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Data

Major and trace element analyses of Tertiary sedimentary rocks from the Sylhet basin, Bangladesh

H. M. Zakir Hossain* and Barry Roser*

Abstract

Whole-rock major and trace element X-ray fluorescence analyses are reported for 238 samples (115 sandstones, 123 mudrocks) from the Jaintia, Barail, Surma, Tipam, and Dupitila Groups of the Sylhet basin, Bangladesh, as part of a study of their provenance. The units examined range from Late Eocene to Plio-Pleistocene in age. The samples analyzed were taken from core material from four hydrocarbon exploration wells, and also from surface outcrop. Loss on ignition contents are generally low (<6%), although occasional higher values occur. SiO_2 contents of the sandstones are usually greater than in the mudrocks, but formation averages of both lithotypes exceed that of average upper continental crust (UCC). Average abundances of Pb, Zr, Th, Ce and most ferromagnesian elements (Sc, Fe_2O_3, TiO_2, Ni, Cr, V) are also usually greater than in UCC. In contrast, average contents of CaO, Na_2O, and Sr are strongly depleted relative to UCC; Nb, K_2O, Rb, MgO, Al_2O_3, and Ba show lesser and more variable depletion.

Key words: Geochemistry, sandstones, mudrocks, major and trace elements, Sylhet basin, Bangladesh

Introduction

The Sylhet basin of northeastern Bangladesh contains one of the world's most voluminous Tertiary sedimentary fills, which is composed primarily of continental to marine clastic sediments and lesser carbonate rocks (Table 1). However, outcrop exposures of these sedimentary rocks are very limited owing to extensive alluvial cover. Several studies have examined many aspects of the Sylhet basin and surrounding areas, including general geology, sedimentology, petrography, and hydrocarbon potential (Hiller and Elahi, 1984; Imam and Shaw, 1985, 1987; Alam, 1989; 1991; Ahmed et al., 1991; Johnson and Alam, 1991; Shamsuddin and Khan, 1991; Reimann, 1993; Imam, 1994; Shamsuddin and Abdullah, 1997; Uddin and Lundberg, 1998; 2004; Rahman, 1999; Brown et al., 2001; Gani and Alam, 2004; and others). In recent years geochemical studies of sedimentary rocks have become tools to evaluate source area weathering, tectonic setting of deposition, and provenance signatures (Nesbitt and Young, 1982; Bhatia, 1983; Roser and Korsch, 1986, 1988; McLennan et al., 1993; and many others). However, to date geochemical studies of clastic sediments in the Sylhet basin have been relatively few (Mannan, 2002; Rahman and Faupl, 2003).

The primary purpose of this report is to present a comprehensive dataset of whole-rock X-ray fluorescence (XRF) analyses of sandstones and mudrocks spanning most of the Tertiary succession in the Sylhet basin. Detailed discussion and interpretation of the data will be presented in a future publication.

Sample Suites

Sandstone and mudrock samples were collected from the Jaintia (Paleocene-Eocene), Barail (Oligocene), Surma (Middle to Late Miocene), Tipam (Late Miocene to

Table 1. Stratigraphy of the Sylhet basin, Bangladesh (after Khan, 1991; Reimann, 1993).

Age	Group	Formation	Lithology	Thickness (m)
Recent	Alluvium	Alluvium	Sand, silt and clay	20+
Late Pleistocene	Dihing	Dihing	Sandstone with interbedded shale	130
Pliocene-Pleistocene	Dupitila	Dupitila	Pebbly sandstone and sandstone with subordinate siltstone	2400
Late Miocene to Pliocene	Tipam	Girujan Clay	Mottled clay with subordinate sandy clay and sandstone	1080
		Tipam Sst	Massive sandstone with subordinate shale	1200
Middle to Late Miocene	Surma	Bokabil	Shale with interbedded sandstone and siltstone	1130
		Bhuban	Alternation of sandstone, sandy shale and siltstone	1560
Oligocene	Barail	Renji	Yellowish brown sandstone, shale and coal lenses	450
		Jenam	Grey to brownish siltstone, silty shale and sandstone	645
Late Eocene	Jaintia	Kopili Shale	Shale with subordinate sandstone and thin limestone	460
Mid Eocene		Sylhet Lst	Grey fossiliferous limestone	245
Paleocene to Early Eocene		Tura Sandstone	Alternation of sandstone and limestone, with shale and coal seams	380

*Dept of Geoscience, Shimane University, Matsue 690-8504, Japan

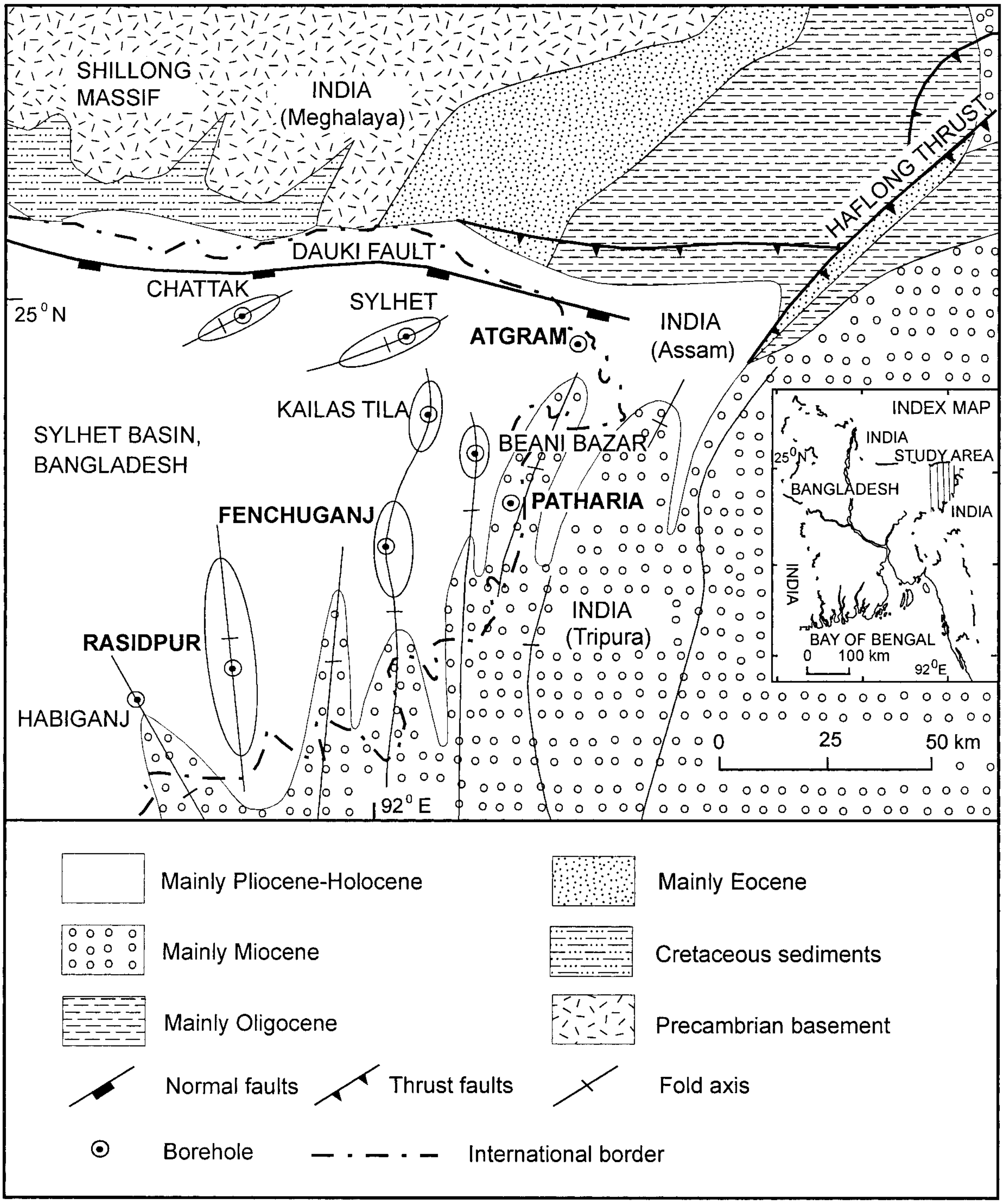

Fig. 1. Map showing location of the study area and hydrocarbon exploration wells in the NE Sylhet basin (after Hiller and Elahi, 1984). Samples were analyzed from the Rasidpur, Fenchuganj, Patharia, and Atgram wells.

Pliocene) and Dupitila (Plio-Pleistocene) Groups (Table 1). The collection spans the Tertiary stratigraphic sequence from the Kopili Shale Formation (Late Eocene) through to the Dupitila Formation (Late Pliocene - Early Pleistocene). Surface samples were collected from sections exposed in the northeastern Sylhet basin (Fig. 1), which lies within latitudes 25° 04′ N and 25° 12′ 30″ N and longitudes 92° 01′ E and 92° 12′30″E (Khan, 1978). This covers the area between the Dauki River near Sonatila in the west, the Lalakhal area to the east, Siripur to the north, and Sharighat to the south (Fig. 2). Subsurface samples of sandstones, siltstones and shales were taken from four hydrocarbon exploration wells, namely Rashidpur-1, Fenchuganj-2, Patharia-5, and Atgram-1X (Fig. 1).

