

ENVIRONMENTAL IMPACT STATEMENT

Nautilus Minerals Niugini Limited

Solwara 1 Project

Volume A
Main Report

Figures and Plates

September 2008
CR 7008_9_v4

ENVIRONMENTAL IMPACT STATEMENT

Solwara 1 Project

VOLUME A: MAIN REPORT FIGURES AND PLATES

CR 7008_09_v4
September 2008



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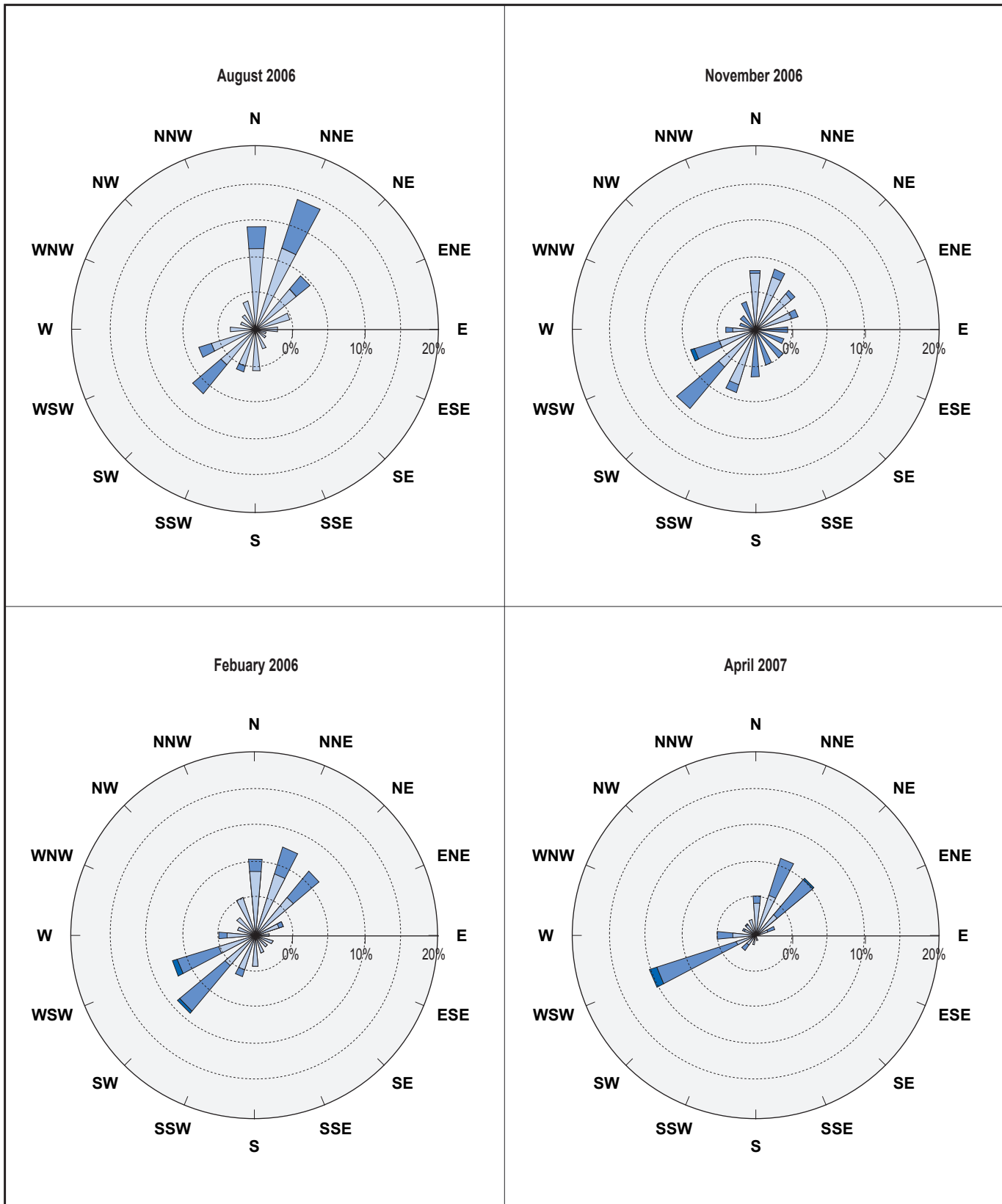
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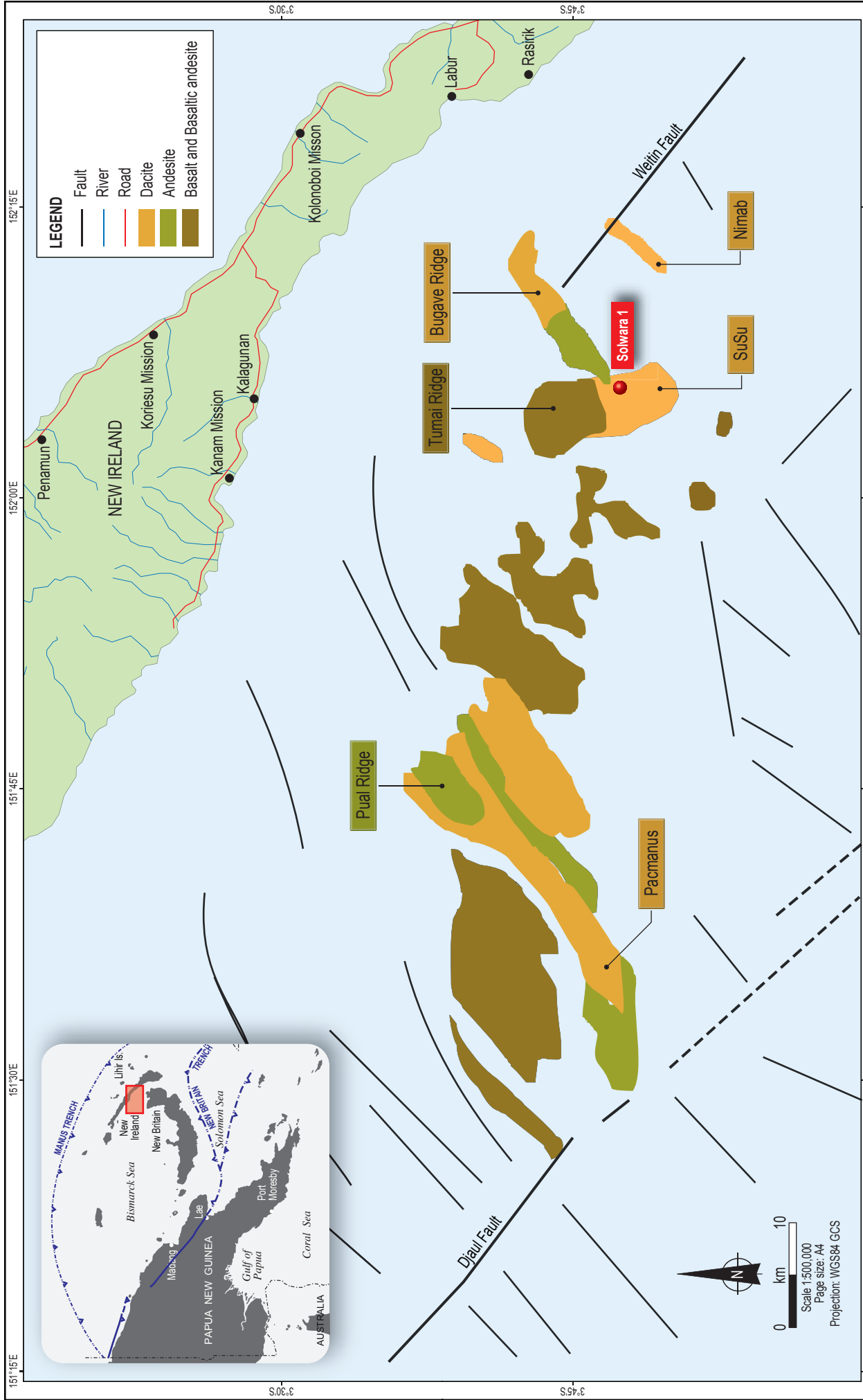
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Note:

1. Percentages show the proportion of time that currents move in a given direction.
2. Roses show the direction that the currents are moving.

LEGEND
Current speed (m/s)
 0 - 0.1
 0.1 - 0.2
 0.2 - 0.3



151°15'E 151°30'E 151°45'E 152°00'E 152°15'E

3°30'S 3°45'S

Source: Geology from Hisicheva study report

Scale 1:500,000
Page size: A4
Projection: WGS84 GCS

0 km 10

coffey
natural systems

Nautilus Minerals Niugini
Solwara 1 Project

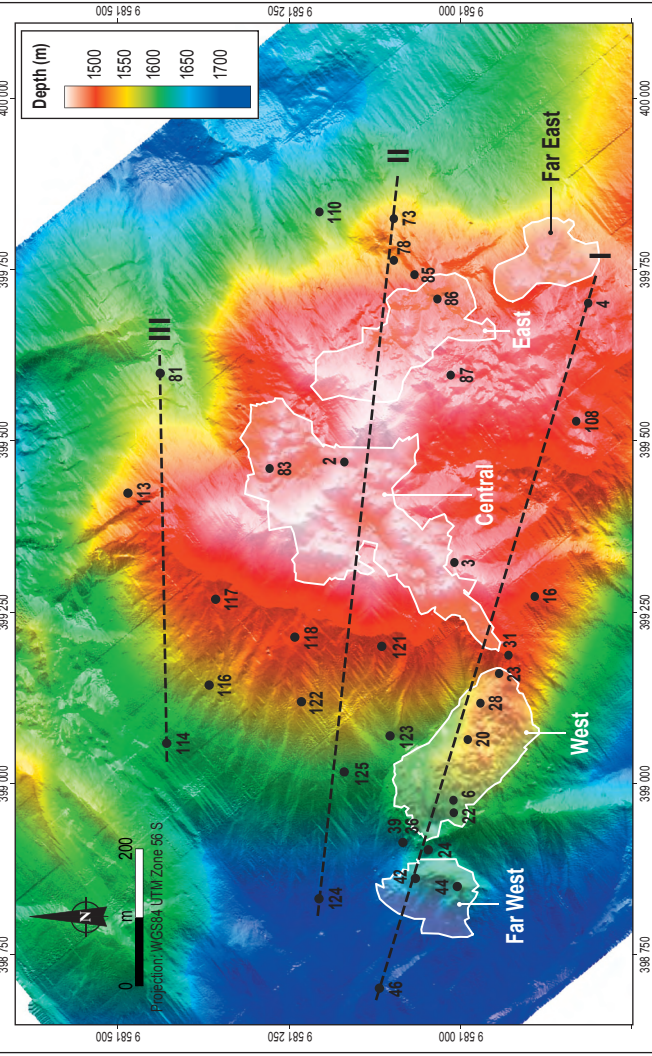
Nautilus Minerals Niugini

Regional setting and geology of the eastern Manus back-arc basin

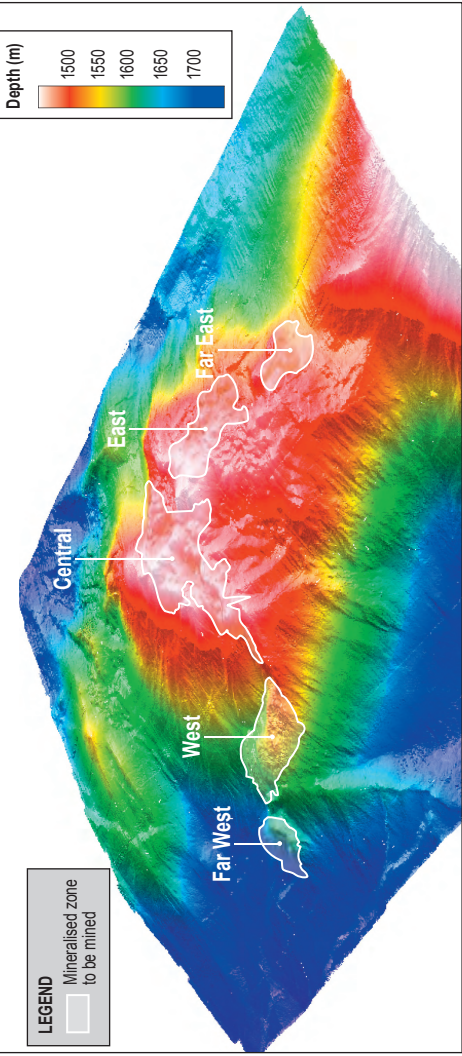
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DATE: 22.09.2008
7008_Nautilus_Solwara1
Project: F07.16_GIS_AI

