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The RV Yokosuka/HOV Shinkai 6500

"Cruise Report"

YK13-04_leg2

The Brazil-Japan Joint Research Initiative in the South Atlantic - R/V Yokosuka and HOV Shinkai 6500 "Iatá-piuna Cruise" in 2013

May 10, 2013-May 24, 2013

Japan Agency for Marine-Earth Science and Technology (JAMSTEC)

Institute of Oceanography, University of São Paulo (IOUSP)

and

Geological Survey of Brazil (CPRM)

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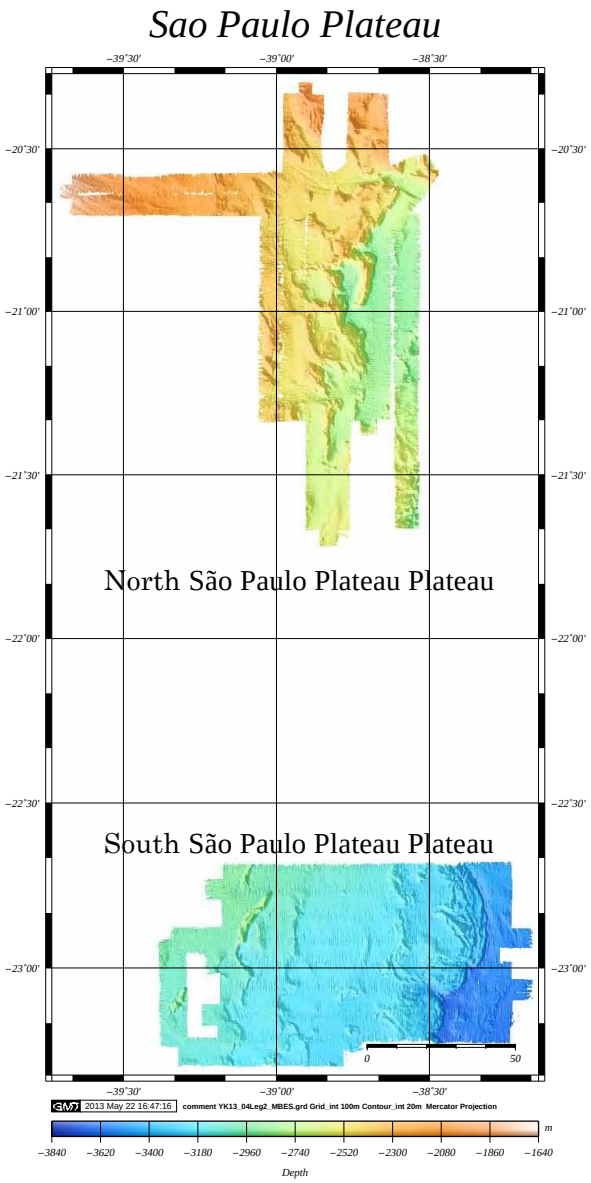

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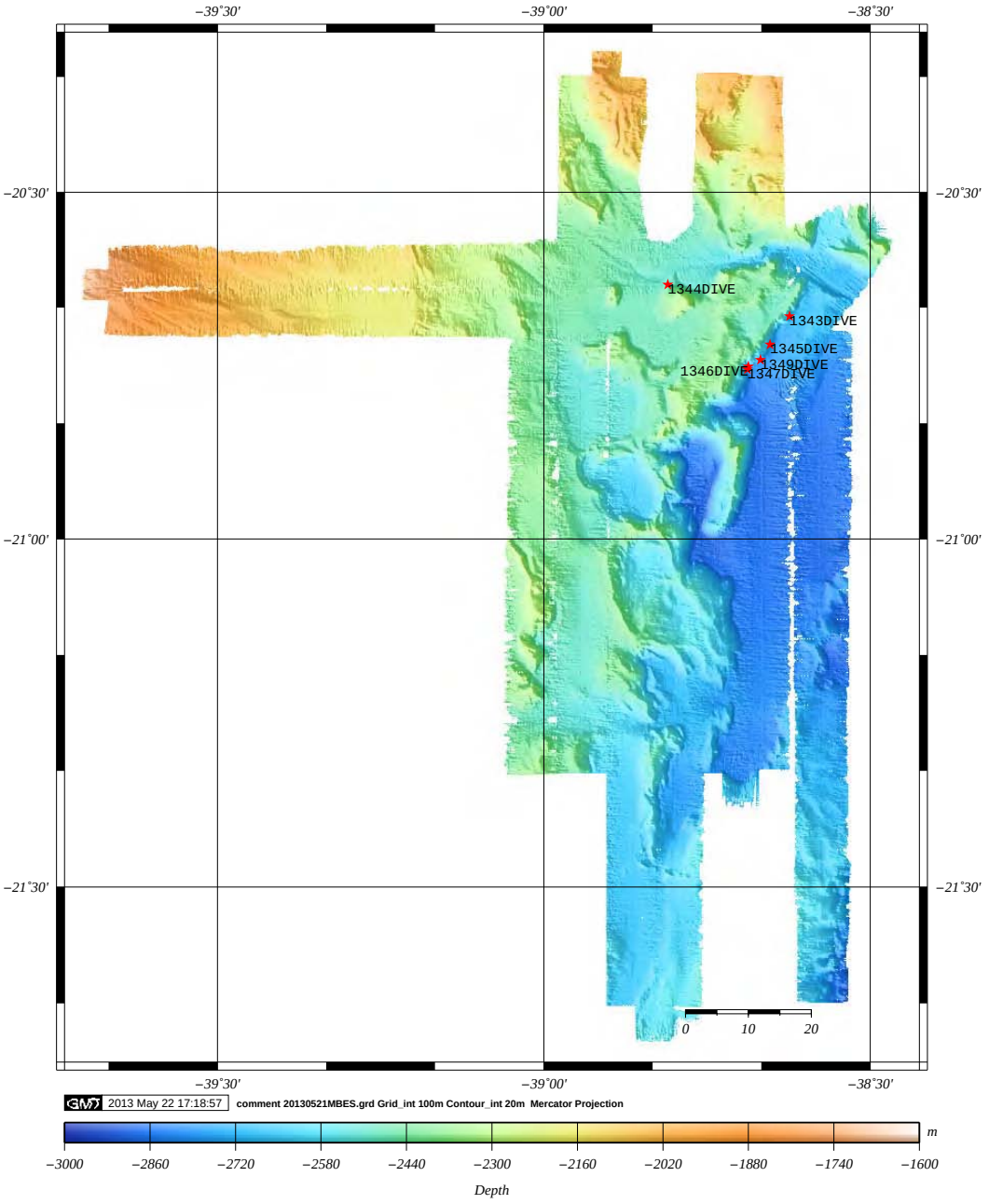

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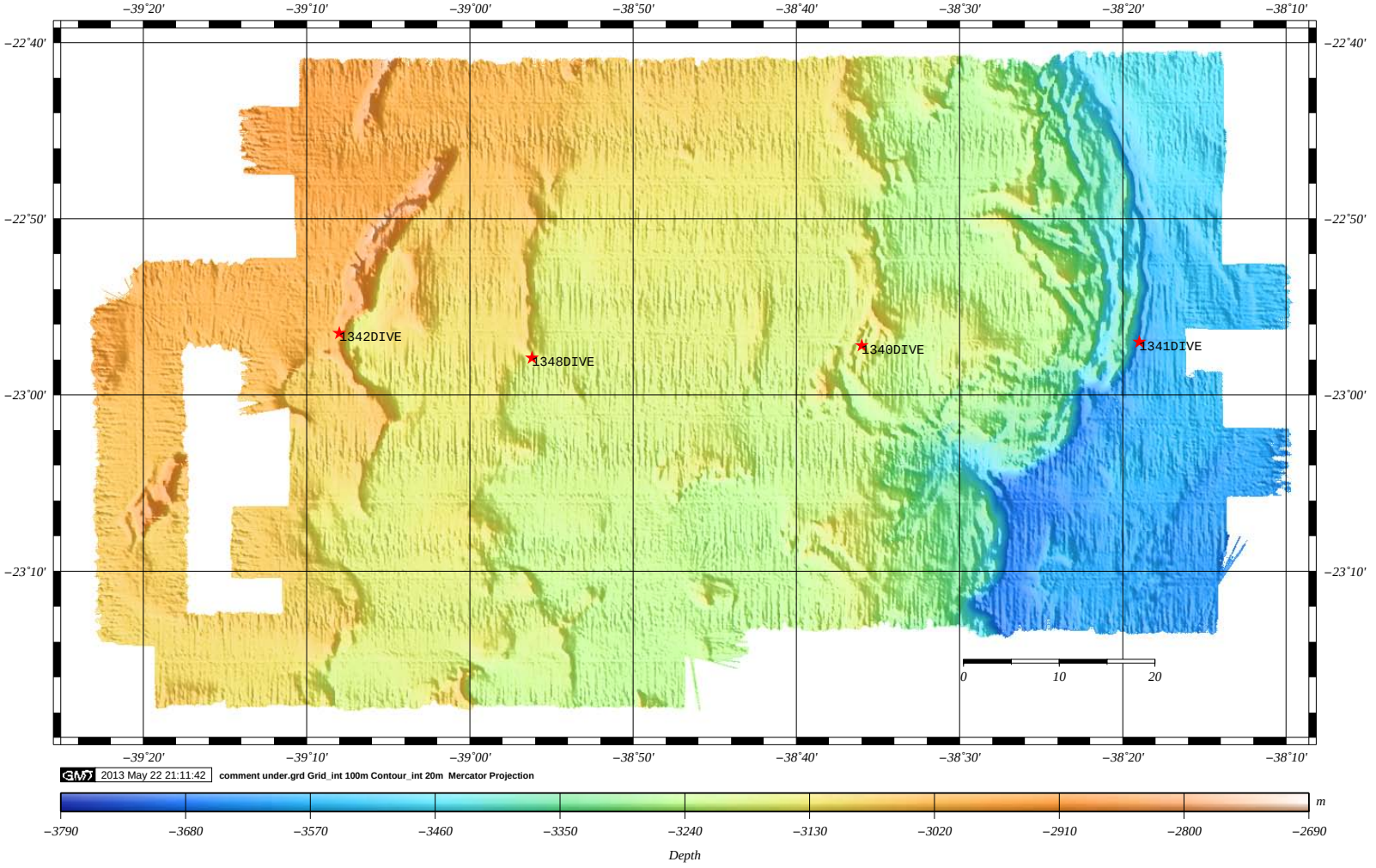

Diving sites of the South São Paulo Plateau, off Brazil

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2-3. The RV Yokosuka ship crew and the HOV Shinkai 6500 operation team (Satomi Manimizawa)

R/V YOKOSUKA Crew List

Captain	HITOSHI TANAKA	Quarter Master	TAKUYA MIYASHITA
Chief Officer	HIROAKI MASUJIMA	Sailor	HIROTAKA SHIGETA
2nd Officer	TAKESHI EGASHIRA	Sailor	YUTA MOTOOKA
3rd Officer	YUMIHIKO KOBAYASHI	Sailor	KENTA NASU
Chief Engineer	EIJI SAKAGUCHI	No.1 Oiler	KOZO MIURA
1st Engineer	TAKASHI OTA	Oiler	KEITA FUNAWATARI
2nd Engineer	KENTA IKEGUCHI	Oiler	YUJI HIGASHIGAWA
3rd Engineer	SHOTA NAGANO	Assistant Oiler	RYO SATO
Chief Radio Off.	TOKINORI NASU	Assistant Oiler	EIJI ARATAKE
2nd Elect. Op.	SHUNSUKE FUKAGAWA	Chief Steward	ISAO MATSUMOTO
3rd Elect.Op	YOSHIKAZU KURAMOTO	Steward	HIDEO FUKUMURA
BoatSwain	KAZUO ABE	Steward	YOSHIO OKADA
Quarter Master	MASANORI OHATA	Steward	SEIJI HONDA
Quarter Master	NAOKI IWASAKI	Steward	NAKAMICHI KANDA

Shinkai6500 Team List

Submersible Op. Manager	TOSHIAKI SAKURAI	2/Submersible Tec. Officer	HITOMI IKEDA
Deputy Submersible Op. Manager	KAZUHIRO CHIBA	2/Submersible Tec. Officer	HIROFUMI UEKI
Deputy Submersible Op. Manager	YOSHITAKA SASAKI	2/Submersible Tec. Officer	KEIGO SUZUKI
1/Submersible Tec. Officer	KAZUKI IIJIMA	2/Submersible Tec. Officer	AKIHISA ISHIKAWA
1/Submersible Tec. Officer	SHINOBU OMIKA	2/Submersible Tec. Officer	TAKUMA ONISHI
1/Submersible Tec. Officer	MITSUHIRO UEKI	2/Submersible Tec. Officer	MASAYA KATAGIRI
1/Submersible Tec. Officer	KEITA MATSUMOTO	3/Submersible Tec. Officer	YUDAI TAYAMA

3. General Investigations

3-1. General Objectives and Background

a. Background Idea for the 2nd Leg in the São Paulo Plateau :

In the São Paulo Plateau area cold seeps associated with natural gas and/or oil seepages are expected occur potentially supporting deep-sea chemosynthetic ecosystems.

The evidences for a presence of biological communities related with the deep-sea chemosynthetic ecosystems in Brazil is based on a presence and intensive exploration of oil, including in the deep water offshore province, the reported presence of seabed pockmarks and a Calyptogena xxx in Santos Bay (Osmar xxx ; Sumida et al, 2004) and the methane presence at Campos bay. Also is known that geological description of a numerous faults can be created by a dynamic of a salt-sediment interaction providing migration of oil and gases from the deep petroleum-generated subsurface to the modern seafloor, as already described in Gulf of Mexico (Roberts & Boland , 2010).

Despite these evidences, biological communities associated with cold seeps or oil seepages were never been described in Brazil.

For this reason chemosynthetic ecosystem studies shall be considered as the main goal of this cruise and the first priority for the dives using Shinkai 6500 in 2nd Leg was the discovery of methane/sulfide seep communities.

For comparison between chemosynthetic vs non-seep ecosystems, it will be investigated both background and chemosynthetic communities across different sites.

The main goals of study during the 2nd leg are itemized below:

A - Discovery of methane/sulfide seep communities in the São Paulo Plateau

- Understanding geological and geochemical settings of seep community

-Understanding community structure including faunal and microbial composition (diversity), distribution patterns and trophic structure in comparison with non-seep ecosystems.

B- Biogeography and Evolution

- Understanding phylogeny of organisms
- Compare biogeographic patterns and distribution of seep communities
- Understanding adaptation and tolerance for extreme environment
- Physiological and molecular studies of symbiotic associations.

C - Investigation of diversity and metabolism of microorganisms

- Studying diversity and metabolic pathways of microorganisms
- Isolation of culturable microorganisms
- Investigation the production of enzymes in microorganisms.

D - Geochemistry and Geology in the seep fields

- Understanding production mechanism of each chemical component including CH_4 and H_2S
- Understanding gas production mechanisms with the salt diaper
- Investigate the features related to the outcrop of salt massive
- Identification of interaction of AABW and São Paulo Plateau outer escarpment.

b. Dive Plans:

Proposed study sites based on Brazilian previous surveys (Figure 1) were:

1. Area1 - South São Paulo Plateau Outer Escarpment (SSPPOE) PT 1-4 (Figure 1)
2. Area2 - North São Paulo Plateau Outer Escarpment (NSPPOE) PT 5 & 6 (Figure 2)

Among the sampling sites (Figure 3), PT 3 and 4 in the SSPPOE and PT 6 in the NSPPOE have high possibility of seep community existence and were considered as priority sites for exploration in order to identify areas with seepage activity (see dive reports for details).

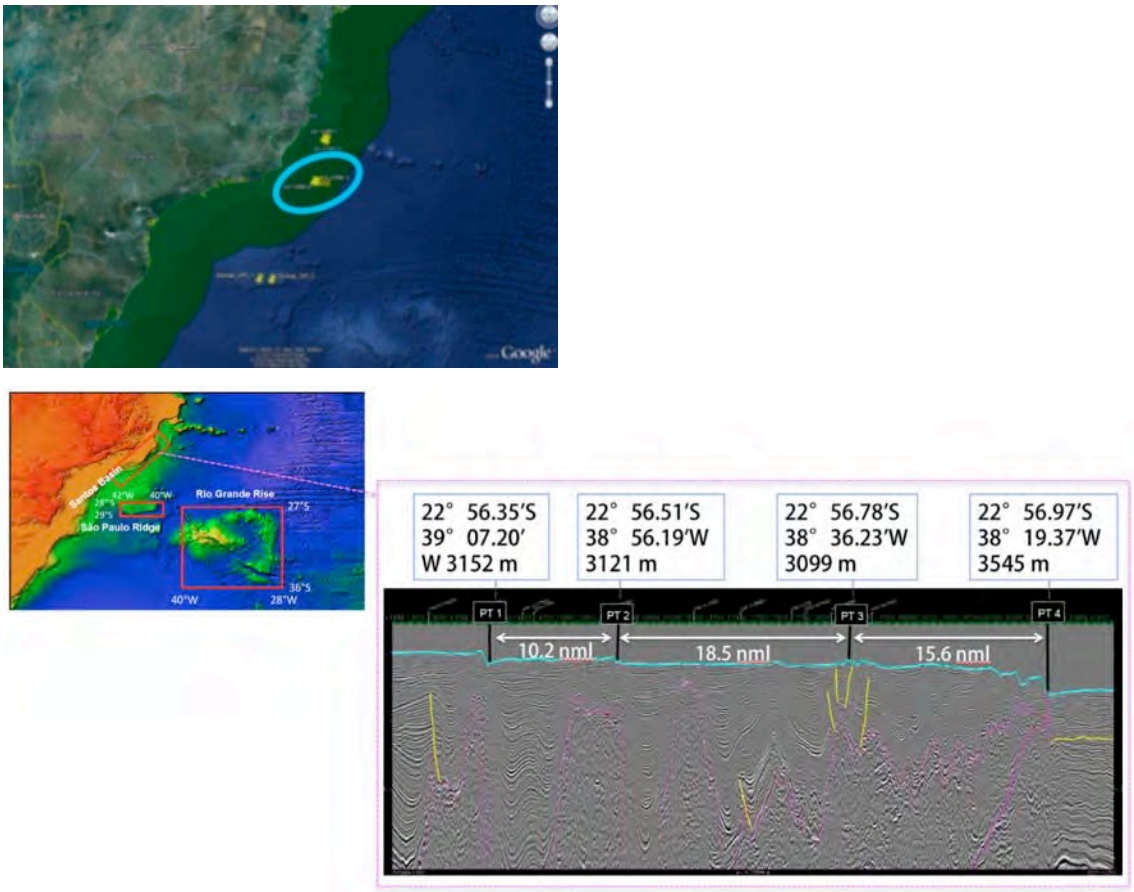


Figure 1. Area 1- South São Paulo Plateau Outer Escarpment (SSPPOE) (upper panel), PT 1 – 4 (lower panel).

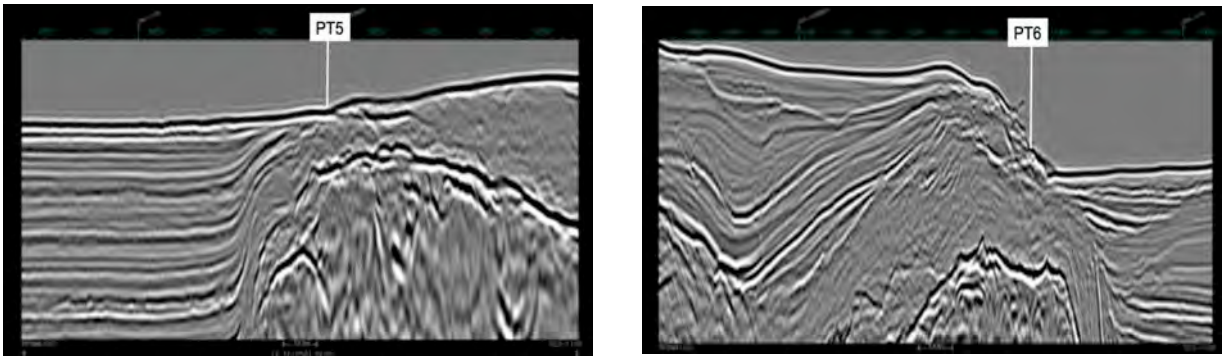


Figure 2. Area 2- North São Paulo Plateau Outer Escarpment (NSPPOE) (upper panel), PT 5 & 6 (lower panel).

3-2. Methods and Instruments

3-2-1. RV Yokosuka including MBES, Gravity and Magneto meters

Research Vessel YOKOSUKA

R/V YOKOSUKA is designed serve as the mother vessel for SHINKAI 6500 and Autonomous Underwater Vehicle (AUV) URASHIMA. It has silent engine, an advanced acoustic navigation systems and an underwater telephone for its state of the art operations. There are 4 laboratories on Yokosuka, No.1-No.3 laboratories and No.1 Study room. No.1 Lab. has dry space. The permanent installations are an video editing system, a PC and a printer. No.2 Lab. has semi-dry and wet space. There are two freezers (-40 & -80 deg.C), a incubator, a Milli-Q, and a fumigation chamber at dry one, and wet one has a rock saw. No.3 Lab. has dry space with storage. No.1 Study room has dry space, there are a gravity meter, a data acquisition system of gravity meter, a 3 axis fluxgate magnet meter and also a proton magnet meter, a work station for data processing, and a A0 size plotter.

The general specifications of R/V YOKOSUKA

Length overall	105.2 m
Beam overall	16.0 m
Depth	7.3 m
Draft	4.5 m
Gross tonnage	4,439 tons
Service speed	16knot
Main propulsion system Diesel engines	2,206kW x 2
Main propulsion method	Controllable pitch propeller x 2

Complement

Crew	27 persons
Submersible operation staff	18 persons
Researchers	15 persons
	Total 60 persons

R/V YOKOSUKA Sea Beam / magnetometers / gravity meter

YOKOSUKA is equipped with various kinds of underway geophysical equipment, a multi narrow beam echo sounder (Sea Beam 2112.004, Sea Beam Instruments, Inc.), a gravity meter (Type S-63, LaCoste & Romberg Gravity Meters Inc.), a ship borne 3 axis magnet meter (Type SFG-1212, Tierra Technica Inc.), and a proton magnet meter (Type STC 10, Kawasaki Geological Engineering Co., Ltd.). The specifications of these instruments are listed below.

The specifications of Seabeam

Measurement depth (m)	100 ~ 11,000
Measurement range (deg.)	90 ~ 150
Measurement frequency (kHz)	12
Measurement method	cross fan beam style
Accuracy	0.2% (center) ~ 0.5% (outer)
Beam width (deg.)	2
Beam interval (deg.)	1
Swath width (deg.)	150 (~ 300m)
	120 (~ 4,500m)
	100 (~ 8,000m)
	90 (~ 11,000m)
Sampling rate (msec.)	1.33 or 2.67
Roll (deg.)	±20
Pitch (deg.)	±7.5

The specifications of Gravity meter

Measurement range (m Gal)	12,000
Drift	3mGal per month or less
Stabilized platform	
Platform pitch(deg.)	±22
Platform roll(deg.)	±25
Platform period(min.)	4 to 4.5
Beam interval(deg.)	1
Control system	
Recording rate(Hz)	1
Serial out put	RS-232
System performance	
Resolution (mGal)	0.01
Static repeatability (mGal)	0.05
50,000m Gal horizontal acceleration (mGal)	0.25
100,000m Gal horizontal acceleration (mGal)	0.50
100,000m Gal vertical acceleration (mGal)	0.25
Dimension (cm)	71×56×84
Weight (kg)	Meter:86, UPS:30

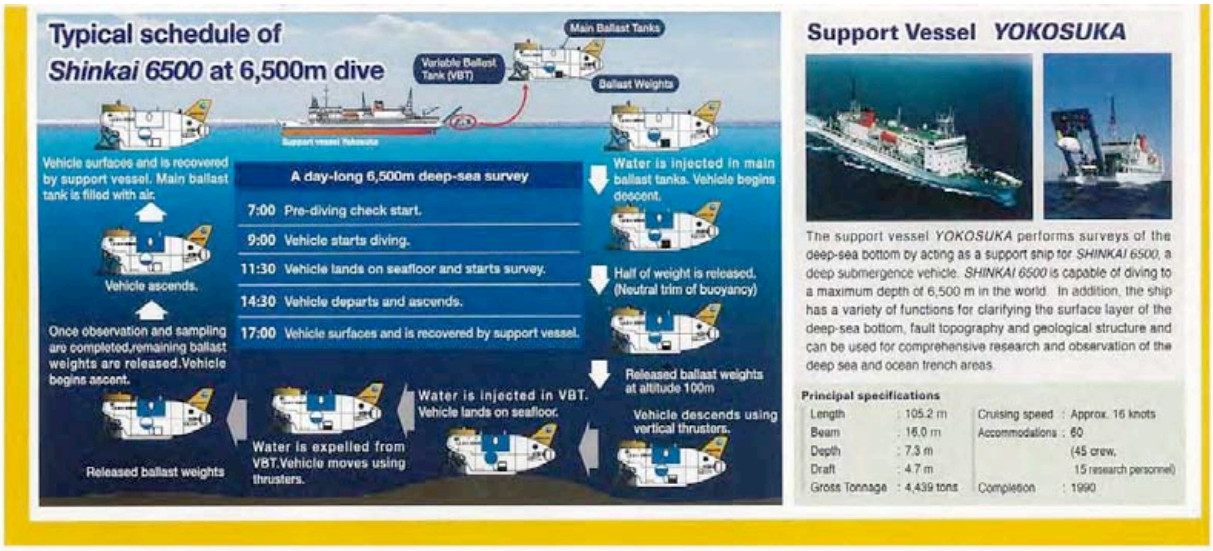
The specifications of 3 axis magnet meter

System	ring core fluxgate
Number of component directly	3 axes
Cable length (m)	50
Sensor dimension (mm)	φ280×130H
Measurement range (nT)	±100000
Resolution (nT)	1

The specifications of Proton magnet meter

Measurement range (nT)	3 ~ 7 x 10**4
Resolution (nT)	0.01
Sampling rate	10sec, 20sec, 1min, manual, external
Time of applying field(sec.)	3 to 10
Sensor dimension (mm)	φ200×1050
Weight (kg)	28.6(in the air), 6.2(in the sea)

3-2-2. HOV Shinkai 6500 (Katsunori Fujikura)



3-2-3. Payloads and equipments loaded to the HOV Shinkai 6500

Nine Shinkai 6500 dives were carried on the study areas and the payloads are indicated in the table below.

Time table of payload arrangement

12th May:

- Slurp gun (suction sampler), 1
- Niskin bottles (1.9L), 2 (red and green)
- Bag water sampler, 1
- H-type push corers, no. 1-9
- Scoop sampler, 1
- Sample black box, 1
- Sample black containers for rocks with 3 divided small rooms, 1
- Marker buoys, 2
- Suction sampler + single-canister
- CTD/DO, 1
- ROV Homer, 1
- Video cameras, No. 1 and 2
- Digital still camera equipped on HOV, 1
- Digital still cameras installed in pressure hull

13-16th May: Sterile corers, 2 added.
17-18th May: new DO sensor added.
19-20th May: H-type corers, no. 1-12 (10-12 added).

Fig. 1. A representative of the payloads viewed from the front bay of 6K.

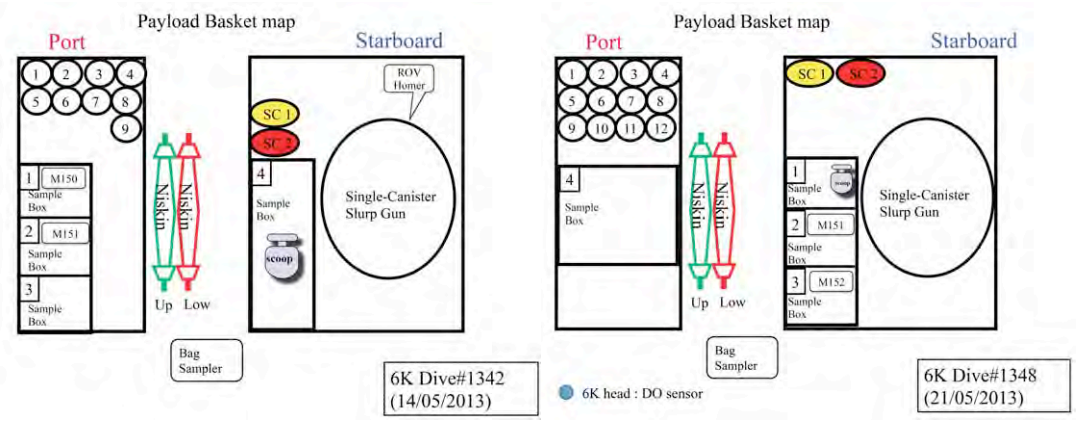


Fig. 2. Two types of the payloads viewed from the top of 6K.

・Slurp Gun (suction sampler) [21X21X58cm, 16.5kg]

Collection of fragile benthic materials was conducted with this sampler. The nozzle attached to the right hand of the manipulator was connected to a single cubic canister, which enable to keep samples in a closed condition.

・Sample boxes

Two sample boxes were loaded in front of the vehicle. They were used to keep specimens collected by a scoop and manipulator.

・Niskin water sampler [φ338X905cm, 40kg in air, 28kg in water]

Niskin green and red samplers were located at a side of corers for obtaining of seawater.

・Bag water sampler [40X20X27cm, 4kg in air]

One bag sampler was used for obtaining a mass of seawater.

・H-type push corers [φ20X50cm, 2.6kg in air, 1.2kg in water]

・Sterile push corers [φ7.5X42cm, 2kg in air]

Because of the more needs of core samples in later dives, the same type of push corers were added as figure 2. Also, we added two sterile corers for bacterial samplings.

Fig. 3. Two types of the core arrangement viewed from the front bay of 6K.

Fig. 4. The sterile push corers, black sample box, and slurp gun viewed from the right side of 6K.

・CTD-DO provided by 6K team

・DO sensor. [φ54X245cm, 0.9kg in air, 0.6kg in water]

The general sensor called CTD-DO to record the real time concentration of dissolved oxygen and temperature is equipped at the dorsal top of 6K from the first dive. A new DO sensor was additionally equipped with CTD-DO since 17th dive, because the CTD-DO might provide doubtful data due to unknown reason. Finally the two sensor could provide very similar data plots, suggesting CTD-DO was normally working trough the all dives.

・ROV homer (equipped but not placed)

The ROV homer was equipped, but it was not placed on the sea bottom in this cruise.

Fig. 5. The CTD-DO (left), DO sensor (center), and ROV-homer (right).

4. Science

4-1. Meio, Macro and Mega Biology

4-1-1. Objectives

Cold seep communities are often represented by a number of invertebrate species including organisms with chemosynthetic symbiosis as well as heterotrophic fauna. Seeps occur at active and passive margins and are often associated with the presence of oil and gas in sub-surface reservoirs (Levin, 2005). Previous research has identified the existence of pockmarks in the Santos Basin and therefore this cruise expected to explore and find evidence of oil and/or gas seep communities in the Brazilian margin (Sumida et al., 2004). Here we aimed to look at community structure, trophic ecology and invertebrate symbiosis of seep associated fauna in the SE Brazilian margin.

4-1-2. Methods

Two target areas (A1 and A2) for exploration of seep ecosystems at the Brazilian margin have been previously defined by the research team (see Cruise Information for details). Scientific dives with the Shinkai 6500 will be conducted to explore candidate sites for seep occurrence. The area will be surveyed, filmed and photographed. Shinkai payloads for biodiversity sampling will include push cores, slurp gun and biological boxes. If seeps are found, samples in specific seep habitats and at different sites will be conducted, and large animals will be sampled for taxonomic, phylogenetic, biogeographic and molecular work.

In laboratory, sediment samples for macro and meiofauna (0-10 cm layer from push cores) will be preserved in Ethanol 99.5%. Sediments will be further sieved at 300 and 42 μm sieves, sorted and the fauna identified for community analysis. Megafaunal organisms (i.e. larger than 1 cm) will be sampled for trophic and molecular analysis, preserved in ethanol 99.5% or frozen, and processed on land. Organisms will also be preserved in formalin 4% for future taxonomic work.

4-1-3. Preliminary results and discussions

A total of 9 Shinkai dives were taken in the South and North Sao Paulo Plateu Areas, but no methane seeps were encountered. Typical deep-sea sediments interspersed with large mudstones and manganese nodules dominated most sites. Other areas exhibited a rough topography with the presence of high rocky cliffs. At the Northern Area (PT-6), oil seepages were discovered in several sites and consisted of large blocks of biodegraded oil lying over the seabed.

Push core samples were collected at all dive sites as well as megafaunal organisms including sponges, galatheid crabs, seastars and holothurians (Table below).

Dive # / Area / Site	N of push cores	Habitat	Megafaunal organisms	Other samples
1340 / A1 / PT-3	3	Mud sediment	Squat lobster (1)	
1341 / A1 / PT-4	3	Mud sediment		
1342 / A1 / PT-1	1	Mud sediment		
1343 / A2 / PT-6	3	Mud sediment	Hydrozoan (1), Sponges (5), Urchin (1)	Associated fauna (Sponges)
1344 / A2 / PT-6	3	Mud sediment	Sponges (2)	Associated fauna

				(Sponges)
1345 / A2 / PT-6	4	Sediment near oil	Sponges (3), Crab (1), Ascidian (1), Ophiuroid (1)	Scoop sample (>500μm), Oil sediments (>2mm, >500μm), Associated fauna
1346 / A2 / PT-6	4	Sediment near oil	Sponges (2), Seastar (1)	
1347 / A2 / PT-6	4	Mud sediment		Scoop sample (>500μm)
1348 / A1 / PT-2	5	Mud sediment	Sponge (1)	Sea cucumbers (2)

We have sampled a number of deep-sea organisms during the nine Shinkai dives in the São Paulo Plateau. Megafaunal organisms such as sponges, sea stars, ophiuroids and sea cucumbers were characteristic of the typical deep-sea mud plains observed in several sites. We have found several organisms associated with sponges, including polychaetes, amphipods and isopods, and these were also sampled for detailed taxonomic and ecological investigations. The site with oil seepage was also investigated at some detail, and we had the opportunity to sample push cores, scoop samples and a few megafaunal organisms near the biodegraded oil. Unfortunately the weather did not allow a last dive that would be targeting a more rigorous assessment of the biology associated with those structures.

4-1-4. References

Levin, L. 2005. Ecology of Cold Seep Sediments: Interactions of fauna with flow, chemistry and microbes. *Oceanography and Marine Biology: An Annual Review*, 43, 1-46

Sumida, P.Y.G.; Yoshinaga, M.Y.; Madureira, L.A.S.; Hovland, M. 2004. Seabed pockmarks associated with deepwater corals in the SE Brazilian Continental Slope, Santos Basin. *Marine Geology*, 207: 159-167

4-2. Microbiology

4-2-1. Objectives

- Describe the diversity of microorganisms such as, fungi, bacteria and archaea in water, sediment and fauna samples, as well as in chemosynthetic habitats at São Paulo Plateau using culture-dependent methods and molecular biology methods.
- Cultivate microorganisms related to chemosynthetic habitats, with a focus on methanogenic archaea, methanotrophic bacteria, and sulfur oxidising bacteria.

4-2-2. Methods

Samples for microbiology collected during Shinkai 6500 dives were:

- Sediment samples collected by push cores, or sterilised samplers
- Water samples collected in Niskin bottles and water bags
- Oil rock samples collected by manipulator
- Some deep-sea animal samples (sponges, crab) collected by slurp gun

The samples will be used for cultivation experiments (enrichment of cultures at controlled atmosphere

conditions, enrichment of culture by selective media) and molecular diversity assessments (metagenomics, quantitative PCR, fluorescent *in situ* hybridization - FISH). The lab work at R/V Yokosuka concentrated on processing and preserving collected samples for these studies . The procedures are summarised in Table 1.

Table 1. Sample processing procedures adopted during leg 2.

Sample	**Research focus**	**Processing**	**Vial**	**Storage**
Sediment	DNA studies	Sediment cores were cut at the first centimeter and then at every three centimeters	Whirl pack	-80^{o}C, no preservatives
	RNA studies		15mL falcon tubes	-80^{o}C, in RNA holder solution
	FISH		15mL falcon tubes; criogenic tubes	-20^{o}C, in fixation buffer
	Cultivation	Sediment from all layers were mixed	15mL falcon tubes, serum bottle flasks	4^{o}C in seawater, or in MJ medium under anaerobic and aerobic conditions
Water	DNA studies	Samples were filtered in 0.22µm cellulose esther membranes	Criogenic tubes	-80^{o}C, in DNA extraction buffer
	RNA studies		Criogenic tubes	-80 ^{o}C, in RNA holder solution
	FISH		15mL Falcon tubes	-20^{o}C, in fixation buffer
	Cultivation		100mL serum bottles	-4oC, in synthethic seawater under aerobic conditions
			Falcon tubes	-80^{o}C, no preservatives
Oil samples	DNA		Falcon tubes and whirl packs	-80^{o}C, no preservatives
	Cultivation		100mL serum bottles	-4^{o}C, in synthethic seawater under aerobic and anaerobic conditions

4-2-3. Preliminary results and discussions

Sediment cores were processed in the on board laboratory, photographed and described for general features

(color, type, presence of distinguished features). We did not find evidence of a chemosynthetic seep community during this cruise. However, a unique oil seep community was observed at dive point 6. The diversity of microorganisms in sediments collected at this oil seeps area will be investigated and compared with non-oil exsistent location. Microbial communities will also be compared at different depths from the surface of the sea floor and geochemical background data. .

4-3. Geochemistry

4-3-1. Objectives

A) Evaluation of chemical flux of cold seepage

Flux of reduced chemical species such as methane and hydrogen sulfide is one of the important factors for evaluating potential how many biomass can sustain at the seepage. For estimation of chemical flux at cold seepage we plan to measure the following chemical species in pore fluids together with overlying seawater; major anions and cations (Cl^-, SO_4^{2-}, Na^+, Mg^{2+}, K^+, Ca^{2+}), silica, H_2S, Br^-, PO_4^{3-}, CH_4, NH_4^+, NO_3^{2-}, and some metals in the pore fluids squeezing from sediment samples obtained by push corer and divided several centimeter intervals.

B) Evaluation of potential energy and food source for seep community

Cold seep community is usually sustained by chemoautotrophic and methanotrophic primary production without photoautotrophic production. For evaluate actual energy source and food source of the community we plan to measure stable isotopic compositions of C, N, and S and lipid biomarker compositions (fatty acids, steroids, hopanoids, and so on) of animal, sediment and POM (particulate organic matter). In addition to those analyses, if necessary, we will measure molecular specific carbon and nitrogen isotopic ratios of lipid and amino acids extracted from animal and potential food sources such as surface sediments and POM.

4-3-2. Methods of onboard analyses

Measurement of pH and determination of titration alkalinity for the seawater samples were conducted onboard, as soon as possible after recovery. Silica and ammonia concentrations of the seawater and pore fluid samples were determined by colorimetric techniques immediately after recovering the samples on deck and squeezing from core sediments. The molybdenum blue method was used for silica, and the indophenol method was used for ammonia, as described in Gieskes et al. (1991).

For onshore laboratory analyses, seawater and pore fluid samples for dissolved ion measurement were filtered using 0.45μm membrane filter and some of them were acidified with ultra pure hydrochloric acids, then stored in a refrigerator or freezer. POM in the seawater samples was filtrated using a glass fiber filter (GC-50/Advantec Corp., pore size 0.5μm, pre heated at 450˚C/3h) and frozen in a deep freezer (–80˚C). Sediment samples were also frozen in a deep freezer.

4-3-3. Preliminary results and discussion

Table shows the result of onboard analyses. The results suggest that any signature of seeping fluid from deep subsurface is not detected from the recovered seawater and sediment core samples. One core sample recovered from oil seep area (6k#1345 H-1) shows slightly higher silica concentration in the pore fluids, however, the reason is unclear for the present. Further study is required.

Table Tentative data of onboard chemical analyses (YK13-04 leg.2)

Dive #	Type	Sample ID	Si (μM/kg)	NH_4^+ (μM/kg)	pH	Remark
1340	Niskin	N-G	51.93	3.32	8.44	just leaving seafloor
	Core H-1	H-1-0	39.67	3.84	8.02	
		H-1-1	61.71	33.05		
		H-1-2	90.05	24.37		
		H-1-3	108.86	20.16		
		H-1-4	121.95	47.26		
		H-1-5	136.95	21.74		
	Core H-2	H-2-0	52.17	5.68	7.88	
1341	Niskin	N-G	59.67	4.37	7.89	just leaving seafloor
	Core H-1	H-1-0	52.40	7.00	7.89	
	Core H-2	H-2-0	59.19	3.84	7.68	
1342	Niskin	N-R	38.40	≤3	7.87	
1343	Niskin	N-R	40.07	≤3	7.93	just leaving seafloor
		N-G	27.57	≤3	7.82	2000m
	Core H-1	H-1-0	32.57	≤3	7.86	
		H-1-1	78.00	19.58		
		H-1-2	95.62	12.21		
		H-1-3	95.38	6.16		
		H-1-4	98.48	41.68		
		H-1-5	104.43	30.11		
		H-1-6	111.33	30.11		
1344	Niskin	N-R	27.69	≤3	7.78	750m
		N-G	37.69	≤3	7.87	just leaving seafloor
1345	Niskin	N-R	38.52	7.73	7.86	
		N-G	29.60	4.09	7.80	1500m
	Core H-1	H-1-0	28.05	5.68	7.94	
		H-1-1	66.19	16.14		
		H-1-2	139.60	11.36		
		H-1-3	182.66	15.23		
		H-1-4	213.21	13.41		
		H-1-5	247.14	16.36		
		H-1-6	285.63	13.86		
	Core H-2	H-2-0	37.57	8.64	7.82	contained oil fragments
		H-2-1	63.02	13.18		
		H-2-2	79.48	15.68		
		H-2-3	94.56	16.82		
		H-2-4	96.94	13.18		
		H-2-5	125.32	10.68		

		H-2-6	122.94	11.59		
		H-2-X	75.71	14.32		
		H-2-Y	71.35	11.36		
		H-2-Z	260.24	9.77		
1346	Niskin	N-G	37.33	5.45	7.88	just leaving seafloor
		N-R	35.43	7.05	7.86	2300m
	Core H-1	H-1-0	38.05	6.36	7.78	
		H-1-1	97.54	16.00		
		H-1-2	95.36	16.77		
		H-1-3	95.36	17.73		
		H-1-4	100.71	17.92		
		H-1-5	113.41	12.73		
		H-1-6	101.90	14.65		
	Core H-2	H-2-1	72.31	13.68		
		H-2-2	101.29	11.18		
		H-2-3	95.23	14.21		
		H-2-4	110.00	12.25		
		H-2-5	126.10	11.18		
		H-2-6	126.29	11.54		
		H-2-7	118.14	14.75		
1347	Niskin	N-R	38.64	5.62	7.87	seafloor
		N-G	21.74	6.00	7.83	1750m
1348	Niskin	N-R	44.07	6.54	7.88	seafloor

4-4. Geology and Geophysics

Dive coordinates:

South São Paulo Plateau Outer Escarpment (SSPPOE)

PT1: 22°56.35’S, 39°07.20’W, 3152 m

PT2: 22°56.51’S, 38°56.19’W, 3121 m

PT3: 22°56.78’S, 38°36.23’W, 3099 m

PT4: 22°56.97’S, 38°19.37’W, 3545 m

North São Paulo Plateau Outer Escarpment (NSPPOE)

PT5: 20°38.013’S, 38°48.599’W, 2467 m

PT6: 20°40.745’S, 38°37.424’W, 2657 m

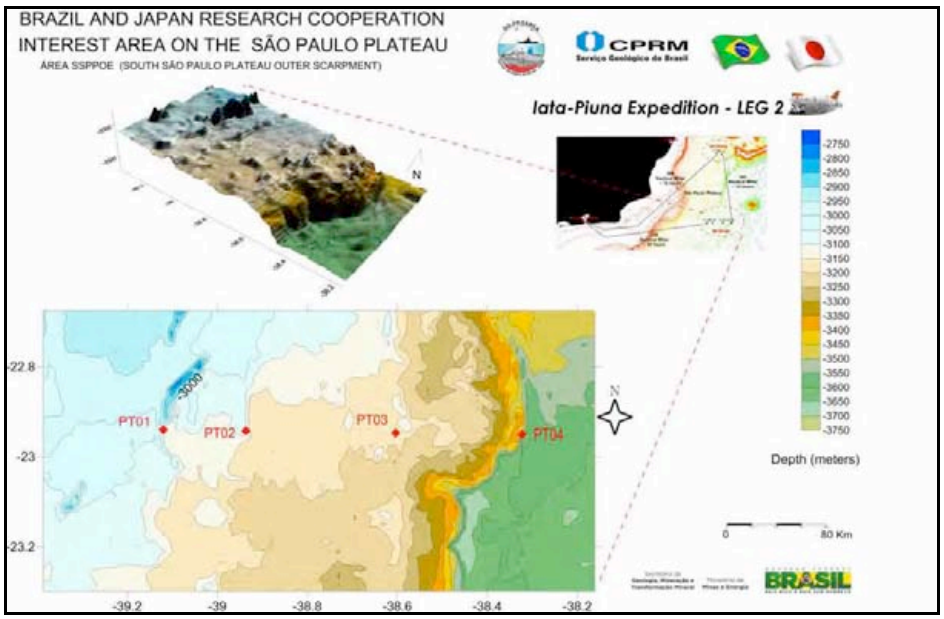


Fig.1 – Dive locations – SSPPOE.

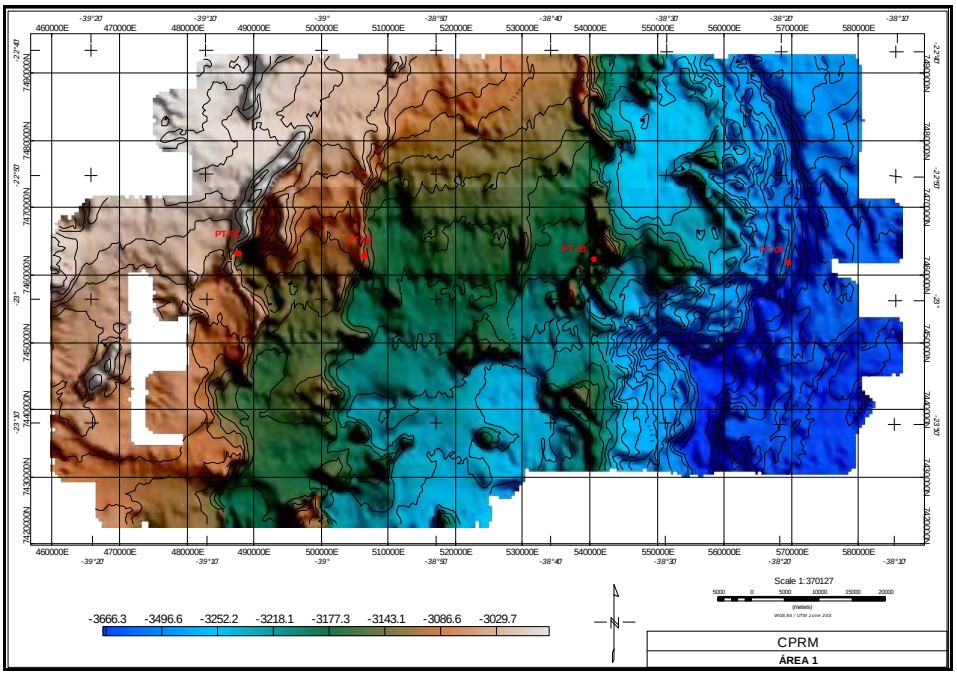


Fig. 2 – Location map of points in SSPPOE área.

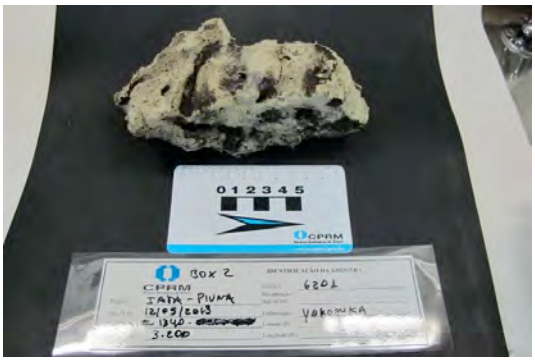
Push-core and rock descriptions:

#1340, Point 3

	Lat	Long	Folder ID
#1340 box 1 (R)	22° 57`	38° 35`	6197
#1340 box 2 (R)	22° 57`	38° 35`	6201
#1340Large Box (R)	22° 57`	38° 35`	6202
#1340 Push Core 6	22° 57`	38° 35`	6190 a 6194
#1340 Push Core 2	22° 57`	38° 35`	x
#1340 Push Core 5	22° 57`	38° 35`	x

	Elipsoidal black manganese nodule with bioclastic nucleous and vugs. No reaction to HCl atack. Some vugs have bioclastic fragments. Approximate dimensions 14 cm X 8 cm X 5 cm.

#1340 box 1 (R)

	Light grey mudstone. Size 15x9x5 cm. Black spots on the surface of the block, not inside. Bioclastic fragments, vugs and burrows.

#1340 box 2 (R)

	Elipsoidal black manganese nodules with bioclastic nucleous and vugs. No reaction to HCl atack. Average dimensions 3 cm X 2 cm X 3 cm.

#1340 Large Box (R)

	Light grey/green mud with pteropods and foram fragments in the top to 2 cm. Bellow 2 cm the mud is homogenous and no bioclastic fragments were observed.

#1340 Push Core 6

	Light grey/green sandy mud with abundant pteropods and foram fragments in the top to 2 cm. Shared sample with USP and UFES.

#1340 Push Core 2

	Light grey/green sandy mud with abundant pteropods and foram fragments in the top to 2 cm. Shared sample with USP and UFES.

#1340 Push Core 5

#1341, Point 4

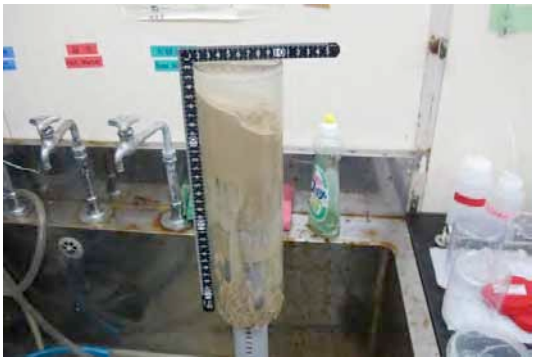
	Lat	Long	Photo Number
#1341 box 1 (R)	22° 57`	38° 19`	6215
#1341 box 2 (R)	22° 57`	38° 20`	6214
#1341 Large Box (R)	x	x	x
#1341 Push Core 6	22° 57`	38° 18`	6209 - 6210
#1341 Push Core 2	22° 57`	38° 20`	6211 a 6212
#1341 Push Core 1	22° 57`	38° 21`	6213

	Elipsoidal black manganese nodule with bioclastic nucleous and vugs. No reaction to HCl atack. Some vugs have bioclastic fragments. Approximate dimension 8 cm X 6 cm X 6 cm.

#1341 box 1 (R)

	Dark Brown siltstone, micaceous, fragile, with a thin manganese crust covering its surface. Approximate size: 10 cm X 5 cm X 2 cm.

#1341 box 2 (R)

	Light Brown mud with bioclast (foram?) fragments on the top.

#1341 Push Core 6

	Light Brown Sandy mud with abundant foram.

#1341 Push Core 1

	Light/dark Brown Sandy mud with abundant foram.

#1341 Push Core 2

#1342, Point 1

	Lat	Long	Photo Number
#1342 Push Core 1	22° 56`	39° 8`	6218 a 6219
#1342 Push Core 6	22° 54`	39° 6`	6220

	Light/dark Brown mud with few bioclasts.

#1342 Push Core 1

	Light/dark Brown mud with few bioclasts.

#1342 Push Core 6

NORTH SÃO PAULO PLATEAU OUTER ESCARPMENT (NSPPOE)

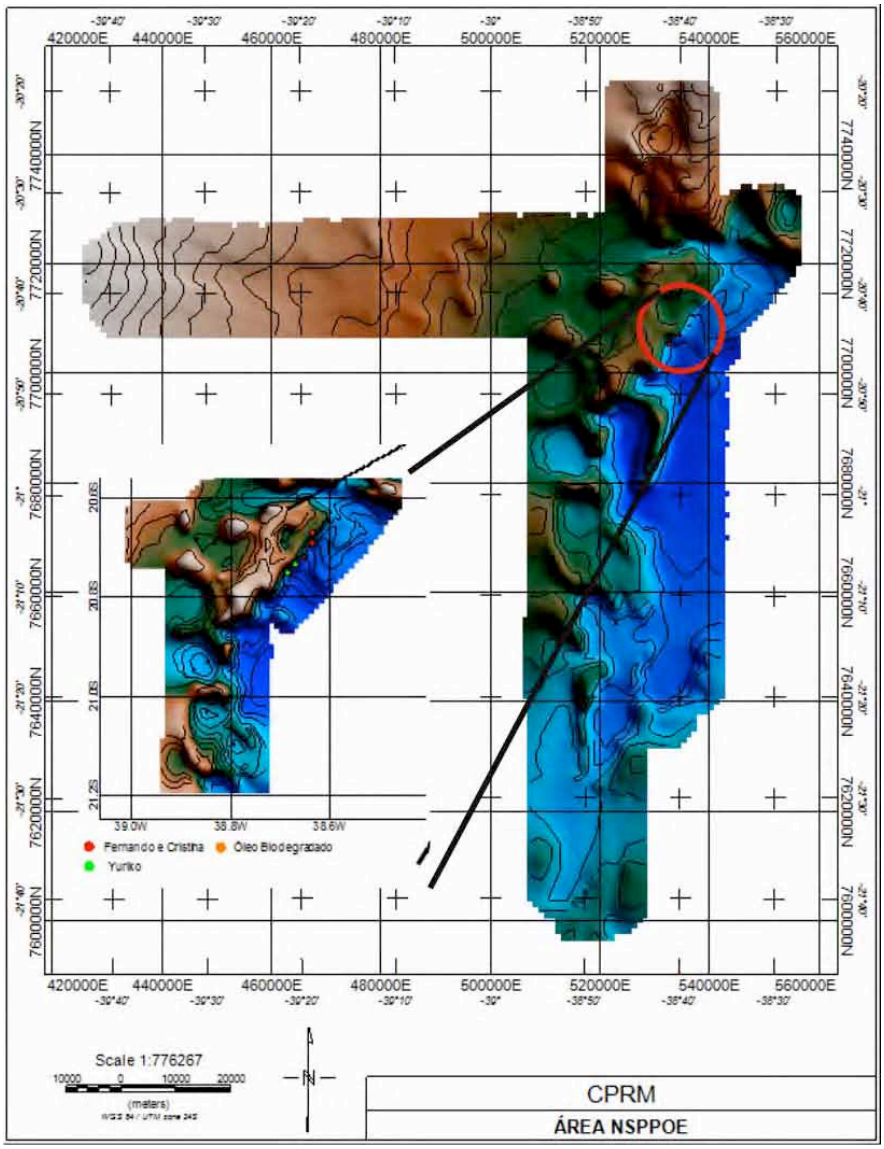


Fig. 3 – Location map of NSPPOE área.

Dives #1343, #1345 e #1346 recovered biodegraded filling-type oil in carbonate rocks (figura 5). General seismic image of points 5 and 6 are shown. Only in point 6 the oil was initially recovered during #1343, followed by #1345 and #1346.

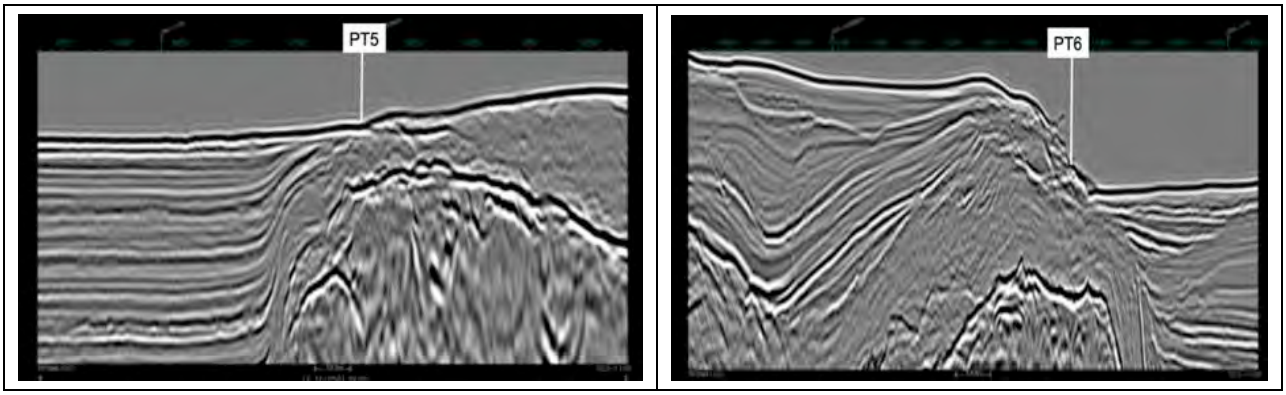


Fig. 4. North São Paulo Plateau Outer Escarpment (NSPPOE), points 5 and 6

Fig. 5 – Biodegraded oil sample from dive 6k#1345, point 6.

