The high resolution bathymetric map of the exhalative area of Panarea (Aeolian Islands, Italy)

Marco Anzidei (1), **Alessandra Esposito** (1), **Giovanni Bortoluzzi** (2) **and Francesco De Giosa** (3)
(1) *Istituto Nazionale di Geofisica e Vulcanologia, Roma, Italy*
(2) *Istituto di Geologia Marina (ISMAR), CNR, Bologna, Italy*
(3) *Coastal Consulting and Exploration srl, Bari, Italy*

Abstract
On November 3, 2002 a shallow submarine gas eruption occurred in an area of 2.3 km^2 east of Panarea (Aeolian volcanic arc, Southern Thyrrenian Sea, Italy). The exhalative area, surrounded by the islets of Dattilo, Panarelli, Lisca Bianca, Bottaro and Lisca Nera, has been known since historical times for the hydrothermal activity related to the Panarea volcanic complex. Due to the exceptional characteristics of the phenomenon, different geological, geochemical, geophysical and studies were carried out in this still poorly known volcanic area. A particular effort was devoted to producing a high resolution bathymetric map that also aimed to estimate the amount and location of the active exhalative centers and their variations in space and time. Data were obtained by three RTK multibeam surveys performed between December 2002 and December 2003. Here we show and discuss the technical details of the bathymetric surveys, the bathymetric map at 0.5 m resolution, and the accurate location of the 606 main exhalative centres active during the 2002-2003 crisis. The bathymetric data and the maps show two prevailing principal NE-SW and NW-SE alignments that match the spatial distribution of the exhalation centres. The accurate positioning at submeter accuracy of the gas vents is useful in the monitoring activity and to study their temporal and spatial variability.

Key words *Panarea – bathimetry – DEM – hydrotermal systems*

1. Introduction

Panarea Island is located in the Southern Tyrrhenian Sea and is part of the volcanic arc of the Aeolian Islands that is made up of seven islands, some minor islets and several seamounts (fig. 1a). The area is characterized by a complex geodynamics (Falsaperla *et al.*, 1999) being affected by shallow to deep seismicity due to a slab deepening under the Calabrian Arc (Chiarabba *et al.*, 2005), active crustal deformation (Anzidei *et al.*, 2000; Hollenstein *et al.*, 2003; Tallarico *et al.*, 2003; D'Agostino and Selvaggi, 2004; Serpelloni *et al.*, 2005), active volcanoes (Lipari, Vulcano and Stromboli) and hydrothermalism. The above features witness a long lasting activity, as described by Italiano and Nuccio (1991), Gamberi *et al.* (1997), Calanchi *et al.* (1999, 2002), De Astis *et al.* (2003) and Caliro *et al.* (2004).

Panarea is the smallest among the Aeolian Islands, representing the subaerial portion of a submarine stratovolcano about 2000 m high and 20 km wide (Gabbianelli *et al.*, 1993; Gamberi *et al.*, 1997). East of Panarea, the islets of Basiluzzo, Dattilo, Panarelli, Lisca Bianca, Bottaro, Lisca Nera and Le Formiche (hereafter referred as the 'Islets') form an archipelago that

Mailing address: Dr. Marco Anzidei, Istituto Nazionale di Geofisica e Vulcanologia, Via di Vigna Murata 605, 00143 Roma, Italy, e-mail: anzidei@ingv.it

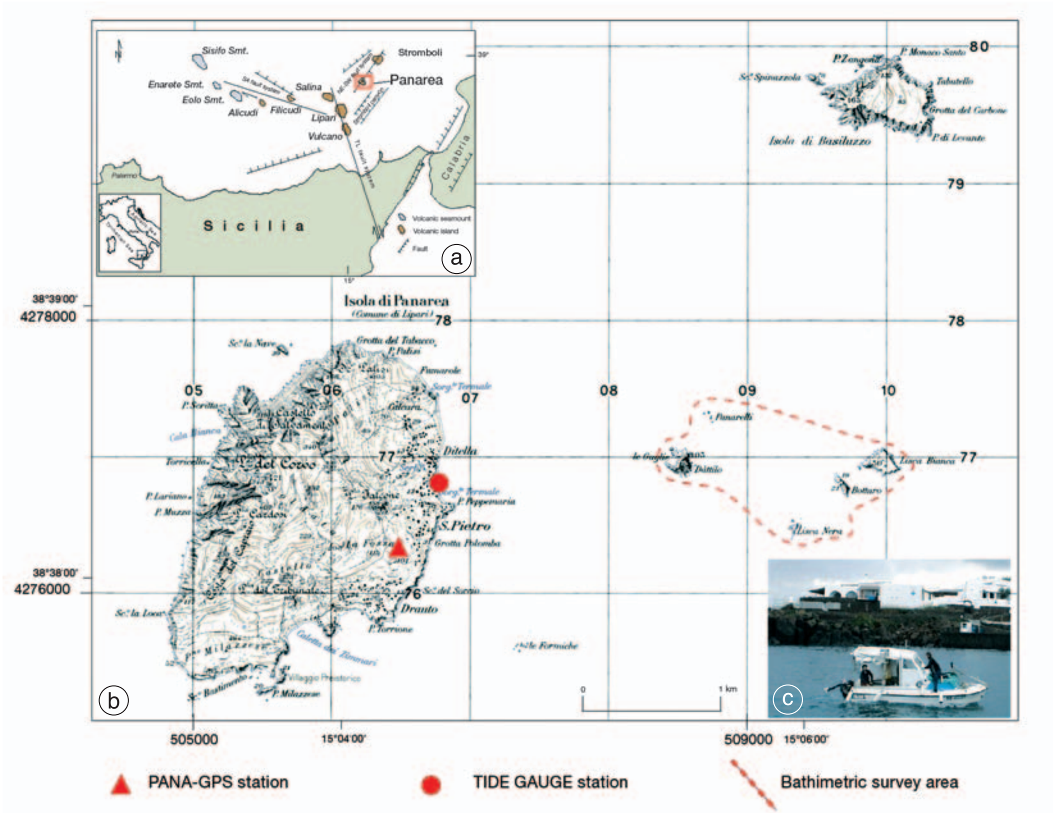

Fig. 1a-c. a) Regional setting of Panarea Island; b) Panarea Archipelago; c) the ALSEA vessel used during bathymetric surveys. In the map are also displayed the locations of the tide gauge, the TyrGeoNet GPS station and the area investigated by the bathymetric surveys.

emerges from the eastern flank of the volcano (fig. 1b). Panarea is made up of dacite to rhyolite lava domes, dated up to 149±5 kyr (Calanchi *et al.*, 1999), interbedded with pyroclastic deposits. The island is topped by the pyroclastic deposits of Punta del Torrione formation, dated between 42 kyr and 11 kyr, which also outcrop at Salina, Lipari, Filicudi, Vulcano and along the northern coast of Calabria and Sicily (Lucchi *et al.*, 2003).

Boiling of the sea-water has been described since historical times in the Aeolian Islands by Titus Livius, Strabo, Julis Obsequens, Orosius Palulus, Posidonius and Plinius the Elder (SGA, 1993). An event that produced sudden changes in the sea level, hot steam from sea surface, stinky air, death of fishes, mud emerging from seafloor occurred on 126 b.C. This event is likely referred to the formation of Vulcanello, nowadays linked to Vulcano Island. The exhalative activity at Panarea has been described by Houel (1782), Dolomieu (1783), Ferrara (1810), Spallanzani (1825), Dumas (1860), Mercalli (1883), Luigi Salvatore d'Austria (1895), Romano (1973), Italiano and Nuccio (1991), Gabbianelli *et al.* (1990), Calanchi *et al.* (1995), Anzidei (2000), Caliro *et al.*, (2004), Caracausi *et al.* (2005).

At the beginning of November 2002, during the eruptions of Etna and Stromboli volcanoes, a submarine gas eruption started in a shallow area up to 30 m water depth and 2.3 km^2 of surface, bordered by the Islets. The event occurred suddenly, without significant seismicity (Saccarotti *et al*., 2003) and reached an intensity level never observed before during the last century (SGA, 1996). The gas output was estimated to be 10^9 l/day, two orders of magnitude higher than that previously measured (Caliro *et al*., 2004). The most active exhalation center (EC-1, fig. 7b) was located close to the SW wall of the islet of Bottaro, with gas flowing vigorously up to the water surface. To provide the present day locations of the submarine gas Exhalation Centres (EC) with respect to previous studies (Gabbianelli *et al*., 1990; Anzidei, 2000) and a first high resolution morphobathymetric map of the exhalation centres, bathymetric surveys were planned and performed during the maximum activity. Surveys were carried out in the early days of December 2002, with partial repetitions in selected areas during July 2003 and December 2003.

2. Bathymetric surveys

A multibeam high resolution survey that covered an area of about 9 km^2 around the Islets was performed for the first time in December 8-12, 2002, using the Alsea boat of Coastal Consulting and Exploration Company (fig. 1c), equipped with an ultra high resolution Reson Seabat 8125 multibeam (240 beams, 120° sector coverage, 455 kHz) (table I).

Before starting the surveys, a check of the health of the GPS/RTK data link was performed

Table I. Instrumentation used during the bathymetric surveys.

Instrumentation	Type	Features
Vessel	M/B ALSEA	-
Differential GPS receiver (RTK mode)	Ashtech-Aquarius 02	10 mm+0.5 ppm, *XY* 20 mm+1.0 ppm, *Z*
Multi beam	Reson SeaBat 8125	Frequency 455 kHz Angle 120° Beams 240 Max depth 120 m Resolution 6 mm
Gyrocompass	SG Brown Meridian	0.05° static secant latitude 0.2° dynamic secant latitude
Velocity sounder	Navitronic SVP 15	Resolution 0.1 m/s Accuracy ±0.25 m/s
CTD	Microcat SBE 37-SI	Conductivity accuracy 0.0003 S/m Temperature accuracy 0.002°C
Motion sensor	TSS DMS 2-05	*Waves* Static accuracy 5 cm Dynamic accuracy 0÷20 s period *Pitch and roll* Static accuracy 0.025° Dynamic accuracy 0.03°±5°
Digital tide gauge (at Panarea)	Ott Hydrometry Orphimedes	Accuracy <1 cm
On board computers	Pentium IV-Windows 2000	Data acquisition
Software	RESON B.V. PDS 2000	Navigation and data analysis
Software	CARIS-HIPS 5.2	Data analysis
Software	ArcView GIS 8.2	Data management

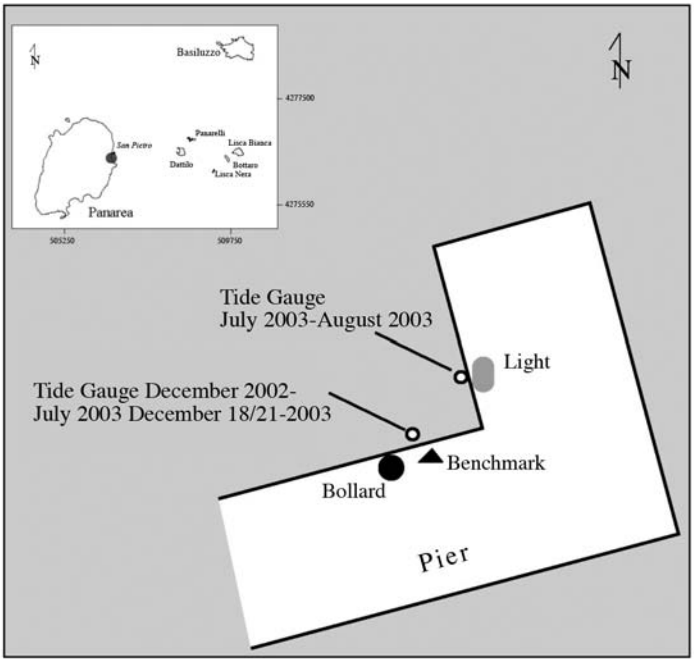

Fig. 2. Sketch (not in scale) of the Panarea Pier with the location of the tide gauge and the geodetic benchmark used to define its coordinates with respect to the TyrGeoNet GPS station of Panarea.

