Meta Data Report

	PI:	Ho
Person(s) filing report:		Schmieder, Reid
Operation description		The Underway SF6 System was used to monitor the advection and dispersion of the SF6 (and 3He) tracer patch. The system was used to determine the center of the patch (i.e., the area of maximum tracer concentration) for the twice-daily CTD casts.
Other operation notes		This Meta Data Report is a reduction of the operation logbook. Schmieder on watch from 03:00 - 15:00, Reid on watch from 15:00 - 03:00
Methods		the underway seawater line using ultra-high purity (UHP) N2 and a membrane contactor (Liqui-Cel Mini-Module). Every 1.25 minutes, the gas sample stream in directed into a sample loop of known volume. Gas chromatography, using anlytical columns filled with molecular sieve 5A (mesh 80/100), separates the SF6 from other gases in the sample. After separation, an electron capture detector (ECD) is used for SF6 analysis.

Date (UTC) (mm/dd/yy)	Time (UTC) (hh:mm:ss)	Lat (signed, dec.)	Lon (signed, dec.)	Event (be as descriptive as necessary)
				System #1 (UW system) has power and N2. Bias current = 7 and baseline is 1,035,000 uV. Using ECD #2. Sample loop SO
02/25/08	22:10:00			GasEx #1, 2.58 ml
02/26/08	12:00:00			Baseline still high. Reduced bias current to 4, no change in baseline voltage.
	17:06:00			ReplaceECD #2 with ECD #1. Set bias current = 6. After 1 hour, responds to std. Noisy baseline.
02/27/08	12:23:00			Baseline noise +/- 500 uV. Std's show large drop in baseline before std peak, probably due to trailing edge of O2 peak. Will start backflush earlier to correct this. Right std's have smaller area than left stds. Create new method: "STD (LR) SoGasEx" has earlier backflush times.
	19:00:00			New Labview VI: "Sf6_gasex_proteus", uses calculation for new H2O flow meter (H2O Flow = 0.7536*Output Voltage + 0.0146. Using voltage and flow rate data in calibration sheet provided by the Manufacturer. 5.02 VDC = 3.781541 L/min; 2.71 VDC = 2.081976 L/min; 0.5 V DC = 0.3785412 L/min.
02/28/08	15:00:00			Changed L column BF from 39 to 51. R column BF from 137 to 110. Start acquisition 35 to 31. Reintegration peak window was changed from 0.25 to 0.17. Runtimes changed from 0.4 to 0.3.
02/29/08	21:00:00			Departed Punta Arenas
03/01/08	11:28:00			Settings: N2 pressure = 58 psi into analytical system. Bias current setting = 6. ECD = 300 C. Zero point for H2O flow meter = 0.31 L/min. N2 flow to membrane contactor = 100 ml/min. N2 flow out of ECD: Inj = 38.6 ml/min, Load = 13.8 ml/min.
	14:35:00			systen, and found there is no need for KNF pump. Recharged DO probes and replaced membrane on DO IN probe. DO probes recalibrated in their housings, which were submerged in seawater so as to be close to operating temperature. Applied seawater correction to probes, value of 33.1 for salinity (no units).
	20:03:00			Serial reading from DO probes is not being parsed correctly at times. Avg. Flow does not start until 1 minute after starting program. During acquisition, average flow continues to calculate, but because no new flow vaues are received, avg flow falls during acquisition period.
03/02/08	13:12:00			Corrected Avg. Flow.vi so that it pauses during acquisiton period. Pauses when SF6 Control.vi is active, and runs under opposite condition. SF6 conc. Calcuations use observed flow, not average flow value.
03/02/08	14:16:00			Updated SF6/DO efficiency relationship, using data from Matt's file "GasserCalibII.xls" Based on composite of several lab calibrations. Y = 0.8089*x^2 - 0.0893*x + 0.181.
	16:17:00			Checked calibration of Proteus flowmeter. At a recorded flow rate of 1.00 L/min, collected ~1050 ml of water per minute.

