

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

Volume 1
Digitally-Recorded 2-7 kHz
Chirp Subbottom Profiles

Mitchell Lyle
Lee Liberty
David Hulett

Center for Geophysical Investigation of the Shallow Subsurface (CGISS)
Boise State University, Boise, Idaho 83725

Aleksandra Janik

Rosenstiel School of Marine and Atmospheric Science
University of Miami, Miami, Florida 33149

BSU CGISS Technical Report 2000-05
1 July 2000

Table of Contents

JD 138 (17 May 2000)	3
JD 139 (18 May 2000)--Begin TEH-1 Survey, Gulf of Tehuantepec	11
JD 140 (19 May 2000)--TEH-1, Day 2	27
JD 141 (20 May 2000)--TEH-1 Survey, Last Day	49
JD 142 (21 May 2000)--Last Day, TEH-1 Survey	88
JD 143 (22 May 2000)--Guatemala Basin	109
JD 144 (23 May 2000)--COC-2 Survey, Cocos Ridge	126
JD 145 (24 May 2000)--COC-2 Survey, Cocos Ridge	143
JD 146 (25 May 2000)--COC-3 Survey, Cocos Ridge	155
JD 147 (26 May 2000)--PAN-1 Survey, Panama Basin	185
JD 148 (27 May 2000)--PAN-2 Survey, equator in Panama Basin	212
JD 149 (28 May 2000)	244
JD 150 (29 May 2000)--CAR-2 Survey, Carnegie Ridge, South Flank	255
JD 151 (30 May 2000)--CAR-2 Survey, Day 2	279
JD 152 (31 May 2000)--end CAR-2 Survey, Begin CAR-1	317
JD 153 (1 June 2000)--CAR-1 Survey, Crest of Carnegie Ridge	364
JD 154 (2 June 2000)--CAR-1 Survey, last day	406
JD 155 (3 June 2000)--PAN-3 Survey, Deep Panama Basin	429
JD 156 (4 June 2000)--Last day, PAN-3 Survey	458
JD 157 (5 June 2000)--COC-1 Survey, Shallow Cocos Ridge	472
JD 158 (6 June 2000)--COC-4 Survey, Cocos Ridge	507
JD 159 (7 June 2000)--COC-5 and MAT-1 Surveys, Costa Rica Margin	544

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

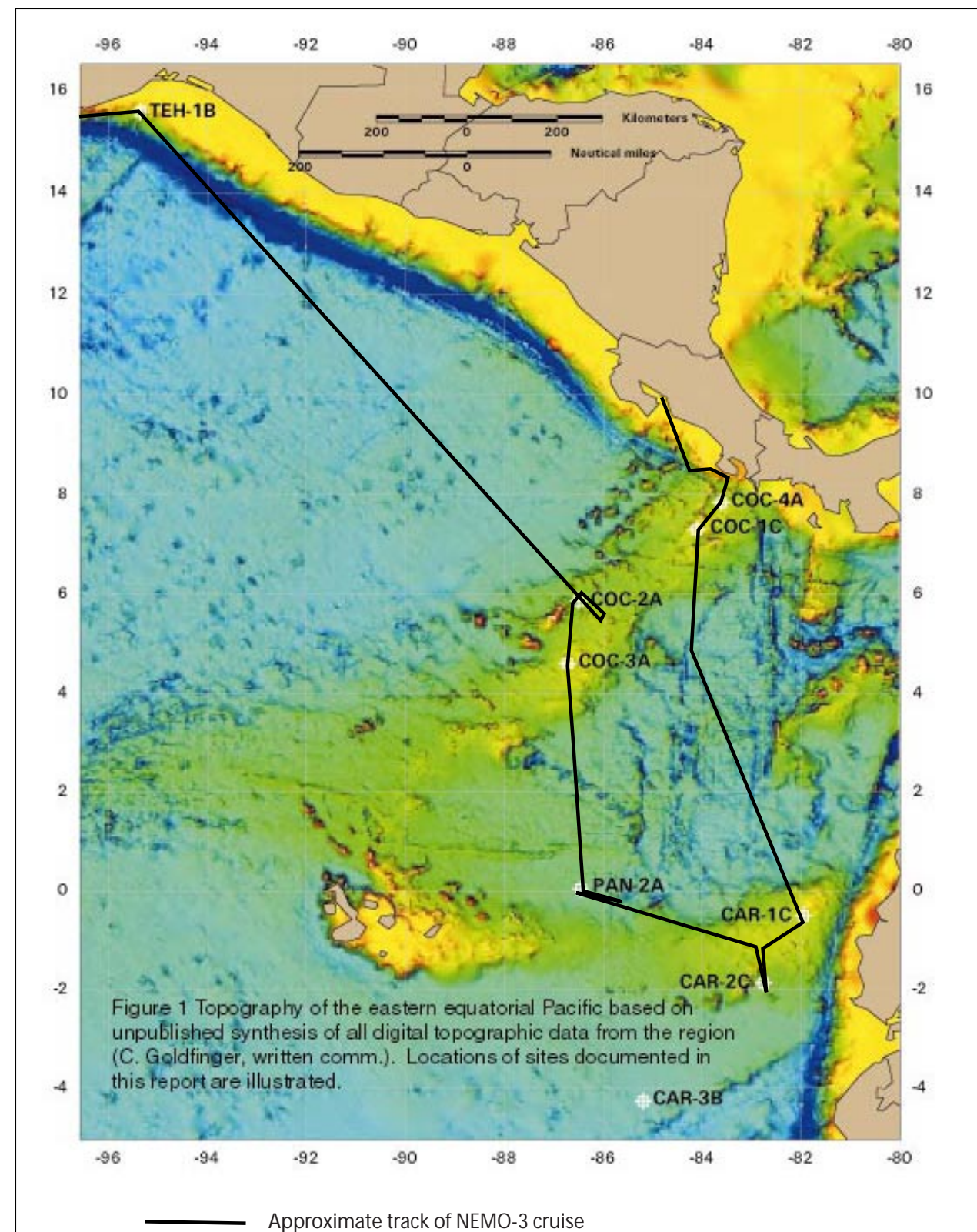
The seismic reflection data were collected using a dual 150 c.i. GI gun seismic source and using the Scripps 4-channel hydrophone streamer. The data were digitally recorded in SEG-Y format, 0.5 msec/sample, using 2 byte integers. We collected 7 seconds of data with no delay.

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.

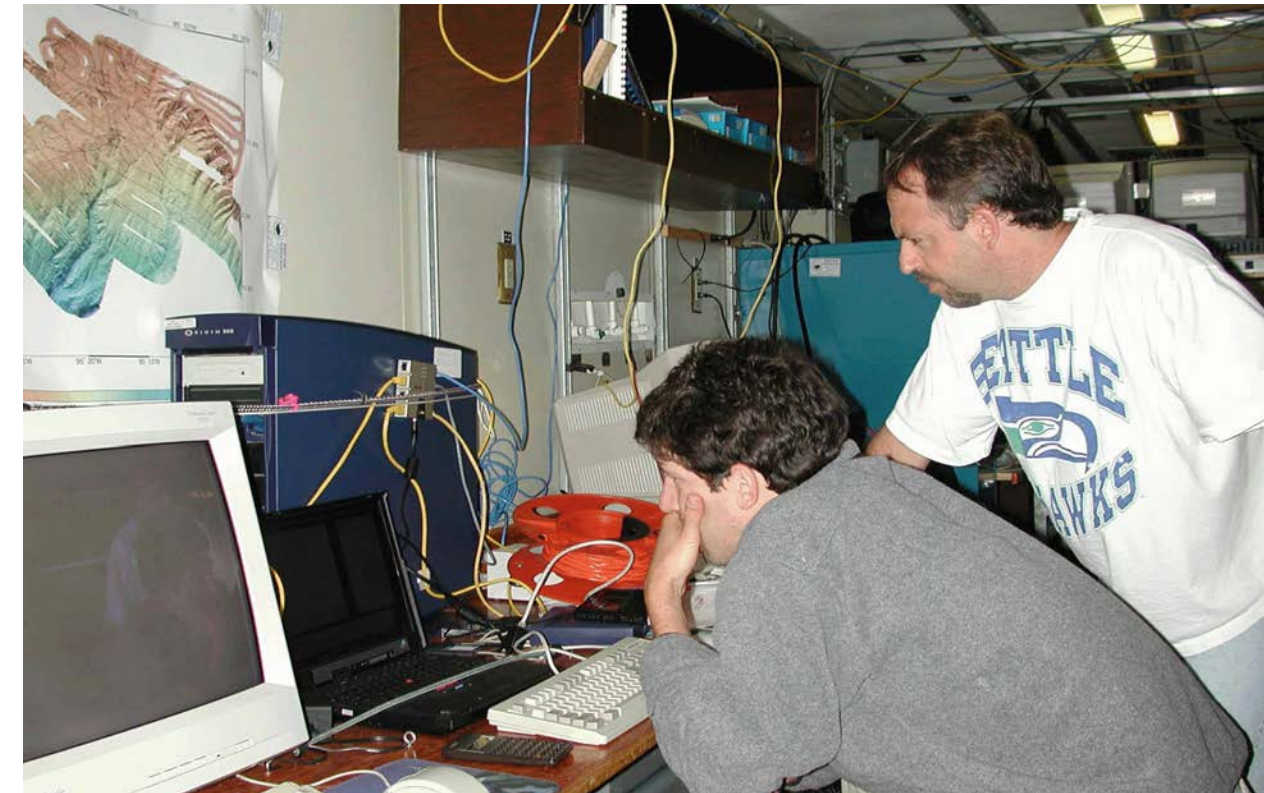


Figure 2: Lee Liberty and Dave Hulett troubleshooting a Geometrics Geode seismometer, NEMO-3 cruise.



Figure 3: Mitch Lyle and Aleksandra Janik, near-real-time processing and image display, Nemo-3 cruise.

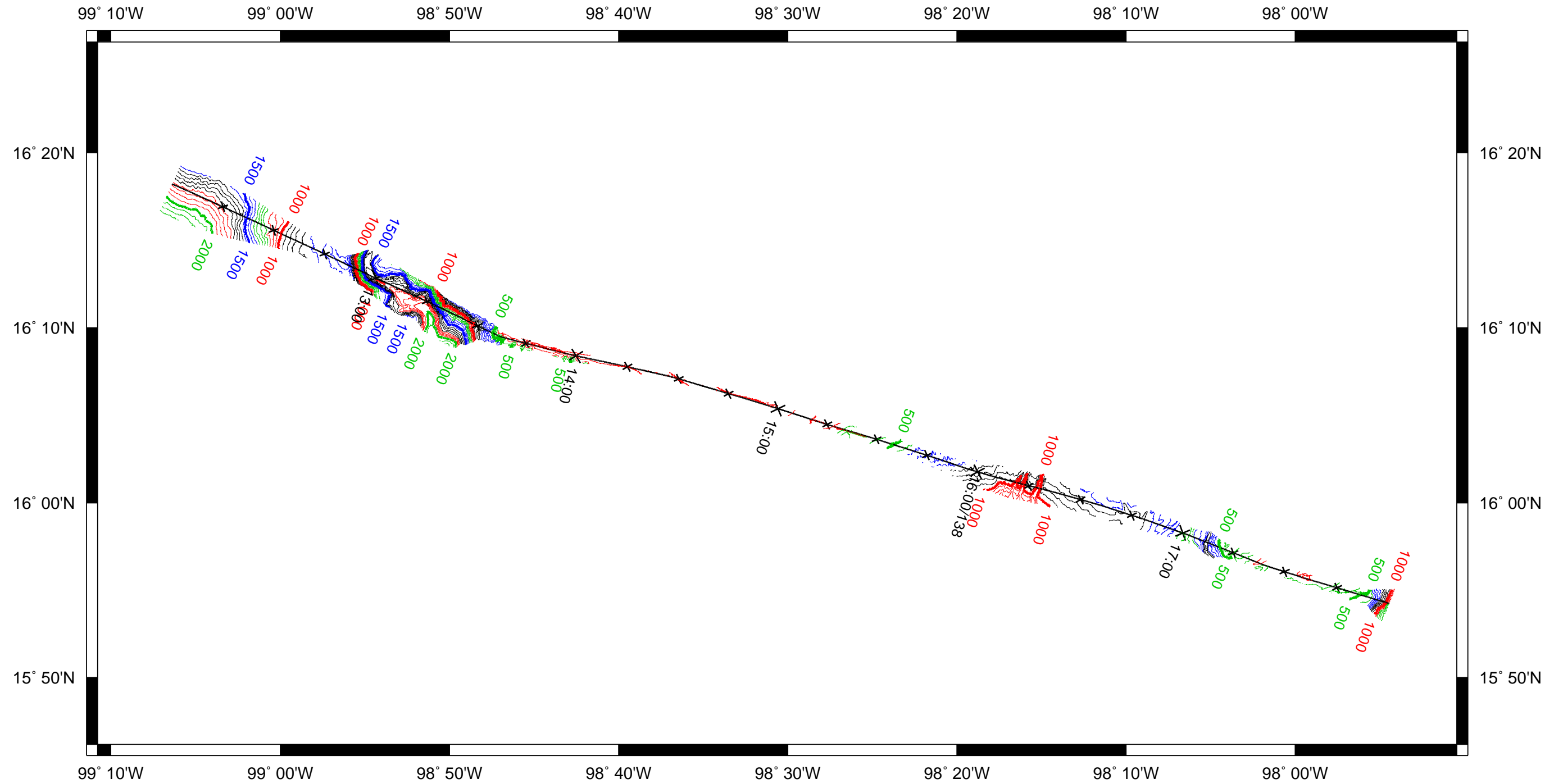
JD 138 (17 May 2000)

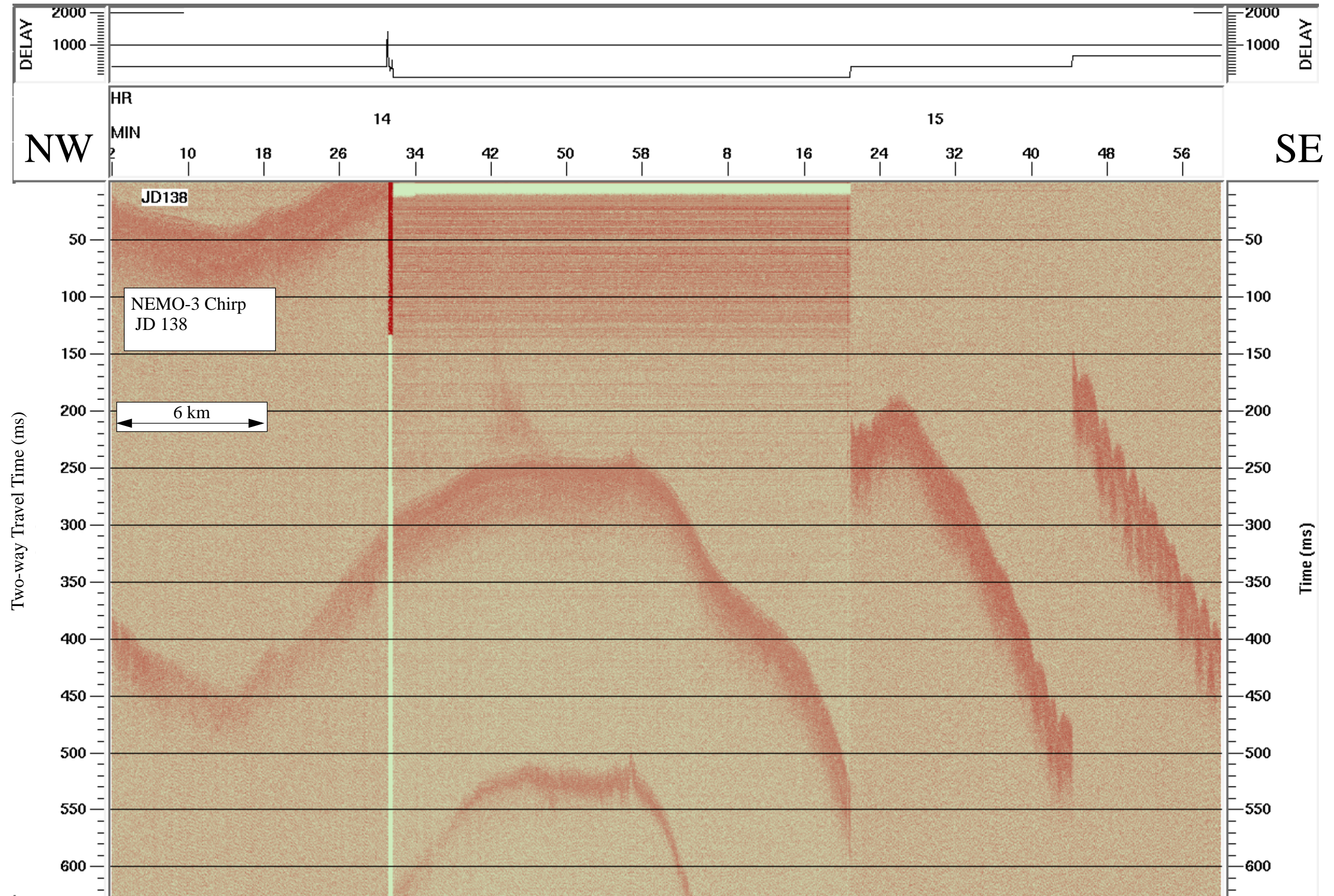
2-7 kHz Chirp Subbottom Profiler

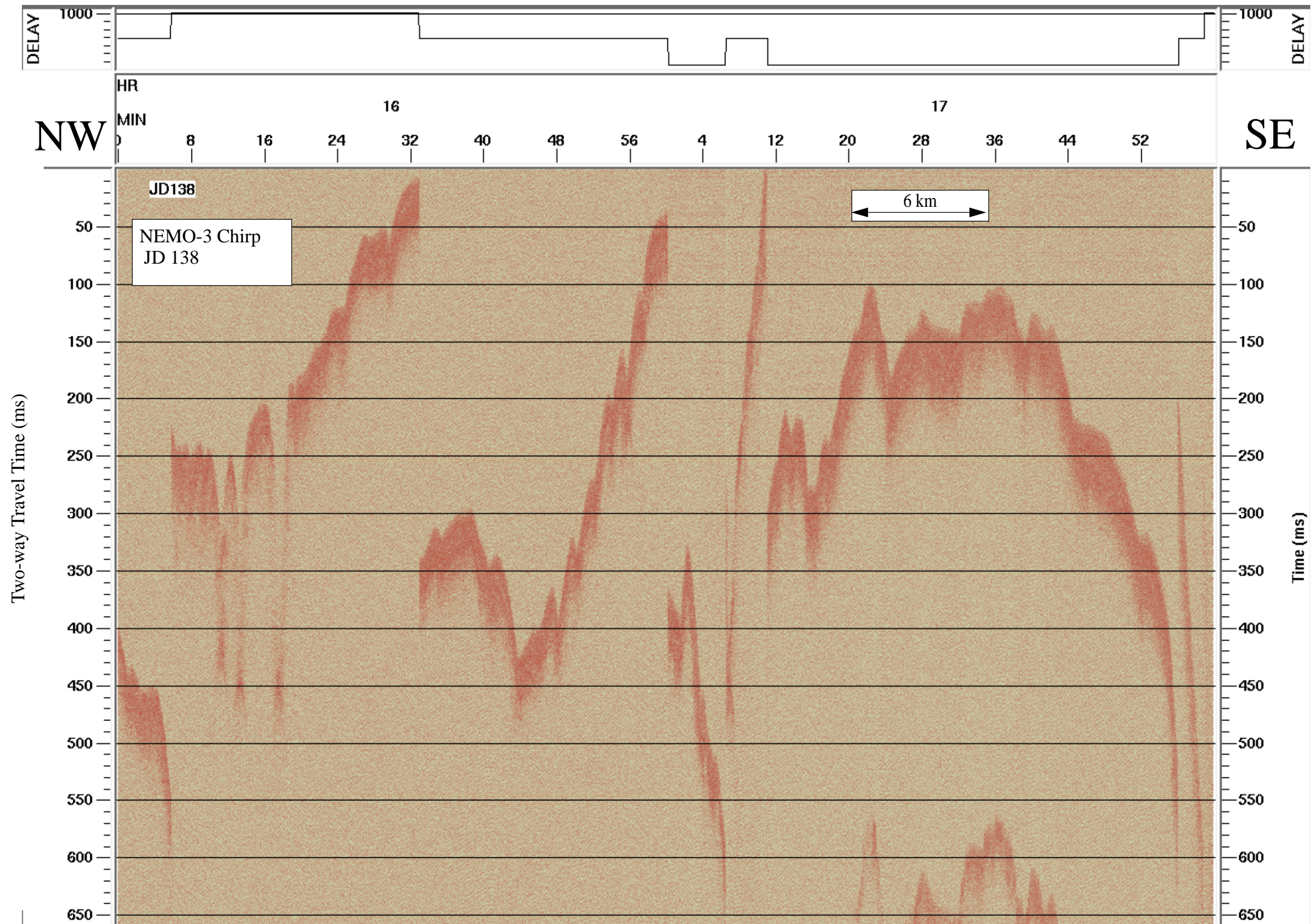
NEMO Leg 3

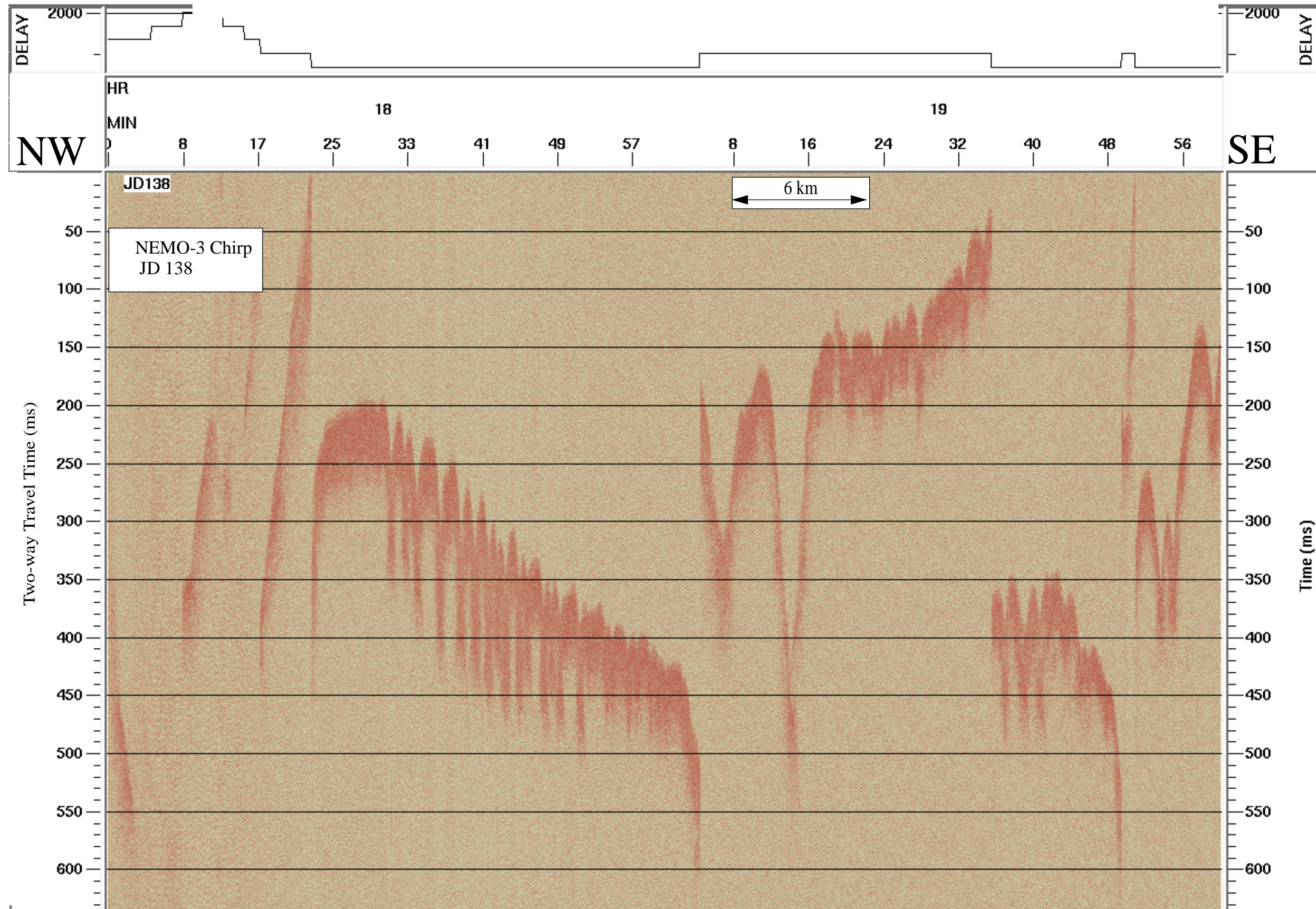
R/V Melville

Data File SBfixavg.2000may17.1200-1800

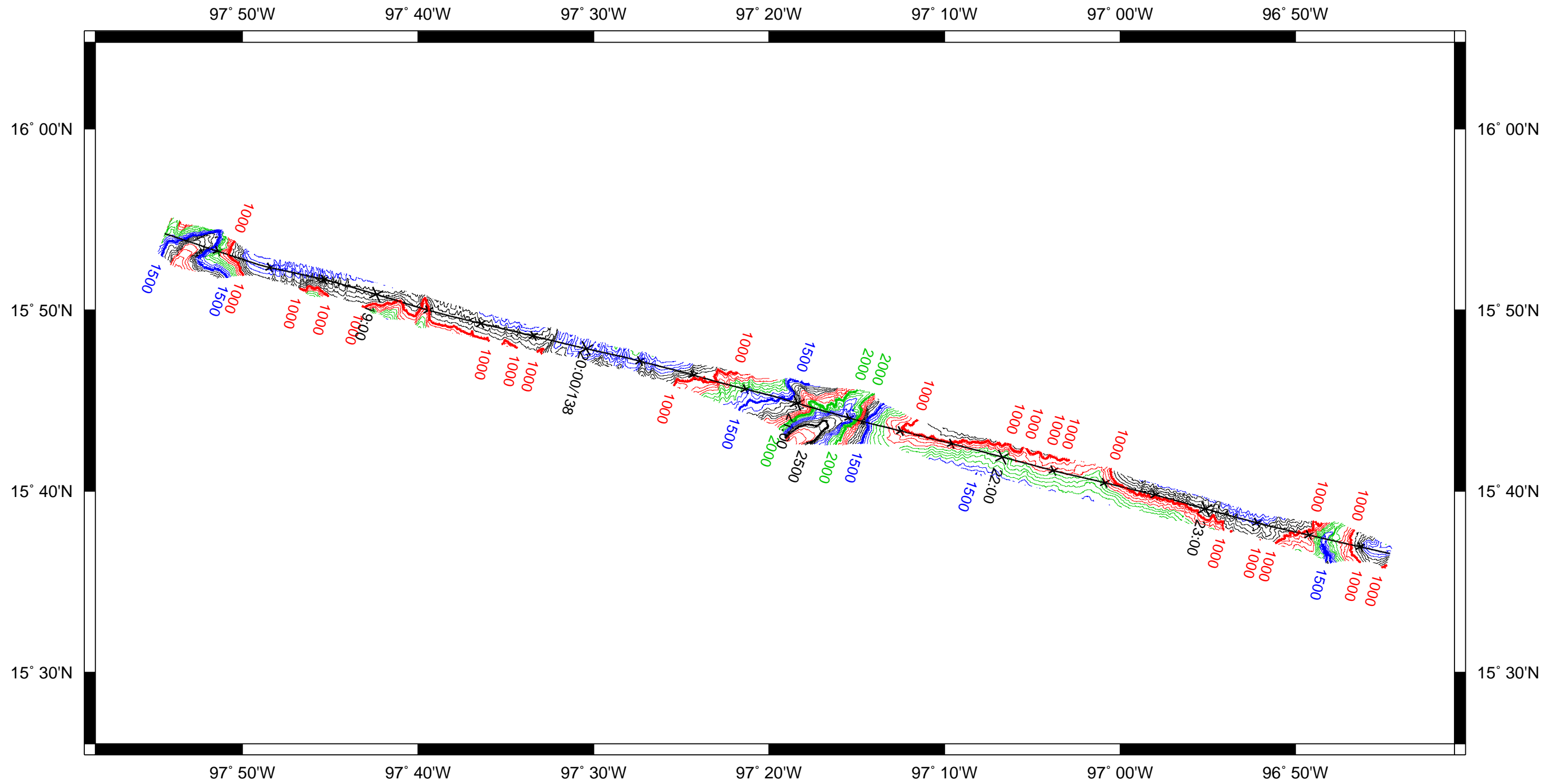


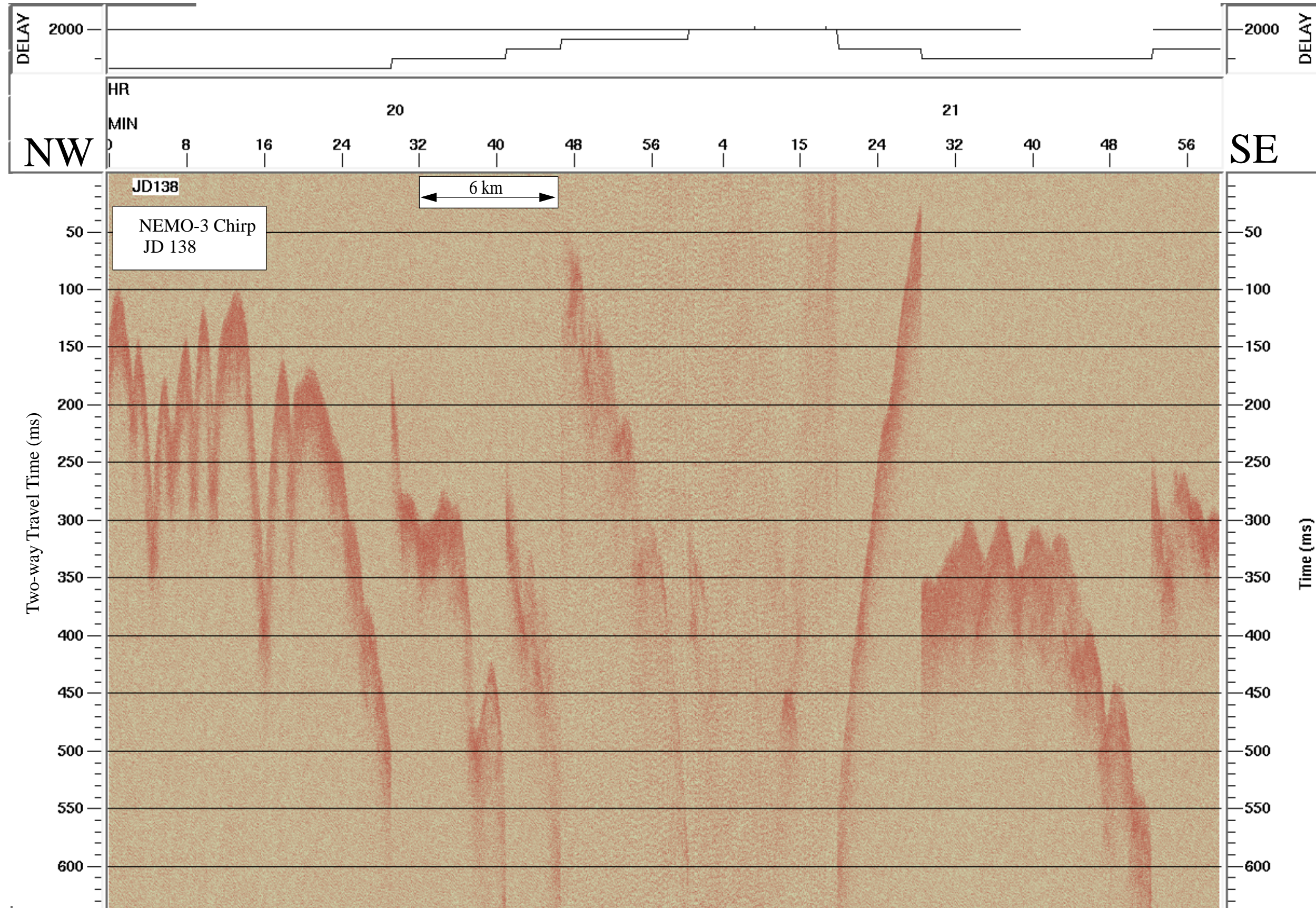


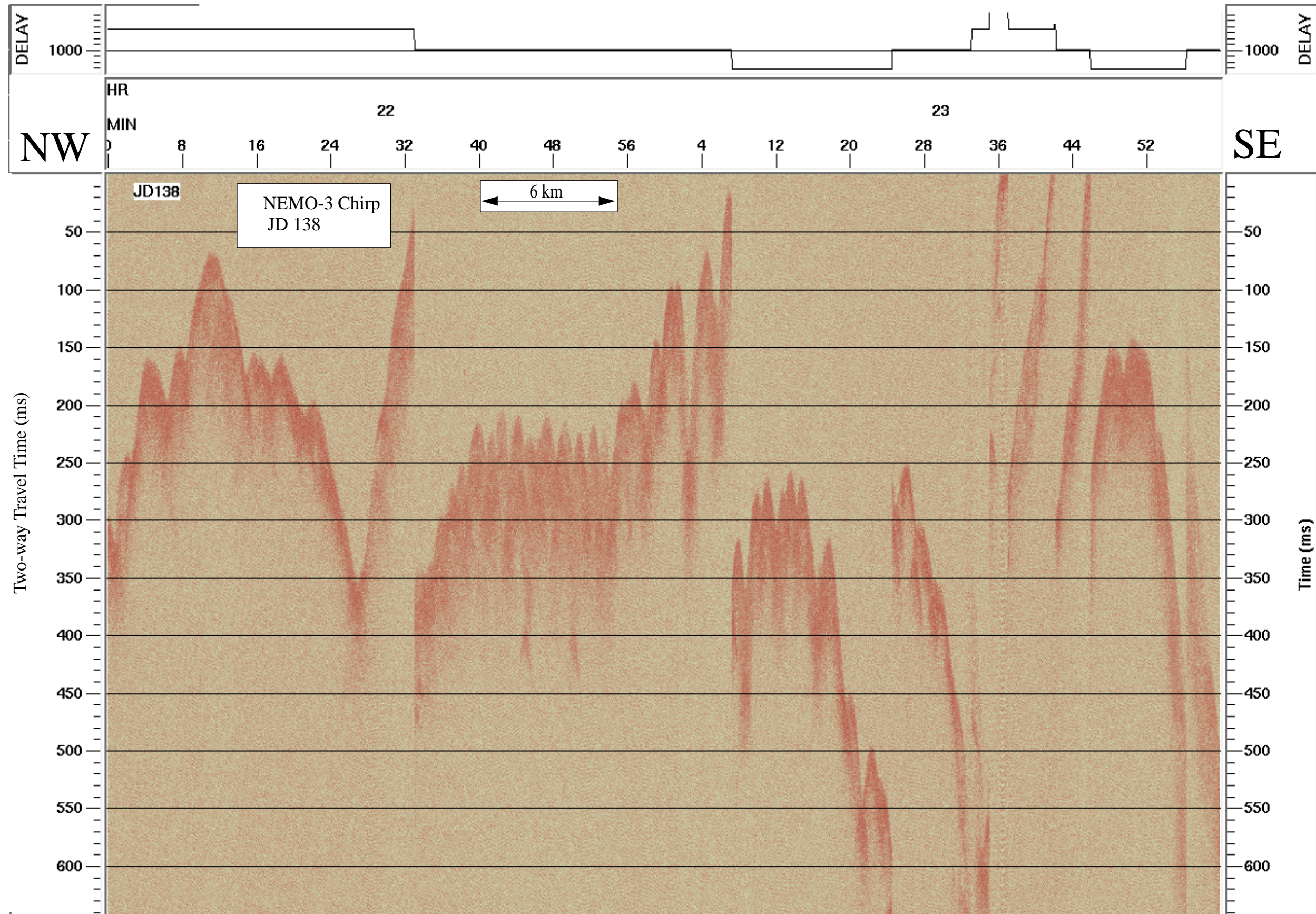




Data File SBfixavg.2000may17.1800-2400







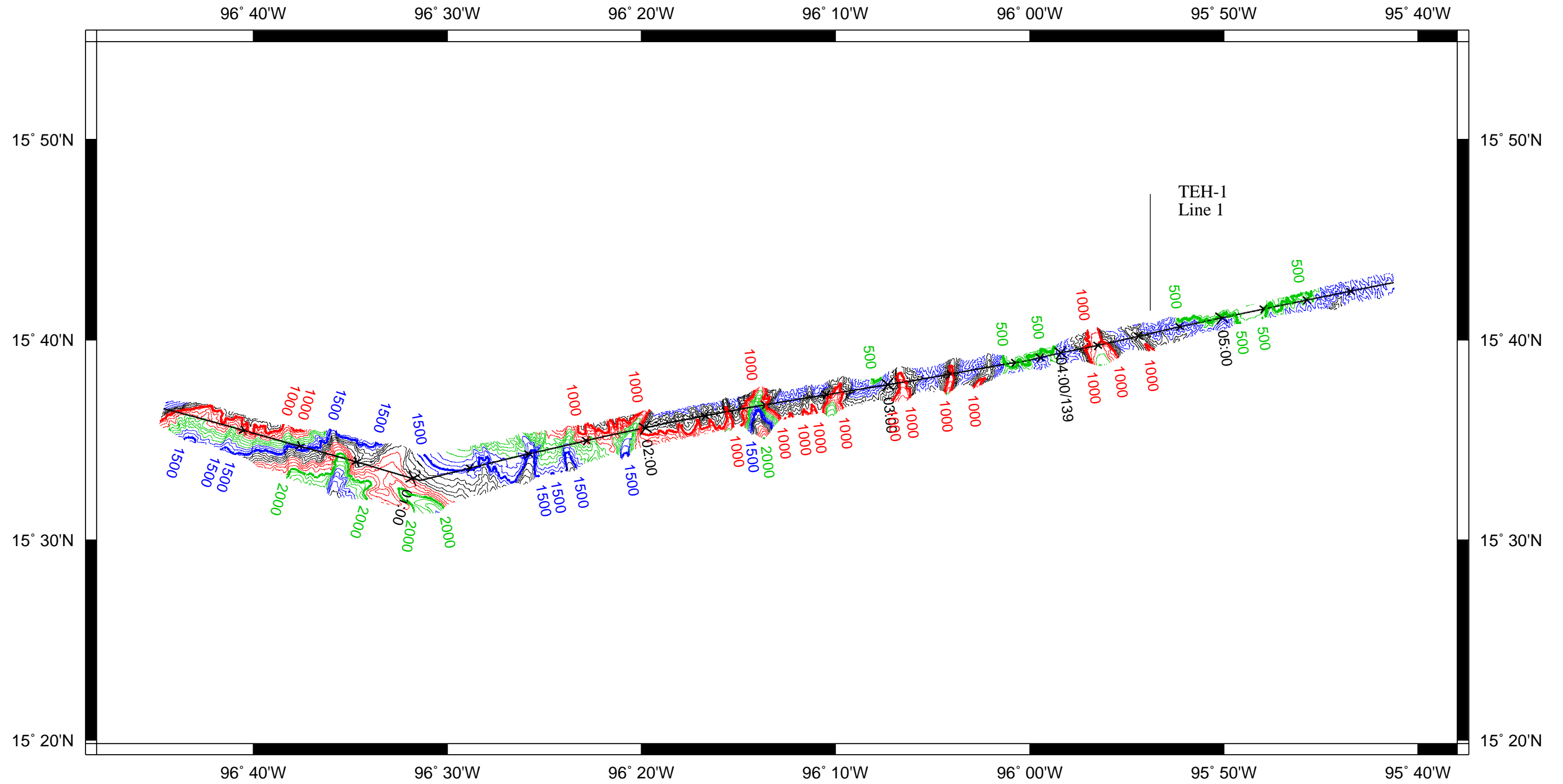
JD 139 (18 May 2000)--Begin TEH-1 Survey, Gulf of Tehuantepec

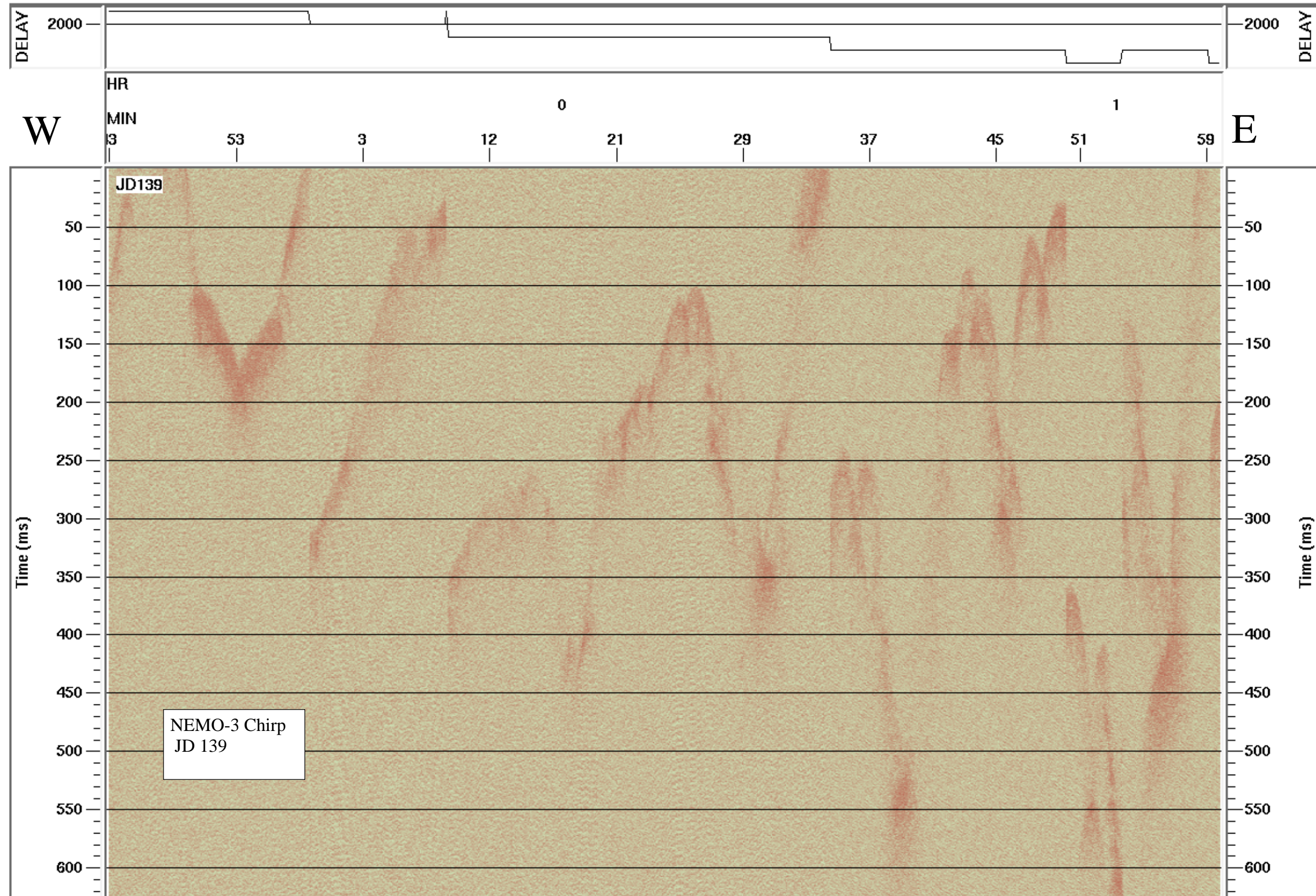
2-7 kHz Chirp Subbottom Profiler

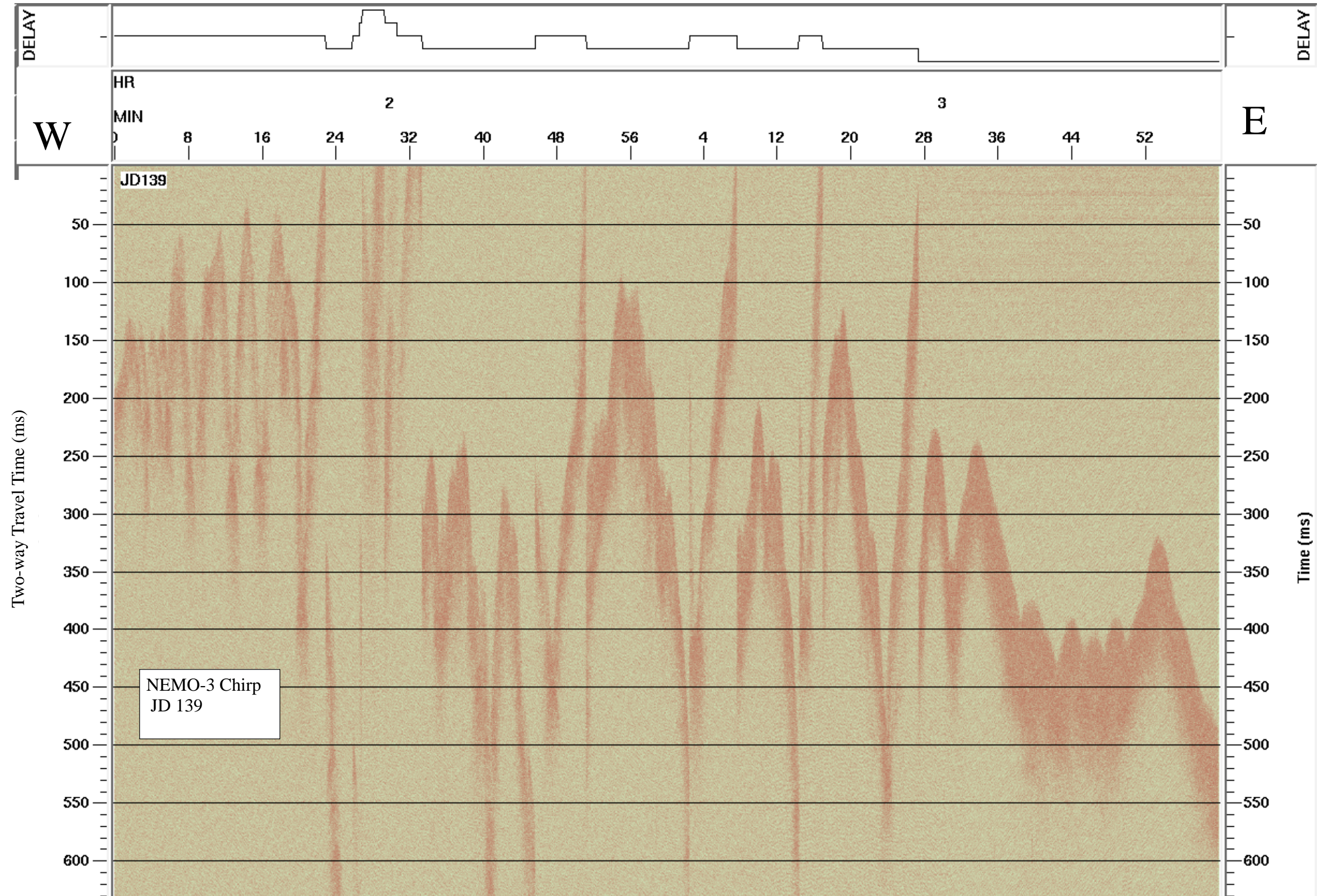
NEMO Leg 3

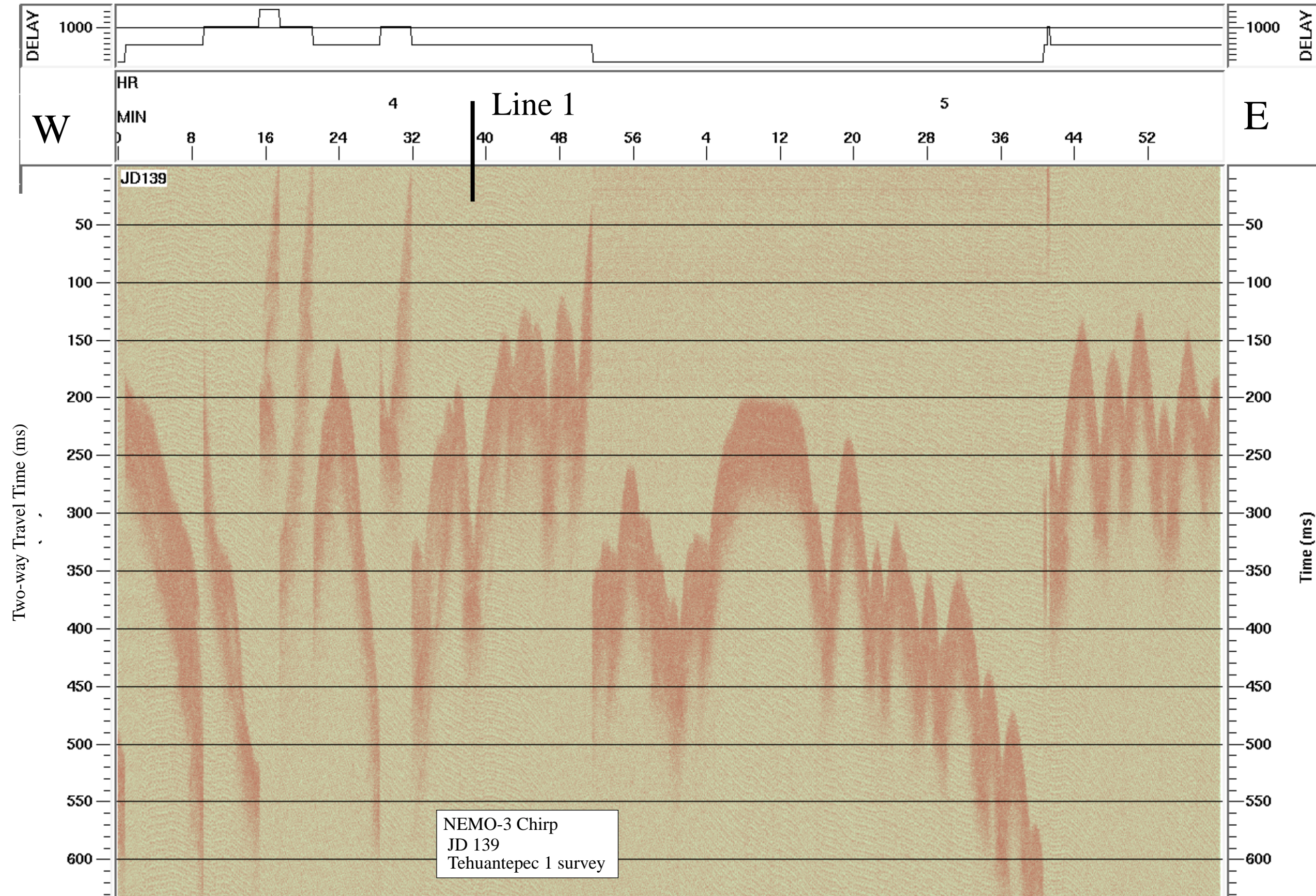
R/V Melville

Data File SBfixavg.2000may18.0000-0600

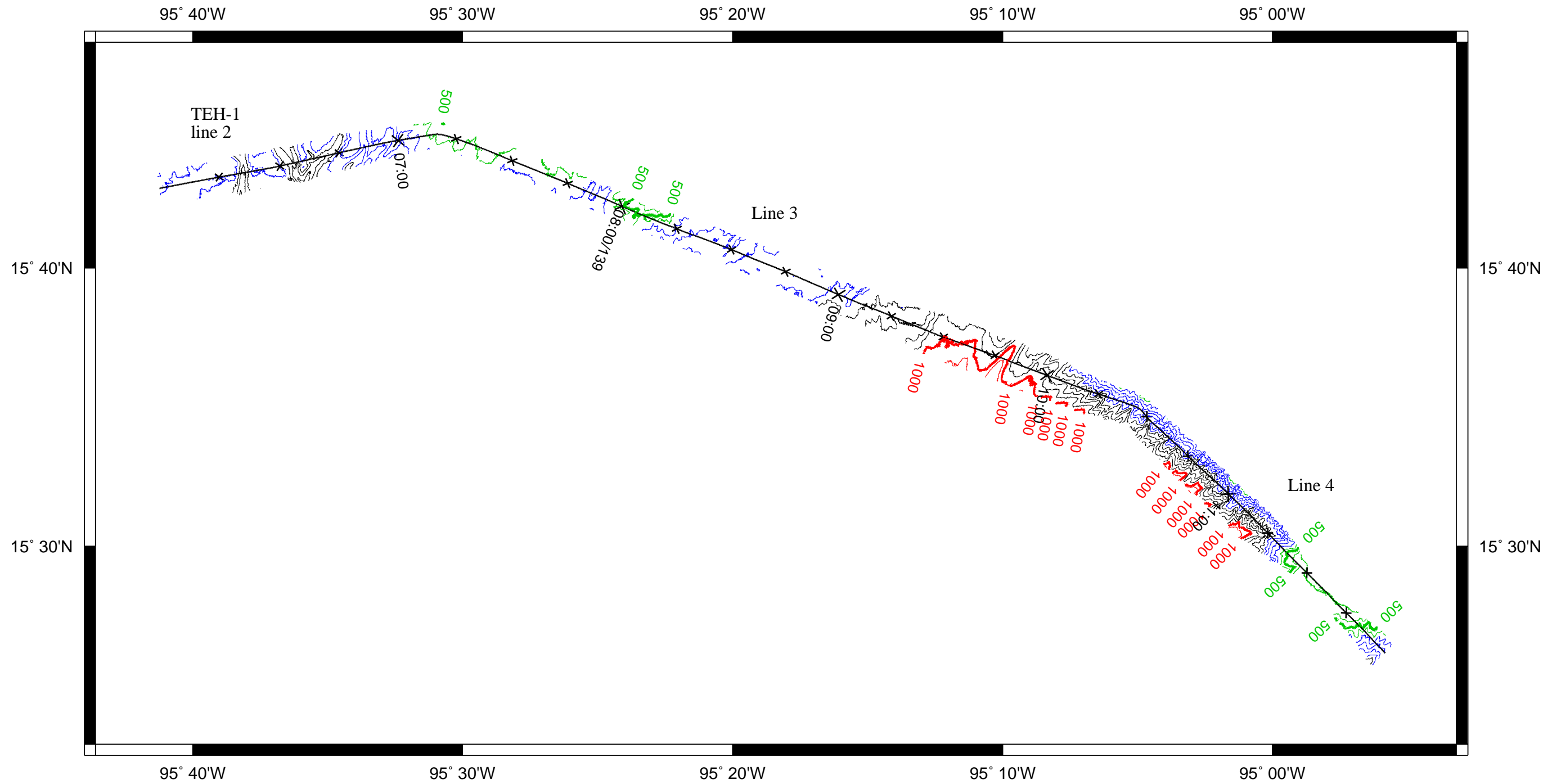


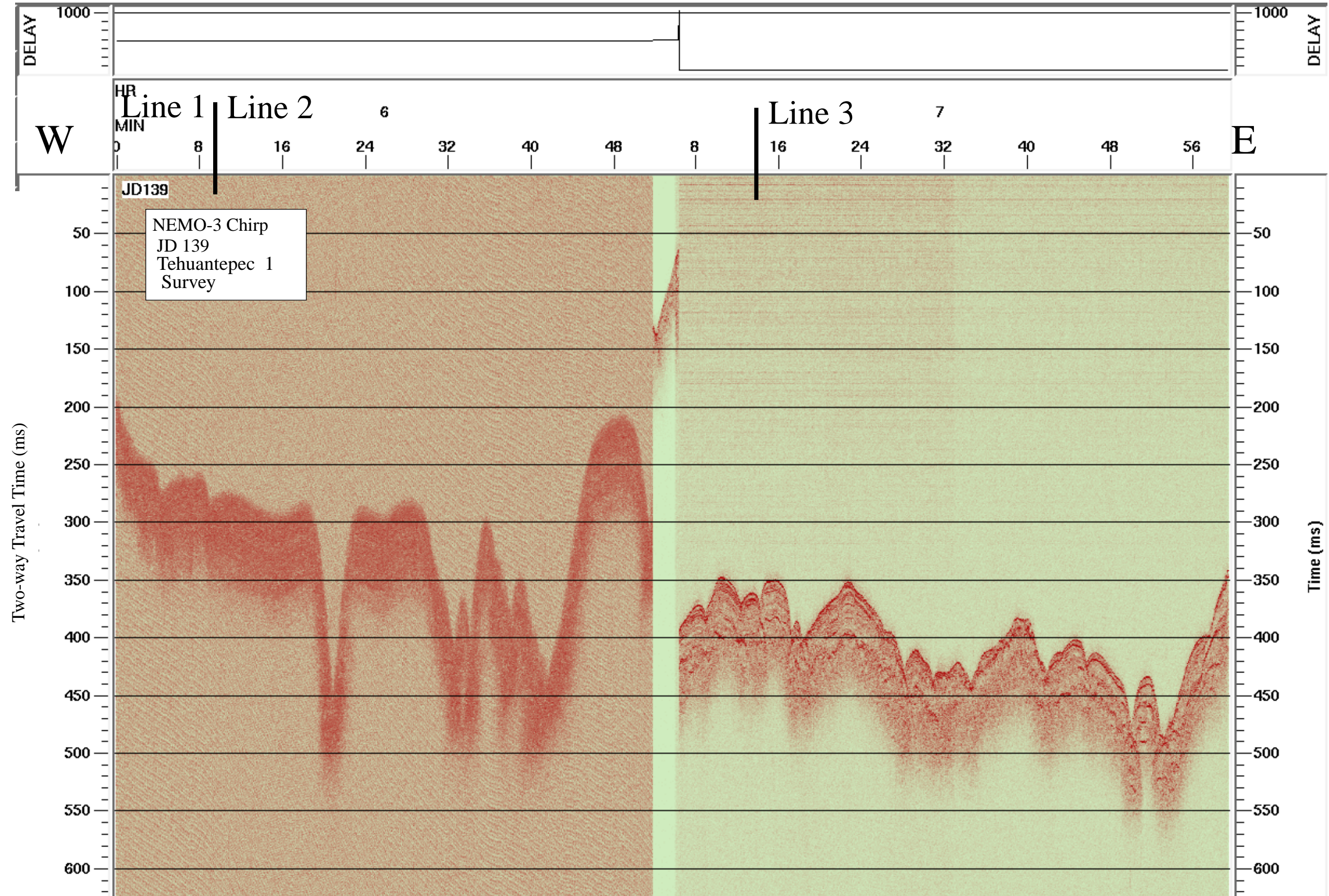


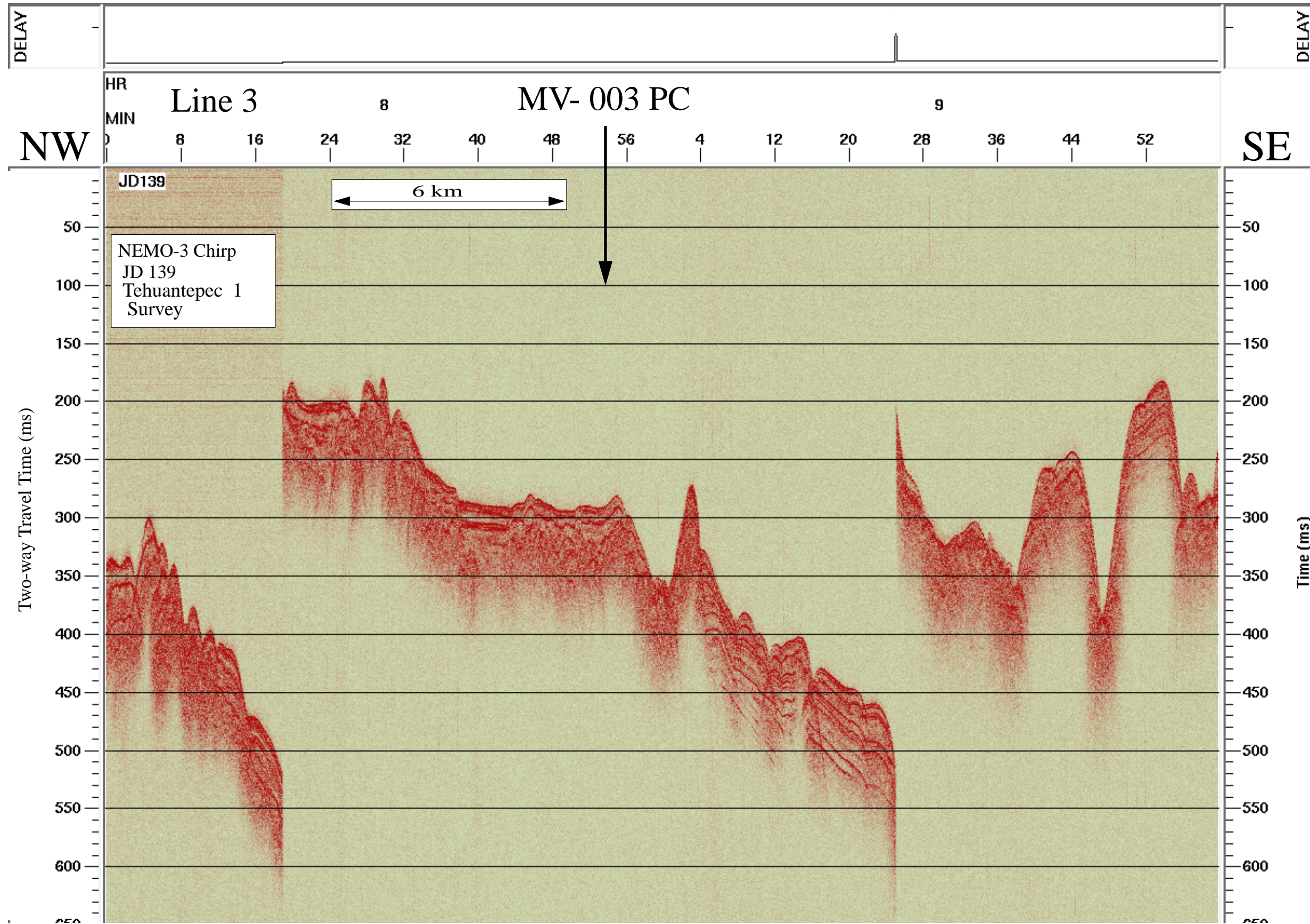


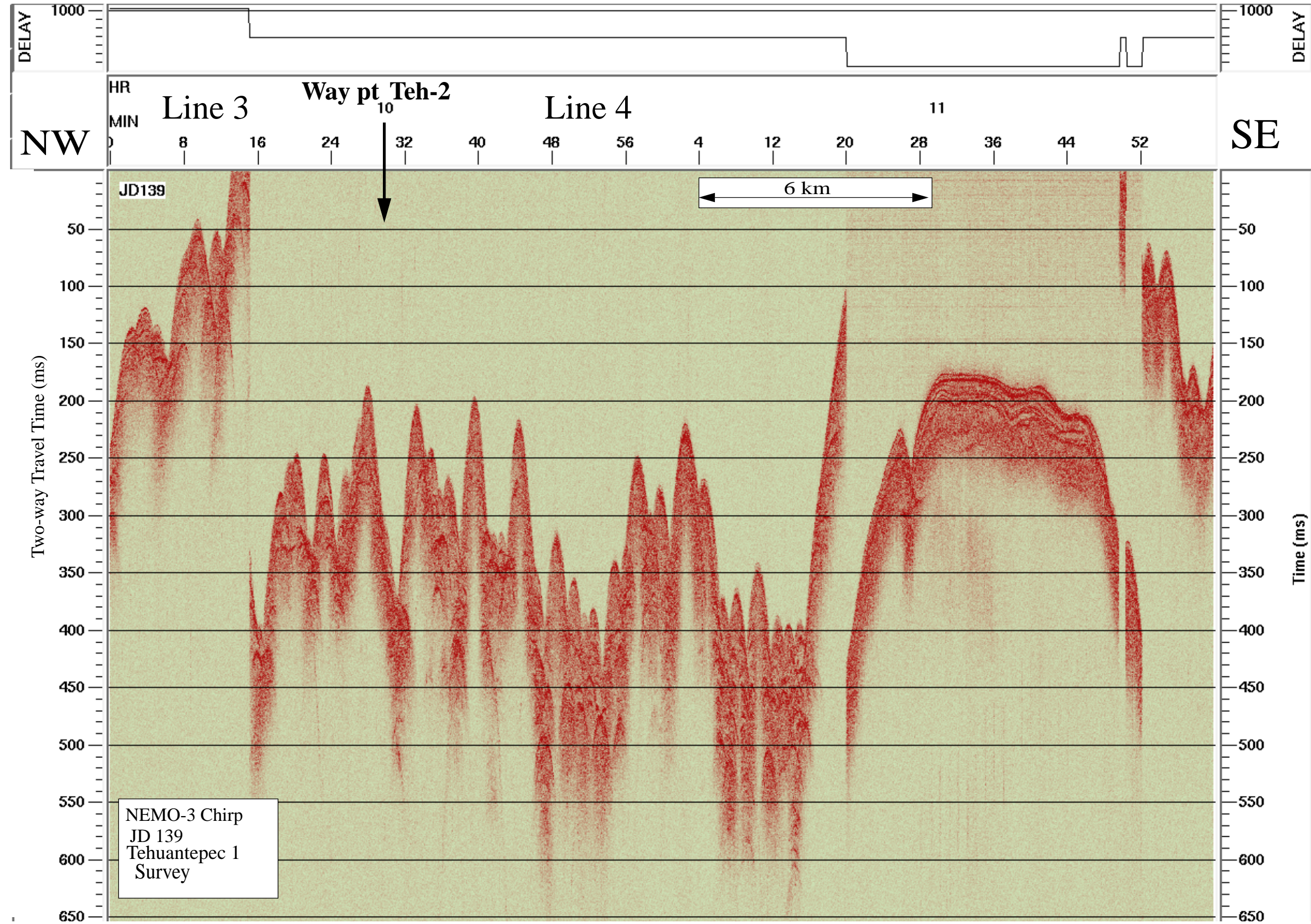


Data File SBfixavg.2000may18.0600-1200

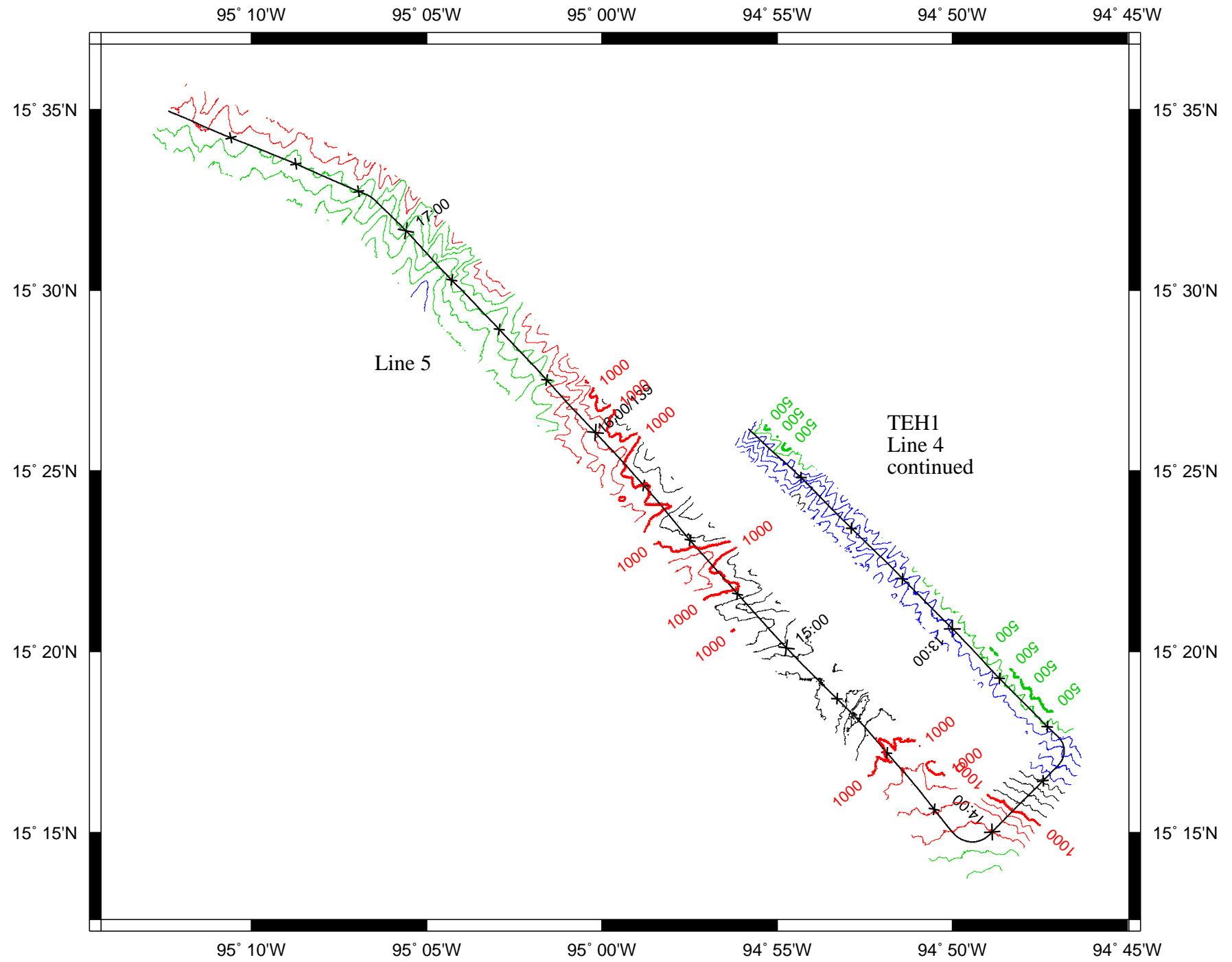


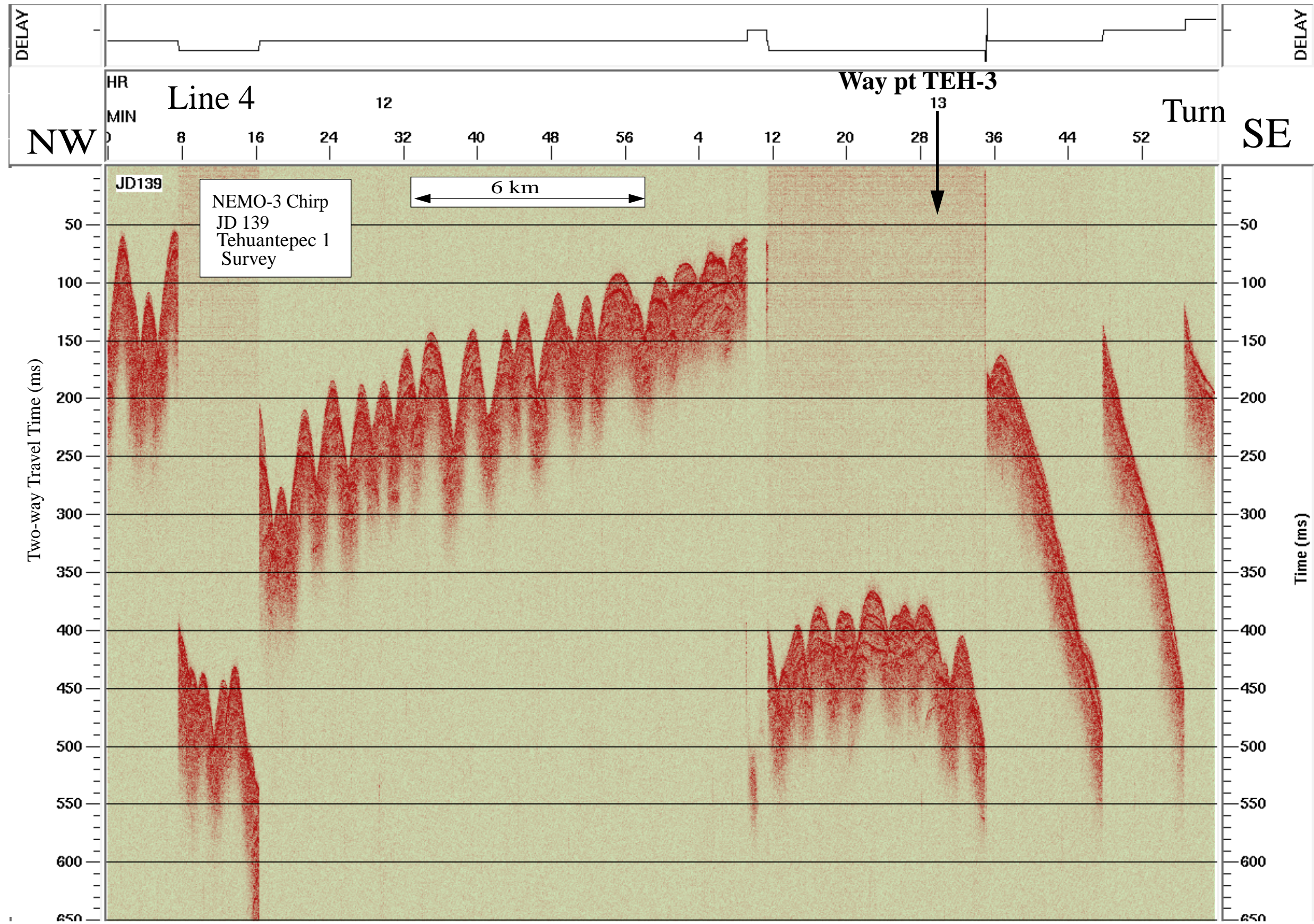


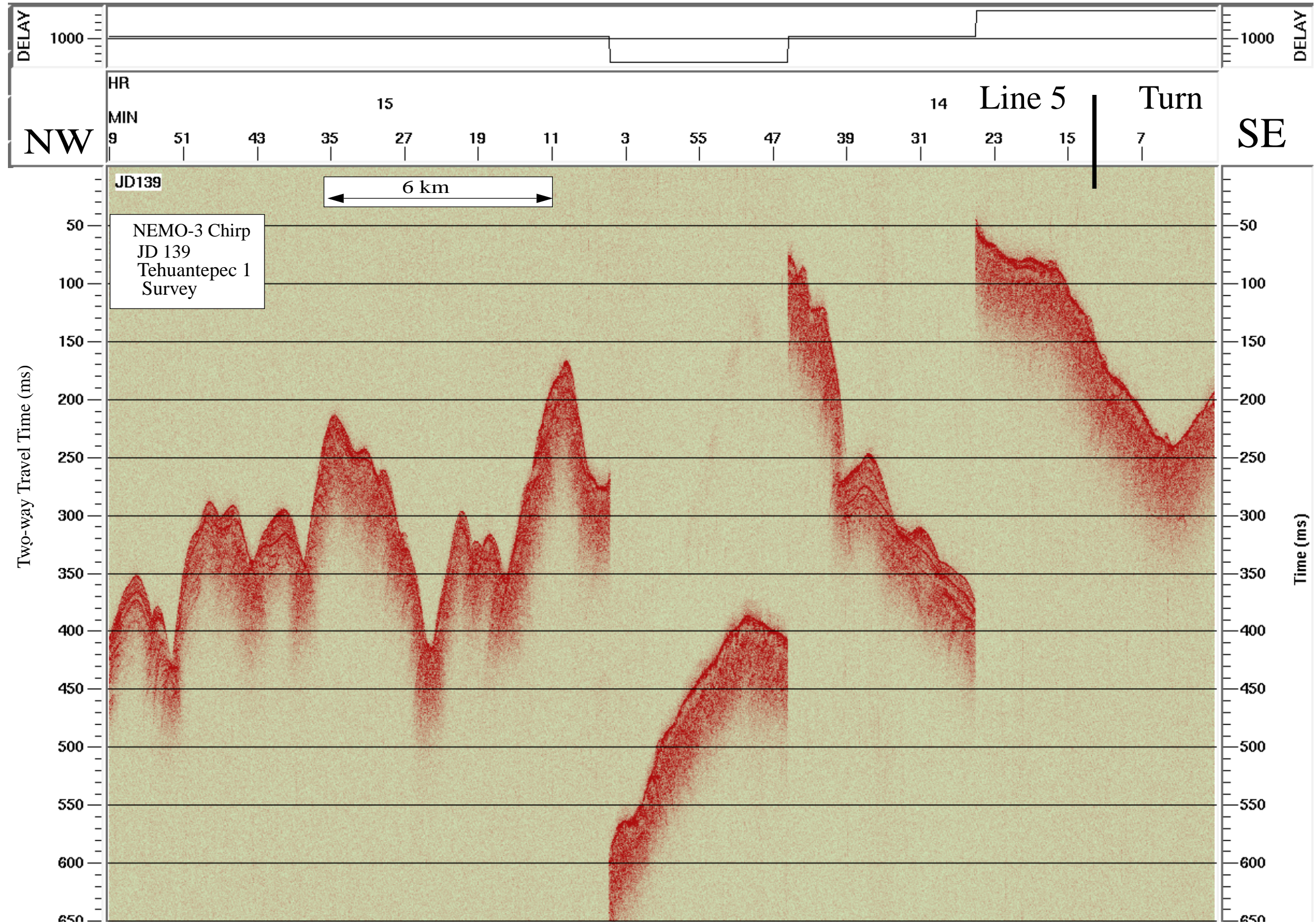


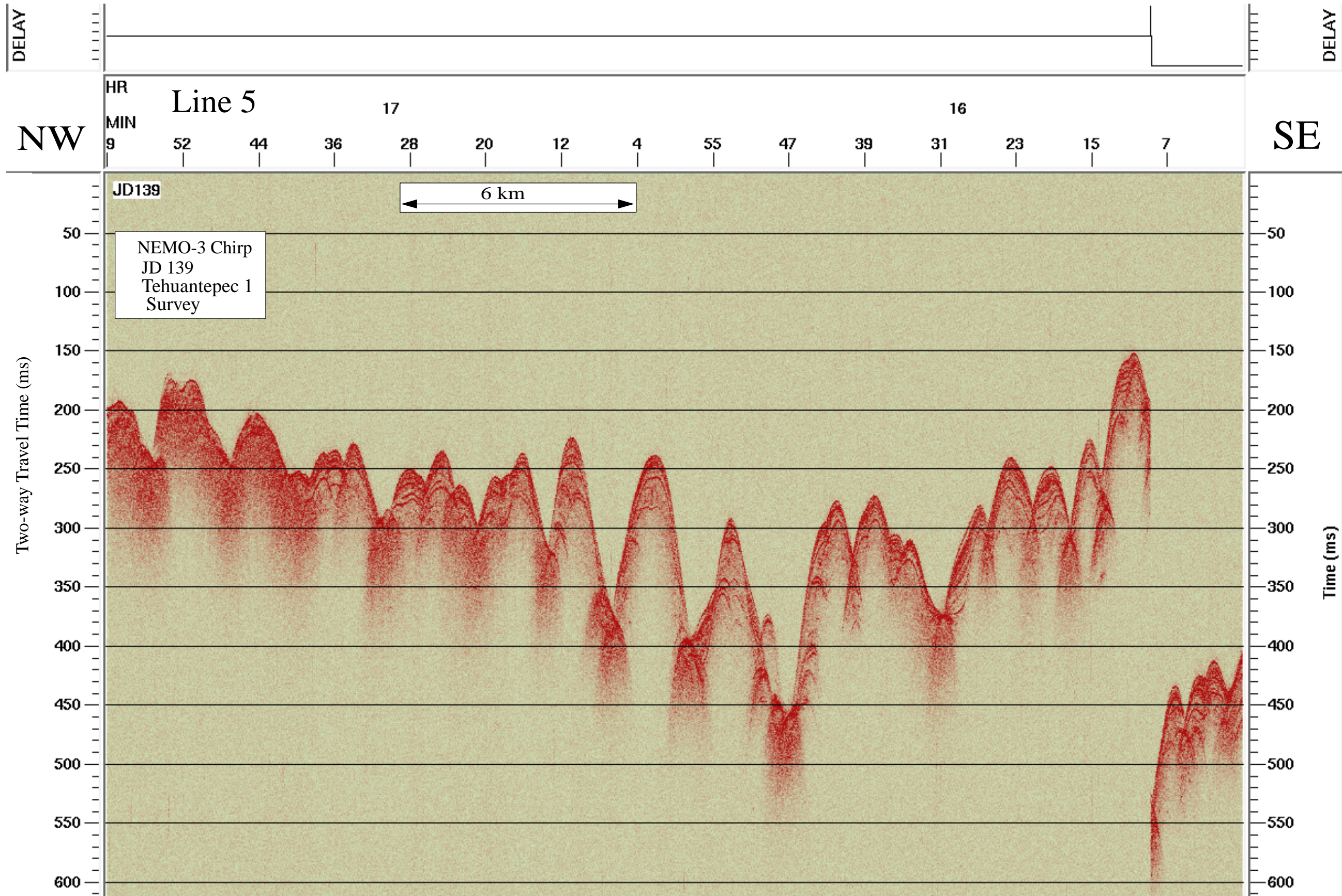


Data File SBfixavg.2000may18.1200-1800

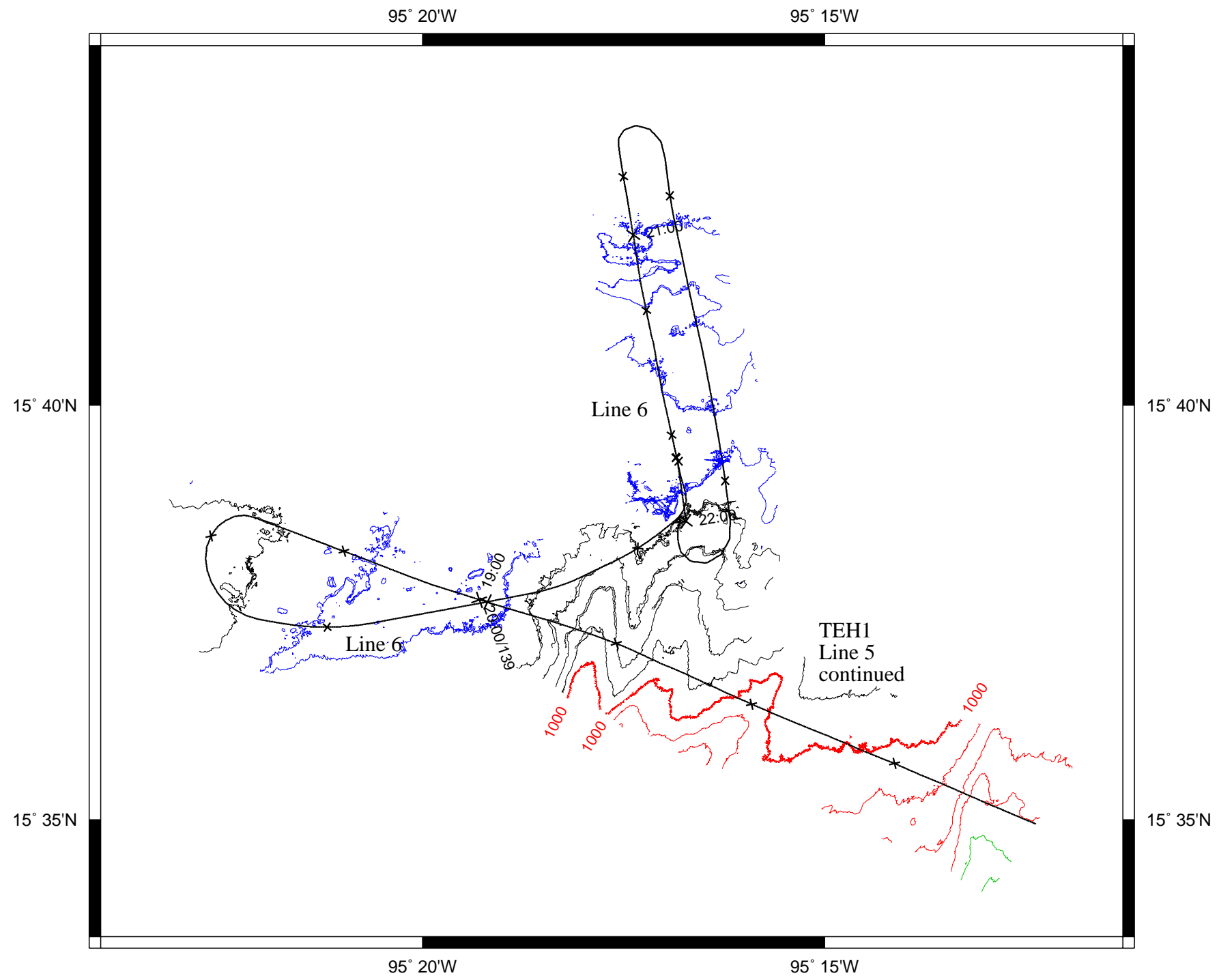


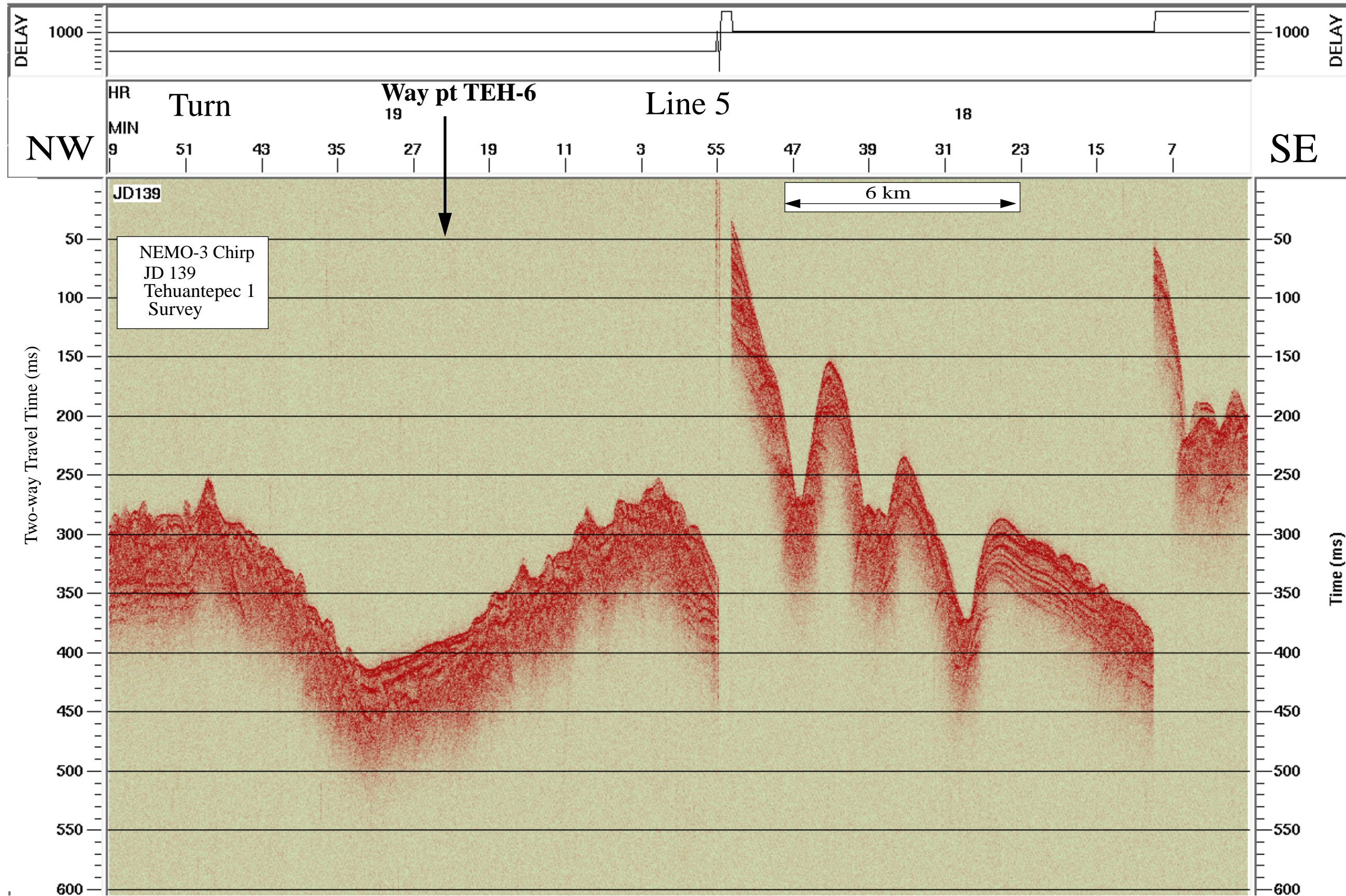


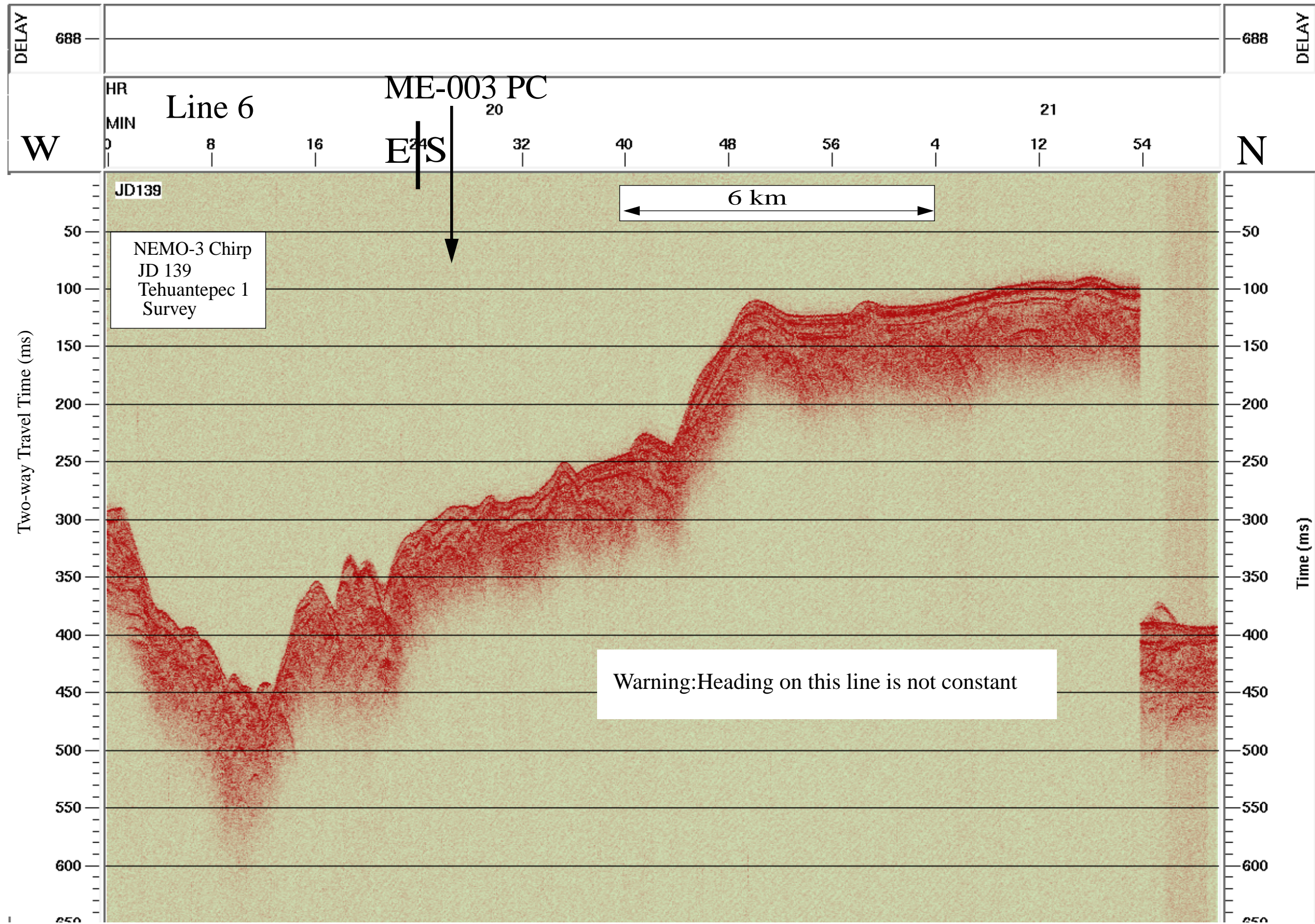




Data File SBfixavg.2000may18.1800-2400





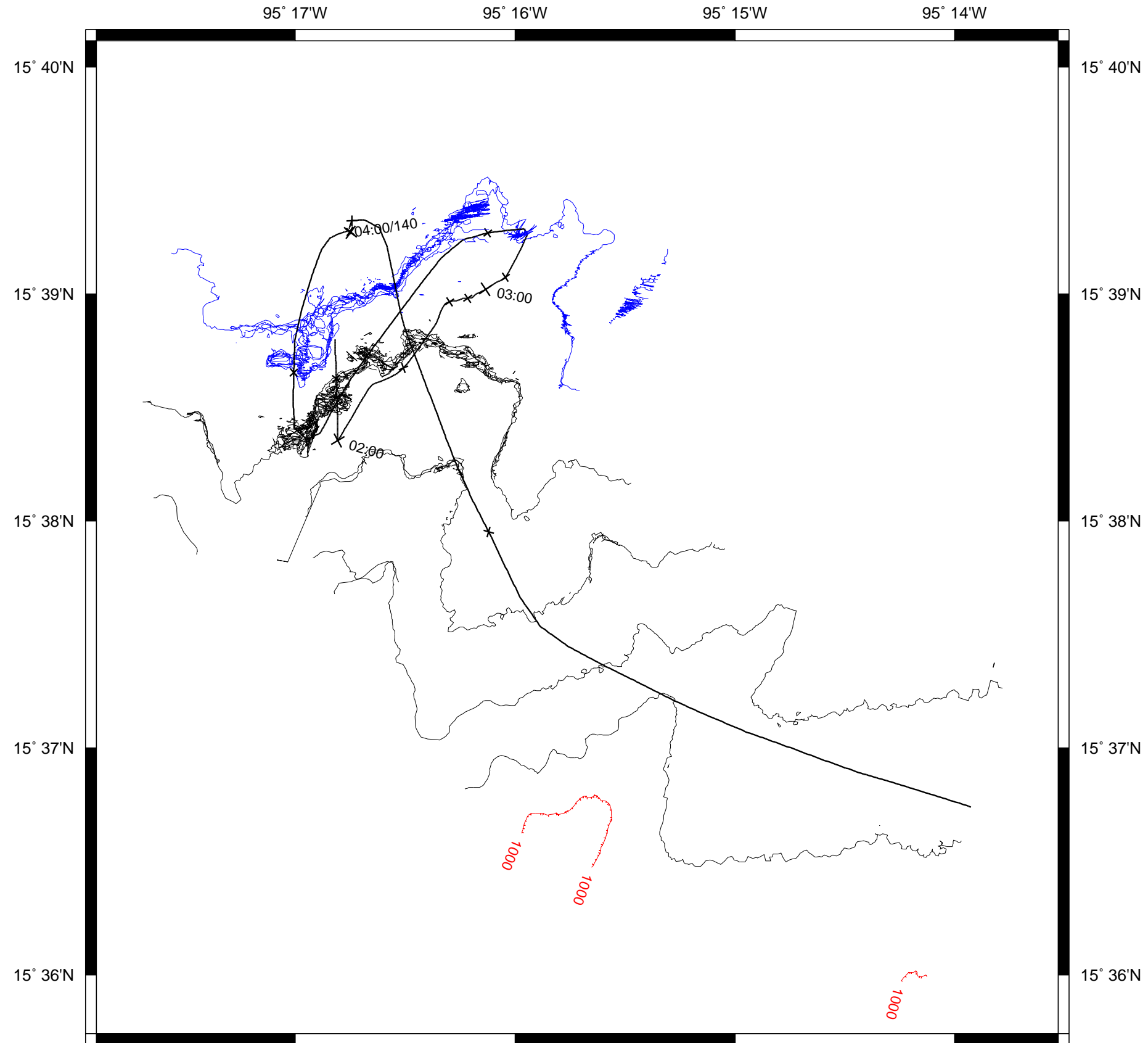


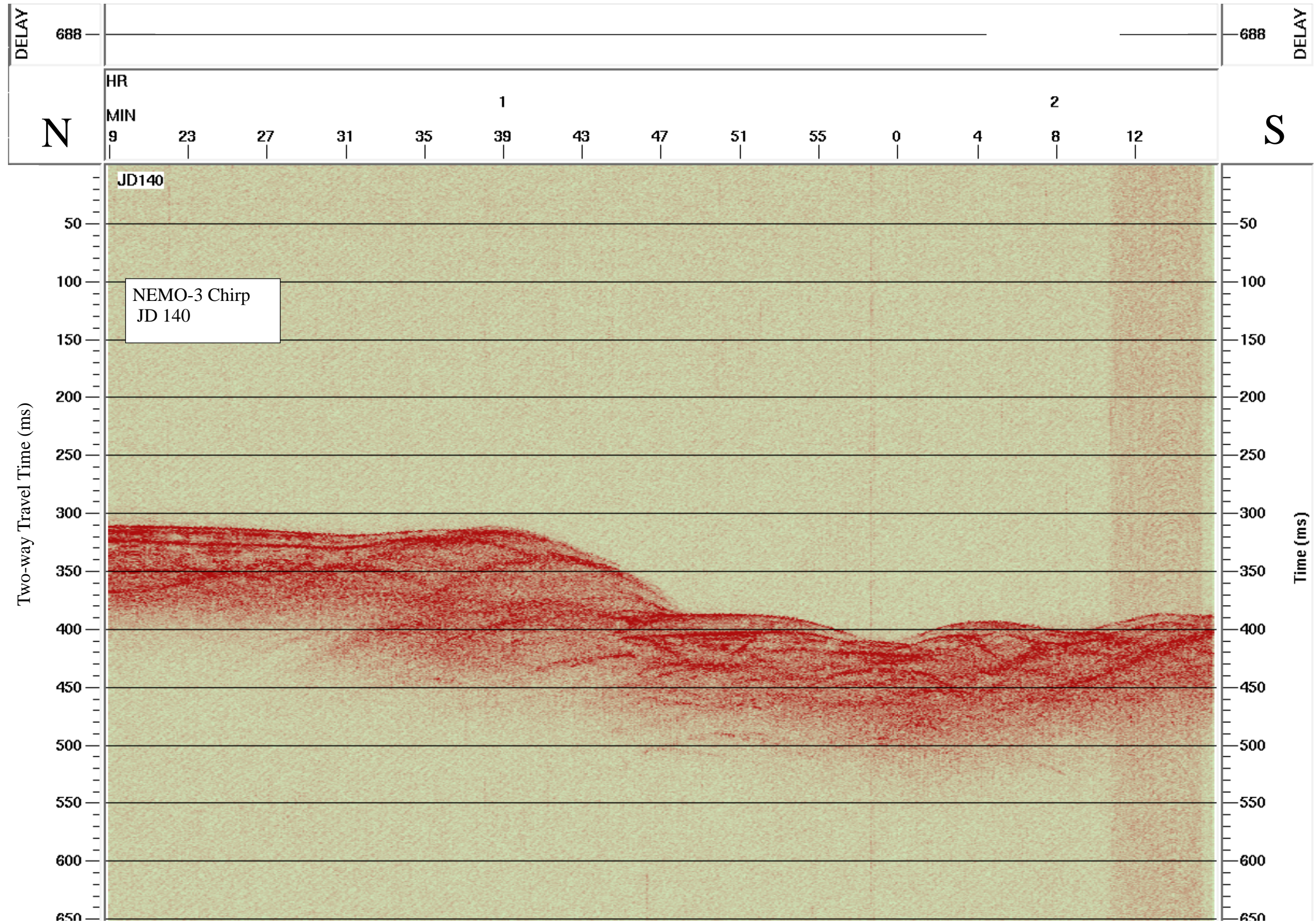
JD 140 (19 May 2000)--TEH-1, Day 2

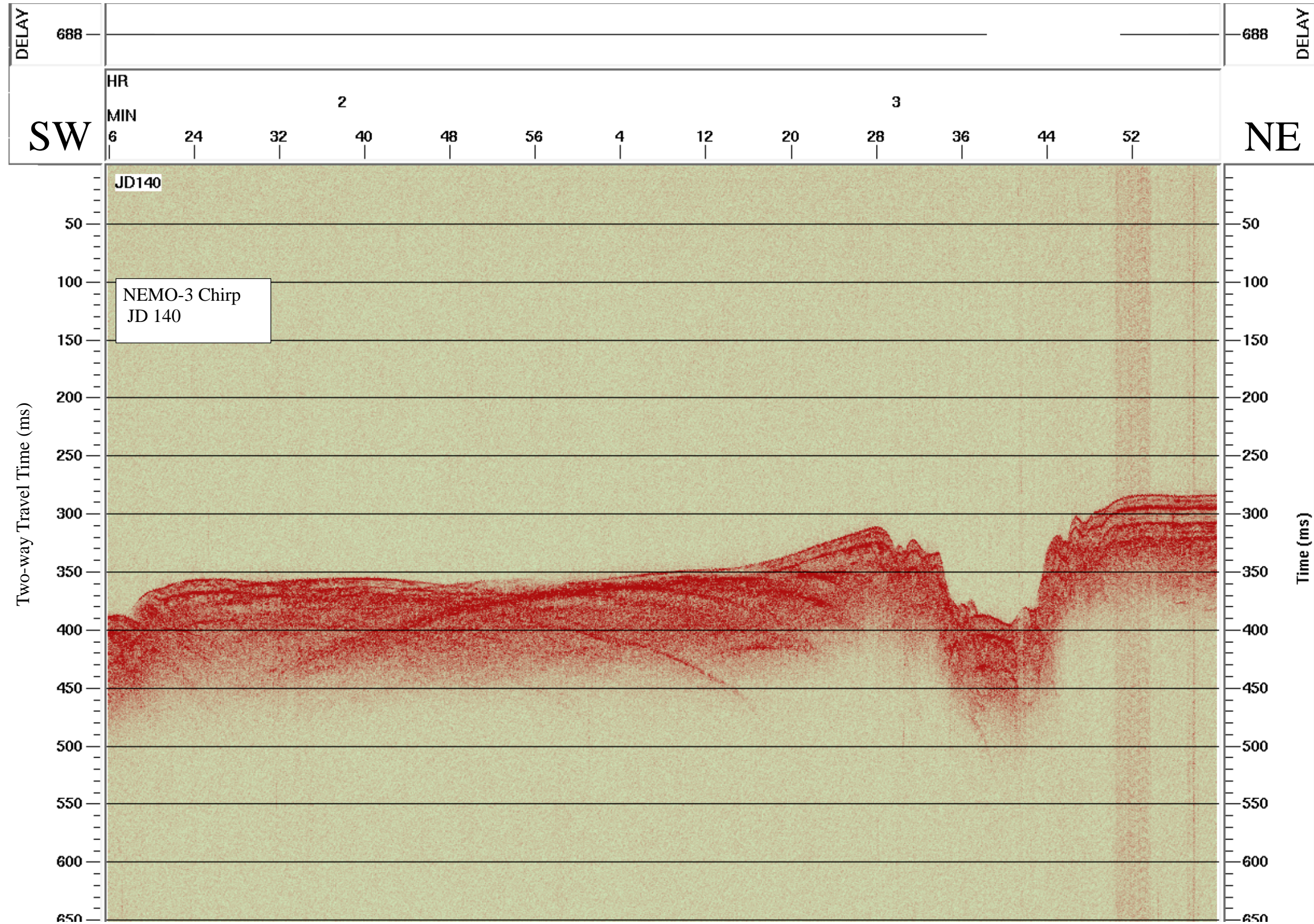
2-7 kHz Chirp Subbottom Profiler

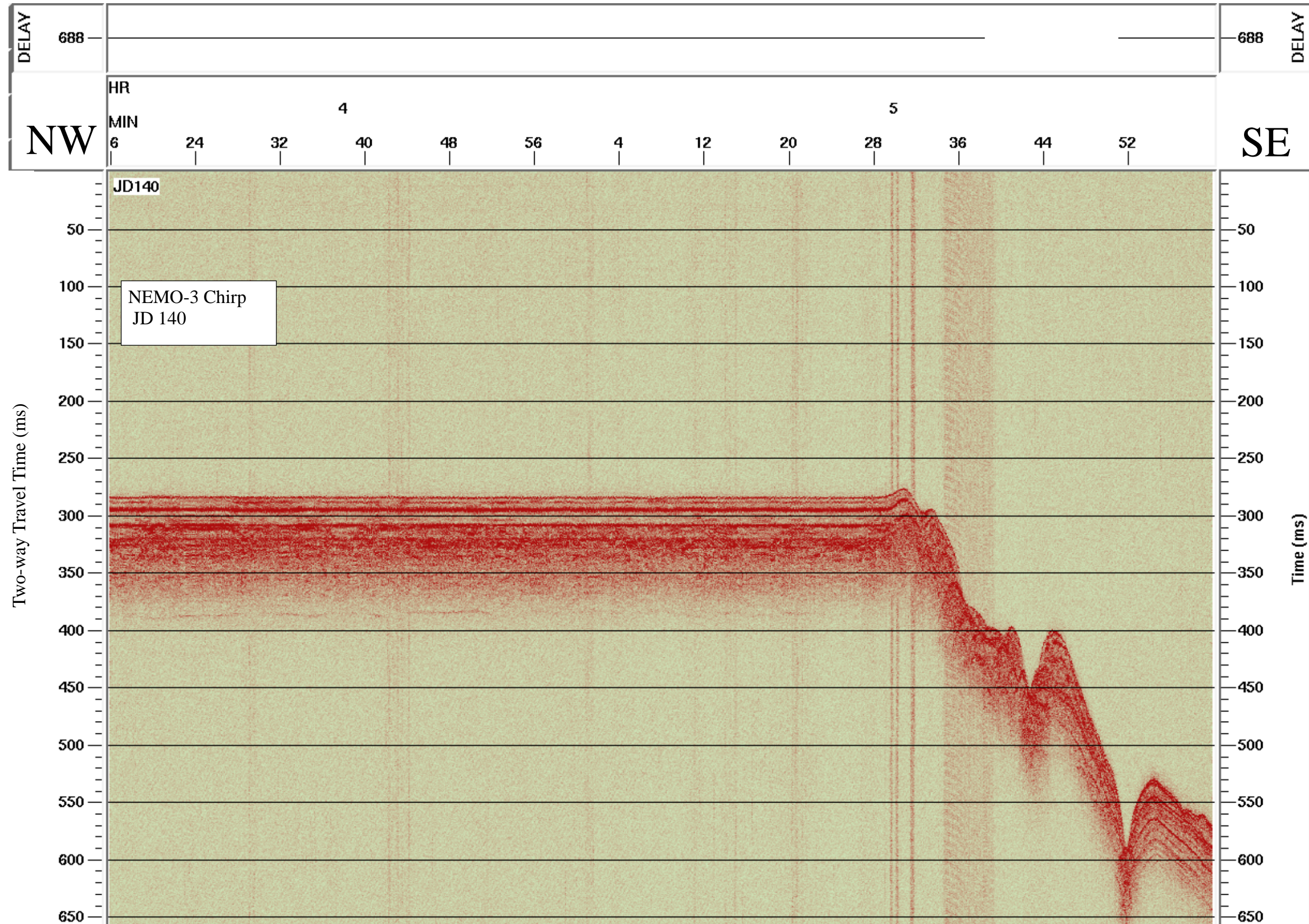
NEMO Leg 3

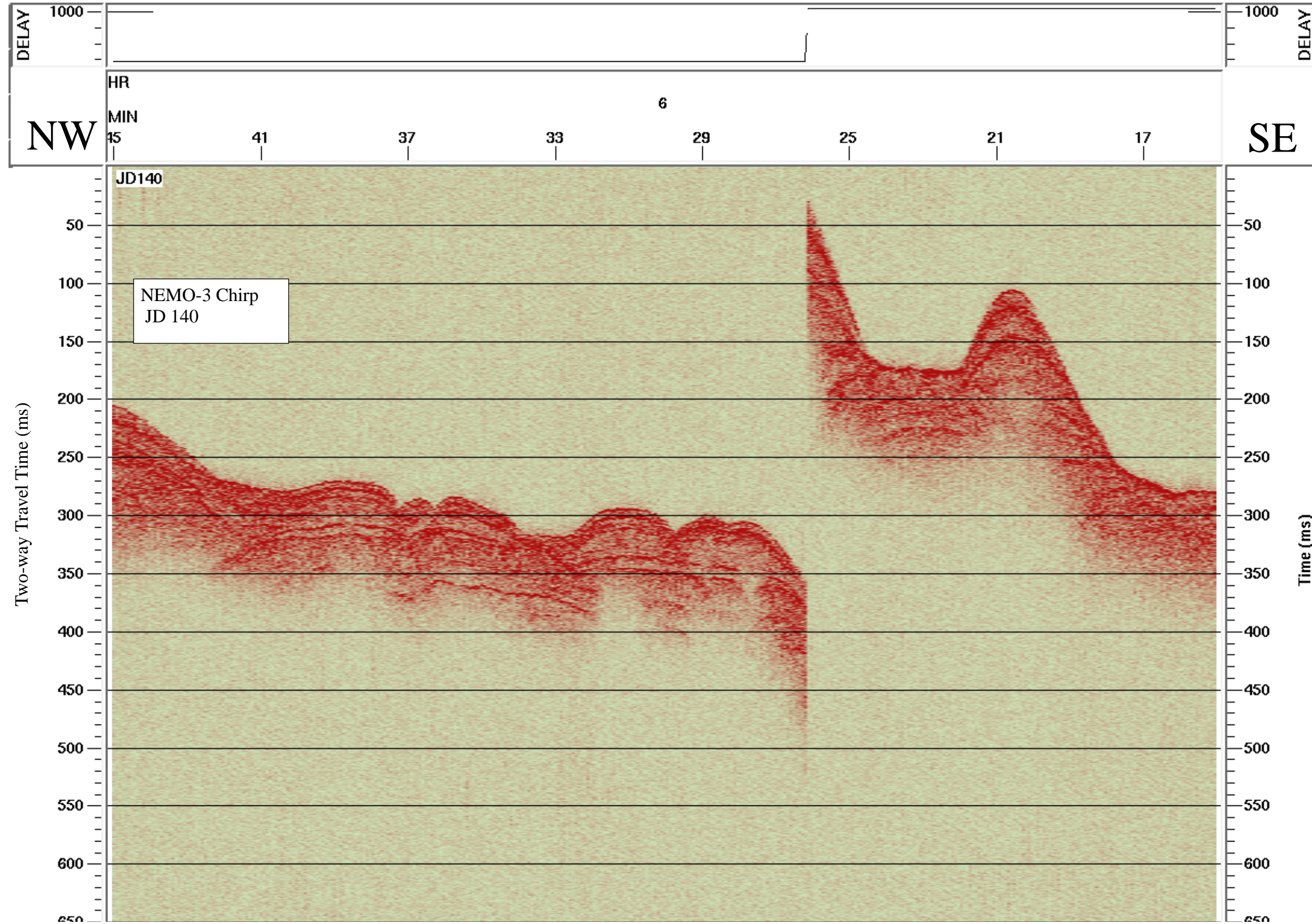
R/V Melville



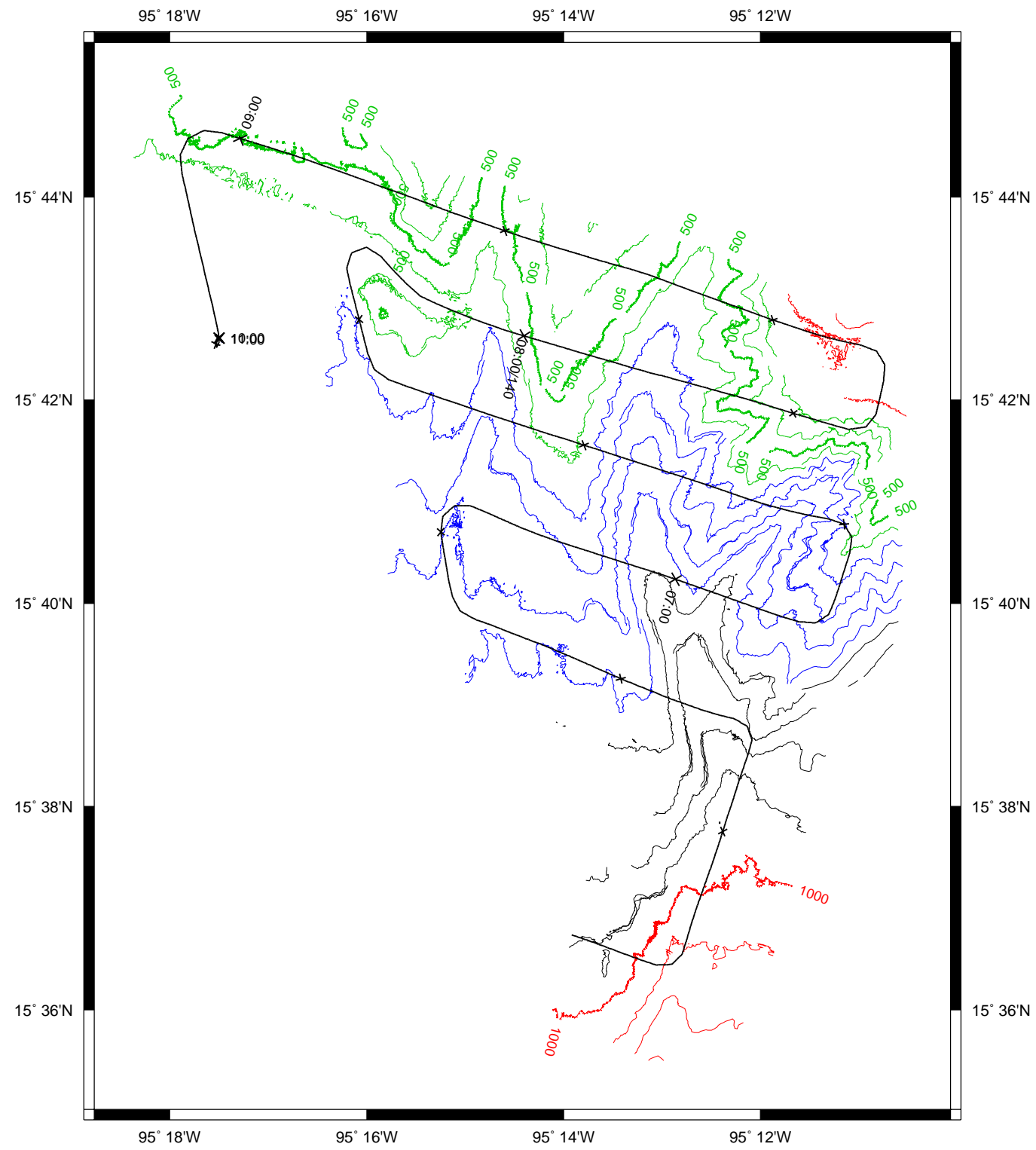


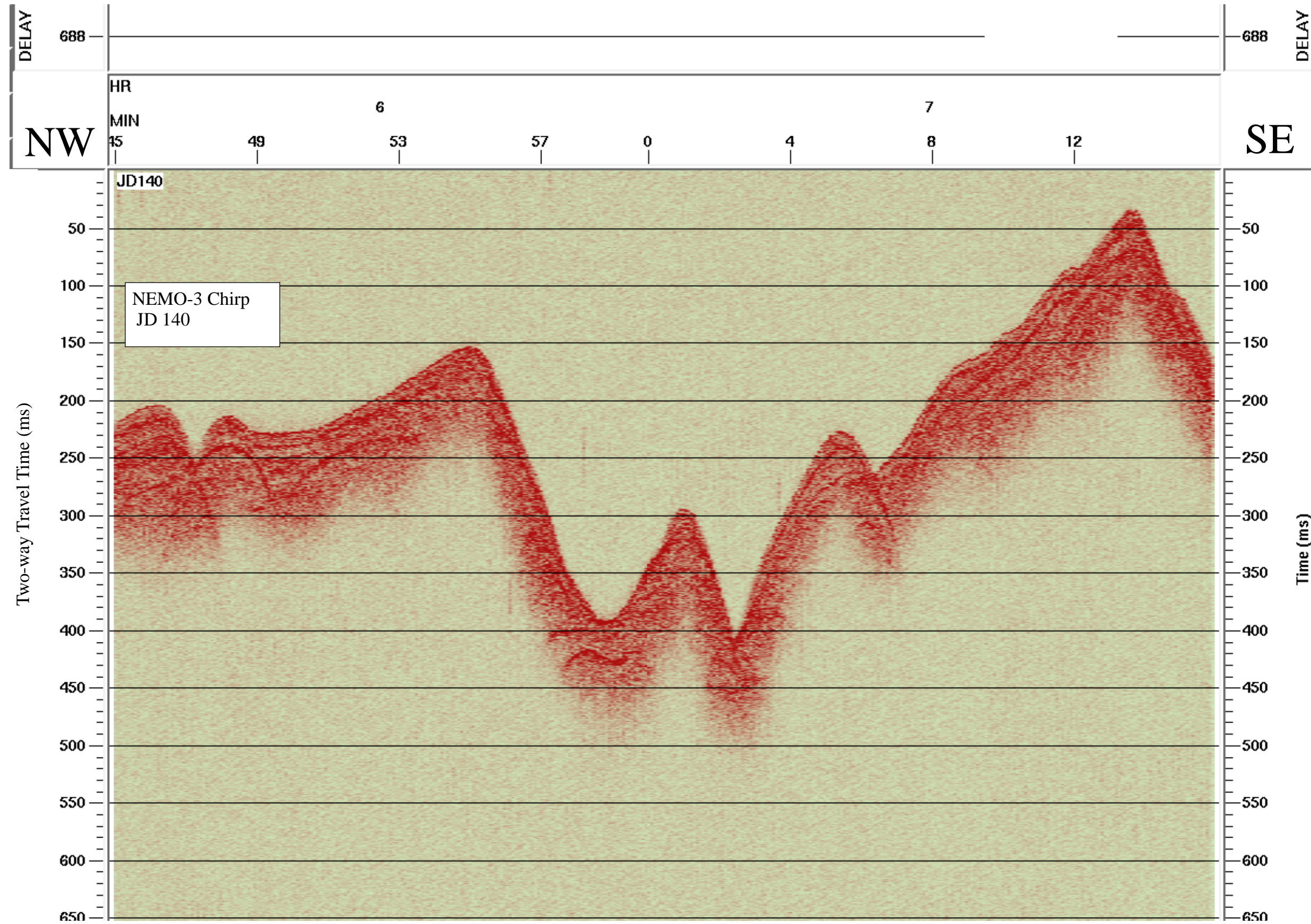


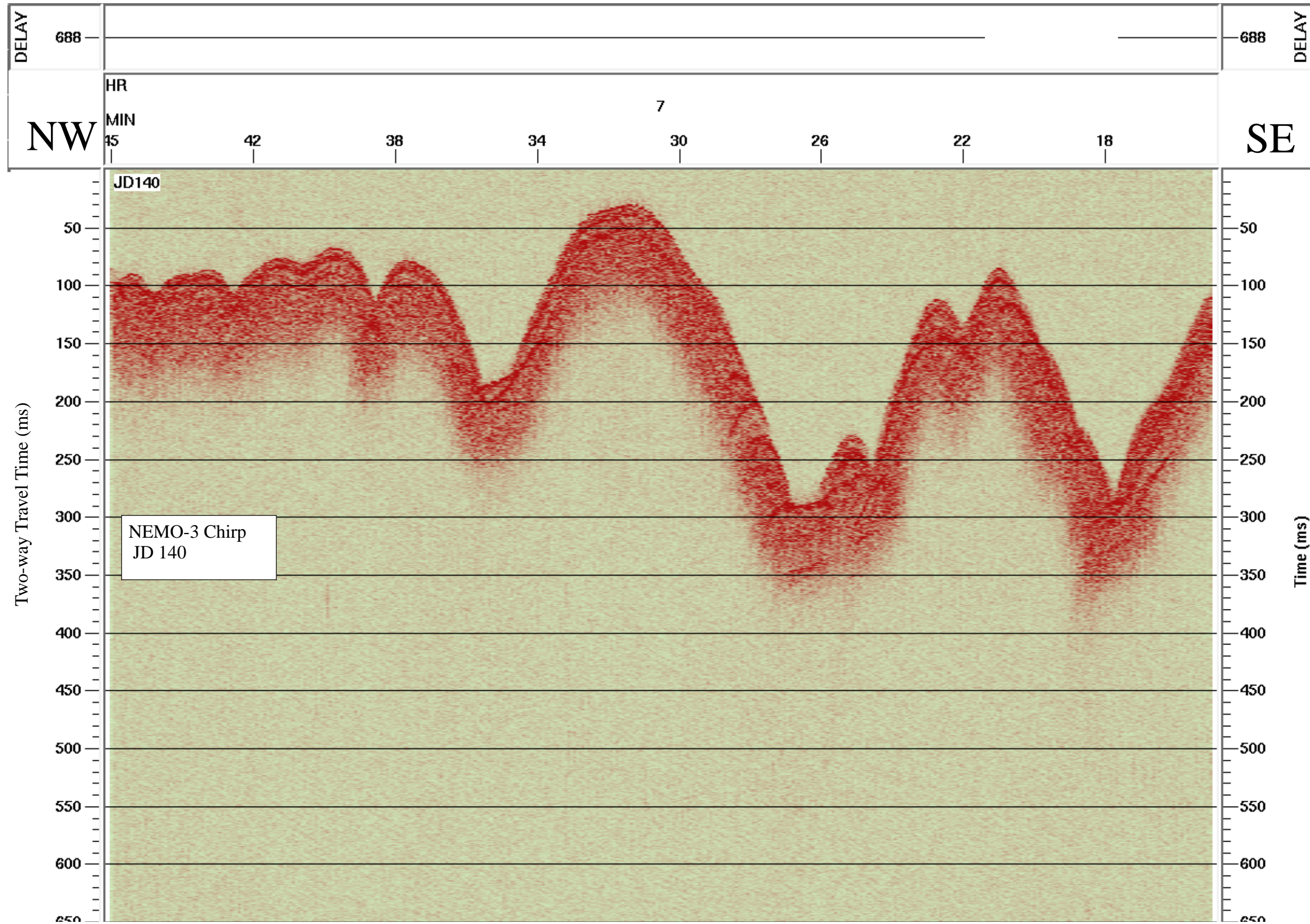


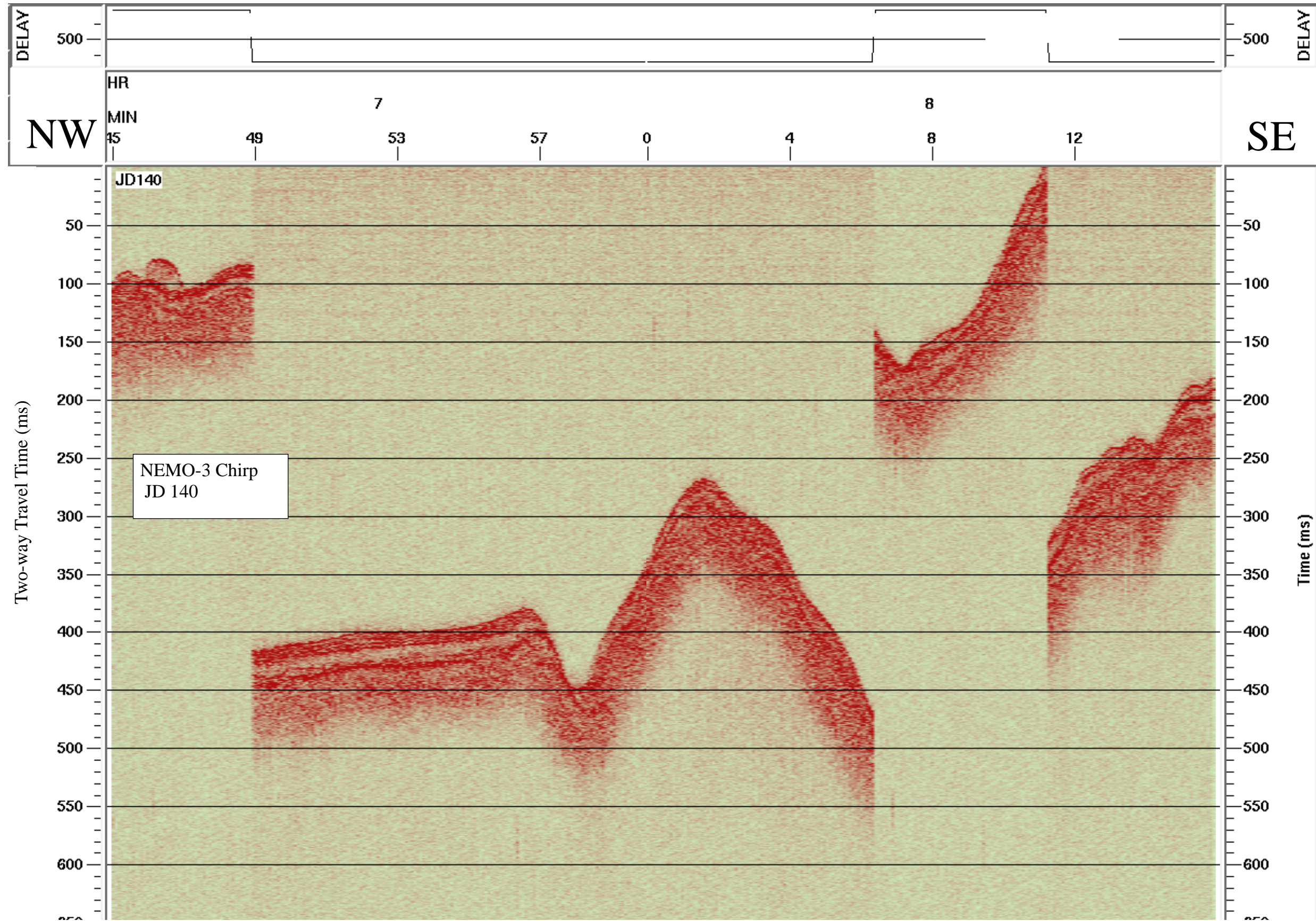


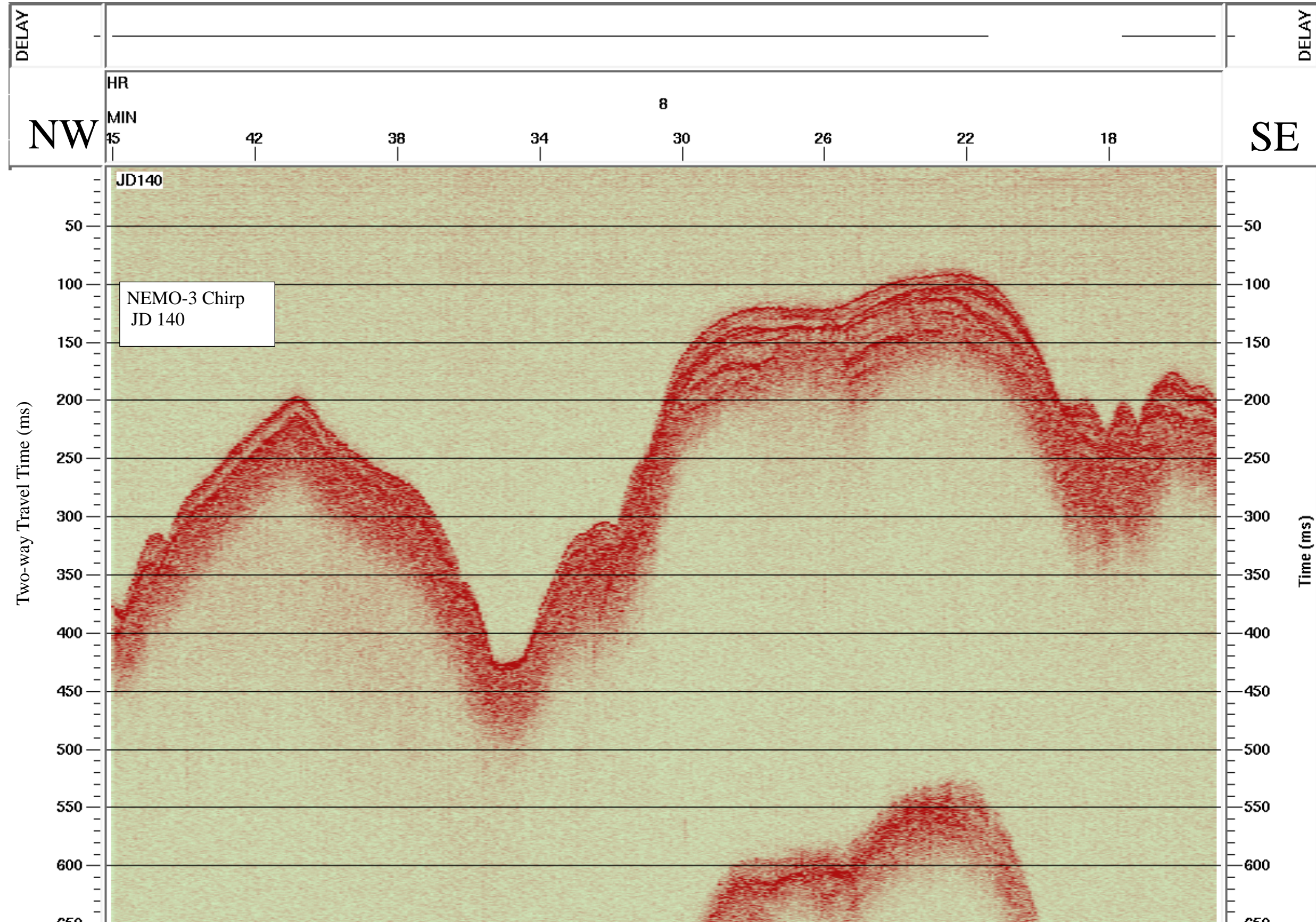
Data File SBfixavg.2000may19.0600-1200

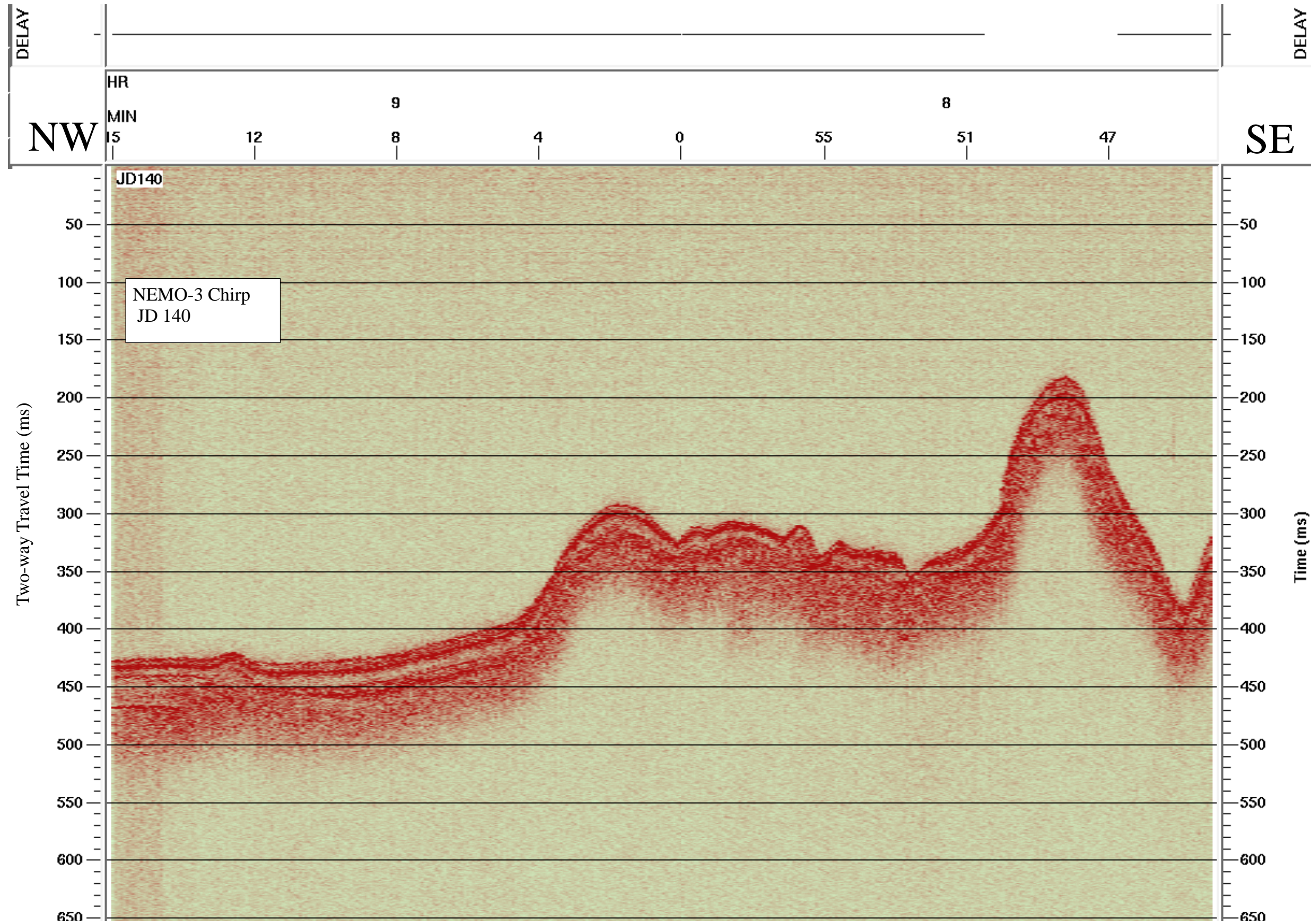


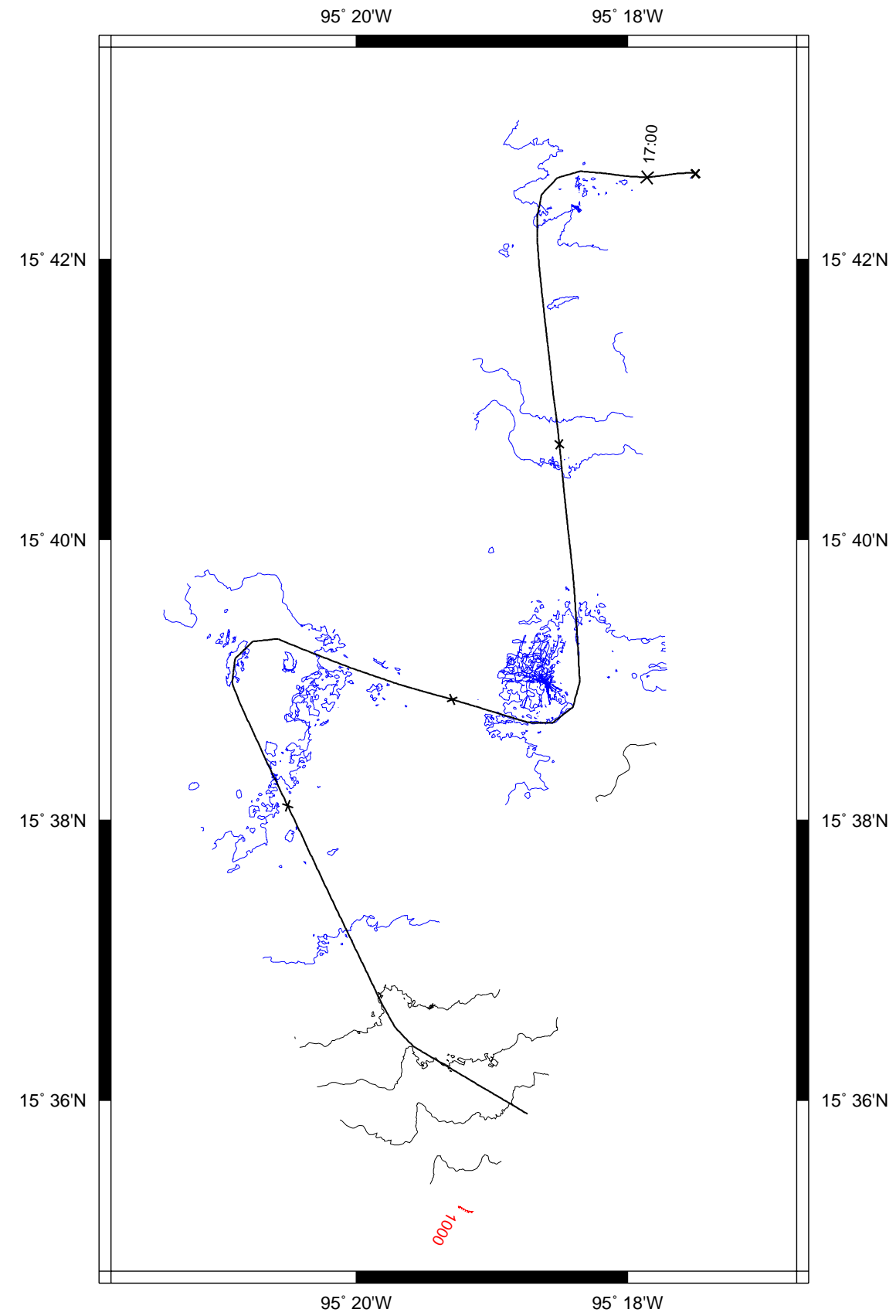


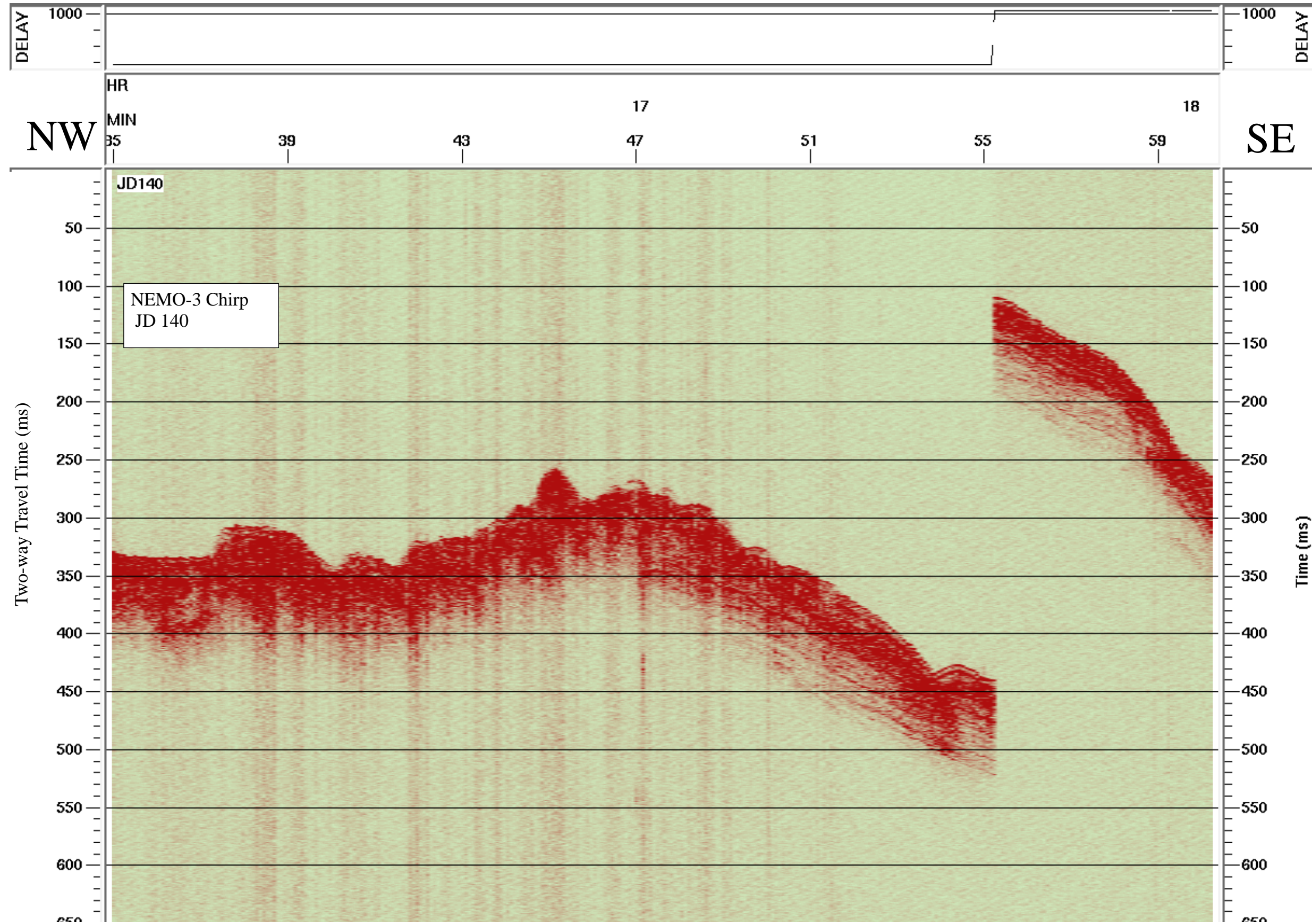




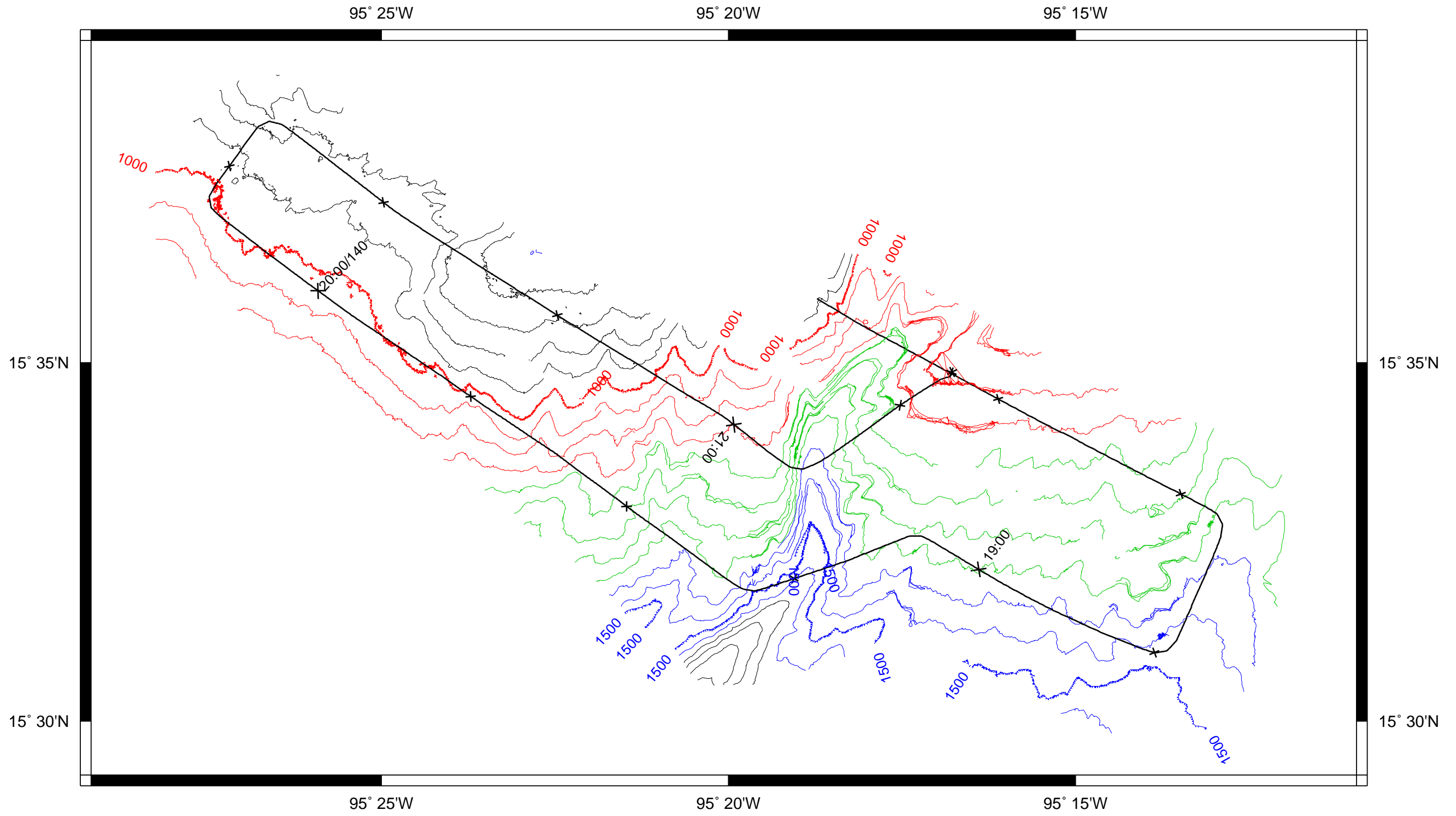


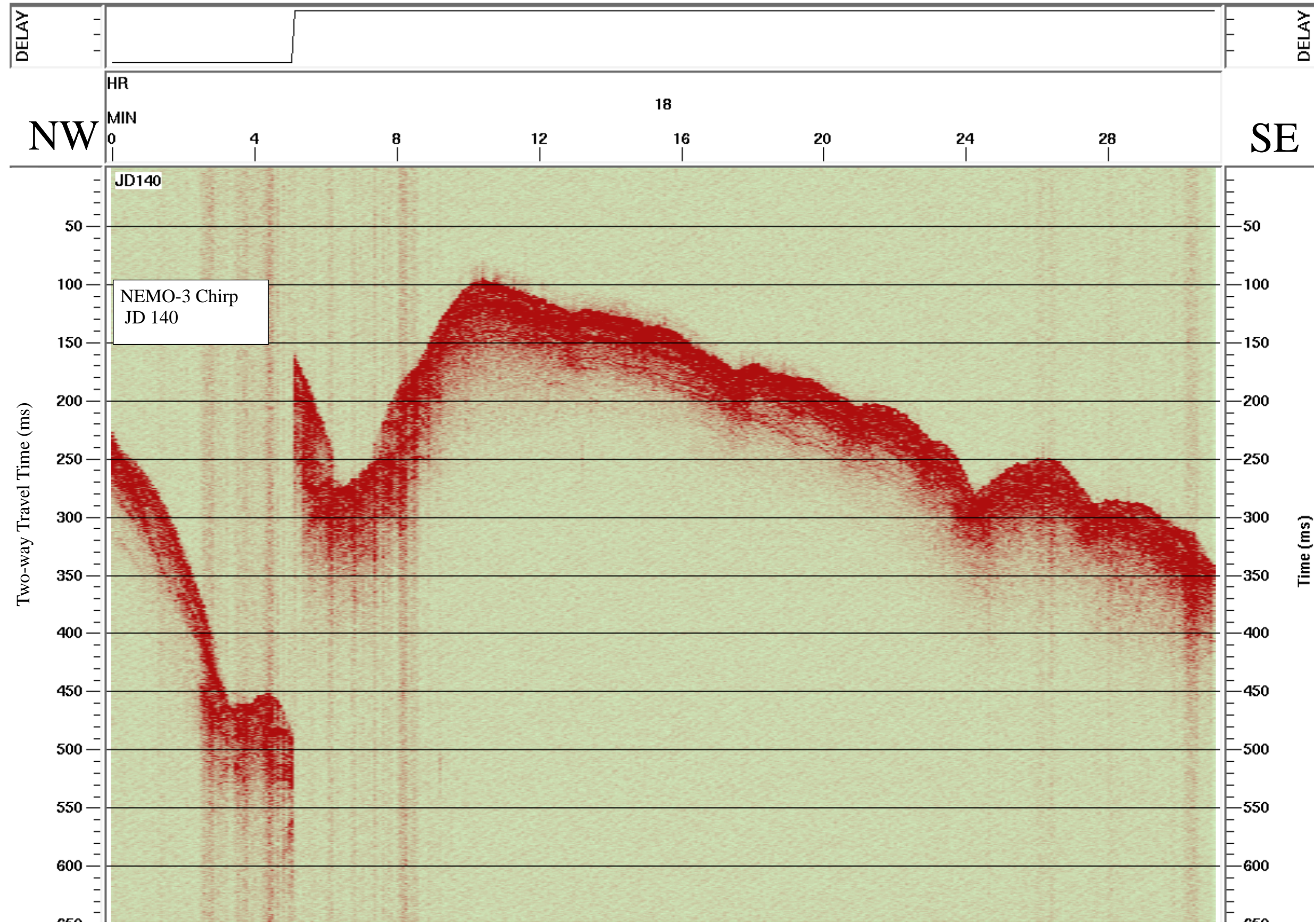


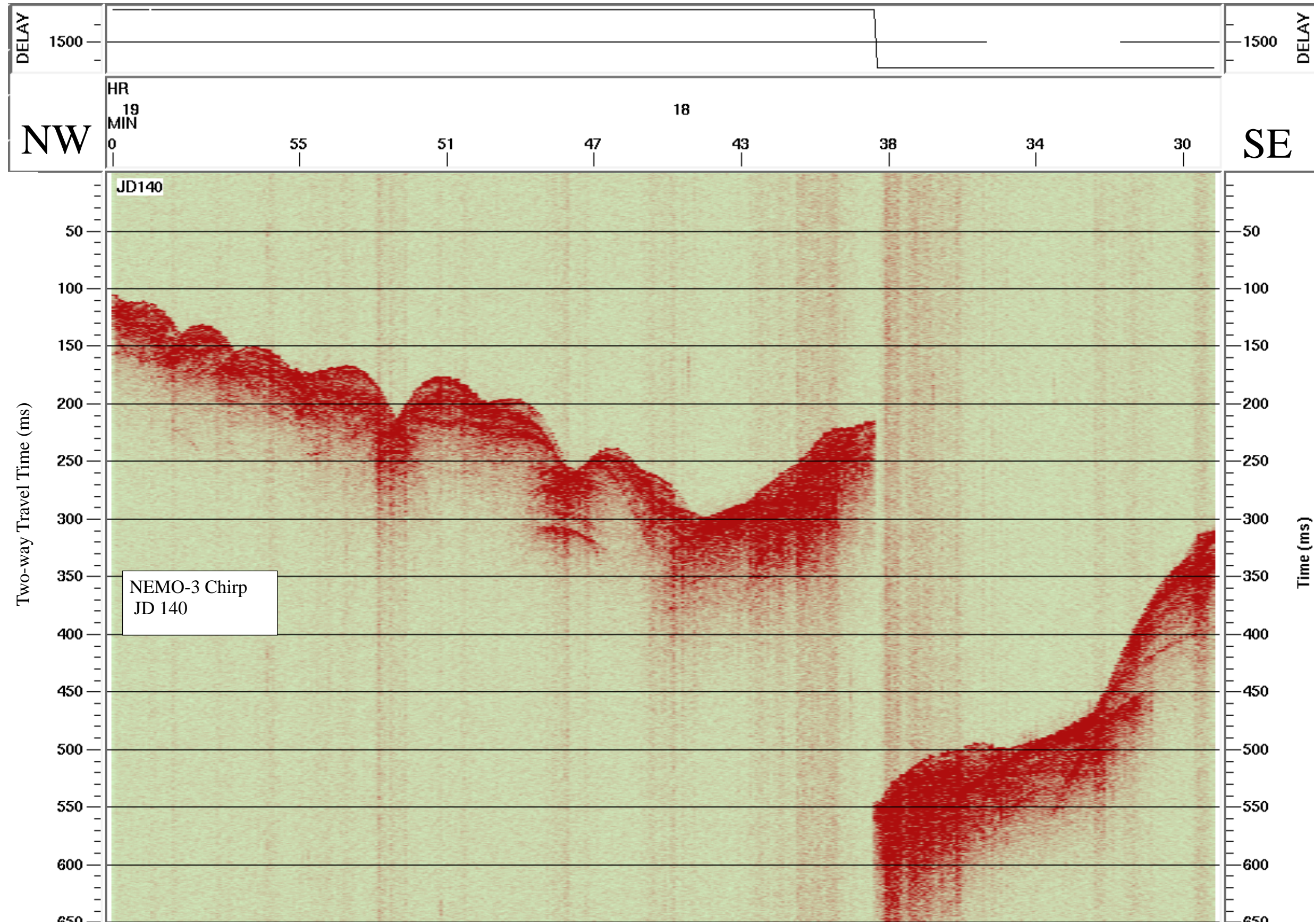


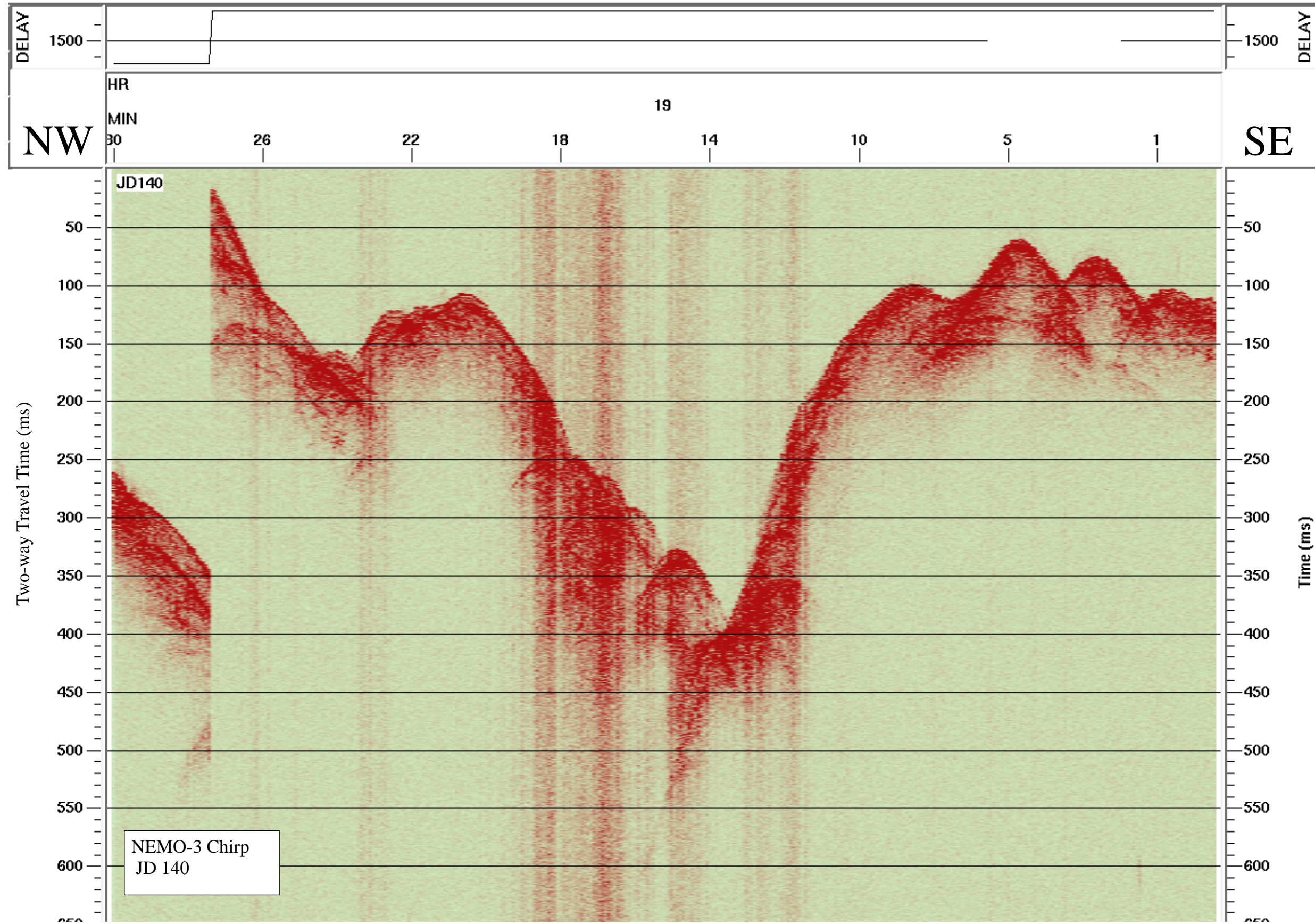


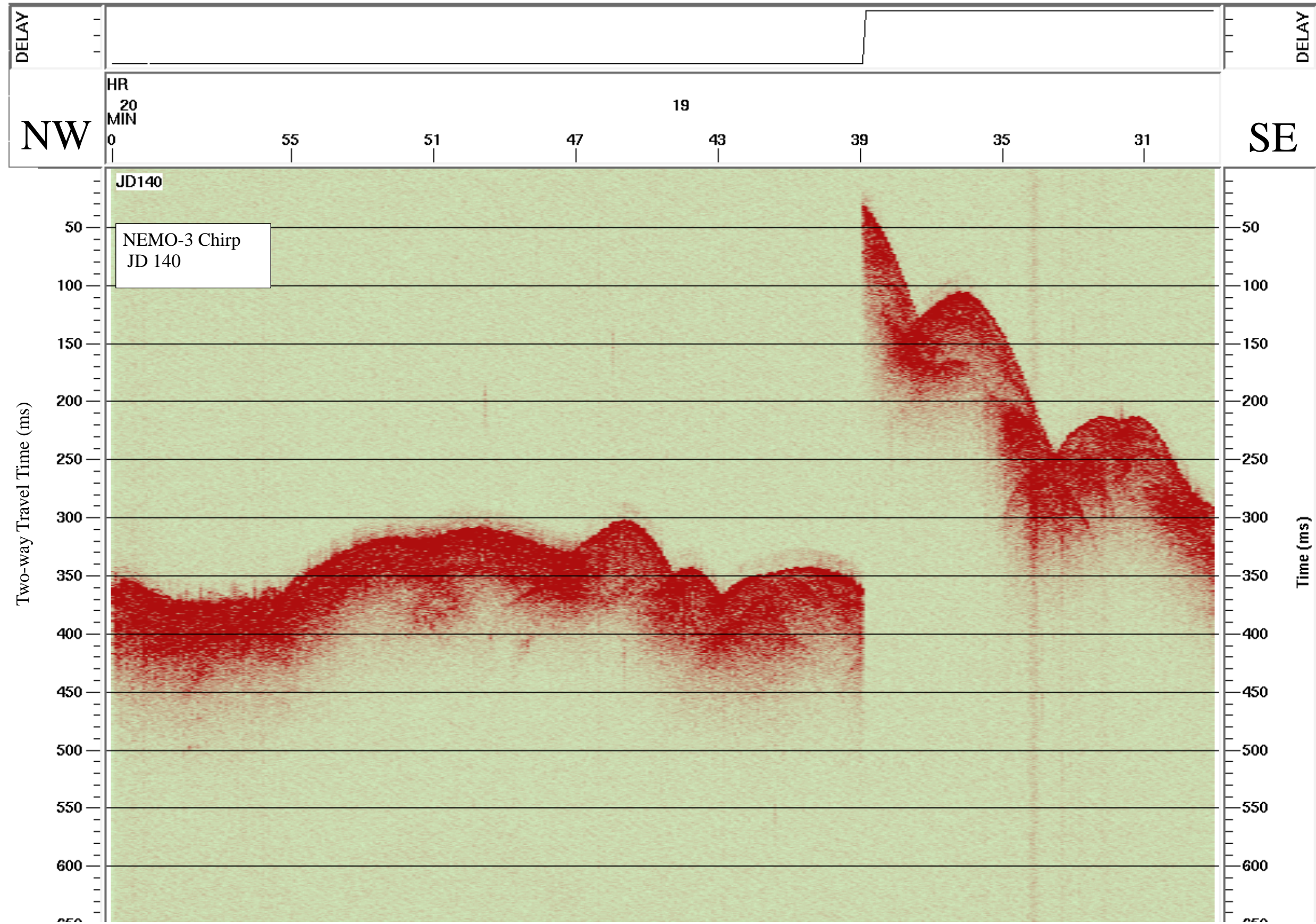
Data File SBfixavg.2000may19.1800-2400

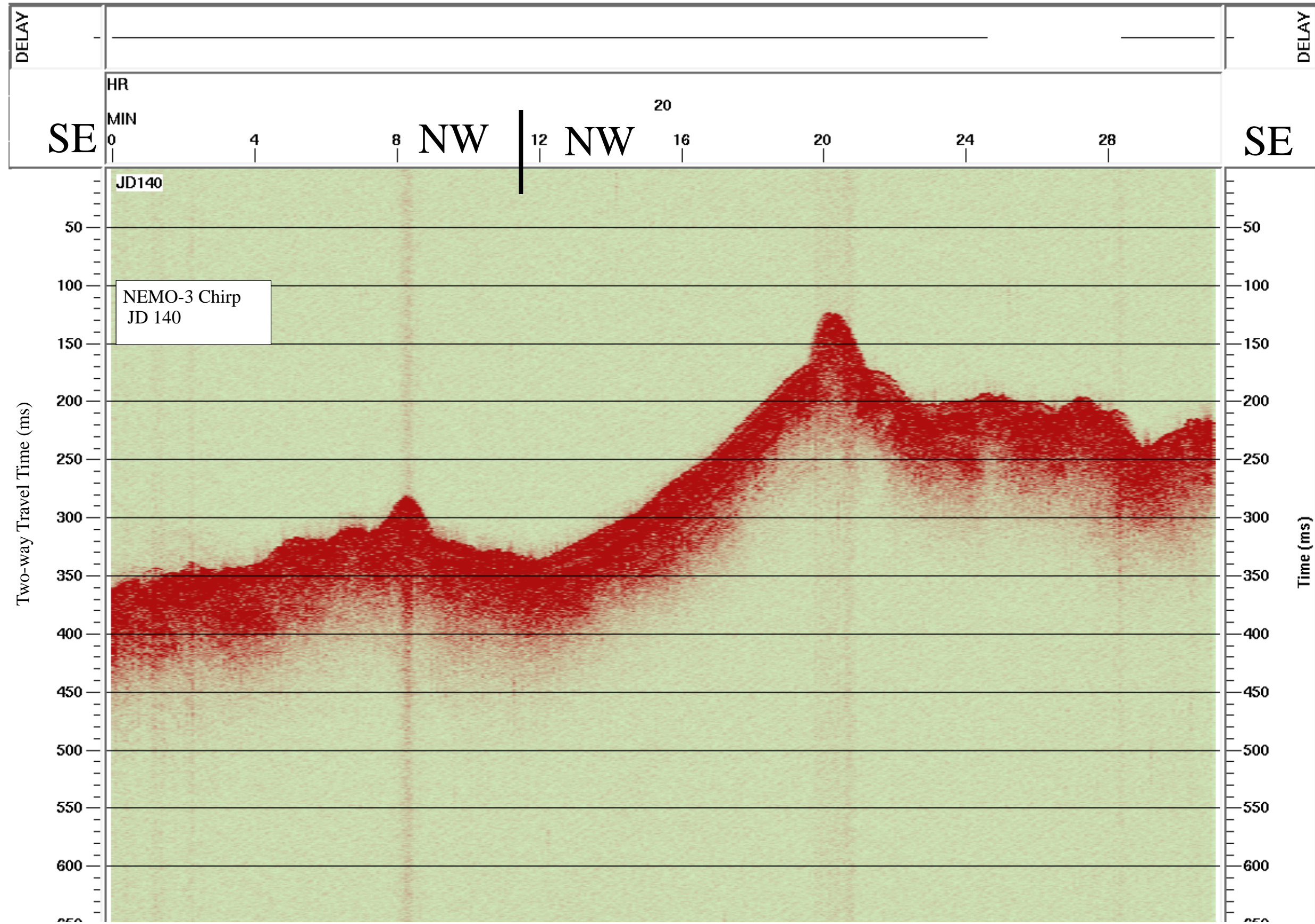


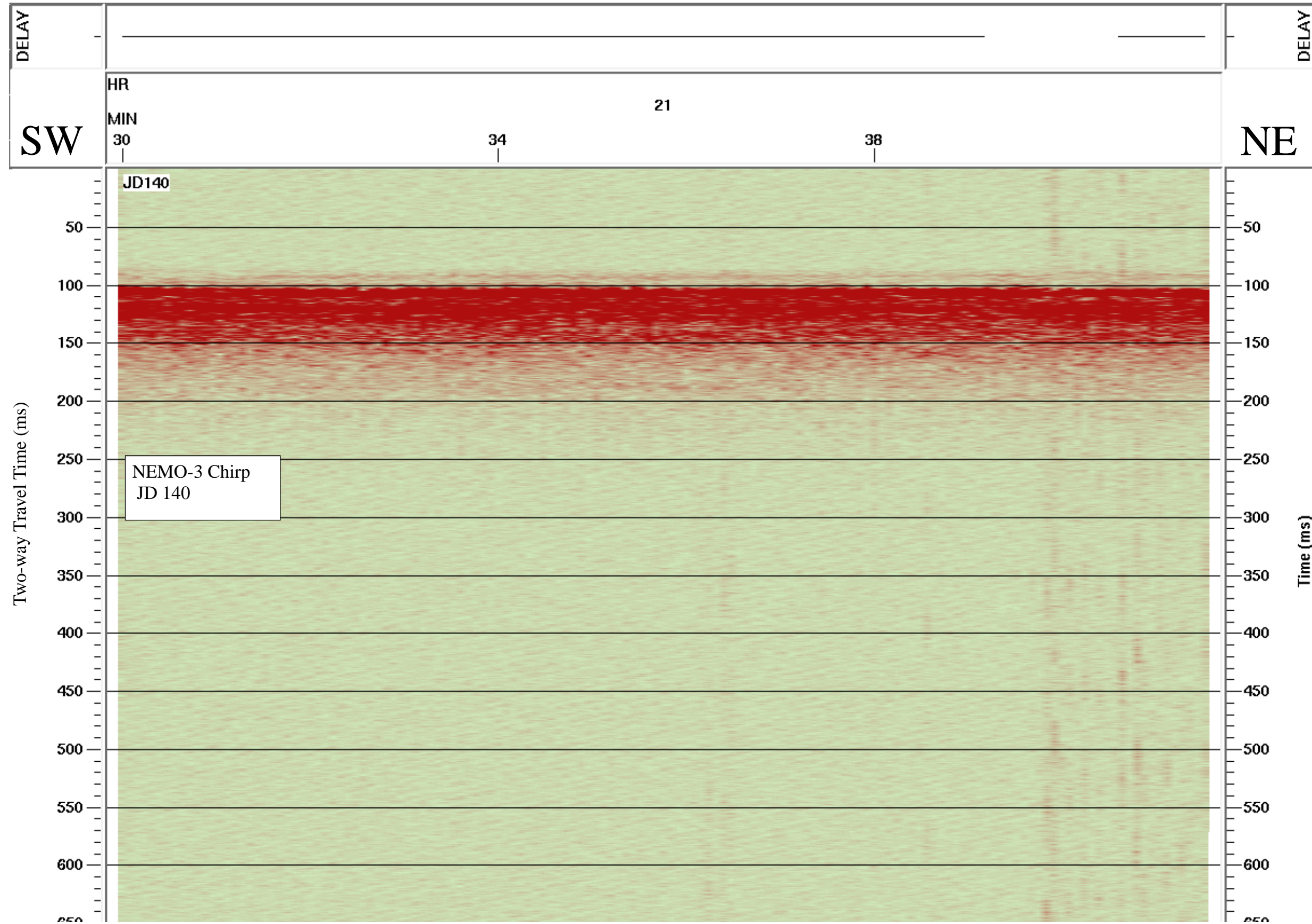












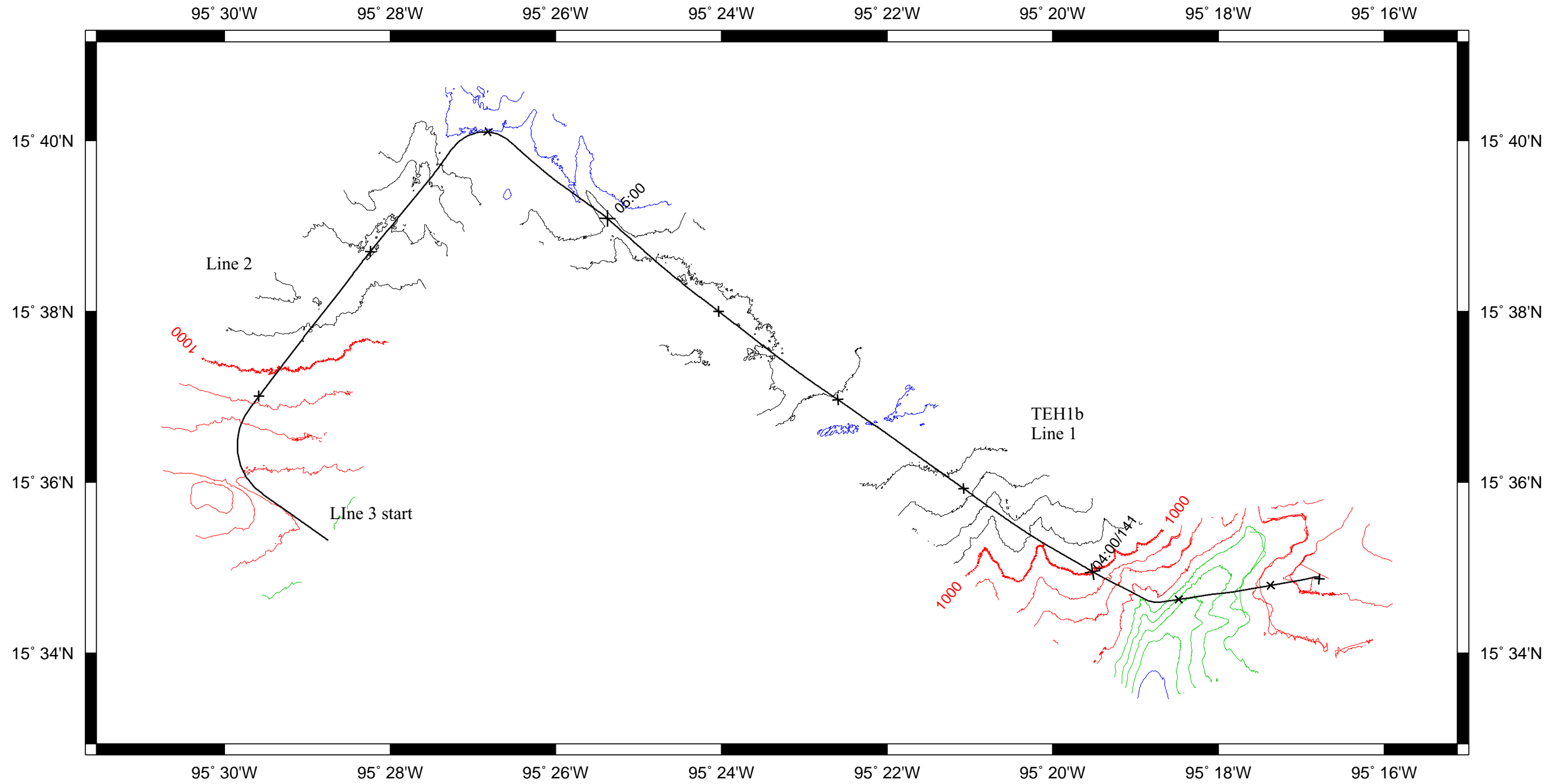
JD 141 (20 May 2000)--TEH-1 Survey, Last Day