Table II. Coordinates of PANA TyrGeoNet station and tide gauge benchmark (WGS84, ellipsoidal heights).

Station	Geographic	UTM	Height (m)
PANA (TyrGeoNet)	Lat N 38°37′58.909 Long E 15°04′26.457	N 4276057.468 E 506442.1583	144554
Tide Gauge	Lat N 38°38′16.772 Long E 15°04′40.257	N 4276608.335 E 506775.313	43.30

throughout the planned survey, having previously found a local shadow area behind the eastern wall of Dattilo. The bathymetric datum was established by measuring the sea level through a high accuracy tide gauge, temporarily installed along the pier at S. Pietro, Panarea (fig. 1a and 2). The instrumental height of the zero level was referred to a WGS84 geodetic benchmark previously set up over the pier (fig. 2 and table II). The latter was measured by geodetic space techniques using a couple of dual frequency GPS receivers and by ground measurements using a Total Station, with reference to the GPS geodetic monument of PANA, located at Panarea (fig. 1a), which belongs to the Tyrrhenian Geodetic Network (TyrGeoNet), whose 3D coordinates are known at a few mm level (Anzidei *et al.*, 1995; Serpelloni *et al.*, 2005), (table II).

The decimetric positioning of the vessel was computed by GPS technique in RTK mode. Real time coordinates were obtained by installing an Ashtech Aquarius reference station located on the GPS station PANA and transmit-

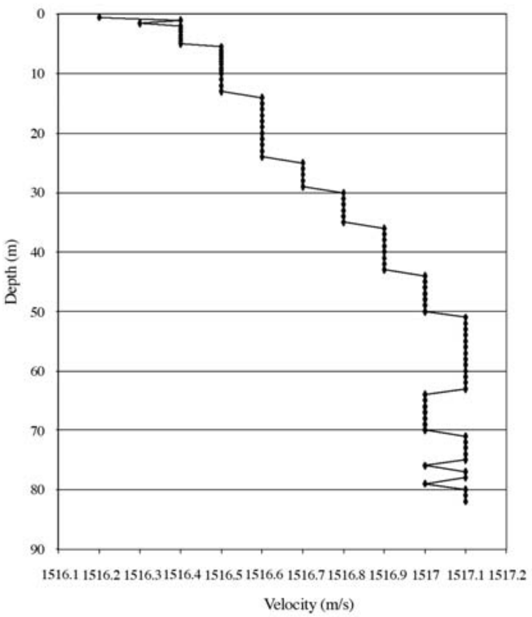

Fig. 3. Sound speed profile. Data were used to calibrate the multibeam system for sound speed velocity in the water to determine depths at 1 cm formal accuracy.

ting the differential corrections by a High Frequency link at 1 Hz rate to the mobile Aquarius receiver which was placed on board of the vessel. In addition to this, a Sg-Brown Meridian Surveyor gyrocompass, a Tss DM505 MRU and a Fugro Omnistar Differential GPS, were interfaced to the Reson PDS2000 Navigation software (www.reson.com) for data acquisition (multibeam and positioning), control, calibration and pre-processing. A SBE 37-SI Microcat CTD probe was located at the sonar head and interfaced to the sonar processor, so providing the real time speed of sound data for the beam forming, while the Navitronics SVP15 and a SeaBird CTD probes were also used for profiling the speed of sound along the water column (fig. 3). Additional details on the instrumentation are reported in table I.

Navigation routes were planned with the aim to achieve the full coverage of the sea bottom (fig. 4), with at least 20-30% overlap of the nearby swaths. The Reson PDS2000 software was able to show in real time to the operator and the pilot the ongoing multibeam and Digital Terrain Model (DTM) and the positioning information that were used for guidance.

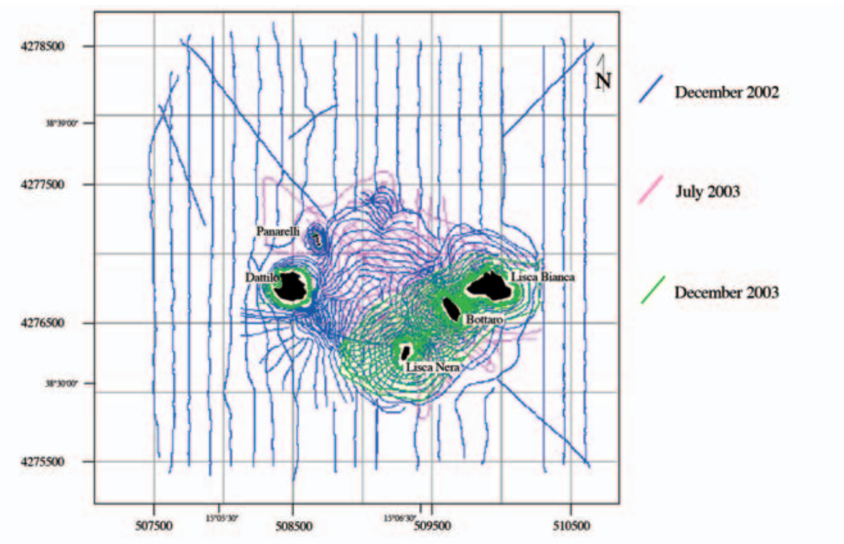

Fig. 4. Course over the ground performed by ALSEA vessel during bathymetric surveys. The 30% overlapping between nearby lines guarantee the full coverage of the area.

At the beginning of each survey, a full set of multibeam calibration lines were acquired, on flat bottoms and steep targets at 30-70 m water depth. The roll, pitch and yaw correction angles were then used to correct the installation geometries. Calibration parameters were taken into account during data analysis to correct the observations.

3. Data analysis, bathymetric map and exhalation centres

Data analysis was performed by the Computer Aided Resource Information System-Hydrographic Information Processing System (CARIS-HIPS) Pro v. 5.2 software (CARIS,

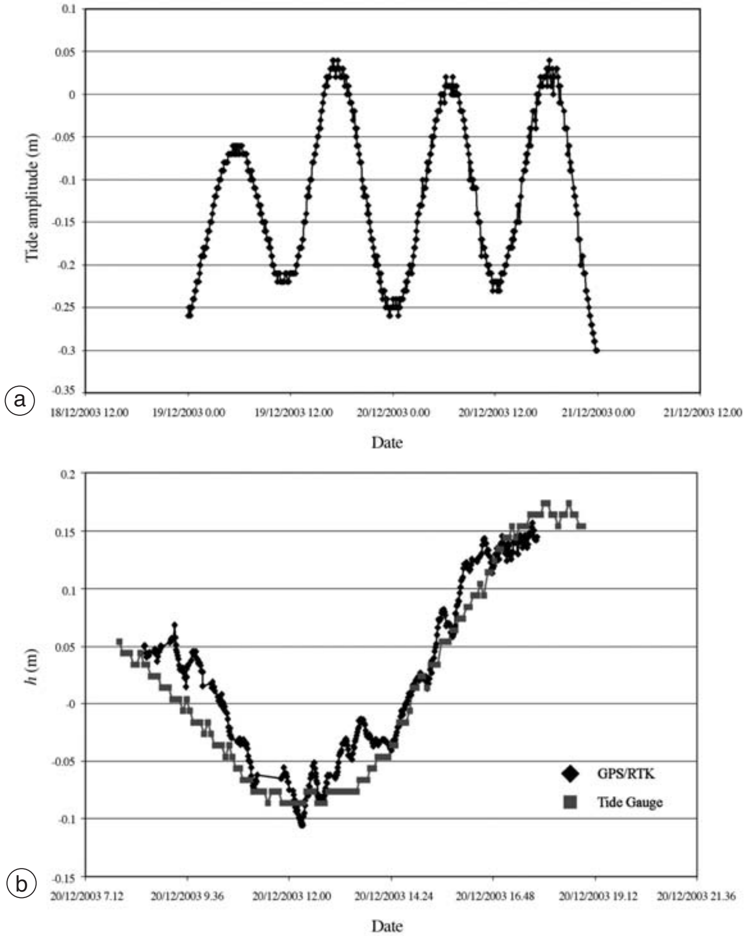

Fig. 5a,b. a) Example of tide gauge recordings collected at 5 min sampling rate at Panarea Pier in the time span December 19-21, 2003 during bathymetric surveys. Tide amplitudes are <0.4 m, typical of the Central Mediterranean Sea. b) Comparison between tide data recorded by the tide gauge located at Panarea (grey line) and those registered by the GPS/RTK system located on board of the vessel (black line) during bathymetric surveys. The GPS/RTK tide data have been collected at 1 min sampling rate but averaged at 10 min to remove the high frequency noise. The two data sets are in good agreement. Tidal values were used to correct depth measurements, that were reduced to a mean sea level.

