

I-205 2006/07 South Pole Seismic Log Book

This document contains the field notes for the active seismic experiments performed by I-205 near the South Pole during the 2006/07 Antarctic Field season. The log book is broken into three sections: Reflection, Shallow refraction, and Horizontal. The reflection section consists of a 48-geophone receiver array of vertical component phones that was recording during the entirety of the field work. The shallow refraction section covers the shallow refraction experiment performed to image the seismic velocity structure of the firn. The horizontal section consists of a 24-geophone receiver array of horizontal component phones that was recording during the latter portion of the field work.

Three sources were used for all the data presented. For the hammer data, a hammer was used to strike a wooden beam, and the Geode was triggered when the hammer struck the beam. Explosives were the other sources (P = 400g PETN, H = 175g PETN), were detonated by a GPS-synced shot box on the minute, and were lowered into shot holes drilled by an Ice Core Drilling Services (ICDS) developed hot water drill.

Section 1: Reflection

These data consist of vertical-component seismic reflection data collected by a 48-geophone receiver array. For all the FFIDs listed, the even-numbered geophones were georods (a 1m-long rod containing 4 40-Hz vertical geophone elements). For FFIDs 102 - 115, the odd-numbered geophones were 100-Hz vertical geophones. For FFIDs 124 - 513, the odd-numbered geophones were strings of 6 4.5-Hz vertical geophones, spaced 5m from each other and centered at the takeout.

For the receiver array, the individual geophone locations were not surveyed in by GPS. The shot locations were surveyed in by GPS, and all this information is listed in the **I-205 South Pole Source - Receiver Information** document. The array was positioned in a linear fashion in line with the shots, with a 30m spacing between each geophone takeout. Geophone 1 was positioned at Flag 44 - 30m (30m along line) and Geophone 48 was positioned at Flag 38 (1440m along line).

Table 1: **South Pole Reflection Seismics — Day 1**

	FFID	Geo1	Geo48	S Flag	S Location	S Depth	Source (S)	S Info	UTC Time	Notes
102	30m	1440m	F41	720m	11m	3xP	Open Hole	04:58	Only Detonator detonated	
103	30m	1440m	F41	720m	11m	P	Open Hole	05:06		
104	30m	1440m	F41	720m	11m	3xP	Backfilled	05:18		
108	30m	1440m	F40	960m	7.3m	10xP	Backfilled	05:56		
111	30m	1440m	F39	1200m	12.7m	10xP	Backfilled	06:32		
112	30m	1440m	F41	720m	Surface	Hammer	1x	06:43		
113	30m	1440m	F41	720m	Surface	Hammer	1x	06:46		

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Table 1: SP Day 1 — Continued

FFID	Geo1	Geo48	S Flag	S Location	S Depth	Source (S)	S Info	UTC Time	Notes
23 DEC 2006									
WX: Overcast, calm									
PASSCAL spread — 48 geophones @ 30m spacing									
Odds = 100Hz vertical geophones; Evens = 40Hz 4-element georods									
Recording = 8 seconds @ 2000 samples/second									
PSU logbook — Leo Peters									
Shooter — Donald Voigt									

Table 2: South Pole Reflection Seismics — Day 2

FFID	Geo1	Geo48	S Flag	S Location	S Depth	Source (S)	S Info	UTC Time	Notes
124	30m	1440m	F38	1440m	28.9m	10xP	Stem	06:00	Stem blow out
125	30m	1440m	F32	2880m	30.0m	10xP	Backfilled	06:26	
126	30m	1440m	F26	4320m	30.4m	10xP	Backfilled	06:56	

26 DEC 2006
 WX:Overcast, calm
 PASSCAL spread — 48 geophones @ 30m spacing
 Odds = PASSCAL 6 per string, 4.5Hz vertical geophones; Evens = 40Hz 4-element georods
 Recording = 8 seconds @ 2000 samples/second
 PSU logbook — Leo Peters
 Shooter — Donald Voigt

Table 3: South Pole Reflection Seismics: Day 3

FFID	Geo1	Geo48	S Flag	S Location	S Depth	Source (S)	S Info	UTC Time	Notes
132	30m	1440m	F37	1680m	27.0m	10xP	Stemmed	21:36	
134	30m	1440m	F36	1920m	26.0m	10xP	Stemmed	22:08	
136	30m	1440m	F35	2160m	24.3m	10xP	Stemmed	22:28	
137	30m	1440m	F34	2400m	24.5m	10xP	Stemmed	22:42	

