

July 2000
Seismic Reflection and Subbottom Profiler Images
from the NEMO-3 Cruise

Volume 2
Seismic Reflection Images

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1. Introduction

The data presented here were collected on the NEMO-3 cruise of the R/V Melville, from 16 May to 8 June 2000. Volume 1 of this technical report contains all the Chirp Subbottom profiler data digitally recorded and archived on NEMO-3, while Volume 2 contains all the seismic reflection data. Each data set is presented in order of Julian Day (May 16 is JD137, etc.) and includes 6 hour incremental swathmaps made on the cruise.

Seismic Reflection Parameters

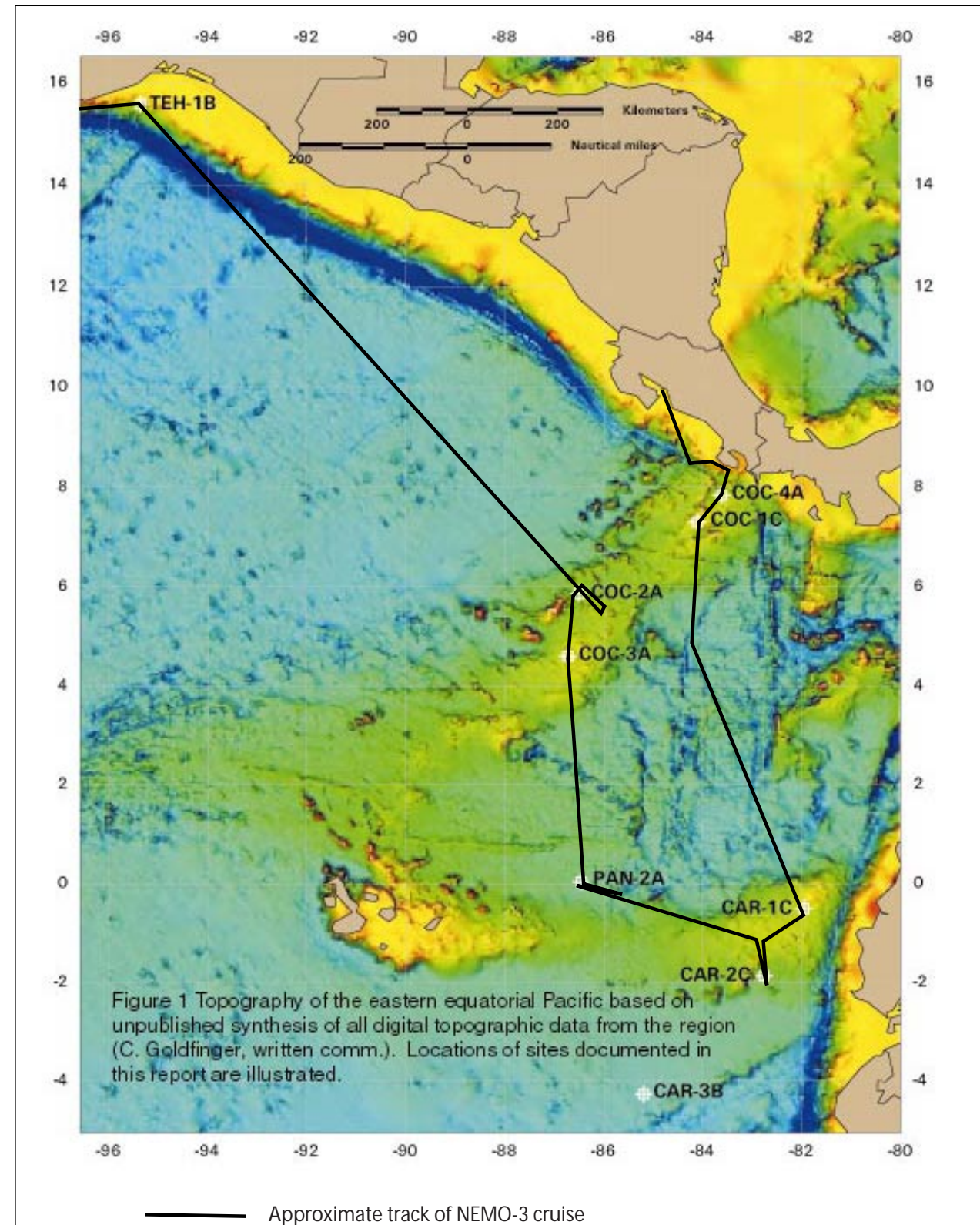
The seismic reflection data were collected using a dual 150 c.i. GI gun seismic source and using the Scripps 4-channel hydrophone streamer. The data were digitally recorded in SEG-Y format, 0.5 msec/sample, using 2 byte integers. We collected 7 seconds of data with no delay.

We merged the data with 1-second P-code GPS navigation (position is for bridge of the R/V Melville, 60 meters forward of the GI gun source or 40 m forward of the fantail). The geometry of the experiment is as follows: GI guns are towed 20 m aft of the fantail. The midpoint of channel 1 is 125 m aft of the fantail; channel 2 midpoint is 175 m aft, channel 3 midpoint is 225 m aft, and channel 4 midpoint is 275 m aft of the fantail.

The data have been stacked, and the SEG-Y file on CD is of the stacked data. Raw 4-channel data have been archived separately on DAT tapes, or for the latter part of the cruise on CD disks. The data are written without a band-pass filter. However, the plot images are shown with a 30-500 Hz bandpass filter. The processing flow is as follows: Read in the 4-channel data; add header values, as described below; define geometry of channels and source; NMO correction using a constant 1500 m/sec sound velocity; sort CDPs using $CDP=ffid - \text{channel number}$; diversity stack (to remove electrical crosstalk between chirp and seismic recording system).

The seismic data have been merged with 1 second P-code GPS data and centerbeam depth from the R/V Melville Seabeam 2000 swathmapping system. Gravity information, in unknown units from standard Scripps underway files have been written into header bytes 181-184. The merged data are in the following locations in the binary header

Variable name	Alternate var name	Byte position	Units
center beam depth	(water depth at source)	61-64	uncorrected m
Longitude	Source-X)	73-76	decimal degrees x 10**6
Latitude	(Source-Y)	77-80	decimal degrees x 10**6
time delay	(delay recording time)	109-110	milliseconds
Year		157-158	
Day		159-160	Julian days
hour		161-162	
minute		163-164	
second		165-166	
gravity		181-184	???



Seismic reflection data were collected along much of but not all of the NEMO-3 cruise track. The majority of the data were collected on the Cocos and Carnegie Ridges and within the Panama Basin. Each specific survey was given a site name, or was named as the transit leg between sites.

Sites that were given priority for drilling are described in more detail in Lyle et al. (2000) and in Mix et al. (2000)

Chirp Subbottom Profiling

We archived the correlated signal from a Knudsen 320B/R digital echo sounder after adding 1-second P-code GPS navigation and center beam depth from the R/V Melville Seabeam 2000 system. The chirp system is a swept 2-7 kHz high resolution seismic system. The data are in SEG-Y format, 0.067 sec/sample, in 2 byte fixed format.

The merged data are in the following locations in the binary header:

Variable name	alt var name	byte position	units
center beam depth	(water depth at source)	61-64	uncorrected m
Longitude	(Source-X)	73-76	decimal degrees x 10**6
Latitude	(Source-Y)	77-80	decimal degrees x 10**6
time delay	(delay recording time)	109-110	milliseconds
Year		157-158	
Day	159-160	Julian days	
hour		161-162	
minute		163-164	
second		165-166	

The chirp images are shown without the delay. They have been processed by correlation with the outgoing pulse (internal to the Knudsen) and are displayed as reflection strength (instantaneous amplitude).

References

- Lyle, M., L.M. Liberty, A. Mix, N. Pias, C. Goldfinger, D. Hulett, and A. Janik, *Site Survey Packages 4B and 4C to ODP Site Survey Panel: Site Surveys for ODP Leg 201 from the NEMO-3 cruise in support of Proposal 465-ADD1: Southeast Pacific paleoceanographic transects* (in 2 Volumes), CGISS Technical Report 2000-06, Boise, 2000.
- Mix, A., N. Pias, C. Goldfinger, M. Lyle, L.M. Liberty, A. Janik, NEMO-3 Scientific Party, D. Hebbeln, G. Wefer, and F. Lamy, *Site Survey Data Package 4, to accompany JOIDES Drilling Proposal 465-ADD1: Southeast Pacific Paleoceanographic Depth Transects*, Oregon State University, Corvallis OR, 2000.



Figure 2: Seth Mogk and one of the 150 c.i. GI guns used for seismic sources on NEMO-3.

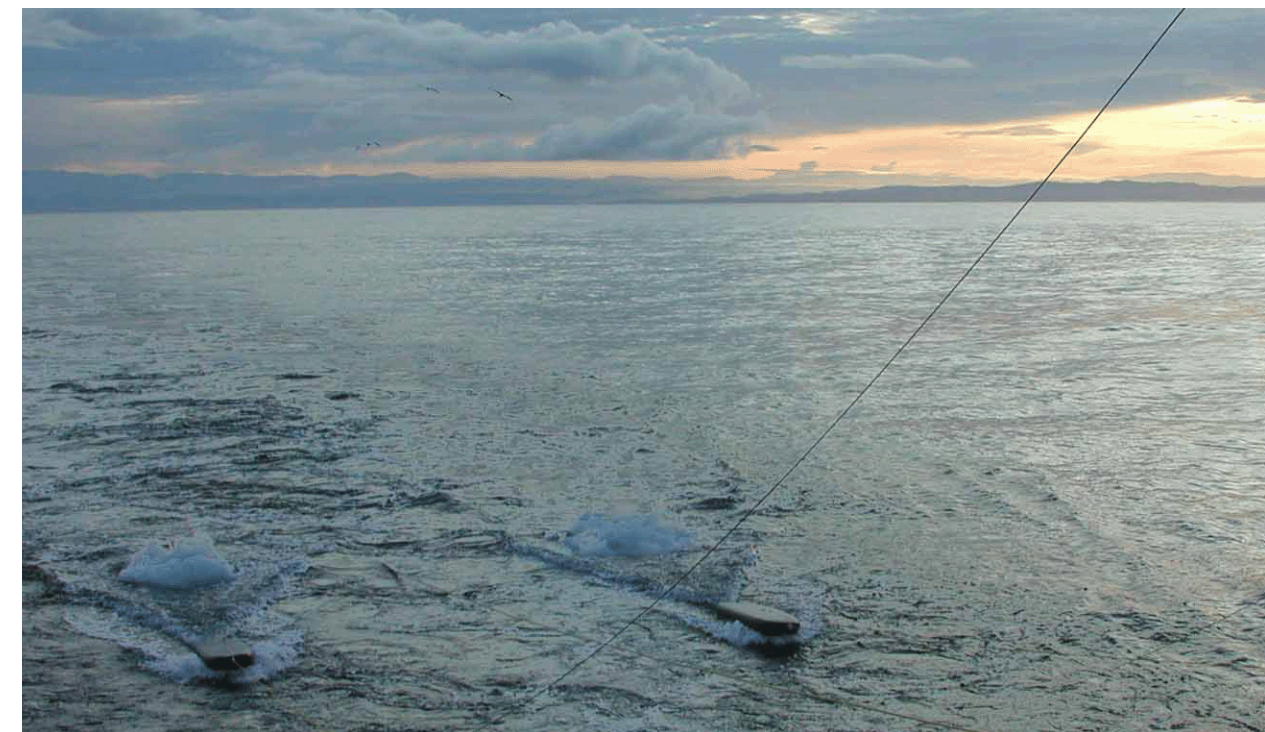


Figure 3: Towing the two GI guns beneath the high-speed "seismic surfboards", off Costa Rica, 7 June 2000.

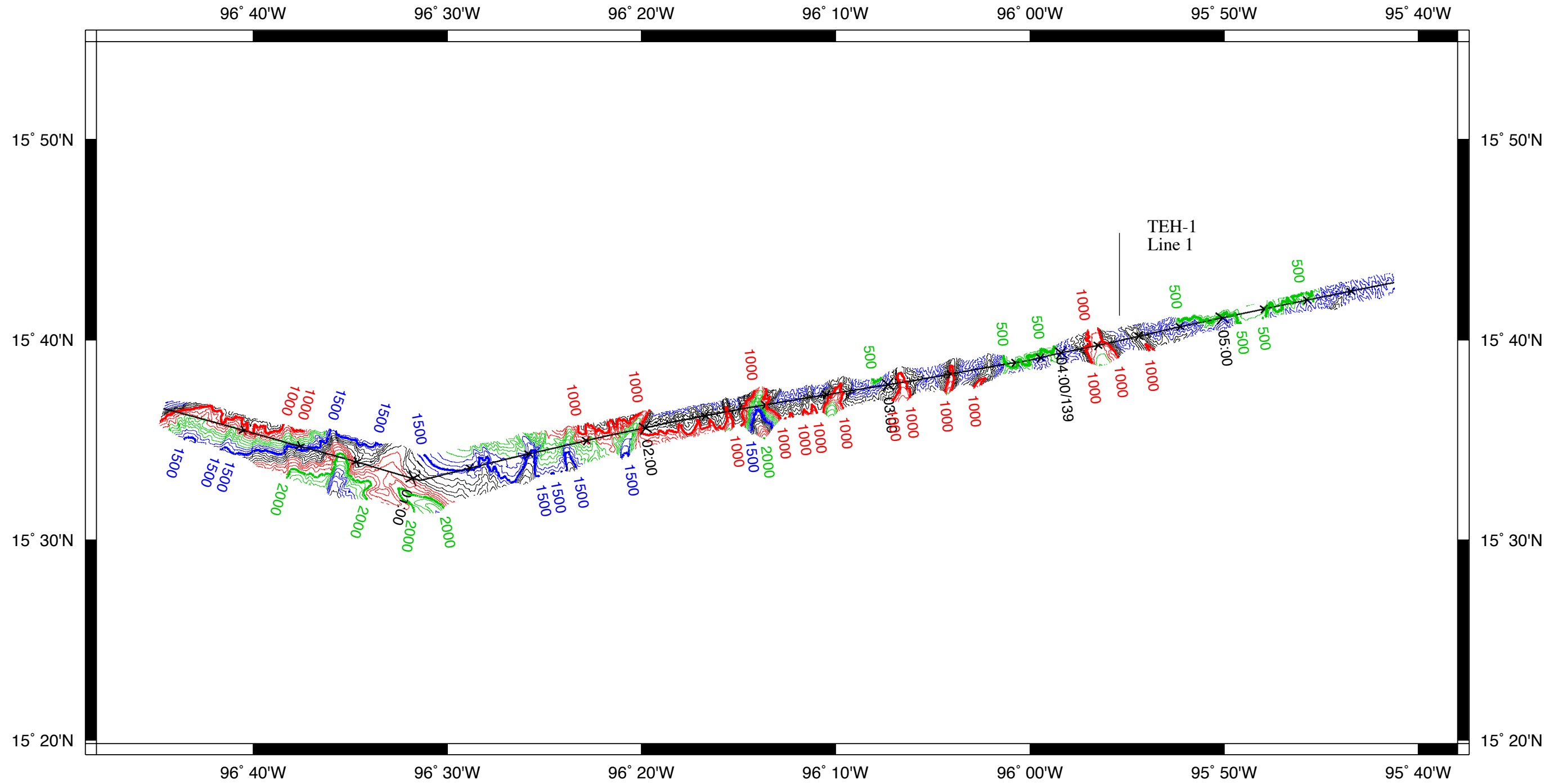
JD 139 (18 May 2000)--Begin TEH-1 Survey, Gulf of Tehuantepec

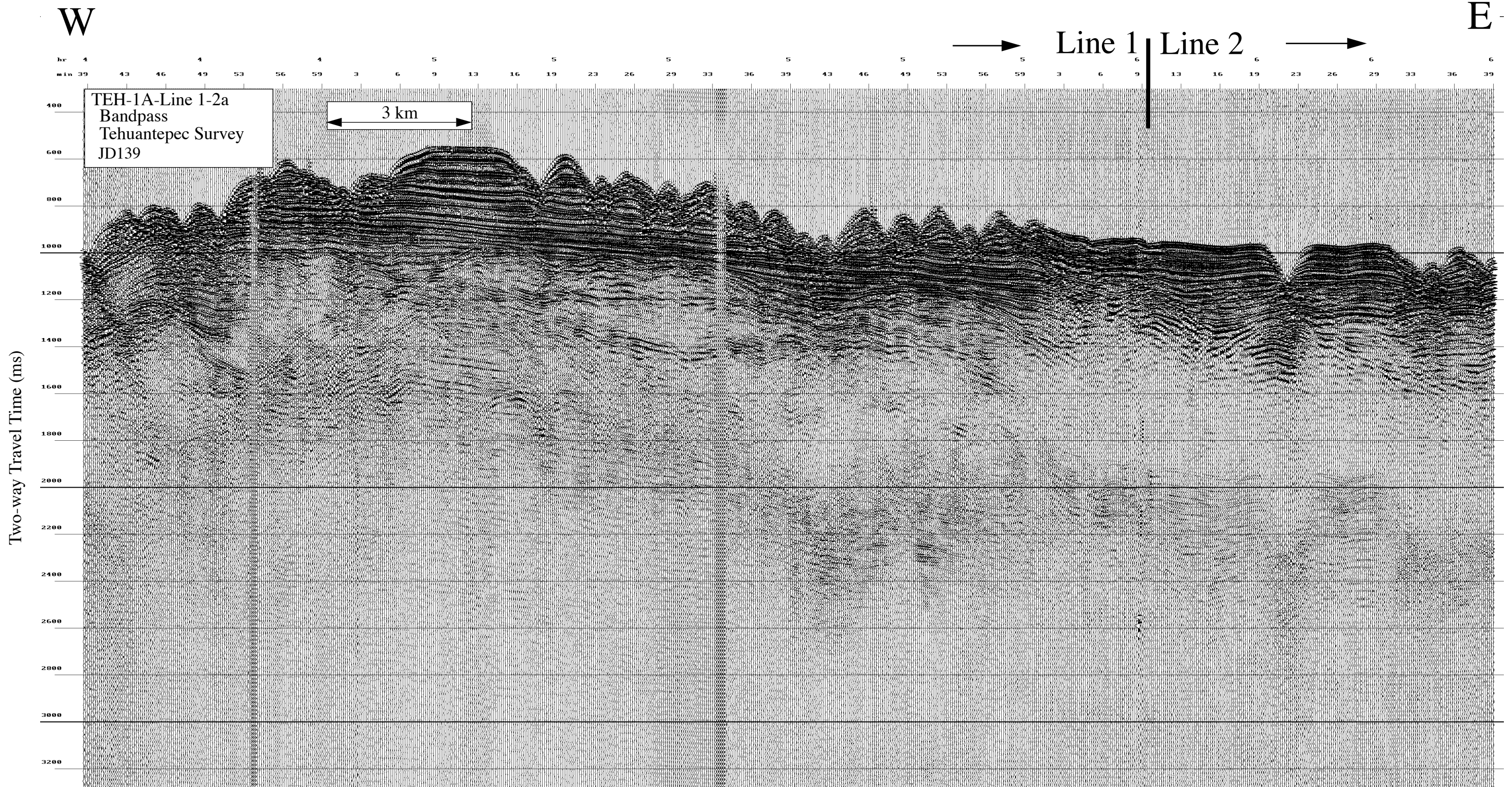
High Resolution Seismic Reflection Records

NEMO Leg 3

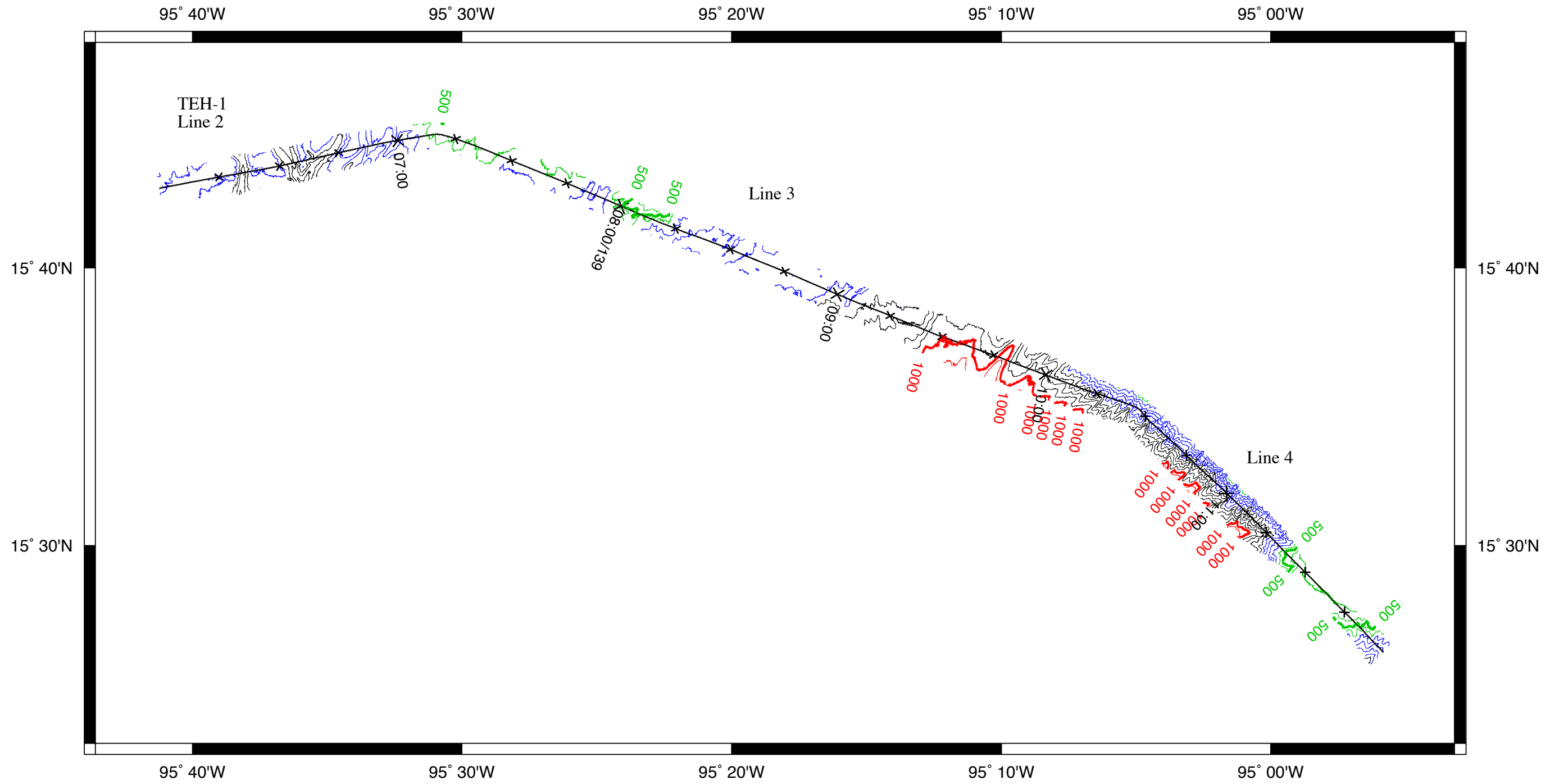
R/V Melville

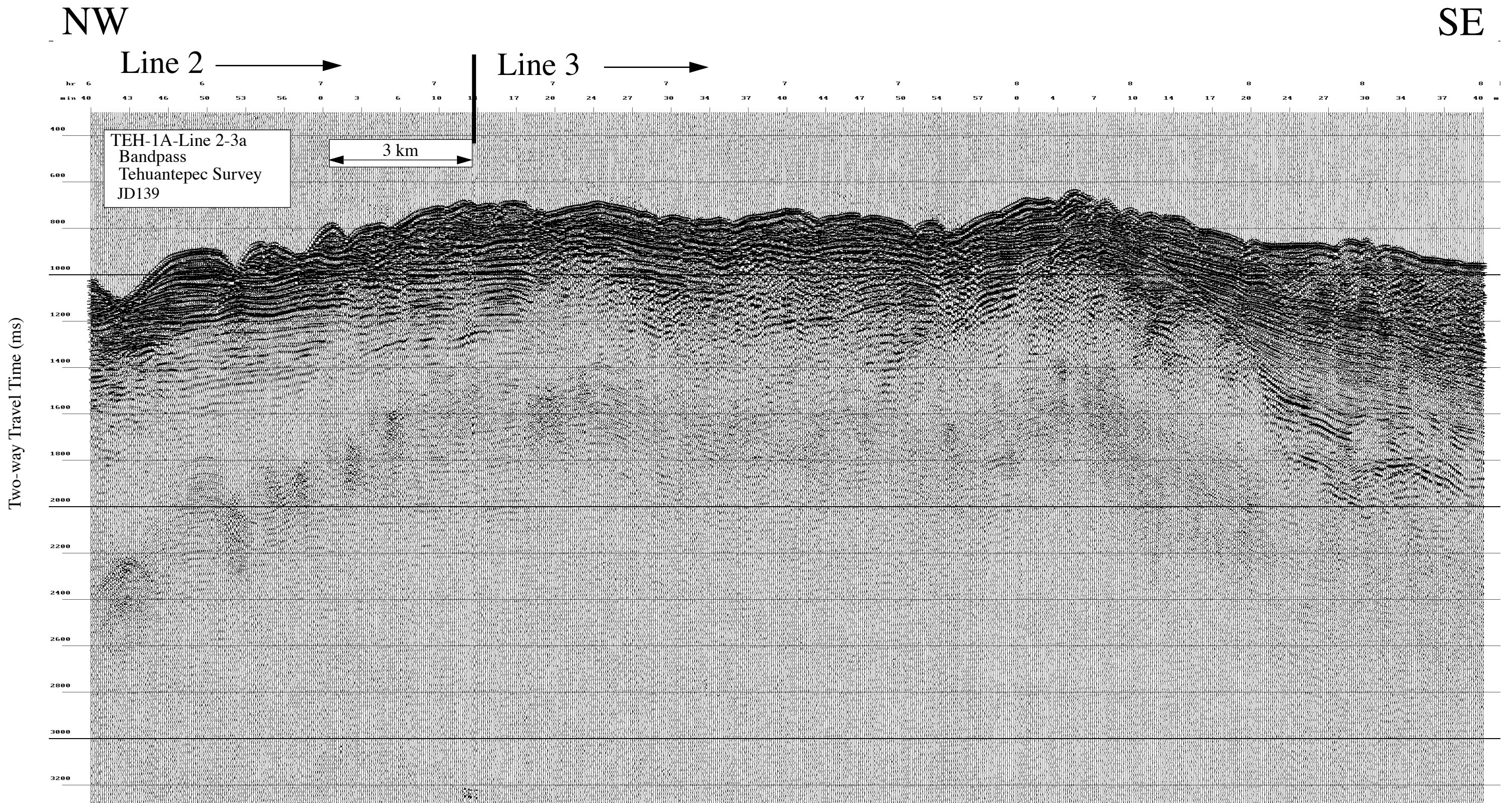
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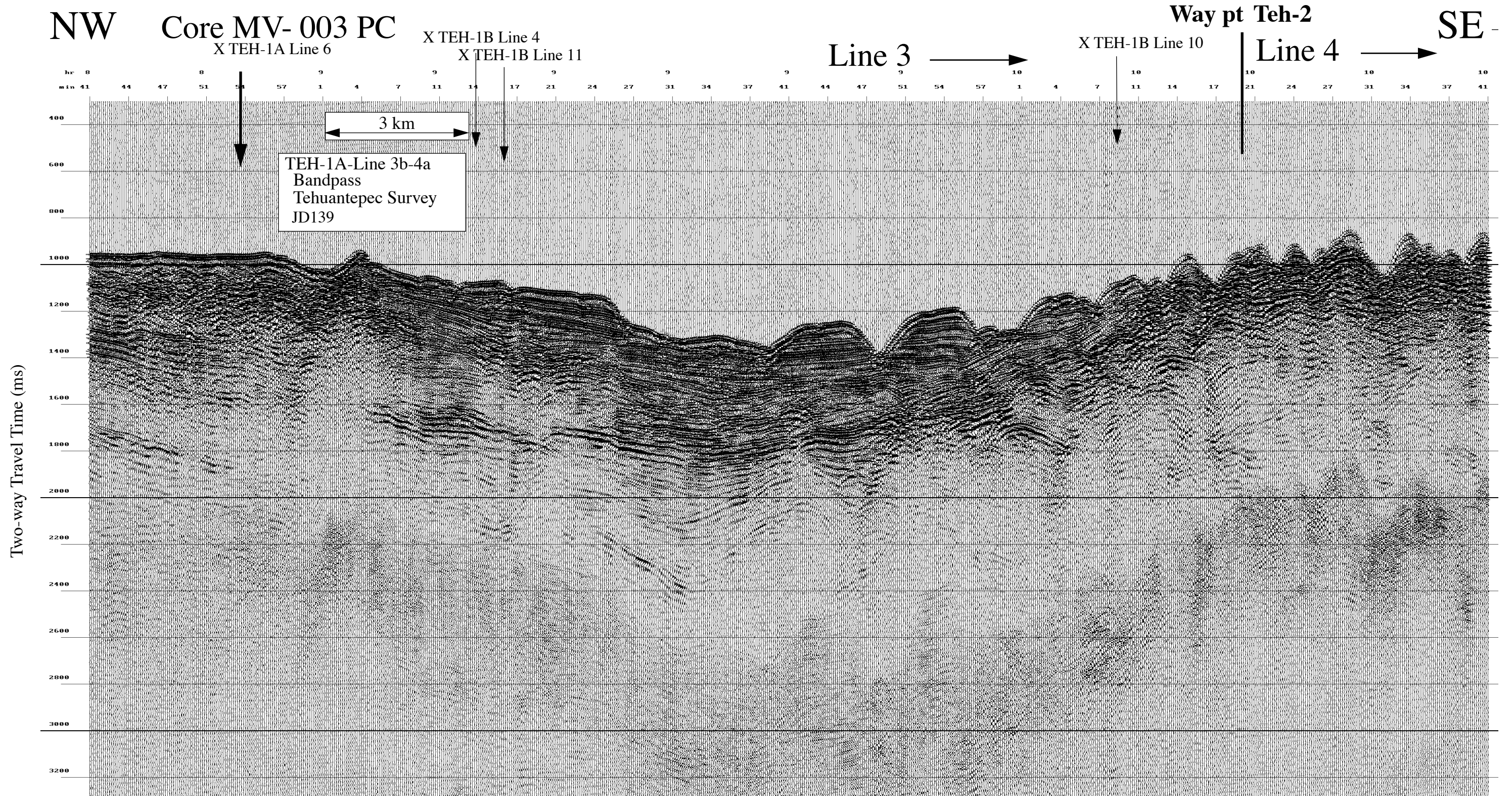


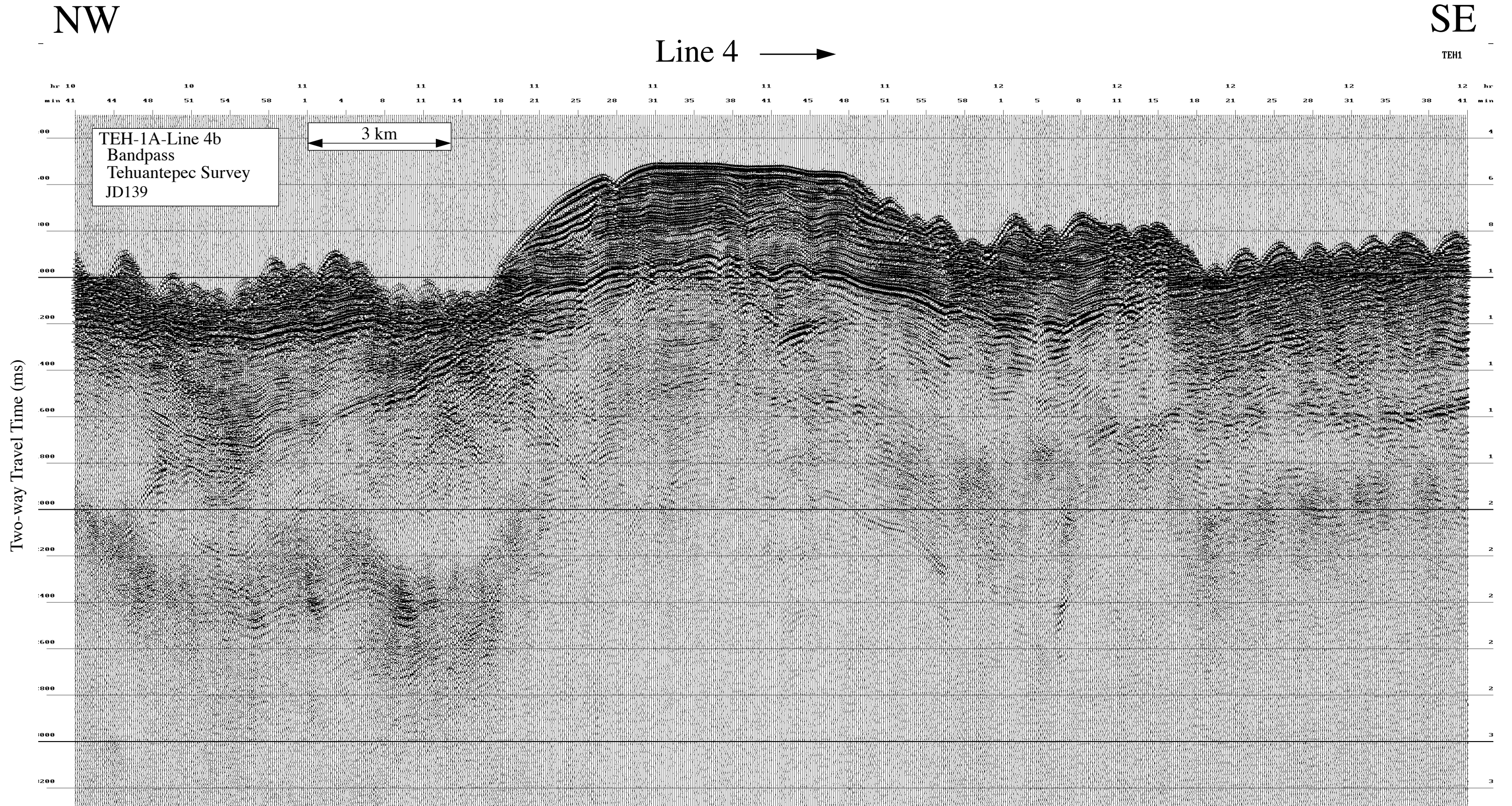


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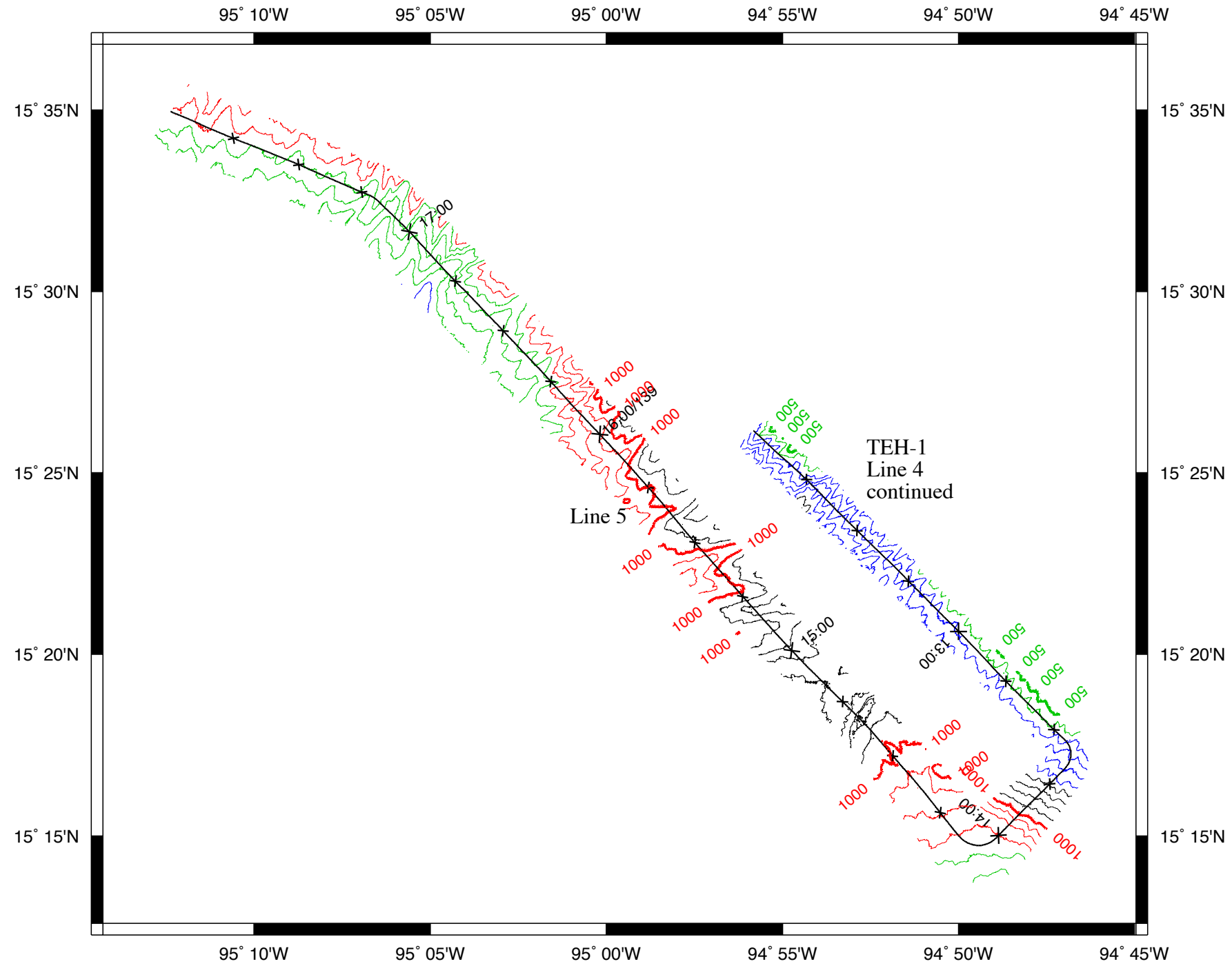






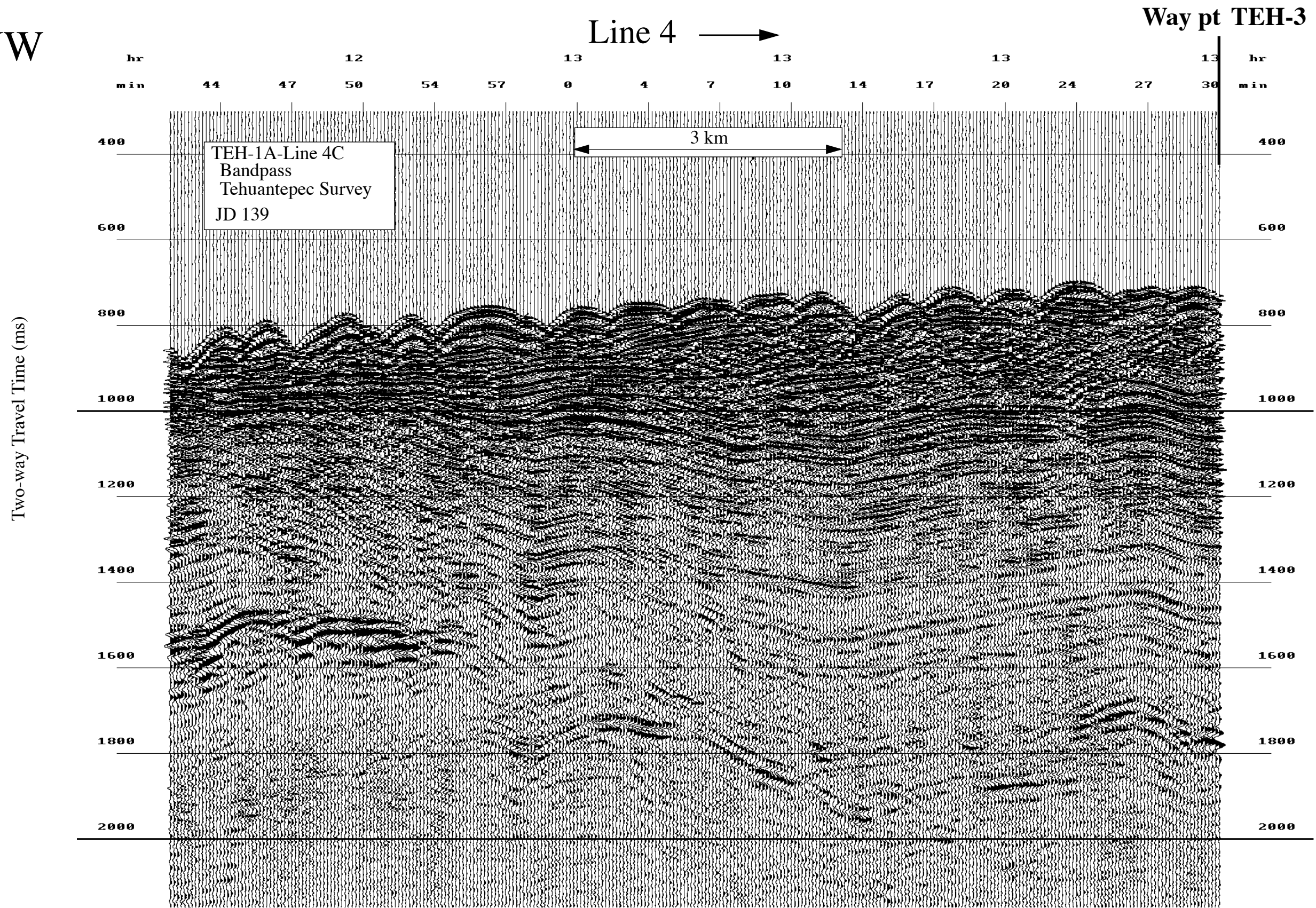


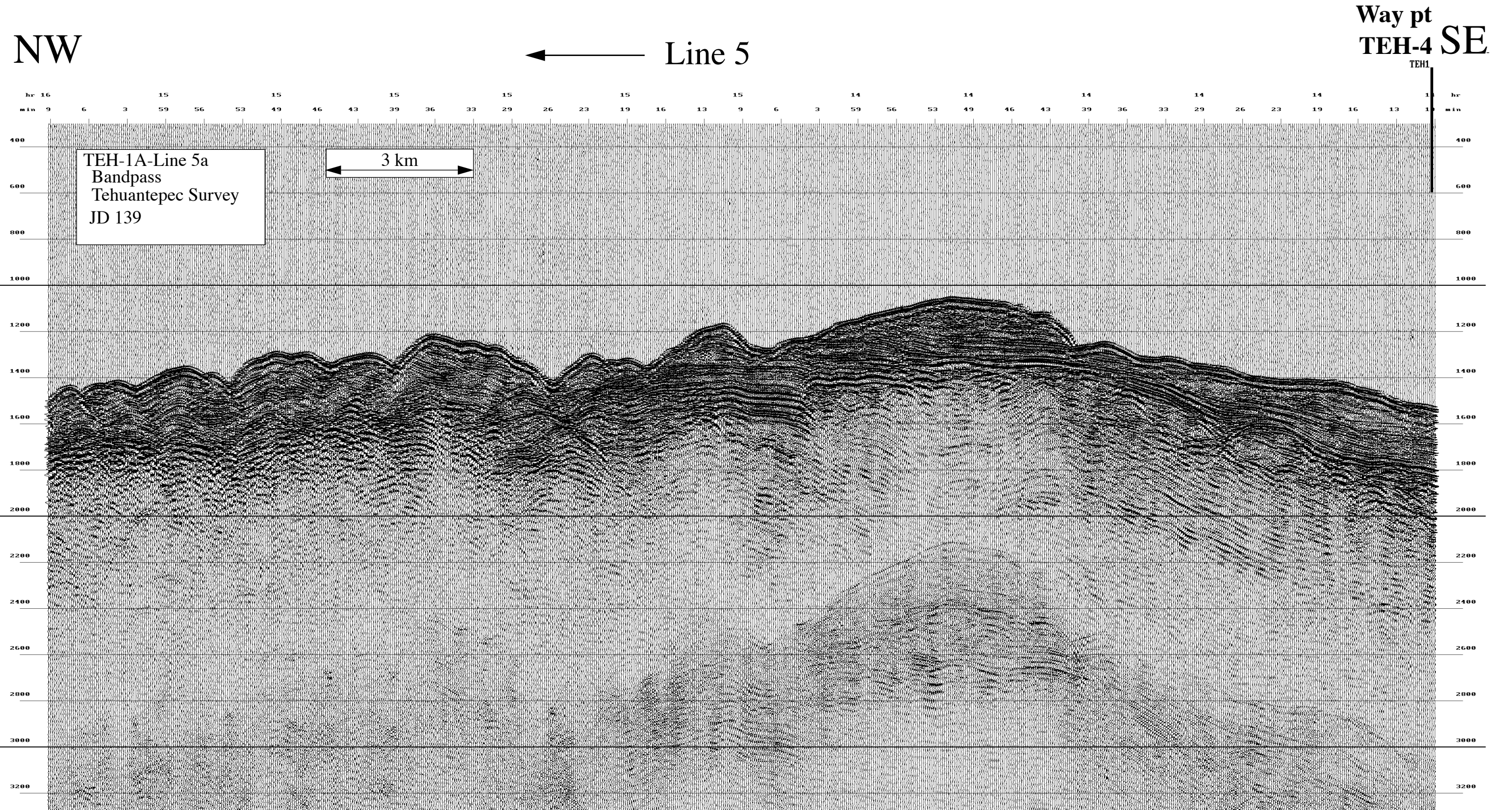
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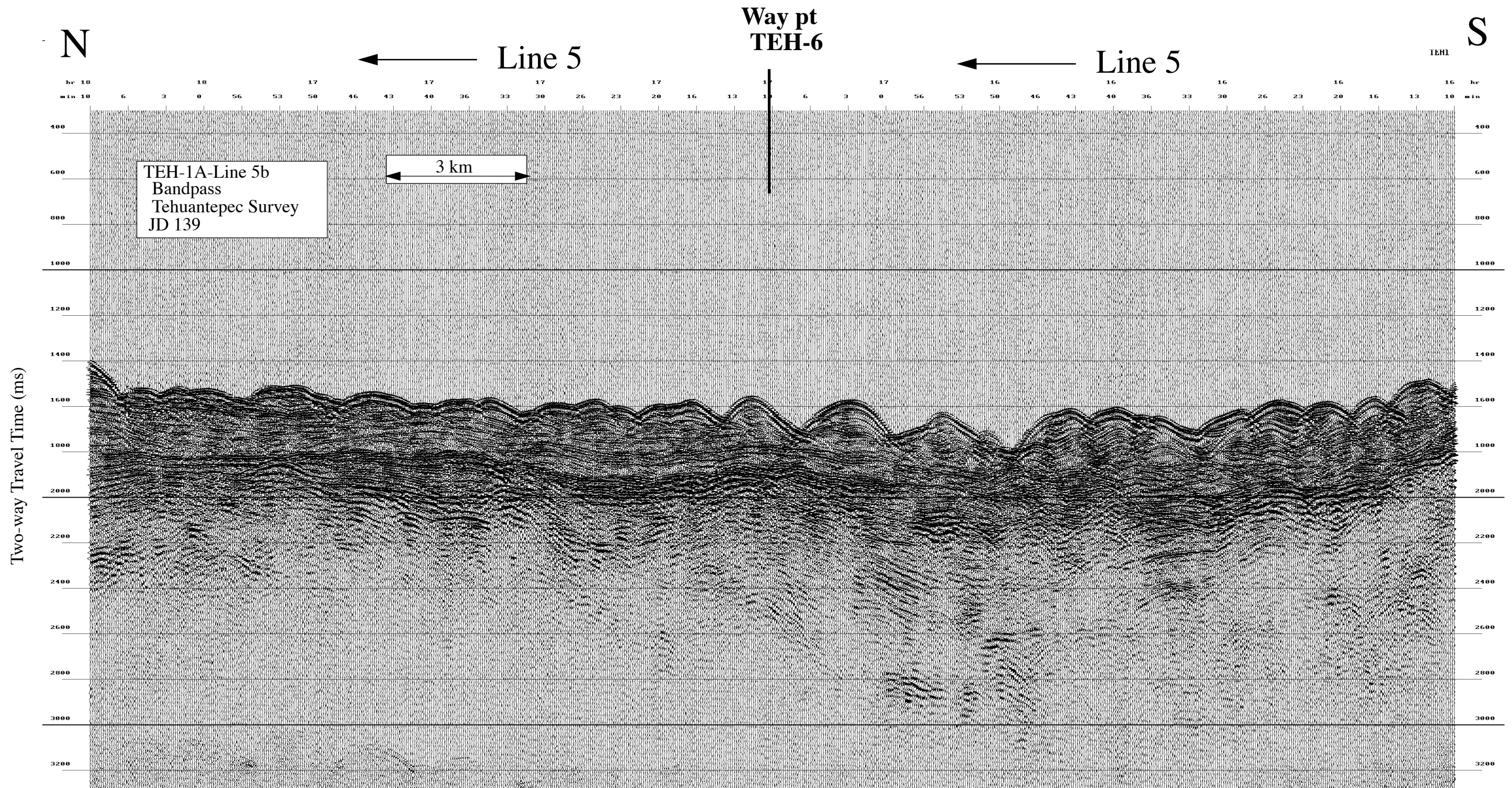


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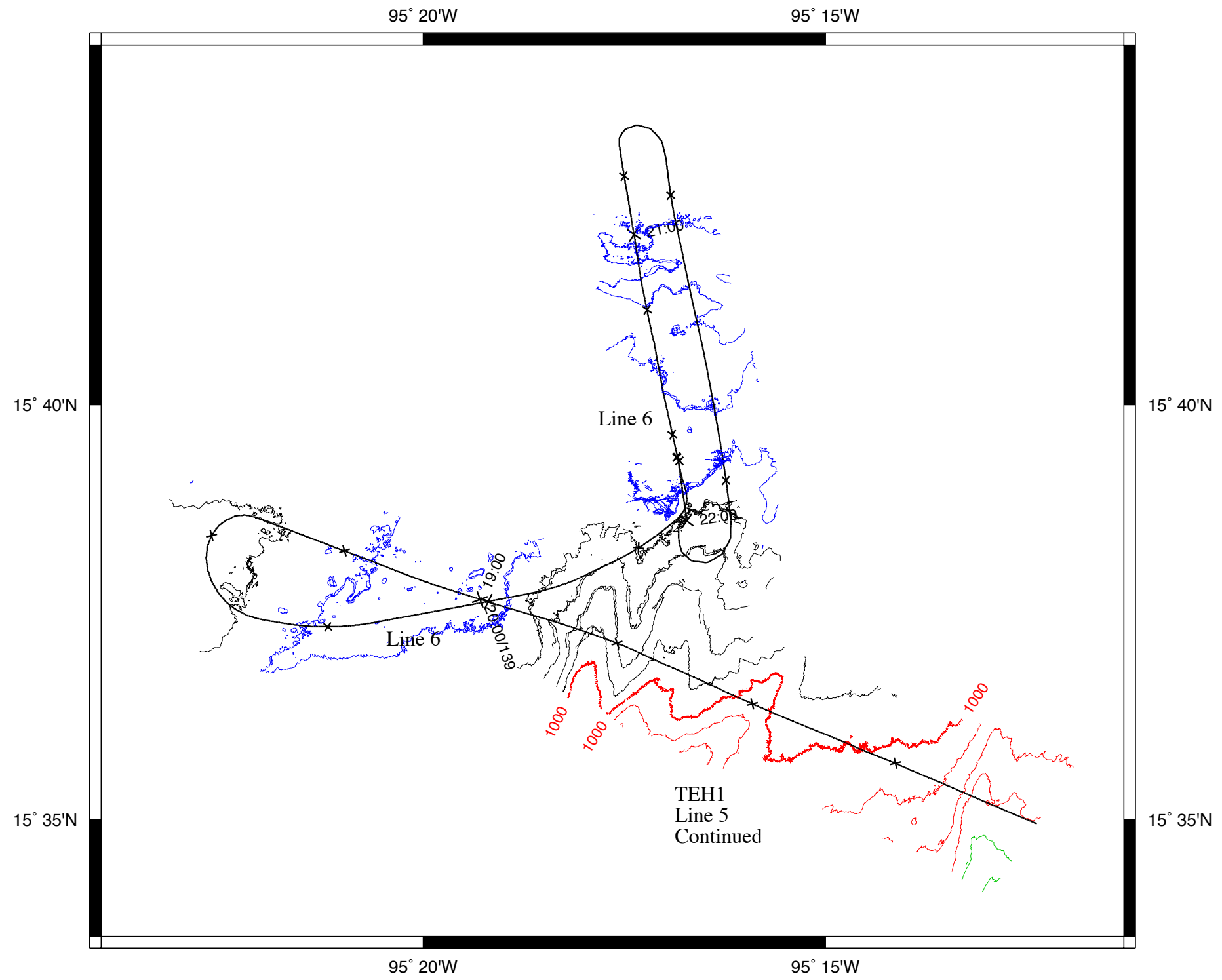
SE

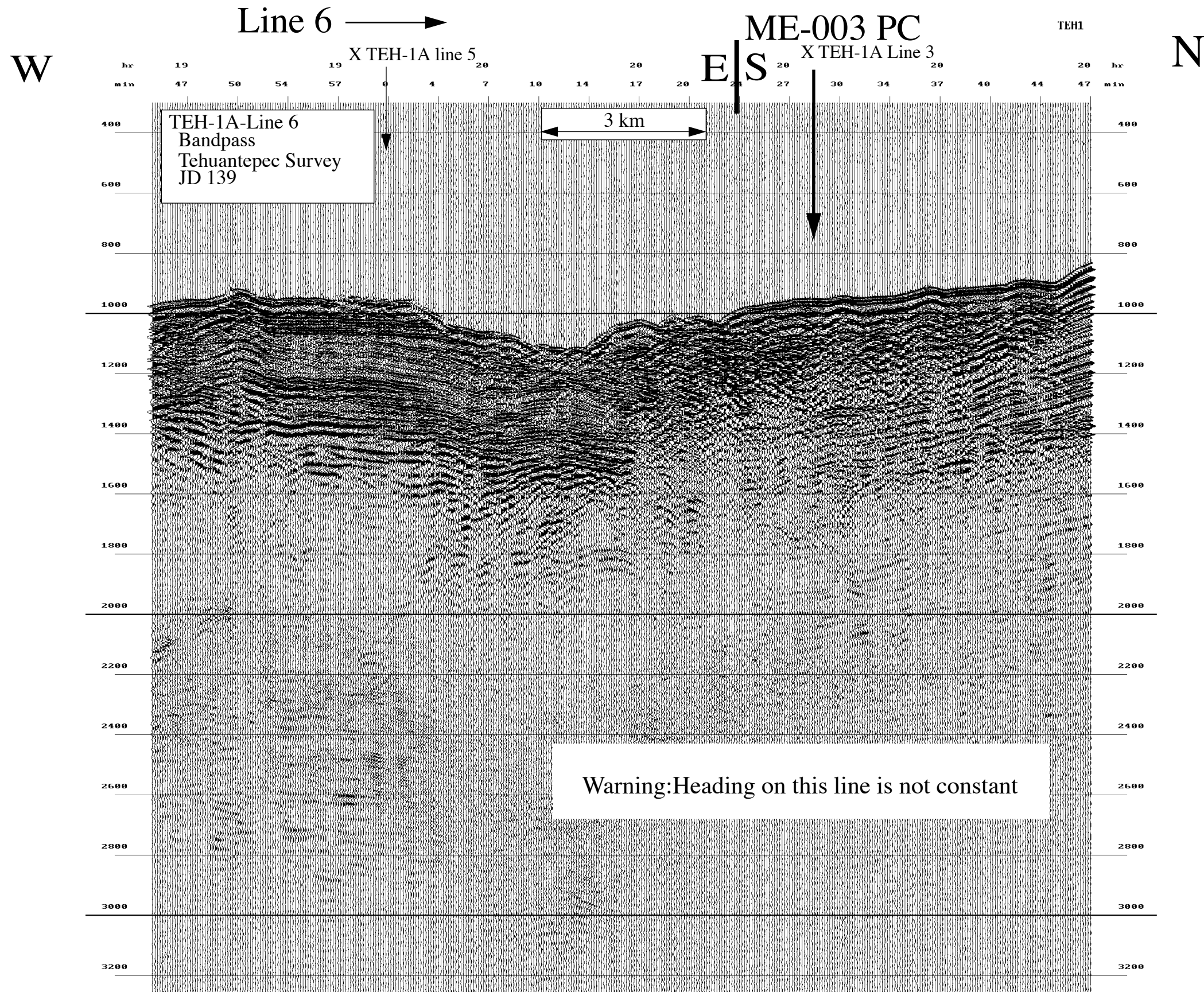






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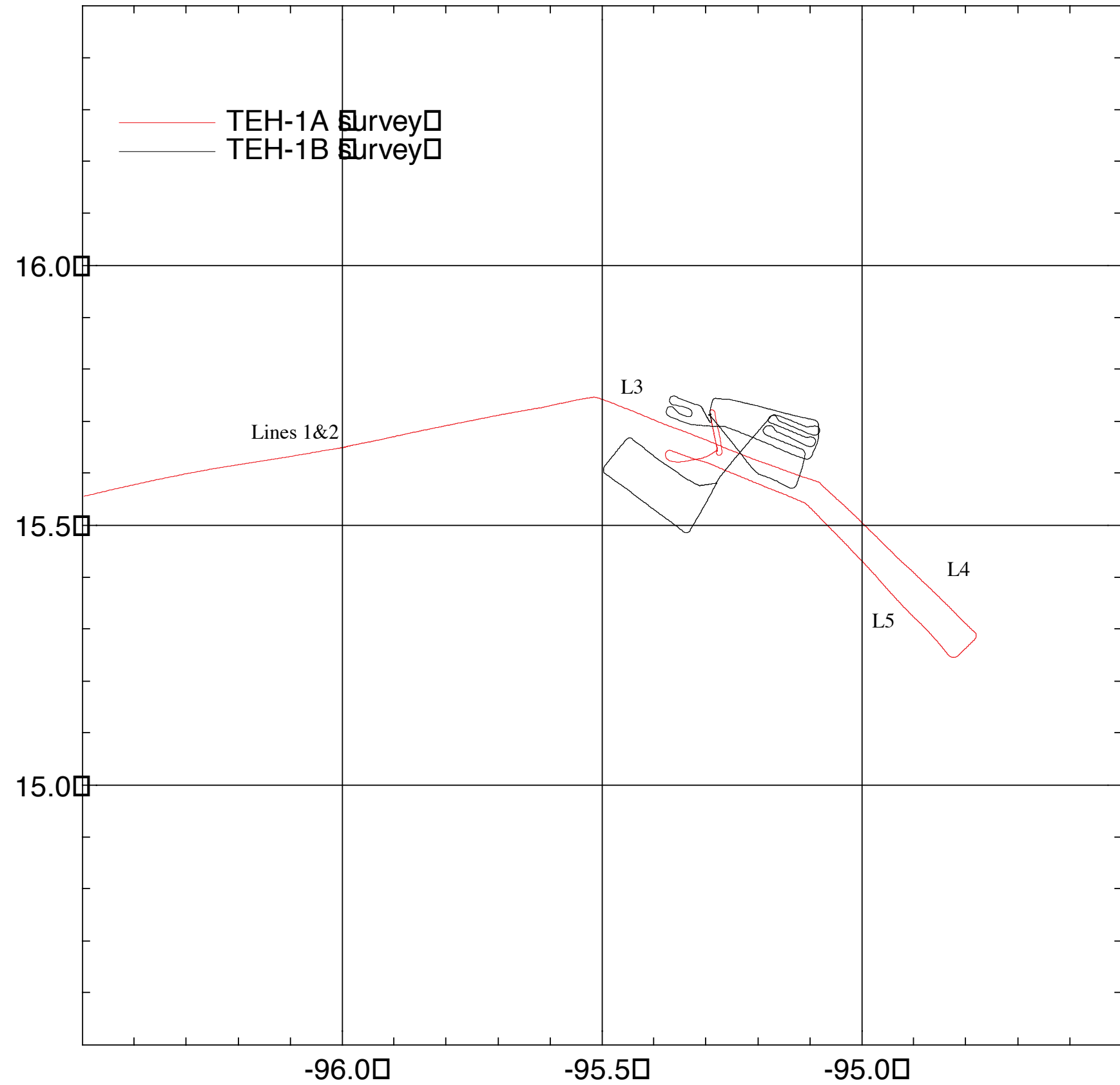
JD 141 (20 May 2000)--TEH-1 Survey, Last Day

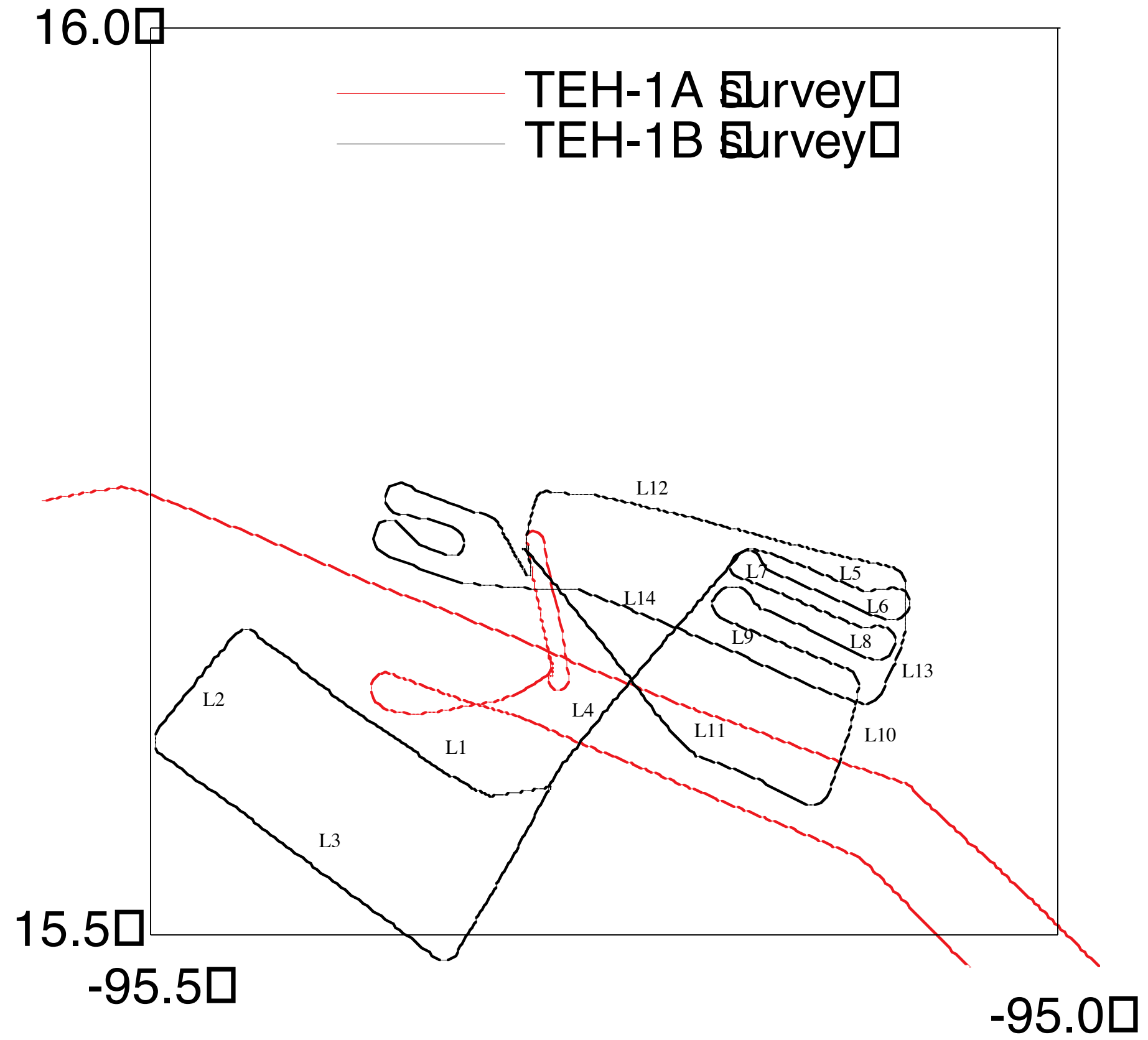
High Resolution Seismic Reflection Records

NEMO Leg 3

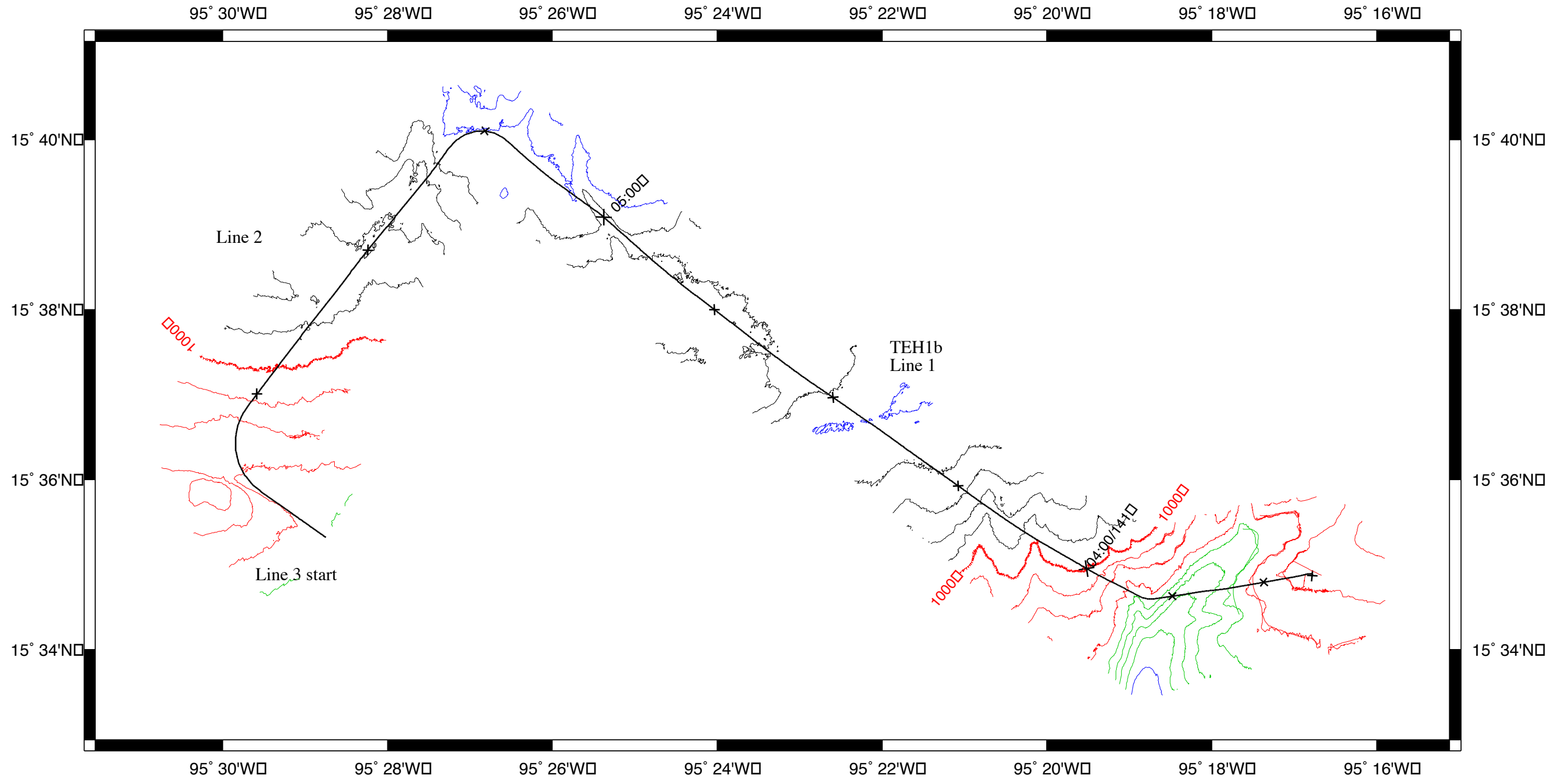
R/V Melville

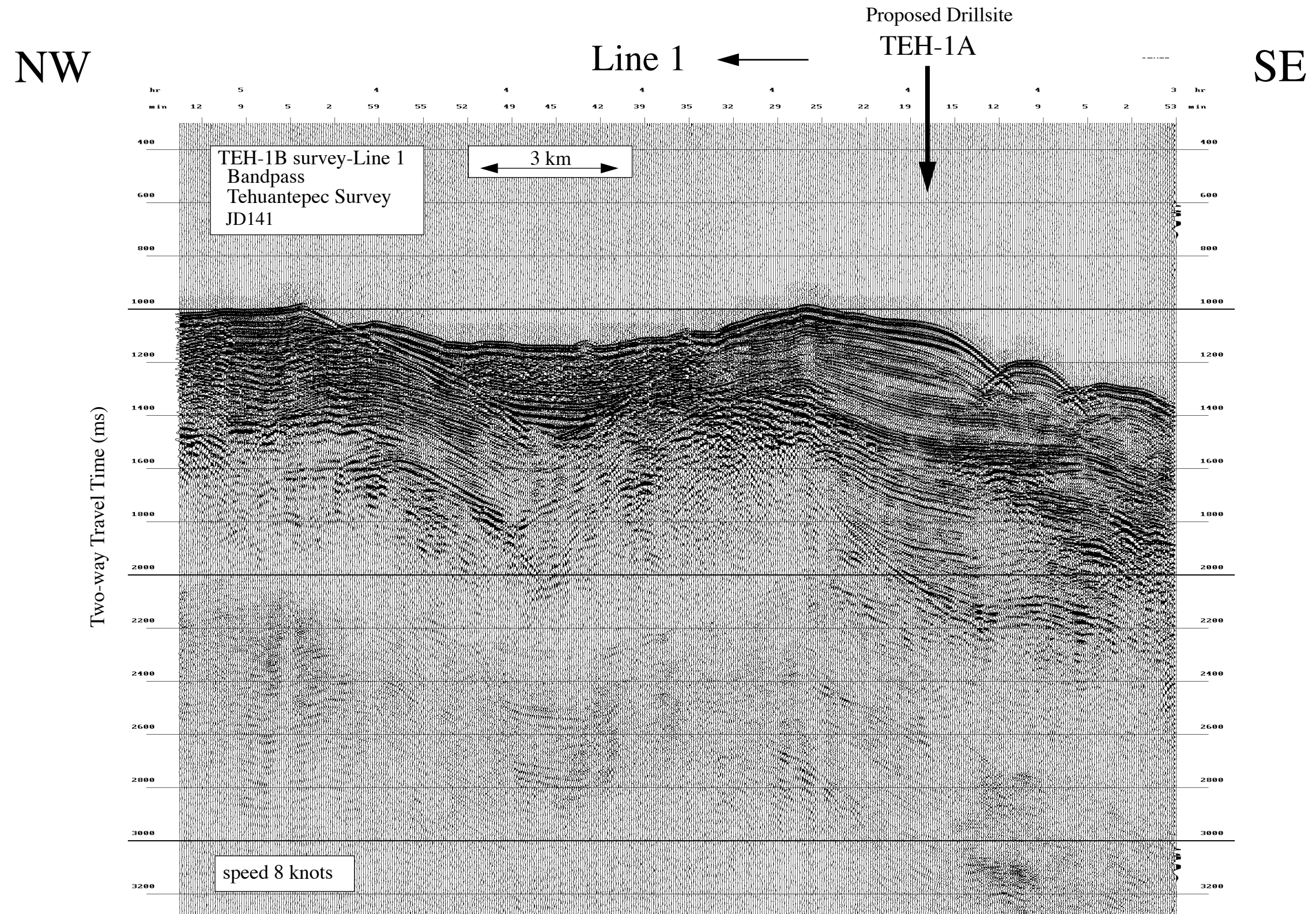
TEH-1 Survey B: Tehuantepec Margin

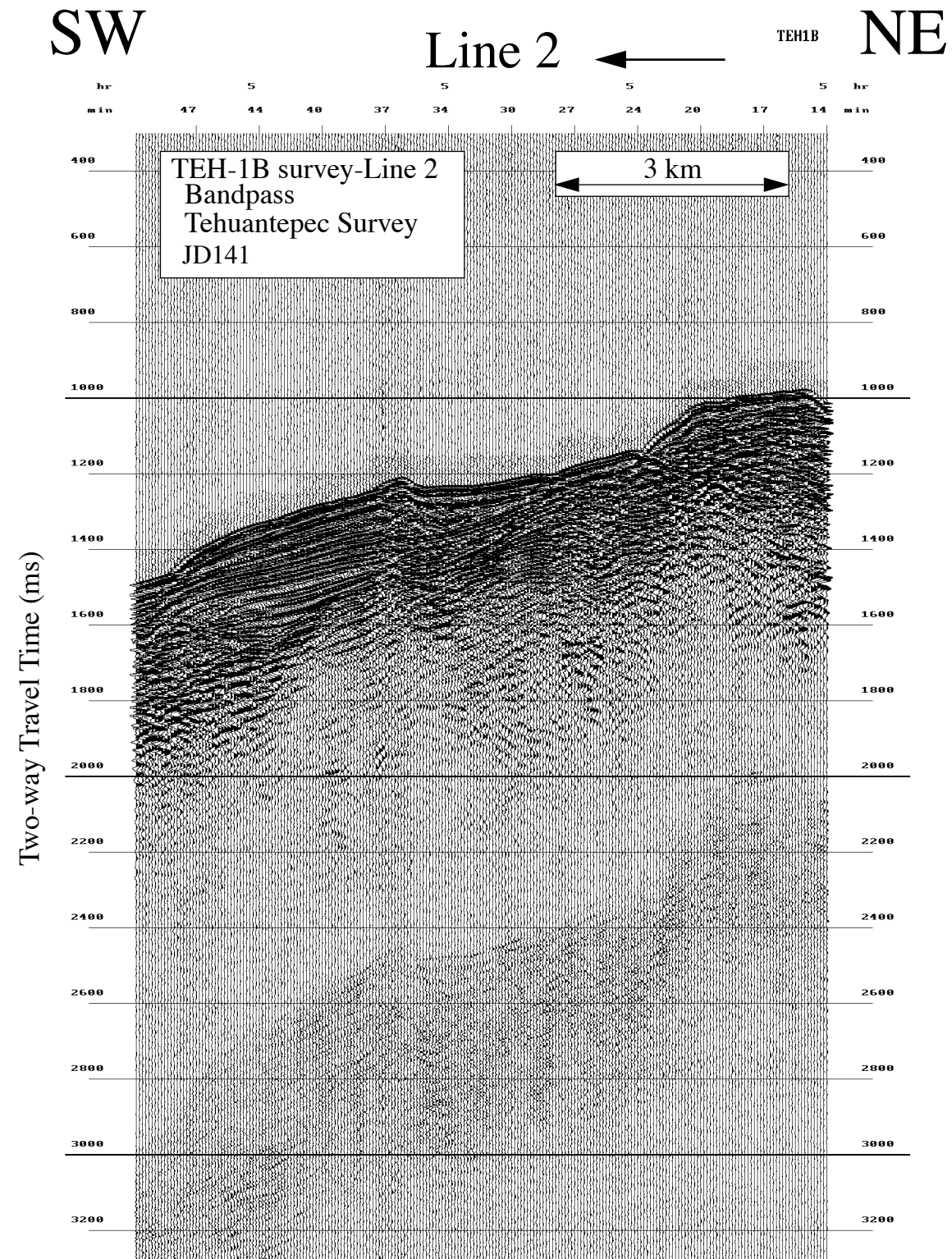




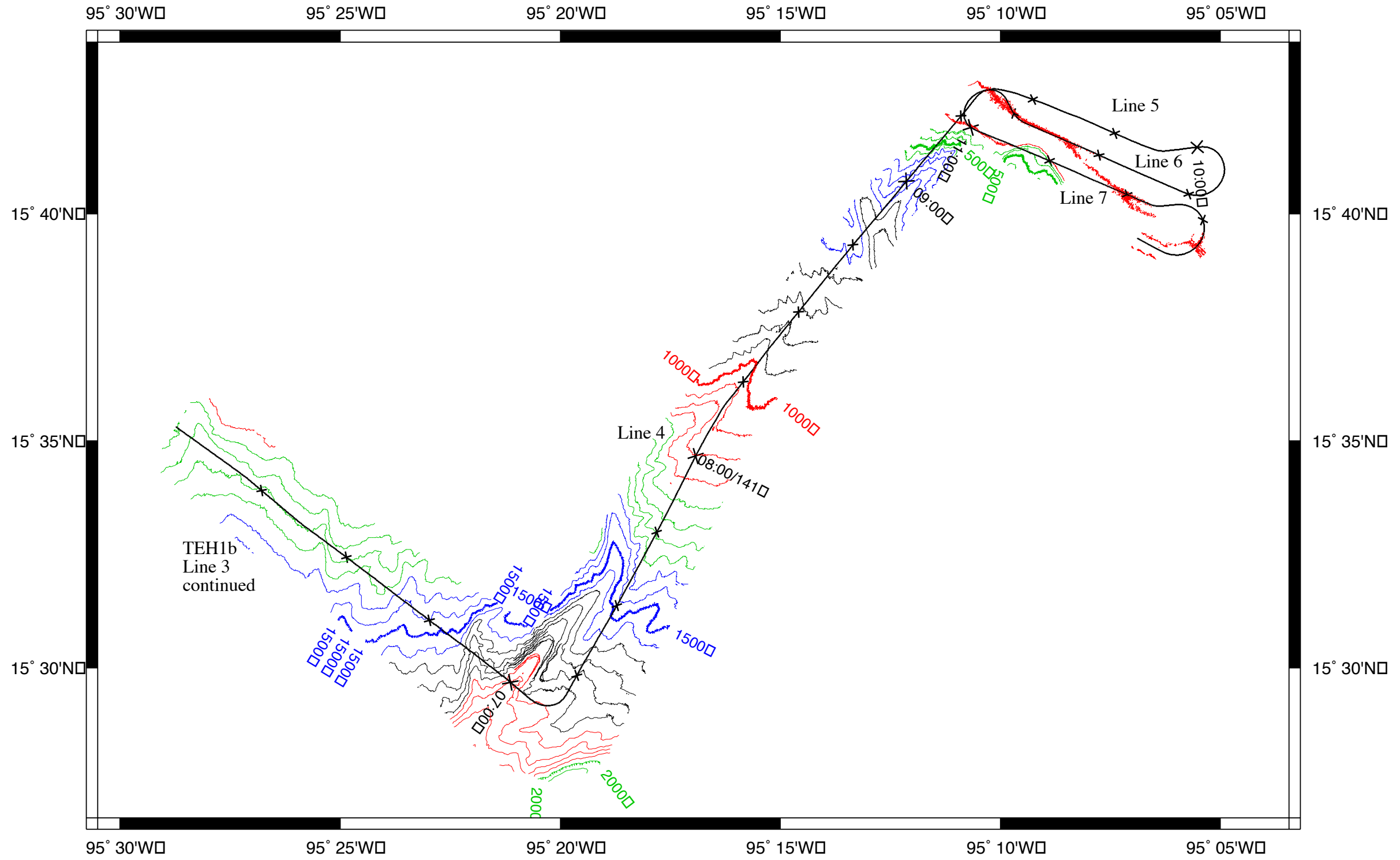
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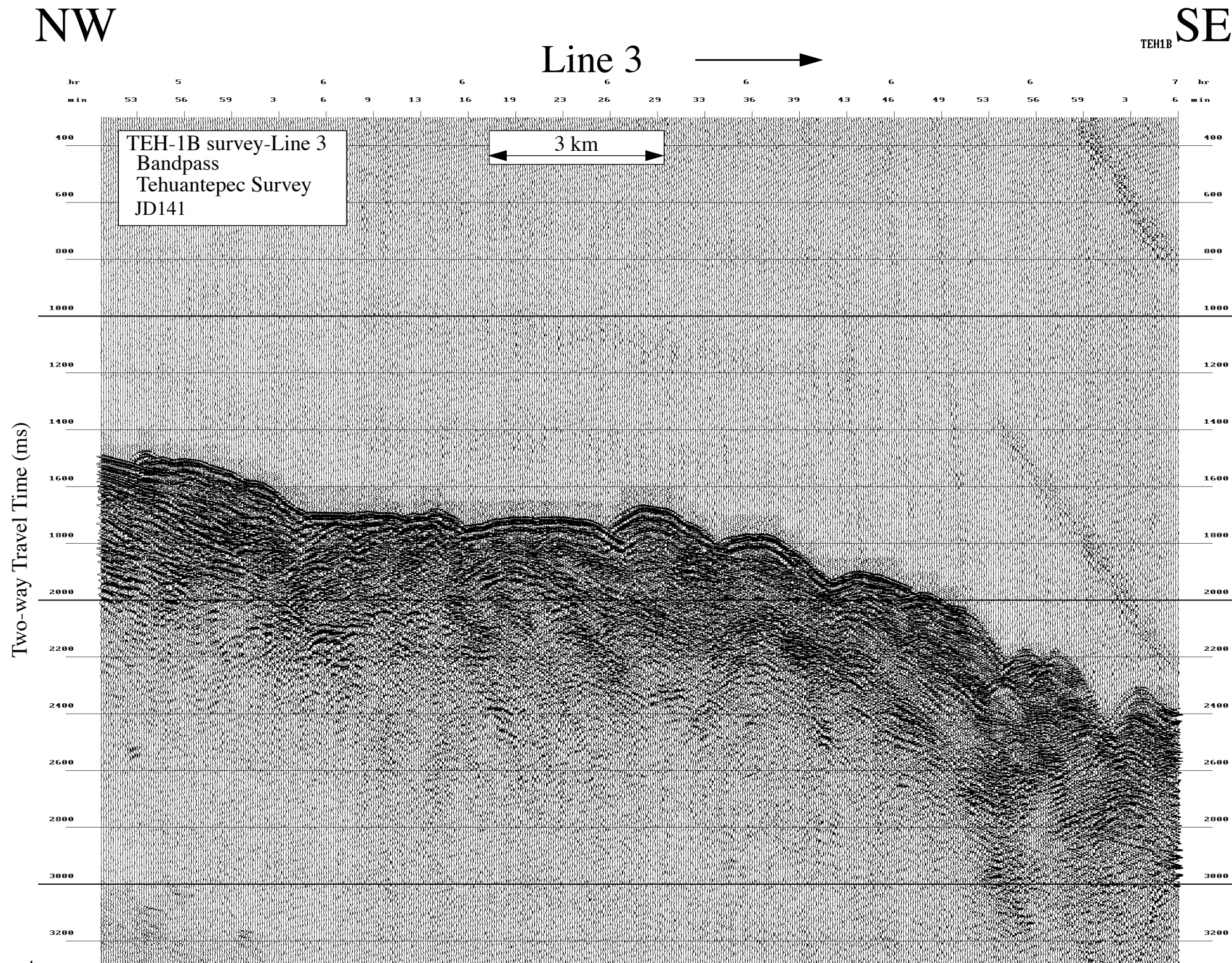


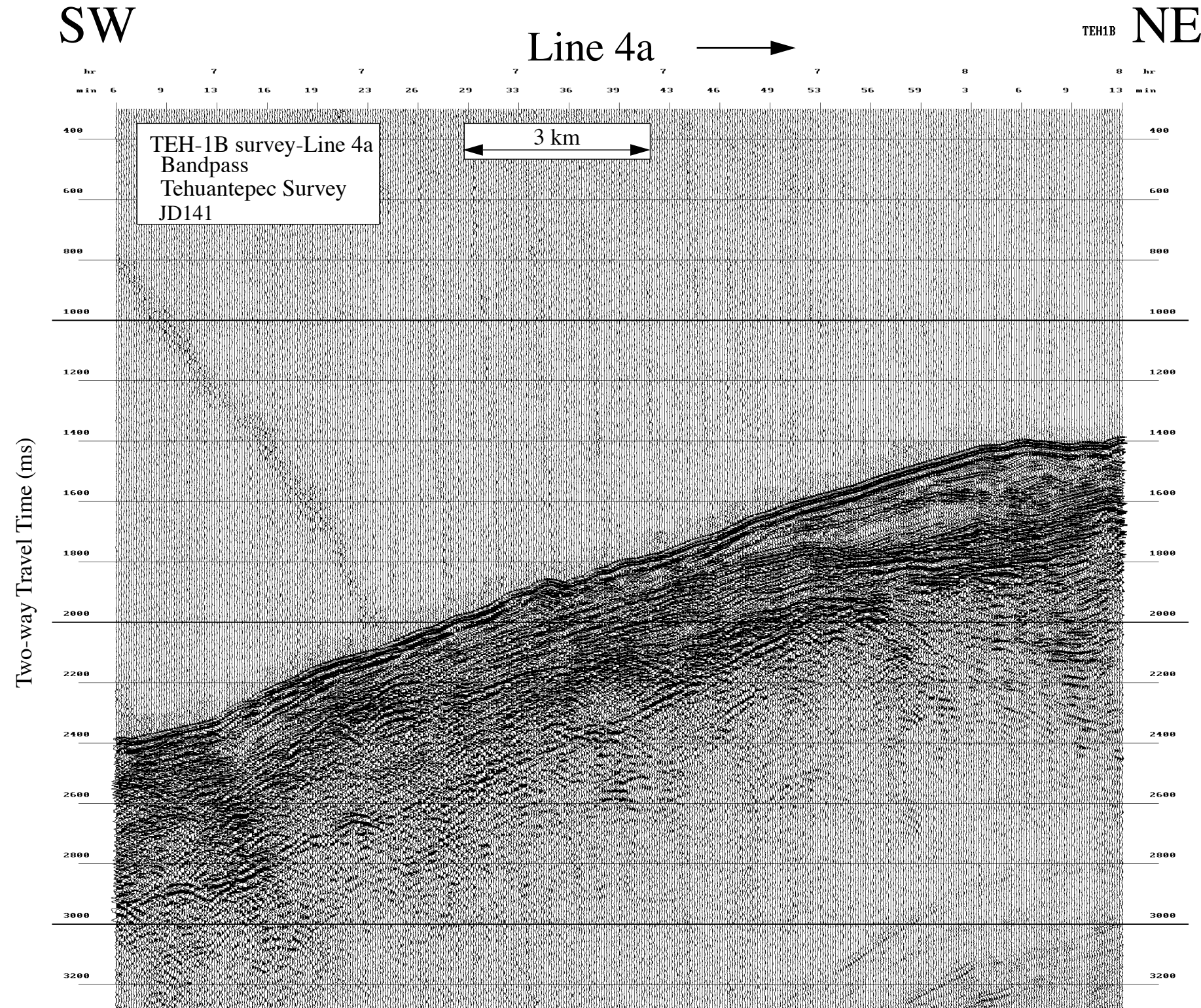


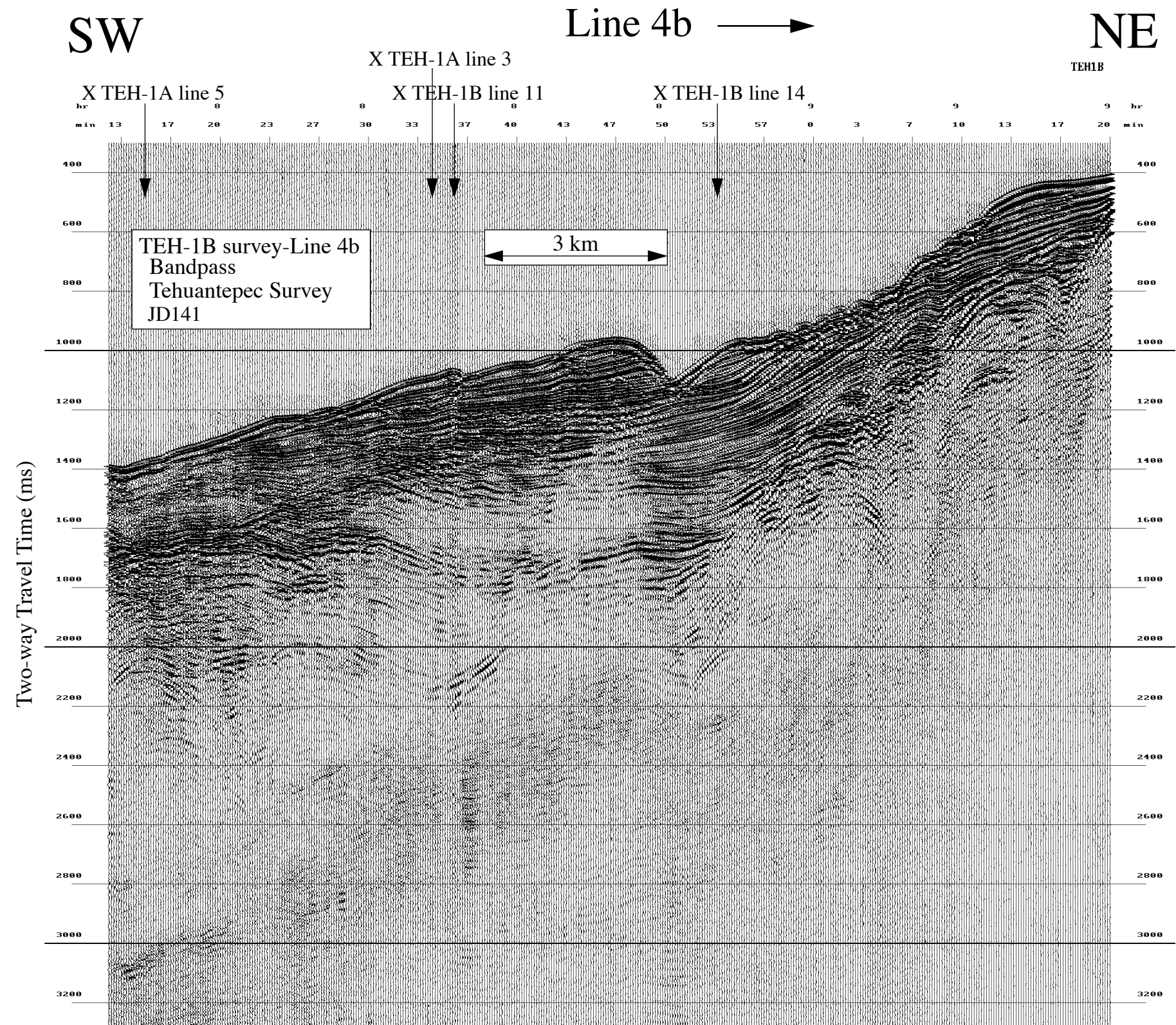


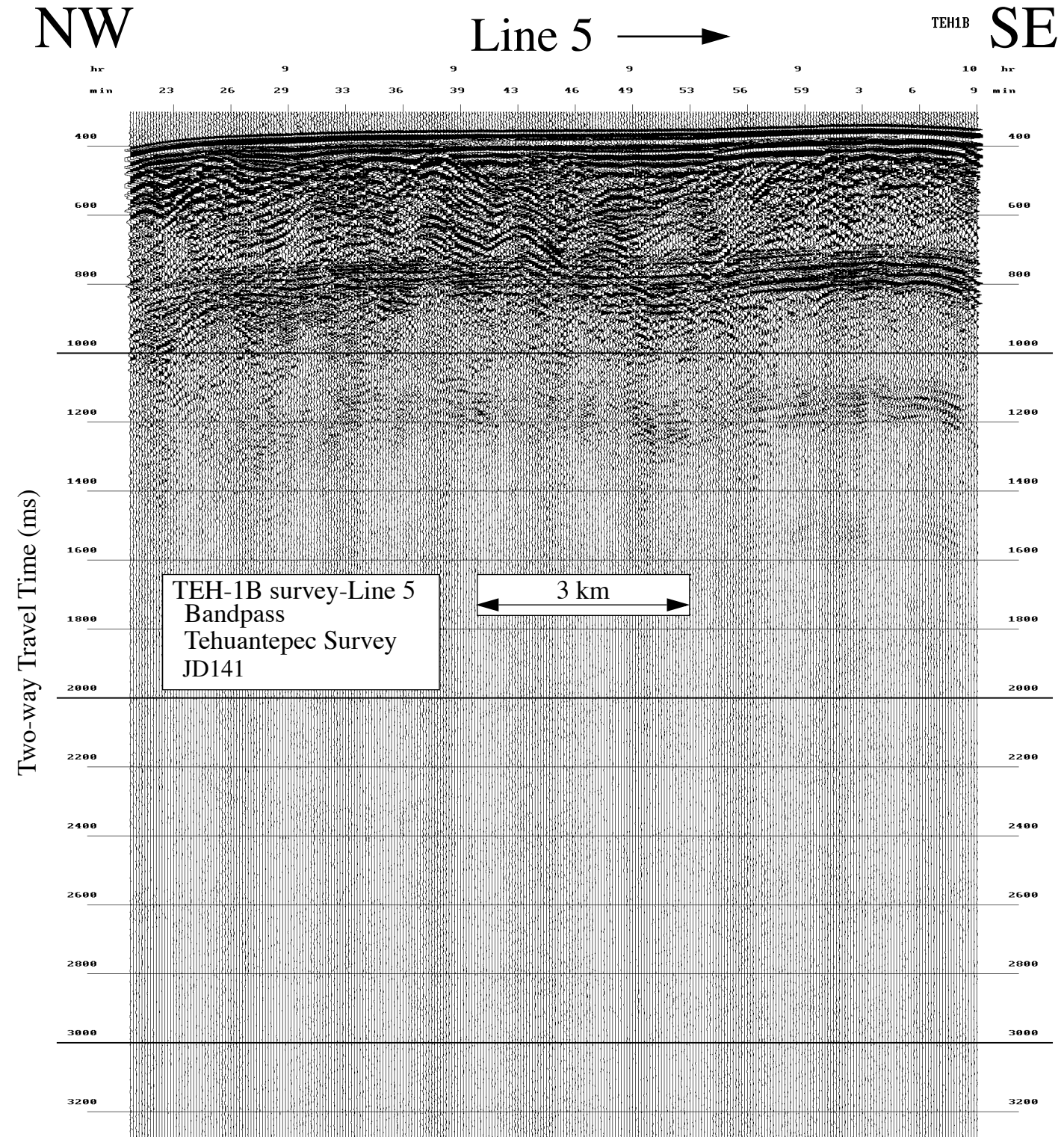
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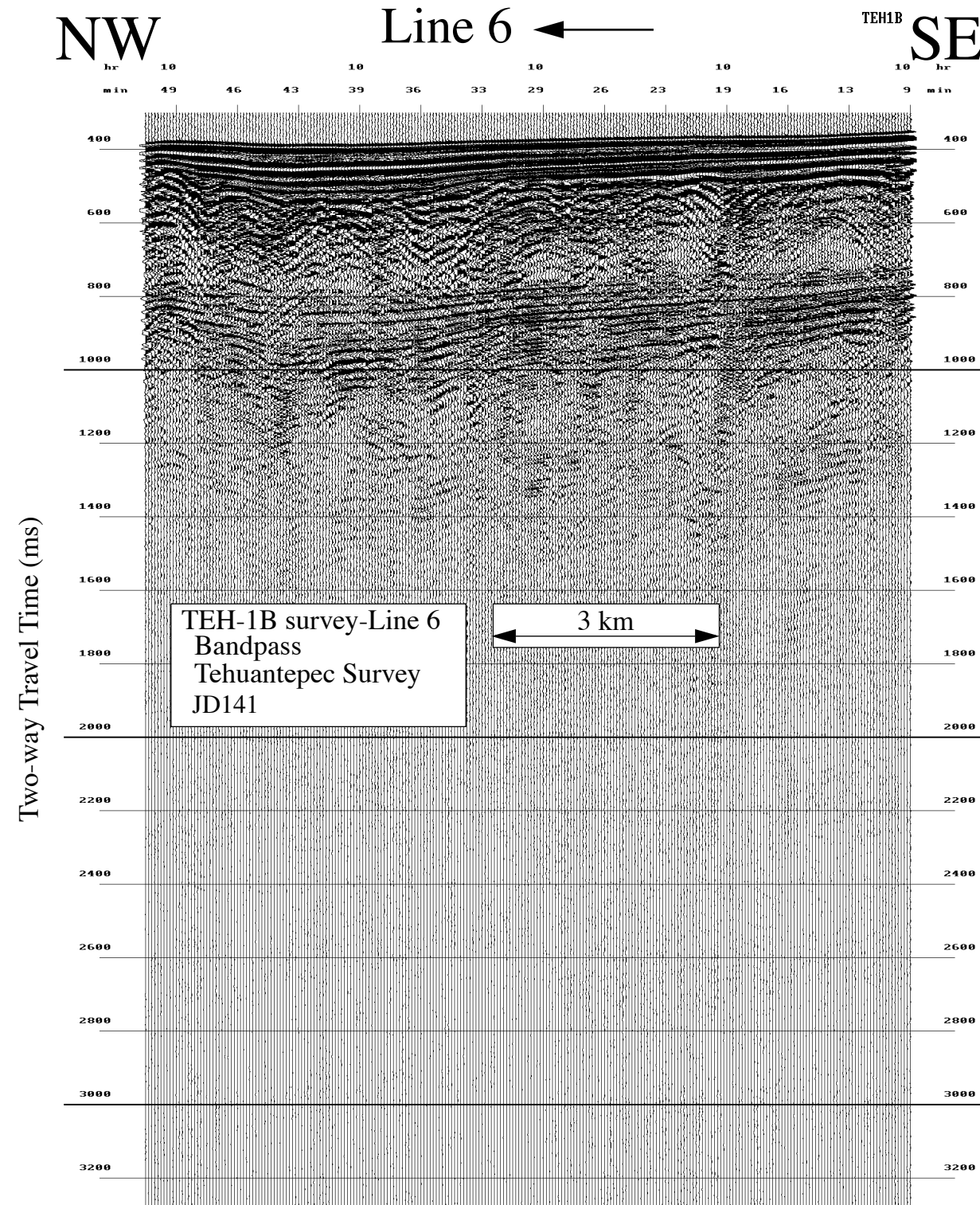