				Labview Modification for day: 1. On Dell Desktop, there is a backup of Summer 2001 Vis from before cruise. 2. Sf6_gasex_proteus now incorporates lat and long inputs to input the location of MAPCO2 buoy and have it plotted on lat - long graph. The changes are in the block diagram, near where the LatLong plot is referenced. 3. LatLongplot.vi. Buoy lat and long are added to the final array
03/03/08				that is the input for the plot. The values are the 11th cluster. In SF6_gasex_proteus.vi, the buoy info can be saved to, and
03/05/08				read from file.
03/06/08	20:37:00			SF6 stds look reproducible. Still some noise.
	22:00:00			Testing underway system to within 0.08 mg/L with each other. Using SO GasEx membrane contactor #1. DO IN ~ 9.9 mg/L. DO Effic is 56.7%. H2O flow rate is 1.00 L/min. ECD baseline voltage is ~17,000 uV. Bias current dial is 6 (corresponds to 0.941 nA). No
	22:45:00			background SF6 detected. SoGasEx SPL (LR), changed R column backflush time from 115
	23:01:00			to 114. Increase EOM time in SPL (LR) SoGasEx method so that O2
	23:45:00			peak can fully BF from R coumn. 132 -> 135. Modifications to flow for BF purposes. New flows: Load = 31.5
03/07/08	14:14:00			ml/min, Inj = 39.8 ml/min. Steaming south of tracer patch to pump and dump. (This time
03/08/08	15:01:00			seems too late ... P+D takes longer).
	15:10:00			Finished dumping and headed NE to recover GPS drifter buoy. SF6 GC master.vi; RT from 0.25 to .19, run time from 0.55 to
	17:05:00	-50.61	-38.62	0.30. LV5 is running on shuttle. Beginning UW operations. Steaming
	18:00:00			north at 6 knots. SF6 detected. Integrated area of 6319. Tracer is patchy as N-
	18:12:54			bound line continues.
	18:51:00			At northern edge of tracer patch
	19:00:00			start S-bound line 0.5 km west of present line.
	19:10:00			Tracer detected at same latitude as previous line. Reached as far south as -50.68 before getting 0 concentration.
	19:50:00			Turned north on line 0.5 km west of present line. Reached as far north as -50.56 at northern edge of patch. Turned south. N-S length of patch is approx. 13 km. Stds. are
	20:54:00			not very consistent. Southbound on line. Program froze. Restarted computer, but
	21:00:00		-38.64	lost data from -50.59 to -50.62 along this line.
	21:48:00			Turned north on new line.
	21:55:00			Approx. time of another computer freeze. Seems to be oval-shaped region of lower SF6 concentration
03/09/08	3:08:00			centered around -50.61
	5:25:00			cleaned inline filters and membrane contactor
	6:54:00			Headed out of patch to Pump and Dump
	9:29:00			DO logged incorrectly; corrected Kevin Sullivan collected 2 bottle samples from underway seawater line. Bottle #251 at 12:07, bottle #252 at 12:08.
	12:06:00			Current concentrations are 10-15 ppt range.
	13:06:00			DO logged incorrectly; corrected
	18:33:00	-50.53	-38.56	Pump and Dump
	19:13:00			Pump and Dump complete LV crashed w/ an I/O or A/D error associated with Data Acq. Results in 5-10 minute data gap as computer reboots, and any
	21:24:00			unsaved data processing is lost (i.e. SF6 concentrations)
	21:54:00			water flow rate oscilating a lot in rough seas
03/10/08	1:00:00			LV froze; 5-minute data gap.
	4:28:00	-50.71	-38.58	On CTD Station; #2.
	7:22:00			Cleaned membrane contactor and filters
	7:50:00	-50.49	-38.59	Pump and Dump. Patch width estimated ~12 km. DAQ error; restarted computer. 6 min data gap; should be
	9:09:00			outside patch.
	9:31:00			Program in discrete mode; missed 4 minutes of data.
	10:58:00			concentrations ~8 ppt.
	11:48:00			Engineering problem; drifting
	14:45:00			LV crash On CTD station; #3. While on station, tried using USB-6221 with LV8, but too much noise. Back to USB-4350. Cleaned
	14:55:00	-50.73	-38.55	membrane contactor.

	18:40:00			Decreased detection limit from 1000 to 500.