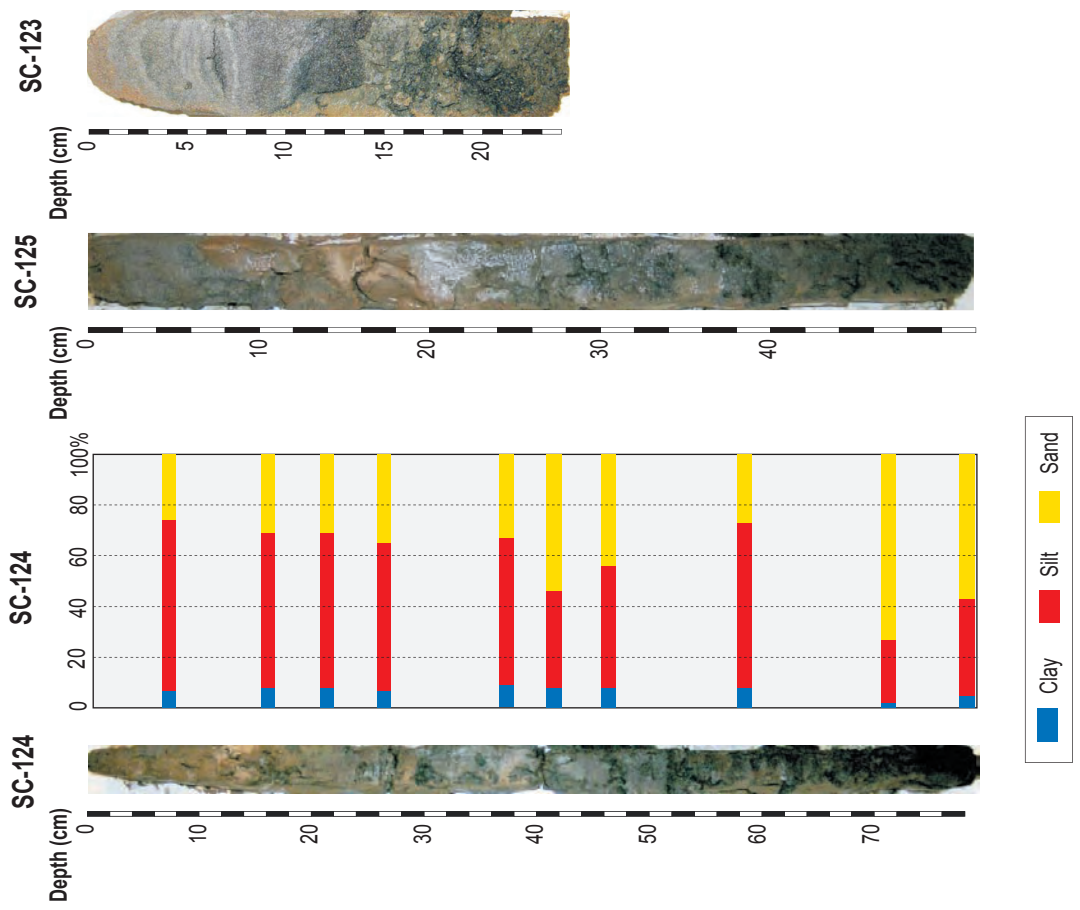
Location of sediment cores (lines are profiles I, II and III)

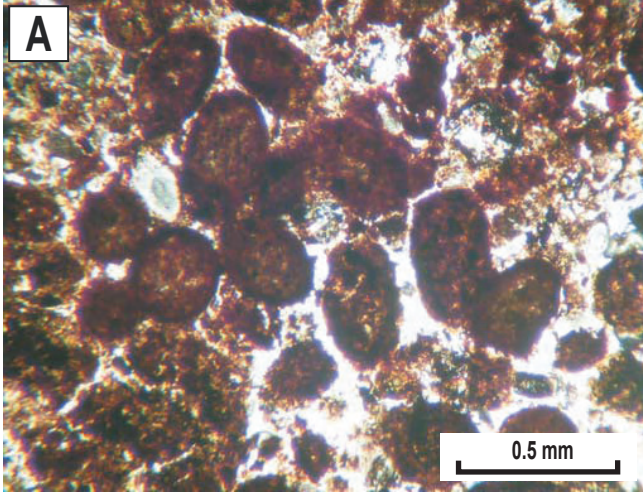


3-dimensional image of proposed mining area at Solwara 1, looking north

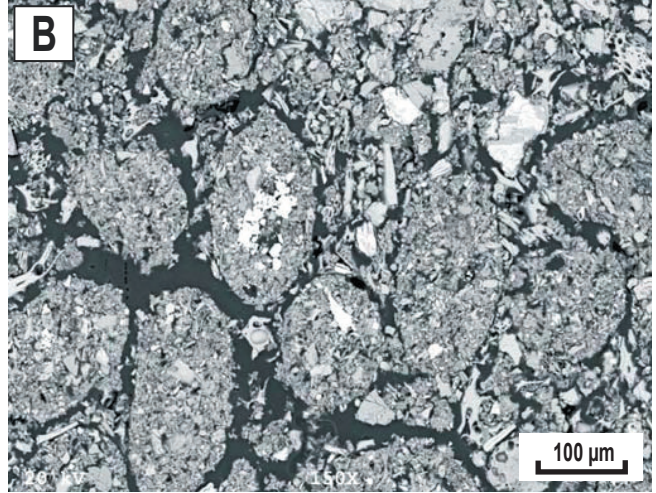


Photographs of cores SC-124, SC-125 and SC-123 located in profile II and dgrain-size composition of sediments of core SC-124.

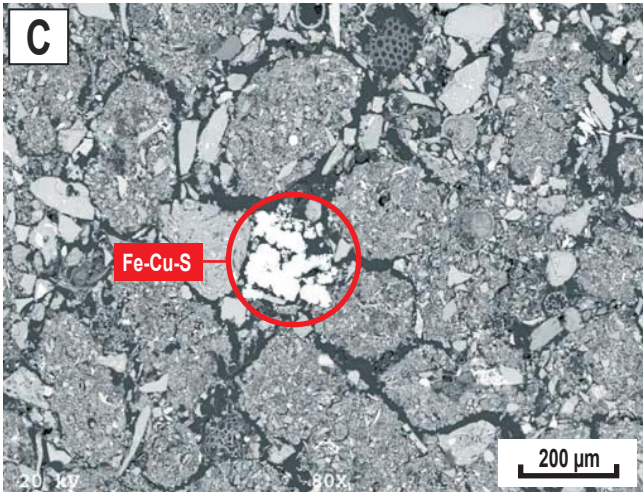




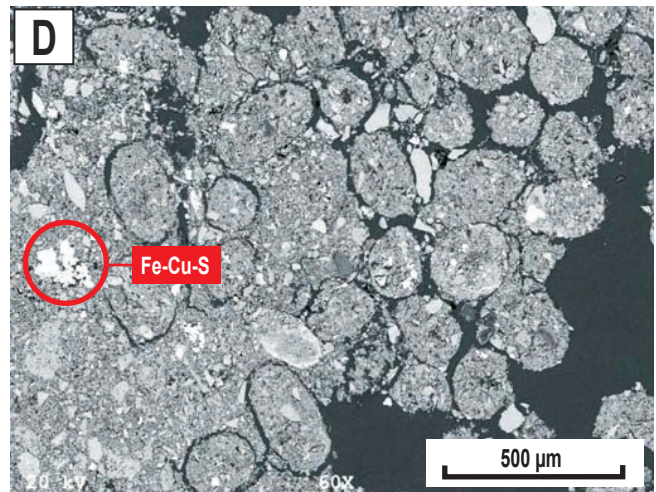
Light microscopy image of faecal pellets.



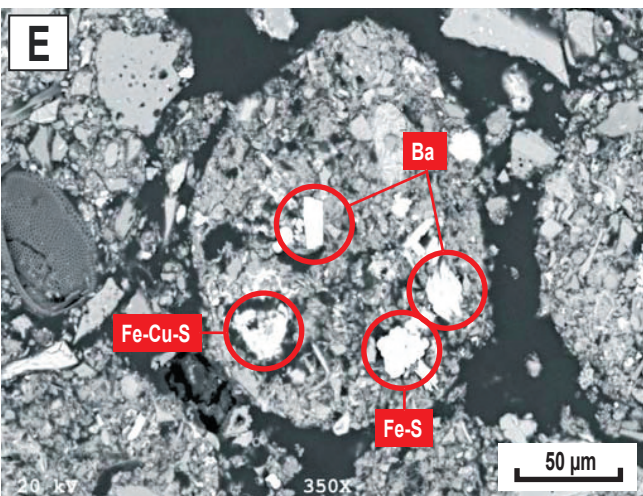
BSE image of faecal pellets containing hydrothermal particles (bright particles) in greenish volcanoclastic sediment of core SC-116.



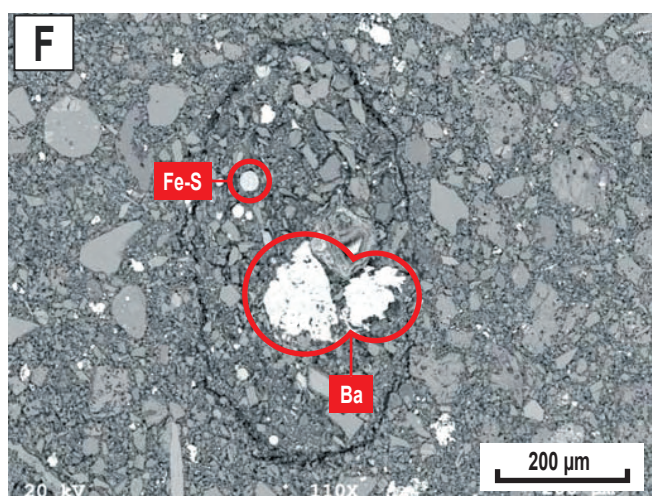
BSE images of faecal pellets and aggregates of Fe-Cu-sulfides (Fe-Cu-S) in a black patch of gray volcanoclastic sediment of core SC-118.



BSE images of faecal pellets and aggregates of Fe-Cu-sulfides (Fe-Cu-S) in a black patch of gray volcanoclastic sediment of core SC-118.

