

Dec 29, 2010

CHIKYU Operation

Structural Geology Observation Sheet

No.

1~4cc

Exp.: 233 Site: C0012C Core: 1H Observer: B.S Summary: Brown mud at the upper part (~ Sec. 3 28cm) & Greenish mud (from sec 3 38cm) w/
shear zone at the lower part

Section No.	Structure ID	Top of Struct	Bottom of Struct	ave. depth	Core face app. Dip		2nd app. Dip		Striation on surface		Coherent interval (for P-mag)		P-mag pole		notes	shear zone at the lower part
					az.	dip	az.	dip	rake	from	top	bottom	az./trend	dip		
1	conj. ft	35	39		270	56	180	49								
		34	41		90	48	0	55								
	bedding	58	58.5		90	6	0	4								silty layers.
	bedding	70	73		270	11	180	3								Bottom of the dark brown layers (below: light brown)
	bedding	109	109		90	3	180	6								disturbed boundary with dark gray layers (Below dark gray layer: much lighter brown)
2	bedding	32.7	33.1		90	2	0	4								Bottom of reddish ash layers
	(fault)	64	70		90	30	0	49								
	(fault)	66.5	74		270	46	180	38								
	bedding	90	91		270	13	180	4								dark gray ash layer.
3	bedding	22	22		90	0	0	3								
	bedding	59.8	60.3		90	1	180	5								
	shear zone	117	137		90	68	180	71								
	bedding	126.2	126.4		270	1	0	4								Bottom of silty clay (below: clay)
4	bedding	8.5	9.5		90	7	180	8								Greenish layer.
	bedding	21.5	22		270	4	0	3								* pyrite: around 4~13cm depth. --> photo. (on Archive.) & CT image

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226 230

CHIKYU Operation

Structural Geology Observation Sheet

No.

✓ #1m7 & cc

Exp.: 333 Site: C0012C Core: 2H Observer: B.S

Shear zone with conjugate faults, minor faults, & vein structures
 Summary: Green mud with reddish layers (Sec 3 32~23 cm, 36cm of thickness) & ash layers

Section No.	Structure ID	Top of Struct	Bottom of Struct	ave, depth	Core face app. Dip		2nd app. Dip		Striation on surface		Coherent interval (for P-mag)		P-mag pole		notes
					az.	dip	az.	dip	rake	from	top	bottom	az./trend	dip	
1	bedding	33	35		90	15	180	18							Tilted-in (From Sec. 3, 73cm to sec4, 19cm) dark layer (tilted)
	bedding	85	46		90	12	180	26							Green layers
	bedding	117.5	119.5		270	18	0	11							Bottom of greenish mud
	bedding	131.3	131.5		90	2	180	3							Bottom of brown ash layers. → photo
	bedding	136.5	137		90	4	180	4							Bottom of green layers
	conj. ft	47	55		90	51	0	44							x scattered pyrite particles at the bottom of sec. 1 (Below 134cm depth)
		45	53		270	52	180	45							
	shear zone	64	75		270	50	0	20							→ photo
	vein structure	82.5	90		90	79	180	80							→ photo
	minor ft	10	18		270	49	180	56							
2	conj. ft	13	19		90	46	0	38							
	N. ft	17	26.5		270	53	180	51							→ offset: 40mm (on CT-image)
	shear zone	43.5	65		90	71	180	70							→ steeper than that of sect 1
	bedding	38	40		90	15	180	26							Bottom of greenish mud (reddish def'd band at the bottom of flow-in)
3	bedding	73	73.2		90	2	0	13							Bottom of reddish ash layers (pink!!) → photo
	bedding	46.5	47		90	9	180	18							Bottom of dark green layers
	shear zone	25.5	39.5		90	65	0	70							
4	bedding	104	105		90	8	180	26							tilted green layer with minor normal fault.

K: high angle due to minor N.ft.

Structural Geology Observation Sheet

No.