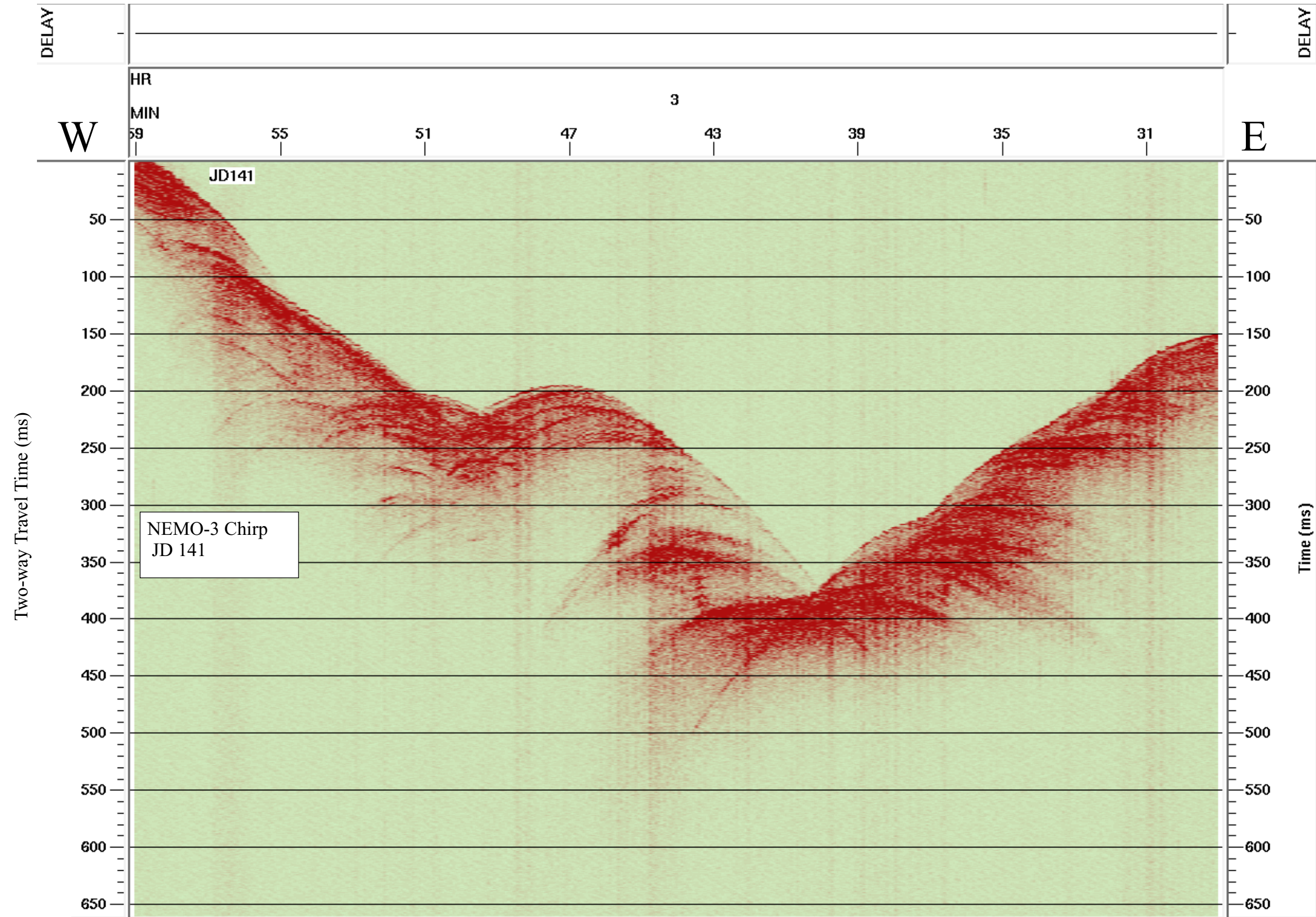
2-7 kHz Chirp Subbottom Profiler

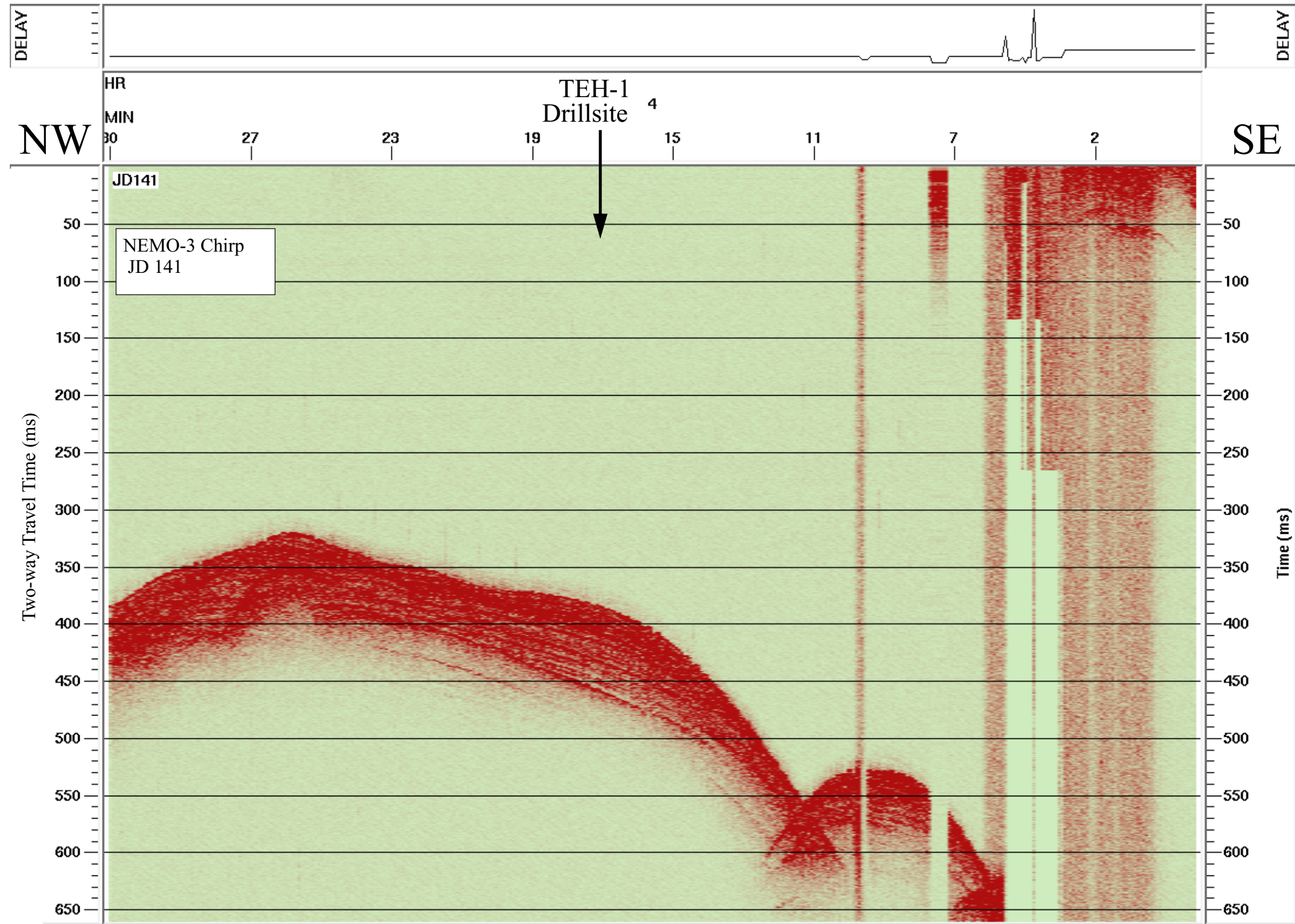
NEMO Leg 3

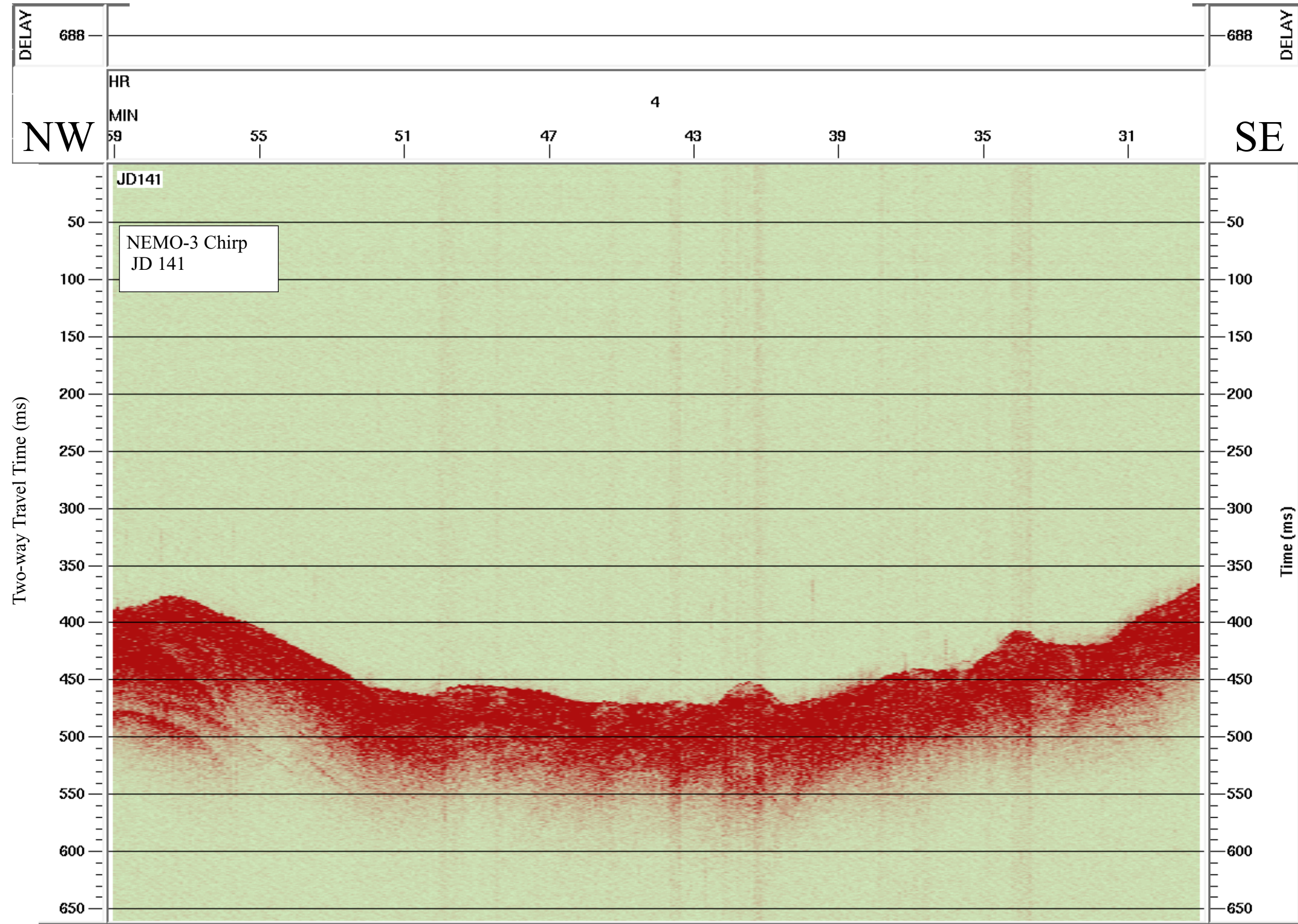
R/V Melville

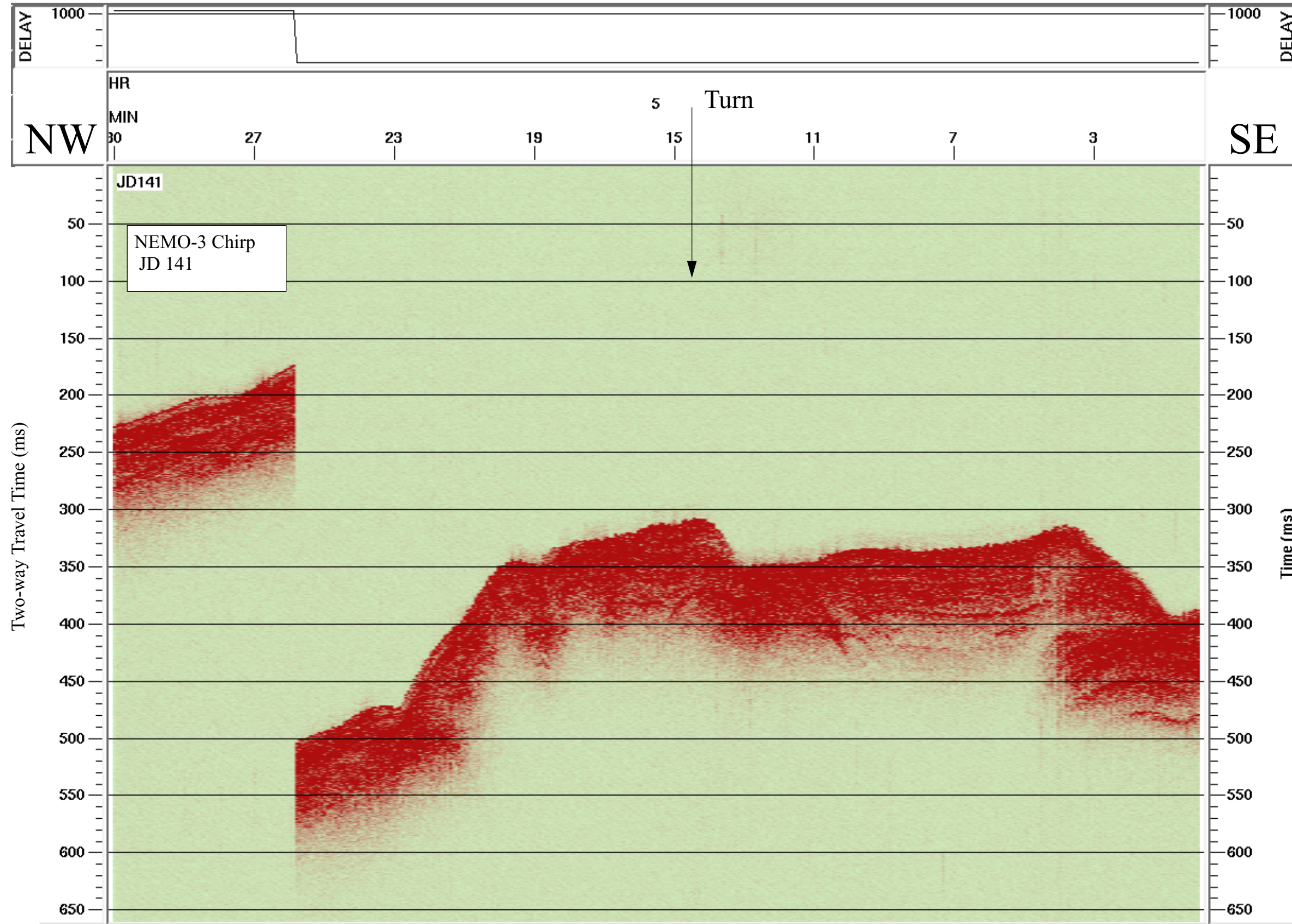
Data File SBfixavg.2000may20.0000-0600

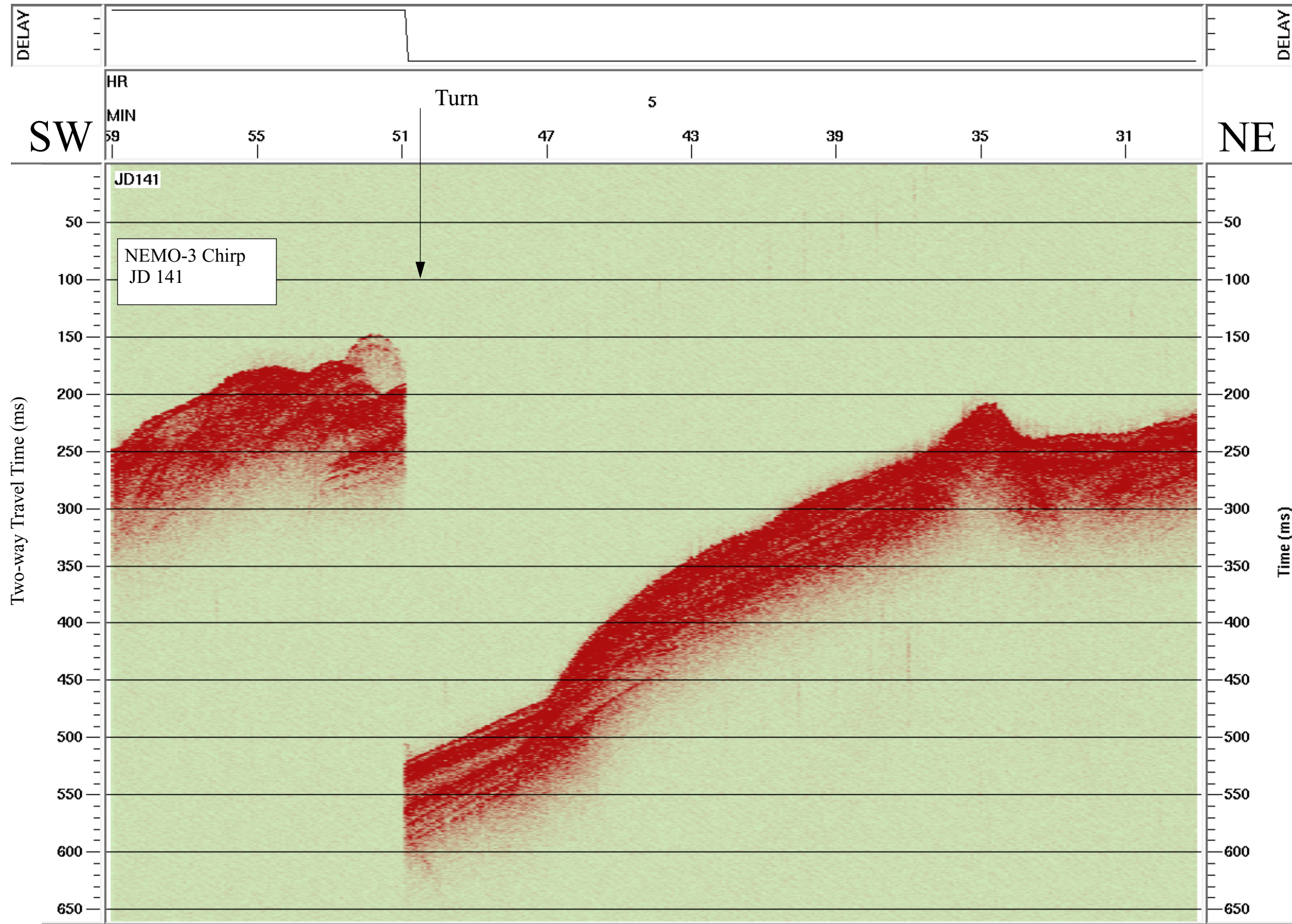




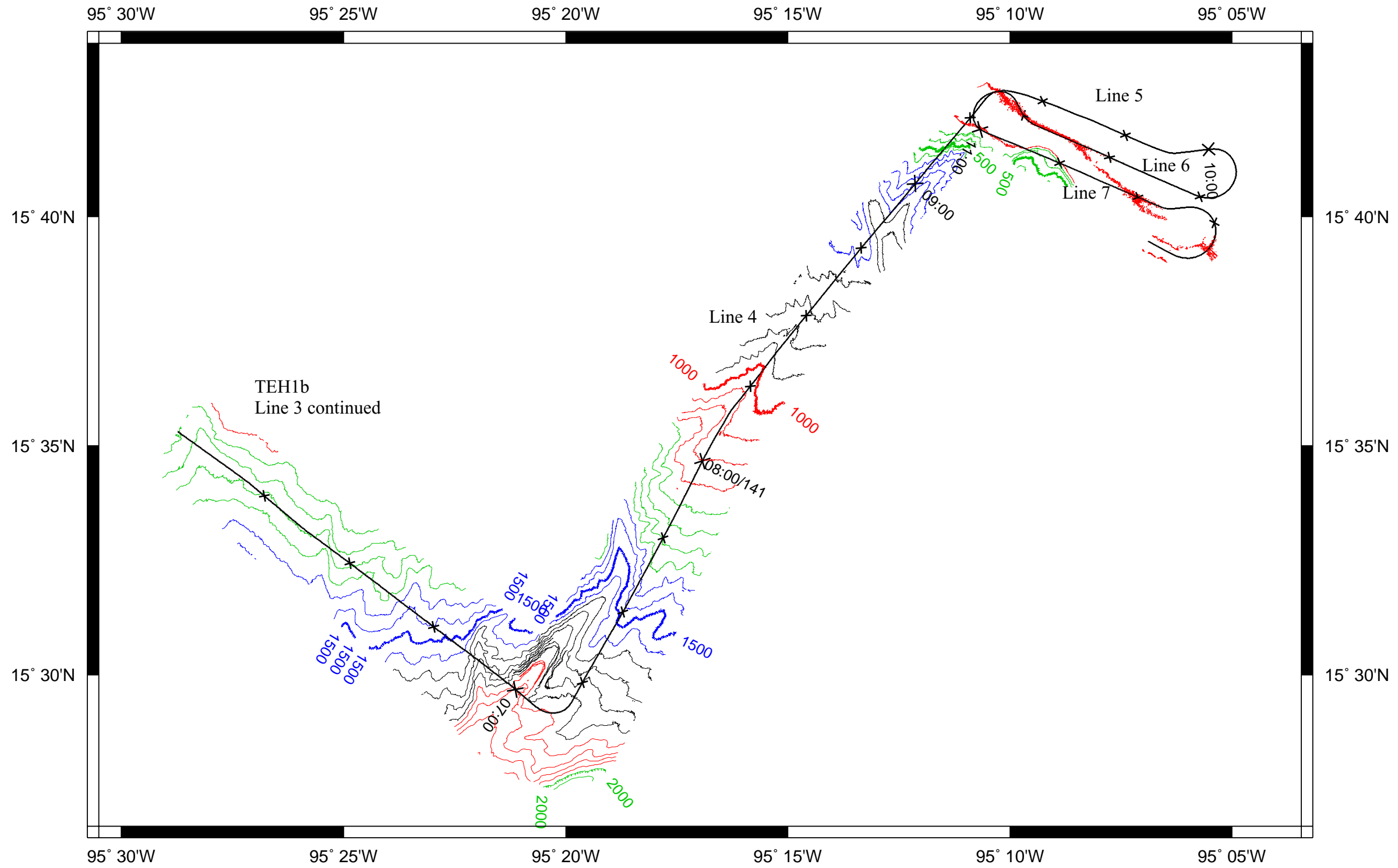


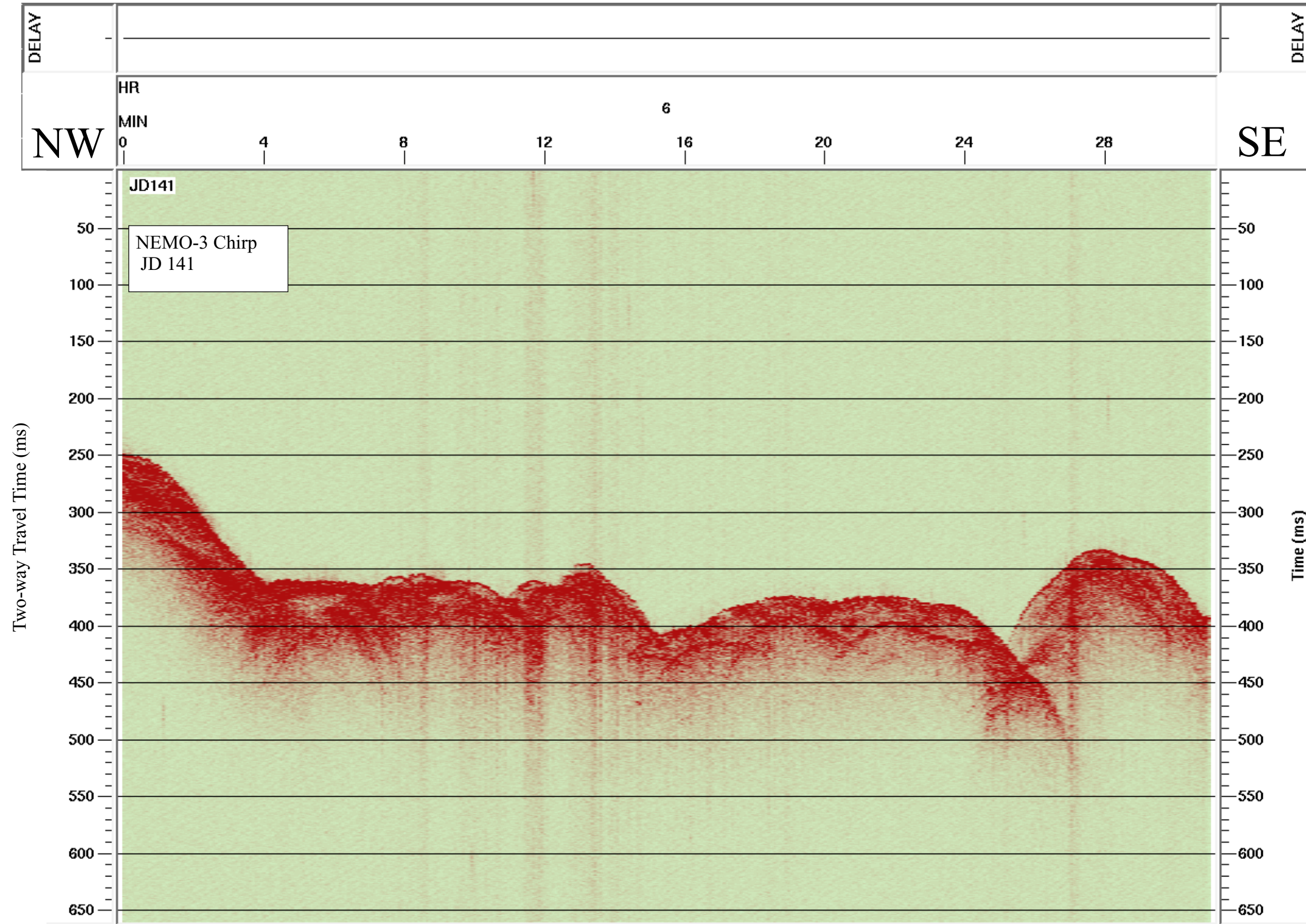


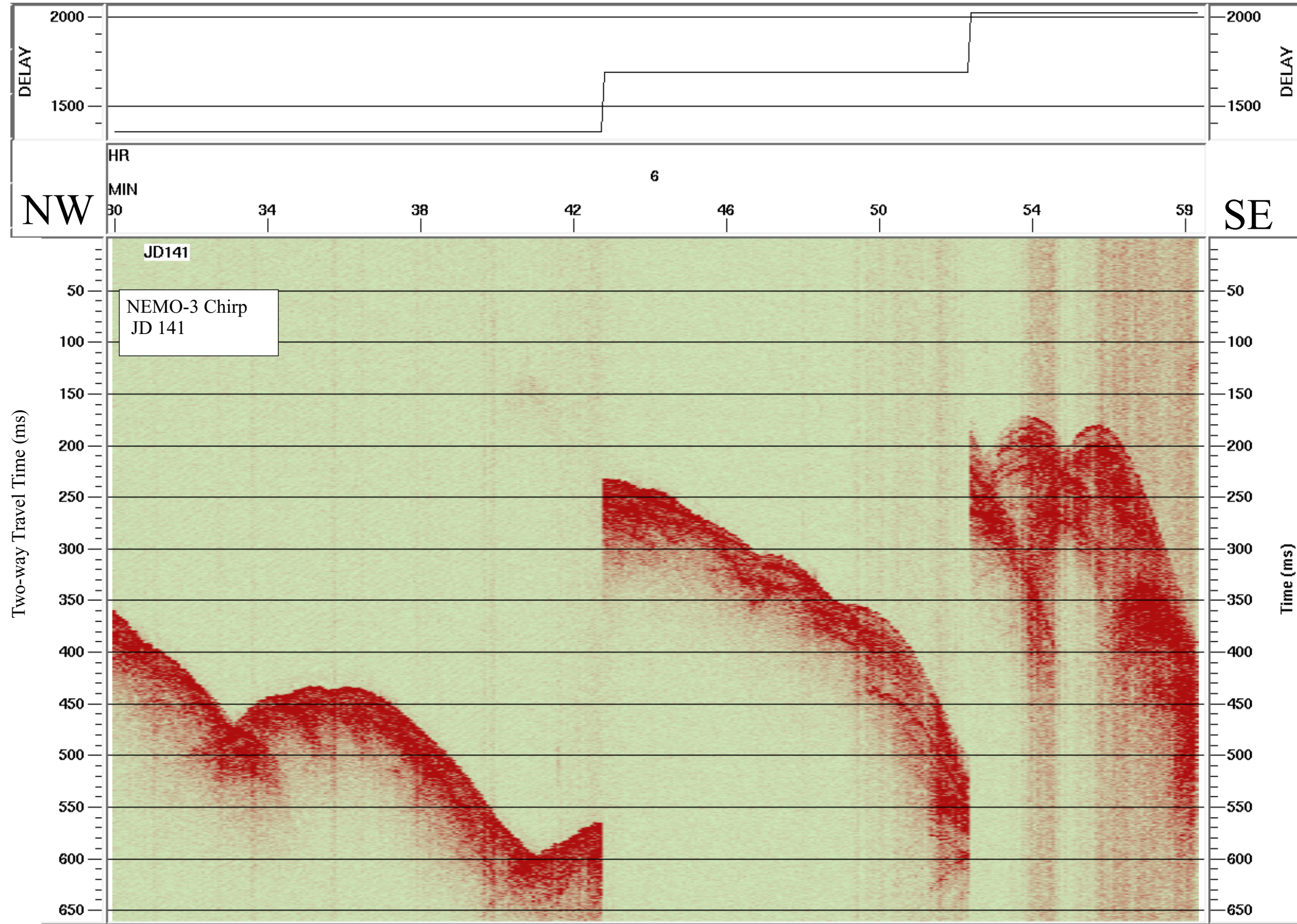


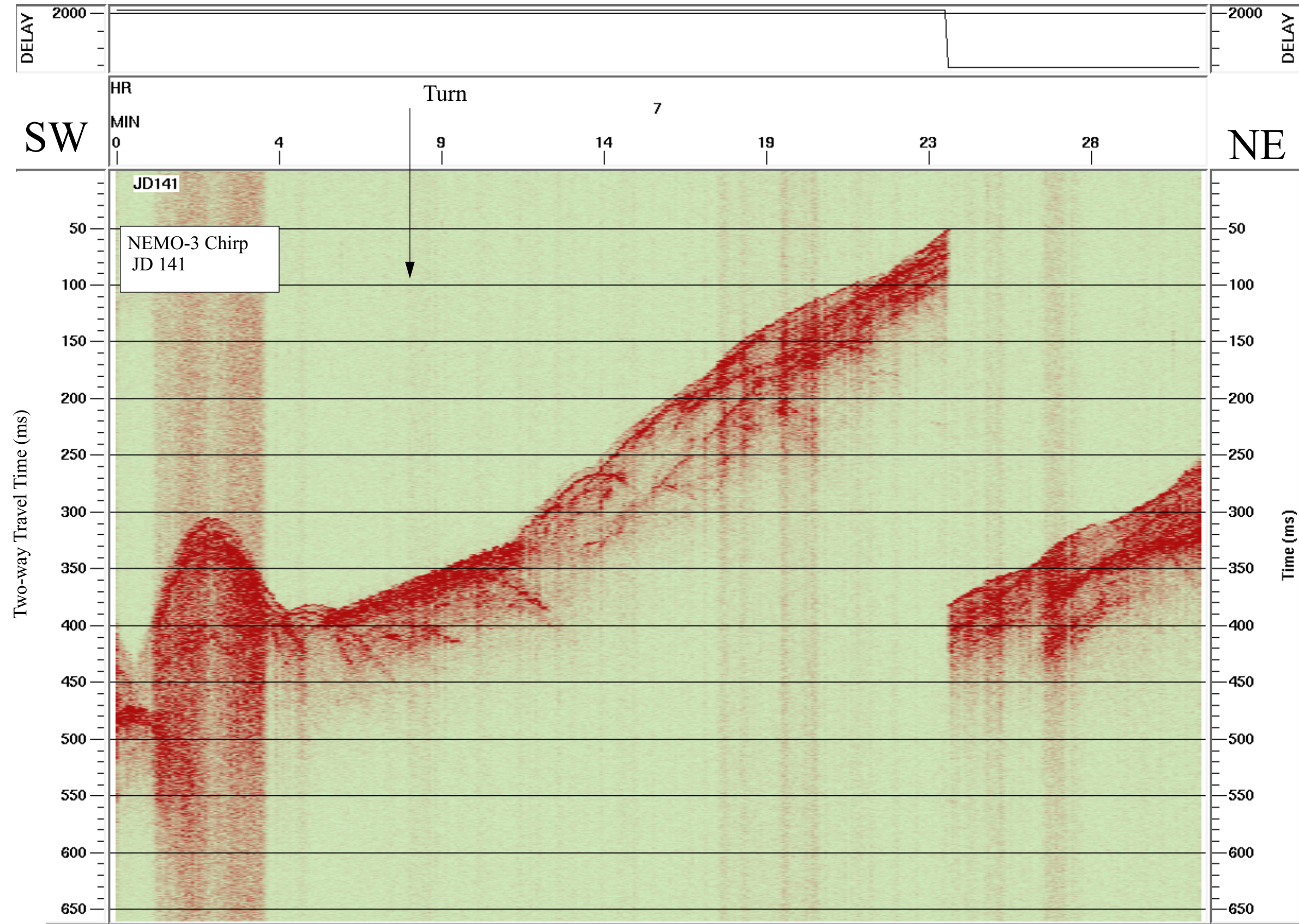


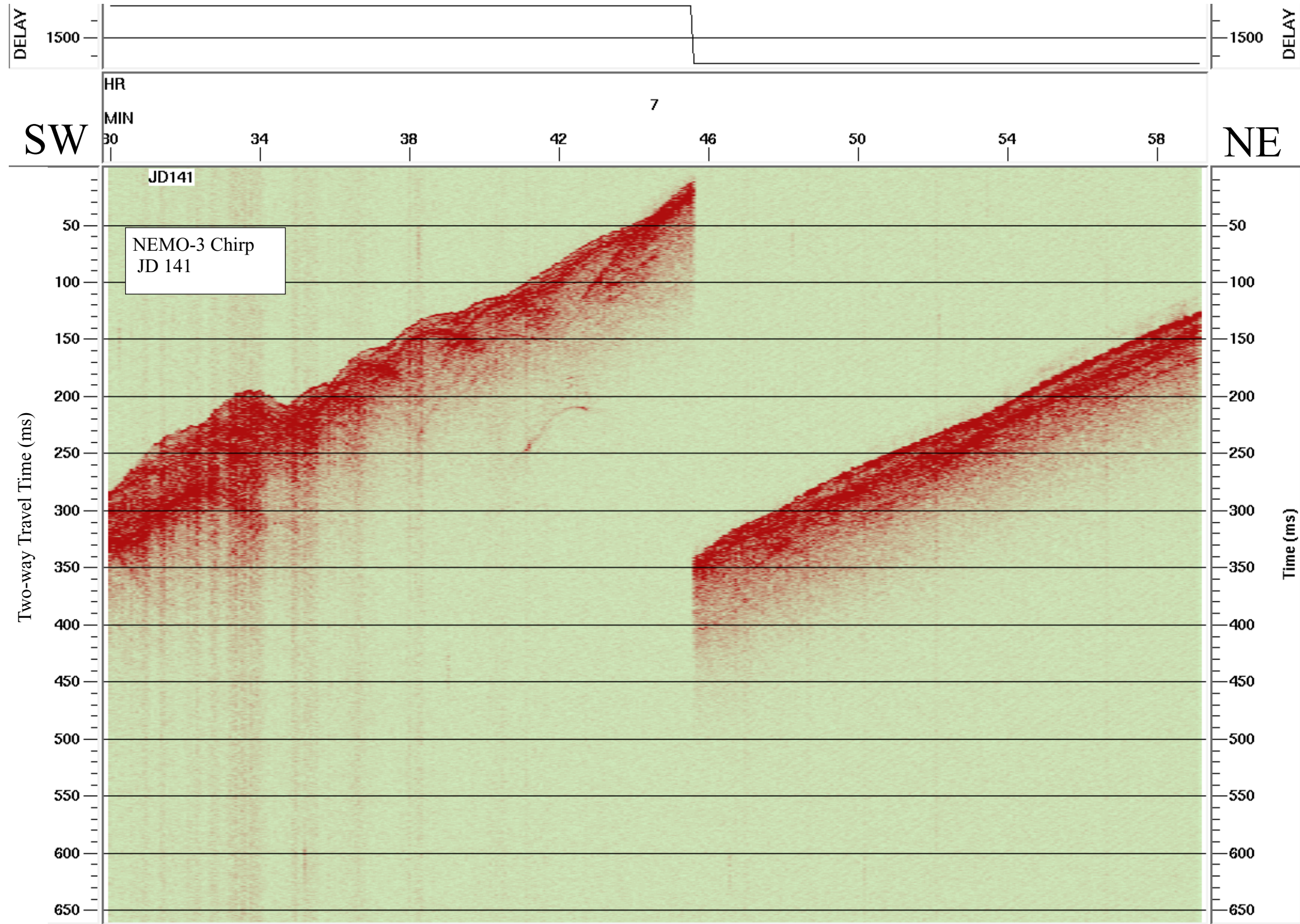
Data File SBfixavg.2000may20.0600-1200

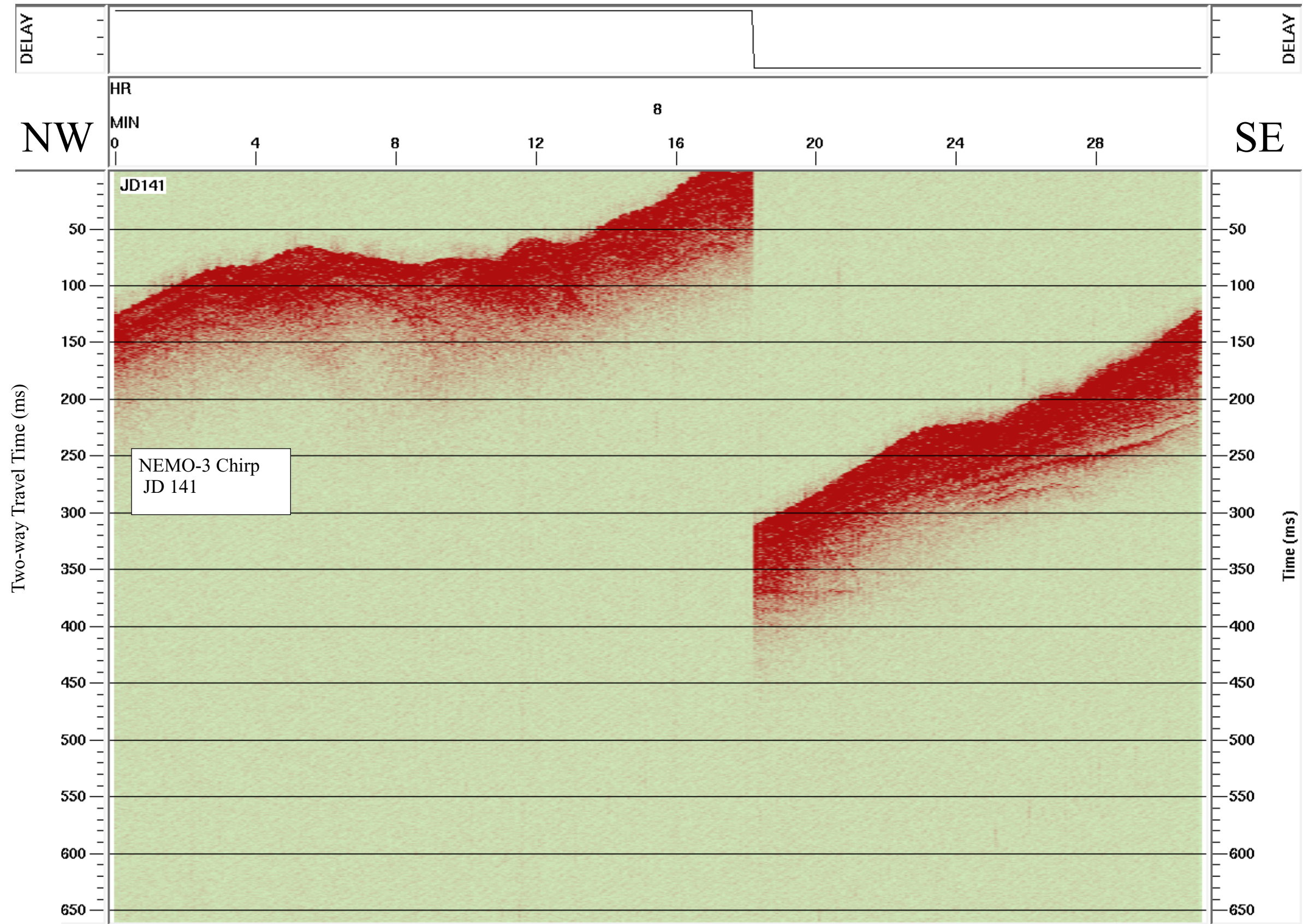


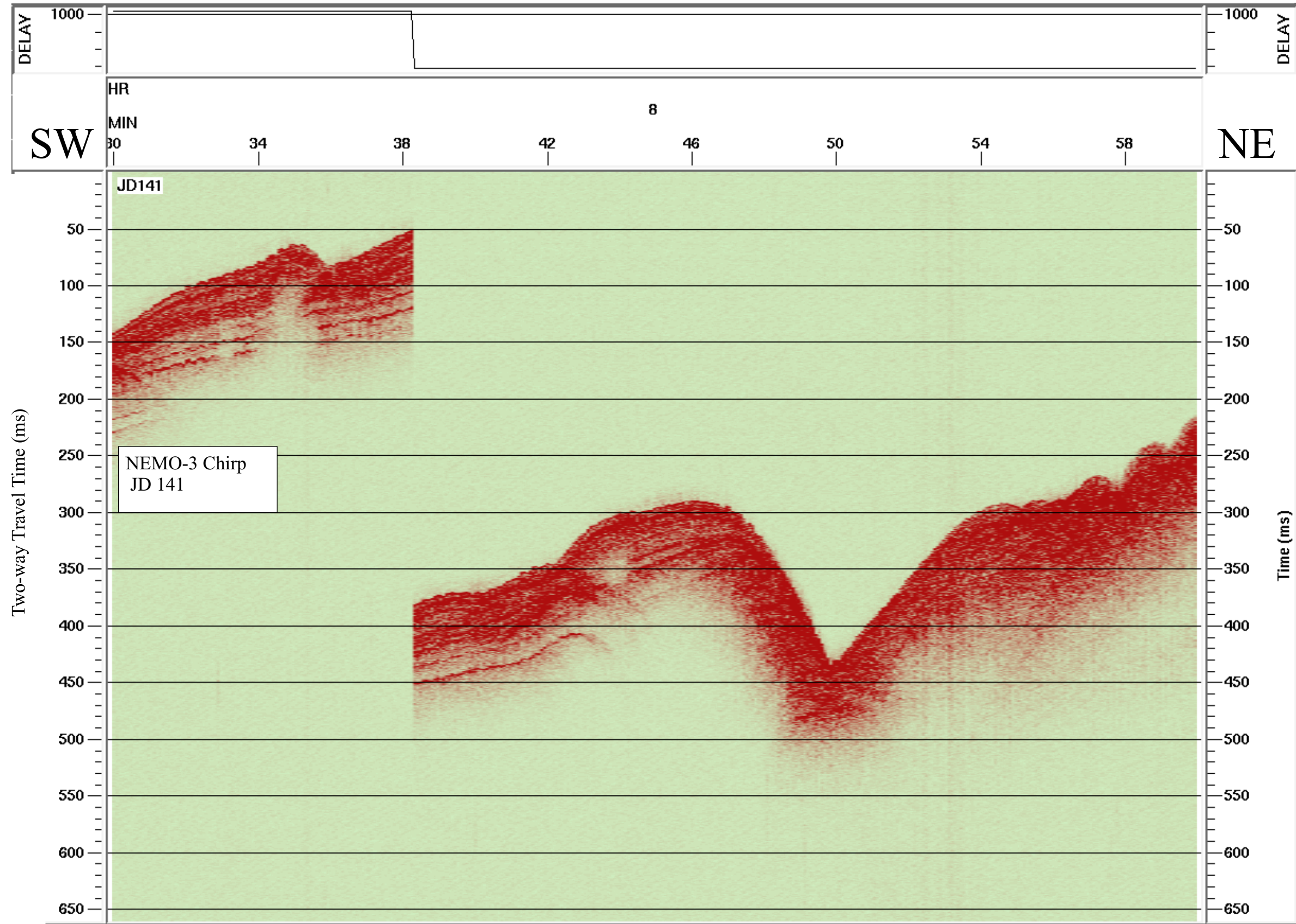


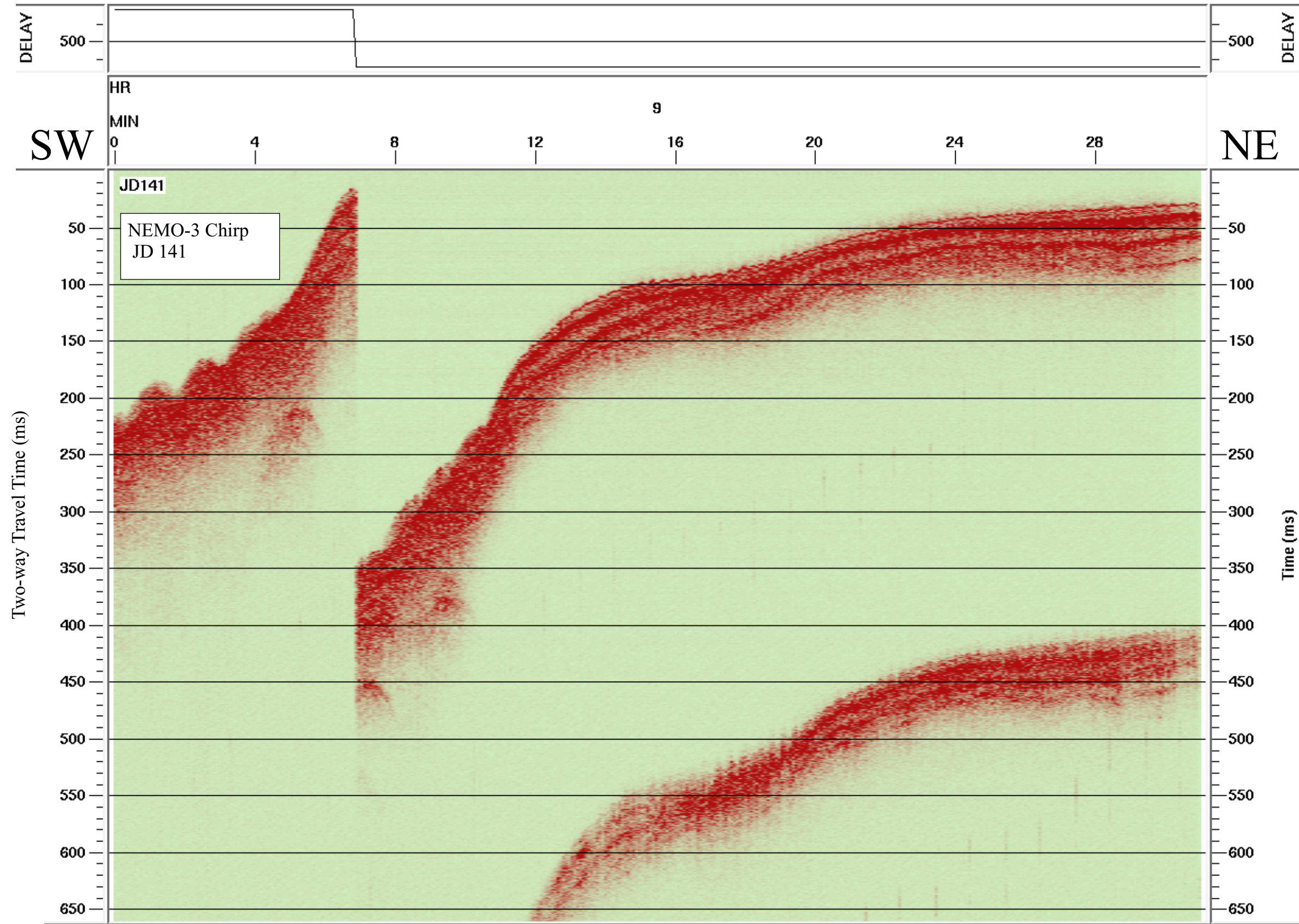


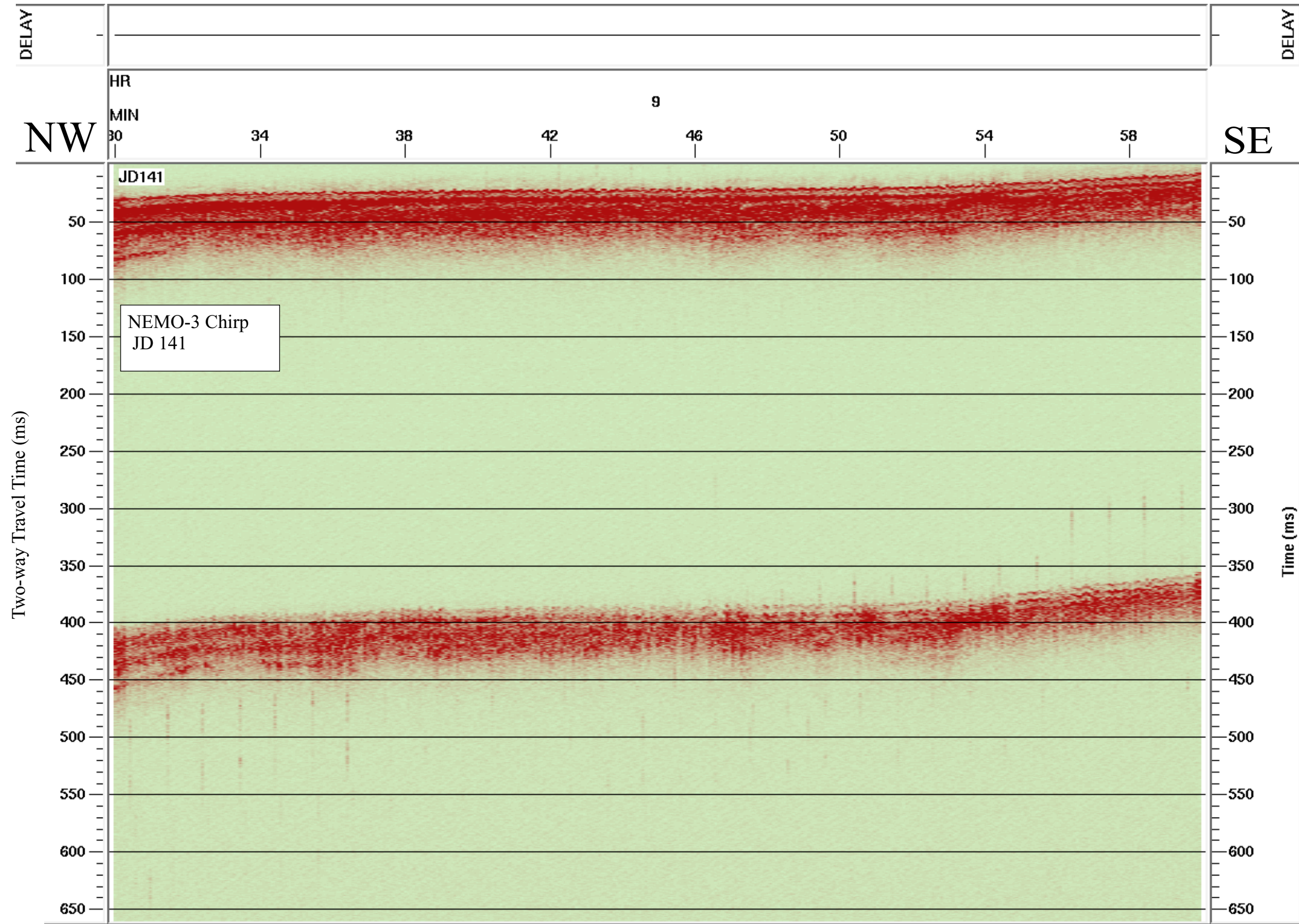


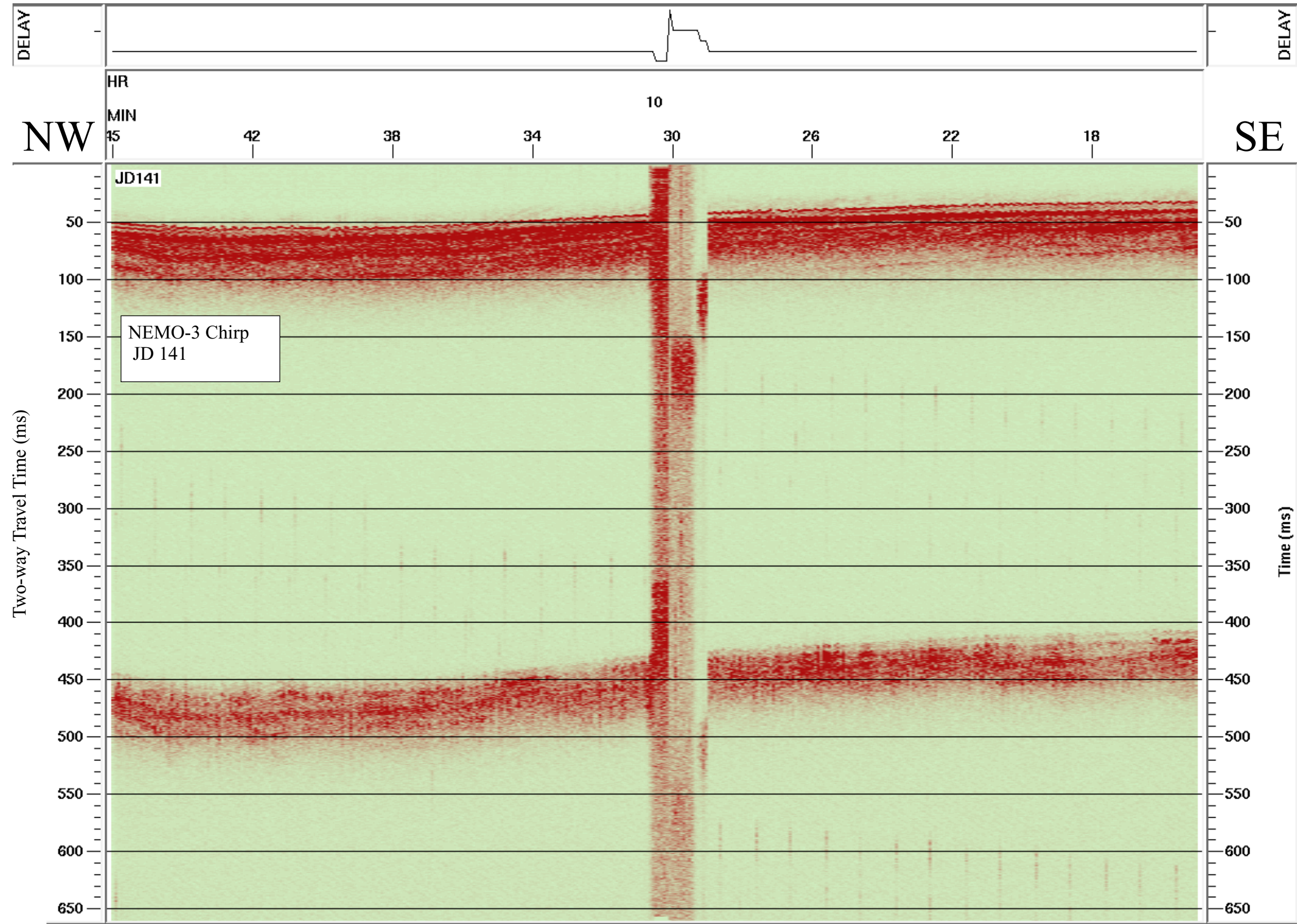


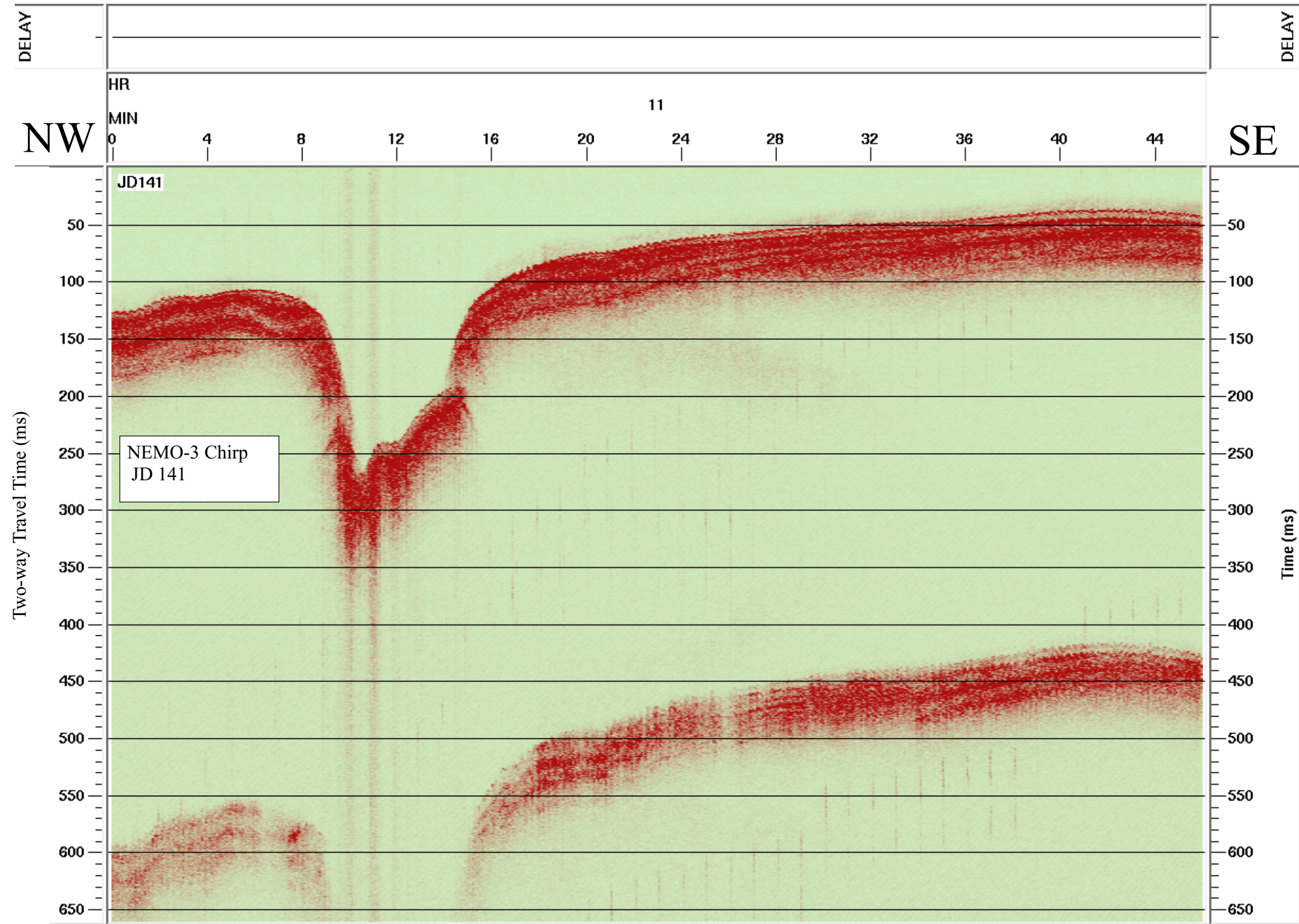




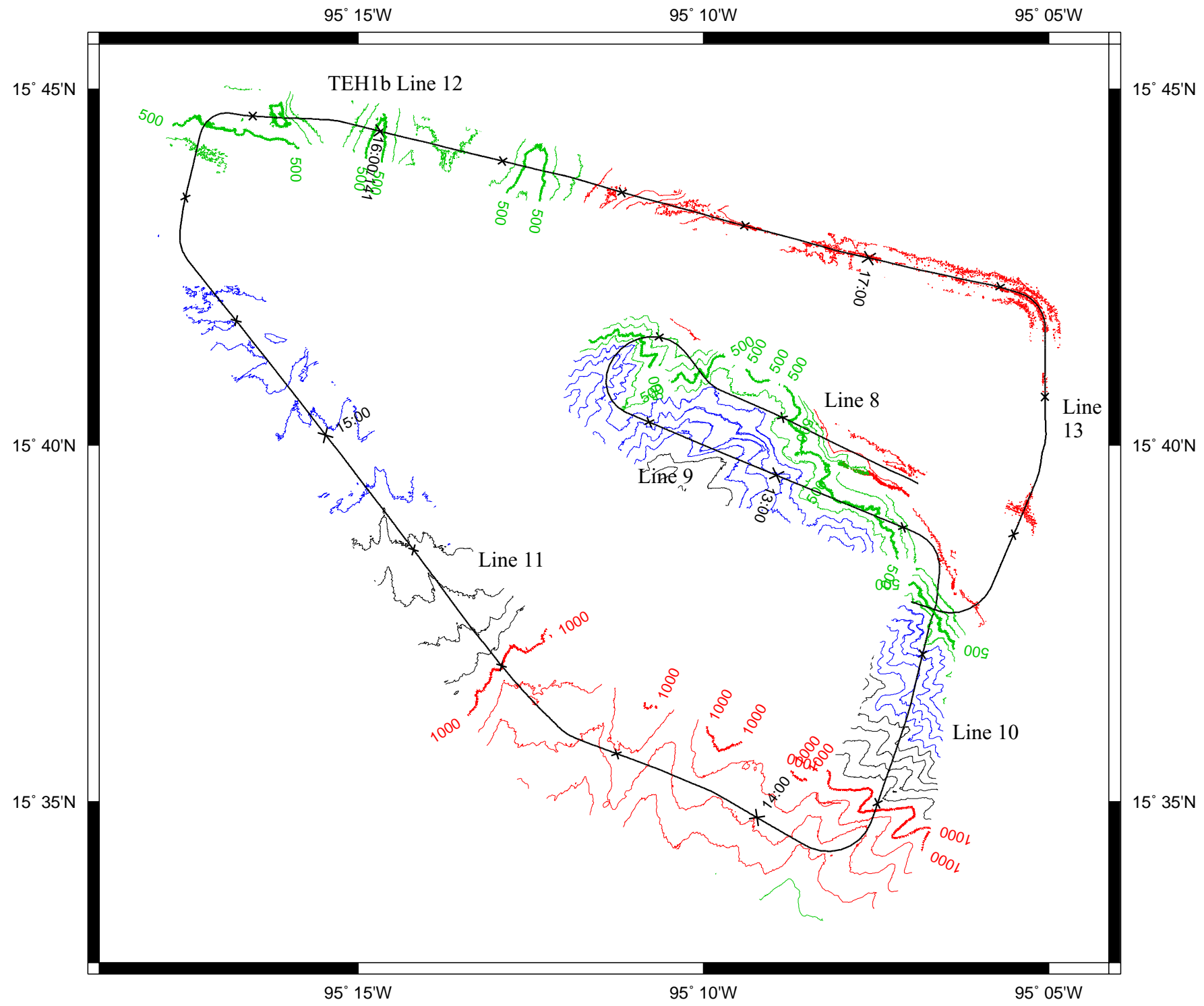


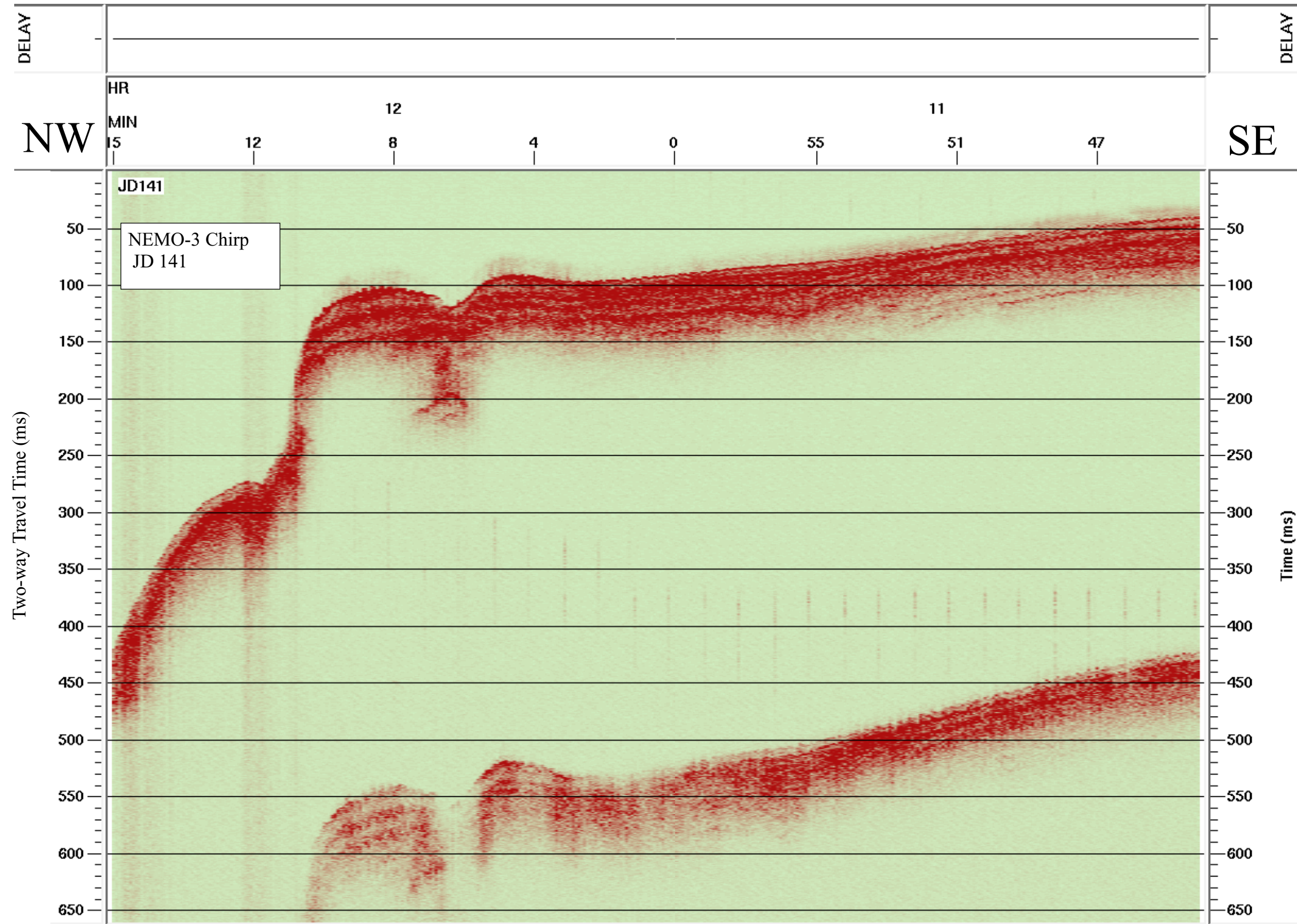


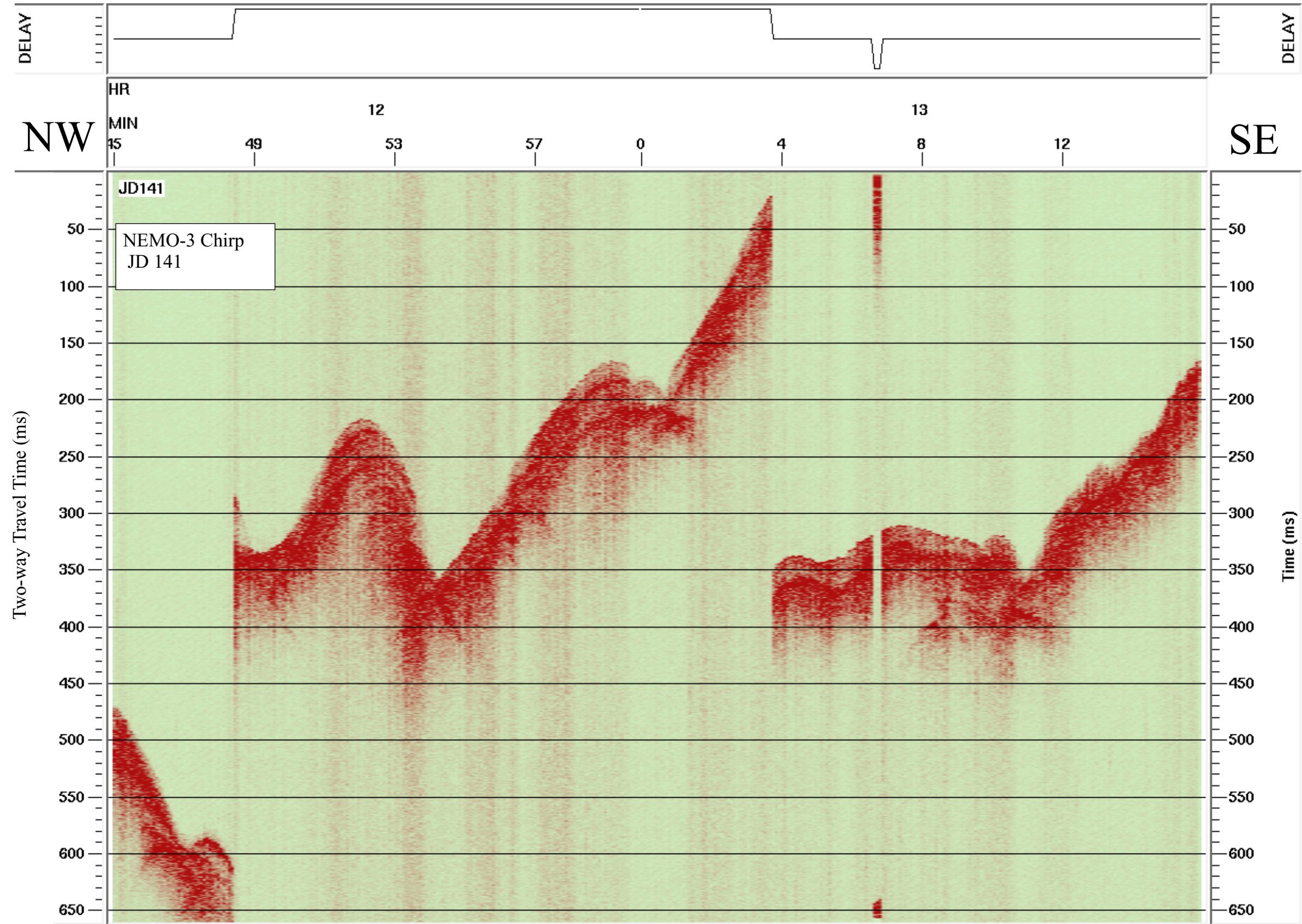


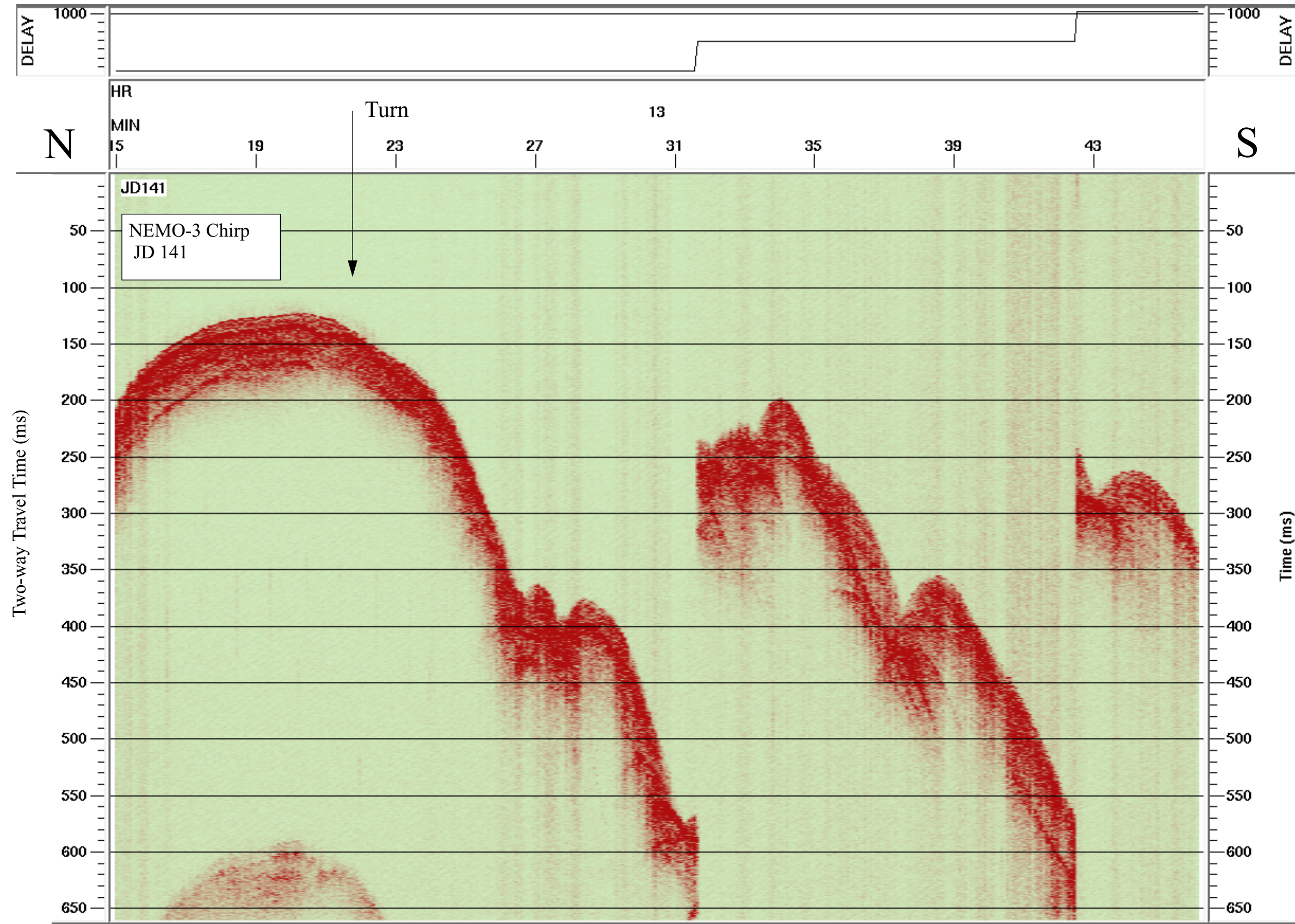


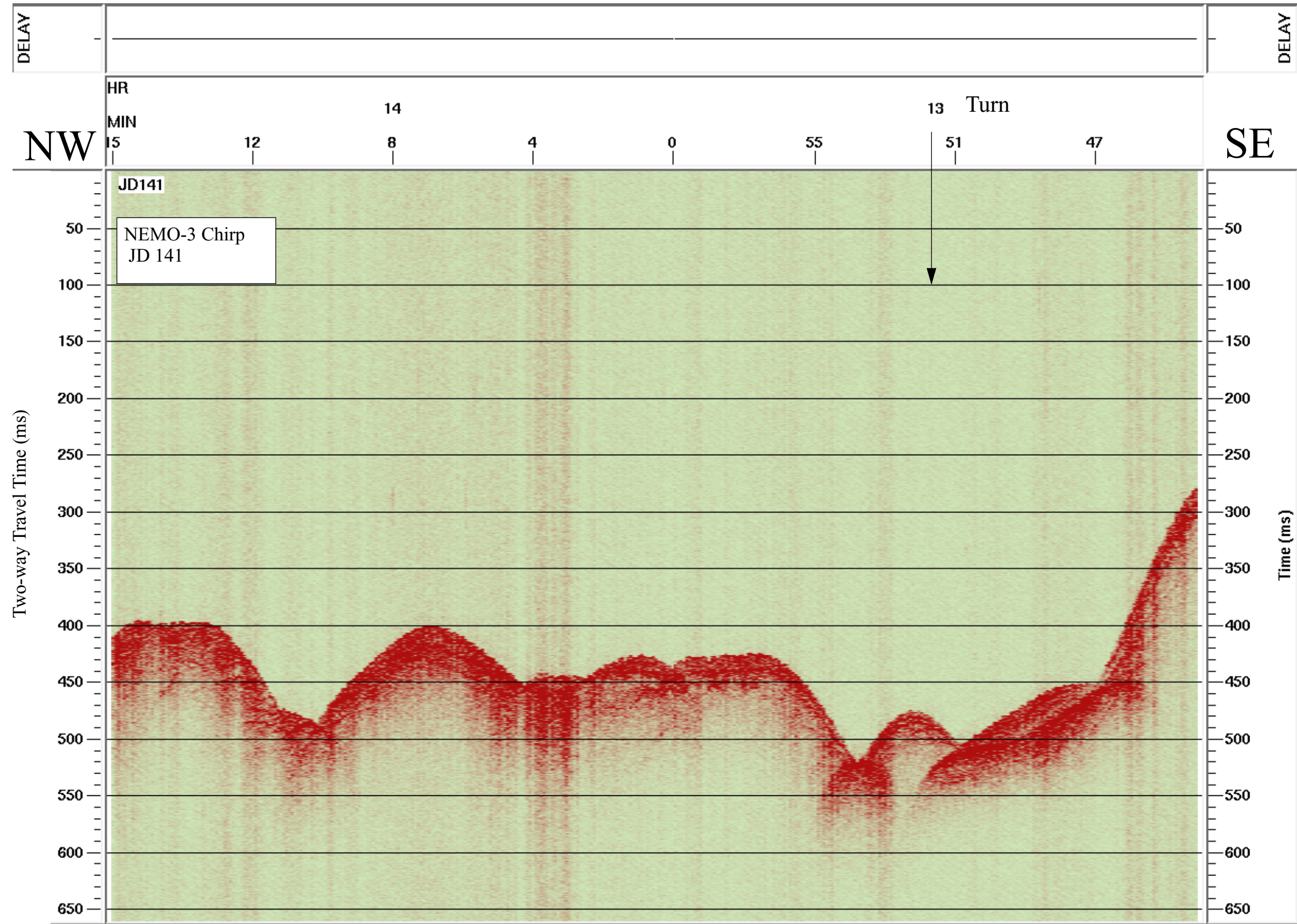
Data File SBfixavg.2000may20.1200-1800

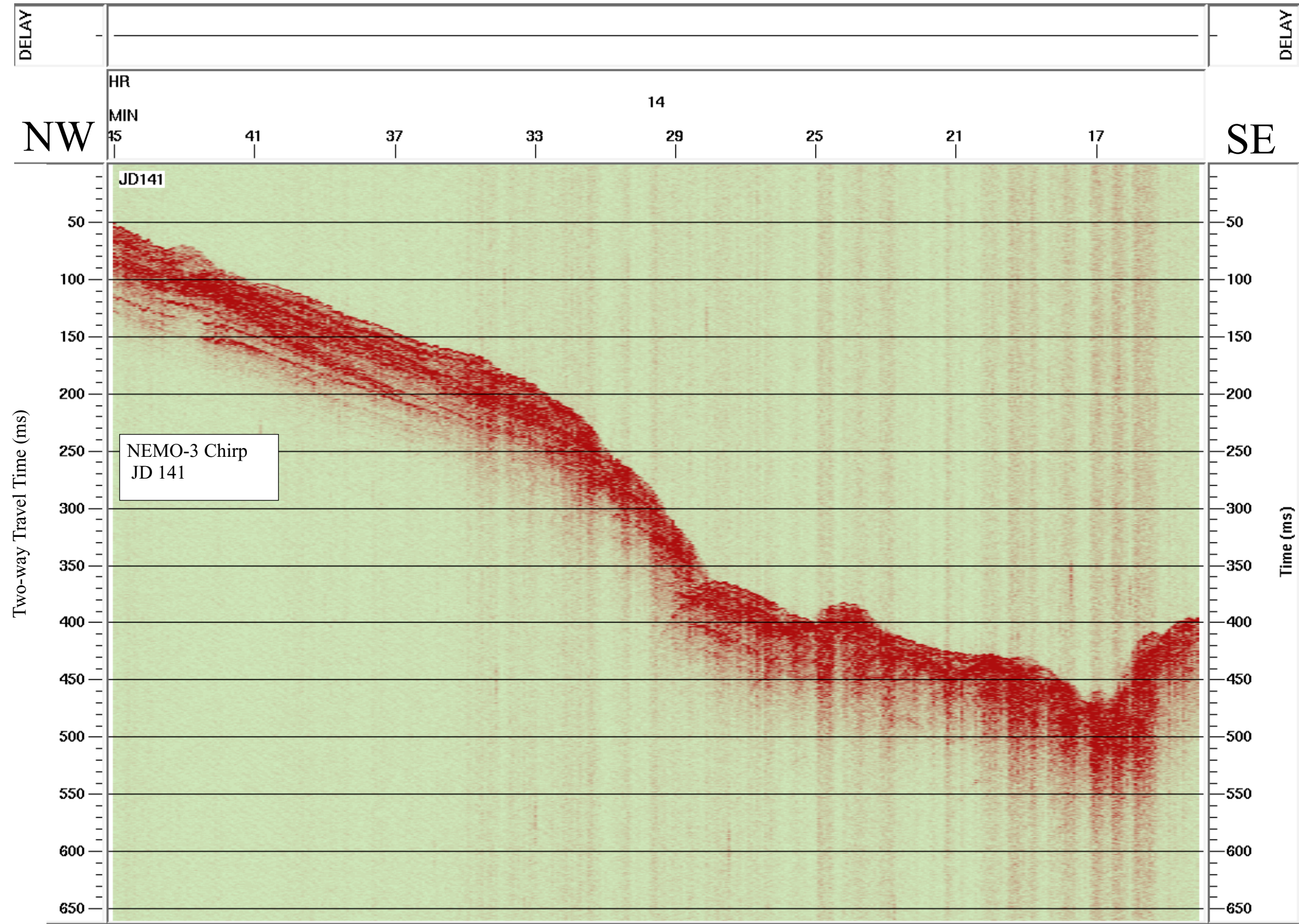


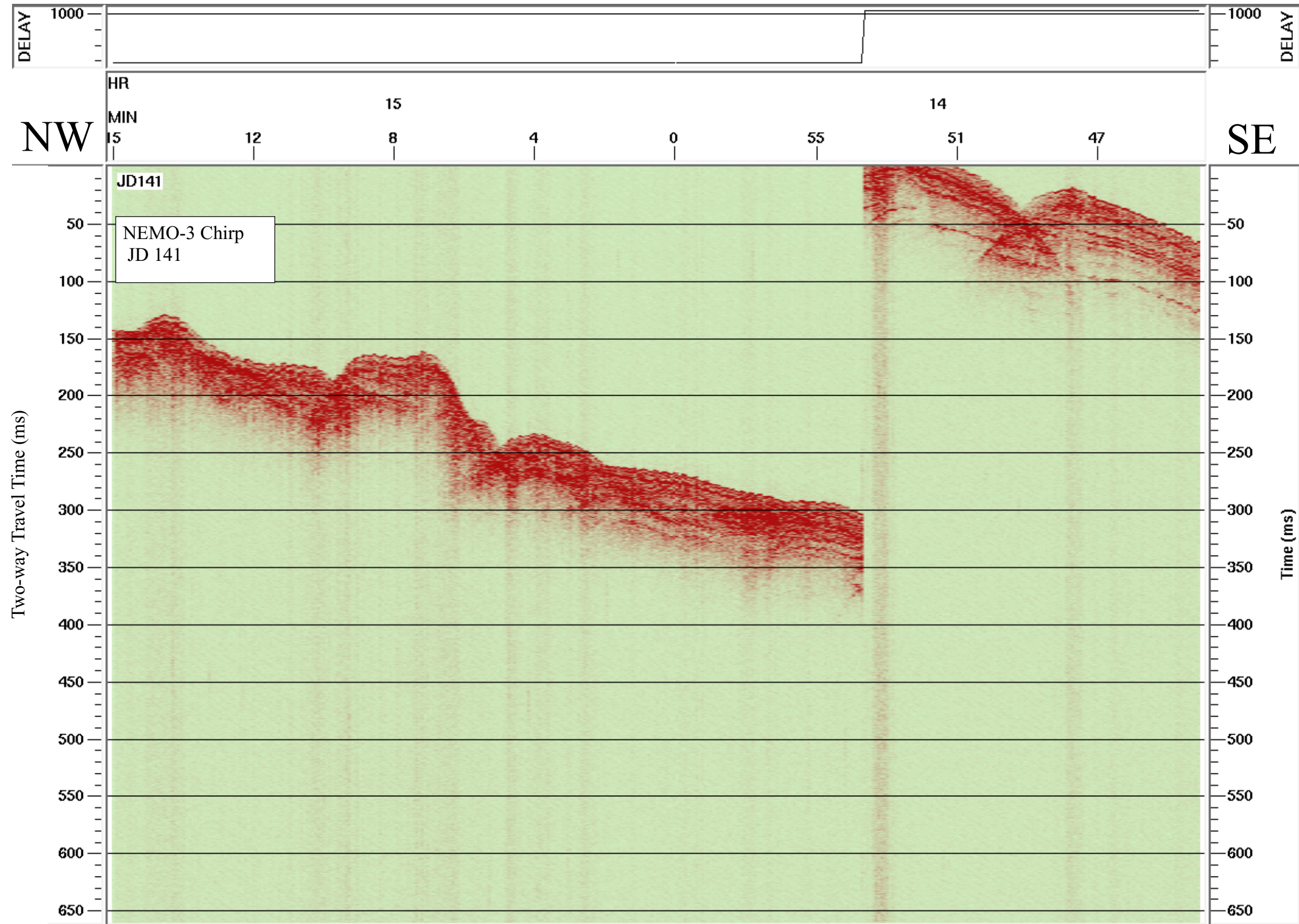


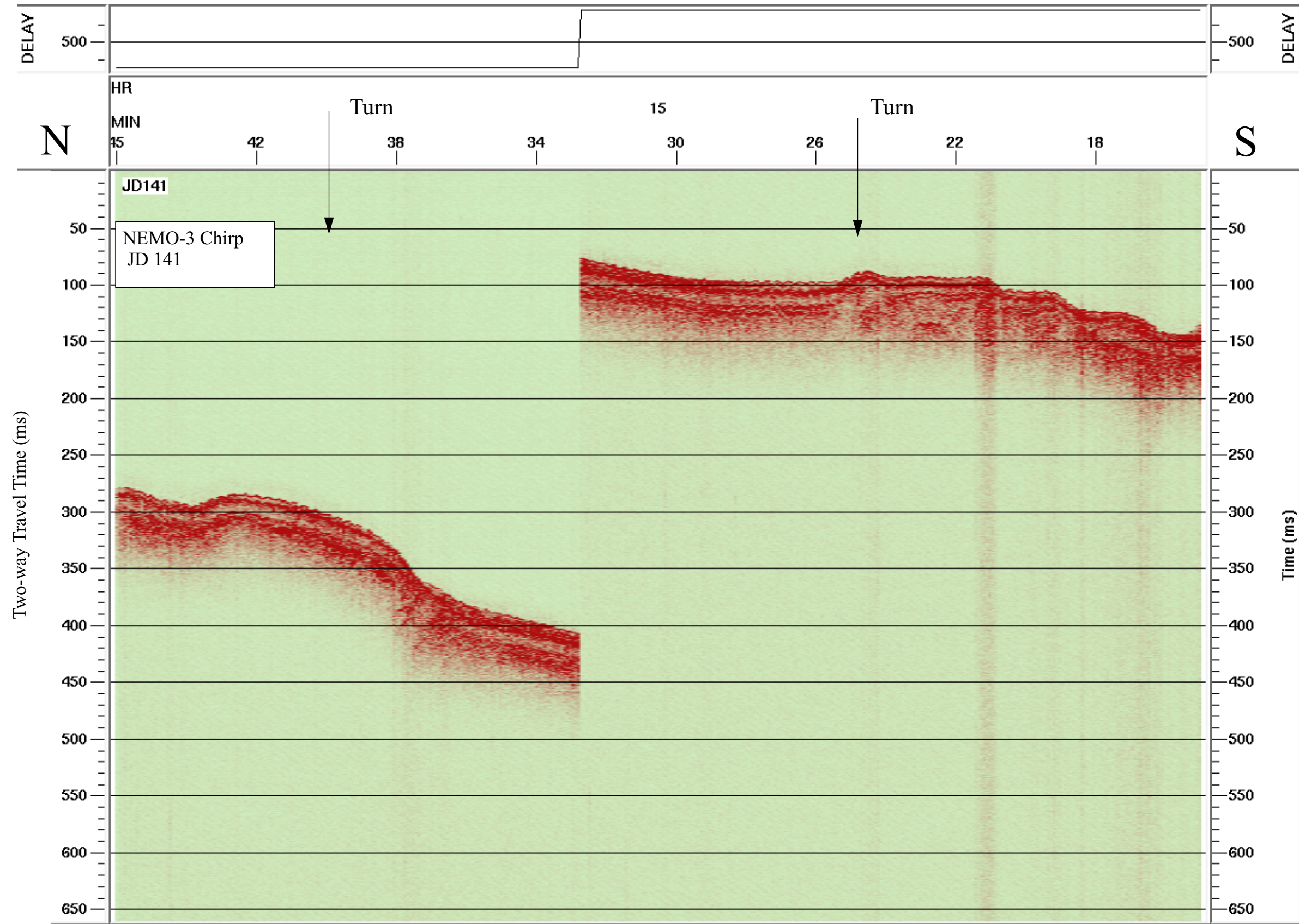


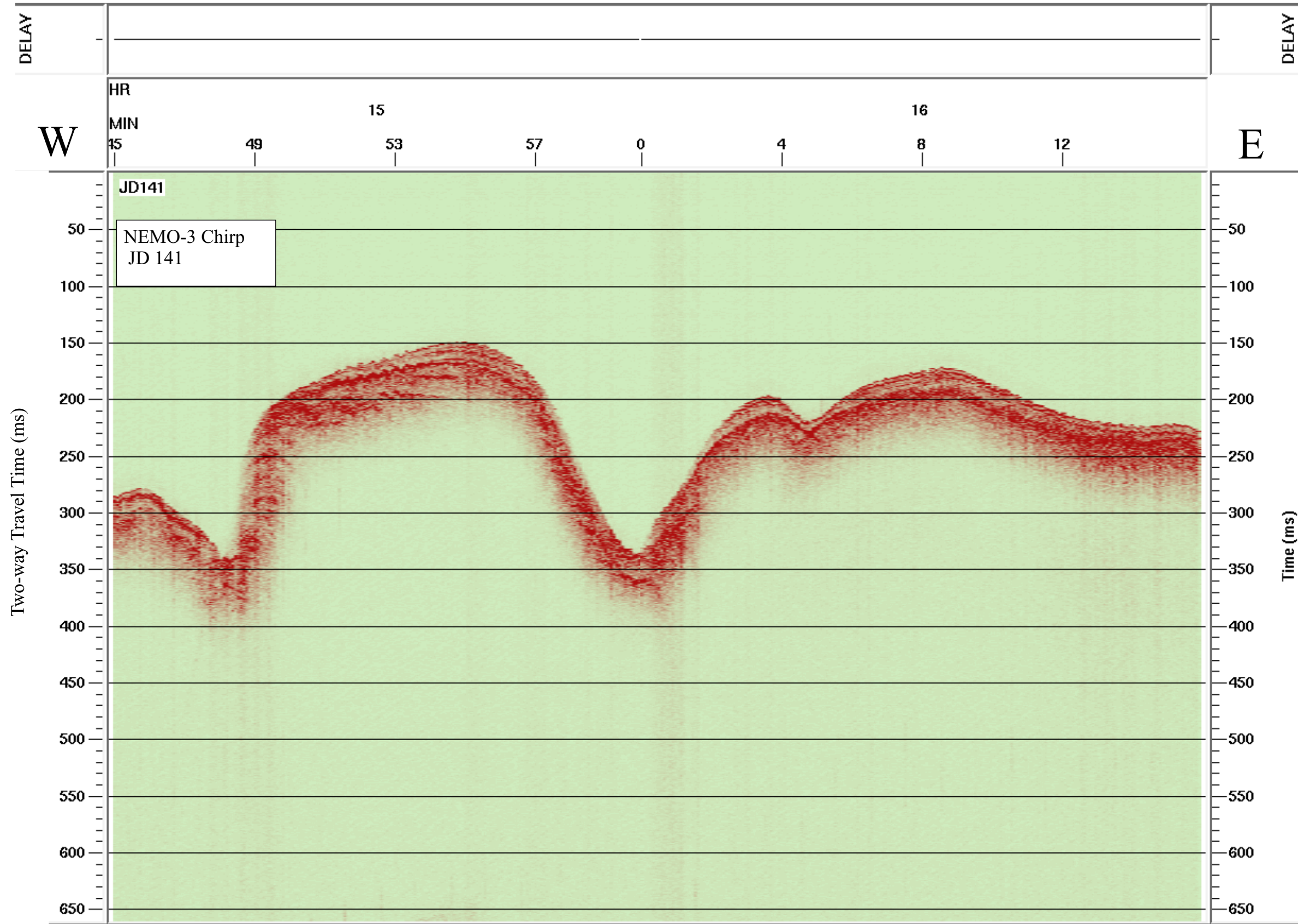


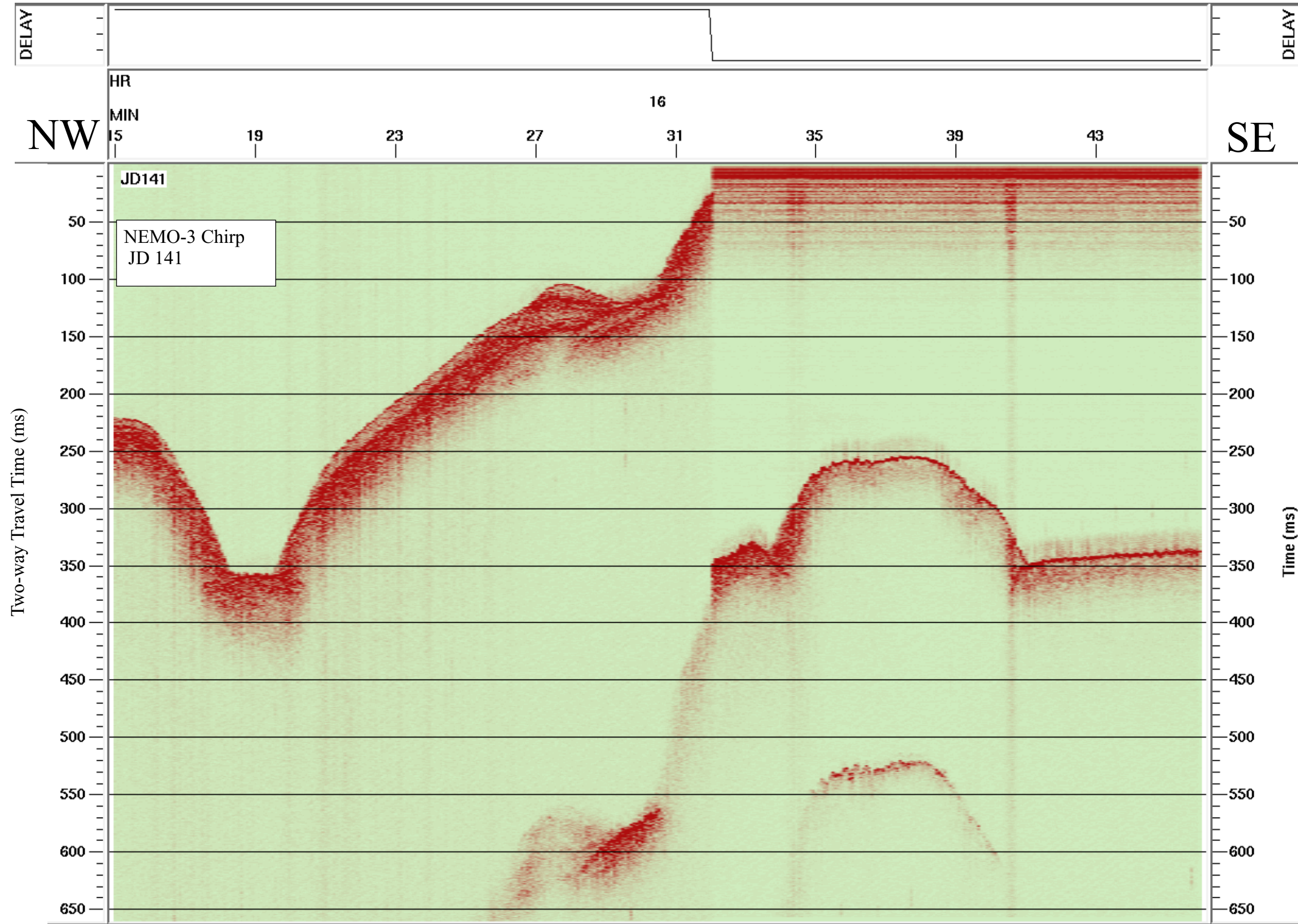


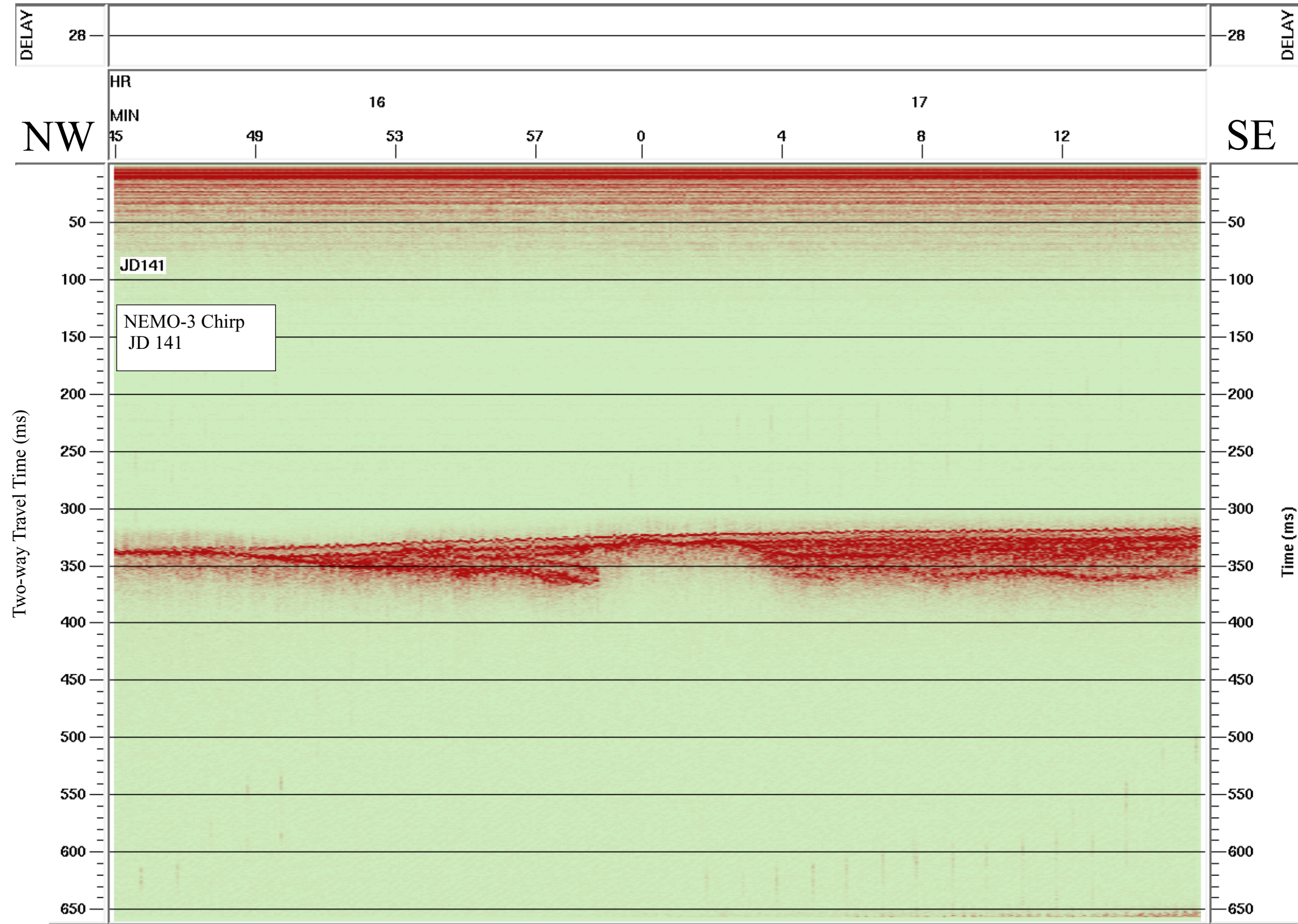


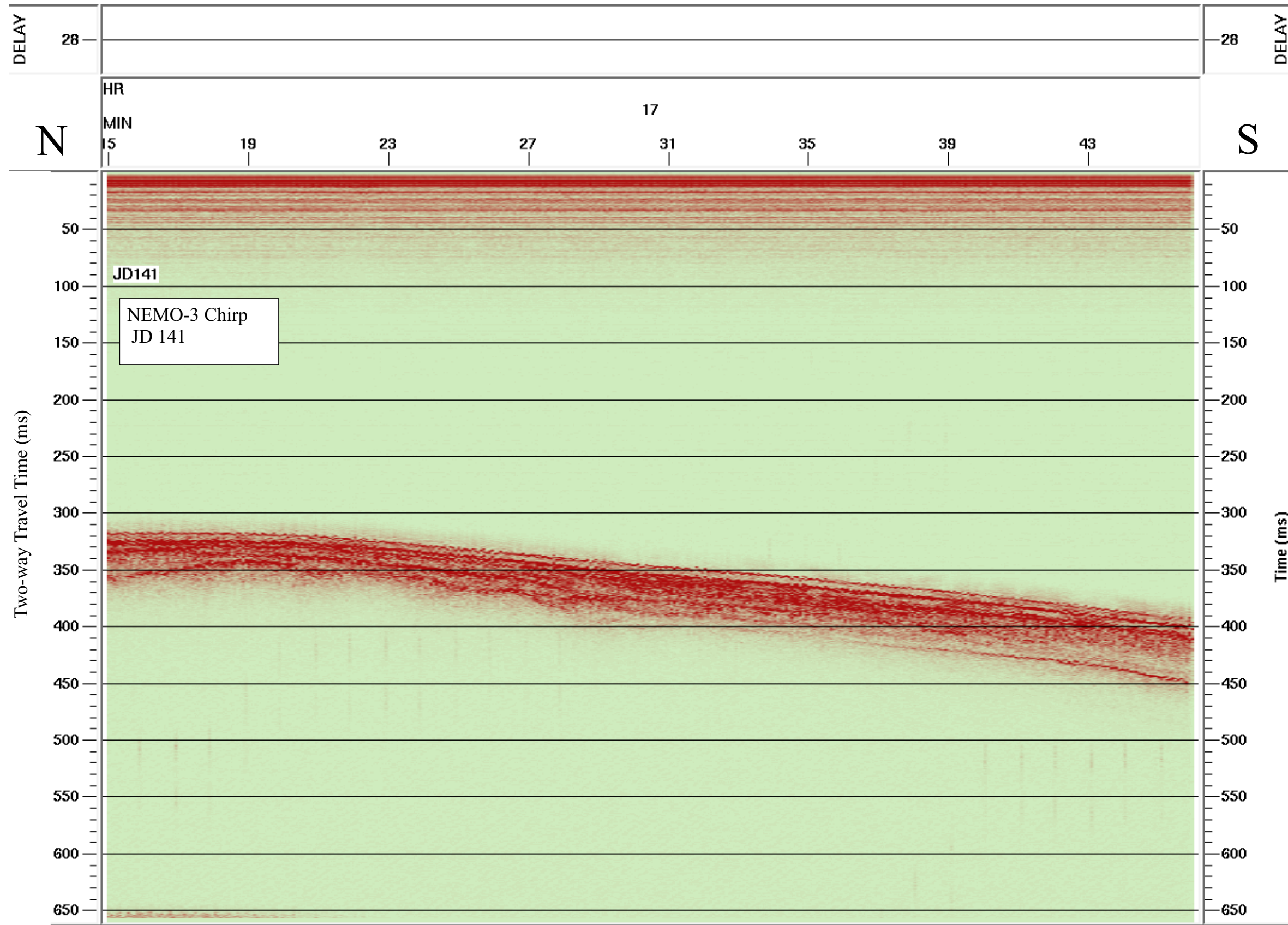




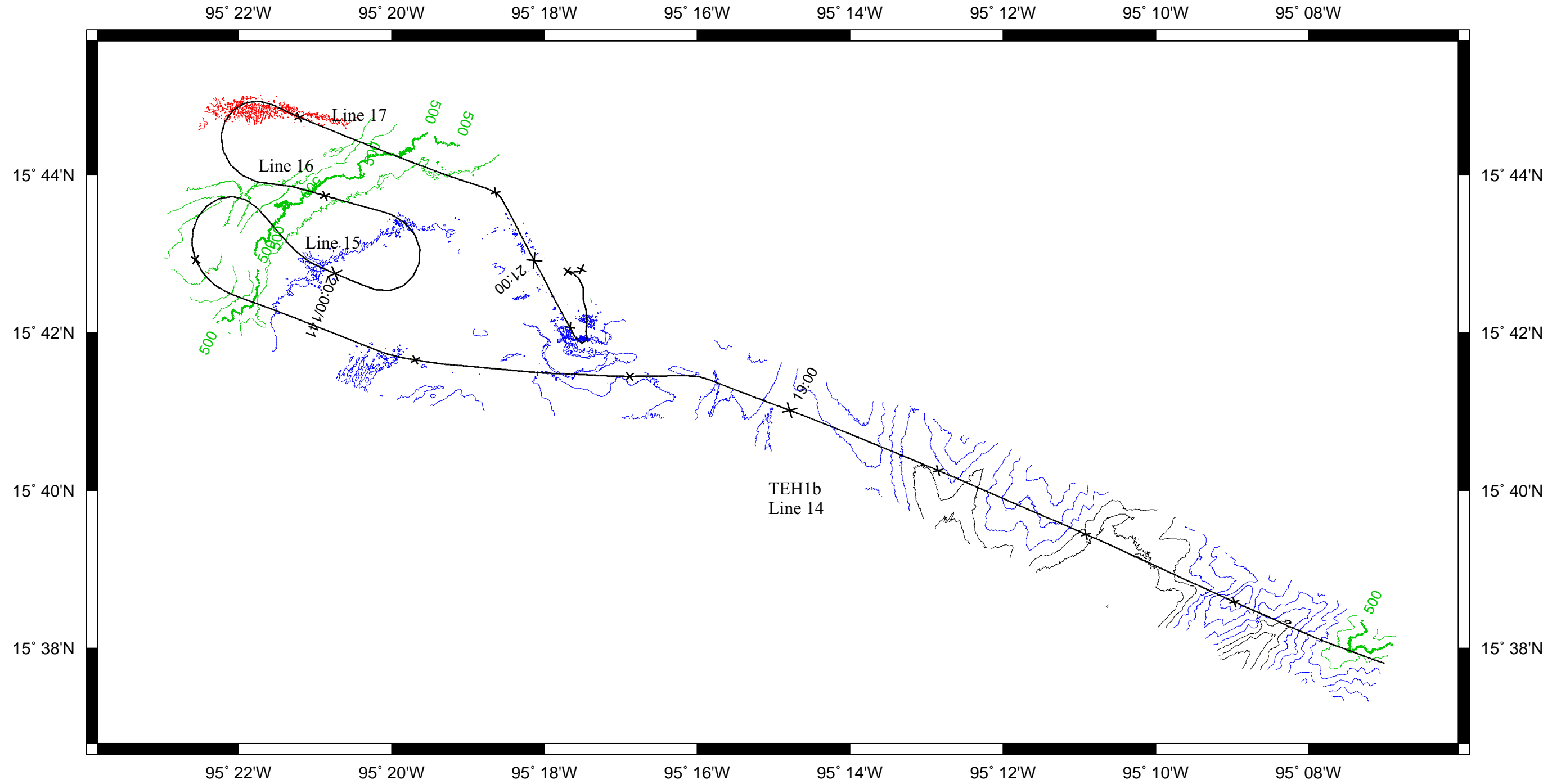


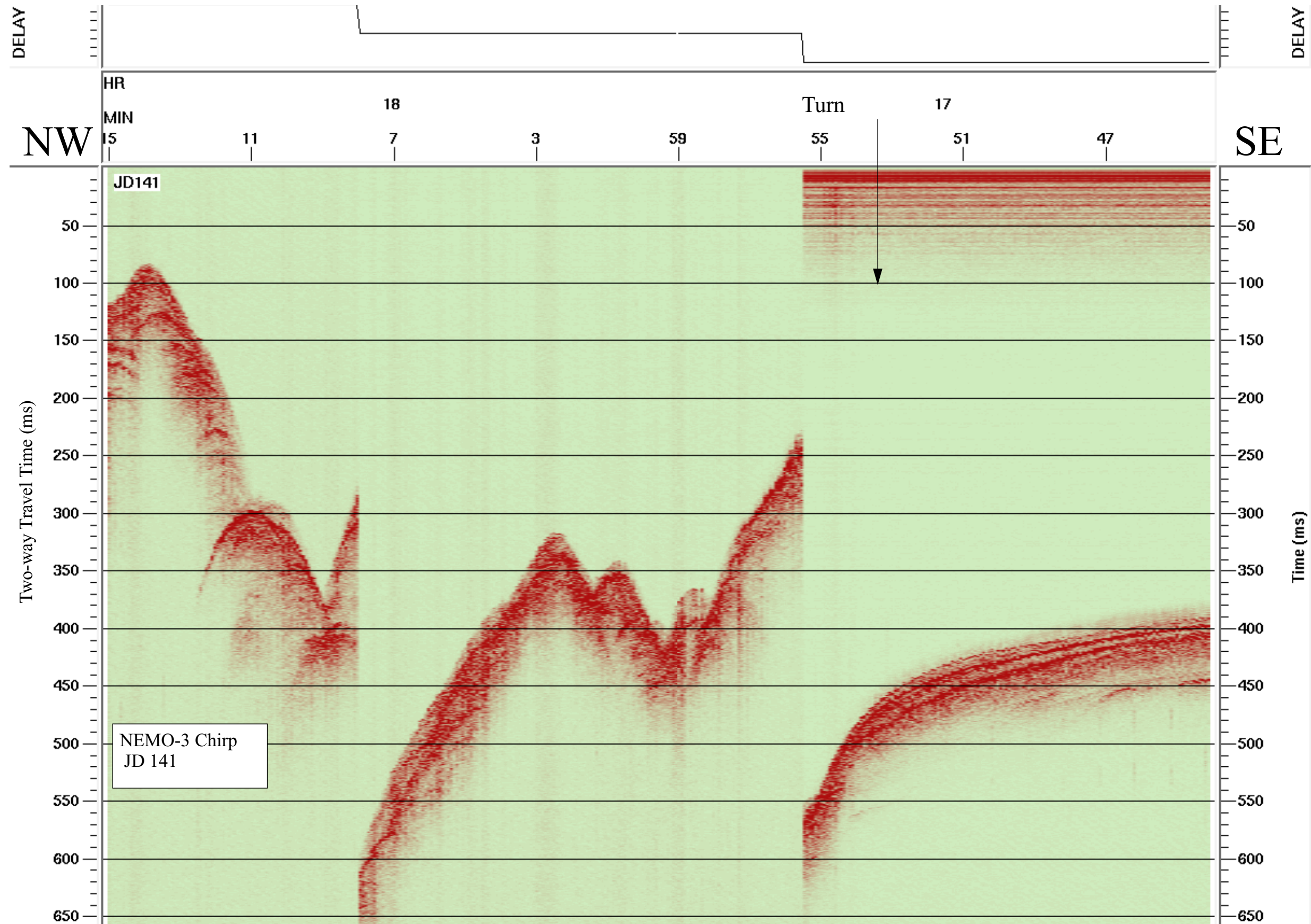


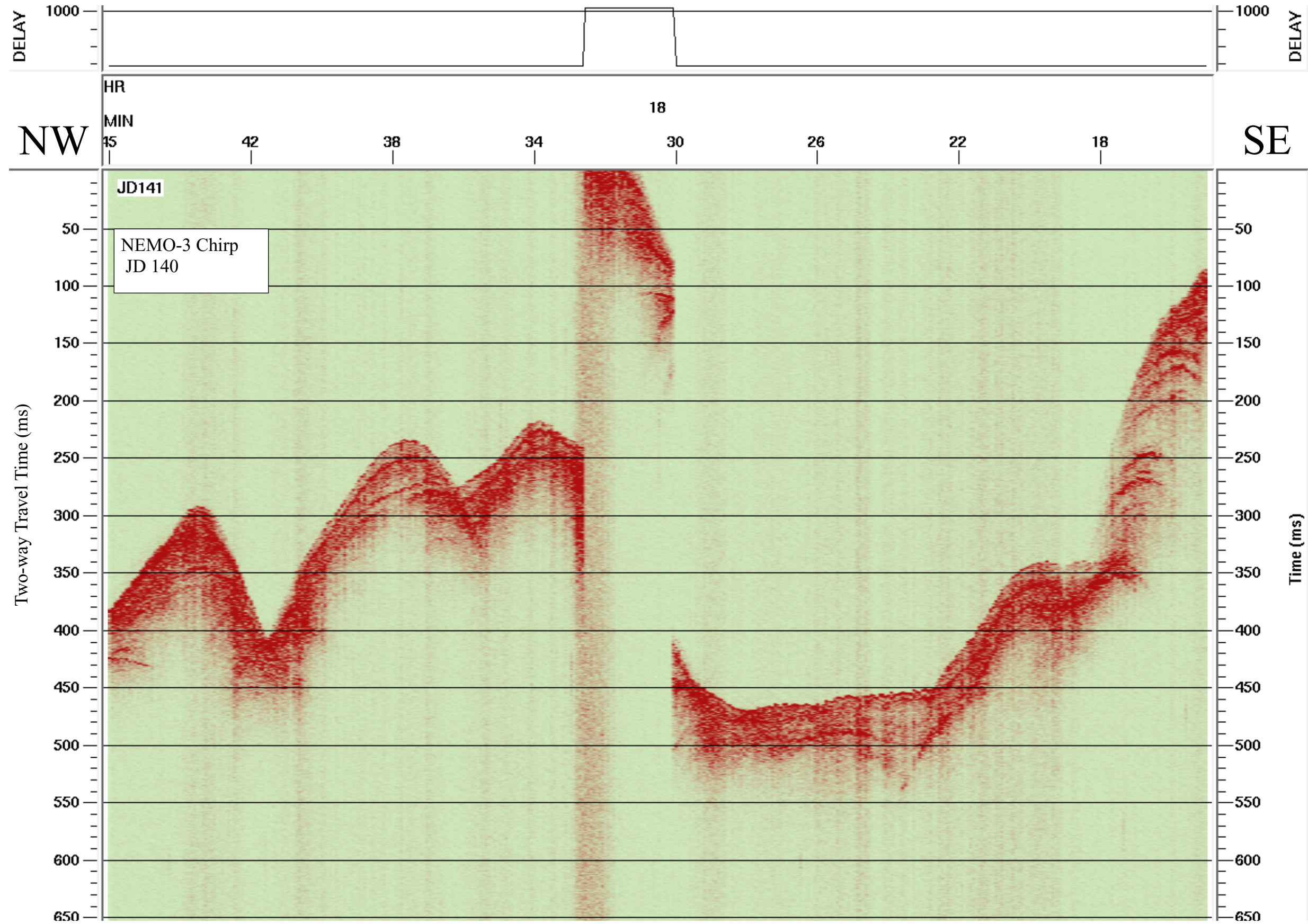


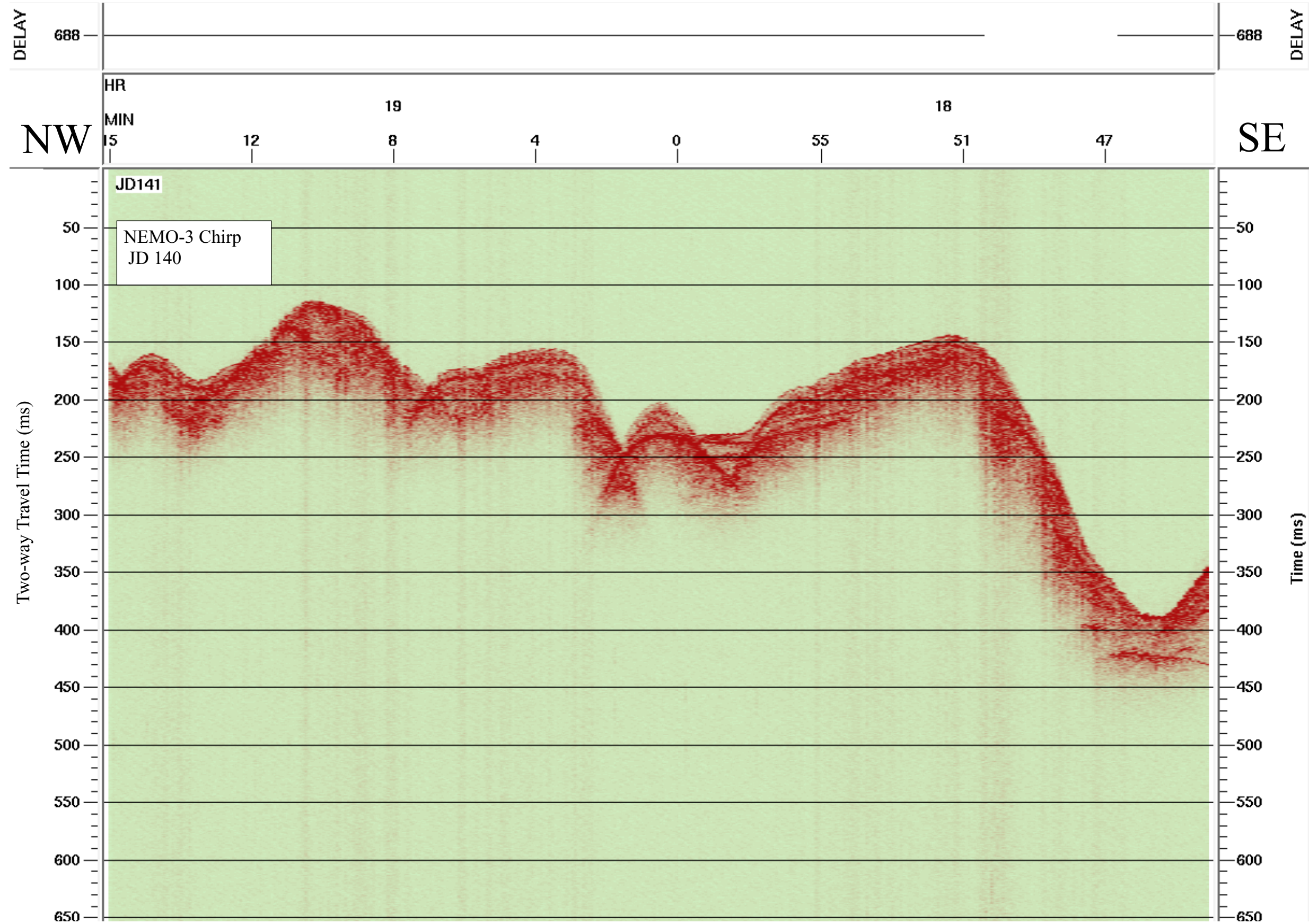


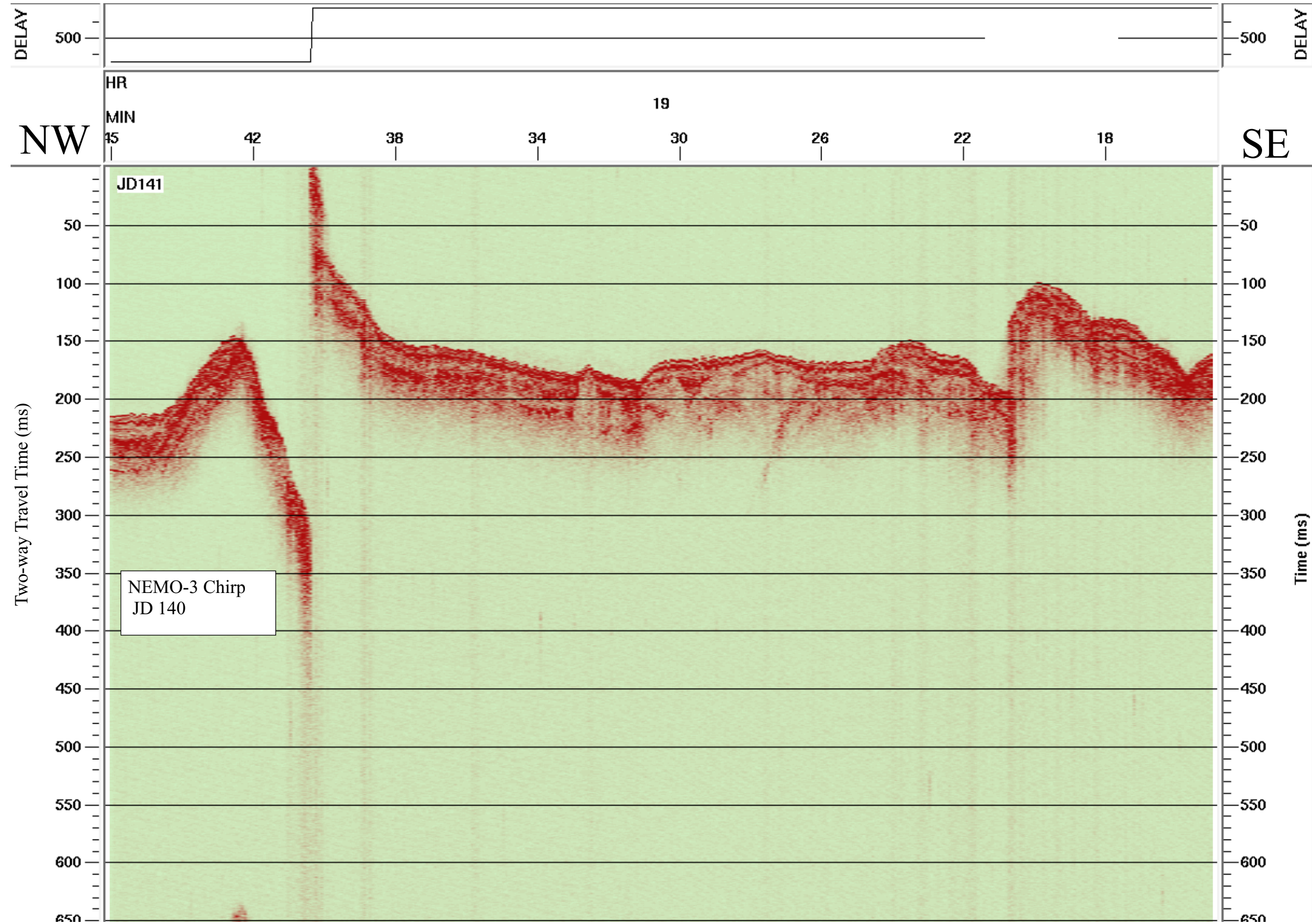
Data File SBfixavg.2000may20.1800-2400

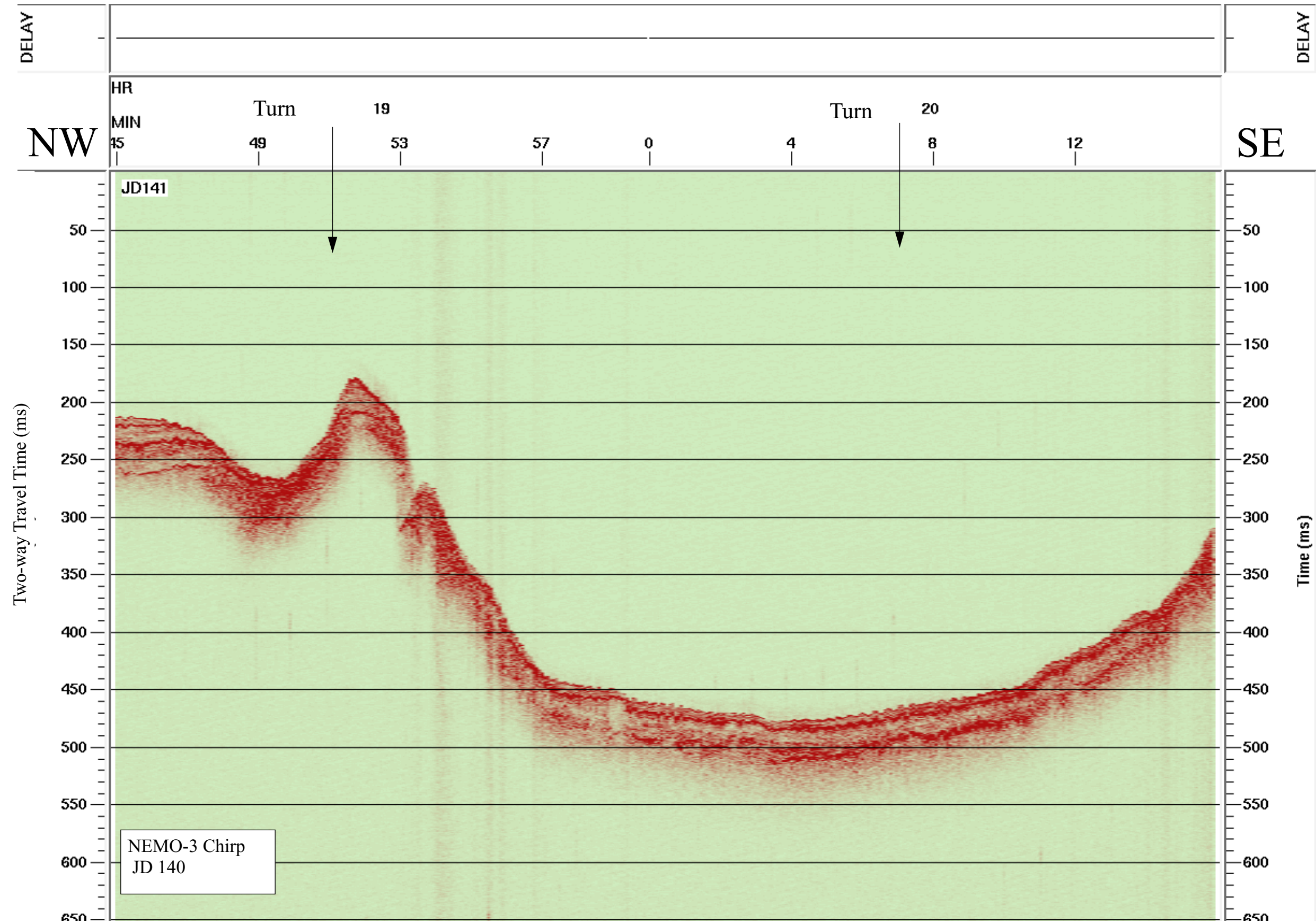


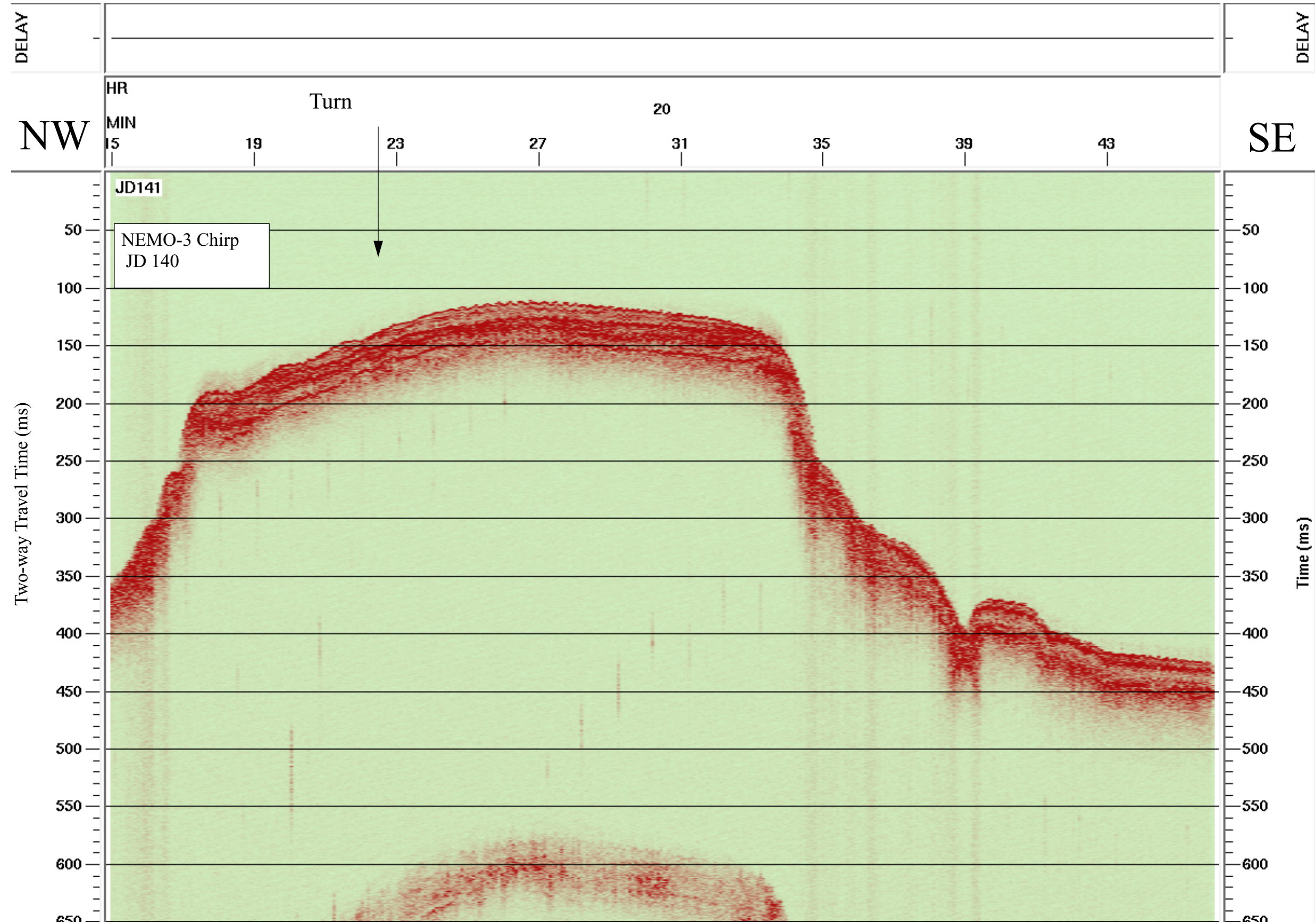


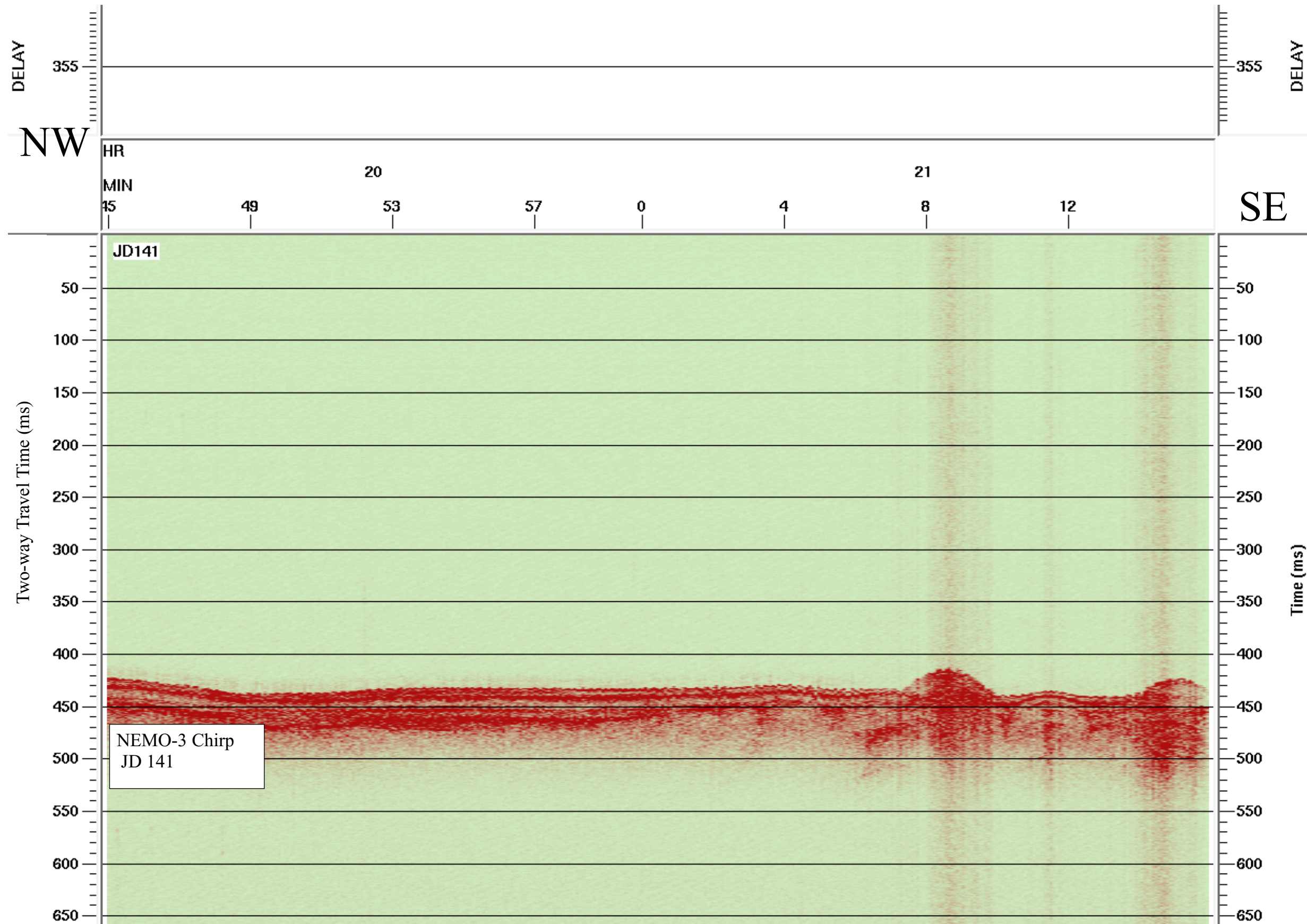












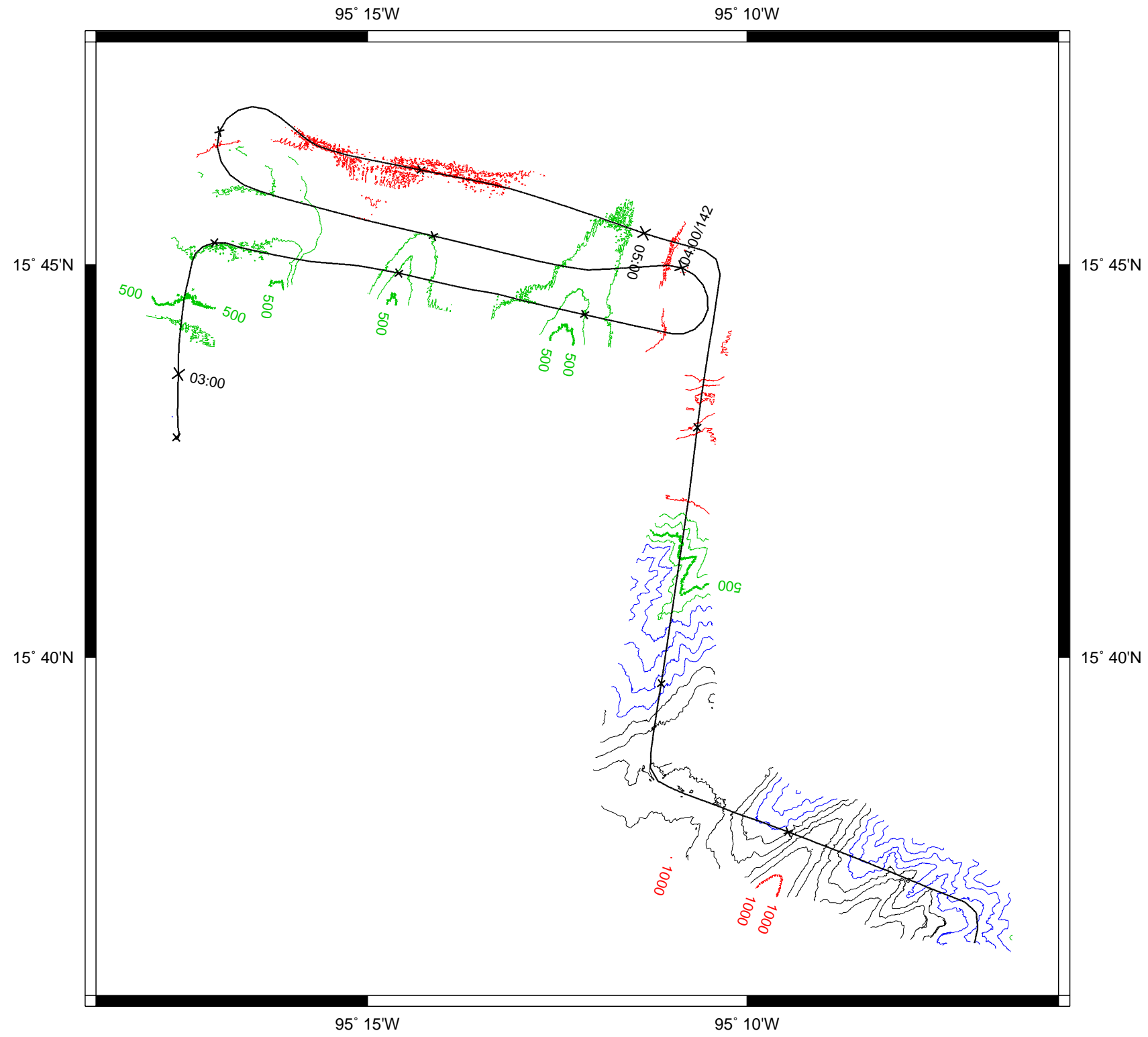
JD 142 (21 May 2000)--Last Day, TEH-1 Survey

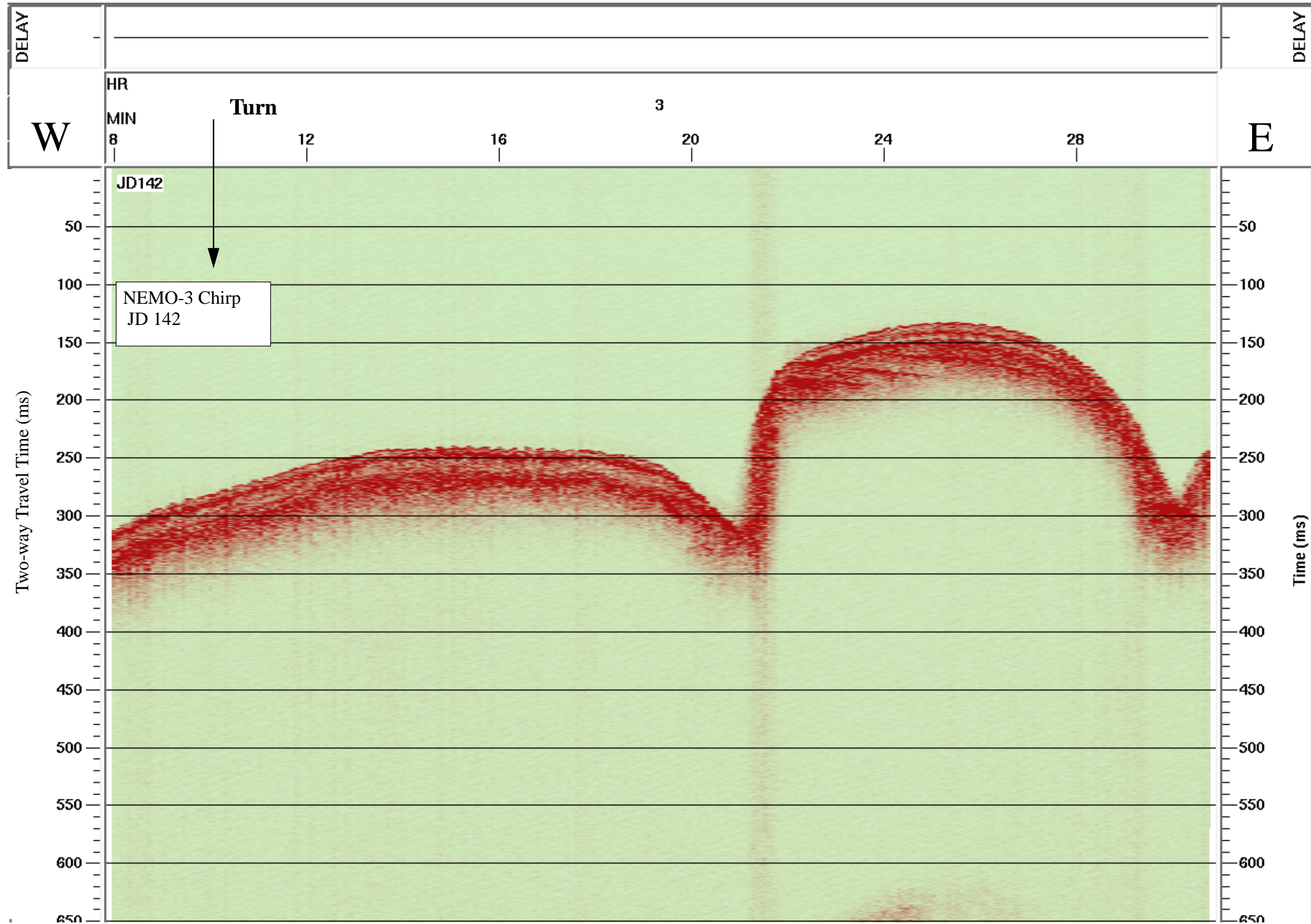
2-7 kHz Chirp Subbottom Profiler

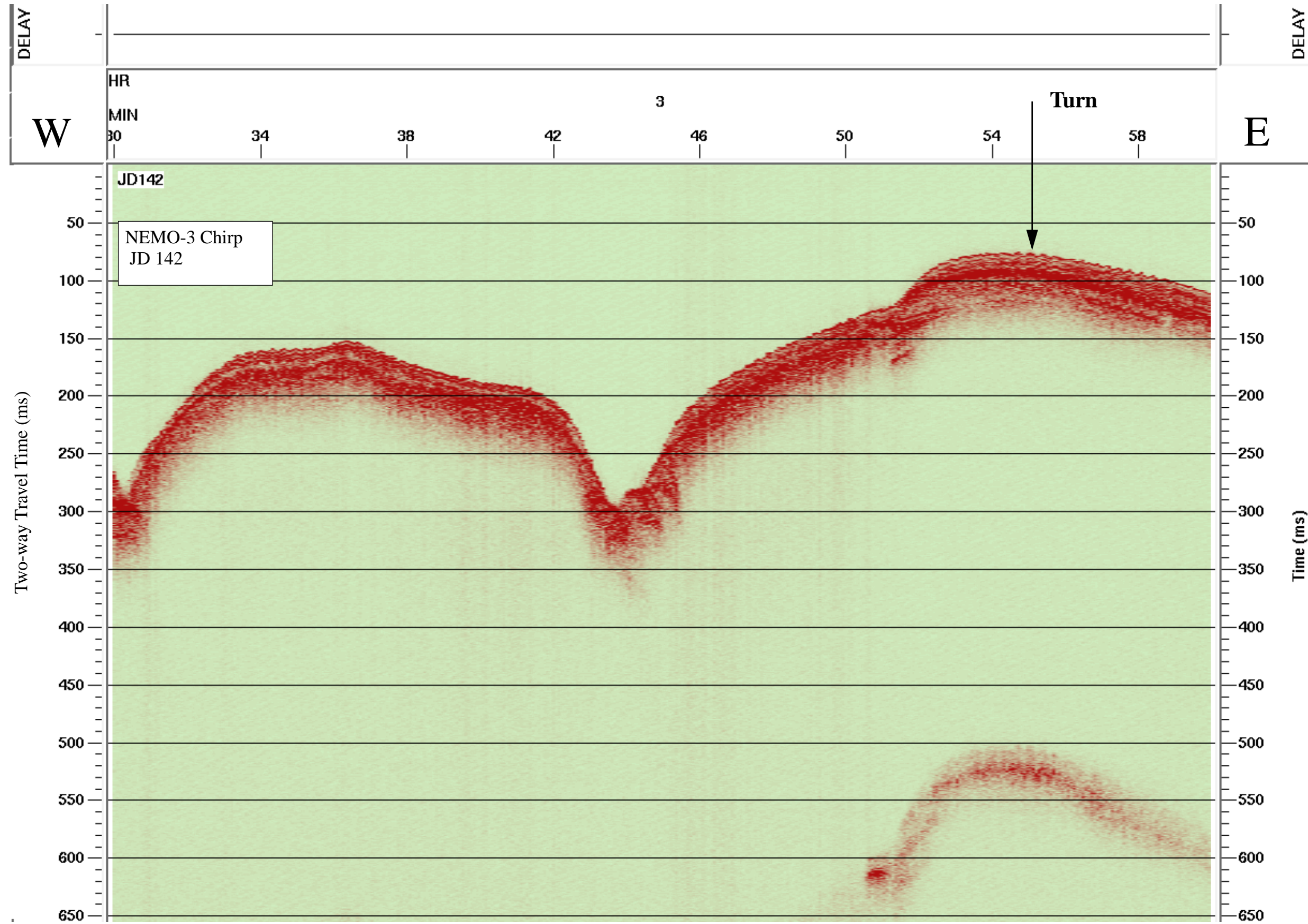
NEMO Leg 3

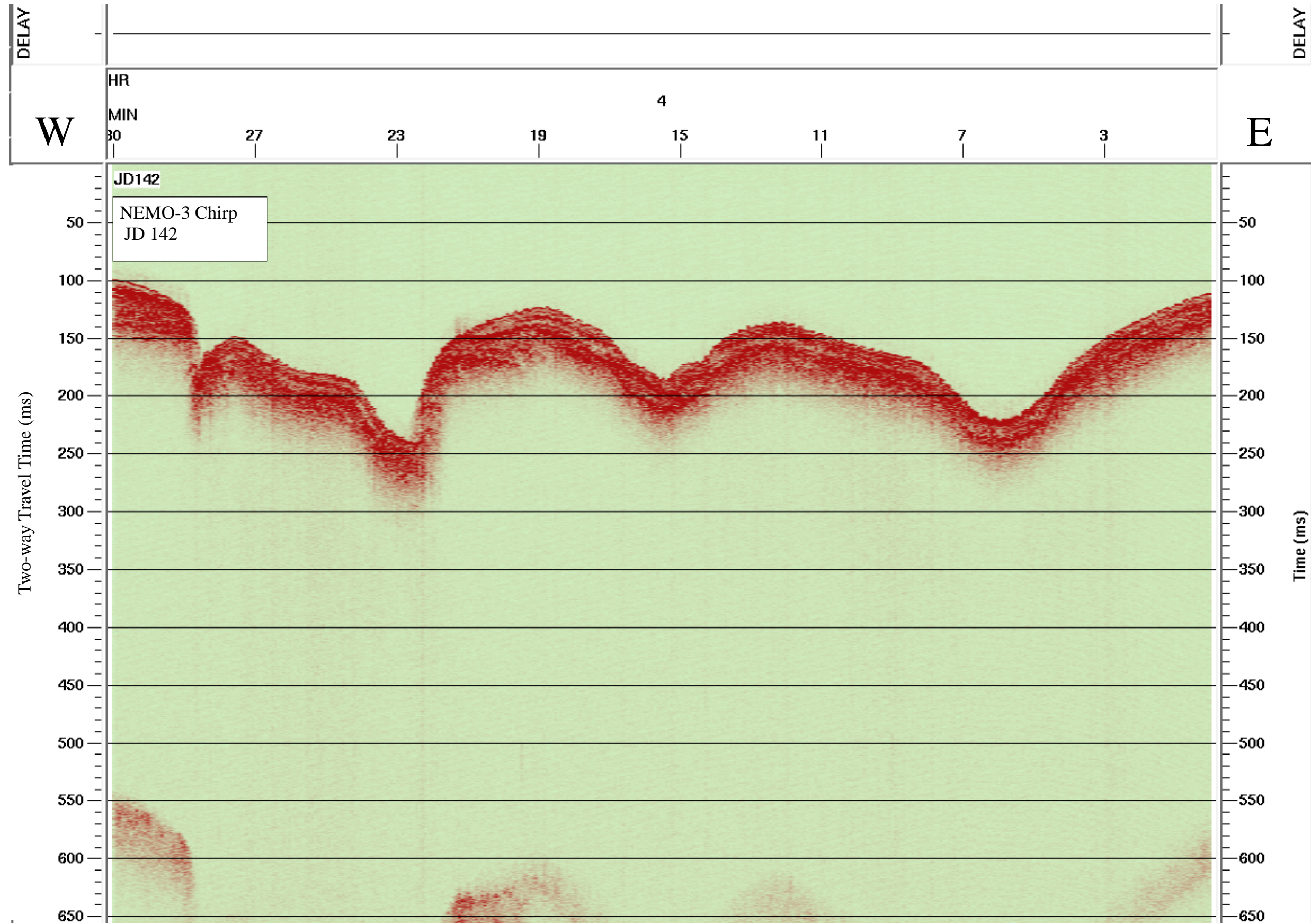
R/V Melville

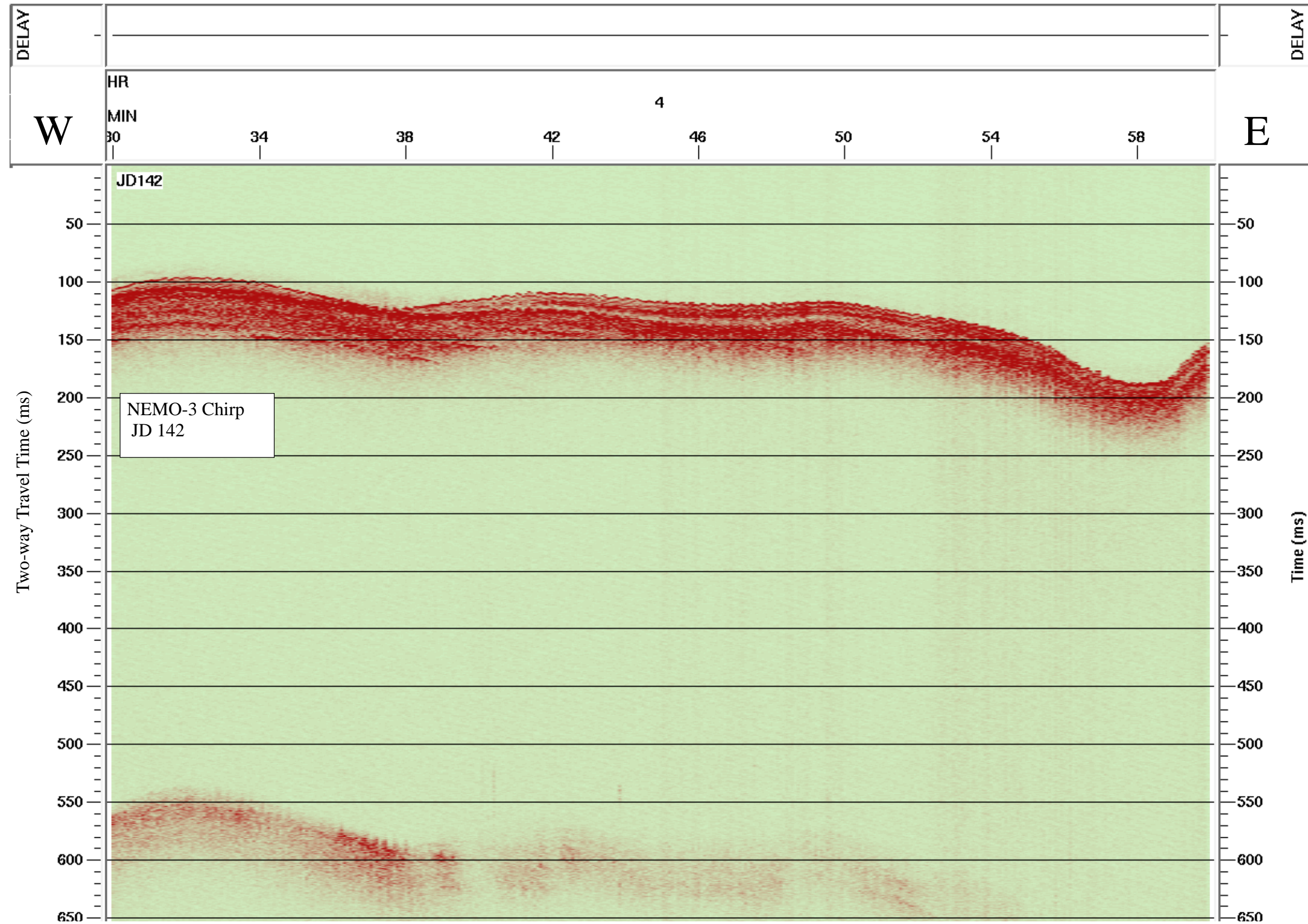
Data File SBfixavg.2000may21.0000-0600

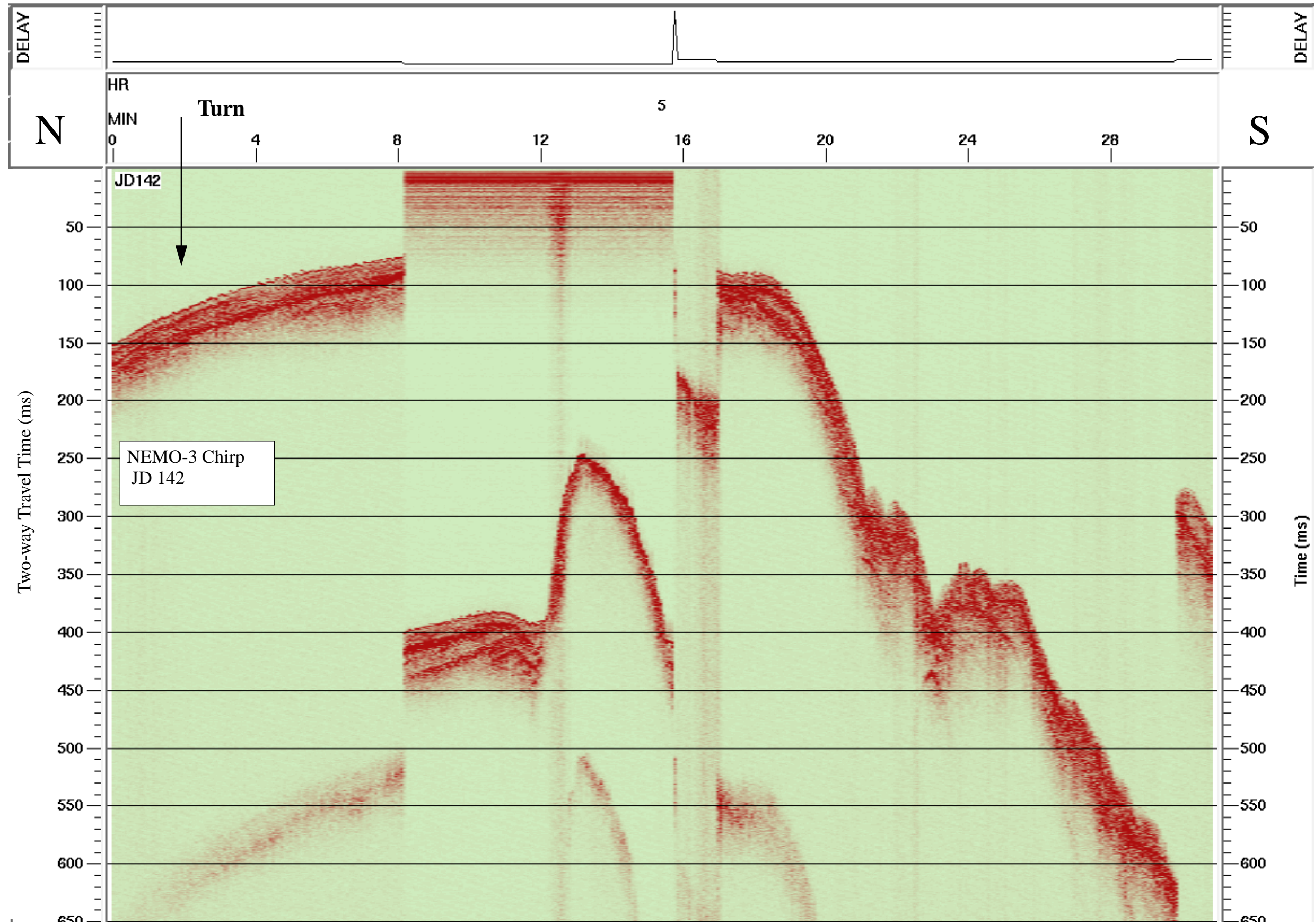


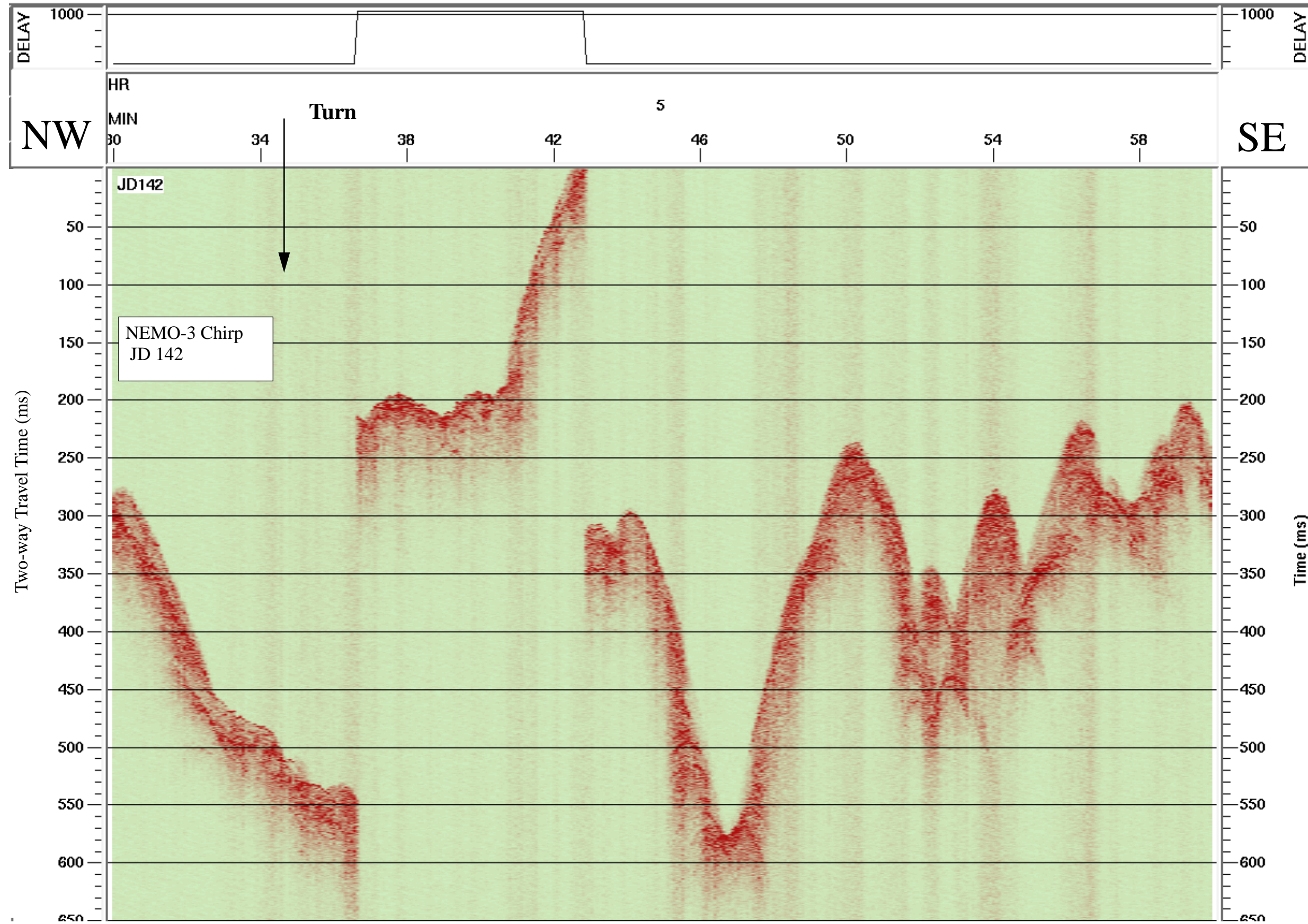




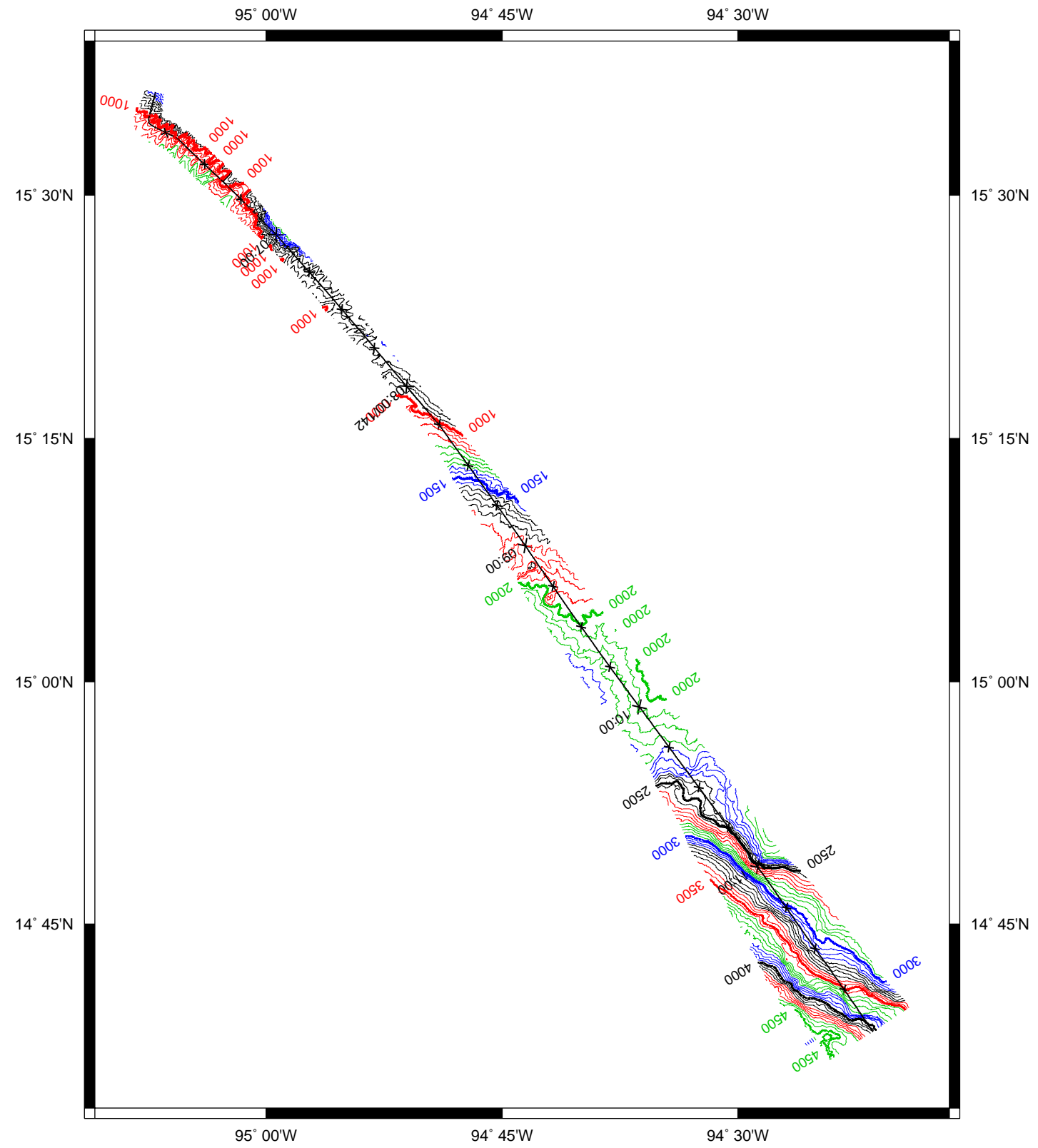


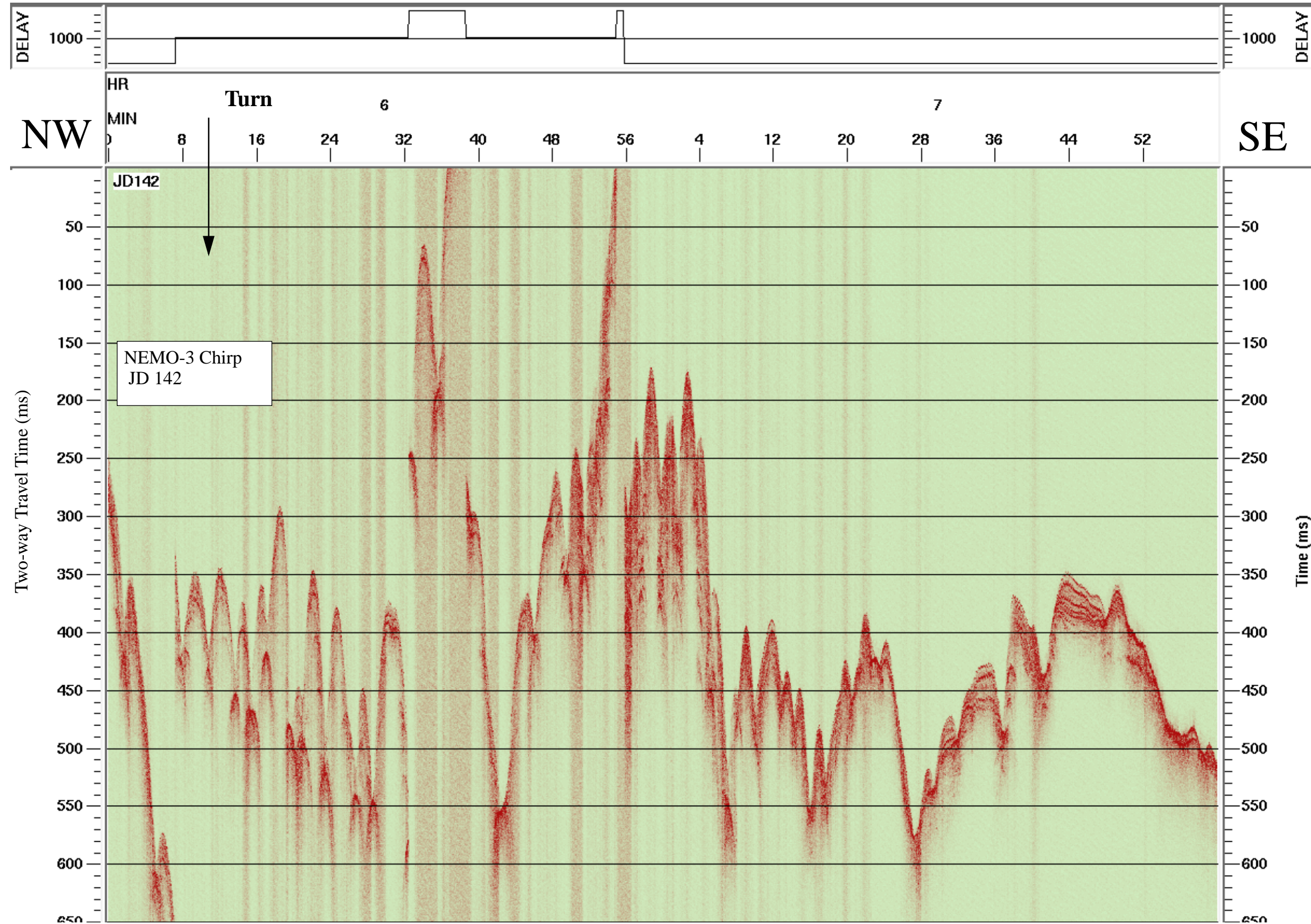


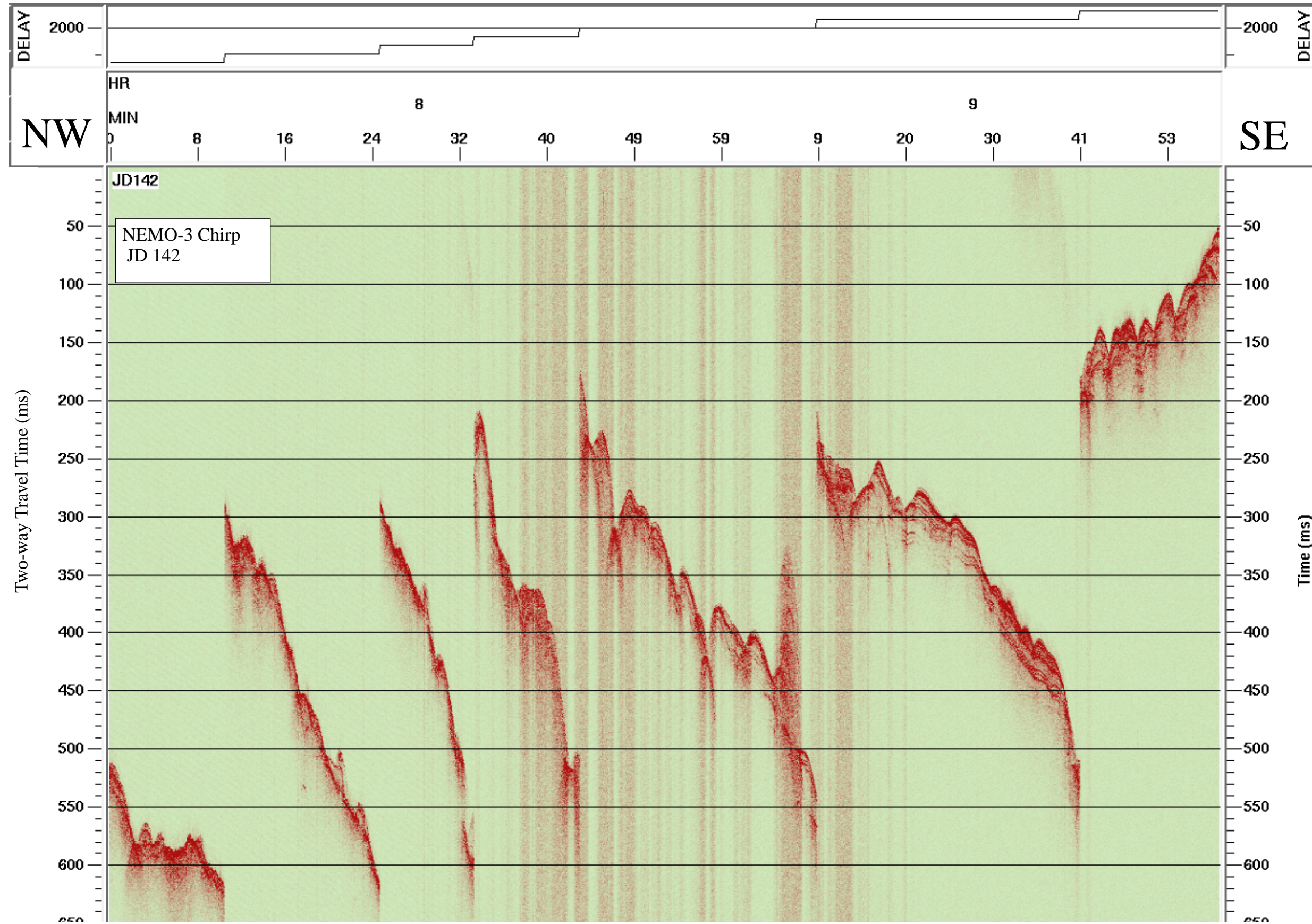


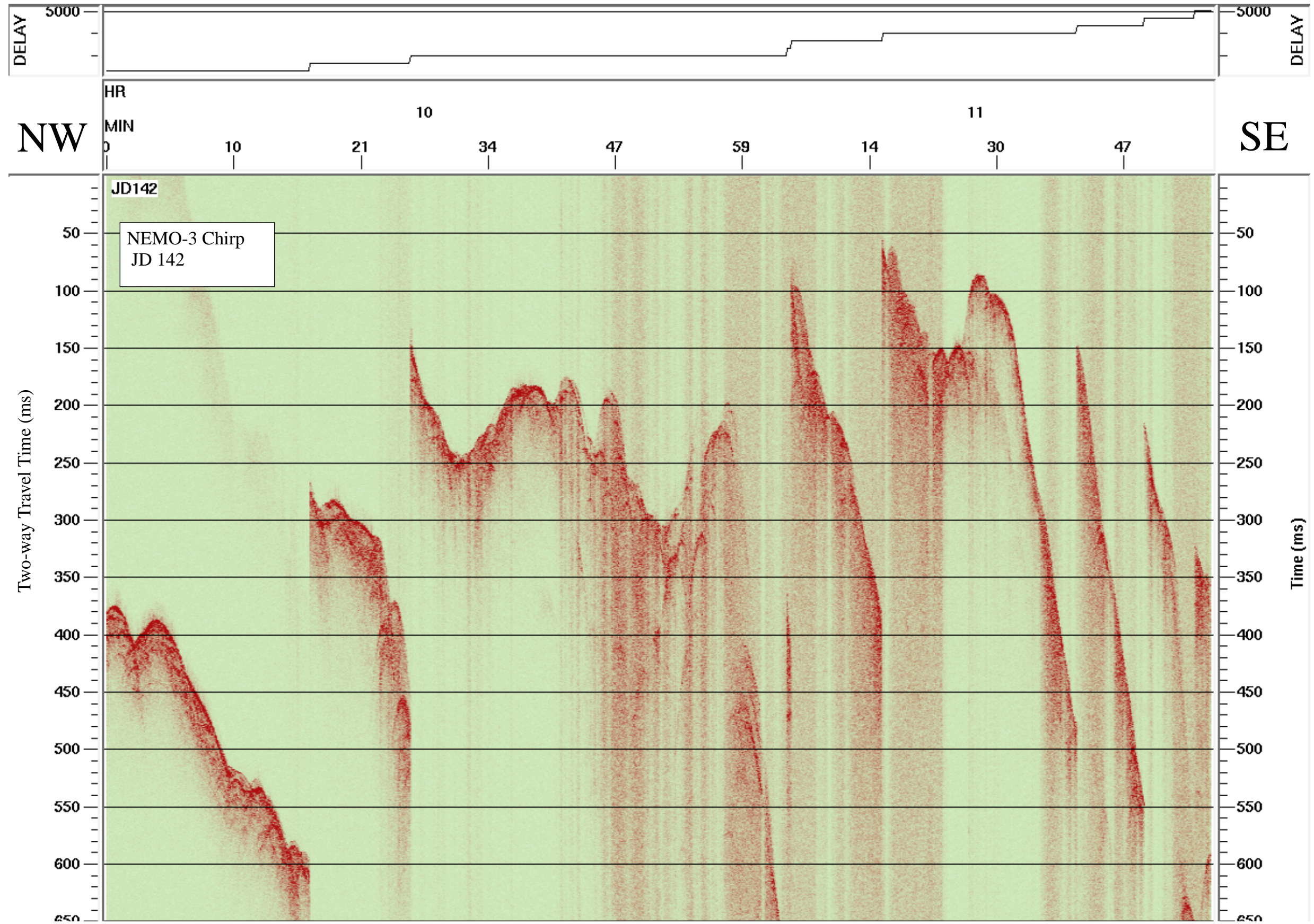


Data File SBfixavg.2000may21.0600-1200

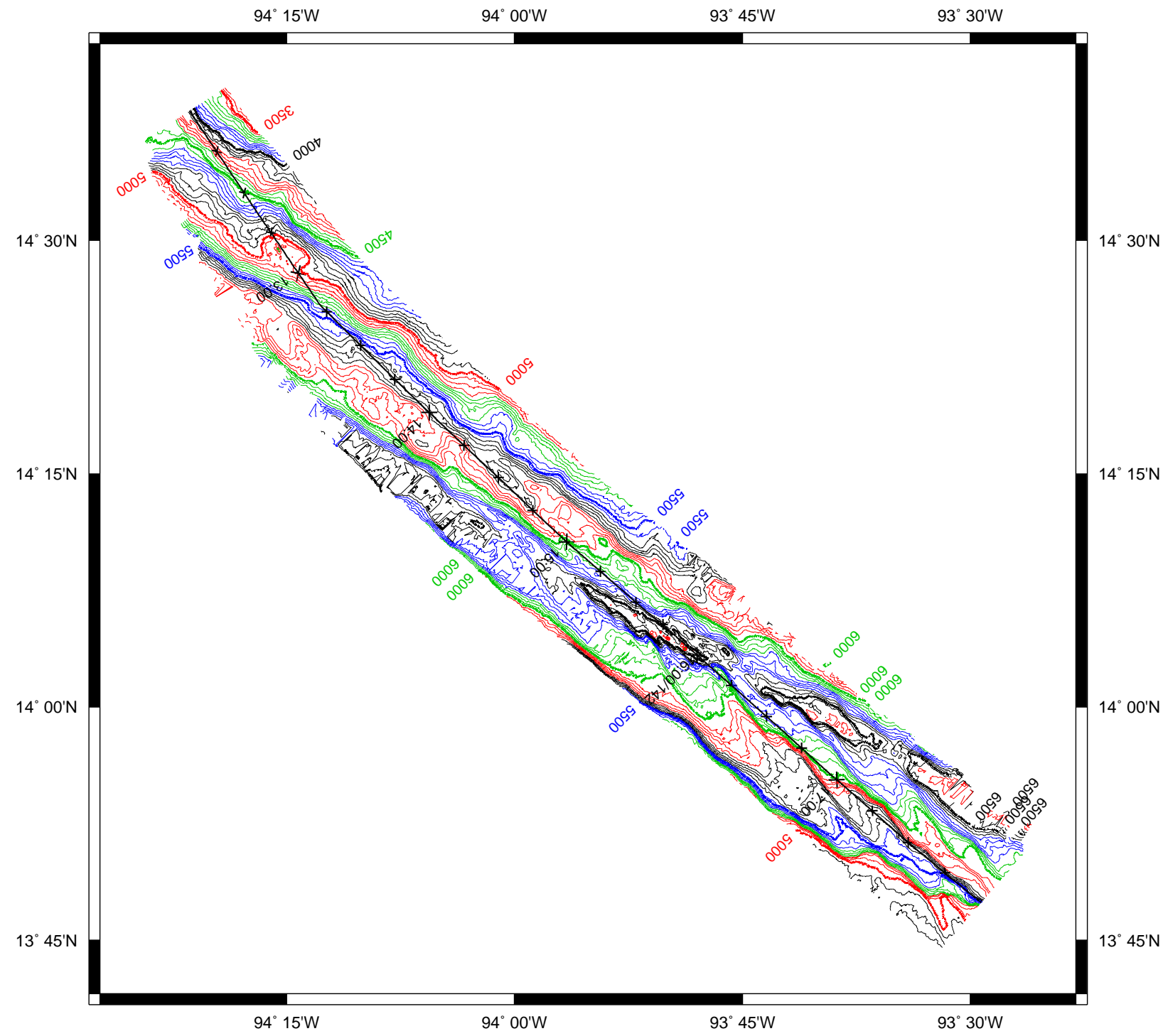


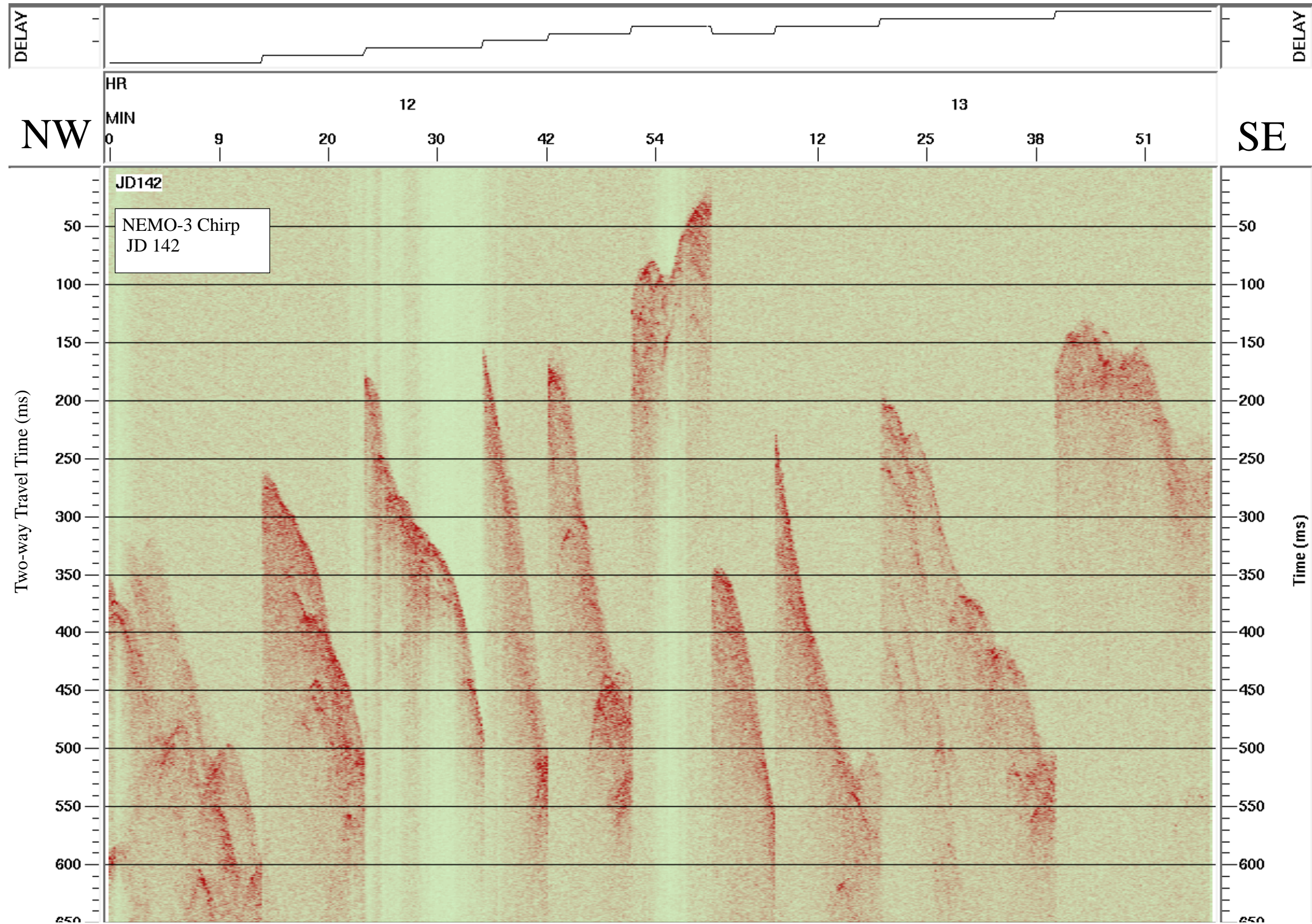


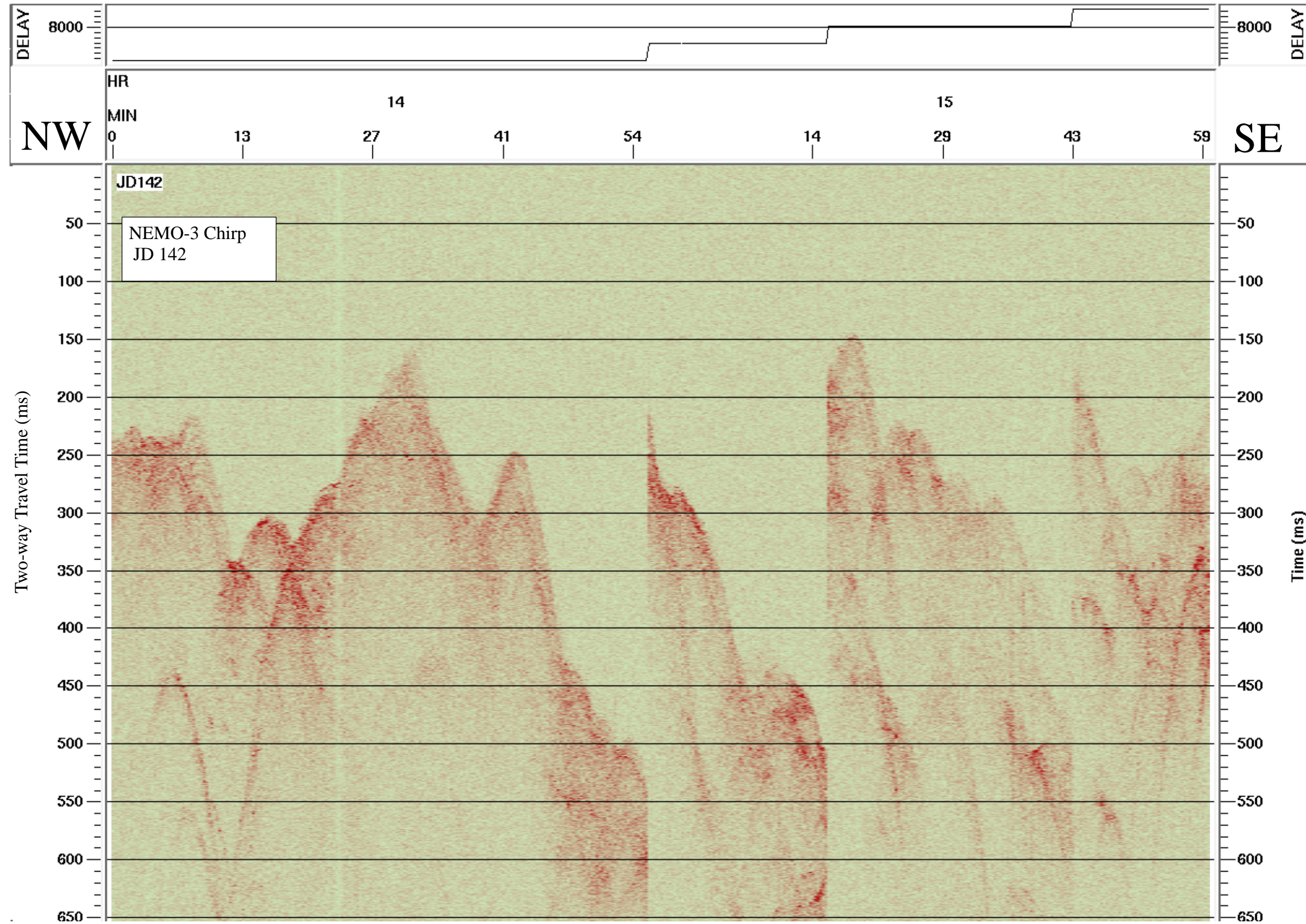


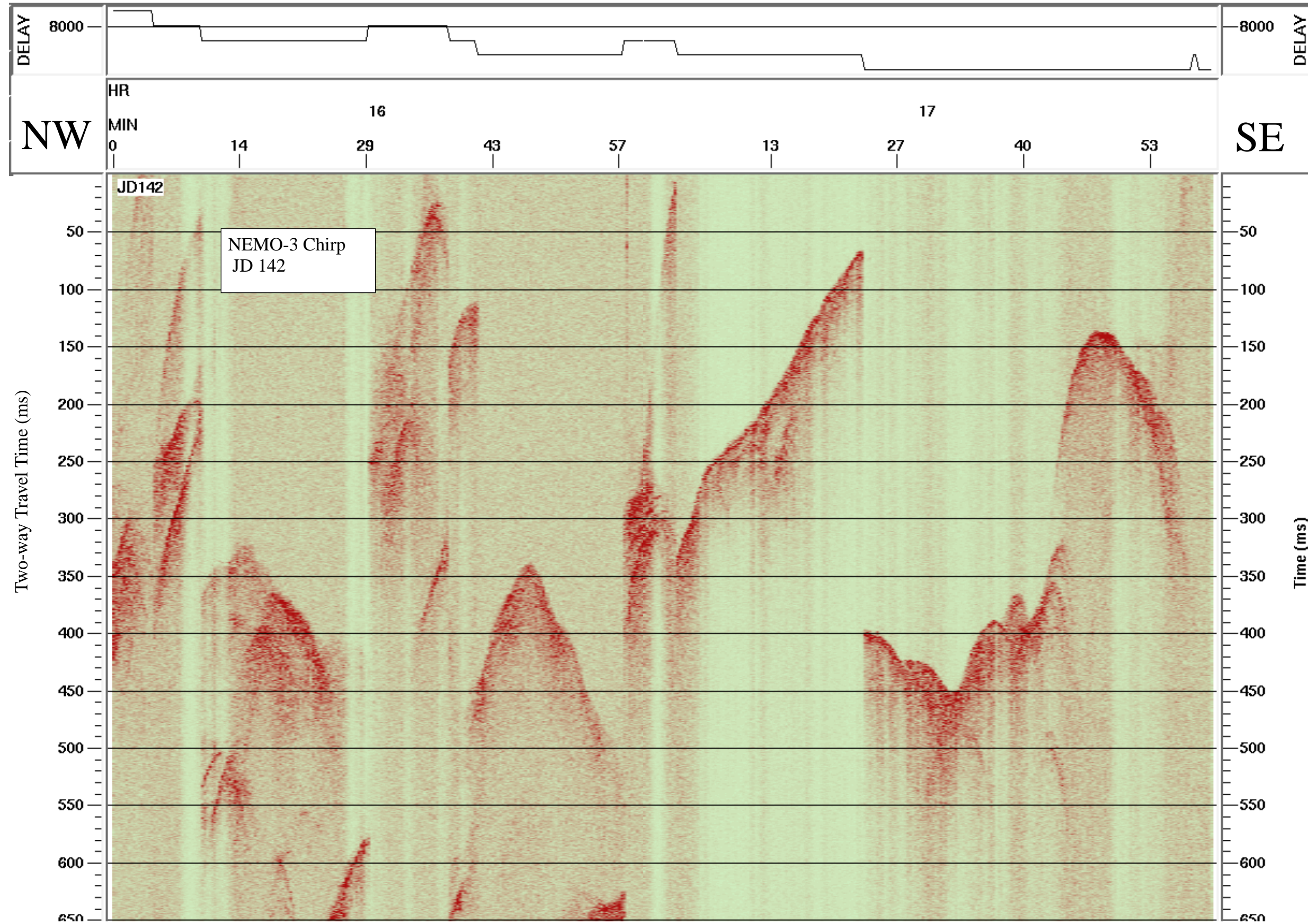


Data File SBfixavg.2000may21.1200-1800

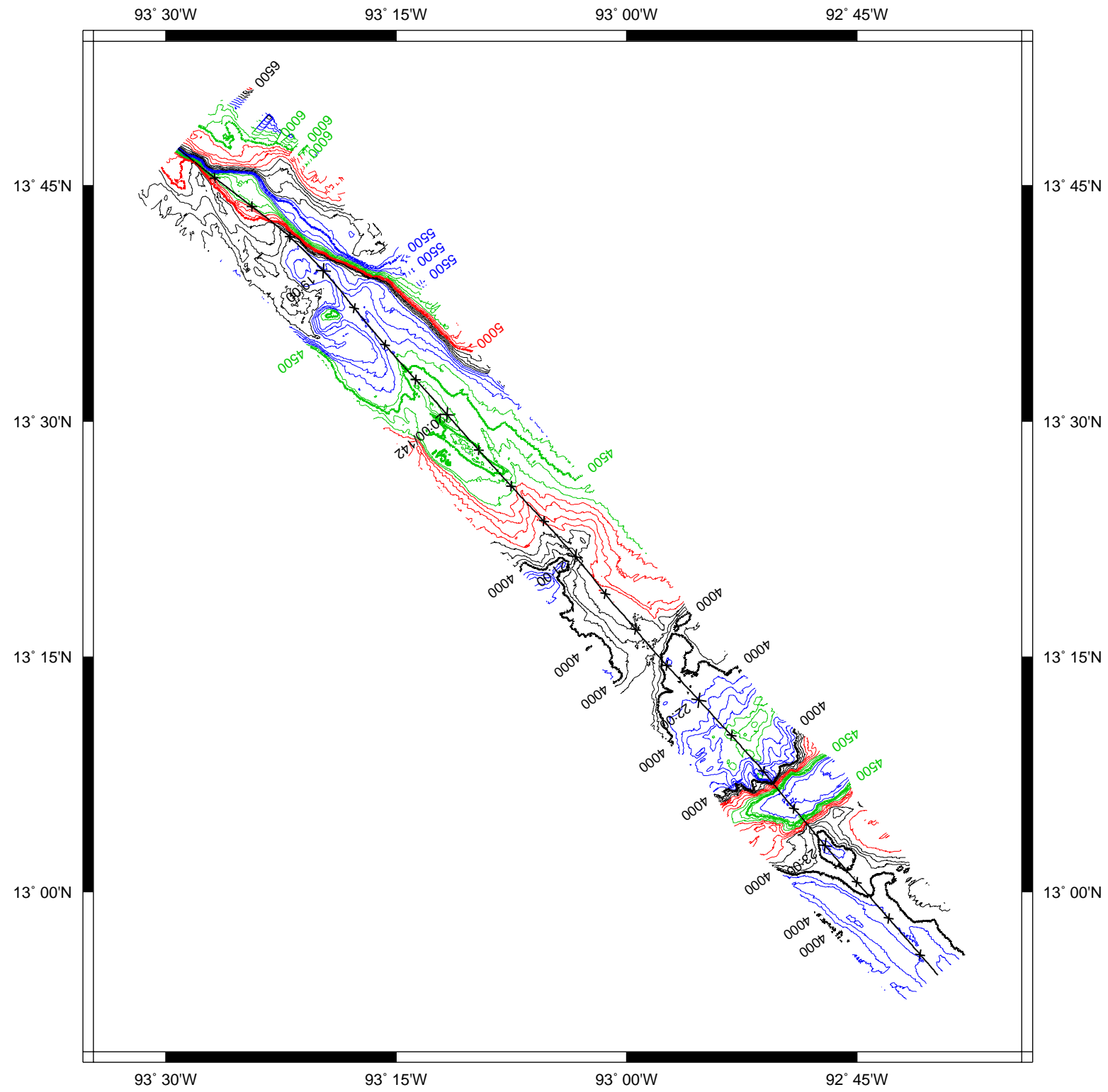


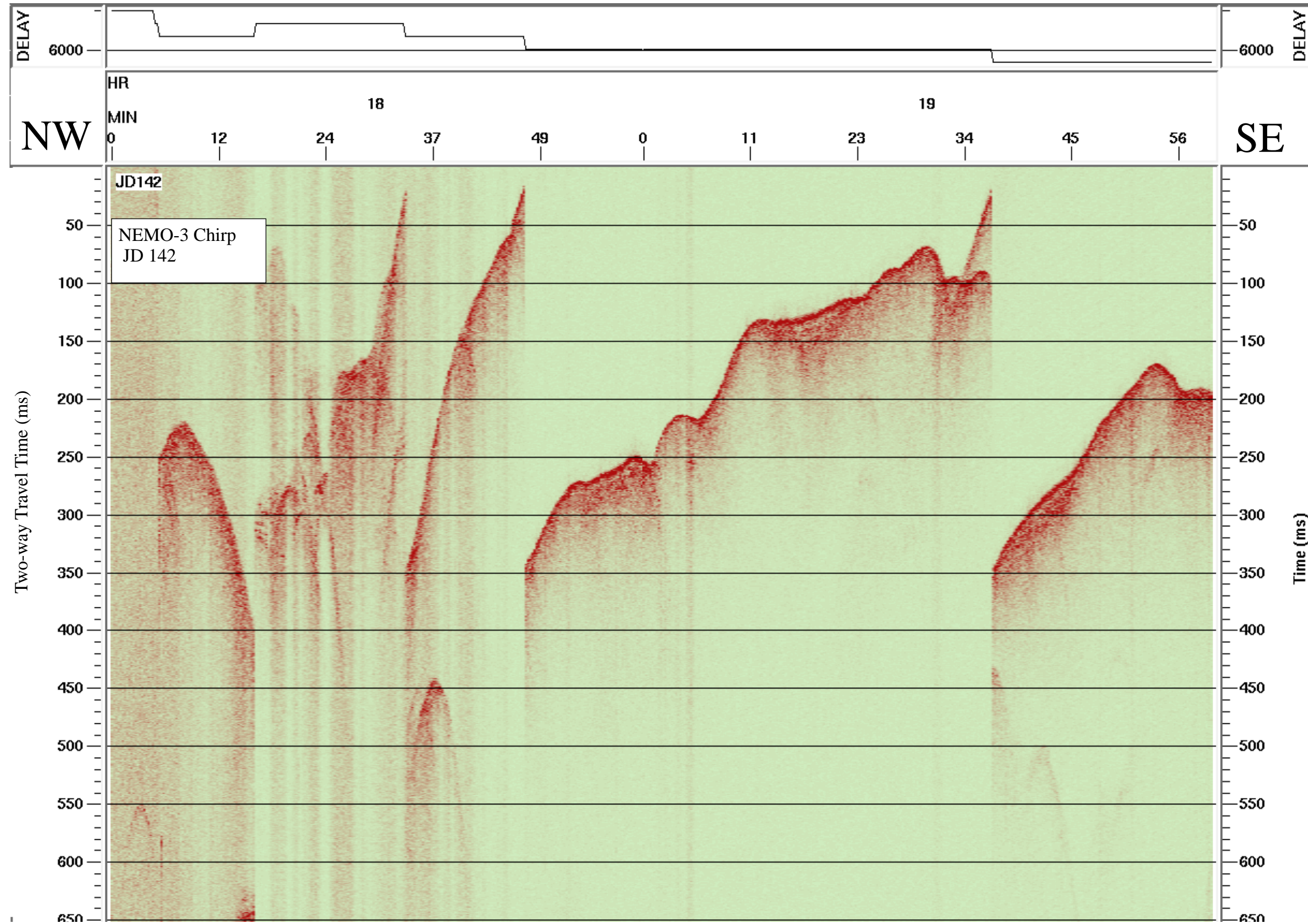


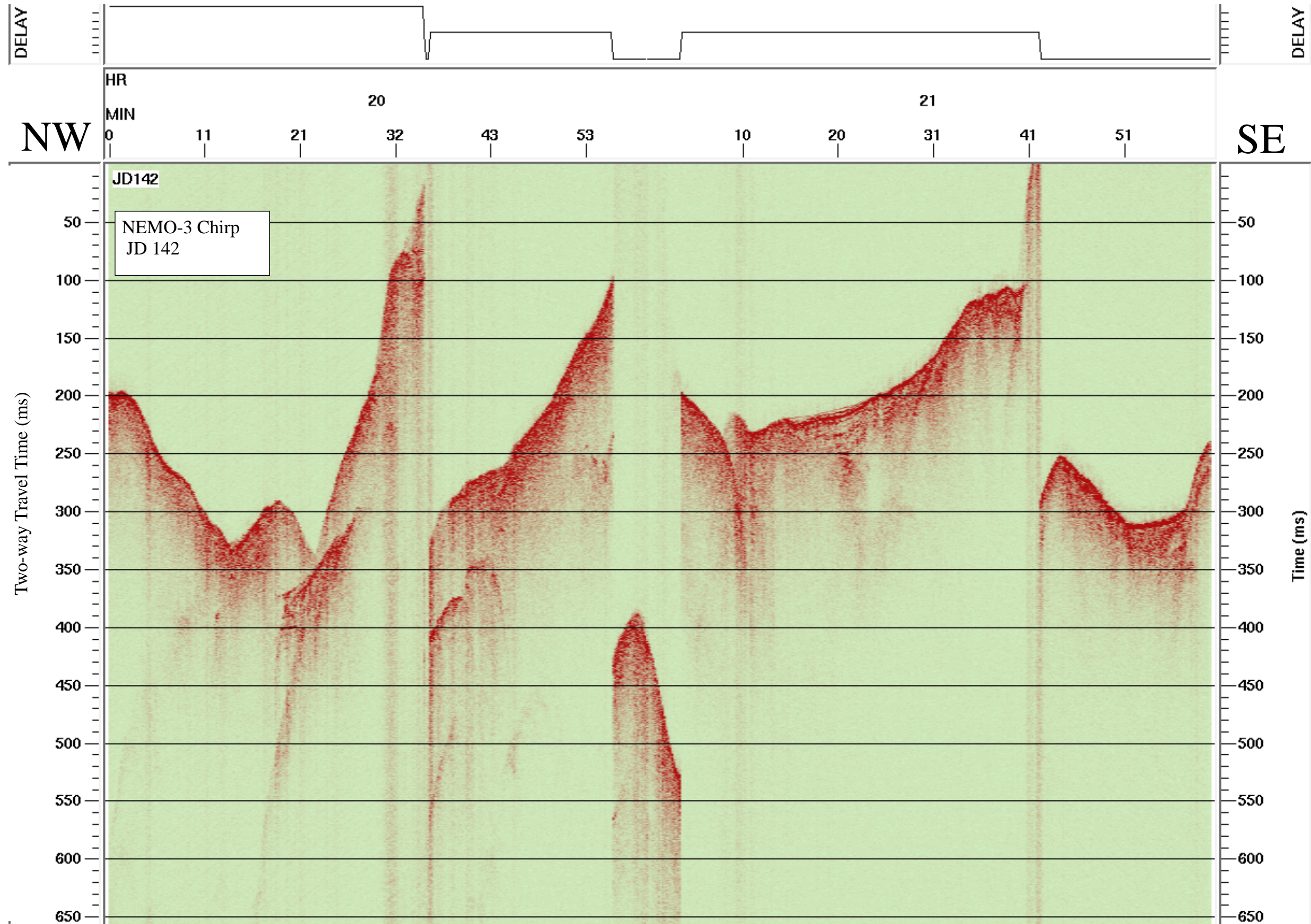


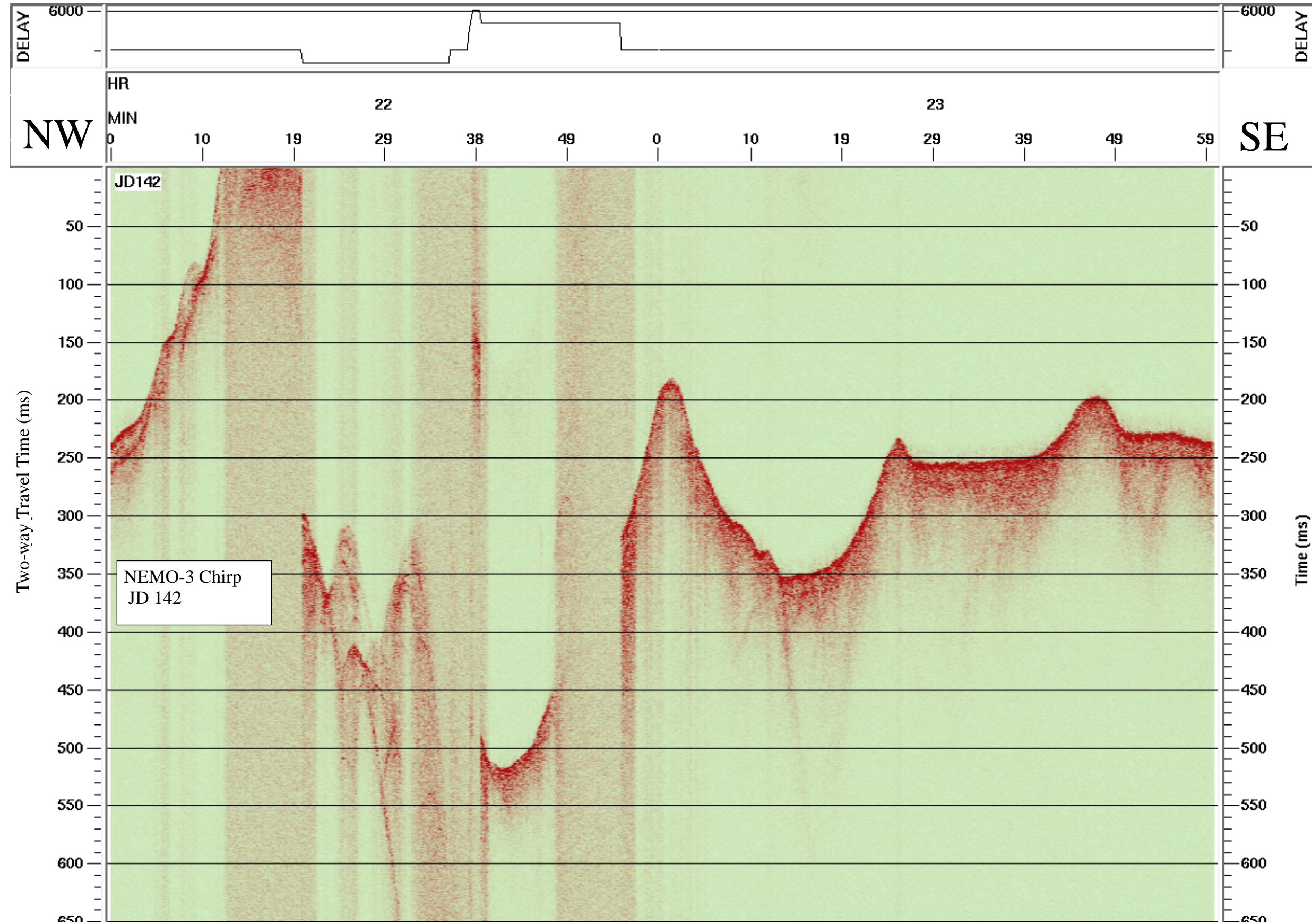


Data File SBfixavg.2000may21.1800-2400









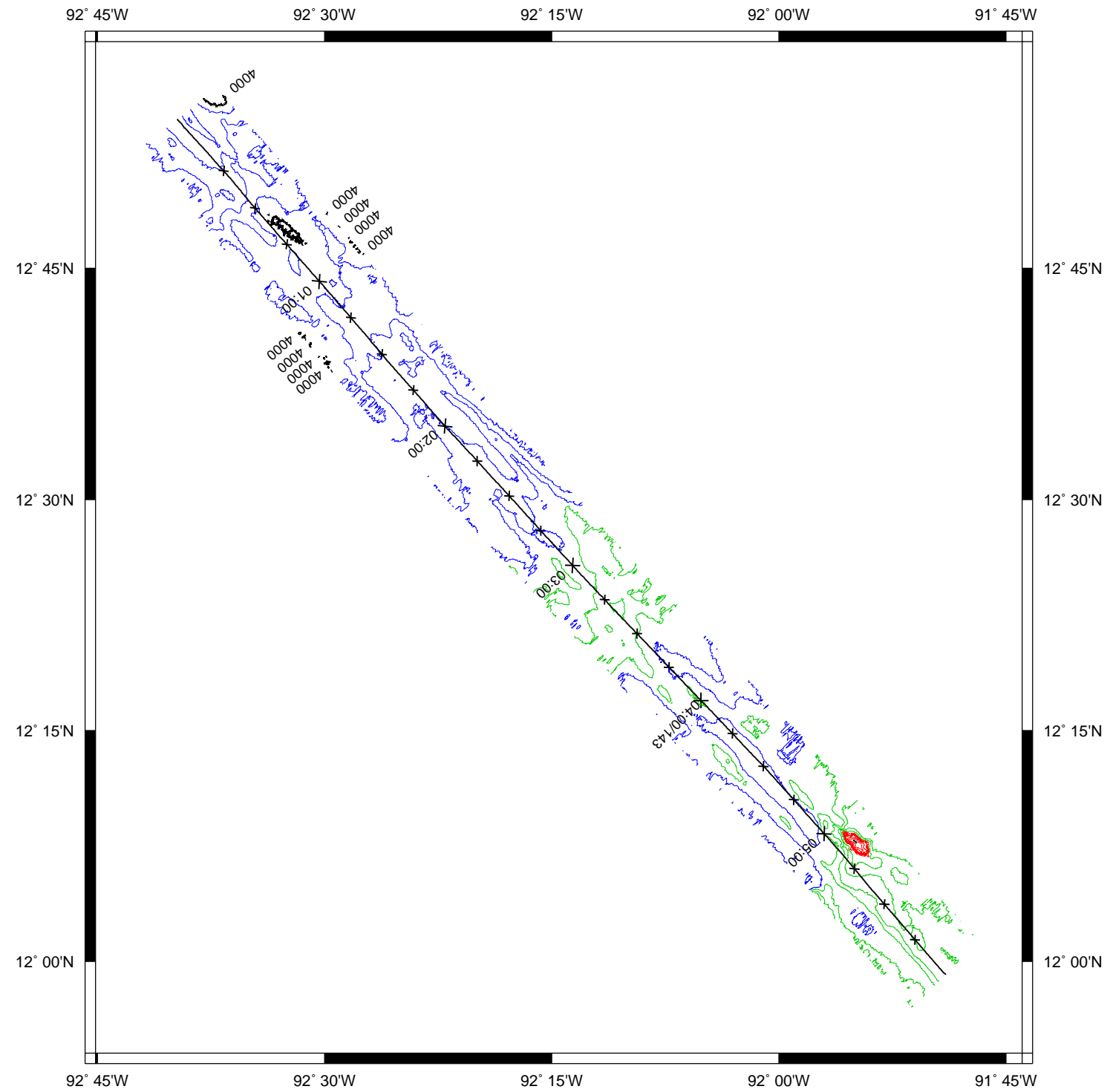
JD 143 (22 May 2000)--Guatemala Basin

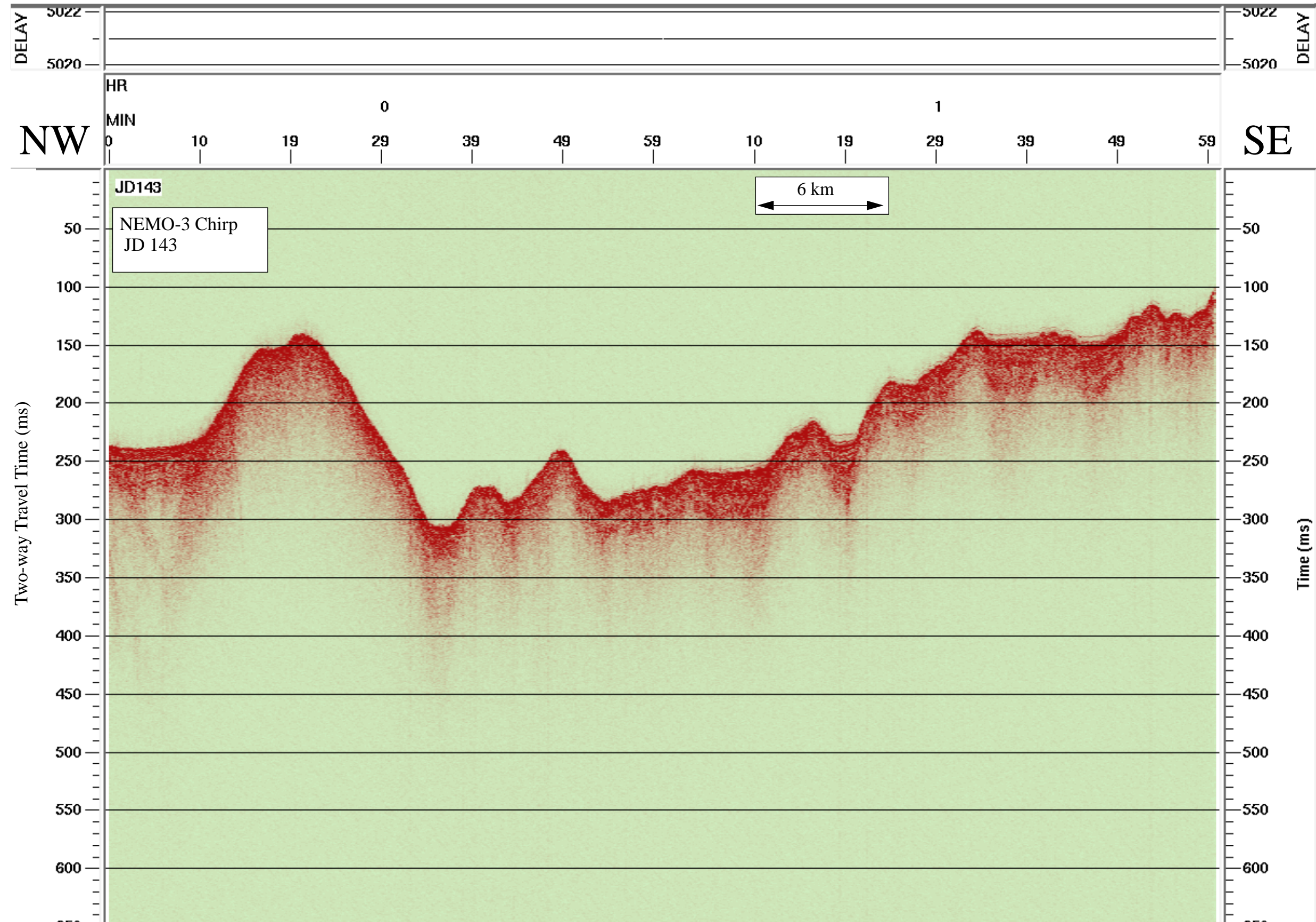
2-7 kHz Chirp Subbottom Profiler

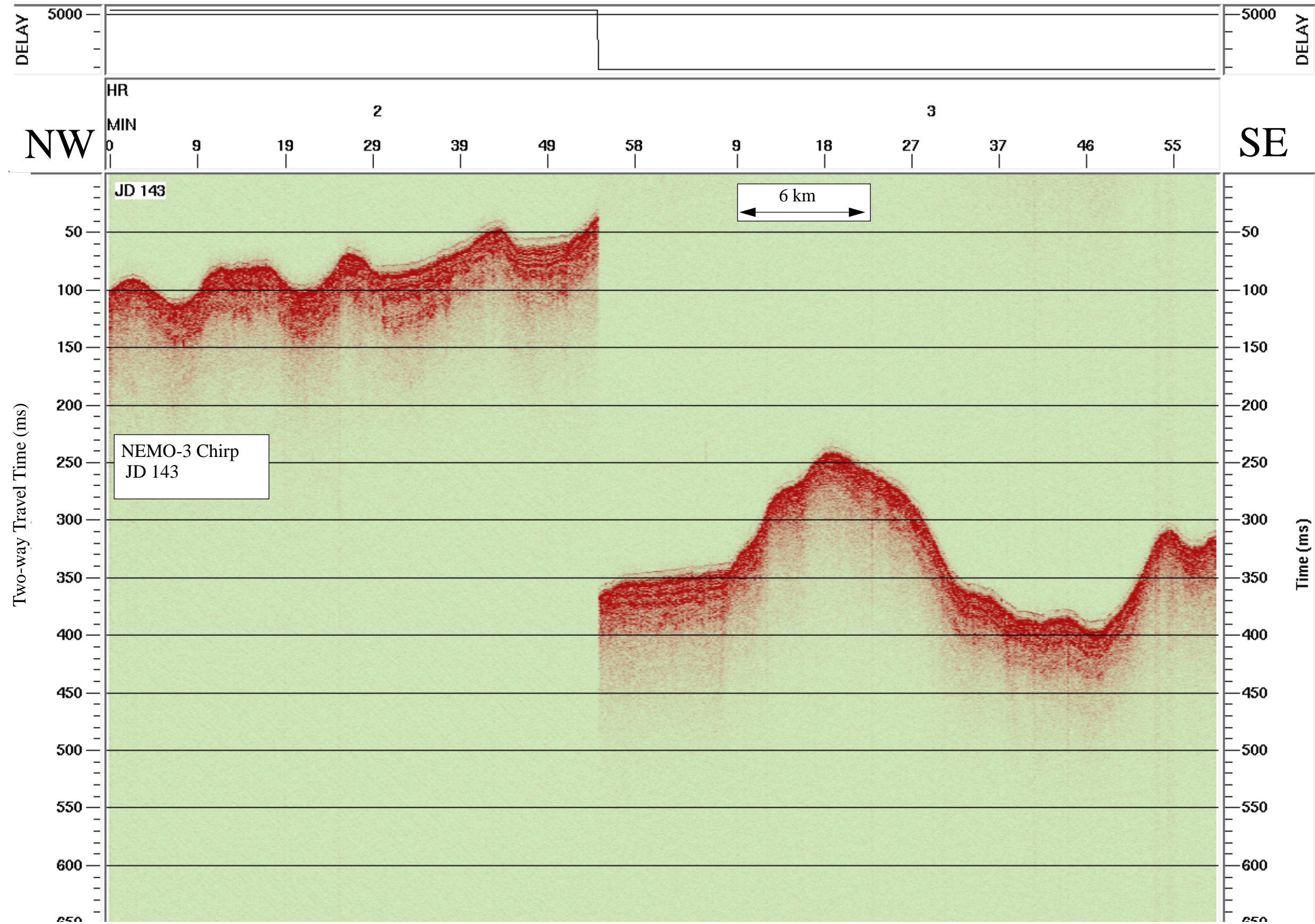
NEMO Leg 3

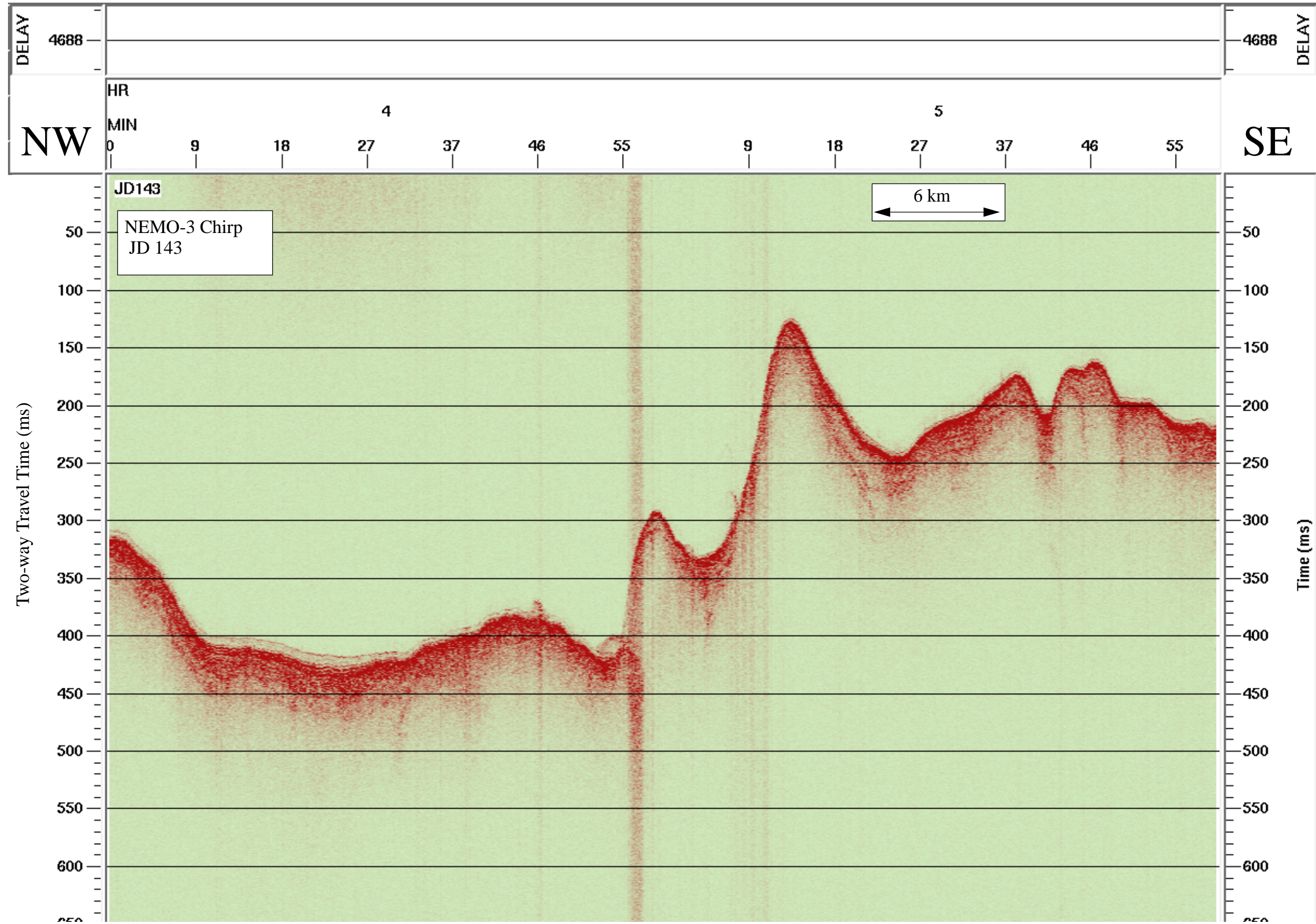
R/V Melville

Data File SBfixavg.2000may22.0000-0600

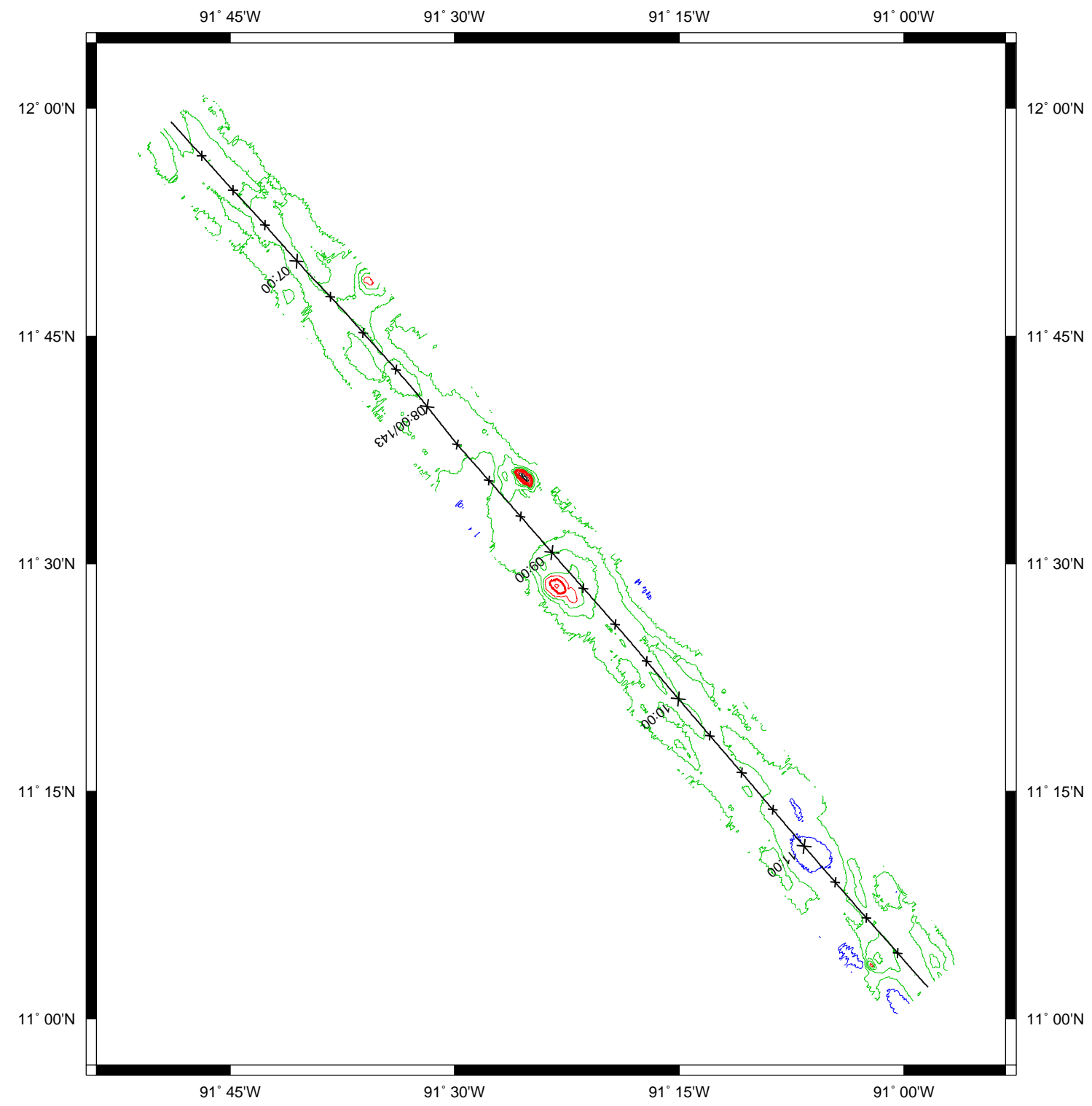


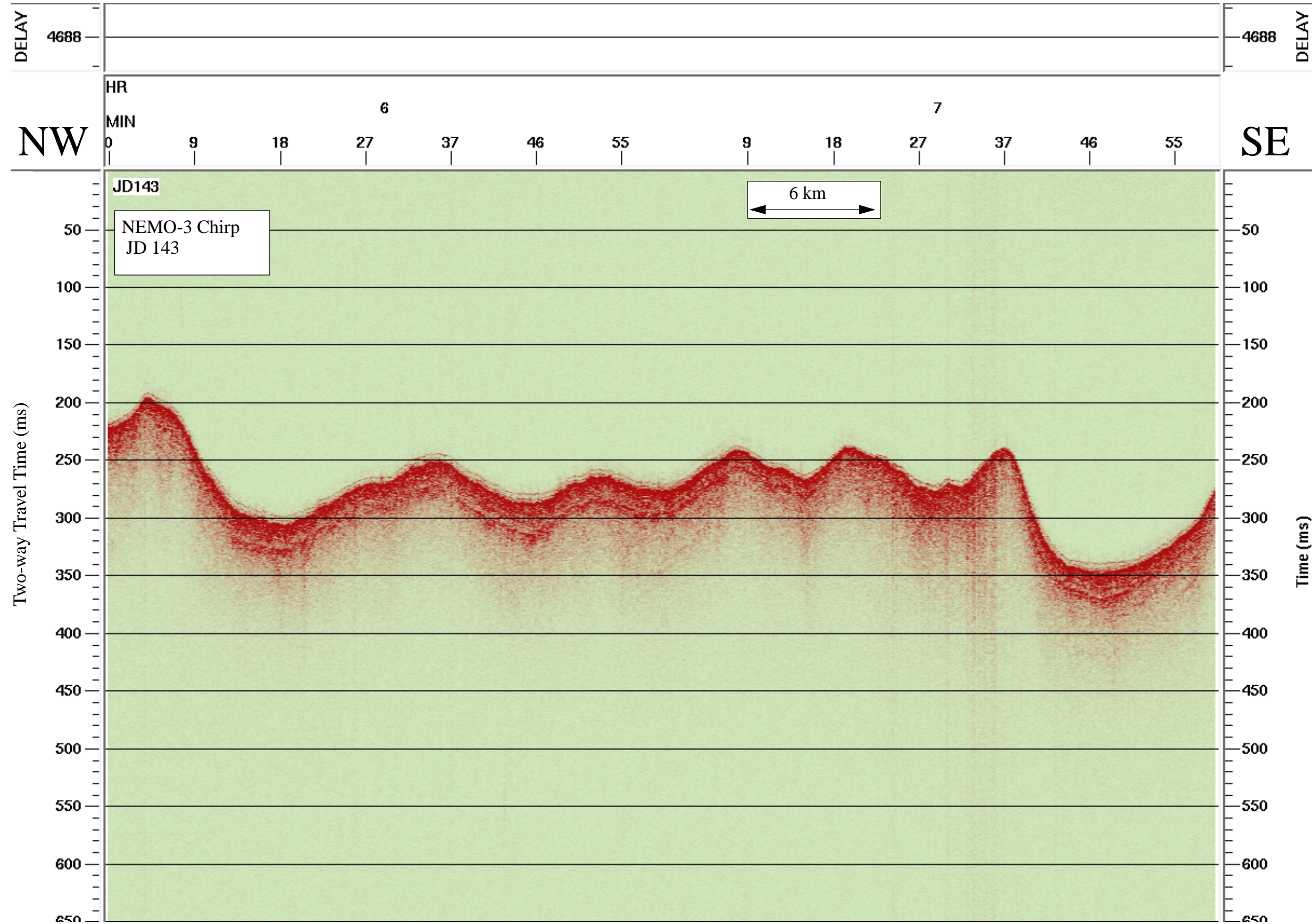


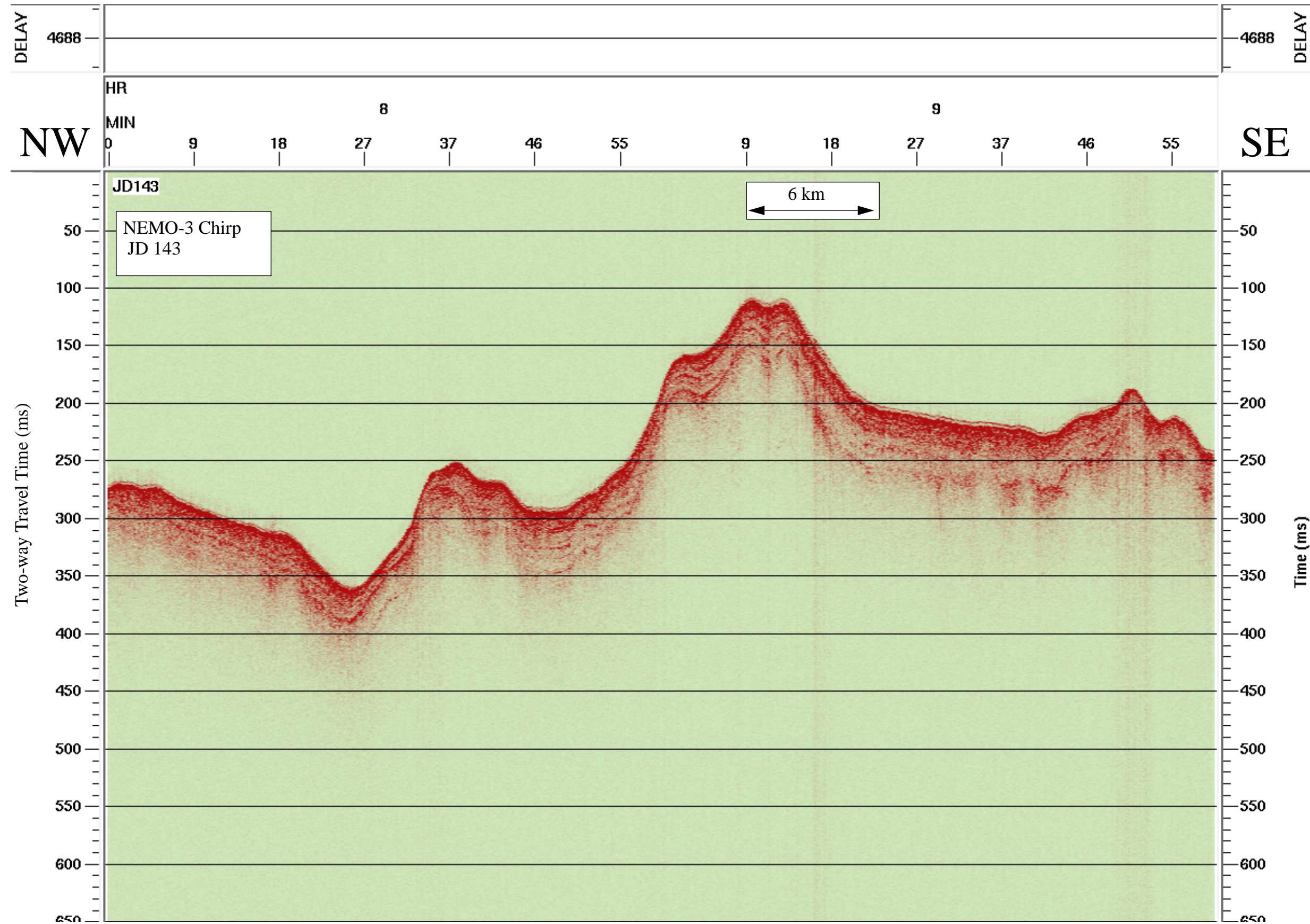


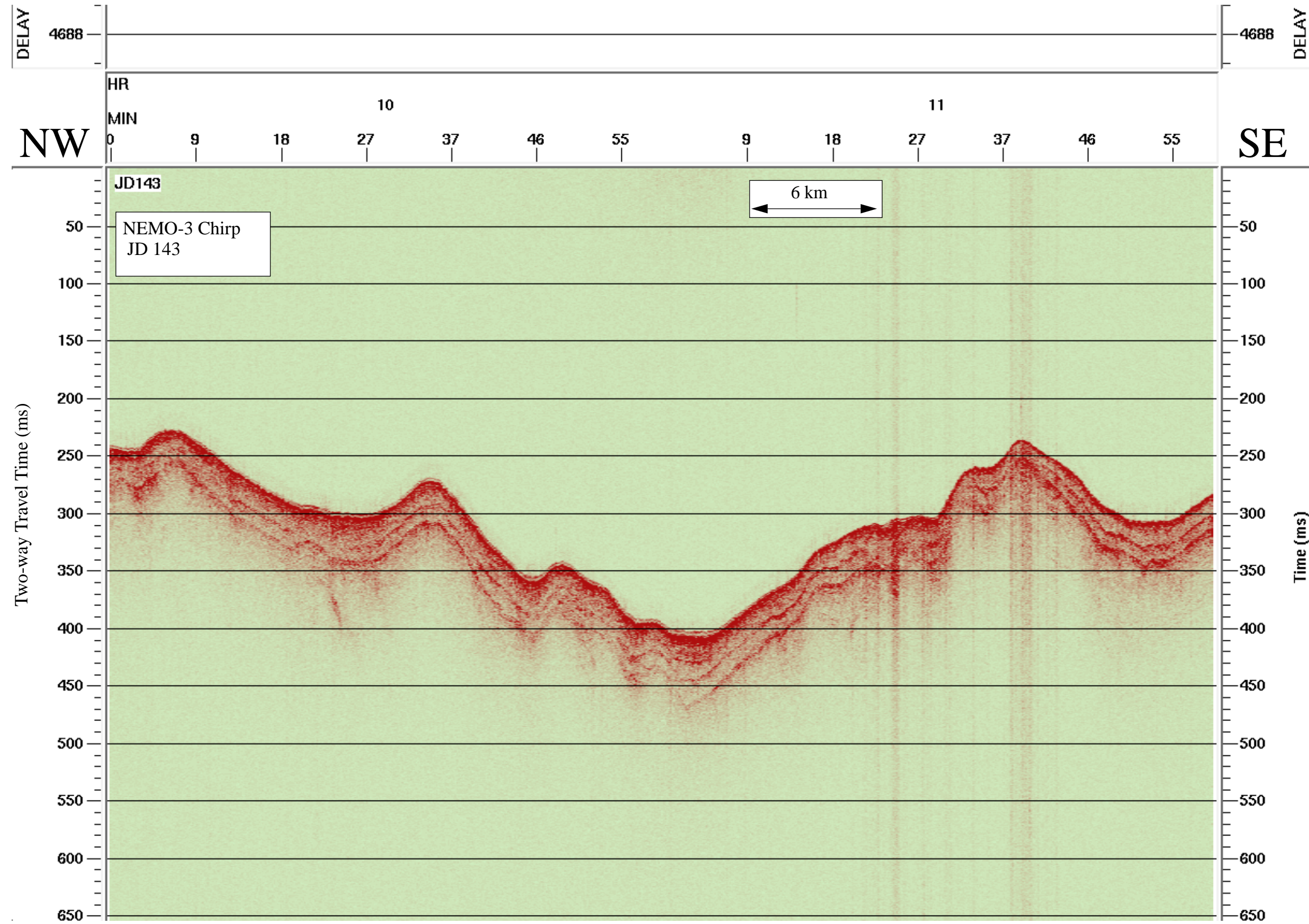


Data File SBfixavg.2000may22.0600-1200

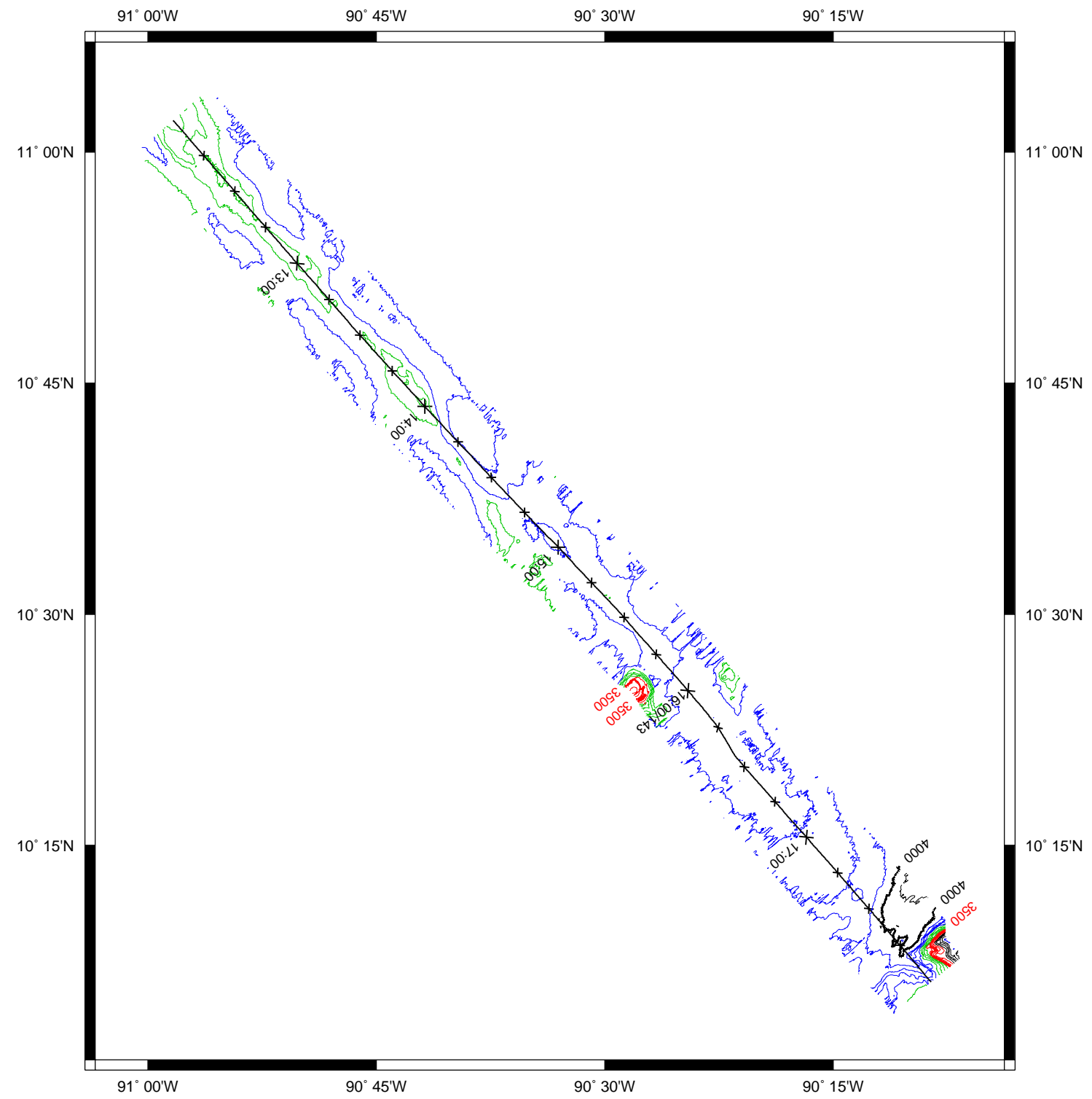


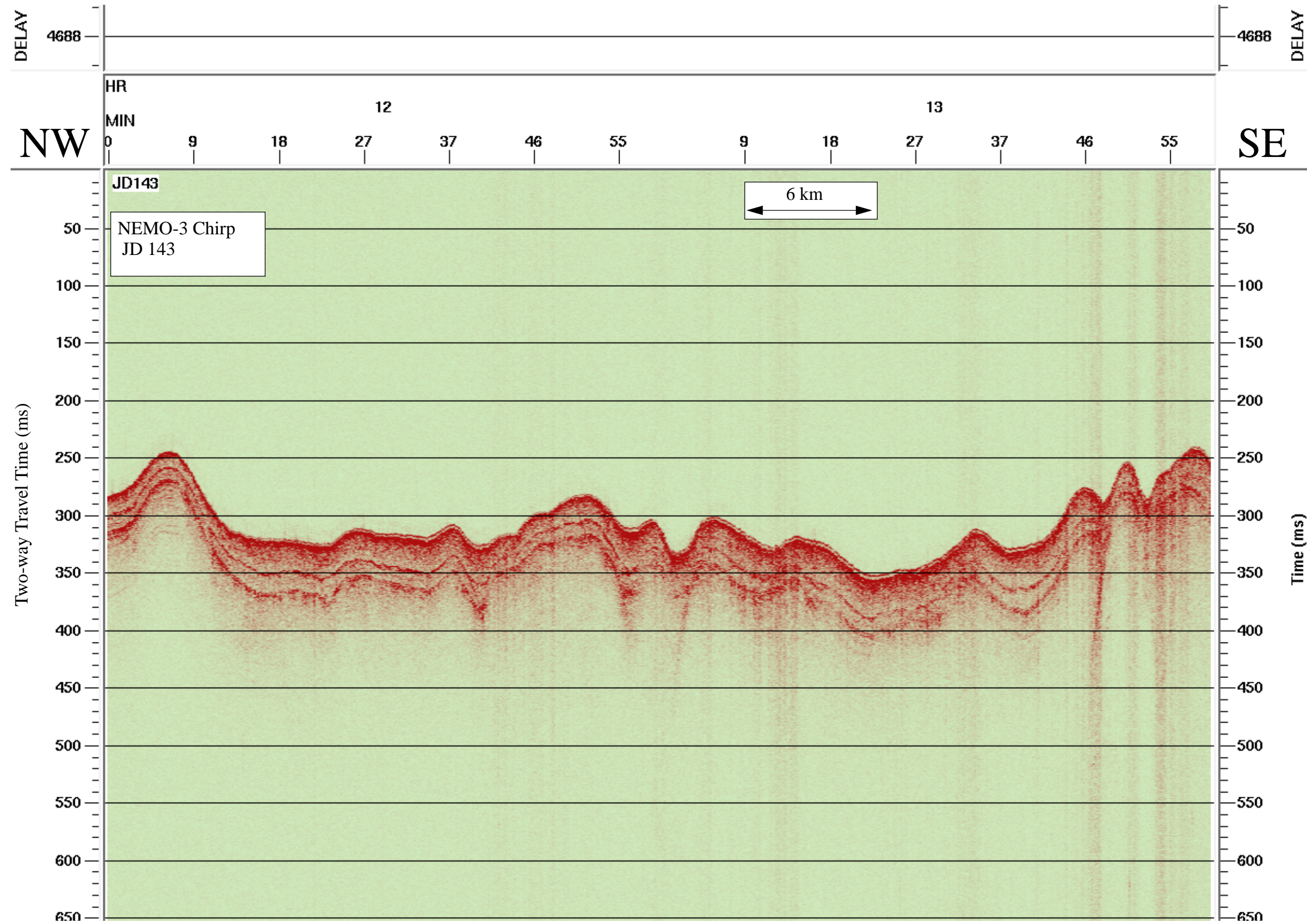


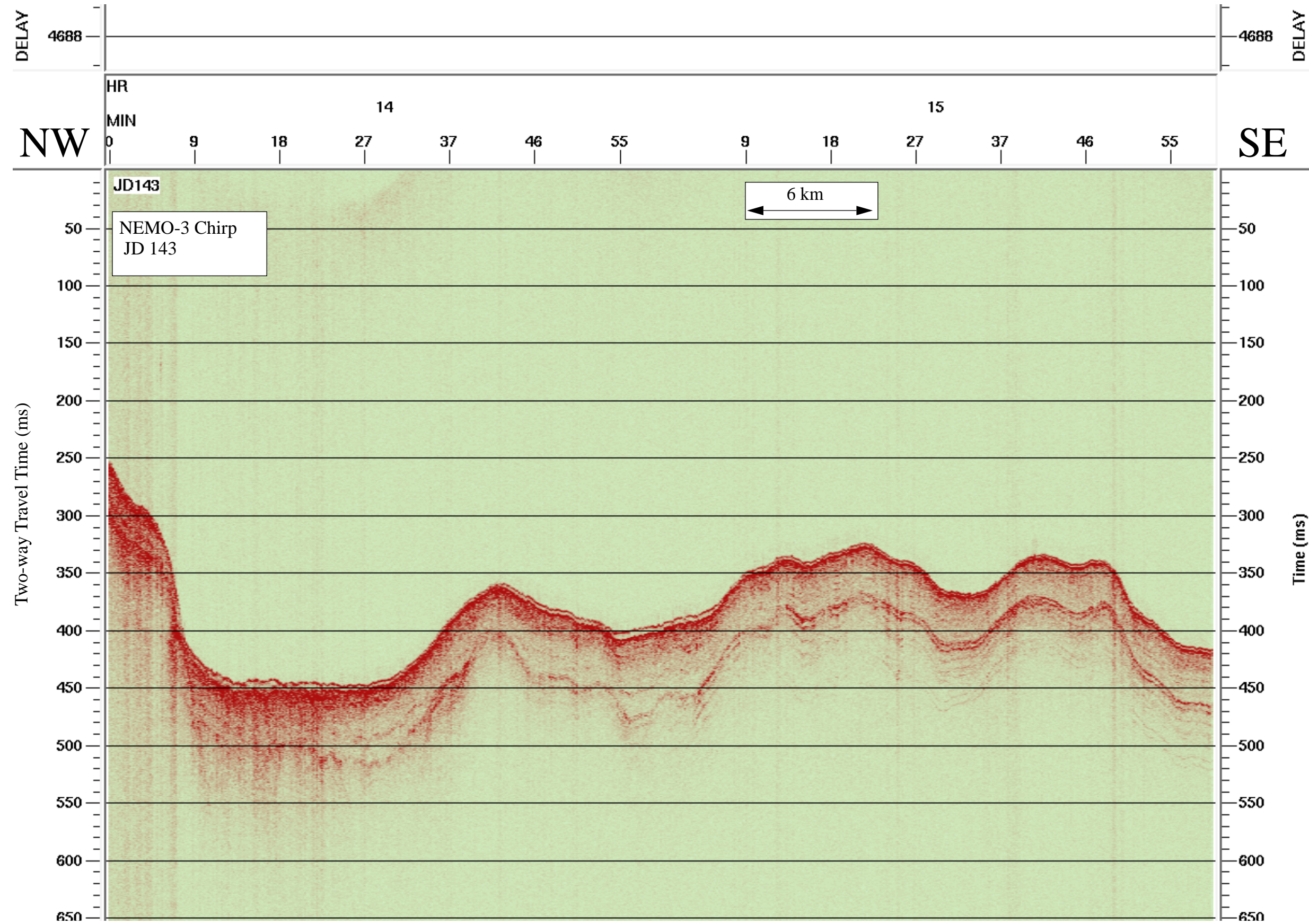


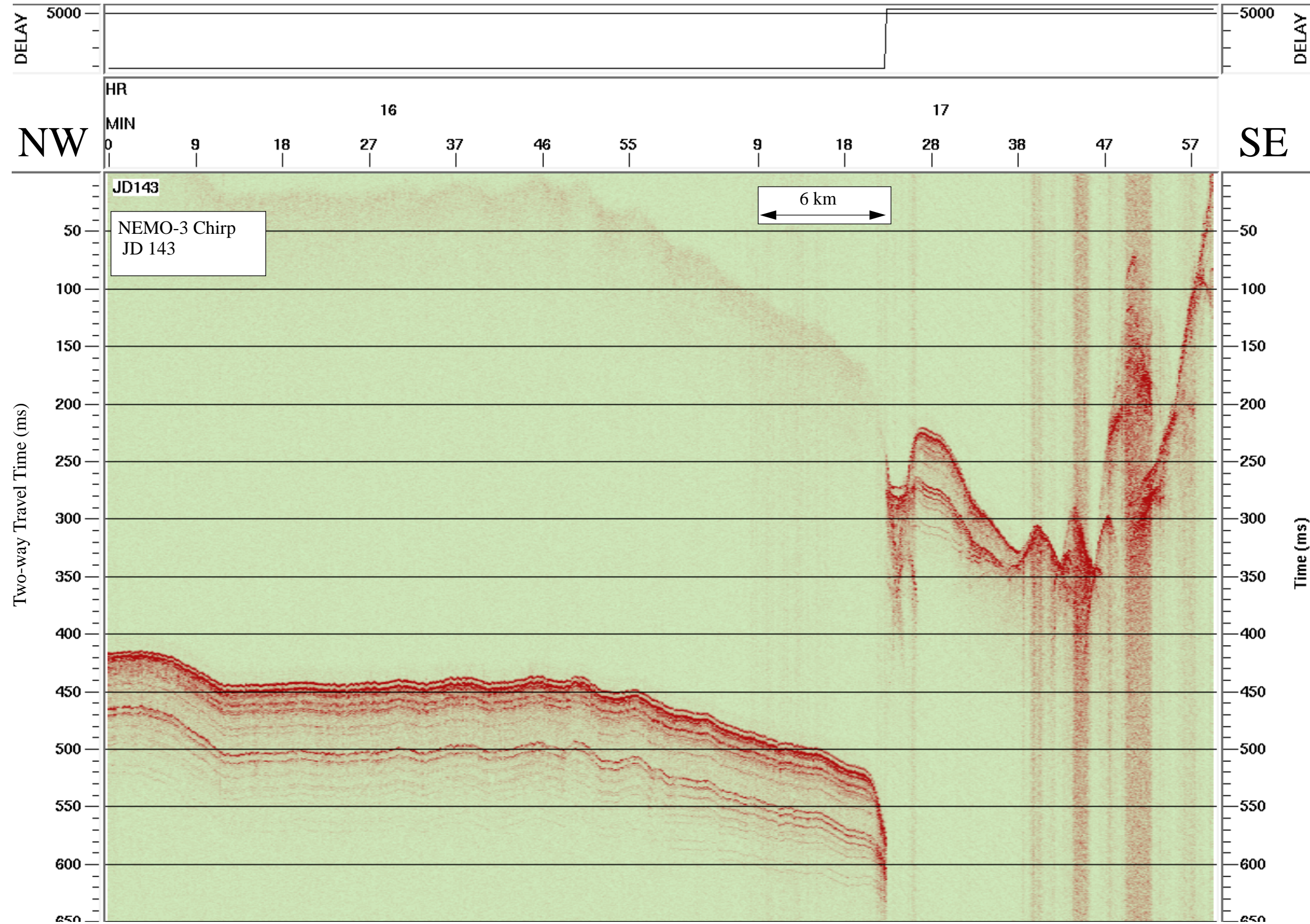


Data File SBfixavg.2000may22.1200-1800

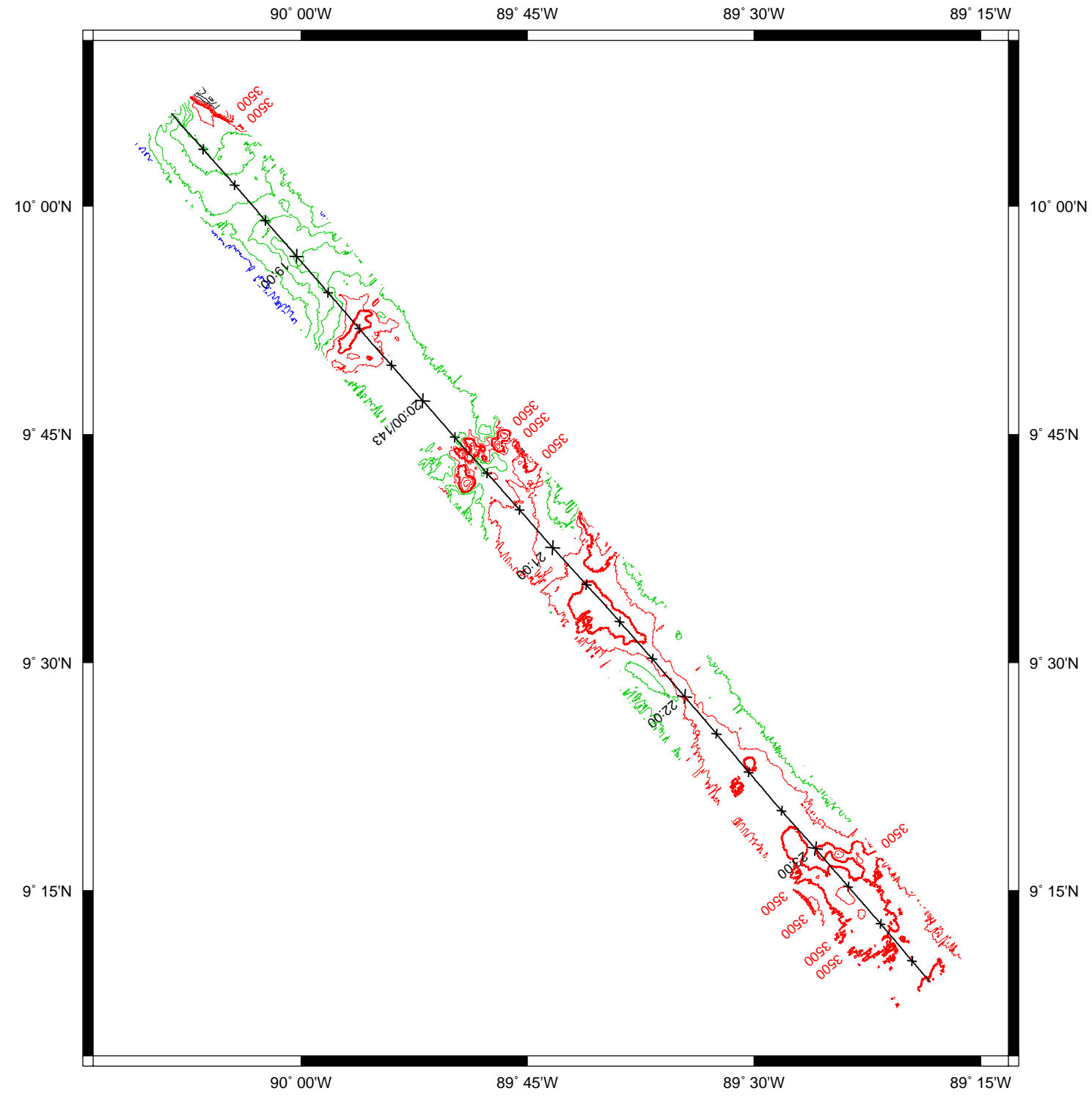


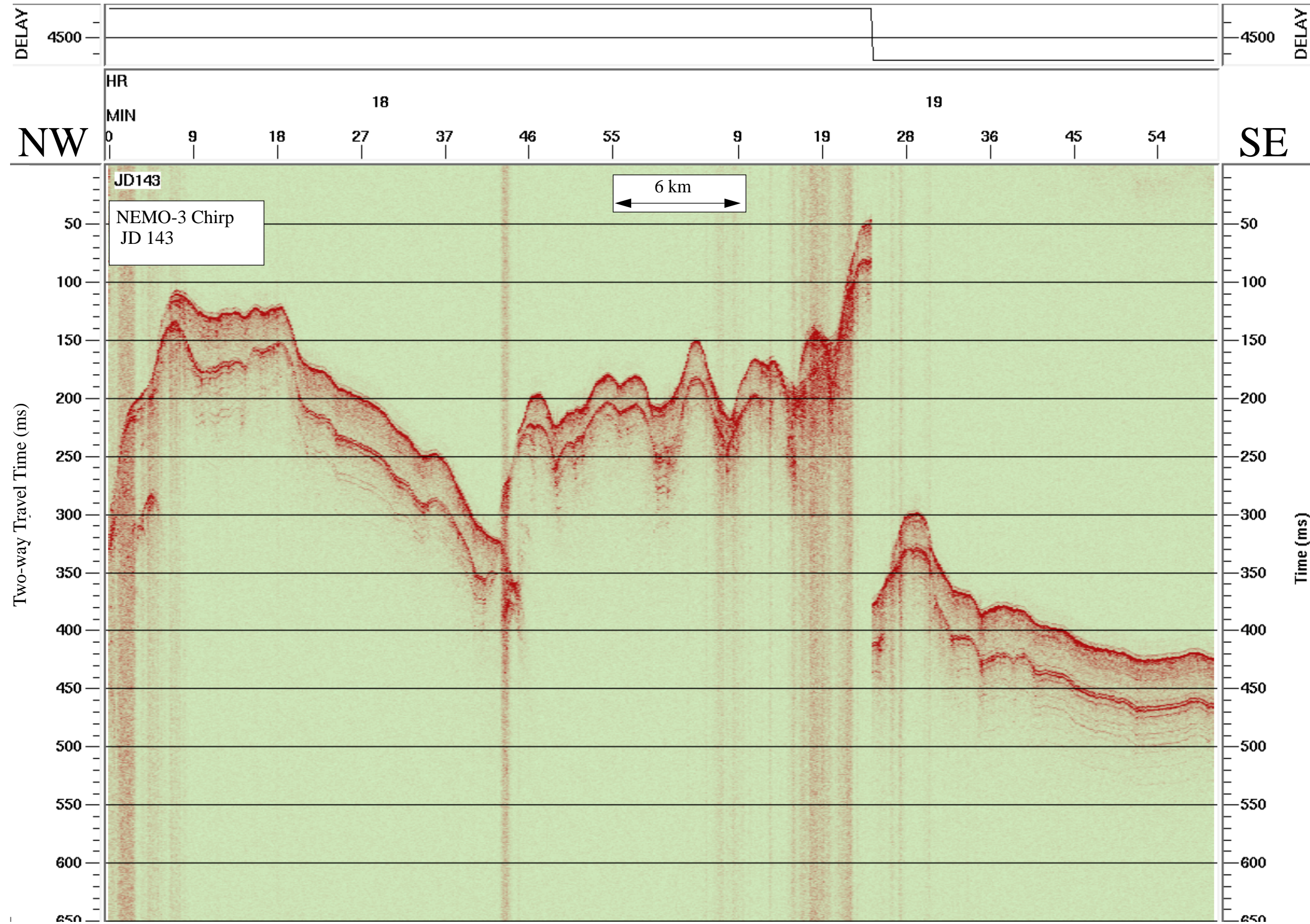


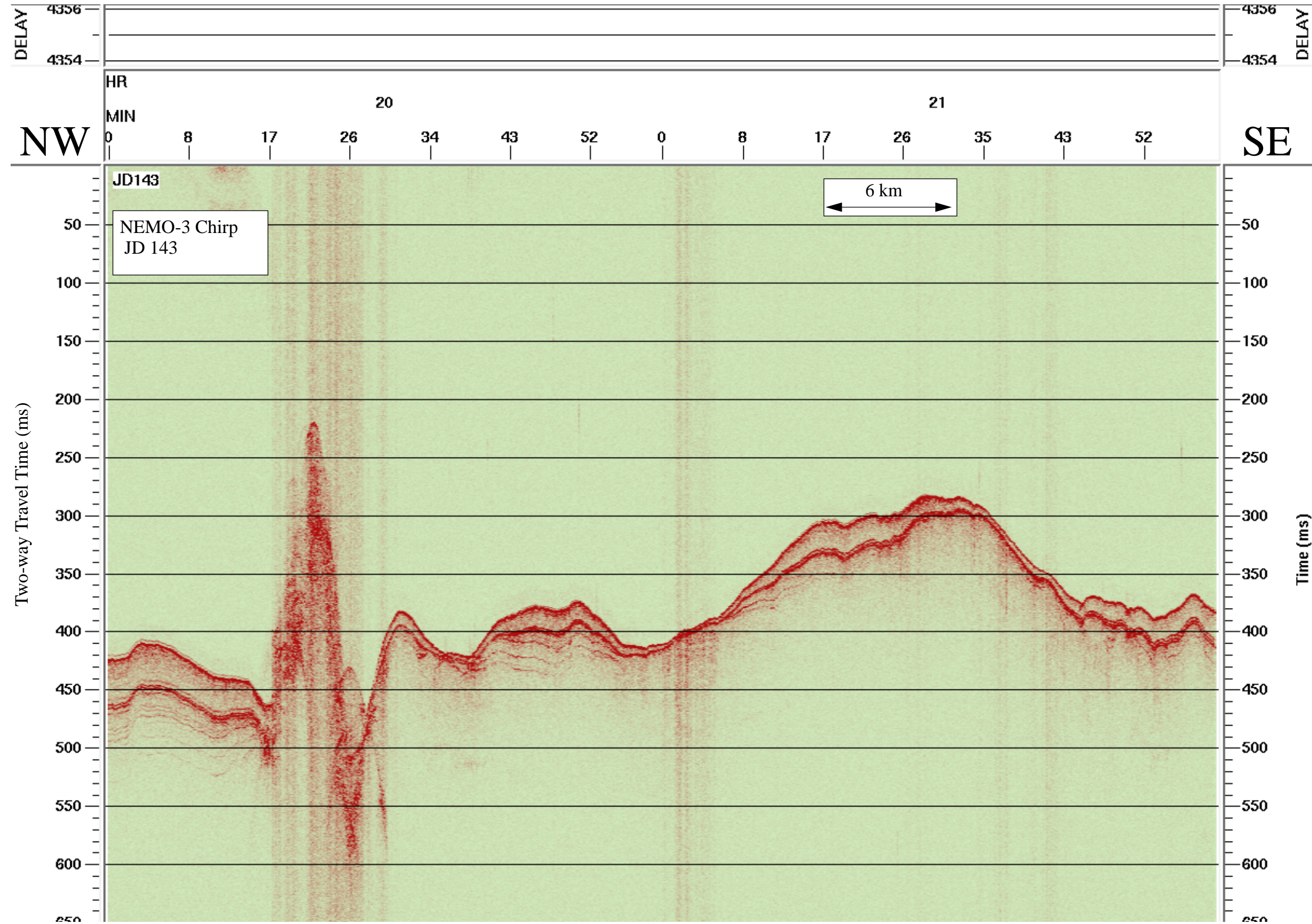


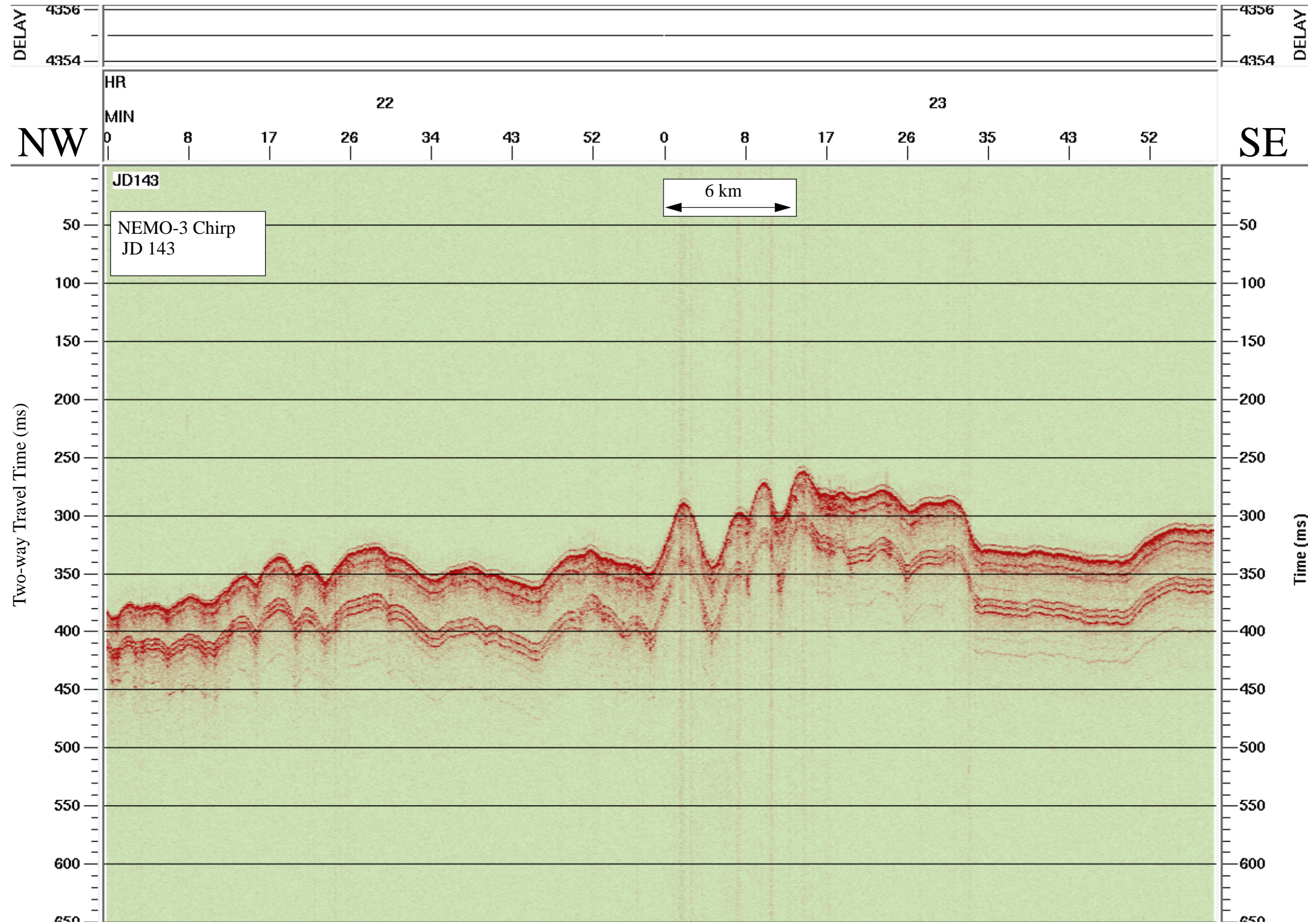


Data File SBfixavg.2000may22.1800-2400









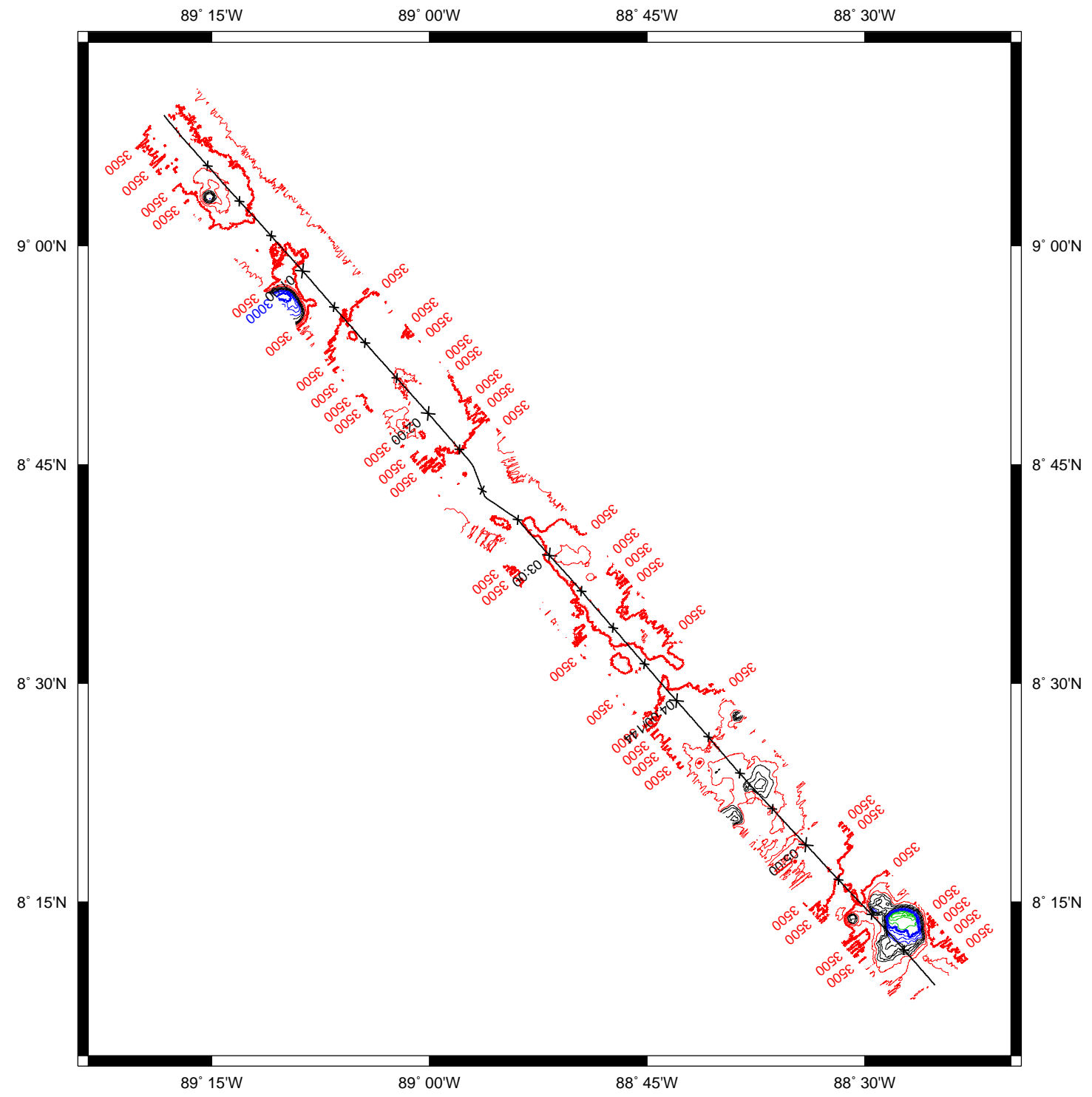
JD 144 (23 May 2000)--COC-2 Survey, Cocos Ridge

