INTERNATIONAL HYDROGRAPHIC ORGANIZATION

INTERGOVERNMENTAL OCEANOGRAPHIC COMMISSION (of UNESCO)

UNDERSEA FEATURE NAME PROPOSAL

(Sea **NOTE** overleaf)

Note: The boxes will expand as you fill the form.

Name Proposed:	**Brothers Seamount**	**Ocean or Sea:**	South Pacific Ocean

Geometry that best defines the feature (Yes/No) :						
Point	Line	Polygon	Multiple points	Multiple lines*	Multiple polygons*	Combination of geometries*
		X				

** Geometry should be clearly distinguished when providing the coordinates below.*

	Lat. (e.g. 63°32.6'N)	Long. (e.g. 046°21.3'W)
Coordinates:	34°52.93'S (centre)	179°04.05'E (centre)
	34°48.983`S	178°59.15`E
	34°48.583`S	179°2.1`E
	34°48.833`S	179°4.483`E
	34°50.15`S	179°7.2`E
	34°51.4`S	179°8.35`E
	34°53.15`S	179°8.367`E
	34°54.683`S	179°6.633`E
	34°55.283`S	179°5.217`E
	34°56.367`S	179°2.883`E
	34°56.083`S	179°1.383`E
	34°54.45`S	179°0.25`E
	34°51.083`S	178°59.117`E
	34°49.5`S	178°59.117`E
	34°48.983`S	178°59.15`E

Feature Description:	Maximum Depth:	2250 metres	Steepness :	
	Minimum Depth :	1197 metres	Shape :	Volcano with central caldera
	Total Relief :	1053 metres	Dimension/Size :	15 x 15 km

Associated Features:	Brothers Seamount lies 15 km north of Healy Seamount in the Kermadec volcanic arc

Chart/Map References:	~~Shown Named on Map/Chart:~~ Named in an internationally peer reviewed journal	IC Wright & JA Gamble (1999). Southern Kermadec submarine caldera arc volcanoes (SW Pacific) caldera formation by effusive and pyroclastic eruption. Marine Geology 161 1999. 207–227. IC Wright, TJ Worthington & JA Gamble (2006). New multibeam mapping and geochemistry of the 308–358 S sector, and overview, of southern Kermadec arc volcanism. *Journal of Volcanology and Geothermal Research* 149, 263 – 296.
	Shown Unnamed on Map/Chart:	
	Within Area of Map/Chart:	Chart NZ 14600 INT 600, INT 605

Reason for Choice of Name (if a person, state how associated with the feature to be named)**:**	Named after Professor RN Brothers (1924-1988), Volcanologist, University of Auckland, 1952-1988, Professor 1974-1988, who described the first submarine volcanic rocks from the southern Kermadec arc.

Discovery Facts:	Discovery Date:	February 1991
	Discoverer (Individual, Ship):	RV Rapuhia

Supporting Survey Data, including Track Controls:	Date of Survey:	Multiple surveys 1994-2015
	Survey Ship:	Multibeam – RV Giljanes (1994), RV Tanagroa (2002, 2004, 2012), RV Thomas Thompson (2009), RV Sonne (1998, 2007), RV Yokosuka (2004)
	Sounding Equipment:	EM12 and MR2, Atlas Hydrosweep DS2, EM 120, EM300, EM302, SeaBeam 2112 multibeam,
	Type of Navigation:	DGPS
	Estimated Horizontal Accuracy (nm):	25 m
	Survey Track Spacing:	Multiple surveys , variable spacing
	Supporting material can be submitted as Annex in analog or digital form.	

Proposer(s):	Name(s):	Mr Mark Dyer (Chairperson of the NZGB) & Mr Adam Greenland (National Hydrographer)
	Date:	27 June 2016
	E-mail:	markdyer@linz.govt.nz
	Organization and Address:	New Zealand Geographic Board PO Box 5501 Wellington 6145 New Zealand
	Concurrer (name, e-mail, organization and address):	Dr Vaughan Stagpoole V.Stagpoole@gns.cri.nz GNS Science PO Box 30 368 Lower Hutt 5040 New Zealand

Remarks:	Informally named Brothers Volcano. The New Zealand Geographic Board gazetted **Brothers Seamount** as an official undersea feature name on 26 May 2016.