Exp.: 333 Site: C0012C Core: 2H/3M Observer: B.S

Summary: core 2H; highly tilted-green layers in shear zone through all sections

Section No.	Structure ID	Top of Struct	Bottom of Struct	ave. depth	Core face app. Dip		2nd app. Dip		Striation on surface		Coherent interval (for P-mag)		P-mag pole		notes
					az.	dip	az.	dip	rake	from	top	bottom	az./trend	dip	
5	bedding	25	25.3		270	3	296	0							Ash layer
	bedding	42.5	49		270	16	0	10							dark green layer
6	bedding	102	102.5		90	2	180	6							deformed ash layer ~ 270° direction N. ft? check CT
	bedding	122.8	123.6		270	9	180	5							
7	shear zone	4	15		270	58	56	0							
	vein structure	33	39												
	bedding	91.5	91.7		90	2	180	25							Green layer
	Shear Z.	116	132		90	63	53	0							
3H	1 bedding	60	79		270	57	355	0							green layer with shear localized zone in the center
	bedding	120	128		270	56	352	0							
	2 bedding	55	59		270	36	346	0							dark layer offset is not clear to measure



green layer with shear localized zone in the center



dark layer

Structural Geology Observation Sheet

No.

3H: Asymmetric (?) fold.

very obvious

Exp.: 333 Site: C0012C Core: 3H Observer: B.S. Summary: High angle green & brown layers and shear zone developed in two direction? No ash layer

Section No.	Structure ID	Top of Struct	Bottom of Struct	ave. depth	Core face app. Dip		2nd app. Dip		Striation on surface		Coherent interval (for P-mag)		P-mag pole		notes	(dominant: 90° direction)
					az.	dip	az.	dip	rake	from	top	bottom	az./trend	dip		
3	bedding	2	10.5		90	49									green & brown layers	→ fold! → photo fold plane (90/46, 73/0) 180/73
	bedding	14	19		270	42									green	
	bedding	98	102		270	52	7	0							brown	
4	bedding	10	12.5		270	50	359	0							green & brown layers	
	bed	78	86.5		270	52	0	18							green	
5	bed	46	58		270	62	0	4							green & brown tint layers	green
	bed	117	139		270	67	23	0							brown	→ photo
6	bed	17	26		90	55	180	65								
	bedding	75	86		270	60	25	0							green layer with wide shear localization zone	localization zone green layers
7	bedding	12	23		270	57			... not clear in CT-image						green layers partly disconnected	X
	bedding	75	86		270	60	0	35								

No shear zone.

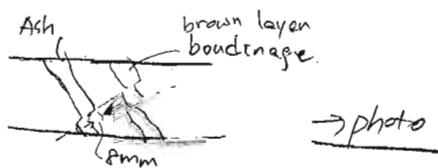
#1~3, 5~8, 2CC

Structural Geology Observation Sheet

No.

Exp.: 333 Site: C0012C Core: 4H Observer: B. S Summary: shear zone having high dip angle layers,

Section No.	Structure ID	Top of Struct	Bottom of Struct	ave. depth	Core face app. Dip		2nd app. Dip		Striation on surface		Coherent interval (for P-mag)		P-mag pole		notes
					az.	dip	az.	dip	rake	from	top	bottom	az./trend	dip	
1	bedding	64.5	74		270	59	6	0							green layer
	bedding	122	136		270	58	12	0							brown layer
2	bedding	66	77		270	60	13	0							green layer
3	bedding	68.5	79		270	59	14	0							green layer.
	bedding	120	125		270	37	22	0							ash layer. about 1.5~2cm of thickness
6	bedding	67	75		270	53	11	0							
7	bedding	43	52.5		270	54	14	0							
8	bedding	47	54.5		270	56	4	0							green layer in shear zone



→ photo



Structural Geology Observation Sheet

High angle beds

No.