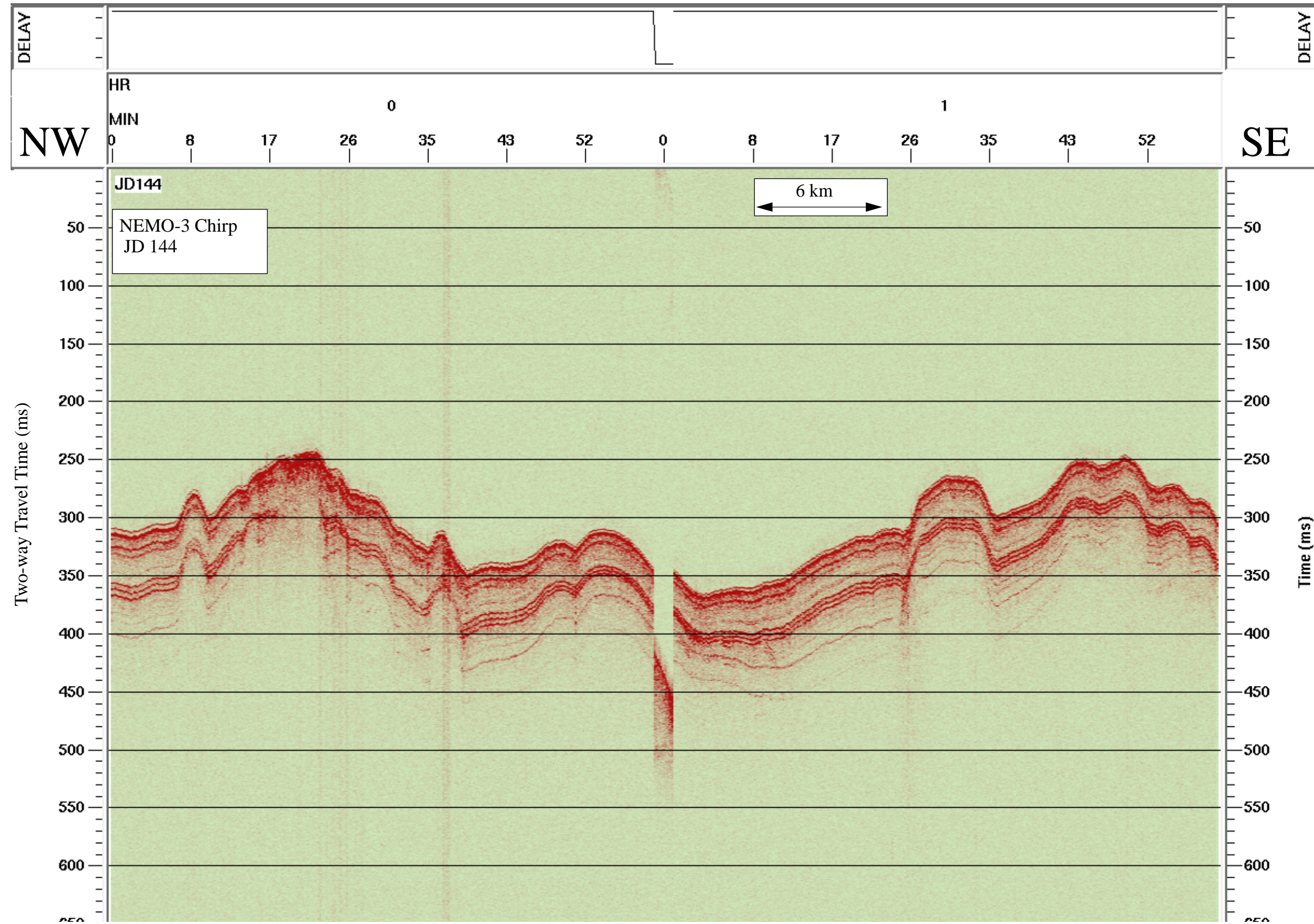
2-7 kHz Chirp Subbottom Profiler

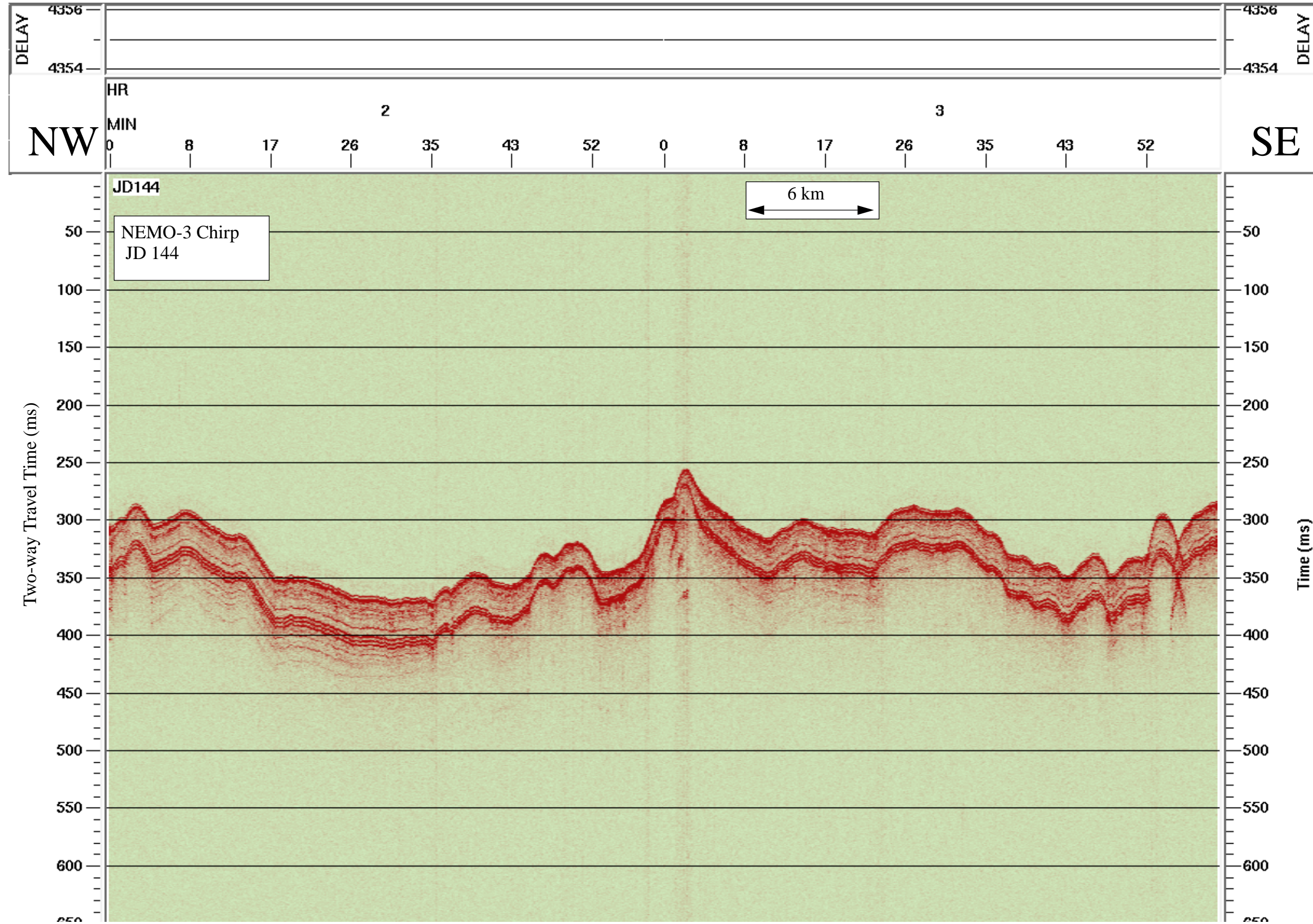
NEMO Leg 3

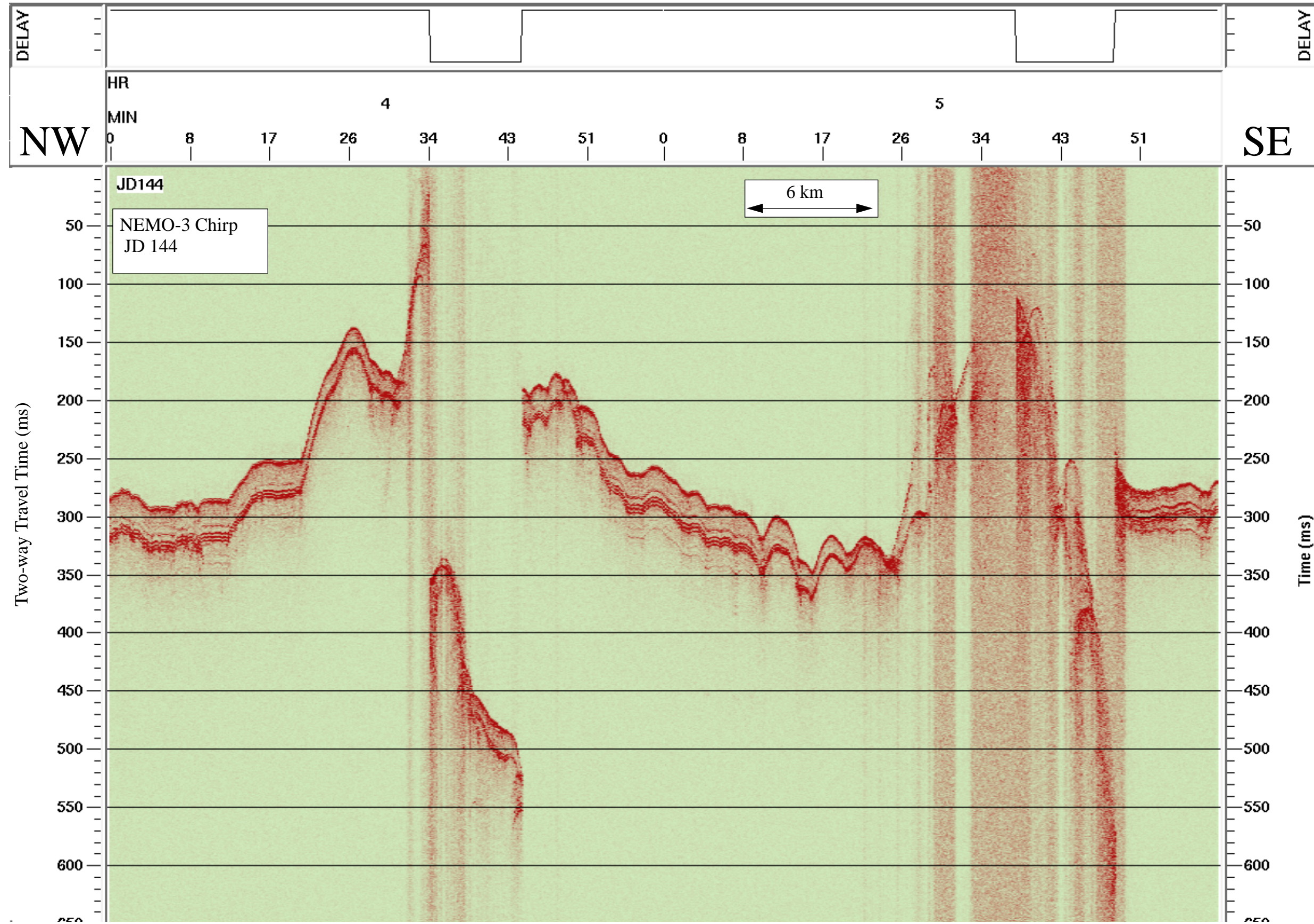
R/V Melville

Data File SBfixavg.2000may23.0000-0600

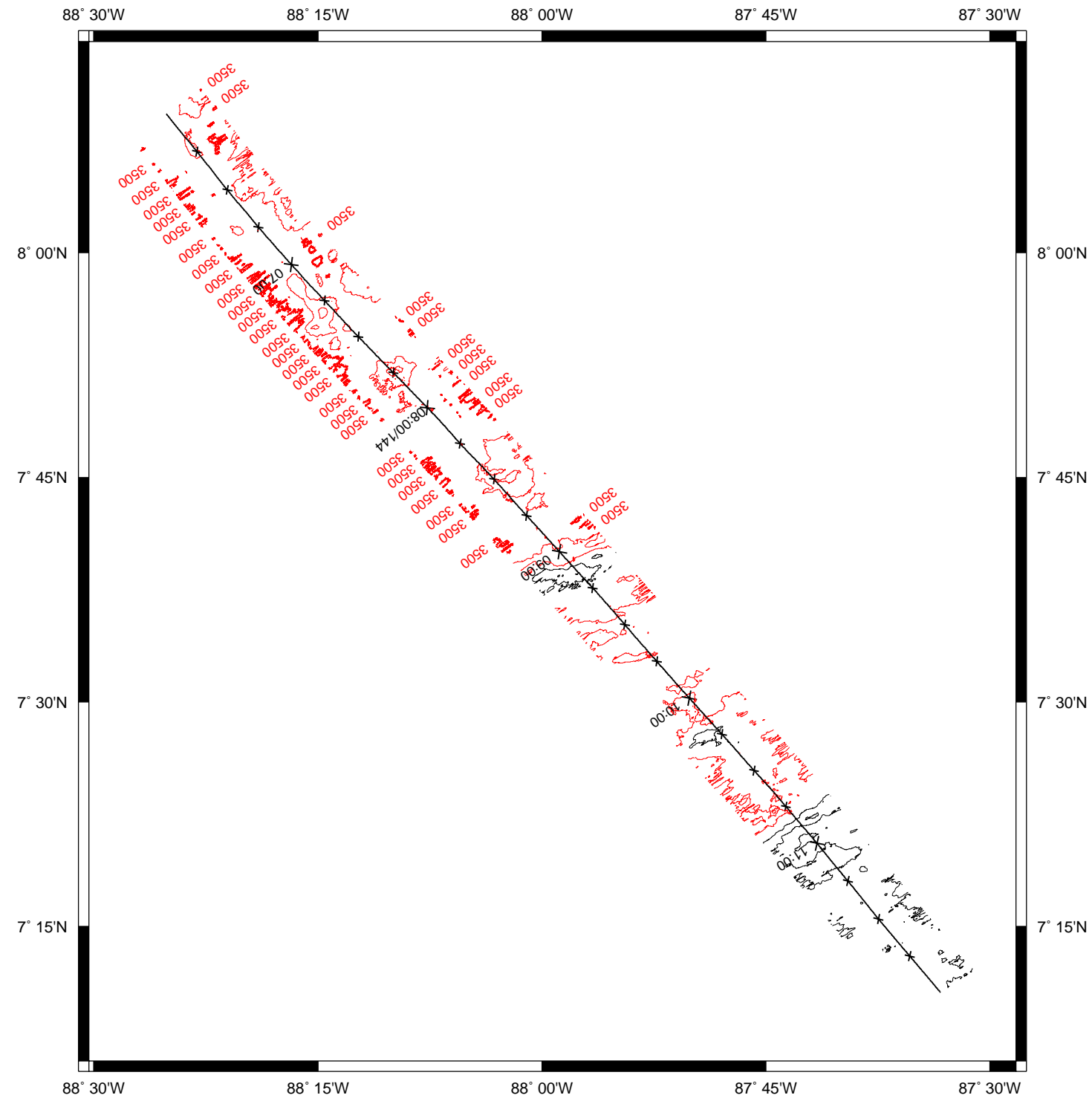


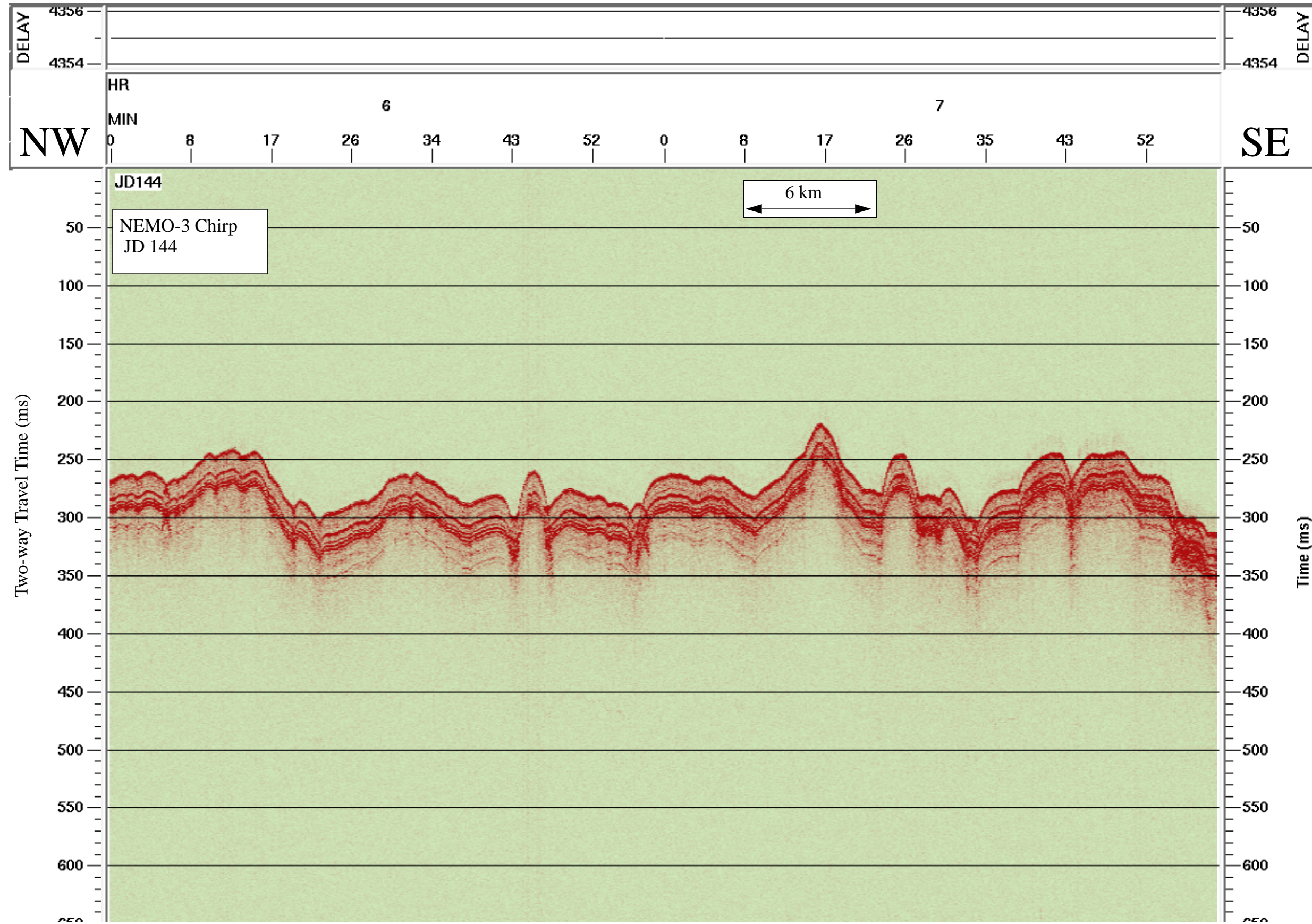


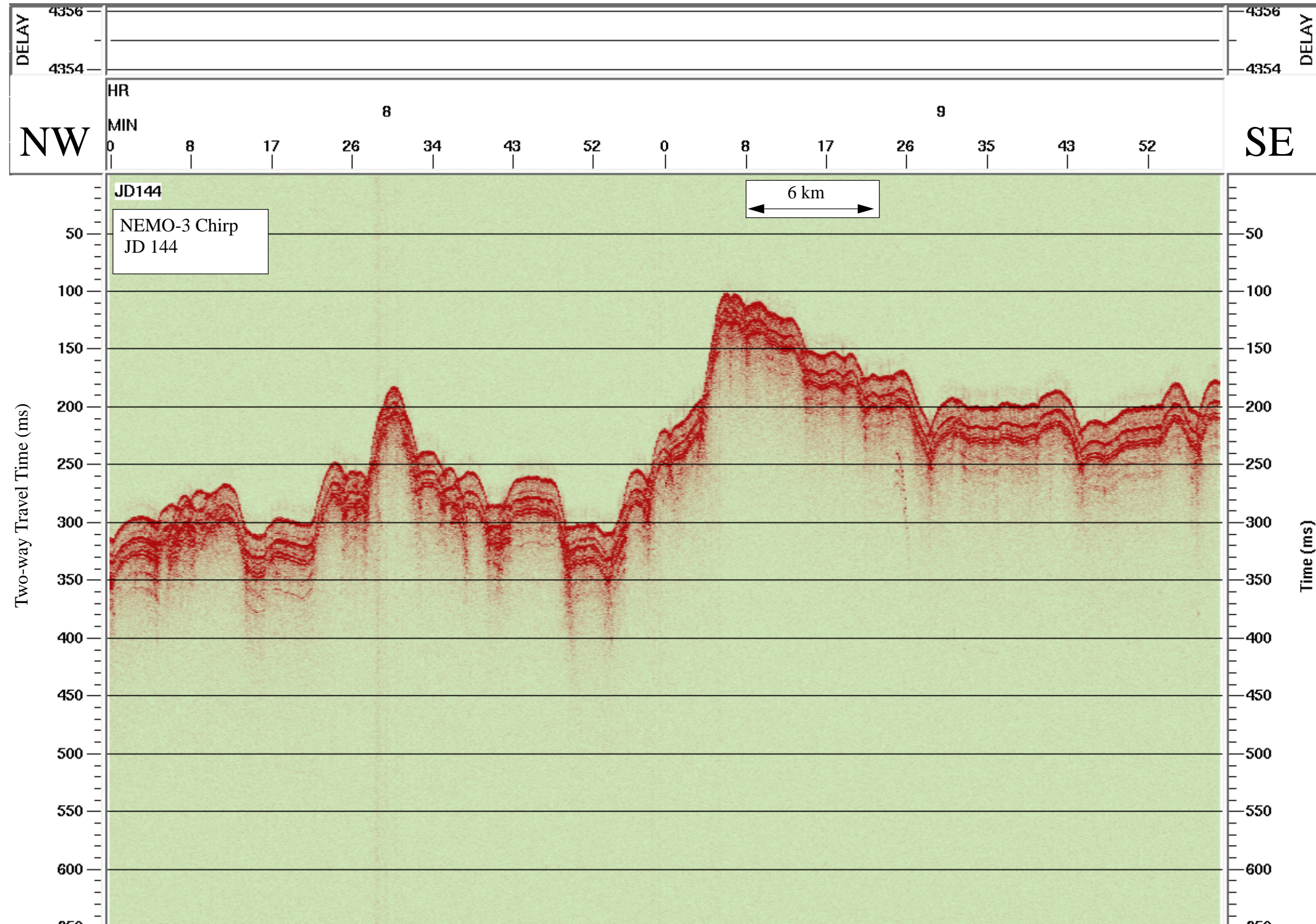


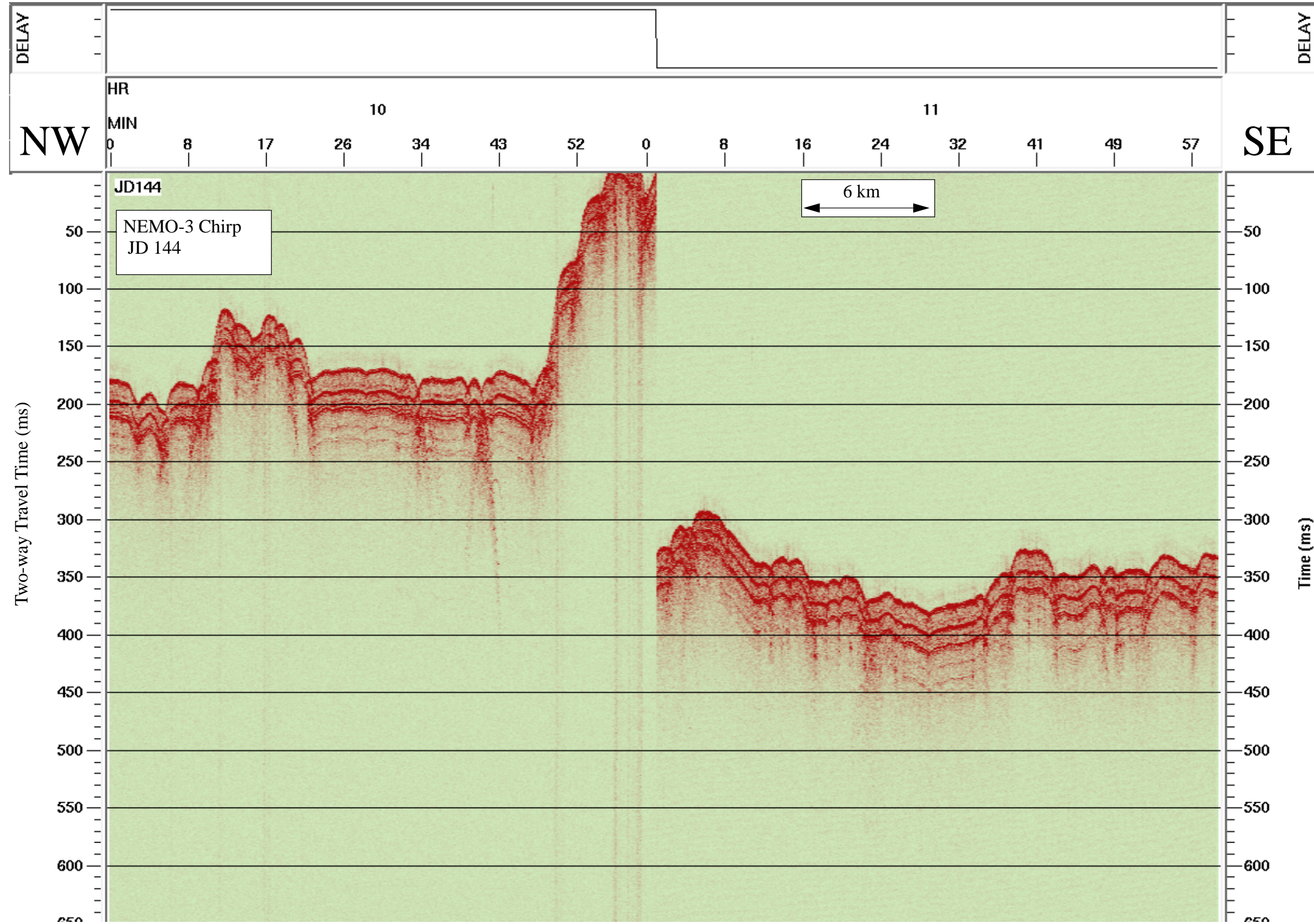


Data File SBfixavg.2000may23.0600-1200

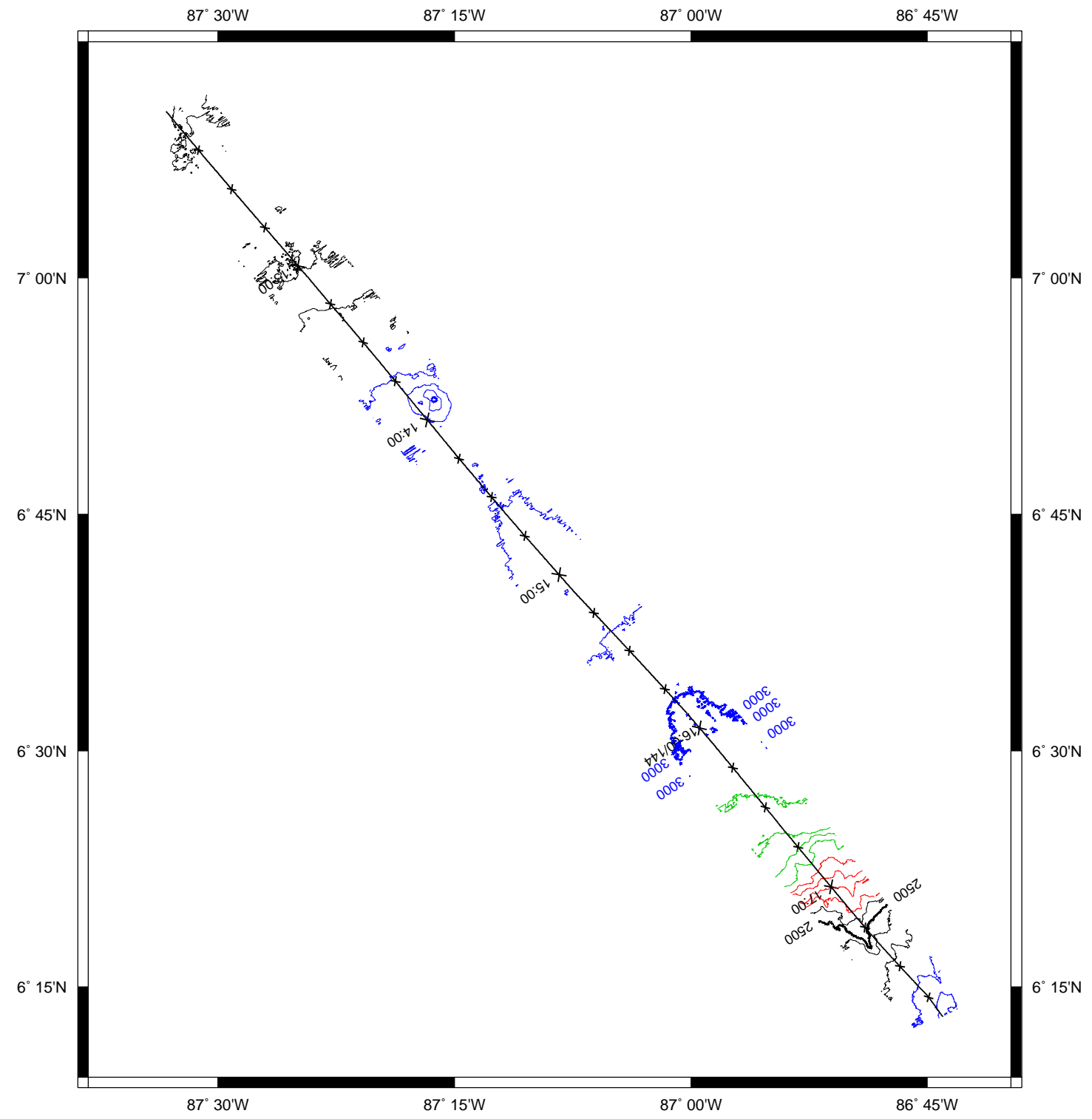


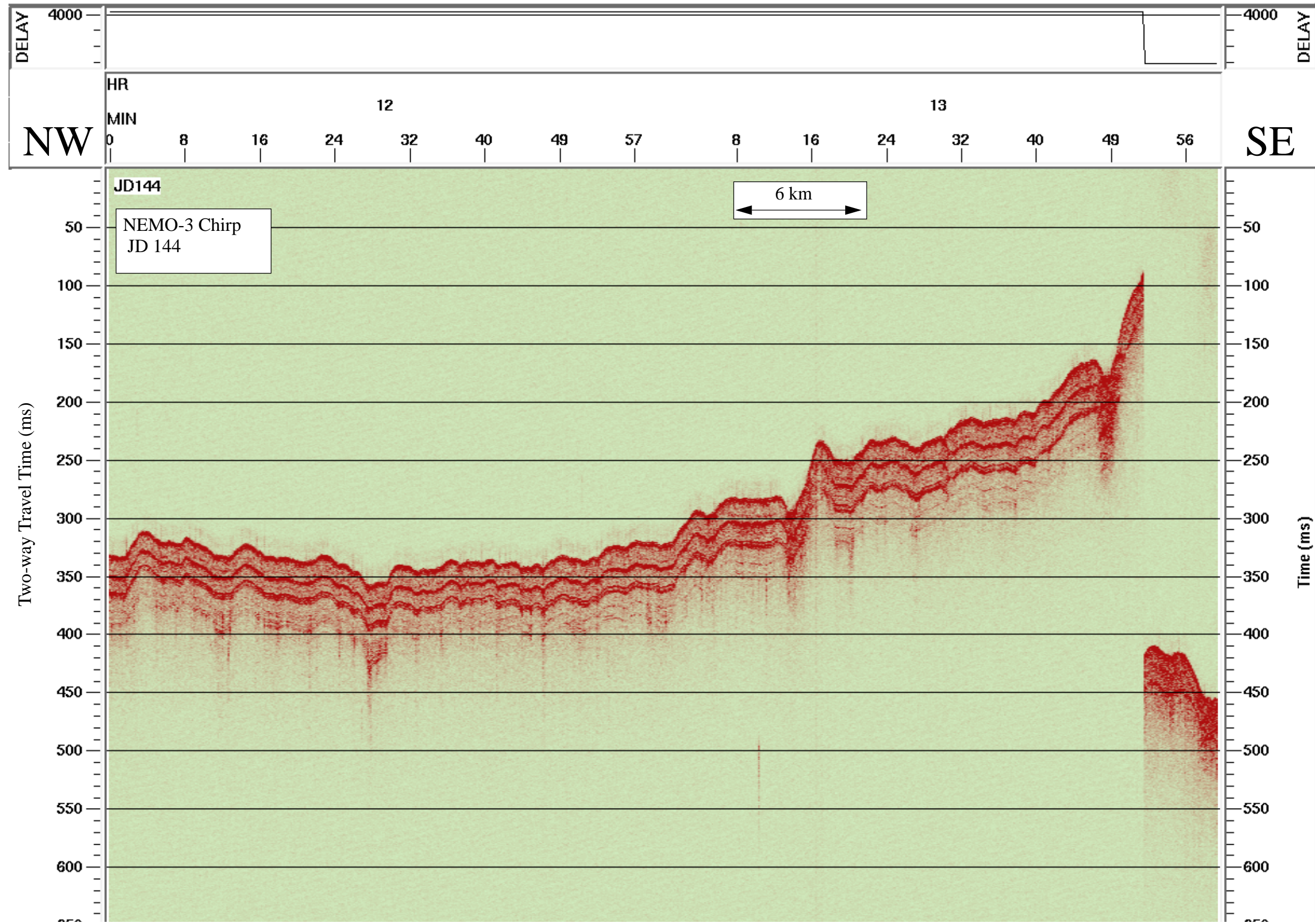


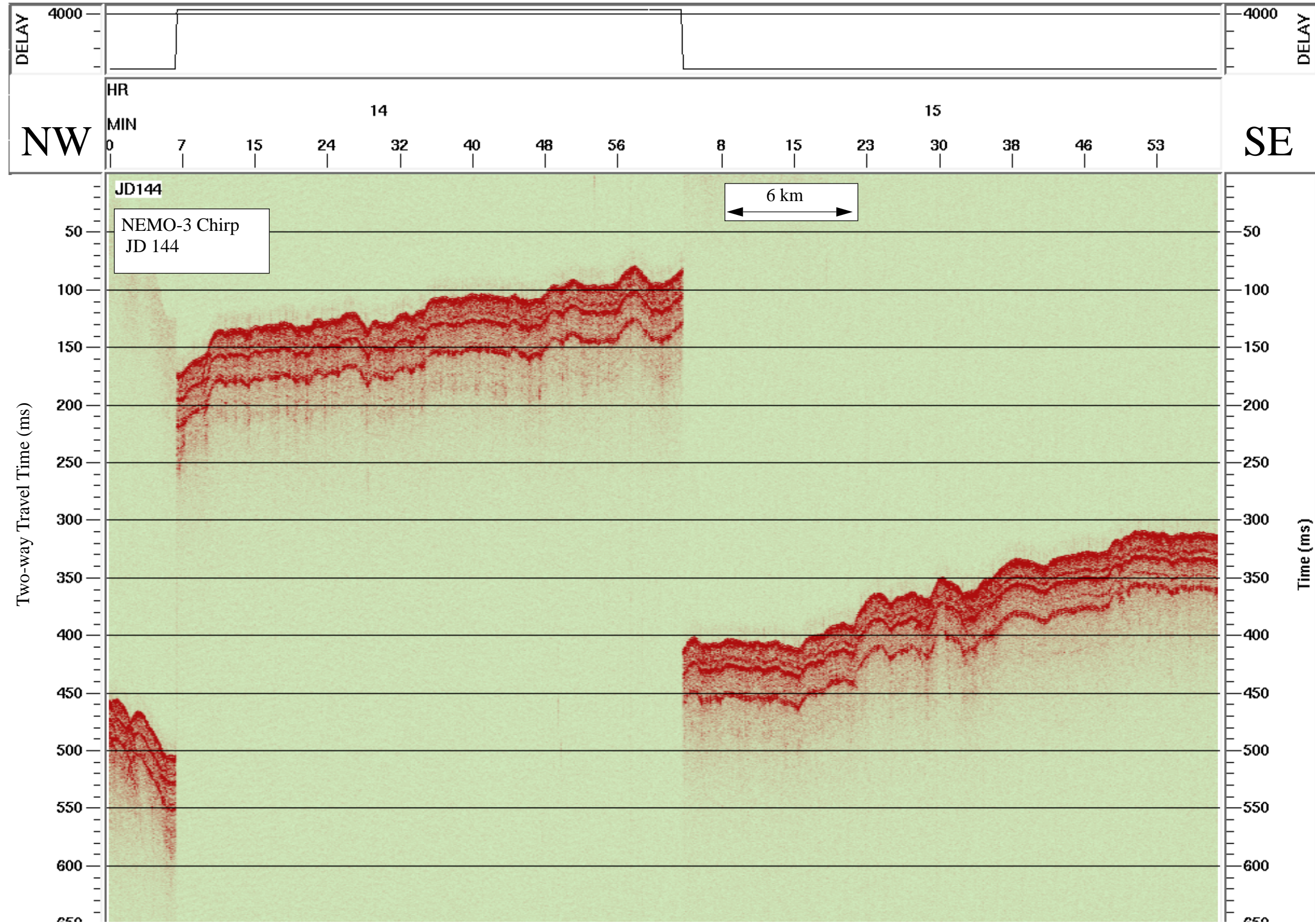


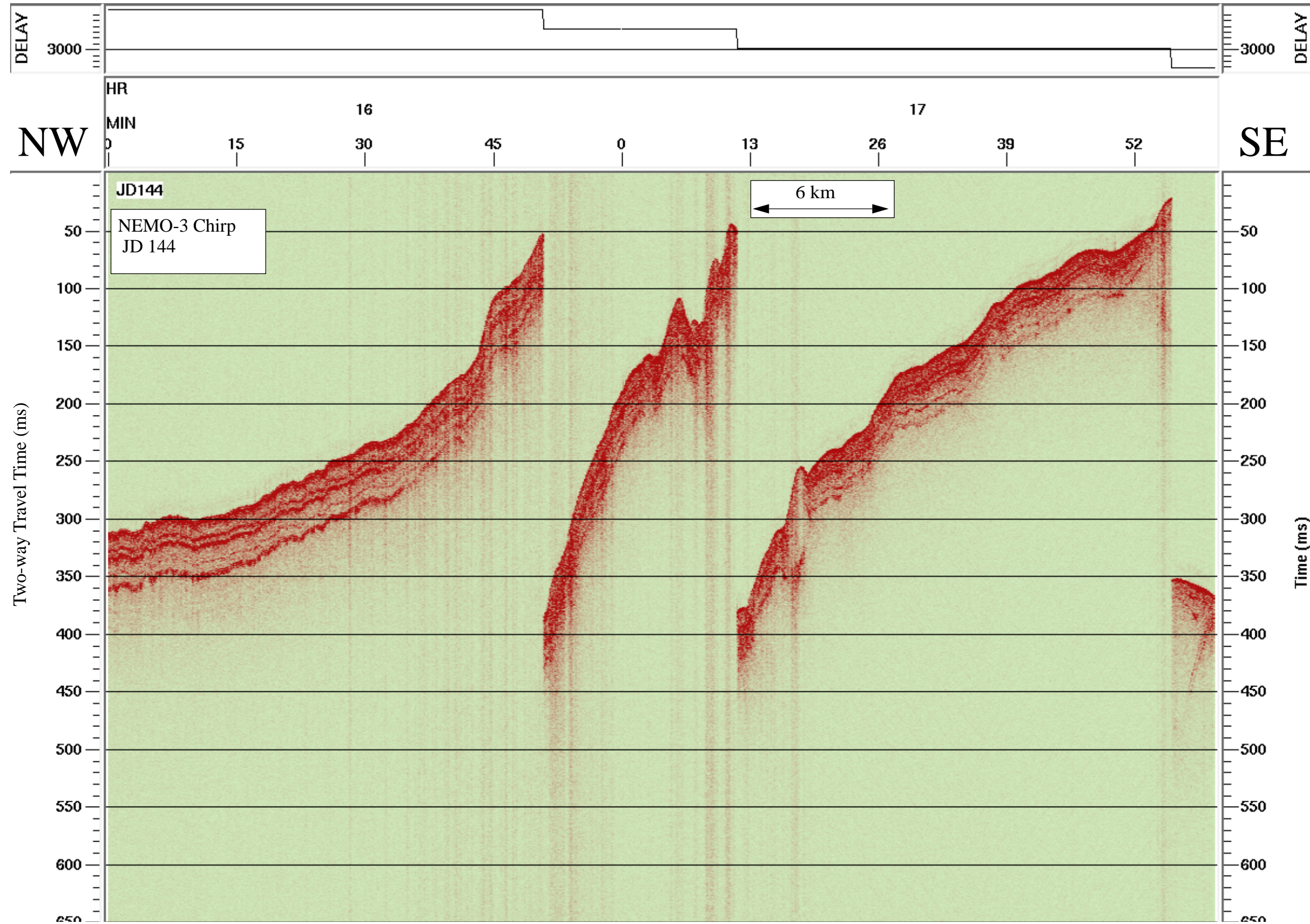


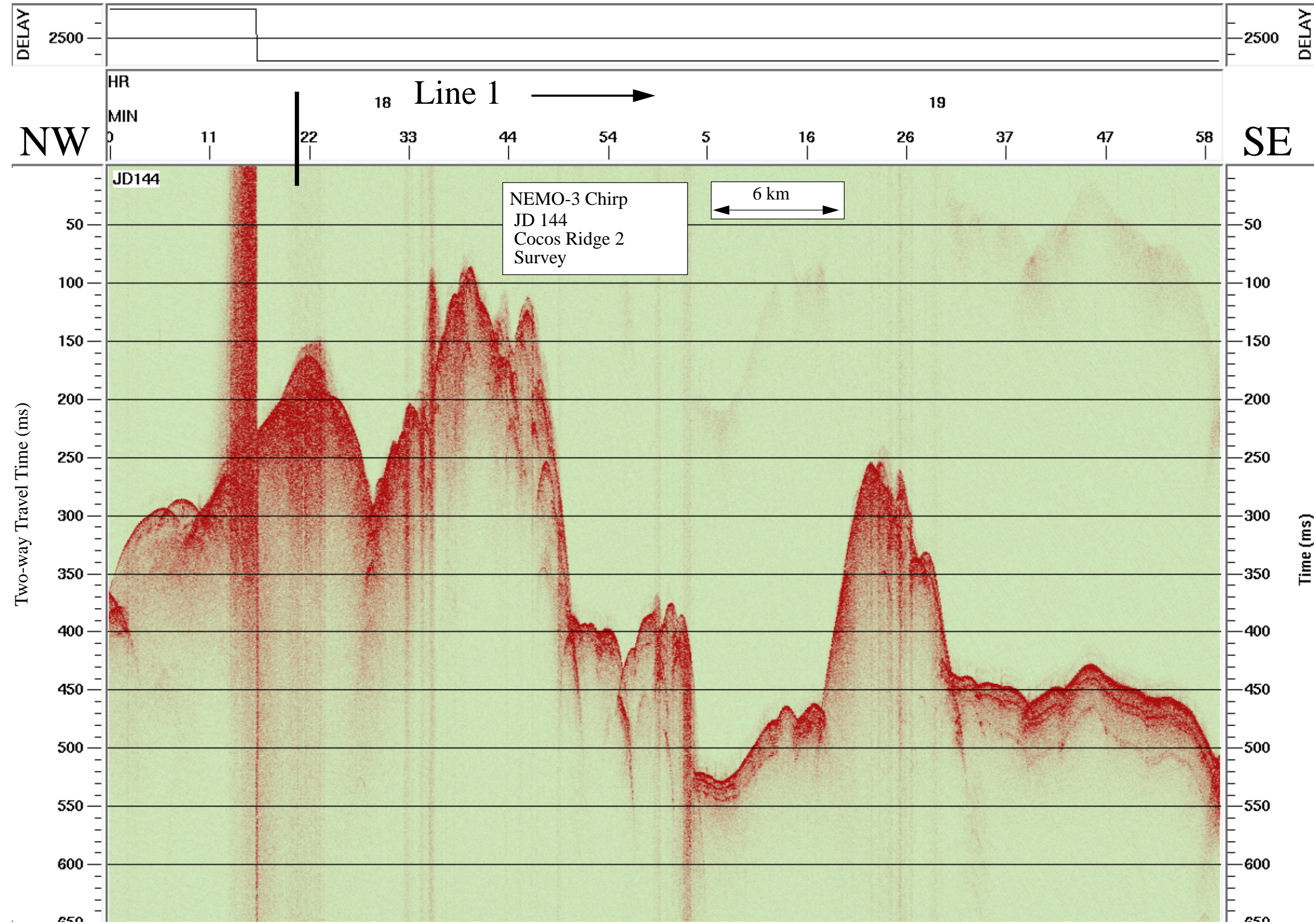
Data File SBfixavg.2000may23.1200-1800

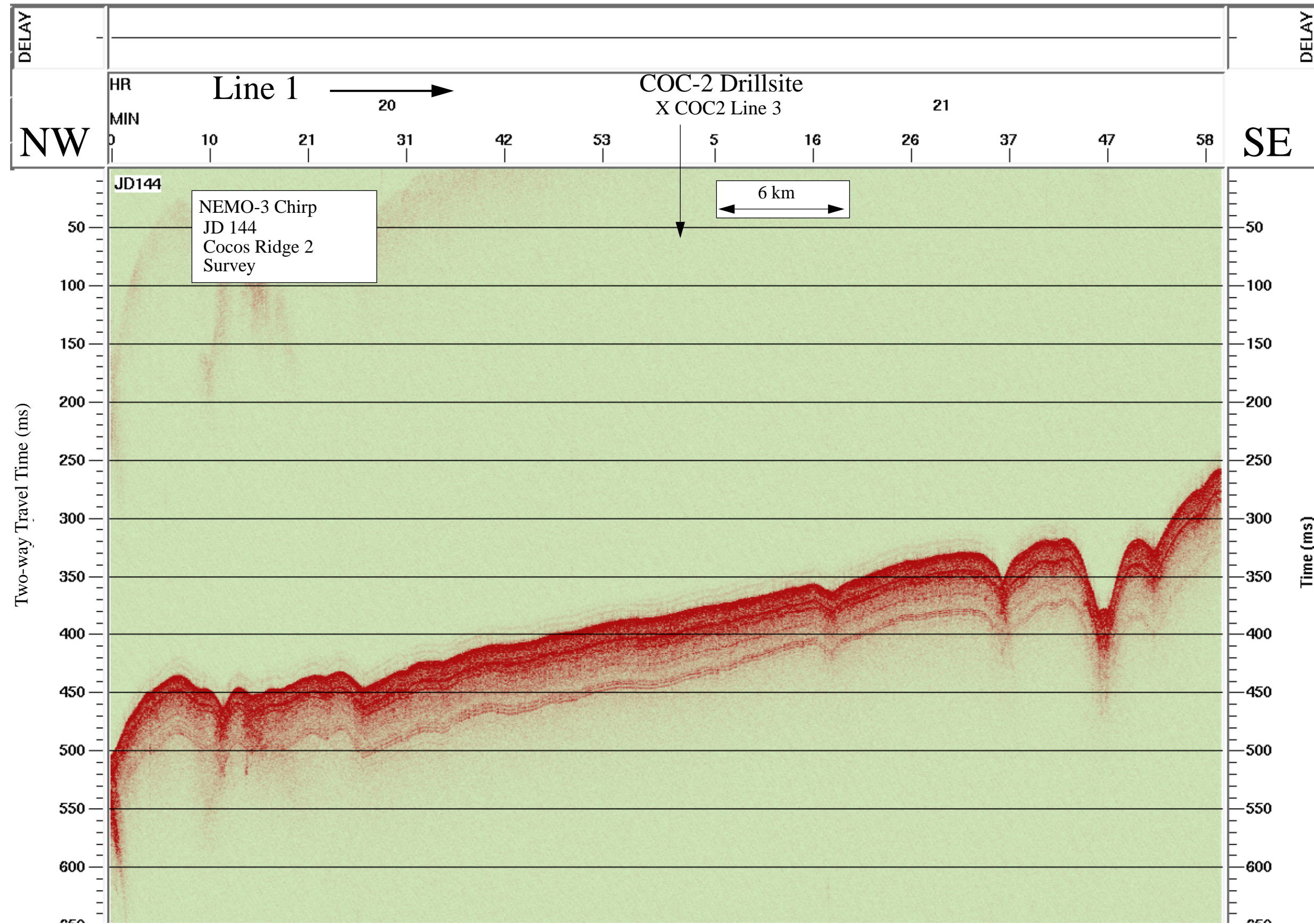


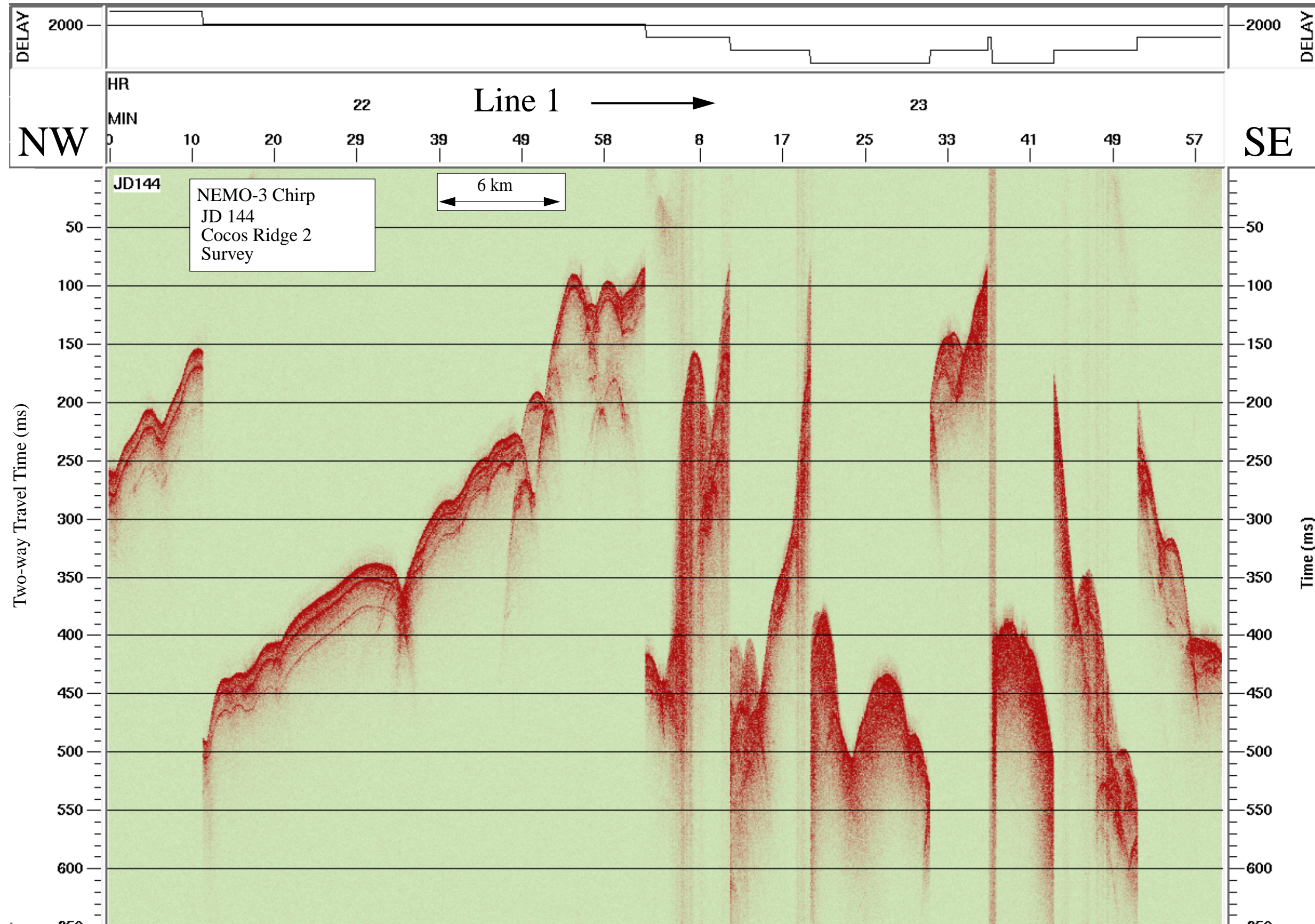












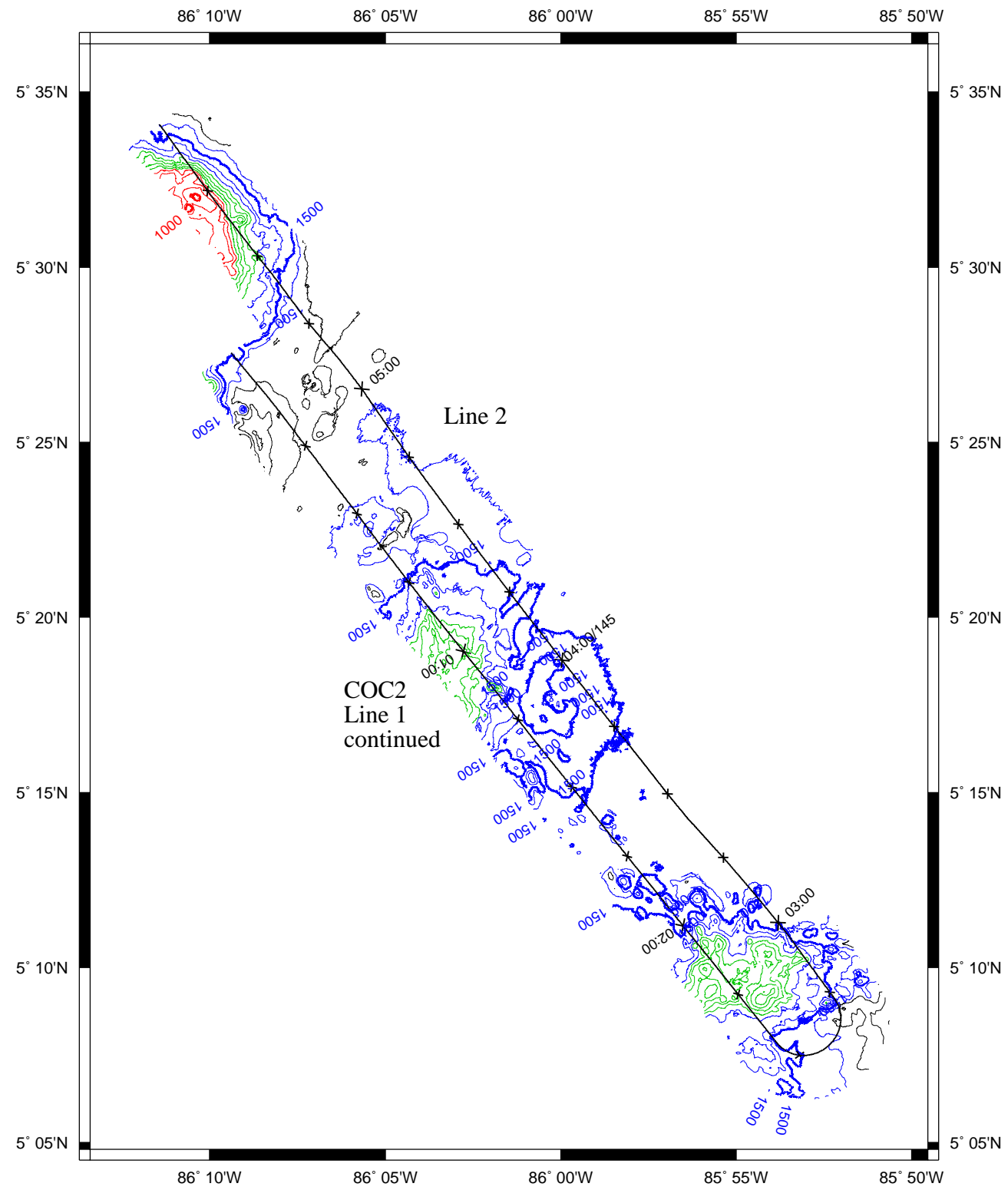
JD 145 (24 May 2000)--COC-2 Survey, Cocos Ridge

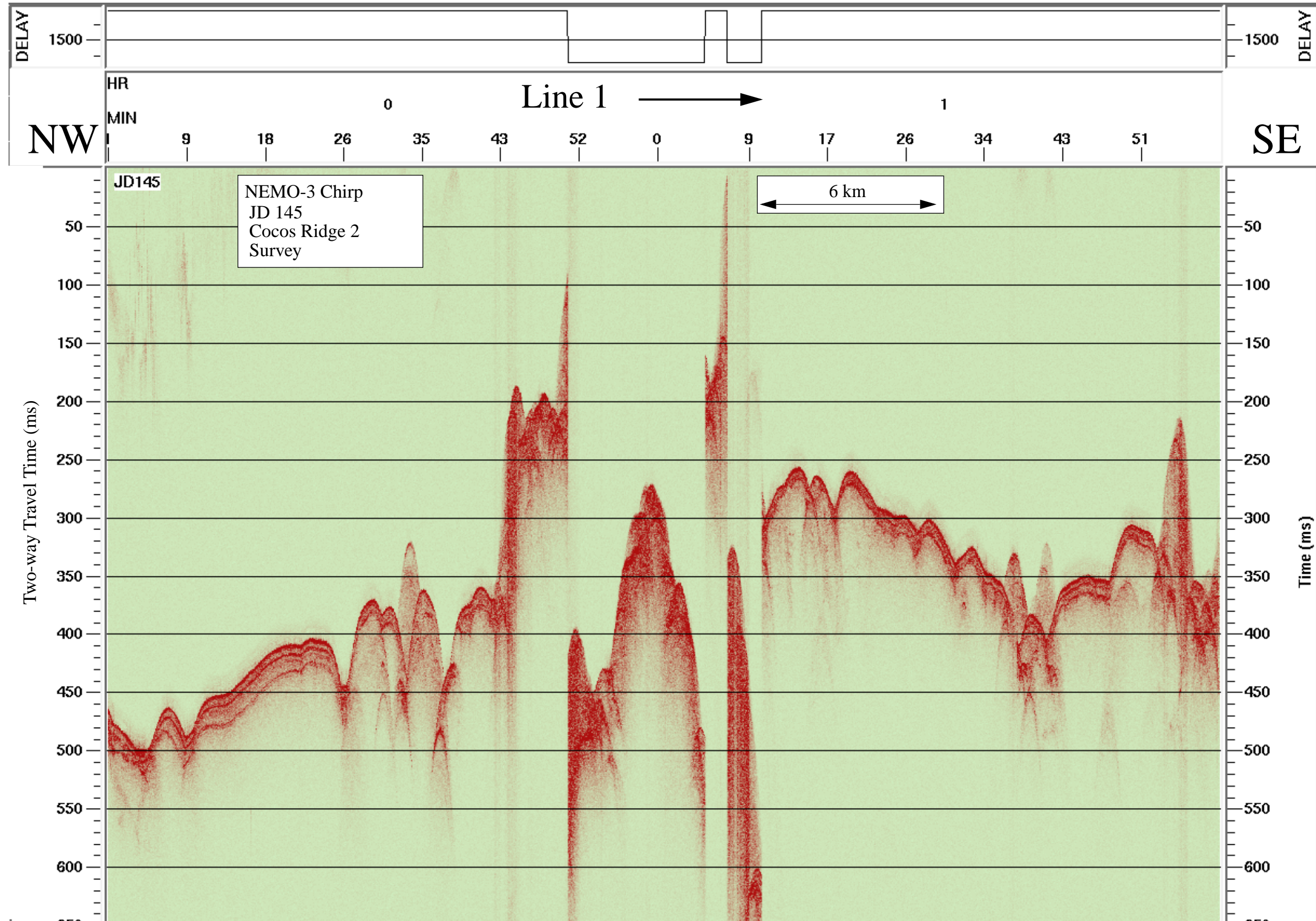
2-7 kHz Chirp Subbottom Profiler

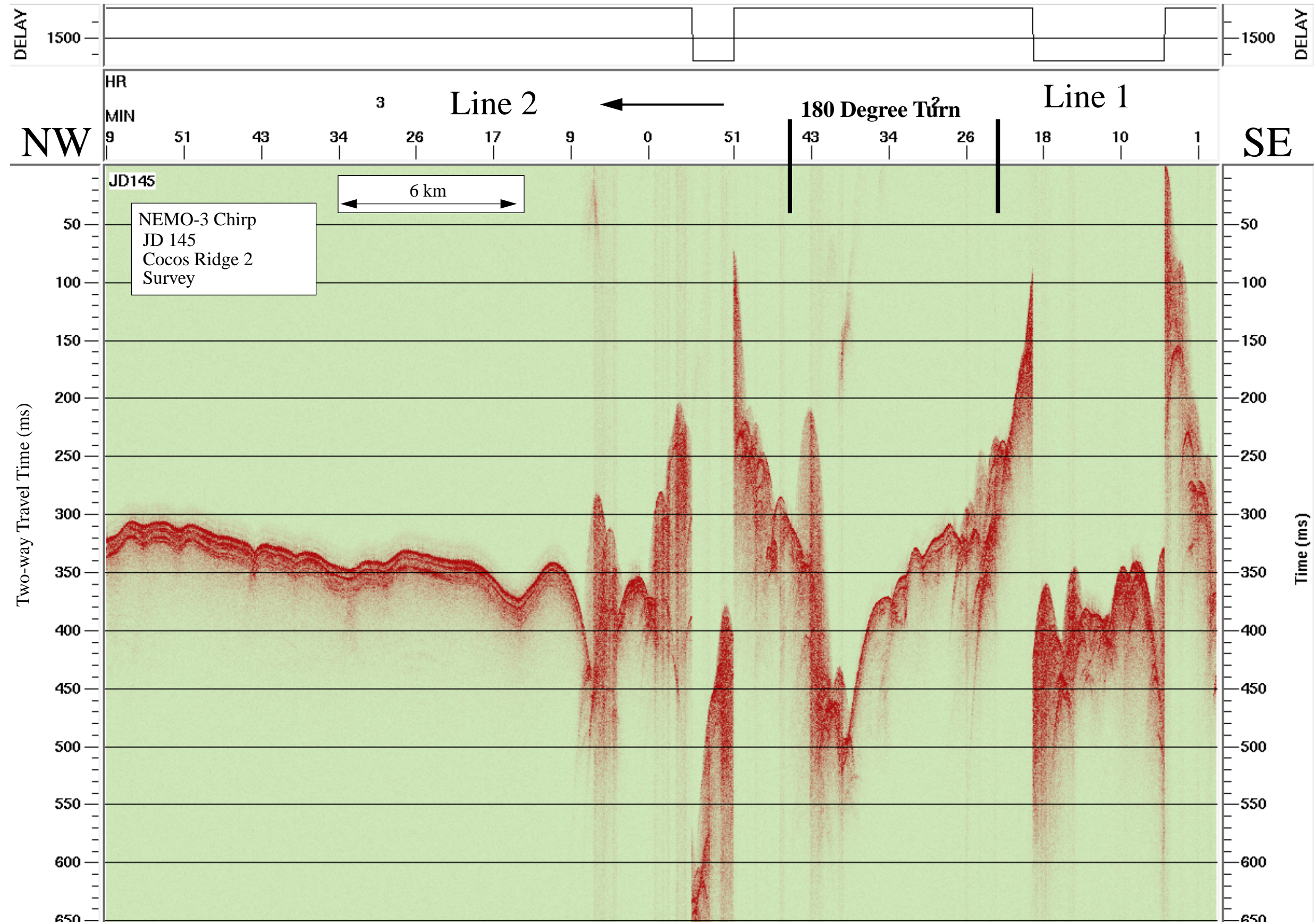
NEMO Leg 3

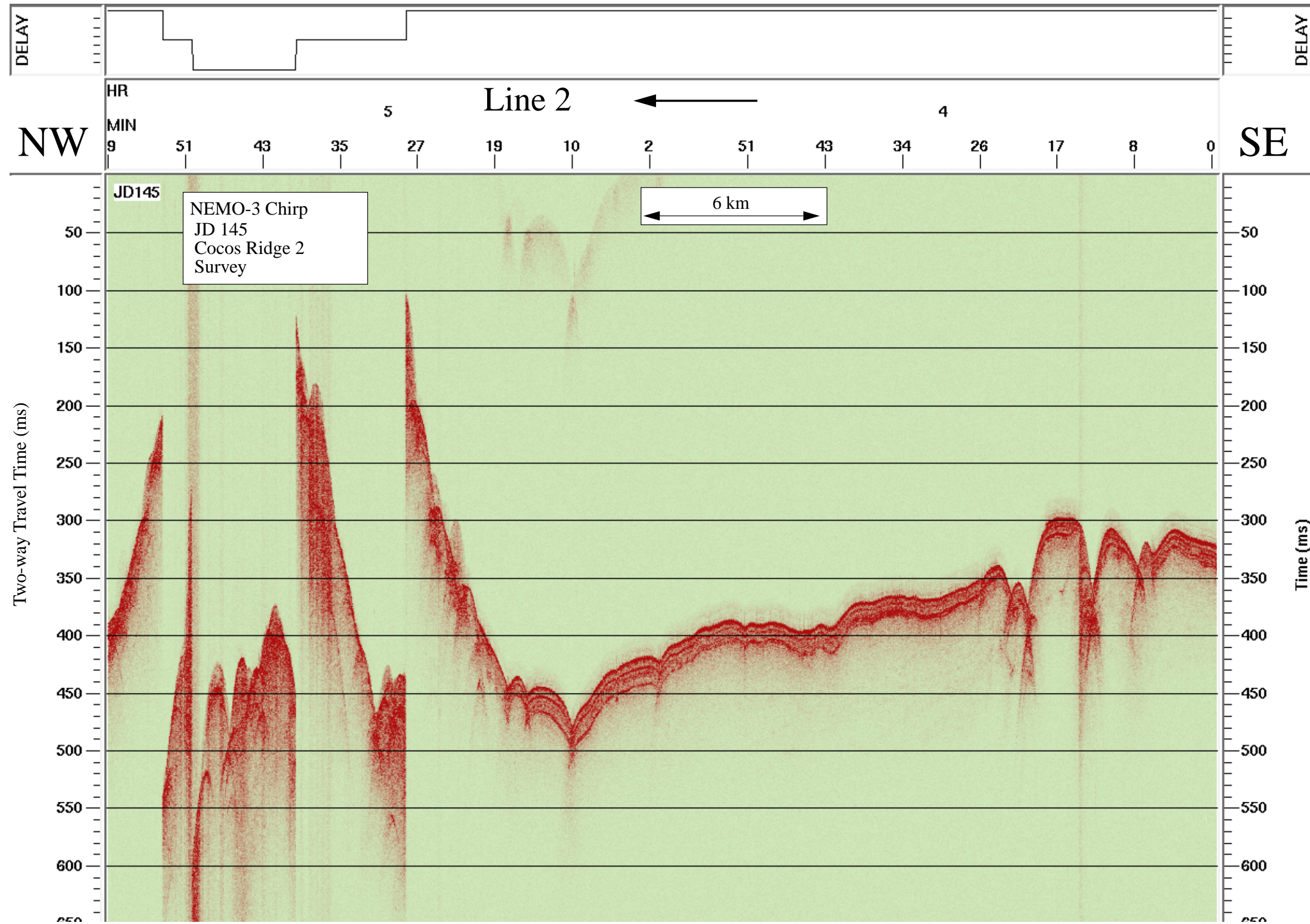
R/V Melville

Data File SBfixavg.2000may24.0000-0600

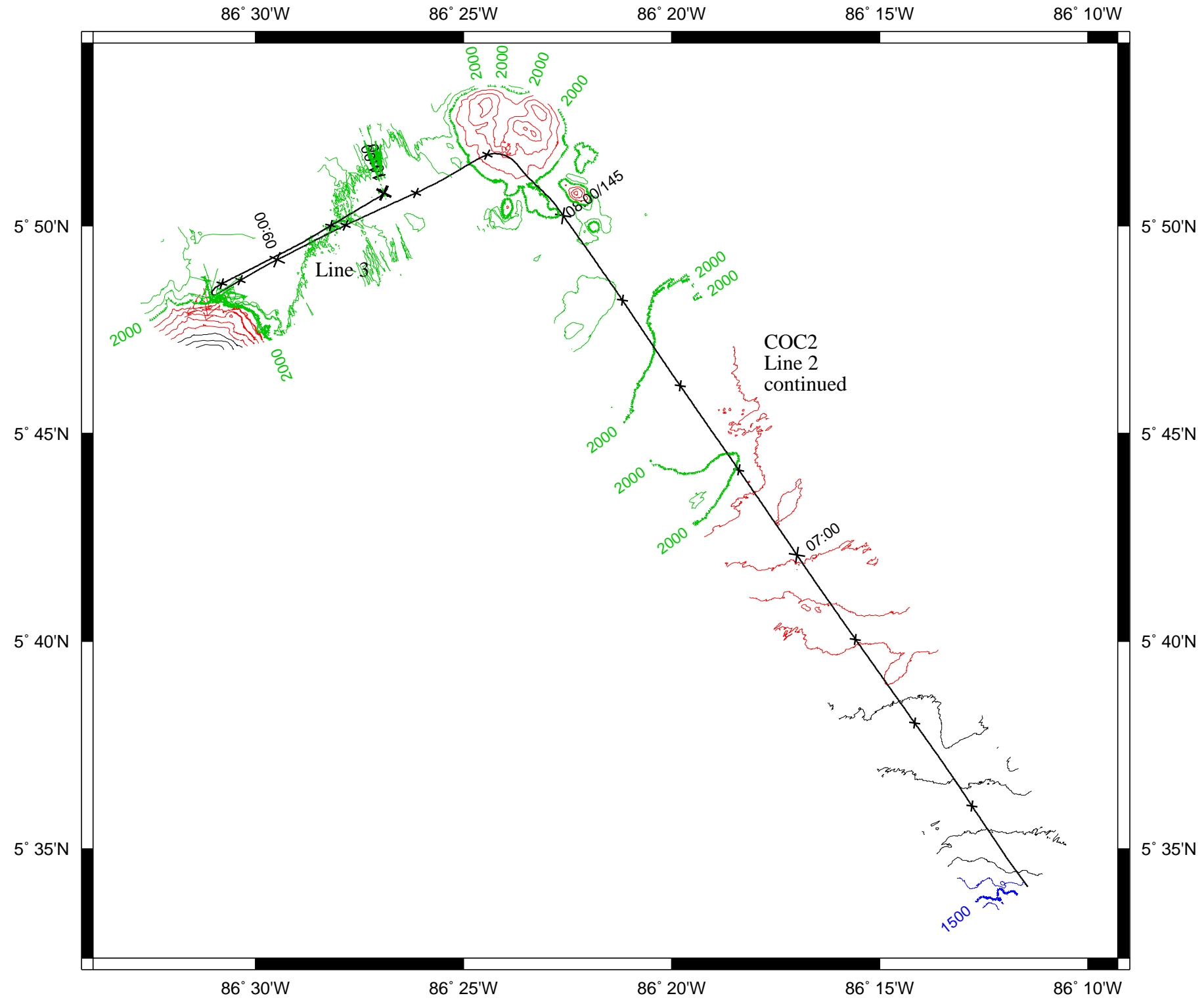


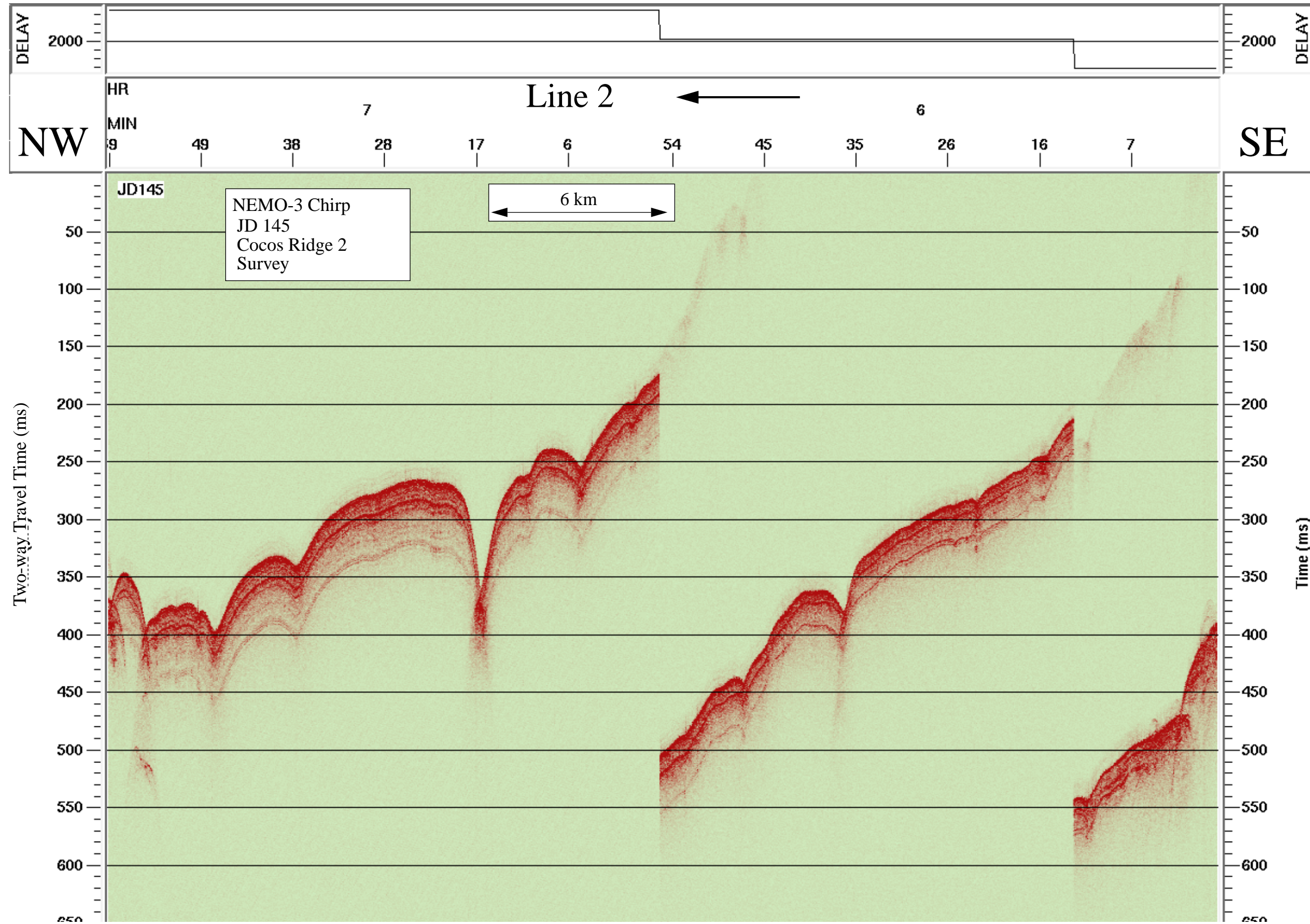


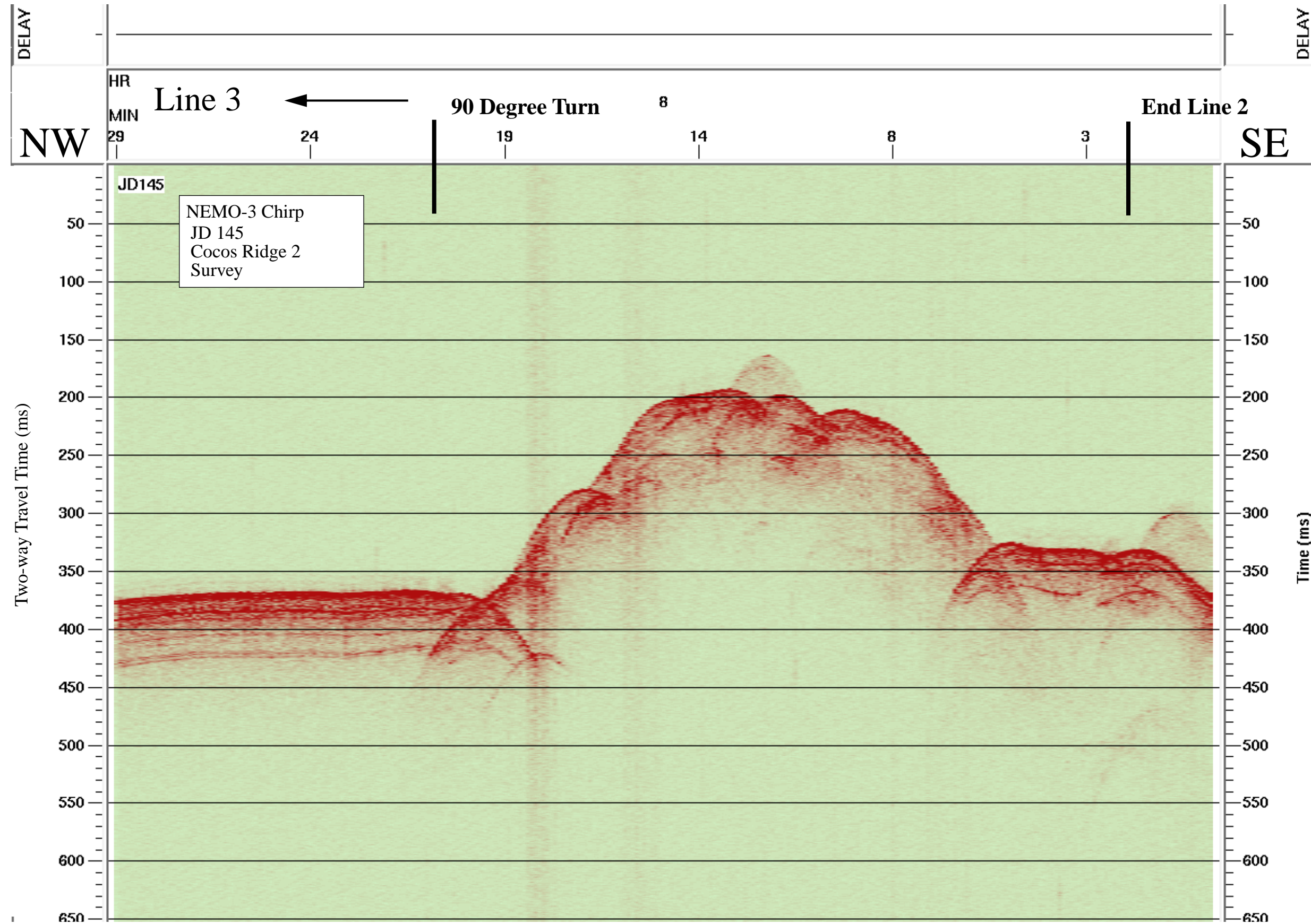


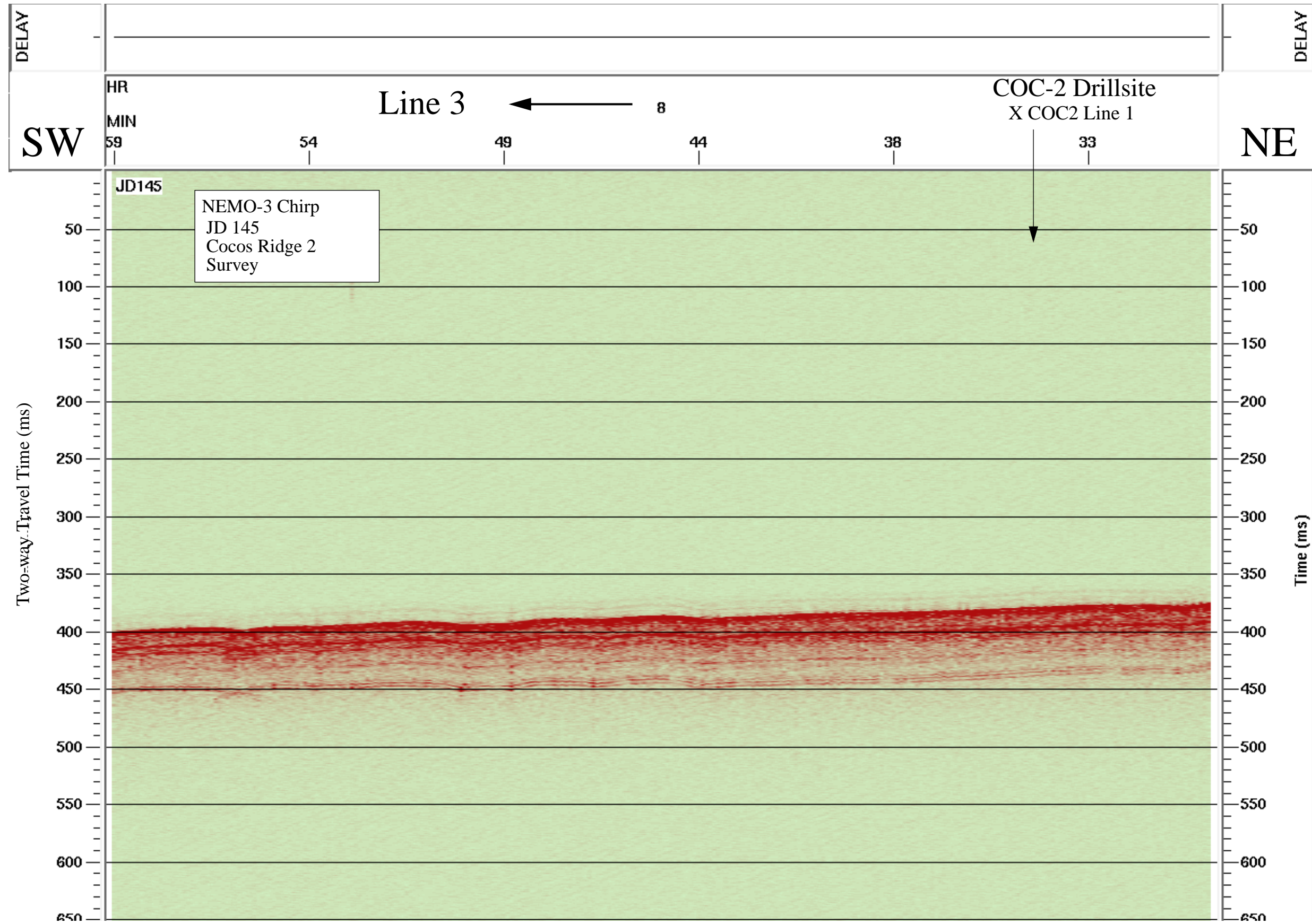


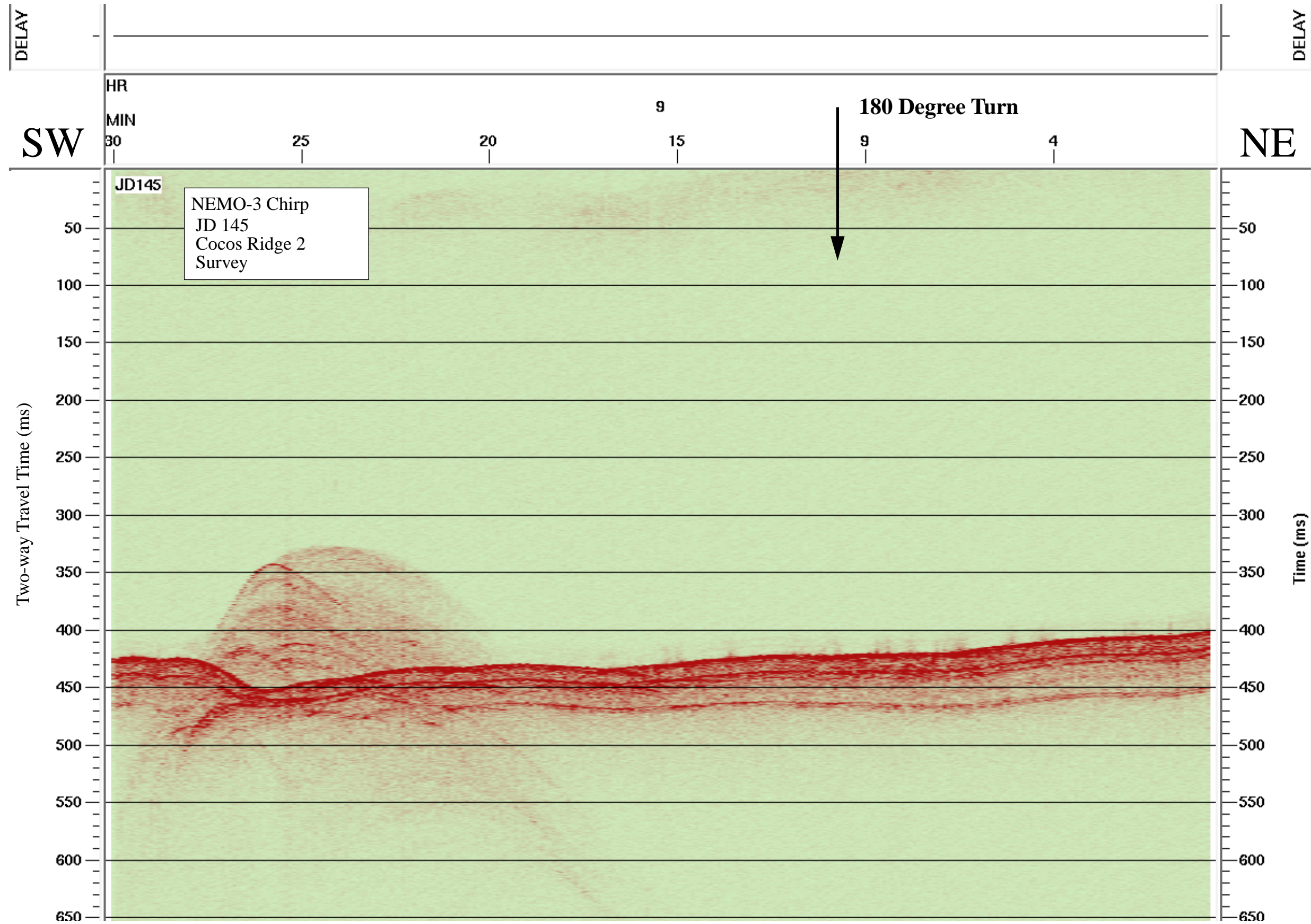
Data File SBfixavg.2000may24.0600-1200

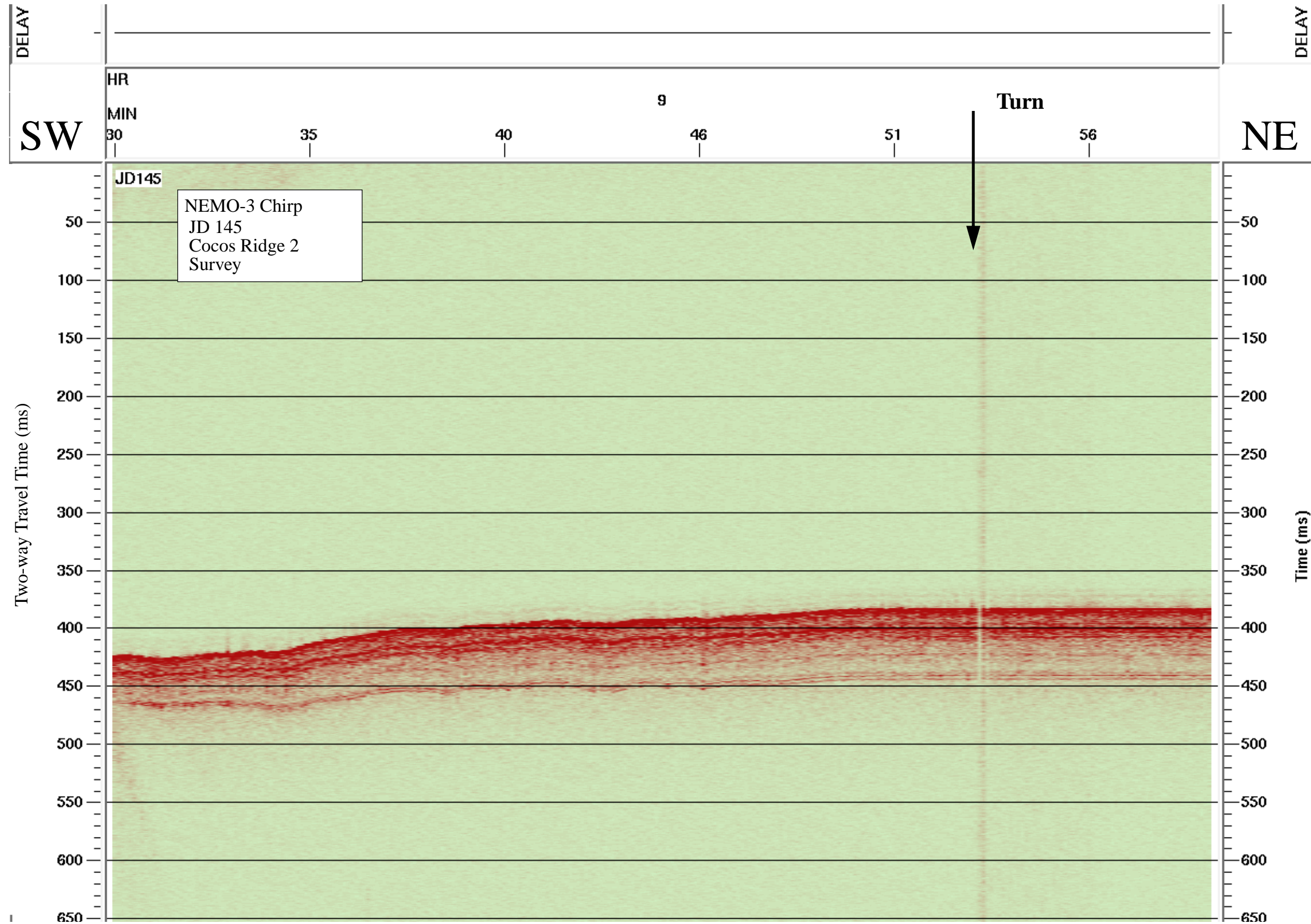


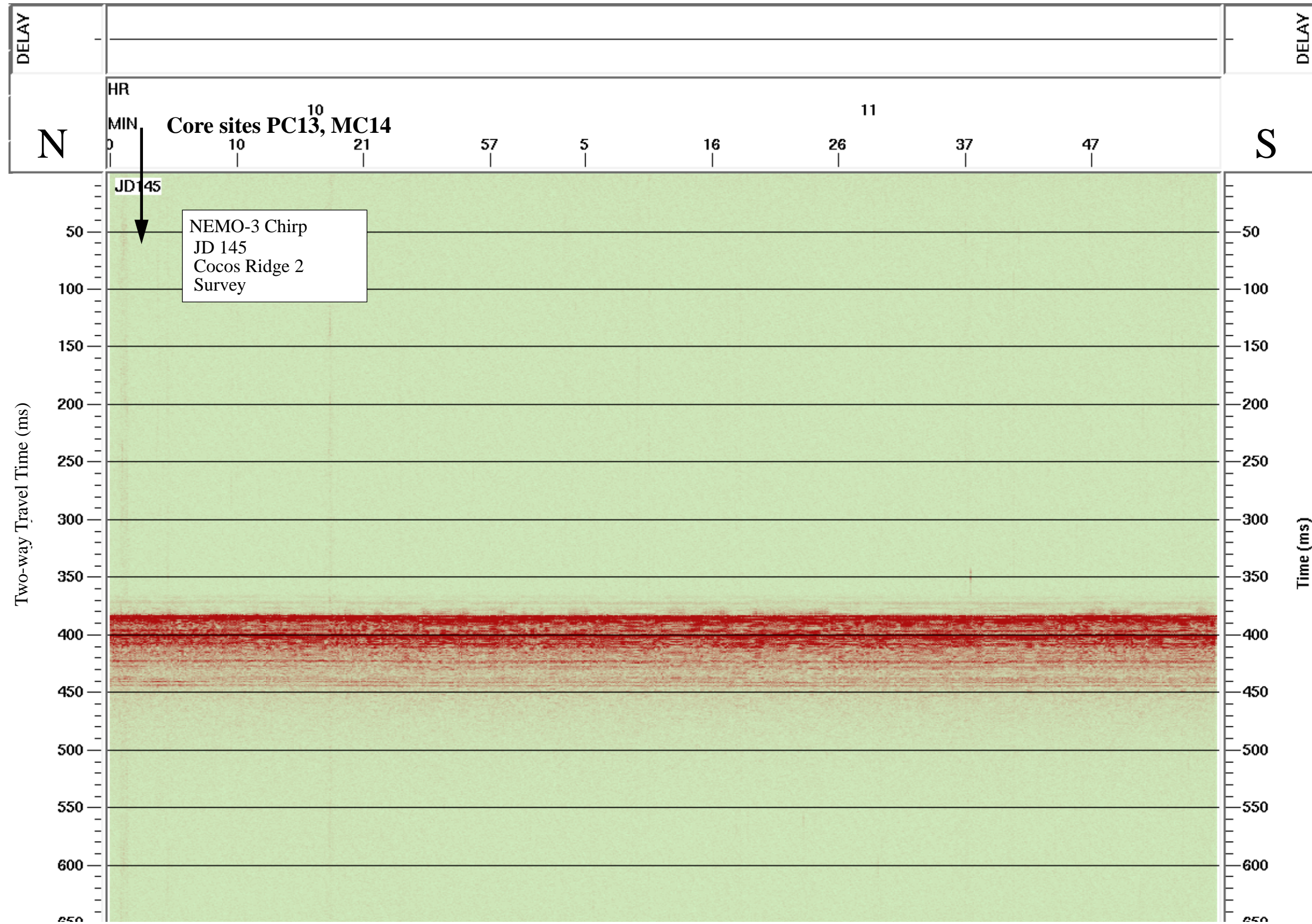












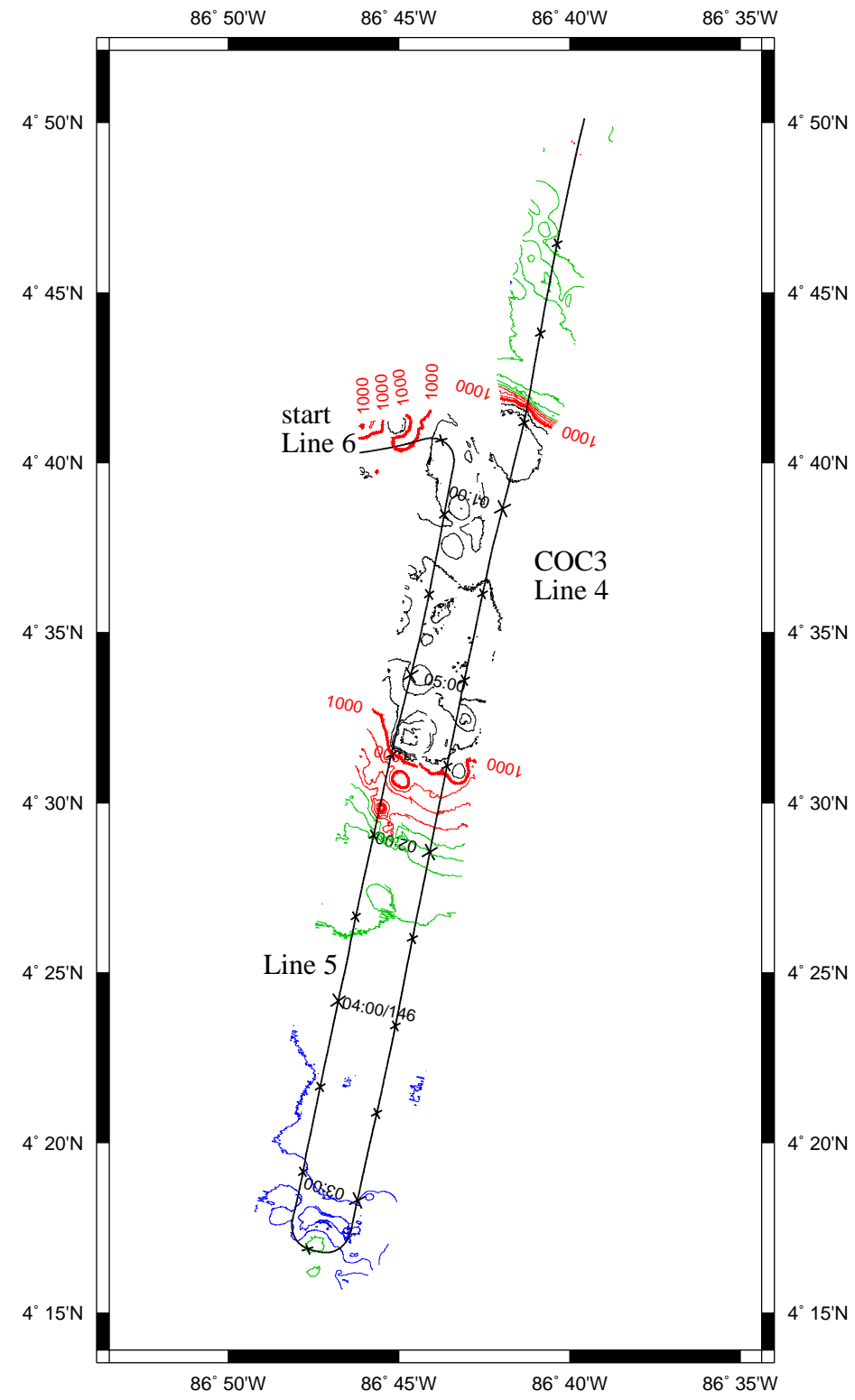
JD 146 (25 May 2000)--COC-3 Survey, Cocos Ridge

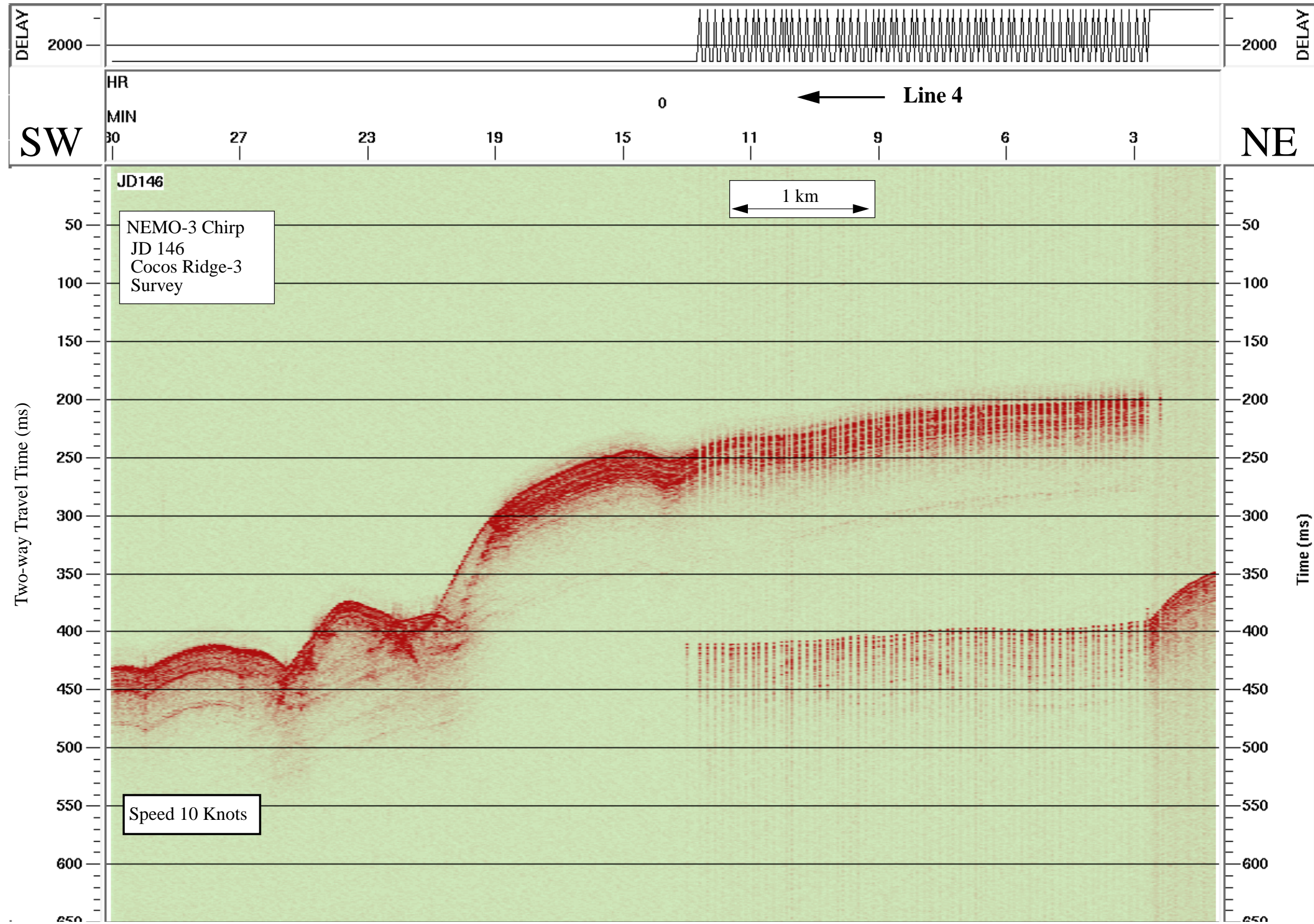
2-7 kHz Chirp Subbottom Profiler

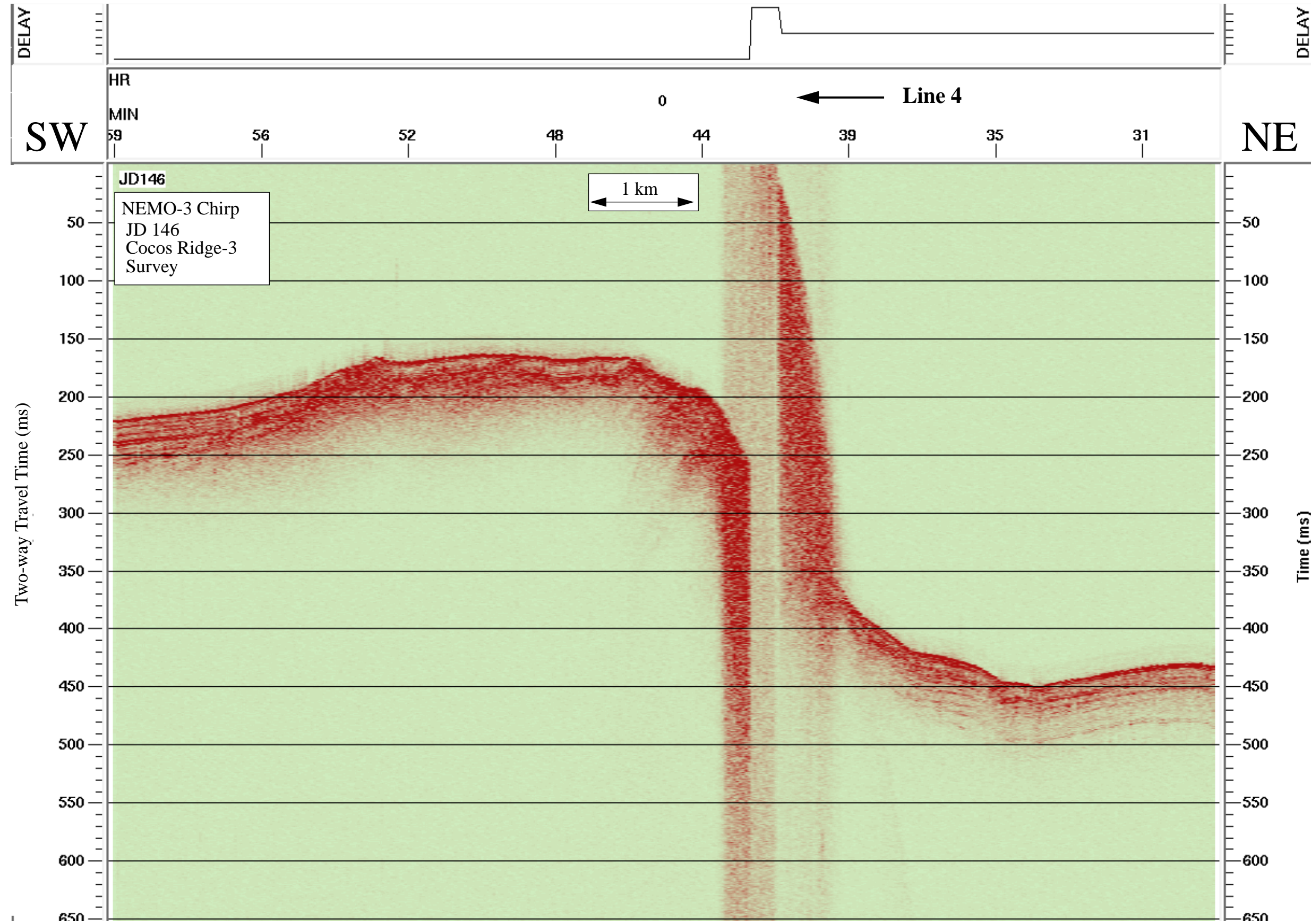
NEMO Leg 3

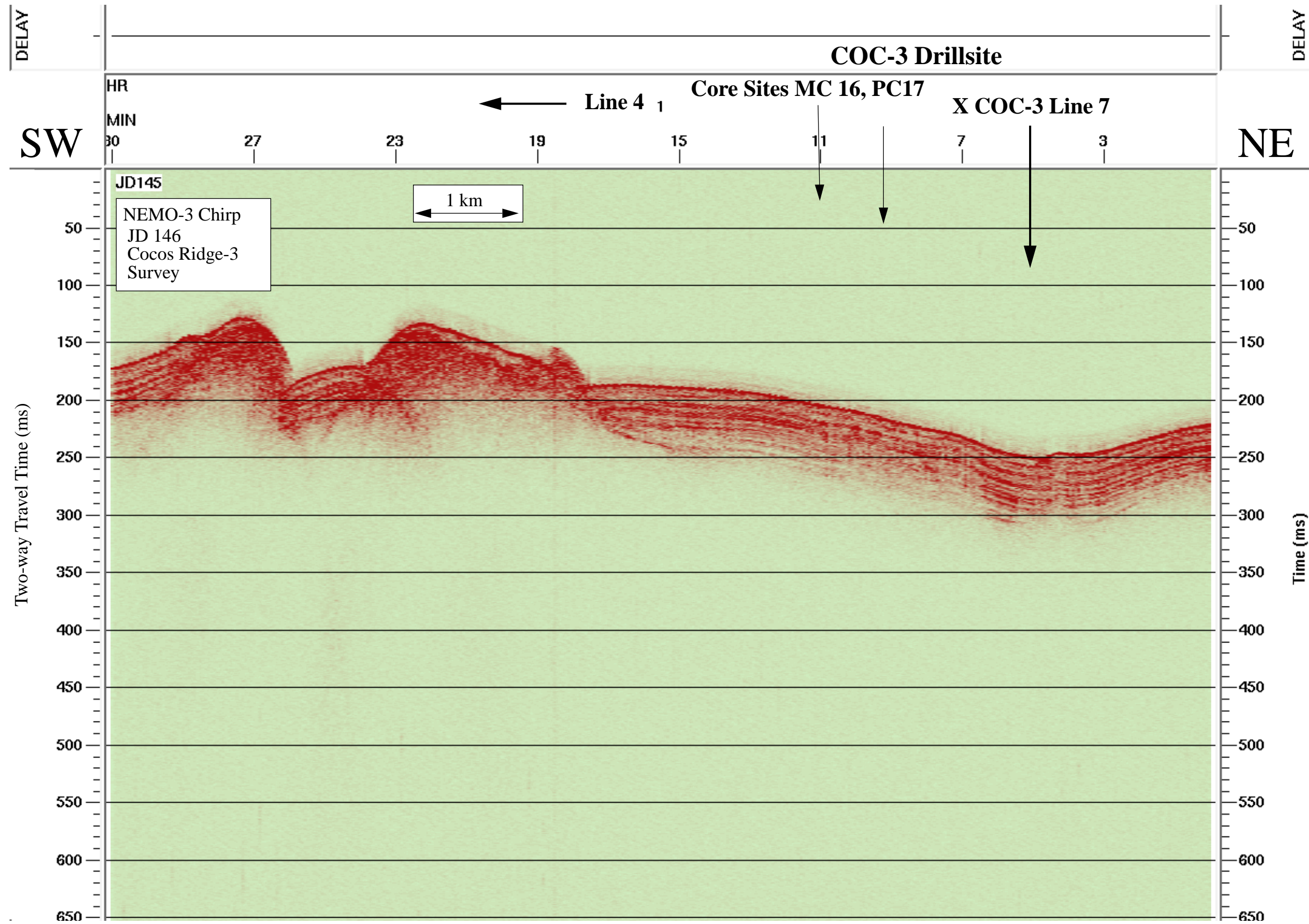
R/V Melville

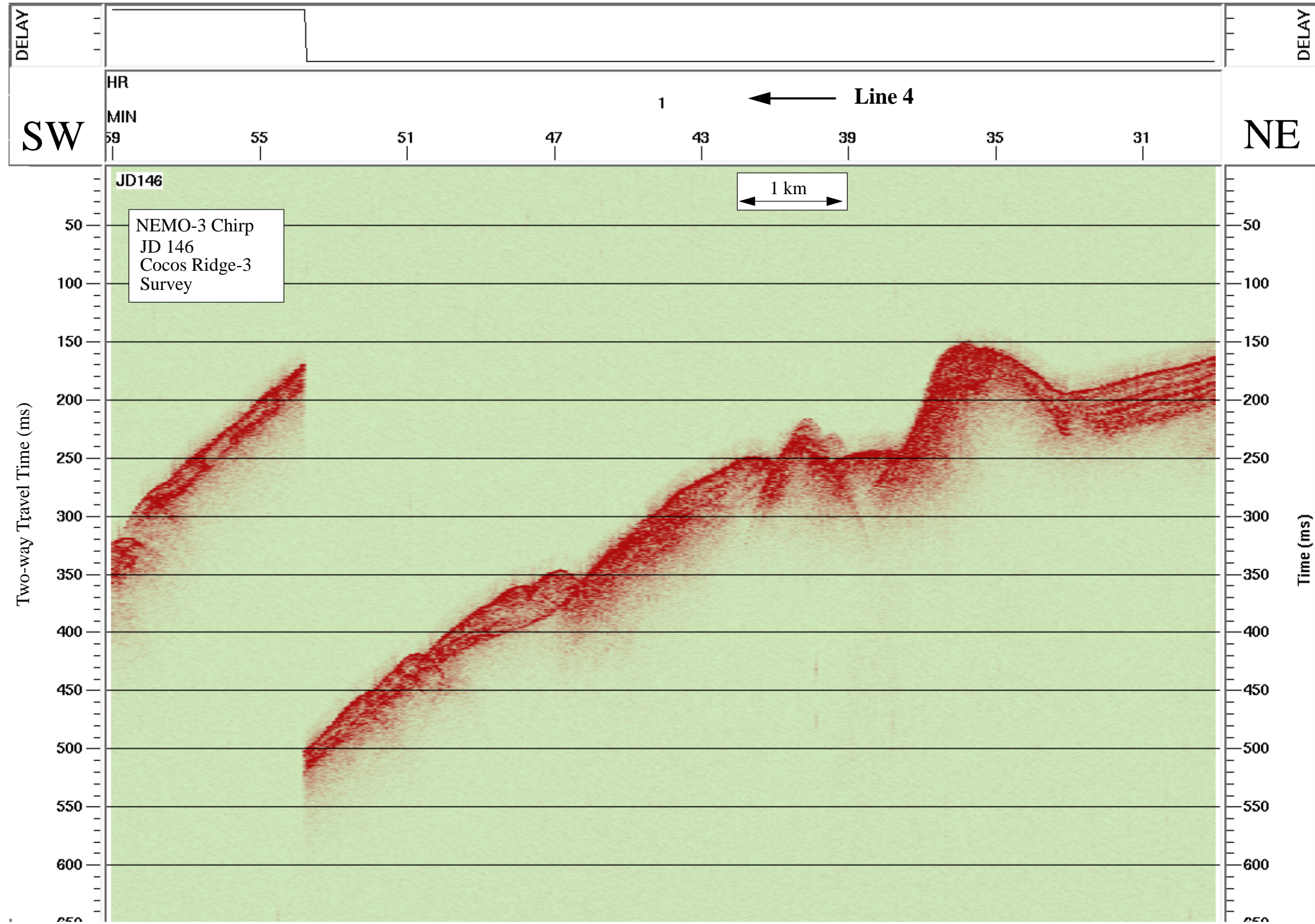
Data File SBfixavg.2000may25.0000-0600

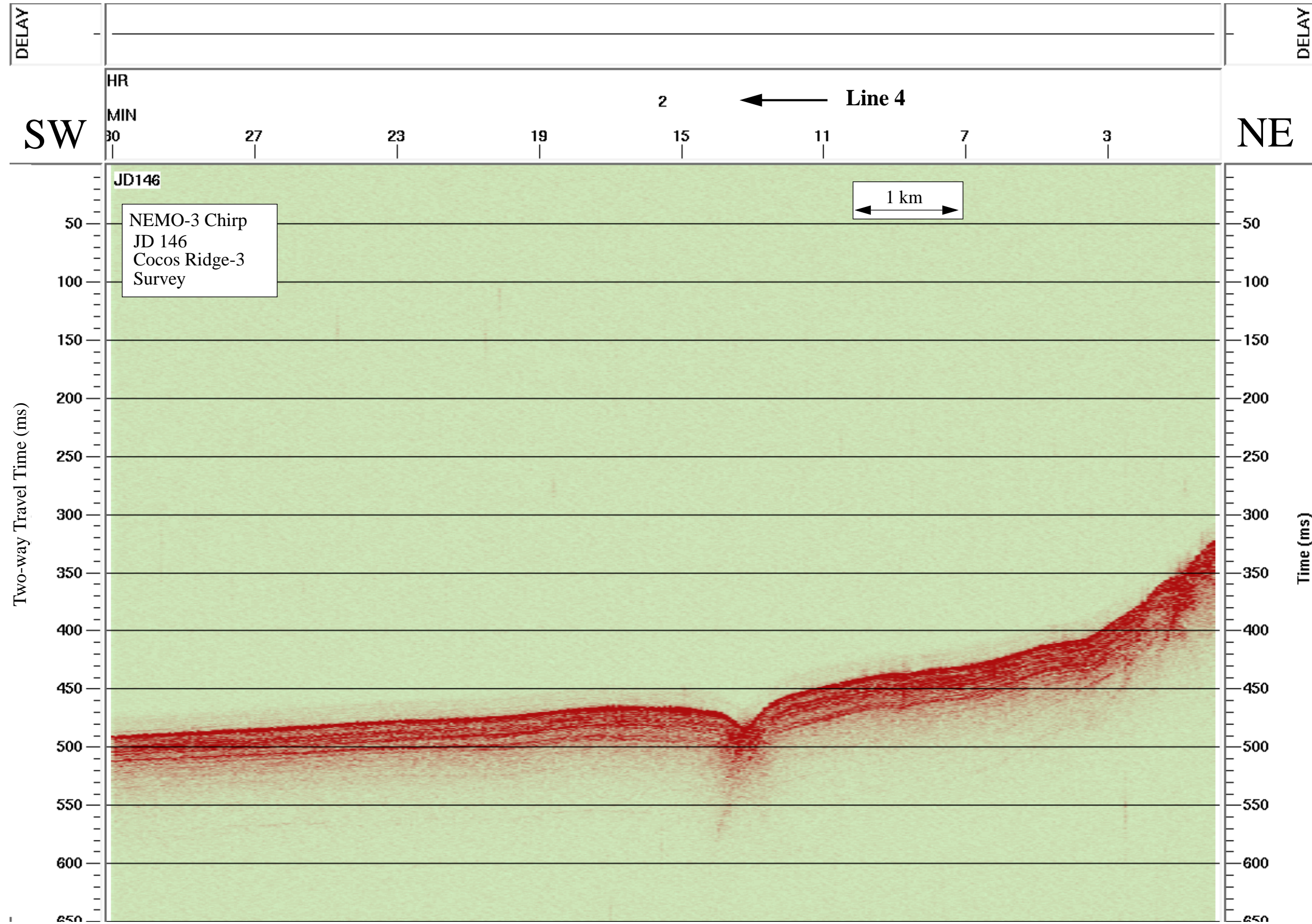


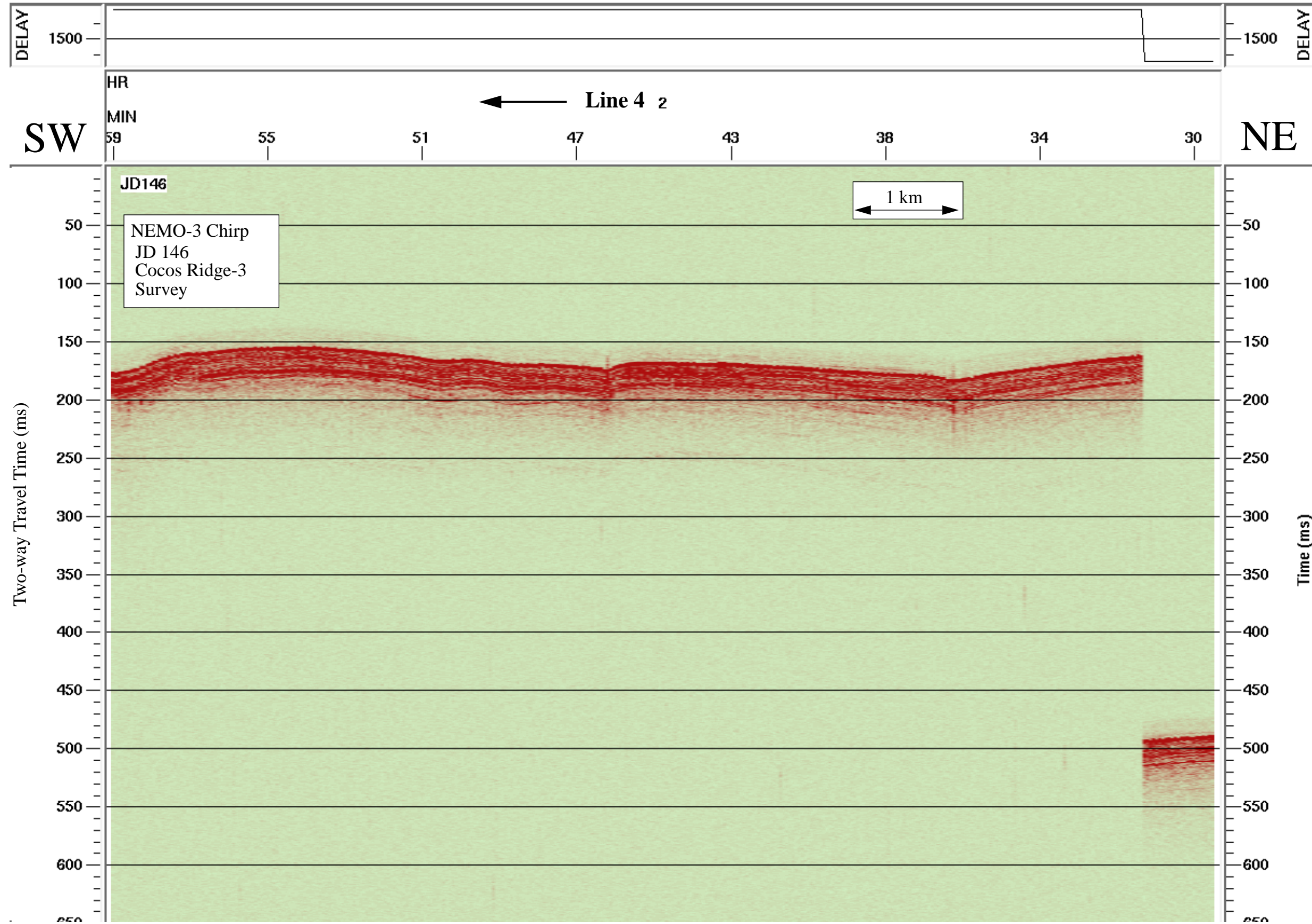


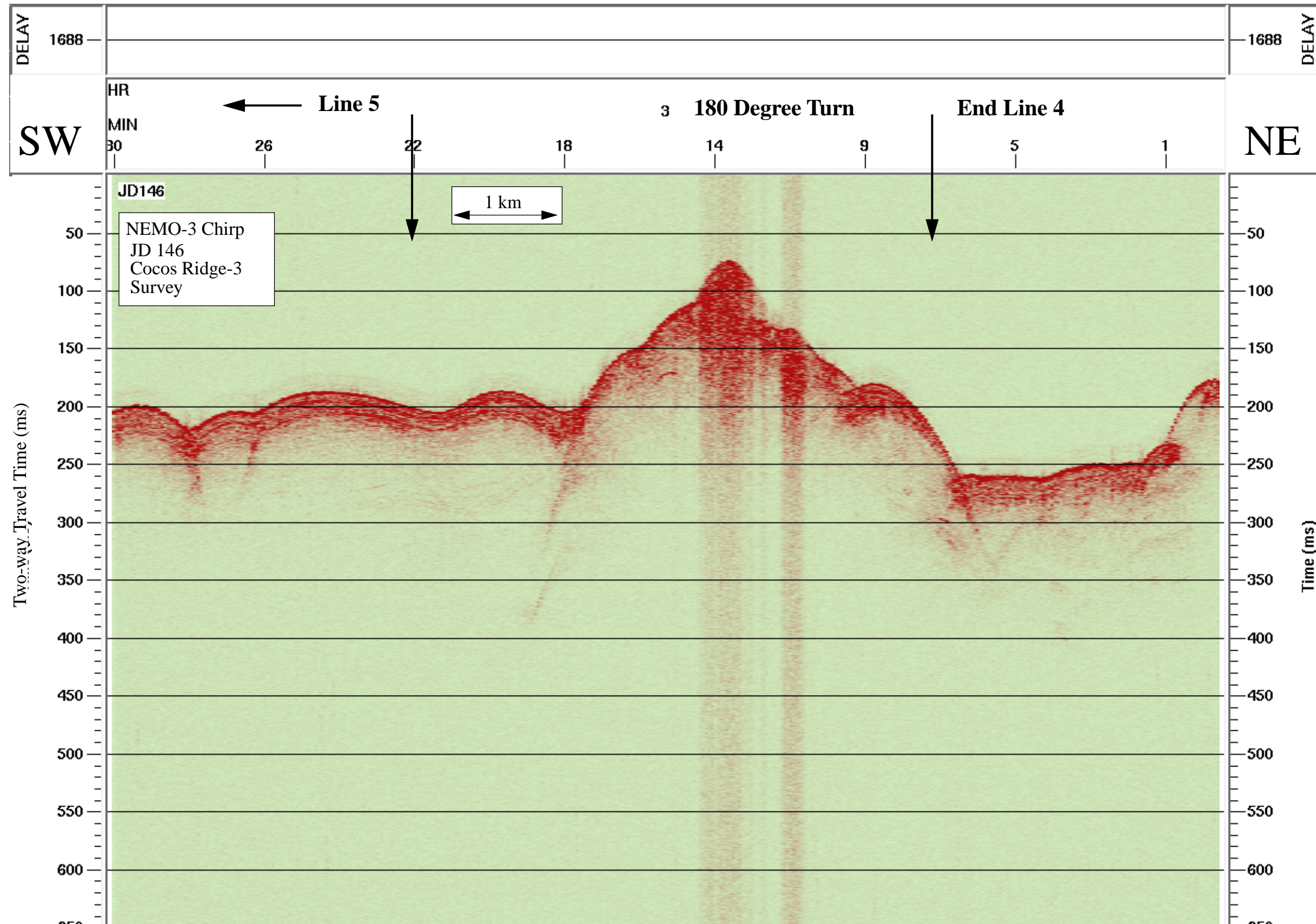


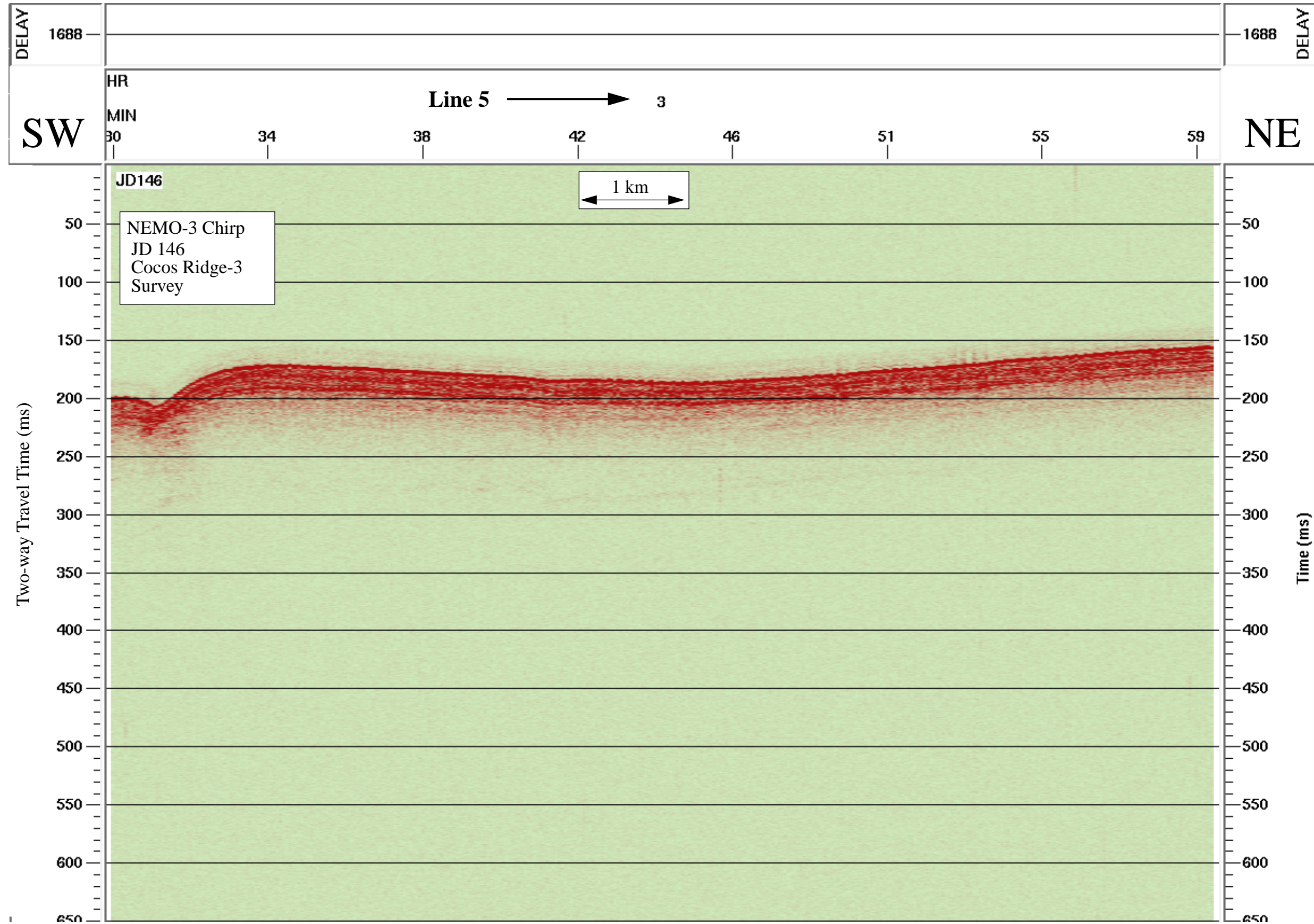


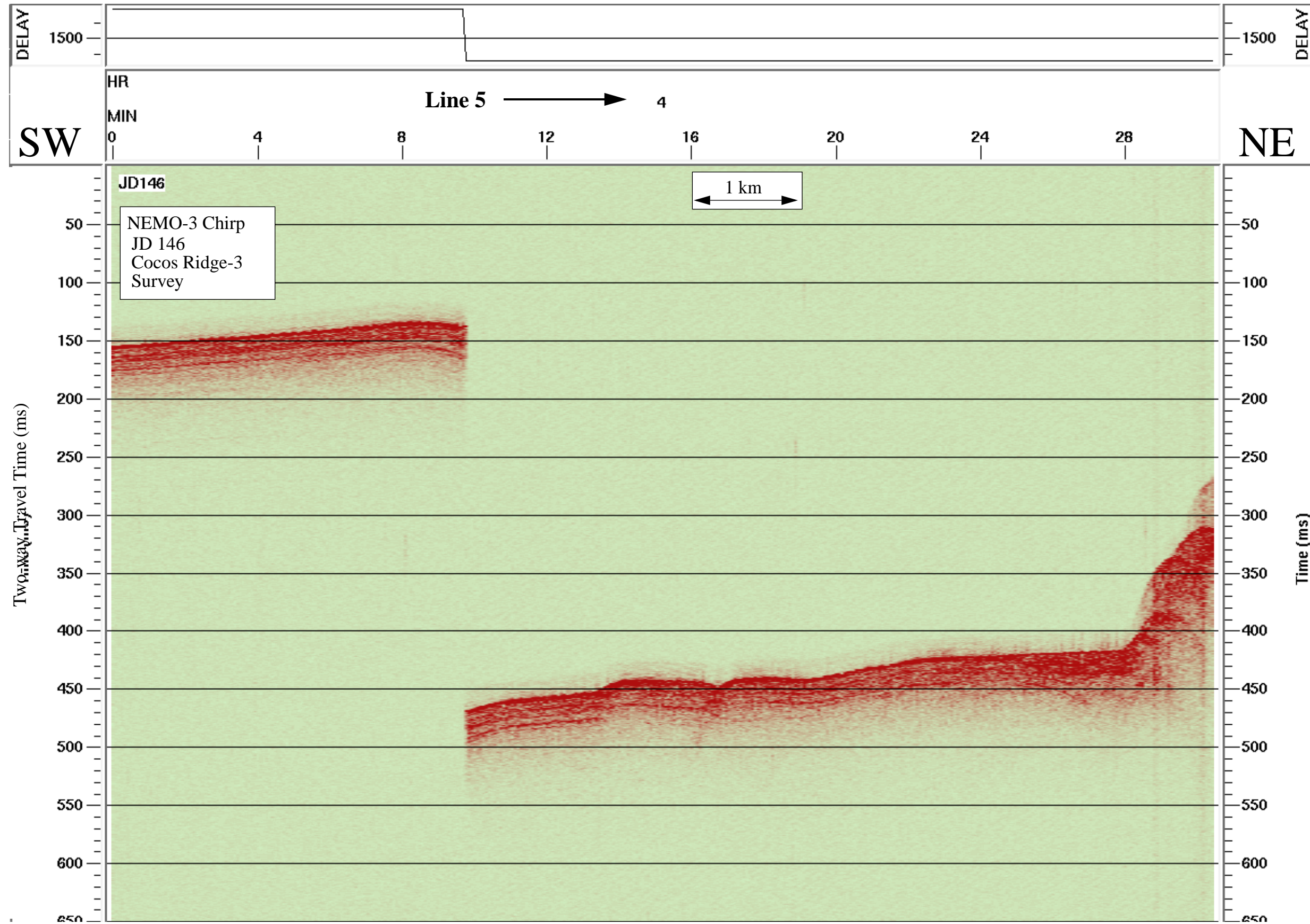


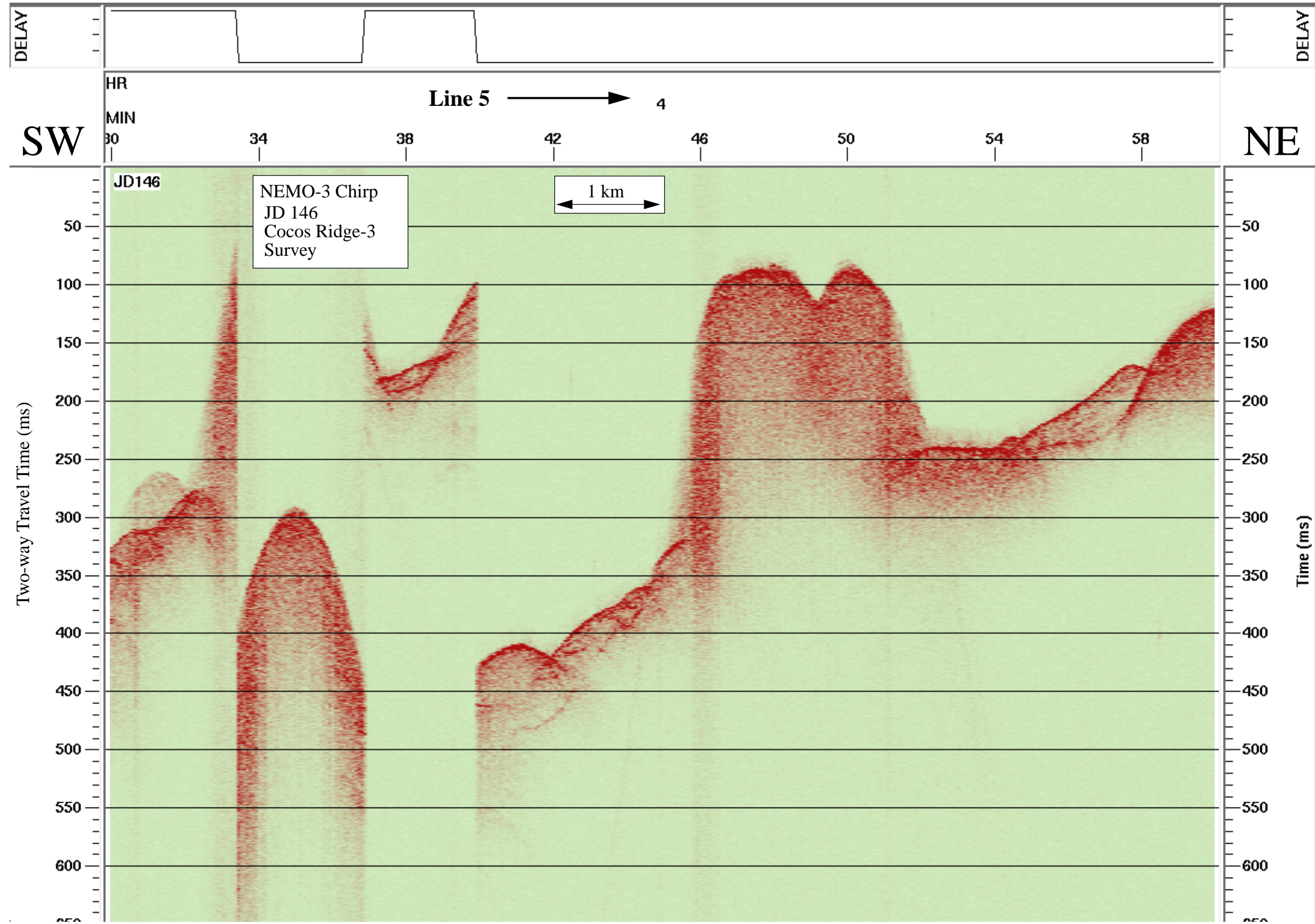


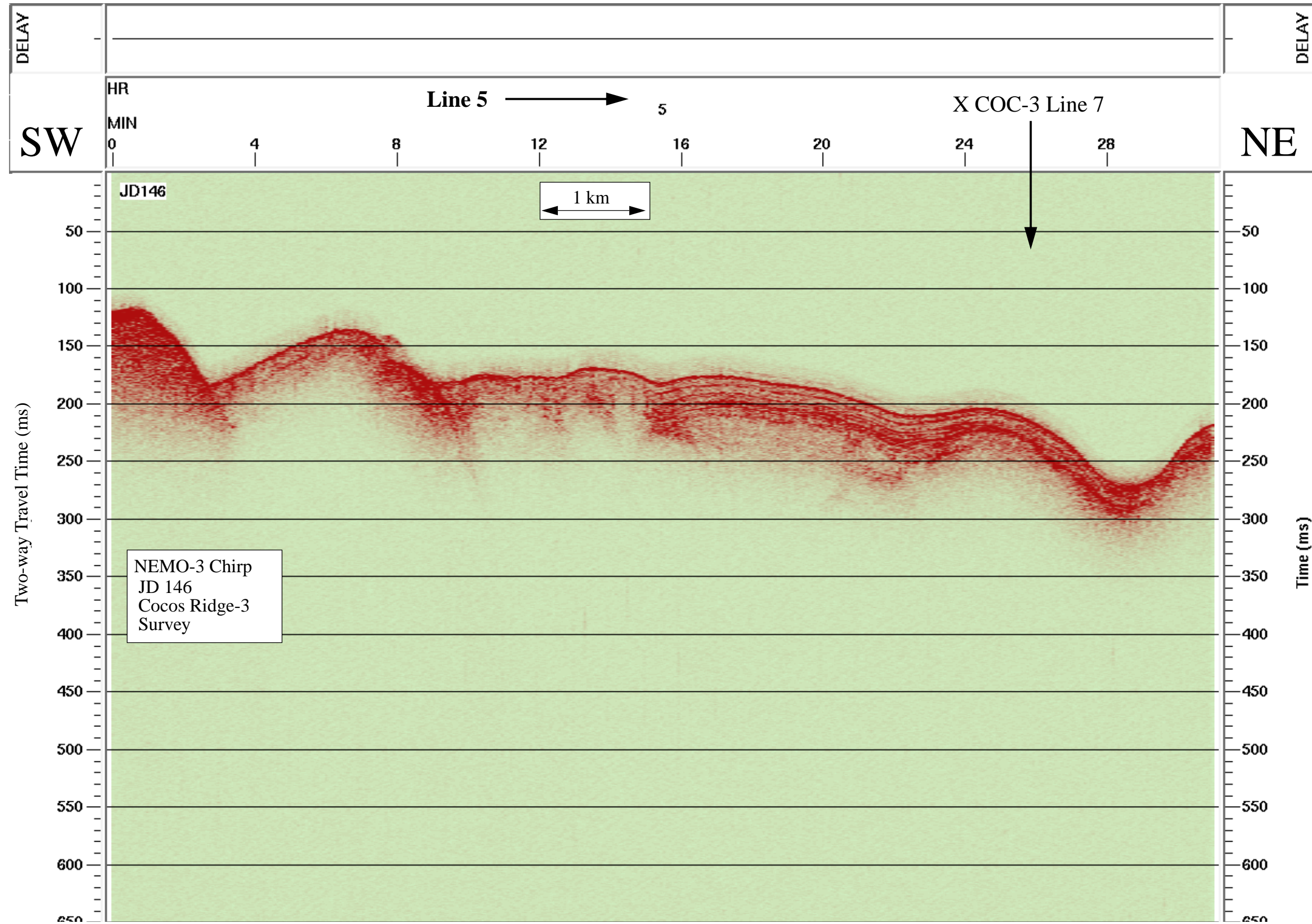


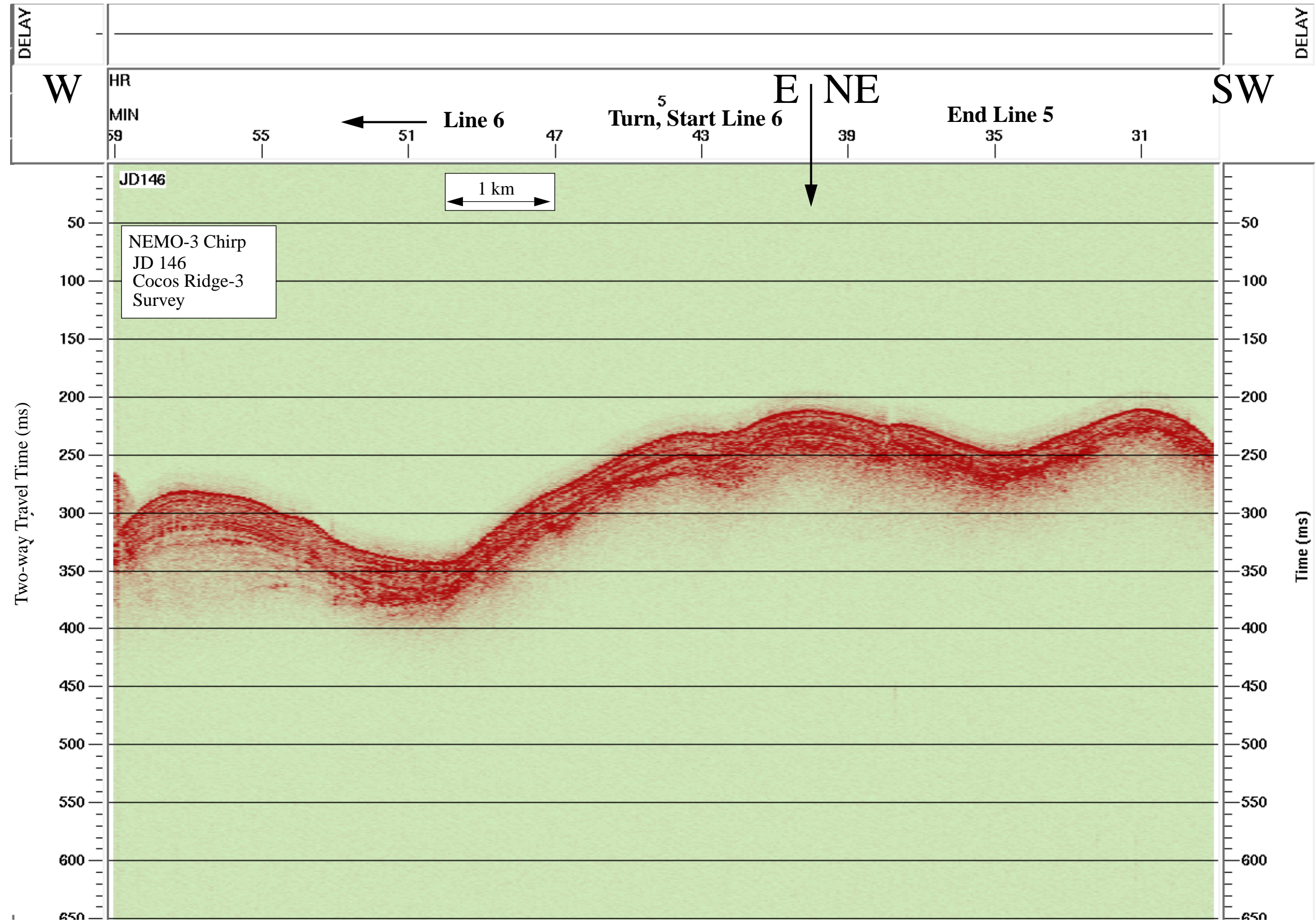




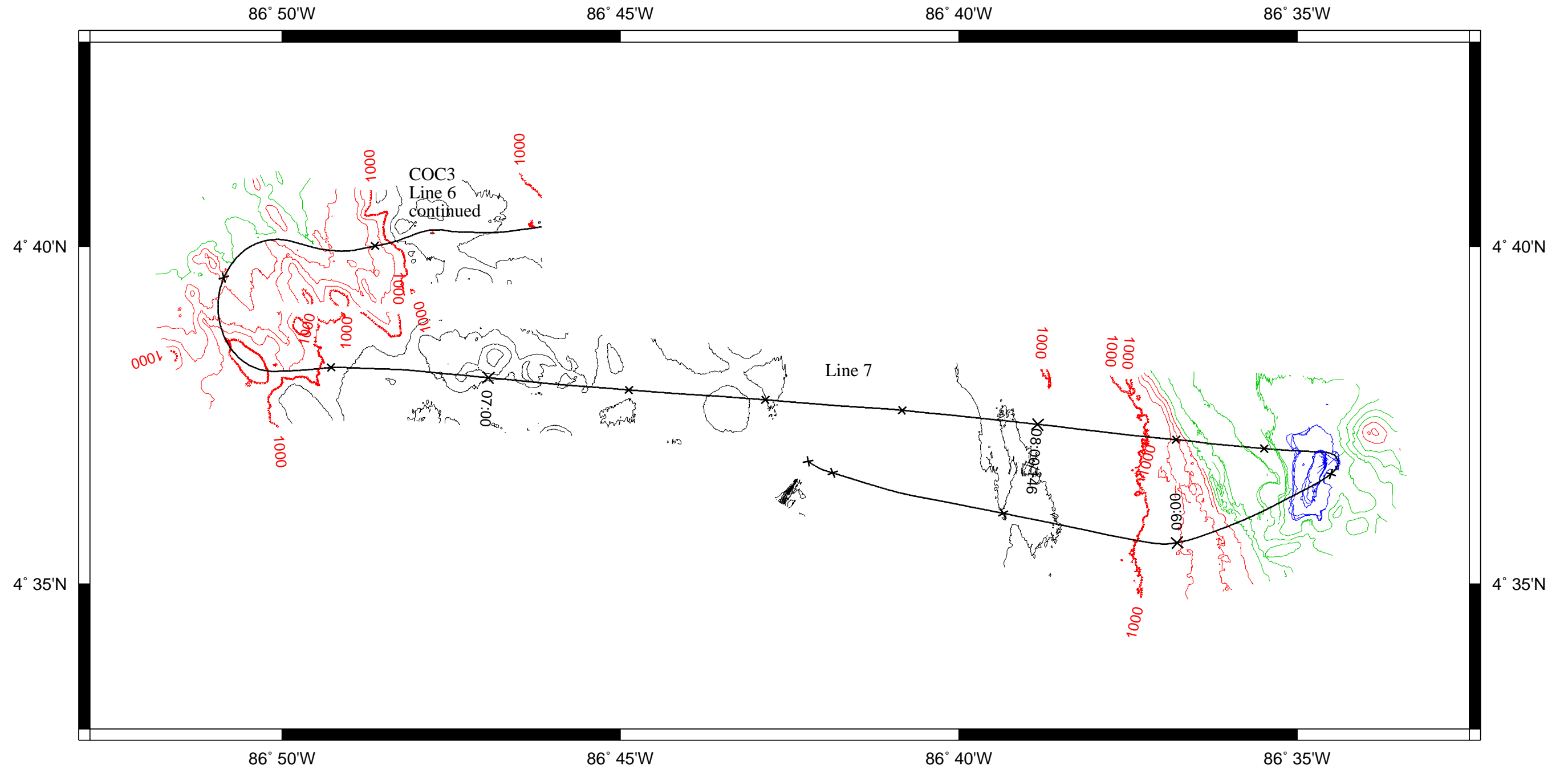


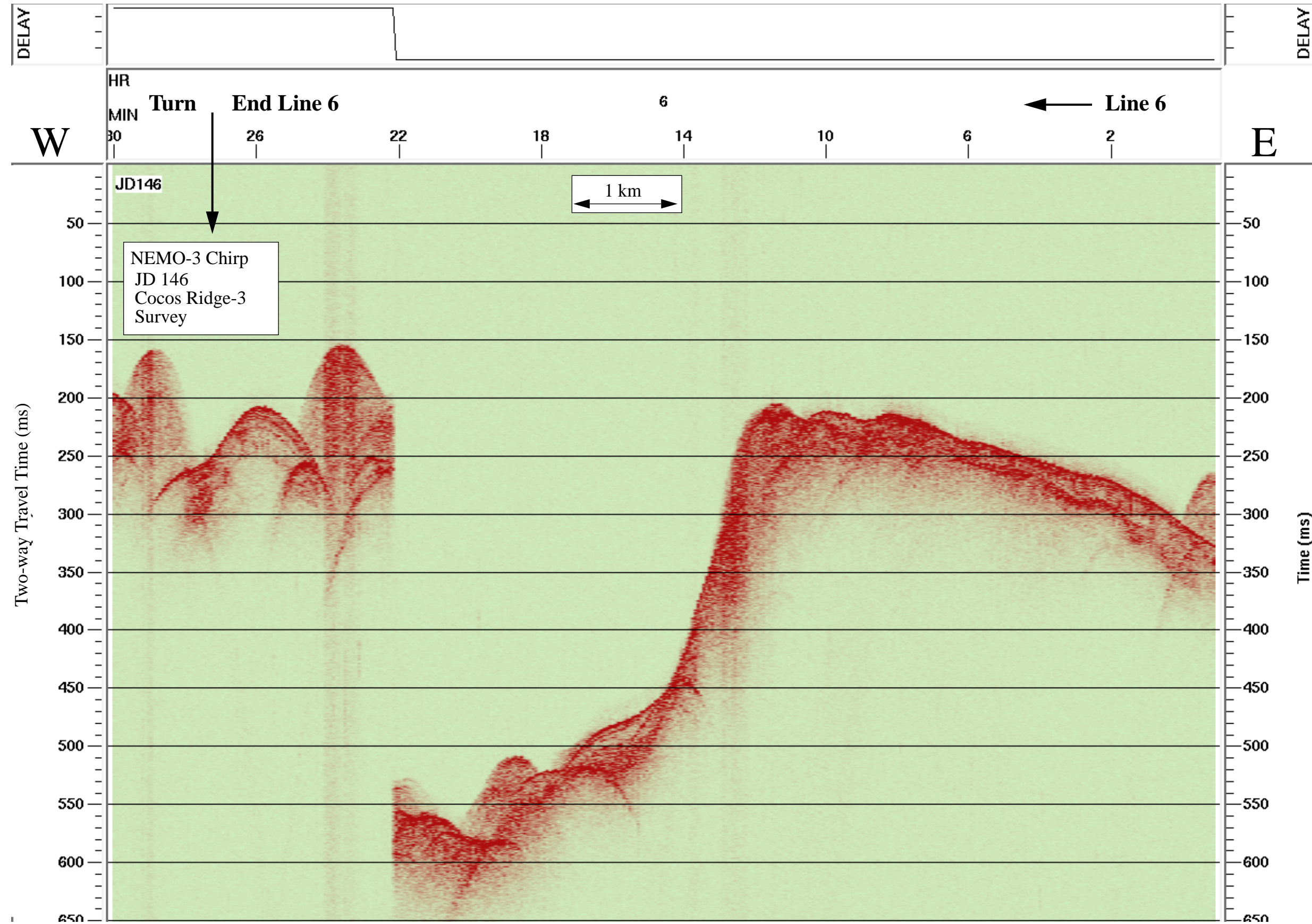


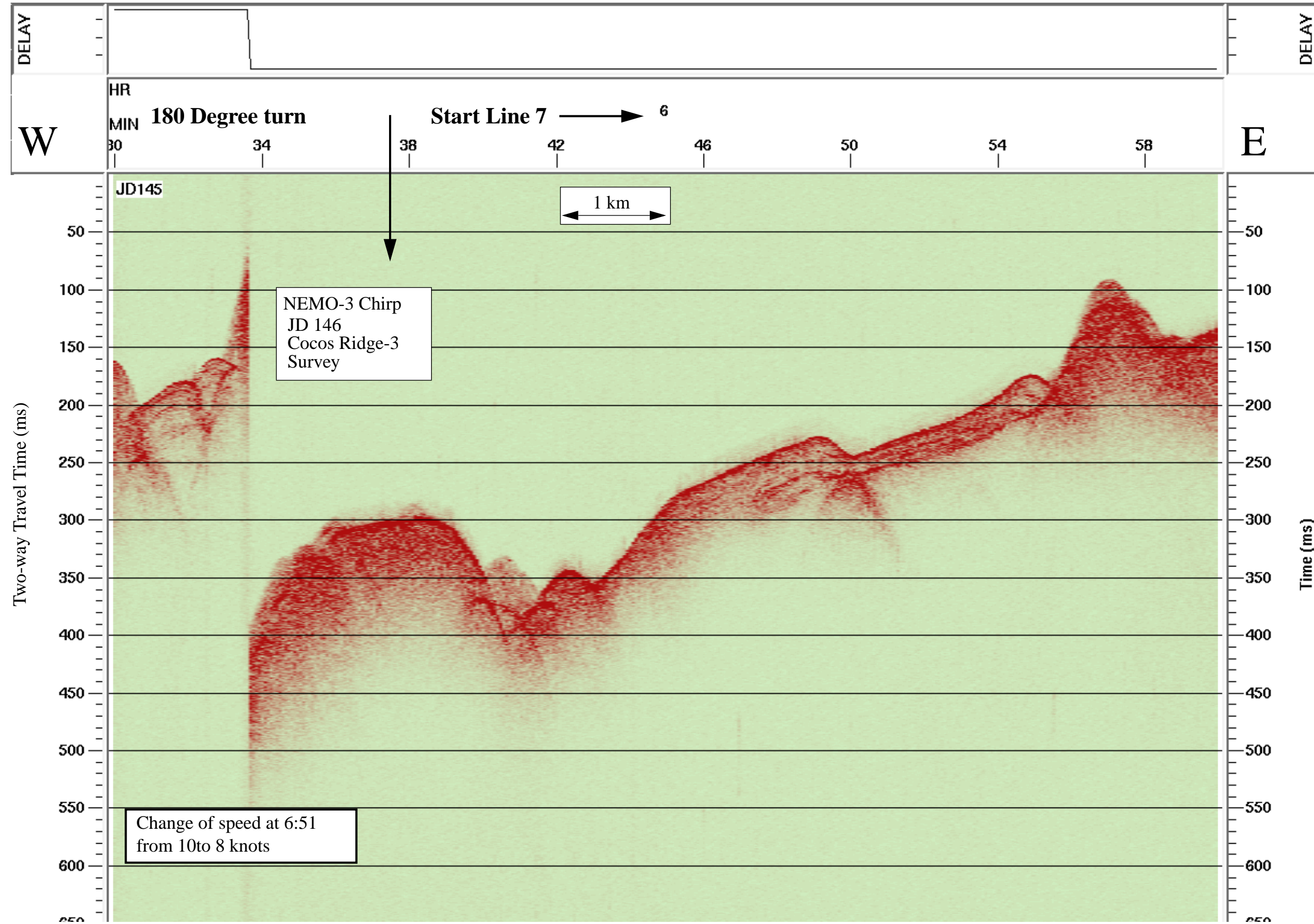


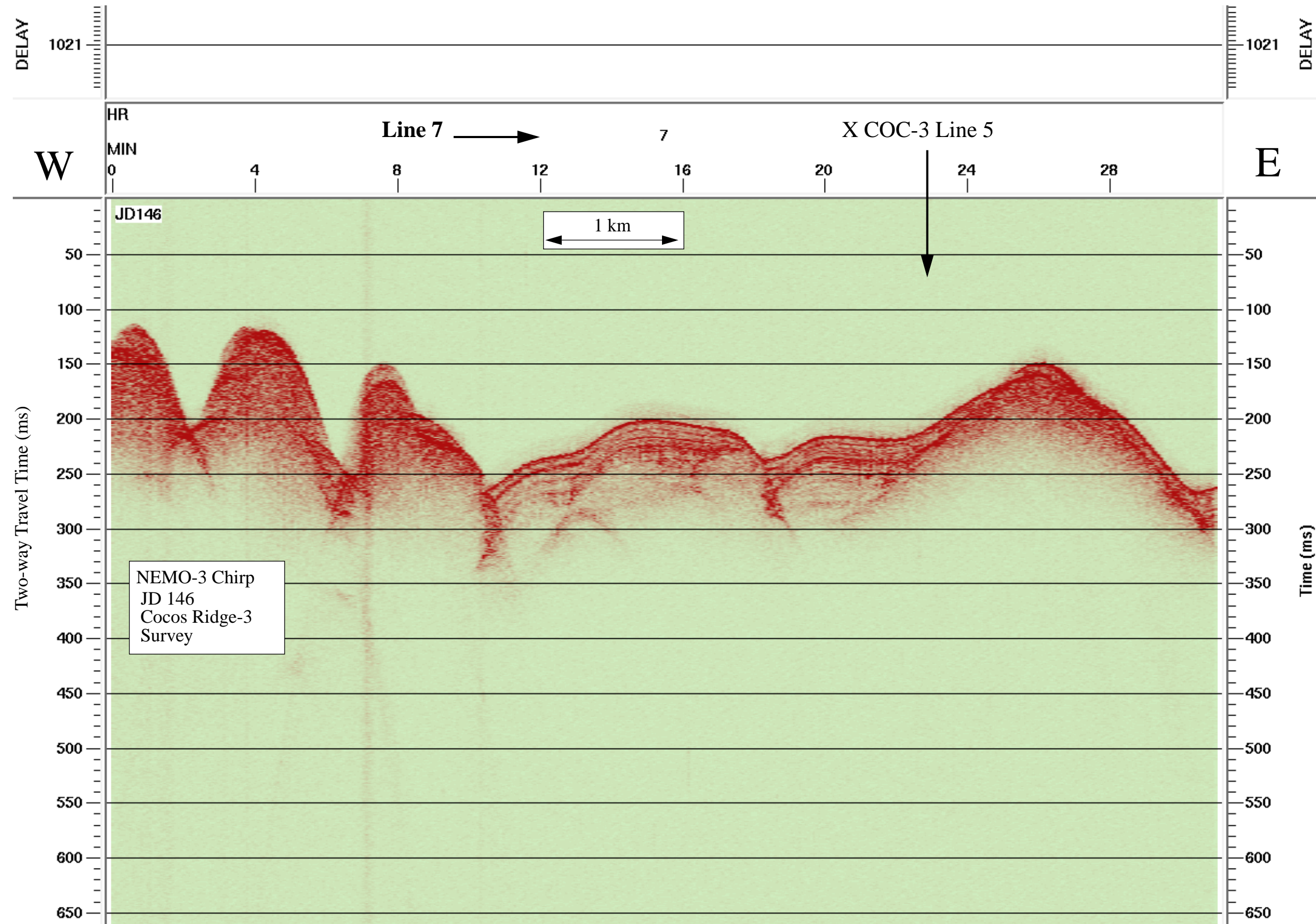


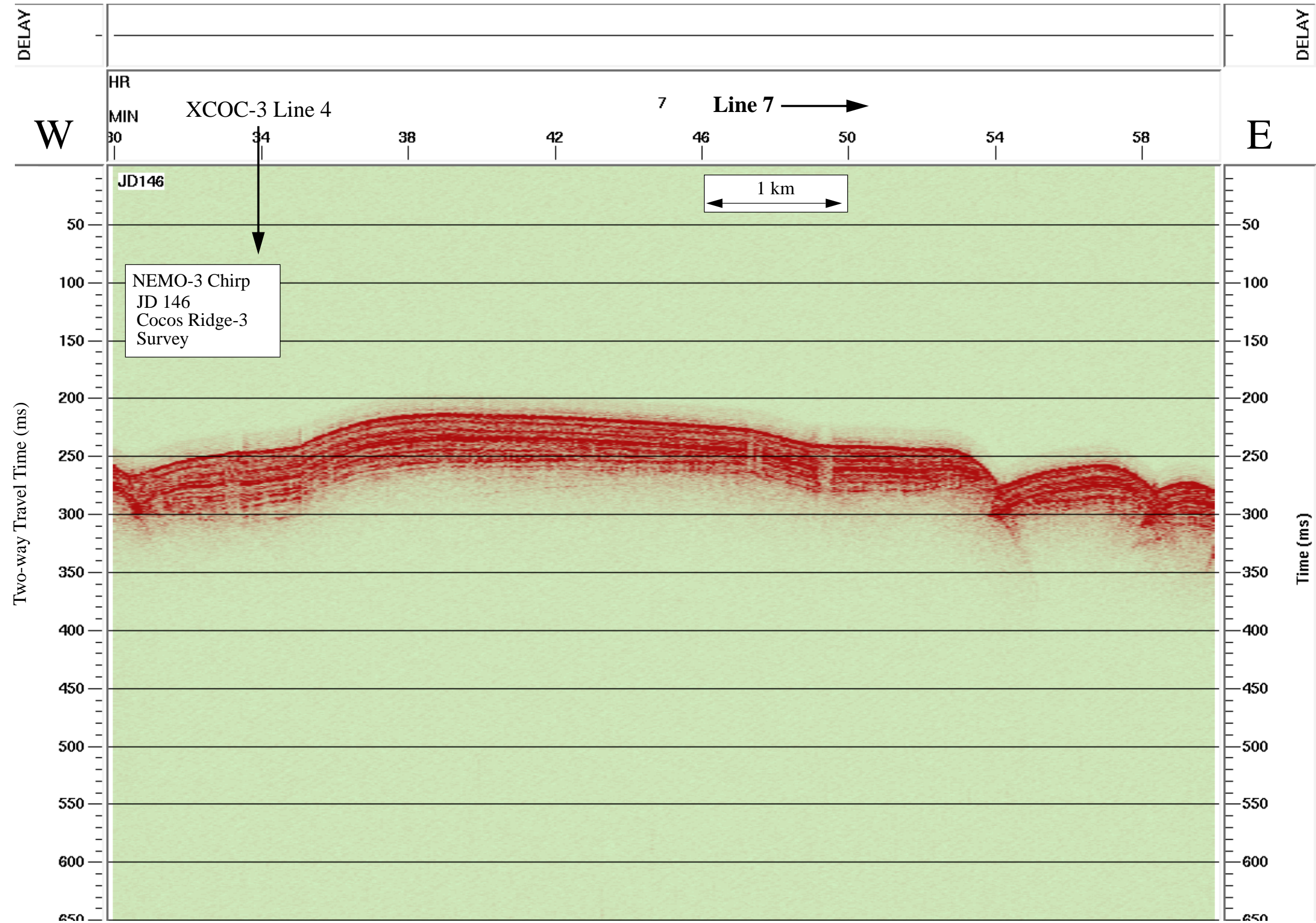
Data File SBfixavg.2000may25.0600-1200

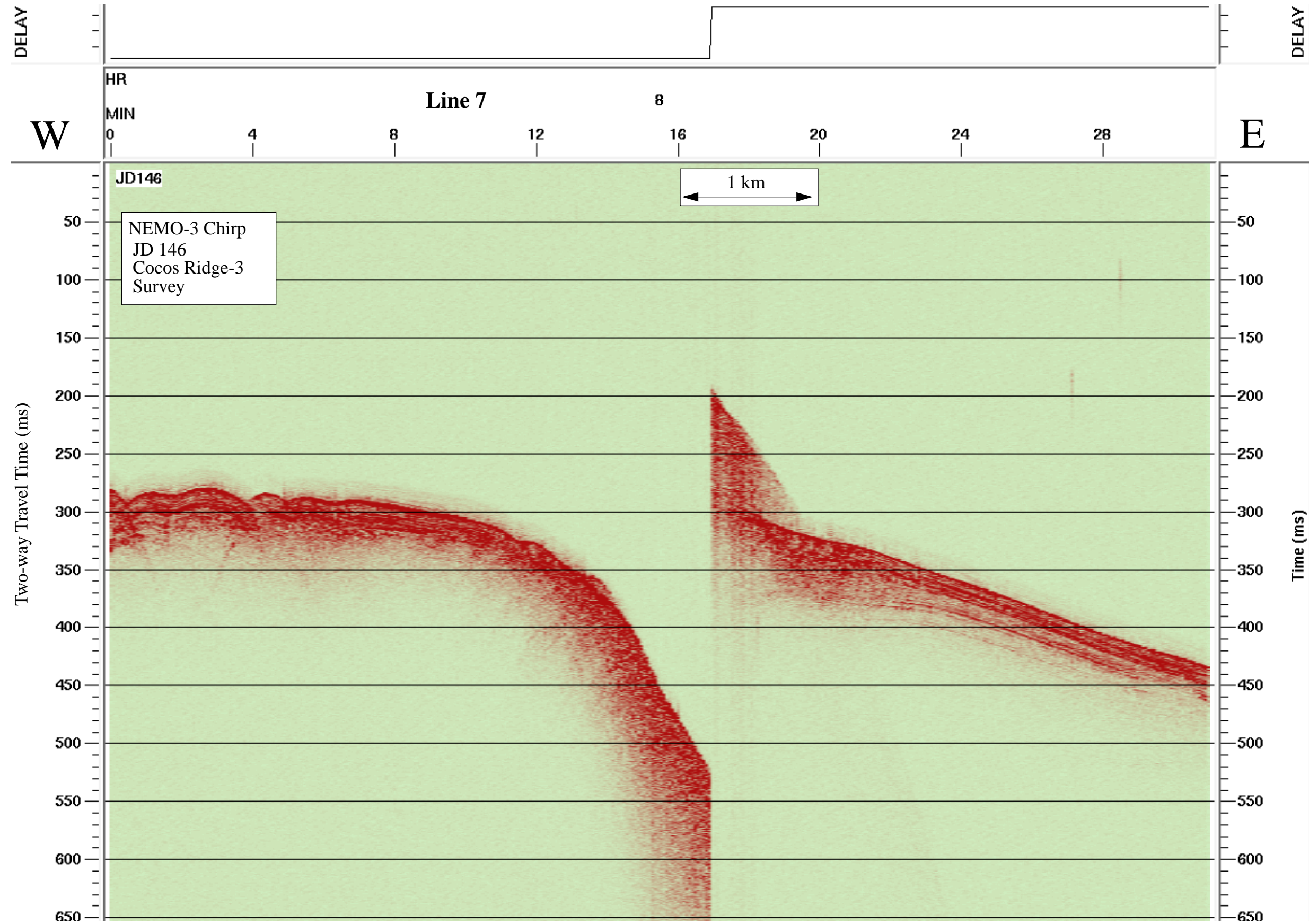


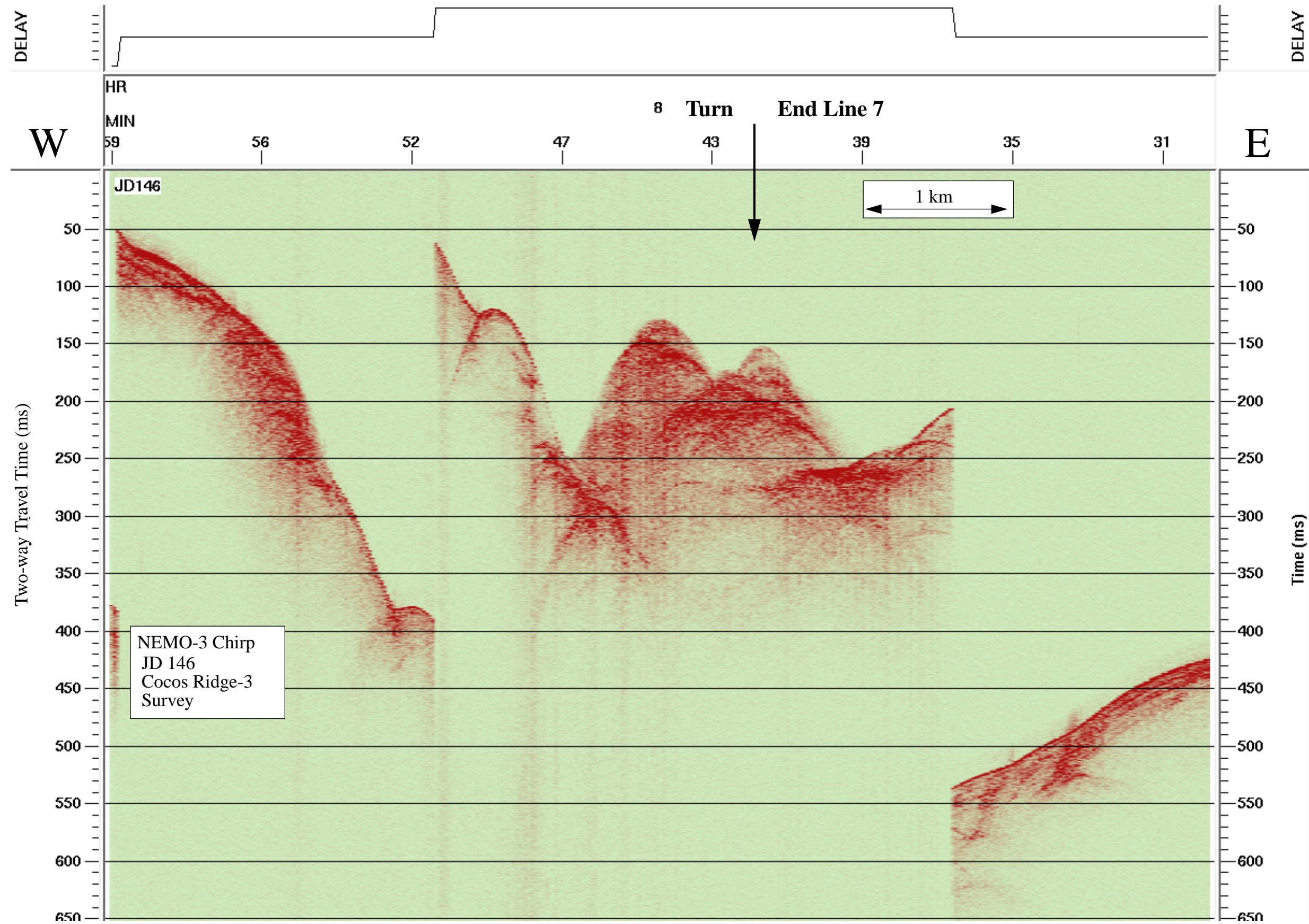


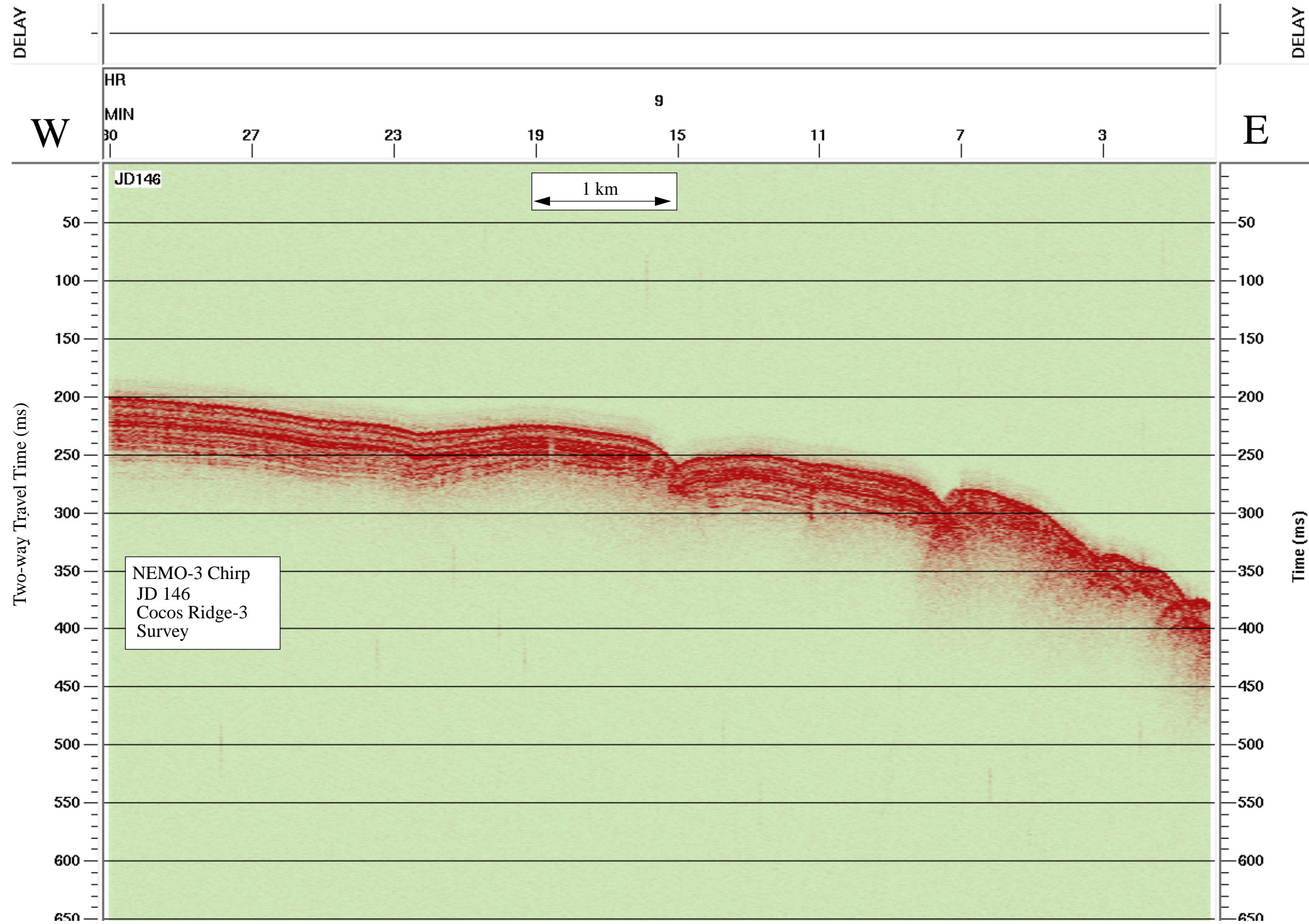


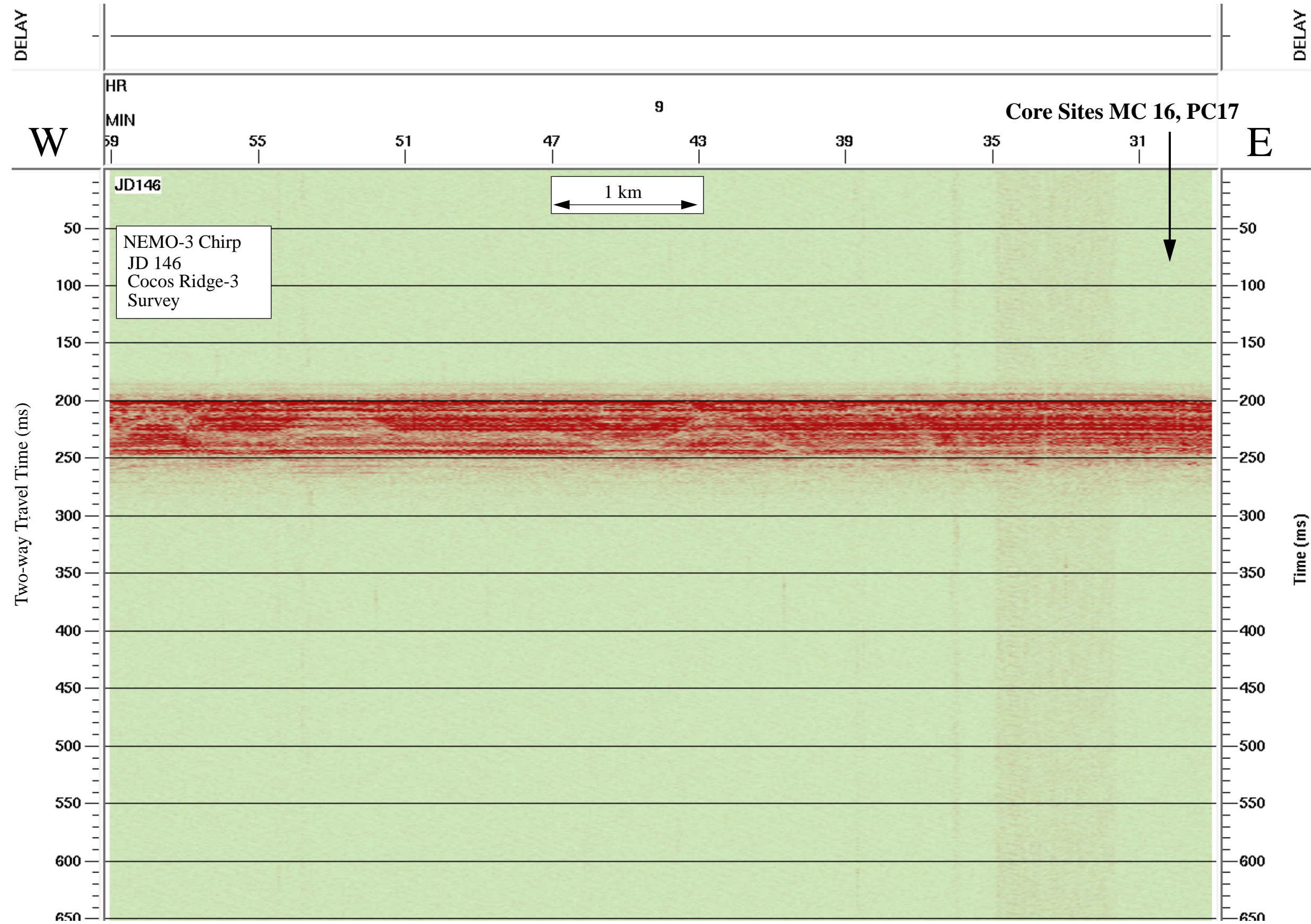




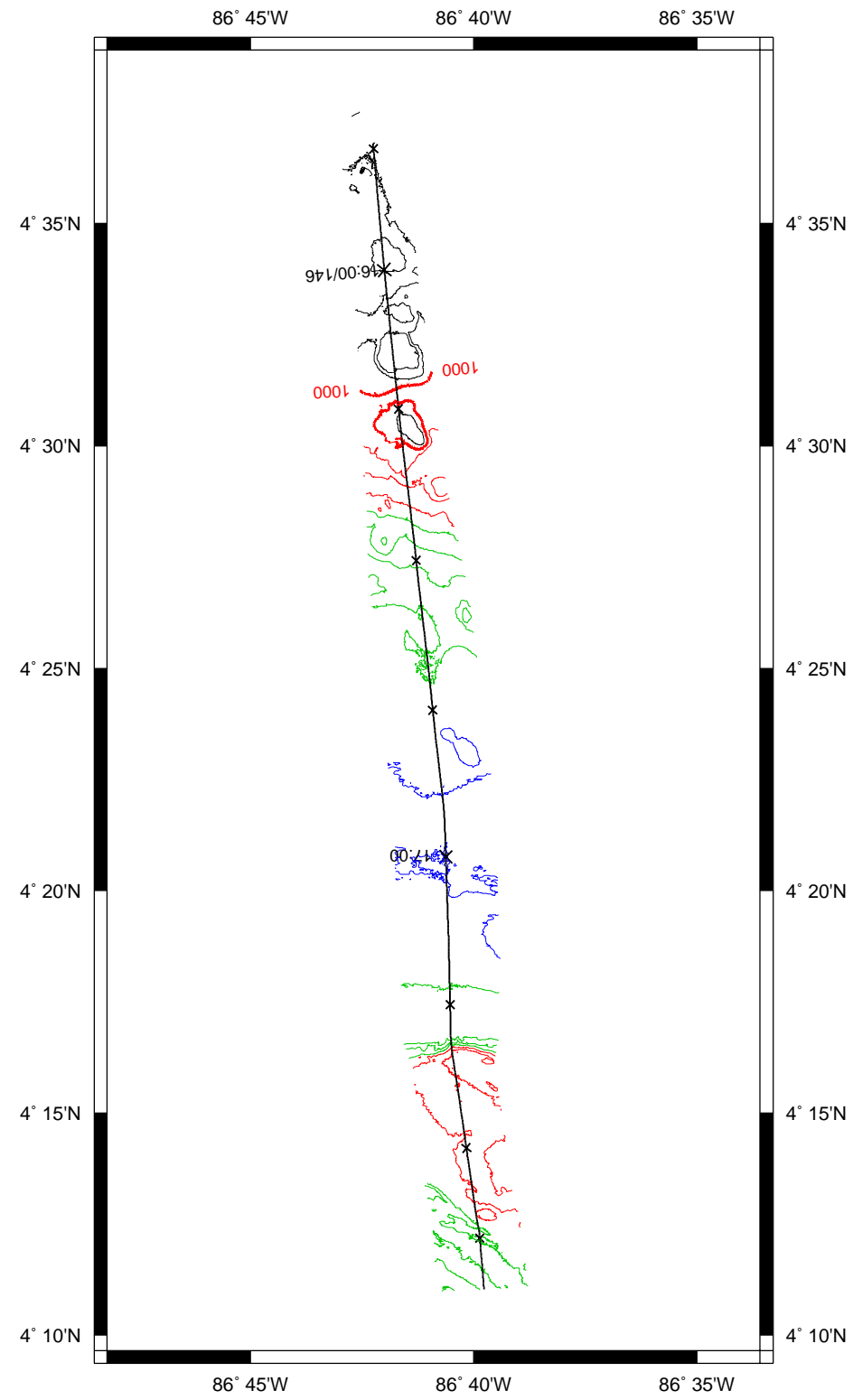


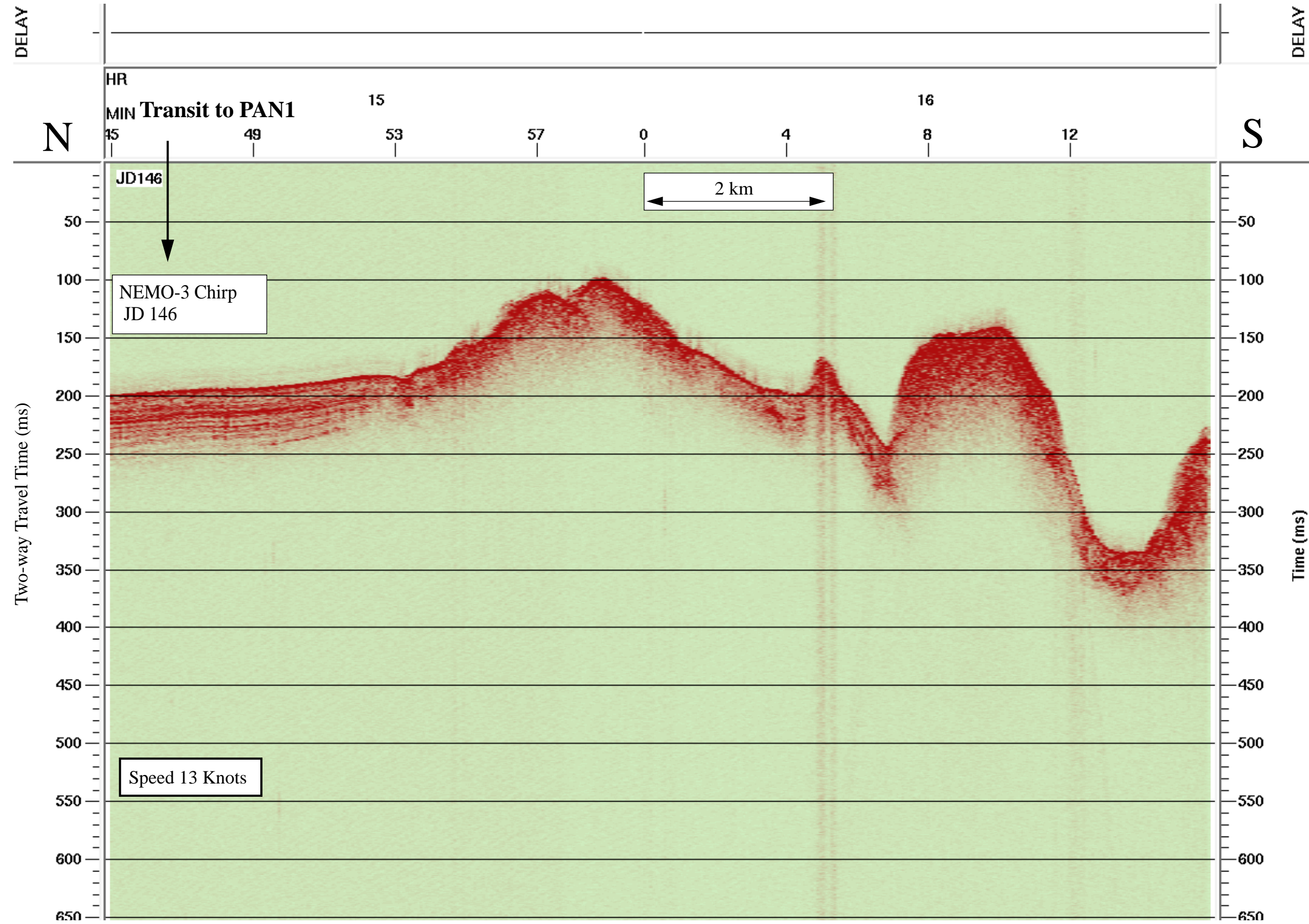


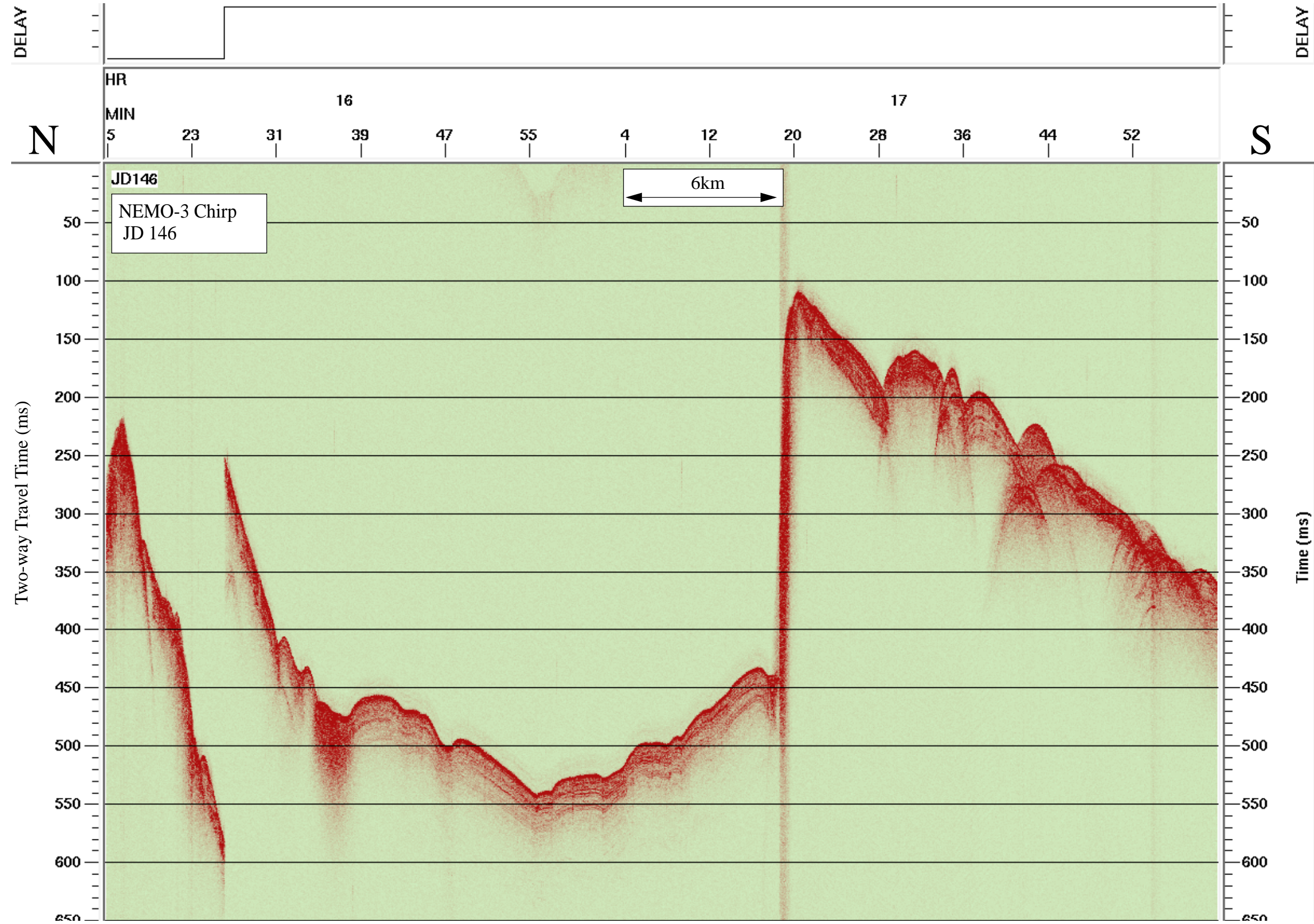




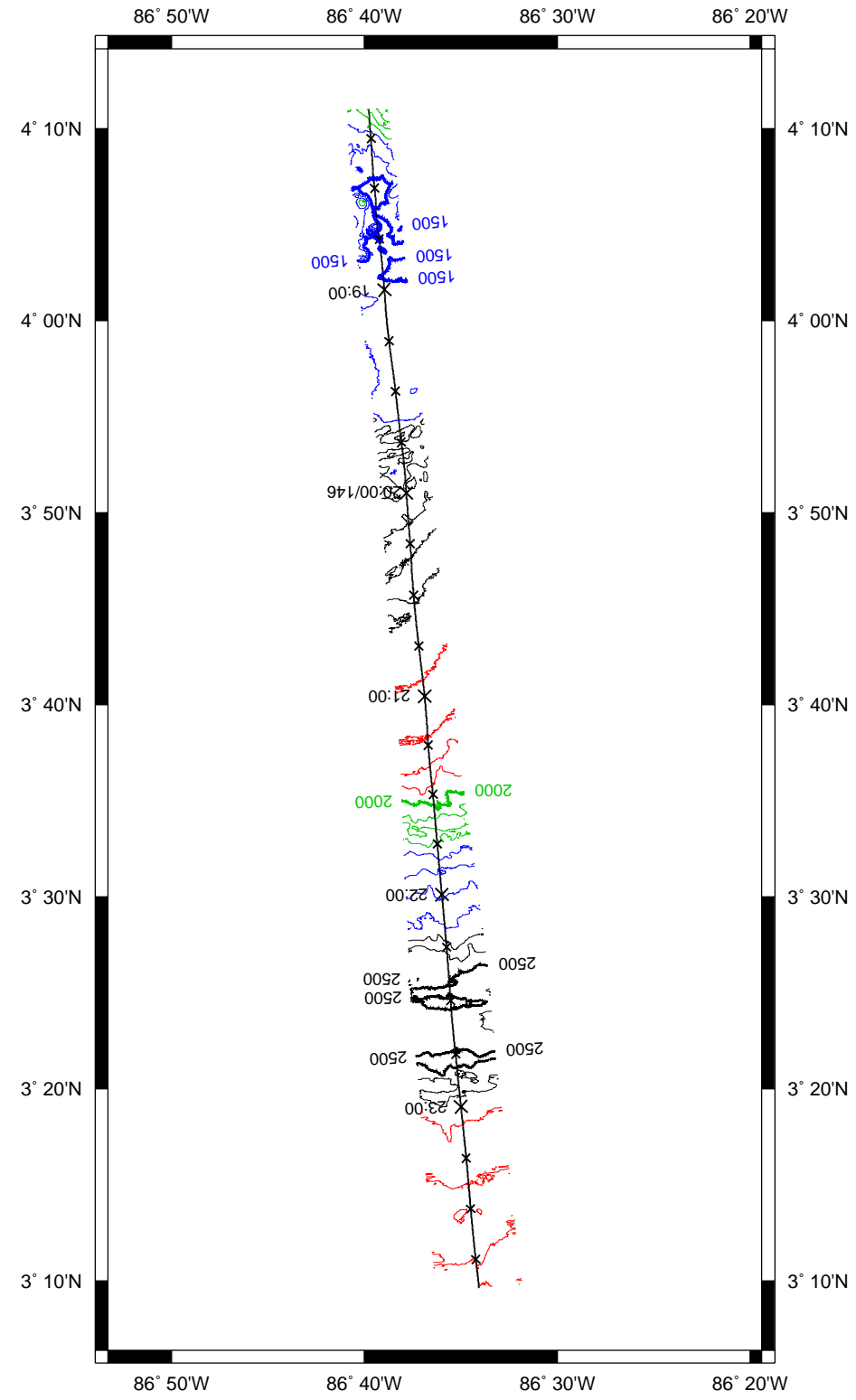
Data File SBfixavg.2000may25.1200-1800

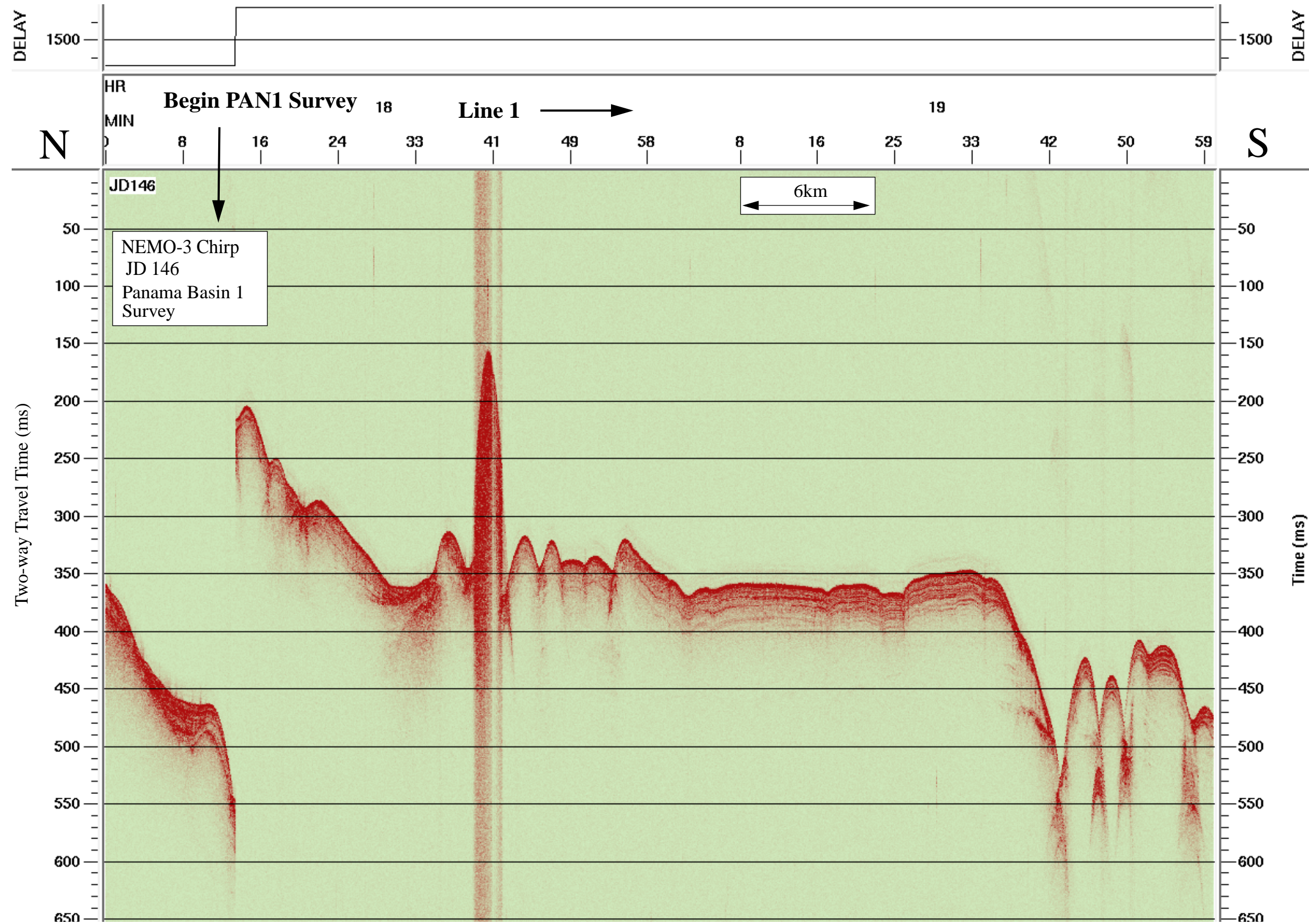


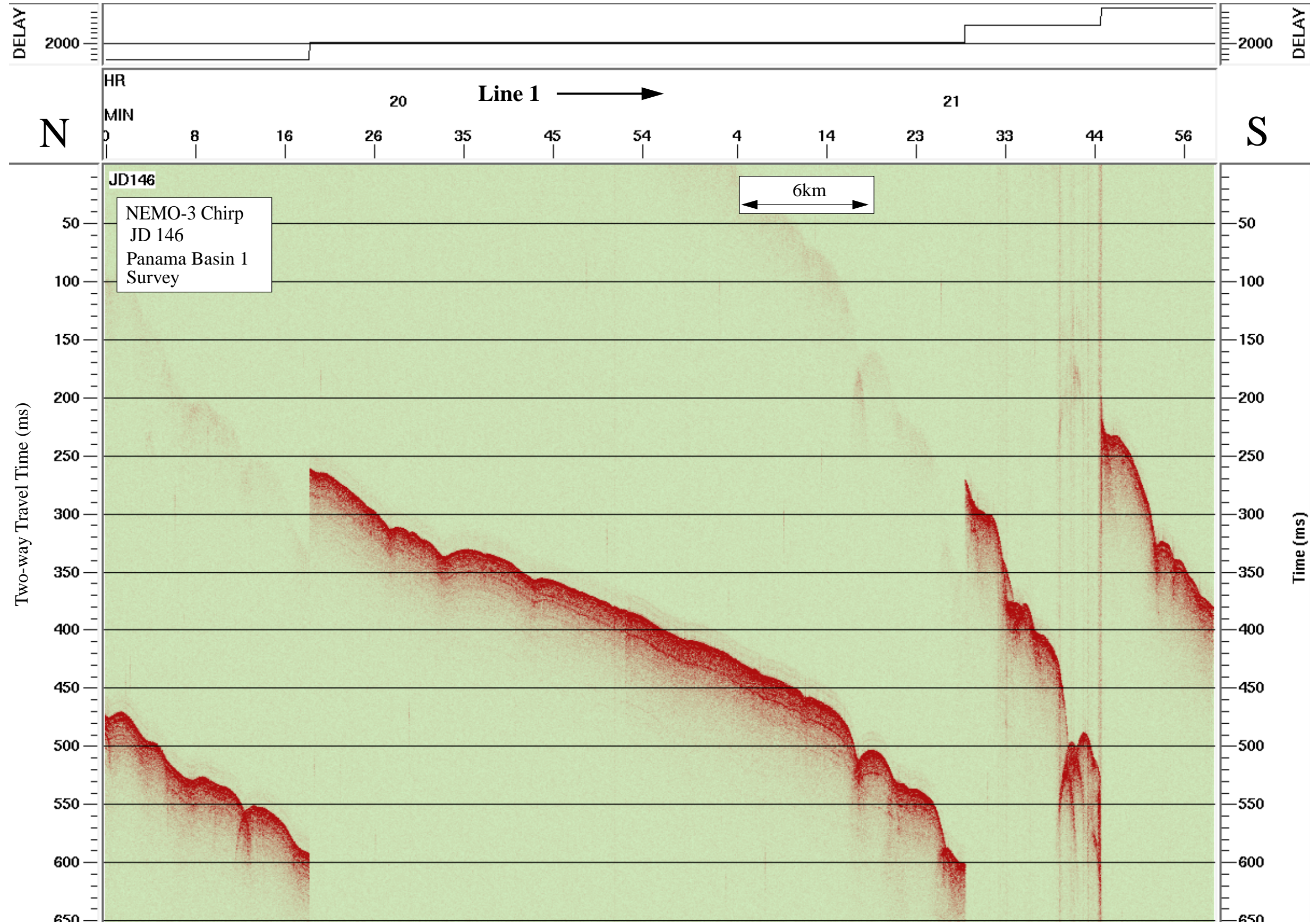


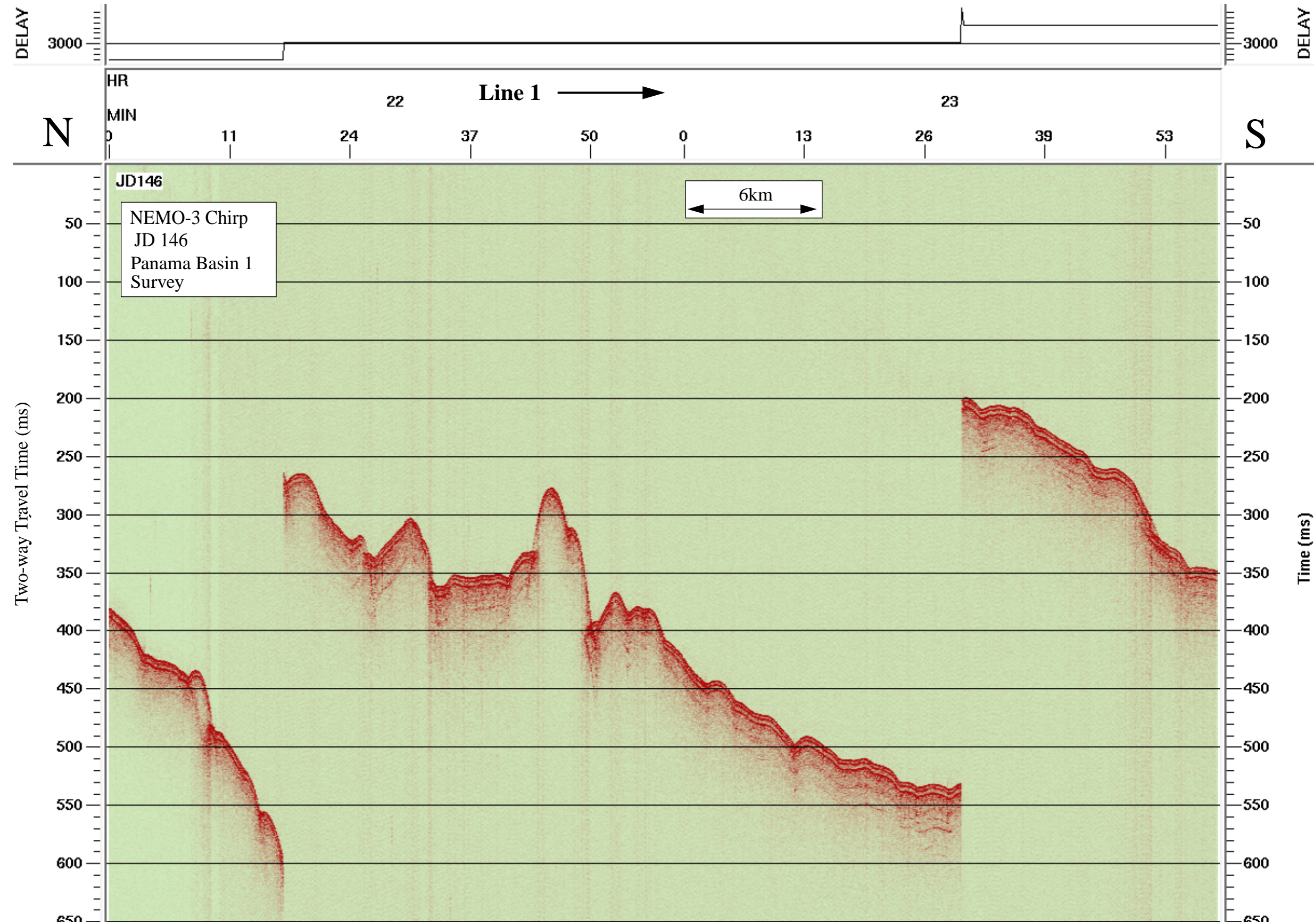


Data File SBfixavg.2000may25.1800-2400









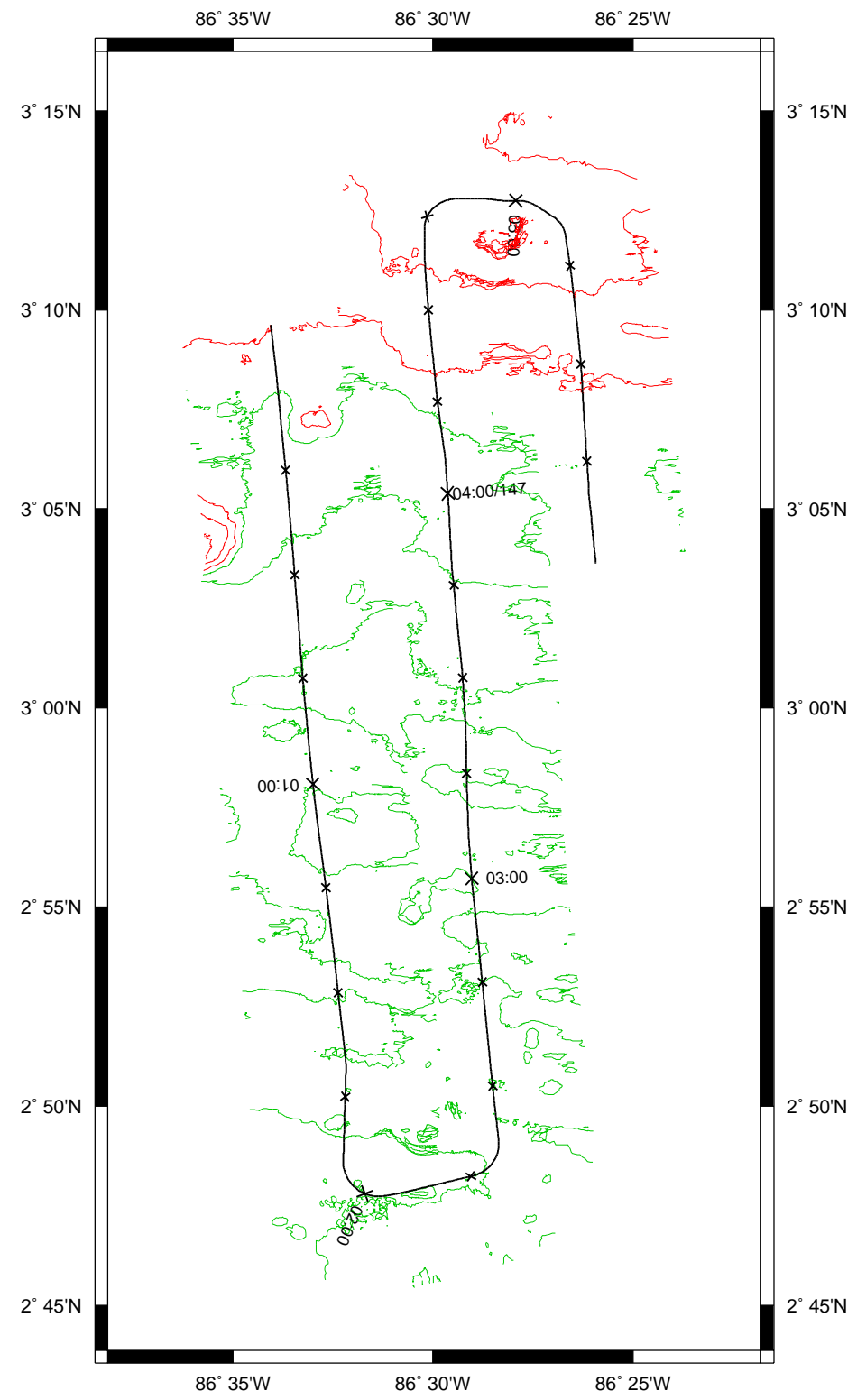
JD 147 (26 May 2000)--PAN-1 Survey, Panama Basin