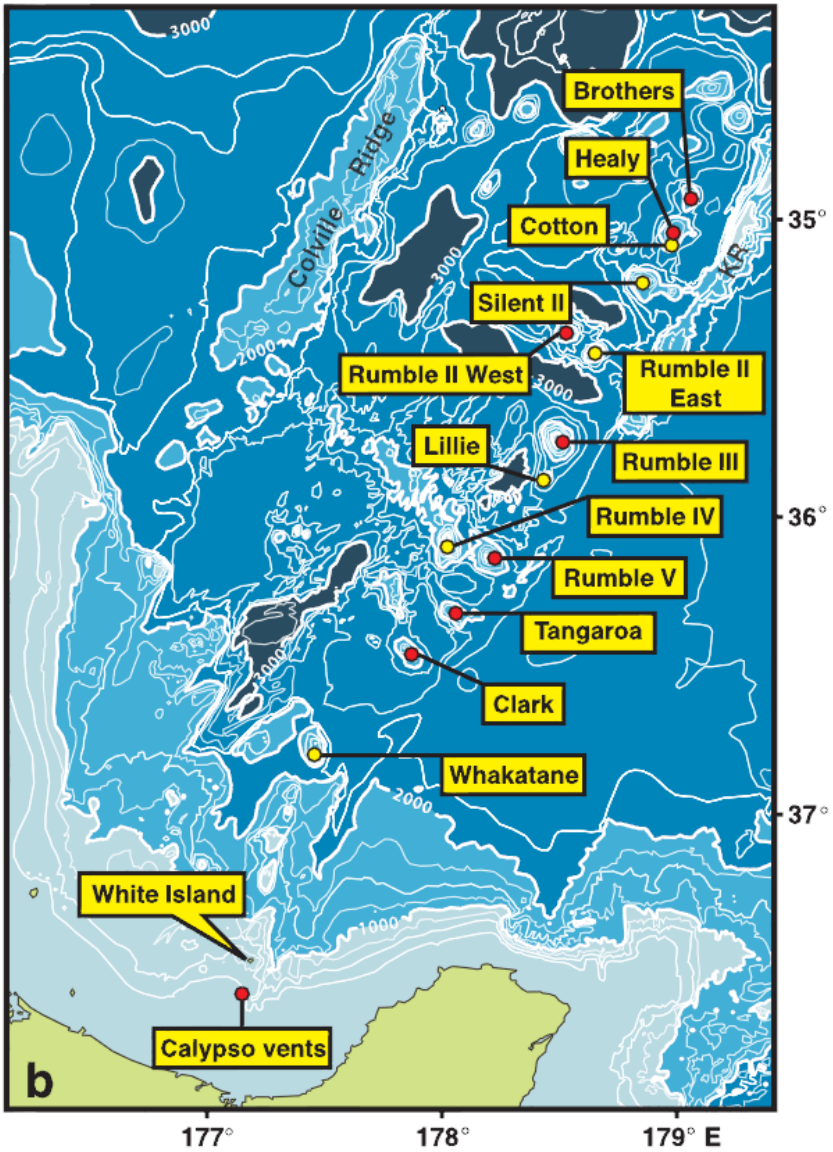
NOTE : This form should be forwarded, when completed :

a) **If the undersea feature is located <u>inside the external limit</u> of the territorial sea**:-
to your "National Authority for Approval of Undersea Feature Names" (see page 2-9) or, if this does not exist or is not known, either to the IHB or to the IOC (see addresses below);

b) **If at least 50 % of the undersea feature is located <u>outside the external limits</u> of the territorial sea**:-
to the IHB or to the IOC, at the following addresses :

International Hydrographic Bureau (IHB)	Intergovernmental Oceanographic Commission (IOC)

4, Quai Antoine 1er B.P. 445 MC 98011 MONACO CEDEX Principality of MONACO Fax: +377 93 10 81 40 E-mail: info@ihb.mc	UNESCO Place de Fontenoy 75700 PARIS France Fax: +33 1 45 68 58 12 E-mail: info@unesco.org



Commonly used names of volcanoes on the southern Kermadec volcanic arc, north of the Bay of Plenty, New Zealand (from CEJ de Ronde, ET Baker, GJ Massoth, JE Lupton, IC Wright, RA Feely, RR. Greene, 2001. Intra-oceanic subduction-related hydrothermal venting, Kermadec volcanic arc, New Zealand. Earth and Planetary Science Letters 193, 359-369). Hydrothermally active sites, vent hot water, are shown with red circles.