#1, 2, 4~8, 2cc

Exp.: 333 Site: COD12C Core: 5H Observer: B.S. Summary: From sec 2 10cm, shear with minor folds & kink bands

Section No.	Structure ID	Top of Struct	Bottom of Struct	ave. depth	Core face app. Dip		2nd app. Dip		Striation on surface		Coherent interval (for P-mag)		P-mag pole		notes
					az.	dip	az.	dip	rake	from	top	bottom	az./trend	dip	
1	bedding	88	103		90	41	29	0							disturbed wide (<10mm) green layer sec#2
5	2. bedding	17	24		90	51	2	0.							
	bed. b	21	31		90	46	19	0.							
	bed. c	40.5	46.5		90	42									linked green layer
	bed. d	53	58		90	55	28	0.							green fold
	bed. e	52.5	60		90	51									brown fold
	bed. f	84	93		90	56	32	0							
4	bedding	35	46		90	56	11	0.							deformed green layer
	bed. X	99	107		90	53	4	0							
6	5. bedding	116.5	123.5		90	55	32	0							
	bedding	129	138		90	55	0	27							tinted brown layer
6	6. bedding	24.5	32.5		90	57	34	0.							green layer
8	bedding	42.5	49		90	48	33	0.							linked green layer

Structural Geology Observation Sheet

No.

Exp.: 333 Site: C0012C Core: 6H Observer: B.S

Summary: tilted green layers which could be folded, & ash layers,
and pink

Section No.	Structure ID	Top of Struct	Bottom of Struct	ave. depth	Core face app. Dip		2nd app. Dip		Striation on surface		Coherent interval (for P-mag)		P-mag pole		notes
					az.	dip	az.	dip	rake	from	top	bottom	az./trend	dip	
1					270	49	52	0							Sec 1 0 ~ 27 cm: slush, watery. 27 ~ 29 cm: void. more tense appearance of green layers in sec. 1 → 1 ~ 15 cm interval but, disconnected & not clear (disturbed)
2	bedding f	7	12		270	39	0	50							thick green layer (1.5cm) green layer w/ ash. dark brown
	bedding f	125	130.5		270	26	0	40							sec 2
3	bed. a	10	15		270	46	0	58							green
	bed. b	66	68		270	15									green
	bed. c	72	79		270	43	0	48							green
	bed. d	92.5	97.5		270	42	0	48							green
	bedding f	50	53.5		270	31	0	45							ash layer
5	bed. a	110	115		270	42	0	56							sec 5: barely having green layers from 10cm to 65cm (disturbed & folded)
	bed. b	129	134		270	36	0	49							green
6	bedding f	25	32		270	43	0	57							thin dark ash layer
	bedding f	39	41.5		270	23	0	0							bottom of brown ash layer
	bedding f	54	55		270	17	0	47							bottom of reddish ash layer
7	bedding f	41	45		270	28	0	50							bottom of light brown ash layer
	bedding f	88	90		270	24	0	53							red ash & green layer (folded) → photo
8	bedding f	11.5	14		270	25	0	54							sec 2c
	bedding f	16.5	17		270	1	0	19							4 15

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CHIKYU Operation

Structural Geology Observation Sheet

Exp.: 333 Site: C0012C Core: 7H/8H Observer: B.S. Summary: 7H: similar structure observed through 3H & 8H, but having less steep dipping angle of layers
8H: folded layer with subhorizontal fold plane.

Section No.	Structure ID	Top of Struct	Bottom of Struct	ave. depth	Core face app. Dip		2nd app. Dip		Striation on surface		Coherent interval (for P-mag)		P-mag pole		notes
					az.	dip	az.	dip	rake	from	top	bottom	az./trend	dip	
7H															
	8	bedding	1.5	5.5	270	41	180	24							Totally destroyed → Replaced liner from sec. 1 to sec. 8 but, the ash beds at the top of sec. 8 is measurable.
		bedding	4.5	8	270	31	180	18							- softed green layers.
		bedding	14.5	17.5	270	31	180	6							- dark brown layer
		bedding	15	21.5	270	37	180	24							- bottom of reddish ash layer ← fold → photo
	cc	bedding	15	21.5	270	37	180	24							- green layer
	Not clear in CT image	bedding	27.5	31.5	90	35									- dark brown layer } diff. dipping angles from upper ones
		bedding	32	36	90	28									- green layer
8H	1	bedding	76	26.5	90	8	180	52							
		bedding	28.5	29	90	8	180	50							- Sect. 0-23cm: watery. Sect. 3-2cc: Replaced liner → but some brown layer } structure(fold) preserved
	2	bedding	62	64	90	14	180	45							- green layer } subhorizontal layers, but still fold → photo
		fault	f7	93	270	46	329	0							- bottom of ash layer with green layer
	3	bedding	29	32	270	29	0	22							- fault with minor fold
	4	bedding	42	43	270	15	0	50							- photo → fold
	5	bedding	104.5	105	270	13	0	43							- layer w/ clasts (pumice?)
		fold													- ash layer
		bedding													- fold reddish ash & greenish layer