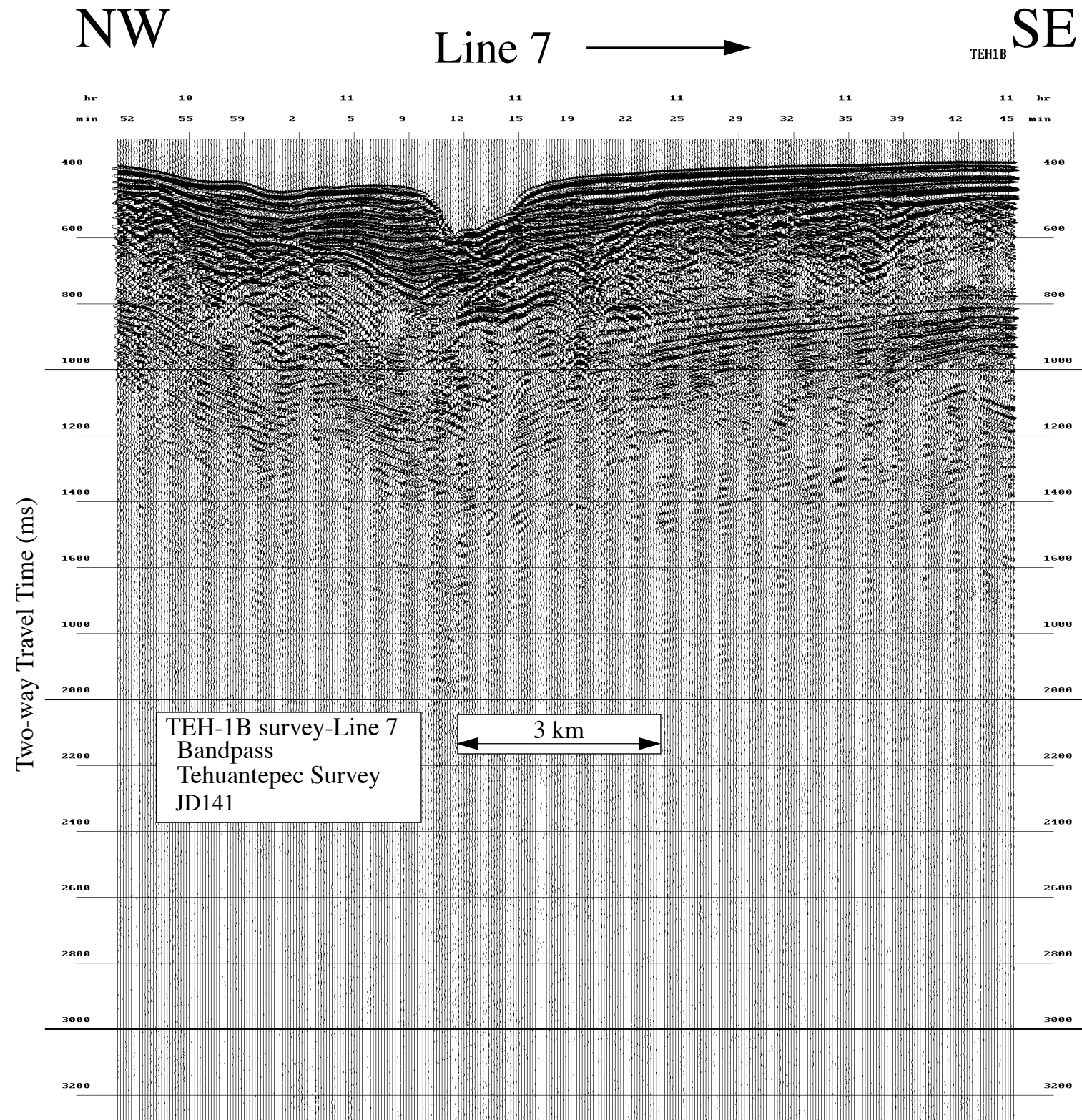




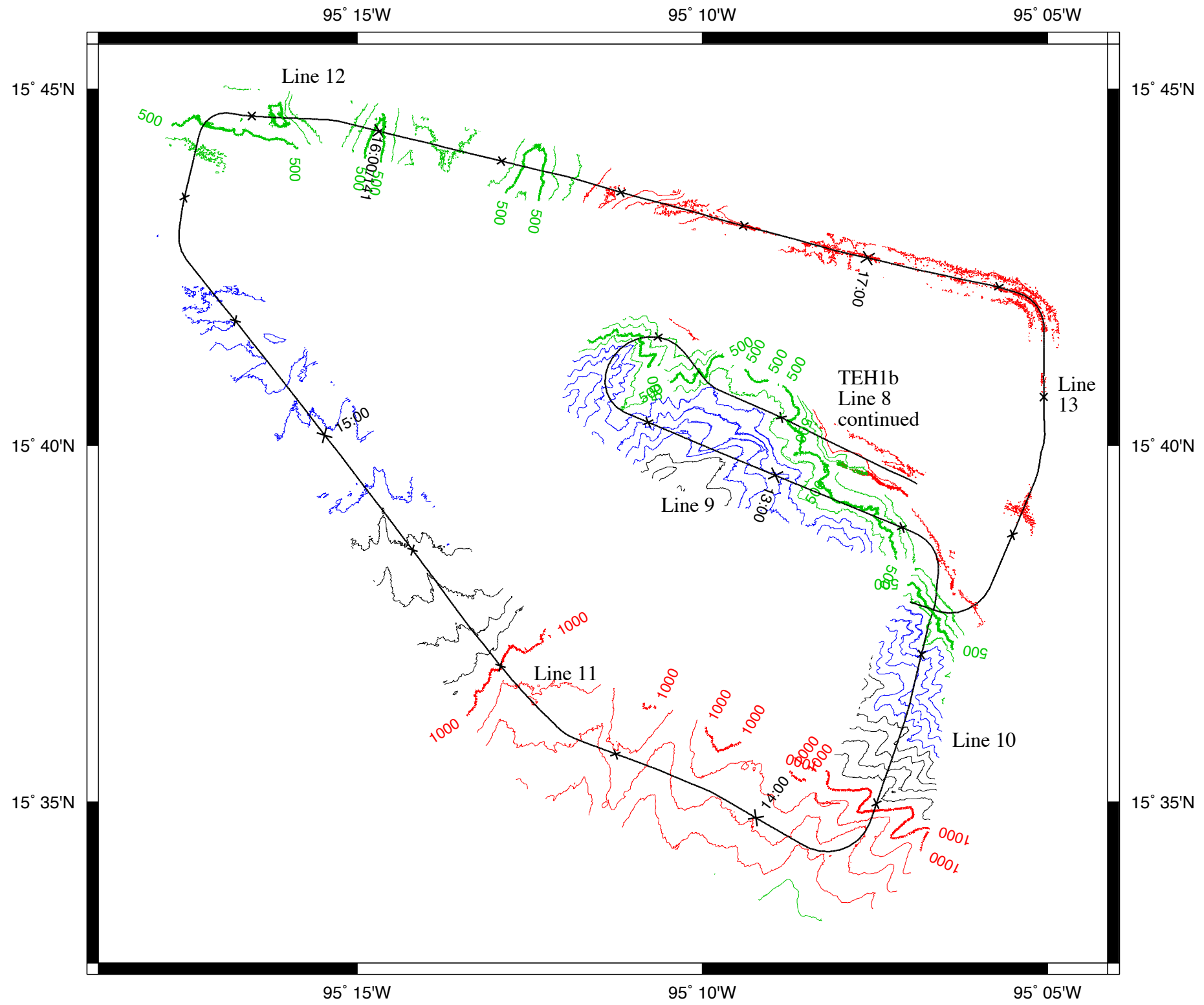


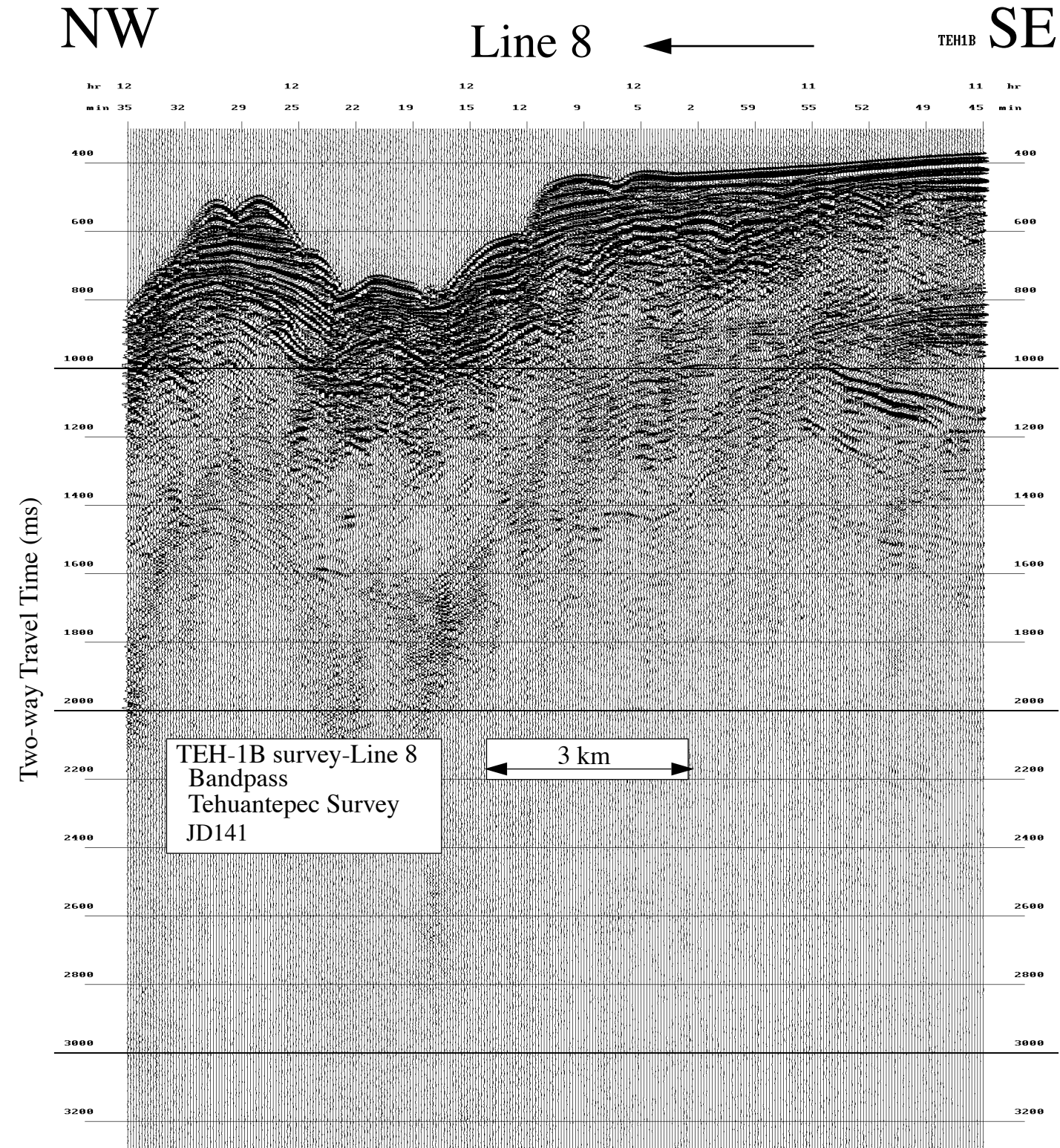




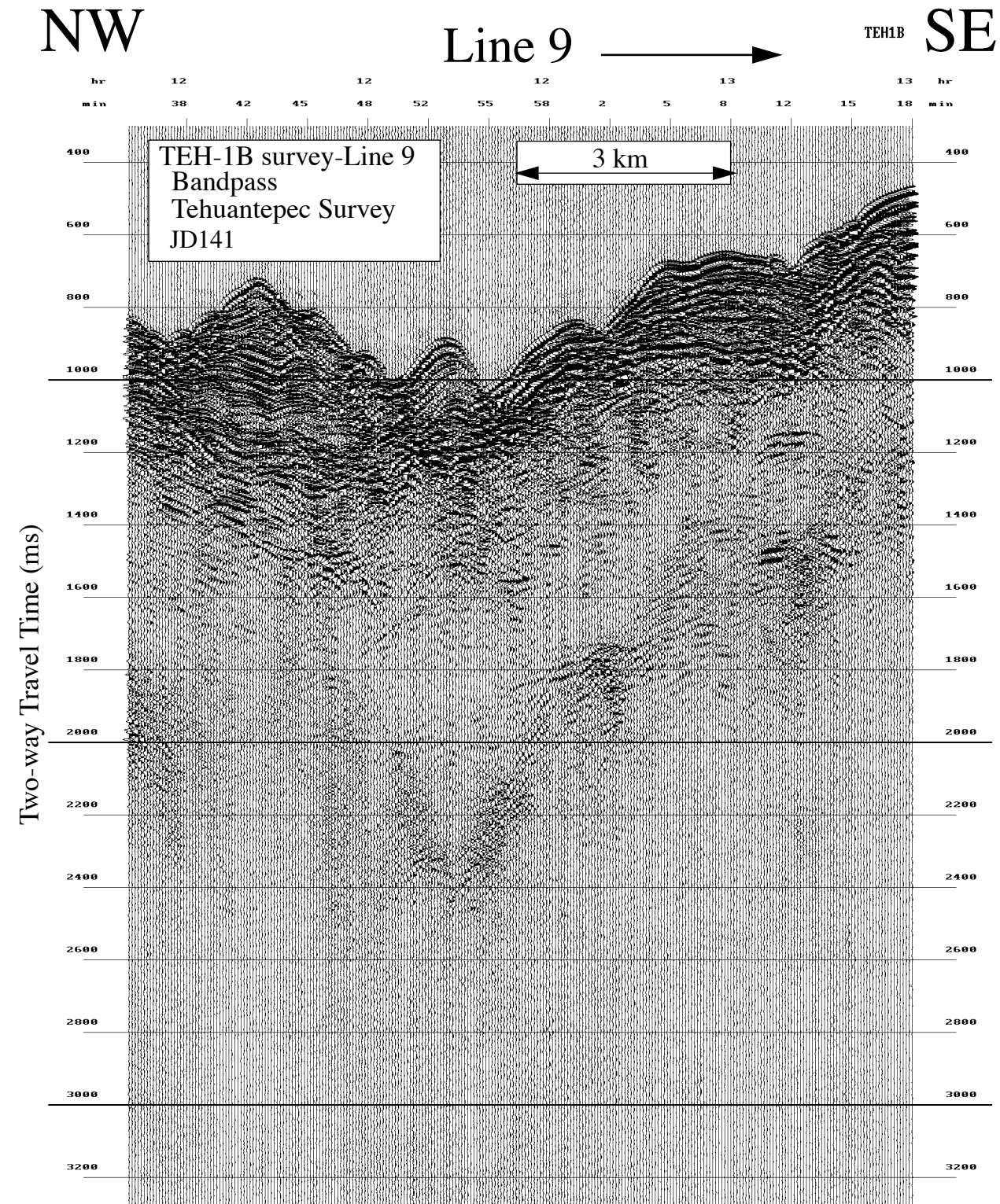


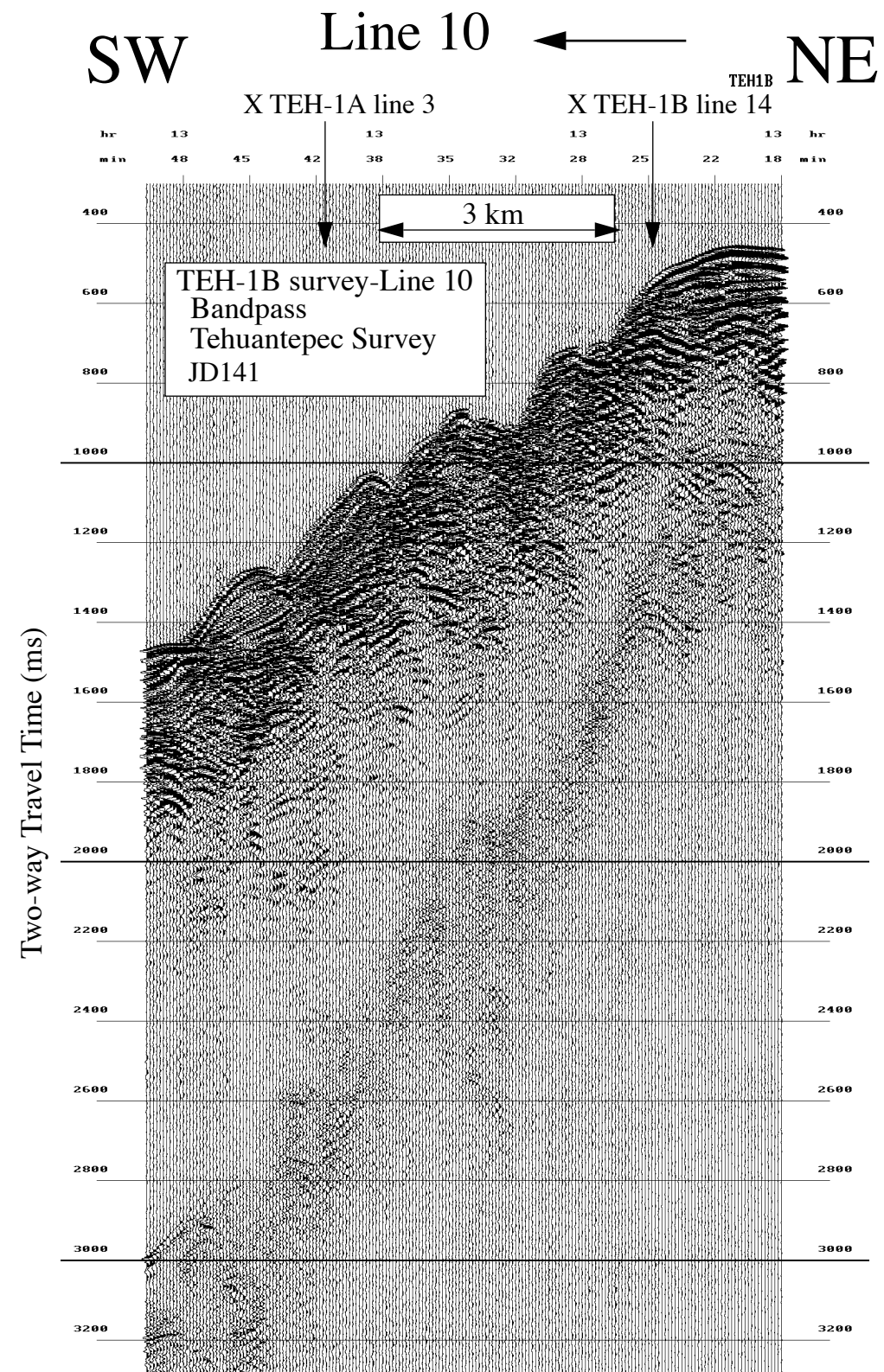
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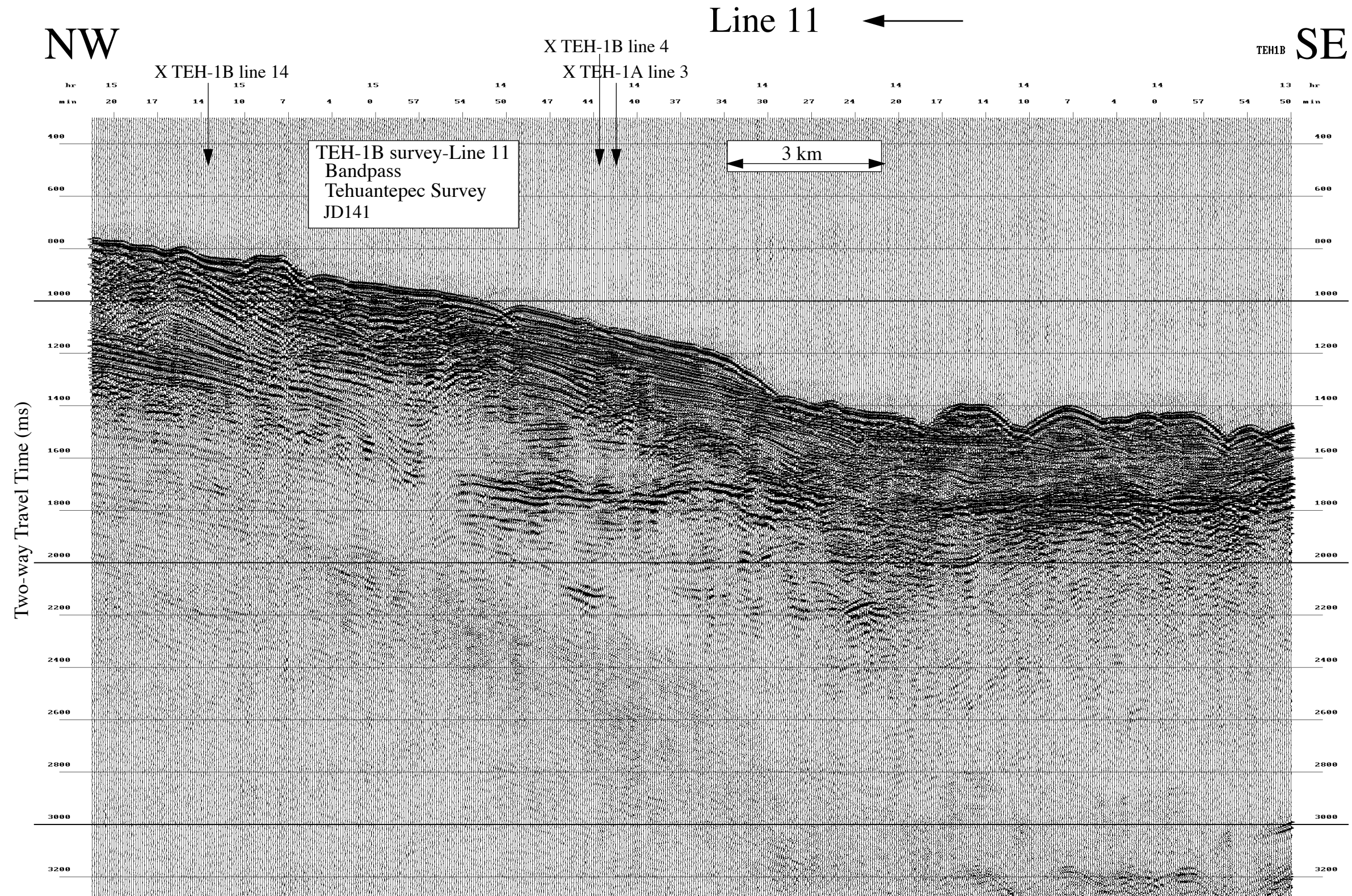


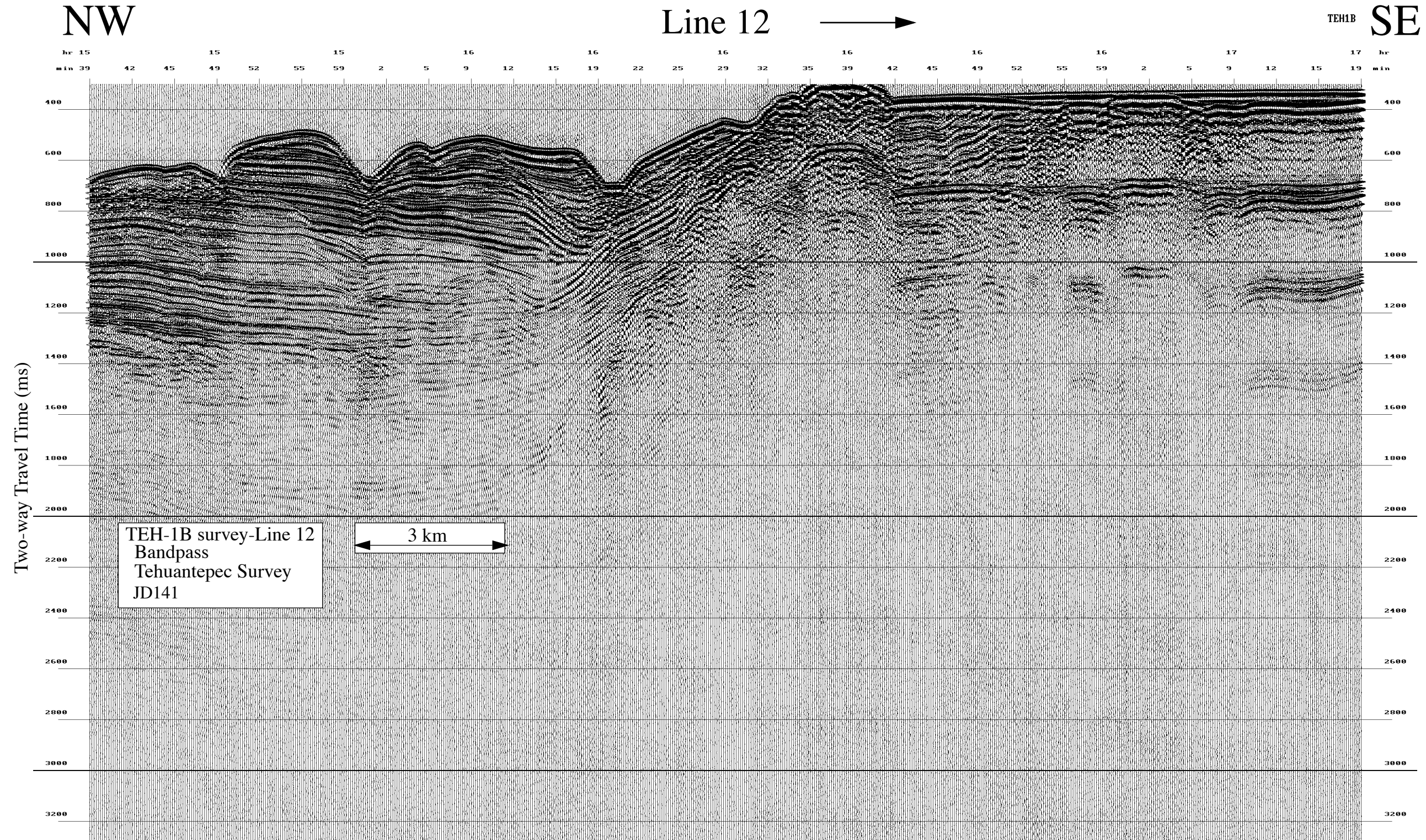


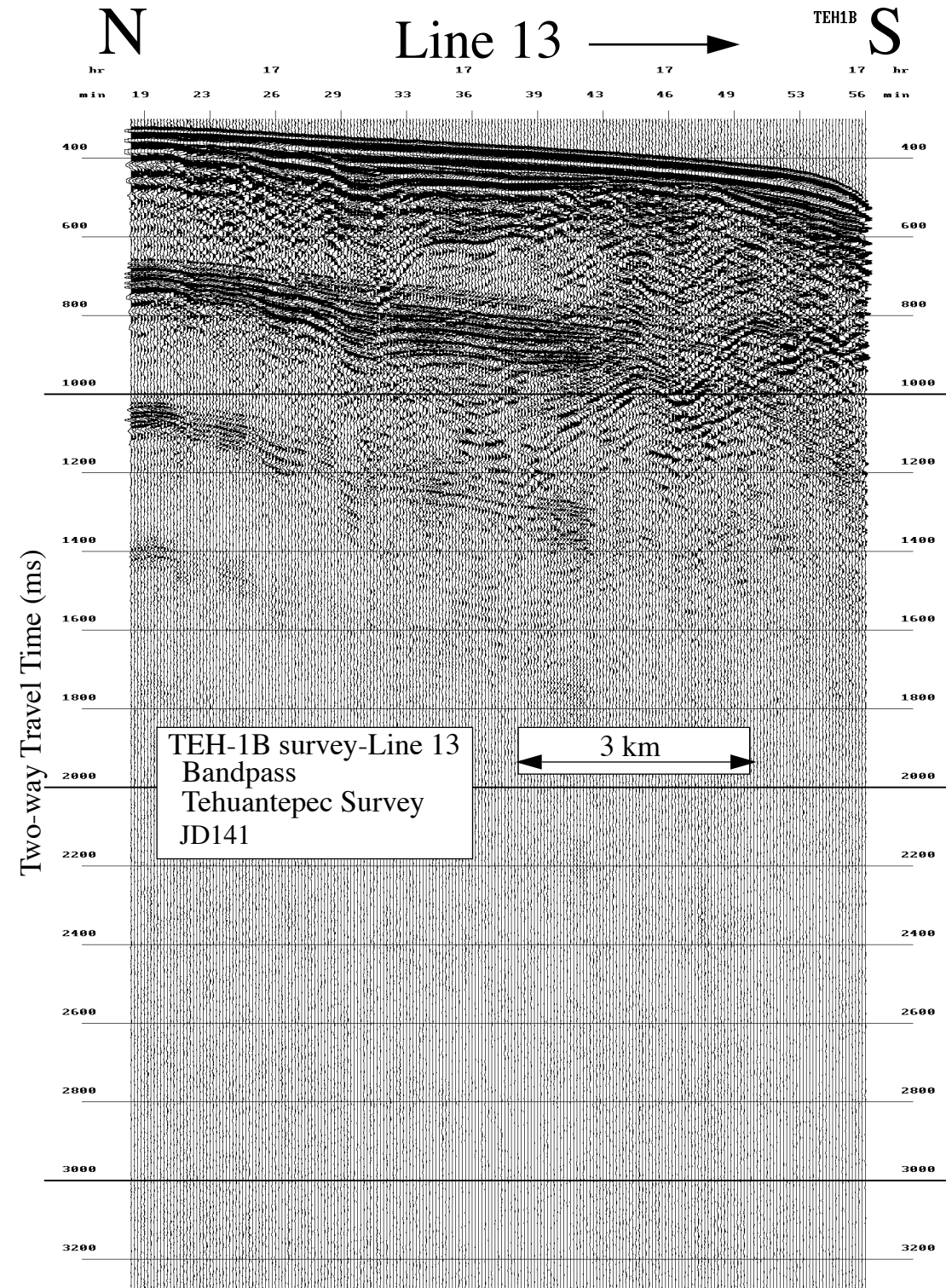
S



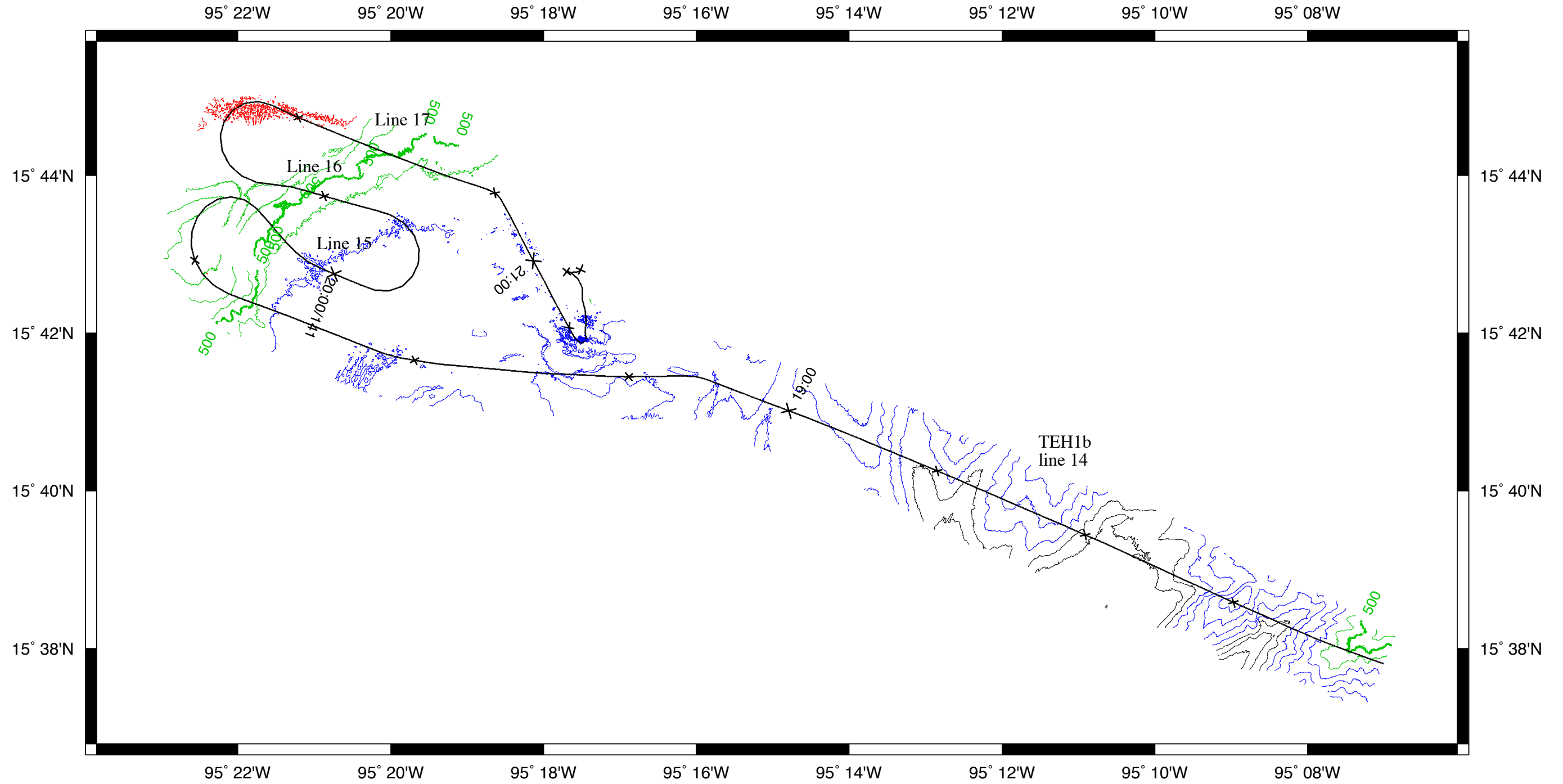


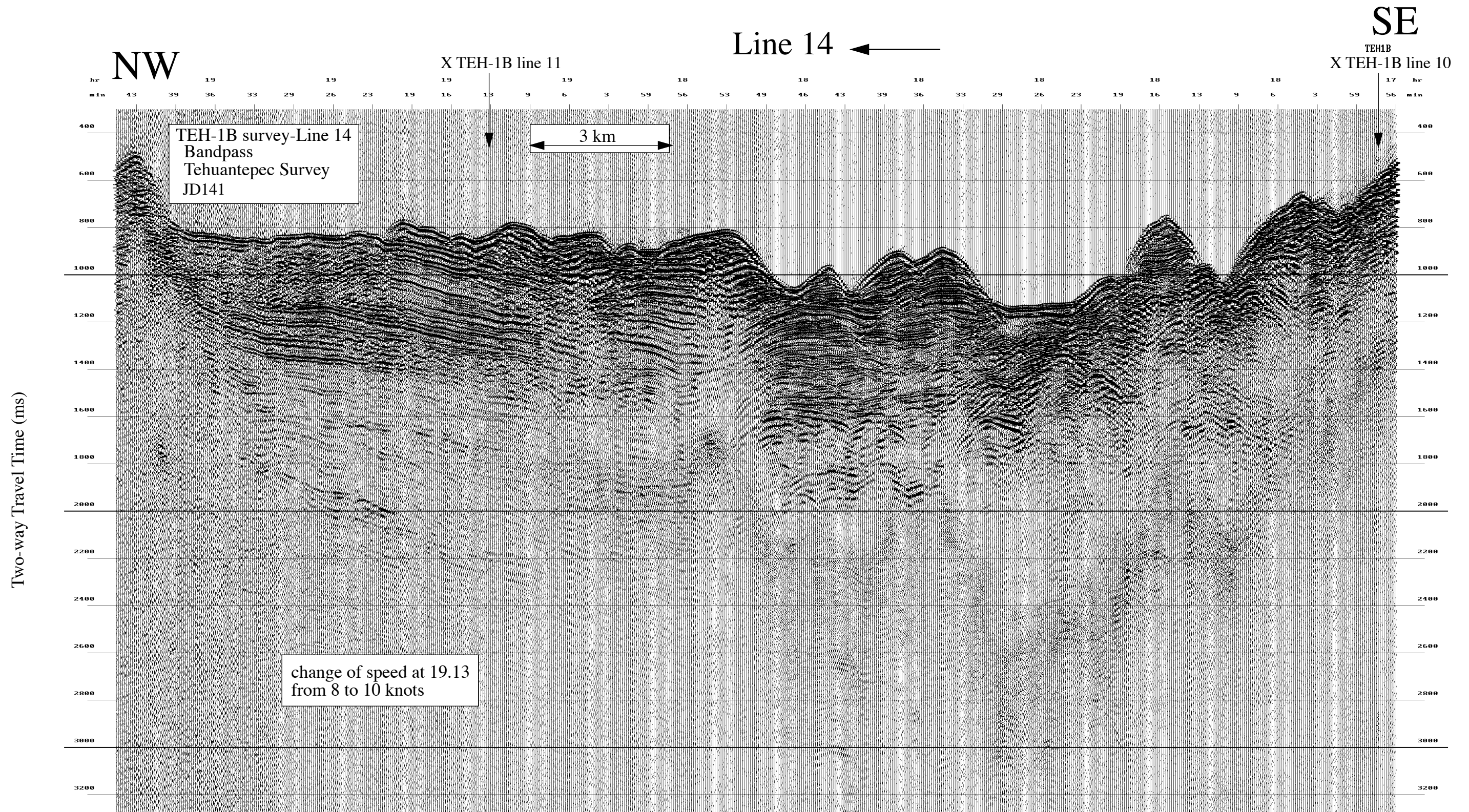


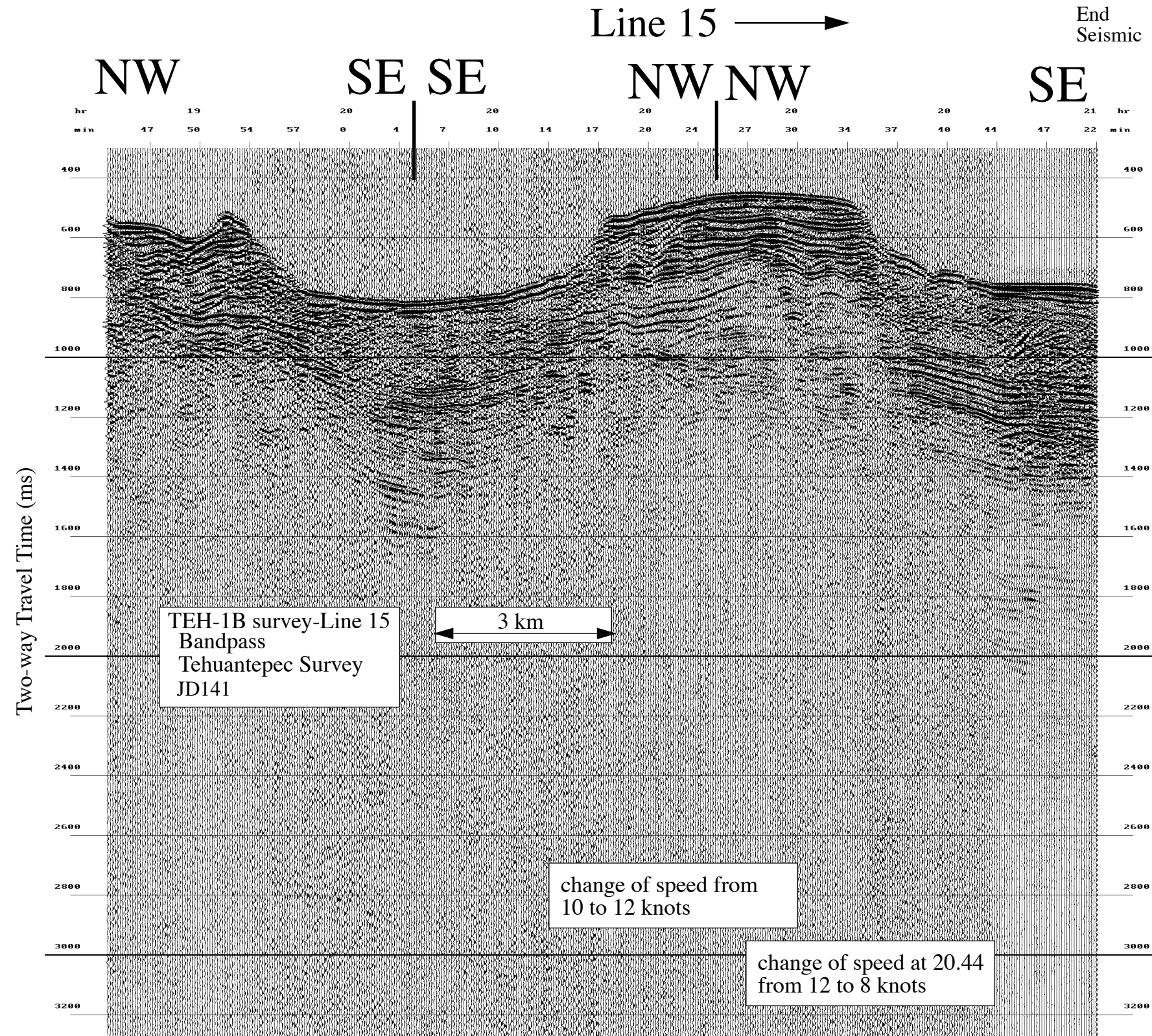




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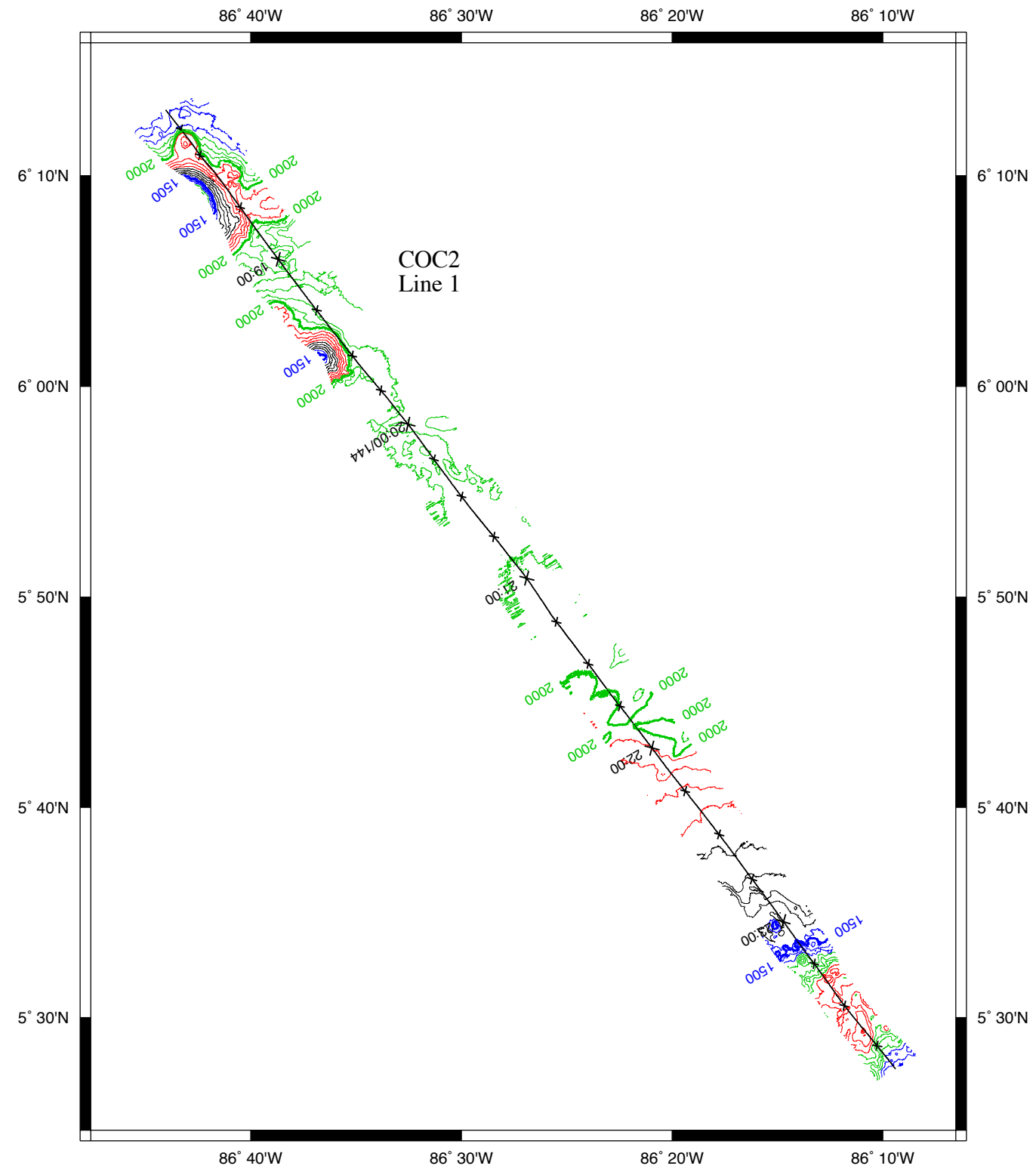
JD 144 (23 May 2000)--COC-2 Survey, Cocos Ridge

High Resolution Seismic Reflection Records

NEMO Leg 3

R/V Melville

Data File SBfixavg.2000may23.1800-2400

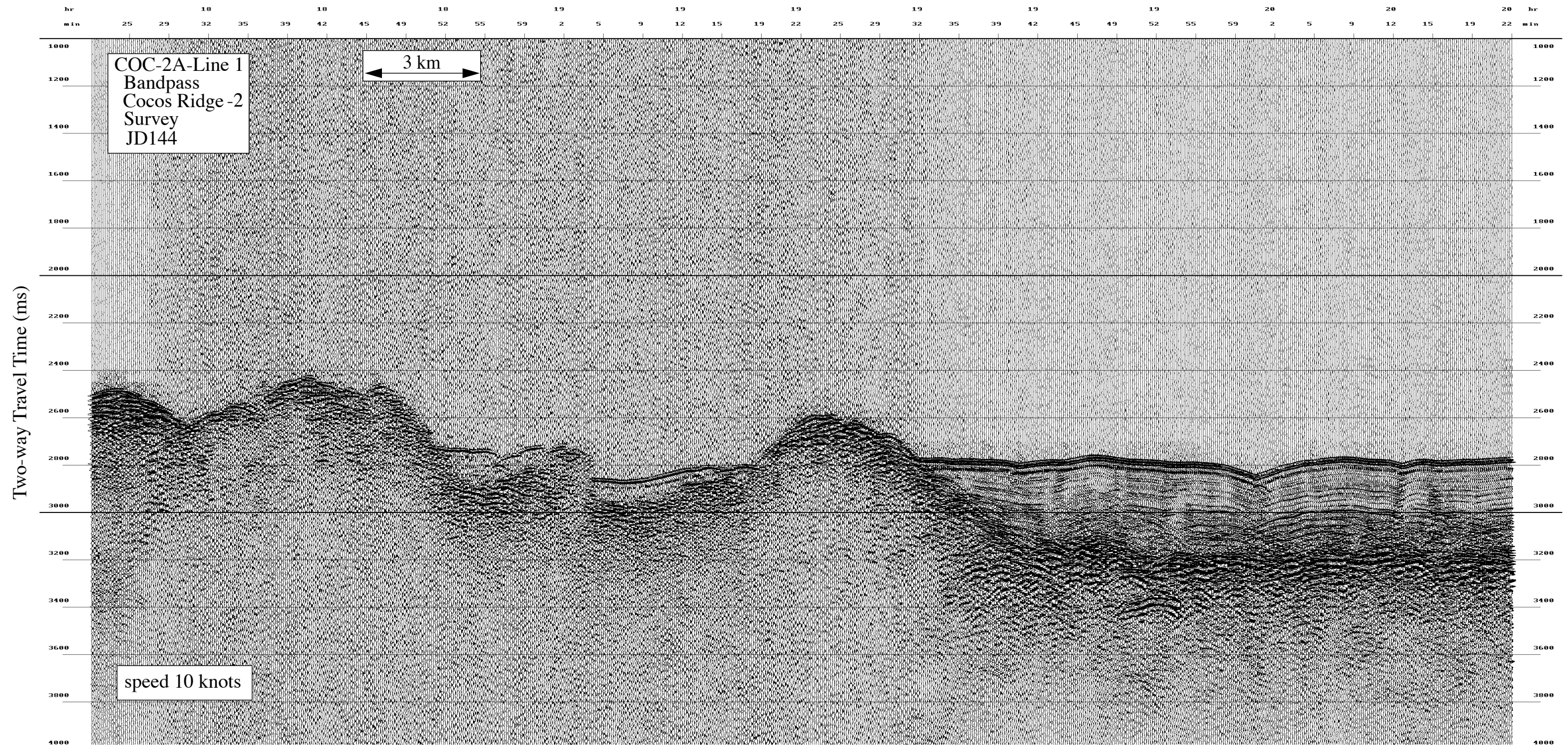


NW

SE

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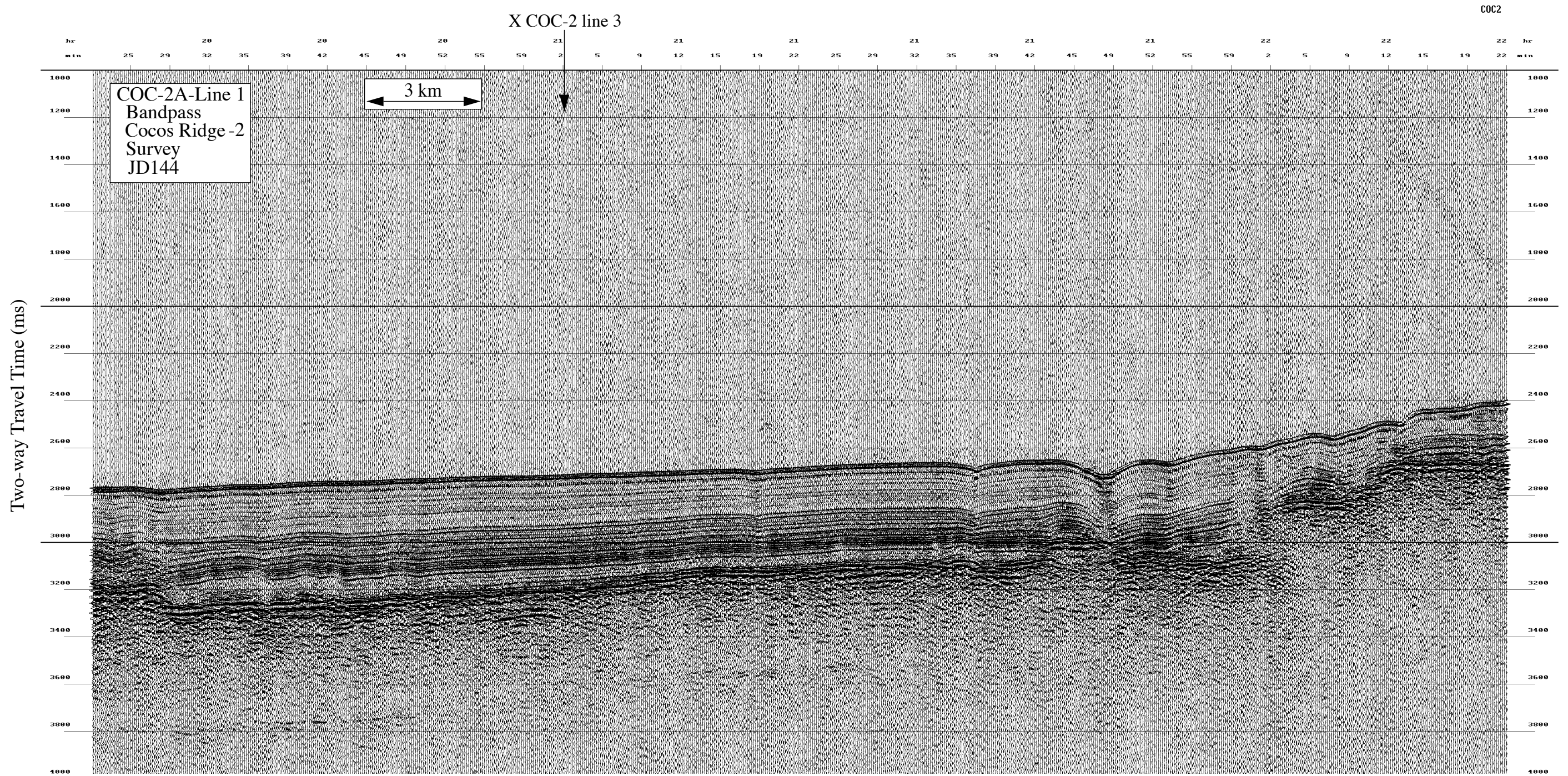
COC2



NW

SE

Line 1 →



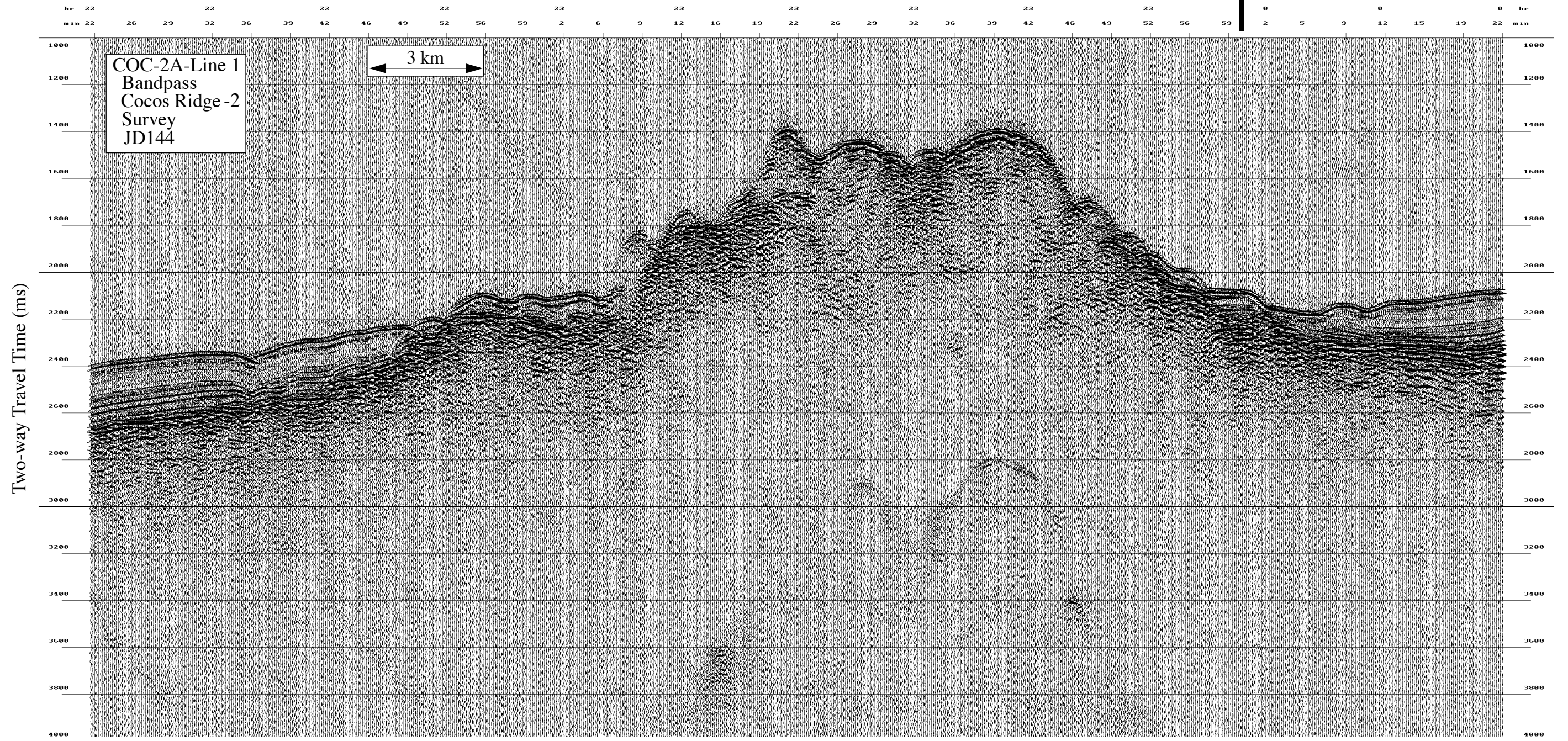
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SE

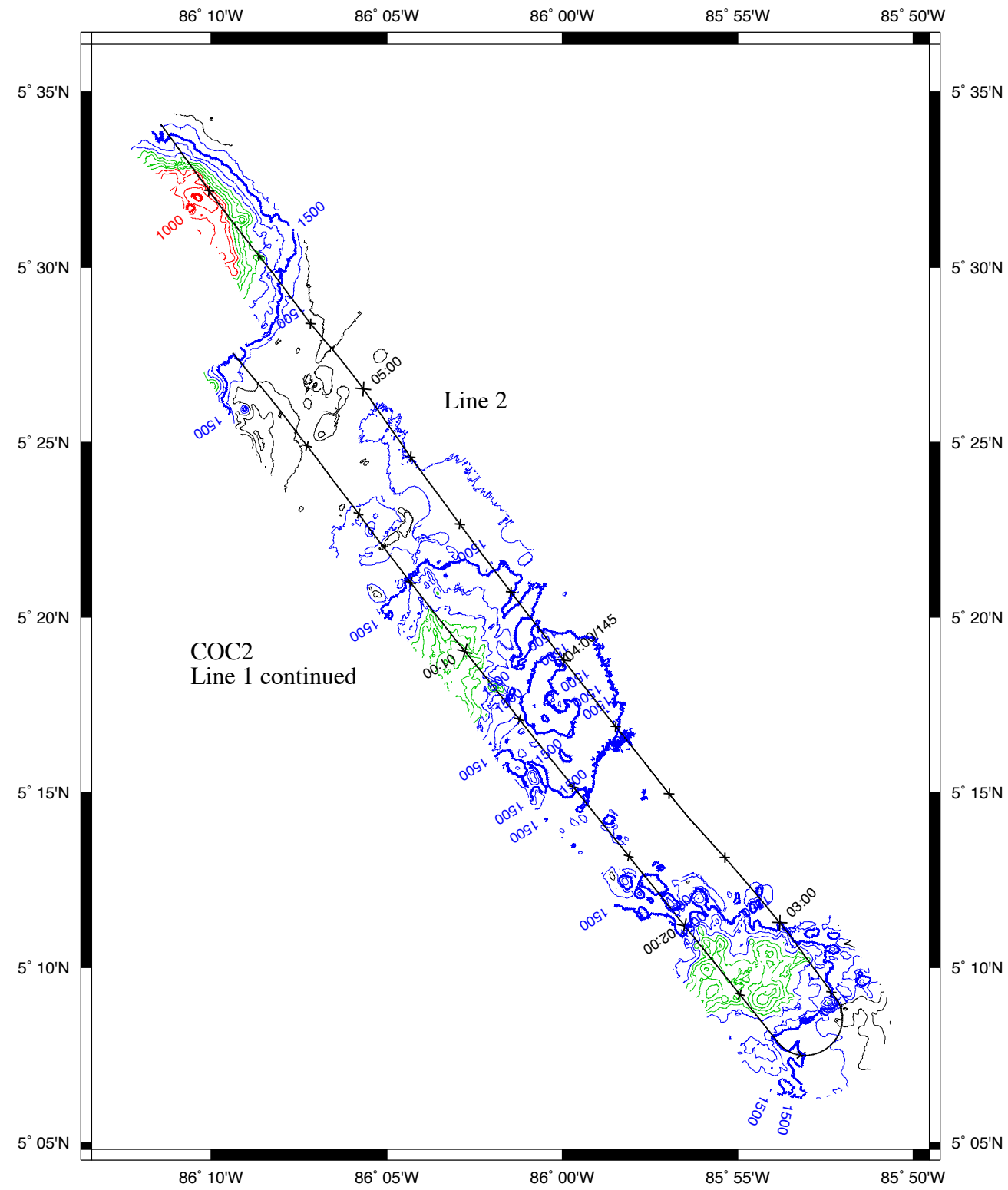
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JD145

COC2



Data File SBfixavg.2000may24.0000-0600

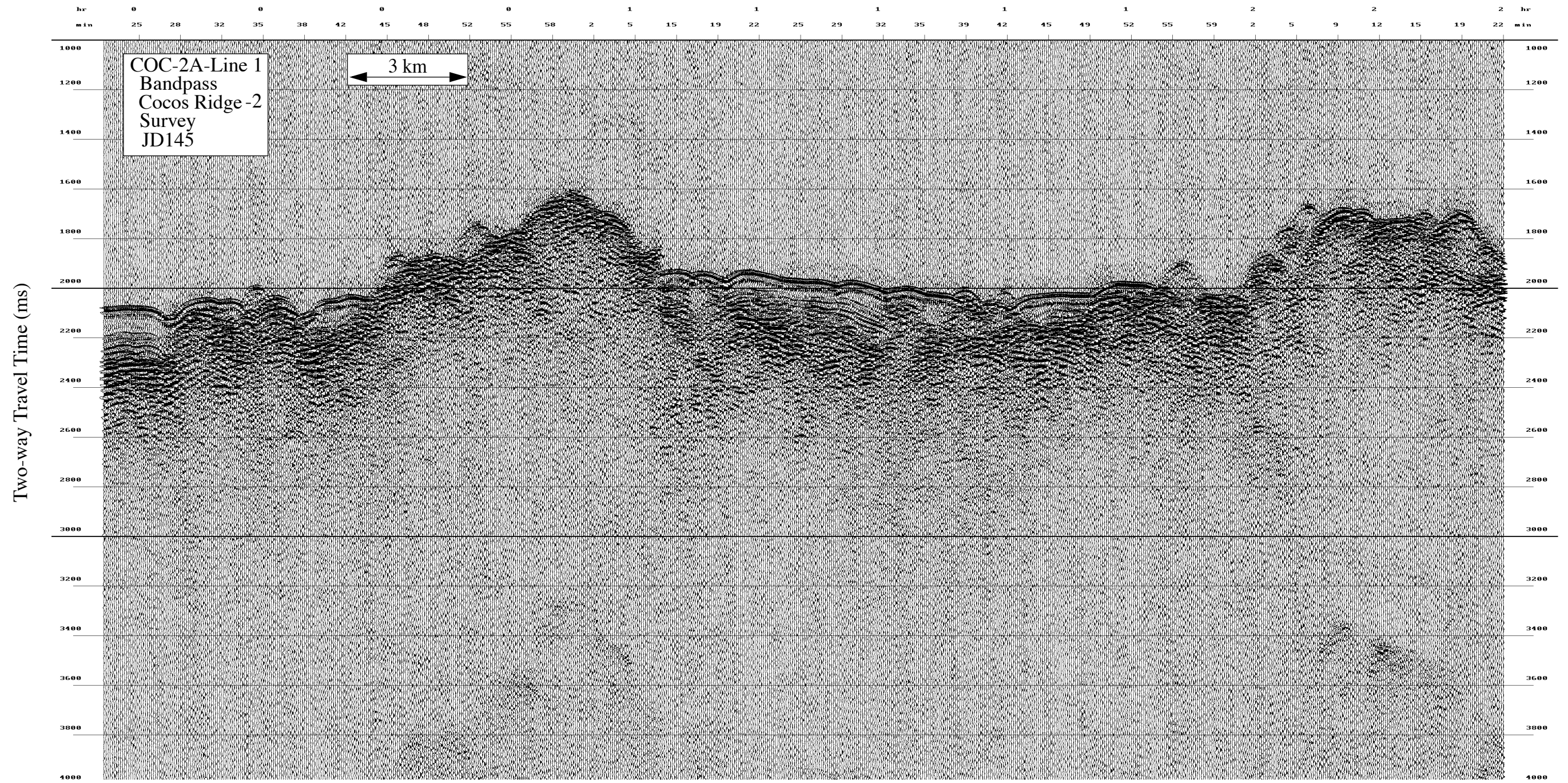


NW

SE

Line 1 →

COC2



NW

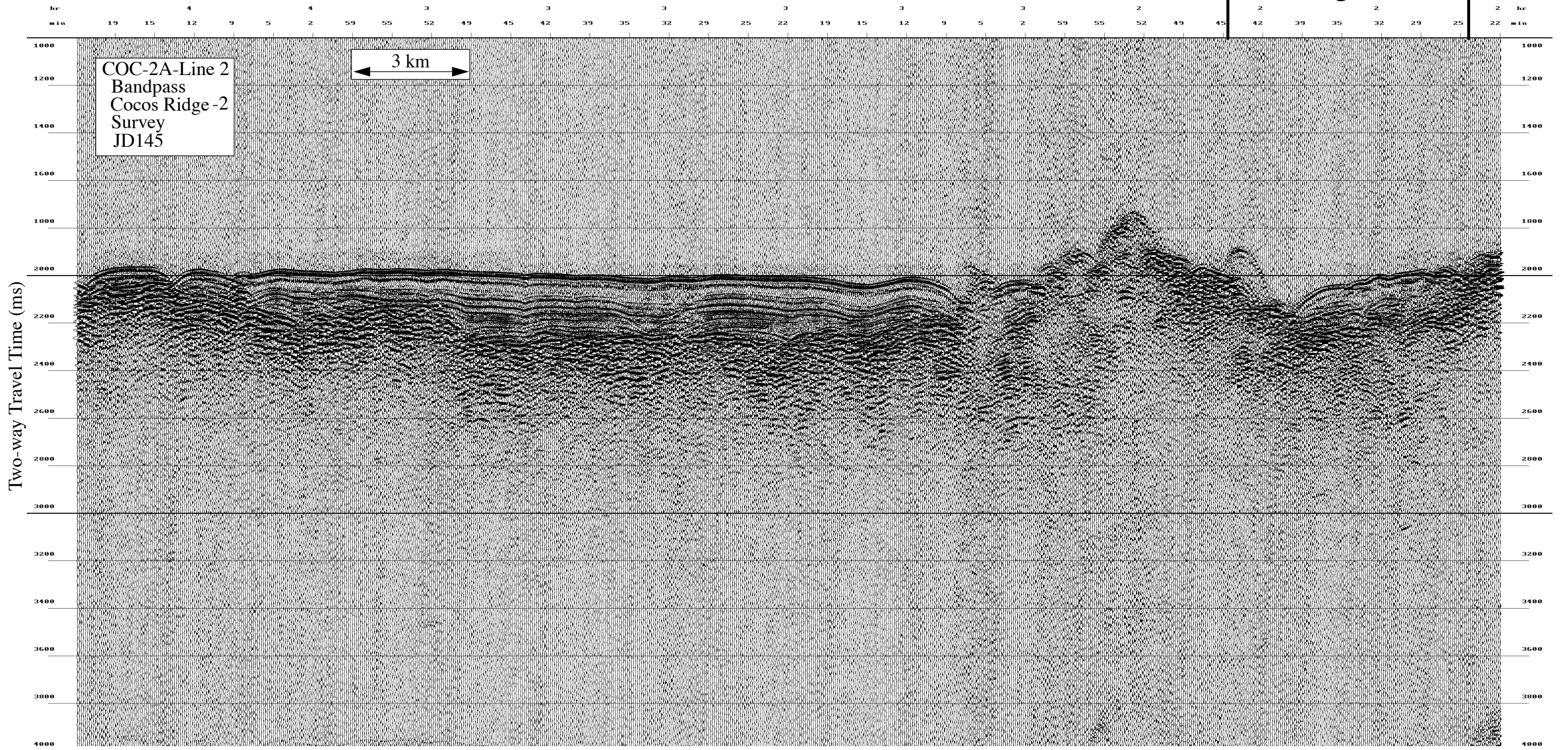
SE

← Line 2

Turn 180
Degrees

Line 1

COC2

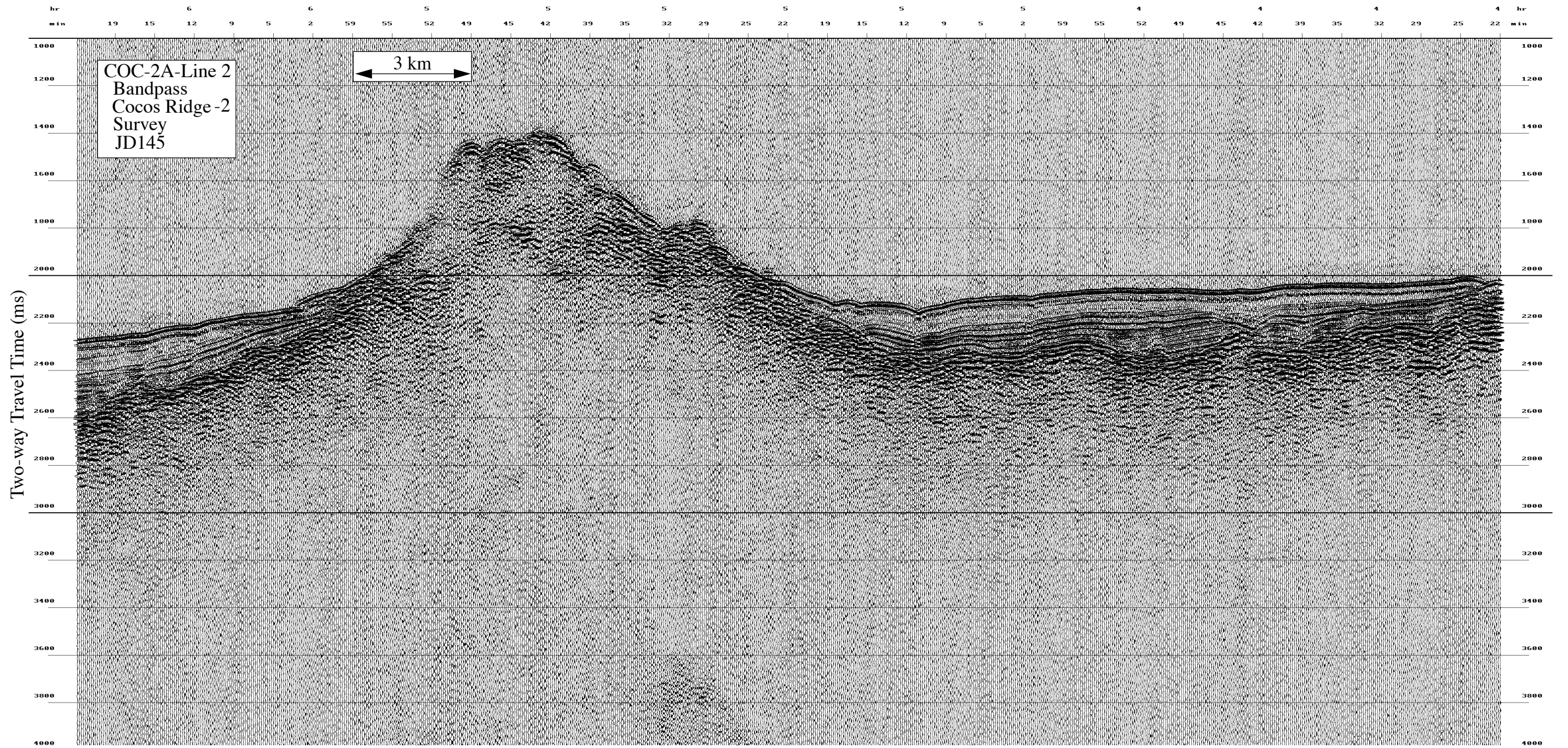


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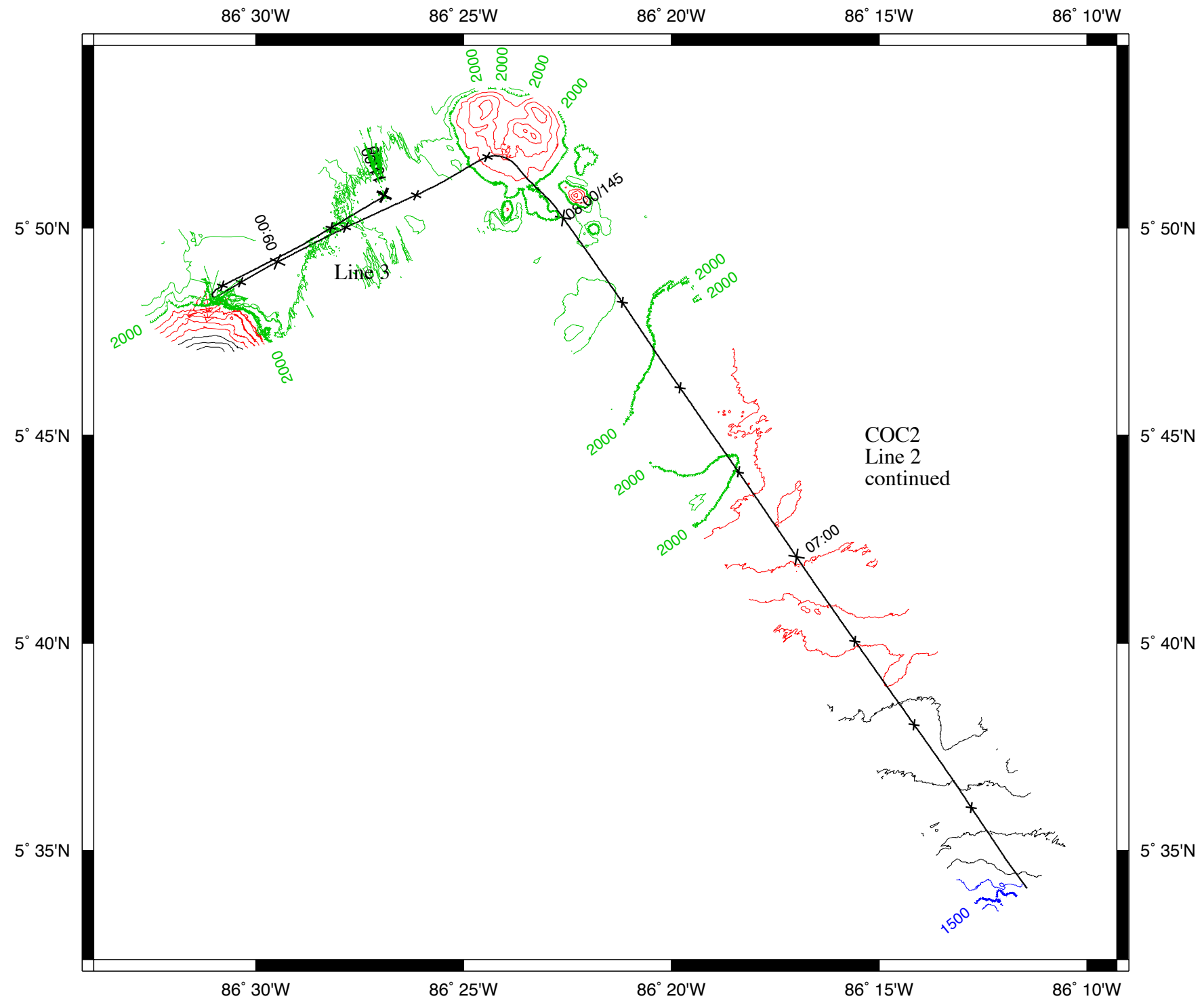
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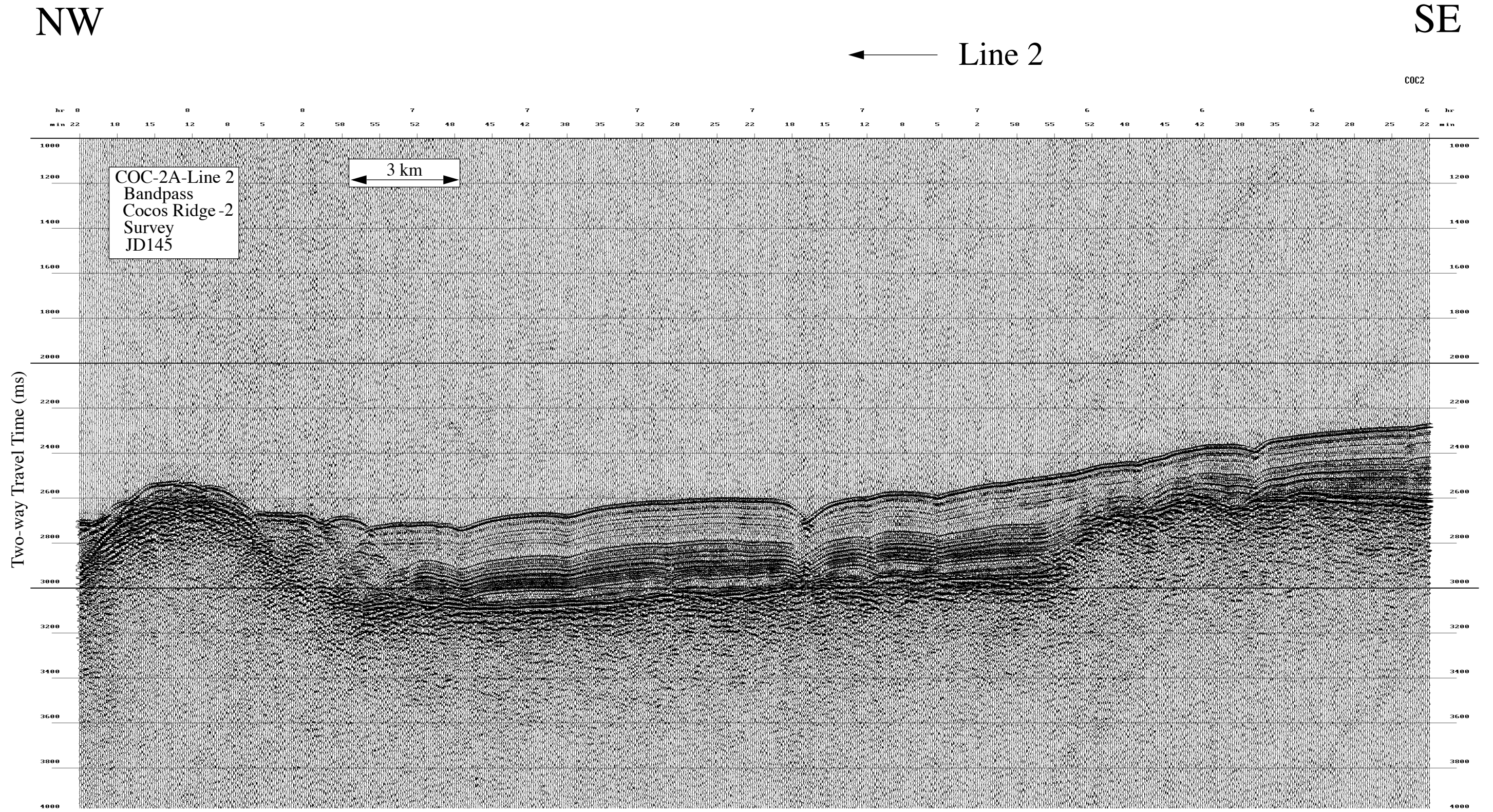
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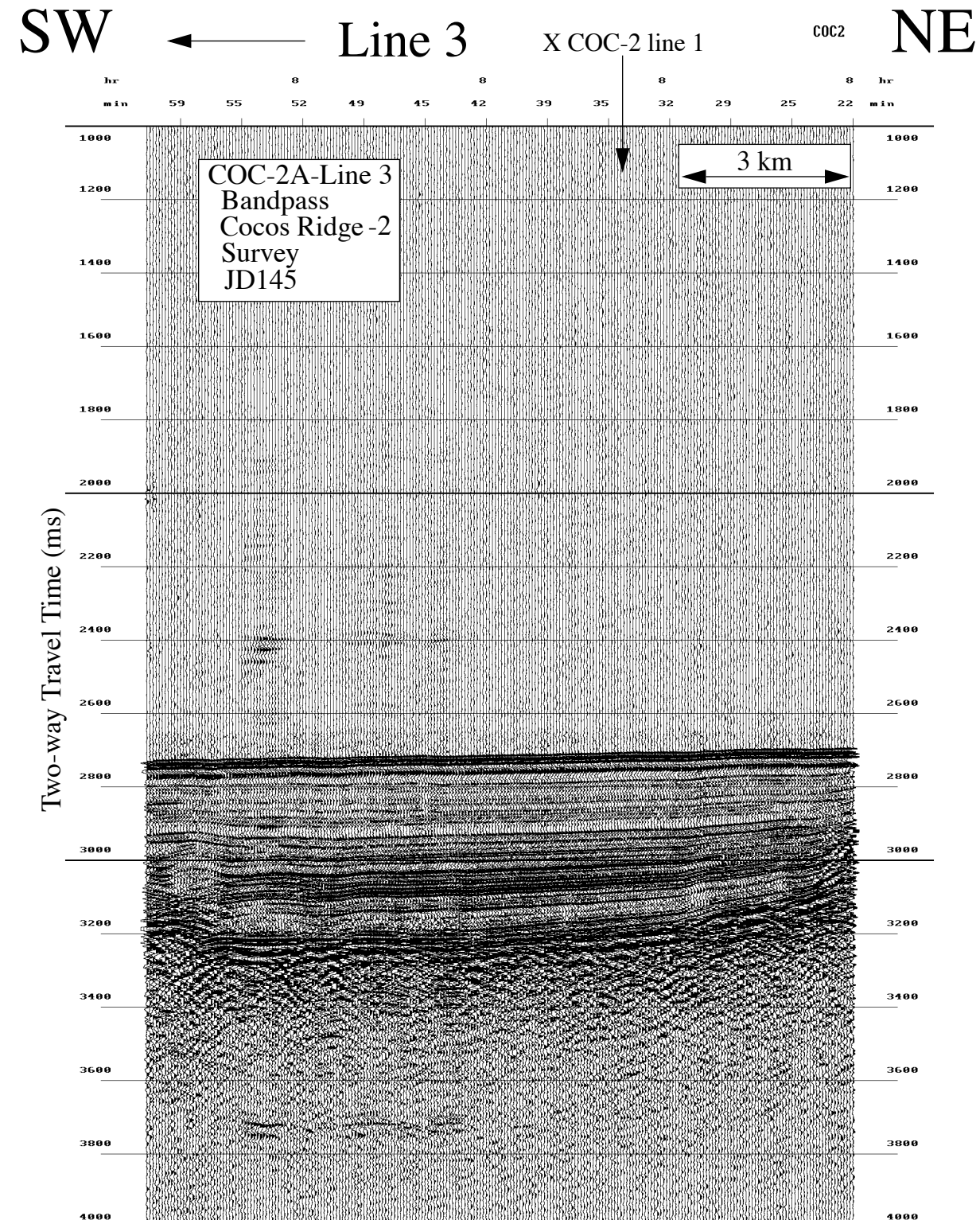
COC2



Data File SBfixavg.2000may24.0600-1200







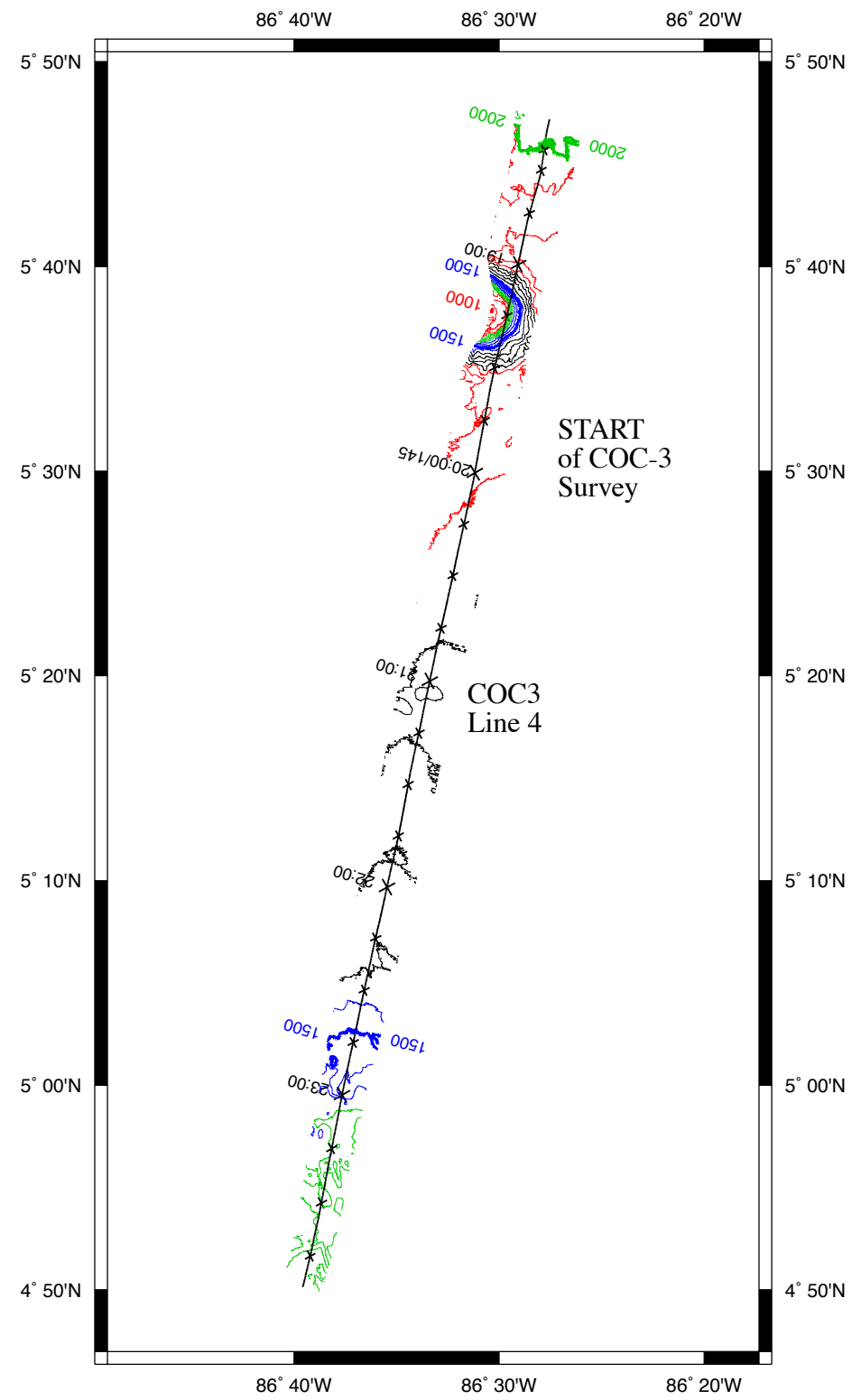
JD 145-146 (24-25 May 2000)--COC-3 Survey, Cocos Ridge