	19:20:00			Data File: sogasex_20080310.dbs
	23:26:00			LV freeze
	23:32:00			LV back up; edited a few cells with NaN or Inf.
03/11/08	1:57:00			LV freeze. 4 min data gap.
	2:50:00	-50.76	-38.48	On CTD Station; #4. SF6 concentrations between 8-10 ppt.
	4:04:00			LV freeze
	5:40:00			LV freeze in middle of survey line. Expect high SF6 conc. here
	8:34:00			LV freeze
	8:41:00			LV crashed again. 11 minute data gap.
	9:08:00			Pump and Dump
	9:35:00			Cleaned membrane contactor
	12:56:00	-50.77	-38.47	On Optical Station
	13:59:00			LV crash
	14:54:00	-50.78	-38.45	ON CTD Station; #5
	16:42:00			LV freeze
	18:30:00			Diagonal lines; bearing 320 or 140
	19:50:00			LV freeze
	20:00:00			Pump and Dump
	20:17:00			LV freeze
03/12/08	2:12:00			LV freeze
	2:35:00	-50.79	-38.41	On CTD Station; #6. SF6 concentrations: 5-7 ppt
	4:32:00			LV feeeze; no new data lost since sitting at station.
	6:05:00			Pump and Dump. Cleaned membrane contactor
	8:16:00			LV freeze; 8 minute data gap.
				Recalibrated DO probes - did not regenerate. Values for DO IN have been drifting from ~9.75 -> 7 mg/L, when unlikely surface concentrations have changed. Probe is drifting. After recal,
	10:27:00			value back to ~9.6 mg/L.
	11:05:00			Restarted computer; mouse problem
	12:36:00	-50.8	-38.36	On optical station
	14:46:00	-50.8	-38.36	On CTD station; #7.
	15:13:00			Put in larger loop; loop #3, ~3.13 ml
	16:32:00			LV freeze
	16:54:00			Restarted computer
	17:56:00			Turned N2 pressure up to 60 psi to decrease RT slightly
	18:24:00			LV freeze
				LV freeze. Switched USB ports for Quantech and USB-4350.
	20:47:00			The QT was in USB 2.0 hub.
	21:37:00			Engineering problem; drifting
	22:06:00			Integration problems with R column.
	22:35:00			changed run time to .25 to address above issue.
	23:50:00			Increased water flow rate to ~1.6 L/min.
03/13/08	3:50:00	-50.87	-38.3	On CTD station; #8
	8:24:55			another peak coming out at .10
	10:56:00			LV freeze
				blue screen. DO readings took a long time to load correctly.
	11:17:00			Slowed ship while getting system ready again.
	11:41:00			LV freeze
				Pump and Dump; changed run time from .26 to .30 to get
	12:14:00			better integration
				On CTD Station; #9. Added larger loop, #4, ~4.85 ml. Current
	14:55:00	-50.88	-38.23	N2 flow rates: Load = 24.2 ml/min; inj = 28.0 ml/min.
				LV freeze at CTD station. Changing LV method, SPL (LR) SoGasEx to make longer loop flushing time. Added 2 seconds
	15:47:00			to flush time. Cleaned membrane contactor
				Informed that we will do a CTD within 4 hours and then will
	20:50:00			leave experiment site for lee of S. Georgia, storm coming.
	22:50:00			Pump and Dump
03/14/08	0:35:00	-50.86	-38.24	On CTD Station #10. After station, left experiment site
05/15/08	??			6.
				Made new 6 ft. mol sieve 80/100 columns. Baked at 250 C for 8 hours overnight. Temperatures ramped slowly: 80, 90, 95, 100, 110, 120, etc. Installed new columns and good gas flow through them. After instaling columns, ECD baseline fell to -585,000 uV. Don't understand why because gas flow through
	18:40:00			these new columns had not yet been diverted to ECD.
03/16/08	??			Changed L column BF from 51 to 52 (adding 1 second).
