Figure Captions

Figure 1. Major physiographic features and active plate boundaries of the Woodlark Basin region. The stippled area encloses oceanic crust formed during the Brunhes Chron at spreading rates (labeled in mm/yr). MT and ST = Moresby and Simbo transform faults, respectively; DE = D'Entrecasteaux Islands. Inset, geographical location of the Woodlark Basin.

Figure 2. Topography of the Papuan Peninsula and bathymetry of the western Woodlark Basin showing relocated epicenters (black circles) and earthquake focal mechanisms from Abers et al. (1997). G = Goodenough Island, F = Fergusson Island, N = Normanby Island, R = Rossel Island, T = Tagula Island, MS = Moresby Seamount, MT = Moresby transform fault, M = Misima Island, W = Woodlark Island. Exploration wells Goodenough-1 and Nubiam-1 are labeled G-1 and N-1. The solid line is the landward boundary of oceanic crust and the thin double lines locate the spreading axes (Taylor et al., 1995).

Figure 3. Nested meridional sections at 151°34.5´E showing the (**A**) regional bathymetry and (**B**) local structures across the incipient conjugate margins (modified after Taylor et al., 1996). Leg 180 drill sites are depicted on the B section. VE = vertical exaggeration; M.S. = Moresby Seamount.

Figure 4. Stacked, migrated, and depth-converted 196-channel (EW95-1369) and 148-channel (EW95-1374) seismic sections collected with a 5-km streamer across the rift basin north of Moresby Seamount that is the locus of current deformation ahead of the Woodlark spreading center (the western tip of the neovolcanic zone is hatched in the inset). There is no vertical exaggeration. The bounding low-angle normal detachment wraps around Moresby Seamount and has a true dip of 27°± 3° toward 015°. Structure contours from 3 to 9 km depth are shown in the inset, with bathymetric contours labeled in hundreds of meters. The antithetic hanging wall normal fault dips south at 45°. On line EW95-1369 the planar detachment (curvi-planar in three dimensions) is imaged over the full depth extent of the seismogenic zone (3–9 km) determined from earthquake waveform inversion results (Abers et al., 1997). Miocene strata on the southern flank of the pre-rift forearc basin dip north at ~10% beneath the northern margin. Figure modified from Taylor et al., (unpubl. data**)** to show the location of Sites 1108, 1112, and 1113.

Figure 5. Stacked and migrated time section of 148-channel seismic line EW95-1366, located in Figure 7, on which Sites 1109–1111, 1114–1116, and 1118 were drilled. Common depth points (CDPs) are labeled 1–7 (in thousands). The top and bottom parts overlap by 100 CDPs (1.25 km). North is to the right.

Figure 6. Stacked and migrated time section of 196-channel seismic line EW95-1371, located in Figure 7, on which Site 1117 was drilled. CDPs are labeled 1–4 (in thousands). Four hundred CDPs equals 5 km. North is to the right.

Figure 7. Shaded relief map showing the locations of the Leg 180 drill sites and multichannel seismic tracks, plotted on a base map with 200-m bathymetric contours (thicker contours labeled every kilometer).

Figure 8. Multibeam bathymetry map (with 100-m contours and thicker contours labeled every kilometer) showing the locations of the Leg 180 drill sites in the vicinity of Moresby Seamount. Multichannel seismic tracks are plotted and labeled every 100 CDPs.

Figure 9. Lithology and correlation of Sites 1108, 1109, 1115, and 1118 from the footwall of the Woodlark rift basin.

Figure 10. Core photograph illustrating the transition facies from diabase, interpreted as a clast in conglomerate, overlain by shallow-marine conglomerates and limestone.