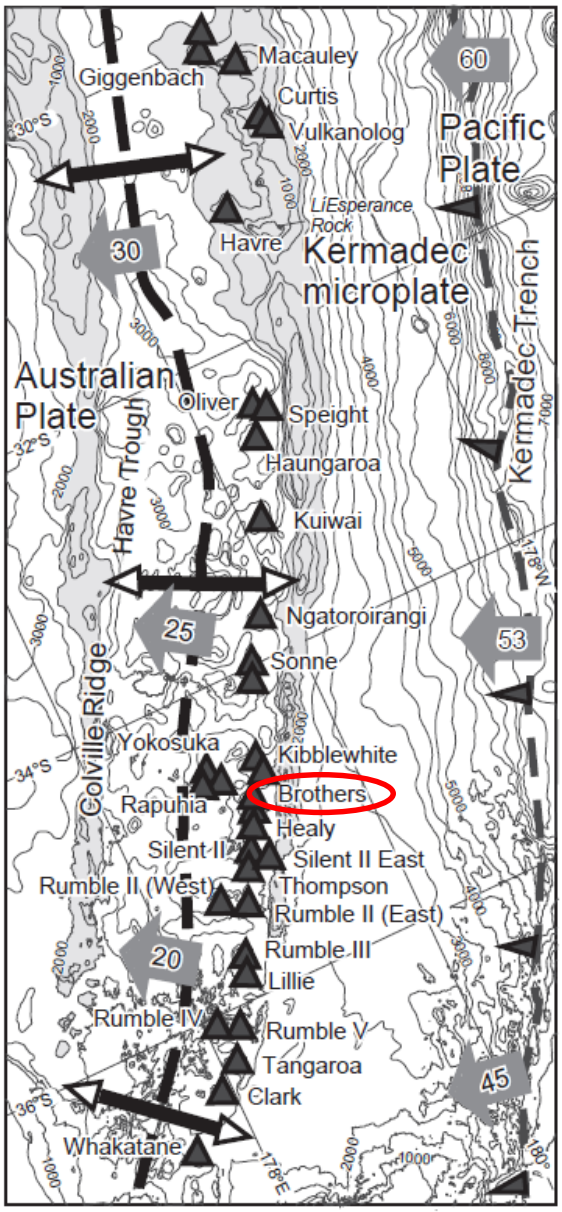
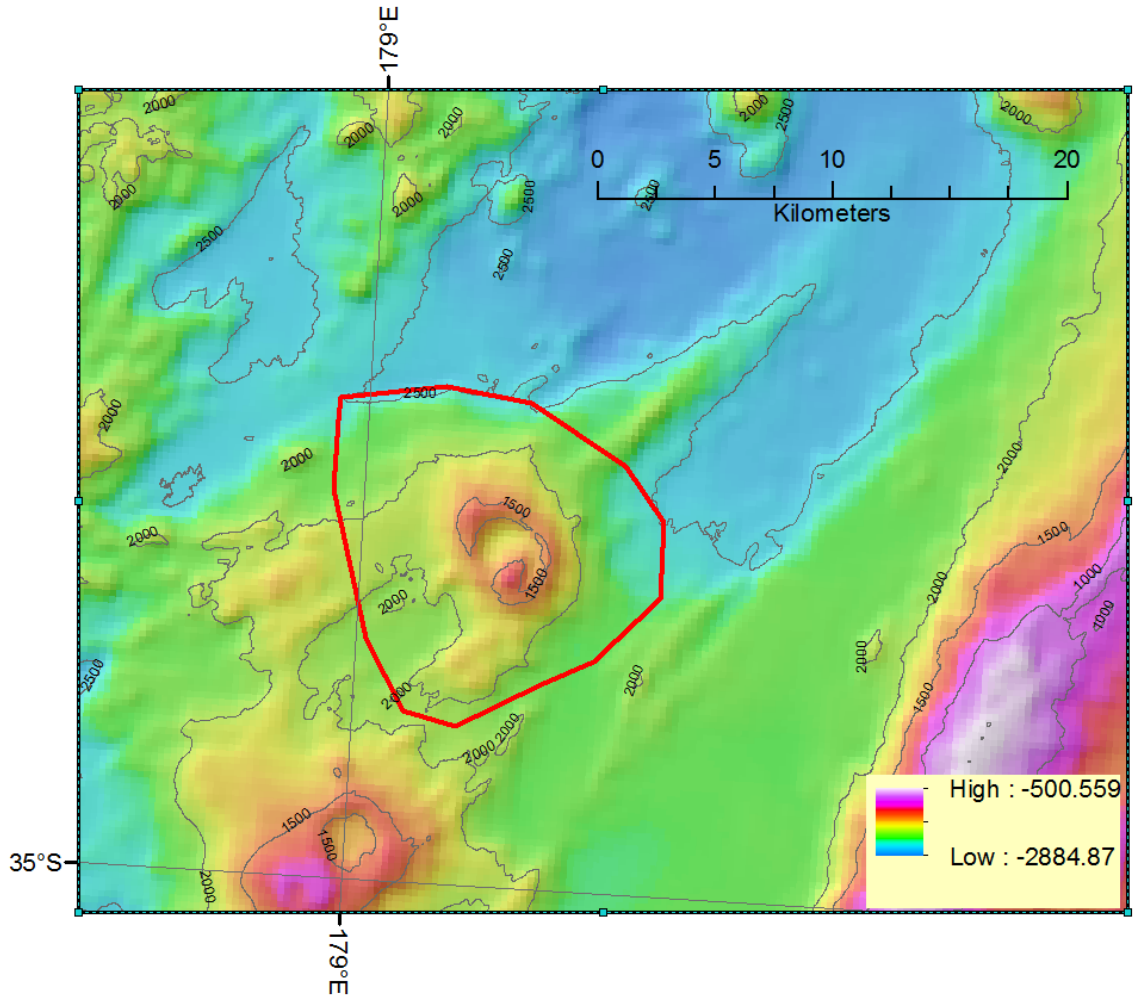