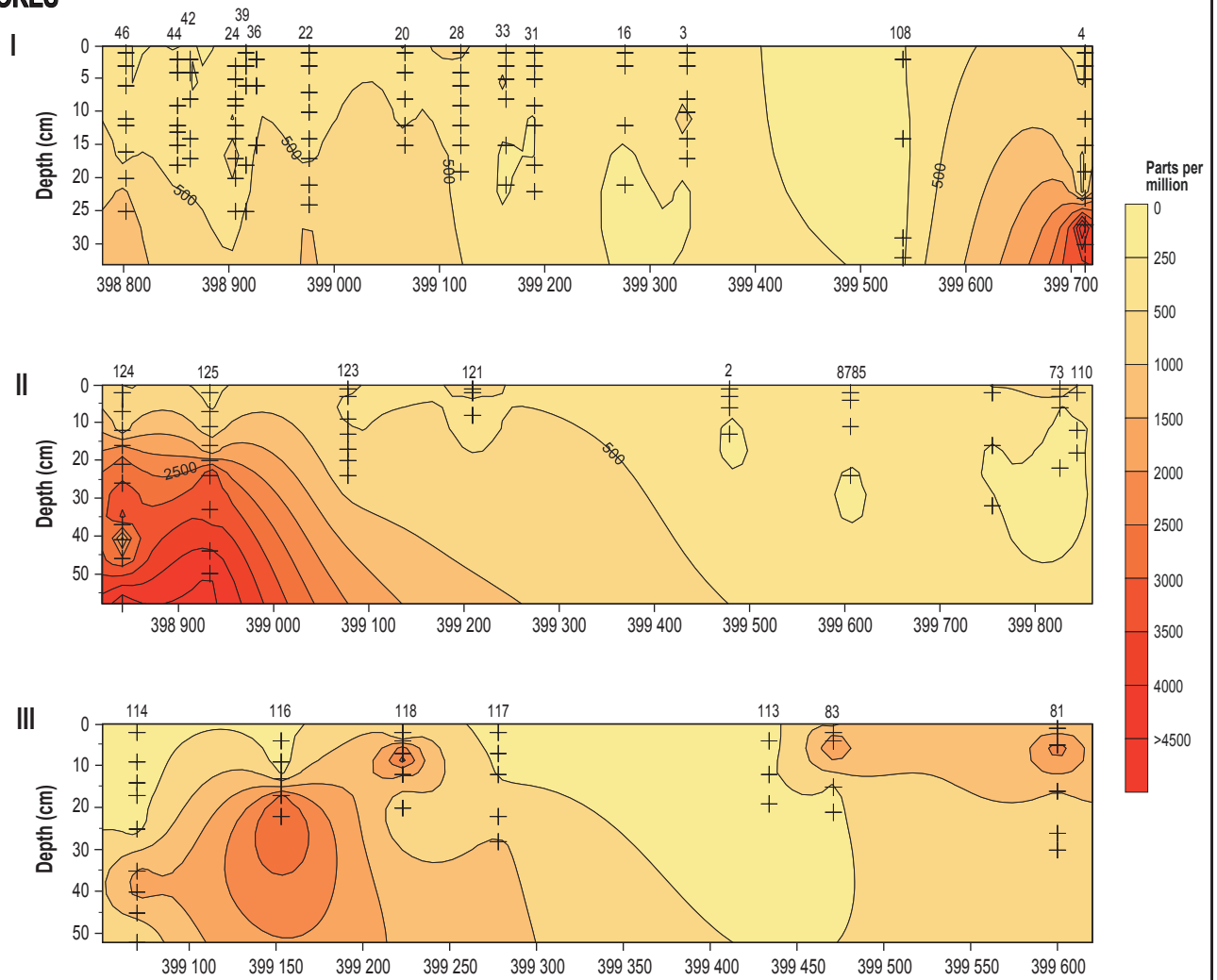


Enlarged image of D showing faecal pellet containing barite (Ba), Fe sulfide (Fe-S) and Fe-Cu sulfide (Fe-Cu-S) particles.

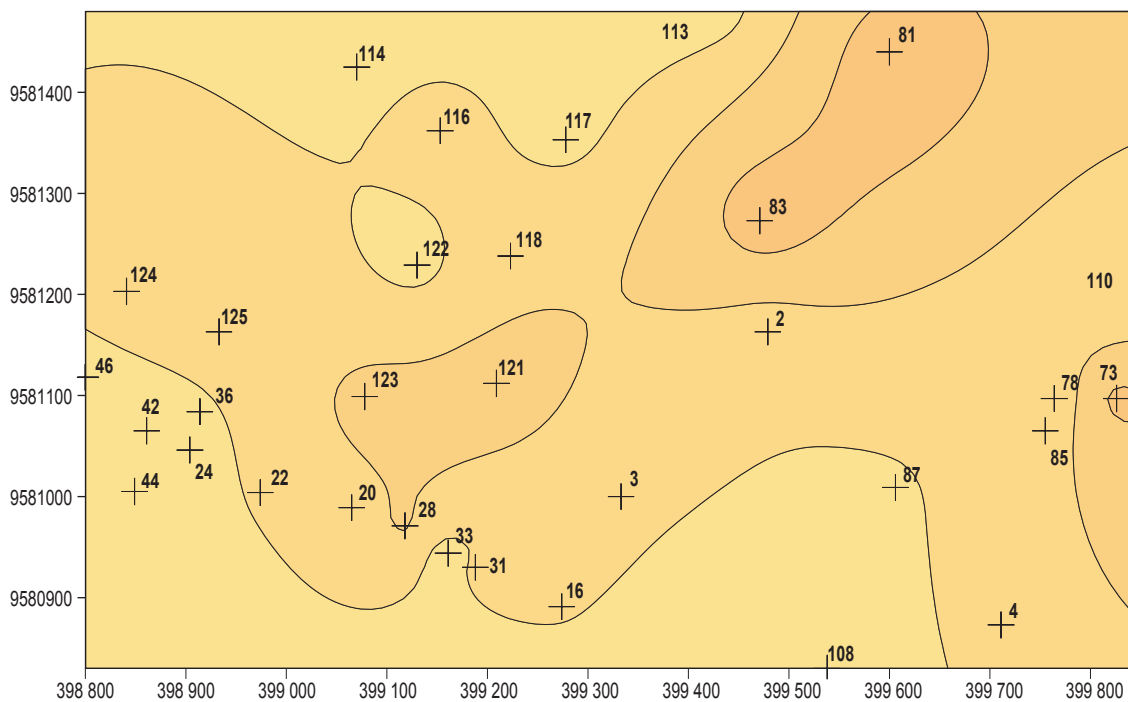


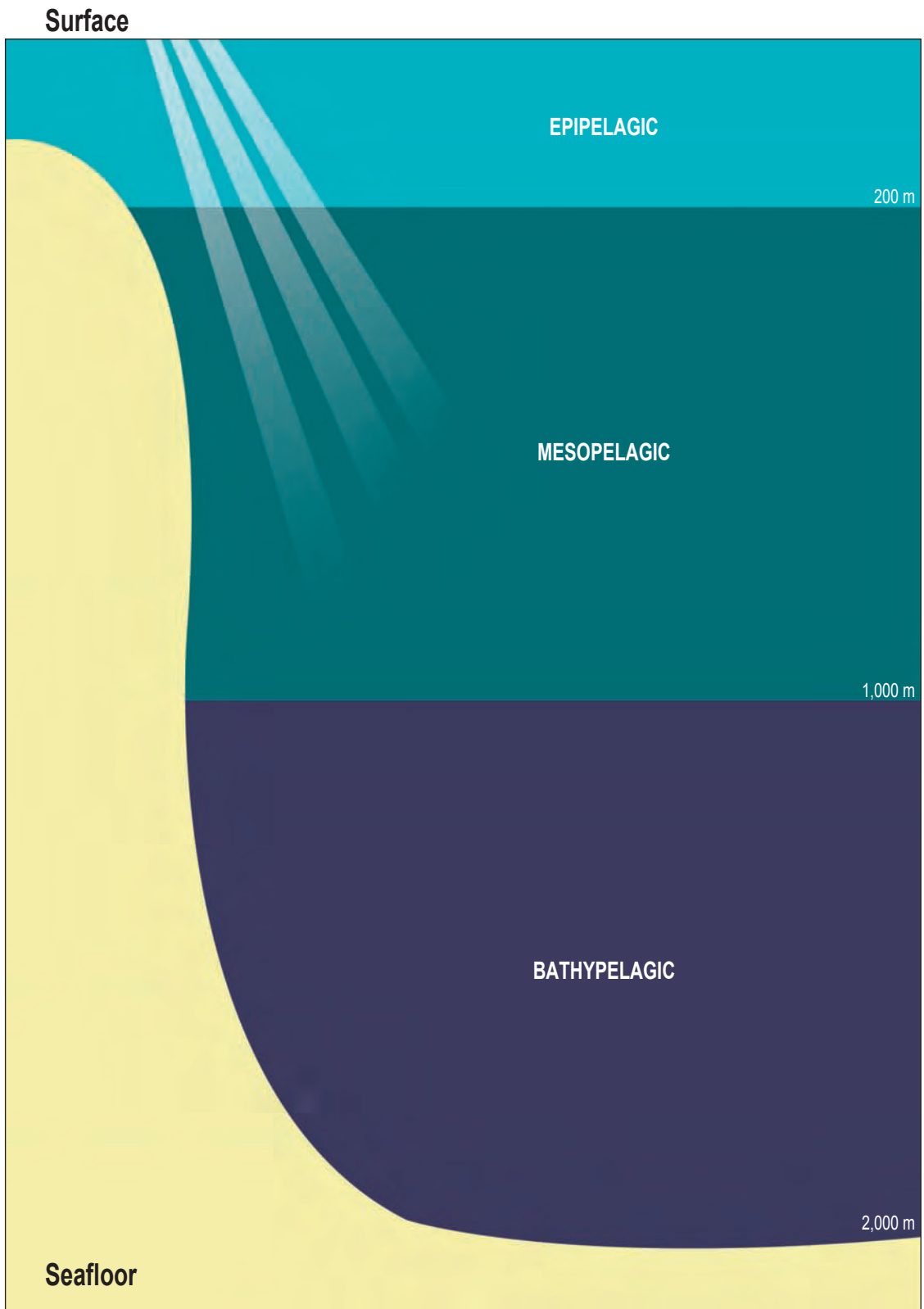
BSE image of faecal pellet containing barite and Fe-sulfide from a black layer in gray volcanoclastic sediment of core SC-33.