03/17/08	5:30:00			Underway to patch

				w/mol sieve 5A 80/100. First bake at 250C for 12 hrs, N2 flow 30 ml/min. Second bake at 250C for 12 hrs, N2 flow = 30 ml/min. 3rd bake at 300 C for 4 hrs. at 100 ml/min. After all bakes, SF6 peak is present when running clean water samples. This peak is not present when these samples were run with old columns. New methods, names end in _OldCol. These methods used with following settings: N2 Load = 40 ml/min, N2 Inj = 32 ml/min. N2 tank pressure = 50.5 psi. Run time=.35, Peak ID
	18:27:00			window=0.21
				membrane contactor is clean. System settings: Baseline=5150 uV, Bias setting=6, sample loop #4, membrane contactor #1,
	18:40:00			STD = 158.2 ppt, ECD temp=300 C. New N2 tank, tank #2
	23:39:00			std=124000.
03/18/08	0:38:00	-50.97	-37.84	Start of survey to find old patch. Starting near MAPCO2 position.
	1:37:00	-51.04	-37.76	first real signal
				Blue screen; DO problems having transmission problems for a
	2:20:00			while afterward
				Increased length of BF by 3 seconds to allow more time for O2
	3:20:00			to come off.
	6:04:00	-51.04	-37.7	On CTD Station; #13
	9:52:00			LV freeze
	10:10:00			Headed to MAPCO2 for recovery.
	10:55:00			LV freeze
	11:41:00			en route to ASIS
	12:03:00			samples 12:00:15 and 11:41:46 have bad DO data
	17:08:00			ASIS recovery
03/19/08	3:45:00			Starting Site Survey
				Began taking discrete samples in new site location to check for
	5:11:00			SF6 background, but these were not ever run.
	10:32:00			Paused system to work on serial connection.
	10:50:00			System running again
	13:04:00			LV crash
	15:30:00			LV crash
	16:49:00			brief pause in flow in seawater line
	17:16:00			Paused system to test columns; columns retain SF6 peak
	18:36:00			System running again
				Testing column #4, made with Kevin's mol sieve 5A 60/80, 6', baked at 300C for 4 hrs. There does not appear to be SF6 beak in blank, but system presure must be >70 psi to get smpl/std out in reasonable time, and there is a rapidly-falling baseline in
03/20/08	9:00:00			vicinity of SF6 peak.
				Reattached column #3, which is made with our mol sieve 5A 80/100. Baked twice, once at 250 C for 12 hrs, once at 300 C
	10:00:00			for 4 hrs. Good flow w/sharp peaks.
				Recalibrated DO probes; DO probes are now closer to values reported by R. Hamme. Current values: DO IN = 10.20 mg/L, DO OUT = 5.29 mg/L. Both values are higher than they were before recal (8.25, 4.92 mg/L) With new calibratiom DO effic jumps from 40.3% to 48.2%. Same membrane conditions (i.e.,
	11:52:00			membrane not cleaned).
				Collected system effluent water for masurement of extraction efficiency using K. Sullivan's discrete system. Bottle 219 effluent, DO IN =10.08, DO OUT = 5.21, Temp = 6.3C, H2O flow
	12:08:00	-51.02	-37.81	(avg) = 1.03, Bottle 220 intake ...
	13:18:00			LV freeze
	13:34:00	-50.94	-37.8	Optical cast in water
03/21/08	8:40:00			Attached columns #2 and #3. #3=L, #2=R. R has shorter RT.
	9:46:00			Attached #4 and #5, #4=L, #5=R
	12:00:00			details).
	12:50:00			Deploying MAPCO2
	15:02:00			Optical cast in water
				Starting UW system. Bias current setting = 6, Sample Loop #4, Analytical Columns = "old" ones, H2O flow = 1 L/min, DO IN =
	15:34:00			10.21 mg/L, DO OUT = 4.85 mg/L, membrane contactor #1
	16:53:00			Staring survey with N-S lines with 0.5 km spacing.
	19:32:00			Pump and Dump
	20:02:00			finished Pump and Dump
	22:00:00	-51.17	-38.39	SF6 concentrations ~ 100 ppt
03/22/08	0:25:00			Starting Diagonal Lines because of wind conditions.
	2:50:00	-51.14	-38.37	ON CTD Station; #16. SF6 concentrations ~45-50 ppt.
	5:00:00			Conc. At station fallen to ~20 ppt during station.