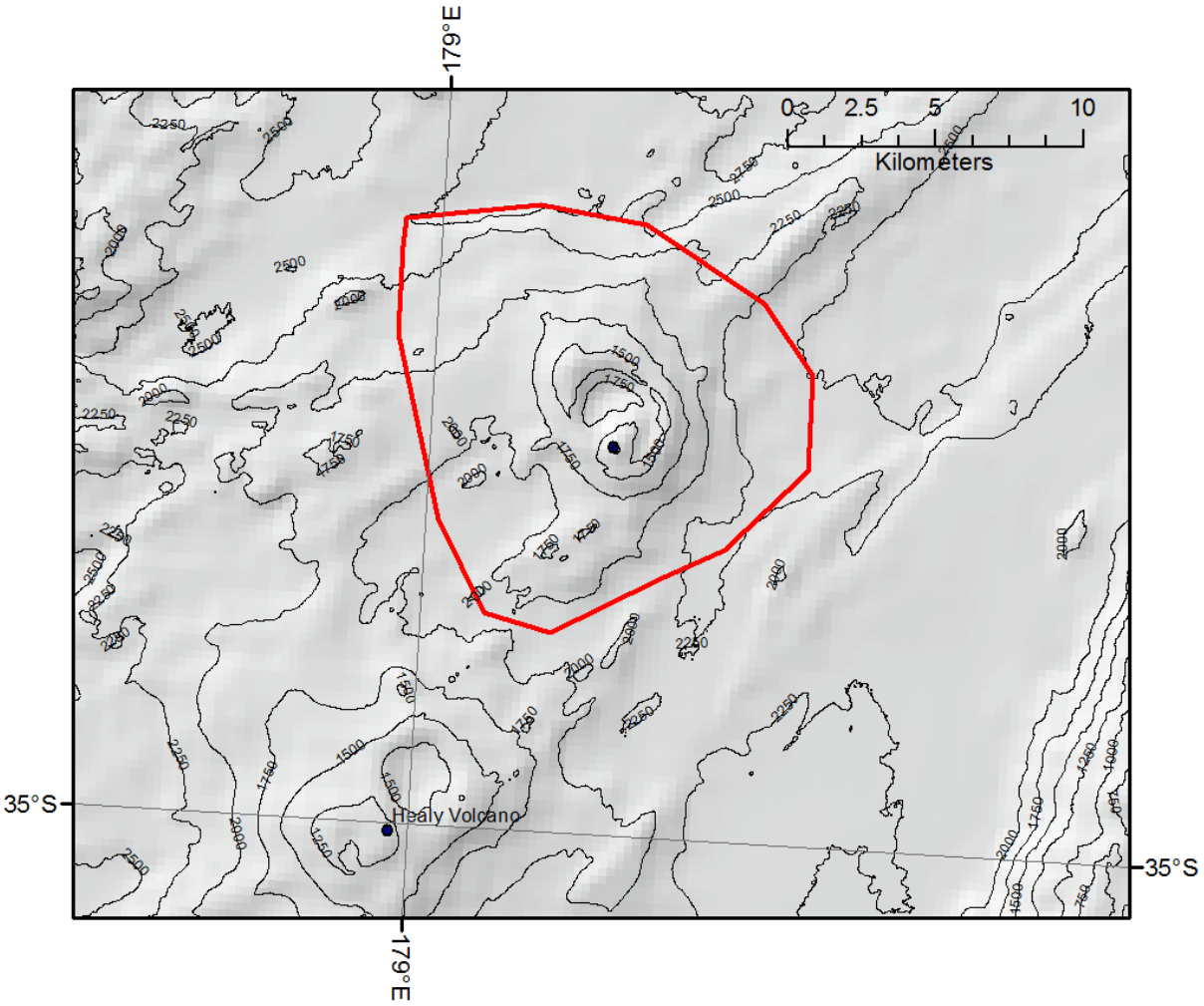