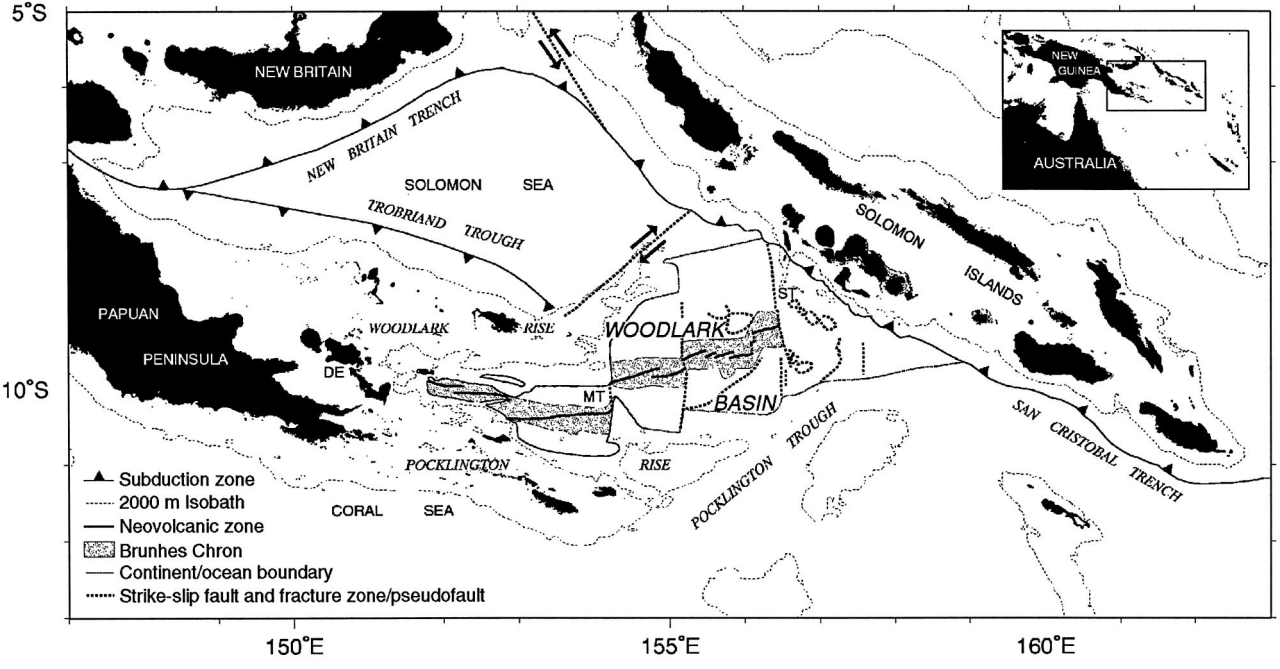
5°S
10°S
150°E
155°E
160°E
NEW BRITAIN
NEW BRITAIN TRENCH
SOLOMON SEA
TROBRIAND TROUGH
PAPUAN PENINSULA
WOODLARK RISE
WOODLARK BASIN
DE
MT
ST
SOLOMON ISLANDS
SAN CRISTOBAL TRENCH
POCKLINGTON RISE
POCKLINGTON TROUGH
CORAL SEA
NEW GUINEA
AUSTRALIA
Subduction zone
2000 m Isobath
Neovolcanic zone
Brunhes Chron
Continent/ocean boundary
Strike-slip fault and fracture zone/pseudofault

Figure 1

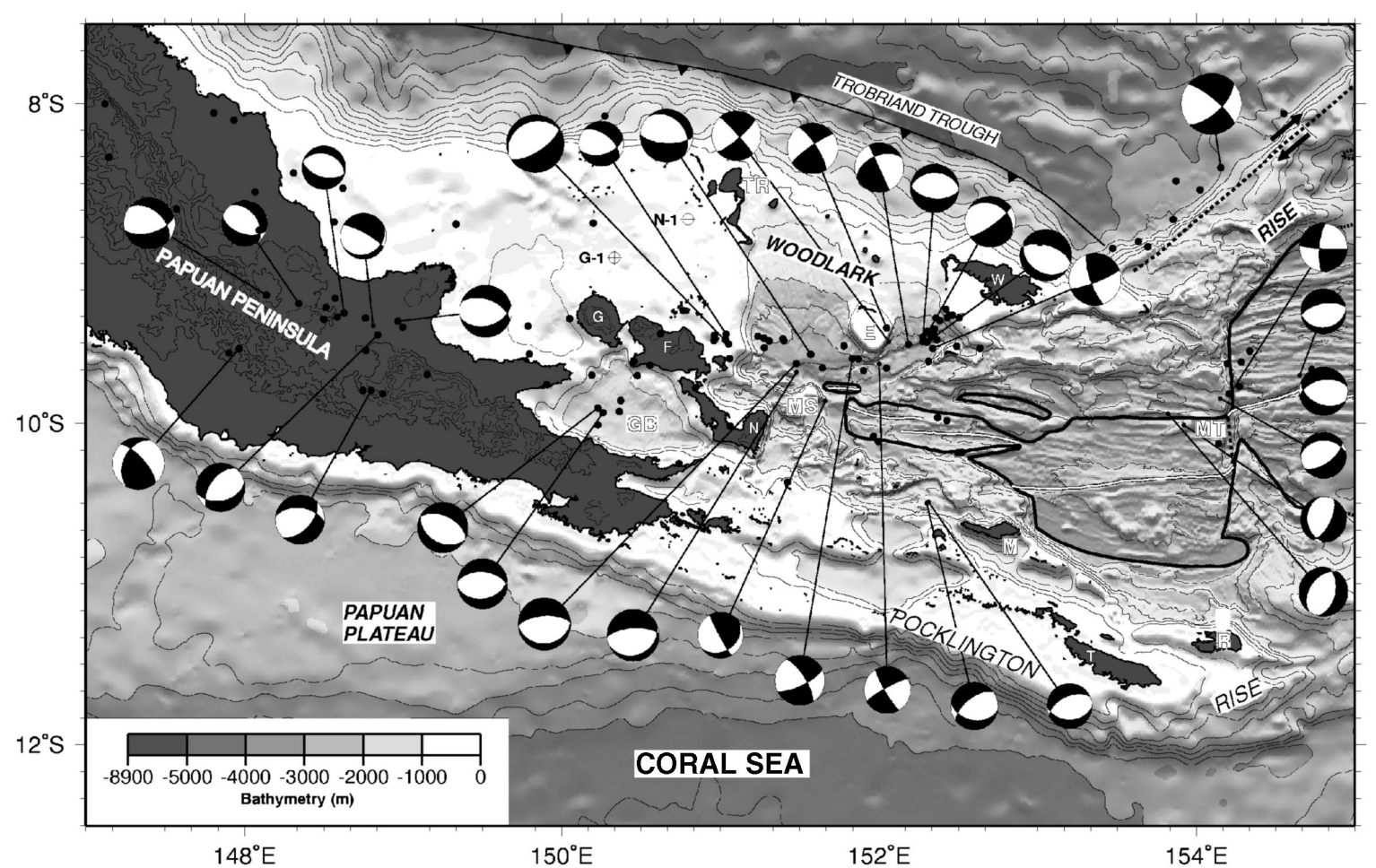
8°S
10°S
12°S
148°E
150°E
152°E
154°E
TROBRIAND TROUGH
RISE
WOODLARK
PAPUAN PENINSULA
PAPUAN PLATEAU
POCKLINGTON
RISE
CORAL SEA
N-1
G-1
TR
W
E
G
F
GB
N
MS
MT
M
R
-8900 -5000 -4000 -3000 -2000 -1000 0
Bathymetry (m)