A - CORES

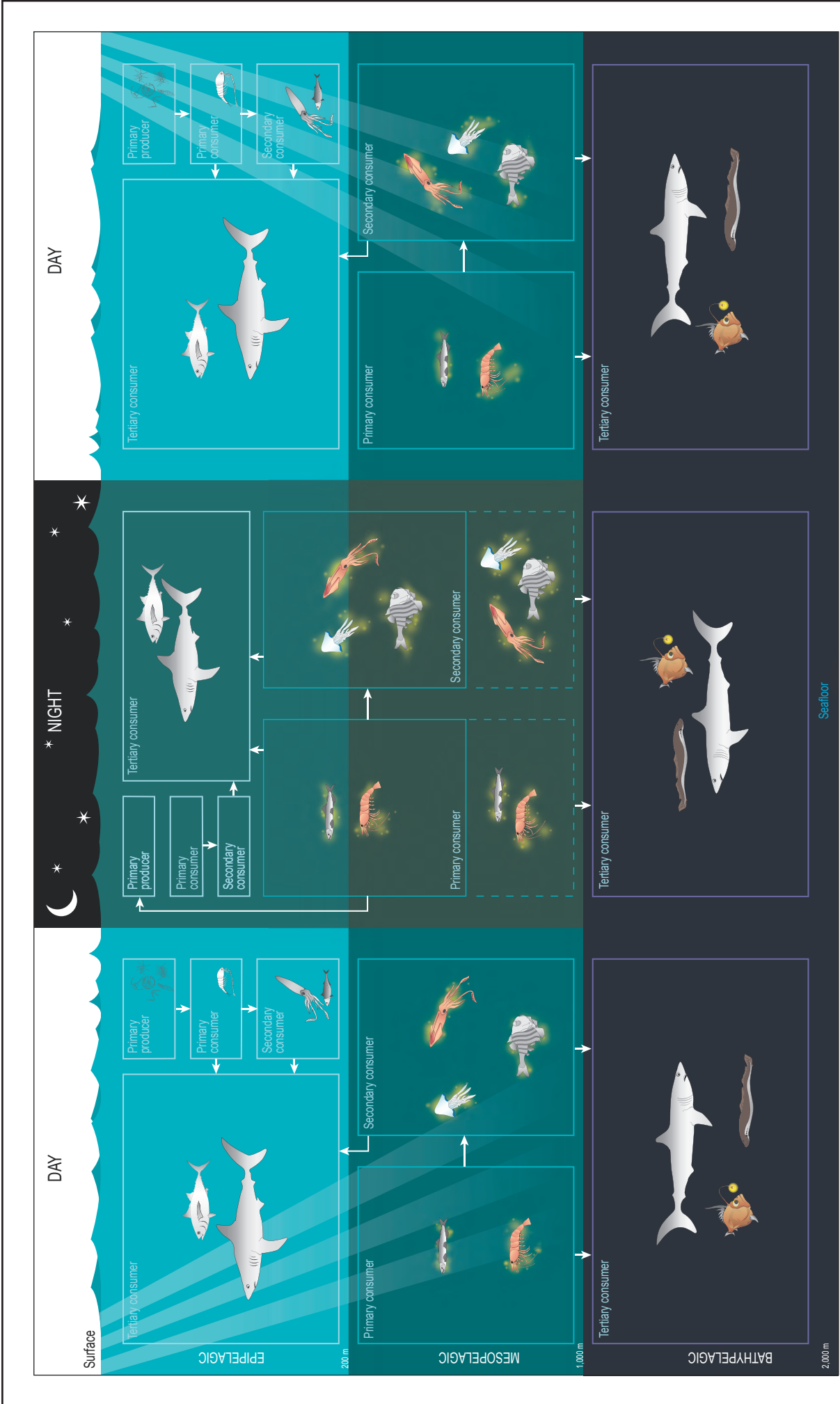


B - SURFACE





Source: Appendix 10



Source: Adapted from Appendix 10

Figure No: **7.21**

Trophic webs and vertical migration of organisms in the water column

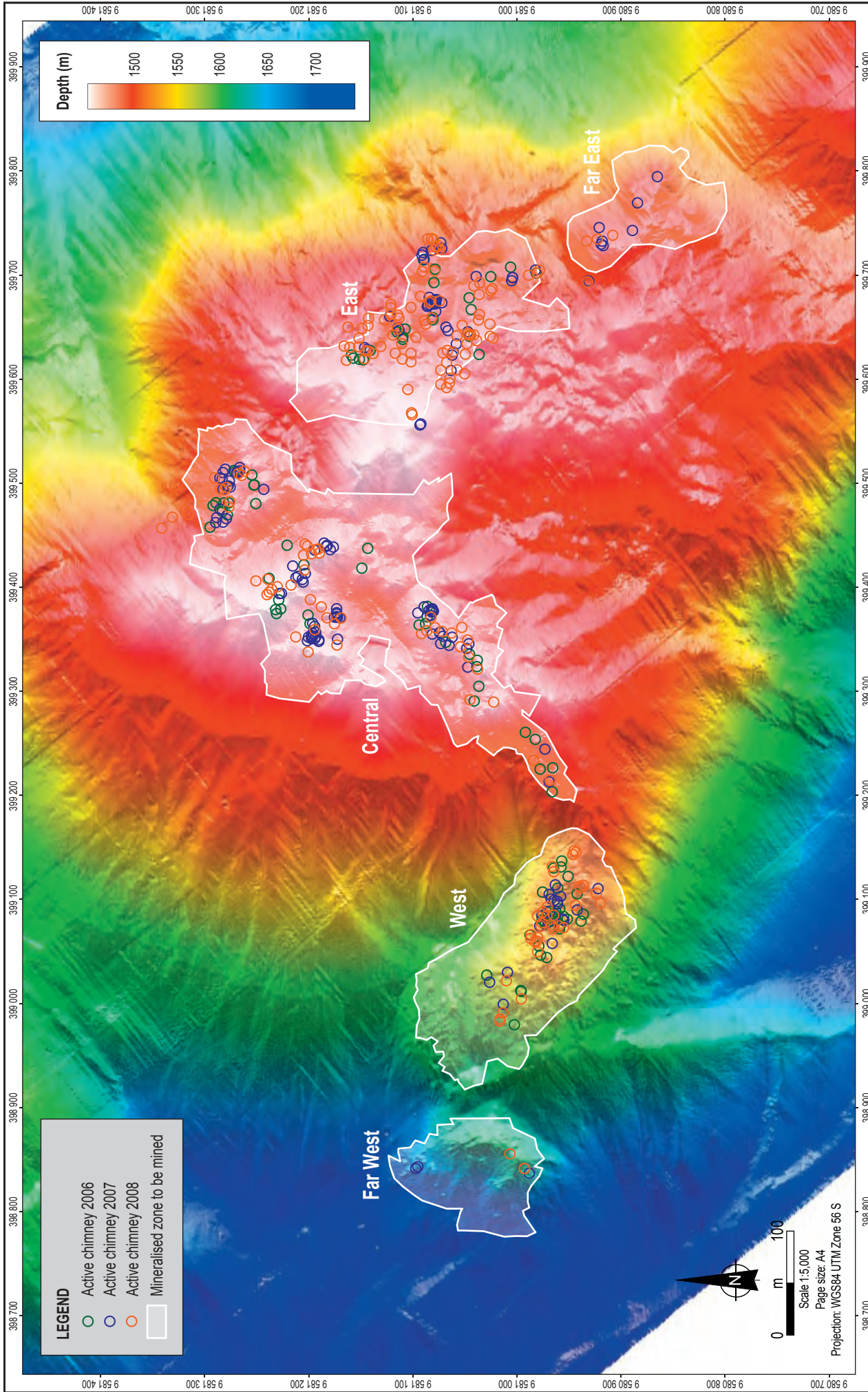
Nautilus Minerals Niugini

Solwara 1 Project

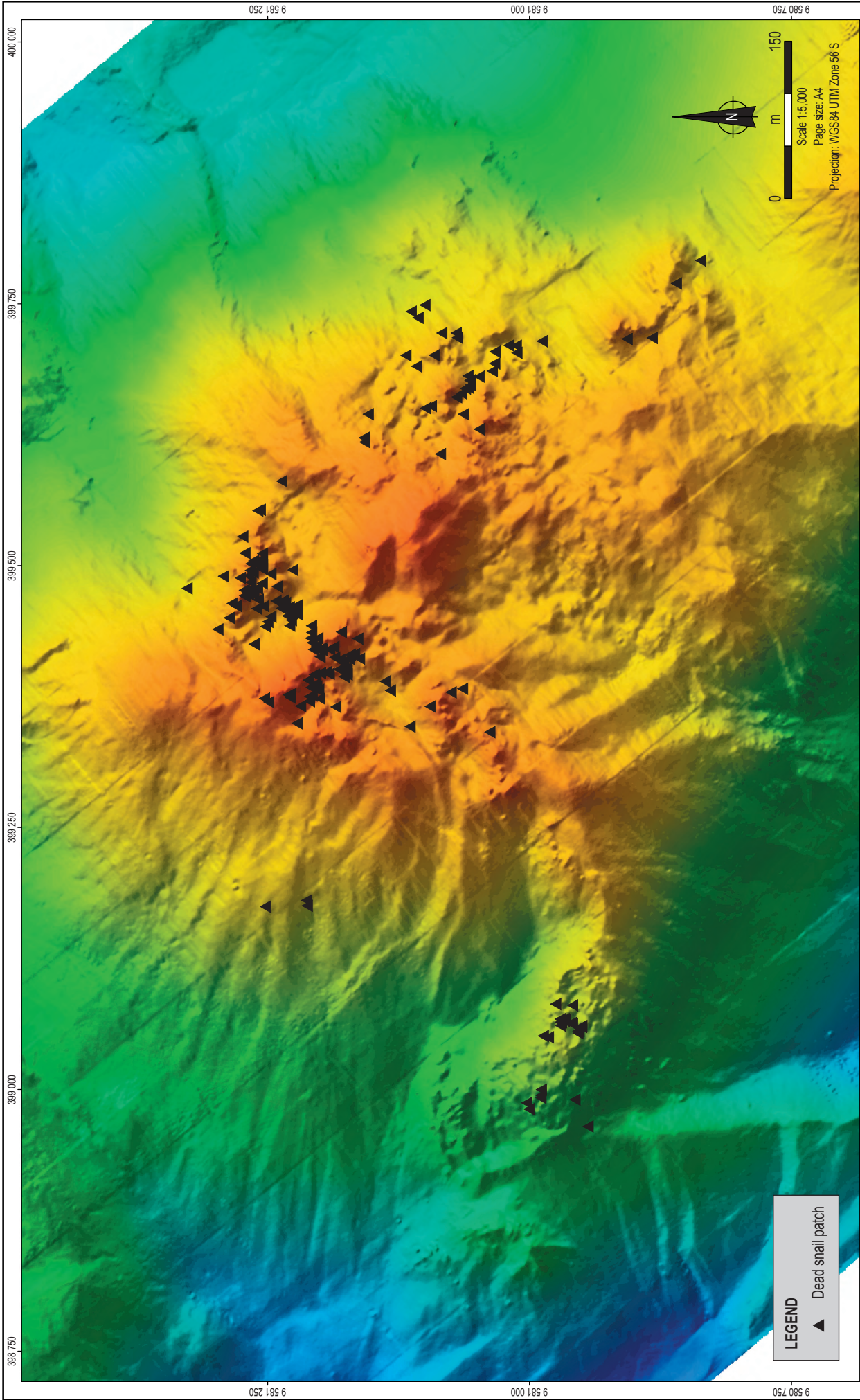
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coffey natural systems