Structural Geology Observation Sheet

BH-CC: ash minor fold (red)

No.

Exp.: 323 Site: C0012C Core: BH/9H Observer: B.S. Summary: 9H: kinked or folded layer (indicator?) steeper dipping angle ($<35^\circ \rightarrow$ up to 58°)

Section No.	Structure ID	Top of Struct	Bottom of Struct	ave. depth	Core face app. Dip		2nd app. Dip		Striation on surface		Coherent interval (for P-mag)		P-mag pole		Well-preserved ash fold (Sec. 2) layers notes	
					az.	dip	az.	dip	rake	from	top	bottom	az./trend	dip		
BH	6. fold bedding	46	46.5		90	5	0	50							- ash fold layer	green layer (49)
	fold bedding	118.5	119		220	4	0	55							- folded green layer	
	8. bedding	24.3	24.6		90	5	0	33							- bottom of ash layer	ash
	CC. minor fold	34	39.5		90	32									- ash minor fold	ash
9H	1. bedding	44	50		90	38	180	43							Sec 1, ~ 36 cm: brecciation	
	bedding	46	51		90	37	180	48							- high angle layer showing again (90° direction dipping)	49
	2. fold bedding	61	64		90	29	180	42							- kinked green layer	
	bedding	13.5	24.5		90	42	180	49							Sec 2	97
	bedding	53	60		90	48	180	53							- top of disturbed layer	105
	5. fold bedding	29.5	39.5		90	54	180	48							- ash layers	
	bedding														upper part	
	bedding														> photo	

Structural Geology Observation Sheet

No.

Exp.: 333 Site: COO/2C Core: 9H (10H) Observer: B.S

Summary: 10H: Highly deformed, ~~fold reactivation~~ beds.

Section No.	Structure ID	Top of Struct	Bottom of Struct	ave. depth	Core face app. Dip		2nd app. Dip		Striation on surface		Coherent interval (for P-mag)		P-mag pole		notes
					az.	dip	az.	dip	rake	from	top	bottom	az./trend	dip	
9H	6	bedding	111	121.5	90	58	180	66							high angle green layer, \rightarrow photo \rightarrow very bright on CT.
	7	bedding	34	38	270	42	0	53							Bottom of ash layer including fold , reddish greenish.
		bedding	23.5	41	90	53	180	55							folded green layer \rightarrow photo
		bedding	111.5	114	90	22	180	24							fold plane of greenish layer.
	8	bedding	28.5	29	90	3	0	27							Bottom of ash layer (fold-like)
10H	1	bedding	23	26	90	29	180	22							Bottom of mud
		bedding	36	39	270	29	0	12							green layer
		bedding	52.5	68	270	8	180	7							bottom of silty clay.
		bedding	75	25.5	270	10	0	6							bottom of gray mud.
		bedding	80	20.5	90	8	180	38							bottom of silty clay
	2	bedding	50	51.5	90	22	180	4							bottom of silty clay

Structural Geology Observation Sheet

No.