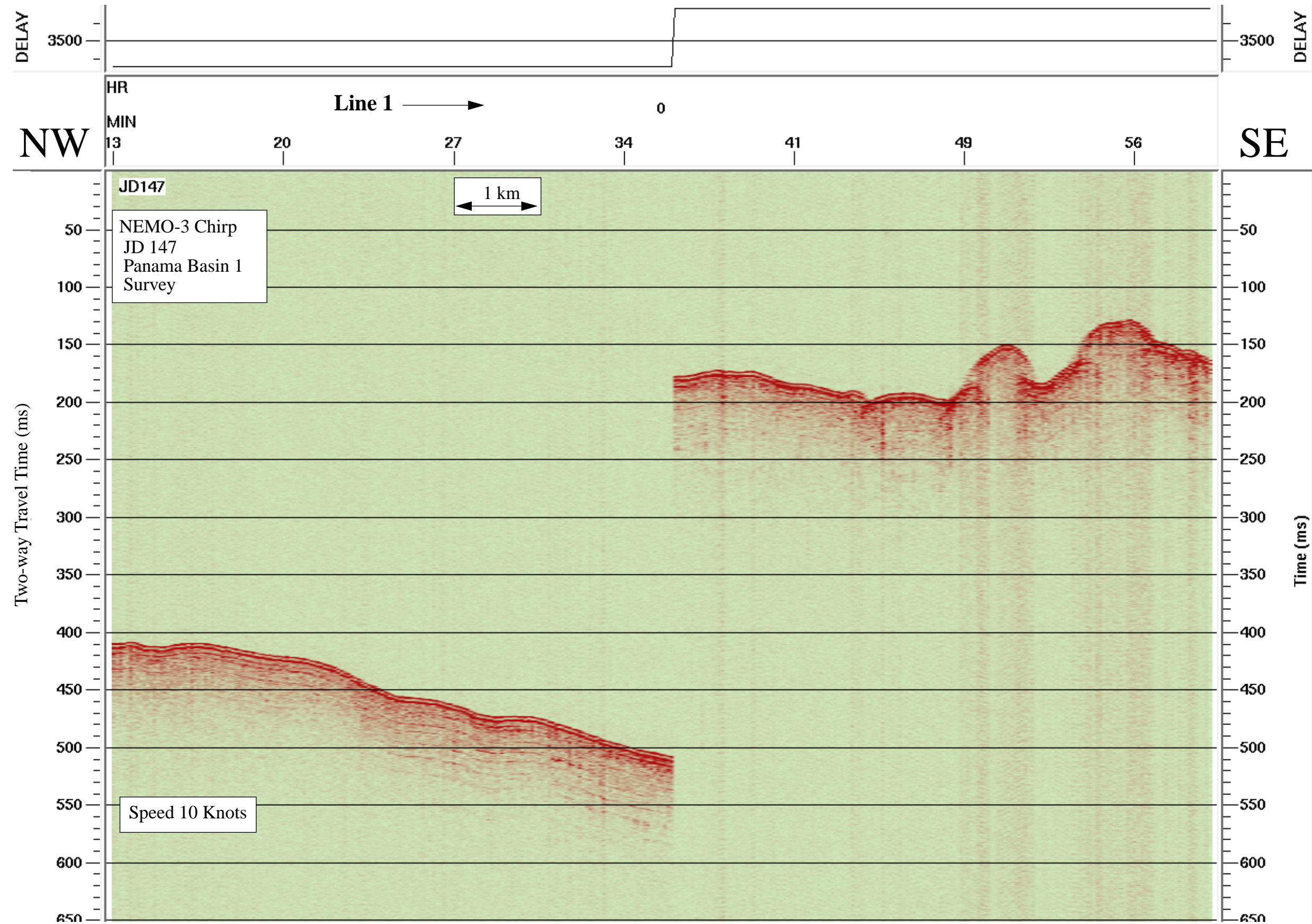
2-7 kHz Chirp Subbottom Profiler

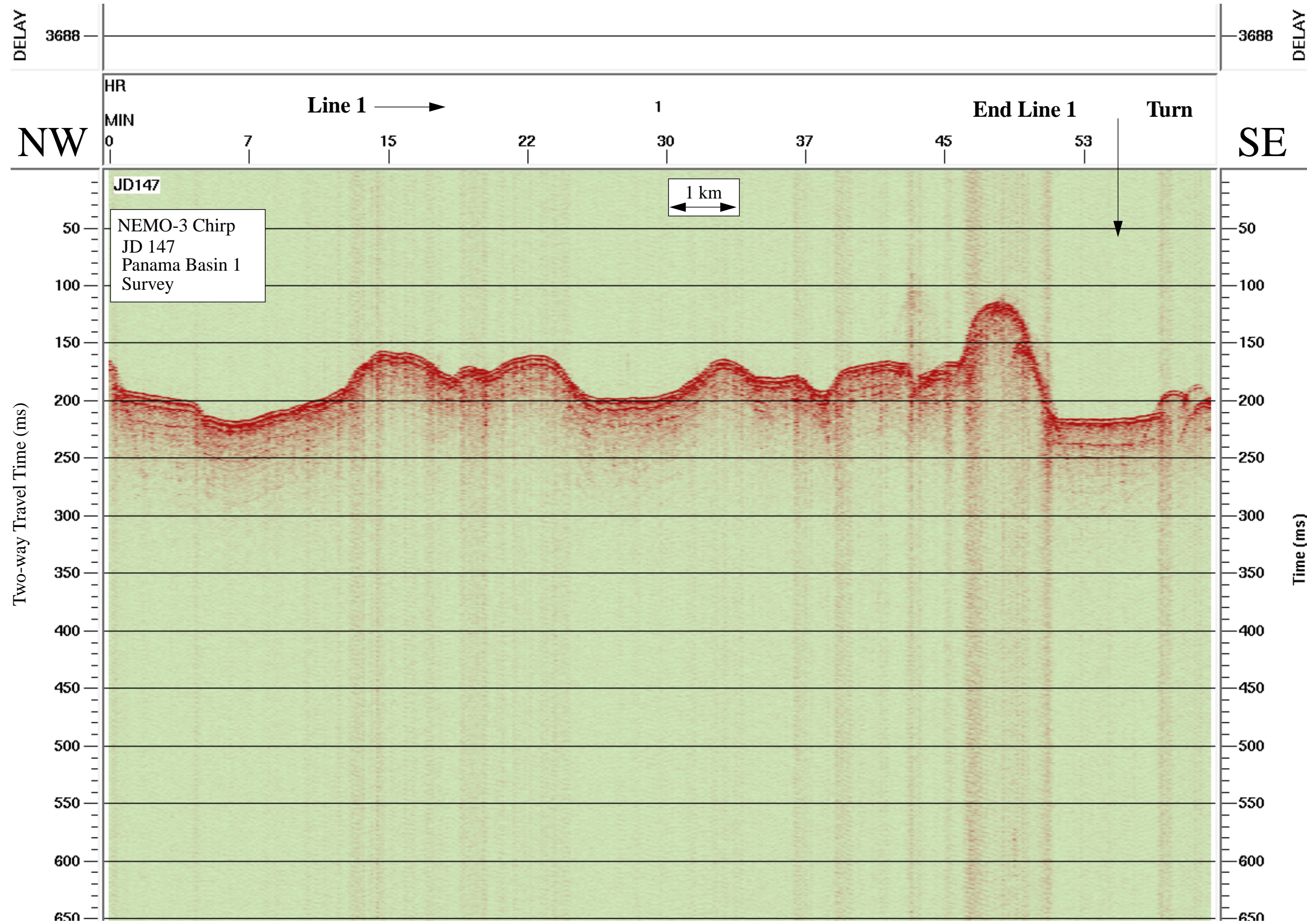
NEMO Leg 3

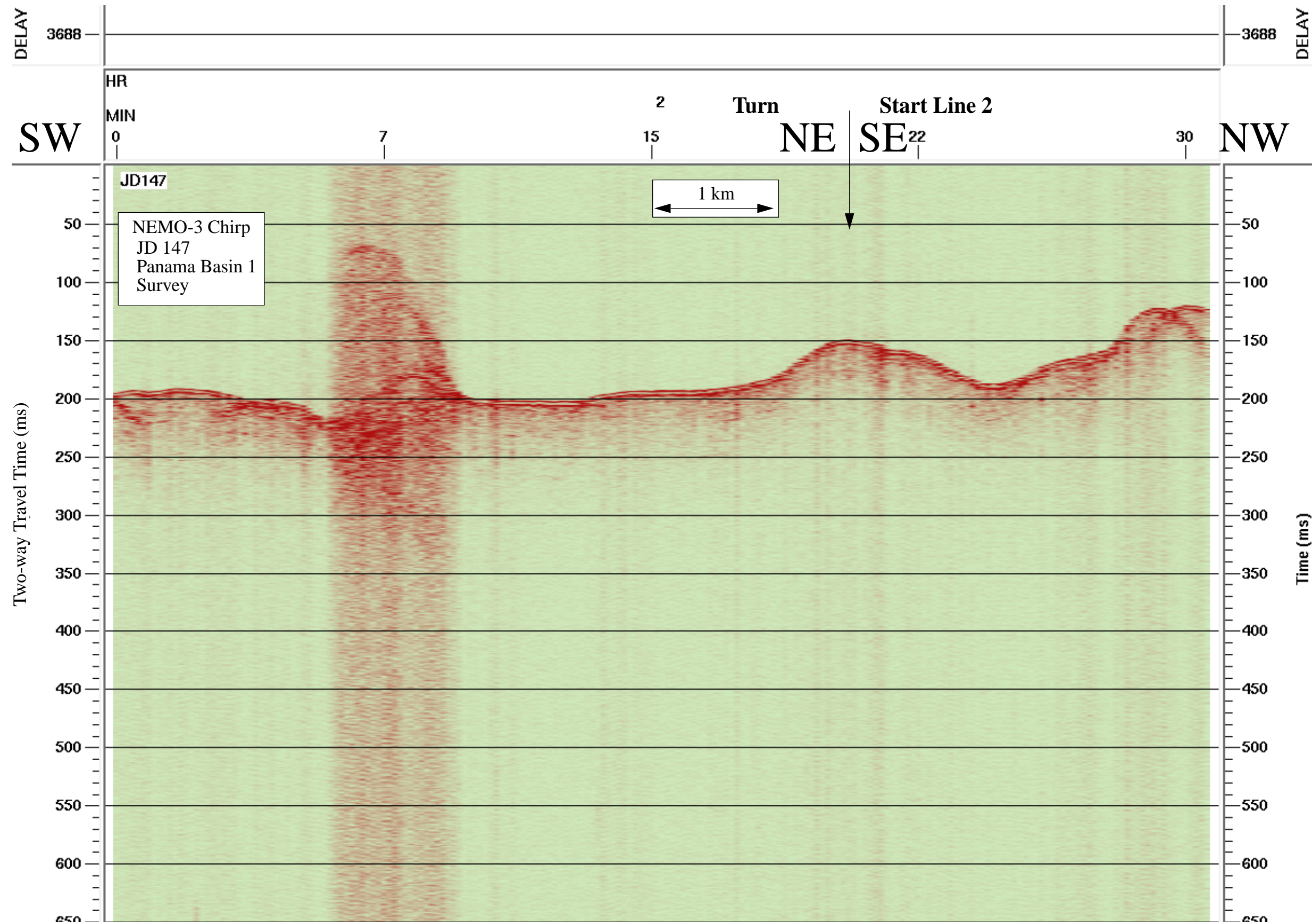
R/V Melville

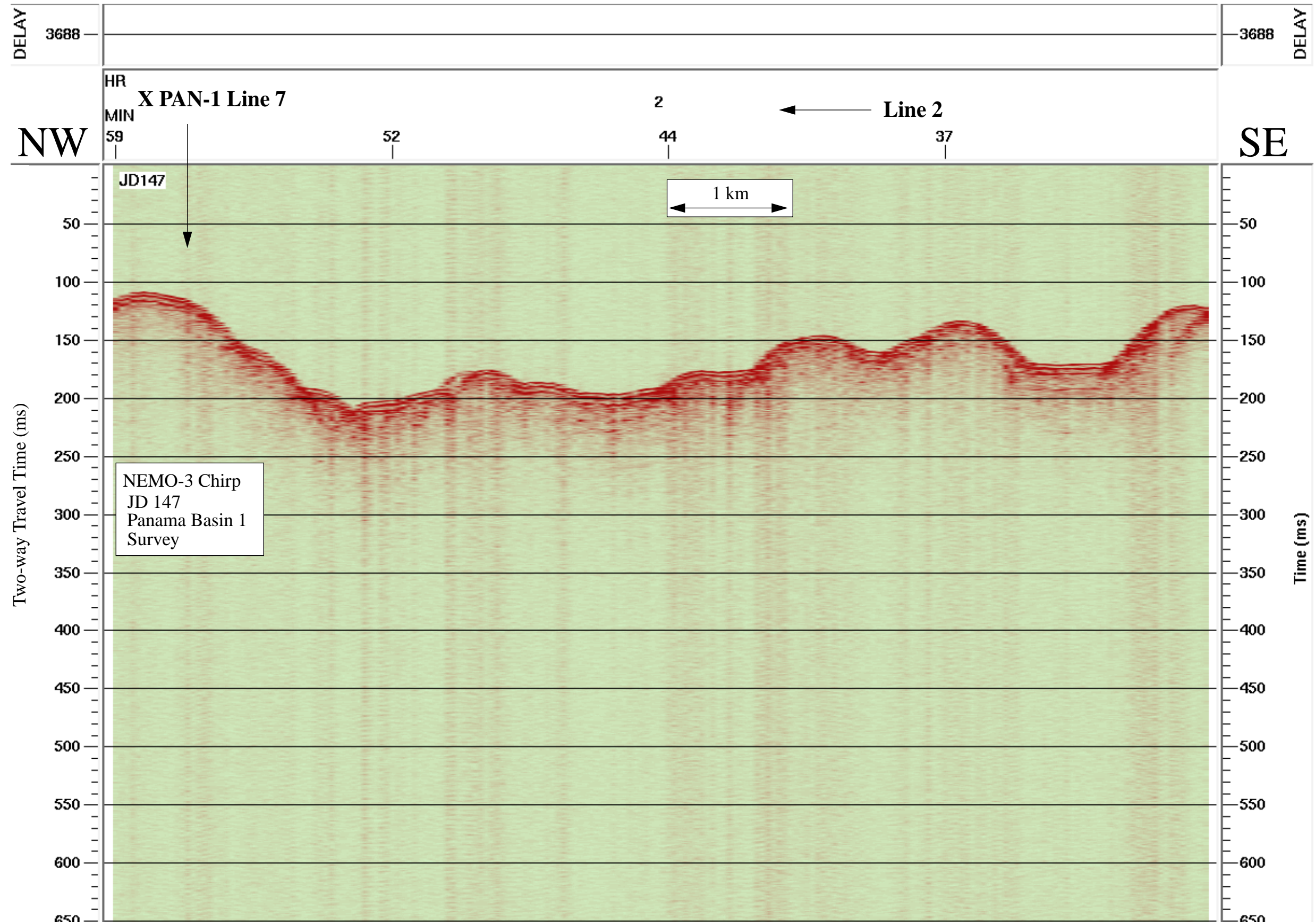
Data File SBfixavg.2000may26.0000-0600

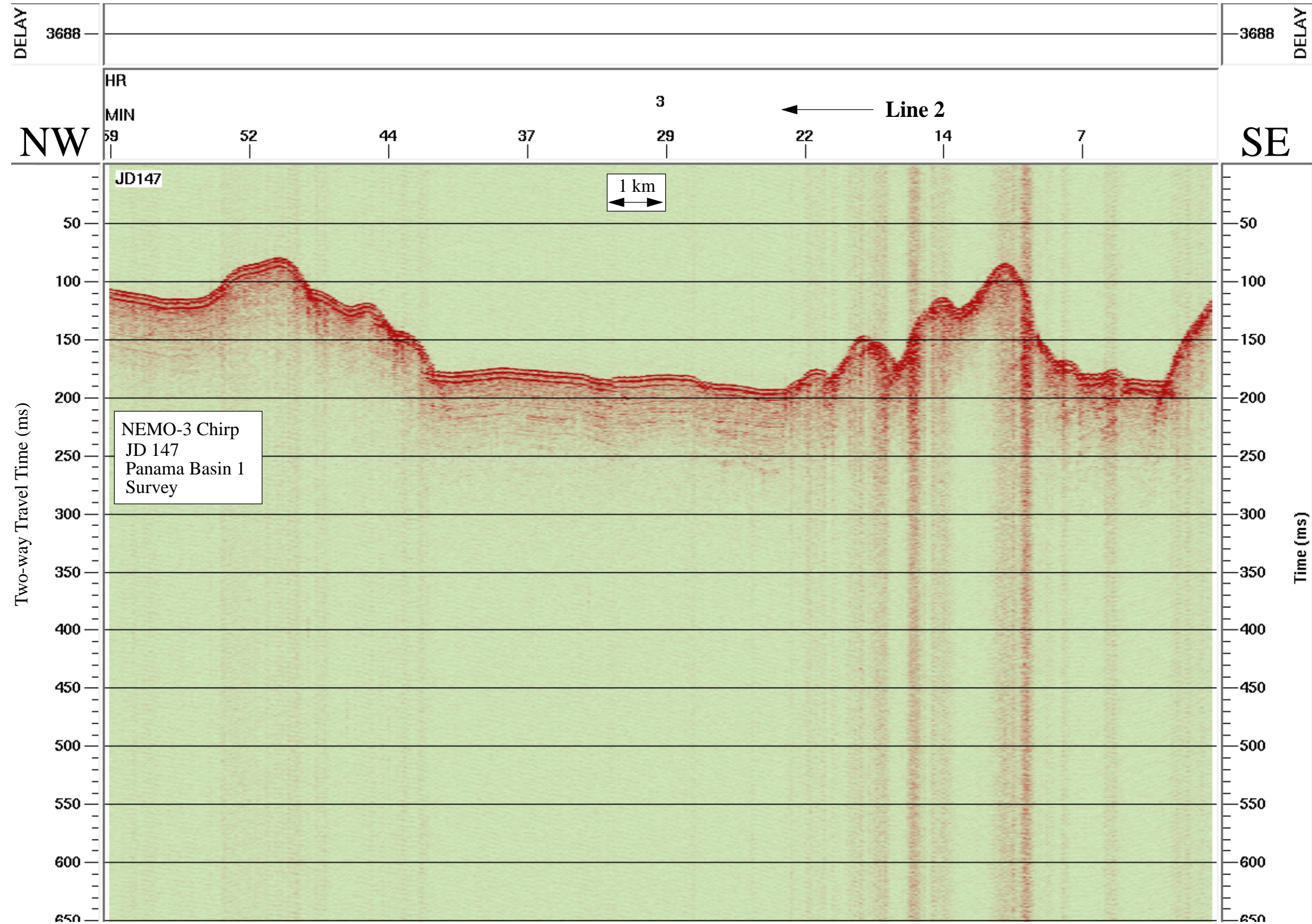


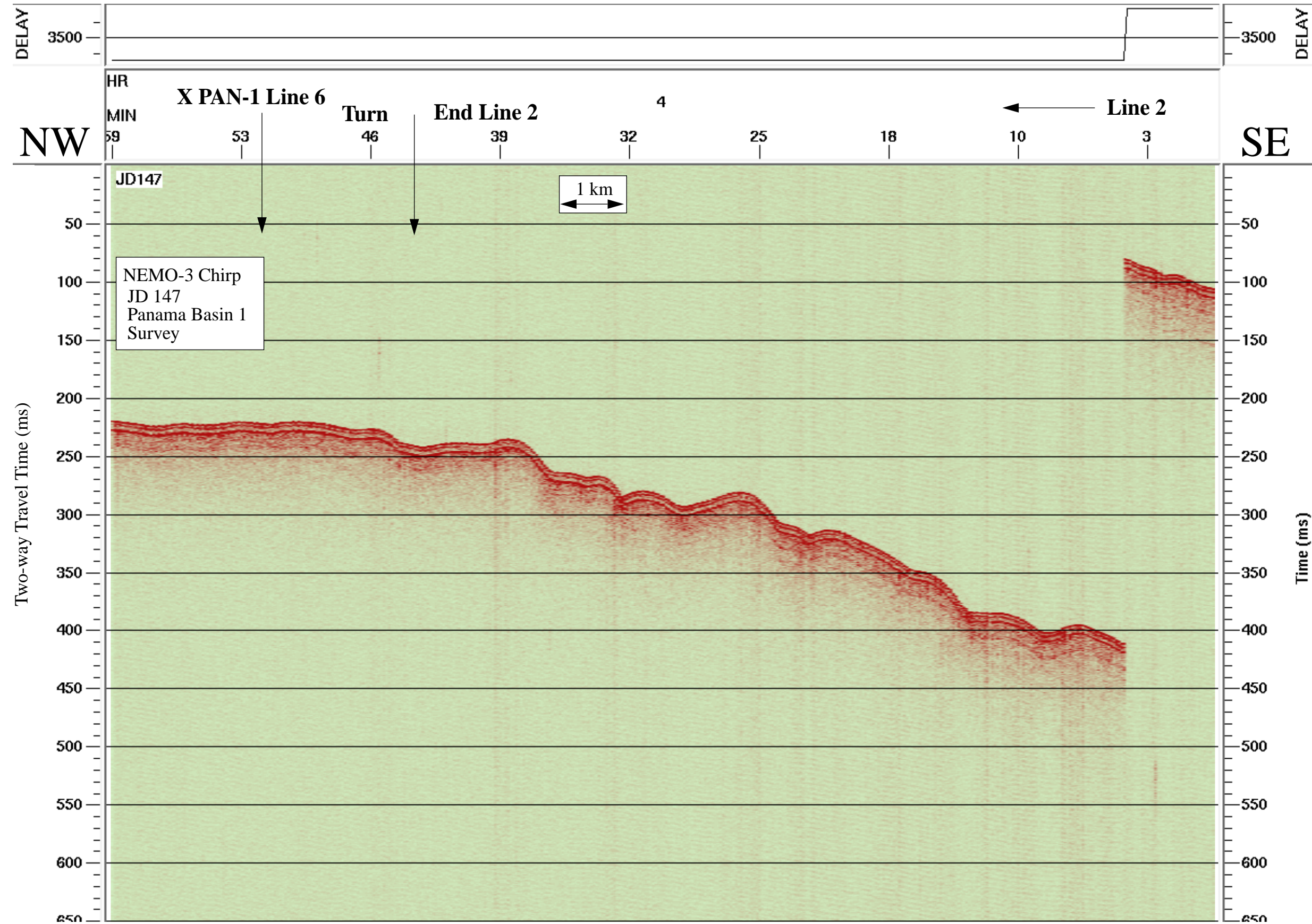




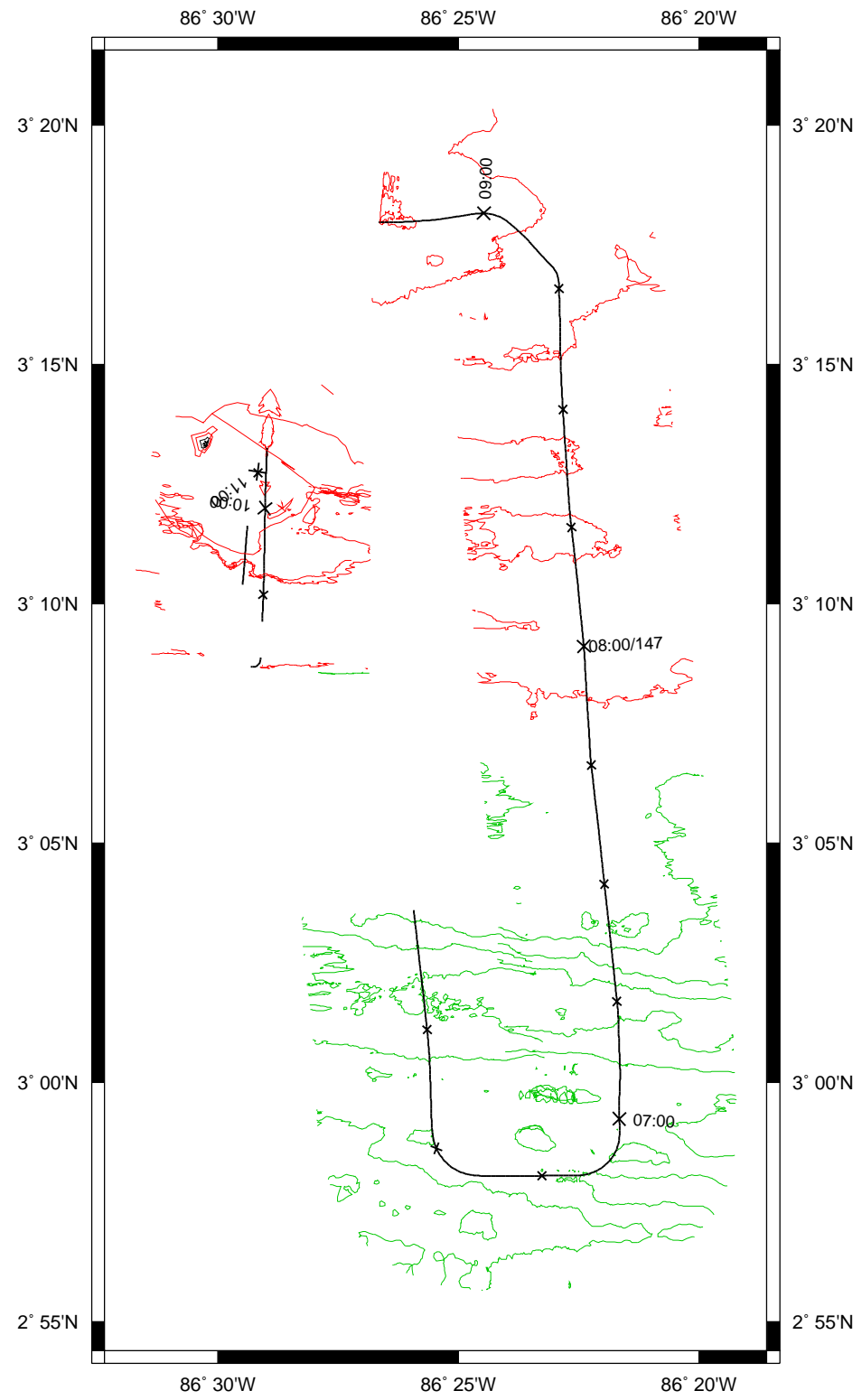


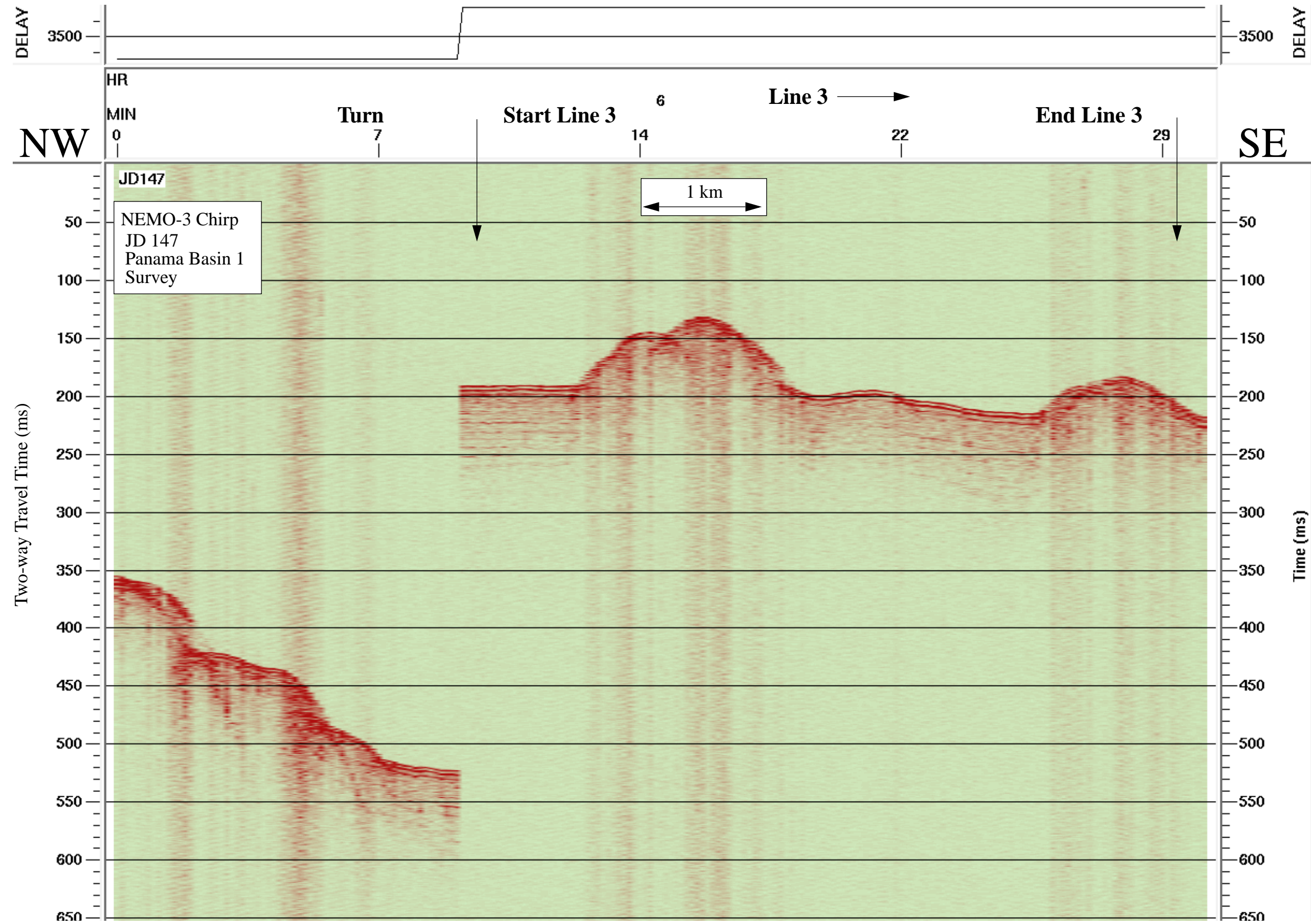


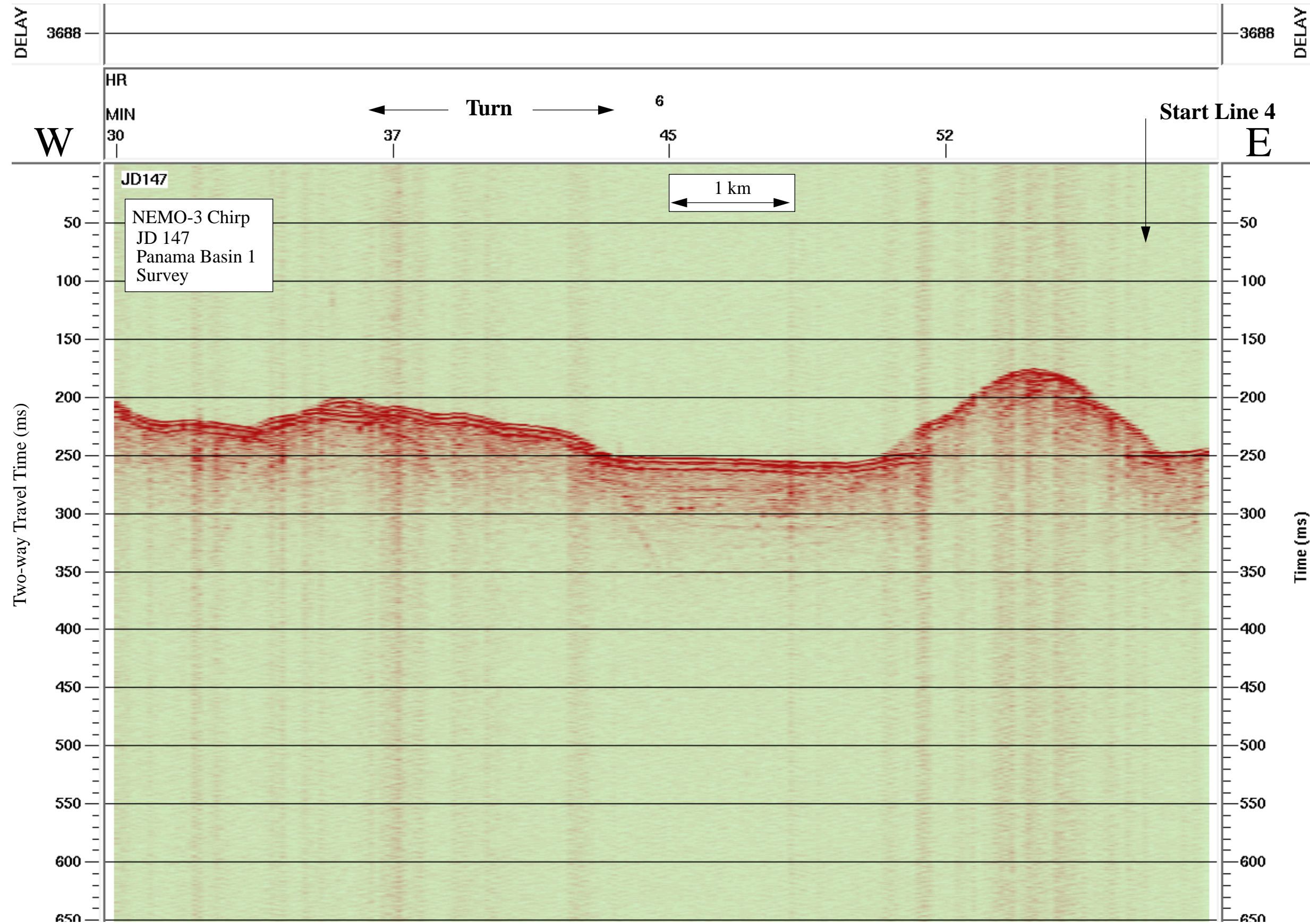


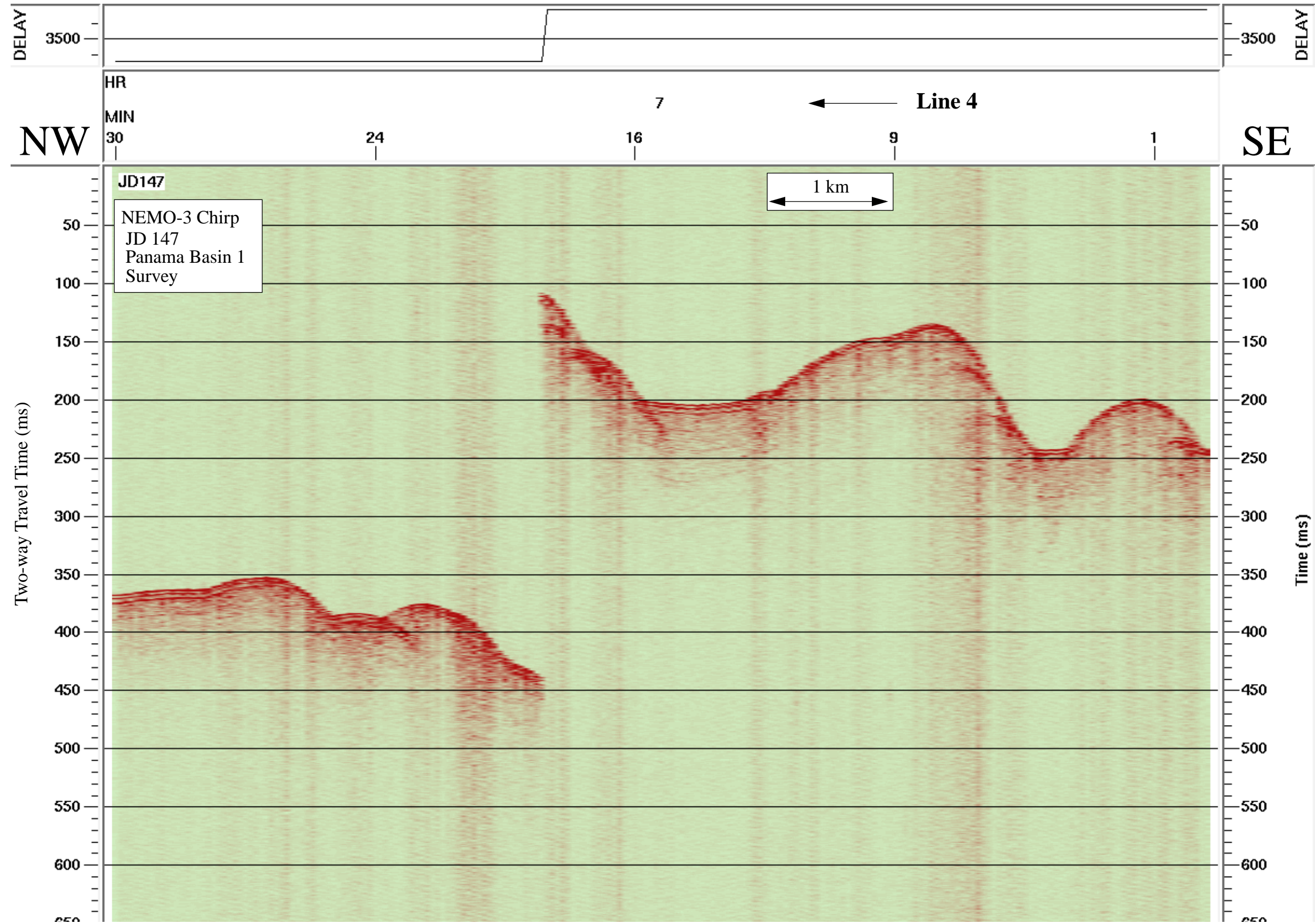


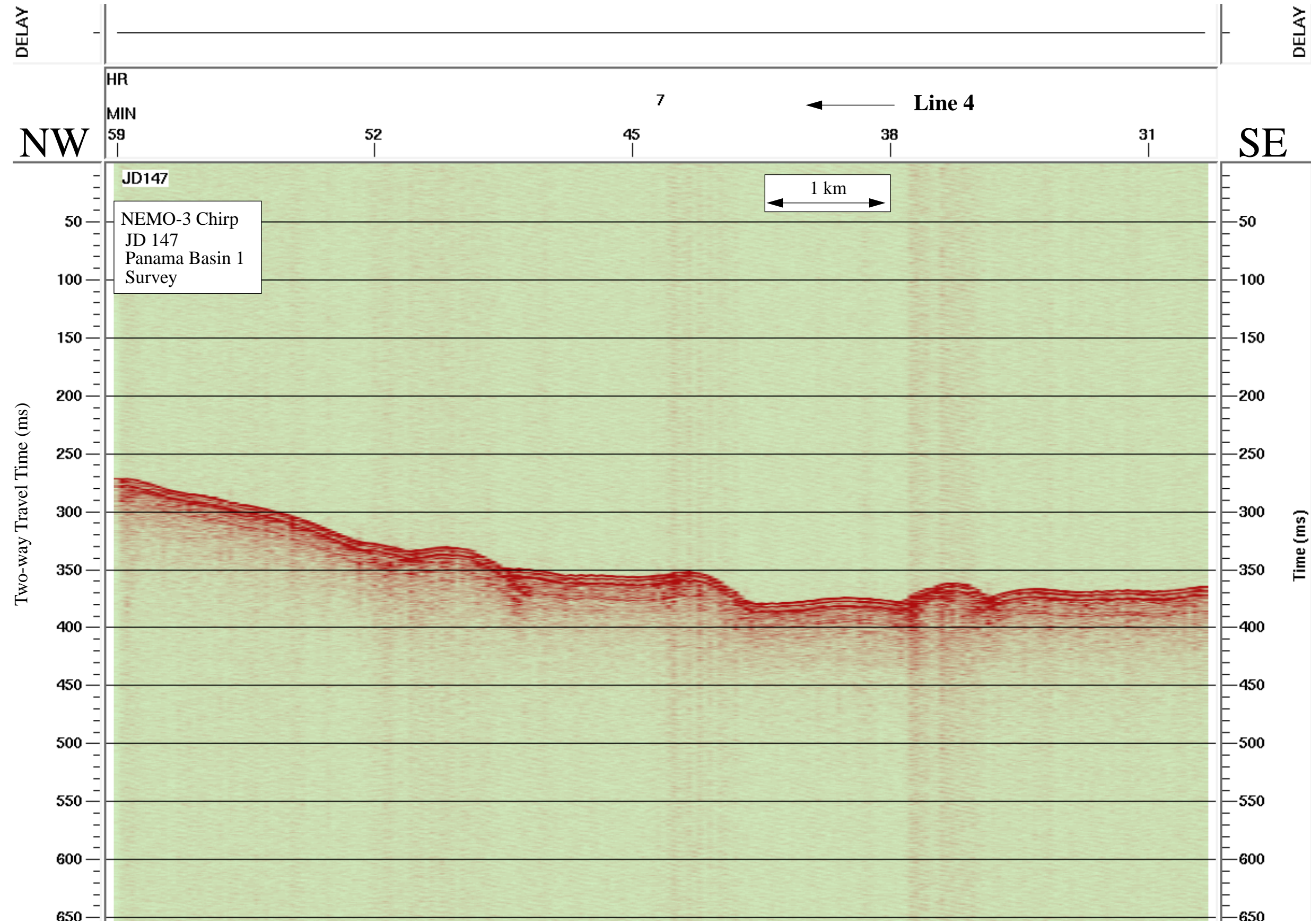
Data File SBfixavg.2000may26.0600-1200

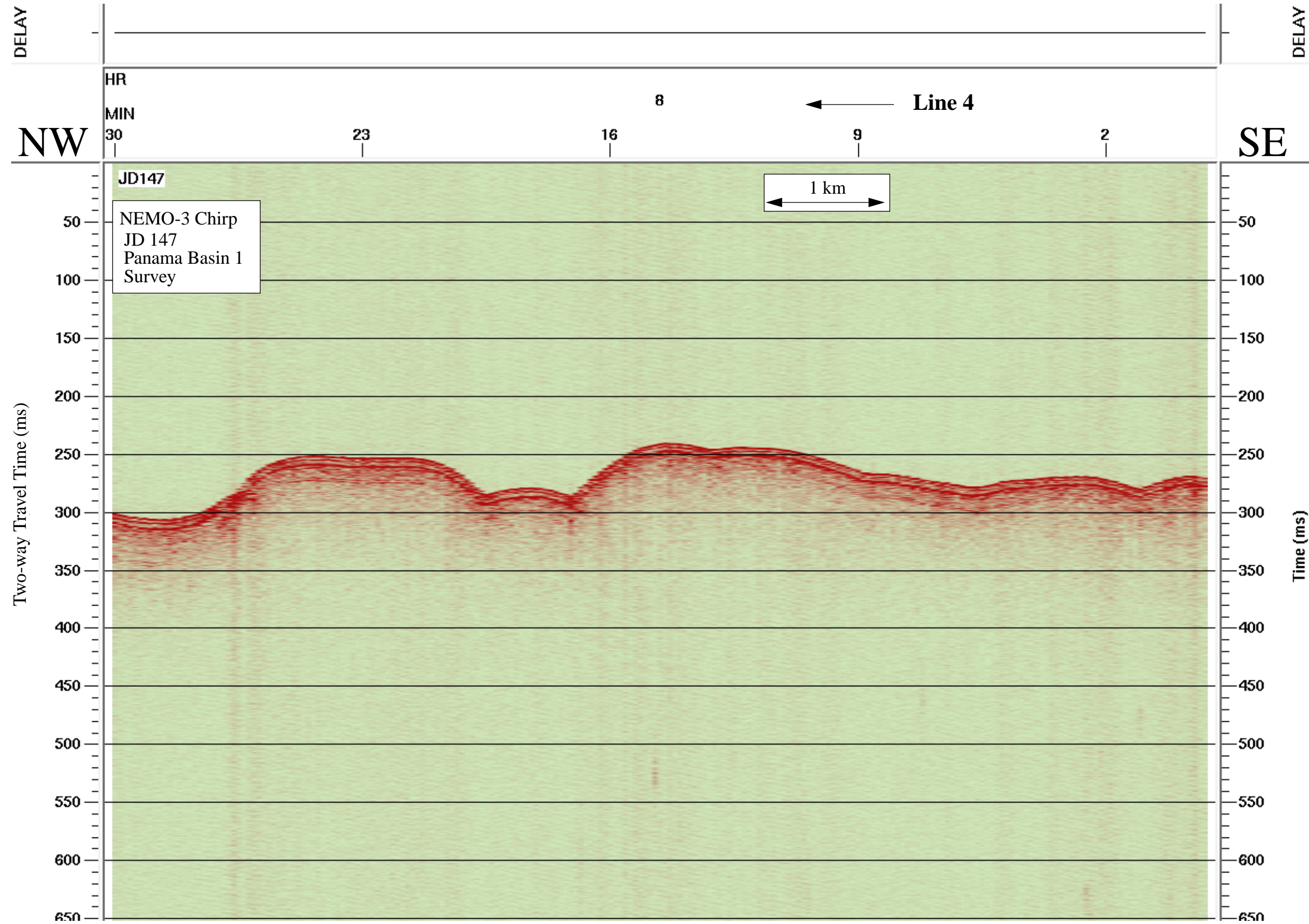


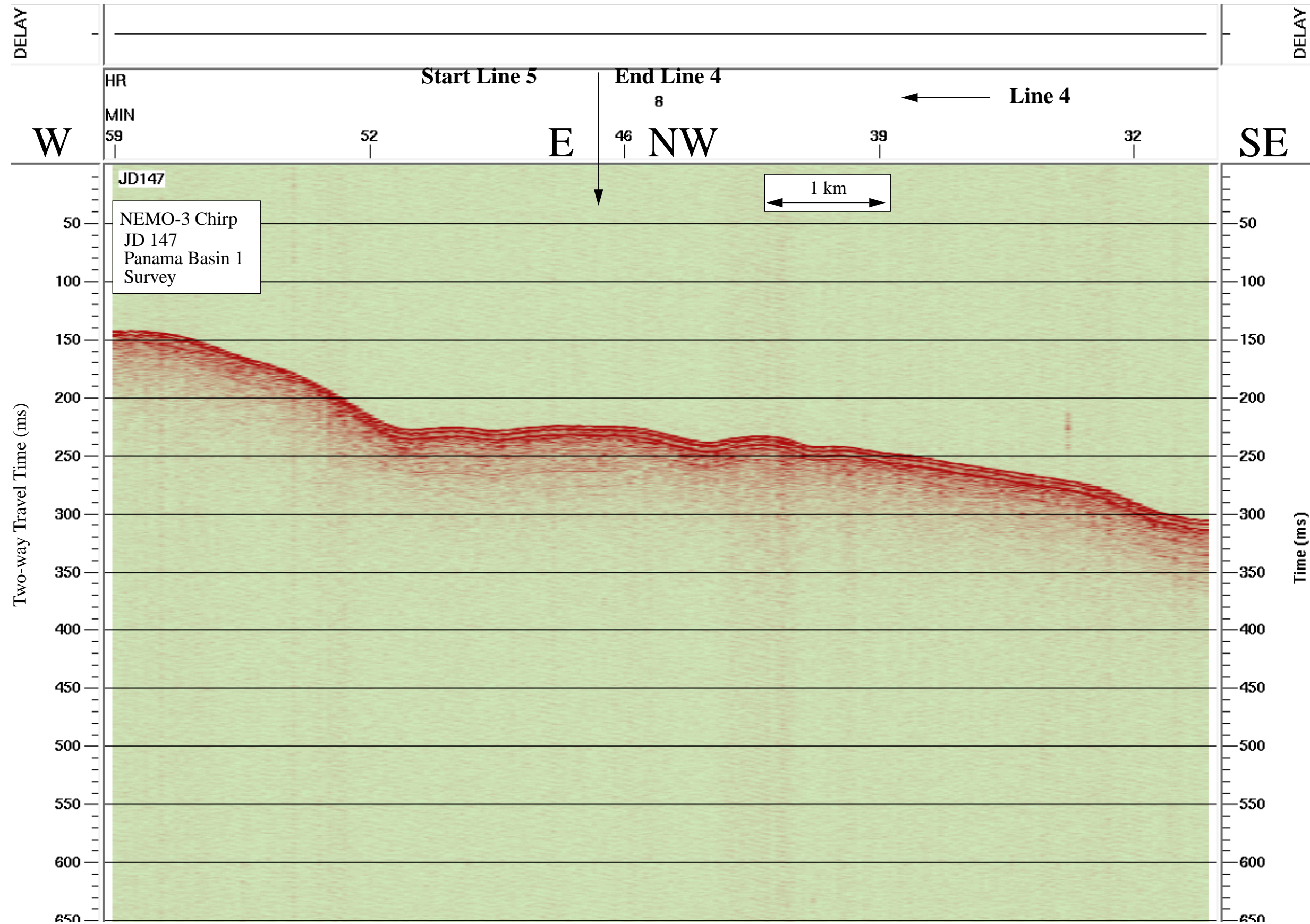


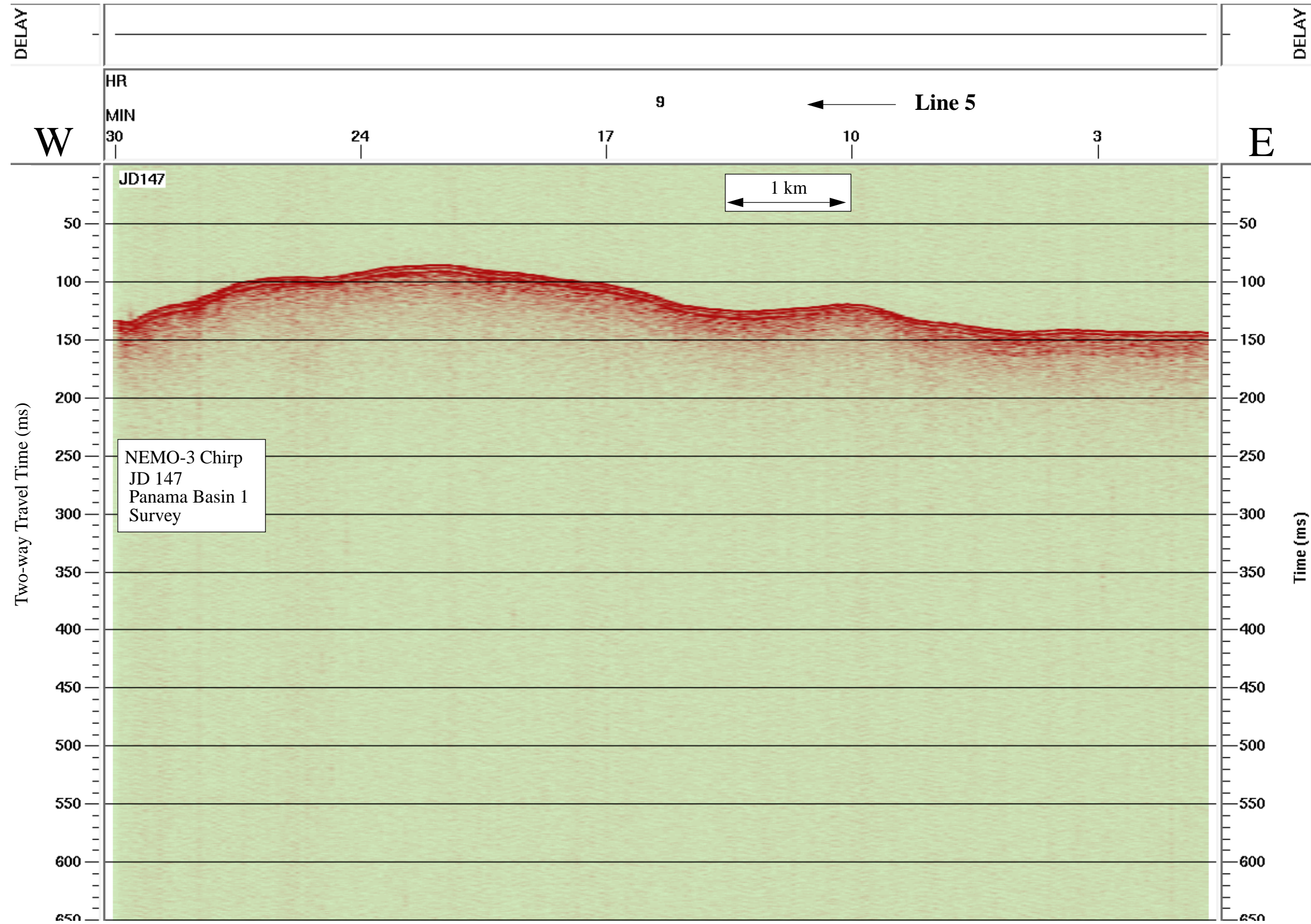


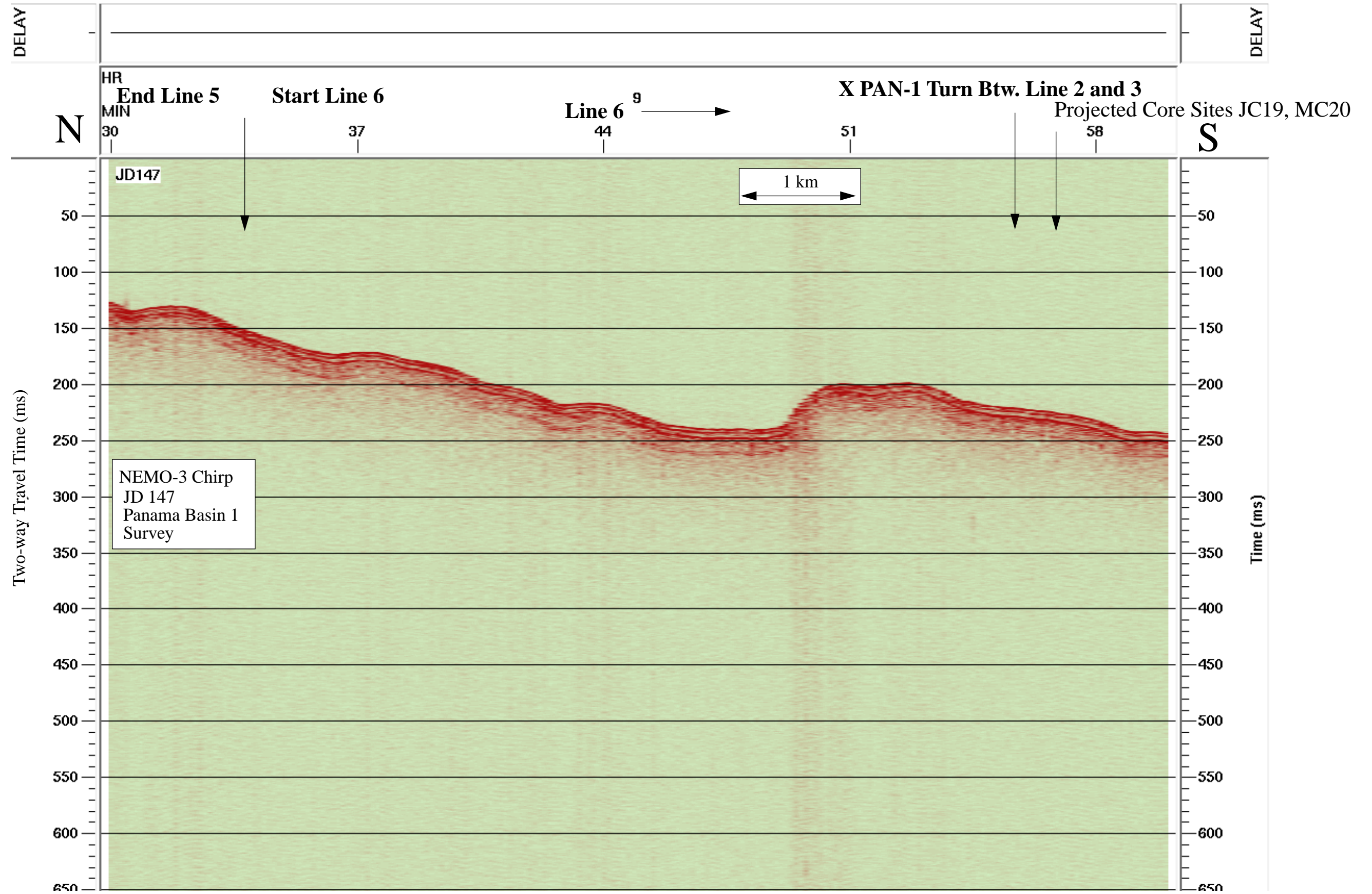


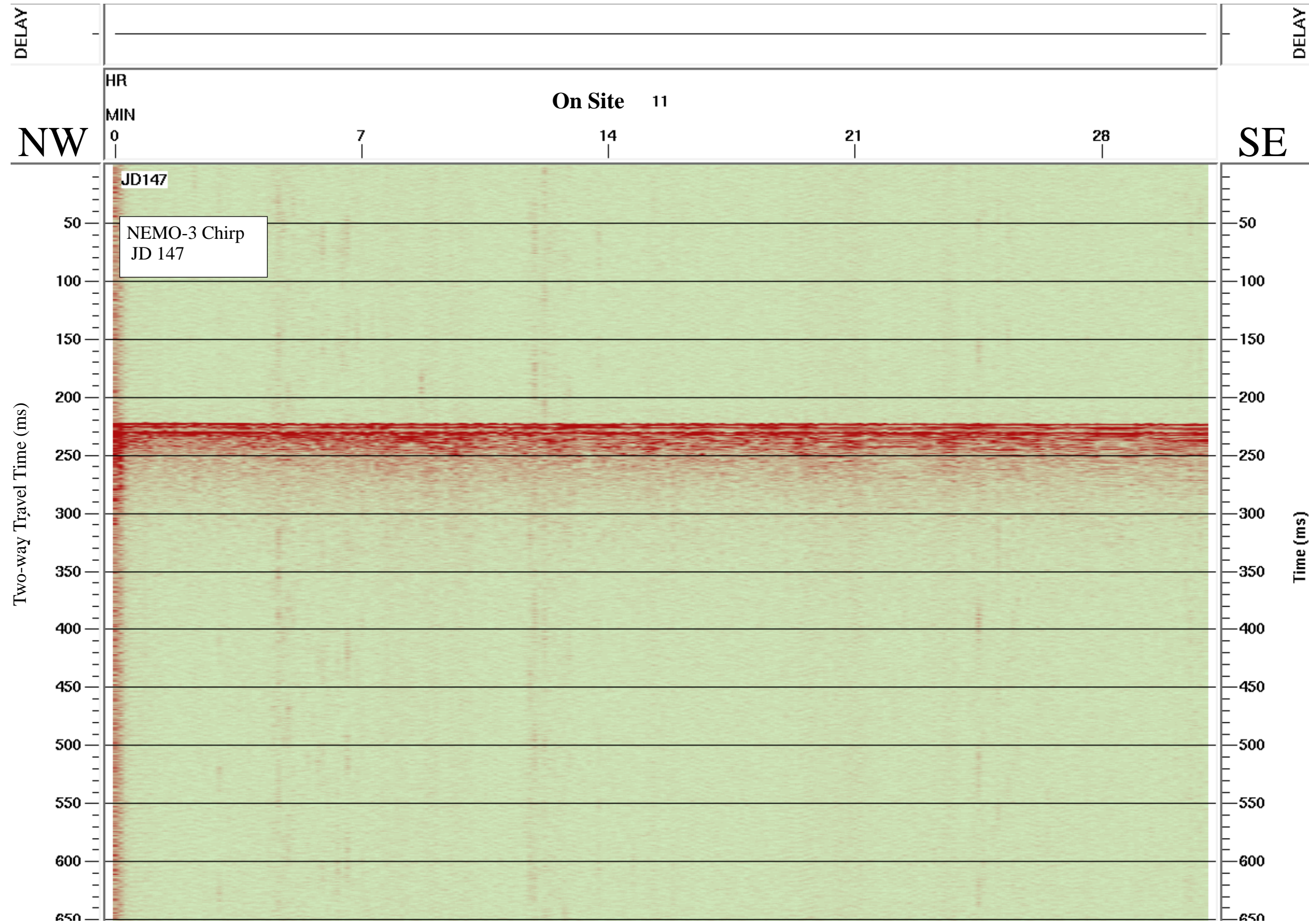




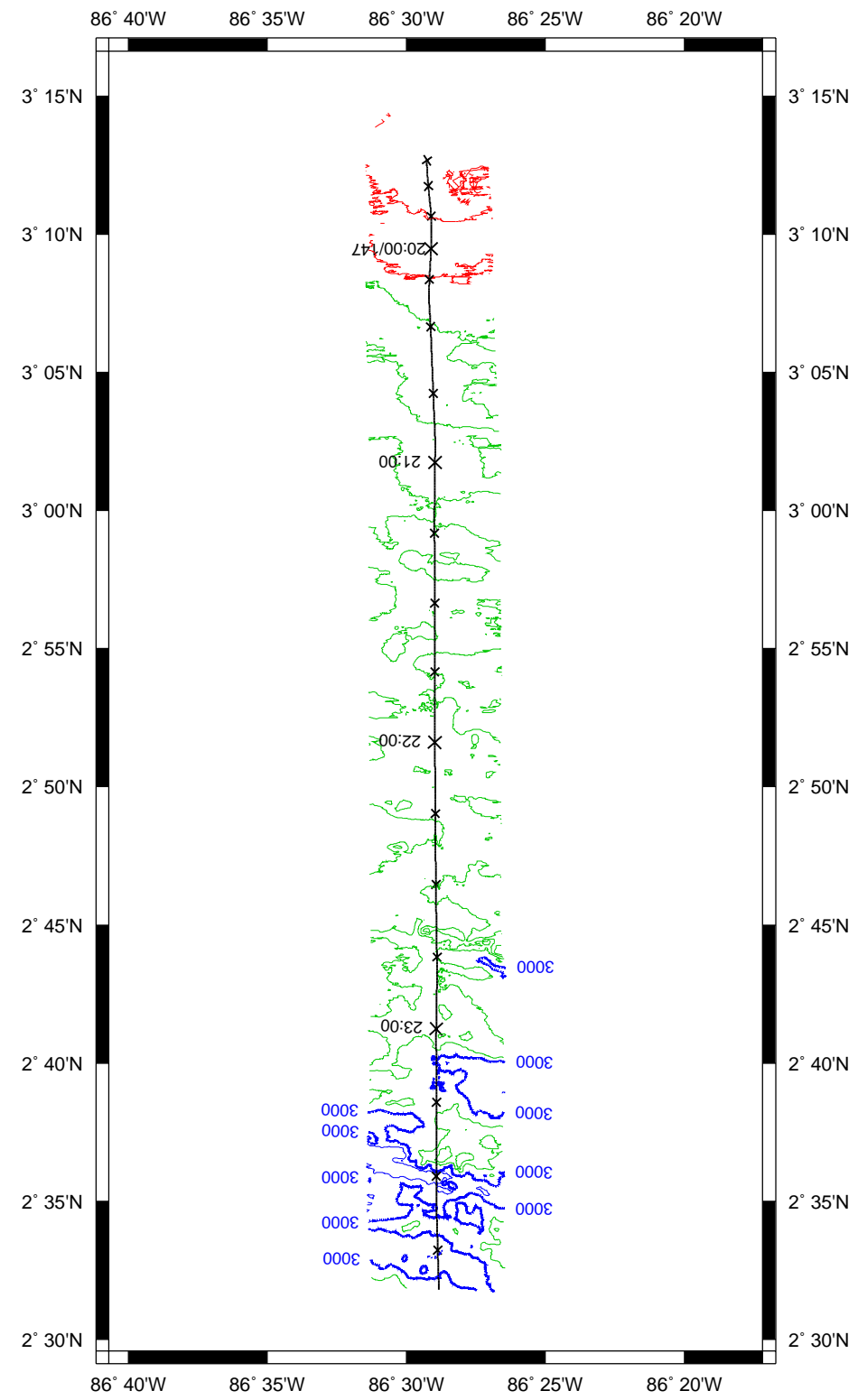


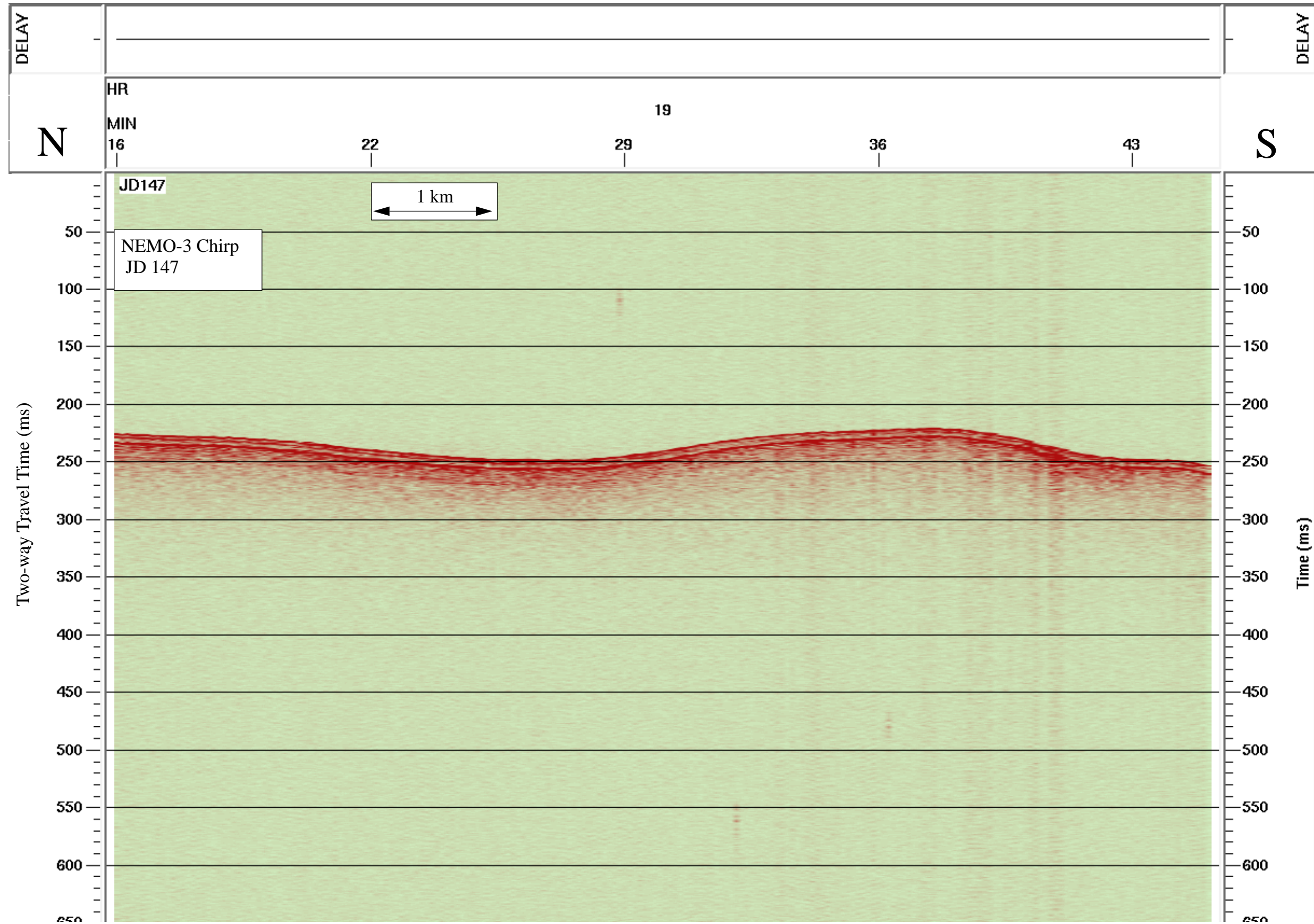


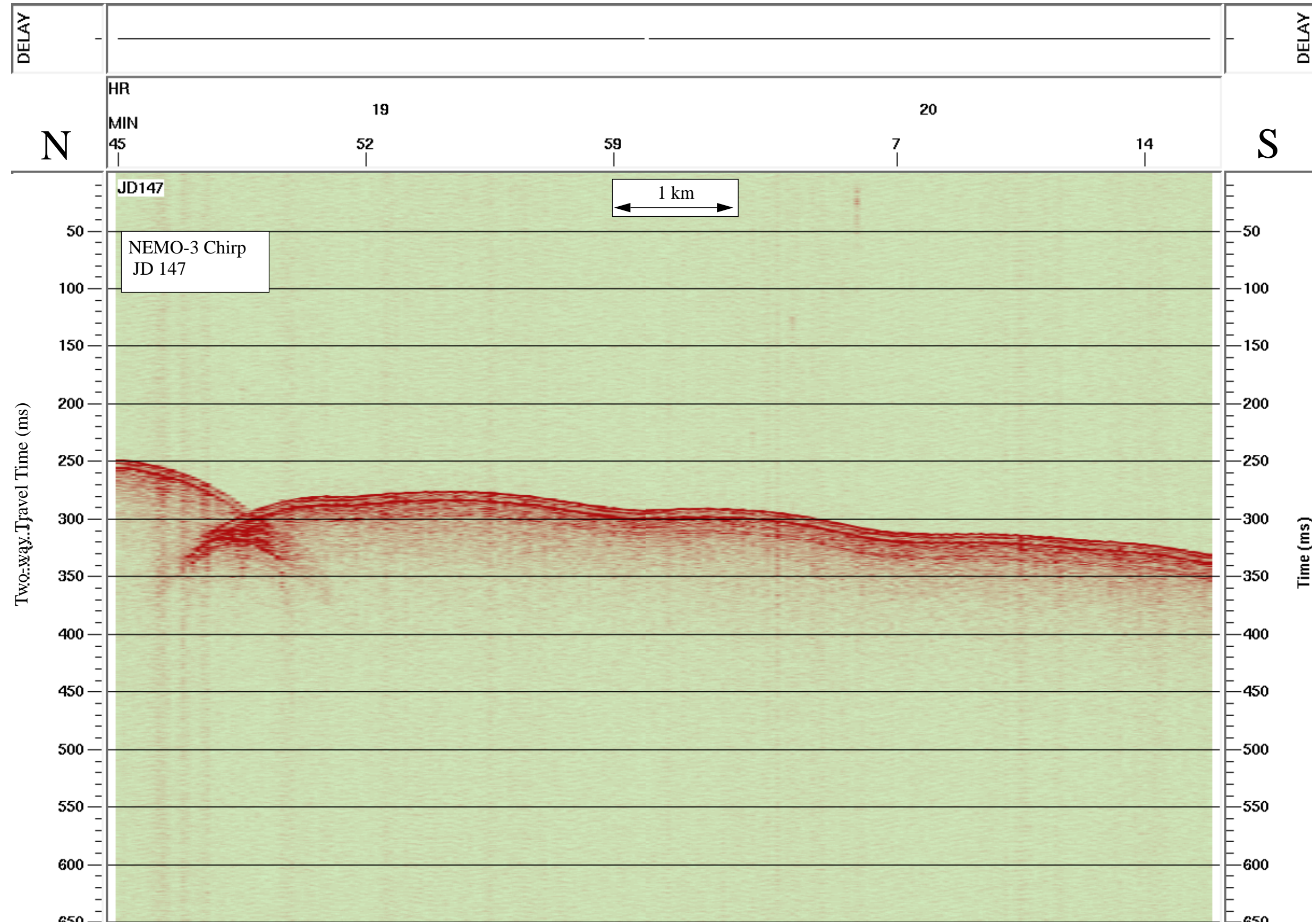


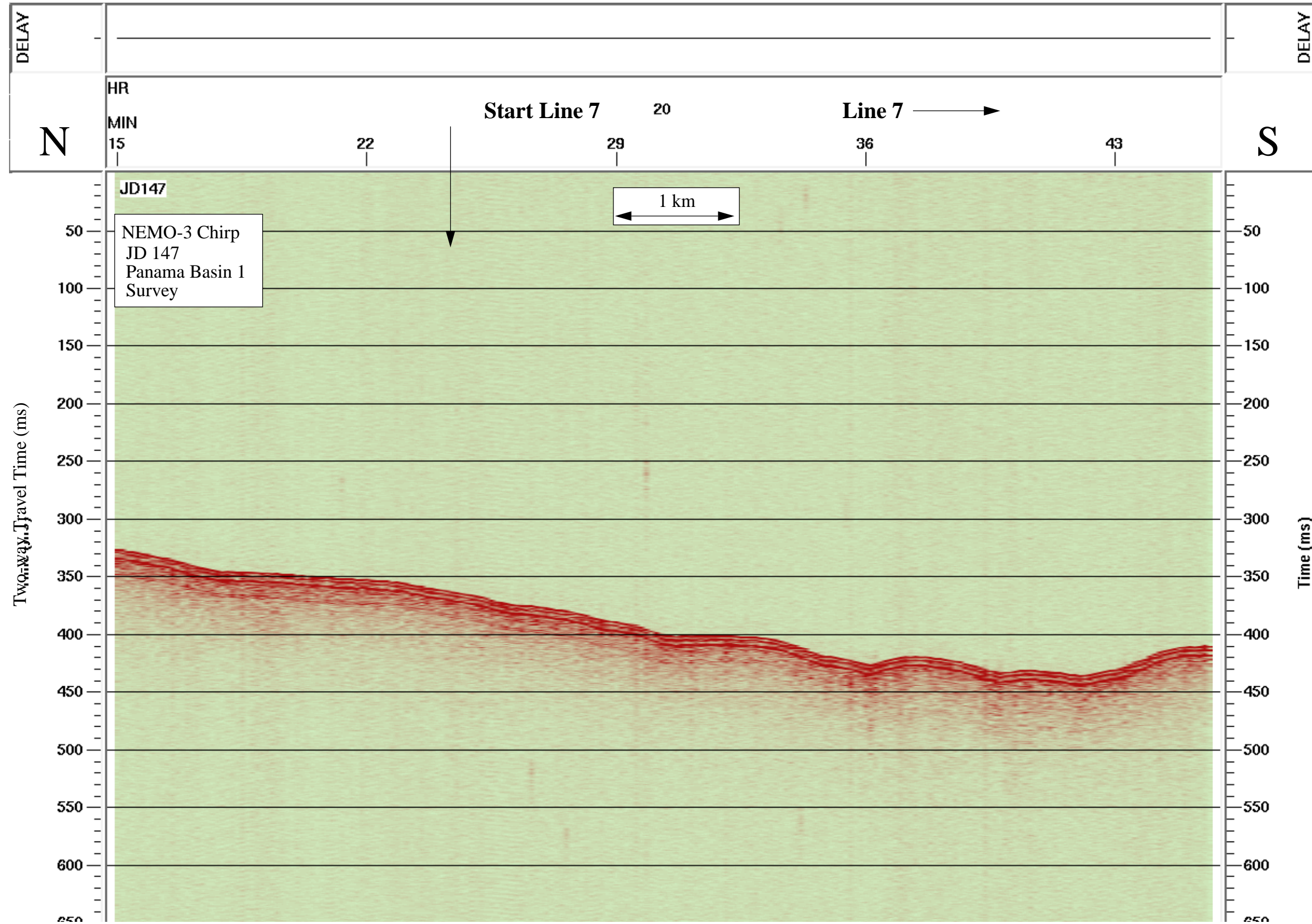


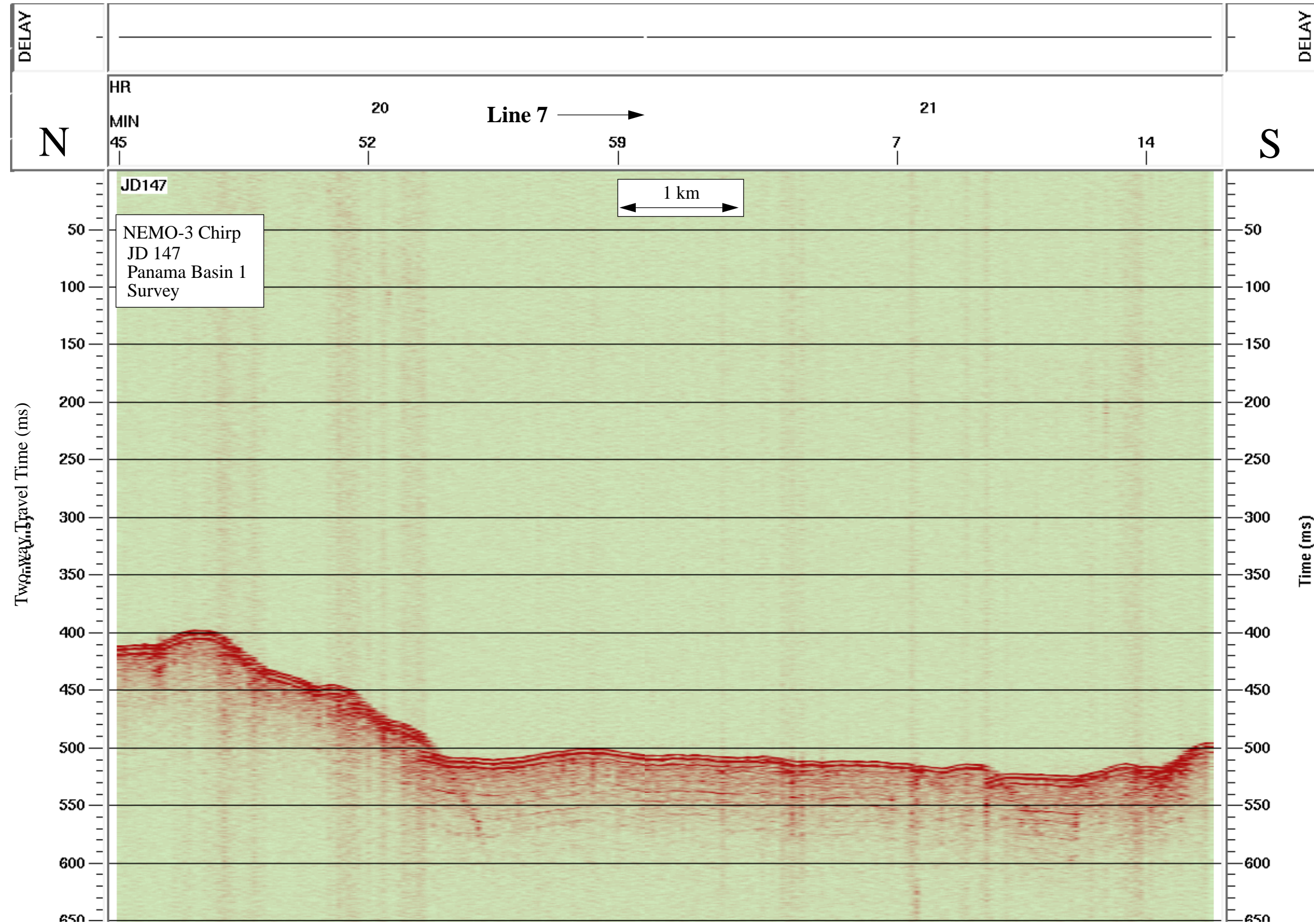
Data File SBfixavg.2000may26.1800-2400

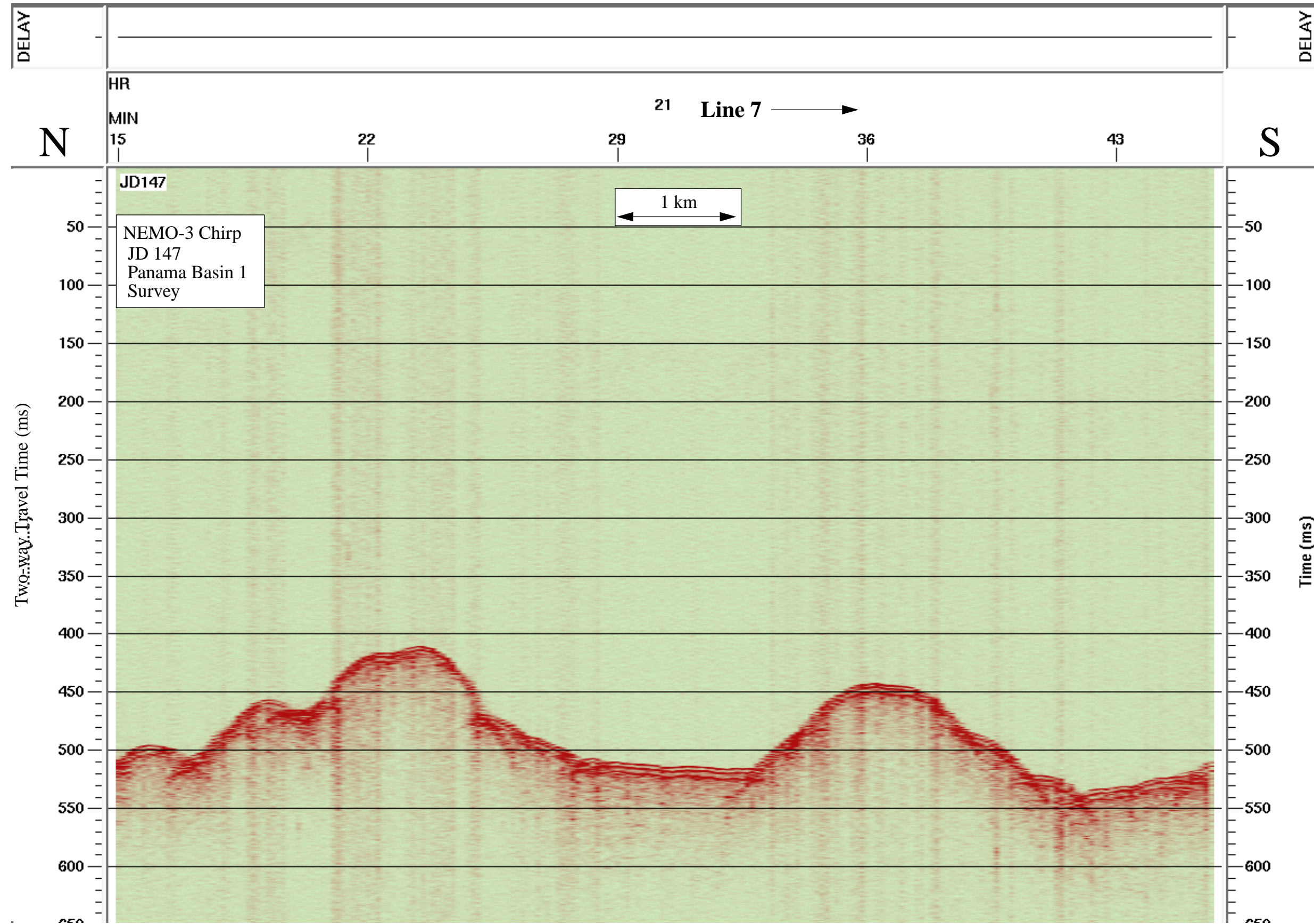


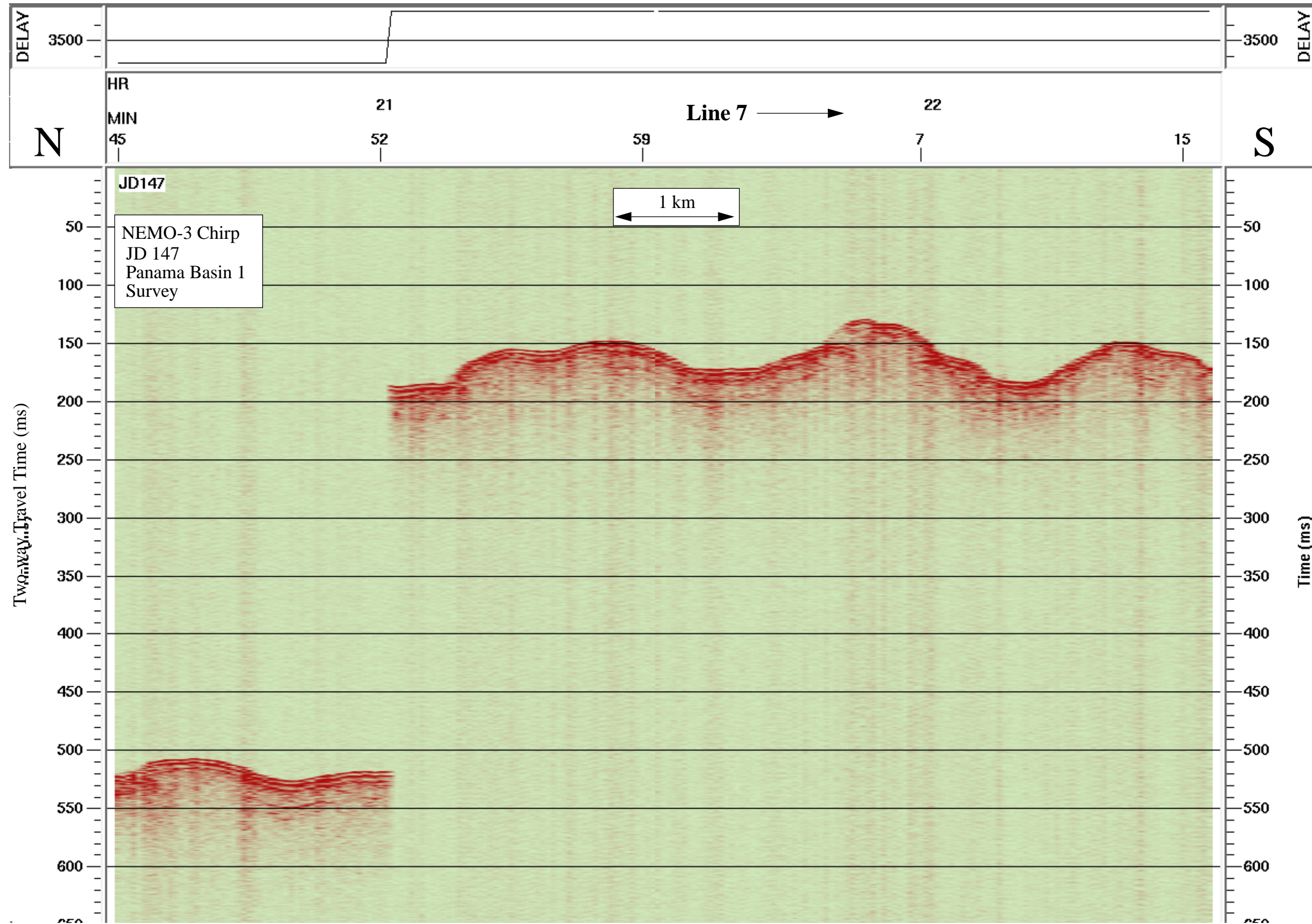












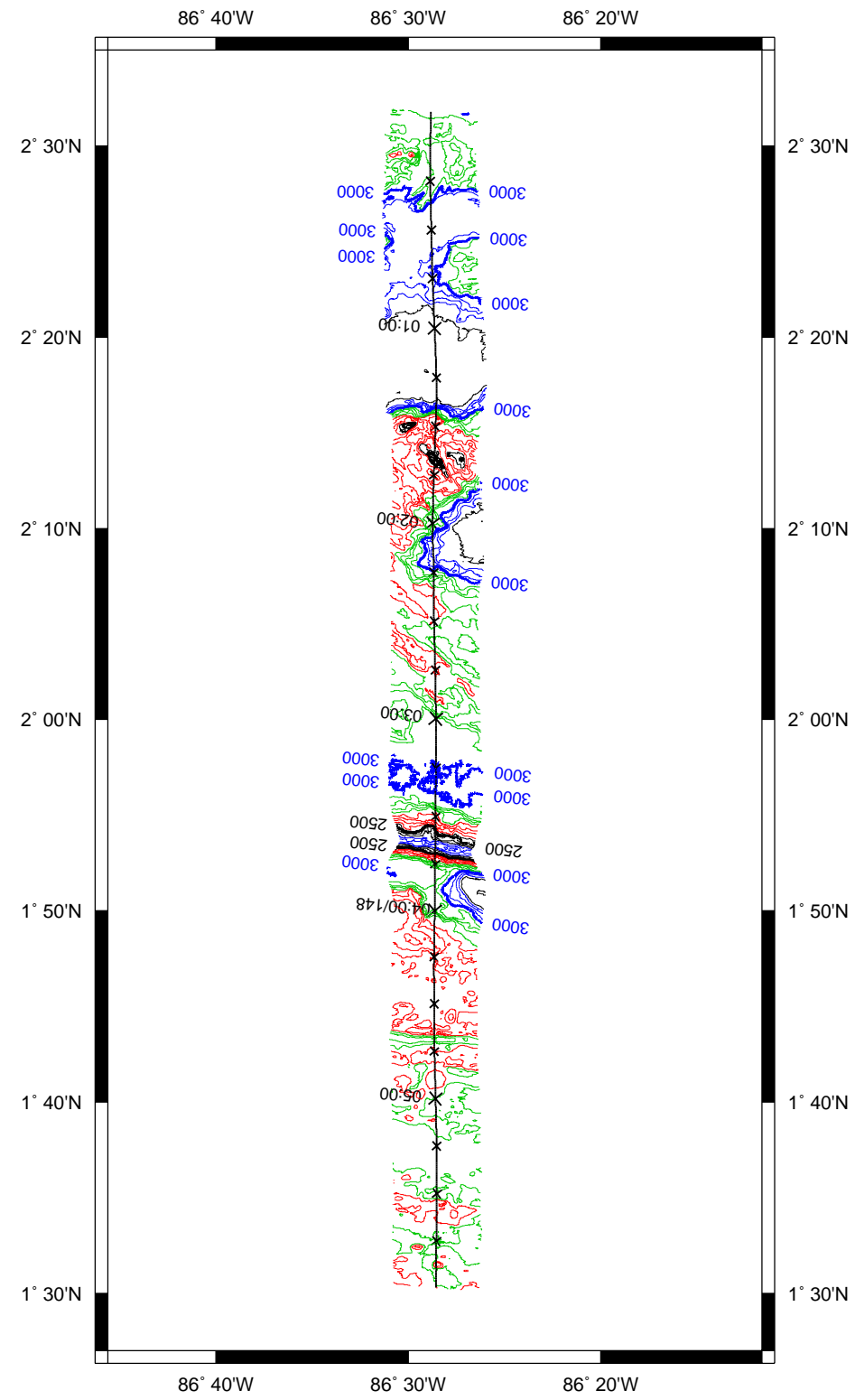
JD 148 (27 May 2000)--PAN-2 Survey, equator in Panama Basin

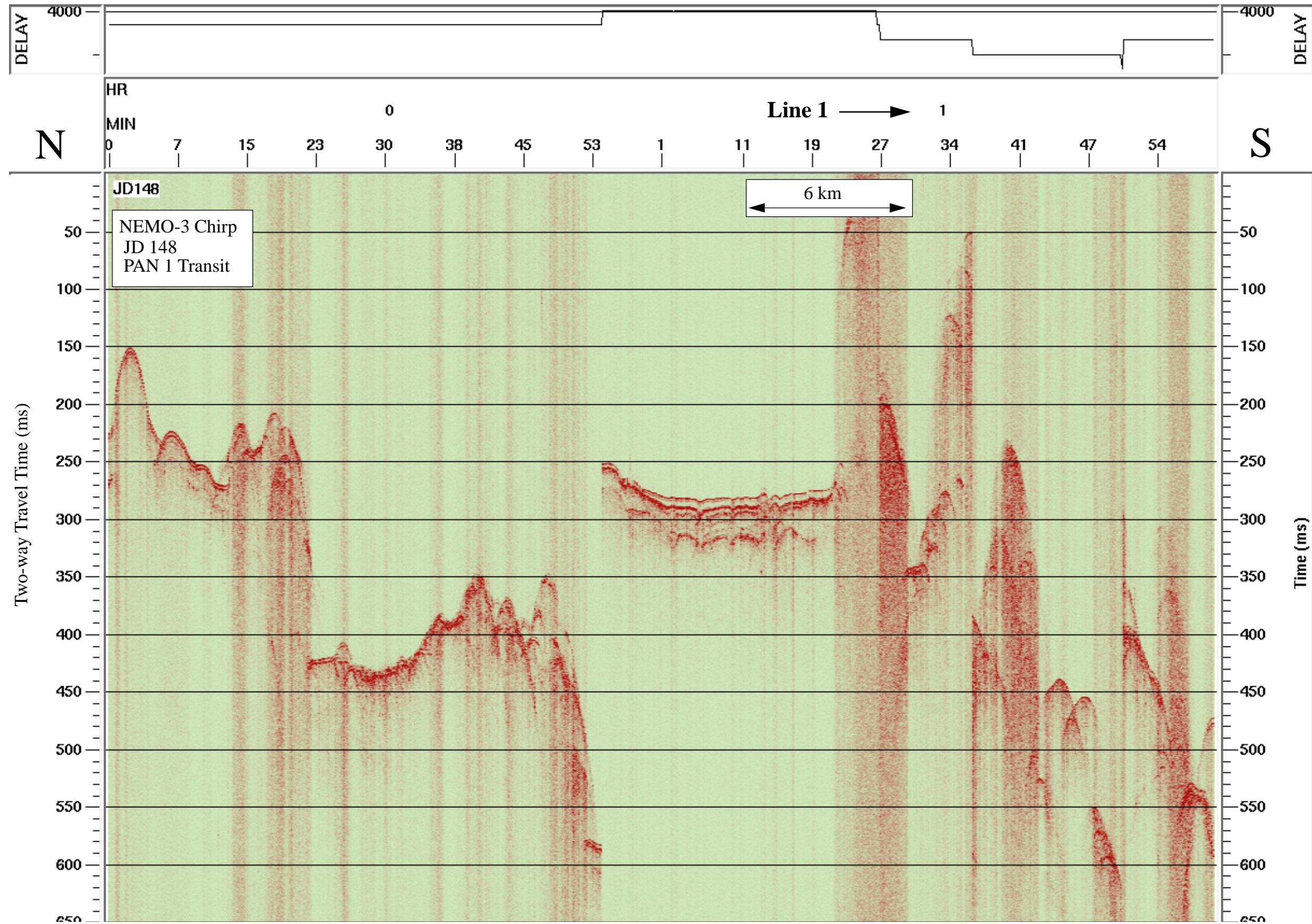
2-7 kHz Chirp Subbottom Profiler

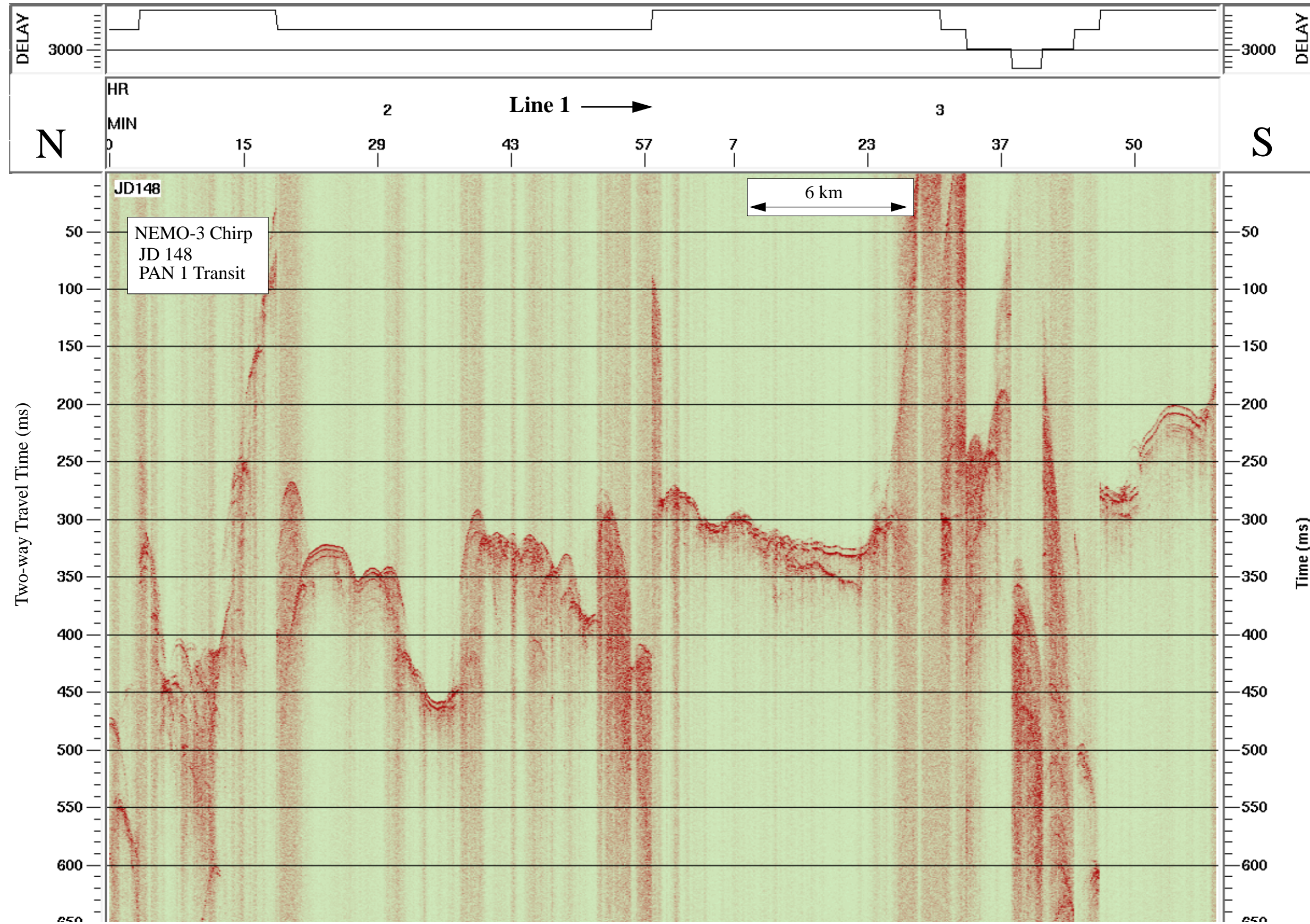
NEMO Leg 3

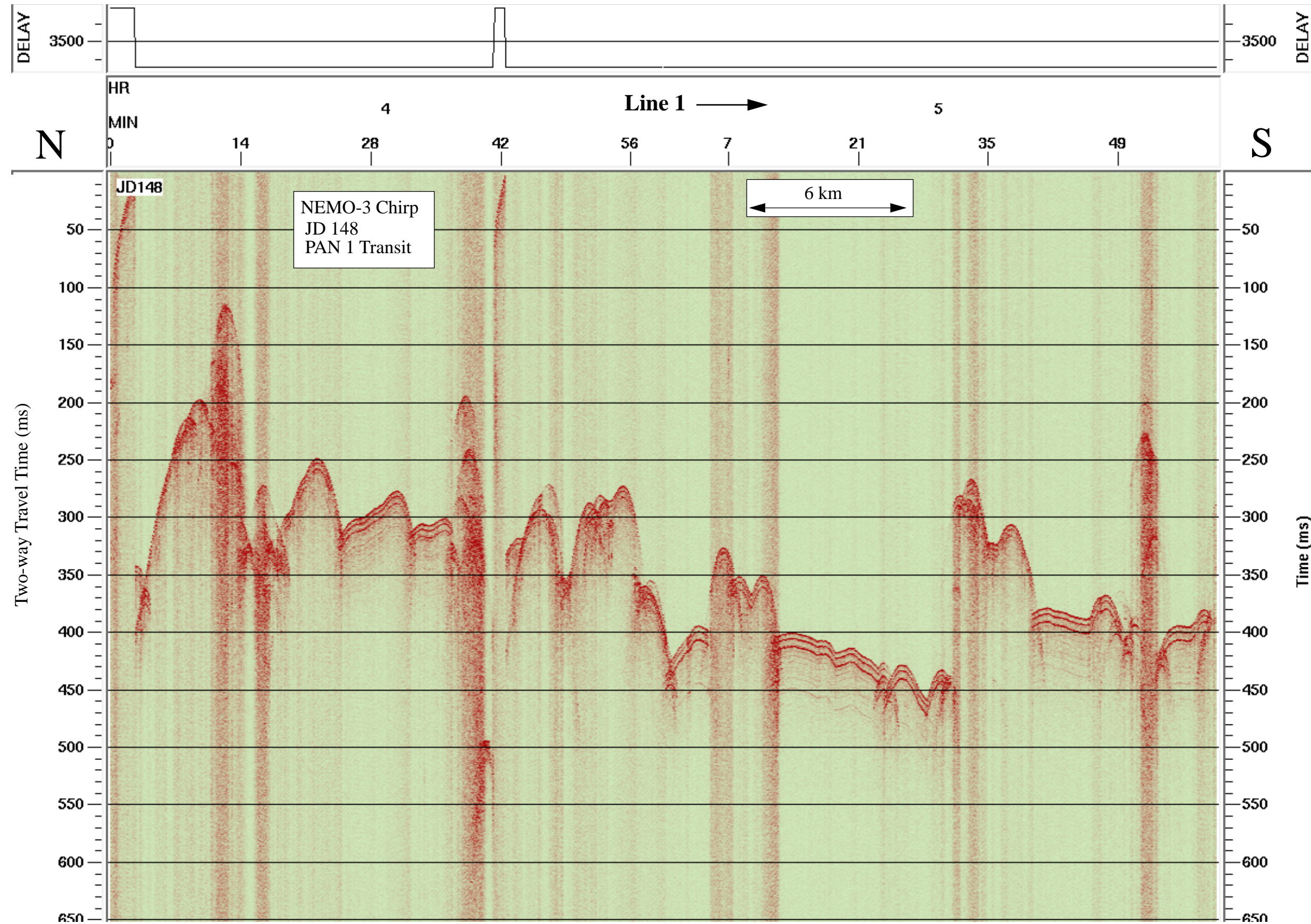
R/V Melville

Data File SBfixavg.2000may27.0000-0600

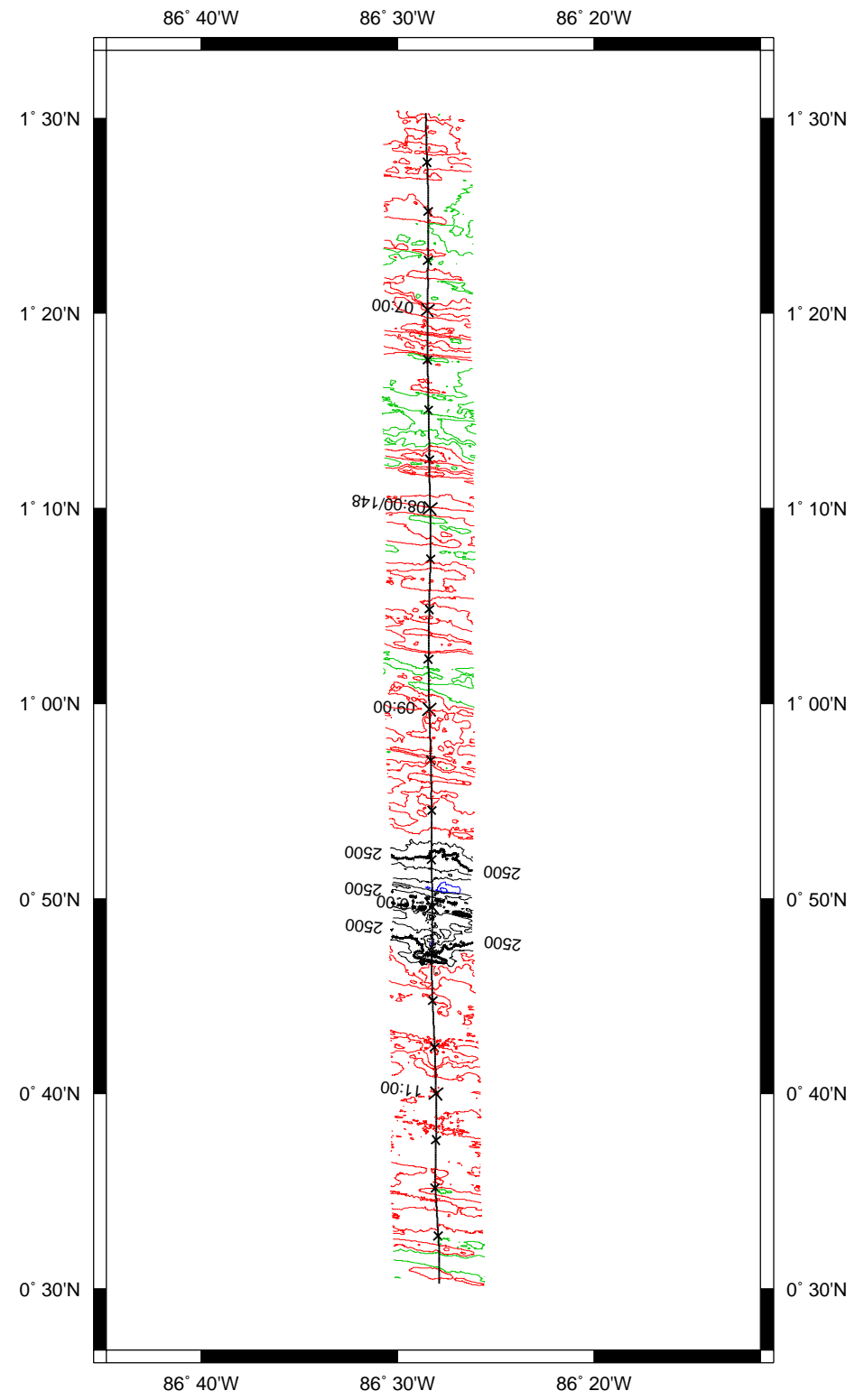


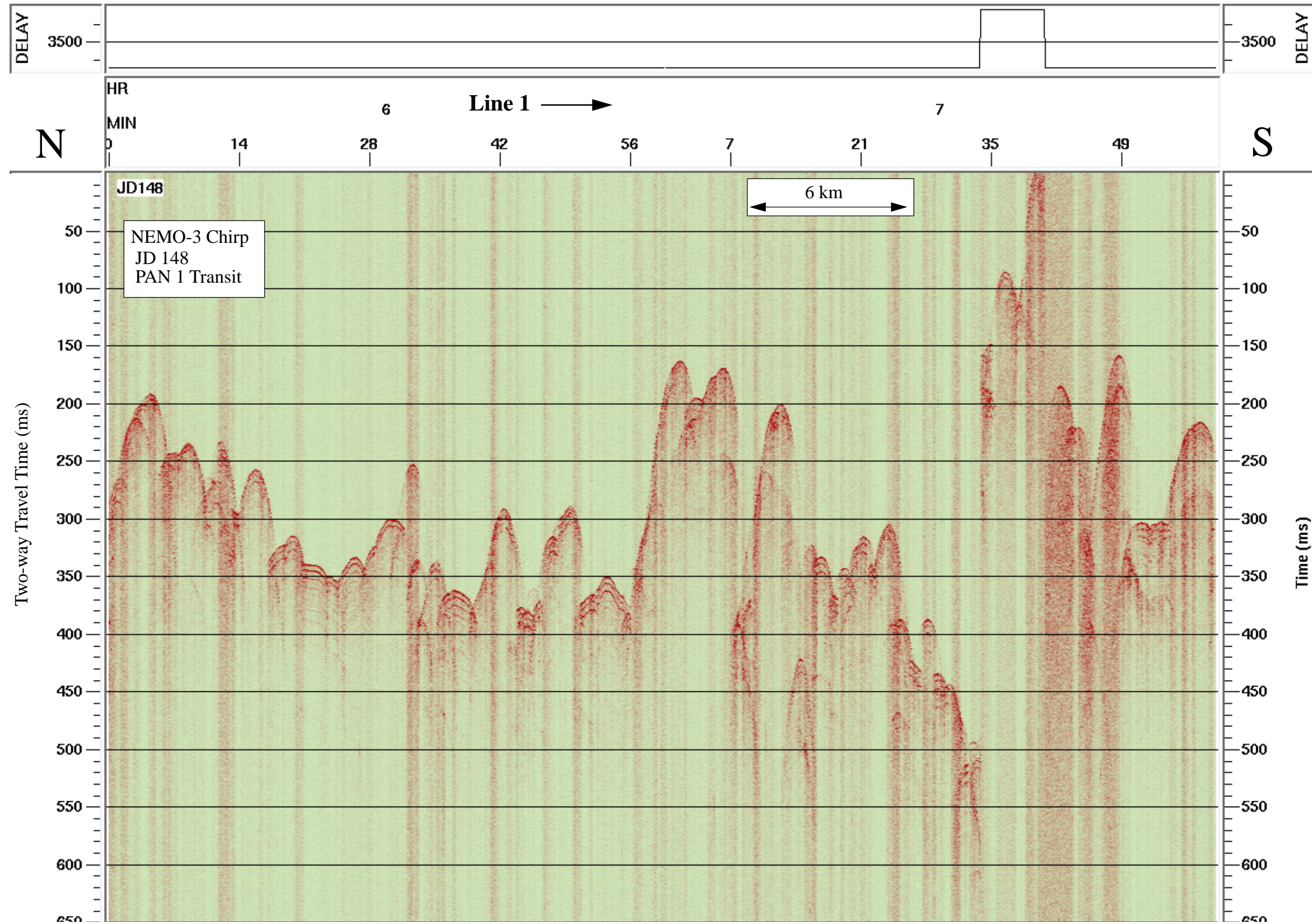


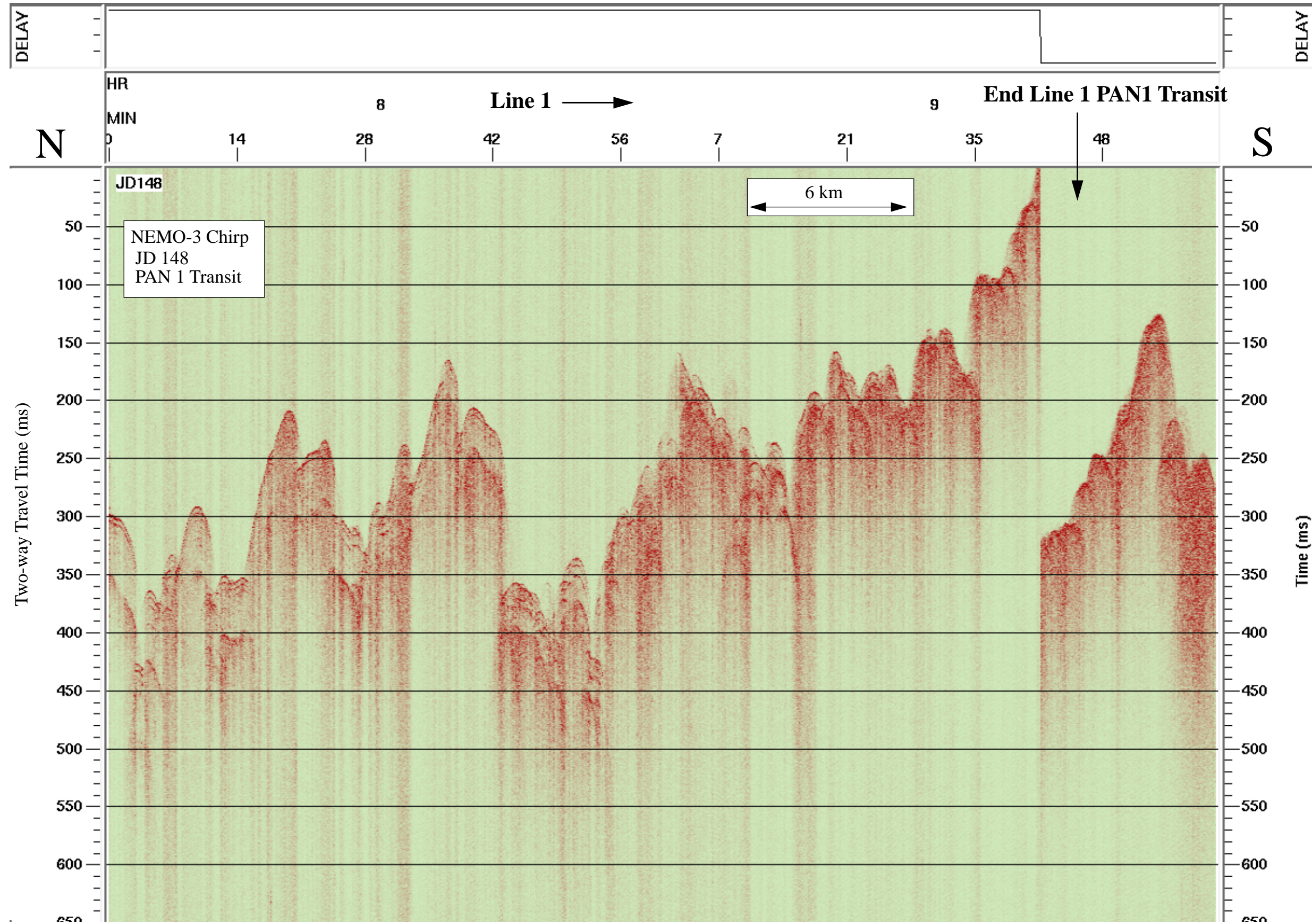


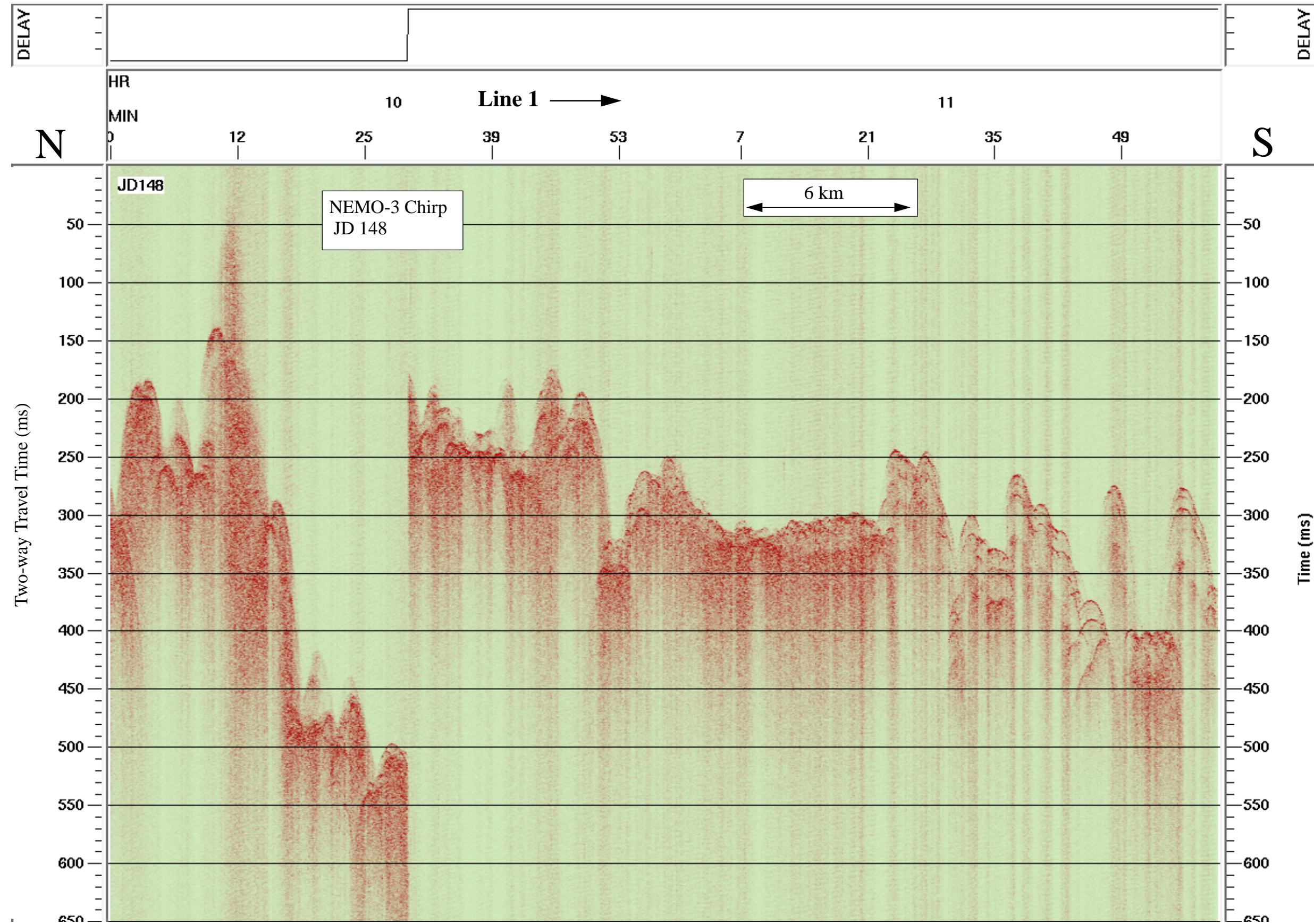


Data File SBfixavg.2000may27.0600-1200

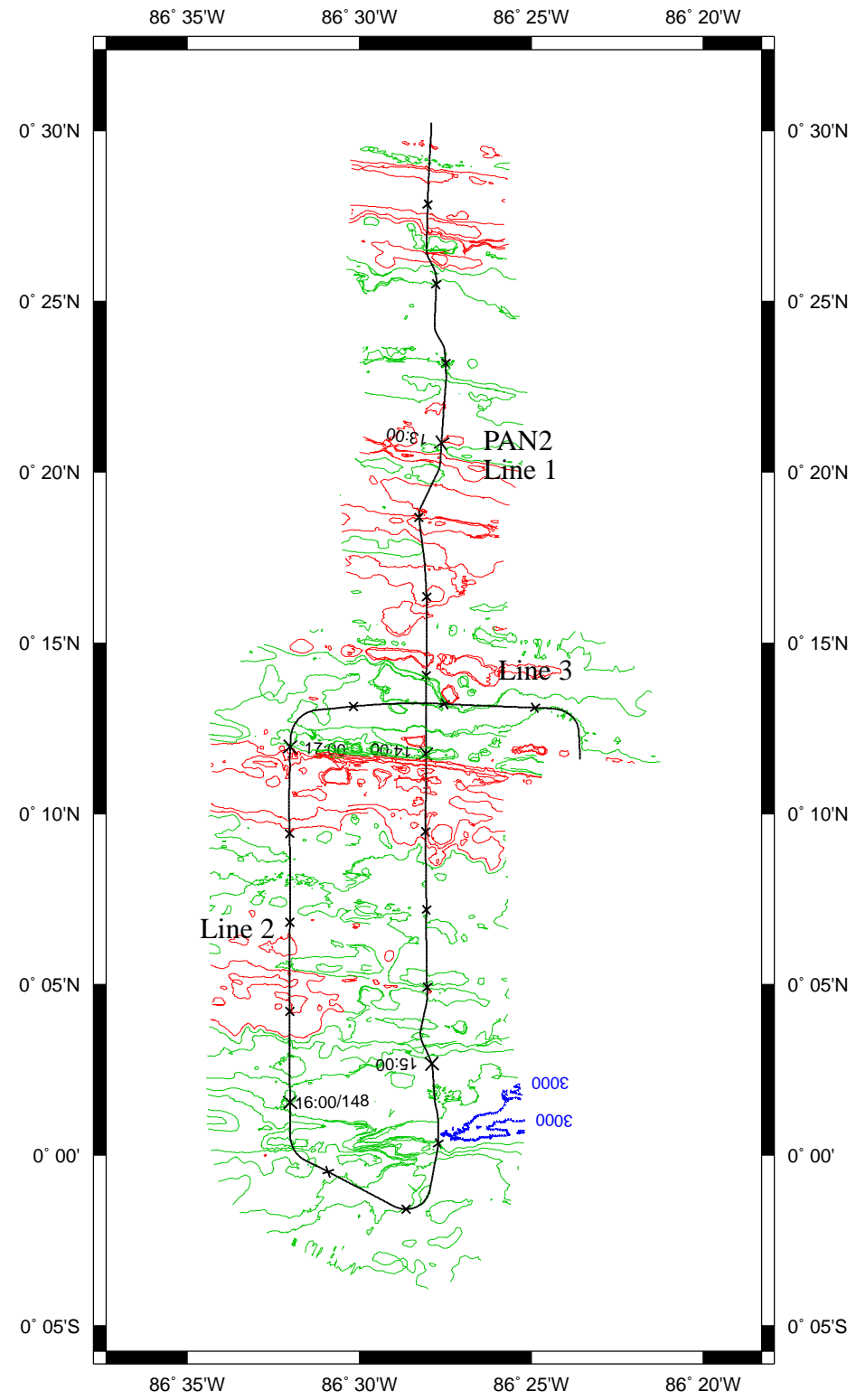


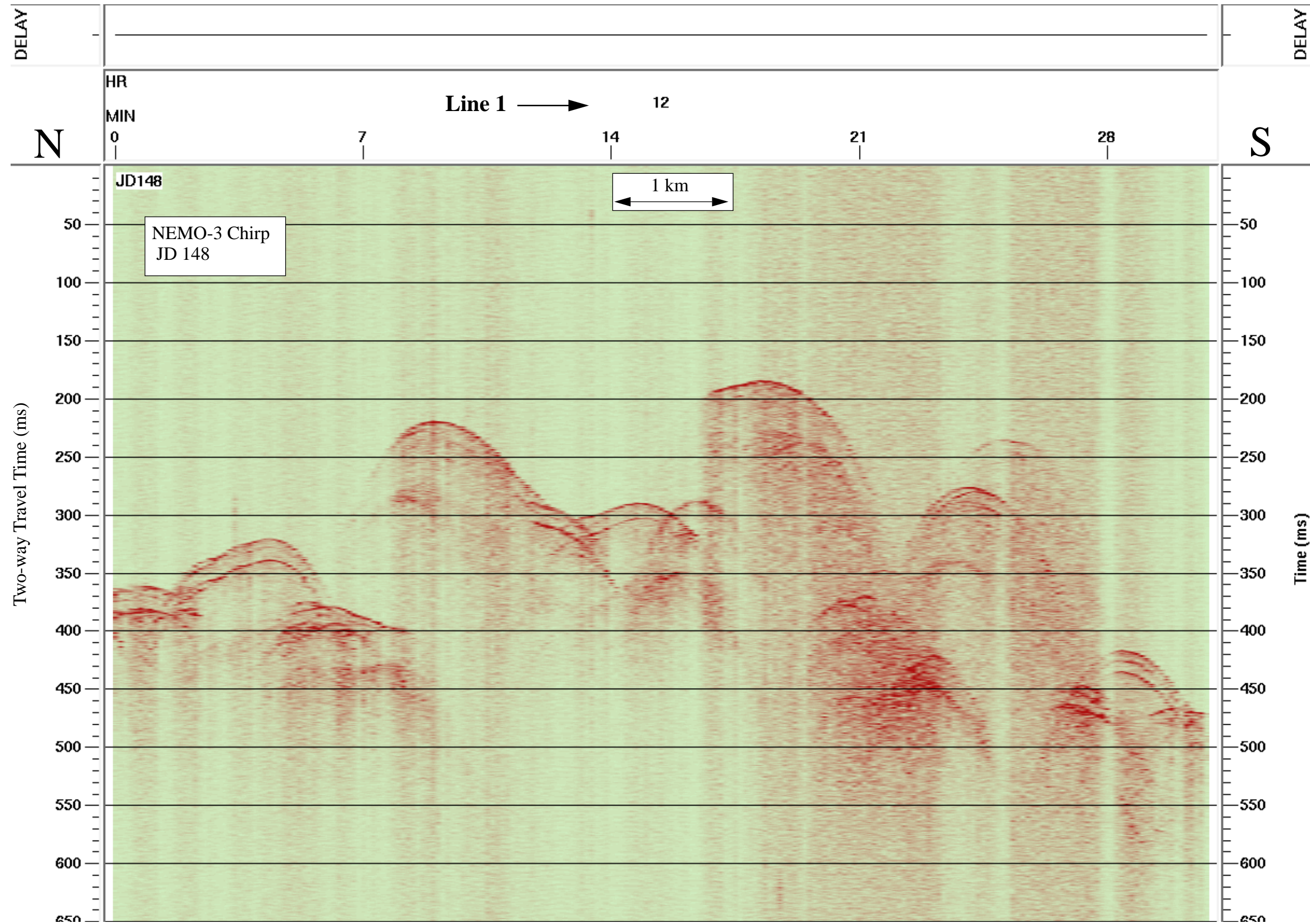


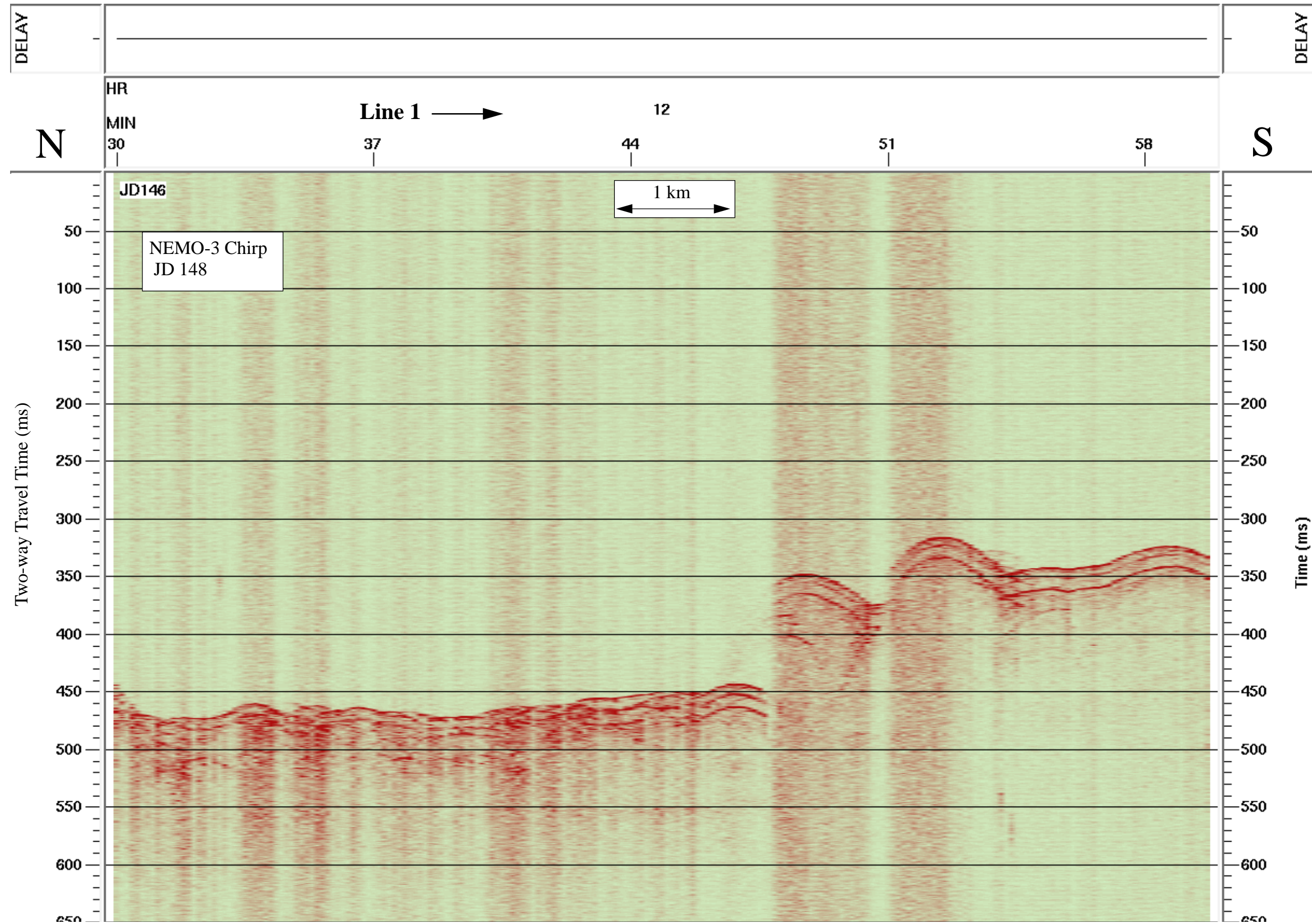


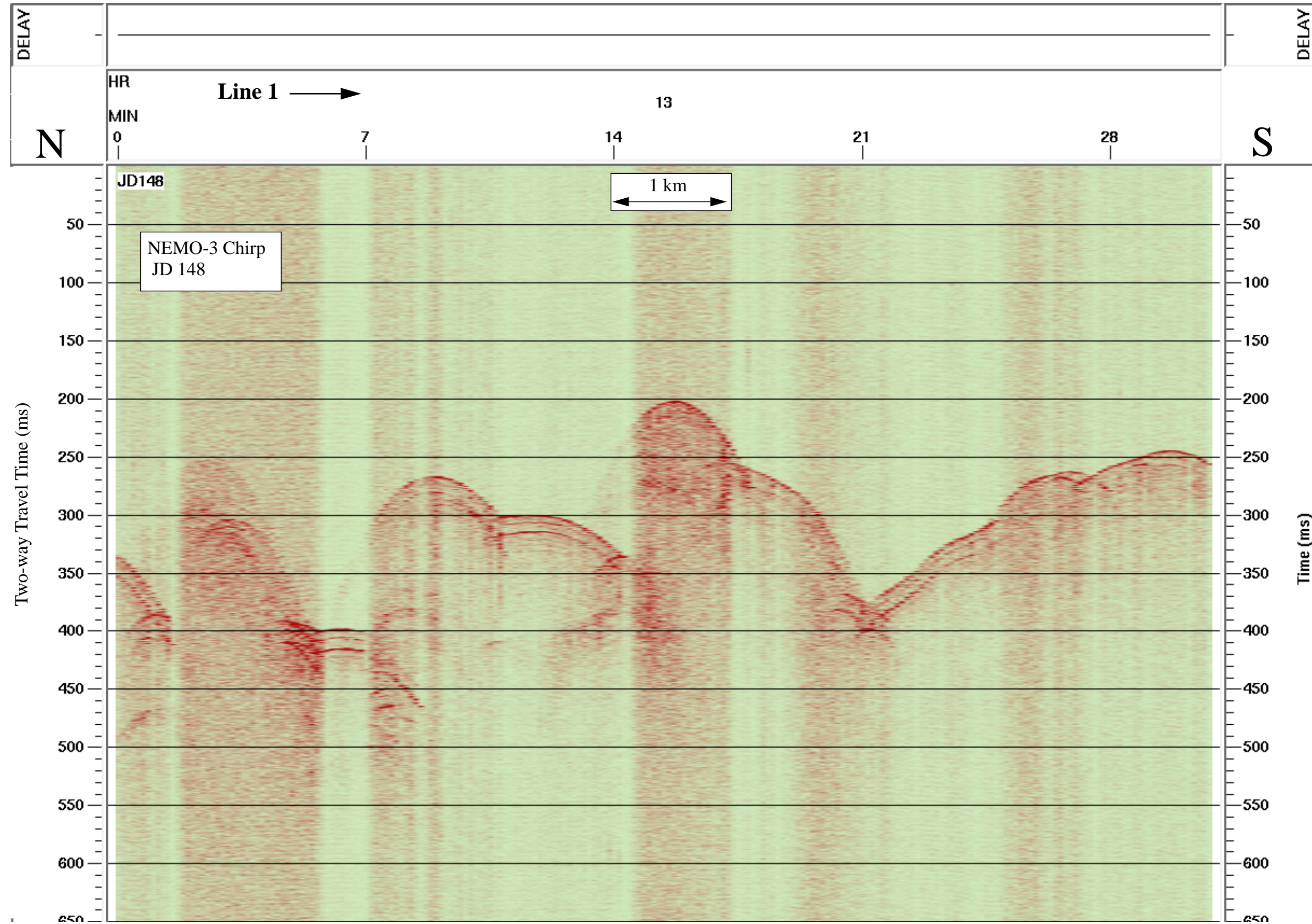


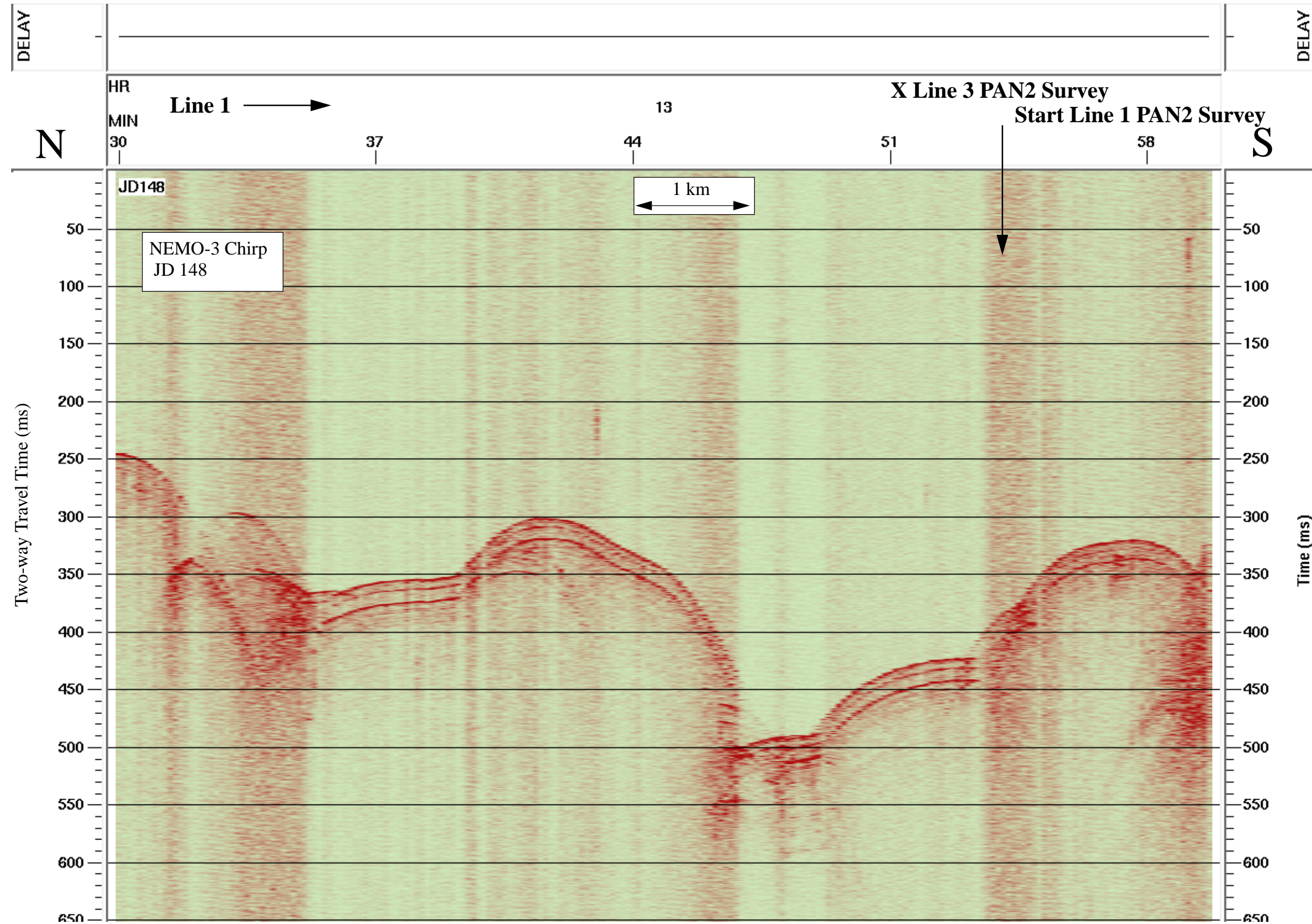
Data File SBfixavg.2000may27.1200-1800

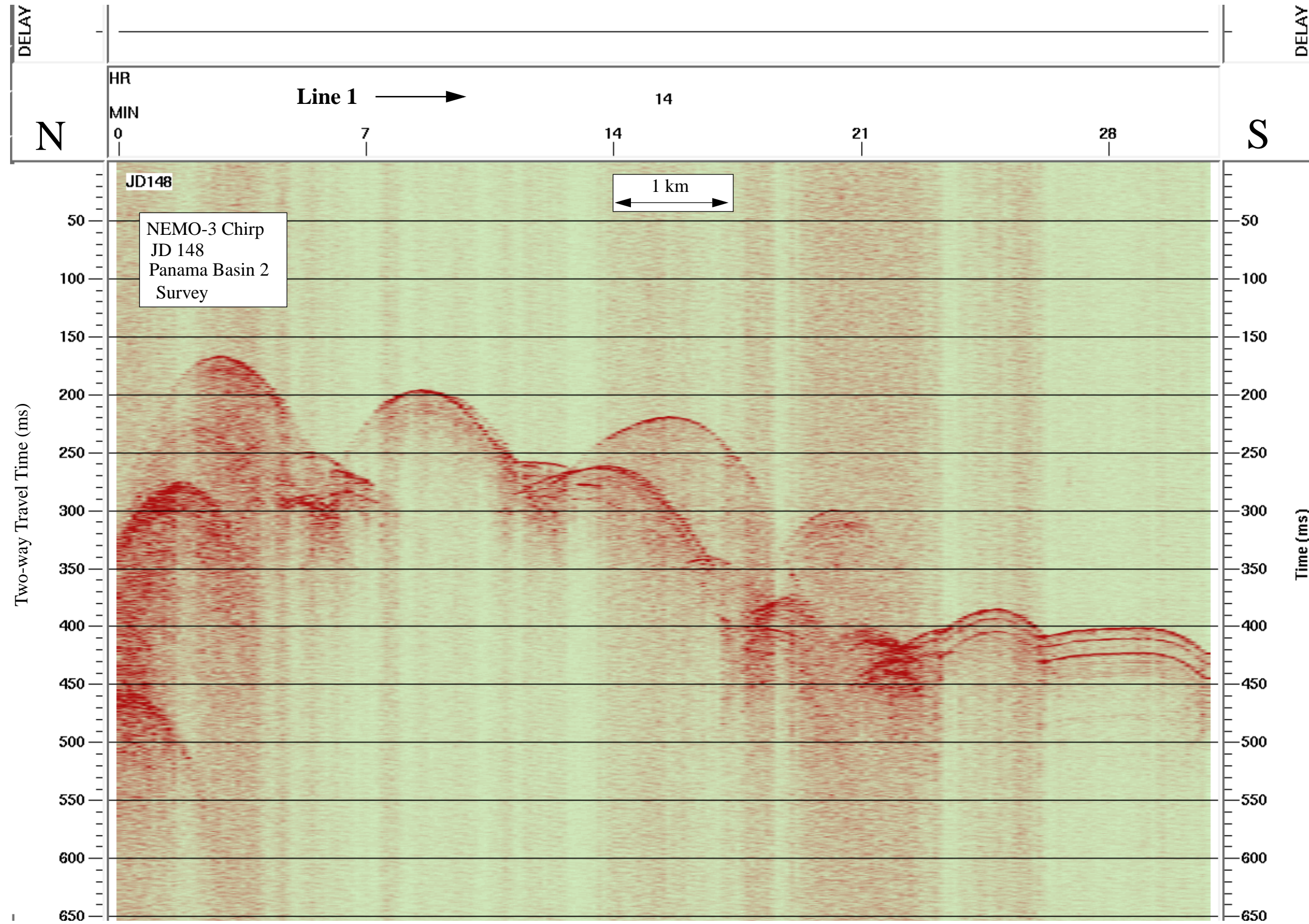


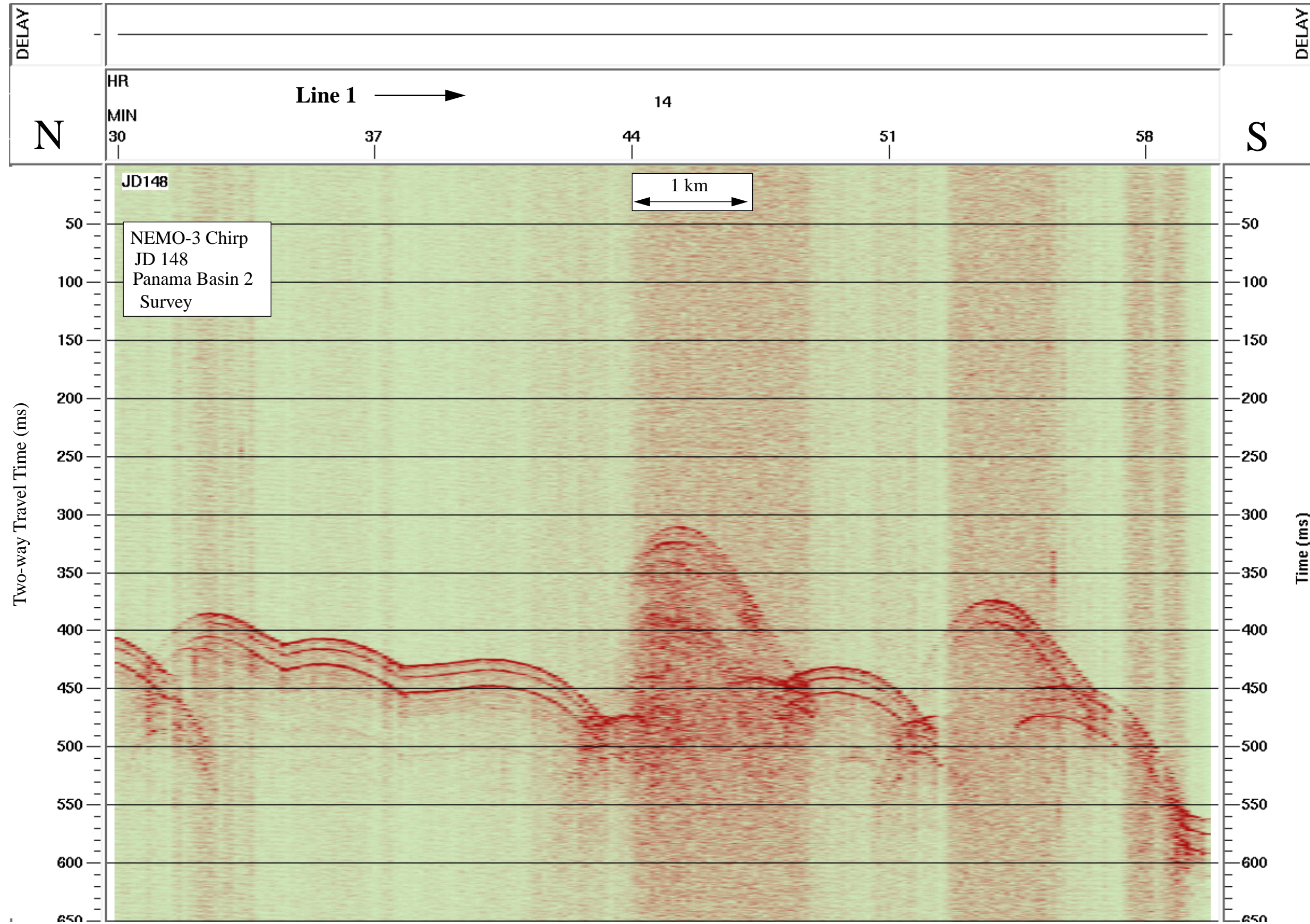


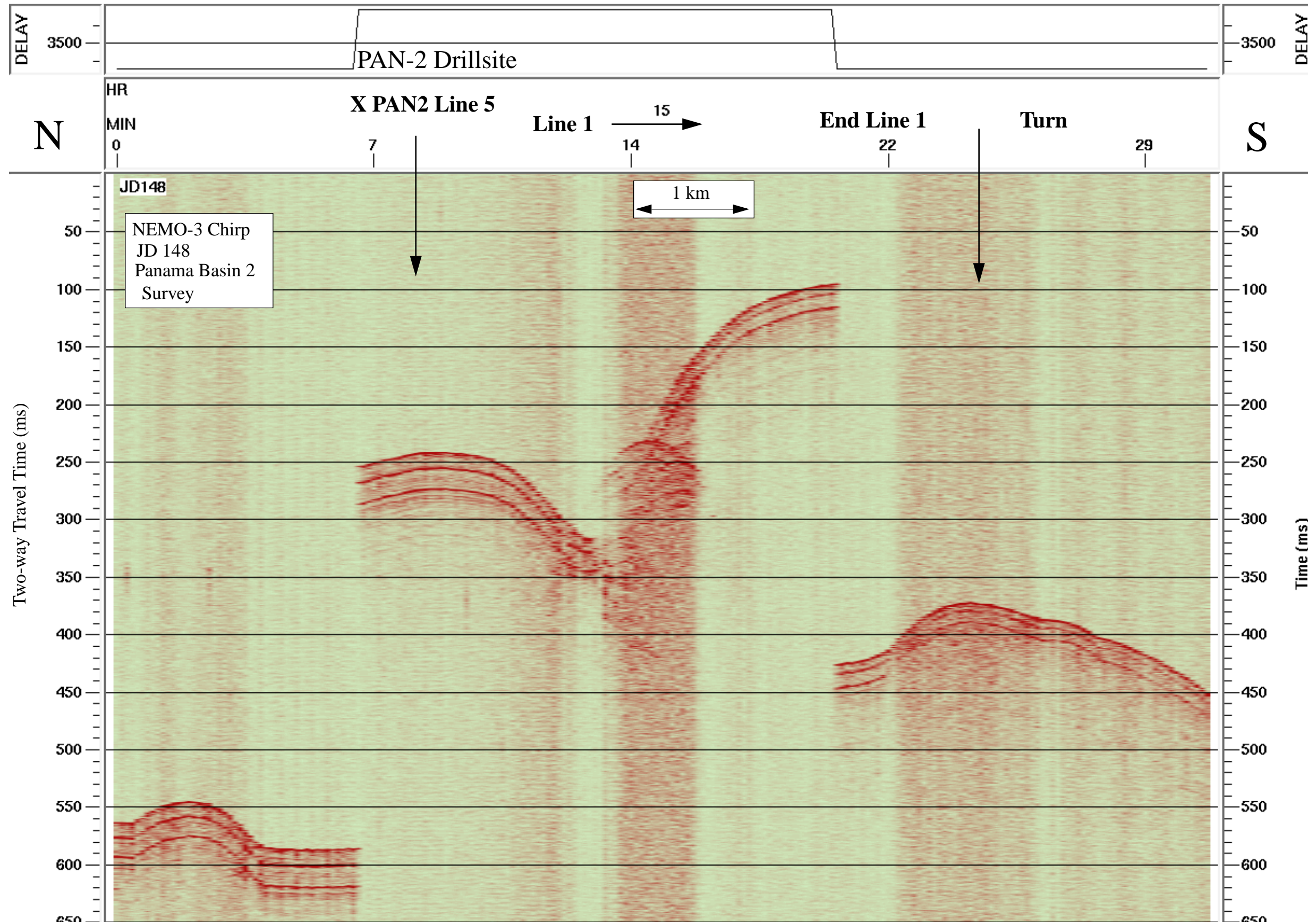


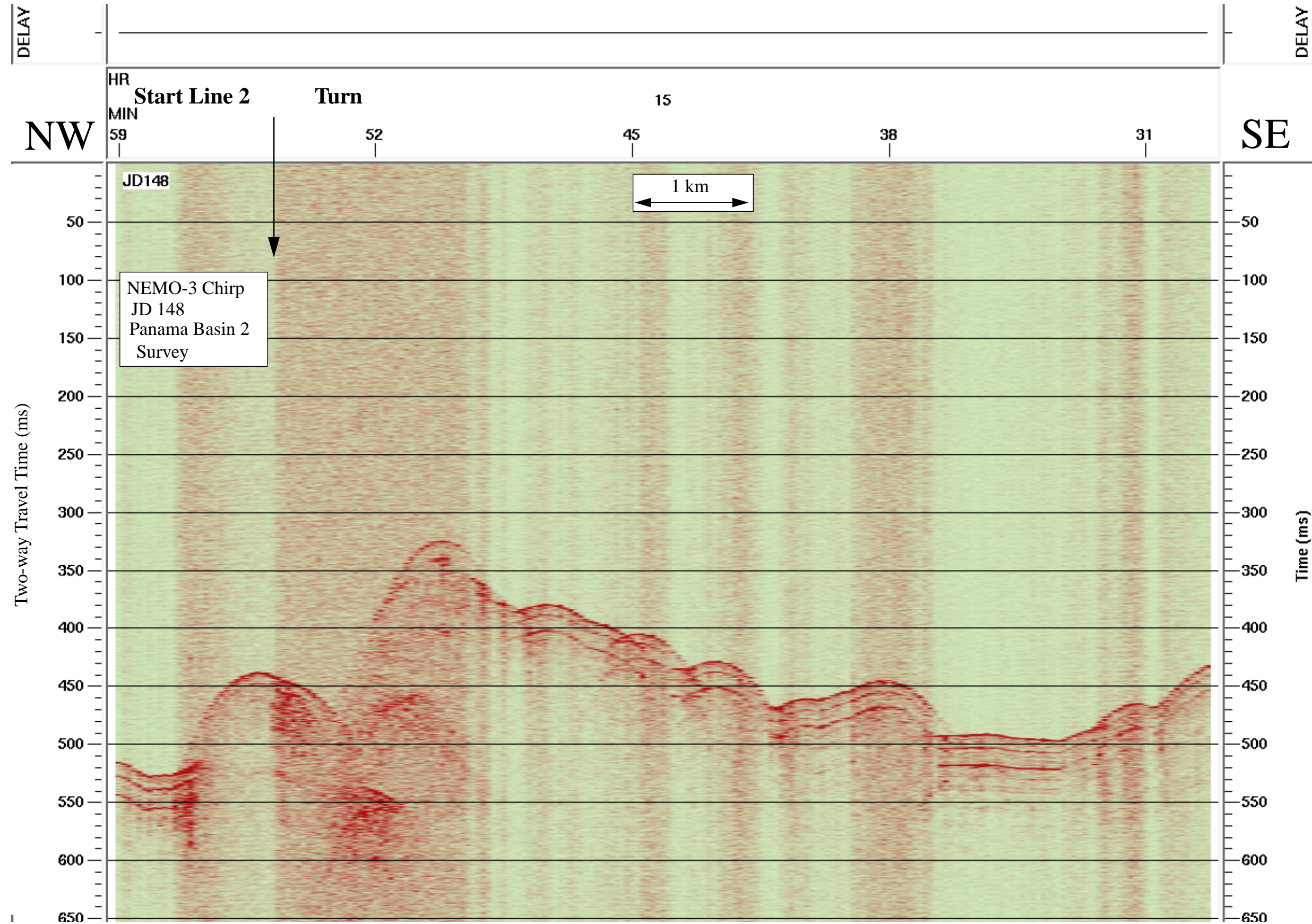


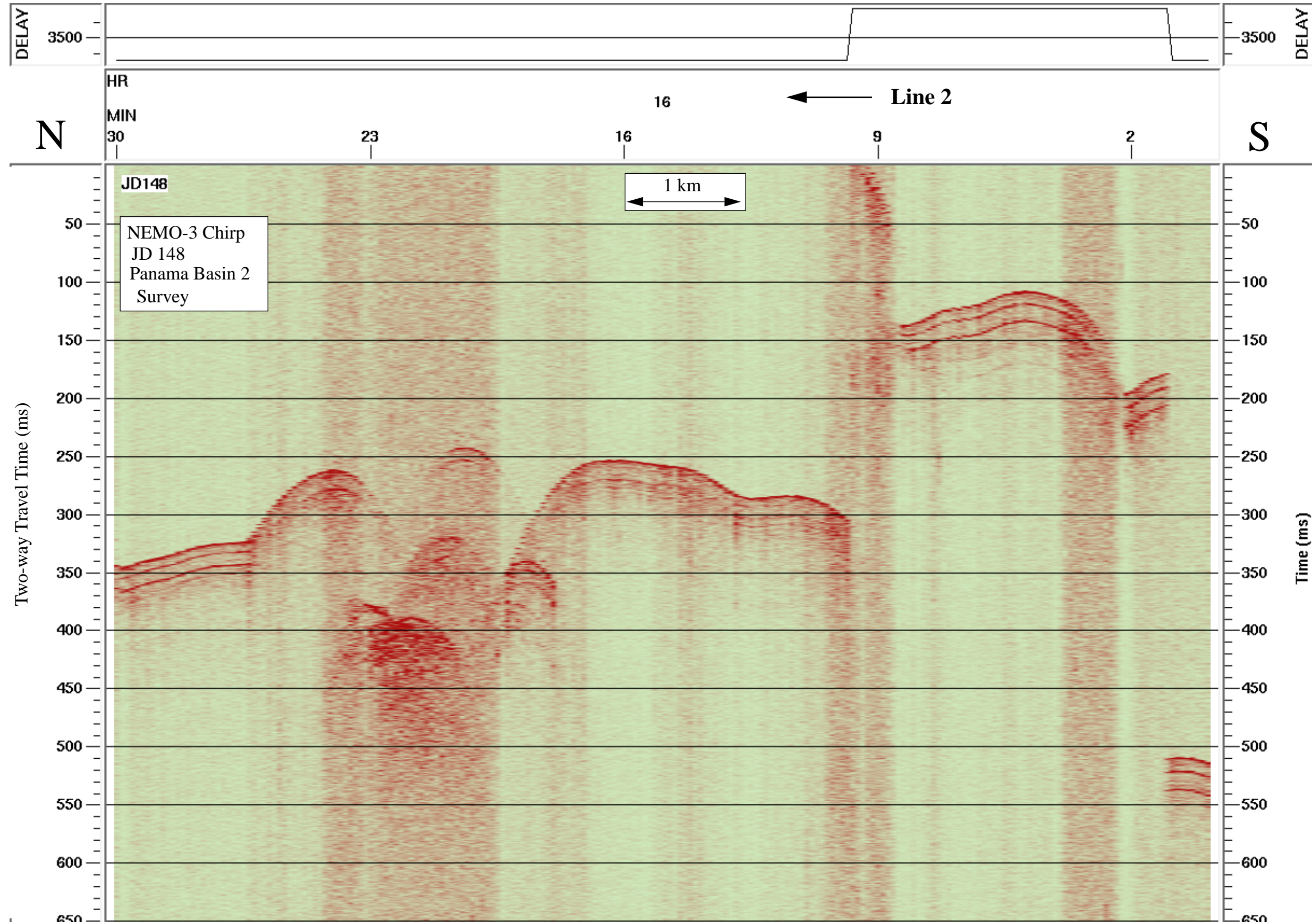


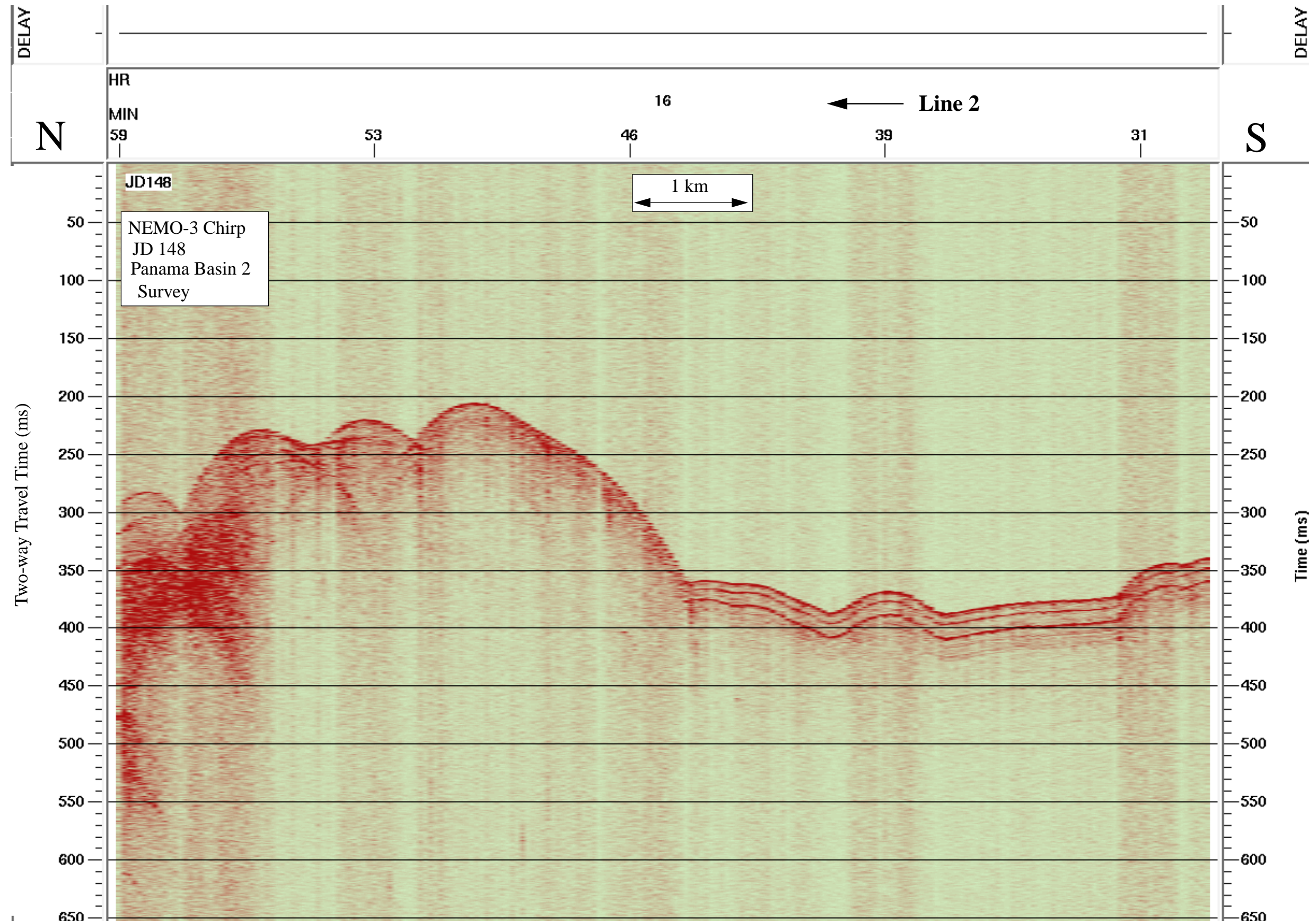


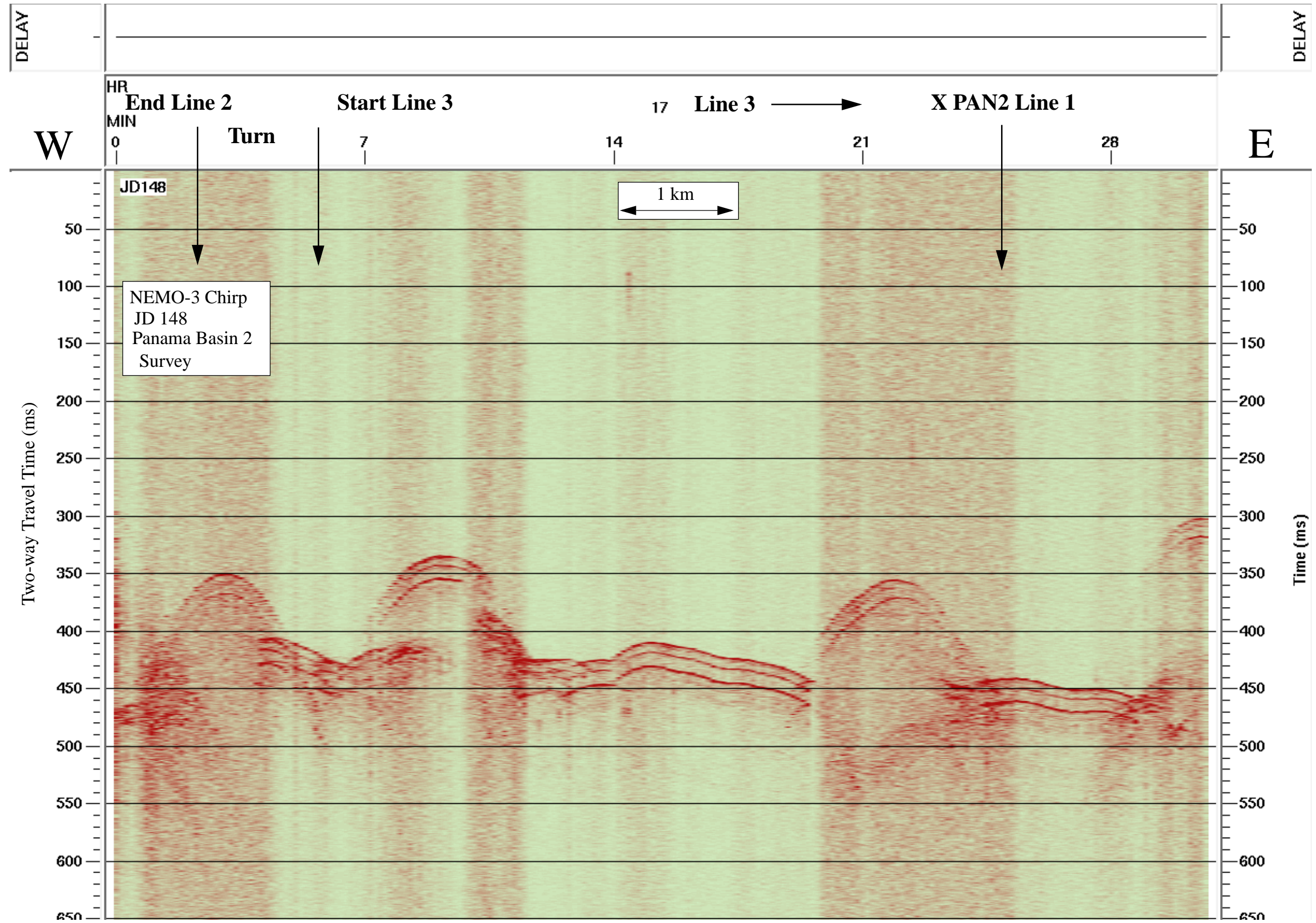


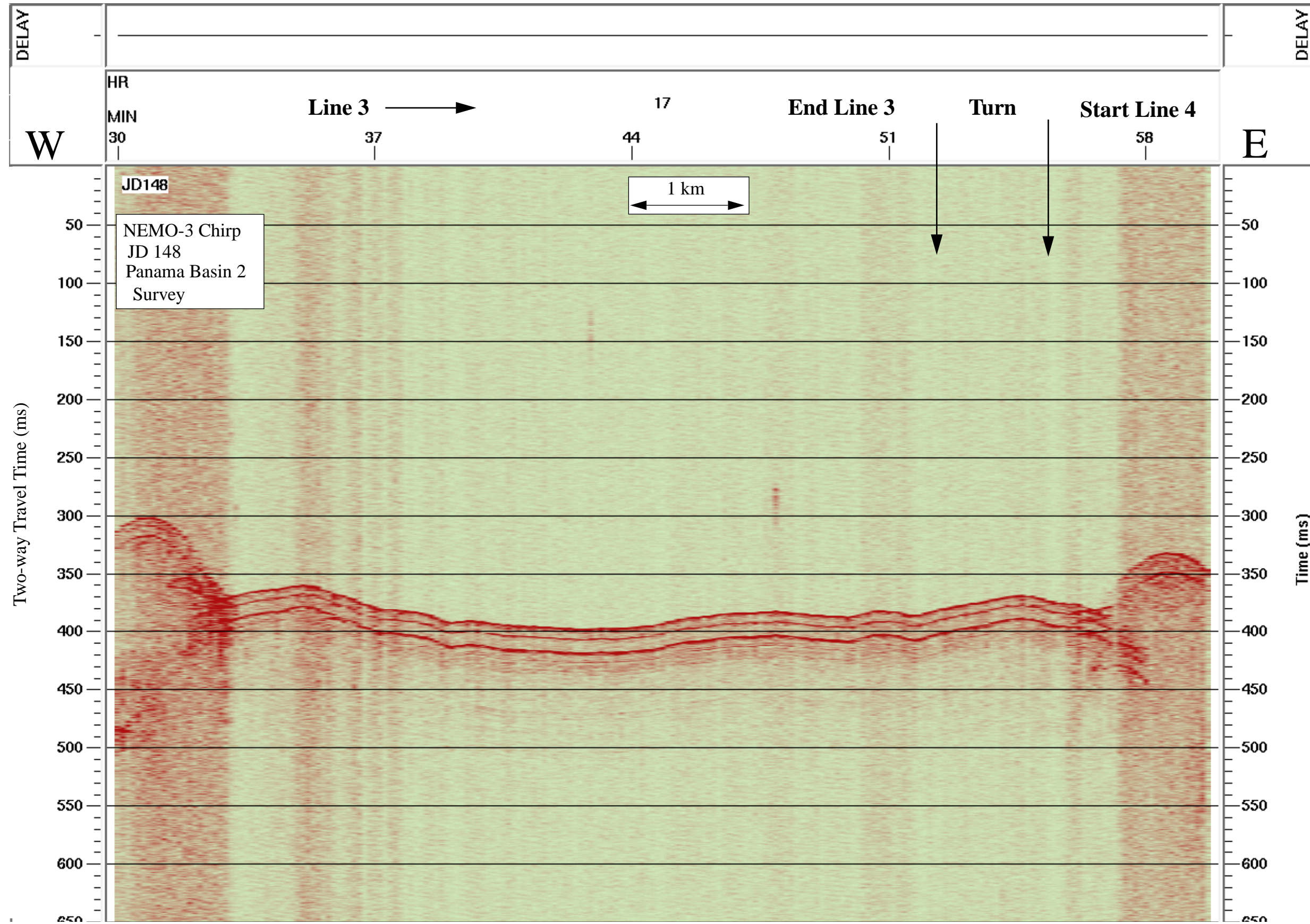




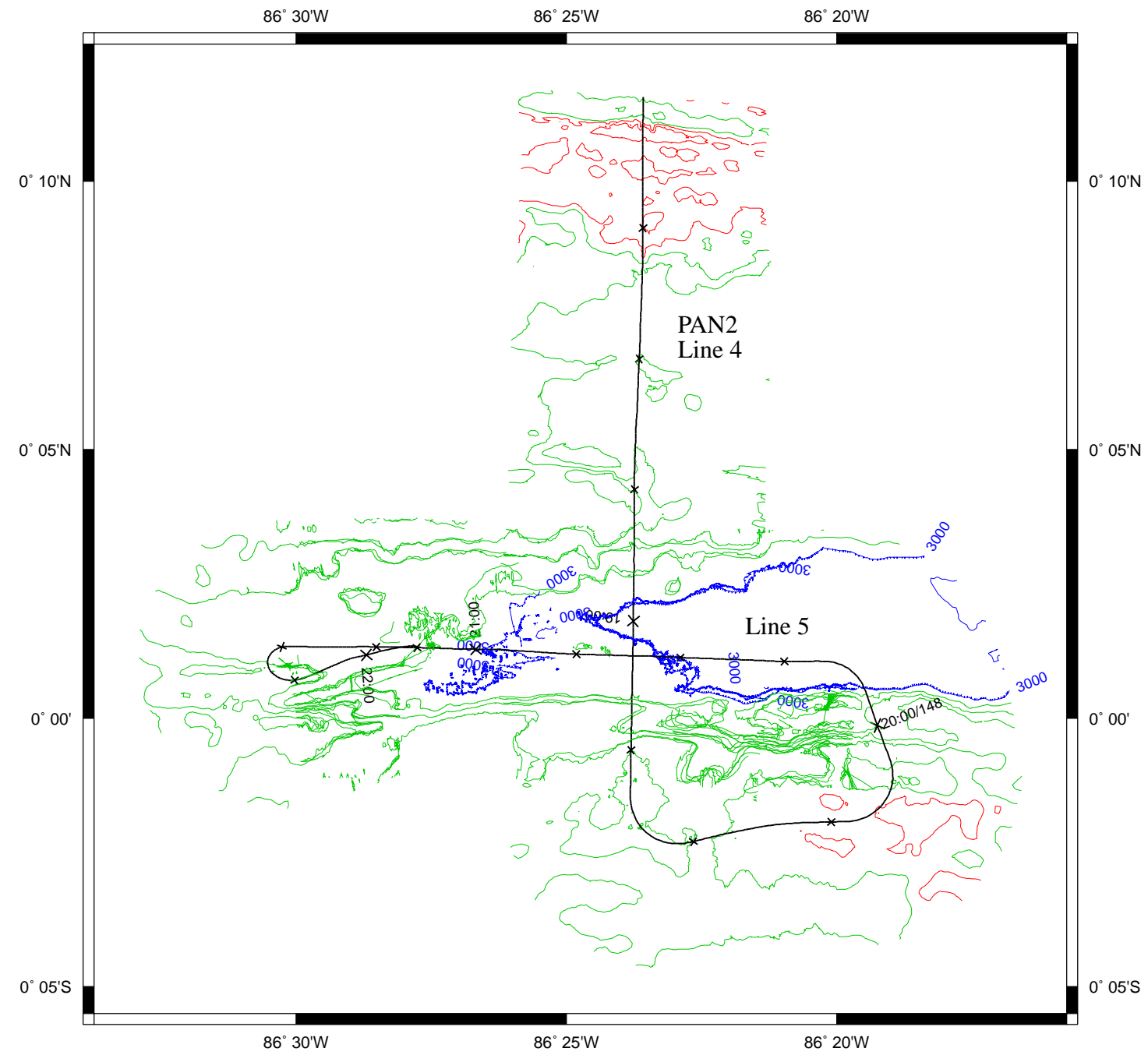


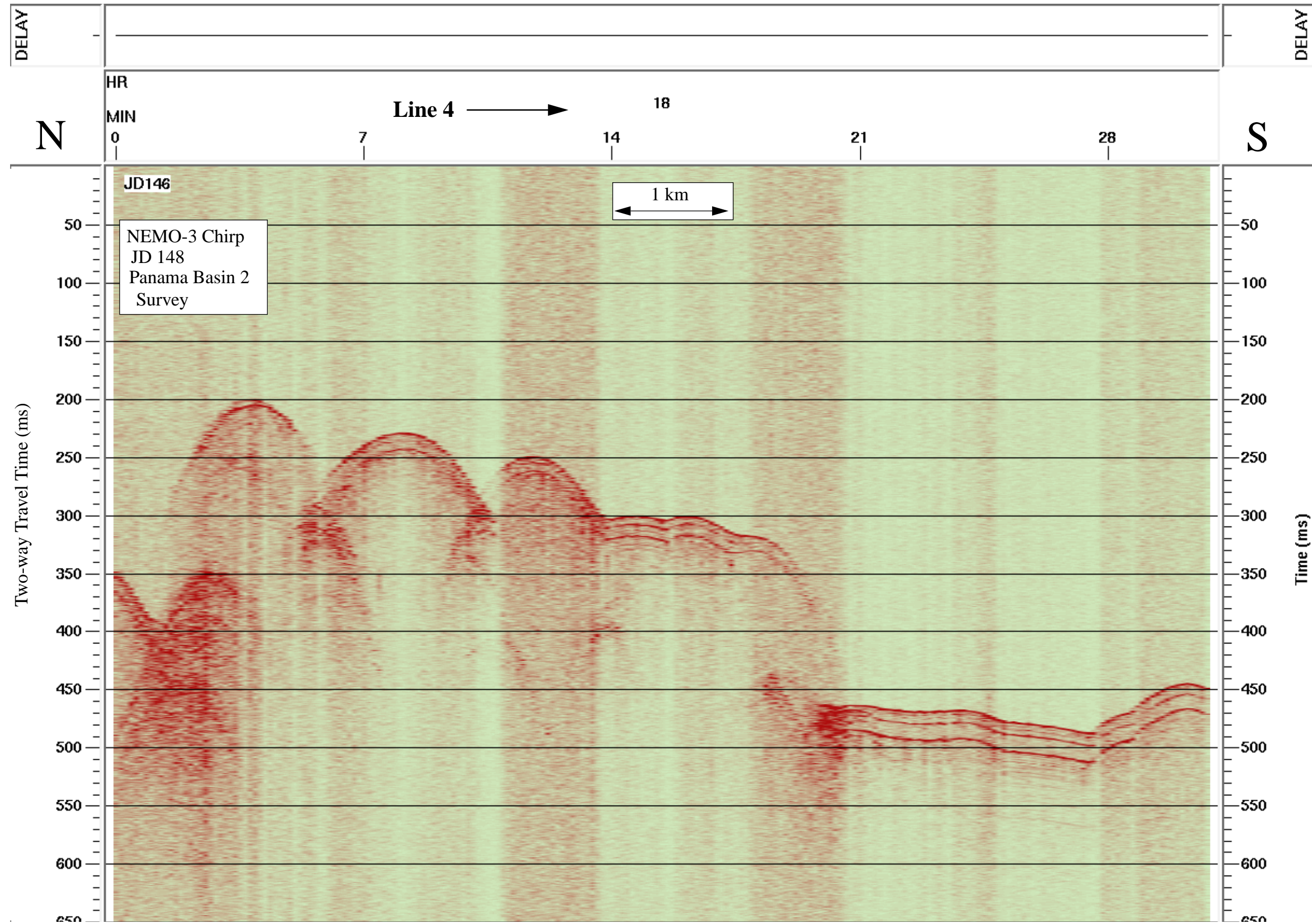


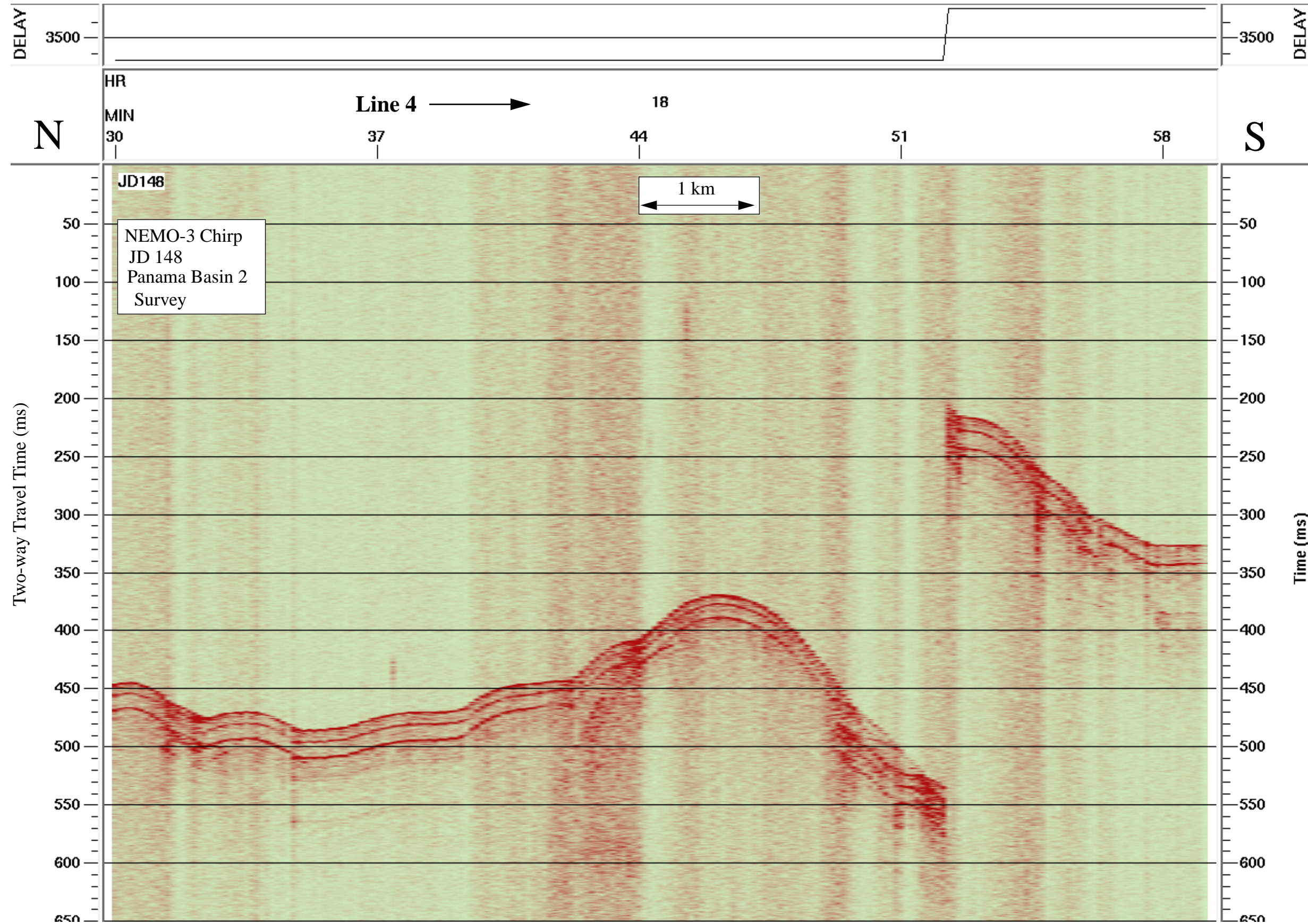


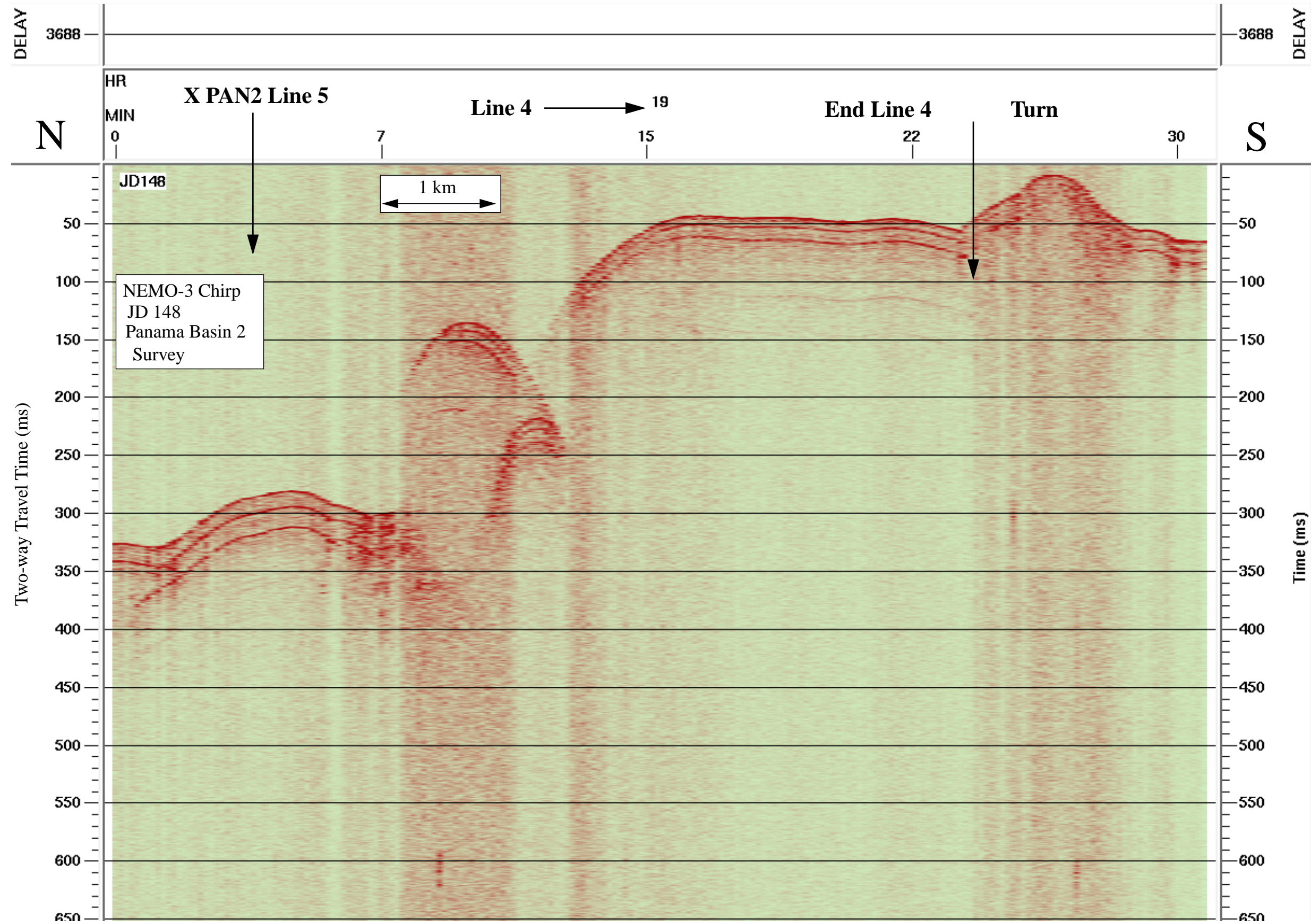


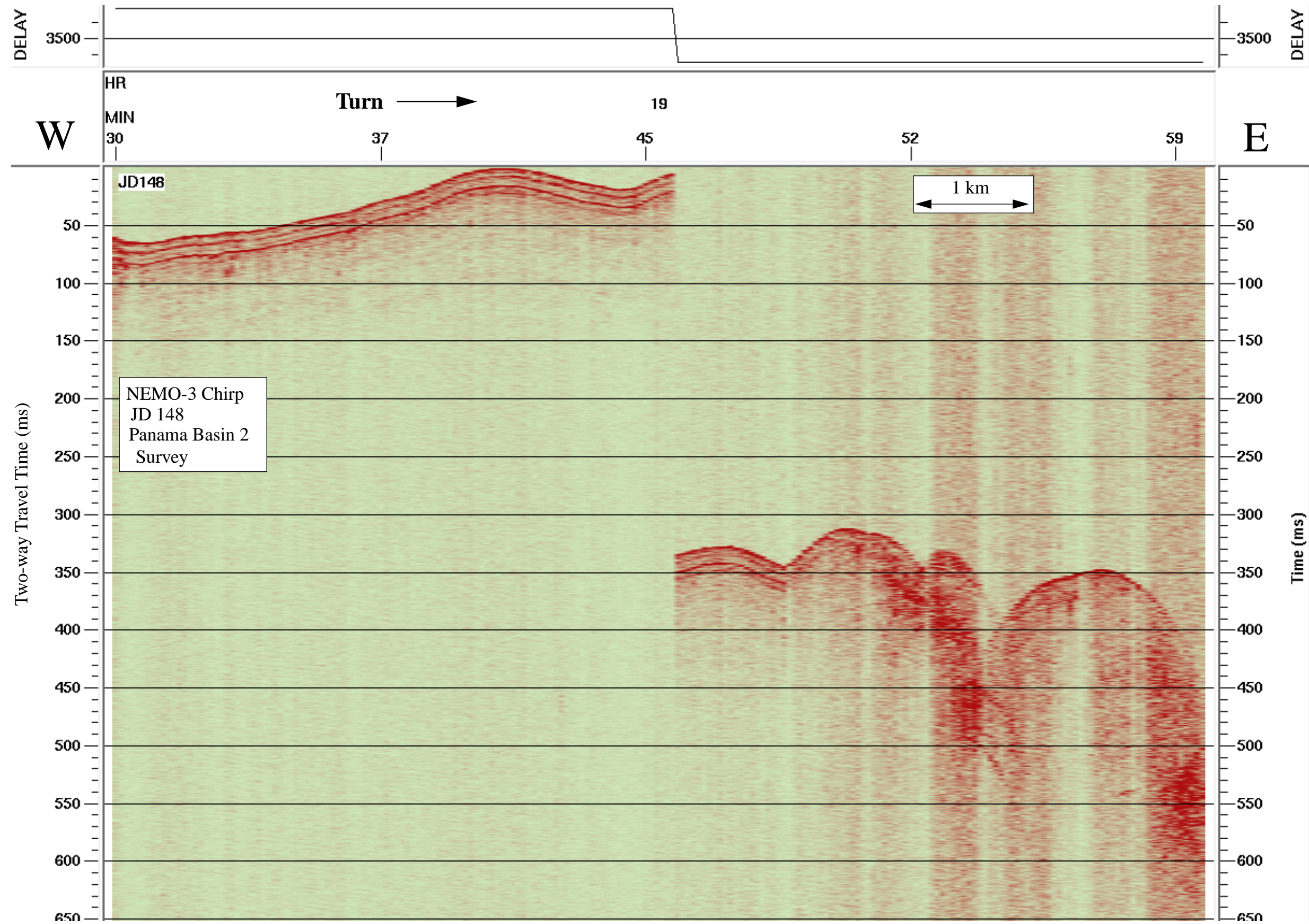
Data File SBfixavg.2000may27.1800-2400

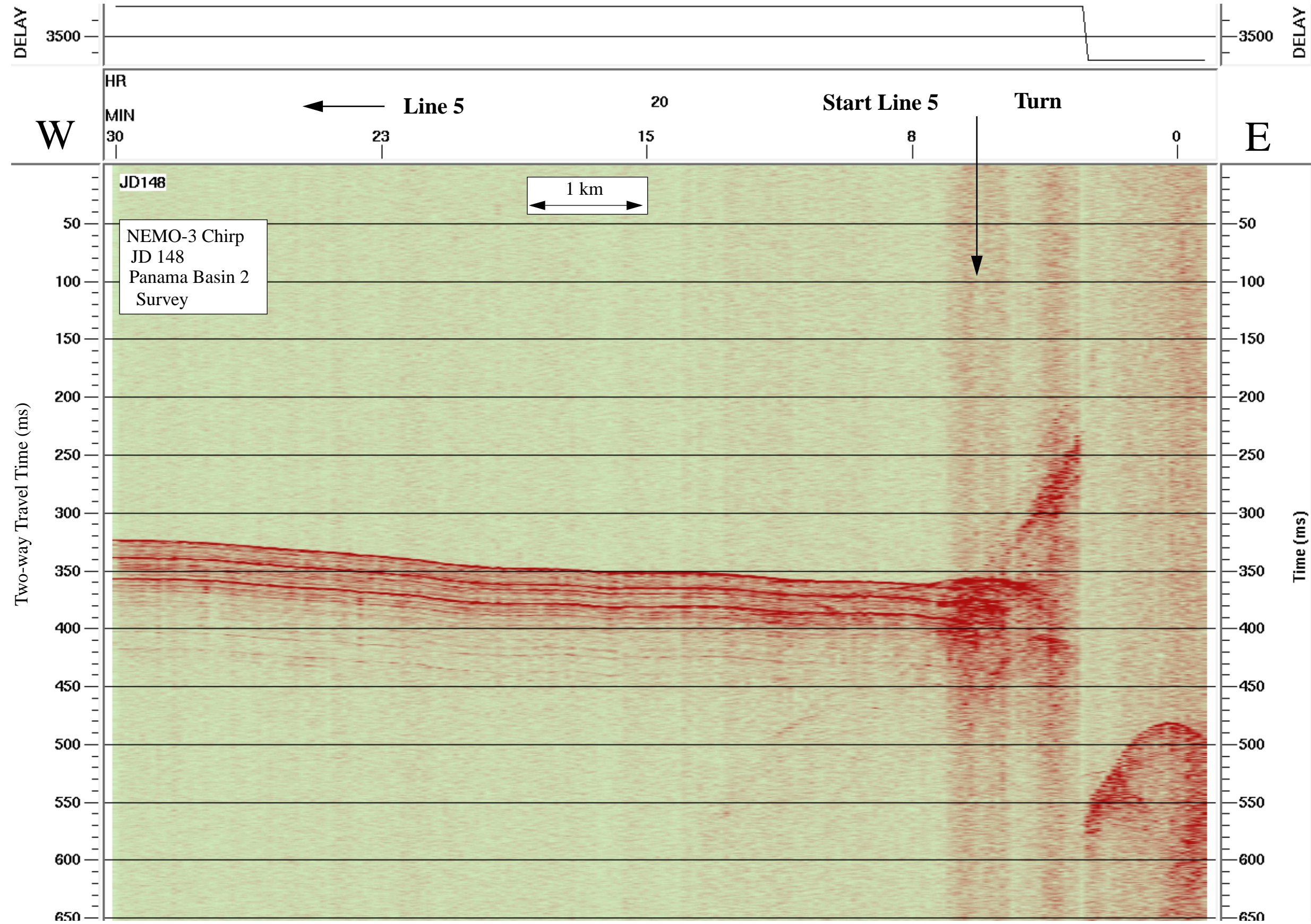


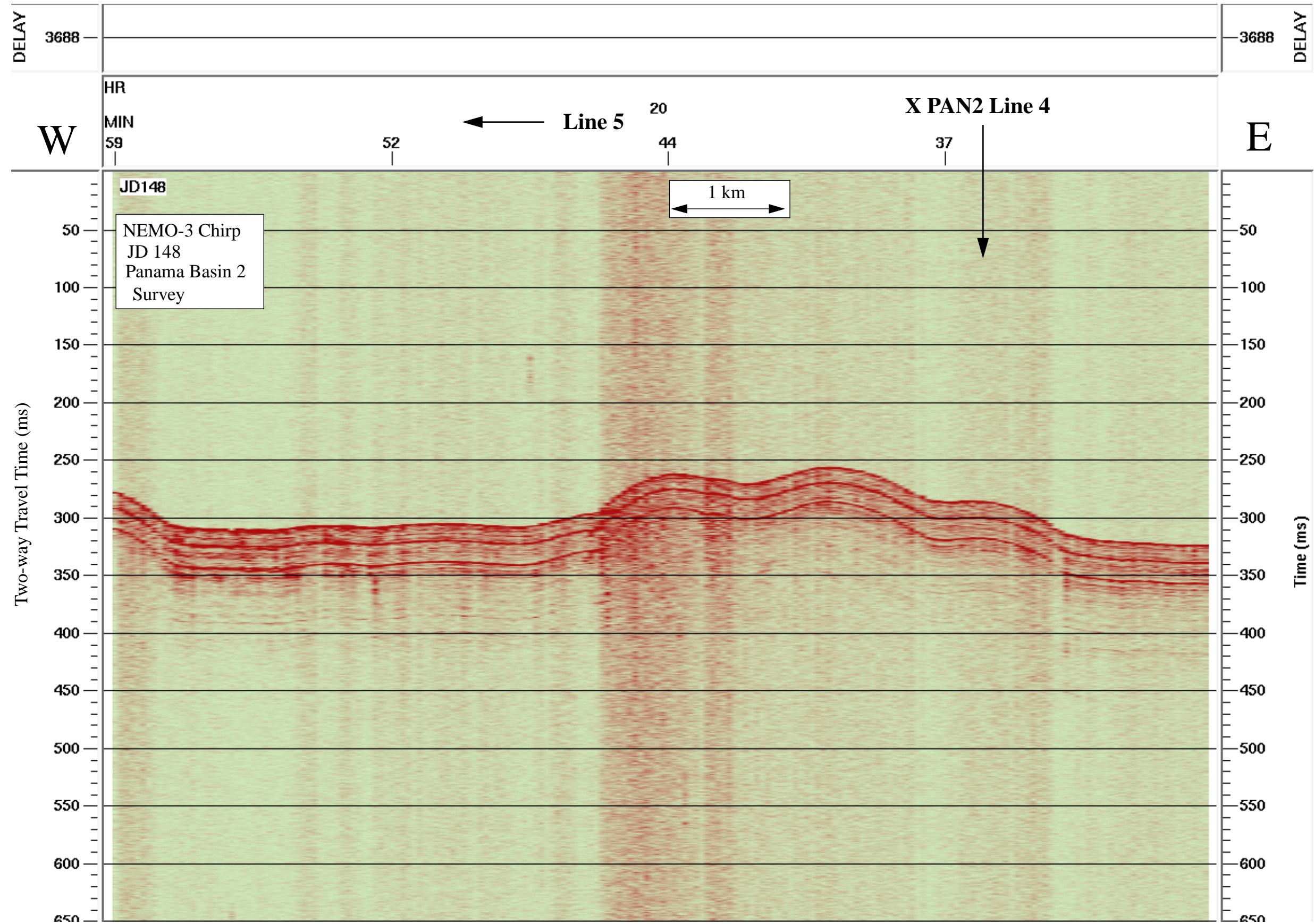


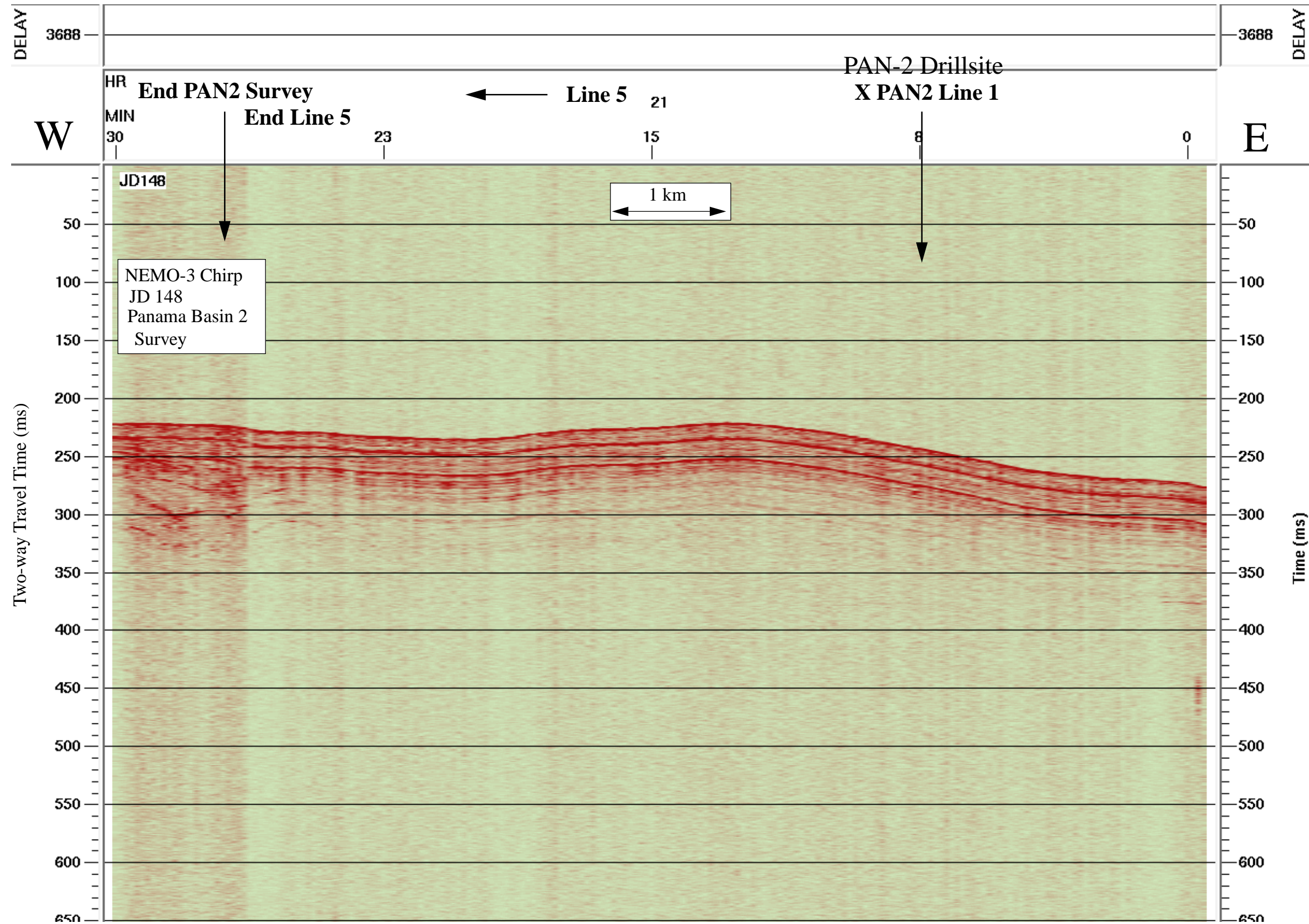


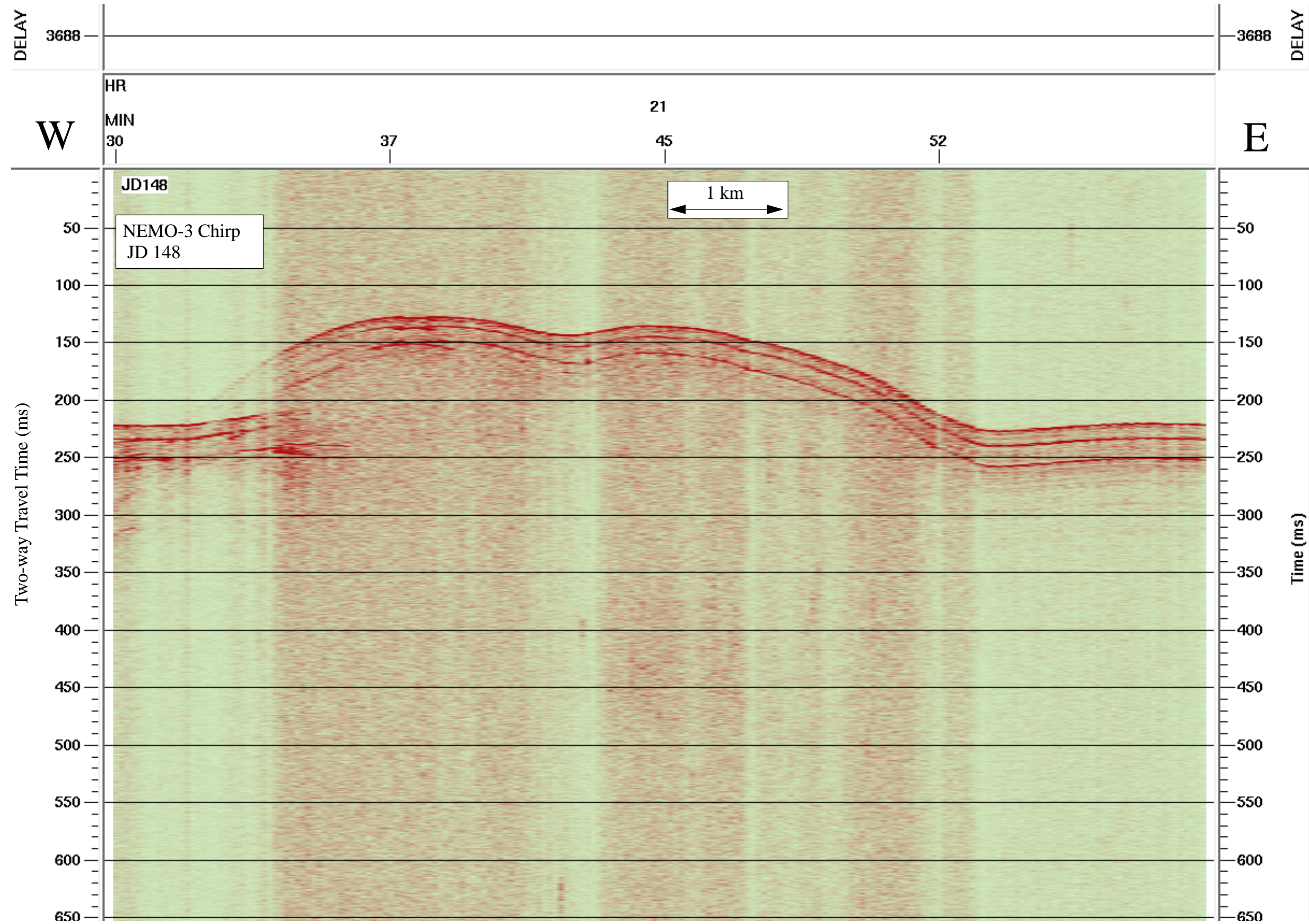


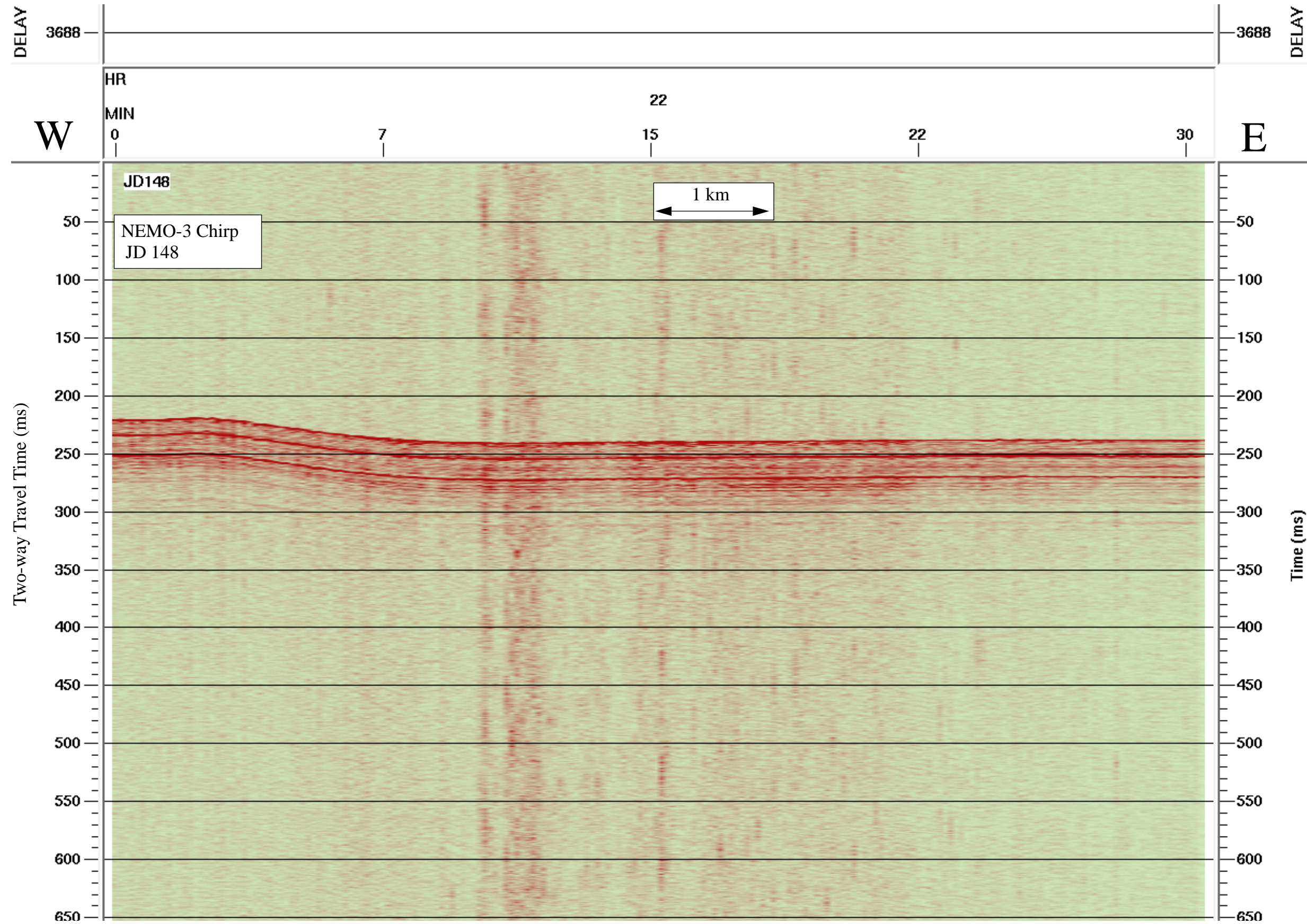












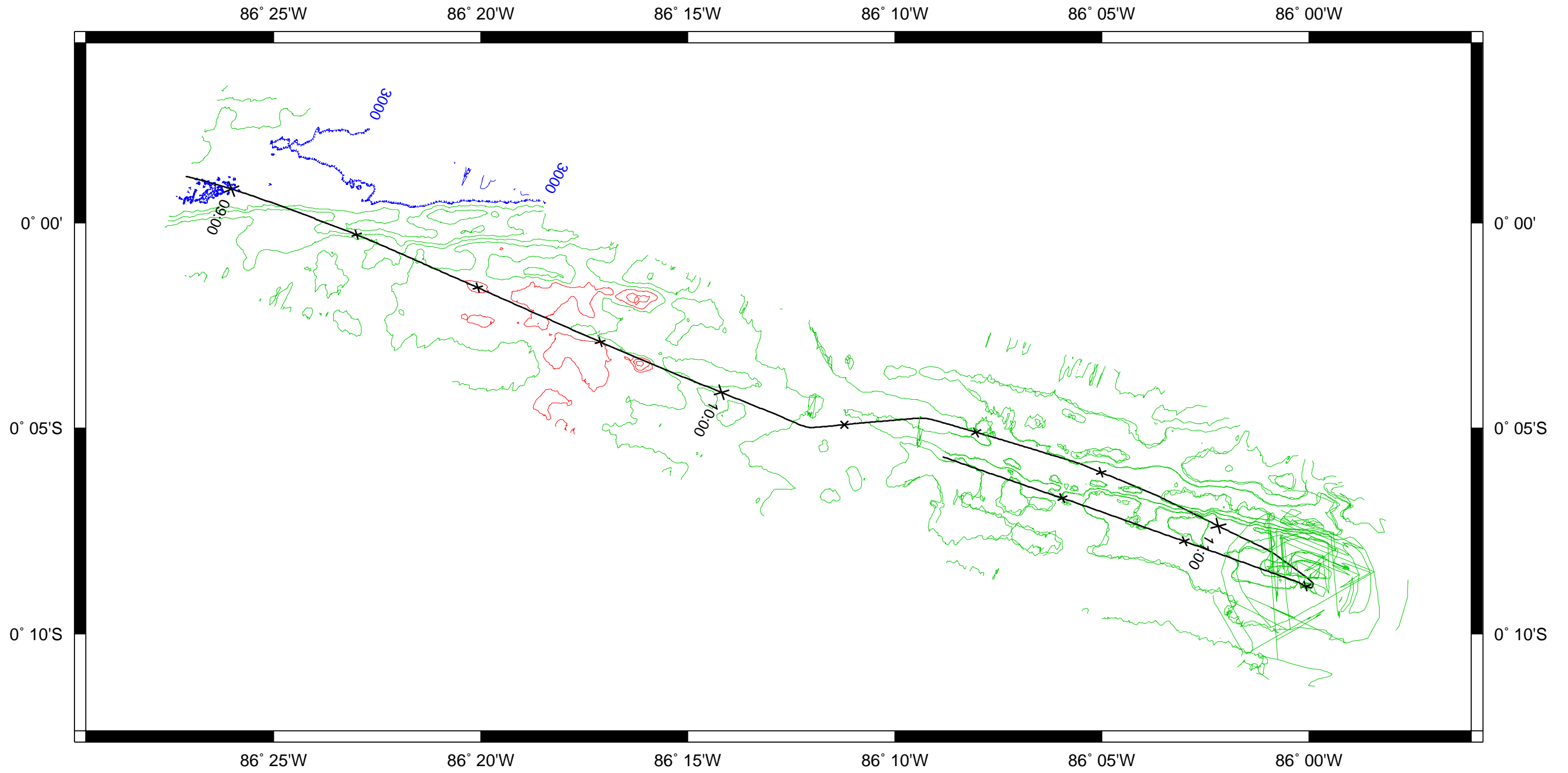
JD 149 (28 May 2000)

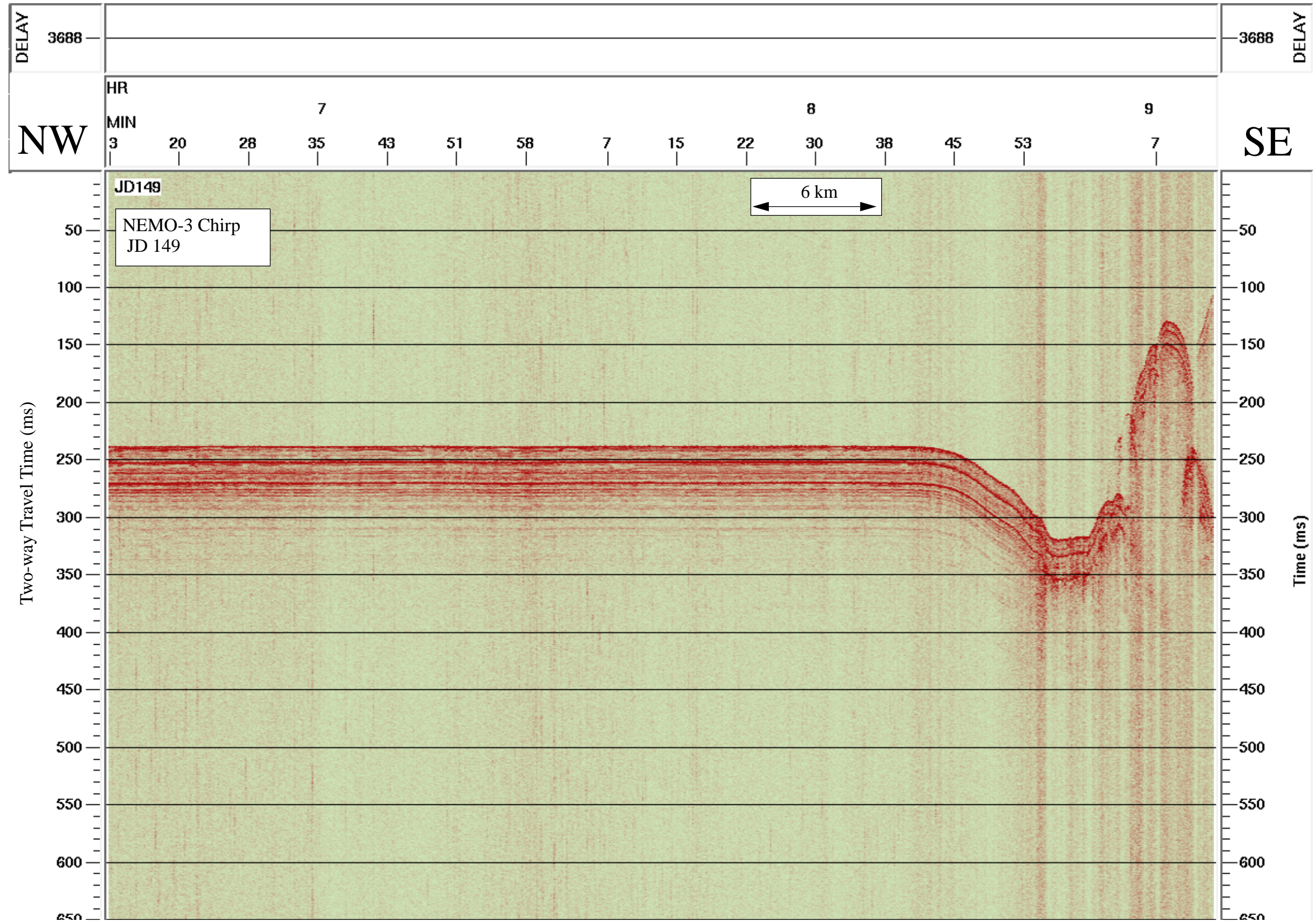
2-7 kHz Chirp Subbottom Profiler

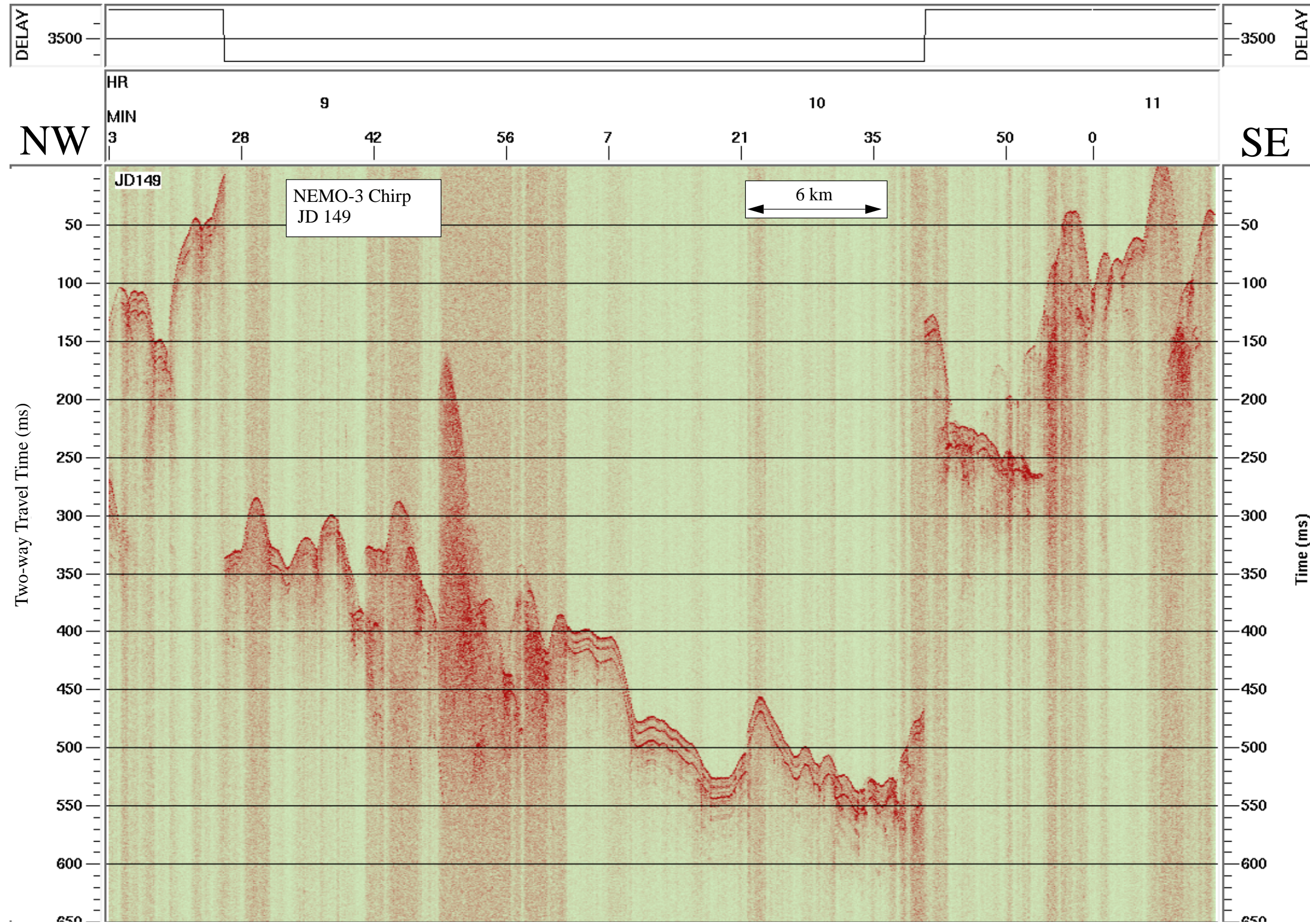
NEMO Leg 3

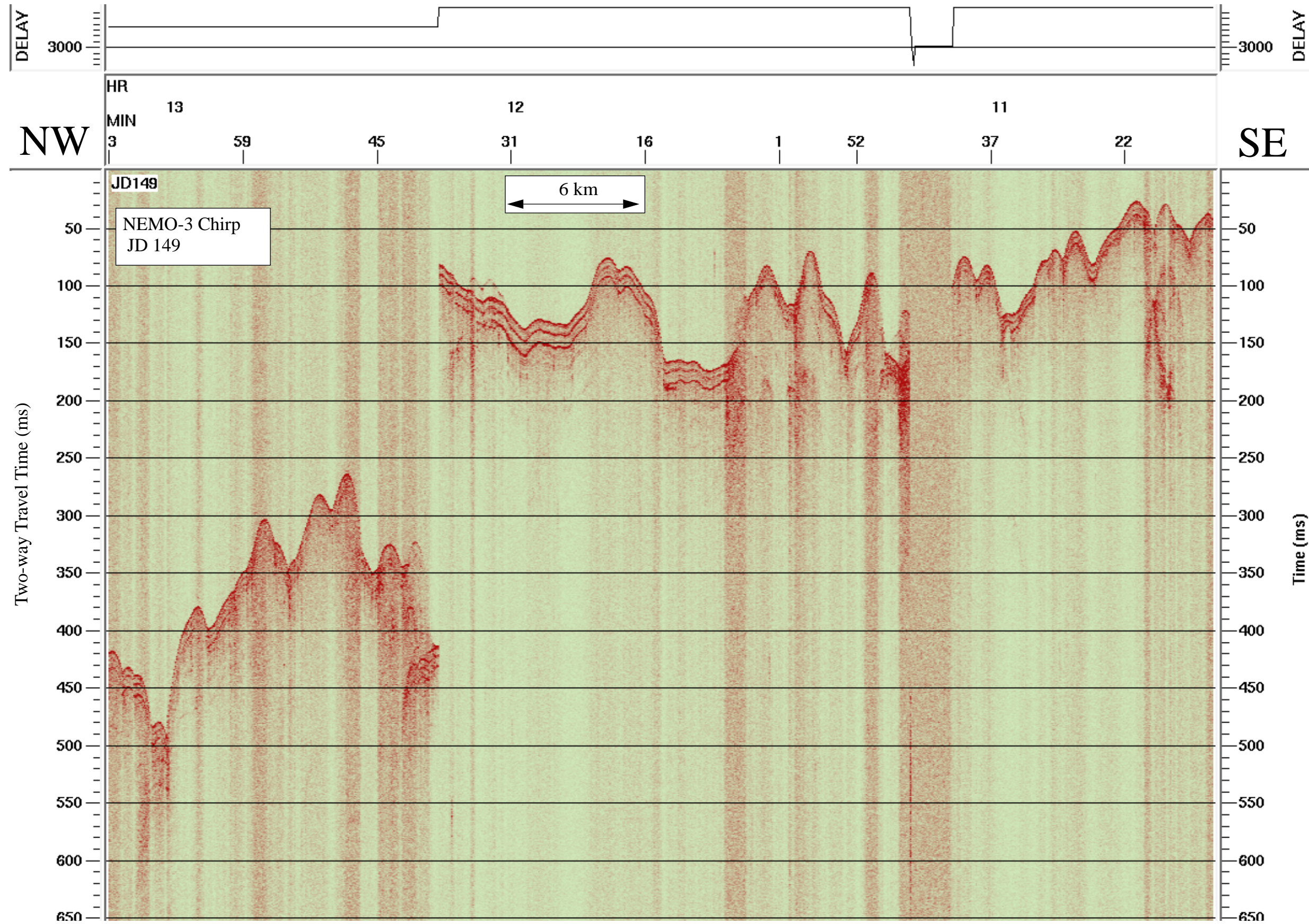
R/V Melville

Data File SBfixavg.2000may28.0600-1200

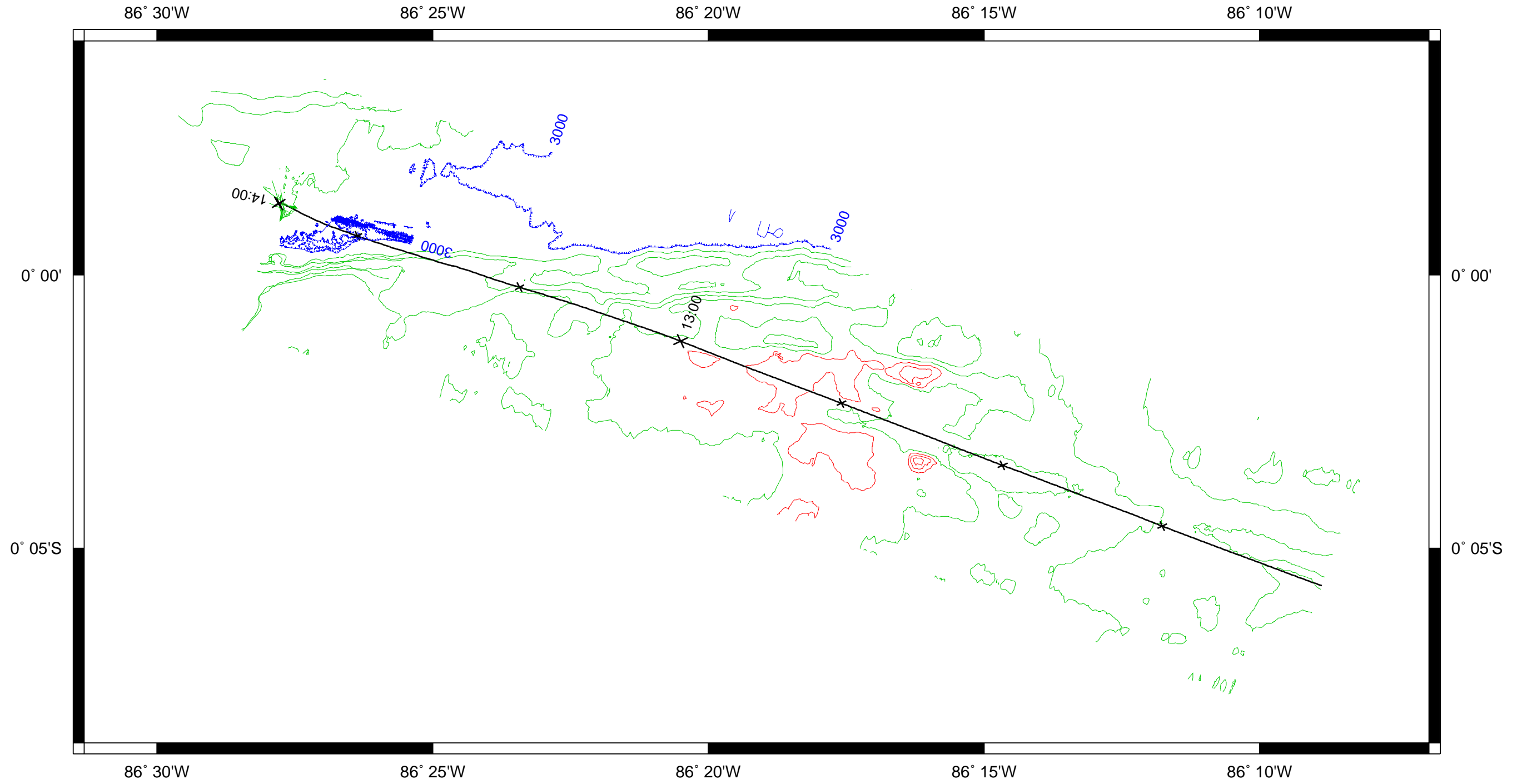


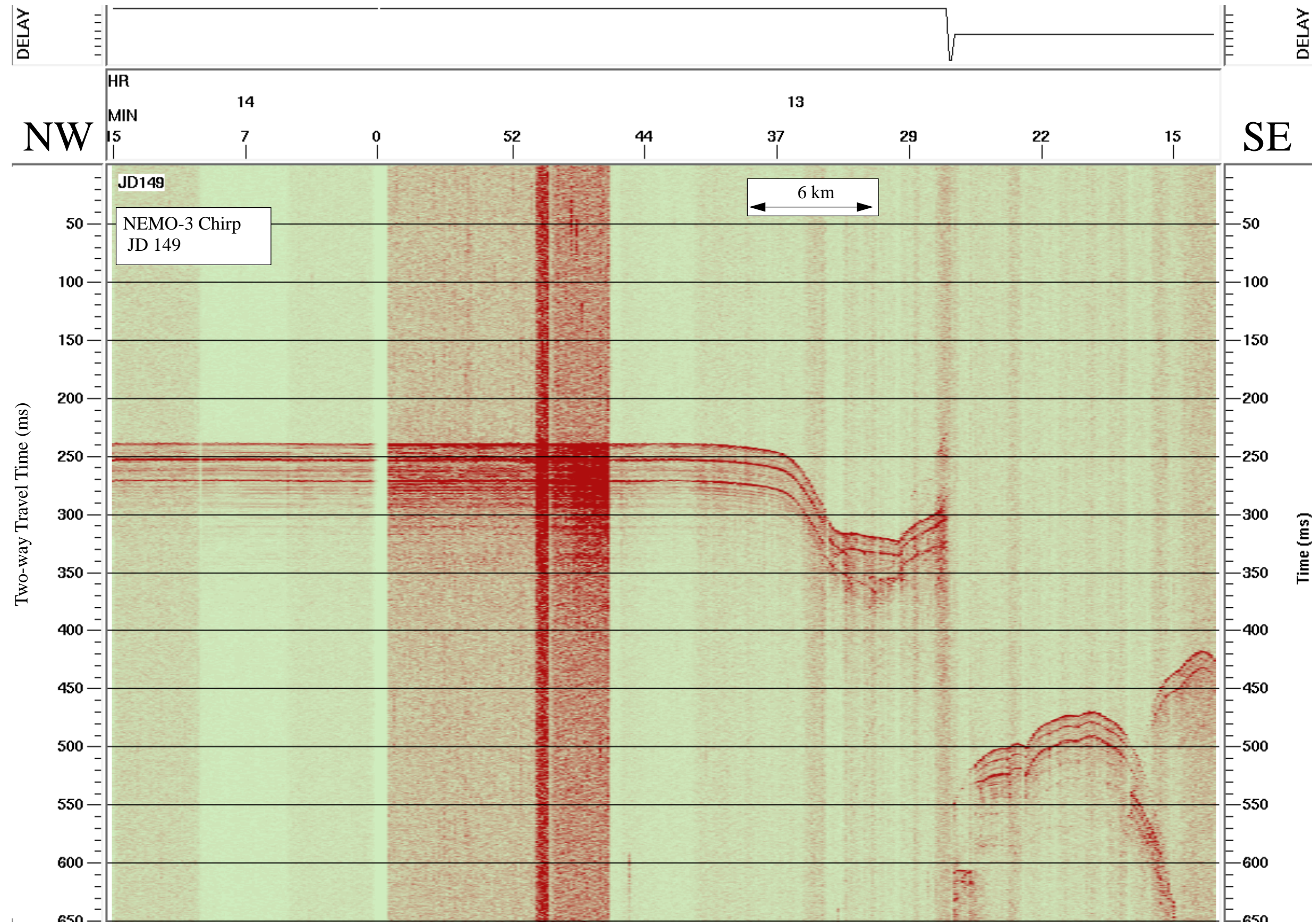




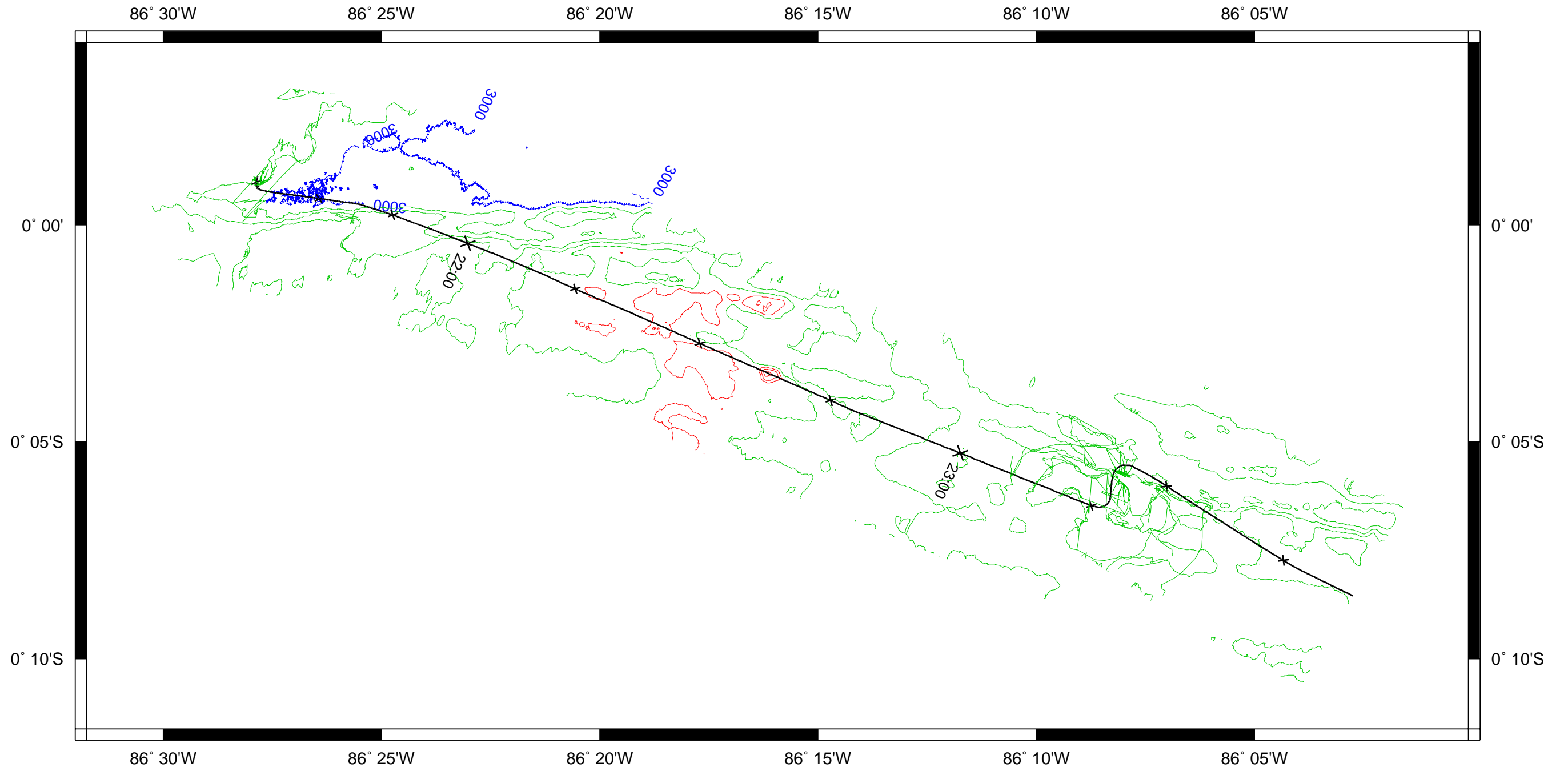


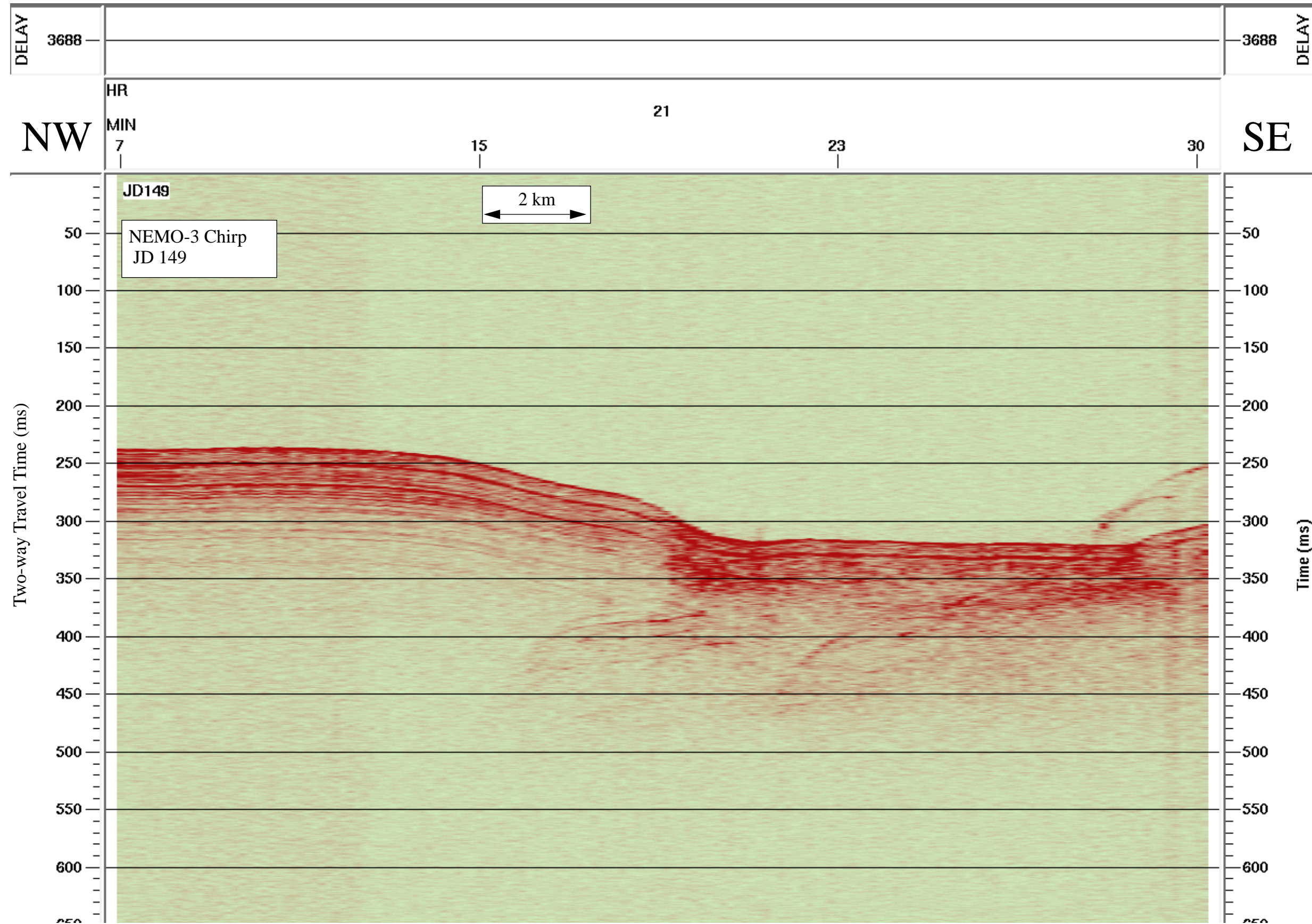
Data File SBfixavg.2000may28.1200-1800

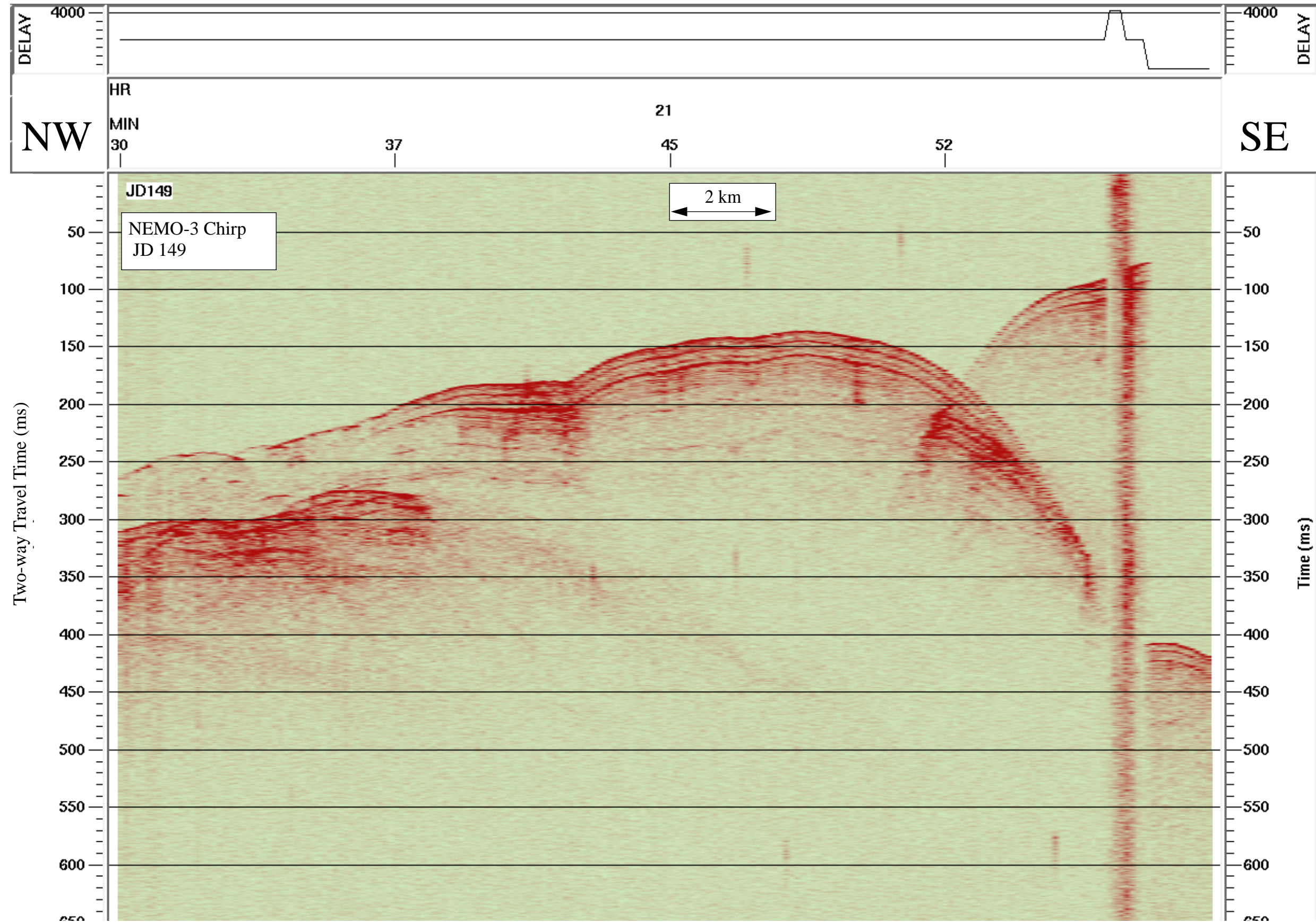


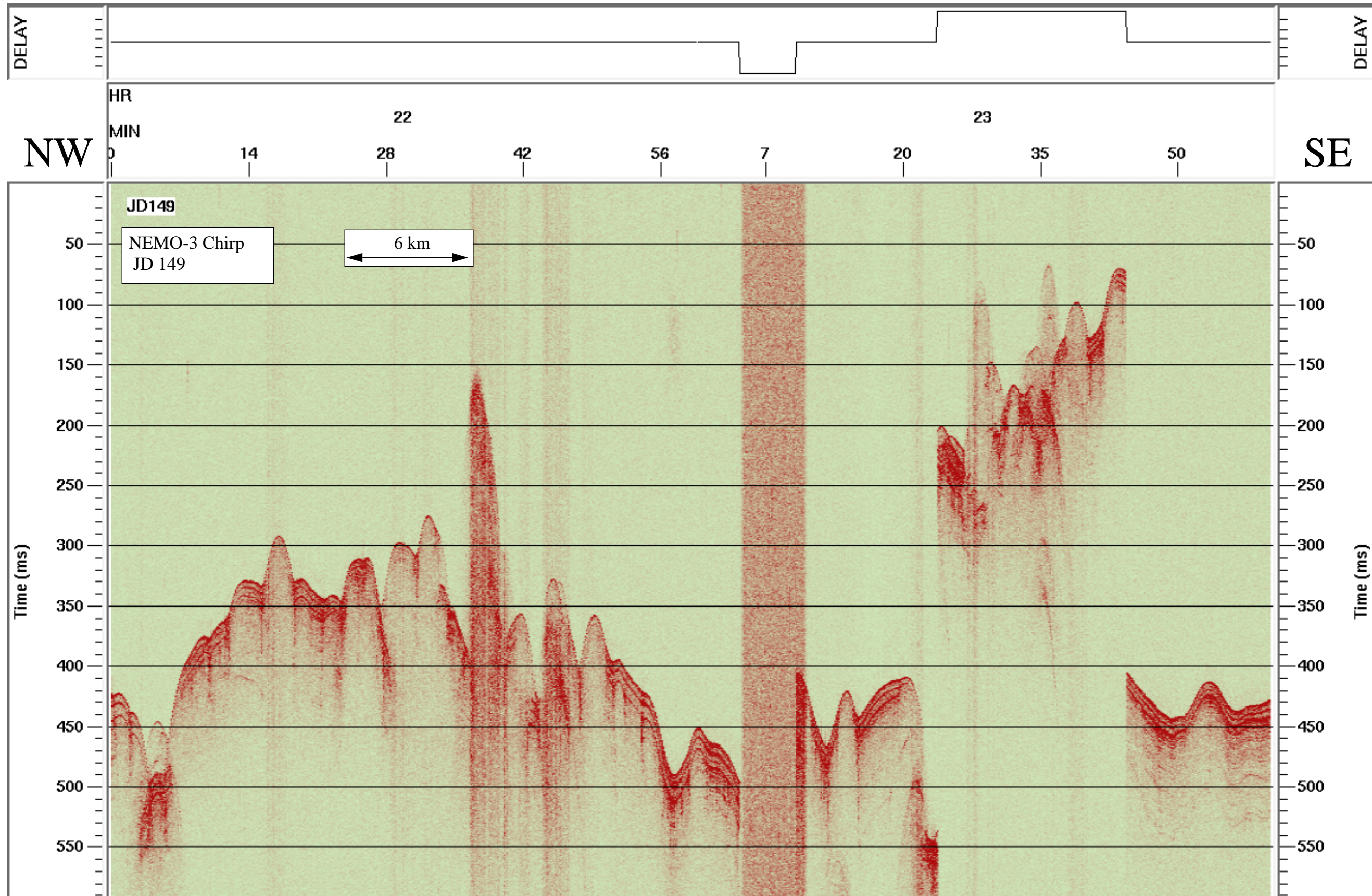


Data File SBfixavg.2000may28.1800-2400









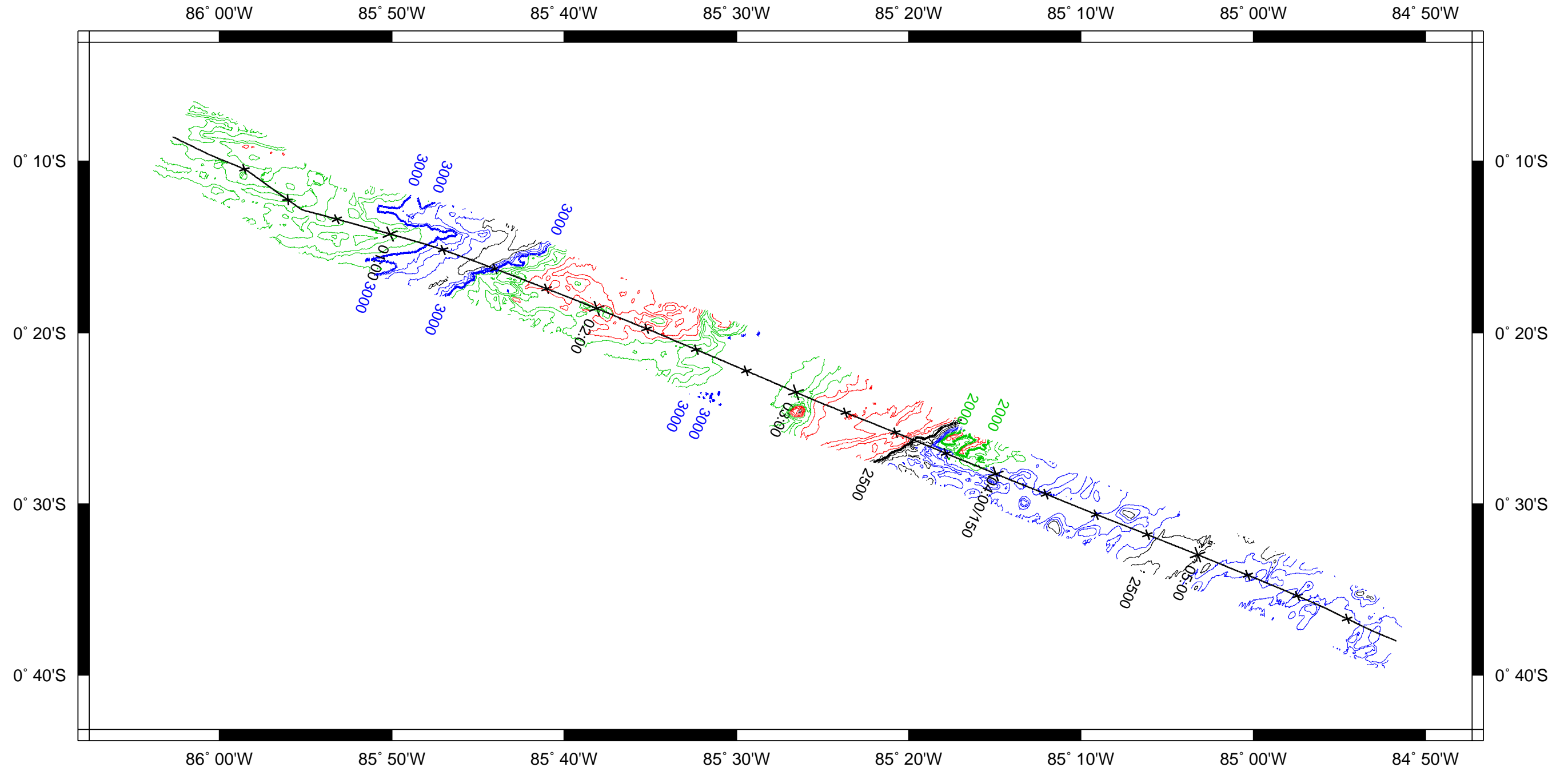
JD 150 (29 May 2000)--CAR-2 Survey, Carnegie Ridge, South Flank