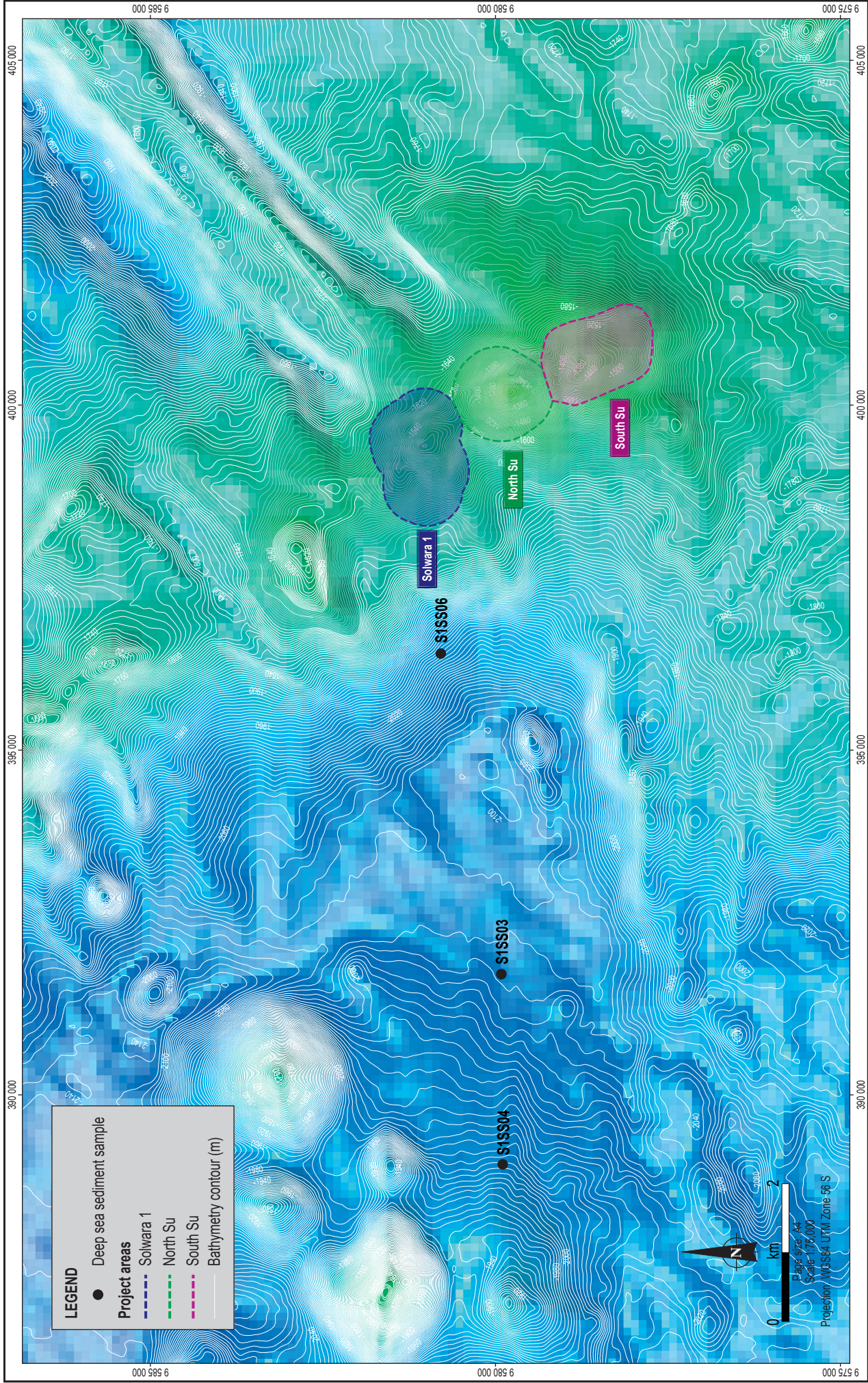
		Job No: 7008	Nautilus Minerals Niugini Solwara 1 Project		Zones of mineralisation and locations of active vents observed in 2006, 2007 and 2008	Figure No: 7.22
		File Name: 7008_09_F07.22_HB				



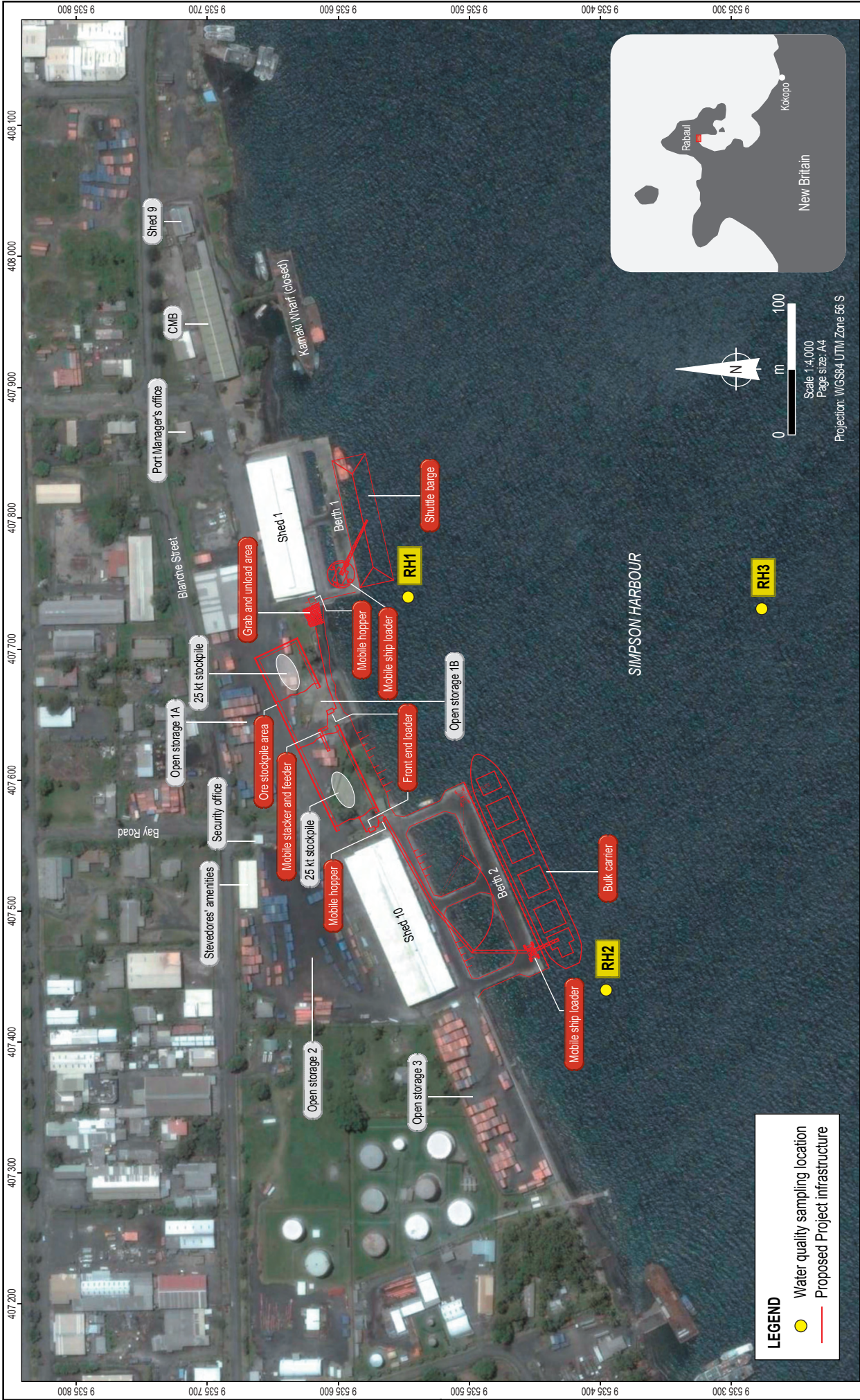
LEGEND
▲ Dead snail patch



	Date: 22.09.2008 WVD: 7008 Nautilus Solwara 1 File Name: 7008_03_F0723_GIS	Nautilus Minerals Niugini Solwara 1 Project		Solwara 1 dead snail patches	Figure No: 7.23
	389,750 389,000 389,250 389,500 389,750 400,000				



	Date: 23.09.2008 Project: 7008_Nautlius_Solwara 1 File: F:\08_08_F0724_GIS_AI		Figure No: 7.24
	Nautilus Minerals Niugini Solwara 1 Project		Sediment sample sites on the abyssal plain west of Solwara 1



LEGEND

- Water quality sampling location
- Proposed Project infrastructure

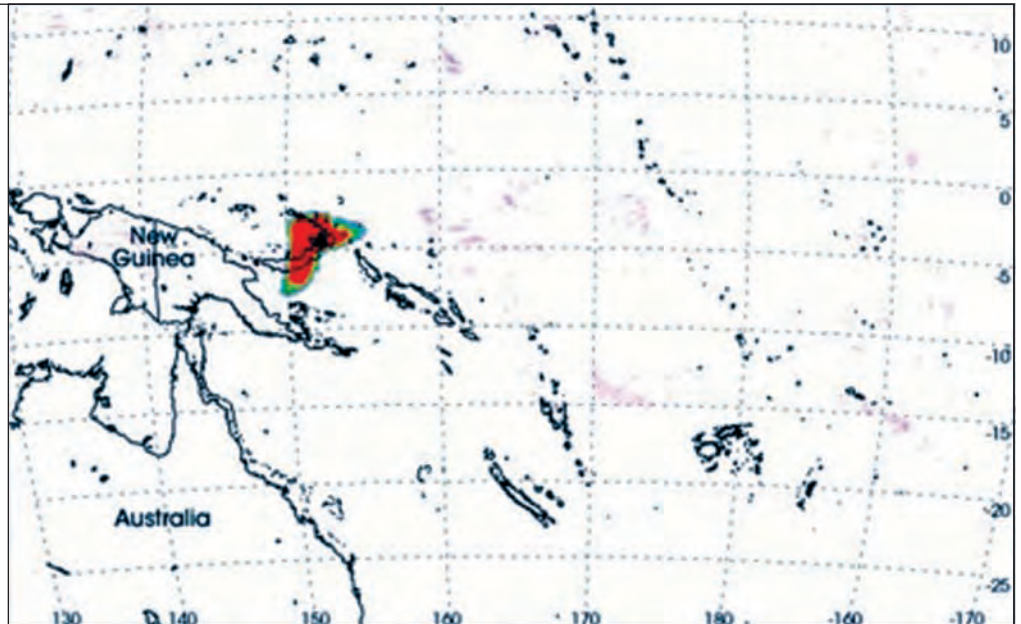
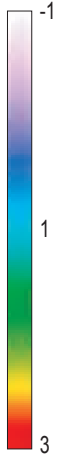


0 100 m
 Scale 1:4,000
 Page size: A4
 Projection: WGS84 UTM Zone 56 S

<p>Source: Imagery from Google Earth. Note: Proposed Project infrastructure is schematic.</p>		<p>Nautilus Minerals Niugini</p> <p>Solwara 1 Project</p>		<p>Port of Rabaul water sampling locations</p>	<p>Figure No: 7.25</p>
<p>Date: 23.09.2008 WCD: 7008 'Nautilus Solwara' File Name: 7008_03_F07.25_GIS AI</p>					

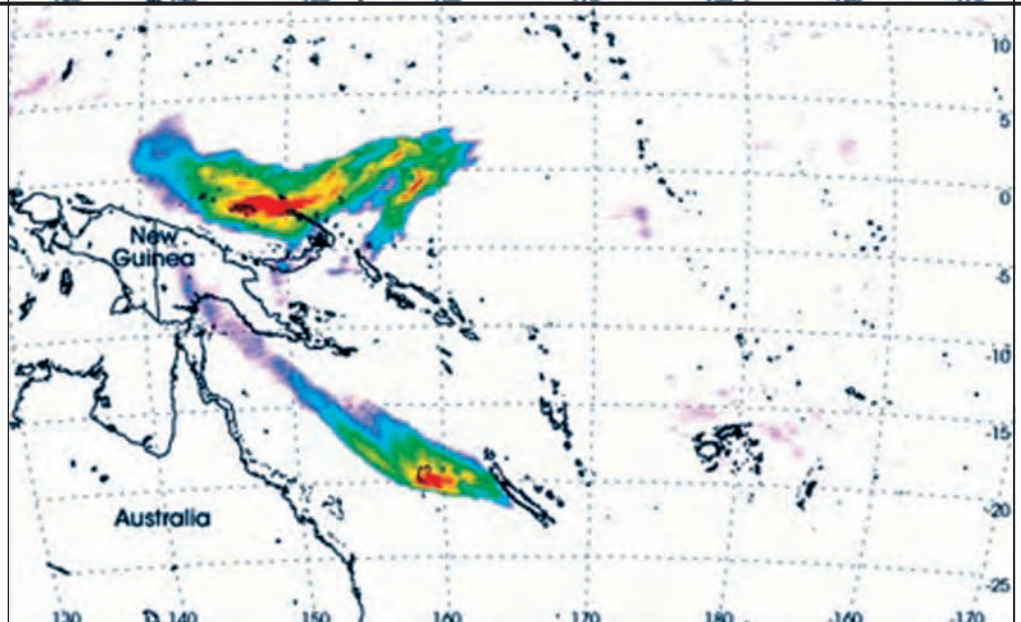
7 October 2006

In [SO₂]
Dobson units (DU)



