

# MANGANESE NODULES AND ENCRUSTATIONS IN THE VICINITY OF NEW CALEDONIA AND THE LOYALTY ISLANDS

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## DESCRIPTION OF SAMPLES AND ANALYTICAL RESULTS

During the GEORSTOM I and II cruises, a number of manganese nodules and encrustations was dredged in the New Caledonia-Loyalty Islands region. This paper describes the samples collected and presents the results of their analysis. Photographs of the nodules are shown in Figs. 1a-c and the location of the stations are shown in Fig. 2.

## STATION GO 202:

### *Position and Depth*

18°02.5'S, 160°46.7'E, 2,550-2,300 m.

### *Environment*

The slightly inclined southern flank of a small massif. Practically no sedimentation.

### *Samples*

30 kg. of dredged encrustations from 5 to 9 cm. thick, showing a mamillated outer



Fig. 1a. Manganese encrustation from station GO 202 showing upper surface of encrustation at top.

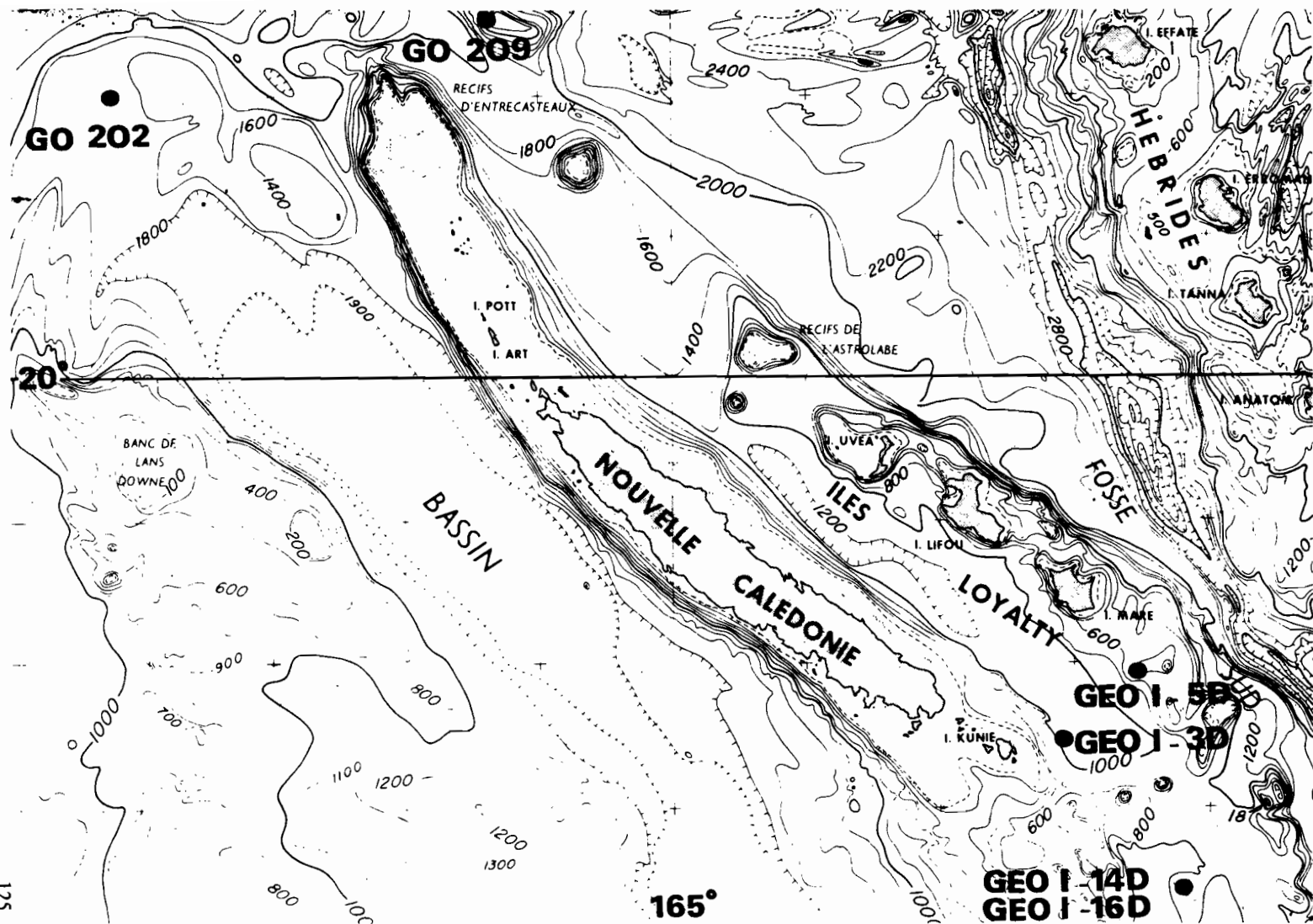


Fig. 2. Location of stations from which manganese nodules were recovered during GEORSTOM I and II cruises.

