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Fig. DR1. Standard graphic plots of geochemical data and classification of the basalts, the data employed from Table DR2 (HB1V-4 and HB1V-6). (a, b) Y vs. Cr and Zr vs. TiO₂ diagrams (Pearce, J. A., 1982, Trace elements characteristic of lavas from destructive plate boundaries, *in* Trorpe, R. S., ed., Andesites: New York, Wiley, p. 525-548); (c, d) Zr vs. P₂O₅ and Zr / P₂O₅ vs. TiO₂ diagrams (Floyd, P. A., and Winchester, J. A., 1975, Magma type and tectonic discrimination using immobile elements: Earth and Planetary Science Letters, v. 27, p. 211-218); (e) SiO₂ vs. Na₂O + K₂O diagram (Kuno, H., 1968, Differentiation of basalt magmas, *in* Hess, H., and Poldervaart, V., eds., Basalts: New York, Interscience, p. 623-688) showing marked excess in alkalies due to spilitization.

Table DR1. F = total feldspar; L = sedimentary + volcanic + metamorphic lithic fragments; Lsm = sedimentary + metasedimentary lithic fragments; Lvm = volcanic + metavolcanic lithic fragments; Q = monocrystalline quartz + polycrystalline quartz + chert; Qm = monocrystalline quartz; Qp = polycrystalline quartz + chert.

Table DR2. The major elements in wt.% and trace elements in ppm.

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Table DR1. Compositions of Lower Cretaceous sandstones from central Tibet

Sample	QFL			QmFLt		QpLvmLsm			
	Q (%)	F (%)	L (%)	Qm (%)	F (%)	Lt (%)	Qp (%)	Lvm (%)	Lsm (%)
<u>Chuanba Fm., ~31°45', 85°33' (BV-3 in Figure 4)</u>									
BV-301	76	14	10	75	14	11	9	4	87
BV-302	75	17	8	70	17	13	38	0	62
BV-303	56	19	25	36	19	45	44	8	48
BV-304	52	30	18	51	30	19	5	37	58
BV-305	88	2	10	86	2	12	17	3	80
BV-306	96	1	3	82	1	17	82	0	18
BV-307	90	5	5	84	5	11	55	0	45
BV-308	94	3	3	86	3	11	73	0	27
BV-309	94	2	4	85	2	13	69	0	31
<u>Samolo Fm., ~31°58', 86°57' (BV-4 in Figure 4)</u>									
BV-401	77	1	22	74	1	25	12	20	68
BV-402	63	20	17	61	20	19	11	16	73
Berriasian -Valanginian Average									
	78±15	11±10	11±8	72±16	11±10	17±10	38±28	8±12	54±22
<u>Duoba Fm., ~31°38', 84°35' (HB-1 in Figure 5)</u>									
HB-101	12	71	17	10	71	19	11	84	5
HB-102	25	52	23	20	52	28	18	82	0
HB-103	21	63	16	15	63	22	27	73	0
HB-104	4	73	23	4	73	23	0	96	4
HB-105	10	72	18	8	72	20	10	85	5
HB-106	8	70	22	7	70	23	4	87	9
<u>Duoba Fm., ~31°25', 85°42' (HB-3 in Figure 5)</u>									
HB-301	5	50	45	3	50	47	4	92	4
HB-302	37	28	35	36	28	35	3	92	5
HB-303	50	23	27	32	23	45	40	56	4
HB-304	67	14	19	62	14	24	21	67	12
HB-305	70	6	24	64	6	30	20	63	17
HB-306	70	6	24	41	6	53	55	32	13
HB-307	64	7	29	36	7	57	49	37	14
HB-308	61	7	32	42	7	51	37	51	12
HB-309	75	5	20	52	5	43	53	12	35
HB-310	64	12	24	35	12	53	55	34	11
HB-311	64	1	35	35	1	64	45	44	11
HB-312	34	18	48	24	18	58	17	80	3
HB-313	88	5	7	41	5	54	87	2	11
HB-314	57	4	43	18	4	82	48	43	9
HB-315	60	10	30	35	10	55	45	53	2
HB-316	56	7	37	41	7	52	29	60	11