#1343 Fernando	-20.6908	-38.636
#1345 Cristina	-20.7033	-38.6468
#1346 Yuriko	-20.7387	-38.6682

#1343, Point 6

	Lat	Long	Photo Number
#1343 box 1 (R)	20° 41`	38° 38`	6224
#1343 Push Core 6	20° 41.6`	38° 38.1`	6228
#1343 Push Core 8	22° 40`	38° 38`	2456

Light grey/light Brown sandy mudstone/limestone with fractures and faults filled by black solid biodegraded oil. Size 5 cm x 7 cm x 3 cm.

#1343 box 1 (R)

Light Brown mud with a few bioclastic fragments.

#1343 Push Core 6

	Light Brown mud with bioclastic fragments.

#1343 Push Core 8

#1344, Point 5

	Lat	Long	Photo Number
#1344 box 1 (R)	20° 38`	38° 47`	6232 a 6233
#1344 Push Core 5	20° 39.103`	38° 46.88`	6230
#1344 Push Core 6	20° 38.0314`	38° 47.1288`	6231

	Light brown mudstone with manganese cover and burrows. Approximate size 15x10x5 cm.

#1344 box 1 (R)

	Medium Brown mud with bioclastic fragments.

#1344 Push Core 5

	Medium Brown mud with bioclastic fragments.

#1344 Push Core 6

#1345, Point 6

	Lat	Long	Photo Number
#1345 box 1 (R)	20° 42.1958`	38° 38.8104`	6261
#1345 Push Core 7	20° 41.4588`	38° 38.1616`	6260
#1345 Push Core 5	20° 42.1958`	38° 38.8104`	6259

	Light grey mudstone/limestone. Size 10x15x8 cm.

#1345 box 1 (R)

	Light Brown mud with abundant bioclasts. Light grey mud in the bottom, probably associated to organic matter enrichment.

#1345 Push Core 7

	Light Brown mud with abundant bioclasts.

#1345 Push Core 5

#1346, Point 6

	Lat	Long	Photo Number
#1346 box 1 (R)	20° 44.3196`	38° 40.0896`	6283 a 6288, 6294
#1346 Push Core 5	20° 44.3196`	38° 40.0896`	6295
#1346 Push Core 7	20° 44.3214`	38° 40.0988`	6293

	Black biodegraded oil from outcrops and seafloor sediments. Approximate blocks size 5x3x4 cm

#1346 box 1 (R)

	Light grey mud._

#1346 Push Core 5

	Light grey sandy mud._

#1345 Push Core 7

#1347, Point 6

	Lat	Long	Photo Number
#1347 box 2 (R)	20° 44.2866`	38° 40.1269`	6297
#1347 Push Core 6	20° 44.2685`	38° 40.1876`	6296

	Light Brown mudstone/limestone with bioturbations? Manganese covering the surface. Approximate size: 14x2,5x12 cm.

#1347 box 2 (R) –

	Medium/dark Brown sandy mud.

#1347 Push Core 6

#1348, Point 2

	Lat	Long	Photo Number
#1348 Push Core 6	20° 44.2866`	38° 40.1269`	6297
#1348 Push Core 8	20° 44.2685`	38° 40.1876`	6296

	Medium/dark Brown sandy mud.

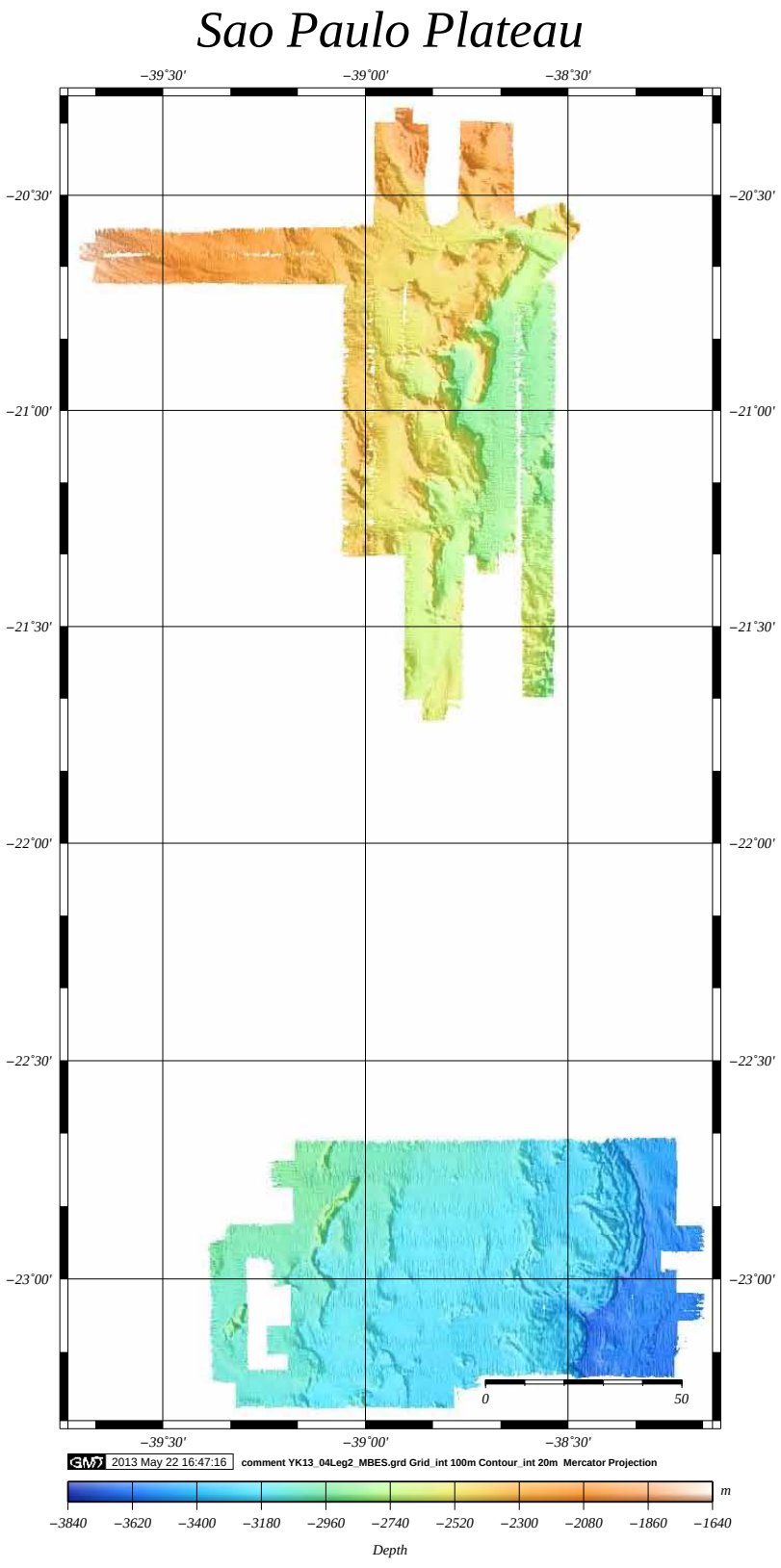
#1348 Push Core 6

	Medium/dark Brown sandy mud.

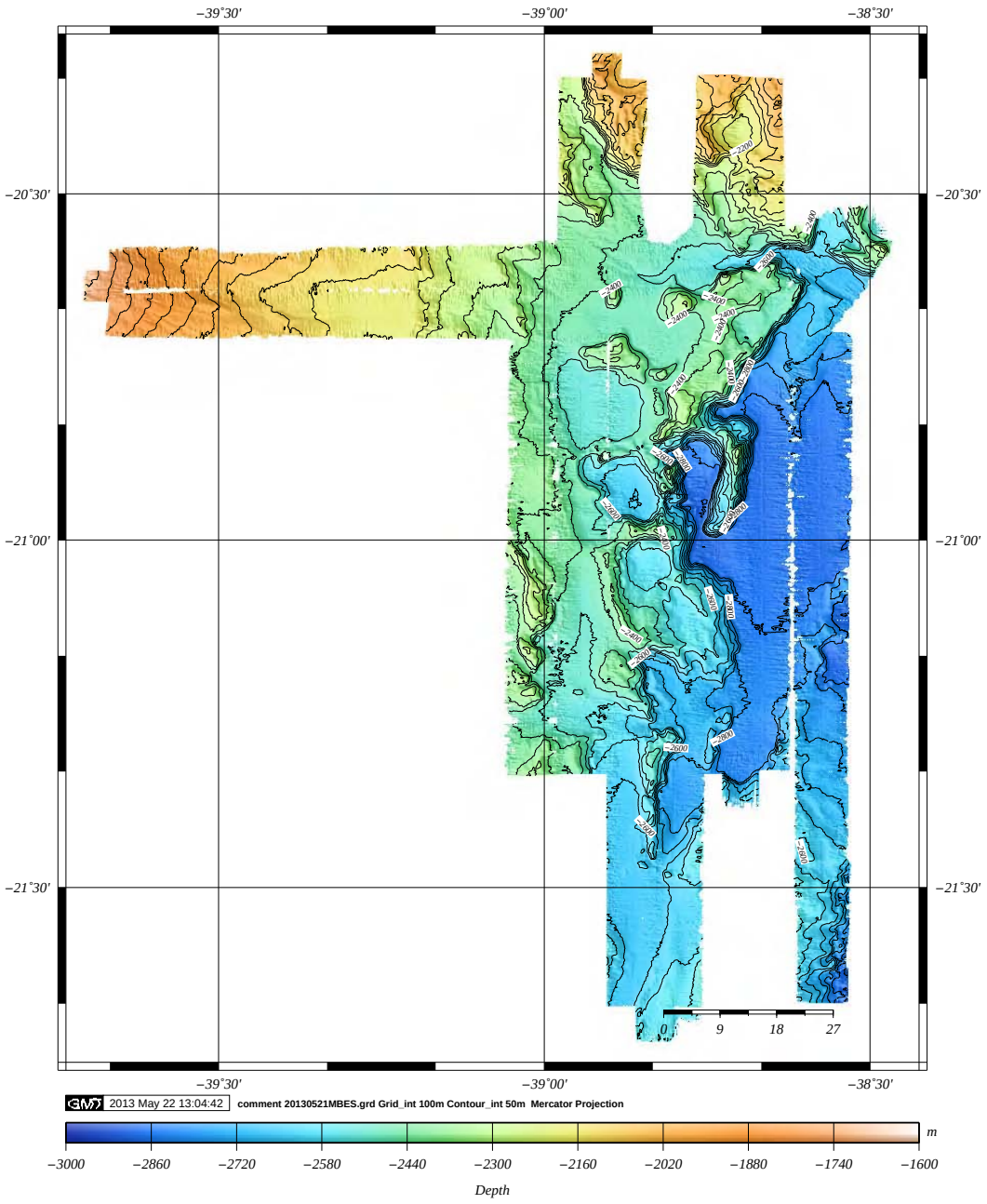
#1348 Push Core 8

4-5. Topography

4-5-1. Preliminary results including maps and SBP

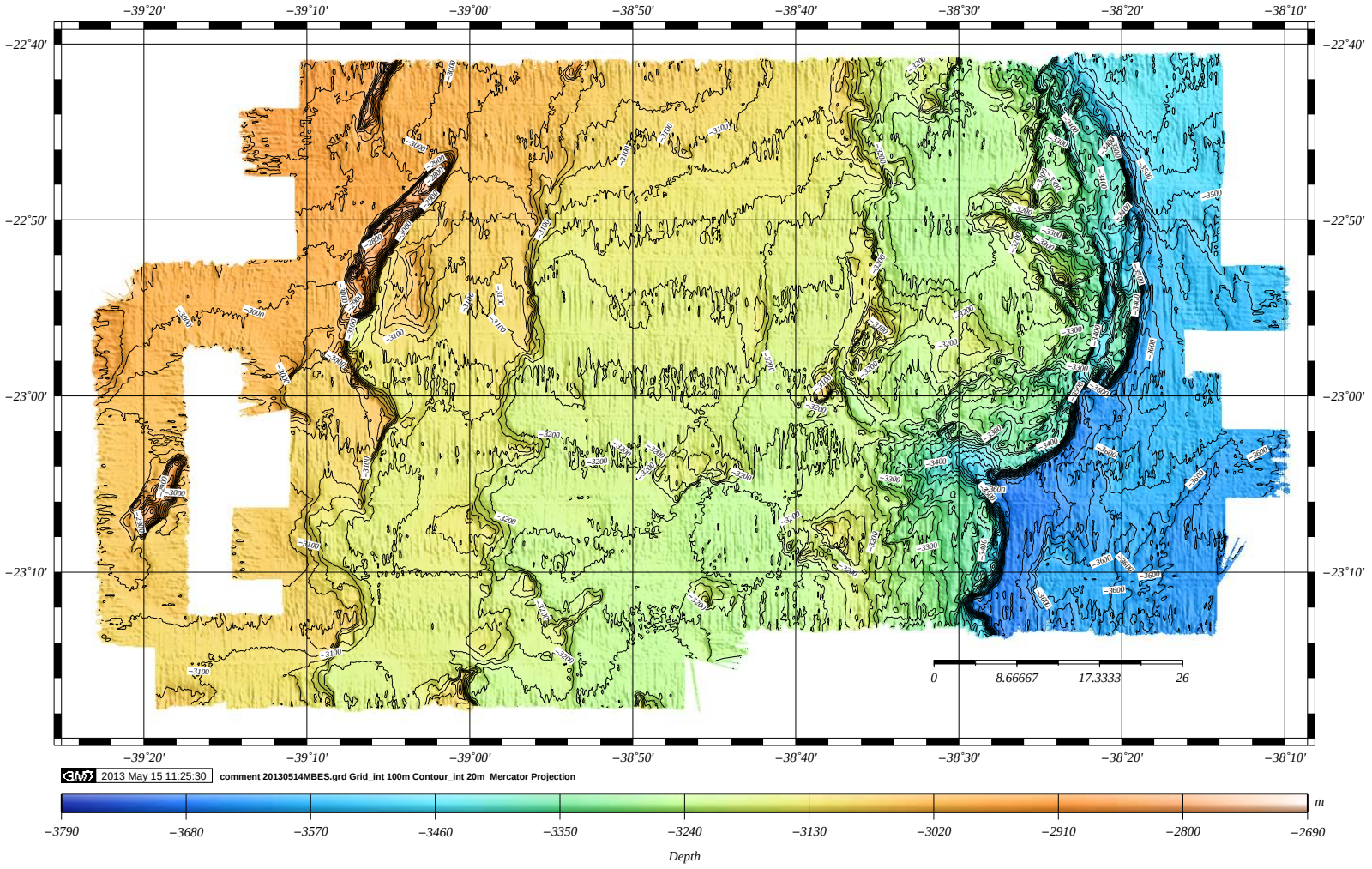


Topography of the São Paulo Plateau.



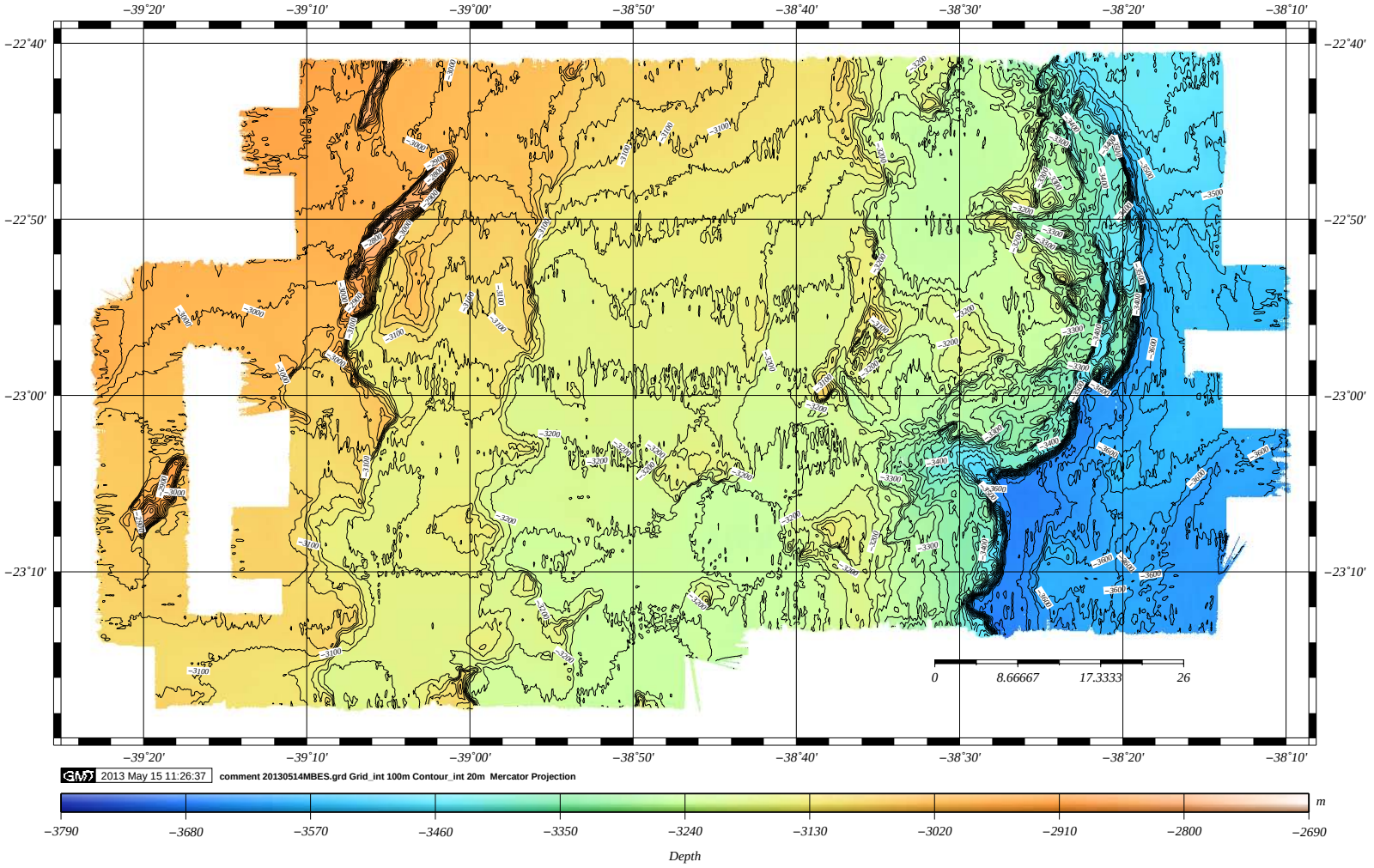
Topography of the North São Paulo Plateau.

YK13−04 5/14 MBES



Topography of the South São Paulo Plateau.

YK13−04 5/14 MBES



Topography of the South São Paulo Plateau.

Multi-Beam Eco-Sounder (MBES) and Sub Bottom Profiles (SBP):

Yokosuka has a MBES sensor fixed on its hull that uses a 12 kHz eco-sounder that can investigate from 50 to 11 meters, with a wide range of 50-150 degrees and maximum of beams of 151, each one with 2 degrees separation. The MBES survey record the topography of the seafloor in all the investigated points. Points 1 to 4 are located at the South Sao Paulo Plateau Outer Escarpment (SSPPOE – Fig. 1), while points 5 and 6 belongs to the North Sao Paulo Plateau Outer Escarpment (NSPPOE – Fig. 2).

Escarpments are very well defined using MBES maps, but characteristics features related to gas seeps, like mounds and pockmarks were not observed on both areas. Structural trends can be observed and suggests a NE-SW trend, parallel to the escarpments, probably caused by salt diapirs activities. Escarpments with shifts of around 100m to 200m can be observed on SSPPOE area. Unfortunately no evidence of gas seeps could be observed during the dives.

Dive #1342 at Point 1 was compromised because the existence of a submarine cable. Dive track was changed and the deeper part of the escarpment was not observed at the dive (Fig. 3). Only the upper part and the slope were visited and no seeps were identified. The shallower zone of Point 1 is a mound with no indication of gas seeps.

The SBP transect to Point 1 shows the topographic shift of ca. 200m clearly, but the high slope gradient does not permit a well response for the sonic waves (Fig. 4). This noise on the signal causes a null return of waves, resulting on a gap on the image. Several blanking zones were identified on both upper and lower sides of the escarpment, suspecting the existence of gas chimneys arriving to the seafloor. However, #1342 did not show any evidence of gas seeps to confirm chimneys occurrence.

Dive #1348 was realized at Point 2, an escarpment of ca. 100m, smaller than the escarpment of Point 1. Dive was executed from the south to the north and no evidence of gas seeps was identified. In fact, Point 2 was ranked as low priority during dives planning because the seismic profile did not show any evidence for gas seepage. There is no topographic feature to support any seep existence on Point 2 (Fig. 5), confirmed by #1348.

The SBP of Point 2 (Fig. 6) revealed same features as the SBP of Point 1, but with less intensity. Gas chimneys are observed and the gap on the topographic record was also identified, showing that steep relief can mask SBP record of Yokosuka at deep zones as observed at the SSPPOE.

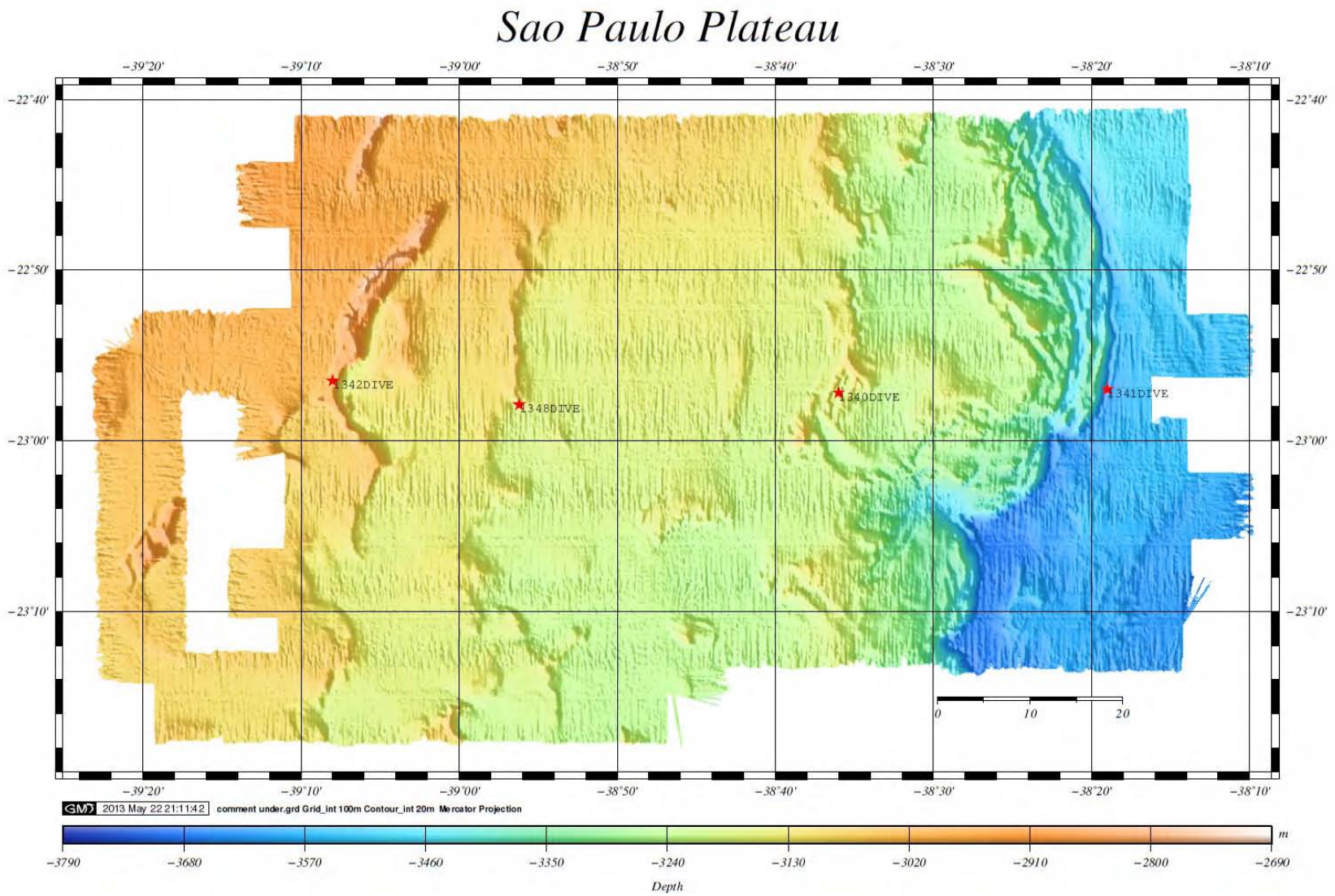


Fig. 1: Multi-Beam Eco-Sounder (MBES) map of the South Sao Paulo Plateau Outer Escarpment (SSPPOE). Location of dives #1342 (Point 1), #1348 (Point 2), #1340 (Point 3) and #1341 (Point 4).

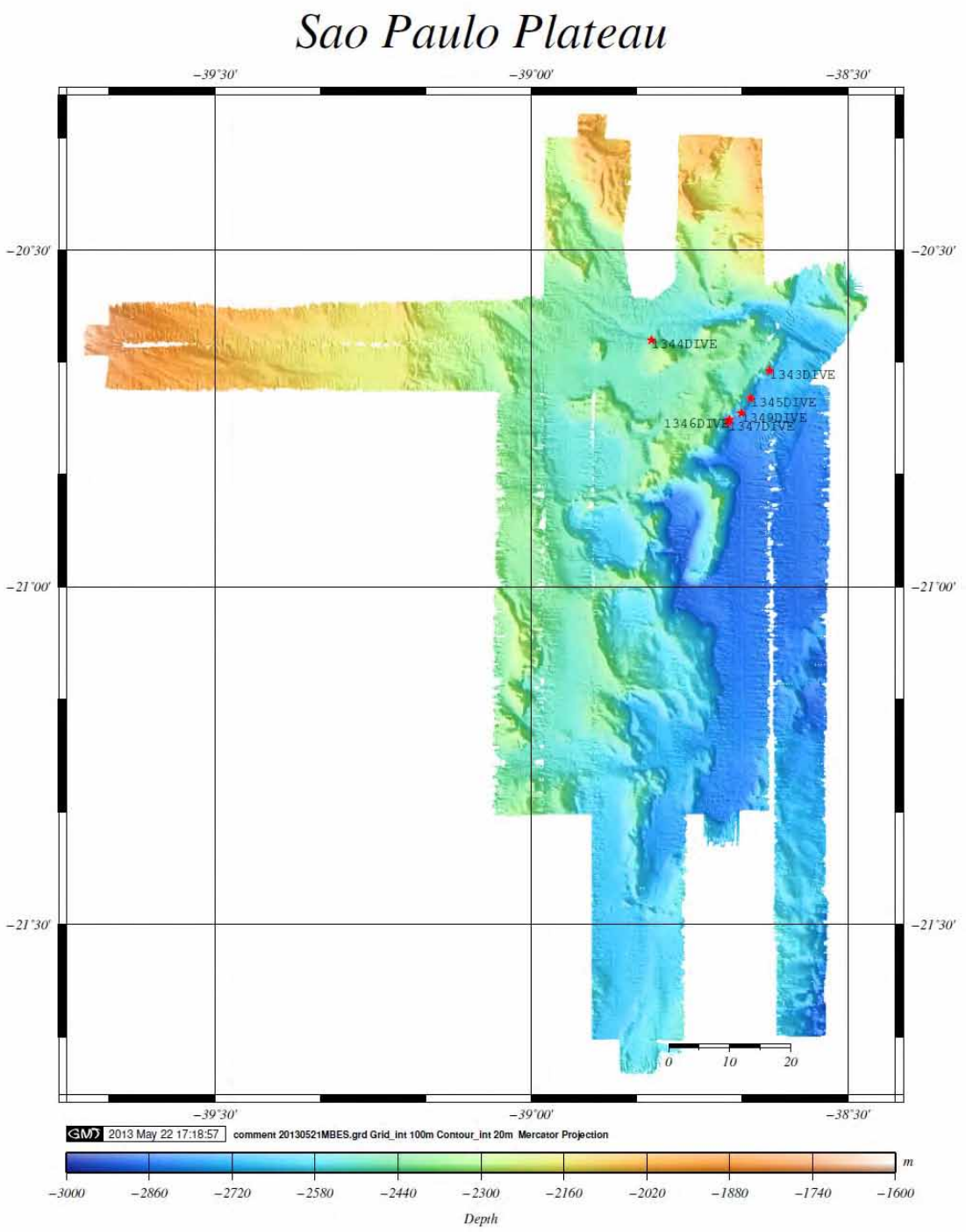


Fig. 2: Multi-Beam Eco-Sounder (MBES) map of the North Sao Paulo Plateau Outer Escarpment (NSPPOE). Location of dives #1344 at Point 5 and #1343, #1345, #1346, #1347 and #1349 (not realized) at Point 6.

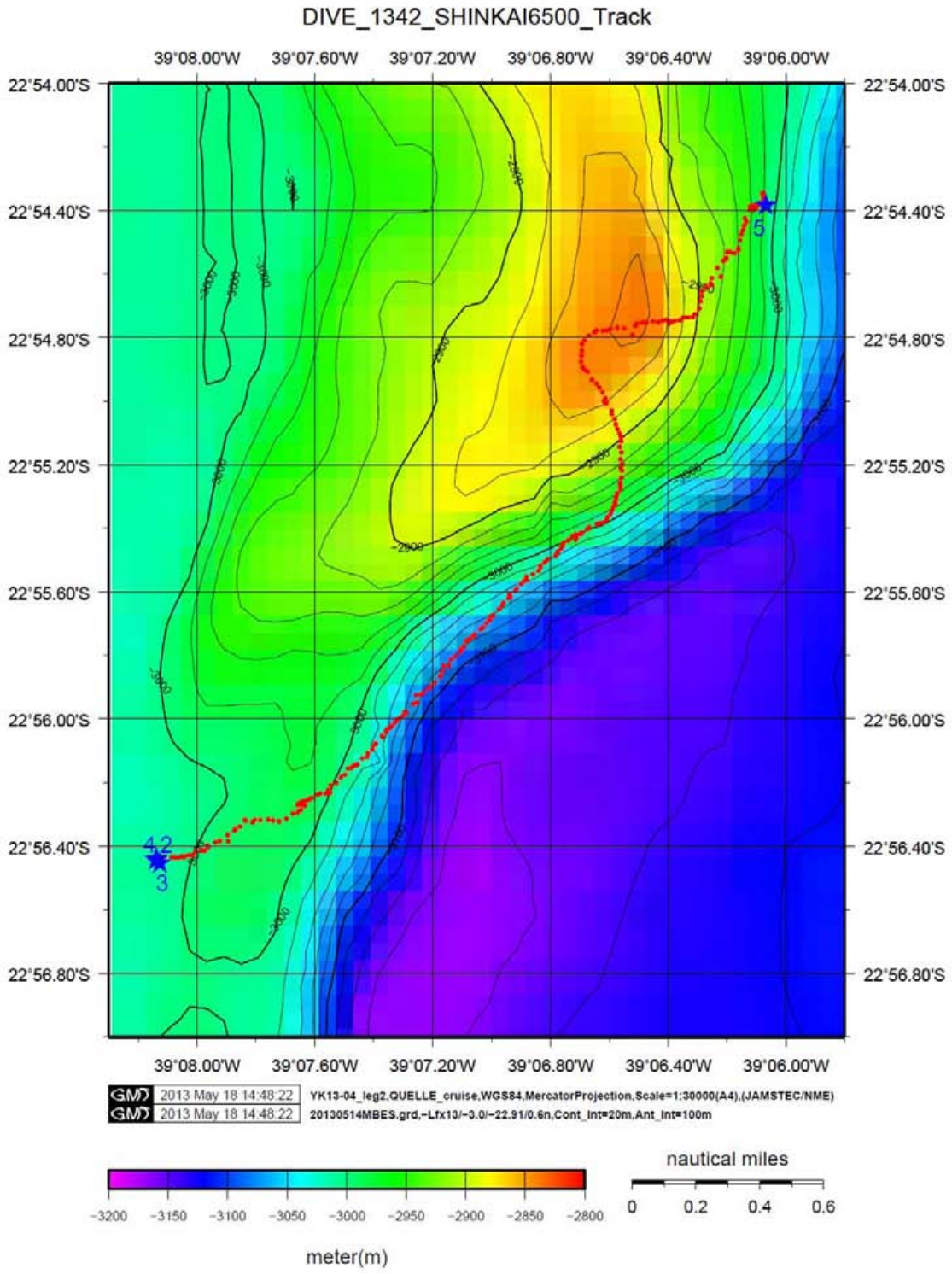


Fig. 3: Detailed Multi-Beam Eco-Sounder (MBES) map of #1342, located at Point 1 on the South Sao Paulo Plateau Outer Escarpment (SSPPOE). Point 1 location in Fig. 1.

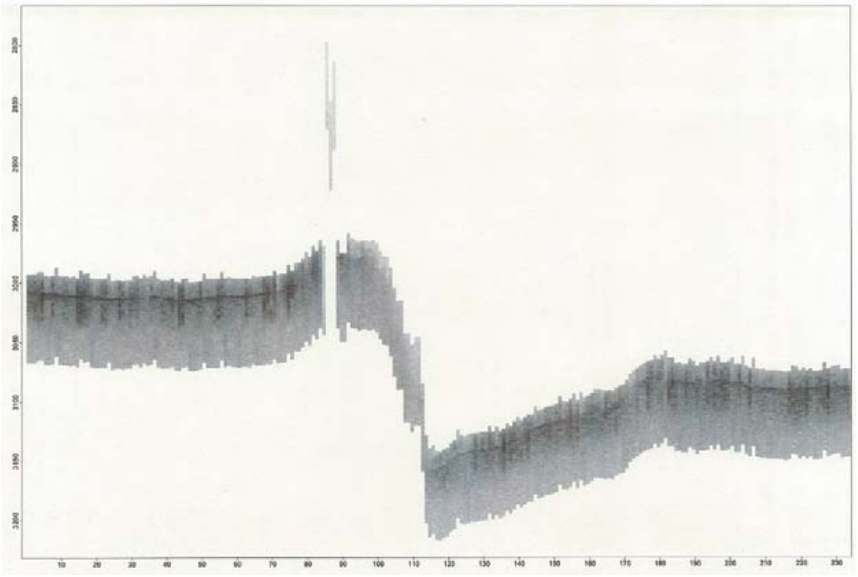


Fig. 4: Sub-Bottom Profile of Point 1, visited by #1342, on the South Sao Paulo Plateau Outer Escarpment (SSPPOE). Point 1 location in Fig. 1.

Point 3 was ranked as the most important location during dives planning because there are several amplitude anomalies a few hundred meters bellow the seafloor, connected to the seafloor through collapse faults. On the other hand, the topography at the seafloor at Point 3 is very rough, suggesting the presence of mounds and pockmarks (Fig. 7).

The SBP image also suggests a strong disturbance in the signal, causing several blanking and gaps on the signal (Fig. 8). The first impression, using all the information above, turn Point 3 as a strong candidate for the occurrence of gas seeps and chemosynthetic communities as well. However, dive #1340 crosses the seafloor structure (Fig. 7) but no evidence of such features was observed. Only rock outcrops and steep reliefs were found during the dive.

The interpretation for that disturbance in the SBP signal is that the sonic waves chock to the rocks and escarps, reflecting in a scatter manner and attenuating the signal. Therefore, blanking and gaps on the signal do not represent gas chimney signatures in the SBP data acquired by R/V Yokosuka during the Leg 2 of the Iata-piuna Cruise. The lost and disturbance in the signal represents, in a first way, the presence of hardgrounds that can be related to rock outcrops and pebbles, as confirmed by SHINKAI 6500 #1340.

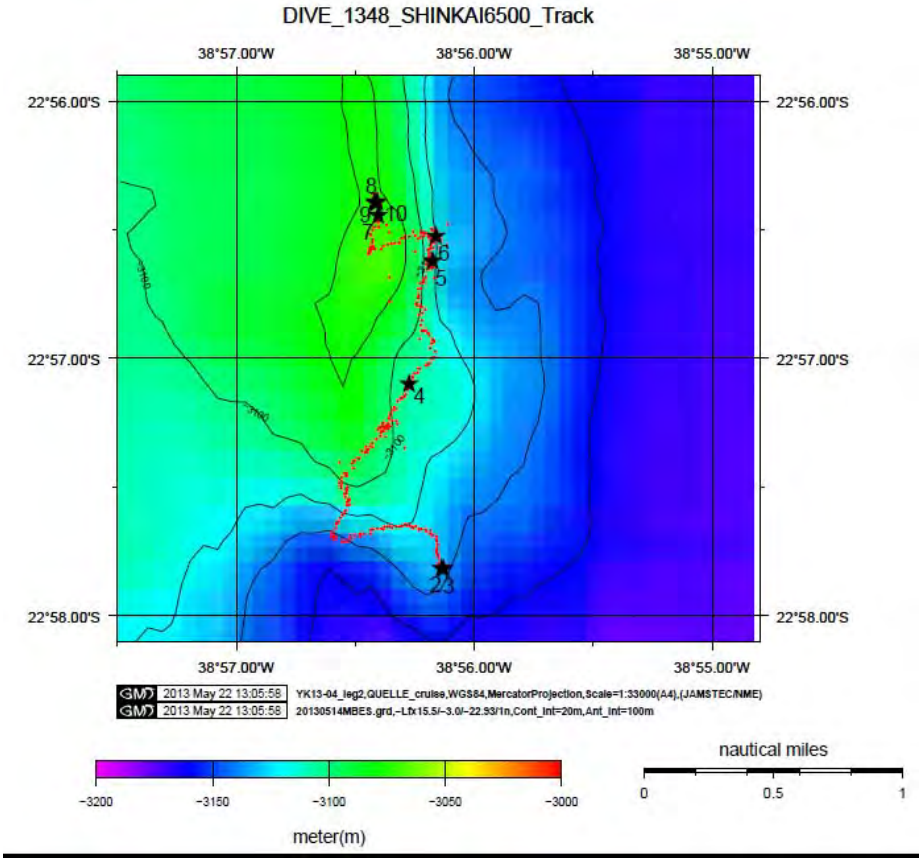


Fig. 5: Detailed Multi-Beam Eco-Sounder (MBES) map of #1348, located at Point 2 on the South Sao Paulo Plateau Outer Escarpment (SSPPOE). Point 2 location in Fig. 1.

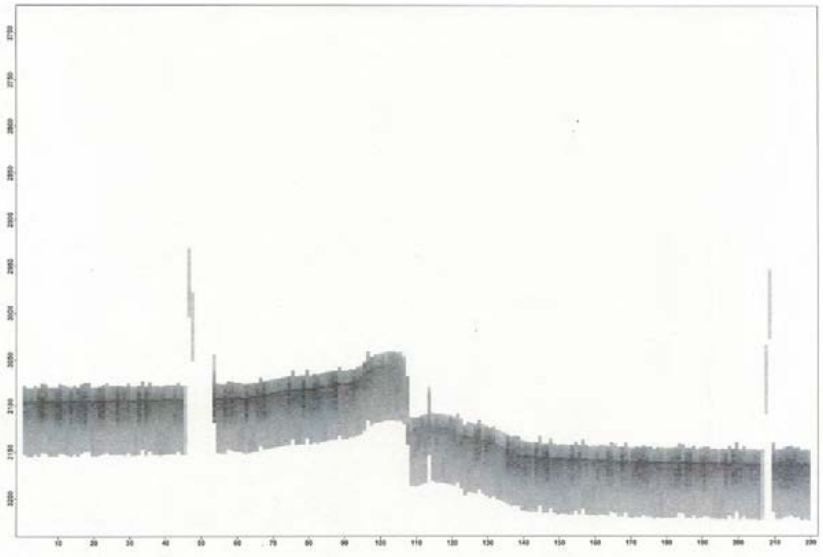


Fig. 6: Sub-Bottom Profile of Point 2, visited by #1348, on the South Sao Paulo Plateau Outer Escarpment (SSPPOE). Point 2 location in Fig. 1.

Point 4 is located at the eastern part of the SSPPOE and represents the stronger escarpment in that area. MBES map of Point 4 indicates that the shift between the upper and the lower parts of the escarpment are ca. 300m (Fig. 9). At the upper part one crater of ca. 400m in diameter and 20~30m deep is observed in the central part of the map, suggesting a possible pockmark. However, dive #1341 crosses this crater but no evidences of pockmark and seeps were found.

SBP in Point 4 is severe disturbed by the strong cliff and the presence of rock outcrops and pebbles, as explained before, and the presence of blanking and lost of signal are not indications about gas chimneys or other seep features (Fig. 10).

The North Sao Paulo Plateau Outer Escarpment (NSPPOE) is located at Espirito Santos Basin (Fig. 2), where occurred dive #1344 at Point 5 and dives #1343, #1345, #1346, #1347 at Point 6. Dive #1349 was not realized because bad weather conditions. Point 5 is located in the western flank of NSPPOE and it is characterized by ca. 200m difference between the upper and the lower part of the escarpment (Fig. 11). MBES map does not suggests any evidence of gas seeps, as mounds and pockmarks. This was confirmed by #1344, executed from the northern lower part to the southern upper part of the escarpment.

SBP of Point 5 shows a strong roughness in the seafloor and some blanking zones like chimneys (Fig. 12). The same explanation is proposed for such features, not related to gas seeps but to rock outcrops and pebbles on the seafloor, associated to a strong cliff.

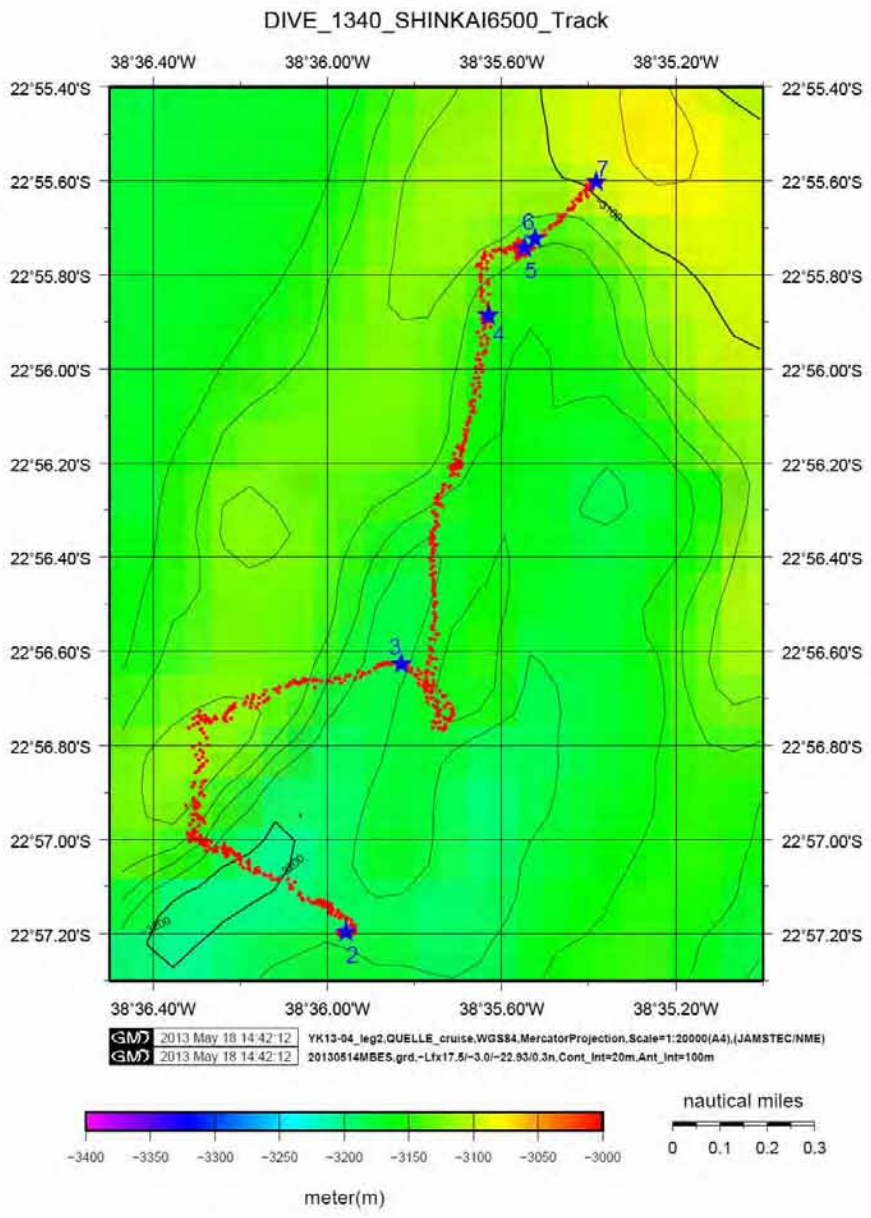


Fig. 7: Detailed Multi-Beam Eco-Sounder (MBES) map of #1340, located at Point 3 on the South Sao Paulo Plateau Outer Escarpment (SSPPOE). Point 3 location in Fig. 1.

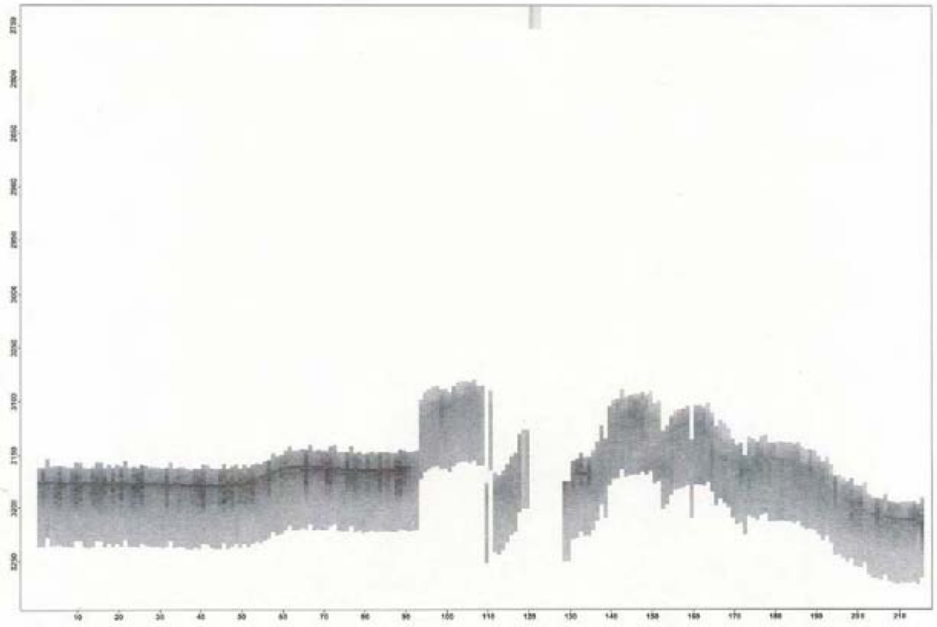


Fig. 8: Sub-Bottom Profile of Point 3, visited by #1340, on the South Sao Paulo Plateau Outer Escarpment (SSPPOE). Point 3 location in Fig. 1.

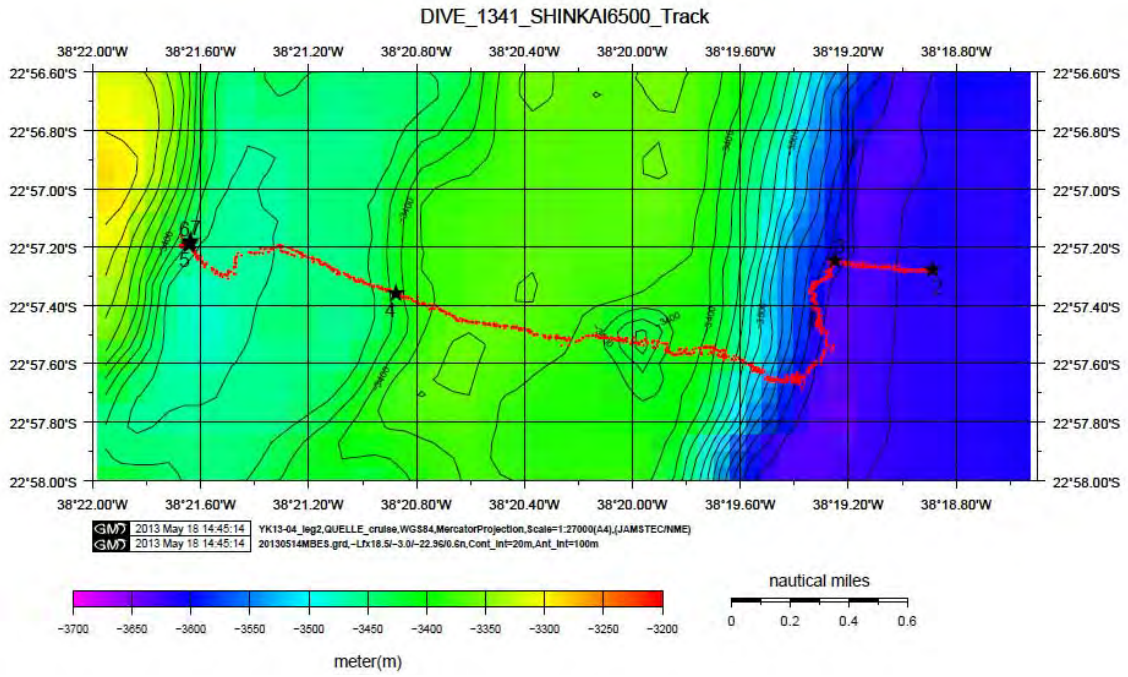


Fig. 9: Detailed Multi-Beam Eco-Sounder (MBES) map of #1341, located at Point 4 on the South Sao Paulo Plateau Outer Escarpment (SSPPOE). Point 4 location in Fig. 1.

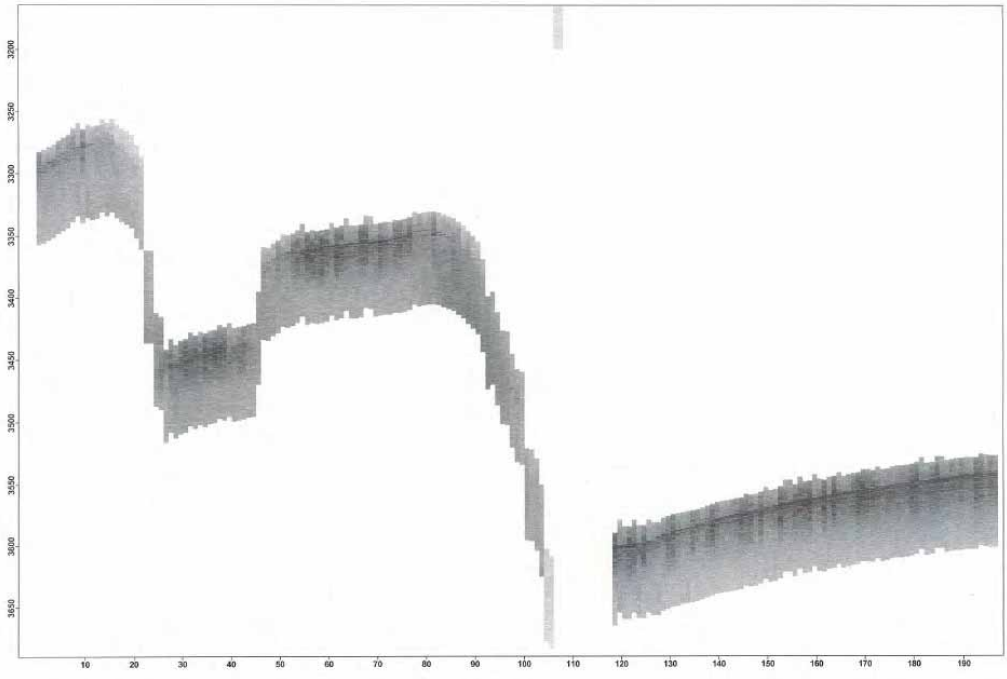


Fig. 10: Sub-Bottom Profile of Point 4, visited by #1341, on the South Sao Paulo Plateau Outer Escarpment (SSPPOE). Point 4 location in Fig. 1.

Point 6 is located at the eastern outer escarpment of NSPPOE, in Espirito Santos basin. MBES map combining all the 4 dives executed there (Fig.13) shows that there is no diagnostic features associated to gas seeps on both sides of ca. 200m escarpment shift. However, dive #1343 discovered rock outcrops, probably Cretaceous carbonate/siltstone rocks with fractures and faults filled by solid biodegraded oil (Fig. 14). On board, a very single analysis using toluene could solve the recovered material, confirming the presence of oil.

Because of the oil discover during #1343, three more dives were executed at the same area. The strategy was to make an overlapping track between the 4 dives as shown in figure 13. The leaving point of #1345 was at the start point of #1343, while the leaving point of #1346 was at the start point of #1345 and so on until #1347. Oil seep was not found during #1347, suggesting that the seep area is concentrated from the start point of #1346 to the start point of #1343 to the north, totalizing ca. 2.5 to 3.0 nautical miles.

Oil seep in the southern part (#1346 – Fig.15) is fresher than in the northern part (#1343 – Fig. 11), suggesting that the younger oil expulsion was in the southern part. Oil seep is related to salt diapirism, confirming the model proposed for the area. Dive points given by Petrobras for Iata-piuna Cruise – Leg 2 confirm the presence of hydrocarbons indicating a pathway for seeps at the seafloor. Unfortunately dives at Point 6 could not find any indication of gas seeps and chemosynthetic communities until now, main objectives of Leg 2, but the oil seep could indicate a strong symbiosis between oil and several animals, like sponges, cucumber, corals, fishes, octopus and others.

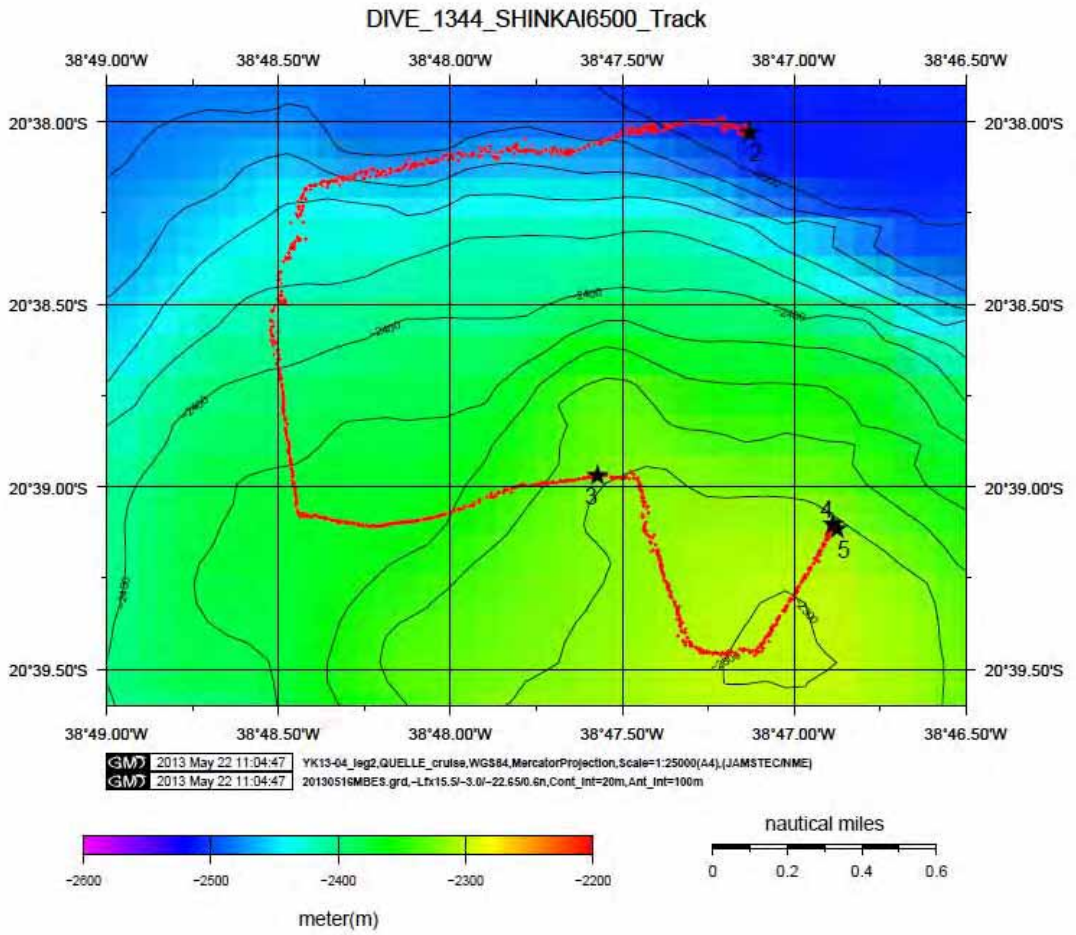


Fig. 11: Detailed Multi-Beam Eco-Sounder (MBES) map of dive #1344 located at Point 5 on the North Sao Paulo Plateau Outer Escarpment (NSPPOE). Point 5 location in Fig. 2.