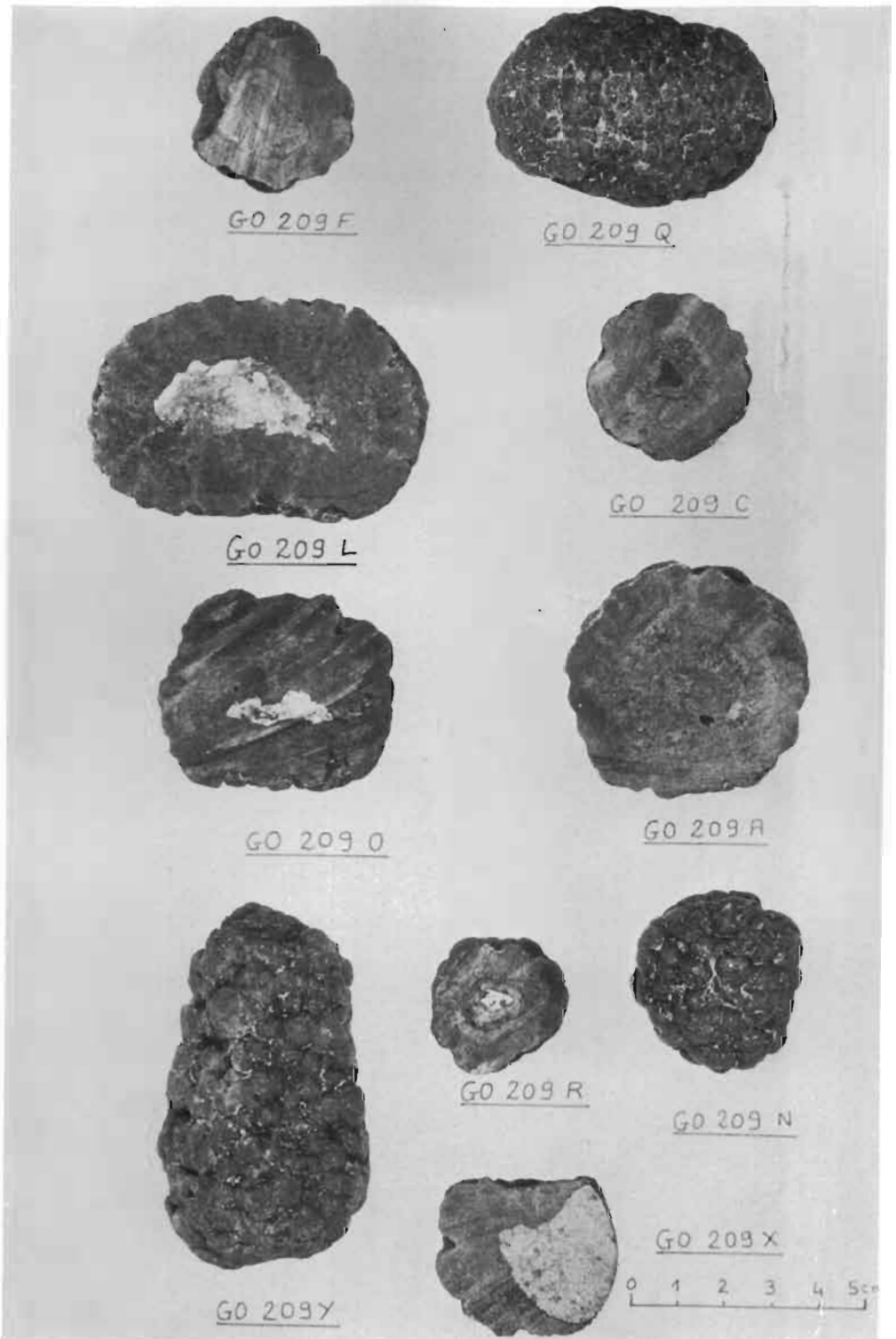


Fig. 1b. Manganese nodules recovered from dredge station GO 209 (GEORSTOM II cruise). Nodules without visible nuclei (GO 209F, GO 209C, GO 209A); nodules with calcareous nuclei (GO 209Q, GO 209L, GO 209O, GO 209R, GO 209Y, GO 209N), encrusted pebble of basalt (GO 209X).

surface, a black, unlayered external zone marked with numerous rusty-yellow patches, and a thinly-layered very black inner zone, with an irregular base surface, underlain by rusty-orange iron oxides.

#### Analysis

Analysis of a complete cross-section of encrustation: Si 7.70%, Fe 23.11%, Mn 19.85%.

#### STATION GO 209:

##### Position and Depth

17°27'S, 163°40'E, 1,300-1,320 m.

##### Environment

An isolated massif which seems to extend the Loyalty Chain-outcropping substratum.

##### Samples

5 kg. of irregularly formed, rather thin encrustations. 2 kg. of nodules, one half without visible nuclei, the other with calcareous nuclei. These nodules show a mamillated external surface and variable sphericity, especially the largest samples. Their dimensions vary between 1.5 and 7 cm. (mean 3 cm.), and the calcareous nuclei range between 0.5 and 3 cm.

##### Analysis

- A — Analysis of a complete cross-section of encrustation.
- B — Mean of the analysis of 10 nodules without visible nuclei.
- C — Mean of the analysis of 12 nodules with calcareous nuclei (These analyses have been made on half nodules with nuclei included).

%	Loss on												