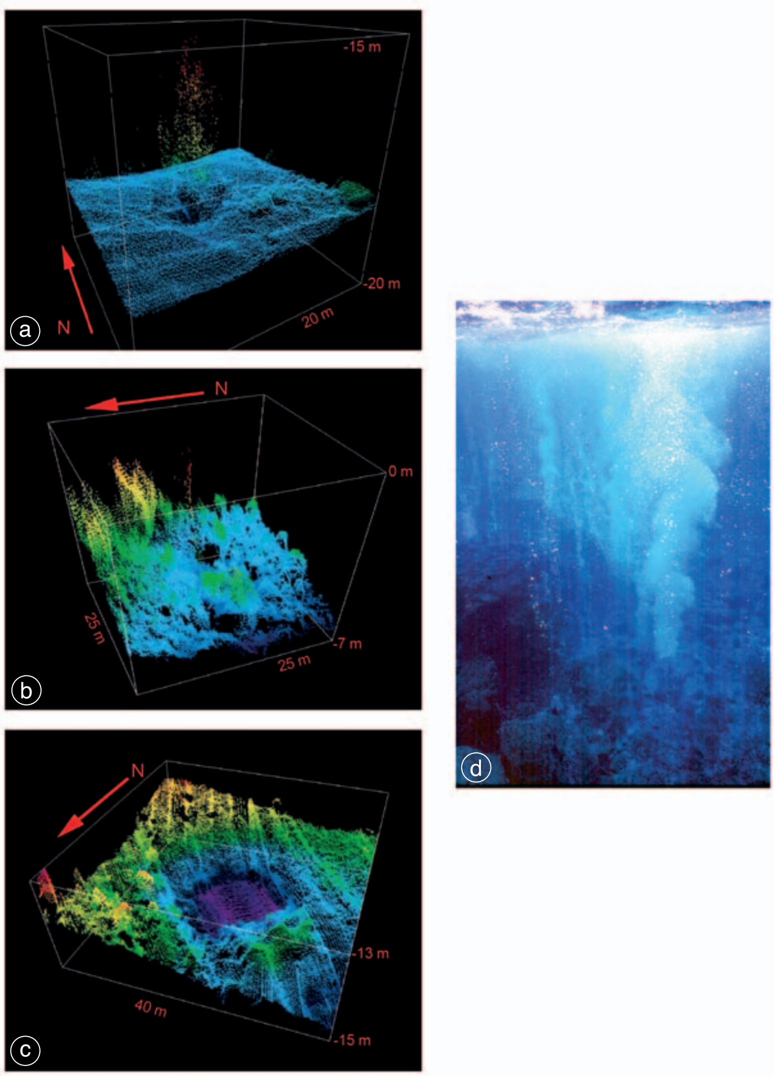

Fig. 6a-d. a-c) Multibeam images of some typical exhalation centres (vertical exaggeration 4*X*), showing uprising gas bubbles from the seafloor and the related small size craters produced by the exhalation activity; d) underwater picture of exhalation centres west of Bottaro Island. Gas bubbles are reaching the sea surface (0A class).

2000), specifically designed to process multibeam data under Windows NT® and capable to manage images in a mosaic of the seafloor and produce raster and analytical maps. The data processing sequence was as follows:

1. System calibration and multibeam data reprocessing.

2. Data quality check: only 15% of the data were discarded due to a low signal to noise ratio.

3. Sea level correction using the tide gauge and RTK data (fig. 5a,b).

4. High and medium frequency spike removal, keeping intact the signatures produced by the uprising gas bubbles from the seafloor (fig. 6a-d).

5. Production of high accuracy Marine Digital Elevation Models (MDEM) (table III).

Through the repeated computations, the signal to noise ratio was greatly improved, allowing a precise discrimination of the significant signal and the subsequent identification and location of EC (table IV).

A total of 606 EC were detected (Appendix) and classified by intensity and significance level (fig. 7b). The latter criteria were expressed by the number of soundings that identified each EC from multiple overlapping swaths (0-1-2 levels of table IV) and from their height above the seafloor (A-B-C levels of table IV).

The exhalation centres were further divided into three classes (table IV):

A) High activity centres, with bubbles columns interesting the entire water column up to the sea surface (figs. 6d and 8).

B) Medium activity centres, with bubble columns extending for 3 to 4 m from the bottom but not reaching the sea surface (fig. 8).

C) Moderate activity centres, with bubble columns extending up to 2 m from the ground floor, not reaching the sea surface (fig. 6a).

The classified EC were mapped over the MDEM, allowing a view of the active exhalation centres for the whole area during the time span 2002-2003 (fig. 7a), and at December 2002, during the maximum intensity of the crisis (fig. 7b). Bathymetric surveys were partially repeated during July and December 2003 (fig. 4), focusing on the most active area around Lisca Bianca, Bottaro and EC-1 (fig. 7b).

To produce the MDEM at 0.5 m average pixel size, of 9 million of 3D punctual data in the UTM33-WGS84 coordinate system were used.

The MDEM for each survey data set (December 2002, July and December 2003), was analysed to reduce any positioning offset or error. The difference grids display pixels whose values are the difference of depth at two survey epochs. The residuals between the three MDEMs were estimated, as reported in table III. By the average standard deviations and excluding values >1 m, supposed to be related to the active exhalation centres, the statistical difference between the surveys for all the investigated area was estimated within 14 cm.

Table III. Accuracy of the MDEMs.

Survey epoch (month/year)	Average of the residuals between grids (m)	Average standard deviation between grids (m)
12/03-12/02	+0.02	0.14
07/03-12/02	+0.10	0.13
12/03-07/03	−0.09	0.11

Table IV. Classification of the exhalation centres.

Detection level	Based on the number of lines which detected the exhalation centre	Based on the height extension of the gas column	Based on the quality of the detection
High	0 (>3 lines)	A (all water column, from seafloor to sea surface)	0A (high) 0B (medium) 0C (low)
Medium	1 (2÷3 lines)	B (4 m height from the seafloor)	1A (high) 1B (medium) 1C (low)
Low	2 (1÷2 lines)	C (2 m height from seafloor)	2A (high) 2B (medium) 2C (low)

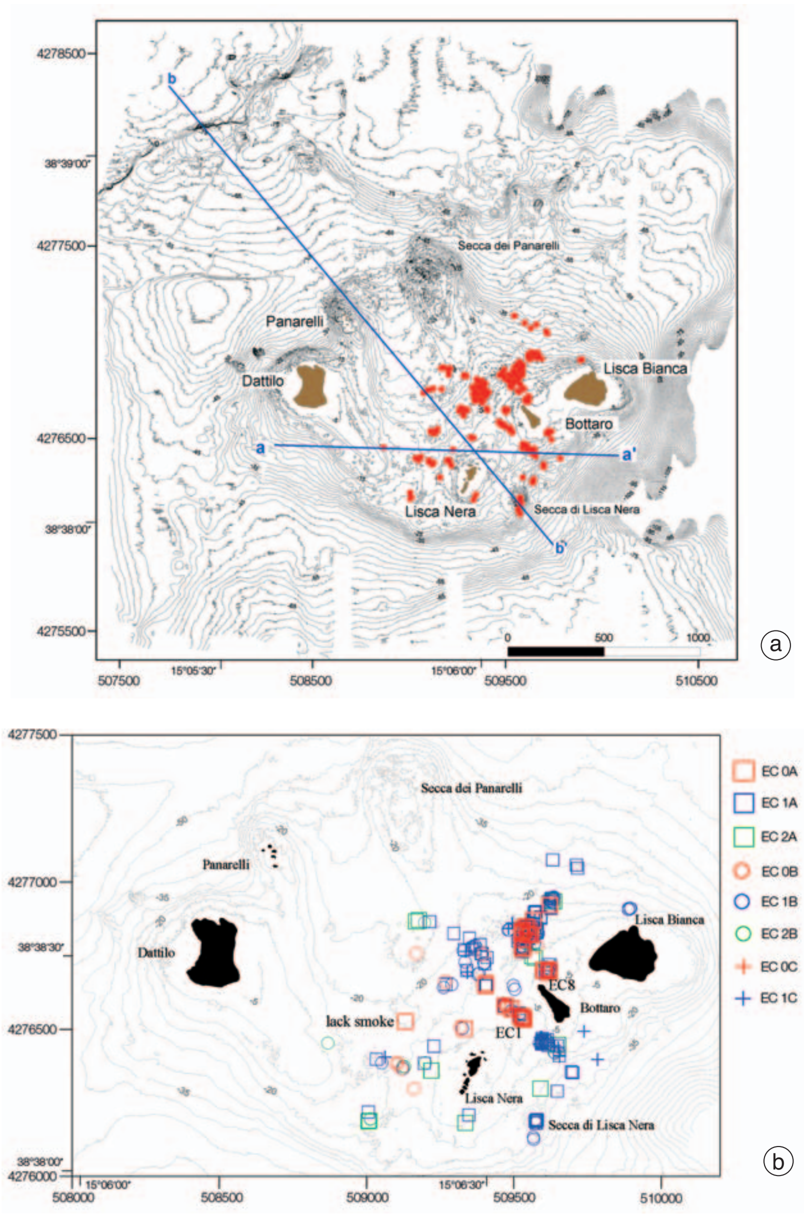

Fig. 7a,b. a) Bathymetry of Panarea Archipelago at 2.0 m countour level. The red dots are the A and B classes of exhalation centres, respectively, detected in the time span December 2002-December 2003. Blue lines are the cross sections aa′ and bb′; b) location of the main exhalation centres active during December 2002, based on their classification (Appendix). In the map are shown the EC-1 (latitude 383818.8N; longitude 150634.0E, depth 13.3 m), EC-8 (latitude 383819.9N, longitude 150637.1E, depth 8.7 m), which were the largest exhalation centres and the EC named black smoke (latitude 383815.1N, longitude 150617.4E, depth 20.8 m). The latter is a 175 m wide and 5 m deep subcircular depression, interested by moderate dark exhalation, surrounded by lava outcrops that show deposition of alunite, sulfur and sulfates.

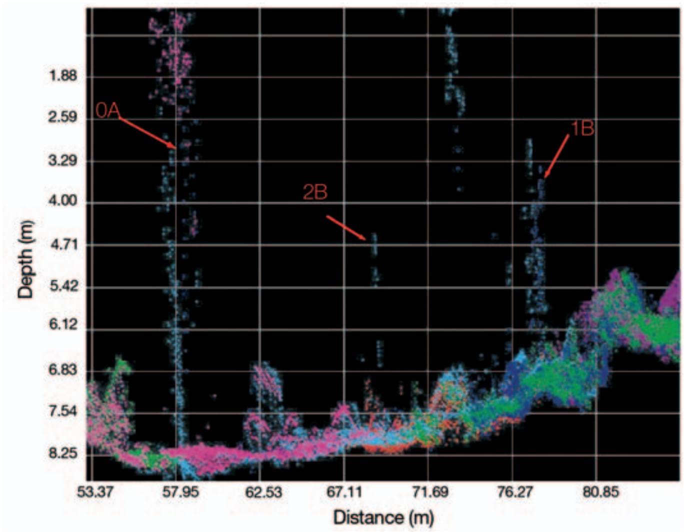

Fig. 8. Classification of the exhalation centres based on their intensity, as detected by the multibeam sensor. See also table III.