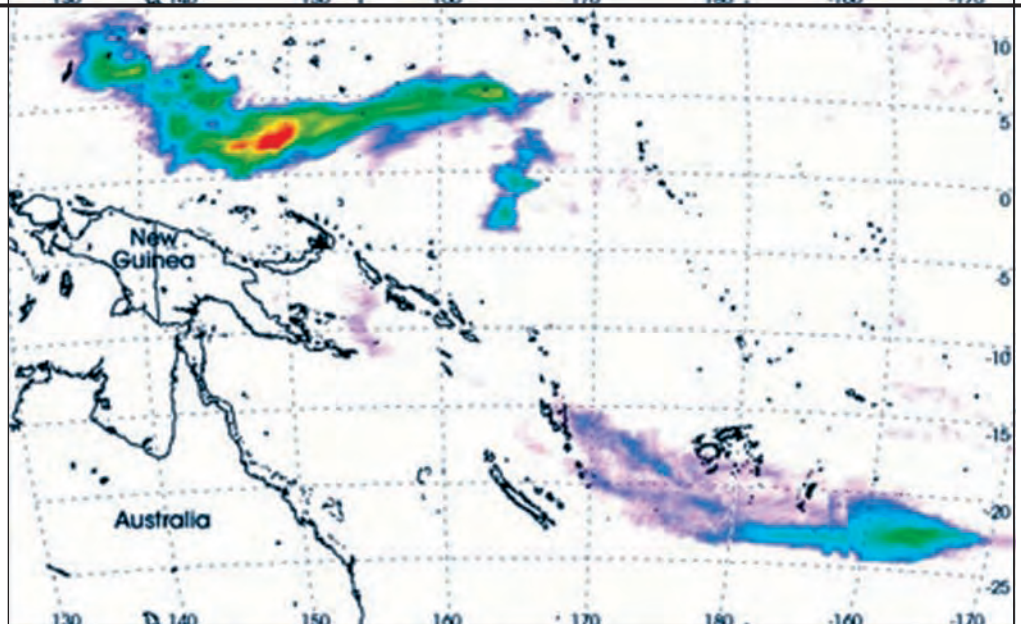
8 October 2006

In [SO₂]
Dobson units (DU)



9 October 2006

In [SO₂]
Dobson units (DU)



Source: NASA Earth Observatory and Simon Carn, University of Maryland Baltimore County.



Plate 7.1
Eruption of Tavurvur Volcano,
Rabaul, 25 February 2008



Plate 7.2
Eruption of Tavurvur Volcano,
Rabaul, 12 March 2008.
Port of Rabaul is located in the
middle foreground.

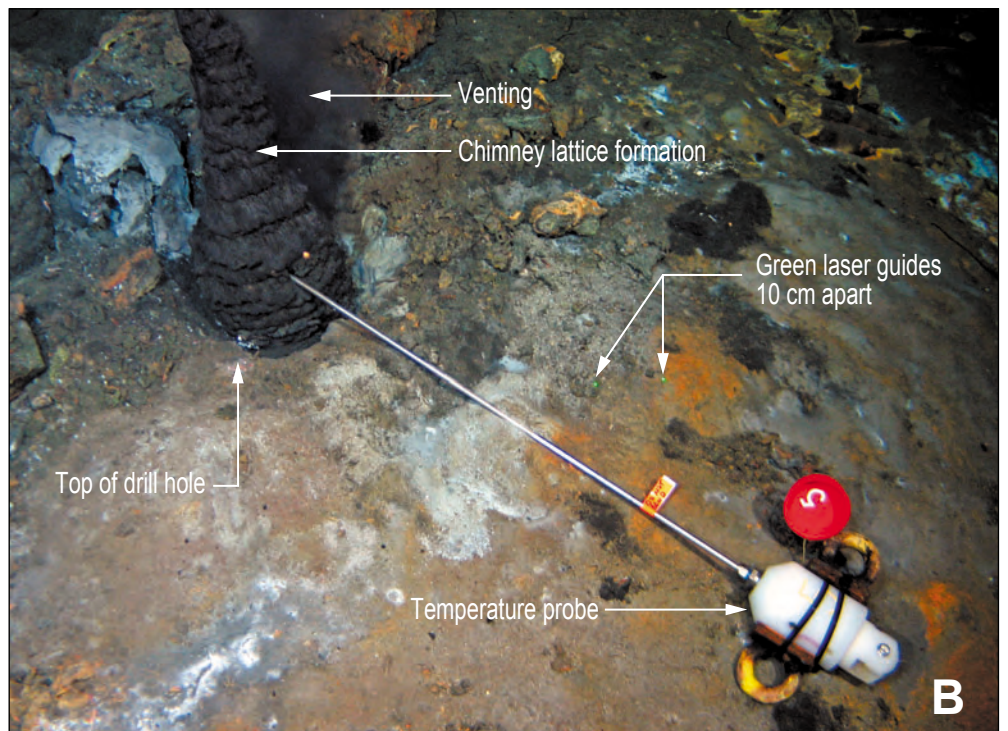
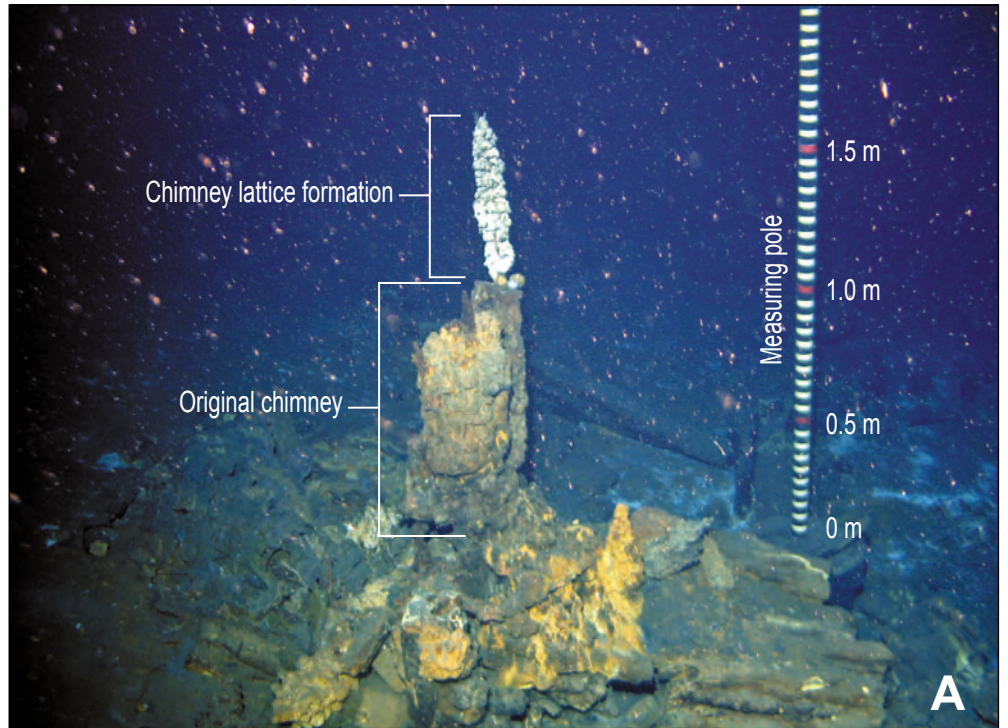


Plate 7.3 Formation of chimney lattice in Solwara 1 West Zone:

- A.** Formation of 58 cm of new chimney lattice over 12 months following the removal of the top part of an existing chimney.
- B.** Formation of 60 cm of new chimney lattice over two days from the top of a drill hole.

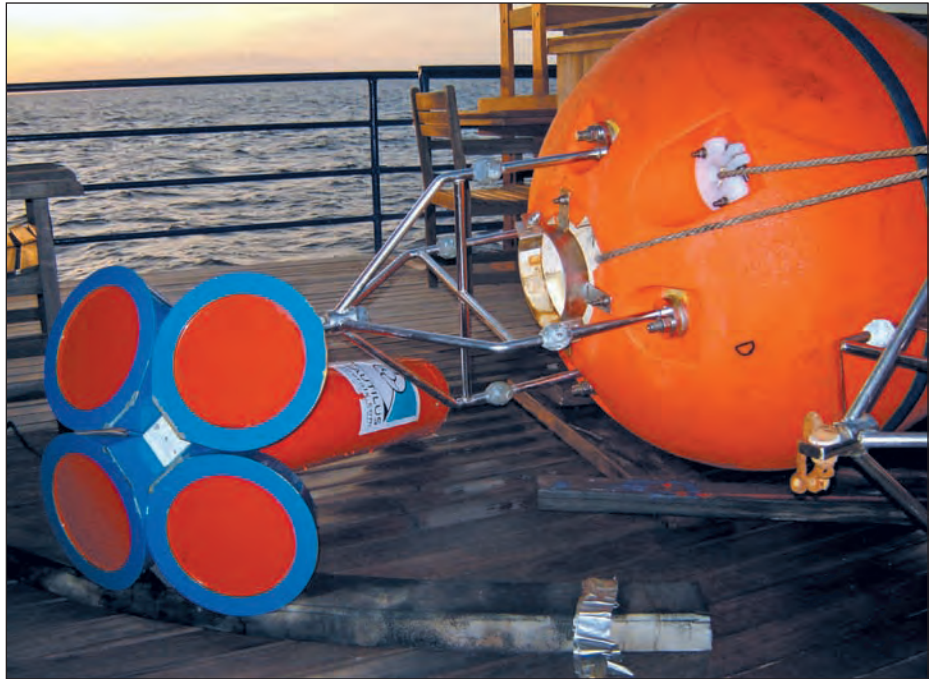


Plate 7.4
75 kHz ADCP current meter
and flotation collar



Plate 7.5
300 kHz ADCP current meter deployed
by ROV on the Solwara 1 mound

Photo credit: Image extracted from Nautilus ROV footage by Hydrobiology.



Plate 7.6
Skipjack tuna at Solwara 1
at 172 m water depth

Photo credit: Image extracted from Nautilus ROV footage by Hydrobiology.