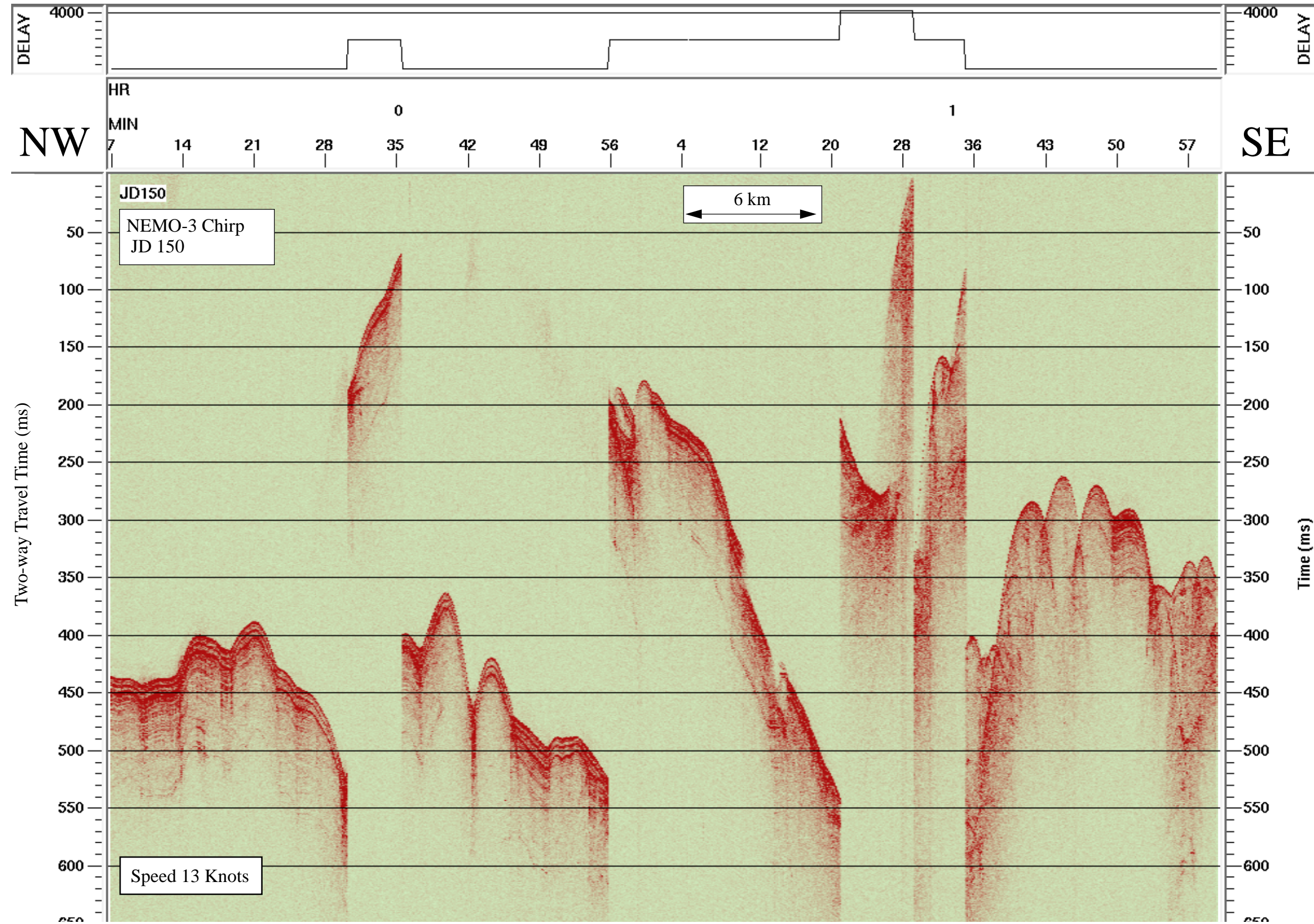
2-7 kHz Chirp Subbottom Profiler

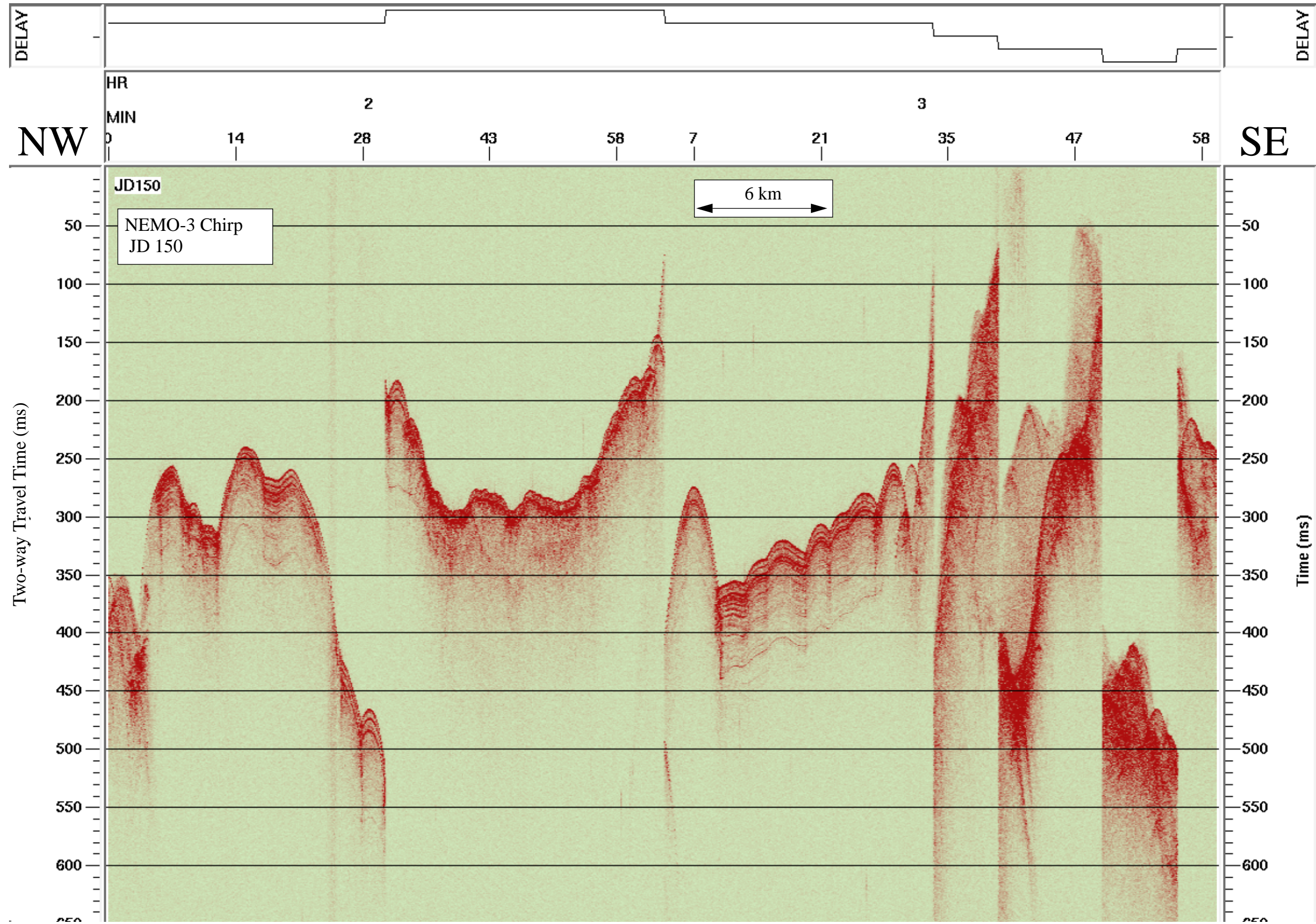
NEMO Leg 3

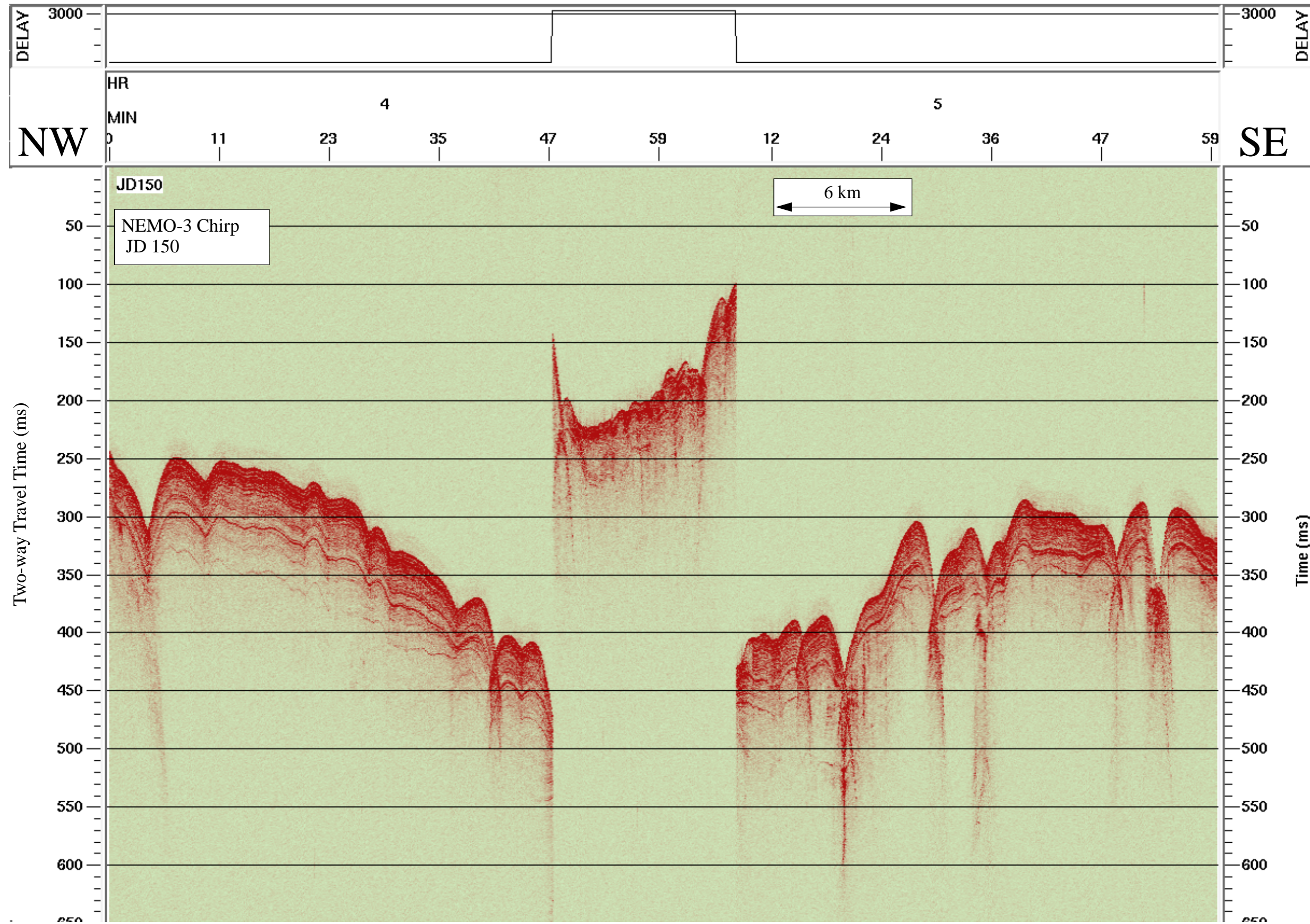
R/V Melville

Data File SBfixavg.2000may29.0000-0600

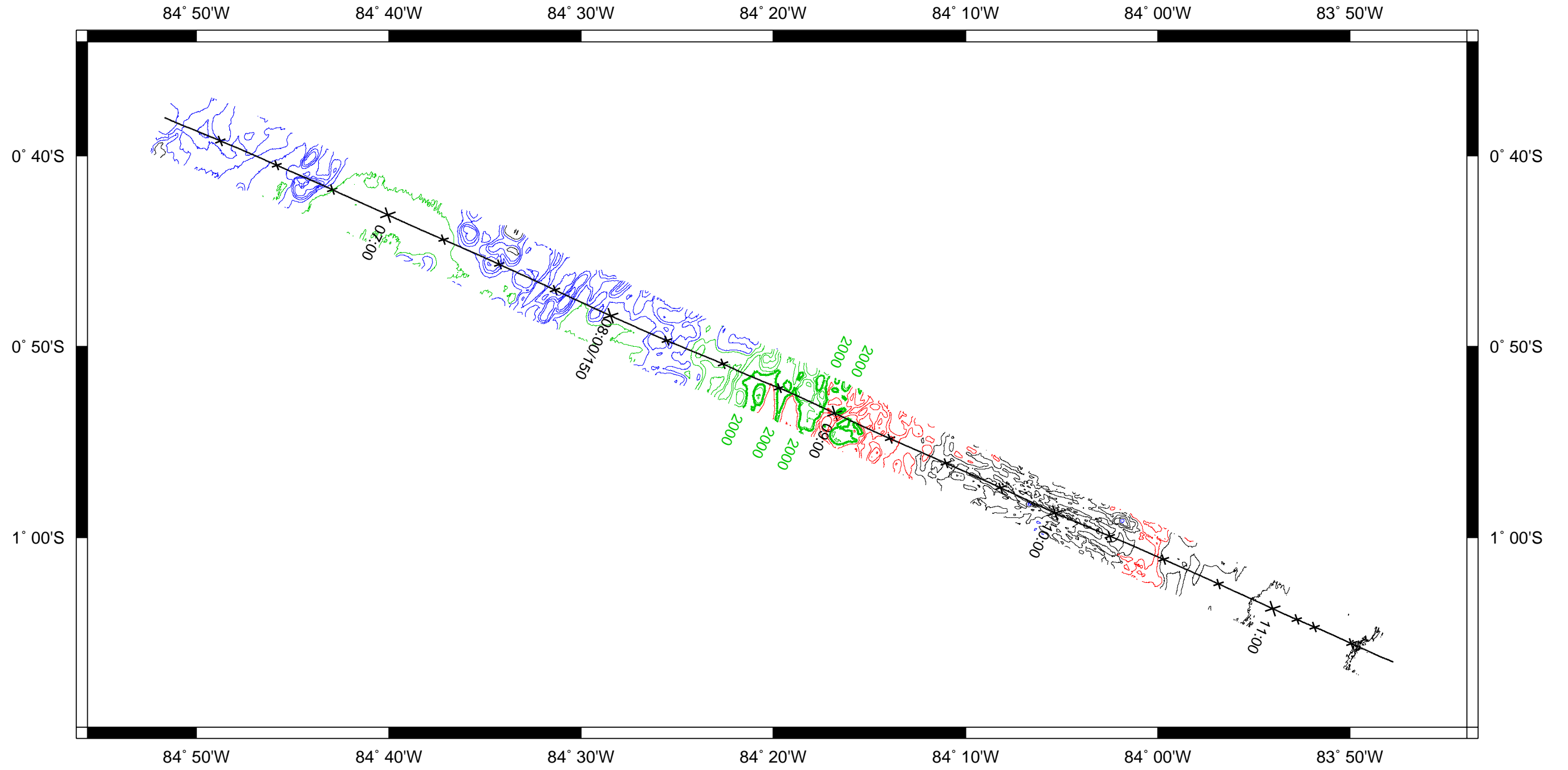


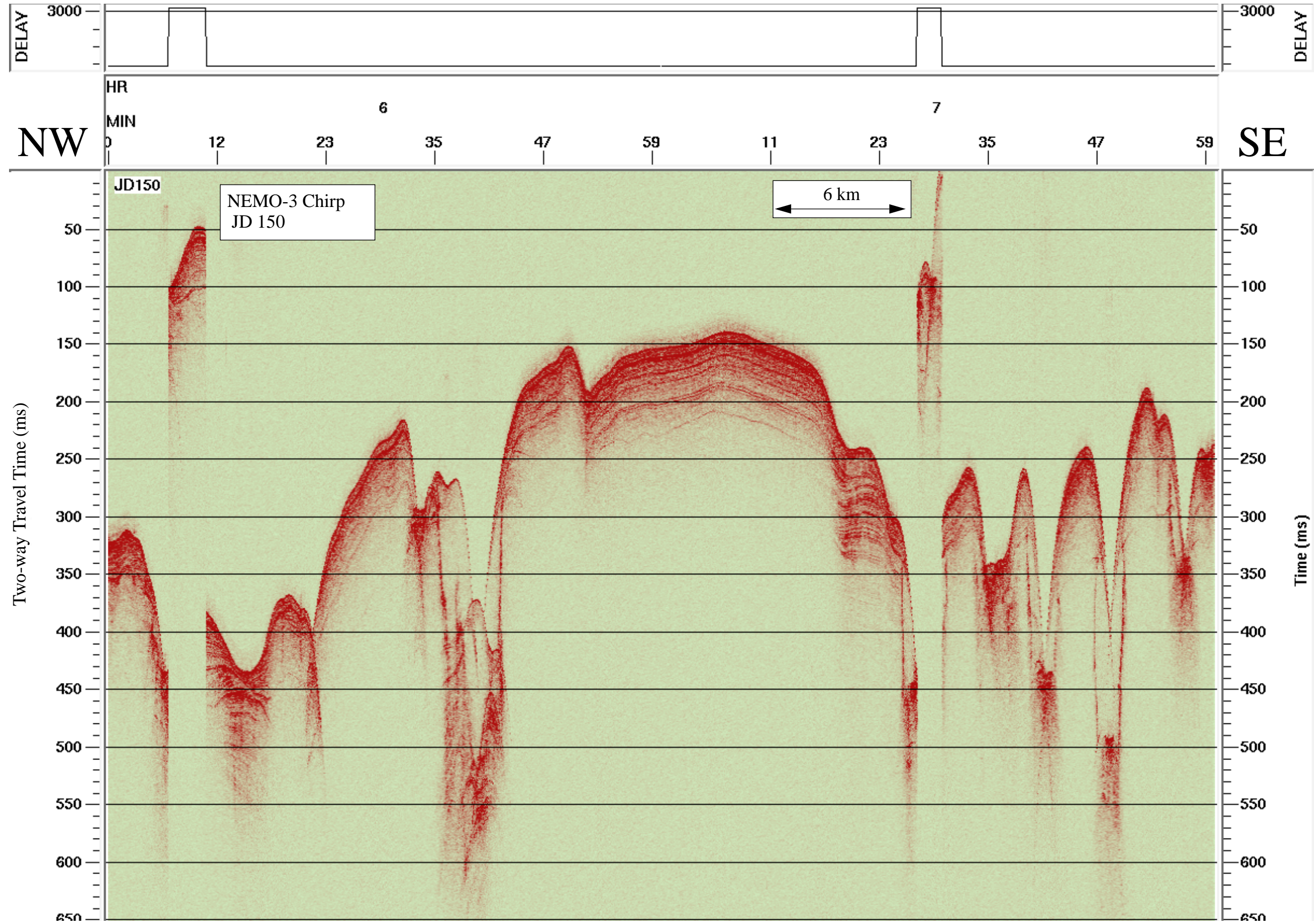


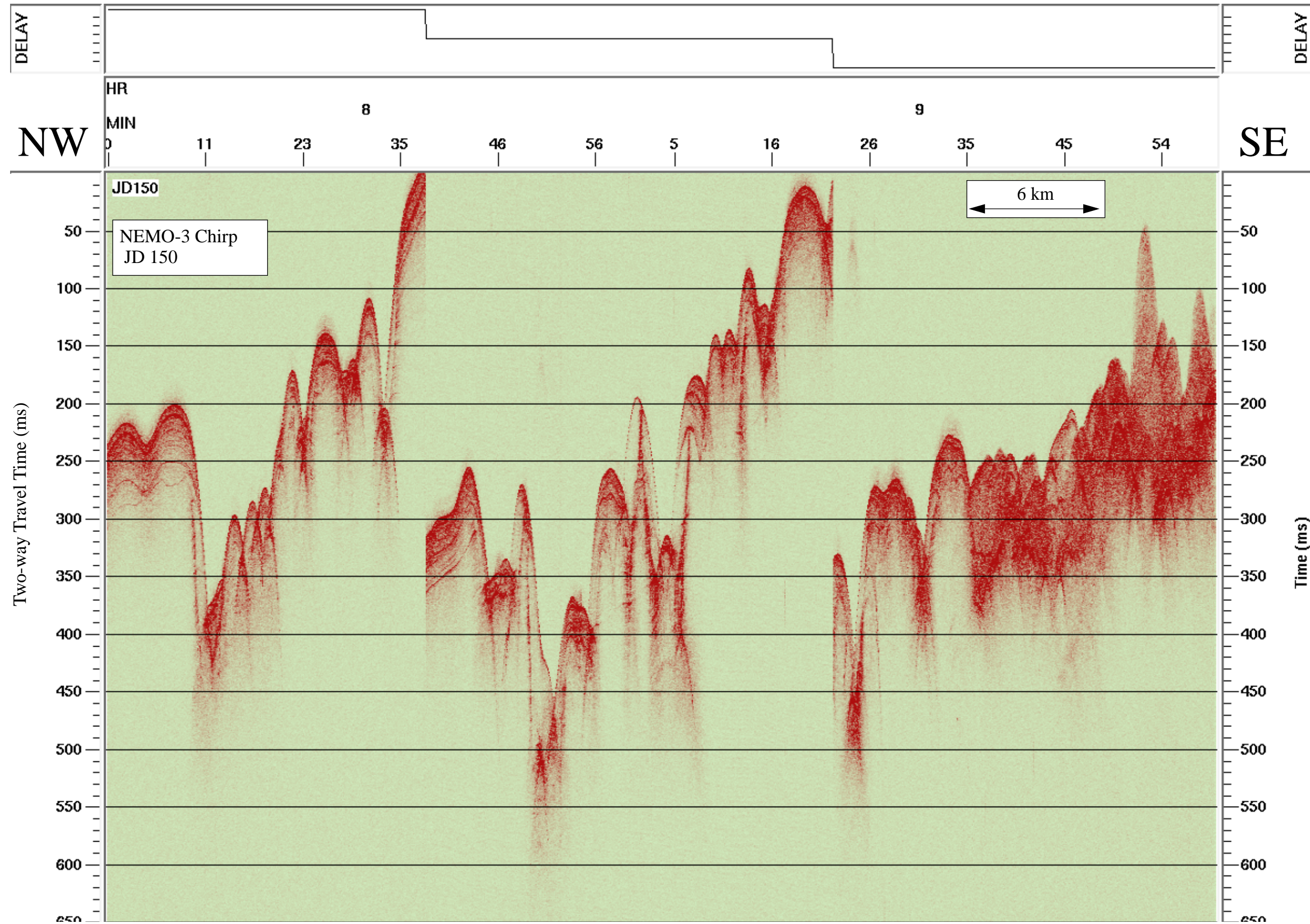


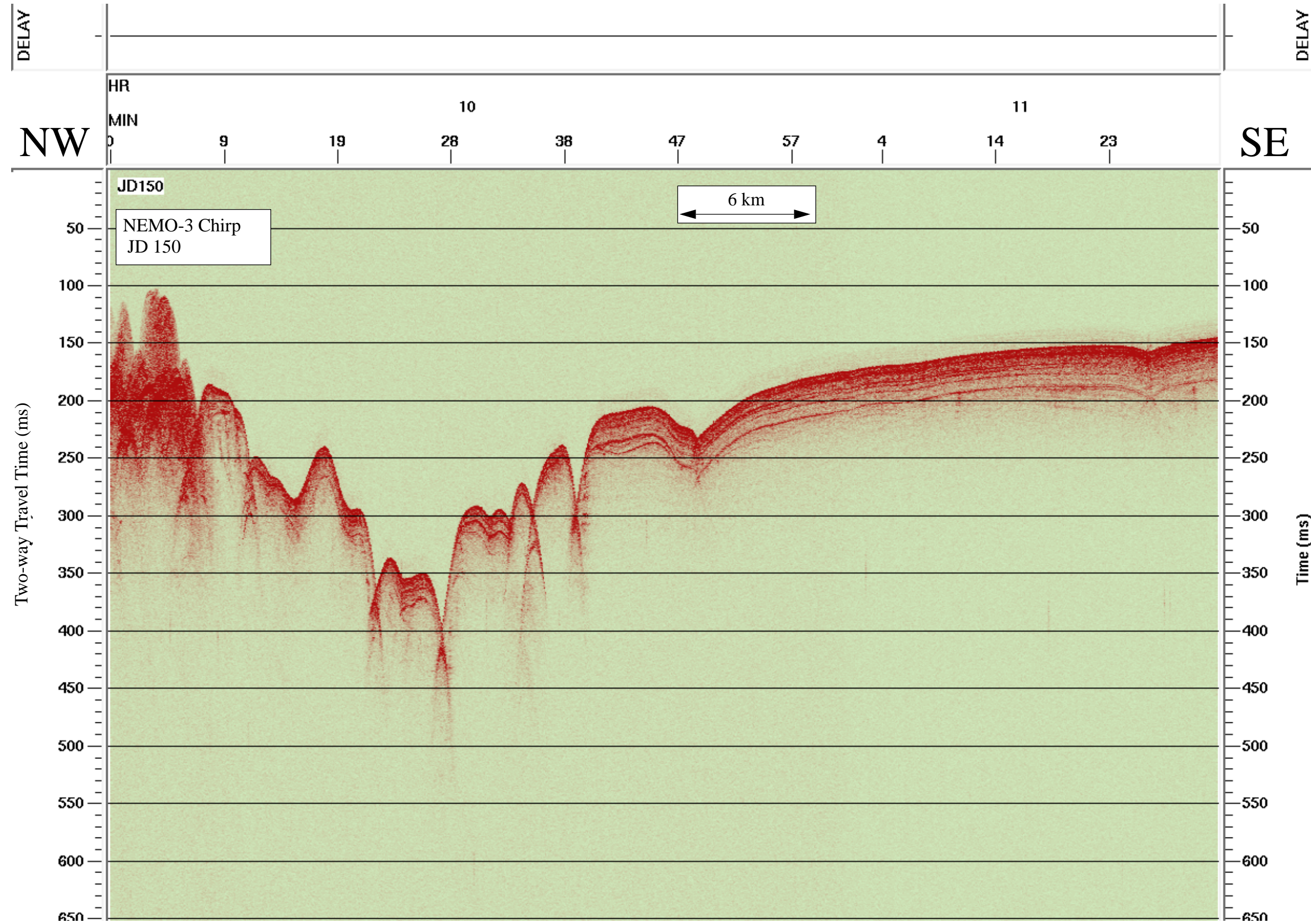


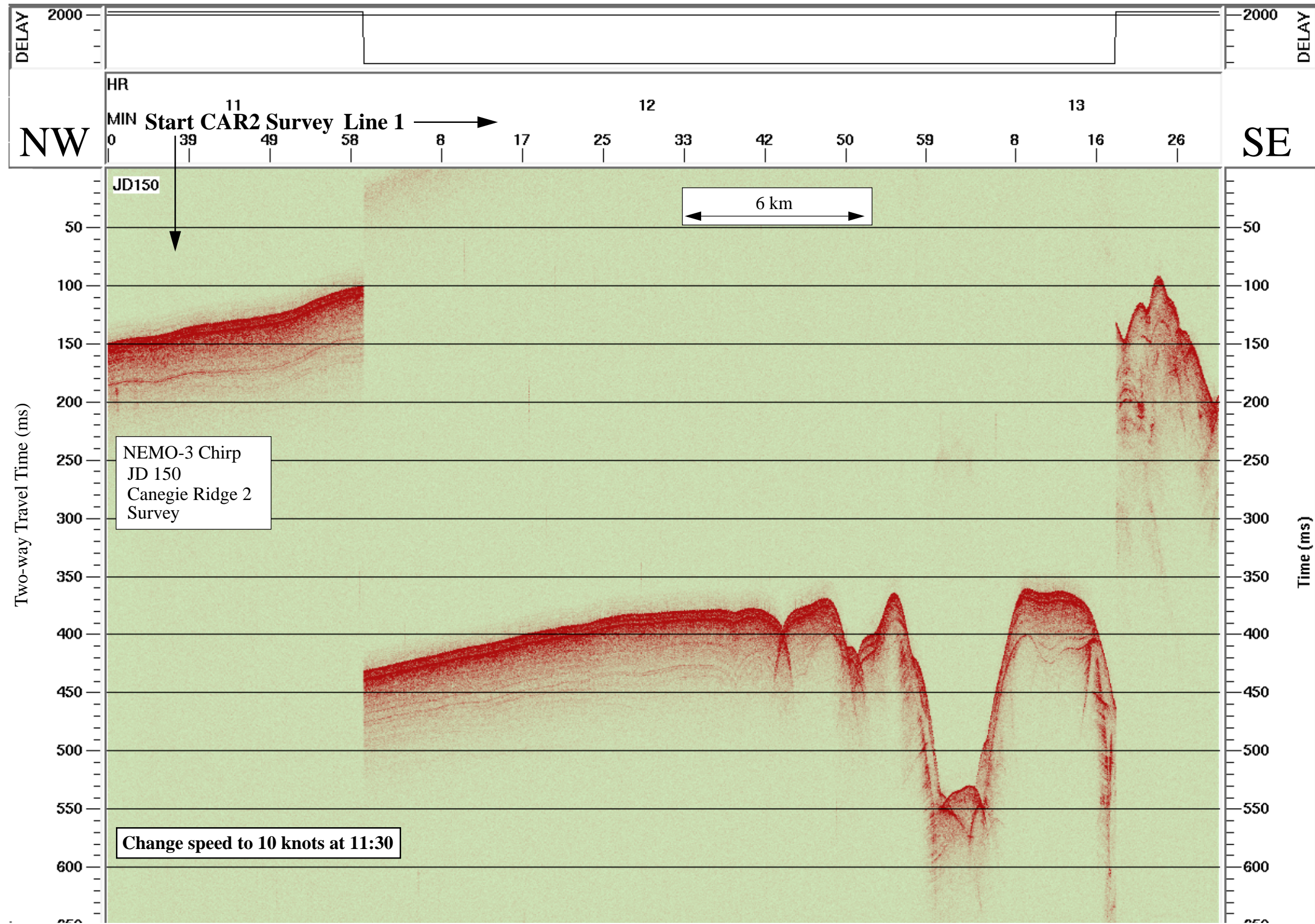
Data File SBfixavg.2000may29.0600-1200

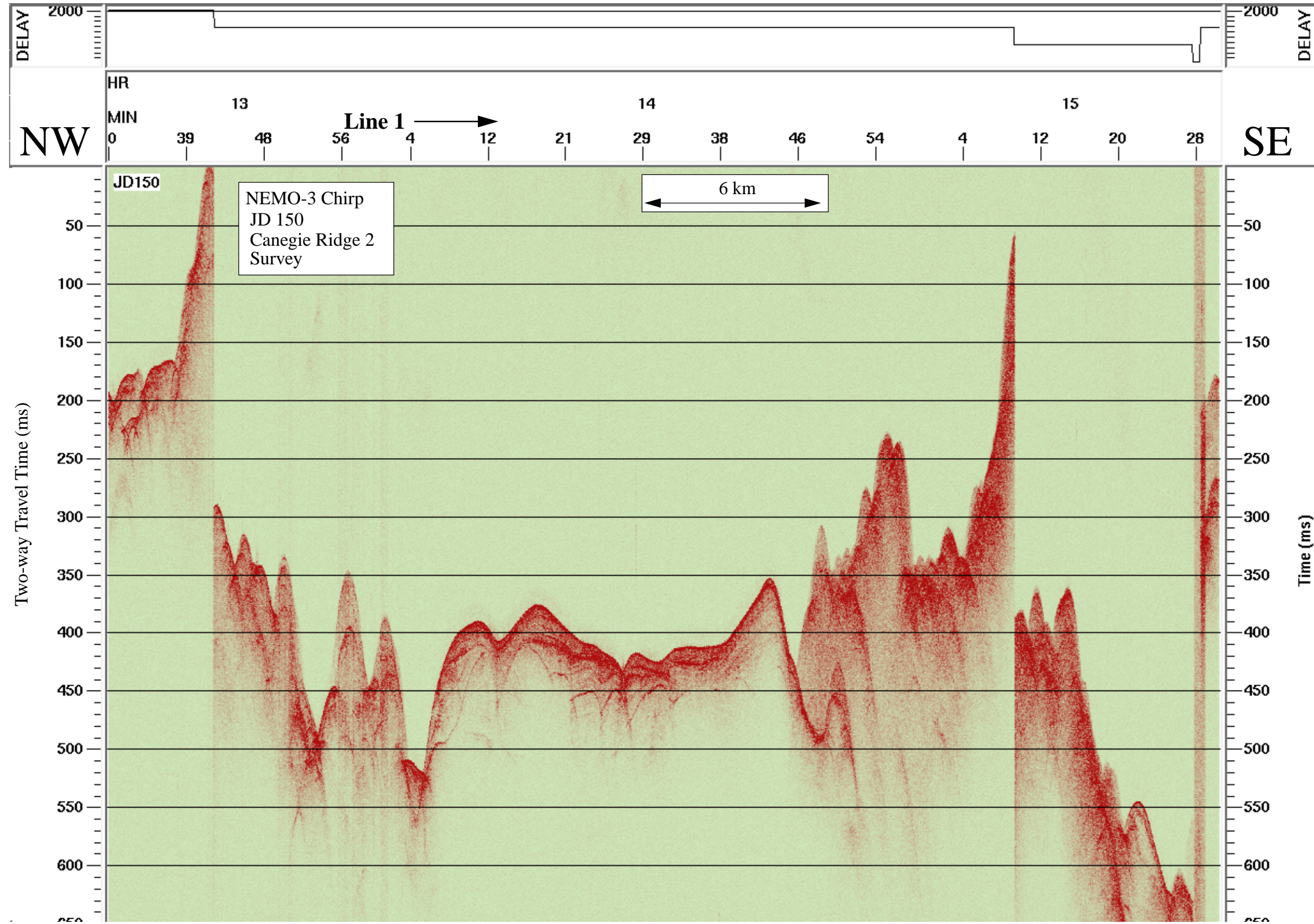


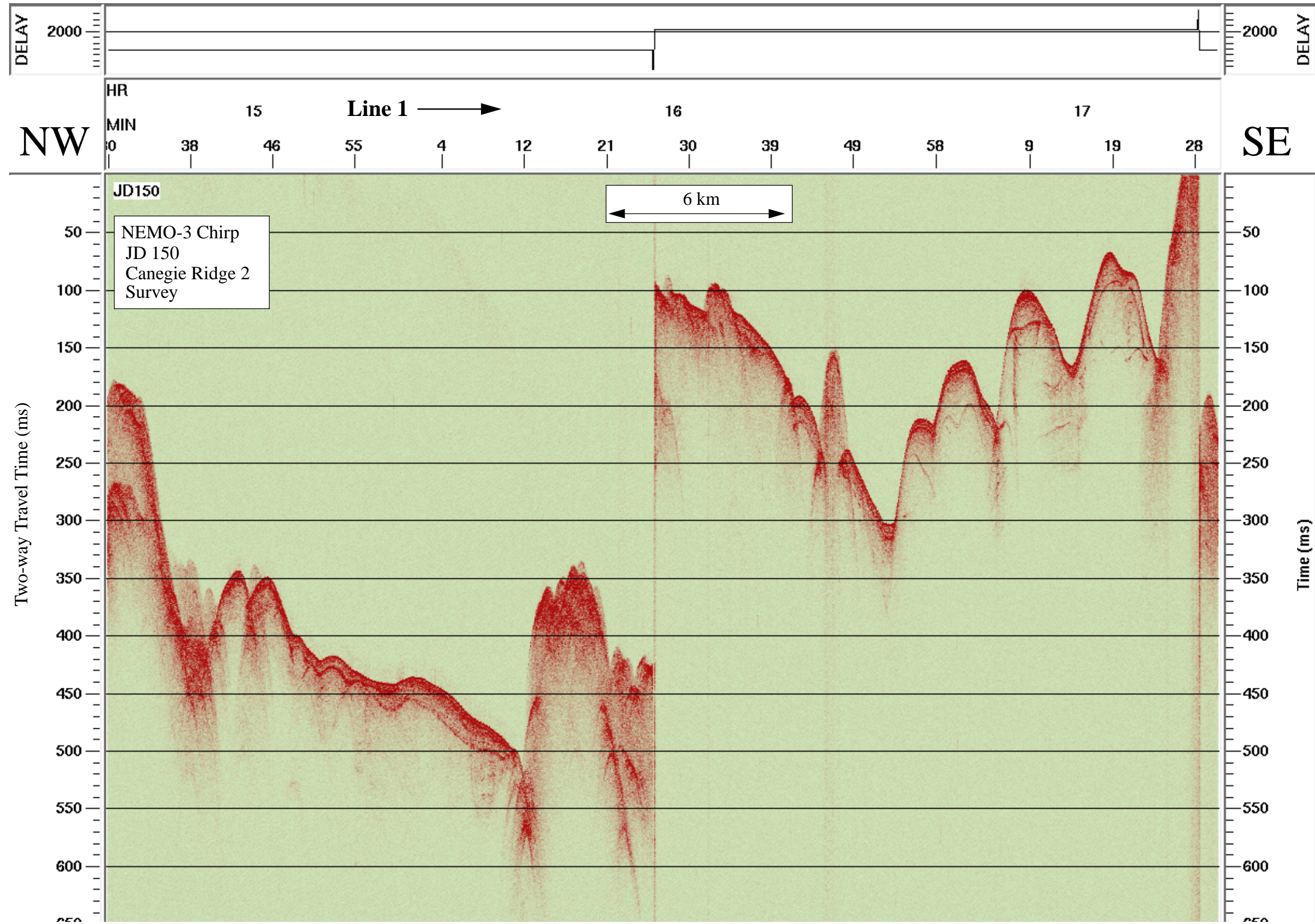




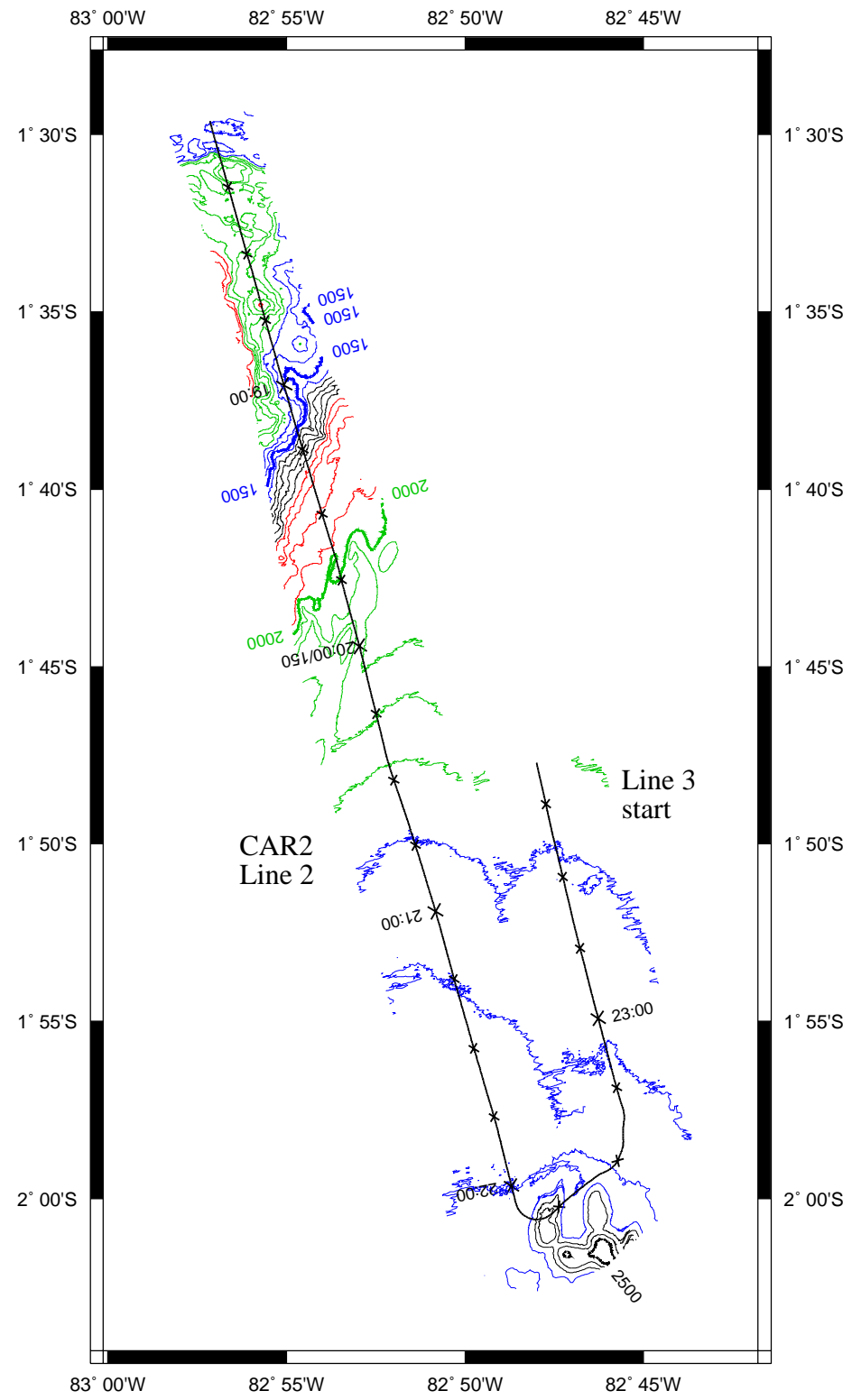


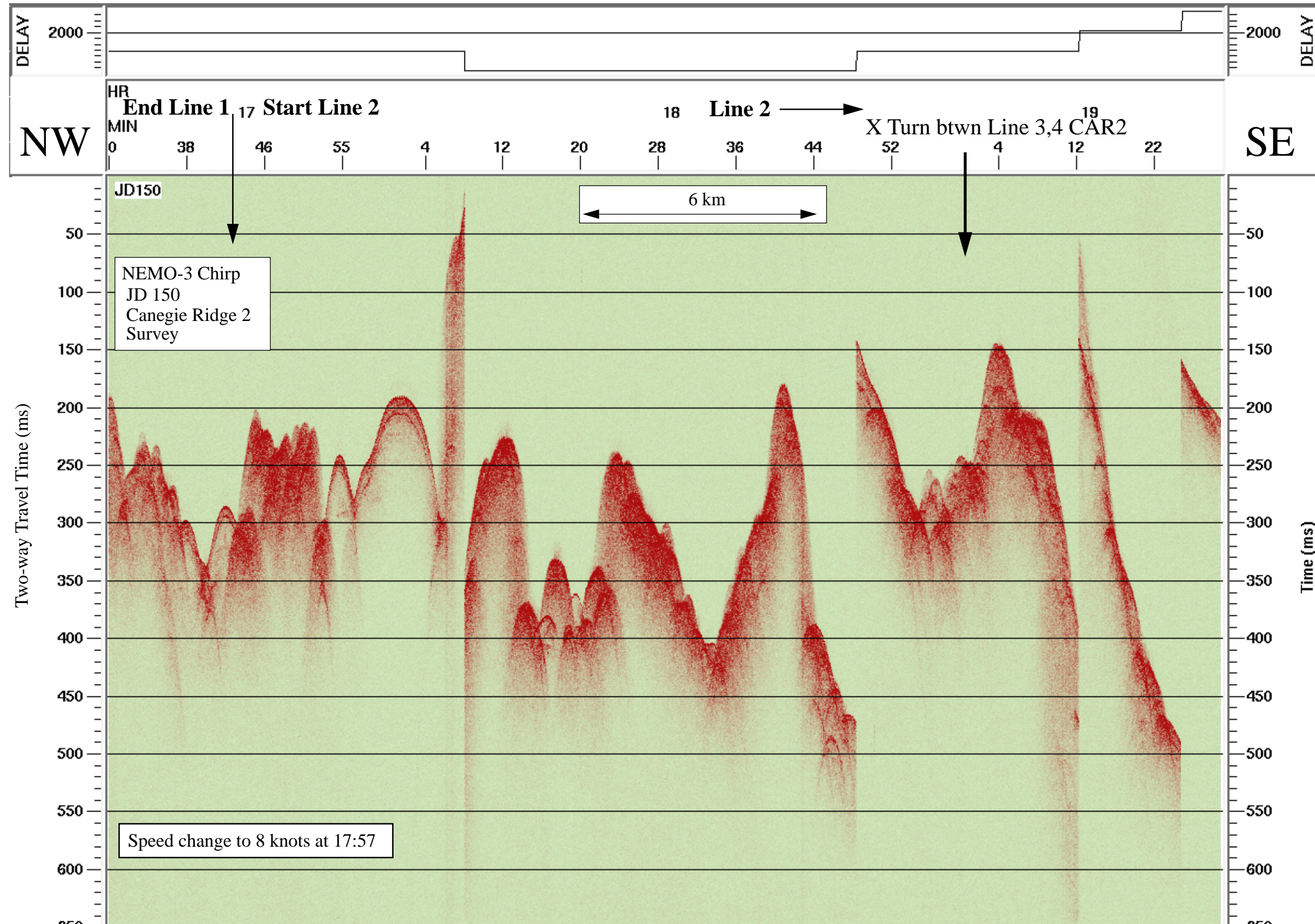


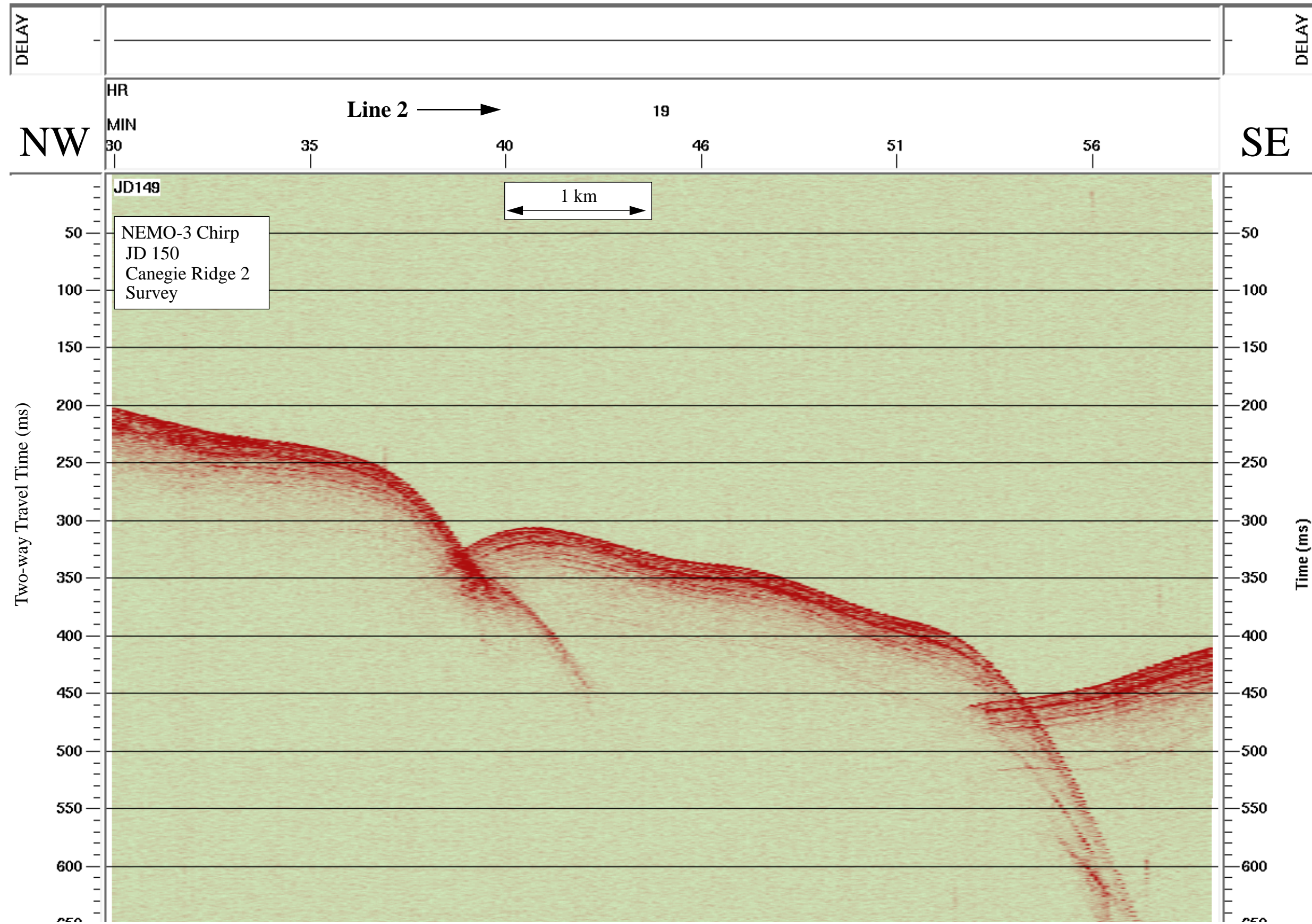


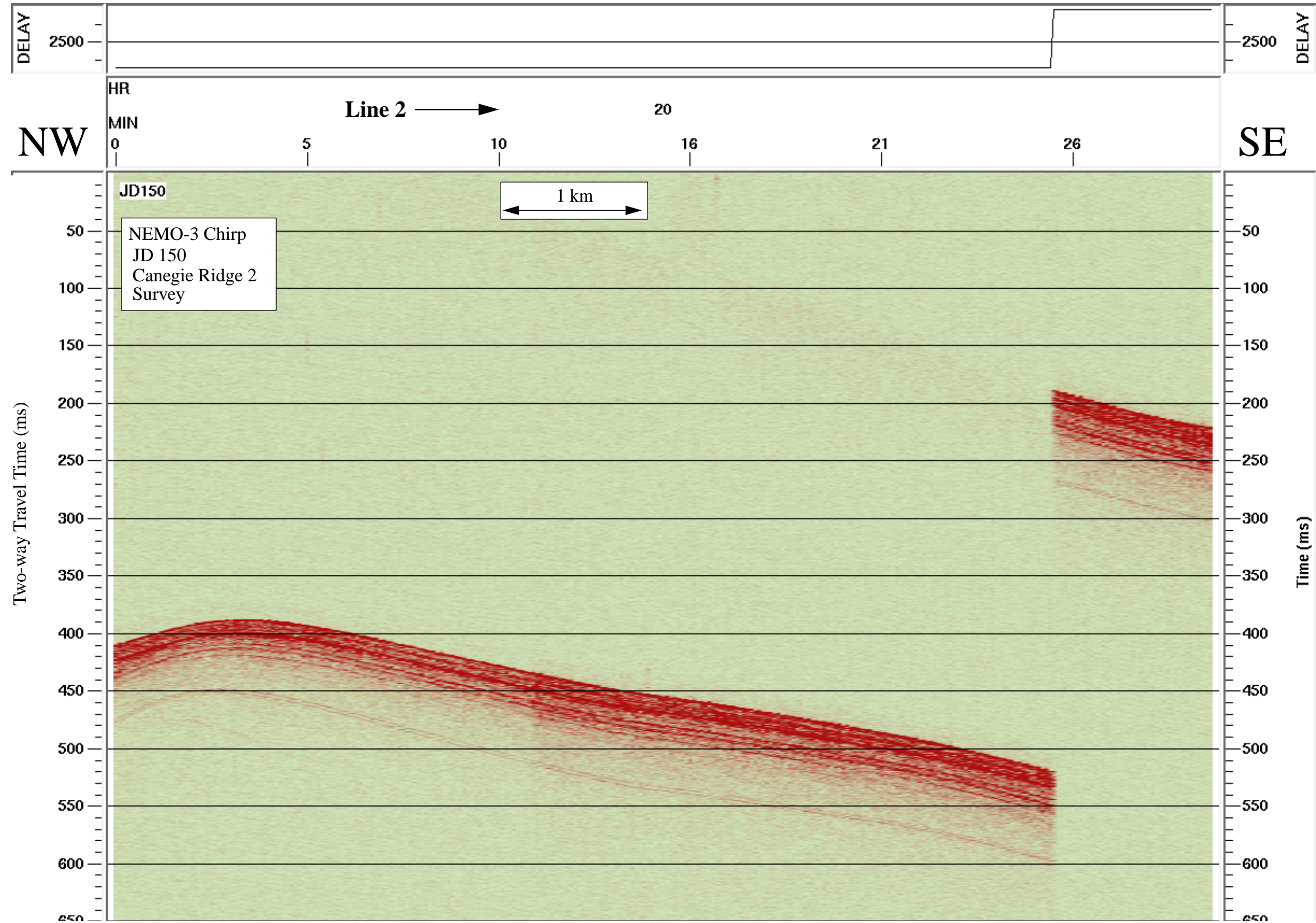


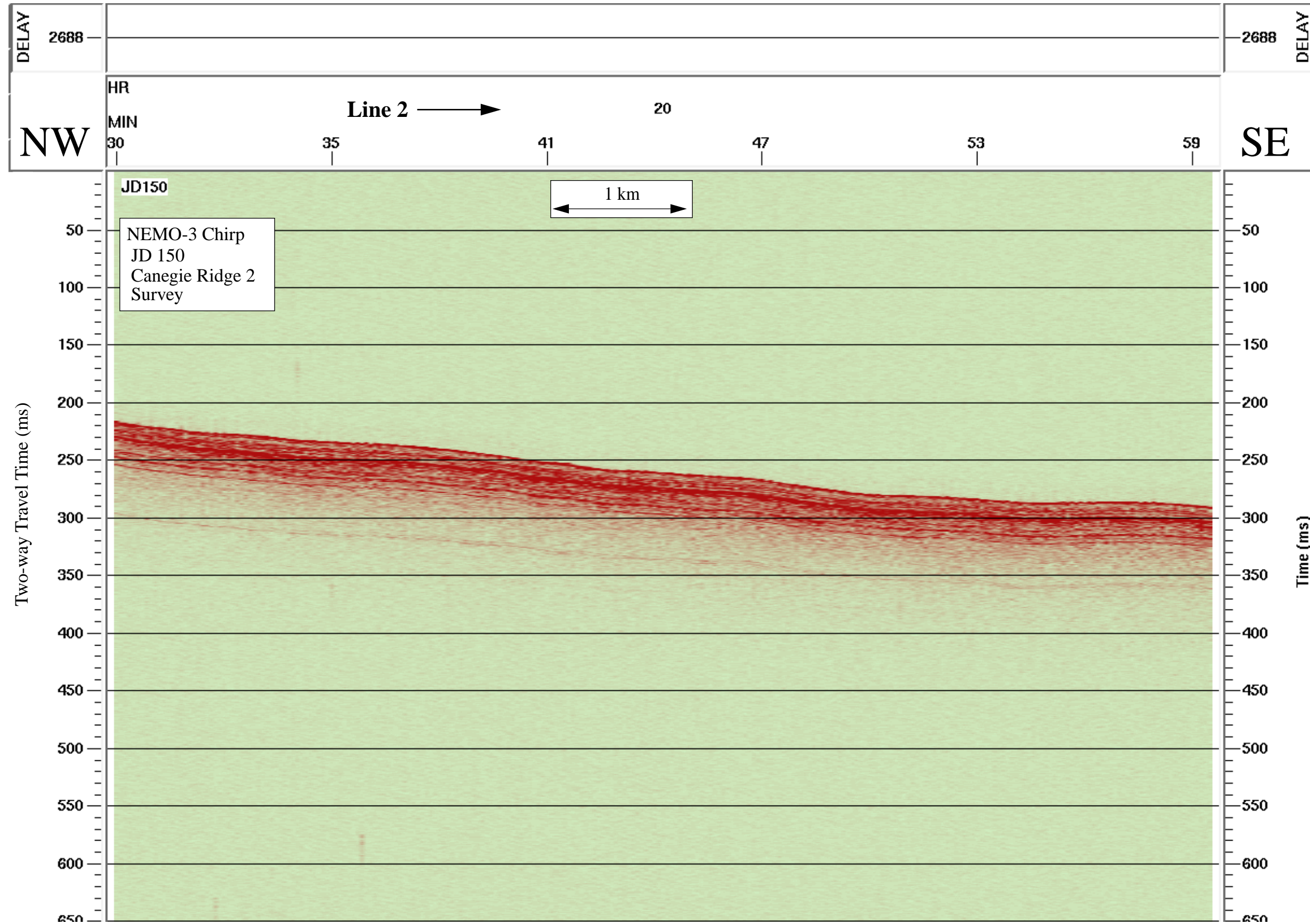
Data File SBfixavg.2000may29.1800-2400

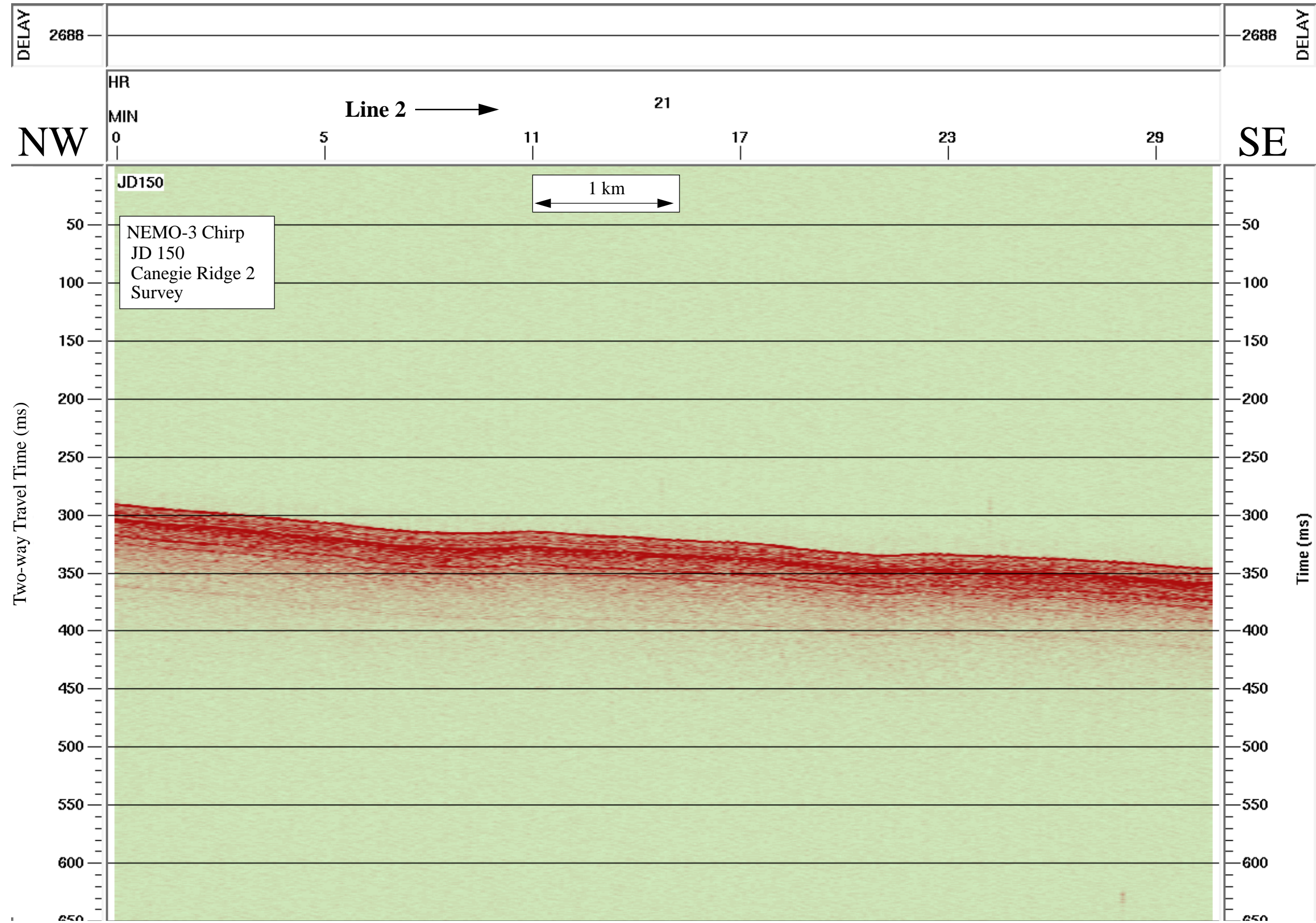


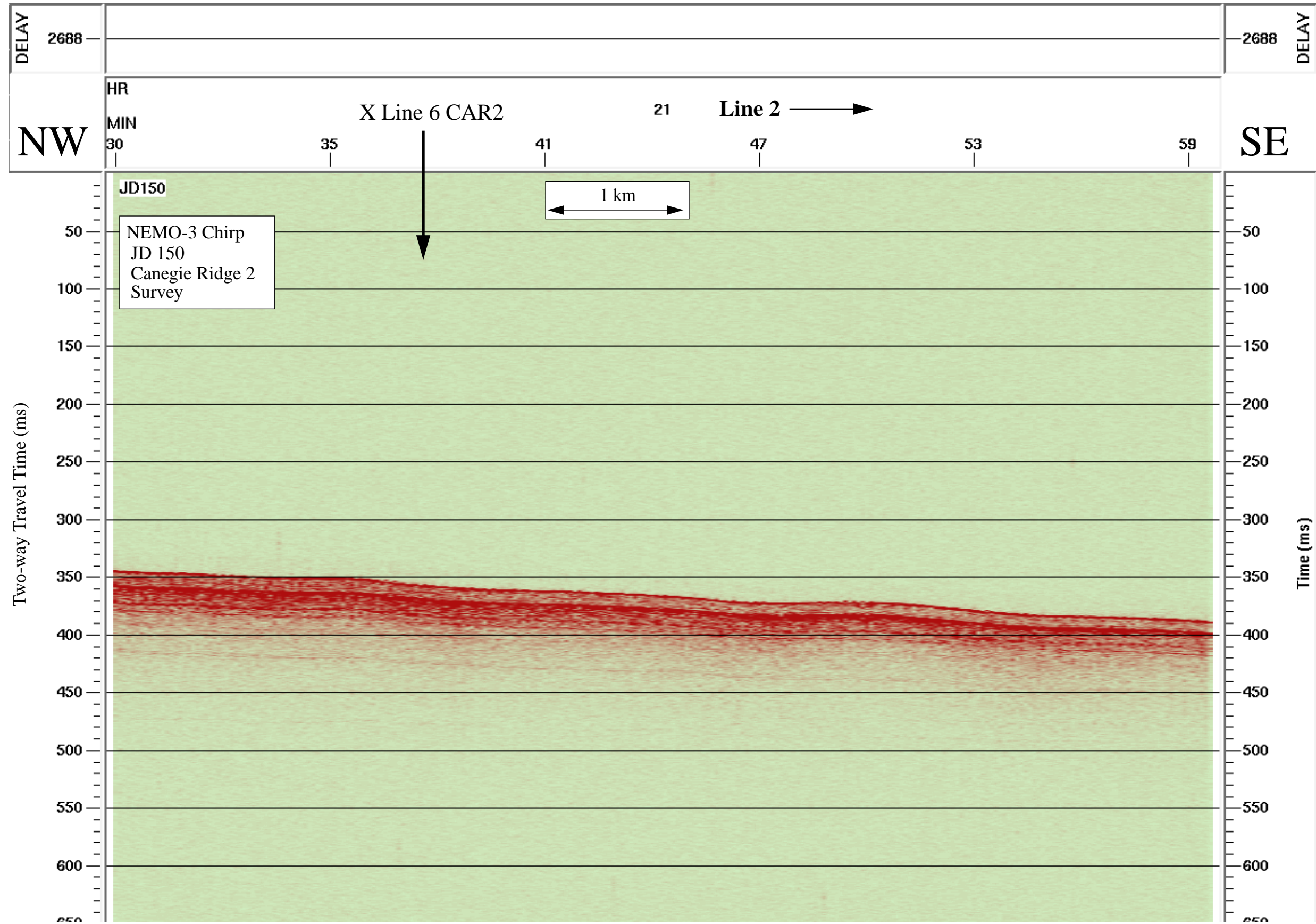


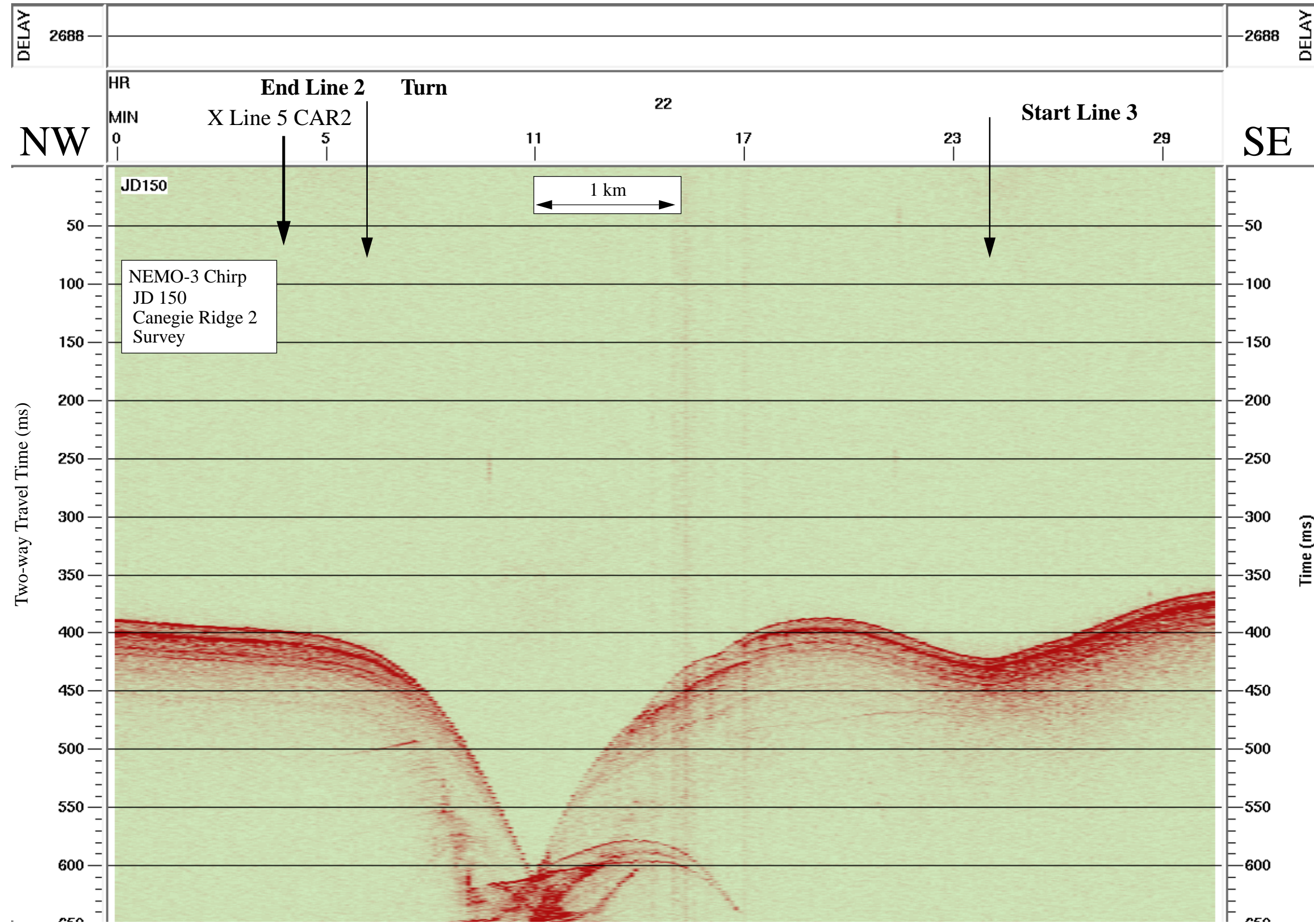


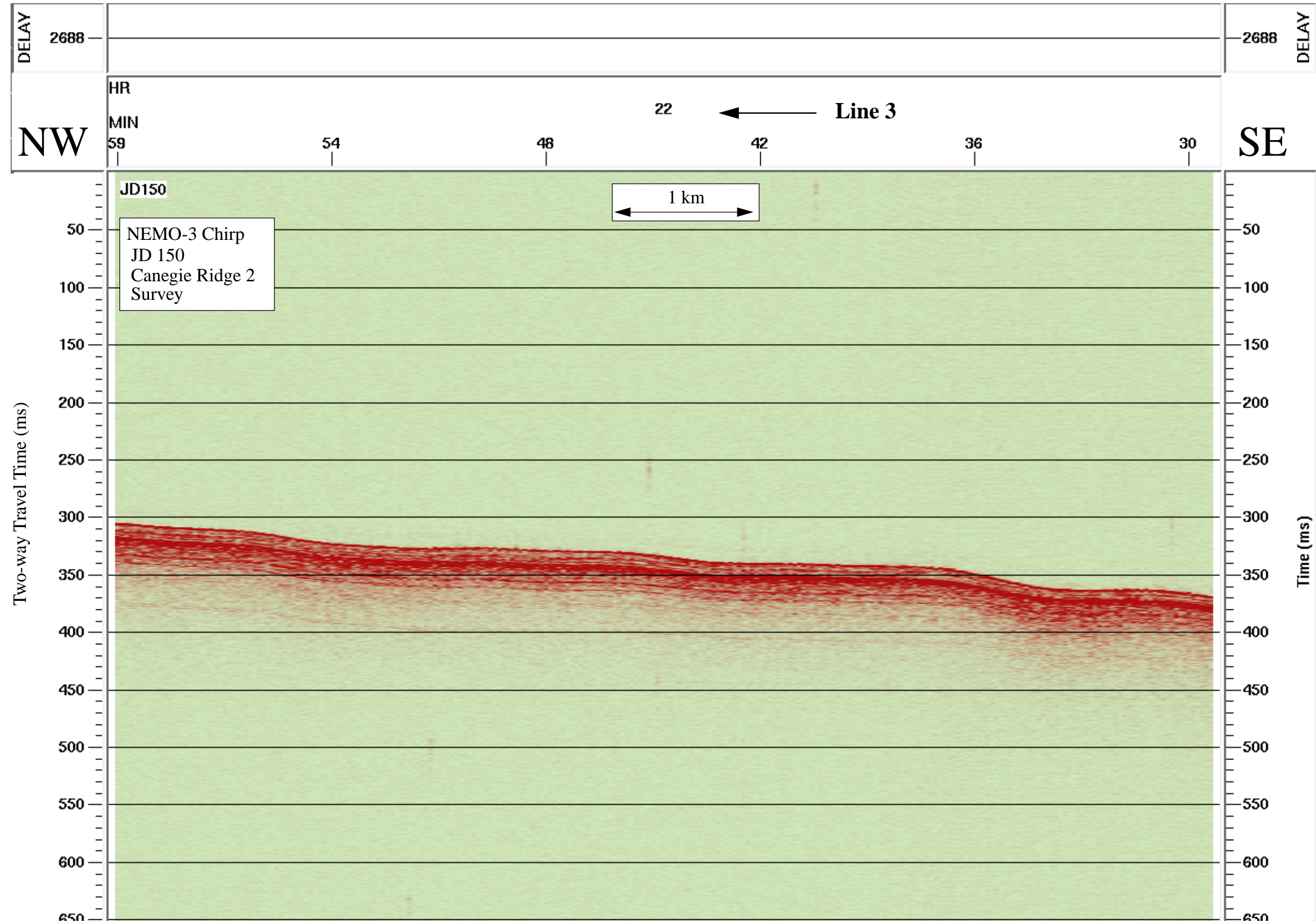


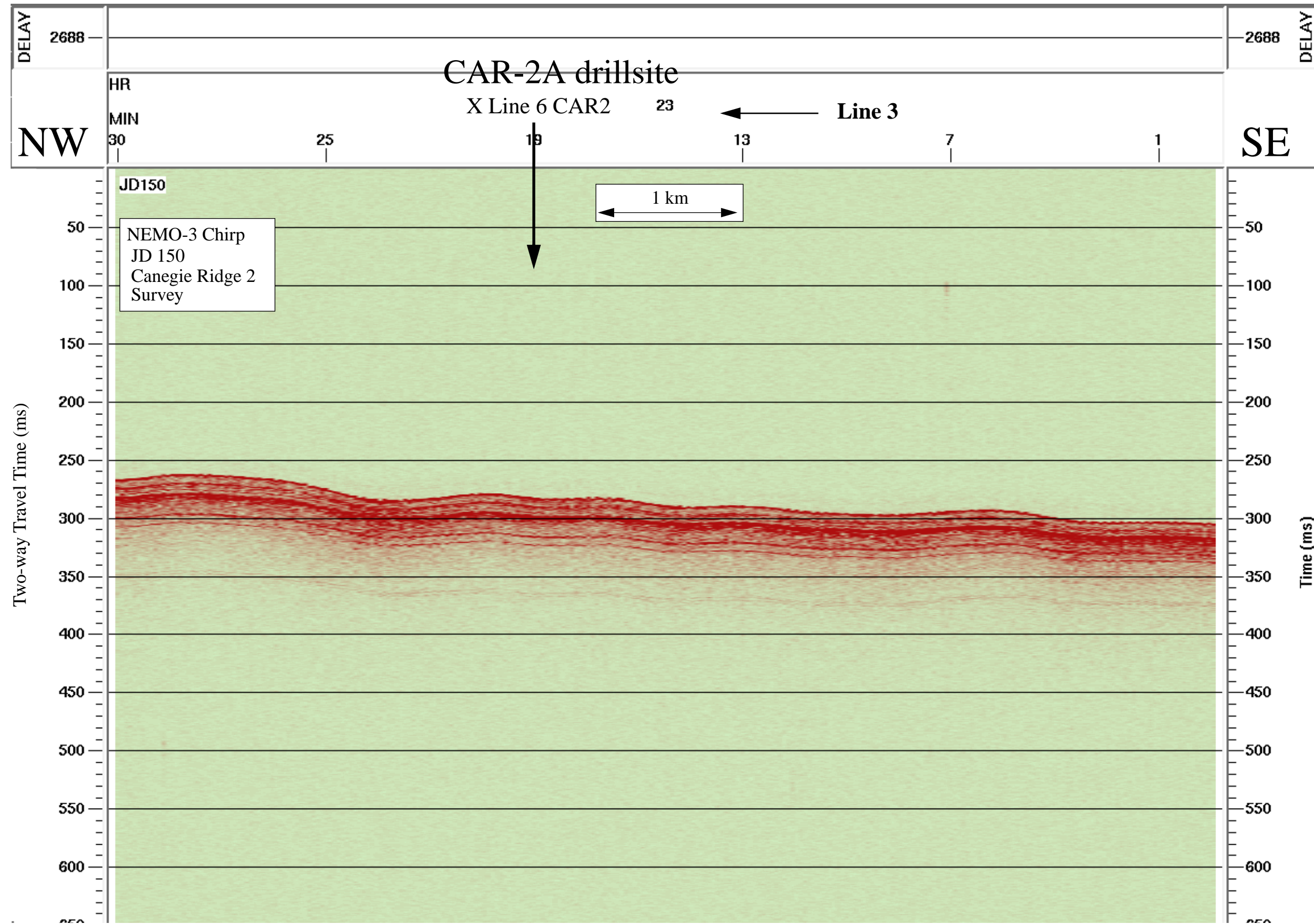


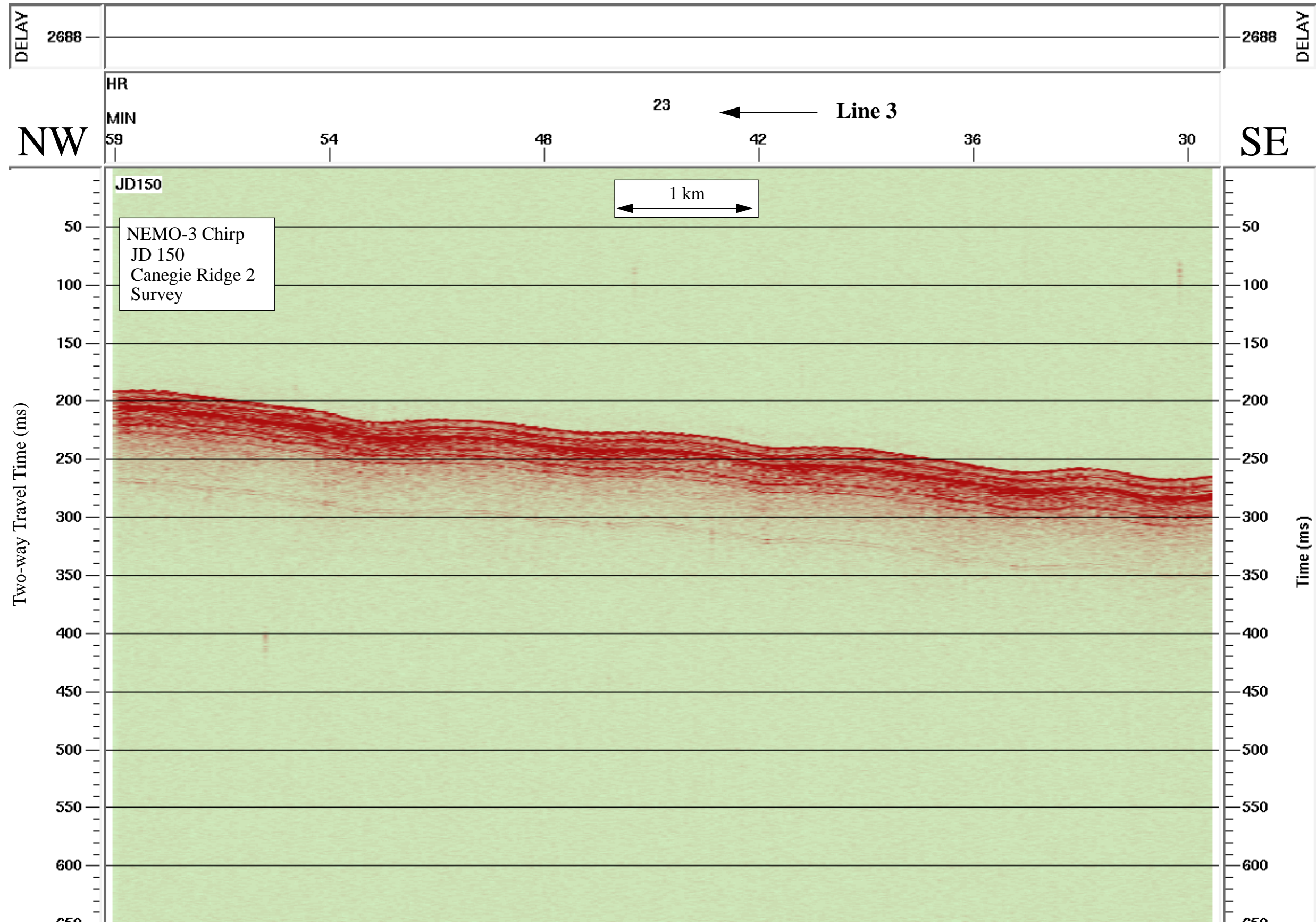












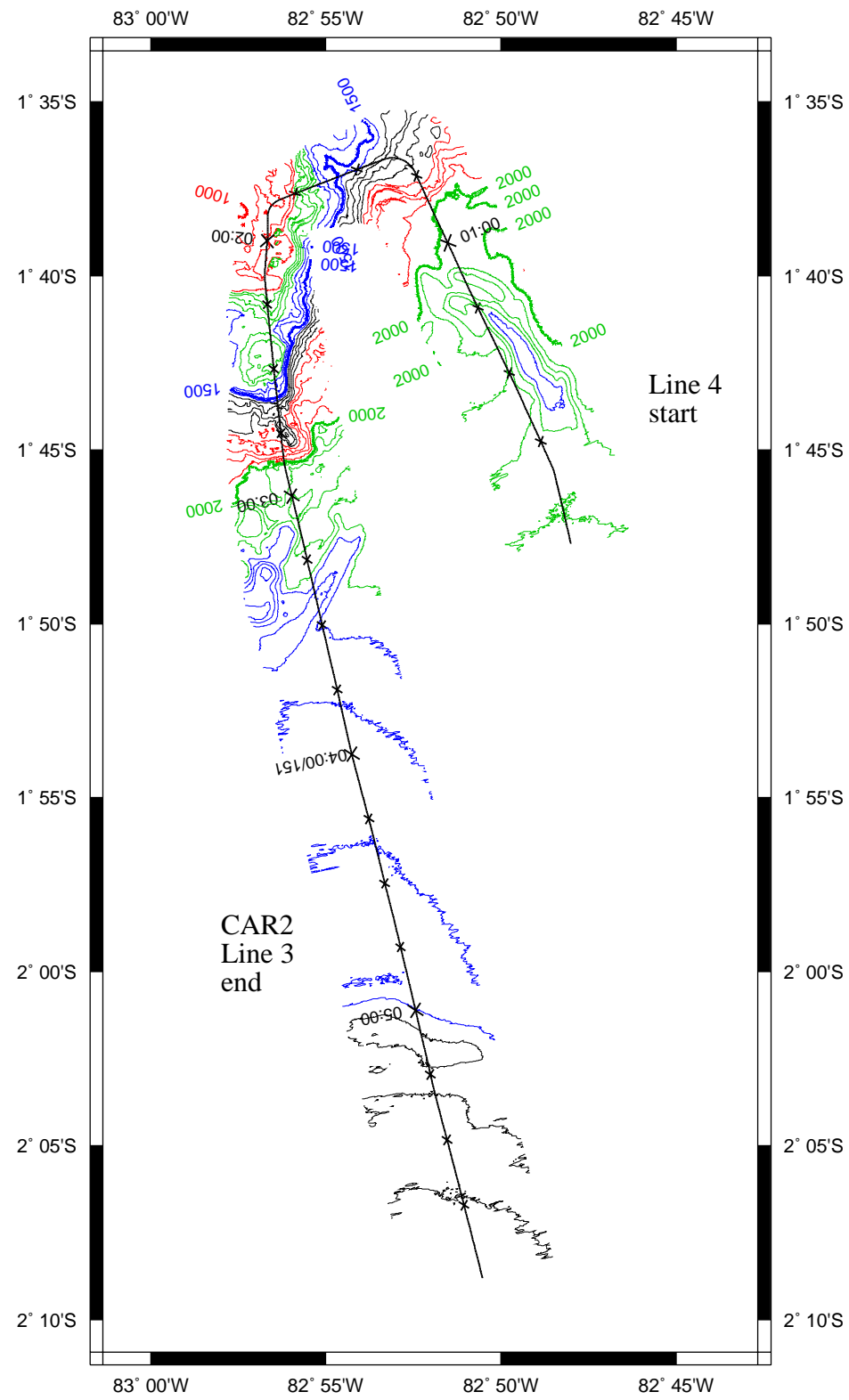
JD 151 (30 May 2000)--CAR-2 Survey, Day 2

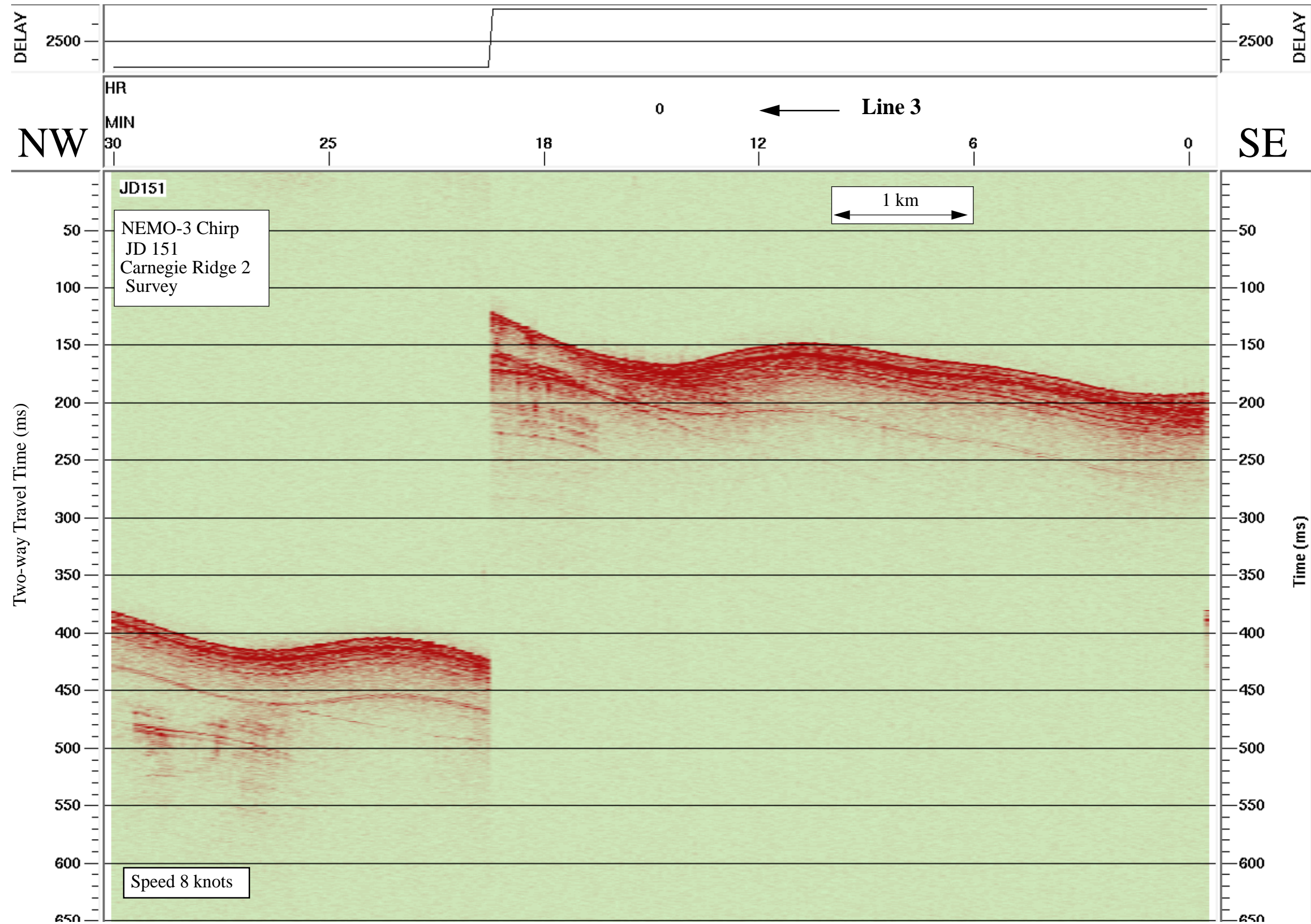
2-7 kHz Chirp Subbottom Profiler

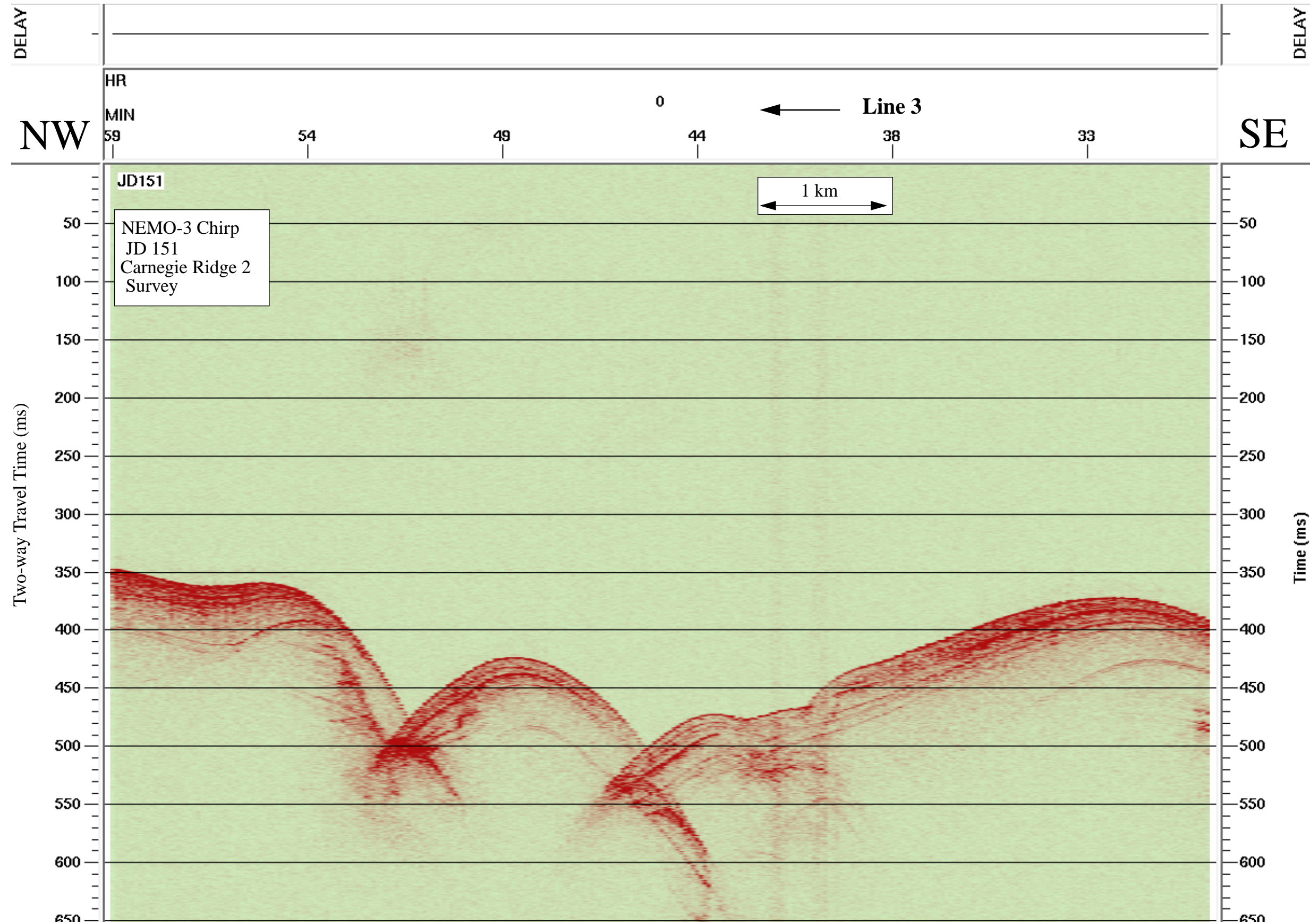
NEMO Leg 3

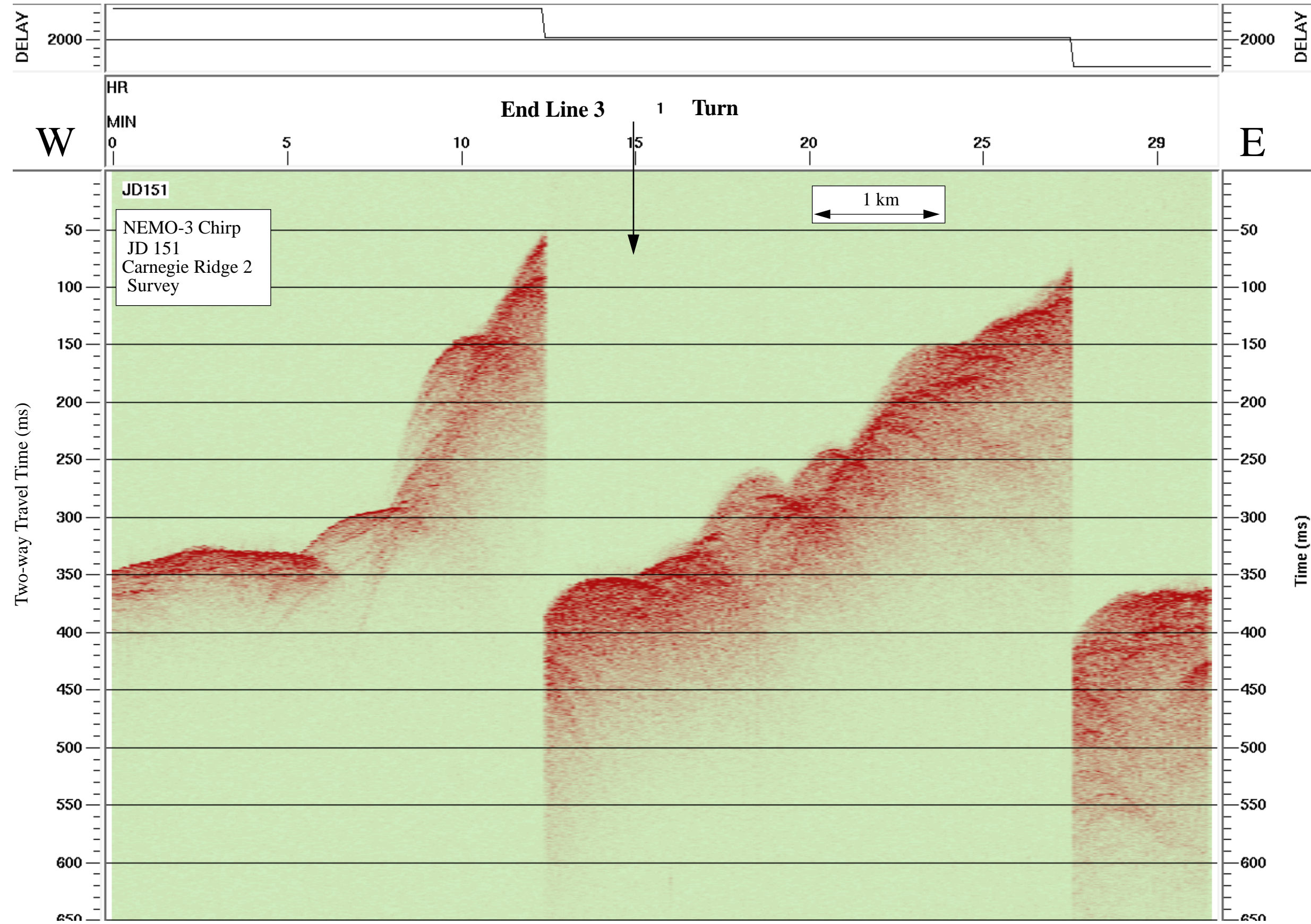
R/V Melville

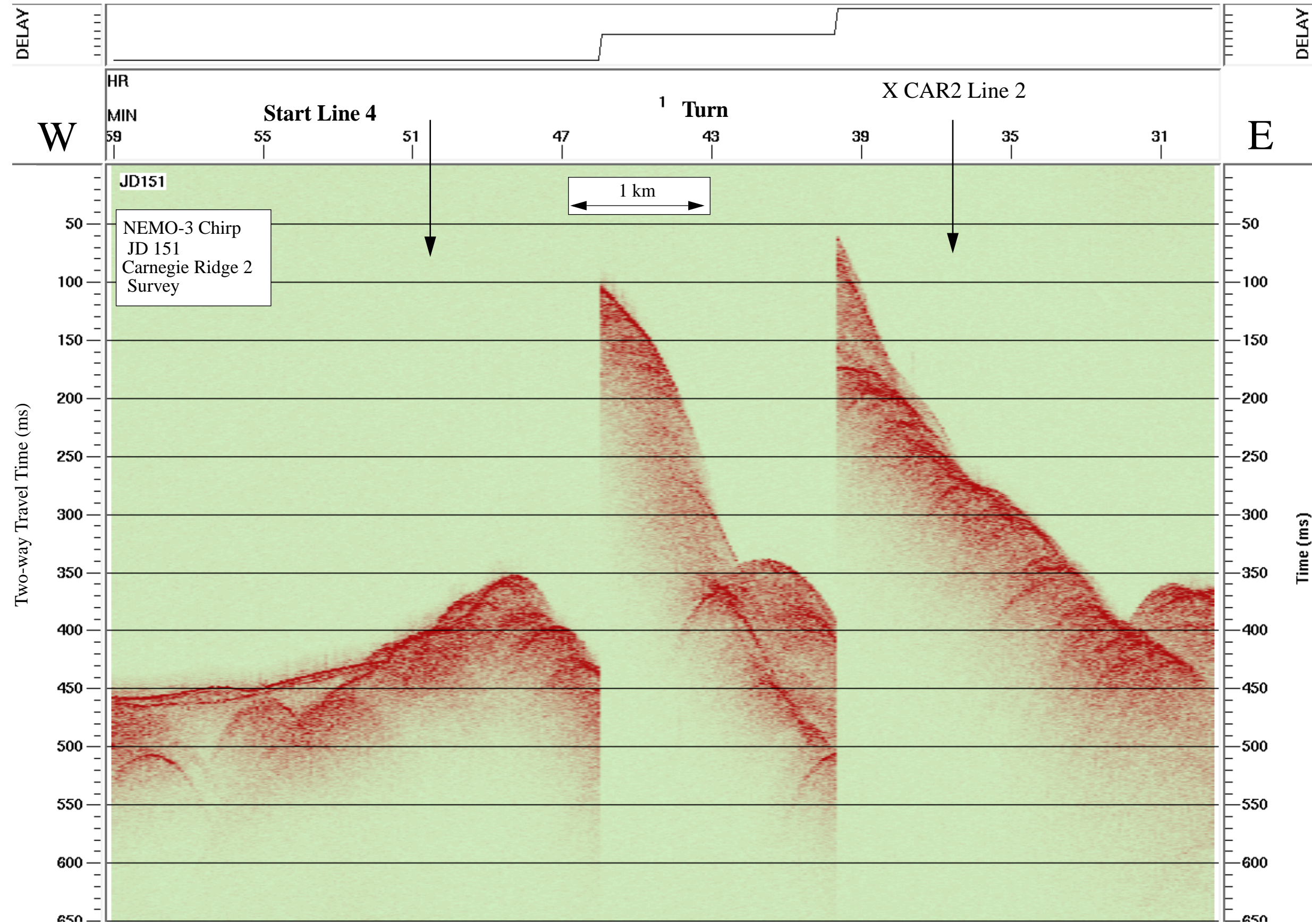
Data File SBfixavg.2000may30.0000-0600

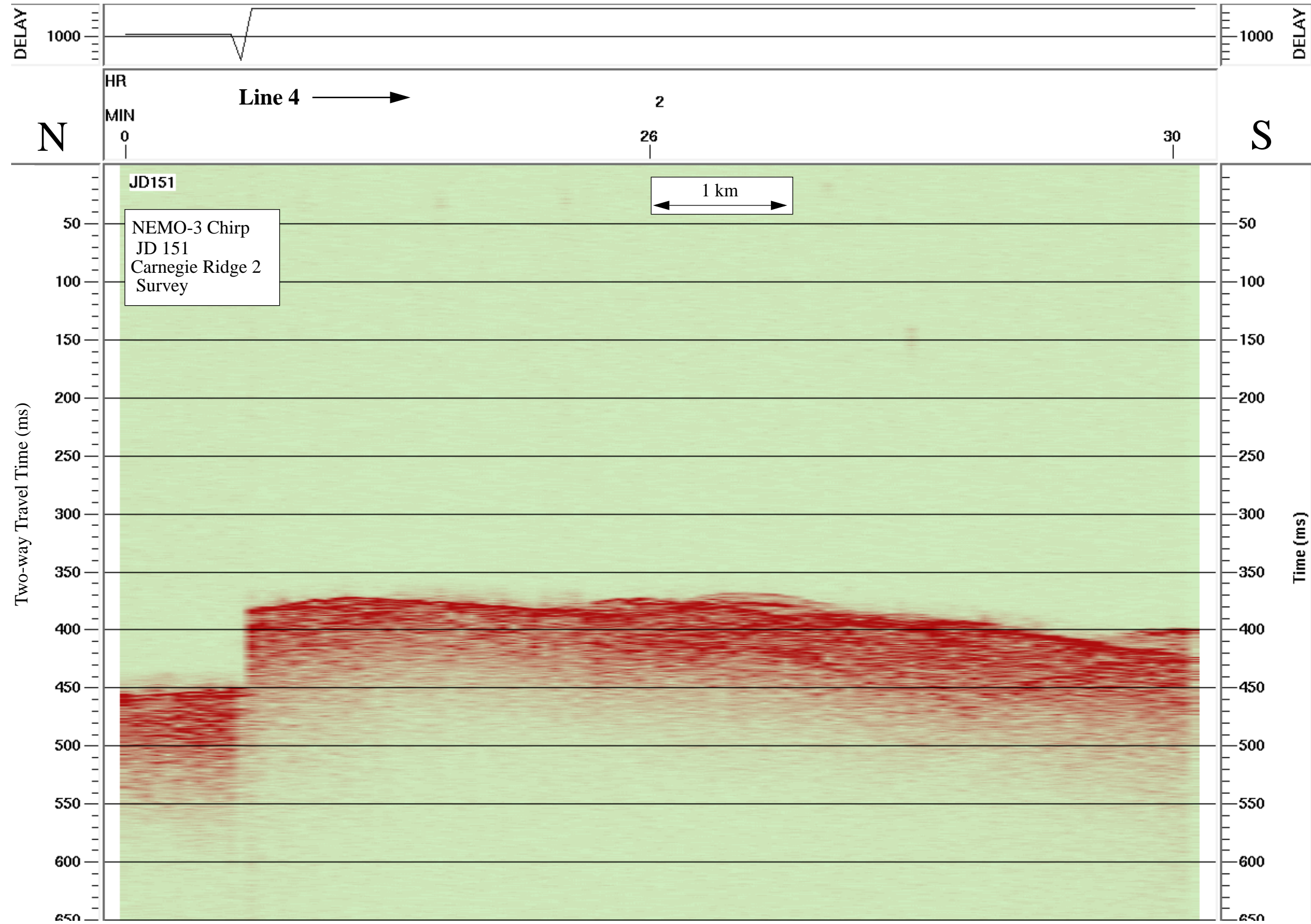


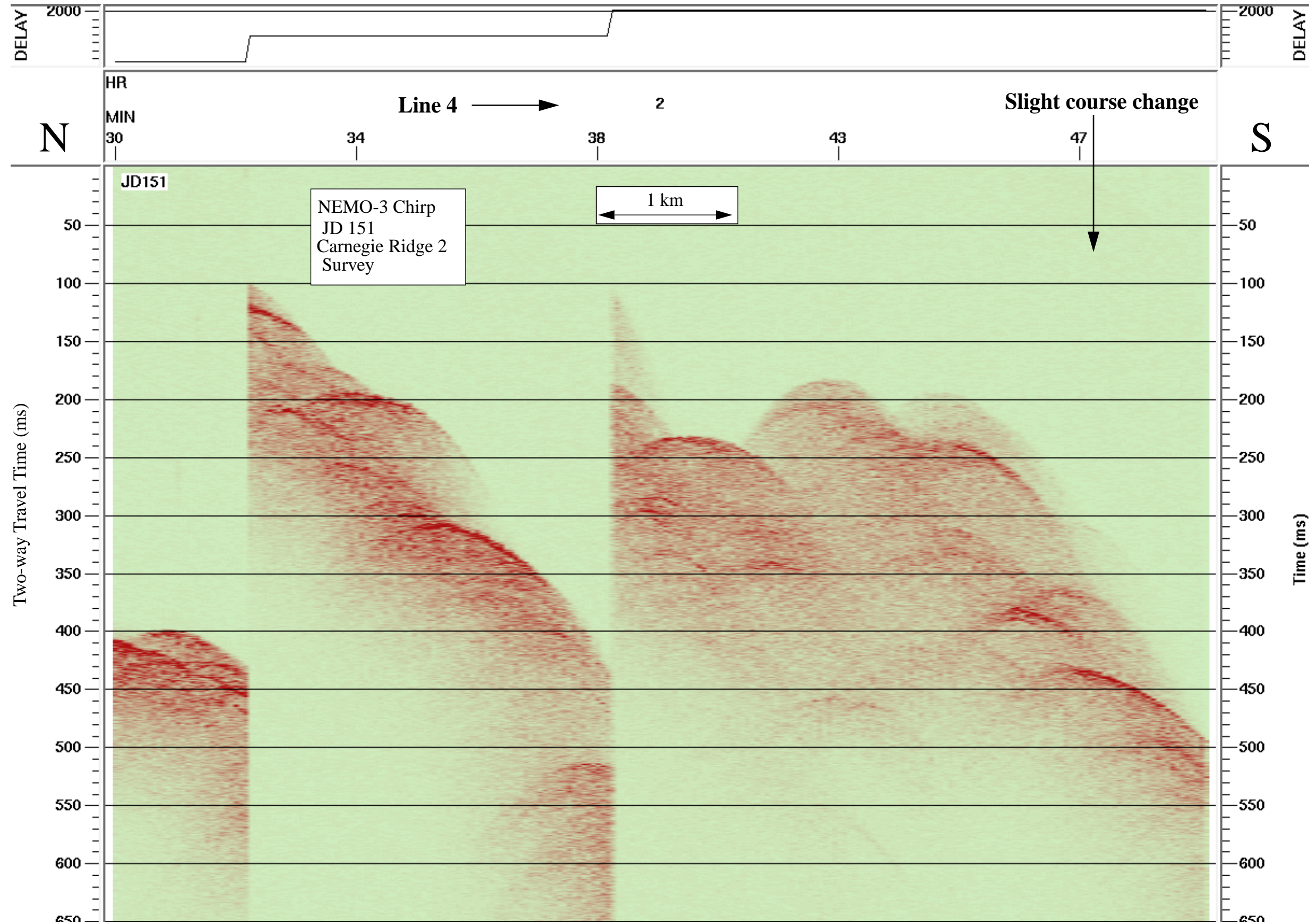


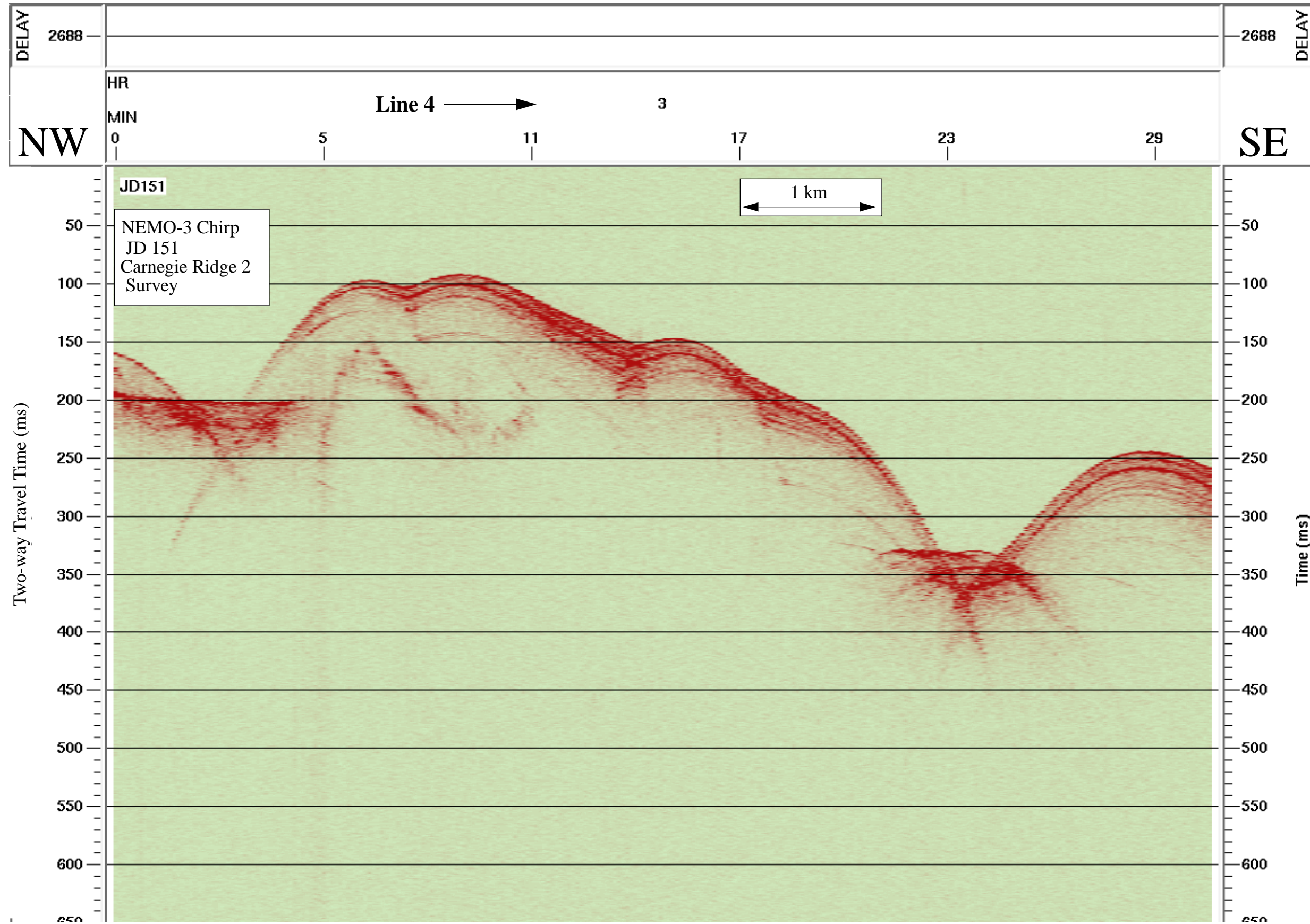


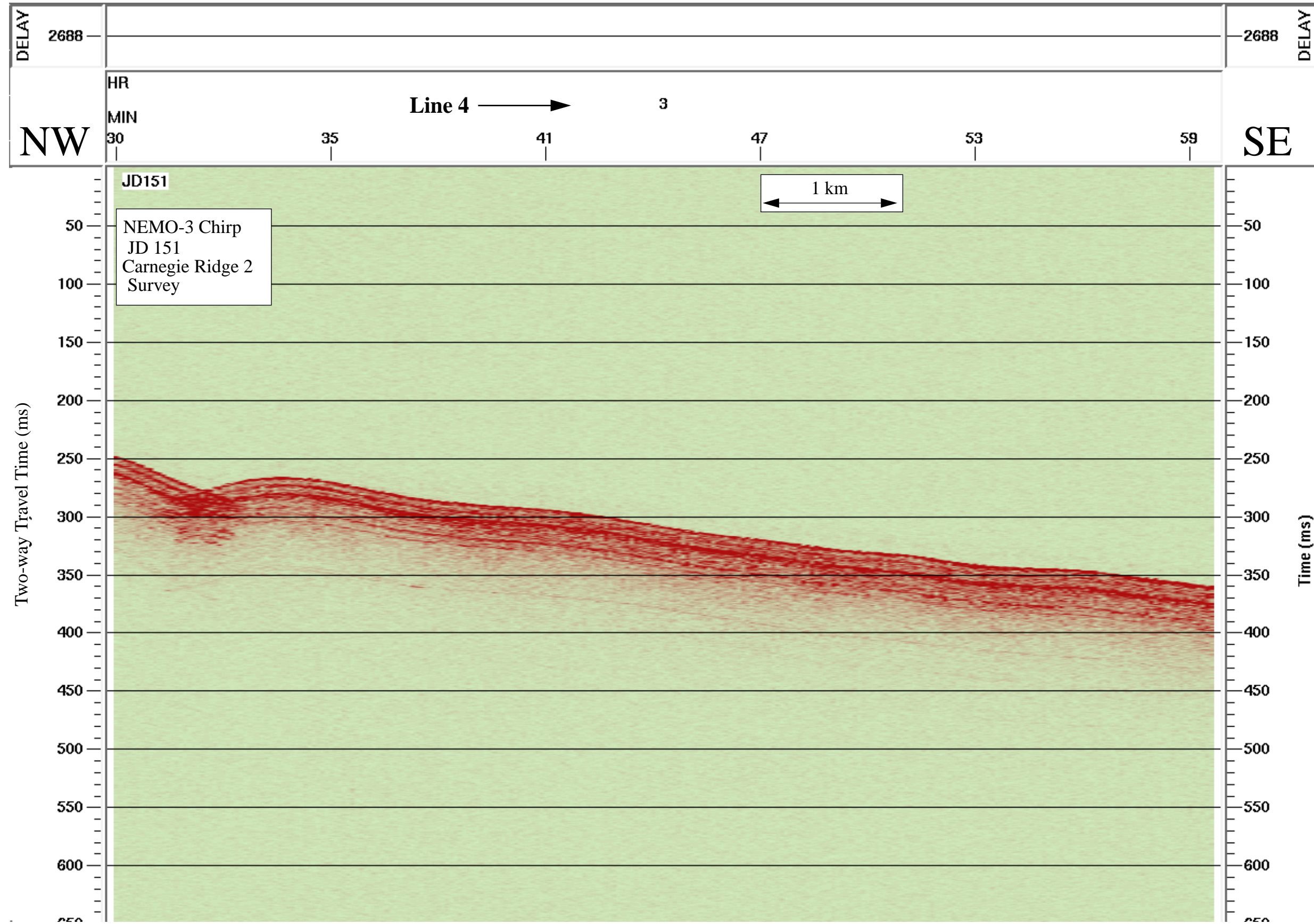


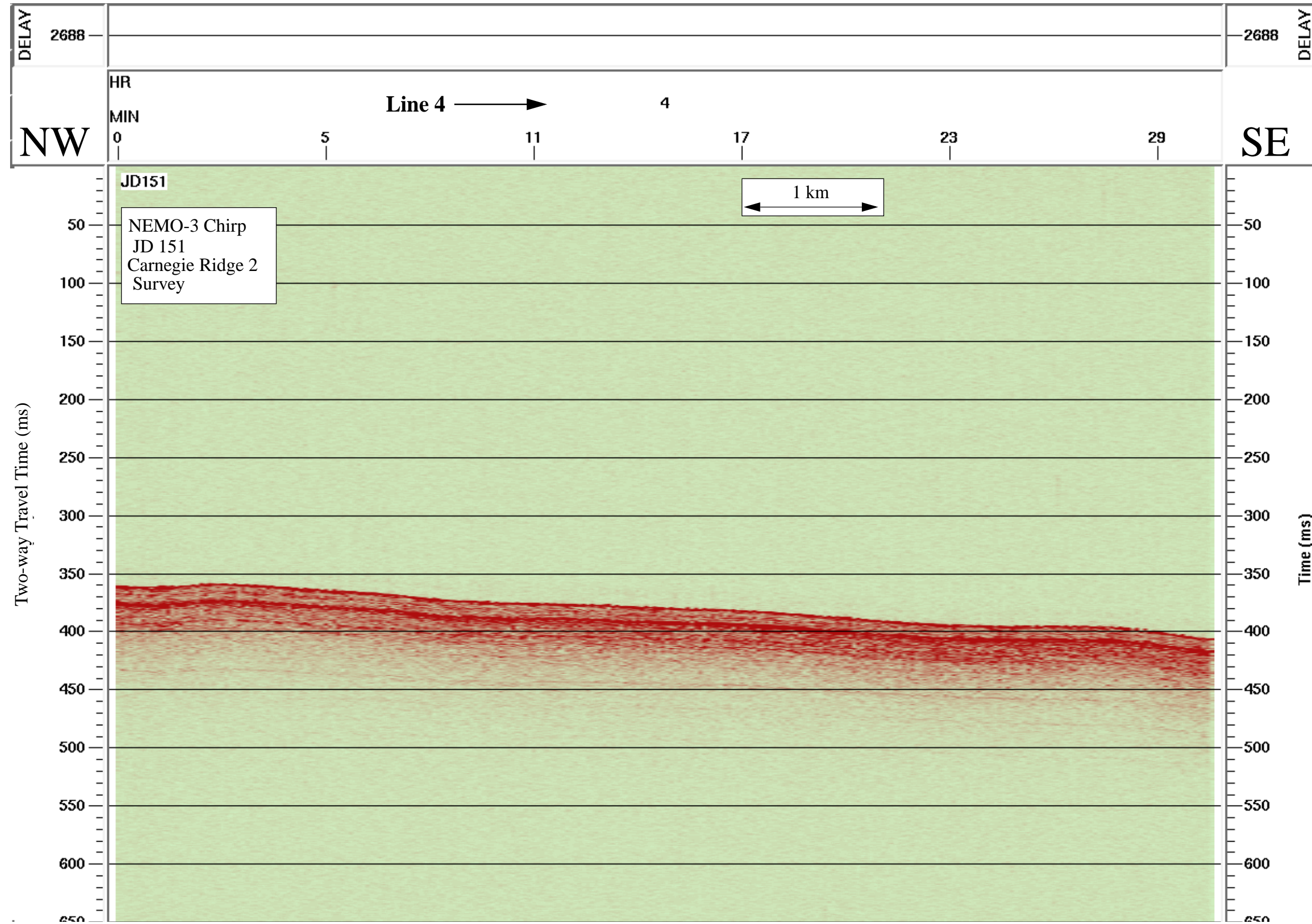


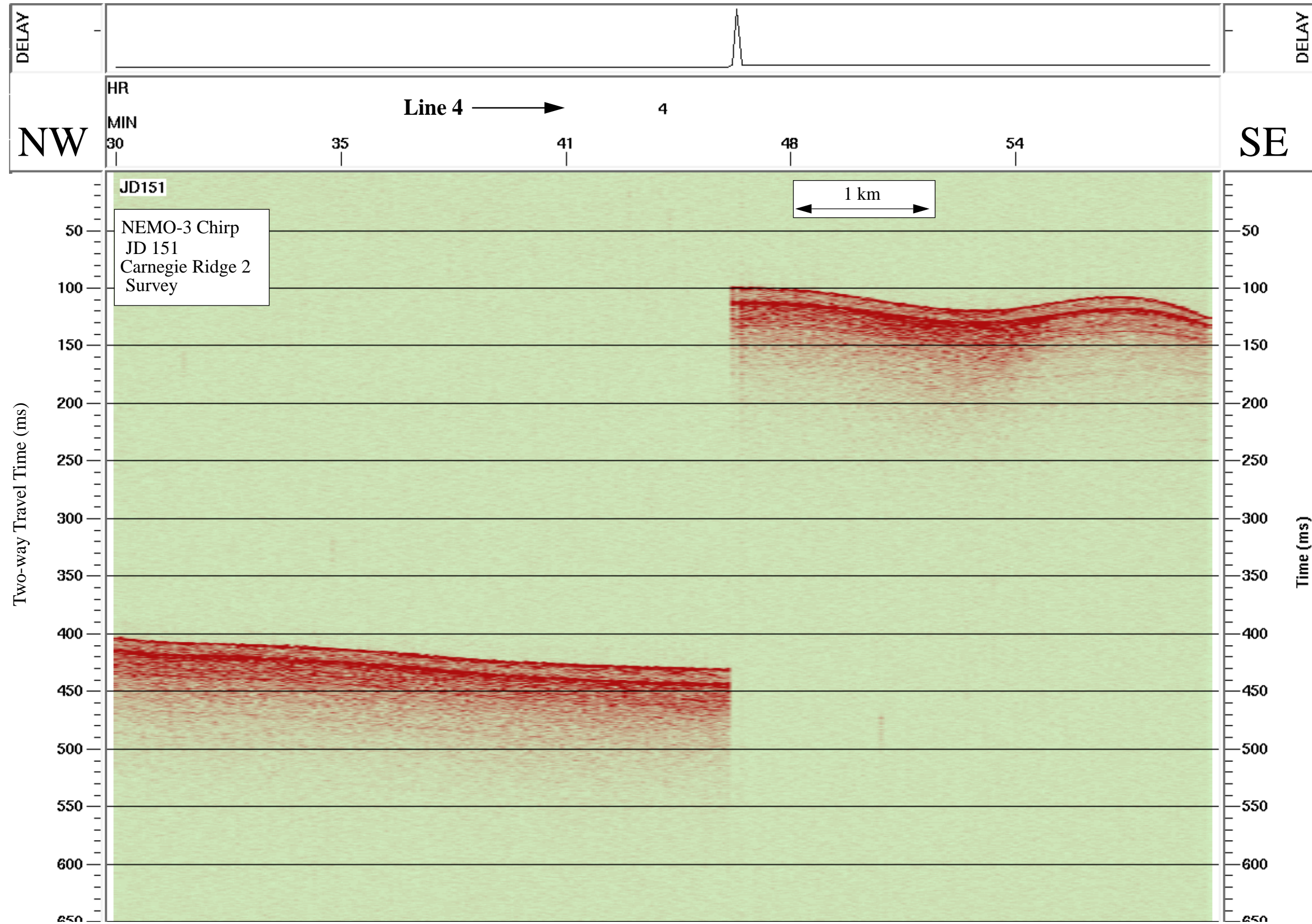


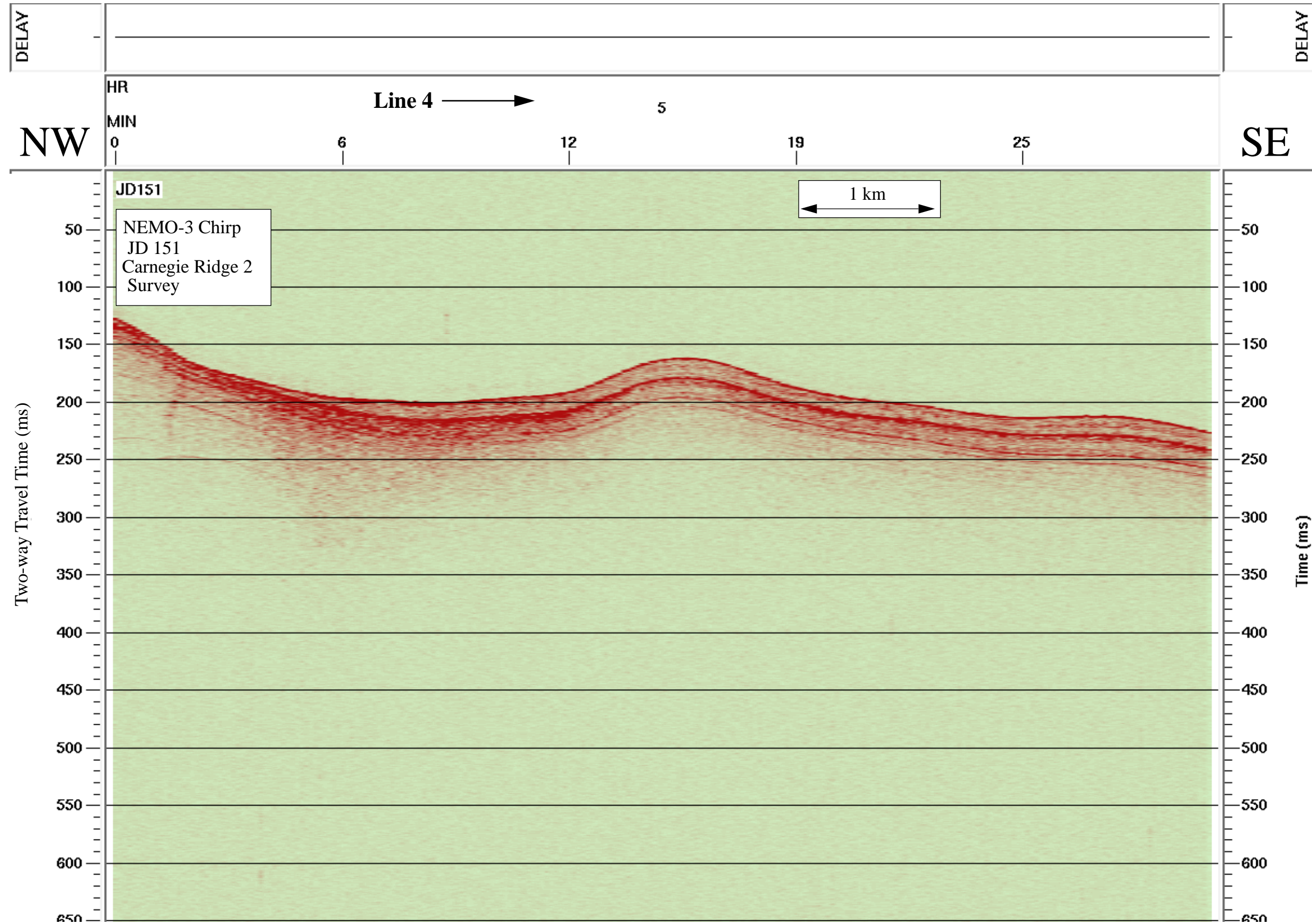


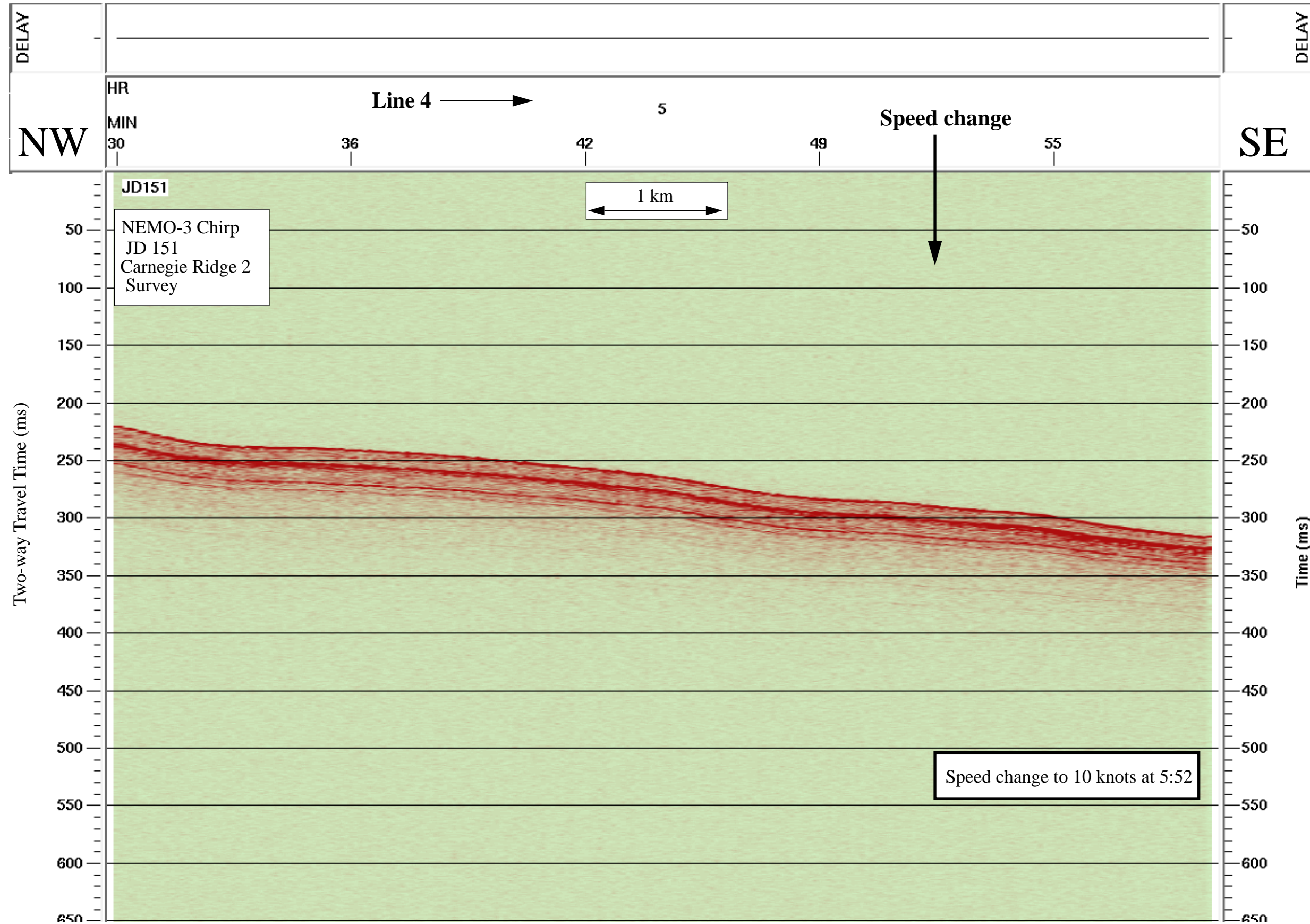




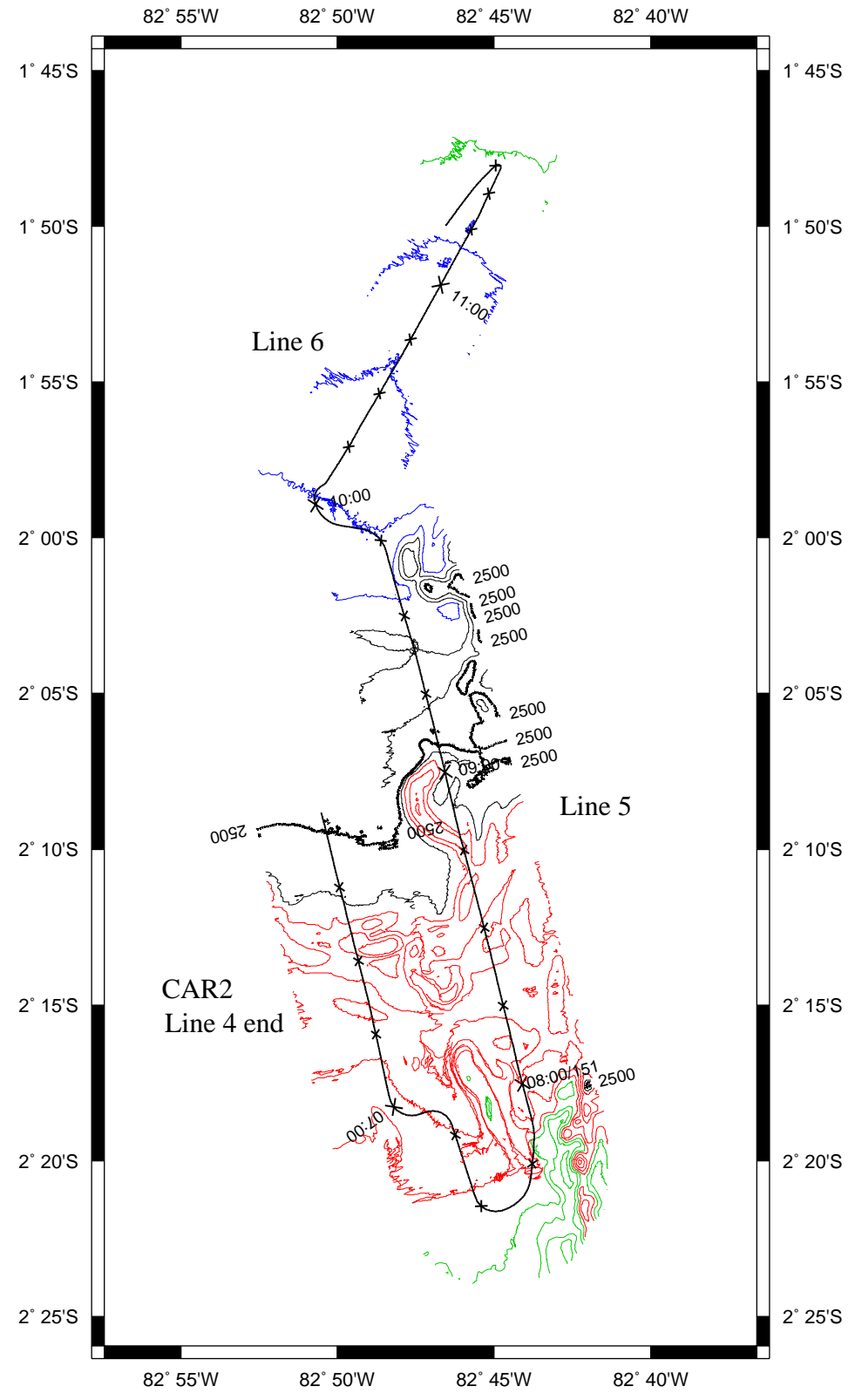


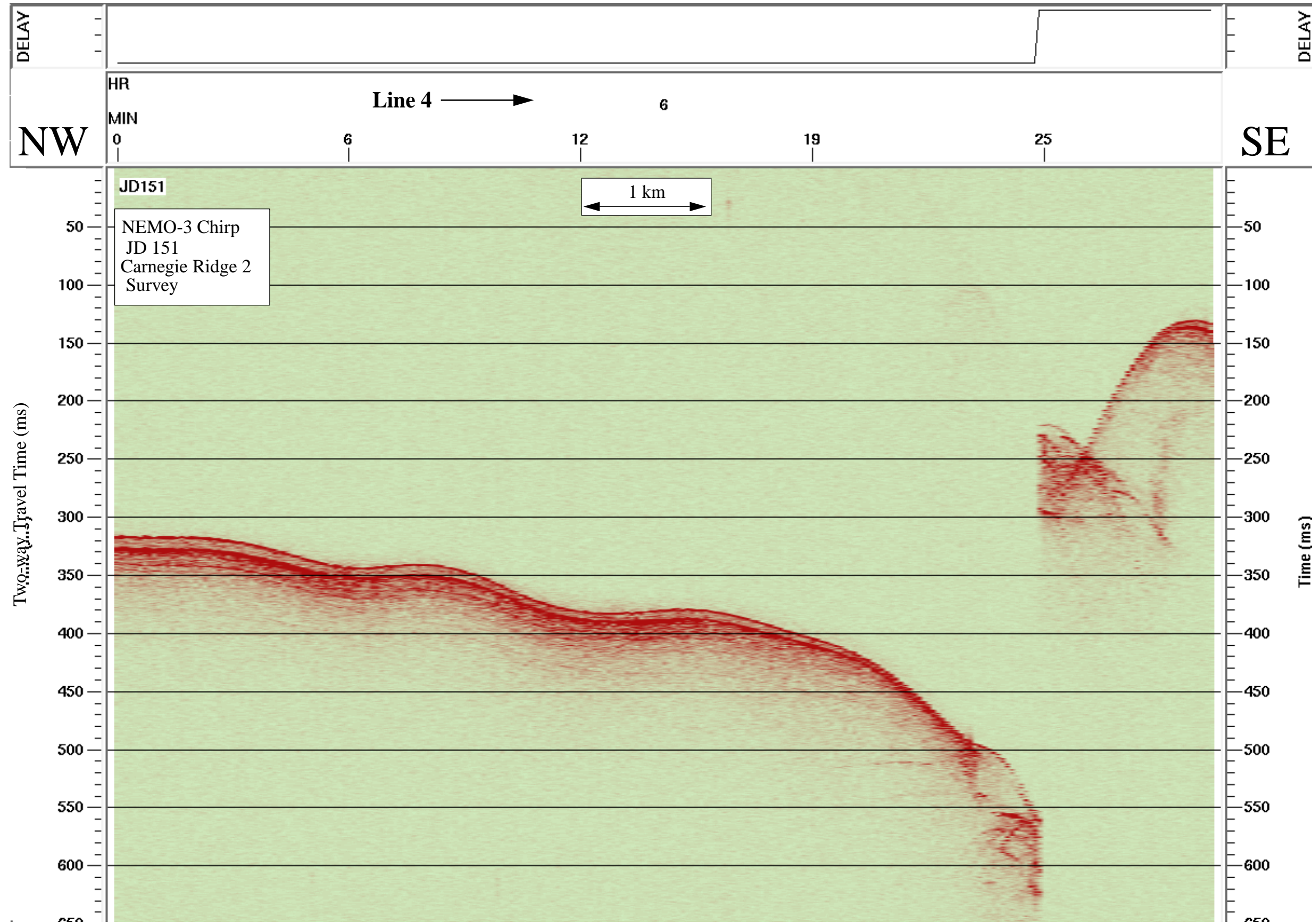


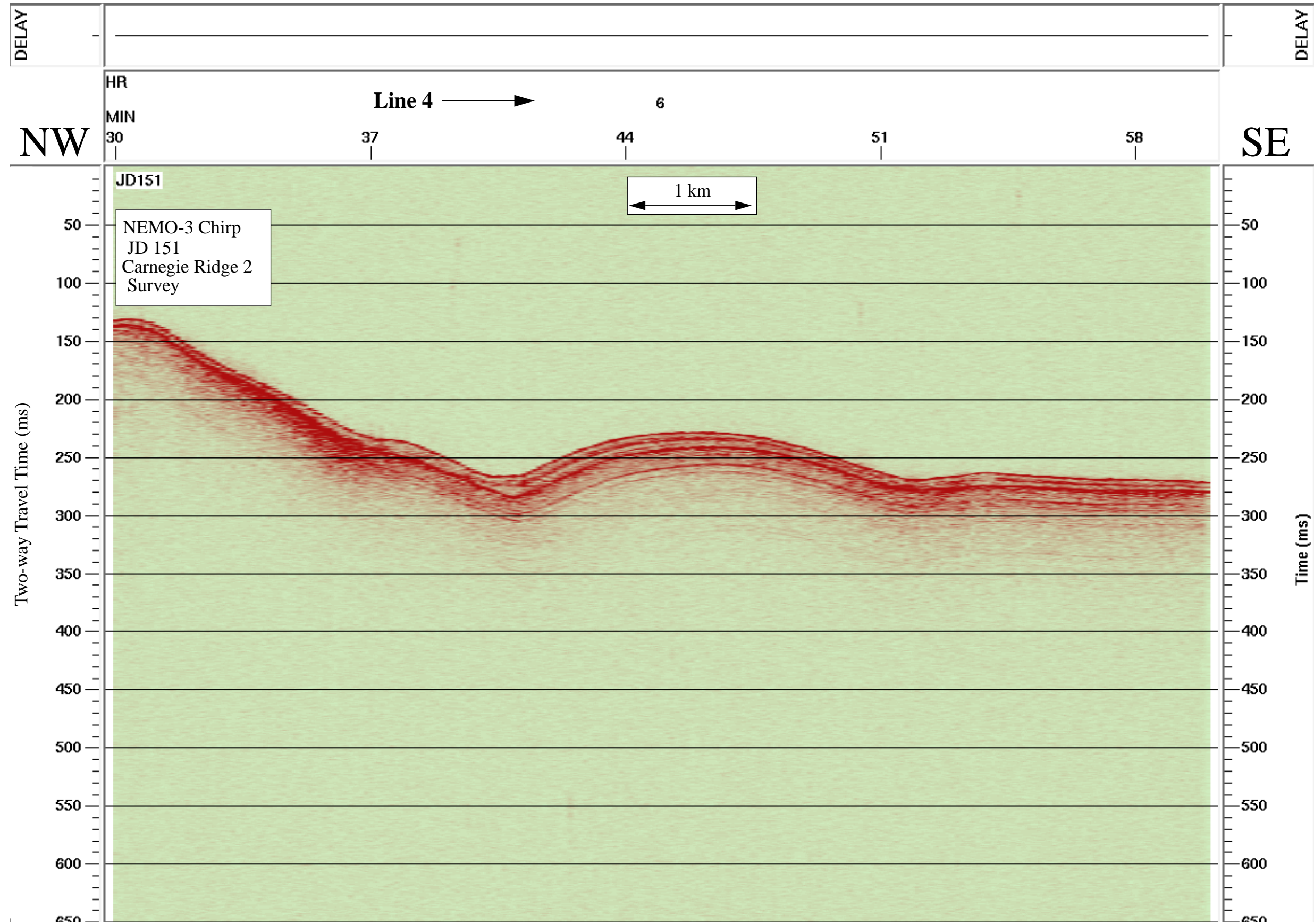


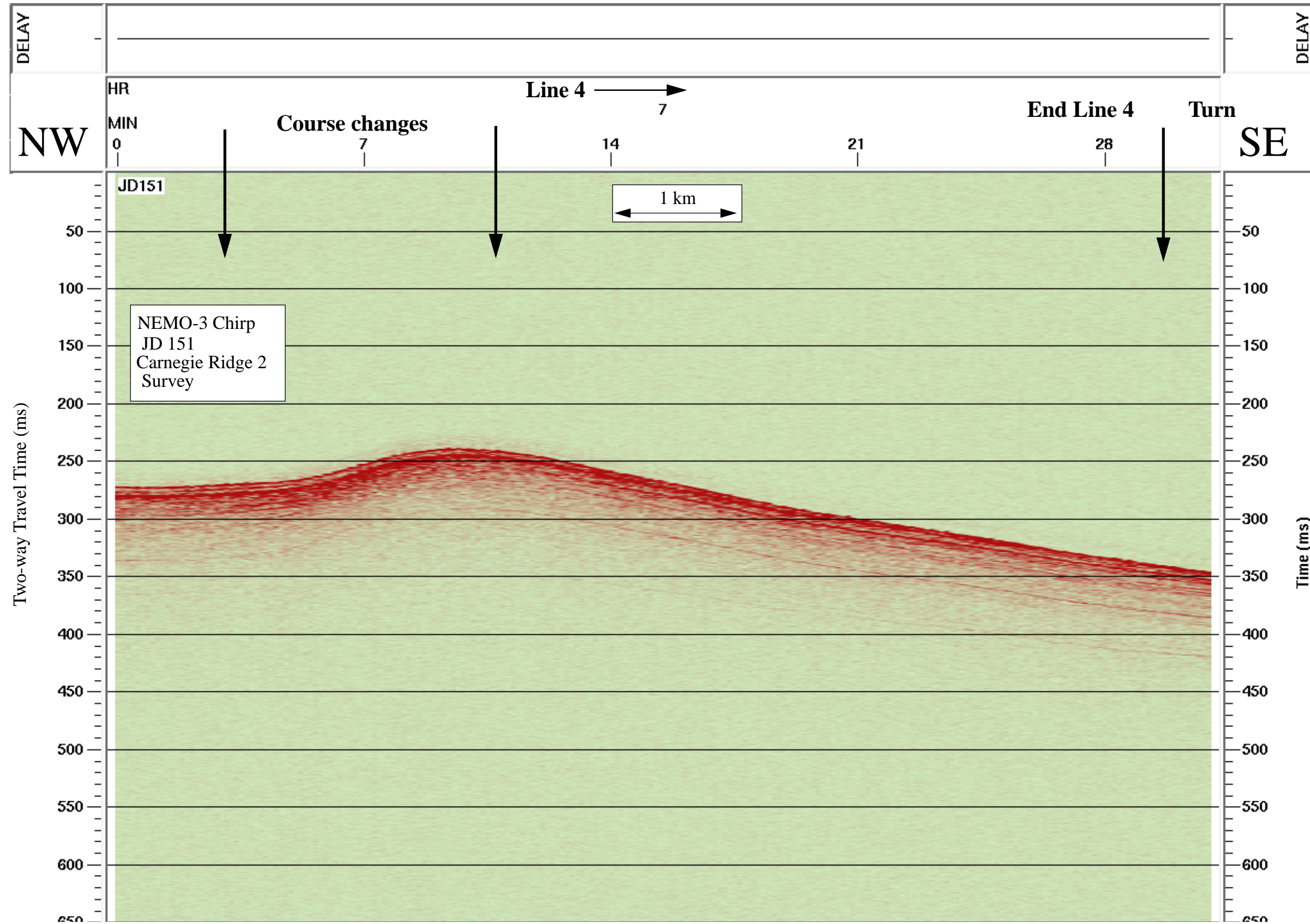


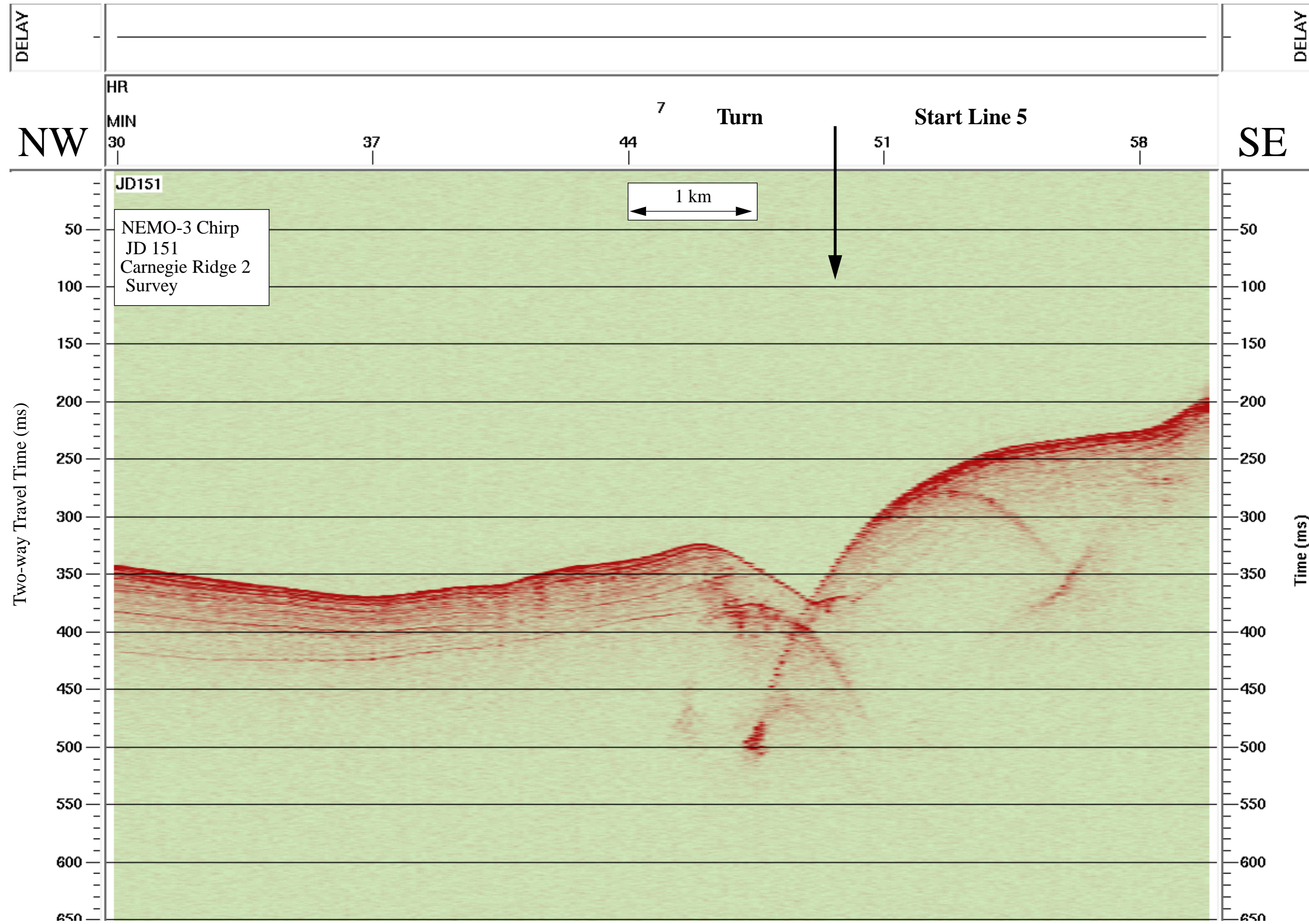
Data File SBfixavg.2000may30.0600-1200

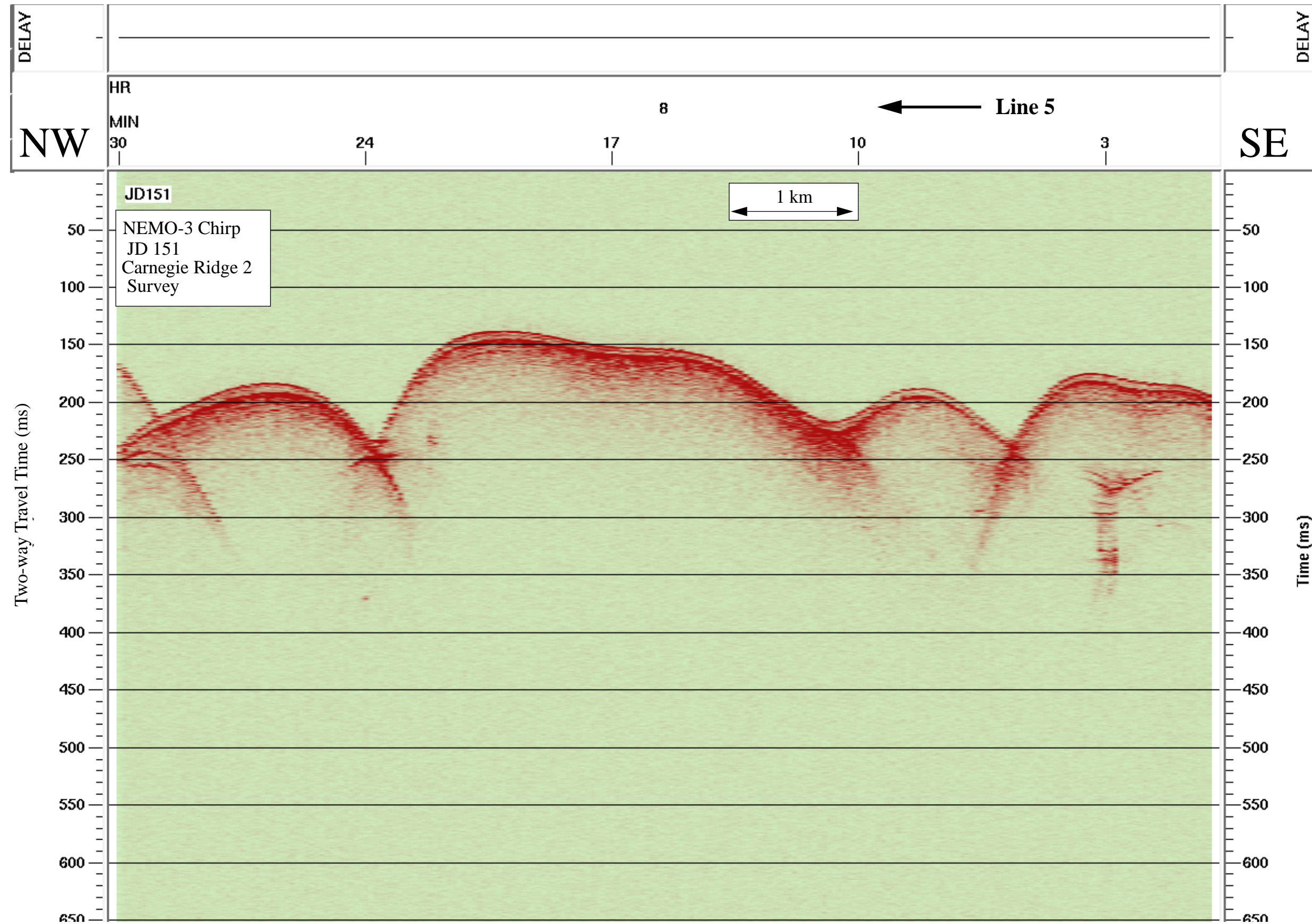


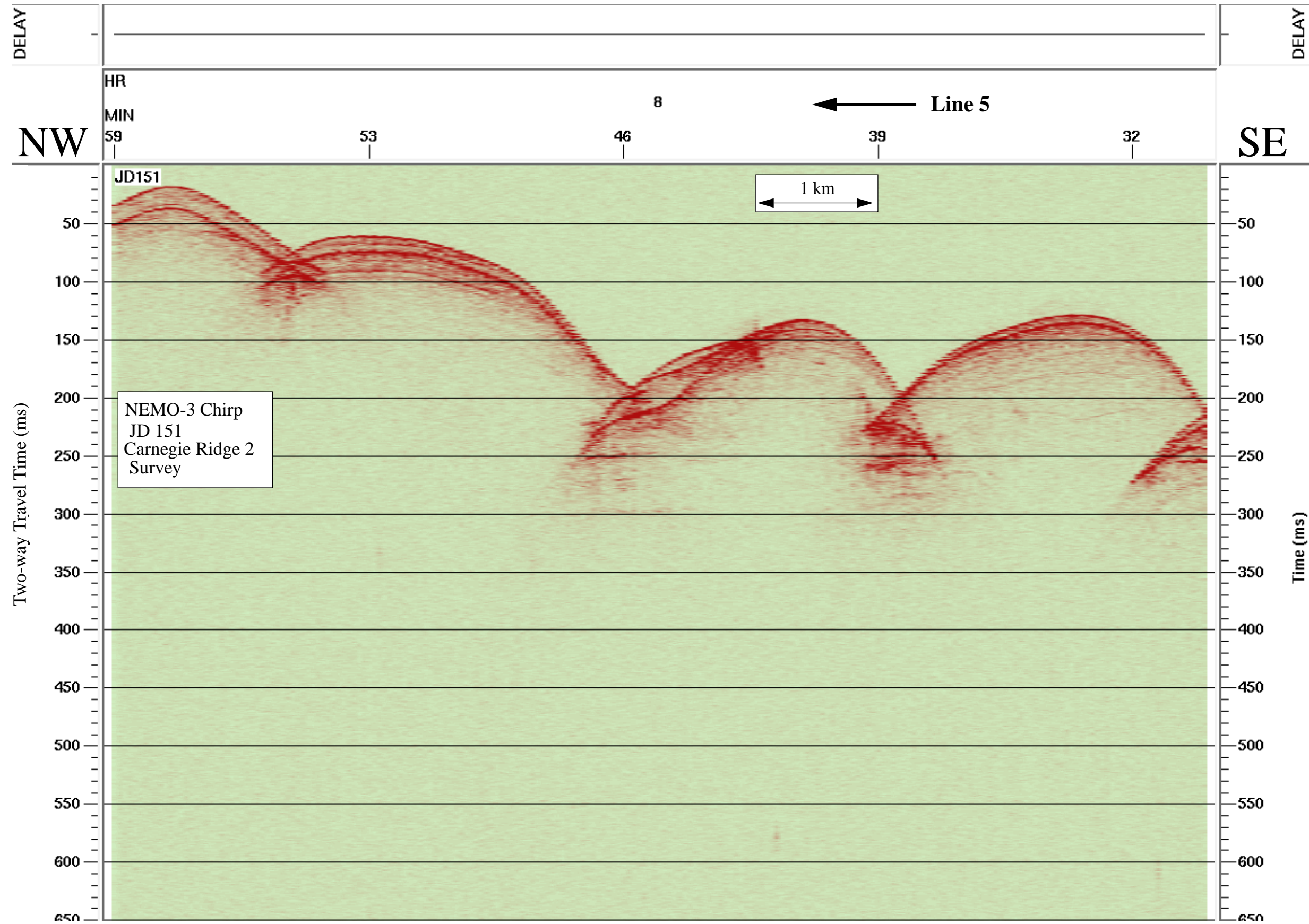


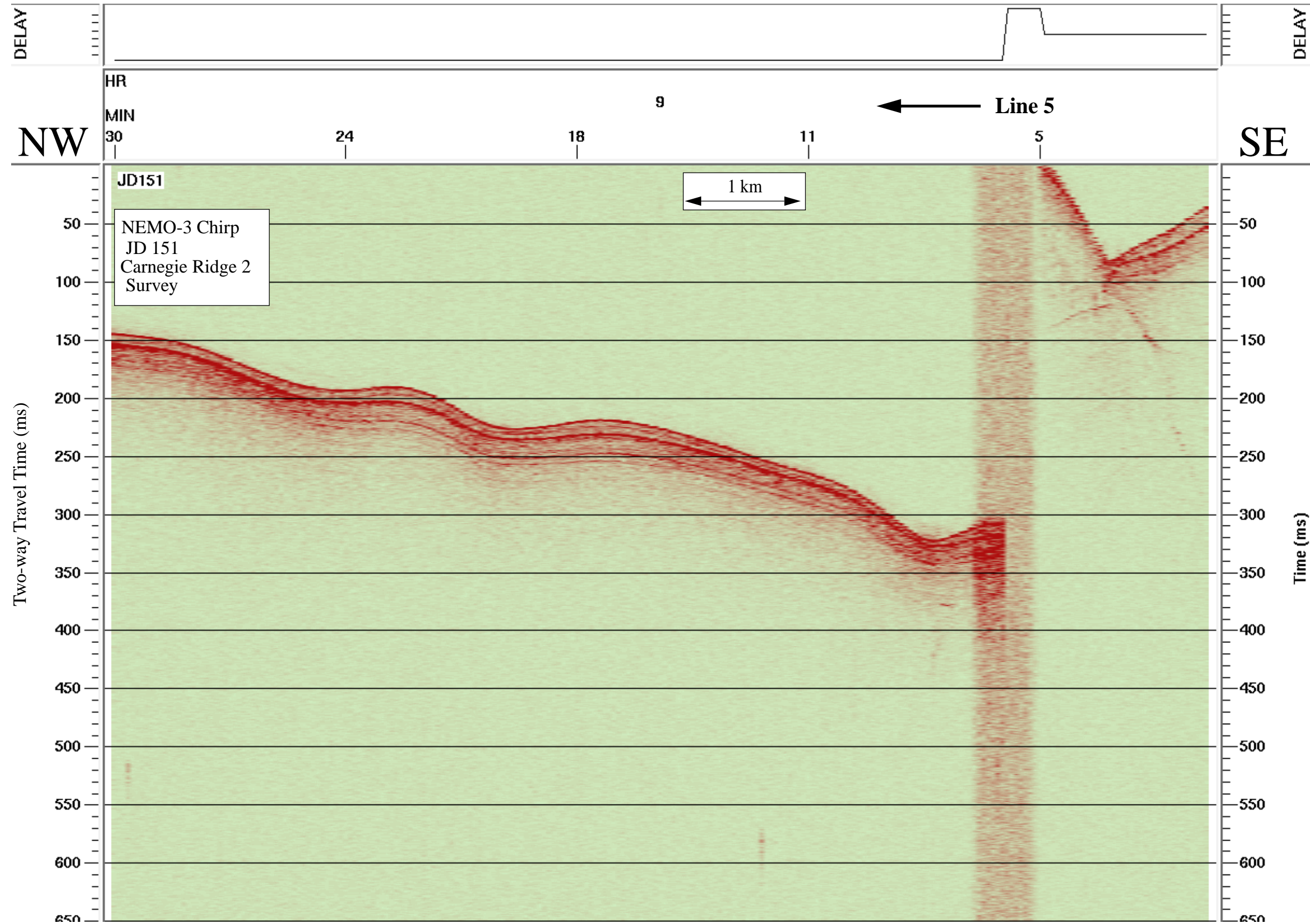


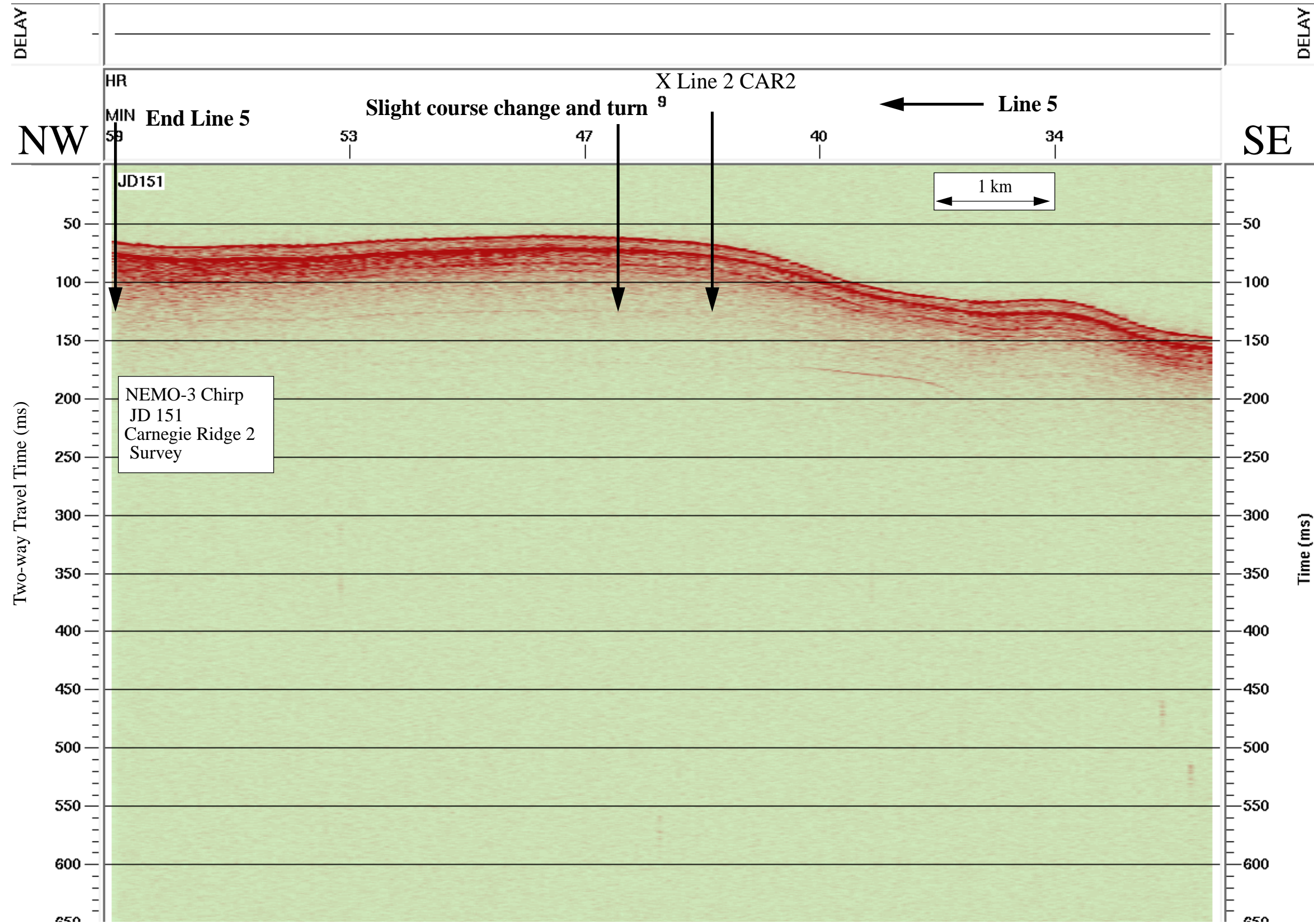


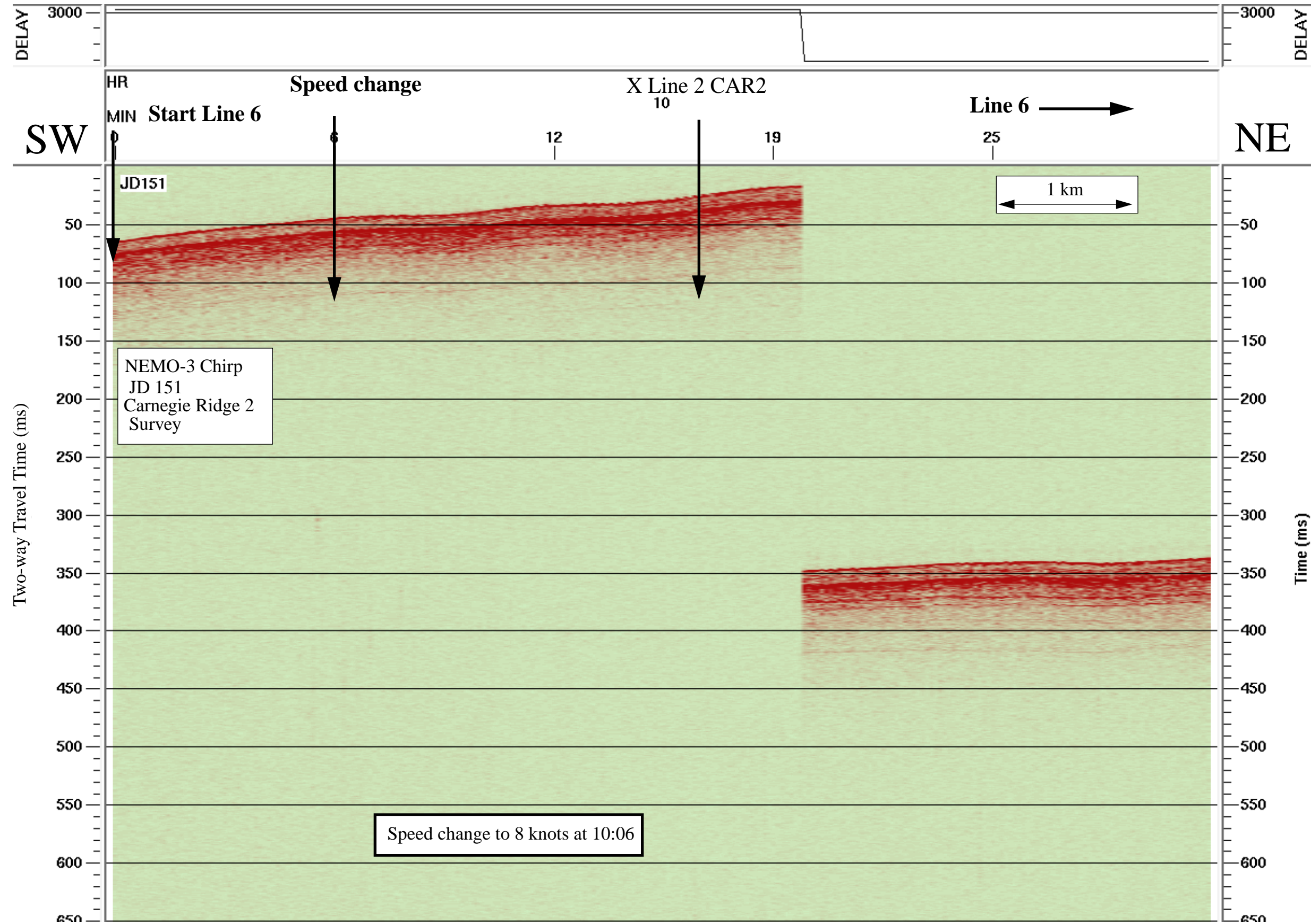


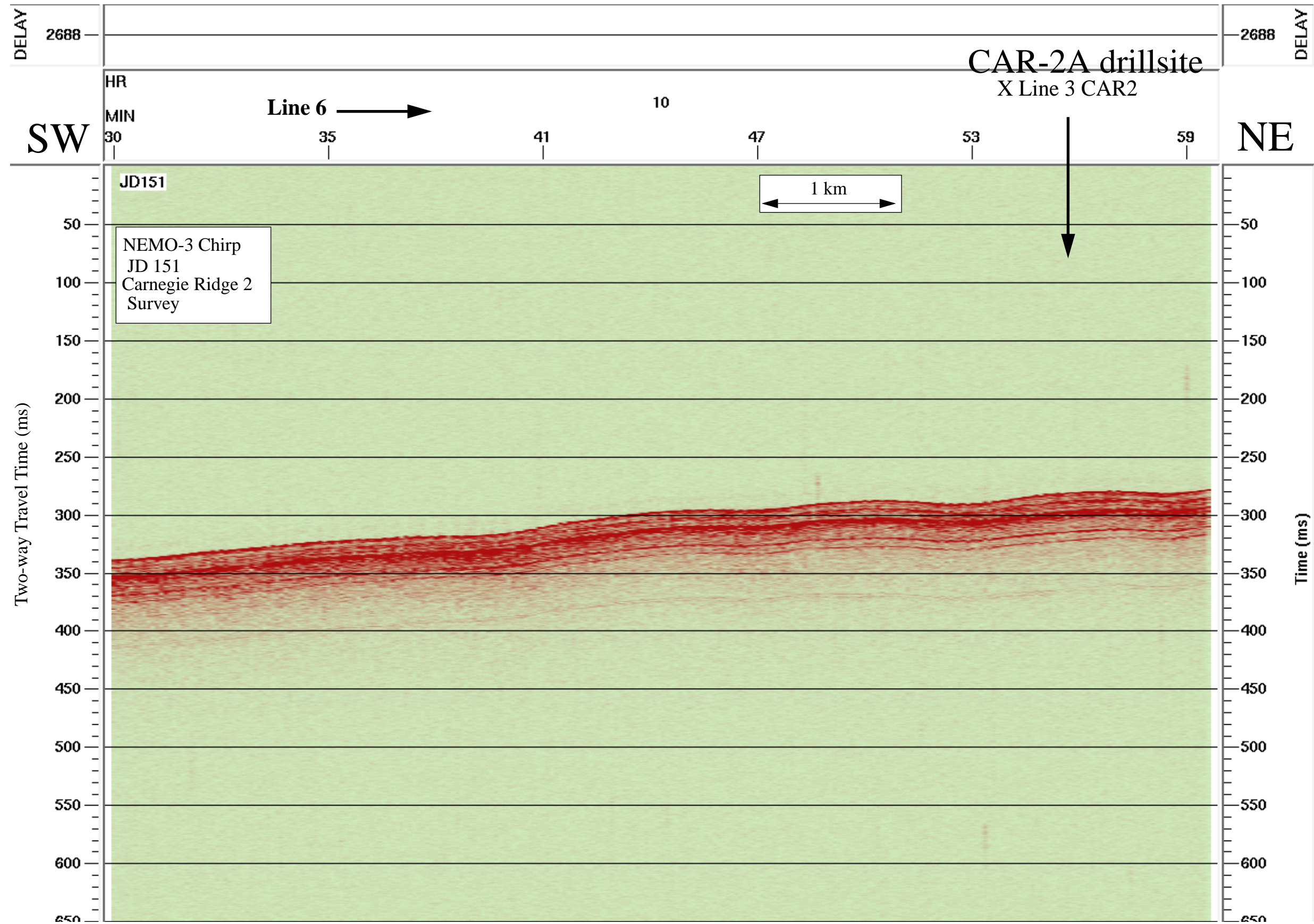


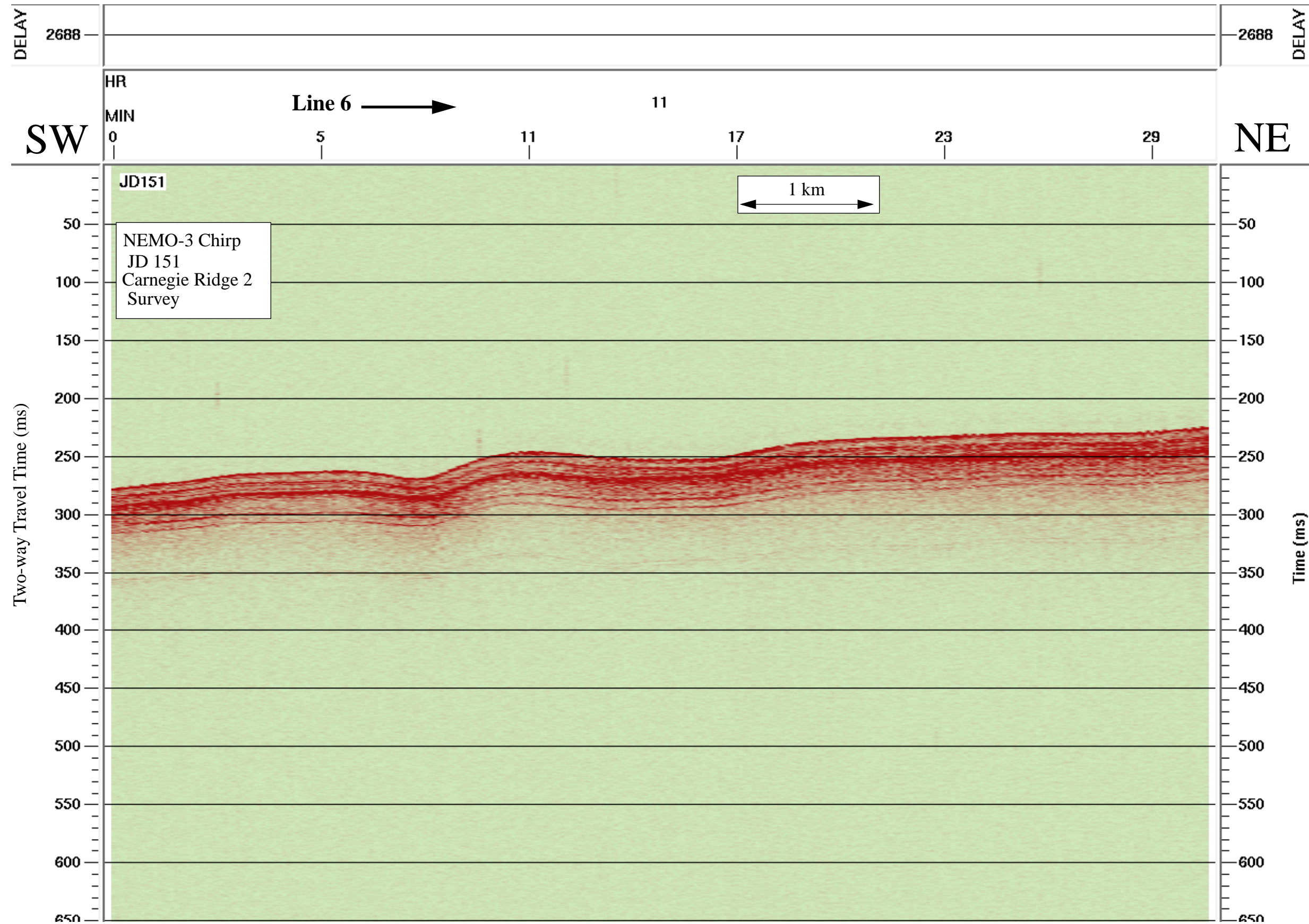


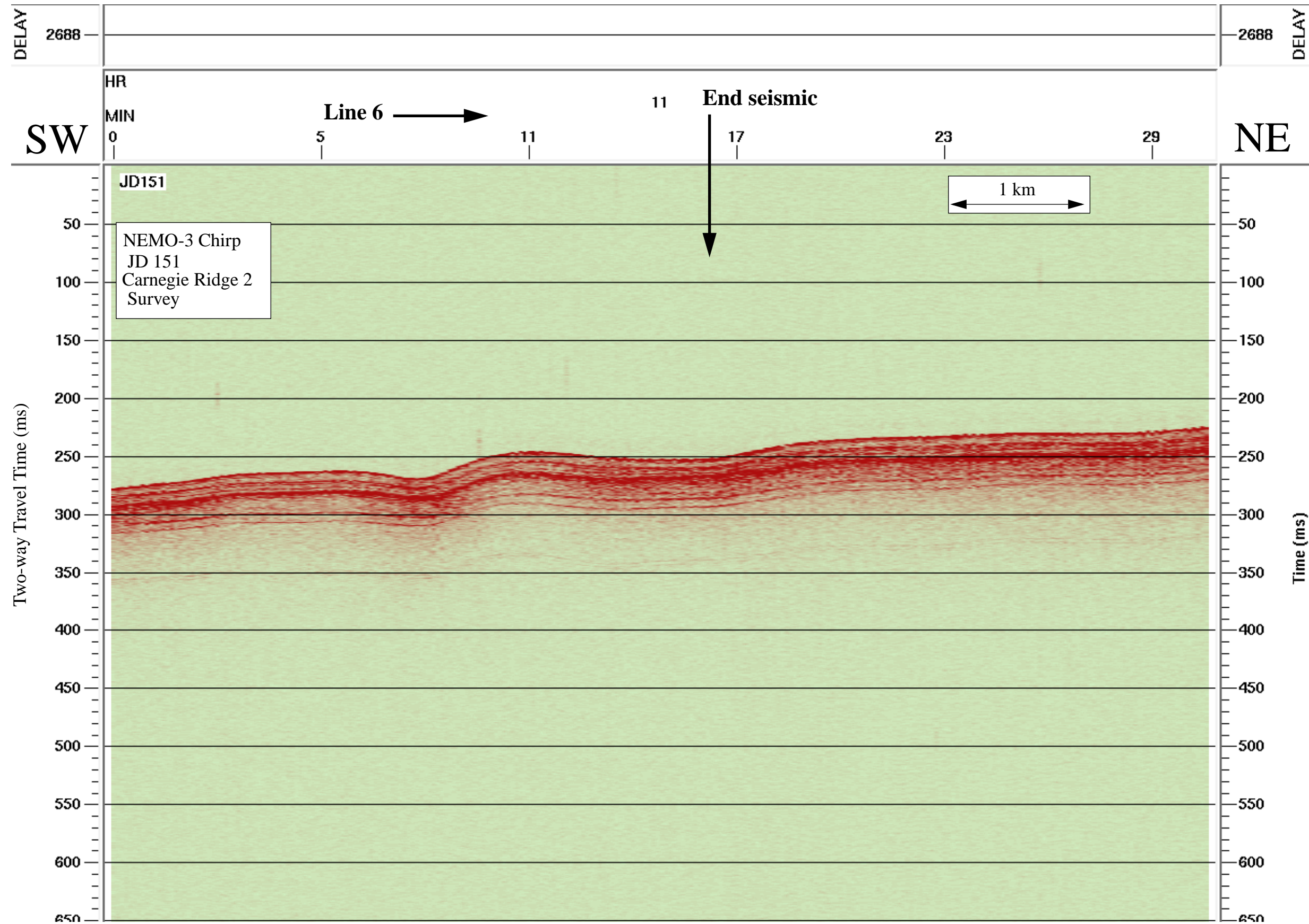


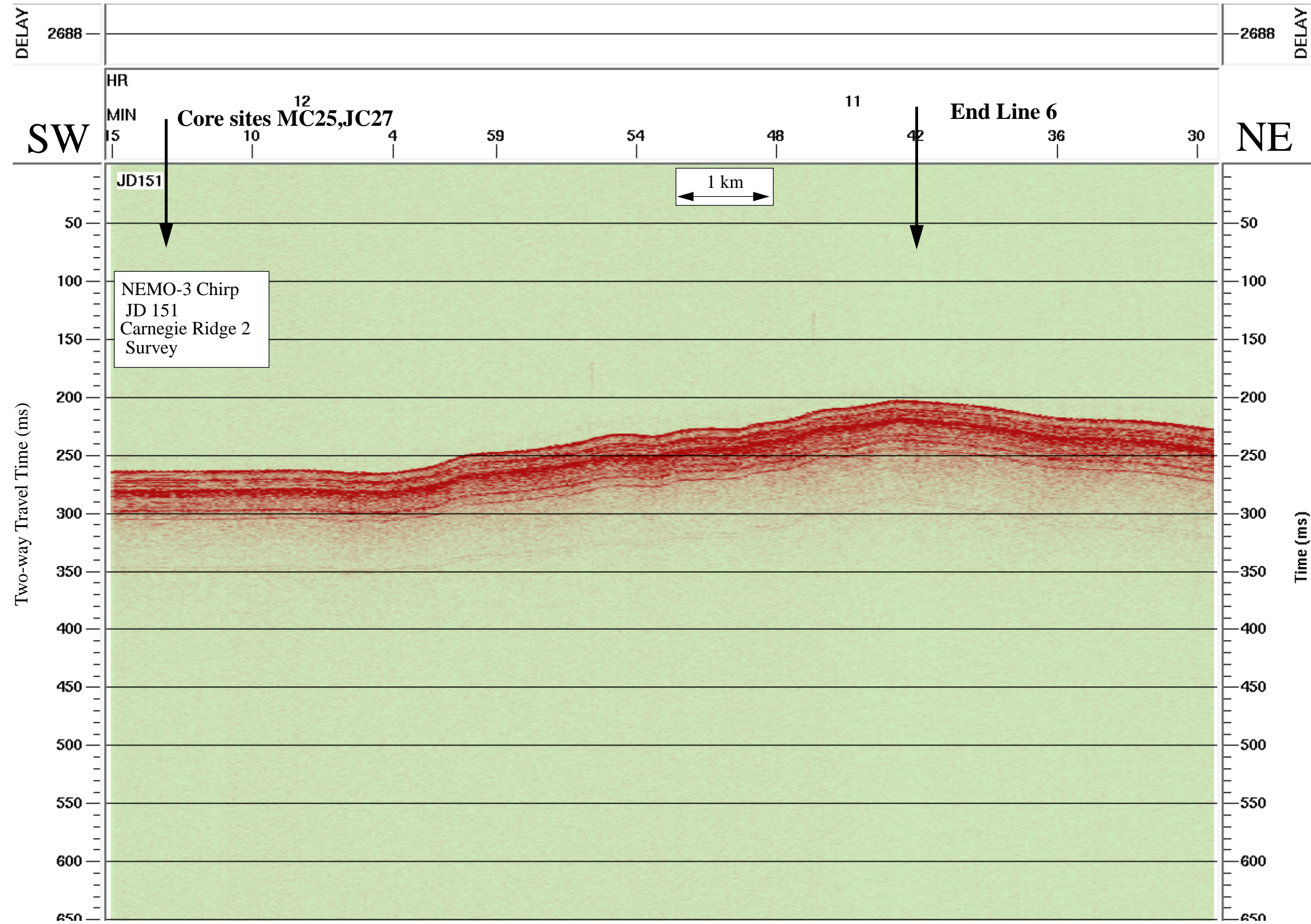




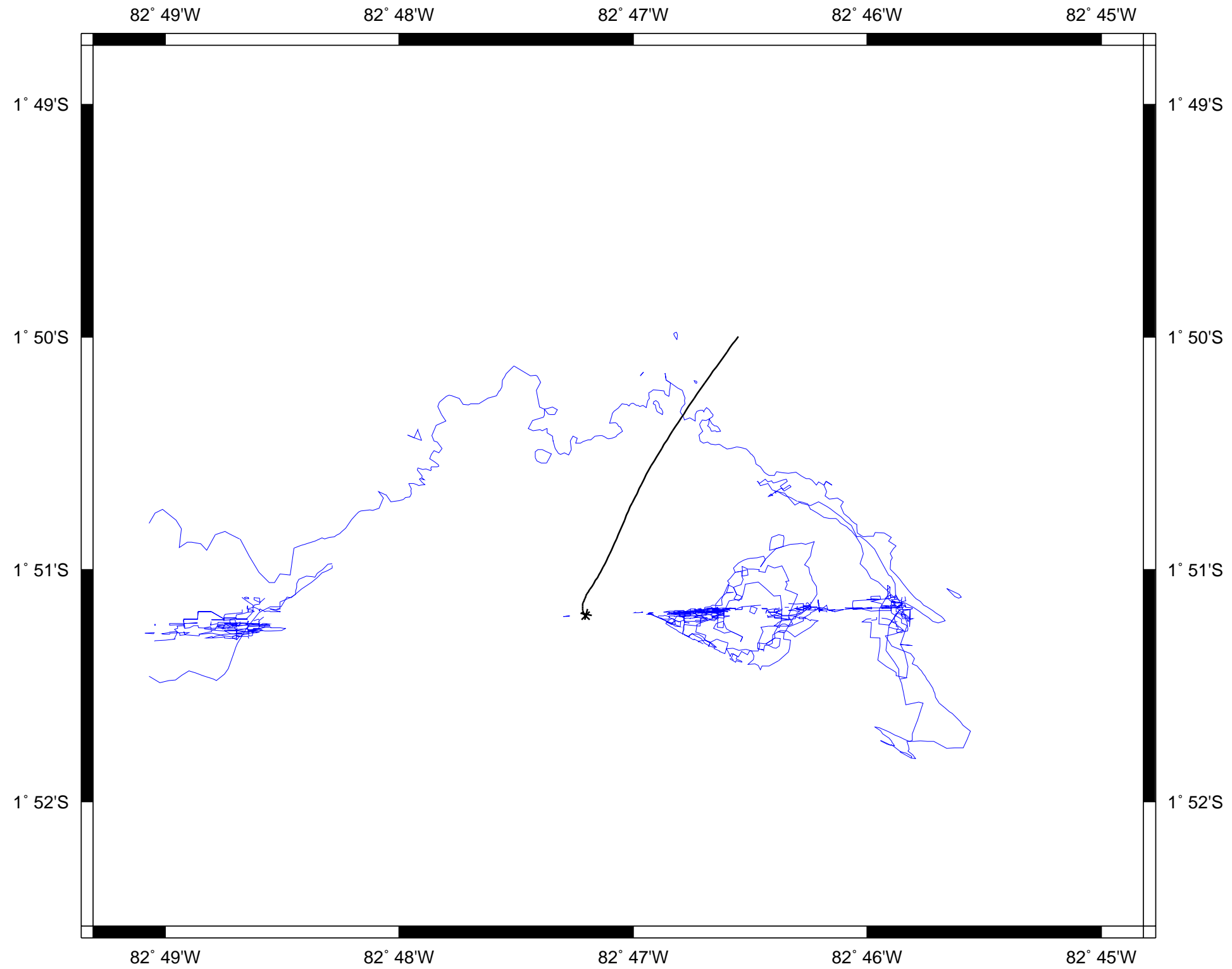




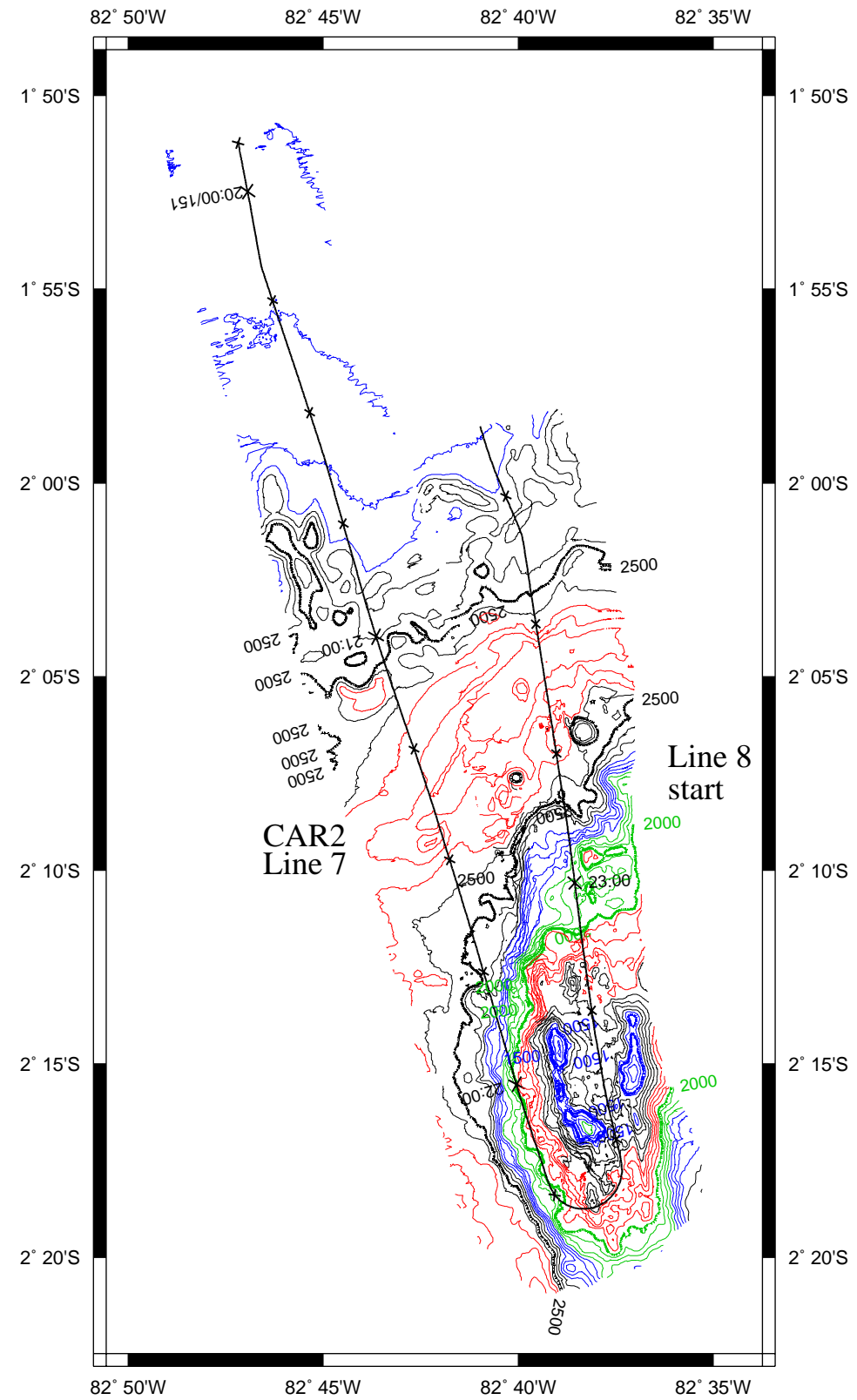


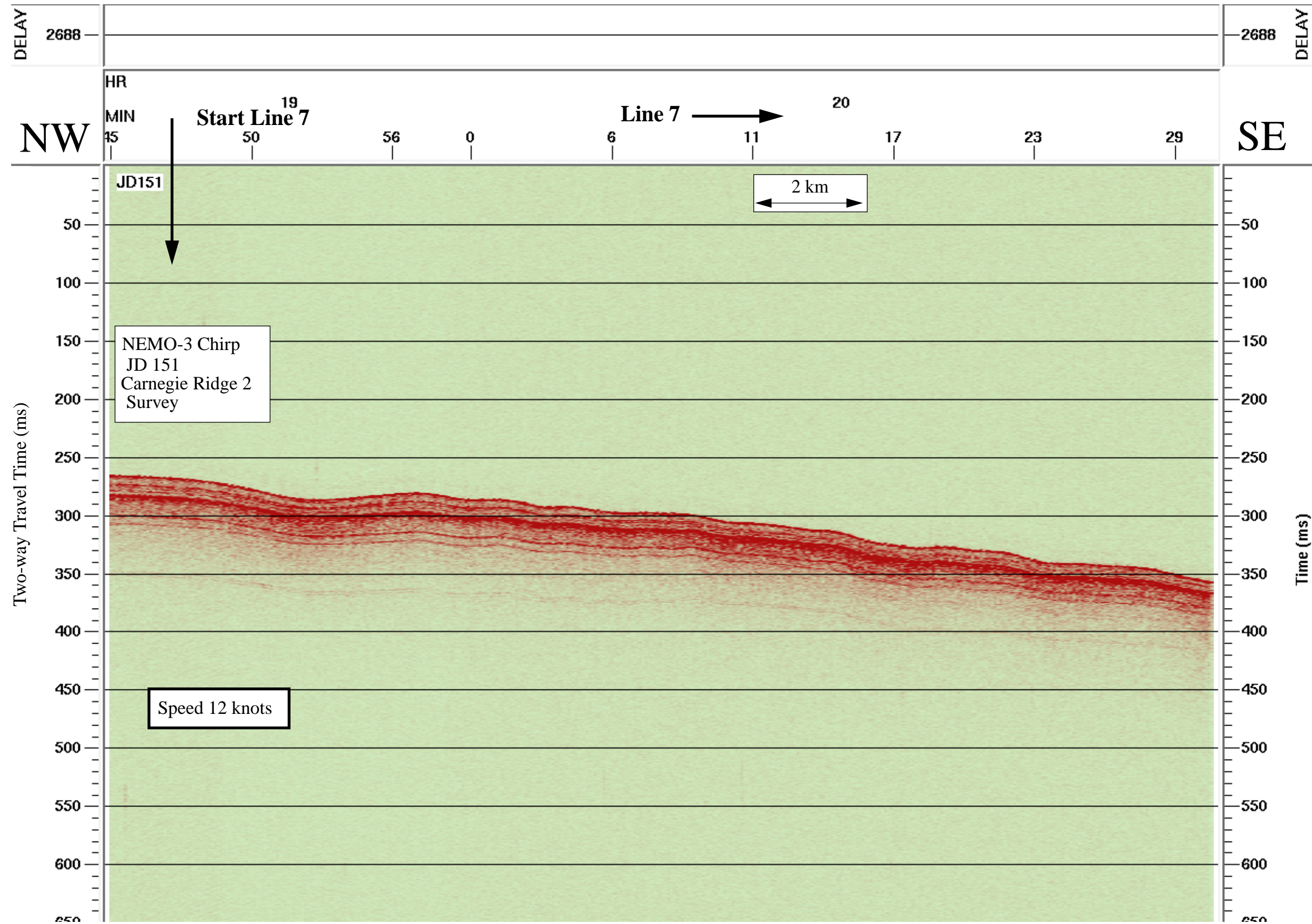


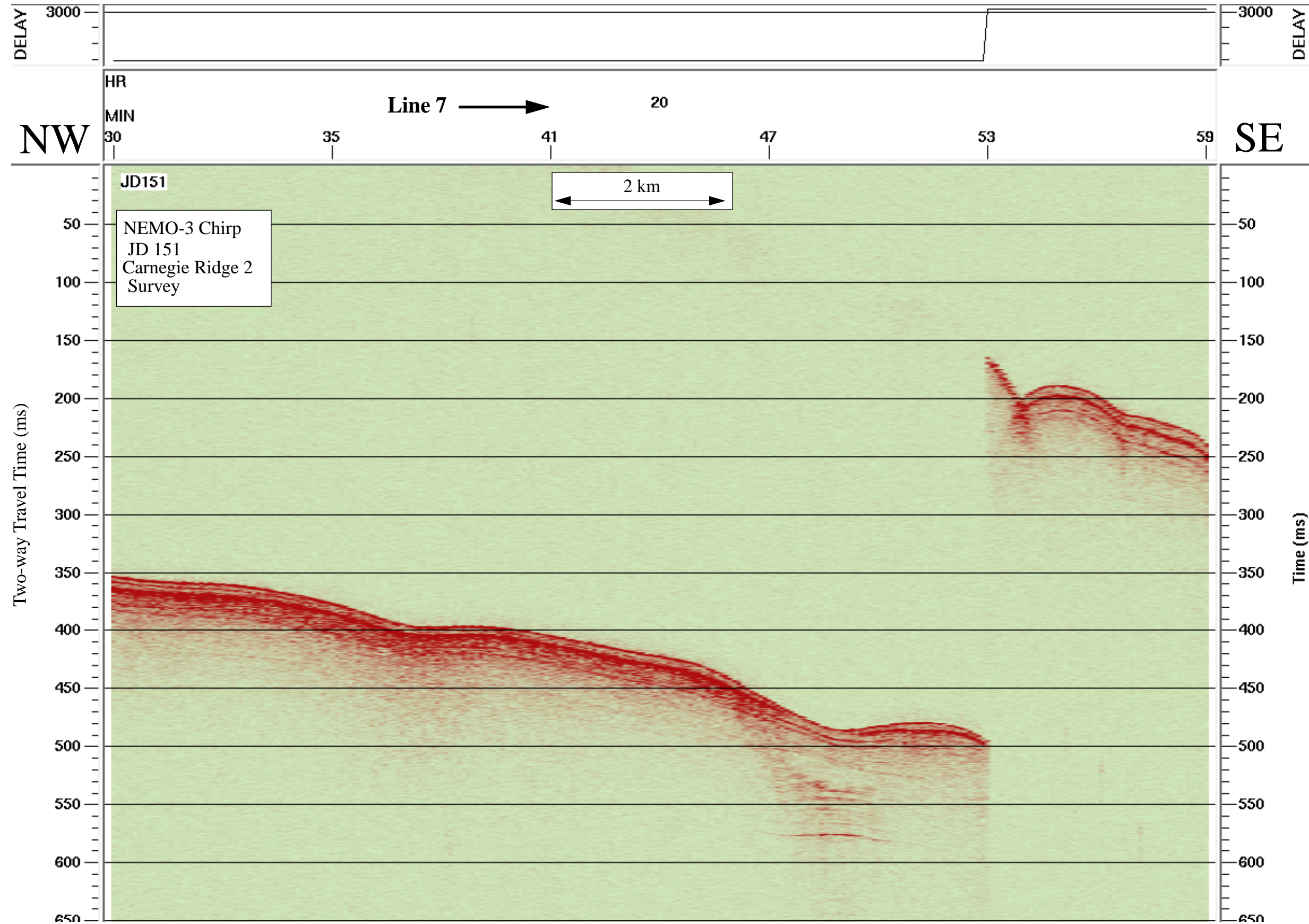
Data File SBfixavg.2000may30.1200-1800

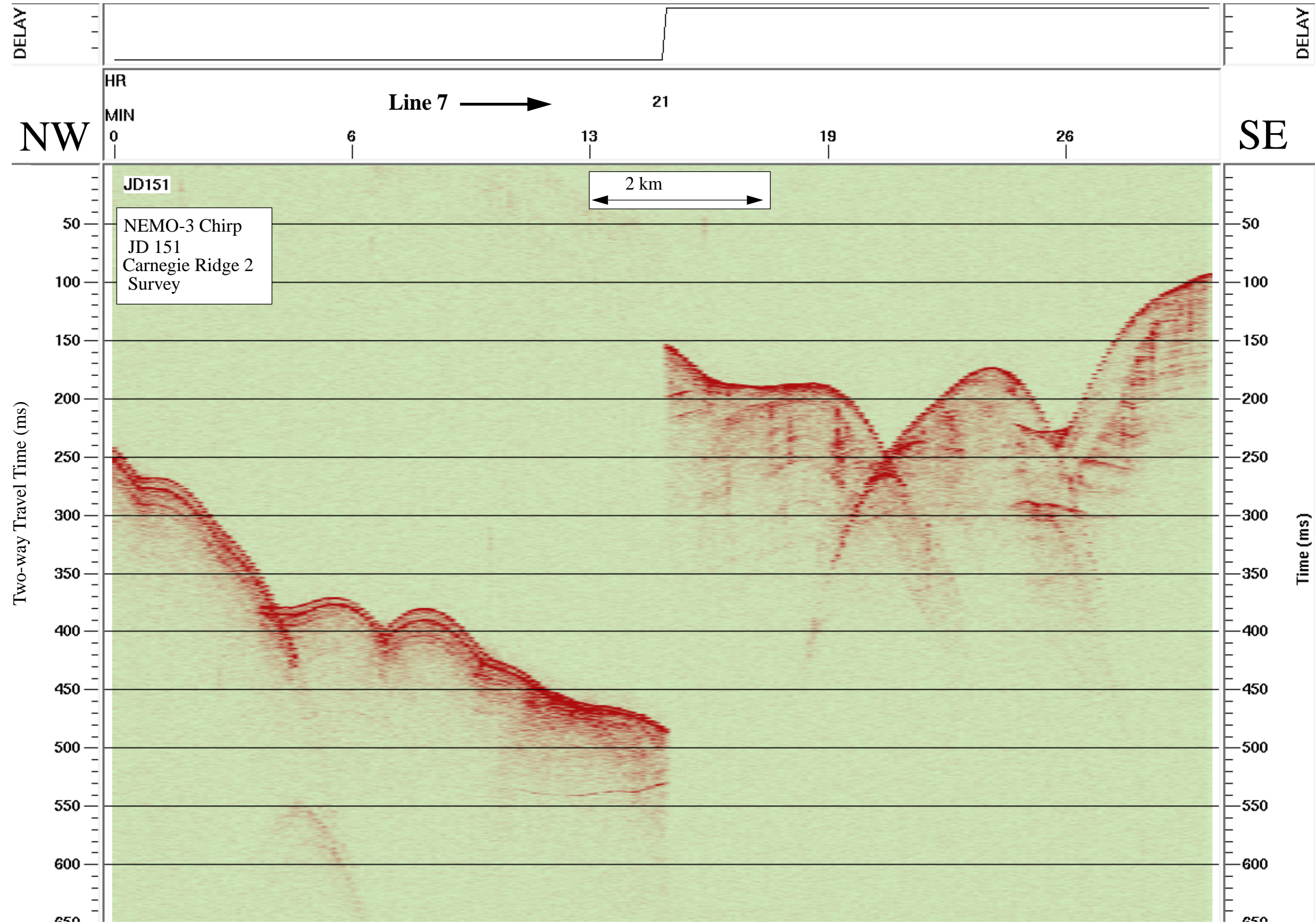


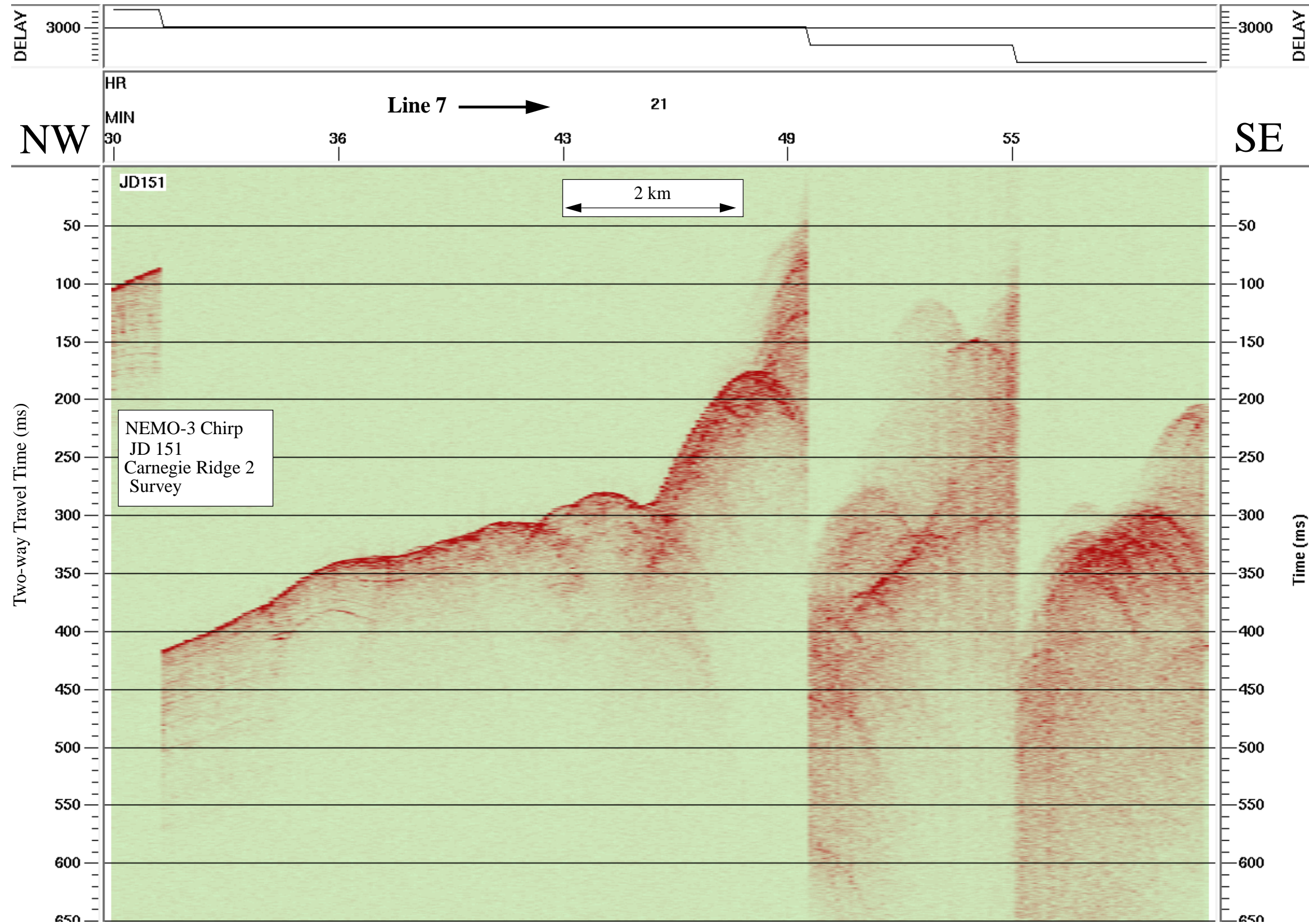
Data File SBfixavg.2000may30.1800-2400

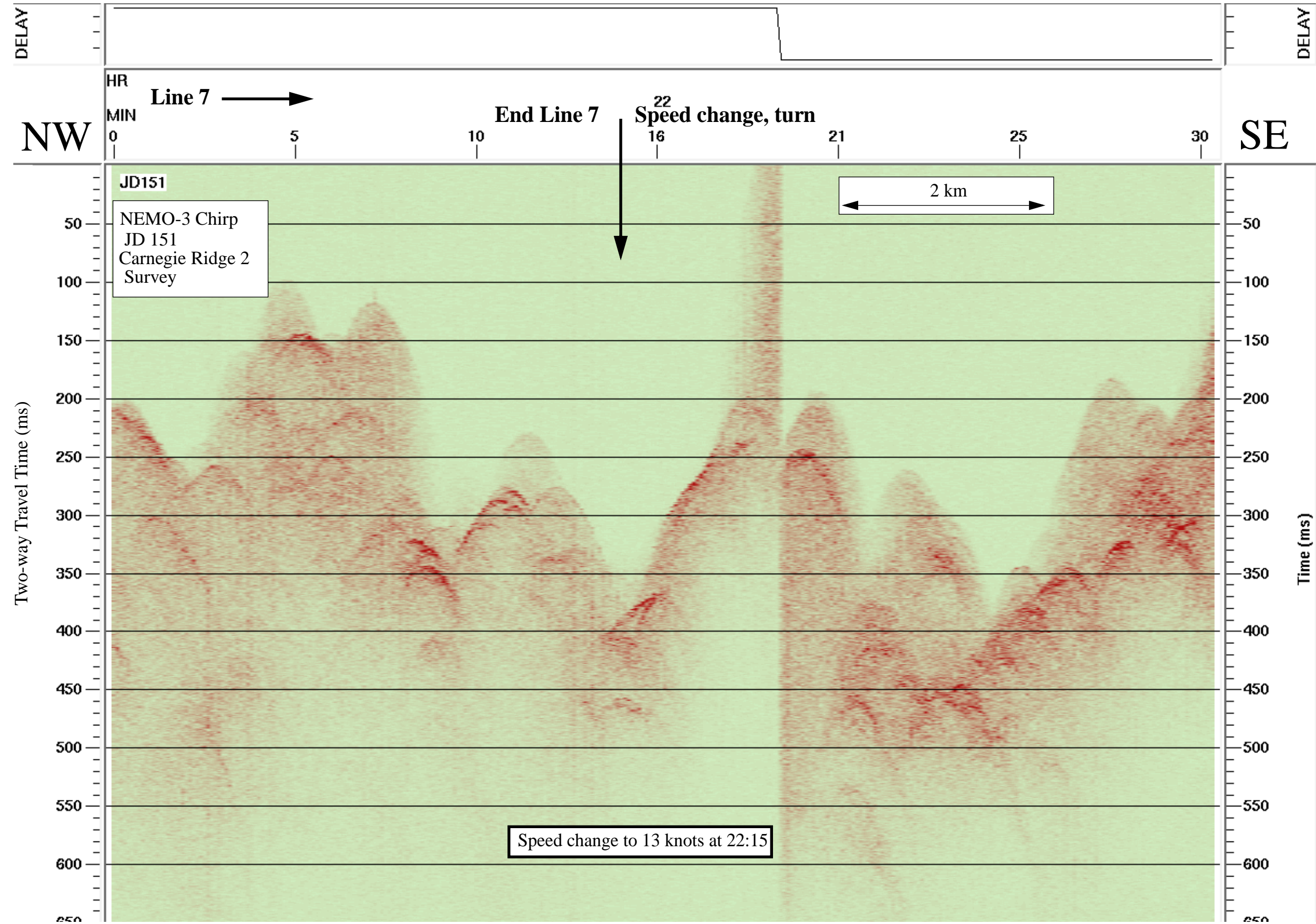


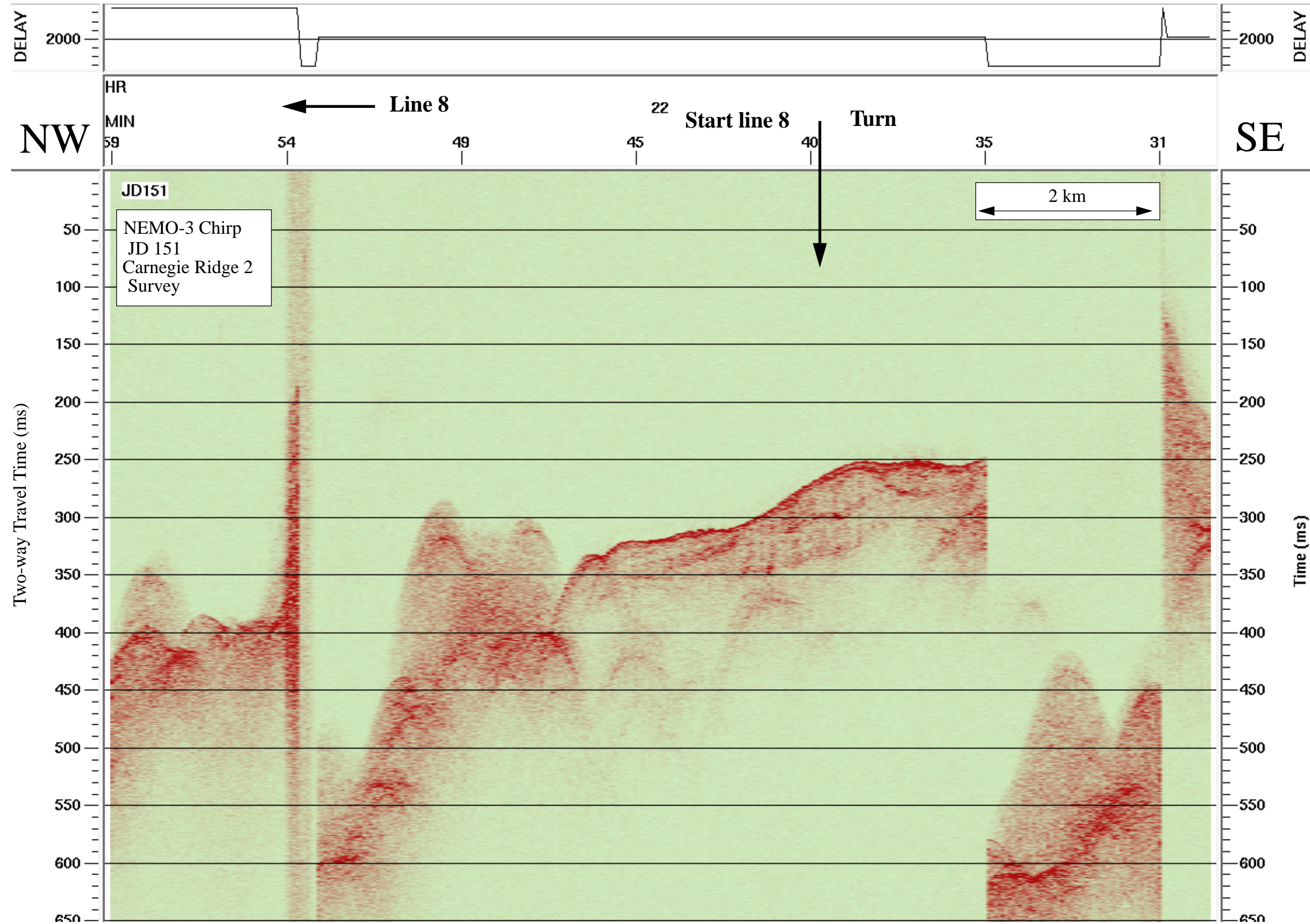


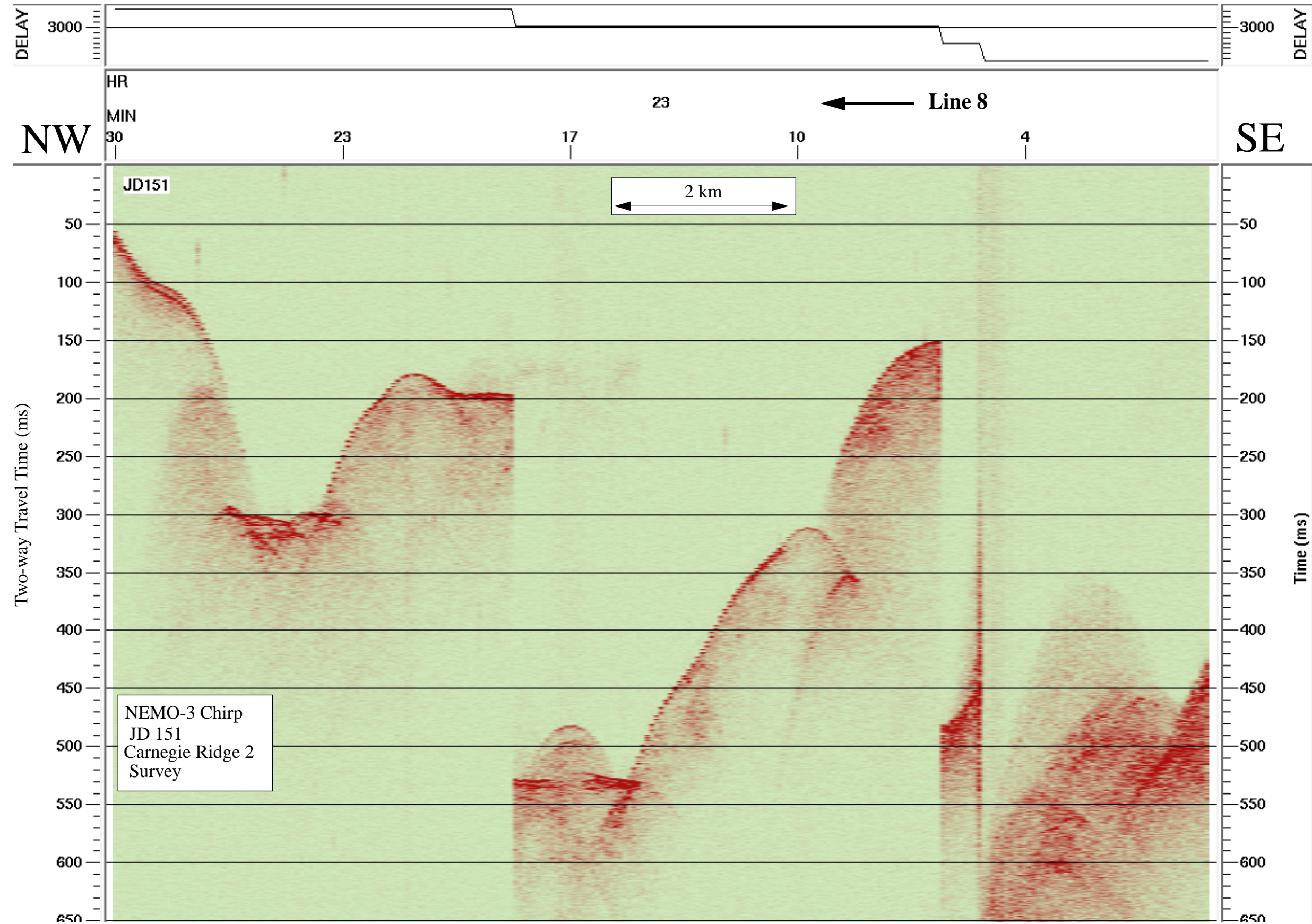


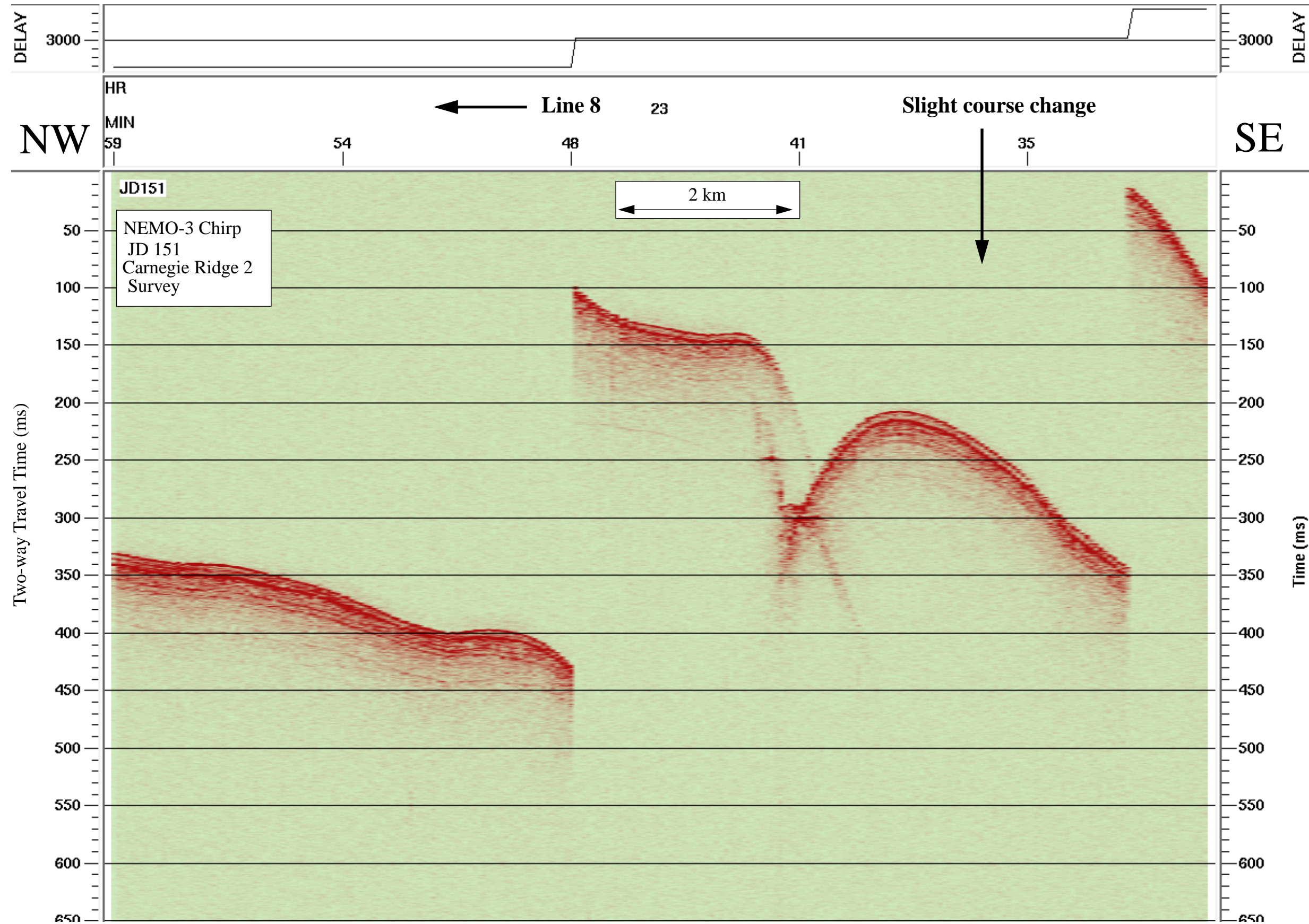












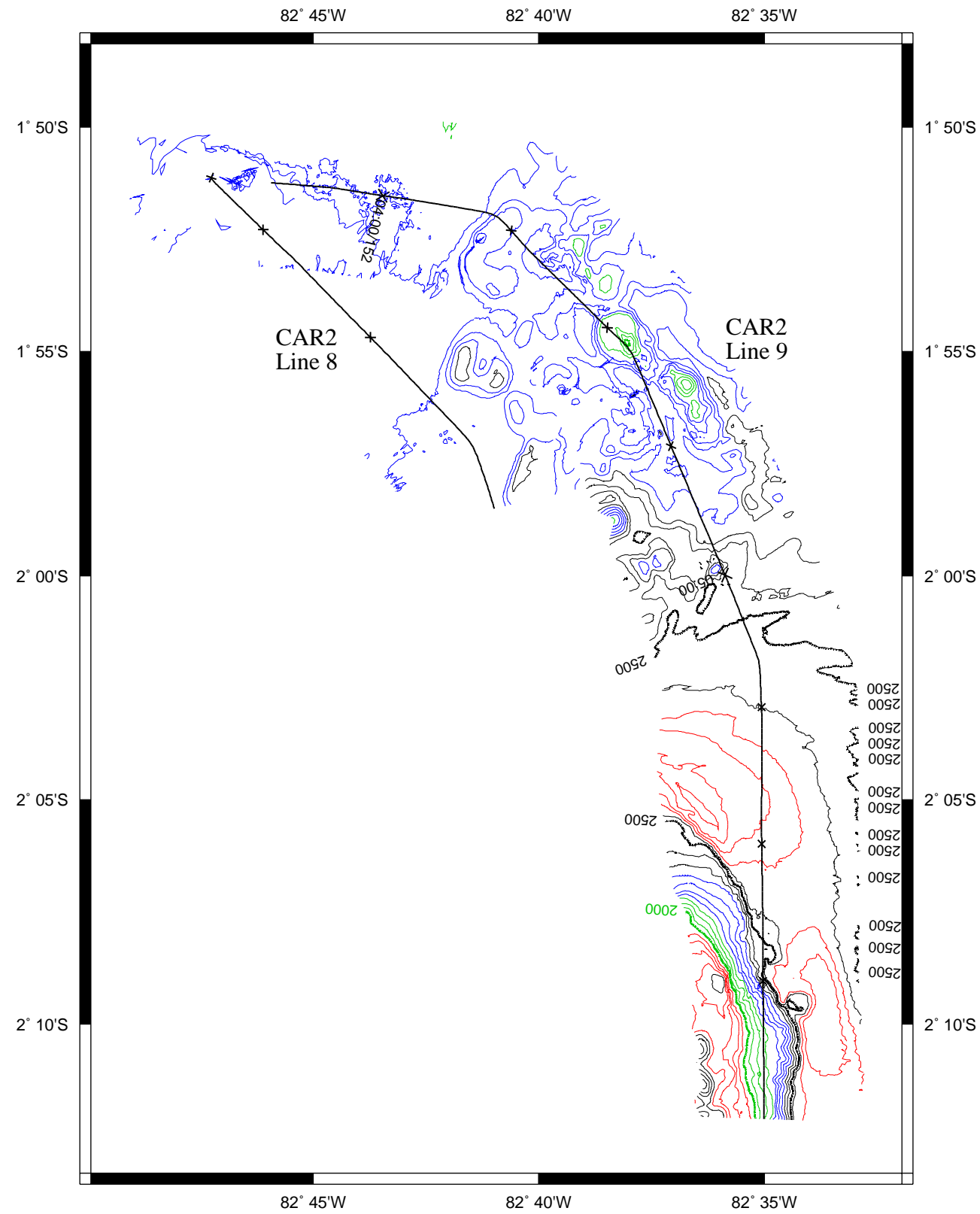
JD 152 (31 May 2000)--end CAR-2 Survey, Begin
CAR-1