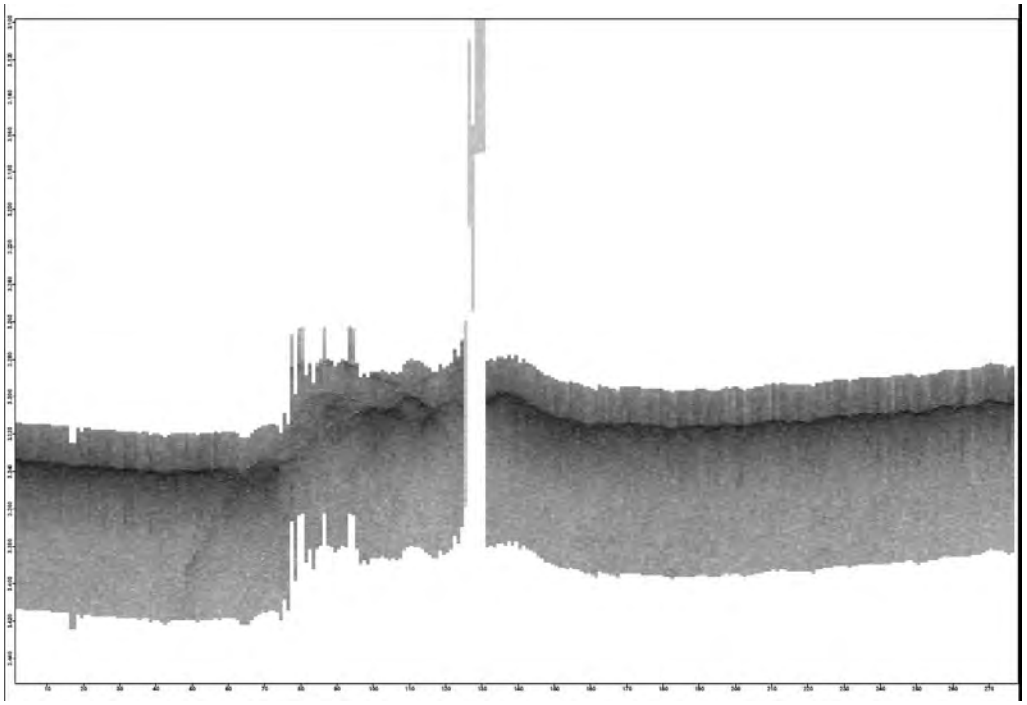


Fig. 12: Sub-Bottom Profile of Point 5, visited by #1344, on the North Sao Paulo Plateau Outer Escarpment (NSPPOE). Point 5 location in Fig. 1.

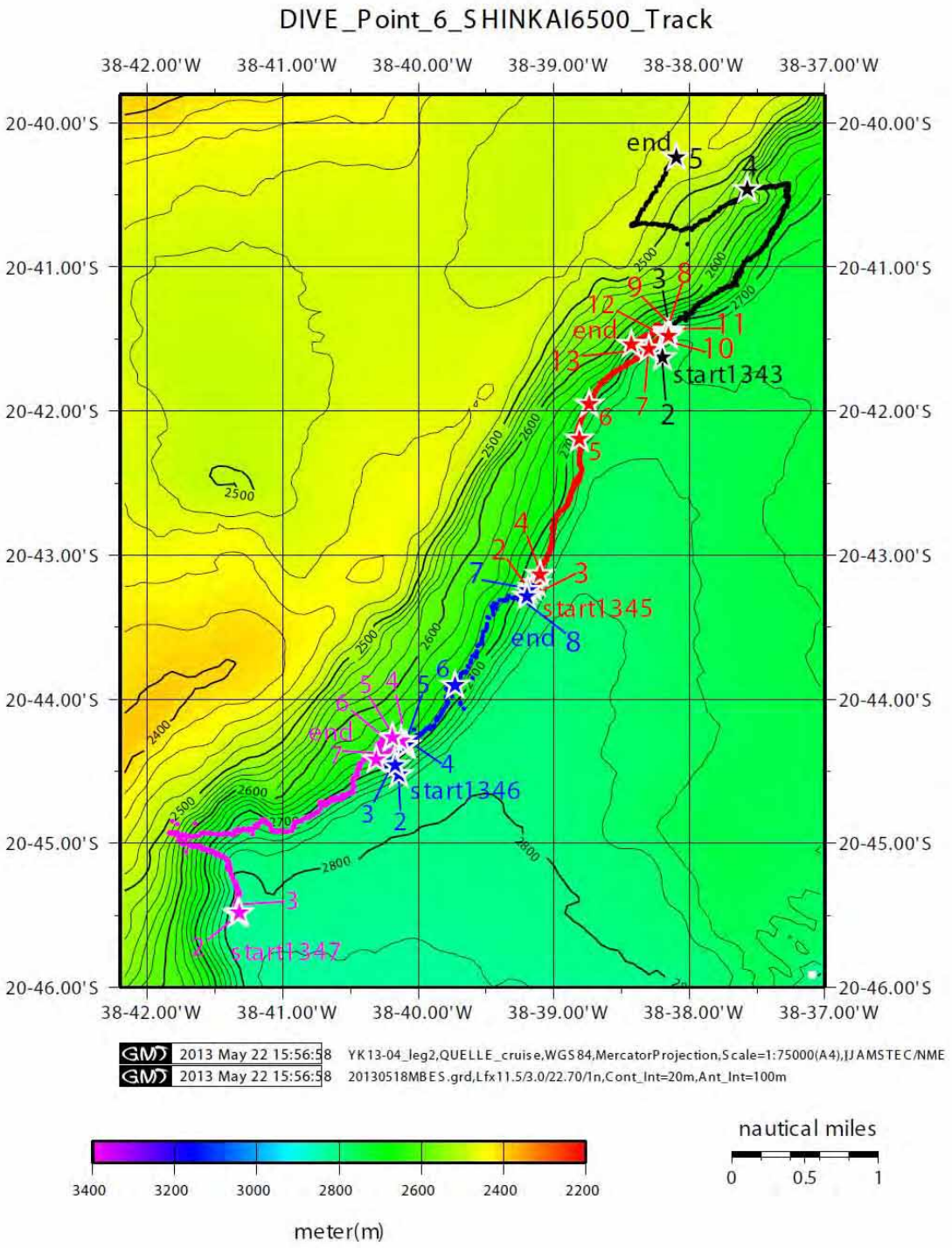


Fig. 13: Combined Multi-Beam Eco-Sounder (MBES) map of dives #1343, #1345, #1346 and #1347 located at Point 6 on the North Sao Paulo Plateau Outer Escarpment (NSPPOE). Point 6 location in Fig. 2.

Fig. 14: Rock outcrop with fractures and faults filled by solid biodegraded oil, discovered during dive #1343 located at Point 6 on the North Sao Paulo Plateau Outer Escarpment (NSPPOE). Point 6 location in Fig. 2.

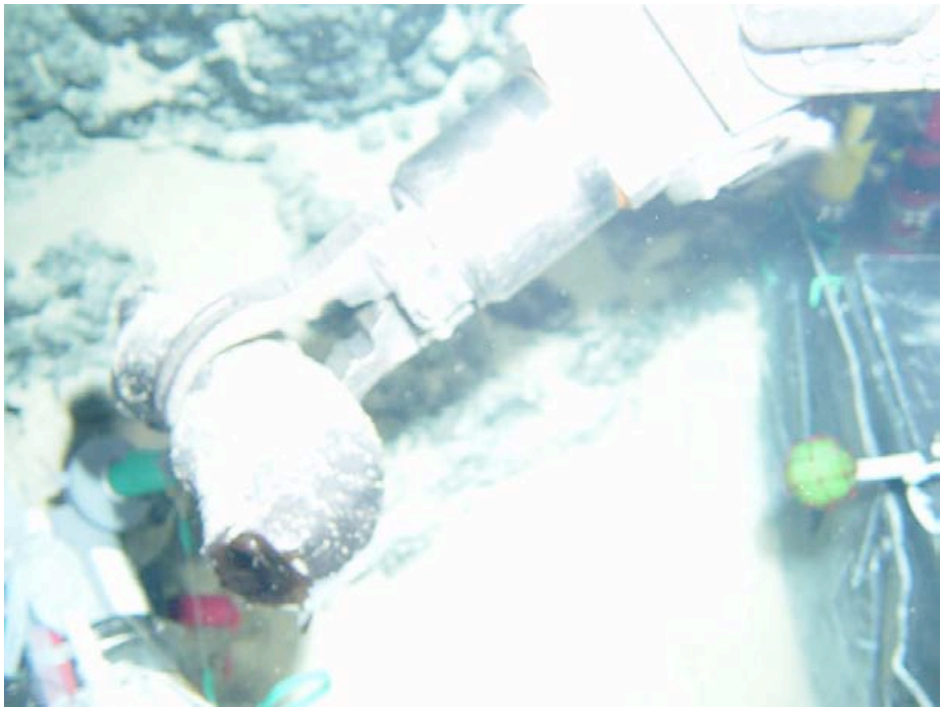


Fig. 15: Block with fresh oil inside. Block recovered during #1346 at Point 6, located on the North Sao Paulo Plateau Outer Escarpment (NSPPOE). Point 6 location in Fig. 2.

SBP of Point 6 is strong disturbed by the cliff, rocks and pebbles present in the seafloor, representing the same interpretation problem observed in the other SBPs. In the lower part of the escarpment is possible to identify well defined reflectors, indicating a normal sedimentation pattern for the seafloor, with no disturbance caused by gas chimneys or other related features.

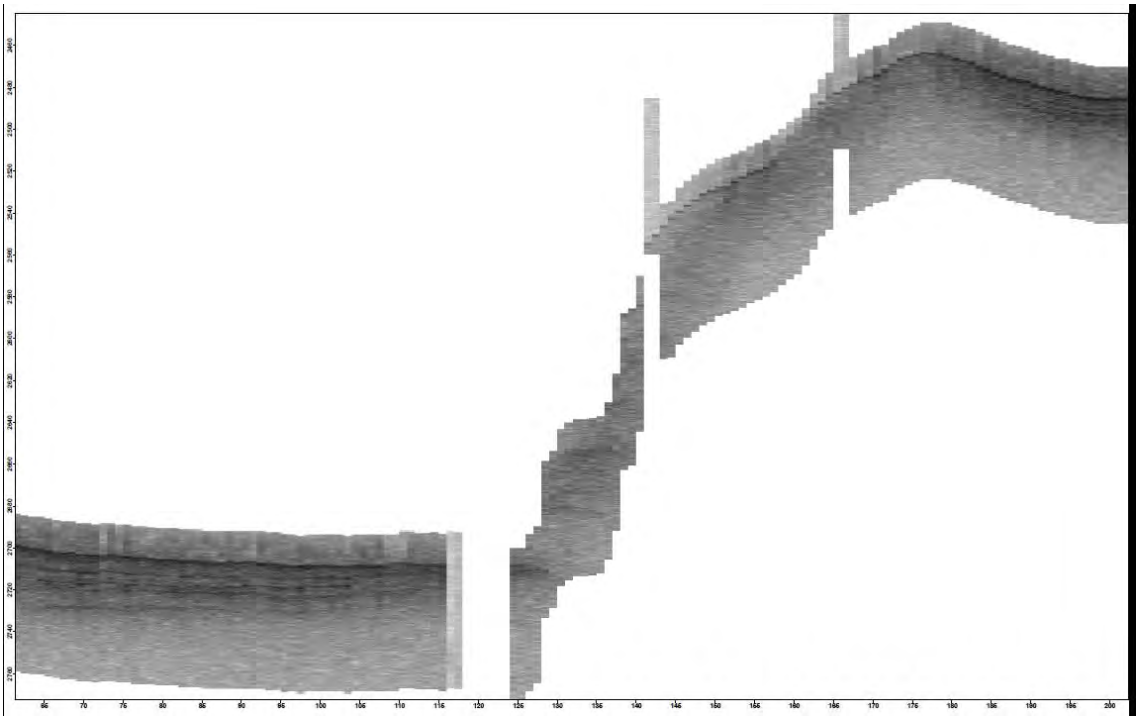


Fig. 16: Sub-Bottom Profile of Point 6, visited by #1343, #1345, #1346 and #1347, on the North Sao Paulo Plateau Outer Escarpment (NSPPOE). Point 6 location in Fig. 1.

Conclusions

Based on the onboard observations this preliminary study about MBES and SBP provides the following conclusions:

1) No features related to gas seeps were observed on the MBES maps, confirmed by dives exploration.
2) SBP suggests several possible gas chimneys and lost of signal. However, dives revealed that the lost of signal is caused by the waves reflection in the seafloor, caused by rocks outcrops, pebbles and cliffs. Blanking zones were not confirmed as gas chimneys zones.

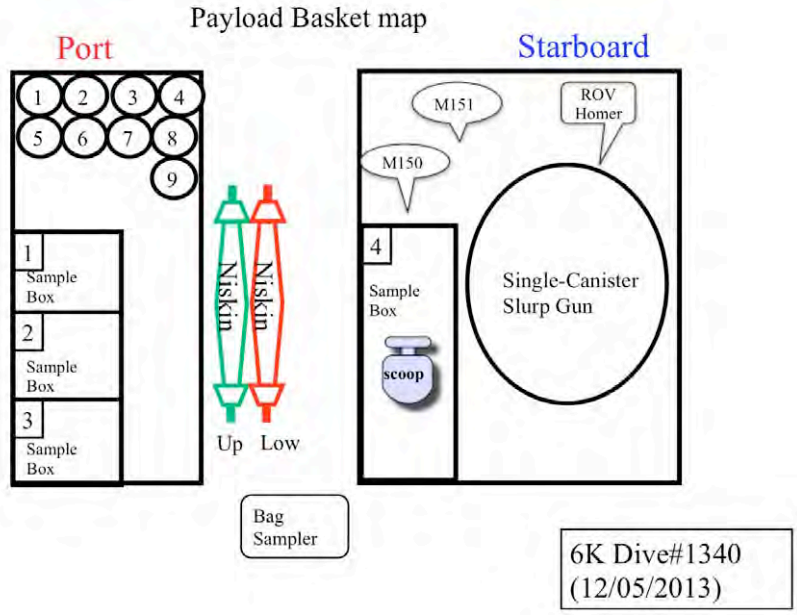
Recommendations

For the next cruises is strongly recommended the utilization of a fish eco-sounder sonar to detect gas plumes in the sea column.

5. HOV Shinkai 6500 Dives

5-1. 6K#1340 Dive Report (Katsunori Fujikura)

Date: 2013/5/12
Dive Scientist: Katsunori Fujikura (JAMSTEC)
Pilot: Kazuhiro Chiba
Co-pilot: Akihisa Ishikawa
Survey site: PT3, South São Paulo Plateau Outer Escarpment (SSPPOE)
Landing Point: 22°57.1972’ S, 38°35.957’ W, 3148 m
Leaving Point: 22°55.6016’ S, 38°35.3825’ W, 3079 m
Payload: Niskin bottles (1.9L)-2, Bag water sampler-1, Push corers-9, Scoop sampler-1, Sample box for biology-1, Sample containers for rocks-1, Marker buoys-2, Suction sampler with single-canister-1, ROV Homer-1



Dive Summary

Subjects:
1) Discovery of the seep communities
2) Observation of distribution pattern of the seep communities
3) Geochemical setting of the seeps
4) Chemical concentration such as CH_4, H_2S, Salinity, etc
5) Origin of chemicals
6) Geological structure in the seeps
7) Faunal composition and flora of the seep communities

Results:
1) Biology
No evidence of seep community was at the PT3, South São Paulo Plateau Outer Escarpment (SSPPOE). Diversity and amount of benthic animals were low. A couple of sponges, tunicates, shrimps, gastropods and sea cucumbers were observed. In gentle slopes, numerous dead shells of Pteropoda: Gastropoda were accumulated on the sea floor. These areas were looked white-colored area like bacteria mats.
2) Geology and Topography
From topographic aspects, seafloor was complicate including very steep several slopes more than 20 m height and gentle slopes. In steep slope area, white outcrops probably carbonate or mud stones of vertical section occurred with stratification structure. Almost outcrops were coated with blackish manganese.

Numerous manganese nodules were also distributed.

3) Geochemistry

No information.

4) Microbiology

No information.

5) Sampling

- 7 Cores (C1-7) on the normal seafloor for Geochemistry, Microbiology, Geology and Macrobiology.
- Water by Niskin bottles and a Bag sampler for Geochemistry and Microbiology
- Rocks carbonate inside manganese nodules, etc for Geology.
- Benthic animal: one Galatheid crab for Megabiology.

List of event marks

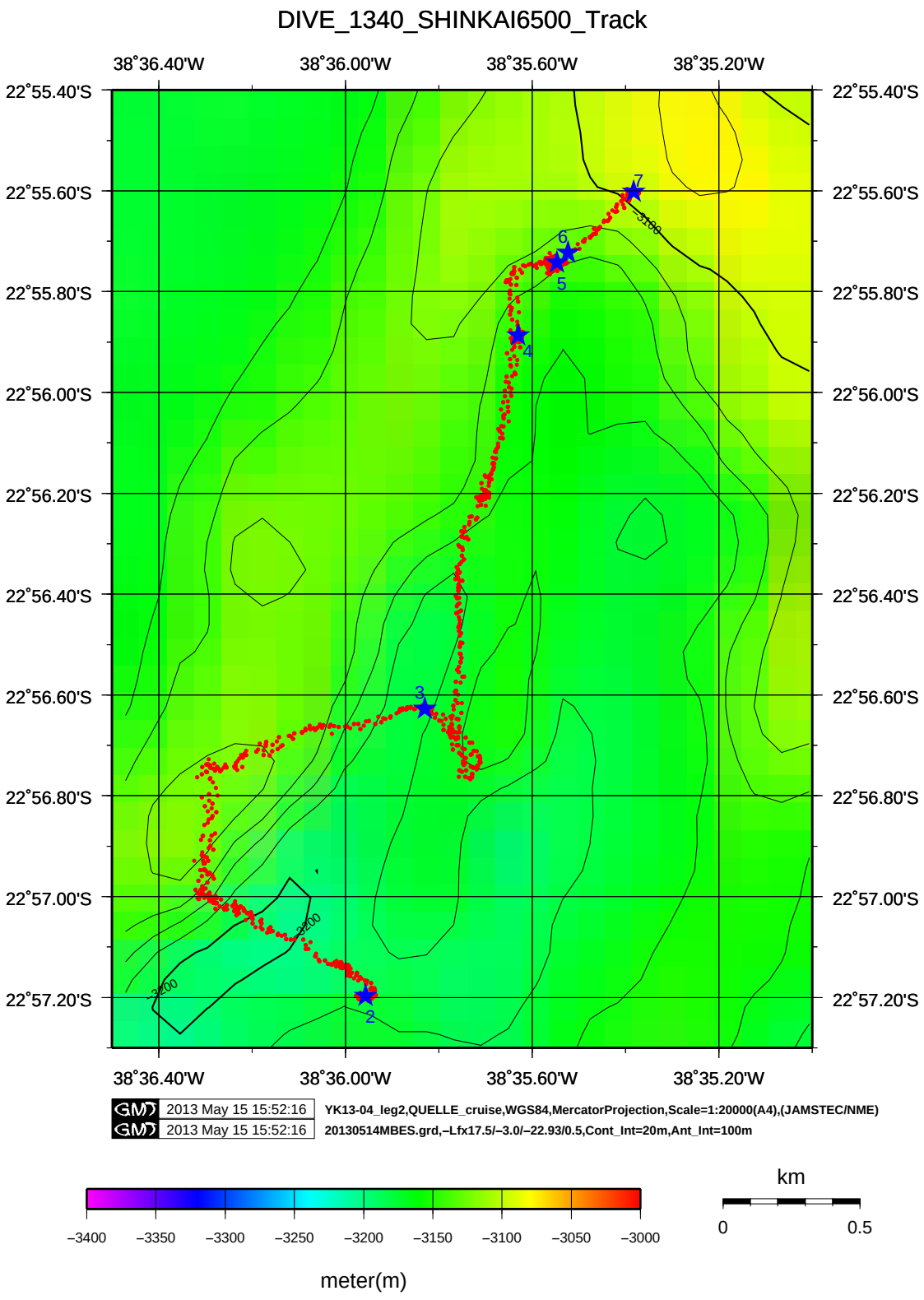
#1340DIVE サンパウロ海台 藤倉 克則 SkyFix(WGS-84)SSBL

*** EVENT MARK LIST *** 2013-05-12 15:10:44

ORIGIN (XY<->LATLON CONVERT) LAT 22° 56.5000'S LON 38° 35.7000'W
XY ORIGIN ((X,Y)=(0,0)) LAT 22° 56.5000'S LON 38° 35.7000'W

NO.	DAY	TIME	LAT	LON	X	Y
1	2013-05-12	09:00:00	22° 57.2000' S	38° 36.0000' W	-1291.8	-512.7
	Landing Target					
2	2013-05-12	10:46:00	22° 57.1972' S	38° 35.9570' W	-1286.7	-439.2
	Landing, Sampling Core#1,#3,#6, Rock(1) D=3148m					
3	2013-05-12	12:25:00	22° 56.6272' S	38° 35.8303' W	-234.7	-222.7
	Sampling Rocks(2) D=3168m					
4	2013-05-12	13:56:00	22° 55.8870' S	38° 35.6306' W	1131.3	118.6
	Sampling Rocks D=3133m					
5	2013-05-12	14:37:00	22° 55.7425' S	38° 35.5471' W	1397.9	261.3
	Sampling Core#2,#4,#5,#7, Water(bag) D=3123m					
6	2013-05-12	14:40:00	22° 55.7230' S	38° 35.5237' W	1433.9	301.3
	Sampling Niskin(2) D=3142m					
7	2013-05-12	15:01:00	22° 55.6016' S	38° 35.3825' W	1658.0	542.6
	Left Bottom, Sampling Animal D=3079m					

Track Line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38°36.40'W
38°36.00'W
38°35.60'W
38°35.20'W
22°55.40'S
22°55.60'S
22°55.80'S
22°56.00'S
22°56.20'S
22°56.40'S
22°56.60'S
22°56.80'S
22°57.00'S
22°57.20'S
3100
3200
3200
1
2
3
4
5
6
7
GMT 2013 May 15 15:52:16
GMT 2013 May 15 15:52:16
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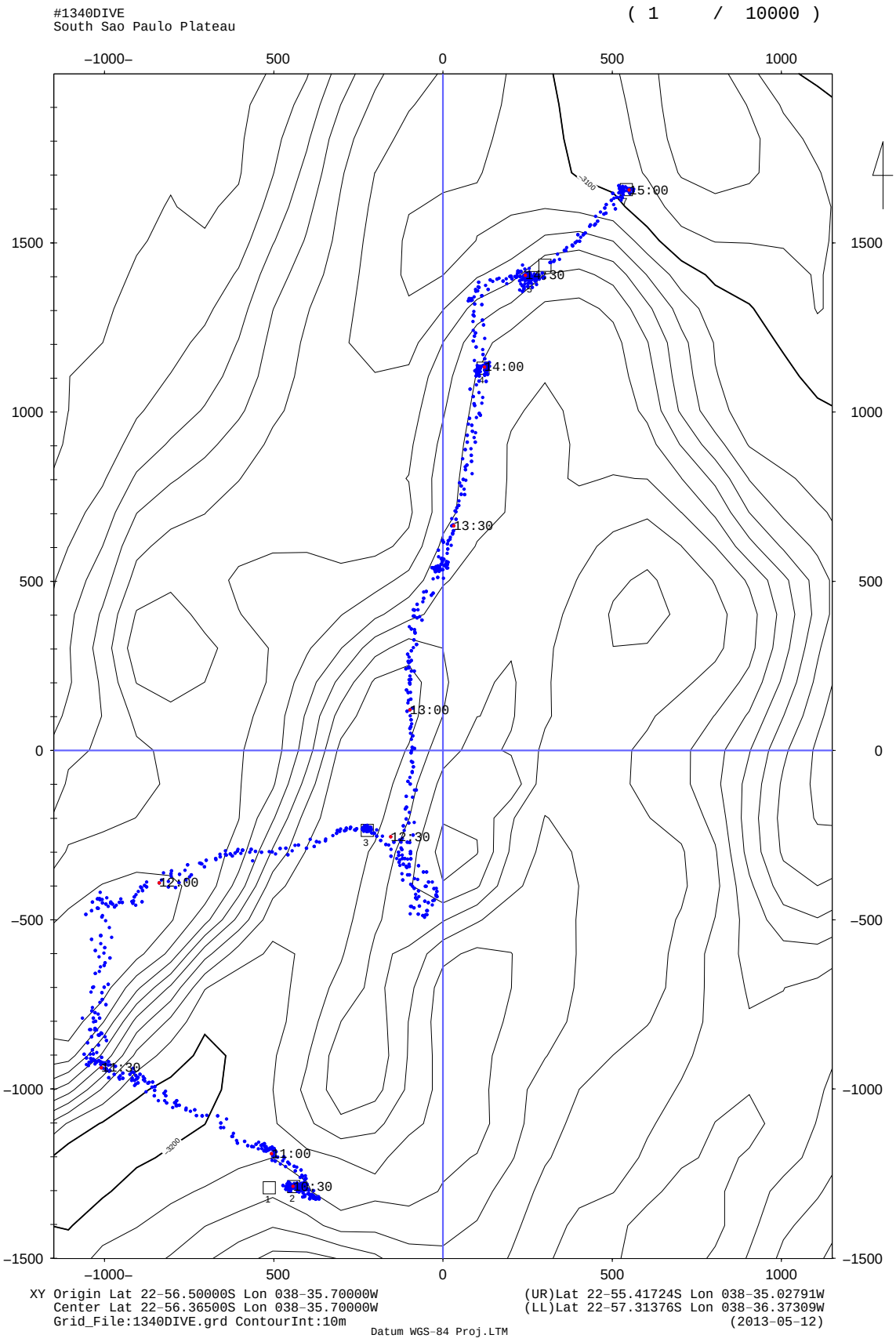
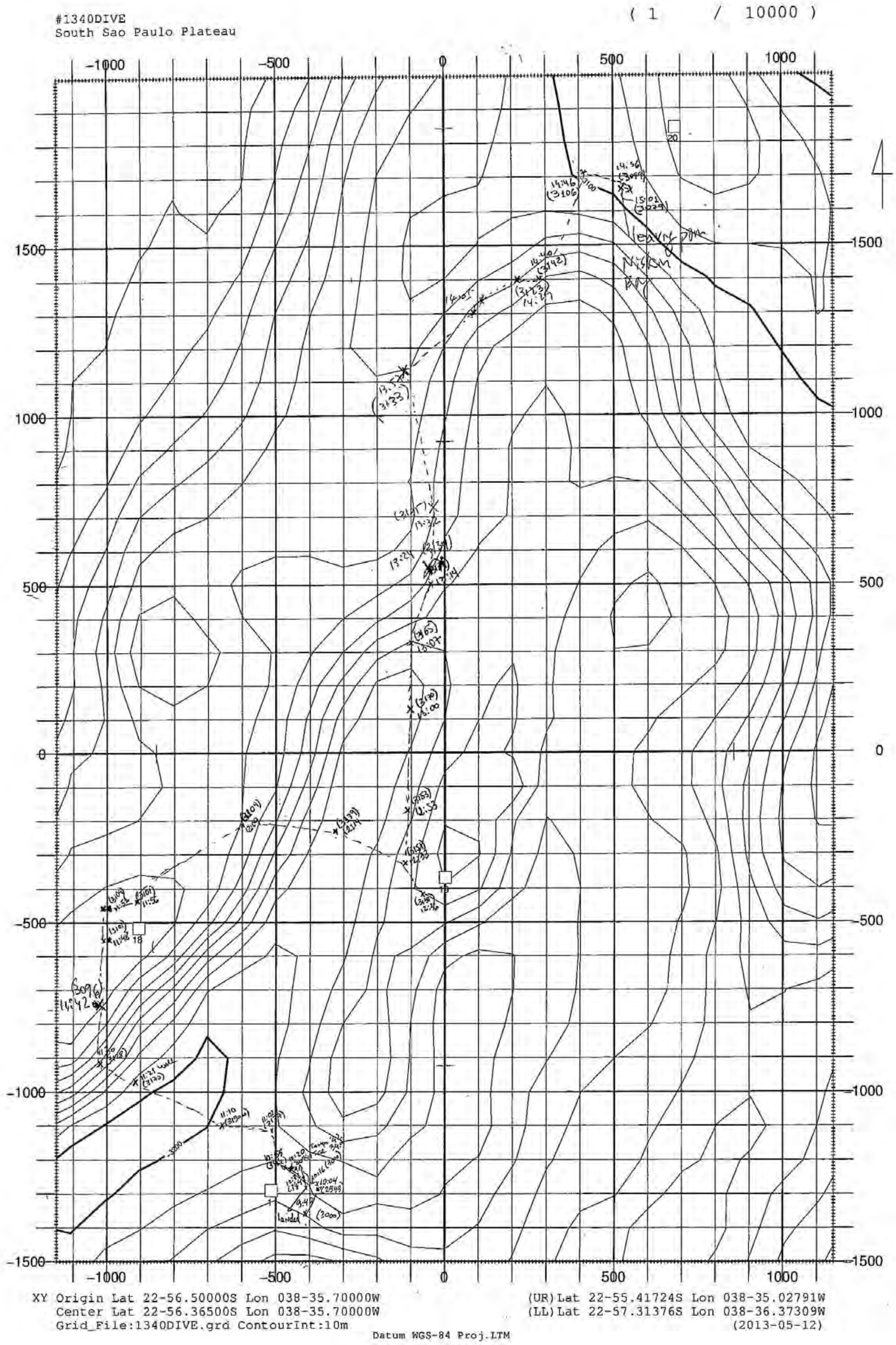
–3350
–3300
–3250
–3200
–3150
–3100
–3050
–3000
meter(m)
km
0
0.5


#1340DIVE
South Sao Paulo Plateau
(1 / 10000)
−1000−
500
0
500
1000
1500
1000
500
0
−500
−1000
−1500
15:00
14:30
14:00
13:30
13:00
12:30
12:00
11:30
11:00
10:30
-3100
-3200
XY Origin Lat 22−56.50000S Lon 038−35.70000W
Center Lat 22−56.36500S Lon 038−35.70000W
Grid_File:1340DIVE.grd ContourInt:10m
(UR)Lat 22−55.41724S Lon 038−35.02791W
(LL)Lat 22−57.31376S Lon 038−36.37309W
(2013−05−12)
Datum WGS−84 Proj.LTM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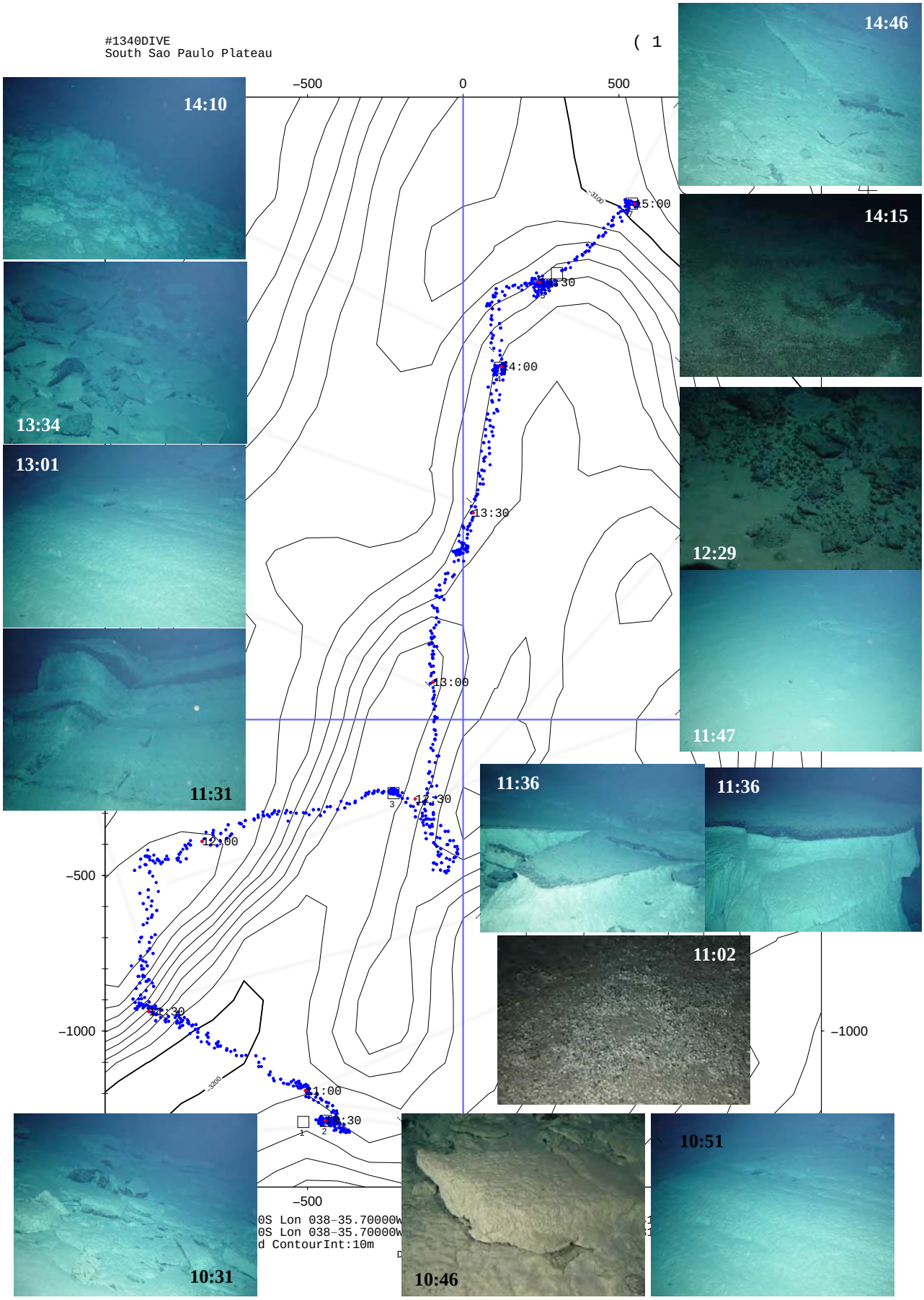
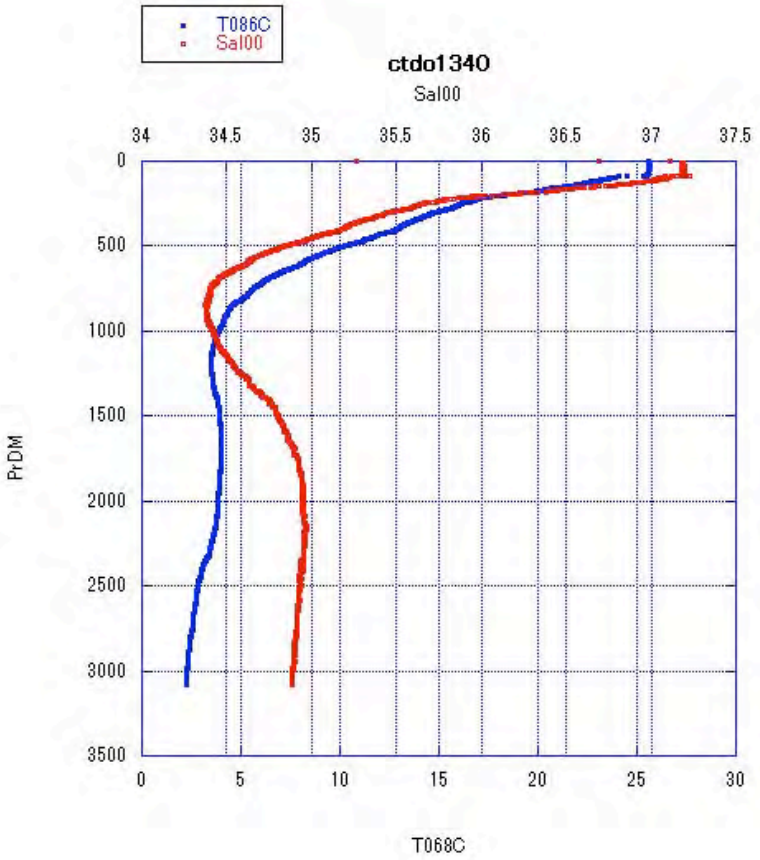
South Sao Paulo Plateau
(1 / 10000)
XY Origin Lat 22-56.50000S Lon 038-35.70000W
Center Lat 22-56.36500S Lon 038-35.70000W
Grid_File:1340DIVE.grd ContourInt:10m
(UR) Lat 22-55.41724S Lon 038-35.02791W
(LL) Lat 22-57.31376S Lon 038-36.37309W
(2013-05-12)
Datum WGS-84 Proj.LTM

In-situ photos on track line



CTD/DO Profile



6.5K#1340 DIVE LOG

Dive Log of **Off Brazil Sea, São Paulo Plateau Outer** **2013/05/12**

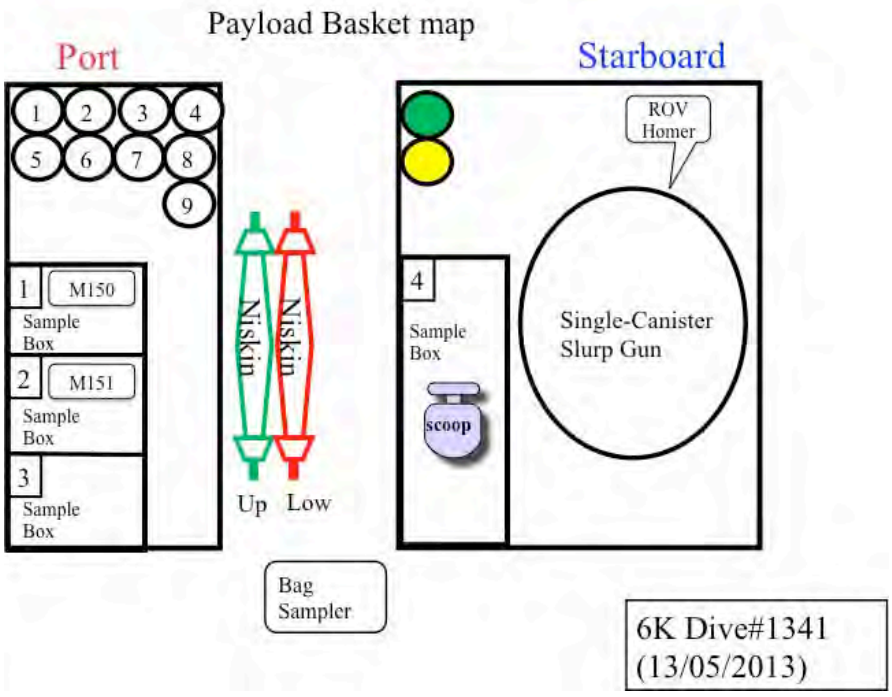
6K Dive #1340 **Escarpment (PT3)**

Time (LCT)	Dep. (m)	Alt. (m)	Head (Deg)	Pos. Xm	Pos. Ym	Description	Remarks
						vent open. Start of dive	WD:3190m
9:43	2000			-1370	-410		Log:
10:04	2542			-1290	-370		
10:16	3000	120m		-1290	-370		
10:20	3044			-1290	-370	Tem. 2.2; Sal. 34.9	
10:32	3148	0		-1290	-440	landed (Sand, Visibility 8m, Tem. 2.1, Flow 300˚, 12 cm/cm)	
10:43		0		-1290	-440	core collected (#1, 3, 6),	core
10:46				-1290	-440	rock #1 collected (Box #1)	rock
10:48				-1232	-465	finished sampling, star to run, course 300˚	
11:02				-1180	-510	shell of gastropod	
11:06				-1180	-510	ripple mark	
11:10	3196	2		-1100	-660		

11:21		4		-970	-920	vertical cliff wall	
11:26				-970	-920	rock outcrop	
11:30	3128			-920	-1020		
11:34	3097			-920	-1020	top of cliff	
11:38	3094			-920	-1020	squat crab	
11:42	3096	4		-750	-1020		
11:44	3097	5		-750	-1020	many blackish rocks	
11:45	3097	4		-750	-1020	squat crab	
11:48	3101	4		-550	-1010		
11:51	3104	2		-460	-1010		
11:51	3104			-460	-1010	Yagi (sea pen?)	
11:52	3104			-460	-1010	change direction to 80˚	
11:56	3101	2		-440	-910		
11:59	3102	1		-440	-910	white patchs	
12:09	3104			-290	-600	top of steep cliff	
12:14	3179	3		-260	-330		
12:19				-228	-217	strat of correction of rock	
12:22	3168			-228	-217	two rock samples stored in Box 2	
12:27	3168			-228	-217	start moving to Event Mk#19	
12:33	3151	1		-330	-120		
12:36	3138	1		-420	-60		
12:37				-420	-60	turn to north	
12:53	3153	3		-170	-110	no sign of chemosynthesis-based community here	
13:00	3170	3		130	-100		
13:07	3165	1		320	-100	no visible organisms	
13:14	3137	2		500	-40	rocky floor	
13:24	3134	1		540	-13		
13:32	3139	1		730	40	rocky floor	
13:57	3133	185		1130	120	small blackish rock samples were taken in sample box 4	
14:05	3112	3		1310	90	rocky floor, marine snow	
14:08	3106	2		1366	105	fish	
14:16	3122	1		1402	260	black patches	
14:25	3123	44		1392	276	core no.2 sampling	
14:27	3123	44		1392	276	core no.4 sampling	
14:28	3123	44		1392	276	core no.5 sampling	
14:29	3123	44		1392	276	core no.7 sampling	
14:34	3125	2		1399	211	leaving point	
14:40	3142	1		1397	298	niskin & bag sampling	

14:46	3106	2		1522	413		
14:56	3079	2		1652	526	preparing for leaving bottom	
15:01	3079	2		1650	550	just leaving bottom crab collected	

5-2. 6K#1341 Dive Report (Vivian Helena Pellizari)
Date: 2013/5/13
Dive Scientist: Vivian Helena Pellizari
Pilot: Hirofumi Ueki
Co-pilot: Kengo Suzuki
Survey site: PT4, South São Paulo Plateau Outer Escarpment (SSPPOE)
Landing Point: 22°57.1972' S, 38°35.957' W, 3148 m
Leaving Point: 22°55.6016' S, 38°35.3825' W, 3079 m
Payload: Niskin bottles (1.9L)-2, Bag water sampler-1, Push corers-9, Scoop sampler-1, Sample box for biology-1, Sample containers for rocks-1, Marker buoys-2, Suction sampler with single-canister-1, ROV Homer-1



Dive Summary

Subjects:
1) Discovery of the seep communities
2) Observation of distribution pattern of the seep communities
3) Geochemical setting of the seeps
4) Chemical concentration such as CH_4, H_2S, Salinity, etc
5) Origin of chemicals
6) Geological structure in the seeps
7) Faunal composition and flora of the seep communities

Results:
1) Biology

No evidence of seep community at the PT4, South São Paulo Plateau Outer Escarpment (SSPPOE).
Diversity and amount of benthic animals were very low. A couple of Tunicates, fish, sponges, star fish, shrimps and sea cucumbers were observed.

2) Geology and Topography

From topographic aspects, seafloor was plane except in two areas of slope with stratification structures mad of mud stones stratification. Also a two main area of manganese nodules were present in the region.

3) Geochemistry

No information.

4) Microbiology

No information.

5) Sampling

- 7 Cores (C1-7) on the normal seafloor for Geochemistry, Microbiology, Geology and Macrobiology.
- Water by Niskin bottles and a Bag sampler for Geochemistry and Microbiology
- Two Rocks of manganese nodules, etc for Geology. One rock brownish was collected.

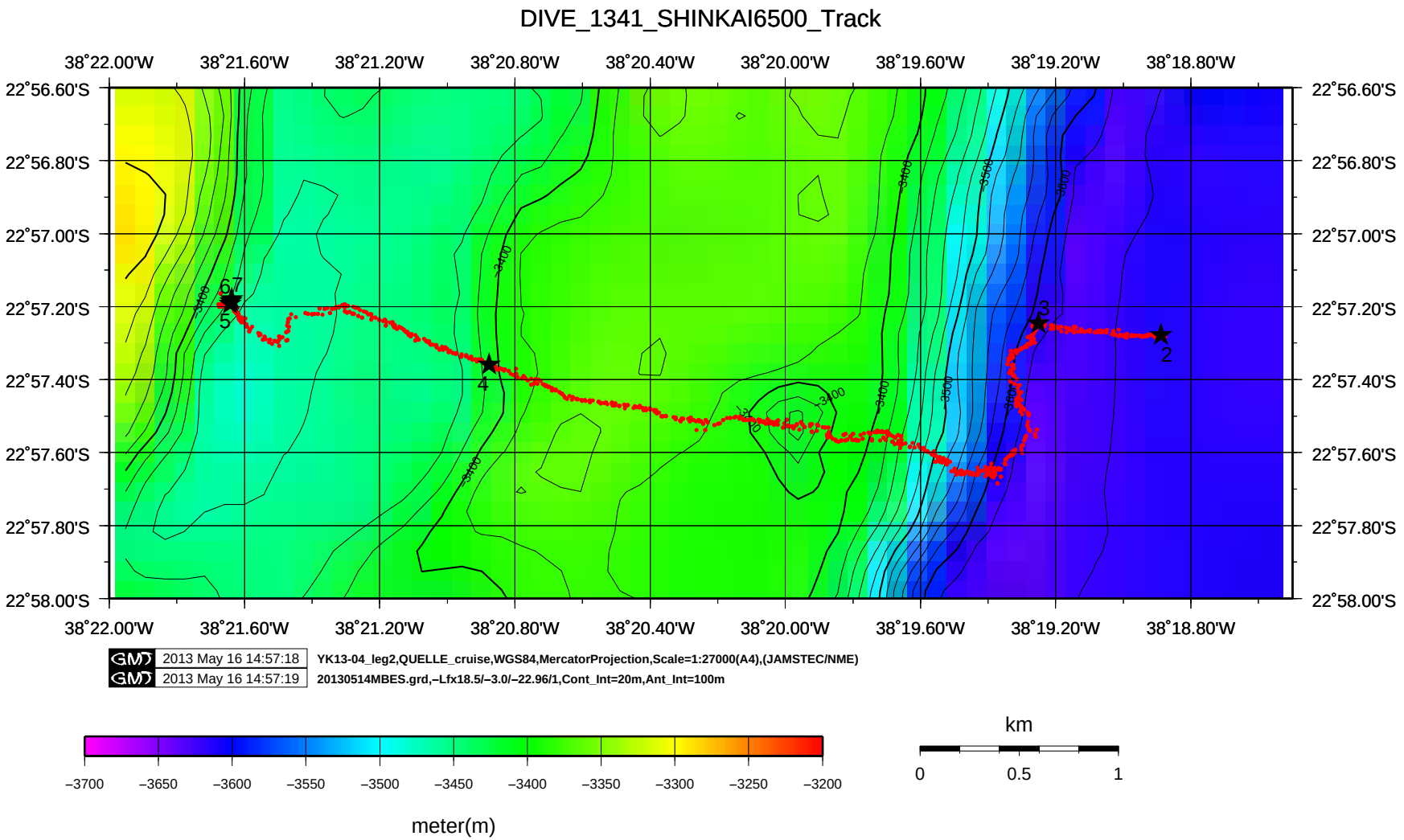
List of event marks

#1341DIVE サンパウロ海台 Vivian Helena SkyFix(WGS-84)SSBL

*** EVENT MARK LIST *** 2013-05-13 15:02:38

ORIGIN (XY<->LATLON CONVERT) LAT 22° 57.0000'S LON 38° 20.5000'W
XY ORIGIN ((X,Y)=(0,0)) LAT 22° 57.0000'S LON 38° 20.5000'W

NO.	DAY	TIME	LAT	LON	X	Y
1	2013-05-13	09:00:00	22° 57.0000' S	38° 19.0000' W	0.0	2563.7
	Landing Target					
2	2013-05-13	10:51:00	22° 57.2781' S	38° 18.8891' W	-513.2	2753.3
	Landing, Sampling Core #1, #3, #6 D=3602m					
3	2013-05-13	11:23:00	22° 57.2456' S	38° 19.2511' W	-453.2	2134.5
	Sampling Rock (1) D=3615m					
4	2013-05-13	13:42:00	22° 57.3587' S	38° 20.8760' W	-661.9	-642.6
	Sampling Rocks(2) D=3388m					
5	2013-05-13	14:52:00	22° 57.1850' S	38° 21.6405' W	-341.4	-1949.3
	S. Core(#2,#4,#5,#7,#8,#9),ST(yellow) Water(bag) D=3438m					
6	2013-05-13	14:57:00	22° 57.1922' S	38° 21.6429' W	-354.7	-1953.4
	Sampling NISKIN(2) D=3425m A=8m					
7	2013-05-13	15:00:00	22° 57.1792' S	38° 21.6382' W	-330.7	-1945.3
	Left Bottom D=3419m A=15m					


DIVE_1341_SHINKAI6500_Track
38°22.00'W
38°21.60'W
38°21.20'W
38°20.80'W
38°20.40'W
38°20.00'W
38°19.60'W
38°19.20'W
38°18.80'W
22°56.60'S
22°56.80'S
22°57.00'S
22°57.20'S
22°57.40'S
22°57.60'S
22°57.80'S
22°58.00'S
-3600
-3400
-3200
1
2
3
4
5
6
7
2013 May 16 14:57:18
2013 May 16 14:57:19
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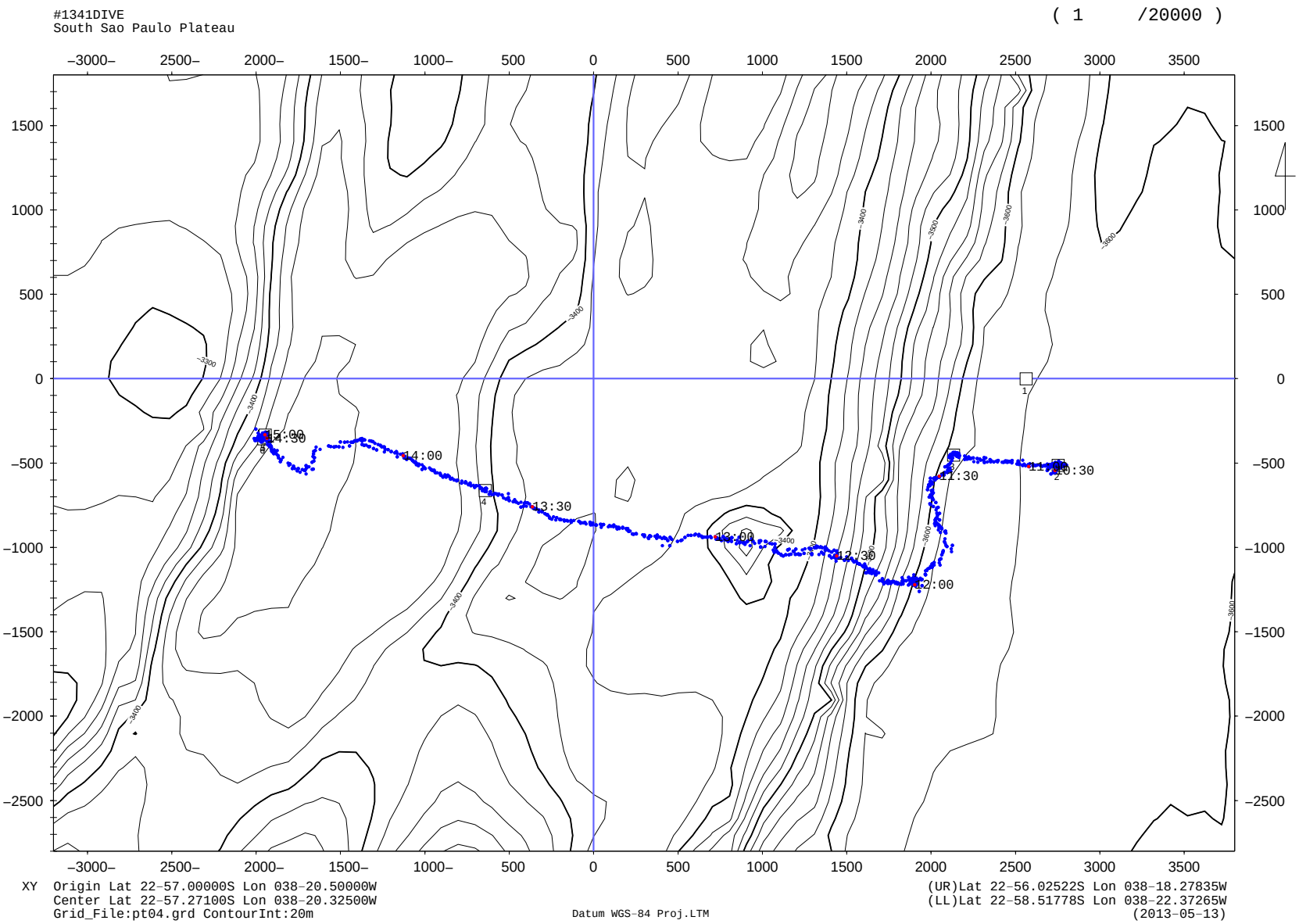
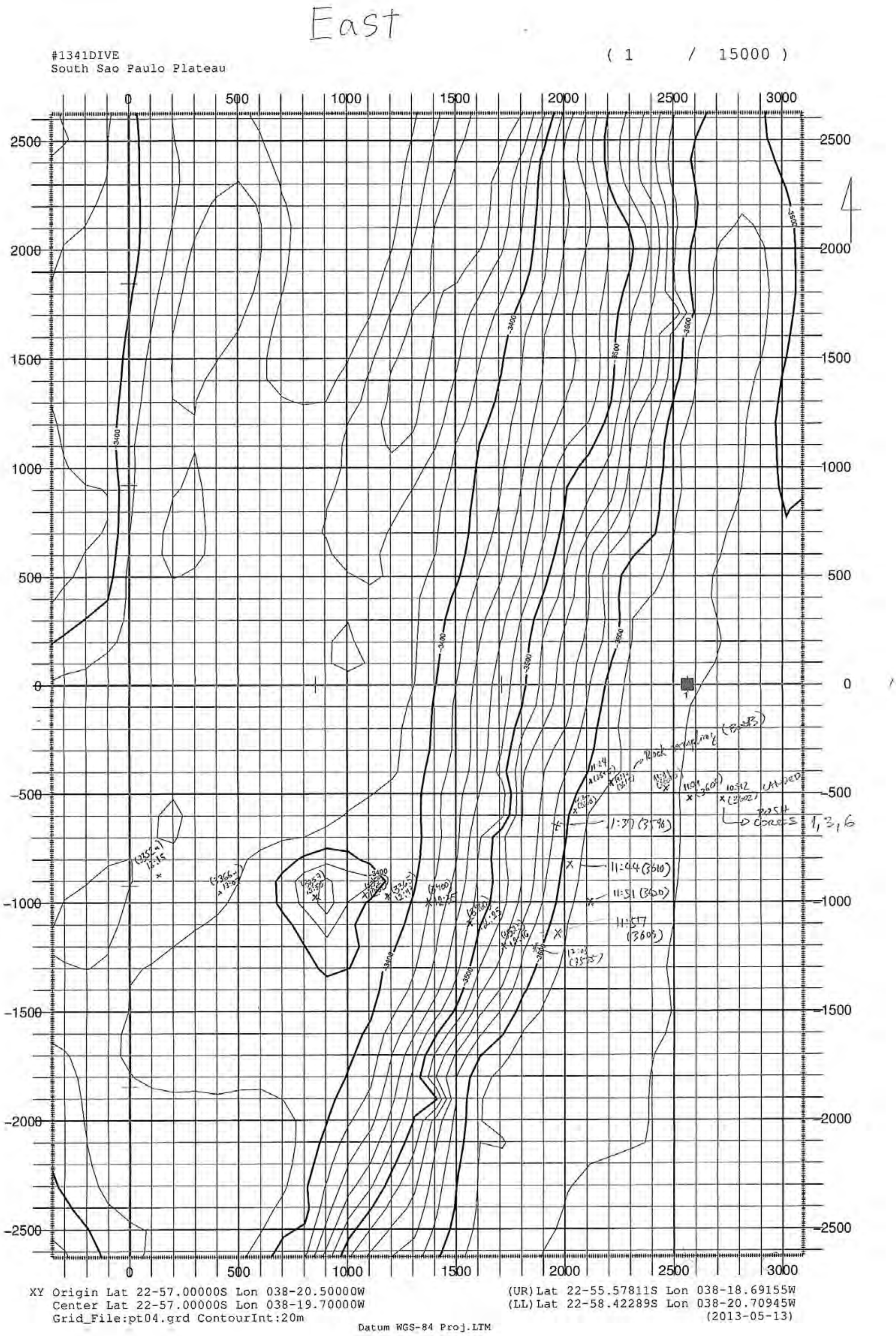
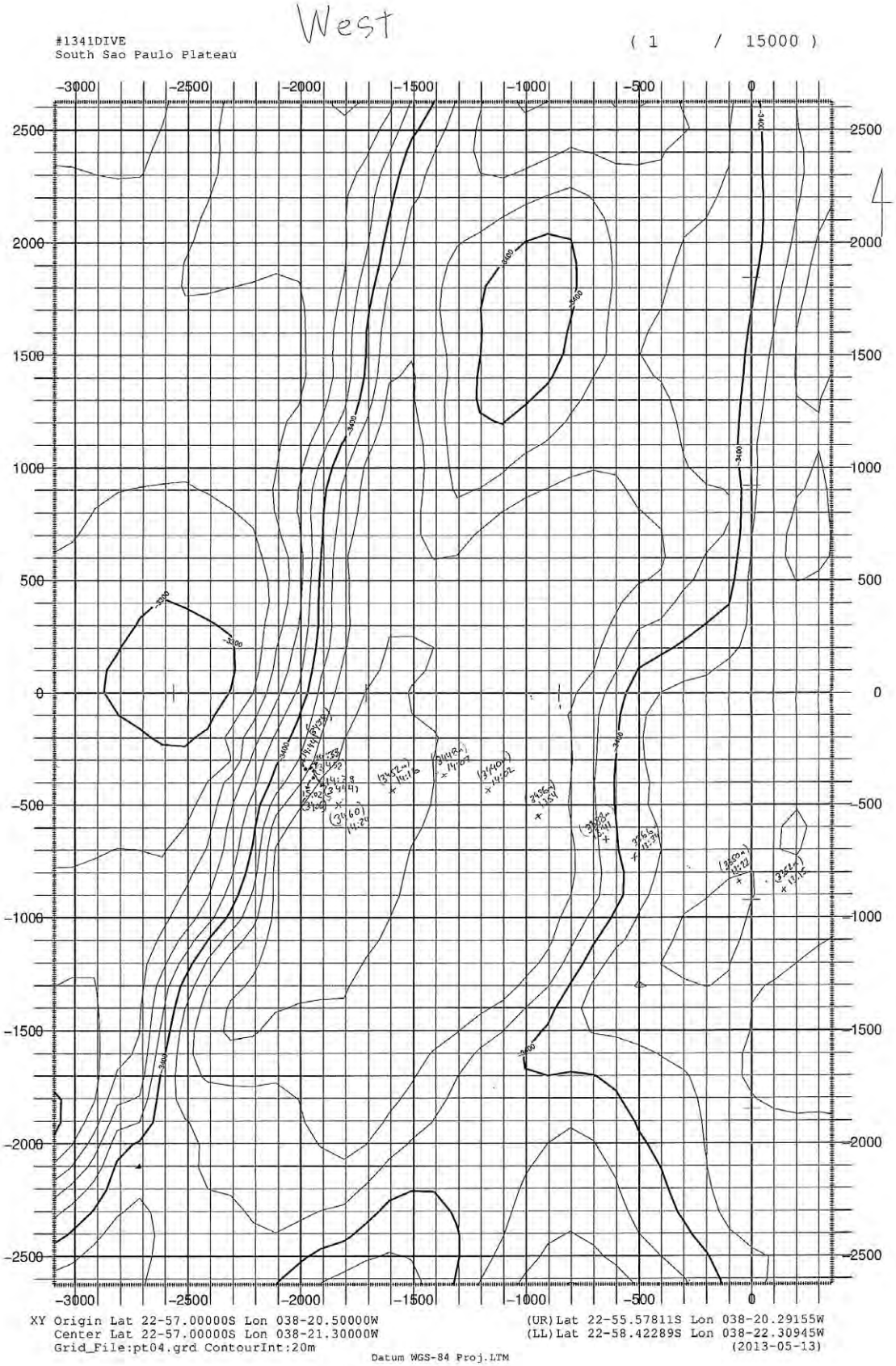
−3650
−3600
−3550
−3500
−3450
−3400
−3350
−3300
−3250
−3200
meter(m)
km
0
0.5
1