High Resolution Seismic Reflection Records

NEMO Leg 3

R/V Melville

Data File SBfixavg.2000may24.1800-2400

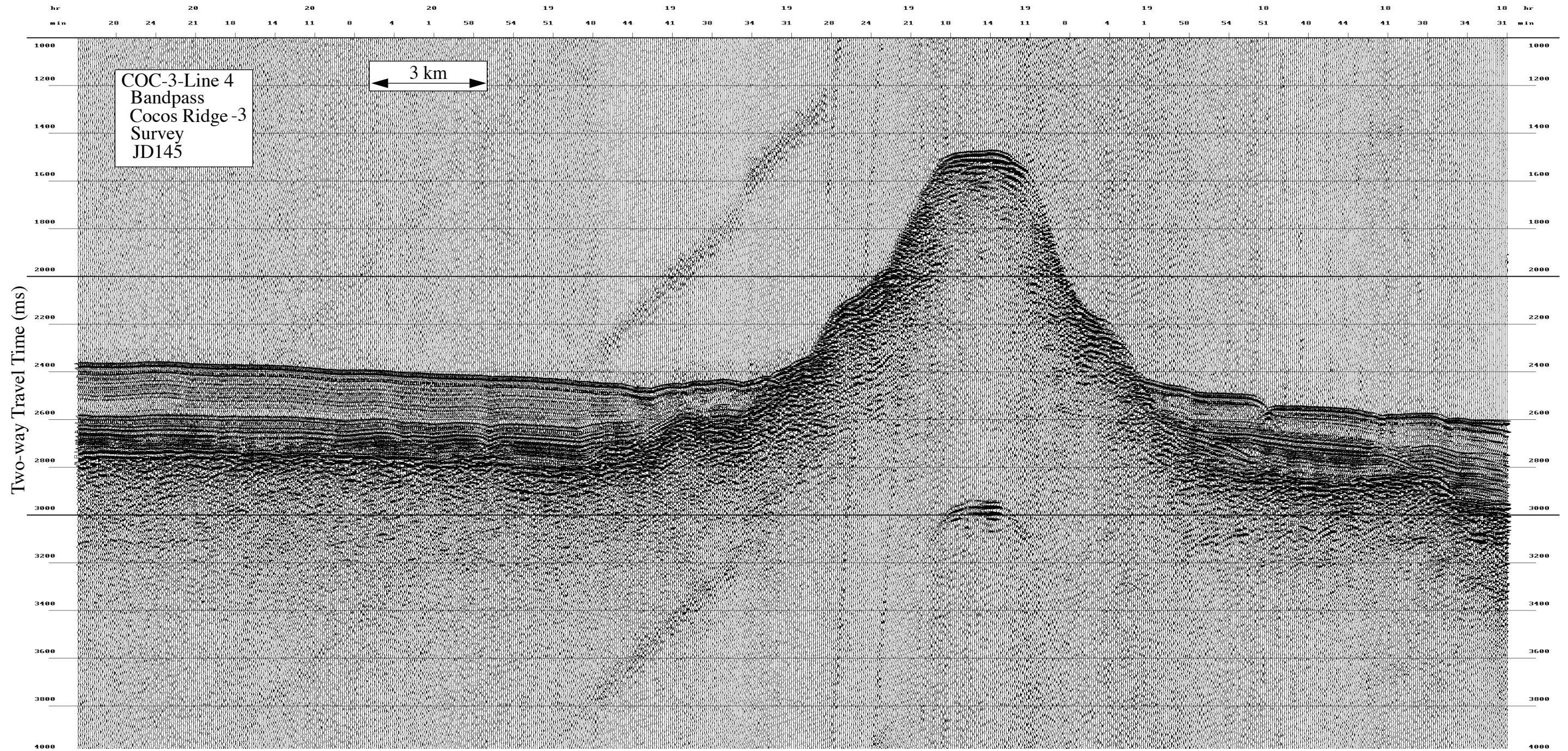


SW

NE

← Line 4

COC2

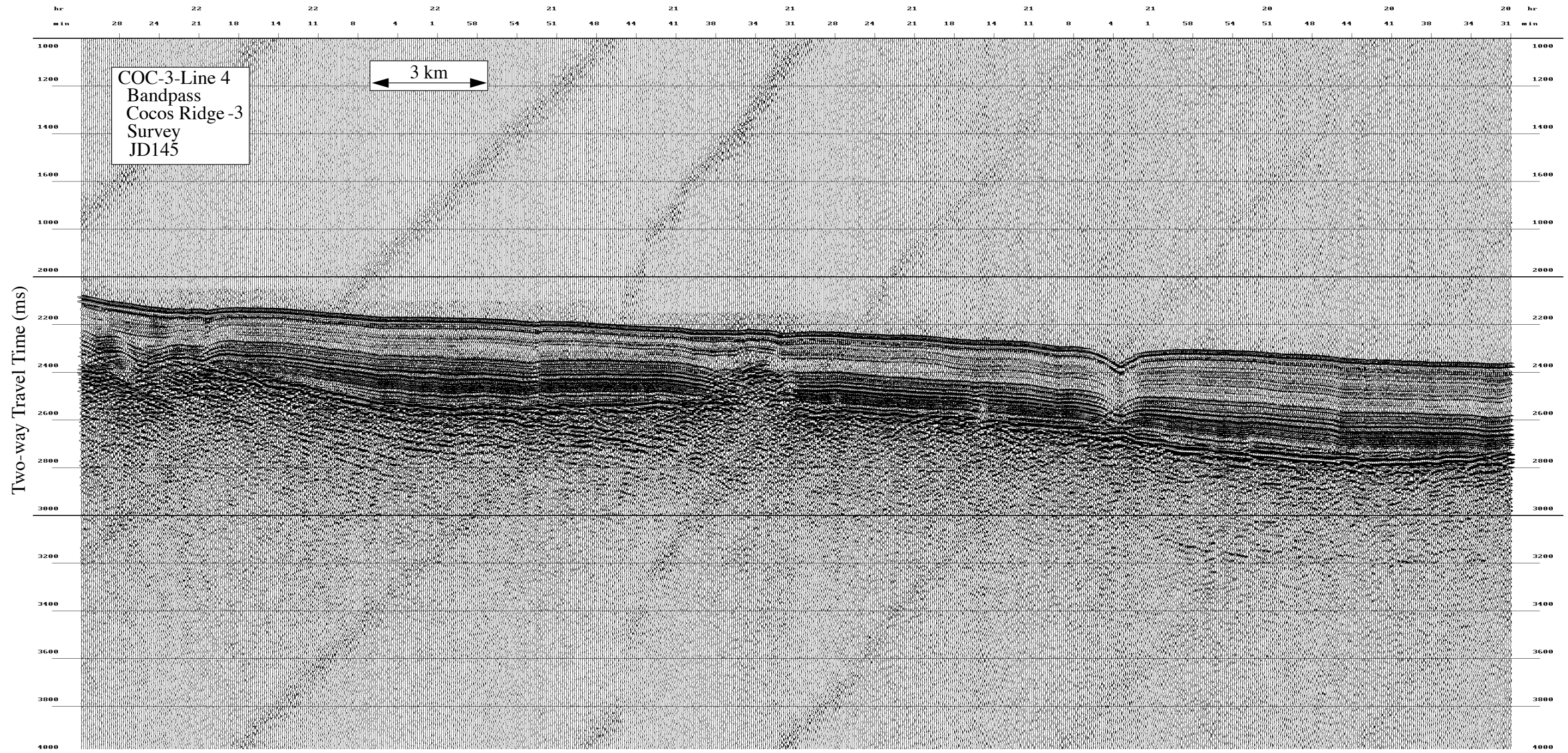


SW

NE

← Line 4

COC2



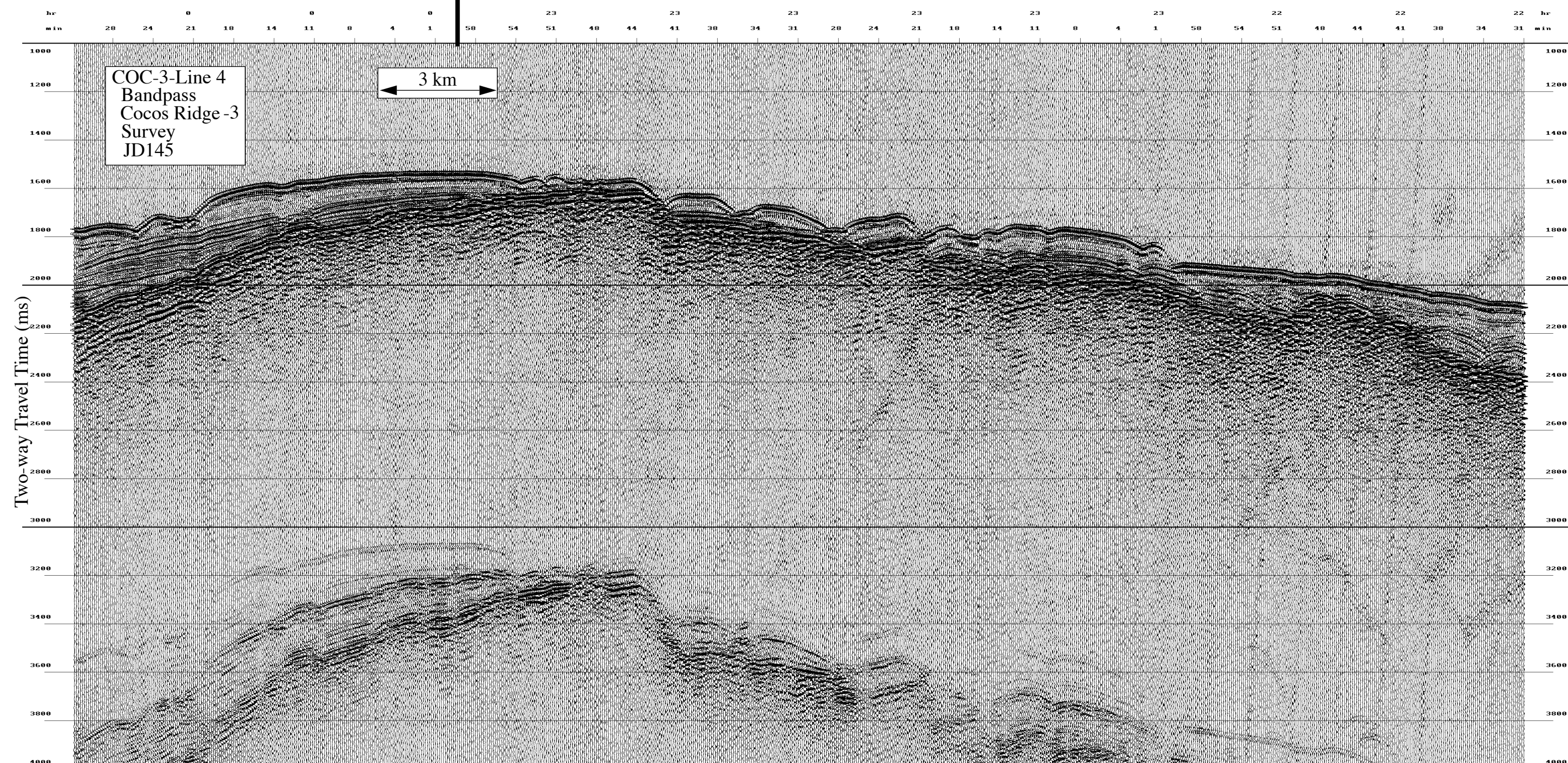
SW

NE

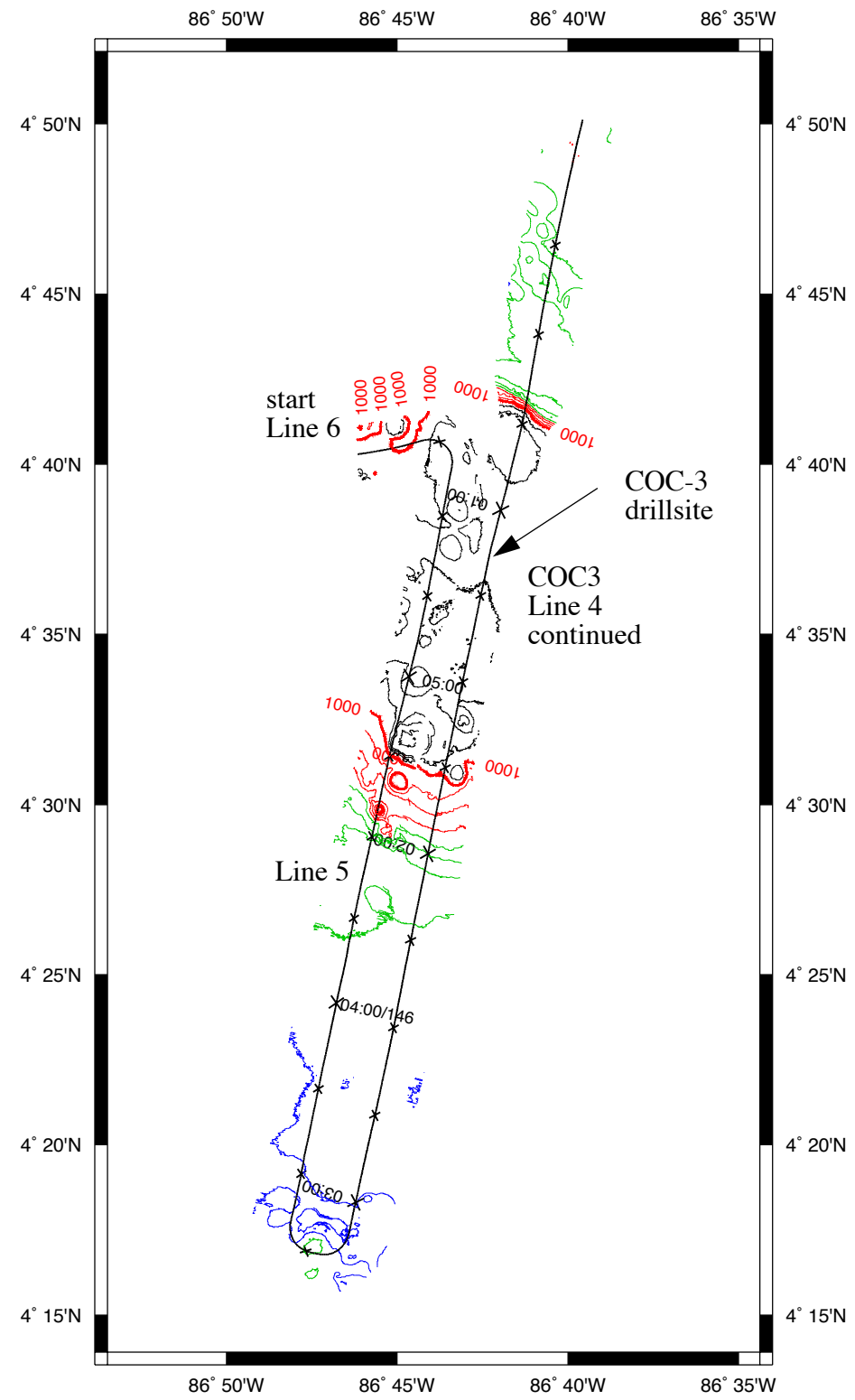
JD146 | JD145

← Line 4

COC2



Data File SBfixavg.2000may25.0000-0600



SW

NE

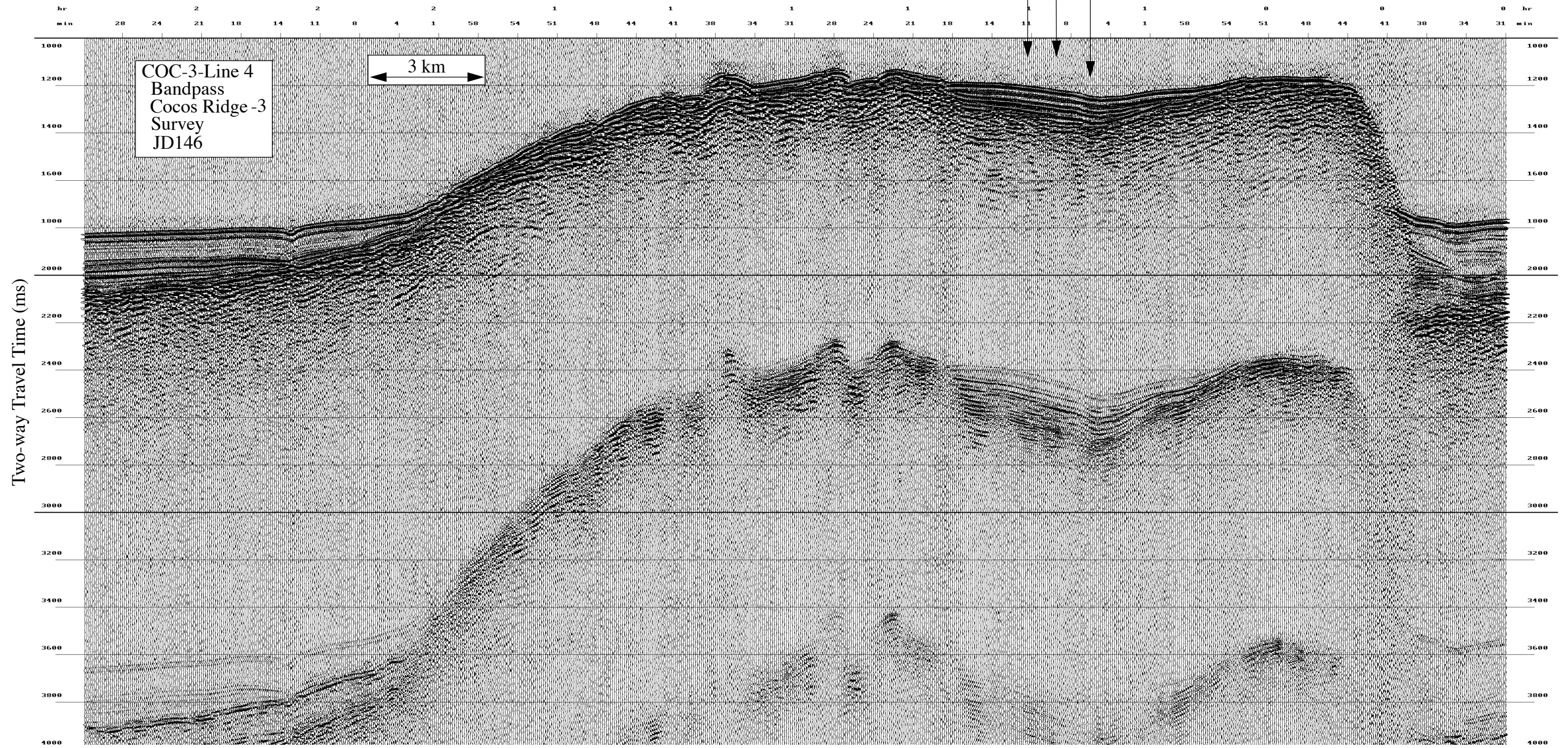
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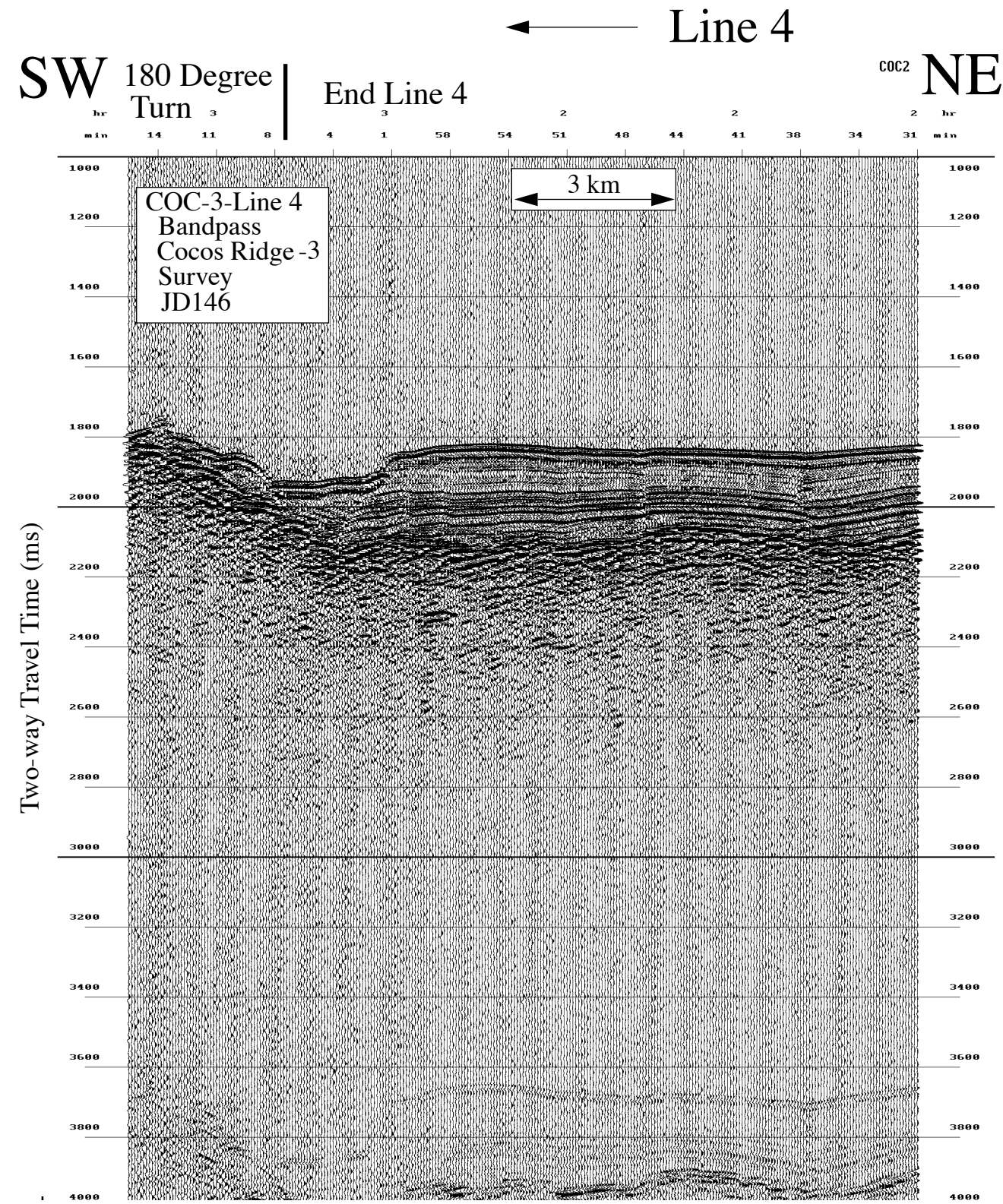
COC-3 Drillsite

MC16/PC17 cores

X COC-3 line 7

COC2





SW

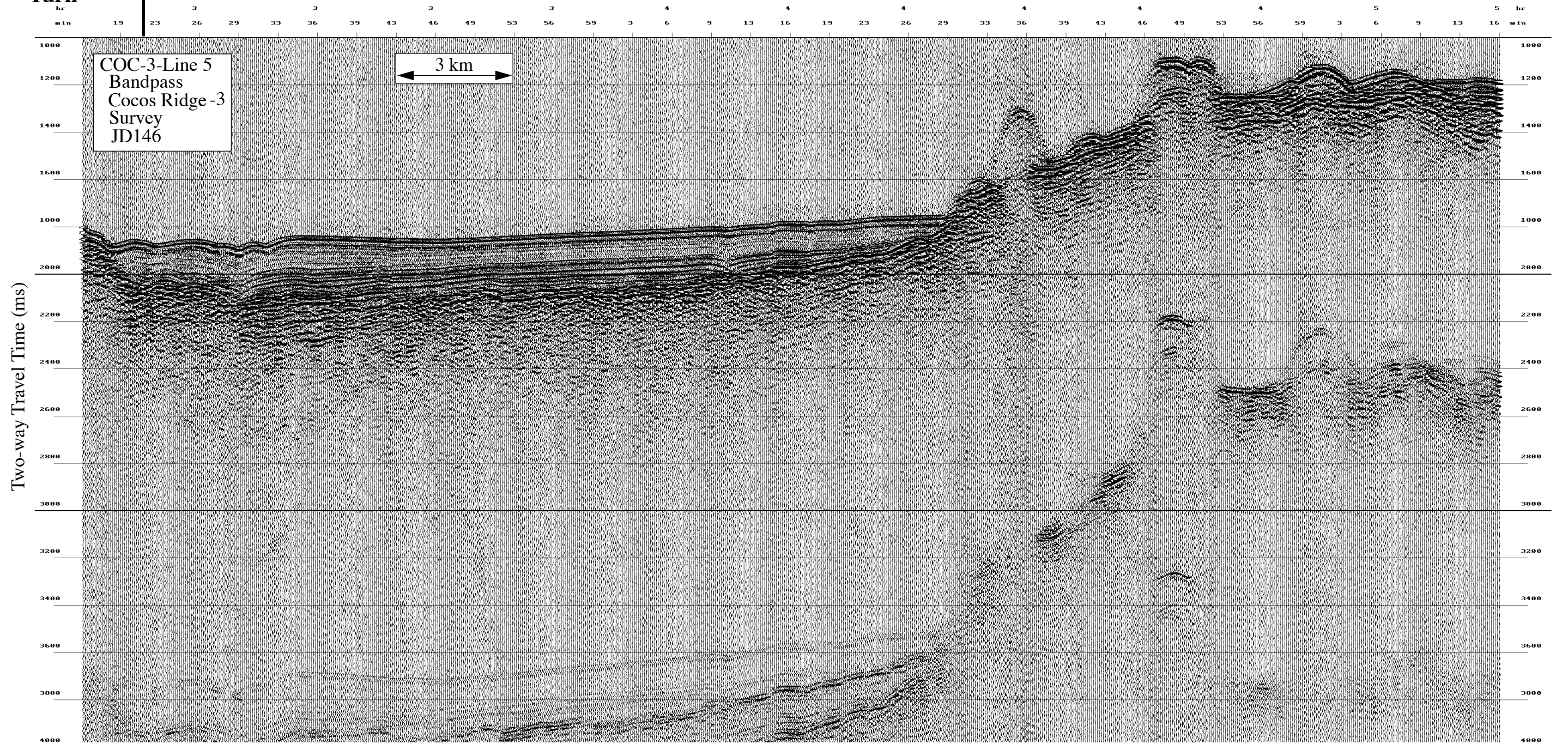
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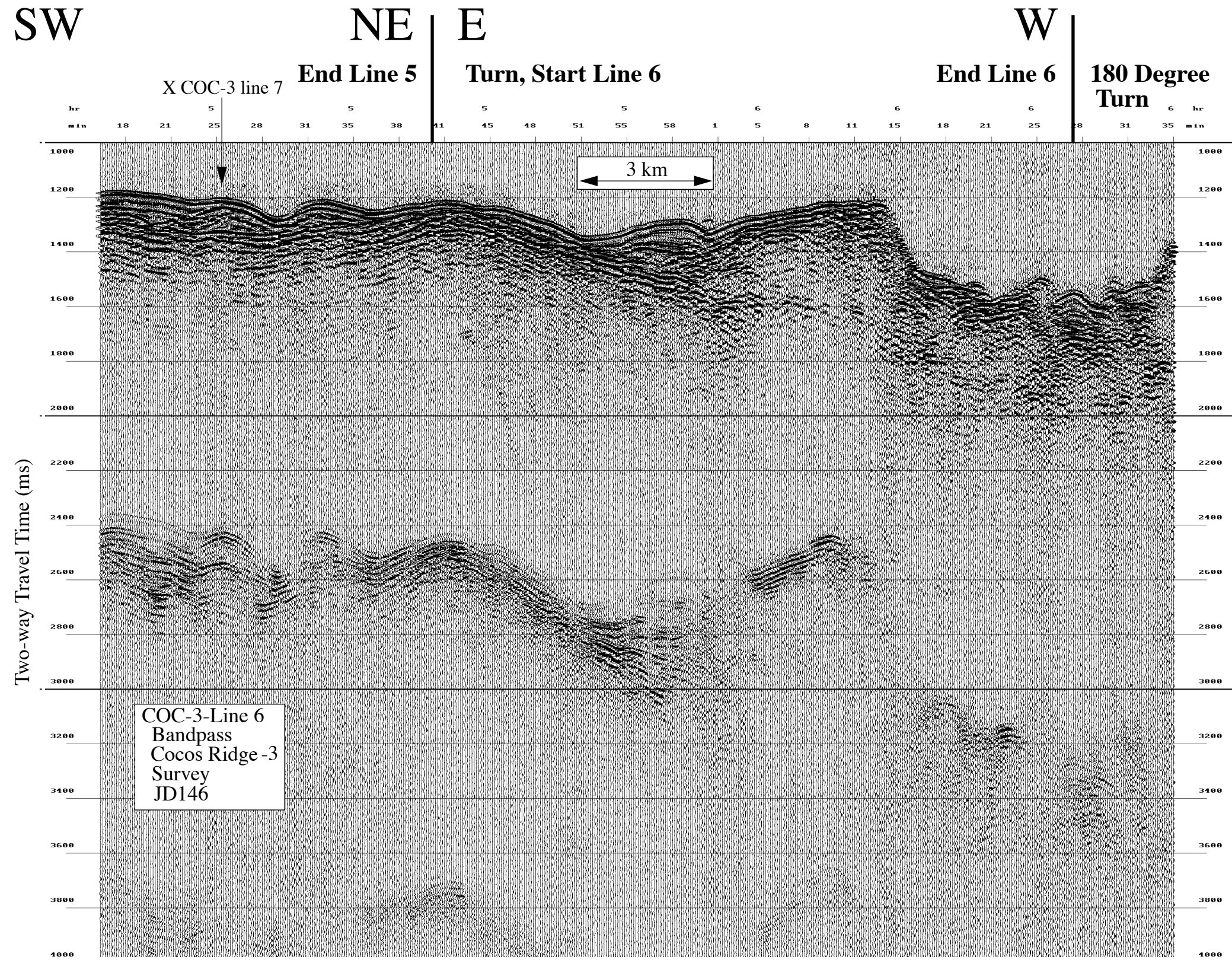
Line 5 →

180 Degree
Turn

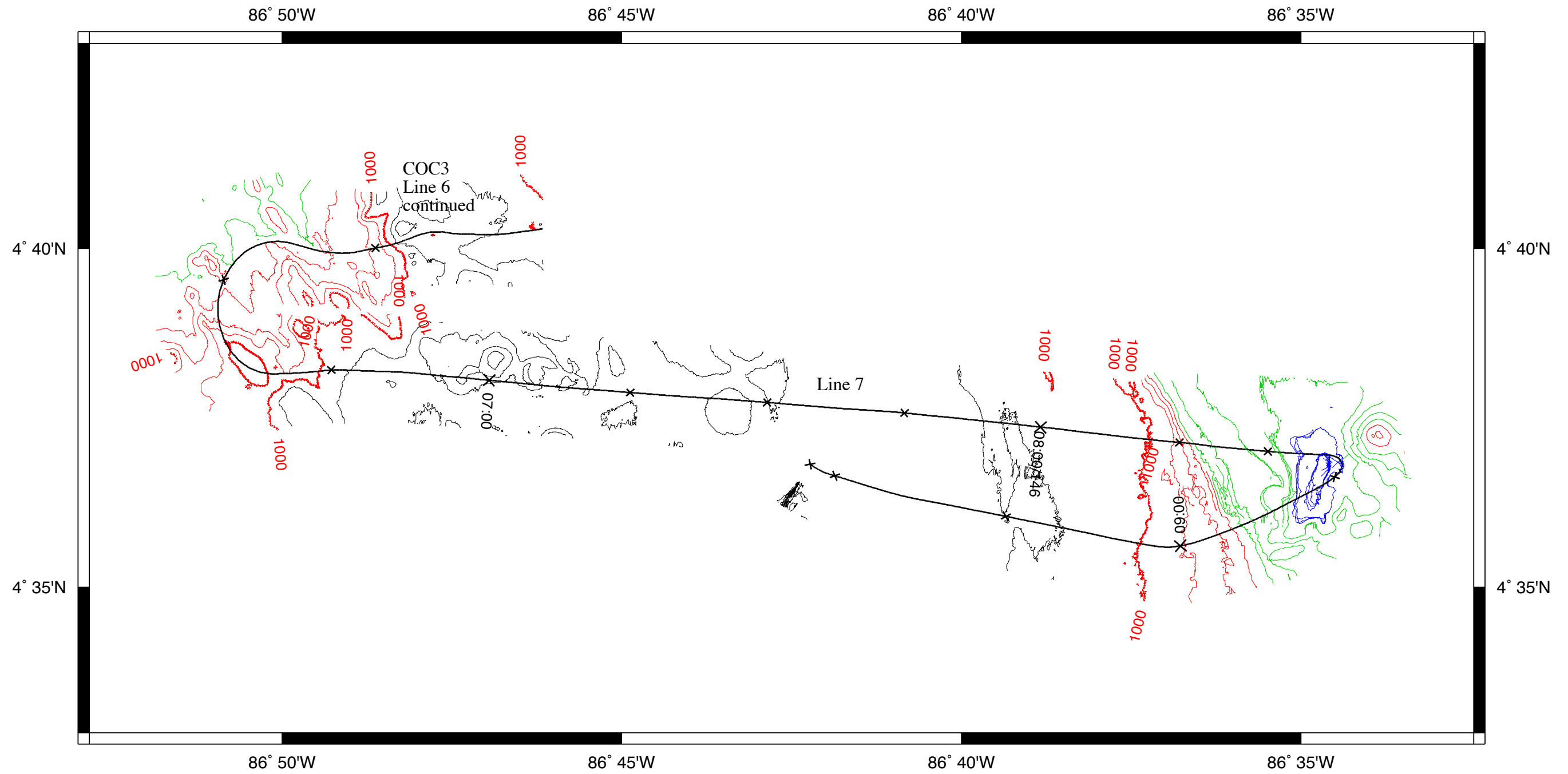
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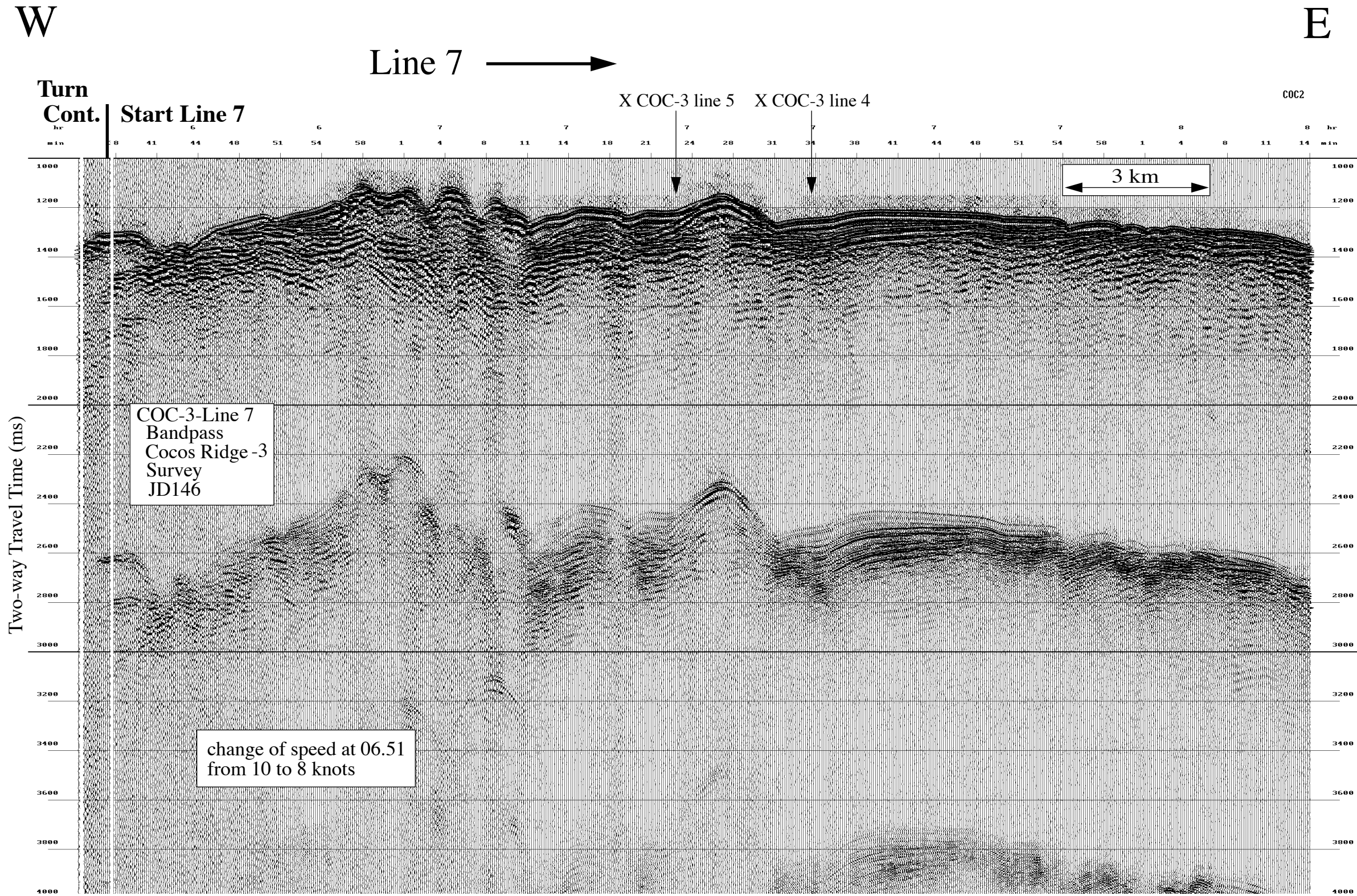
COC2





Data File SBfixavg.2000may25.0600-1200





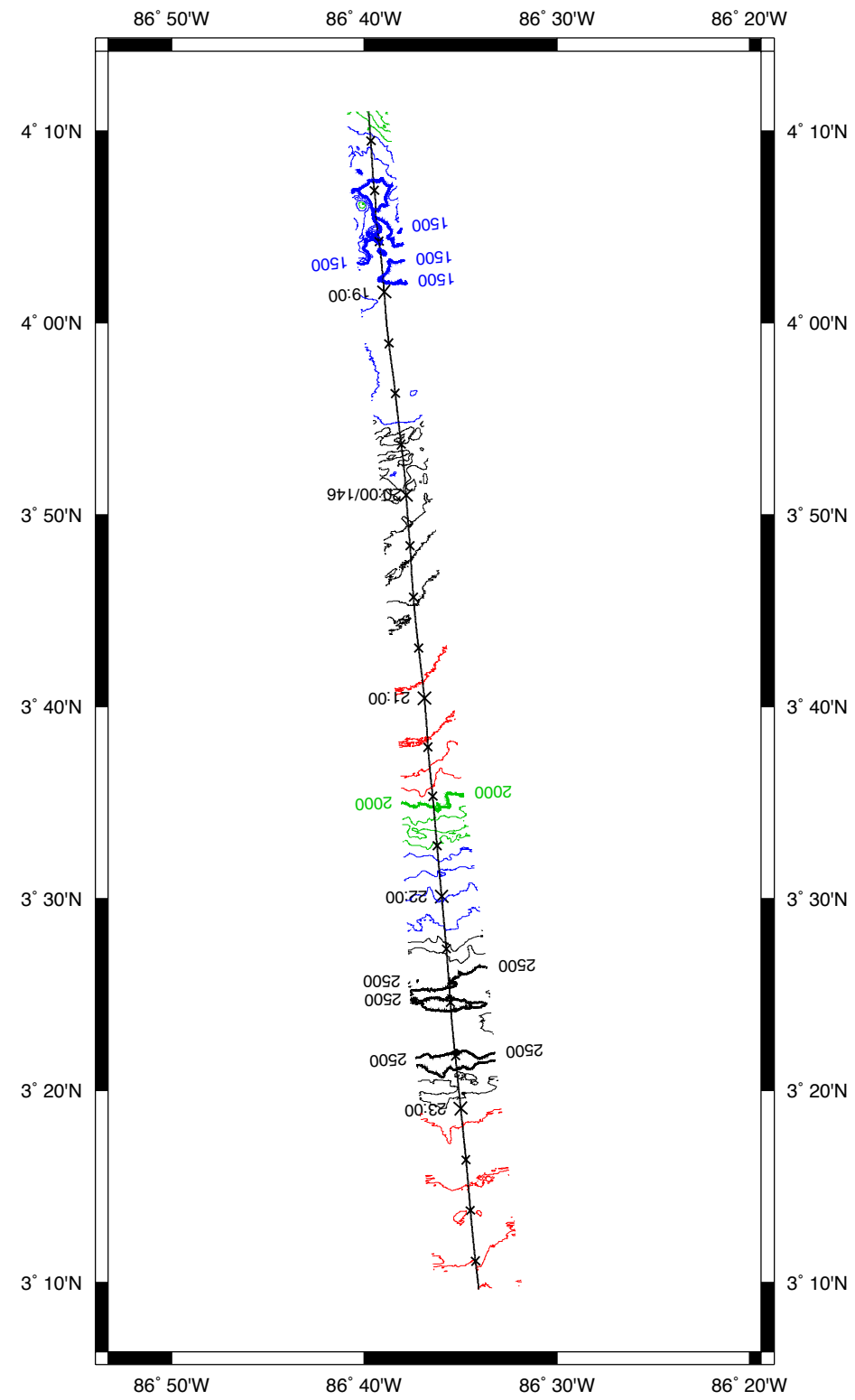
JD 146-147 (25-26 May 2000)--PAN-1 Survey, Panama Basin

High Resolution Seismic Reflection Records

NEMO Leg 3

R/V Melville

Data File SBfixavg.2000may25.1800-2400

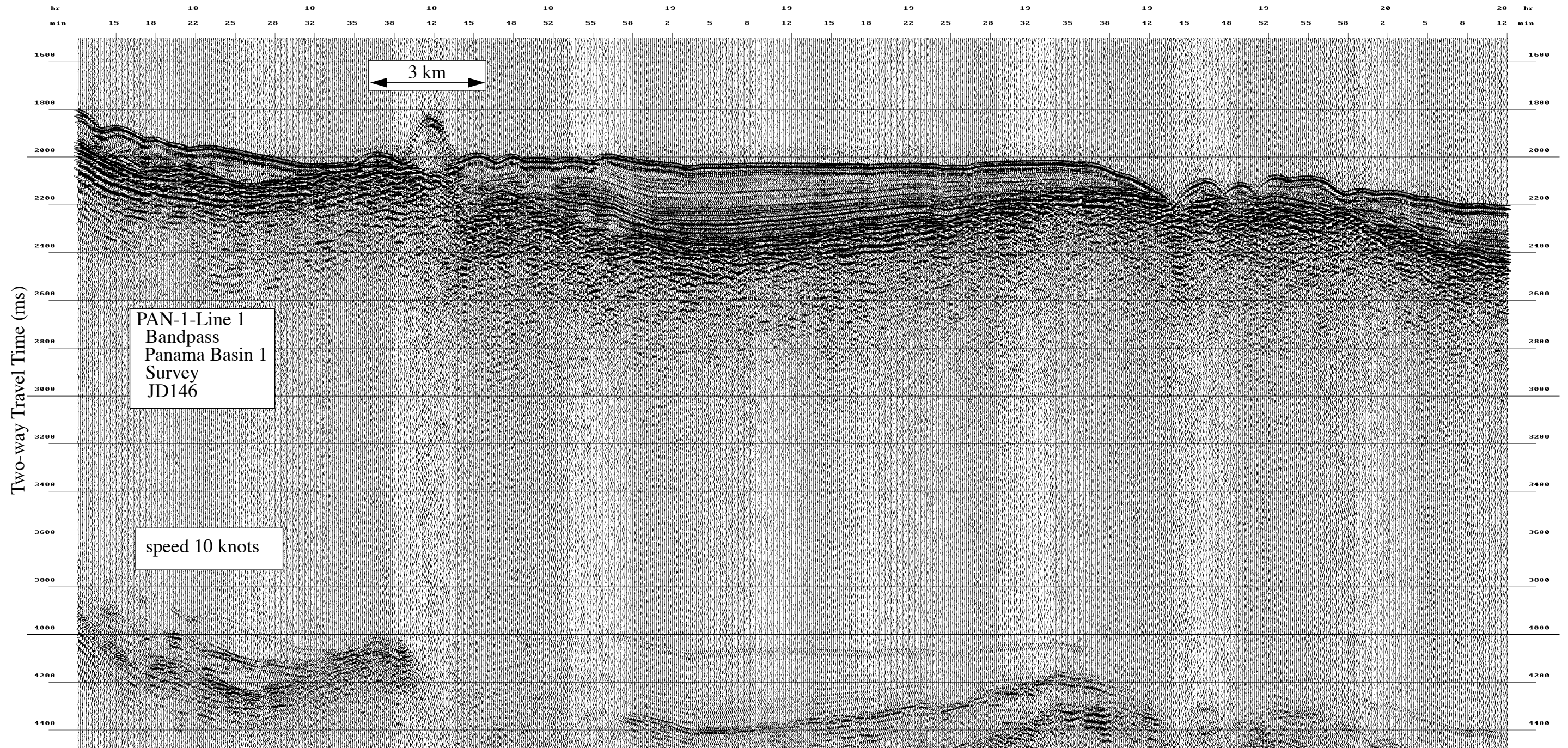


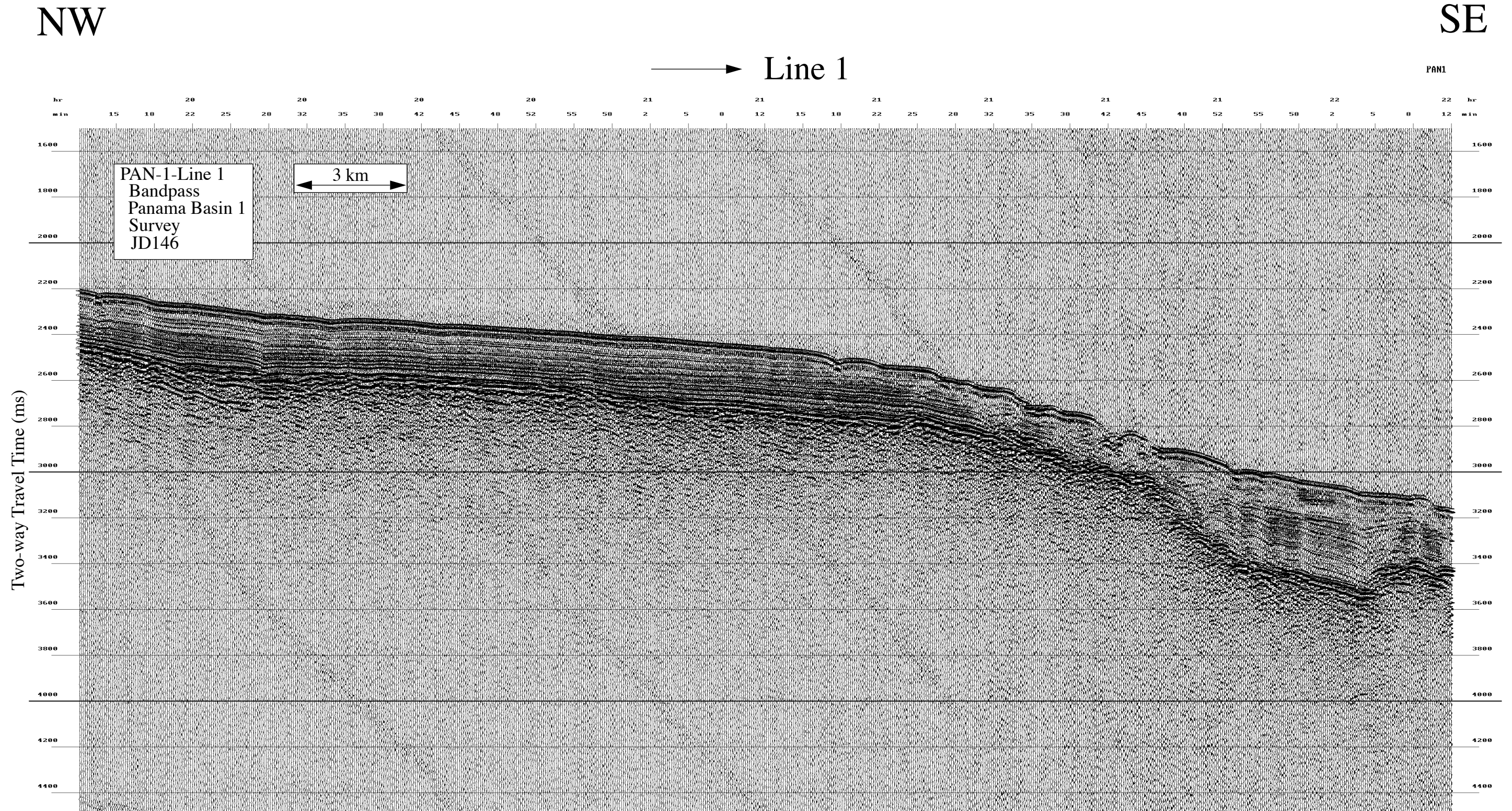
NW

SE

→ Line 1

PAN1



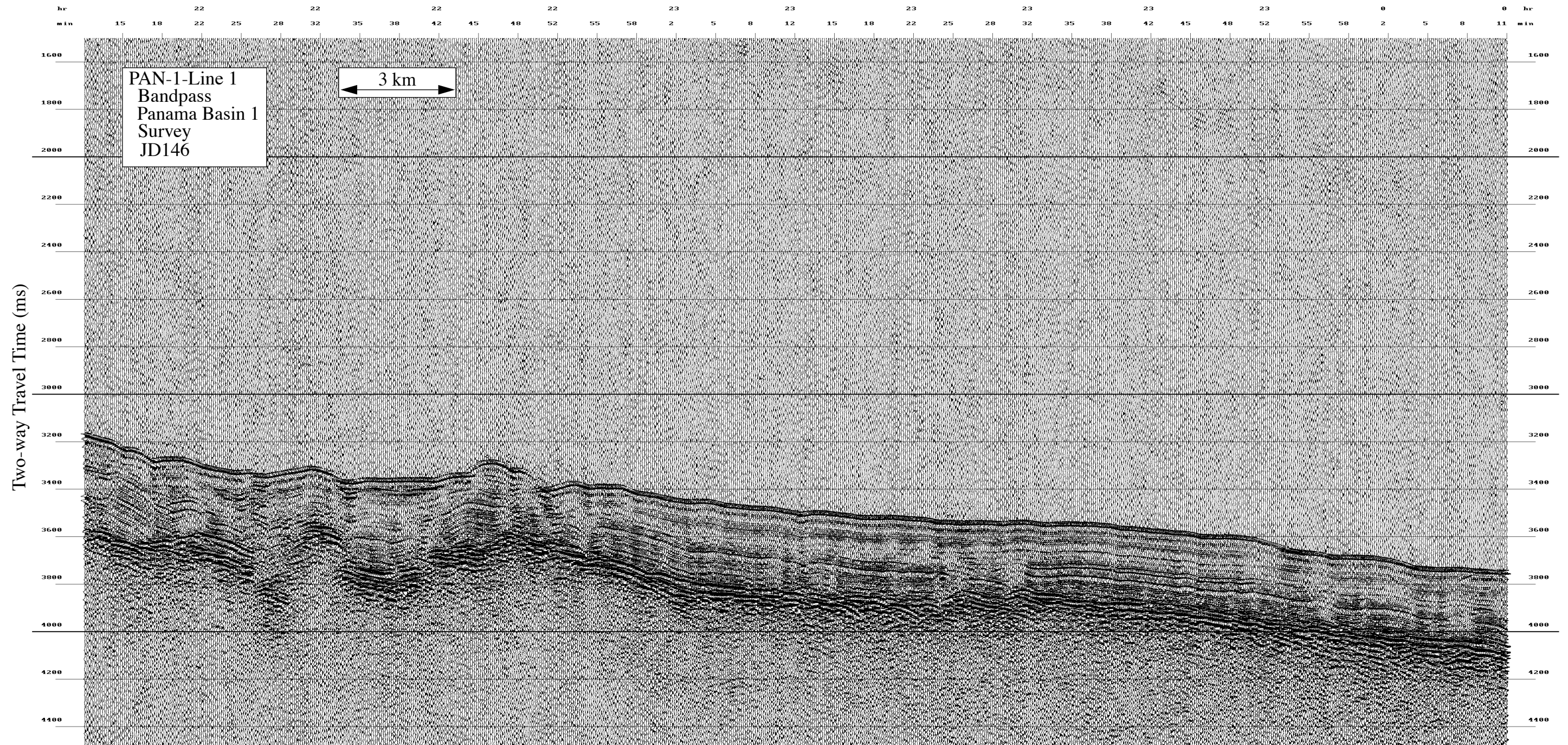


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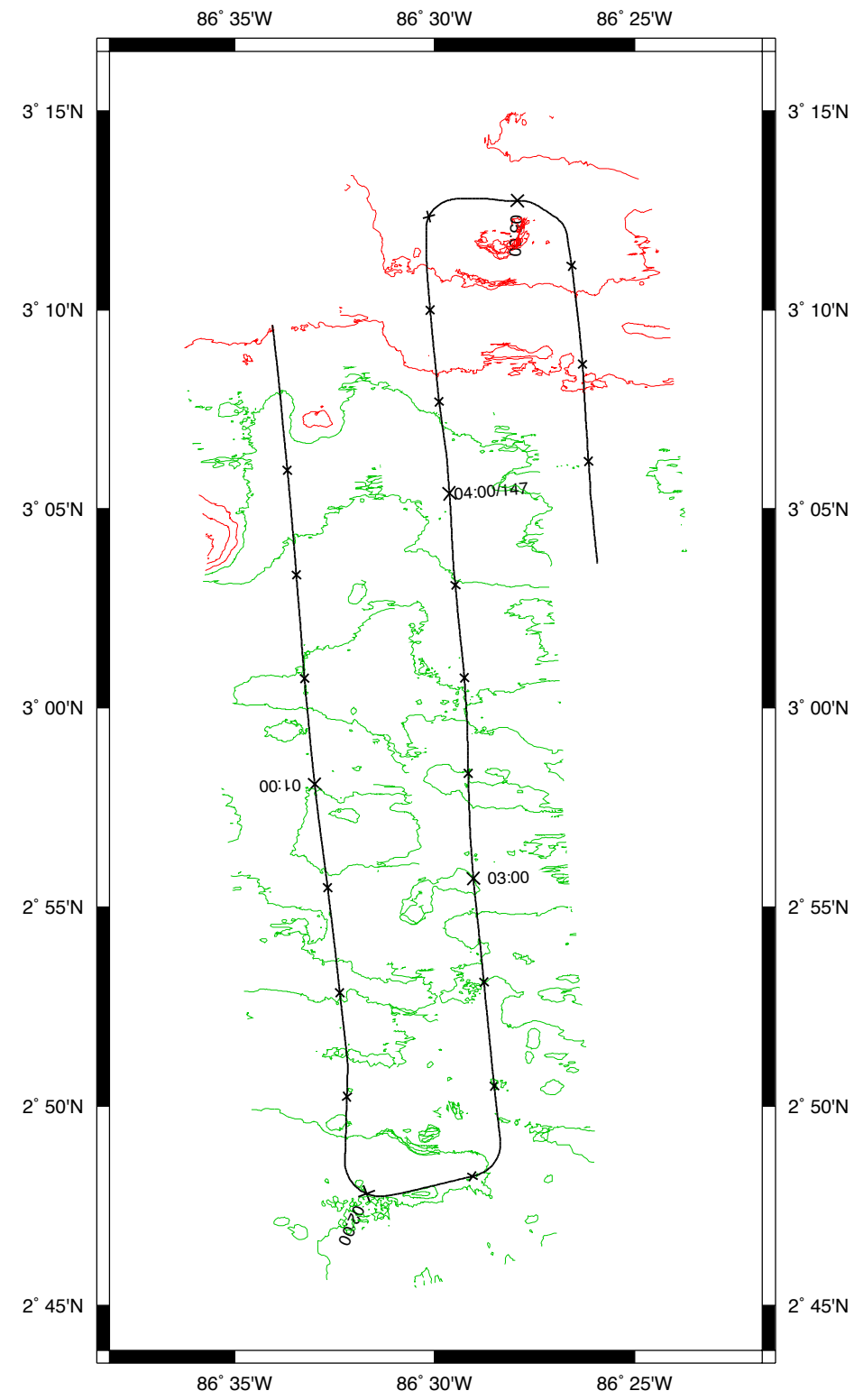
SE

→ Line 1

PAN1



Data File SBfixavg.2000may26.0000-0600



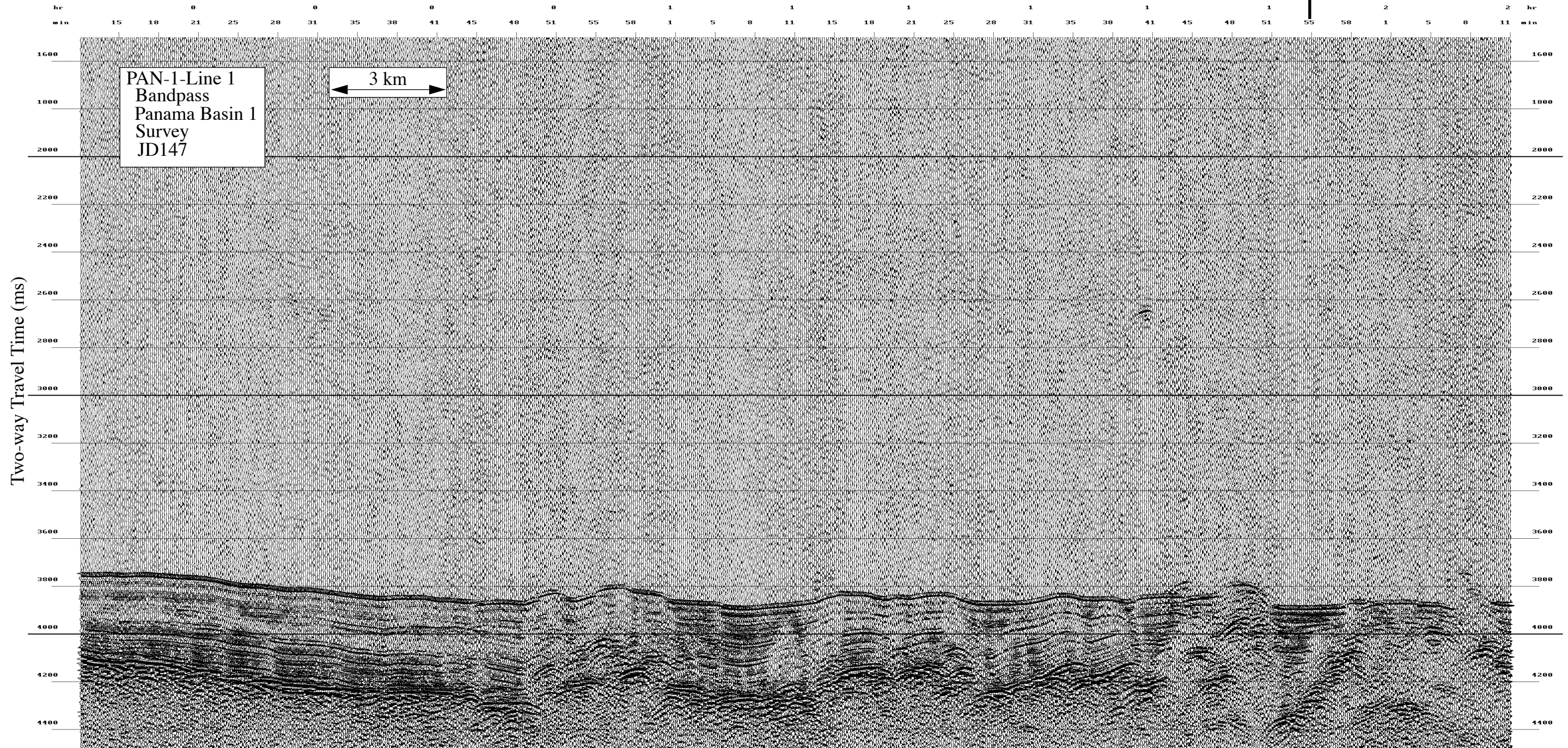
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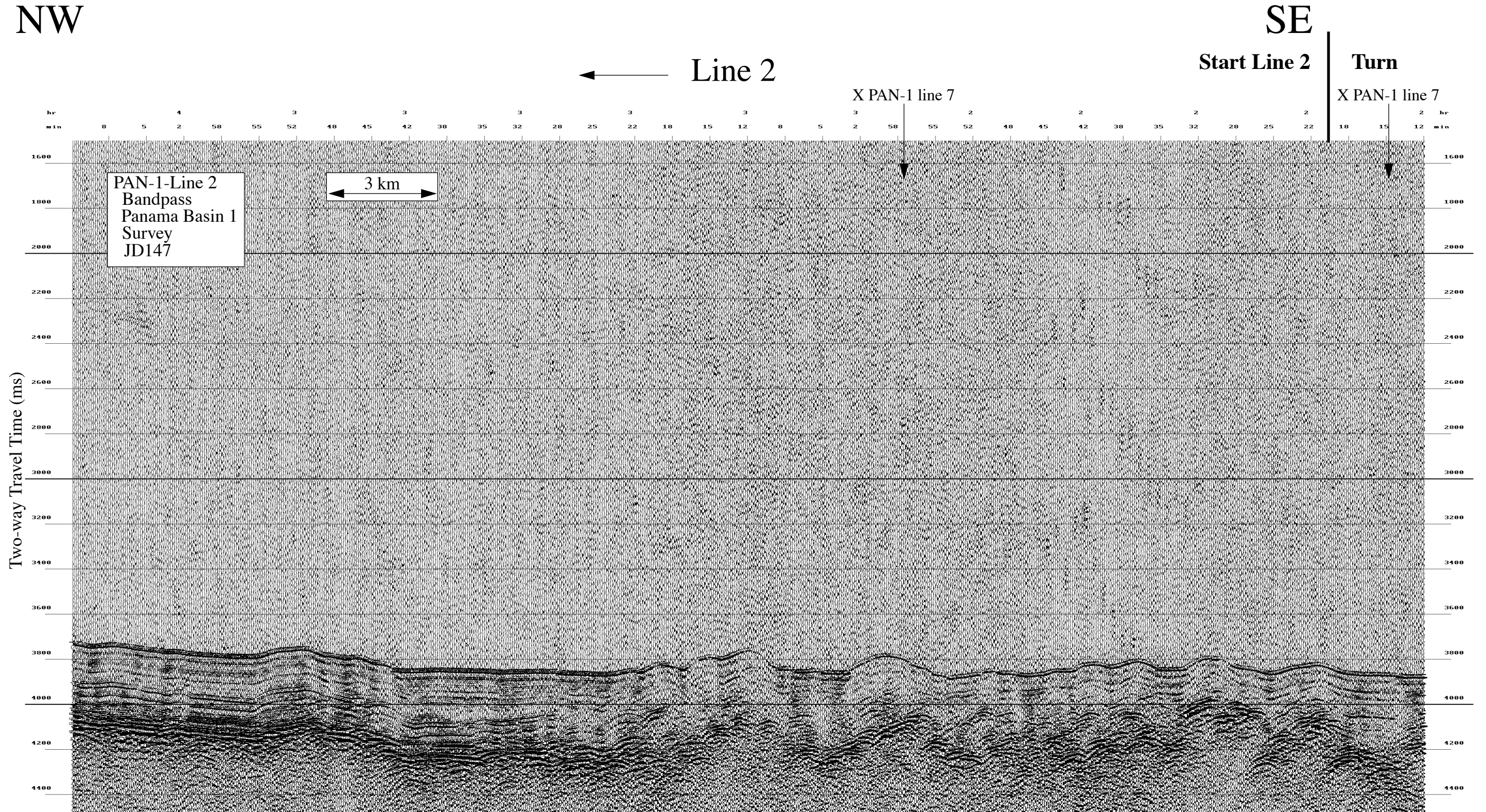
SE

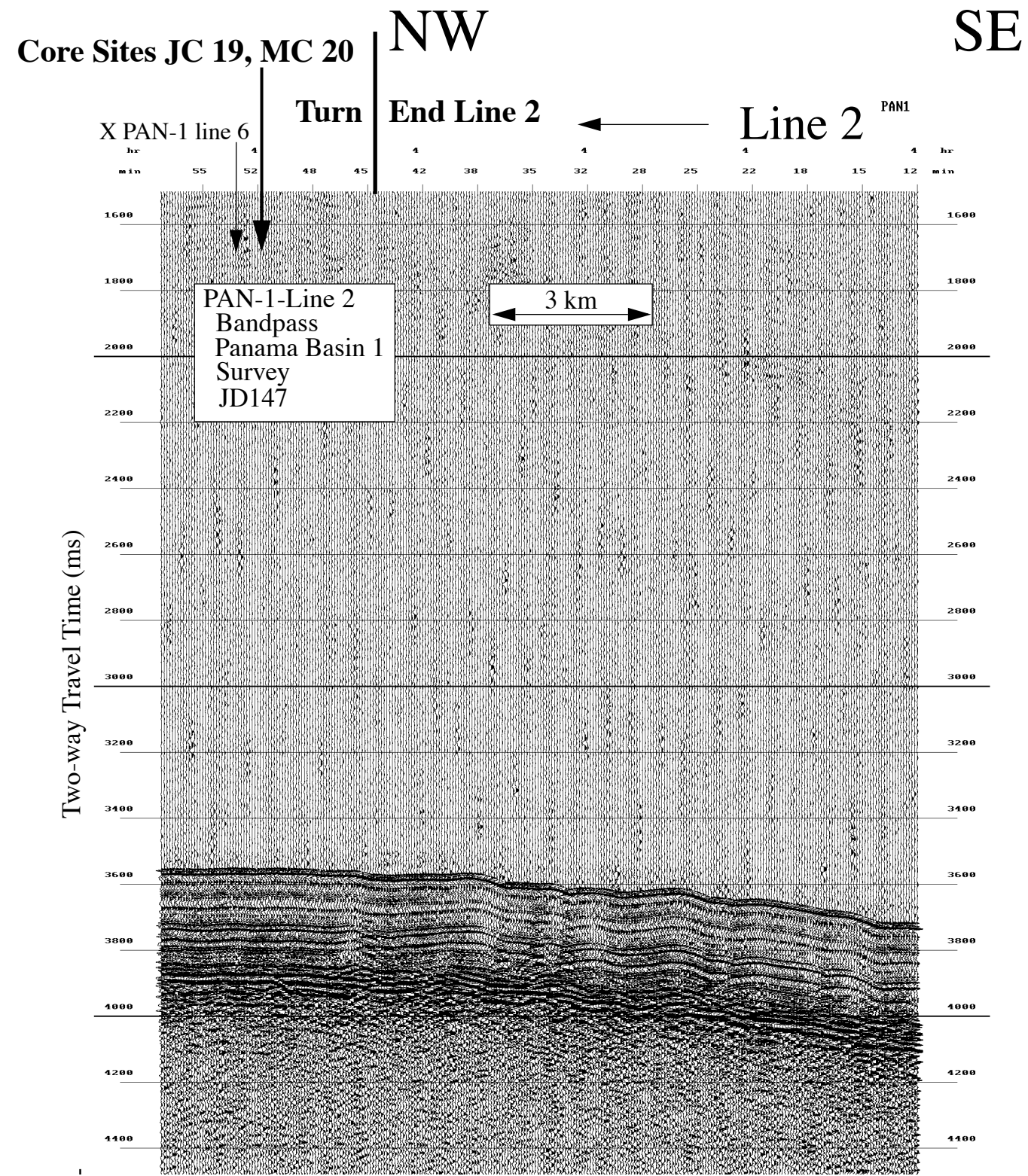
→ Line 1

End Line 1 Turn

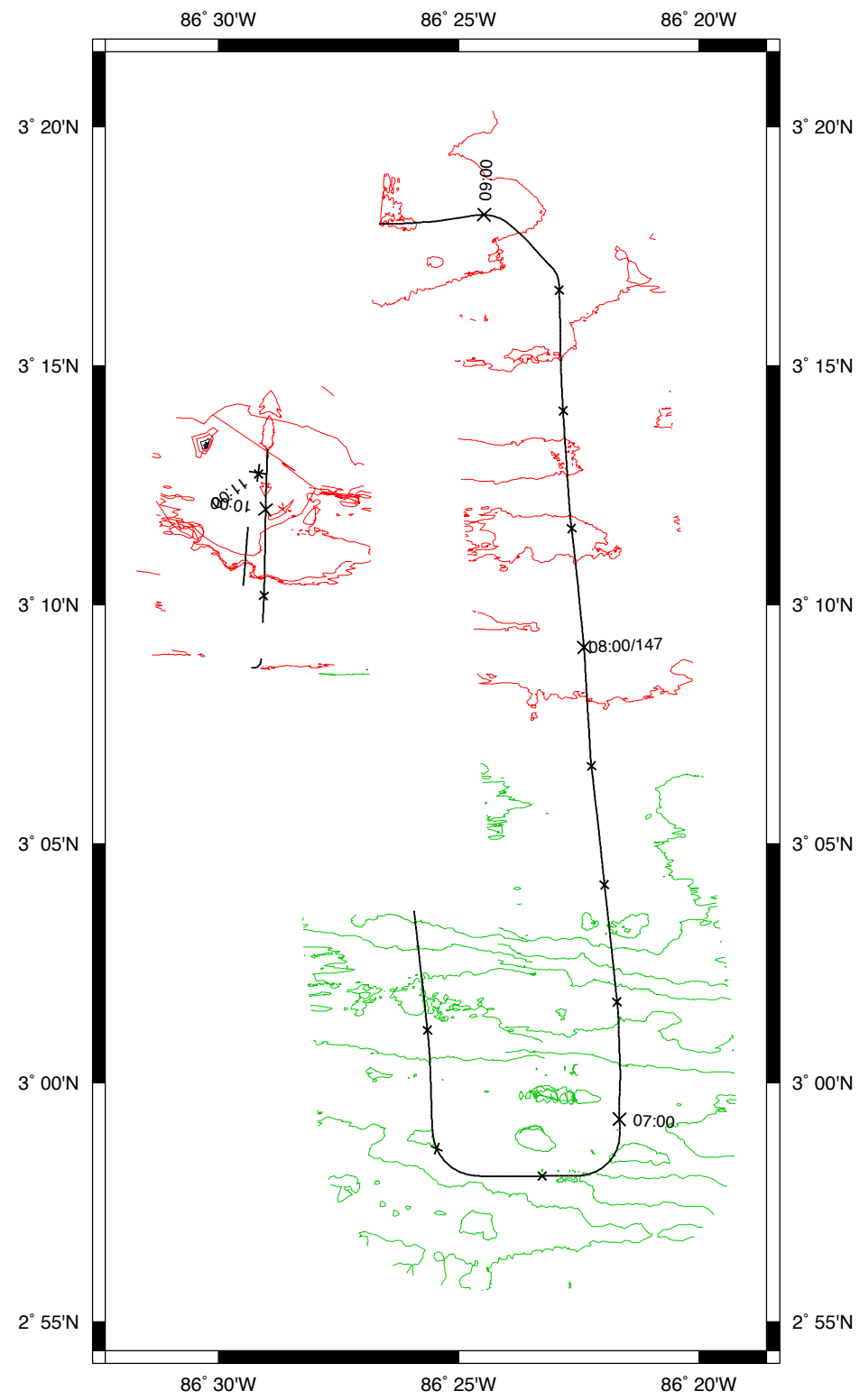
PAN1

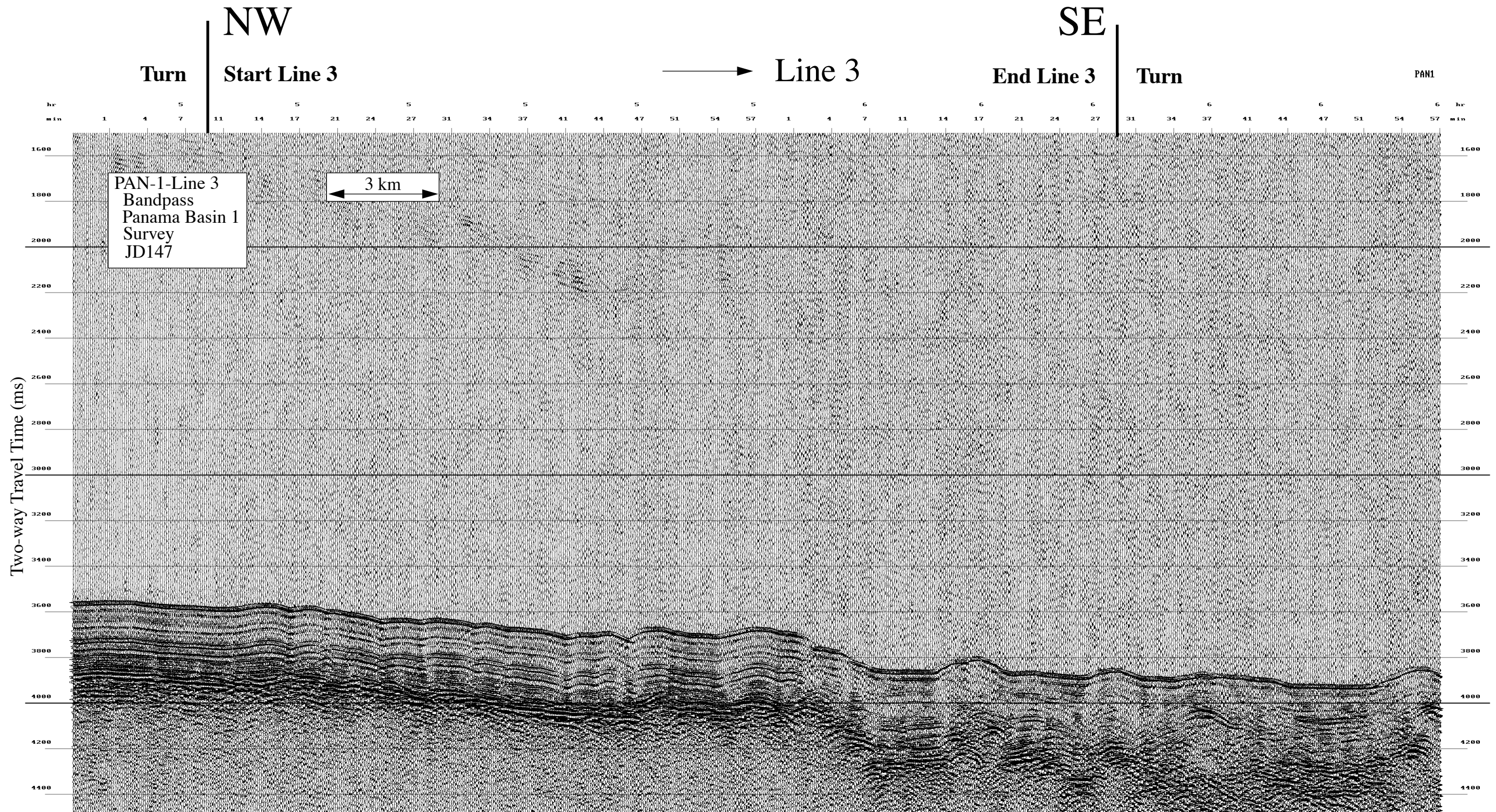






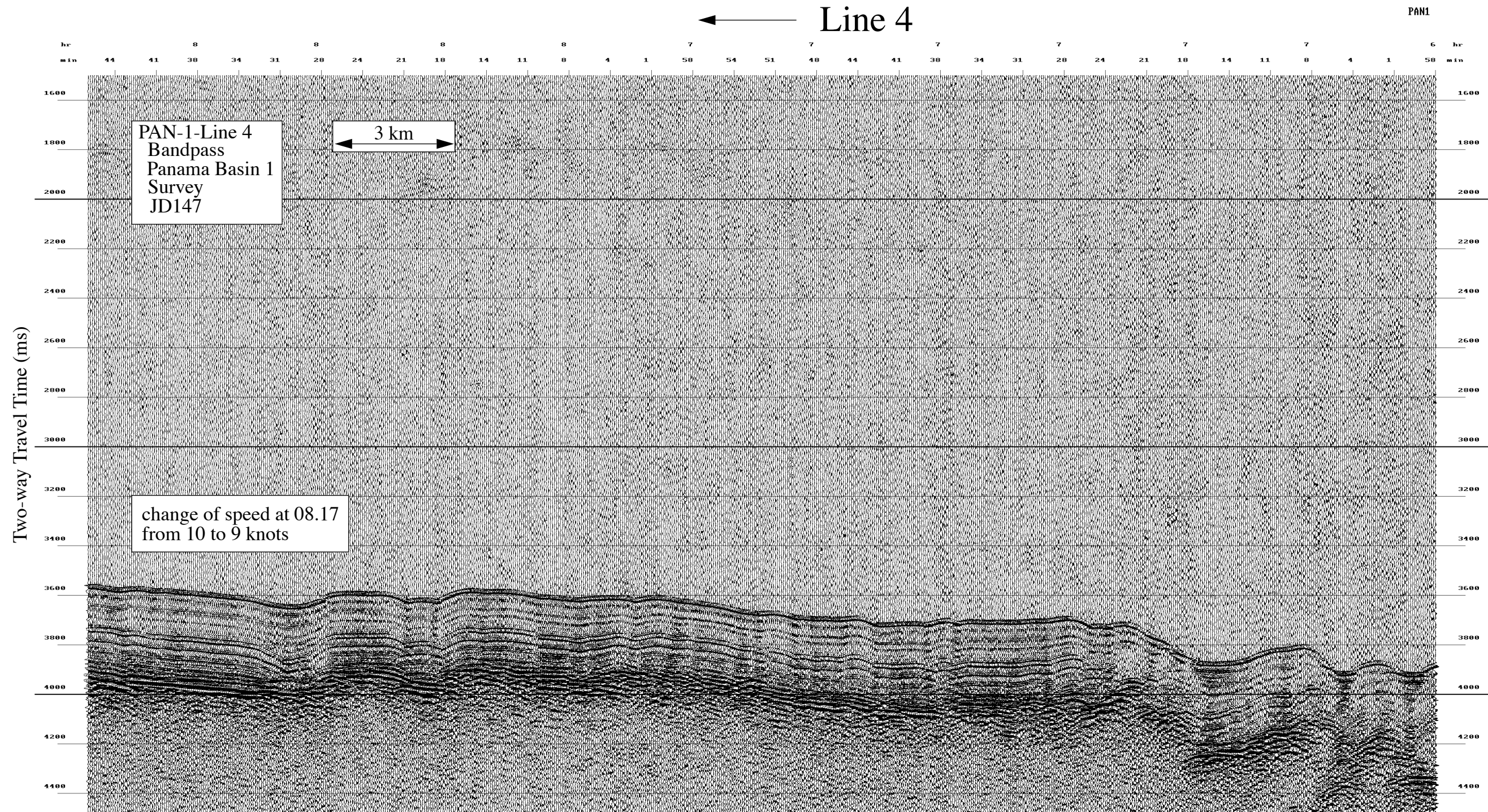
Data File SBfixavg.2000may26.0600-1200

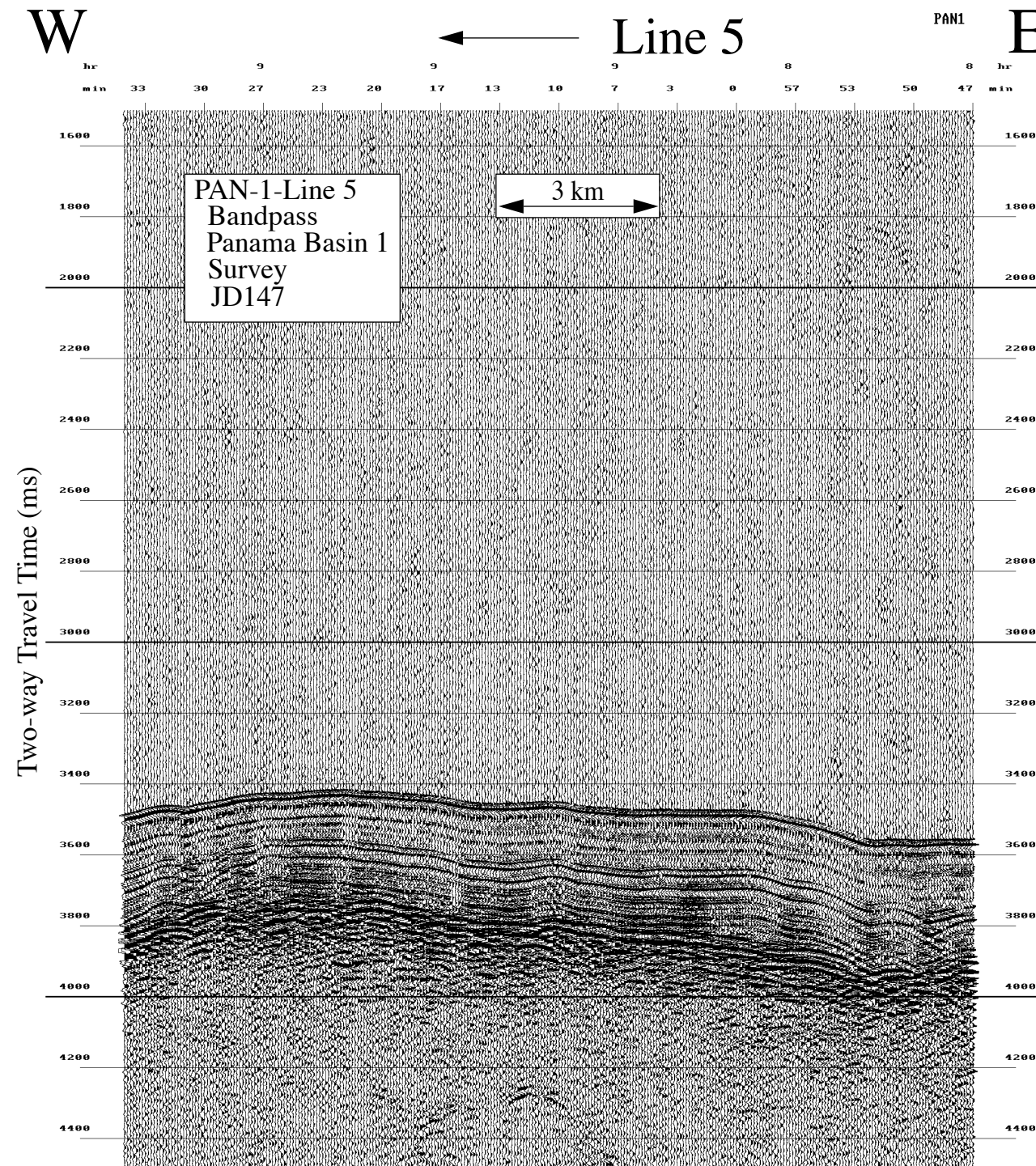


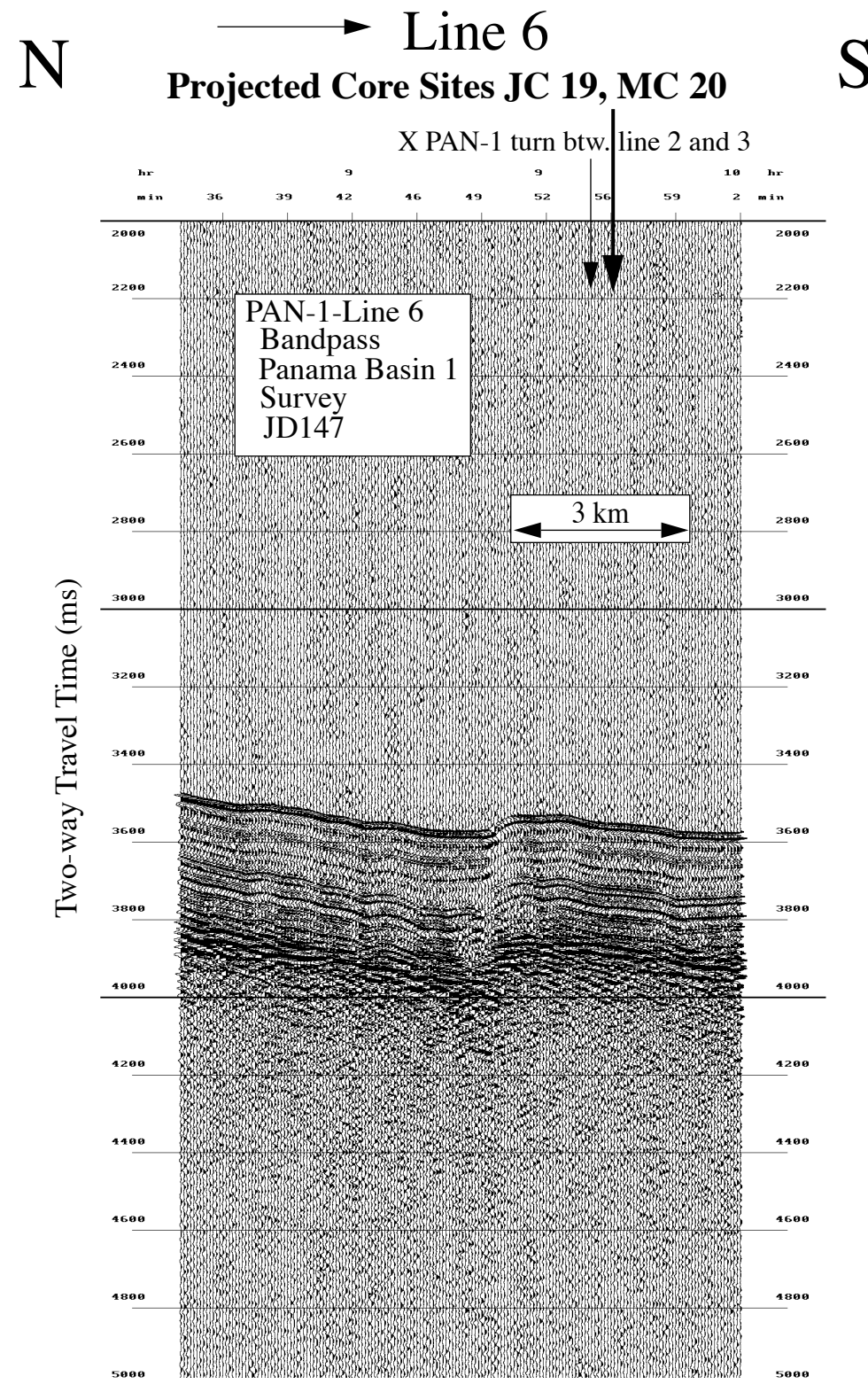


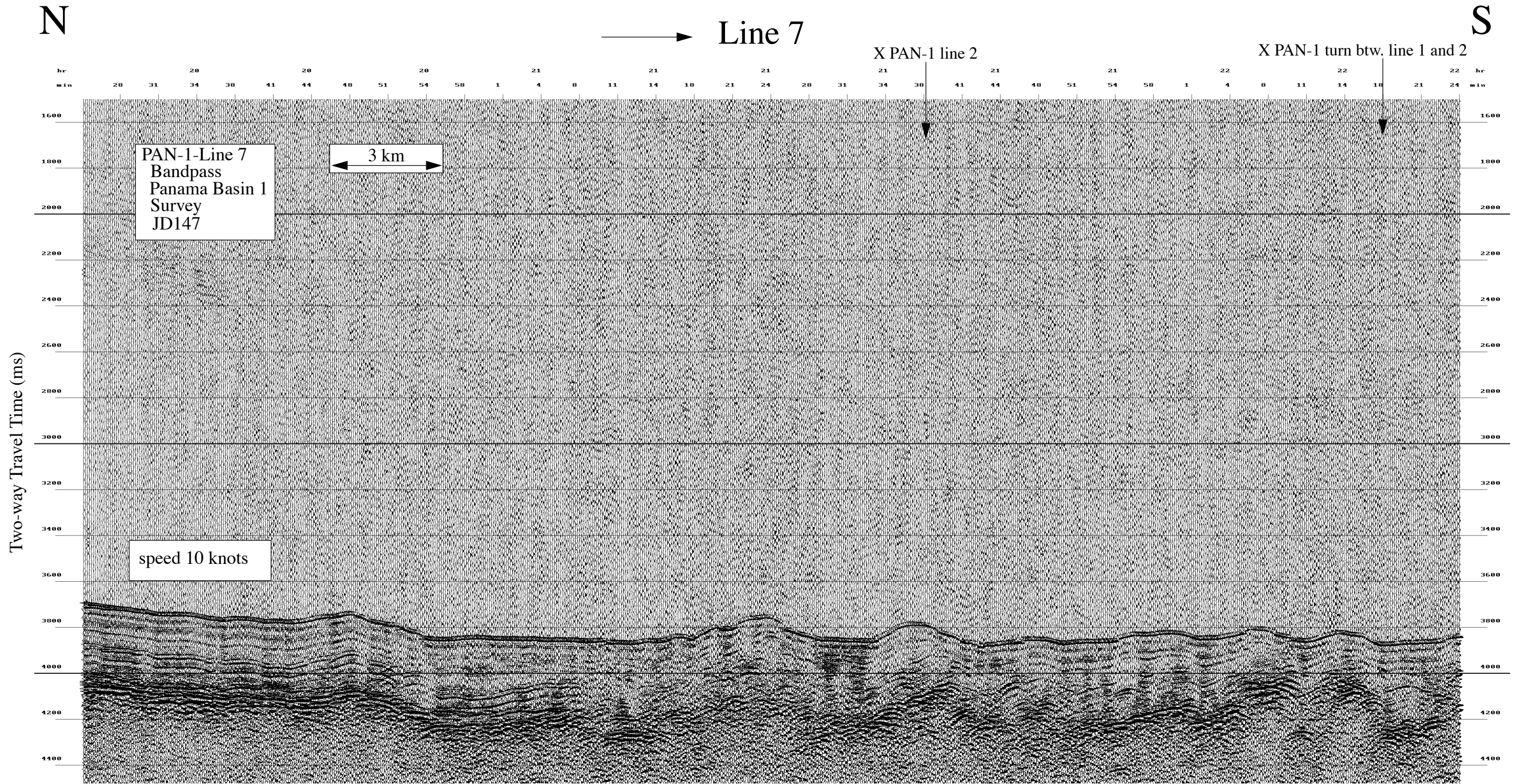
NW

SE









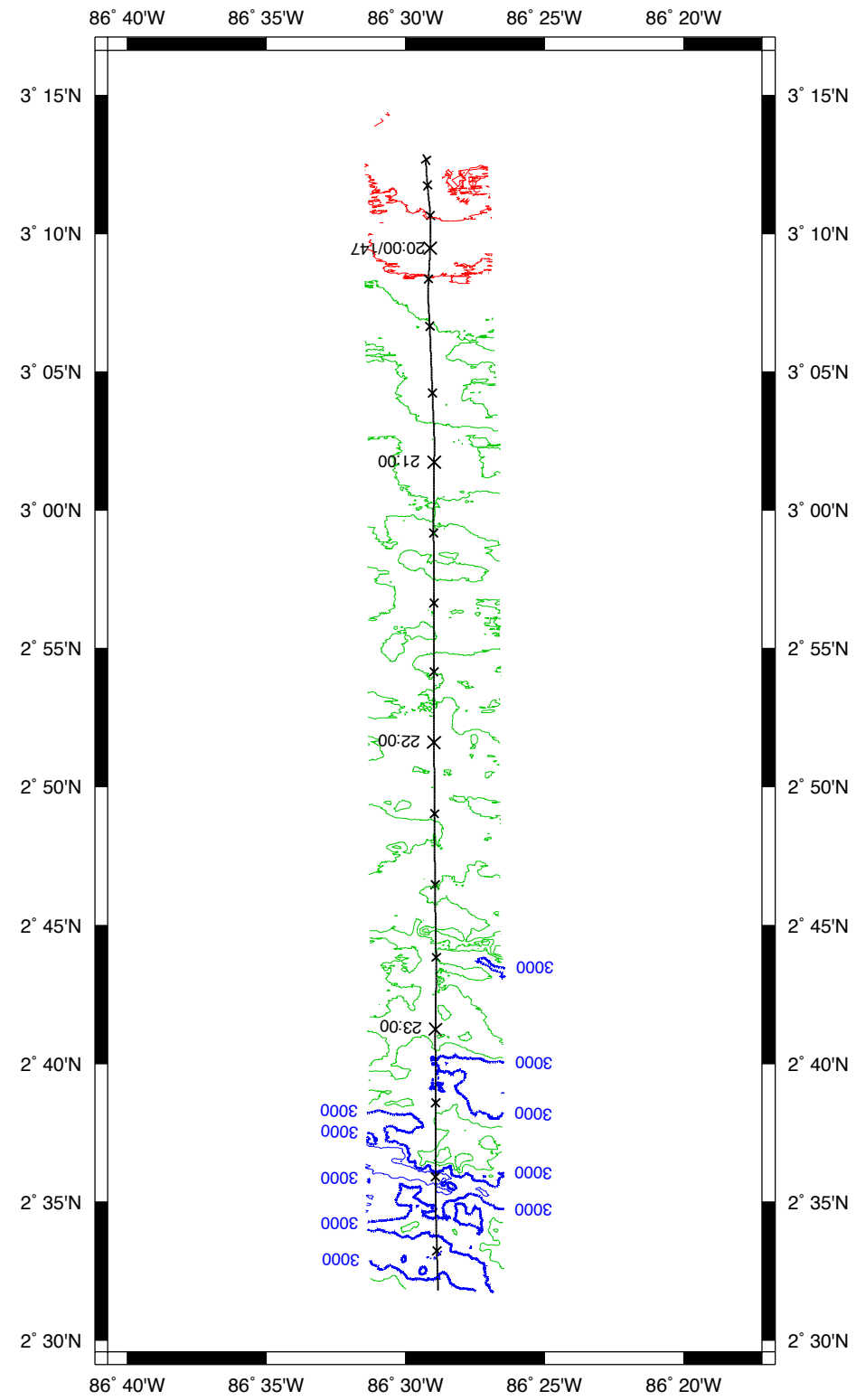
JD 148 (27 May 2000)--Transit from PAN-1 and PAN-2, Panama Basin

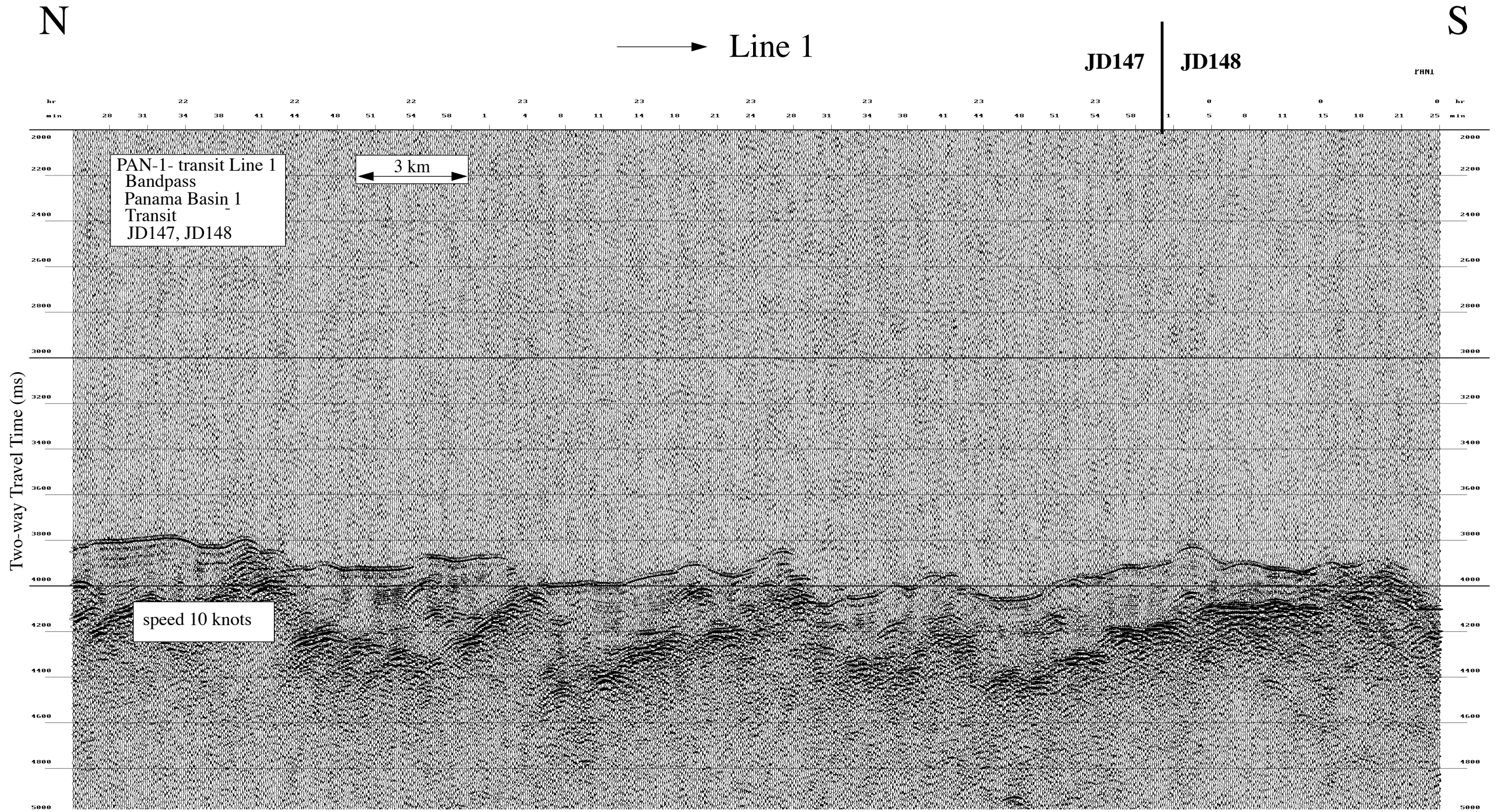
High Resolution Seismic Reflection Records