1. Surface Exposures

Samples from the Kopili Shale Formation of the Jaintia Group were collected from the Dauki River section and in

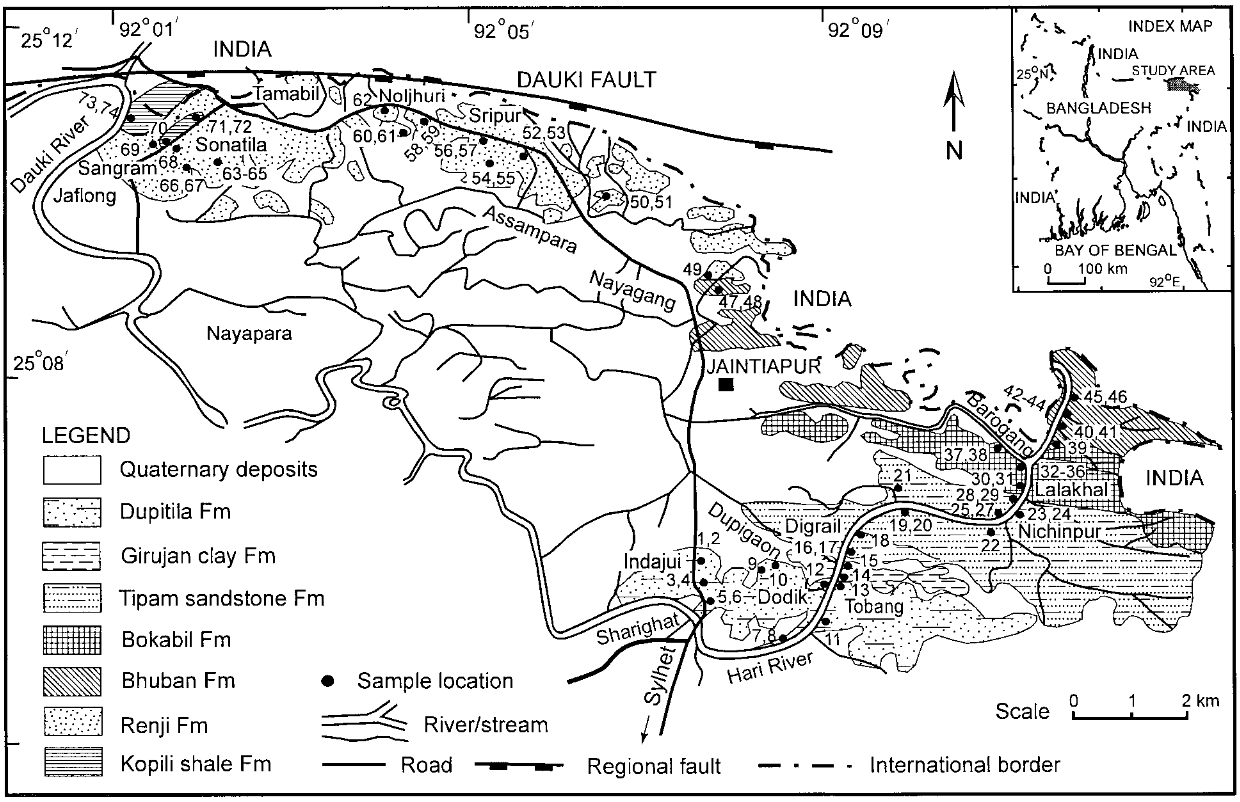

Fig. 2. Geological map of the study area (after Reimann, 1993) showing locations of the surface samples and principal geographic features.

the Sonatila area in northwest Jaintiapur, Sylhet. The Kopili shales are dark grey to brownish black, well-indurated, calcareous, and carbonaceous. The Kopili Shale Formation is interpreted to have been deposited in distal deltaic to shelf or slope environments (Alam et al., 2003). The upper contact with the overlying Barail Group is unconformable.

The Jenam Formation (sandstone, siltstone, and silty shale) forms the lower part of the Barail Group, but was not sampled in this study. The overlying Renji Formation crops out in the Sonatila chara and along the Tamabil-Jaintiapur road section, and also in the Sripur area of Jaintiapur, Sylhet. This formation consists primarily of grey, yellowish- to reddish-brown, medium- to fine-grained sandstones, with alternating grey to yellowish-brown siltstones and dark grey shales. The Barail sediments in the Jaflong-Tamabil area are thought to have been deposited in tide-dominated shelf environments (Alam, 1991), whereas those in the Naga Hills area consist of deltaic and prodeltaic deposits (Rao, 1983; cited in Johnson and Alam, 1991). The contact between the Renji Formation and the overlying Surma Group is unconformable.

The Bhuban Formation is well exposed in the Hari River, and is divided into lower, middle and upper members (Uddin and Lundberg, 1999). Samples from the lower, middle and upper members were collected from the Nayagang, Jaintiapur, and Bagchara areas respectively, near Lalakhal Bazar. This formation consists of sandstone with alternating siltstone and shale. The sandstones are grey to yellowish, fine to medium grained, moderately unconsolidated, and thinly to thickly bedded. The siltstones are light grey to light yellow, laminated to bedded, and moderately hard. The shales are light grey to yellow, well laminated, and relatively indurated. Samples from the overlying Bokabil Formation were collected from the confluence of the Barogang and Hari Rivers in the Lalakhal area, and consist primarily of moderately indurated grey shale, silty shale/siltstone, and sandstone. The Miocene sedimentation occurred in open marine to inter deltaic environments, as documented from lithofacies variation (Reimann, 1993). The contact between the Bokabil Formation and the overlying Tipam Sandstone Formation (Tipam Group) is erosional.

Sandstones and mudrocks of the Tipam Sandstone Formation were collected from the Hari River section near the Lalakhal, Nichinpur and Digrail areas of Jaintiapur. This formation is generally composed entirely of yellow to reddish brown sandstone with occasional shale and siltstone, but in places may be pebbly and conglomeratic. Johnson and Alam (1991) suggested that the Tipam sediments were deposited in bedload-dominated braided-fluvial environments. Variegated claystones of the succeeding Girujan Clay Formation were collected from the Digrailer Tila and Sunar Kher areas along the Hari River section. The Girujan Clays were deposited in lacustrine, flood plain and overbank environments (Reimann, 1993). The contact between the Girujan Clay and the Dupitila

Formation (Dupitila Group) is unconformable.

The Dupitila Formation is well exposed along the Hari River section in Jaintiapur, Sylhet. Samples were collected from the Tobang, Dodik, Dupigoan and Sharighat sections. This formation consists of grey, yellowish- to reddish-brown, fine to coarse grained, mostly unconsolidated sandstones, with subordinate siltstone and/or shale interbeds. The Dupitila Formation was deposited by small-scale, mud-rich meandering rivers (Gani and Alam, 2004). The upper contact of the Dupitila Formation with the Late Pleistocene Dihing Group is erosional.

Locations of the surface samples are listed in Appendix 1 and are illustrated in Fig. 2.

2. Well Sections

Samples from the Oligocene to Mio-Pliocene Jenam, Renji, Bhuban, Bokabil and Tipam Sandstone Formations were also taken from cores from four hydrocarbon exploration wells (Fig. 1). The deepest well was Atgram-1X (4968 m below surface level), which penetrated all the above units except the Tipam Sandstone Formation. In contrast, the shallower Patharia-5 well (3438 m b.s.l) penetrated only the Bhuban Formation.

The Jenam Formation of the lower Barail Group is encountered only in the Atgram-1X well between 4712 m and 4968 m b.s.l. (Petrobangla, 1982), where it consists of indurated dark grey shale/silty shale. The Renji Formation (Barail Group) was intersected from 3975 m to 4712 m in Atgram-1X and from 4820 m to 4977 m in the Fenchuganj-2 well. This formation consists mainly of light to dark grey, fine to medium grained indurated sandstone with minor shale and siltstone. The base of the Barail Group was not intersected in these wells.

The Surma Group (Bhuban and Bokabil Formations) is unconformably overlain by the Tipam Sandstone Formation and is underlain by the Barail Group, and was intersected in the wells at 2720-3860 m (Rashidpur-1), 2220-4820 m (Fenchuganj-2), from the surface to 3438 m (Patharia-5), and from 1441-3975 m (Atgram-1X). Most of the well samples analyzed here are from the Surma Group. The Bhuban Formation, the lower part of the group, is composed mainly of sandstones, siltstones, shaly sandstones, and shales. The sandstones are grey, medium to fine grained (occasionally coarse grained), slightly calcareous, and hard and compact. The siltstone and shales are dark grey to black, and well indurated. The Bhuban Formation was intersected at 1010-2720 m in Rasidpur-1, 1180-2220 m in Fenchuganj-2, and 911-1441 m in Atgram-1X. The base of the Bhuban Formation was not intersected in the Rashidpur-1 and Patharia-5 wells. The overlying Bokabil Formation consists mainly of moderately indurated light grey shale, siltstone and sandstone.

The Tipam Group consists primarily of sandstones with thin interbeds of shale and siltstone. Only one sandstone sample was collected from this formation, in the Rashidpur-1 well, at a depth of 547.7 m below surface.

Positions of individual samples within the cores are listed in Appendix 2.

Analytical Methods

Indurated samples were chipped using a manual rock splitter to chip <10 mm in diameter. Unconsolidated samples needed no disaggregation. The chipped samples were then washed with running tap water to remove any loose surface material, and subsequently immersed in deionized distilled water for 24 hours. The latter treatment was also applied to the unconsolidated samples. After draining, the cleaned samples were then dried in an oven at 110℃ for several hours.

The oven-dried samples were subsequently crushed in a tungsten-carbide ring mill for 25 to 45 seconds. About 10 g of each powdered sample was then dried in a 110℃ oven for 24 hours before gravimetric determination of loss on ignition (LOI). LOI was estimated from the net wet loss after ignition in a muffle furnace at 1020℃ for at least 2 hours. The ignited materials were disaggregated by hand and gentle grinding in an agate mortar and pestle, and subsequently returned to a 110℃ oven for at least 24 hours. This ignited sample was then used for preparation of glass fusion beads for the X-ray fluorescence (XRF) analysis.

The XRF analyses of the major elements and 14 trace elements (Ba, Ce, Cr, Ga, Nb, Ni, Pb, Rb, Sc, Sr, Th, V, Y and Zr) were made using a Rigaku RIX 2000 instrument at Shimane University. Glass fusion beads were prepared in an automatic bead sampler (fusion 240 seconds, agitation 360 seconds), using an alkali flux (80% lithium tetraborate and 20% lithium metaborate), with a sample to flux ratio of 1:2, following the methods of Kimura and Yamada (1996). Additional description of the crushing procedures and XRF analysis are given by Roser et al. (1998, 2000, 2003).

Results

Major and trace element analyses of the Sylhet sandstones and mudrocks are listed in Tables 2 and 3, for the surface and subsurface samples respectively. The data are reported on a hydrous basis. LOI values were generally low, ranging from 1 to 6 wt%, but occasional higher values (>6) were observed, due mainly to authigenic carbonate contents.

Comparison of anhydrous-normalized average compositions for sandstones and mudrocks by formation with average Upper Continental Crust (UCC) shows the Sylhet sediments tend to have greater SiO_2 contents (Fig. 3). They also usually have greater contents of Pb, Zr, Th, and Ce than UCC, and the largely ferromagnesian elements in the segment Sc-V are progressively enriched. Conversely, the average compositions are strongly depleted in CaO, Na_2O, and Sr relative to UCC, and are depleted to a lesser degree

Table 2. Whole rock major (wt%) and trace element (ppm) analyses of outcrop samples from the Sylhet basin, Bangladesh (hydrous basis). SaNr = sample number; Lith = lithology (c, coarse; m, medium; f, fine; vf, very fine; sst, sandstone; zst, siltstone; mst, mudstone); LOI = loss on ignition. Astered* samples are pervasively weathered and hence mobile element concentrations may have been modified from original values.