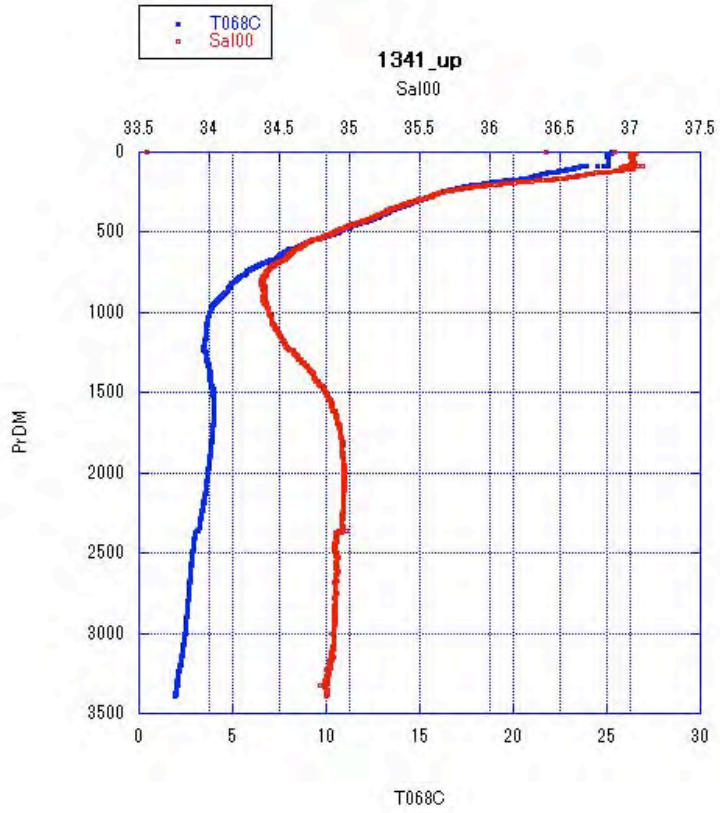




East
#1341DIVE
South Sao Paulo Plateau
(1 / 15000)
Rock sampling (BOB)
11:30 (3586)
11:44 (3610)
11:51 (3600)
11:57 (3605)
LANDED
Push cores 1,3,6
XY Origin Lat 22-57.00000S Lon 038-20.50000W
Center Lat 22-57.00000S Lon 038-19.70000W
Grid_File:pt04.grd ContourInt:20m
(UR) Lat 22-55.57811S Lon 038-18.69155W
(LL) Lat 22-58.42289S Lon 038-20.70945W
(2013-05-13)
Datum WGS-84 Proj.LTM


West
#1341DIVE
South Sao Paulo Plateau
(1 / 15000)
XY Origin Lat 22-57.00000S Lon 038-20.50000W
Center Lat 22-57.00000S Lon 038-21.30000W
Grid_File:pt04.grd ContourInt:20m
(UR)Lat 22-55.57811S Lon 038-20.29155W
(LL)Lat 22-58.42289S Lon 038-22.30945W
(2013-05-13)
Datum WGS-84 Proj.LTM

CTD/DO Profile



6.5K#1341 Track (To Be included)

6.5K #1341 Dive Log

Dive Log of **Off Brazil Sea, São Paulo Plateau Outer**

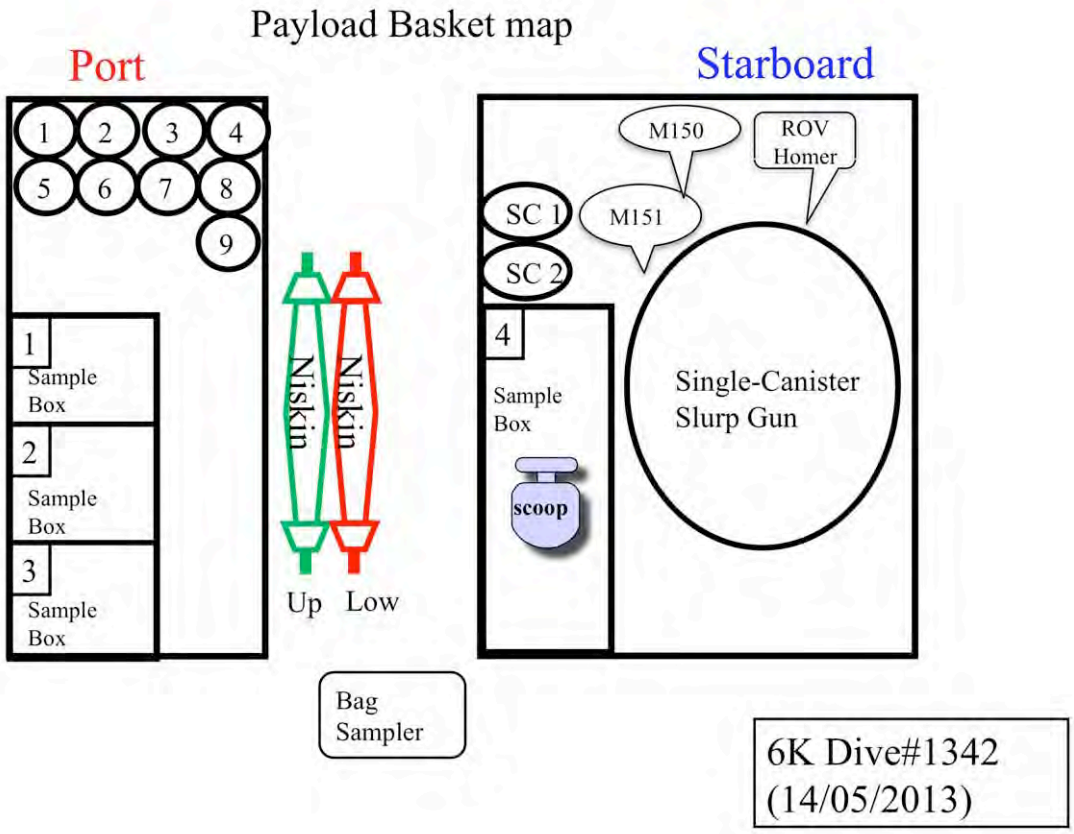
6K Dive #1341 **Escarpment (PT4)** **2013/05/13**

Time (LCT)	Dep. (m)	Alt. (m)	Head (Deg)	Pos. Xm	Pos. Ym	Description	Remarks
9:01						vent open. Start of dive	WD:3140m
10:15	3175	408		-510	2608		
10:20	3368	219		-546	2660		
10:25	3521	77		-547	2727	Tem: 1.7; Sal: 34.8	
10:30	3539	60		-546	2735		
10:35	3595	7		-516	2737		
10:36	3601	3		-523	2779		
10:40	3602	3		-501	2769		
10:42	3602			-510	2750	landed, mud, visibility 10m, flow 40˚ 3cm/s	
10:51						push core 1,3, 6; then start to run, course 270˚	core
11:01	3606			-520	2579		
11:04						ripple mark	

11:10	3619			-490	2320		
11:17	3615			-463	2117	stop for samping	
						collect Rock #1 (Box #3)	rock
11:23	3614			-450	2130	start to run, along isobath	
11:30	3606			-580	2060		
11:33	3602					fish	
11:34	3601					Fish follwed the Shinkai	
11:37	3596			-650	1980		
11:40	3598					ripple mark ?	
11:44	3610			-820	2030		
11:51	3619			-1000	2110		
11:56	3610					clif? Many rocks	
11:57	3603			-1140	1960		
12:00	3588					trun to course 280˚	
12:03	3585			-1200	1870	stop for rock sampling	
12:06						stop samping (hard rock!)	
12:16	3525			-1200	1730		
12:25	3460			-1100	1570		
12:35	3400			-1000	1370		
12:36						turn to course 270˚	
12:43	3365			-1030	1190		
12:50	3359			-960	980		
12:55	3357			-980	840		
12:58	3360					sea cucumber	
13:07	3366			-950	410	no visible organisms	
13:15	3352			-880	140	no visible organisms	
13:22	3350			-840	-70	no visible organisms	
13:24	3351			-840	-175	something black	
13:27	3354			-801	-306	something black again	
13:34	3366			-720	-470	no visible organisms	
13:37	3384					many black rocks, nodules?	
13:41	3388			-660	-640	collecting rocks	
13:43	3388			-660	-640	collected rock#2 #3 in box 2	rock
13:53	3436			-556	-945	fish	
13:54	3436			-550	-950		
13:55	3436			-530	-990		
13:58	3431			-480	-1080	fish or shrimp?	
14:02	3440			-440	-1180		
14:07	3448			-370	-1370	animal tracks?	

14:16	3452			-430	-1660	no visible organisms	
14:20	3450					rocky floor appears	
14:24	3460			-490	-1830	small black rocks	
14:27	3454					mass of old rocks	
14:33	3452			-329	-1969	rocks	
14:39	3444			-336	-1943	trying for six all cores, bag sampler, niskin, sterized core sampler	
14:44	3438			-345	-1998	2,4,5,7,8,9 cores (4 failed), bag, yelleow ok but green sterized core has failed, niskin (green, red)	
15:02	3406			-351	-1950	left from the bottom	

5-3. 6K#1342 Dive Report
Date: 2013/5/14
Dive Scientist: Takao Yoshida (JAMSTEC)
Pilot: Yoshitaka Sasaki
Co-pilot: Takuma Ohnishi
Survey site: PT1, South São Paulo Plateau Outer Escarpment (SSPPOE)
Landing Point: 22°56.4439' S, 38°8.1391' W, 2997 m
Leaving Point: 22°54.3834' S, 39°6.0679' W, 2967 m
Payload: Niskin bottles (1.9L)-2, Bag water sampler-1, Push corers-9, Sterilized corers-2, Scoop sampler-1, Sample box for biology-1, Sample containers for rocks-1, Marker buoys-2, Suction sampler with single-canister-1, ROV Homer-1



Dive Summary

Subjects:
1) Discovery of the seep communities

Results:
1) Biology
There was no evidence of seep community at the PT1, South São Paulo Plateau Outer Escarpment (SSPPOE). Diversity and amount of benthic animals were very low. Several fishes, shrimps, sponges and sea cucumbers were observed.

2) Geology and Topography
Seafloors were flat and several small rocks were scattered at landing point and top of mountain. In foot of mountain, there was very steep slope.

3) Geochemistry
No information.

4) Microbiology
No information.
5) Sampling
- 3 Cores (C1, 3, 6) on the normal seafloor for Geochemistry, Microbiology, Geology and Macrobiology.
- Water by Niskin bottles for Geochemistry and Microbiology

List of event marks

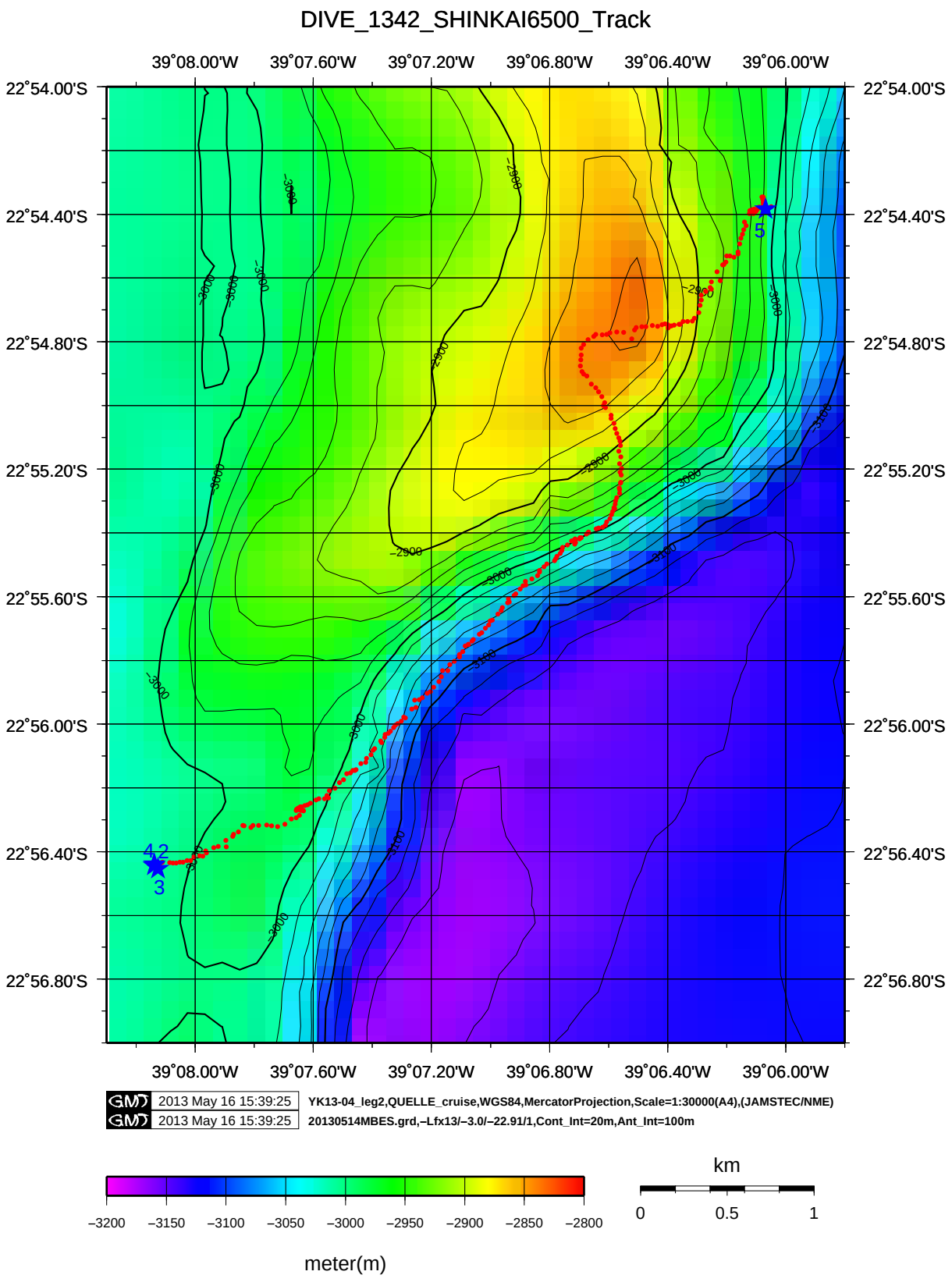
#1342DIVE サンパウロ海台 吉田 尊雄 SkyFix(WGS-84)SSBL

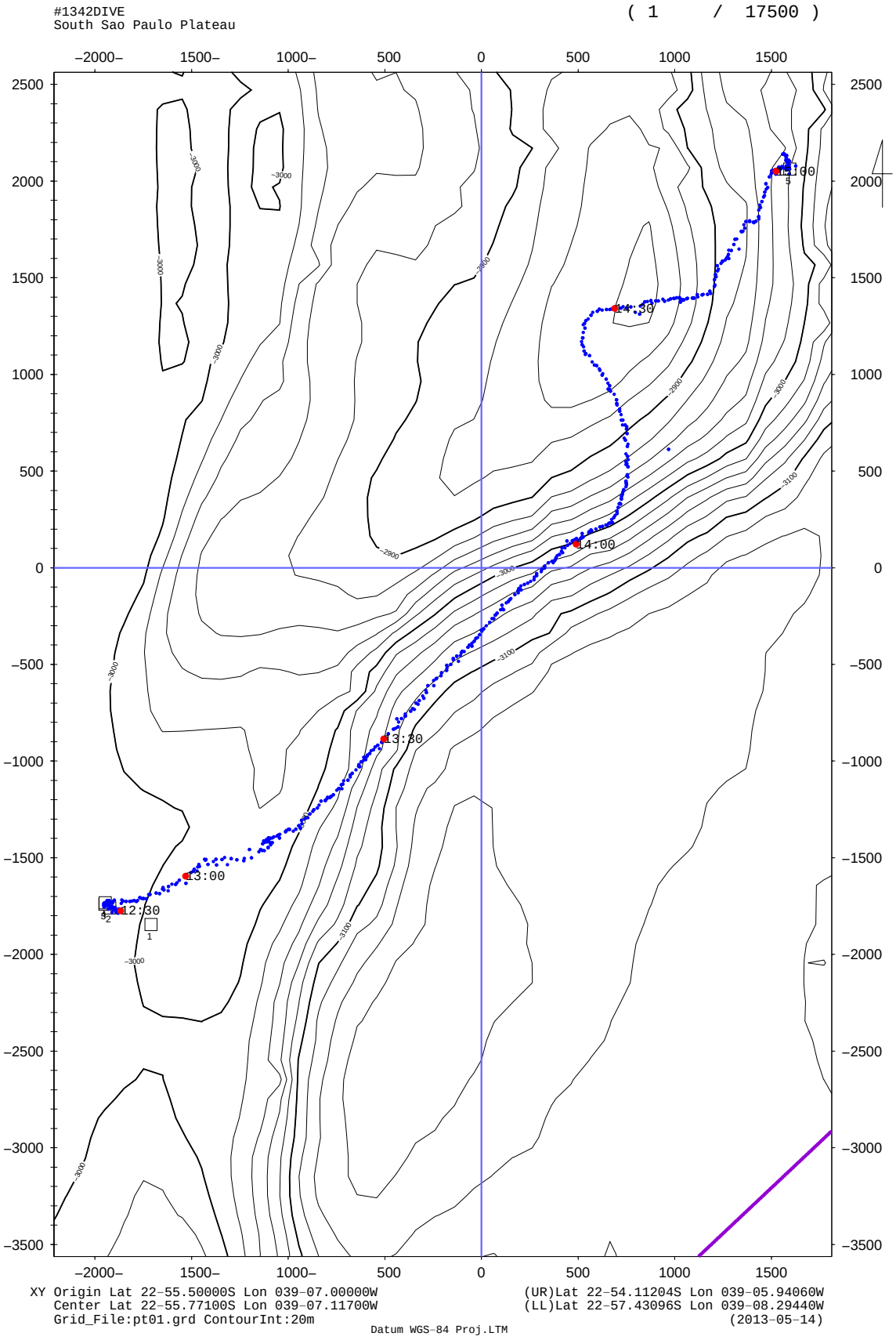
*** EVENT MARK LIST *** 2013-05-14 15:55:08

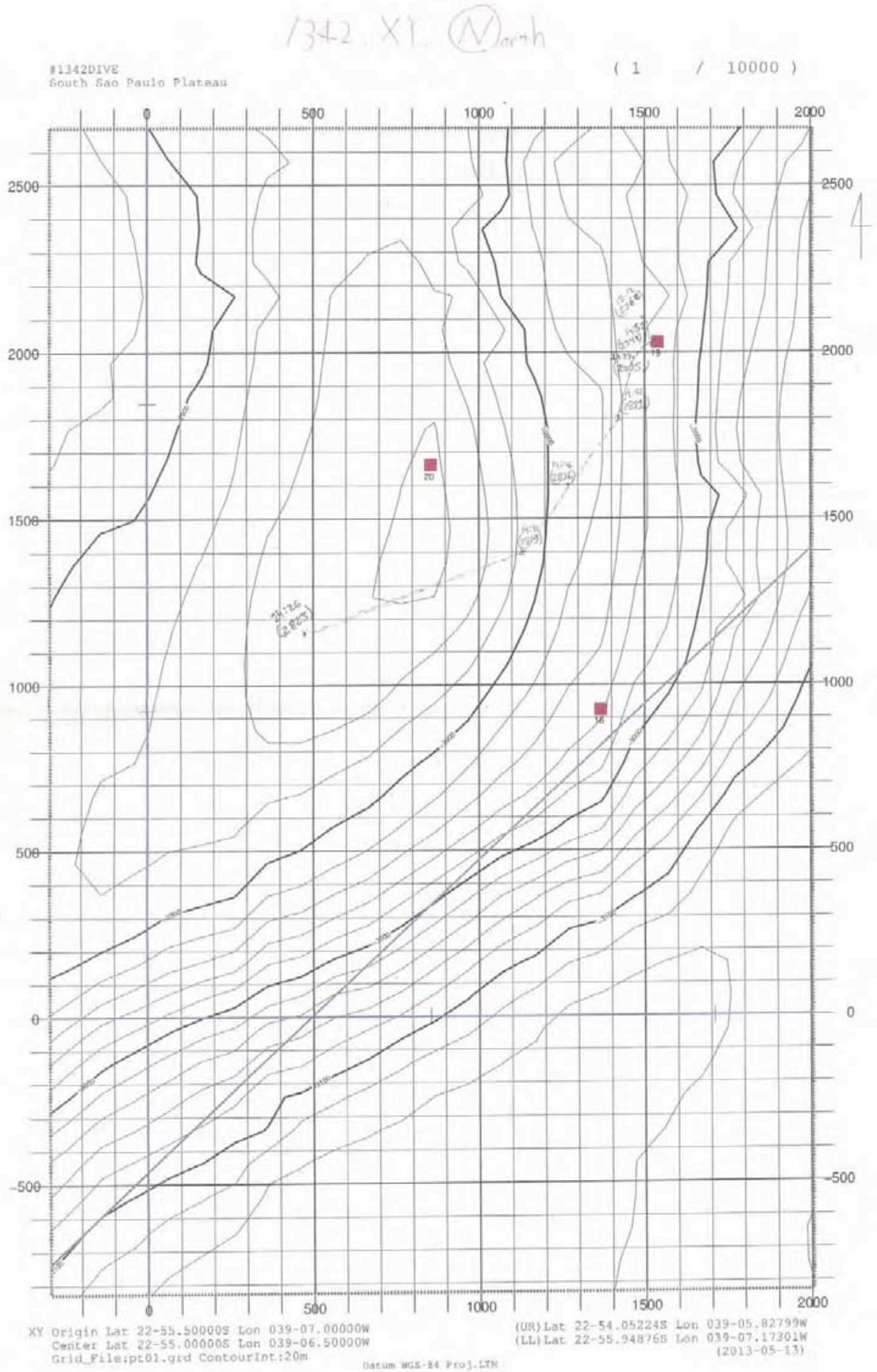
ORIGIN (XY<->LATLON CONVERT) LAT 22°55.5000'S LON 39°07.0000'W
XY ORIGIN ((X,Y)=(0,0)) LAT 22°55.5000'S LON 39°07.0000'W

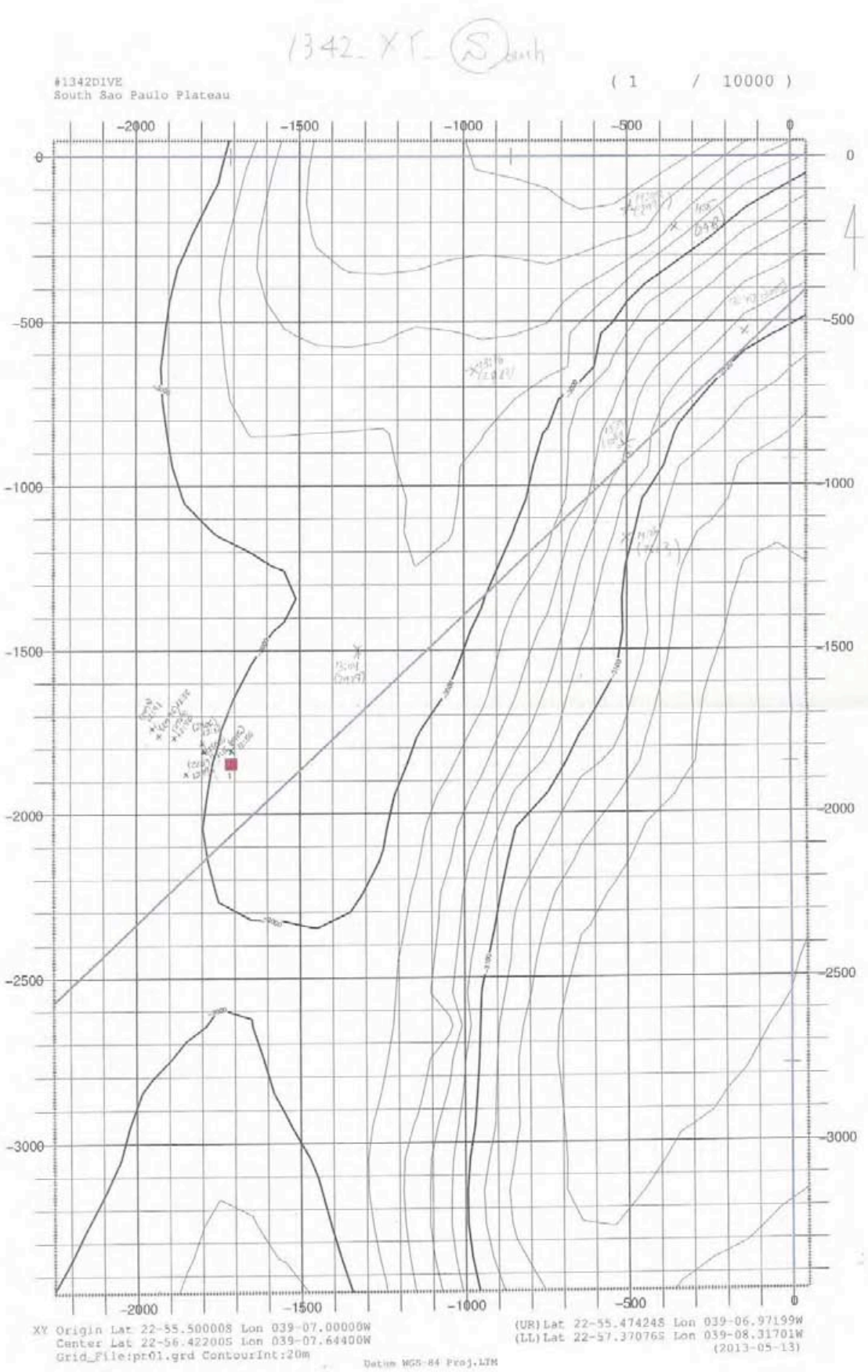
NO.	DAY	TIME	LAT	LON	X	Y
1	2013-05-14	09:00:00	22° 56.5000' S	39° 8.0000' W	-1845.5	-1709.4
	Landing Target					
2	2013-05-14	12:35:00	22° 56.4537' S	39° 8.1255' W	-1760.0	-1924.0
	Sampling NISKIN(Red) D=2995m					
3	2013-05-14	12:40:00	22° 56.4439' S	39° 8.1403' W	-1741.9	-1949.3
	Landing D=2997m					
4	2013-05-14	12:44:00	22° 56.4399' S	39° 8.139' W	-1734.6	-1947.2
	Sampling Core(#1,#3,#6) D=2997m					
5	2013-05-14	15:07:00	22° 54.3834' S	39° 6.0879' W	2060.7	1693.4
	Ball Bottom D=2967m					

Track Line

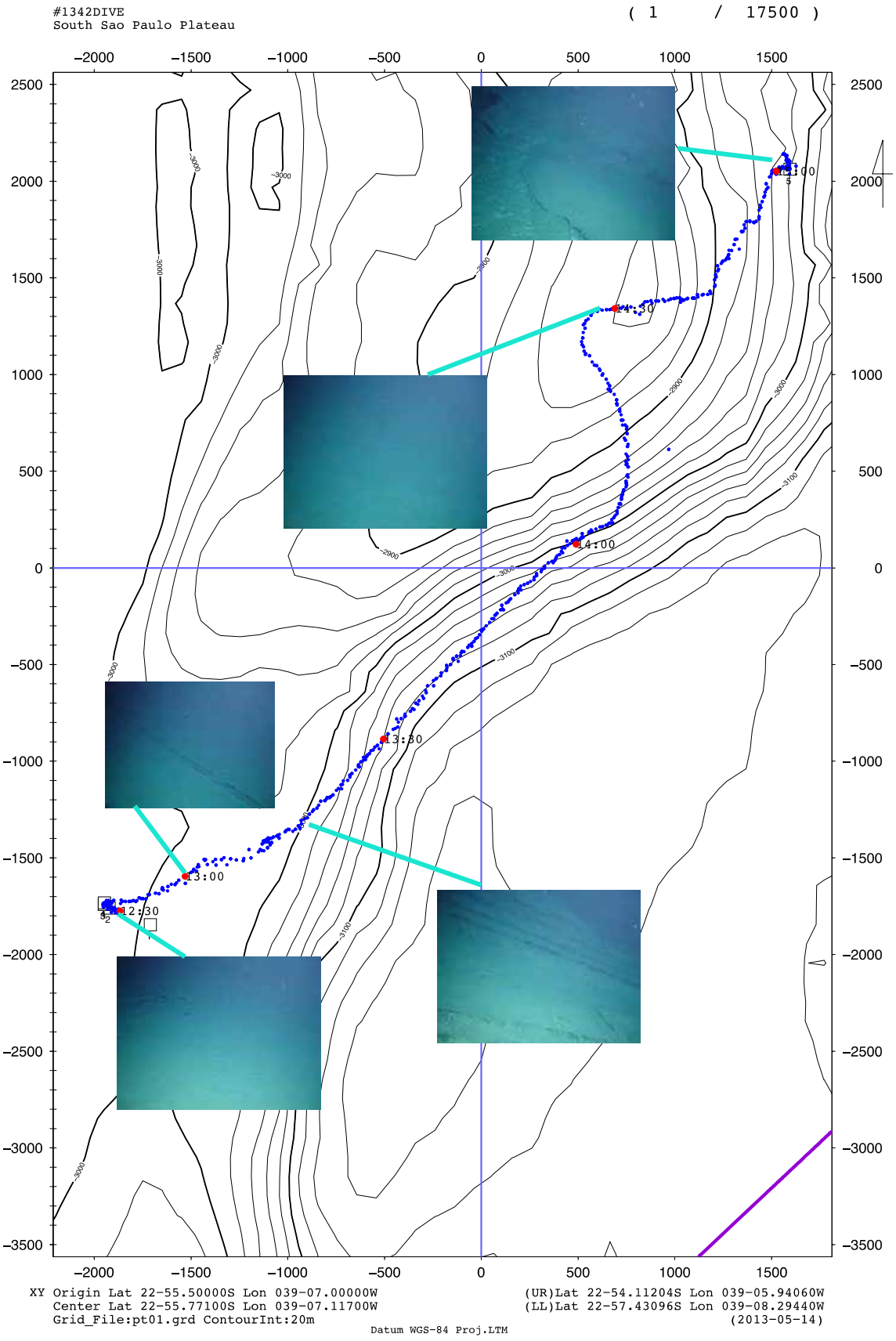

DIVE_1342_SHINKAI6500_Track
39°08.00'W
39°07.60'W
39°07.20'W
39°06.80'W
39°06.40'W
39°06.00'W
22°54.00'S
22°54.40'S
22°54.80'S
22°55.20'S
22°55.60'S
22°56.00'S
22°56.40'S
22°56.80'S
2
3
4
5
2013 May 16 15:39:25
YK13-04_leg2,QUELLE_cruise,WGS84,MercatorProjection,Scale=1:30000(A4),(JAMSTEC/NME)
2013 May 16 15:39:25
20130514MBES.grd,−Lfx13/−3.0/−22.91/1,Cont_Int=20m,Ant_Int=100m
−3200 −3150 −3100 −3050 −3000 −2950 −2900 −2850 −2800
meter(m)
km
0
0.5
1


#1342DIVE
South Sao Paulo Plateau
(1 / 17500)
12:30
13:00
13:30
14:00
14:30
XY Origin Lat 22-55.50000S Lon 039-07.00000W
Center Lat 22-55.77100S Lon 039-07.11700W
Grid_File:pt01.grd ContourInt:20m
(UR)Lat 22-54.11204S Lon 039-05.94060W
(LL)Lat 22-57.43096S Lon 039-08.29440W
(2013-05-14)
Datum WGS-84 Proj.LTM

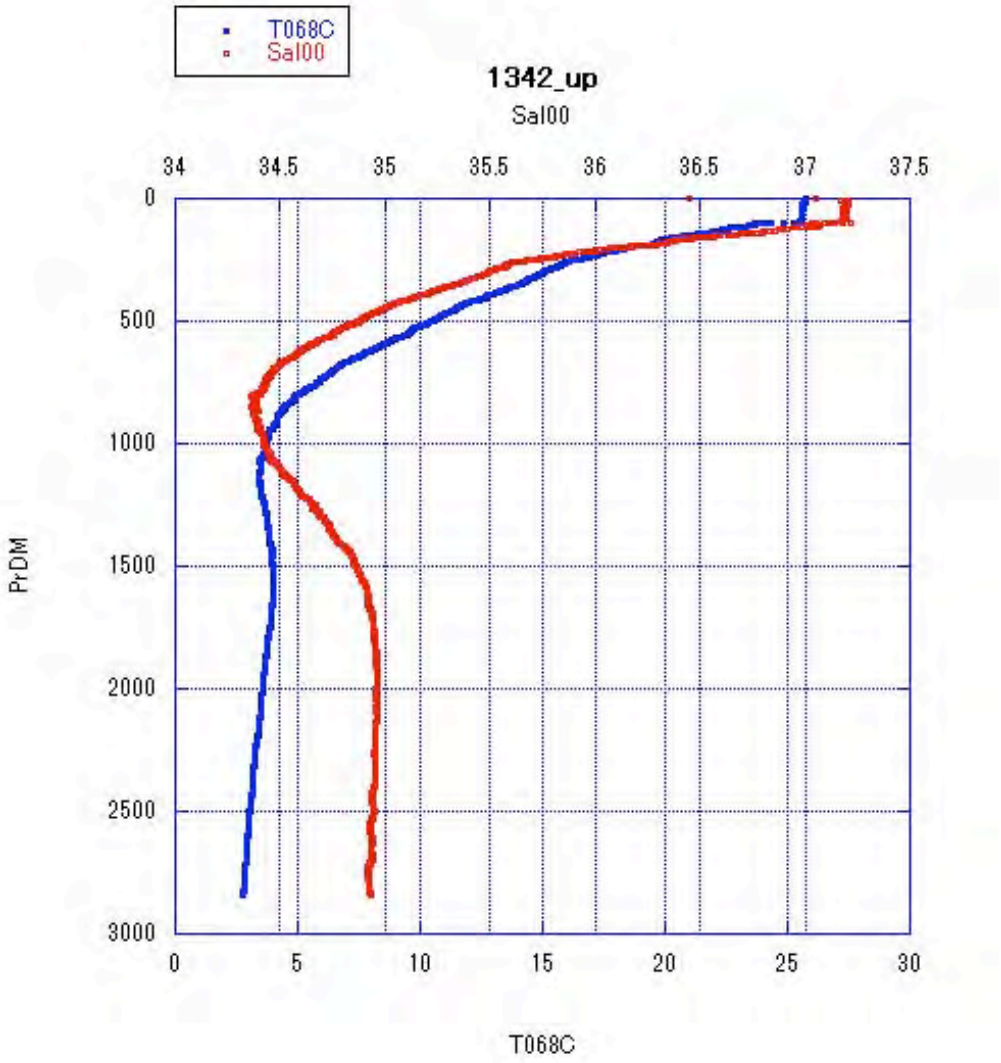

#1342DIVE
South Sao Paulo Plateau
(1 / 10000)
0
500
1000
1500
2000
2500
-500
XY Origin Lat 22-55.50000S Lon 039-07.00000W
Center Lat 22-55.00000S Lon 039-06.50000W
Grid_File:pt01.grd ContourInt:20m
(UR)Lat 22-54.05224S Lon 039-05.82799W
(LL)Lat 22-55.94876S Lon 039-07.17301W
(2013-05-13)
Datum WGS-84 Proj.LTM


#1342DIVE
South Sao Paulo Plateau
(1 / 10000)
-2000
-1500
-1000
-500
0
-2500
-3000
XY Origin Lat 22-55.500008 Lon 039-07.00000W
Center Lat 22-56.422005 Lon 039-07.64400W
Grid_File:pr01.grd ContourInt:20m
Datum WGS-84 Proj.LTM
(UR)Lat 22-55.474248 Lon 039-06.97199W
(LL)Lat 22-57.370765 Lon 039-08.31701W
(2013-05-13)

In-situ photos on track line



CTD/DO Profile



6.5K#1342 DIVE LOG

Dive Log of 6K Dive #1342

Off Brazil Sea, São Paulo Plateau Outer Escarpment (PT1)

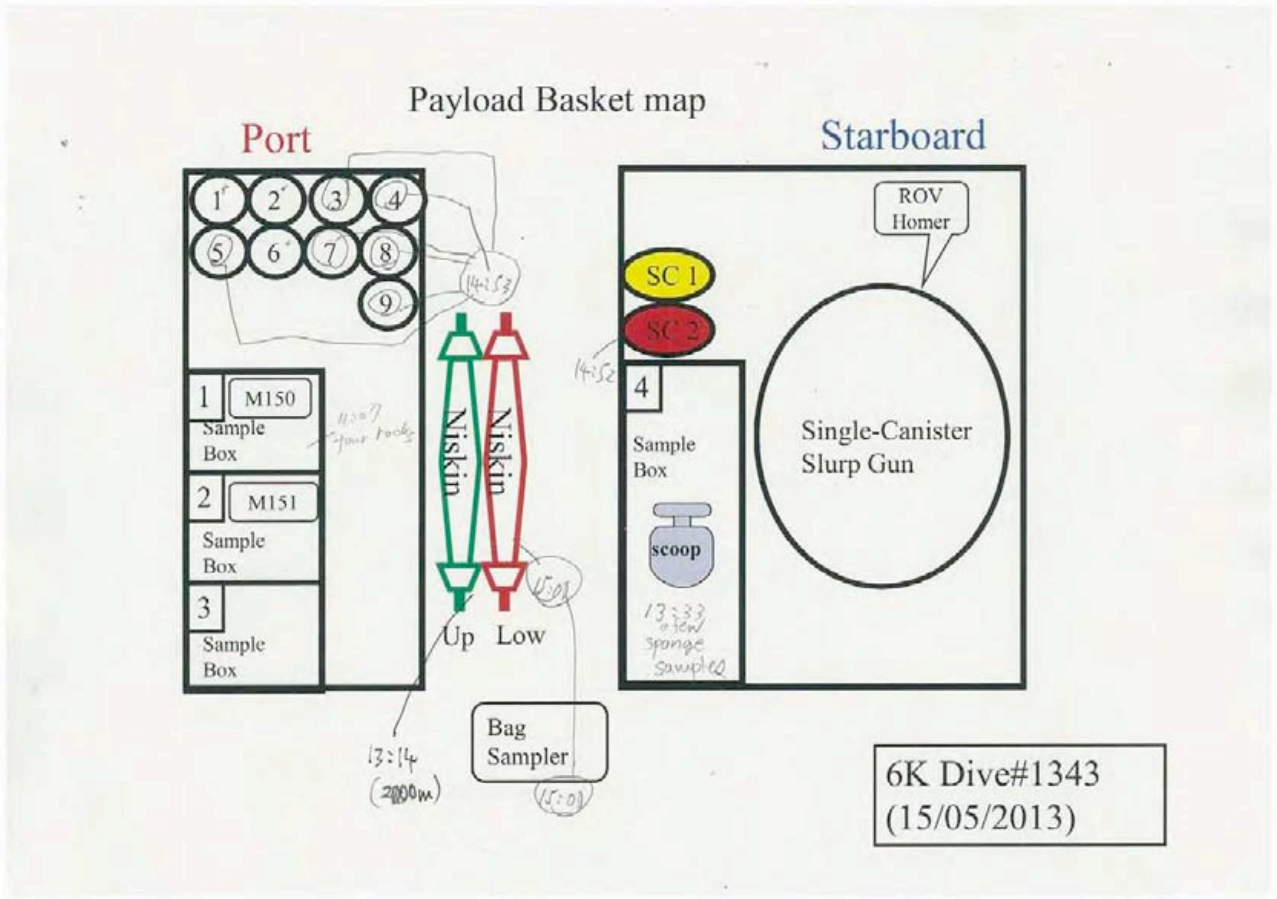
2013.05.14

Time (LCT)	Dep. (m)	Alt. (m)	Head (Deg)	Pos. Xm	Pos. Ym	Description	Remarks
						vent open. Start of dive	WD:2990m
12:09	2257			-1820	-1840		
12:12	2406			-1790	-1800		
12:16	2500			-1801	-1791		
12:30	2929			-1772	-1869	alt. 63m	
12:35	2994	2		-1755	-1929	Niskin	Niskin Red
12:41	2997			-1742	-1945	landed on seafloor, visibility 7m, mud with pebble, flow 270˚,	

						20cm/s, 2.5˚C	
12:42						start core sampling	core 1, 3, 6
12:50						start moving, course 90˚	
12:56	2986			-1710	-1710		
13:04	2978			-1500	-1310	tured to course 70˚	
13:16	2983			-1350	-980	turned to course 60˚	
13:30	3064			-890	-500		
13:40	3075	2		-470	-130	rocky floor	
13:43	3057					black patches?	
13:55	3013	2		39	380	strabge looking rocks??	
14:00	2995	3		150	500	rocky floor	
14:05	2978	6		218	643	heading to event mark 20	
14:07	2967	4				fish	
14:11	2932	5		430	750		
14:14	2902	3		545	746	rocks with white and black layers	
14:16	2884			850	700	ripple mark	
14:26	2823	3		1170	520		
14:41	2819			1400	1130	going to endpoint	
14:46	2836			1600	1280	moving fast	
14:51	2881			1800	1420		
14:54	2895			1970	1480	moving	
14:59	2948			2050	1530	sea floar, sea cucumber, sea anemone	
15:12	2962			2104	1503	left from the bottom	

5-4. 6K#1343 Dive Report

Date: 2013/5/15
Dive Scientist: Antonio Fernando Menezes Freire (PETROBRAS)
Pilot: Kazuki Iijima
Co-pilot: Yudai Tayama
Survey site: PT6, North São Paulo Plateau Outer Escarpment (NSPPOE)
Landing Point: 20°41.6262’ S, 38°38.1977’ W, 2728 m
Leaving Point: 20°40.2408’ S, 38°38.0971’ W, 2456 m
Payload: Niskin bottles (1.9L)-2, Bag water sampler-1, Push corers-9, Scoop sampler-1, Sample box for biology-1, Sample containers for rocks-1, Marker buoys-2, Suction sampler with single-canister-1, ROV Homer-1



Dive Summary

Subjects:

1) Discovery of the seep communities
2) Observation of distribution pattern of the seep communities
3) Geochemical setting of the seeps
4) Chemical concentration such as CH_4, H_2S, Salinity, etc
5) Origin of chemicals
6) Geological structure in the seeps
7) Faunal composition and flora of the seep communities

Results:

1) Biology

There is no evidence of seep community at PT6, North São Paulo Plateau Outer Escarpment (NSPPOE). Diversity and amount of benthic animals were high, compared to previous dive points at SSPPOE. Several sponges, tunicates, shrimps, gastropods, octopus and sea cucumbers were observed. In gentle slopes, numerous dead shells of Pteropoda: Gastropoda were accumulated on the sea floor. These areas were looked white-colored area like bacteria mats.

2) Geology and Topography

Several outcrops of carbonates/mudstones/siltstones are observed. Fractures and faults filled by black oil could be observed. Rocks are basculled and compose a scarp of fault that configures the steep relief of more than 200 m shift between the top and the base of the plateau.

3) Geochemistry

No information.

4) Microbiology

No information.

5) Sampling

- 9 Cores (C1-9) on the normal seafloor for Geochemistry, Microbiology, Geology and Macrobiology.
- Water by Niskin bottles and a Bag sampler for Geochemistry and Microbiology
- Rocks and oil filling-fractures for Geology.
- Benthic animal: sponges for Megabiology.