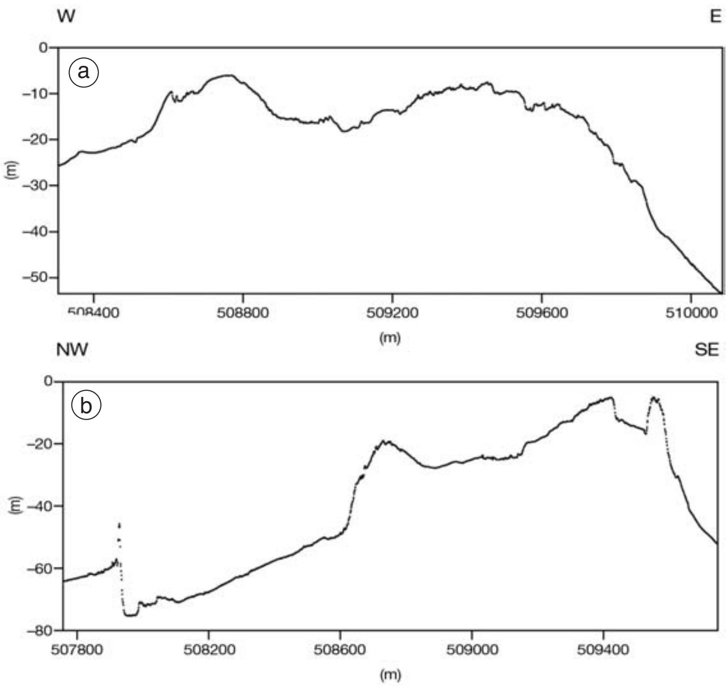

Fig. 9a,b. Cross sections of the investigated area: aa′, bb′, running a) W-E and b) NW-SE, respectively. It is remarkable the 20 m height vertical slope in cross section aa′, that could be related with a tectonic structure running SW-NE (labelled with A in fig.10a).

Once the offsets were analysed and applied, the final MDEMs were produced and made available for the morphostructural analysis, including the Exhalation Center (EC) detection, production of contour maps at 1:2500 scale (fig. 7a,b), cross sections (fig. 9a,b) and shaded relief (fig. 10a,b), which show the roughness and complexity of this sector of the Panarea volcano surface.

Applying this analysis to a limited area including the EC-1, a crater about 40 m long, 15 m wide and 9 m deep (fig. 11), which was the largest activated on December 2002, the morphological differences during time were evidenced. Figure 12 shows the results obtained by comparing the December 2002-December 2003 data: starting from a reference surface which fits the average surface of the seafloor around

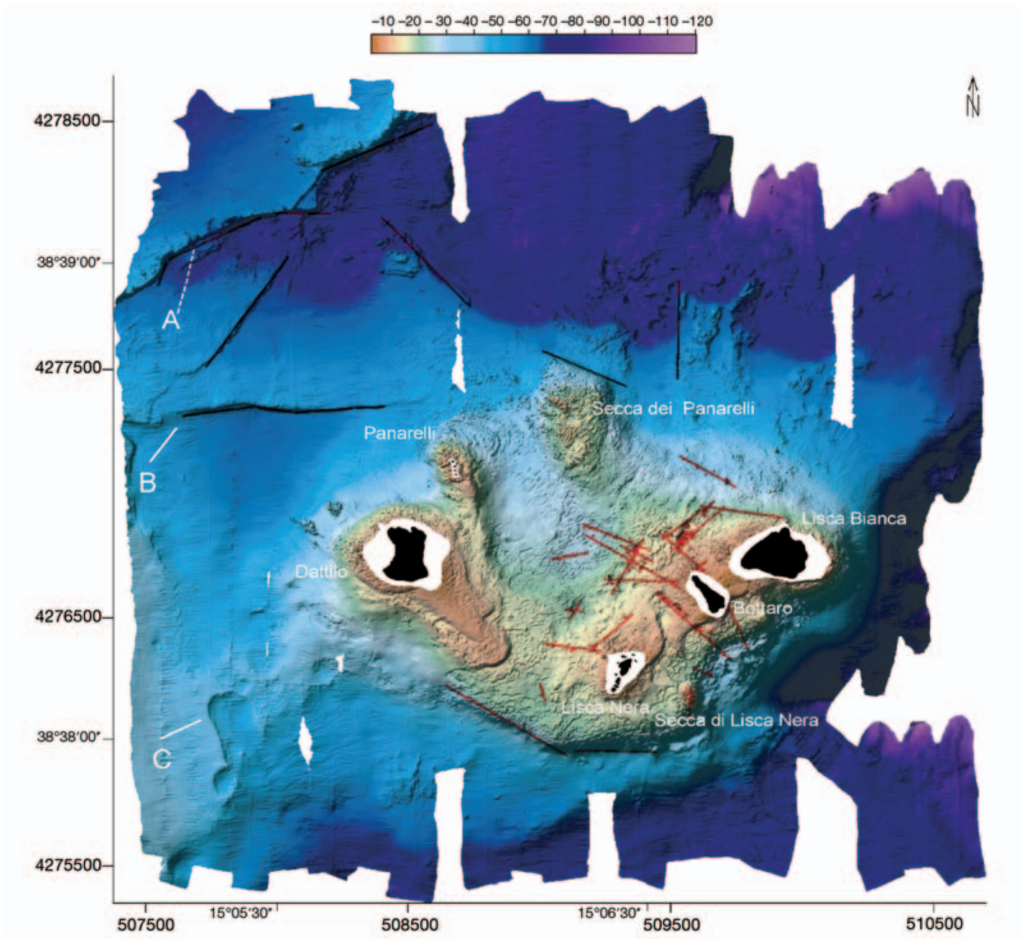

Fig. 10a. Marine Digital Elevation Model (MDEM) showing the morphobathymetry of the area. Scale colour shows depths ranging between 0 and –60 m. Exhalation centres (red dots) and main lineaments (red lines) revealed by the exhalation centres distribution are reported in the map. The exhalation area is located at the top of the stratovolcano. A and B, are two areas that displays relevant tectonic features; C, is likely to be a past exhalation centre.

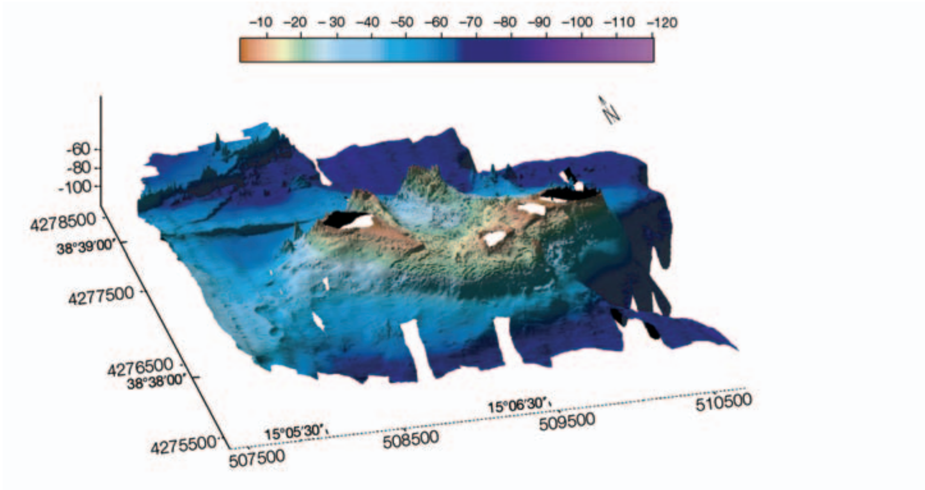

Fig. 10b. Three dimensional view of the area (vertical exaggeration = 2).

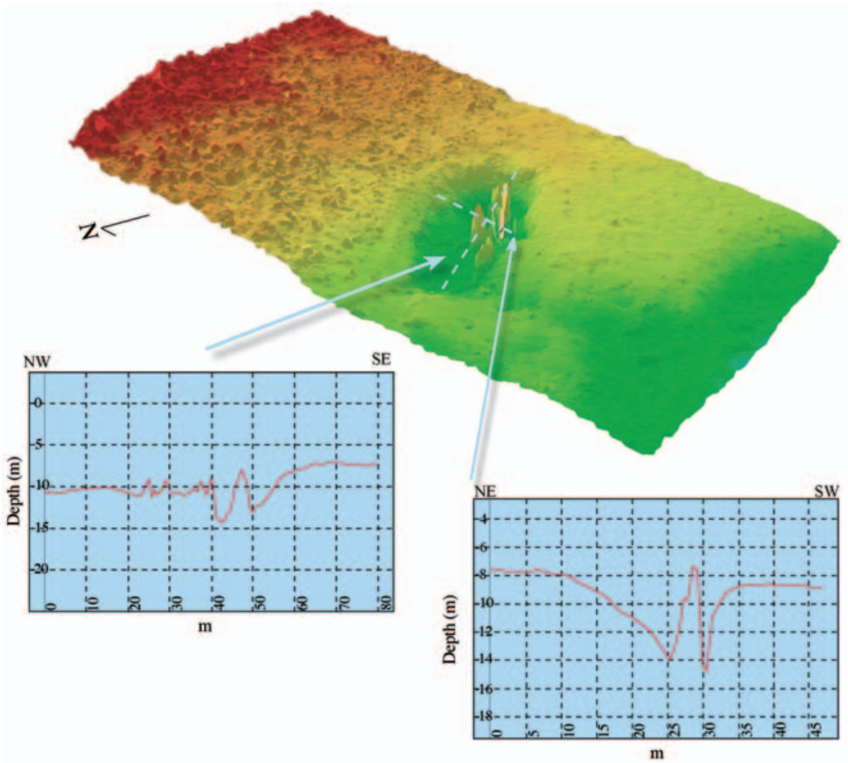

Fig. 11. Digital Terrain Model of the EC-1. The cross section profiles obtained by multibeam data displayed a crater about 40 m long, 15 m wide and 9 m deep. The spikes located in the deepest part of the crater are the uprising gas bubbles.

the EC-1, we tentatively estimated that the explosive opening of the crater produced an extraction at 3852 m^3 of rock during the maximum of the crisis. One year after its opening, the crater was partially filled with approximately 221 m^3 of debris due to rock falls of the inner flank of the crater the upwelling gas and water flows.