Figure 2

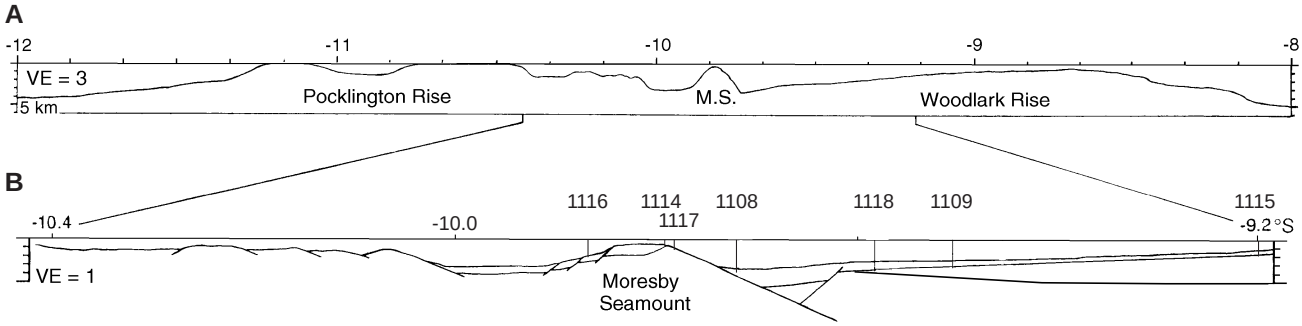
A
-12
-11
-10
-9
-8
VE = 3
5 km
Pocklington Rise
M.S.
Woodlark Rise
B
-10.4
-10.0
1116
1114
1117
1108
1118
1109
1115
-9.2°S
VE = 1
Moresby
Seamount

Figure 3

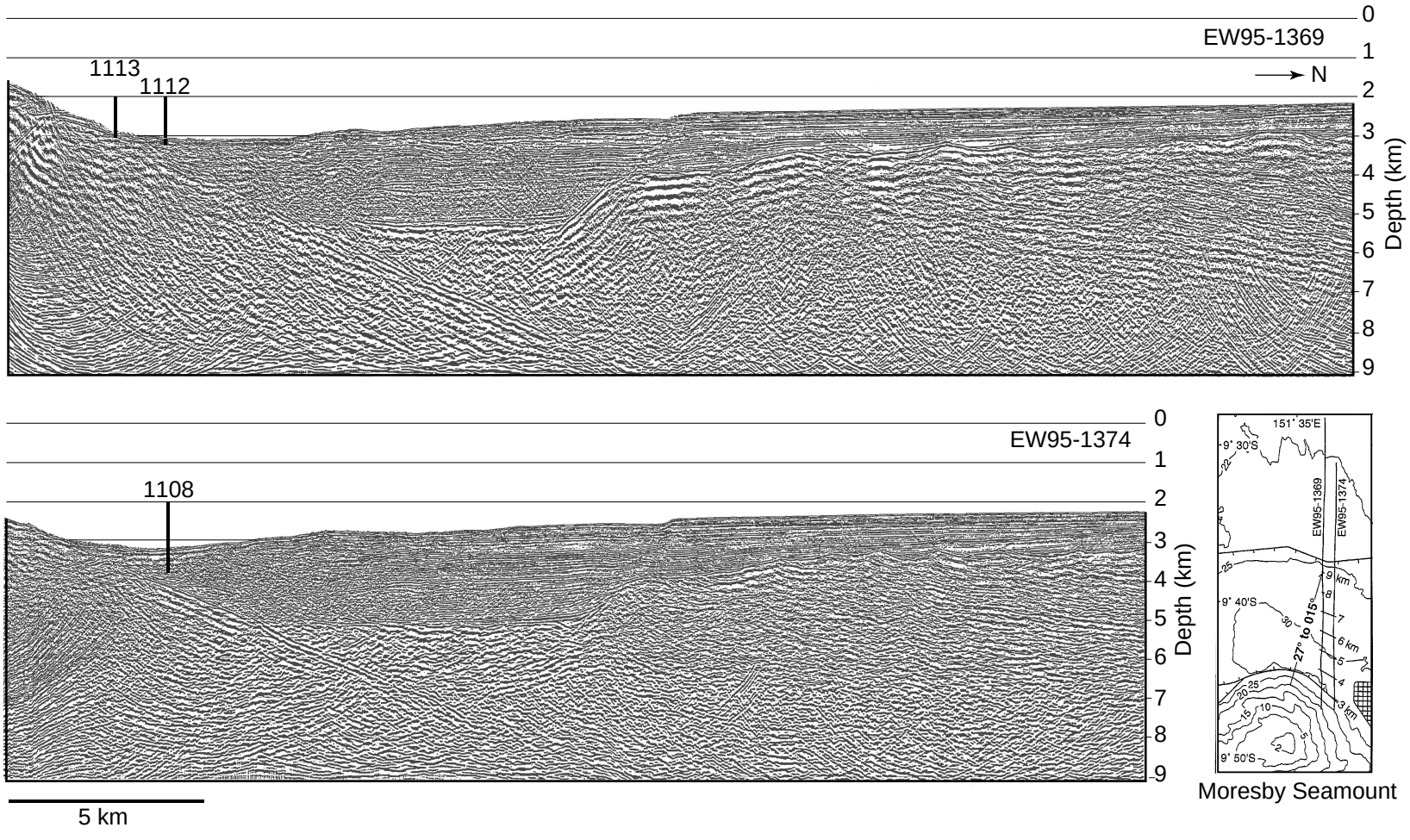
EW95-1369
N
1113
1112
0
1
2
3
4
5
6
7
8
9
Depth (km)
EW95-1374
1108
0
1
2
3
4
5
6
7
8
9
Depth (km)
5 km
151° 35'E
9° 30'S
9° 40'S
9° 50'S
EW95-1369
EW95-1374
9 km
7
6 km
5
4
3 km
27° to 015°
Moresby Seamount