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Table 3: **SP Day 3 — Continued**

FFID	Geo1	Geo48	S Flag	S Location	S Depth	Source (S)	S Info	UTC Time	Notes
140	30m	1440m	F33	2640m	28.5m	10xP	Backfilled	23:04	
141	30m	1440m	F32	2880m	20.9m	10xP	Backfilled	23:14	
143	30m	1440m	F31	3120m	30.7m	10xP	Backfilled	23:26	
144	30m	1440m	F30	3360m	30?m	10xP	Backfilled	23:32	
145	30m	1440m	F29	3600m	28.4m	10xP	Backfilled	23:44	
146	30m	1440m	F28	3840m	27.7m	10xP	Backfilled	23:54	
148	30m	1440m	F27	4080m	27.9m	10xP	Backfilled	00:04	
149	30m	1440m	F26	4320m	14.4m	10xP	Stemmed	00:56	

27 DEC 2006

WX: Overcast, slight wind

PASSCAL spread — 48 geophones @ 30m spacing

Odds = PASSCAL 6 per string, 4.5Hz vertical geophones; Evens = 40Hz 4-element georods

Recording = 8 seconds @ 2000 samples/second

PSU logbook — Leo Peters

Shooter — Donald Voigt

Table 4: **South Pole Reflection Seismics: Day 4**

FFID	Geo1	Geo48	S Flag	S Location	S Depth	Source (S)	S Info	UTC Time	Notes
305	30m	1440m	F31	3120m	26.0m	10xP	Stemmed	02:22	
306	30m	1440m	F29	3600m	24.6m	10xP	Stemmed	02:38	
308	30m	1440m	F28	3840m	24.5m	10xP	Stemmed	03:10	Stem Blow Out
310	30m	1440m	F26	4320m	14.4m	10xP	Stemmed	03:30	
311	30m	1440m	F25	4560m	27.4m	10xP	Stemmed	03:42	
313	30m	1440m	F23	5040m	21.7m	10xP	Stemmed	03:56	
314	30m	1440m	F21	5520m	23.1m	10xP	Stemmed	04:08	
315	30m	1440m	F19	6000m	23.6m	10xP	Stemmed	04:20	
317	30m	1440m	F17	6480m	24.4m	10xP	Stemmed	04:32	

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Table 4: **SP Day 4 — Continued**

FFID	Geo1	Geo48	S Flag	S Location	S Depth	Source (S)	S Info	UTC Time	Notes
30 DEC 2006									
WX: Overcast, windy, increasing to blowing snow at end of shooting									
PASSCAL spread — 48 geophones @ 30m spacing									
Odds = PASSCAL 6 per string, 4.5Hz vertical geophones; Evens = 40Hz 4-element georods									
Recording = 8 seconds @ 2000 samples/second									
PSU logbook — Sridhar Anandakrishnan									
Shooter — Donald Voigt, Leo Peters									

Table 5: **South Pole Reflection Seismics: Day 5**

FFID	Geo1	Geo48	S Flag	S Location	S Depth	Source (S)	S Info	UTC Time	Notes
501	30m	1440m	F30+5m	3355m	0.5m	H	Backfilled	21:16	
502	30m	1440m	F29+5m	3595m	0.5m	H	Backfilled	21:24	
503	30m	1440m	F15	6960m	26.0m	10xP		22:10	
504	30m	1440m	F13	7440m	29.1m	10xP		22:22	
510	30m	1440m	F11	7920m	23.6m	10xP		22:34	
511	30m	1440m	F9	8400m	24.0m	10xP		22:44	
512	30m	1440m	F28	3840m	13.0m	P	Open Hole	00:06	
513	30m	1440m	F28	3840m	13.0m	P	Backfilled	00:24	

01 JAN 2007

WX: Overcast, slight wind

PASSCAL spread — 48 geophones @ 30m spacing

Odds = PASSCAL 6 per string, 4.5Hz vertical geophones; Evens = 40Hz 4-element georods

Recording = 8 seconds @ 2000 samples/second

PSU logbook — Sridhar Anandakrishnan

Shooter — Donald Voigt, Leo Peters

Section 2: Shallow Refraction

These data consist of a 24-geophone receiver array. For FFIDs 318 - 344, all the geophones were georods (a 1m-long rod containing 4 40-Hz horizontal geophone elements). For FFIDs 346 - 369, all the geophones were 100-Hz vertical geophones. For the Hammer sources, V means the wooden beam was struck from above, and H means the wooden beam was struck on the side.