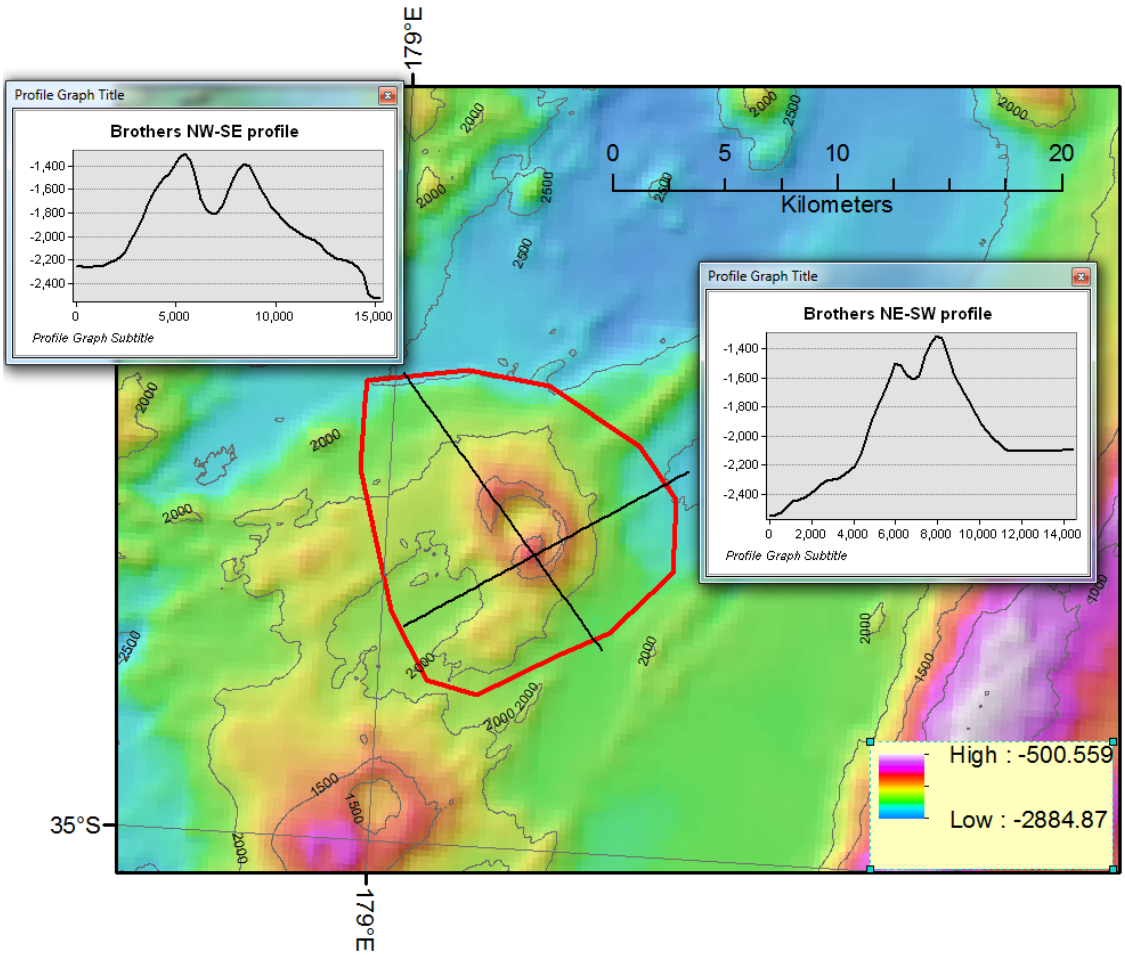
Fig. 2A of Wright et al 2006. Regional setting of the southern and central Kermadec subduction system, including newly discovered volcanoes (closed triangles) of the arc front [including Brothers]. Dashed lines show location of the subduction and extensional plate boundaries, east and west of the Kermadec microplate, respectively, with grey arrows showing estimated relative Pa–Ke and Ke–Au plate motion in millimeters per annum.