SaNr	Lith	SiO_2	TiO_2	Al_2O_3	Fe_2O_3	MnO	MgO	CaO	Na_2O	K_2O	P_2O_5	LOI	Total	Ba	Ce	Cr	Ga	Nb	Ni	Pb	Rb	Sc	Sr	Th	V	Y	Zr
Dupitila Group																											
Dupitila Formation																											
Z-01	f sst	83.13	0.50	5.67	7.08	0.01	0.26	0.05	0.15	1.02	0.03	2.24	100.15	368	30	20	12	7	11	17	85	5.4	549	5.8	23	4	72
Z-02*	mst	69.92	1.04	16.19	3.37	0.03	0.99	0.12	0.20	2.64	0.04	4.93	99.48	479	116	102	21	20	70	30	135	17.2	68	18.7	140	40	289
Z-03*	mst	71.75	1.00	16.73	2.59	0.01	0.80	0.09	0.22	2.24	0.04	4.51	99.99	415	151	113	22	19	58	31	133	16.0	63	19.3	128	63	297
Z-04*	m-f sst	92.25	0.58	1.55	3.80	0.04	0.19	0.04	0.07	0.06	0.02	0.85	99.43	64	44	49	2	11	3	6	11	0.8	9	4.6	25	7	150
Z-05*	m sst	78.58	0.89	11.54	2.25	0.02	0.65	0.06	0.19	1.85	0.03	3.89	99.94	372	103	79	15	18	65	24	104	9.6	46	15.0	92	37	347
Z-06*	m-c sst	79.84	0.80	9.96	3.51	0.09	0.56	0.05	0.11	1.29	0.03	3.36	99.60	277	90	85	13	15	67	17	83	7.3	39	13.4	88	27	382
Z-07*	mst	73.48	0.83	12.19	7.16	0.08	0.54	0.07	0.14	1.71	0.16	3.85	100.20	359	82	99	16	18	34	23	104	12.8	47	16.5	99	28	364
Z-08*	f-m sst	82.00	0.76	7.82	5.05	0.05	0.33	0.04	0.09	1.15	0.11	2.43	99.84	251	127	105	10	15	18	18	65	9.1	35	18.3	69	27	789
Z-09*	f sst	76.81	0.87	12.20	3.64	0.05	0.60	0.09	0.11	1.83	0.05	3.45	99.70	378	90	79	16	18	40	19	108	13.2	58	16.3	98	28	380
Z-10	f-m sst	94.25	0.39	2.60	0.43	0.00	0.20	0.04	0.01	0.12	0.01	0.82	98.85	29	75	51	3	9	4	9	16	2.0	13	10.6	18	12	430
Z-11	c sst	82.93	0.29	8.74	2.28	0.04	0.50	0.50	0.69	1.80	0.03	1.74	99.55	354	47	26	10	7	12	18	87	4.2	84	9.9	26	16	119
Z-12	m-c sst	82.34	0.27	8.71	2.92	0.05	0.55	0.45	0.89	2.02	0.03	1.67	99.90	371	41	27	10	7	13	20	93	4.5	97	6.8	27	14	107
Z-13	c sst	80.73	0.31	9.75	3.07	0.04	0.55	0.55	1.01	1.94	0.03	1.86	99.83	375	43	34	11	8	19	20	98	6.0	101	8.3	45	11	117
Tipam Group																											
Girujan Clay Formation																											
Z-14	mst	63.10	0.90	19.04	6.06	0.03	1.76	0.46	0.34	3.30	0.06	4.80	99.84	571	104	122	26	19	110	33	181	17.6	88	19.8	155	46	186
Z-15	mst	68.29	0.98	15.73	6.18	0.09	1.05	0.25	0.37	2.22	0.05	4.37	99.59	377	98	141	20	19	69	31	121	16.2	72	17.1	136	34	315
Tipam Sandstone Formation																											
Z-16	f sst	66.15	0.78	13.63	9.47	0.06	1.52	0.33	0.52	2.37	0.17	4.29	99.29	478	79	95	19	15	46	26	125	13.8	66	13.7	120	36	220
Z-17	c-m sst	80.63	0.48	8.97	3.75	0.08	0.62	0.80	0.79	1.37	0.07	1.86	99.41	396	85	162	10	10	33	15	60	7.0	140	17.2	51	21	147
Z-18	mst	70.68	0.81	14.15	5.35	0.08	1.30	0.58	0.88	2.50	0.10	3.29	99.73	506	75	109	19	17	47	24	128	13.6	96	15.0	115	27	199
Z-19	f-m sst	77.76	0.61	10.31	3.68	0.31	0.97	0.90	1.04	1.84	0.07	2.05	99.55	396	72	85	13	12	49	18	103	9.2	120	15.1	64	23	275
Z-20	mst	60.32	1.02	17.38	8.26	0.13	2.34	0.85	0.64	3.17	0.13	5.02	99.26	535	85	135	24	21	76	32	156	19.9	105	19.8	157	32	213
Z-21	mst	62.13	1.06	18.92	7.39	0.04	1.55	0.30	0.33	2.59	0.13	5.35	99.79	467	102	132	24	22	69	39	131	18.9	89	20.1	159	32	263
Z-22	m-c sst	81.36	0.40	8.95	3.46	0.11	0.52	0.44	0.51	1.60	0.08	2.20	99.63	356	65	42	10	9	17	18	69	6.6	84	13.2	52	16	142
Z-23	m-c sst	80.09	0.53	8.99	4.00	0.08	0.56	0.52	0.69	1.55	0.07	1.97	99.06	347	87	90	11	10	37	14	74	9.6	98	16.9	60	26	208
Z-24	m-c sst	78.16	0.42	9.32	5.88	0.08	0.60	0.33	0.60	1.78	0.06	2.41	99.63	394	69	52	11	8	49	17	92	6.7	79	9.3	49	23	138
Z-25	c sst	83.53	0.33	7.97	2.68	0.06	0.42	0.24	0.27	1.64	0.04	1.89	99.08	363	64	39	9	7	16	19	72	6.0	68	9.0	34	20	132
Z-26	m-c sst	80.94	0.37	9.73	2.63	0.05	0.63	0.36	0.41	1.80	0.04	2.32	99.27	356	49	48	11	8	25	20	94	8.2	65	8.3	36	14	118
Z-27	m-f sst	77.52	0.52	9.89	4.10	0.07	1.24	1.01	1.17	2.07	0.07	1.54	99.20	357	70	76	12	12	39	25	116	8.0	102	15.6	63	22	231
Z-28	mst	63.39	0.90	17.50	6.07	0.04	2.22	0.69	0.78	3.38	0.16	4.47	99.61	490	81	143	24	19	69	32	173	19.2	98	20.6	147	32	196
Z-29	m-c sst	81.48	0.29	7.54	4.85	0.06	0.45	0.33	0.52	1.64	0.06	2.04	99.25	347	46	42	8	7	14	18	74	5.4	74	7.7	26	9	134
Surma Group																											
Bokabil Formation																											
Z-30	mst	62.05	0.95	16.55	6.83	0.09	2.53	1.30	0.69	3.03	0.14	5.34	99.50	468	91	131	22	20	74	27	155	19.1	100	19.6	132	31	227
Z-31	mst	64.95	0.82	14.06	6.02	0.09	2.19	1.75	1.00	2.78	0.13	4.70	98.48	435	77	113	18	17	64	24	136	13.8	103	17.4	104	26	238
Z-33	mst	64.92	0.89	16.05	7.69	0.28	1.50	0.34	0.48	2.95	0.14	4.33	99.57	520	111	113	21	19	66	36	156	16.5	75	21.3	124	33	276
Z-34	mst	67.47	0.86	15.12	7.32	0.04	1.37	0.17	0.23	2.32	0.14	4.62	99.66	409	102	129	19	18	57	27	125	15.0	56	19.1	122	44	326
Z-35	mst	59.50	0.91	17.00	7.25	0.13	2.63	1.92	0.75	3.26	0.16	6.11	99.61	469	85	133	23	19	74	32	163	18.4	112	18.7	141	31	203
Z-36	zst	72.04	0.67	11.89	4.94	0.05	1.60	1.43	1.07	2.36	0.10	3.12	99.26	407	69	96	15	14	46	19	119	10.5	111	13.7	81	22	227
Z-37	zst	63.57	0.63	9.48	4.82	0.81	1.43	7.24	0.85	1.92	0.09	7.66	98.51	346	78	86	12	13	42	17	93	10.1	128	13.6	72	31	234
Z-38	m-c sst	79.55	0.42	9.07	4.20	0.08	0.82	0.73	0.94	1.73	0.09	1.89	99.53	320	64	63	11	8	31	21	83	9.7	105	9.1	52	36	159
Bhuban Formation																											
Z-39	mst	62.44	0.94	17.11	7.47	0.14	2.22	0.78	0.75	3.17	0.12	4.42	99.56	491	87	139	23	19	76	30	158	17.4	97	21.1	146	30	273
Z-40	mst	62.88	0.94	18.15	7.04	0.09	2.03	0.35	0.55	3.00	0.09	4.68	99.82	533	94	130	24	20	75	33	150	18.6	82	19.1	140	35	230
Z-41	mst	66.77	0.83	15.78	6.45	0.09	1.73	0.43	0.84	2.74	0.10	3.76	99.53	505	91	112	20	17	67	27	141	16.6	83	17.1	115	32	222
Z-42	zst	70.68	0.74	11.98	4.80	0.07	1.71	1.62	1.41	2.31	0.14	3.34	98.79	401	78	94	15	15	45	19	113	12.4	116	16.0	84	27	289
Z-43	mst	62.47	0.82	15.62	6.96	0.11	2.48	1.58	1.17	2.99	0.14	4.78	99.11	485	83	121	21	17	68	27	150	17.5	111	17.2	114	28	215
Z-44	mst	63.26	0.82	15.35	6.42	0.08	2.37	1.56	1.21	2.91	0.13	4.63	98.73	463	79	113	20	17	64	27	145	18.3	114	18.8	125	27	228
Z-45	mst	63.91	0.80	15.33	6.38	0.08	2.37	1.68	1.21	2.89	0.13	4.66	99.43	460	77	-4	20	17	64	25	146	19.0	115	16.2	125	25	206
Z-47*	zst	73.33	0.75	13.80	4.24	0.02	0.92	0.17	0.09	2.22	0.08	3.85	99.47	416	89	73	16	17	35	17	114	12.0	37	18.7	96	28	309
Z-48*	mst	72.02	0.71	14.09	5.08	0.02	1.12	0.14	0.08	2.17	0.08	4.04	99.56	401	78	81	17	16	52	22	117	11.3	35	16.2	85	26	278
Barail Group																											
Renji Formation																											
Z-49*	f sst	75.18	0.63	11.31	6.41	0.05	0.43	0.06	0.01	1.39	0.05	3.92	99.44	291	48	61	14	14	30	14	74	9.7	33	15.3	71	16	267
Z-50*	f sst	76.90	0.74	11.73	4.71	0.00	0.55	0.04	0.07	1.41	0.04	3.59	99.77	232	66	69	14	15	17	14	78	11.6	55	12.1	104	19	237
Z-51*	c sst	88.71	0.52	4.74	2.59	0.00	0.25	0.04	0.00	0.48	0.02	1.57	98.93	95	56	35	6	9	8	7	33	6.4	26	8.4	51	14	182
Z-52*	m-f sst	74.19	1.10	14.08	2.80	0.00	0.77	0.04	0.04	1.82	0.06	4.63	99.53	274	146	107	18	21	24	18	101	14.8	89	22.8	131	44	634
Z-53*	mst	69.79	1.21	16.73	2.81	0.00	0.82	0.04	0.13	2.33	0.07	5.41	99.35	320	137	117	23	24	27	15	126	17.6	112	20.1	158	41	441
Z-54*	m-f sst	87.62	0.67	5.85	1.66	0.00	0.26	0.04	0.03	0.66	0.03	1.76	98.57	131	146	54	7	12	1	10	40	8.1	44	26.3	60	23	831
Z-55*	mst	62.40	1.12	16.78	6.02	0.01	1.24	0.05	0.46	2.84	0.07	8.44	99.44	392	93	108	24	23	29	20	143	18.2	101	15.4	154	31	224
Z-56*	m-f sst	86.92	0.62	6.15	2.23	0.00	0.36	0.04	0.03	0.82	0.02	1.85	99.03	165	75	48	7	12	14	10	47	3.9	45	12.2	55	18	368
Z-57*	mst	62.11	1.20	17.70	5.88	0.01	1.21	0.05	0.29	3.10	0.06	8.12	99.72	421	98	114	26	25	28	16	157	18.7	104	16.1	173	33	234
Z-58*	m-f sst	86.43	0.68	5.54	3.75	0.00	0.28	0.04	0.02	0.58	0.03	2.06	99.41	108	87	63	7	12	7	7	38	6.4	29	14.8	57	20	606
Z-59*	mst	68.81	1.16	16.06	4.63	0.54	0.67	0.05	0.14	2.20	0.10	4.90	99.26	326	134	107	20	23	21	37	112	16.9	105	22.1	147	29	511
Z-60*	m-f sst	90.73	0.85	3.35	2.03	0.01	0.29	0.04	0.00	0.32	0.03	1.23	98.88	66	119	71	4	13	8	5	25	4.4	18	17.6	44	18	631
Z-61*	mst	67.01	1.19	15.43	7.85	0.00	0.65	0.05	0.10	2.05	0.07	5.04	99.44	314	105	119	20	23	26	26	103	16.1	89	20.4	161	34	406
Z-62*	m-c sst	74.81	0.91	11.48	6.14	0.00	0.53	0.06	0.09	1.46	0.05	3.80	99.33	243	89	89	14	18	25	18	79	12.5	66	14.6	113	25	314
Z-63*	m-f sst	88.61	0.51	4.43	2.69	0.05	0.47	0.05	0.05	0.62	0.07	1.36	98.92	123	66	38	5	10	11	5	35	5.5	24	10.3	42	13	366
Z-64*	m-c sst	89.72	0.62	3.21	2.82	0.02	0.43	0.05	0.00	0.37	0.05	1.18	98.47	86	95	49	3	11	11	6	23	4.4	20	15.6	38	18	686
Z-65*	m-c sst	65.92	0.42	4.40	20.62	0.55	0.62	0.29	0.37	0.66	0.75	4.34	98.94	206	75	49	6	7	22	11	35	11.2	31	10.2	90	62	282
Z-66*	f sst	78.38	1.10	12.55	1.96	0.00	0.41	0.05	0.08	1.13	0.04	3.82	99.52	186	120	97	15	23	24	23	68	11.9	75	18.4	111	31	565
Z-67*	m-f sst	88.80	0.50	4.60	2.80	0.00	0.24	0.04	0.03	0.35	0.05	1.67	99.08	82	65	38	5	9	15	12	26	8.5	28	9.9	67	13	203
Z-68*	mst	59.98	1.23	19.45	8.95	0.00	0.91	0.05	0.16	2.66	0.06	6.25	99.71	328	101	136	27	25	34	25	135	19.8	91	21.4	193	31	323
Z-69*	f sst	78.15	0.92	10.29	4.83	0.03	0.63	0.08	0.08	1.25	0.07	3.24	99.58	205	97	84	13	18	29	18	68	10.2	48	16.9	107	26	549
Jaintia Group																											
Kopili Shale Formation																											
Z-70*	mst	58.29	1.14	17.37	6.64	0.03	1.26	0.04	0.14	2.88	0.08	10.97	98.84	364	99	114	24	25	43	9	151	22.1	101	16.7	165	30	210
Z-71*	mst	71.33	1.11	14.83	4.02	0.01	1.08	0.05	0.18	2.14	0.05	4.49	99.29	332	132	106	19	23	50	25	116	14.2	89	21.2	143	43	588
Z-72*	mst	69.40	0.98	13.37	6.43	0.02	1.02	0.09	0.26	1.95	0.12	5.57	99.20	297	102	105	18	20	33	17	104	15.1	87	17.9	135	29	384
Z-73*	mst	51.46	1.13	21.90	11.84	0.01	2.08	0.55	0.07	3.14	0.14	7.29	99.61	274	131	171	31	21	77	36	172	23.9	170	18.7	318	28	206
Z-74*	mst	56.92	1.19	18.99	9.12	0.09	1.66	0.57	0.20	2.49	0.20	7.72	99.16	246	105	144	25	26	63	19	145	23.8	166	18.4	207	32	231