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HB-317	74	11	15	33	11	56	73	22	5
HB-318	59	15	26	41	15	44	41	50	9
HB-319	58	9	33	30	9	61	46	48	6
HB-320	43	27	30	37	27	36	17	25	58
HB-321	40	15	45	28	15	57	21	68	11
HB-322	39	10	51	22	10	68	25	63	12

Zelong Gr., ~85°54', 31°21' (HB-4 in Figure 5)

HB-401	15	38	47	15	38	47	0	98	2
HB-402	65	23	12	64	23	13	8	84	8
HB-403	38	39	23	37	39	24	4	92	4
HB-404	55	31	14	50	31	19	26	69	5
HB-405	86	2	12	85	2	13	8	84	8
HB-406	76	4	20	76	4	20	0	90	10
HB-407	65	24	11	61	24	15	27	66	7
HB-408	46	42	12	43	42	15	20	73	7

Duoba Fm., ~31°30', 86°13' (HB-5 in Figure 5)

HB-501	70	17	13	67	17	16	19	75	6
HB-502	42	15	43	42	15	43	0	74	26
HB-503	48	10	42	46	10	44	6	84	10
HB-504	30	27	43	30	27	43	0	81	19
HB-505	27	20	53	26	20	54	2	93	5
HB-506	50	7	43	48	7	45	4	40	56
HB-507	43	23	34	40	23	37	8	81	11
HB-508	48	12	40	46	12	42	5	52	43

Duoba Fm., ~31°44', 86°04' (HB-6 in Figure 5)

HB-601	81	8	11	80	8	12	8	8	84
HB-602	80	9	11	79	9	12	8	8	84
HB-603	65	22	13	62	22	16	19	75	6
HB-604	83	5	12	82	5	13	8	85	7
HB-605	63	23	14	61	23	16	12	82	6
HB-606	47	36	17	45	36	19	10	85	5
HB-607	88	1	11	41	1	58	81	2	17
HB-608	87	1	12	86	1	13	8	8	84
HB-609	45	17	38	42	17	41	7	76	17
HB-610	89	1	10	87	1	12	17	43	42
HB-611	68	9	23	64	9	27	15	30	55
HB-612	82	8	10	79	8	13	23	8	69
HB-613	34	46	20	33	46	21	5	86	9
HB-614	66	3	1	63	3	34	9	76	15
HB-615	65	24	18	57	24	19	5	90	5
HB-616	31	54	15	27	54	19	21	74	5
HB-617	82	2	16	81	2	17	6	11	83

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Duoba Fm., ~31°33', 86°52' (HB-7 in Figure 5)

HB-701	31	2	67	30	2	68	1	57	42
HB-702	63	3	31	61	3	33	6	76	18
HB-703	43	1	56	38	1	61	8	25	67
HB-704	87	3	10	85	3	12	17	17	66
HB-705	77	13	10	75	13	12	17	25	58
HB-706	59	20	21	58	20	22	5	82	13

Hauterivian-Lower Barremian average

54±22 20±19 26±14 45±22 20±19 35±18 20±20 59±28 21±24

HB-1 average

13±8 67±8 20±3 11±6 67±8 22±3 12±9 84±7 4±3

HB-3 average

56±17 13±11 31±11 36±13 13±11 51±13 38±21 50±23 12±12

HB-4 average

56±22 25±15 19±12 54±22 25±15 21±11 12±11 82±11 6±2

HB-5 average

45±13 16±6 39±11 43±12 16±6 41±11 5±6 73±17 22±18

HB-6 average

68±18 16±16 16±7 63±19 16±16 21±12 15±17 50±35 35±33

HB-7 average

60±20 7±7 33±24 58±21 7±7 35±24 9±6 47±28 44±23

Jika Fm., ~85°42', 31°16' (BC-3 in Figure 7)