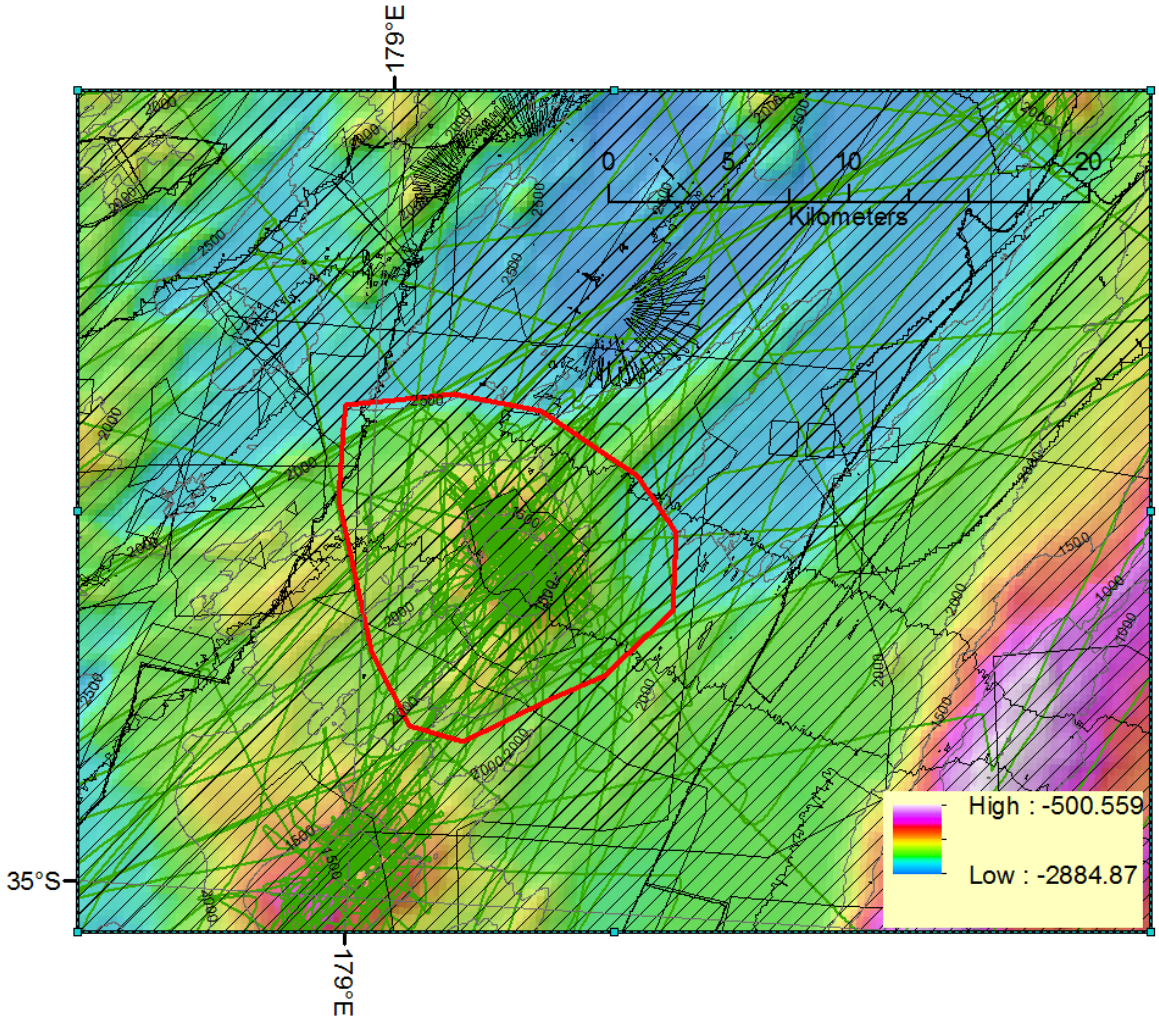
Bathymetry (350m grid) of Brothers Seamount and polygon around the feature