Table 3. Whole rock major (wt%) and trace element (ppm) analyses of core samples from the Sylhet basin, Bangladesh (hydrous basis). SaNr = sample number; Lith = lithology (c, coarse; m, medium; f, fine; vf, very fine; sst, sandstone; zst, siltstone; mst, mudstone); LOI = loss on ignition.

SaNr	Lith	SiO_2	TiO_2	Al_2O_3	Fe_2O_3	MnO	MgO	CaO	Na_2O	K_2O	P_2O_5	LOI	Total	Ba	Ce	Cr	Ga	Nb	Ni	Pb	Rb	Sc	Sr	Th	V	Y	Zr
Tipam Group																											
Tipam Sandstone Formation																											
ZH-120	f sst	81.41	0.32	8.21	2.97	0.08	0.55	0.86	1.35	1.94	0.04	1.34	99.06	384	46	39	9	7	19	62	78	6.8	123	8.3	37	12	134
Surma Group																											
Bokabil Formation																											
Upper Bokabil Formation																											
ZH-121	mst	55.11	0.82	15.09	6.95	0.13	2.64	5.02	1.13	3.25	0.17	8.54	98.86	467	86	137	21	15	77	27	139	15.8	147	17.1	125	27	200
ZH-122	mst	60.69	0.84	16.33	6.97	0.09	2.66	1.90	1.35	3.18	0.14	5.53	99.68	550	98	143	17	16	71	29	141	17.8	142	22.0	147	30	247
ZH-123	mst	62.03	0.82	14.48	6.36	0.09	2.75	2.70	1.35	2.94	0.13	5.78	99.44	472	97	145	17	16	77	25	128	15.7	140	19.7	123	29	279
ZH-124	mst	62.88	0.80	15.67	6.42	0.10	2.27	1.85	1.60	3.27	0.15	4.78	99.80	472	91	113	20	16	50	30	152	13.5	150	18.6	125	28	207
ZH-125	mst	63.35	0.82	16.00	6.12	0.08	2.24	1.71	1.67	3.29	0.15	4.57	100.01	473	89	117	22	15	50	29	155	14.8	151	17.8	129	28	214
ZH-126	mst	61.57	0.82	16.23	6.74	0.10	2.38	1.77	1.53	3.40	0.16	5.01	99.71	494	91	119	18	15	53	31	157	15.2	147	20.0	139	28	198
ZH-127	mst	62.86	0.83	15.47	6.44	0.09	2.30	1.97	1.50	3.17	0.17	4.76	99.57	468	90	111	15	16	54	28	147	14.5	147	22.0	139	28	232
Middle Bokabil Formation																											
ZH-128	mst	60.02	0.86	17.55	7.26	0.11	2.64	1.29	1.46	3.56	0.13	5.05	99.95	524	88	142	20	16	68	32	166	19.3	144	20.9	156	29	192
ZH-129	zst	63.10	0.85	15.73	6.72	0.10	2.38	1.54	1.52	3.17	0.16	4.59	99.85	470	106	136	22	16	60	28	144	15.4	145	18.8	134	30	297
ZH-130	f sst	66.78	0.76	13.79	6.08	0.10	2.13	1.76	1.54	2.80	0.15	4.06	99.97	444	84	106	18	14	53	24	133	15.4	143	15.7	115	27	254
Lower Bokabil Formation																											
ZH-47	f sst	73.16	0.75	12.39	4.62	0.06	1.49	0.67	1.44	2.34	0.12	2.77	99.82	384	82	93	15	14	42	23	112	11.9	108	15.8	84	27	292
ZH-48	f sst	76.72	0.51	10.75	3.54	0.04	1.14	0.61	1.34	2.24	0.07	2.09	99.06	377	59	60	12	10	35	20	99	7.1	119	10.9	71	15	176
ZH-49	vf sst	71.14	0.81	13.25	5.26	0.07	1.68	0.68	1.45	2.46	0.13	3.06	99.99	390	92	100	16	14	48	21	118	13.1	112	17.8	97	29	328
ZH-50	f sst	69.85	0.76	13.40	5.78	0.07	1.87	0.64	1.60	2.59	0.11	3.20	99.87	417	72	102	17	13	51	21	126	11.0	111	14.0	98	25	234
ZH-51	f sst	68.73	0.83	13.89	5.96	0.08	1.88	0.67	1.61	2.63	0.13	3.42	99.83	410	84	105	18	15	51	23	129	13.2	116	16.7	111	27	281
ZH-52	zst	67.54	0.81	14.42	6.34	0.08	2.03	0.62	1.61	2.75	0.11	3.59	99.91	424	77	103	19	16	56	23	137	11.6	112	15.3	111	26	245
ZH-53	m sst	77.56	0.64	9.79	3.70	0.05	1.08	0.69	1.47	1.98	0.10	1.76	98.84	338	76	87	11	10	36	17	89	7.8	110	14.3	66	22	345
ZH-54	f sst	71.50	0.73	12.73	5.30	0.07	1.63	0.67	1.56	2.47	0.11	3.00	99.77	401	78	81	16	13	49	21	118	12.4	110	14.8	95	25	234
ZH-55	mst	66.73	0.83	14.74	6.15	0.08	2.01	0.66	1.68	2.86	0.11	3.92	99.77	432	83	101	20	14	61	25	139	15.8	117	15.9	127	26	239
ZH-56	zst	67.05	0.83	14.43	6.28	0.09	2.01	0.86	1.60	2.77	0.13	3.89	99.94	422	76	110	18	15	56	23	135	13.7	121	17.6	111	29	250
ZH-131	f sst	69.42	0.63	11.18	4.91	0.06	2.06	2.86	1.56	2.49	0.11	4.52	99.80	418	68	106	12	12	66	22	117	12.6	124	15.8	77	24	257
ZH-132	f sst	65.52	0.81	14.89	6.20	0.09	2.08	1.23	1.43	3.06	0.13	4.32	99.76	446	95	130	14	15	58	26	142	13.4	133	22.2	128	28	263
ZH-133	mst	60.76	0.89	17.43	6.73	0.08	2.42	1.18	1.52	3.88	0.12	4.90	99.91	562	97	146	18	17	60	36	183	17.2	128	24.9	147	27	203
Bhuban Formation																											
Upper Bhuban Formation																											
ZH-57	f sst	83.67	0.54	8.16	2.09	0.03	0.68	0.56	1.30	1.52	0.07	1.29	99.91	266	76	91	9	11	24	14	65	6.4	95	14.2	49	21	314
ZH-58	f sst	80.83	0.41	7.83	3.49	0.15	0.78	0.62	1.31	1.57	0.07	2.11	99.17	281	57	66	7	8	21	17	65	6.8	99	11.0	39	16	211
ZH-59	mst	61.17	0.91	17.80	7.19	0.09	2.34	0.93	1.35	3.46	0.14	5.04	100.40	460	81	135	22	15	77	32	166	16.3	131	21.0	159	27	189
ZH-60	mst	57.66	0.86	17.52	7.16	0.08	3.16	1.83	1.28	3.72	0.14	6.40	99.81	505	73	117	24	15	69	33	181	17.3	119	17.9	133	27	182
ZH-61	mst	56.40	0.90	18.57	7.34	0.07	3.24	1.65	1.25	3.93	0.11	6.50	99.95	495	78	125	26	16	72	33	192	20.1	118	19.1	148	26	179
ZH-62	mst	56.94	0.89	17.89	6.89	0.07	3.20	1.83	1.25	3.82	0.12	6.52	99.42	494	83	119	24	15	70	31	183	18.0	118	19.0	138	26	184
ZH-63	vf sst	66.56	0.71	12.24	5.20	0.09	2.49	2.41	1.36	2.58	0.13	5.50	99.25	605	70	86	15	12	43	21	116	11.9	106	14.7	84	27	242
ZH-64	f sst	66.91	0.68	11.98	4.98	0.09	2.43	2.77	1.33	2.55	0.12	5.63	99.47	475	70	85	16	13	39	18	117	13.2	125	15.1	83	25	246
ZH-65	f sst	70.62	0.57	10.07	4.38	0.10	2.00	3.12	1.37	2.15	0.11	4.76	99.26	414	63	67	12	10	38	19	95	9.3	140	13.2	56	21	234
ZH-66	zst	61.89	0.78	14.70	5.98	0.08	2.89	2.36	1.32	3.19	0.12	6.15	99.46	472	77	101	20	14	53	29	149	12.9	107	16.4	109	25	215
Middle Bhuban Formation																											
ZH-67	f sst	59.83	0.69	11.65	4.90	0.08	3.78	5.37	1.30	2.51	0.12	8.93	99.18	355	73	85	15	12	42	19	106	11.6	126	14.7	79	27	248