List of event marks

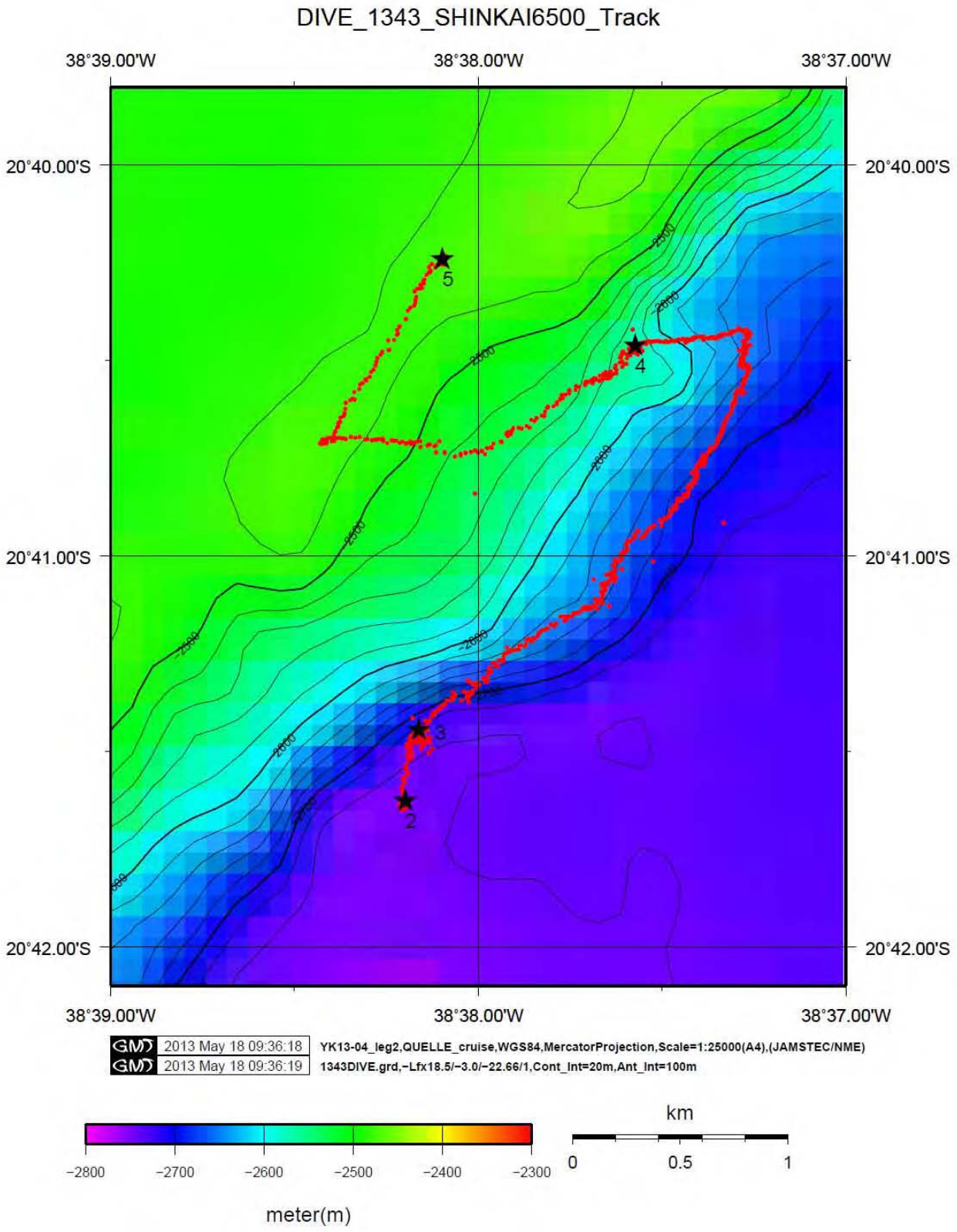
#1343DIVE サンパウロ海台 Antonio Fernando SkyFix(WGS-84)SSBL

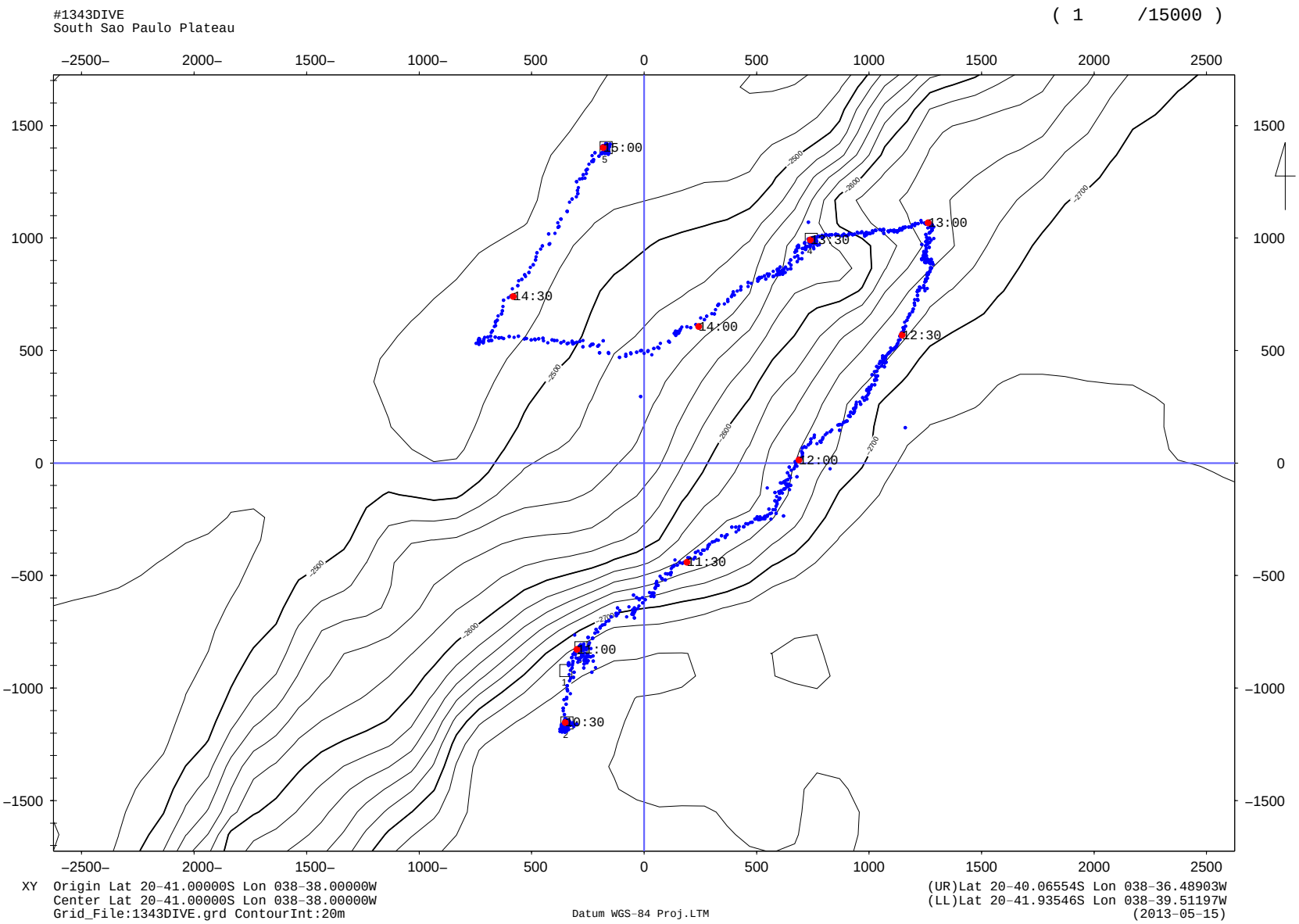
*** EVENT MARK LIST *** 2013-05-15 15:06:30

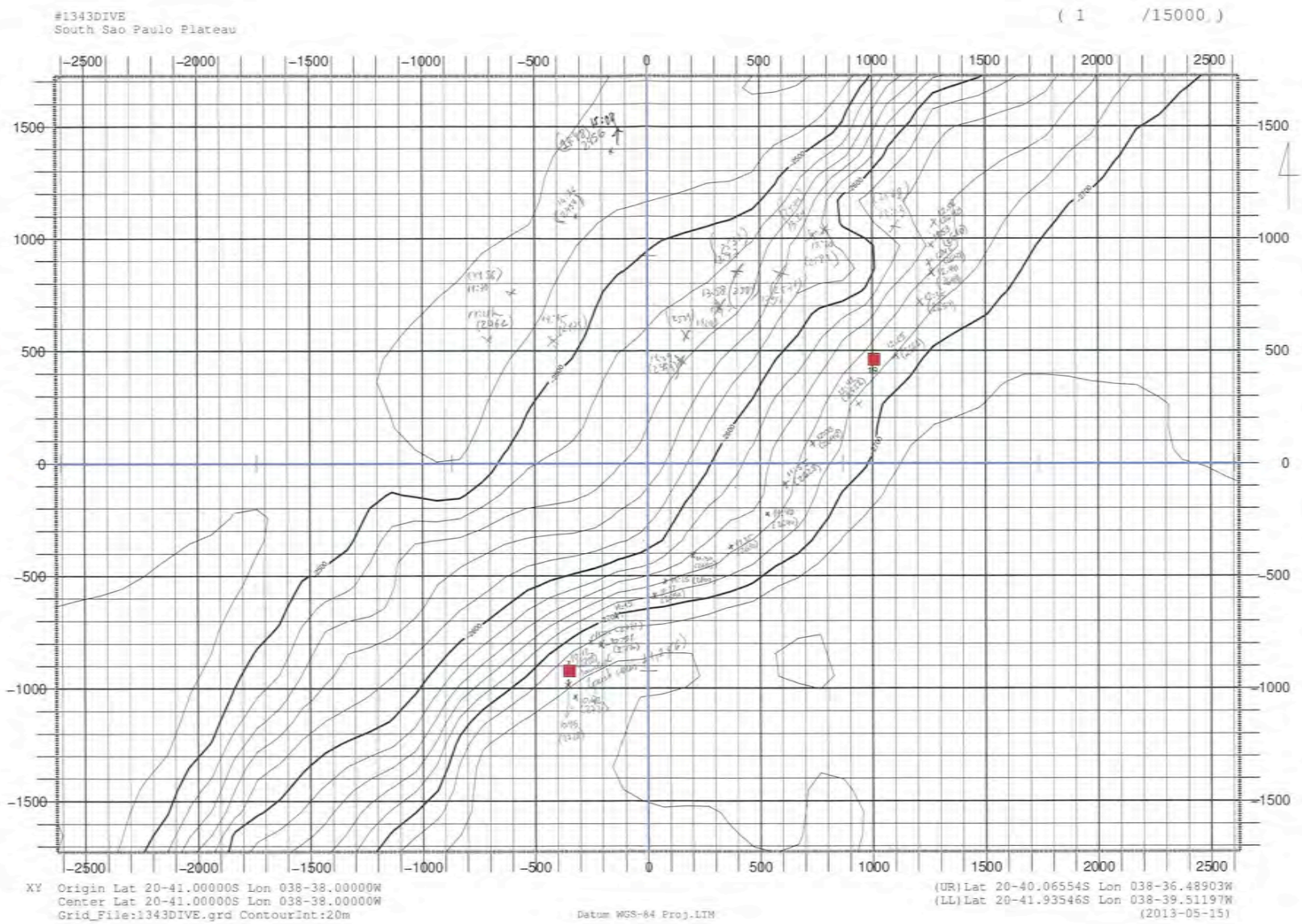
ORIGIN (XY<->LATLON CONVERT) LAT 20° 41.0000'S LON 38° 38.0000'W
XY ORIGIN ((X,Y)=(0,0)) LAT 20° 41.0000'S LON 38° 38.0000'W

NO.	DAY	TIME	LAT	LON	X	Y
1	2013-05-15	09:00:00	20° 41.5000' S	38° 38.2000' W	-922.5	-347.2
	Landing Target					
2	2013-05-15	10:36:00	20° 41.6262' S	38° 38.1977' W	-1155.3	-343.2
	Landing, Sampling Core(#1,#2,#6) D=2728m					
3	2013-05-15	11:06:00	20° 41.4455' S	38° 38.1613' W	-821.9	-280.0
	Sampling Rocks(4) D=2719m					
4	2013-05-15	13:34:00	20° 40.4616' S	38° 37.5723' W	993.3	742.6
	Sampling Sponge D=2574m					
5	2013-05-15	15:00:00	20° 40.2408' S	38° 38.0971' W	1400.7	-168.5
	Sampling NISKIN, Animal, Core(6), ST, Left Bottom D=2456m					

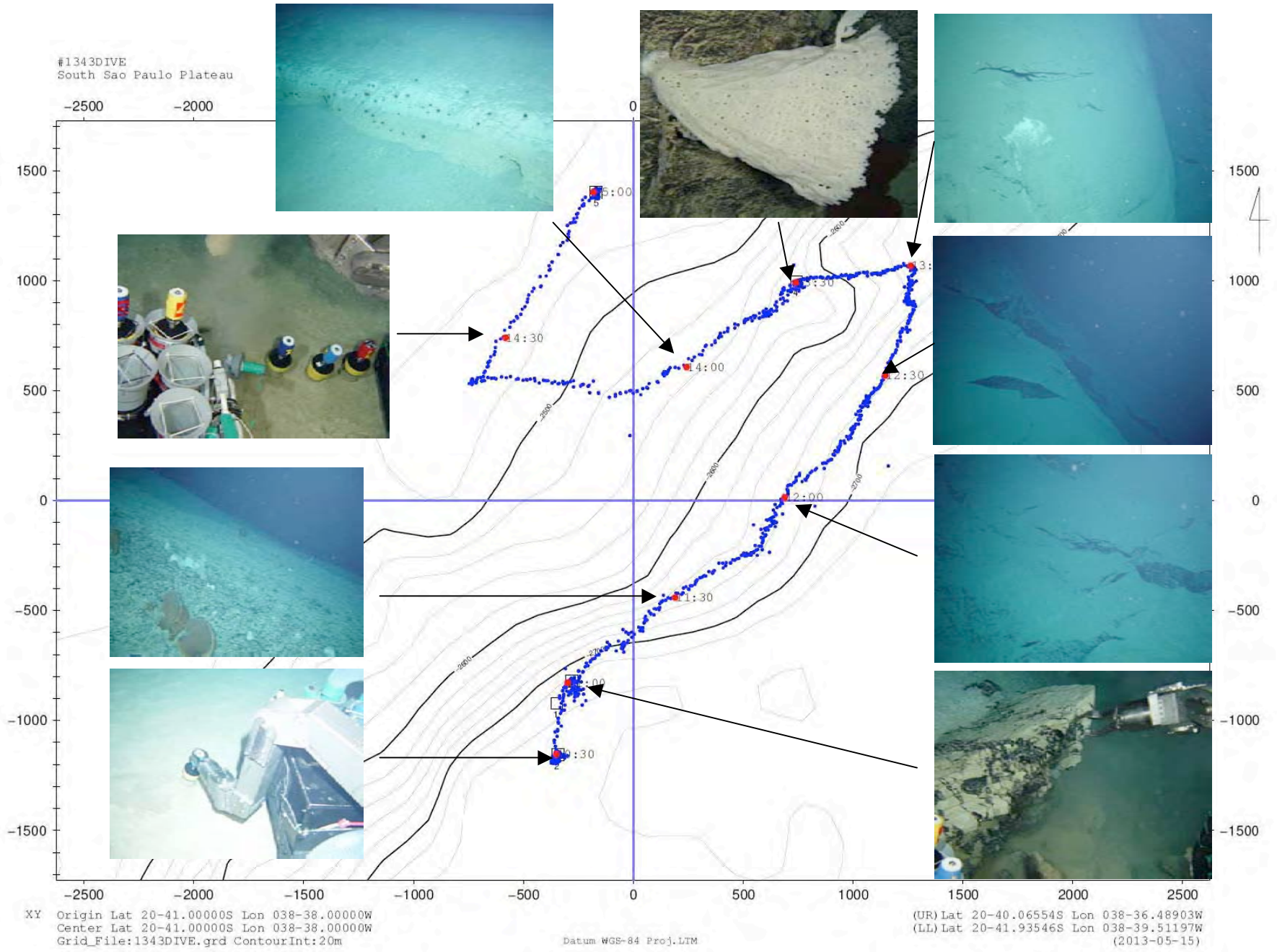
Track Line


DIVE_1343_SHINKAI6500_Track
38°39.00'W
38°38.00'W
38°37.00'W
20°40.00'S
20°41.00'S
20°42.00'S
5
4
3
2
2013 May 18 09:36:18
2013 May 18 09:36:19
YK13-04_leg2,QUELLE_cruise,WGS84,MercatorProjection,Scale=1:25000(A4),(JAMSTEC/NME)
1343DIVE.grd,-Lfx18.5/-3.0/-22.66/1,Cont_Int=20m,Ant_Int=100m
−2800
−2700
−2600
−2500
−2400
−2300
meter(m)
km
0
0.5
1

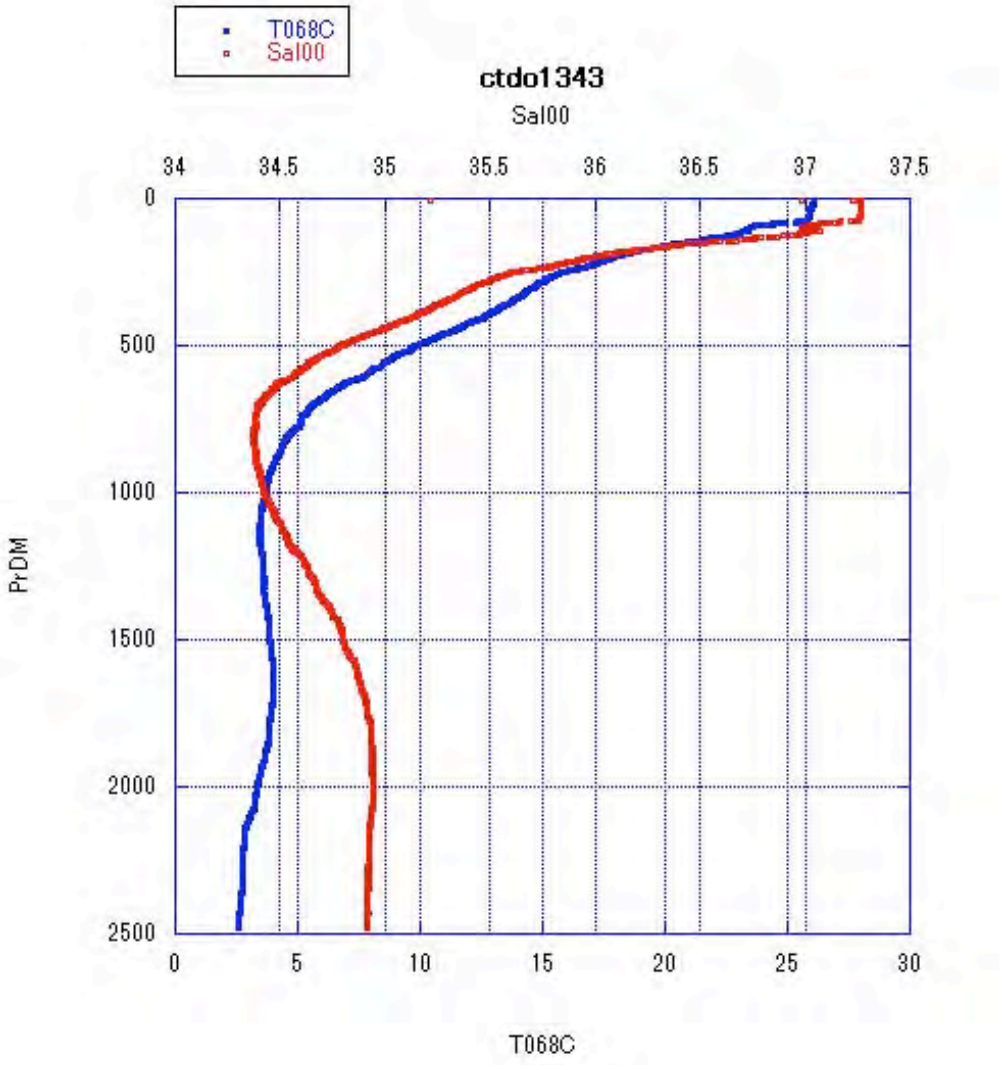

#1343DIVE
South Sao Paulo Plateau
(1 /15000)
15:00
14:30
14:00
13:30
13:00
12:30
12:00
11:30
11:00
10:30
XY Origin Lat 20-41.00000S Lon 038-38.00000W
Center Lat 20-41.00000S Lon 038-38.00000W
Grid_File:1343DIVE.grd ContourInt:20m
Datum WGS-84 Proj.LTM
(UR)Lat 20-40.06554S Lon 038-36.48903W
(LL)Lat 20-41.93546S Lon 038-39.51197W
(2013-05-15)


#1343DIVE
South Sao Paulo Plateau
(1 /15000)
-2500
-2000
-1500
-1000
-500
0
500
1000
1500
2000
2500
XY Origin Lat 20-41.00000S Lon 038-38.00000W
Center Lat 20-41.00000S Lon 038-38.00000W
Grid_File:1343DIVE.grd ContourInt:20m
Datum WGS-84 Proj.LIM
(UR)Lat 20-40.06554S Lon 038-36.48903W
(LL)Lat 20-41.93546S Lon 038-39.51197W
(2013-05-15)

In-situ photos on track line



CTD/DO Profile



6.5K#1343 DIVE LOG

Dive Log of

6K Dive #1343

Off Brazil Sea, São Paulo Plateau Outer Escarpment (PT6) **2013/05/15**

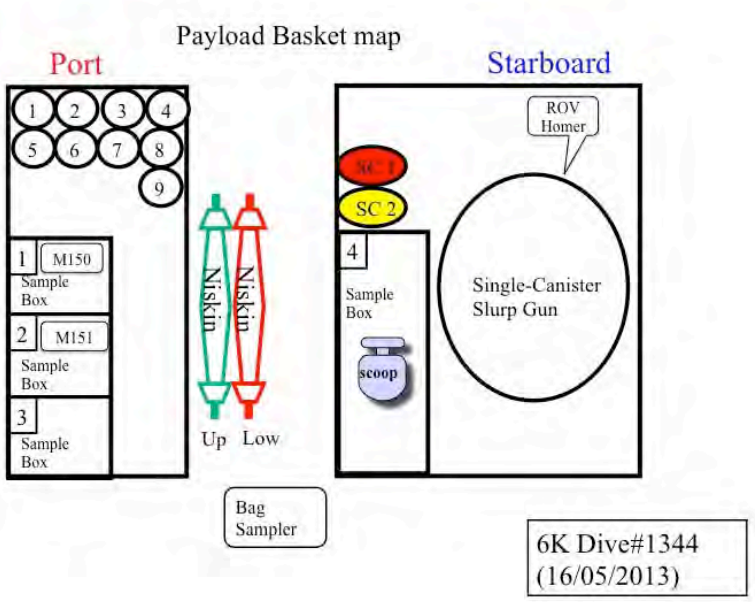
Time (LCT)	Dep. (m)	Alt. (m)	Head (Deg)	Pos. Xm	Pos. Ym	Description	Remarks
09:05						vent open. Start dive	WD:2657m
09:41	1500			-830	-440		
09:47				-800	-360	Hd 120˚ start to run	
09:52	1874			-1150	-310		
09:55	2000					stop running	
10:08	2500			-1200	-390		
	2600					DO 5.2?	
10:12						ready to landing	
10:26	2727			-1160	-340	landed	landed
						Visibility 12m, Tem 2.6, Mud, Flow 230˚ 6cm/cm	

						push core collected (#1, #2, #6)	cores colleted
						DO 5.16?	
10:42	2720			-1073	-356	ripple mark	
10:45	2728			-990	-330		
10:52				-820	-270	outcrop, rocky cliff	
10:55				-810	-274	landed	
11:07						four rocks with oil filling fractures collected (Box #1)	rocks collected
11:09						start to run, along course 45˚	
						outcrop, rock	
11:11	2612					Sal 34.9, Tem 2.6	
11:15				-670	-130		
						outcrop of rocky cliff	
11:22				-590	33		
11:25	2637			-520	70	rock cliff	
11:31	2615			-422	200		
11:32						ascidians?	
11:35	2630			-320	370	sea cucumber	
						outcrop of rocky wall	
11:40	2640			-230	520	running along course 30 ˚	
11:51	2631					finned octopus	
11:55	2628			-90	610		
11:58	2647					ripple mark	
12:01	2651					ripple mark	
12:03	2648			90	740		
12:12	2658			260	940	rocky seafloor	
12:16						continue to run course 30˚	
12:21	2652					close to EM#19, keep course 30˚	
12:25	2661			480	1100		
12:35	2657			722	1215	rock floor	
12:40	2648			850	1260		
12:45	2647			890	1246	whitish something (actually white rock!)	
12:53	2610			980	1260		
12:58	2642			1060	1270	change course 260˚	
13:08	2585			1030	1065	sponges	
13:09	2590			1020	1070	sea cucumber	
13:13	2568			1006	977	sponges	
13:15	2570					sea cucumber	
13:17	2580					sea cucumber	
13:19	2582					sponges	

13:20	2582			1010	790		
13:21	2581					sponges	
13:22	2581					dambo octopus	
13:24	2574			1000	740		
13:25	2575					something brown	
13:25	2575					big sponge	
13:29	2575			990	733	start sampling sponges	sample box 4
13:33	2574					sponges	
13:35	2576			1000	740		
13:38	2589					change course 240˚	
13:44	2544			880	620		
13:46	2530					black something-sea anemone	
13:47	2532					sea anemone	
13:51	2517			830	590		
13:58	2504			700	320		
14:03	2509			570	140		
14:06	2507					sea cucumber	
14:09	2499			470	-140		
14:15	2473			540	-420		
14:21	2462			540	-690	reached point 20, change course 45˚	
14:28	2457					something black on floor	
14:30	2456			766	-580		
14:36	2457			1100	-350		
14:48	2456			1397	-167	landed, sea urchin collected, niskin red, bag sampler	all core collected
						sterized core SC2, core#3, 4, 5, 7, 8, 9	
15:09	2455			1400	-170	left from the bottom	
15:14	2000			1265	-141	niskin green 2000m	

5-5. 6K#1344 Dive Report

Date: 2013/5/16
Dive Scientist: Toshiro Yamanaka (Okayama University)
Pilot: Keita Matsumoto
Co-pilot: Hitomi Ikeda
Survey site: PT5, North São Paulo Plateau Outer Escarpment (NSPPOE)
Landing Point: 20°38.0314' S, 38°47.1288' W, 2499 m
Leaving Point: 20°39.1157' S, 38°46.8751' W, 2307 m
Payload: Niskin bottles (1.9L)-2, Bag water sampler-1, Push corers-9, Scoop sampler-1, Sample box for biology-1, Sample containers for rocks-1, Marker buoys-2, Sterilized core sampler-2, Suction sampler with single-canister-1, ROV Homer-1



Dive Summary

Subjects:

1) Discovery of the seep communities
2) Observation of distribution pattern of the seep communities
3) Geochemical setting of the seeps
4) Chemical concentration such as CH_4, H_2S, Salinity, etc
5) Origin of chemicals
6) Geological structure in the seeps
7) Faunal composition and flora of the seep communities

Results:

1) Biology

No evidence of seep community was at the PT5, North São Paulo Plateau Outer Escarpment (NSPPOE). Diversity and amount of benthic animals were very low except sea cucumbers, which had often observed on sandy flat seafloor. A couple of sponges, tunicates, shrimps, and gastropods were observed.

2) Geology and Topography

Seafloor bathymetory observed from submersible was characterized as follows; 1) sand covered smooth seafloor with current ripple located foot of the plateau, 2) steep slopes of silty rock outcrops, 3) gentle slope and smooth seafloor with significant biotabation continue to the plateau peak. Some blackish layer and/or cover could see on the outcrops, but it was not oil remains such as observed by the previous dive.

3) Geochemistry

In addition to CTD/DO data, measured pH of seawater sampled by Niskin bottles were around 7.8, suggesting that it is normal deep seawater.

4) Microbiology
No information.
5) Sampling
- 6 Cores (C1-6) on the normal seafloor for Geochemistry, Microbiology, Geology and Macrobiology.
- Water by Niskin bottles (Green at bottom, Red at 750 m depth) for Geochemistry and Microbiology
- Rocks for Geology and Geochemistry.
- Benthic animal: one sponge for Megabiology.

List of event marks

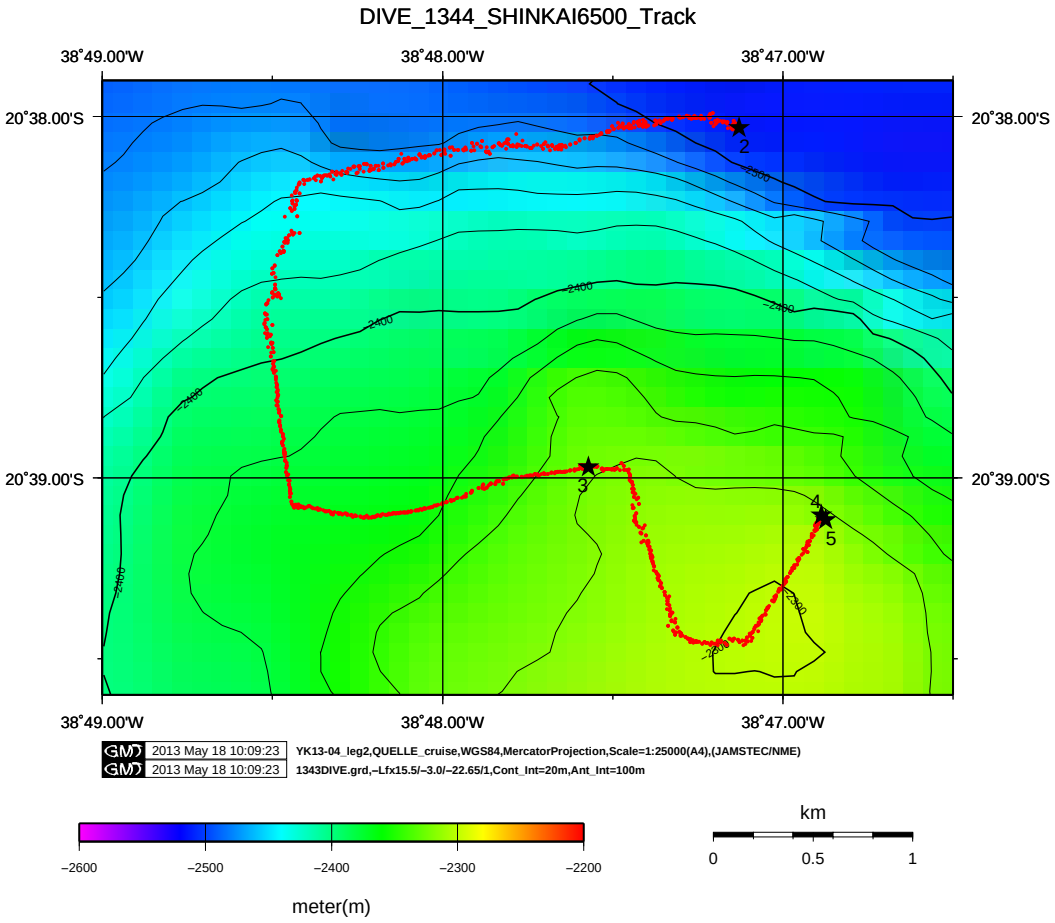
#1344DIVE サンパウロ海台　山中　寿朗　SkyFix(WGS-84)SSBL

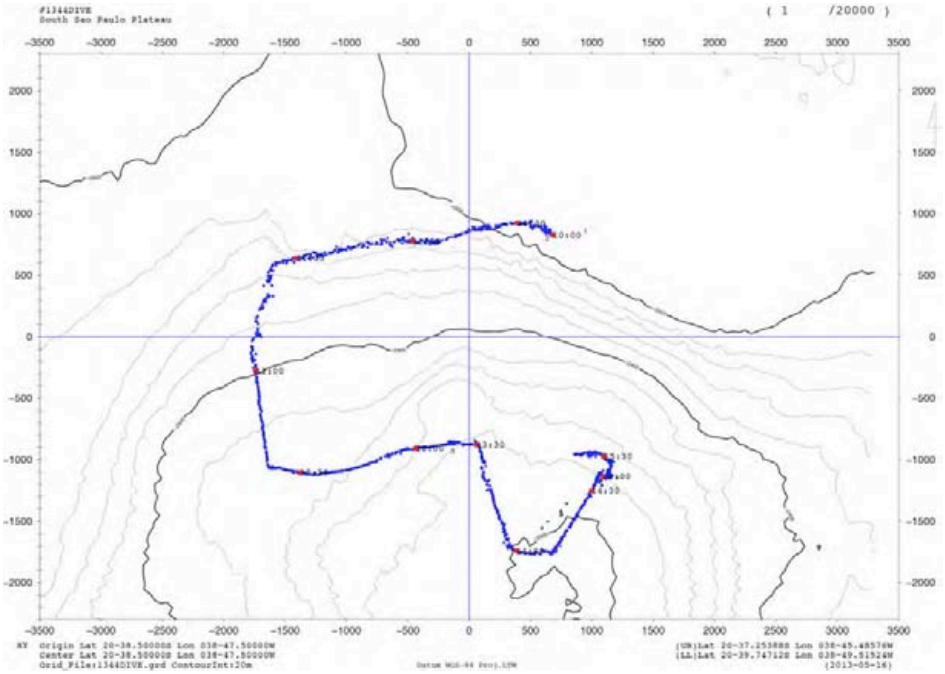
*** EVENT MARK LIST ***　2013-05-16 17:29:22

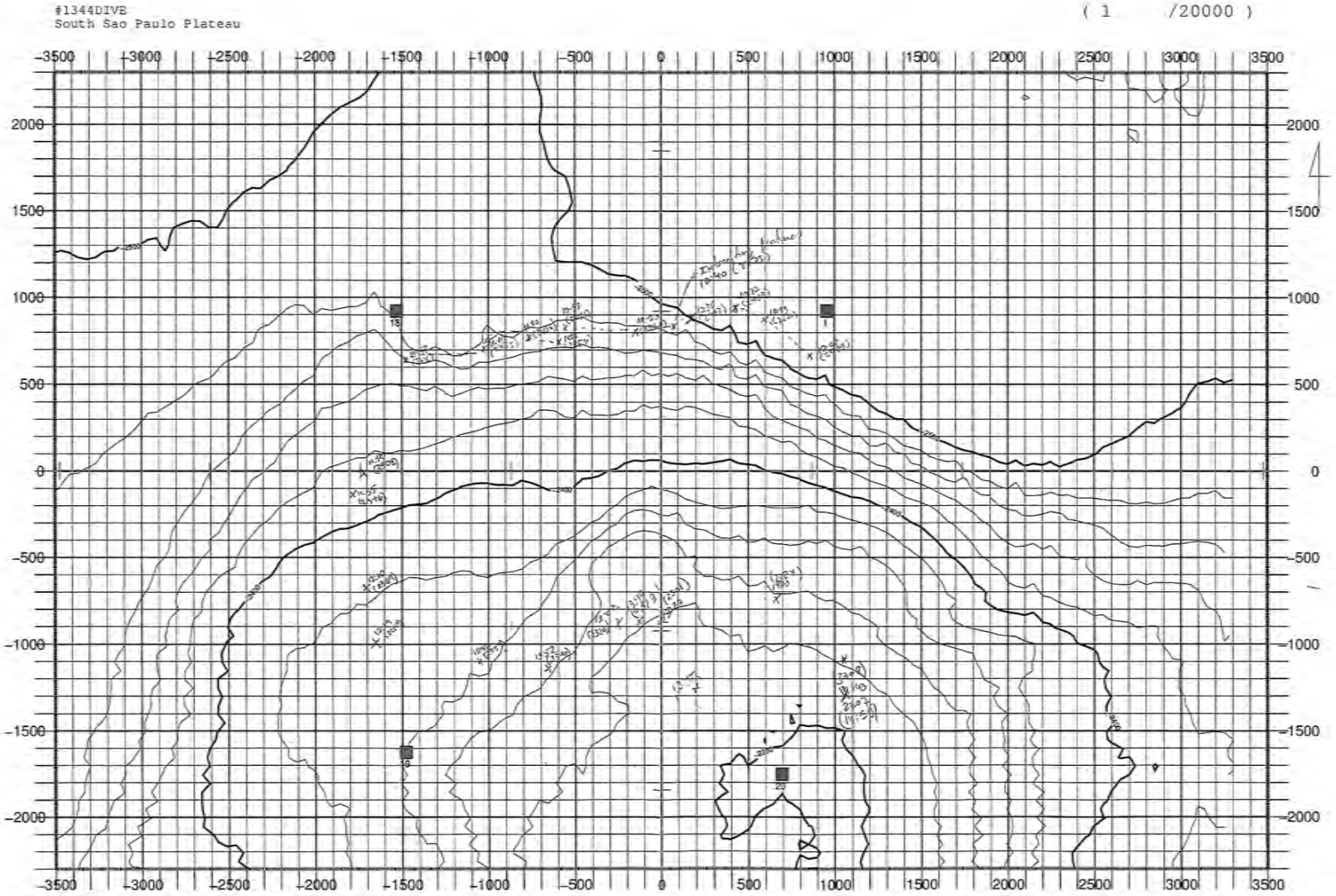
ORIGIN (XY<->LATLON CONVERT)　LAT 20°38.5000'S　LON 38°47.5000'W
XY ORIGIN ((X,Y)=(0,0))　LAT 20°38.5000'S　LON 38°47.5000'W

NO.	DAY	TIME	LAT	LON	X	Y
1	2013-05-16	09:00:00	20° 38.0000' S	38° 46.9500' W	922.5	955.2
	Landing Target					
2	2013-05-16	10:16:00	20° 38.0314' S	38° 47.1288' W	864.5	644.6
	Landing, Sampling Core(#1,#3,#6) D=2499m					
3	2013-05-16	13:16:00	20° 38.9708' S	38° 47.5722' W	-868.6	-125.3
	Sampling Rocks D=2313m					
4	2013-05-16	14:58:00	20° 39.1031' S	38° 46.8866' W	-1112.7	1065.3
	Sampling Sponge, Core(#2,#4,#5), NISKIN(Green) D=2308m					
5	2013-05-16	15:01:00	20° 39.1157' S	38° 46.8751' W	-1135.9	1085.2
	Left Bottom D=2307m					

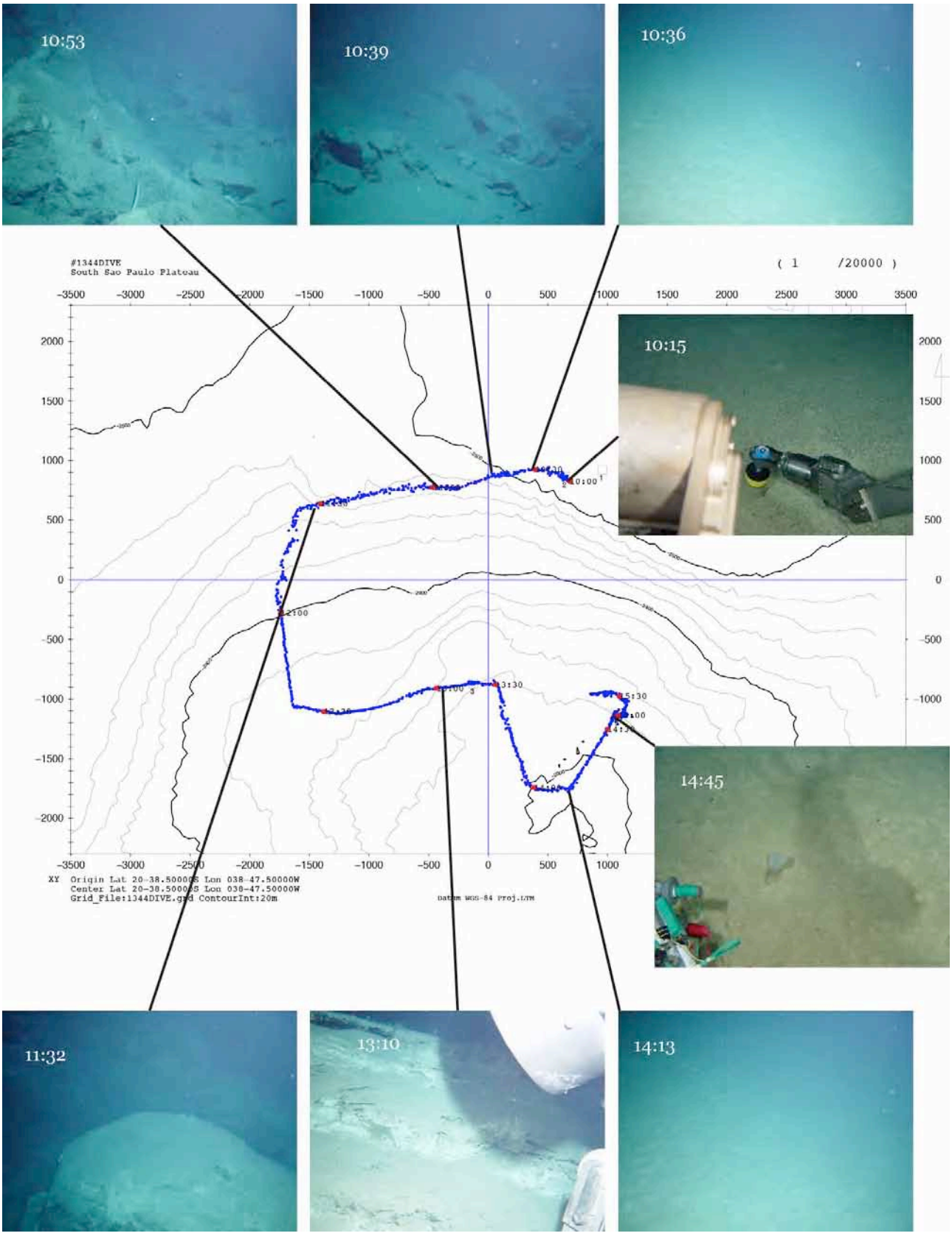
Track Line


DIVE_1344_SHINKAI6500_Track
38°49.00'W
38°48.00'W
38°47.00'W
20°38.00'S
20°39.00'S
2
3
4
5
2013 May 18 10:09:23
YK13-04_leg2,QUELLE_cruise,WGS84,MercatorProjection,Scale=1:25000(A4),(JAMSTEC/NME)
2013 May 18 10:09:23
1343DIVE.grd,-Lfx15.5/-3.0/-22.65/1,Cont_Int=20m,Ant_Int=100m
−2600
−2500
−2400
−2300
−2200
meter(m)
km
0
0.5
1

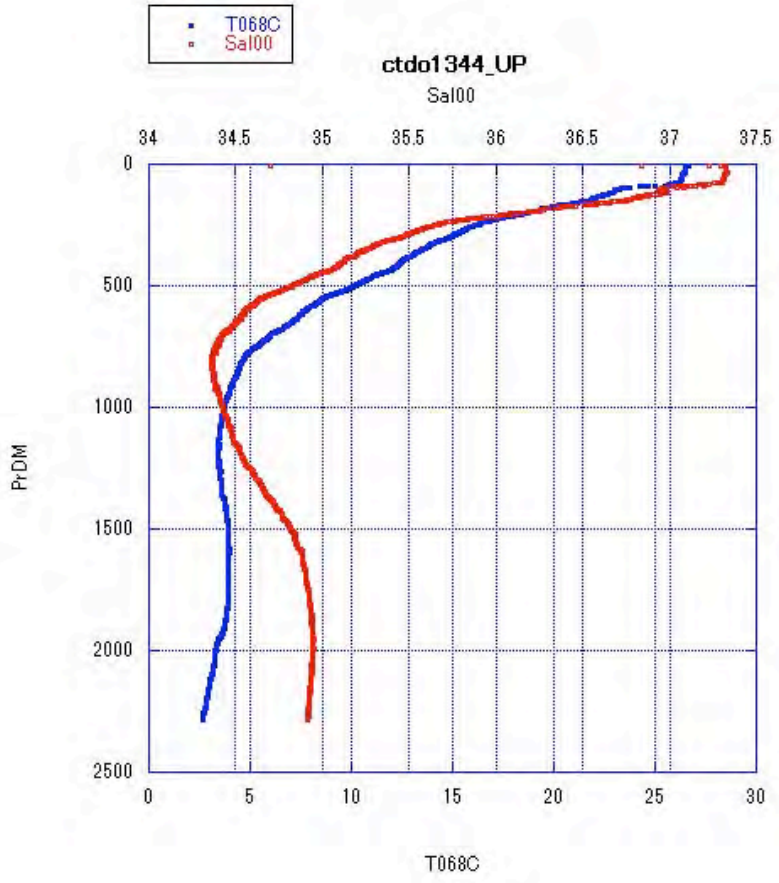

#1344DIVE
South Sao Paulo Plateau
(1 /20000)


#1344DIVE
South Sao Paulo Plateau
(1 /20000)
-3500 -3000 -2500 -2000 -1500 -1000 -500 0 500 1000 1500 2000 2500 3000 3500
2000 1500 1000 500 0 -500 -1000 -1500 -2000
XY Origin Lat 20-38.50000S Lon 038-47.50000W
Center Lat 20-38.50000S Lon 038-47.50000W
Grid_File:1344DIVE.grd ContourInt:20m
Datum WGS-84 Proj.LTM
(UR)Lat 20-37.25388S Lon 038-45.48576W
(LL)Lat 20-39.74712S Lon 038-49.51524W

In-situ photos on track line



CTD/DO Profile



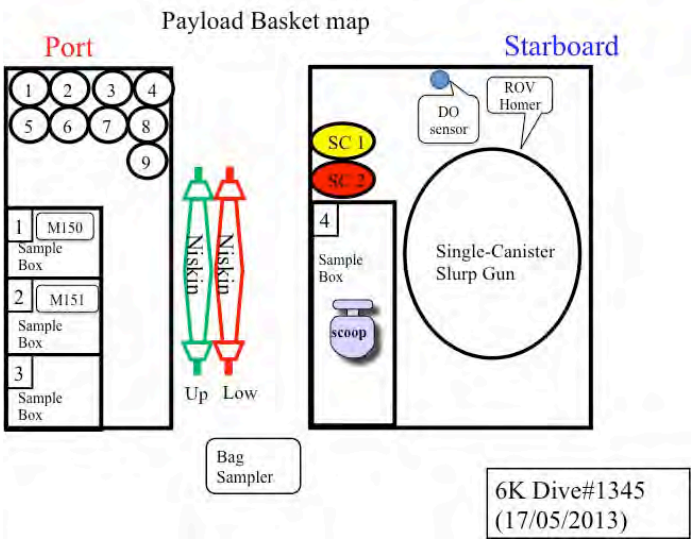
6.5K#1344 DIVE LOG

Dive Log of 6K Dive #1344 | **Off Brazil Sea, São Paulo Plateau Outer Escarpment (PT5)** | **2013/05/14**

Time (LCT)	Dep. (m)	Alt. (m)	Head (Deg)	Pos. Xm	Pos. Ym	Description	Remarks
8:57						vent open. Start dive	WD:2470m
9:41	2000			830	770		
9:59	2429					ready to landing	
10:08	2499			860	640	landed	
						sand with pebble, visibility 8m, Tem 2.6, Flow 270˚ 6cm/sec	
						core collected (#1, #3, #6)	Core
10:19				887	600	start to run along 270˚ course	
10:27				920	430		
10:36				872	181		
10:37				880	160	outcrop of rock	
10:41	2474			864	84	rocky cliff	
10:44	2470			870	30		

10:51	2460			800	-170	sandy and rocky floor	
10:58	2456			780	-420		
11:06				772	-600		
11:10	2456			770	-770		
	2460			700	-1060		
11:21	2468			680	-1150		
				622	-1463		
11:34	2425			620	-1530		
11:50	2401			-10	-1710		
11:55	2396			-140	-1780		
12:10	2369			-660	-1700		
12:19	2359			-990	-1650		
12:20				-990	-1650	change to course 90 ˚	
12:31	2854			-1120	-1320		
12:42	2349			-1100	-1050		
12:52	2340			-950	-660		
13:02	2326			-900	-370		
13:11	2313			-866	-129	yellowish sponge	
13:14	2313			-855	144	collecting rock (box#1)	rock
13:19	2313			-870	-130		
13:22	2310					sea cucumber	
13:27	2301			-880	0	change to course 150 ˚	
13:28	2302					sea cucumber	
13:33	2301					sea cucumber	
13:33	2301					something black on the seafloor	
13:45	2298			-1350	200		
13:54	2294					sea cucumber	
13:55	2292			-1650	300		
13:56	2290					sea cucumber	
13:57	2289					change to course 100 ˚	
14:09	2284			-1750	660		
14:15	2285					sea cucumber	
14:26	2291			-1350	940		
14:34	2304					sea cucumber	
14:37	2304					sandy line	
14:43	2308			-1108	1063	glass sponge in box, core#2, 4, 5	
14:59	2307			-1310	1070	niskin green, left from the bottom	
15:37	732			-973	967	red niskin	

5-6. 6K#1345 Dive Report (Cristina Rossi Nakayama)
Date: 2013/5/17
Dive Scientist: Cristina Rossi Nakayama (UNIFESP)
Pilot: Kazuhiro Chiba
Co-pilot: Masaya Katagiri
Survey site: PT6, North São Paulo Plateau Outer Escarpment (NSPPOE)
Landing Point: 20°43.2000' S, 38°39.200' W, 2708 m
Leaving Point: 20°41.4780' S, 38°38.1558' W, 2706 m
Payload: Niskin bottles (1.9L)-2, Bag water sampler-1, Push cores-9, Scoop sampler – 1, Sterilised sampler-2, Sample box for biology-1, Sample containers for rocks-1, Marker buoys-2, Suction sampler with single-canister-1, ROV Homer-1, DO Sensor – 1.



Dive Summary

Subjects:
1) Discovery of the seep communities
2) Observation of distribution pattern of the seep communities
3) Geochemical setting of the seeps
4) Chemical concentration such as CH_4, H_2S, Salinity, etc
5) Origin of chemicals
6) Geological structure in the seeps
7) Faunal composition and flora of the seep communities

Results:
1) Biology
No evidence of chemosynthetic seep community at the PT6, North São Paulo Plateau Outer Escarpment (SSPPOE), however seeps of oil were found in the area.
Animal diversity and abundance were relatively high in comparison to previously surveyed points. Sponges, polichaetes, tunicates, shrimps, sea cucumbers, anemones, brittle star, starfish, a squat crab, hydrozoans, octopuses and fishes were observed. Diversity was higher at areas near faults or where oil was present (in rocks or on the floor). No bacterial mats were detected.

2) Geology and Topography
From topographic aspects, seafloor along isobath 2700m was complicated. It included large rock outcrops and, at the northern portion of the track, deep valleys and steep cliffs of more than 50m height. When the submersible went east from this isobath, sandy plains and gentle slopes were found. In outcrop areas, solid

oil masses were found coming out of rocks or from the ground, especially at the middle to southern portion of the track. At the northern portion, oil was observed as veins in rocks. Mudstones were common in the area.

3) Geochemistry
No information.

4) Microbiology
No information.

5) Sampling
- 3 Cores (C1, C3 and C6) near the landing point at the surroundings of oil masses for Geochemistry, Microbiology and Geology.
- 1 Core (C4) near the end point next to rocks with oil veins for Macrobiology.
- 5 Cores (C2, C5, C7, C8, C9) near the end point next to rocks with oil veins for Geochemistry, Microbiology, Geology and Macrobiology.
- Water by Niskin bottles and a Bag sampler for Geochemistry and Microbiology
- Oil masses and mudrocks for Geology.
- Benthic animal: 01 ascidian, 01 anemone, 02 sponges, 02 polichaetes, 01 ofiuro and 01 Galatheid crab for Megabiology.

List of event marks

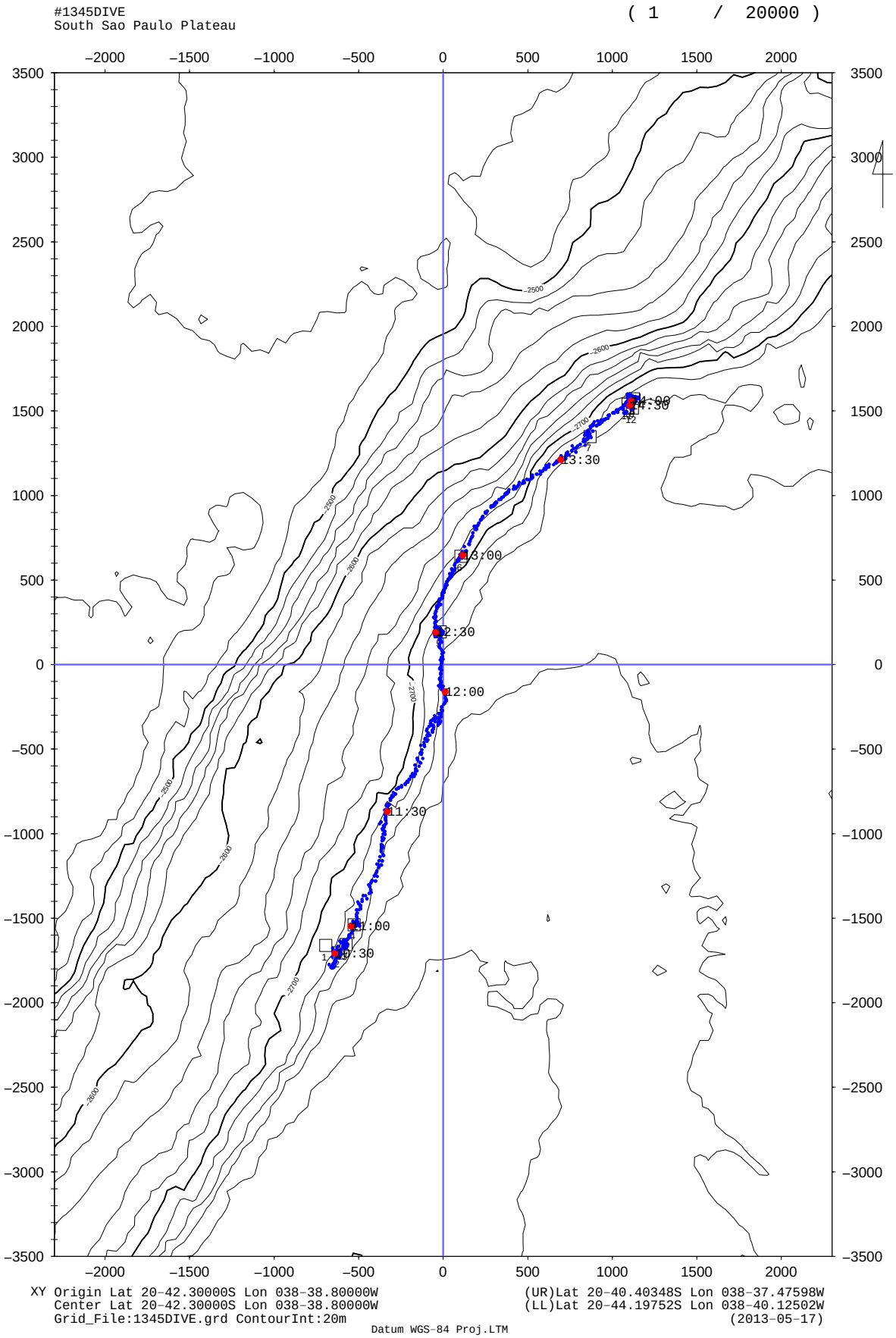
#1345DIVE サンパウロ海台　Cristina Rossi SkyFix(WGS-84)SSBL

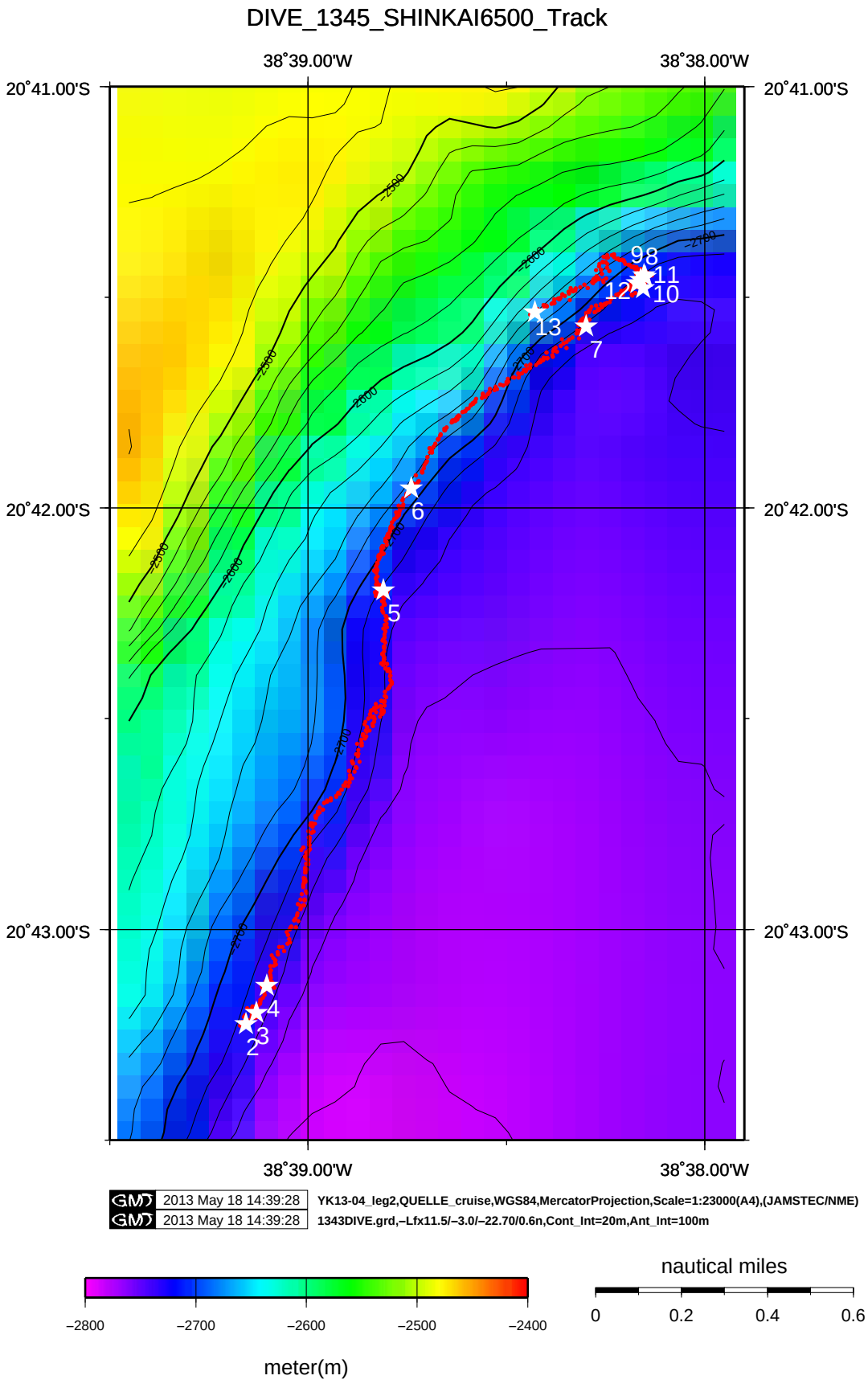
*** EVENT MARK LIST ***　2013-05-17 16:21:11

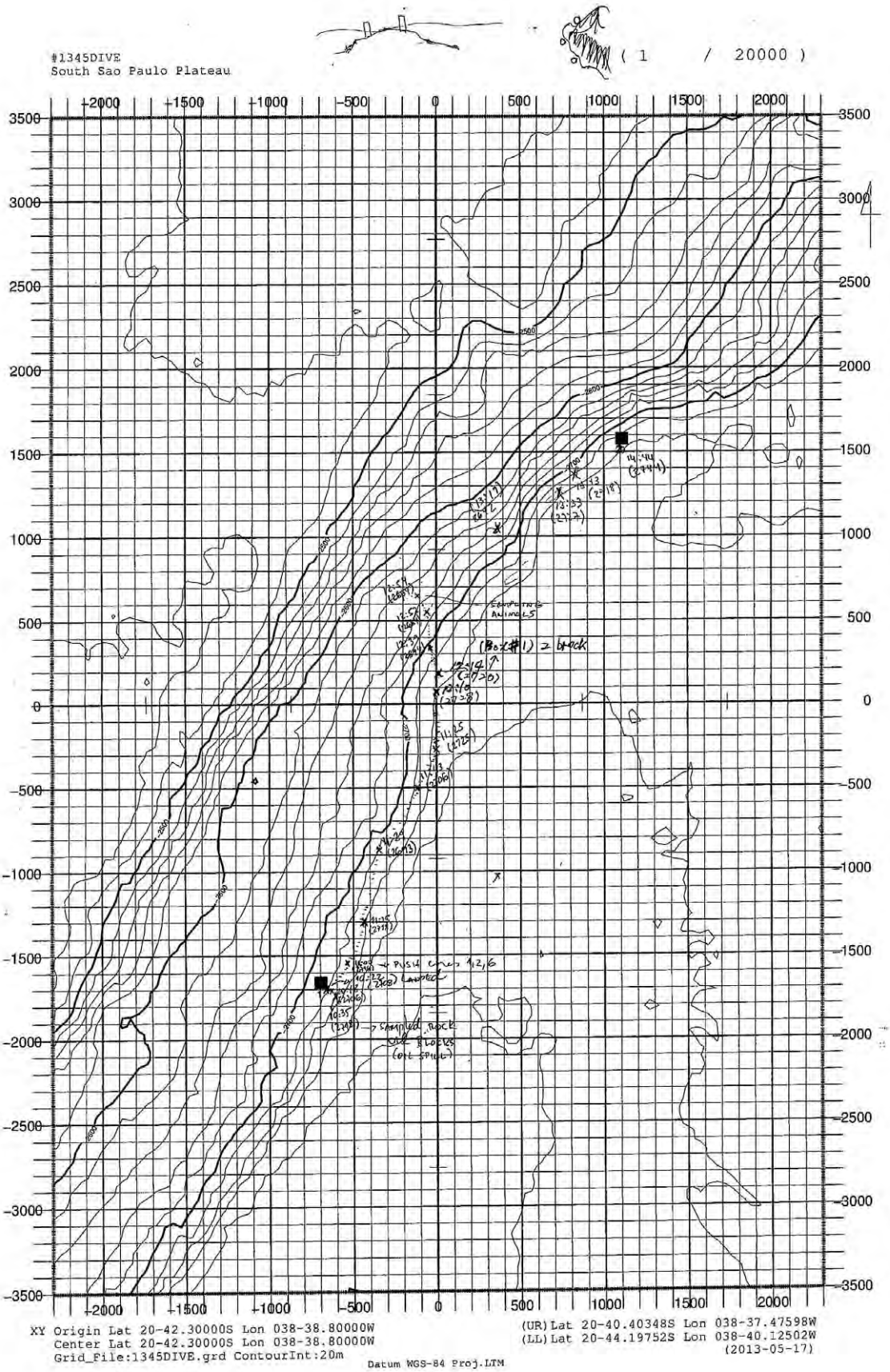
ORIGIN (XY<->LATLON CONVERT)　LAT 20° 42.3000′S　LON 38° 38.8000′W
XY ORIGIN ((X,Y)=(0,0))　LAT 20° 42.3000′S　LON 38° 38.8000′W