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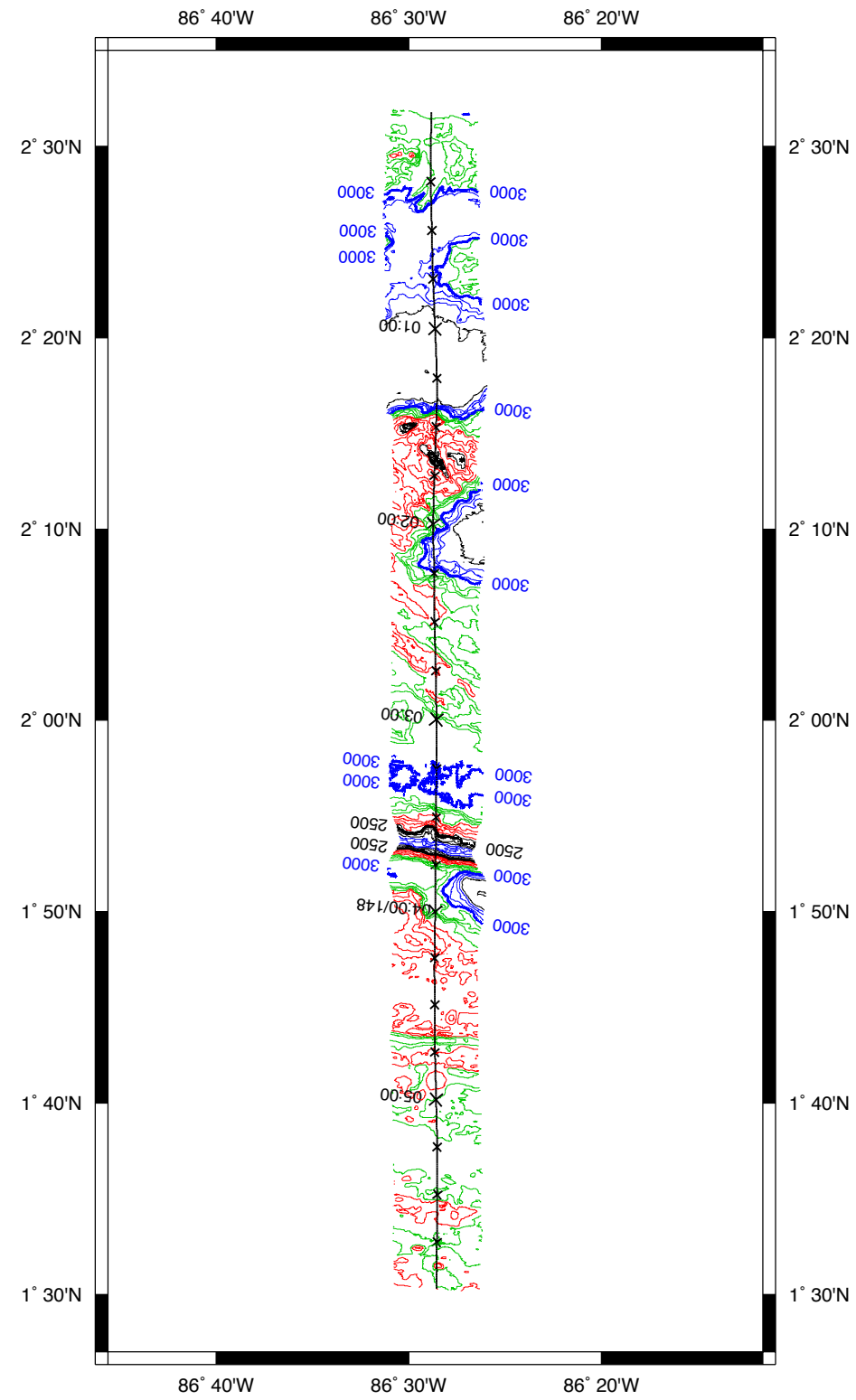
R/V Melville

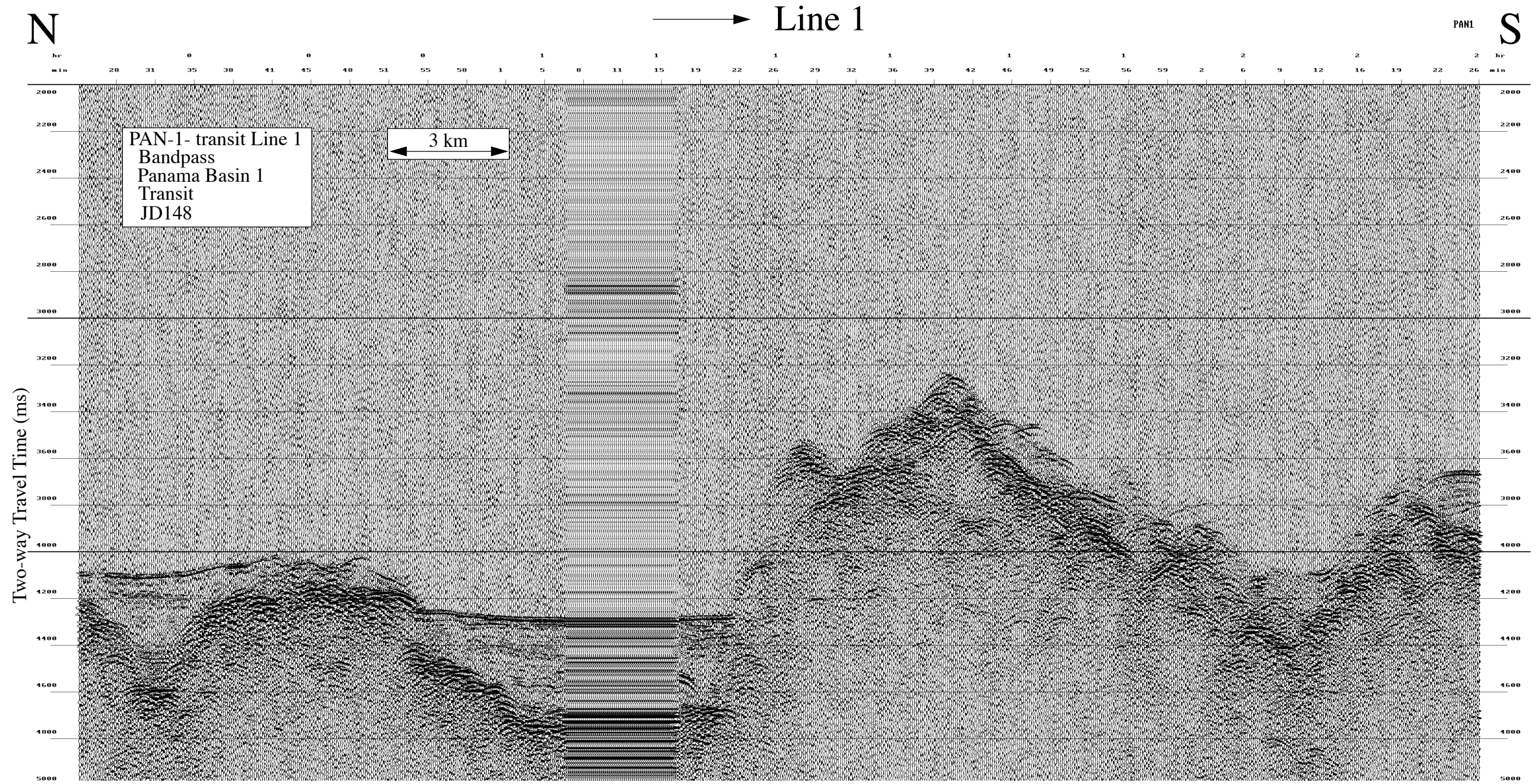
Data File SBfixavg.2000may26.1800-2400

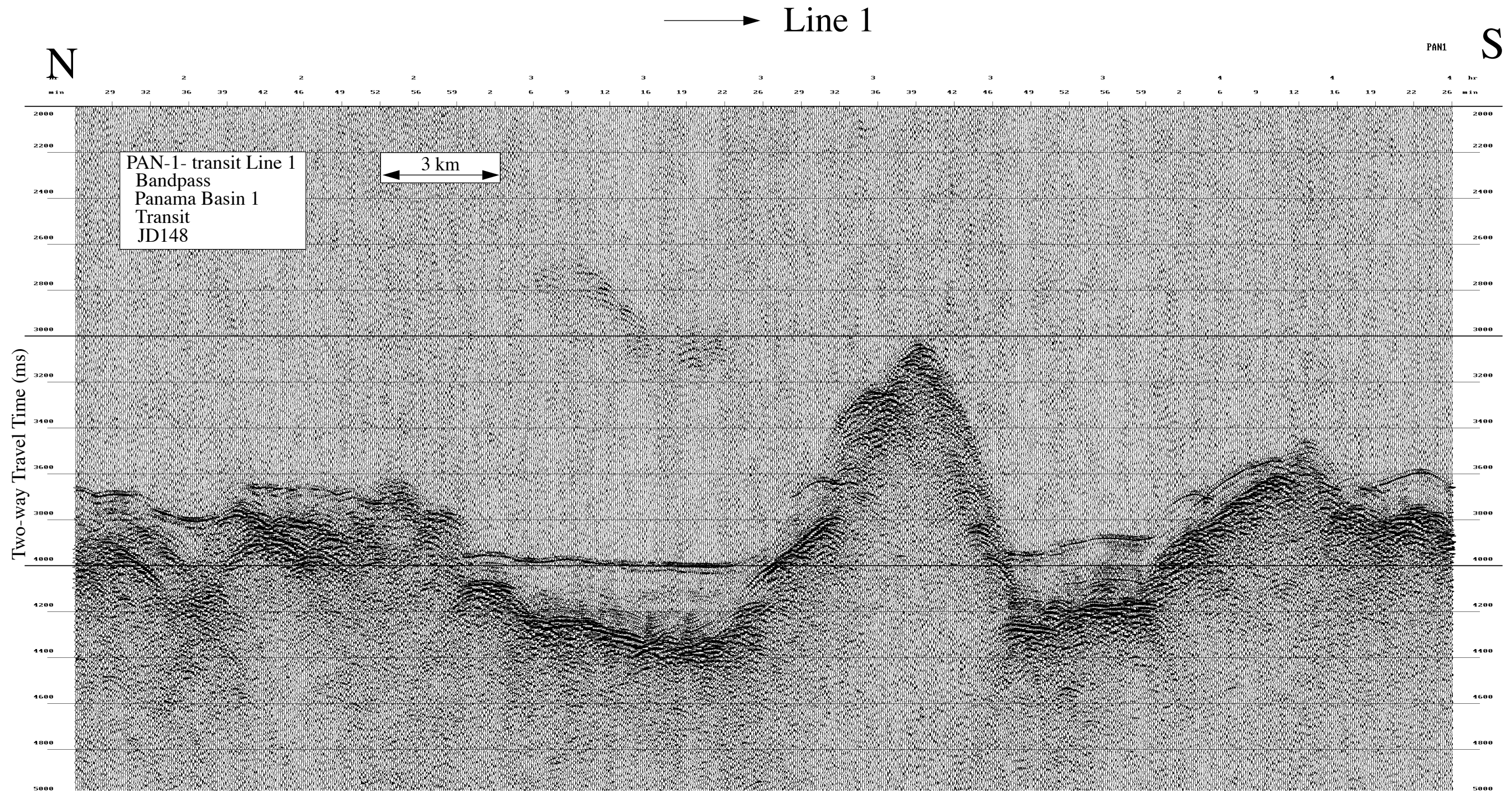


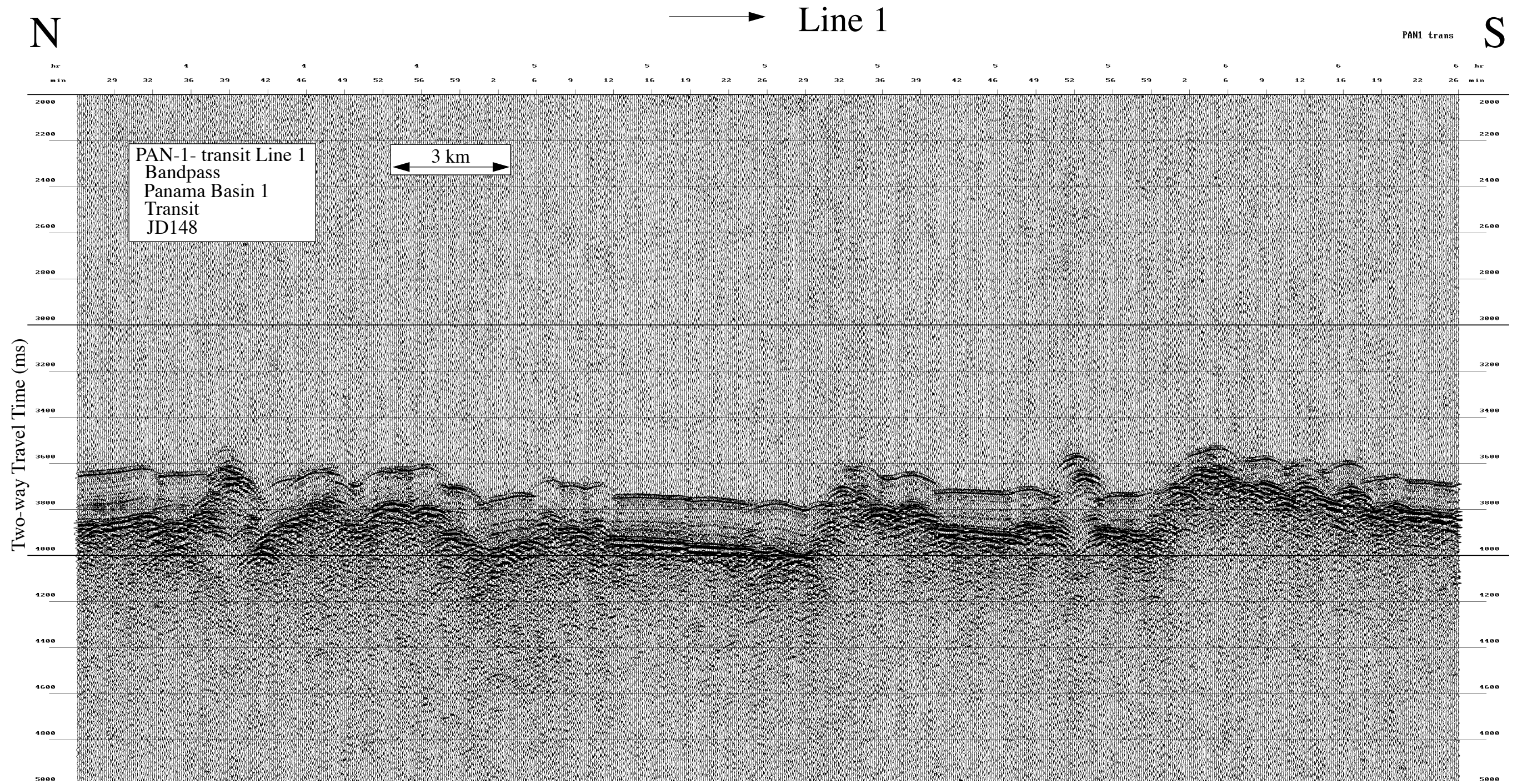


Data File SBfixavg.2000may27.0000-0600

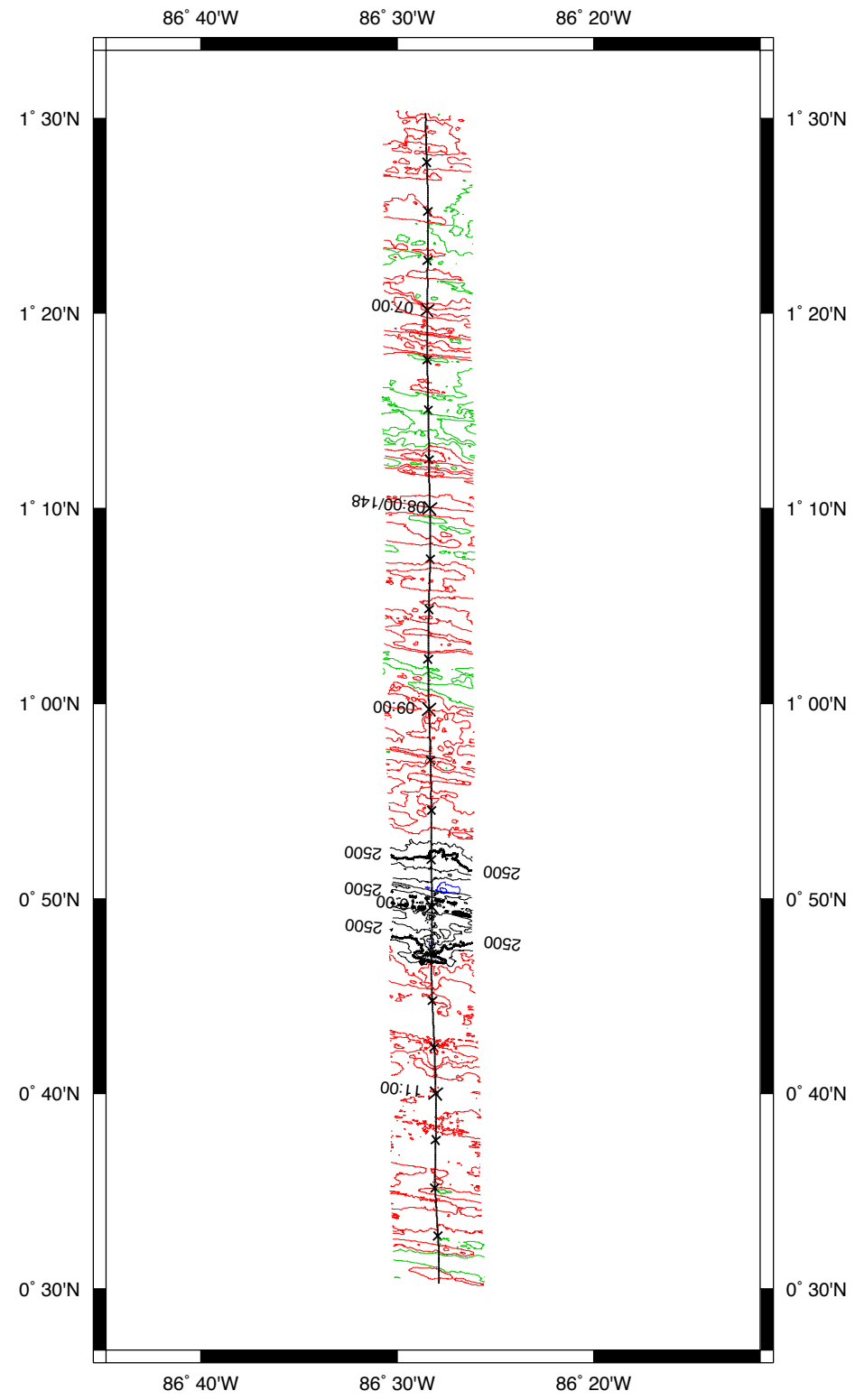


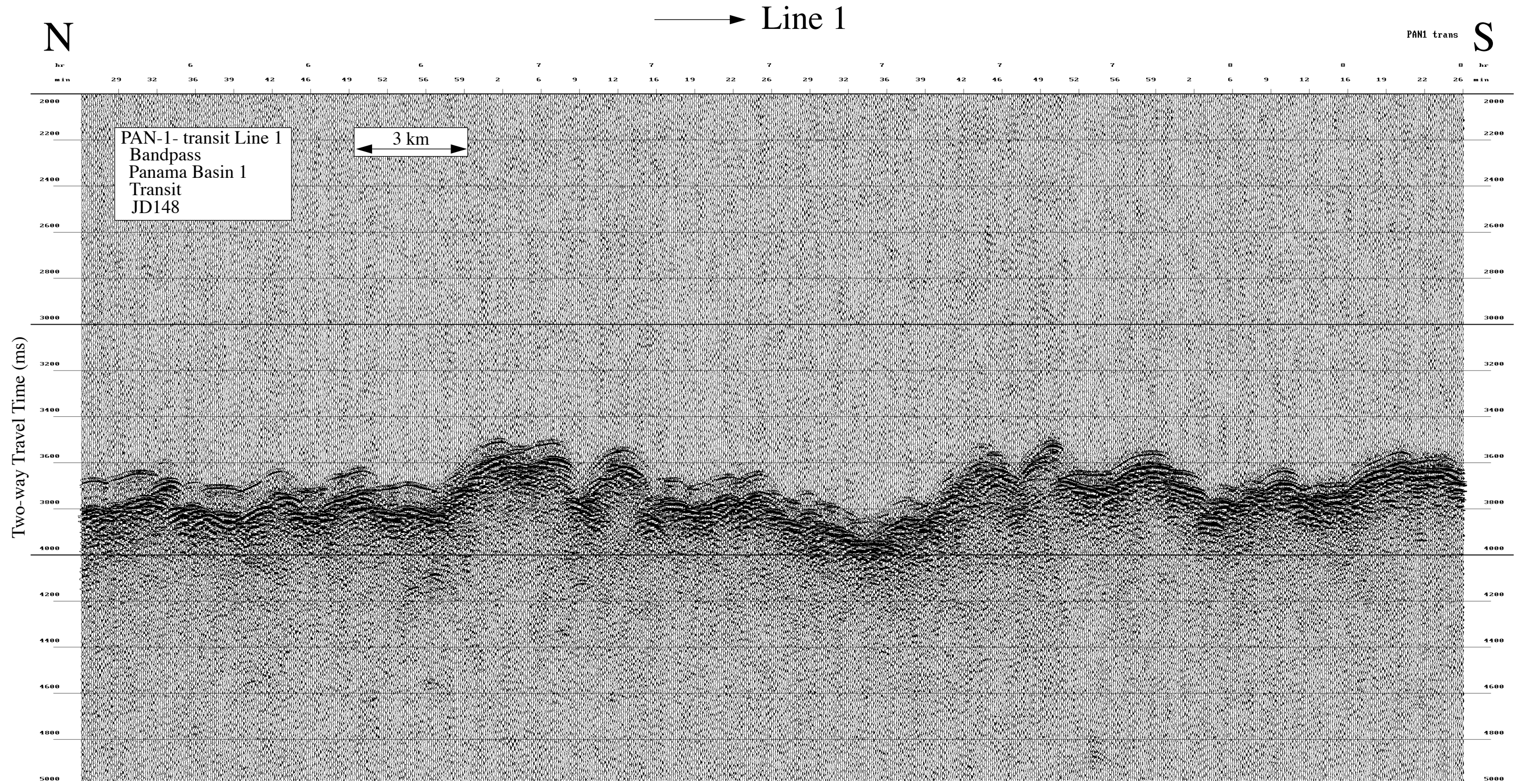


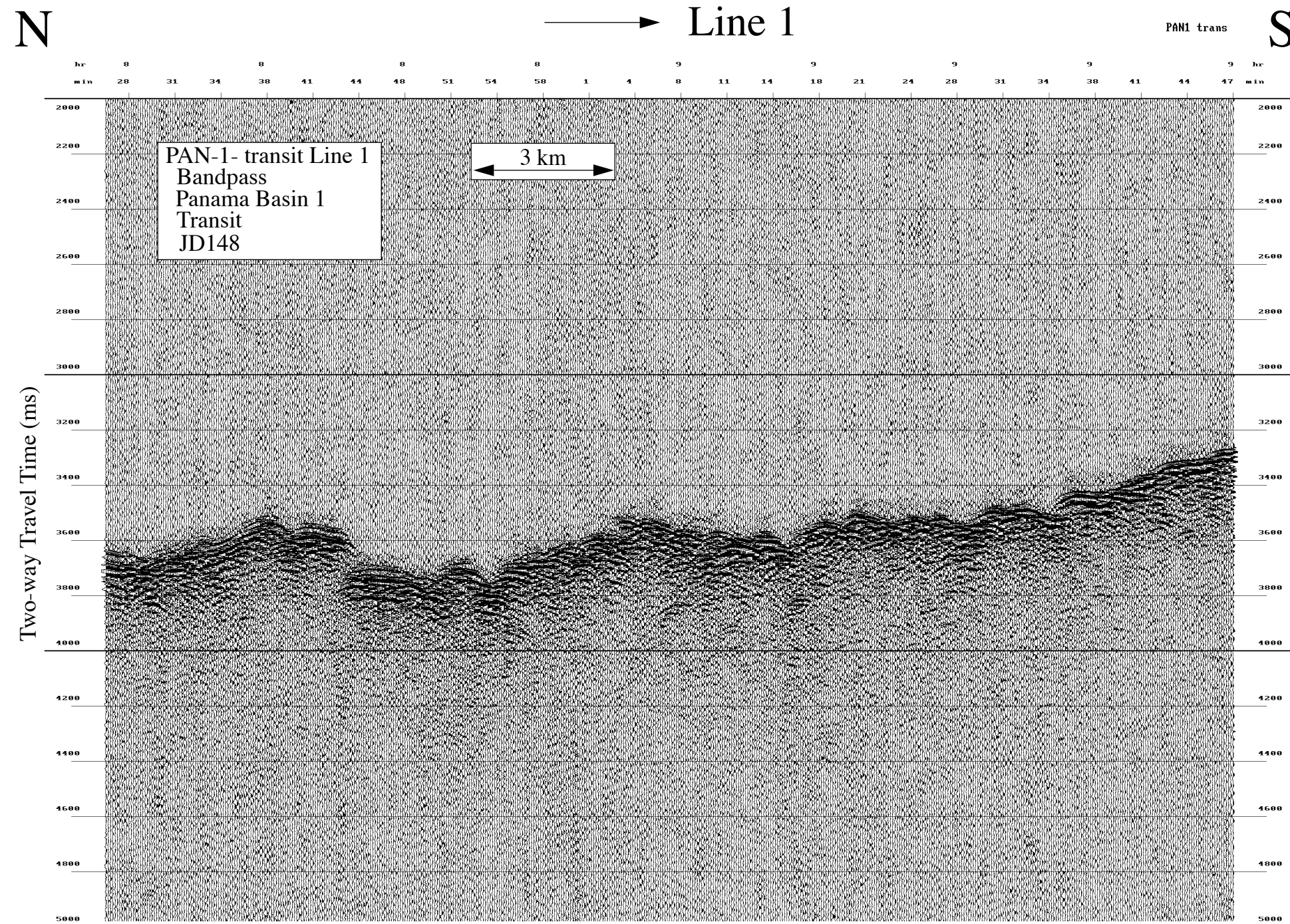




Data File SBfixavg.2000may27.0600-1200







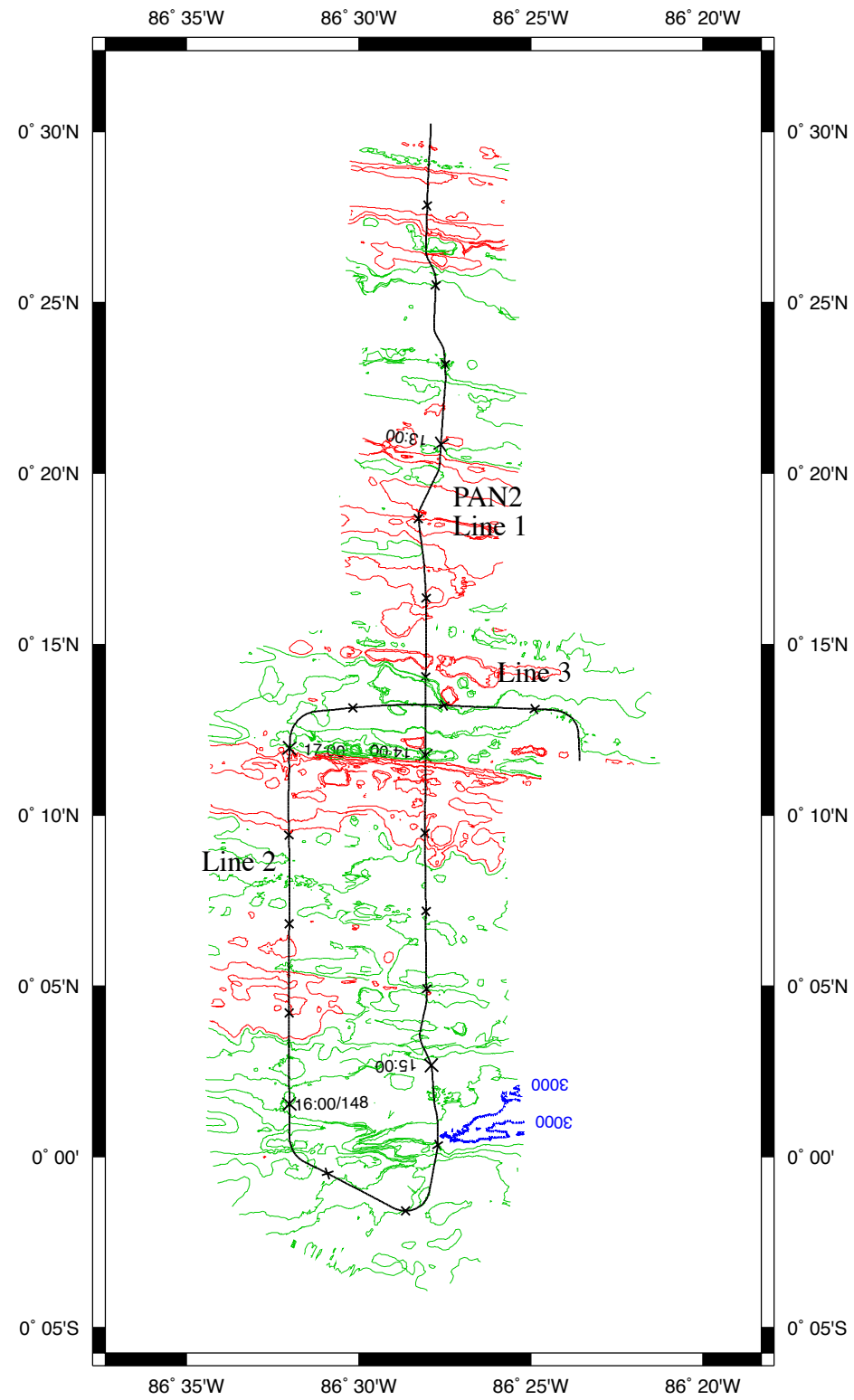
JD 148 (27 May 2000)--PAN-2 Survey, equator in Panama Basin

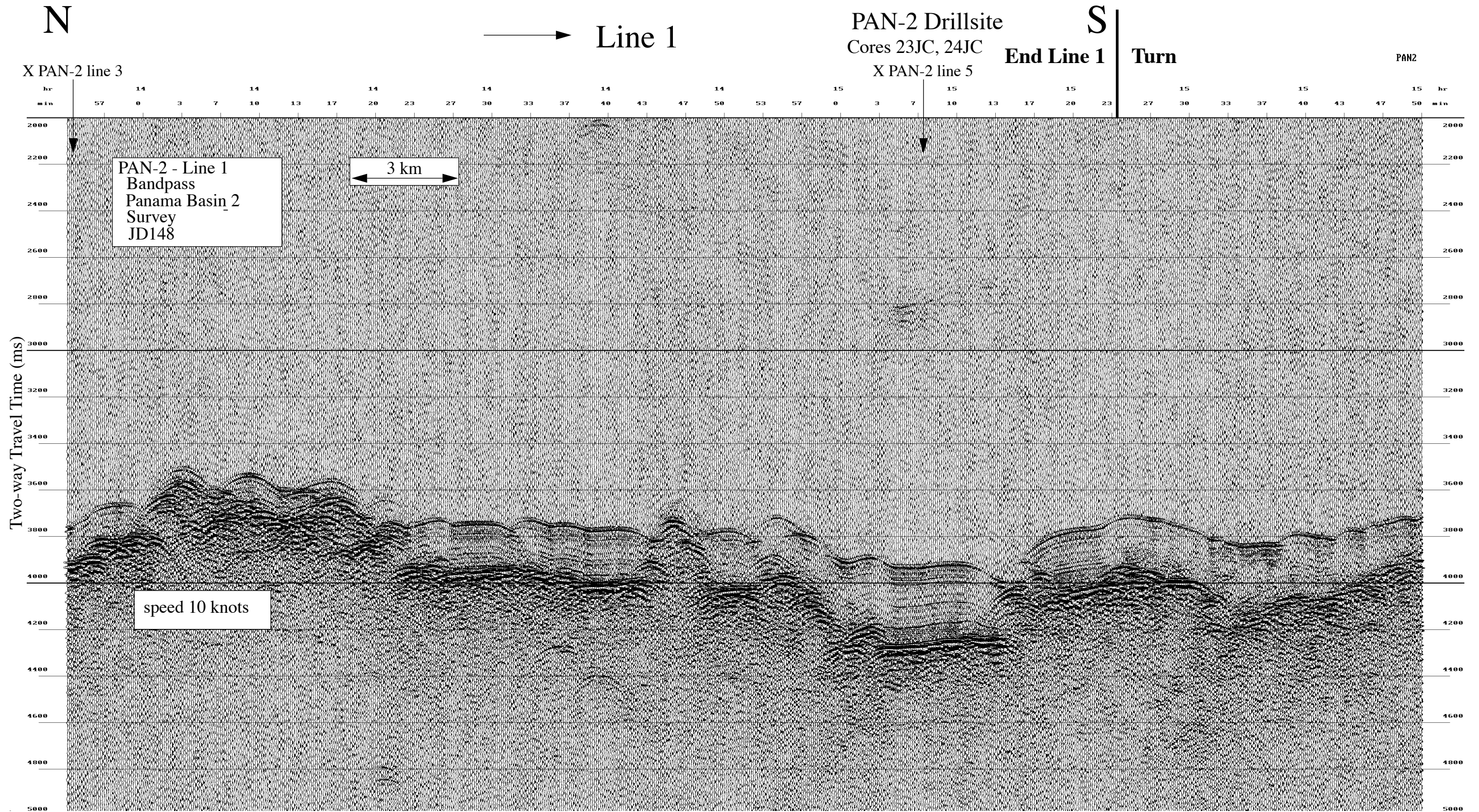
High Resolution Seismic Reflection Records

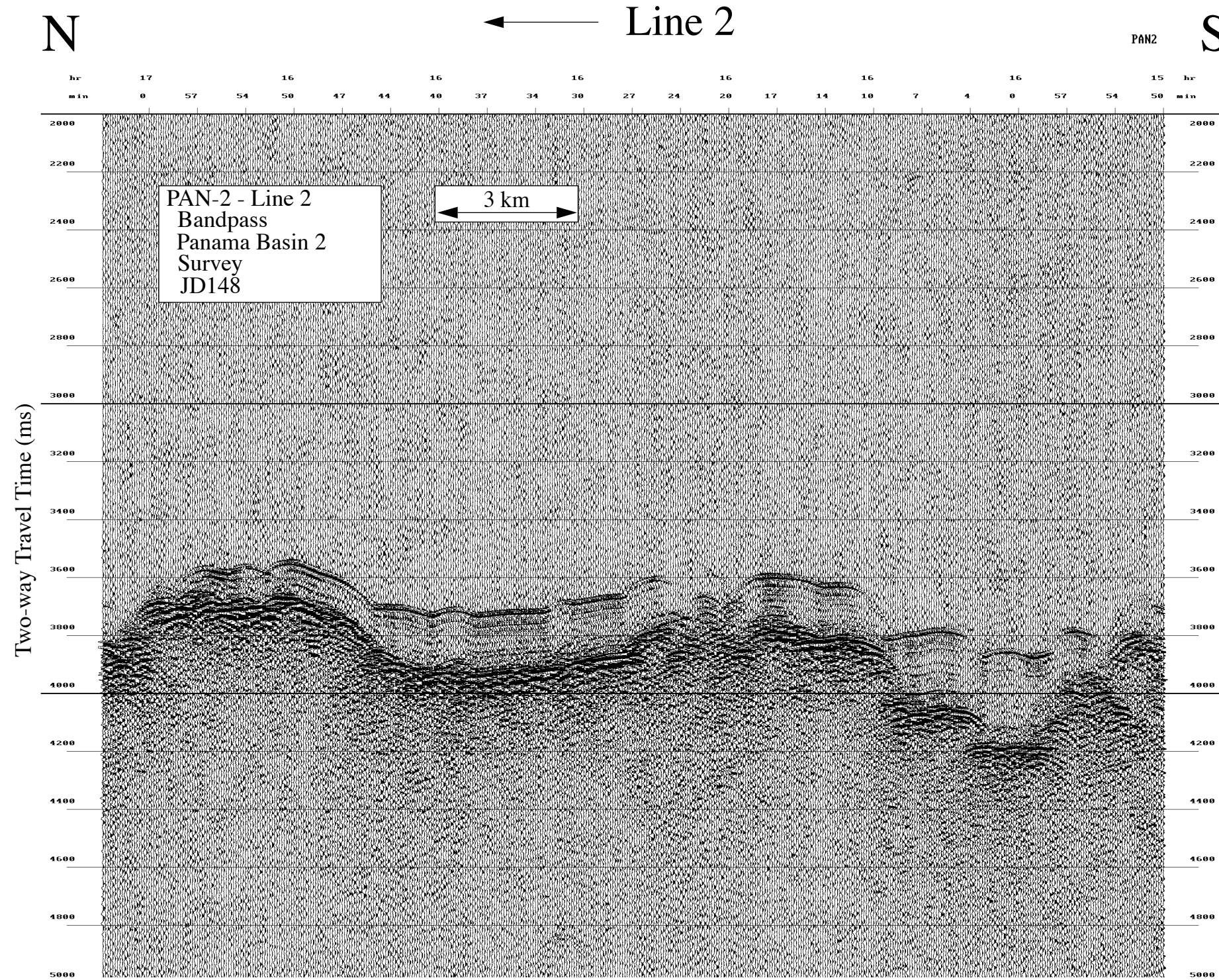
NEMO Leg 3

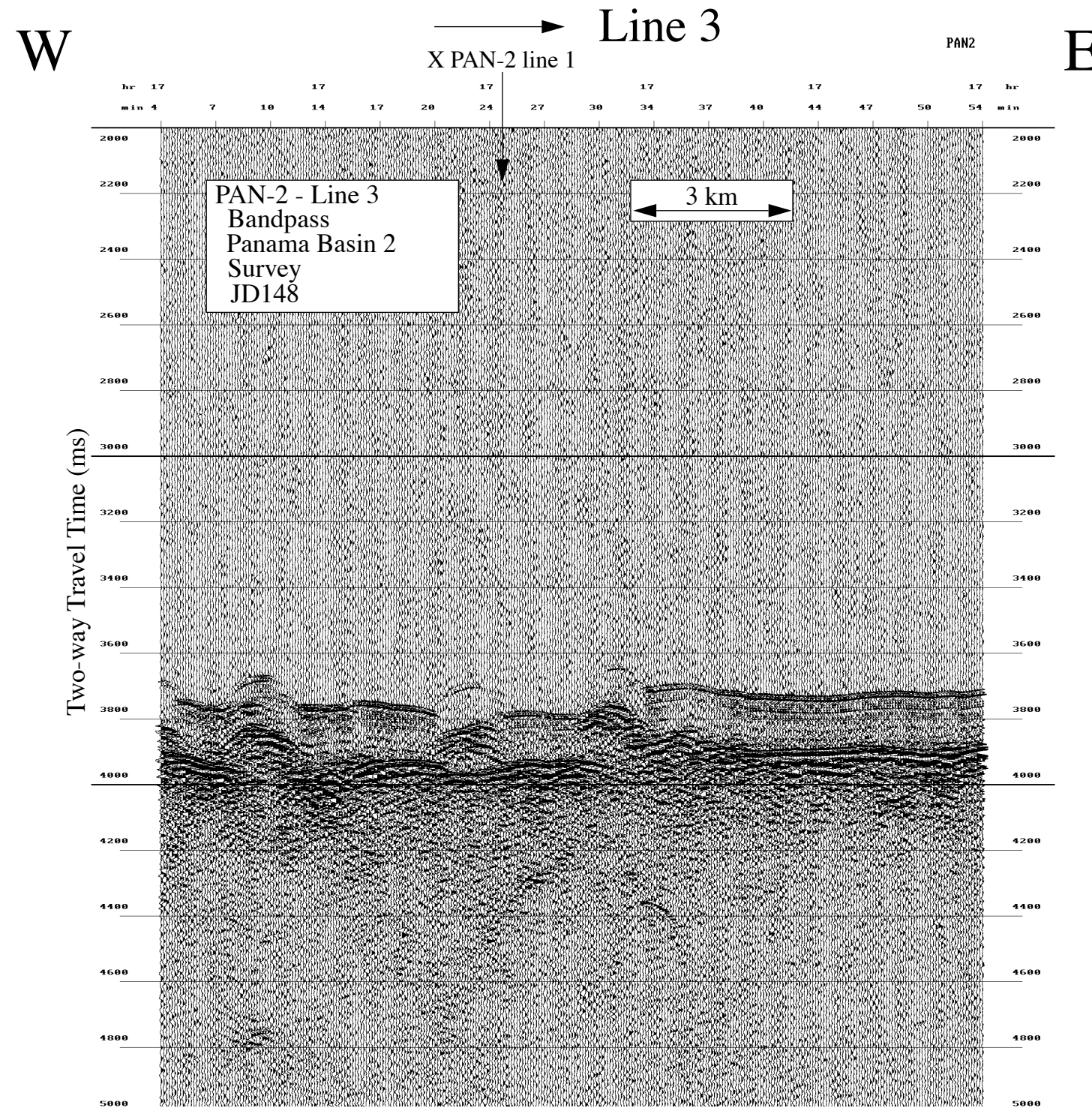
R/V Melville

Data File SBfixavg.2000may27.1200-1800

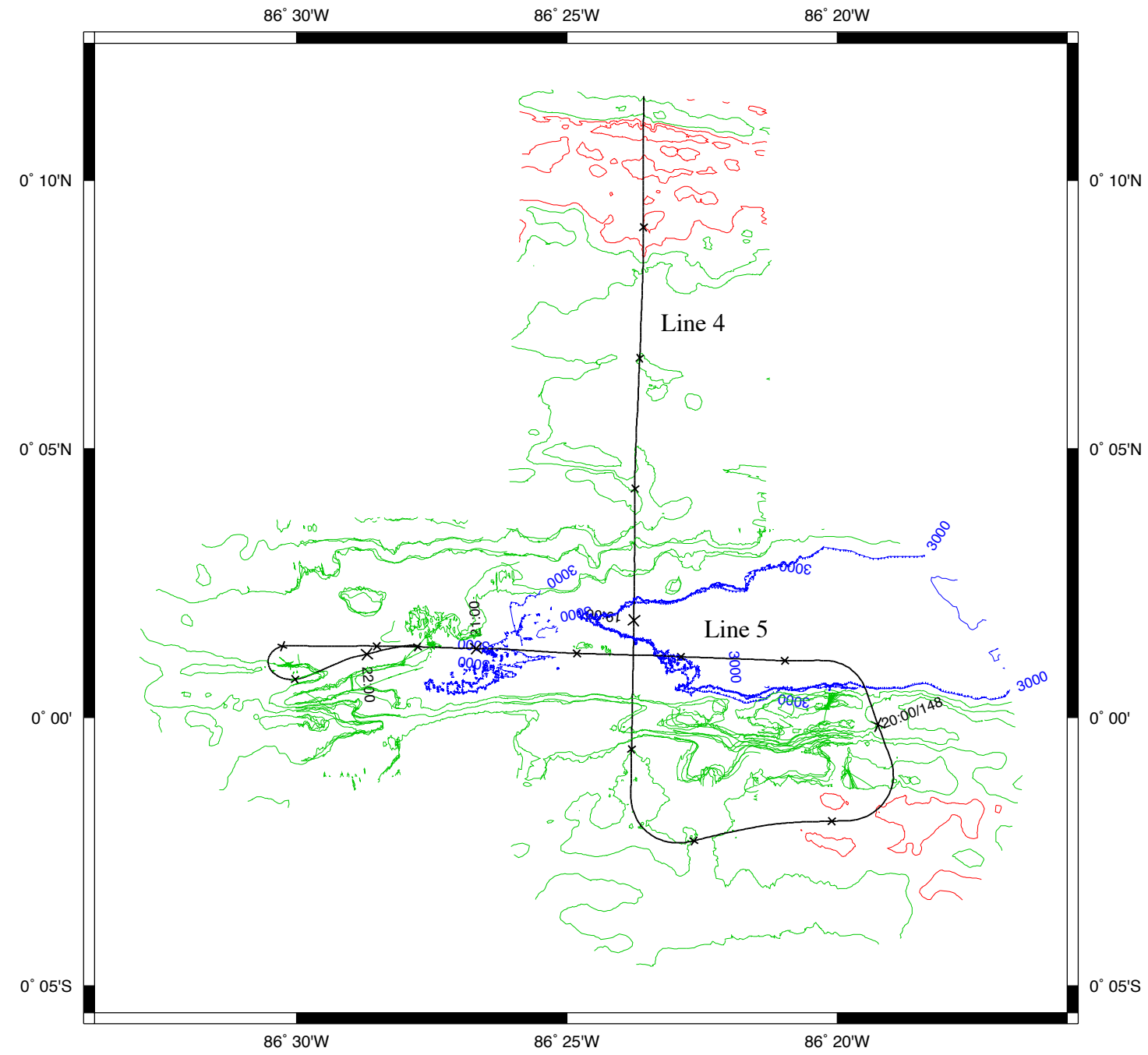


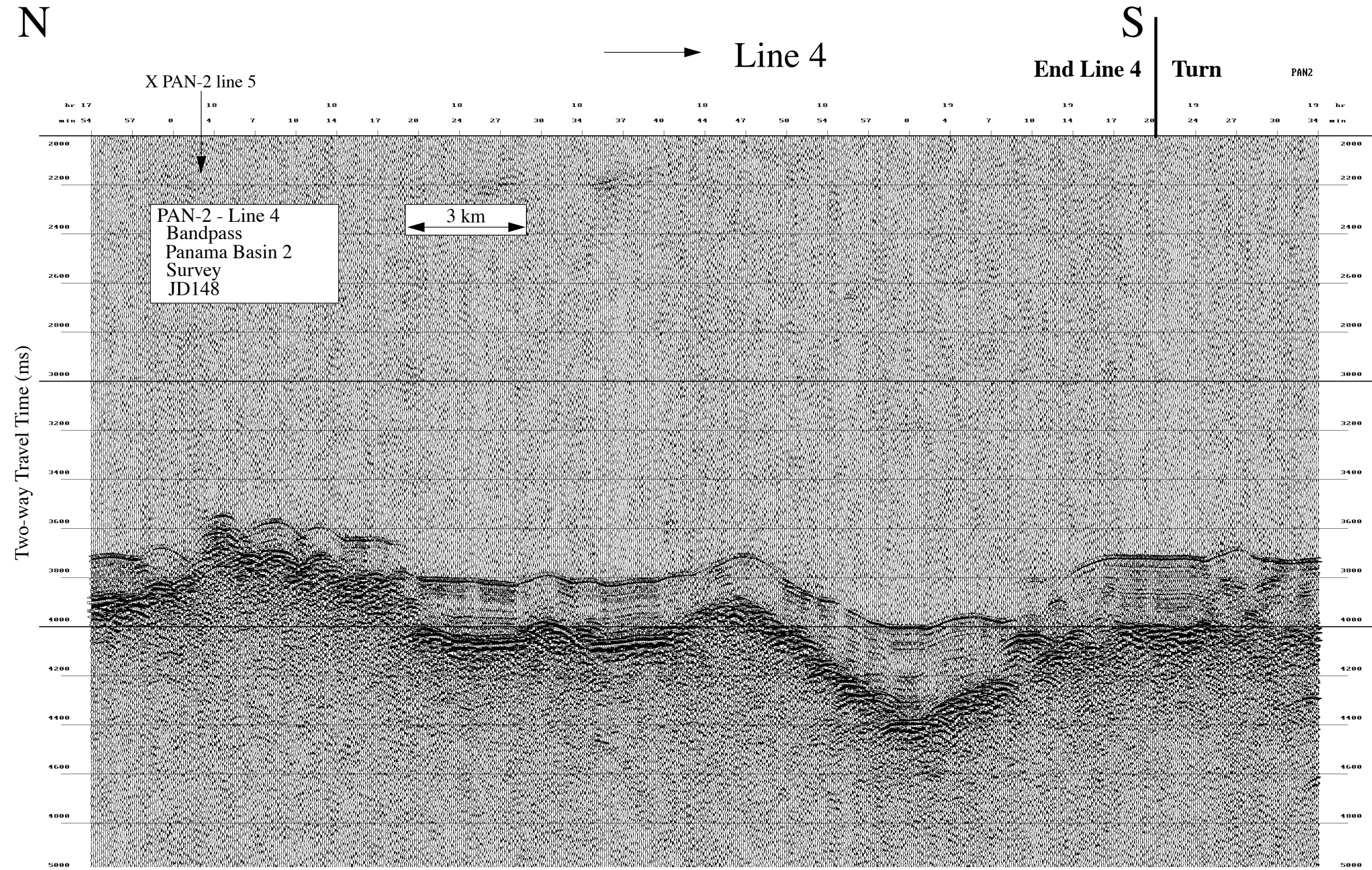


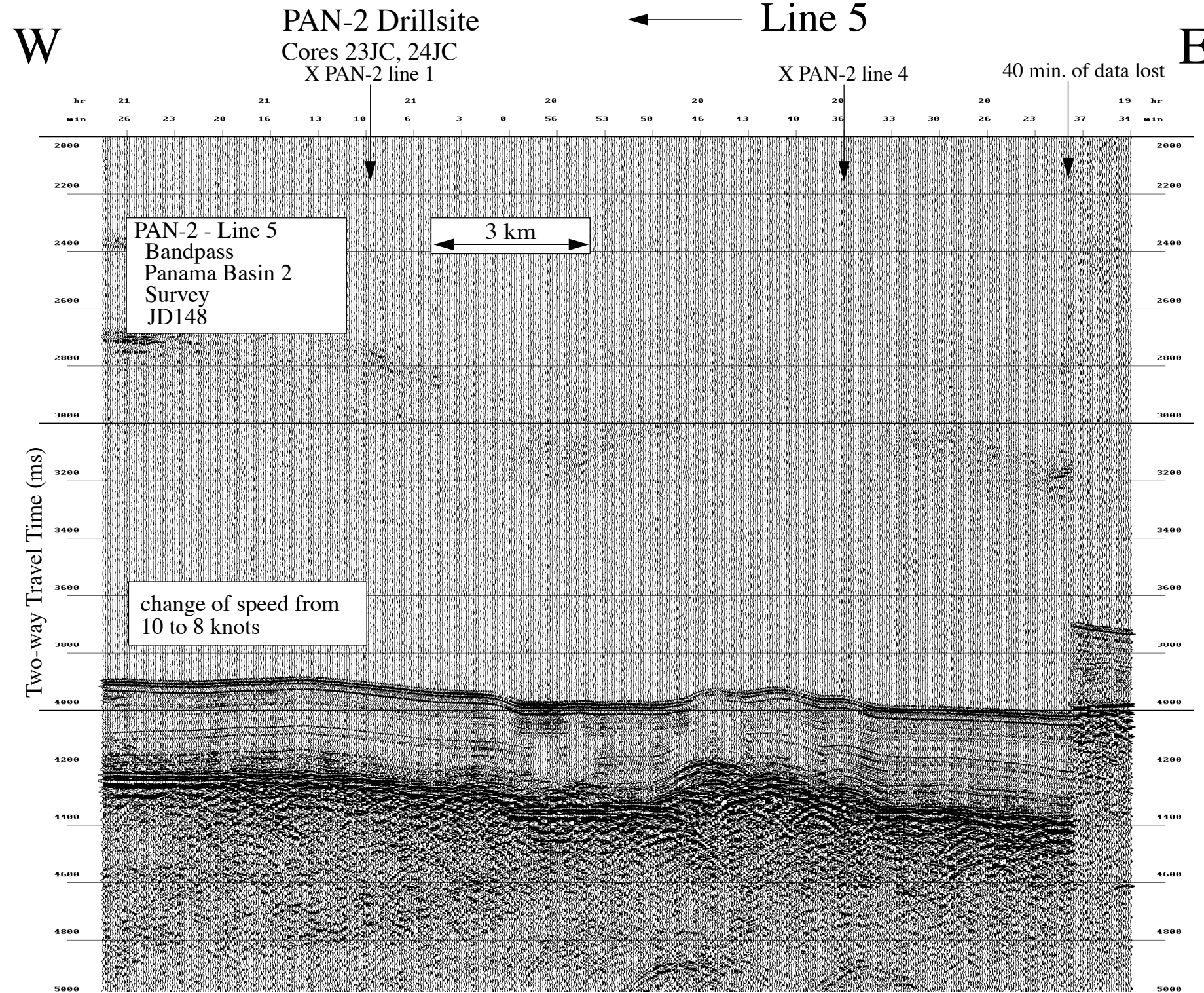




Data File SBfixavg.2000may27.1800-2400







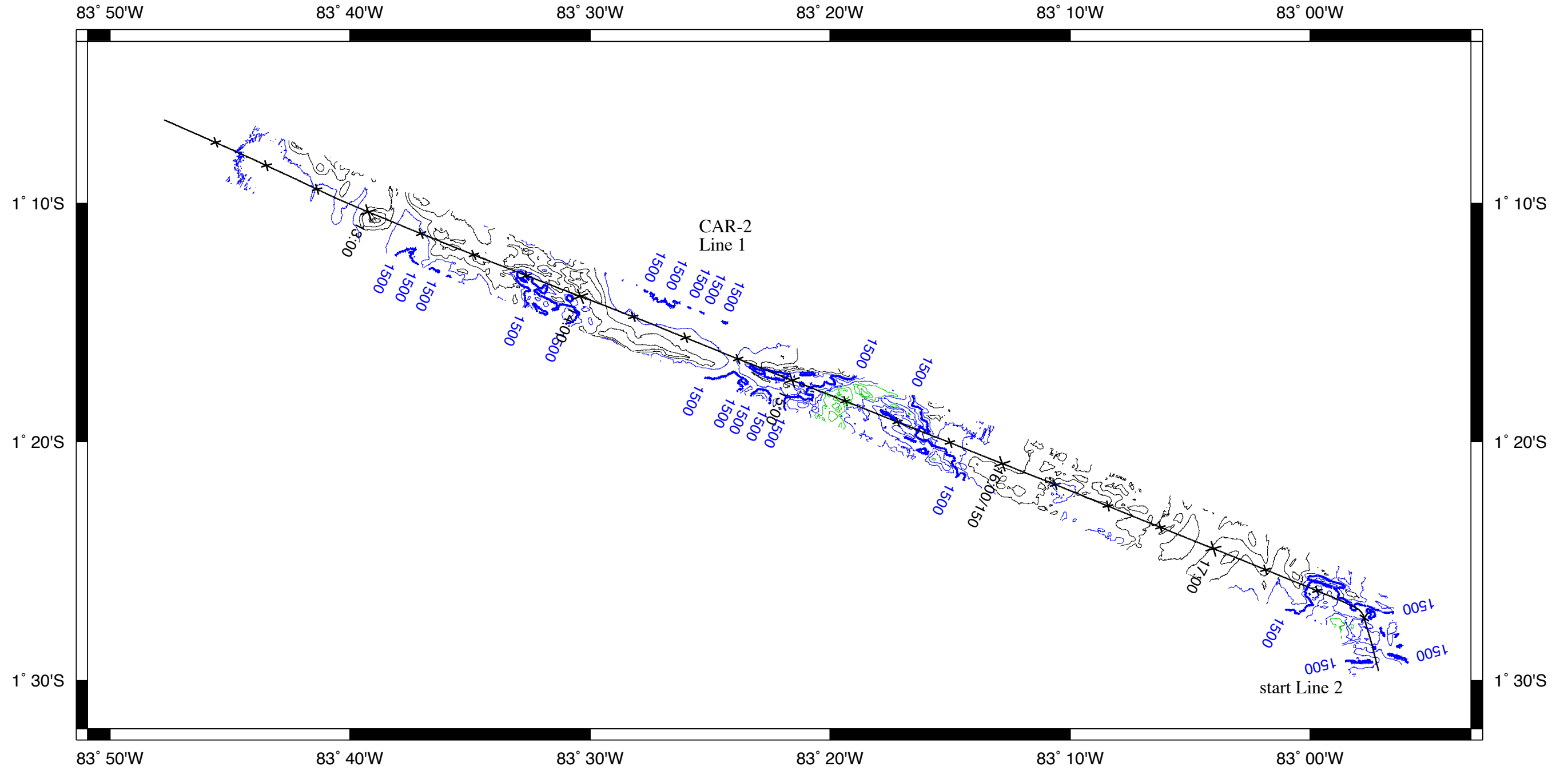
JD 150 (29 May 2000)--CAR-2 Survey, Carnegie Ridge, South Flank