ZH-68	mst	57.41	0.89	17.52	7.20	0.08	3.16	1.84	1.21	3.75	0.12	6.37	99.54	487	85	119	22	15	65	29	179	16.9	122	21.6	137	27	193
ZH-69	m sst	77.03	0.53	10.41	4.09	0.15	1.13	0.63	1.75	1.96	0.08	1.62	99.39	428	53	67	11	10	36	24	87	6.2	139	12.8	65	17	198
ZH-70	f sst	68.05	0.57	10.22	4.48	0.06	2.64	3.35	1.37	2.21	0.14	5.82	98.91	389	65	69	11	11	40	16	95	9.7	111	13.5	68	22	220
ZH-71	zst	59.21	0.70	12.24	5.25	0.08	3.89	4.85	1.36	2.71	0.12	8.69	99.08	426	73	83	14	13	46	18	115	10.7	114	16.6	87	24	240
ZH-72	f sst	69.15	0.81	13.21	5.18	0.08	1.92	1.24	1.52	2.40	0.12	3.66	99.29	430	89	96	16	15	45	22	115	11.9	138	18.6	90	28	324
ZH-73	mst	55.82	0.81	14.19	6.10	0.08	4.86	5.72	1.26	3.13	0.13	7.09	99.19	397	77	104	18	15	53	25	133	13.1	124	17.0	108	26	221
ZH-74	m sst	78.36	0.34	10.18	3.80	0.03	1.04	0.60	1.80	1.94	0.05	1.51	99.66	459	37	51	10	6	29	22	83	8.1	143	8.4	45	13	106
ZH-75	m sst	63.99	0.65	8.15	3.70	0.37	1.44	8.67	1.21	1.63	0.11	8.53	98.43	258	81	61	9	11	24	20	70	11.9	312	16.5	54	28	325
ZH-76	m sst	74.58	0.56	10.73	4.96	0.06	1.67	0.85	1.40	2.19	0.12	2.62	99.72	453	57	64	14	10	43	22	107	10.0	93	10.6	68	19	169
ZH-77	zst	64.98	0.78	15.06	6.43	0.06	2.38	1.05	1.39	3.09	0.13	4.17	99.52	759	72	100	18	15	57	27	153	13.5	110	17.4	109	25	219
ZH-78	m sst	79.00	0.73	8.75	3.62	0.05	1.13	0.92	1.40	1.58	0.13	1.97	99.28	553	95	86	11	13	24	17	68	6.9	88	18.6	62	28	383
ZH-79	zst	67.36	0.80	14.85	6.36	0.07	2.00	0.57	1.76	2.74	0.13	3.15	99.78	508	75	103	19	16	60	21	137	12.0	130	16.3	108	27	215
ZH-80	zst	67.24	0.84	14.74	6.59	0.08	2.08	0.59	1.74	2.75	0.14	3.20	99.98	455	79	101	20	14	62	23	140	17.0	129	17.0	109	27	243
ZH-81	f sst	71.19	0.68	9.97	3.86	0.33	1.14	3.97	1.65	1.86	0.12	4.46	99.23	318	79	65	11	12	27	14	82	9.6	280	16.3	70	28	290
ZH-82	f sst	72.75	0.71	10.86	4.19	0.12	1.27	2.26	1.79	2.02	0.11	3.13	99.20	365	79	83	12	12	32	17	91	9.2	147	17.7	72	29	300
ZH-83	mst	58.52	0.89	18.40	6.94	0.07	2.72	1.21	1.38	3.77	0.13	5.59	99.62	523	82	128	23	16	77	29	174	18.6	136	19.4	140	26	193
ZH-84	f sst	68.24	0.77	14.23	6.25	0.06	1.87	0.58	1.68	2.59	0.11	3.10	99.48	597	78	95	18	13	54	28	127	12.1	137	16.8	112	26	249
ZH-85	f sst	77.76	0.58	10.50	4.02	0.04	1.15	0.63	1.72	1.84	0.10	1.84	100.19	400	68	65	13	11	31	17	83	7.1	129	11.8	59	20	211
ZH-86	f sst	72.97	0.61	11.69	5.80	0.06	1.61	0.59	1.79	2.19	0.09	2.40	99.79	637	57	70	15	12	50	24	106	8.9	127	11.6	89	19	187
ZH-87	f sst	70.35	0.77	13.02	6.33	0.05	1.76	0.55	1.77	2.40	0.11	2.63	99.74	433	82	95	17	14	44	22	114	11.0	119	15.0	92	24	282
ZH-88	mst	59.70	0.95	18.50	7.71	0.12	2.52	0.66	1.41	3.33	0.15	4.91	99.95	473	78	144	21	16	83	30	174	19.3	155	21.3	159	27	180
ZH-89	mst	59.81	0.97	18.43	7.70	0.09	2.56	0.60	1.47	3.36	0.16	4.80	99.94	496	82	138	25	16	83	28	171	19.0	153	17.1	161	26	185
ZH-90	mst	61.86	0.93	17.33	7.49	0.09	2.42	0.61	1.55	3.09	0.15	4.36	99.88	464	78	126	17	15	76	27	156	20.8	148	21.4	148	28	192
ZH-91	mst	61.05	0.95	16.92	7.61	0.15	2.41	1.02	1.52	3.06	0.17	4.79	99.66	474	80	133	22	16	76	27	155	17.0	161	17.8	137	30	207
ZH-92	mst	58.89	0.98	18.85	7.87	0.10	2.63	0.54	1.43	3.45	0.15	4.94	99.82	476	83	144	25	16	84	29	175	18.9	151	17.7	169	27	185
ZH-93	mst	58.53	0.99	19.14	7.73	0.08	2.61	0.51	1.44	3.56	0.14	4.97	99.69	550	76	145	21	17	89	30	183	17.7	150	21.1	167	25	183
ZH-94	mst	59.79	0.96	18.60	7.58	0.09	2.52	0.53	1.47	3.40	0.14	4.75	99.81	484	82	135	21	16	86	30	175	19.1	151	21.3	163	25	182
ZH-95	f sst	76.35	0.62	10.46	3.94	0.05	1.25	0.99	1.88	1.94	0.09	1.72	99.30	342	72	88	13	10	33	15	84	8.5	144	14.6	72	22	263
ZH-96	f sst	66.89	0.65	12.06	5.09	0.14	1.78	3.40	1.32	2.27	0.12	5.32	99.05	376	71	88	12	11	44	23	103	11.3	204	17.2	82	25	208
ZH-97	mst	61.62	0.84	16.27	6.62	0.10	2.51	1.65	1.39	3.16	0.14	5.37	99.67	448	80	115	23	15	67	27	145	14.8	134	16.9	124	28	204
ZH-98	f sst	76.22	0.44	9.96	3.80	0.05	1.28	1.12	1.75	1.75	0.08	2.23	98.68	368	55	64	8	9	49	15	80	5.3	125	12.0	50	18	143
ZH-99	mst	64.12	0.77	14.66	5.96	0.09	2.20	1.99	1.71	2.99	0.12	5.15	99.77	875	86	125	18	14	58	28	132	14.7	147	18.1	117	28	239
ZH-100	f sst	76.39	0.77	10.56	4.24	0.06	1.24	1.07	2.25	1.96	0.10	1.87	100.50	356	124	132	11	13	32	15	83	10.4	142	21.5	82	31	538
Lower Bhuban Formation																											
ZH-13	c sst	75.57	0.50	9.62	3.79	0.09	1.39	2.10	1.34	1.79	0.20	3.46	99.86	419	68	67	11	8	25	18	81	7.5	136	13.3	63	24	206
ZH-14	mst	59.20	0.87	18.08	7.48	0.12	2.73	1.04	1.41	3.47	0.15	5.41	99.96	472	79	132	23	16	76	32	168	17.9	118	18.1	142	26	173
ZH-15	mst	58.86	0.87	17.74	7.45	0.15	2.76	1.50	1.49	3.41	0.15	5.66	100.02	467	74	120	23	15	72	32	163	17.5	123	18.3	145	27	177
ZH-16	mst	58.71	0.86	17.30	7.23	0.18	2.71	2.03	1.53	3.28	0.16	5.98	99.96	443	81	127	23	15	69	31	157	17.6	121	17.2	146	31	180
ZH-17	f sst	76.64	0.60	10.32	2.96	0.05	1.09	1.13	2.11	2.12	0.10	2.52	99.63	361	87	88	11	10	26	16	86	9.1	93	15.3	67	24	315
ZH-18	f sst	74.39	0.62	11.26	3.57	0.05	1.42	1.21	1.62	2.21	0.11	2.90	99.34	382	75	72	13	9	32	19	92	10.3	96	13.7	70	22	258
ZH-19	mst	60.71	0.85	17.33	6.77	0.08	2.63	1.29	1.60	3.40	0.13	5.06	99.85	445	79	112	21	17	60	29	160	16.2	116	19.8	128	29	189
ZH-20	mst	61.23	0.81	16.74	6.92	0.08	2.65	1.48	1.59	3.33	0.13	4.98	99.95	455	76	110	22	16	60	30	158	16.0	122	17.7	123	27	187

Table 3 (ctd). Whole rock major (wt%) and trace element (ppm) analyses of core samples from the Sylhet basin, Bangladesh (hydrous basis).