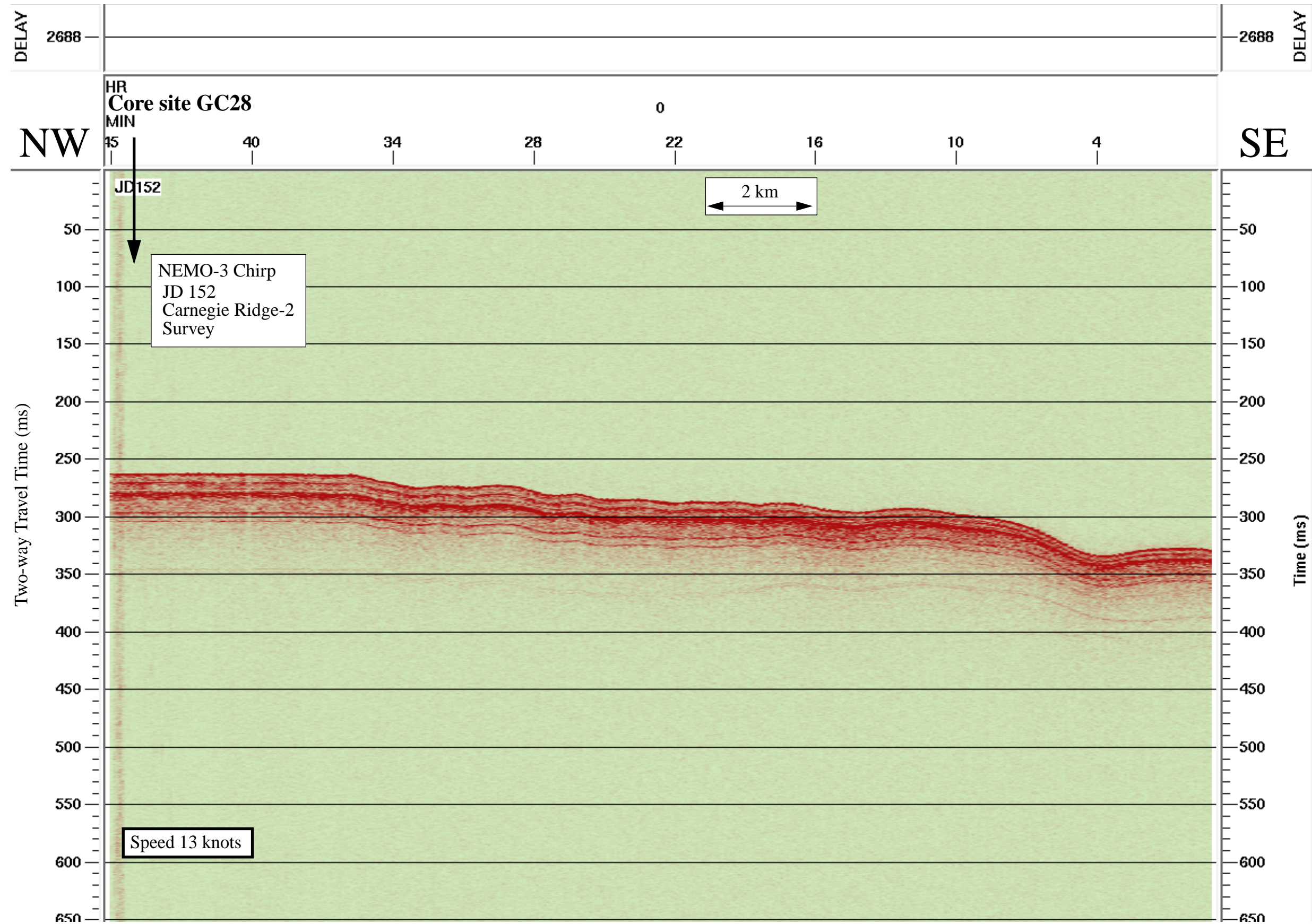
2-7 kHz Chirp Subbottom Profiler

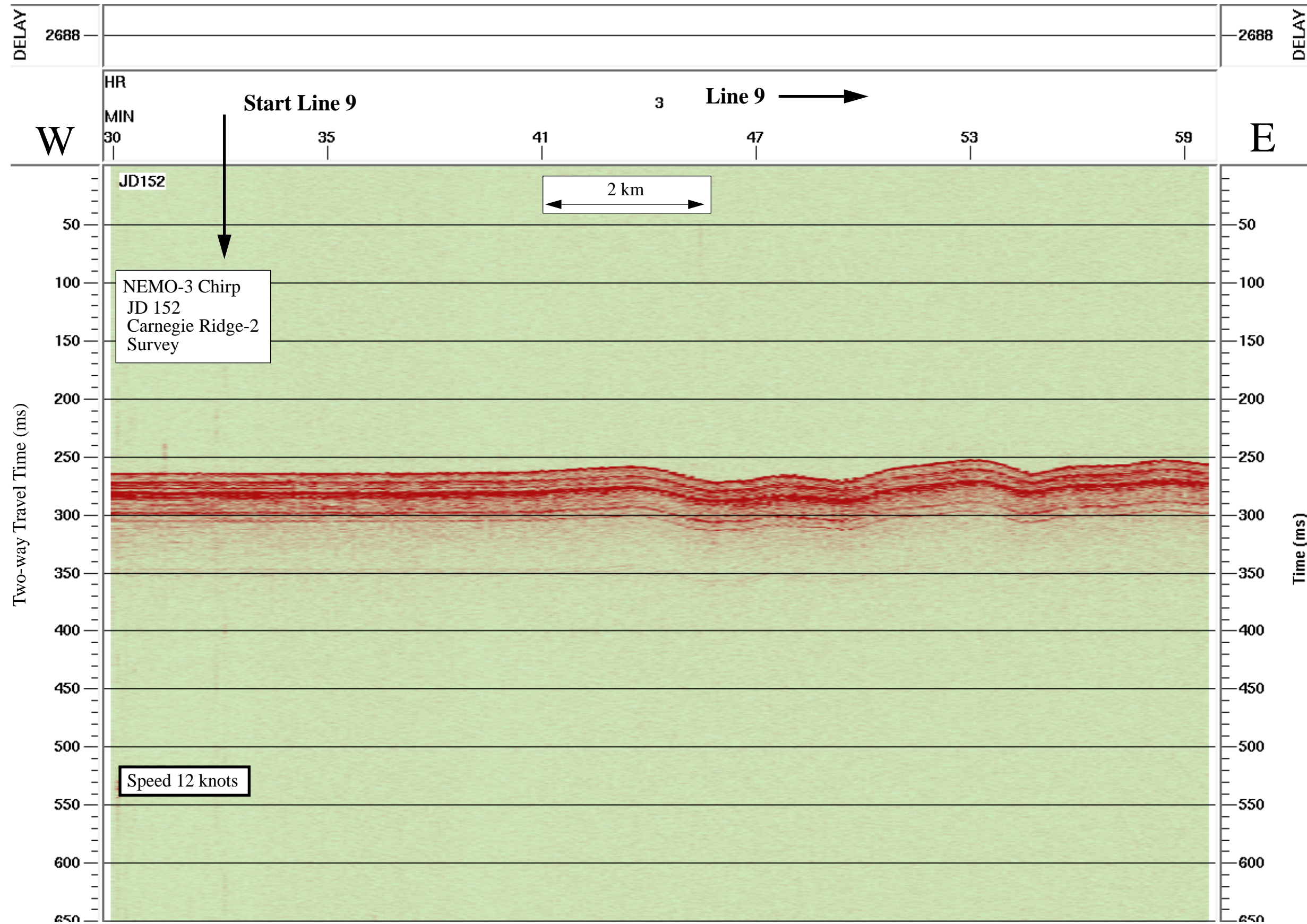
NEMO Leg 3

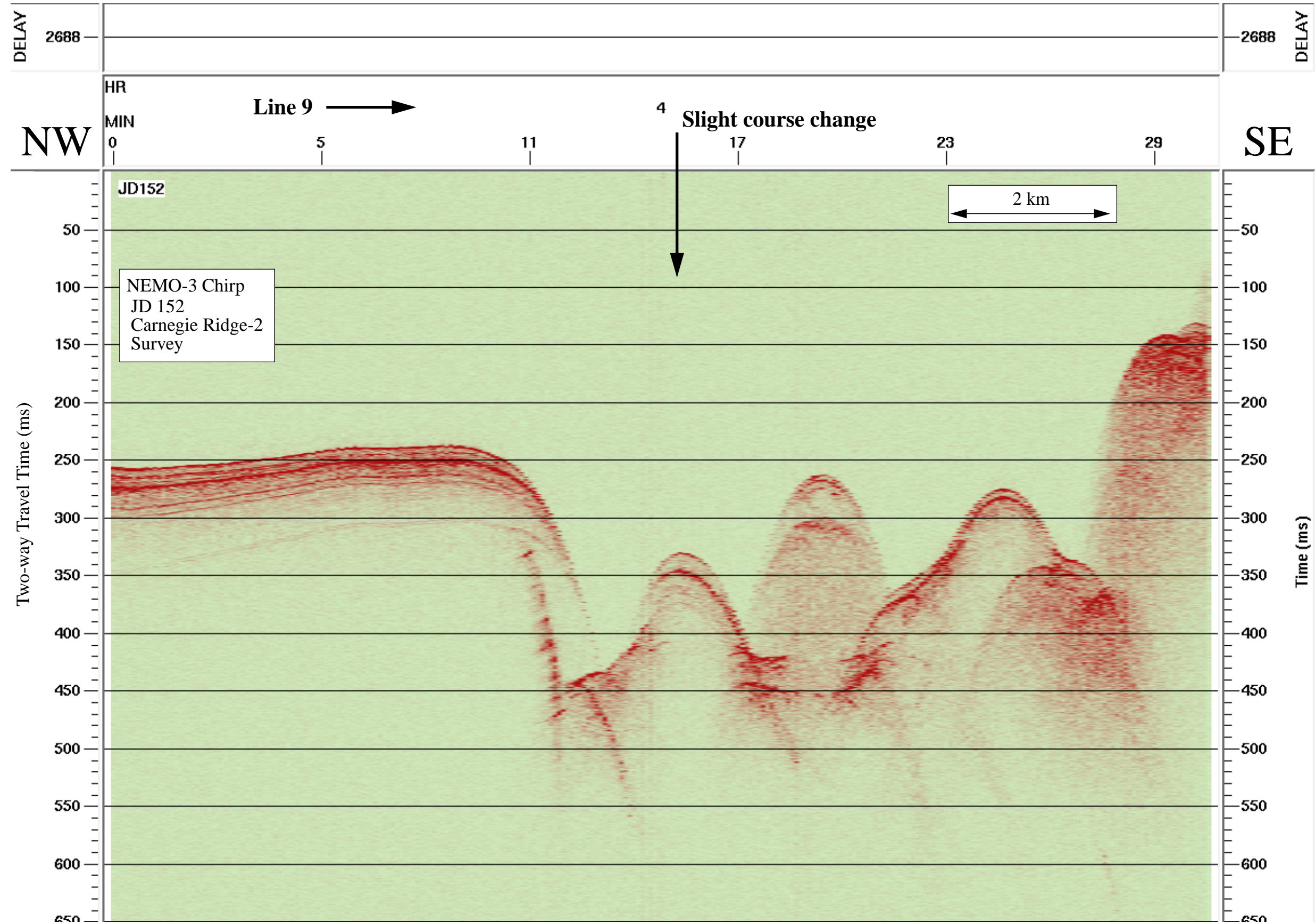
R/V Melville

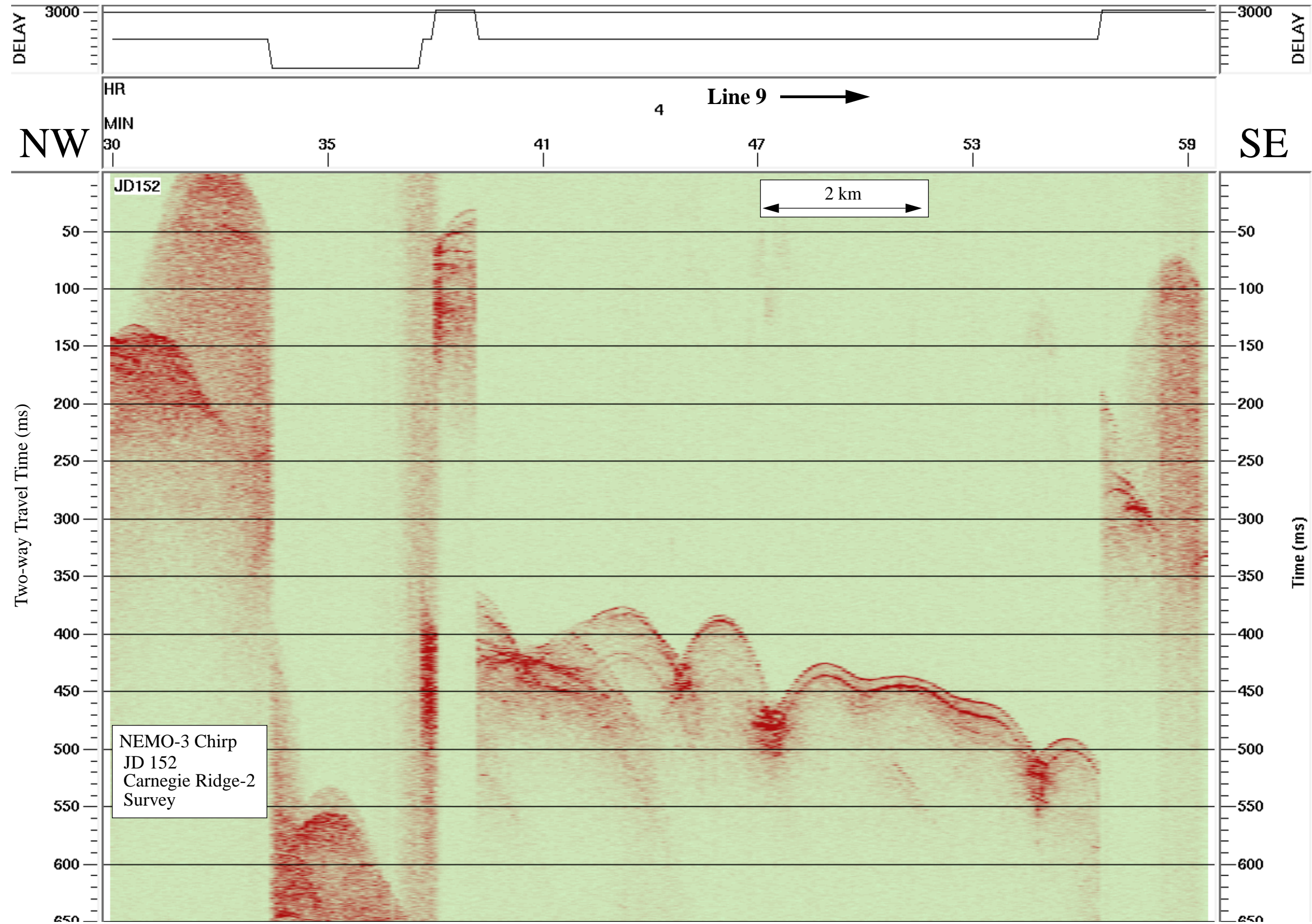
Data File SBfixavg.2000may31.0000-0600

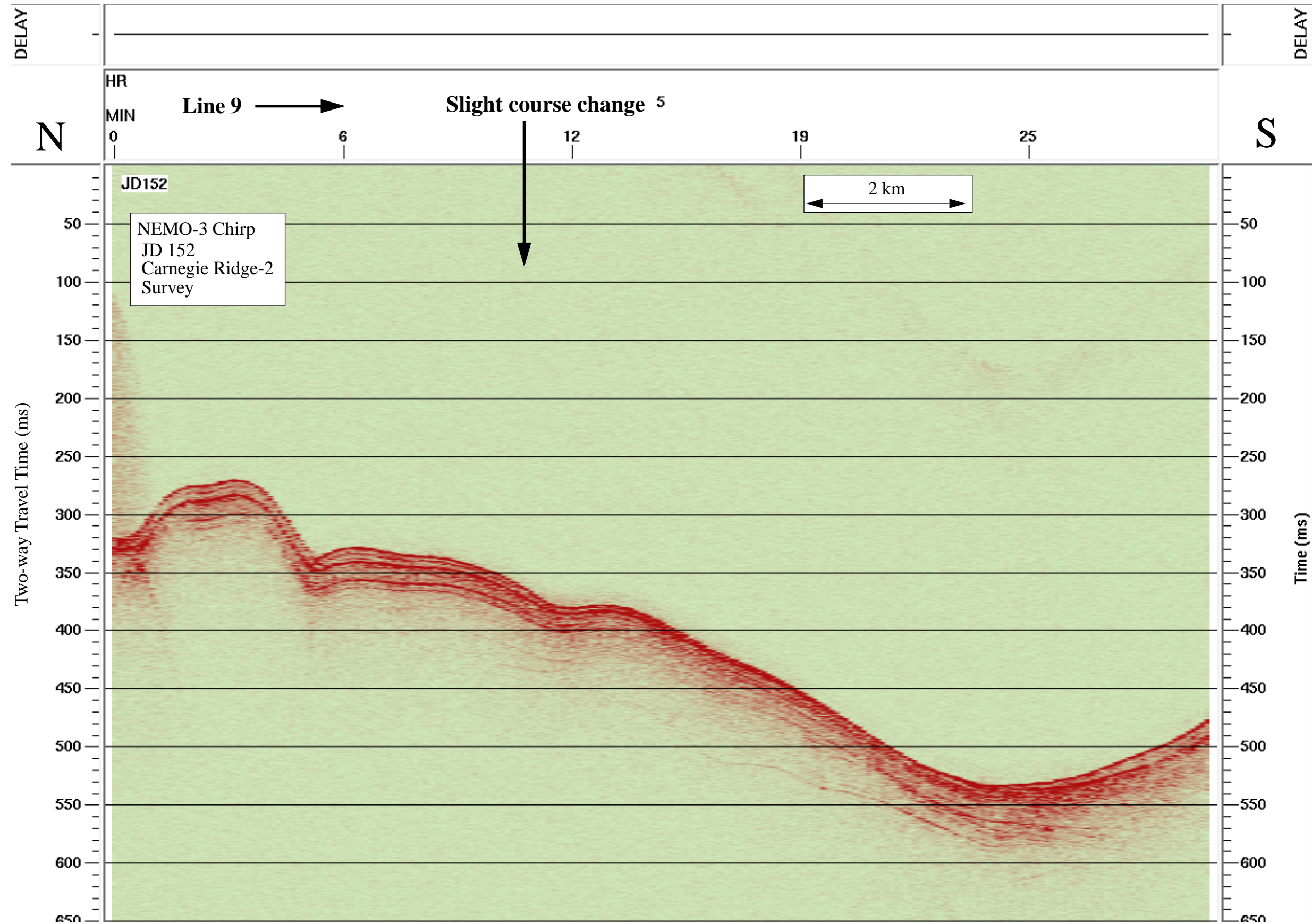


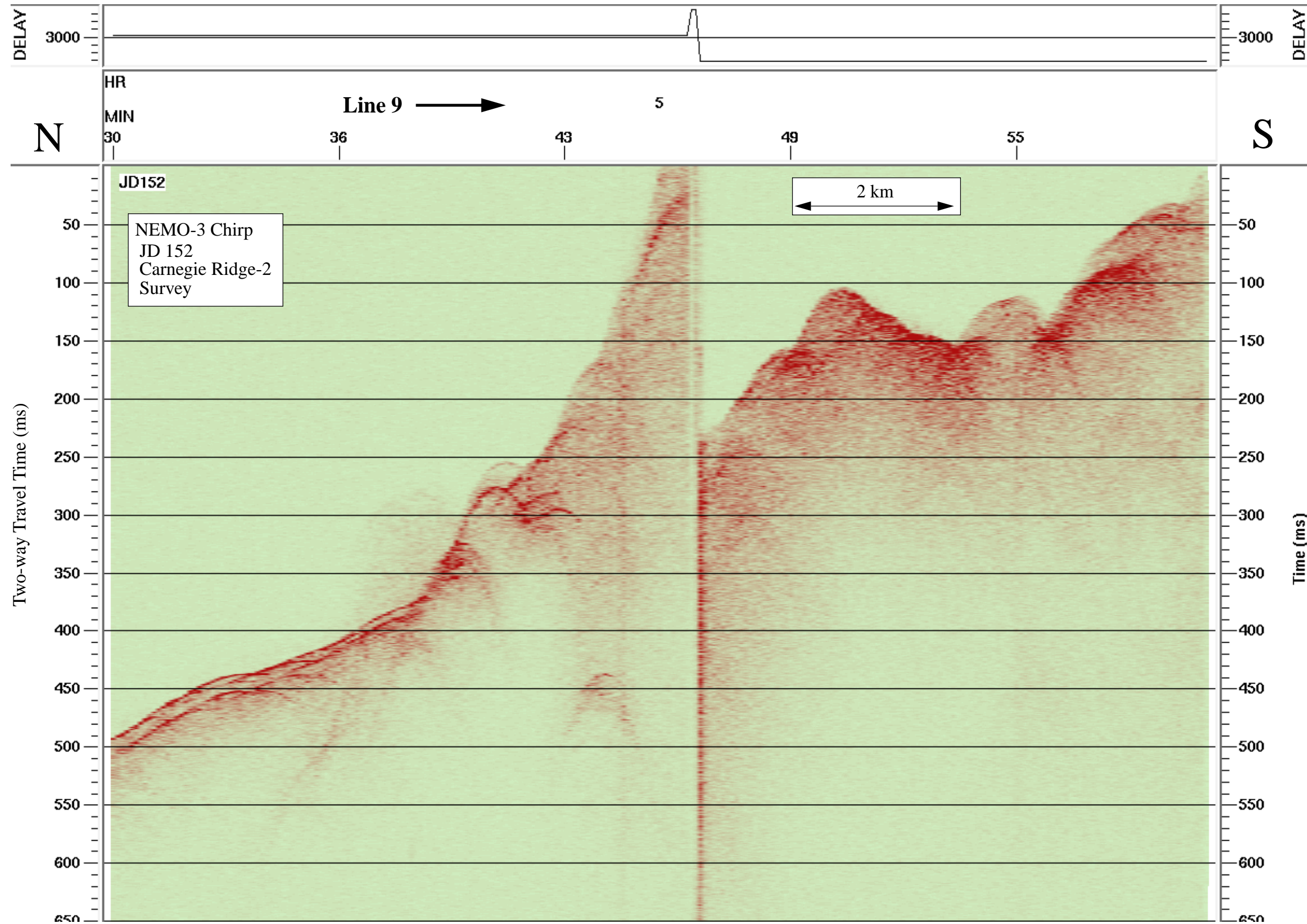




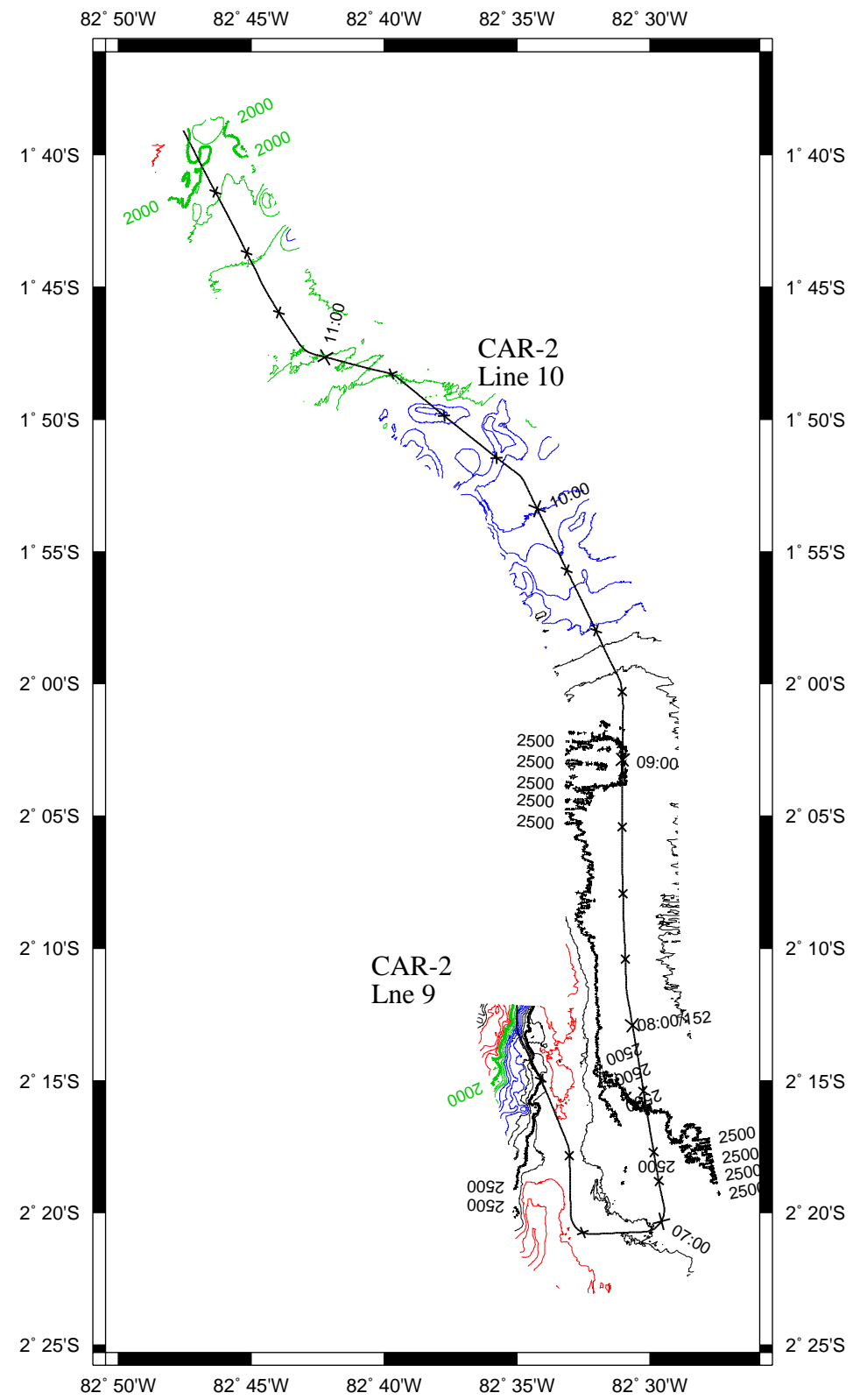


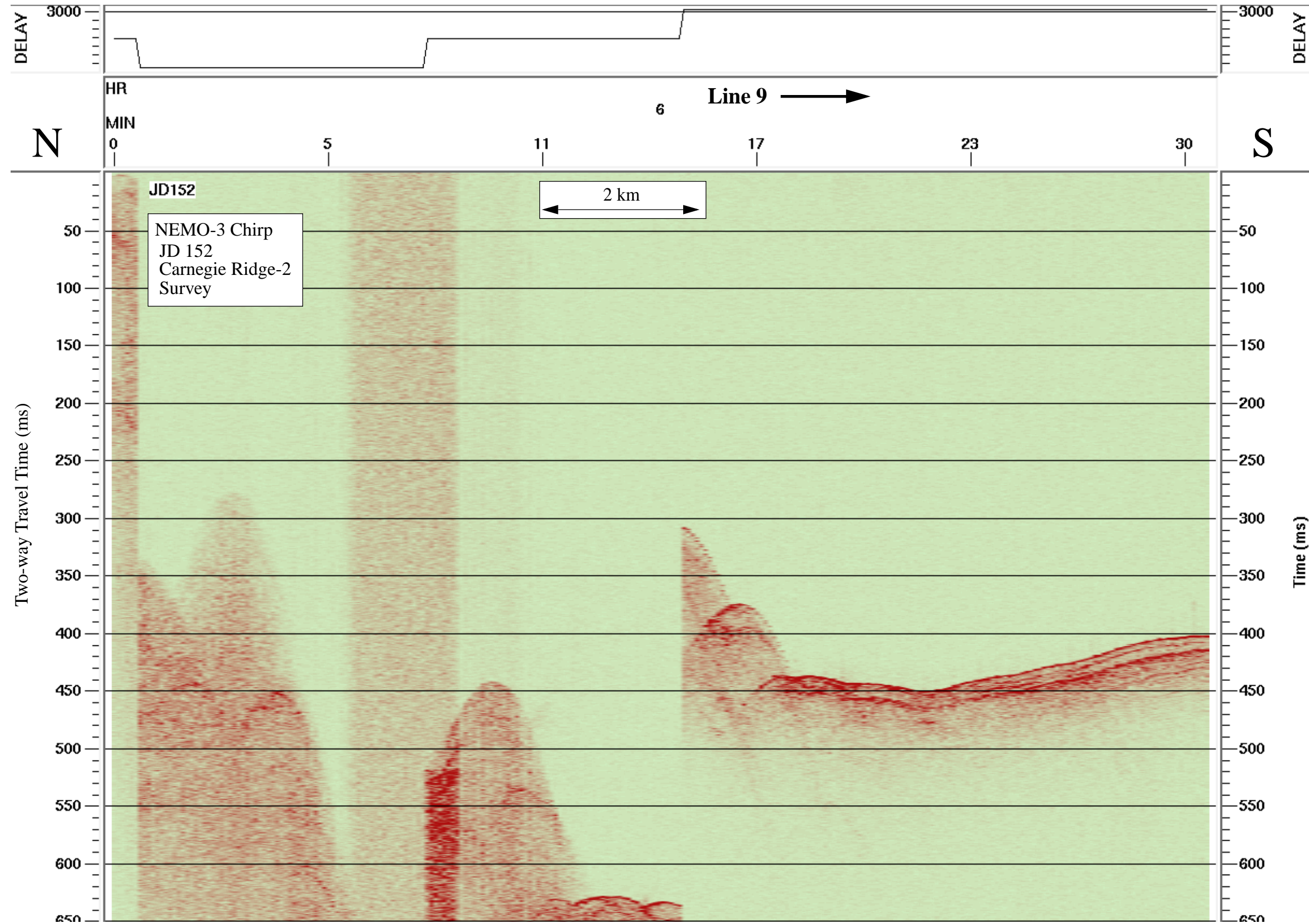


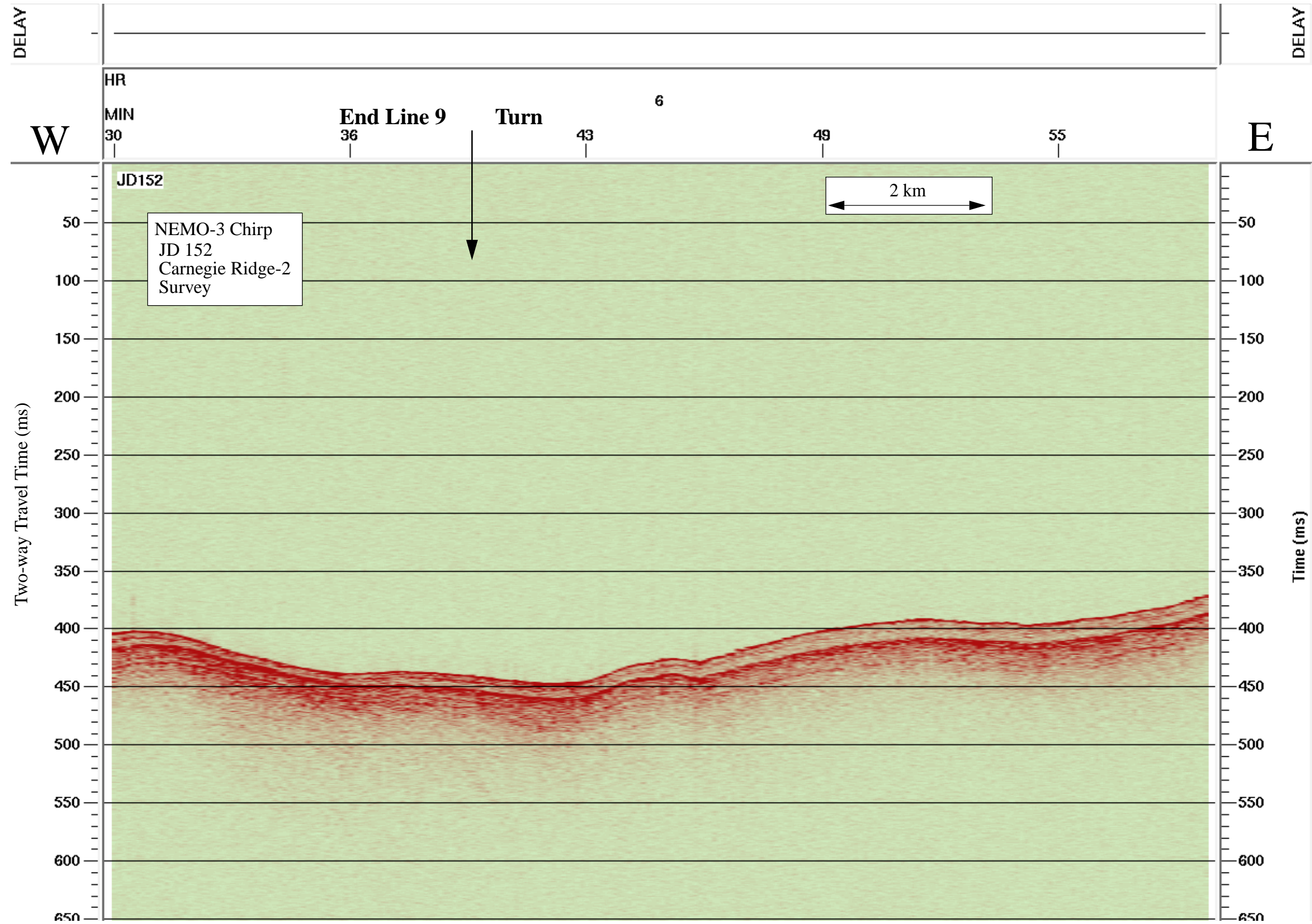


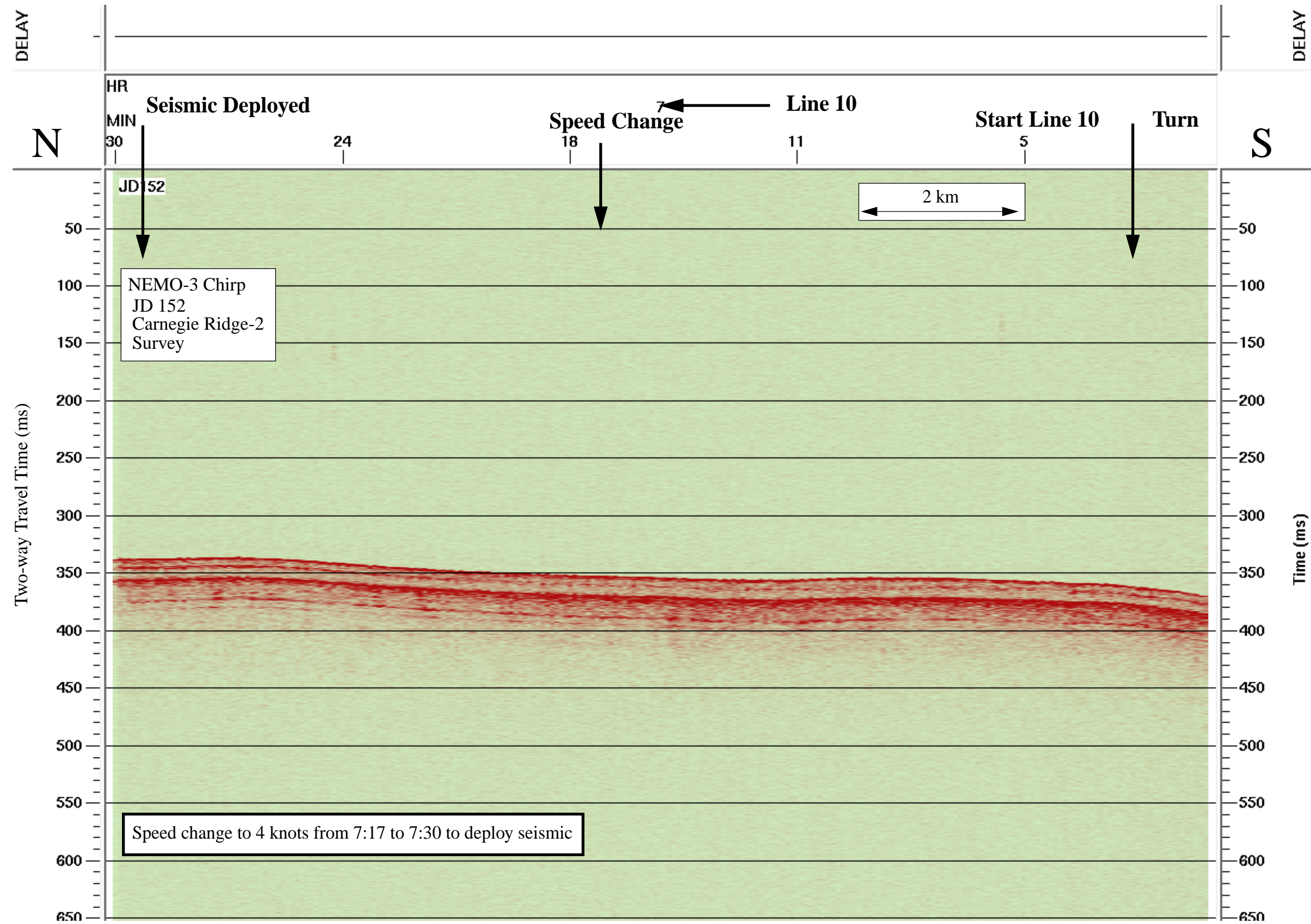


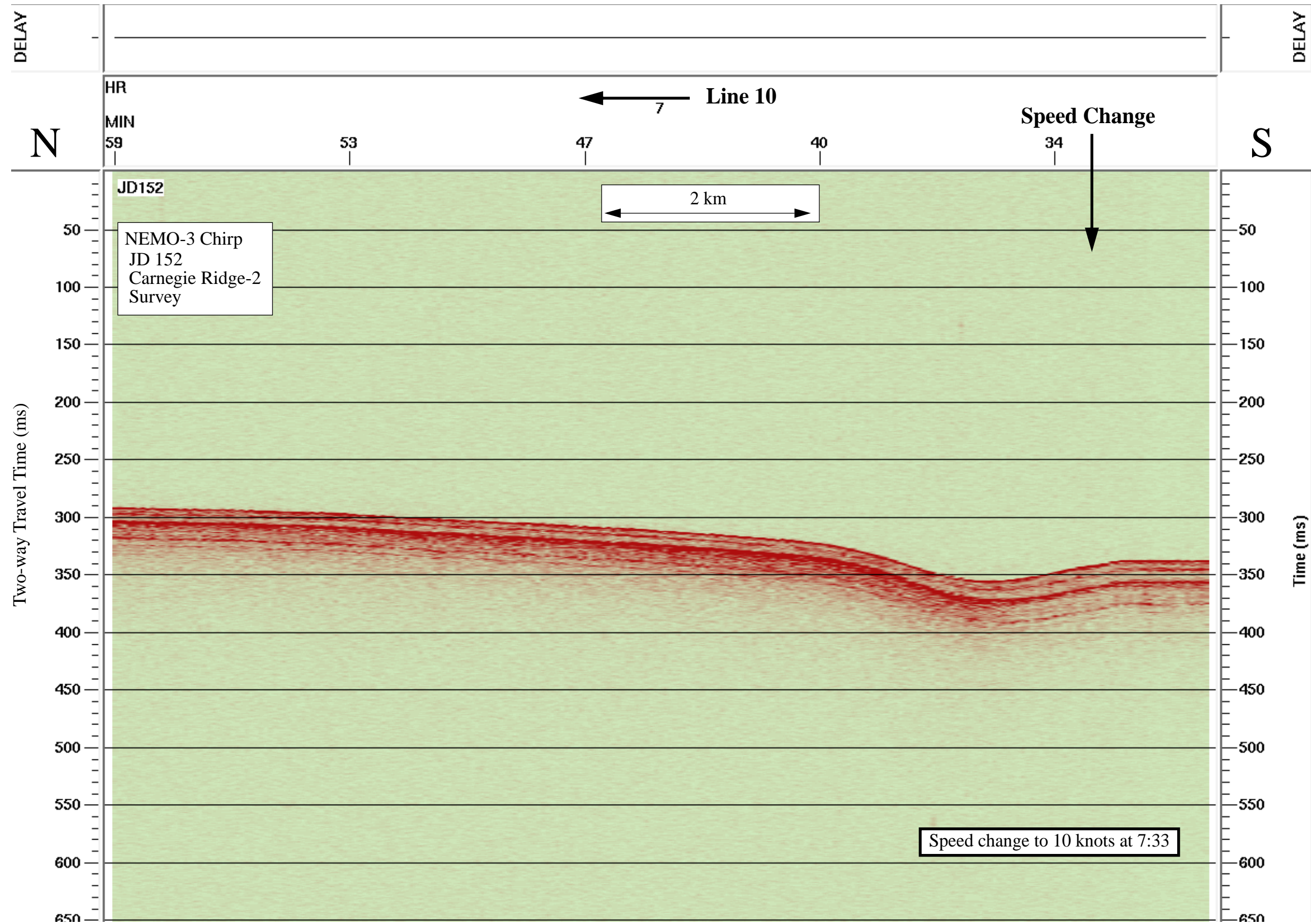
Data File SBfixavg.2000may31.0600-1200

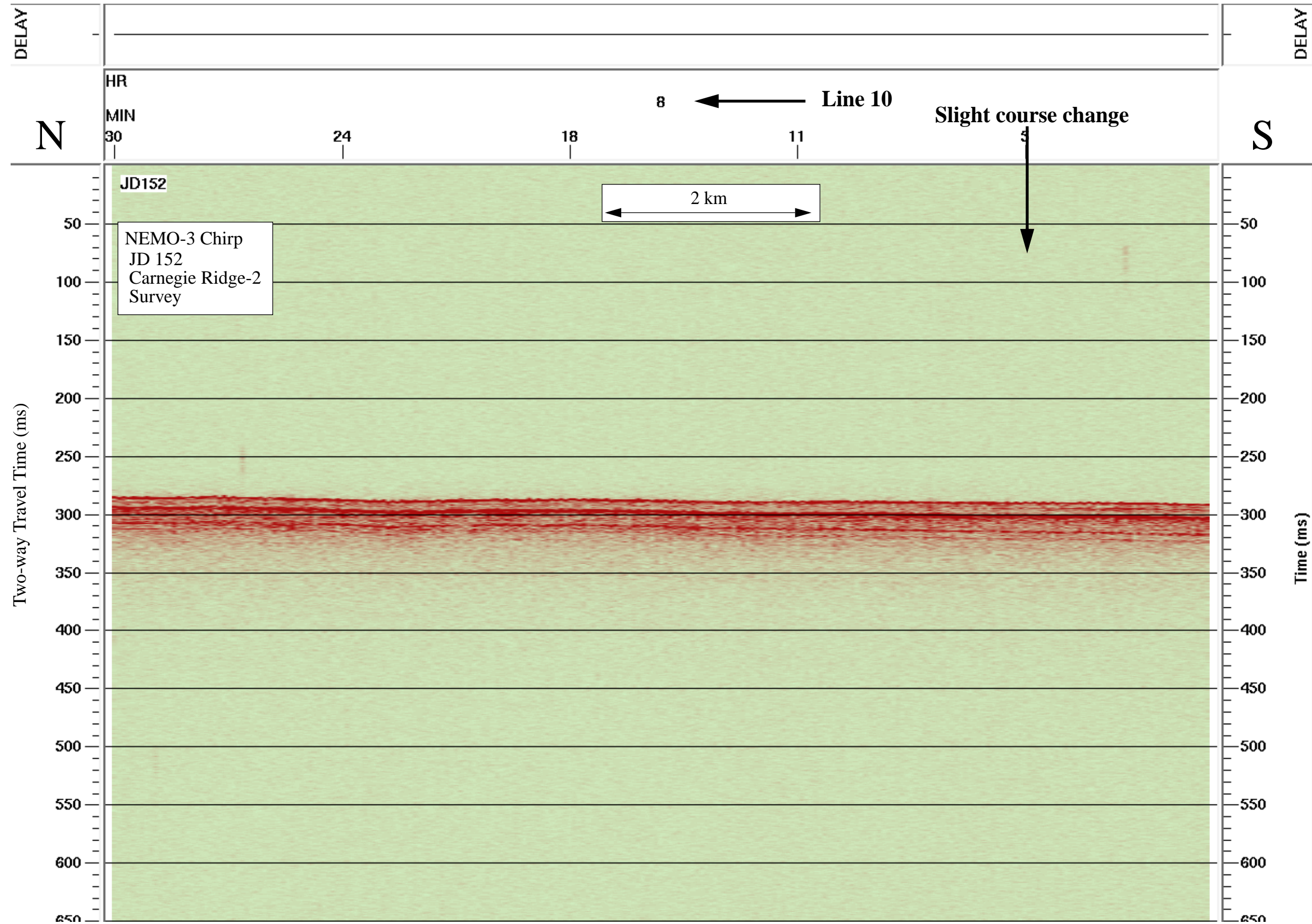


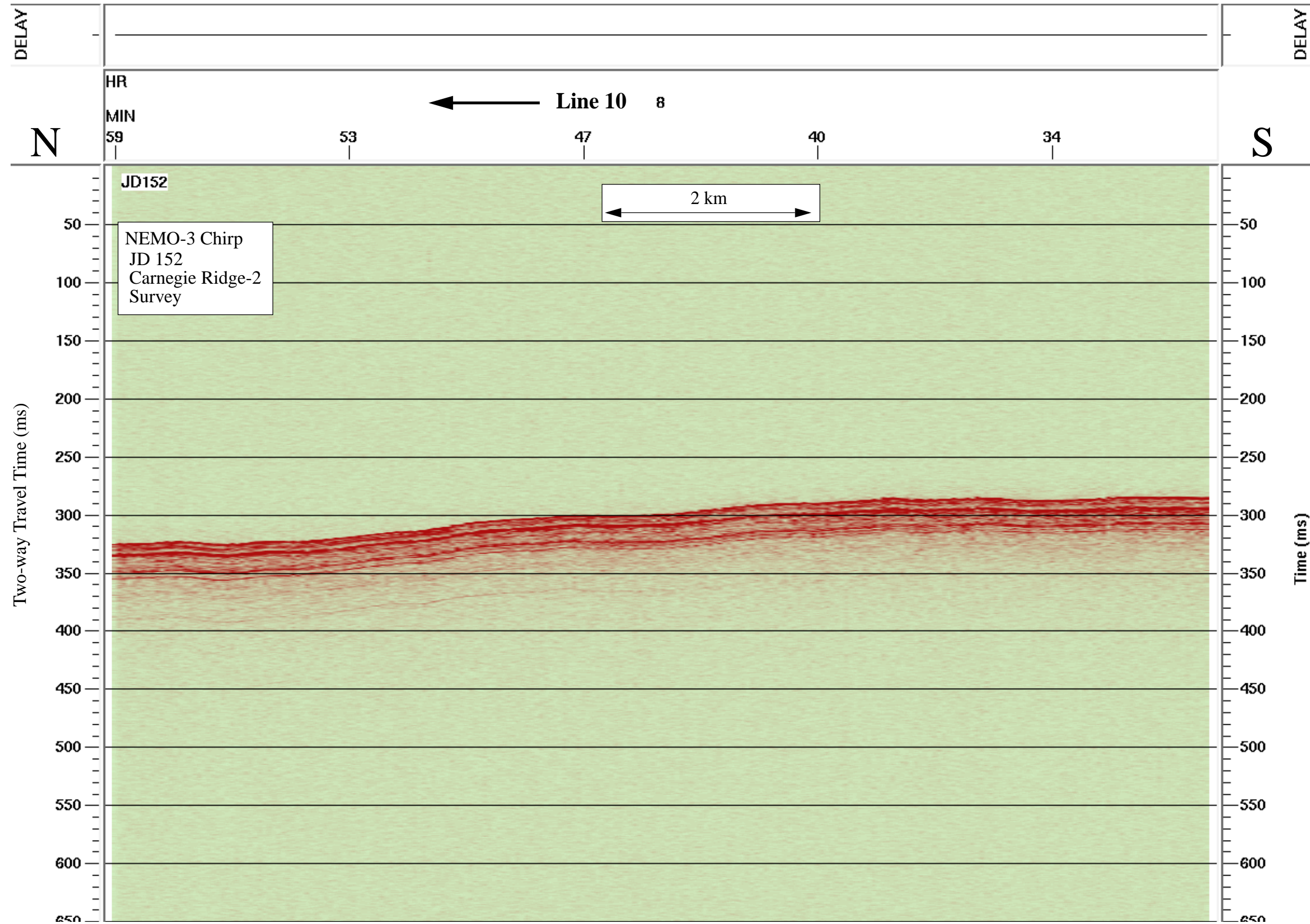


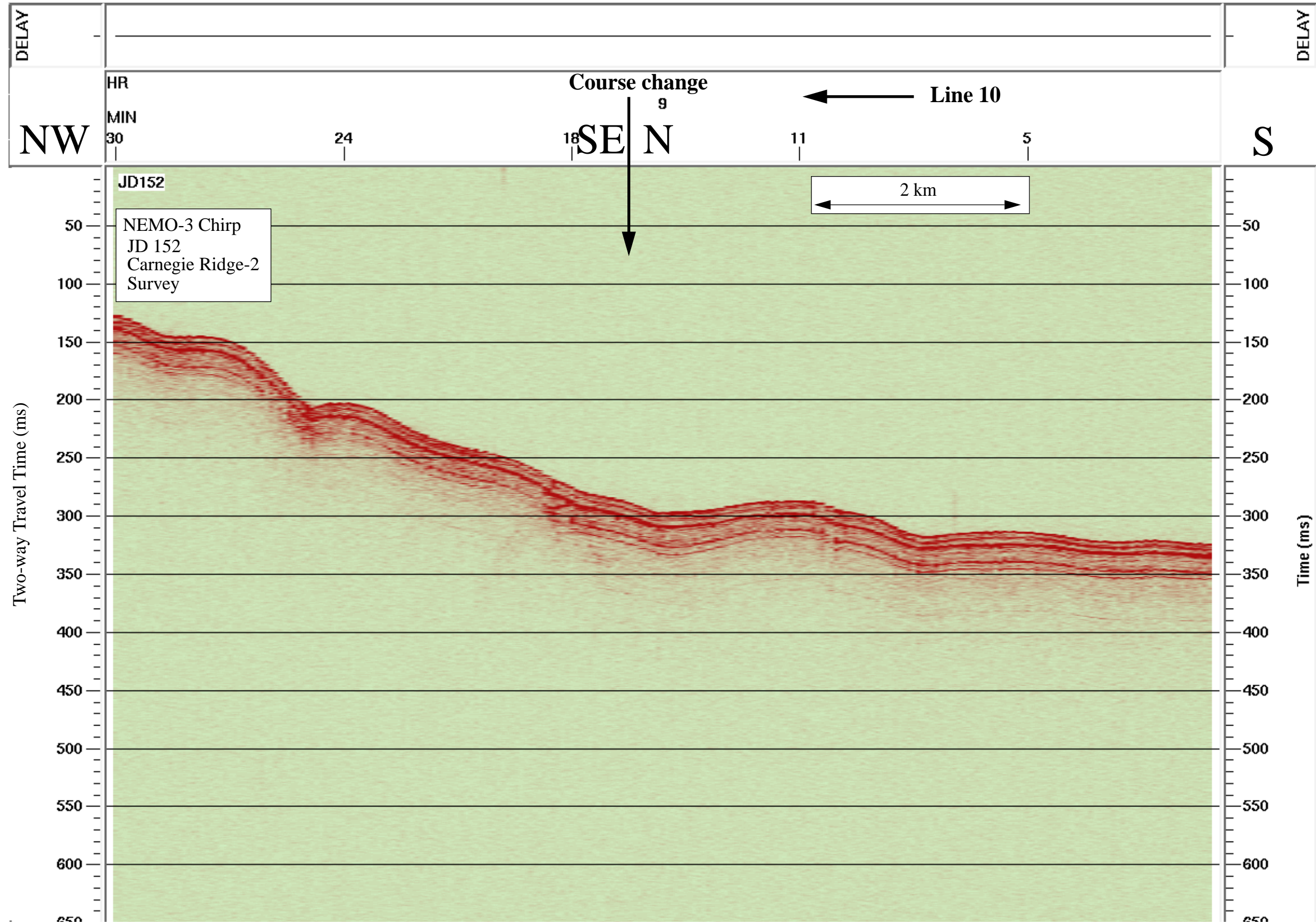


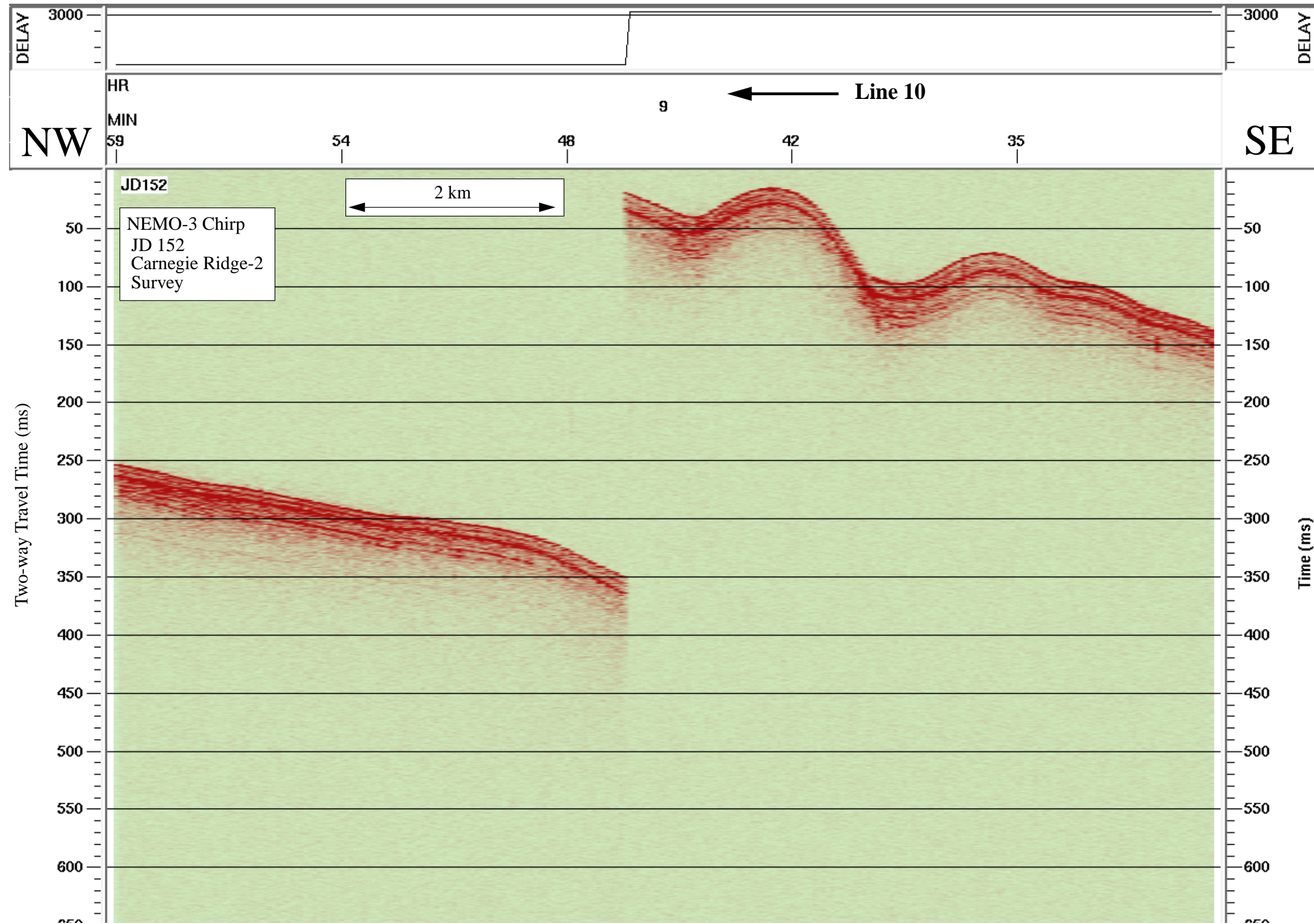


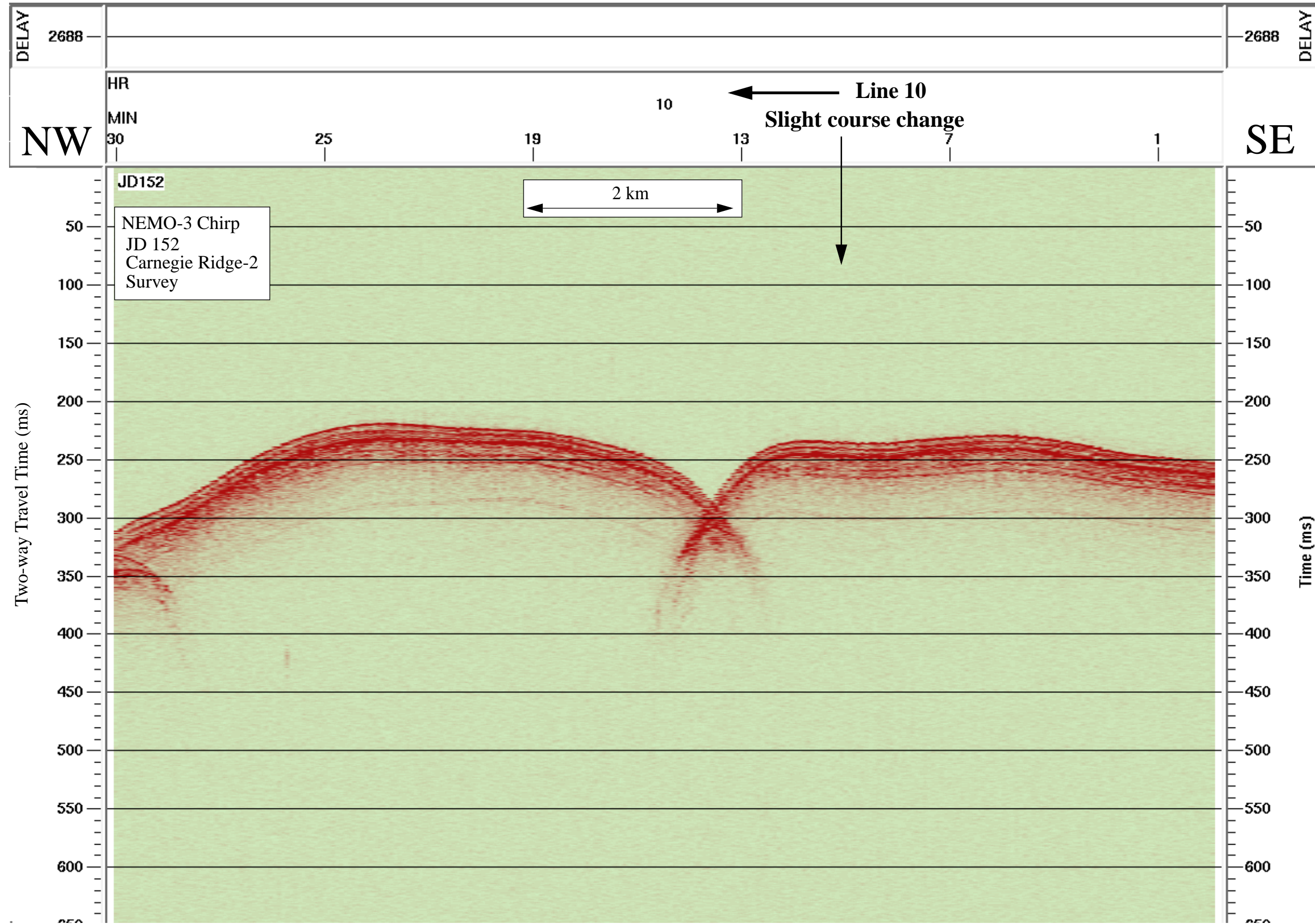


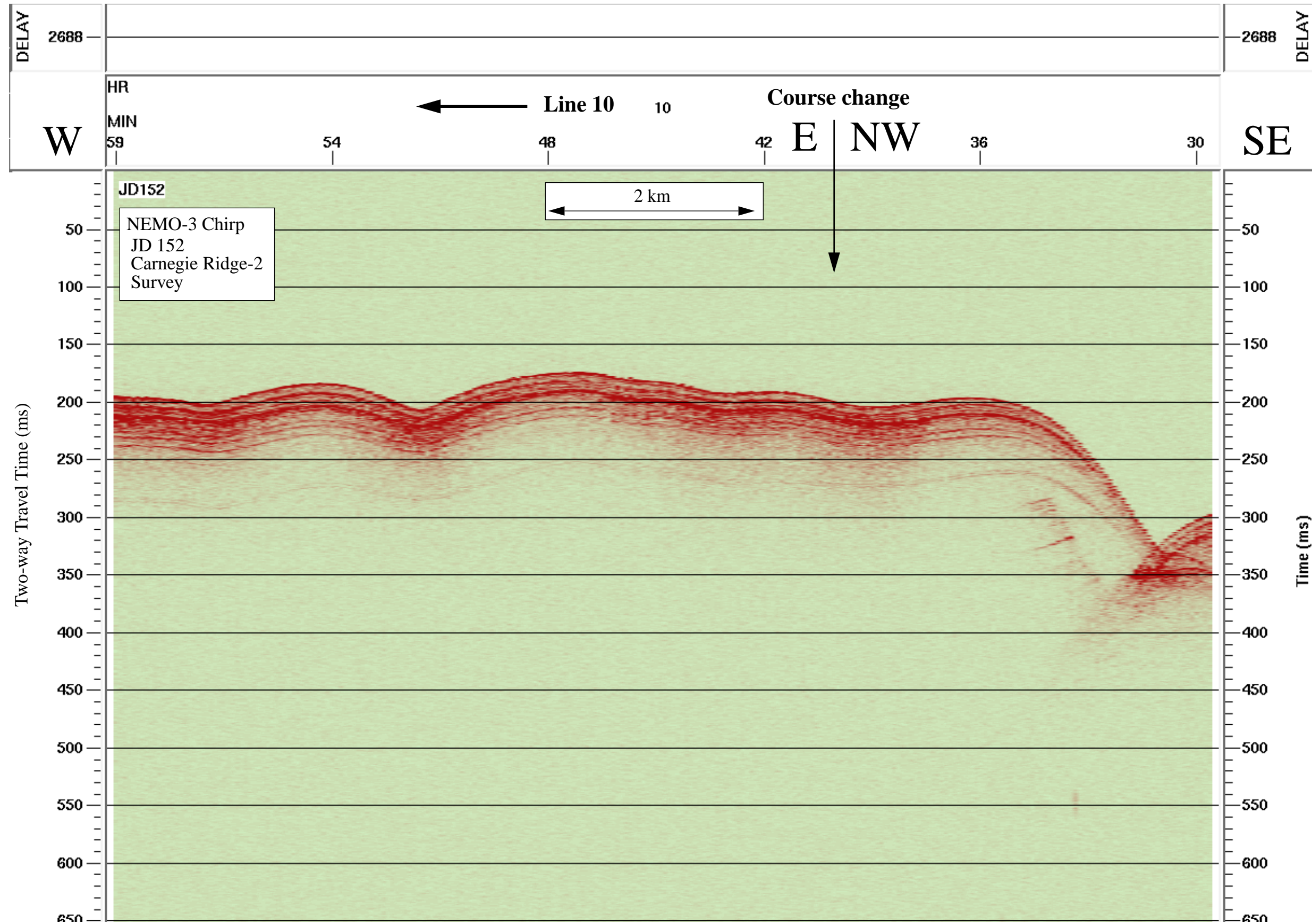


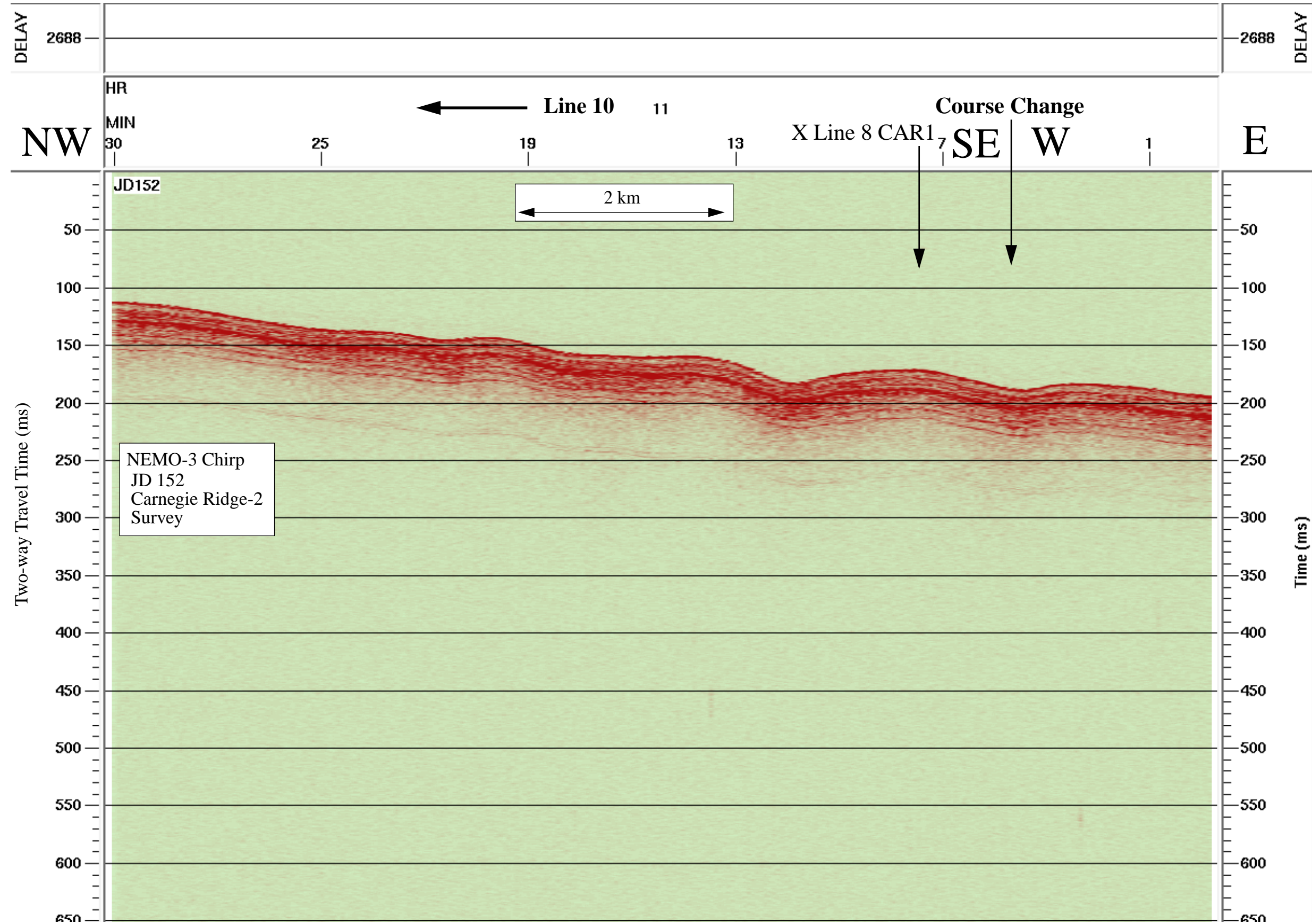


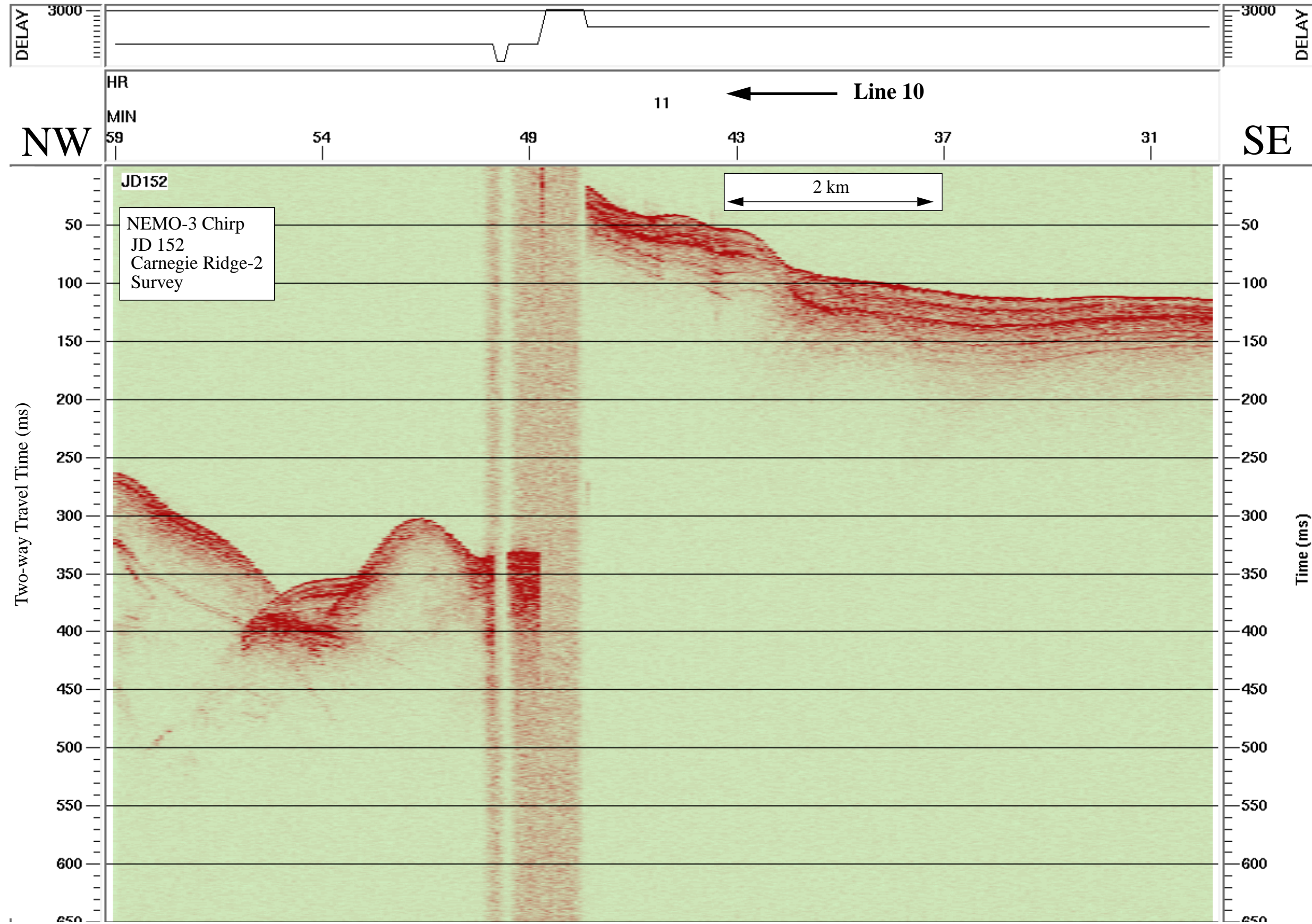




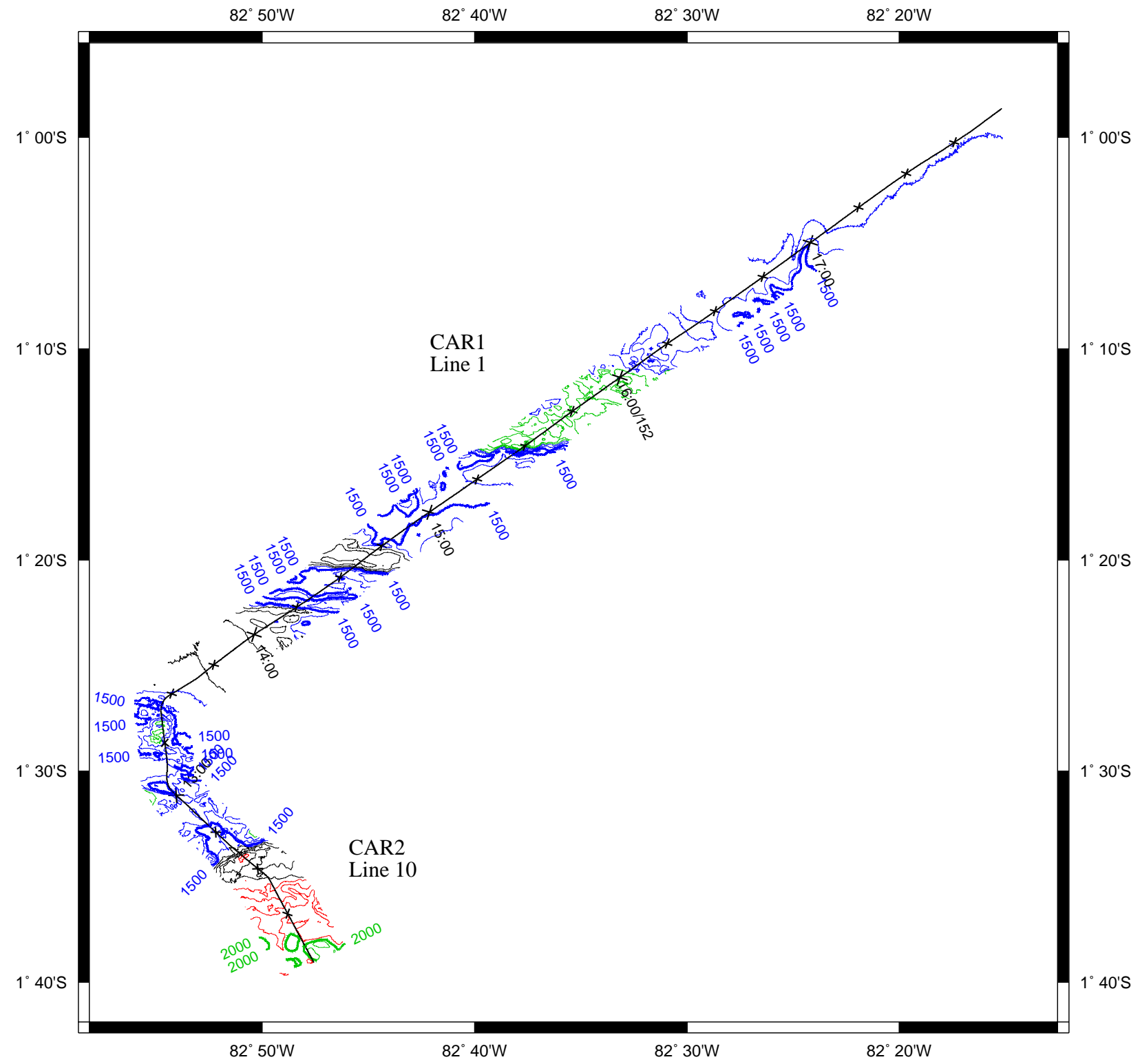


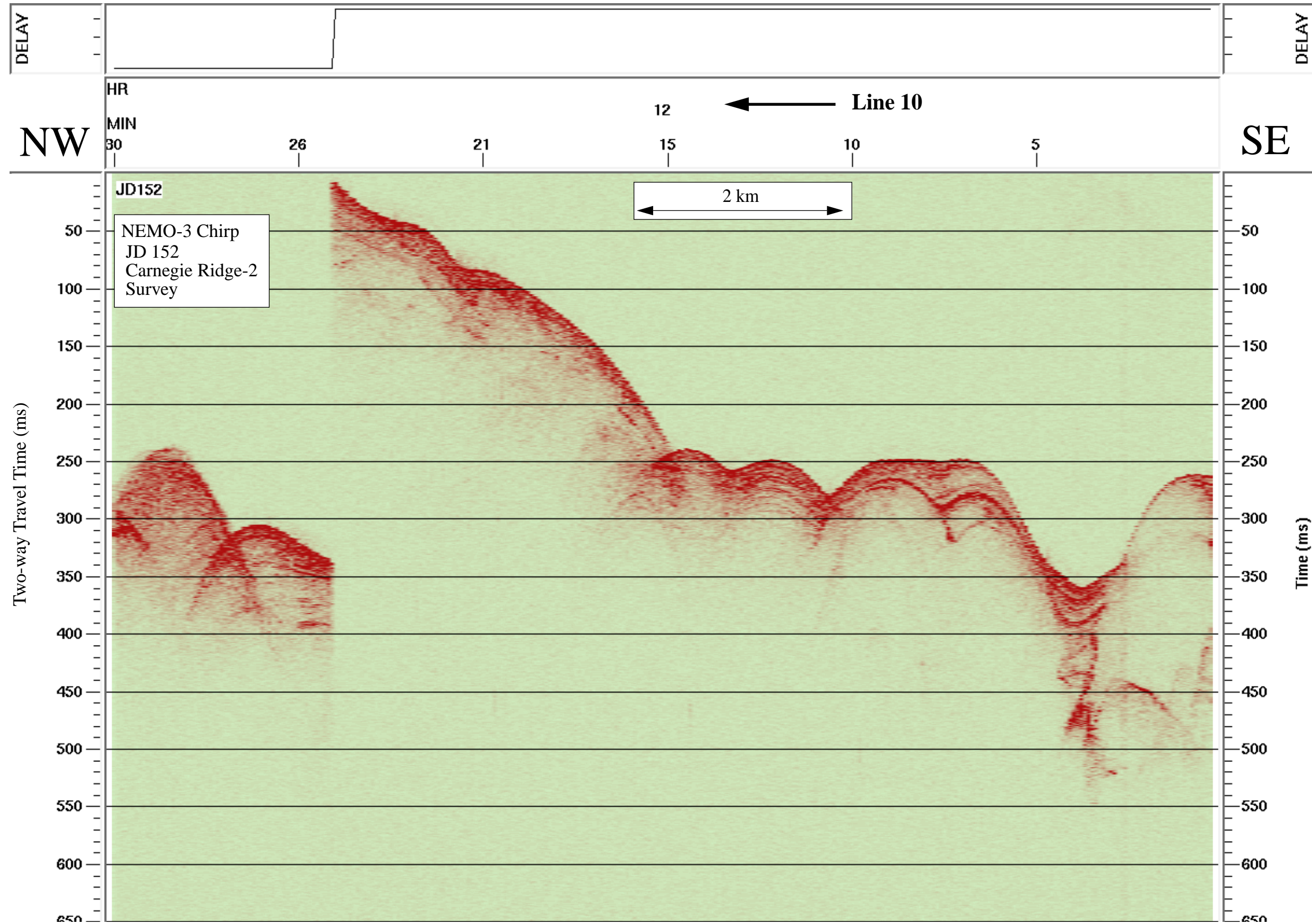


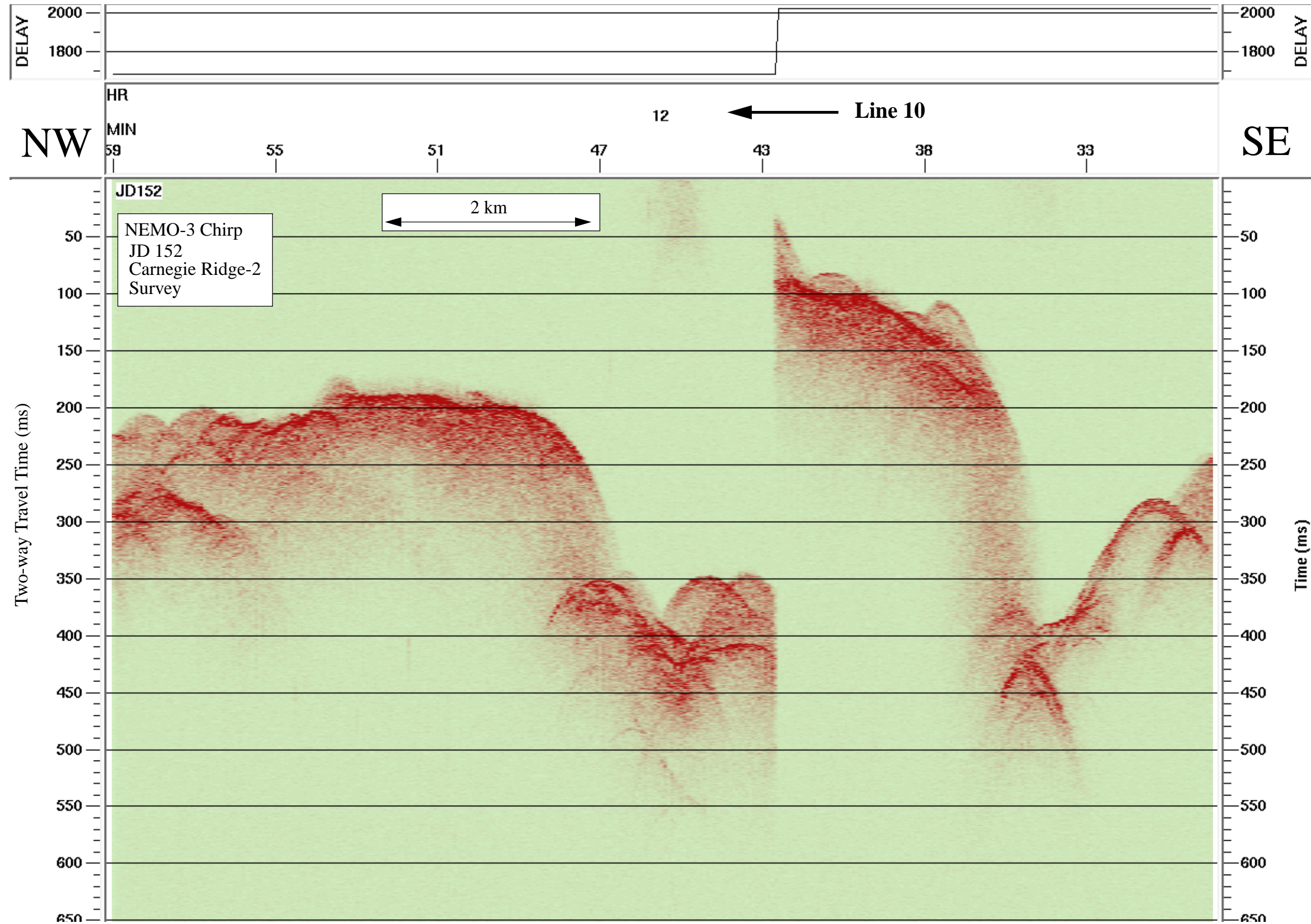


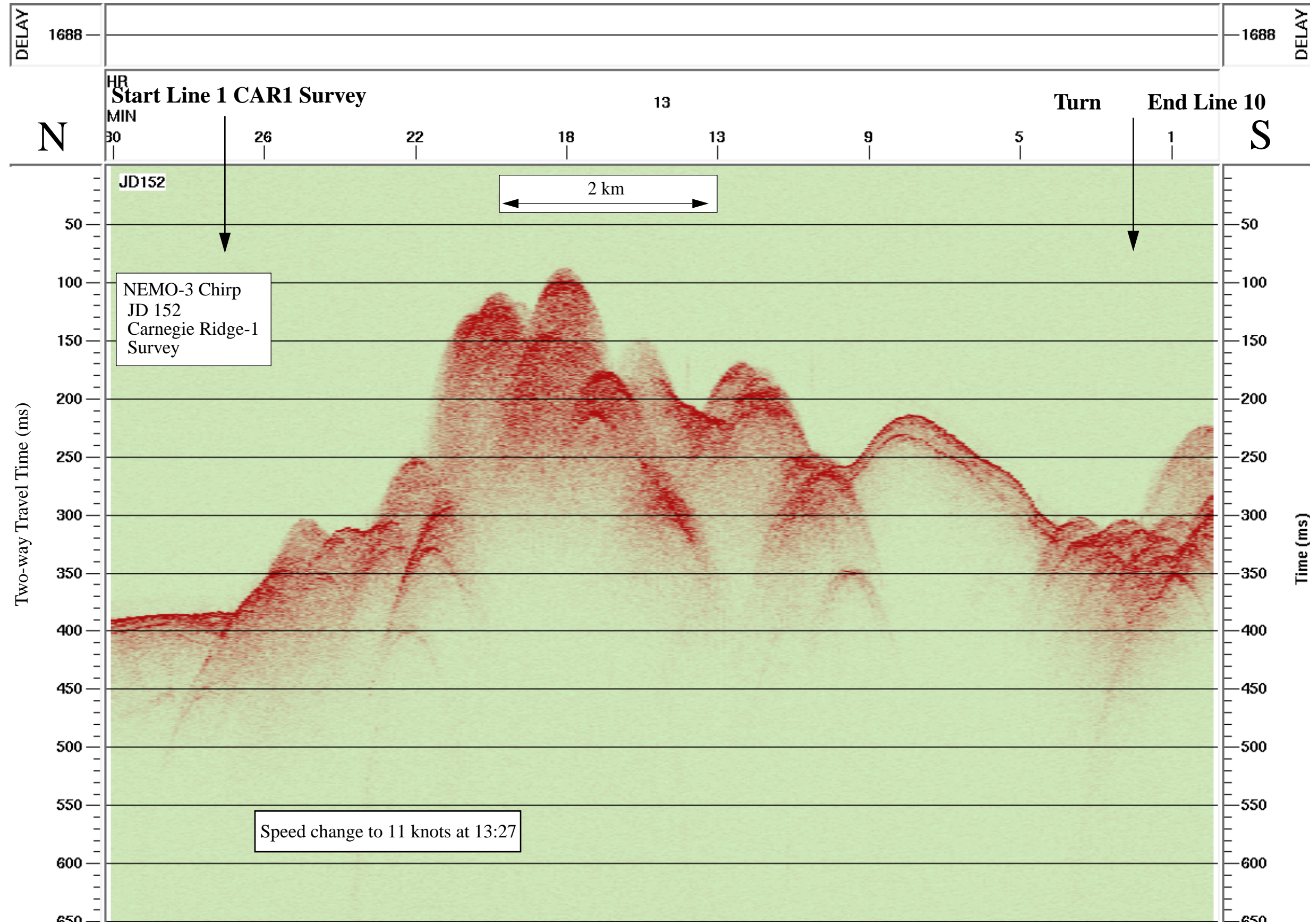


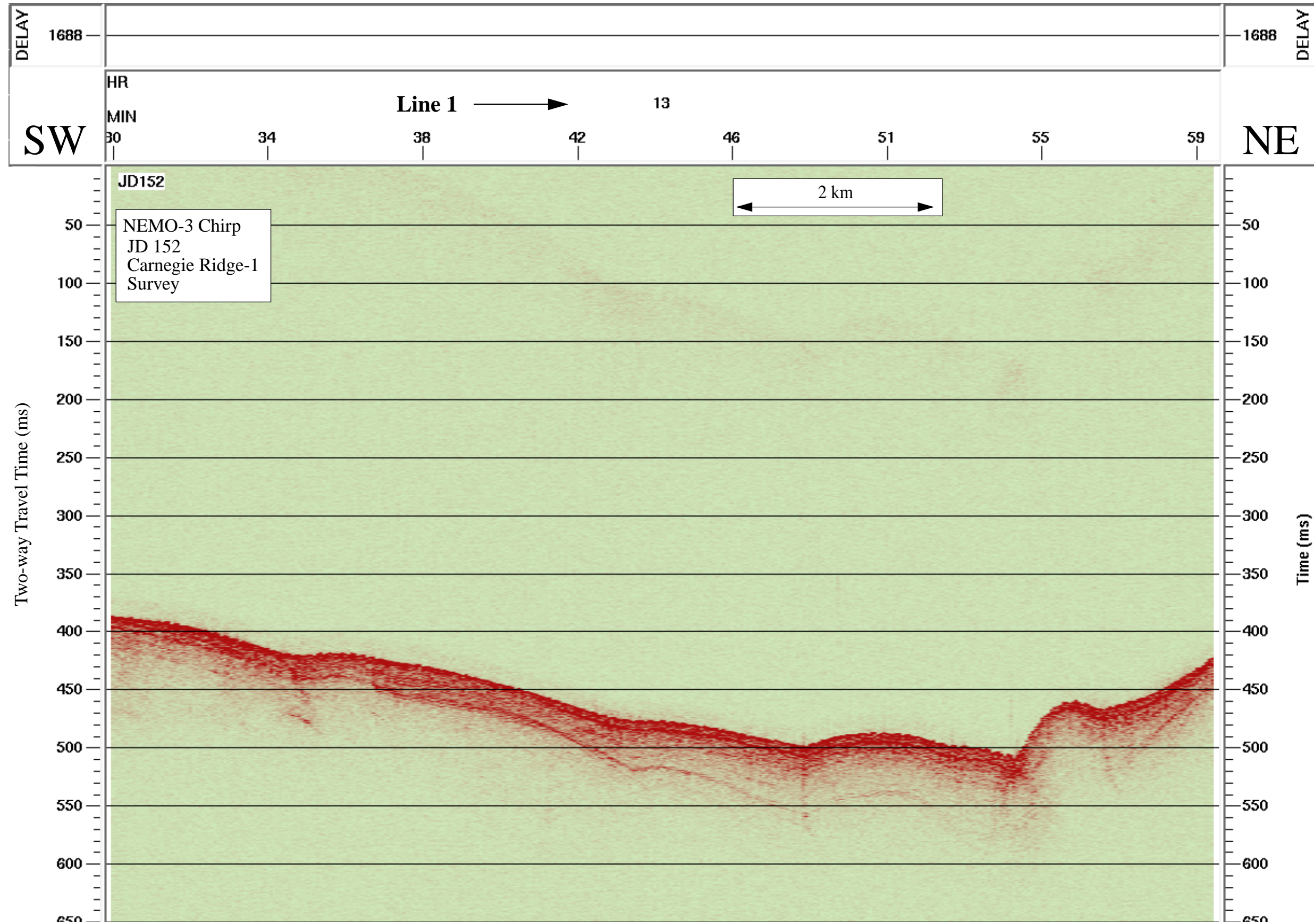
Data File SBfixavg.2000may31.1200-1800

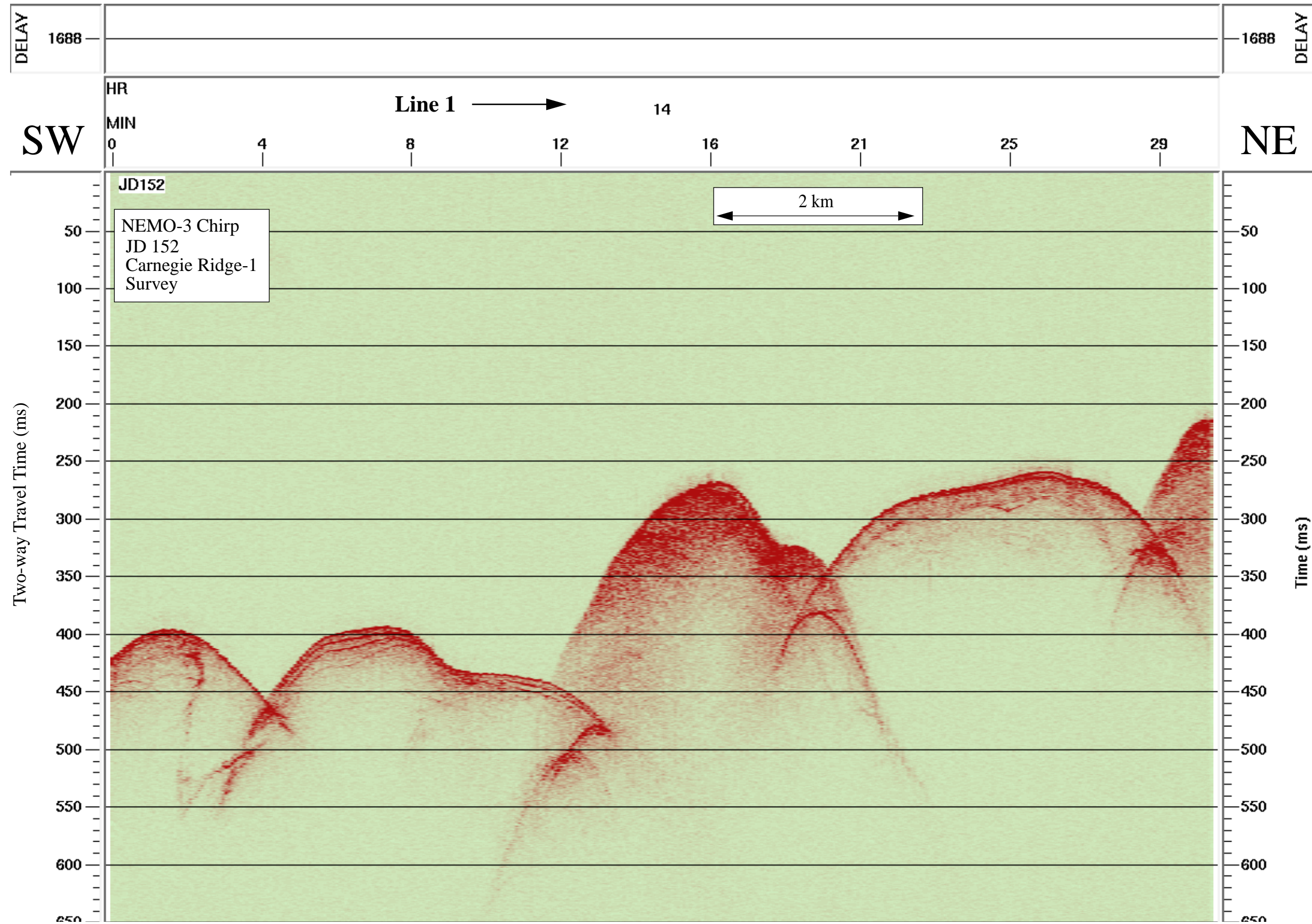


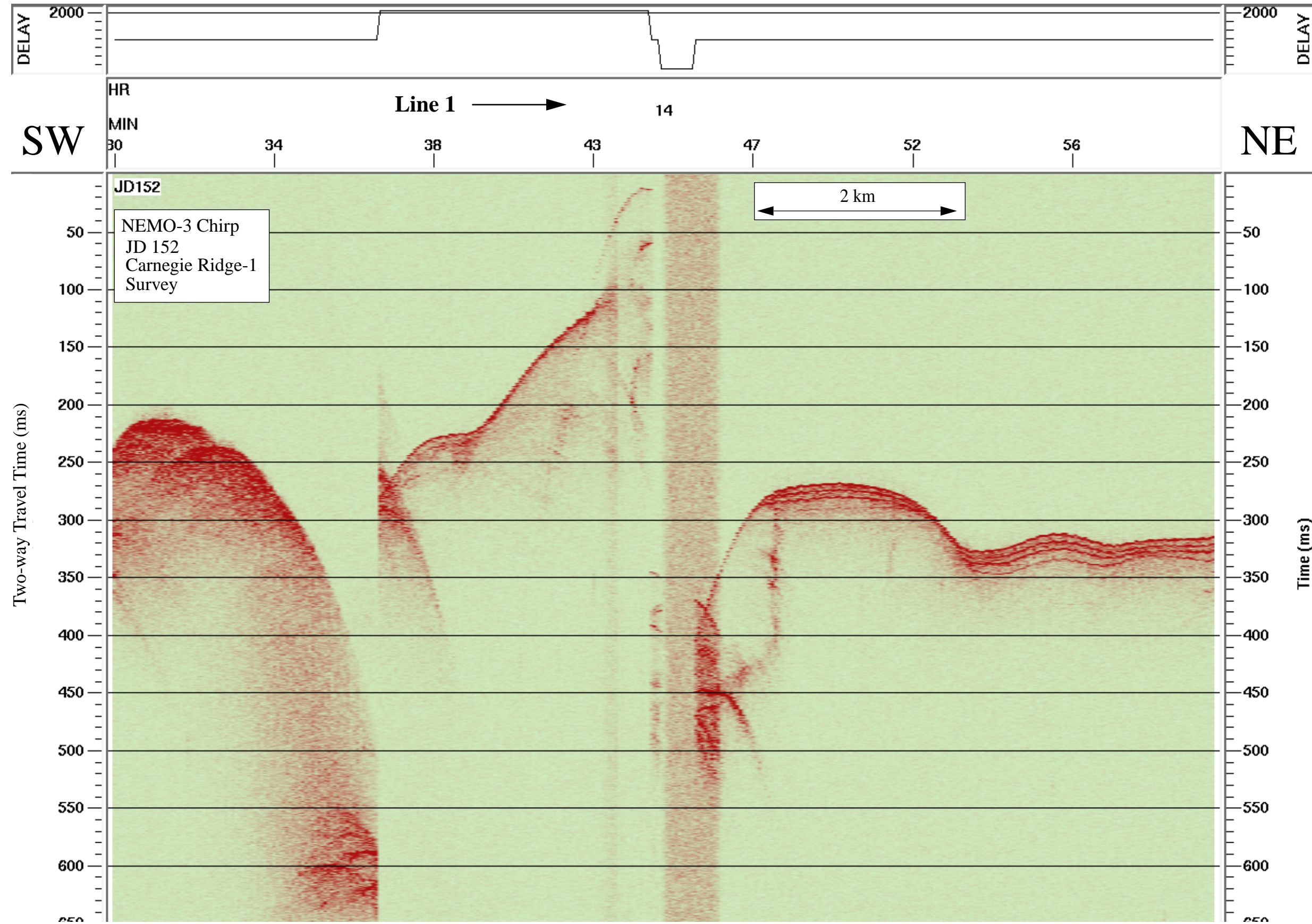


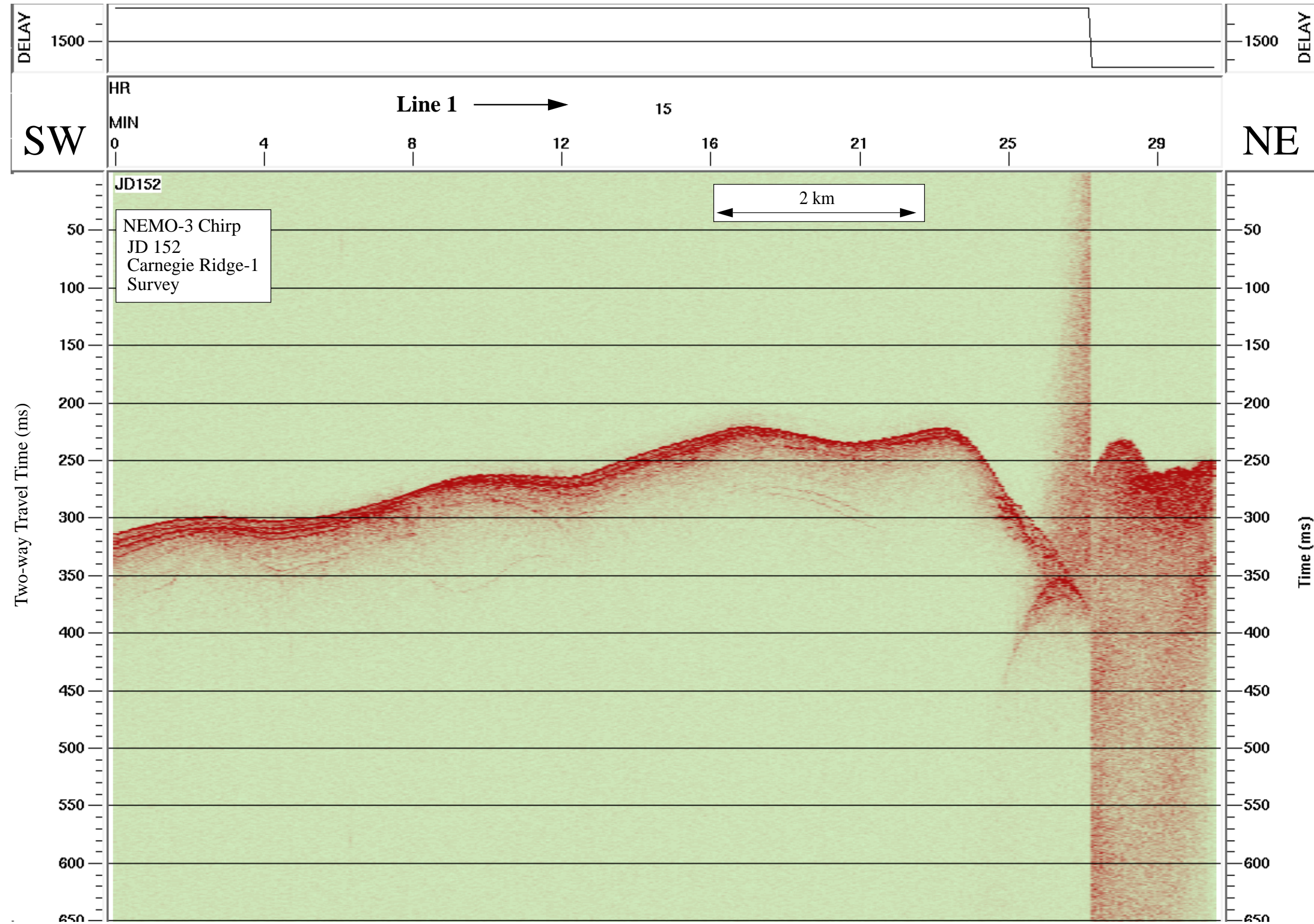


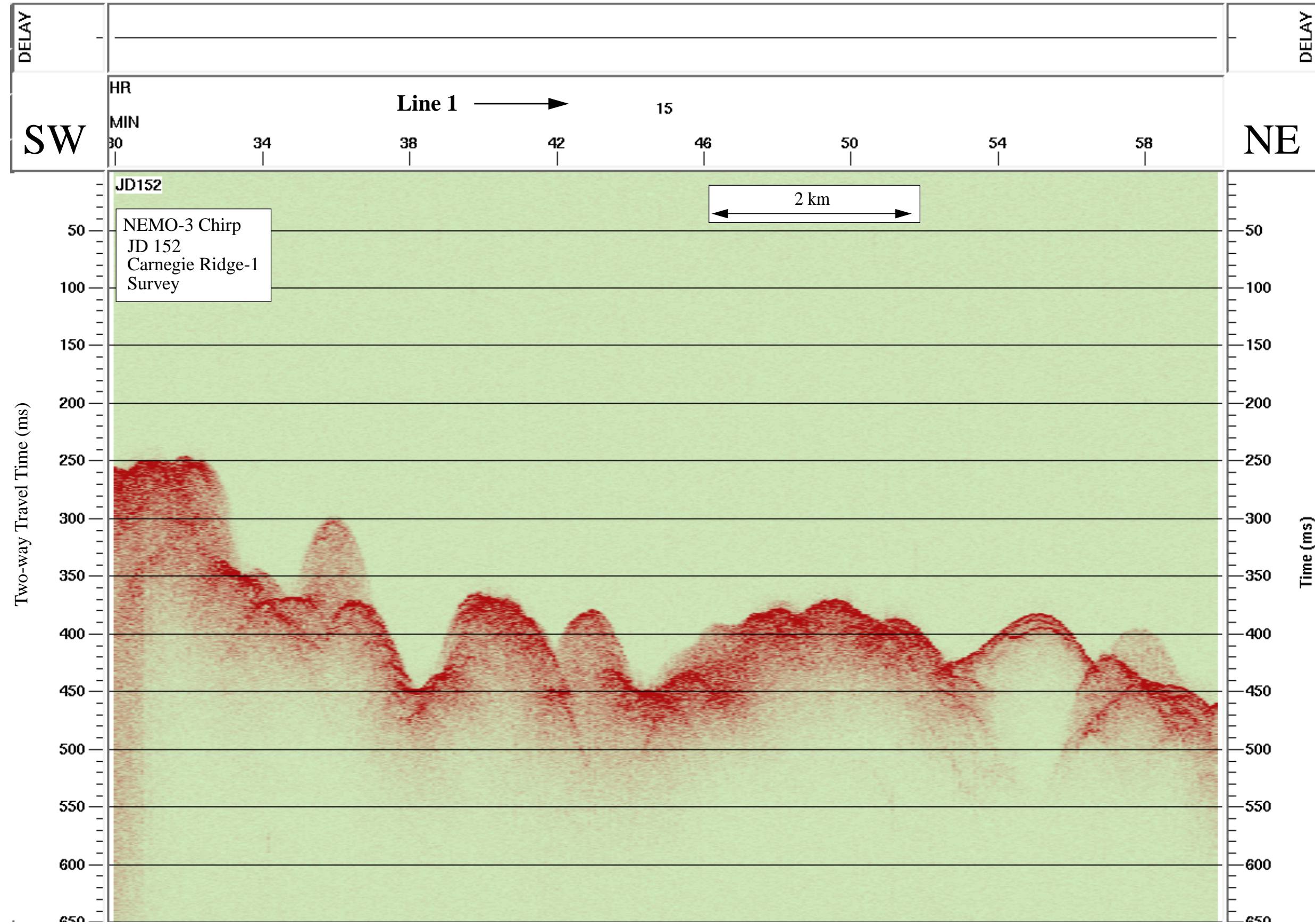


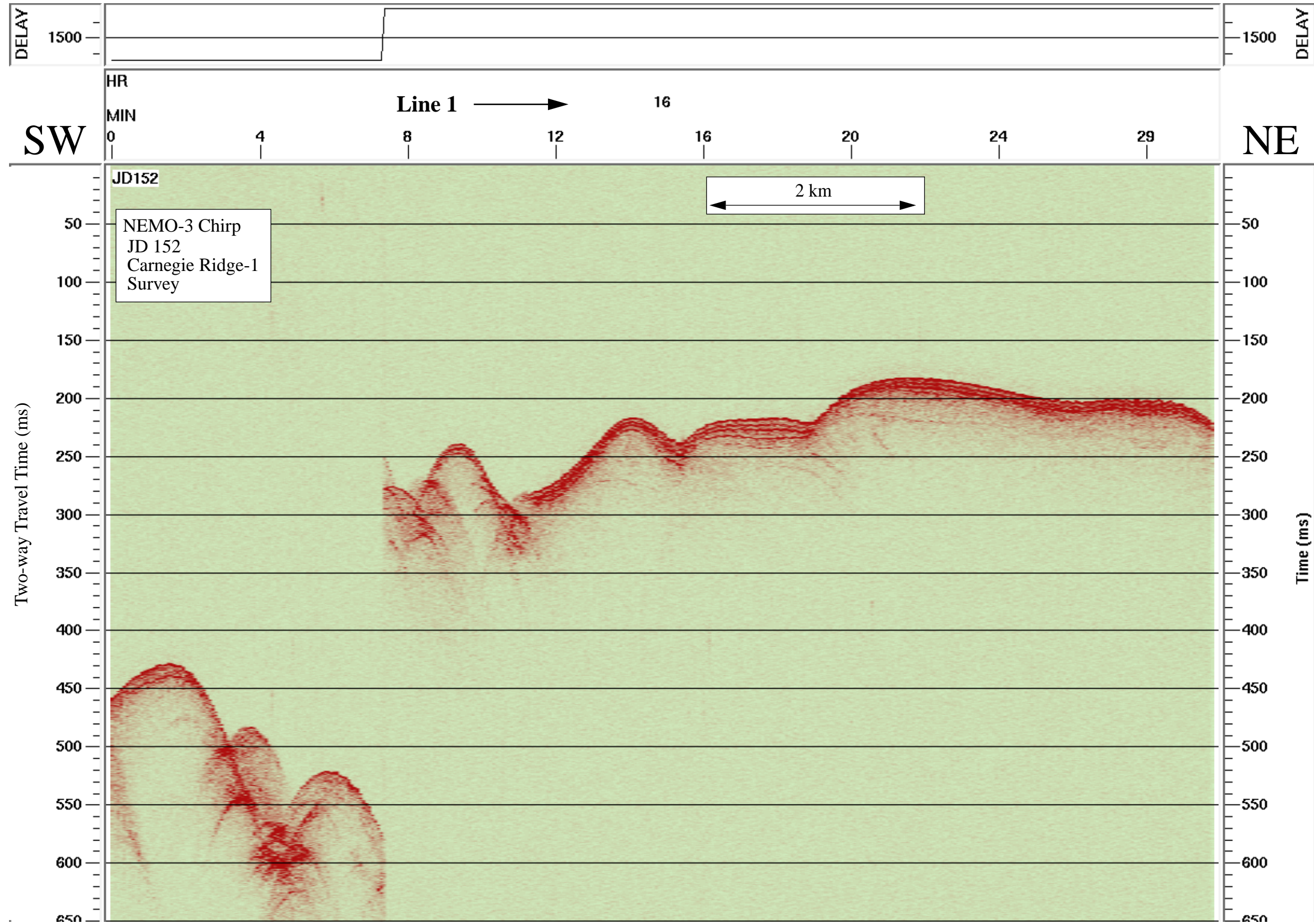


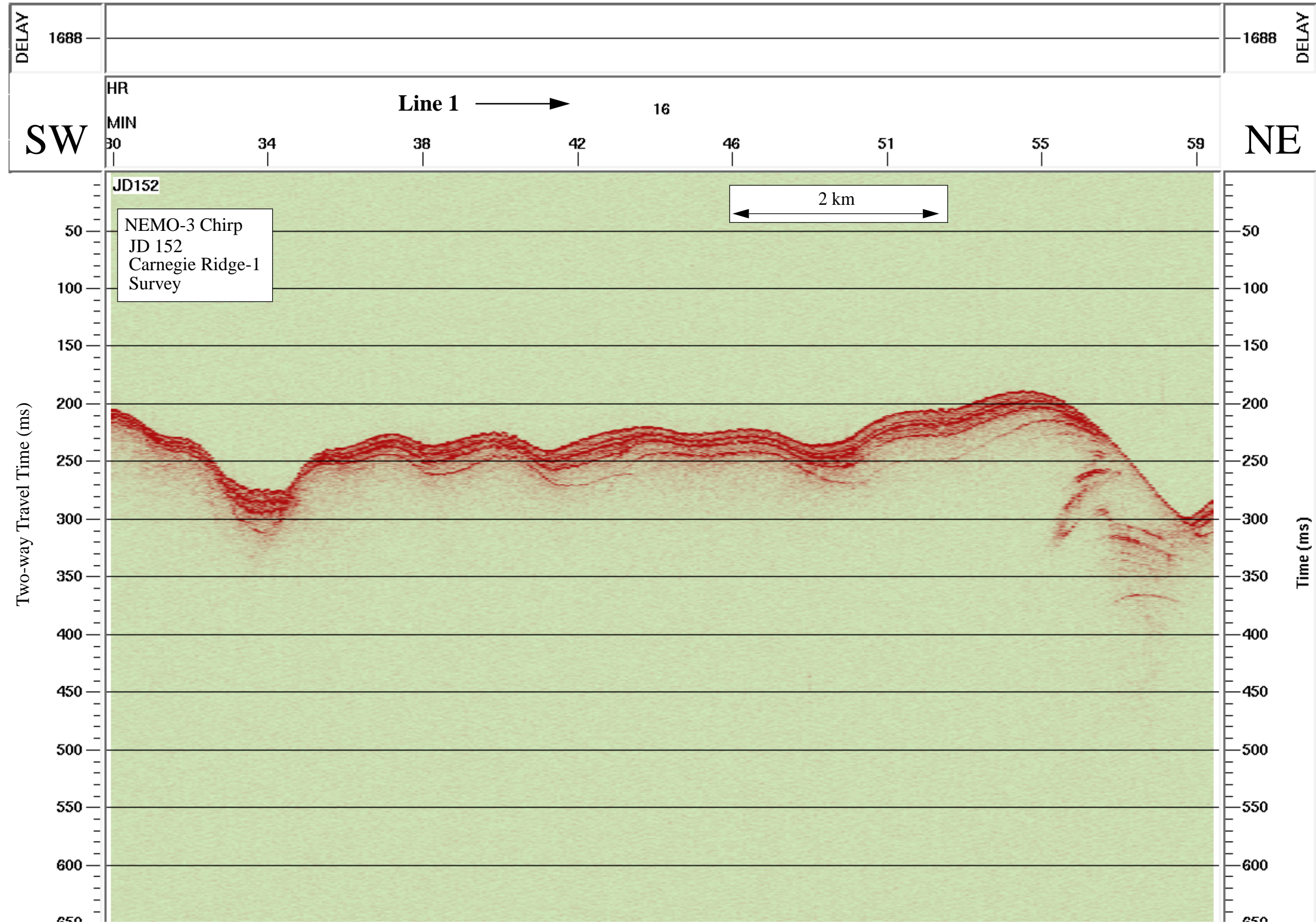


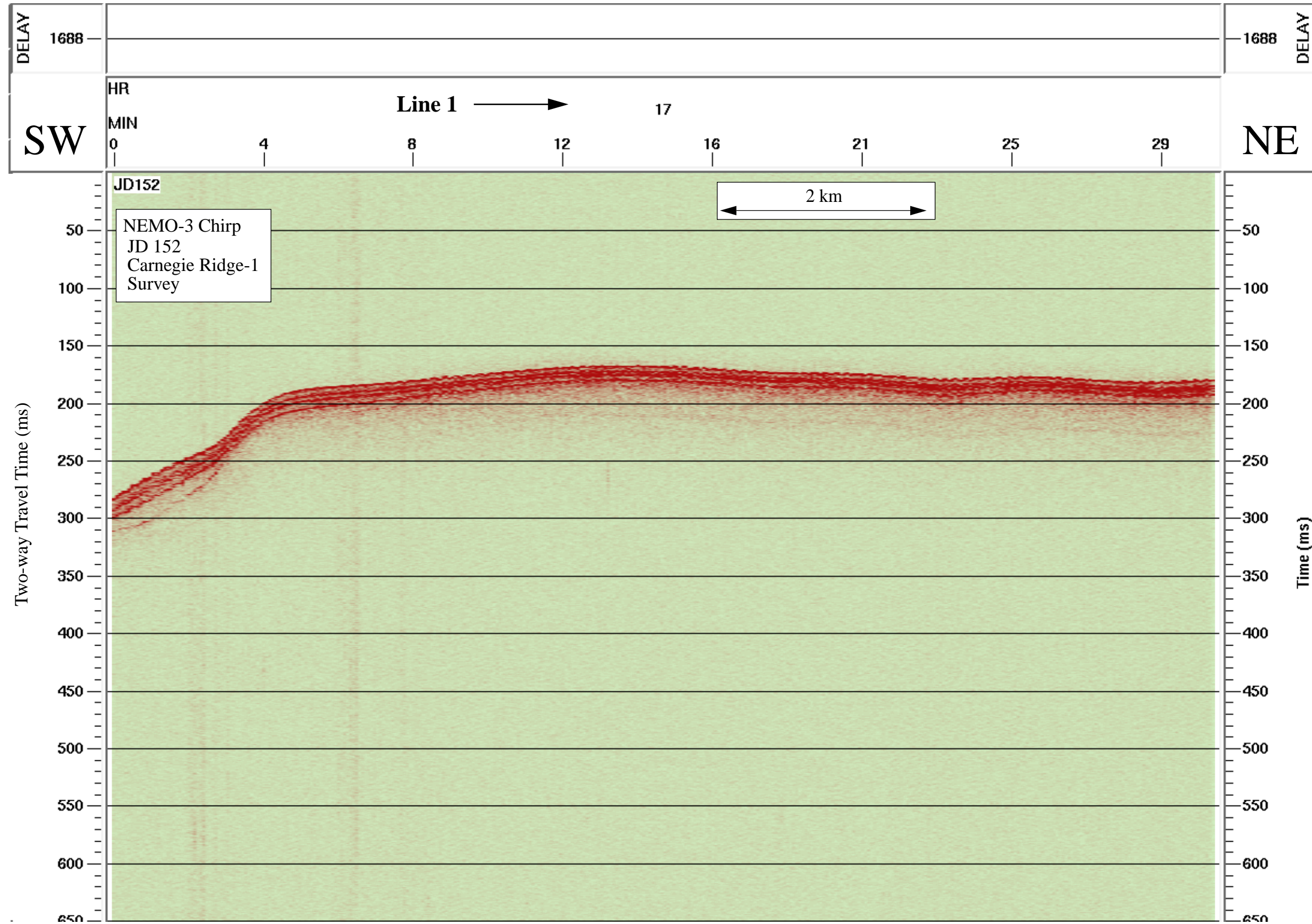


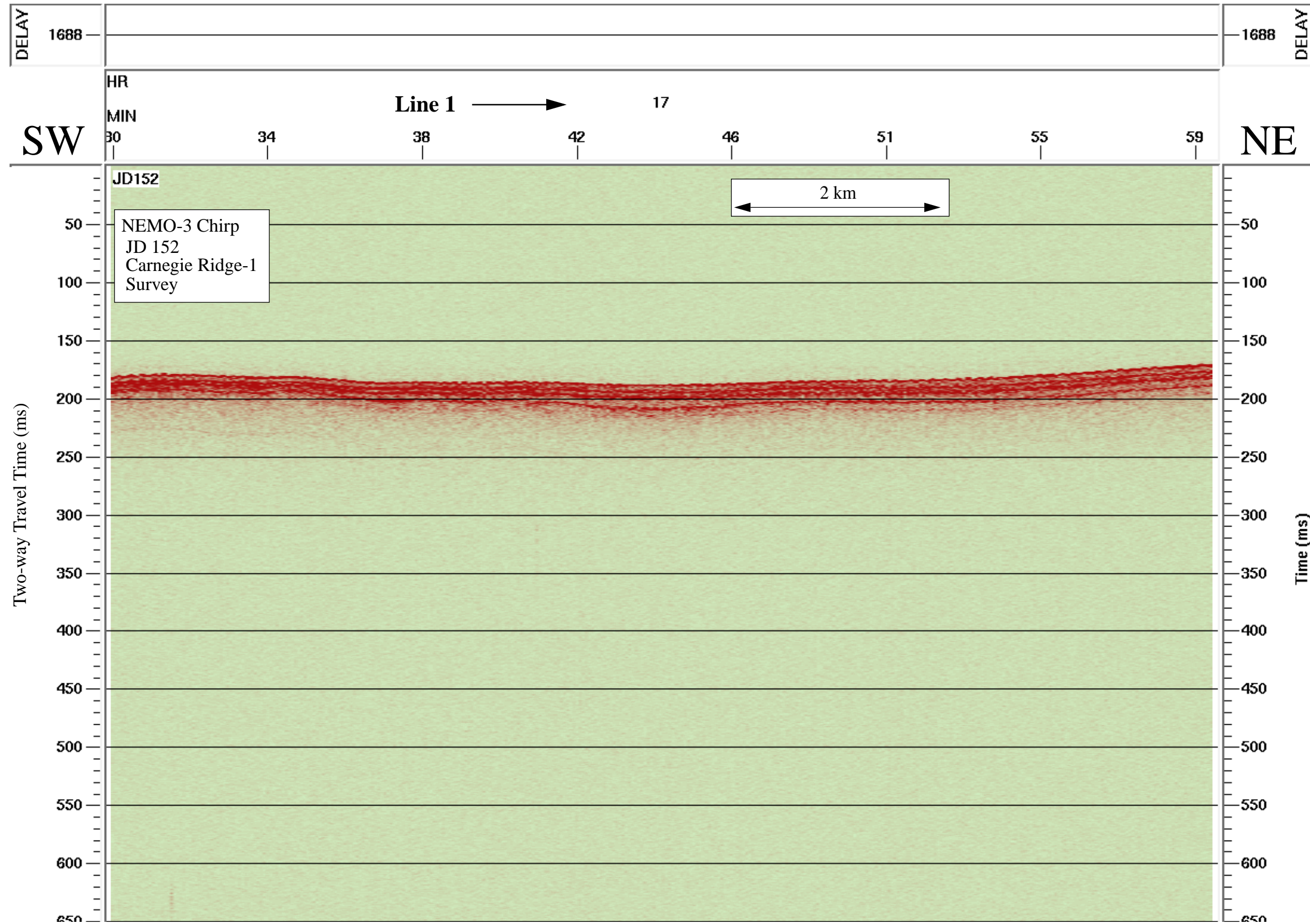




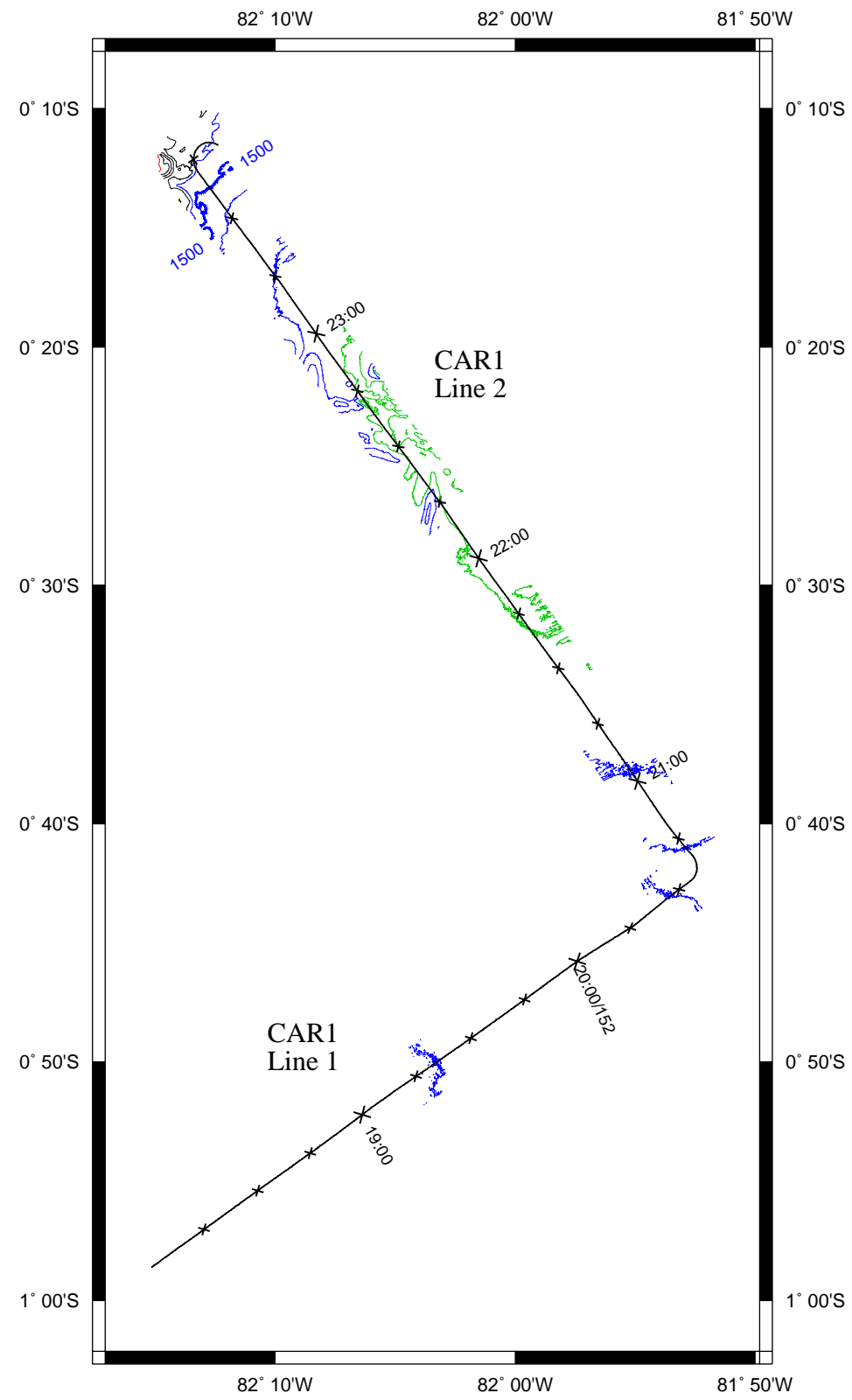


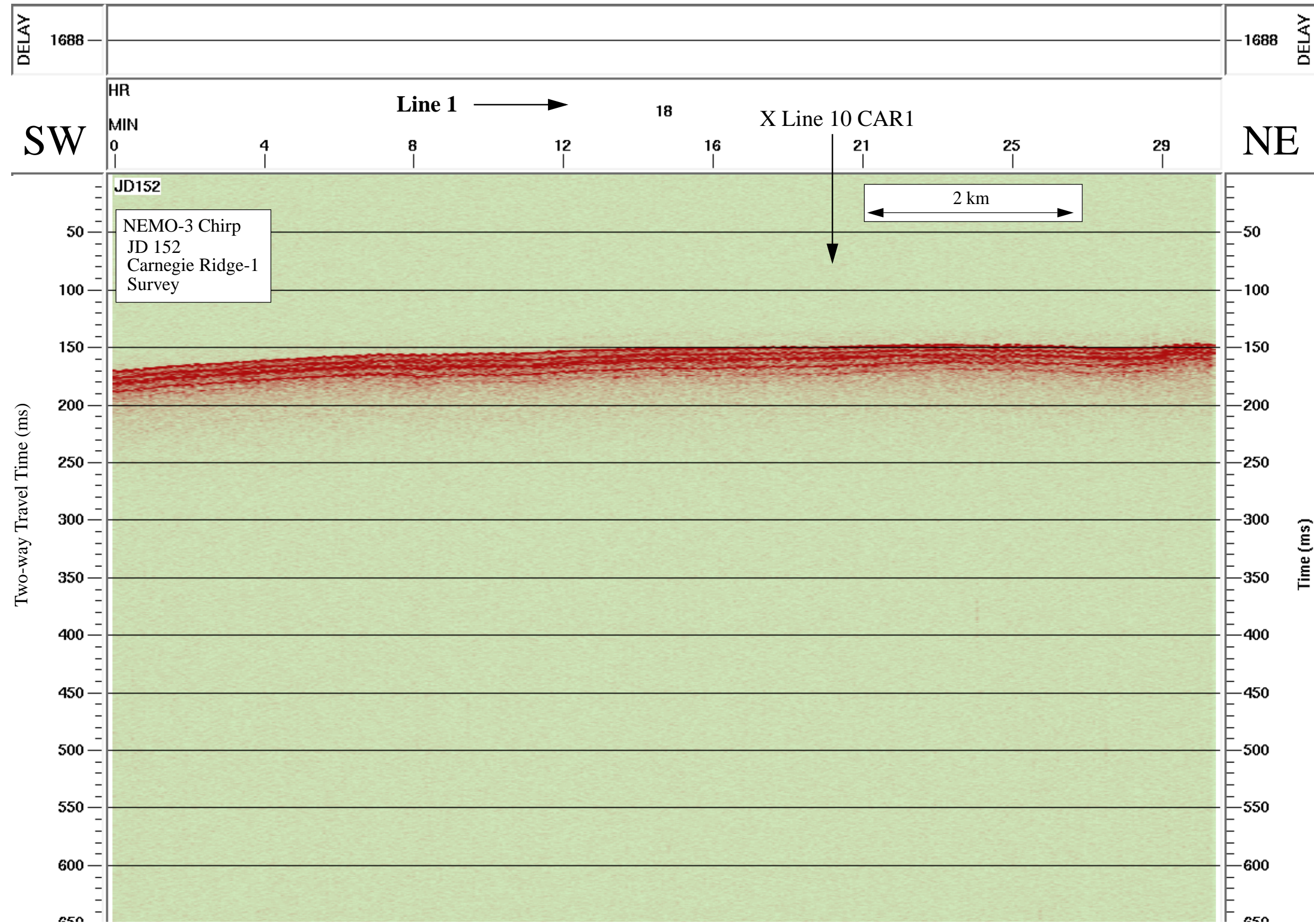


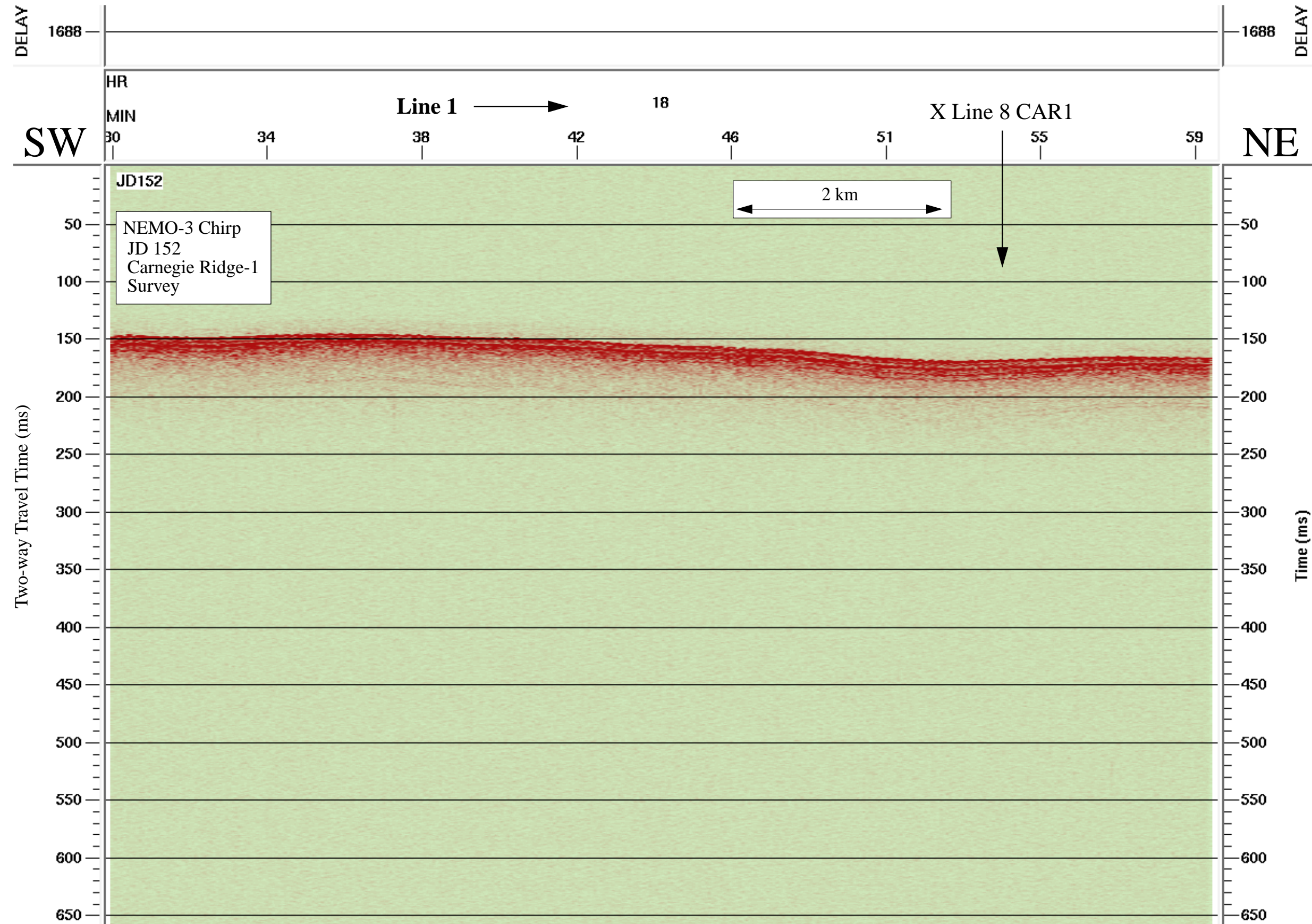


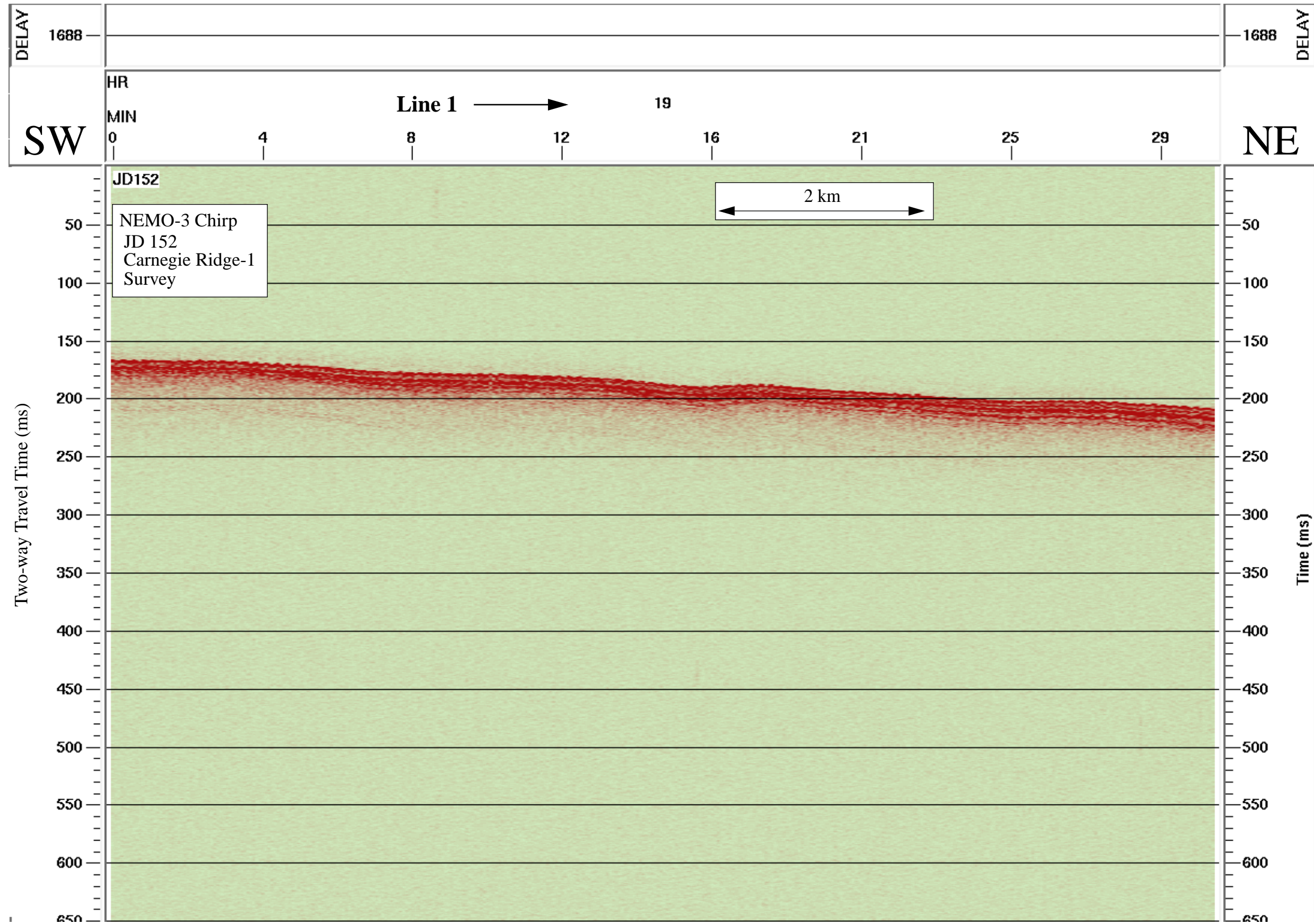


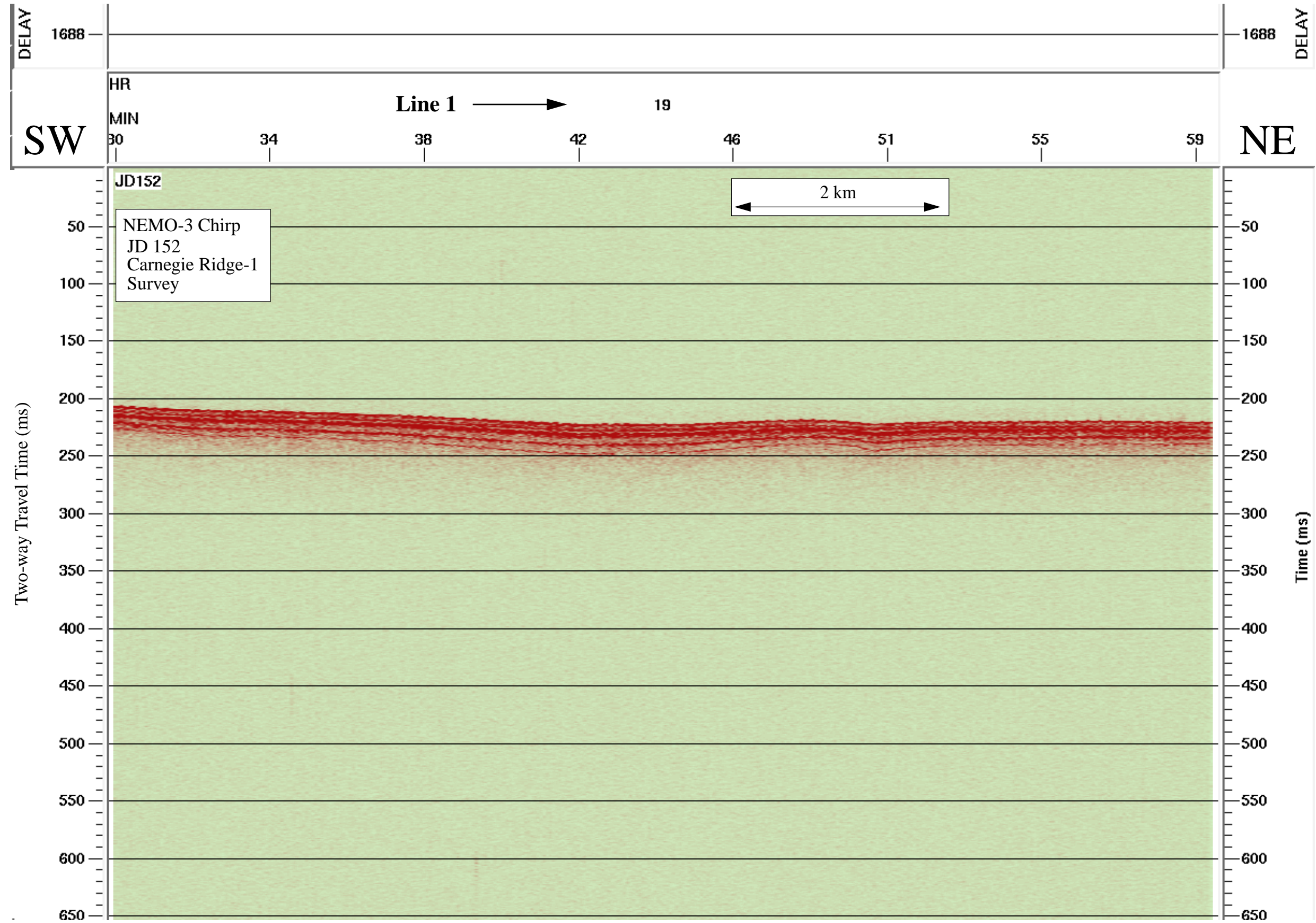
Data File SBfixavg.2000may31.1800-2400

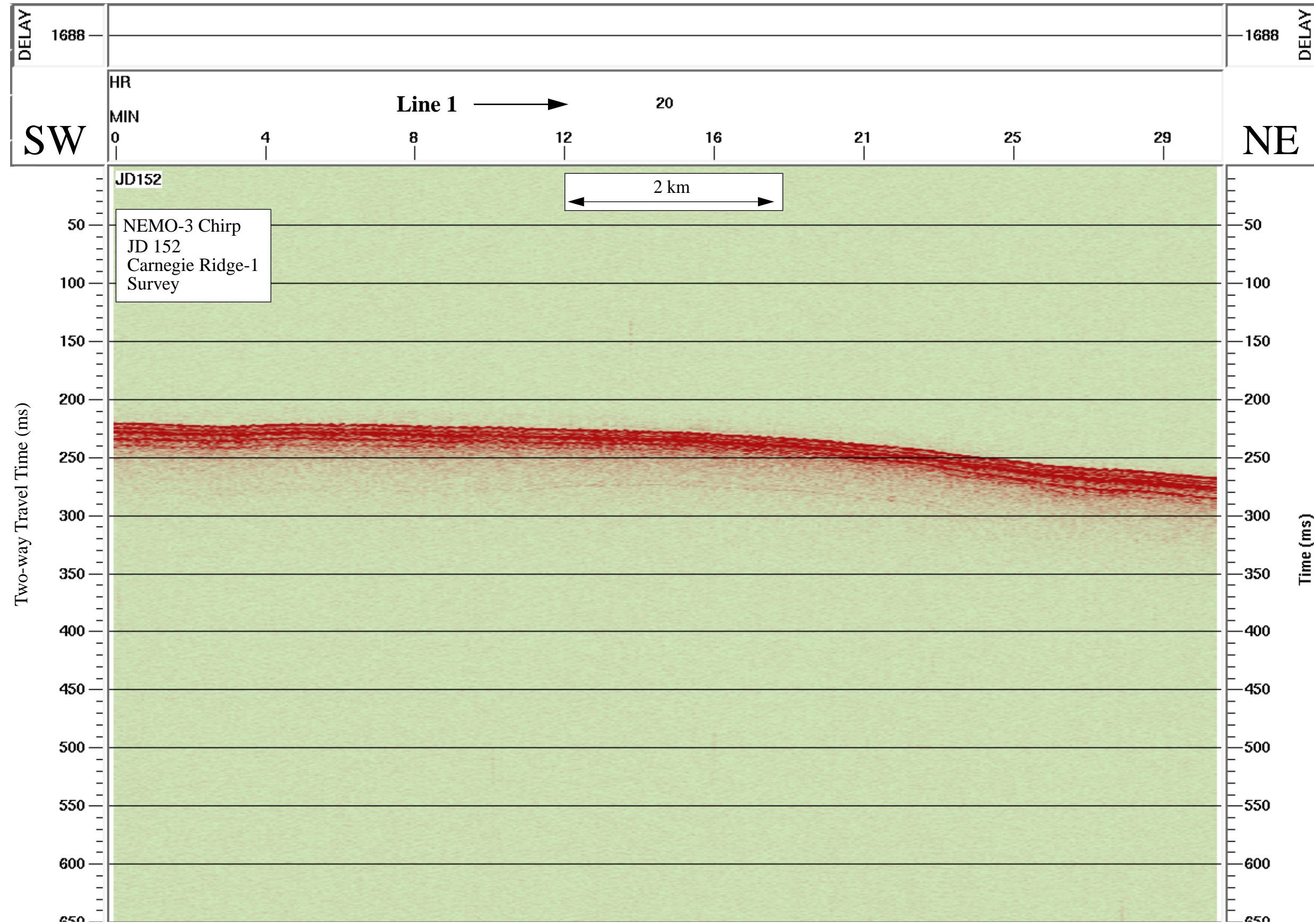


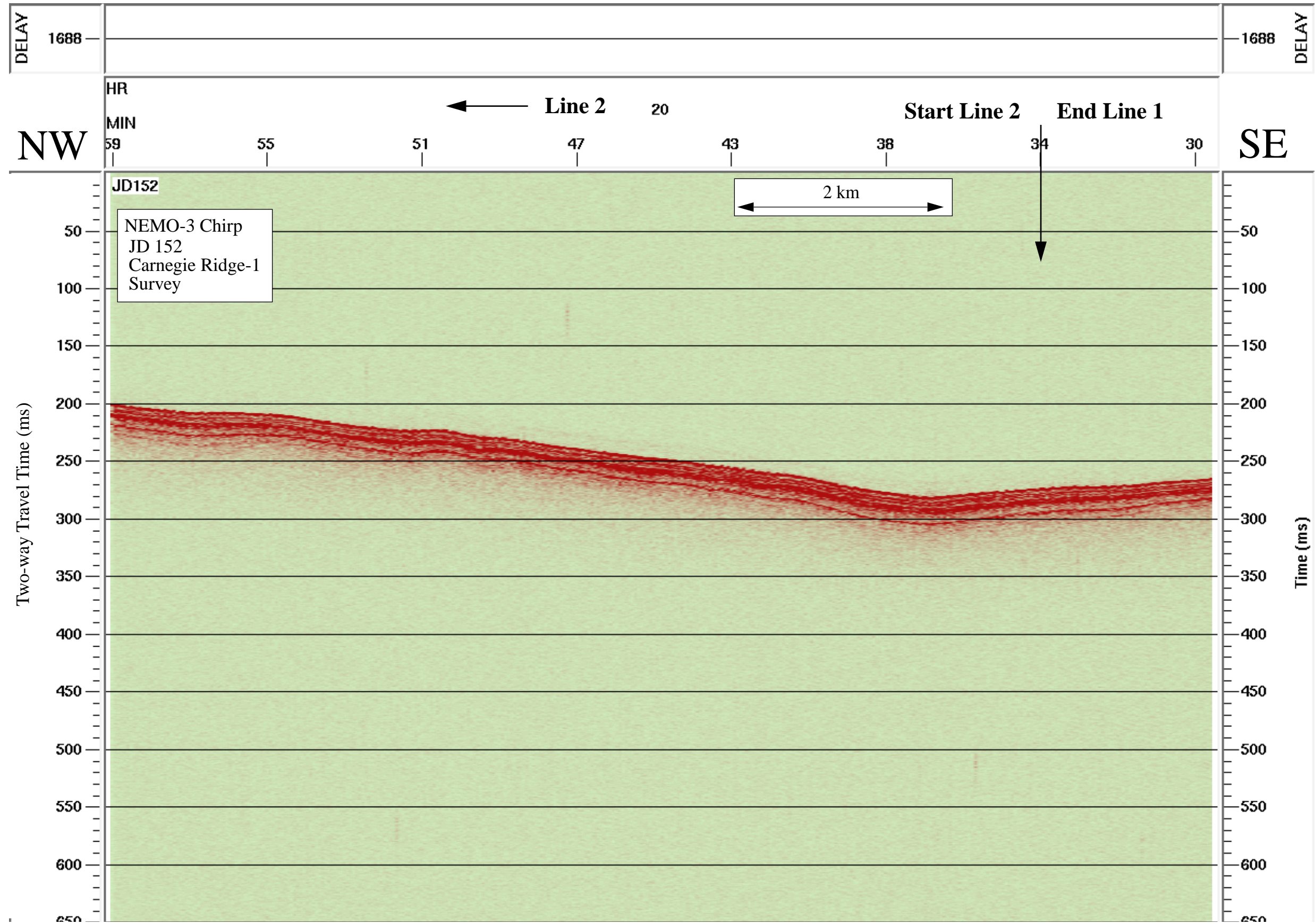


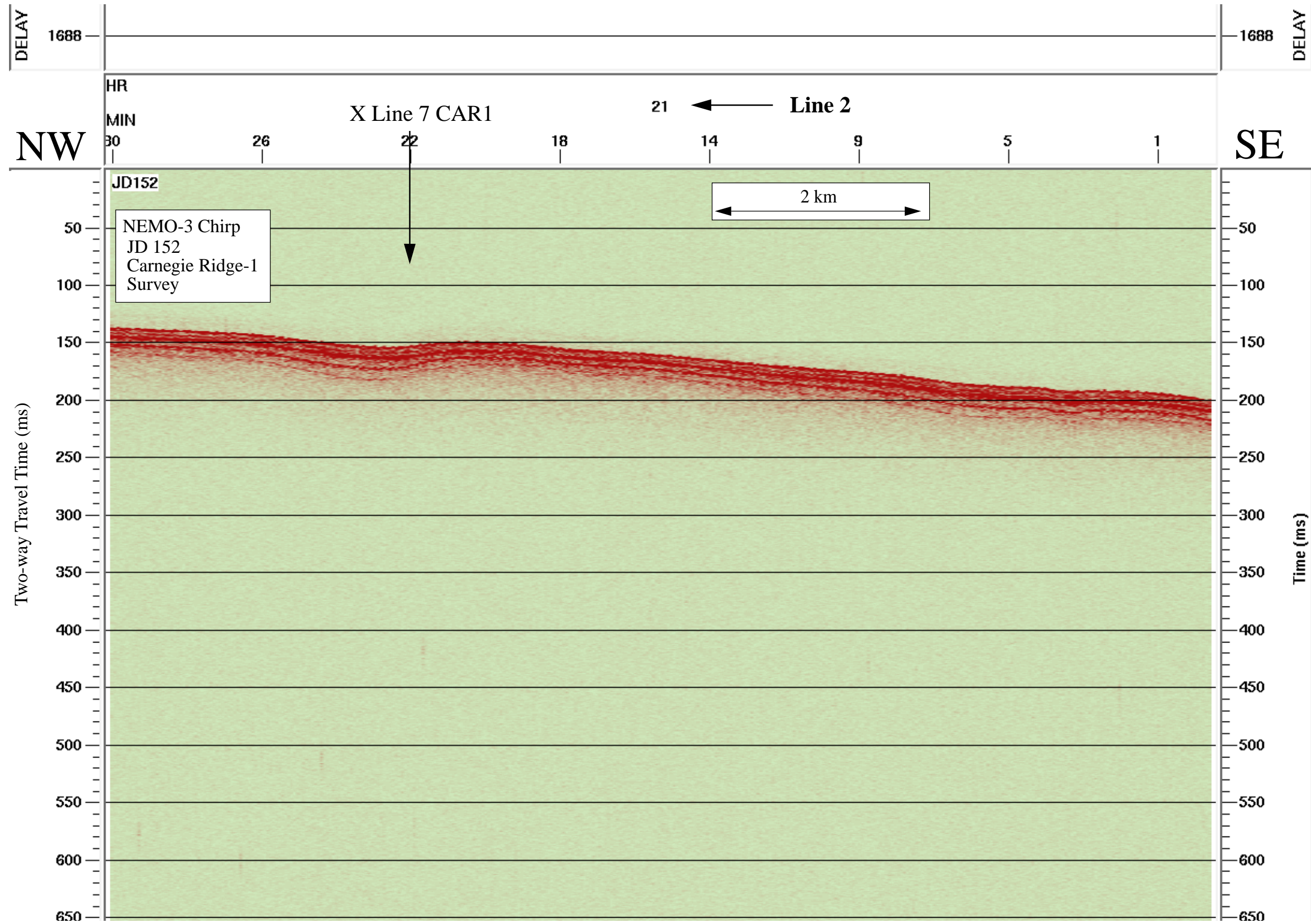


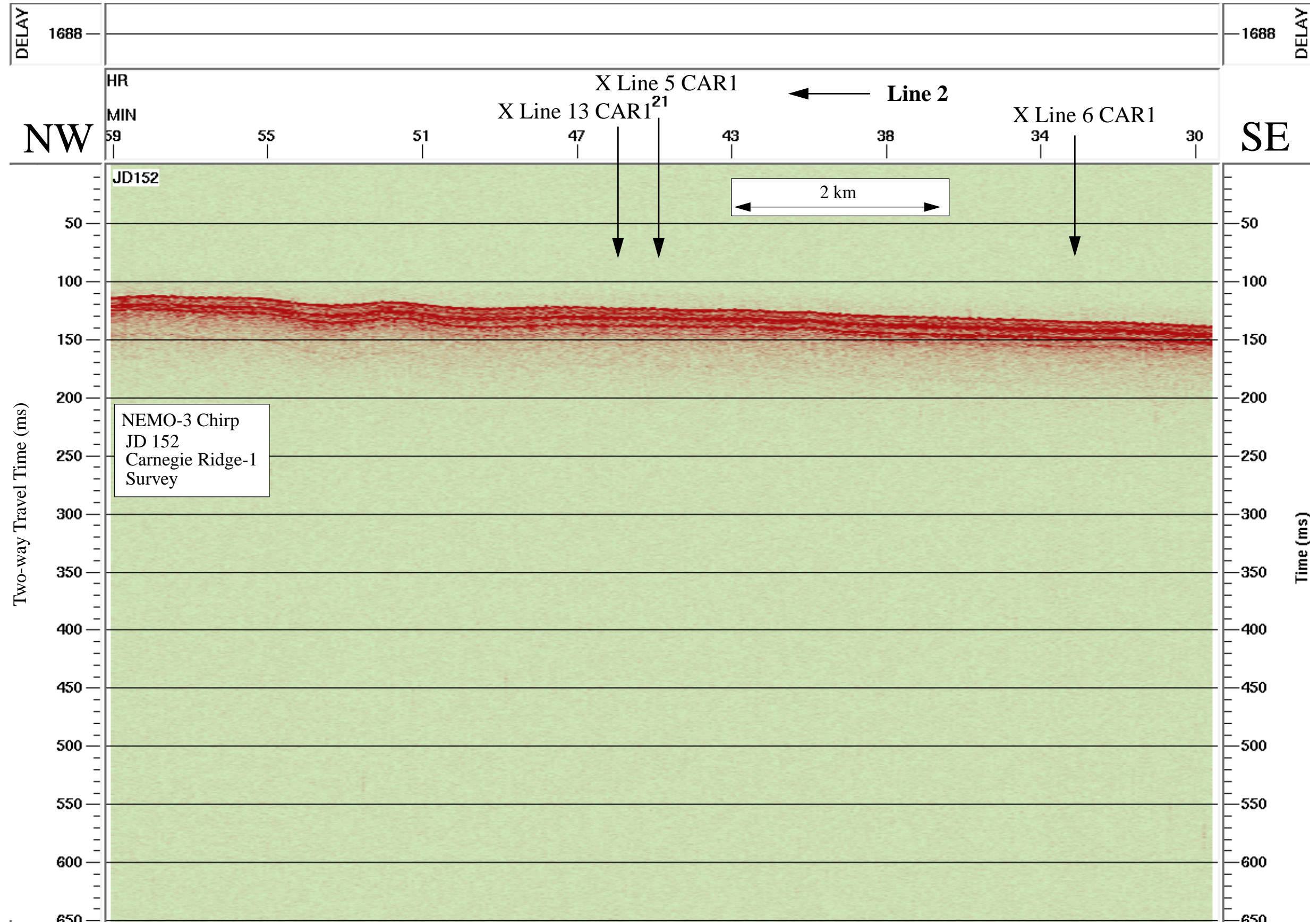


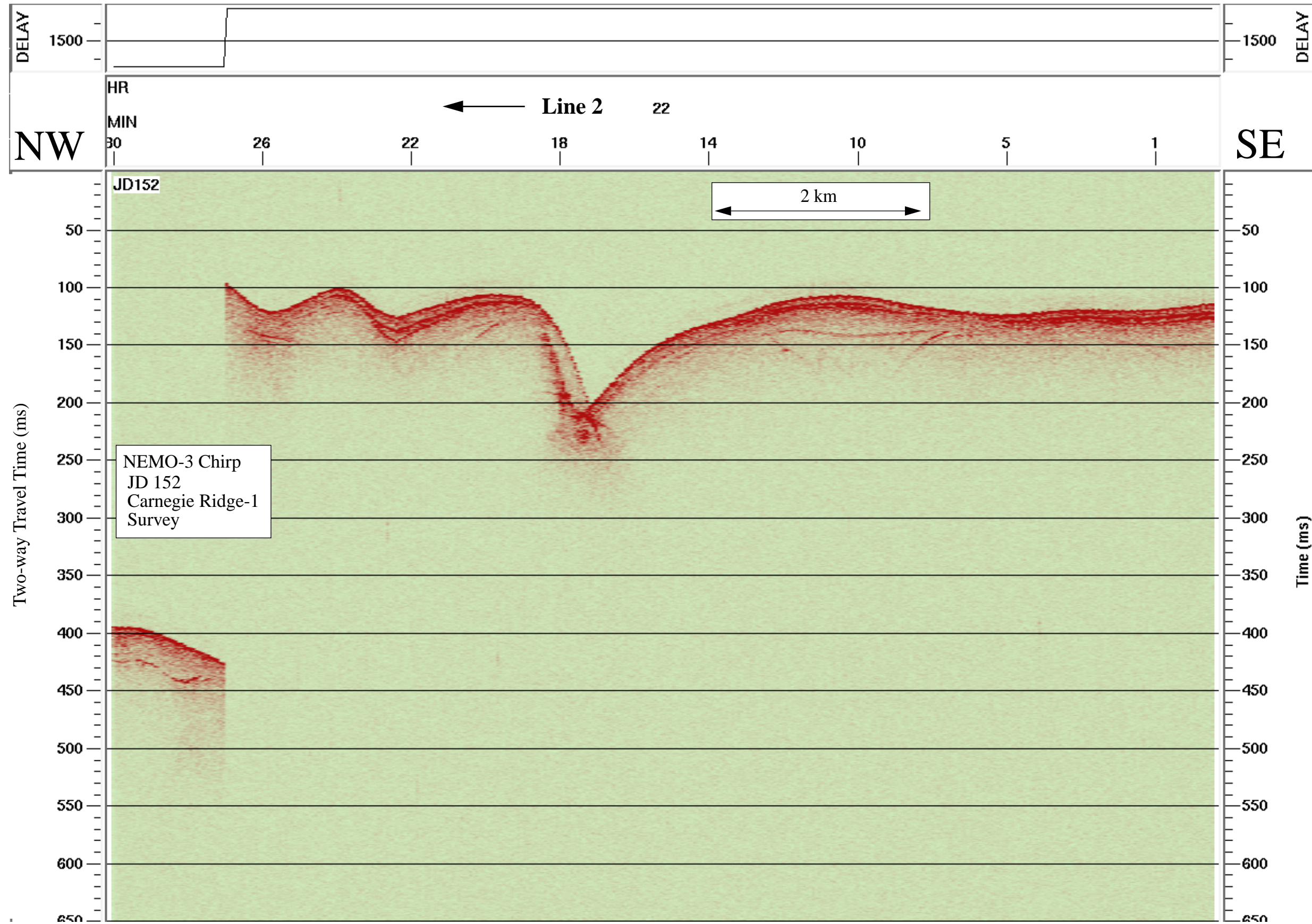


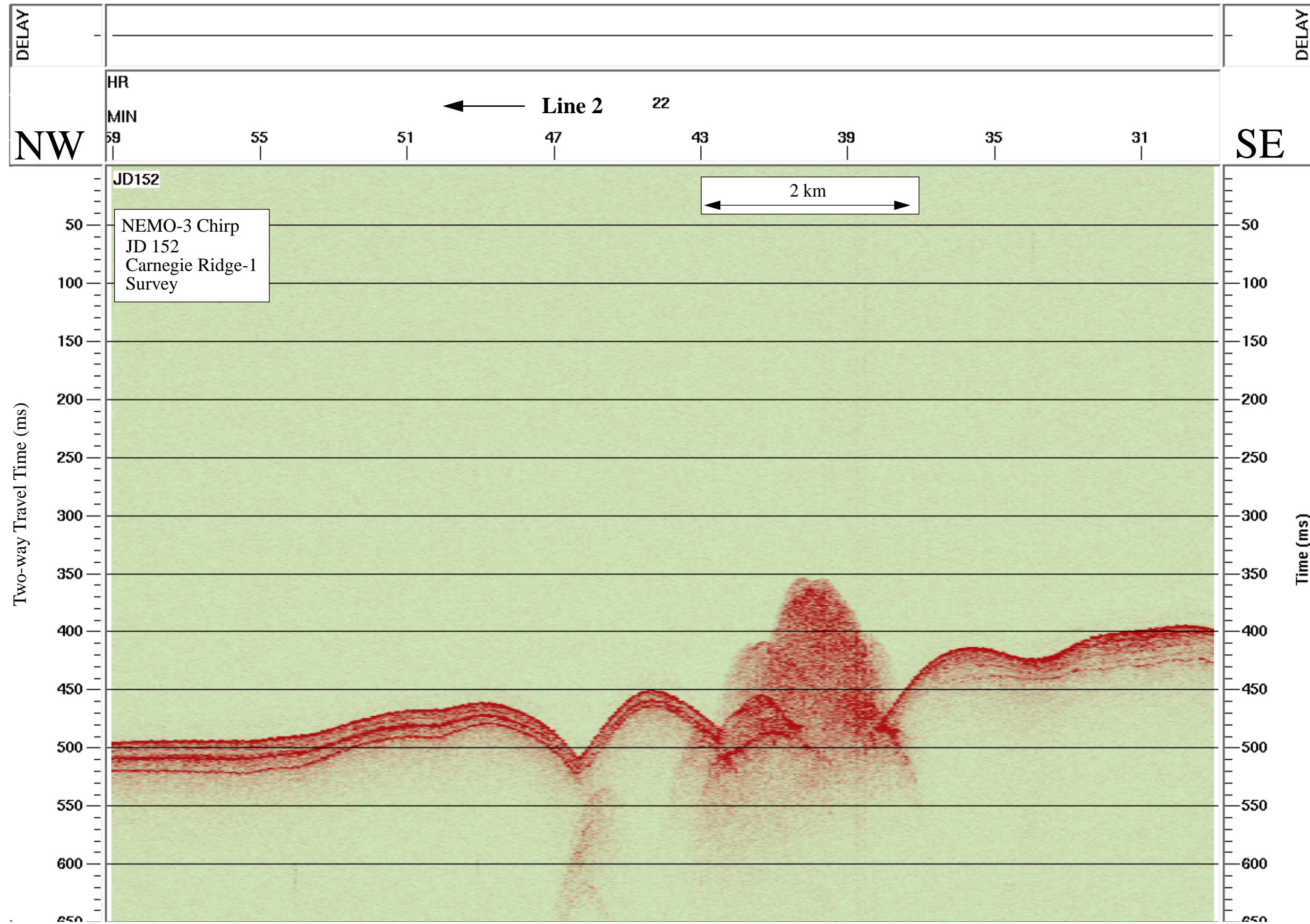


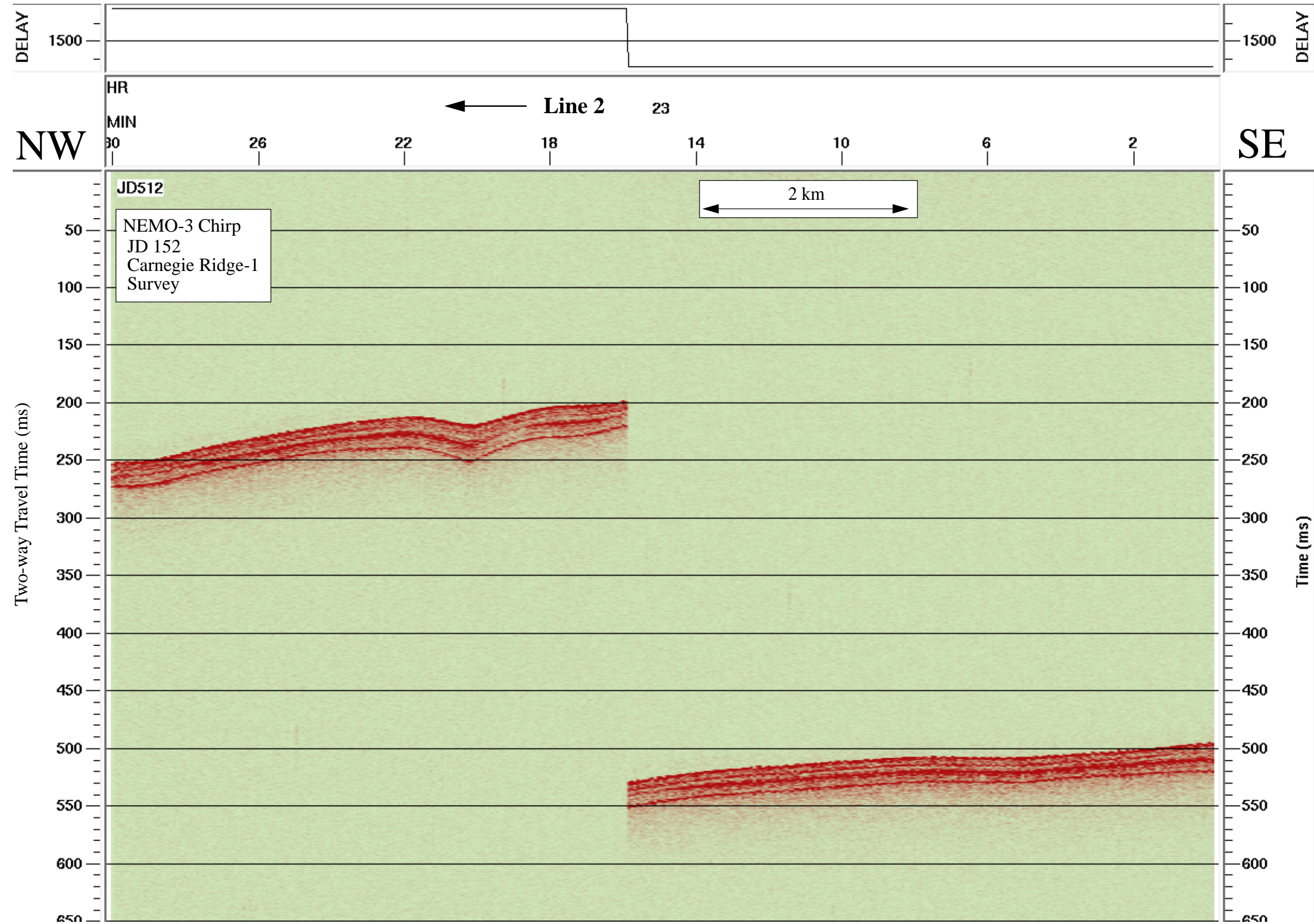


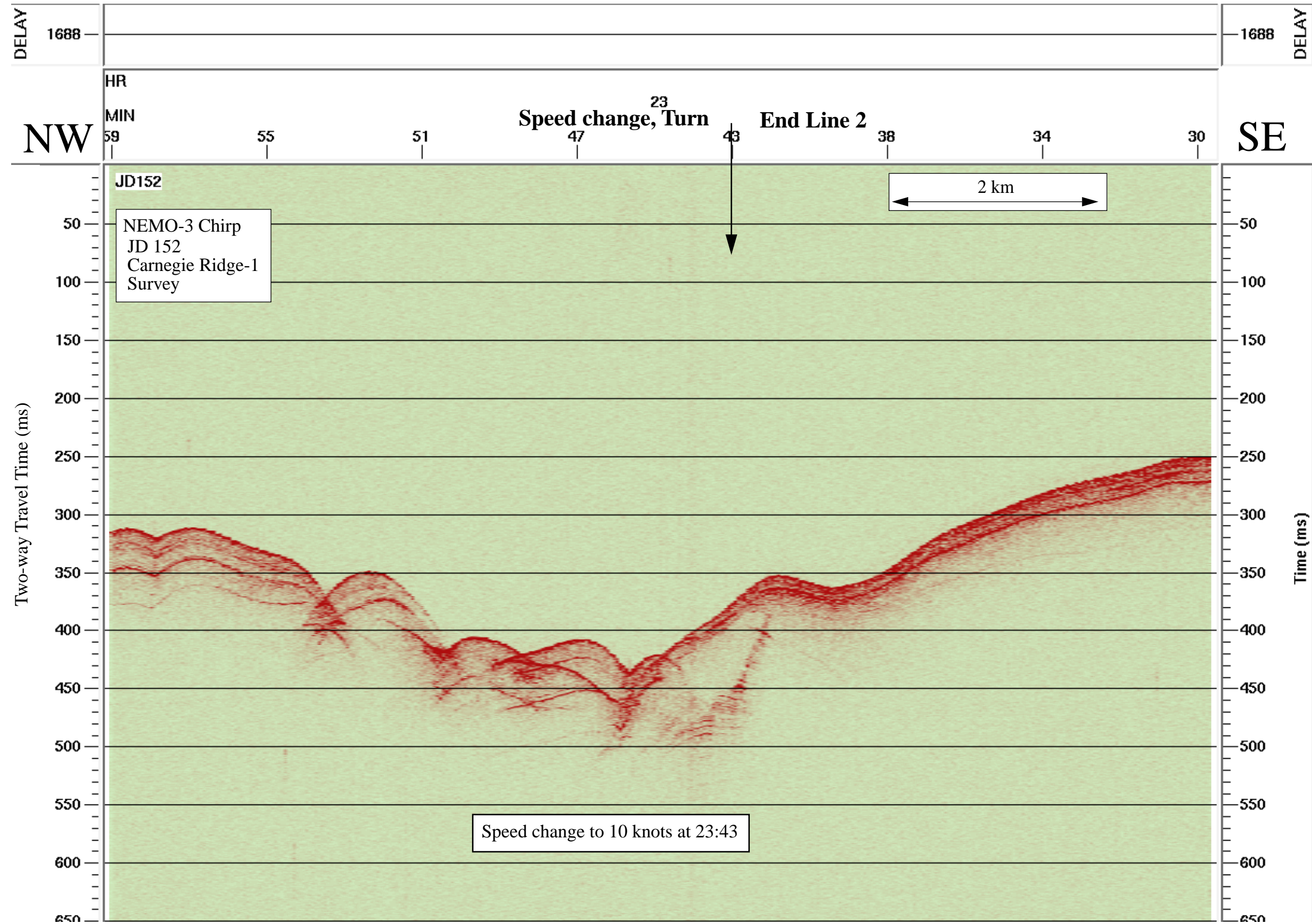












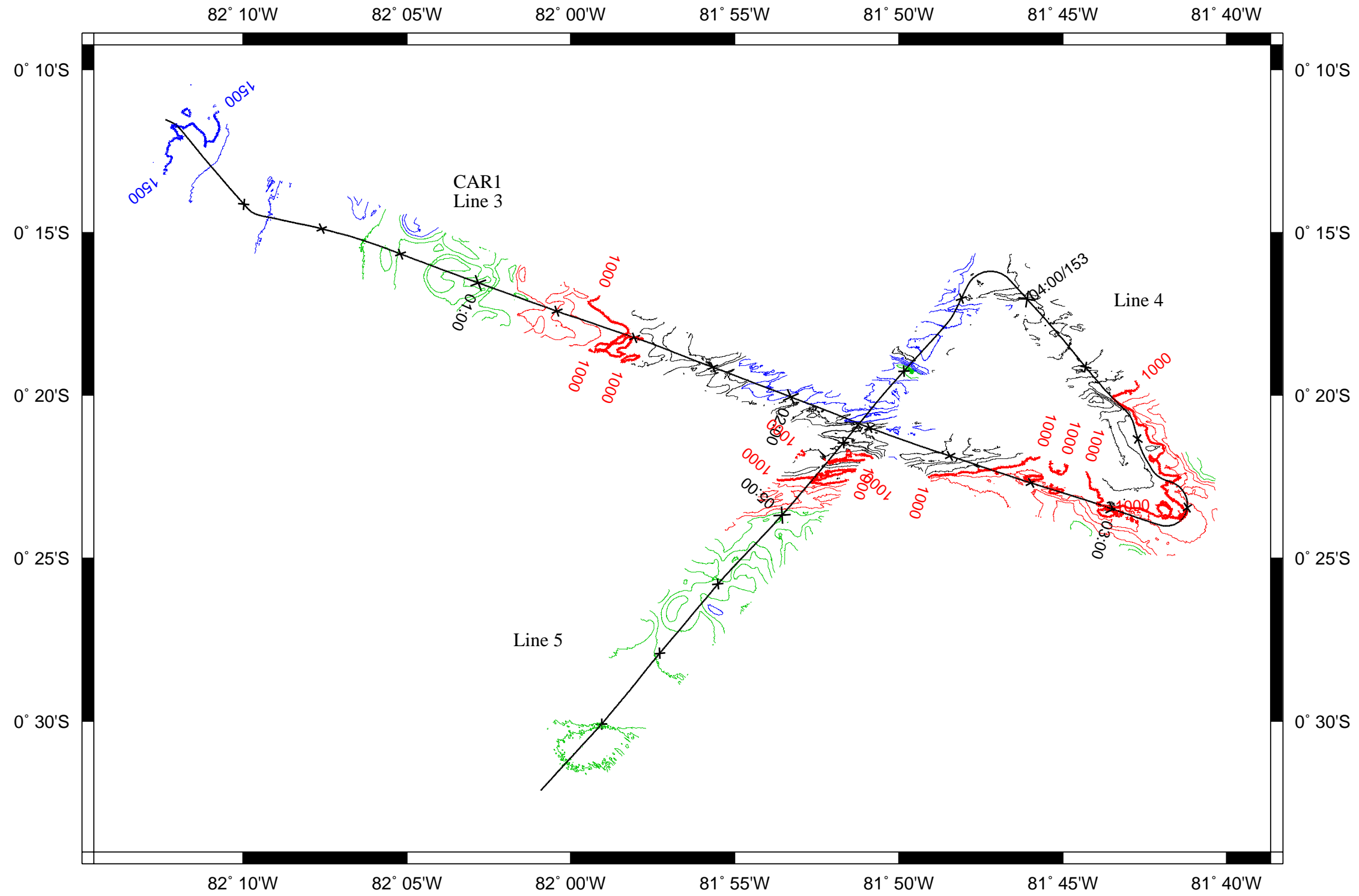
JD 153 (1 June 2000)--CAR-1 Survey, Crest of Carnegie Ridge