NO.	DAY	TIME	LAT	LON	X	Y
1	2013-05-17	09:00:00	20° 43.2000' S	38° 39.2000' W	-1660.5	-694.4
	Landing Target					
2	2013-05-17	10:29:00	20° 43.2245' S	38° 39.1568' W	-1705.7	-619.4
	Landing, Sampling Sponge(2), Animal(1) D=2708m					
3	2013-05-17	10:53:00	20° 43.1981' S	38° 39.1310' W	-1657.0	-574.6
	Sampling Oil Block , Starfish, Sponge D=2718m					
4	2013-05-17	11:07:00	20° 43.1341' S	38° 39.1038' W	-1538.9	-527.4
	Sampling Core(#1,#3,#6), NISKIN(red) D=2715m					
5	2013-05-17	12:25:00	20° 42.1958' S	38° 38.8104' W	192.2	-18.0
	Sampling Rocks(2), Animal(1) D=2719m					
6	2013-05-17	13:03:00	20° 41.9533' S	38° 38.7397' W	639.6	104.6
	Sampling Sponge D=2663m					
7	2013-05-17	13:42:00	20° 41.5696' S	38° 38.2996' W	1347.6	868.7
	Sampling Rock(1) D=2718m					
8	2013-05-17	14:03:00	20° 41.4521' S	38° 38.1499' W	1564.4	1128.5
	Sampling Rocks(2) D=2721m					
9	2013-05-17	14:08:00	20° 41.4482' S	38° 38.1529' W	1571.6	1123.3
	Sampling Core(#4) D=2720m					
10	2013-05-17	14:45:00	20° 41.4588' S	38° 38.1616' W	1552.0	1108.2
	Sampling Core(#7,#8,#9), ST(2) D=2723m					
11	2013-05-17	14:51:00	20° 41.4664' S	38° 38.1700' W	1538.0	1093.6
	Sampling Water(bag) D=2696m					
12	2013-05-17	14:56:00	20° 41.4780' S	38° 38.1558' W	1516.6	1118.3
	Left Bottom D=2706m, Alt=20m					
13	2013-05-17	15:25:00	20° 41.5358' S	38° 38.4281' W	1409.9	645.6
	Sampling NISKIN(green) D=1500m					
14						
15						
16						
17						
18						
19						
20						

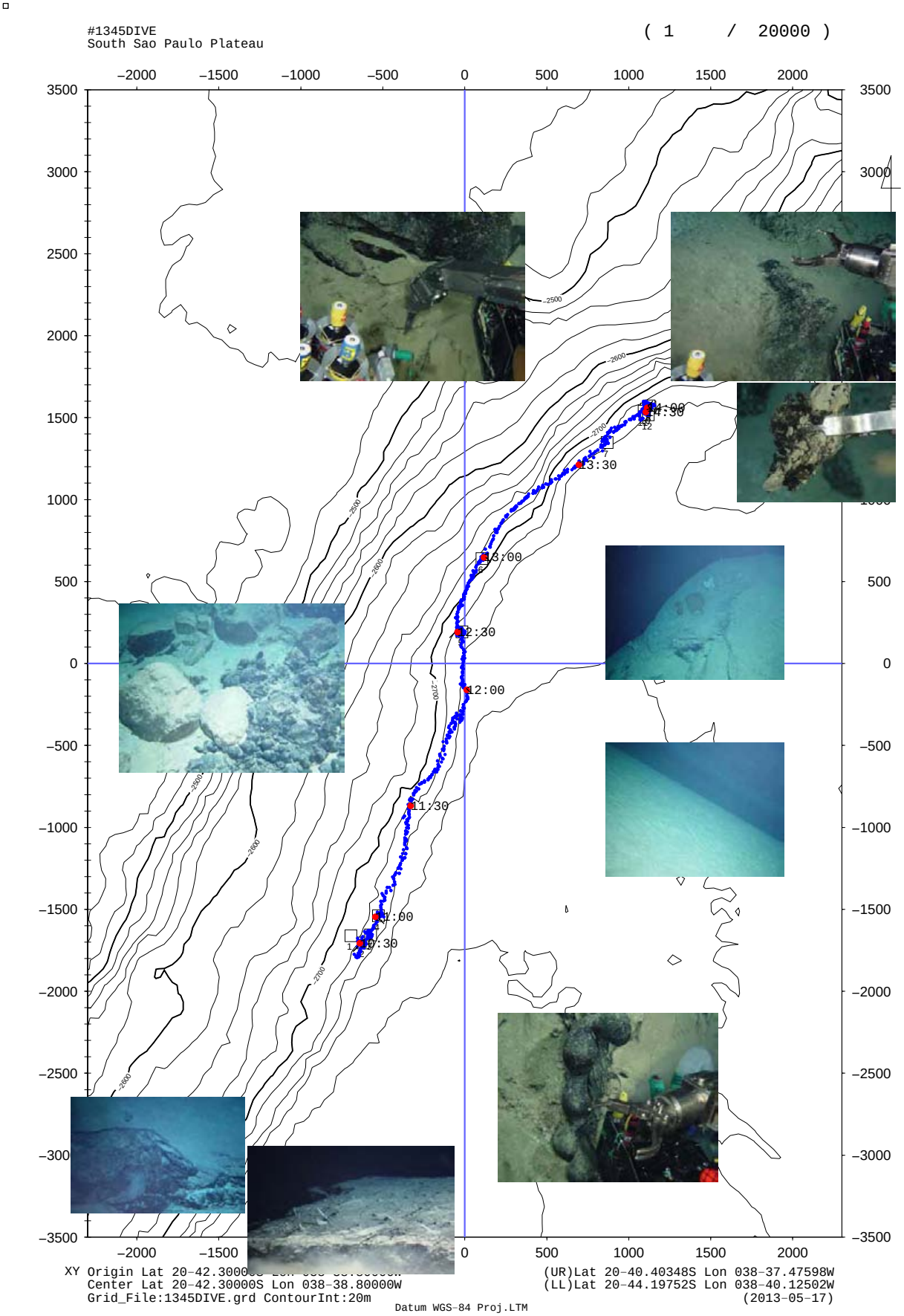
Track Line


#1345DIVE
South Sao Paulo Plateau
(1 / 20000)
−2000 −1500 −1000 −500 0 500 1000 1500 2000
3500 3000 2500 2000 1500 1000 500 0 −500 −1000 −1500 −2000 −2500 −3000 −3500
-2500
-2600
-2700
-2800
13:30
13:00
12:30
12:00
11:30
11:00
10:30
XY Origin Lat 20-42.30000S Lon 038-38.80000W
Center Lat 20-42.30000S Lon 038-38.80000W
Grid_File:1345DIVE.grd ContourInt:20m
(UR)Lat 20-40.40348S Lon 038-37.47598W
(LL)Lat 20-44.19752S Lon 038-40.12502W
(2013-05-17)
Datum WGS-84 Proj.LTM

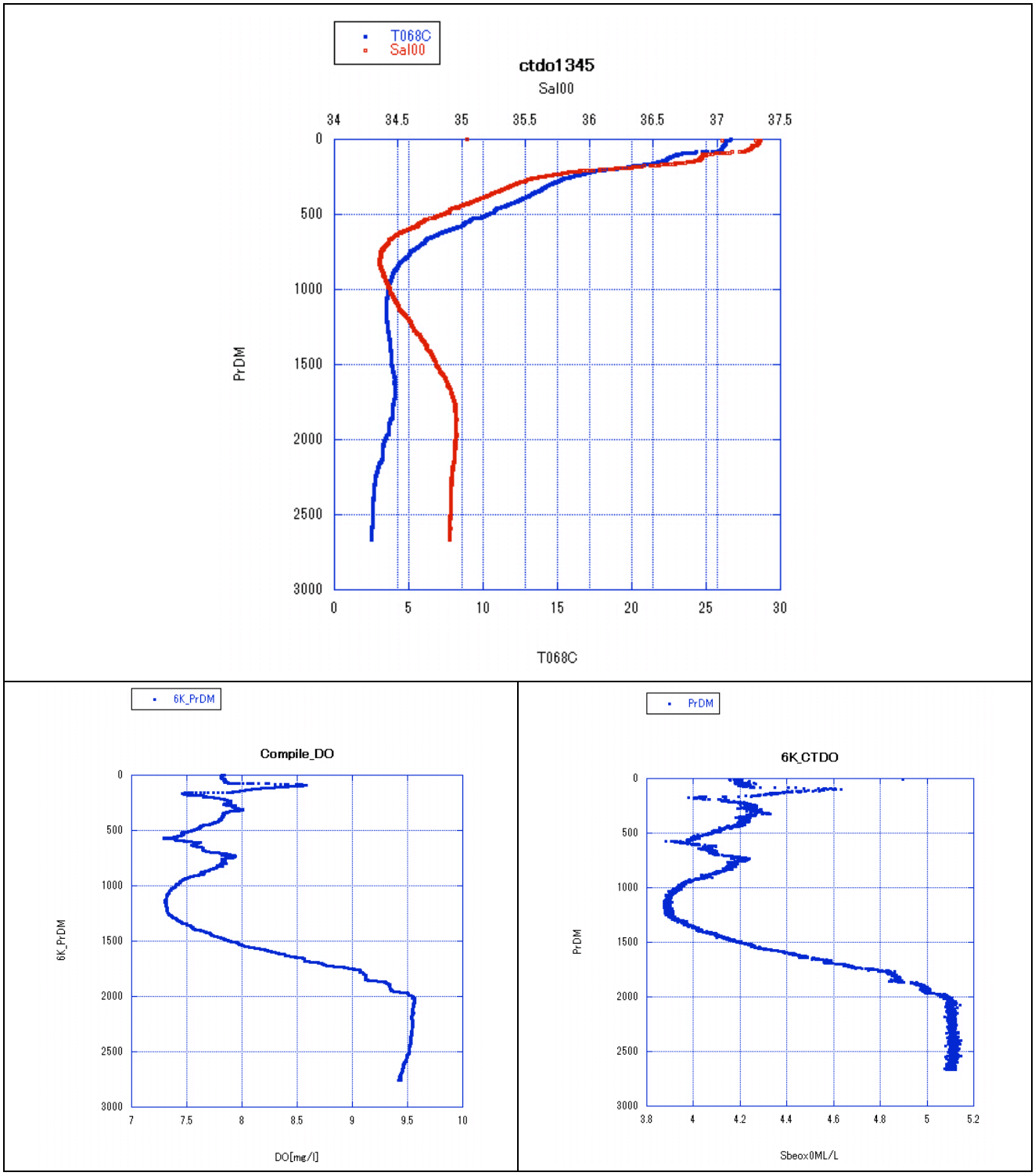

DIVE_1345_SHINKAI6500_Track
38°39.00'W
38°38.00'W
20°41.00'S
20°42.00'S
20°43.00'S
2500
2600
2700
2800
1
2
3
4
5
6
7
8
9
10
11
12
13
GMT 2013 May 18 14:39:28
GMT 2013 May 18 14:39:28
YK13-04_leg2,QUELLE_cruise,WGS84,MercatorProjection,Scale=1:23000(A4),(JAMSTEC/NME)
1343DIVE.grd,–Lfx11.5/–3.0/–22.70/0.6n,Cont_Int=20m,Ant_Int=100m
−2800
−2700
−2600
−2500
−2400
meter(m)
nautical miles
0
0.2
0.4
0.6


#1345DIVE
South Sao Paulo Plateau
(1 / 20000)
+2000 +1500 +1000 -500 0 500 1000 1500 2000
3500 3000 2500 2000 1500 1000 500 0 -500 -1000 -1500 -2000 -2500 -3000 -3500
(Rock #1) = black
XY Origin Lat 20-42.30000S Lon 038-38.80000W
Center Lat 20-42.30000S Lon 038-38.80000W
Grid_File:1345DIVE.grd ContourInt:20m
Datum WGS-84 Proj.LTM
(UR) Lat 20-40.40348S Lon 038-37.47598W
(LL) Lat 20-44.19752S Lon 038-40.12502W
(2013-05-17)

In-situ photos on track line



CTD/DO Profile

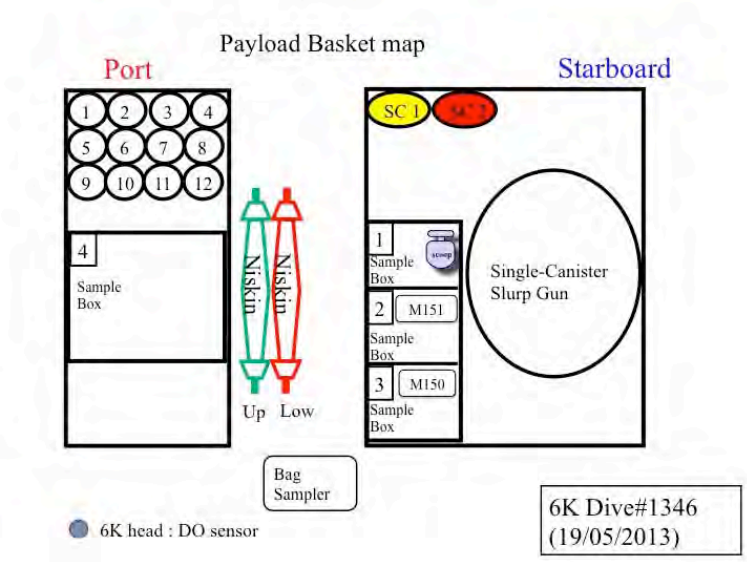


Dive Log of 6K Dive #1345 | **Off Brazil Sea, São Paulo Plateau Outer Escarpment (PT6)** | **2013/05/17**

Time (LCT)	Dep. (m)	Alt. (m)	Head (Deg)	Pos. Xm	Pos. Ym	Description	Remarks
09:02						vent open. Start dive	WD:2700m
09:38	1500			-1570	-850	runninng along 150˚ course	
09:42	1680			-1720	-860		
09:46	1800			-1820	-790		
09:50	2000			-1860	-810		
09:55	2215			-1860	-900		
10:02	2573					running along 90˚	
10:06	2623					stop running	
10:22	2708			-1710	-620	landed (visibility 10m, rocky, Tem. 2.6˚C, Flow 30˚ 10cm/sec)	landed
						two sponges and one biological material collected	sponge collected
10:35	2718			-1660	-580	oil block?	
						landidng, collected oil block (in bascket near Box #1)	oil brock collected
10:47	2714			-1660	-580	one britle star and one sponge collected (by Slup Gun)	sponge etc sampled
10:56	2708					start to run along 20˚ course	
11:02	2715					stopped	
11:05	2707			-1540	-530	push core collected (#1, #3, #6), NISKIN Red sampled	core, NISKIN sampling
11:08	2703					start to run along 20˚ course	
11:15	2718			-1270	-470	running along 10˚	
11:29	2693			-880	-330		
11:43	2706			-510	-110		
11:55	2725	2		-270	0		
11:58	2730	2				course 350˚	
12:09	2728			90	0		
12:14	2719			194	-14	sampling rocks	rock sample (2, Box 1)
12:24						sampling animal using the slurp gun	1 squat lobster
12:33						finish obeservation. Start to run course 350˚	
12:39	2694			347	-33	finned octopus	
12:41						course 20˚	
12:52	2666			560	60		
12:54	2664			640	108	stopped sampling animals	
13:04	2663			640	100	collected sponge sample in box#4	sponge
13:14	2650			940	790		
13:19	2642			1020	380	cliff wall	
13:29	2689			1200	670		
13:33	2727			1250	750		
13:43	2718			1350	870	collected rock sample in box 2	rock (box2)
13:46	2707					moving to point 20	
13:51	2717					many reflection on screen (??)	
13:55	2721					sponge??	
13:56	2725			1540	1102	fish	
13:58	2723					oil	
13:59	2722			1569	1121	collected (oil) 2 rock samples in box #3	
14:08	2719					collected core #4 but only 5cm was obtained due to hard floor	
14:20	2723			1578	1120	start sampling core #2, 5 near oil rocks	core #2,5
14:29	2723					collected sediment samples by scoop into box #3	sediment #3
14:37	2723			1534	1110	core #7, 8, 9	
14:44	2744			1525	1107	sterized sampler #sc1, sc2, bag sampler,	
14:55	2706			1480	1070	left from the bottom	
15:25	1500			1405	627	niskin green	

5-7. 6K#1346 Dive Report

Date: 2013/5/19
Dive Scientist: Yuriko Nagano (JAMSTEC)
Pilot: Hirofumi Ueki
Co-pilot: Takuma Onishi
Survey site: PT6, North São Paulo Plateau Outer Escarpment (NSPPOE)
Landing Point: 20°44.5237' S, 38°40.1438' W, 2730 m
Leaving Point: 20°43.2425' S, 38°39.1932' W, 2692 m
Payload: Niskin bottles (1.9L)-2, Bag water sampler-1, Push cores-12, Scoop sampler – 1, Sterilised sampler-2, Sample box for biology-1, Sample containers for rocks-1, Marker buoys-2, Suction sampler with single-canister-1



Dive Summary

Subjects:

1) Discovery of the seep communities
2) Observation of distribution pattern of the seep communities
3) Geochemical setting of the seeps
4) Chemical concentration such as CH_4, H_2S, Salinity, etc
5) Origin of chemicals
6) Geological structure in the seeps
7) Faunal composition and flora of the seep communities

Results:

1) Biology

No evidence of chemosynthetic seep community at the PT6, North São Paulo Plateau Outer Escarpment (SSPPOE), however seeps of oil were frequently found in the area. High diversity of animals, especially sponges were observed in correlation with the presence of oil. Biodiversity was relatively low in non-oil existence seafloor area, however some sponges, polichaetes, tunicates, shrimps, sea cucumbers, anemones, brittle star, starfish, a squat crab, hydrozoans, octopuses and fishes were observed.

2) Geology and Topography

From topographic aspects, seafloor along isobath 2700m was complicated. It included large rock outcrops and, at the northern portion of the track, deep valleys and steep cliffs of more than 50m height. When the submersible went east from this isobath, sandy plains and gentle slopes were found. In outcrop areas, solid oil masses were found coming out of rocks or from the ground. A mount of oil (approximately 5-10m) were also observed along isobath 2700m in the area.

3) Geochemistry
No information.

4) Microbiology
No information.

5) Sampling
-Animal sample (star fish) was collected for biology.
- 4-5 oil mass blocks were collected for Geochemistry, Microbiology and Geology.
- 1 Core (C5) was collected near the mount of oil masses for biology.
- Sediments near oil masses were collected by scoop for Macrobiology.
- 3 Cores (C6, C7, C8) were collected near the oil masses for Geology and Macrobiology.
- Water sample was collected by Niskin bottle (green) near oil masses for Geochemistry and Microbiology.
- 4 cores (C1, C2, C3, C4) were collected near the oil masses for Geochemistry and Microbiology.
-Animal sample (sponge), which was habiting on oil masses were collected for Biology.
-2 cores (C11, C12) were collected near oil masses just before the leaving for Geology and Macrobiology.
-Water sample was collected by Niskin bottle (red) at 2300m.

List of event marks

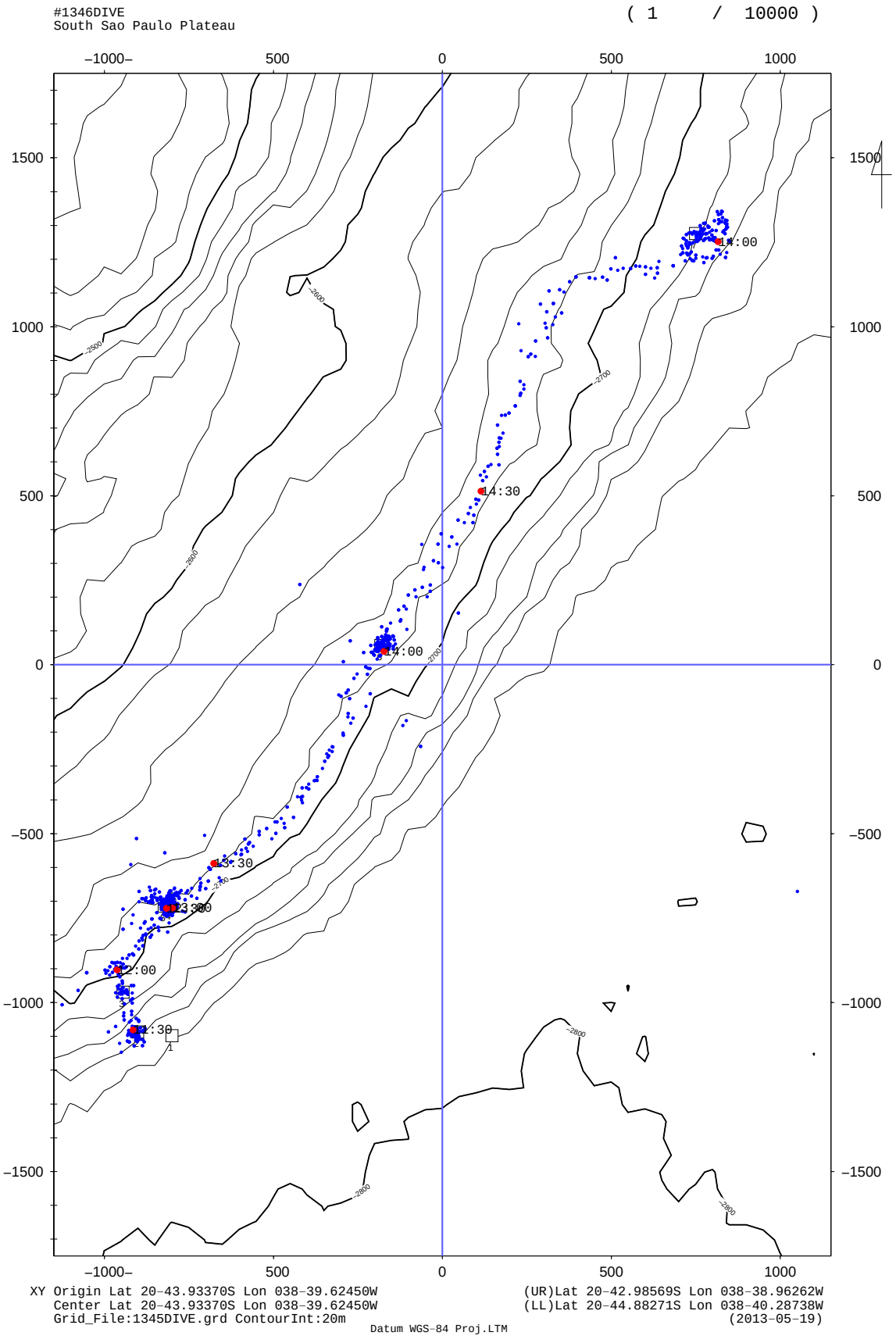
#1346DIVE サンパウロ海台　長野　由梨子　SkyFix(WGS-84)SSBL

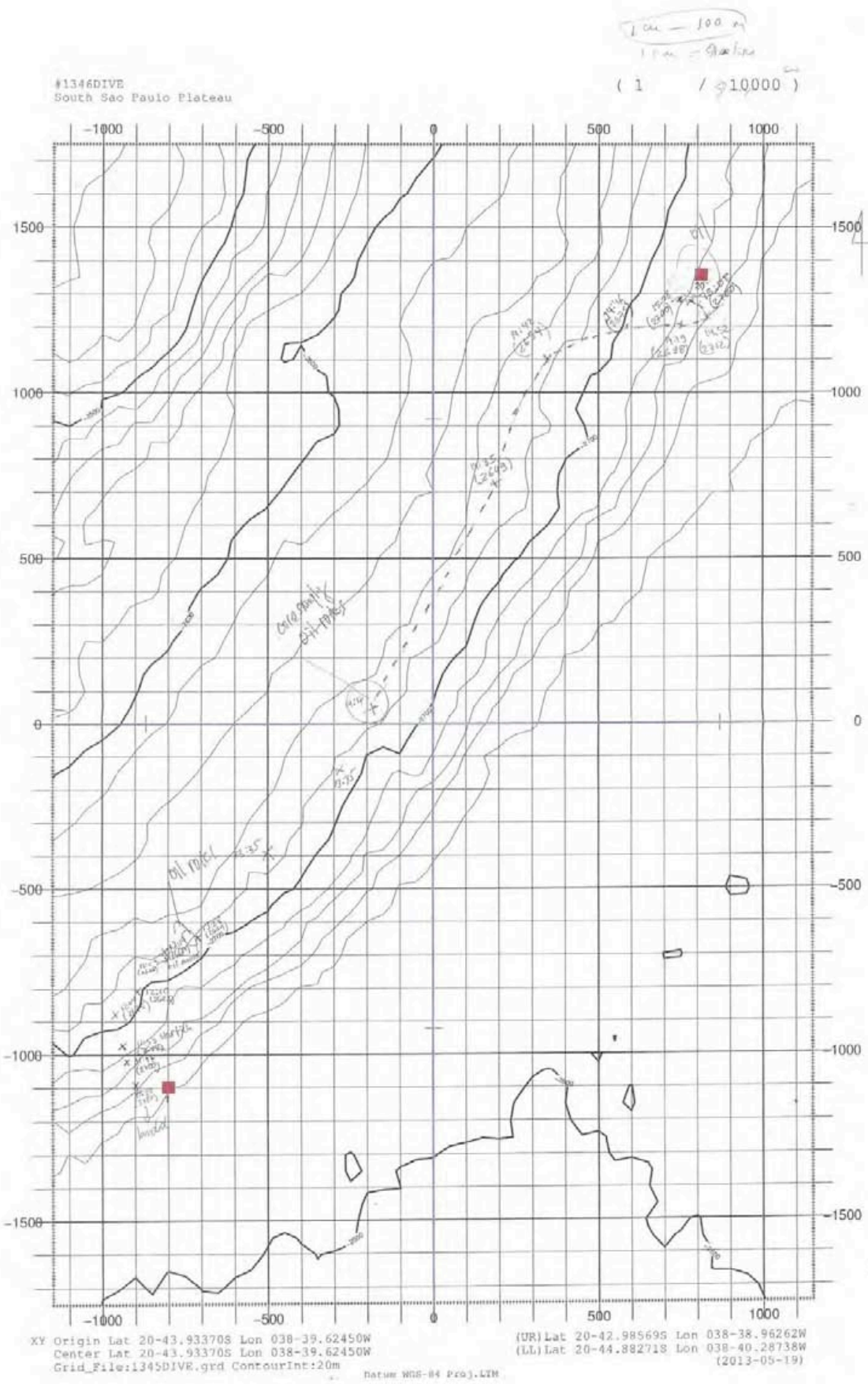
*** EVENT MARK LIST ***　2013-05-19 17:46:56

ORIGIN (XY<->LATLON CONVERT)　LAT 20°43.9337'S　LON 38°39.6245'W
XY ORIGIN ((X,Y)=(0,0))　LAT 20°43.9337'S　LON 38°39.6245'W

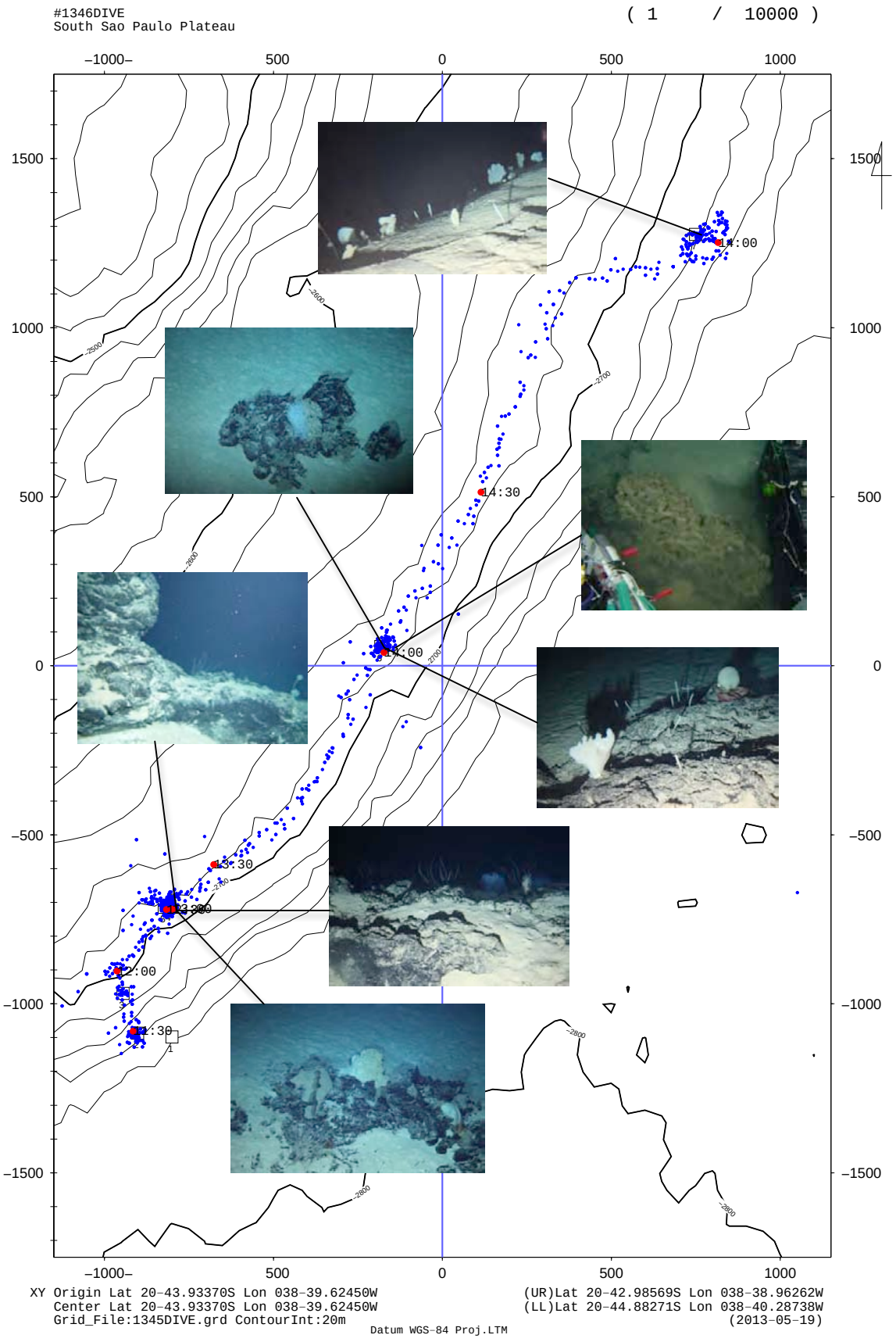
NO.	DAY	TIME	LAT	LON	X	Y
1	2013-05-18	09:00:00	20° 44.5299' S	38° 40.0854' W	-1100.0	-799.9
	Landing Target					
2	2013-05-19	11:38:00	20° 44.5237' S	38° 40.1438' W	-1088.5	-901.3
	Landing D=2730m					
3	2013-05-19	11:54:00	20° 44.4594' S	38° 40.1688' W	-969.9	-944.7
	Sampling Animal D=2688m					
4	2013-05-19	12:56:00	20° 44.3196' S	38° 40.0896' W	-712.0	-807.2
	Sampling Rocks, Mud, Core(#5) Set #150 Marker D=2666m					
5	2013-05-19	13:22:00	20° 44.3214' S	38° 40.0988' W	-715.3	-823.2
	Sampling Core(#6,#7,#8) NISKIN(green) D=2664m					
6	2013-05-19	14:18:00	20° 43.9033' S	38° 39.7294' W	56.0	-182.0
	Sampling Sponge, Core(#1,#2,#3,#4) D=2651m					
7	2013-05-19	15:16:00	20° 43.2425' S	38° 39.1932' W	1275.2	748.6
	Sampling Core(#11,#12), Left Bottom D=2692m					
8	2013-05-19	15:25:00	20° 43.2869' S	38° 39.1974' W	1193.3	741.3
	Sampling NISKIN(Red) D=2300m					

Track Line

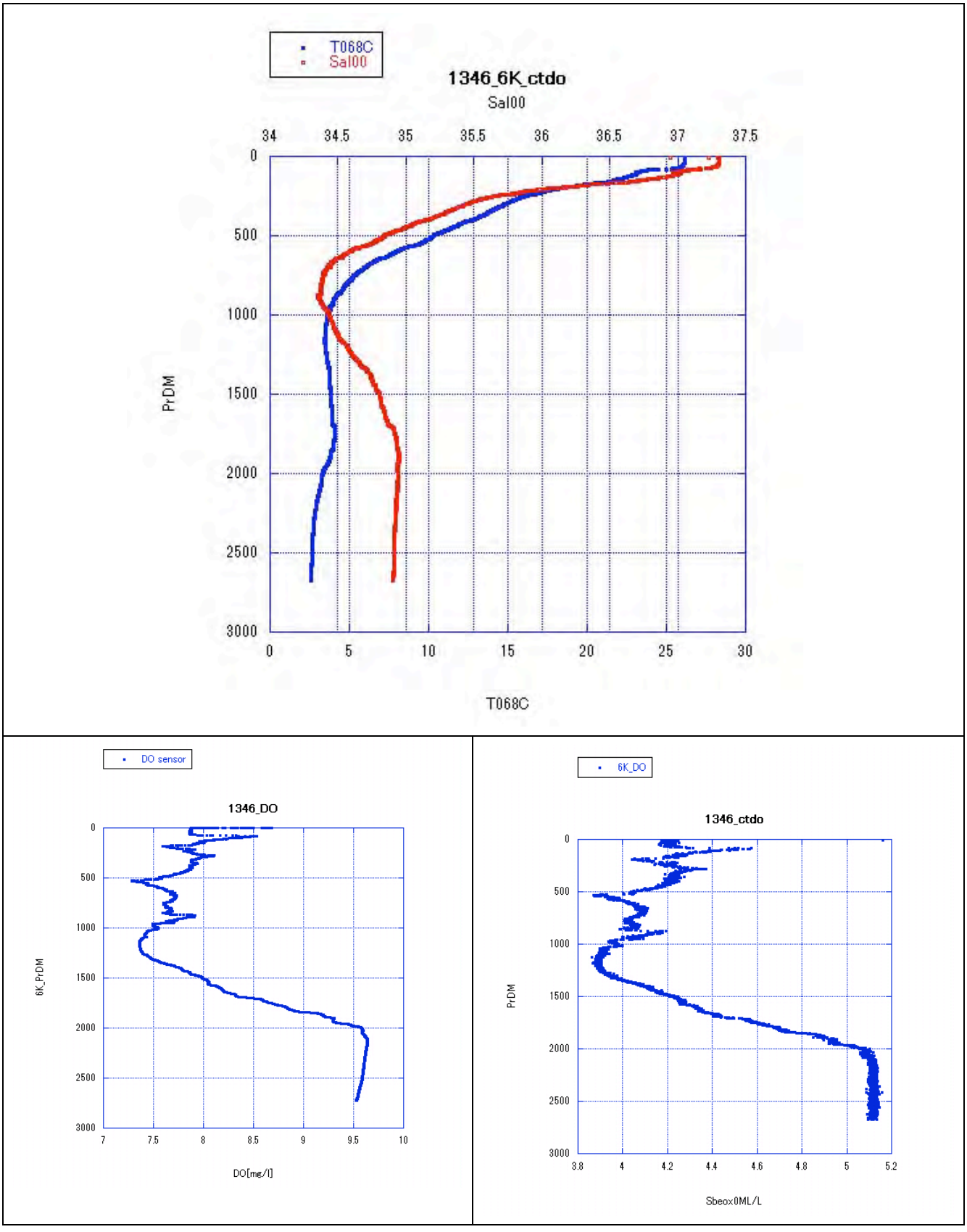

#1346DIVE
South Sao Paulo Plateau
(1 / 10000)
−1000−
500
0
500
1000
1500
1000
500
0
−500
−1000
−1500
14:00
14:30
14:00
13:30
13:30
12:00
14:30
XY Origin Lat 20−43.93370S Lon 038−39.62450W
Center Lat 20−43.93370S Lon 038−39.62450W
Grid_File:1345DIVE.grd ContourInt:20m
(UR)Lat 20−42.98569S Lon 038−38.96262W
(LL)Lat 20−44.88271S Lon 038−40.28738W
(2013−05−19)
Datum WGS−84 Proj.LTM


#1346DIVE
South Sao Paulo Plateau
(1 / 10000)
-1000
-500
0
500
1000
1500
XY Origin Lat 20-43.93370S Lon 038-39.62450W
Center Lat 20-43.93370S Lon 038-39.62450W
Grid_File:1345DIVE.grd ContourInt:20m
Datum WGS-84 Proj.UTM
(UR)Lat 20-42.98569S Lon 038-38.96262W
(LL)Lat 20-44.88271S Lon 038-40.28738W
(2013-05-19)

In-situ photos on track line



CTD/DO Profile



Dive Log of 6K Dive #1346 | **Off Brazil Sea, São Paulo Plateau Outer Escarpment (PT6)** | **2013/05/19**

Time (LCT)	Dep. (m)	Alt. (m)	Head (Deg)	Pos. Xm	Pos. Ym	Description	Remarks
10:21						vent open. Start dive	WD:2700m
10:57	1500						
11:06	1894						
11:07	1949		30	-1250	-910	running along course 30˚	
11:09	2000						
11:13	2195		20	-1190	-920	ture to 20˚	
11:18				-1120	-910	stop to run	
11:21	2500						
11:28						ready to landing	
11:38	2730			-1090	-900	landed (Mud, Tem 2.6, Sal. 34.9, Vsibility 13m, Flow 160˚ 4cm/sec)	
11:41			340			start to run along 340˚ course	
11:47	2700			-1020	-930		
11:53	2688			-972	-939	sampling star fish	slup gun (animal x1)
11:57			330				
12:01			40			turn to course 40˚	
12:04				-880	-960		
12:10	2680	2		-810	-890	seafloor topography is continuously up and down	
12:14	2669			-695	-806	outcrop of oil contained silty rock	
						sampling blackish block (oil?) in Box 4	rock samples (sevral rocks into #4 Box)
12:39						start to sediment sampling into Box 4 using scoop	sediment sample (#4 Box)
12:48						deployed #150 marker	#150 marker
12:53	2666			-710	-810	observed around	
12:56						core sampling (#5)	core #5
13:05	2665						
13:12						landed in front of oil rock	
13:13	2664					core sampling (#6, #7, #8) near oil rock	core #6, #7, #8
13:22	2664					niskin bottle (green)	
13:23						start to run course 40˚	
13:28				-650	-710	many oil rocks	
13:35				-510	-500		
13:36						turn to cource 30˚	
13:45				-140	-270		
13:50	2653					rocks (oil?)	
13:52	2652					many and biggest oil rocks	
13:54						Sampling sponge on a big oil rock in Box1	Sponge sample (Box 1)
14:02						core sampling (#1, #3, #4) near oil rock	core #1, #3, #4
14:17				50	-180	core sampling (#2) outside oil rock	core #2
14:19						start to run course 45˚	
14:29	2647			490	110		
14:35	2649			750	190	moving	
14:40	2654			1060	340	moving	
14:42	2654			1100	360	moving, flat seafloor	
14:46	2675			1180	590	flat seafloor	
14:49	2698			1190	760	flat seafloor	
14:52	2712			1230	820		
15:08	2700			1273	757	core sampling, 9,10,11,12	#9, #10, #11, #12
15:18	2688			1246	730	leaving seafloor	
15:25	2294			1189	753	niskin red	niskin red

5-8. 6K#1347 Dive Report

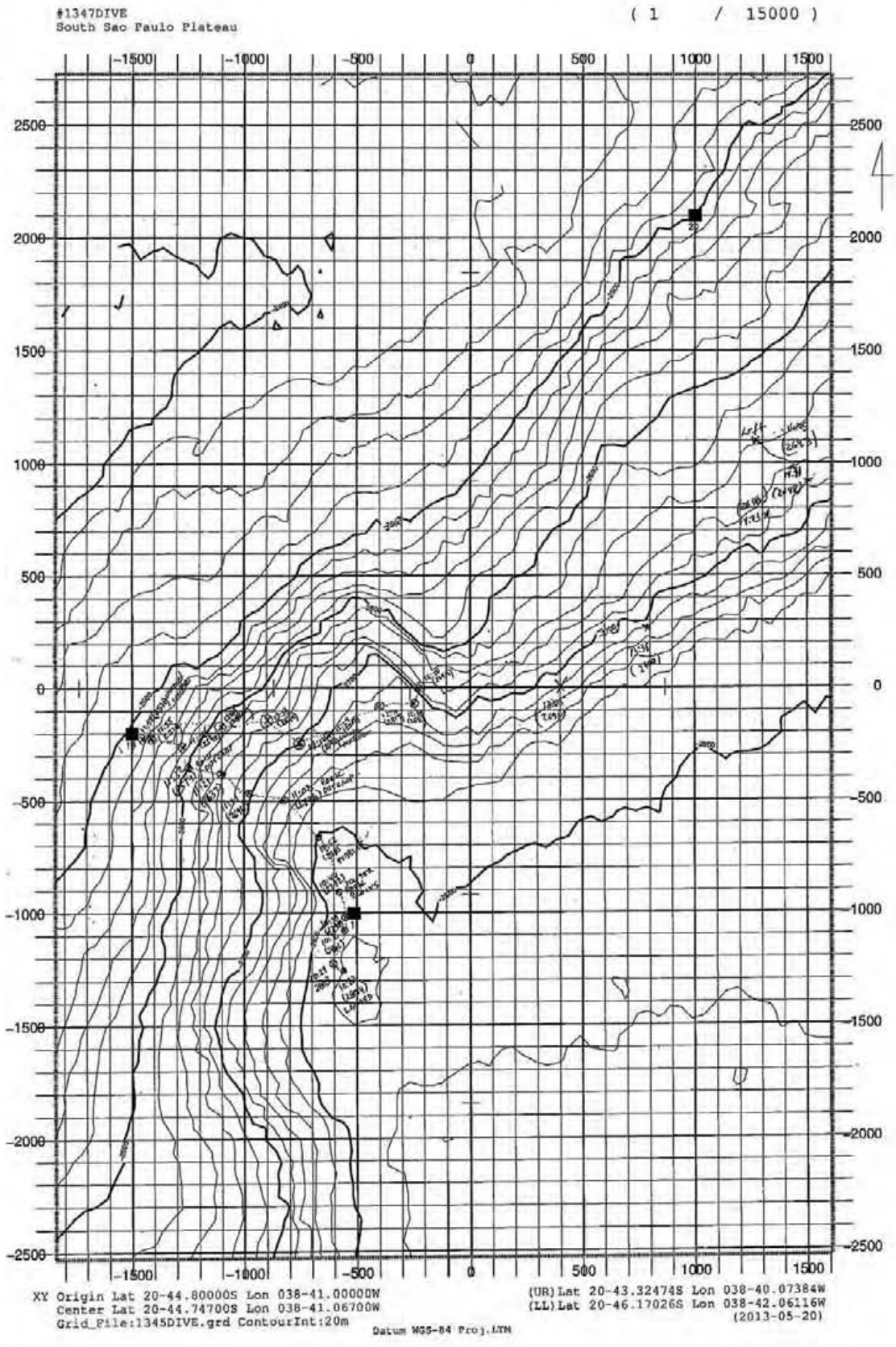
Date: 2013/5/20

Dive Scientist: Angelo Fraga Bernardino (UFES)

Pilot:

Co-pilot: Akihisa Ishikawa
Survey site: North São Paulo Plateau Outer Escarpment (NSPPOE)
Dive point: 20°44.9’ S, 38°41.1’ W, 2804 m

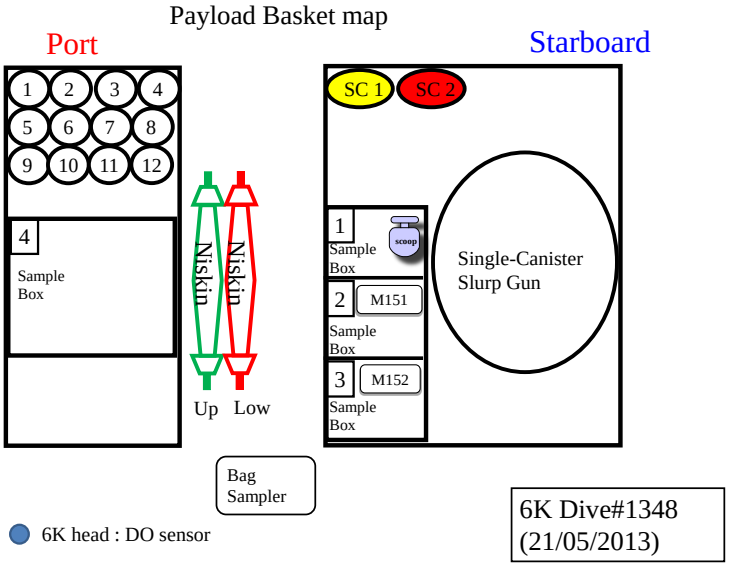
Track Line



5-9. #1348

6K#1348 Dive Report

Date: 2013/5/21
Dive Scientist: Jing Zhang (University of Toyama)
Pilot: Kazuki IIjima
Co-pilot: Masaya Katagiri
Survey site: PT2, South São Paulo Plateau Outer Escarpment (SSPPOE)
Landing Point: 22°57.8167’ S, 38°56.1294’ W, 3127 m
Leaving Point: 22°56.3913’ S, 38°56.4184’ W, 3058 m
Payload: Niskin bottles (1.9L)-2, Bag water sampler-1, Push corers-12, Sample box for biology-1, Sample containers for rocks-3, Marker buoys-2, Sterilized core sampler-2, Suction sampler with single-canister-1



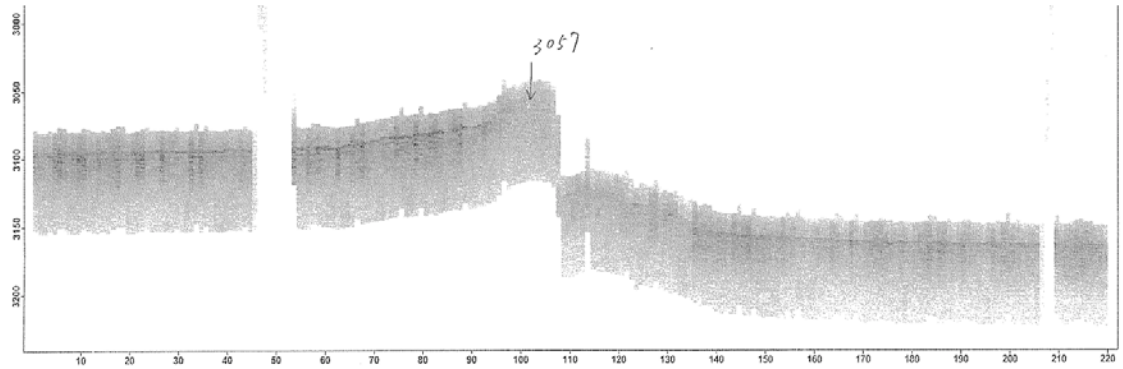
Dive Summary

Subjects:

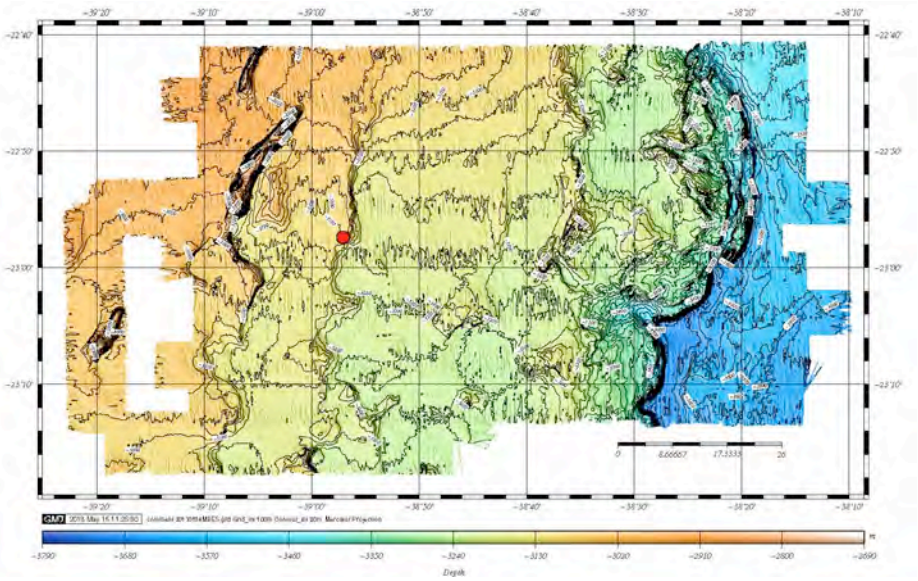
1) Discovery of the seep communities
2) Observation of distribution pattern of the seep communities
3) Geochemical setting of the seeps
4) Chemical concentration such as CH_4, H_2S, Salinity, etc
5) Origin of chemicals
6) Geological structure in the seeps
7) Faunal composition and flora of the seep communities
8) Complete the DO vertical profile in SSPPOE

Topography of dive area:

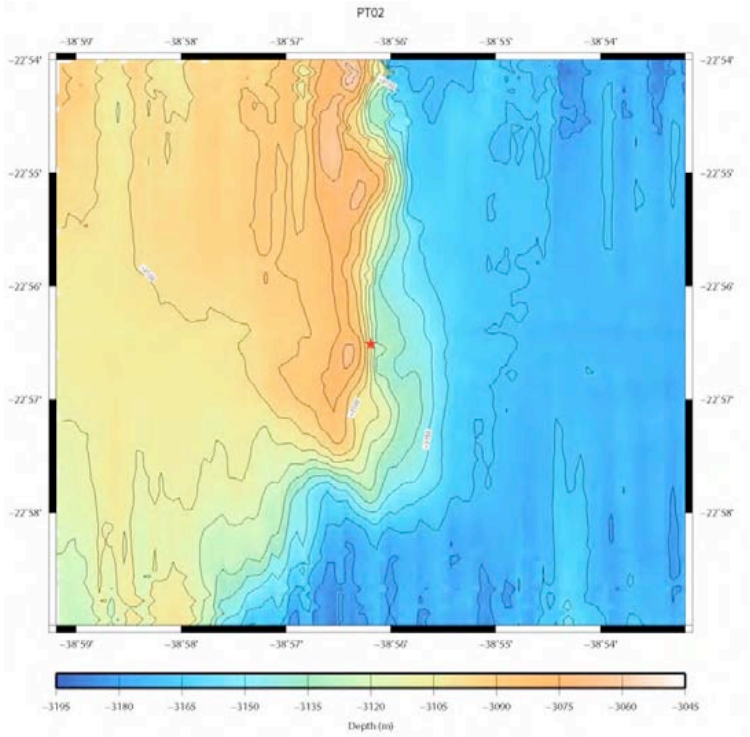
1) SBP of PT 2.



2) MBES of SSPPOE.



3) MBES of PT2.



Results:

1) Biology

No evidence of any cold/gas seep community was discovered at the PT2 site, SSPPOE. Diversity and amount of benthic animals were a little bit higher near the original PT2. Tripod fishes were frequently observed during the diving. Two sea cucumbers were collected, one covered with pteropods and one with foraminiferans. Sponges and squat lobsters were observed and sampled also.

2) Geology and Topography

Seafloor bathymetry observed from the submersible was characterized as follows: 1) mud covered smooth seafloor with current ripples located on the plateau and the bottom of the canyon; 2) gentle slopes of smooth seafloor along the dive course with mud/sedimentary rock outcrops, and 3) seafloor in the canyon was covered by sedimentary rocks caused by landslide(s).

3) Geochemistry

Together with previous dives at PT3 and PT1, CTDO data, onboard measuring Si concentration and pH value of bottom seawater and pore water all show common results in SSPPOE, just like normal deep seawater/pore water.

4) Microbiology

No information.

5) Sampling

- seven push cores (C1, C3, C6, C2, C4, C8 and C12) on the normal seafloor for Geochemistry, Microbiology, Geology and Macrobiology.
- One bottom sea water sample by Niskin bottle (Red, three meters above sea floor collected just before landing) for Geochemistry and Microbiology
- One mud stone for Geology and Microbiology.
- Benthic animal: one sponge, two sea cucumbers and one squat lobster for Meio-biology.