Bathymetry contours on hillshade background



Bathymetry of Brothers Seamount and profiles of the feature. Summit elevation is 1197 m



Data coverage

Cross-hatch = multibeam bathymetry coverage

Dark green = single beam bathymetry data

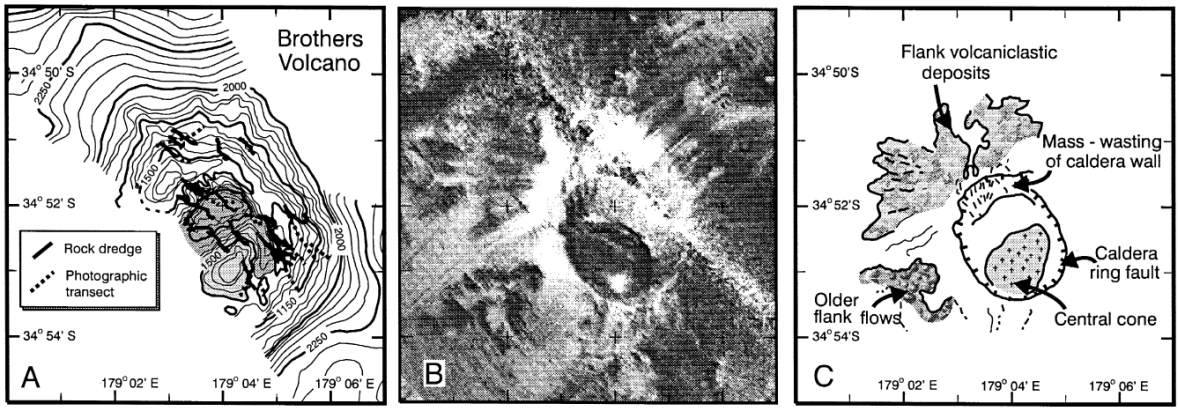


Fig. 2. Brothers volcano; (A) Bathymetry, and seafloor dredge and photographic transects, (B) MR1 imagery with dark areas as regions of high acoustic backscatter, and (C) Geological interpretation of swath and photographic data.

Source: IC Wright & JA Gamble (1999). Southern Kermadec submarine caldera arc volcanoes (SW Pacific): caldera formation by effusive and pyroclastic eruption. Marine Geology 161, 207–227