BC-301	35	0	65	31	0	69	6	87	7
BC-302	15	60	25	15	60	25	0	88	12
BC-303	51	5	44	49	5	46	4	87	9
BC-304	48	6	47	48	6	47	0	97	13
BC-305	28	30	42	27	30	43	2	93	5
BC-306	14	23	63	14	23	63	0	95	5
BC-307	19	17	64	19	17	64	0	94	6

Langshan Fm., ~31°34', 86°18' (BC-4 in Figure 7)

BC-401	47	36	17	46	36	17	0	82	18
BC-402	50	35	15	48	35	17	12	71	17

Upper Barremian-Lower Cenomanian Average

34±15 24±19 42±19 33±15 24±19 43±20 3±4 87±8 10±5

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**Table DR2 Geochemical analyses of the volcanic rocks
from central Tibet, western China**

	HB1V-1	HB1V-2	HB1V-3	HB1V-4	HB1V-5	HB1V-6
	rhyolite	Quartz keratophyre	latite	Alkaline basalt	latite	spilite
SiO ₂	69.32	67.48	60.16	45.37	60.18	51.94
TiO ₂	0.61	0.08	0.57	1.63	0.56	0.82
Al ₂ O ₃	12.30	15.37	12.60	18.11	12.63	14.43
Fe ₂ O ₃	5.31	4.53	4.21	8.85	4.14	7.32
MnO	0.06	0.04	0.12	0.06	0.11	0.12
MgO	2.21	1.77	1.12	4.91	1.12	8.47
CaO	5.21	2.33	10.43	6.90	10.29	4.77
Na ₂ O	1.47	5.43	3.27	2.35	3.28	3.95
K ₂ O	2.30	1.18	2.75	2.22	2.75	0.06
P ₂ O ₅	0.06	0.14	0.08	0.20	0.08	0.17
LOI	1.24	1.23	4.37	7.43	4.29	7.73
total	100.09	99.58	99.68	98.03	99.43	99.78
Ni	45.8	5.6	6.6	17.0	6.4	127.3
Co	11.0	9.9	10.0	24.0	8.2	28.1
Cu	23.7	15.9	11.4	38.9	10.5	39.0
Zn	54.5	64.9	44.8	109.1	45.5	67.7
V	87.9	103.0	70.7	416.8	76.2	165.5
Cr	112.8	15.4	10.9	83.0	13.0	446.7
Rb	109.55	29.03	77.76	106.32	18.34	2.97
Ba	276.98	280.93	867.82	411.23	121.02	66.32
Th	14.93	11.63	9.66	8.91	5.71	6.17
U	2.50	2.62	1.88	1.99	1.11	1.07
Nb	13.31	14.23	9.22	10.55	9.74	7.69
Ta	0.80	0.92	0.58	0.57	0.55	0.46
Pb	16.80	21.28	27.89	19.57	10.88	4.29
Sr	161.86	242.77	313.13	259.31	451.56	790.47
Zr	44.48	211.62	187.87	134.18	149.99	117.31
Hf	1.08	5.71	4.95	3.67	3.88	3.05
Y	21.92	30.66	21.79	21.76	17.93	16.71
La	29.64	35.71	26.07	41.61	28.61	22.96
Ce	58.25	68.75	51.71	75.54	56.20	46.91

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Pr	7.00	8.27	5.63	9.72	6.97	5.57
Nd	25.03	30.54	20.09	35.09	26.03	21.08
Sm	5.73	6.64	4.42	7.16	5.26	4.45
Eu	0.73	1.23	1.42	1.72	1.61	0.92
Gd	4.83	6.33	4.43	6.17	4.67	4.05
Tb	0.48	0.86	0.59	0.71	0.57	0.55
Dy	4.53	6.08	4.00	4.73	3.72	3.38
Ho	0.71	1.15	0.89	0.84	0.61	0.71
Er	2.94	3.24	2.30	2.31	1.91	1.65
Tm	0.18	0.46	0.37	0.33	0.28	0.25
Yb	2.16	3.19	2.28	2.17	1.75	1.57