Figure 4

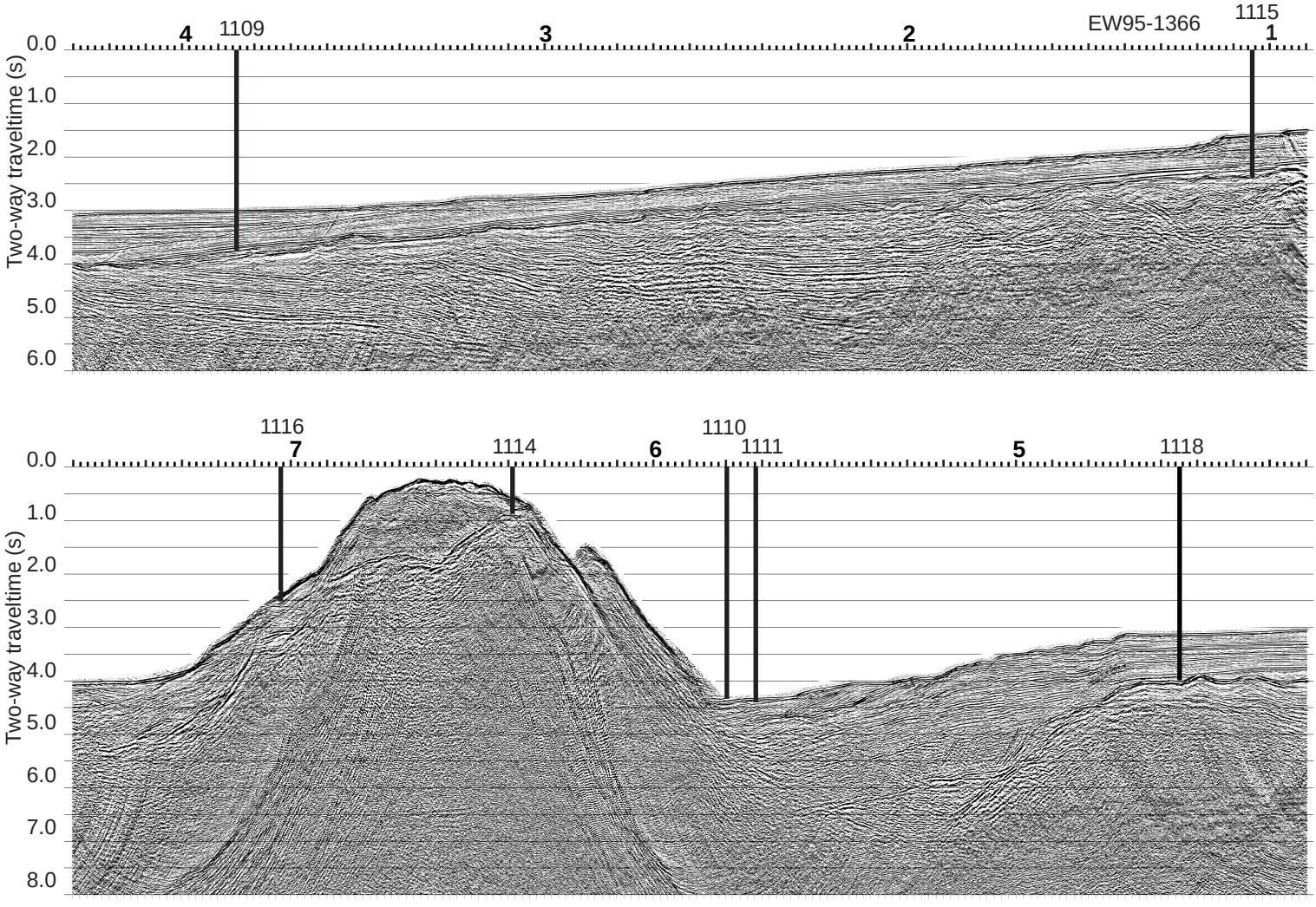
4
1109
3
2
EW95-1366
1115
1
Two-way traveltime (s)
0.0
1.0
2.0
3.0
4.0
5.0
6.0
1116
7
1114
6
1110
1111
5
1118
Two-way traveltime (s)
0.0
1.0
2.0
3.0
4.0
5.0
6.0
7.0
8.0