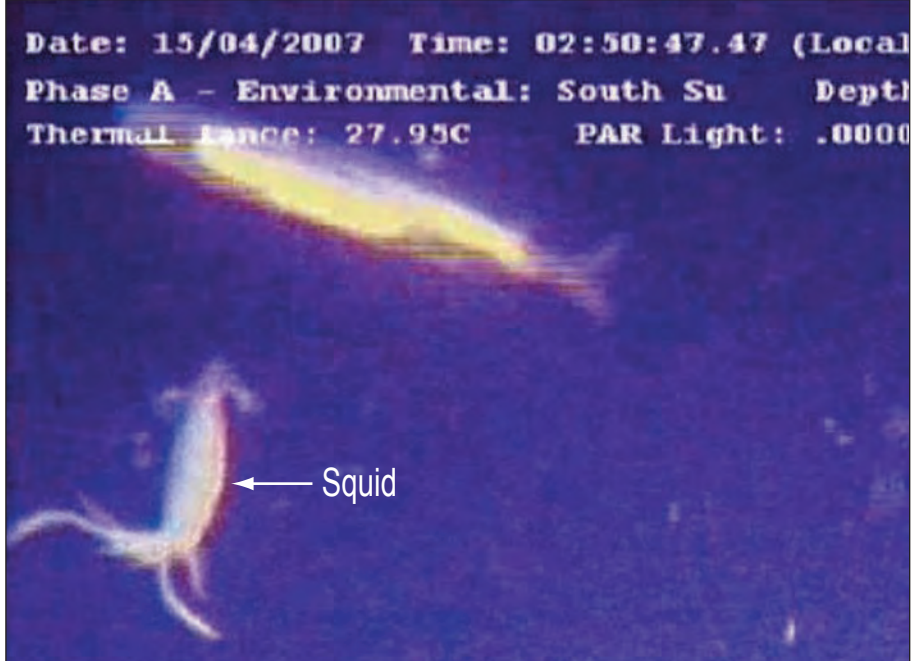


Plate 7.7
Squid at 16 m water depth

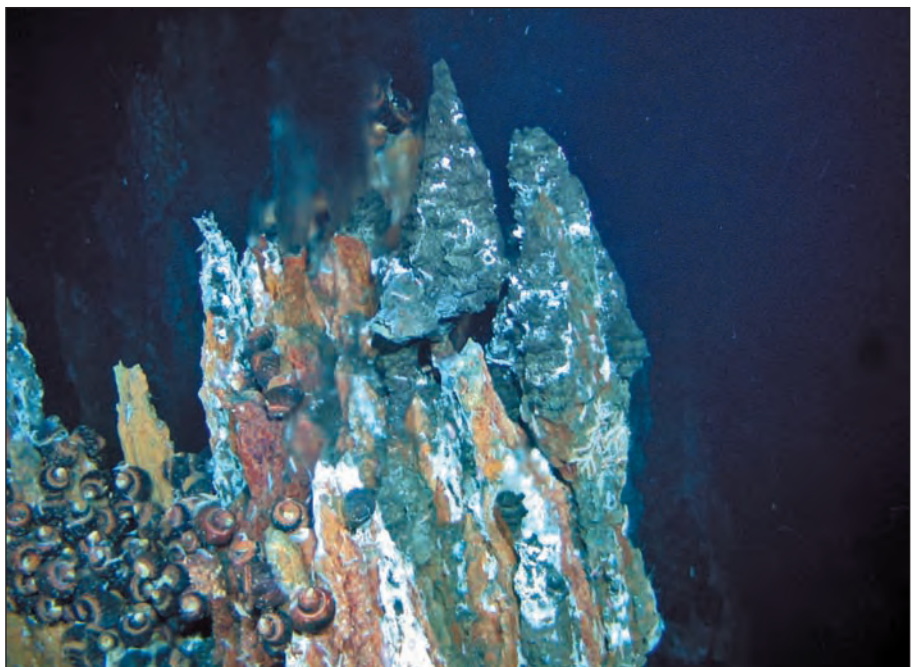


Plate 7.8
Venting chimney at Solwara 1

Plate 7.9
Outcrop of dacite

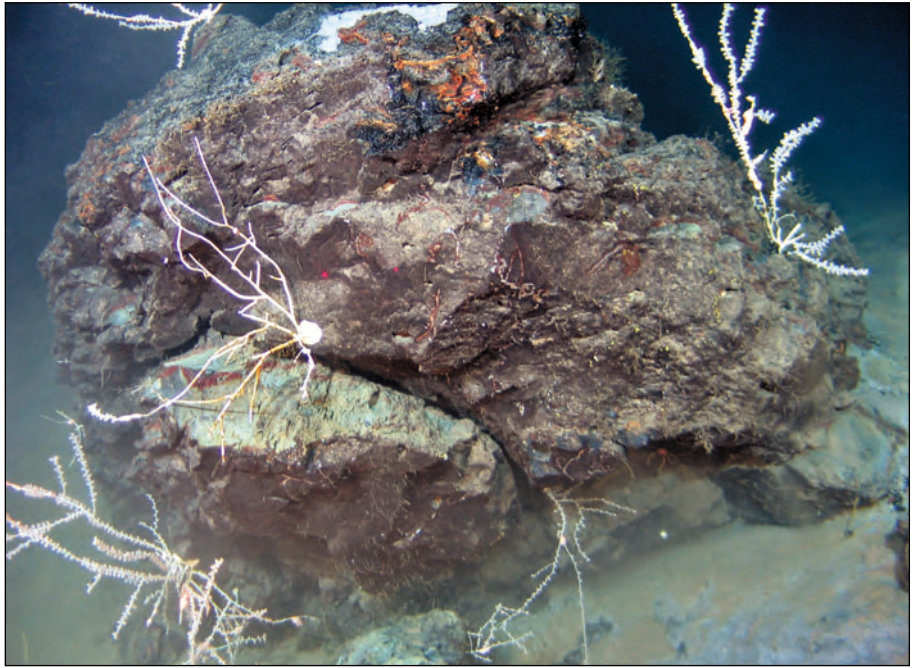


Plate 7.10
Dead snails



Plate 7.11
Dead snails



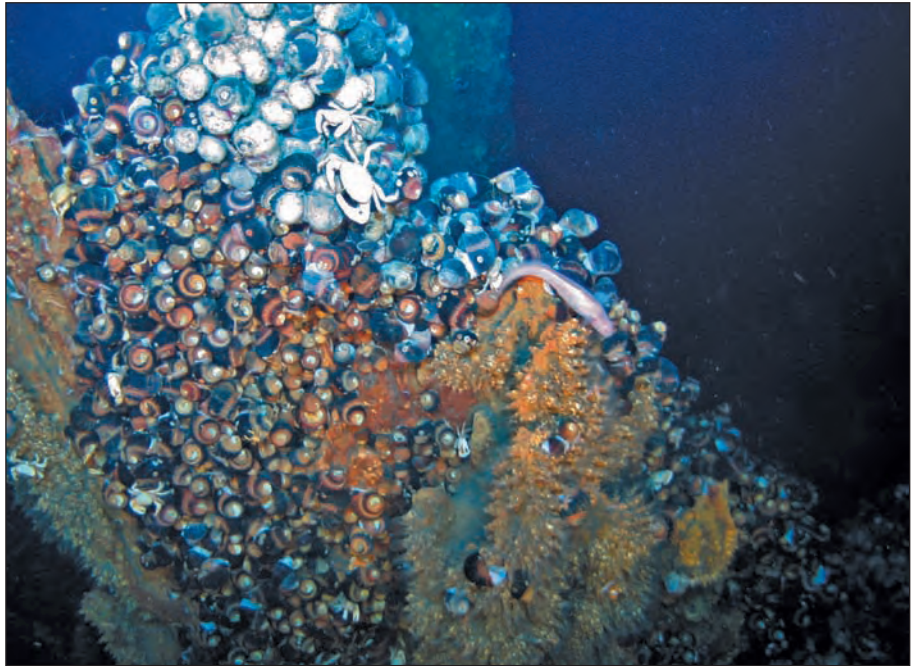


Plate 7.12
Actively venting chimney with high biomass



Plate 7.13
Actively venting chimney with low biomass

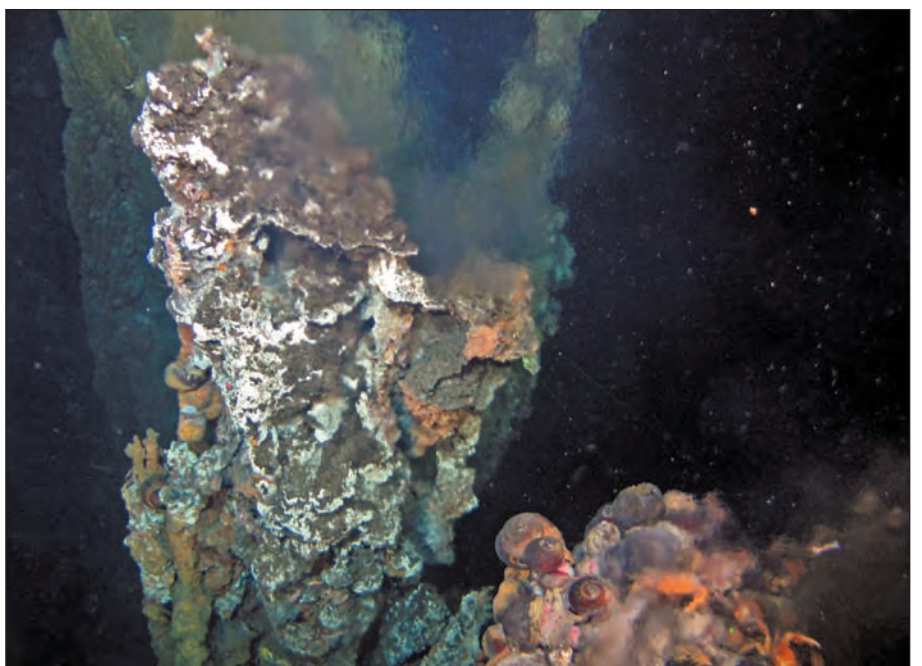
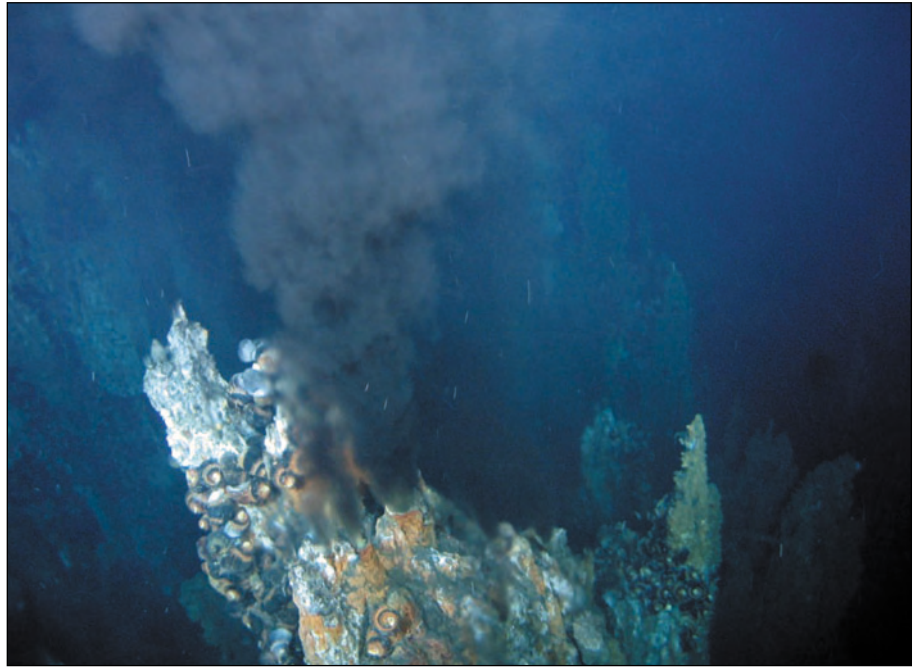