4. Discussion and conclusions

The high resolution multibeam technique provided the first 3D detailed bathymetric map of the seafloor at 0.5 m average pixel resolution and the location and distribution of the exhalation centres, during the crisis that has affected the Panarea area since November 2002 (fig. 10a,b). These data are useful to improve and support the geological, volcanological, geochemical, geophysical research and monitoring of this still poorly known volcanic area. Moreover, they represent the first accurate record of the last submarine exhalation crisis which occurred at Panarea.

The MDEM (fig. 10a,b) shows that the area of Panarea Archipelago represents a positive geomorphic feature which is defined by the the coalescence of individual volcanic edifices. This is an asymmetric structure sloping at high angle in its southeastern flank while the others flanks display smoother slopes. The area within the Islets is characterised by a shallow seafloor platform, bewteen 0 and –30 m, gently slooping to NW between Panarelli and Secca dei Panarelli (fig. 10a,b). Lisca Bianca, Bottaro and Lisca Nera islets are NE-trending coalescent structures. The Dattilo structure shows an elongated tongue-like marine abrasion platform, SE trending, for 0.8 km at depths between –5 and –8 m.

The area within the Islets is dotted by hundreds of circular or horseshoe-shaped depressions up to several metres deep and wide, largely distributed especially surrounding Dattilo, Lisca Nera and Bottaro. The high frequency relief of coarse textured morphology, at metre to decimetre size pinnacles and troughs, is well developed between Lisca Bianca, Bottaro and Secca dei Panarelli. In the area between Panarelli and Secca dei Panarelli the map reveals large lava flow surfaces, smooth and lobed.

The deepest sector dislays evident morphological structures such as those located in the northwest area, NE- NNE- NNW- and E-trending lineaments (fig. 10a: A,B). The southwest sector displays a sub-elliptical shape wide depression probably due gravitative movements (C in fig. 10a).

The shaded relief (fig. 10a,b) does not show a caldera-like structure as suggested in Gabianelli *et al.* (1990) and Caliro *et al.* (2004).

The high quality of the surveys disclosed 606 exhalation centres (Apppendix), which were classified on the basis of their different size and activity level, as estimated from the interferences on the multibeam sensor. The location of the gas vents, mapped on the bathymetric maps, revealed the existence of preferential EC aligments NE-SW and NW-SE trending (fig. 10a,b) and along which the gas eruption took place. These alignments match those measured from the fractures, the alunite veins and the fossil gas-pipes exposed on the lava of the seafloor and along the Islets' cliffs (Anzidei *et al.*, 2003, 2004a,b; Esposito *et al.*, 2005). Therefore we suggest that the NE-SW and NW-SE systems are the main pathways for the upwelling of hydrothermal fluids.

The comparison between the gas bubble alignments and those inferred by morphologycal analysis, suggests that presently the gas path is mainly driven by an active extension along the NE- and NW-trending fracture systems.The trends of the fracture systems are in agreement with the main regional tectonic structures (De Astis *et al.*, 2003).

The maximum number of exhalation centres was located in a limited extended zone, west of Bottaro and Lisca Bianca islets, whereas clusters of minor centres were sparse in the area. The largest and most active exhalation centre EC-1 was located a few tenths of metres south of Bottaro (figs. 7b and 11). The ellipsoidal crater rim spans between –8 m and –15 m. Its main axis, NW-oriented, is 40 m long and the minor axis is 25 m long. The hundreds of depression features identified on the seafloor (fig. 10a,b) can be related to fossil exhalation cen-

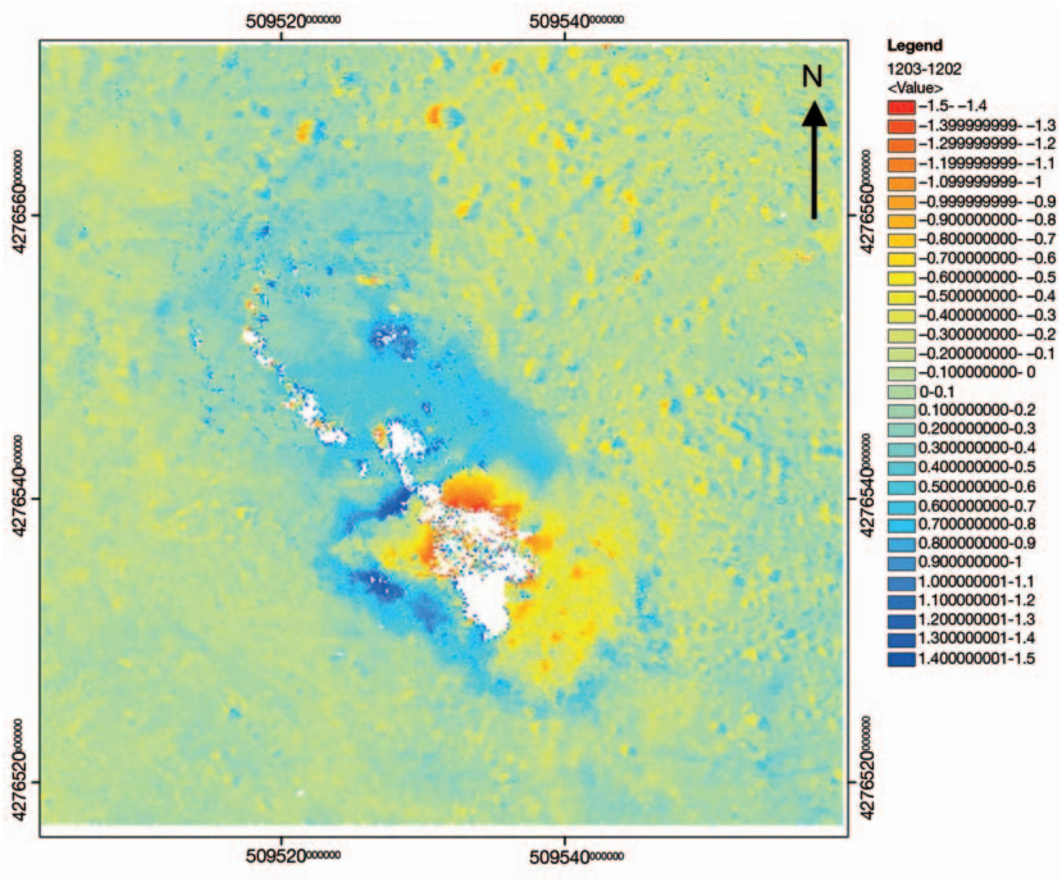

Fig. 12. Topographic changes of the groundfloor at the EC-1, after one year from its opening. The differential MDEM obtained from multibeam data in the time span December 2002-December 2003, estimated 3852 m^3 of extracted rock during the gas explosion; 221 m^3 were recovered after 12 months, due to a continuous but decreasing gas flux from the seafloor. Positive values are negative groundfloor changes (blue) due to slides inside the crater; negative values (red) are positive groundfloor changes, due to the progressive filling of the bottom of the crater.

tres suggesting that the area has been the site of past episodes of gas eruptions similar to that of November 2002 (Anzidei *et al*., 2003, 2004 a,b; Esposito *et al*., 2005).

The differential MDEM obtained from multibeam data in the time span December 2002-December 2003, estimated 3852 m^3 of extracted rock during the gas explosion; 221 m^3 were recovered after 12 months, due to a continuous but decreasing gas flux from the seafloor (fig. 12). As far as the tectonic and volcanic interpretations are not the object of this paper, which aims to shows bathymetric survey data and results applied to the submarine part of Panarea volcano, we think that a change in the regional and local strain fields in this area may have produced a reactivation of previous fractures or the opening of new ones, causing a subsequent gas exhalation during the 2002-2003 Panarea crisis, as more extensively described in Caliro *et al*. (2004), Caracausi *et al*. (2005) and Esposito *et al*. (2005).

Appendix.

Coordinates of the 606 exhalation centres (UTM 33 coordinates). Their depth reported to the mean sea level during surveys, classification and epoch of detection, are also reported.

EC 0A 12/02

No.	Long	Lat	Depth	Class	Date
1	150634.05	383823.87	13.6	0A	12/02
2	150634.41	383814.31	13.2	0A	12/02
3	150634.41	383814.35	13.1	0A	12/02
4	150631.68	383815.80	11.8	0A	12/02
5	150629.03	383818.20	12.4	0A	12/02
6	150629.03	383818.17	12.5	0A	12/02
7	150628.99	383818.04	12.3	0A	12/02
8	150634.32	383814.30	13	0A	12/02
9	150634.12	383814.56	11.3	0A	12/02
10	150634.16	383814.52	11.2	0A	12/02
11	150634.09	383814.51	11.3	0A	12/02
12	150634.20	383814.48	11.3	0A	12/02
13	150634.20	383814.43	11.3	0A	12/02
14	150633.83	383814.66	11.4	0A	12/02
15	150632.67	383815.37	11.2	0A	12/02
16	150632.69	383815.44	11.5	0A	12/02
17	150634.01	383823.68	13.7	0A	12/02
18	150634.05	383823.84	12.7	0A	12/02
19	150634.88	383823.74	16	0A	12/02
20	150634.09	383823.94	13	0A	12/02
21	150634.13	383824.00	12.6	0A	12/02
22	150635.17	383824.03	16.2	0A	12/02
23	150634.26	383824.16	11.9	0A	12/02
24	150634.88	383824.39	15.1	0A	12/02
25	150634.63	383824.49	14.7	0A	12/02
26	150635.70	383825.14	17.5	0A	12/02
27	150635.71	383825.20	17.5	0A	12/02
28	150638.02	383826.82	19.2	0A	12/02
29	150638.07	383826.85	19.2	0A	12/02
30	150634.09	383821.99	10.8	0A	12/02
31	150634.21	383822.06	10.7	0A	12/02
32	150634.25	383822.12	10.9	0A	12/02
33	150634.96	383823.58	15.7	0A	12/02
34	150635.21	383823.55	15.2	0A	12/02
35	150635.37	383823.51	15.2	0A	12/02
36	150634.09	383823.00	12.6	0A	12/02
37	150637.76	383819.49	6.7	0A	12/02
38	150637.97	383819.59	6.6	0A	12/02
39	150637.10	383819.65	8	0A	12/02
40	150637.27	383819.65	8.1	0A	12/02
41	150637.77	383819.72	8	0A	12/02
42	150626.09	383813.30	12.5	0A	12/02
43	150617.69	383814.06	22.5	0A	12/02