Figure 5

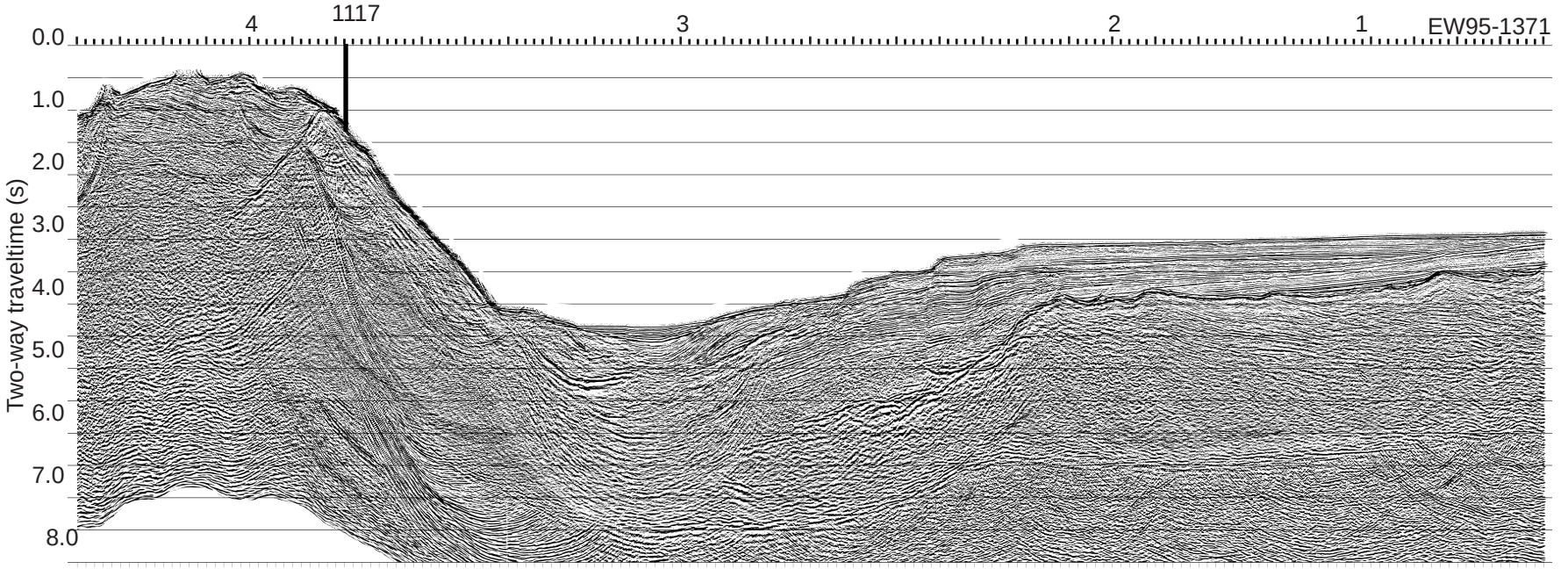
4
1117
3
2
1
EW95-1371
0.0
1.0
2.0
3.0
4.0
5.0
6.0
7.0
8.0
Two-way traveltime (s)