Plate 7.14
Chimney actively venting
clear hot fluid

Plate 7.15
Chimney actively venting
plumes of sediment



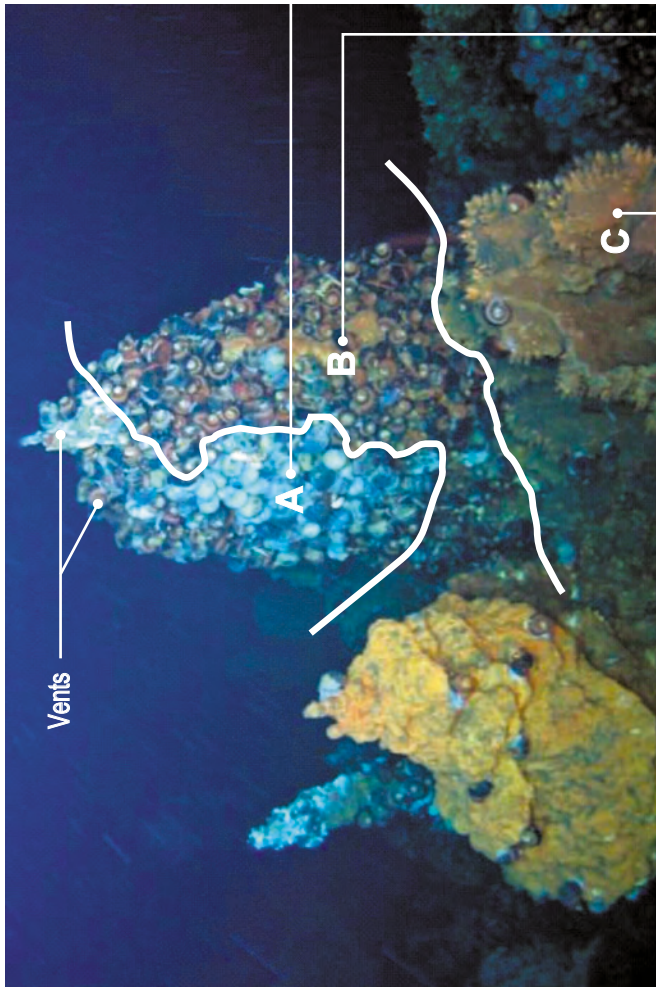


Plate 7.16 Active (venting) sites at both Solwara 1 and South Su were dominated by three habitat zones defined by their biomass-dominant species: Habitat A closest to the vent: *Alviniconcha* sp. (Hairy Snails), Habitat B middle zone: *Ifrimeria nautilii* (Black Snails) and Habitat C outer zone: *Eochionelasmus ohtai* (Barnacles).

Plate 7.17
Deep-sea mussel
(*Bathymodiolus manusensis*)
at South Su



Plate 7.18
Vestimentiferan tube worm
(*Arcovestia ivanovi*)
at South Su



Plate 7.19
Bamboo coral
(*Keratoisis* sp.)

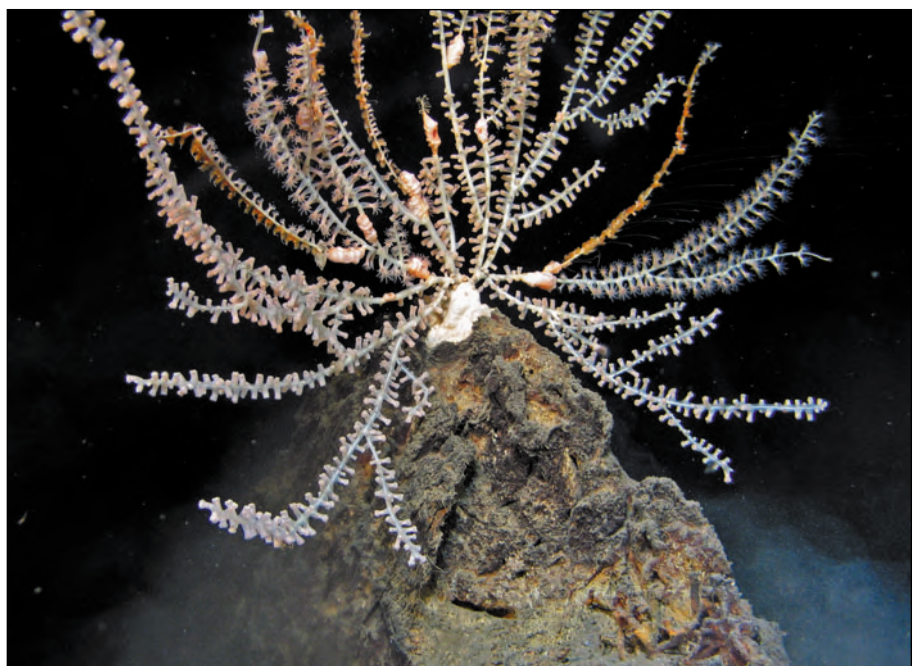


Plate 7.20
Stalked barnacles
(*Vulcanolepas parensis*)



Plate 7.21
Hydroids

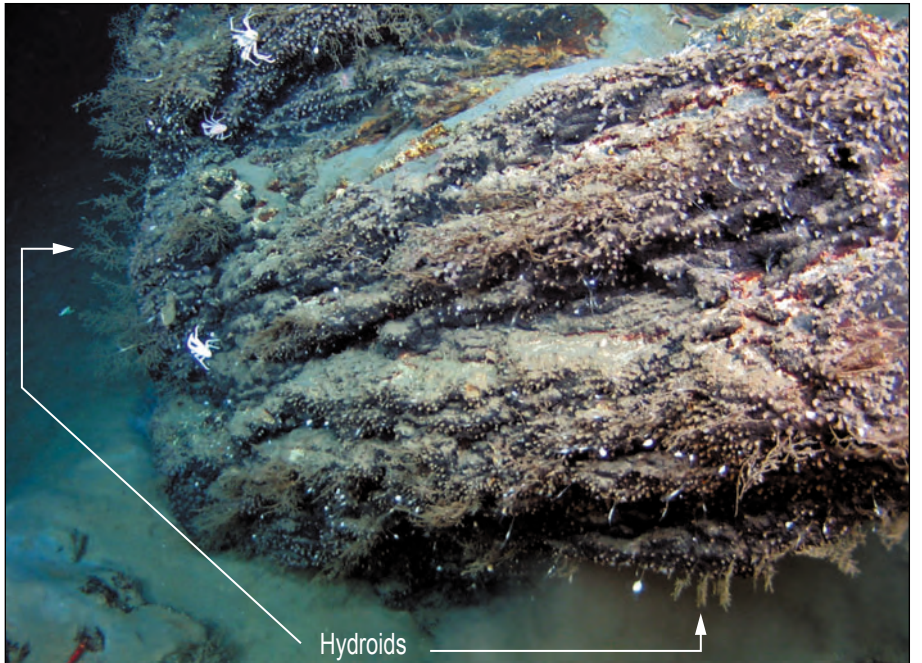
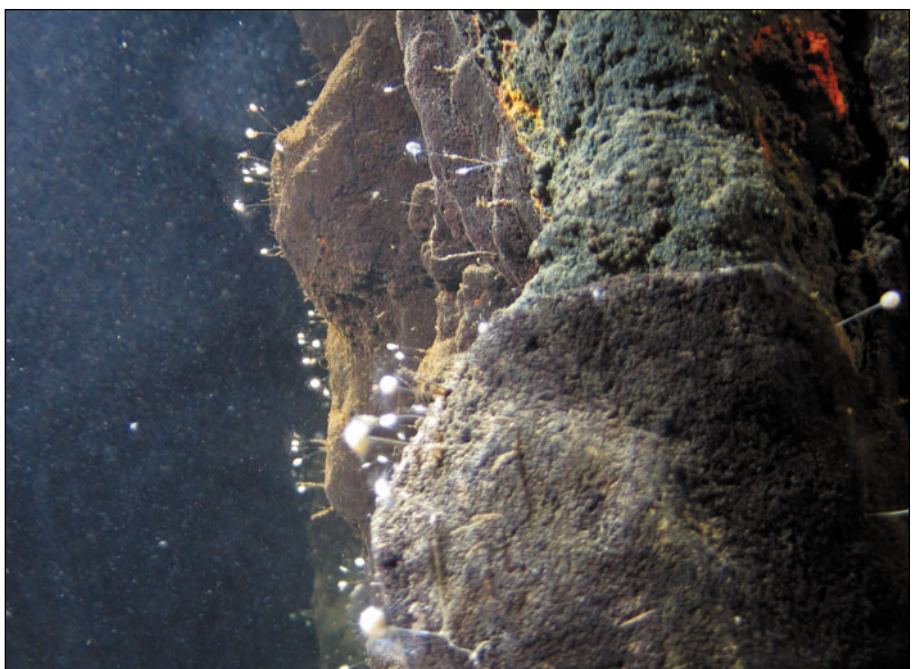


Plate 7.22
Carnivorous sponges
(*Abyssocladia* sp.)



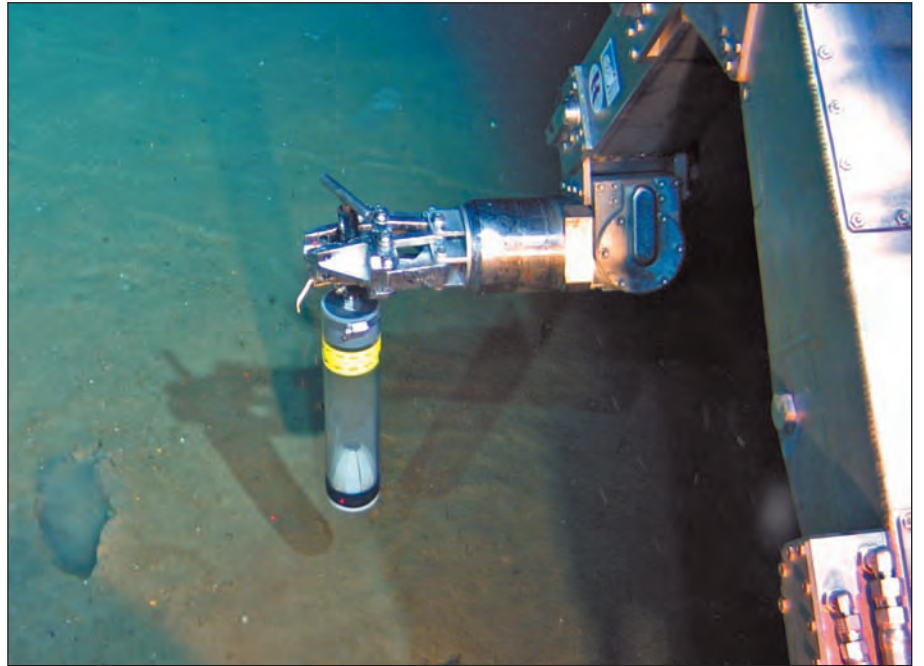


Plate 7.23
Push-core being used from ROV arm



Plate 7.24
Sediment samples taken on the
abyssal plain 10 km west of
Solwara 1 using multicorer



Plate 7.25
Ash plume from
Tavurvur Volcano
over Rabaul,
26 October 2006



Plate 7.26
Fishing boats at Port of Rabaul



Plate 7.27
Passenger boats at Port of Rabaul



Plate 7.28
Container ship at Berth 2 - Port of Rabaul



Plate 7.29
Berth 2 and Shed 10



Plate 7.30
Berth 1 and Shed 1