	5:12:00			Left patch to Pump and Dump

	6:00:00			Finished Pump and Dump
	9:30:00			LV shutdown at end of survey line
	9:37:00			LV running again
	12:59:00			Stopping for optical cast
	13:31:00			samples 13:31 - 13:35 are not real
				and USB-4350. Reduced "start acq" time on all used methods by 5 seconds. The timing is slower than on Shuttle. Integrated std areas are slightly higher on Dell Runtime = .2, Peak
	14:11:00			window =0.09
	15:20:00			Added 4 to acq. Time in methods for STD(L) and STD®.
				Turned Dell system off -- back to the shuttle. Data on shuttle
	15:39:00			starts @ 220308-154356
	15:45:00	-51.19	-38.3	At CTD station; #18.
	18:16:00			LV crash
	20:18:00	-51.17	-38.31	max conc. ~50 ppt
	22:21:00			LV freeze. Reset V1; sounds better.
				Freeze; AI control error. Restarted, then blue screen. ~10
	23:18:00			minute data gap.
03/23/08	1:15:00			LV freeze; leaving patch to Pump and Dump
	2:00:00			finished Pump and Dump
	2:42:00			LV freeze as we entered patch
	2:56:00	-51.19	-38.26	On CTD Station; #19. SF6 concentrations ~30 ppt
	4:23:00			starting diagonals because of wind conditions
	8:37:00			LV freeze
	8:41:00			LV freeze again
	8:48:00			LV freeze again
	11:46:00			GPS log error
	12:49:00	-51.19	-38.12	On Optical station; #20; SF6 concentrations ~3.17 ppt
	14:32:00	-51.2	-38.12	On CTD Station; #21; SF6 concentrations ~18 ppt
	15:26:00			cleaned filters/membrane contactor
	15:36:00			SF6 conc. Down to 6.6 ppt
	16:24:00			New file, sogasex_20080323.dbs
	17:30:00			Pump and Dump
				Steamed through own wastewater, added noise to our chromatograms and affected pCO2 measurements. 1740 ->
	17:53:00			1751, samples noisy.
	18:47:00			Chromatograms back to normal.
	21:48:00			LV freeze
	22:53:00			Some logging errors in GPS
03/24/08	0:48:00			short interruption in seawater flow
	1:00:00			Headed out of patch to Pump and Dump
	1:35:00			finished Pump and Dump
	2:38:00	-51.22	-38.02	On CTD Station; #22; SF6 concentrations ~20-25 ppt.
				cleaned filters/membrane contactor. Immediately after cleaning, conc. Jumped to 27, then came back to previous
	3:36:00			values from 20-25 ppt.
	6:00:00			calc error in SF6 conc.
	8:13:00			LV freeze
	13:00:00			On station for optical; #23
				On CTD Station; #24. Cleaned membrane contactor and filters, and calibrated DO probes; DO IN went from 6 mg/L to 10 mg/L
	14:36:00			after calibration
	16:31:00			New file, sogasex_20080324.dbs
	17:46:00			Heading out of patch to Pump and Dump
	18:30:00	-51.18	-37.84	Seem to have steamed through own wastewater again.
	20:35:00			Estimate patch ~3.5km wide and 6.5 km long (N-S dimension).
	21:19:00			LV freeze
03/25/08	0:11:00			Brief interrupt in flow of underway seawater line
	1:41:00			Pump and Dump NE of patch
				On CTD station; #25. Paused system for K. Sullivan to take
	3:39:00	-51.26	-37.87	several discrete samples before and after membrane contacter.
	3:50:00			Started system again.
	5:44:00			LV freeze
	8:09:00			LV freeze
	12:57:00	-51.31	-37.57	Pump and Dump
	13:14:00			Pump and Dump complete
	14:23:00	-51.3	-37.69	On CTD station; #26. SF6 conc. ~6.9 ppt
				new file, sogasex_20080325.dbs. Cleaned membrane
	15:32:00			contactor/filters
	17:37:00			LV freeze

				water flow rate dropped to zero, and ship also sucked in some
	17:53:00			air and bubbles into seawater line
	22:21:00			Headed E out of patch for Pump and Dump
	23:15:00			Pump and Dump complete
03/26/08	1:15:00			LV freeze
	1:55:00	-51.33	-37.56	On CTD station; #27; SF6 conc. ~5.5 ppt
	2:36:00			regenerated and recalibrated again. Cleaned membrane contactor.