Exp.: 333 Site: Cooke Core: 70H Observer: A.Y. Summary:

Section No.	Structure ID	Top of Struct	Bottom of Struct	ave. depth	Core face app. Dip		2nd app. Dip		Striation on surface		Coherent interval (for P-mag)		P-mag pole		notes
					az.	dip	az.	dip	rake	from	top	bottom	az./trend	dip	
2	bedding	127	128		90	14	296	0							* Sec. 3, 4, 5, 6, 7, 8, 9: chaotic deposit Dips & direction of beddings are scattered.
3	bed	9	14		270	41	357	0							3 []
4	bed	3	5		90	25	31	0							4 []
5	bed.	24	26		90	24	49	0							5 []
6	bed	3	4		90	8	180	4							6 []
	bed	6	8		90	27	180	39							80
	bed	65	68		90	24	180	46							110 112
	bed	89	92		270	45	337	0							
	fault	101	109		90	38	322	0							← cut by planar structure
	fault	104	112		90	39	54	0							Sec. 6
	(Normal)														
	bedding	110	114		270	49	300	0							
7	bed	18	20		270	40	42	0							Sec. 7
	dewatering struct.	8	11												dewatering cuff
															green layer
															green layer
															* diapir-like structure suggest dewatering

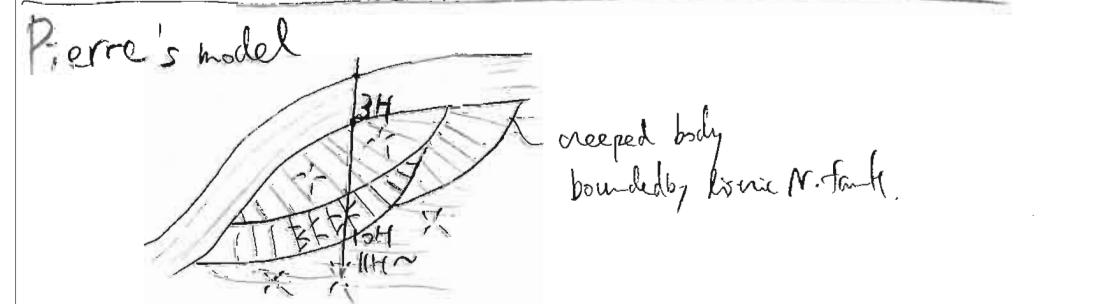
Structural Geology Observation Sheet

No.

Exp.: 333 Site: Cool2c Core: 10H Observer: A.Y. Summary: Chaotic sediments possibly reflect soft-sediment deformation

Section No.	Structure ID	Top of Struct	Bottom of Struct	ave. depth	Core face app. Dip		2nd app. Dip		Striation on surface		Coherent interval (for P-mag)		P-mag pole		notes
					az.	dip	az.	dip	rake	from	top	bottom	az./trend	dip	
8	bed.	5	6		270	18	180	10							
	bed.	35	36		270	5	180	9							
	bed.	36	37		90	6	0	9							
	bed	50	56		270	57	0	21							
	bed.	56	57		270	13	180	12							
	fault	57	68		270	60	331	0							
9.	fault (Normal)	15	23		90	80	74	0							

* Beds are disturbed, but faults are not very common. The occurrence suggests "soft-sediment deformation" maintained by independent particulate flow.



Structural Geology Observation Sheet

No. _____

Exp.: 333 Site: C0012C Core: 11H Observer: A.Y. Summary: Highly bioturbated mudstone with gently dipping beds.