SaNr	Lith	SiO_2	TiO_2	Al_2O_3	Fe_2O_3	MnO	MgO	CaO	Na_2O	K_2O	P_2O_5	LOI	Total	Ba	Ce	Cr	Ga	Nb	Ni	Pb	Rb	Sc	Sr	Th	V	Y	Zr
Bhuban Formation (ctd)																											
Lower Bhuban Formation (ctd)																											
ZH-21	mst	61.11	0.83	17.21	6.64	0.08	2.62	1.34	1.63	3.39	0.14	5.00	99.98	451	78	110	22	15	60	28	162	16.6	122	18.5	123	27	187
ZH-22	mst	61.49	0.84	17.14	6.42	0.08	2.58	1.38	1.56	3.39	0.14	4.92	99.94	464	80	108	21	16	59	30	162	18.4	120	19.1	129	26	191
ZH-23	f sst	77.63	0.50	9.95	3.47	0.04	1.23	0.84	1.78	2.11	0.10	1.76	99.41	397	67	55	11	11	26	21	96	8.8	120	13.2	56	16	242
ZH-24	c sst	51.28	0.22	5.04	4.41	0.44	1.08	18.32	0.83	1.18	0.06	13.60	96.46	188	33	18	5	4	13	10	38	6.4	195	4.7	12	9	70
ZH-25	mst	58.55	0.94	18.82	8.02	0.12	2.76	0.57	1.68	3.47	0.14	5.06	100.15	502	78	145	23	16	99	32	170	19.4	134	19.3	159	28	182
ZH-26	mst	58.32	0.85	18.31	7.34	0.10	2.89	1.35	1.55	3.64	0.14	5.48	99.96	481	77	119	24	15	70	32	175	19.9	117	18.2	140	26	167
ZH-27	zst	65.87	0.86	15.52	6.43	0.06	2.27	0.60	1.72	2.84	0.13	3.66	99.96	487	75	127	18	15	76	25	136	14.1	131	17.6	127	25	217
ZH-28	m sst	76.58	0.61	9.72	3.94	0.05	1.45	1.38	1.42	1.87	0.09	2.26	99.37	478	70	82	9	11	39	16	83	8.6	142	17.2	72	22	241
ZH-29	m sst	74.94	0.46	9.50	4.09	0.05	1.22	0.79	1.58	1.77	0.07	5.20	99.67	337	45	74	12	8	43	12	73	7.9	132	7.9	52	13	145
ZH-30	mst	58.71	0.96	20.09	8.66	0.06	3.09	0.42	1.47	3.78	0.10	2.58	99.94	593	74	152	28	17	103	29	187	22.8	128	17.7	182	25	183
ZH-31	m sst	79.76	0.47	9.40	3.46	0.03	1.01	0.61	1.63	1.70	0.06	1.92	100.05	323	45	78	11	8	34	14	69	7.3	133	8.7	53	12	163
ZH-32	mst	59.00	0.97	18.27	7.73	0.10	2.71	0.85	1.64	3.47	0.17	5.05	99.94	518	81	128	25	16	81	33	170	17.8	134	18.7	157	29	198
ZH-33	mst	60.28	0.89	17.43	7.33	0.13	2.53	1.29	1.74	3.34	0.17	4.94	100.08	487	79	113	22	15	74	31	162	18.4	131	19.0	127	30	193
ZH-34	mst	58.73	0.96	18.52	7.77	0.10	2.68	0.82	1.62	3.57	0.16	5.02	99.95	554	80	125	23	17	83	37	176	19.4	134	21.1	149	30	192
ZH-35	mst	59.11	0.93	19.15	7.57	0.09	2.71	0.48	1.46	3.50	0.12	4.91	100.04	502	82	145	26	16	100	31	175	17.6	142	17.0	157	26	180
ZH-36	mst	60.29	0.87	17.80	7.41	0.10	2.53	0.89	1.80	3.44	0.16	4.74	100.02	512	74	117	22	16	73	33	168	18.0	129	19.4	141	27	179
ZH-37	f sst	67.34	0.78	12.77	5.27	0.06	2.16	2.35	1.96	2.58	0.17	4.15	99.58	411	86	84	16	13	38	21	122	11.6	136	17.9	94	30	274
ZH-38	f sst	73.26	0.67	11.40	4.53	0.07	1.58	1.20	2.00	1.98	0.12	2.89	99.69	361	67	82	14	10	44	15	89	9.6	118	13.4	81	24	238
ZH-39	mst	61.41	0.91	18.21	7.40	0.07	2.78	0.85	1.81	3.63	0.12	2.93	100.12	382	67	83	16	11	55	18	107	9.9	115	13.6	83	20	202
ZH-40	vf sst	70.81	0.21	11.93	2.86	0.07	0.19	1.27	2.98	4.74	0.01	4.58	99.64	523	76	126	22	16	77	29	170	18.5	132	19.2	135	24	217
ZH-41	c sst	73.27	0.69	12.60	5.31	0.07	1.81	1.21	2.03	2.26	0.11	0.32	99.68	726	108	-1	22	17	-1	21	160	10.2	91	17.2	-3	60	341
ZH-42	mst	60.30	0.67	15.34	6.58	0.10	3.48	6.11	3.40	1.46	0.11	3.15	100.71	364	68	88	13	12	52	17	104	8.9	124	15.2	88	21	217
ZH-43	mst	60.72	0.88	17.99	7.18	0.07	2.66	0.76	1.57	3.61	0.12	4.41	99.98	520	77	124	23	15	73	32	177	17.8	134	19.1	140	23	207
ZH-01	mst	63.93	0.78	15.89	6.80	0.13	2.17	1.07	1.41	3.34	0.19	4.58	100.29	500	80	98	22	15	44	28	156	15.0	106	15.9	117	32	209
ZH-02	mst	62.98	0.78	16.59	6.74	0.09	2.23	0.95	1.56	3.53	0.14	4.55	100.15	521	80	86	23	15	49	31	165	14.5	102	16.6	133	26	203
ZH-03	mst	63.43	0.80	16.54	6.52	0.10	2.20	1.01	1.34	3.52	0.14	4.61	100.20	523	75	92	23	15	47	31	165	14.4	102	17.5	126	25	206
ZH-04	mst	62.06	0.80	17.19	6.88	0.10	2.30	0.97	1.36	3.73	0.14	4.73	100.24	538	80	91	24	15	54	32	175	17.6	101	16.9	128	26	198
ZH-05	mst	61.46	0.81	17.35	6.87	0.10	2.29	0.97	1.43	3.73	0.14	4.81	99.96	535	78	100	24	14	52	33	174	17.1	102	17.2	133	26	200
ZH-06	mst	61.73	0.82	16.93	7.23	0.14	2.28	1.07	1.35	3.56	0.18	4.90	100.19	544	82	100	23	14	52	31	166	16.8	110	17.3	132	32	204
ZH-07	mst	60.43	0.84	17.92	7.39	0.11	2.39	0.92	1.25	3.84	0.14	4.95	100.19	561	76	102	24	15	57	34	180	16.6	108	17.3	140	27	192
ZH-08	mst	60.02	0.84	17.96	7.55	0.12	2.41	0.92	1.27	3.76	0.16	5.08	100.09	533	78	100	25	15	59	30	175	20.0	111	17.3	140	28	193
ZH-09	mst	62.74	0.80	16.51	6.78	0.11	2.21	1.11	1.29	3.50	0.14	4.75	99.93	527	82	92	21	15	48	30	163	16.4	104	17.9	121	28	205
ZH-101	zst	64.01	0.82	16.43	6.50	0.06	2.25	0.76	1.79	3.27	0.14	4.08	100.12	503	101	123	22	15	62	31	150	18.6	124	17.8	129	29	257
ZH-102	mst	61.67	0.84	17.36	6.98	0.08	2.48	0.78	1.73	3.67	0.13	4.42	100.14	553	86	131	22	16	67	31	169	18.2	131	18.4	139	28	211
ZH-103	mst	64.62	0.79	15.84	6.42	0.08	2.26	0.85	1.79	3.22	0.14	3.96	99.99	488	87	121	21	15	57	27	148	15.6	124	16.6	124	29	215
ZH-104	m sst	75.36	0.48	8.46	3.66	0.22	0.92	3.11	1.59	1.63	0.08	3.61	99.12	310	78	79	6	9	26	20	67	6.0	171	15.7	51	27	239
ZH-105	f sst	77.52	0.69	9.52	4.45	0.07	1.09	0.77	1.86	1.77	0.09	1.76	99.60	360	118	115	12	13	27	13	73	9.8	107	20.5	81	28	433
ZH-106	m sst	68.09	0.73	14.00	5.78	0.06	2.14	0.98	1.48	2.74	0.12	3.57	99.70	474	80	128	18	13	60	24	131	14.9	113	16.8	115	28	239
ZH-107	f sst	70.76	0.68	12.76	5.32	0.06	1.87	0.90	1.93	2.39	0.12	3.11	99.90	524	79	118	17	12	51	20	106	13.6	110	13.2	93	26	235
ZH-108	m sst	78.03	0.47	9.69	3.60	0.05	1.09	0.73	2.66	1.69	0.08	1.79	99.87	354	67	93	10	8	45	16	73	7.8	105	11.6	61	20	172
ZH-109	c sst	76.53	0.48	10.48	4.24	0.05	1.33	0.74	2.02	1.85	0.10	2.21	100.04	410	58	93	14	10	69	32	81	9.7	109	8.7	70	19	144
ZH-110	f sst	77.52	0.50	9.75	3.49	0.05	1.11	0.97	1.95	1.73	0.08	2.08	99.25	428	64	92	9	9	41	16	77	8.8	110	13.5	56	22	202
ZH-111	f sst	72.27	0.65	11.90	5.27	0.06	1.86	0.76	1.91	2.24	0.11	2.82	99.85	379	83	106	16	12	67	23	104	12.5	100	13.2	88	25	228
ZH-112	m sst	72.72	0.66	11.74	5.13	0.05	1.79	0.80	1.89	2.15	0.11	2.76	99.81	375	85	106	16	12	56	20	95	10.3	98	13.2	87	25	251
ZH-113	c sst	69.02	0.70	12.46	4.97	0.10	1.79	2.13	1.57	2.42	0.10	3.91	99.18	411	84	125	16	13	58	22	112	14.6	152	16.0	110	25	261
ZH-114	f sst	88.50	0.27	5.01	2.13	0.03	0.62	0.47	0.73	1.07	0.05	1.37	100.25	514	54	115	6	8	14	12	51	4.9	39	6.4	28	16	137
Barail Group																											
Renji Formation																											
ZH-44	m sst	76.20	0.66	10.64	4.09	0.05	1.28	0.90	1.88	1.95	0.09	1.70	99.42	362	74	92	13	12	35	16	84	11.6	143	14.1	67	24	297
ZH-45	m sst	76.10	0.63	10.67	4.02	0.05	1.29	0.94	1.90	1.96	0.09	1.91	99.57	376	71	77	13	12	37	17	86	9.2	142	12.9	65	21	266
ZH-46	m sst	76.14	0.63	10.60	3.97	0.05	1.26	0.95	1.89	1.95	0.09	1.83	99.36	397	76	85	13	11	34	16	87	6.3	142	14.0	67	22	260
ZH-115	f sst	64.67	0.78	15.09	6.24	0.08	2.27	1.34	1.46	3.10	0.12	4.57	99.72	493	88	133	18	15	68	27	146	16.2	111	18.8	129	28	223
ZH-116	f sst	71.78	0.69	12.04	4.84	0.06	1.71	0.99	1.60	2.49	0.12	3.19	99.51	411	92	108	11	14	54	24	111	11.5	80	21.0	156	30	323
ZH-117	f sst	70.82	0.69	12.64	5.25	0.06	1.89	0.88	1.71	2.49	0.12	3.07	99.60	412	93	104	12	12	60	25	113	12.7	94	19.9	91	29	261
ZH-118	f sst	72.42	0.66	11.59	4.76	0.06	1.67	0.94	1.58	2.35	0.10	3.21	99.32	420	86	103	13	13	50	19	106	10.6	73	17.7	88	26	286
ZH-119	f sst	69.98	0.75	10.07	3.75	0.24	1.09	4.70	1.83	2.03	0.09	4.76	99.27	366	111	124	12	12	31	15	82	8.7	173	17.9	82	30	460
Jenam Formation																											
ZH-10	zst	66.74	0.92	15.22	6.50	0.09	1.36	0.30	0.84	3.03	0.14	5.06	100.21	461	90	89	20	18	36	21	141	12.8	142	17.3	120	30	266
ZH-11	mst	63.98	1.01	17.18	6.17	0.06	1.44	0.23	0.84	3.51	0.12	5.34	99.89	476	103	100	25	19	44	22	162	16.9	161	17.7	150	31	268
ZH-12	zst	68.83	0.90	14.48	5.63	0.04	1.21	0.22	0.89	2.92	0.11	5.00	100.23	468	94	87	20	18	36	12	137	13.2	138	17.7	121	29	282