	Ignition	Si	Al	Fe	Mn	Ca	Mg	K	Na	Ni	Cr	Co	Cu
A	18.13	2.56	1.20	18.64	22.95	3.18	1.32	0.36	1.64	0.33	0.0016	0.598	0.070
B	15.18	5.94	1.93	17.58	20.78	2.02	1.57	0.42	1.95	0.38	0.0033	0.449	0.101
C	15.54	5.39	1.88	17.36	20.26	2.98	1.51	0.38	1.52	0.39	0.0031	0.469	0.103



Fig. 1c. Encrusted pebbles of basalt from station GEO I. 16D.

#### STATIONS GEO 1.3D-1.16D:

##### Position and Depth

GEO 1.3D	22°33.0'S,	167°57.8'E,	1,875 m.
GEO 1.5D	22°05.4'S,	168°30.0'E,	800 m.
GEO 1.14D	23°33.0'S,	168°48.5'E,	1,450-1,200 m.
GEO 1.16D	23°38.5'S,	168°50.6'E,	1,200 m.

##### Environment

Southern extension of the Loyalty Chain (GEO 1.5D) and of the New Caledonia Ridge (other samples). Thin sediment covering (sedimentary breccias with volcanic elements and detrital limestones), outcropping substratum.

##### Samples

Encrusted pebbles of basic eruptive rocks (gabbros, basalts). The dimensions of the pebbles vary between 4 and 20 cm.; the thickness of the manganese encrustations varies between 1 and 2 cm.

*Analysis*

A — Encrustation of a pebble (GEO 1.3D).

B — Mean of the analysis of 3

encrustations (GEO 1.5D).

C — Mean of the analyses of 8 encrustations (GEO 1.14D and GEO 1.16D).

	<i>Loss on</i>							
%	<i>Ignition</i>	<i>Si</i>	<i>Fe</i>	<i>Mn</i>	<i>Ni</i>	<i>Cr</i>	<i>Co</i>	<i>Cu</i>
A	14.40	6.46	32.20	10.56	0.42	0.0030	0.48	0.09
B	15.80	3.25	24.03	14.84	0.36	0.0036	0.37	0.12
C	16.10	3.21	25.10	19.86	0.51	0.0028	0.65	0.11

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