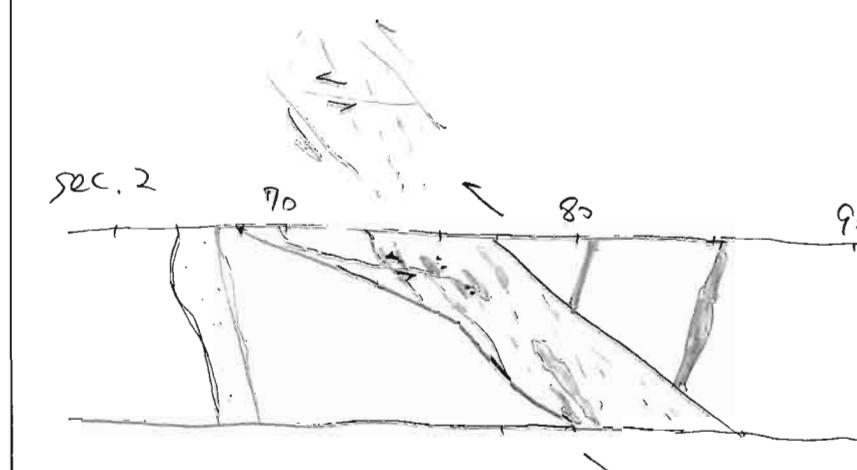
Section No.	Structure ID	Top of Struct	Bottom of Struct	ave. depth	Core face app. Dip		2nd app. Dip		Striation on surface		Coherent interval (for P-mag)		P-mag pole		notes
					az.	dip	az.	dip	rake	from	top	bottom	az./trend	dip	
1	bed.	103	104		270	10	0	15							Overview
2	bed	115	116		270	18	0	15							1
4	ft.	20	28		90	52	180	50							2
5	bed.	35	36		270	8	0	11							3
7	ft.	20	31		270	62									4
	(Normal)														28
8	bed.	24	25		270	12	0	12							20 WRs
	ft.	50	80												5
															7 WRs
															8 WRs
															cc: flow-in.
															* Disturbed, but most of them are caused by animals. (bioturbation; relatively large hole diameter ($\sim 1\text{ cm}$))
															* Subhorizontal beds suggest that this core is located below tilted (maybe creped) body (core i ~10).
															sec. 8
															50 60 70 80 90
															strike-slip faults (both normal & reverse offsets.)

Structural Geology Observation Sheet

No.

Exp.: 333 Site: C0012C Core: 72H Observer: A.Y. Summary: Gently tilted beds with normal faults & shear zone.

Section No.	Structure ID	Top of Struct	Bottom of Struct	ave. depth	Core face app. Dip		2nd app. Dip		Striation on surface		Coherent interval (for P-mag)		P-mag pole		notes
					az.	dip	az.	dip	rake	from	top	bottom	az./trend	dip	
12H	1	bed.	69	72	90	26	332	0							
		ft.	102	108	90	58	354	0							
		(N)													
		ft.	130	140	90	58	329	0							
	2	shear zone (N)	68	80 (top)	270	55	180	32							
			77	86 (bottom)	270	58	180	16							
		fc. (N)	100	108	270	59	313	0							
	4	bed.	42	44	90	10	0	1							
	5	bed.	98	100	90	8	0	2							
13H	2	ft.	45	56	270	62	350	0							* Normal faults &
	3	N.ft.	9	20	270	66	14	0							offset = 1.6 cm. Green bands (slightly dipping)
	4	N.ft.	55	69	270	69	17	0							
	5	N.ft.	53	63	270	62	354	0							
	6	N.ft.	49	61	270	62	6	0							



← offset = 5 mm



offset = 1.6 cm.

From sec 6, 87 cm, ⇒ Flow-in.

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Structural Geology Observation Sheet

left : subhorizontal bed

No.

Exp. : 333 Site : C0012C Core : 14H/15H Observer : B.G

Site : COOZC Core : 4H/15H Observer : B.e

Summary

101 = Normal faults

Section No.	Structure ID	Top of Struct	Bottom of Struct	ave, depth	Core face app. Dip		2nd app. Dip		Striation on surface		Coherent interval (for P-mag)		P-mag pole		notes
					az.	dip	az.	dip	rake	from	top	bottom	az./trend	dip	
3	bedding	31.5	32.5		270	11	180	13							Sec 4~7: replaced liner. → but, beds seem to be preserved Sec 1: broken down → crack green layer
4	bedding	88.5	89.5		270	7	180	11							disturbed green layer
6	bedding	131	131		90	0	180	16							green layer
8	bedding	58.	59		270	3	180	10							bottom of ash layers reddish
2	bedding	47	47.5		270	3	0	b							
	fault	70	82.5		90	56	180	49							normal ft → offset: 3mm
3	shear zone	41	66		270	88	0	74							offset: 2mm
5	fault	43	50		90	47	341	0							normal ft → offset: 6mm
	fault	77	85		270	50	11	0							normal ft → offset: 7mm
6	fault	51	58.		90	38	14	0							
	bedding	93.5	94		90	2	0	14							bottom of ash layers
															sec. 8 & 9: flow-t1