High Resolution Seismic Reflection Records

NEMO Leg 3

R/V Melville

Data File SBfixavg.2000may29.1200-1800



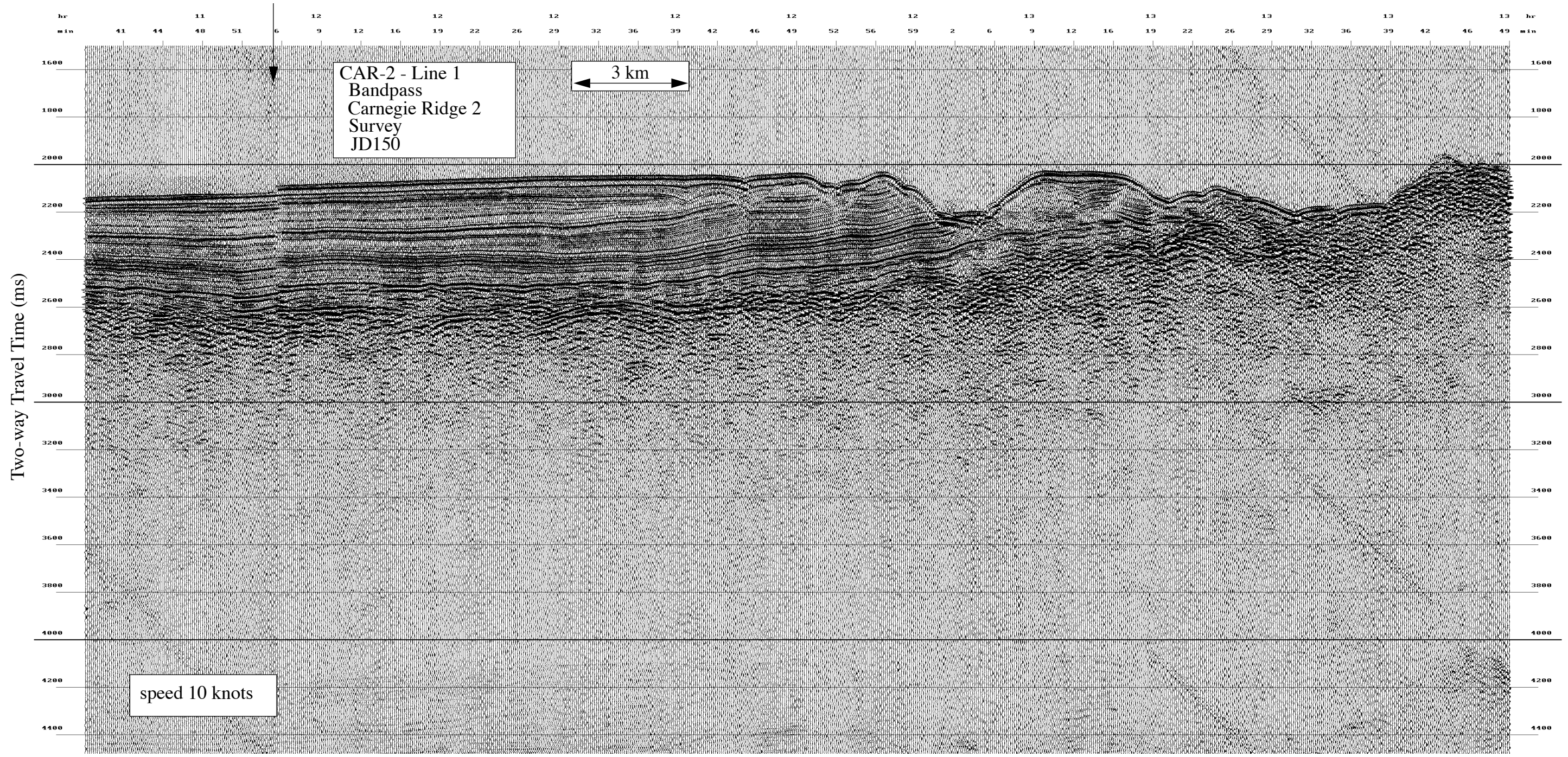
NW

SE

→ Line 1

11 min. of data lost

CAR2

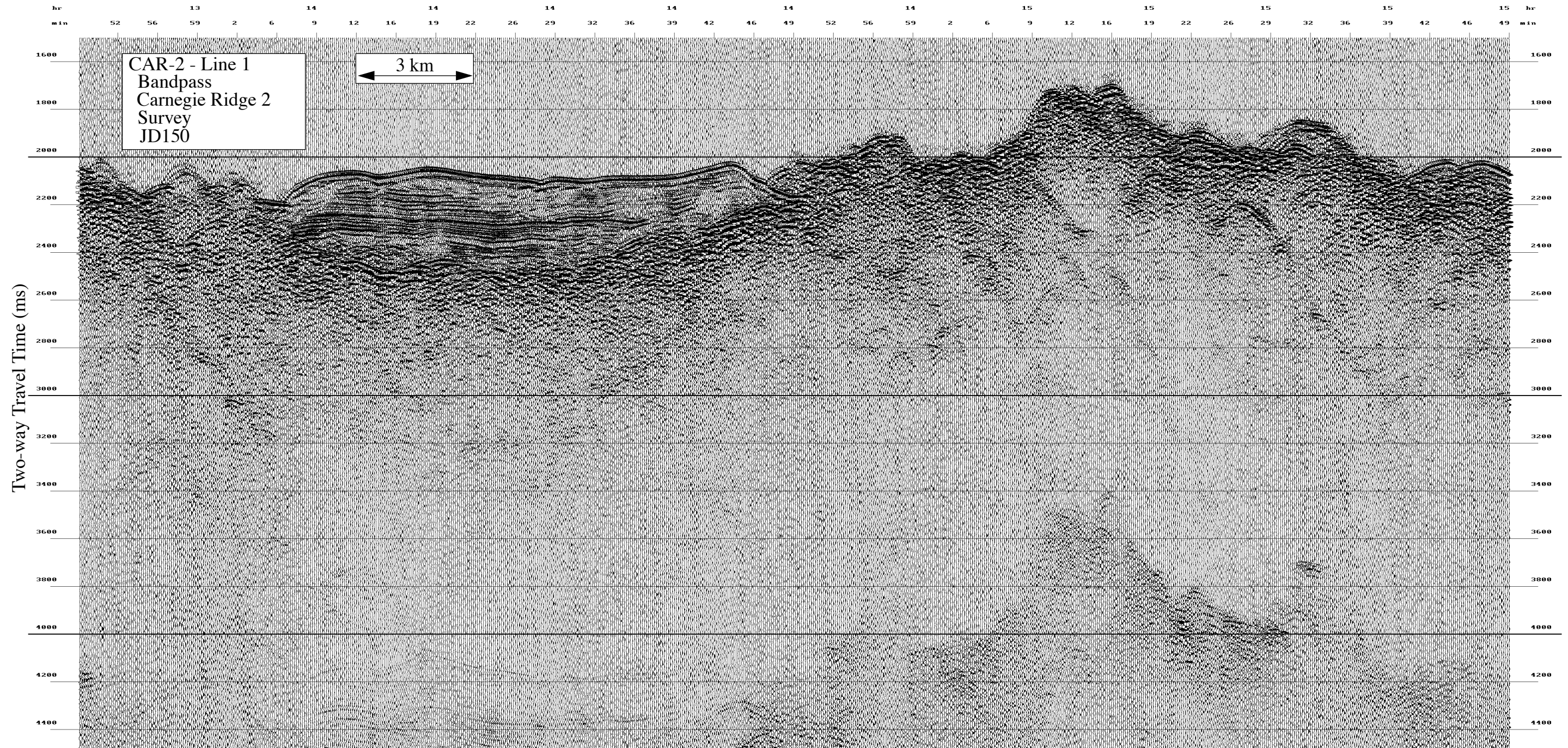


NW

SE

→ Line 1

CAR2

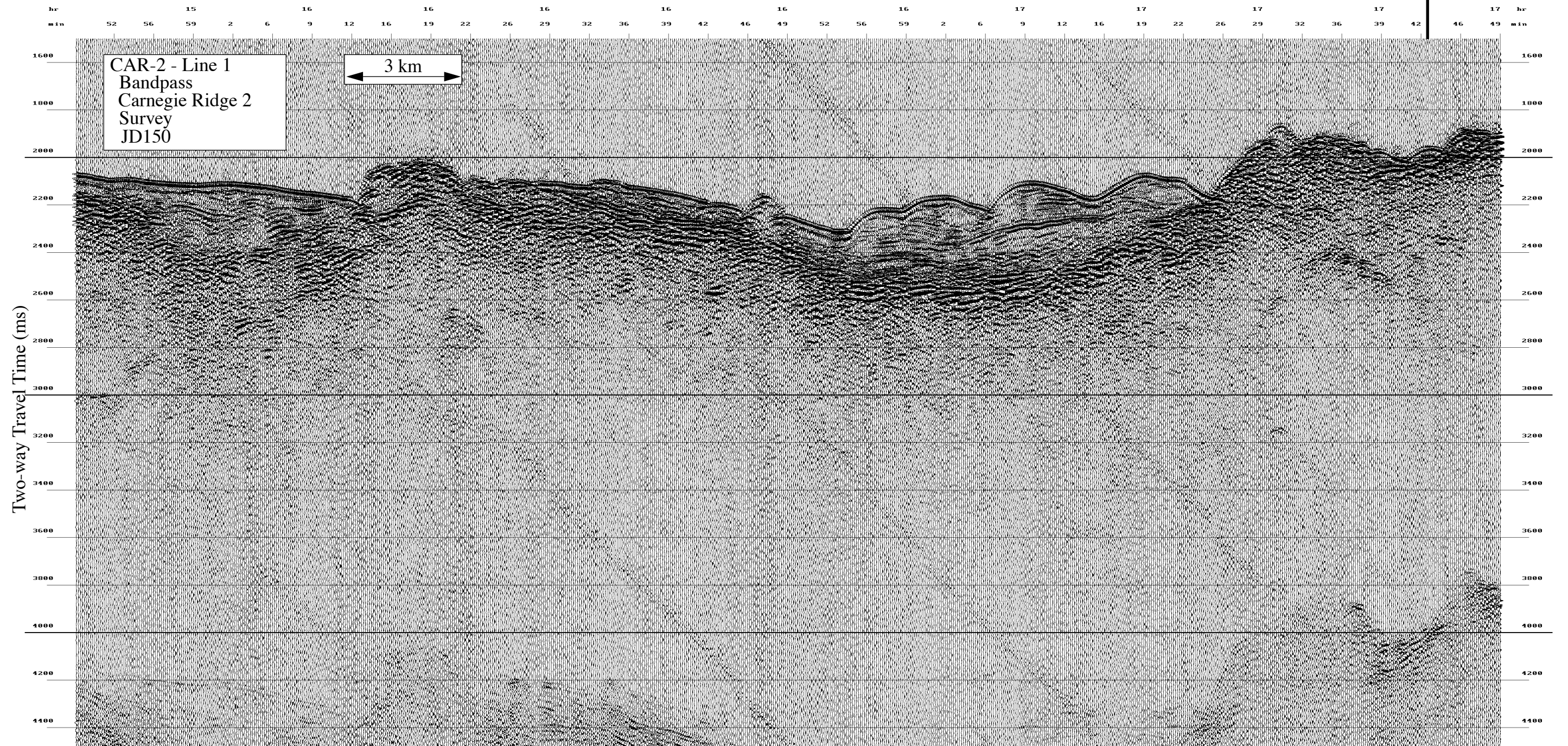


NW

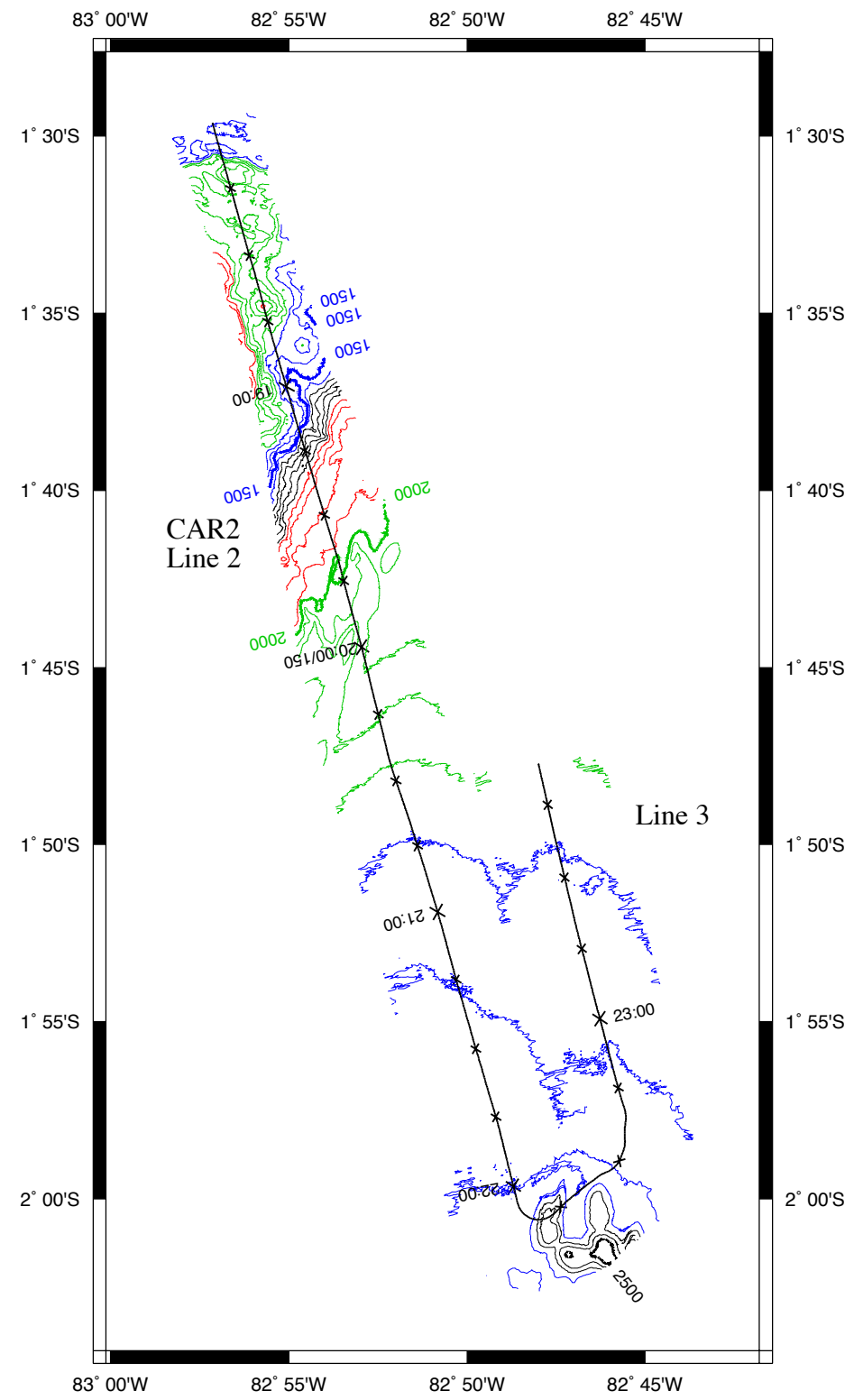
SE

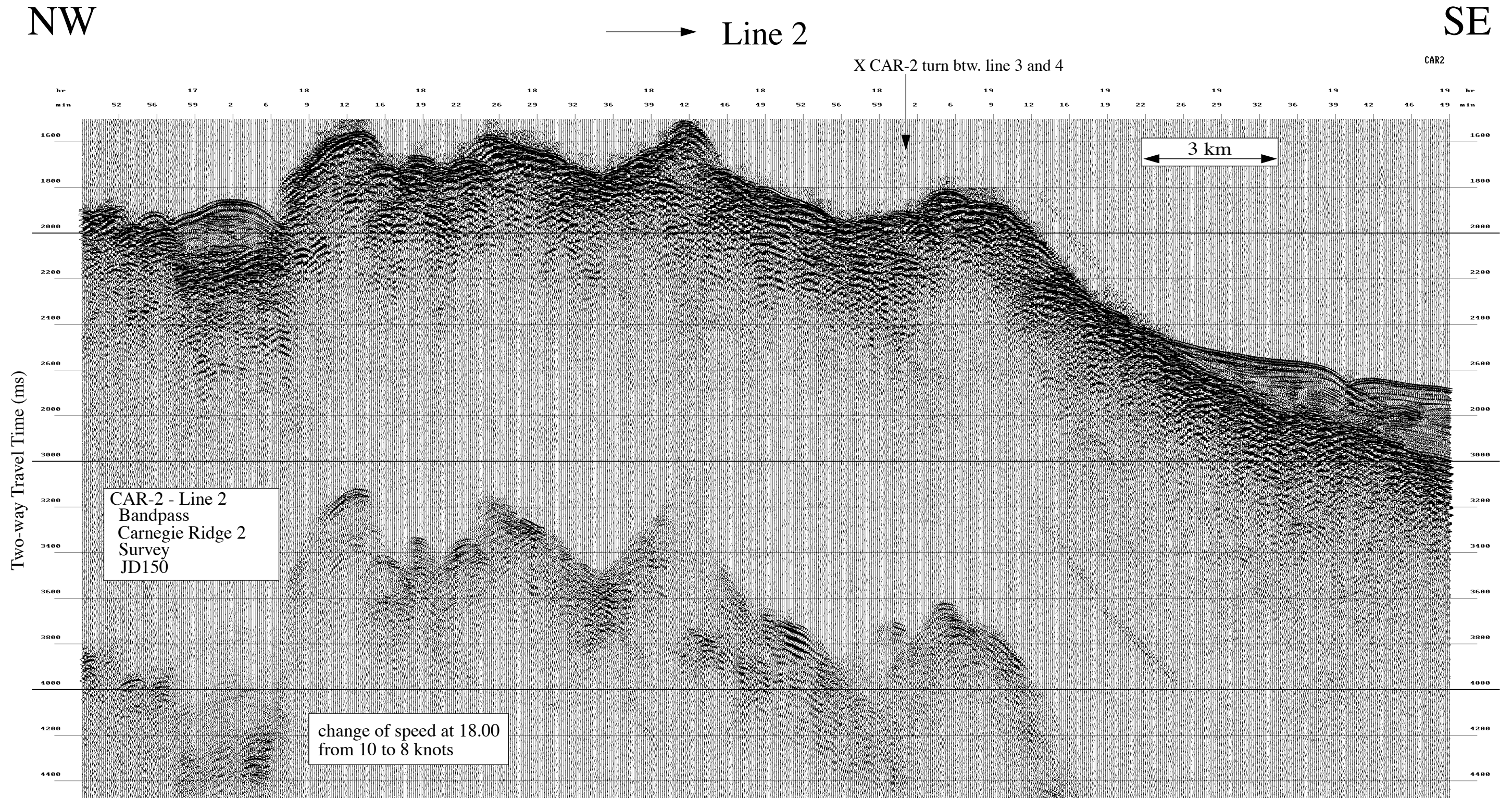
→ Line 1

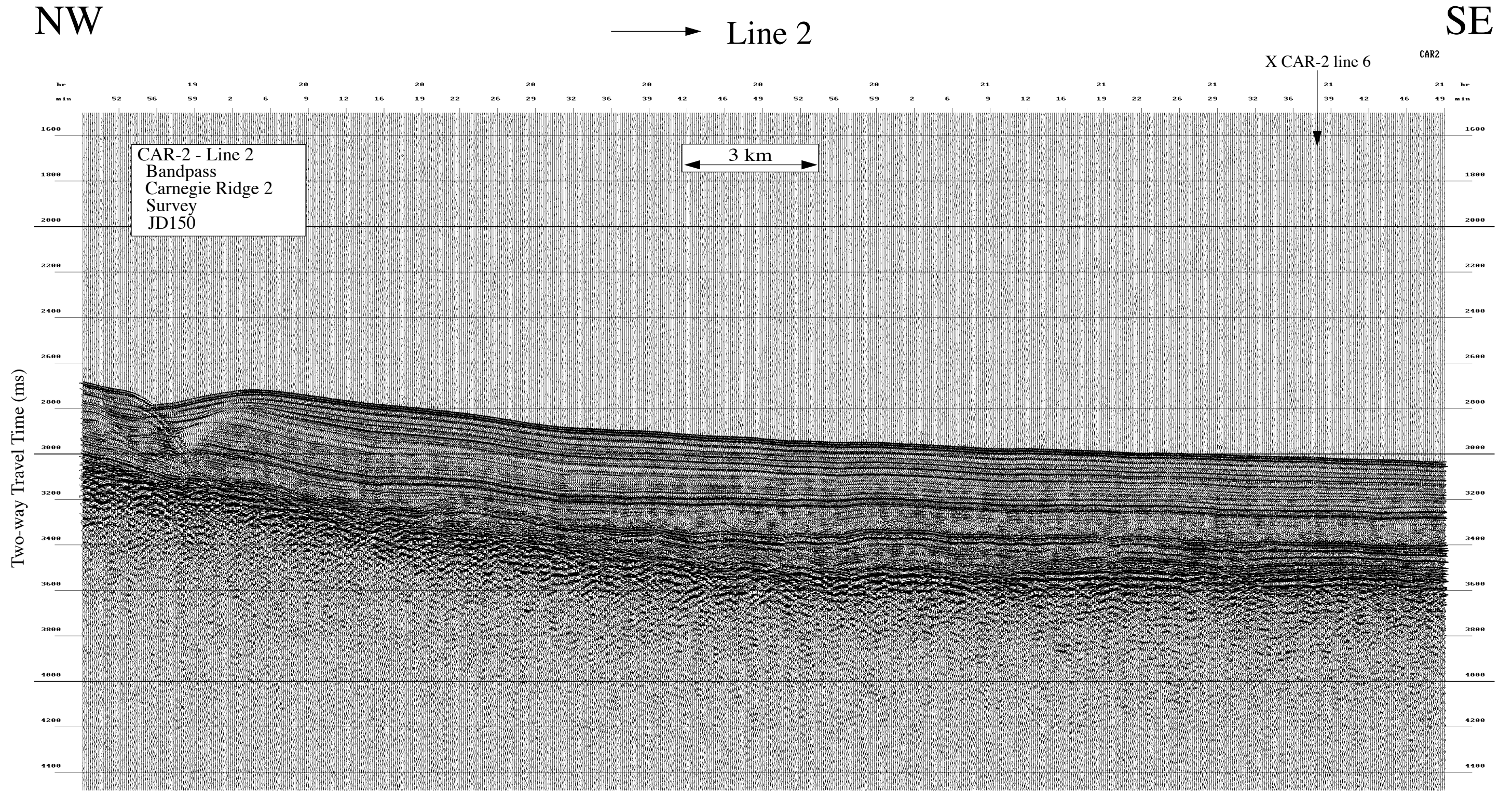
End Line 1 | Start Line 2

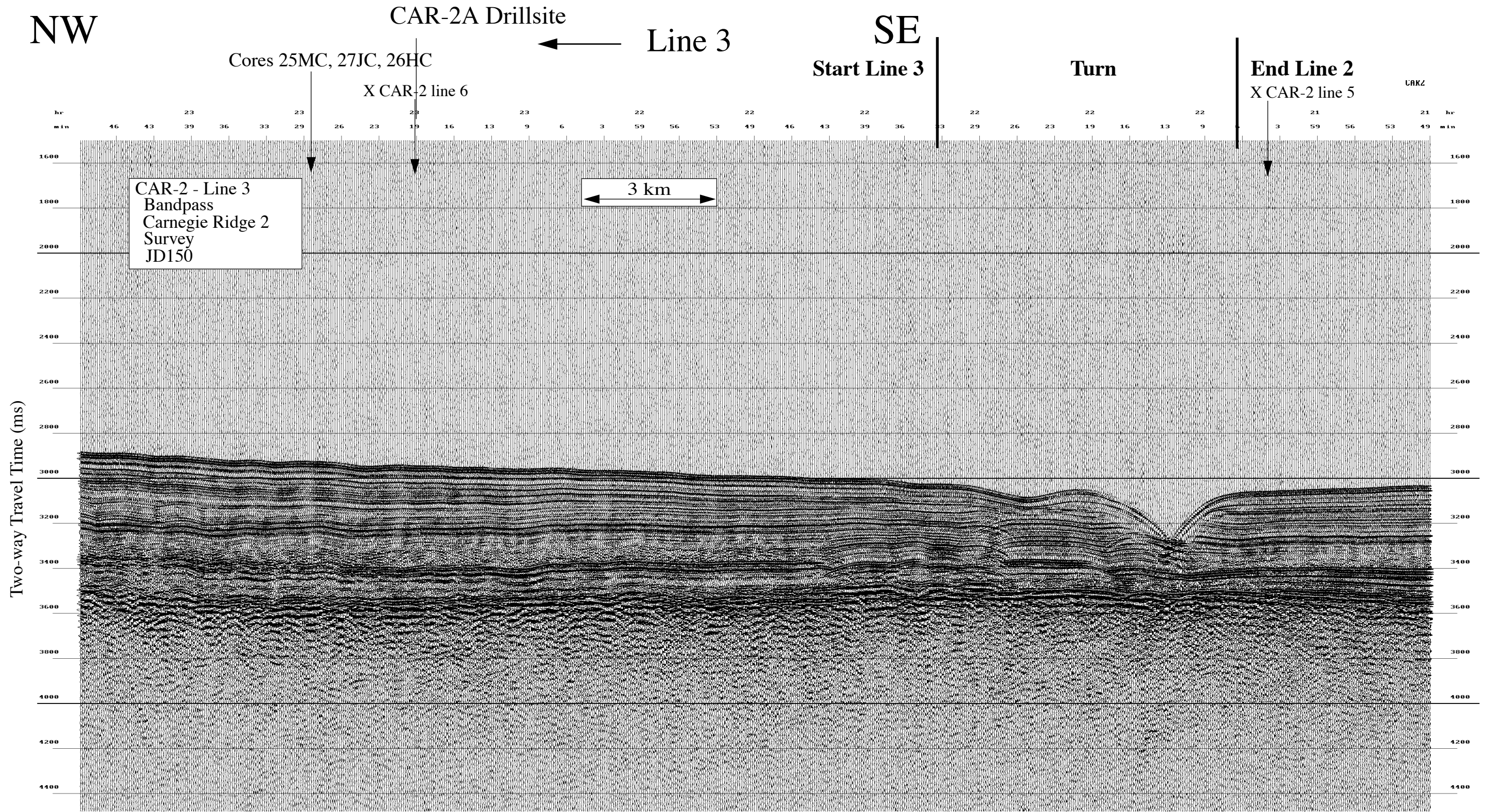


Data File SBfixavg.2000may29.1800-2400

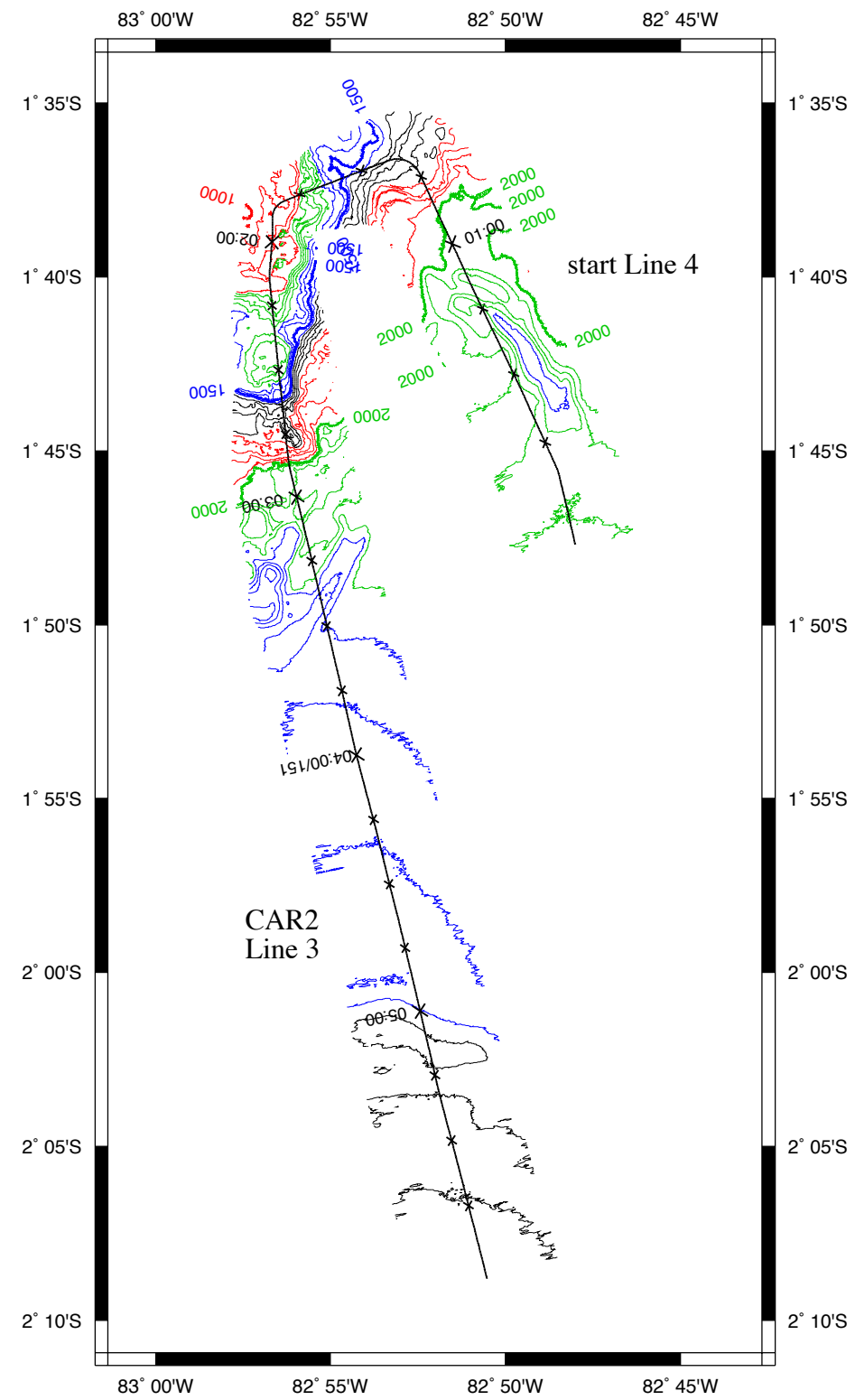


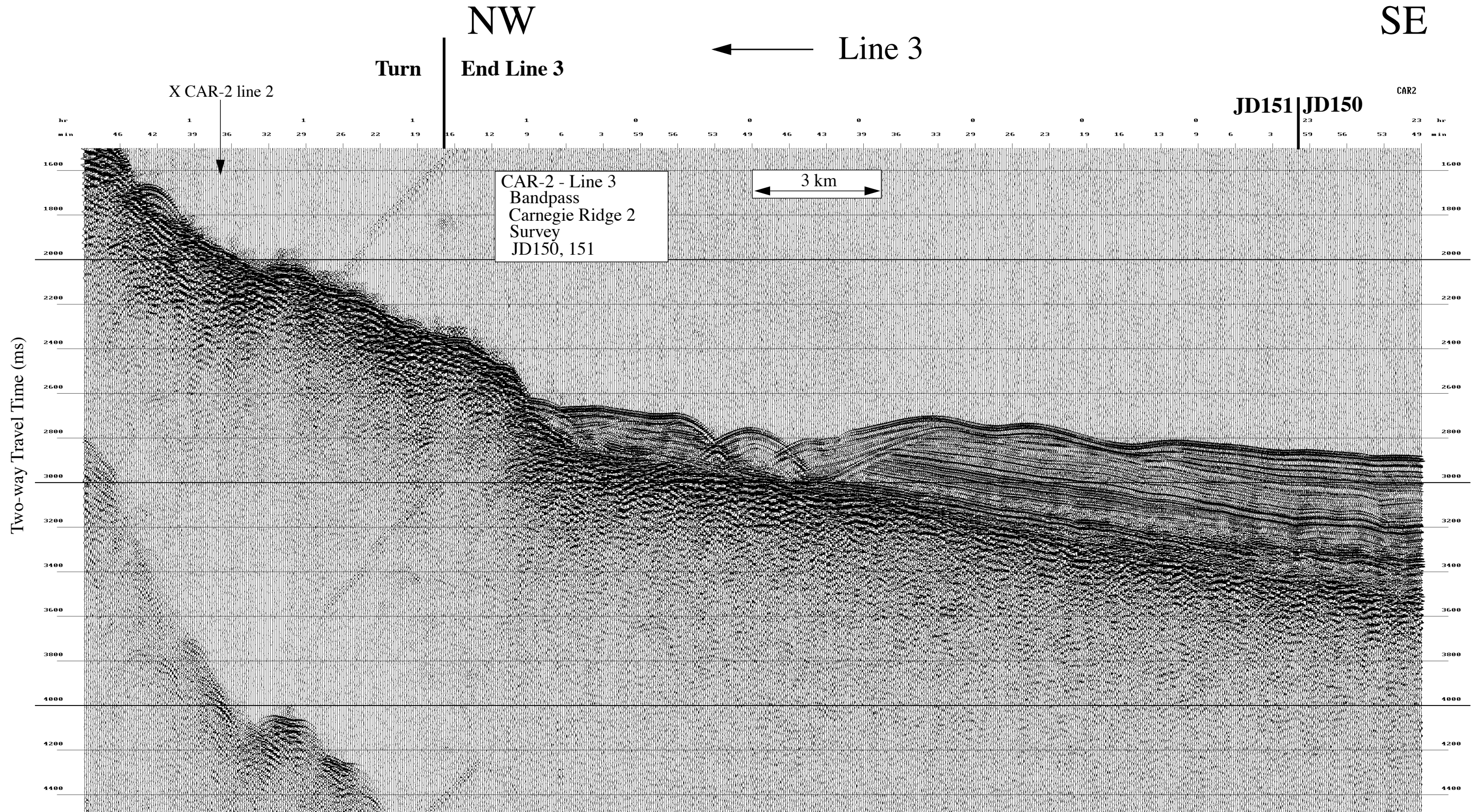


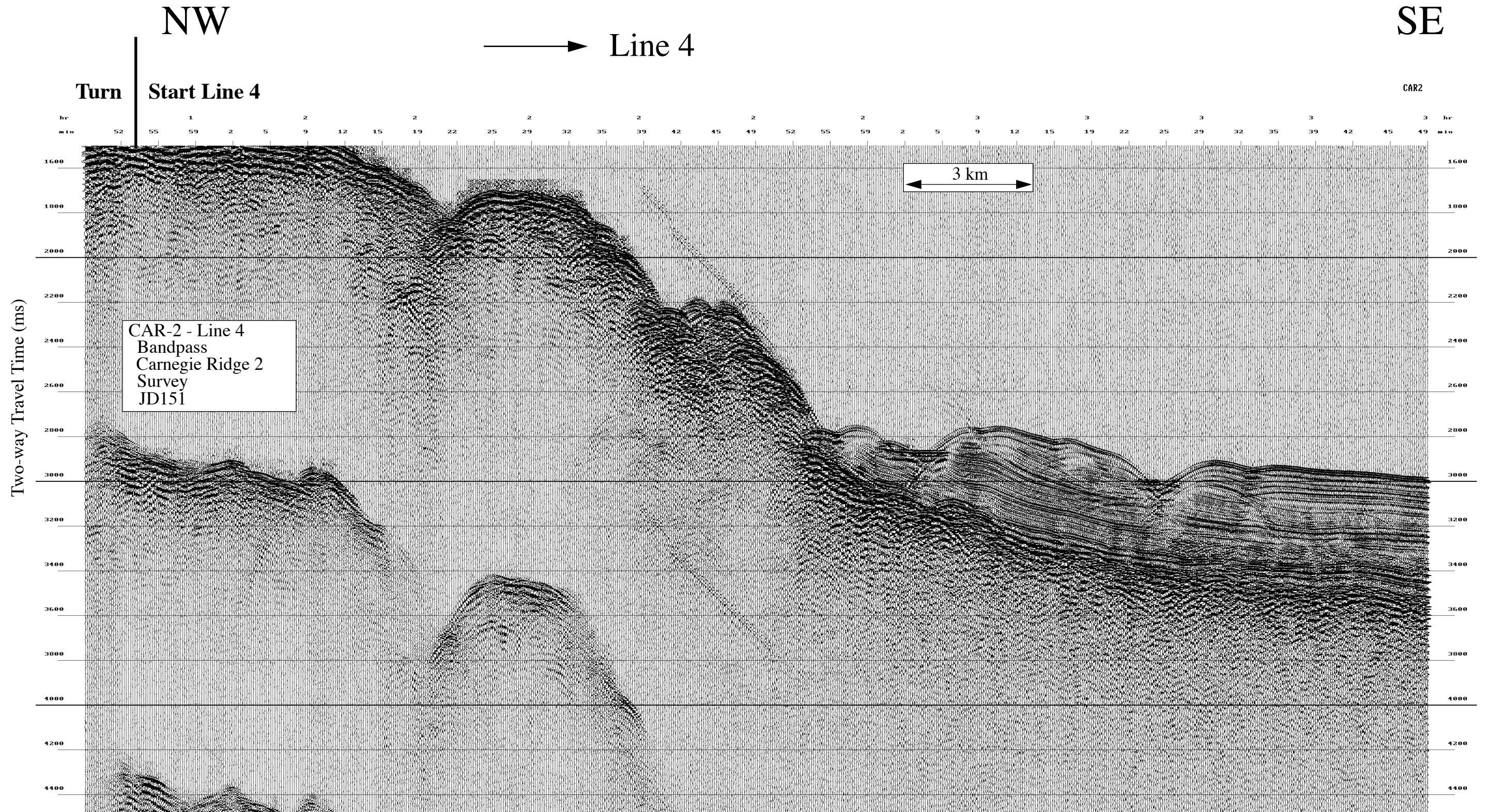




Data File SBfixavg.2000may30.0000-0600





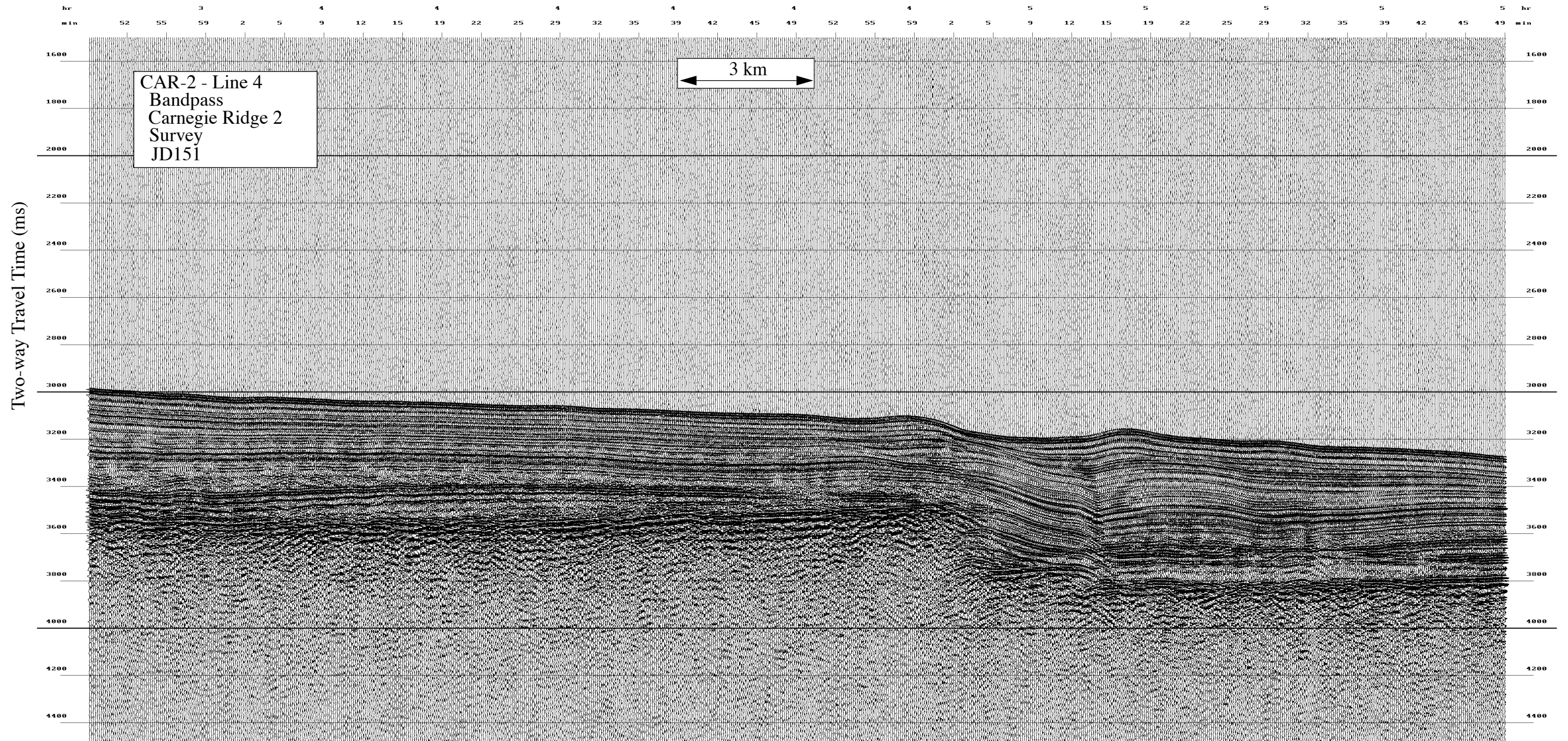


NW

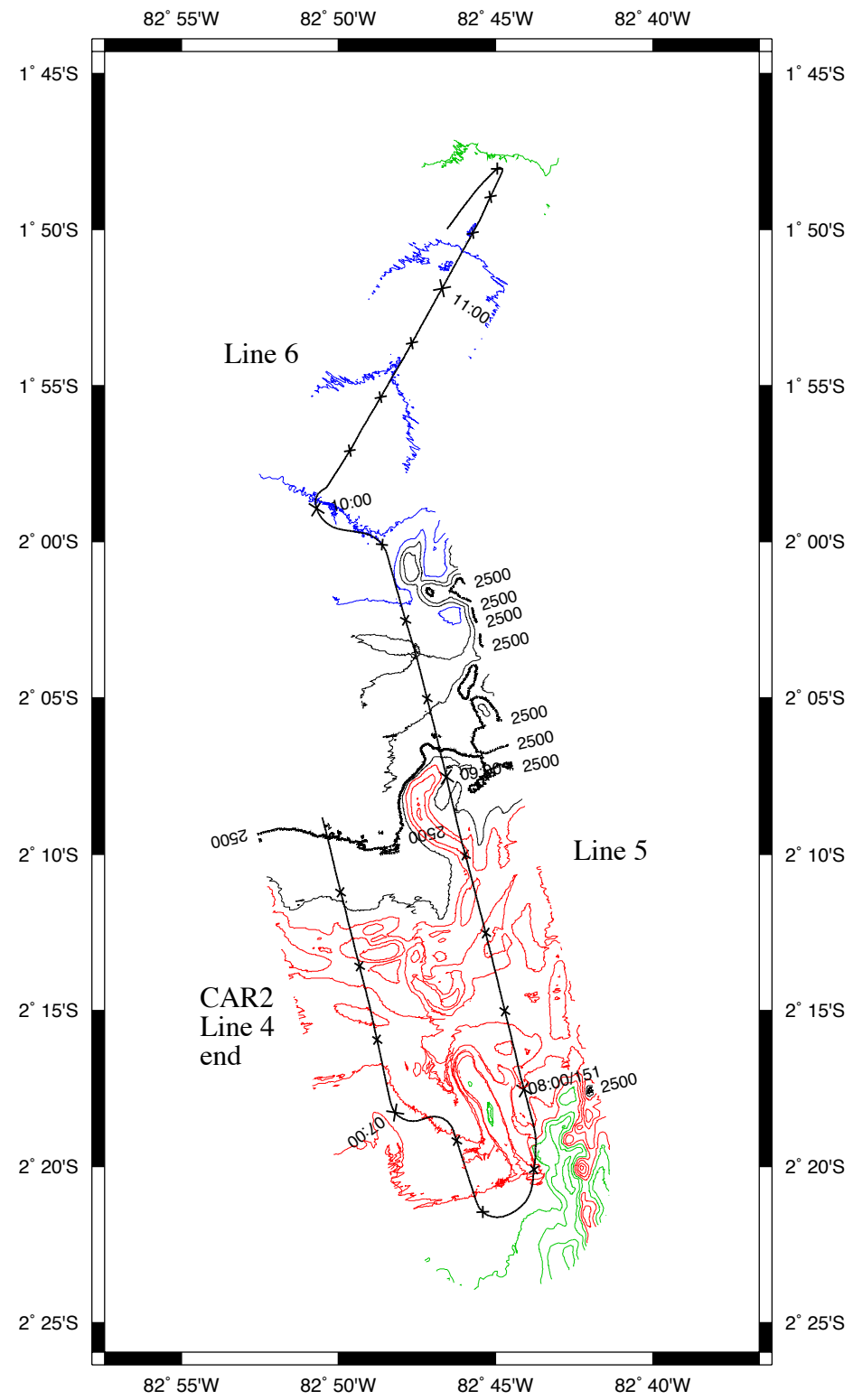
→ Line 4

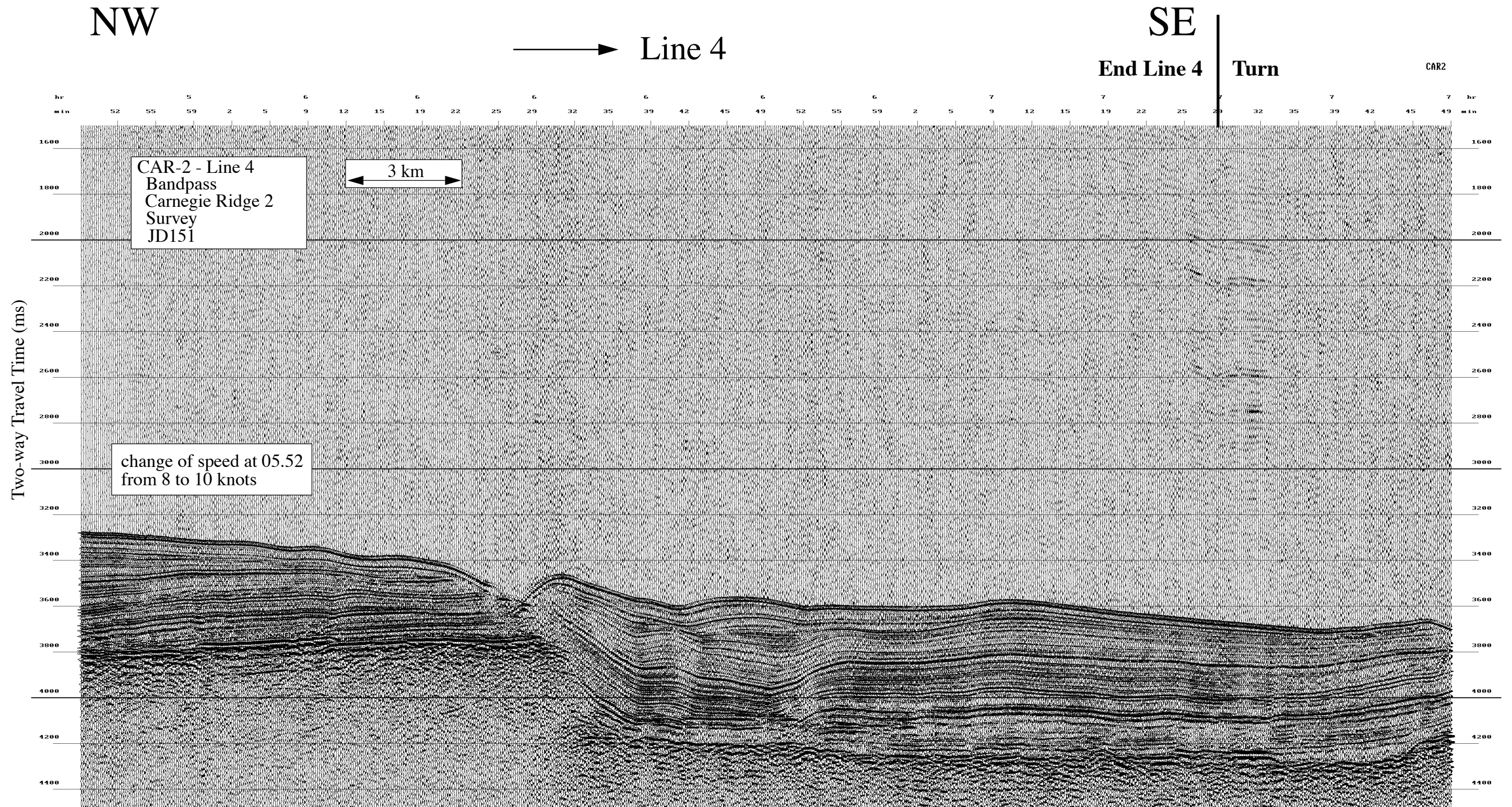
SE

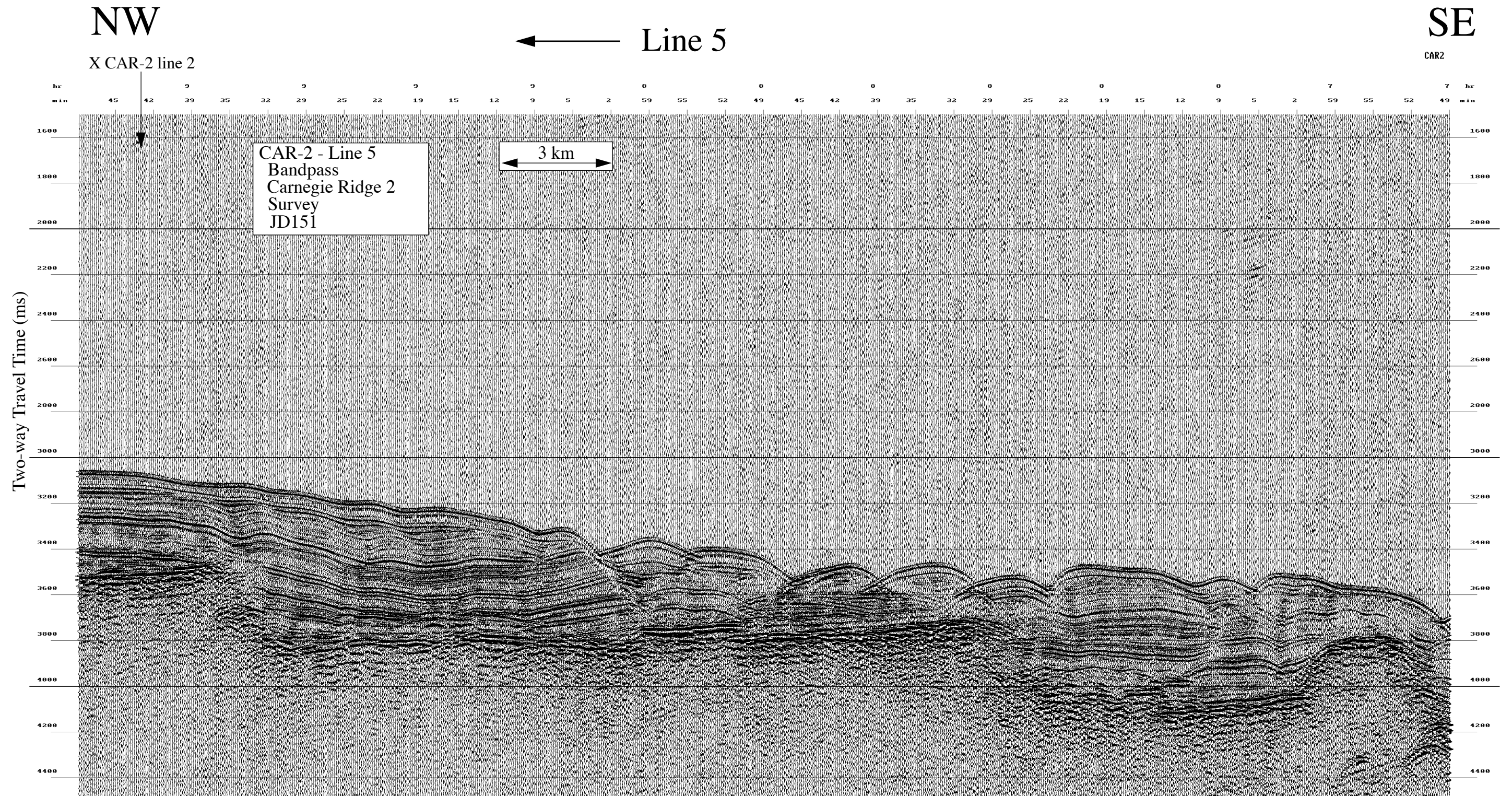
CAR2

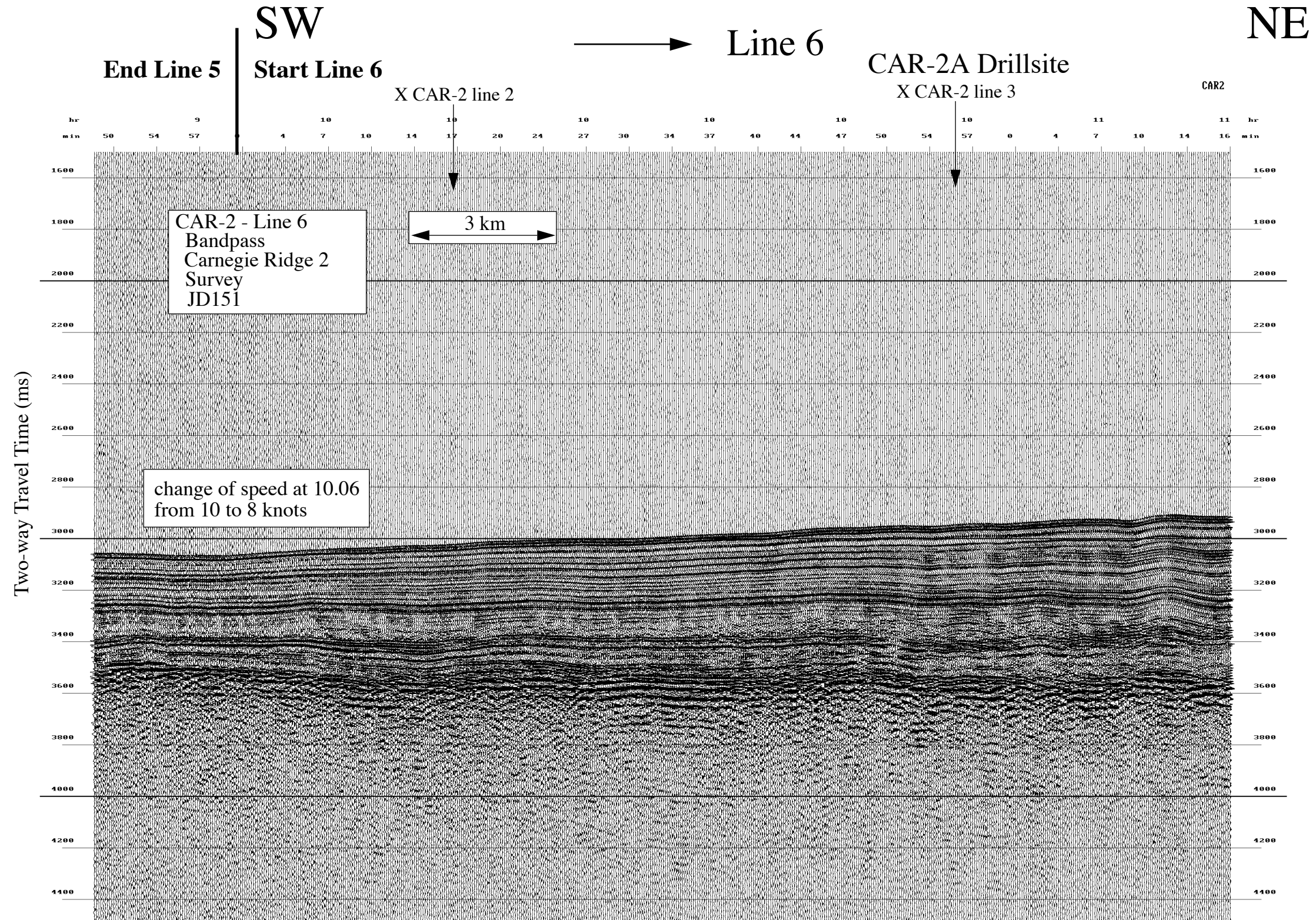


Data File SBfixavg.2000may30.0600-1200









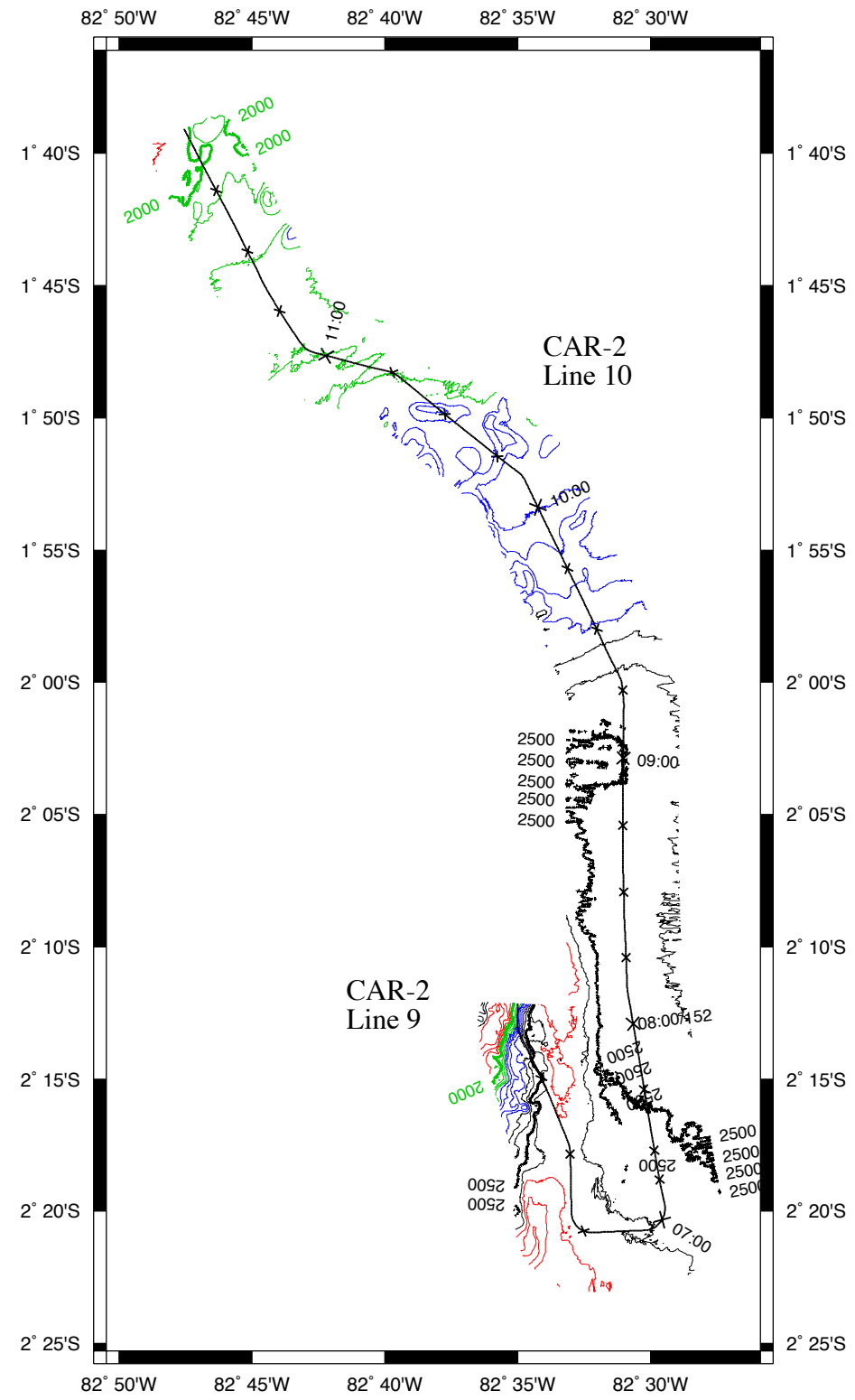
JD 152 (31 May 2000)--end CAR-2 Survey

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NEMO Leg 3

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Data File SBfixavg.2000may31.0600-1200

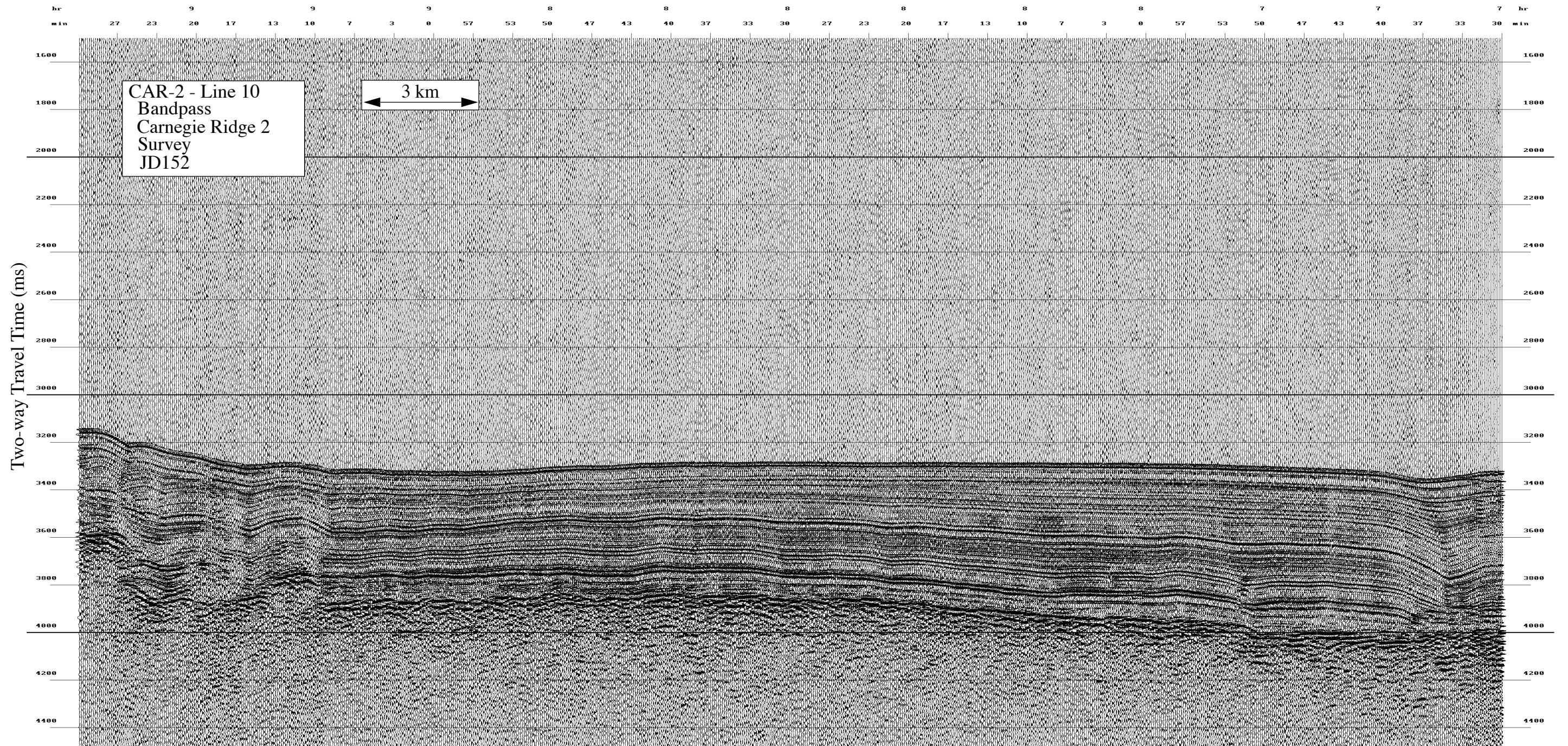


NW

SE

← Line 10

CAR2

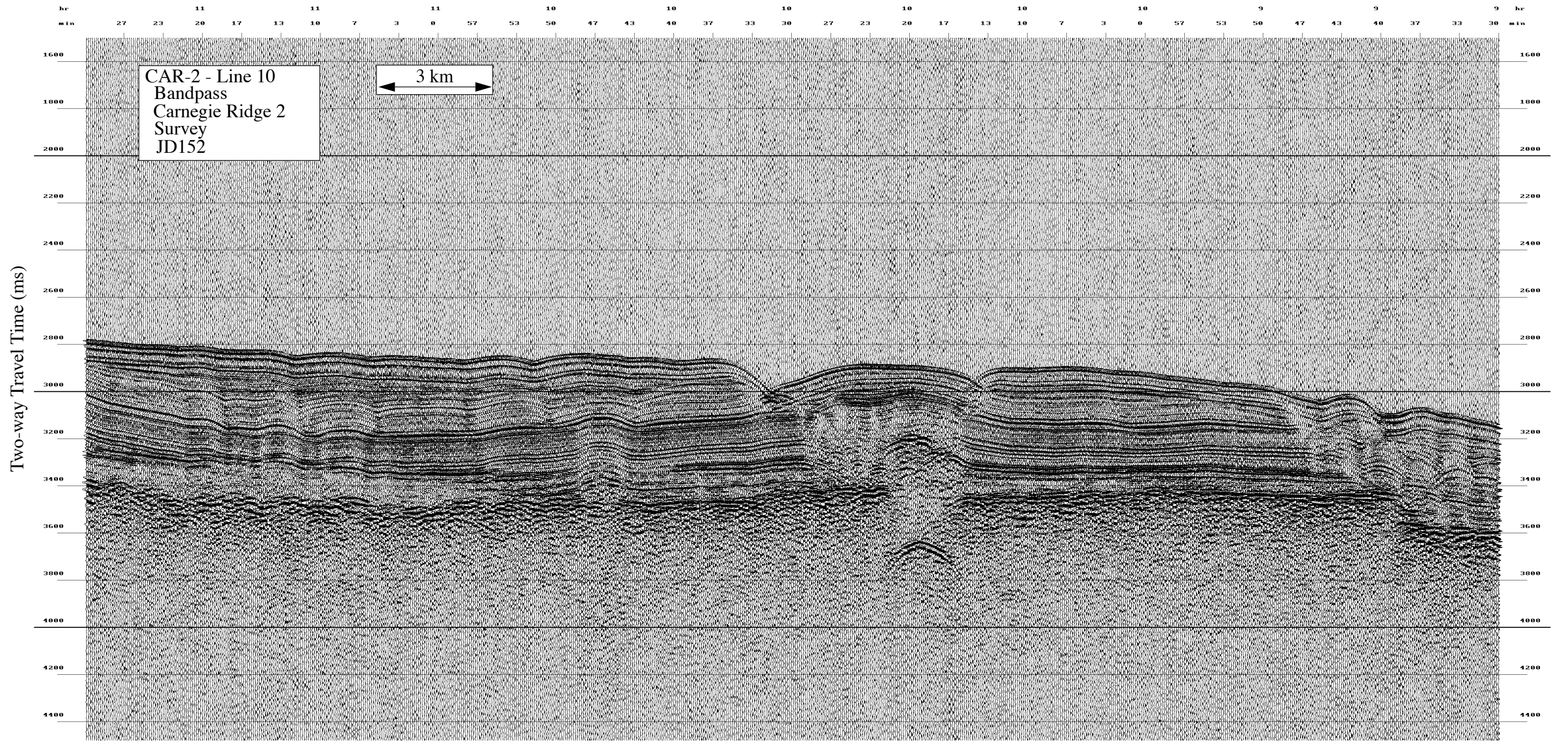


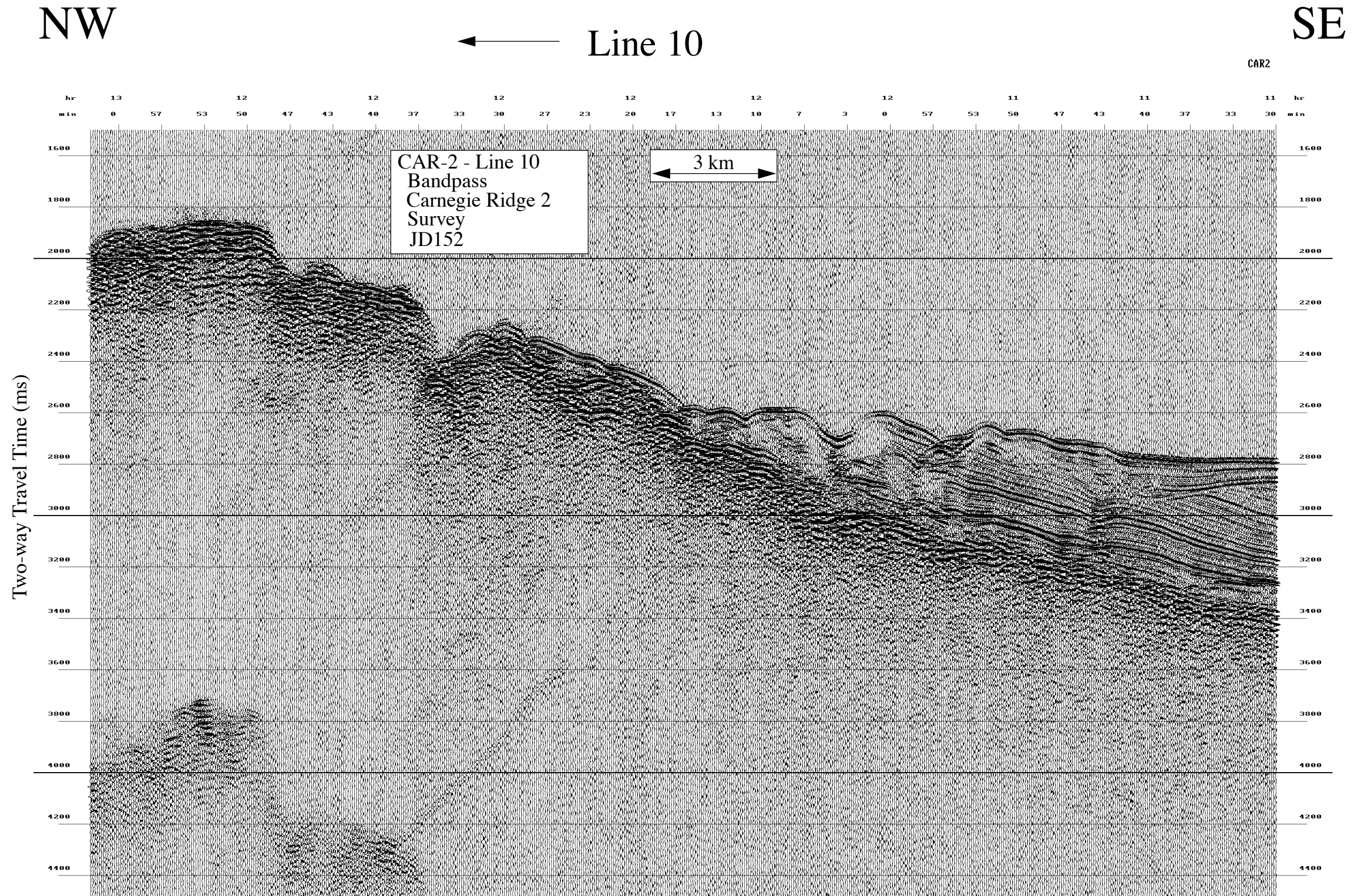
NW

SE

← Line 10

CAR2





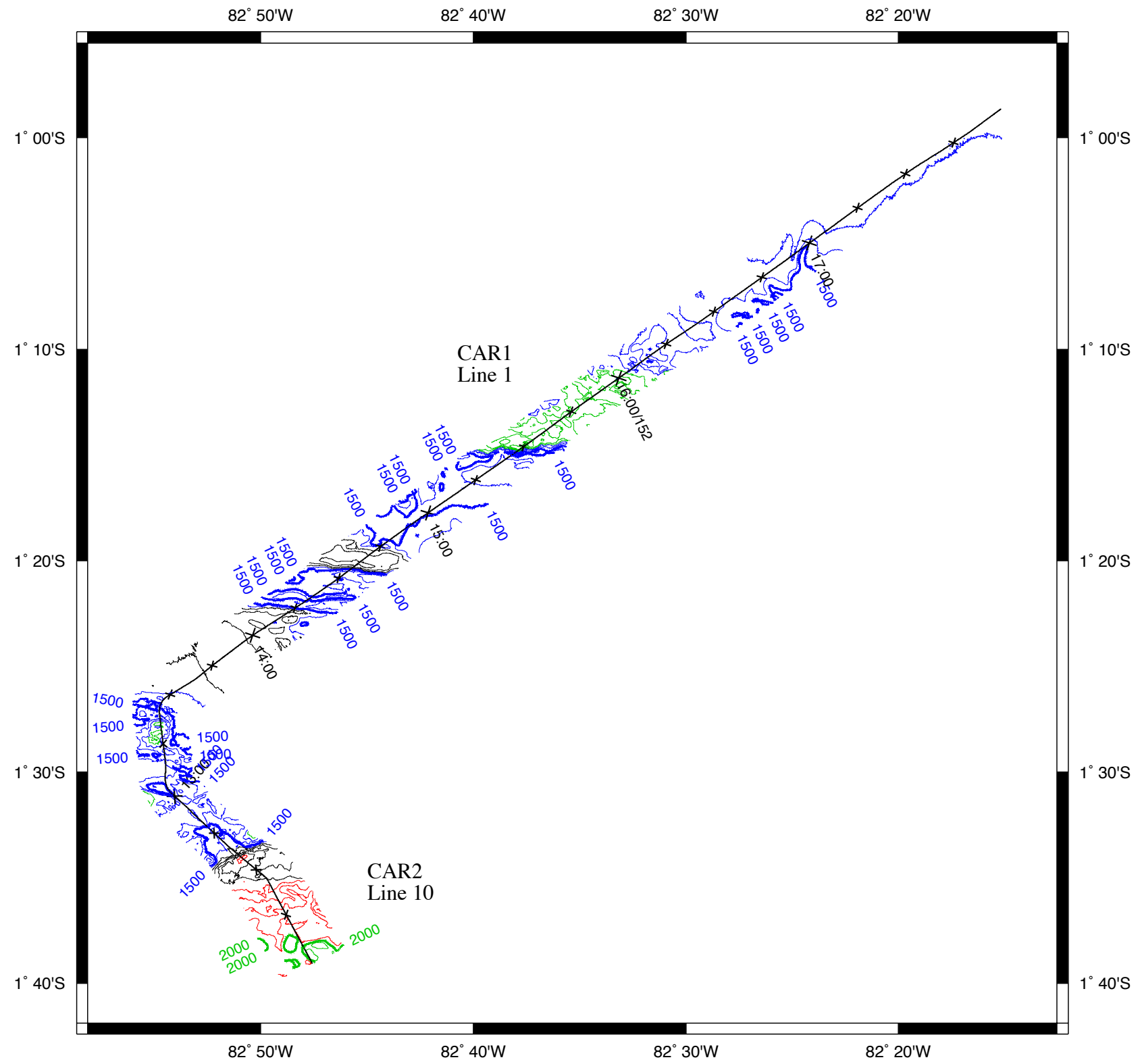
JD 152 (31 May 2000)--Begin CAR-1 Survey, Carnegie Ridge Crest

High Resolution Seismic Reflection Records

NEMO Leg 3

R/V Melville

Data File SBfixavg.2000may31.1200-1800

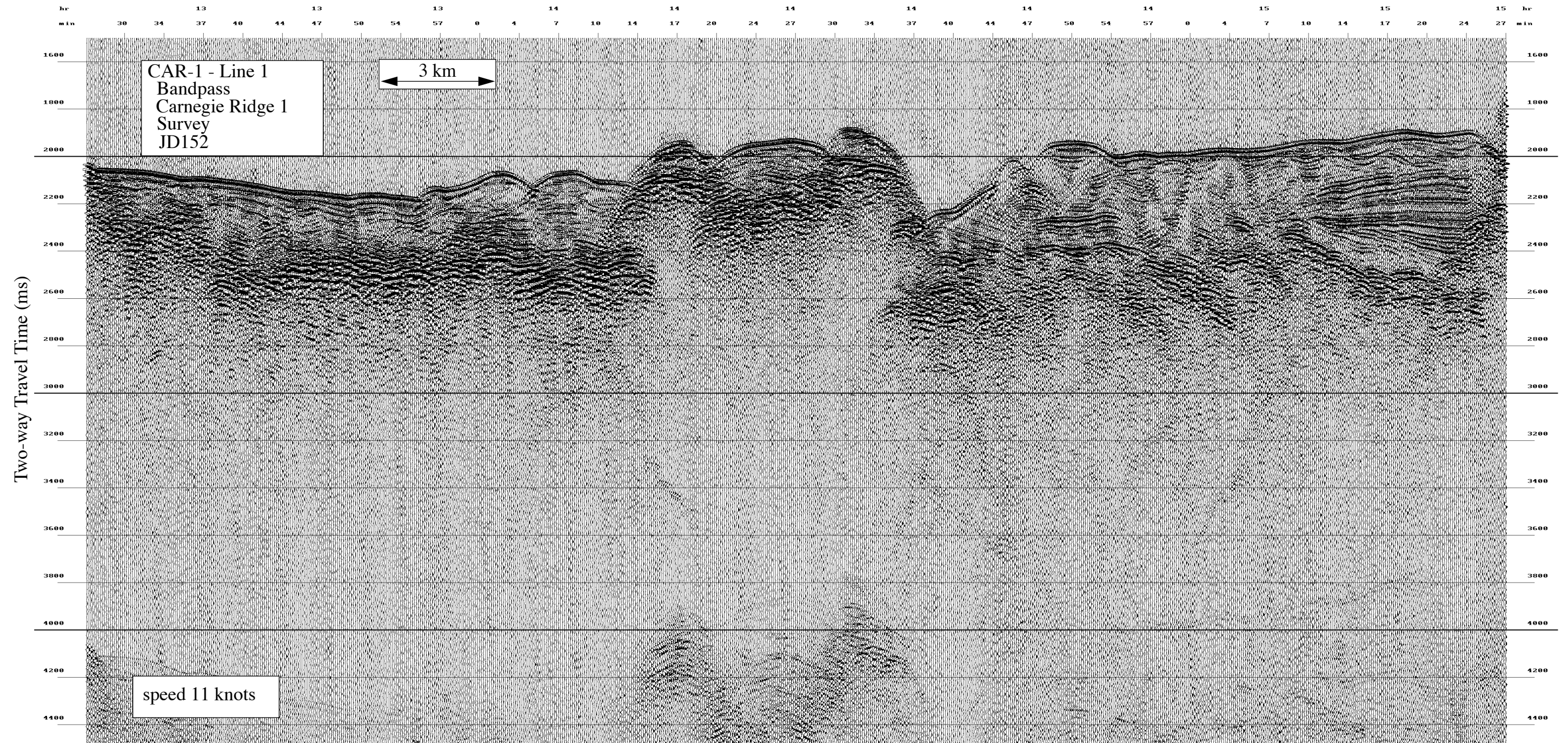


SW

NE

→ Line 1

CAR1

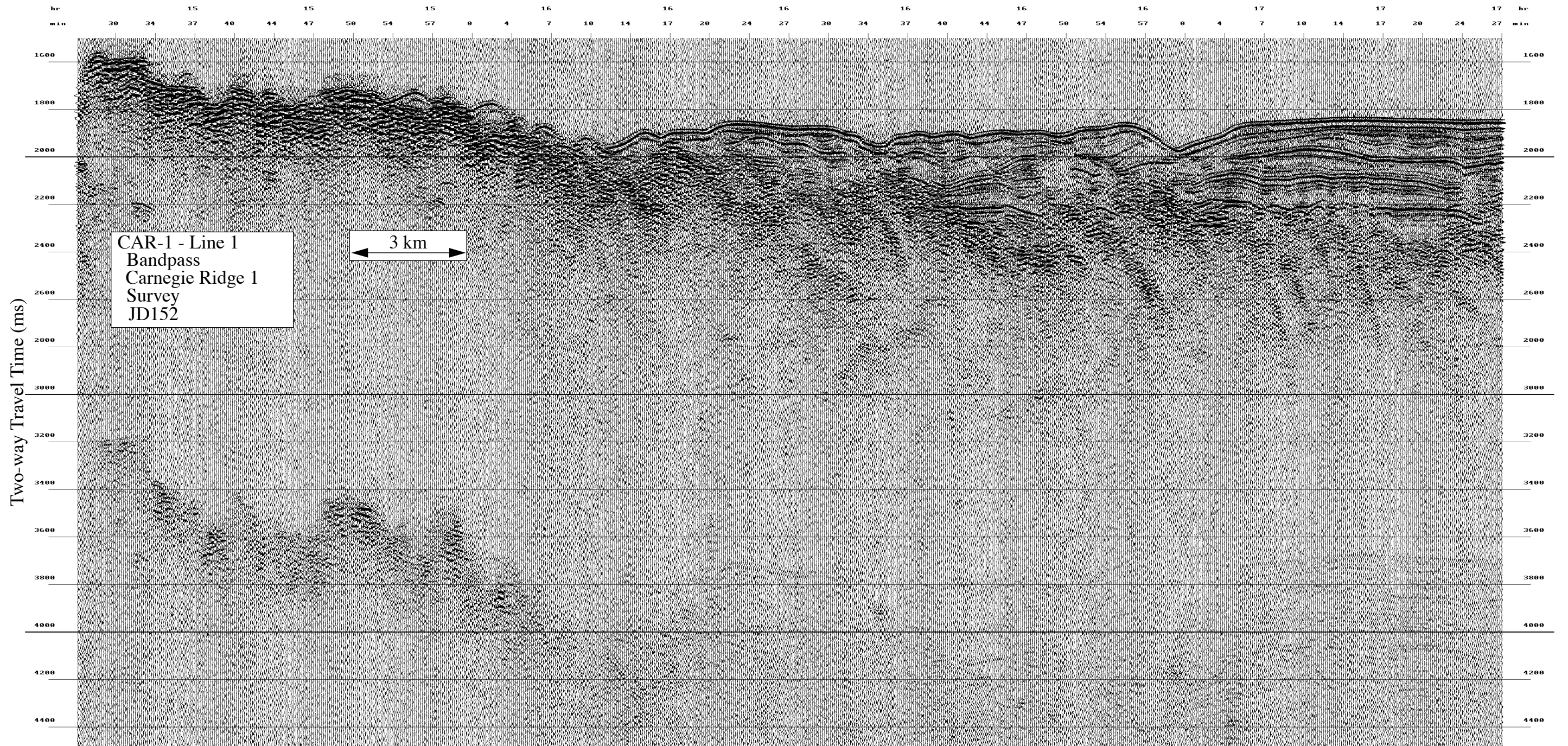


SW

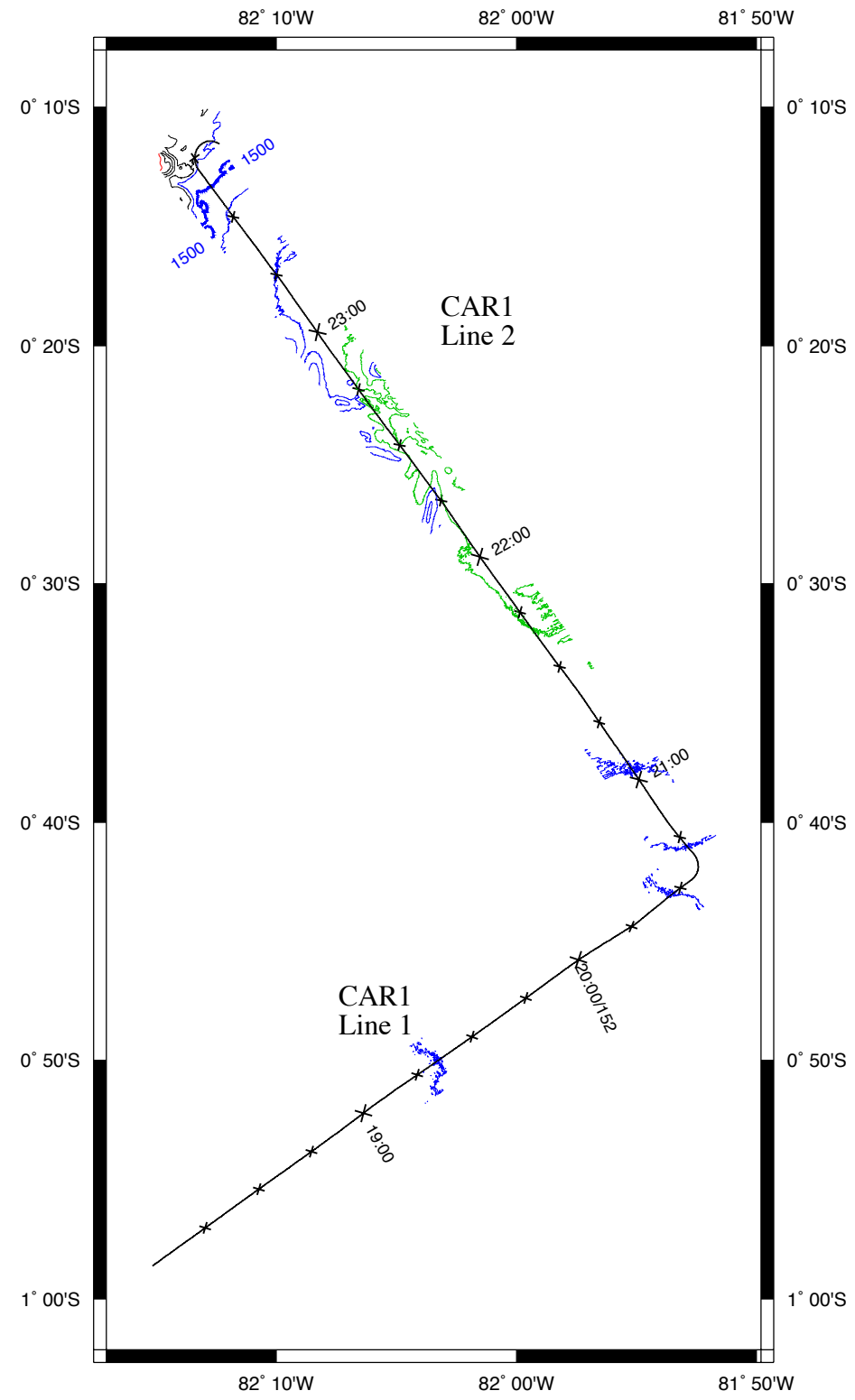
NE

→ Line 1

CAR1



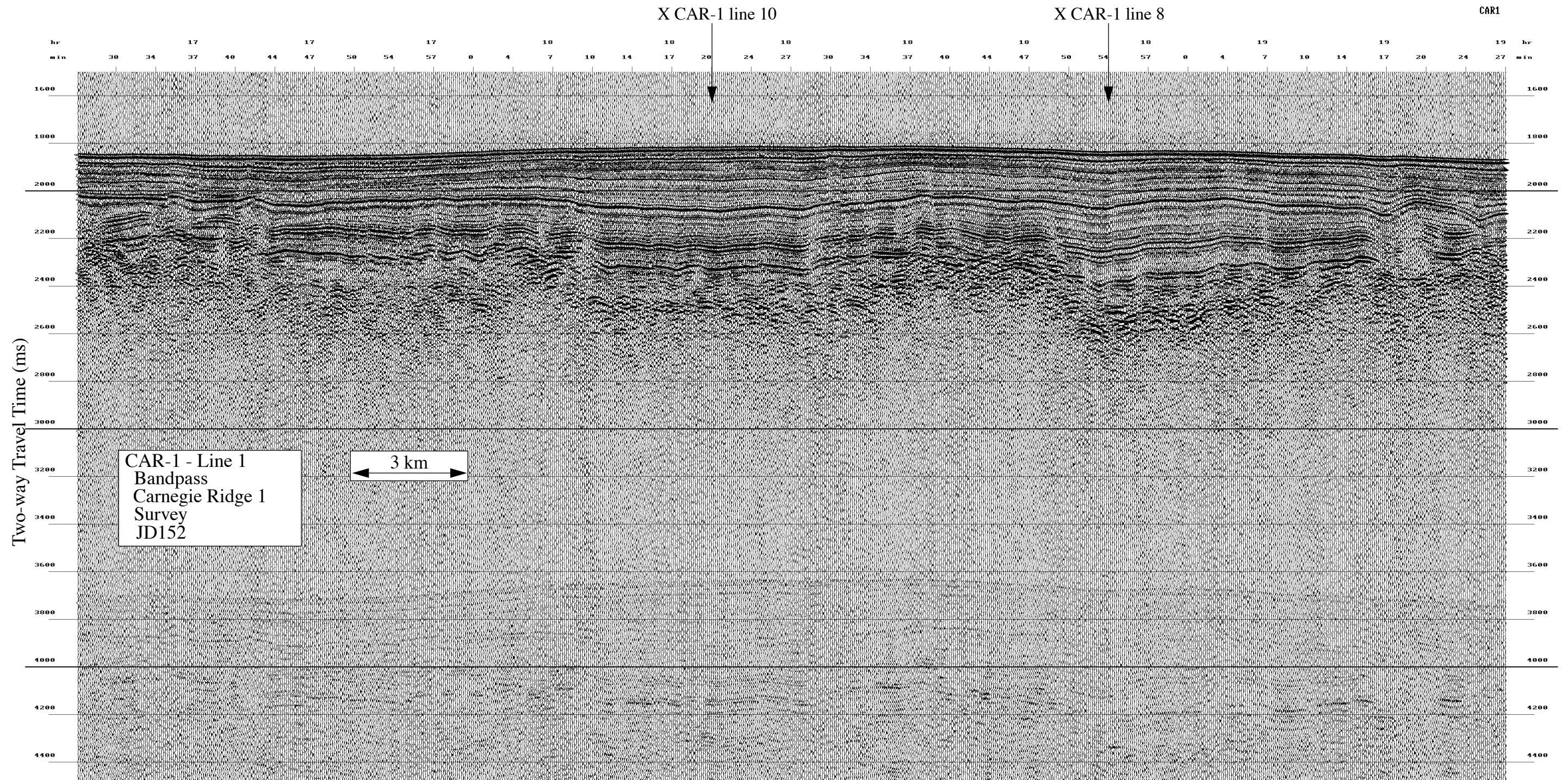
Data File SBfixavg.2000may31.1800-2400



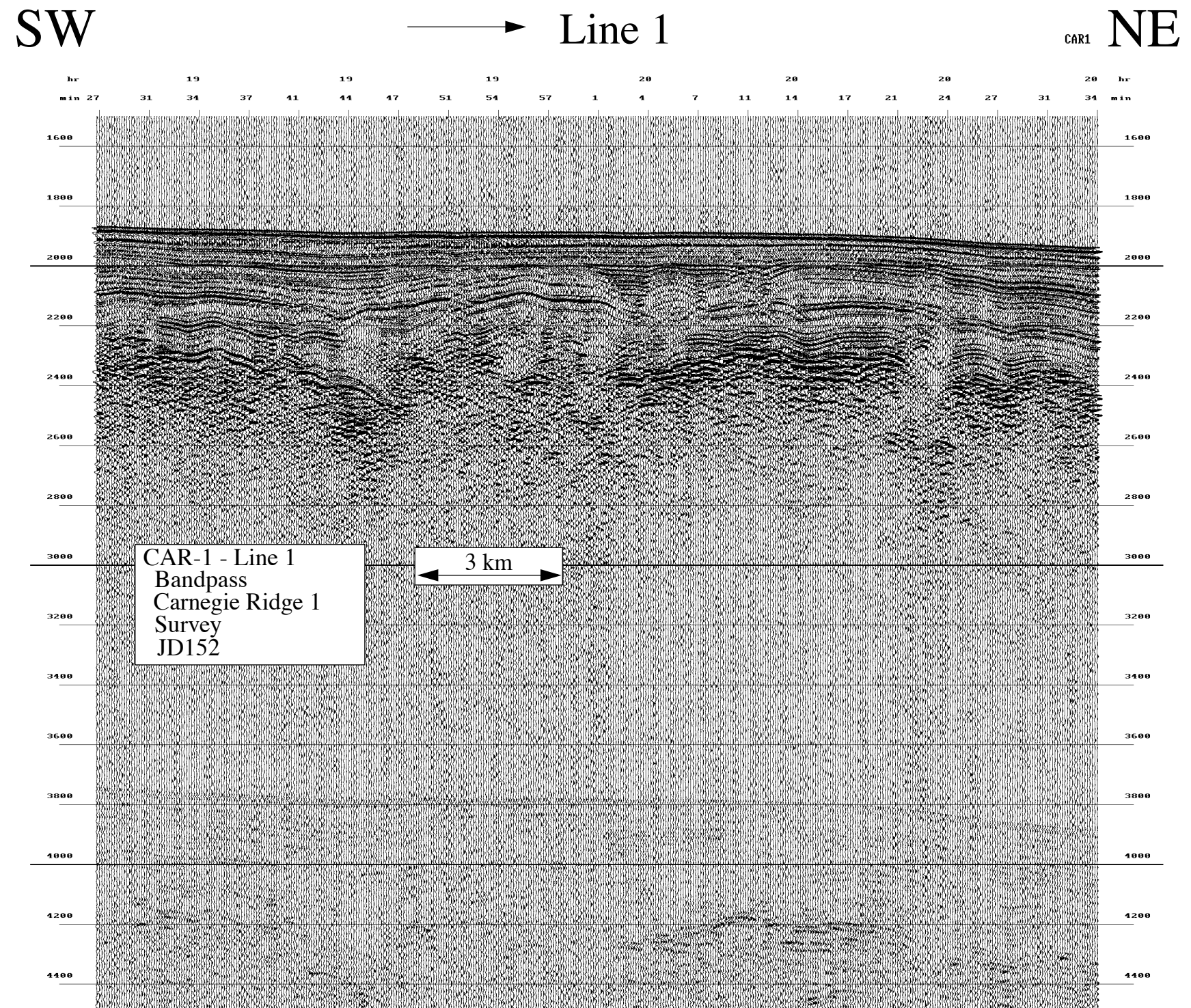
SW

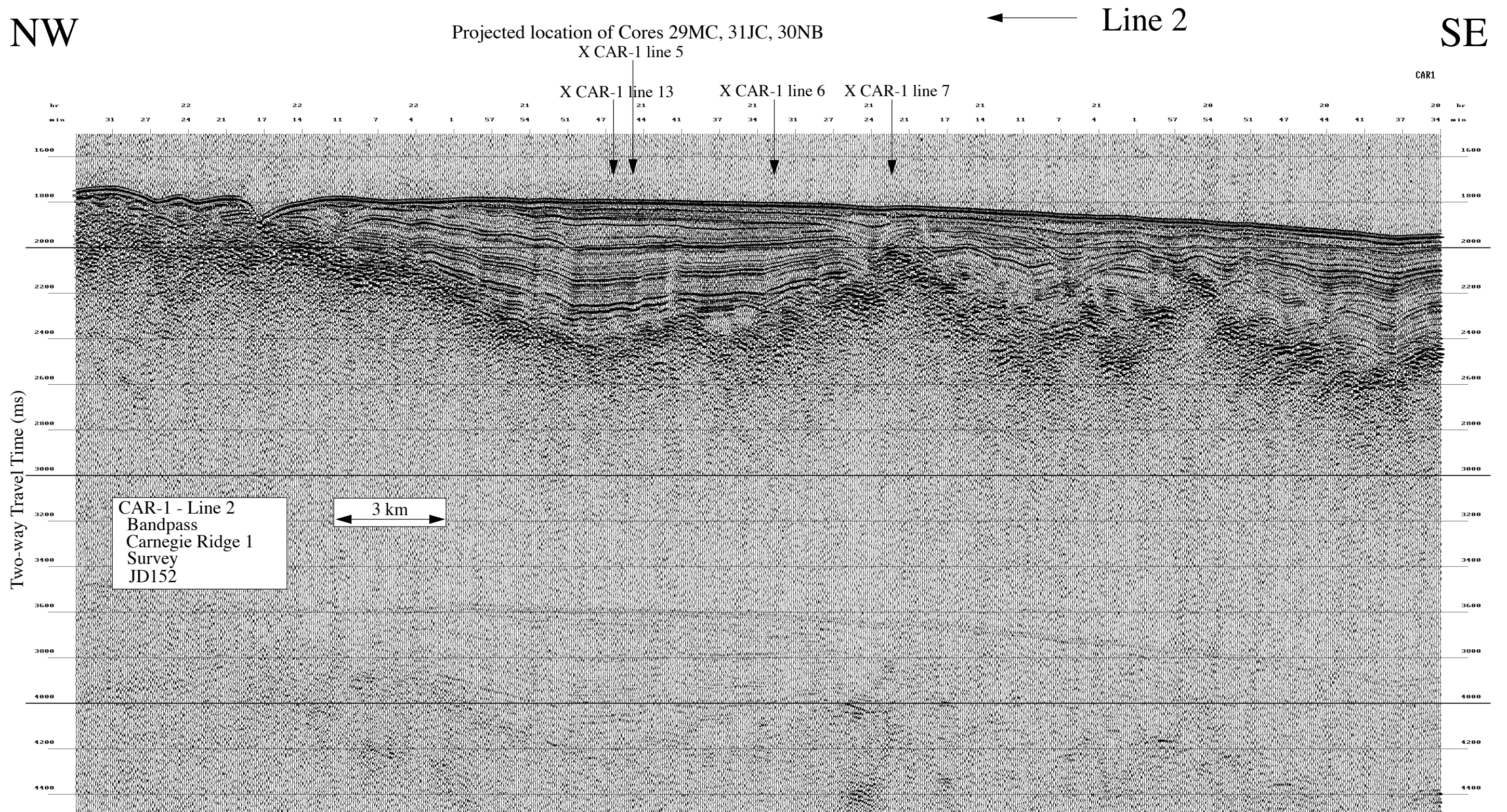
→ Line 1

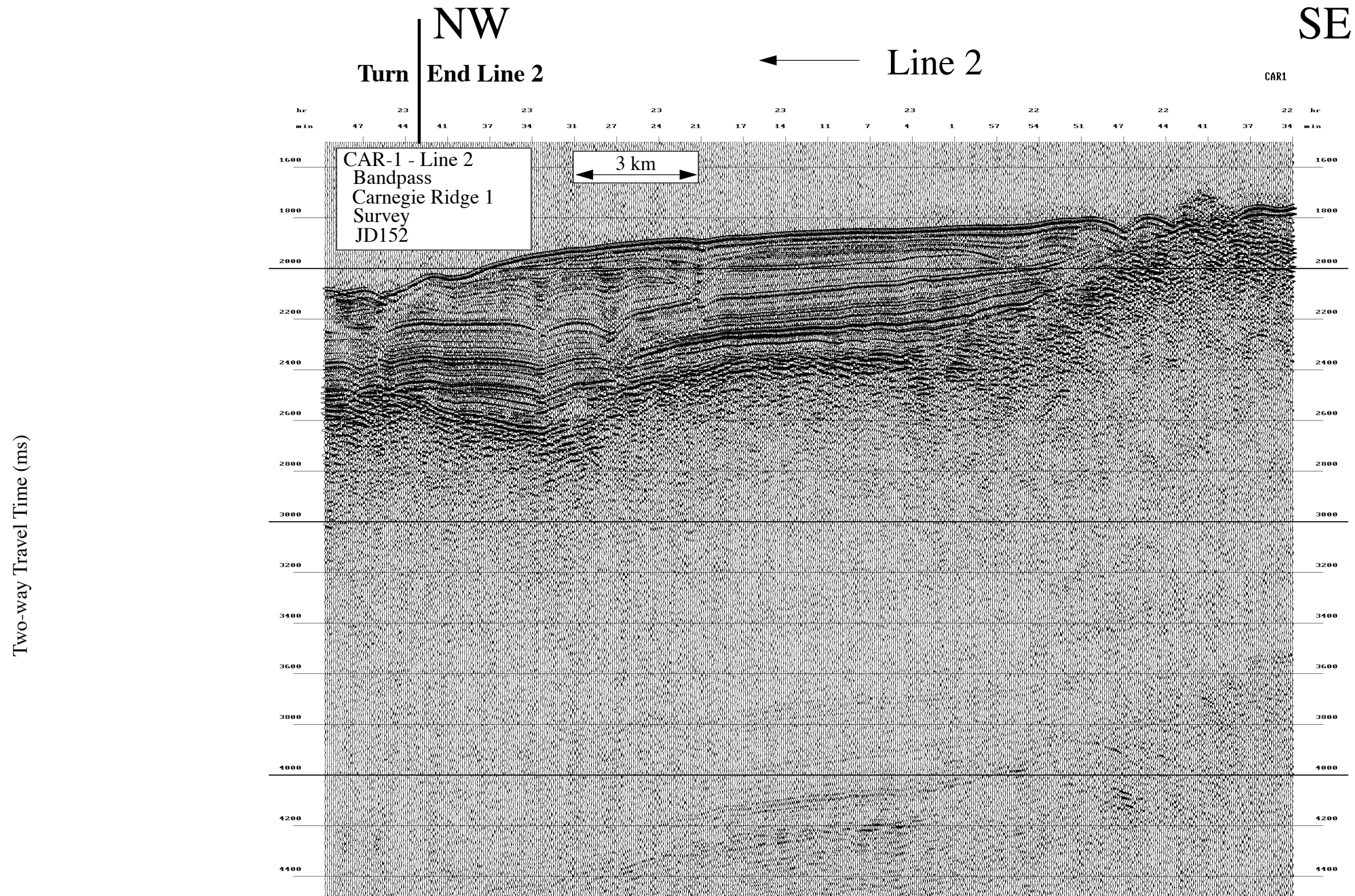
NE



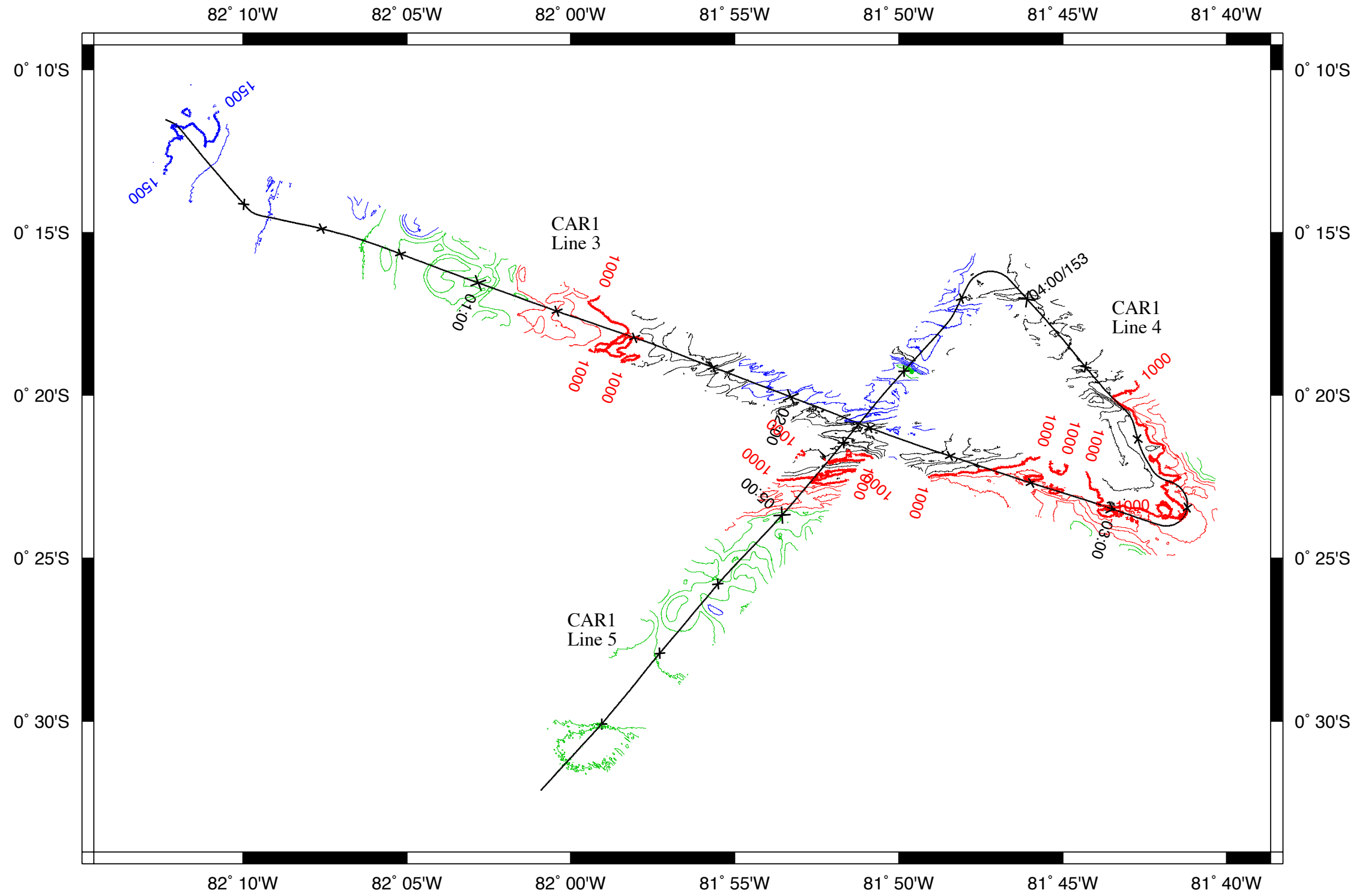
Two-way Travel Time (ms)