Figure 6

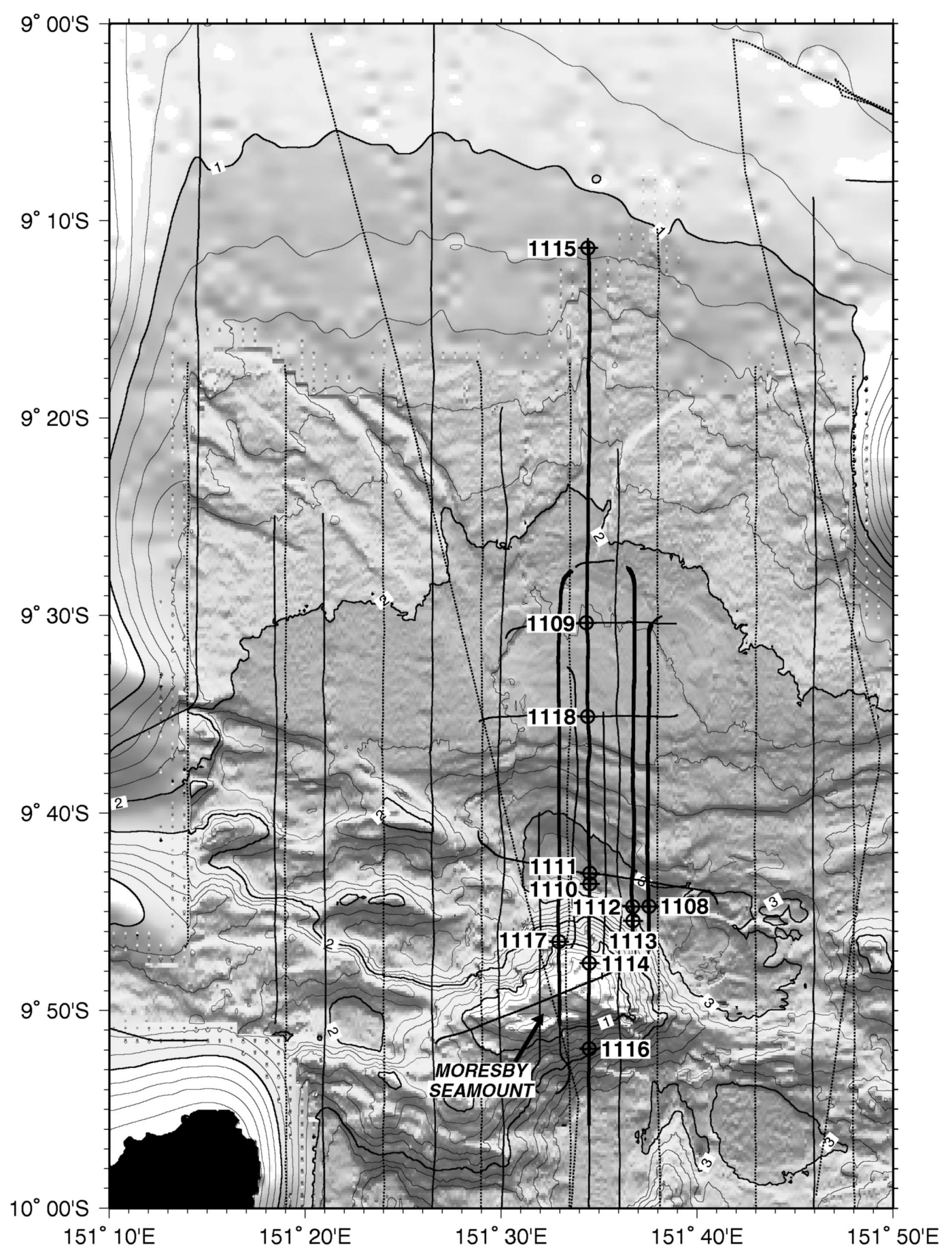
9° 00'S
9° 10'S
9° 20'S
9° 30'S
9° 40'S
9° 50'S
10° 00'S
151° 10'E
151° 20'E
151° 30'E
151° 40'E
151° 50'E
1115
1109
1118
1111
1110
1112
1108
1117
1113
1114
1116
MORESBY
SEAMOUNT

Figure 7

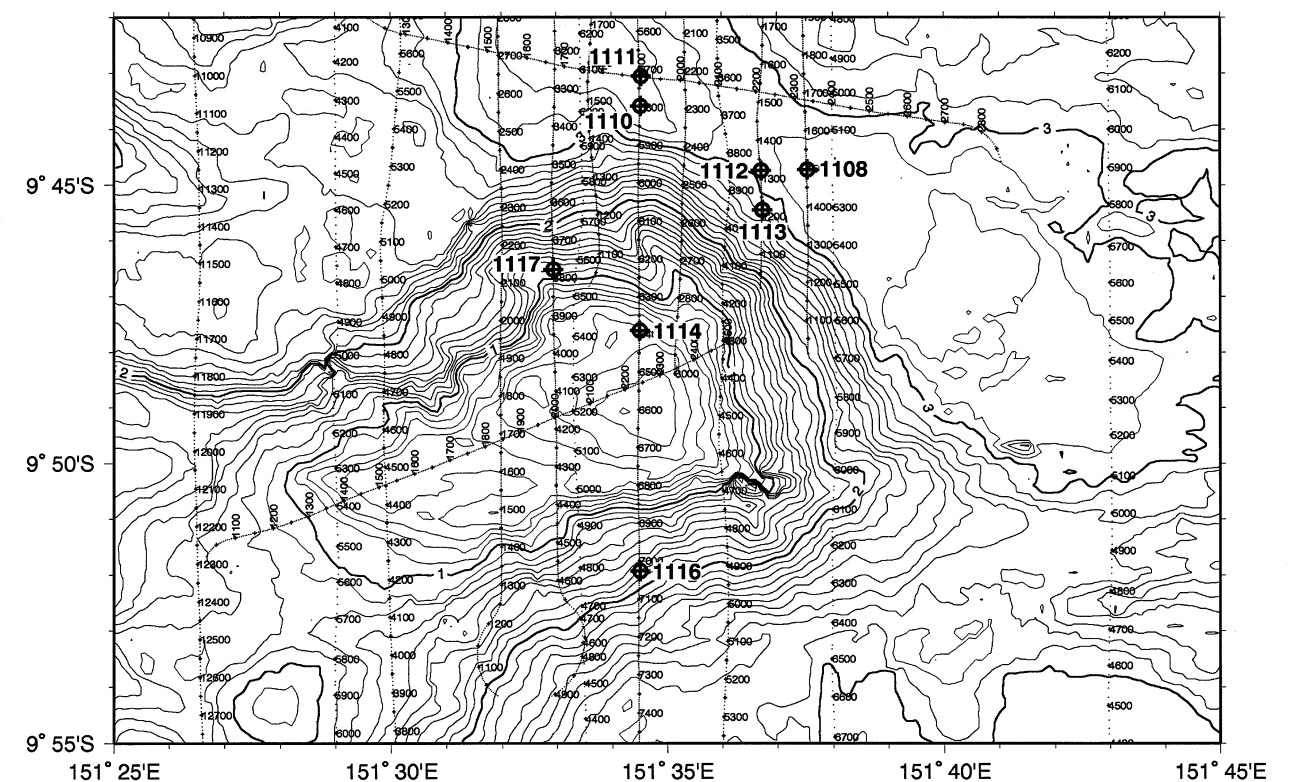
1111
1110
1112
1108
1113
1117
1114
1116
9° 45'S
9° 50'S
9° 55'S
151° 25'E
151° 30'E
151° 35'E
151° 40'E
151° 45'E