List of event mark

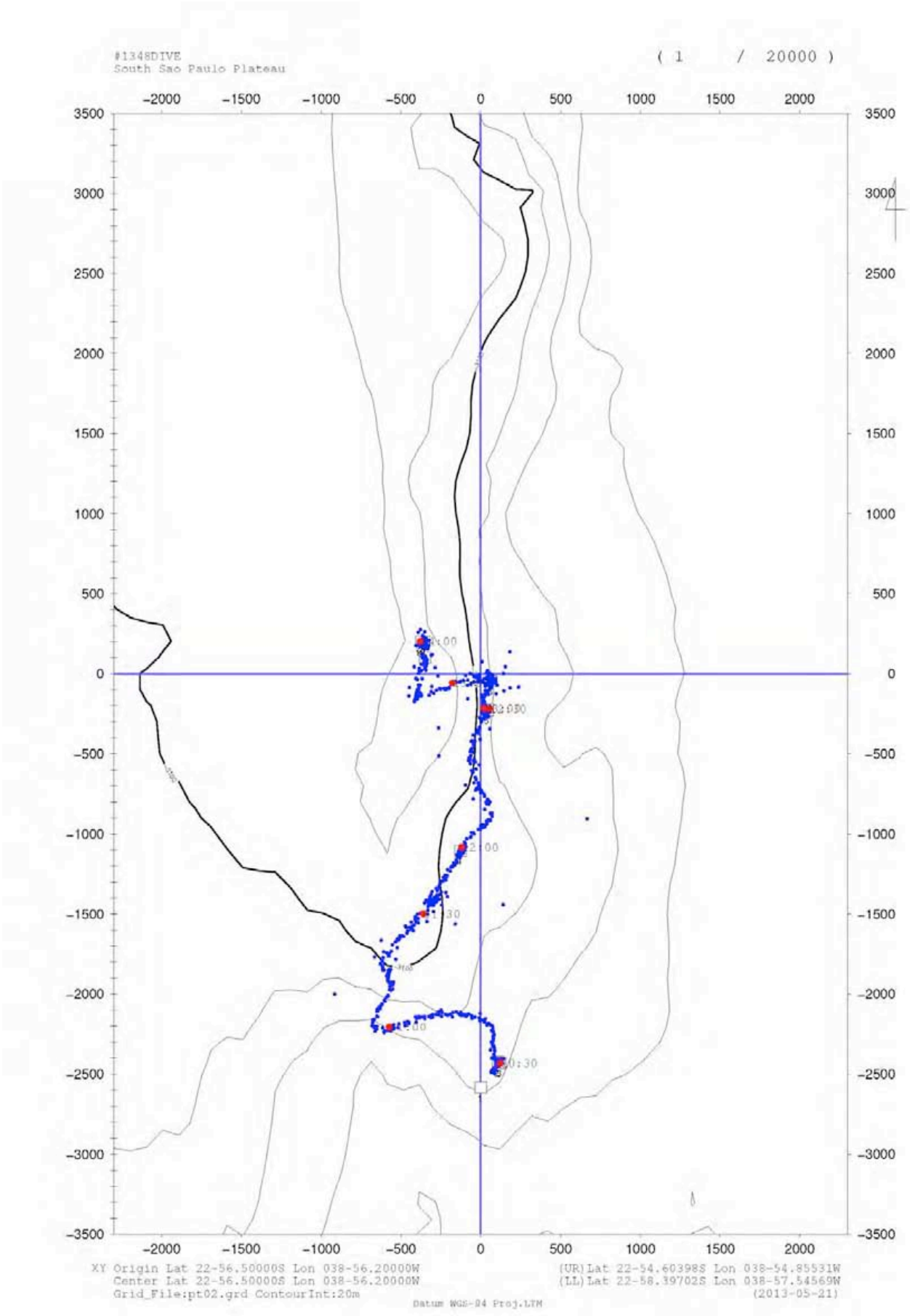
#1348DIVE サンパウロ海台 Zhang Jing SkyFix(WGS-84)SSBL

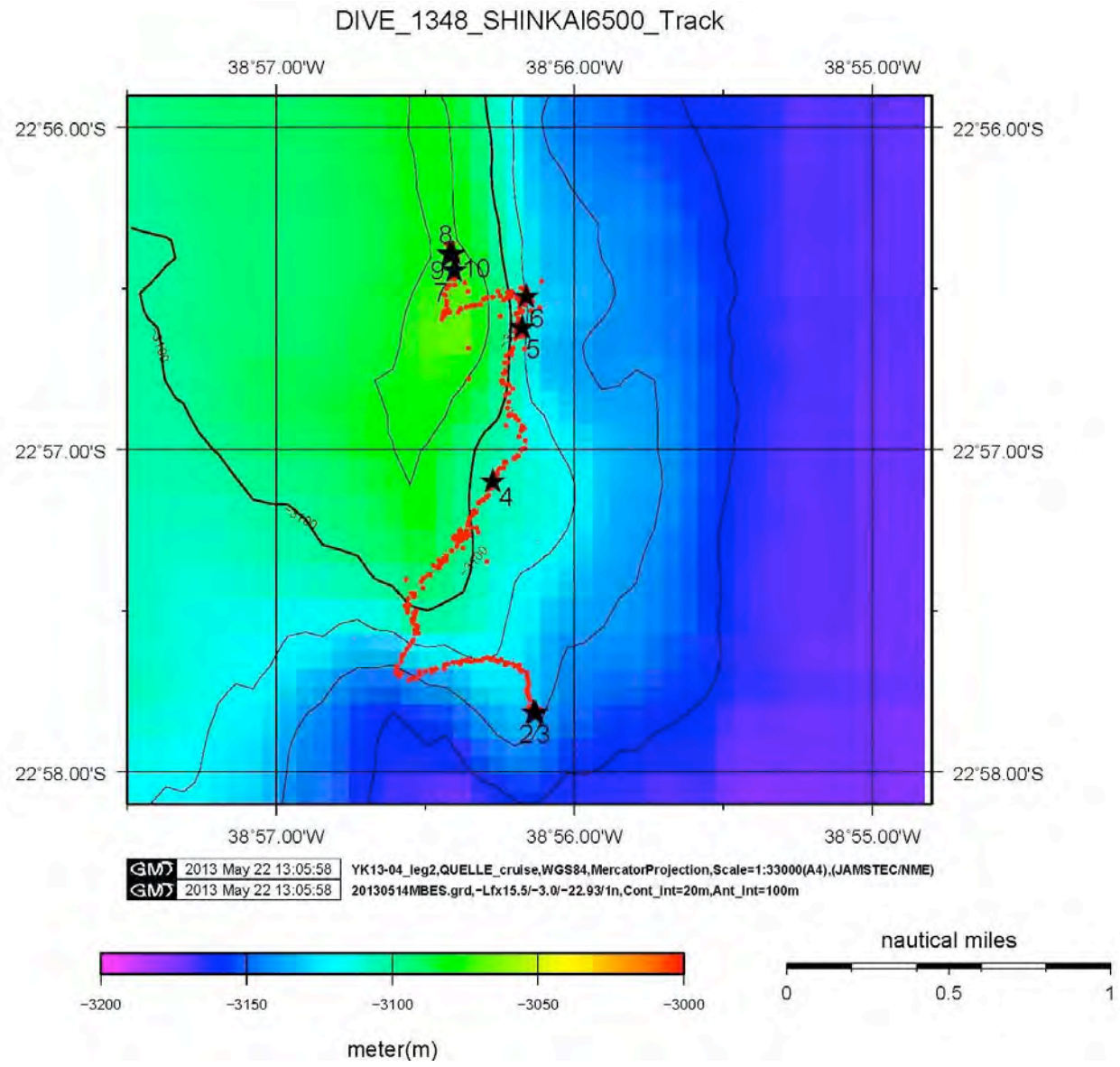
*** EVENT MARK LIST *** 2013-05-21 14:17:24

ORIGIN (XY<->LATLON CONVERT) LAT 22°56.5000'S LON 38°56.2000'W
XY ORIGIN ((X,Y)=(0,0)) LAT 22°56.5000'S LON 38°56.2000'W

NO.	DAY	TIME	LAT	LON	X	Y
1	2013-05-21	00:00:00	22° 57.9000' S	38° 56.2000' W	-2583.7	0.0
	Landing Target					
2	2013-05-21	10:26:00	22° 57.8149' S	38° 56.1364' W	-2426.6	108.7
	Sampling NISKIN(red) D=3127m Alt=3m					
3	2013-05-21	10:32:00	22° 57.8167' S	38° 56.1294' W	-2430.0	120.6
	Landing, Sampling Core(#1,#3,#6) D=3127m					
4	2013-05-21	11:56:00	22° 57.0989' S	38° 56.2749' W	-1105.2	-128.0
	Sampling Sponge D=3096m					
5	2013-05-21	12:36:00	22° 56.6221' S	38° 56.1746' W	-225.3	43.4
	Sampling Rock D=3118m					
6	2013-05-21	13:19:00	22° 56.5256' S	38° 56.1610' W	-47.2	66.6
	Sampling Galatheidae D=3124m					
7	2013-05-21	13:50:00	22° 56.4451' S	38° 56.4040' W	101.3	-348.6
	Sampling Sea cucumber D=3056m					
8	2013-05-21	13:58:00	22° 56.3913' S	38° 56.4087' W	200.6	-356.7
	Sampling Sea cucumber D=3059m					
9	2013-05-21	14:02:00	22° 56.3967' S	38° 56.4149' W	190.6	-367.3
	Sampling Core(#2,#4,#8,#12) D=3059m					
10	2013-05-21	14:06:00	22° 56.3913' S	38° 56.4184' W	200.6	-373.3
	Left Bottom D=3058m					

Track Line


#1348DIVE
South Sao Paulo Plateau
(1 / 20000)
XY Origin Lat 22-56.50000S Lon 038-56.20000W
Center Lat 22-56.50000S Lon 038-56.20000W
Grid_File:pt02.grd ContourInt:20m
(UR)Lat 22-54.60398S Lon 038-54.85531W
(LL)Lat 22-58.39702S Lon 038-57.54569W
(2013-05-21)
Datum WGS-84 Proj.LTM


DIVE_1348_SHINKAI6500_Track
38°57.00'W
38°56.00'W
38°55.00'W
22°56.00'S
22°57.00'S
22°58.00'S
8
9
10
7
6
5
4
2
3
2013 May 22 13:05:58
YK13-04_leg2,QUELLE_cruise,WGS84,MercatorProjection,Scale=1:33000(A4),(JAMSTEC/NME)
2013 May 22 13:05:58
20130514MBES.grd,-Lfx15.5/-3.0/-22.93/1n,Cont_Int=20m,Ant_Int=100m
−3200
−3150
−3100
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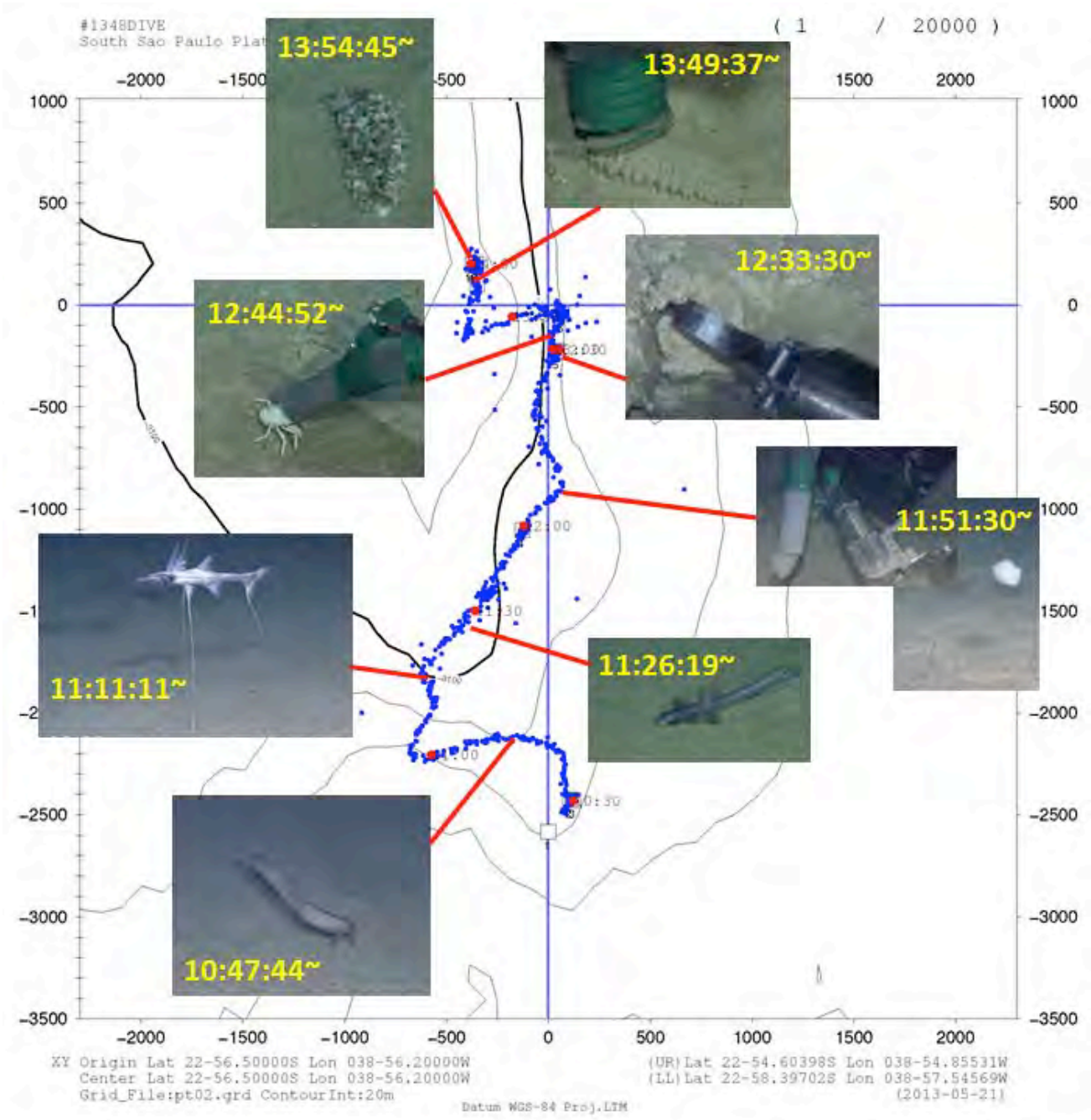
−3000
meter(m)
nautical miles
0
0.5
1

In-situ photos on track line



CTD/DO result during #1348 diving

6.5K#1348 DIVE LOG

Dive Log of
6K Dive #1348

Off Brazil Sea, São Paulo Plateau Outer Escarpment (PT2)

2013/05/21

Time (LCT)	Dep. (m)	Alt. (m)	Head (Deg)	Pos. Xm	Pos. Ym	Description	Remarks
8:59						vent open. Start dive	WD:3140m
10:11	3000						
10:14	3044					ready for landing	
10:20	3128					landed	
						Niskin red	Niskin R
10:26	3127			-2420	120	landed (Mud, Tem 2.3, Vsibility 9m, Flow 60˚ 10cm/sec)	
10:27				-2420	120	core sampling (#1, #3, #6)	Core (#1, #3, #6)

10:33				-2420	120	run to course 350˚	
10:39	3120			-2260	70		
10:49	3109			-2120	-170		
10:55	3117			-2140	-400		
10:59	3130			-2220	-580		
11:01	3133					run to course 10˚	
11:10	3100			-1950	-550		
11:11	3100					fish	
11:20				-1773	-600		
11:20				-1750	-560		
11:23	3078					run to course 30˚	
11:30	3078			-1500	-330		
11:31	3081			-1477	-360		
11:36	3086					fish	
11:40	3086			-1447	-380		
11:53	3096			-1101	-122	landing and try to sample animal	sponge x1 (slurp gun)
12:00			30			start to run toward to course 30˚	
12:05	3096	3	330	-940	30	turn to course 330˚	
12:15	3090	4	0	-610	-50	turn to course 0˚	
12:24				-330	0		
12:33	3118			-220	40	sampling rock	rock x1 (box 1)
12:37			0			start to run	
12:42						squat lobster	
12:43				-233	29	sampling lobster (failed)	
13:07	3125			-134	181	sandy seafloor with rocks and ripple mark	
13:19	3123			-50	60	collected 1 squat lobster	squat lobster ×1(slurp gun)
13:27	3079			-20	-30	sandy seafloor	
13:33	3052			-120	-300	sandy seafloor	
13:57	3059			182	-347	collected sea cucamber	sea cucamber ×1(slurp gun)
14:03	3059			155	-331	collected core samples (#2,4,8,12), sterilised sampler failed	core (#2,4,8,12)
14:05	3058			190	-370	left seafloor	
14:28	2000					Niskin Green	Niskin Green

Appendix:

Hydrography of seawater in NSPPOE and SSPPOE area.

I. Vertical profiles of temperature, salinity, dissolved oxygen and density of seawater in NSPPOE and SSPPOE (Dissolved oxygen data in dive #1340-#1342 are likely incorrect because of the questionable DO sensor used).

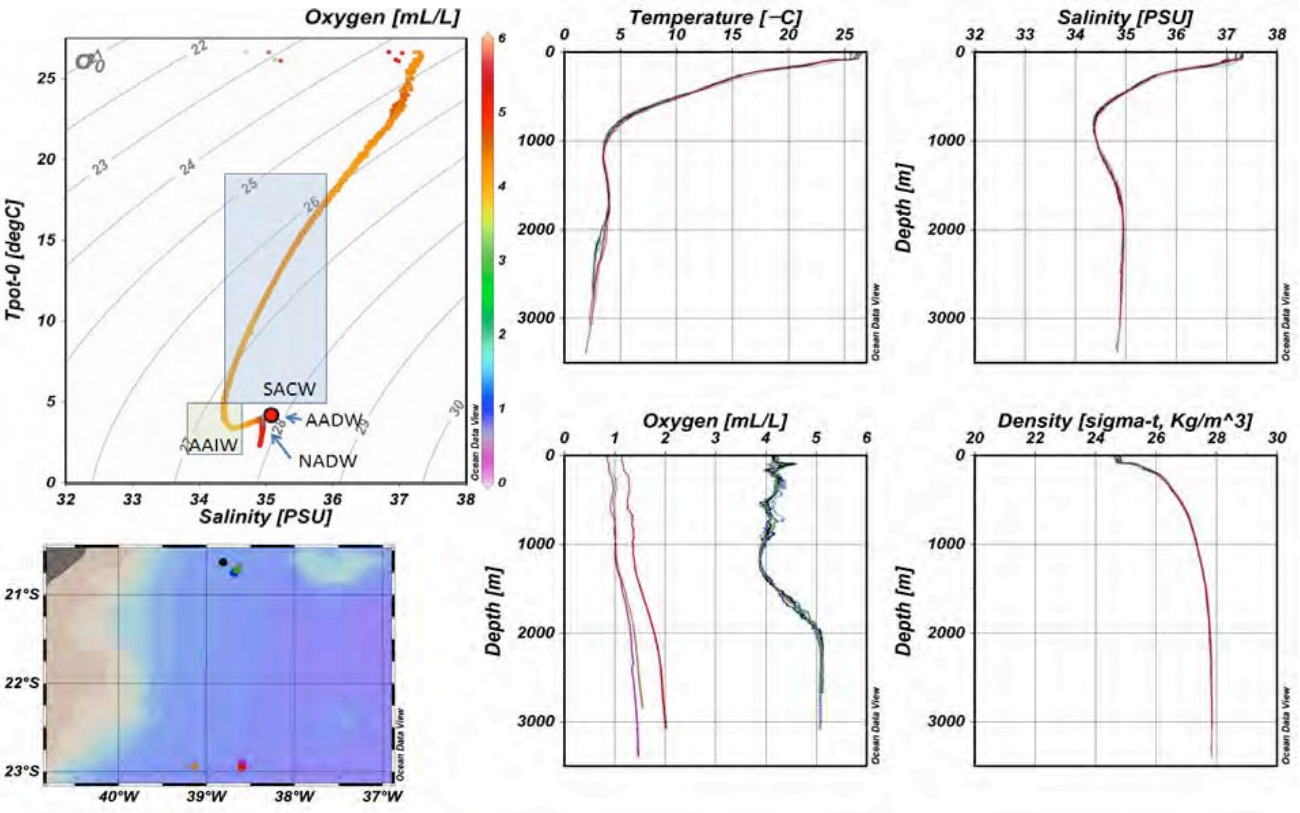
Various water masses shown in the figure are as follows.

SACW: Temp.5-18 ˚C, Sal.34.3-35.9

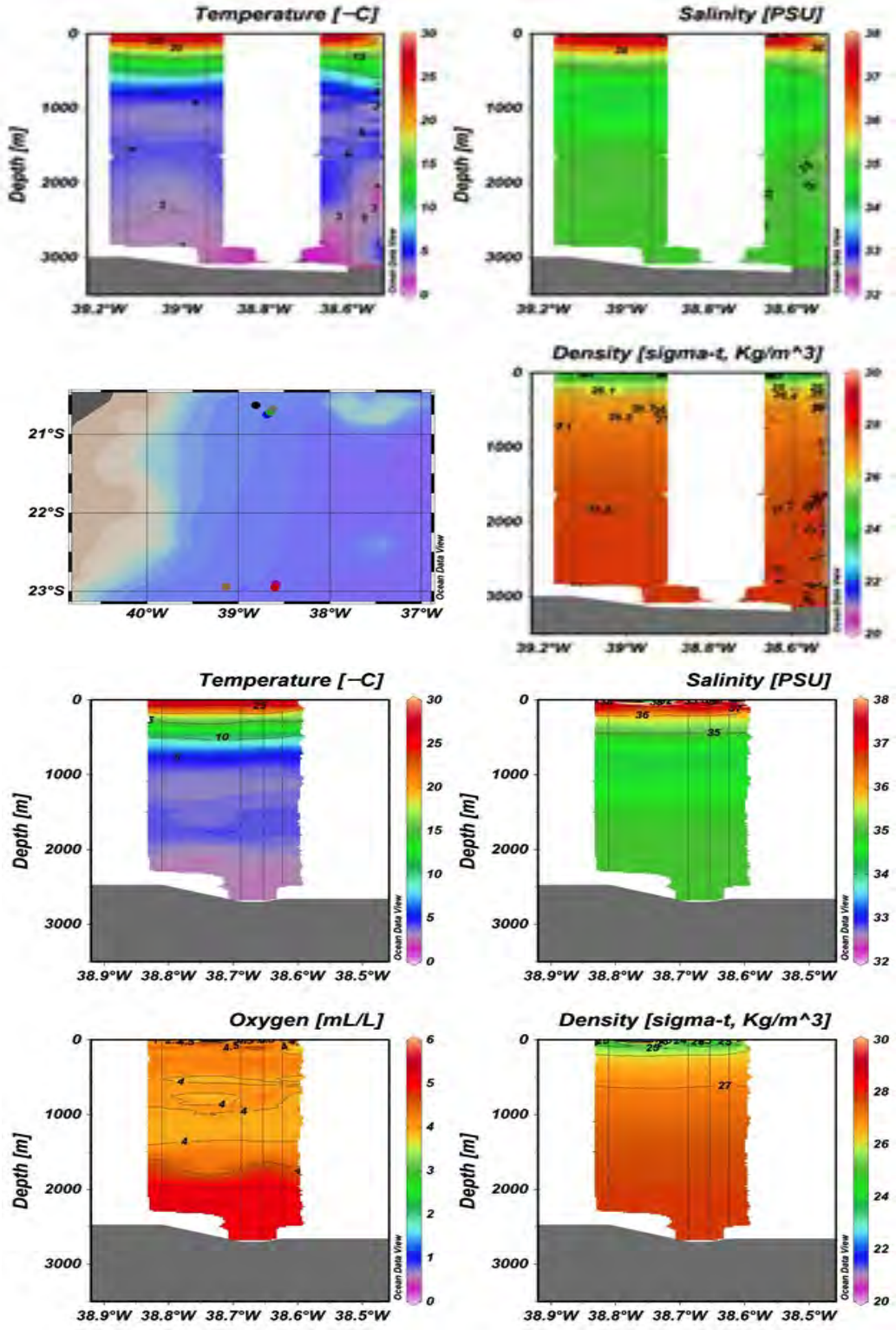
AAIW: Temp.2.2-5 ˚C, Sal.33.8-34.6

NADW: Temp.3-4 ˚C, Sal.34.9-35.0

AADW: Temp.4.0 ˚C, Sal.35.0



II. Section view of temperature, salinity, dissolved oxygen and density in water column at NSPPOE and SSPPOE.



6. Future Plan (All scientists)

Benthic Biology

Katsunori Fujikura (JAMSTEC), Paulo Sumida (USP), Takao Yoshida, Shuichi Shigeno (JAMSTEC), Angelo Bernardino (Federal University of Espírito Santo)

1) Deep-sea biological communities associated with oil seep

Collaborators: All onboard scientists, Hiroshi Kitazato (JAMSTEC), other scientist (if we need).

2) Ecological relationship between sea cucumbers and other organisms including foraminifera, molluscan dead shells etc.

Collaborators: Hiroshi Kitazato (JAMSTEC), Vivian Pellizari (USP), Takenori Sasaki (University of Tokyo), other scientist (if we need).

3) Ecological relationship between galatheid crabs and micro-organisms.

Collaborators: Yuriko Nagano, Shinji Tsuchida, Hiroshi Kitazato (JAMSTEC), Vivian Pellizari (USP), Cristina Nakayama (Federal University of São Paulo), other scientist (if we need).

4) Deep-sea megaepibenthic communities on the North São Paulo Plateau

Collaborators: All onboard scientists, Hiroshi Kitazato (JAMSTEC), other scientist (if we need).

5) Commensal relationship between a deep-sea glass sponge and a polychaete worm

Collaborators: Hiroshi Kitazato (JAMSTEC), onboard scientists, other scientist (if we need).

6) Macrofaunal communities associated with oil seepages on the deep North São Paulo Plateau, SW Atlantic Ocean (includes backgound fauna)

Collaborators: Hiroshi Kitazato (JAMSTEC), onboard scientists, other scientist (if we need).

7) Meiofaunal communities associated with oil seepages on the deep North São Paulo Plateau, SW Atlantic Ocean (includes background)

Collaborators: Hiroshi Kitazato (JAMSTEC), onboard scientists, other scientist (if we need).

Microbiology

Vivian Pellizari (USP), Yuriko Nagano (JAMSTEC), Cristina Nakayama (Federal University of São Paulo)

1) To determine site-to-site comparison of microbial diversity at several levels of resolution using culture dependent vs. culture independent approaches at sites 1 and 2 mainly to compare sites in and out oil seep distributed in area 1 and 2 of this expedition

2) Document the habitat, activities, composition and biomass of microbial communities in oil seep sediments to understand which metabolism is stimulating microbial communities that feed on the oil seep site.

3) test how oceanographic and geochemical factors control variation in sedimentary habitats, activities and communities.

4) Investigation of fungal diversity in deep-sea sediments collected at different points in São Paulo

Plateau Outer Escarpment (SPPOE), especially on oil seeps related sediments, by both culture-dependent and culture independent methods (DNA, RNA).

5) Isolation of oil degrading microorganisms

6) Isolation of piezophilic bacteria

Collaborator: Chiaki Kato (JAMSTEC), Katsunori Fujikura (JAMSTEC)

7) Investigation on fungal diversity in oil seeps related deep-sea sponges

8) Isolation of bacteria and archaea by unique culturing methods

Collaborator: Taishi Tsubouchi (JAMSTEC), Andre

9) Isolation of hyperhalophilic archaea (?)

Collaborator: Yasuhiro Shimane (JAMSTEC)

10) Screening of useful agents from fungal isolates (?)

Collaborator: Yuji Hatada, Yukari Ohta, Kozue Mori, Yasuhiro Shimane, Taishi Tsubouchi, Shinro Nishi (JAMSTEC)

11) Investigating on microbial diversity in samples collected during YK13-04 leg1 cruise.

Collaborator: Andre

Geochemisty

Toshiro Yamanaka (Okayama University), Jing Zhang (University of Toyama)

1) Organic geochemical and stable isotopic studies of benthic community and associated sediment, oil, and POM.

Collaborators: All onboard scientists, Hitoshi Chiba (Okayama University), Hiroshi Naraoka (Kyushu University), Minoru Ikehara (Kochi University), Yoshihito Chikaraishi (JAMSTEC), and Okayama University students will support some part of the studies as their thesis (not open access).

2) Trace element, micro-nutrient biogeochemistry and isotope composition in bottom seawater and pore water from the South/North São Paulo Plateau.

Collaborators: Keiji Horikawa (University of Toyama), Minoru Kusakabe (University of Toyama), Takafumi Hirata (Kyodo University), Kei Okamura (Kochi University), all onboard scientists, other scientists (if we need).

3) Trace element, micro-nutrient biogeochemistry and isotope composition in surface sediment from the South/North São Paulo Plateau.

Collaborators: Keiji Horikawa (University of Toyama), Kazumi Marumo (University of Toyama), Yoshihiro Asahara (Nagoya University), all onboard scientists, other scientists (if we need).

Geology

Fernando Menezes Freire (PETROBRAS), Marcos Nóbrega II (CPRM)

1) Check or determine quimical composition and mineralogy

2) In case of detritic sediments we will try to determine isotopics parametric, (e.g. Sm-Nd;Pb-Pb; Rb-Sr, etc..)

3) In case of carbonatic sediments, we will try, Determine isotopics parameters like C,O,Sr, or eventally U-Th.

4) To determine mineralogy and chemical composition of sediments and rocks.

5) To determine the absolute age of sediment and rocks using radio isotopes.

6) To determine the relative age of sediment and rocks using biostratigraphy.

7) To determine stable isotopes composition of sediment and rocks for paleoenvironmental discussions.

8) To characterize the oil seep using stable isotopes and biomarkers.

Science Team of the 2nd Leg in the São Paulo Plateau, based on Future Plan

			Science Category				
	Name	Affiliation	General Description	Animal Biology	Microbiology	Geochemisty	Geology and Geophysics
Onborad Scientist							
	Katsunori Fujikura	JAMSTEC	+	+	+	+	+
	Takao Yoshida	JAMSTEC	+	+		+	
	Shuichi Shigeno	JAMSTEC	+	+		+	
	Yuriko Nagano	JAMSTEC	+	+	+	+	
	Toshiro Yamanaka	Okayama Univ	+			+	
	Jing Zhang	Univ. Toyama	+			+	
	Paulo Sumida	IOUSP	+	+	+	+	+
	Cristina Nakayama	UNIFESP	+	+	+	+	
	Marcos Nóbrega II	CPRM	+			+	+
	Vivian Pellizari	IOUSP	+	+	+	+	+
	Angelo Bernardino	UFES	+	+		+	
	Antonio Fernando Freire	PETROBRAS	+			+	+
	Satomi Minamizawa	NME	+			+	
General PI							
	Hiroshi Kitazato	JAMSTEC	+	+	+	+	+
	Vivian Pellizari	IOUSP	+	+	+	+	+
Scientist from Pre-Cruise							
	Ryo Matsumoto	Meiji Univ.				+	+
	Eugenio Pires	CPRM					+

	Frazão						
	Adriano Viana	PETROBRAS				+	+
	Takashi Toyofuku	JAMSTEC		+		+	
	Takeshi Oi	Univ. Tokyo		+		+	+
	Peter Hatspacher	UNESP					+
	Germano Melo Júnior	UFRN				+	
	Shota Kambayashi	Univ. Toyama				+	
	Lauro Caliari	FURG					+
	Manuel Flores Montes	UFPE		+			
	Mauro Lisboa Souza	CPRM					+
	Heliasio Augusto Simões	CPRM					+
	Luis Palmeira	CPRM					+
	Marcos Nobrega II	CPRM					+
	Jairo Cleber Pessoa	CPRM					+
	Roberto Aguiar Alves	CPRM					+
	Edson Gomes	CPRM					+
	Ivo Bruno Pessanha	FEMAR					+
	Cleverson Guizan Silva	UFF - LAGEMAR					+
	Susana Eleonora Sichel	UFF - LAGEMAR					+
	Elirio Ernestino Toldo	UFRGS					+
	Marco Ianniruberto	UNB					+
	Antonio Tadeu dos Reis	UERJ					+
	Helenice Vital	UFRN					+
	Manuel Flores	UFPE				+	
	Germano Melo Junior	UFRN				+	
	Monica Heilbron	UERJ					+
	João Marcelo Ketzer	PUC-RS					+
	Rodolfo Trouw	UFRJ					+
	Fernando Alkimin	UFOP					+
	Ricardo Trindade	USP					+
	José Soares	UNB					+

	Renata Schmitt	UFRJ					+
	Yoshihiro Fujiwara	JAMSTEC					
	Takenori Sasaki	Univ. Tokyo		+			
	Shinji Tsuchida	JAMSTEC		+			
	Norio Miyamoto	JAMSTEC		+			
	Hiromi Watanabe	JAMSTEC		+			
	Uji Ise	Univ. of Tokyo		+			
	Kensuke Yanagi	NHMI, Chiba		+			
	James Reimer	Univ. Ryukyus		+			
	Hiroshi Saito	NSMT		+			
	Takuma Haga	JAMSTEC		+			
	Ejiro Nishi	Yokohama Natnl. Univ.		+			
	Shinji Tsuchida	JAMSTEC		+			
	Tomoyuki Komai	NHMI, Chiba		+			
	Tatsuo Oji	Nagoya Univ.		+			
	Toshihiko Fujita	NSMT		+			
	Teruaki Nishikawa	Toho Univ.		+			
	Shigeaki Kojima	Univ. Tokyo		+			
	Hiroshi Seno	Kanagawa MNH		+			
	José Angel A. Perez	UNIVALI		+			
	Abílio Soares Gomes	UFF		+			
	Débora Pires	MN-UFRJ		+			
	Irene Cardoso	MN-UFRJ		+			
	Eduardo Hajdu	MN-UFRJ		+			
	Alexandre Pimenta	MN-UFRJ		+			
	Renato Ventura	MN-UFRJ		+			
	Lúcia Campos	UFRJ		+			
	Antônio Carlos Marques	USP		+			
	Karin Elbers	IOUSP		+			
	Taishi Tsubouchi	JAMSTEC			+		
	André de Oliveira Souza Lima	UNIVALI			+		
	Yasuhiro Shimane	JAMSTEC			+		
	Dhugal Lindsay	JAMSTEC		+			
	Koichi Ara	Nihon Univ.		+			
	Kiyotaka	JAMSTEC			+		

	Takishita						
	Akinori Yabuki	JAMSTEC			+		
	Takahiko Nagahama	Higashi-Chikushi junior college			+		
	Sérgio Netto	UNISUL		+			
	Maria Antônia Z. Cecília Amaral	UNICAMP		+			
	Maurício Shimabukuro	IOUSP		+			
	Arthur Güth	IOUSP		+			
	Maria Carolina Ribeiro	IOUSP		+			
	Yuki Hongo	TUMSAT		+	+		
	Masaru Kawato	JAMSTEC		+	+		
	Tetsuro Ikuta	JAMSTEC		+	+		
	Tomoko Koito	Nihon University		+			
	Genki Ozawa	Kitasato Univ.		+	+		
	Hidetaka Nomaki	JAMSTEC		+		+	
	Naohiko Okochi	JAMSTEC				+	
	Paula Moraes	IOUSP		+		+	
	Ana Godoi	IOUSP		+		+	
	Betina Alves	IOUSP		+		+	
	Yuji Hatada	JAMSTEC			+		
	Yukari Ohta	JAMSTEC			+		
	Kozue Mori	JAMSTEC			+		
	Yasuhiro Shimane	JAMSTEC			+		
	Shinro Nishi	JAMSTEC			+		
	Keiko Usui	JAMSTEC			+		
	Miyuki Nishijima	Techno Suruga Laboratory Co., Ltd			+		
	Tomohiko Kiyuna	Techno Suruga Laboratory Co., Ltd			+		
Additional Scientist							
	Chiaki Kato	JAMSTEC			+		
	Hitoshi Chiba	Okayama Univ				+	
	Hiroshi Naraoka	Kyushu Univ.				+	
	Minoru Ikehara	Kochi Univ.				+	
	Yoshihito Chikaraishi	JAMSTEC				+	
	Okayama Univ. Students	Okayama Univ				+	
	Keiji Horikawa	Univ. Toyama				+	

	Minoru Kusakabe	Univ. Toyama				+	
	Takafumi Hirata	Kyodo Univ.				+	
	Kei Okamura	Kochi Univ.				+	
	Kazumi Marumo	Univ. Toyama				+	
	Yoshihiro Asahara	Nagoya Univ.				+	

7. Ship Log (Satomi, Bruno)

日付 Date	時間 Local Time	内容 Note	特記事項 Description	本船位置／気象／海象 Position/Weather/Wind/Sea condition
10-May-13	8:00	1st Scientific meeting		10/05 12:00(UTC-3h)
	10:00	Departure from Rio de Janeiro		23-00.0S, 043-00.0W
	11:00	Living on Board Lecture		Rio de Janeiro
	13:00	Fire and Abandon Drill		Blue Sky
	14:00	SBP of diving points lecture by Fernando (Petrobras)		E-4 (Moderate breeze)
	15:30	Introduce of Yokosuka Officers		3 (Sea smooth)
	16:40	Komplia Pray for good cruise		1 (Low swell short)
		Transit to research area		Visibly: 8'
11-May-13		**Transit to research area**		11/05 12:00(UTC-3h)
	6:00	Start MBES and SBP Survey and XBT		22-57.0S, 038-36.0W
	9:30	Briefing about Shinkai6500		Dive Pts 1-4
	14:00	Science Meeting by Dr. Kats		Blue Sky
	17:45	Gas Hydrate lecture by Fernando (Petrobras)		N-4 (Moderate breeze)
				3 (Slight)
				1 (Low swell short)
				Visibly: 8'
12-May-13	6:00	End MBES and SBP Survey		12/05 08:00(UTC-3h)
	9:00	Dive #1340 Start Pt3		22-57.0S, 038-36.0W
	15:00	Science meeting by Dr. Vivian		Dive Pt 3
	16:15	Dive #1340 End		Blue Sky
	19:00	Science meeting by Dr. Kats		N-4 (Moderate breeze)
	20:00	Start MBES Survey		3 (Slight)

				1 (Low swell short)
				Visibly: 8'
13-May-13	6:00	End MBES and SBP Survey		13/05 08:00(UTC-3h)
	9:00	Dive #1341 Start Pt4		22-57.0S, 038-19.0W
	16:20	Dive #1341 End		Dive Pt 4
	19:00	Science meeting by Dr. Vivian Pellizari		Fine But Cloudy
				N-4 (Moderate breeze)
				3 (Slight)
				1 (Low swell short)
				Visibly: 8'
14-May-13	11:00	Dive #1342 Start Pt1 - Late due to Shinkai problem		14/05 08:00(UTC-3h)
	16:20	Dive #1342 End		22-57.0S, 039-08.0W
	19:00	Science meeting		Dive Pt 1
				Blue Sky
				N-4 (Moderate breeze)
				3 (Slight)
				1 (Low swell short)
				Visibly: 8'
15-May-13	9:00	Dive #1343 Start Pt6		15/05 08:00(UTC-3h)
	16:20	Dive #1343 End		20-41.0S, 038-38.0W
	19:00	Science meeting		Dive Pt 6
				Blue Sky
				NE-4 (Moderate breeze)
				3 (Slight)
				1 (Low swell short)
				Visibly: 8'
16-May-13	9:00	Dive #1344 Start Pt5		16/05 08:00(UTC-3h)
	16:10	Dive #1344 End		20-38.0S, 038-49.0W
	19:00	Science meeting		Dive Pt 5
				Blue Sky
				N-4 (Moderate breeze)
				4 (Moderate)

				2 (Low swell Long)
				Visibly: 8'
17-May-13	9:00	Dive #1345 Start Pt6		17/05 08:00(UTC-3h)
	16:10	Dive #1345 End		20-41.0S, 038-37.0W
	19:00	Science meeting		Dive Pt 6
				Fine But Cloudy
				N-4 (Moderate breeze)
				4 (Moderate)
				2 (Low swell Long)
				Visibly: 8'
18-May-13	9:00	Dive Cancelled due to bad weather		18/05 08:00(UTC-3h)
				20-41.0S, 038-37.0W
				Dive Pt 6
				Cloudy/Rain
				NW-7 (Near Gale)
				5 (Rough)
				4 (Moderate Short)
				Visibly: 5'
19-May-13	10:15	Dive #1346 Start Pt6		19/05 08:00(UTC-3h)
	16:10	Dive #1346 End		20-41.0S, 038-37.0W
	19:00	Science meeting		Dive Pt 6
				Fine But Cloudy
				E-4 (Moderate breeze)
				3 (Slight)
				1 (Low swell short)
				Visibly: 8'
20-May-13	9:10	Dive #1347 Start Pt6		20/05 08:00(UTC-3h)
	16:10	Dive #1347 End		20-45.4S, 038-41.2W
	19:00	Science meeting		Dive Pt 6
				Fine But Cloudy
				E-4 (Moderate breeze)
				3 (Slight)
				1 (Low swell short)
				Visibly: 8'
21-May-13	9:15	Dive #1348 Start Pt2		21/05 08:00(UTC-3h)

	15:20	Dive #1348 End		22-57.9S, 038-56.2W
	19:00	Science meeting		Dive Pt 2
				Fine ButCloudy
				SW-6 (Strong breeze)
				4 (Moderate)
				1 (Low swell short)
				Visibly: 8'
22-May-13	9:15	Dive Cancelled		22/05 08:00(UTC-3h)
	10:00	Ship Tour		20-45.4S, 038-41.2W
	14:00	Tea Cerimony		Dive Pt 6
	19:00	Science meeting		Fine But Cloudy
				NW-6 (Strong breeze)
				4 (Moderate)
				1 (Low swell short)
				Visibly: 8'
23-May-13	8:00	Tidy up Laboratory		23/05 08:00(UTC-3h)
	13:00	Science meeting		23-27.0S, 042-26.0W
	16:00	Photo Group		Close to Rio de Janeiro
	17:00	Last Day BBQ		Cloudy/Rain
				SW-4 (Moderate)
				4 (Moderate)
				1 (Low swell short)
				Visibly: 8'
24-May-13	09;00	**Arrive At Santos-SP Brazil**		

8. Video List

Dive No.		Camera	K. Fujikura	T. Yoshida	Y. Nagano	S. Shigeno	T. Yamanaka	J. Zhang	P. Sumida	C. Nakayama	M. Nobrega	V Pellizari	A Bernardino	A Freire	B Baptista
1340	impose	No.1 (High resolution) 40mbps	OK	OK	OK	OK					OK	OK	OK		
		No.2 (High resolution) 40mbps	OK	OK	OK	OK	OK				OK	OK	OK		
		No.1 (Low resolution) 4mbps	OK	OK	OK	OK	OK	OK			OK	OK	OK		
		No.2 (Low resolution) 4mbps	OK	OK	OK	OK		OK			OK	OK	OK		
	no impose	KiPro	OK	OK					OK						
		Digest	OK	OK	OK	OK	OK	OK		OK	OK	OK	OK	OK	OK
1341	impose	No.1 (High resolution) 40mbps	OK	OK	OK	OK					OK	OK			
		No.2 (High resolution) 40mbps	OK	OK	OK	OK	OK				OK	OK			
		No.1 (Low resolution) 4mbps	OK	OK	OK	OK	OK	OK			OK	OK	OK		
		No.2 (Low resolution) 4mbps	OK	OK	OK	OK		OK			OK	OK	OK		
	no impose	KiPro	OK	OK					OK						
		Digest	OK	OK	OK	OK	OK	OK		OK	OK	OK	OK	OK	OK
1342	impose	No.1 (High resolution) 40mbps	OK	OK	OK	OK					OK	OK			
		No.2 (High resolution) 40mbps	OK	OK	OK	OK	OK				OK	OK			
		No.1 (Low resolution) 4mbps	OK	OK	OK	OK	OK	OK			OK	OK	OK		
		No.2 (Low resolution) 4mbps	OK	OK	OK	OK		OK			OK	OK	OK		
	no impose	KiPro	OK	OK					OK						
		Digest	OK	OK	OK	OK	OK	OK		OK	OK	OK	OK	OK	OK
1343	impose	No.1 (High resolution) 40mbps	OK	OK	OK	OK	OK				OK	OK			
		No.2 (High resolution) 40mbps	OK	OK	OK	OK	OK				OK	OK			
		No.1 (Low resolution)	OK	OK	OK	OK		OK			OK	OK	OK	OK	

		4mbps													
		No.2 (Low resolution) 4mbps	OK	OK	OK	OK		OK			OK	OK	OK	OK	
	no impose	KiPro	OK	OK					OK						
		Digest	OK	OK	OK	OK	OK	OK		OK	OK	OK	OK	OK	OK
1344	impose	No.1 (High resolution) 40mbps	OK	OK	OK	OK	OK				OK	OK			
		No.2 (High resolution) 40mbps	OK	OK	OK	OK	OK				OK	OK			
		No.1 (Low resolution) 4mbps	OK	OK	OK	OK		OK			OK	OK	OK		
		No.2 (Low resolution) 4mbps	OK	OK	OK	OK		OK			OK	OK	OK		
	no impose	KiPro	OK	OK					OK						
		Digest	OK	OK	OK	OK	OK	OK		OK	OK	OK	OK	OK	OK
1345	impose	No.1 (High resolution)40mbps	OK	OK	OK	OK	OK				OK	OK			
		No.2 (High resolution) 40mbps	OK	OK	OK	OK	OK				OK	OK			
		No.1 (Low resolution) 4mbps	OK	OK	OK	OK		OK			OK	OK	OK	OK	
		No.2 (Low resolution) 4mbps	OK	OK	OK	OK		OK		OK	OK	OK	OK	OK	
	no impose	KiPro	OK	OK					OK						
		Digest	OK	OK	OK	OK	OK	OK		OK	OK	OK	OK	OK	OK
1346	impose	No.1 (High resolution) 40mbps	OK	OK	OK	OK	OK				OK	OK			
		No.2 (High resolution) 40mbps	OK	OK	OK	OK	OK				OK	OK			
		No.1 (Low resolution) 4mbps	OK	OK	OK	OK		OK			OK	OK	OK	OK	
		No.2 (Low resolution) 4mbps	OK	OK	OK	OK		OK			OK	OK	OK	OK	
	no impose	KiPro	OK	OK					OK						
		Digest	OK	OK	OK	OK	OK	OK		OK	OK	OK	OK	OK	OK
1347	impose	No.1 (High resolution) 40mbps	OK	OK	OK	OK					OK	OK			
		No.2 (High resolution) 40mbps	OK	OK	OK	OK					OK	OK			

		No.1 (Low resolution) 4mbps	OK	OK	OK	OK		OK			OK	OK	OK		
		No.2 (Low resolution) 4mbps	OK	OK	OK	OK		OK			OK	OK	OK		
	no impose	KiPro	OK	OK					OK						
		Digest	OK	OK	OK	OK	OK	OK		OK	OK	OK	OK	OK	OK
1348	impose	No.1 (High resolution) 40mbps	OK	OK	OK	OK		OK			OK	OK			
		No.2 (High resolution) 40mbps	OK	OK	OK	OK		OK			OK	OK			
		No.1 (Low resolution) 4mbps	OK	OK	OK	OK		OK			OK	OK	OK		
		No.2 (Low resolution) 4mbps	OK	OK	OK	OK		OK			OK	OK	OK		
	no impose	KiPro	OK	OK					OK						
		Digest	OK	OK	OK	OK	OK	OK		OK	OK	OK	OK	OK	OK

9. Sample Lists

9-1. Meio, Macro & Mega Organisms

South São Paulo Plateau Outer Escarpment: SSPPOE, North São Paulo Plateau Outer Escarpment: NSPPOE

P. Sumida (USP): PS, S. Shigeno (JAMSTEC): SS

No.	On board ID	Dive No.	Sample Name / Scientific Name	No. Individuals	Attributes	Sampling Method	Fixation	Sample Repository Contact Person	Area	Locality	Latitude			Longitude			Depth	Date Collected			Remarks
											Deg.	Min.	N/S	Deg.	Min.	E/W	[m]	YYYY	MM	DD	
1	1340-1	1340	sediment 0-5 cm	1		Push core 6	99.5% Etha.	PS	SSPPOE	PT-03	22	57.1972	S	38	35.9570	W	3148	2013	5	12	macrofauna
2	1340-2	1340	sediment 0-5 cm	1		Push core 2	99.5% Etha.	PS	SSPPOE	PT-03	22	55.7425	S	38	35.5471	W	3123	2013	5	12	macrofauna
3	1340-3	1340	Squat lobster	1	white	Slurp gun	99.5% Etha.	PS	SSPPOE	PT-03	22	55.6016	S	38	35.3825	W	3079	2013	5	12	taxonomy
4	1340-4	1340	sediment 0-10 cm	1		Push core 5	99.5% Etha.	PS	SSPPOE	PT-03	22	55.7425	S	38	35.5471	W	3123	2013	5	12	macrofauna
5	1341-1	1341	sediment 0-8 cm	1		Push core 6	99.5% Etha.	PS	SSPPOE	PT-04	22	57.0000	S	38	18.8891	W	3602	2013	5	13	macrofauna
6	1341-2	1341	sediment 0-10 cm	1		Push core 1	99.5% Etha.	PS	SSPPOE	PT-04	22	57.0000	S	38	18.8891	W	3602	2013	5	13	macrofauna
7	1341-3	1341	sediment 0-10 cm	1		Push core 2	99.5% Etha.	PS	SSPPOE	PT-04	22	57.1850	S	38	21.6405	W	3438	2013	5	13	macrofauna
8	1342-1	1342	sediment 0-10 cm	1		Push core 1	99.5% Etha.	PS	SSPPOE	PT-01	22	56.4399	S	39	8.1391	W	2997	2013	5	14	macrofauna
9	1343-1	1343	sediment 0-10 cm	1		Push core 8	99.5% Etha.	PS	NSPPOE	PT-06	20	40.3041	S	38	38.0971	W	2456	2013	5	15	macrofauna
10	1343-2	1343	sediment 0-10 cm	1		Push core 7	99.5% Etha.	PS	NSPPOE	PT-06	20	40.3041	S	38	38.0971	W	2456	2013	5	15	macrofauna
11	1343-3	1343	sediment 0-10 cm	1		Push core 5	99.5% Etha.	PS	NSPPOE	PT-06	20	40.3041	S	38	38.0971	W	2456	2013	5	15	macrofauna
12	1343-4-1	1343	Hydrozoa	1	Beige	Push core 6	Formalin	PS	NSPPOE	PT-06	20	41.6262	S	38	38.1977	W	2728	2013	5	15	taxonomy
13	1343-4-2	1343	Hydrozoa	1	Beige	Push core 6	99.5% Etha.	PS	NSPPOE	PT-06	20	41.6262	S	38	38.1977	W	2728	2013	5	15	DNA
14	1343-5-1	1343	Hydrozoa	1	Beige		Formalin	PS	NSPPOE	PT-06	20	41.6262	S	38	38.1977	W	2728	2013	5	15	taxonomy

15	1343-5-2	1343	Hydrozoa	1	Beige		99.5% Etha.	PS	NSPPOE	PT-06	20	41.6262	S	38	38.1977	W	2728	2013	5	15	DNA
16	1343-6	1343	sediment 0-10 cm	1		Push core 6	99.5% Etha.	PS	NSPPOE	PT-06	20	41.6262	S	38	38.1977	W	2728	2013	5	15	macrofauna
17	1343-7-1	1343	Brown sponge	1	dark brown	Manipulator	Formalin	PS	NSPPOE	PT-06	20	40.4616	S	38	37.5723	W	2574	2013	5	15	taxonomy
18	1343-7-2	1343	Brown sponge	1	dark brown	Manipulator	Frozen	PS	NSPPOE	PT-06	20	40.4616	S	38	37.5723	W	2574	2013	5	15	DNA
19	1343-7-3	1343	Brown sponge	1	dark brown	Manipulator	Frozen	PS	NSPPOE	PT-06	20	40.4616	S	38	37.5723	W	2574	2013	5	15	Stable isotopes
20	1343-7-4	1343	Brown sponge	1	dark brown	Manipulator	Frozen	SS	NSPPOE	PT-06	20	40.4616	S	38	37.5723	W	2574	2013	5	15	
21	1343-7-5	1343	Amphipod on Brown sponge	2	Beige	Manipulator	99.5% Etha.	PS	NSPPOE	PT-06	20	40.4616	S	38	37.5723	W	2574	2013	5	15	taxonomy
22	1343-7-6	1343	Sponges	1		Manipulator	Formalin	PS	NSPPOE	PT-06	20	40.4616	S	38	37.5723	W	2574	2013	5	15	taxonomy
23	1343-8-1	1343	Giant white sponge	1	white	Manipulator	Formalin	PS	NSPPOE	PT-06	20	40.4616	S	38	37.5723	W	2574	2013	5	15	taxonomy
24	1343-8-2	1343	Giant white sponge	1	white	Manipulator	Frozen	PS	NSPPOE	PT-06	20	40.4616	S	38	37.5723	W	2574	2013	5	15	DNA
25	1343-8-3	1343	Giant white sponge	1	white	Manipulator	Frozen	PS	NSPPOE	PT-06	20	40.4616	S	38	37.5723	W	2574	2013	5	15	Stable isotopes
26	1343-9-1	1343	Ramified white sponge	1	white	Manipulator	Formalin	PS	NSPPOE	PT-06	20	40.4616	S	38	37.5723	W	2574	2013	5	15	taxonomy
27	1343-9-2	1343	Ramified white sponge	1	white	Manipulator	Frozen	PS	NSPPOE	PT-06	20	40.4616	S	38	37.5723	W	2574	2013	5	15	DNA
28	1343-9-3	1343	Ramified white sponge	1	white	Manipulator	Frozen	PS	NSPPOE	PT-06	20	40.4616	S	38	37.5723	W	2574	2013	5	15	Stable isotopes
29	1343-10-1	1343	Black stiff sponge	1	black	Manipulator	Formalin	PS	NSPPOE	PT-06	20	40.4616	S	38	37.5723	W	2574	2013	5	15	taxonomy
30	1343-10-2	1343	Black stiff sponge	1	black	Manipulator	Frozen	PS	NSPPOE	PT-06	20	40.4616	S	38	37.5723	W	2574	2013	5	15	DNA
31	1343-10-3	1343	Black stiff sponge	1	black	Manipulator	Frozen	PS	NSPPOE	PT-06	20	40.4616	S	38	37.5723	W	2574	2013	5	15	Stable isotopes
32	1343-11-1	1343	Sandy sponge	1	Beige	Manipulator	Formalin	PS	NSPPOE	PT-06	20	40.4616	S	38	37.5723	W	2574	2013	5	15	taxonomy
33	1343-11-2	1343	Sandy sponge	1	Beige	Manipulator	Frozen	PS	NSPPOE	PT-06	20	40.4616	S	38	37.5723	W	2574	2013	5	15	DNA
34	1343-11-3	1343	Sandy sponge	1	Beige	Manipulator	Frozen	PS	NSPPOE	PT-06	20	40.4616	S	38	37.5723	W	2574	2013	5	15	Stable isotopes

35	1343-12-1	1343	Sea urchin	1	white	Manipulator	99.5% Etha.	PS	NSPPOE	PT-06	20	40.4616	S	38	37.5723	W	2574	2013	5	15	taxonomy
36	1343-13	1343	sediment 0-10 cm	1		Push core 3	99.5% Etha.	PS	NSPPOE	PT-06	20	40.3041	S	38	38.0971	W	2456	2013	5	15	macrofauna
37	1344-1	1344	sediment 0-10 cm	1		Push core 5	99.5% Etha.	PS	NSPPOE	PT-05	20	39.1031	S	38	46.8866	W	2308	2013	5	16	macrofauna
38	1344-2	1344	sediment 0-10 cm	1		Push core 6	99.5% Etha.	PS	NSPPOE	PT-05	20	38.0314	S	38	47.1288	W	2499	2013	5	16	macrofauna
39	1344-3	1344	sediment 0-10 cm	1		Push core 2	99.5% Etha.	PS	NSPPOE	PT-05	20	39.1031	S	38	46.8866	W	2308	2013	5	16	macrofauna
40	1344-4-1	1344	Hexactinellid sponge	1	Beige	Manipulator	Formalin	PS	NSPPOE	PT-05	20	39.1031	S	38	46.8866	W	2308	2013	5	16	taxonomy
41	1344-4-2	1344	Amphipod associated with hexactinellid sponge	1	Beige	Manipulator	99.5% Etha.	PS	NSPPOE	PT-05	20	39.1031	S	38	46.8866	W	2308	2013	5	16	taxonomy
42	1344-4-3	1344	Polychaeta comensal in hexactinellid sponge	2	Beige	Manipulator	99.5% Etha.	PS	NSPPOE	PT-05	20	39.1031	S	38	46.8866	W	2308	2013	5	16	taxonomy
43	1344-4-4	1344	Hexactinellid sponge	1	Beige	Manipulator	99.5% Etha.	PS	NSPPOE	PT-05	20	39.1031	S	38	46.8866	W	2308	2013	5	16	DNA
44	1344-4-5	1344	Hexactinellid sponge	1	Beige	Manipulator	Frozen	PS	NSPPOE	PT-05	20	39.1031	S	38	46.8866	W	2308	2013	5	16	Stable isotopes
45	1344-4-6	1344	Polychaeta comensal in hexactinellid sponge	1	Beige	Manipulator	99.5% Etha.	PS	NSPPOE	PT-05	20	39.1031	S	38	46.8866	W	2308	2013	5	16	DNA
46	1344-4-7	1344	Polychaeta comensal in hexactinellid sponge	1	Beige	Manipulator	Frozen	PS	NSPPOE	PT-05	20	39.1031	S	38	46.8866	W	2308	2013	5	16	Stable isotopes
47	1345-1	1345	sediment 0-10 cm	1		Push core 6	99.5% Etha.	PS	NSPPOE	PT-06	20	43.1341	S	38	39.1038	W	2715	2013	5	17	macrofauna
48	1345-2	1345	sediment 0-10 cm	1		Push core 7	99.5% Etha.	PS	NSPPOE	PT-06	20	41.4588	S	38	38.1616	W	2723	2013	5	17	macrofauna
49	1345-3	1345	sediment 0-10 cm	1		Push core 9	99.5% Etha.	PS	NSPPOE	PT-06	20	41.4588	S	38	38.1616	W	2723	2013	5	17	macrofauna

50	1345-4	1345	sediment 0-6 cm	1		Push core 4	99.5% Etha.	PS	NSPPOE	PT-06	20	41.4482	S	38	38.1529	W	2720	2013	5	17	macrofauna
51	1345-5-1	1345	sediment >500 µm	1		Scoop	99.5% Etha.	PS	NSPPOE	PT-06	20	41.4521	S	38	38.1499	W	2721	2013	5	17	macrofauna
52	1345-5-2	1345	sediment >2 mm	1		Scoop	99.5% Etha.	PS	NSPPOE	PT-06	20	41.4521	S	38	38.1499	W	2721	2013	5	17	macrofauna
53	1345-6-1	1345	Actinoscyphia	1	Rose	Slurp gun	Formalin	PS	NSPPOE	PT-06	20	43.1981	S	38	39.1310	W	2718	2013	5	17	taxonomy
54	1345-6-2	1345	Actinoscyphia	1	Rose	Slurp gun	99.5% Etha.	PS	NSPPOE	PT-06	20	43.1981	S	38	39.1310	W	2718	2013	5	17	DNA
55	1345-6-3	1345	Actinoscyphia	1	Rose	Slurp gun	Frozen	PS	NSPPOE	PT-06	20	43.1981	S	38	39.1310	W	2718	2013	5	17	Stable isotopes
56	1345-7-1	1345	Galatheid	1	white	Slurp gun	99.5% Etha.	PS	NSPPOE	PT-06	20	42.1958	S	38	38.8104	W	2719	2013	5	17	taxonomy
57	1345-7-2	1345	Galatheid	1	white	Slurp gun	99.5% Etha.	PS	NSPPOE	PT-06	20	42.1958	S	38	38.8104	W	2719	2013	5	17	DNA
58	1345-7-3	1345	Galatheid	1	white	Slurp gun	Frozen	PS	NSPPOE	PT-06	20	42.1958	S	38	38.8104	W	2719	2013	5	17	Stable isotopes
59	1345-8-1	1345	Ophiuroid	1	orange	Slurp gun	99.5% Etha.	PS	NSPPOE	PT-06	20	43.1981	S	38	39.1310	W	2718	2013	5	17	taxonomy
60	1345-8-2	1345	Ophiuroid	1	orange	Slurp gun	99.5% Etha.	PS	NSPPOE	PT-06	20	43.1981	S	38	39.1310	W	2718	2013	5	17	DNA
61	1345-8-3	1345	Ophiuroid	1	orange	Slurp gun	Frozen	PS	NSPPOE	PT-06	20	43.1981	S	38	39.1310	W	2718	2013	5	17	Stable isotopes
62	1345-9-1	1345	White sponge soft	1	white	Slurp gun	Formalin	PS	NSPPOE	PT-06	20	43.2245	S	38	39.1586	W	2708	2013	5	17	taxonomy
63	1345-9-2	1345	White sponge soft	1	white	Slurp gun	99.5% Etha.	PS	NSPPOE	PT-06	20	43.2245	S	38	39.1586	W	2708	2013	5	17	DNA
64	1345-9-3	1345	White sponge soft	1	white	Slurp gun	Frozen	PS	NSPPOE	PT-06	20	43.2245	S	38	39.1586	W	2708	2013	5	17	Stable isotopes
65	1345-10-1	1345	Giant brown sponge	1	dark brown	Slurp gun	Formalin	PS	NSPPOE	PT-06	20	41.9533	S	38	38.7397	W	2663	2013	5	17	taxonomy
66	1345-10-2	1345	Giant brown sponge	1	dark brown	Slurp gun	99.5% Etha.	PS	NSPPOE	PT-06	20	41.9533	S	38	38.7397	W	2663	2013	5	17	DNA
67	1345-10-3	1345	Giant brown sponge	1	dark brown	Slurp gun	Frozen	PS	NSPPOE	PT-06	20	41.9533	S	38	38.7397	W	2663	2013	5	17	Stable isotopes
68	1345-11-1	1345	White sponge hard	1	white	Slurp gun	Formalin	PS	NSPPOE	PT-06	20	41.9533	S	38	38.7397	W	2663	2013	5	17	taxonomy
69	1345-11-2	1345	White sponge hard	1	white	Slurp gun	99.5% Etha.	PS	NSPPOE	PT-06	20	41.9533	S	38	38.7397	W	2663	2013	5	17	DNA
70	1345-11-3	1345	White sponge hard	1	white	Slurp gun	Frozen	PS	NSPPOE	PT-06	20	41.9533	S	38	38.7397	W	2663	2013	5	17	Stable isotopes
71	1345-12-	1345	Megalodicop	1	transpa	Slurp gun	Formalin	PS	NSPPOE	PT-06	20	43.2245	S	38	39.1586	W	2708	2013	5	17	taxonomy