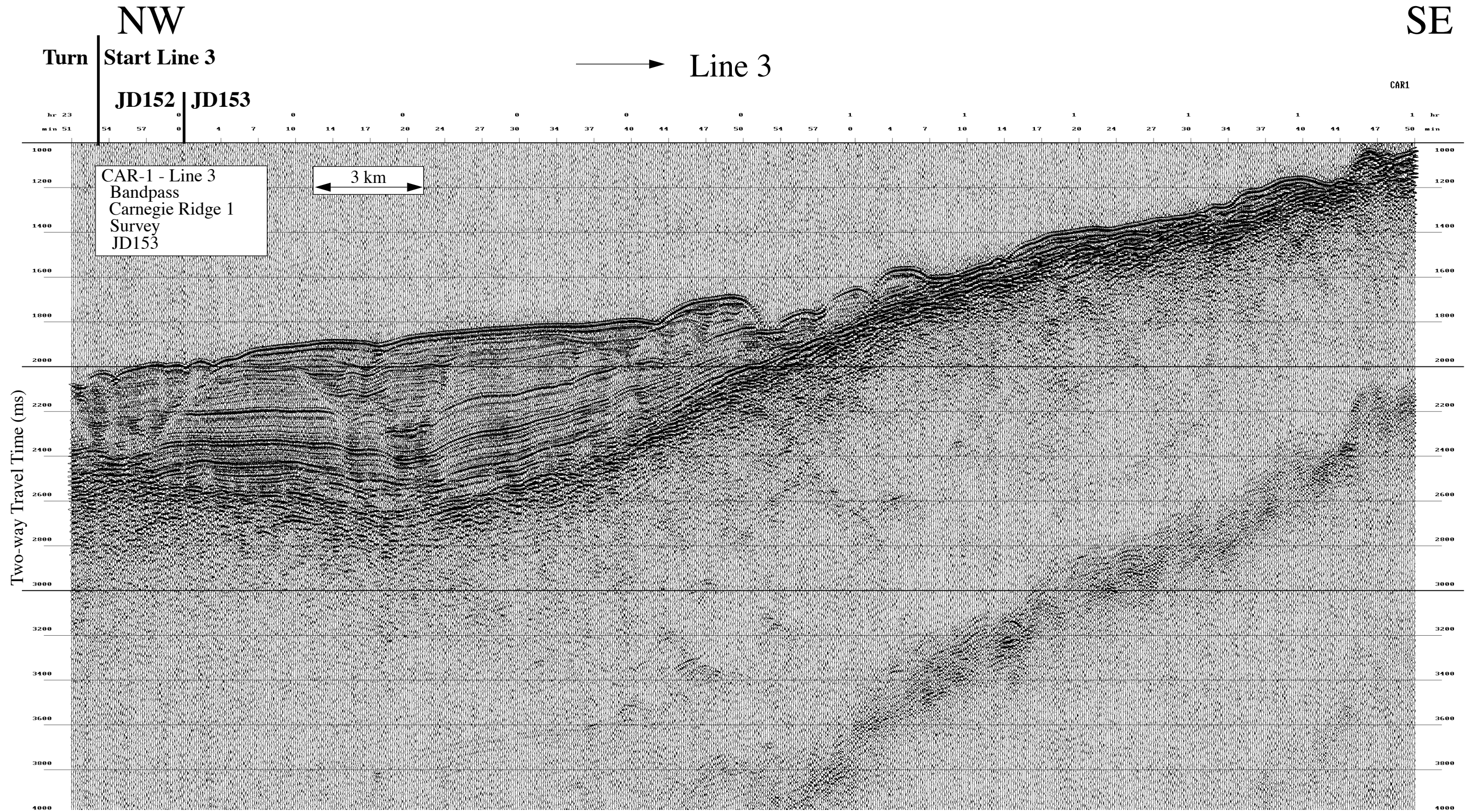


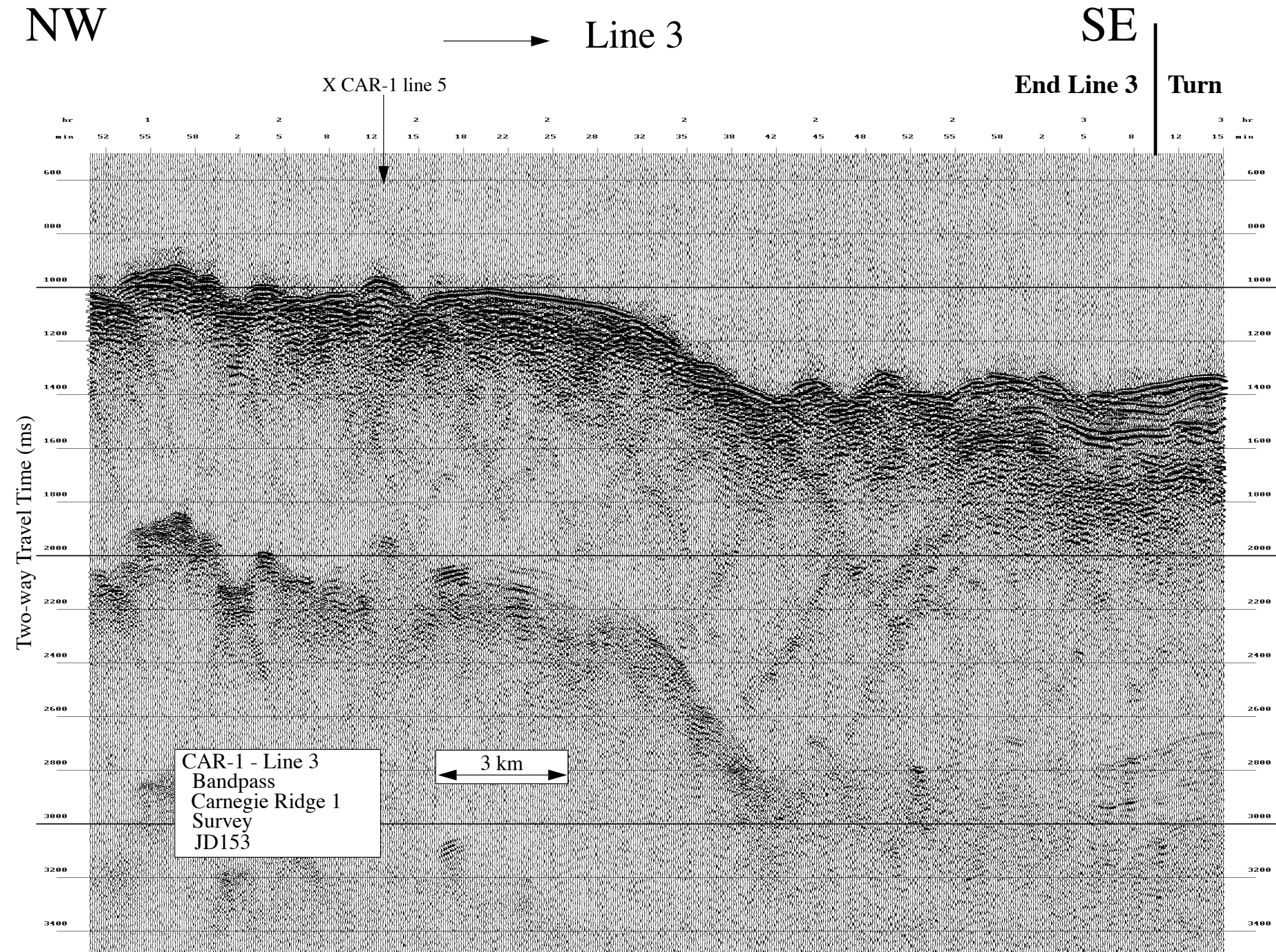


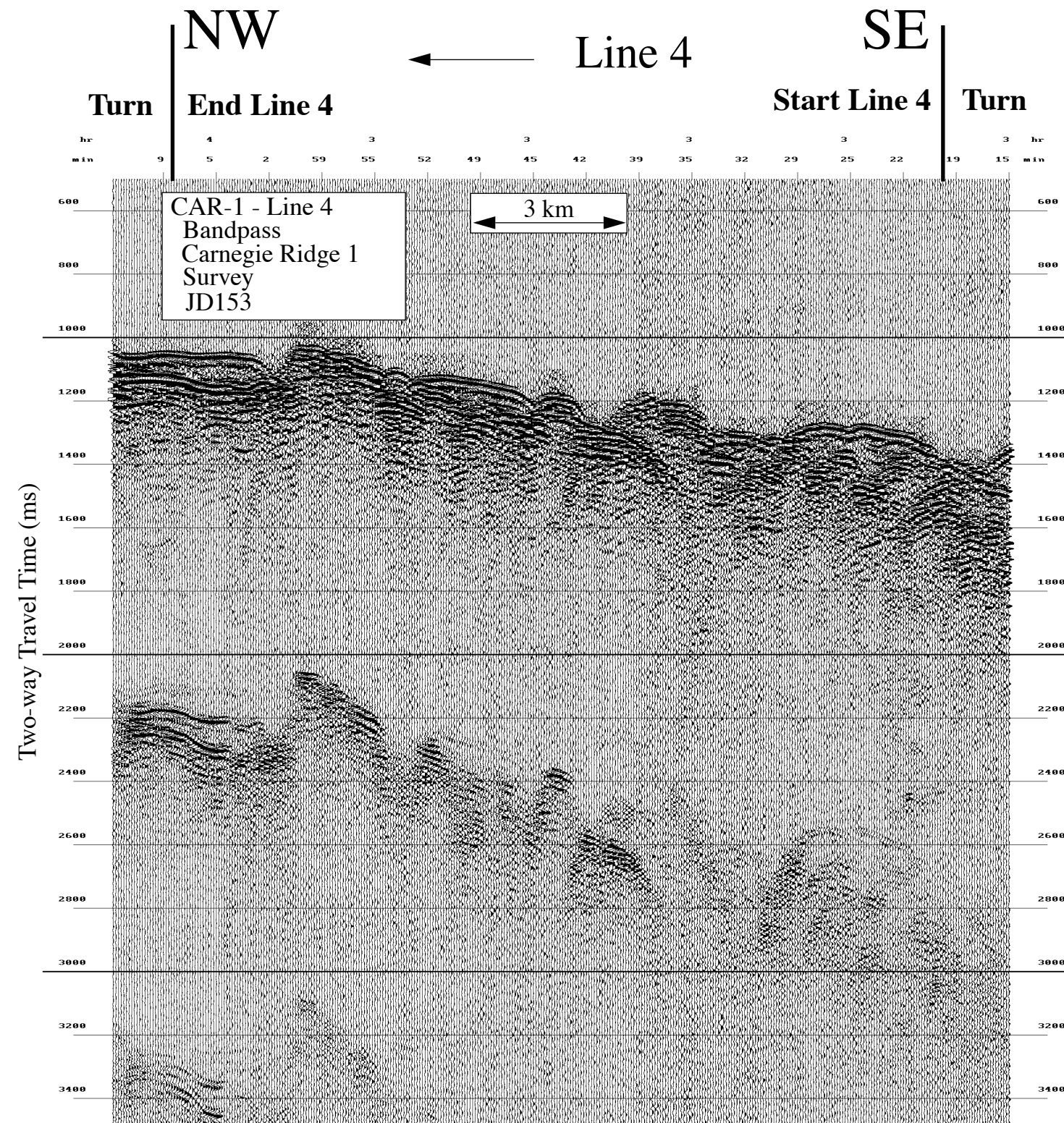


Data File SBfixavg.2000jun01.0000-0600









SW

NE

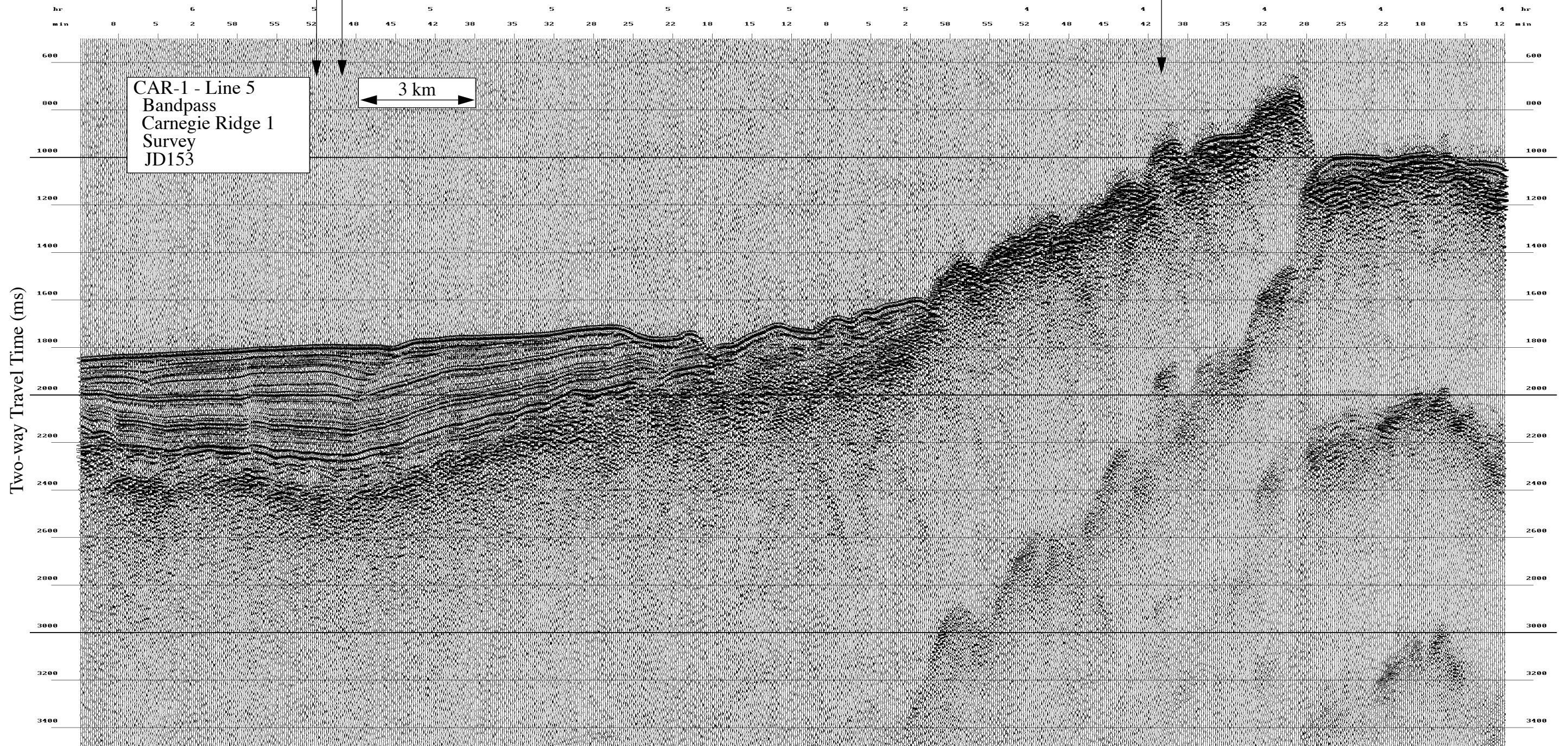
Cores 29MC, 31JC, 30NB
X CAR-1 line 13

← Line 5

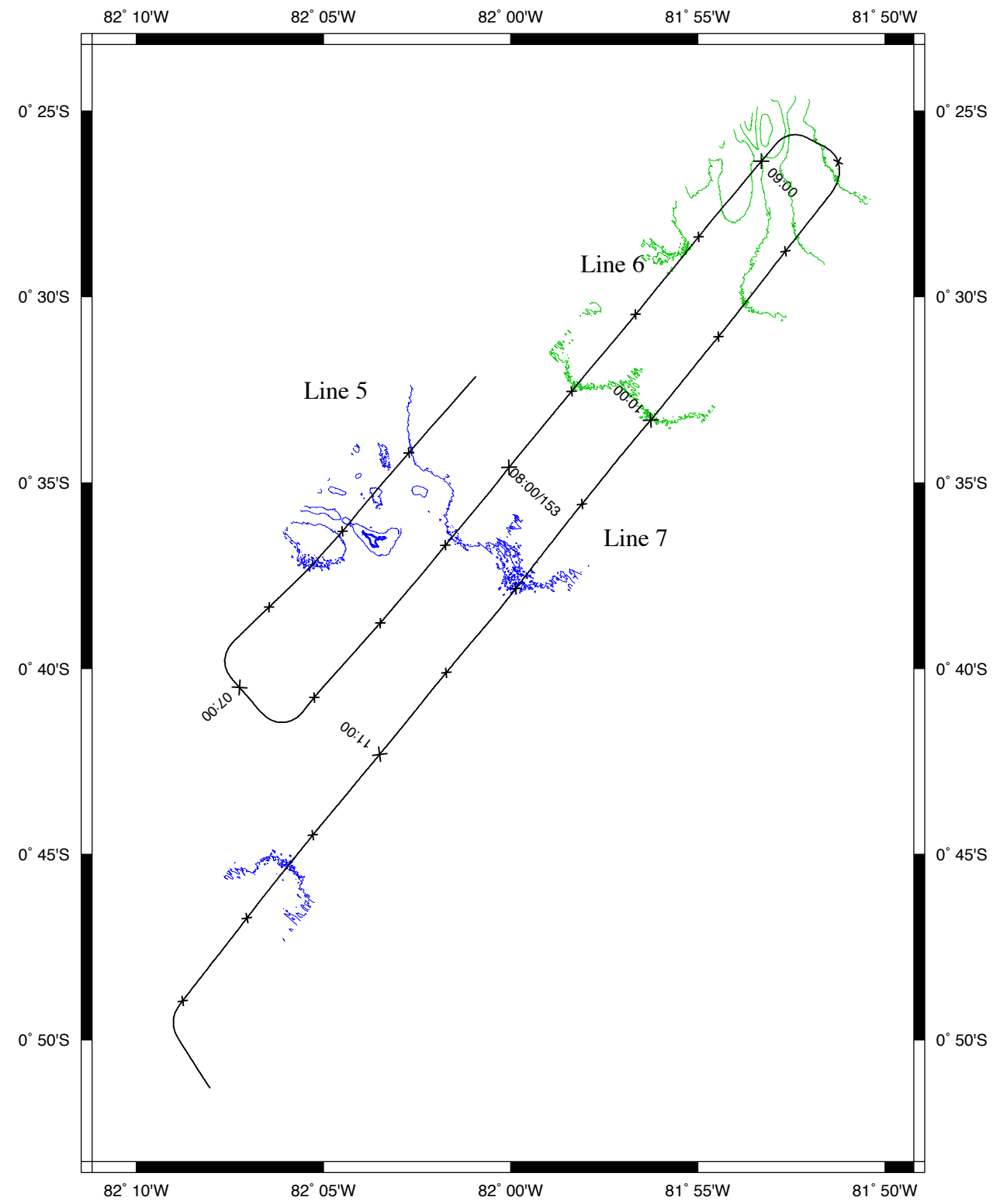
X CAR-1 line 2

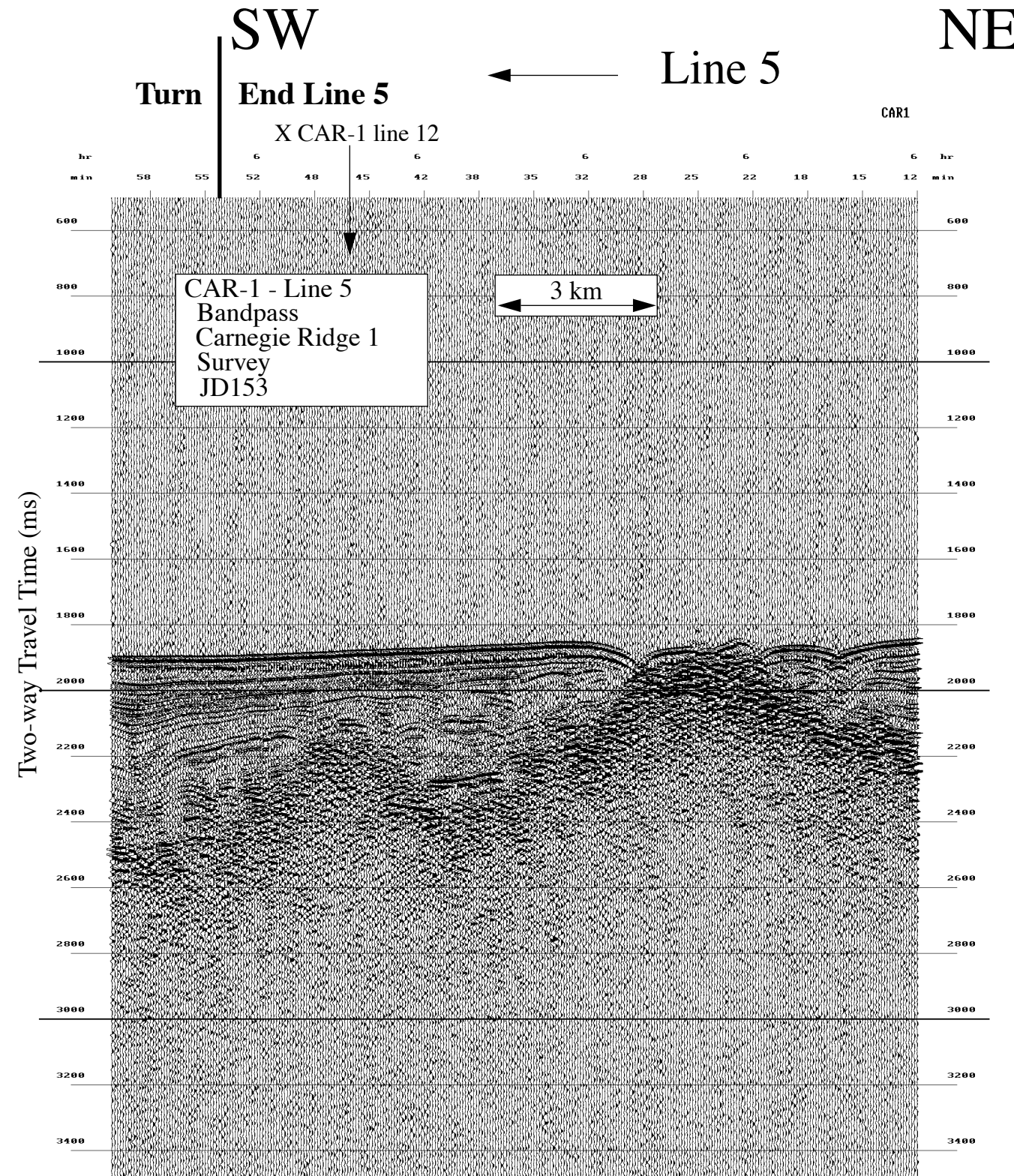
X CAR-1 line 3

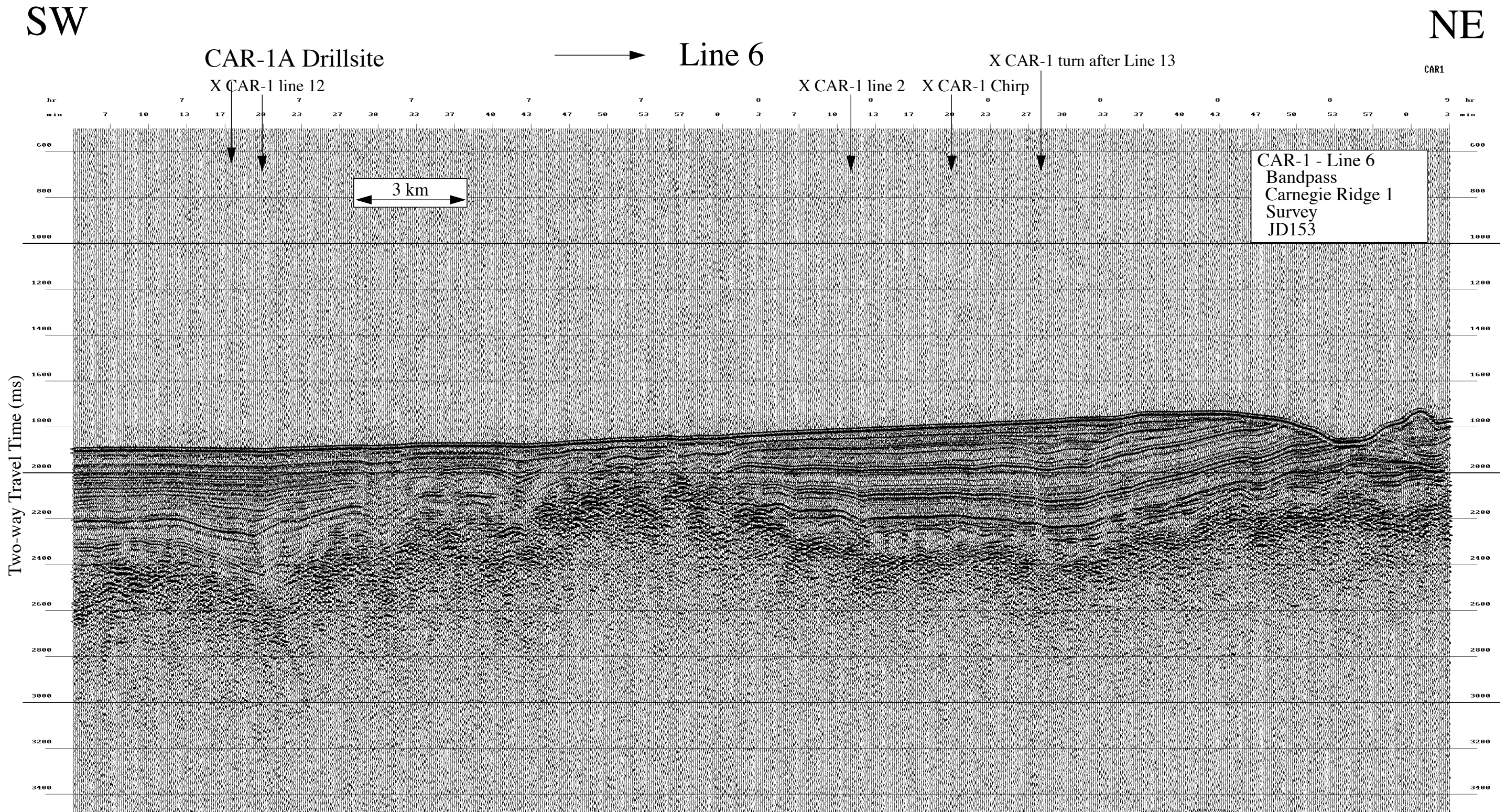
CAR1



Data File SBfixavg.2000jun01.0600-1200







SW

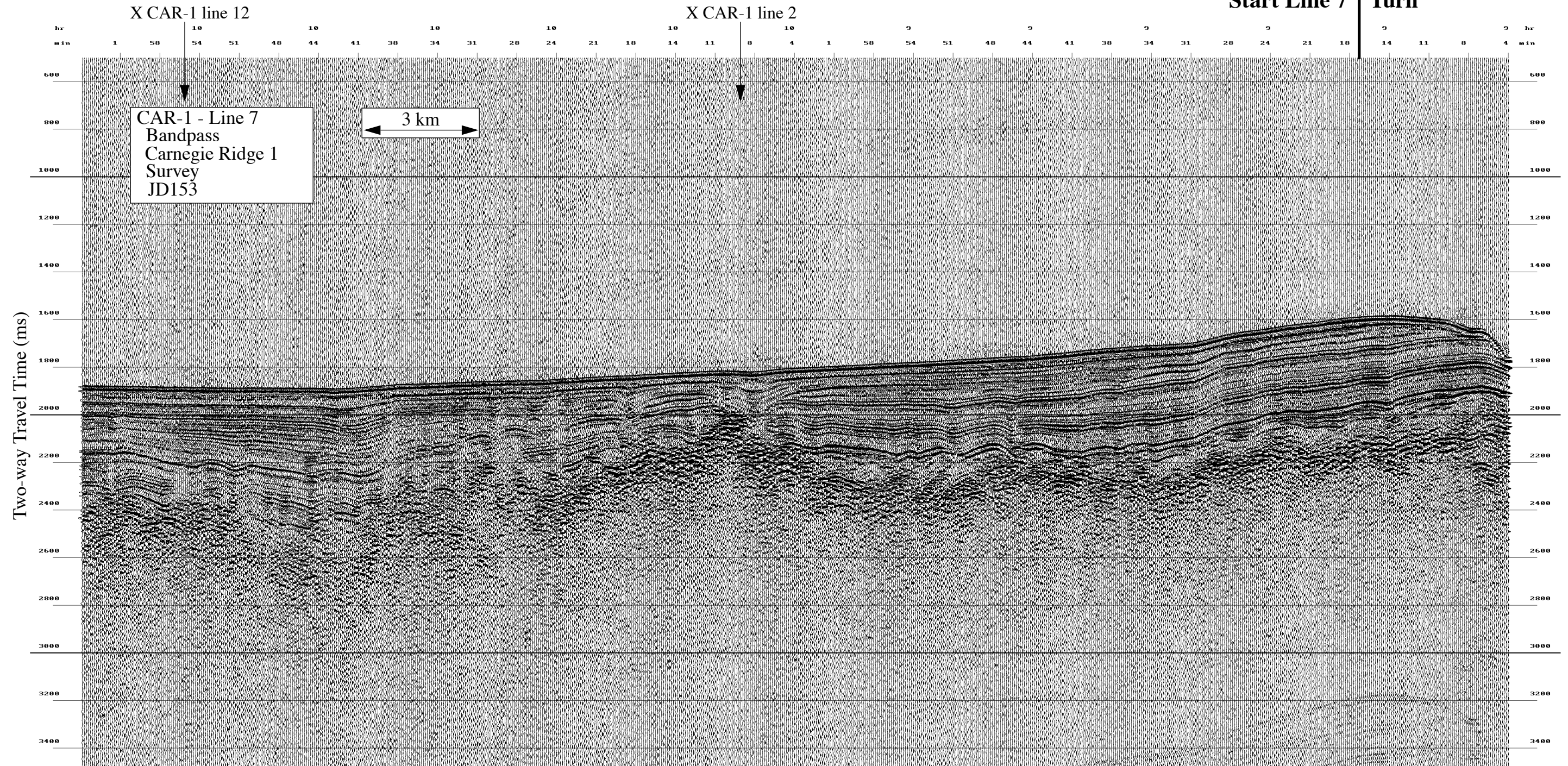
← Line 7

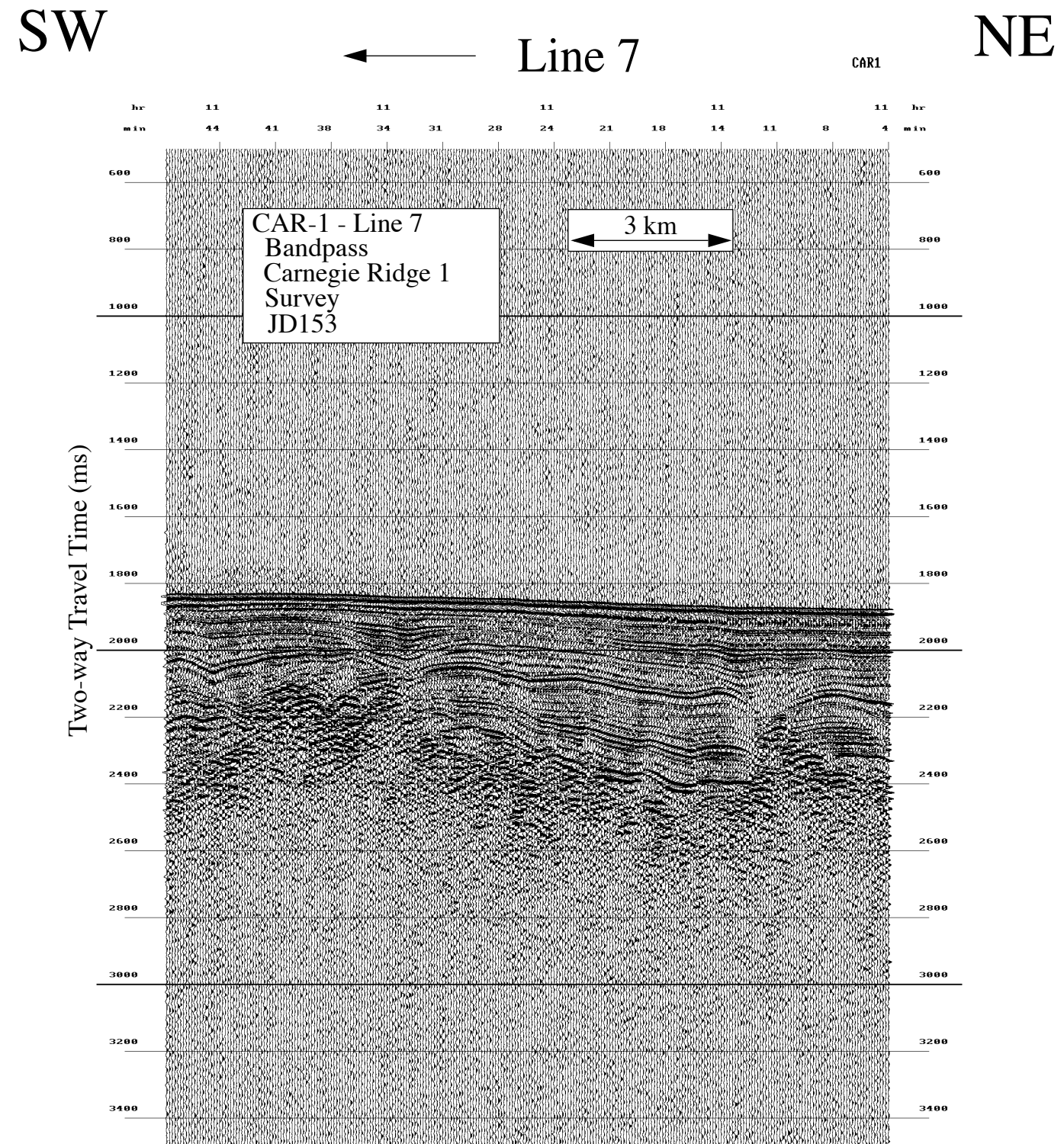
NE

Start Line 7

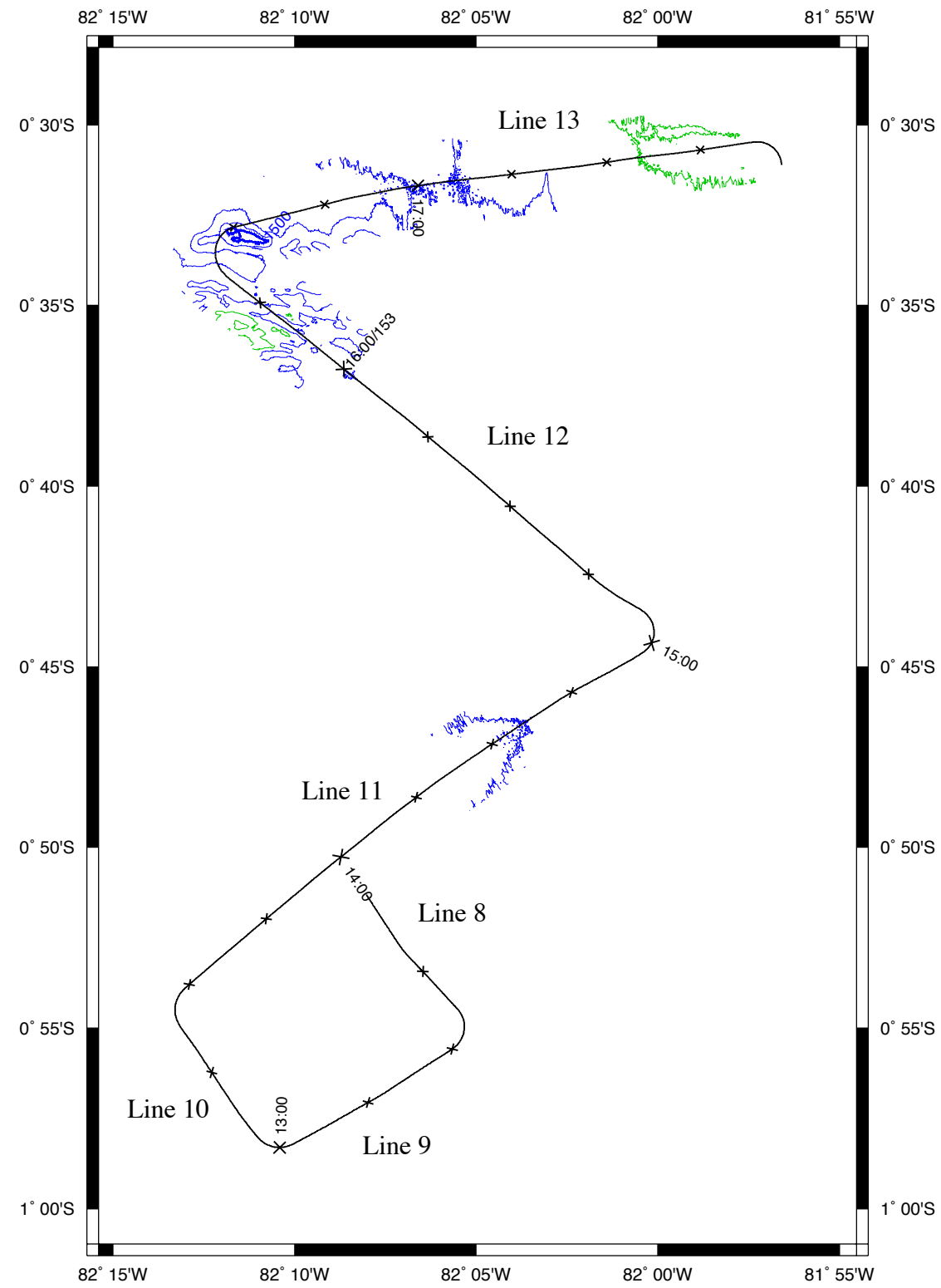
Turn

CAR1

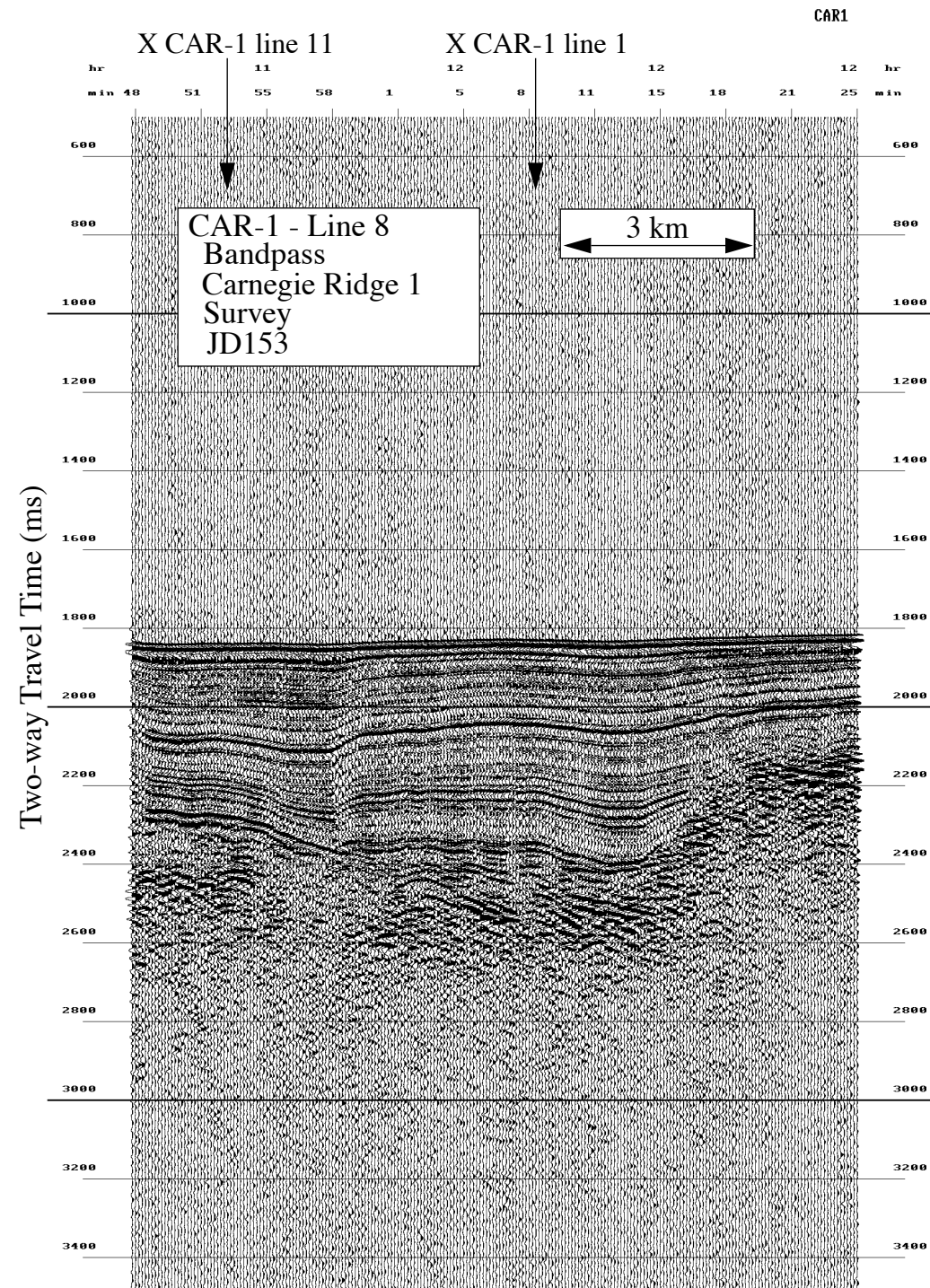


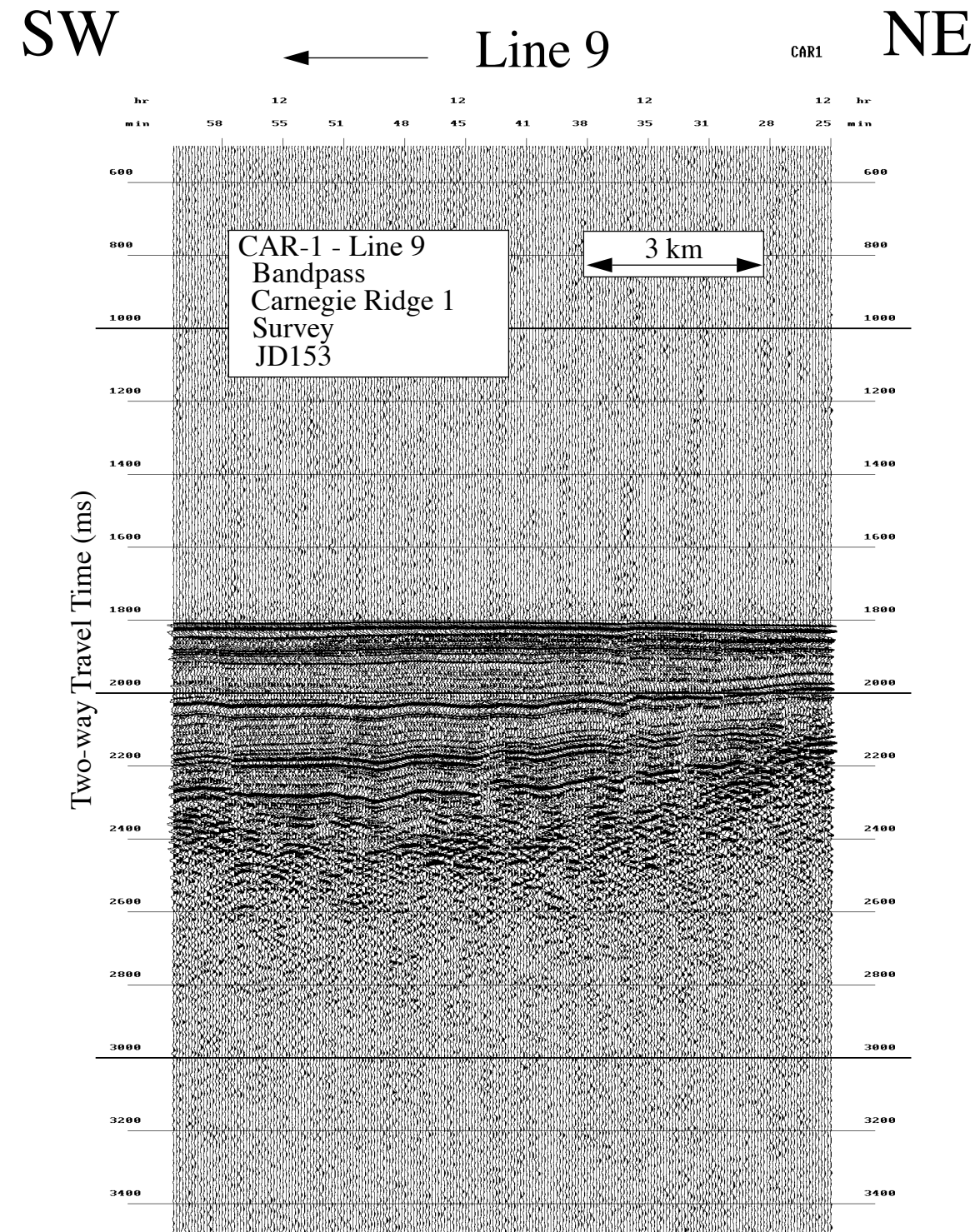


Data File SBfixavg.2000jun01.1200-1800

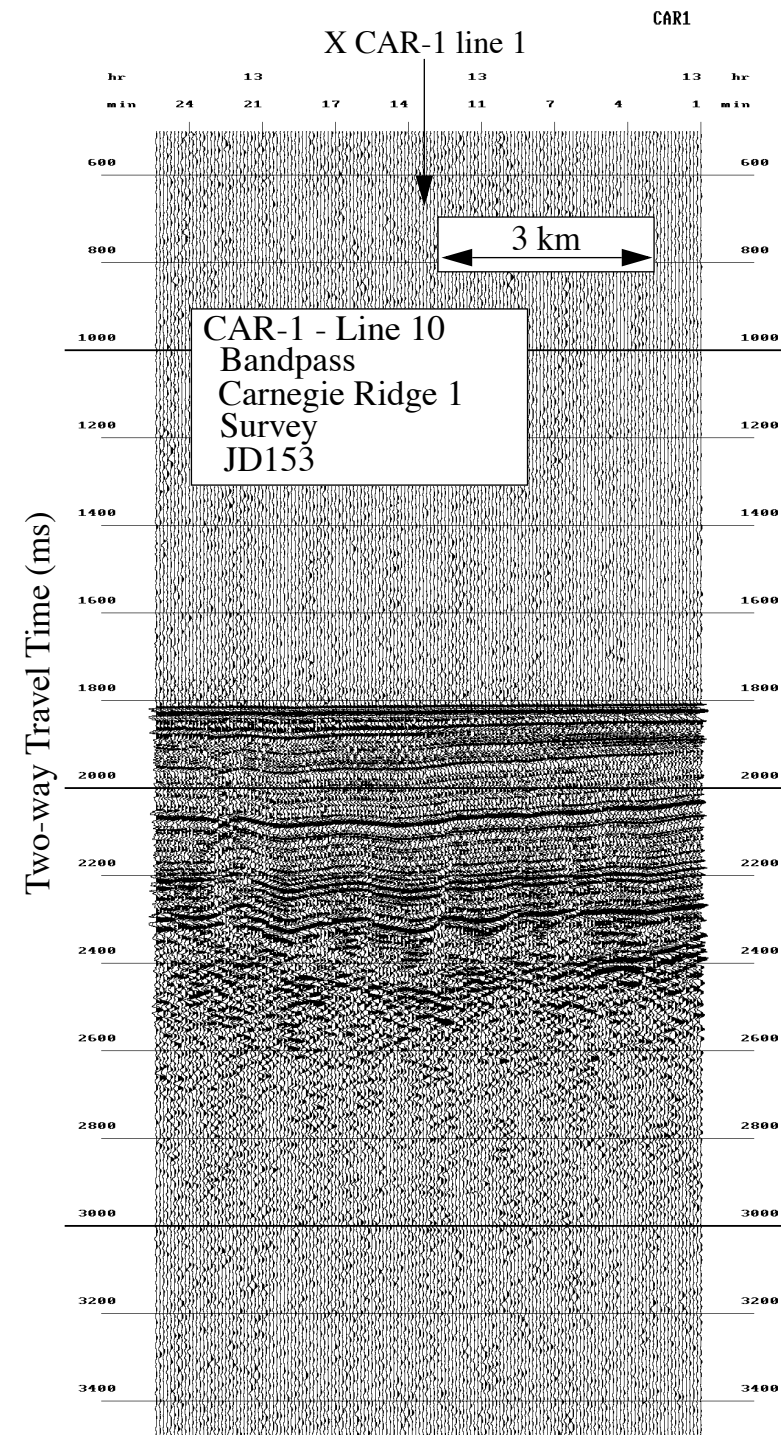


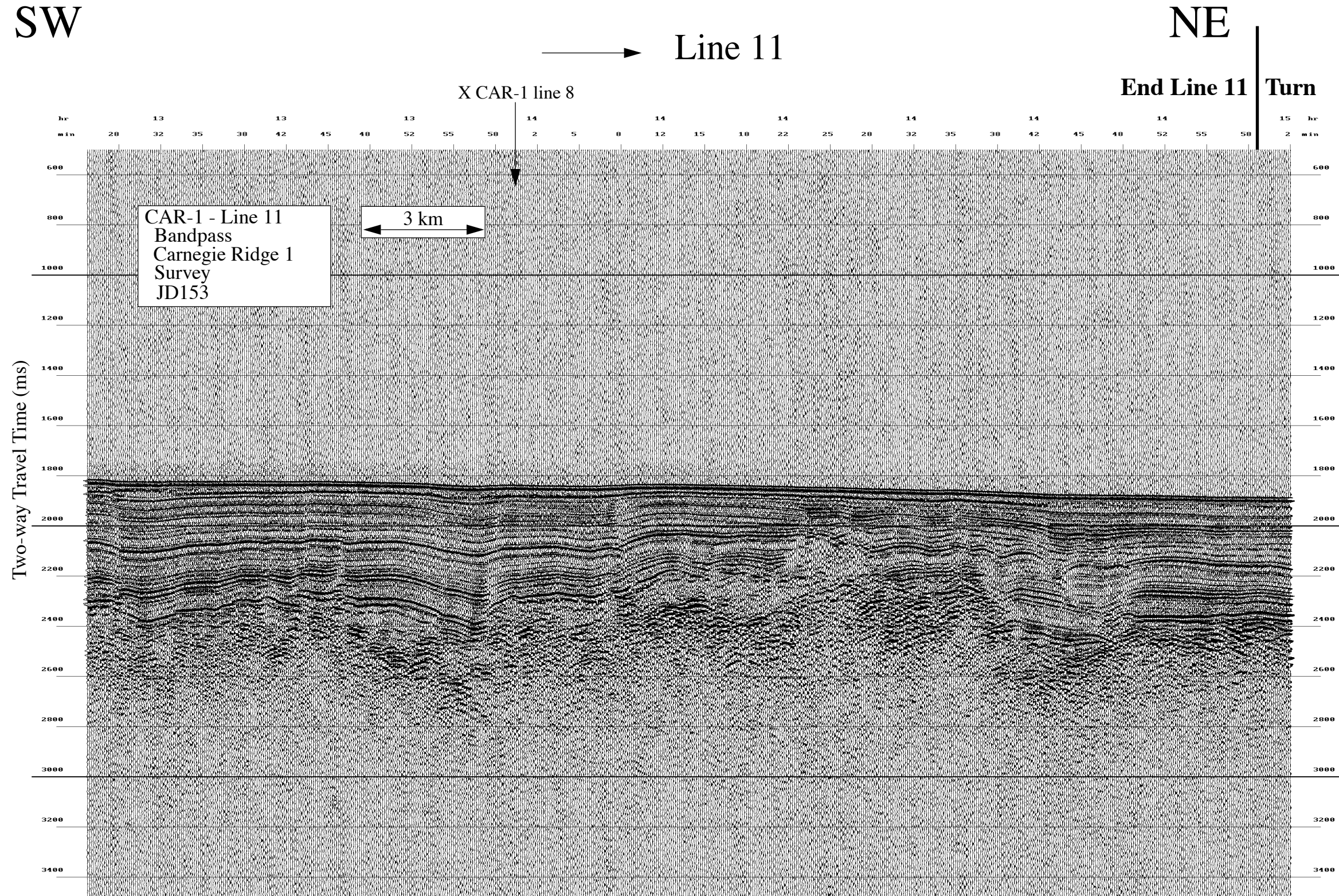
NW → Line 8 → SE

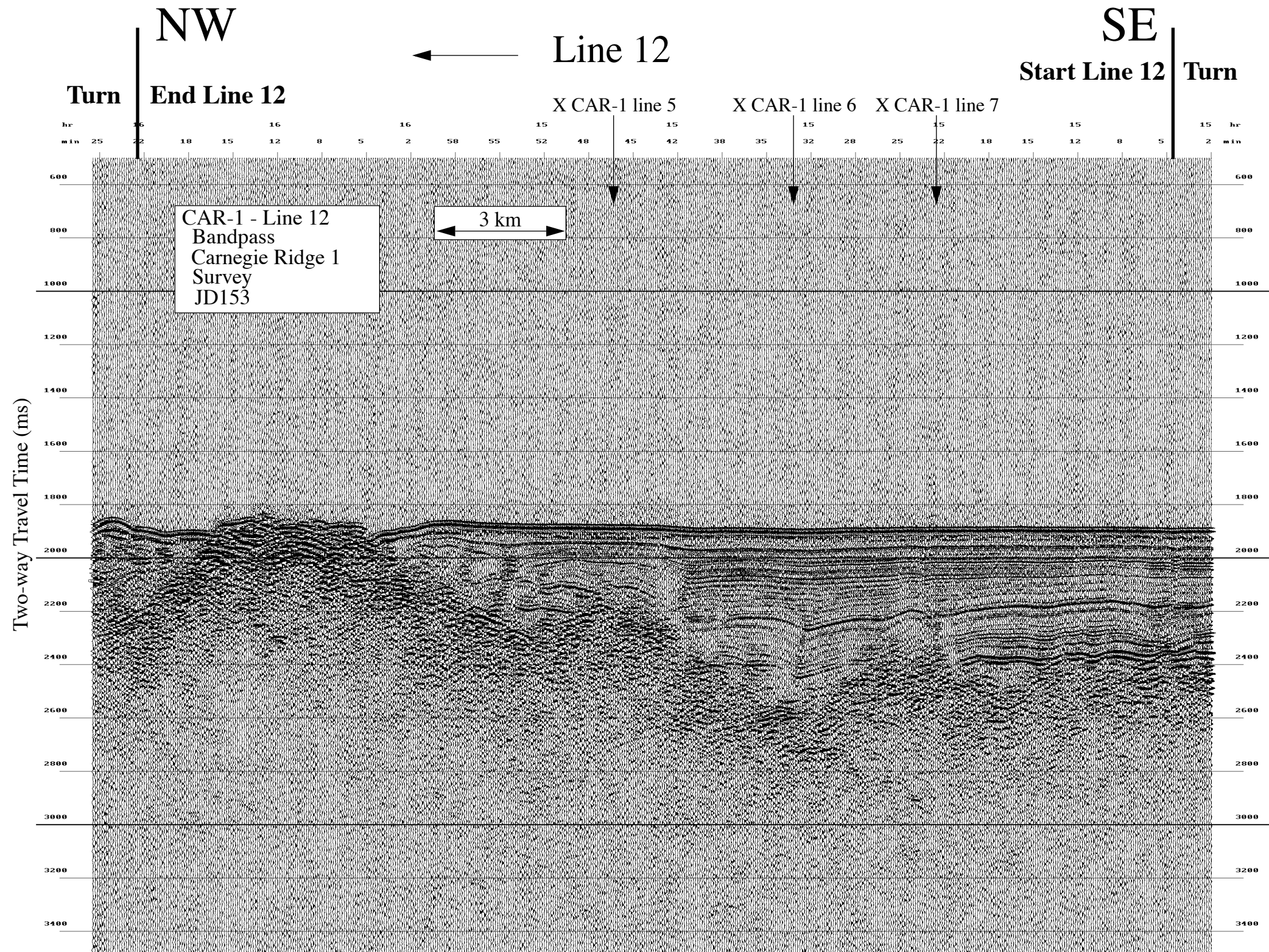


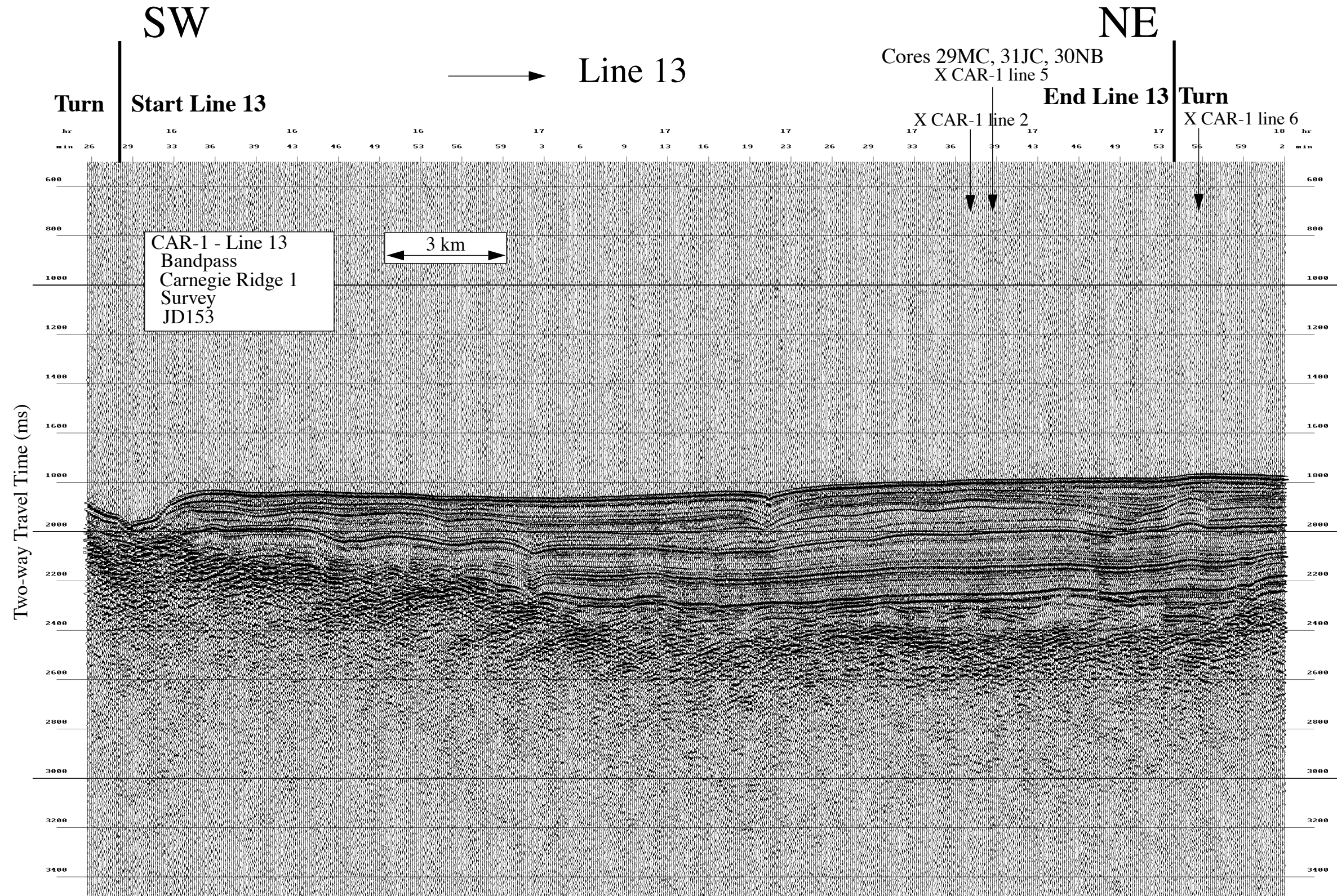


NW ← Line 10 → SE









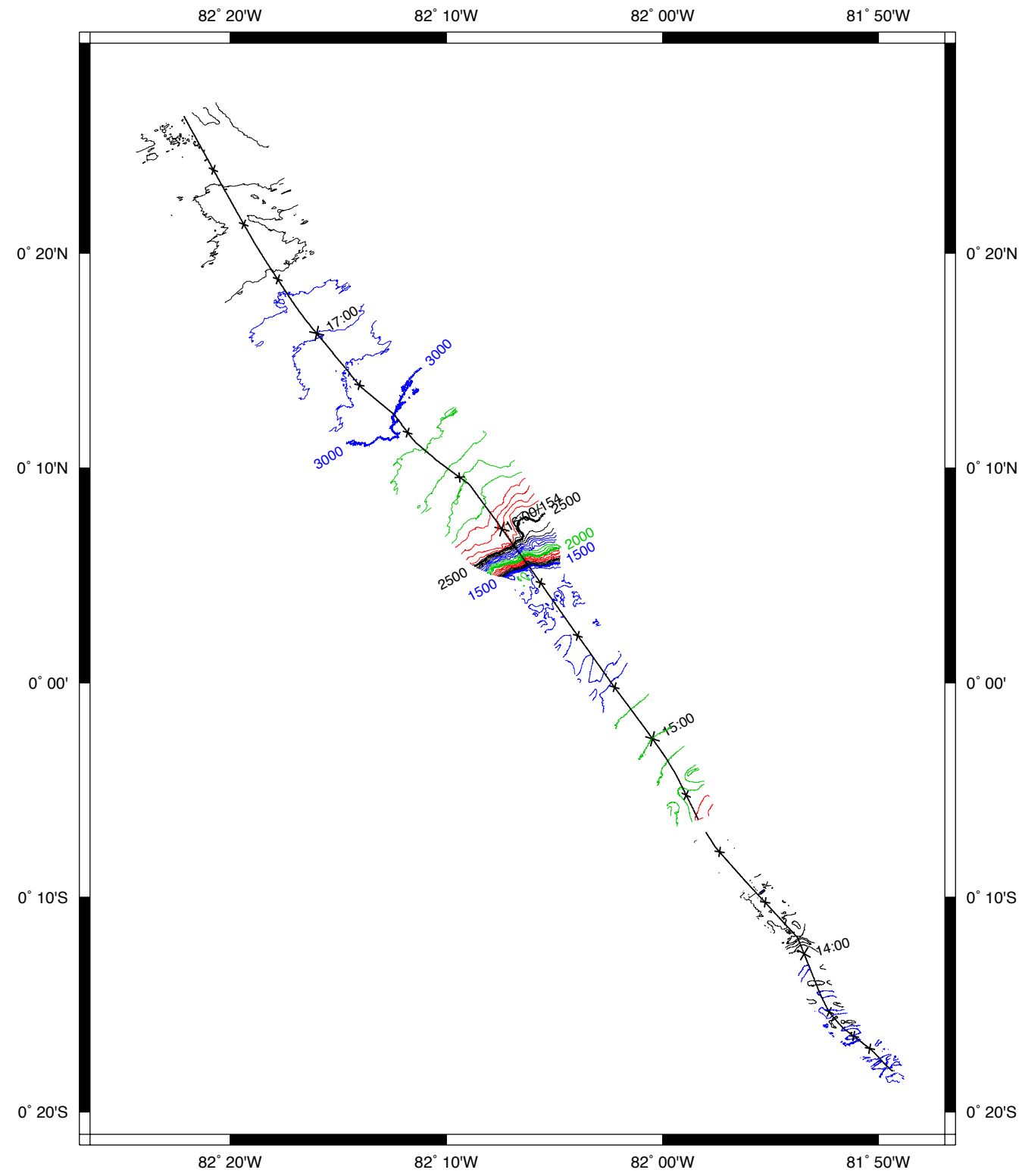
JD 154 (2 June 2000)--CAR-1 to PAN-3 transit, Panama Basin

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NEMO Leg 3

R/V Melville

Data File SBfixavg.2000jun02.1200-1800

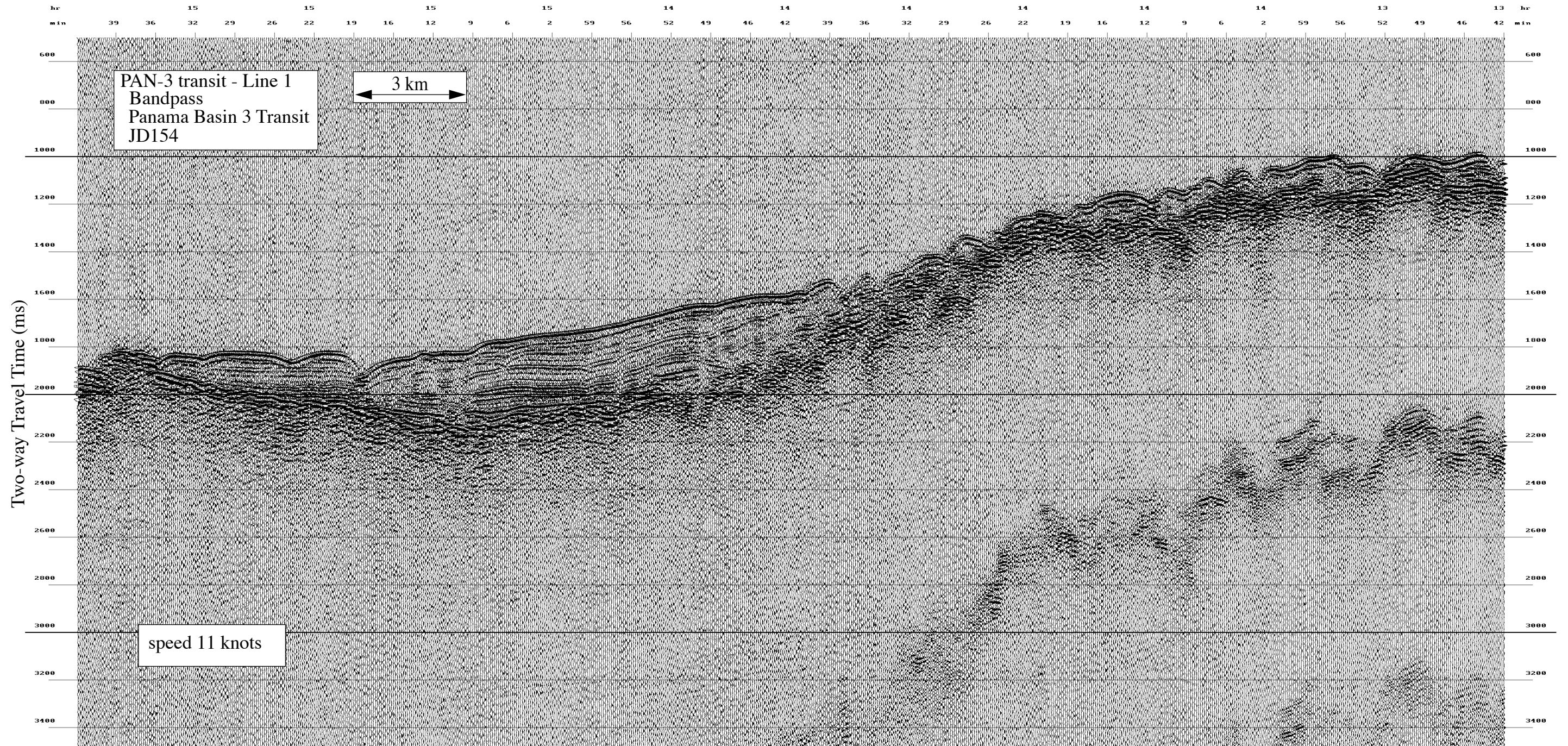


NW

SE

← Line 1

PAN3 transit

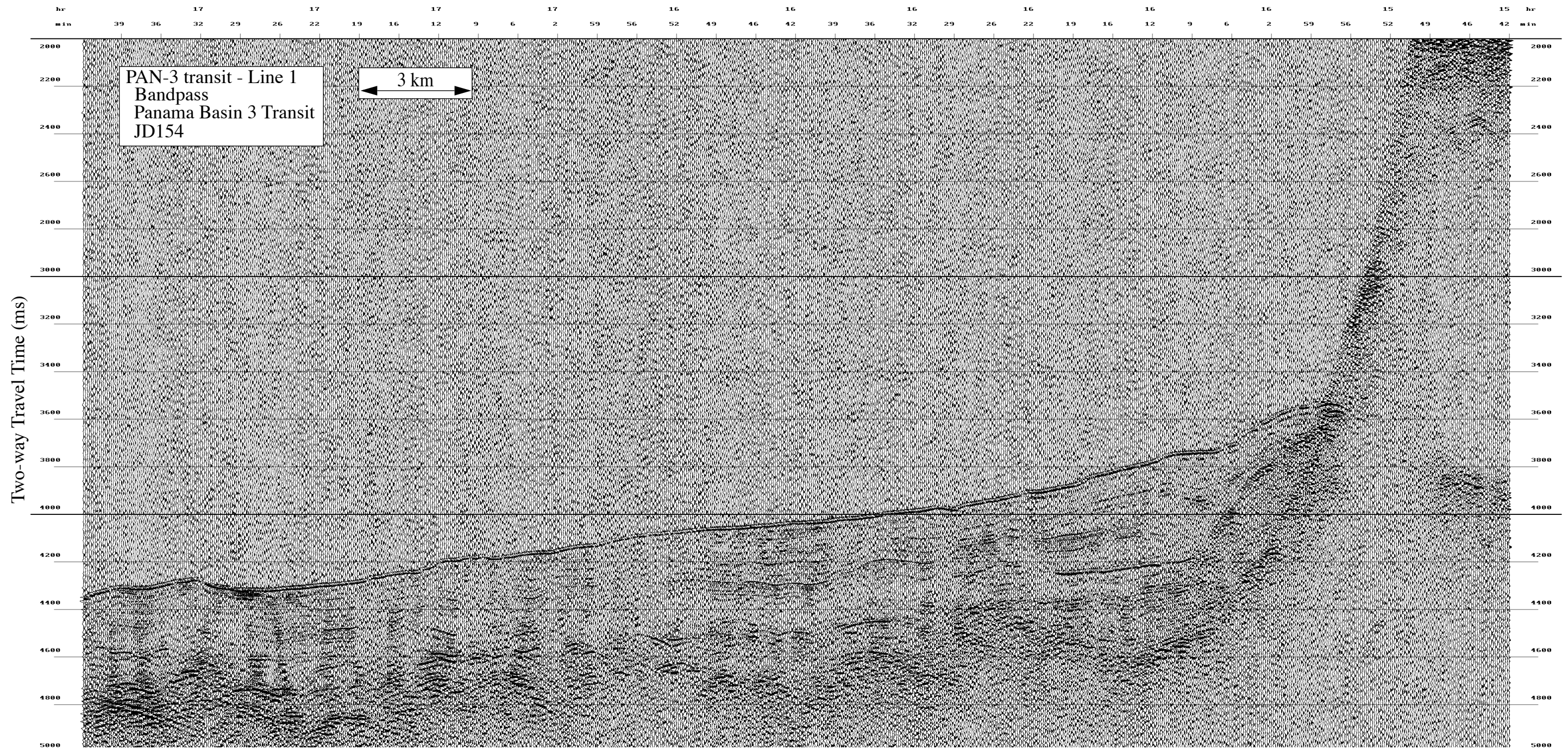


NW

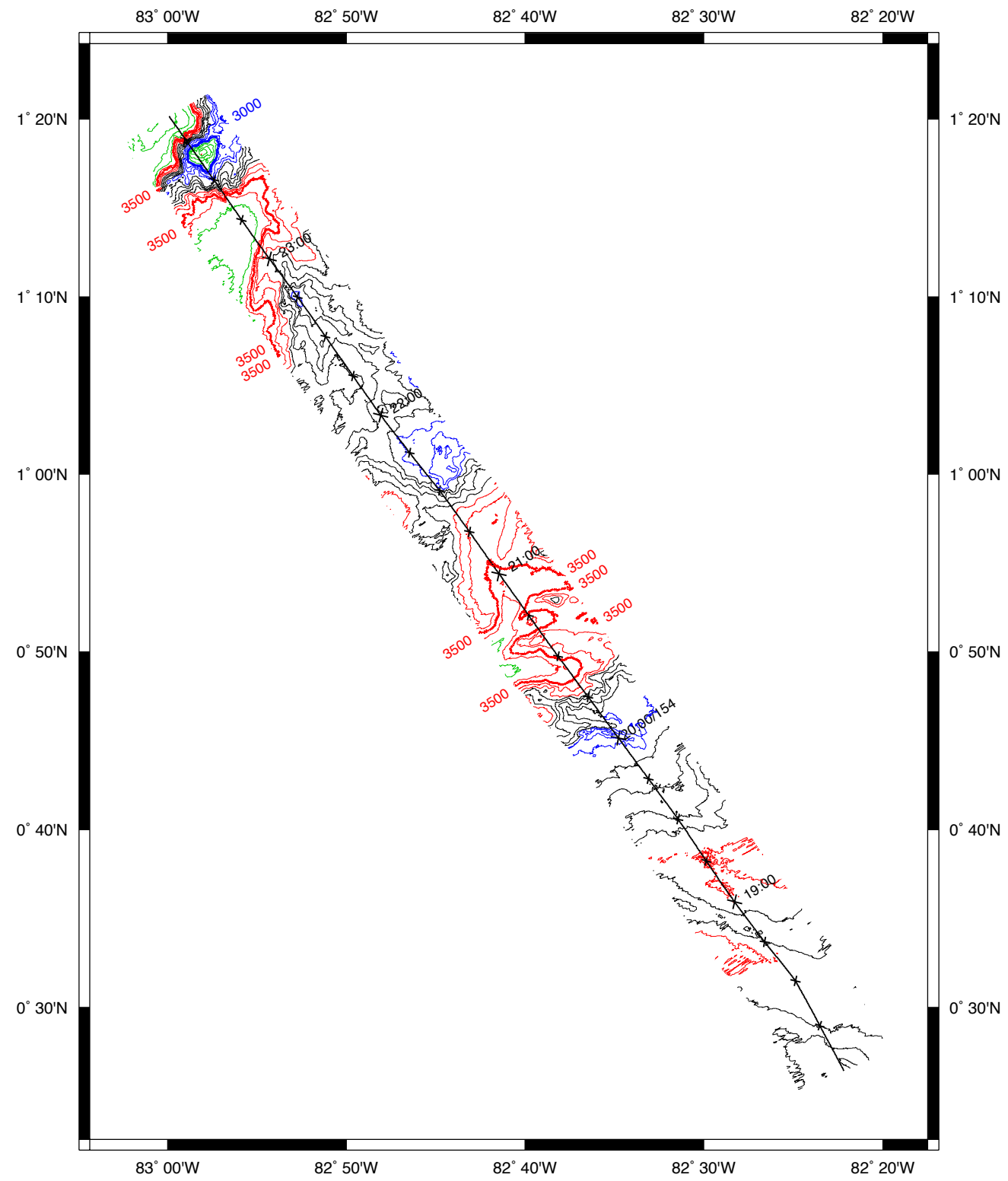
SE

← Line 1

PAN3 transit



Data File SBfixavg.2000jun02.1800-2400

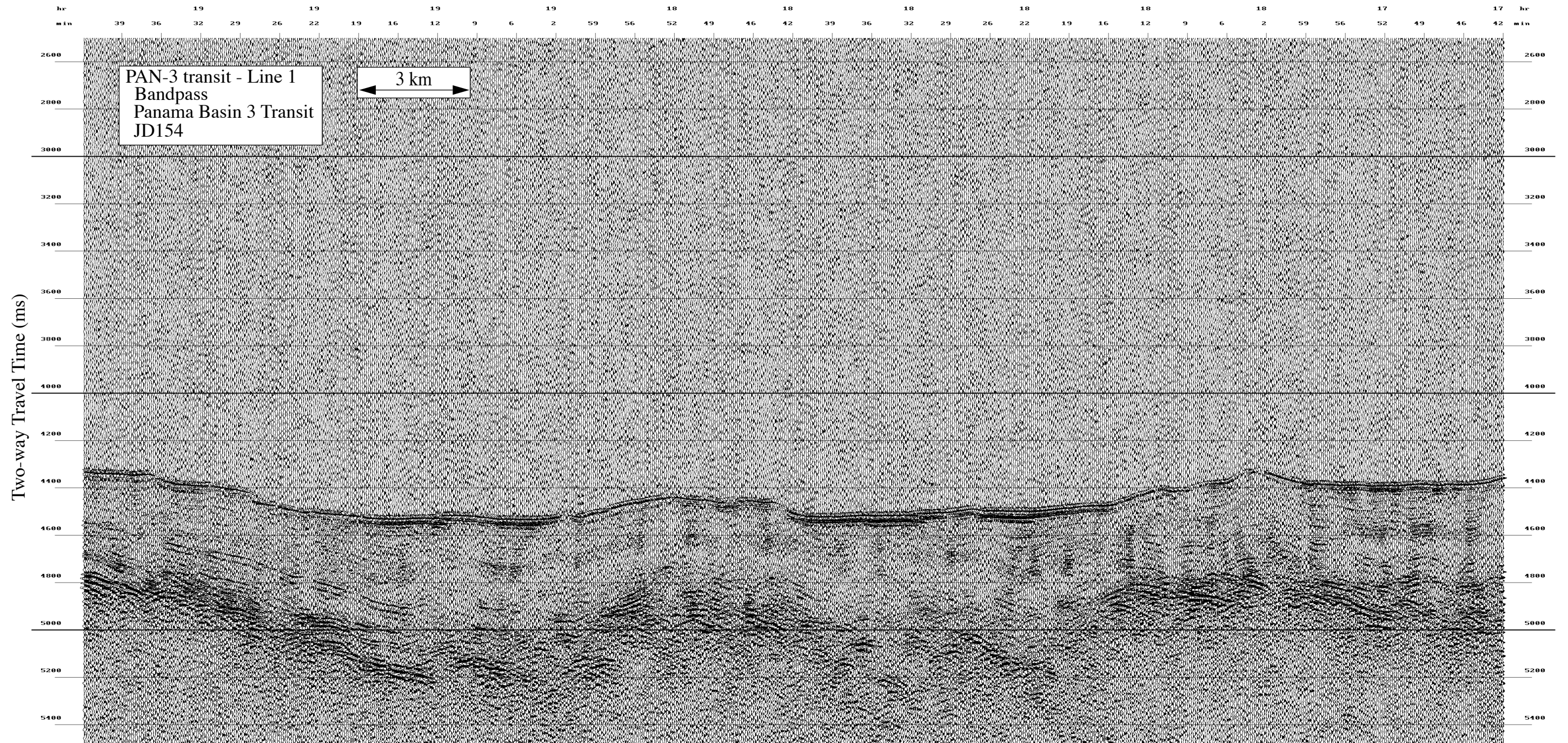


NW

SE

← Line 1

PAN3 transit

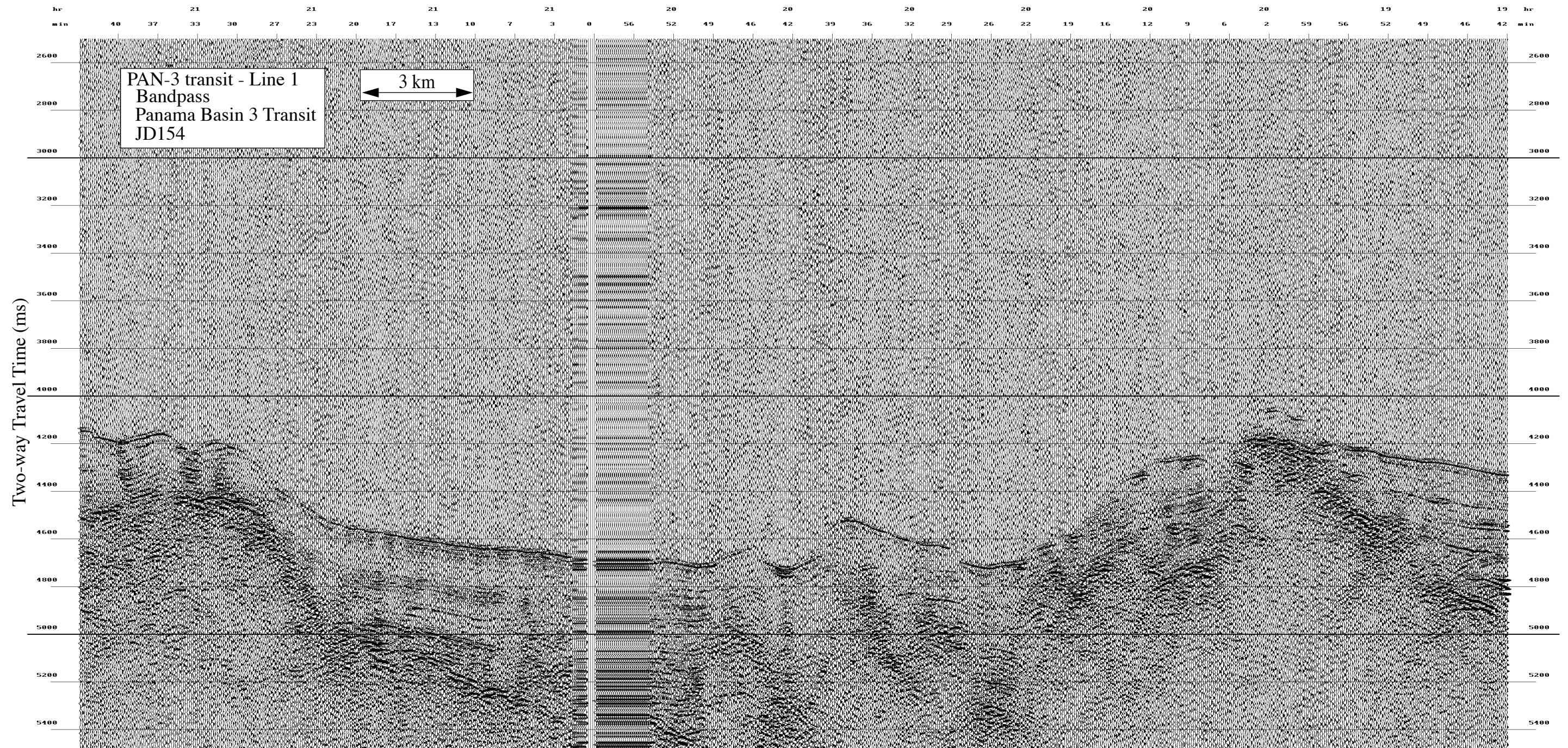


NW

SE

← Line 1

PAN3 transit

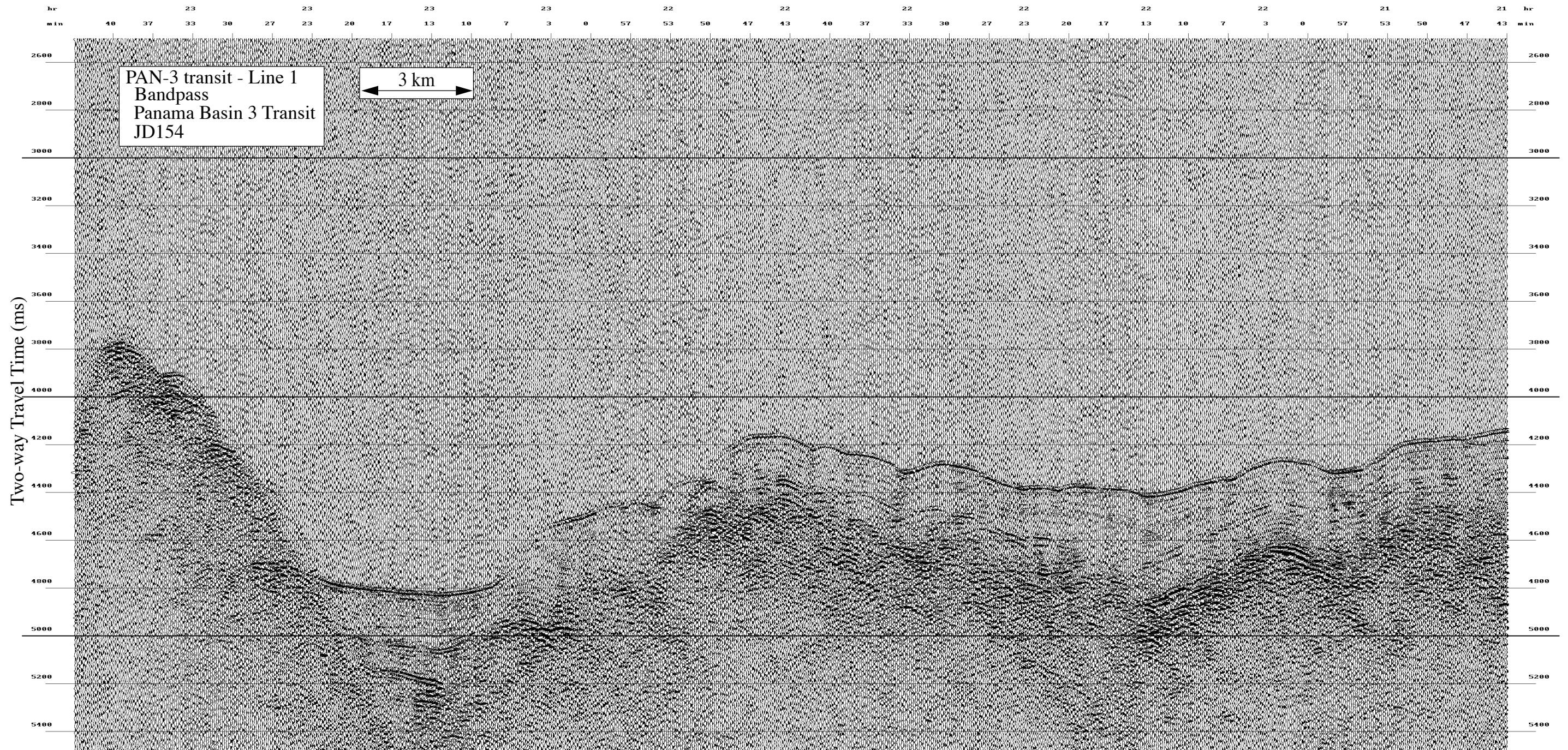


NW

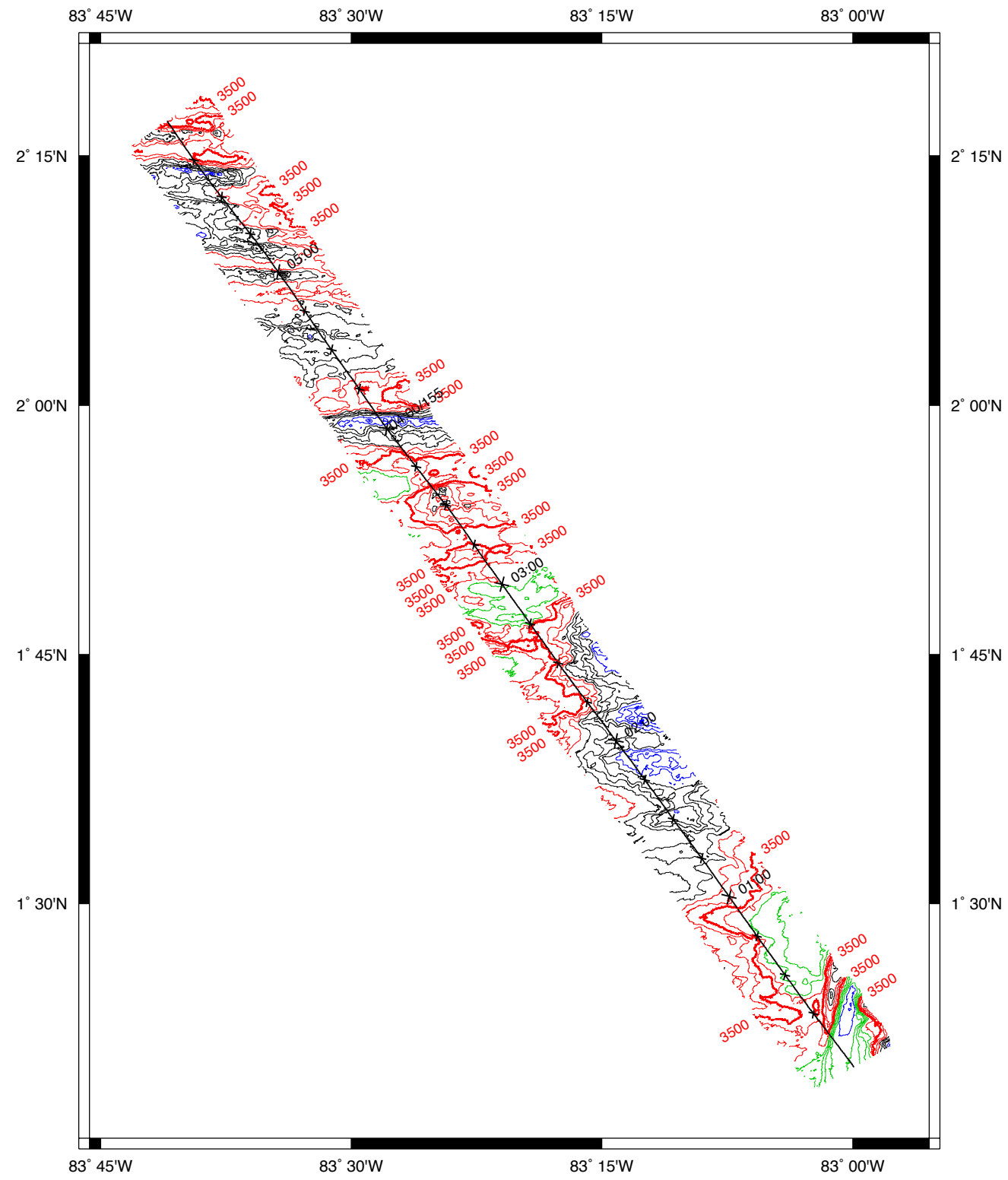
SE

← Line 1

PAN3 transit



Data File SBfixavg.2000jun03.0000-0600

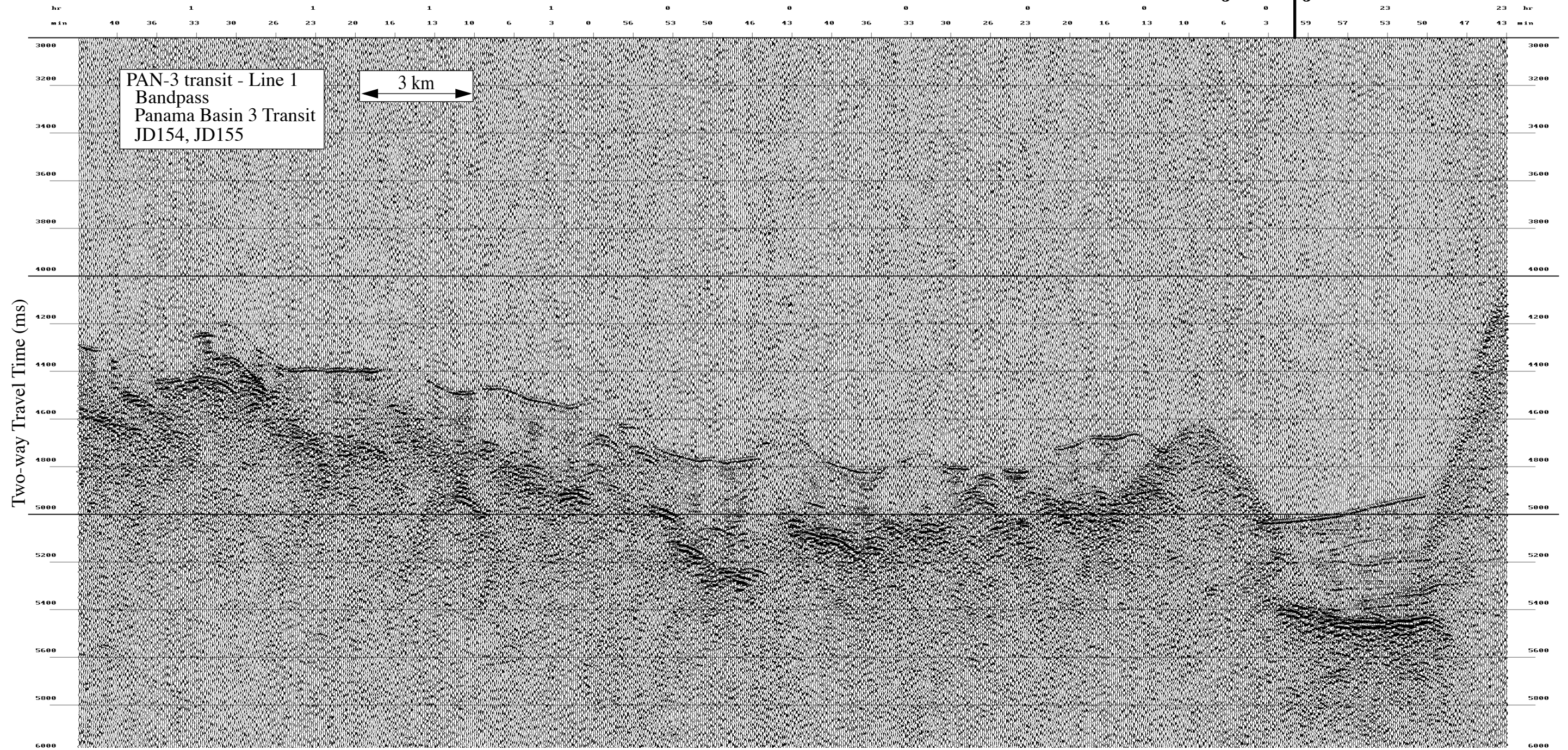


NW

SE

← Line 1

JD155 | JD154 PAN3 transit

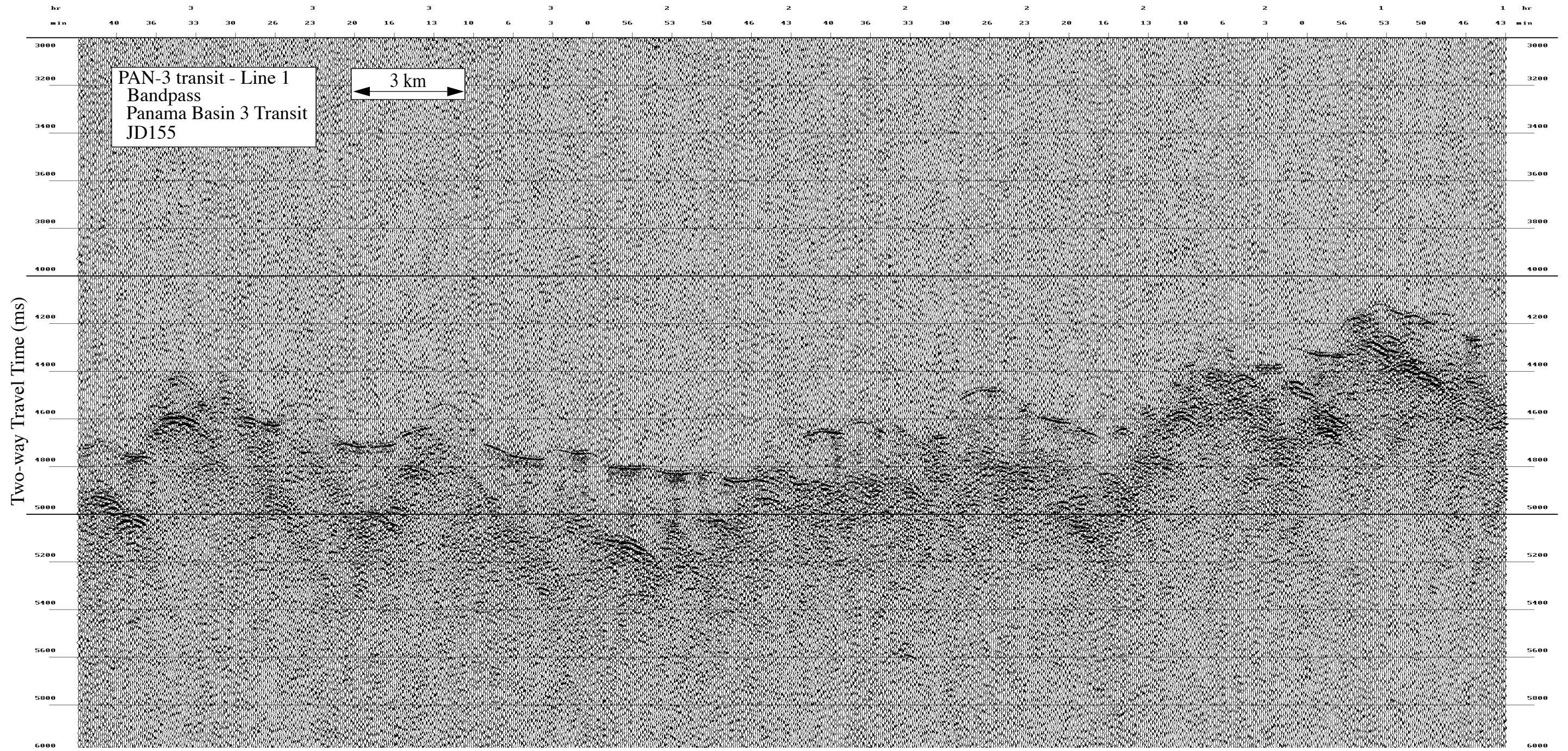


NW

SE

← Line 1

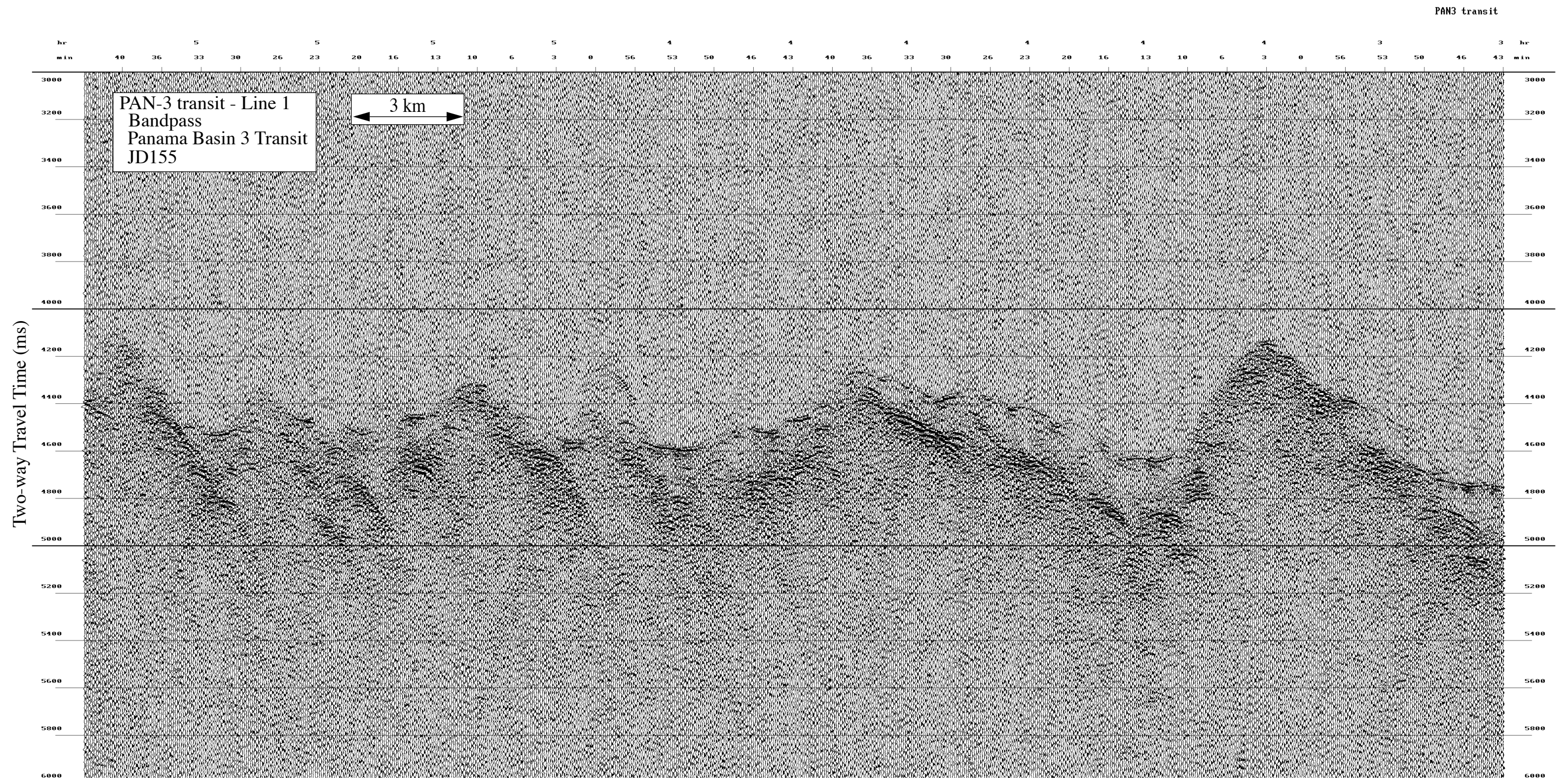
PAN3 transit



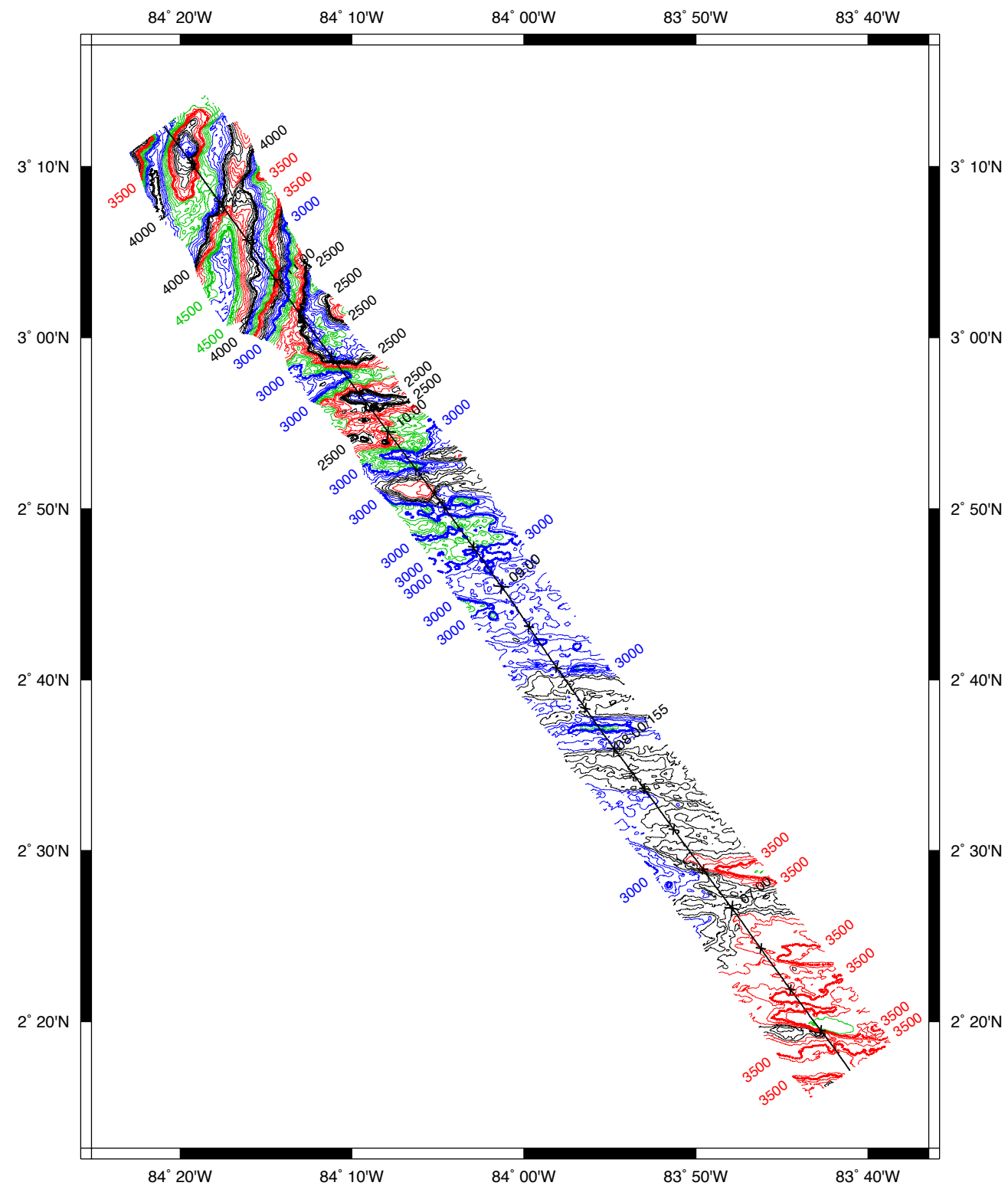
NW

SE

← Line 1



Data File SBfixavg.2000jun03.0600-1200

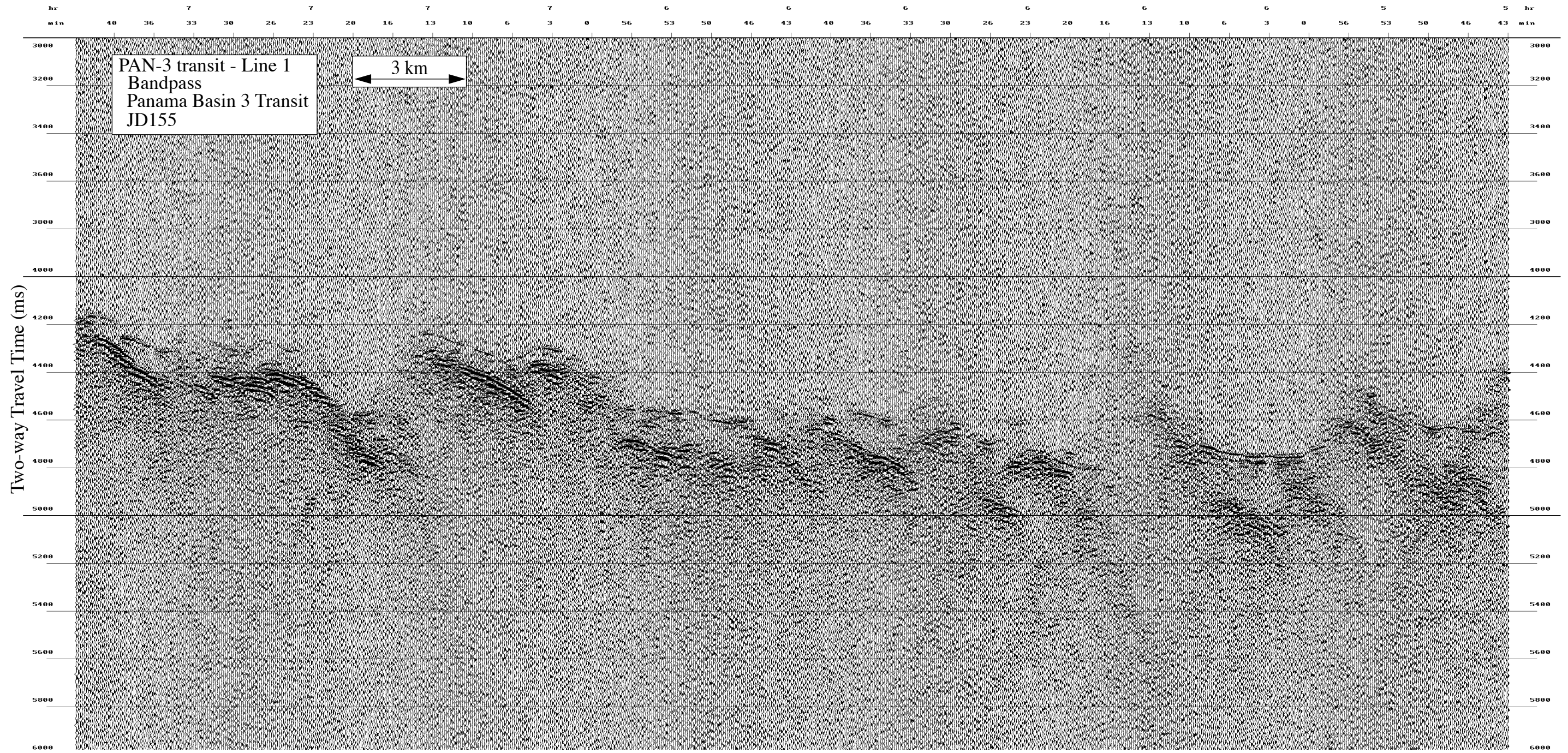


NW

SE

← Line 1

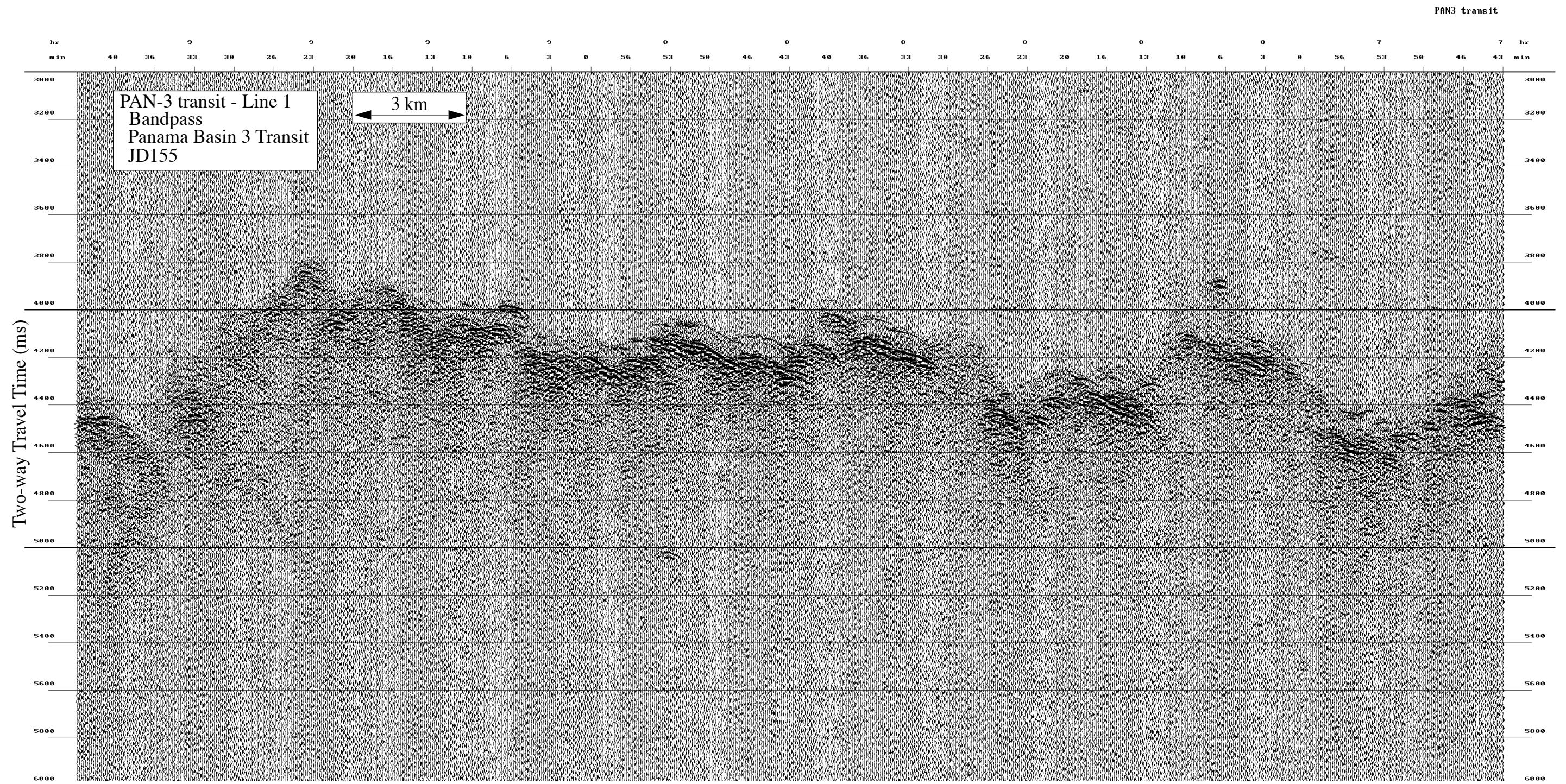
PAN3 transit



NW

SE

← Line 1

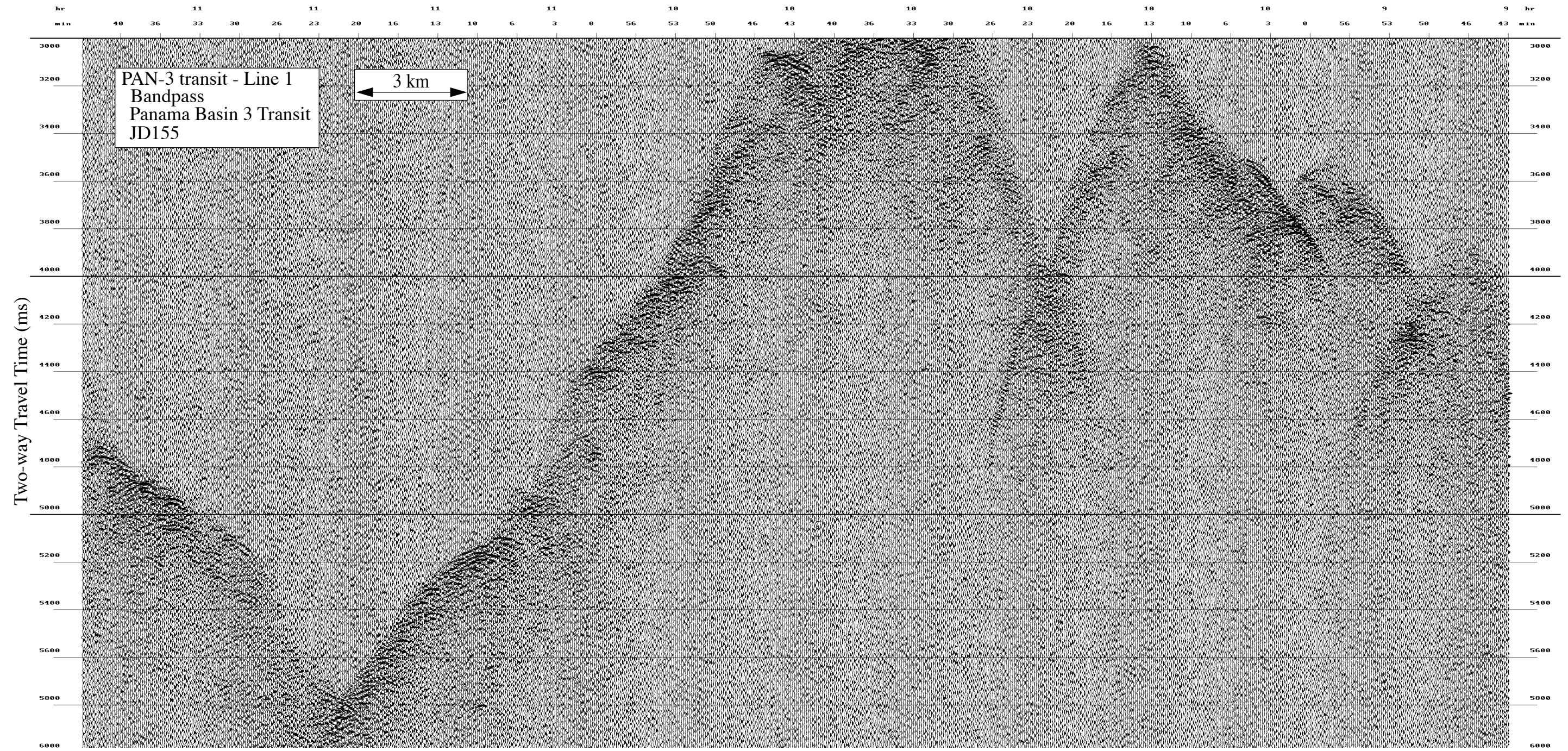


NW

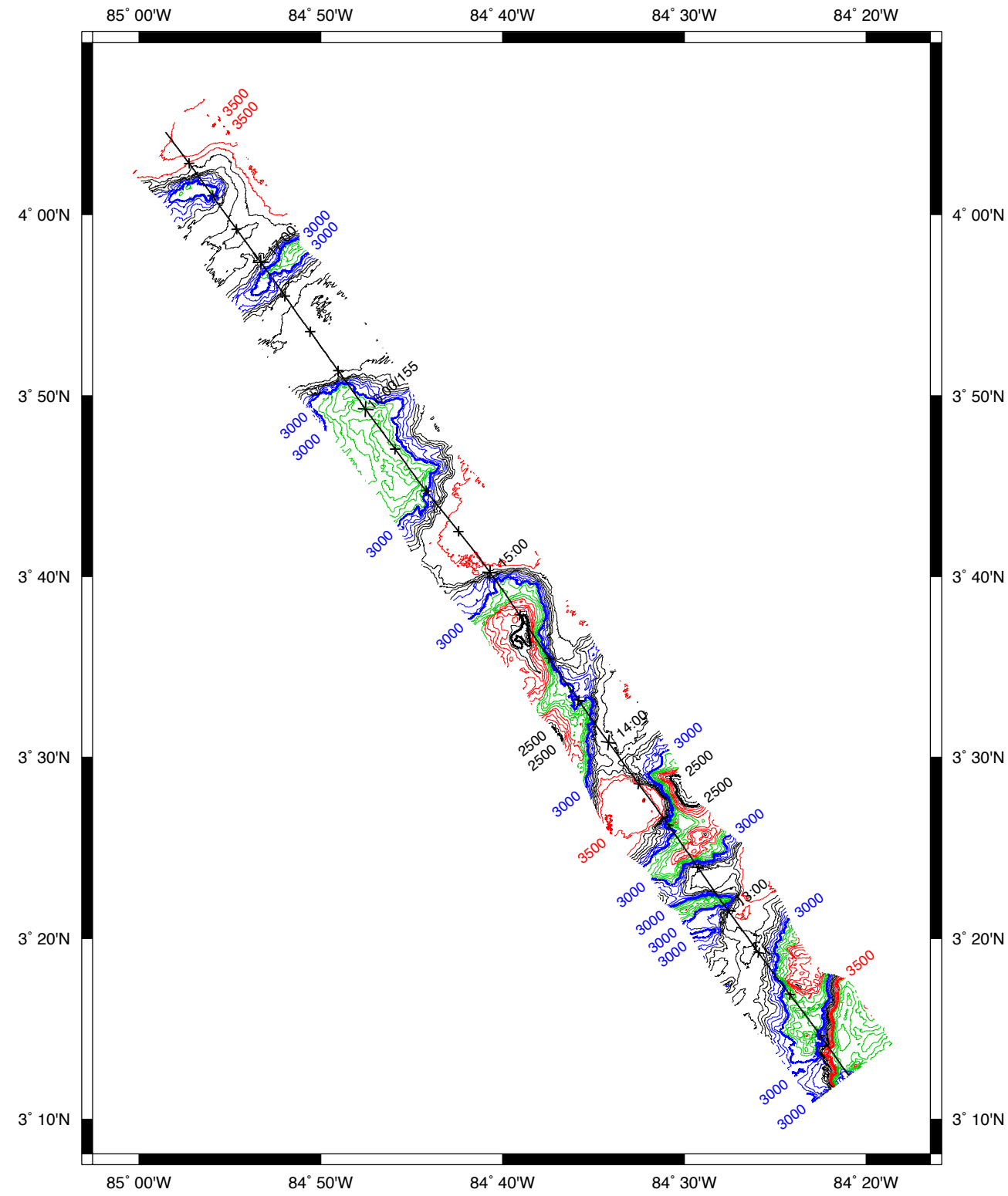
SE

← Line 1

PAN3 transit



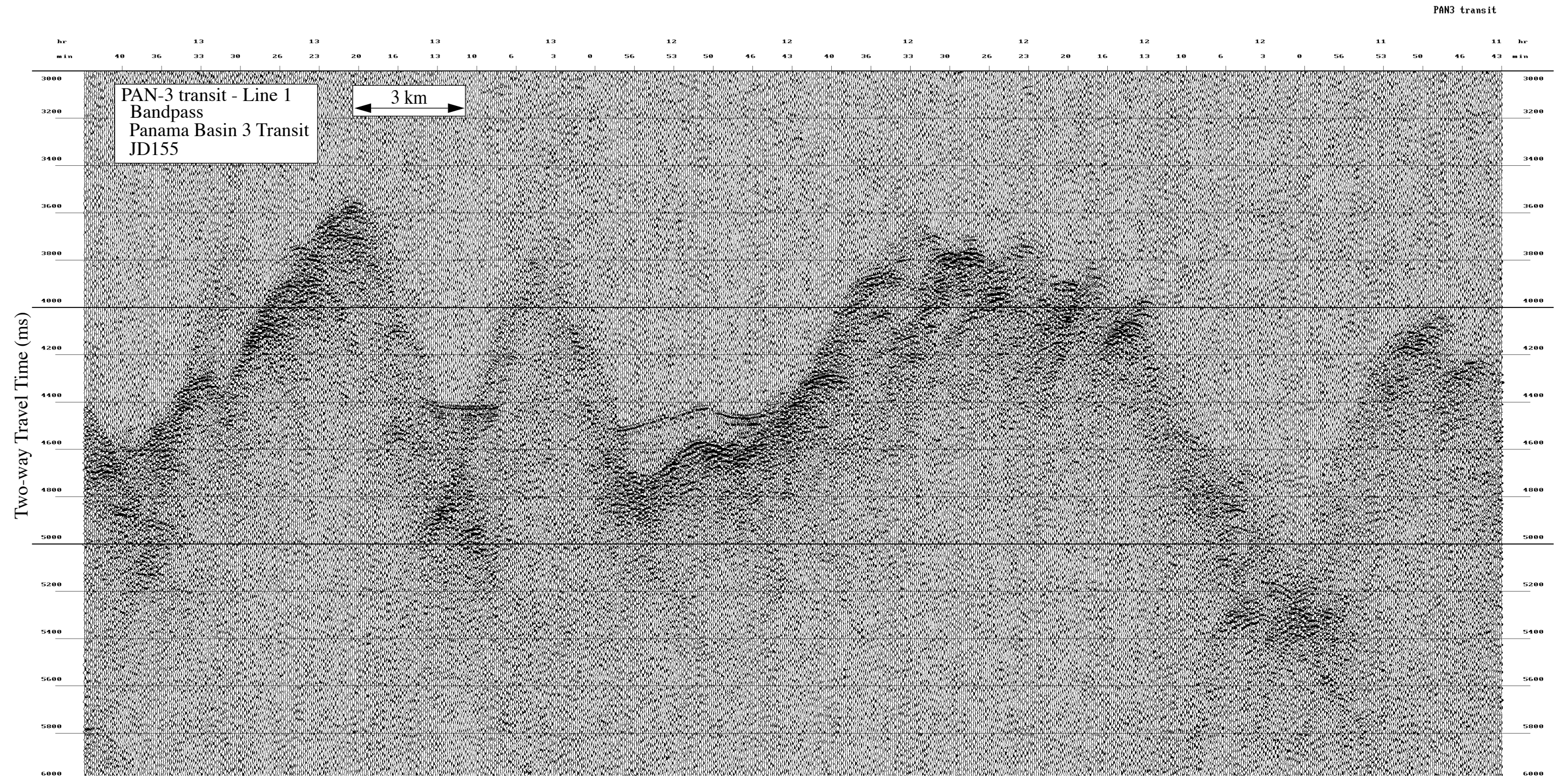
Data File SBfixavg.2000jun03.1200-1800



NW

SE

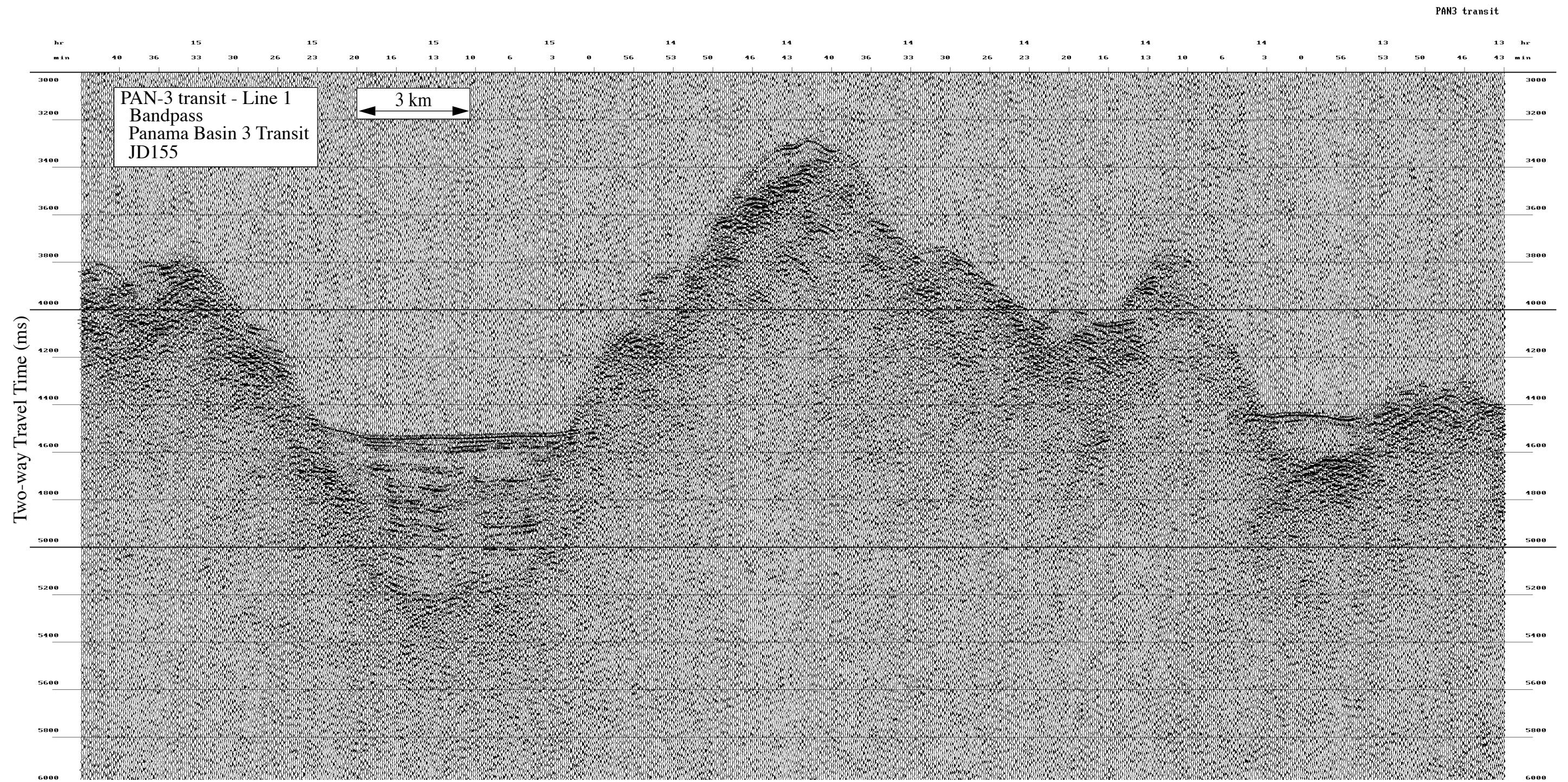
← Line 1



NW

SE

← Line 1



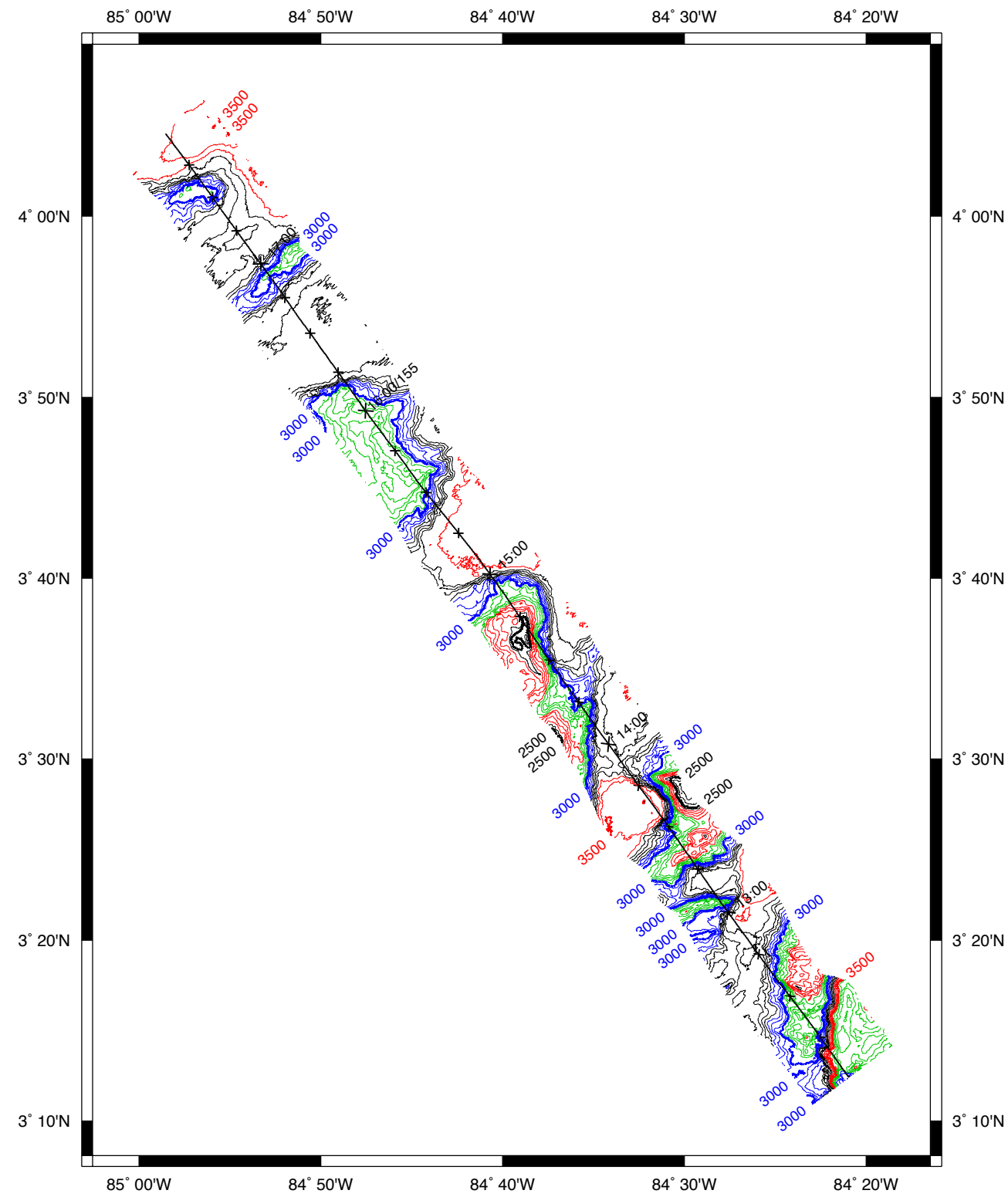
JD 155 (3 June 2000)--PAN-3 Survey, Deep Panama Basin