Figure 8

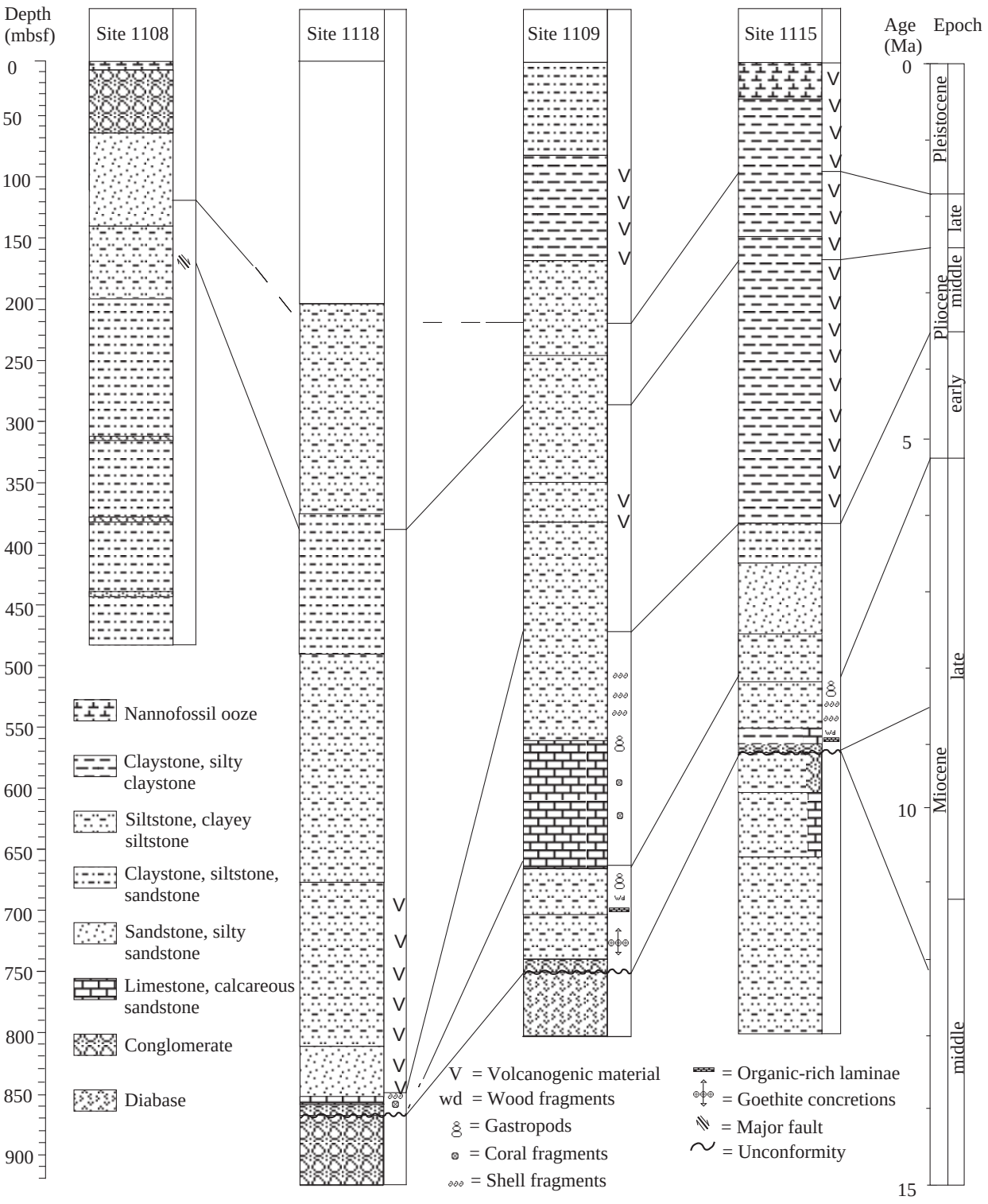
Depth (mbsf)
0
50
100
150
200
250
300
350
400
450
500
550
600
650
700
750
800
850
900
Site 1108
Site 1118
Site 1109
Site 1115
Age (Ma)
Epoch
0
5
10
15
Pleistocene
Pliocene
late
middle
early
Miocene
late
middle
Nannofossil ooze
Claystone, silty claystone
Siltstone, clayey siltstone
Claystone, siltstone, sandstone
Sandstone, silty sandstone
Limestone, calcareous sandstone
Conglomerate
Diabase
V = Volcanogenic material
wd = Wood fragments
= Gastropods
= Coral fragments
= Shell fragments
= Organic-rich laminae
= Goethite concretions
= Major fault
= Unconformity