for Nb, K_2O, Rb, MgO, Al_2O_3, and Ba, especially in Tipam and Dupitila sandstones. Contrast between sandstone and mudrock averages in individual formations in the Barail and Surma Groups is limited, but becomes distinct in the Tipam and Dupitila Groups (Fig. 3). These features show the compositions of the Sylhet sediments diverge significantly from UCC, and that some stratigraphic contrast is present. A detailed interpretation of the data will be presented in a future publication.

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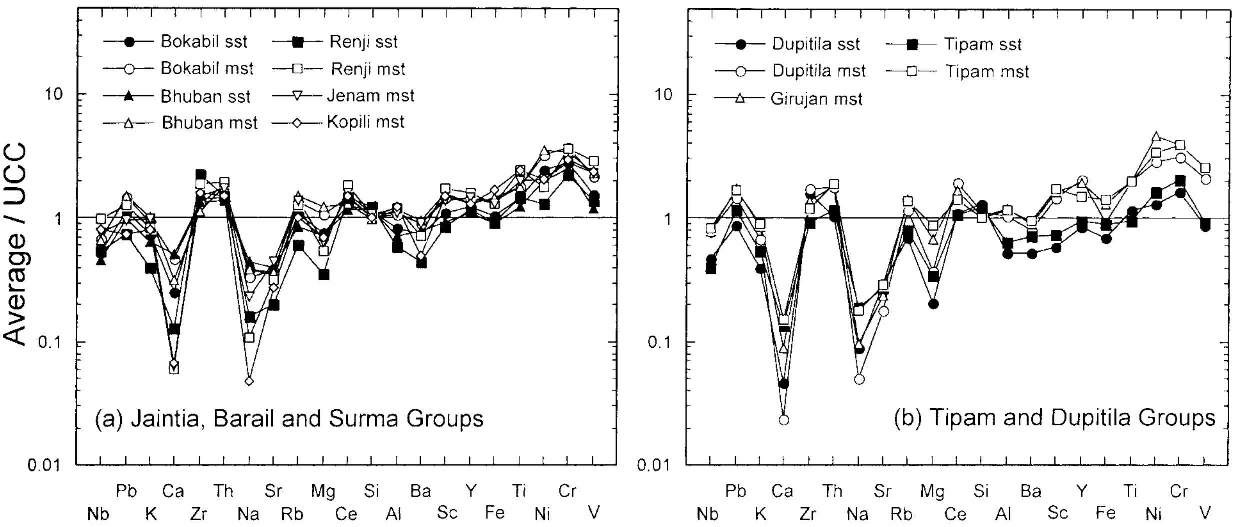

Fig. 3. Average sandstone (sst) and mudrock (mst) compositions of Sylhet basin formations normalized against the average upper continental crust (UCC) composition of Taylor and McLennan (1985). Elements are arranged from left to right in order of increasing abundance in average Mesozoic-Cenozoic greywacke (Condie, 1993) relative to UCC, following the methodology of Dinelli et al. (1999). Major elements are normalized as oxides and trace elements as ppm.

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Appendix 1. Locations of outcrop samples.

SaNr	Longitude	Latitude	Local name	SaNr	Longitude	Latitude	Local name
Dupitila Group				**Bhuban Formation**			
Dupitila Formation				Z-39	92° 11' 4"	25° 07' 1"	Opposite to Borogang
Z-01	92° 07' 3"	25° 06' 15"	Indajui	Z-40	92° 11' 7"	25° 07' 11"	Afifa tea garden
Z-02	92° 07' 3"	25° 06' 15"	Indajui	Z-41	92° 11' 7"	25° 07' 11"	Afifa tea garden
Z-03	92° 07' 5"	25° 06' 43"	Sharighat	Z-42	92° 11' 21"	25° 07' 29"	Tetulghat
Z-04	92° 07' 5"	25° 06' 43"	Sharighat	Z-43	92° 11' 21"	25° 07' 29"	Tetulghat
Z-05	92° 07' 9"	25° 05' 25"	Sharighat	Z-44	92° 11' 21"	25° 07' 30"	Tetulghat
Z-06	92° 07' 9"	25° 05' 25"	Sharighat	Z-45	92° 11' 27"	25° 07' 33"	Hari River section
Z-07	92° 08' 11"	25° 05' 8"	South Dodik	Z-46	92° 11' 27"	25° 07' 33"	Hari River section
Z-08	92° 08' 11"	25° 05' 8"	South Dodik	Z-47	92° 07' 19"	25° 08' 45"	Nayagang
Z-09	92° 07' 39"	25° 05' 32"	Dupigaon	Z-48	92° 07' 19"	25° 08' 45"	Nayagang
Z-10	92° 07' 43"	25° 05' 34"	Dupigaon				
Z-11	92° 08' 31"	25° 05' 18"	Tobang	**Barail Group**			
Z-12	92° 08' 32"	25° 05' 32"	Dodik	**Renji Formation**			
Z-13	92° 08' 40"	25° 05' 33"	Tobang	Z-49	92° 07' 13"	25° 09' 1"	Nayagang
				Z-50	92° 06' 10"	25° 09' 37"	Assampara
Tipam Group				Z-51	92° 06' 10"	25° 09' 37"	Assampara
Girujan Clay Formation				Z-52	92° 05' 5"	25° 09' 1"	Sripur
Z-14	92° 08' 45"	25° 05' 39"	Tobang	Z-53	92° 05' 5"	25° 09' 1'	Sripur
Z-15	92° 08' 45"	25° 05' 52"	Digrail	Z-54	92° 04' 57"	25° 10' 7"	Sripur
Tipam Sandstone Formation				Z-55	92° 04' 57"	25° 10' 7"	Sripur
Z-16	92° 08' 57"	25° 06' 10"	Digrail	Z-56	92° 04' 53"	25° 10' 9"	Sripur
Z-17	92° 08' 57"	25° 06' 10"	Digrail	Z-57	92° 04' 53"	25° 10' 9"	Sripur
Z-18	92° 09' 3"	25° 06' 17"	Digrail	Z-58	92° 04' 22"	25° 10' 29"	Noljhuri
Z-19	92° 09' 24"	25° 06' 32"	Digrail	Z-59	92° 04' 22"	25° 10' 29"	Noljhuri
Z-20	92° 09' 24"	25° 06' 32"	Digrail	Z-60	92° 04' 21"	25° 10' 26"	Noljhuri
Z-21	92° 09' 18"	25° 06' 44"	Putikhal	Z-61	92° 04' 21"	25° 10' 26"	Noljhuri
Z-22	92° 10' 31"	25° 06' 13"	Nichinpur	Z-62	92° 04' 18'	25° 10' 30"	Noljhuri
Z-23	92° 10' 41"	25° 06' 20"	Nichinpur	Z-63	92° 02' 23"	25° 09' 51"	Sonatila
Z-24	92° 10' 41"	25° 06' 20"	Nichinpur	Z-64	92° 02' 23"	25° 09' 51"	Sonatila
Z-25	92° 10' 36"	25° 06' 26"	B.D.R. camp	Z-65	92° 02' 23"	25° 09' 51"	Sonatila
Z-26	92° 10' 36"	25° 06' 26"	B.D.R. camp	Z-66	92° 02' 15"	25° 09' 54"	Sonatila-Sangram
Z-27	92° 10' 36"	25° 06' 26"	B.D.R. camp	Z-67	92° 02' 15"	25° 09' 54"	Sonatila-Sangram
Z-28	92° 10' 38"	25° 06' 36"	B.D.R. camp	Z-68	92° 02' 7"	25° 10' 1"	Sonatila-Sangram
Z-29	92° 10' 38"	25° 06' 36"	B.D.R. camp	Z-69	92° 02' 2"	25° 10' 1"	Sangram
Surma Group				**Jaintia Group**			
Bokabil Formation				**Kopili Shale Formation**			
Z-30	92° 10' 45"	25° 06' 43"	B.D.R. camp	Z-70	92° 02' 4"	25° 10' 2"	Sonatila
Z-31	92° 10' 45"	25° 06' 43"	B.D.R. camp	Z-71	92° 02' 8"	25° 10' 53"	Tamabil
Z-32	92° 10' 45"	25° 06' 56"	Borogang-Hari confluence	Z-72	92° 02' 8"	25° 10' 53"	Tamabil
Z-33	92° 10' 45"	25° 06' 56"	Borogang-Hari confluence	Z-73	92° 01' 3"	25° 10' 51"	Dauki River
Z-34	92° 10' 45"	25° 06' 56"	Borogang-Hari confluence	Z-74	92° 01' 3"	25° 10' 51"	Dauki River
Z-35	92° 10' 45"	25° 06' 56"	Borogang-Hari confluence				
Z-36	92° 10' 45"	25° 06' 56"	Borogang-Hari confluence				
Z-37	92° 10' 36"	25° 07' 8"	Borogang section				
Z-38	92° 10' 36"	25° 07' 8"	Borogang section				