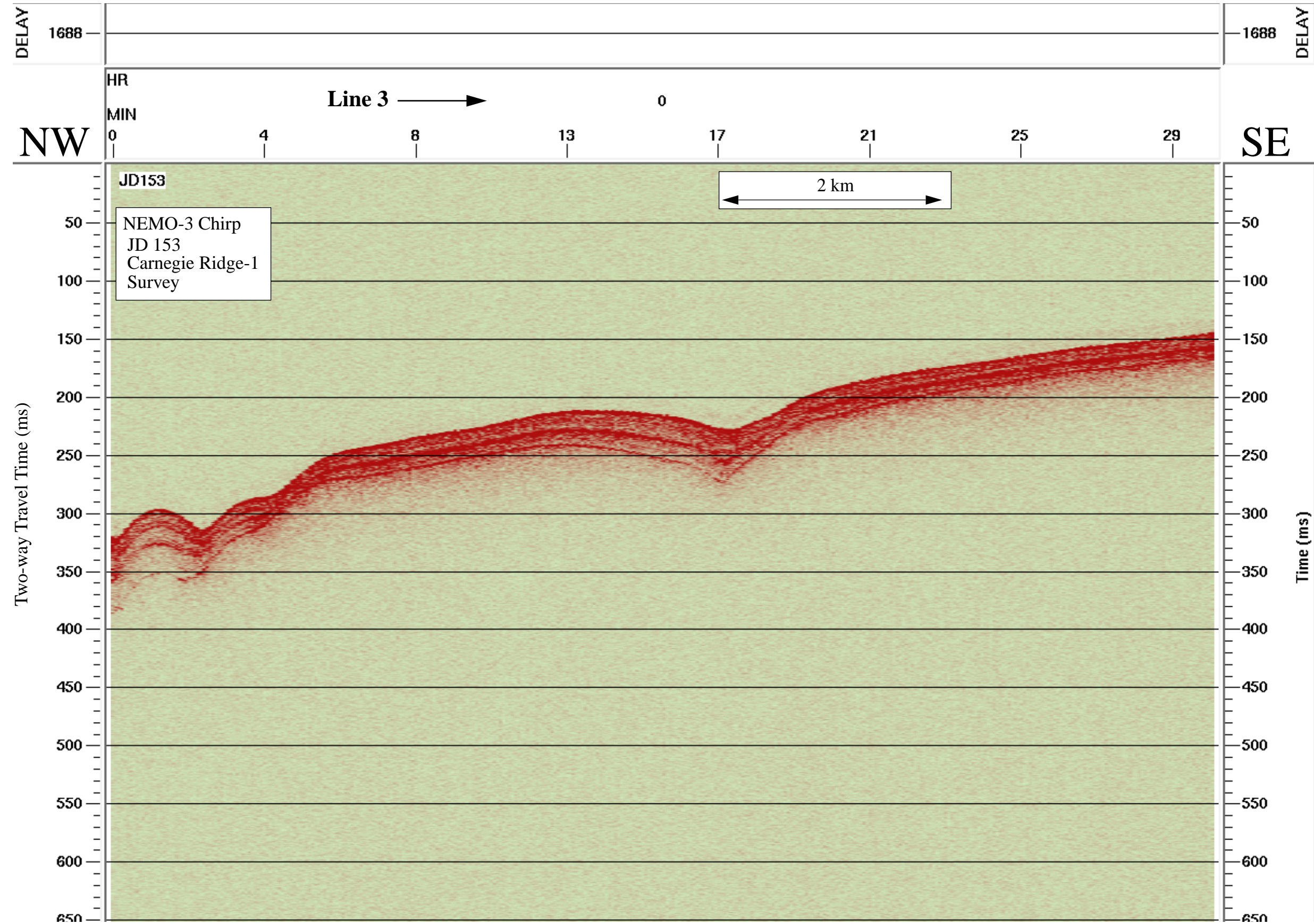
2-7 kHz Chirp Subbottom Profiler

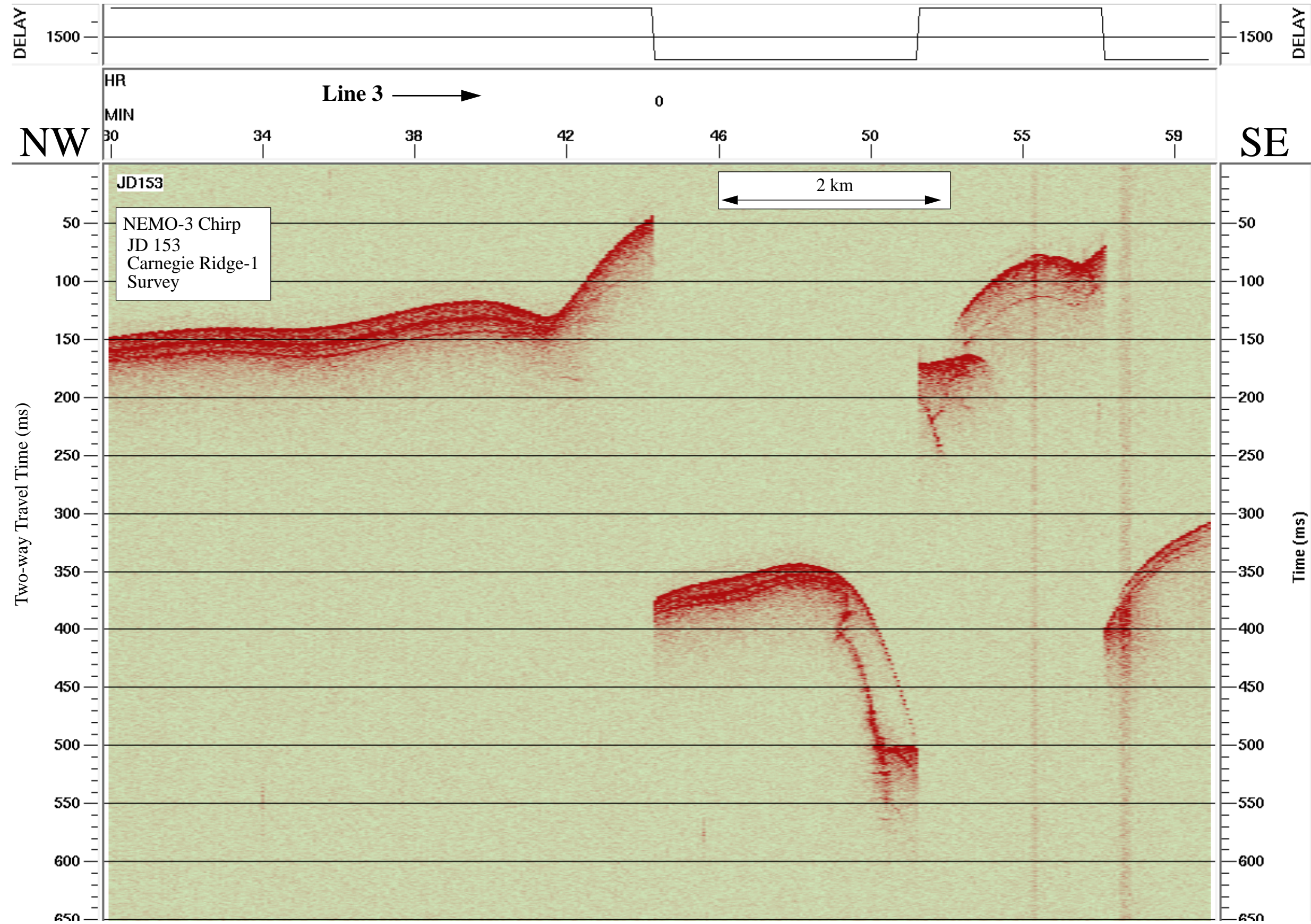
NEMO Leg 3

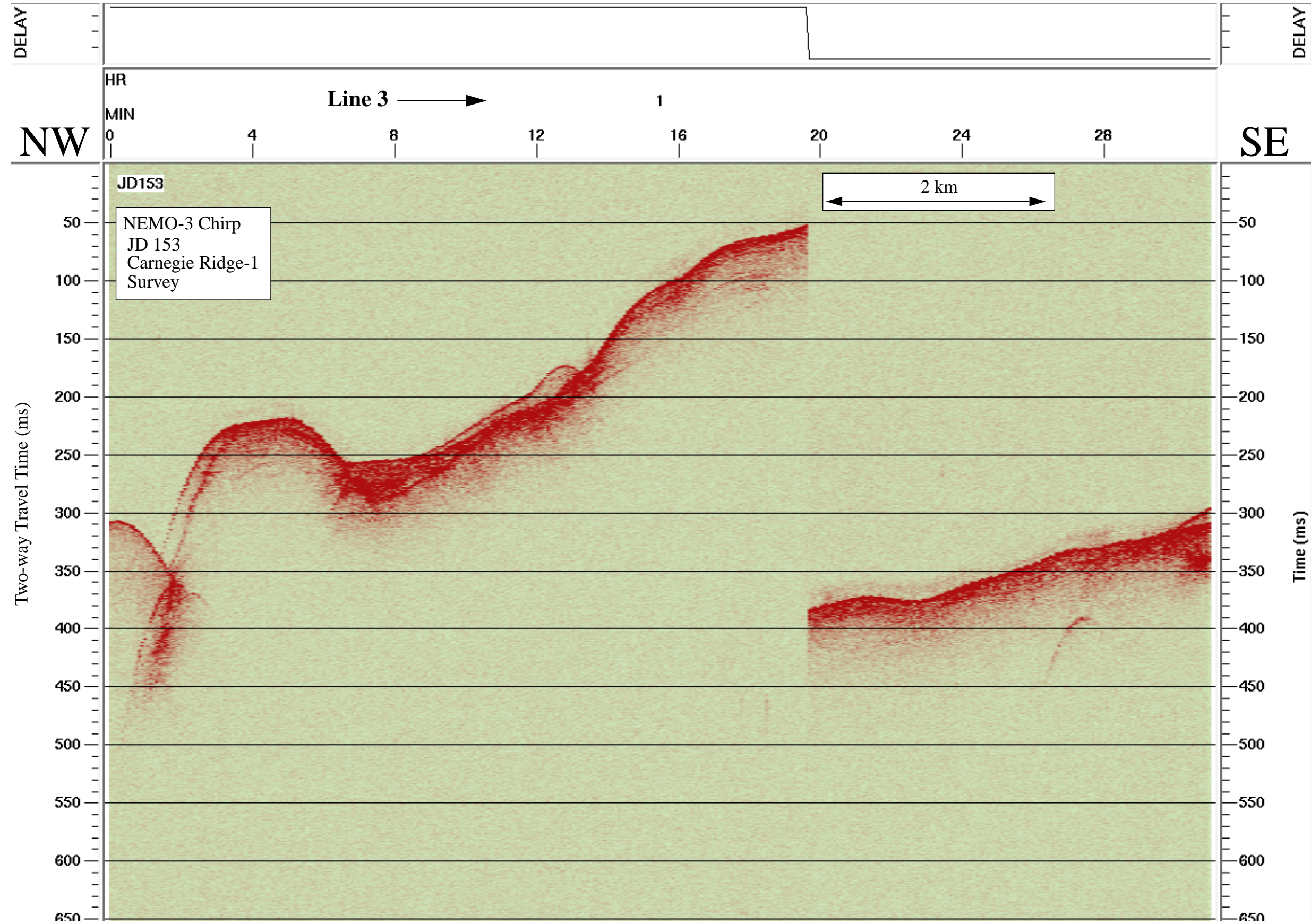
R/V Melville

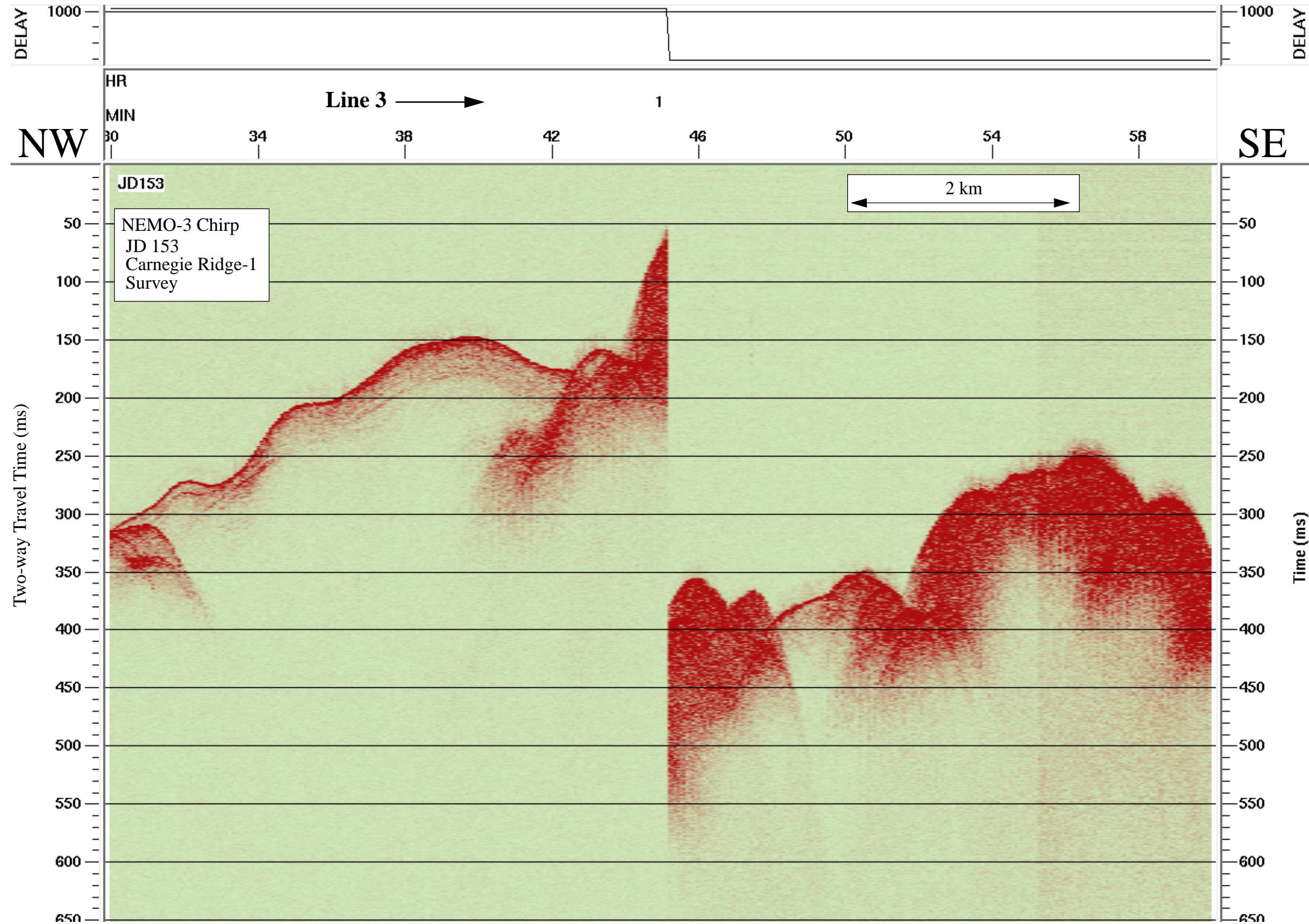
Data File SBfixavg.2000jun01.0000-0600

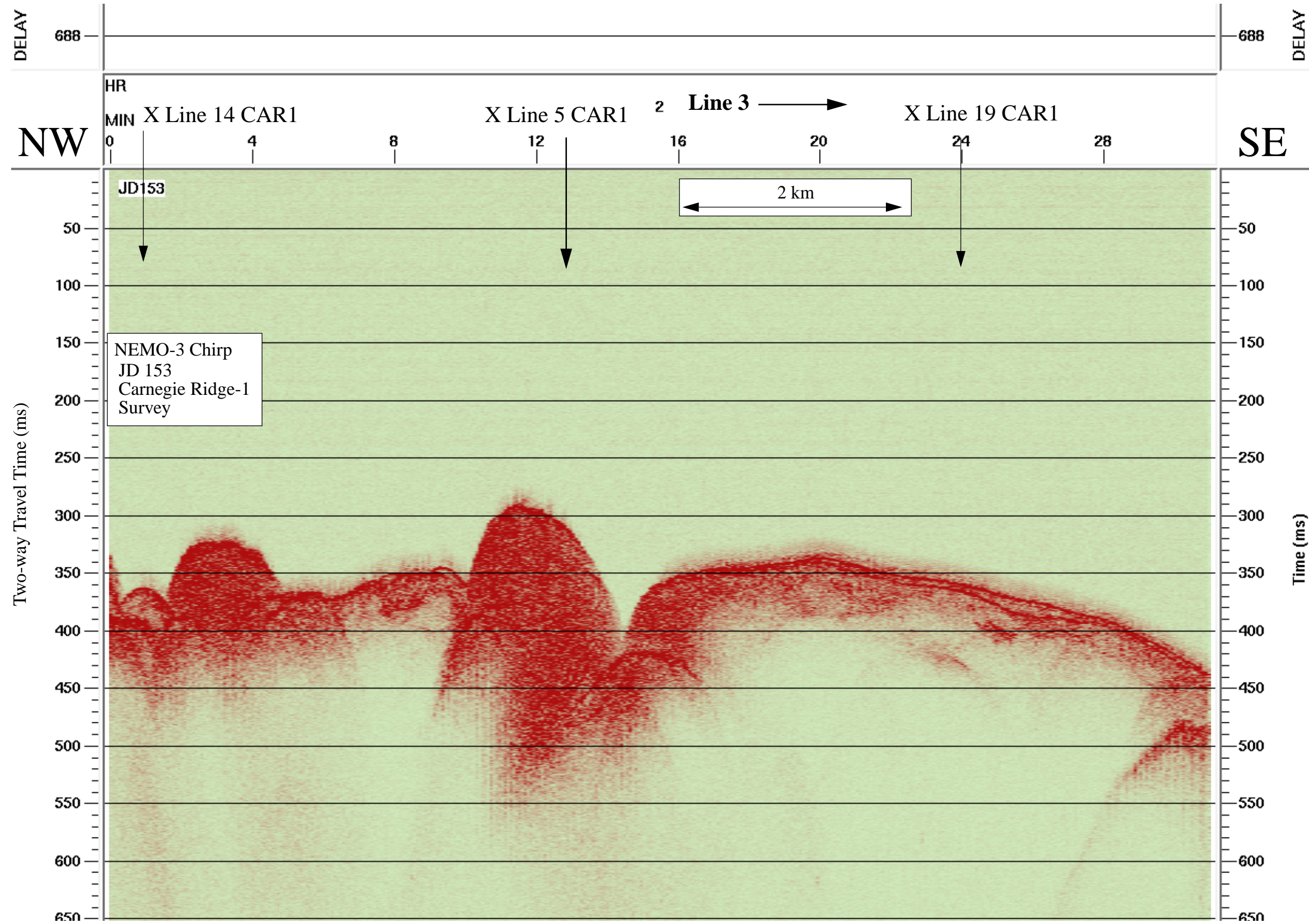


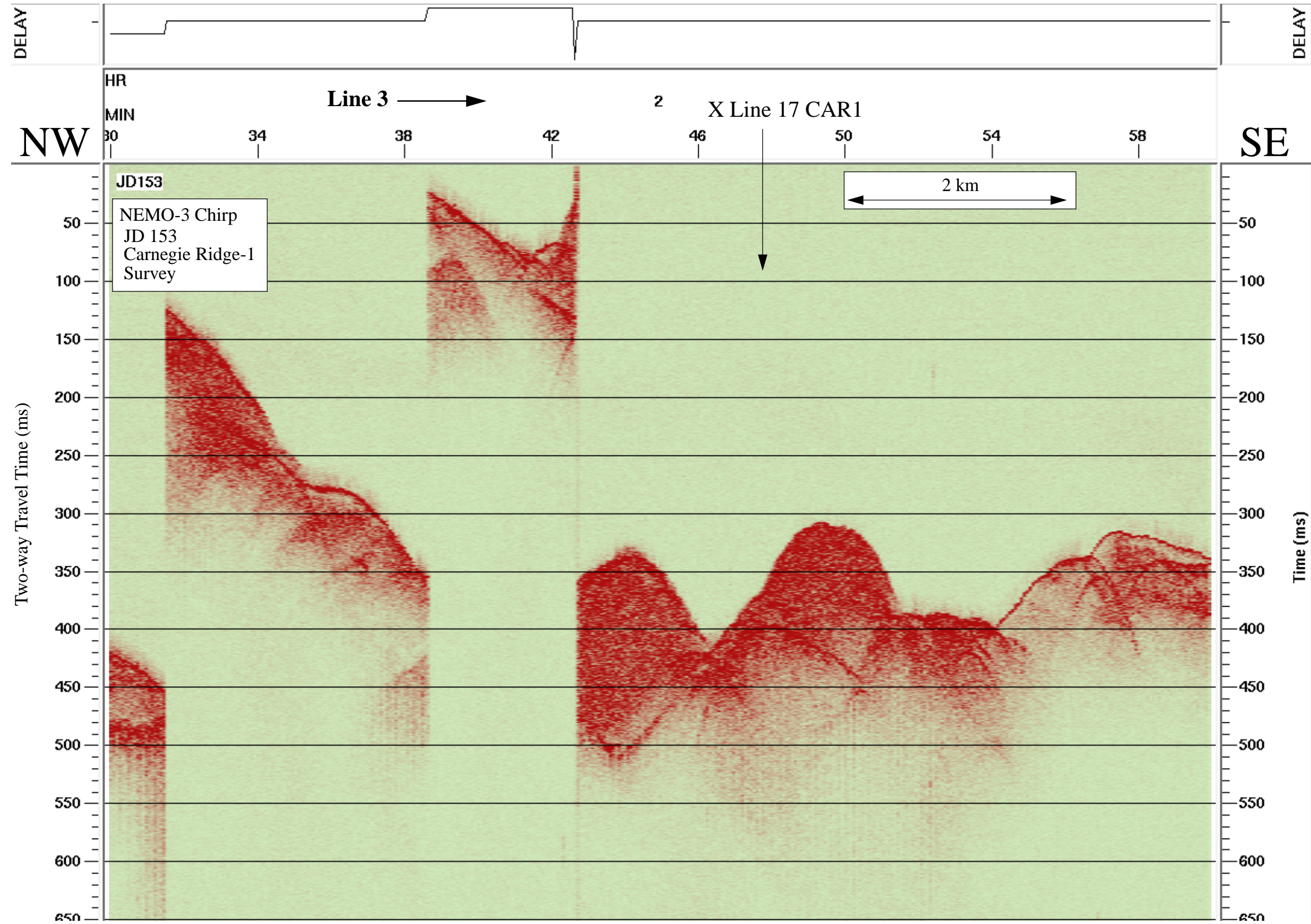


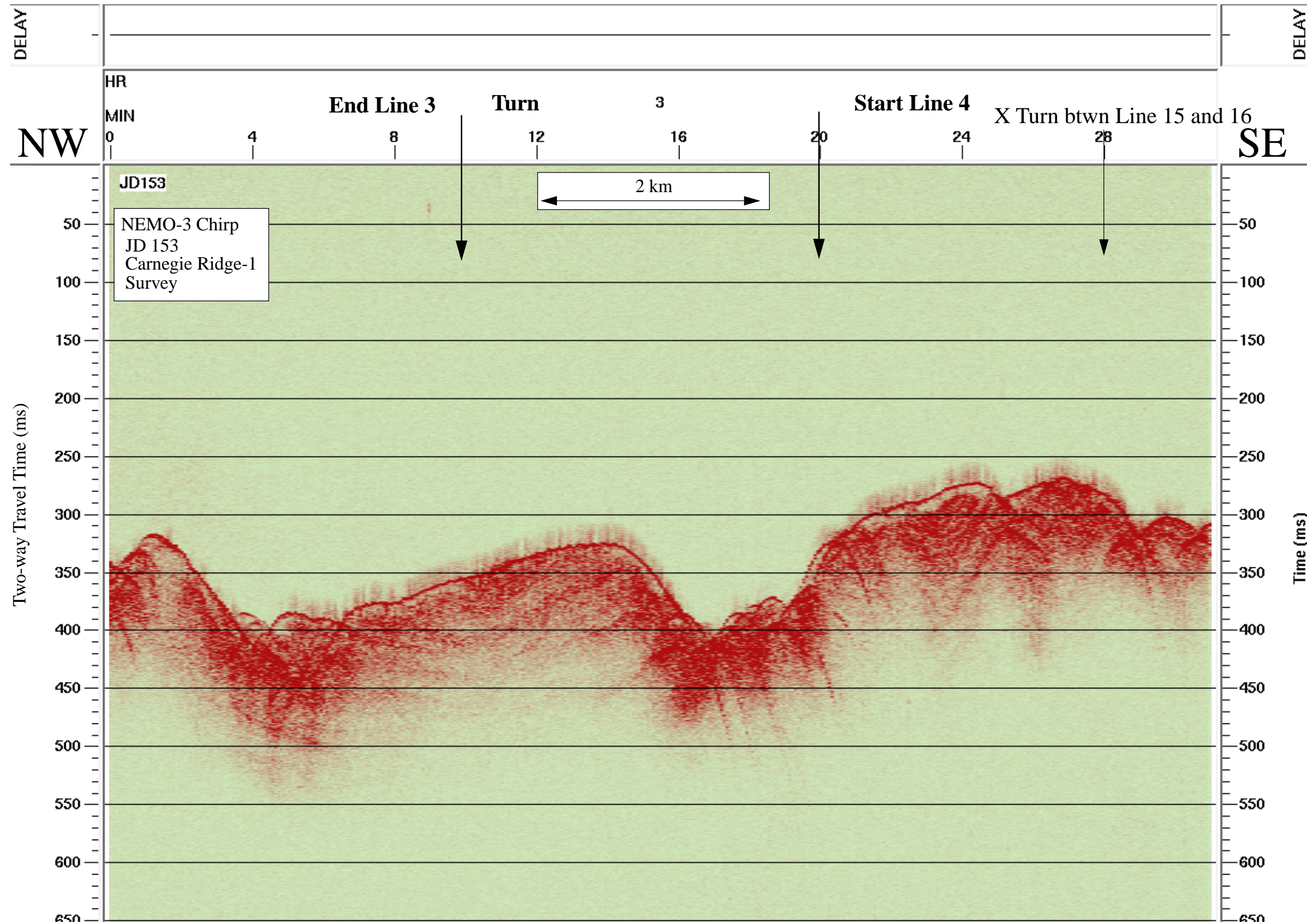


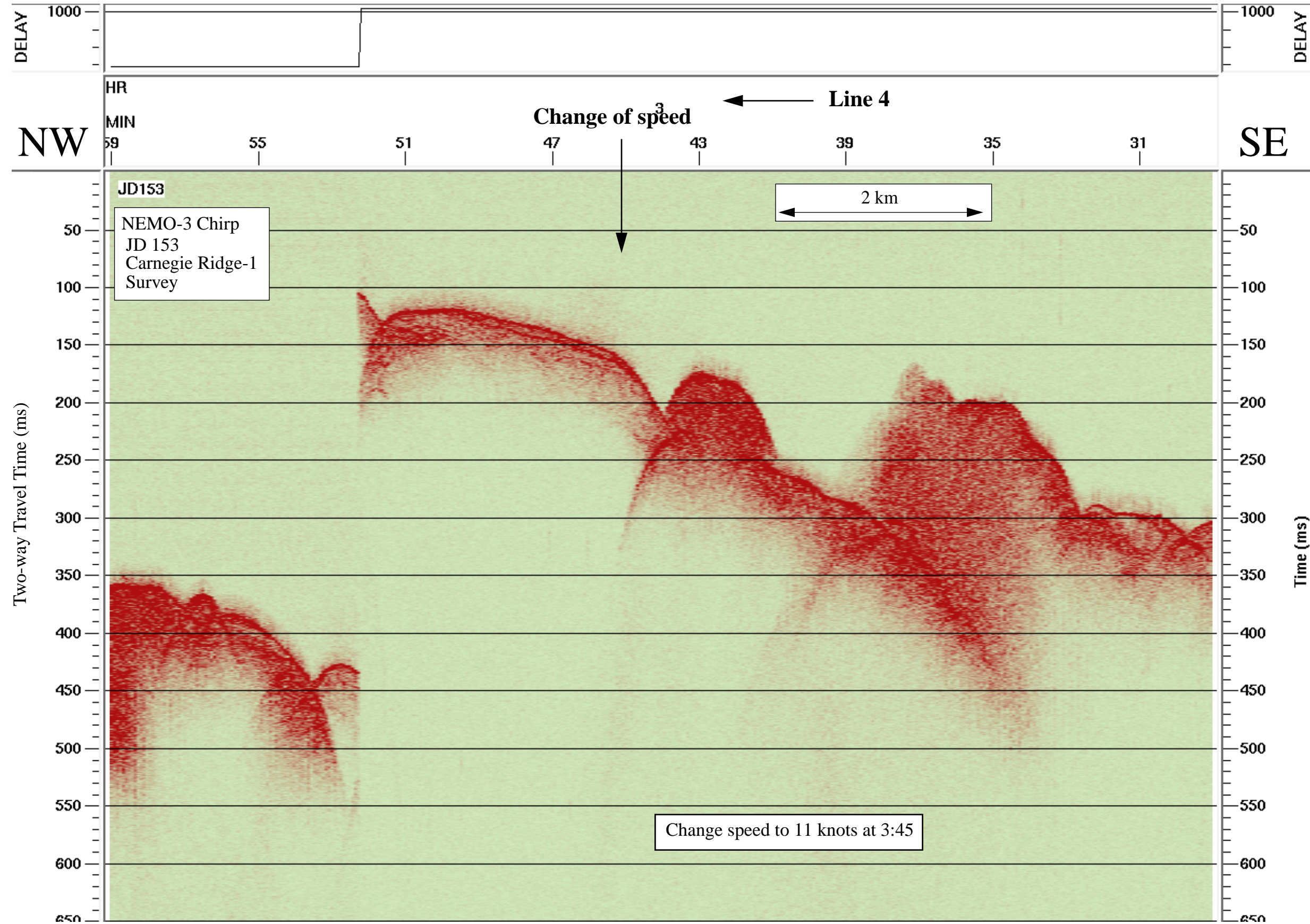


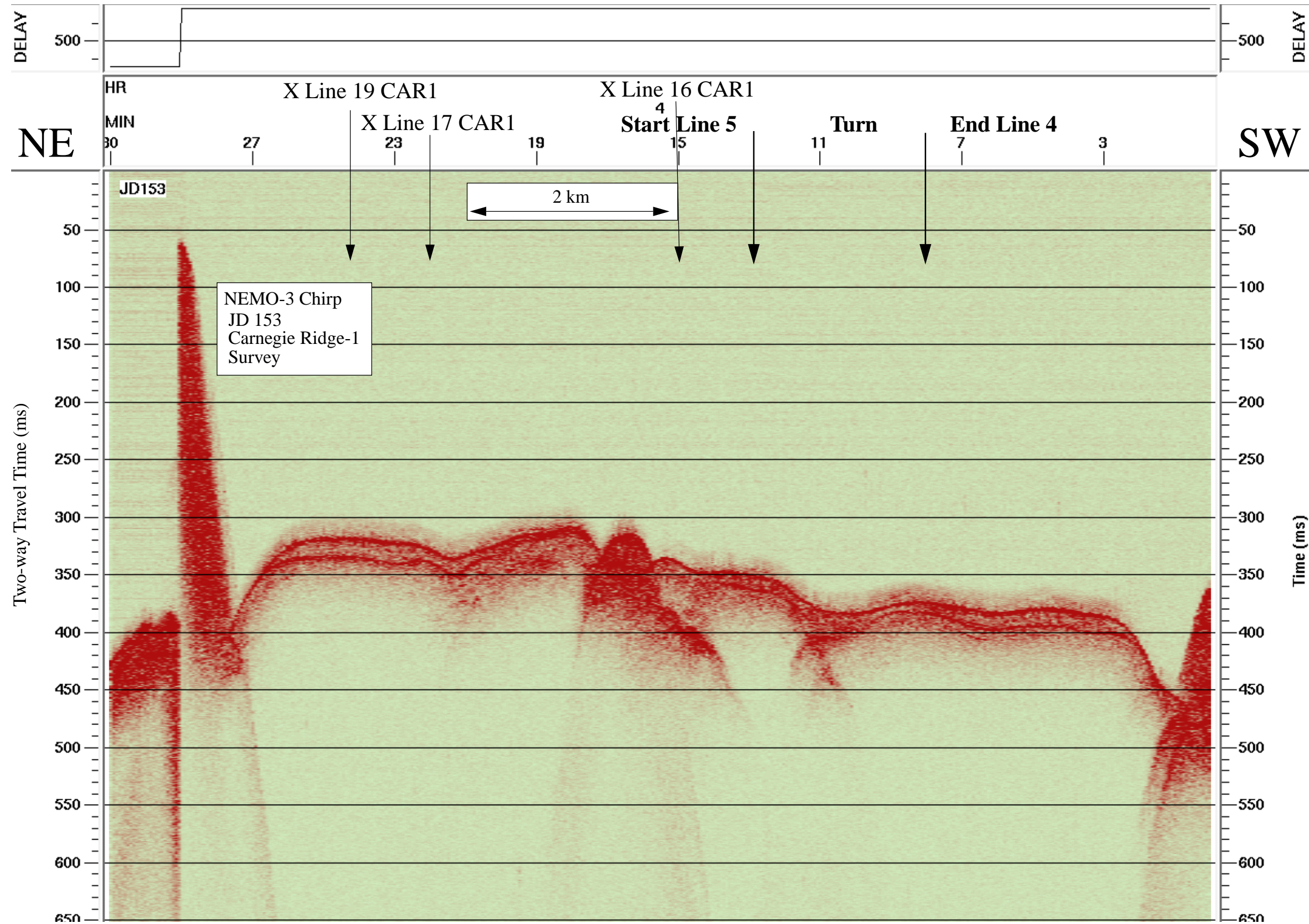


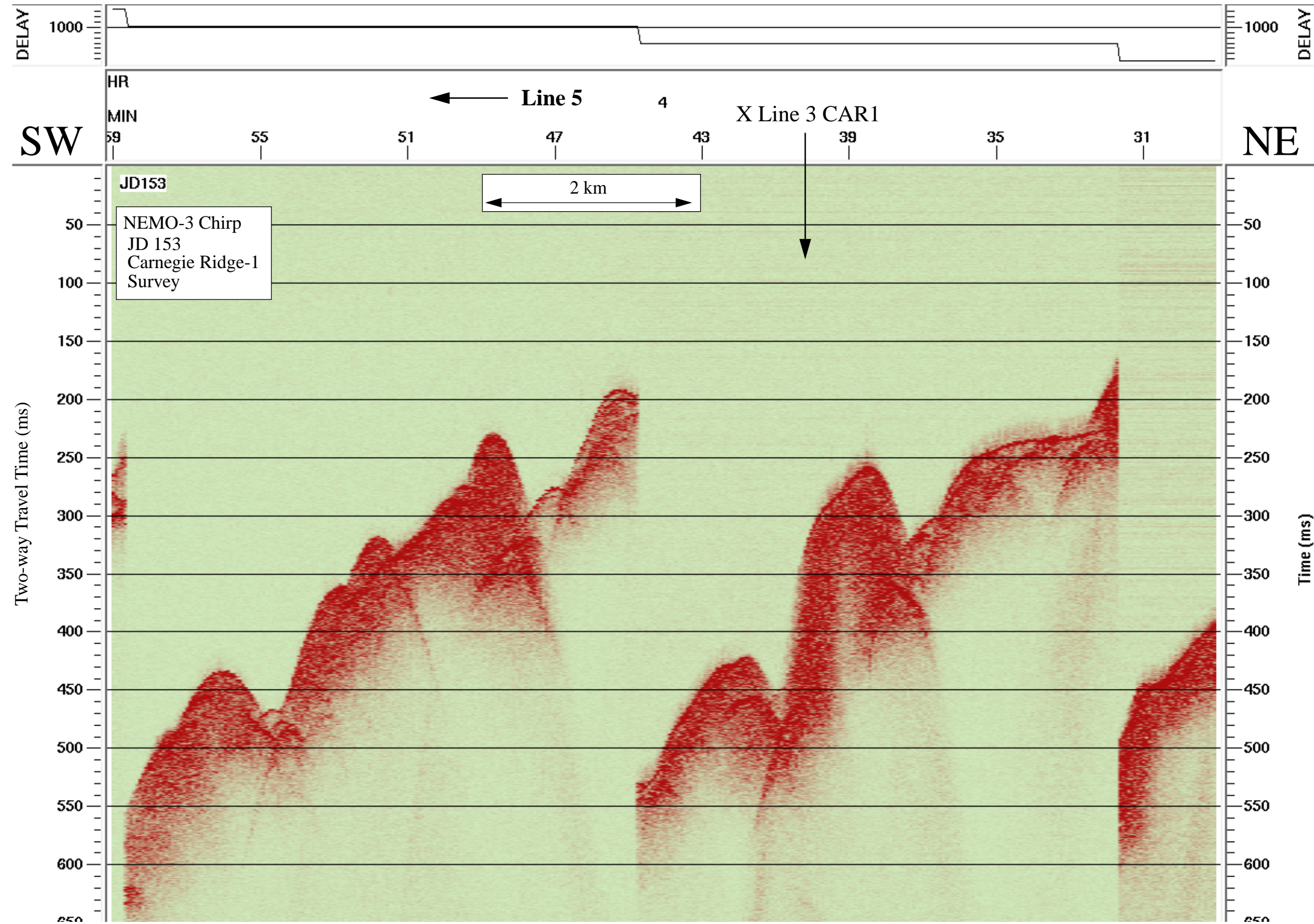


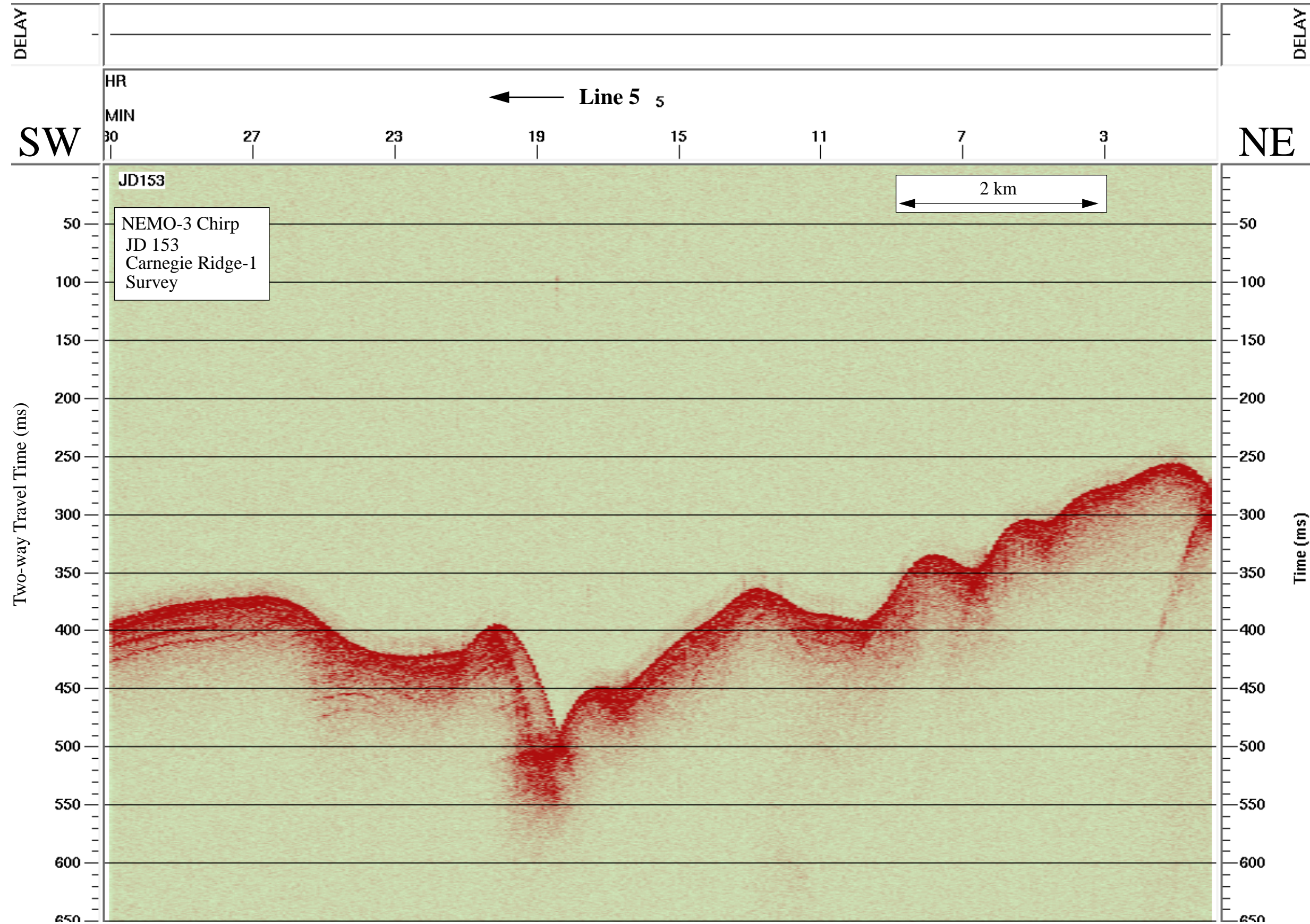


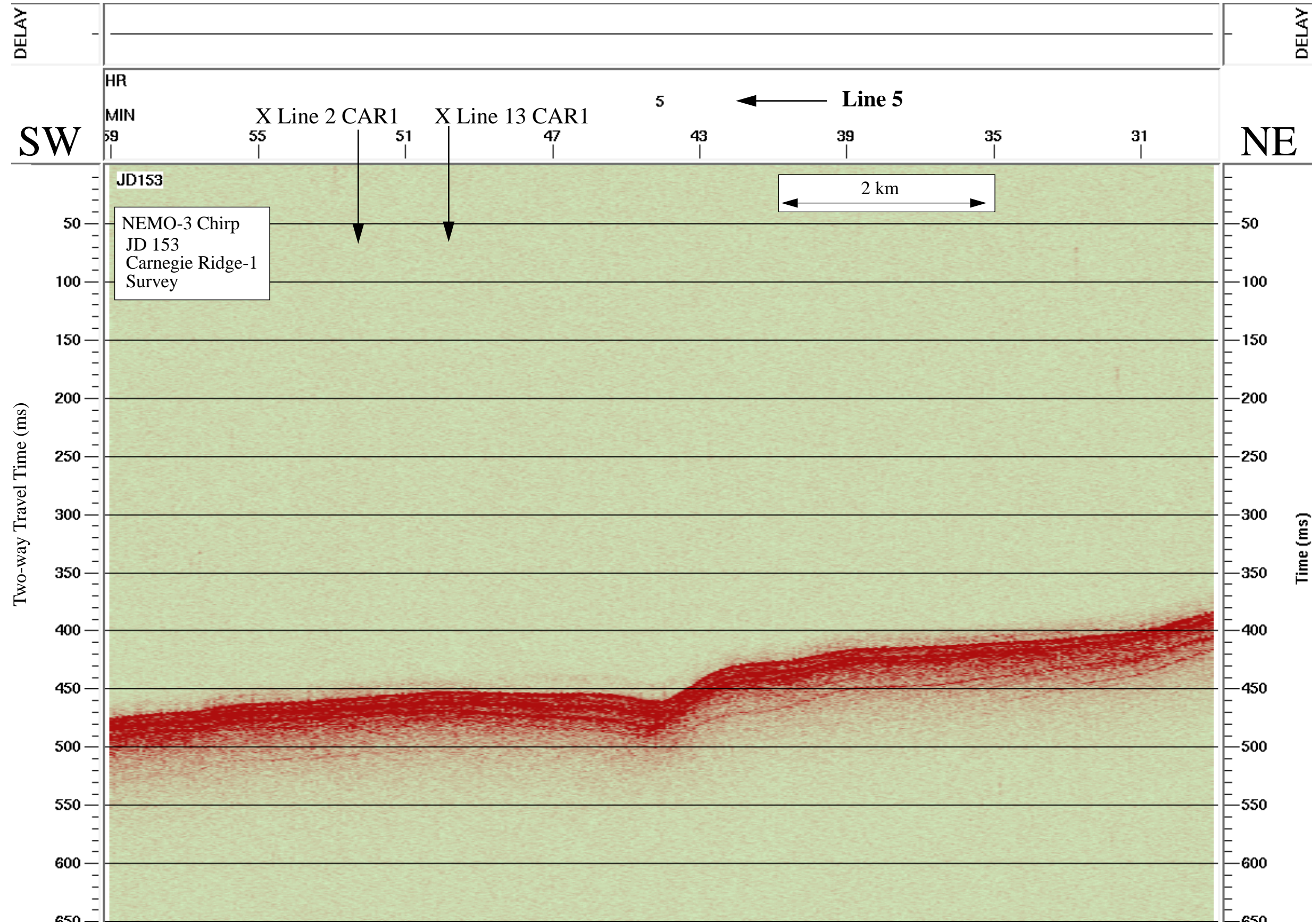




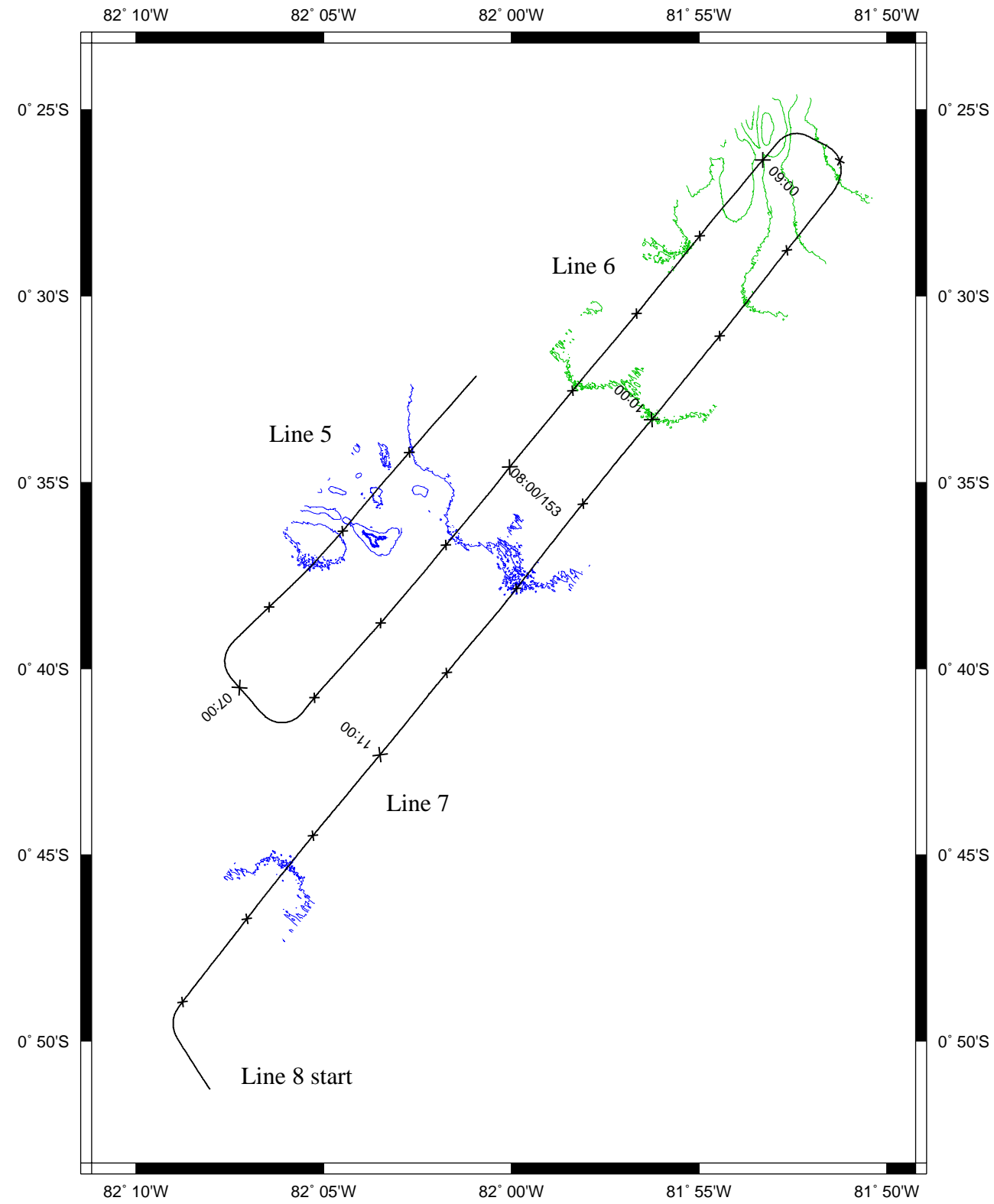


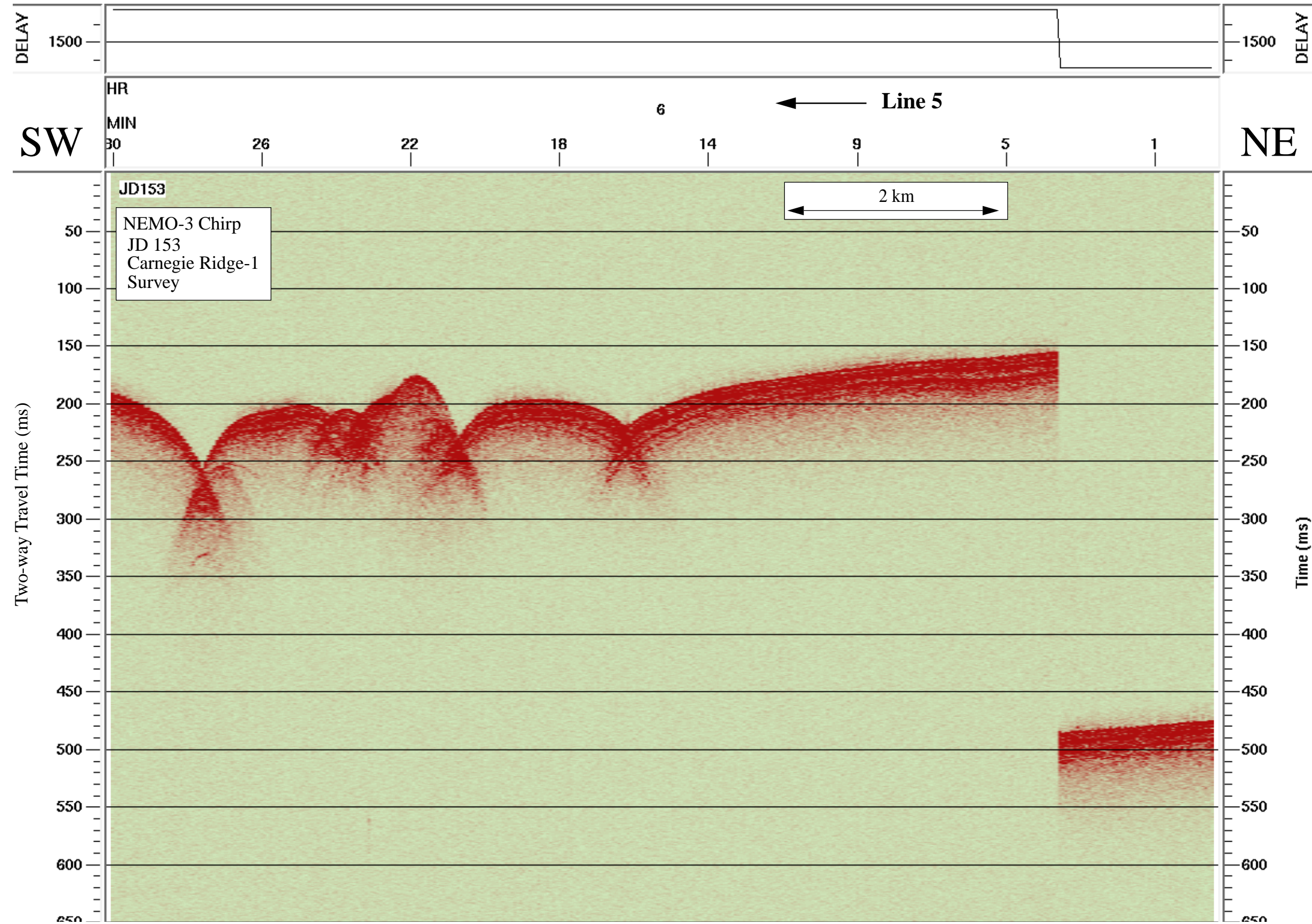


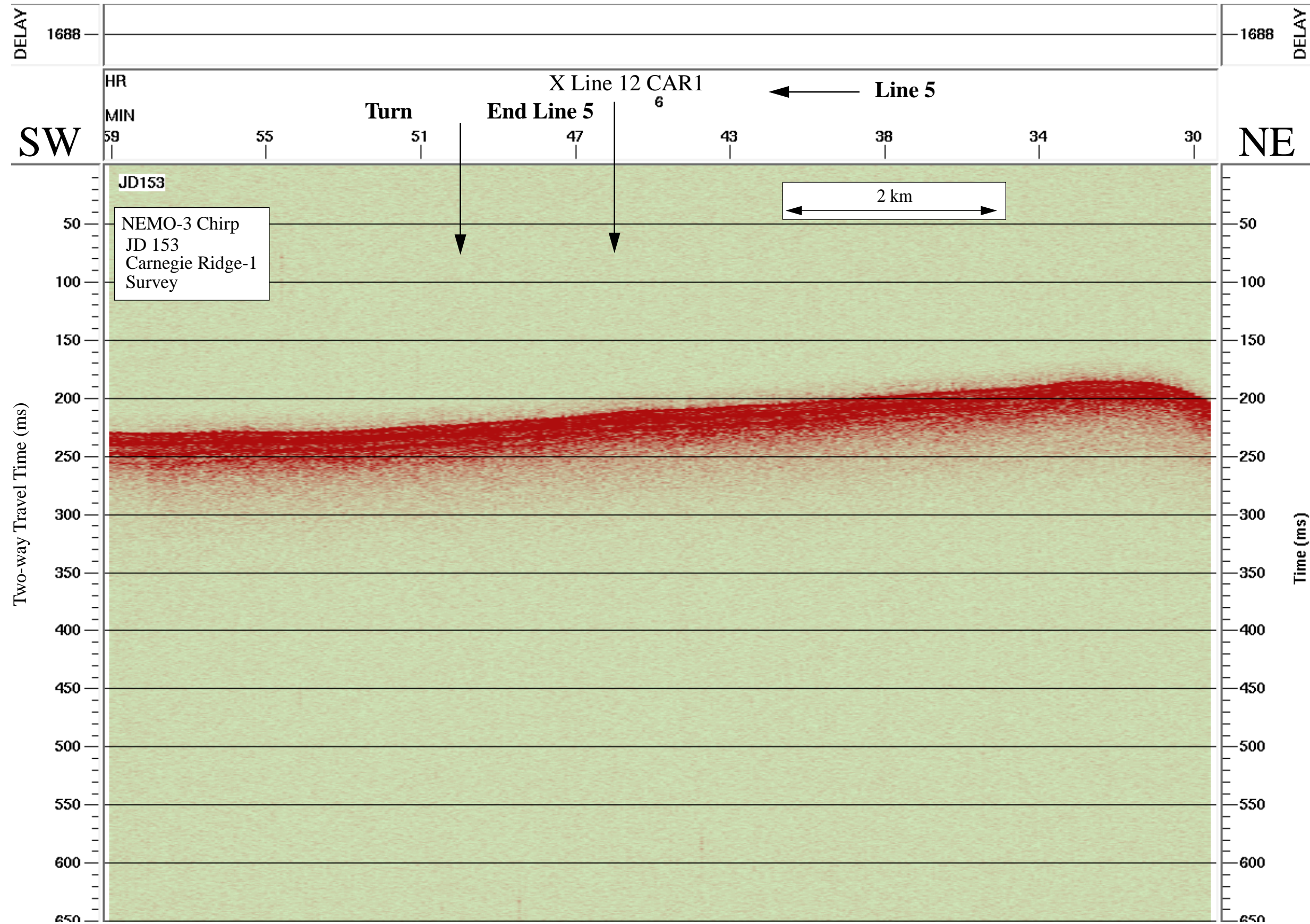


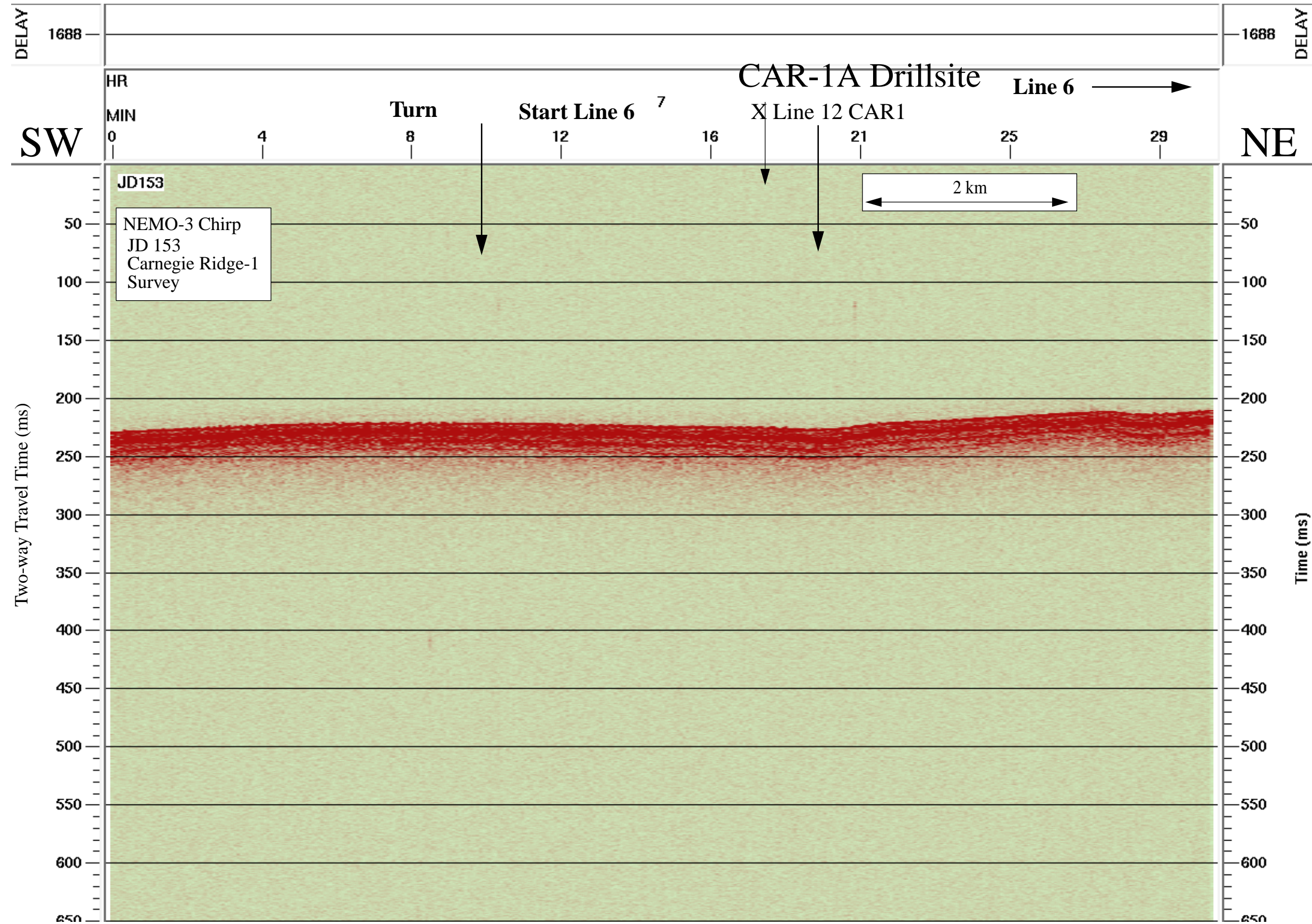


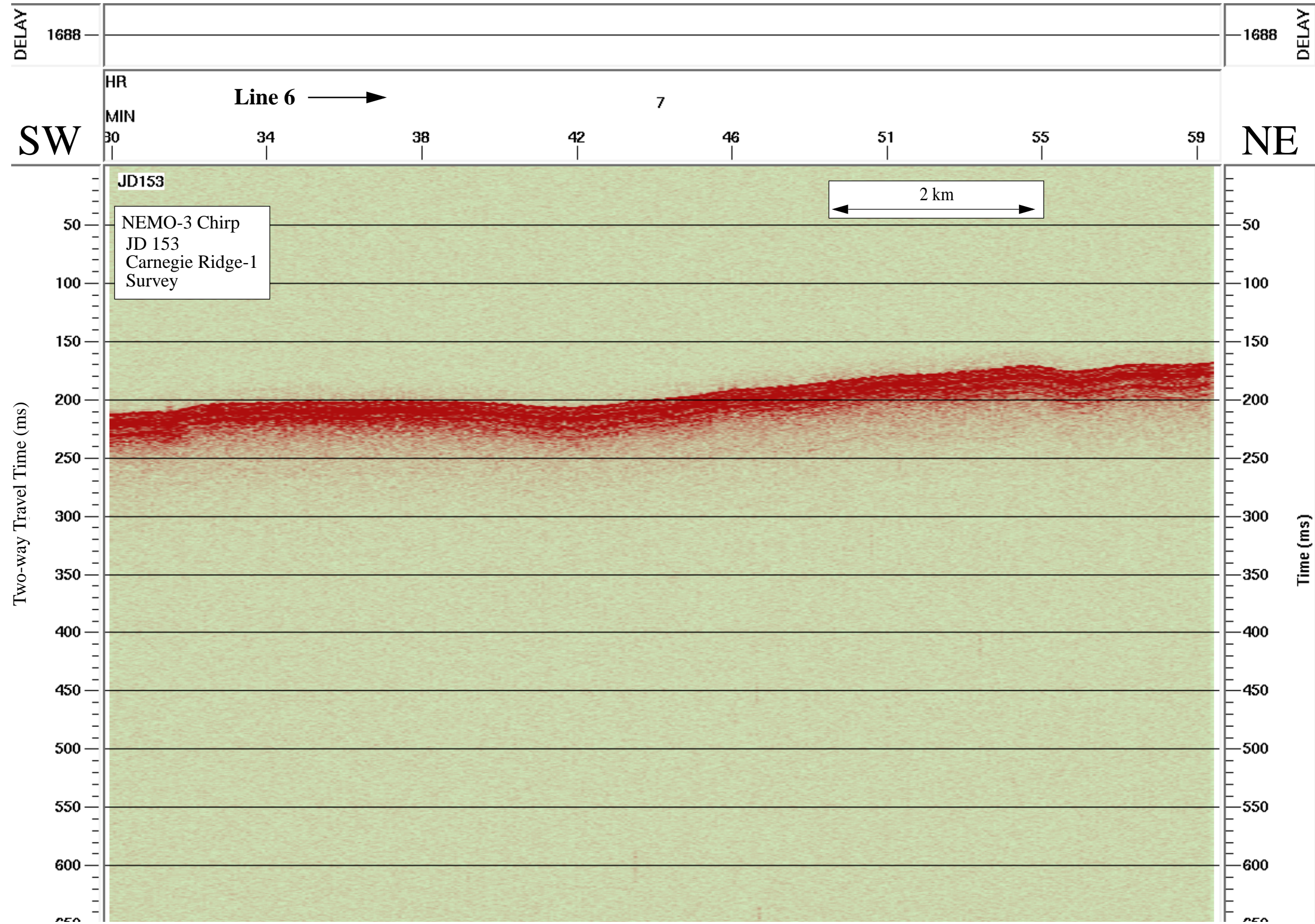
Data File SBfixavg.2000jun01.0600-1200

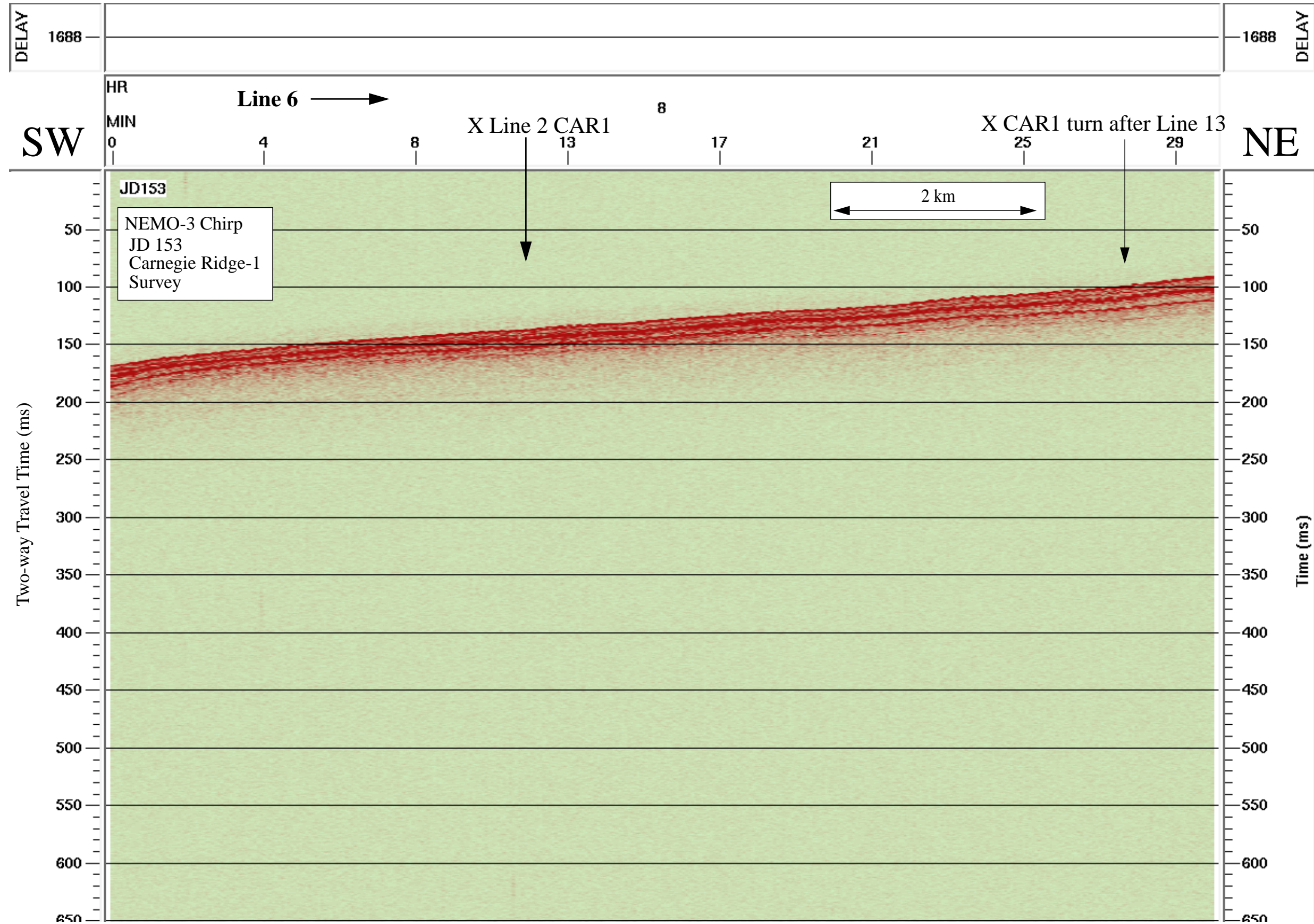


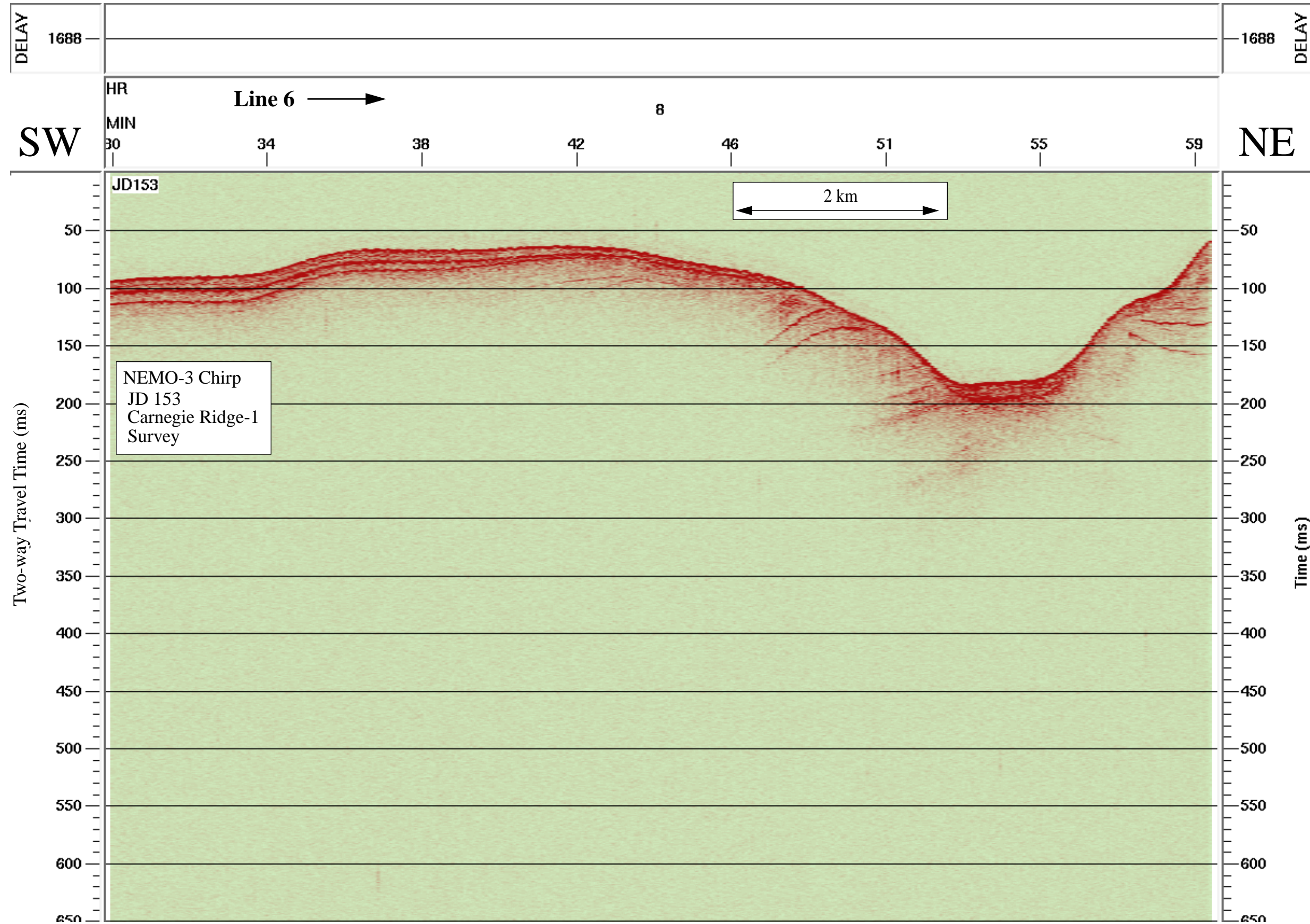


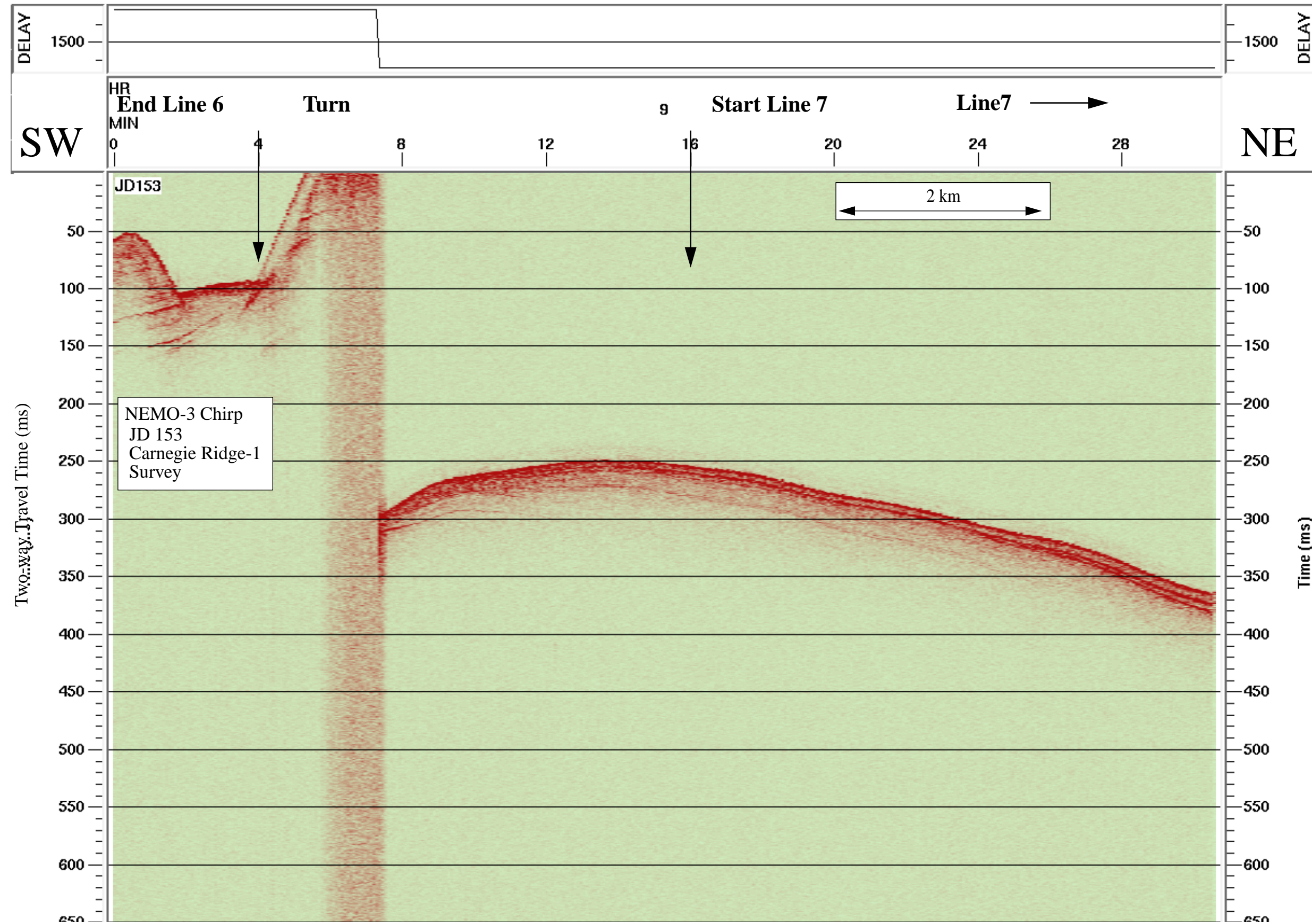


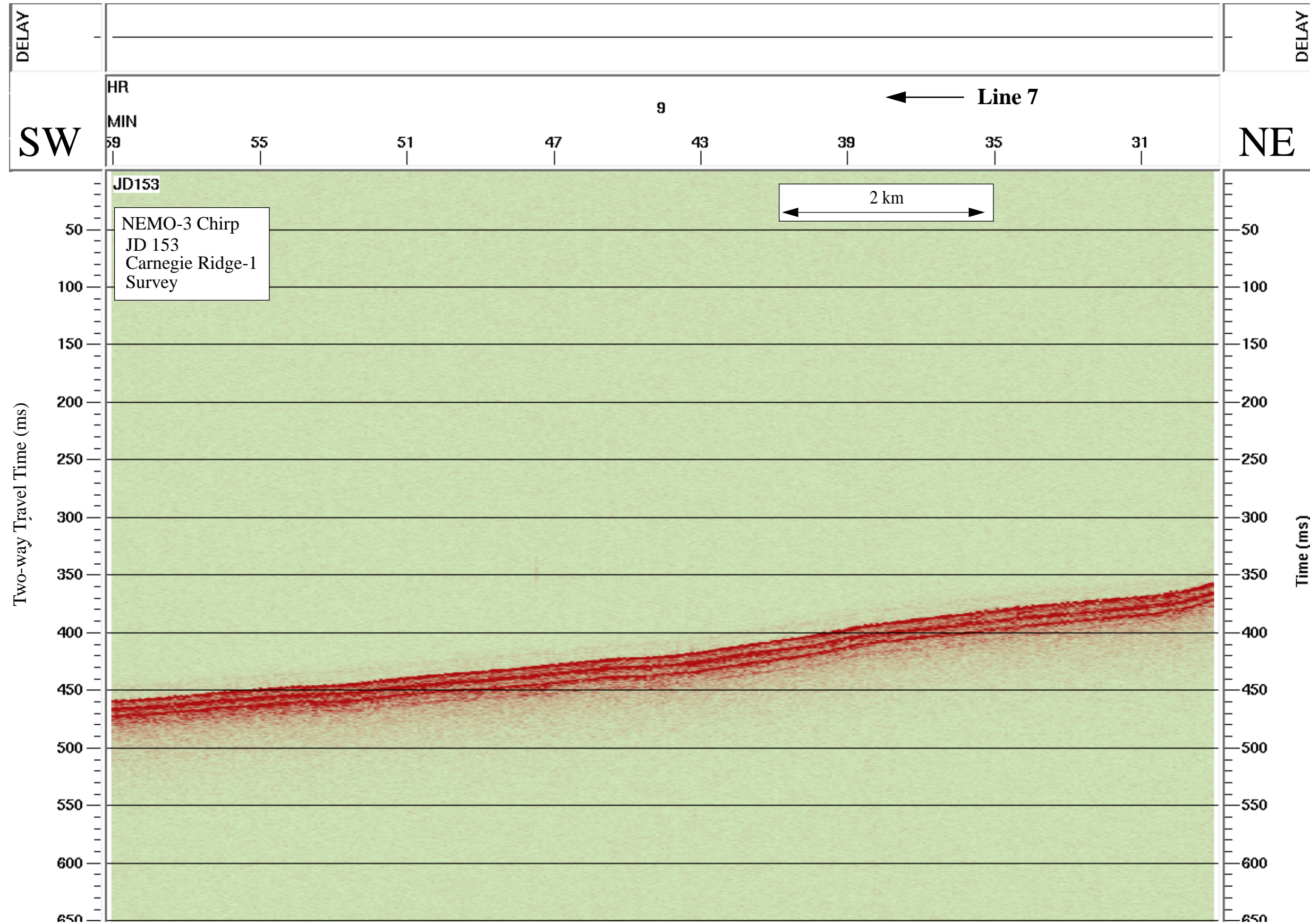


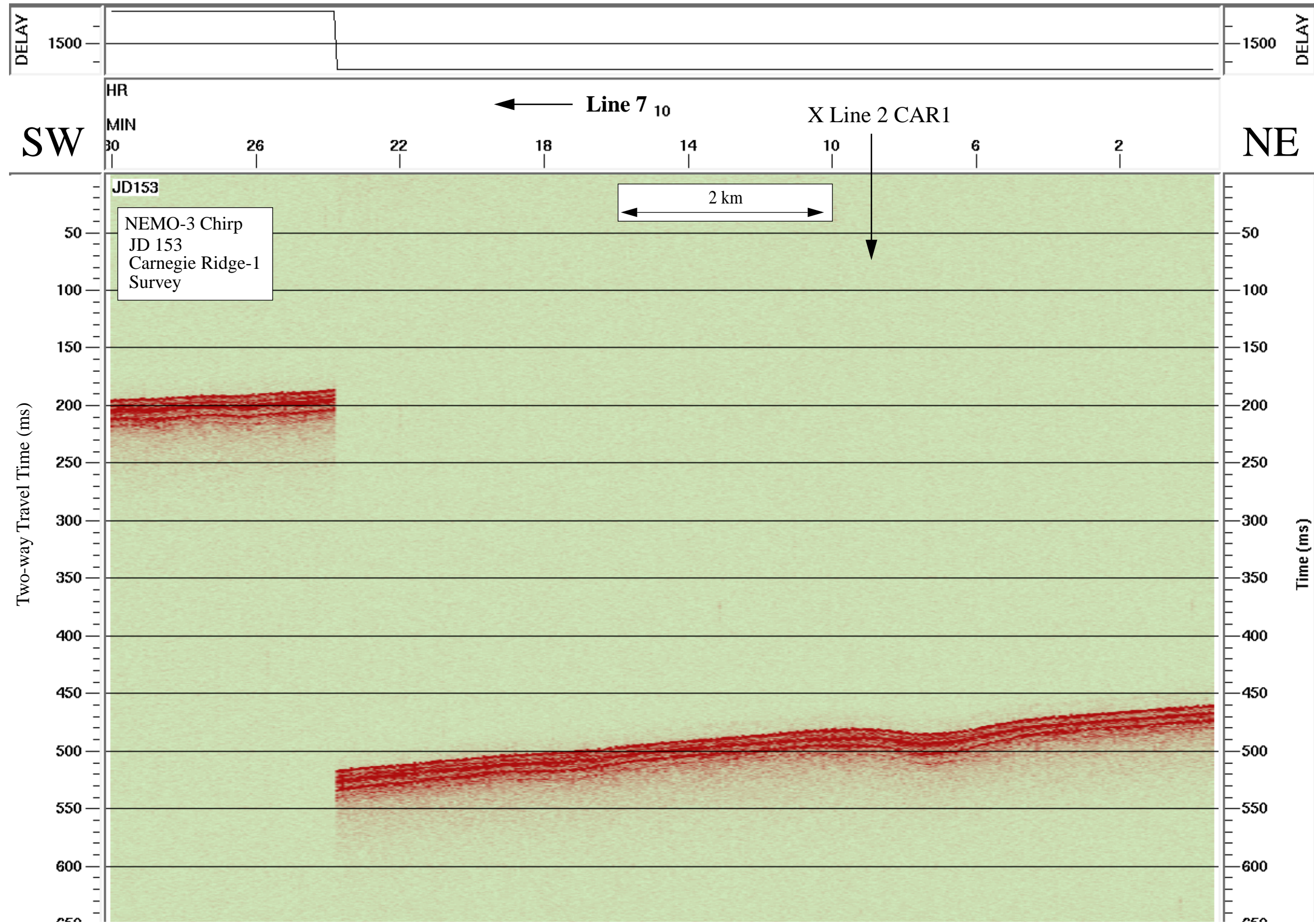


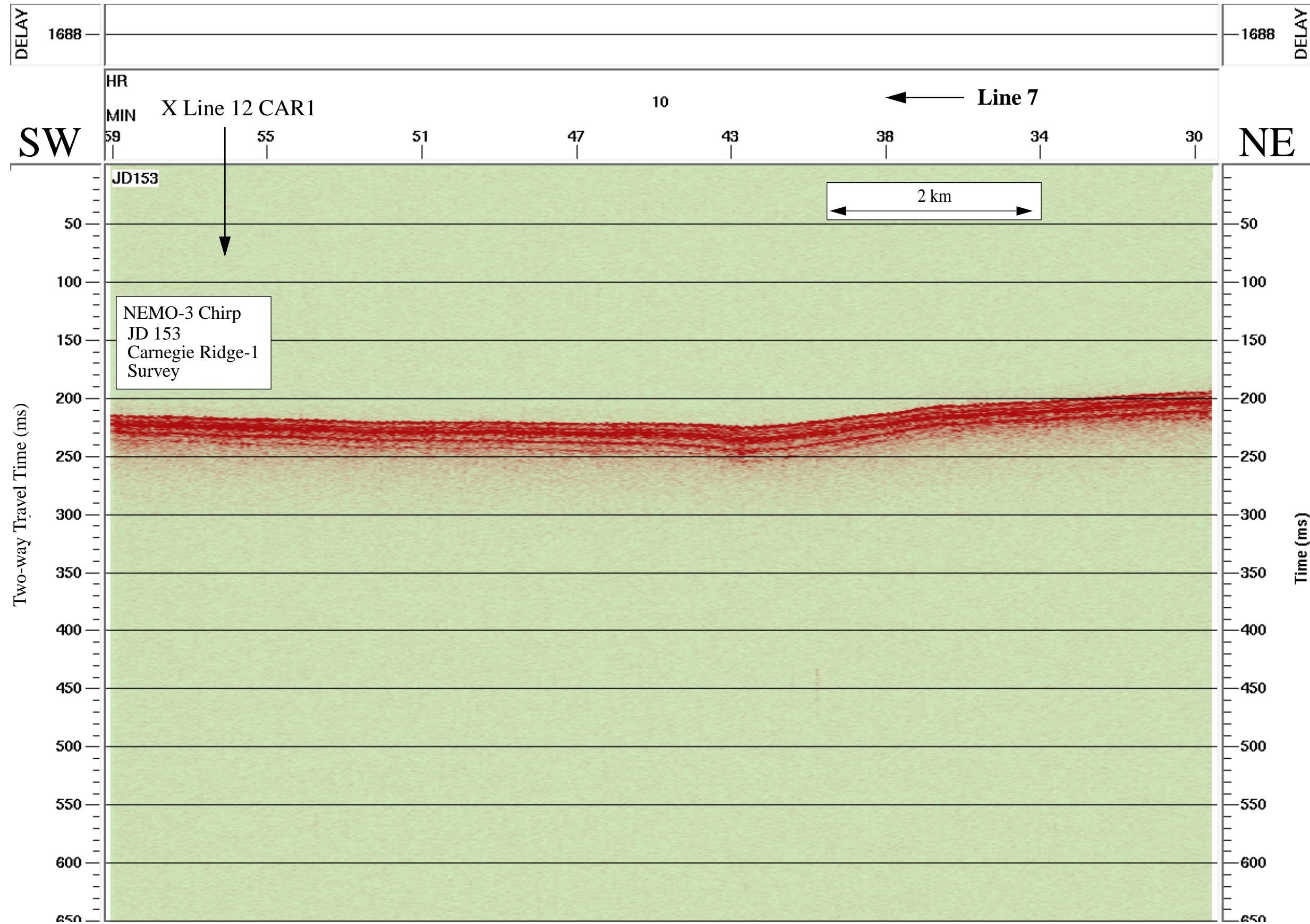


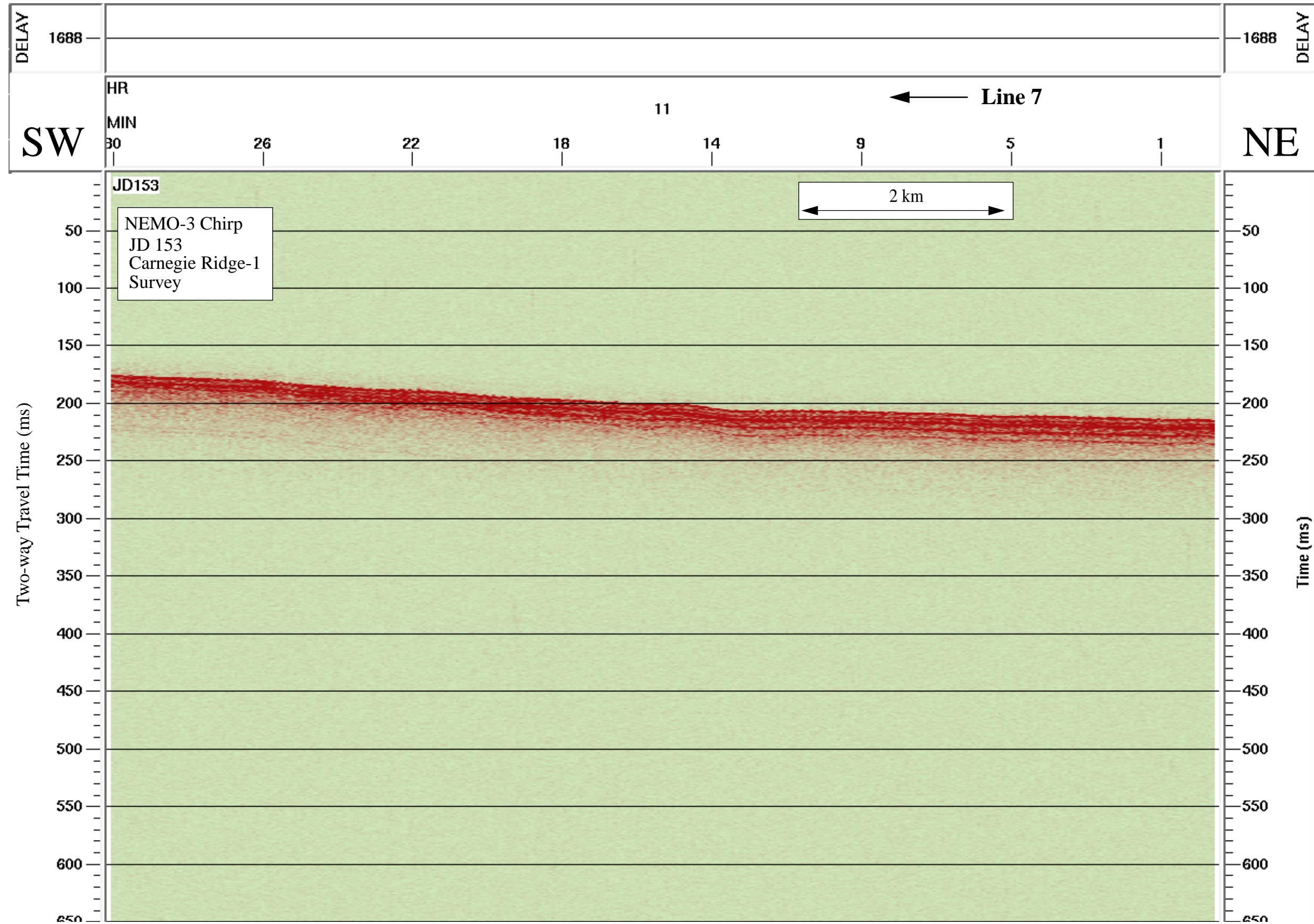


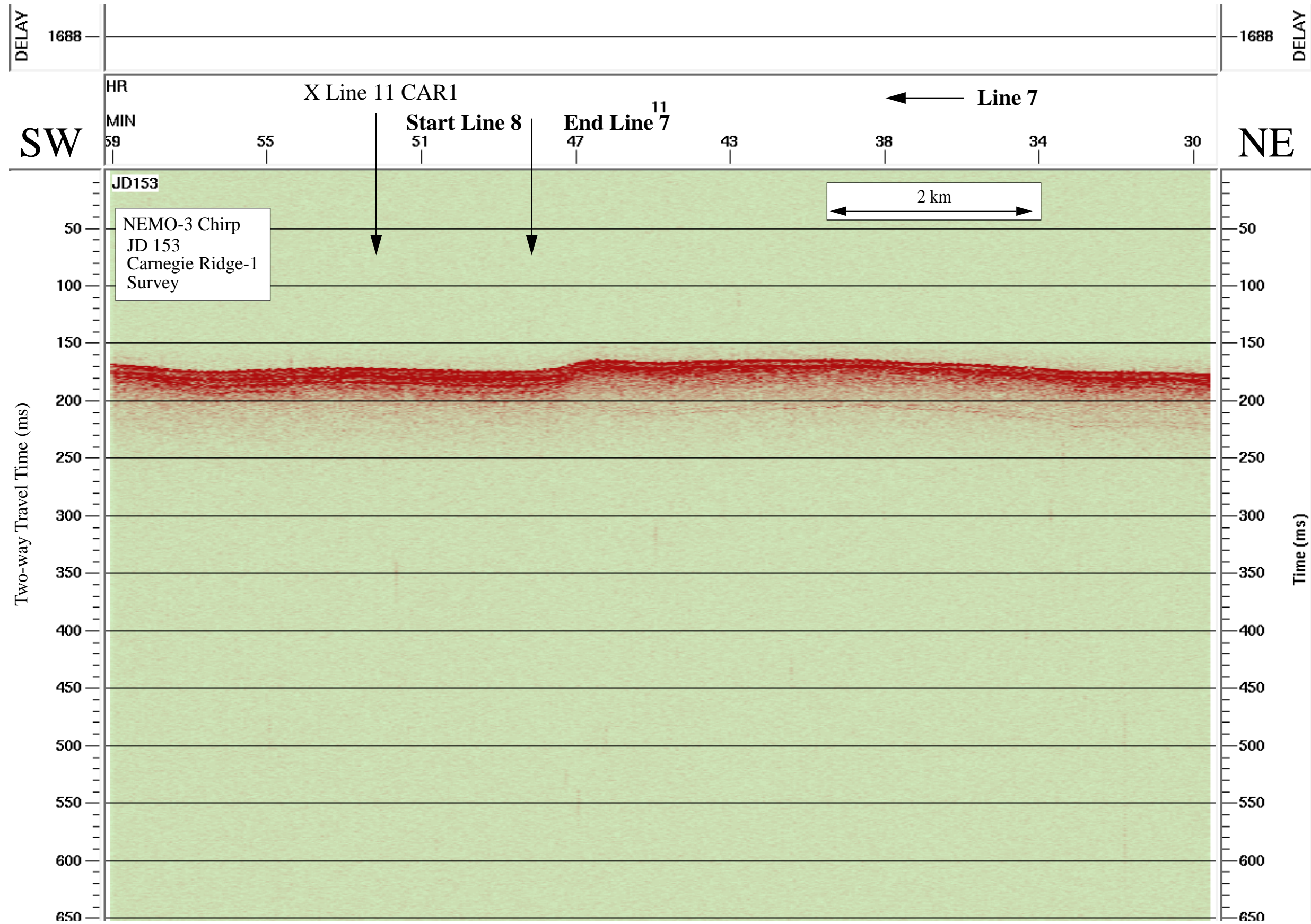




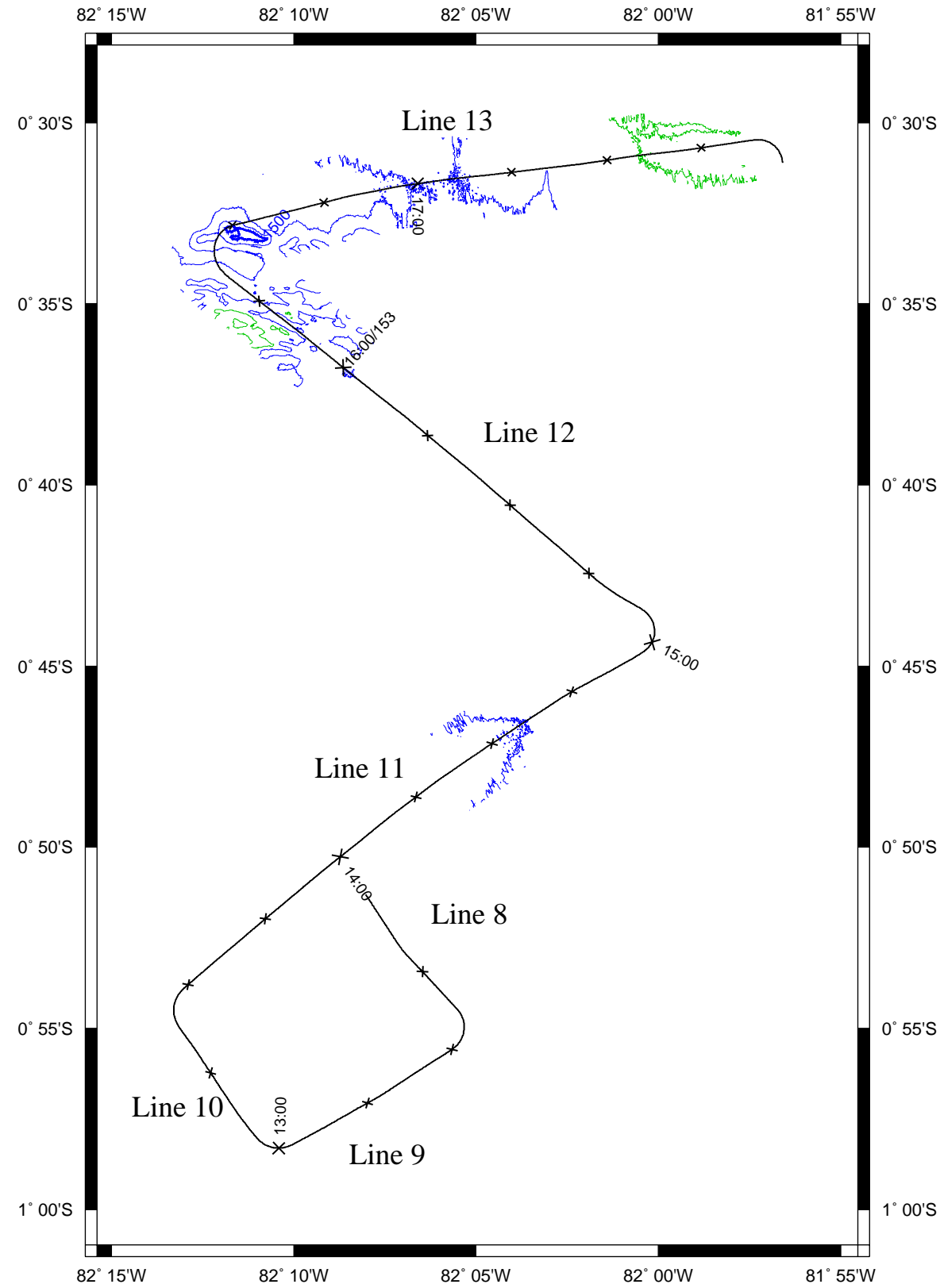


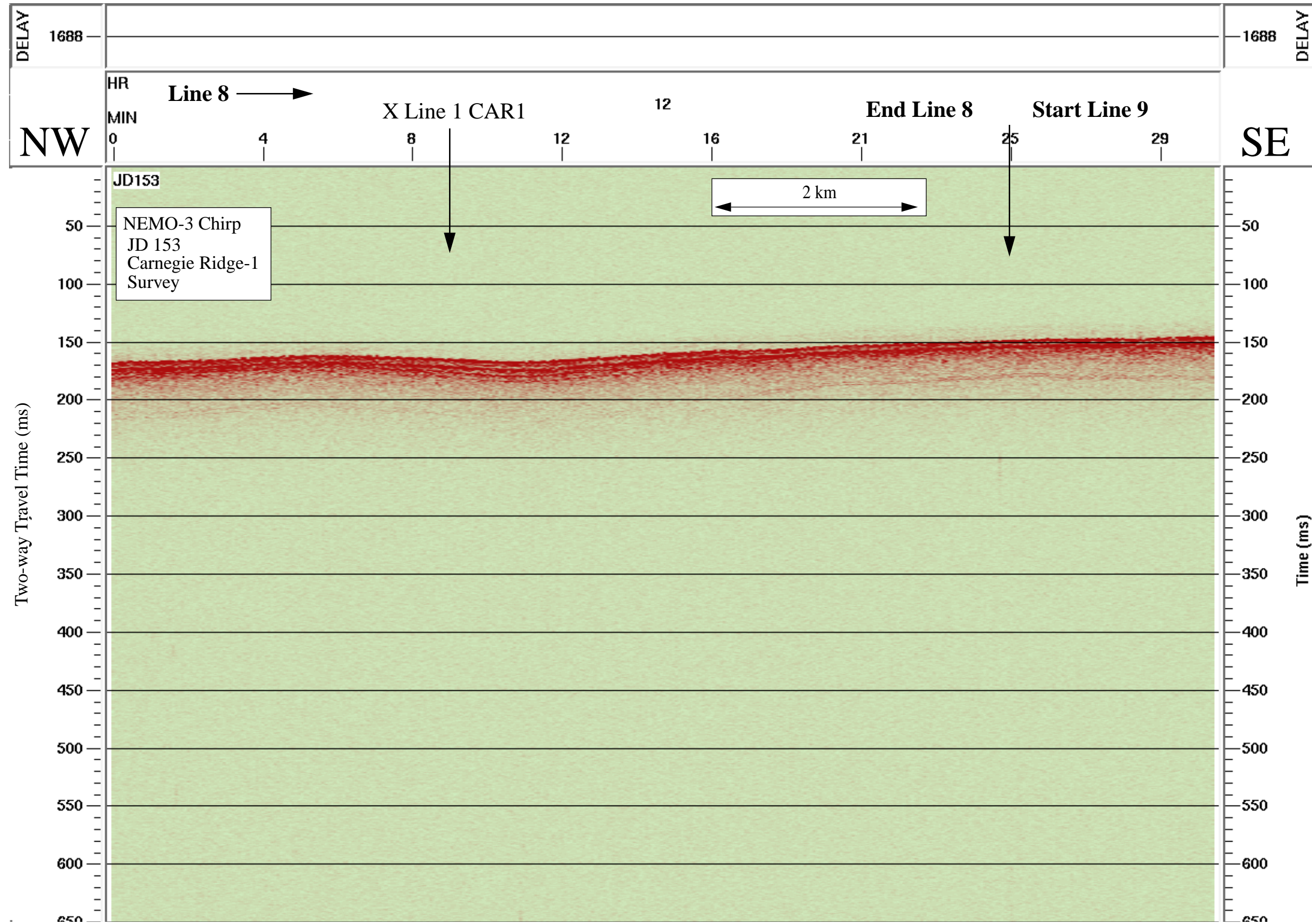


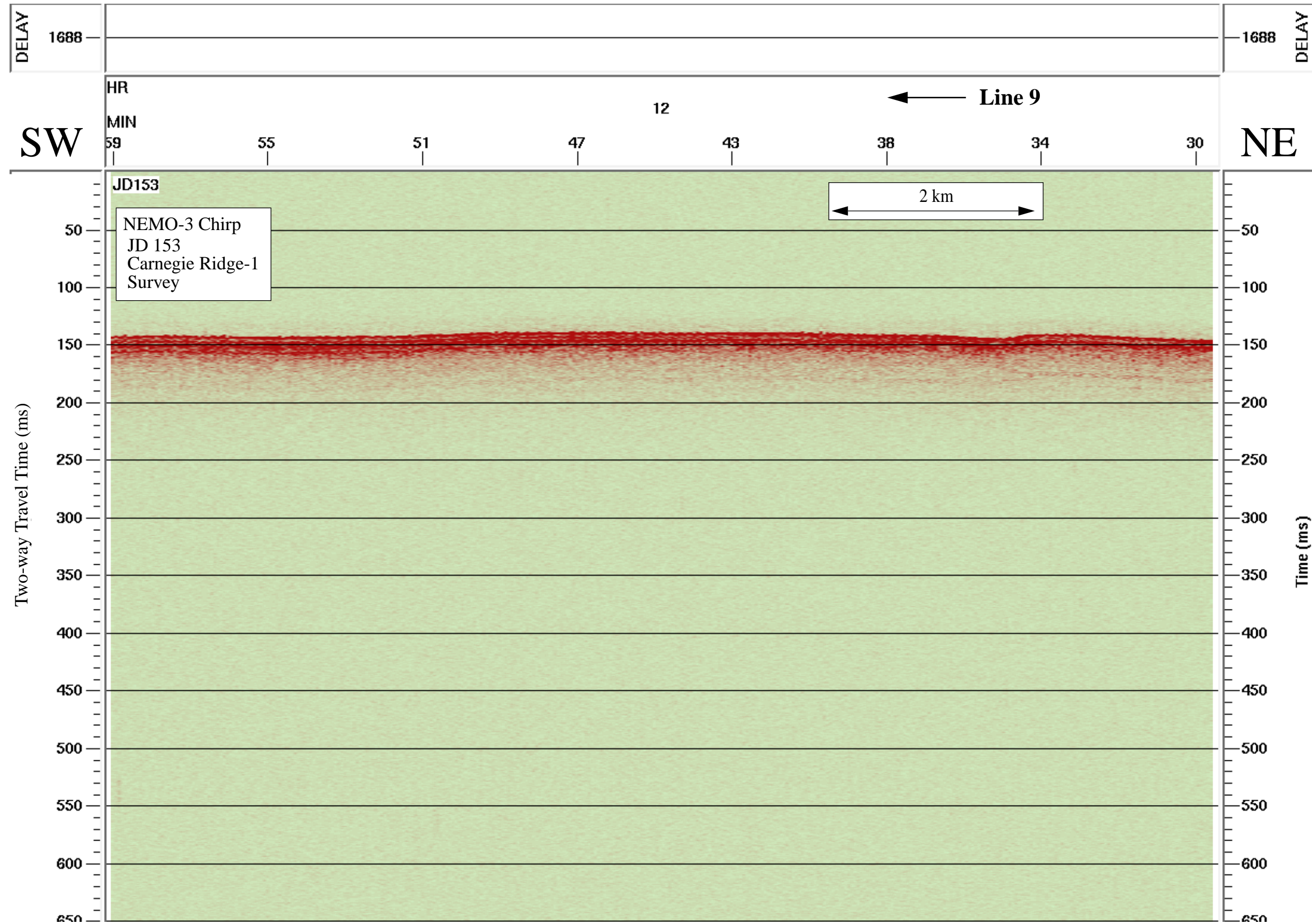


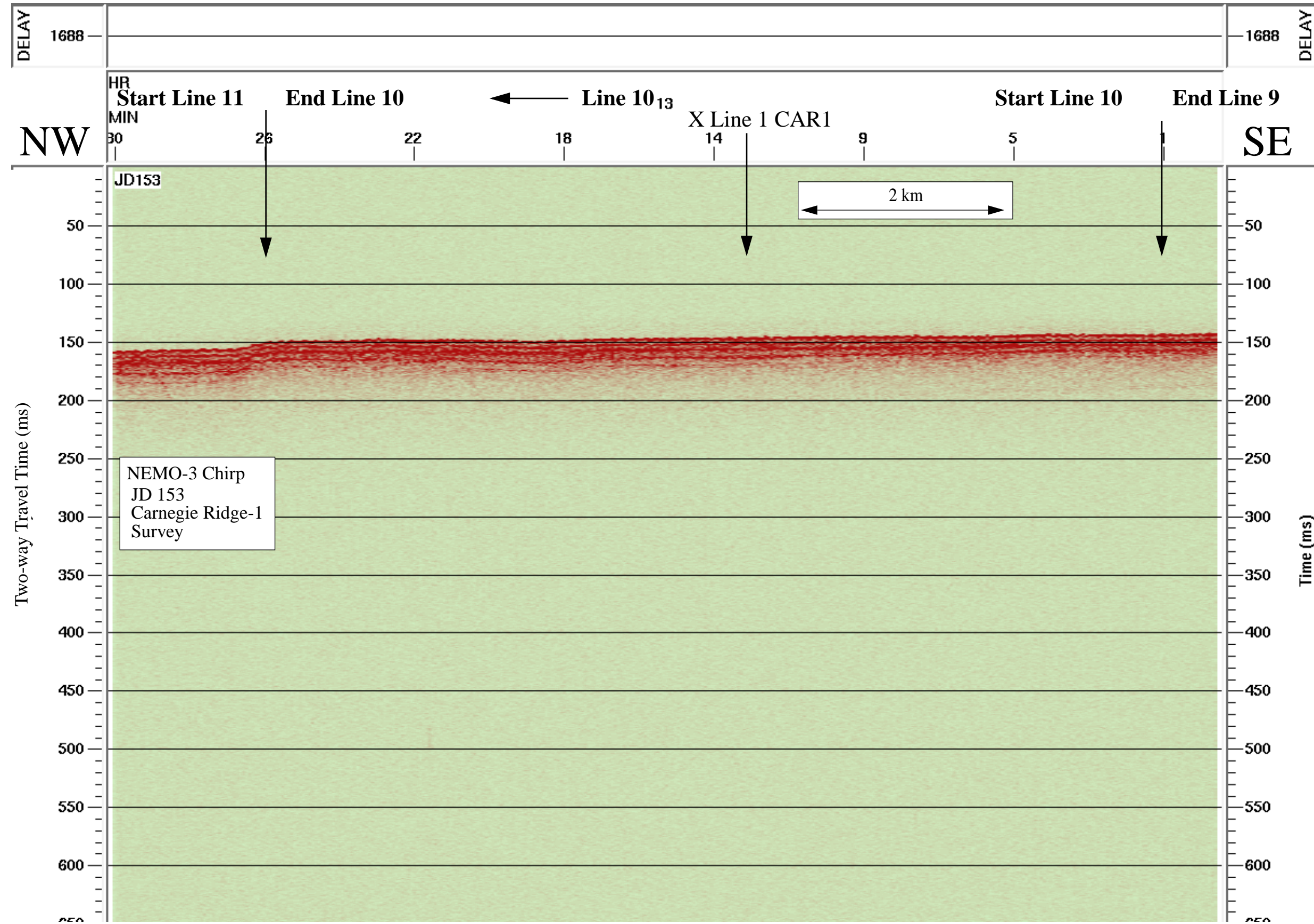


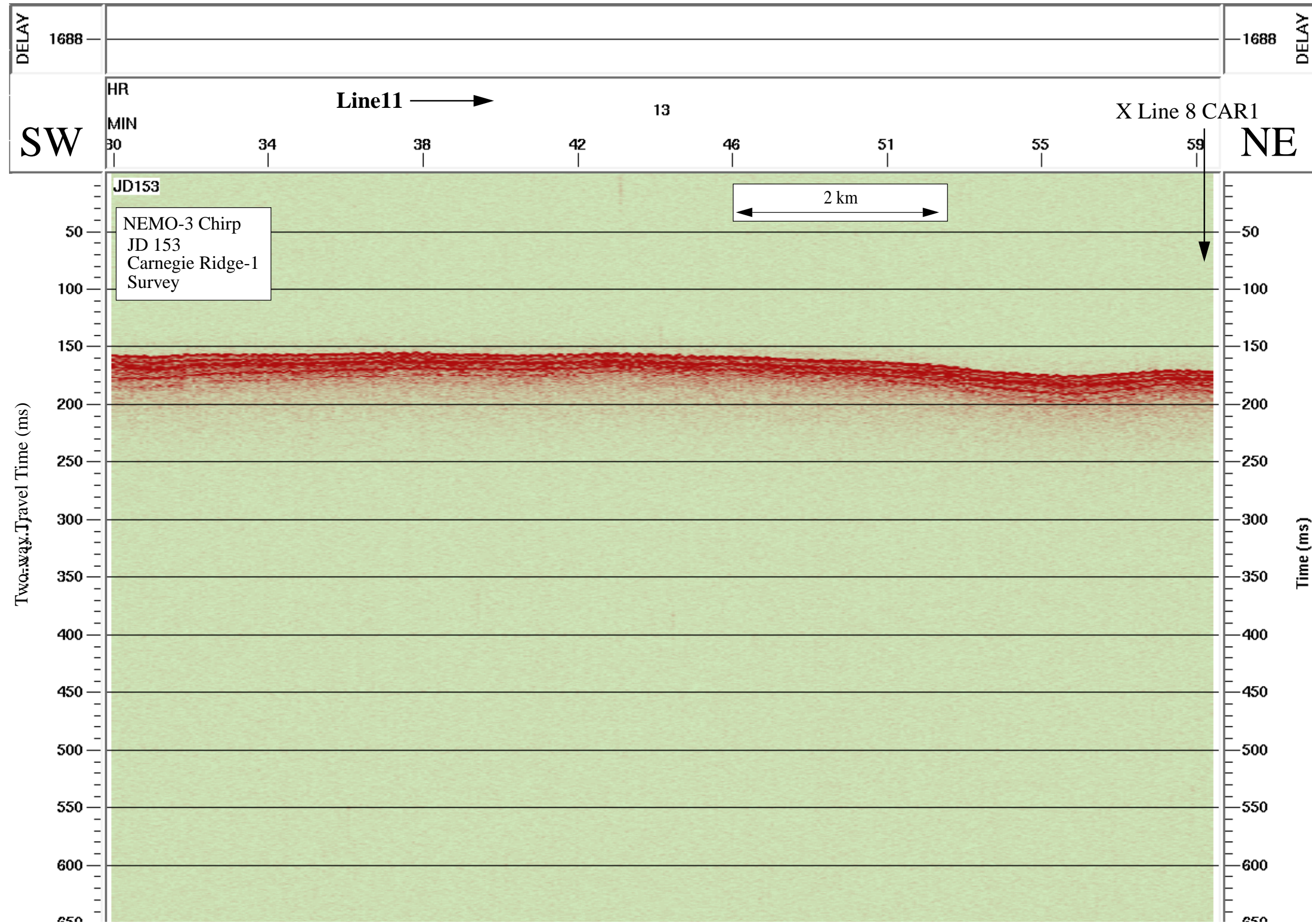
Data File SBfixavg.2000jun01.1200-1800

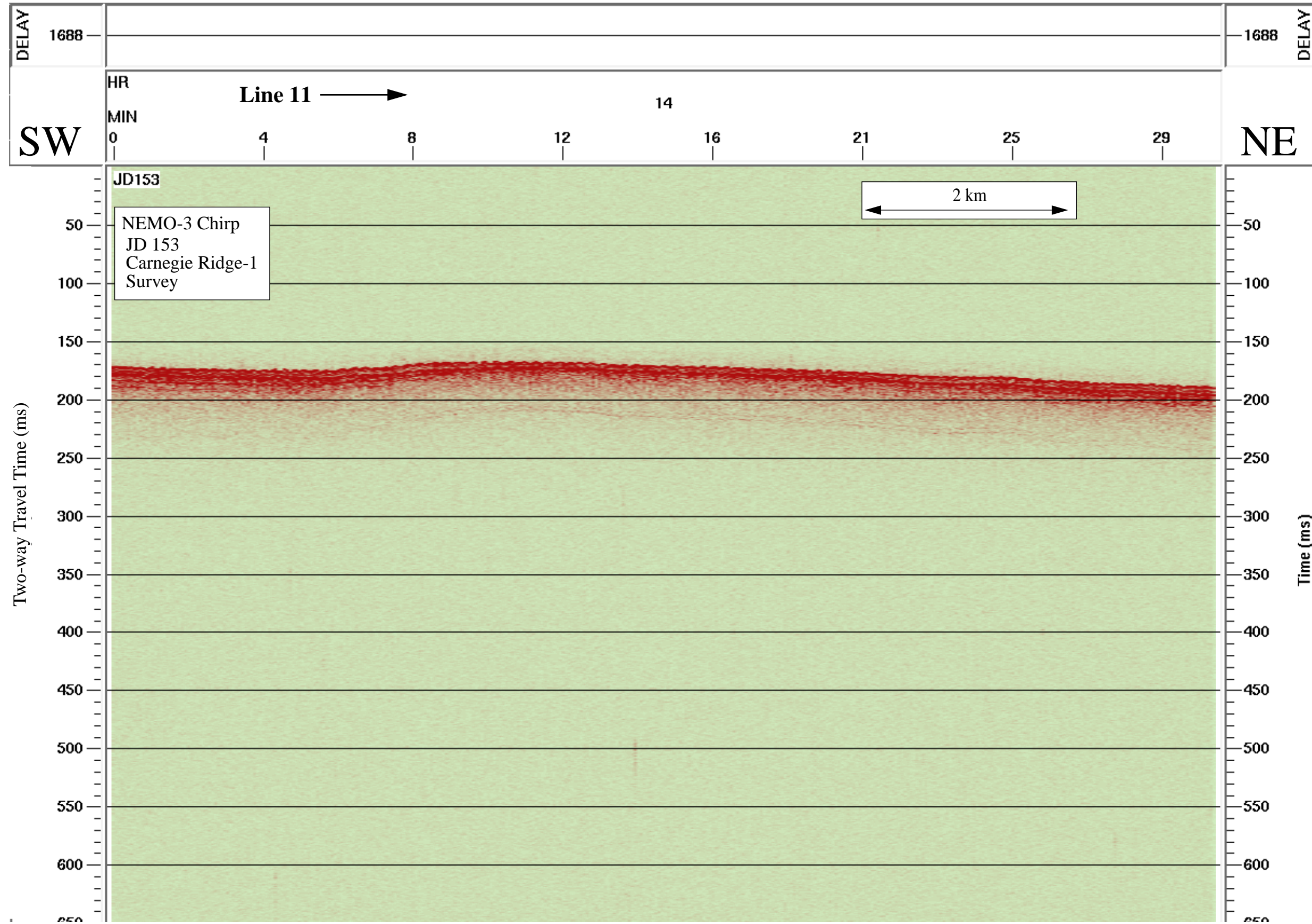


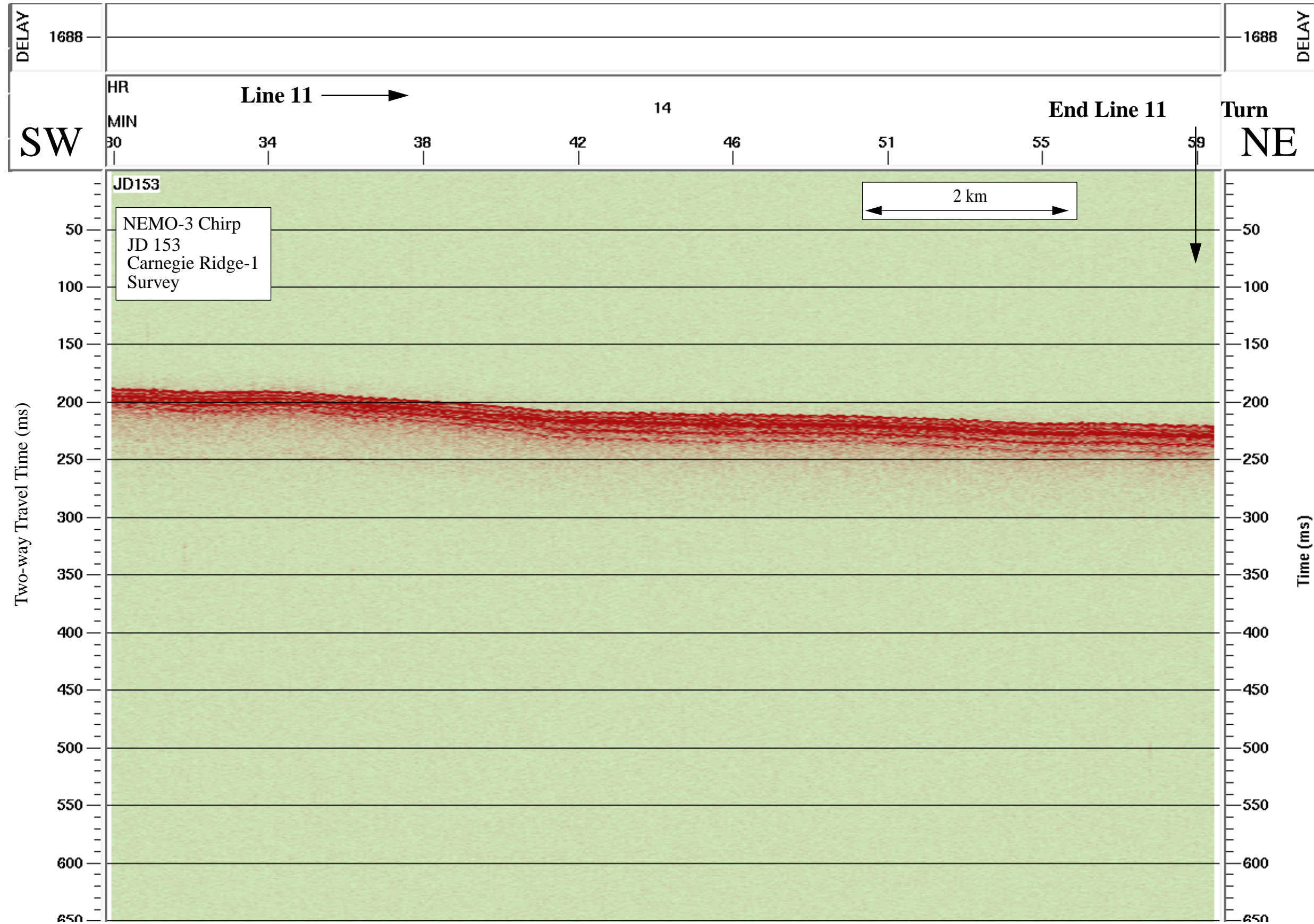


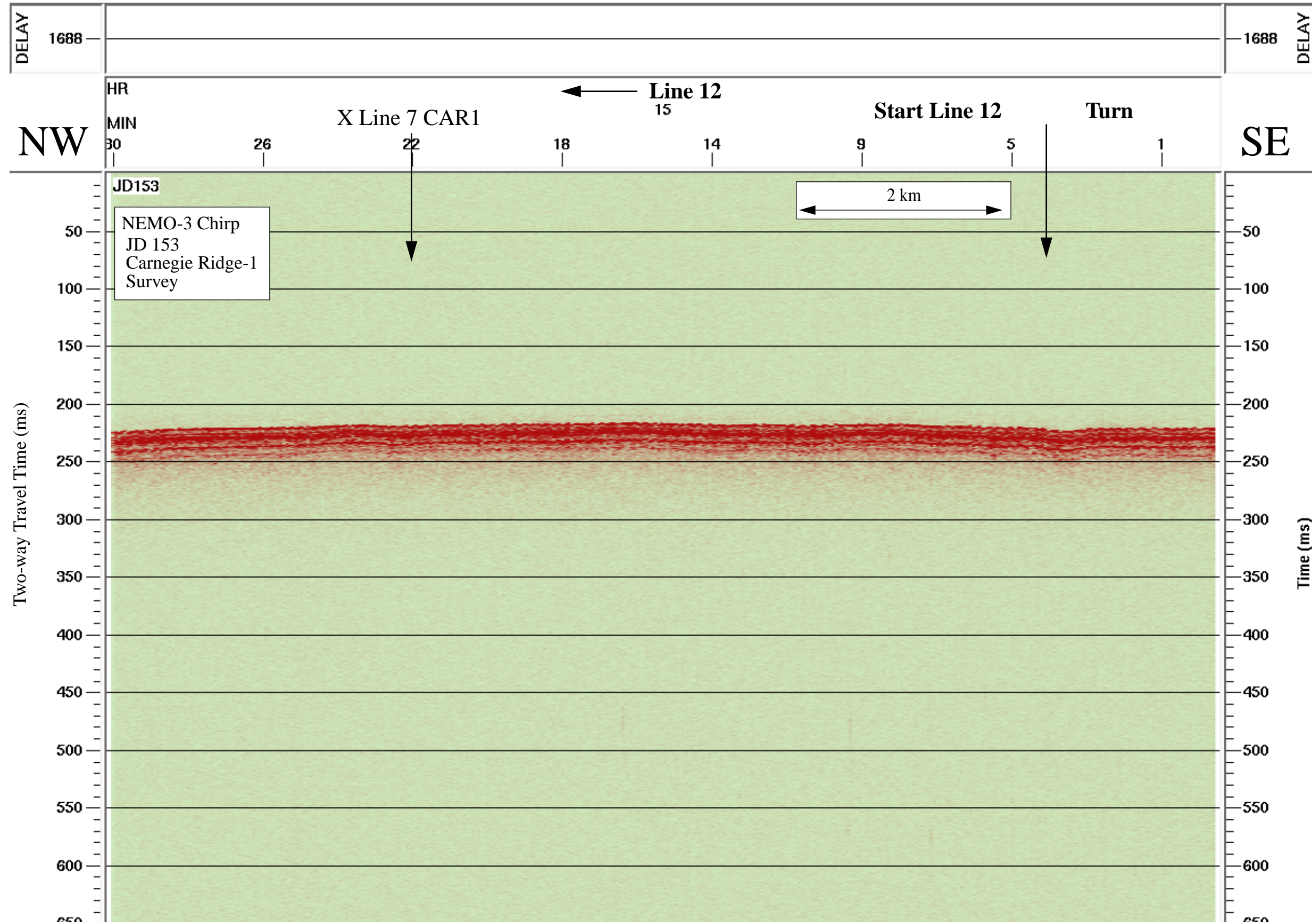


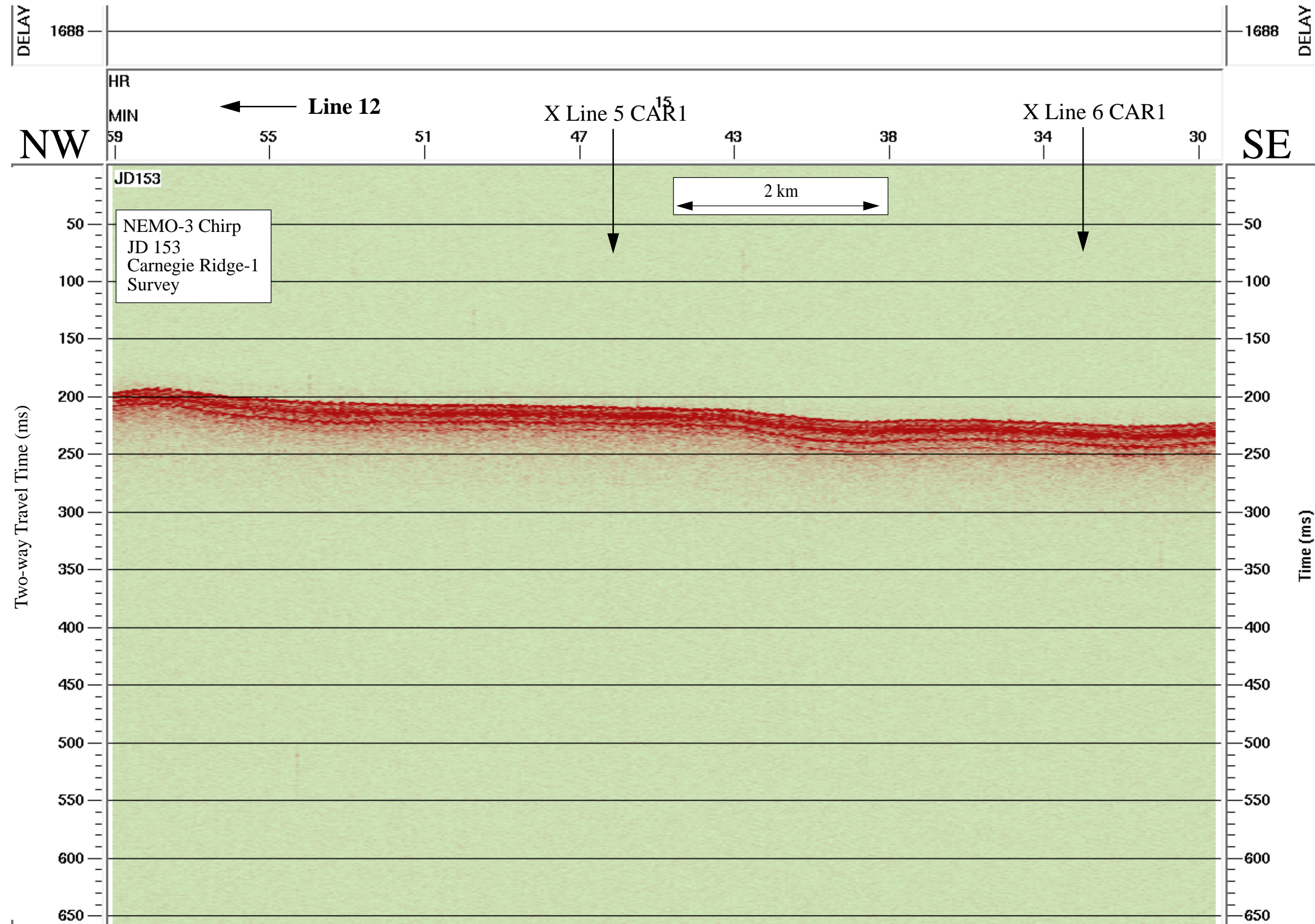


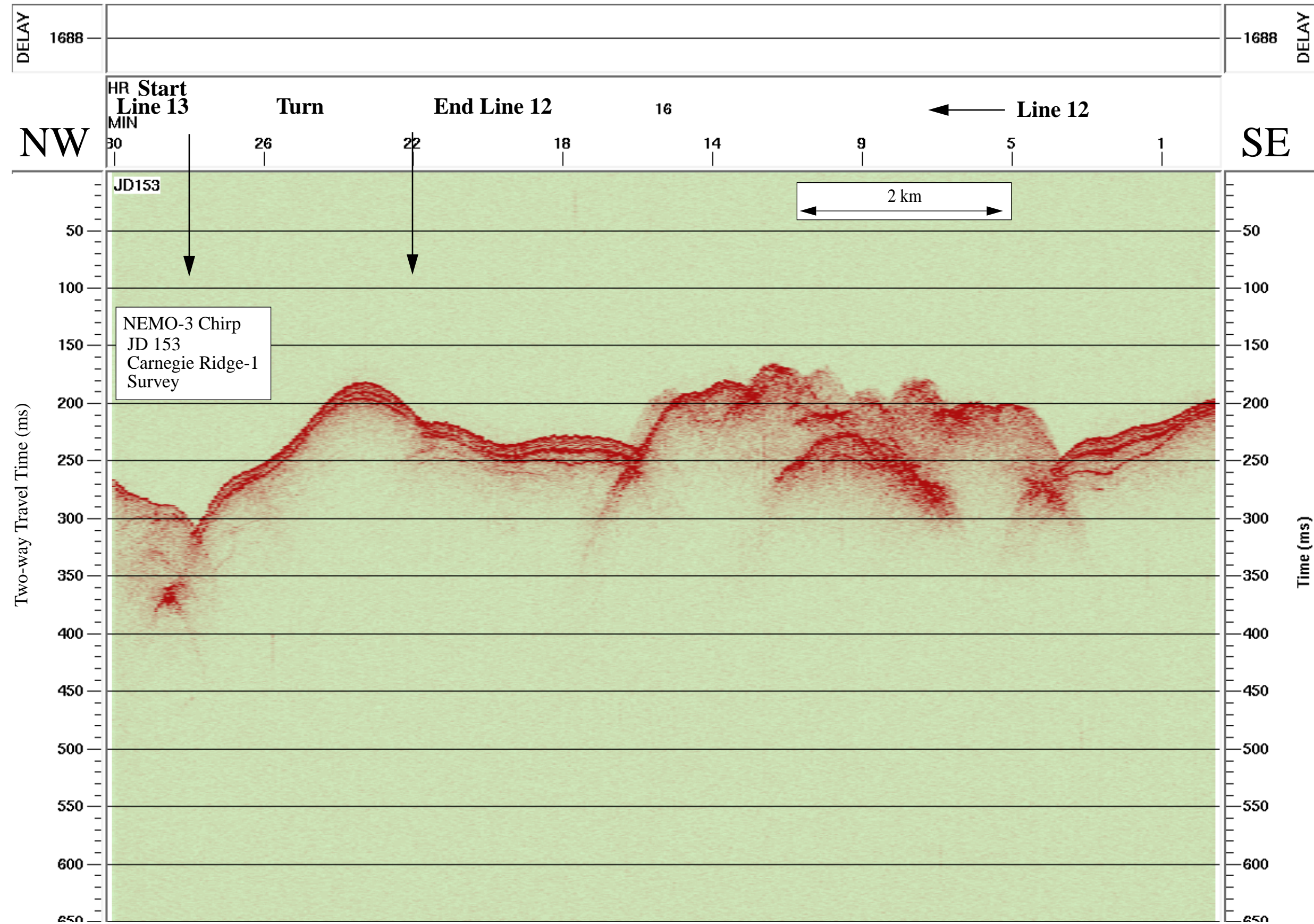


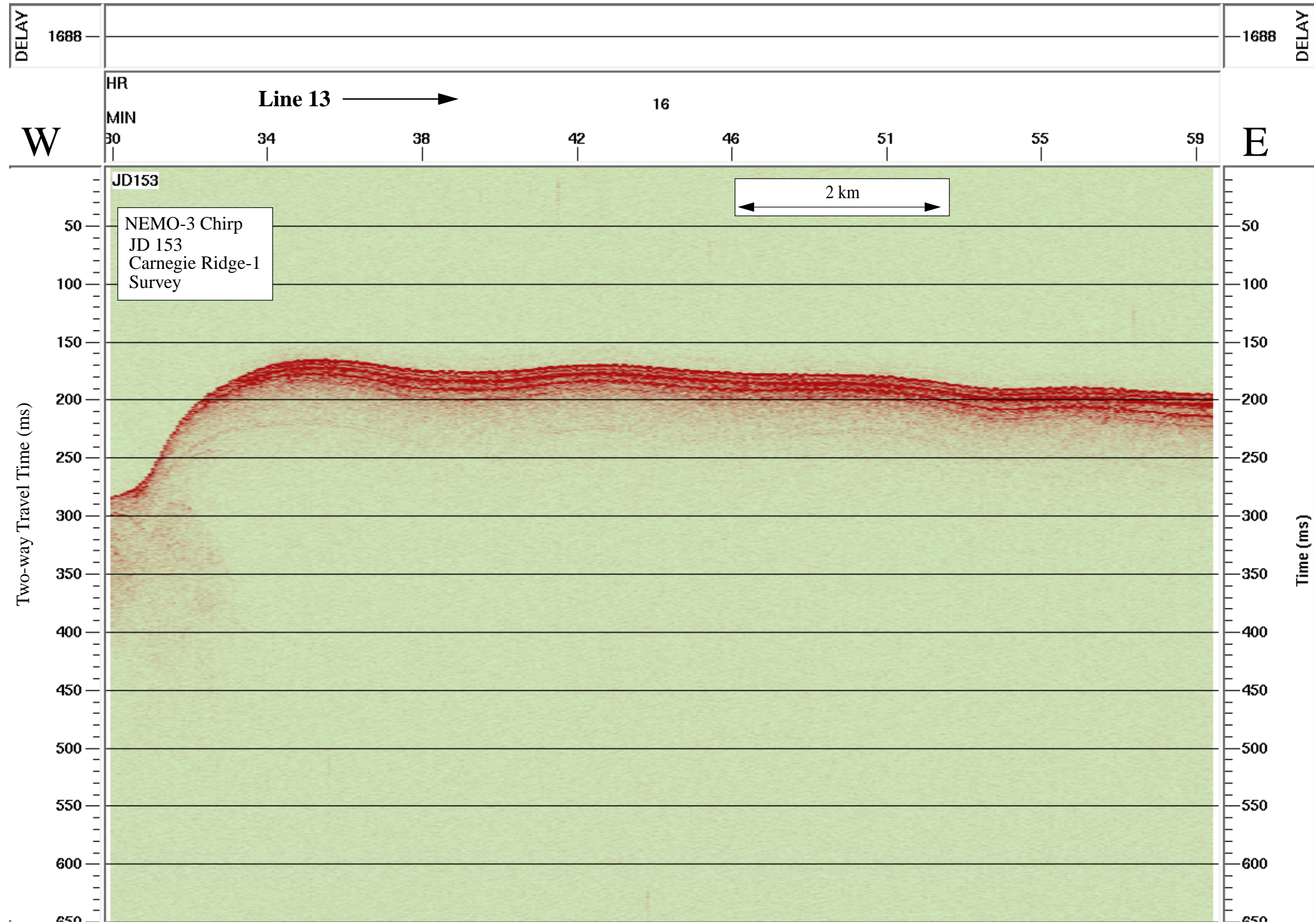


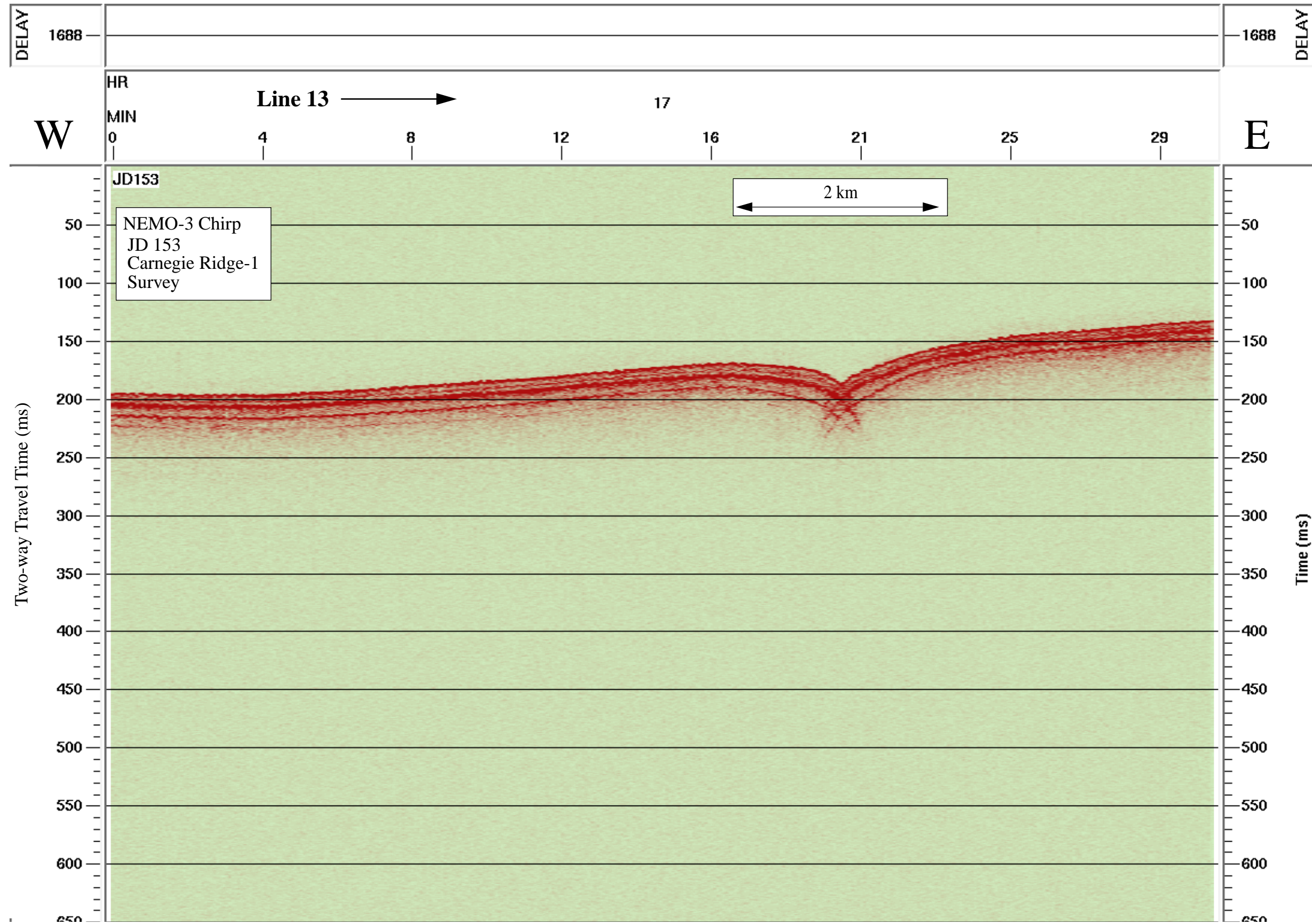


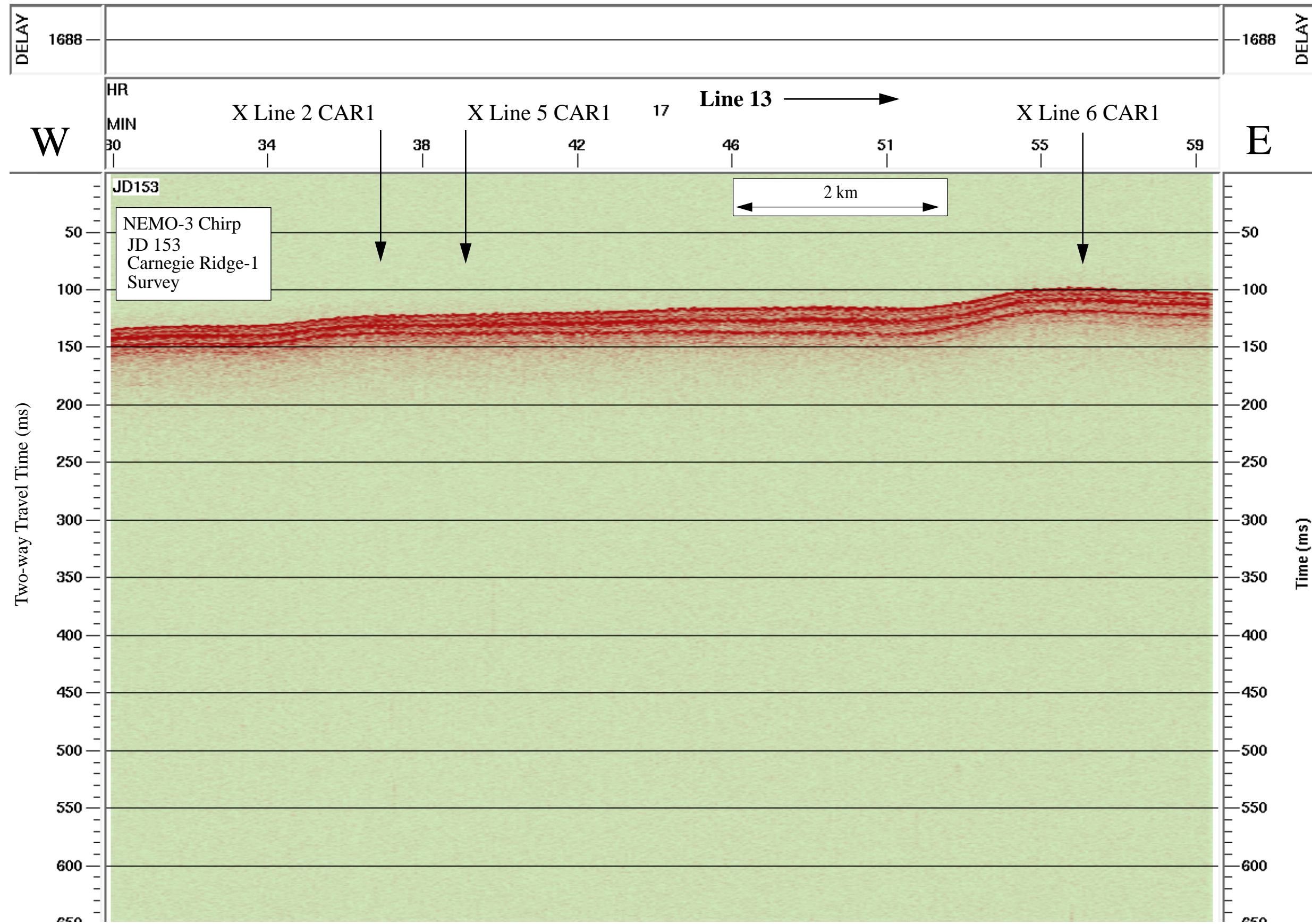




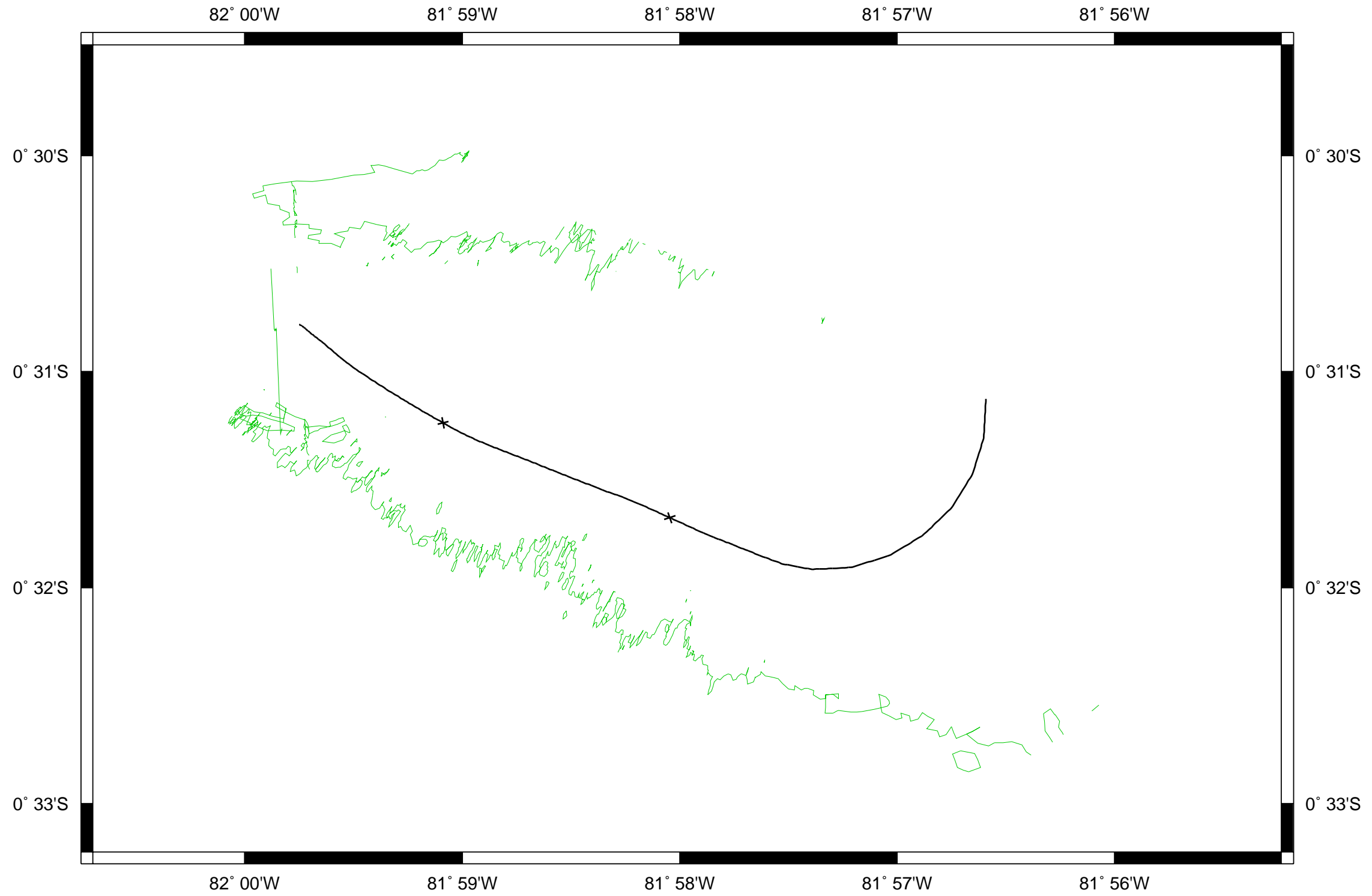


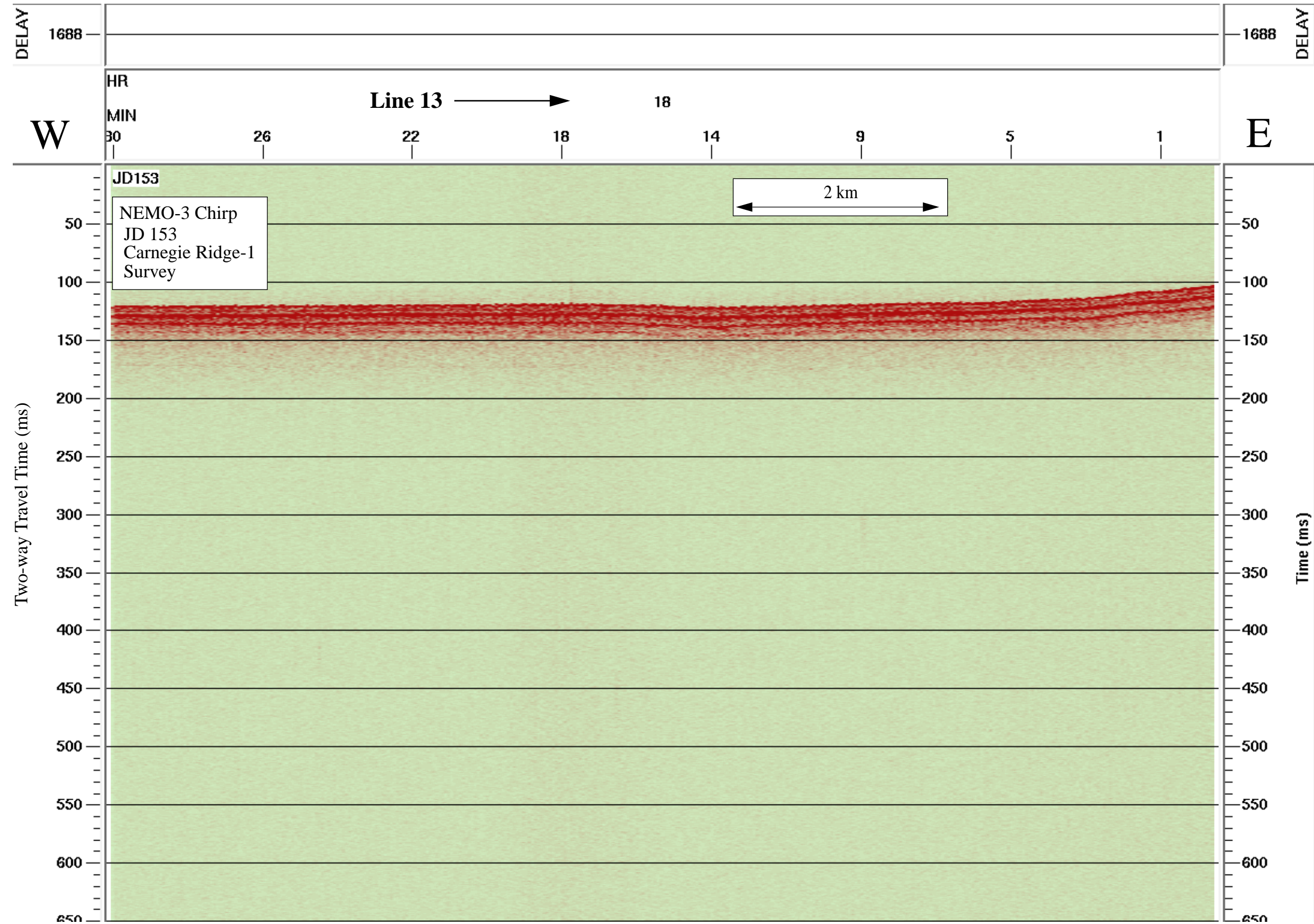






Data File SBfixavg.2000jun01.1800-2400





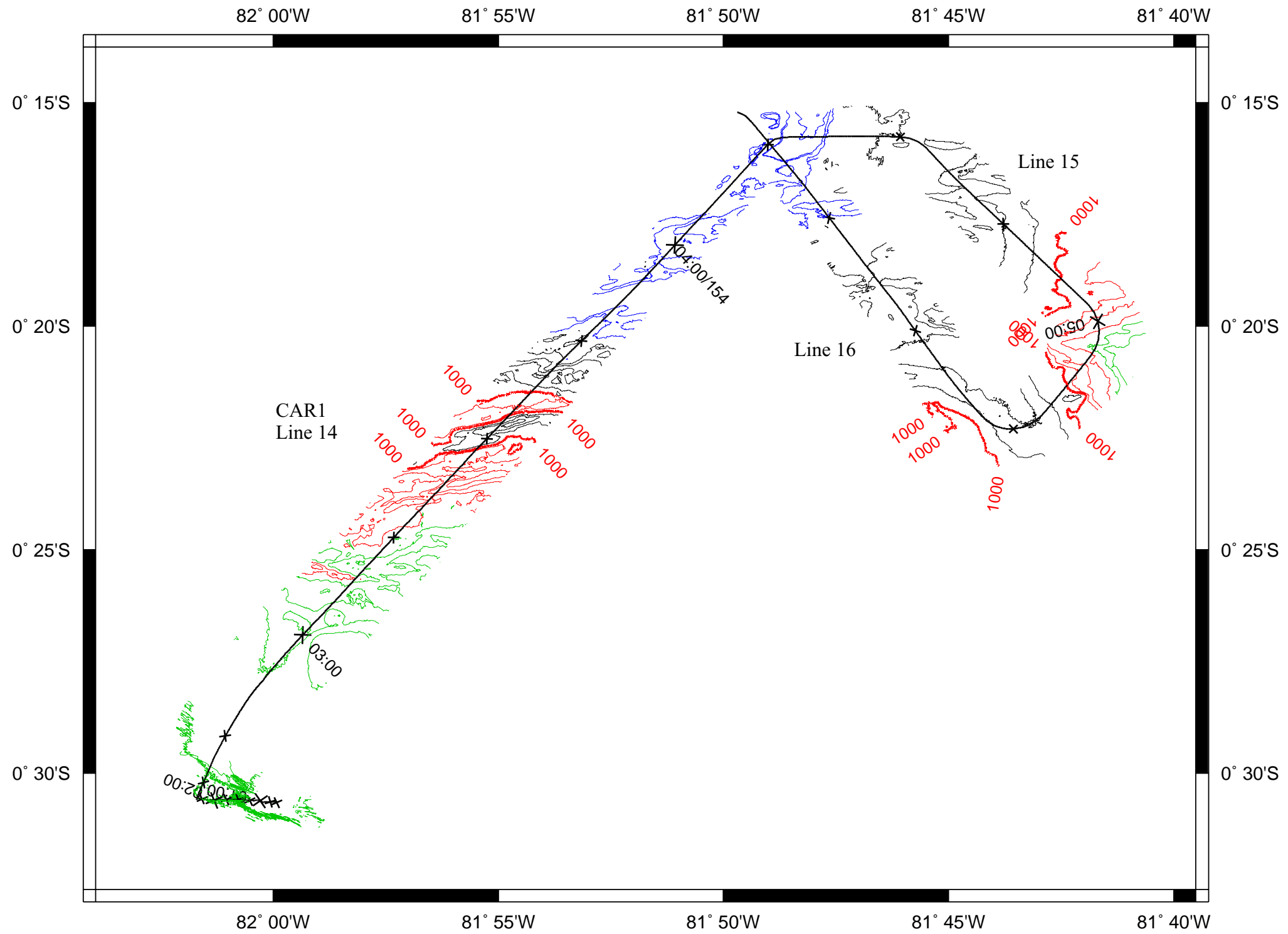
JD 154 (2 June 2000)--CAR-1 Survey, last day

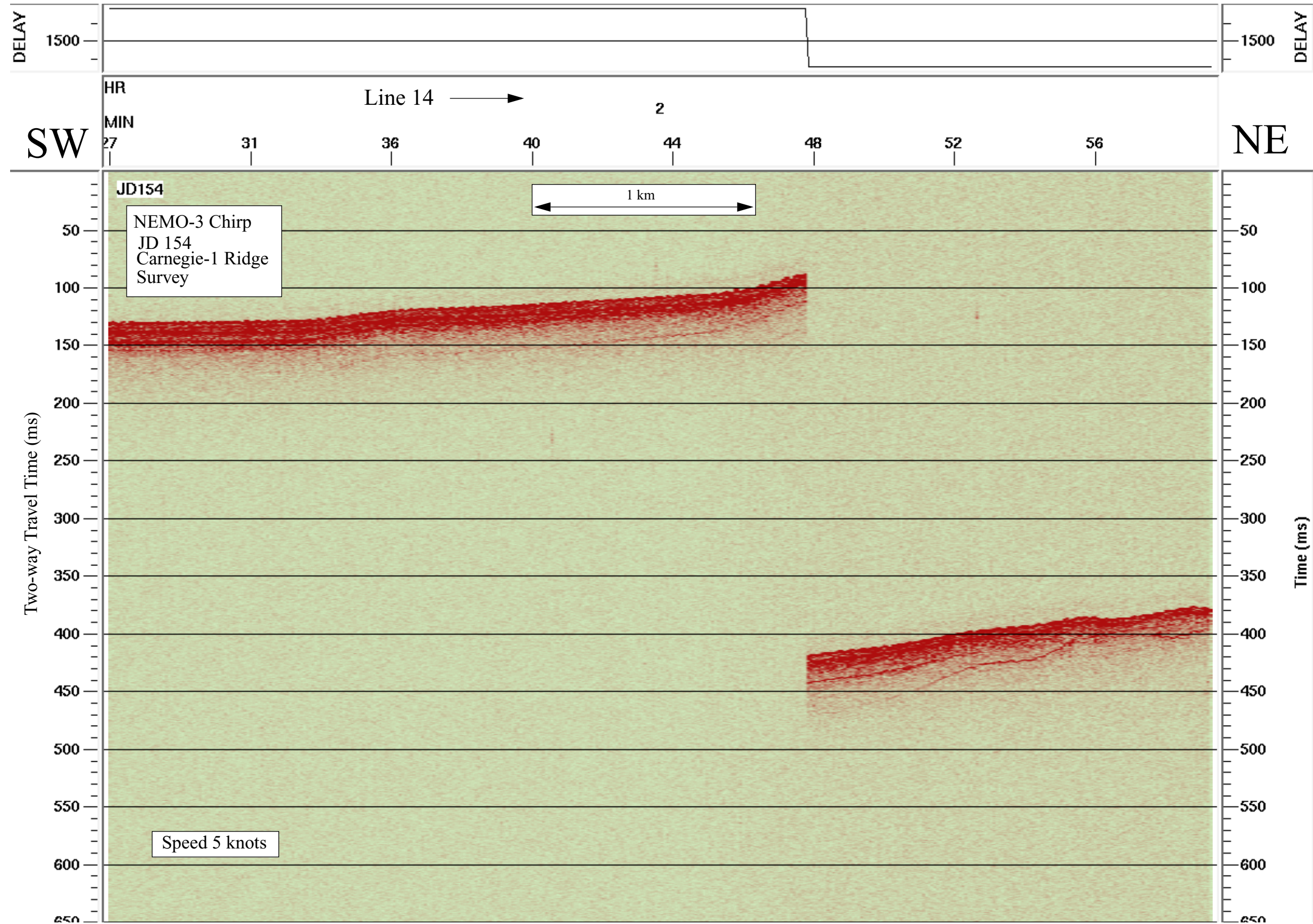
2-7 kHz Chirp Subbottom Profiler

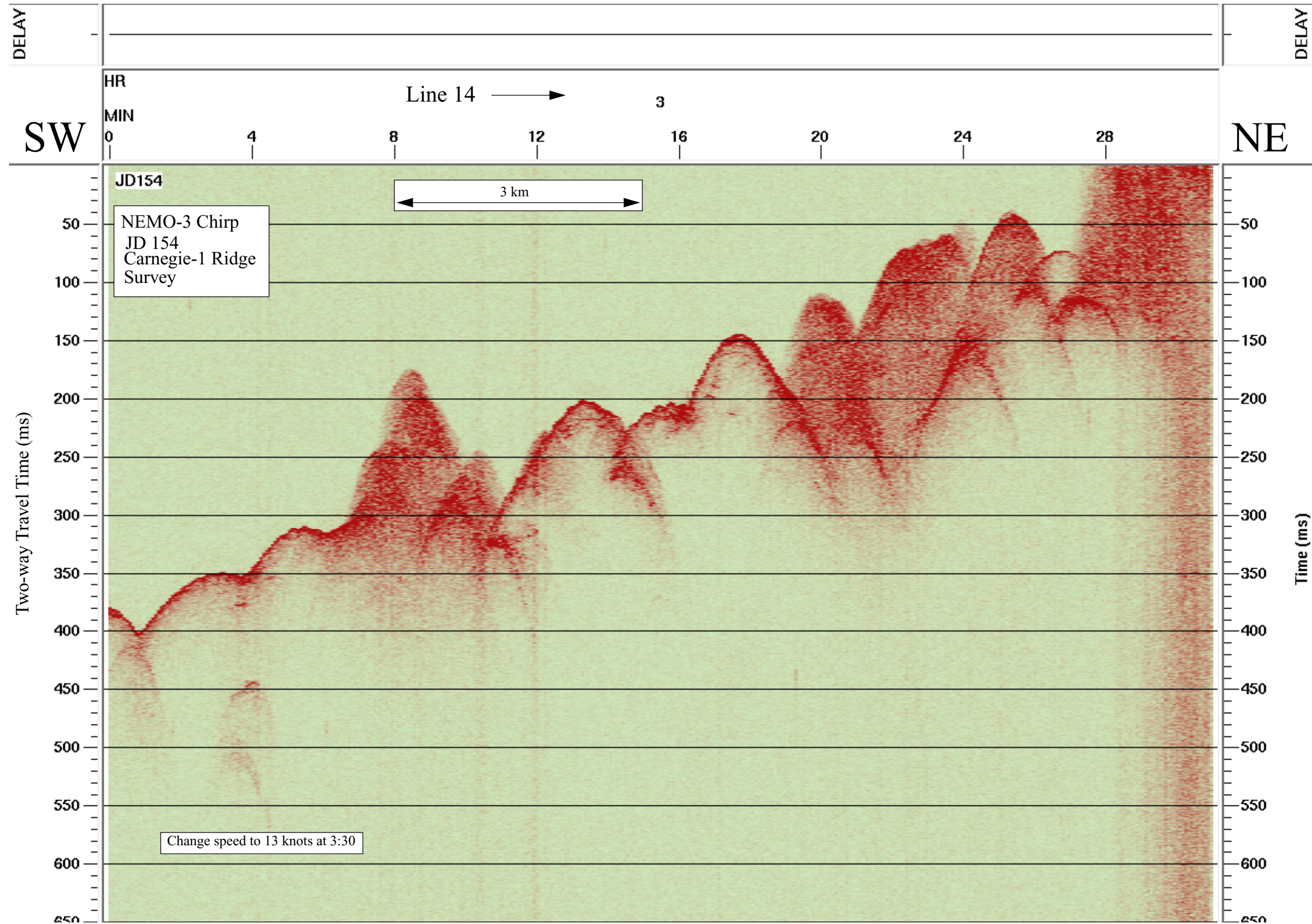
NEMO Leg 3

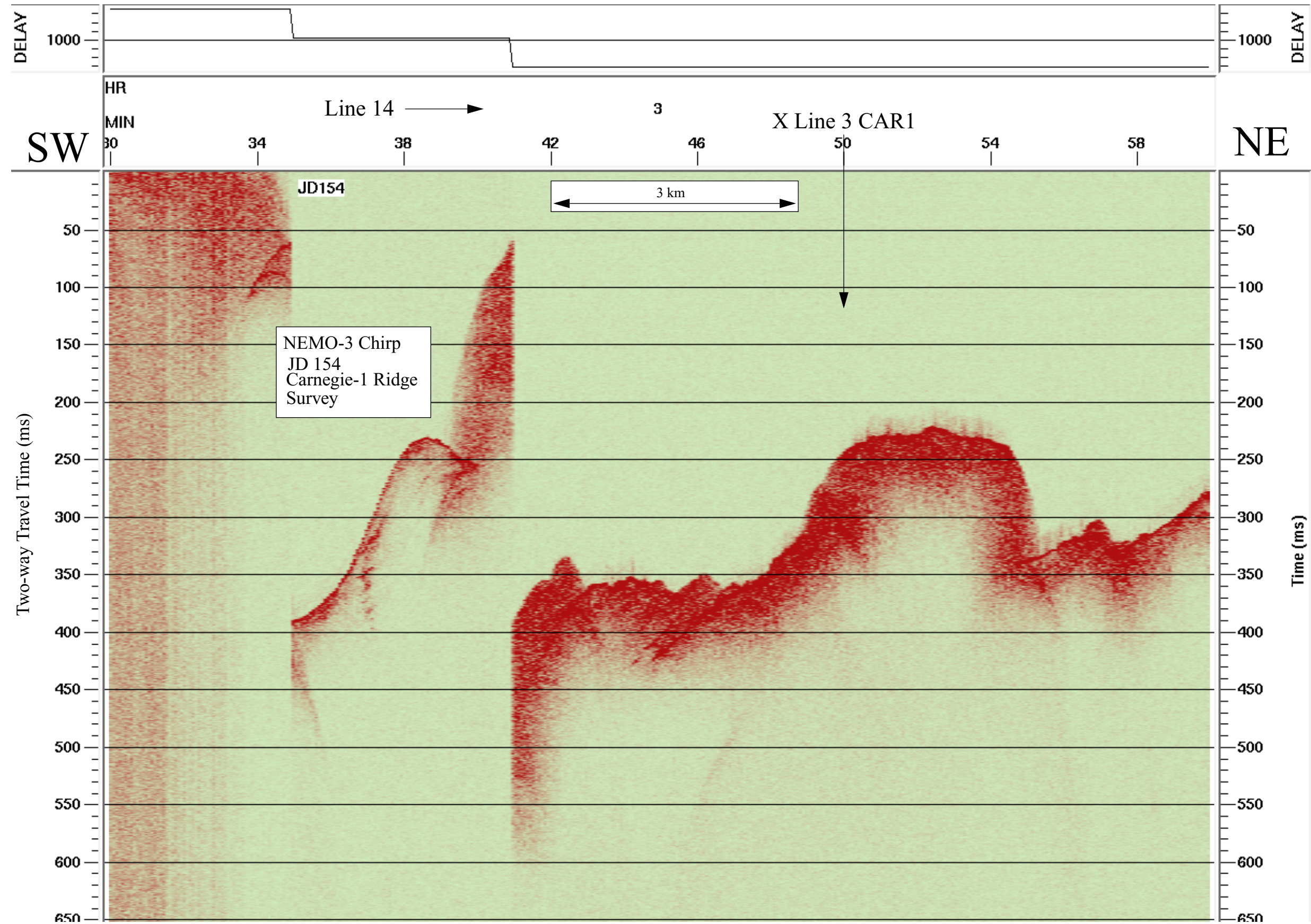
R/V Melville

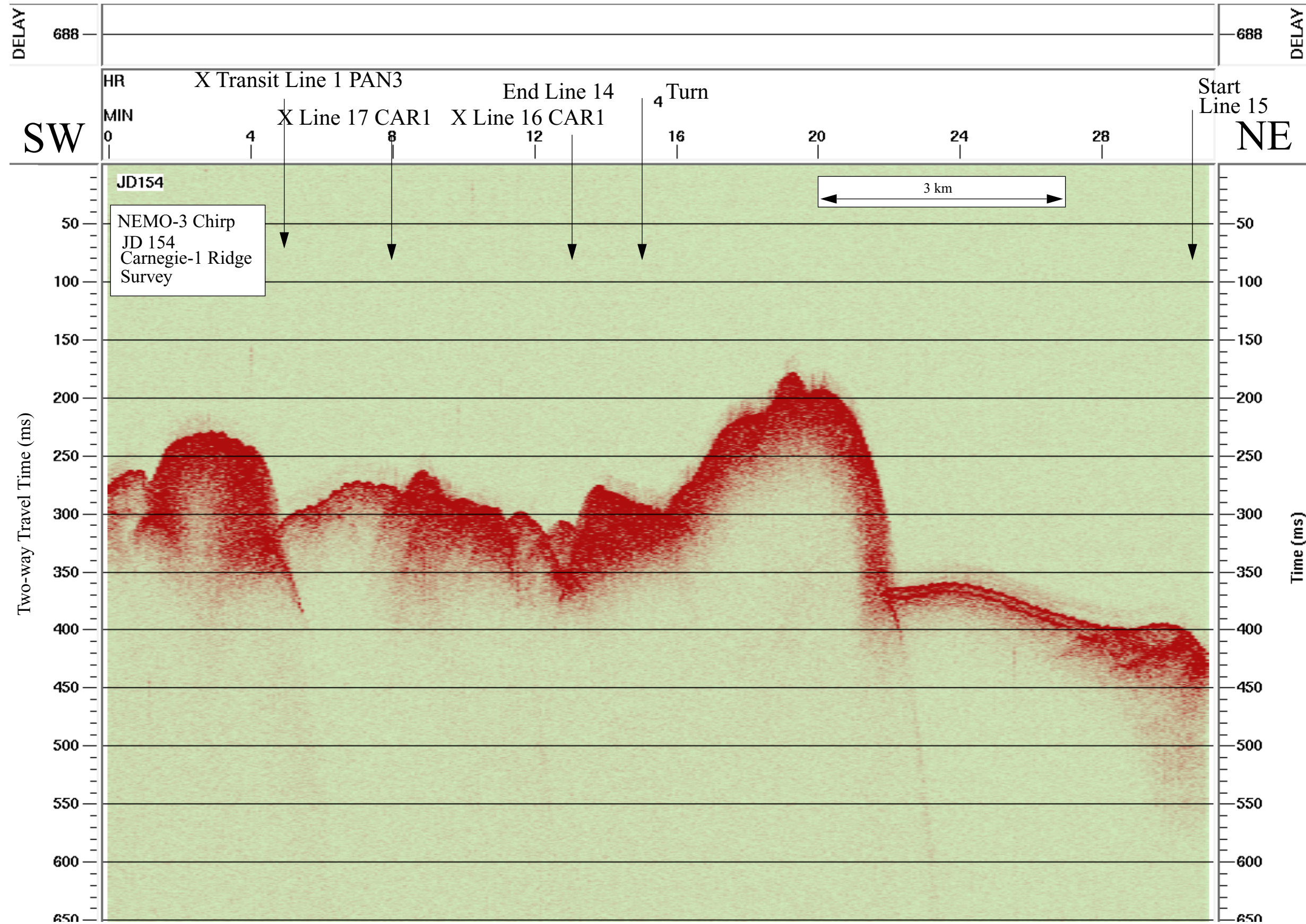
Data File SBfixavg.2000jun02.0000-0600

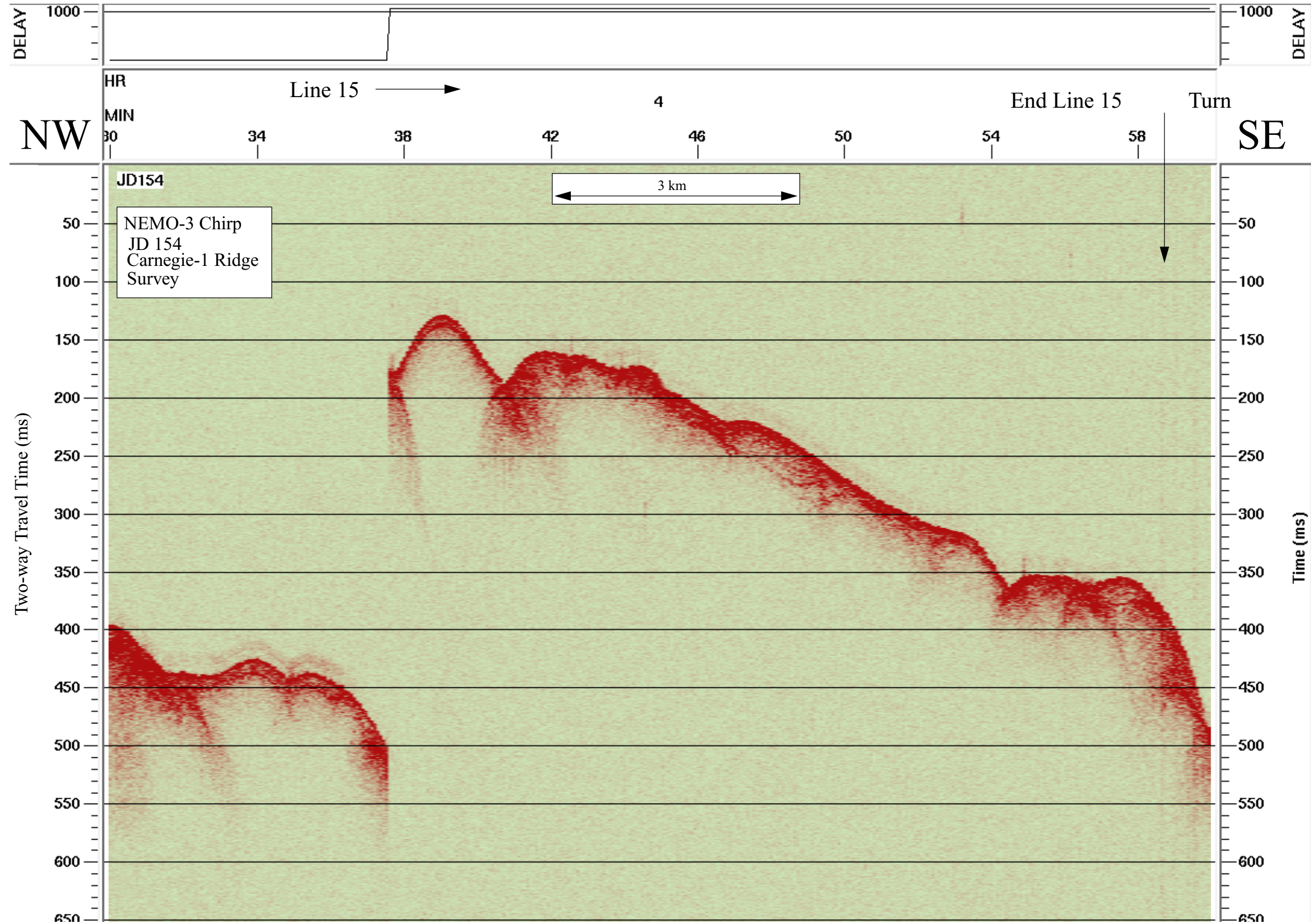


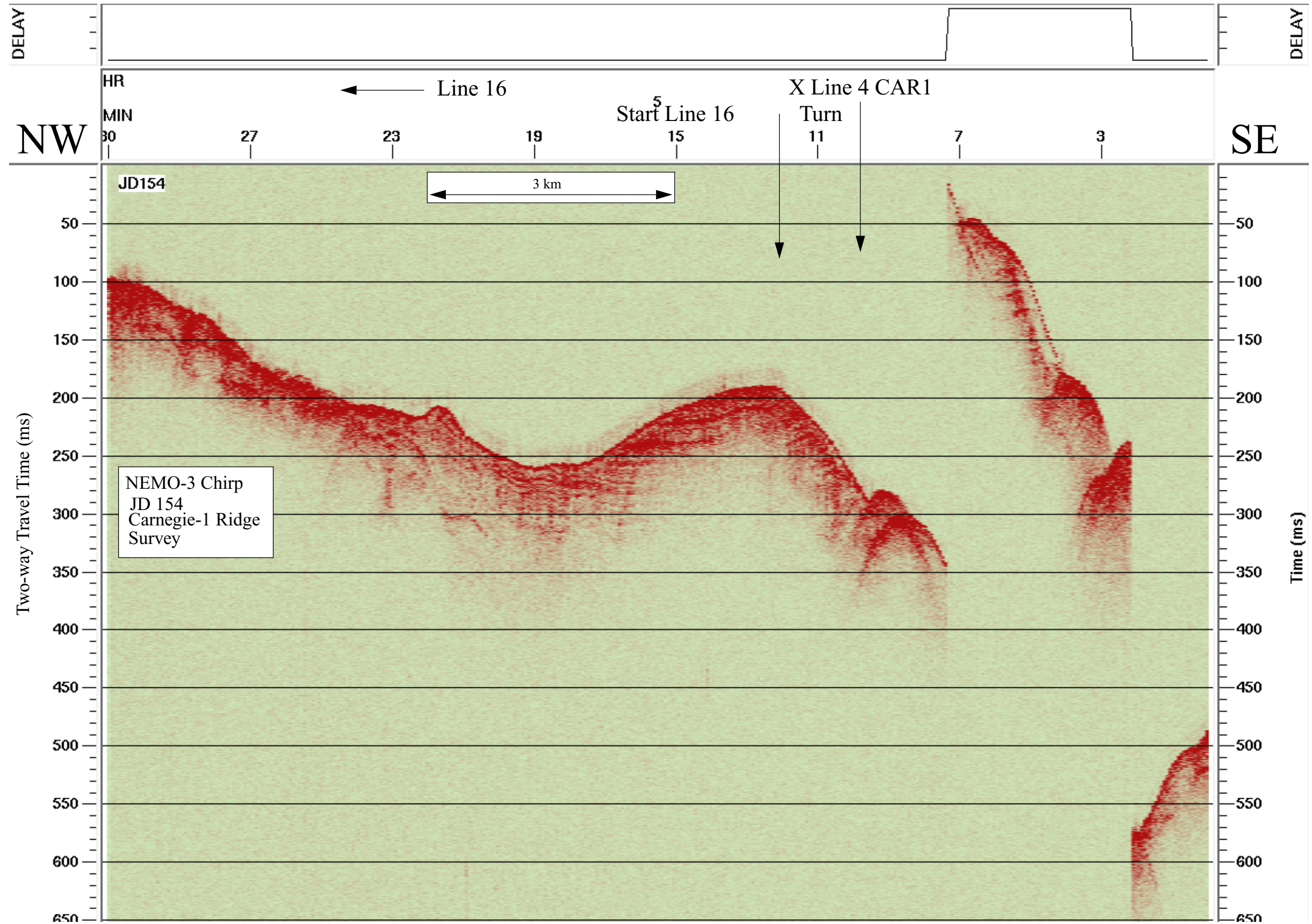


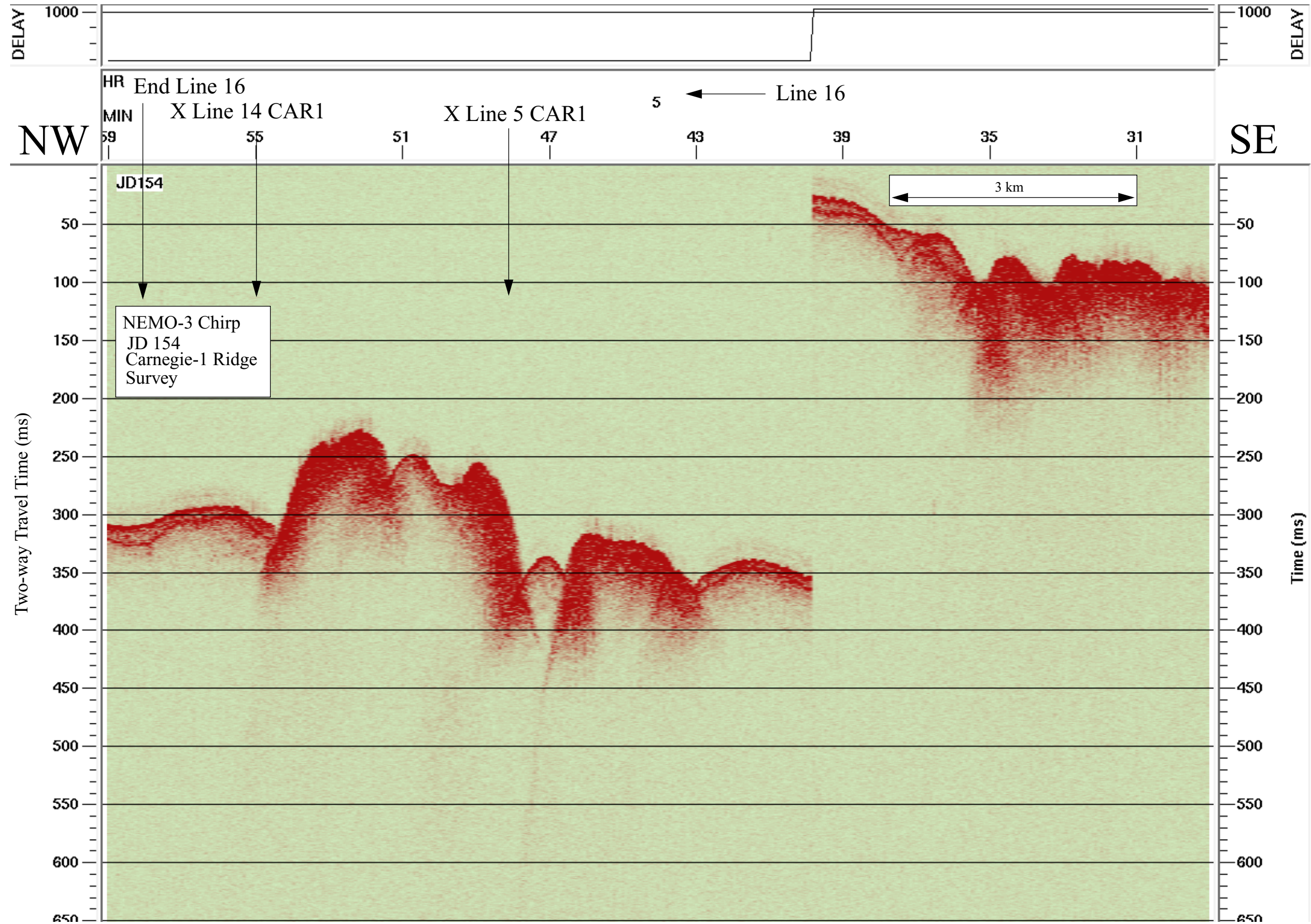




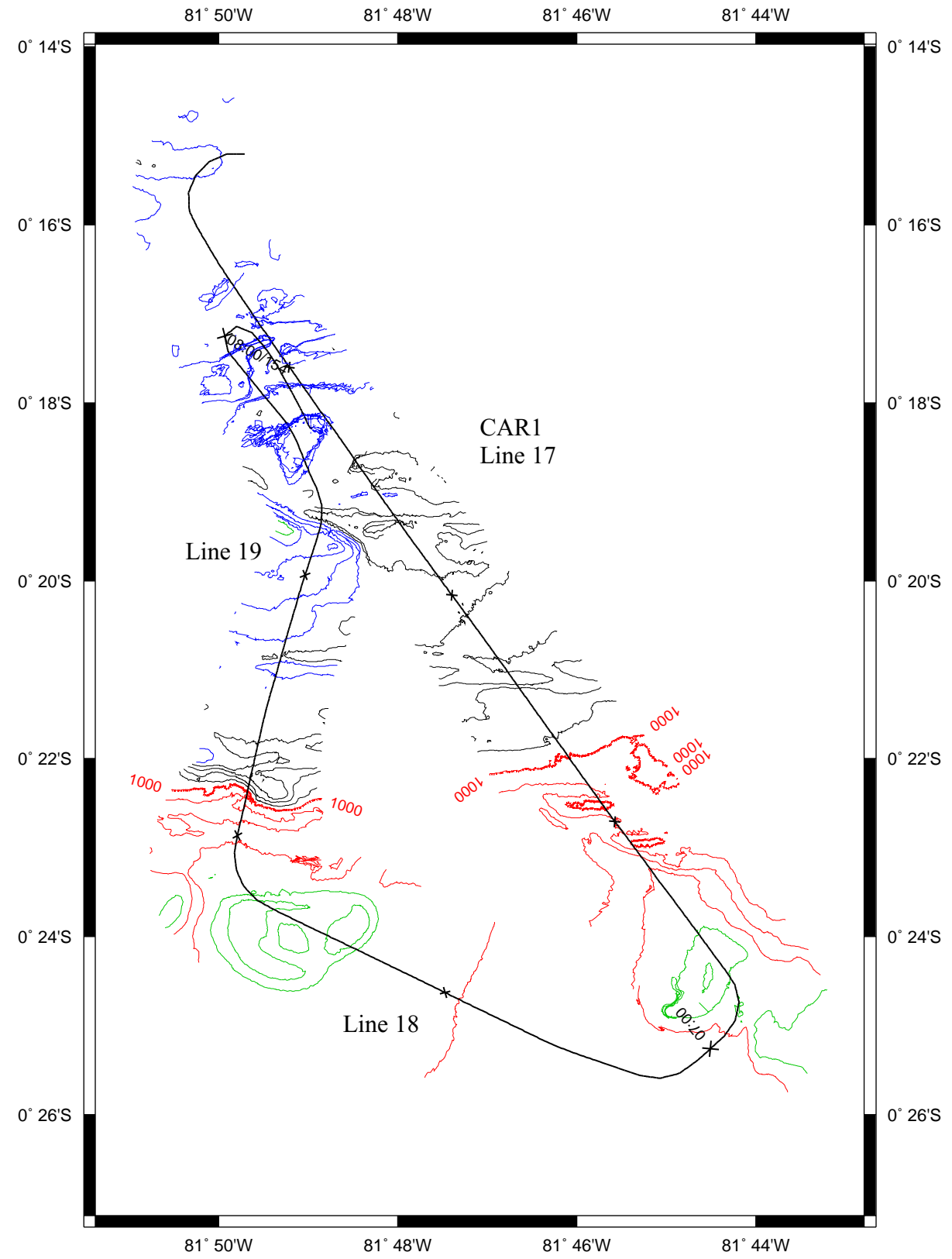


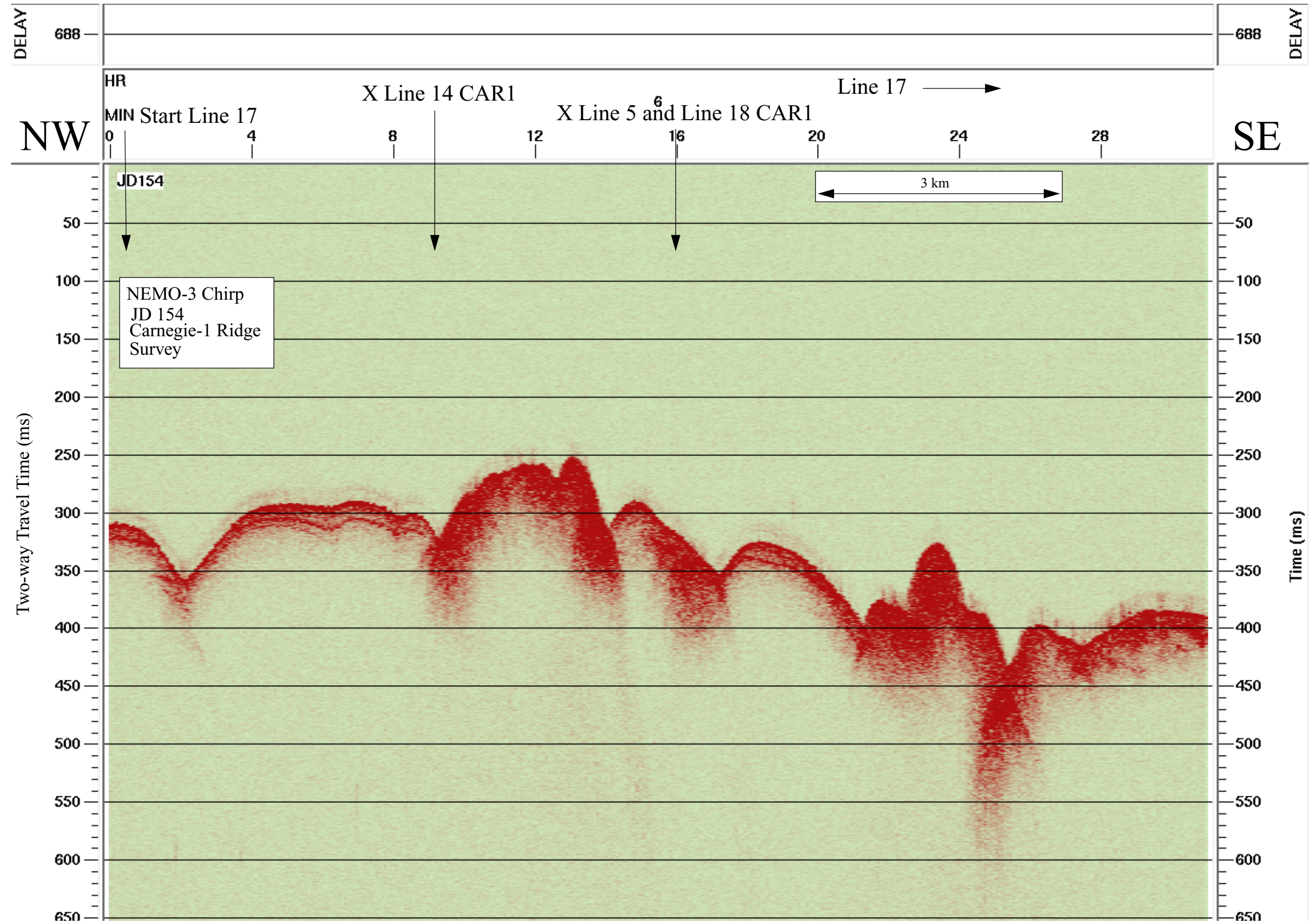


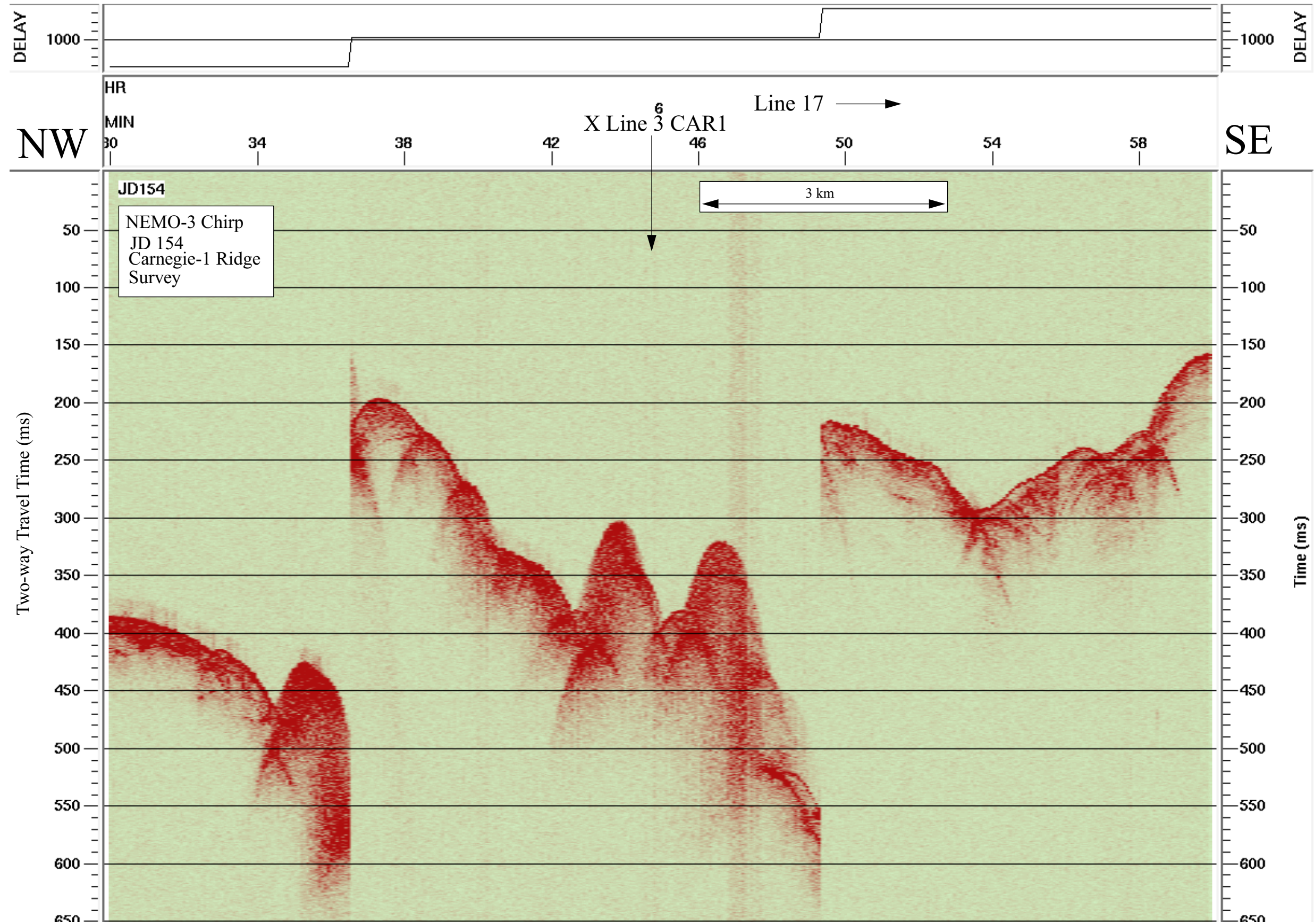


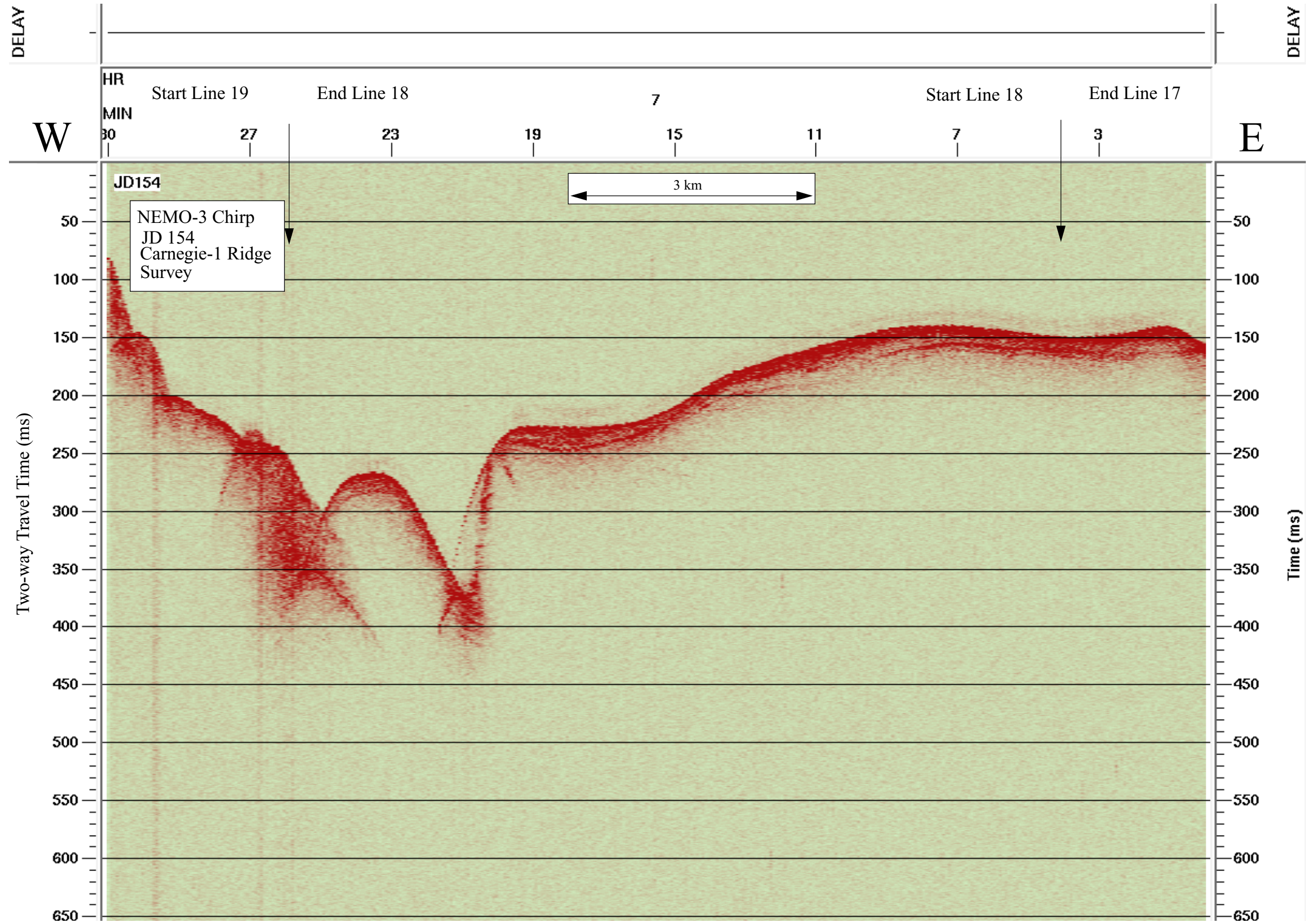


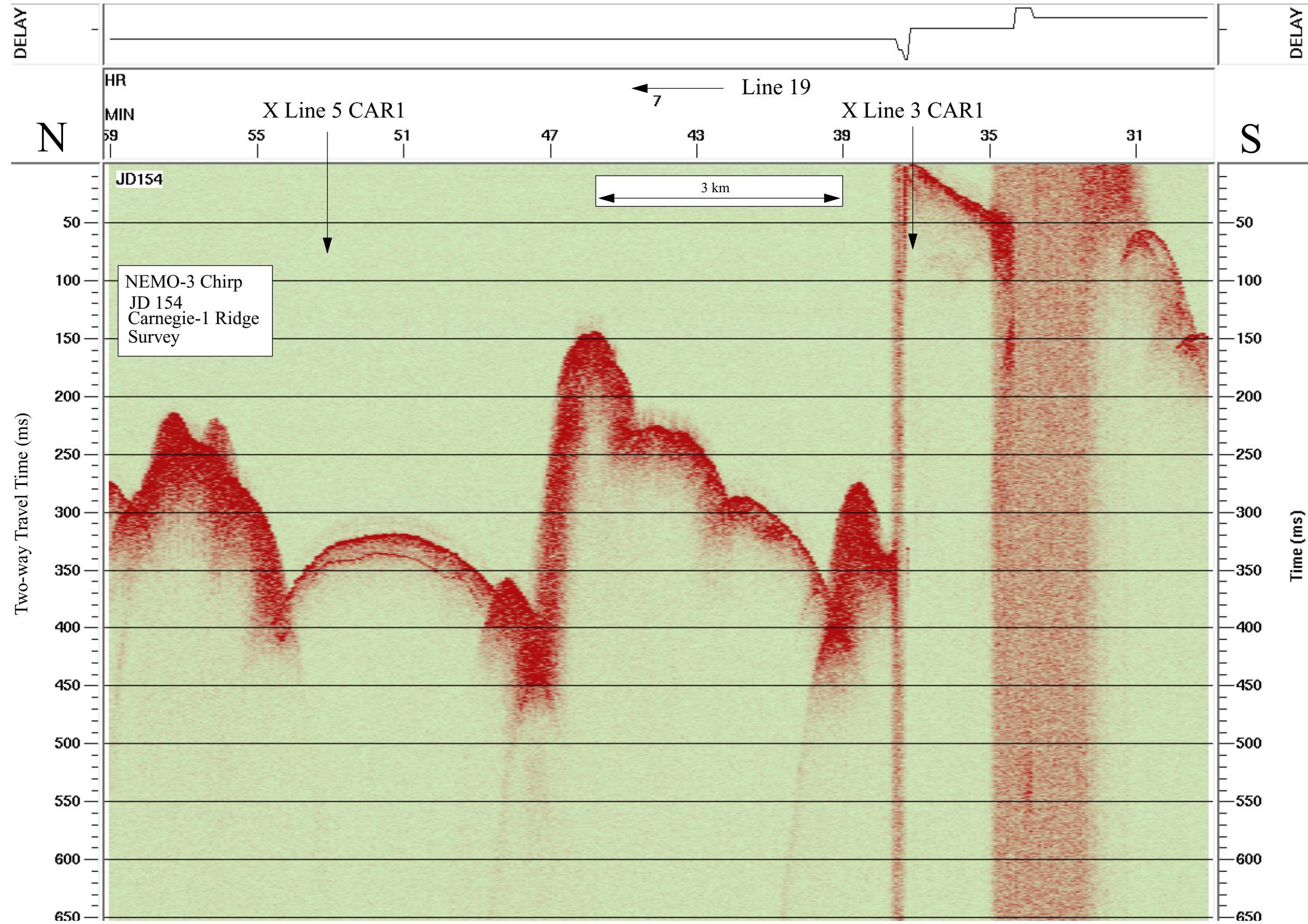
Data File SBfixavg.2000jun02.0600-1200

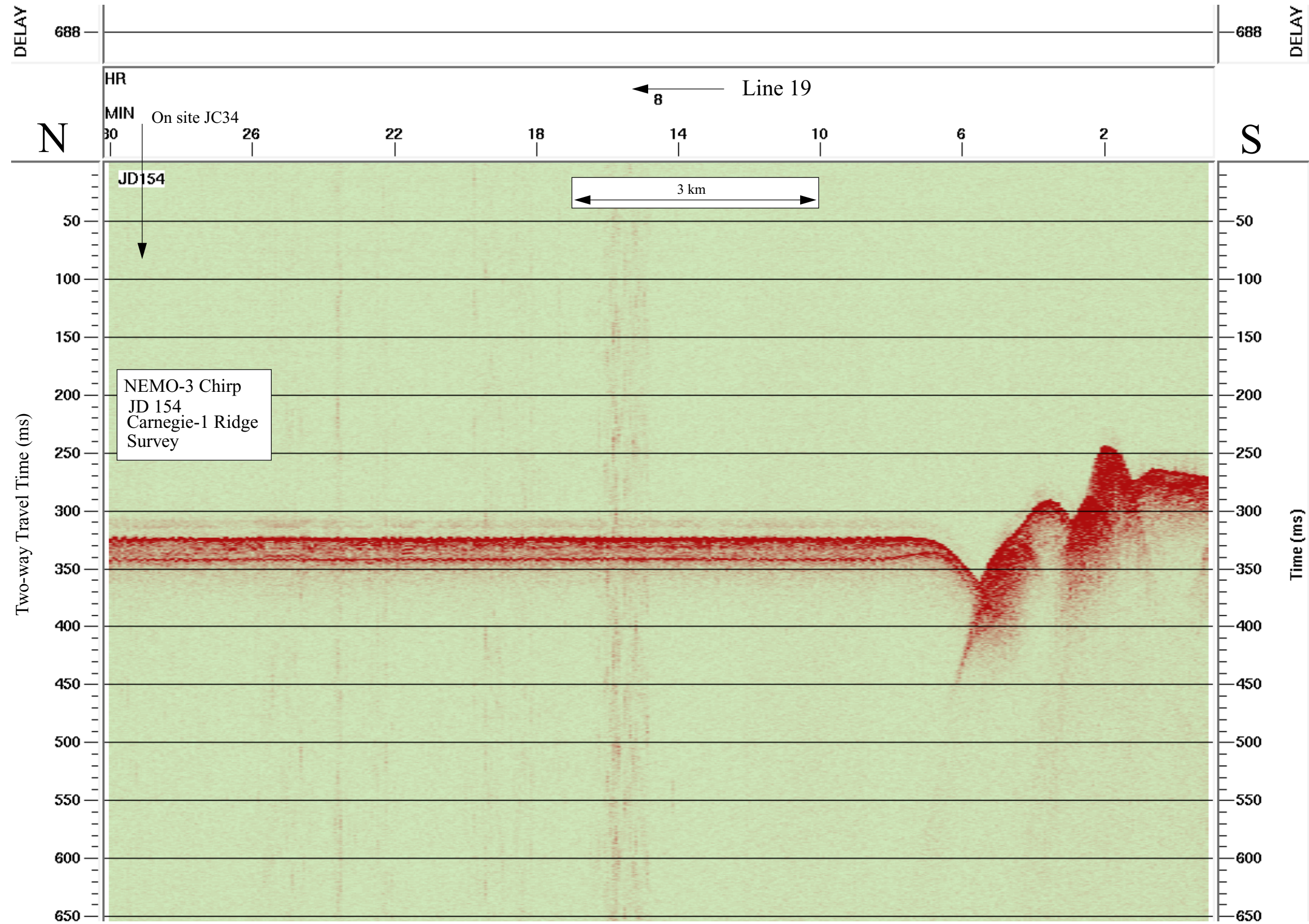




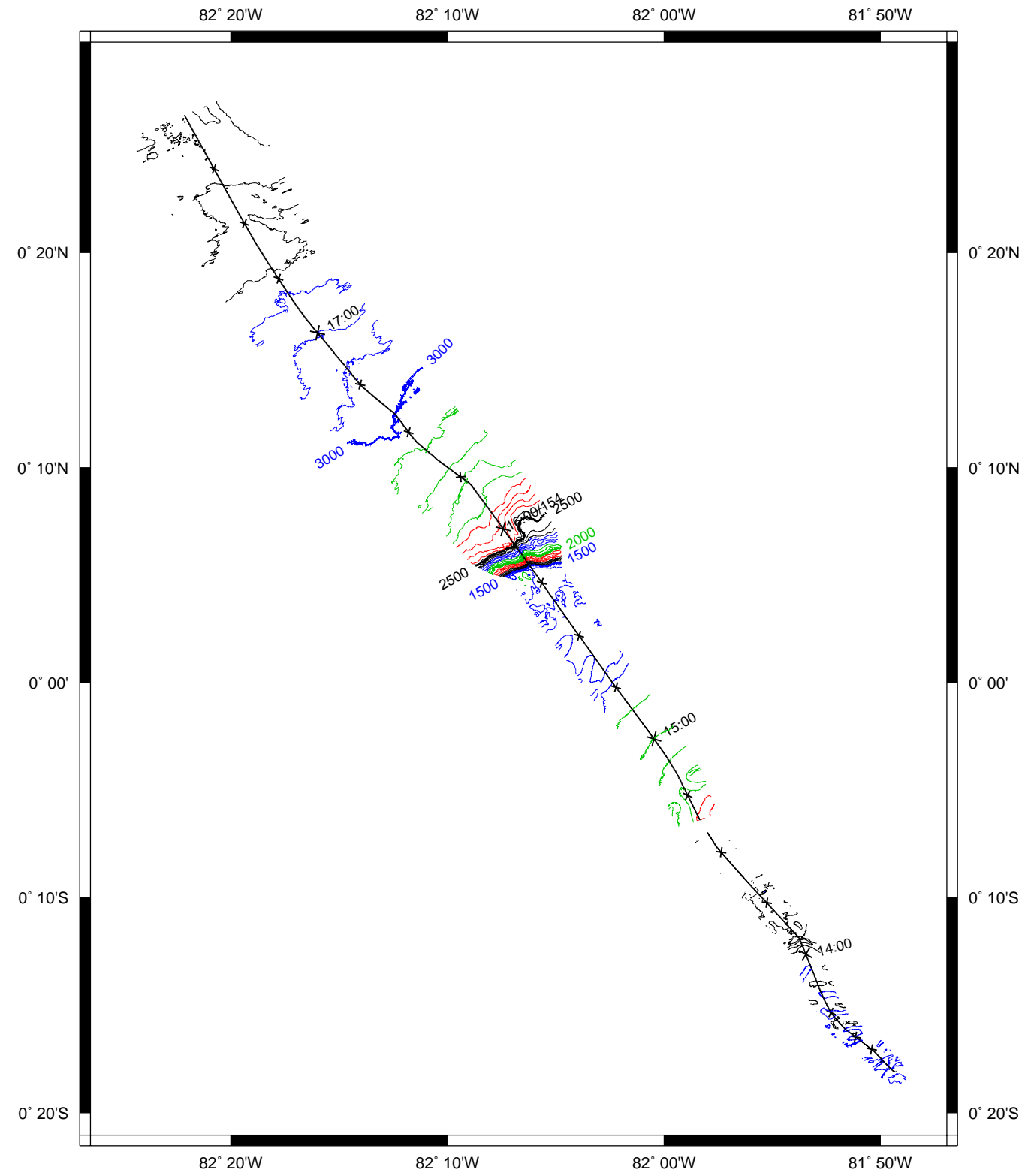


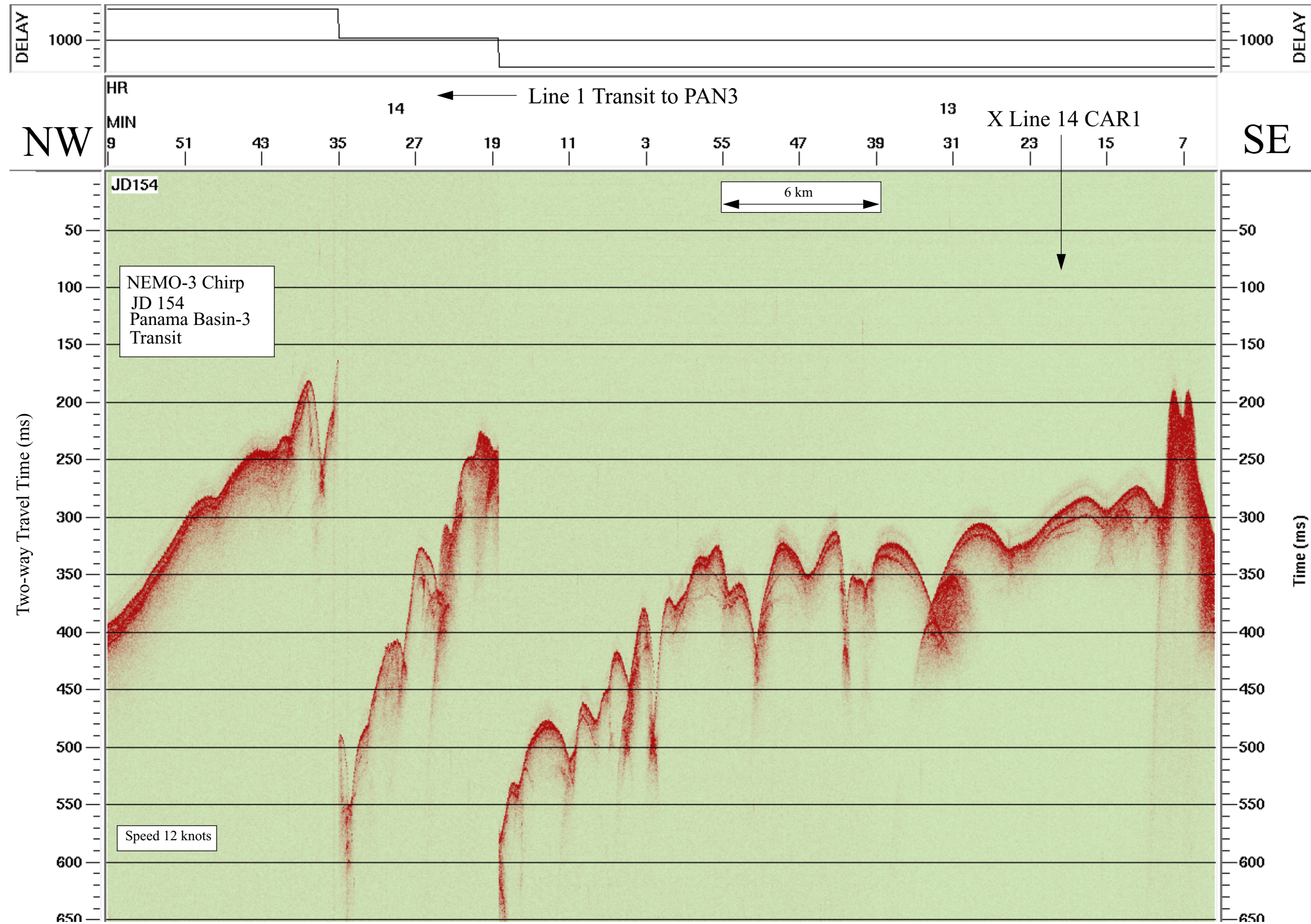


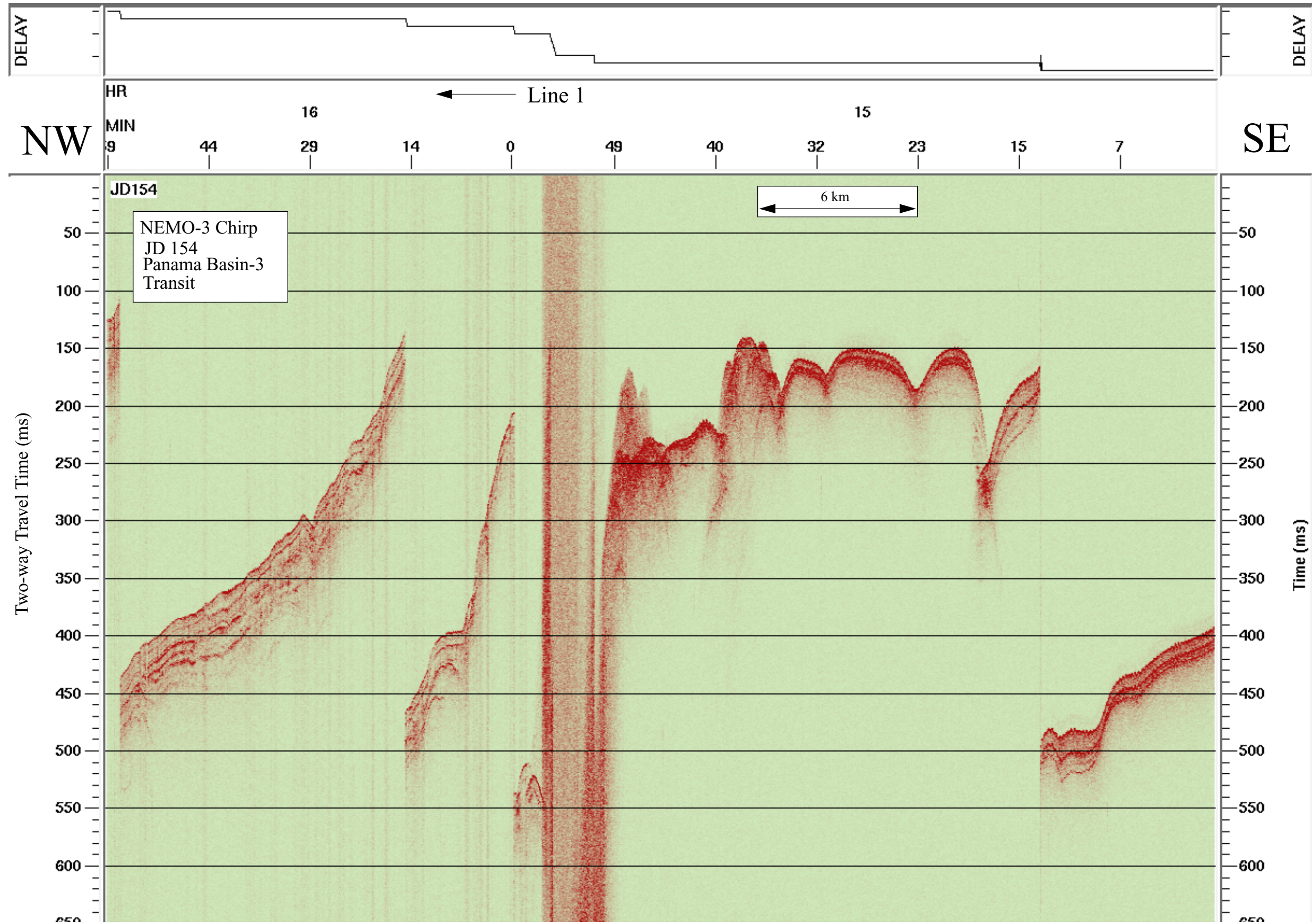




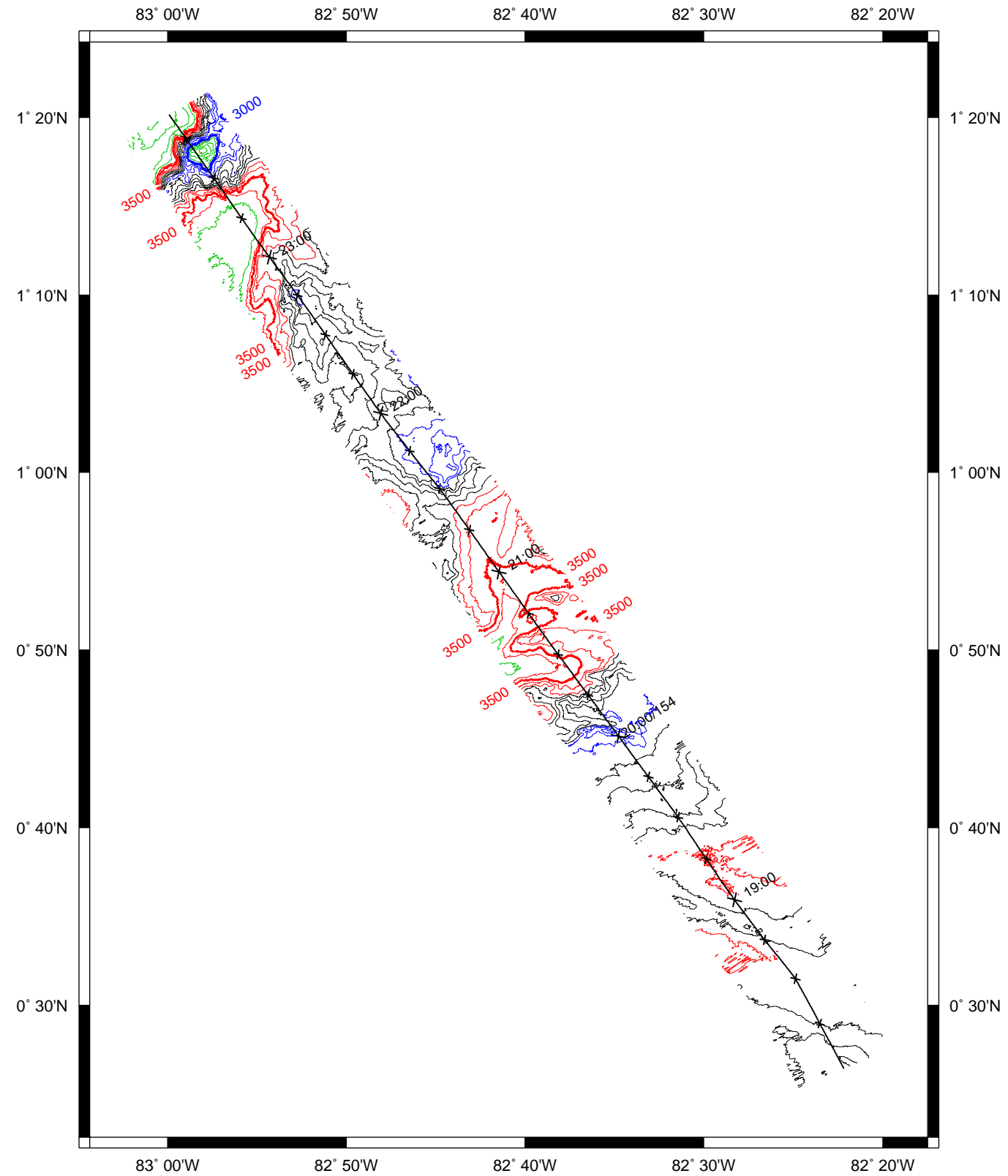
Data File SBfixavg.2000jun02.1200-1800

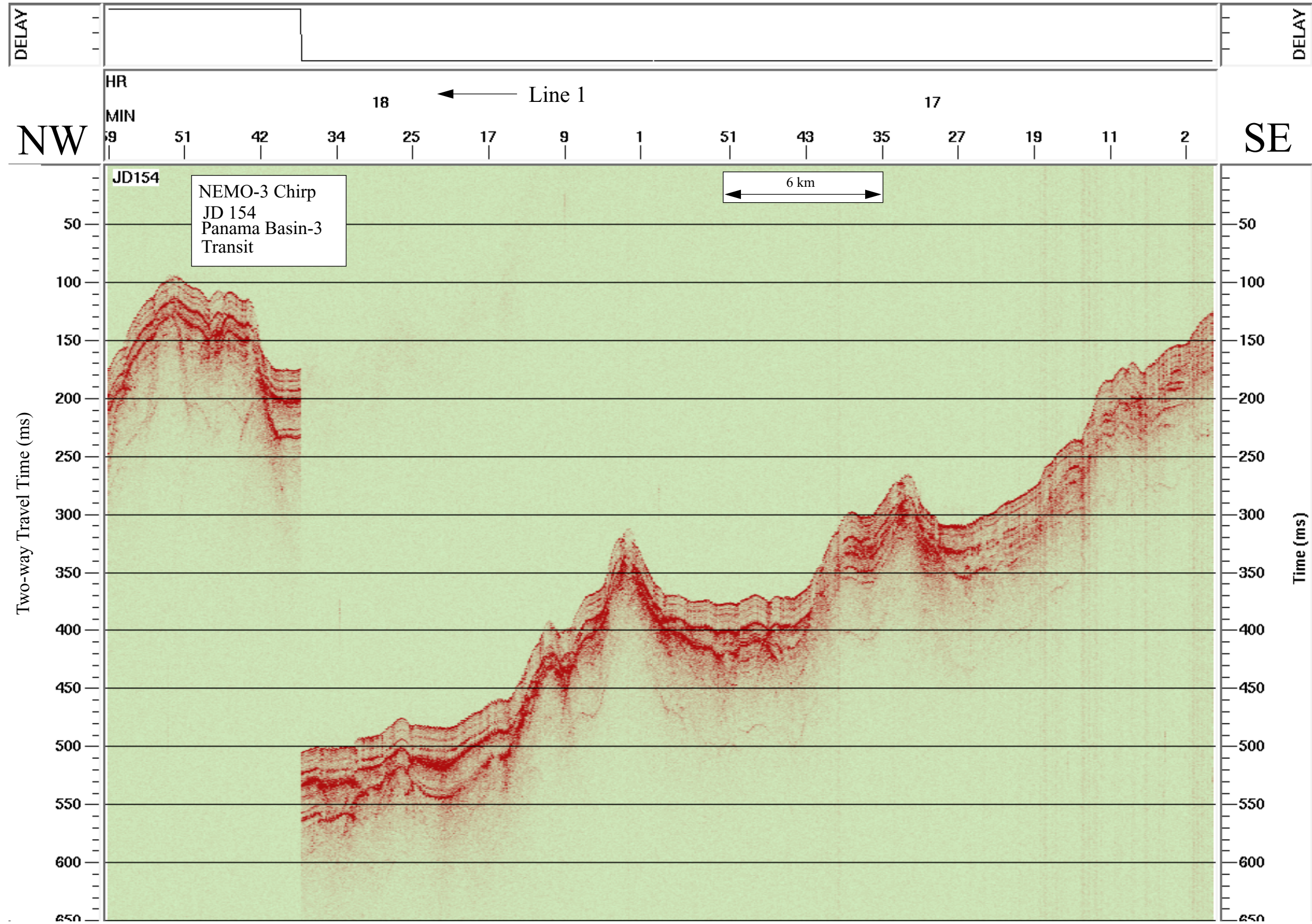


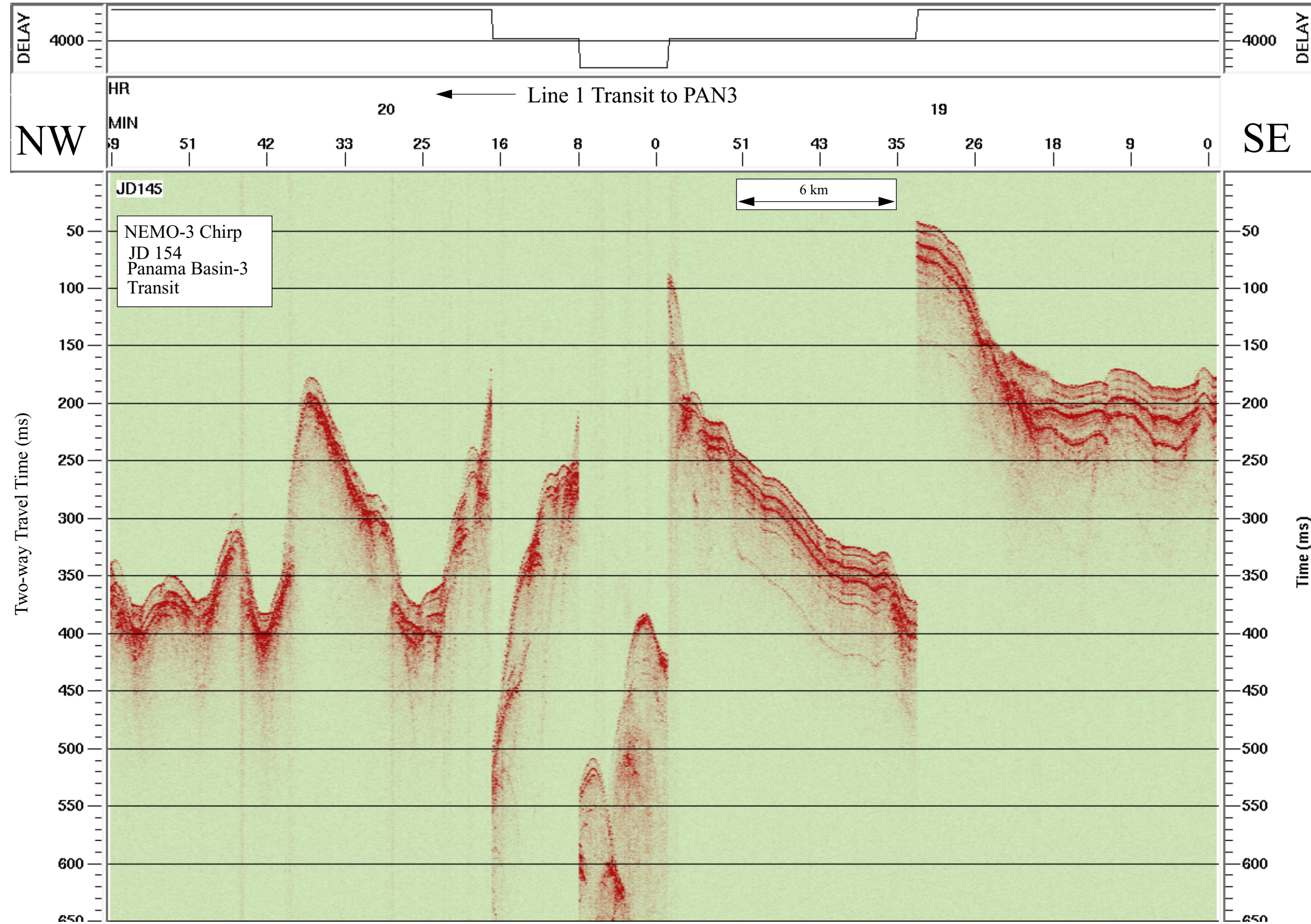


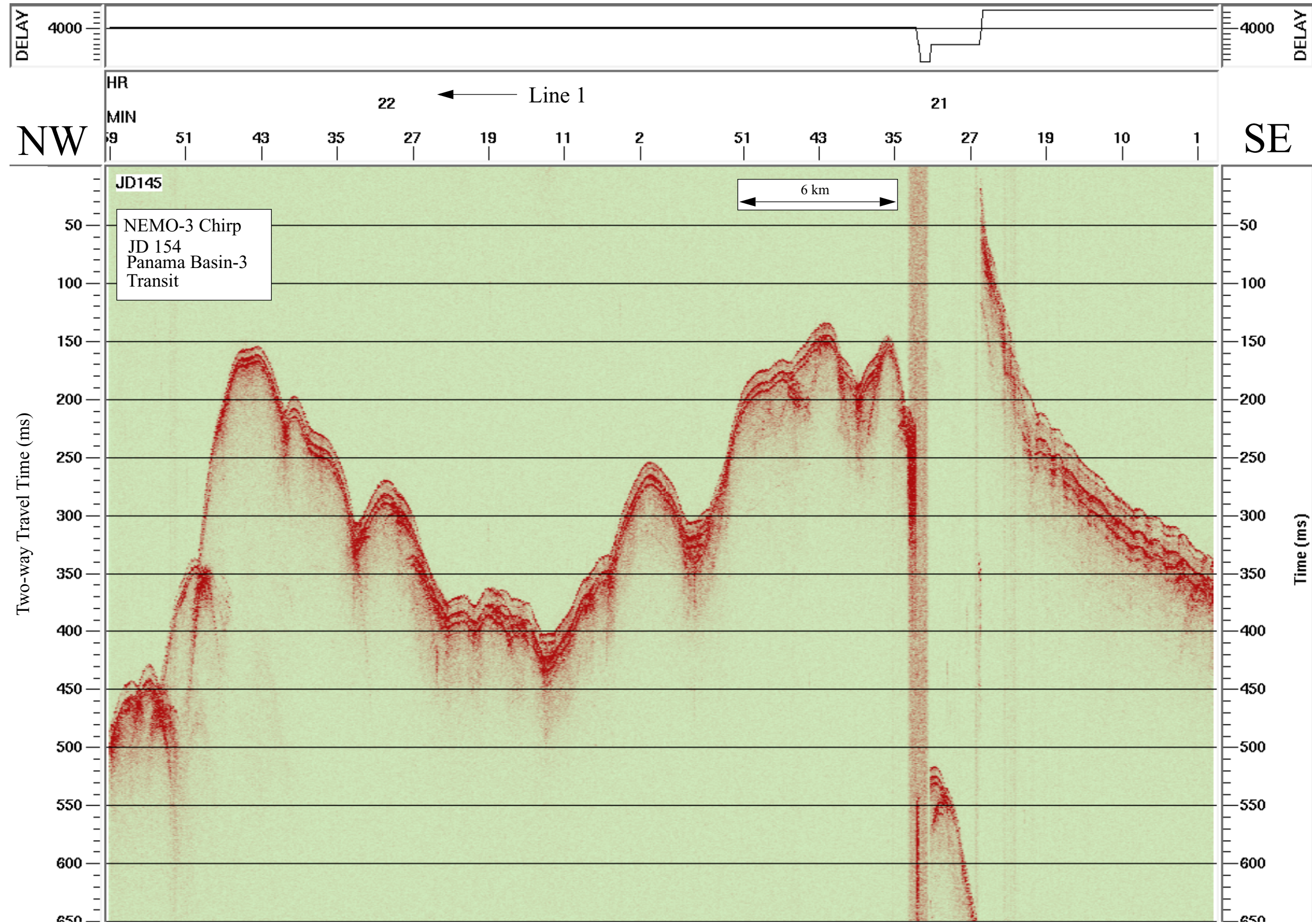


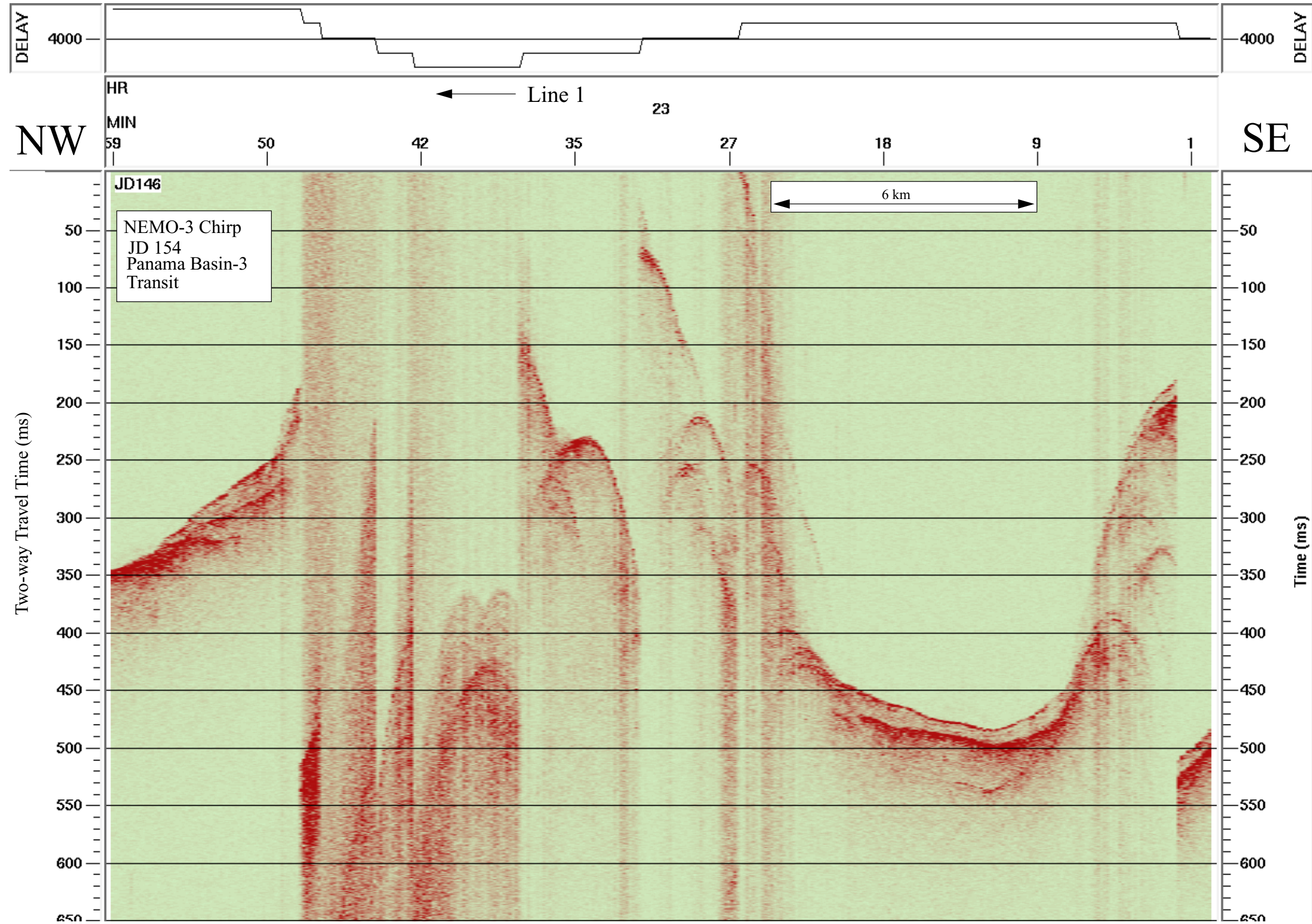
Data File SBfixavg.2000jun02.1800-2400











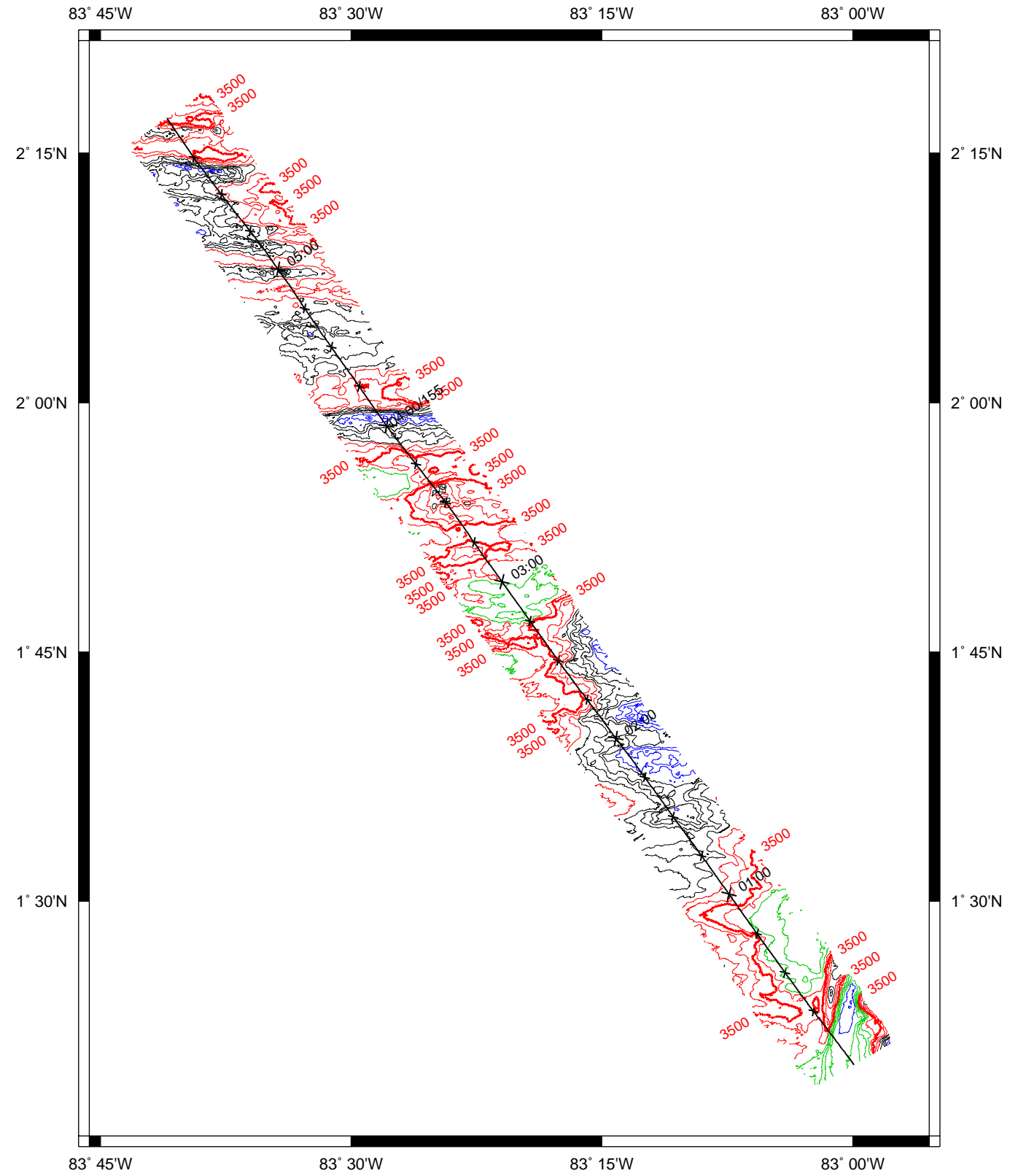
JD 155 (3 June 2000)--PAN-3 Survey, Deep Panama Basin

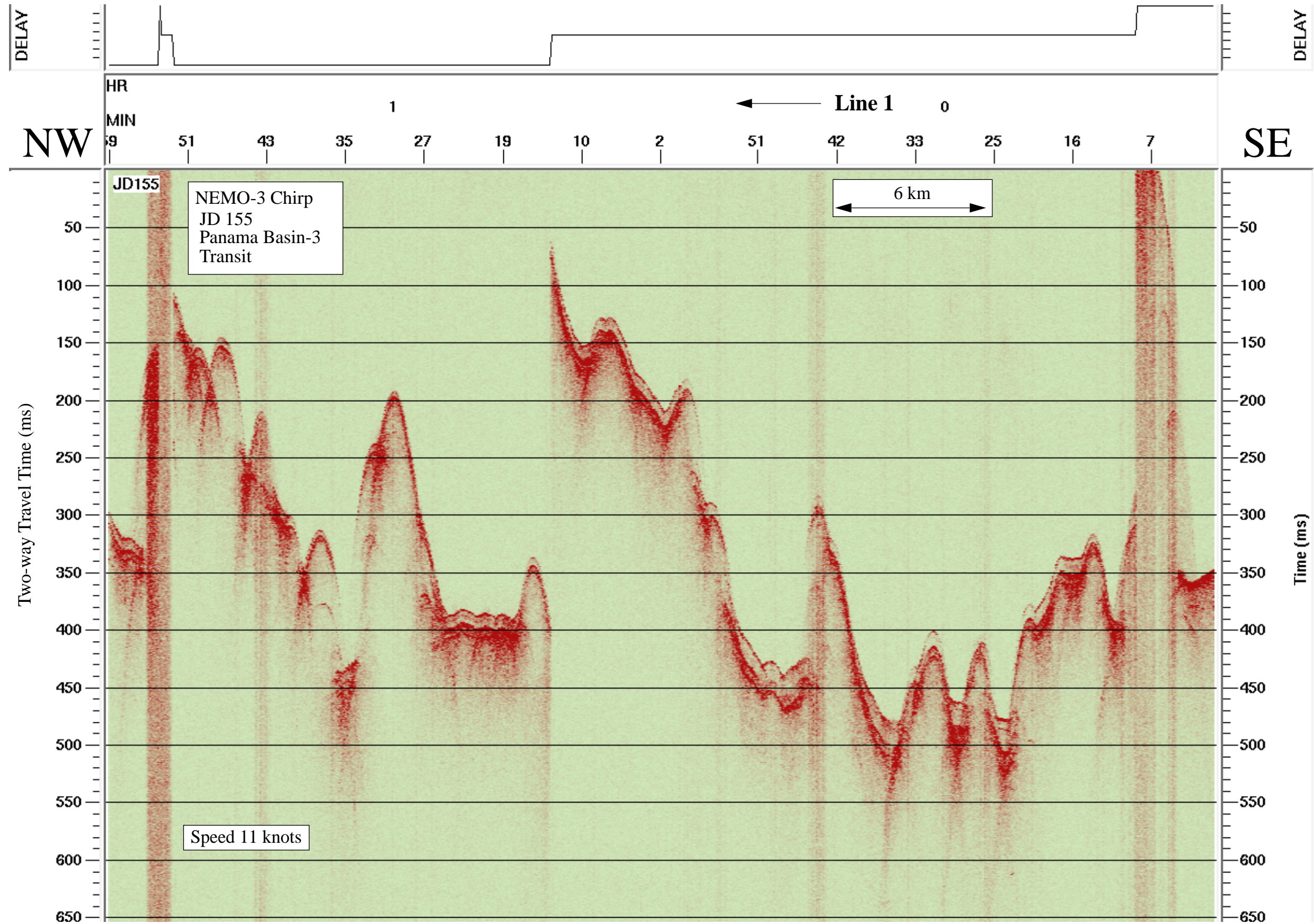
2-7 kHz Chirp Subbottom Profiler

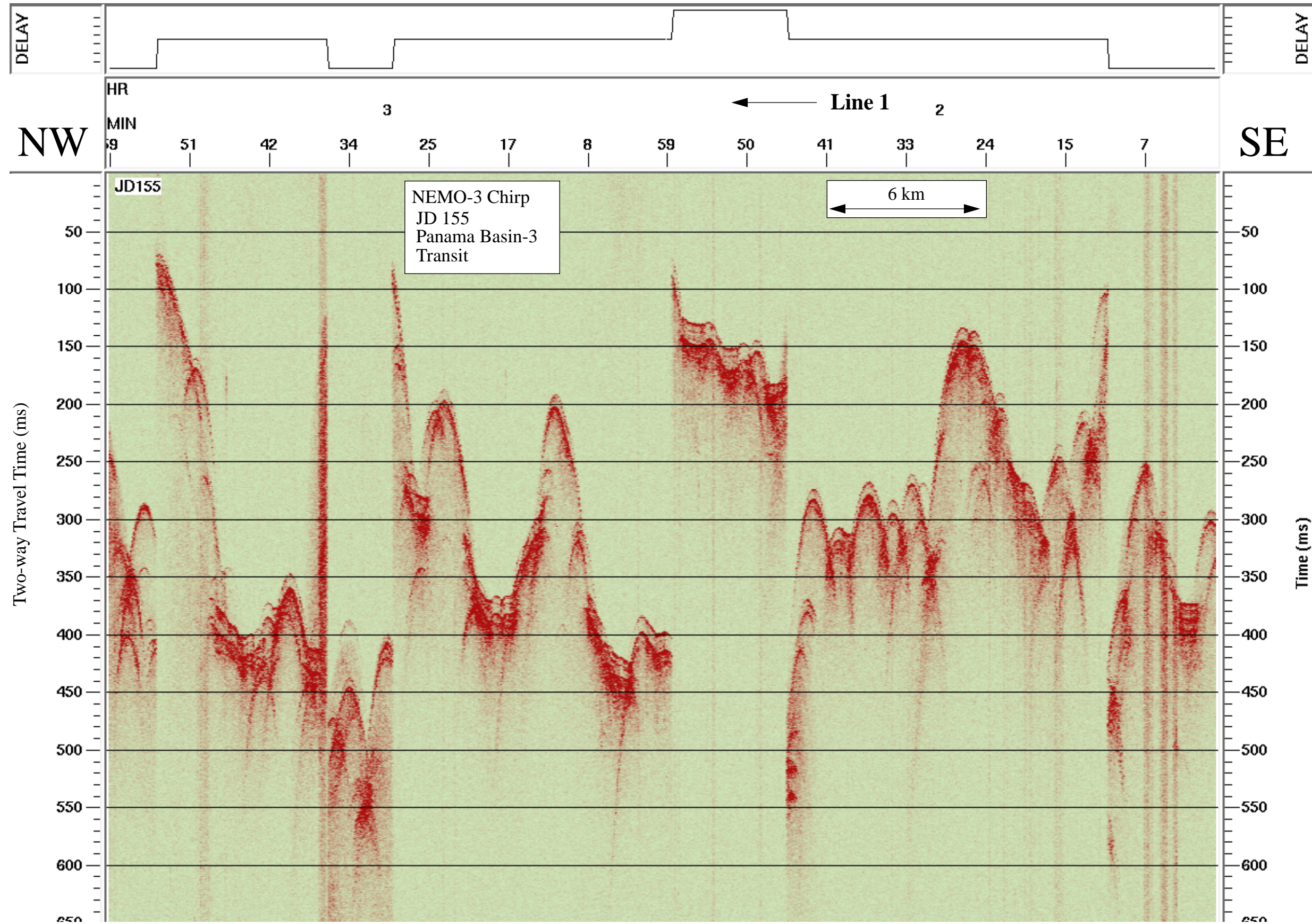
NEMO Leg 3

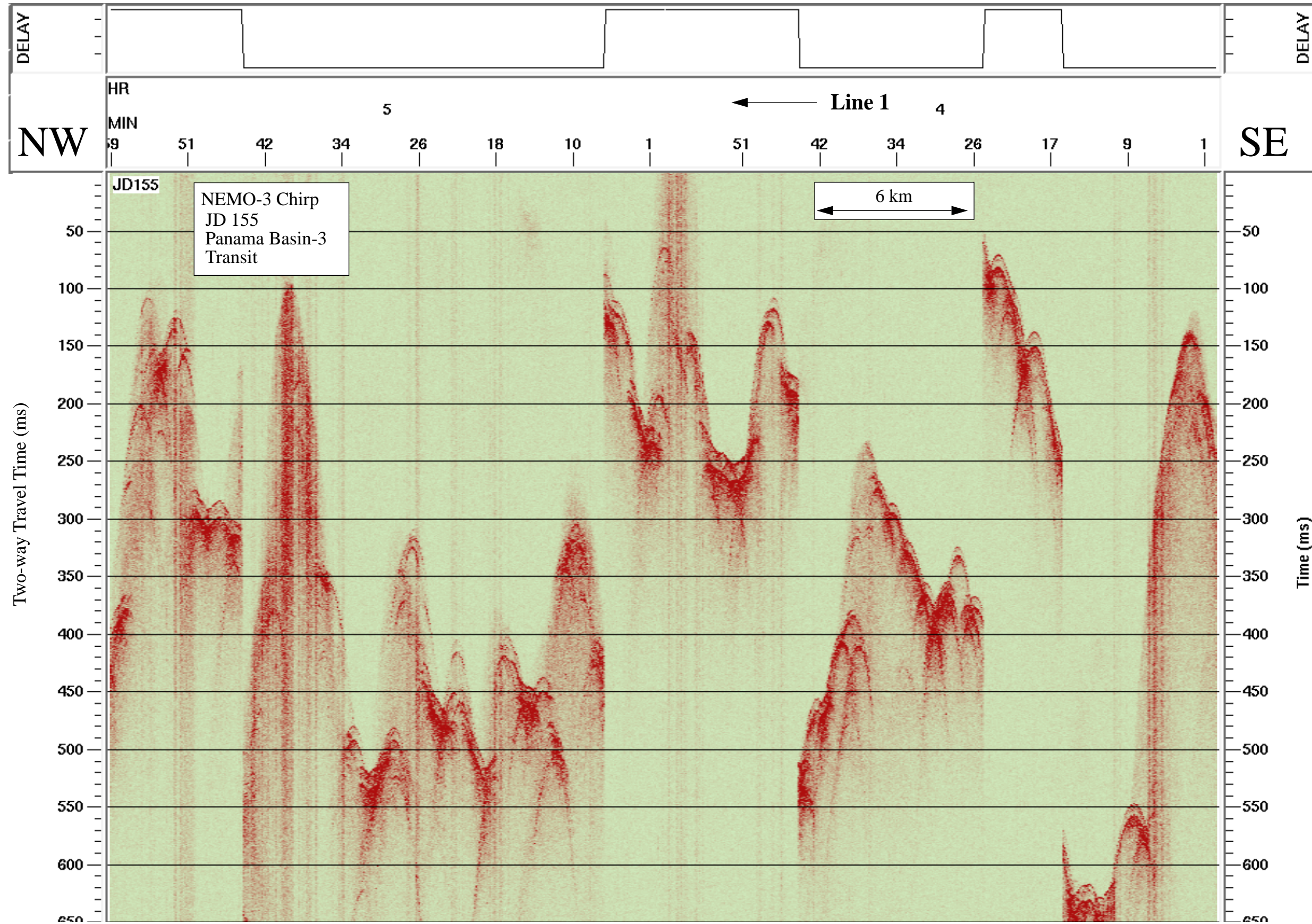
R/V Melville

Data File SBfixavg.2000jun03.0000-0600

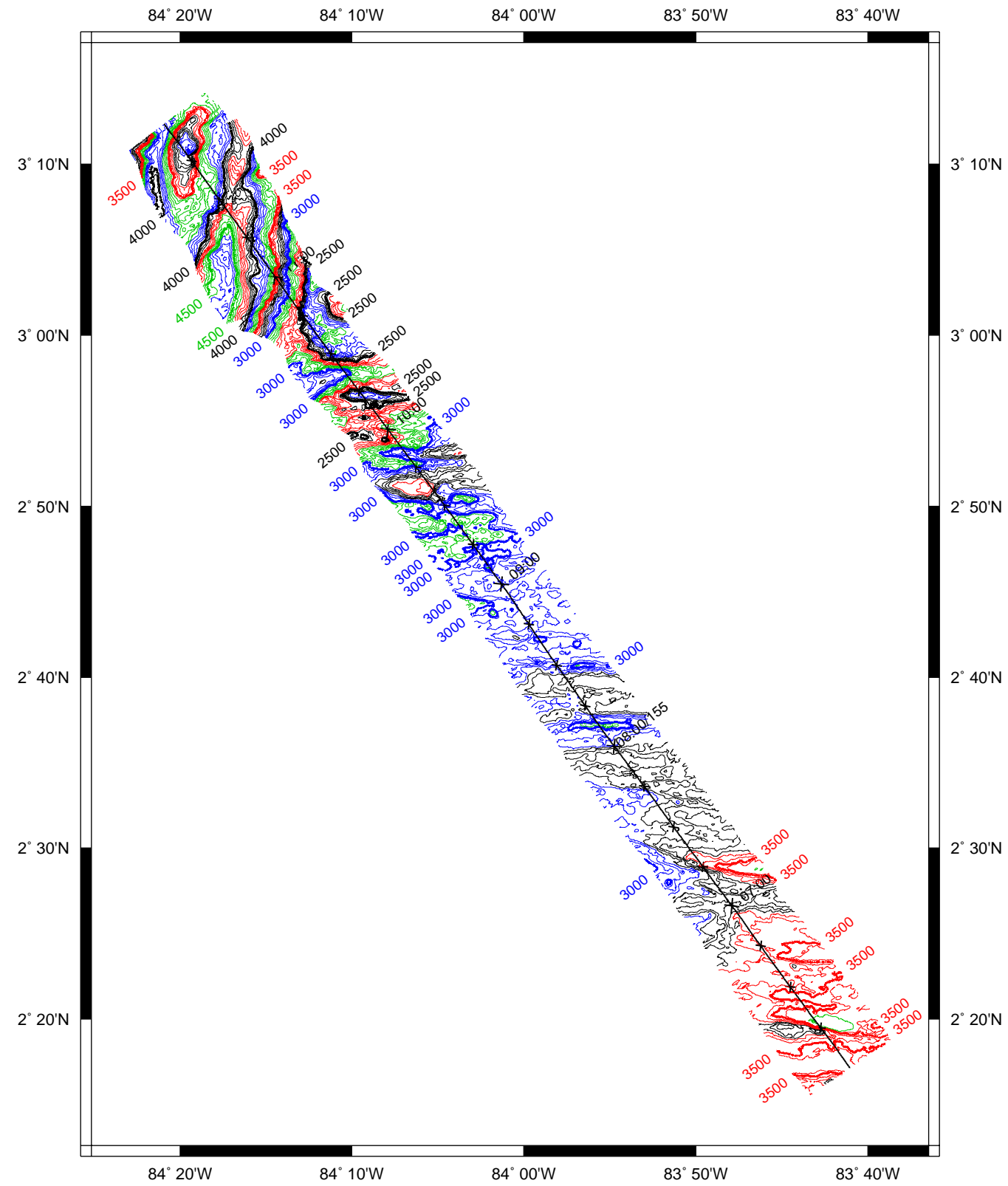


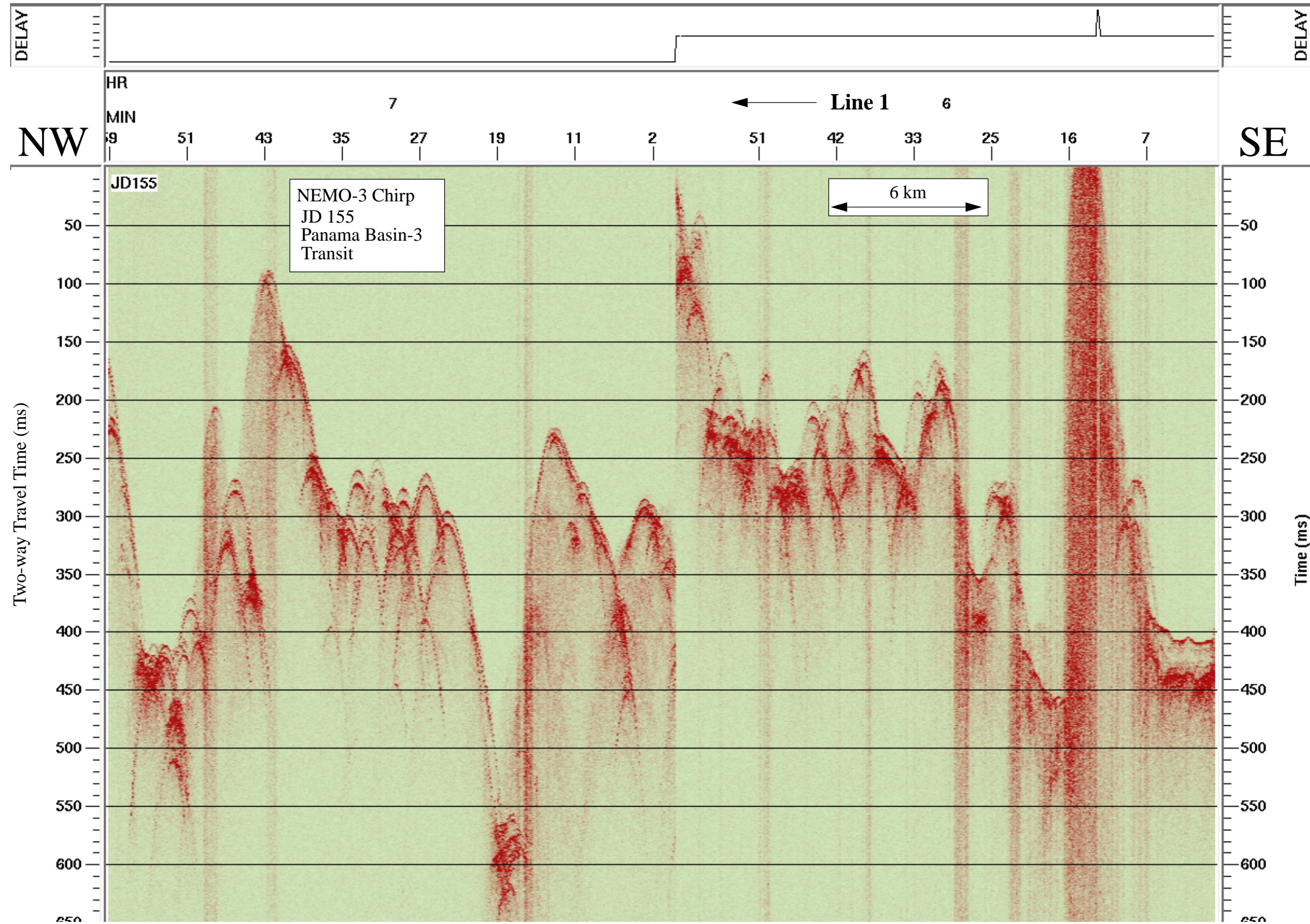


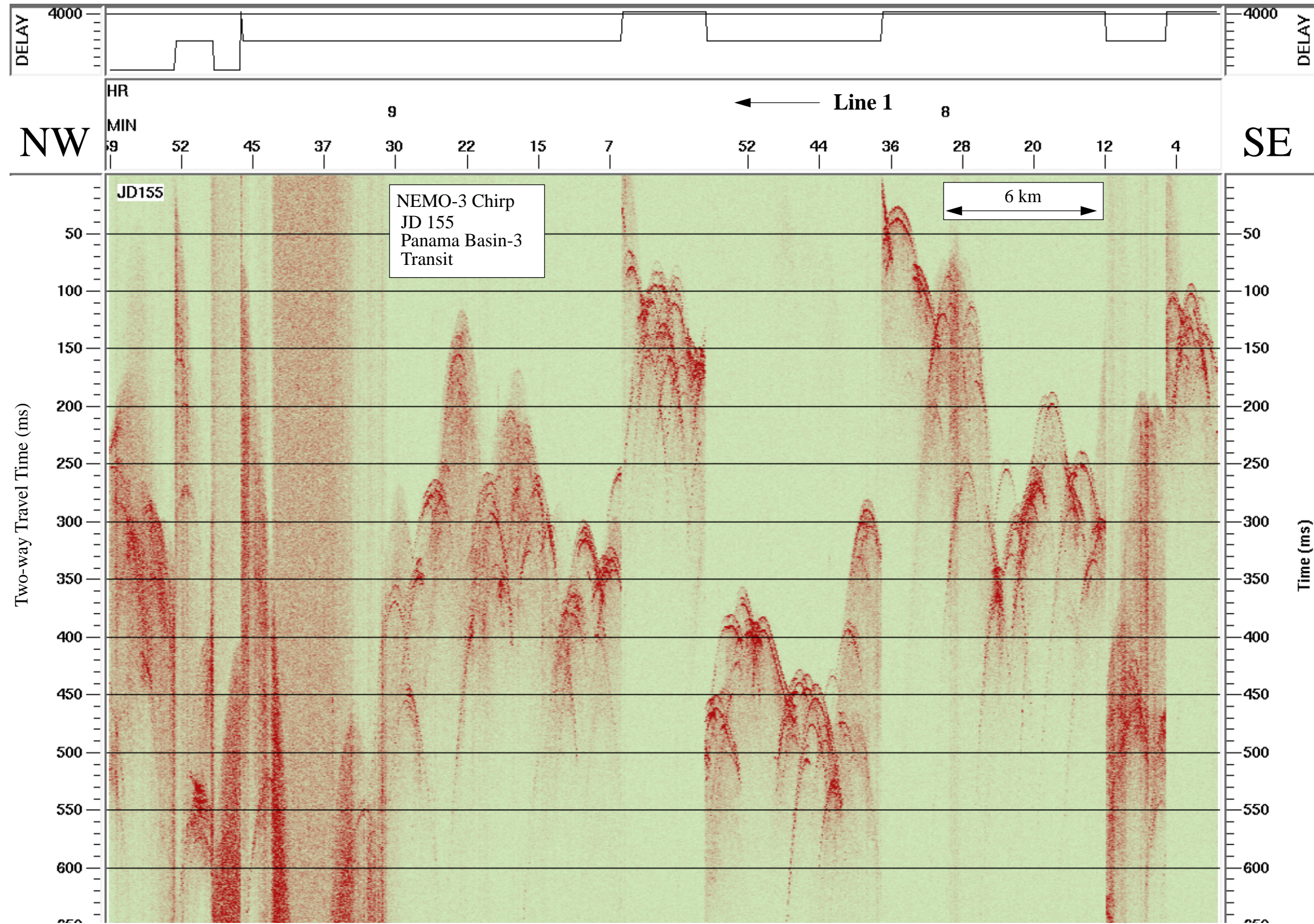


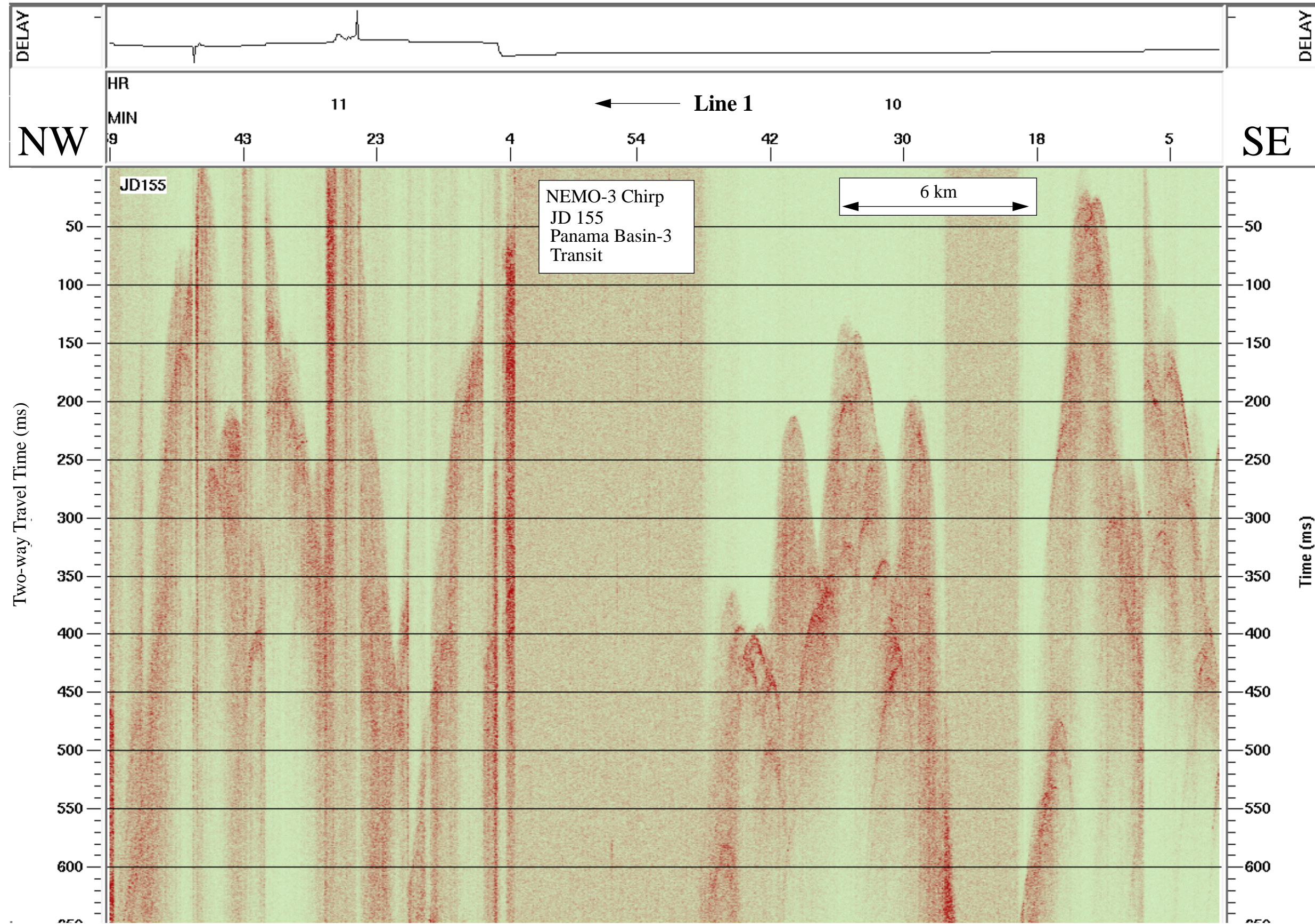


Data File SBfixavg.2000jun03.0600-1200

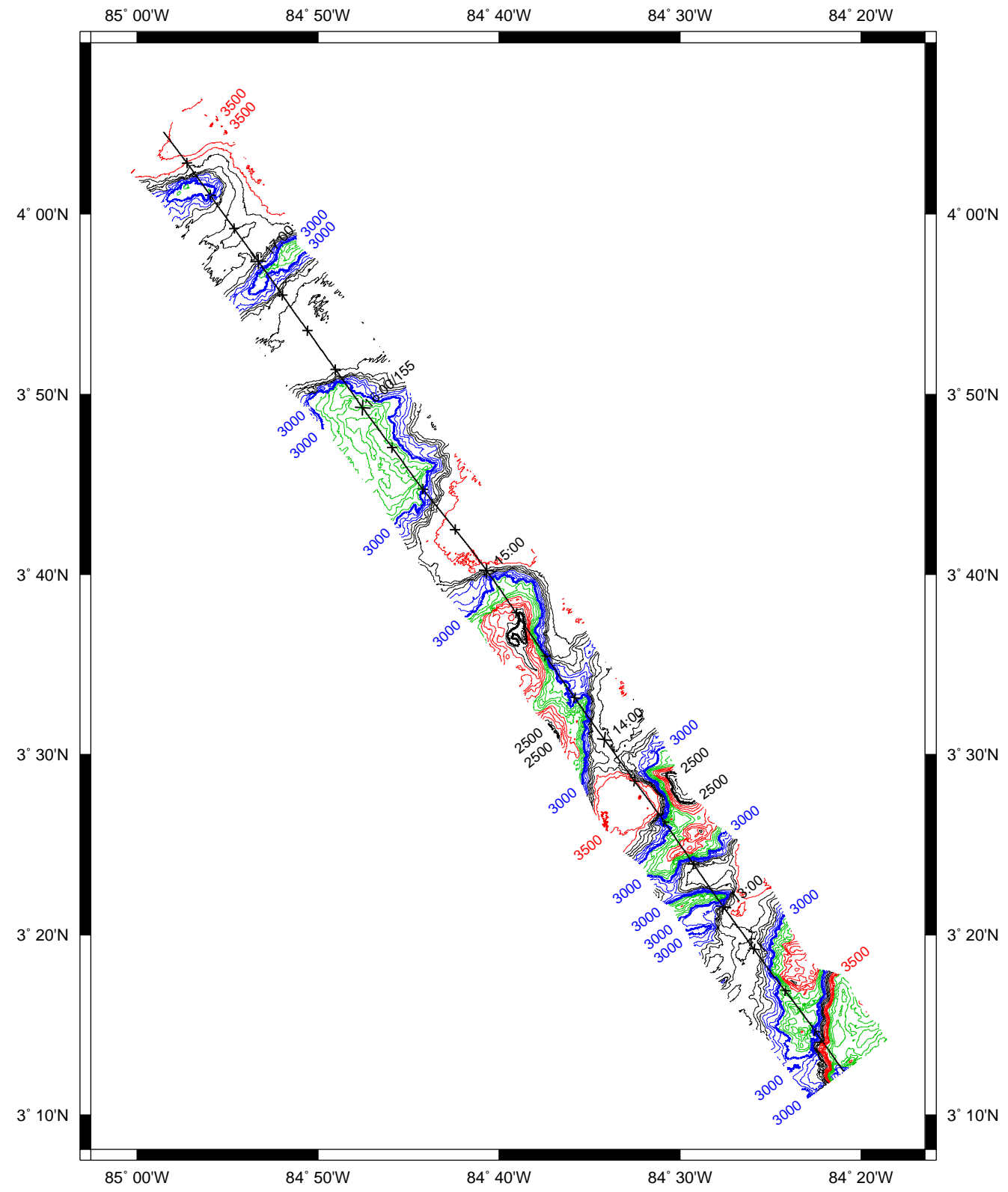


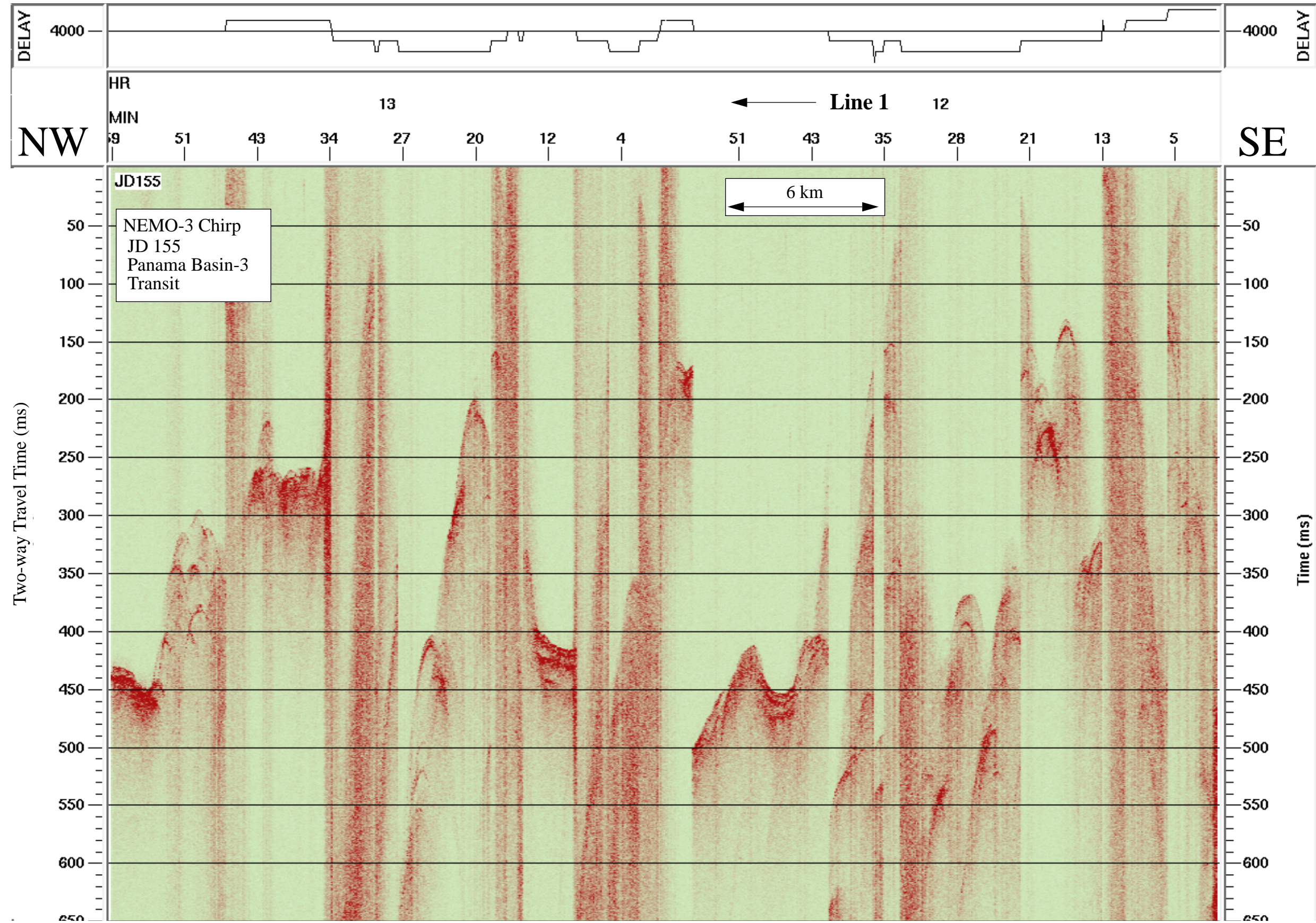


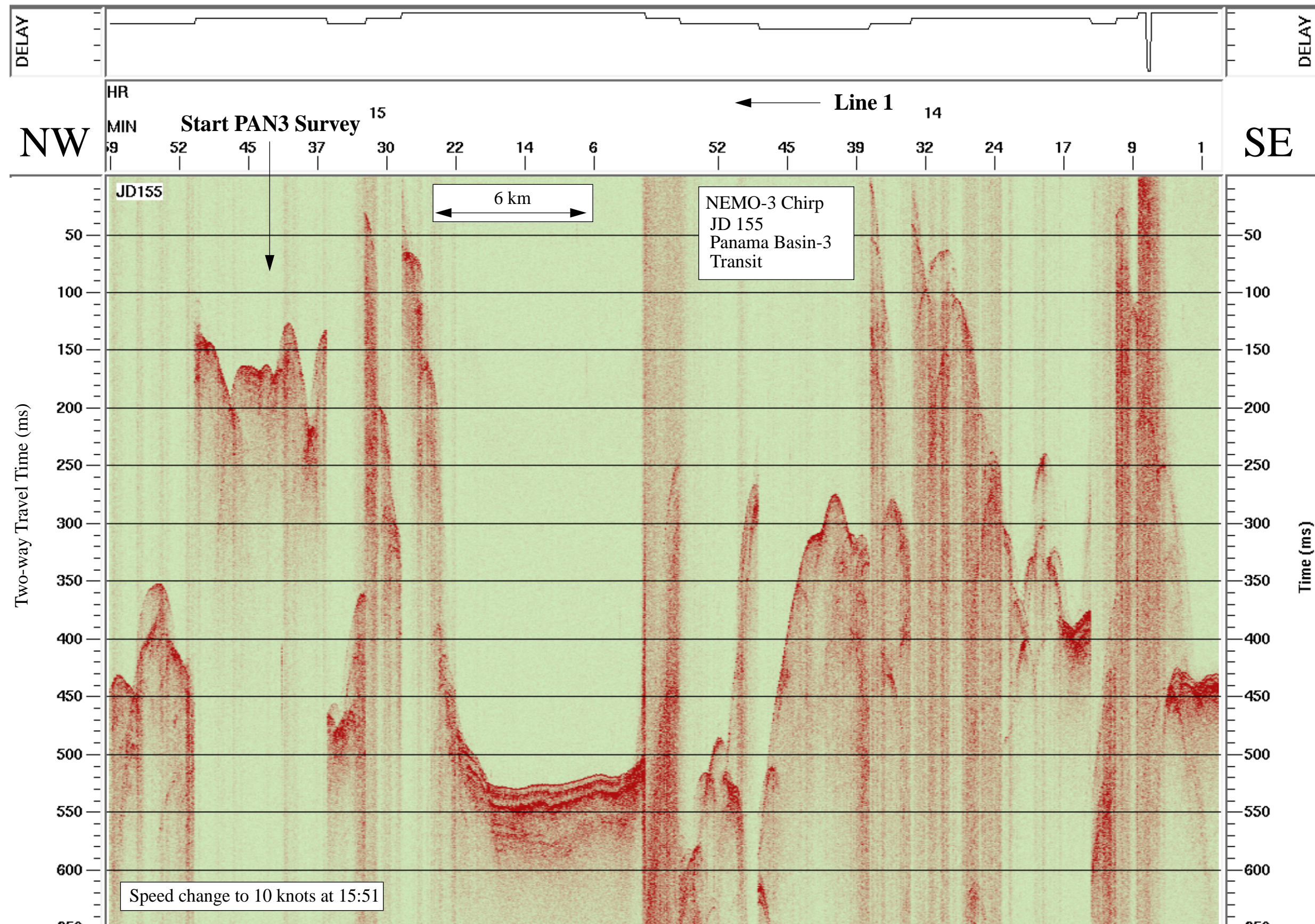


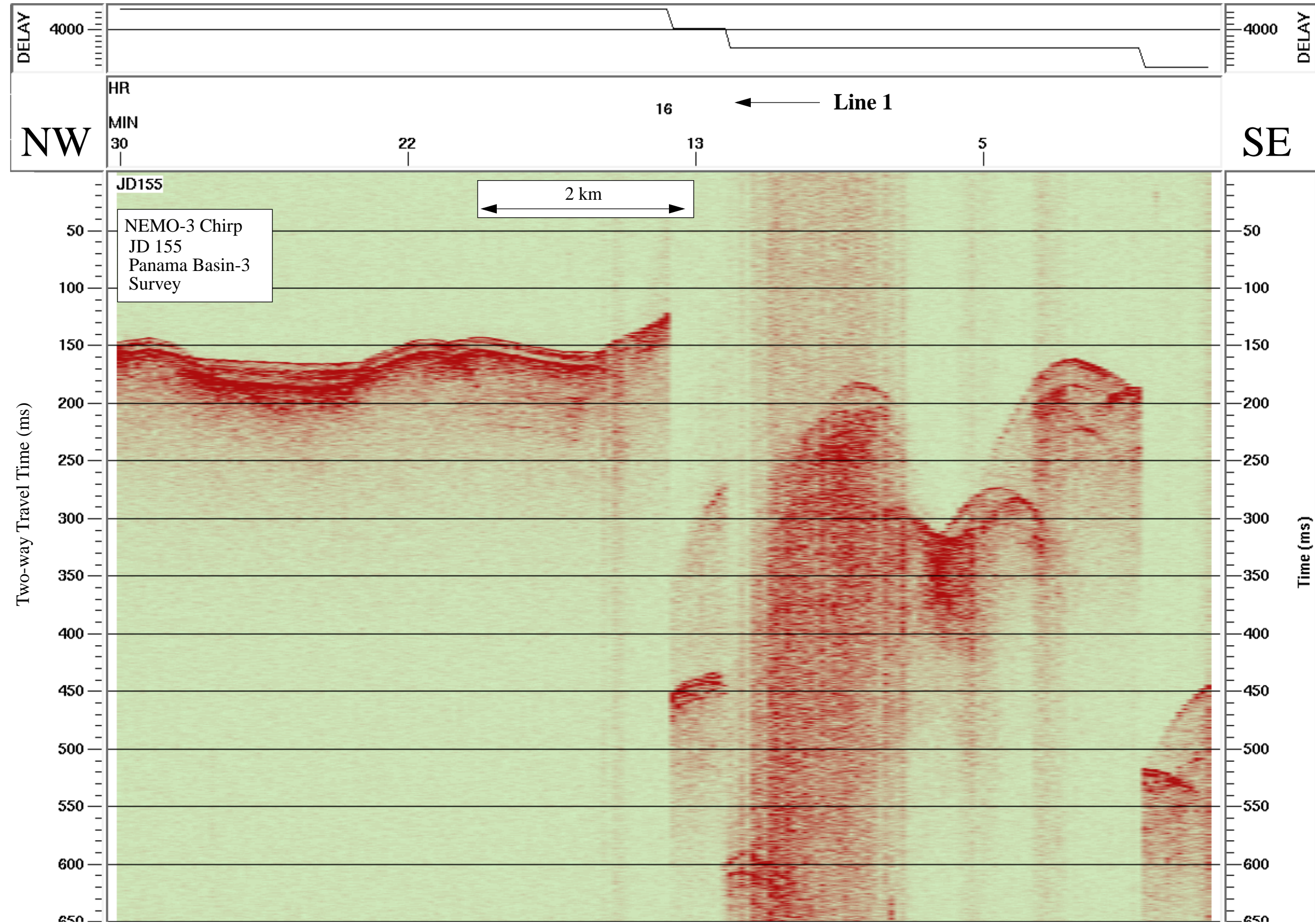


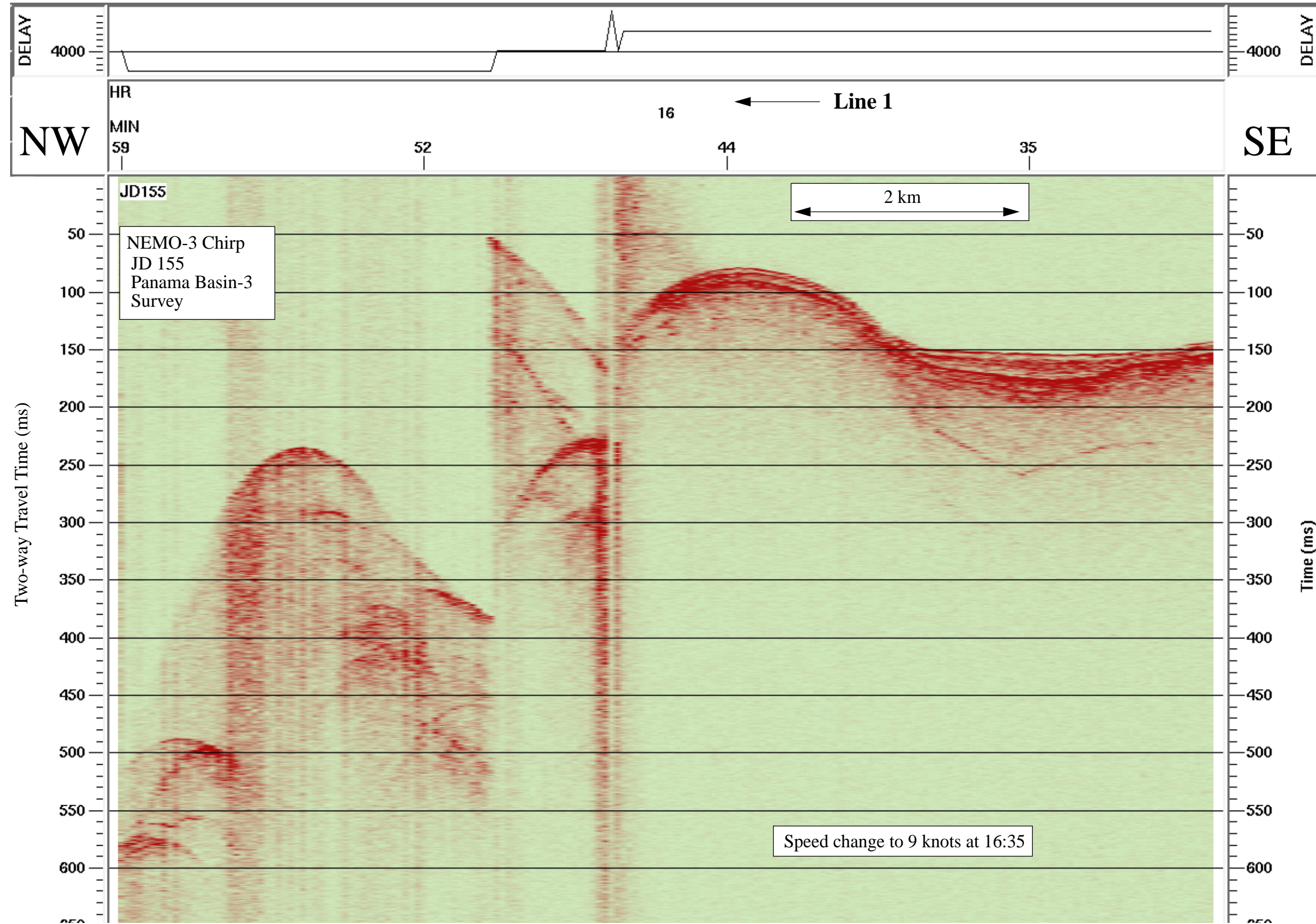
Data File SBfixavg.2000jun03.1200-1800

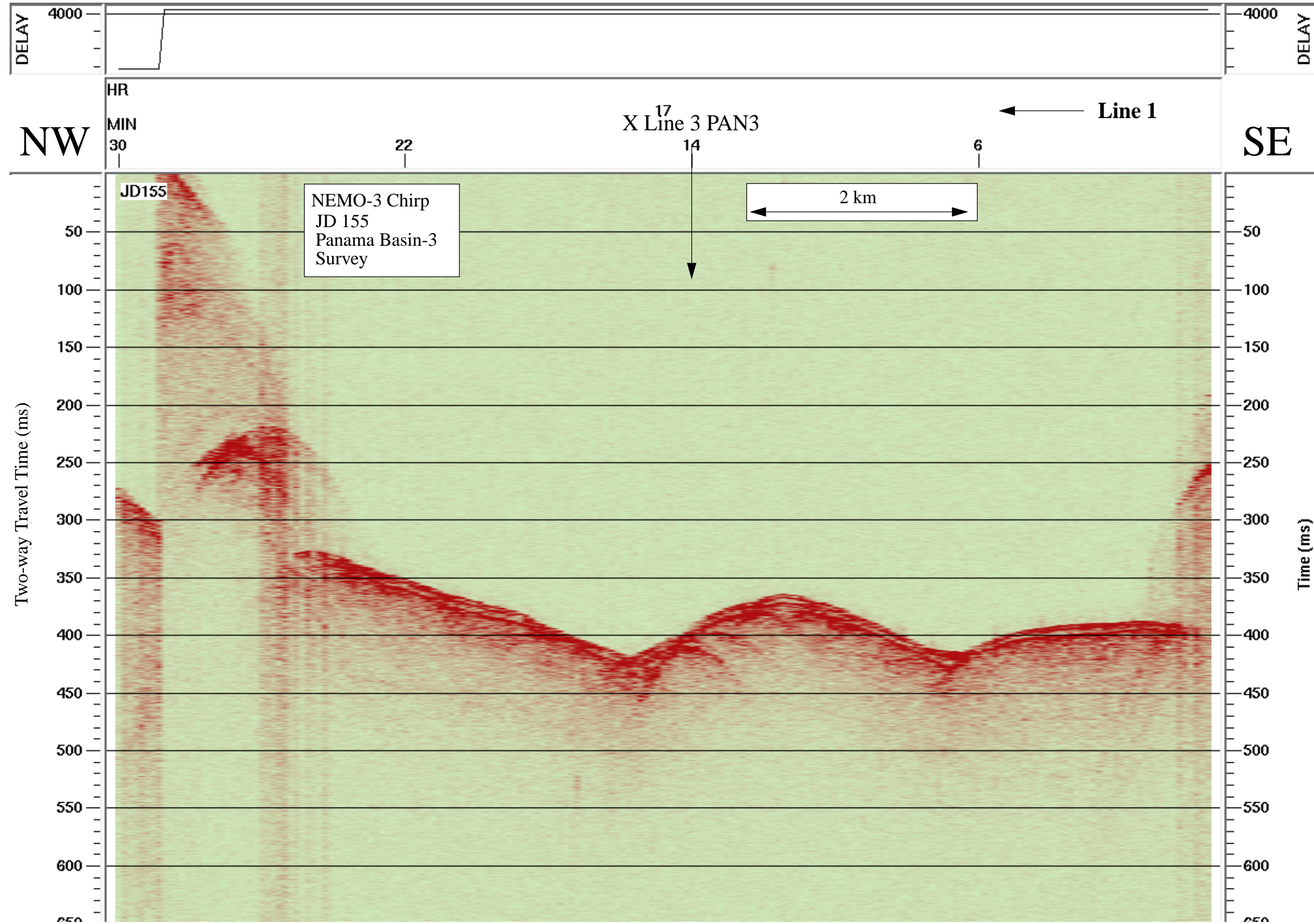


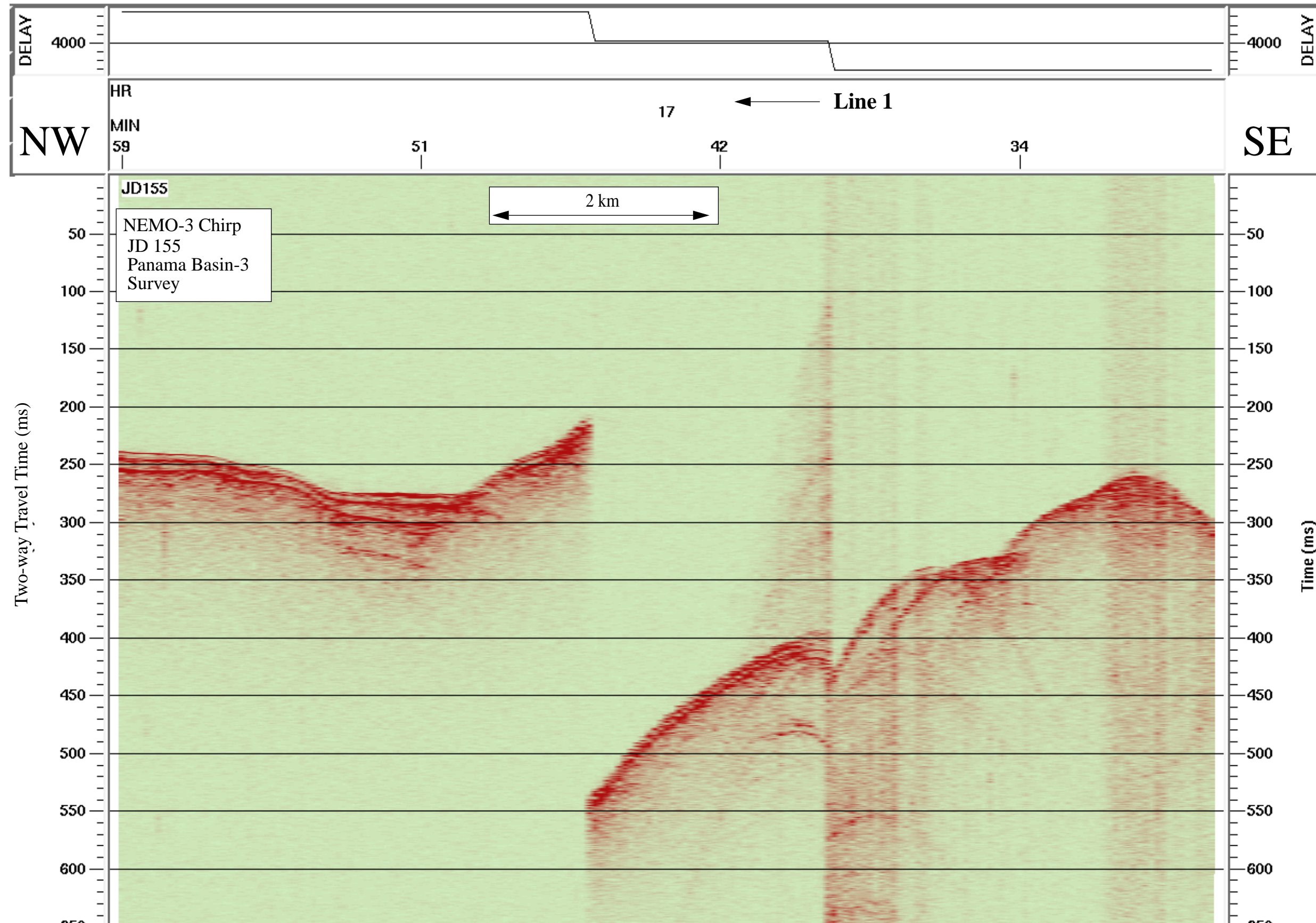




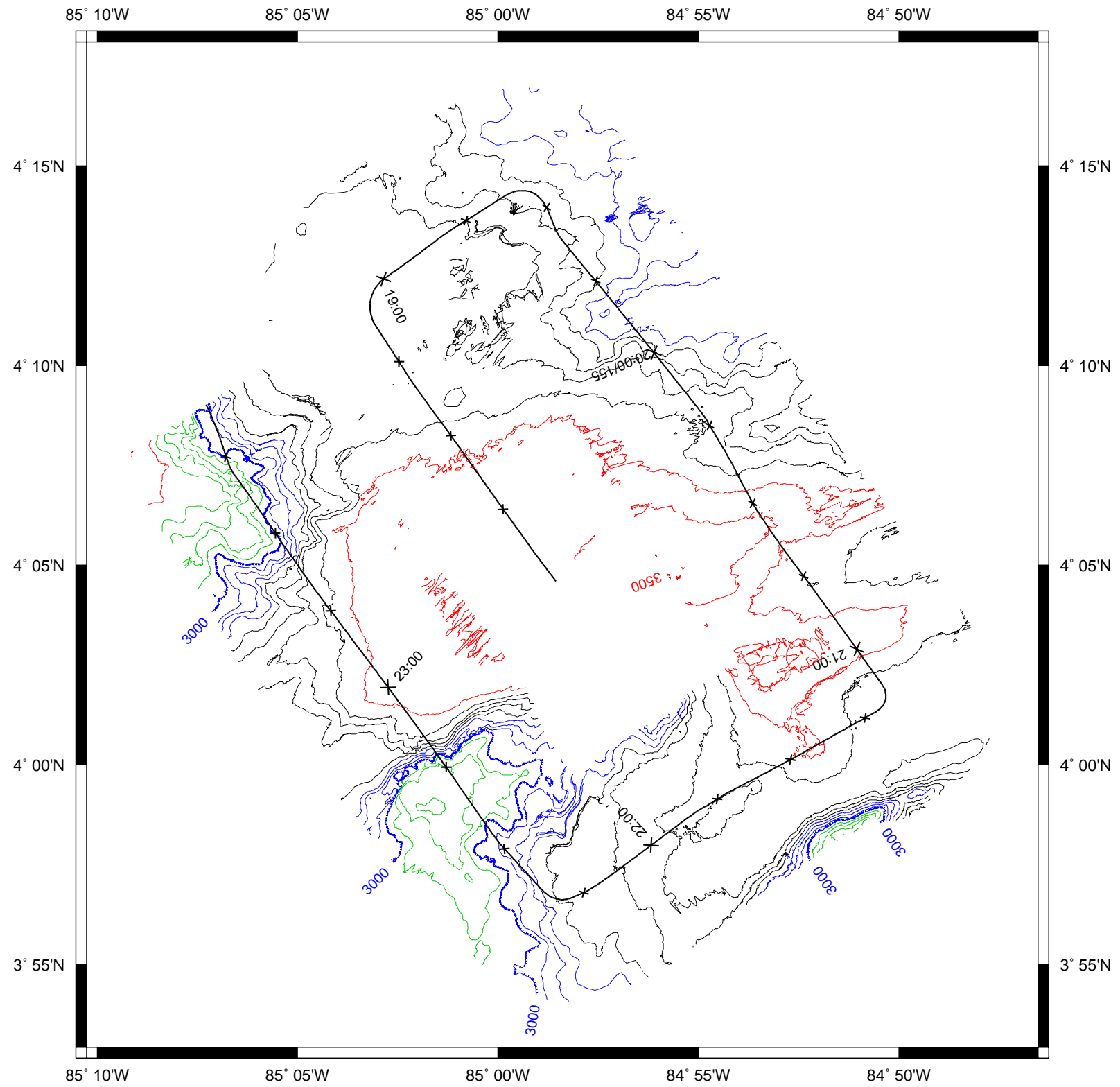


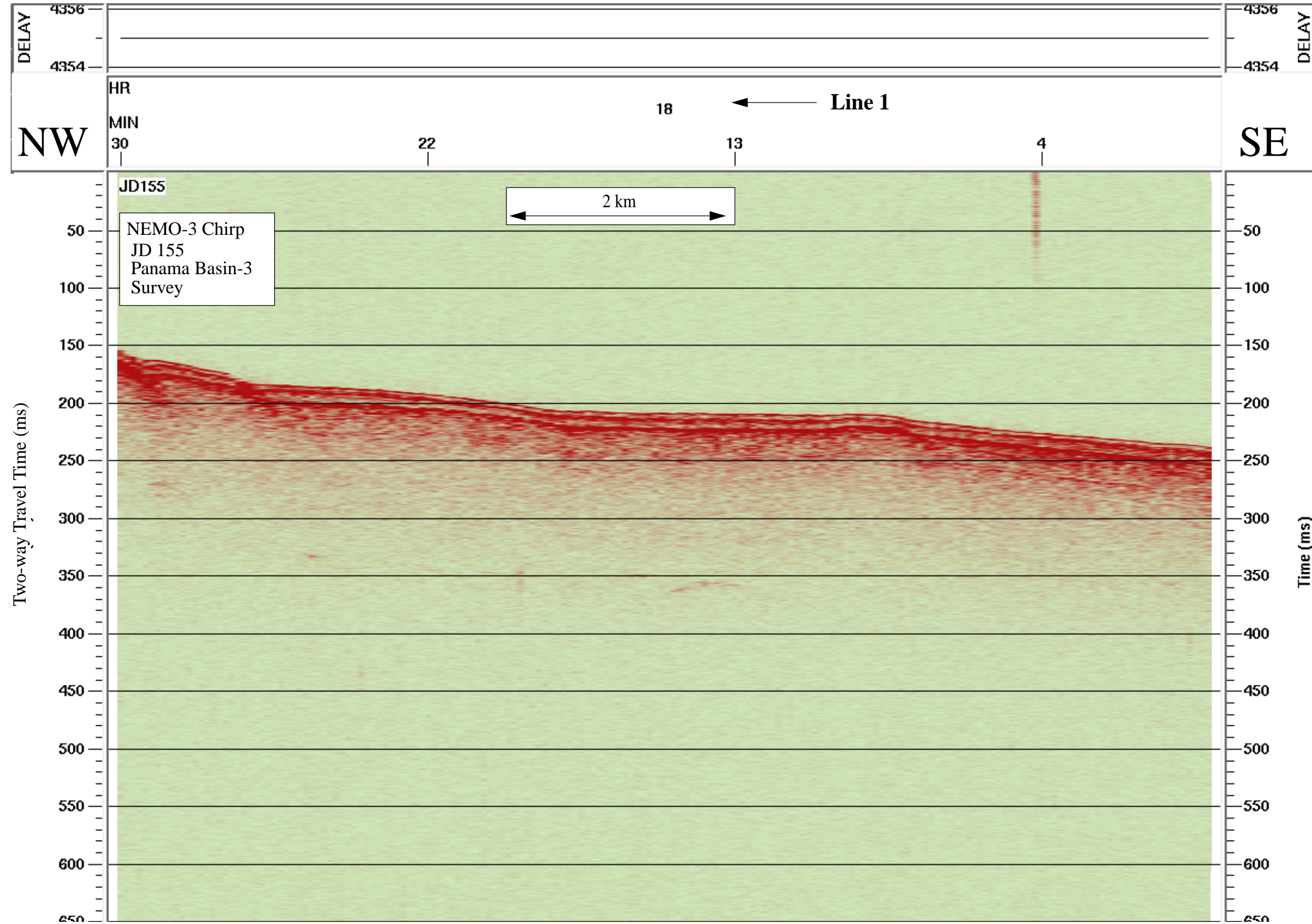


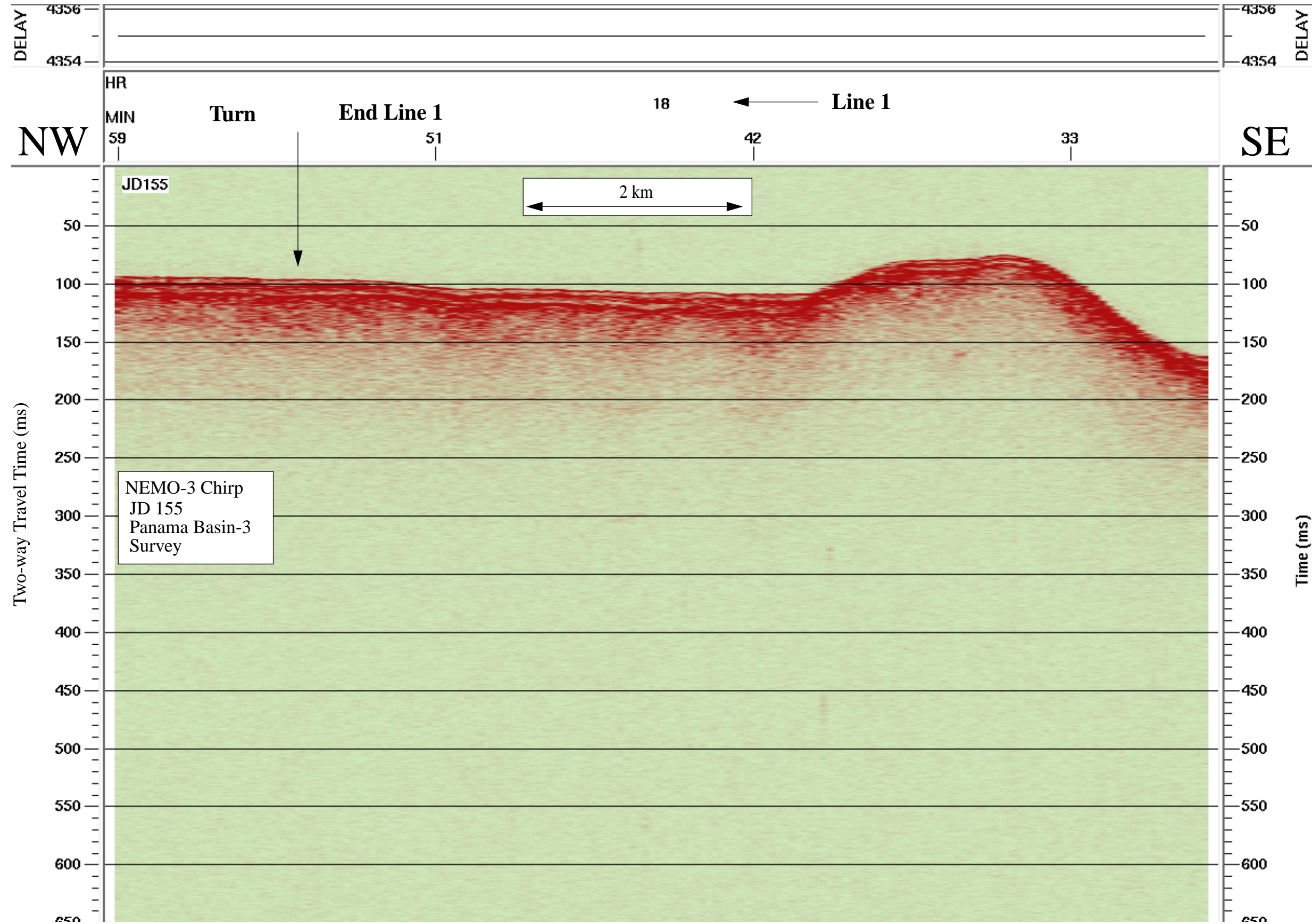


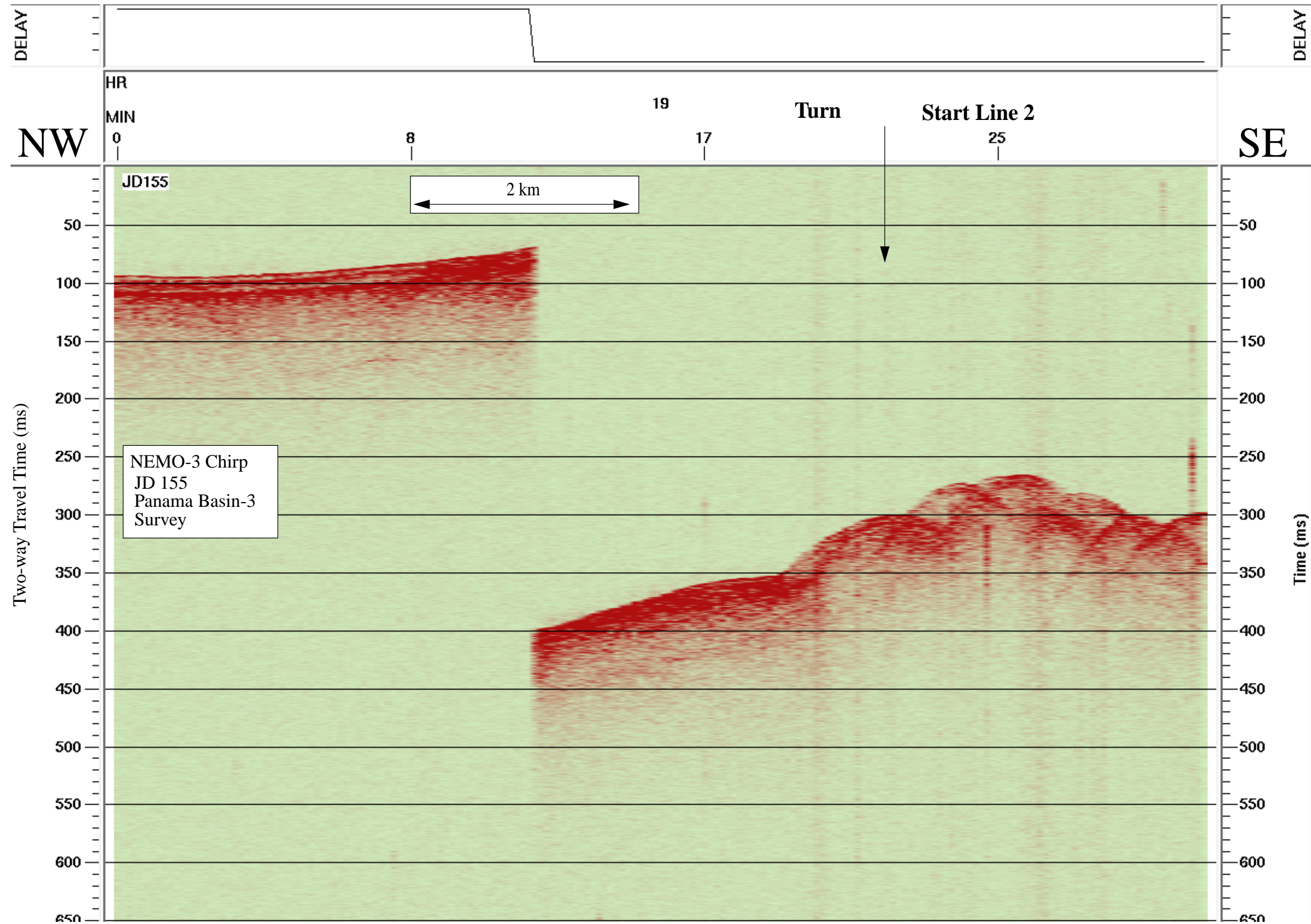


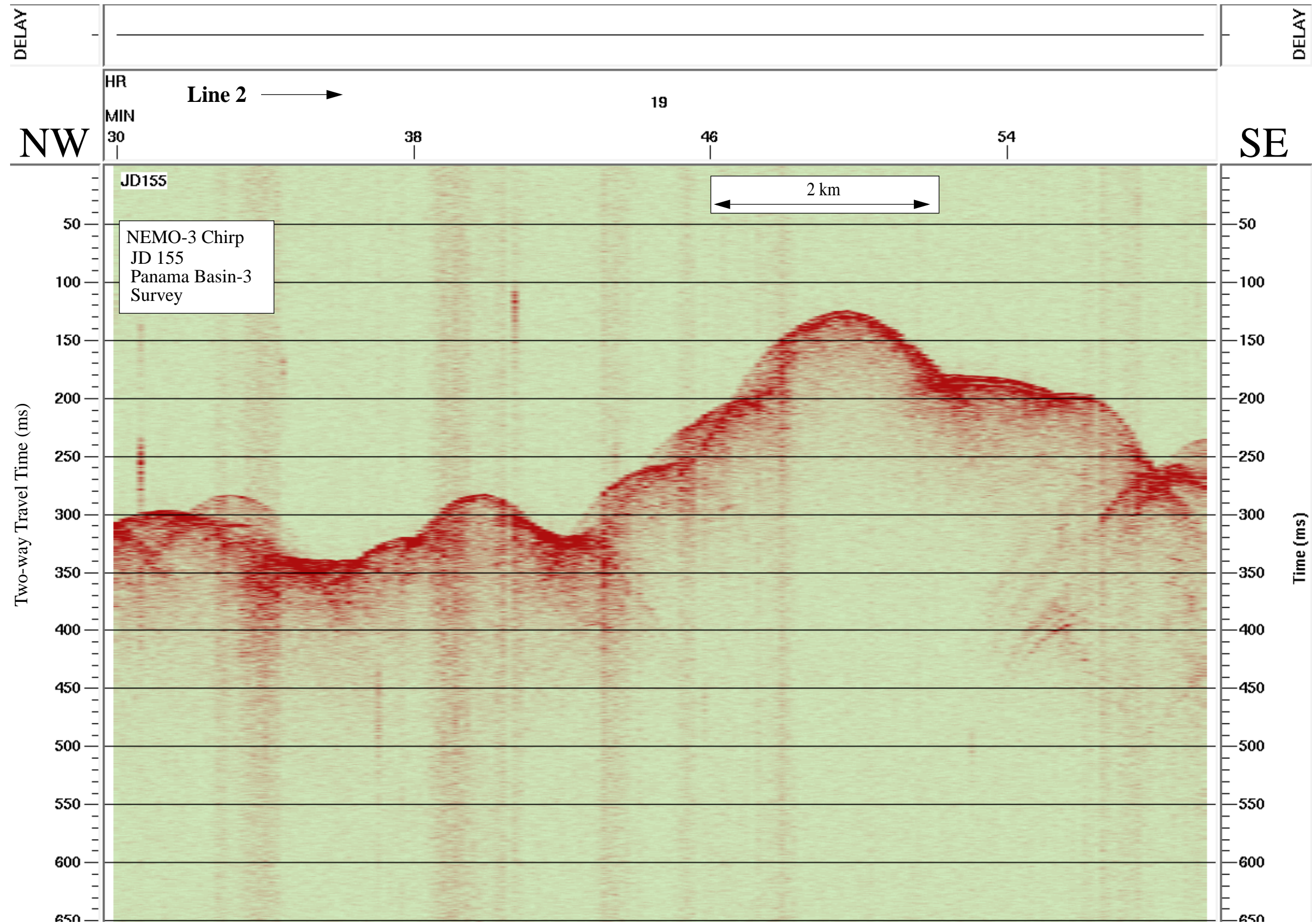
Data File SBfixavg.2000jun03.1800-2400

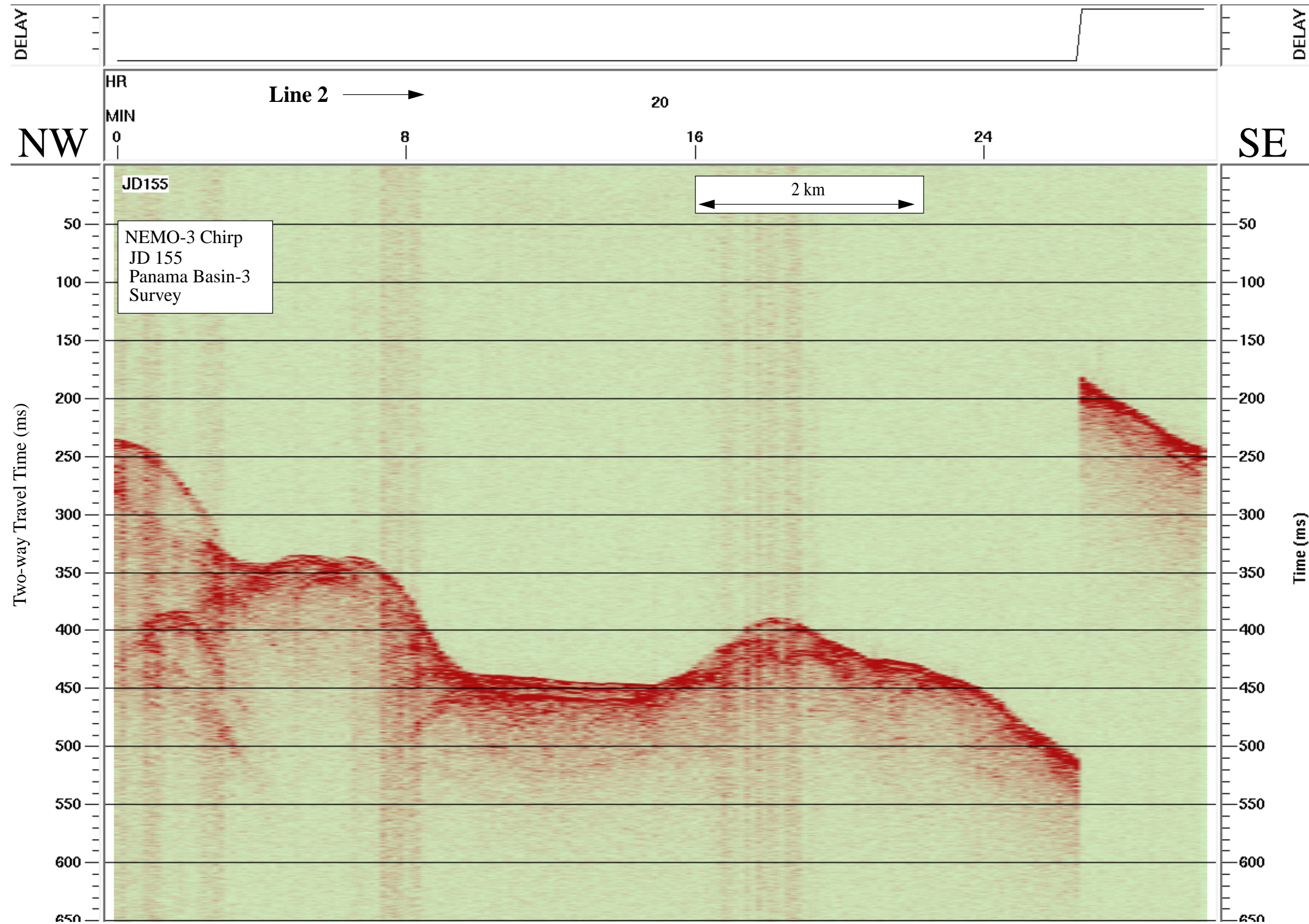


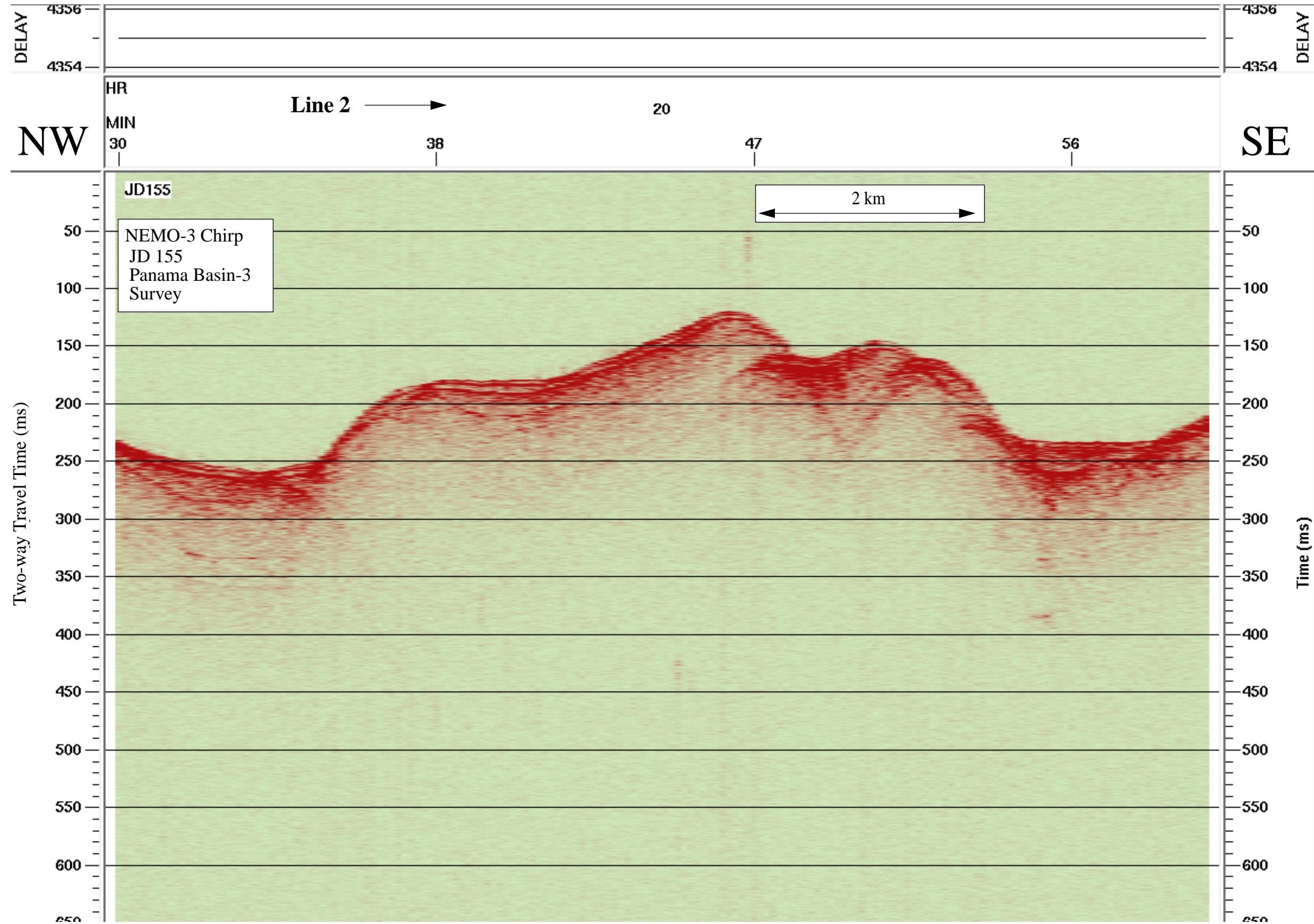


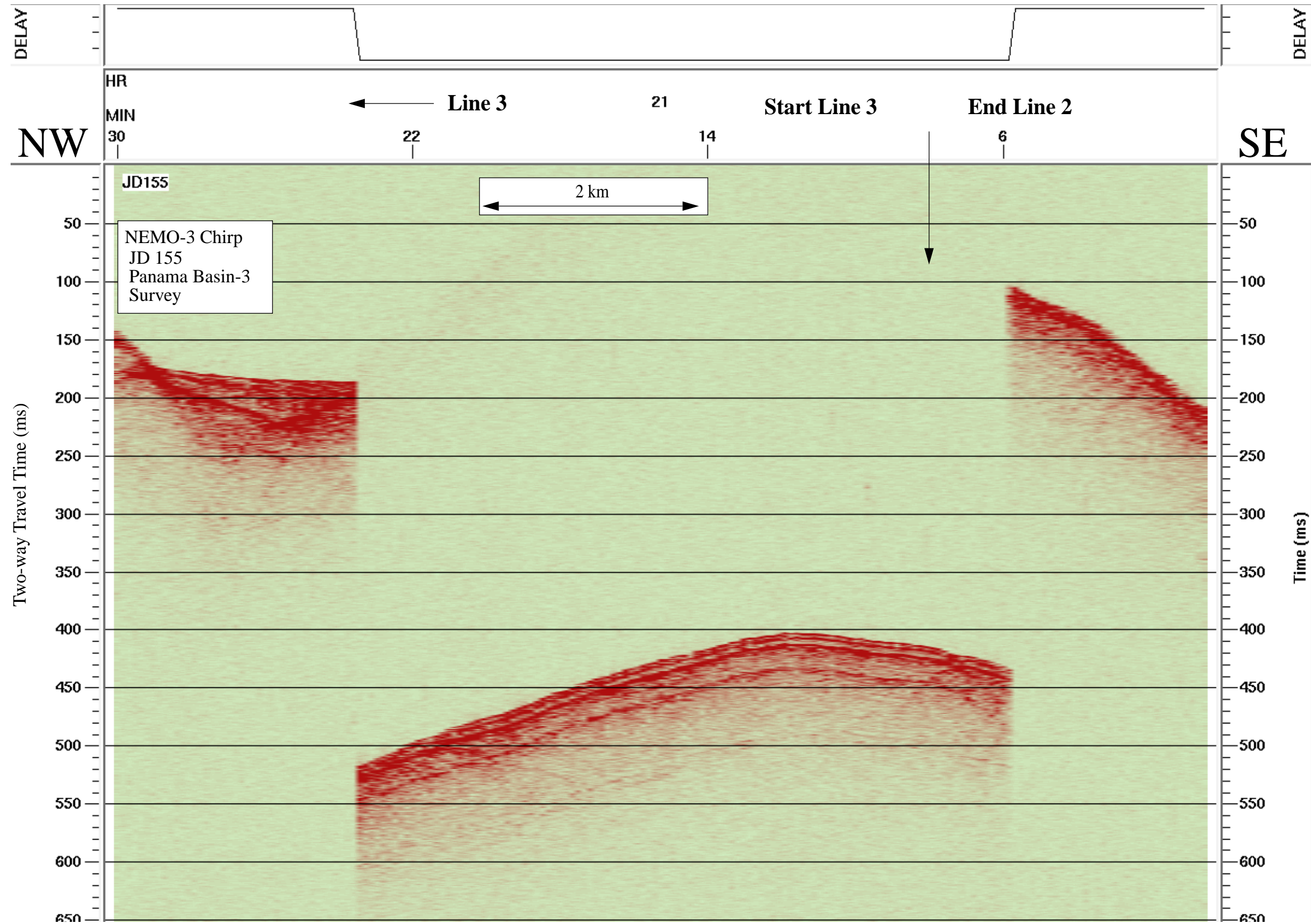


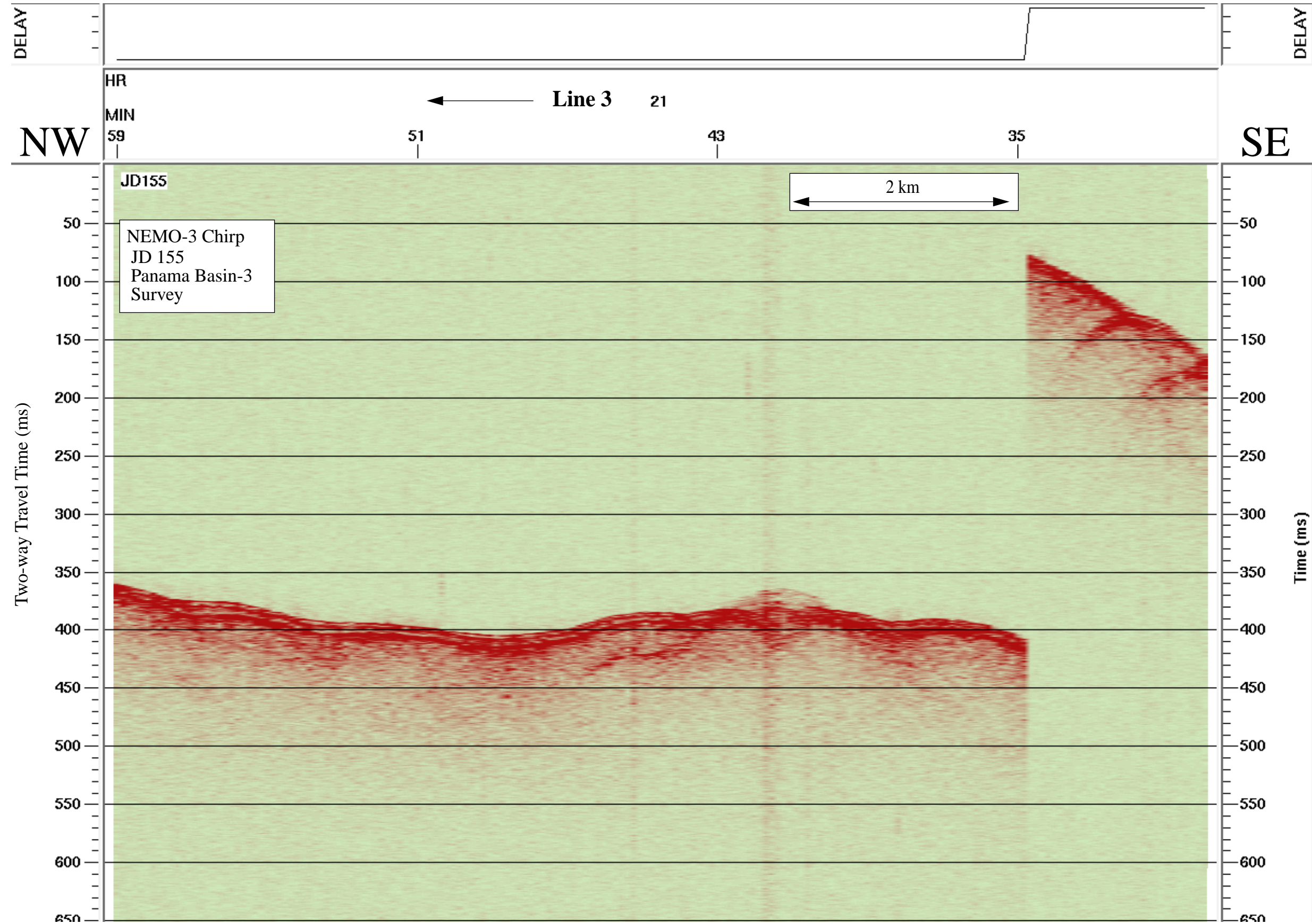


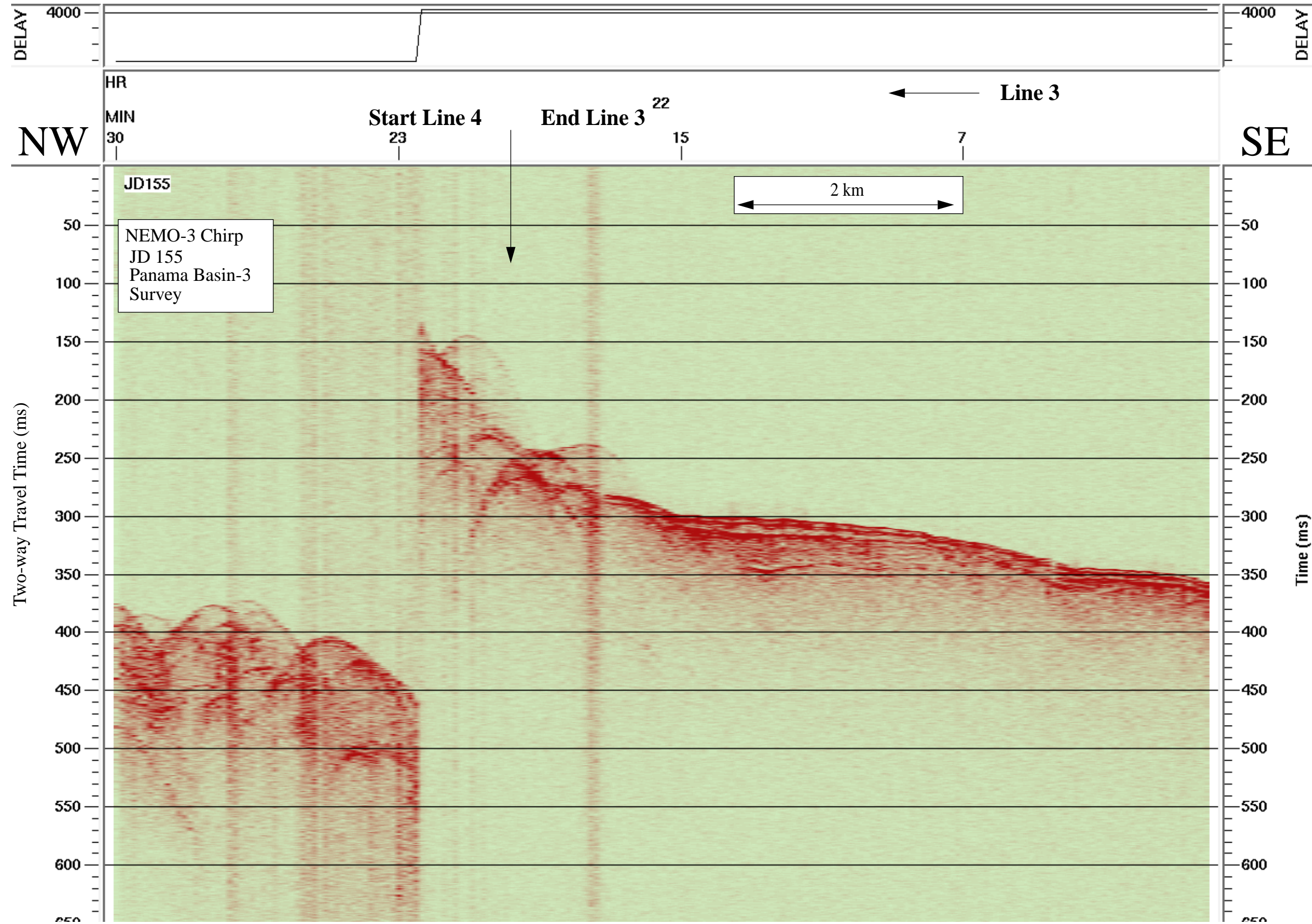


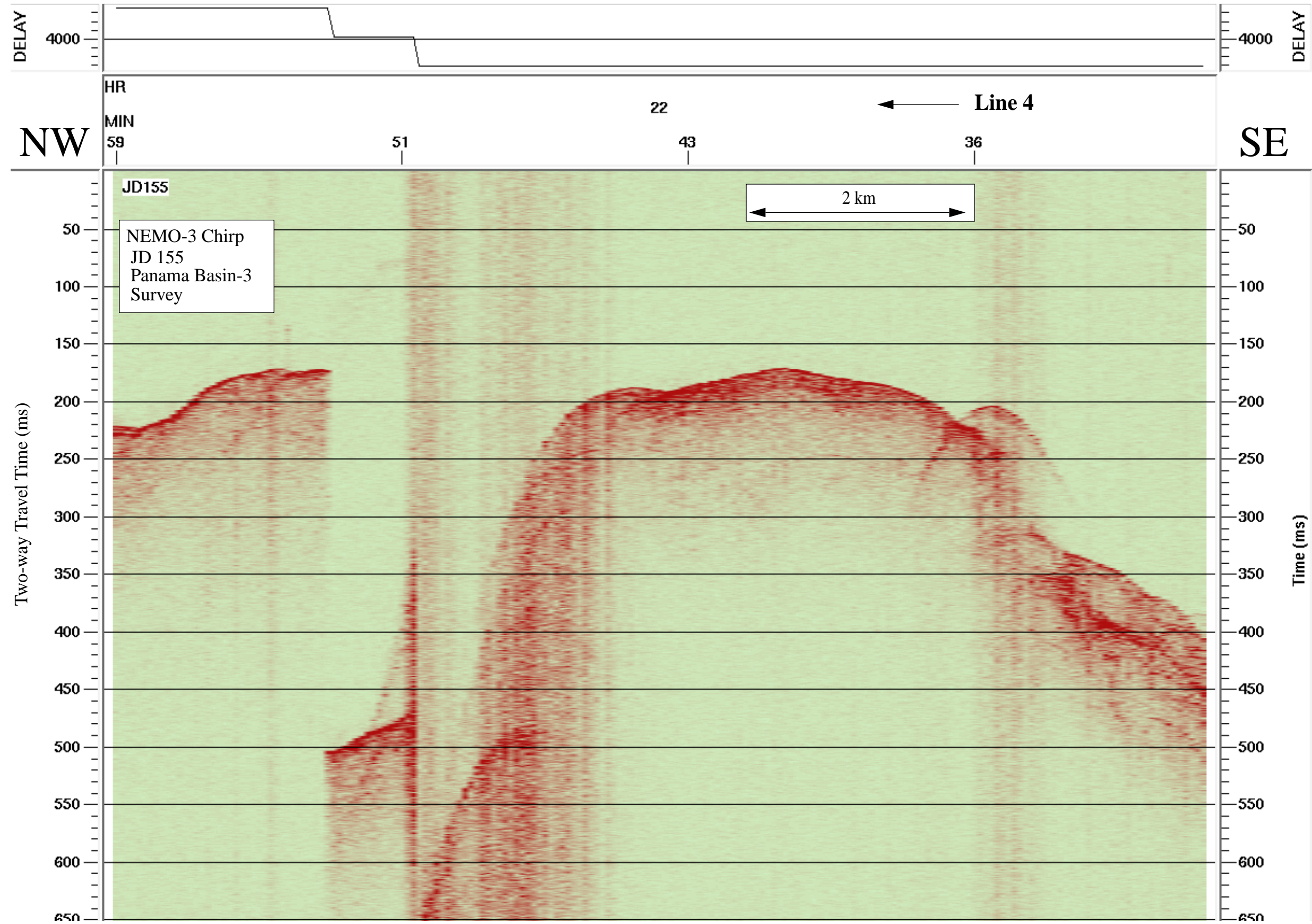


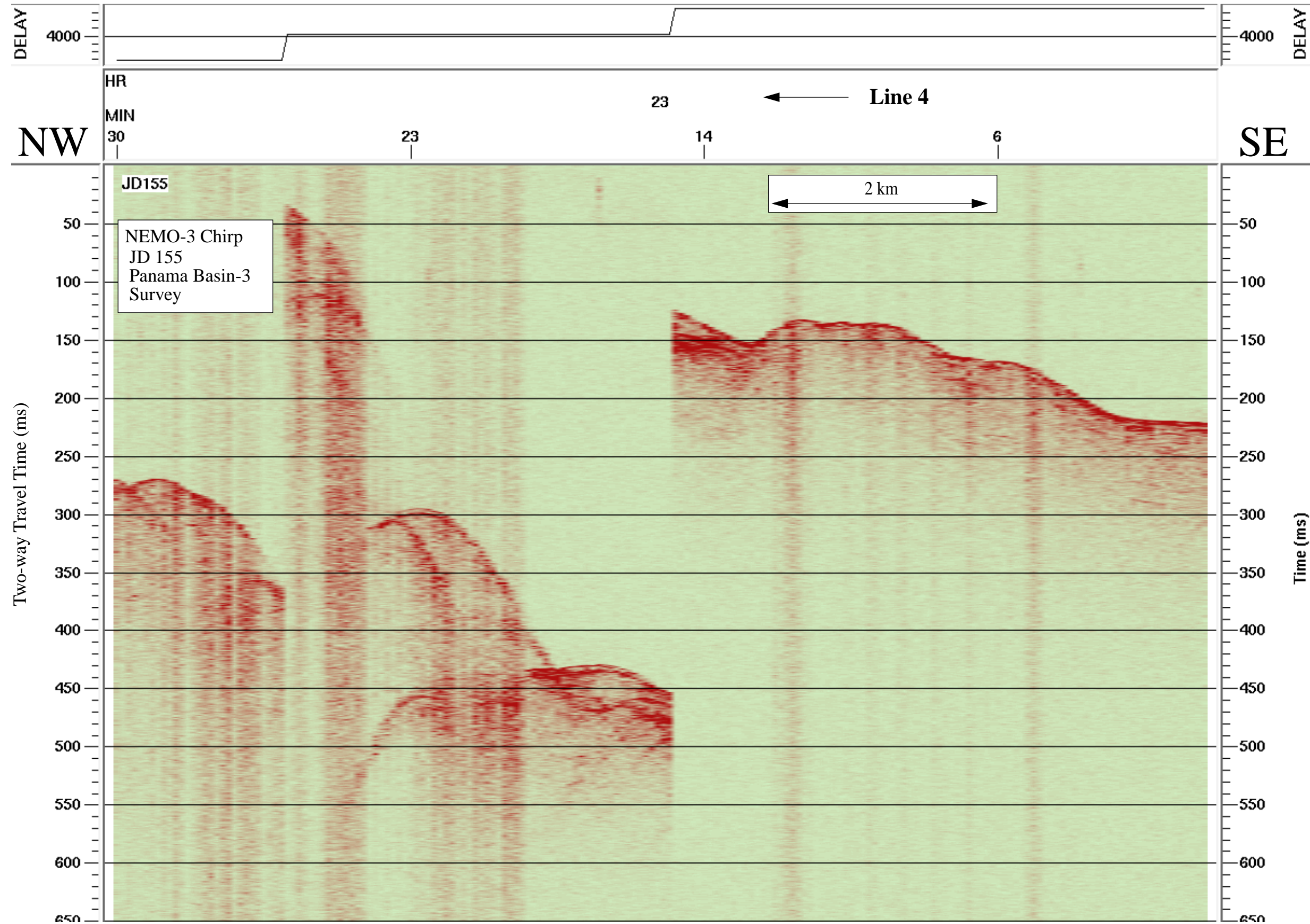


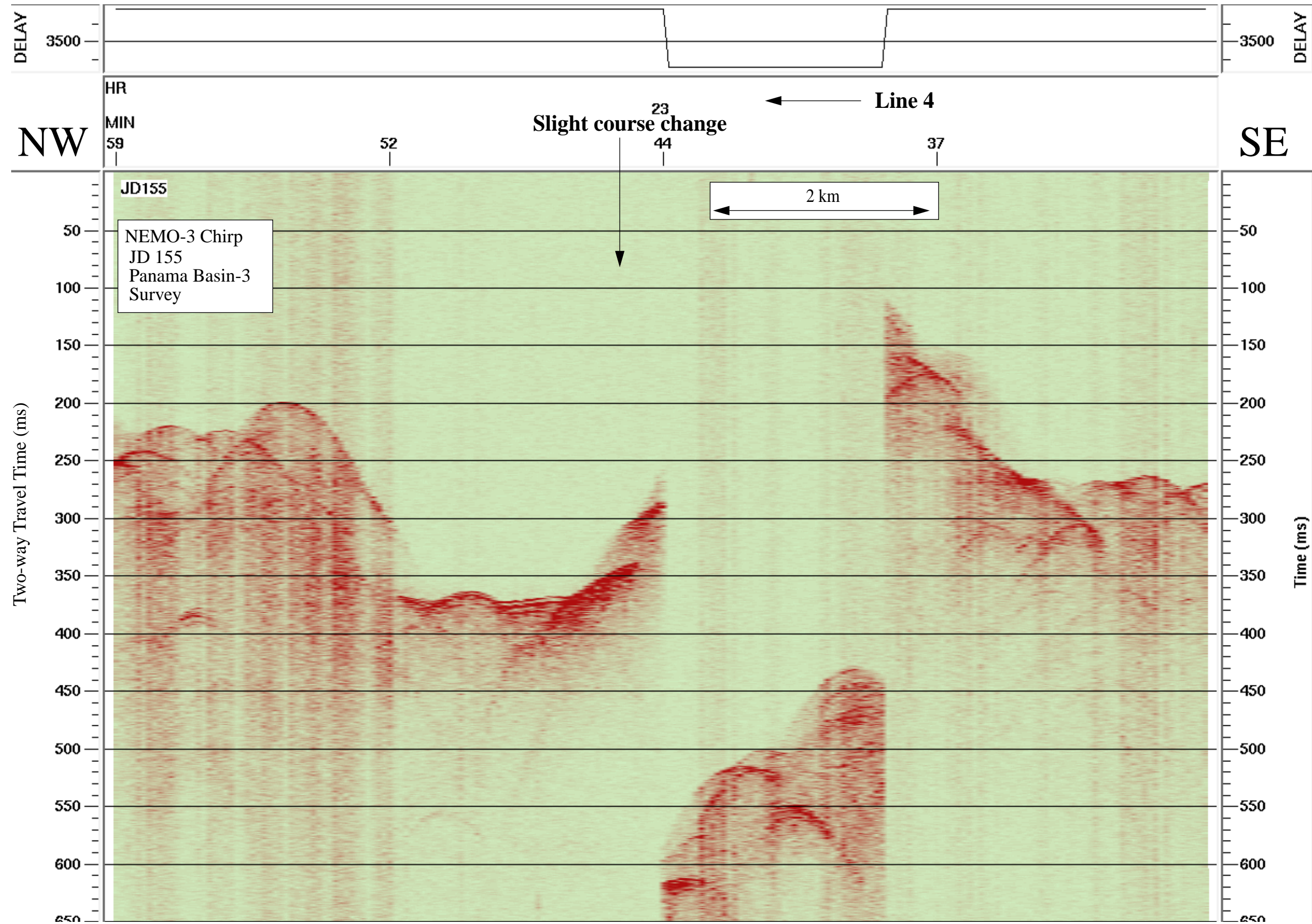












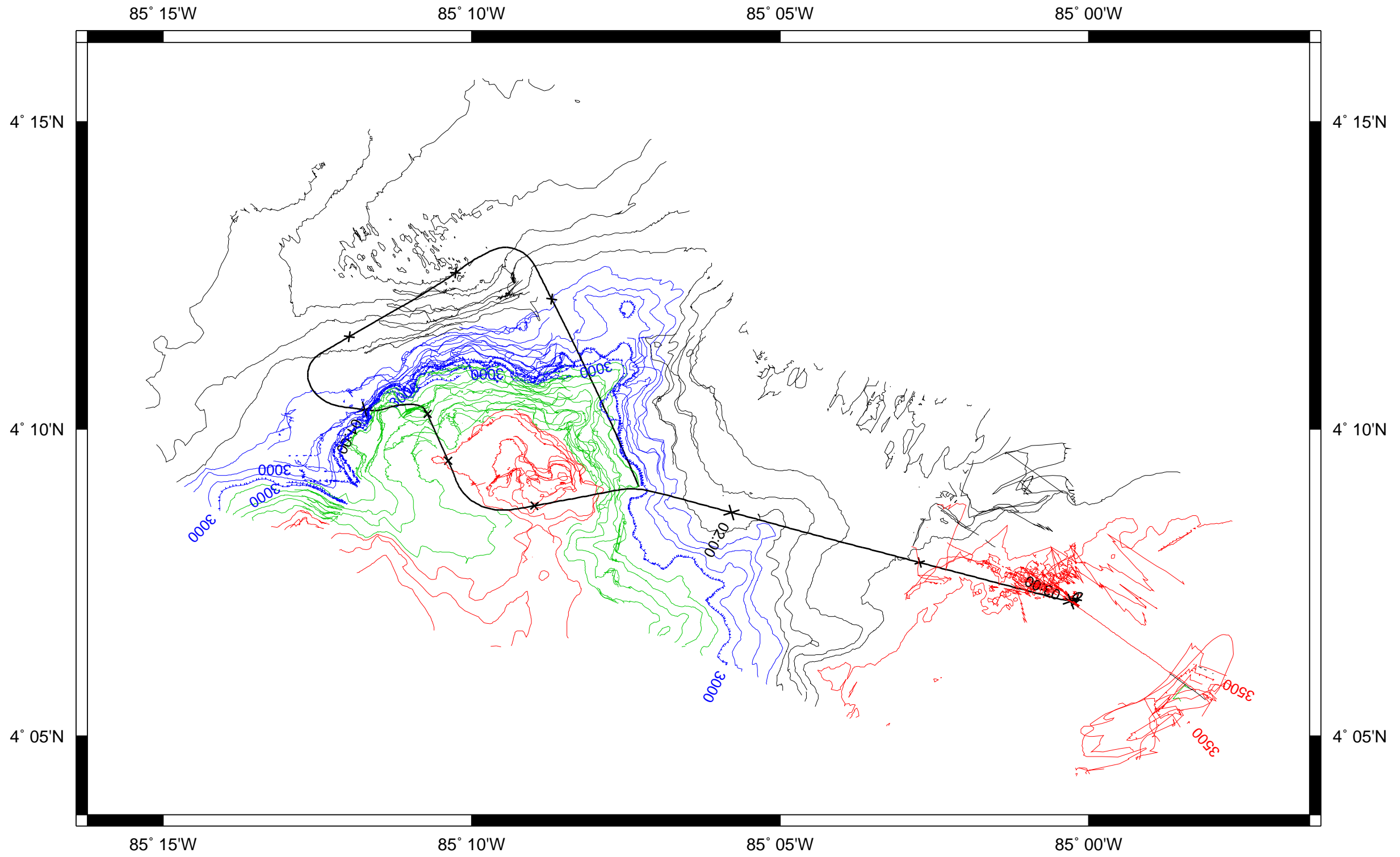
JD 156 (4 June 2000)--Last day, PAN-3 Survey