For the receiver array, the individual geophone locations were not surveyed in by GPS. The shot locations were surveyed in by GPS, and all this information is listed in the **I-205 South Pole Source - Receiver Information** document. The array was positioned in a linear fashion in line with the shots, with a 10m spacing between each geophone takeout. Geophone 1 was positioned at Flag 35 - 10m (2170m along line) and Geophone 48 was positioned at Flag 34 (2400m along line).

Table 6: **South Pole Shallow Refraction**

FFID	Geo1	Geo48	S Flag	S Location	S Depth	Source (S)	S Info	UTC Time	Notes
318	2170m	2400m	F34-1m	2401m	Surface	Hammer	1xH	01:17	
319	2170m	2400m	F34-1m	2401m	Surface	Hammer	1xV	01:17	
320	2170m	2400m	F34-1m	2401m	Surface	Hammer	5xH	01:36	
321	2170m	2400m	F34-1m	2401m	Surface	Hammer	5xV	01:43	
322	2170m	2400m	F34-1m	2401m	Surface	Hammer	5xH	01:56	
323	2170m	2400m	F34-2m	2402m	Surface	Hammer	5xH	02:03	
324	2170m	2400m	F34-3m	2403m	Surface	Hammer	5xH	02:07	
325	2170m	2400m	F34-4m	2404m	Surface	Hammer	5xH	02:14	
326	2170m	2400m	F34-5m	2405m	Surface	Hammer	5xH	02:17	
327	2170m	2400m	F34-6m	2406m	Surface	Hammer	5xH	02:23	
328	2170m	2400m	F34-7m	2407m	Surface	Hammer	5xH	02:26	
329	2170m	2400m	F34-8m	2408m	Surface	Hammer	5xH	02:29	
330	2170m	2400m	F34-9m	2409m	Surface	Hammer	5xH	02:32	
331	2170m	2400m	F34-10m	2410m	Surface	Hammer	5xH	02:35	
332	2170m	2400m	F34-30m	2430m	Surface	Hammer	5xH	02:53	
333	2170m	2400m	F34-60m	2460m	Surface	Hammer	5xH	02:59	
334	2170m	2400m	F34-60m	2460m	Surface	Hammer	5xH	03:01	
335	2170m	2400m	F34-90m	2490m	Surface	Hammer	5xH	03:10	
338	2170m	2400m	F34-30m	2430m	0.5m	H	Backfilled	04:34	
339	2170m	2400m	F34-90m	2490m	0.5m	H	Backfilled	04:40	
340	2170m	2400m	F33-5m	2645m	0.5m	H	Backfilled	04:46	
341	2170m	2400m	F33-10m	2650m	0.5m	H	Backfilled	04:50	
342	2170m	2400m	F32	2880m	0.5m	H	Backfilled	04:56	

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Table 6: SP Shallow Refraction — Continued

FFID	Geo1	Geo48	S Flag	S Location	S Depth	Source (S)	S Info	UTC Time	Notes
343	2170m	2400m	F31	3120m	0.5m	H	Backfilled	05:02	
344	2170m	2400m	F30	3360m	0.5m	H	Backfilled	05:10	
346	2170m	2400m	F34-90m	2490m	Surface	Hammer	5xV	05:42	
347	2170m	2400m	F34-60m	2460m	Surface	Hammer	5xV	05:48	
348	2170m	2400m	F34-30m	2430m	Surface	Hammer	5xV	05:51	
349	2170m	2400m	F34-30m	2430m	Surface	Hammer	5xV	05:53	
350	2170m	2400m	F34-10m	2410m	Surface	Hammer	5xV	05:59	
351	2170m	2400m	F34-9m	2409m	Surface	Hammer	5xV	06:01	
352	2170m	2400m	F34-8m	2408m	Surface	Hammer	5xV	06:05	
353	2170m	2400m	F34-7m	2407m	Surface	Hammer	5xV	06:07	
354	2170m	2400m	F34-6m	2406m	Surface	Hammer	5xV	06:09	
355	2170m	2400m	F34-5m	2405m	Surface	Hammer	5xV	06:11	
356	2170m	2400m	F34-4m	2404m	Surface	Hammer	5xV	06:13	
357	2170m	2400m	F34-3m	2403m	Surface	Hammer	5xV	06:15	
358	2170m	2400m	F34-2m	2402m	Surface	Hammer	5xV	06:17	
359	2170m	2400m	F34-1m	2401m	Surface	Hammer	5xV	06:19	
362	2170m	2400m	F34-120m	2520m	0.5m	H	Backfilled	20:50	
363	2170m	2400m	F33+10m	2630m	0.5m	H	Backfilled	20:56	
364	2170m	2400m	F33+5m	2635m	0.5m	H	Backfilled	20:58	
365	2170m	2400m	F32+5m	2875m	0.5m	H	Backfilled	21:04	
366	2170m	2400m	F31+5m	3115m	0.5m	H	Backfilled	21:10	
367	2170m	2400m	F30+5m	3355m	0.5m	H	Backfilled	21:16	
369	2170m	2400m	F29+5m	3595m	0.5m	H	Backfilled	21:24	

