaoi</i> Grabau, <i>P. lateriplanus</i> Ma, <i>P. thailandicus</i> (Hayami), <i>P. sinensis</i> Gu, <i>Lamprotula (Eolamprotula)</i> sp., <i>Undulatula perlonga</i> Gu, <i>U. ptychorhyncha</i> Gu, <i>Cuniopsis</i> cf. <i>johannisbohmi</i> (Frech), <i>Solenia tanggulaensis</i> Wen, <i>Unio</i> cf. <i>obrutschewi</i> Martinson,</p>

		<i>Margaritifera isfarensis</i> Chernyshev
T3T	Norian	Bivalve: <i>Cardium (Tulongcardium) martini</i> — <i>Trigonia (Kumatrigonia) kukxilensis</i>

Biostratigraphy is from Institute of Tibetan Geological Survey (2004), Geological report of the 1:250, 000 regional geological survey in Chibuzhang Co area (in Chinese) 39 pp.

Table S3 GPS coordinates of AFT samples

Sample	N	E	H/m
D0609	32°37 ' 06.86"	89°08 ' 12.51"	4878
D0815	32°31 ' 40.39"	89°17 ' 12.33"	4767
ED0616	32°47 ' 09.82"	90°38 ' 18.64"	4999
ED0620	32°57 ' 02.70"	90°36 ' 02.30"	5080
EP1502	32° 54' 31.84"	90° 49' 04.48"	5155
EP1503	32°53 ' 28.03"	90° 49' 56.32"	5271
EP1504-09	32° 44' 02"	90° 37' 11"	4919
EP1504-17	32° 43' 55"	90° 37' 07"	4926
EP1505	32° 58' 12.27"	90° 44' 32.52"	5099
EP1506	32° 43' 43.03"	91° 04' 10.82"	4982
PQ1503	33° 21' 29.16"	88° 41' 52.10"	4965
PQ1506	32° 46' 01.07"	88° 53' 52.86"	4972

Figure S1. Thermal history modeling results of samples from the Qiangtang Basin