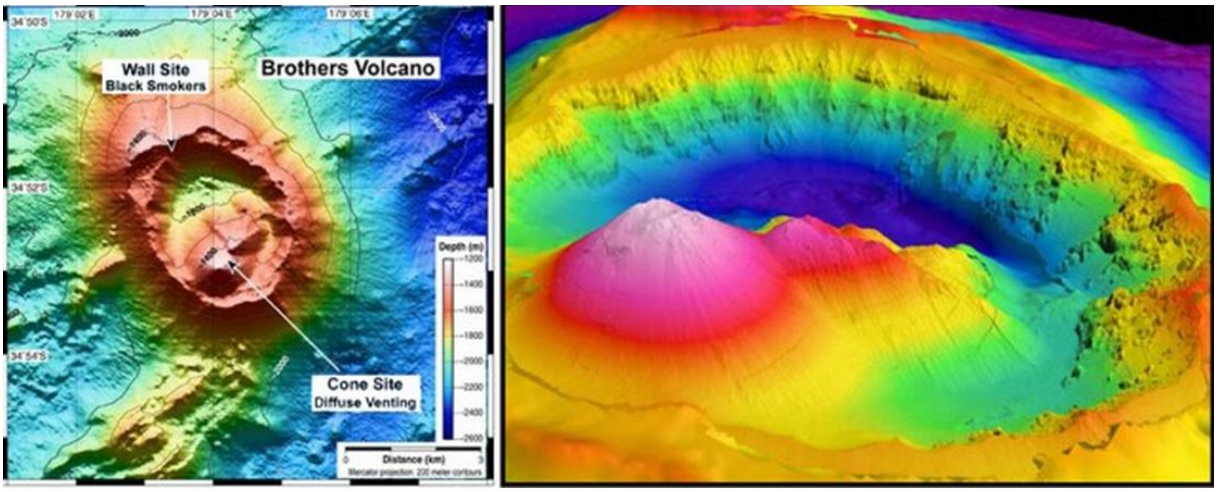
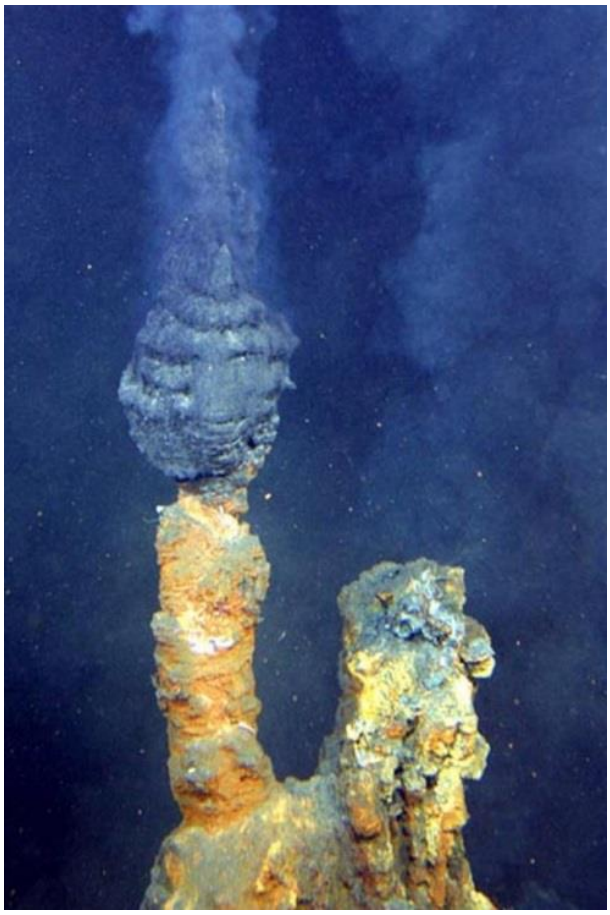


Figure 2. (Left) A bathymetric map based on EM 300 multibeam soundings and depicting Brothers with a contour interval of 200 m. Much of the sea floor surrounding the edifice at distances of several kilometers away lies below 2,200 m depth. Much of the volcano's rim lies at ~ 1,400 m depth. Fluids as hot as 300°C vented at the two identified hydrothermal areas. (Right) An oblique, three-dimensional view of Brothers looking NW (with 3-fold vertical exaggeration) in a graphic prepared at the end of the 2007 cruise. The caldera's dimensions are 3-by-4 km. Although a vertical scale corresponding to the shading is absent, the large cone in the left foreground rises ~ 350 m above the caldera floor. Both that summit crater and the smaller cone to the NE (right) discharged hydrothermal emissions. The rough, sometimes blocky material exposed along the caldera wall consists of older, pre-caldera lavas and other volcanic rocks. Courtesy of New Zealand American Submarine Ring of Fire 2007 Exploration.

Source: Smithsonian Institute database
Global Volcanism Program, 2007. Report on Brothers (New Zealand). In: Wunderman, R (ed.), Bulletin of the Global Volcanism Network, 32:7. Smithsonian Institution. http://dx.doi.org/10.5479/si.GVP.BGVN200707-241150.



An active hydrothermal chimney (commonly known as a "black smoker") photographed at Brothers at the NW caldera hydrothermal site during the 2007 cruise.

Source: Smithsonian Institute database
Global Volcanism Program, 2007. Report on Brothers (New Zealand). In: Wunderman, R (ed.), Bulletin of the Global Volcanism Network, 32:7. Smithsonian Institution. http://dx.doi.org/10.5479/si.GVP.BGVN200707-241150.