31 DEC 2006 (FFIDS 318 - 359) & 01 JAN 2007 (FFIDS 362 - 369)

WX: Overcast, slight wind

PSU Spread: 24 geophones @ 10m spacing

FFIDS 318 - 344 = All Horizontal georods (4 horizontal 40Hz elements spaced over 1m)

FFIDS 346 - 369 = All 100Hz vertical geophones

Recording = 8 seconds @ 2000 samples/second

PSU logbook — Leo Peters, Huw Horgan

Shooter — Huw Horgan, Leo Peters

Section 3: Horizontals

These data consist of horizontal-component seismic reflection data collected by a 24-geophone receiver array. For all the FFIDs listed, all the geophones were georods (a 1m-long rod containing 4 40-Hz horizontal geophone elements).

For the receiver array, the individual geophone locations were not surveyed in by GPS. The shot locations were surveyed in by GPS, and all this information is listed in the **I-205 South Pole Source - Receiver Information** document. The array was positioned in a linear fashion in line with the shots, with a 10m spacing between each geophone takeout. Geophone 1 was positioned at Flag 35 - 10m (2170m along line) and Geophone 48 was positioned at Flag 34 (2400m along line).

Table 7: **South Pole Horizontal Spread: Day 1**

FFID	Geo1	Geo48	S Flag	S Location	S Depth	Source (S)	S Info	UTC Time	Notes
305	2170m	2400m	F31	3120m	26m	10xP	Stemmed	02:22	
306	2170m	2400m	F29	3600m	24.6m	10xP	Stemmed	02:38	
307	2170m	2400m	F28	3840m	24.5m	10xP	Stemmed	03:10	
308	2170m	2400m	F26	4320m	14.4m	10xP	Stemmed	03:30	
309	2170m	2400m	F25	4560m	27.4m	10xP	Stemmed	03:42	
310	2170m	2400m	F23	5040m	21.7m	10xP	Stemmed	03:56	
311	2170m	2400m	F21	5520m	23.1m	10xP	Stemmed	04:08	
312	2170m	2400m	F19	6000m	23.6m	10xP	Stemmed	04:20	
314	2170m	2400m	F17	6480m	24.4m	10xP	Stemmed	04:32	

30 DEC 2006

WX: Overcast, windy, increasing to blowing snow at end of shooting

PSU Spread: 24 geophones @ 10m spacing

All 40Hz 4-element horizontal georods

Recording = 8 seconds @ 2000 samples/second

PSU logbook — Huw Horgan

Shooter — Donald Voigt, Leo Peters

Table 8: **South Pole Horizontal Spread: Day 2**

FFID	Geo1	Geo48	S Flag	S Location	S Depth	Source (S)	S Info	UTC Time	Notes
371	2170m	2400m	F15	6960m	26.0m	10xP		22:10	
372	2170m	2400m	F13	7440m	29.1m	10xP		22:22	
373	2170m	2400m	F11	7920m	23.6m	10xP		22:34	
374	2170m	2400m	F9	8400m	24m	10xP		22:44	
389	2170m	2400m	F28	3840m	13.0m	P	Open Hole	00:06	
398	2170m	2400m	F28	3840m	13.0m	P	Backfilled	00:24	

01 JAN 2007

WX: Overcast, slight wind

PSU Spread: 24 geophones @ 10m spacing

All 40Hz 4-element horizontal georods

Recording = 8 seconds @ 2000 samples/second

PSU logbook — Huw Horgan

Shooter — Donald Voigt, Leo Peters