High Resolution Seismic Reflection Records

NEMO Leg 3

R/V Melville

Data File SBfixavg.2000jun03.1200-1800

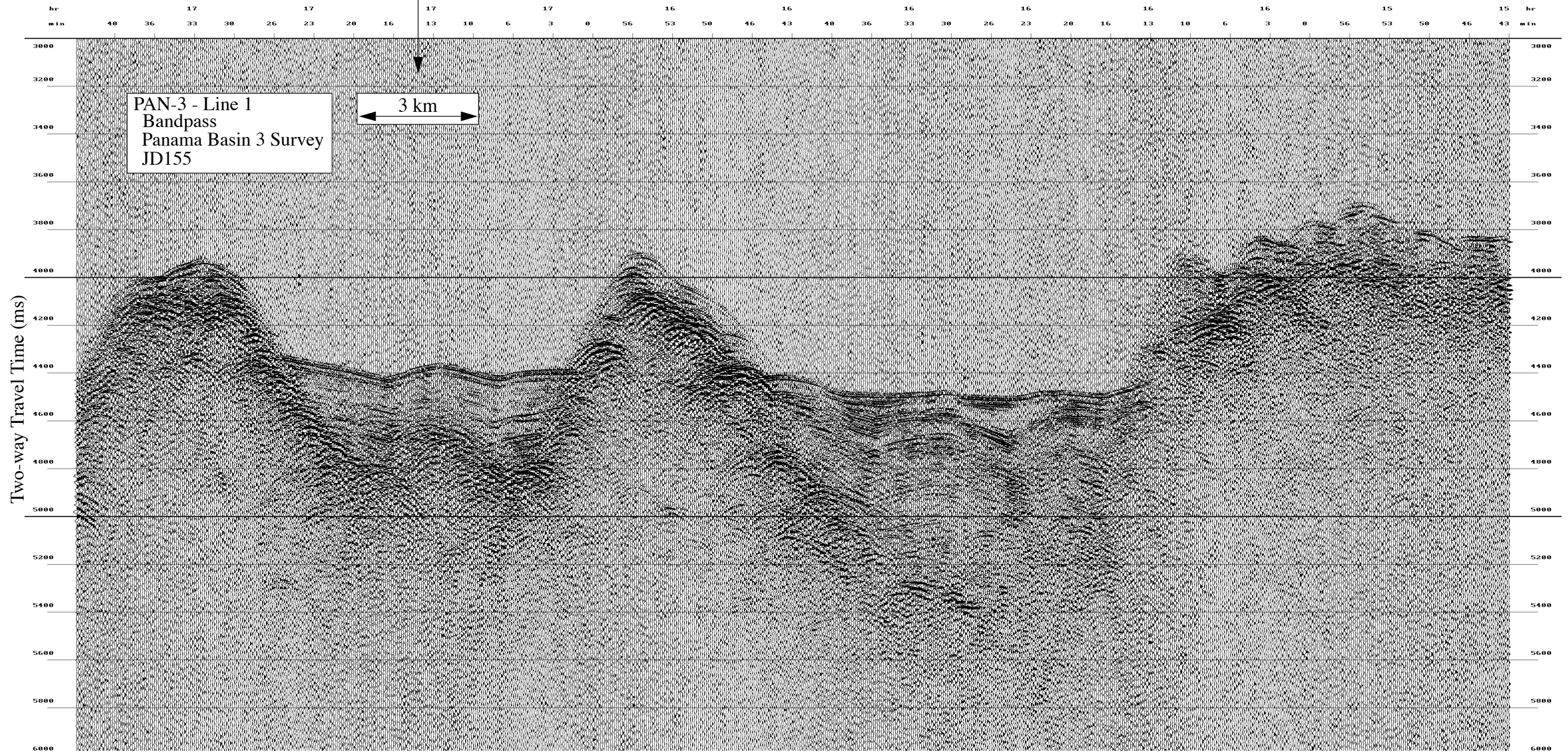


NW

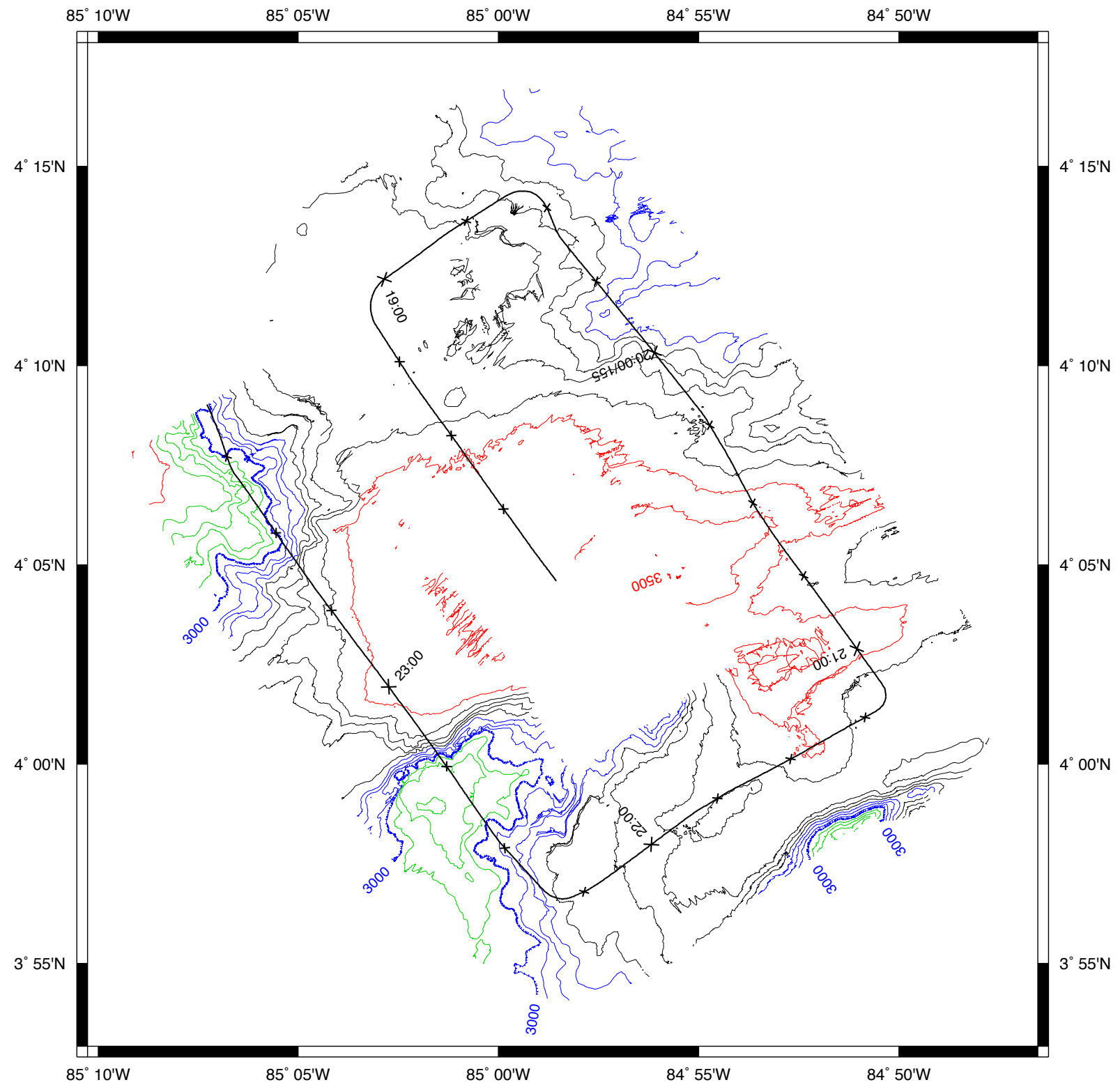
SE

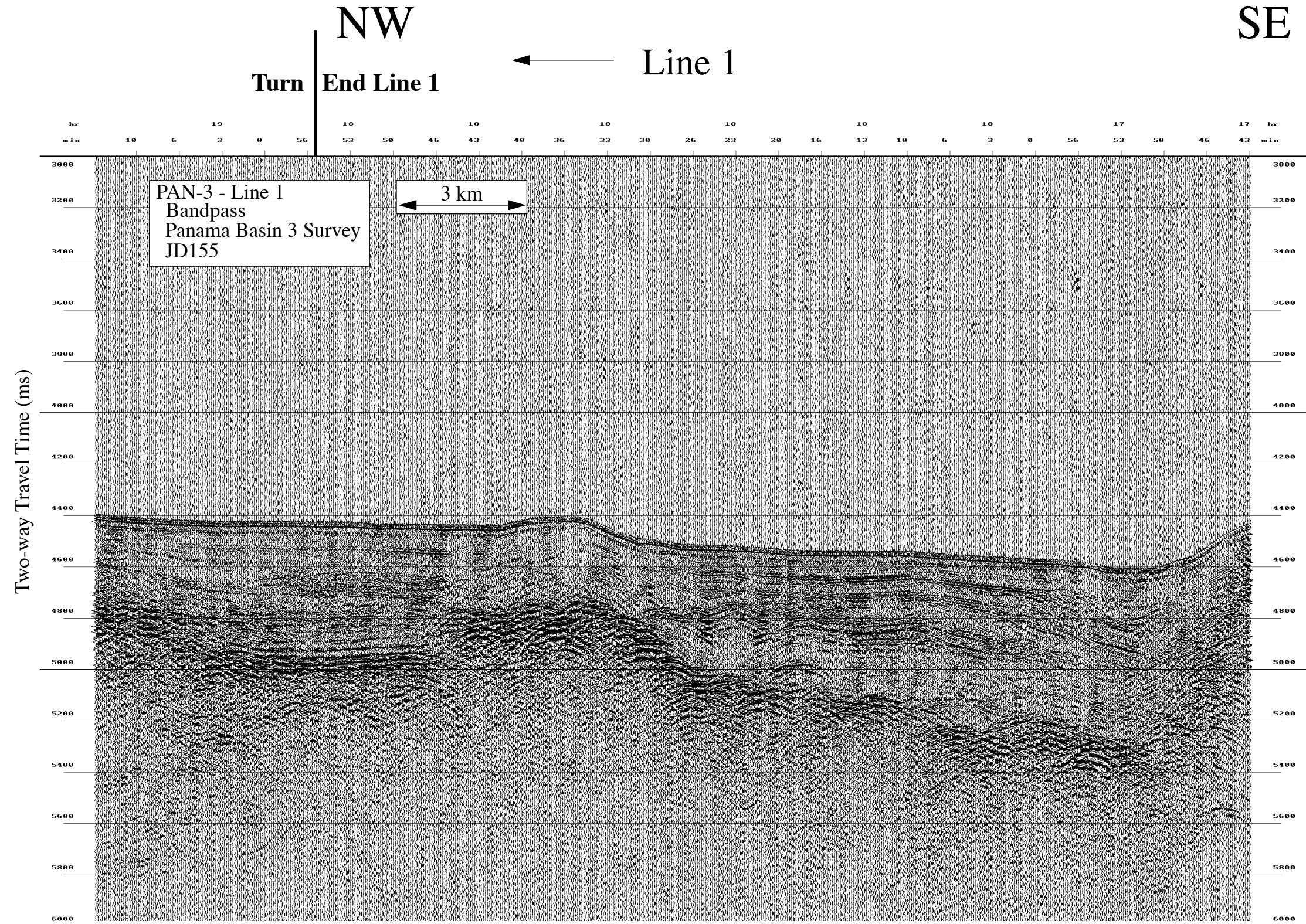
← Line 1

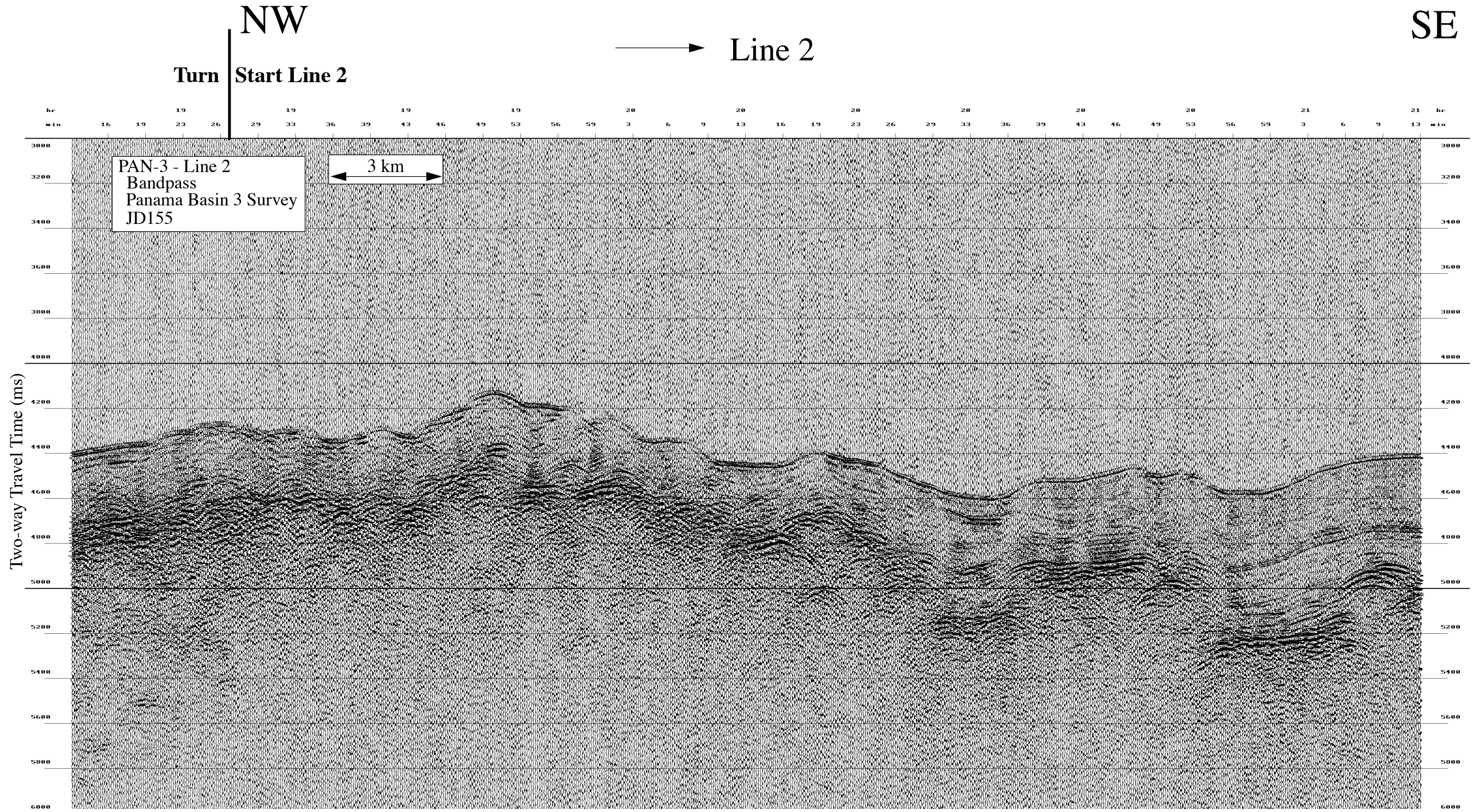
X PAN-3 line 3

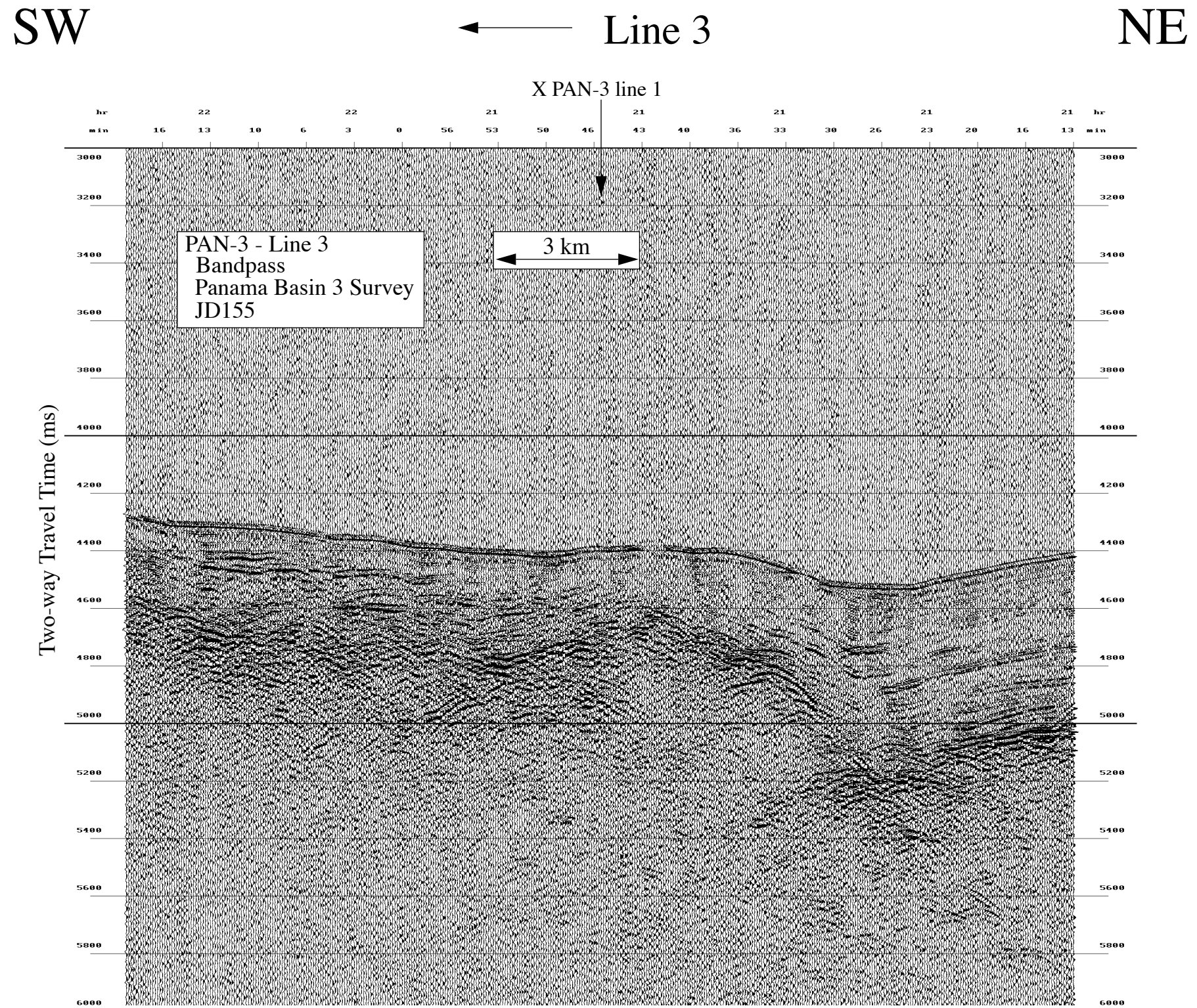


Data File SBfixavg.2000jun03.1800-2400







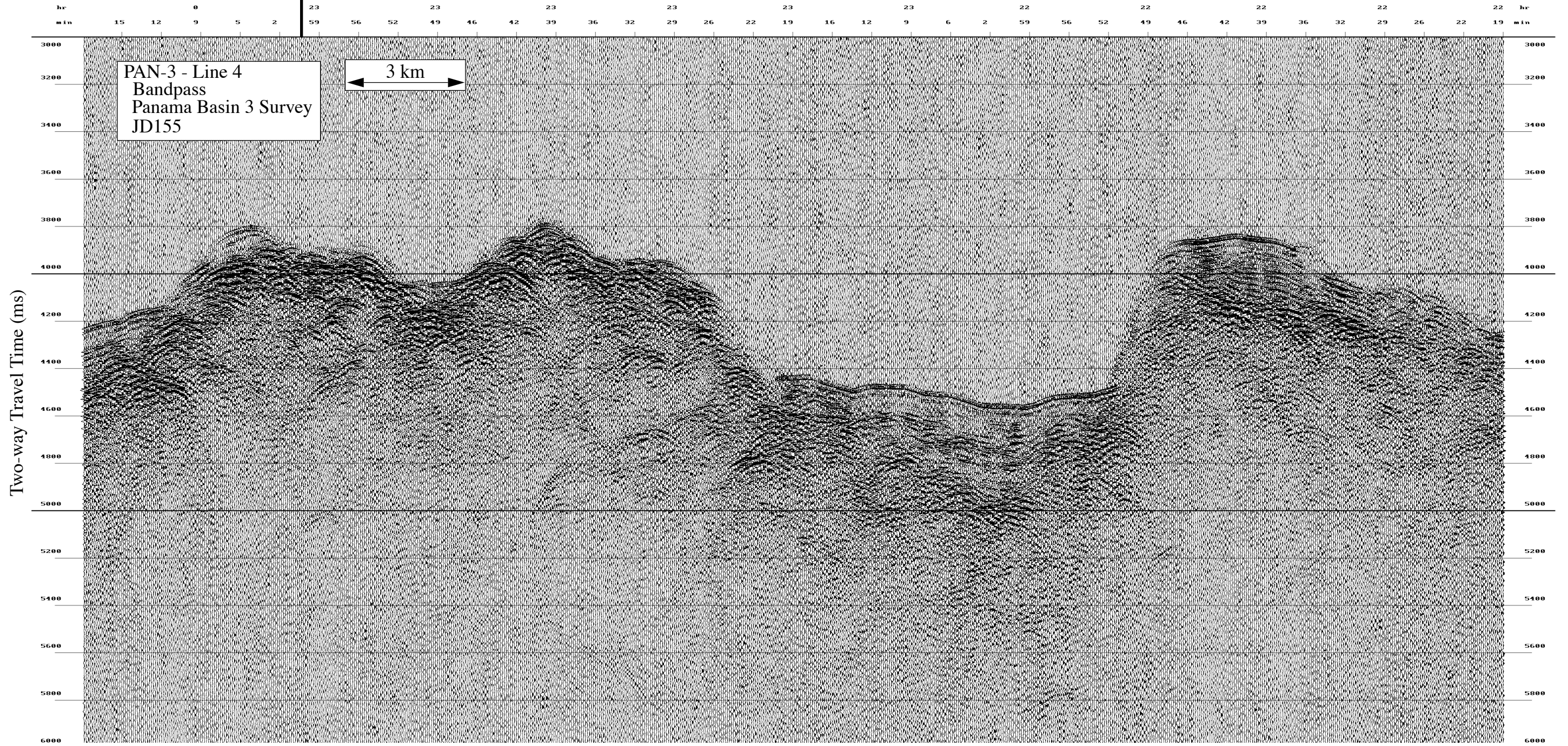


NW

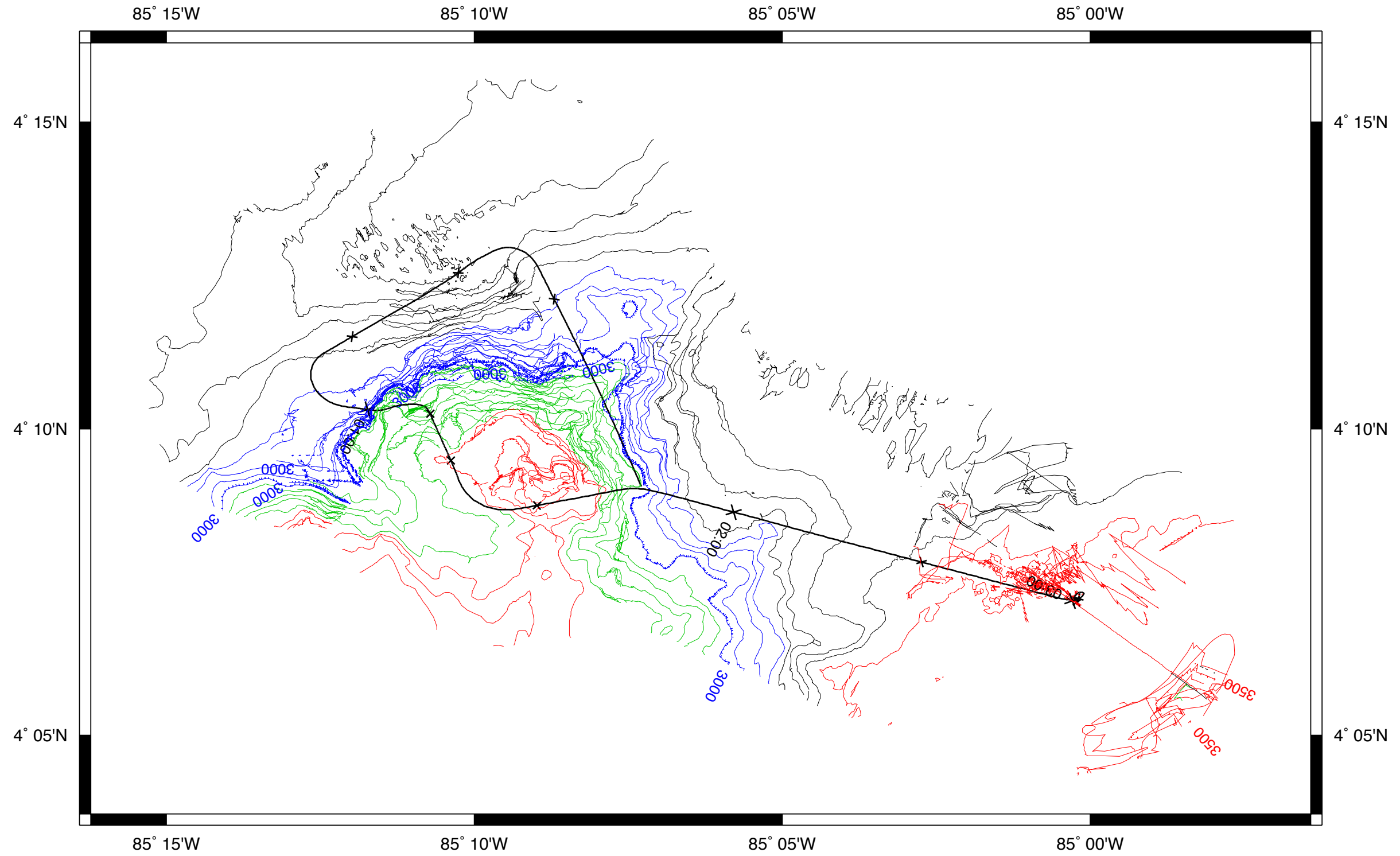
SE

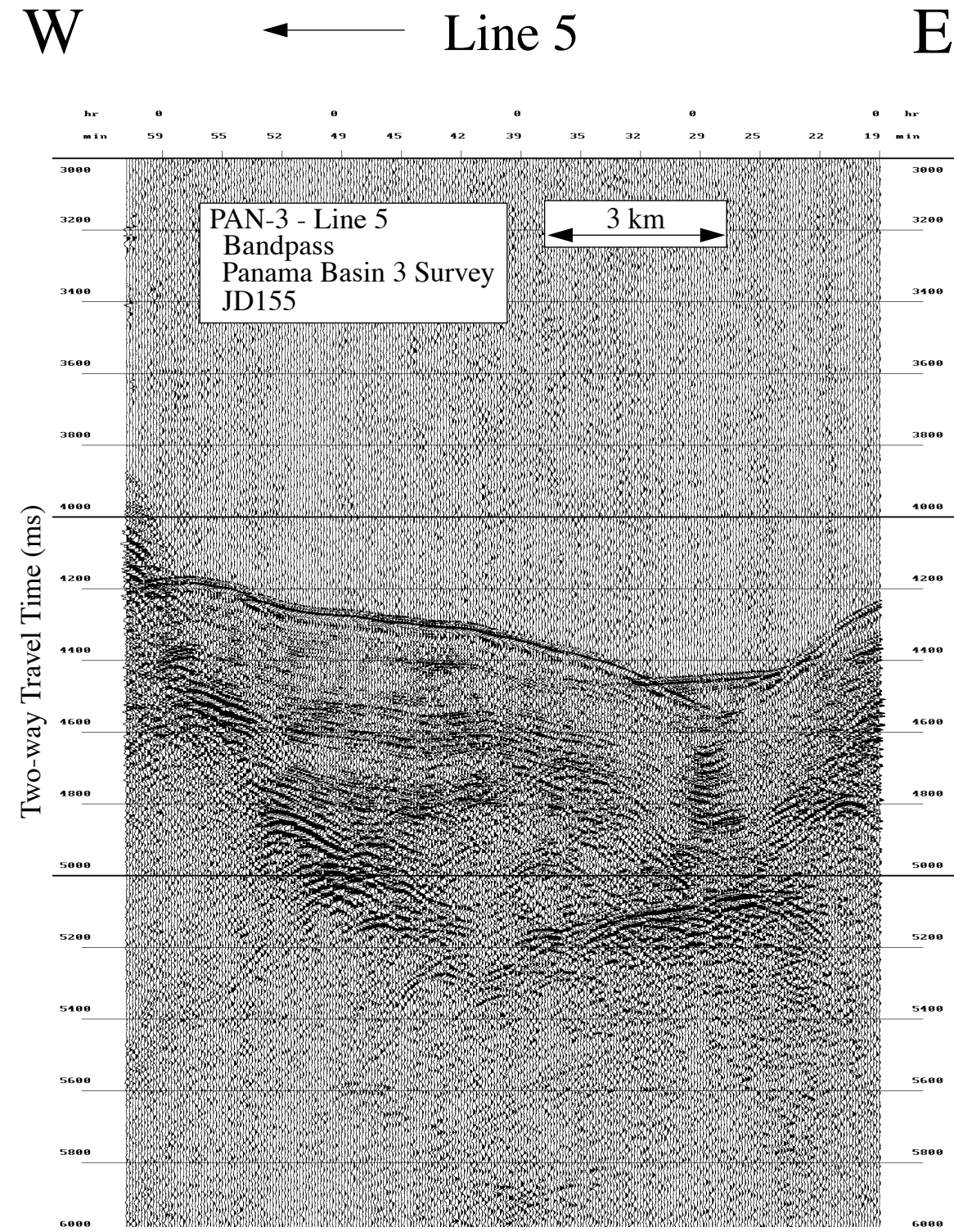
← Line 4

JD156 | JD155



Data File SBfixavg.2000jun04.0000-0600





JD 157 (5 June 2000)--Transit from PAN-3 toCOC-1

High Resolution Seismic Reflection Records

NEMO Leg 3

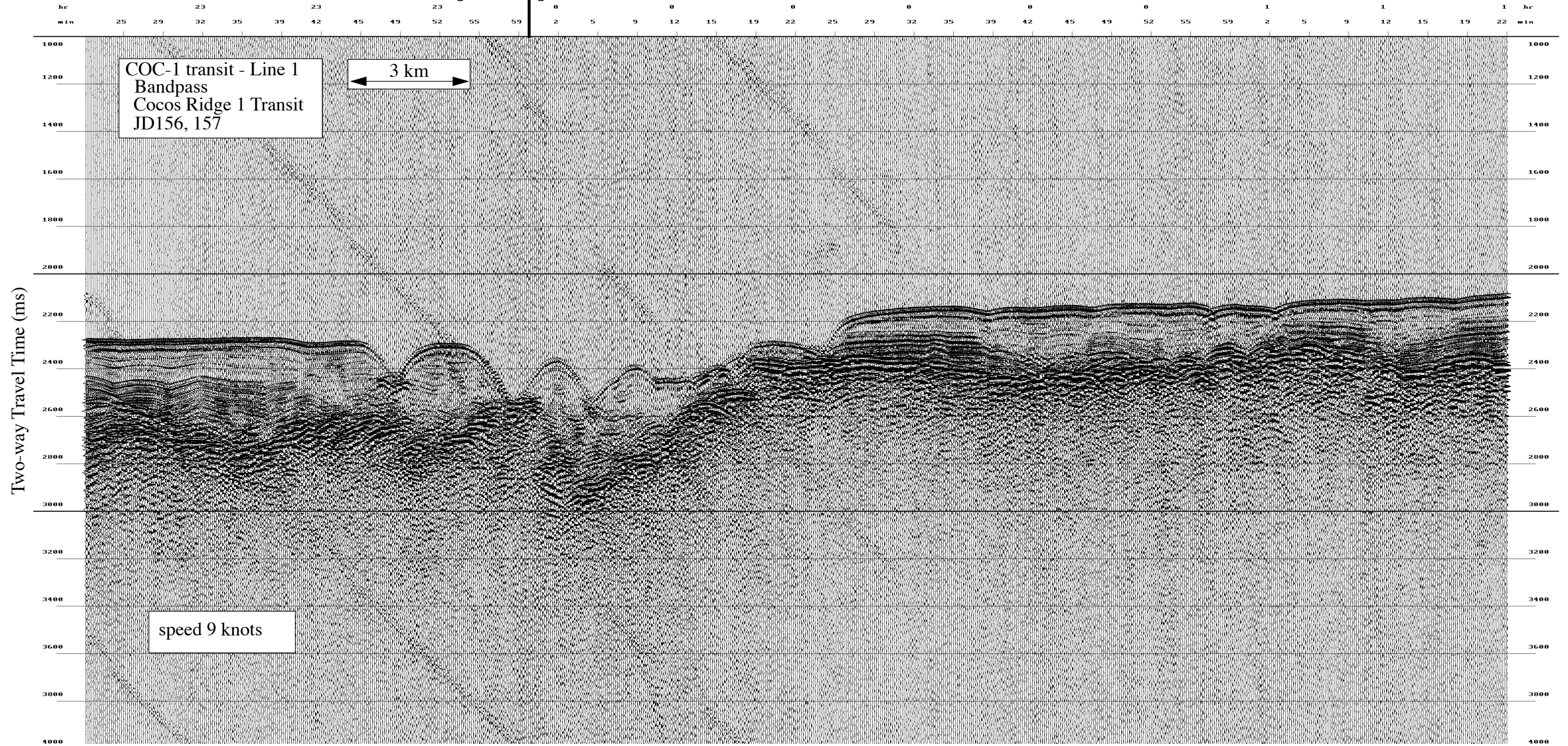
R/V Melville

SW

NE

→ Line 1

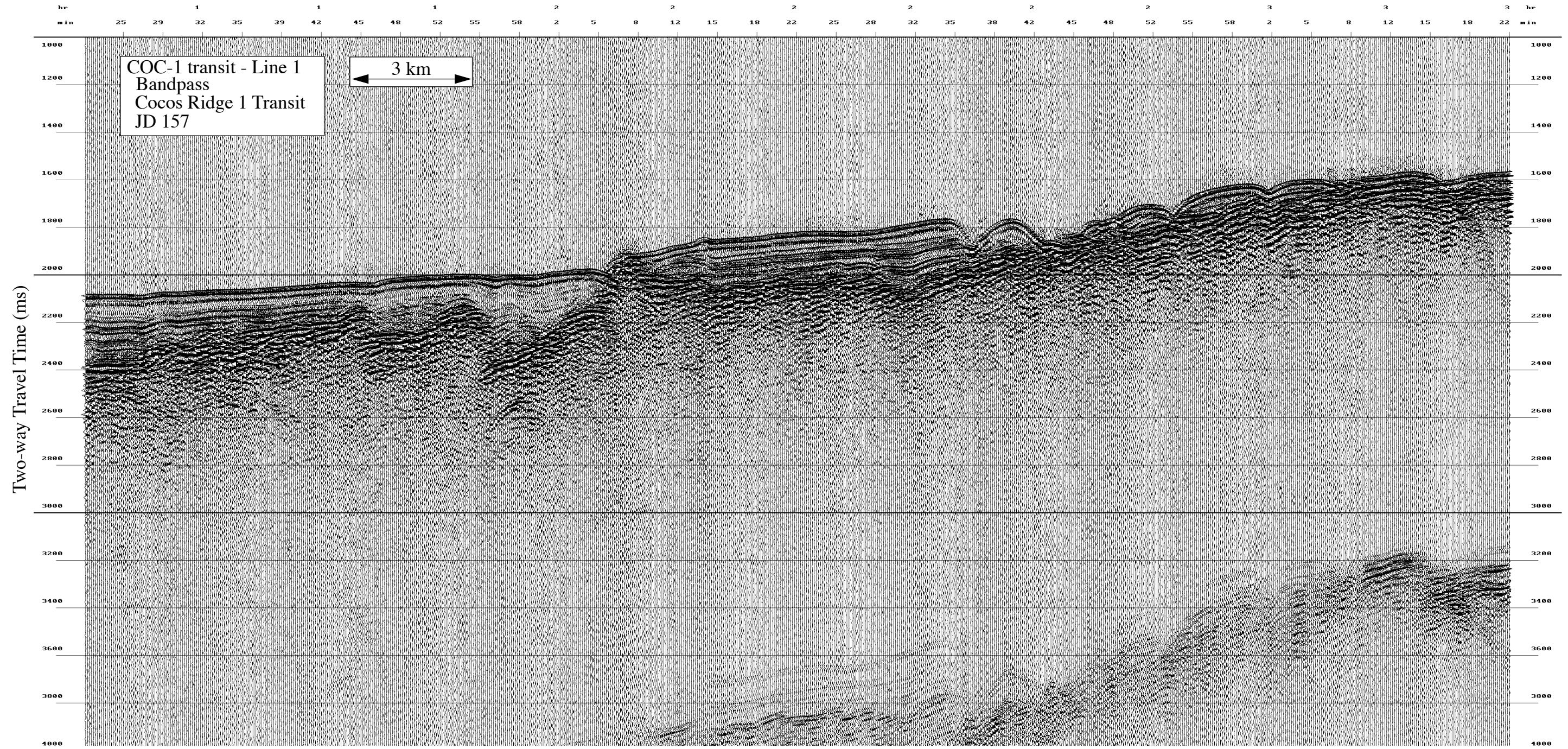
JD156 | JD157



SW

NE

→ Line 1



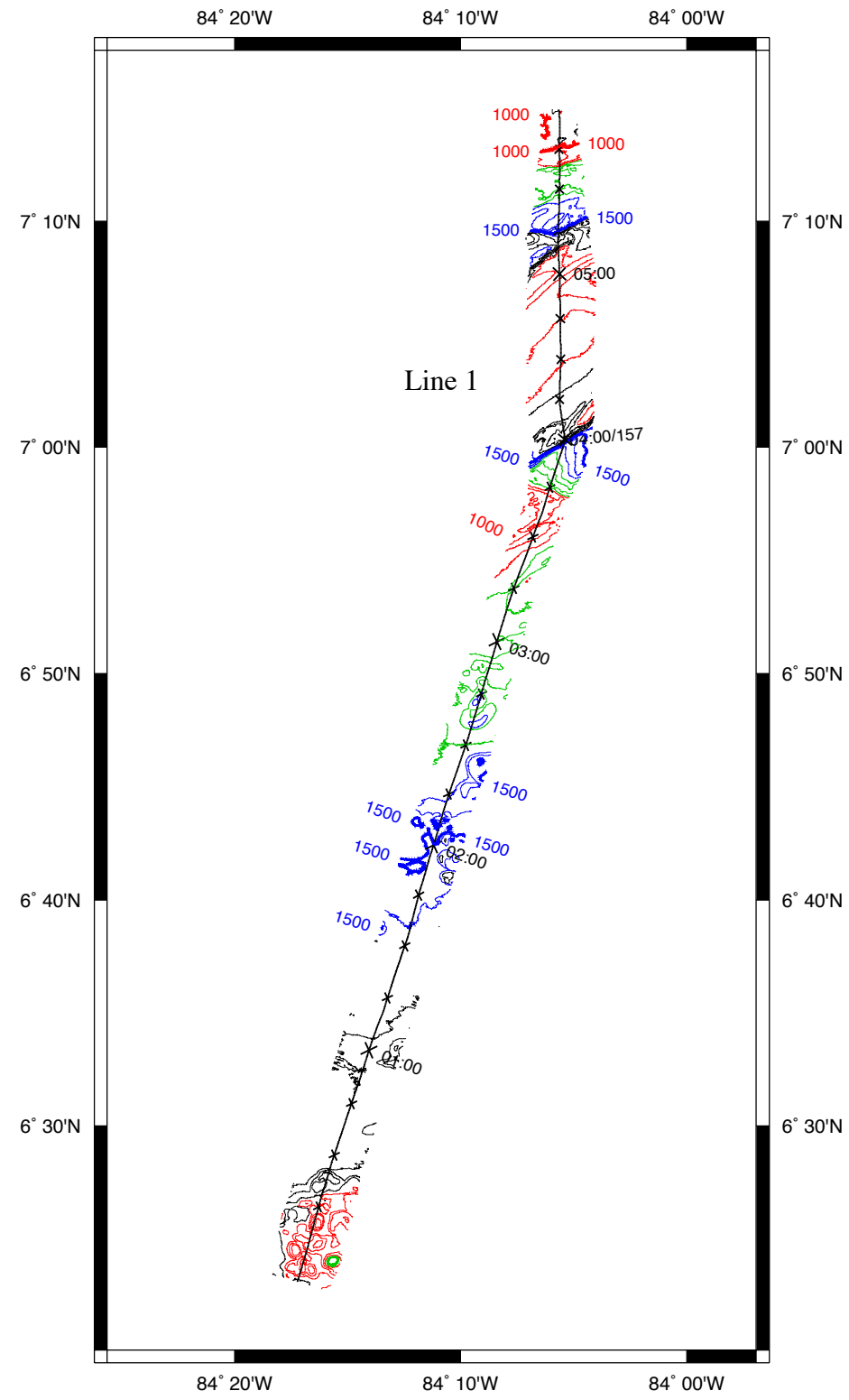
JD 157 (5 June 2000)--COC-1 Survey, Shallow Cocos Ridge

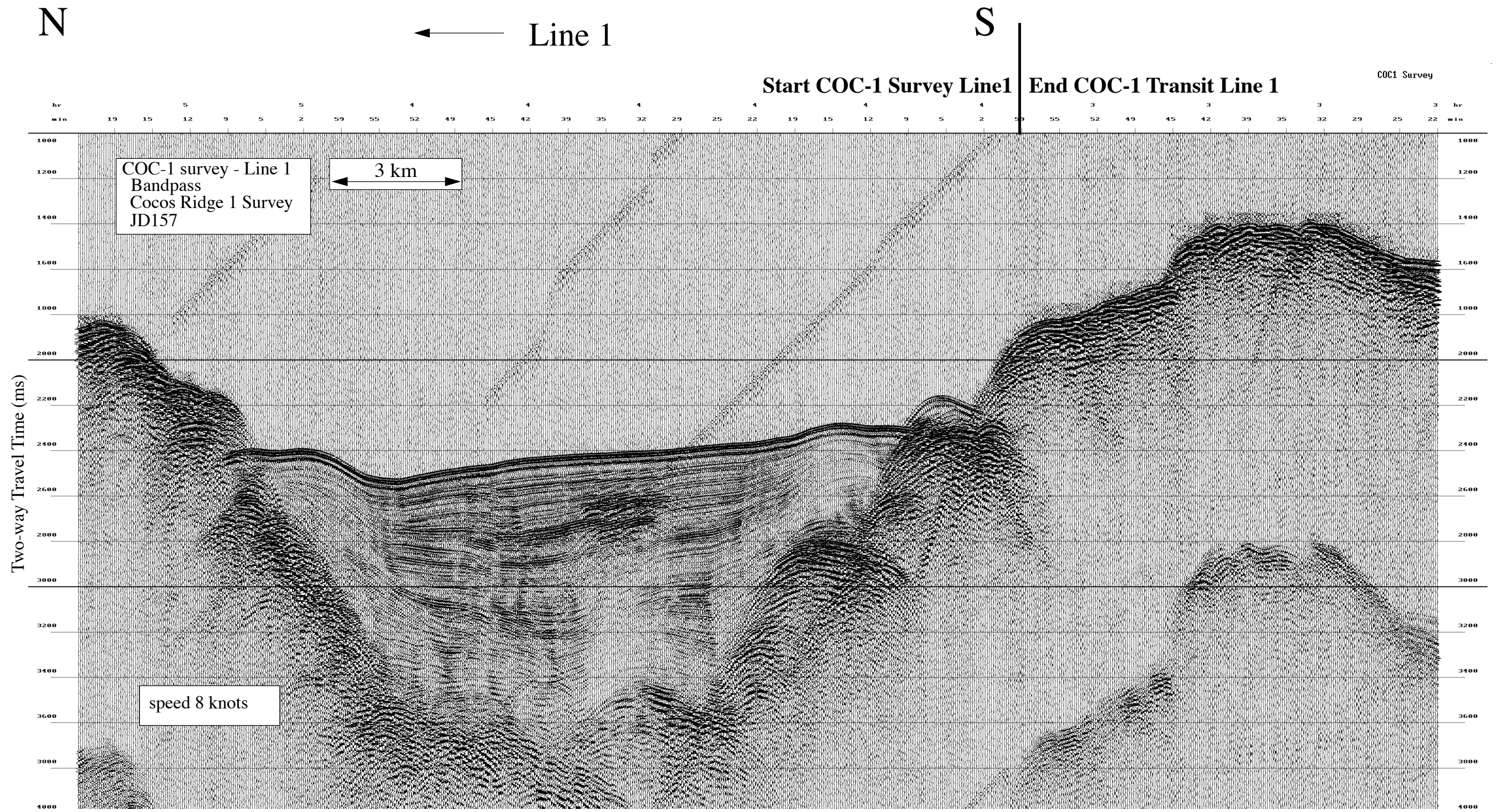
High Resolution Seismic Reflection Records

NEMO Leg 3

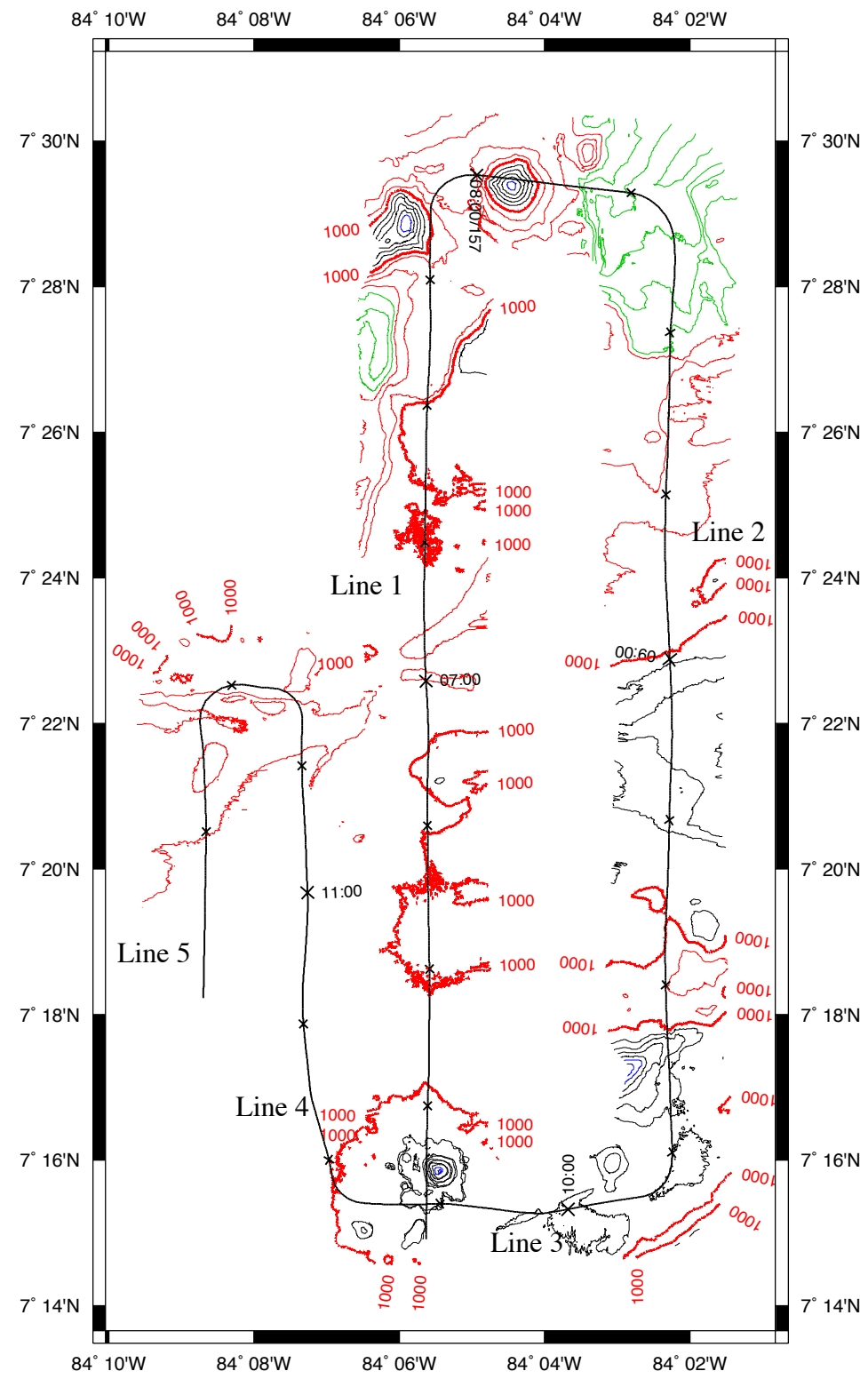
R/V Melville

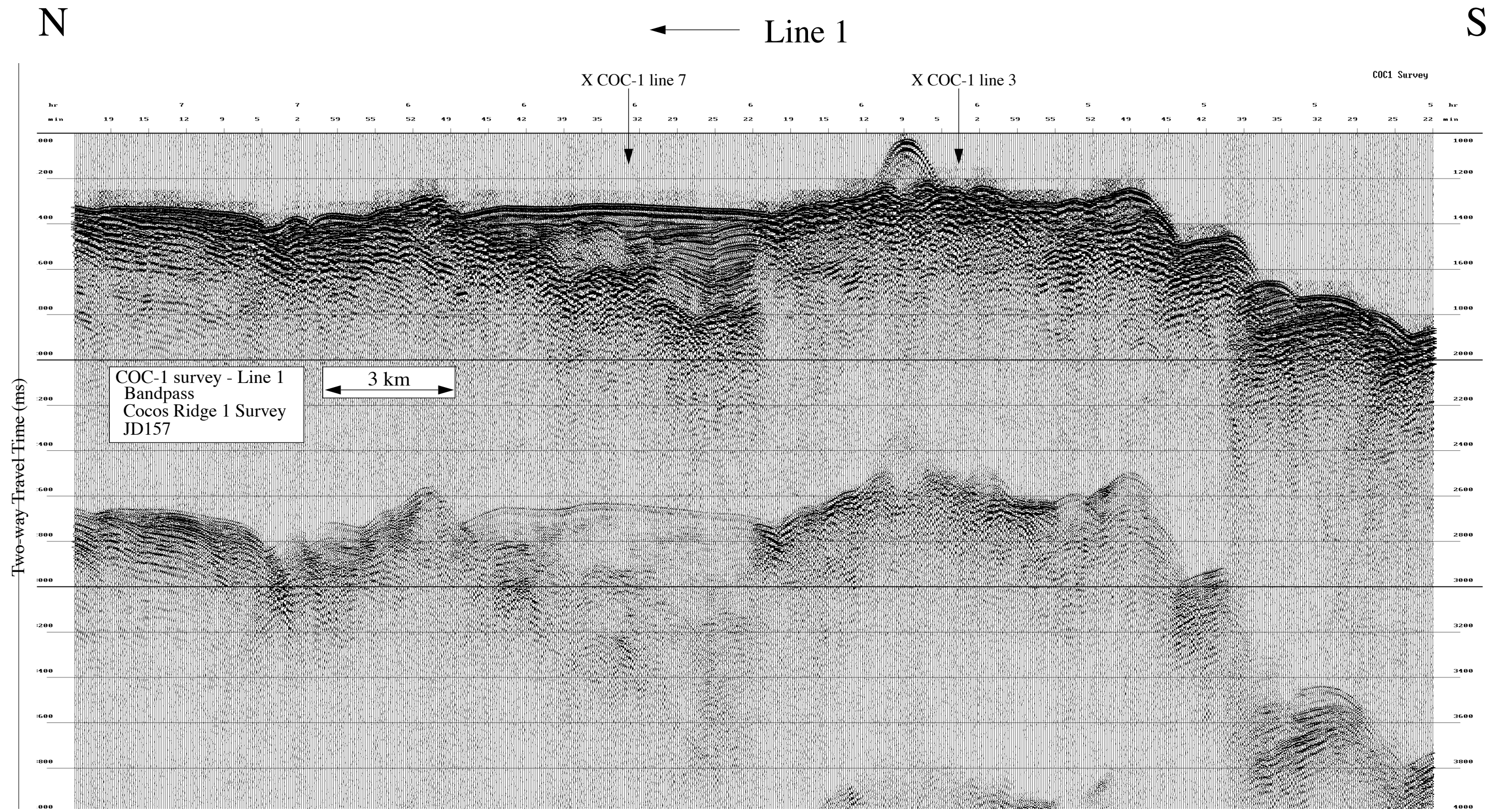
Data File SBfixavg.2000jun05.0000-0600

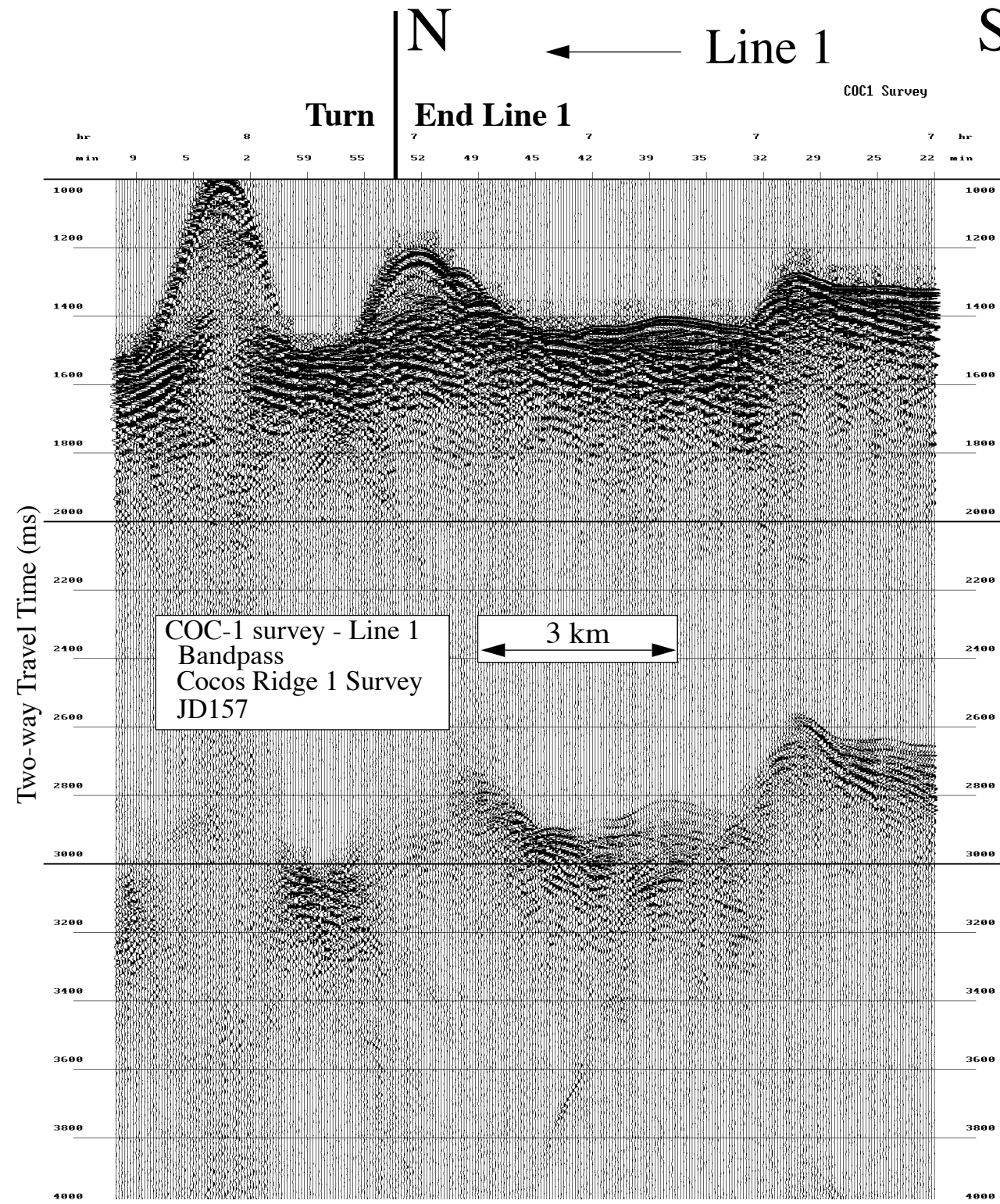


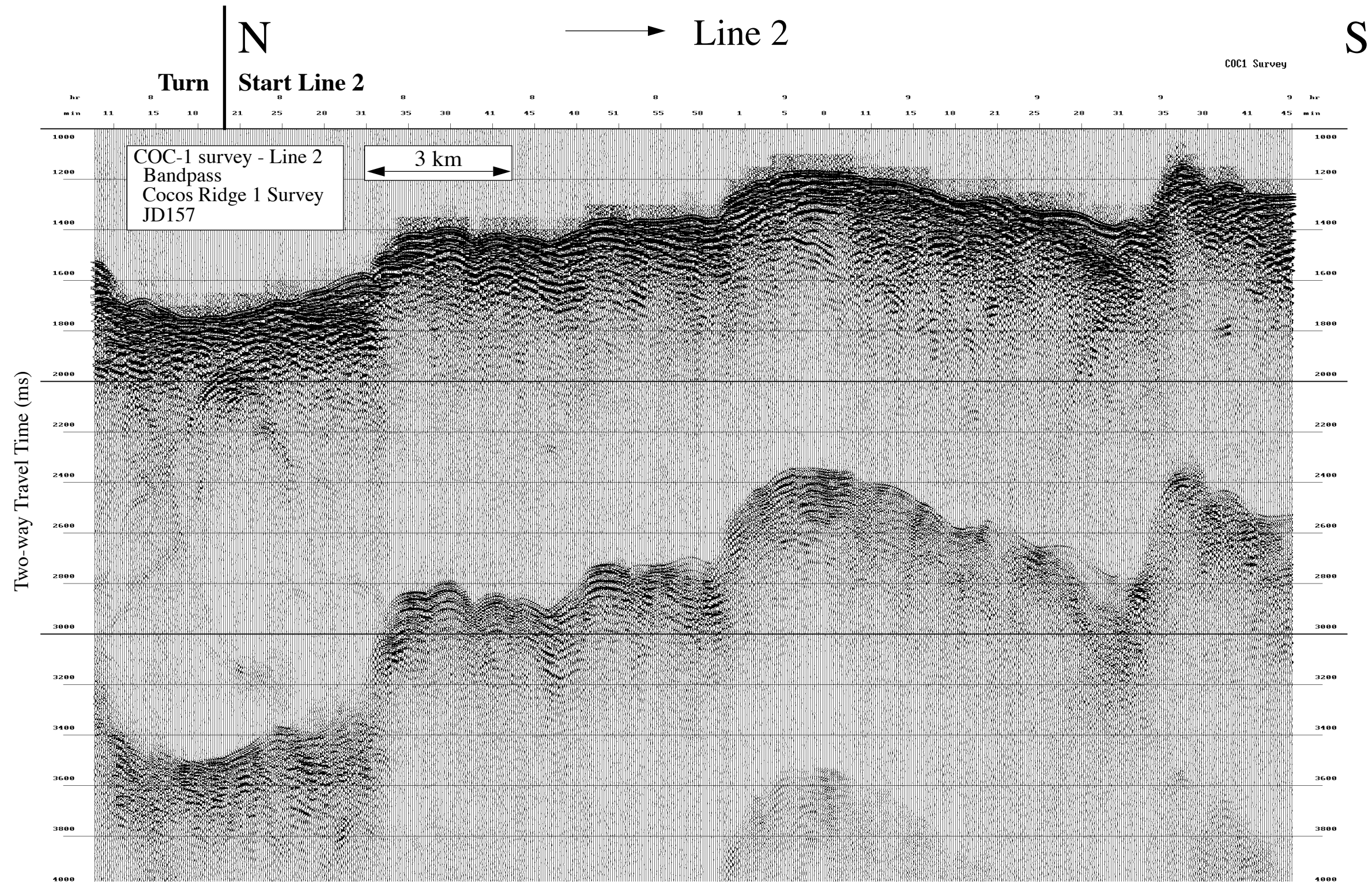


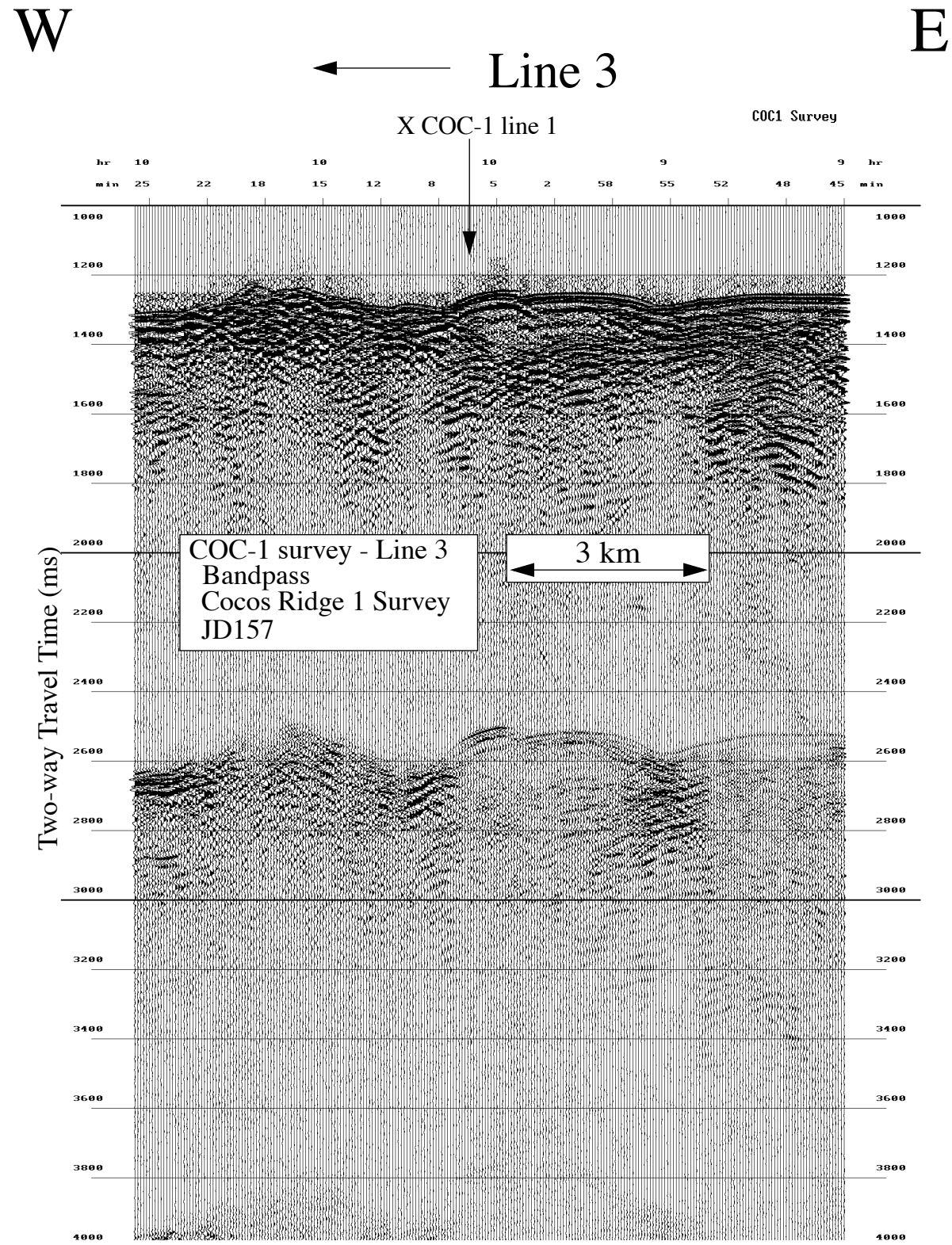
Data File SBfixavg.2000jun05.0600-1200

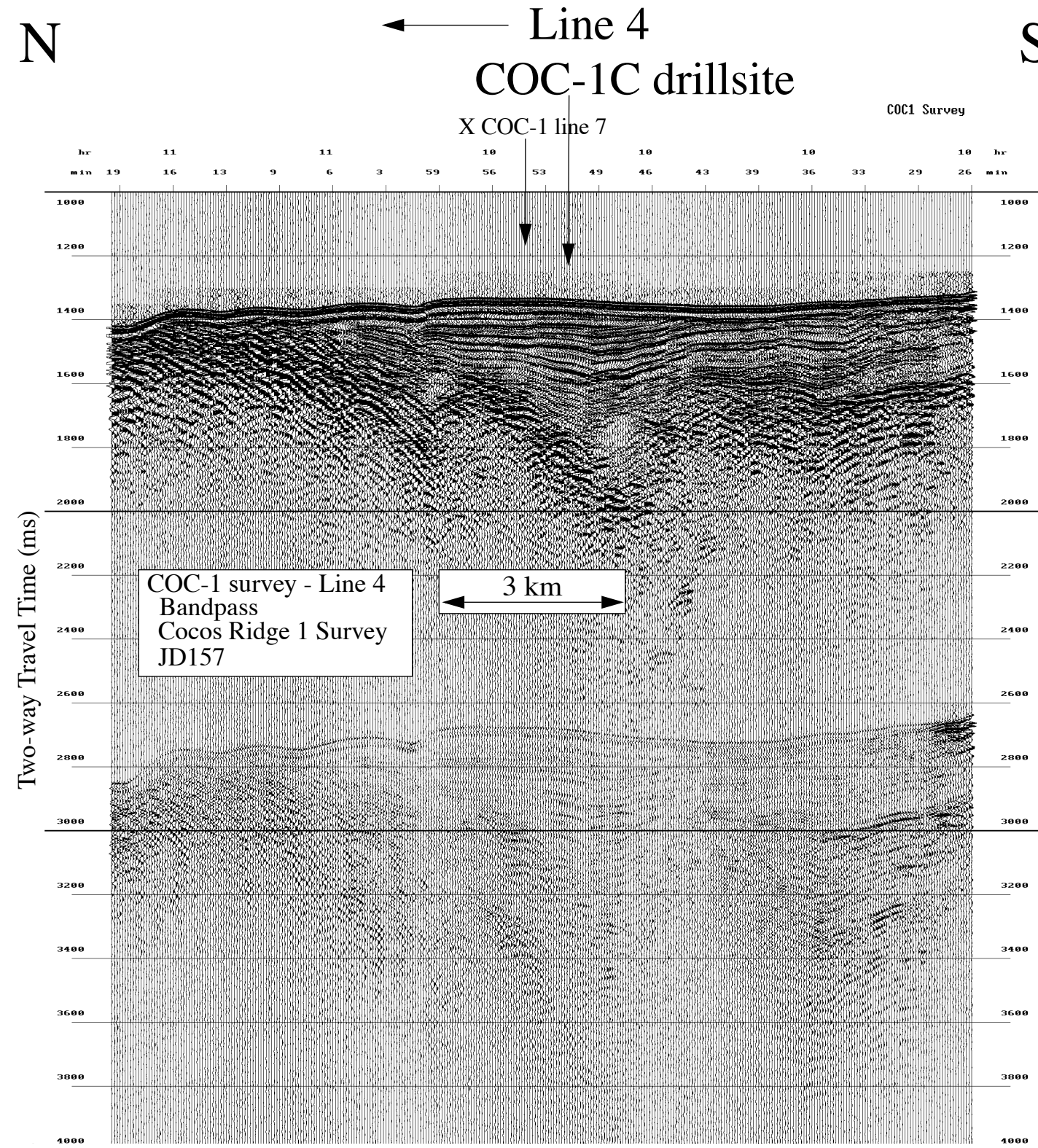


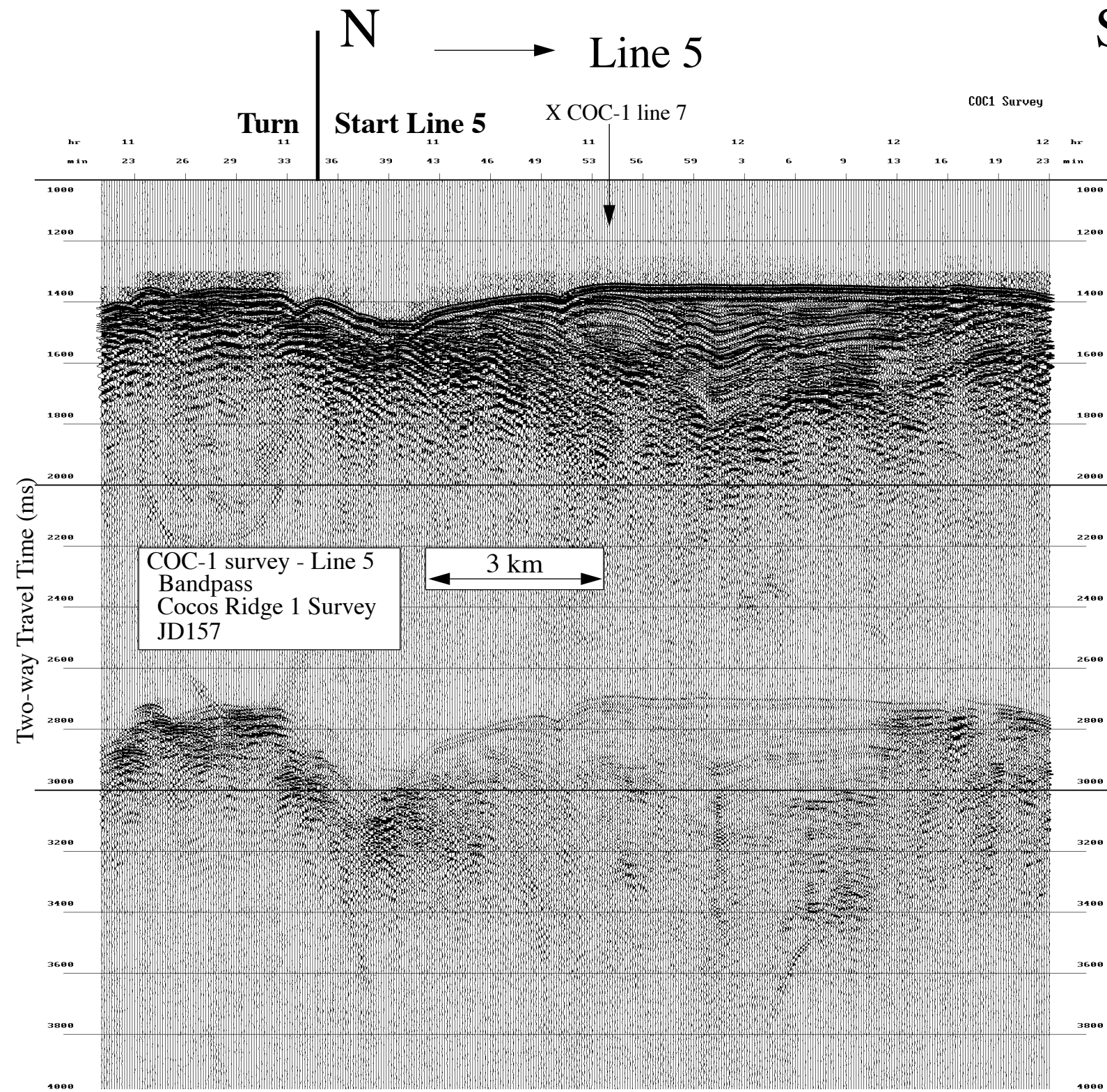




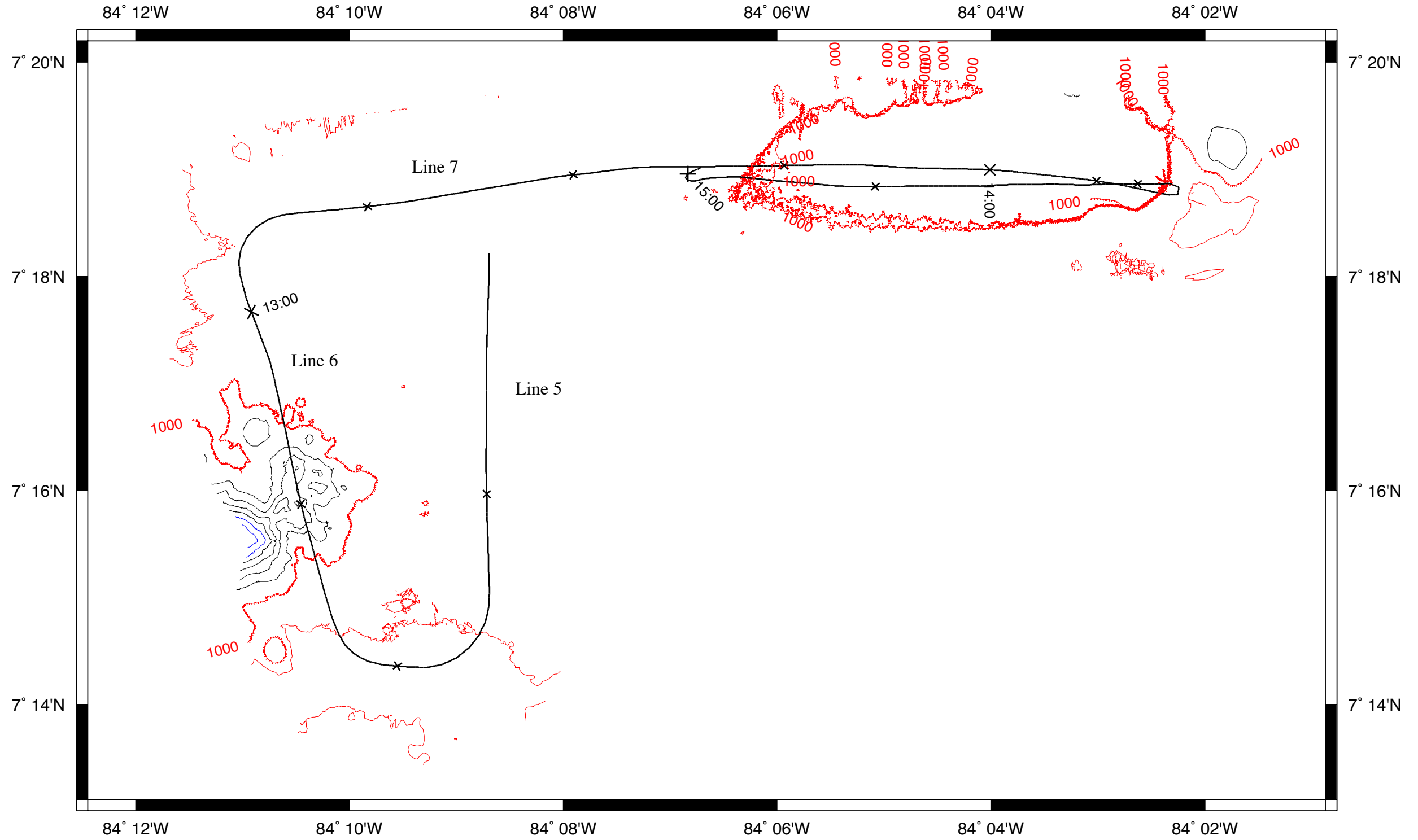


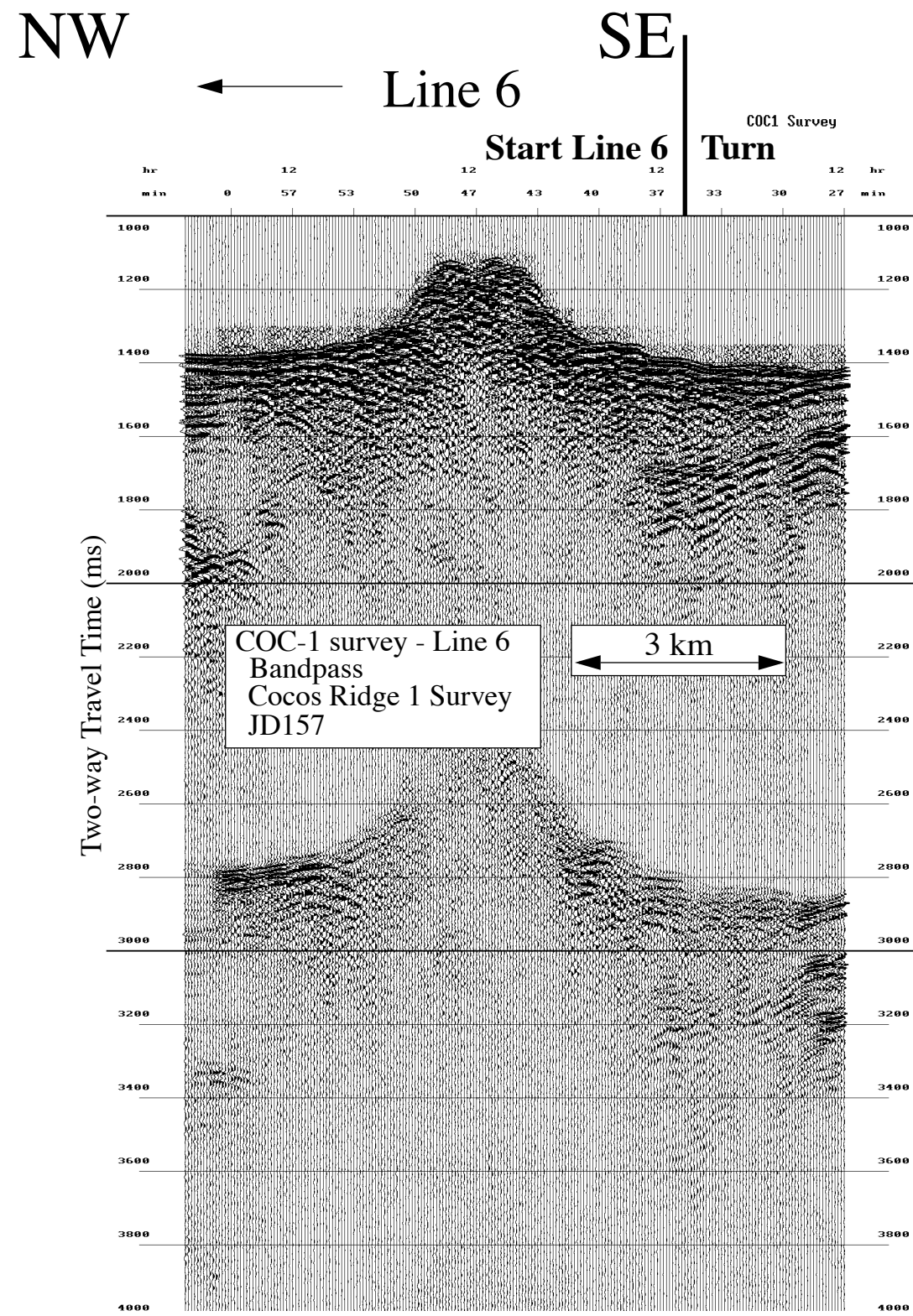


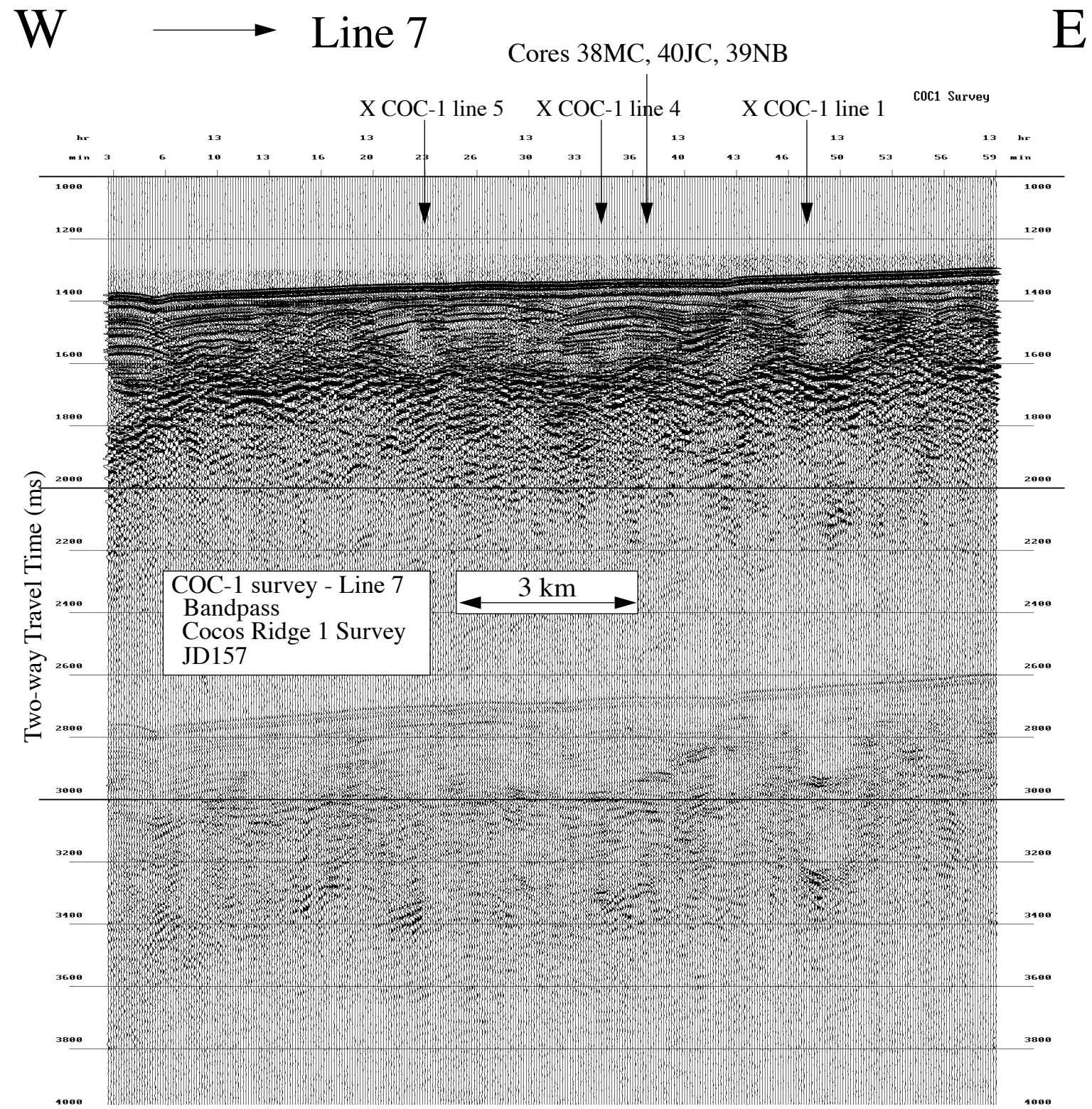




Data File SBfixavg.2000jun05.1200-1800







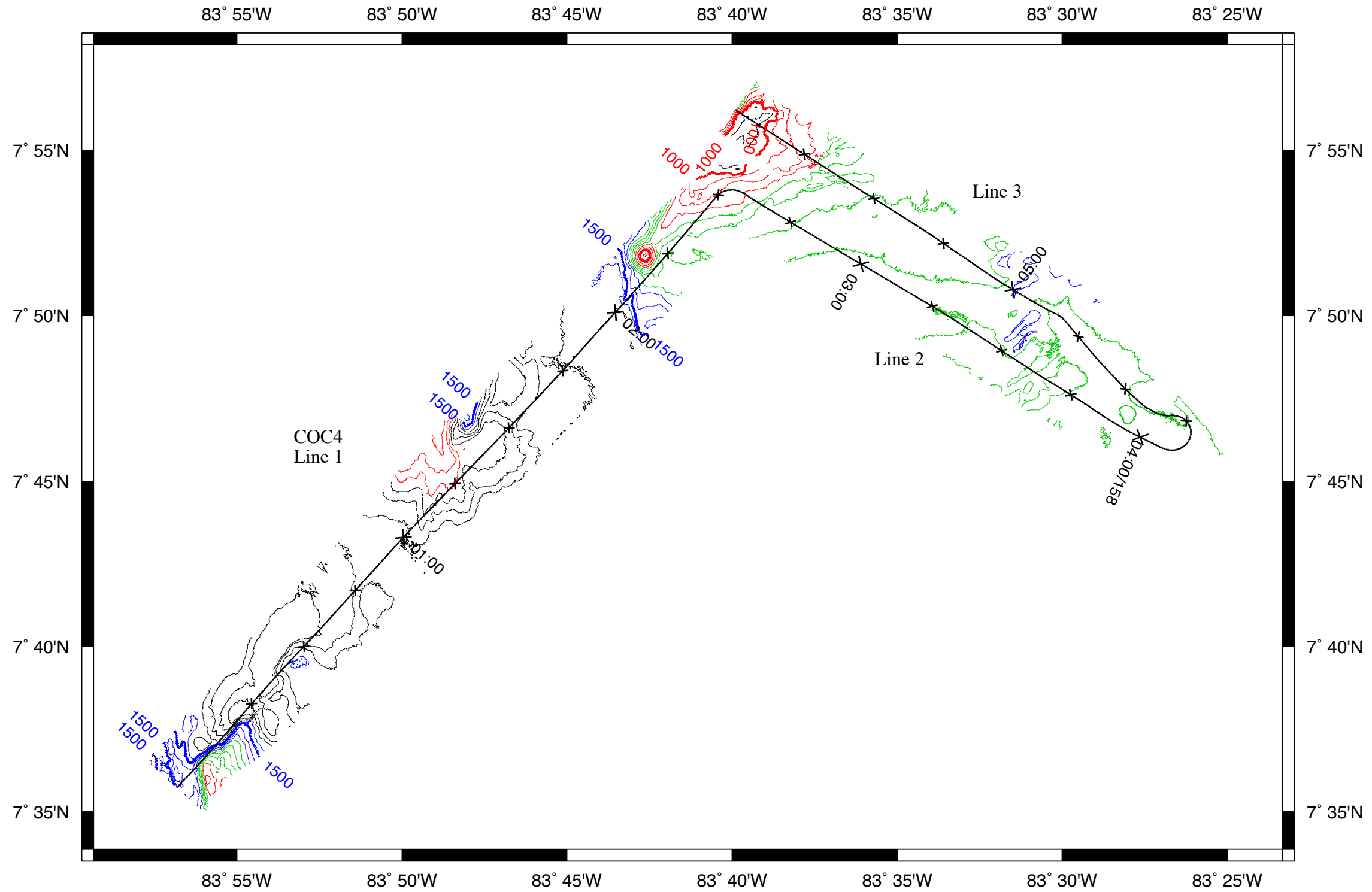
JD 158 (6 June 2000)--COC-4 Survey, Cocos Ridge