EC 0B 12/02

No.	Long	Lat	Depth	Class	Date
44	150631.80	383815.70	11.9	0B	12/02
45	150631.84	383815.67	11.7	0B	12/02
46	150631.80	383815.70	11.7	0B	12/02
47	150631.80	383815.76	11.8	0B	12/02
48	150631.80	383815.76	11.9	0B	12/02
49	150631.89	383815.76	12.2	0B	12/02
50	150631.89	383815.83	12.2	0B	12/02
51	150631.89	383815.83	12	0B	12/02
52	150631.72	383815.83	12.1	0B	12/02
53	150631.55	383816.02	12.2	0B	12/02
54	150631.72	383815.86	12.1	0B	12/02
55	150633.93	383814.60	11.3	0B	12/02
56	150633.77	383814.73	11.3	0B	12/02
57	150623.37	383818.43	21.5	0B	12/02
58	150628.63	383821.44	13.2	0B	12/02
59	150634.54	383823.78	17	0B	12/02
60	150635.04	383823.94	16.5	0B	12/02
61	150634.09	383822.02	10.8	0B	12/02
62	150634.54	383822.22	10.9	0B	12/02
63	150636.20	383822.28	10.3	0B	12/02
64	150634.67	383823.58	16.1	0B	12/02
65	150634.59	383823.52	15.8	0B	12/02
66	150634.17	383822.96	12.5	0B	12/02
67	150637.97	383819.55	6.3	0B	12/02
68	150638.01	383819.62	6.7	0B	12/02
69	150637.64	383819.62	7.7	0B	12/02
70	150637.56	383819.75	8.2	0B	12/02
71	150619.28	383821.52	25.4	0B	12/02
72	150625.47	383813.40	12.4	0B	12/02
73	150617.15	3838,08.87	13.4	0B	12/02
74	150616.49	383809.35	14	0B	12/02
75	150616.57	383809.55	13.9	0B	12/02
76	150618.92	383806.66	12.5	0B	12/02

EC 0C 12/02

No.	Long	Lat	Depth	Class	Date
77	150632.71	383815.54	11.6	0C	12/02
78	150634.88	383823.81	16.4	0C	12/02
79	150637.23	383819.75	8	0C	12/02

EC 1A 12/02

No.	Long	Lat	Depth	Class	Date
80	150639.03	383806.35	28.8	1A	12/02
81	150641.02	383808.49	27.5	1A	12/02
82	150639.03	383806.35	29	1A	12/02
83	150641.18	383808.39	27.6	1A	12/02
84	150641.22	383808.39	27.7	1A	12/02
85	150639.32	383810.27	15	1A	12/02
86	150636.93	383812.19	8	1A	12/02
87	150636.88	383812.03	10.2	1A	12/02
88	150636.88	383811.93	10.7	1A	12/02
89	150636.97	383811.83	11.2	1A	12/02
90	150636.97	383811.83	11.3	1A	12/02
91	150636.97	383811.74	11.6	1A	12/02
92	150637.71	383811.54	11.2	1A	12/02
93	150636.88	383811.64	11.6	1A	12/02
94	150636.80	383811.57	11.7	1A	12/02
95	150636.93	383811.57	11.6	1A	12/02
96	150637.75	383811.38	11.5	1A	12/02
97	150639.08	383811.38	10.4	1A	12/02
98	150637.63	383812.06	10.8	1A	12/02
99	150637.30	383812.06	9.7	1A	12/02
100	150636.21	383803.14	6.9	1A	12/02
101	150636.09	383803.17	6.4	1A	12/02
102	150636.17	383803.20	5.9	1A	12/02
103	150636.21	383803.14	5.4	1A	12/02
104	150636.13	383803.01	6	1A	12/02
105	150636.08	383803.01	6.4	1A	12/02
106	150636.08	383802.85	6.4	1A	12/02
107	150636.13	383802.82	5.9	1A	12/02
108	150635.92	383803.04	6.4	1A	12/02
109	150631.68	383815.67	11.7	1A	12/02
110	150631.64	383815.80	11.8	1A	12/02
111	150628.99	383818.01	12.3	1A	12/02
112	150629.12	383817.97	11.9	1A	12/02
113	150629.08	383817.97	11.8	1A	12/02
114	150634.36	383814.14	9.1	1A	12/02
115	150633.70	383814.78	11.3	1A	12/02
116	150633.70	383814.87	11.3	1A	12/02
117	150633.71	383814.94	11.3	1A	12/02
118	150623.41	383818.14	20.9	1A	12/02
119	150626.73	383823.20	18.9	1A	12/02
120	150627.47	383822.00	16.7	1A	12/02
121	150626.02	383821.93	17	1A	12/02
122	150626.35	383819.63	17.2	1A	12/02
123	150633.55	383822.87	12.2	1A	12/02
124	150633.55	383822.87	12.2	1A	12/02
125	150634.01	383823.06	12.5	1A	12/02
126	150633.76	383823.29	12.9	1A	12/02
127	150628.21	383822.48	15.8	1A	12/02
128	150628.50	383821.51	13.5	1A	12/02
129	150628.38	383821.45	13.7	1A	12/02
130	150629.20	383821.05	13.4	1A	12/02
131	150628.87	383820.37	13.9	1A	12/02
132	150624.53	383823.72	21.1	1A	12/02
133	150636.20	383823.77	13.2	1A	12/02
134	150636.16	383823.77	13.8	1A	12/02
135	150636.24	383823.87	13.6	1A	12/02
136	150635.83	383824.00	15	1A	12/02
137	150636.28	383824.03	14.2	1A	12/02
138	150635.46	383824.13	15.9	1A	12/02
139	150634.96	383824.20	15.7	1A	12/02
140	150634.38	383824.23	13	1A	12/02
141	150635.95	383824.33	14.5	1A	12/02
142	150634.88	383824.33	16.6	1A	12/02
143	150636.16	383824.33	15	1A	12/02
144	150634.59	383824.42	15	1A	12/02
145	150634.96	383824.49	16.2	1A	12/02
146	150635.46	383824.49	15.5	1A	12/02
147	150634.63	383824.52	15.2	1A	12/02
148	150634.84	383824.55	15.3	1A	12/02
149	150635.71	383825.33	17.5	1A	12/02
150	150636.78	383825.40	15.6	1A	12/02
151	150636.74	383825.53	16.5	1A	12/02
152	150635.83	383825.98	15.9	1A	12/02
153	150636.08	383826.08	16.1	1A	12/02
154	150635.95	383826.14	16	1A	12/02
155	150638.19	383826.50	17.8	1A	12/02
156	150638.11	383826.59	18	1A	12/02
157	150637.90	383826.72	18.4	1A	12/02
158	150637.82	383827.21	19.9	1A	12/02
159	150638.31	383827.60	21.4	1A	12/02
160	150638.19	383827.57	21.2	1A	12/02
161	150634.17	383821.73	10.7	1A	12/02
162	150634.21	383821.83	10.7	1A	12/02
163	150634.21	383821.89	10.8	1A	12/02
164	150634.21	383821.99	10.7	1A	12/02

165	150634.25	383822.19	11.1	1A	12/02
166	150634.34	383822.22	11.3	1A	12/02
167	150634.38	383822.35	11.4	1A	12/02
168	150634.30	383822.90	12.6	1A	12/02
169	150634.42	383822.83	12.7	1A	12/02
170	150634.50	383822.80	12.6	1A	12/02
171	150634.67	383822.80	12.5	1A	12/02
172	150635.08	383823.19	14.3	1A	12/02
173	150637.39	383819.36	7.1	1A	12/02
174	150637.56	383819.36	7	1A	12/02
175	150637.89	383819.36	4.4	1A	12/02
176	150637.68	383819.39	7.5	1A	12/02
177	150637.43	383819.81	8	1A	12/02
178	150637.81	383820.27	7.9	1A	12/02
179	150638.06	383820.27	7.1	1A	12/02
180	150638.23	383827.50	21.1	1A	12/02
181	150641.96	383830.91	31.7	1A	12/02
182	150641.92	383830.91	31.7	1A	12/02
183	150638.43	383831.80	31	1A	12/02
184	150641.75	383831.26	30	1A	12/02
185	150621.14	383825.02	26.3	1A	12/02
186	150621.70	383811.33	13.7	1A	12/02
187	150613.64	383809.91	14.8	1A	12/02
188	150612.51	383804.07	19.1	1A	12/02
189	150626.61	383803.73	8.1	1A	12/02
190	150620.38	383809.45	12.8	1A	12/02

EC 1B 12/02

No.	Long	Lat	Depth	Class	Date
191	150637.55	383812.00	11	1B	12/02
192	150637.59	383811.90	11.2	1B	12/02
193	150637.13	383811.90	11.3	1B	12/02
194	150636.84	383811.83	11.3	1B	12/02
195	150636.55	383811.64	11.8	1B	12/02
196	150636.76	383811.57	11.2	1B	12/02
197	150638.62	383810.63	12.7	1B	12/02
198	150635.71	383801.03	19.7	1B	12/02
199	150635.67	383801.26	18.4	1B	12/02
200	150636.00	383802.85	6.5	1B	12/02
201	150635.96	383803.24	6.5	1B	12/02
202	150633.70	383814.89	11.4	1B	12/02
203	150632.63	383815.24	11.1	1B	12/02
204	150632.88	383818.03	11.4	1B	12/02
205	150633.09	383817.61	8.1	1B	12/02
206	150624.24	383818.14	17.6	1B	12/02
207	150623.08	383817.82	16.3	1B	12/02
208	150627.55	383822.39	17.8	1B	12/02
209	150627.26	383822.32	17.6	1B	12/02
210	150627.01	383822.22	17.6	1B	12/02
211	150627.18	383822.13	17.6	1B	12/02
212	150625.86	383821.80	17.1	1B	12/02
213	150626.10	383820.57	16.1	1B	12/02
214	150626.31	383819.66	17.6	1B	12/02
215	150628.75	383820.44	14.1	1B	12/02
216	150628.83	383820.37	13.7	1B	12/02
217	150627.88	383819.24	14.3	1B	12/02
218	150628.08	383819.30	14.4	1B	12/02
219	150632.31	383824.10	14.3	1B	12/02
220	150632.15	383824.10	14.3	1B	12/02
221	150636.41	383823.71	12.7	1B	12/02
222	150635.54	383823.74	16.3	1B	12/02
223	150635.17	383824.94	16.1	1B	12/02
224	150635.75	383824.88	16.4	1B	12/02
225	150637.98	383827.31	20	1B	12/02
226	150638.19	383827.50	20.7	1B	12/02
227	150638.56	383827.70	21.4	1B	12/02
228	150638.44	383827.70	21.7	1B	12/02
229	150634.71	383822.57	12.2	1B	12/02
230	150635.87	383822.61	10.3	1B	12/02
231	150636.03	383823.55	14.6	1B	12/02
232	150635.50	383823.22	14.2	1B	12/02
233	150637.48	383819.98	8.5	1B	12/02
234	150638.40	383827.05	20	1B	12/02
235	150638.60	383827.73	21.9	1B	12/02
236	150649.07	383826.32	15.2	1B	12/02
237	150649.07	383826.45	15.3	1B	12/02
238	150649.40	383826.45	15.4	1B	12/02
239	150649.28	383826.49	15.2	1B	12/02
240	150625.72	383813.30	12.2	1B	12/02
241	150614.38	383809.49	14.7	1B	12/02
242	150617.36	383808.87	13.3	1B	12/02