	1		ia		rent																
72	1345-12-2	1345	Megalodicopia	1	transparent	Slurp gun	99.5% Etha.	PS	NSPPOE	PT-06	20	43.2245	S	38	39.1586	W	2708	2013	5	17	DNA
73	1345-12-3	1345	Megalodicopia	1	transparent	Slurp gun	Frozen	PS	NSPPOE	PT-06	20	43.2245	S	38	39.1586	W	2708	2013	5	17	Stable isotopes
74	1345-13	1345	Polychaeta on Actinoscyphia	2	white	Slurp gun	99.5% Etha.	PS	NSPPOE	PT-06	20	43.1981	S	38	39.1310	W	2718	2013	5	17	Taxonomy
75	1345-14	1345	Amphipoda with sponges	2	Beige	Slurp gun	99.5% Etha.	PS	NSPPOE	PT-06	20	41.9533	S	38	38.7397	W	2663	2013	5	17	Taxonomy
76	1345-15	1345	Isopoda on sponge	1	Gray	Slurp gun	99.5% Etha.	PS	NSPPOE	PT-06	20	41.9533	S	38	38.7397	W	2663	2013	5	17	Taxonomy
77	1345-16	1345	Polychaeta on giant brown sponge	1		Slurp gun	99.5% Etha.	PS	NSPPOE	PT-06	20	41.9533	S	38	38.7397	W	2663	2013	5	17	Taxonomy
78	1346-1	1346	sediment 0-9 cm	1		Push core 8	99.5% Etha.	PS	NSPPOE	PT-06	20	44.3214	S	38	40.0988	W	2664	2013	5	19	macrofauna
79	1346-2	1346	sediment 0-10 cm	1		Push core 7	99.5% Etha.	PS	NSPPOE	PT-06	20	44.3214	S	38	40.0988	W	2664	2013	5	19	macrofauna
80	1346-3	1346	sediment 0-10 cm	1		Push core 5	99.5% Etha.	PS	NSPPOE	PT-06	20	44.3196	S	38	40.0896	W	2666	2013	5	19	macrofauna
81	1346-4	1346	sediment 0-5 cm	1		Push core 11	99.5% Etha.	PS	NSPPOE	PT-06	20	43.2425	S	38	39.1932	W	2692	2013	5	19	macrofauna (live sorting)
82	1346-5-1	1346	Sponge on oil mass	1	Gray	Manipulator	Formalin	PS	NSPPOE	PT-06	20	43.9033	S	38	39.7294	W	2651	2013	5	19	taxonomy
83	1346-5-2	1346	Sponge on oil mass	1	Gray	Manipulator	99.5% Etha.	PS	NSPPOE	PT-06	20	43.9033	S	38	39.7294	W	2651	2013	5	19	DNA
84	1346-5-3	1346	Sponge on oil mass	1	Gray	Manipulator	Frozen	PS	NSPPOE	PT-06	20	43.9033	S	38	39.7294	W	2651	2013	5	19	Stable isotopes
85	1346-6-1	1346	Sponge associated with sponge on oil mass	1	Beige	Manipulator	Formalin	PS	NSPPOE	PT-06	20	43.9033	S	38	39.7294	W	2651	2013	5	19	taxonomy
86	1346-6-2	1346	Sponge associated with sponge	1	Beige	Manipulator	99.5% Etha.	PS	NSPPOE	PT-06	20	43.9033	S	38	39.7294	W	2651	2013	5	19	DNA

			on oil mass																	
87	1346-6-3	1346	Sponge associated with sponge on oil mass	1	Beige	Manipulator	Frozen	PS	NSPPOE	PT-06	20	43.9033	S	38	39.7294	W	2651	2013	5	19	Stable isotopes
88	1346-7-1	1346	Spherical sponge associated with sponge on oil mass	1	Beige	Manipulator	Formalin	PS	NSPPOE	PT-06	20	43.9033	S	38	39.7294	W	2651	2013	5	19	taxonomy
89	1346-7-2	1346	Spherical sponge associated with sponge on oil mass	1	Beige	Manipulator	99.5% Etha.	PS	NSPPOE	PT-06	20	43.9033	S	38	39.7294	W	2651	2013	5	19	DNA
90	1346-7-3	1346	Spherical sponge associated with sponge on oil mass	1	Beige	Manipulator	Frozen	PS	NSPPOE	PT-06	20	43.9033	S	38	39.7294	W	2651	2013	5	19	Stable isotopes
91	1346-8-1	1346	Brisingidae	1	Red	Manipulator	99.5% Etha.	PS	NSPPOE	PT-06	20	44.4594	S	38	40.1688	W	2688	2013	5	19	taxonomy
92	1346-8-2	1346	Brisingidae	1	Red	Manipulator	Frozen	PS	NSPPOE	PT-06	20	44.4594	S	38	40.1688	W	2688	2013	5	19	DNA
93	1346-8-3	1346	Brisingidae	1	Red	Manipulator	Frozen	PS	NSPPOE	PT-06	20	44.4594	S	38	40.1688	W	2688	2013	5	19	Stable isotopes
94	1347-1	1347	sediment 0-10 cm	1		Push core 6	99.5% Etha.	PS	NSPPOE	PT-06	20	44.2866	S	38	40.1269	W	2645	2013	5	20	macrofauna
95	1347-2	1347	sediment 0-10 cm	1		Push core 7	99.5% Etha.	PS	NSPPOE	PT-06	20	44.2866	S	38	40.1269	W	2645	2013	5	20	macrofauna
96	1347-3	1347	sediment 0-10 cm	1		Push core 4	99.5% Etha.	PS	NSPPOE	PT-06	20	44.2866	S	38	40.1269	W	2645	2013	5	20	macrofauna
97	1347-4	1347	sediment 0-10 cm	1		Push core 5	99.5% Etha.	PS	NSPPOE	PT-06	20	44.2866	S	38	40.1269	W	2645	2013	5	20	macrofauna
98	1347-5	1347	sediment >500 µm	1		Scoop	99.5% Etha.	PS	NSPPOE	PT-06	20	44.2866	S	38	40.1269	W	2645	2013	5	20	macrofauna
99	1348-1	1348	sediment 0-10 cm	1		Push core 6	99.5% Etha.	PS	SSPPOE	PT-02	22	57.8167	S	38	56.1294	W	3127	2013	5	21	macrofauna
100	1348-2	1348	sediment 0-10 cm	1		Push core 8	99.5% Etha.	PS	SSPPOE	PT-02	22	56.3967	S	38	56.4149	W	3059	2013	5	21	macrofauna
101	1348-3	1348	sediment	1		Push core 4	99.5% Etha.	PS	SSPPOE	PT-02	22	56.3967	S	38	56.4149	W	3059	2013	5	21	macrofau

			0-10 cm																		na
102	1348-4	1348	sediment 0-10 cm	1		Push core 12	99.5% Etha.	PS	SSPPOE	PT-02	22	56.3967	S	38	56.4149	W	3059	2013	5	21	macrofauna
103	1348-5	1348	sediment 0-10 cm	1		Push core 1	99.5% Etha.	PS	SSPPOE	PT-02	22	57.8167	S	38	56.1294	W	3127	2013	5	21	macrofauna
104	1348-6-1	1348	Stalked sponge	1	white	Manipulator	Formalin	PS	SSPPOE	PT-02	22	57.0989	S	38	56.2749	W	3096	2013	5	21	taxonomy
105	1348-6-2	1348	Stalked sponge	1	white	Manipulator	99.5% Etha.	PS	SSPPOE	PT-02	22	57.0989	S	38	56.2749	W	3096	2013	5	21	DNA
106	1348-6-3	1348	Stalked sponge	1	white	Manipulator	Frozen	PS	SSPPOE	PT-02	22	57.0989	S	38	56.2749	W	3096	2013	5	21	Stable isotopes
107	YK13-04 # 02-B01	1343	Sponges	1	dark brown	Slurp gun	RNA later	SS	NSPPOE	PT-06	20	40.4616	S	38	37.5723	W	2574	2013	5	15	
108	YK13-04 # 02-B02	1343	Sponges	1	dark brown	Slurp gun	2.5% glutal/sw	SS	NSPPOE	PT-06	20	40.4616	S	38	37.5723	W	2574	2013	5	15	
109	YK13-04 # 02-B03	1343	Sponges	1	dark brown	Slurp gun	Frozen	SS	NSPPOE	PT-06	20	40.4616	S	38	37.5723	W	2574	2013	5	15	
110	YK13-04 # 02-B04	1343	Sponges	1	dark brown	Slurp gun	99%ethanol	SS	NSPPOE	PT-06	20	40.4616	S	38	37.5723	W	2574	2013	5	15	
111	YK13-04 # 02-B05	1345	Sponges	1	dark brown	Slurp gun	Dry	SS	NSPPOE	PT-06	20	41.9533	S	38	38.7397	W	2663	2013	5	17	
112	YK13-04 # 02-B06	1346	Farrea sp.1	1	dead on oil	Slurp gun	4%PFA	SS	NSPPOE	PT-06	20	43.2425	S	38	39.1932	W	2692	2013	5	19	
113	YK13-04 # 02-B07	1346	Farrea sp.1	1	dead on oil	Slurp gun	2.5% glutal/sw	SS	NSPPOE	PT-06	20	43.2425	S	38	39.1932	W	2692	2013	5	19	
114	YK13-04 # 02-B08	1346	Farrea sp.1	1	dead on oil	Slurp gun	99%ethanol	SS	NSPPOE	PT-06	20	43.2425	S	38	39.1932	W	2692	2013	5	19	
115	YK13-04 # 02-B09	1346	Farrea sp.1	1	dead on oil	Slurp gun	Frozen	SS	NSPPOE	PT-06	20	43.2425	S	38	39.1932	W	2692	2013	5	19	
116	YK13-04	1348	Holothurioid	1	Gray,	Slurp gun	99%ethanol	SS	SSPPOE	PT-02	22	56.4451	S	38	56.4040	W	3056	2013	5	21	

	# 02-B10		ea sp.		covered with round foramini shells															
117	YK13-04 # 02-B11	1348	Holothurioid ea sp.	1	Gray, covered with round foramini shells	Slurp gun	Frozen	SS	SSPPOE	PT-02	22	56.4451	S	38	56.4040	W	3056	2013	5	21	
118	YK13-04 # 02-B12	1348	Holothurioid ea sp.	1	Gray, covered with round foramini shells	Slurp gun	10% formalin	SS	SSPPOE	PT-02	22	56.4451	S	38	56.4040	W	3056	2013	5	21	
119	YK13-04 # 02-B13	1348	Holothurioid ea sp.	1	covered with pteropods shells	Slurp gun	99%ethanol	SS	SSPPOE	PT-02	22	56.3913	S	38	56.4087	W	3059	2013	5	21	
120	YK13-04 # 02-B14	1348	Holothurioid ea sp.	1	covered with pteropods shells	Slurp gun	Frozen	SS	SSPPOE	PT-02	22	56.3913	S	38	56.4087	W	3059	2013	5	21	
121	YK13-04 # 02-B15	1348	Holothurioid ea sp.	1	covered with pteropods shells	Slurp gun	10% formalin	SS	SSPPOE	PT-02	22	56.3913	S	38	56.4087	W	3059	2013	5	21	
122	YK13-04 # 02-B16	1348	Munidopsis sp.	1	dead	Slurp gun	99%ethanol	SS	SSPPOE	PT-02	22	56.5256	S	38	56.1610	W	3124	2013	5	21	
123	YK13-04 # 02-B17	1348	Munidopsis sp.	1	dead	Slurp gun	Frozen	SS	SSPPOE	PT-02	22	56.5256	S	38	56.1610	W	3124	2013	5	21	
124	YK13-04 # 02-B18	1348	Munidopsis sp.	1	dead	Slurp gun	10% formalin	SS	SSPPOE	PT-02	22	56.5256	S	38	56.1610	W	3124	2013	5	21	
125	YK13-04	1341	sediment for	1L	muddy	Push	5% Rose	SS	SSPPOE	PT-04	22	57.1850	S	38	21.6405	W	3438	2013	5	13	Foram

	#02_C09_01		foraminifera		sand	corer 09	Bengal Formalin													Assemblage
126	YK13-04 #02_C06_02	1342	sediment for foraminifera	1L	muddy sand	Push corer 06	5% Rose Bengal Formalin	SS	SSPPOE	PT-01	22	56.4399	S	39	8.1391	W	2997	2013	5	14	Foram Assemblage
127	YK13-04 #02_C09_03	1343	sediment for foraminifera	1L	muddy sand	Push corer 09	5% Rose Bengal Formalin	SS	NSPPOE	PT-06	20	40.2408	S	38	380971	W	2455	2013	5	15	Foram Assemblage
128	YK13-04 #02_C07_04	1345	sediment for foraminifera	1L	muddy sand	Push corer 07	5% Rose Bengal Formalin	SS	NSPPOE	PT-06	20	43.1341	S	38	39.1038	W	2715	2013	5	17	Foram Assemblage
129	YK13-04 #02_C06_05	1346	sediment for foraminifera	1L	muddy sand	Push corer 06	5% Rose Bengal Formalin	SS	NSPPOE	PT-06	20	44.3214	S	38	40.0988	W	2664	2013	5	19	Foram Assemblage
130	YK13-04 #02_C06_06	1346	sediment for foraminifera	1L	muddy sand	Push corer 06	Frozen	SS	NSPPOE	PT-06	20	44.3214	S	38	40.0988	W	2664	2013	5	19	Foram Assemblage
131	YK13-04 #02_C06_07	1346	sediment for foraminifera	1L	muddy sand	Push corer 06	2.5% Glutal	SS	NSPPOE	PT-06	20	44.3214	S	38	40.0988	W	2664	2013	5	19	Foram Assemblage
132	YK13-04 #02_C06_08	1346	sediment for foraminifera	0.25L	muddy sand	Push corer 06	Frozen	SS	NSPPOE	PT-06	20	44.3214	S	38	40.0988	W	2664	2013	5	19	Foram Assemblage
133	YK13-04 #02_C01_09	1347	sediment for foraminifera	0.5L	muddy sand	Push corer 01	50%ethnaol	SS	NSPPOE	PT-06	22	57.1972	S	38	35.9570	W	3148	2013	5	20	Foram Assemblage
134	YK13-04 #02_C02_10	1347	sediment for foraminifera	0.5L	muddy sand	Push corer 02	5% Rose Bengal Formalin	SS	NSPPOE	PT-06	22	55.425	S	38	35.5471	W	3123	2013	5	20	Foram Assemblage
135	YK13-04 #02_C02_11	1348	sediment for foraminifera	0.5L	muddy sand	Push corer 02	5% Rose Bengal Formalin	SS	SSPPOE	PT-02	22	56.3967	S	38	56.4149	W	3059	2013	5	21	Foram Assemblage

9-2. Sediments including Micro Organisms

							Jing & Toshiro		Vivian & Cristina				Yuriko	Fernando & Marcos
Date	Dive#	Core No.	Lat (S)	Long (W)	Depth	Time of sampling	Pore Fluid	Organic geochem.	DNA	RNA	FISH	Cultivation	Fungi	Geology

2013/5/12	1340	1	22˚57.1972'	38˚35.9570'	3148	10:30	√	√						
	ST3	3	*ditto*	*ditto*	*ditto*	*ditto*			√	√	√	√		
		6	*ditto*	*ditto*	*ditto*	*ditto*								√
		2	22˚55.7425'	38˚35.5471'	3123	14:30		√						√
		4	*ditto*	*ditto*	*ditto*	*ditto*			√	√	√	√		
		5	*ditto*	*ditto*	*ditto*	*ditto*								√
		7	*ditto*	*ditto*	*ditto*	*ditto*								
2013/5/13	1341	1	22˚57.2781'	38˚18.8891'	3602	10:45		√						√
	ST4	3	*ditto*	*ditto*	*ditto*	*ditto*			√	√	√	√		
		6	*ditto*	*ditto*	*ditto*	*ditto*								√
		2	22˚57.1850'	38˚21.6405'	3438	14:48		√						√
		4	*ditto*	*ditto*	*ditto*	*ditto*								
		5	*ditto*	*ditto*	*ditto*	*ditto*								
		7	*ditto*	*ditto*	*ditto*	*ditto*								
		8	*ditto*	*ditto*	*ditto*	*ditto*								
		9	*ditto*	*ditto*	*ditto*	*ditto*								
2013/5/14	1342	1	22˚56.4399'	39˚08.1391'	2997	12:40								√
	ST1	3	*ditto*	*ditto*	*ditto*	*ditto*			√	√	√	√		
		6	*ditto*	*ditto*	*ditto*	*ditto*								√
2013/5/15	1343	1	20˚41.6262'	38˚38.1977'	2728	10:32	√	√						
	ST6	2	*ditto*	*ditto*	*ditto*	*ditto*			√	√	√	√		
		6	*ditto*	*ditto*	*ditto*	*ditto*								√
		3	20˚40.2408'	38˚38.0971'	2456	14:55								

		4	*ditto*	*ditto*	*ditto*	*ditto*			√	√	√	√		
		5	*ditto*	*ditto*	*ditto*	*ditto*								
		7	*ditto*	*ditto*	*ditto*	*ditto*								√
		8	*ditto*	*ditto*	*ditto*	*ditto*								√
		9	*ditto*	*ditto*	*ditto*	*ditto*								
2013/5/16	1344	1	20˚38.0314'	38˚47.1288'	2499	10:12								
	ST5	3	*ditto*	*ditto*	*ditto*	*ditto*			√	√	√	√		
		6	*ditto*	*ditto*	*ditto*	*ditto*								√
		2	20˚39.1031'	38˚46.8866'	2308	14:50								
		4	*ditto*	*ditto*	*ditto*	*ditto*			√	√	√	√		
		5	*ditto*	*ditto*	*ditto*	*ditto*								√
2013/5/17	1345	1	20˚43.1341'	38˚39.1038'	2715	11:00	√	√						
	ST6	3	*ditto*	*ditto*	*ditto*	*ditto*			√	√	√	√		
		6	*ditto*	*ditto*	*ditto*	*ditto*								√
		4	20˚43.1341'	38˚39.1038'	2720	14:05								
		2	?	?	2723	14:20	√	√						
		5	?	?	*ditto*	*ditto*			√	√	√	√		√
		7	20˚41.4588'	38˚39.1616'	2723	14:40								√
		8	*ditto*	*ditto*	*ditto*	*ditto*								
		9	*ditto*	*ditto*	*ditto*	*ditto*								
2013/5/19	1346	1	20˚43.9033'	38˚39.7294'	2651	14:15	√	√						
	ST6	2	*ditto*	*ditto*	*ditto*	*ditto*	√	√						
		3	*ditto*	*ditto*	*ditto*	*ditto*			√	√	√	√		

		4	*ditto*	*ditto*	*ditto*	*ditto*			√	√	√	√		
		5	20˚44.3196'	38˚40.0896'	2666	12:55								
		6	20˚44.3214'	38˚40.0988'	2664	13:20								
		7	*ditto*	*ditto*	*ditto*	*ditto*								√
		8	*ditto*	*ditto*	*ditto*	*ditto*								
		9	20˚43.2425'	38˚39.1932'	2692	15:14								
		10	*ditto*	*ditto*	*ditto*	*ditto*								
		11	*ditto*	*ditto*	*ditto*	*ditto*								
		12	*ditto*	*ditto*	*ditto*	*ditto*								
2013/5/20	1347	1	20˚44.2866'	38˚40.1269'	2645	14:30								
	ST6	2	*ditto*	*ditto*	*ditto*	*ditto*								
		3	*ditto*	*ditto*	*ditto*	*ditto*			√	√	√	√		
		4	*ditto*	*ditto*	*ditto*	*ditto*								
		5	*ditto*	*ditto*	*ditto*	*ditto*								
		6	*ditto*	*ditto*	*ditto*	*ditto*								√
		7	*ditto*	*ditto*	*ditto*	*ditto*								
2013/5/21	1348	1	22˚57.8167'	38˚56.1294'	3127	10:30								
	ST2	3	*ditto*	*ditto*	*ditto*	*ditto*			√	√	√	√		
		6	*ditto*	*ditto*	*ditto*	*ditto*								√
		2	22˚56.3967'	38˚56.4149'	3059	14:00								
		4	*ditto*	*ditto*	*ditto*	*ditto*								
		8	*ditto*	*ditto*	*ditto*	*ditto*								√
		12	*ditto*	*ditto*	*ditto*	*ditto*								

9-3. Rocks

LST=JST-12h, South São Paulo Plateau Outer Escarpment: SSPPOE, North São Paulo Plateau Outer Escarpment: NSPPOE

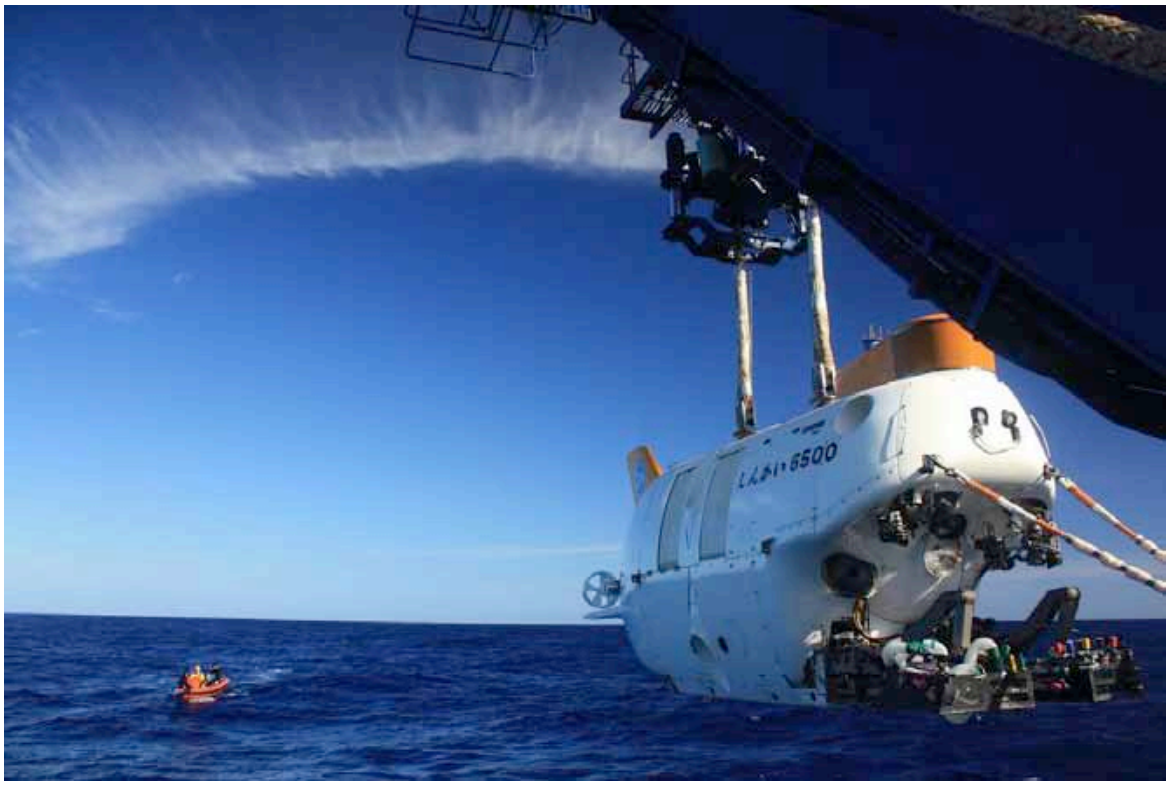
No.	On board ID	Date Collected					Latitude			Longitude			Depth [m]	Area	Locality	Size on Board [cm]	Weight on Board [kg]	Description	Rock Name	Photo	Marcos	JAMSTEC Archive
		YYYY	MM	DD	hh:mm:ss	UTC/JST	Deg.	Min.	N/S	Deg.	Min.	E/W										
1	6K#1340-R01-Box1	2013	05	12	12:25	LCT	22	57.2456	S	38	19.2511	W	3615	SOUTH ATLANTIC	SSPPOE	10x15	1.0	Fe/Mn Nodule with carbonatic nucleo	Nodule FE/Mn	6197	○	
2	6K#1340-R02-Box2	2013	05	12	10:46	LCT	22	57.1972	S	38	35.9570	W	3148	SOUTH ATLANTIC	SSPPOE	10x15		Compact mudstone, grey to beige color, have concretions and carbonatic biowaste.	mudstone	6201	○	
3	6K#1340-R03-Large Box	2013	05	12	13:56	LCT	22	55.88	S	38	35.63	W	3133	SOUTH ATLANTIC	SSPPOE	3x2x3		probably Fe/Mn nodule whit carbonatic nucleo	Nodule FE/Mn	6202	○	○
4	6K#1341-R01-Box1	2013	05	13	11:23	LCT	22	57.24	S	38	19.2511	W	3615	SOUTH ATLANTIC	SSPPOE	8x6x4		Probably Fe/Mn nodule whit carbonatic nucleo	Nodule FE/Mn	6215	○	○
5	6K#1341-R02-Box2	2013	05	13	13:42	LCT	22	57.3587	S	38	20.8760	W	3615	SOUTH ATLANTIC	SSPPOE	10x5x2		Micaceo siltite, litle compact, brown color with a litle thin black layer that prbably Fe/Mn layer.	micaceo siltite	6214	○	○
6	6K#1343-R01-Box1	2013	05	15	11:06	LCT	20	41.4455	S	38	38.1613	W	2719	SOUTH ATLANTIC	NSPPOE	5x7x3		Mudstone alternete with Sandstone, beige colour,	mudstone	6224	○	○

																	fractured and filled with oleo				
7	6K#1344-R01-Box 1	2013	05	16	13:16	LCT	20	38.9708	S	38	47.5722	W	3013	SOUTH ATLANTIC	NSP POE	10x15x3		mudstone compact beige colour, have a good forms of bioturbation cavidade, and a litlle and thin fe/mn crust	mudstone	6232	○	○
8	6K#1345-R01-Box2	2013	05	17	12:25	LCT	20	42.1958	S	38	38.8104	W	2719	SOUTH ATLANTIC	NSP POE	10x15x8		probably an carbonatic rock , colour light grey , dimension sample aproximadly 10x15x08, without bioclastic elements.	mudstone	6261	○	○
9	6K#1346-R01-Box1	2013	05	19	12:56	LCT	20	44.3196	S	38	40.0896	W	2666	SOUTH ATLANTIC	NSP POE	5x3x4		Samples of biodegraded oil founded on the see flor.	oil	6283	○	○
10	6K#1347-R01-Box2	2013	05	20	14:51	LCT	20	44.2685	S	38	40.1876	W	2643	SOUTH ATLANTIC	NSP POE	14x2,5x12		probably an carbonatic rock , colour light grey , dimension sample aproximadly 14x2.5x12, without bioclastic elements.	mudstone	6297	○	○

9-4. Waters including Micro Organisms

							Univ. Okayama (Toshi) & Univ. Toyama (Jing)											Vivian & Cristina			
Date	Dive#	Niskin ID	Lat (S)	Long (W)	Depth	Time of sampling	pH	Alkalinity	Si	P	NH4+NO3	H2S	POM	Major Inos	REEs/Trace metal	O-18/D-2	Salinity	DNA	RNA	FISH	Culture media
2013/5/12	1340	NG	22˚55.7230'	38˚35.5237'	3142	14:40	√	√	√	√	√		√	√	√	√	√				
		NR	*ditto*	*ditto*	*ditto*	*ditto*												√	√	√	
		Bag	22˚55.7425'	38˚35.5471'	3123	14:30															√
2013/5/13	1341	NG	22˚57.1922'	38˚21.6382'	3425	14:57	√	√	√	√	√		√	√	√	√	√				
		NR	*ditto*	*ditto*	*ditto*	*ditto*												√	√	√	
		Bag	22˚57.1850	38˚21.6405'	3438	14:52												√	√		
2013/5/14	1342	NR	22˚56.4537'	39˚8.1255'	2995	12:35	√	√	√	√	√		√	√	√	√	√				
2013/5/15	1343	NG	20˚40.2408'	38˚38.0971'	2000	15:15	√	√	√	√	√			√	√	√	√	√			
		NR	*ditto*	*ditto*	2456	15:00	√	√	√	√	√			√	√	√	√	√			
2013/5/16	1344	NG	20˚39.1031'	38˚46.8866'	2308	14:58	√	√	√	√	√			√	√	√	√	√			
		NR	*ditto*	*ditto*	750	15:37	√	√	√	√	√			√	√	√	√	√			
2013/5/17	1345	NG	20˚41.5358'	38˚38.4281'	1500	15:25	√	√	√	√	√			√	√	√	√				
		NR	20˚43.1341'	38˚39.1038'	2715	11:00	√	√	√	√	√			√	√	√	√	√			
		Bag	20˚41.4664'	38˚38.1700'	2696	14:51												√			
2013/5/19	1346	NG	20˚44.3214'	38˚40.0988'	2664	13:20	√	√	√	√	√		√	√	√	√	√				
		NR	20˚43.2896'	38˚39.1974'	2300	15:25	√	√	√	√	√			√	√	√	√				
2013/5/20	1347	NG	20˚44.4192'	38˚40.3124'	1750	15:18	√	√	√	√	√			√	√	√	√	√			
		NR	20˚45.4919'	38˚41.3338'	2764	10:16	√	√	√	√	√			√	√	√	√	√			
2013/5/21	1348	NR	22˚57.8149'	38˚56.1354'	3127	10:26	√	√	√	√	√			√	√	√	√	√			

10. Photo Book



YK 13-04 LEG2 PHOTO BOOK
2013 5/10-24

DEPERTURE FROM RIO DE JANEIRO
2013 5/10

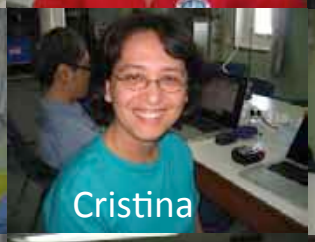

Kats

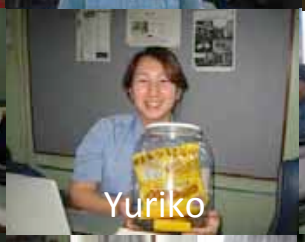

Vivian


Takao


Fernando


Toshiro


Cristina

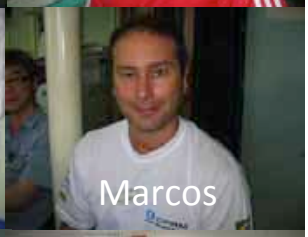

Yuriko


Angelo


Zing


Paulo


Shuichi


Marcos


Bruno


Satomi

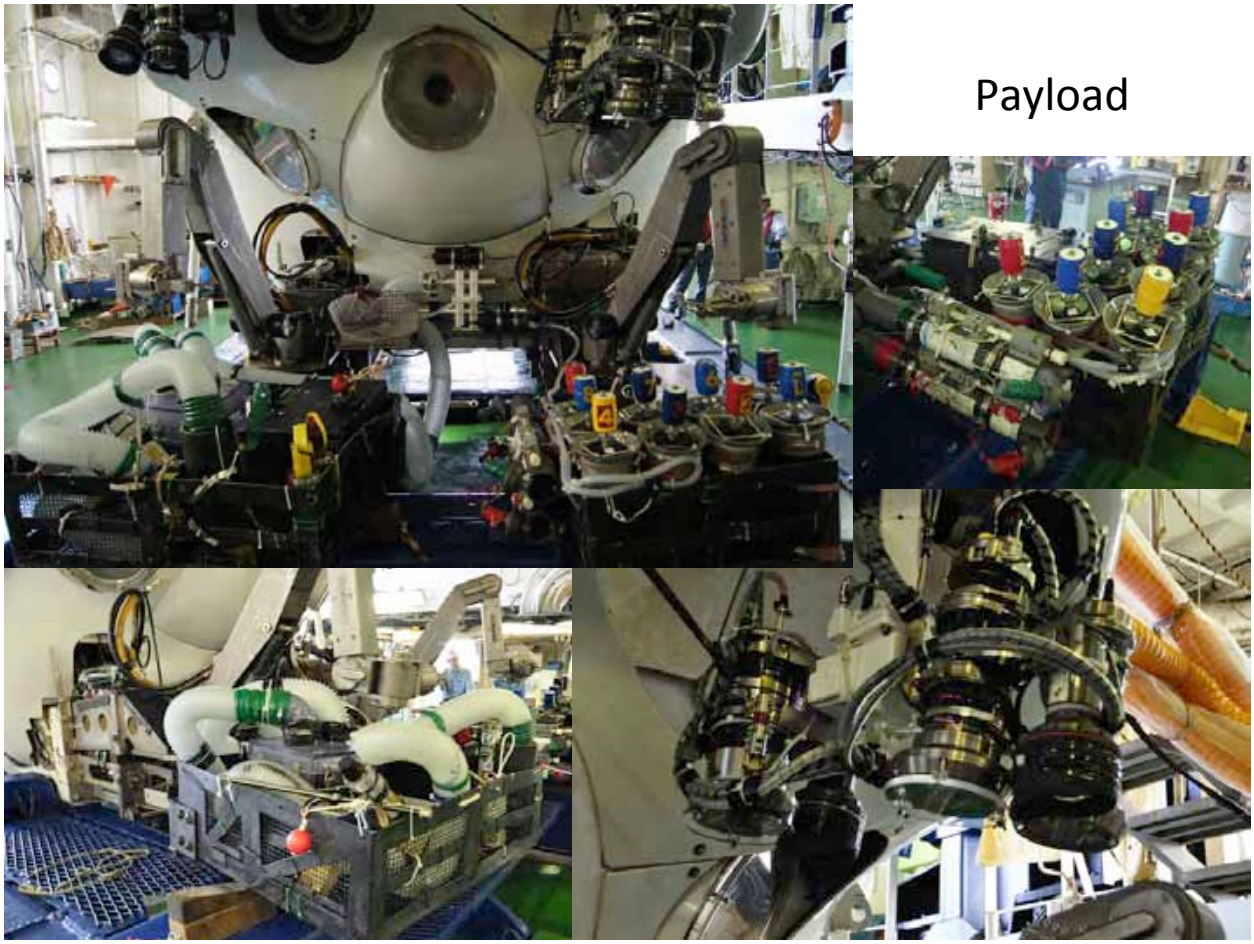

Nobu

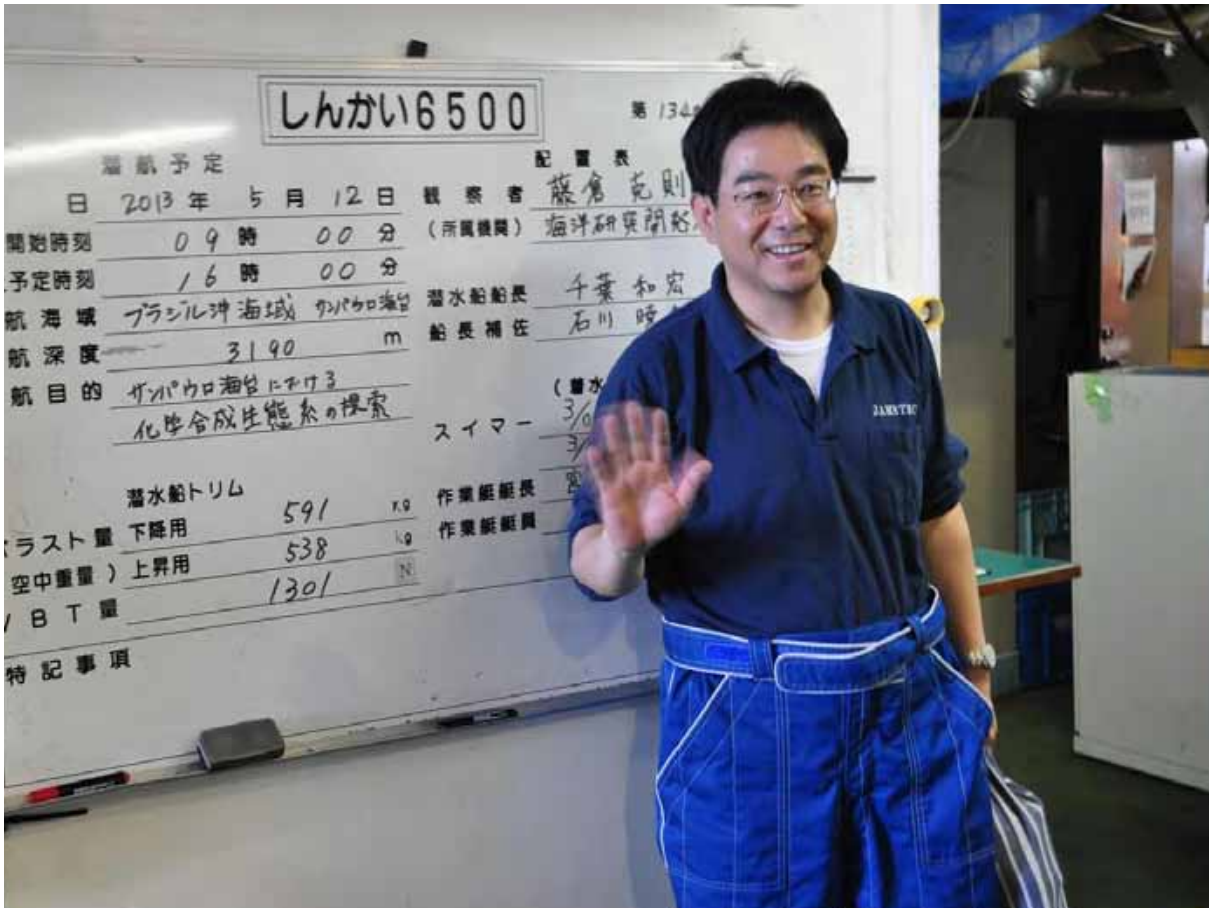

Hiro

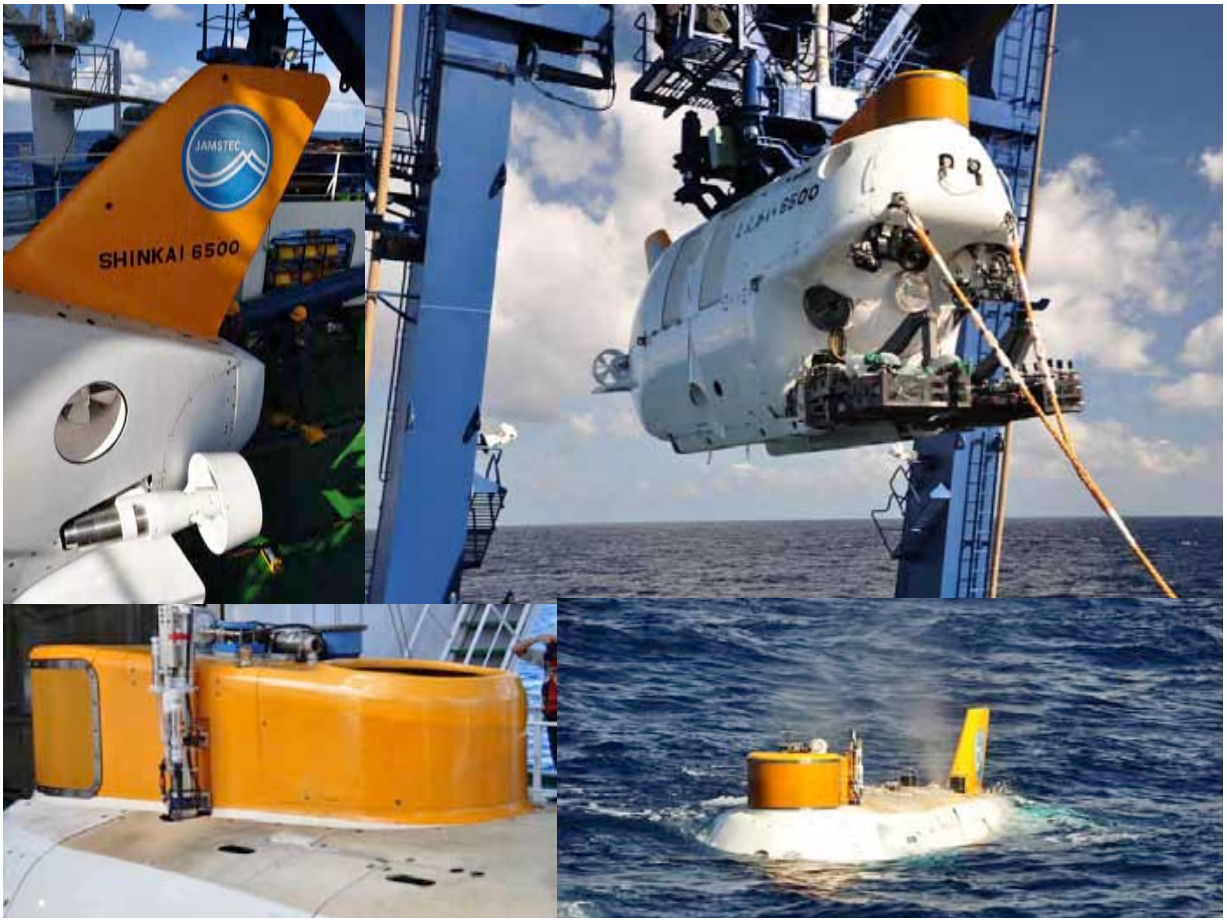

SHINKAI 6500
OPERATION TEAM
Toshiaki Sakurai
Kazuhiro Chiba
Yoshitaka Sasaki


2013
UELLE

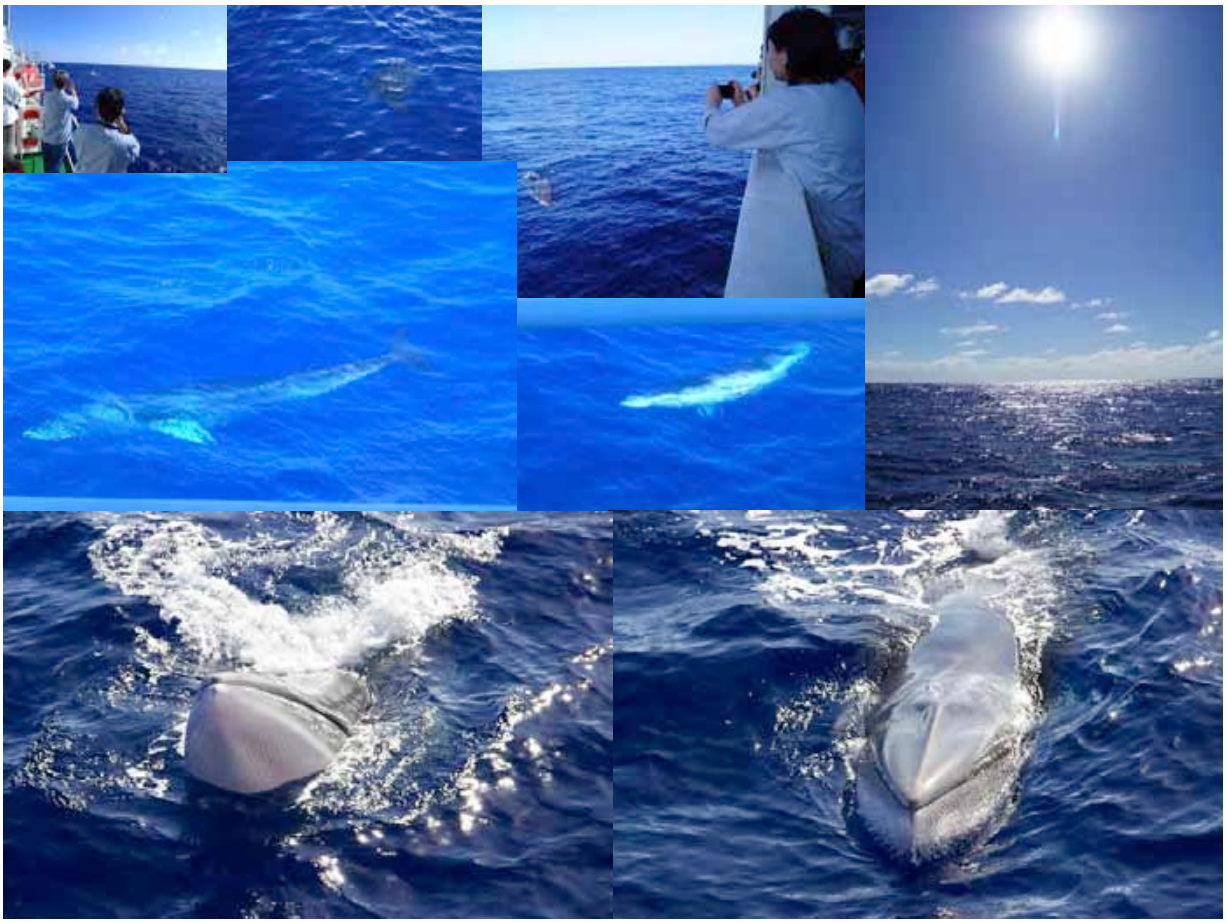
Payload




しんかい6500
潜航予定
日 2013年 5月 12日
開始時刻 09時 00分
予定時刻 16時 00分
航海域 ブラジル沖海域 サンパウロ海台
航深度 3190 m
航目的 サンパウロ海台における
化学合成生態系の探索
潜水船トリム
下降用 591 kg
上昇用 538 kg
1301 N
特記事項
観察者 藤倉克則
(所属機関) 海洋研究開発
潜水船船長 千葉和宏
船長補佐 石川
スイマー
作業艇艇長
作業艇艇員


JAMSTEC
SHINKAI 6500


500
しんかい6500





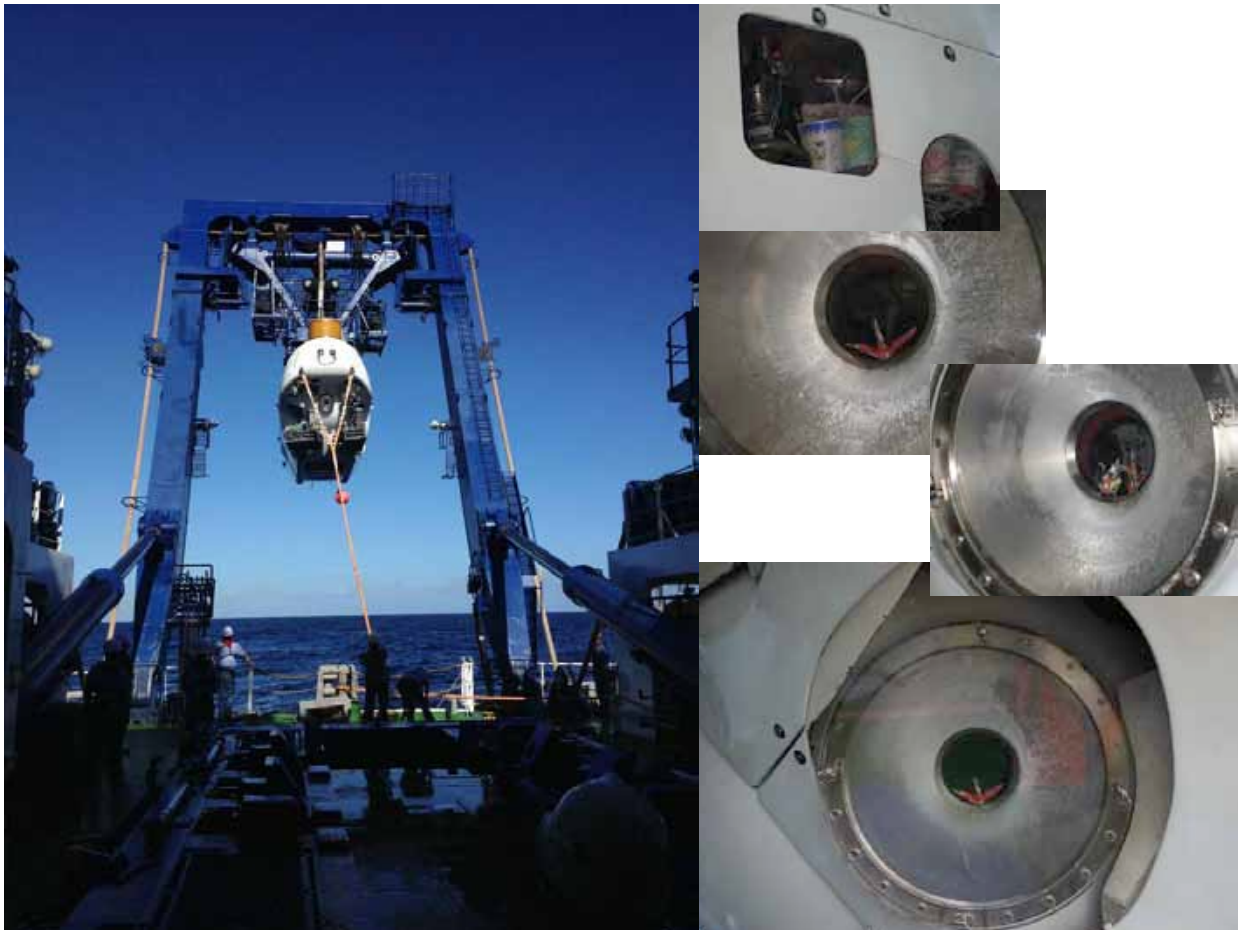




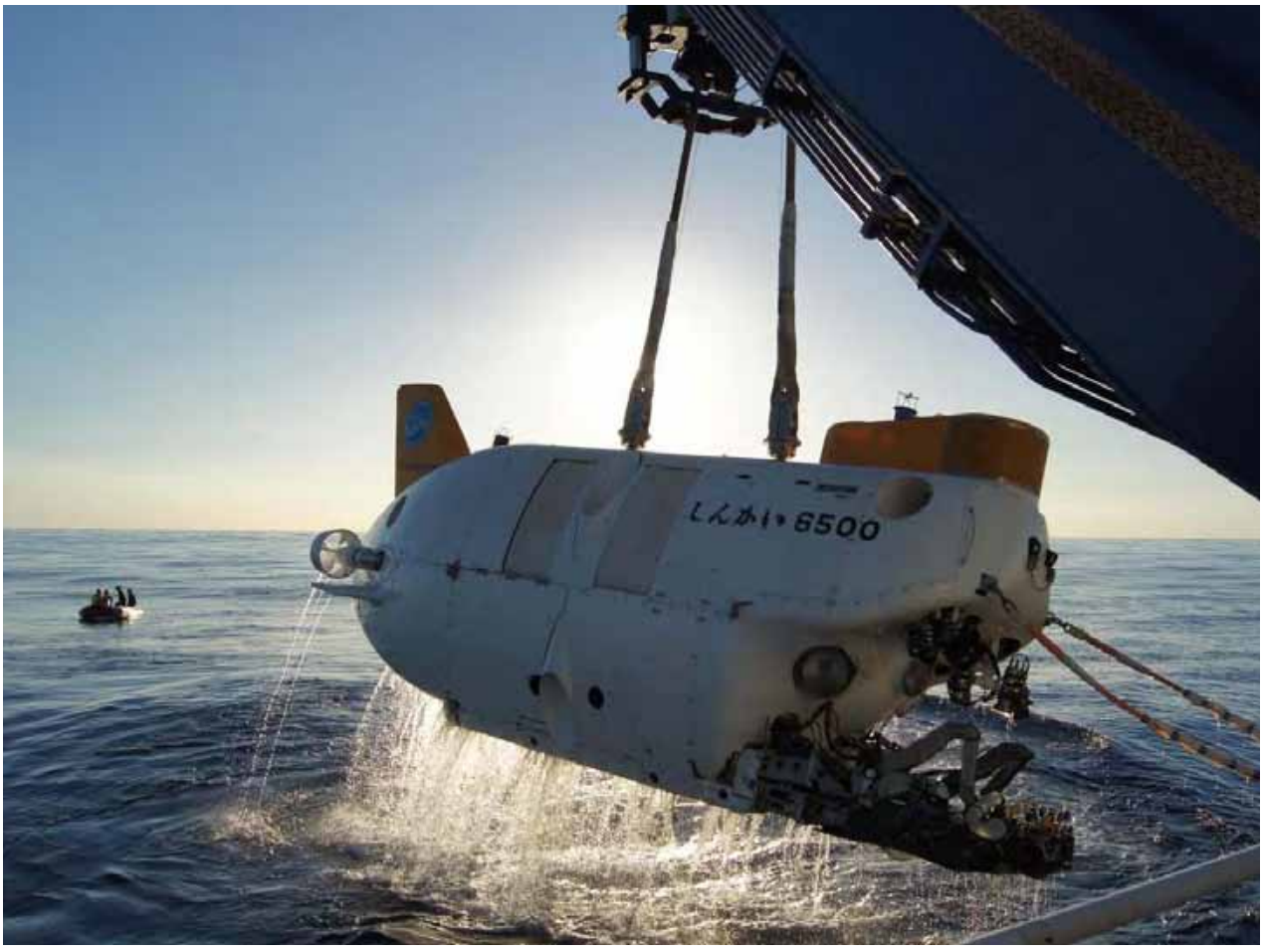




PUNTO
6K #1345




OLD NAVY

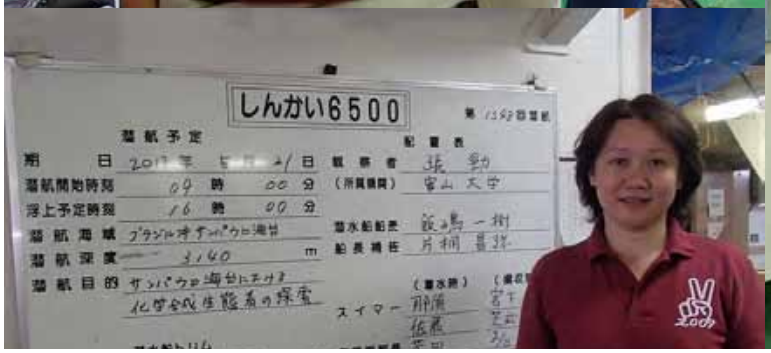

しんかい6500





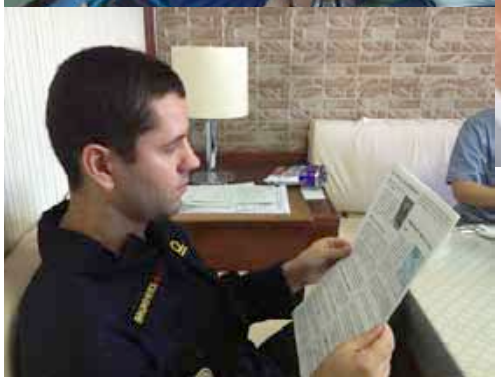





しんかい6500
潜航予定
潜航開始時刻
浮上予定時刻
潜航海域
潜航深度
3140
m
潜航目的
配置表







モナ王
バニラ




11. Notice on Using

This cruise report is a preliminary documentation as of the end of the cruise.

This report may not be corrected even if changes on contents (i.e. taxonomic classifications) may be found after its publication. This report may also be changed without notice. Data on this cruise report may be raw or unprocessed.


Quest for Limit of Life
2013
QUELLE
JAMSTEC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