High Resolution Seismic Reflection Records

NEMO Leg 3

R/V Melville

Data File SBfixavg.2000jun06.0000-0600



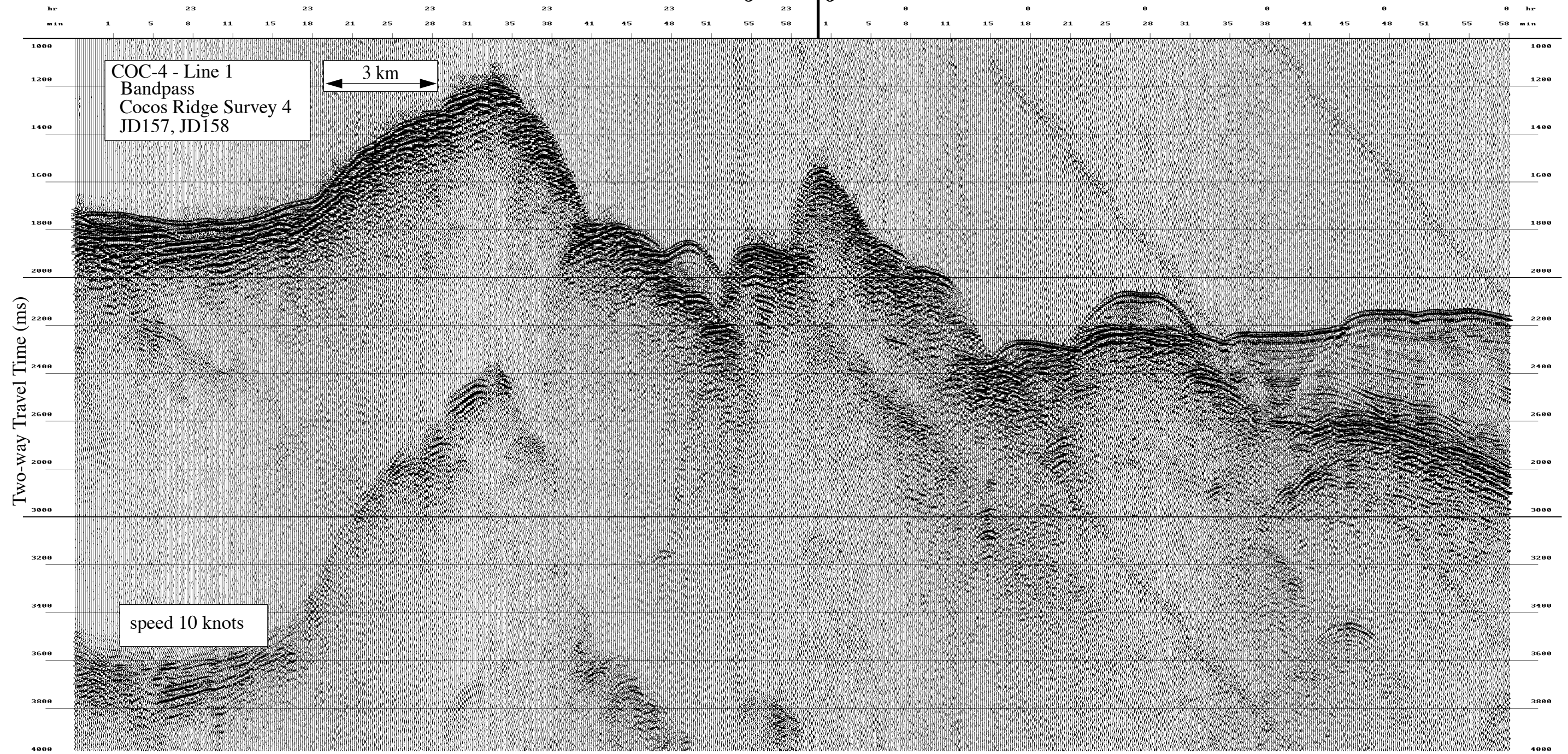
SW

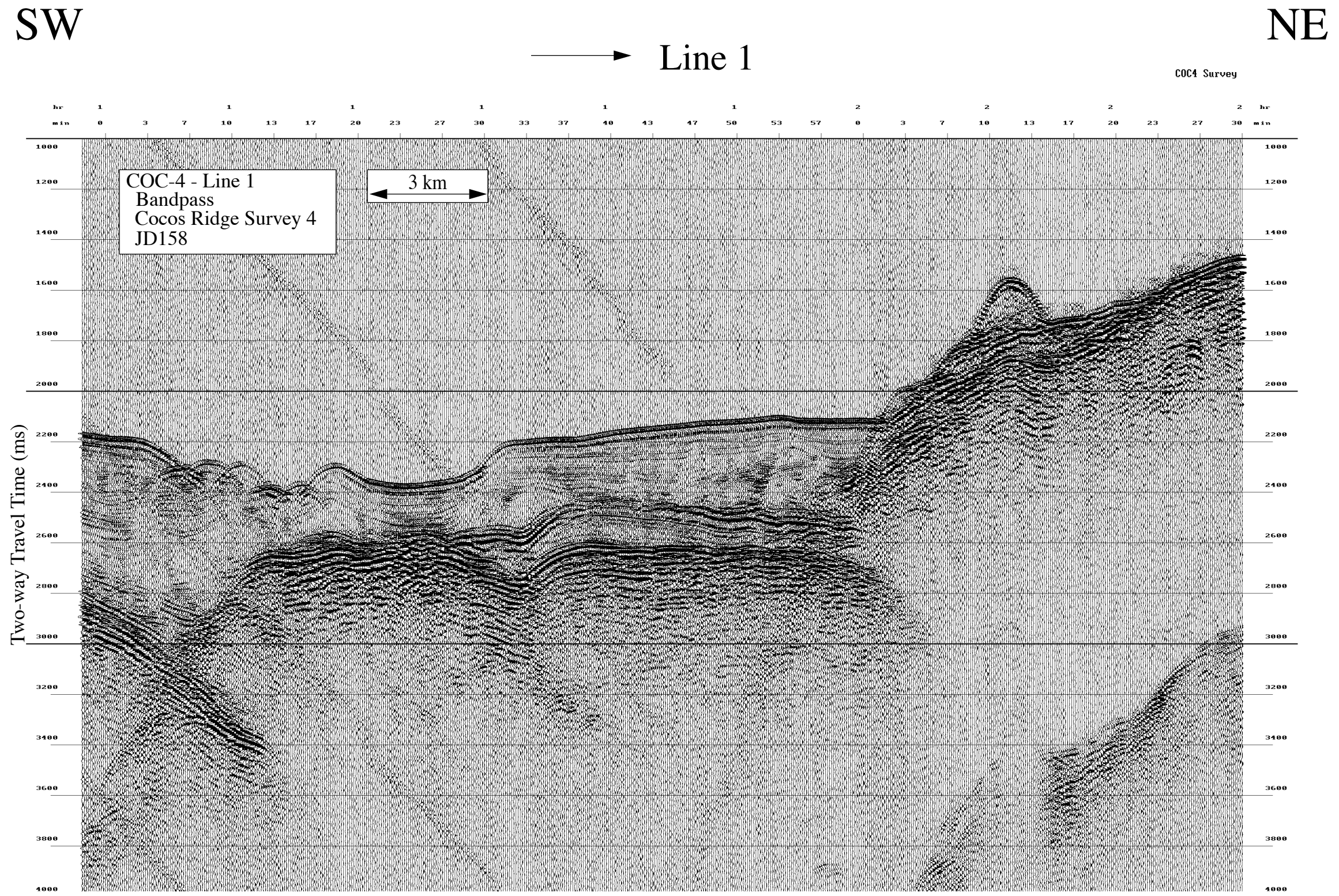
NE

→ Line 1

JD157 | JD158

COC4 Survey

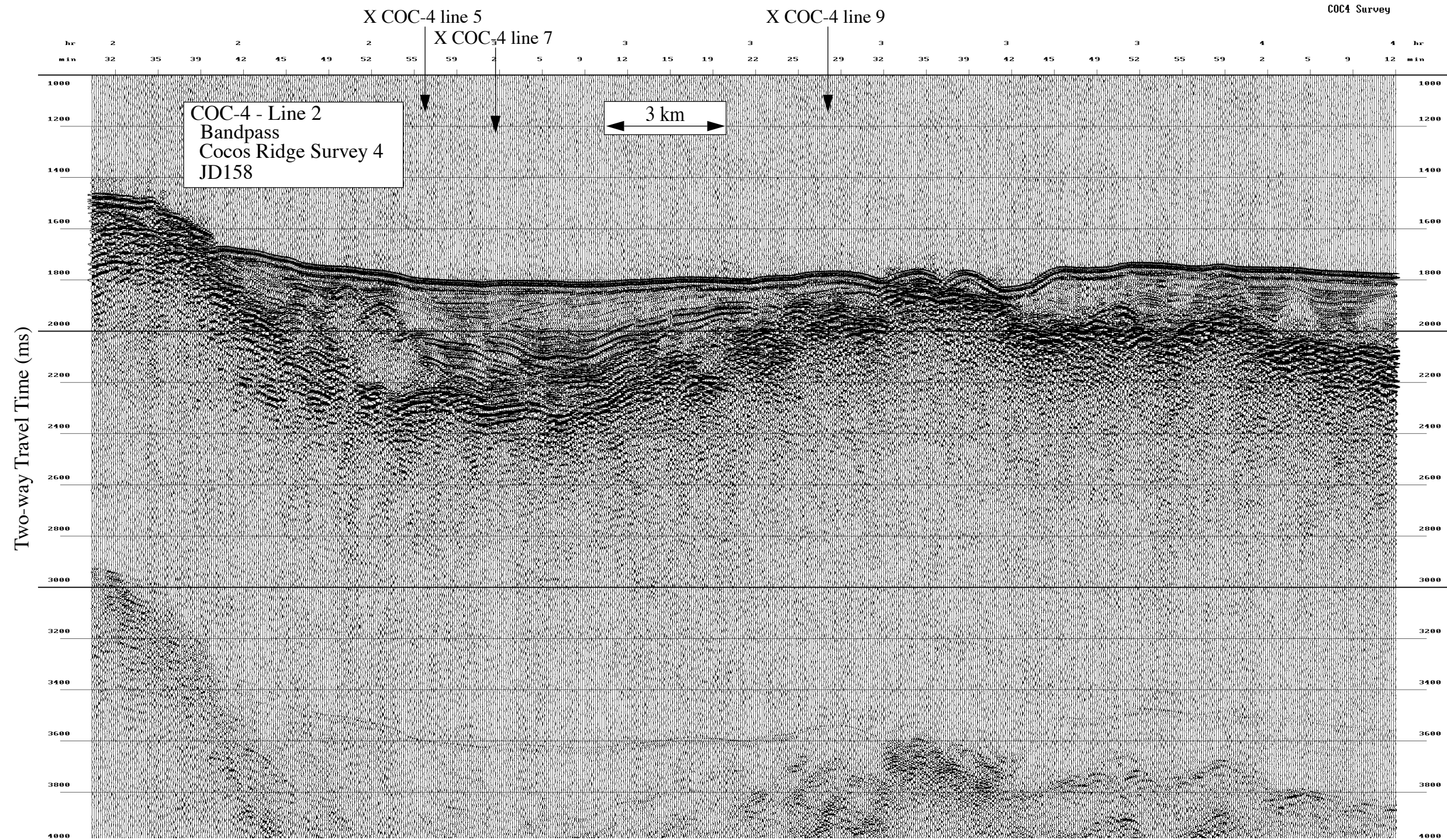




NW

SE

→ Line 2



NW

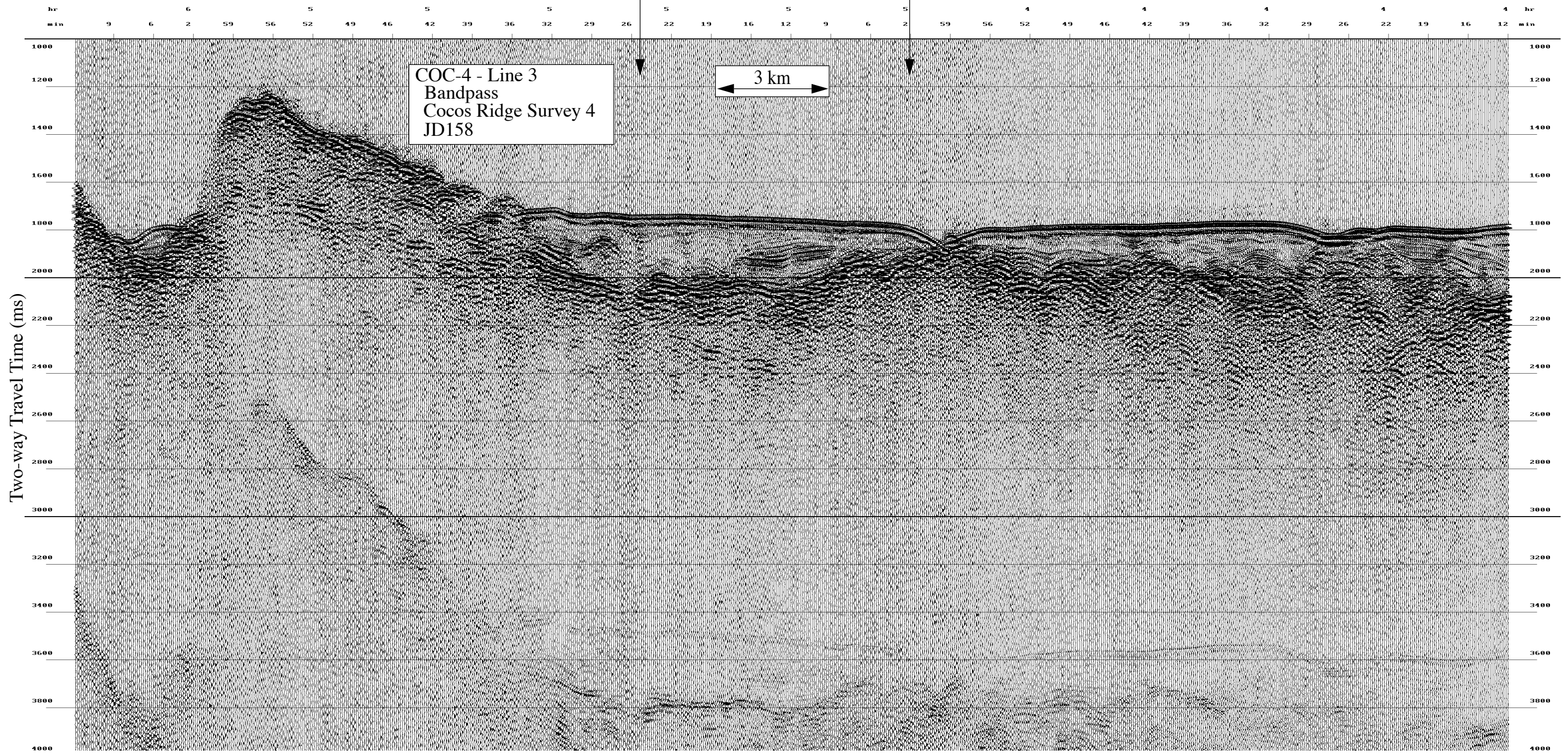
SE

← Line 3

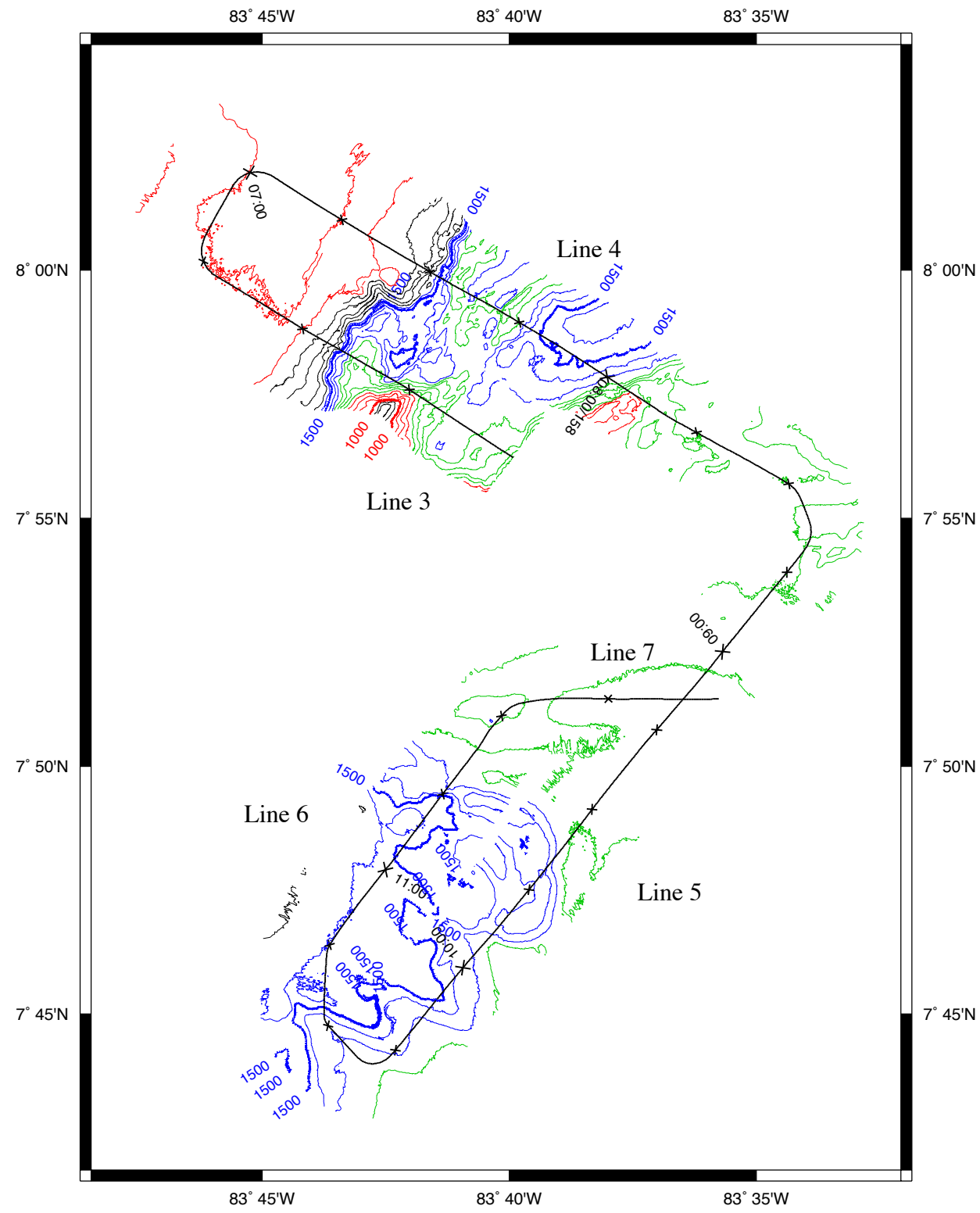
X COC-4 line 5

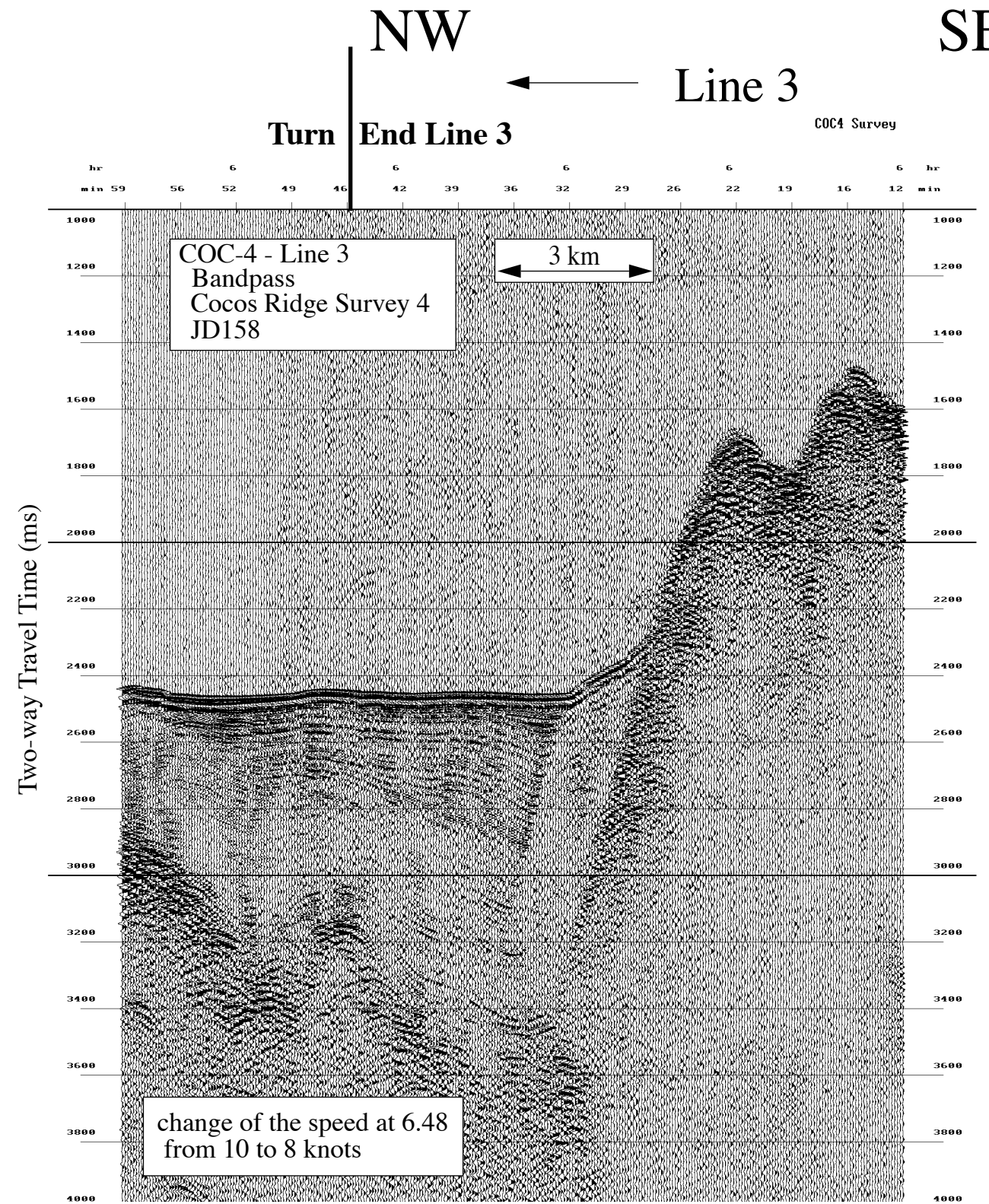
X COC-4 line 9

COC4 Survey



Data File SBfixavg.2000jun06.0600-1200



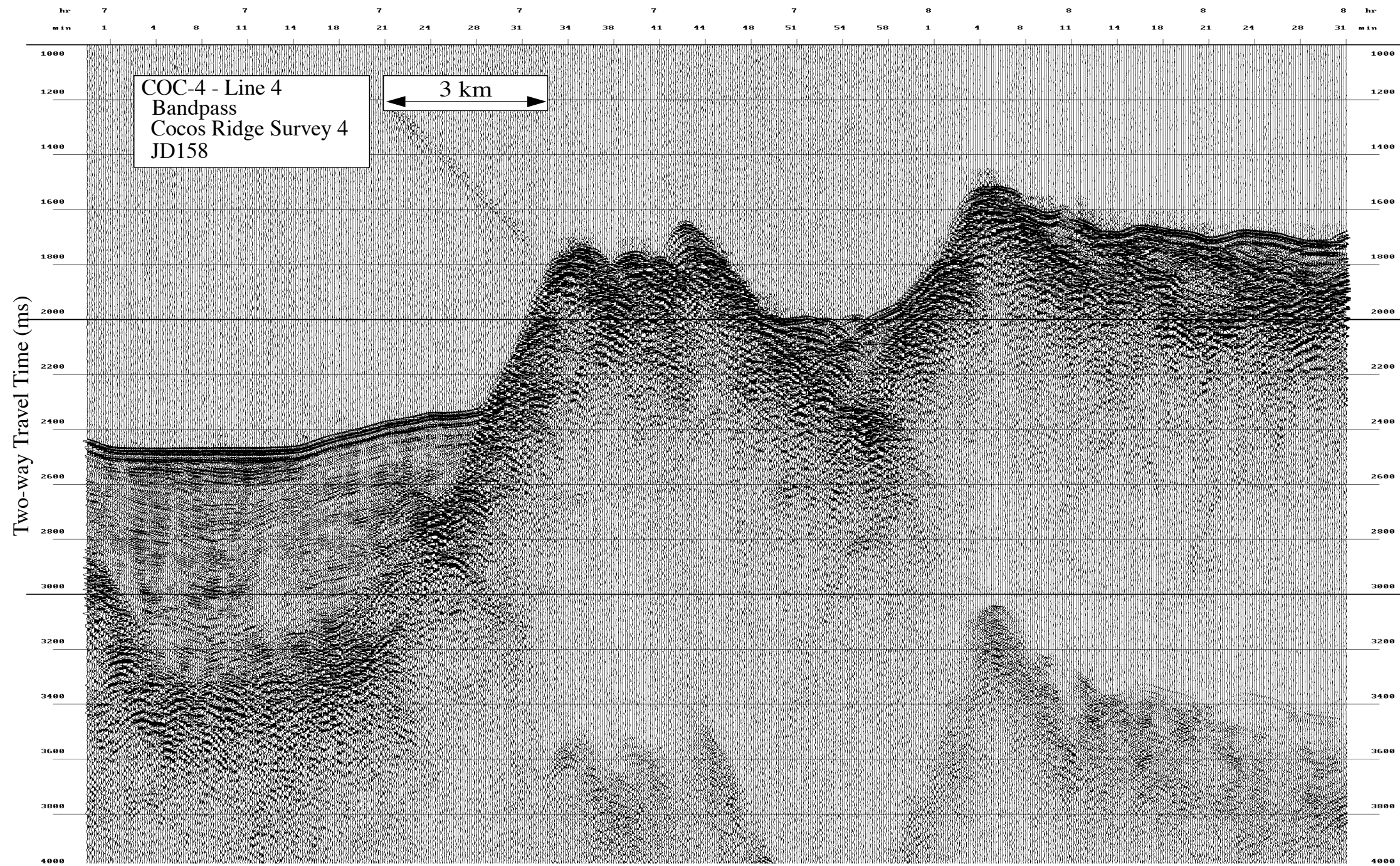


NW

SE

→ Line 4

COC4 Survey



SW

NE

← Line 5

COC-4 Drillsite

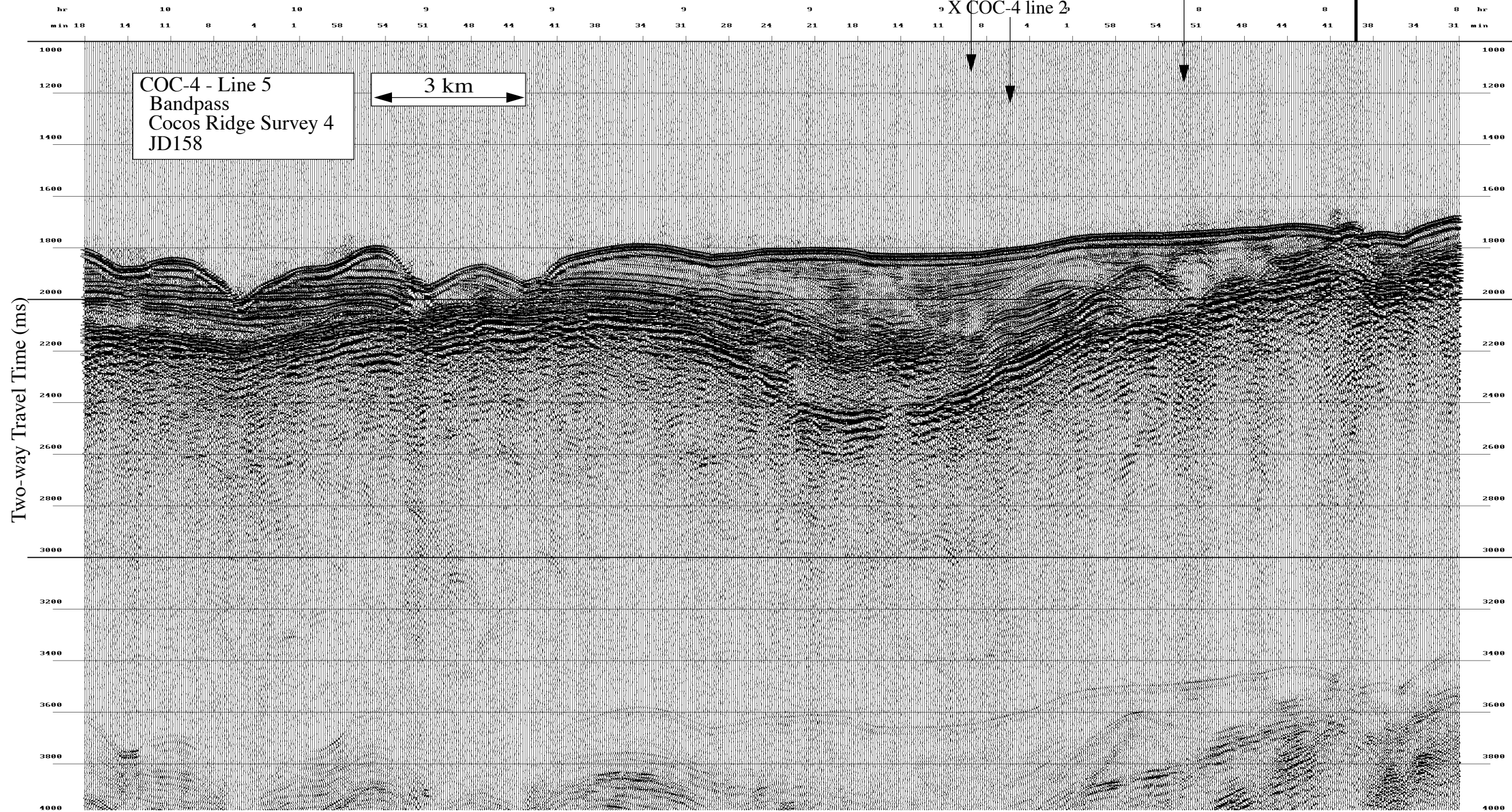
Start Line 5

Turn

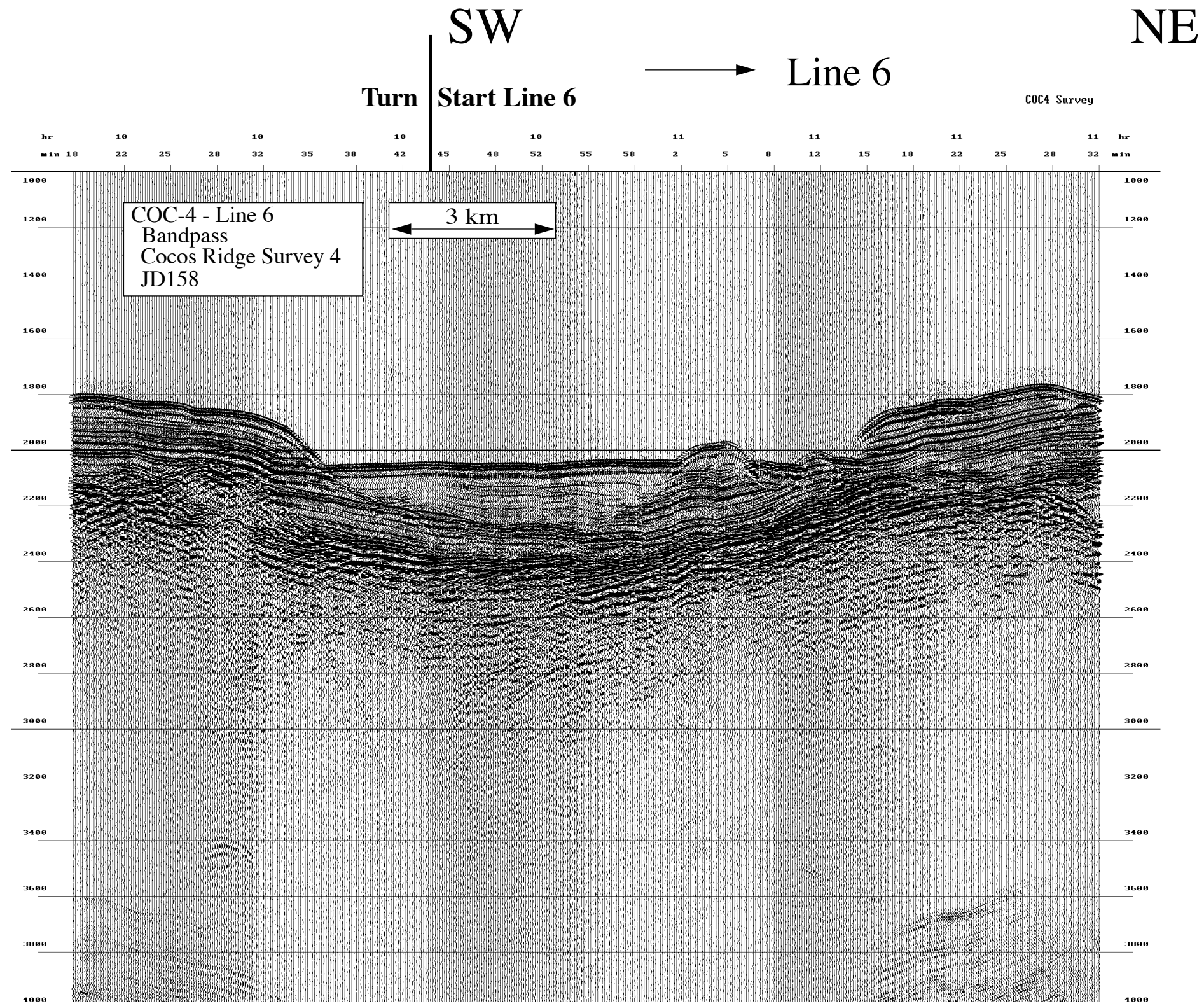
Cores 41MC, 43JC
X COC-4 line 7

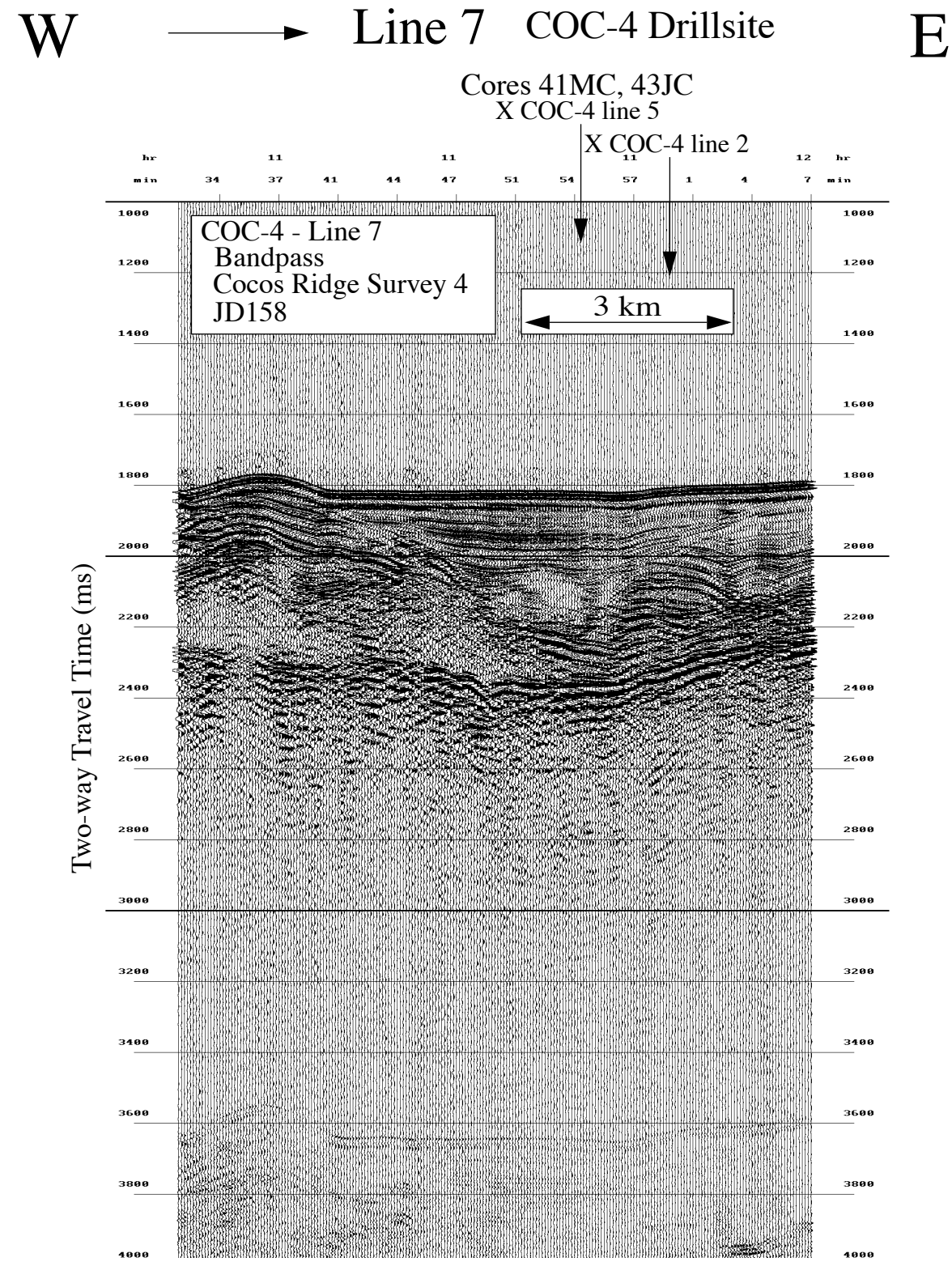
X COC-4 line 3

COC4 Survey

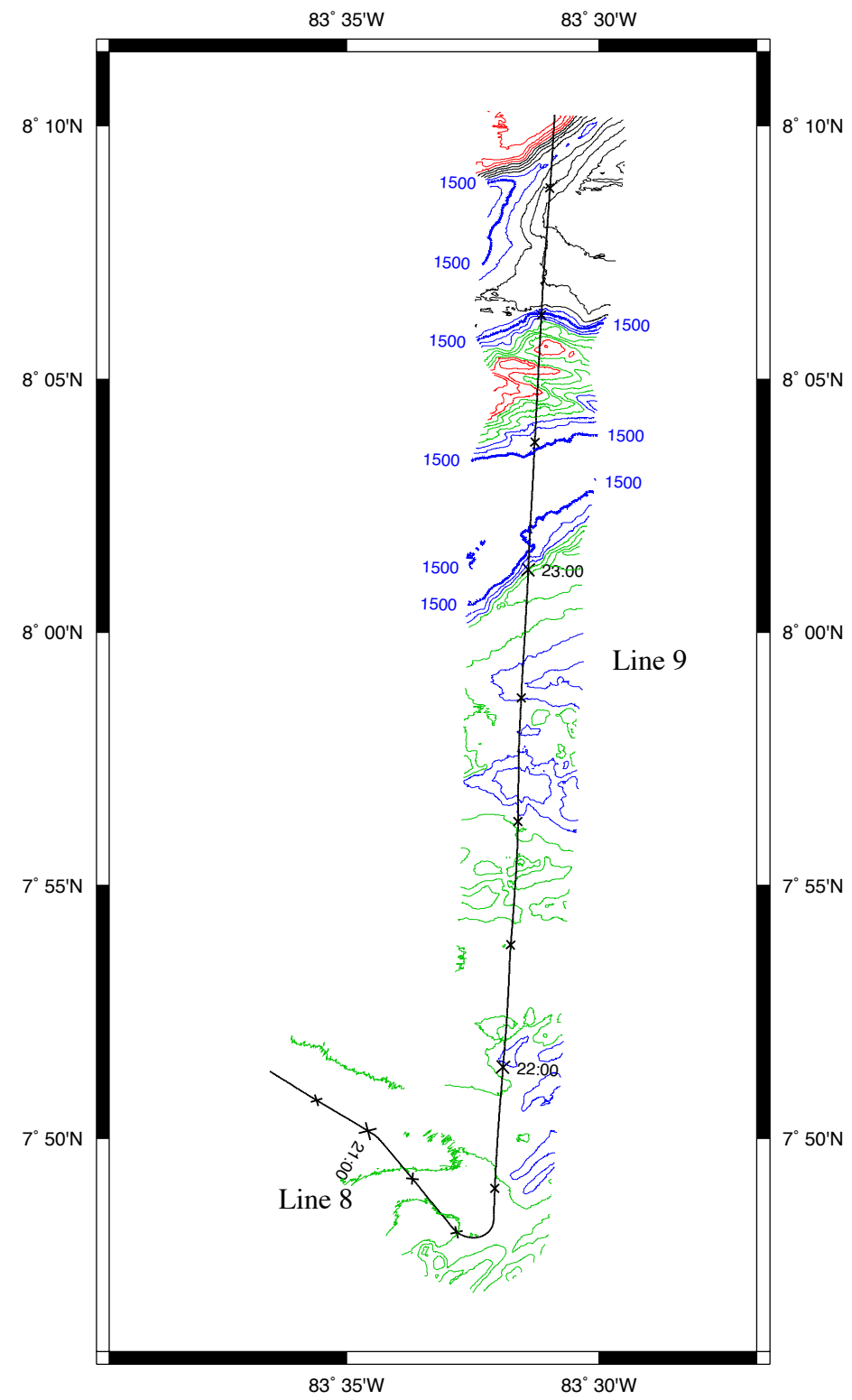


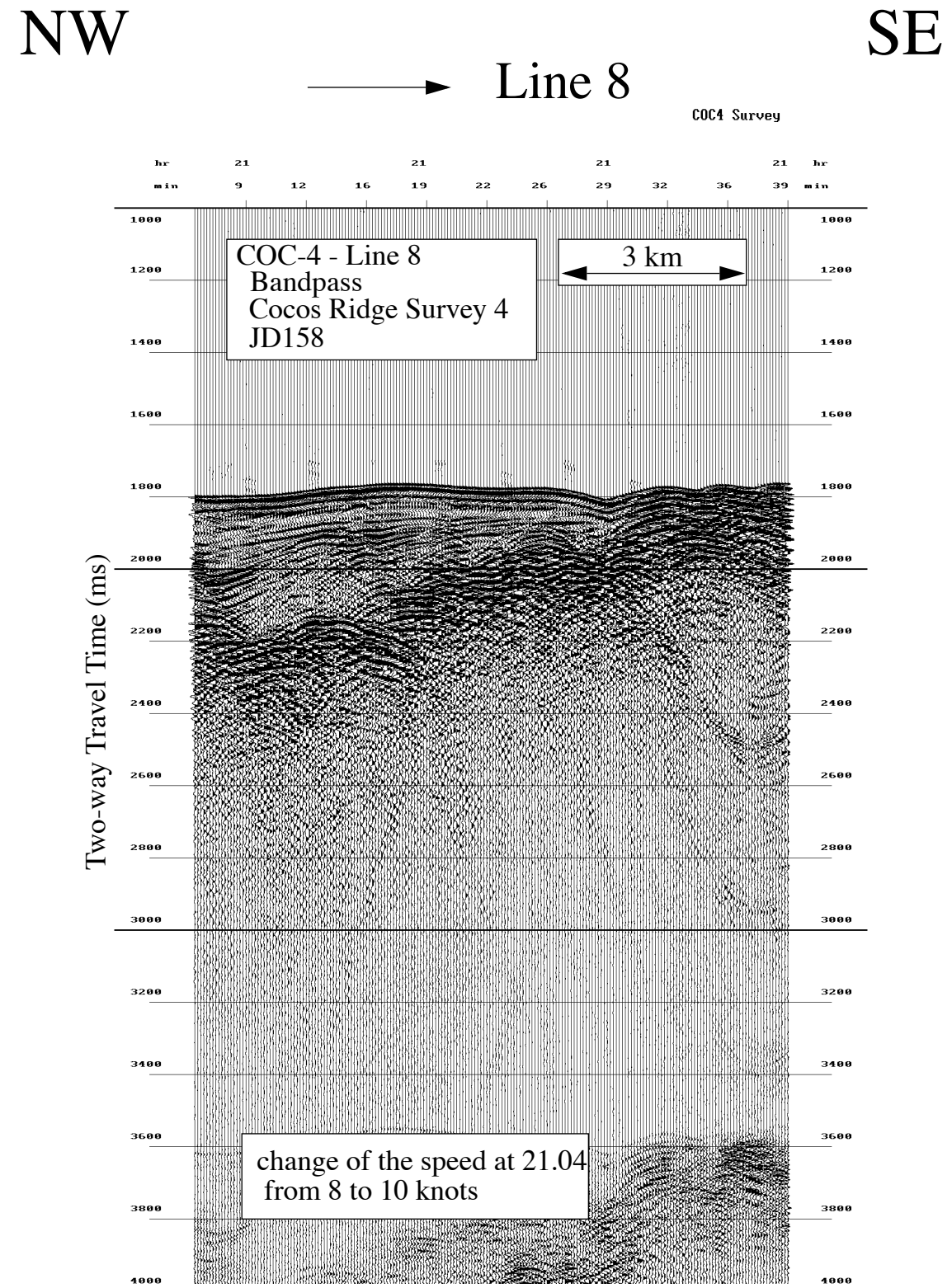
Two-way Travel Time (ms)

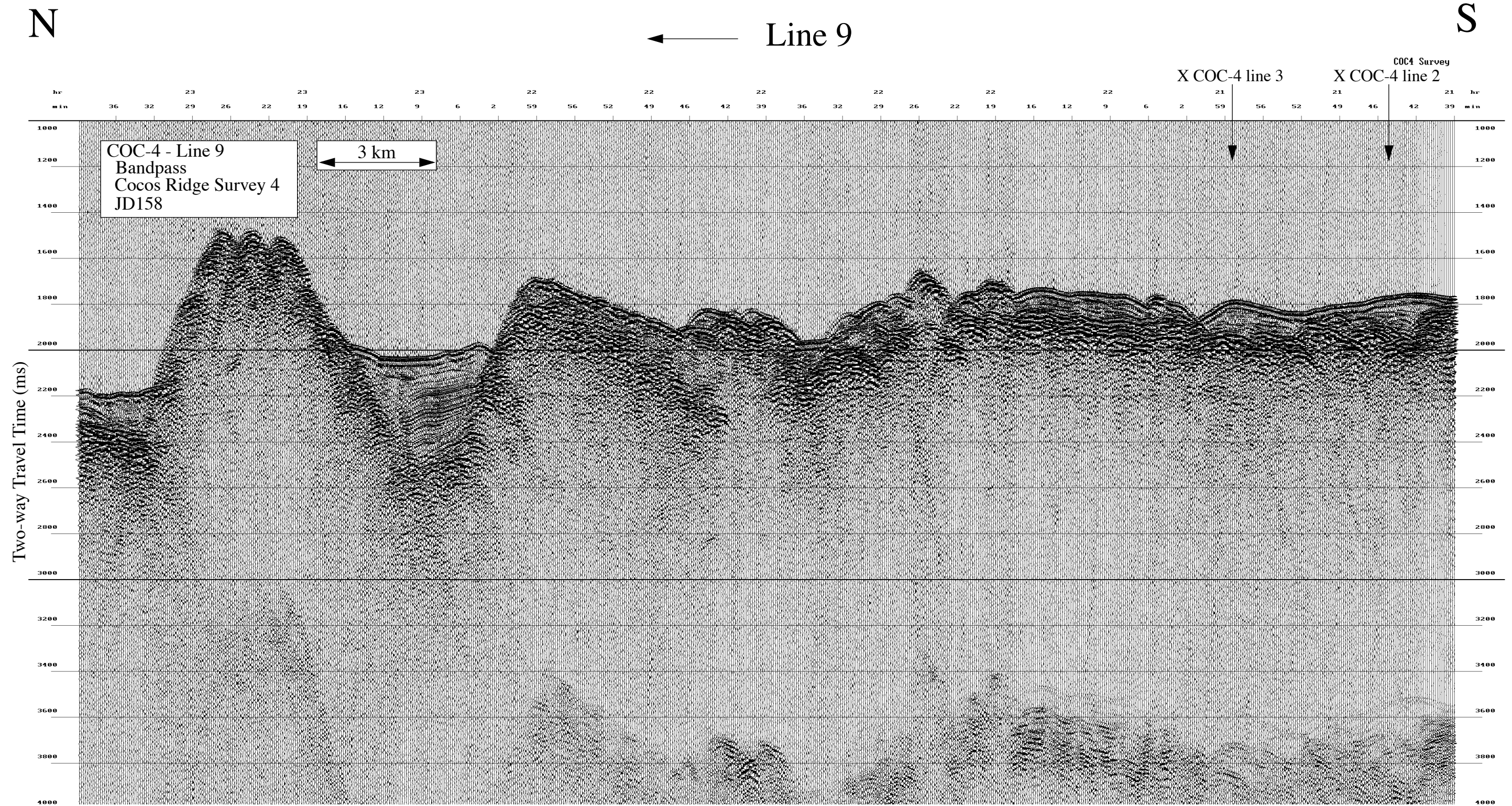




Data File SBfixavg.2000jun06.1800-2400







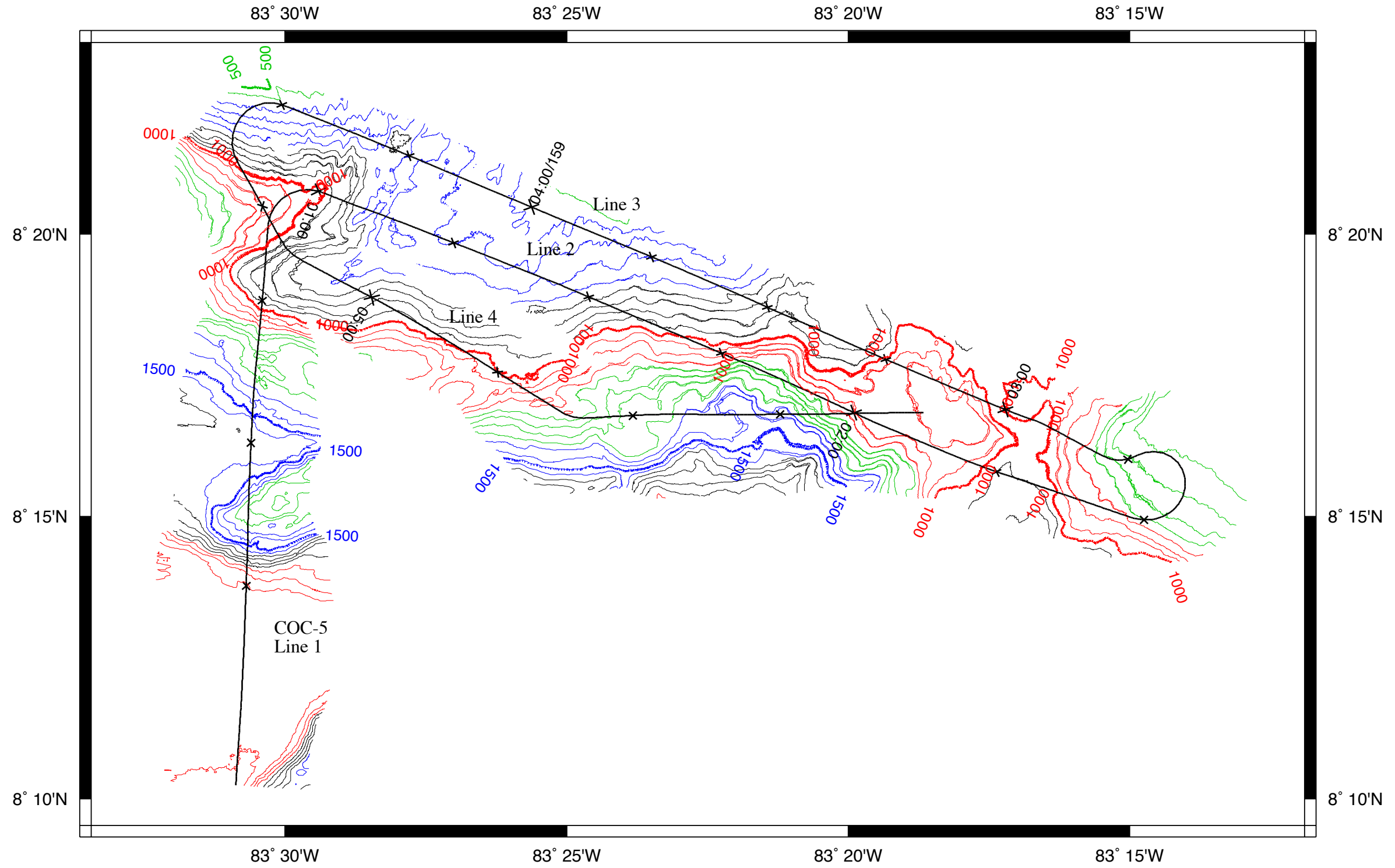
JD 159 (7 June 2000)--COC-5 Survey, Costa Rica Margin

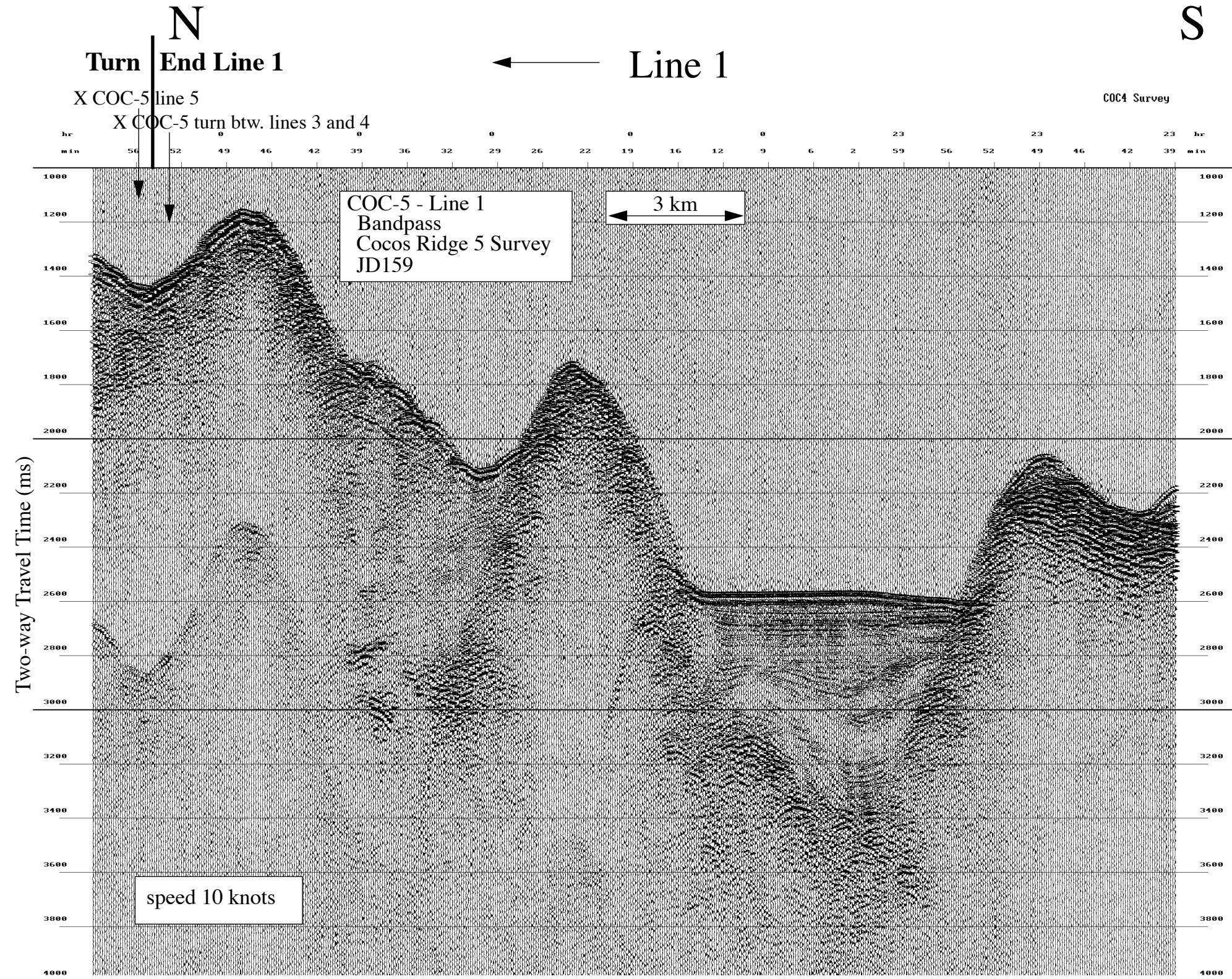
High Resolution Seismic Reflection Records

NEMO Leg 3

R/V Melville

Data File SBfixavg.2000jun07.0000-0600

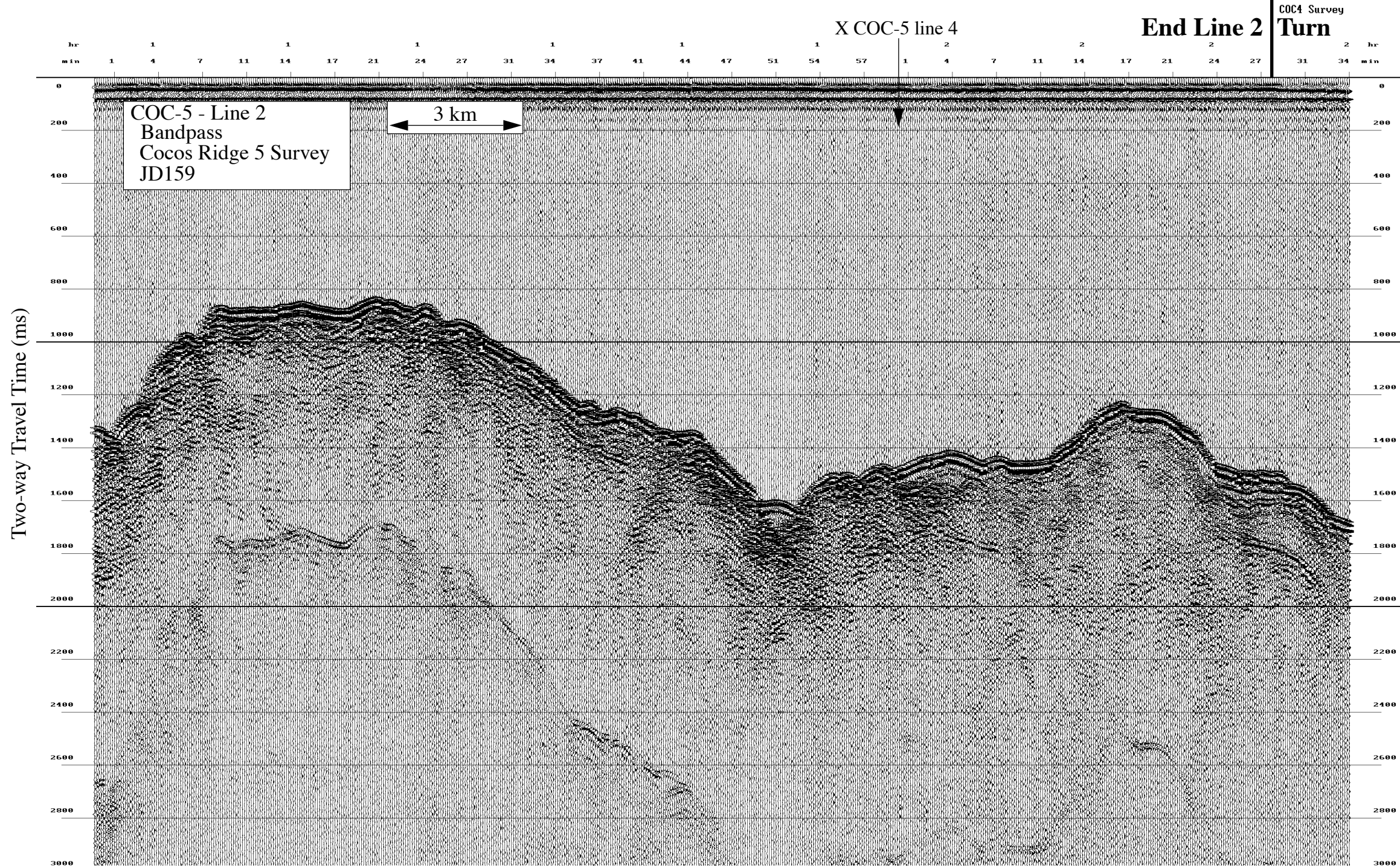


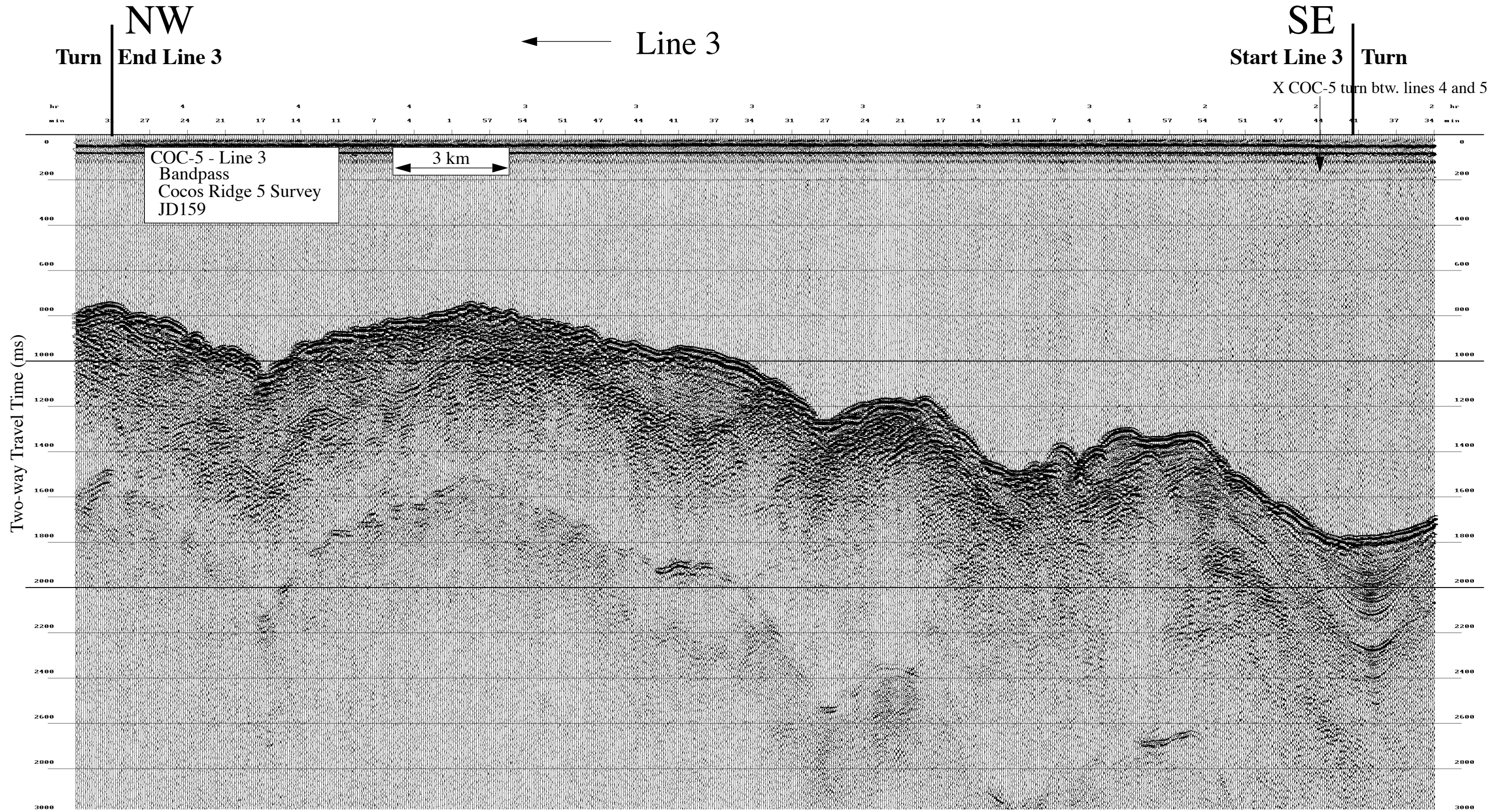


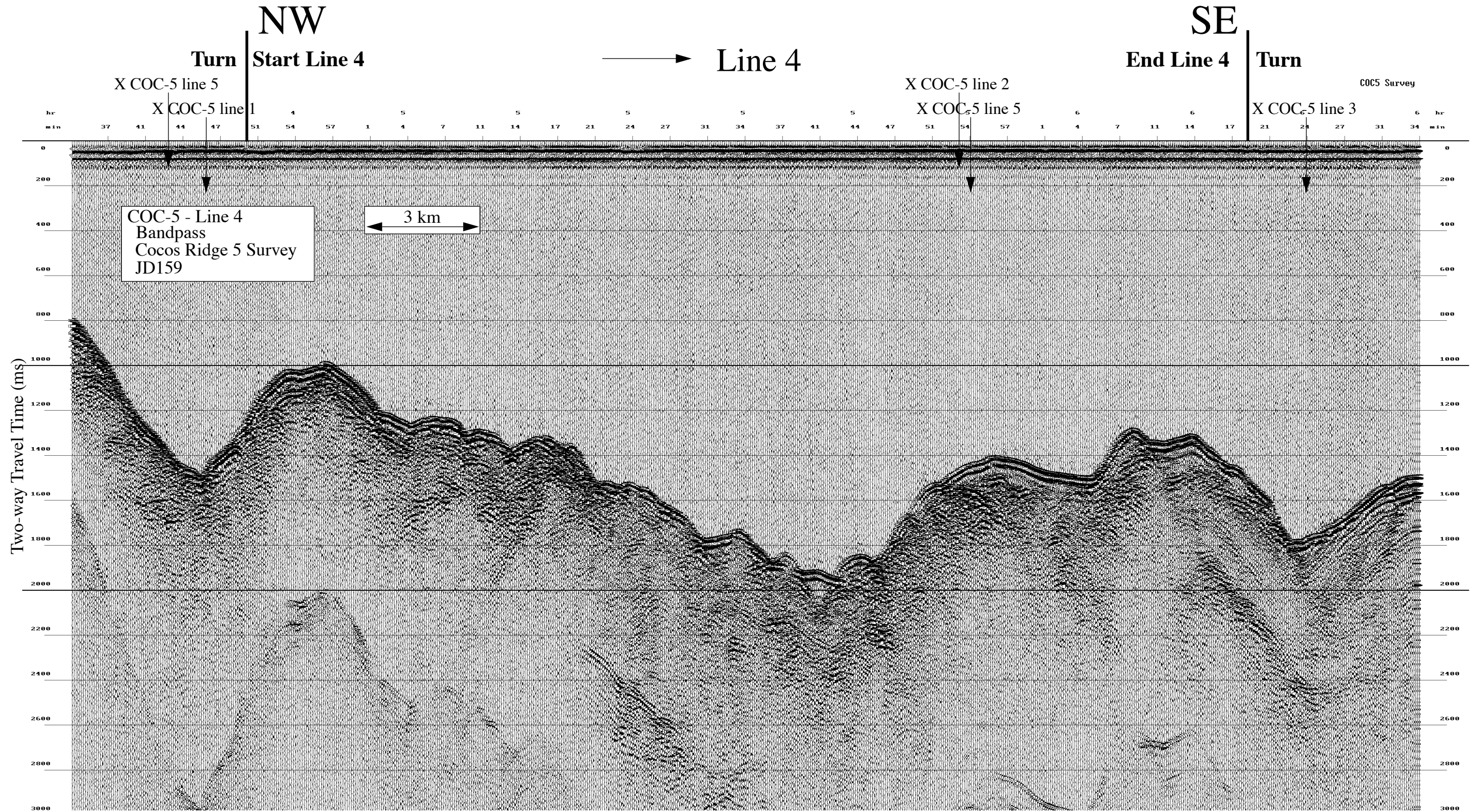
NW

→ Line 2

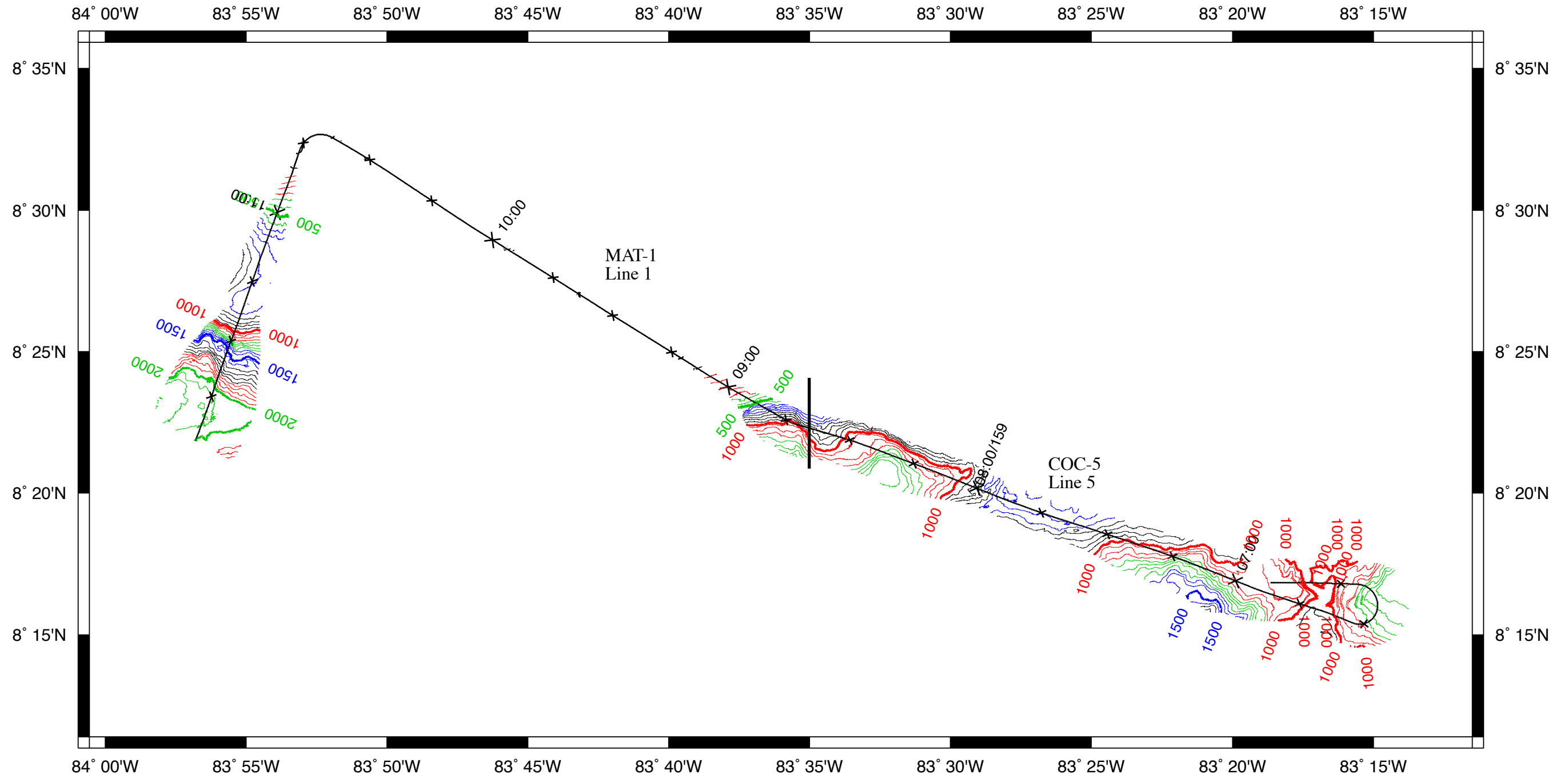
SE

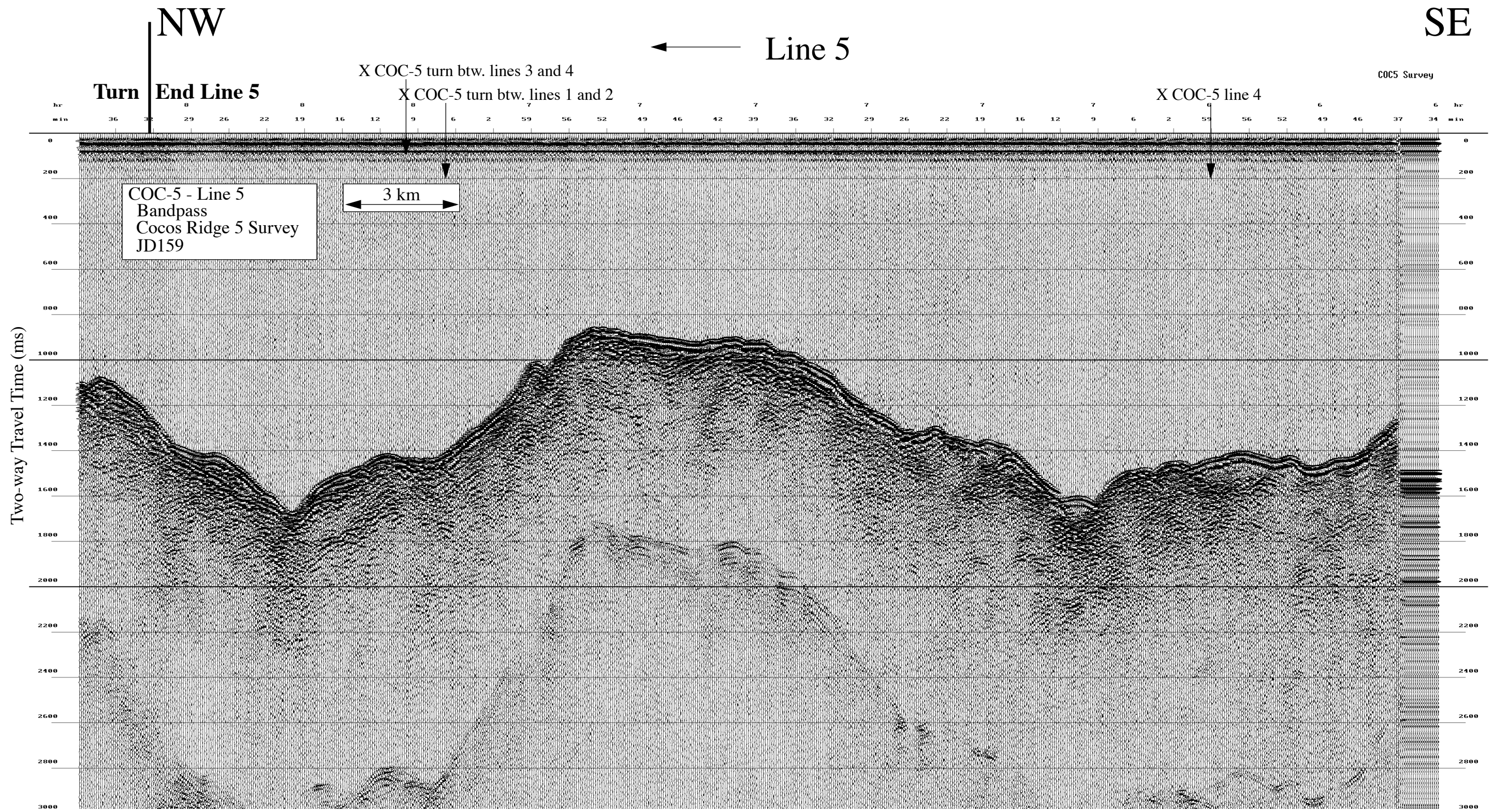






Data File SBfixavg.2000jun07.0600-1200





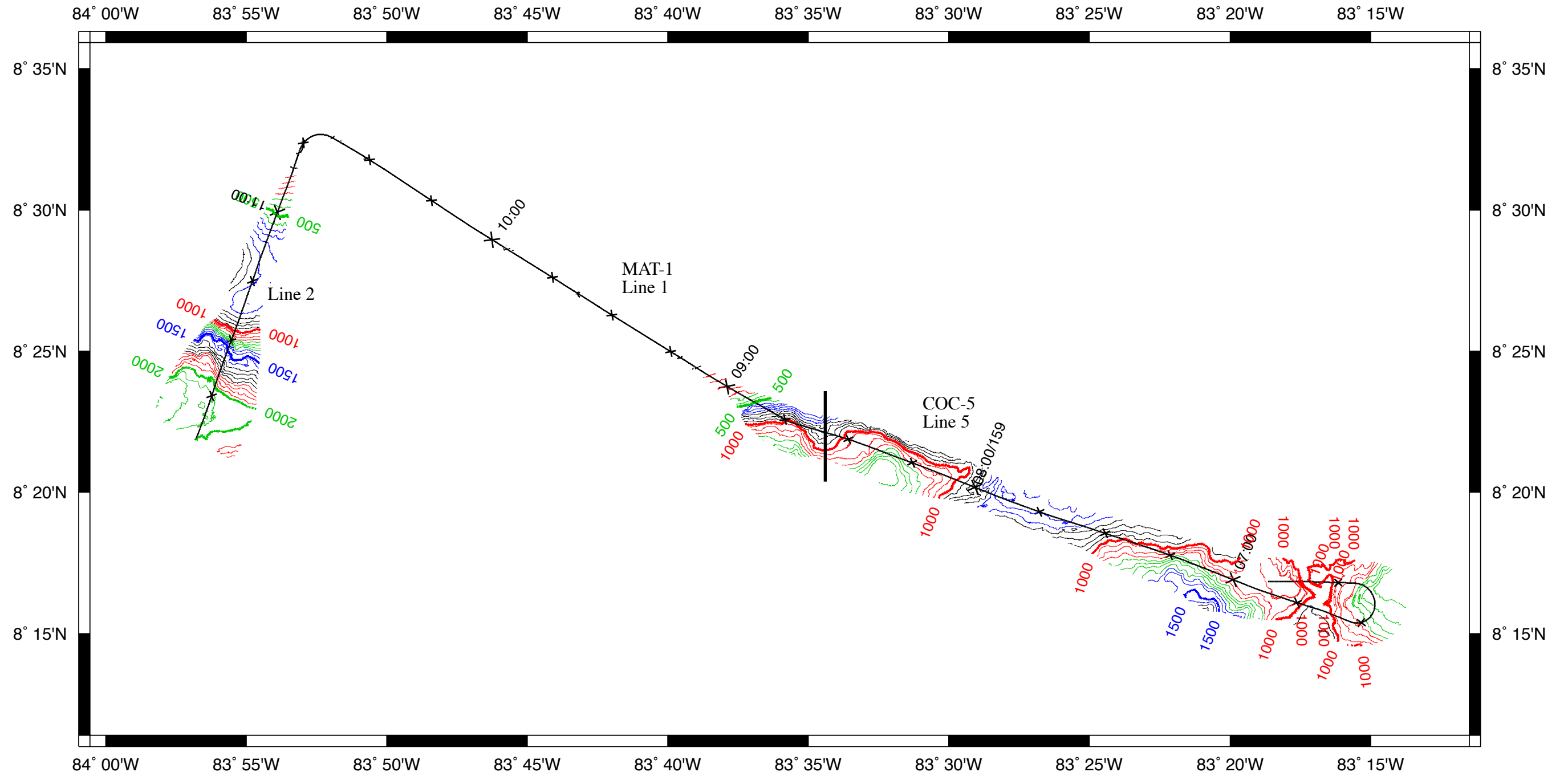
JD 159 (7 June 2000)--MAT-1 Surveys, Mid-America Trench

High Resolution Seismic Reflection Records

NEMO Leg 3

R/V Melville

Data File SBfixavg.2000jun07.0600-1200

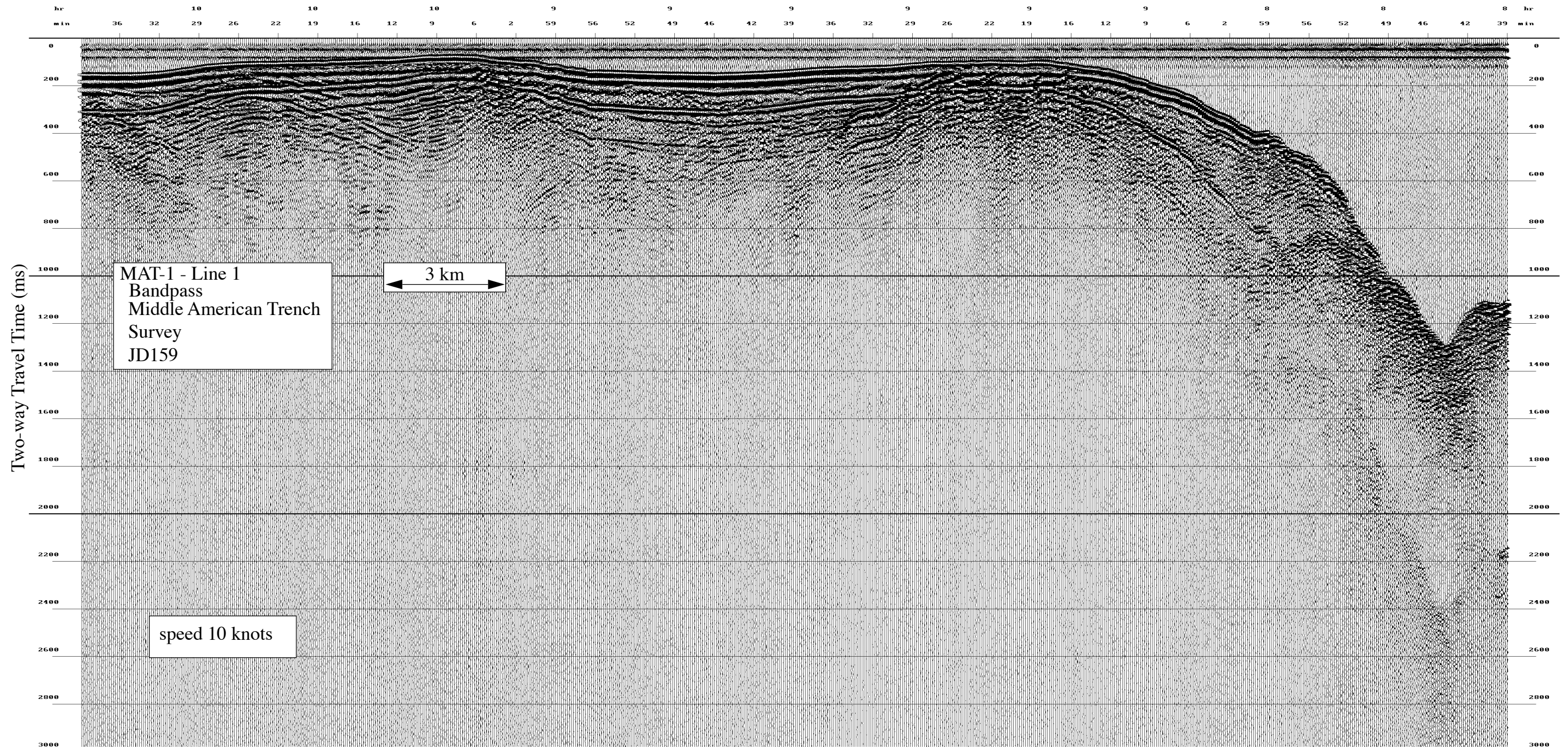


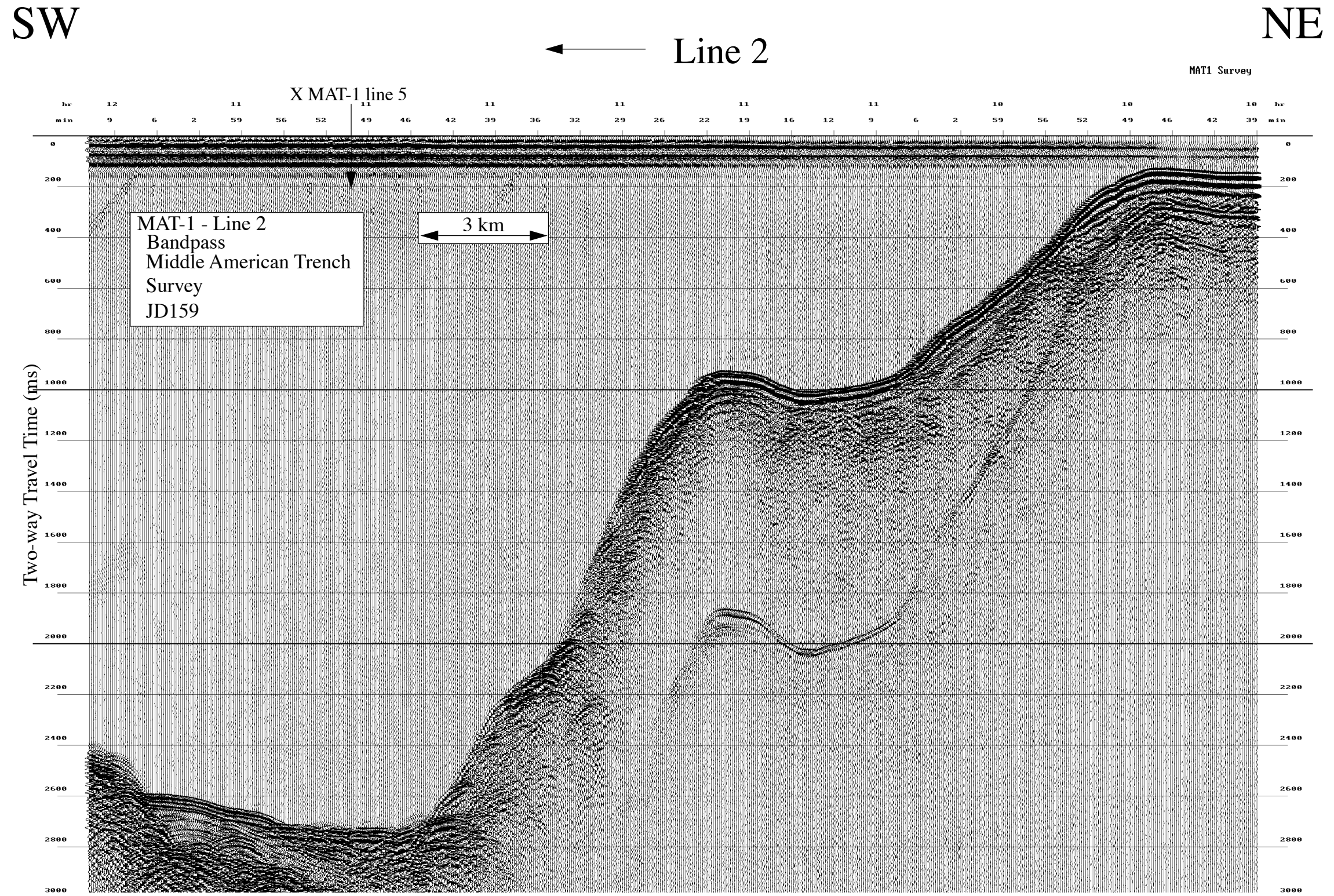
NW

SE

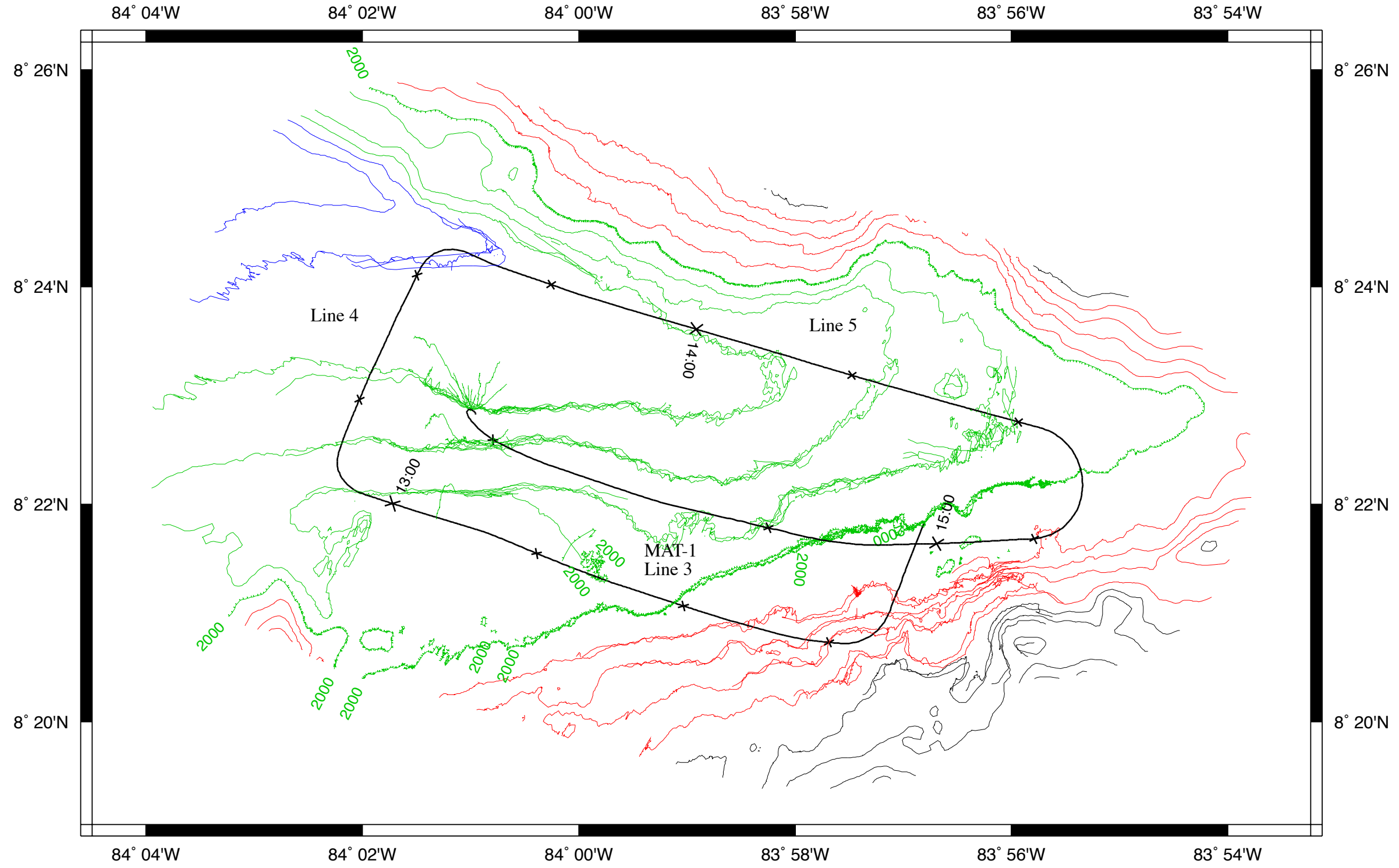
← Line 1

MAT1 Survey





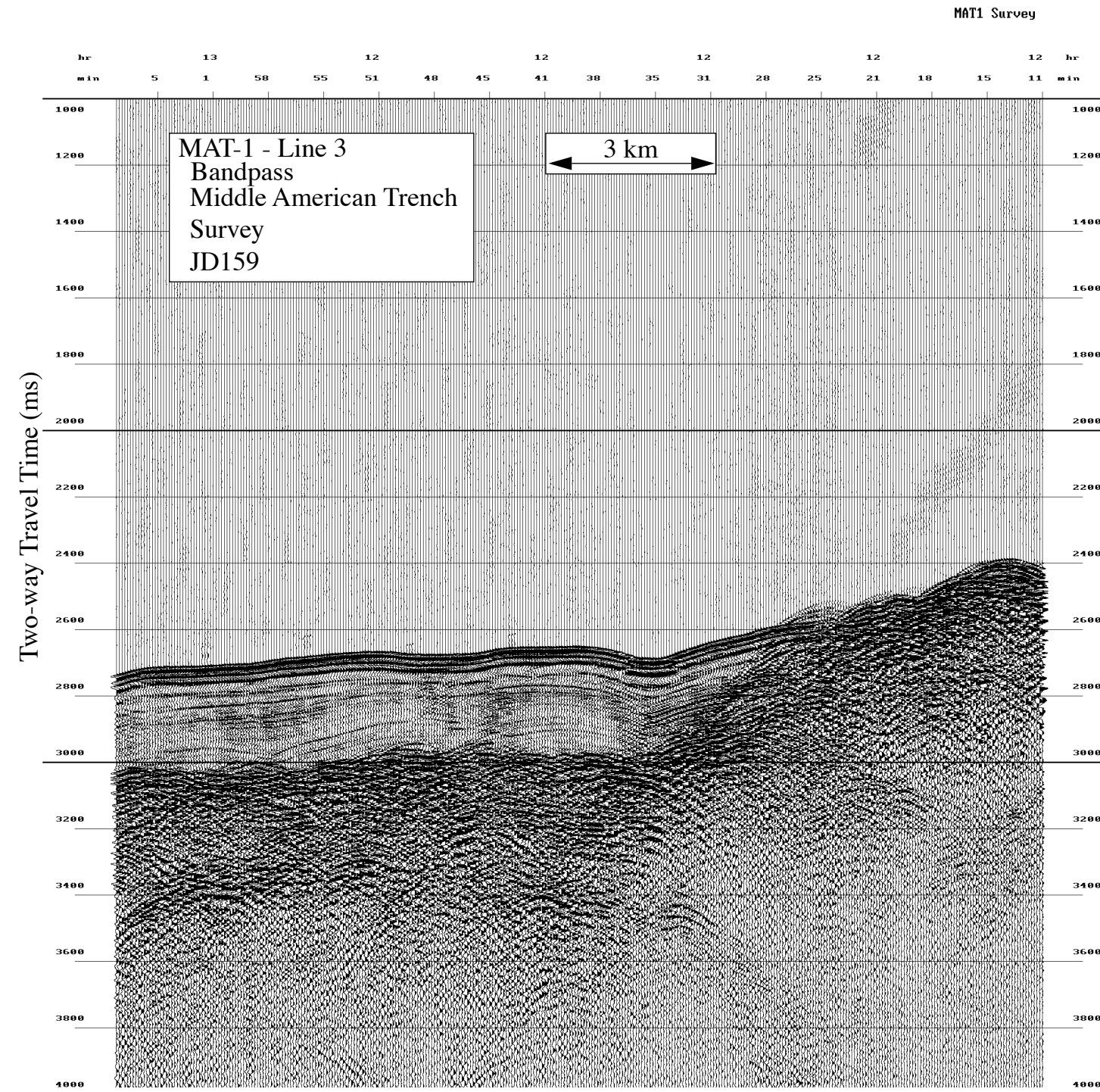
Data File SBfixavg.2000jun07.1200-1800



NW

← Line 3

SE



SW → Line 4 → NE