	3:10:00			LV freeze
	5:28:00			LV freeze
	7:00:00			Config file error. Stopped ship until system was underway again. Switched over to Dell running LV5.1 on xp, using USB-4350. SF6_gasex_proteus_lv5.vi. After Dell system started running: Added 4 seconds to "SPL (LR) So_GasEx_OldCol. This solved problem of insufficient flushing of std. Average flow value is incorrect.
	7:54:00			Changed loop runtime in FlowAvg.vi to 500 milliseconds, so loop executes faster.
	8:09:00			need to reintegrate data from 8:00 - 9:20
	8:10:00			Start acq. Sooner for each column in "SPL (LR) So_GasEx_OldCol" methods.
	10:40:18			This sample shows unusually large area, probably due to valve switching problem.
	11:57:00			Pump and Dump 2 nautical miles E of last SF6 sample
	12:15:00			Pump and Dump complete
	13:01:00			On CTD Station; #28
	13:17:00			LV Freeze up on Dell; ~10 min data gap
	13:36:00			new file, sogasex_20080326.dbs
	15:15:00			On optical station
	20:15:00			Integration errors on samples around this time, likely due to varying RT as a result of valve switch irregularities.
	20:43:00			more bad integration; must reintegrate
	21:07:00			edited values for SF6 conc. For R samples from 2056 - 2106 due to bad integration. Will need to recalculate
	22:04:00			R stds not coming through. Later realized this is because timing of valve switiching was off.
	22:22:00			Heading SW of patch to pump and dump
	22:58:00			Pump and Dump complete. Other groups thought they saw effect of wastewater on underway measurements.
	23:09:00			changed data points at 23:06 and 23:09, problem w Right STDs
	23:22:00			Ship stopped for generator problem
	23:55:00			Ship underway again but seed reduced.
03/27/08	1:20:00	-51.29	-37.43	On CTD Station; #29; concentrations ~5 ppt
	4:10:00			Possibly bad data due to valve switch problem.
	7:30:00			Smpl following L STD very high; likely due to valve switch error
	7:59:00			Added 1 second to smpl inject time in "SPL (LR) SoGasEx_OldCol" method.
	8:36:05			Area of smpl after L STD too high.
	10:10:00			LV Freeze
	10:39:21			L STD has no peak
	11:36:00			Pump and Dump N of patch
	11:57:00	-51.32	-37.35	Pump and Dump complete
	13:13:21			Sample peak did not come through
	14:43:00			New file, sogasex_20080327.dbs
	15:07:00			On optical station
	15:47:00			Still getting some smpls with no peaks, in areas that should have tracer
	15:50:00			Moved Dell to other side of bench. Realized that all 3 valves are not switching when they are supposed to. Observed that if SF6_gasex_proteus is stopped, and Flow Avg.vi alone is run, ir keeps up with flow rate and averages correctly.
	16:42:00			Samples from 15:50-16:42 should not be used; on station and adjusting valve timing.
	16:58:00			TOMASI in water
	17:00:00			TOMASI back on deck; end of TOMASI survey
	17:14:00			Data points 17:06:19, 17:10:35, and 17:13:05 are bad, poor valve switching. Modified SPL (LR) method, increased time between Nafion off and L column Foreflush by 1 sec.
	17:22:00			Line of data up to here is suspect due to valve switching errors. In Sf6 Control.vi, changed "set time" from 300 to 700 msec.
	17:49:57			This Std is on wrong column.
	18:17:05			smpl needs reintegration

	19:00:00			two bad samples, 18:55:20, 18:58:13.
	19:22:00			Restarted computer because windows couldn't be moved. Later realized this was because bungee was pushing esc key.
	19:25:00			Changed N2 tank. In Sf6 control.vi, changed event 2 timing to 1 sec. Timing in sf6 control.vi changed to 1500 sec.