Figure 9

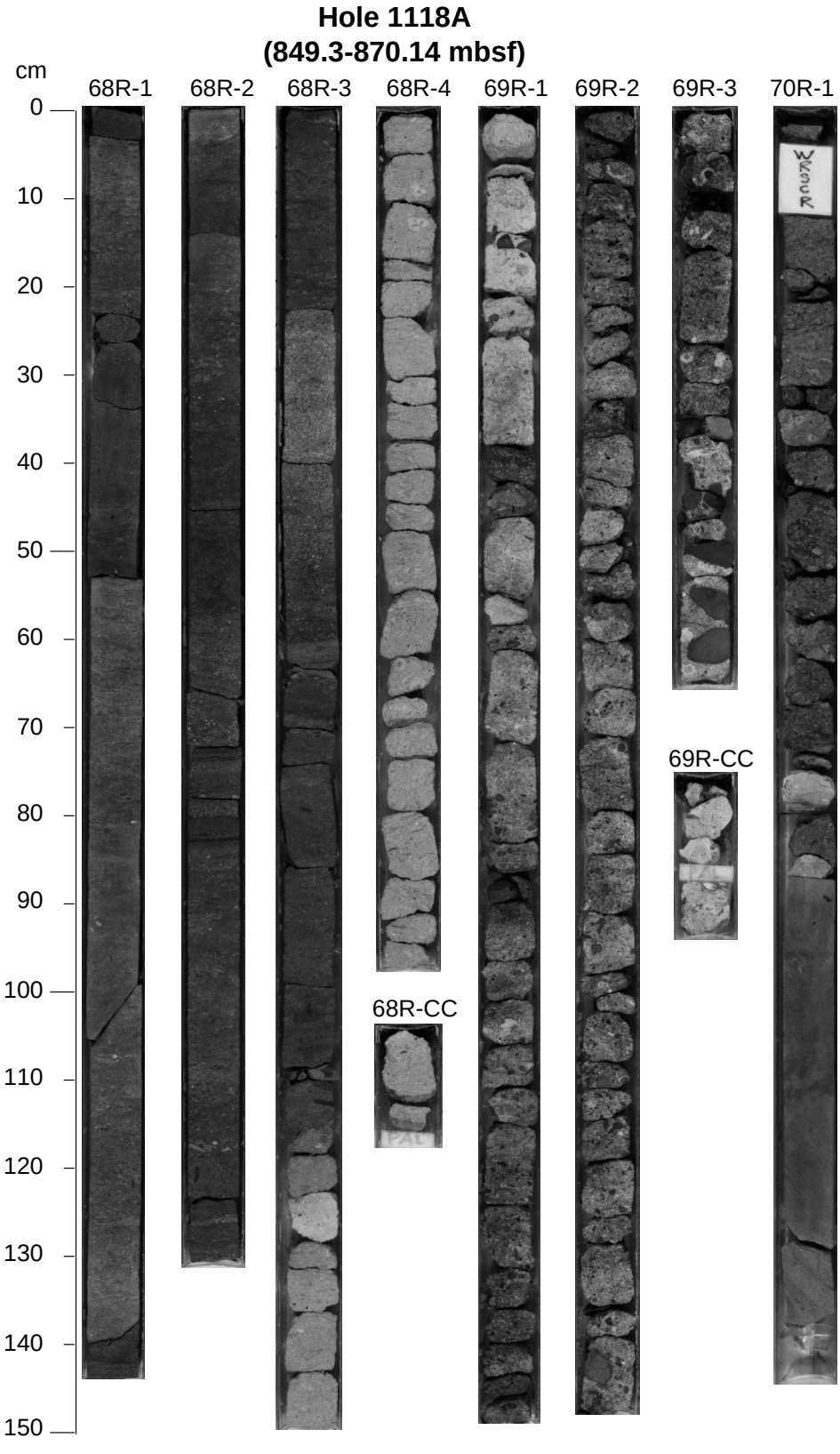
Hole 1118A
(849.3-870.14 mbsf)
cm
0
10
20
30
40
50
60
70
80
90
100
110
120
130
140
150
68R-1
68R-2
68R-3
68R-4
68R-CC
69R-1
69R-2
69R-3
69R-CC
70R-1

Figure 10