EC 1C 12/02

No.	Long	Lat	Depth	Class	Date
243	150644.70	383809.85	26.8	1C	12/02
244	150639.36	383810.21	15.2	1C	12/02
245	150642.80	383812.96	12.8	1C	12/02
246	150639.36	383810.27	14.8	1C	12/02
247	150636.80	383812.32	7.4	1C	12/02
248	150636.68	383812.29	7.5	1C	12/02
249	150637.01	383812.22	7.7	1C	12/02
250	150636.76	383812.19	8.1	1C	12/02
251	150636.76	383812.29	7.3	1C	12/02
252	150636.76	383812.13	8	1C	12/02

253	150636.76	383812.00	9.3	1C	12/02
254	150637.21	383811.74	11.5	1C	12/02
255	150636.55	383811.54	11.8	1C	12/02
256	150639.16	383811.18	10.9	1C	12/02
257	150638.66	383811.38	10.5	1C	12/02
258	150626.23	383821.74	16.1	1C	12/02
259	150626.43	383819.47	17	1C	12/02
260	150632.73	383824.85	15	1C	12/02
261	150632.23	383824.26	14.7	1C	12/02
262	150634.05	383823.84	13	1C	12/02
263	150637.86	383827.24	20.2	1C	12/02
264	150614.83	383810.13	15.5	1C	12/02

EC 2A 12/02

No.	Long	Lat	Depth	Class	Date
265	150636.67	383806.64	19.2	2A	12/02
266	150639.16	383811.48	9.8	2A	12/02
267	150635.91	383821.02	8	2A	12/02
268	150635.53	383821.21	8	2A	12/02
269	150638.65	383827.24	21	2A	12/02
270	150638.36	383827.24	21	2A	12/02
271	150619.20	383825.05	26.2	2A	12/02
272	150619.61	383825.22	26.1	2A	12/02
273	150621.37	383808.64	12	2A	12/02
274	150621.33	383808.64	12	2A	12/02
275	150612.51	383803.03	19.8	2A	12/02
276	150612.63	383803.13	19.8	2A	12/02
277	150626.12	383802.86	10.6	2A	12/02

EC 2B 12/02

No.	Long	Lat	Depth	Class	Date
278	150638.74	383810.57	13	2B	12/02
279	150638.56	383827.47	21.8	2B	12/02
280	150620.44	383824.92	26.2	2B	12/02
281	150617.60	383809.09	13.6	2B	12/02
282	150617.36	383809.09	13.6	2B	12/02
283	150612.80	383803.32	18.7	2B	12/02
284	150612.76	383803.26	18.9	2B	12/02
285	150620.50	383809.51	12.5	2B	12/02
286	150606.81	383811.70	18.2	2B	12/02

EC 0A 07/03

No.	Long	Lat	Depth	Class	Date
287	150632.63	383815.41	11.2	0A	07/03
288	150634.39	383814.30	13.1	0A	07/03

EC 0B 07/03

No.	Long	Lat	Depth	Class	Date
289	150641.06	383808.59	27.4	0B	07/03
290	150641.06	383808.46	27.4	0B	07/03
291	150641.10	383808.39	27.5	0B	07/03
292	150631.68	383815.83	11.7	0B	07/03
293	150631.80	383815.80	11.8	0B	07/03
294	150631.93	383815.83	11.9	0B	07/03
295	150631.68	383815.76	11.8	0B	07/03
296	150631.72	383815.70	11.7	0B	07/03
297	150631.84	383815.70	11.6	0B	07/03
298	150631.84	383815.67	11.5	0B	07/03
299	150632.71	383815.54	11	0B	07/03
300	150632.71	383815.50	11	0B	07/03
301	150632.55	383815.47	11.5	0B	07/03
302	150632.67	383815.44	11	0B	07/03
303	150632.67	383815.34	11.1	0B	07/03

EC 0C 07/03

No.	Long	Lat	Depth	Class	Date
304	150641.18	383808.39	27.4	0C	07/03

EC 1A 07/03

No.	Long	Lat	Depth	Class	Date
305	150639.03	383806.15	30.9	1A	07/03
306	150638.78	383805.96	28.1	1A	07/03
307	150638.90	383805.99	29.5	1A	07/03
308	150638.82	383805.90	29.2	1A	07/03
309	150638.82	383805.83	29.1	1A	07/03
310	150636.08	383802.88	5.9	1A	07/03
311	150641.10	383808.78	27.2	1A	07/03
312	150636.97	383811.80	11.5	1A	07/03
313	150636.84	383811.80	11.5	1A	07/03
314	150636.76	383811.77	11.5	1A	07/03
315	150636.84	383811.80	11.4	1A	07/03
316	150636.84	383811.87	11.4	1A	07/03
317	150637.01	383811.77	11.6	1A	07/03
318	150636.80	383811.77	11.6	1A	07/03
319	150641.77	383814.07	8.6	1A	07/03
320	150641.81	383814.10	9	1A	07/03
321	150631.68	383815.67	11.6	1A	07/03
322	150632.67	383815.31	11	1A	07/03
323	150627.92	383822.94	16.6	1A	07/03
324	150626.77	383823.17	18.5	1A	07/03
325	150626.10	383820.51	16.3	1A	07/03
326	150626.10	383820.60	16.1	1A	07/03
327	150626.10	383820.64	16.4	1A	07/03
328	150623.78	383817.72	17.1	1A	07/03
329	150623.57	383817.78	16.3	1A	07/03
330	150624.77	383818.01	17.3	1A	07/03

331	150624.82	383818.01	18	1A	07/03
332	150624.28	383818.14	17.4	1A	07/03
333	150623.45	383818.40	21.1	1A	07/03
334	150624.58	383823.72	21.3	1A	07/03
335	150624.04	383823.72	21.8	1A	07/03
336	150624.37	383823.88	22.5	1A	07/03
337	150634.63	383823.58	16.2	1A	07/03
338	150634.63	383823.55	16	1A	07/03
339	150634.21	383823.45	14.6	1A	07/03
340	150633.80	383823.32	13.2	1A	07/03
341	150633.80	383823.32	13	1A	07/03
342	150634.25	383823.16	13.7	1A	07/03
343	150634.21	383823.00	13.1	1A	07/03
344	150634.38	383822.93	12.6	1A	07/03
345	150634.38	383822.93	12.7	1A	07/03
346	150634.83	383822.87	12.5	1A	07/03
347	150634.87	383822.83	12.4	1A	07/03
348	150634.58	383822.80	12.4	1A	07/03
349	150634.67	383822.80	12.5	1A	07/03
350	150634.58	383822.80	12.4	1A	07/03
351	150634.25	383822.12	11.1	1A	07/03
352	150634.54	383823.68	16	1A	07/03
353	150634.88	383823.71	16.1	1A	07/03
354	150634.92	383823.77	16.2	1A	07/03
355	150634.09	383823.87	13.7	1A	07/03
356	150634.09	383823.87	13.6	1A	07/03
357	150634.88	383823.90	16.7	1A	07/03
358	150634.88	383823.94	16.8	1A	07/03
359	150634.79	383823.97	17.2	1A	07/03
360	150634.13	383823.97	12.9	1A	07/03
361	150634.63	383824.42	15.4	1A	07/03
362	150634.59	383824.42	15.4	1A	07/03
363	150636.45	383823.74	12.9	1A	07/03
364	150636.32	383823.87	13.6	1A	07/03
365	150636.32	383823.90	13.6	1A	07/03
366	150636.32	383823.90	14.4	1A	07/03
367	150636.20	383824.00	12.5	1A	07/03
368	150636.32	383824.07	14.3	1A	07/03
369	150636.32	383824.13	14.8	1A	07/03
370	150636.65	383824.16	12.7	1A	07/03
371	150636.32	383824.13	14.6	1A	07/03
372	150636.28	383824.20	15	1A	07/03
373	150636.57	383824.32	13.3	1A	07/03
374	150636.20	383824.33	14.9	1A	07/03
375	150636.57	383824.42	13.6	1A	07/03
376	150636.20	383824.33	15.1	1A	07/03
377	150636.57	383824.49	13.7	1A	07/03
378	150636.66	383824.65	13.8	1A	07/03
379	150635.58	383825.20	17.4	1A	07/03
380	150635.33	383825.49	16.6	1A	07/03
381	150638.23	383826.56	17.8	1A	07/03
382	150638.07	383826.85	19.2	1A	07/03
383	150635.41	383823.58	15	1A	07/03
384	150635.25	383823.55	15.1	1A	07/03
385	150634.96	383823.58	15.5	1A	07/03
386	150635.21	383823.48	15.1	1A	07/03
387	150638.11	383826.89	19.1	1A	07/03
388	150637.90	383827.24	20	1A	07/03
398	150617.37	383821.58	25.2	1A	07/03
399	150616.34	383821.39	25	1A	07/03
400	150615.43	383820.87	24	1A	07/03
401	150636.58	383824.50	13.7	1A	07/03
402	150634.93	383833.83	33.5	1A	07/03
403	150634.85	383833.90	33.6	1A	07/03
404	150620.75	383809.51	12.5	1A	07/03
405	150620.71	383809.51	12.5	1A	07/03

EC 1B 07/03

No.	Long	Lat	Depth	Class	Date
406	150638.99	383806.25	29.6	1B	07/03
407	150638.98	383806.09	30.4	1B	07/03
408	150638.78	383806.06	26.8	1B	07/03
409	150638.86	383806.02	29.2	1B	07/03
410	150638.82	383805.93	28	1B	07/03
411	150638.82	383805.93	29.2	1B	07/03
412	150638.90	383805.80	29	1B	07/03
413	150636.13	383802.85	6.2	1B	07/03
414	150636.00	383802.82	6.6	1B	07/03
415	150636.04	383802.36	6.2	1B	07/03
416	150635.92	383802.43	6.3	1B	07/03
417	150641.14	383808.59	27.2	1B	07/03
418	150636.84	383811.87	11.3	1B	07/03
419	150642.10	383814.46	10.5	1B	07/03
420	150642.31	383814.07	11.3	1B	07/03
421	150641.81	383814.13	8.9	1B	07/03
422	150631.72	383815.83	11.6	1B	07/03
423	150631.93	383815.83	11.9	1B	07/03
424	150632.17	383815.50	11.6	1B	07/03
425	150632.67	383815.28	11	1B	07/03
426	150627.34	383822.26	17.6	1B	07/03
427	150627.59	383822.39	17.5	1B	07/03
428	150627.43	383822.52	15.7	1B	07/03
429	150626.10	383820.44	16.6	1B	07/03
430	150626.56	383821.32	16.6	1B	07/03