	20:21:00			Pump and Dump N of patch
	20:52:00			Ship stopped for engineering problem
	22:10:00			Problem fixed; underway again
	23:12:00			RT time of smpl off - likely valve timing error
03/28/08	0:47:00	-51.32	-37.32	On CTD Station; #31; concentrations ~4.6 ppt
	0:57:00			data point not real
	1:13:00			Paused program to change GPS date/time string formatting in LDEO GPS.vi. Time is now padded with zeroes
	4:59:00			L STD did not come through; will need to recalculate next few points after this
	6:12:00			On S-bound line, ventured further south than on previous lines to explore presence of low-concentration large-area SF6 patch to south. Decided to turn back N and save this for next day's 24-hour UW survey.
	8:31:45			L STD did not integrate correctly
	8:52:00			Pump and Dump N of patch
	9:11:00			Pump and Dump complete
	11:45:00			LV freeze
	12:03:49			Sample integrated with too large an area
	12:53:00	-51.32	-37.3	On CTD Station; #32; SF6 concentrations ~2.5-4 ppt. CTD damaged, so no CTD cast. Collected discrete samples using Grundfos pump at this station.
	16:36:00			smpl needs reintegration
	18:22:00			R column been integrating incorrectly. Lowered N2 pressure by ~0.5 ppt.
	18:47:39			This smpl had incorrect integration.
	20:00:00			Starting Pump and Dump
03/29/08	0:19:00			peak shows bad RT; likely valve timing problem.
	0:55:00	-51.3	-37.28	On CTD Station; #33; concentrations ~ 3.5-5 ppt
	3:44:00			Leaving patch to the E to Pump and Dump
	4:40:00			Entered low-concentration SF6 area to south. Concentrations ~ 0.5 - 1 ppt.
	7:08:00			Stopped system to clean filters and membrane contactor. Samples immediately after change show tracer; may contain air from gas extraction system.
	9:20:00			Pump and Dump
	9:29:00			Restart Computer; was plotting slowly
	9:45:00	-51.18	-37.25	Pump and Dump complete
	11:55:00			slowed to 4.3 knots; apparent engineering problem. Restarted compuetr because windows were spontaneously closing.
	12:25:00			More engineering trouble; surveying at 2.6 knots
	12:32:49			peak came out late, needs to be reintegrated. Cold room.
	12:49:00	-51.29	-37.25	On CTD Station; #34; concentrations ~3.5 ppt
	13:42:00			engines cut out for period; drifting
	17:45:00	-51.31	-37.28	On CTD Station; #35; concentrations ~3 ppt
	19:22:00			New file, sogasex_20080329.dbs. Cleaned membrane contactor/filters, but DO efficiency decreased afterwards.
	19:40:00			Headed out of patch for Pump and Dump
	21:26:00			smpl peak came out too late; recalculate. Also 21:29 smpl.
	21:33:00			smpls.
	21:56:00			Because of reduced generator capacity, ship speed is limited
03/30/08	0:01:00	-51.28	-37.29	On optical station
	2:18:00	-51.32	-37.3	On CTD Station; #37; concentrations ~3.3-3.9 ppt
	7:03:00			Reset V1; was sounding bad
	7:05:00			LV freeze. When restarted, recorded water flow rate of ~1.5 L/min, while just before crash recorded flowrate has been ~1.2 L/min, and nothing had been changed. Possible that flowrate had always been this high and was being read incorrectly, which would explain low DO efficiency observed at the time. Not clear what software glitch could cause this, though.
	10:12:00			Pump and Dump noth of patch
	11:09:00			Pump and Dump complete
	11:54:00			Engineering trouble; stopped
	12:57:00			Engines back on
	14:43:00	-51.3	-37.33	On CTD station; #38; concentrations ~2.5-2.9 ppt
	17:11:00			On optical station

	21:20:00			Haeded out of patch to E to Pump and Dump
	23:55:00	-51.3	-37.35	On CTD Station; #39; concentrations ~2.2-2.7 ppt
03/31/08	2:39:00			LV showed an error; hit "OK" and program continued running without problem.