Appendix 2. Depths and lithologies of well samples.

Sample	Lith	Depth (m)	Lithologic description
Atgram-1X well			
Bhuban Formation			
ZH-01	M	3630.7	Dark grey mst
ZH-02	M	3632.3	Dark grey mst
ZH-03	M	3634.0	Dark grey mst
ZH-04	M	3634.9	Dark grey mst
ZH-05	M	3635.7	Dark grey mst
ZH-06	M	3636.6	Dark grey mst
ZH-07	M	3637.5	Dark grey mst
ZH-08	M	3638.4	Dark grey mst
ZH-09	M	3817.0	Dark grey mst
Jenam Formation			
ZH-10	M	4731.4	Dark grey silty mst
ZH-11	M	4733.0	Dark grey mst
ZH-12	M	4735.0	Dark grey silty mst
Patharia-5 well			
Bhuban Formation			
ZH-13	S	960.1	Dark grey coarse grained sst
ZH-14	M	961.1	Dark grey mst
ZH-15	M	963.1	Dark grey mst
ZH-16	M	964.1	Dark grey mst
ZH-17	S	1829.0	Light grey fine grained sst
ZH-18	S	1830.0	Light grey fine grained sst
ZH-19	M	1833.0	Black mst
ZH-20	M	1834.5	Black mst
ZH-21	M	1835.5	Black mst
ZH-22	M	1836.0	Black mst
ZH-23	S	1836.6	Dark grey fine grained sst
ZH-24	S	2299.5	Light grey coarse grained sst
ZH-25	M	2300.5	Black mst
ZH-26	M	2302.0	Light grey mst
ZH-27	M	2304.0	Grey mst with sandy partings
ZH-28	S	2305.0	Light grey medium grained sst
ZH-29	S	2305.3	Light grey medium grained sst
ZH-30	M	2306.0	Light grey mst
ZH-31	S	2307.3	Light grey medium grained sst
ZH-32	M	2829.0	Black mst
ZH-33	M	2829.8	Black mst
ZH-34	M	2831.5	Black mst
ZH-35	M	2833.0	Black mst
ZH-36	M	2834.0	Black mst
ZH-37	S	3161.0	Light grey fine grained sst
ZH-38	S	3162.0	Dark grey fine grained sst
ZH-39	M	3164.0	Black mst
ZH-40	S	3165.8	Grey very fine grained sst
ZH-41	S	3166.0	Black coarse grained sst
ZH-42	M	3167.3	Dark grey mst
ZH-43	M	3168.3	Black mst
Renji Formation			
ZH-44	S	4255.5	Light grey medium grained sst
ZH-45	S	4256.8	Light grey medium grained sst
ZH-46	S	4257.0	Light grey medium grained sst
Rasidpur-1 well			
Tipam Sandstone Formation			
ZH-120	S	547.7	Light grey medium grained sst
Bokabil Formation			
ZH-121	M	1081.7	Light grey mst
ZH-122	M	1085.4	Light grey mst
ZH-123	M	1087.2	Light grey mst
ZH-124	M	1248.2	Light grey mst
ZH-125	M	1248.8	Light grey sandy mst
ZH-126	M	1249.7	Light grey mst
ZH-127	M	1252.7	Light grey sandy mst
ZH-128	M	1827.9	Light grey mst
ZH-129	M	1829.4	Light grey sandy mst
ZH-130	S	1832.5	Light grey fine grained sst
ZH-131	S	2135.7	Grey fine grained sst
ZH-132	S	2473.1	Light grey fine grained sst
ZH-133	M	2677.4	Dark grey mst
Fenchuganj-2 well			
Bokabil Formation			
ZH-47	S	2190.0	Light grey fine grained sst
ZH-48	S	2191.5	Light grey fine grained sst
ZH-49	S	2192.0	Grey very fine grained sst
ZH-50	S	2193.5	Light grey fine grained sst
ZH-51	S	2194.0	Grey fine grained sst with mst
ZH-52	M	2195.0	Grey sandy mst
ZH-53	S	2196.0	Light grey medium grained sst
ZH-54	S	2197.5	Light grey fine grained sst
ZH-55	M	2198.0	Light grey sandy mst
ZH-56	M	2199.0	Light grey sandy mst
Bhuban Formation			
ZH-57	S	2457.0	Light grey fine grained sst
ZH-58	S	2458.0	Light grey fine grained sst
ZH-59	M	2459.0	Dark grey mst
ZH-60	M	3137.0	Dark grey mst
ZH-61	M	3138.5	Dark grey mst
ZH-62	M	3140.0	Dark grey mst
ZH-63	S	3140.5	Dark grey very fine grained sst
ZH-64	S	3141.5	Dark grey fine grained sst
ZH-65	S	3142.5	Dark grey sst
ZH-66	M	3143.0	Light grey sandy mst
ZH-67	S	3259.5	Dark grey sst
ZH-68	M	3262.0	Dark grey mst
ZH-69	S	3264.5	Grey medium grained sst
ZH-70	S	3266.0	Light grey fine grained sst
ZH-71	M	3267.0	Grey sandy mst
ZH-72	S	3267.5	Grey fine grained sst
ZH-73	M	3269.0	Dark grey mst
ZH-74	S	3270.0	Light grey medium grained sst
ZH-75	S	3424.0	Light grey medium grained sst
ZH-76	S	3426.0	Grey medium grained sst
ZH-77	M	3426.5	Grey sandy mst
ZH-78	S	3428.0	Light grey medium grained sst
ZH-79	M	3615.0	Dark grey sandy mst
ZH-80	M	3616.0	Dark grey sandy mst
ZH-81	S	3618.0	Light grey fine grained sst
ZH-82	S	3618.5	Light grey fine grained sst
ZH-83	M	3619.5	Dark grey mst
ZH-84	S	3621.0	Grey fine grained sst
ZH-85	S	3622.5	Grey fine grained sst
ZH-86	S	3623.0	Light grey fine grained sst
ZH-87	S	3624.0	Dark grey fine grained sst
ZH-88	M	3770.0	Dark grey mst
ZH-89	M	3771.5	Dark grey mst
ZH-90	M	3773.0	Dark grey sandy mst
ZH-91	M	3775.0	Dark grey mst
ZH-92	M	3776.0	Dark grey mst
ZH-93	M	3777.5	Dark grey sandy mst
ZH-94	M	3778.5	Dark grey mst
ZH-95	S	4086.0	Light grey fine grained sst
ZH-96	S	4088.5	Light grey fine grained sst
ZH-97	M	4089.0	Dark grey mst
ZH-98	S	4091.0	Light grey fine grained sst
ZH-99	M	4092.5	Grey sandy mst
ZH-100	S	4248.5	Light grey fine grained sst
ZH-101	M	4541.0	Grey mst with sandy partings
ZH-102	M	4542.5	Grey mst with sandy lenses
ZH-103	M	4544.0	Grey mst with sandy partings
ZH-104	S	4548.0	Light grey medium grained sst
ZH-105	S	4548.5	Light grey fine grained sst
ZH-106	S	4721.5	Light grey medium grained sst
ZH-107	S	4722.5	Light grey fine grained sst
ZH-108	S	4723.5	Light grey medium grained sst
ZH-109	S	4725.0	Dark grey coarse grained sst
ZH-110	S	4726.0	Light grey fine grained sst
ZH-111	S	4726.5	Dark grey fine grained sst
ZH-112	S	4728.0	Dark grey medium grained sst
ZH-113	S	4728.5	Light grey coarse grained sst
ZH-114	S	4730.0	Light grey fine grained sst
Renji Formation			
ZH-115	S	4934.0	Grey fine grained sst with mst
ZH-116	S	4935.5	Grey fine grained sst
ZH-117	S	4937.0	Dark grey sst
ZH-118	S	4938.0	Grey fine grained sst
ZH-119	S	4939.0	Grey fine grained sst

（要　旨）

H. M. Zakir Hossain・Barry Roser，2006，バングラデシュ，シレット盆地の第三紀堆積岩類の主成分および微量成分元素分析，島根大学地球資源環境学研究報告，25，49-59

バングラデシュ，シレット盆地に分布するジョアンティア，バライル，スルマ，ティパムおよびデュピティラ層群から採取した 238 試料（砂岩 115 個，泥岩 123 個）について，これらの起源を探る研究の一環として，全岩の主成分と微量成分元素の蛍光 X 線分析を行った．これらの地層の年代は後期始新世から鮮新－更新世におよぶ．分析した試料は 4 本の炭化水素の試掘井からのコア試料，および地表の露頭から採取された．灼熱減量は時折高い値が見られるが，一般的に低い(6%未満)．砂岩中の SiO_2 含有量は泥岩中のそれよりも通常多いが，両方の岩石の地層ごとの平均値は平均的な上部大陸地殻のそれよりも上回っている．Pb，Zr，Th，Ce および大部分の苦鉄質元素(Sc，Fe_2O_3，TiO_2，Ni，Cr，V)の平均組成も上部大陸地殻の平均組成よりも通常多い．対照的に，CaO，Na_2O や Sr の平均含有量は上部大陸地殻の組成に対して非常に枯渇しており，Nb，K_2O，Rb，MgO，Al_2O_3 や Ba の平均含有量も程度の差はいろいろあるが，より枯渇している．