431	150626.27	383821.77	16.4	1B	07/03
432	150623.08	383817.85	16.3	1B	07/03
433	150623.37	383818.17	17.1	1B	07/03
434	150623.45	383818.17	17.5	1B	07/03
435	150623.41	383818.40	21	1B	07/03
436	150624.58	383823.72	21.2	1B	07/03
437	150634.63	383823.45	15.5	1B	07/03
438	150634.09	383823.42	14	1B	07/03
439	150634.25	383823.35	14	1B	07/03
440	150634.25	383823.29	13.6	1B	07/03
441	150634.38	383823.06	13.6	1B	07/03
442	150634.92	383823.81	16.2	1B	07/03
443	150634.88	383823.87	16.2	1B	07/03
444	150634.59	383823.81	17.2	1B	07/03
445	150634.92	383823.87	16.2	1B	07/03
446	150634.88	383823.90	16.5	1B	07/03
447	150636.32	383823.77	13.1	1B	07/03
448	150636.61	383823.94	12.2	1B	07/03
449	150636.57	383824.23	12.2	1B	07/03
450	150635.99	383824.33	14.5	1B	07/03
451	150635.50	383823.29	14.2	1B	07/03
452	150638.44	383827.08	20.3	1B	07/03
453	150637.08	383832.66	31.6	1B	07/03
454	150637.08	383832.63	31.7	1B	07/03
455	150617.78	383814.06	22.6	1B	07/03
456	150618.19	383814.32	23	1B	07/03
457	150617.03	383814.22	20.1	1B	07/03
458	150636.61	383823.90	18.8	1B	07/03
459	150620.91	383809.45	12.4	1B	07/03
460	150620.83	383809.61	12.4	1B	07/03
461	150614.83	383810.13	15.2	1B	07/03

C 1C 07/03

No.	Long	Lat	Depth	Class	Date
462	150638.74	383806.06	26.9	1C	07/03
463	150638.94	383805.77	29	1C	07/03
464	150636.00	383802.82	6.6	1C	07/03
465	150636.00	383802.78	6	1C	07/03
466	150641.18	383808.36	27.4	1C	07/03
467	150641.18	383808.85	27.4	1C	07/03
468	150642.18	383814.23	11	1C	07/03
469	150642.31	383814.36	11.2	1C	07/03
470	150642.89	383814.36	11.2	1C	07/03
471	150631.72	383815.76	11.7	1C	07/03
472	150632.09	383815.57	11.9	1C	07/03
473	150632.26	383815.41	11.2	1C	07/03
474	150627.34	383822.29	17.5	1C	07/03
475	150627.14	383822.39	18.2	1C	07/03
476	150628.71	383822.42	14.5	1C	07/03
477	150627.59	383822.42	17.4	1C	07/03
478	150628.71	383822.42	14.4	1C	07/03
479	150627.97	383822.52	16.5	1C	07/03
480	150627.47	383822.65	16.7	1C	07/03
481	150626.06	383820.86	17.2	1C	07/03
482	150626.02	383821.97	17.2	1C	07/03
483	150623.08	383817.98	16.5	1C	07/03
484	150624.11	383818.14	17.6	1C	07/03
485	150624.08	383823.72	22.2	1C	07/03
486	150624.12	383823.88	21.8	1C	07/03
487	150634.88	383823.58	15.7	1C	07/03
488	150634.09	383823.35	13.8	1C	07/03
489	150632.77	383823.26	12.6	1C	07/03
490	150634.83	383823.13	13.8	1C	07/03
491	150634.75	383823.09	13.5	1C	07/03
492	150634.75	383823.06	13	1C	07/03
493	150634.21	383823.00	13	1C	07/03
494	150634.21	383821.83	10.9	1C	07/03
495	150634.63	383823.74	16.7	1C	07/03
496	150632.52	383823.84	13.9	1C	07/03
497	150632.68	383824.00	14.3	1C	07/03
498	150635.58	383823.68	14.9	1C	07/03
499	150636.20	383823.94	14.2	1C	07/03
500	150635.83	383824.00	15.3	1C	07/03
501	150635.83	383824.00	15.3	1C	07/03
502	150635.79	383824.07	15	1C	07/03
503	150635.70	383824.13	15.1	1C	07/03
504	150636.03	383824.26	13.8	1C	07/03
505	150635.95	383824.46	14.7	1C	07/03
506	150635.71	383825.33	17.9	1C	07/03
507	150635.42	383825.36	16.9	1C	07/03
508	150635.62	383825.49	17.9	1C	07/03
509	150634.96	383823.45	15.2	1C	07/03
510	150638.44	383827.11	20.2	1C	07/03
511	150638.56	383827.28	21	1C	07/03
512	150638.36	383827.24	20.5	1C	07/03
513	150638.11	383827.02	19.2	1C	07/03
514	150639.69	383832.40	32.7	1C	07/03
515	150616.91	383814.32	20.1	1C	07/03
516	150621.00	383809.42	12.3	1C	07/03

C 2C 07/03

No.	Long	Lat	Depth	Class	Date
517	150638.78	383805.73	29	2B	07/03
518	150636.08	383802.72	5.9	2B	07/03

519	150636.04	383800.41	24.6	2B	07/03
520	150636.41	383802.33	7	2B	07/03
521	150619.61	383825.22	27	2B	07/03
522	150620.81	383823.98	25.9	2B	07/03
523	150636.04	383800.41	24.6	2B	07/03
524	150636.41	383802.33	7	2B	07/03
525	150619.61	383825.22	27	2B	07/03
526	150620.81	383823.98	25.9	2B	07/03

EC 1A 12/03

No.	Long	Lat	Depth	Class	Date
528	150634.58	383822.83	12.4	1A	12/03
529	150634.67	383822.80	12.4	1A	12/03
530	150634.79	383822.87	12.5	1A	12/03
531	150634.34	383822.90	12.2	1A	12/03
532	150634.83	383822.87	12.1	1A	12/03
533	150634.38	383823.06	13.1	1A	12/03
534	150633.80	383823.32	13	1A	12/03
535	150634.63	383823.52	15.7	1A	12/03
536	150634.13	383824.00	13.1	1A	12/03
537	150636.66	383824.68	14	1A	12/03
538	150636.53	383824.45	14.1	1A	12/03
539	150636.49	383824.42	13.6	1A	12/03
540	150636.53	383824.36	13.6	1A	12/03
541	150636.16	383824.33	15.1	1A	12/03
542	150636.53	383824.29	13.3	1A	12/03
543	150636.16	383824.33	15.1	1A	12/03
544	150636.24	383824.07	14.2	1A	12/03
545	150636.28	383823.90	14.1	1A	12/03
546	150636.24	383823.94	14.1	1A	12/03
547	150634.88	383823.81	16.2	1A	12/03
548	150634.88	383823.78	16	1A	12/03
549	150634.96	383823.61	15.6	1A	12/03
550	150635.29	383823.55	14.9	1A	12/03
551	150635.24	383823.54	14.8	1A	12/03
552	150635.26	383823.52	14.7	1A	12/03
553	150634.83	383822.87	12.7	1A	12/03
554	150635.16	383822.90	12.2	1A	12/03
555	150638.23	383826.53	17.7	1A	12/03
556	150637.94	383826.63	18.6	1A	12/03
557	150640.80	383826.66	19.3	1A	12/03
558	150639.64	383826.72	19.6	1A	12/03

1B 12/03

No.	Long	Lat	Depth	Class	Date
559	150634.75	383822.74	12.6	1B	12/03
560	150634.17	383823.00	12.7	1B	12/03
561	150634.09	383823.35	13.8	1B	12/03
562	150634.09	383823.45	13.9	1B	12/03
563	150634.59	383823.81	16.8	1B	12/03
564	150634.09	383824.00	11.7	1B	12/03
565	150634.88	383825.27	14.9	1B	12/03
566	150636.70	383824.71	14	1B	12/03
567	150636.70	383824.68	13.9	1B	12/03
568	150636.57	383824.49	13.7	1B	12/03
569	150636.28	383824.10	14.4	1B	12/03
570	150635.04	383824.00	16.5	1B	12/03
571	150636.16	383823.94	14.4	1B	12/03
572	150636.16	383823.94	14.4	1B	12/03
573	150635.04	383823.16	13.5	1B	12/03
574	150634.96	383822.83	12.8	1B	12/03
575	150638.23	383826.53	17.9	1B	12/03
576	150638.07	383826.85	19.2	1B	12/03
577	150639.80	383827.66	22.8	1B	12/03

1C 12/03

No.	Long	Lat	Depth	Class	Date
578	150634.71	383823.09	12.7	1C	12/03
579	150635.58	383825.27	17.3	1C	12/03
580	150635.99	383824.33	15.1	1C	12/03
581	150635.99	383824.33	14.8	1C	12/03
582	150636.61	383824.16	12.9	1C	12/03
583	150635.83	383824.00	15	1C	12/03
584	150636.28	383823.81	13.7	1C	12/03
585	150639.64	383826.76	19.4	1C	12/03
586	150638.07	383826.85	19.2	1C	12/03
587	150638.11	383826.95	19.3	1C	12/03
588	150638.11	383827.02	19.4	1C	12/03
589	150638.48	383827.11	20	1C	12/03
590	150637.98	383827.24	20.1	1C	12/03
591	150638.44	383827.28	20.5	1C	12/03
592	150640.01	383827.53	21.9	1C	12/03
593	150634.92	383825.27	14.5	1C	12/03

A 12/03

No.	Long	Lat	Depth	Class	Date
594	150634.25	383823.29	13.3	2A	12/03
595	150634.09	383823.87	13.6	2A	12/03
596	150634.63	383824.46	15.2	2A	12/03
597	150635.22	383823.81	15.4	2A	12/03
598	150635.29	383823.85	15.5	2A	12/03
599	150635.37	383823.71	15.2	2A	12/03
600	150635.08	383823.71	15.6	2A	12/03
601	150636.98	383821.53	8.8	2A	12/03

12/03					
No.	Long	Lat	Depth	Class	Date
602	150631.65	383823.84	14.8	2B	12/03
603	150632.48	383823.84	13.9	2B	12/03
604	150632.68	383824.00	13.8	2B	12/03
605	150636.78	383825.56	16	2B	12/03
606	150635.12	383823.74	15.7	2B	12/03

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(received January 13, 2005;
accepted June 21, 2005)