	4:15:00			Paused program to clean membrane contactor/filters
	10:00:00			Increased H2O flow
	11:58:00	-51.31	-37.48	Pump and Dump begins
	13:49:00	-51.3	-37.34	On CTD station; #40; concentrations ~1.25-1.7 ppt
	15:07:00			Underway towards buoy
	18:22:00	-51.79	-36.89	At MAPCO2 buoy; SF6 concentrations ~0.61 ppt
	19:30:00			Put in new sample loop, #5. ~6 ml. Removed loop #4. New file, sogasex_20080331.dbs. Changed methods for new loop, L column acq. Starts 2 sec earlier. Acq. Window ends at .25.
	20:44:00			On R Std method, changed start acq. To 33
	23:00:00			Ship's GPS down, started using our Garmin GPS.
	23:10:00			back to ship's GPS
	23:28:00			Back to our GPS
	23:50:00			DO 2 having transmission problems.
04/01/08	0:06:00			Returned to patch from buoy recovery
	1:22:00			On CTD Station; #42; SF6 concentrations ~1.65 ppt. Conc. Steady throughout CTD cast.
	5:44:00			Interruption in seawater line throughout ship. Paused program and stopped Ship. Survey tech restarted seawater fllow.
	6:04:00			seawater line back. Restarted program.
	10:16:00	-51.17	-37.42	Pump and Dump
	10:36:00			Pump and Dump complete
	12:45:00			On station #43; concentrations ~1.35-1.45 ppt. Conc. ~1.4 ppt when CTD pulled from water. Staying here for optical
	14:20:00			Kevin collected 3 underway samples @ CTD station 43. DO Effic. ~48% at time of sampling.
	15:45:00			Paused system to clean membrane contactor/filters
	16:22:00			new file, sogasex_20080401.dbs
	19:58:00			Pump and Dump
	20:35:00			Dell rebooted spontaneously
	22:55:00			Bad integration on this point
04/02/08	1:15:00	-51.34	-37.46	On CTD station #44; conc. ~ 1.3 ppt
	2:09:00			Integration error on this point
	2:54:00			Pump and Dump to E of patch
	8:48:00			LV Freeze
	13:01:00	-51.34	-37.48	On CTD Station; #45; conc. ~1.2 ppt
	14:33:00			new file, sogasex_20080402.dbs
	14:50:00			In LDEO popup.vi, changed upper limit on water flow from 1.88 L/min to 3 L/min. Switched to ship's GPS
	16:35:00			Pump and Dump
	22:35:00			Heading south to Pump and Dump. Paused program to reset V1. LV freeeze; lost a lot of data on this crash.
04/03/08	1:00:00	-51.38	-37.48	On CTD station #46; concentrations ~ 0.7-0.8 ppt
	12:59:00	-51.41	-37.52	during station. K. Sullivan took several surface samples from sink
	14:20:00			Pause program to clean membrane contactor/filters
	14:31:00			New file, sogasex_20080403.dbs
	14:55:00			On optical station
	16:37:00			Heading W of patch to Pump and Dump
	17:32:00	-51.42	-37.66	Pump and Dump complete
	18:53:29			DO logged incorrectly
	22:20:00			Pump and Dump
	23:05:00			Pump and Dump complete
04/04/08	2:15:00	-51.44	-37.48	On CTD Station #48; conc. ~0.3 ppt
	7:12:00			Adjusted H2O flow, avg ~2.07 L/min.
	10:30:32			incorrect chromatogram
	11:15:00	-51.57	-37.43	Pump and Dump begins
	11:51:00	-51.54	-37.44	Pump and Dump complete
	13:01:00	-51.45	-37.44	On CTD station #49; conc. ~ 0.3-0.35 ppt
	15:05:00			On optical station
	18:47:00	-51.45	-37.25	On CTD station #50; conc. = 0.0 ppt
	19:28:00			cleaned filters/membrane contactor
	20:02:00			Started Pump and Dump
	20:53:00			New file, sogasex_20080404.dbs
04/05/08	0:45:00	-51.47	-37.41	On CTD Station #51. Conc. ~ 0.3 ppt. Conc. Steady throughout station

2:59:00	Left patch to NW. Stopped program.
18:19:00	ECD power turned off