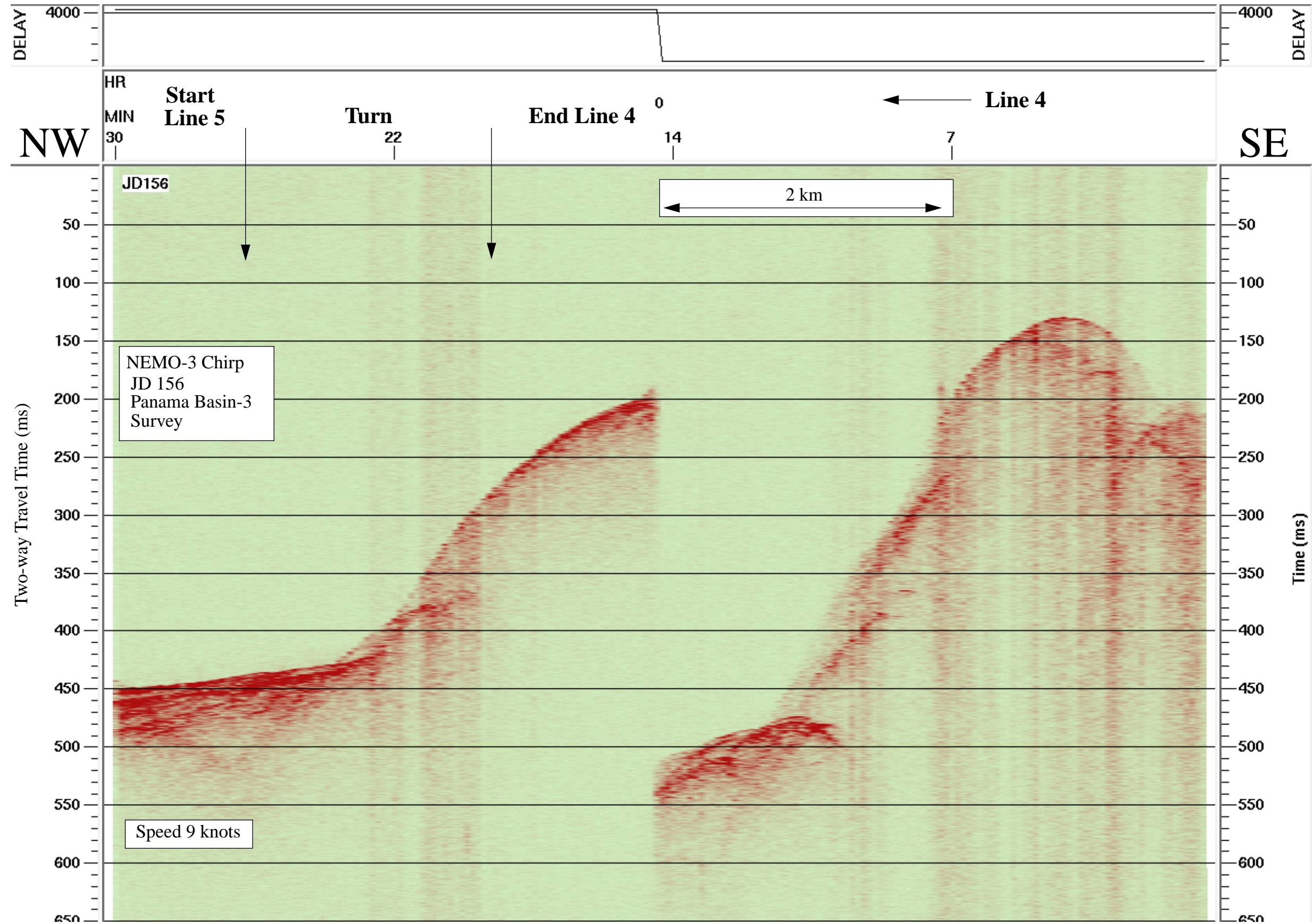
2-7 kHz Chirp Subbottom Profiler

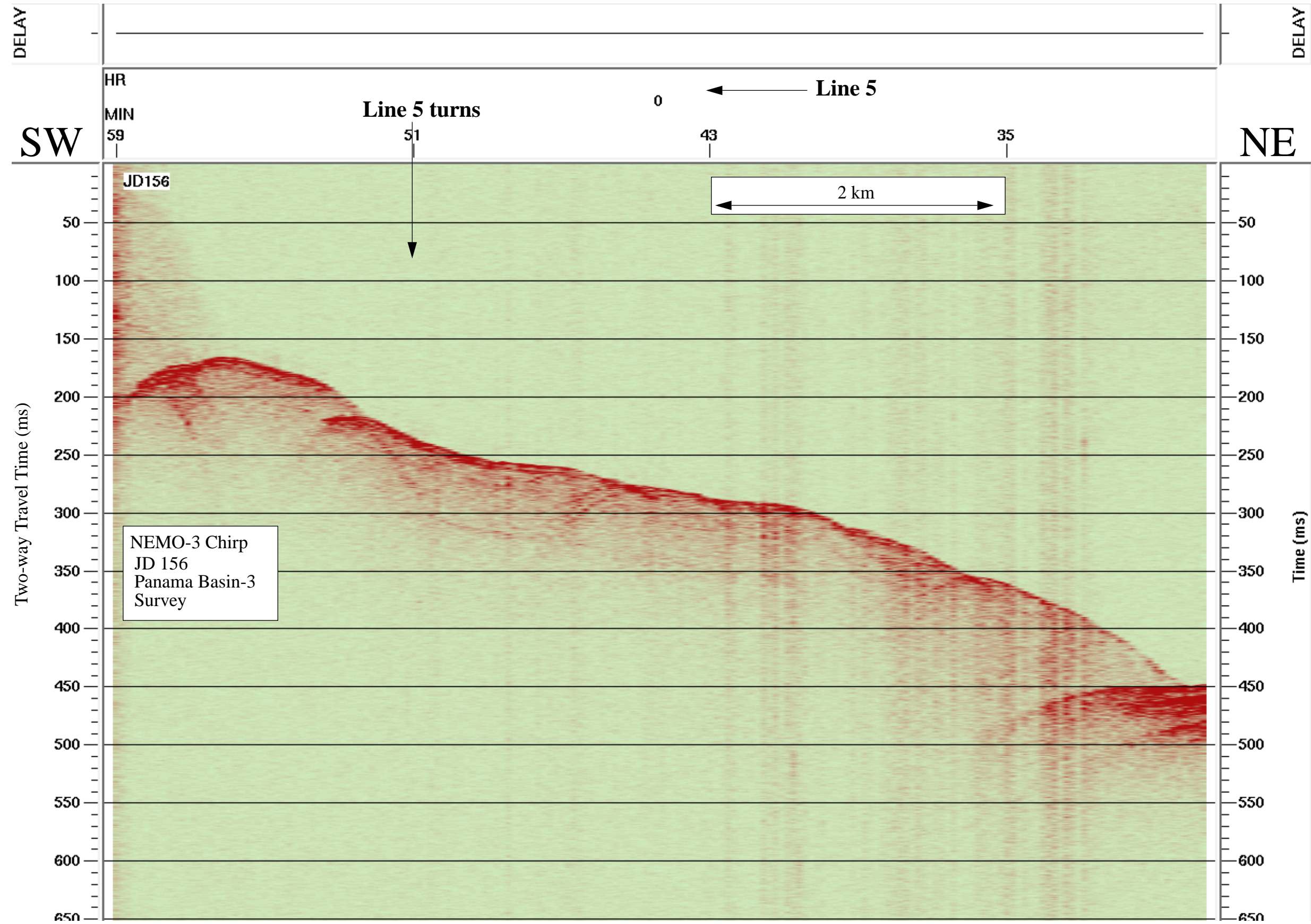
NEMO Leg 3

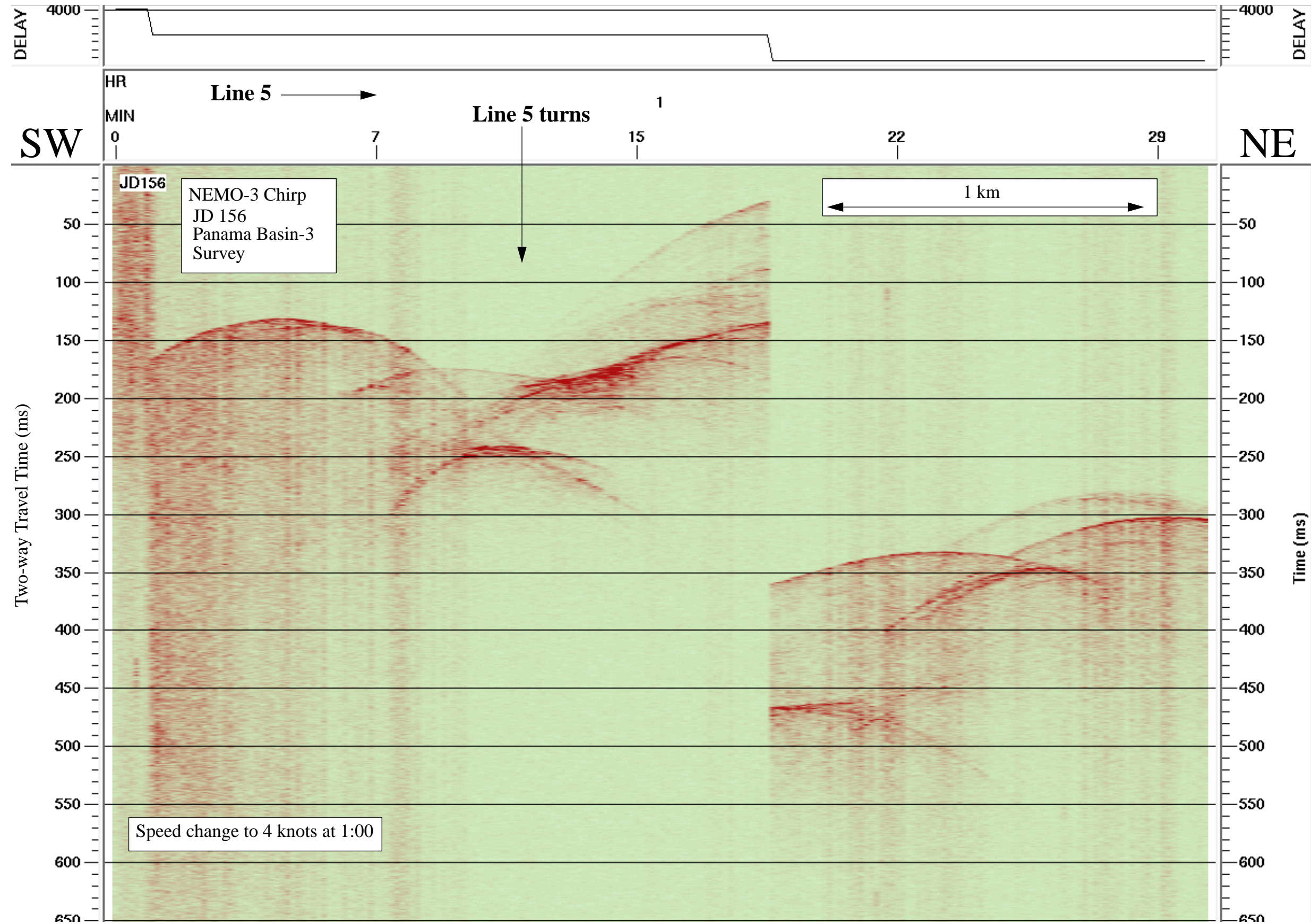
R/V Melville

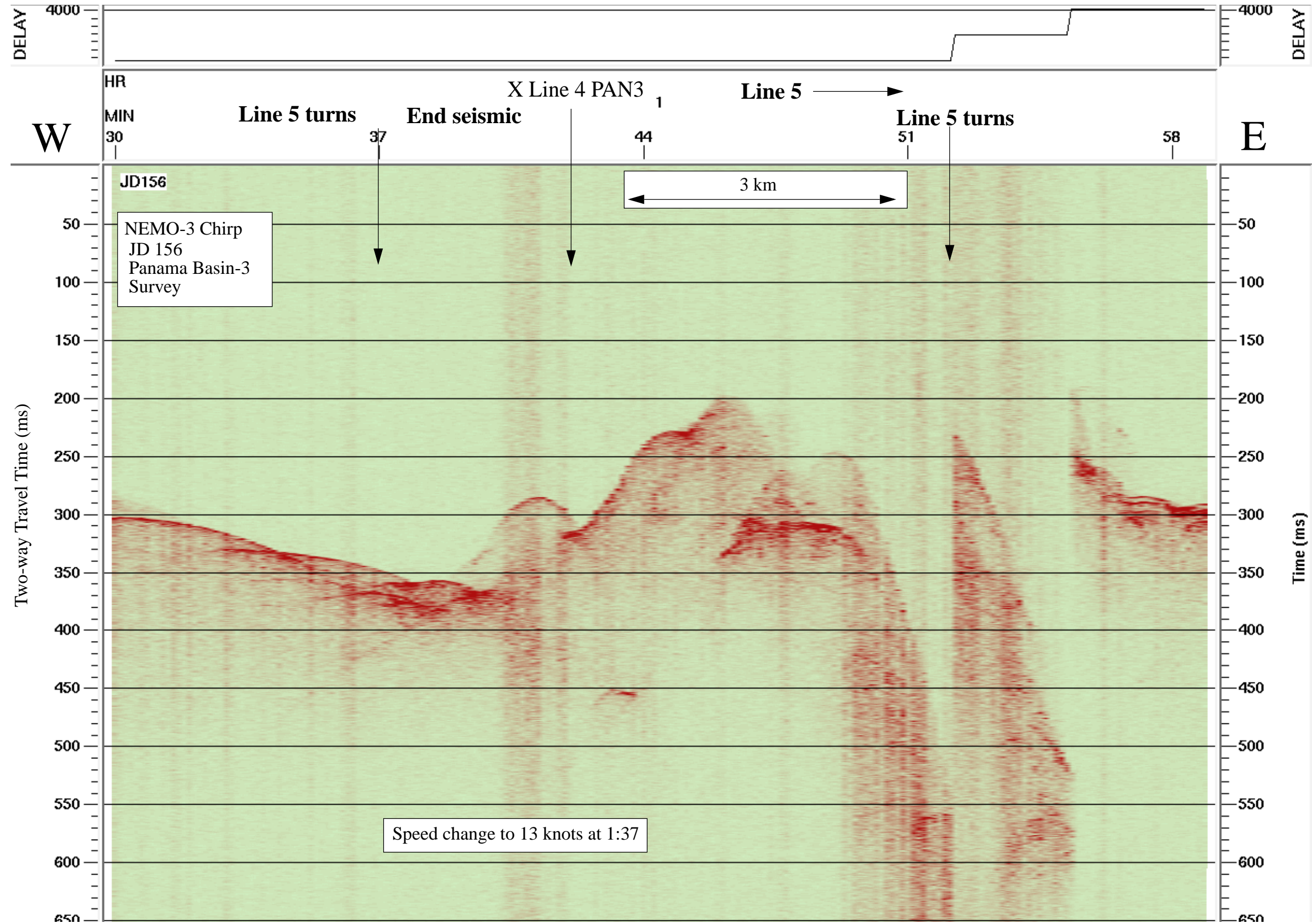
Data File SBfixavg.2000jun04.0000-0600

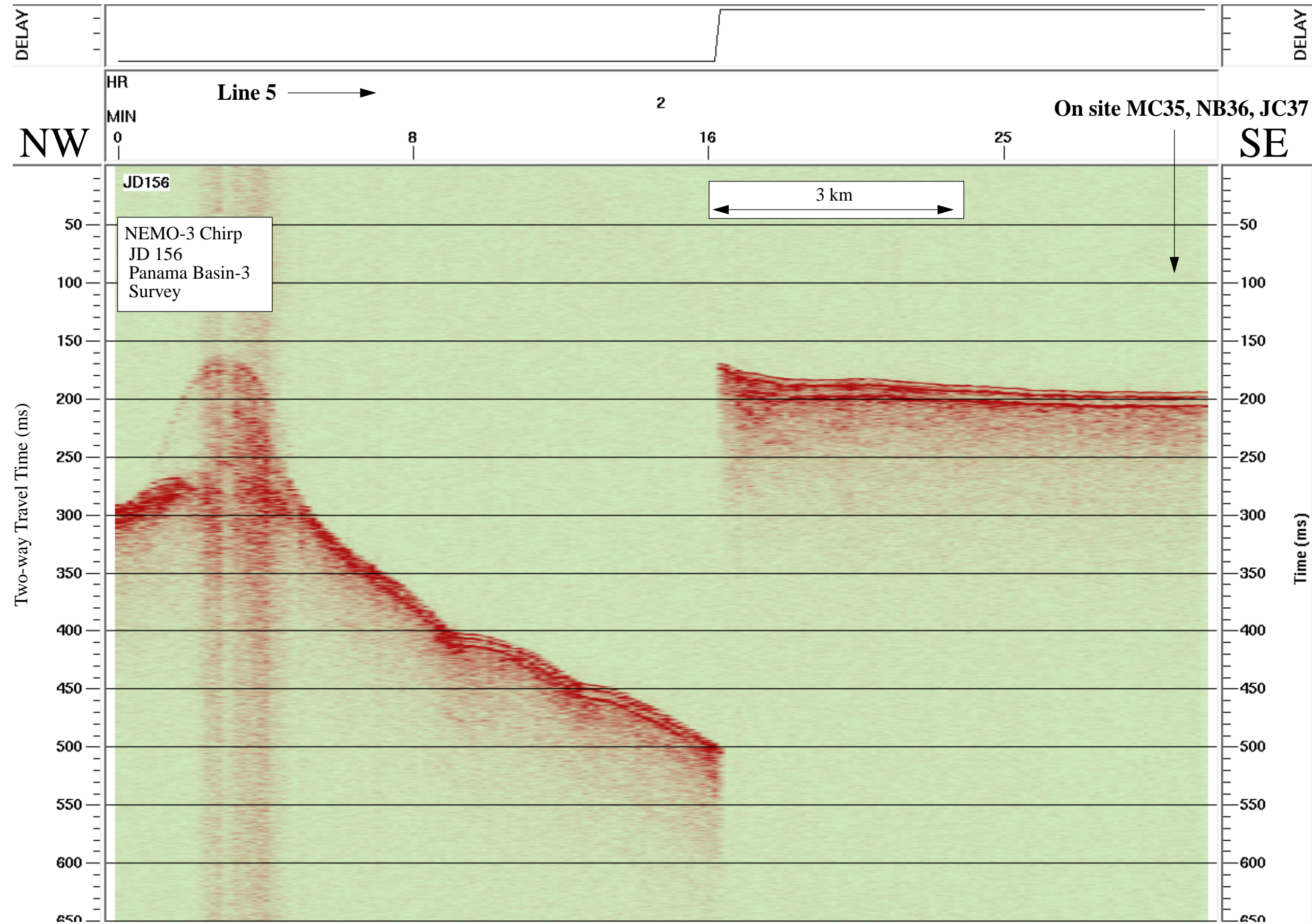




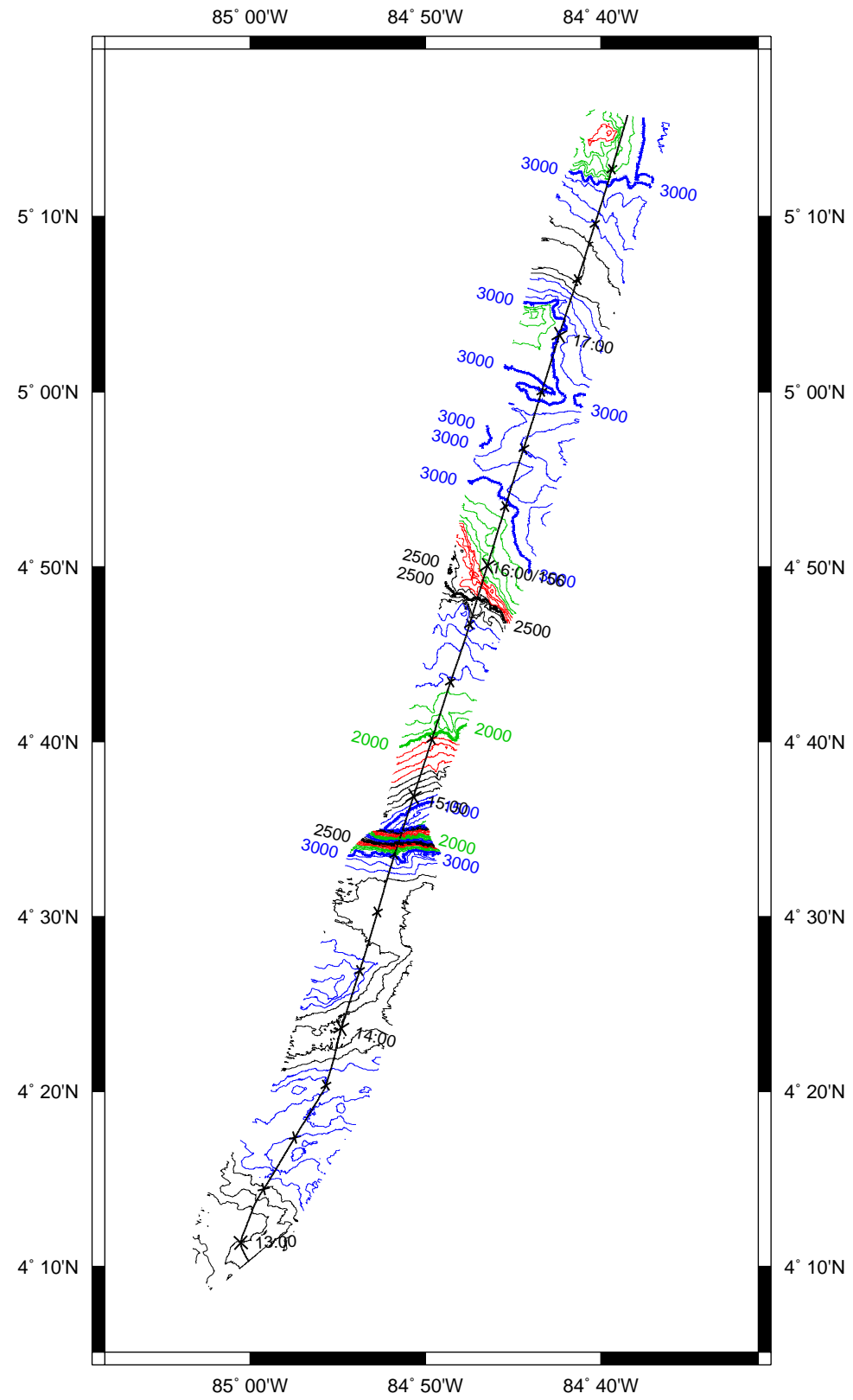


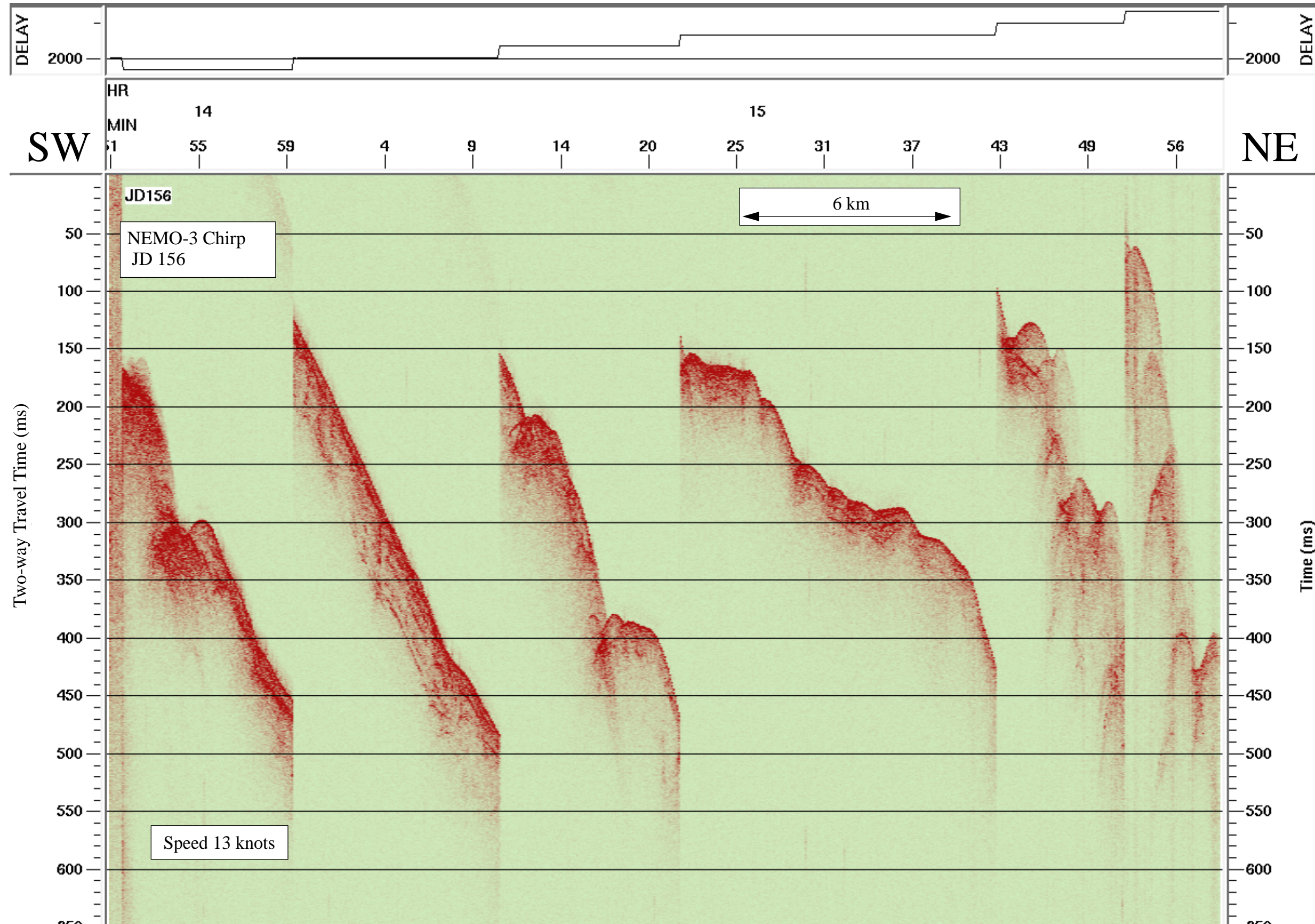


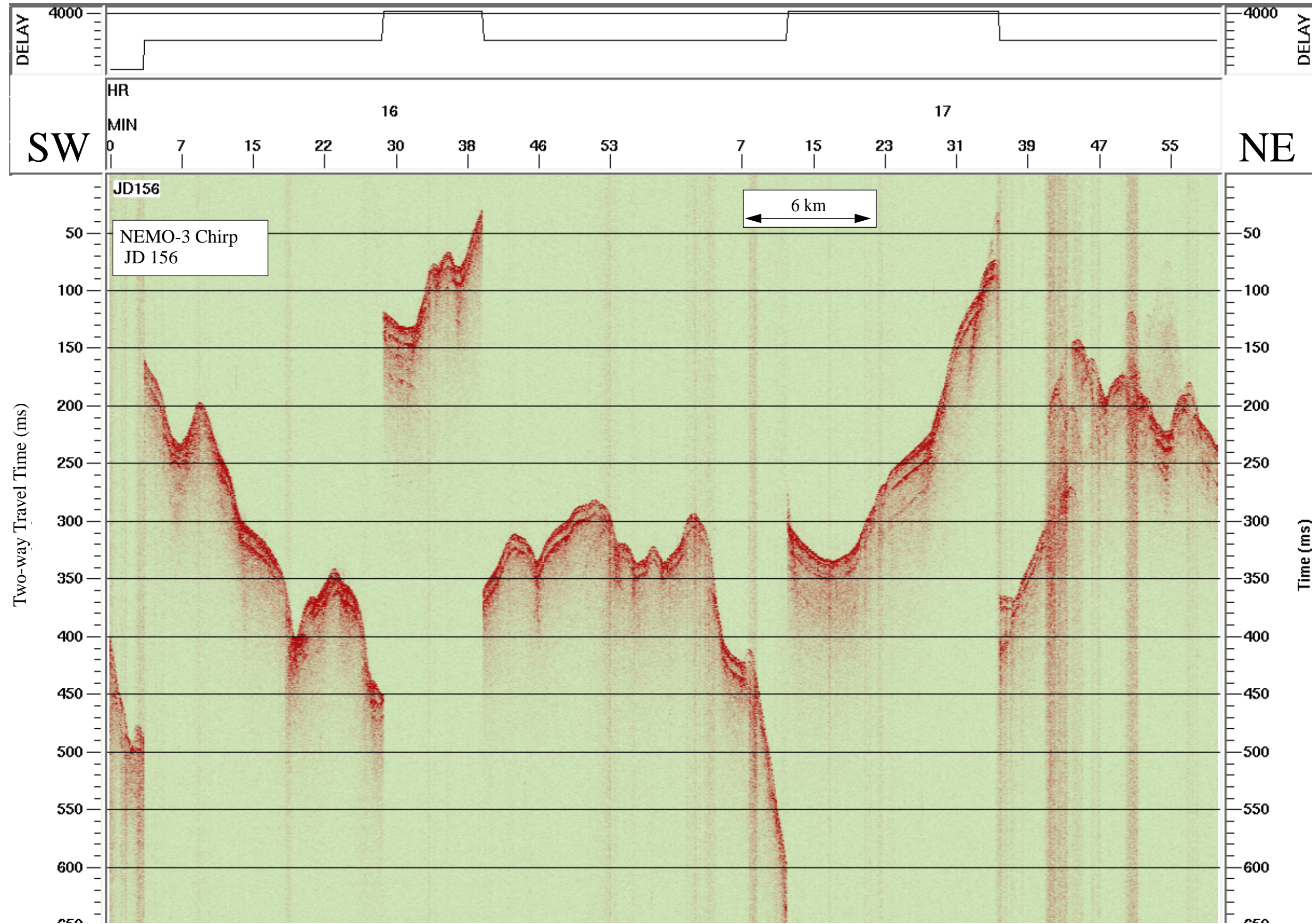




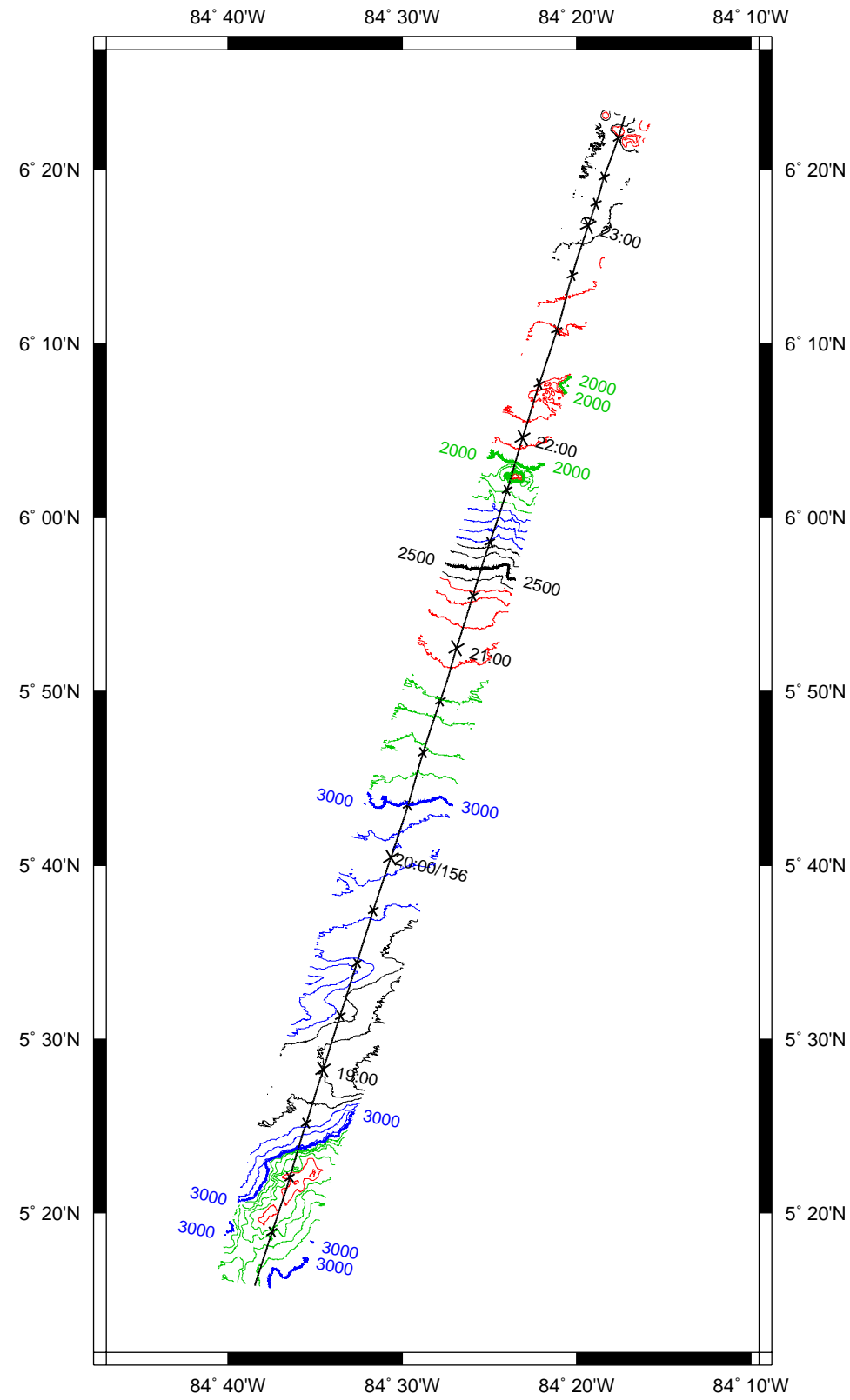
Data File SBfixavg.2000jun04.1200-1800

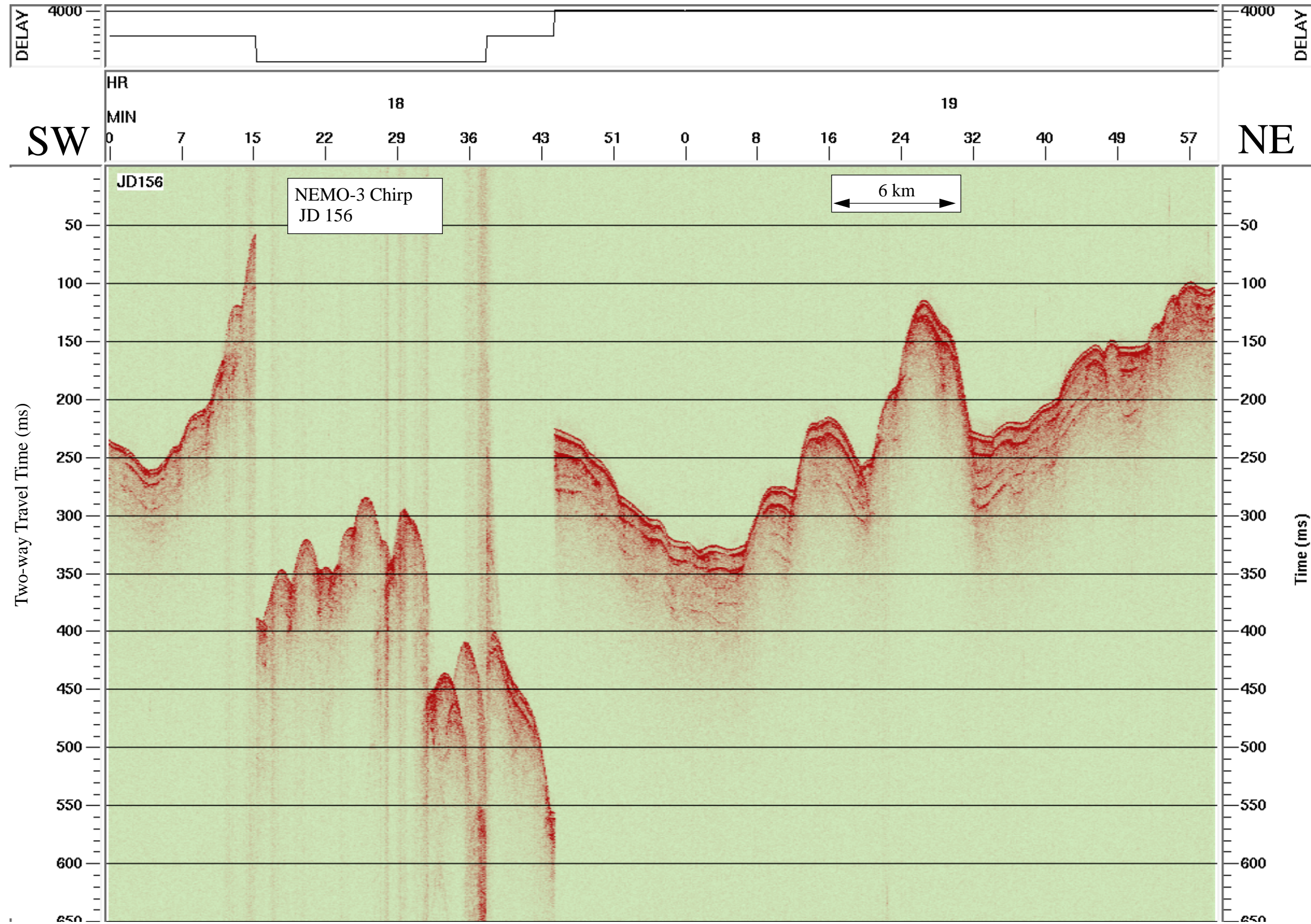


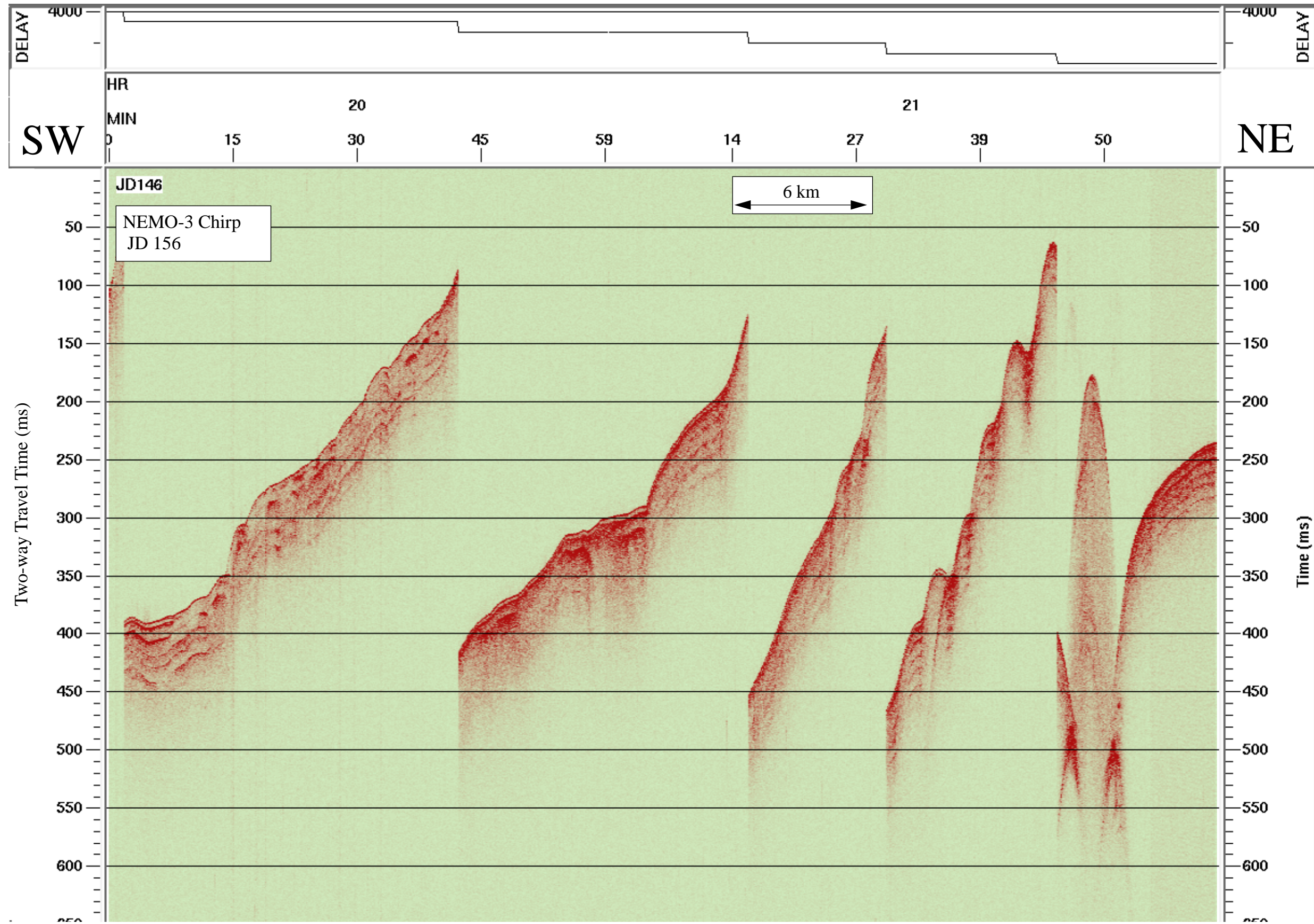


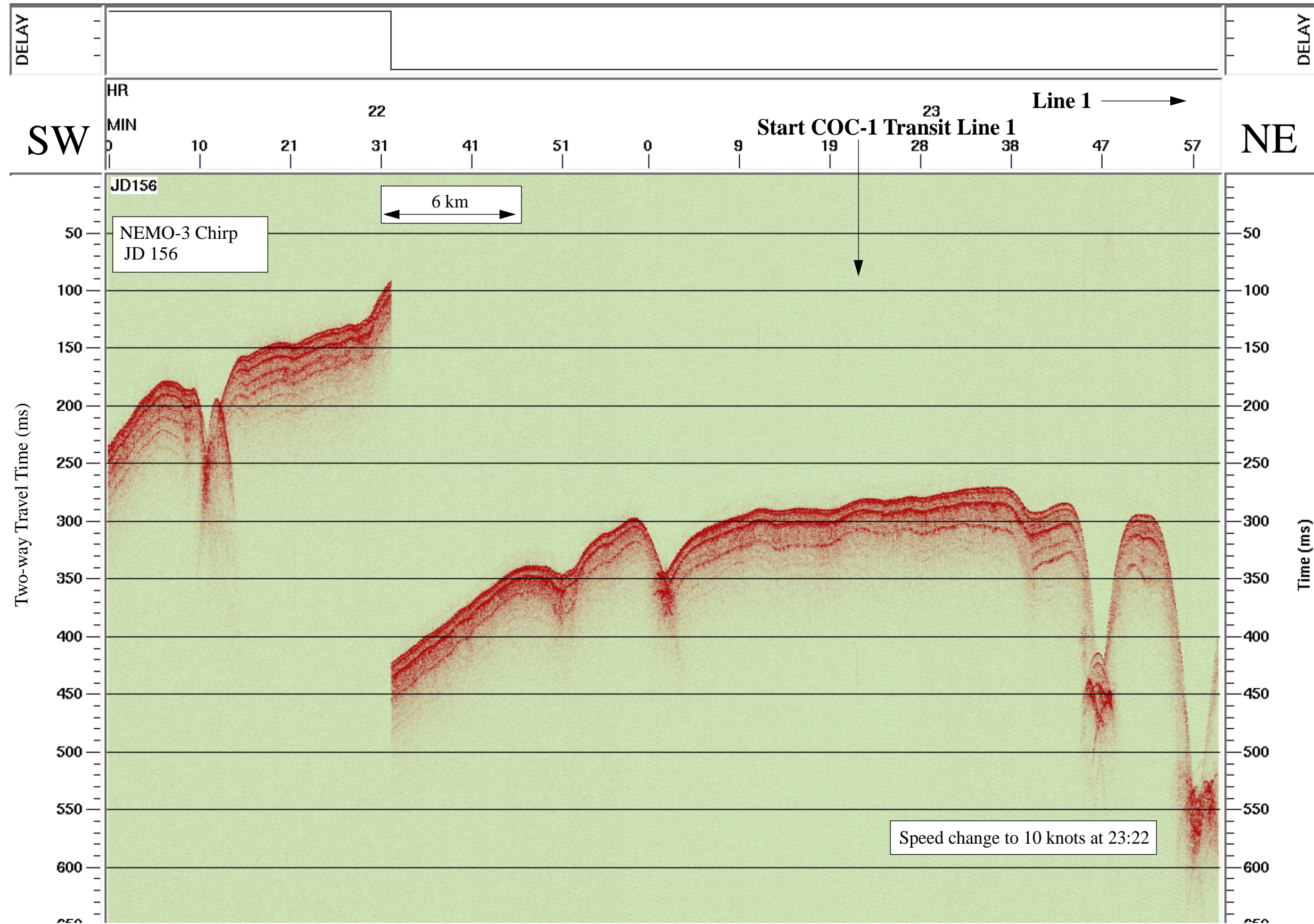


Data File SBfixavg.2000jun04.1800-2400









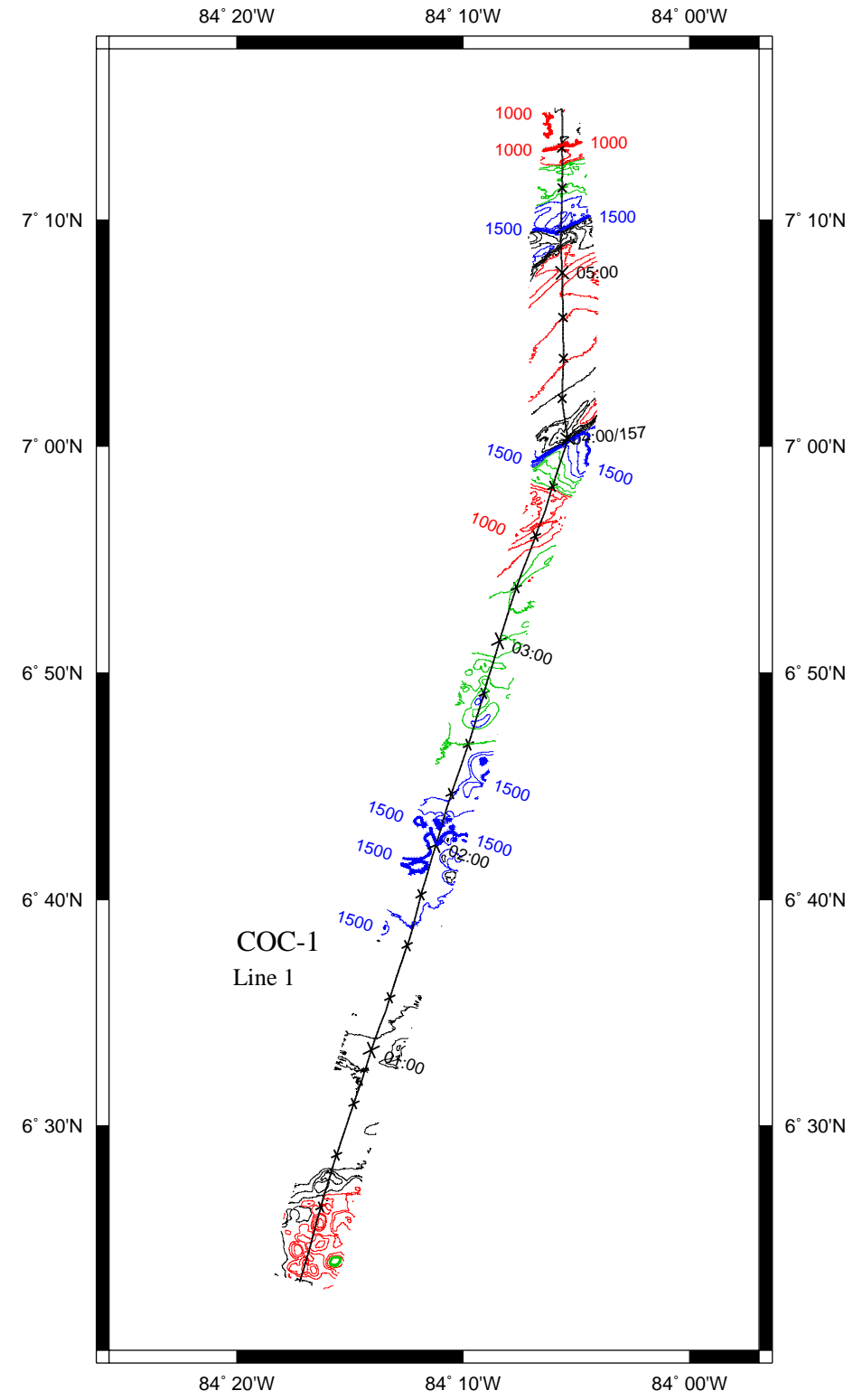
JD 157 (5 June 2000)--COC-1 Survey, Shallow Cocos Ridge

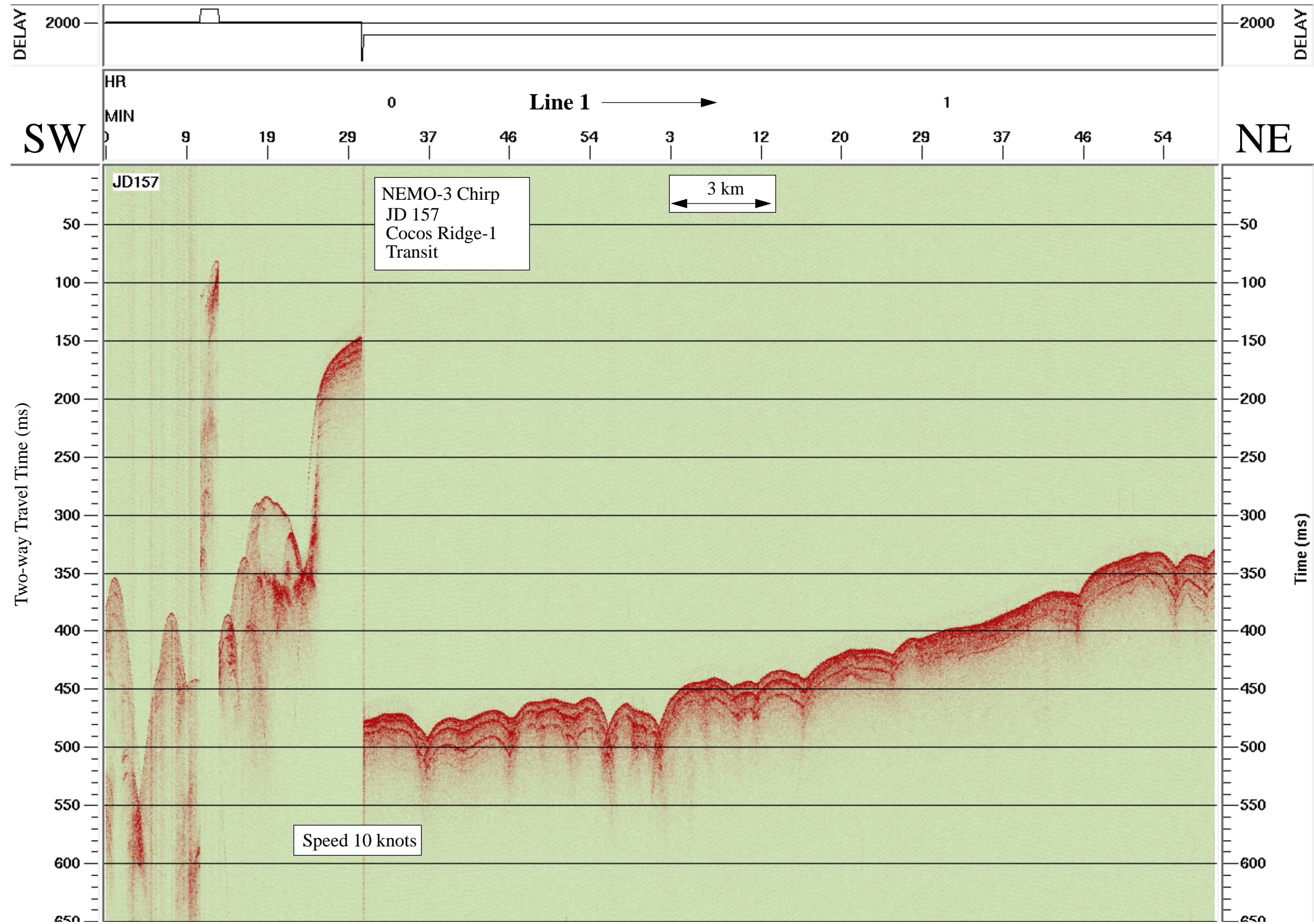
2-7 kHz Chirp Subbottom Profiler

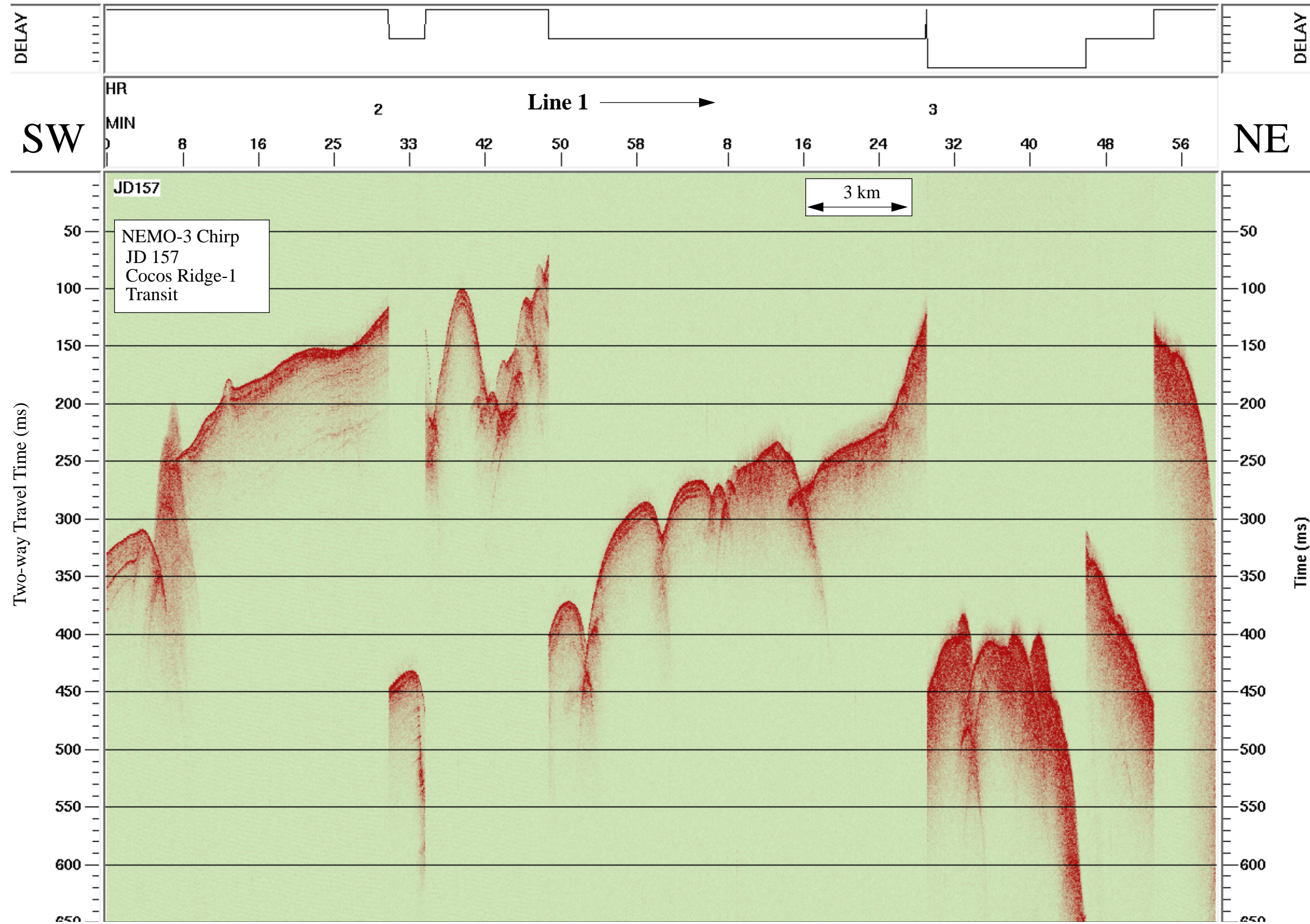
NEMO Leg 3

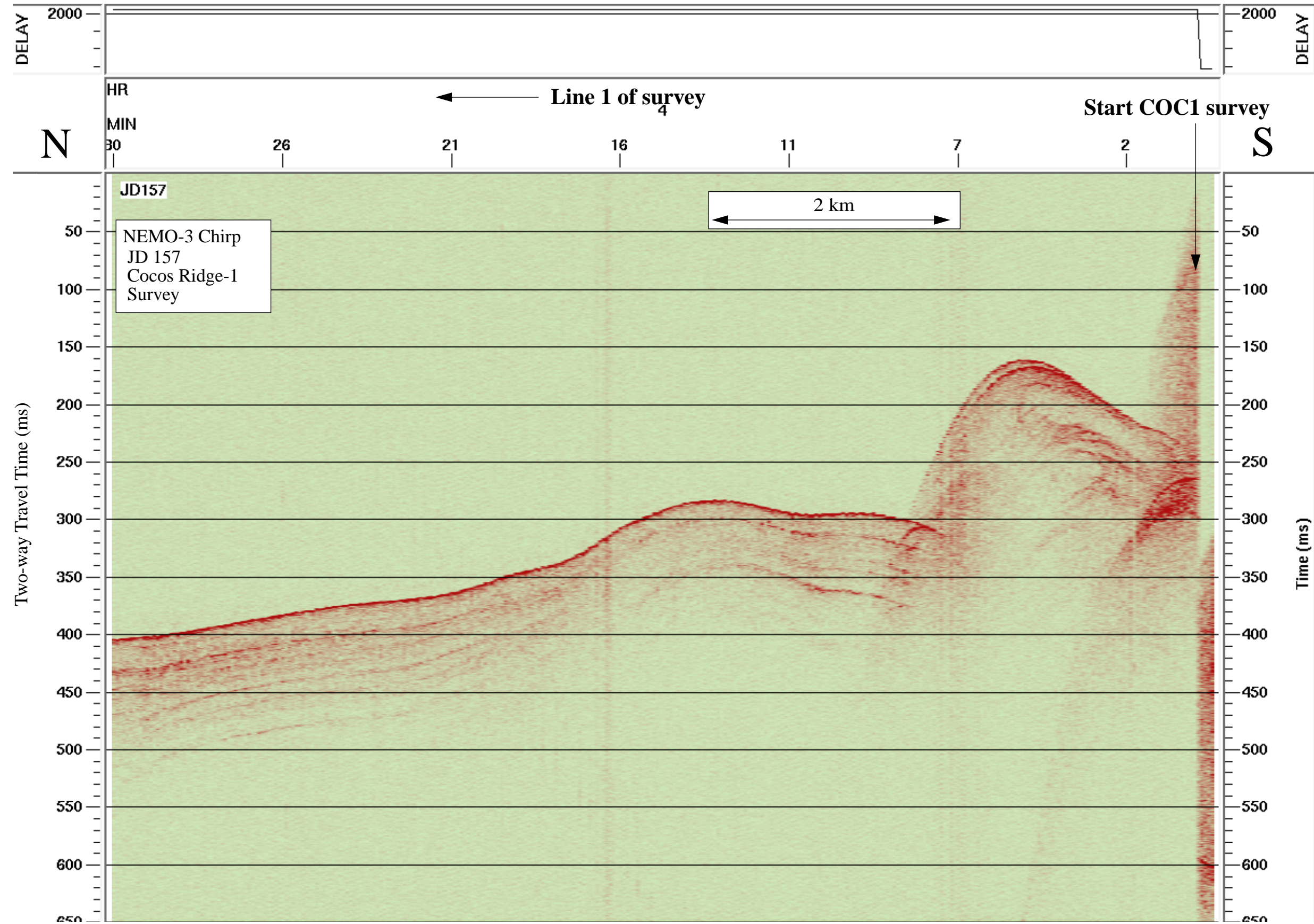
R/V Melville

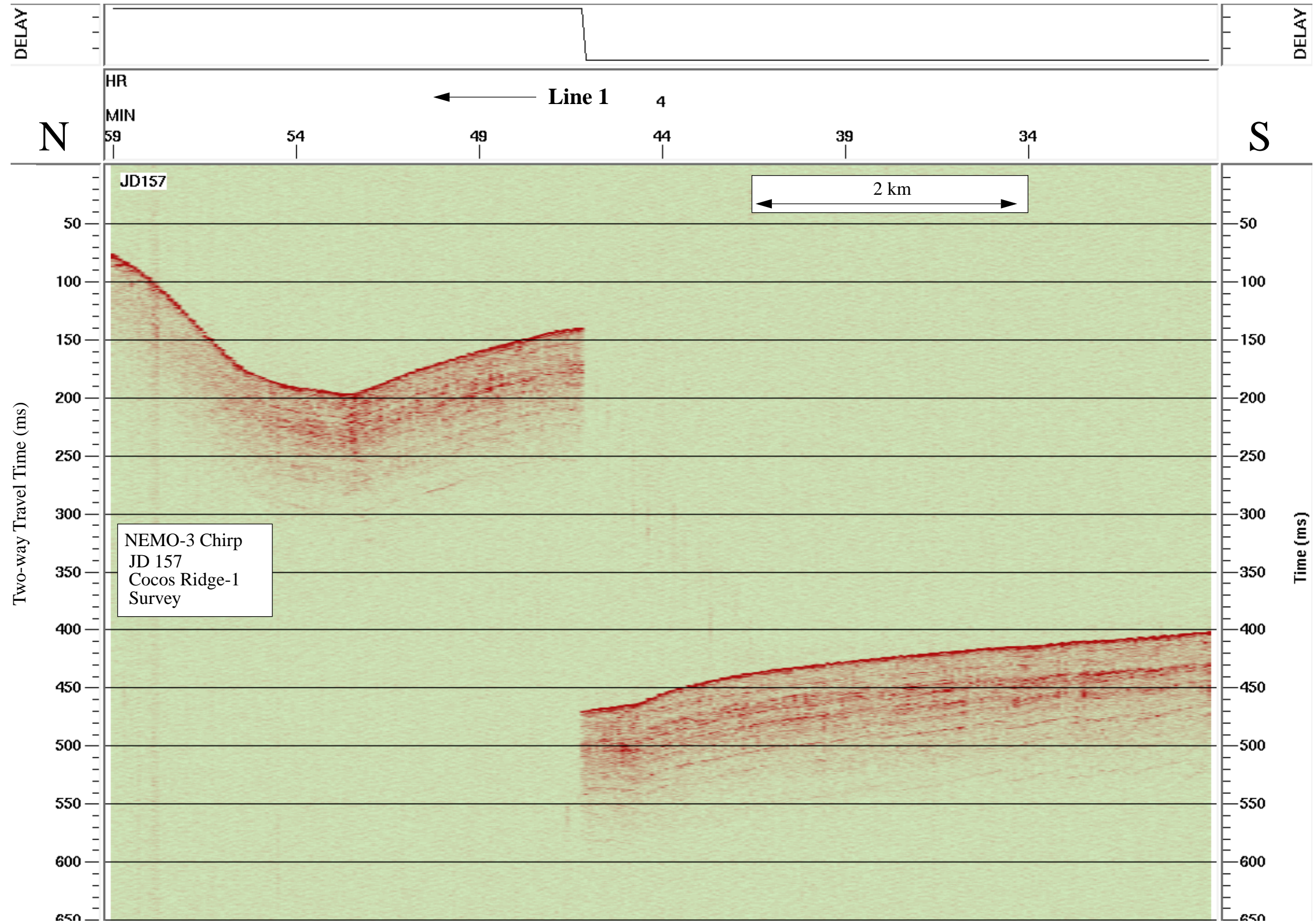
Data File SBfixavg.2000jun05.0000-0600

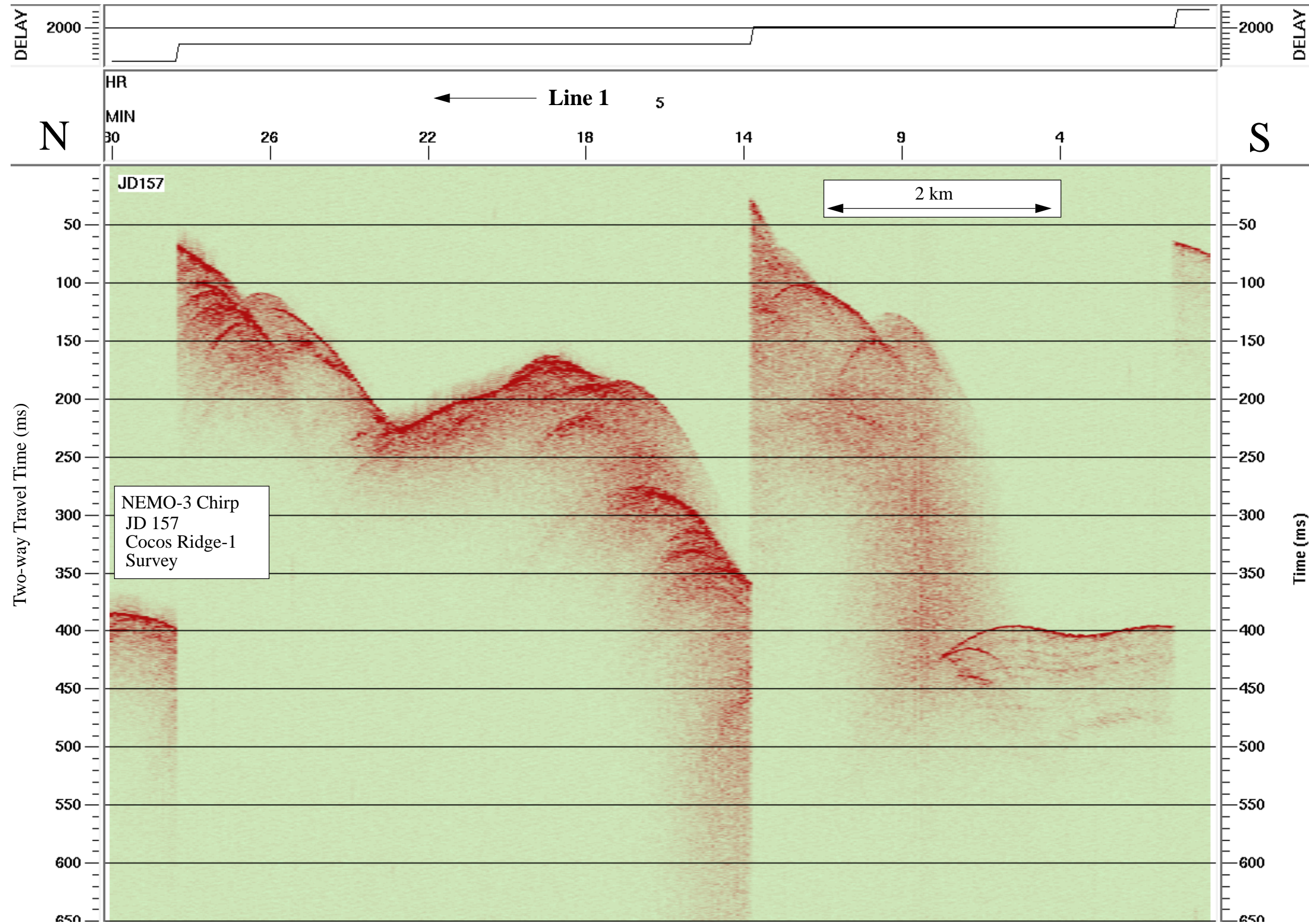


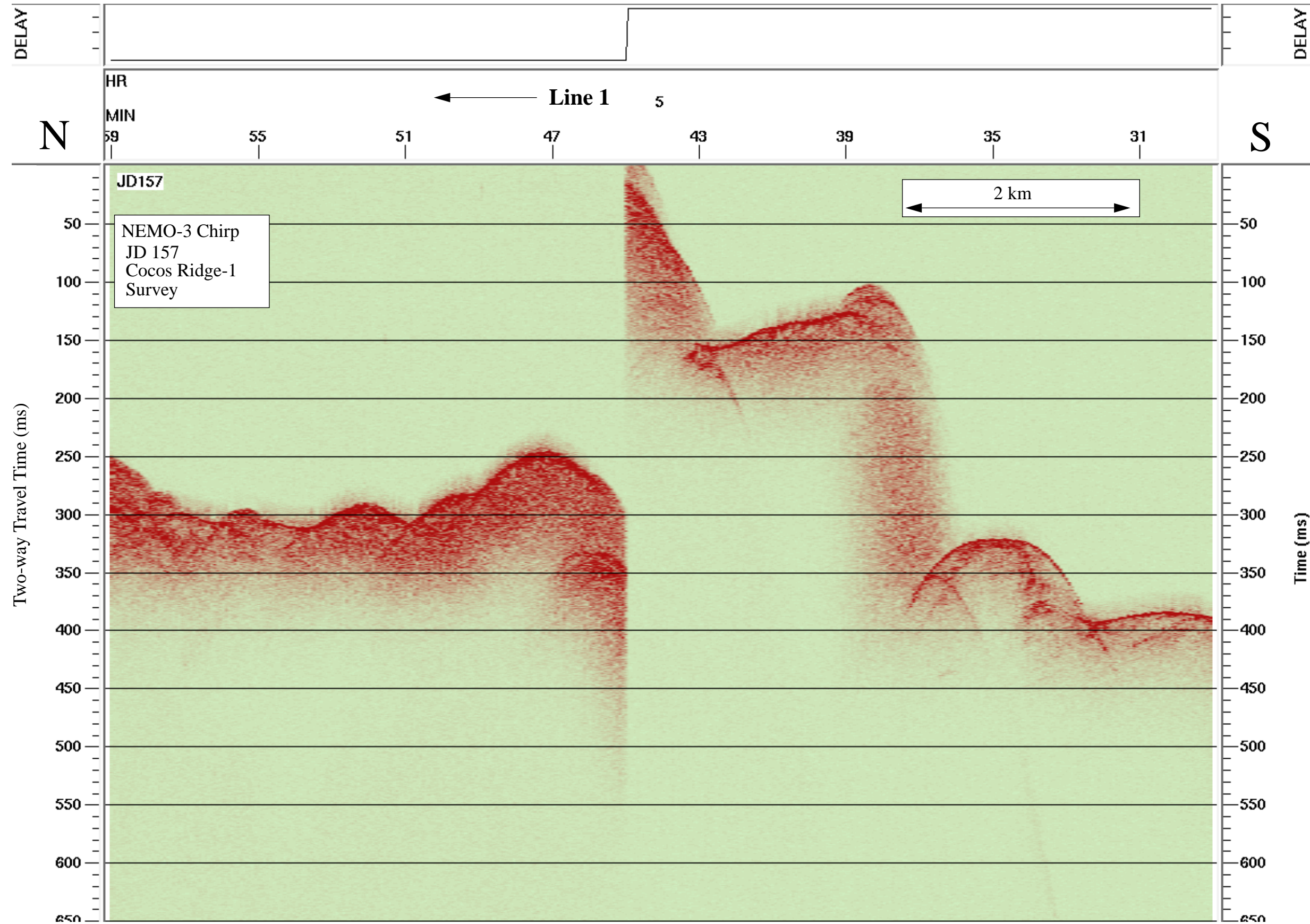




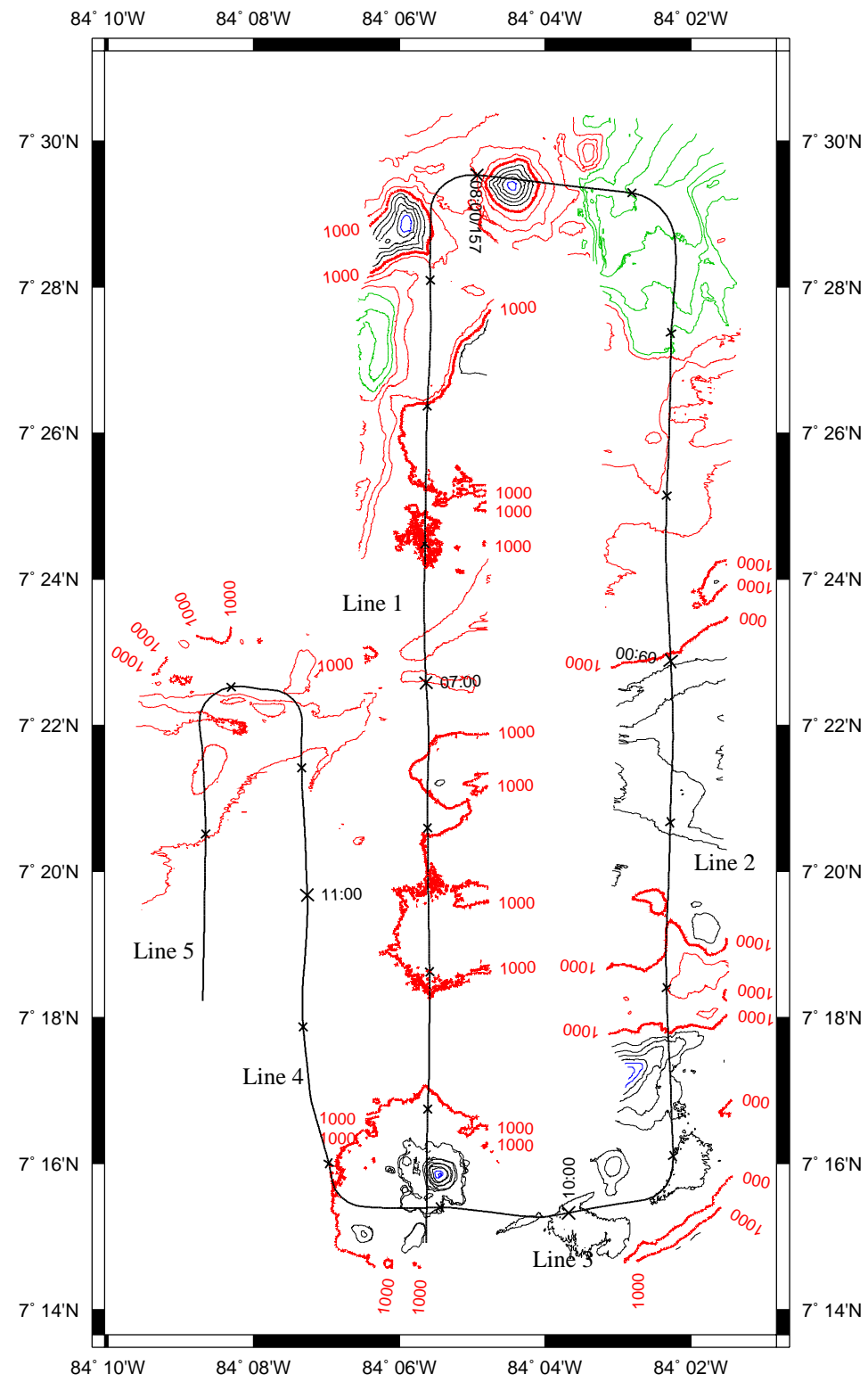


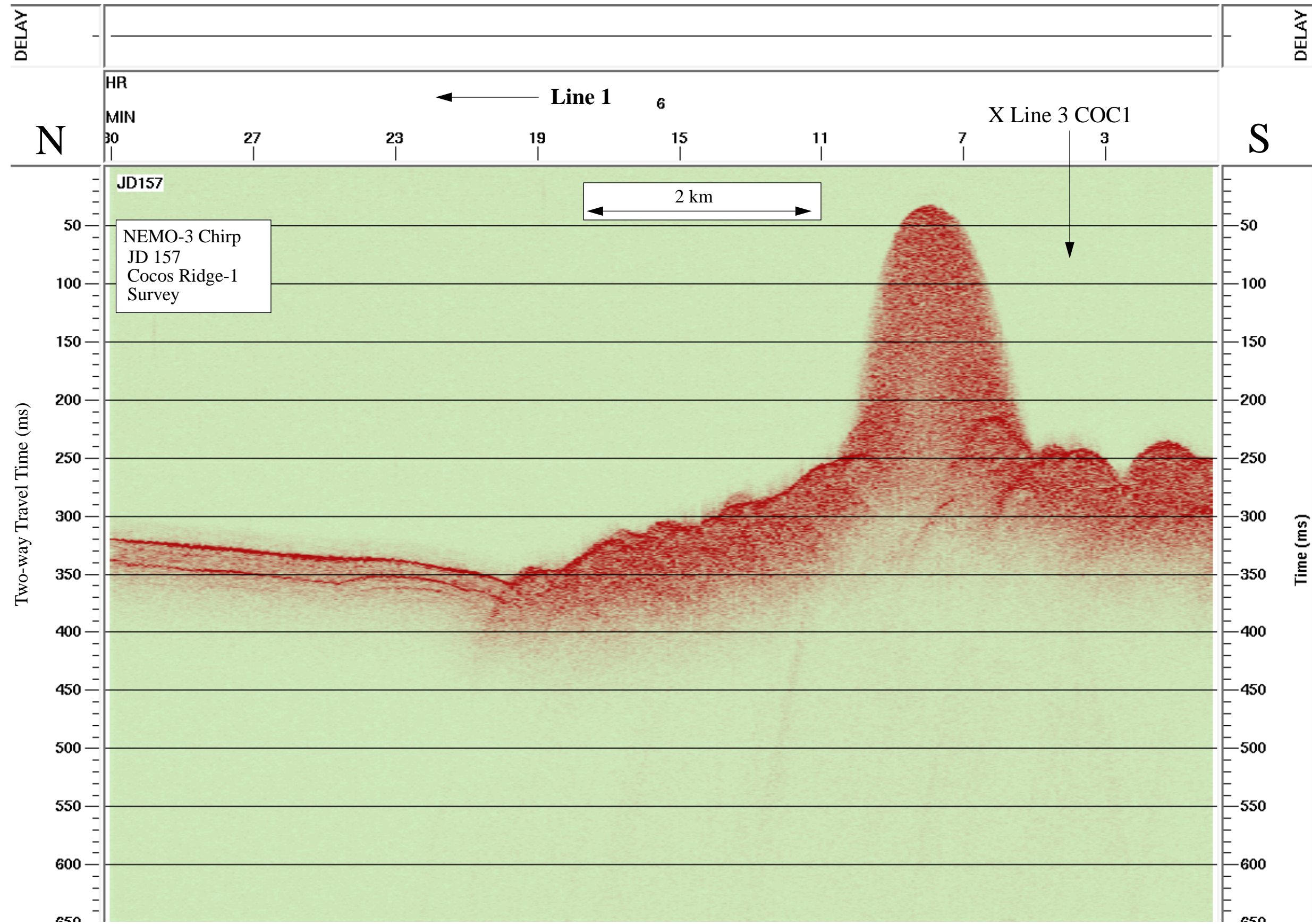


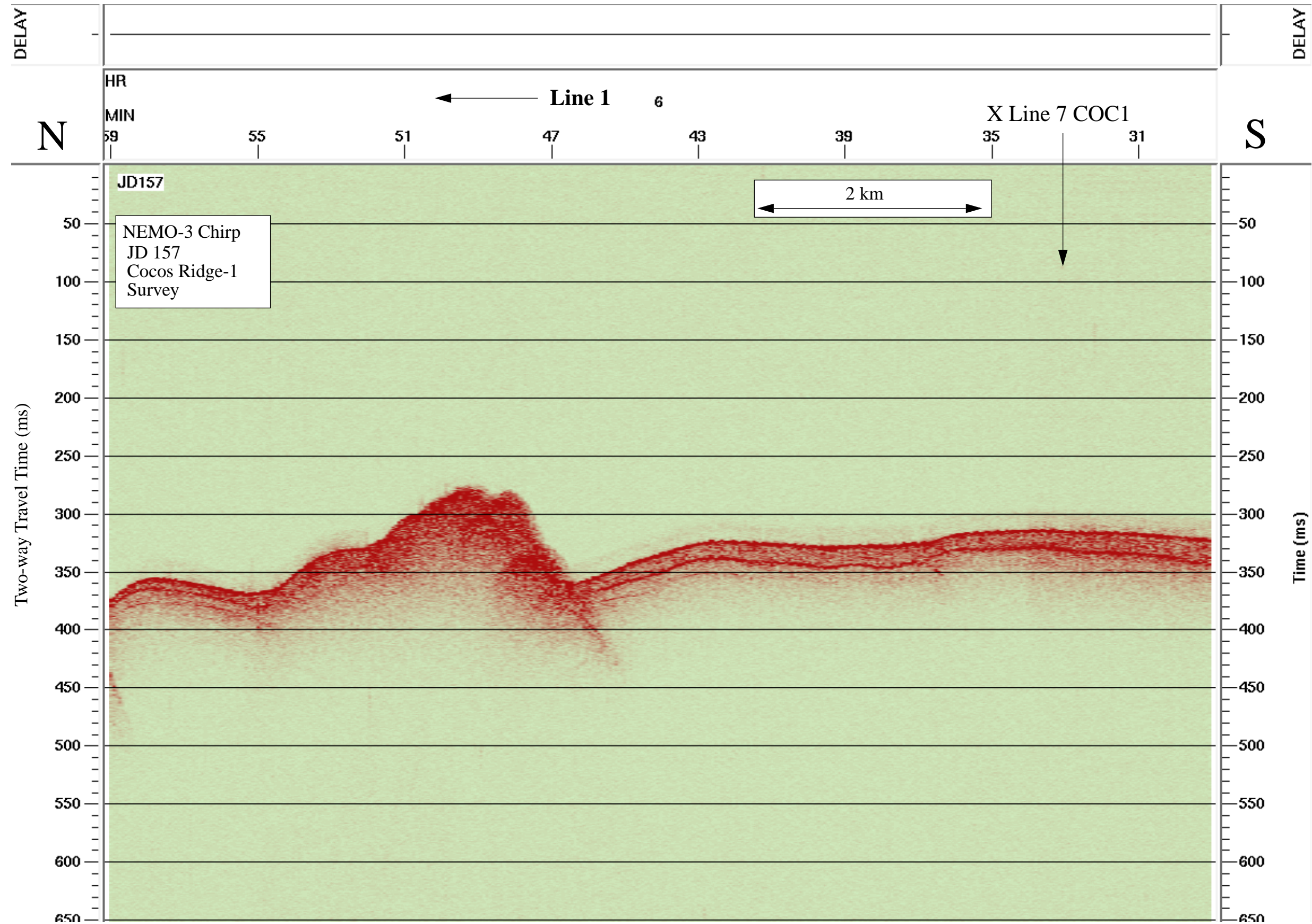


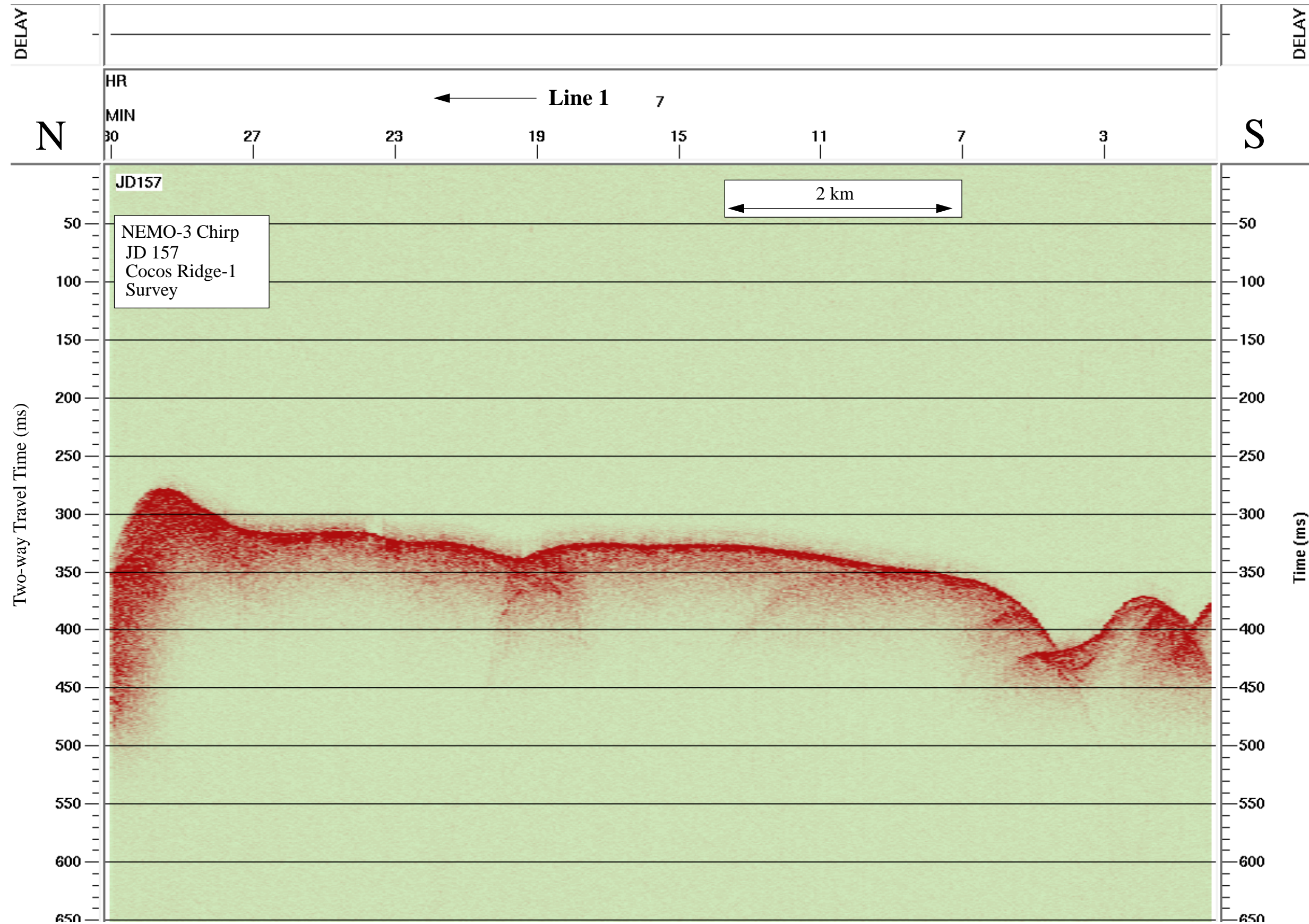


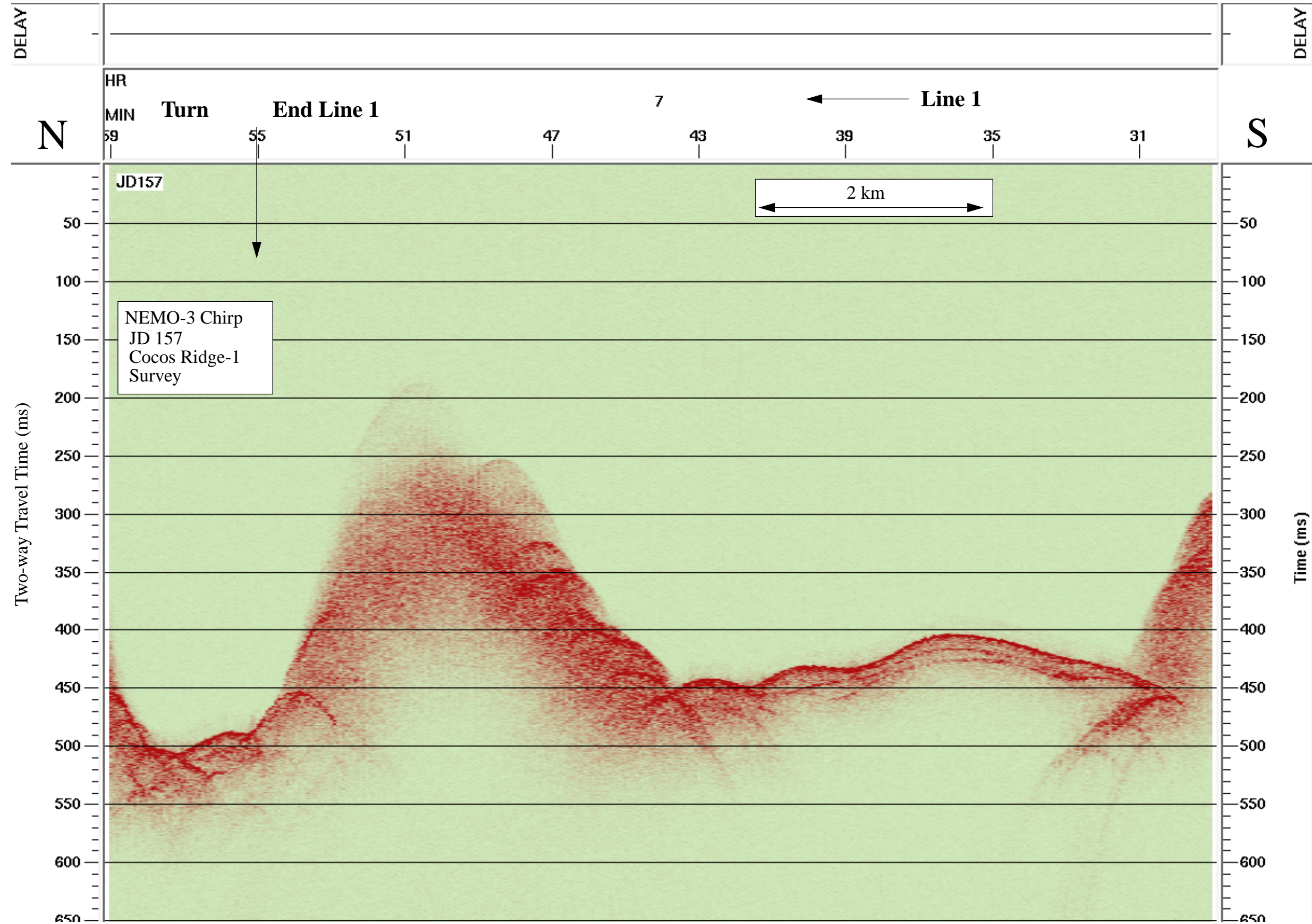
Data File SBfixavg.2000jun05.0600-1200

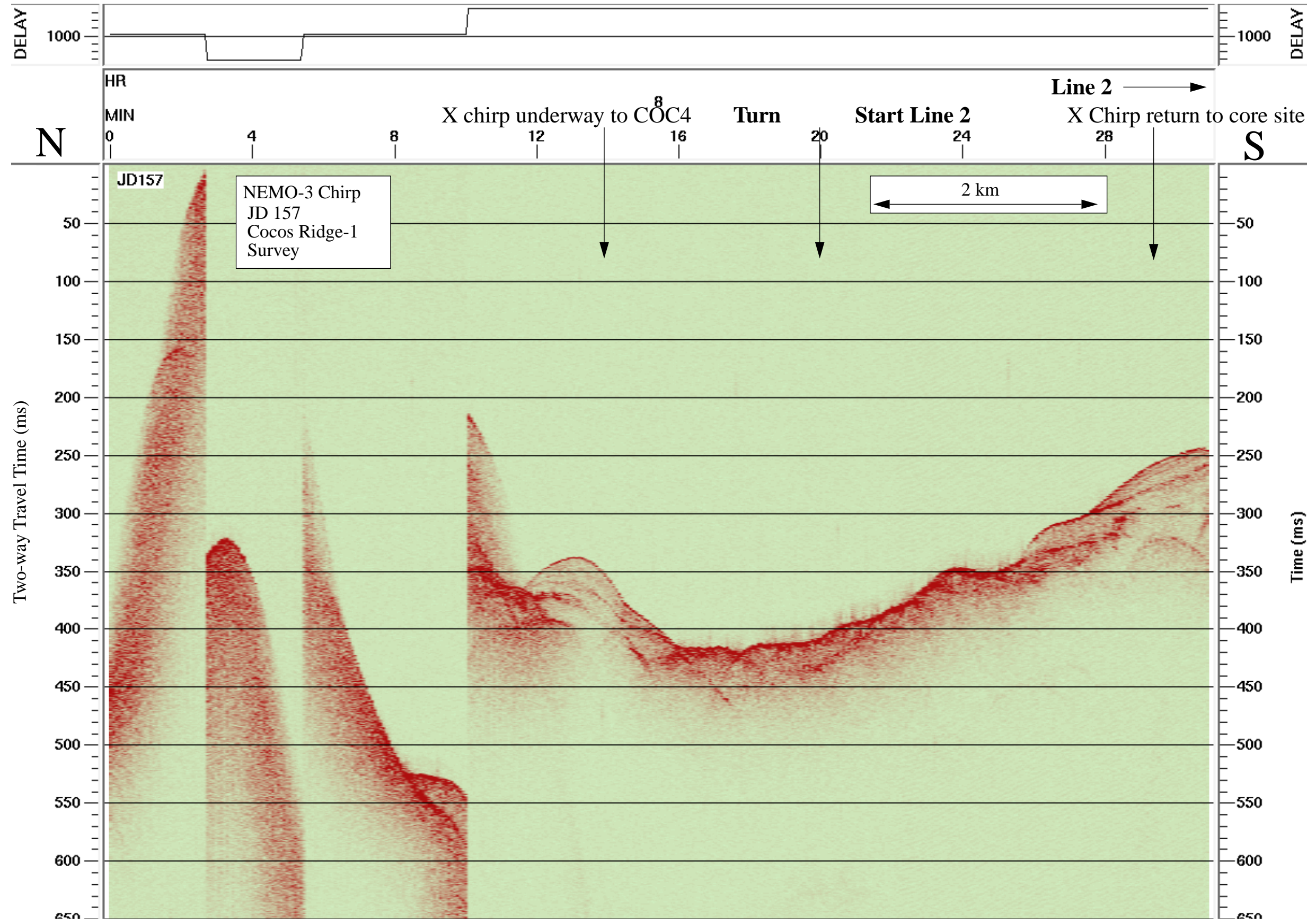


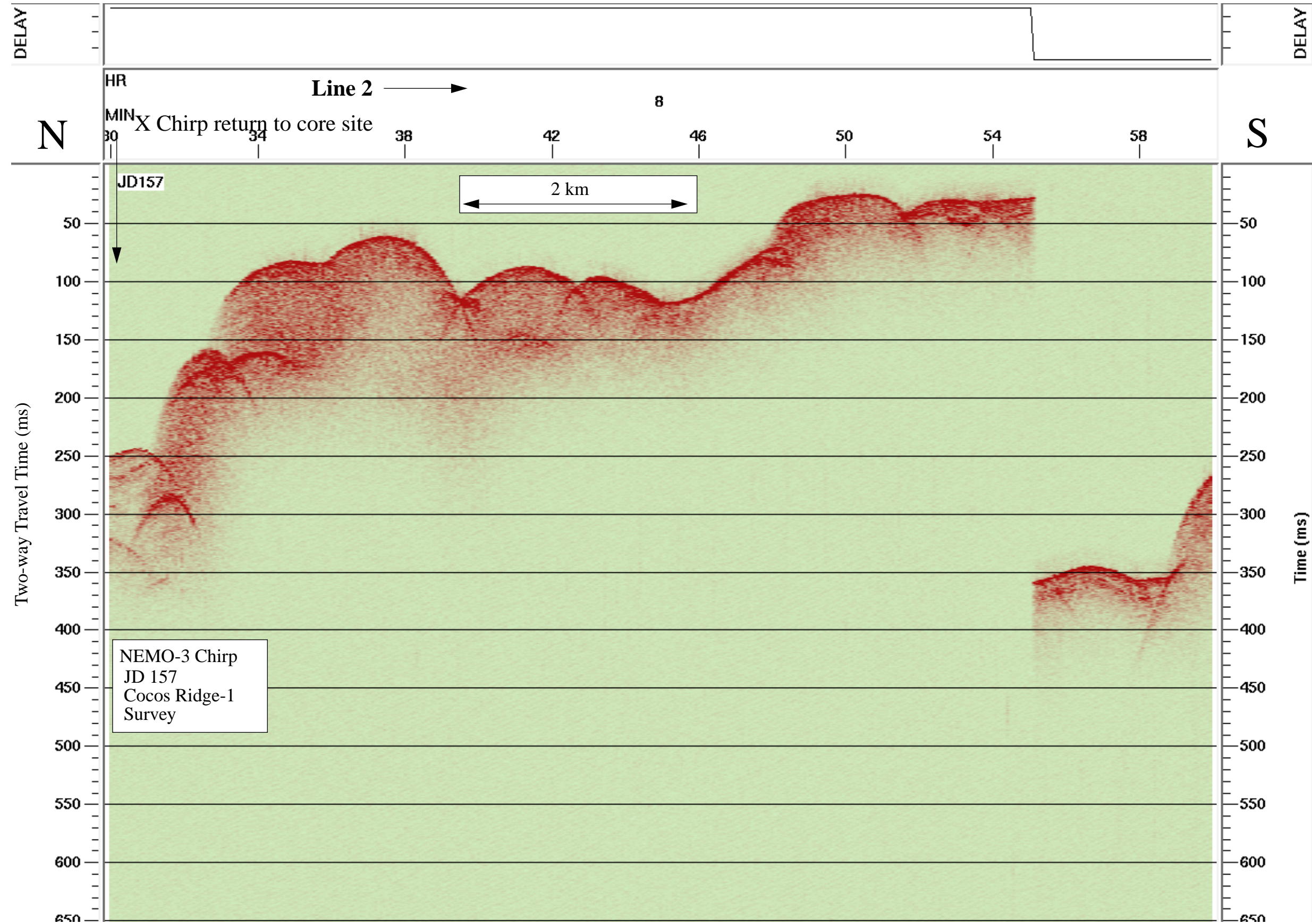


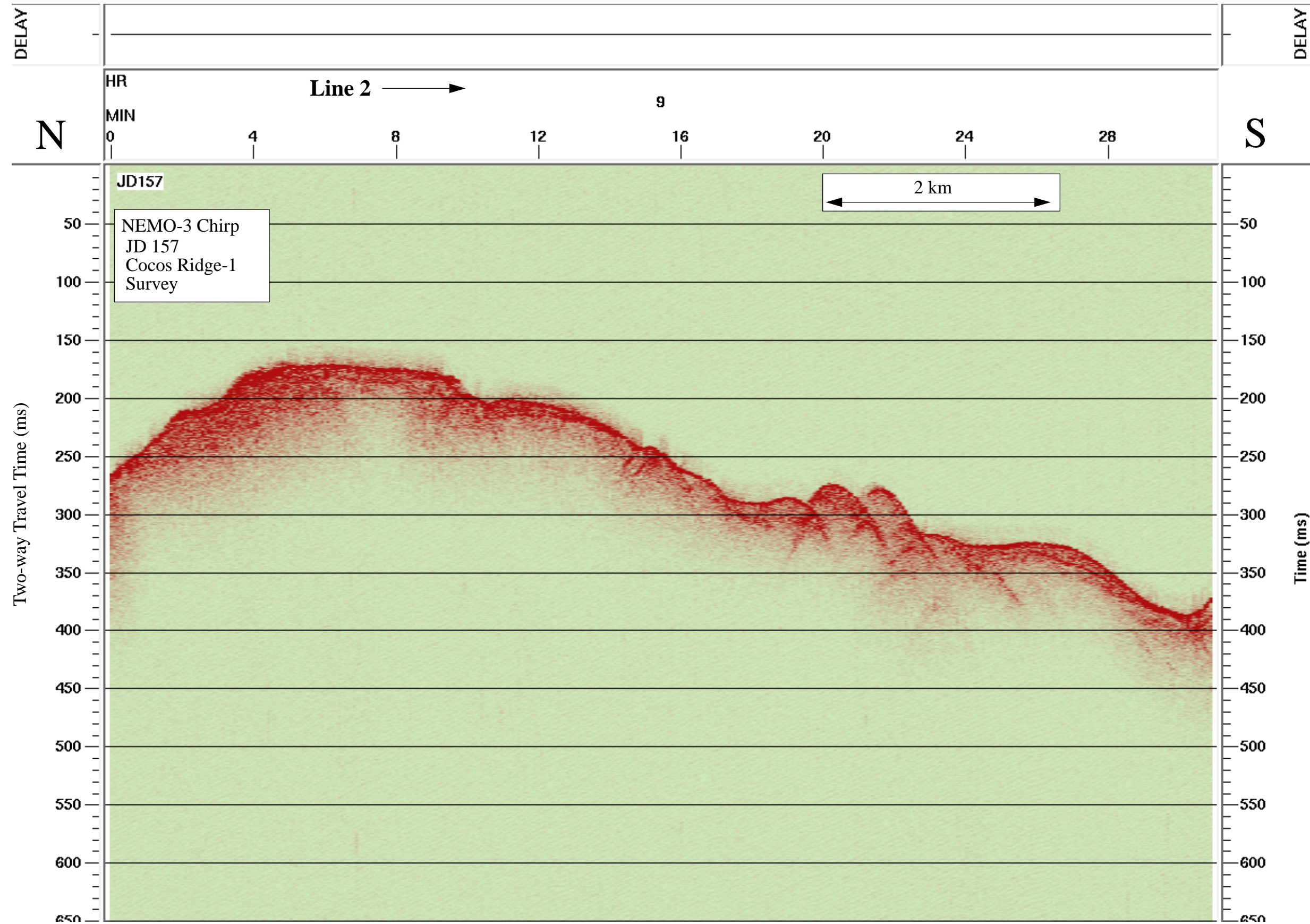


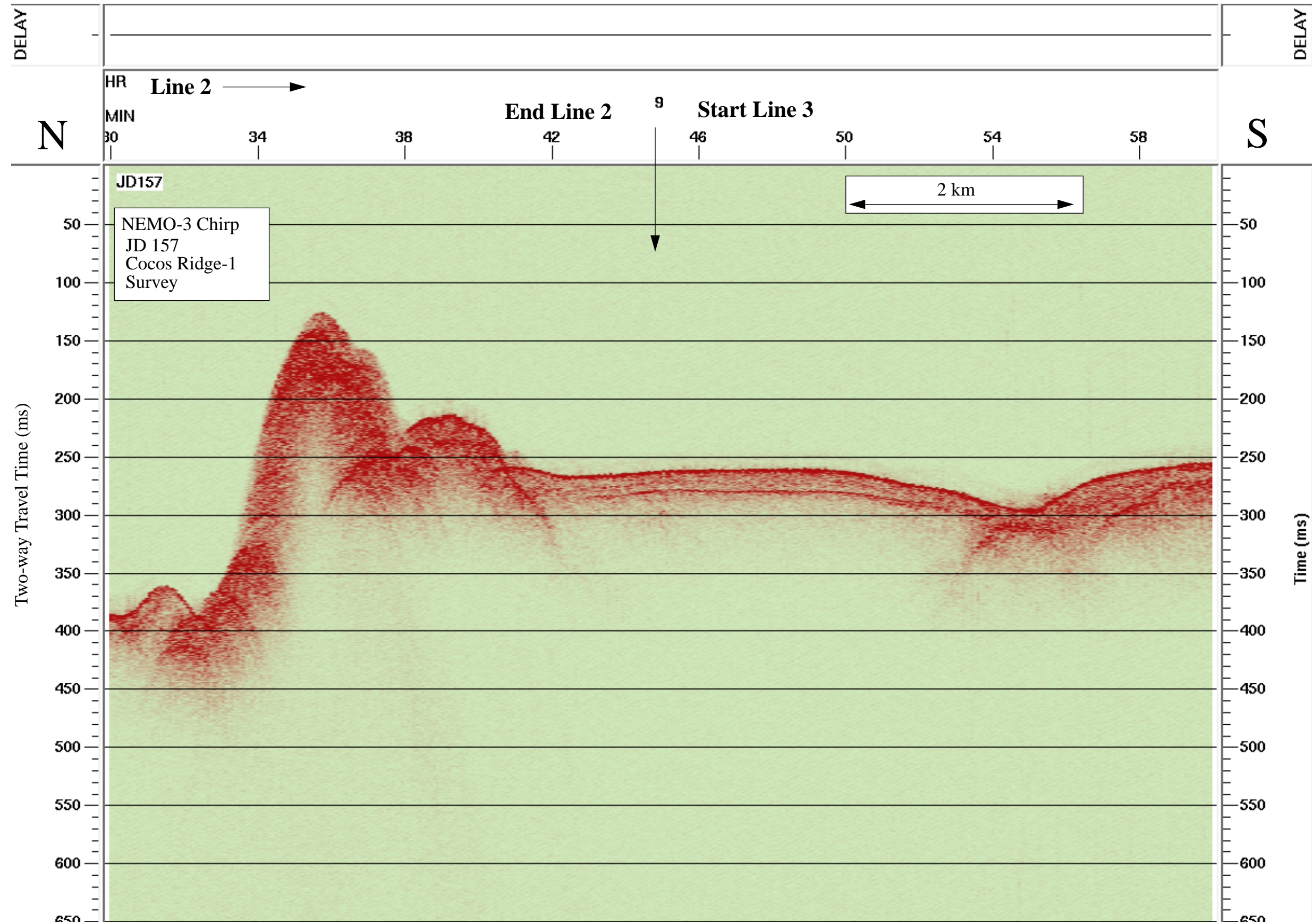


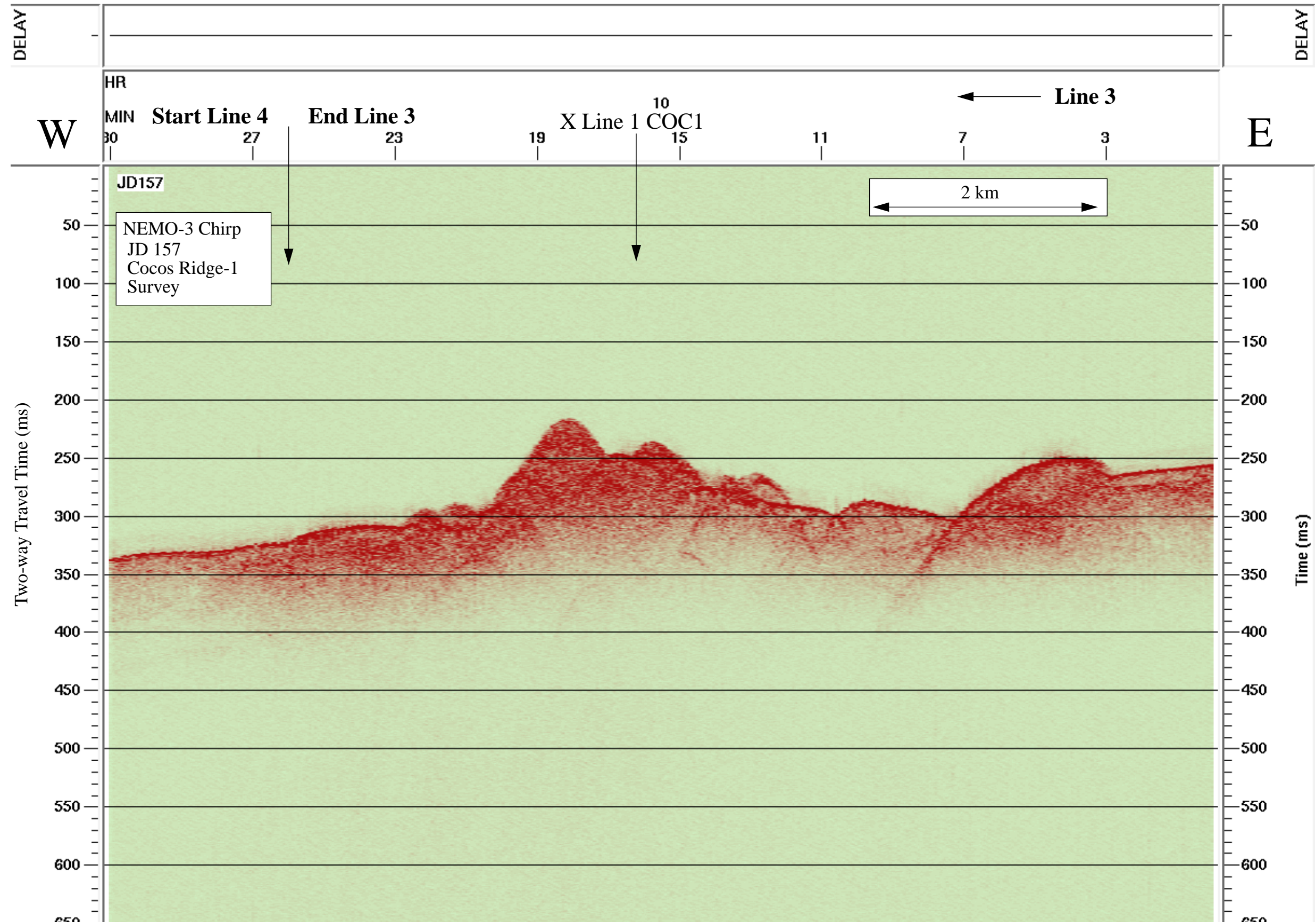


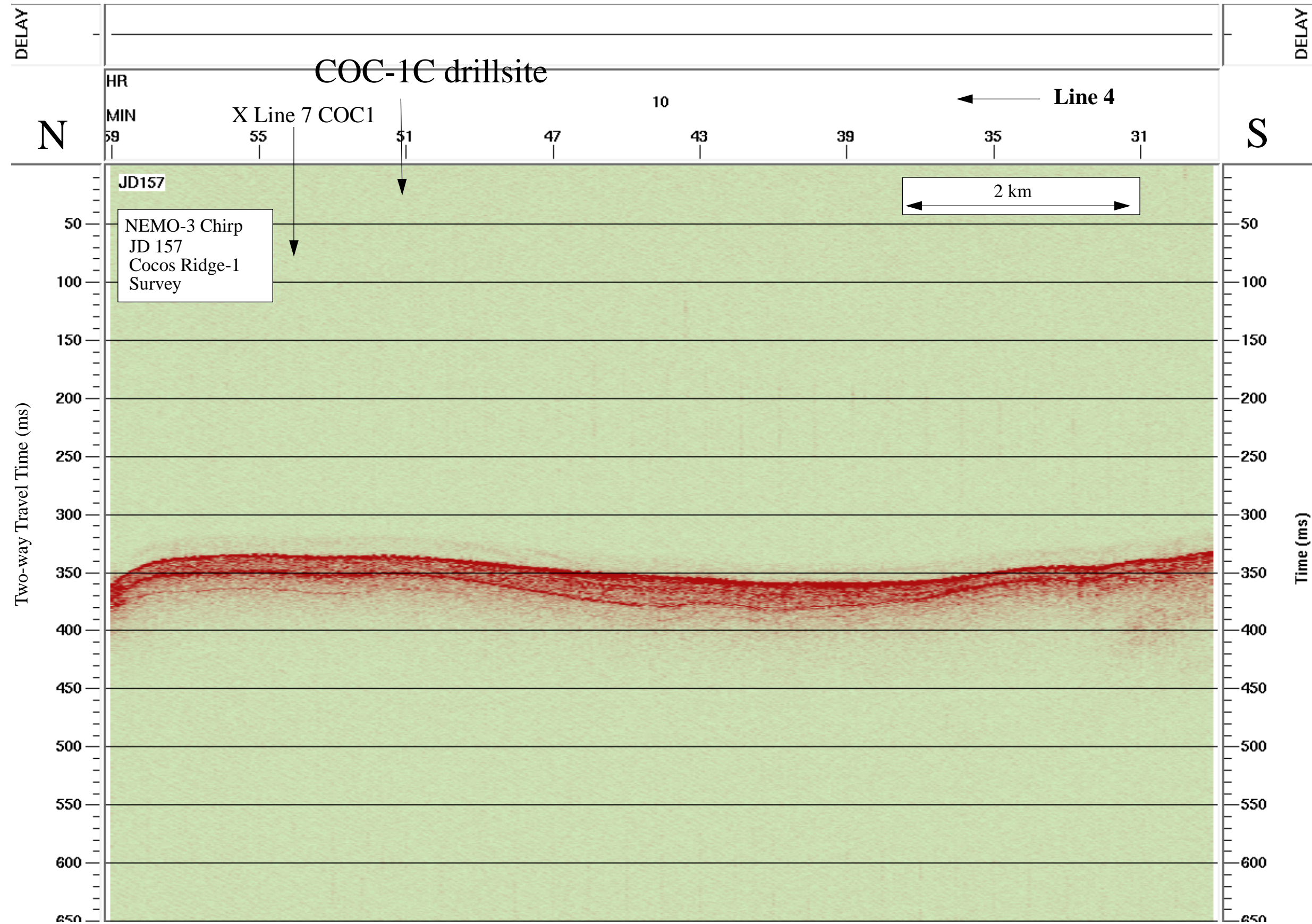


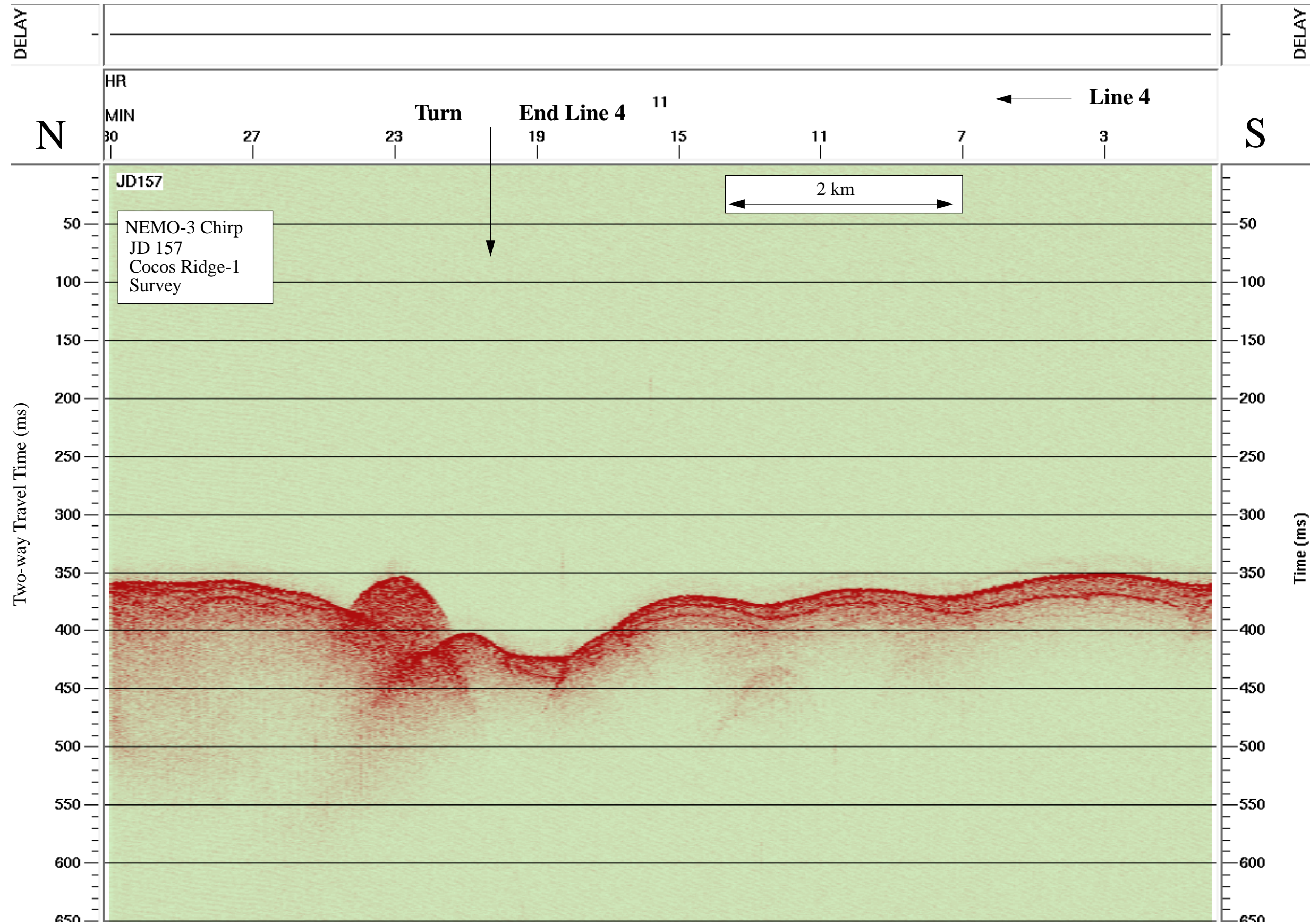


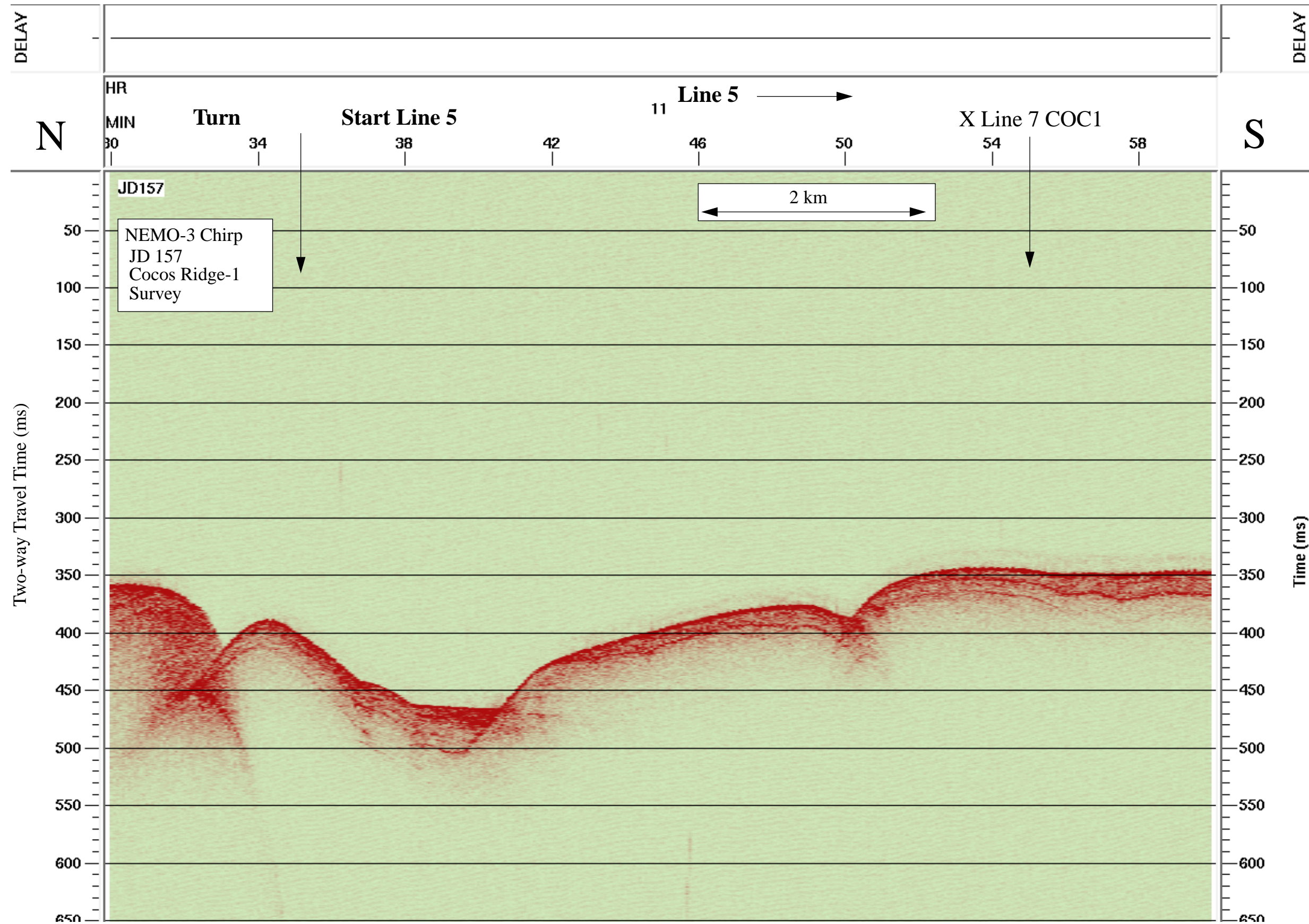




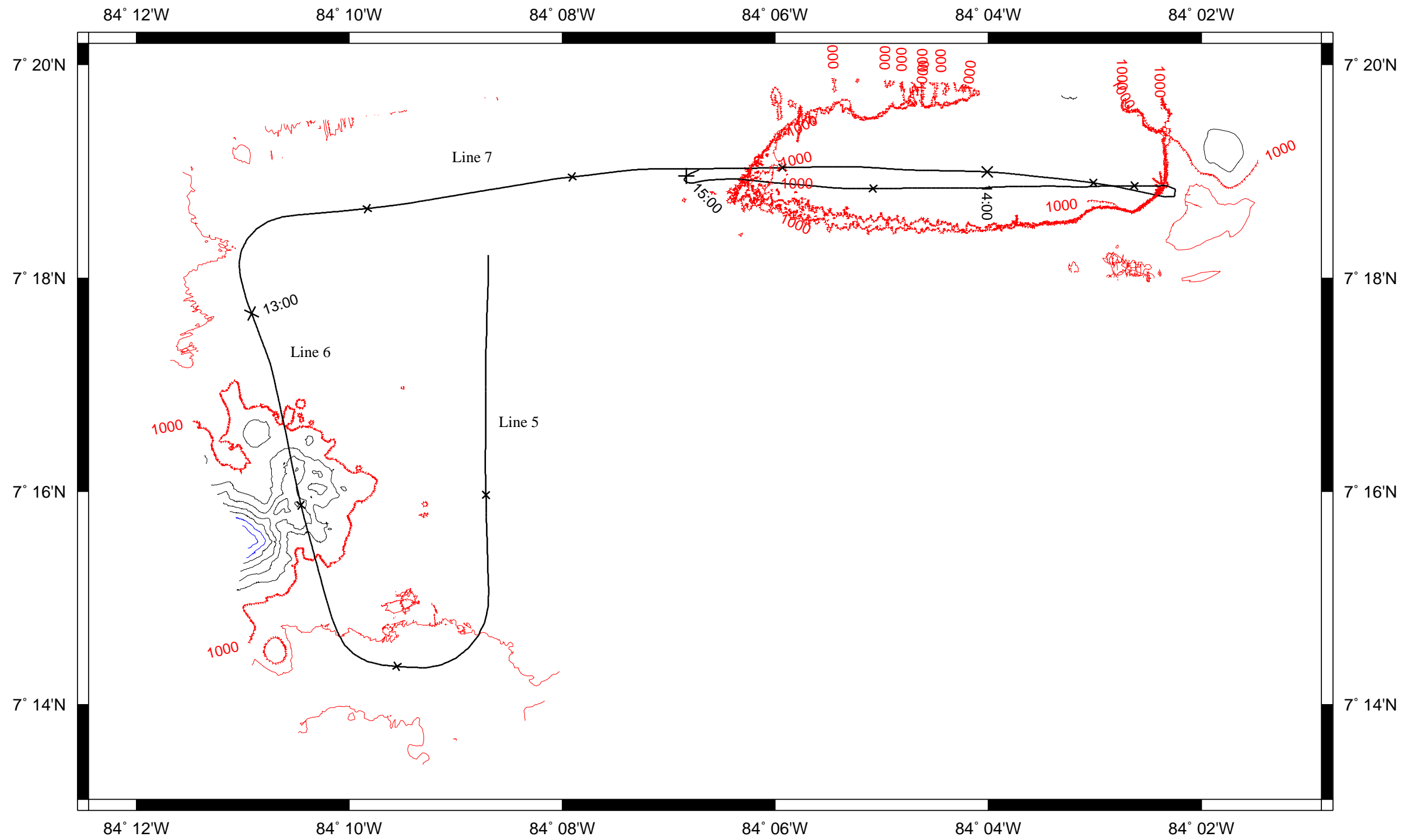


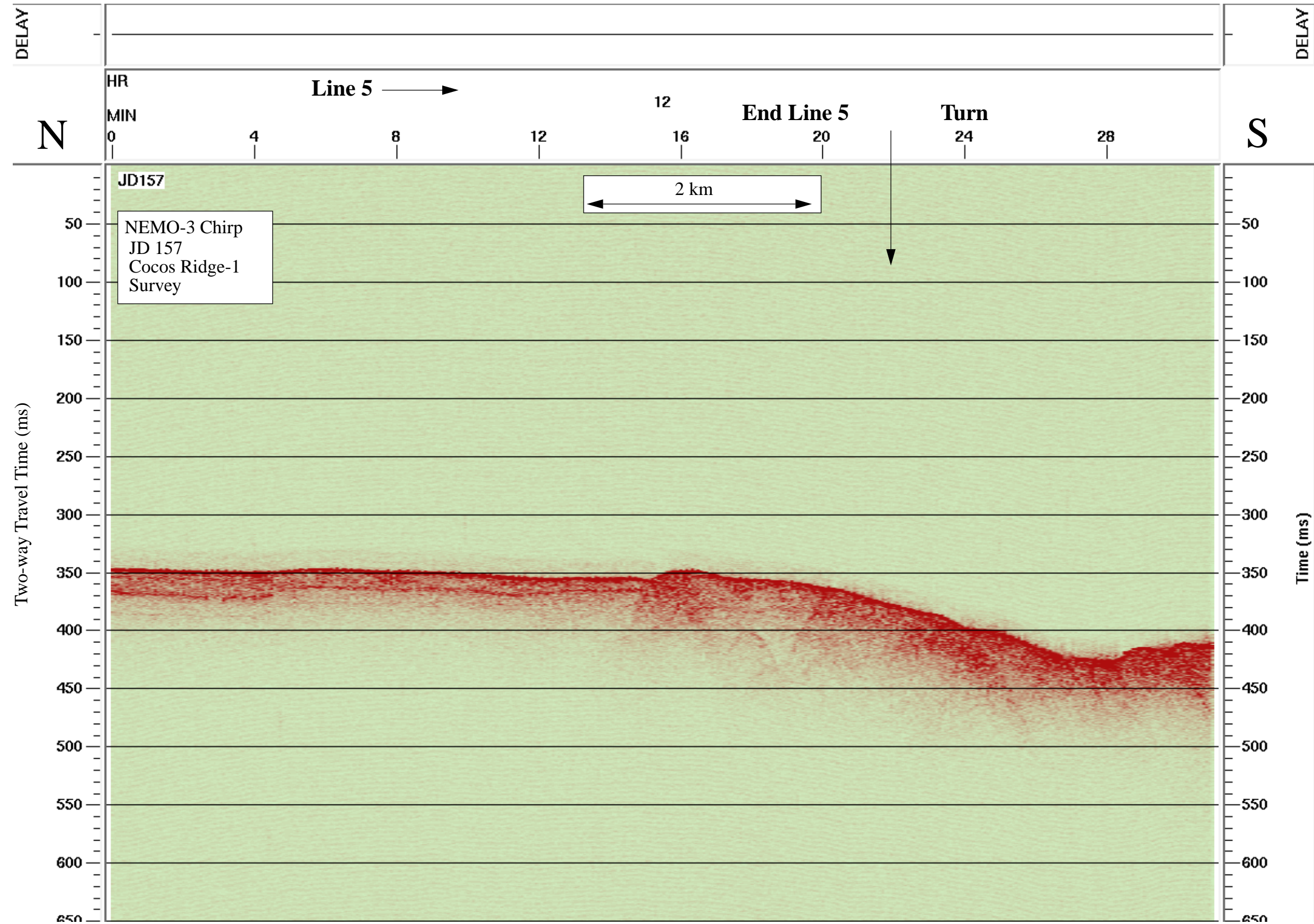


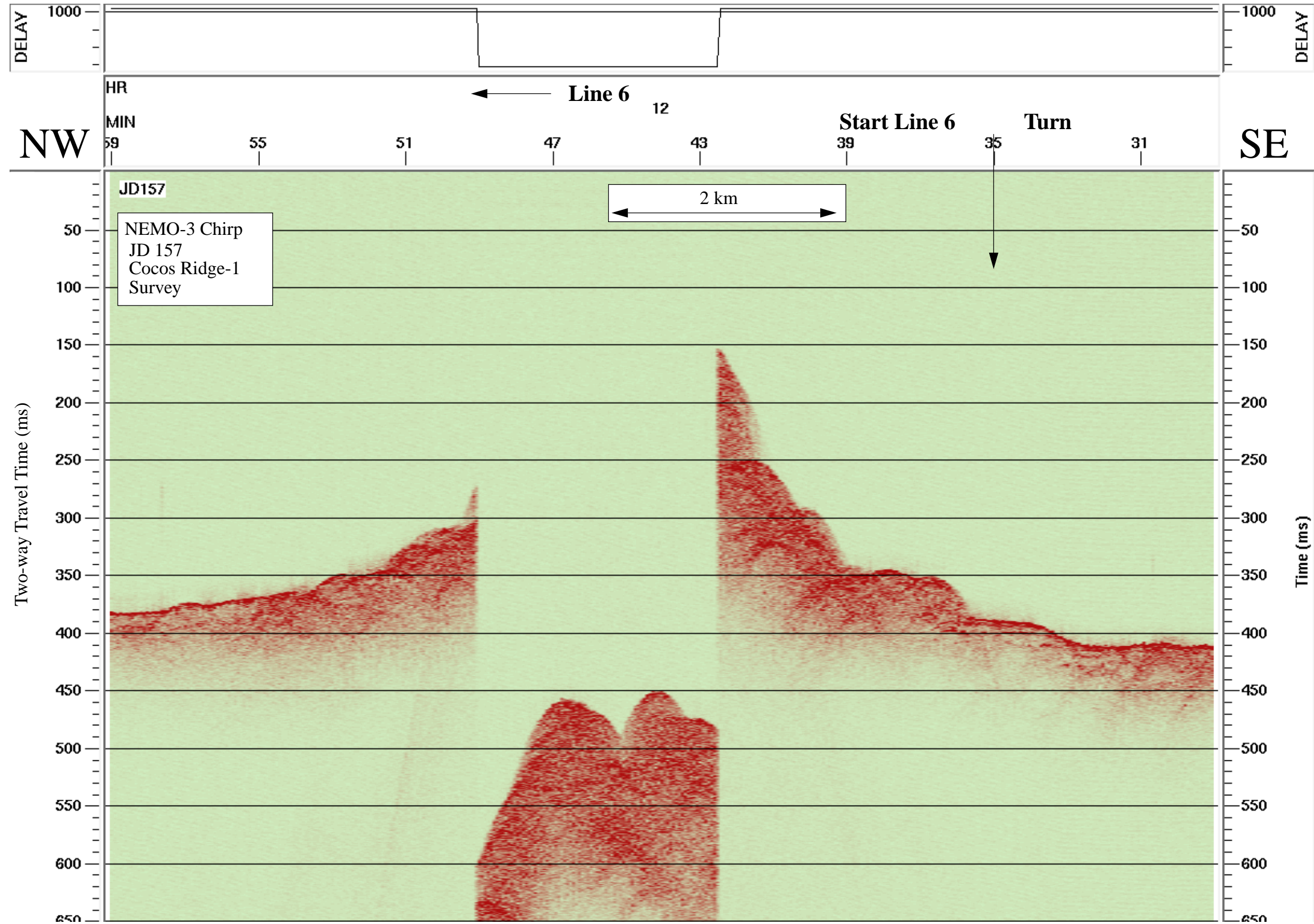


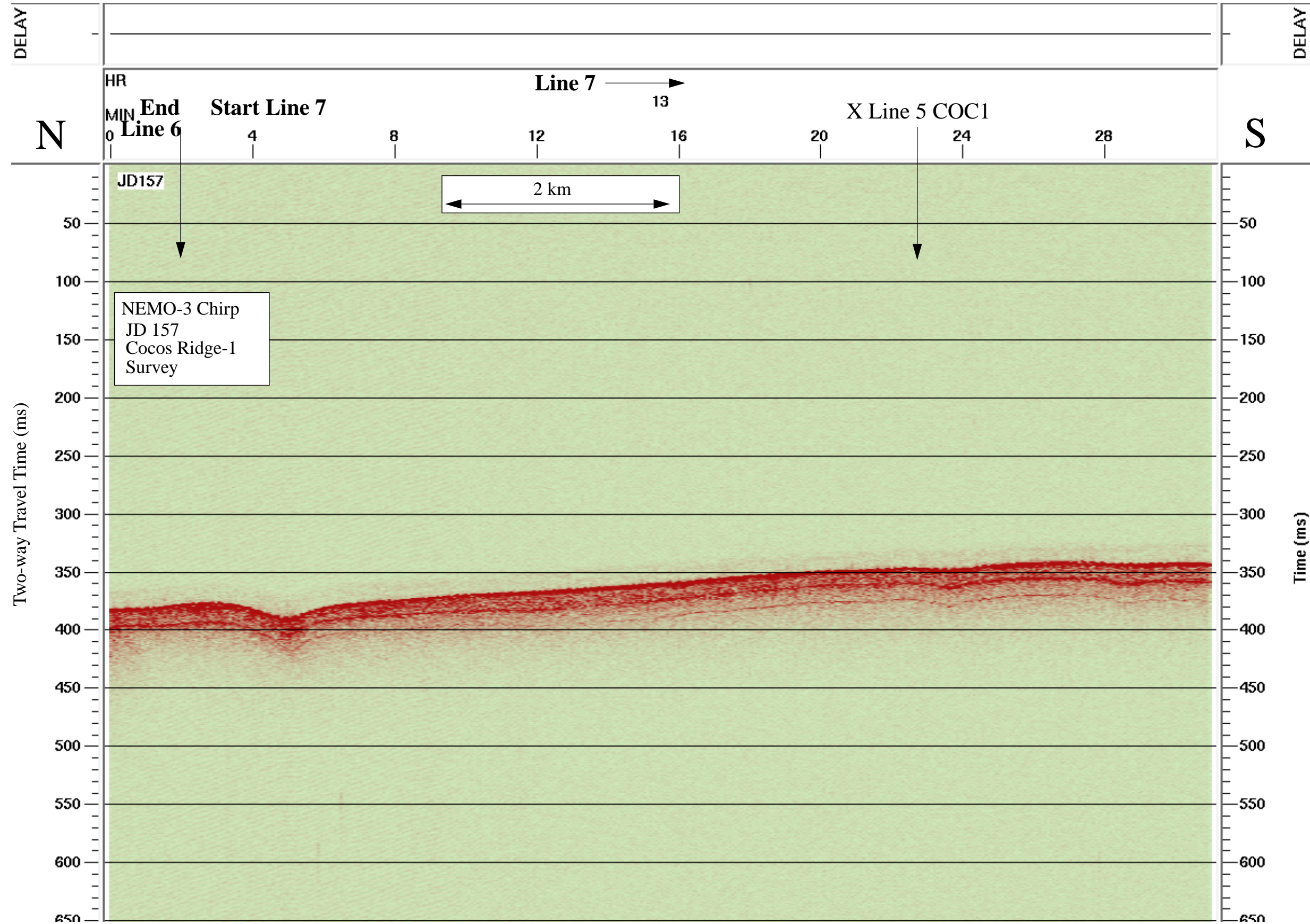


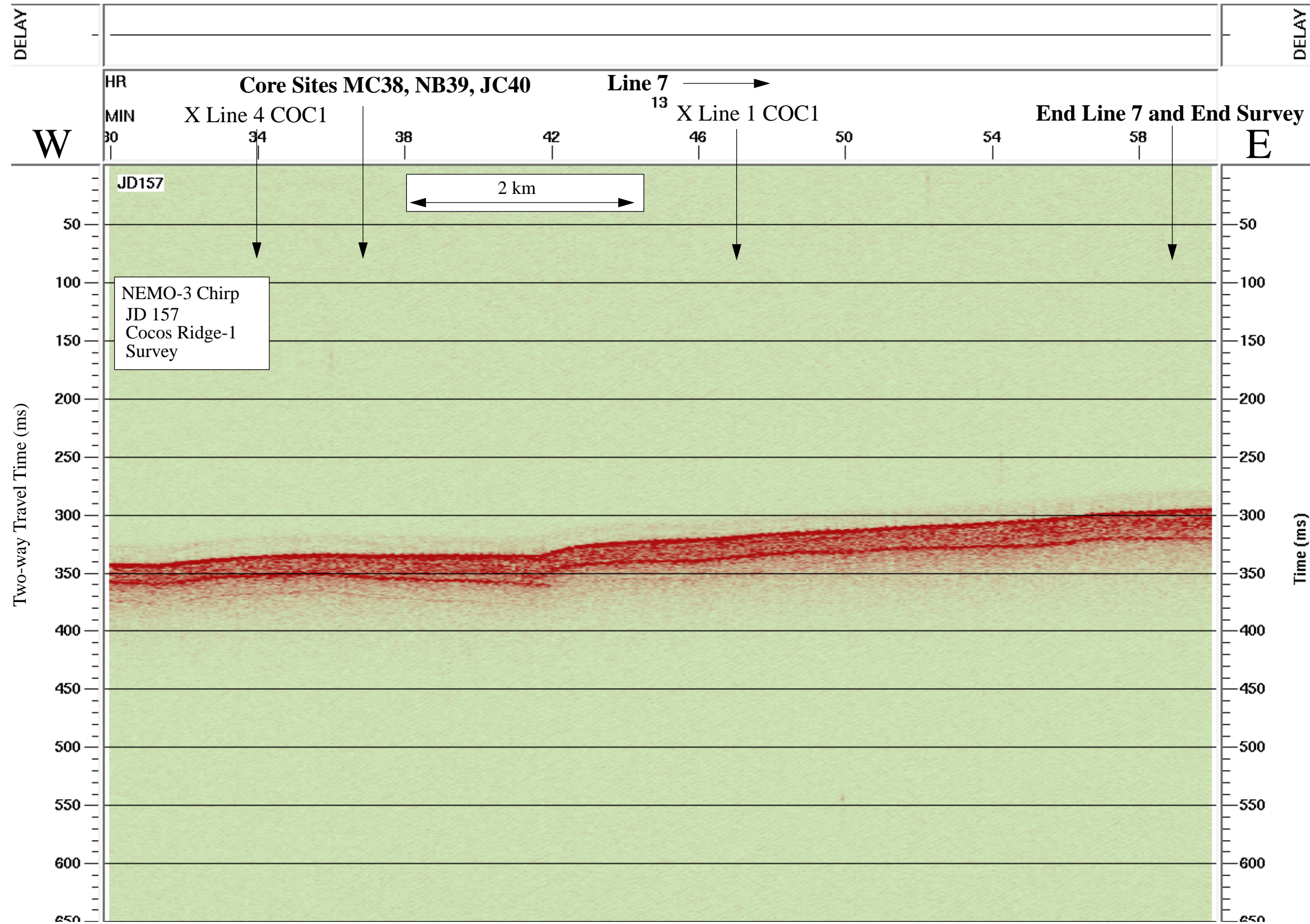
Data File SBfixavg.2000jun05.1200-1800

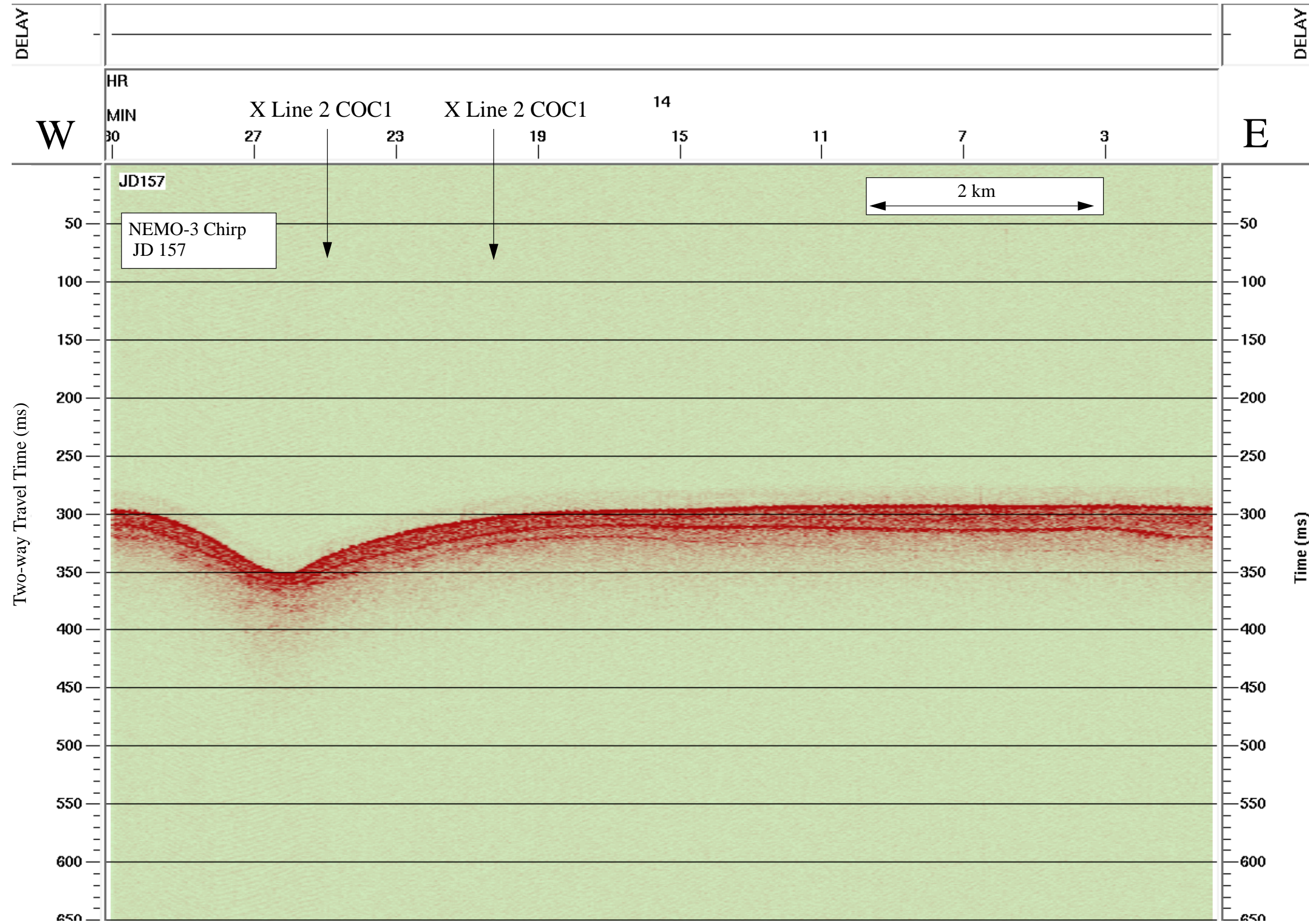


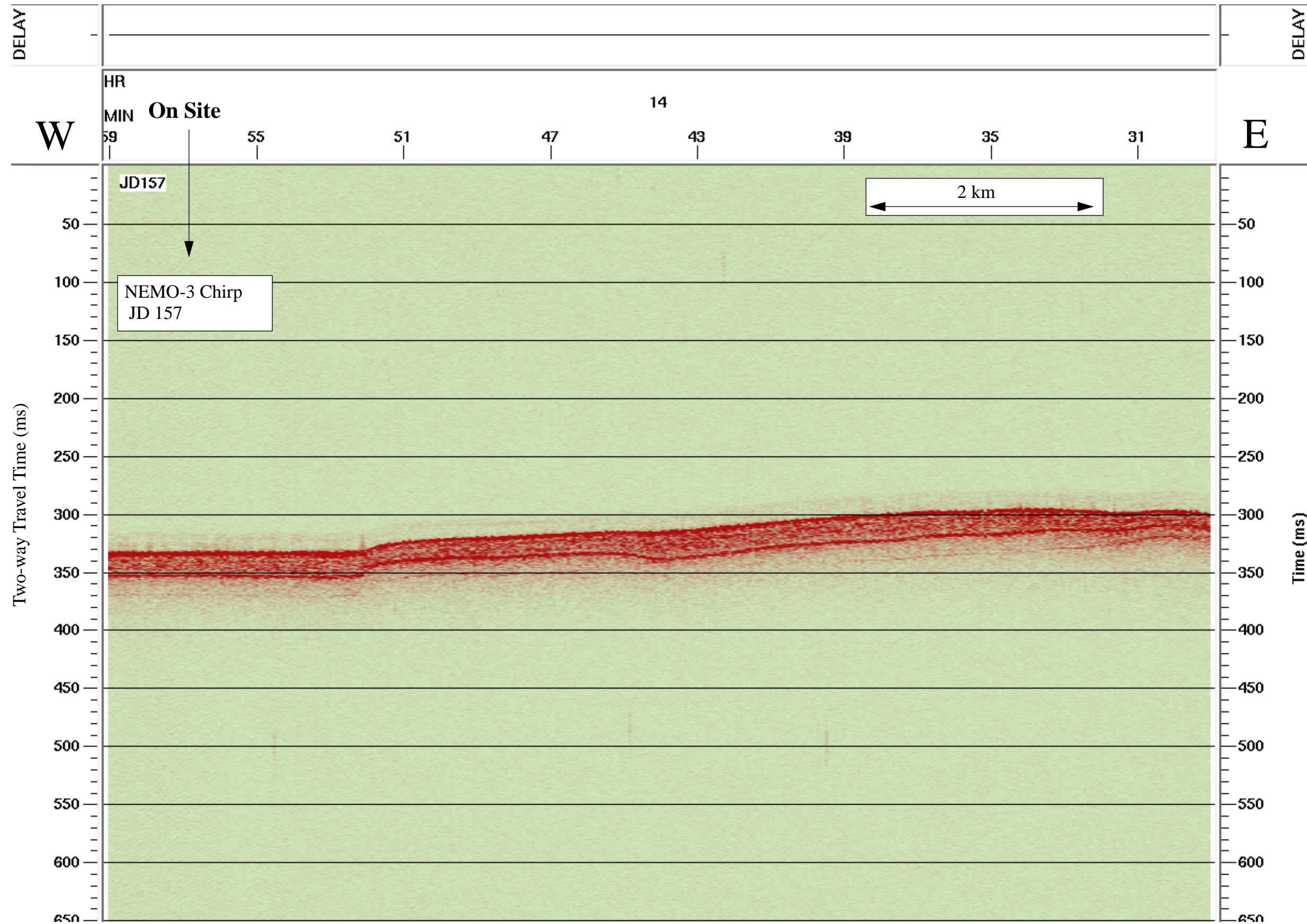




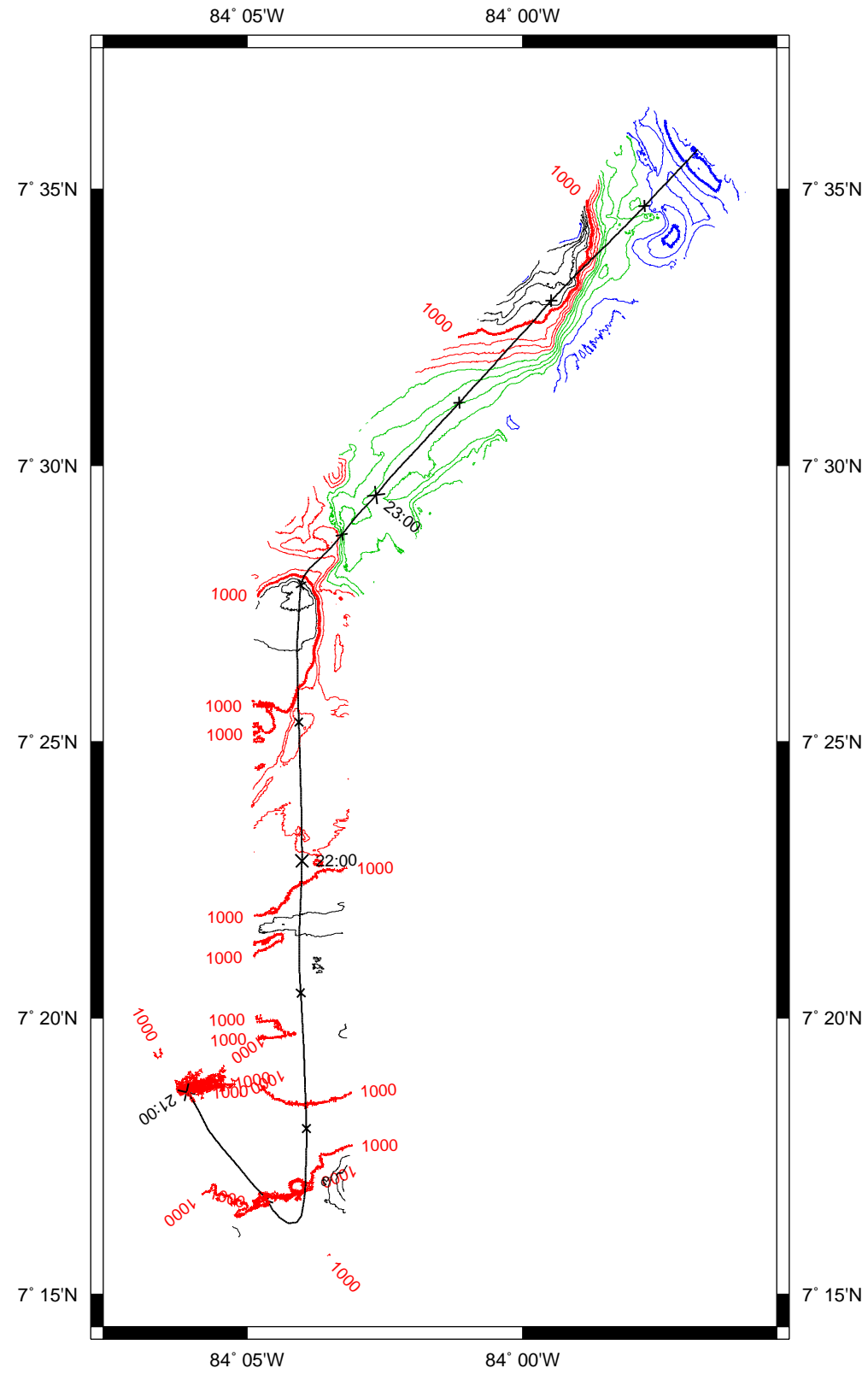


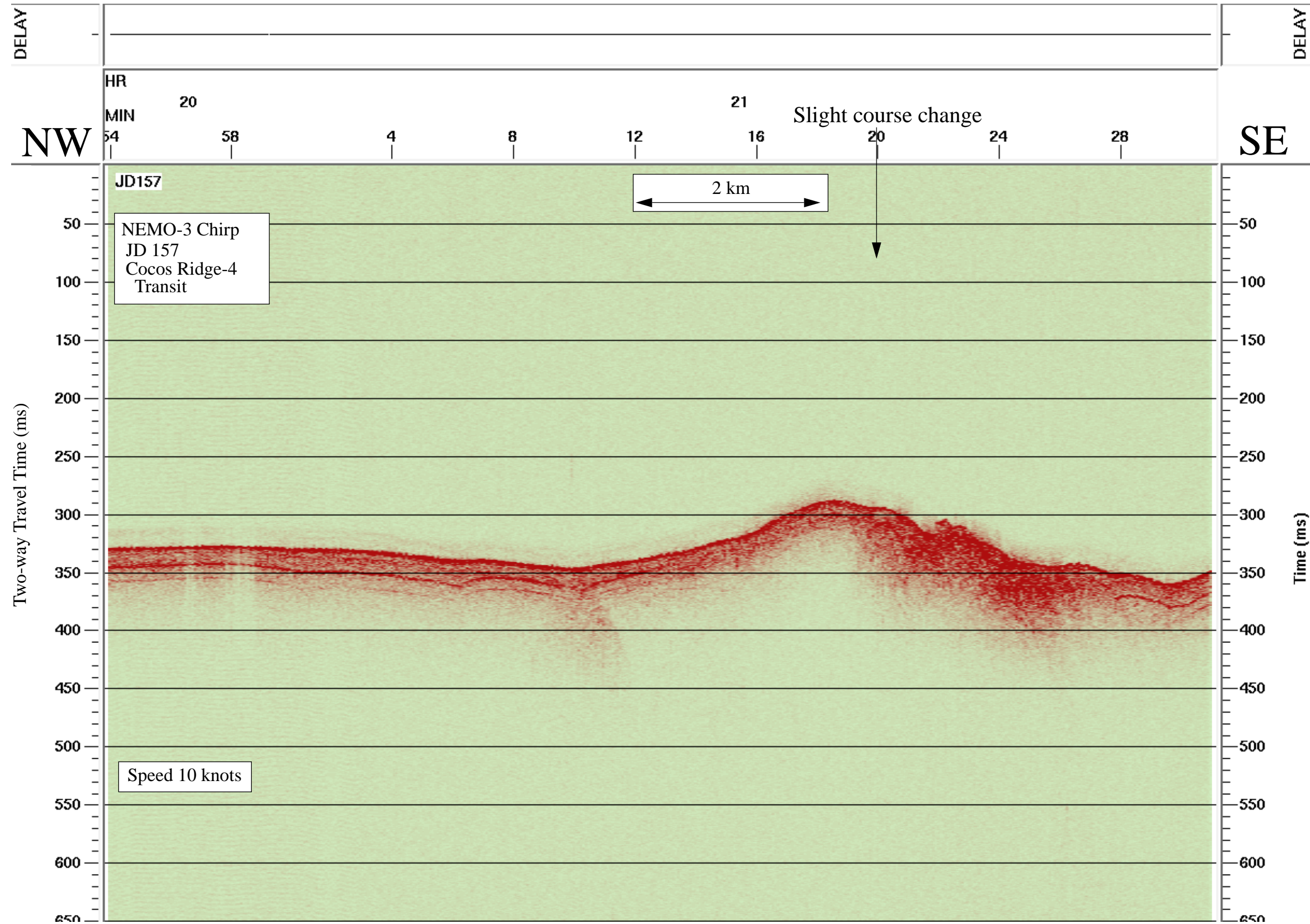


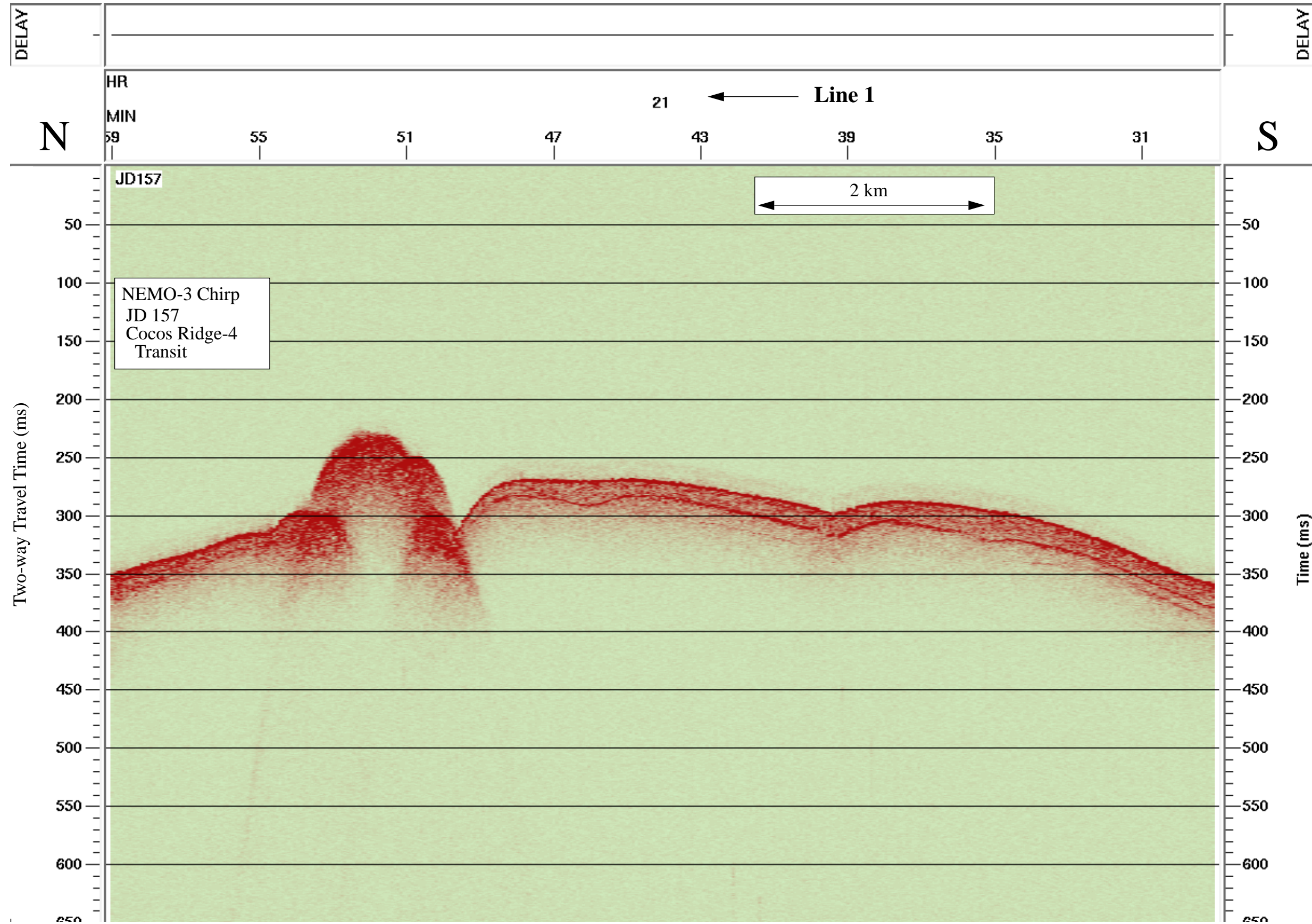


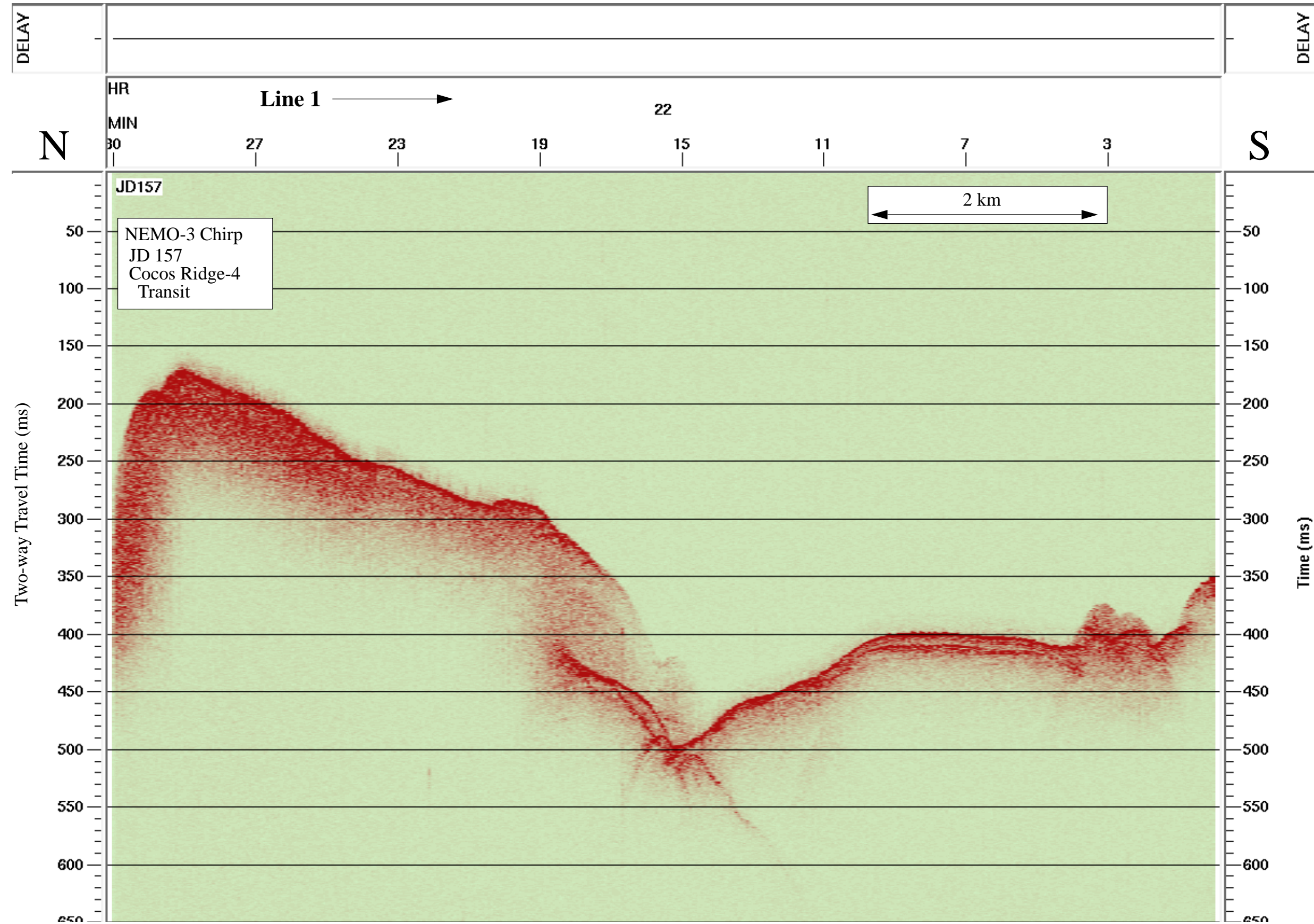


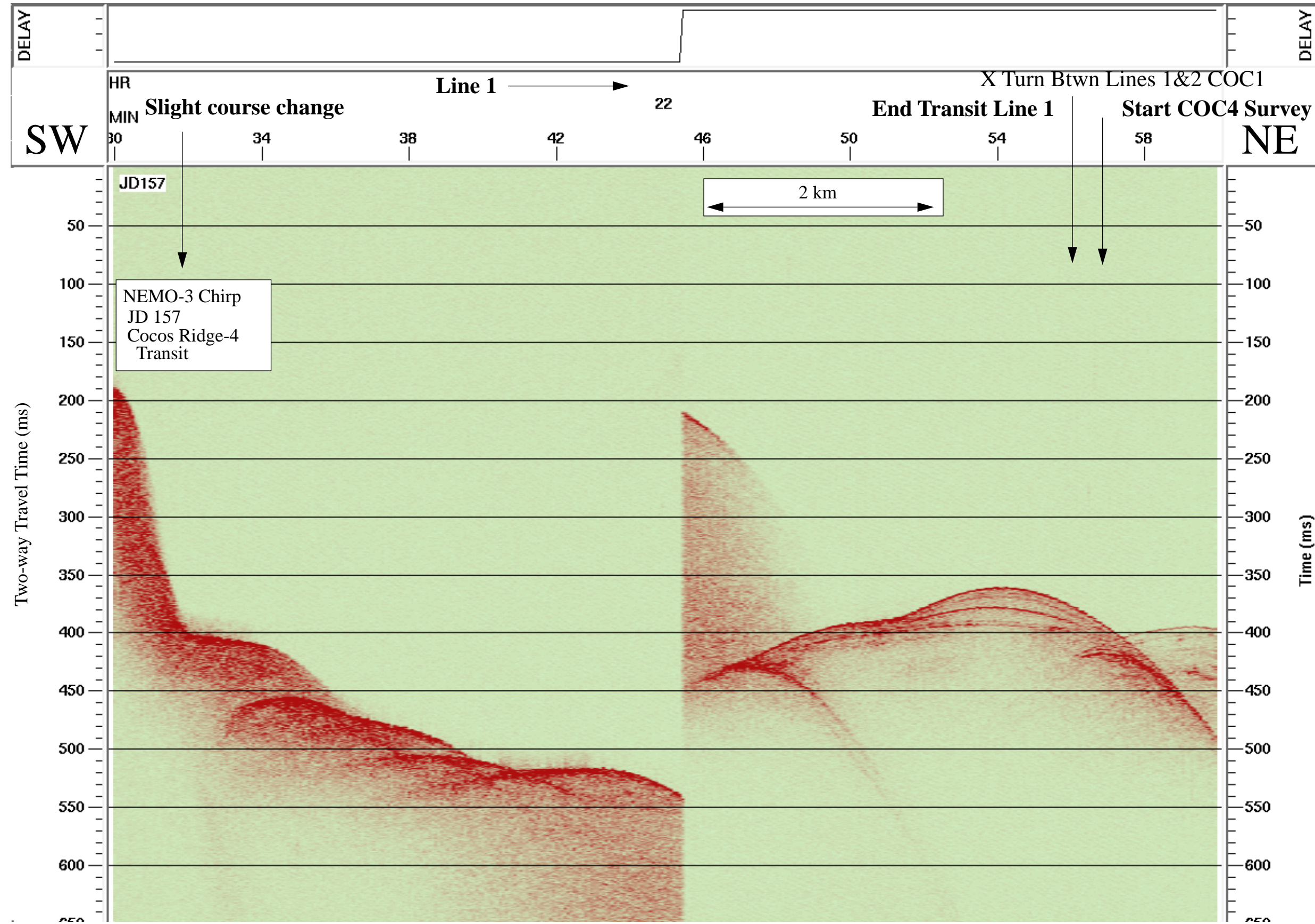
Data File SBfixavg.2000jun05.1800-2400

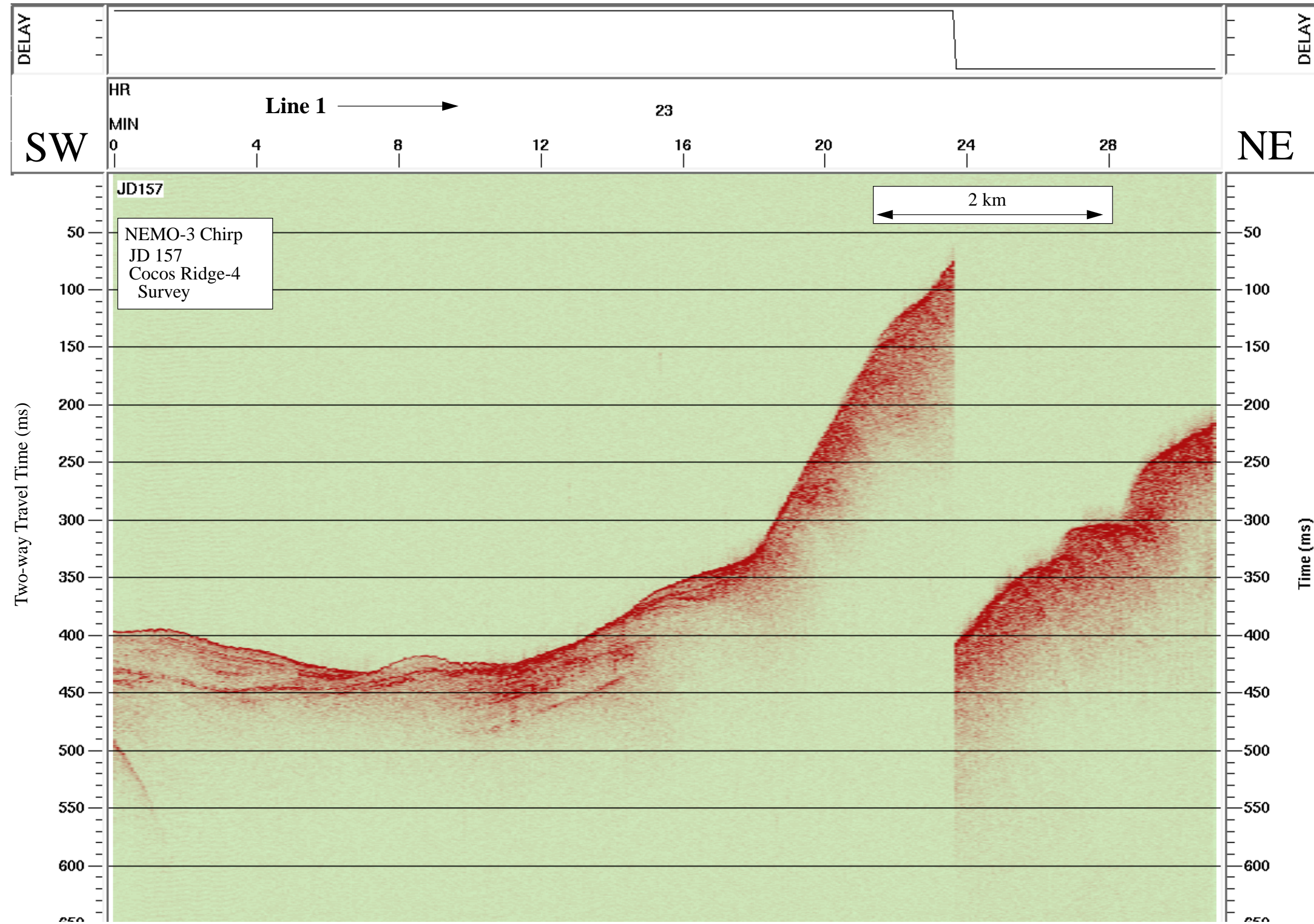


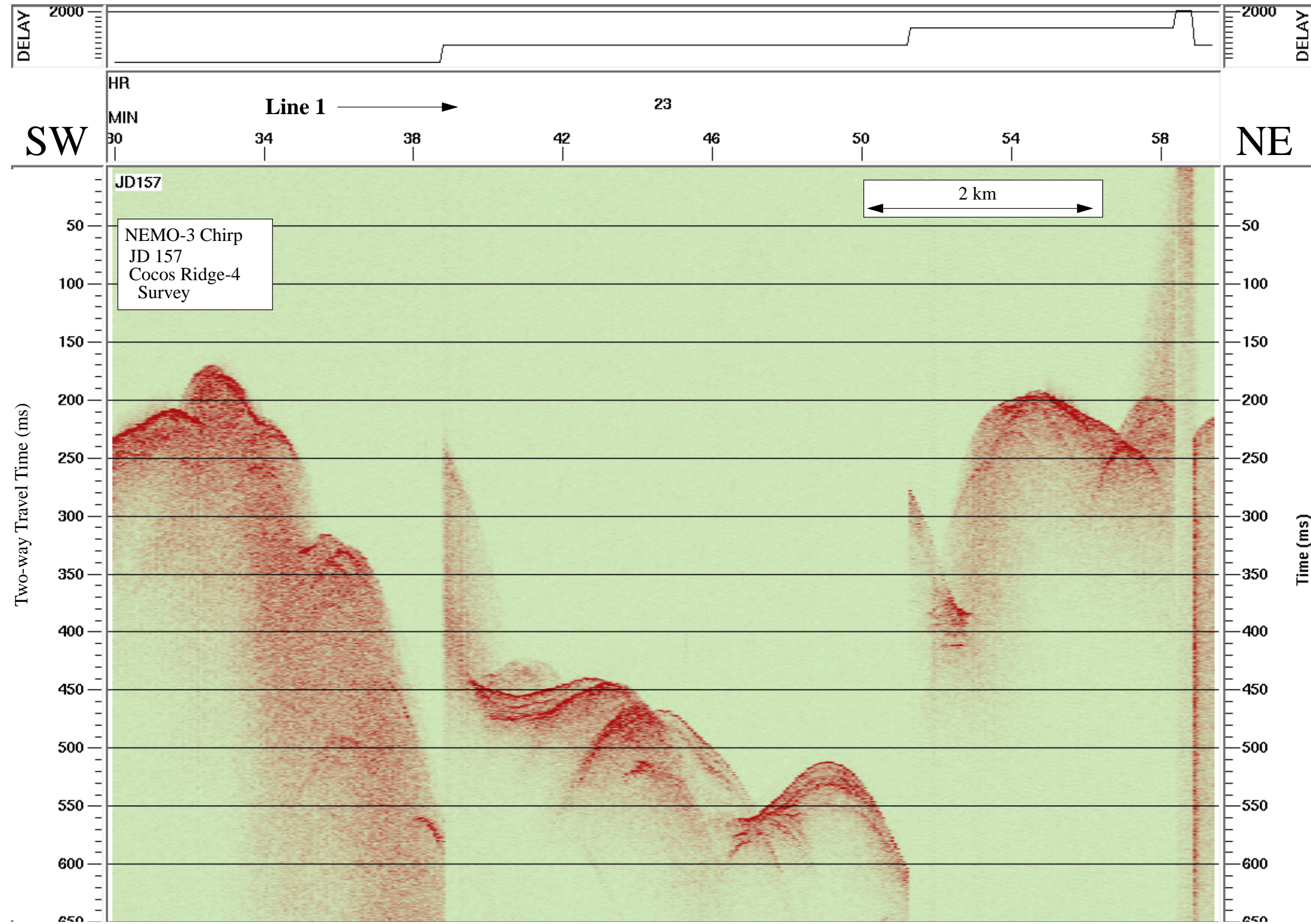












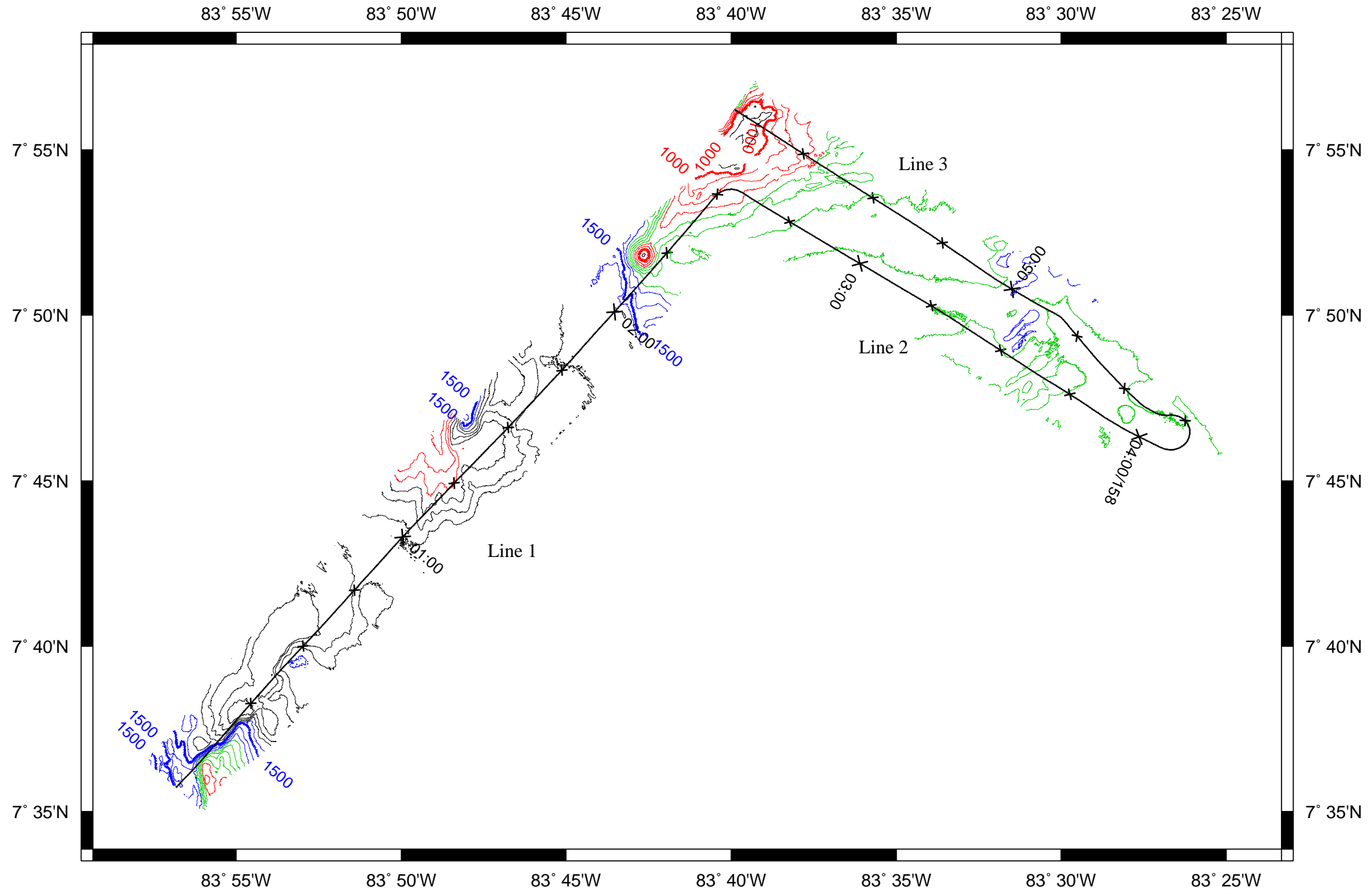
JD 158 (6 June 2000)--COC-4 Survey, Cocos Ridge

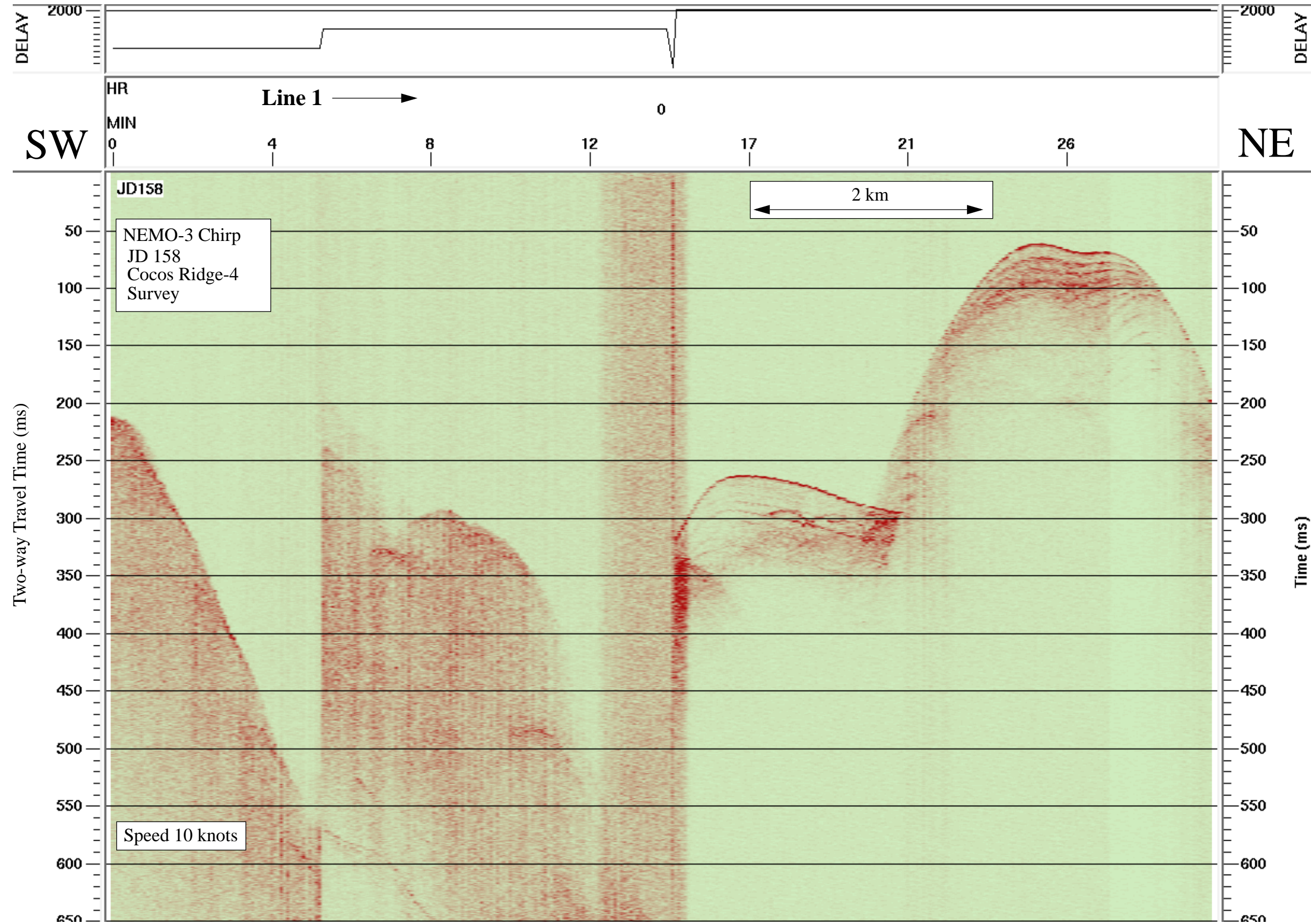
2-7 kHz Chirp Subbottom Profiler

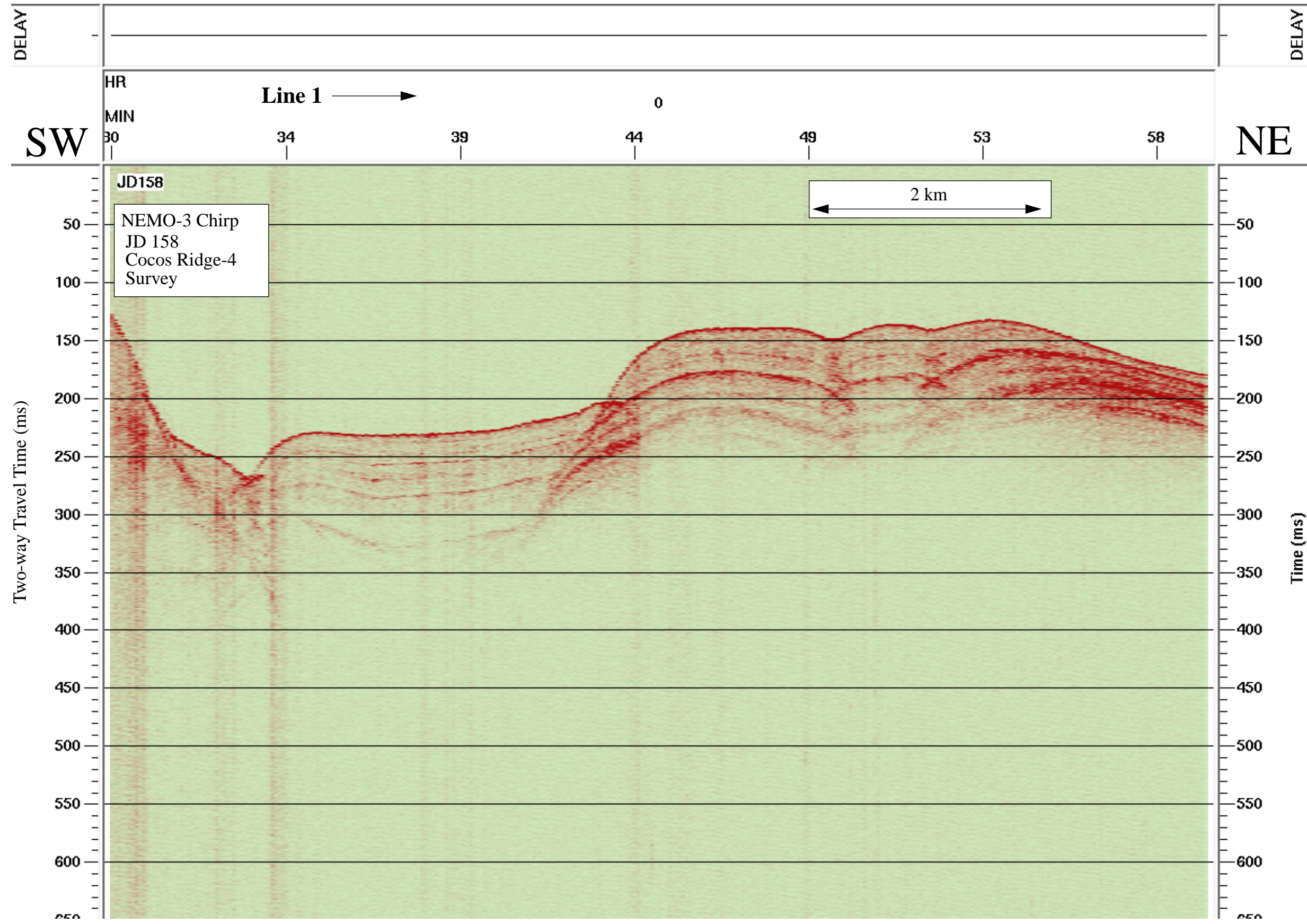
NEMO Leg 3

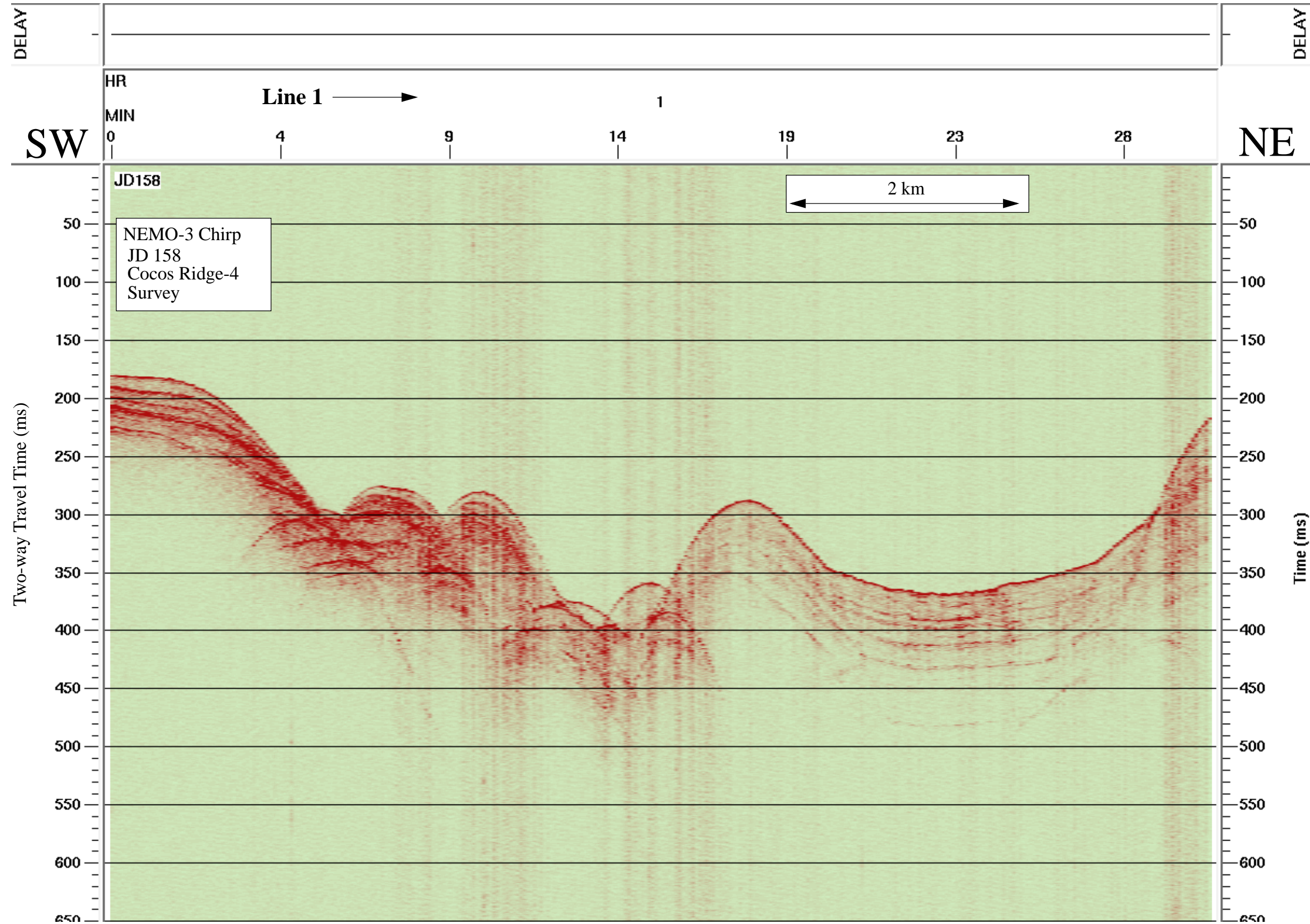
R/V Melville

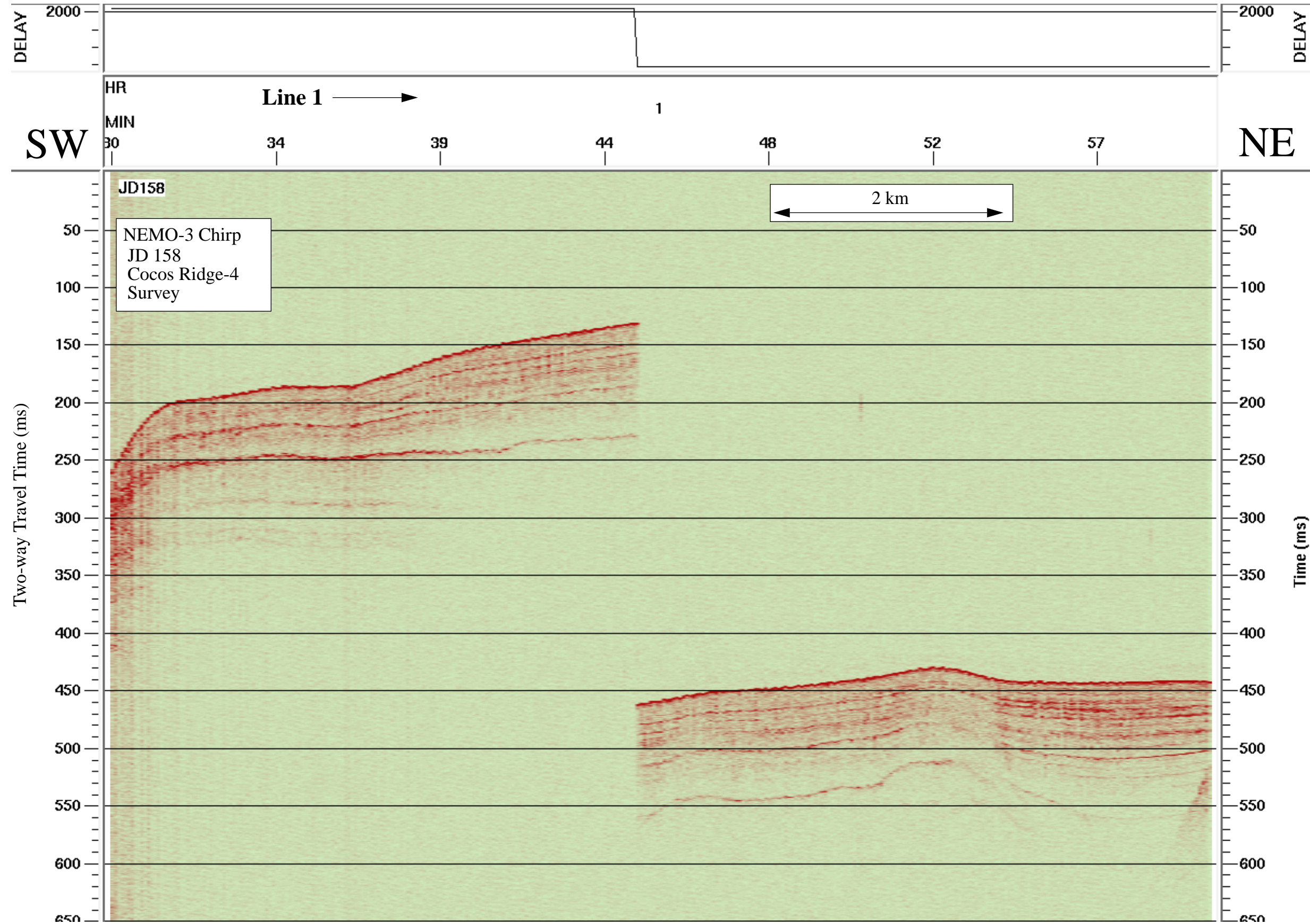
Data File SBfixavg.2000jun06.0000-0600

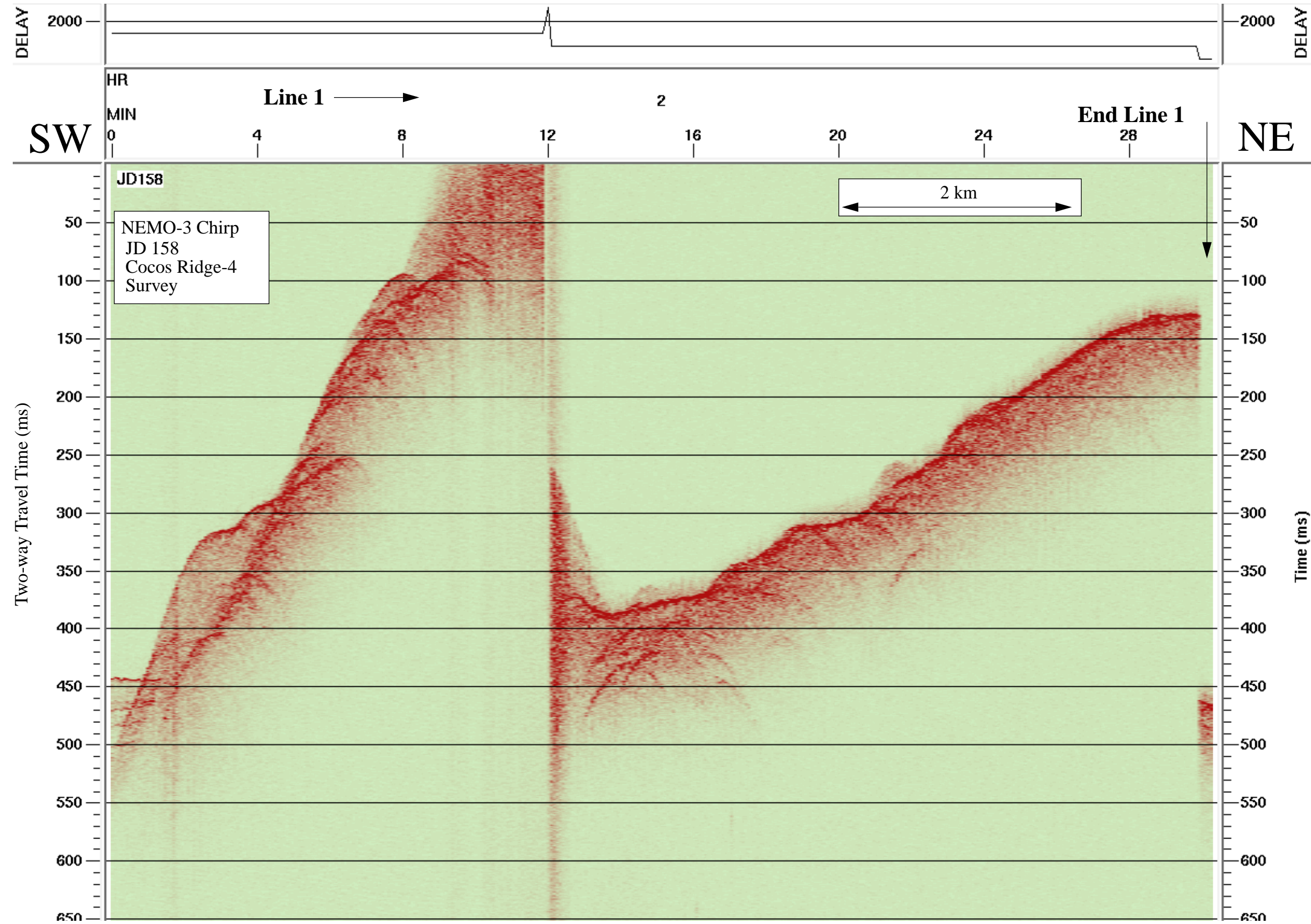


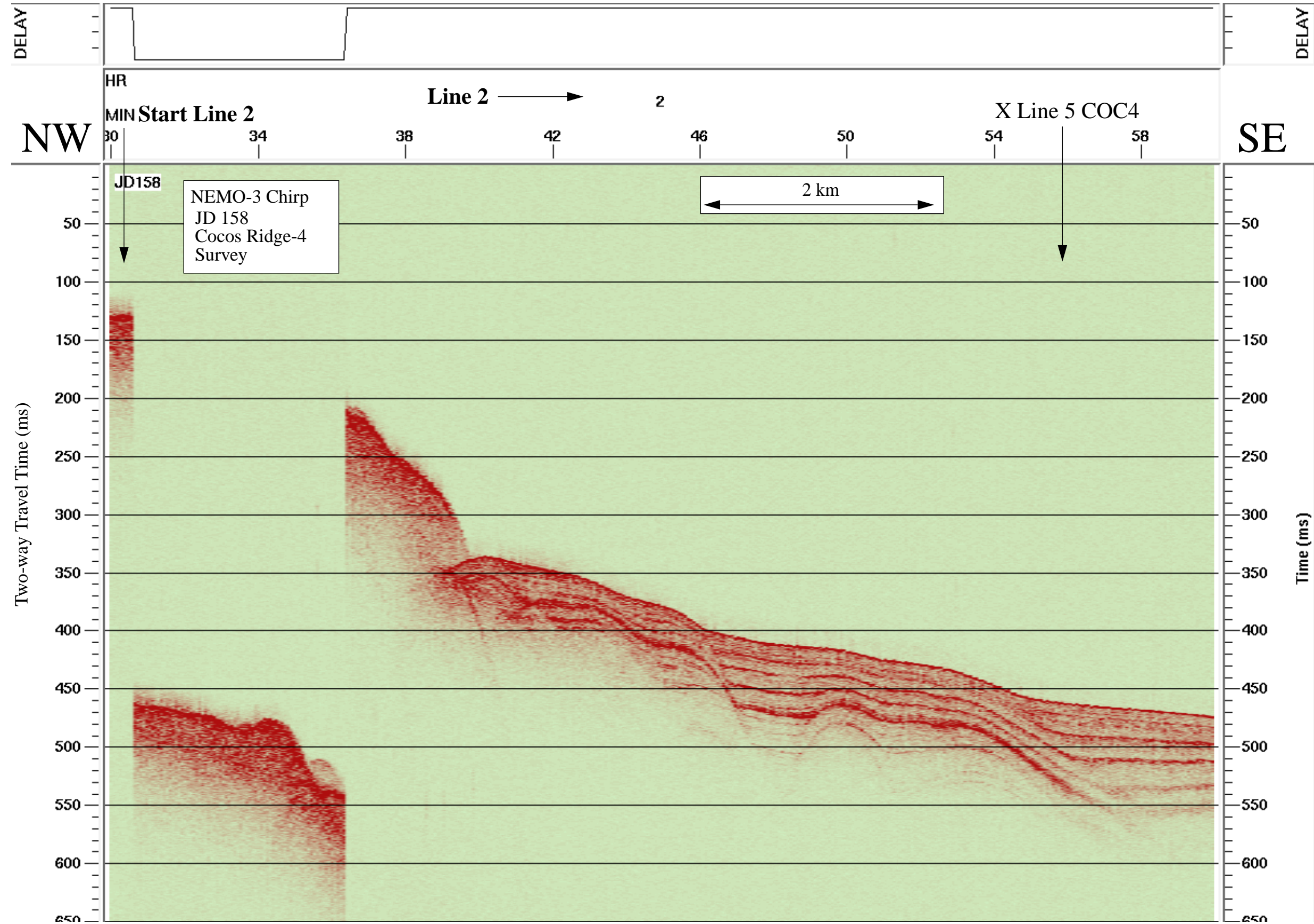


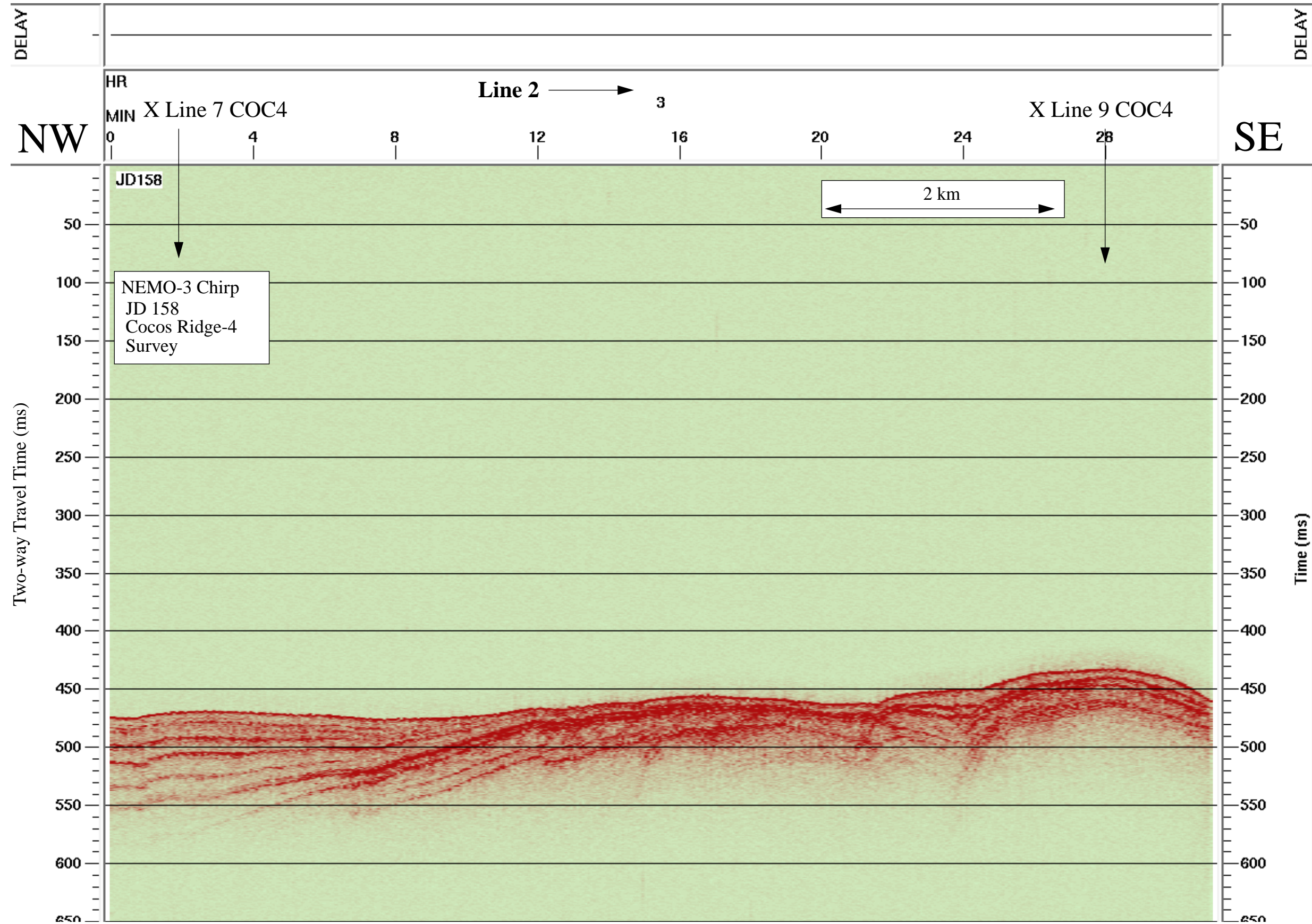


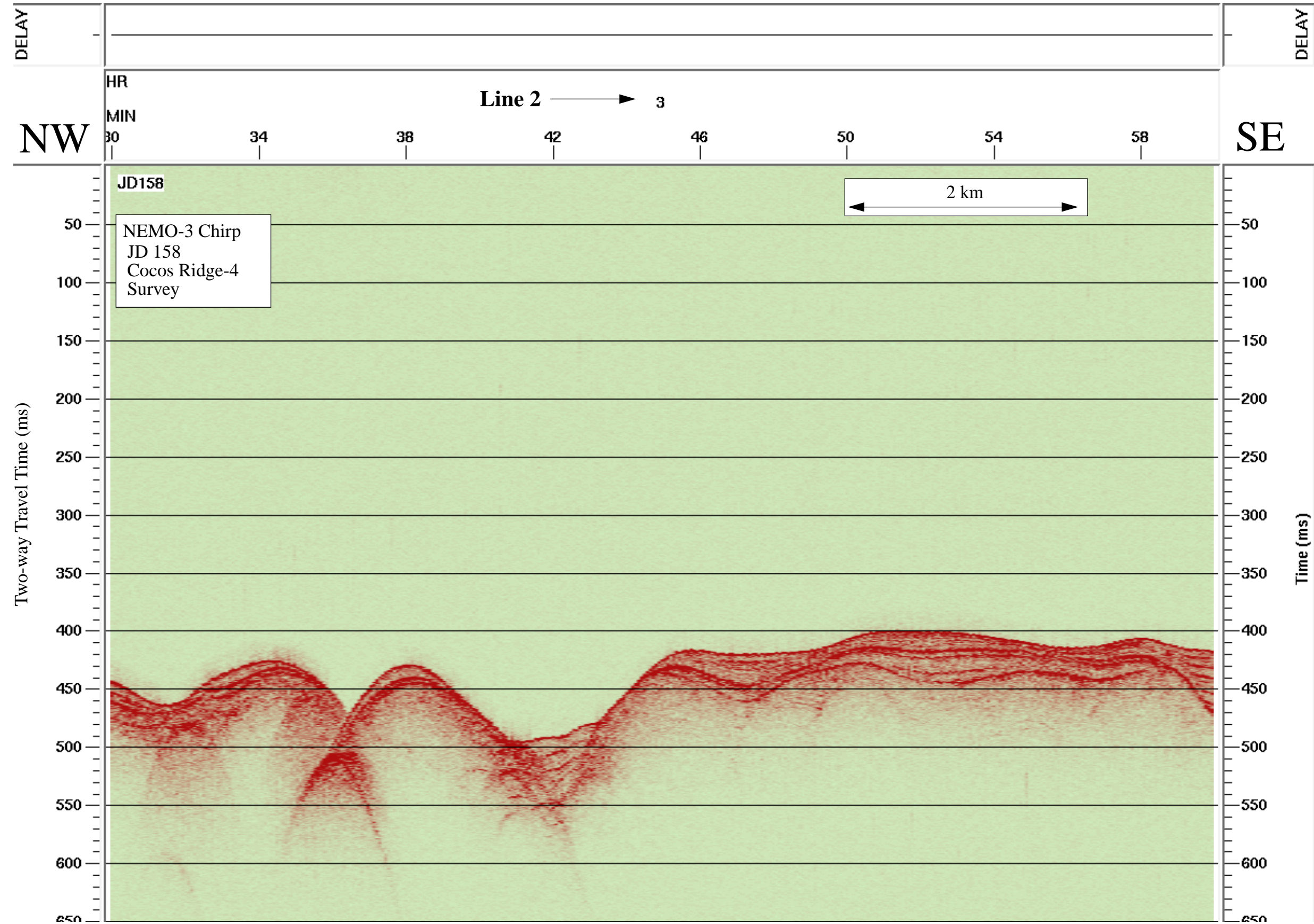


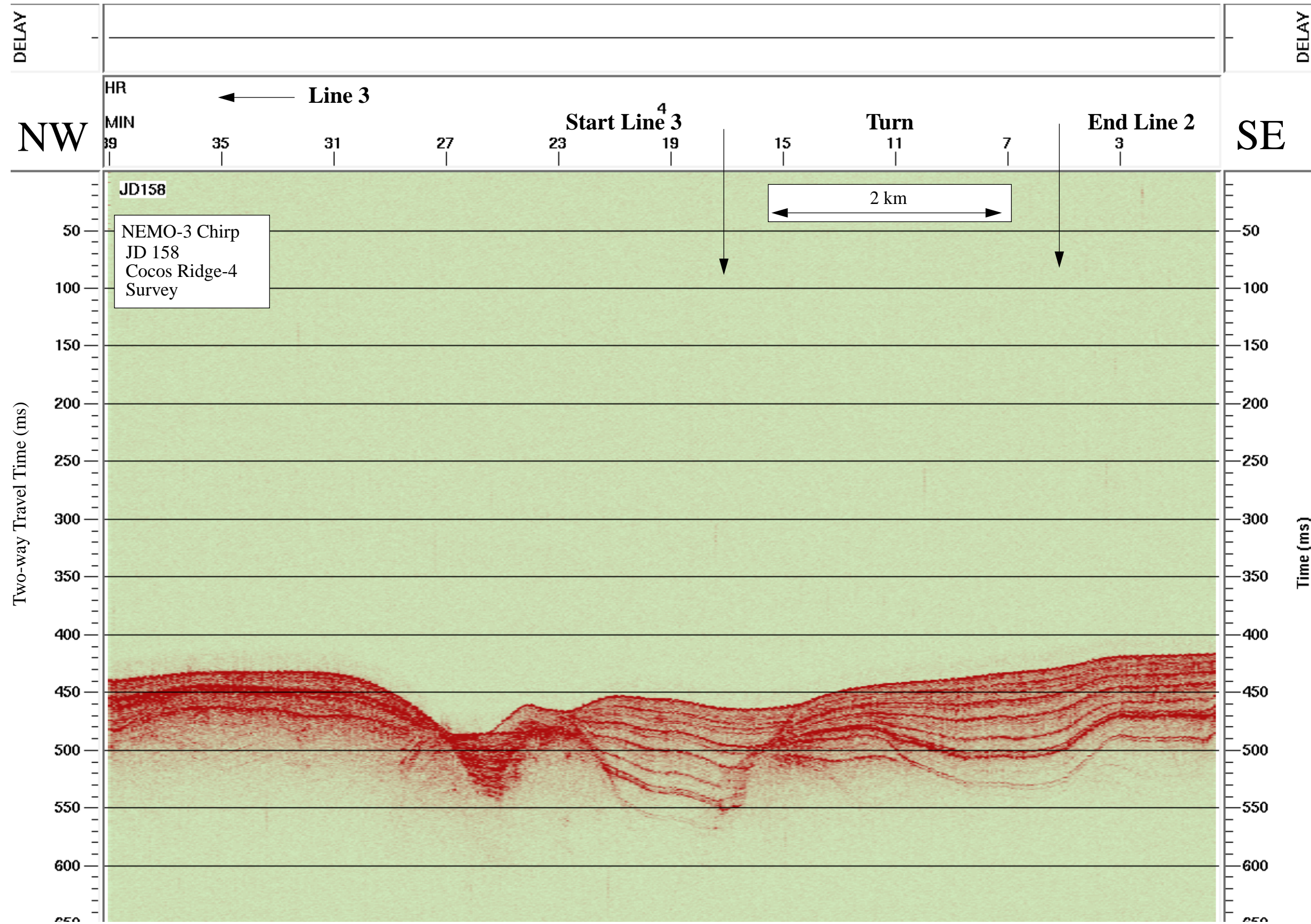


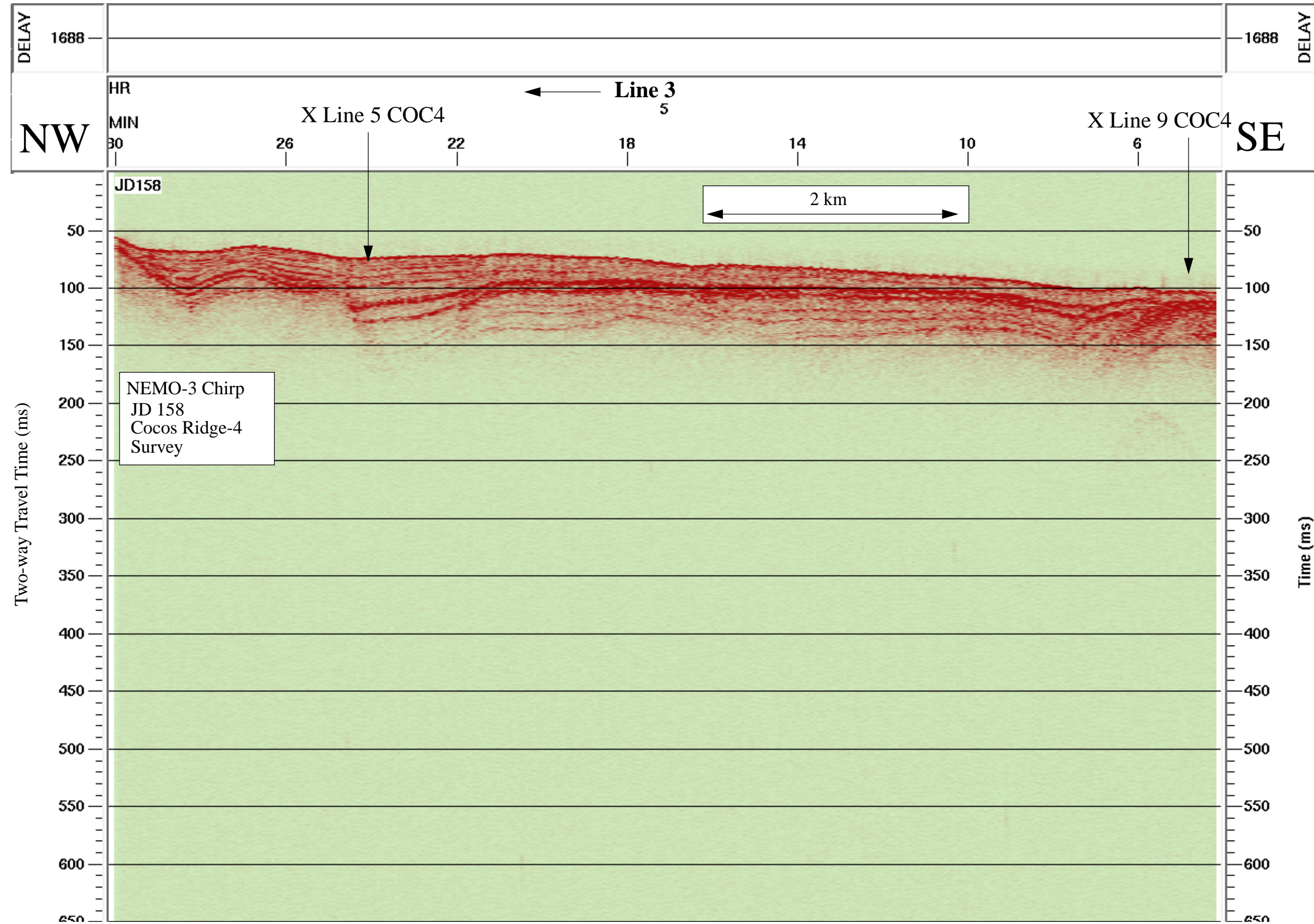


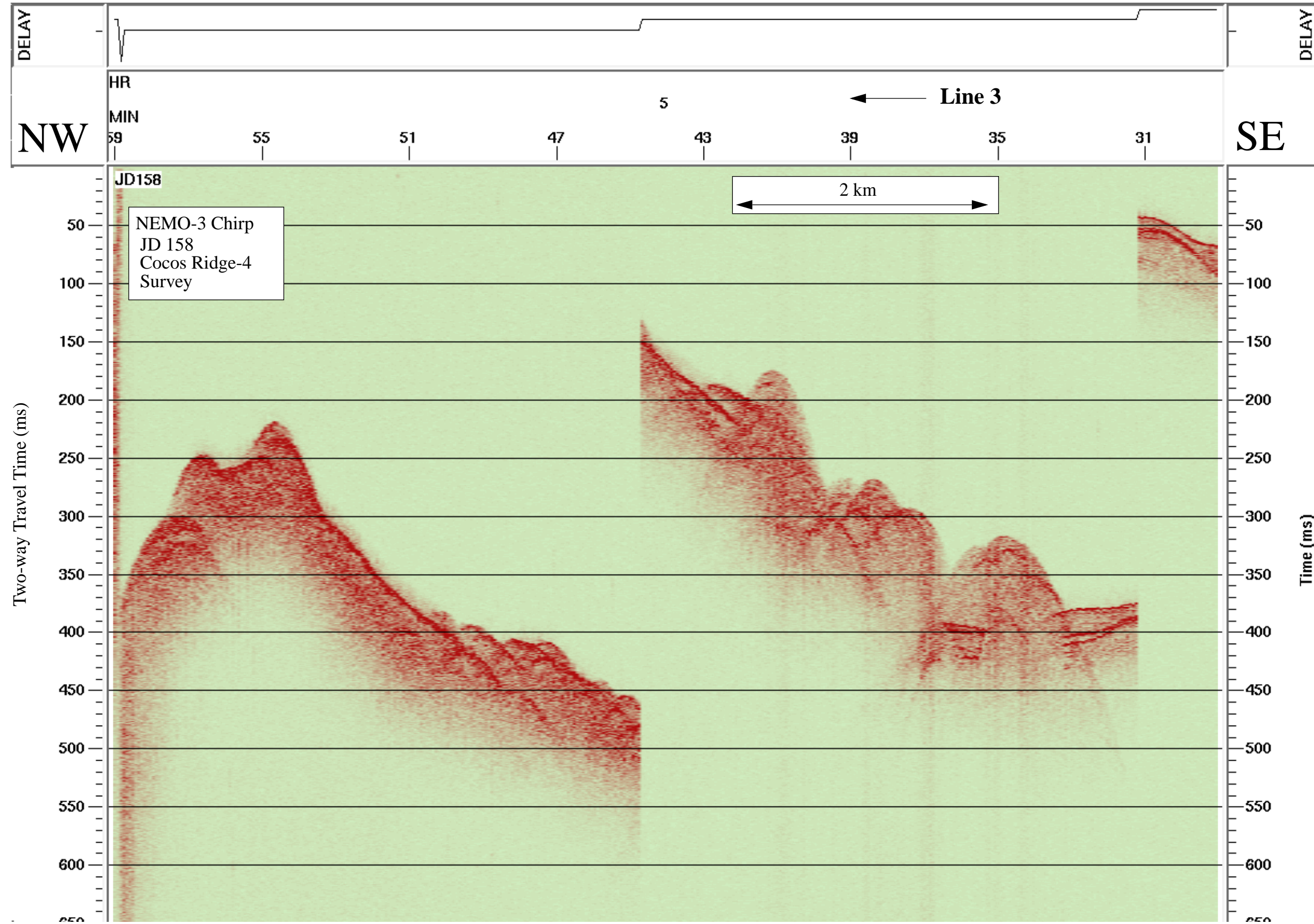




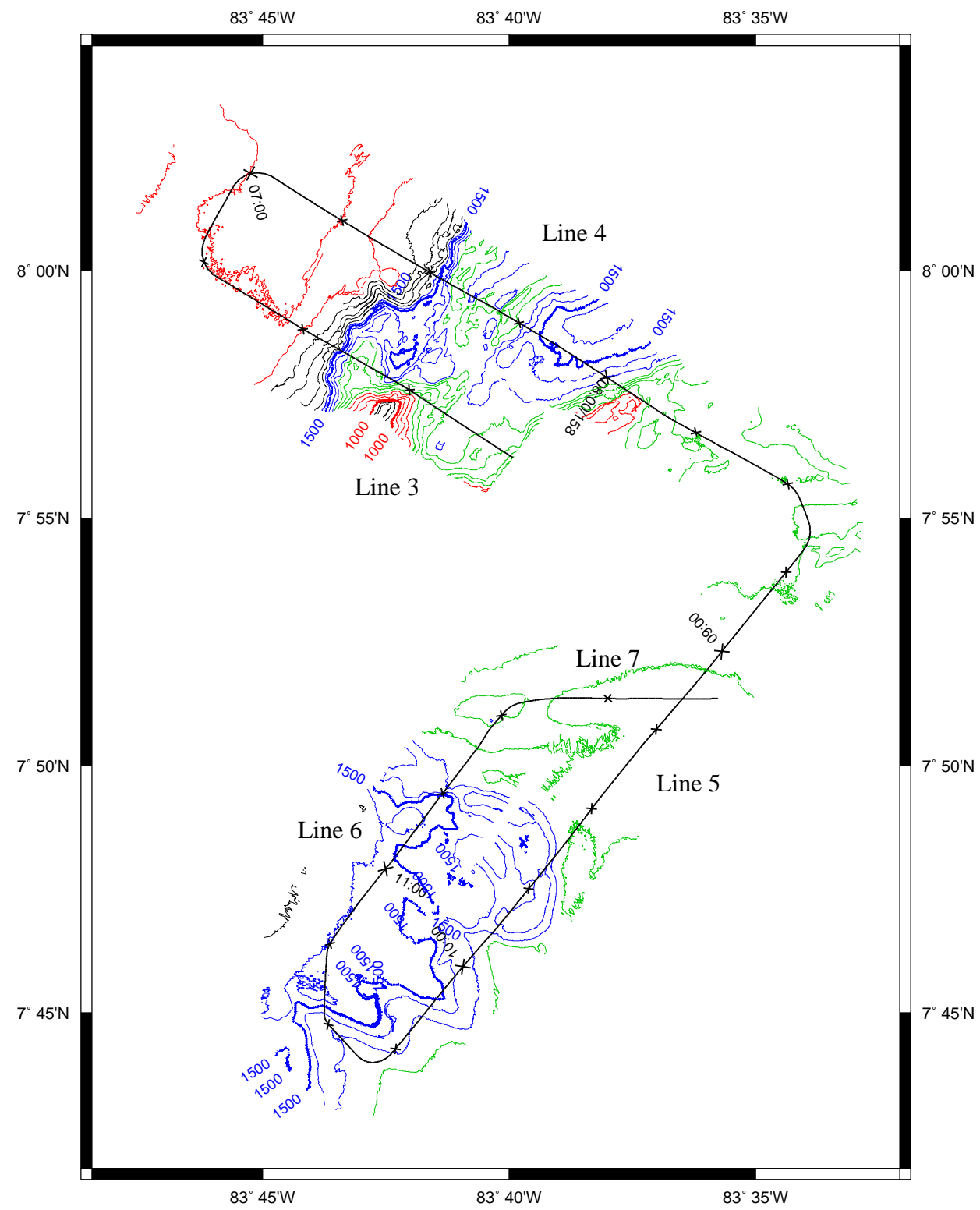


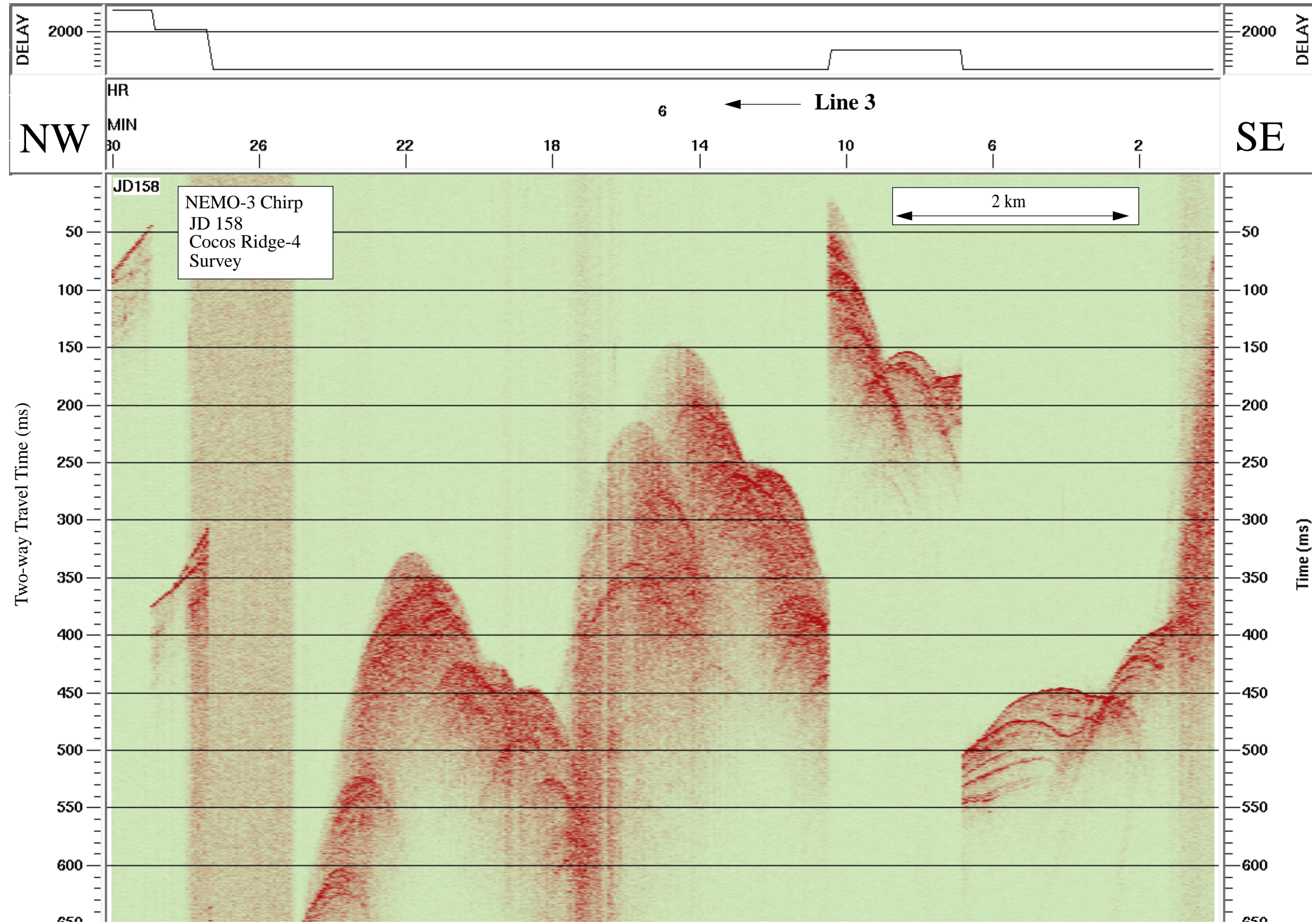


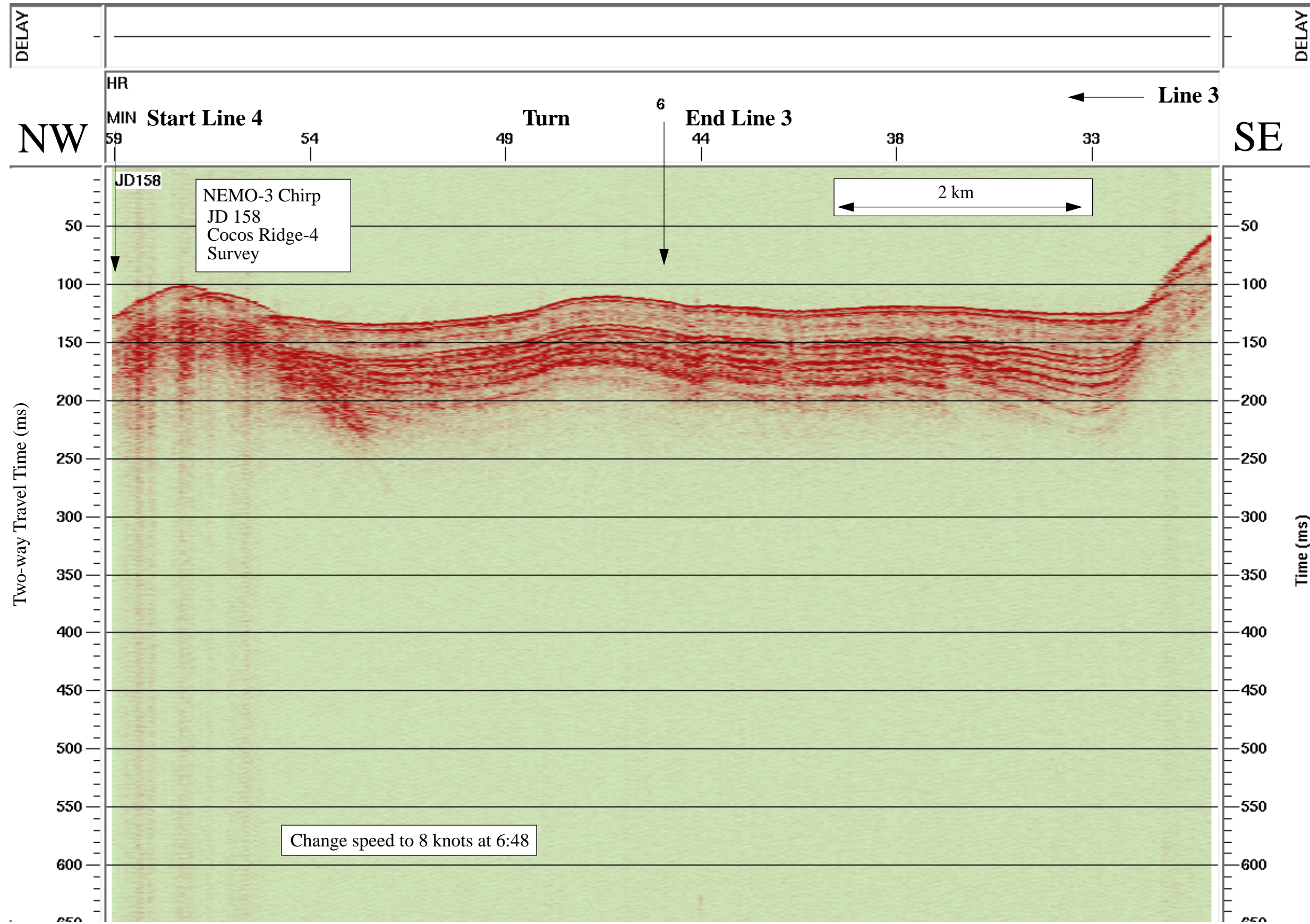


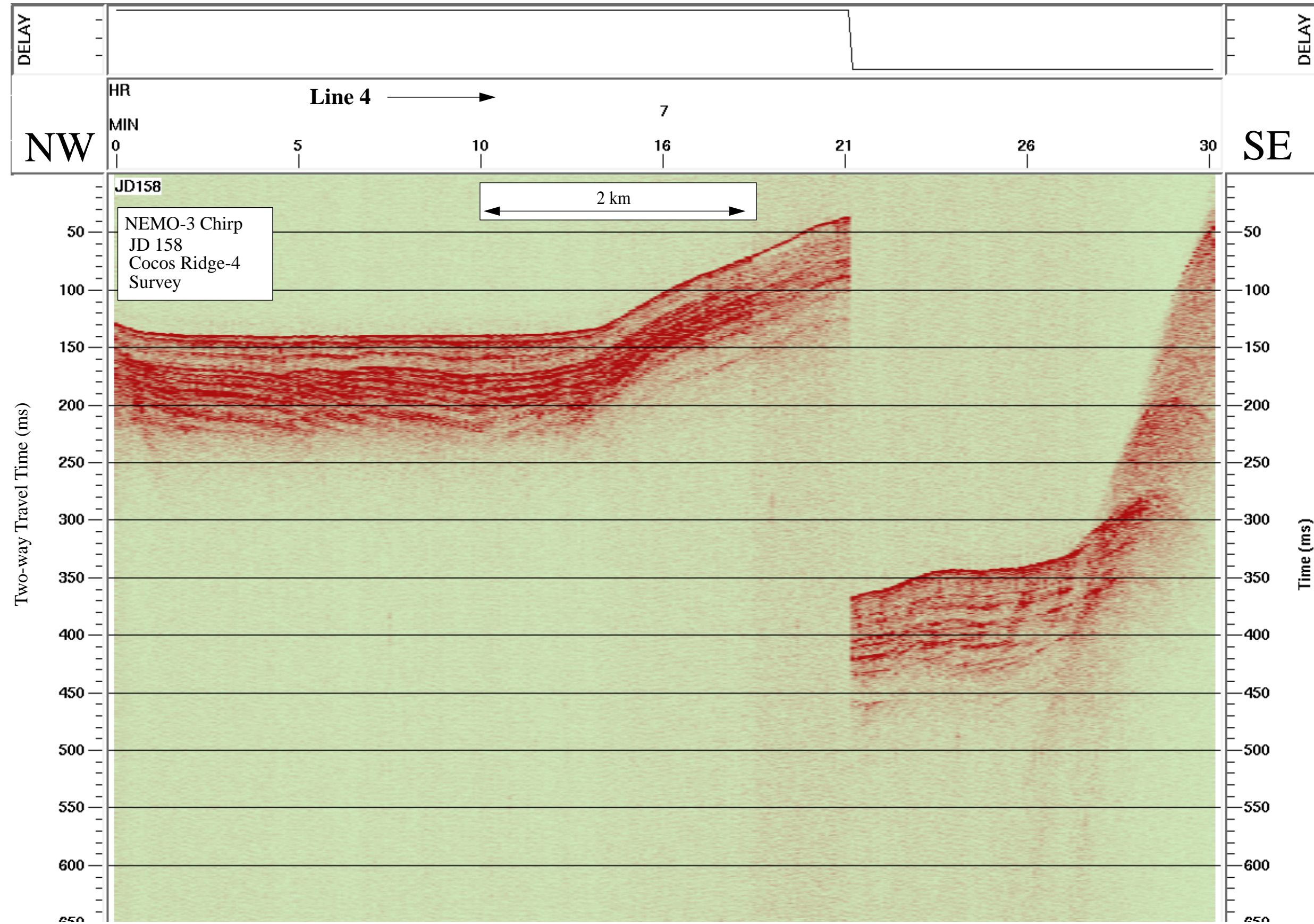


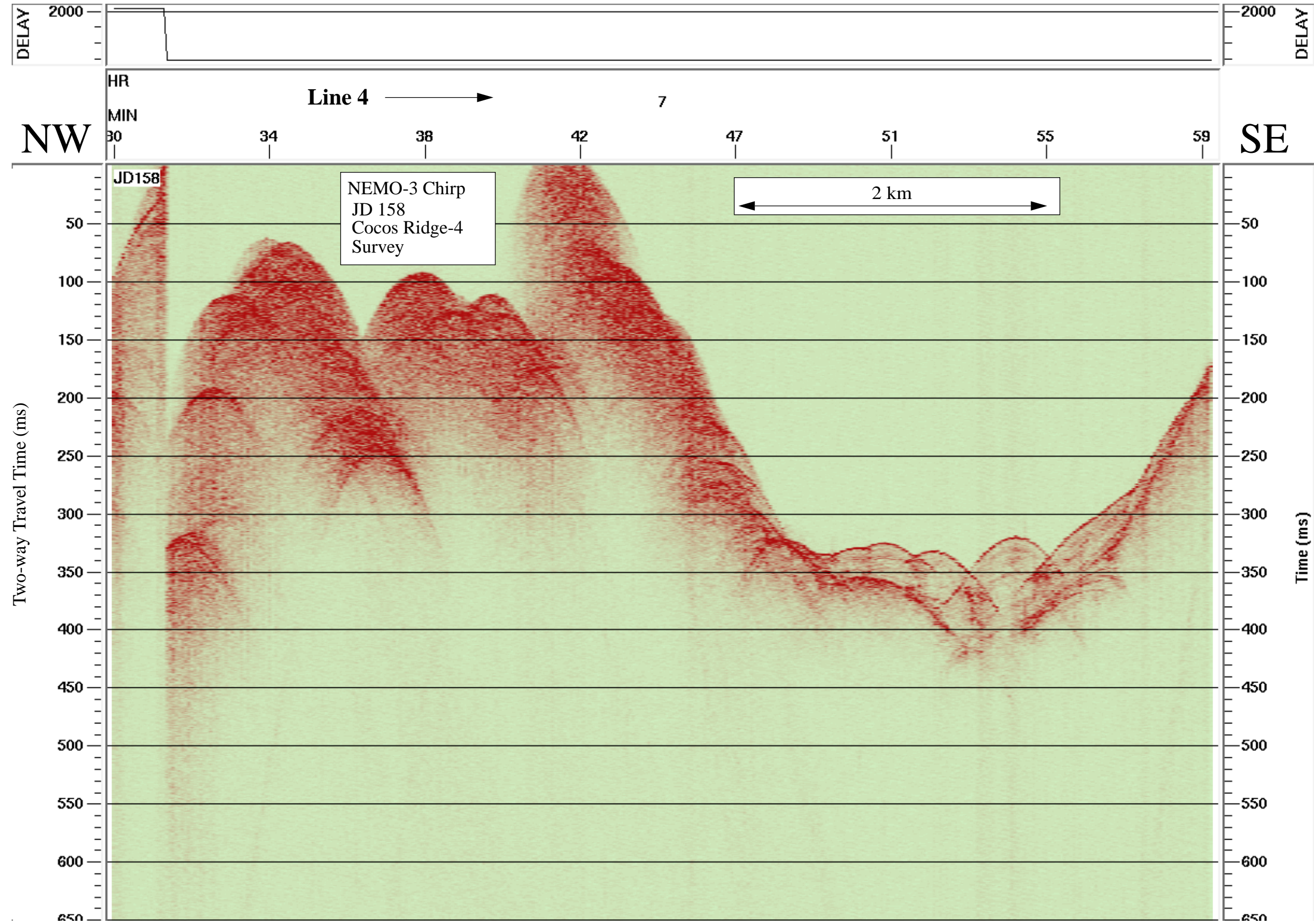
Data File SBfixavg.2000jun06.0600-1200

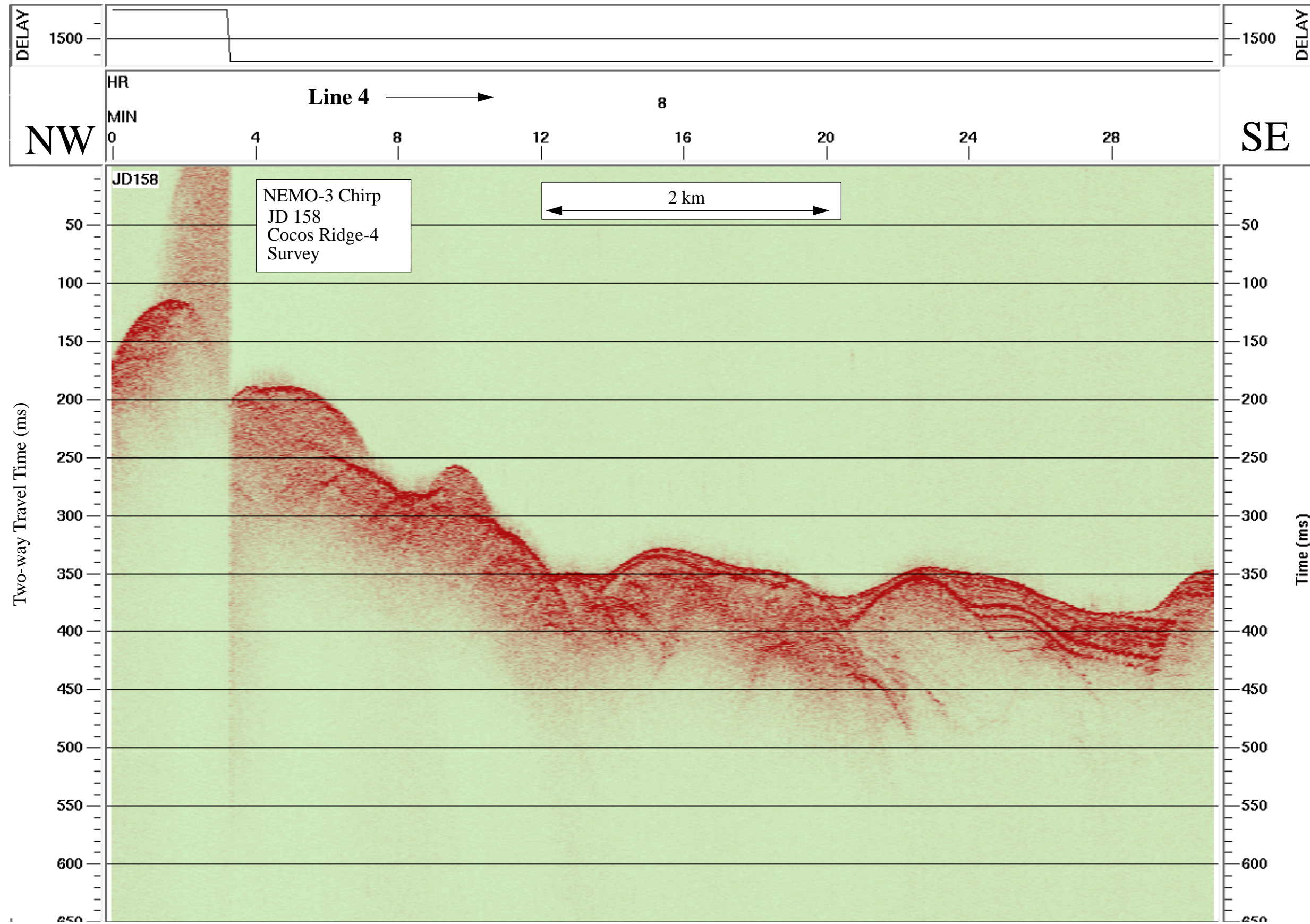


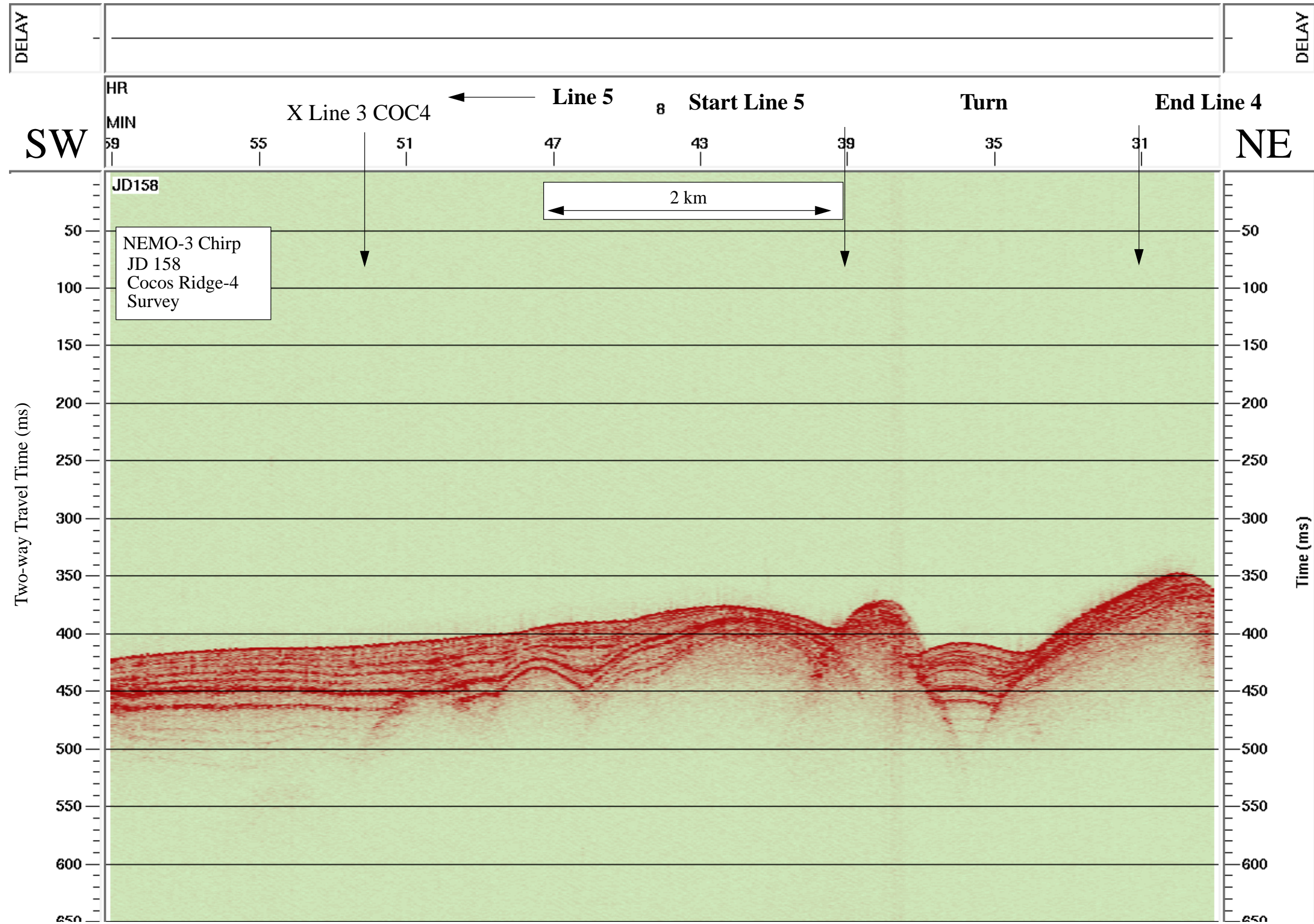


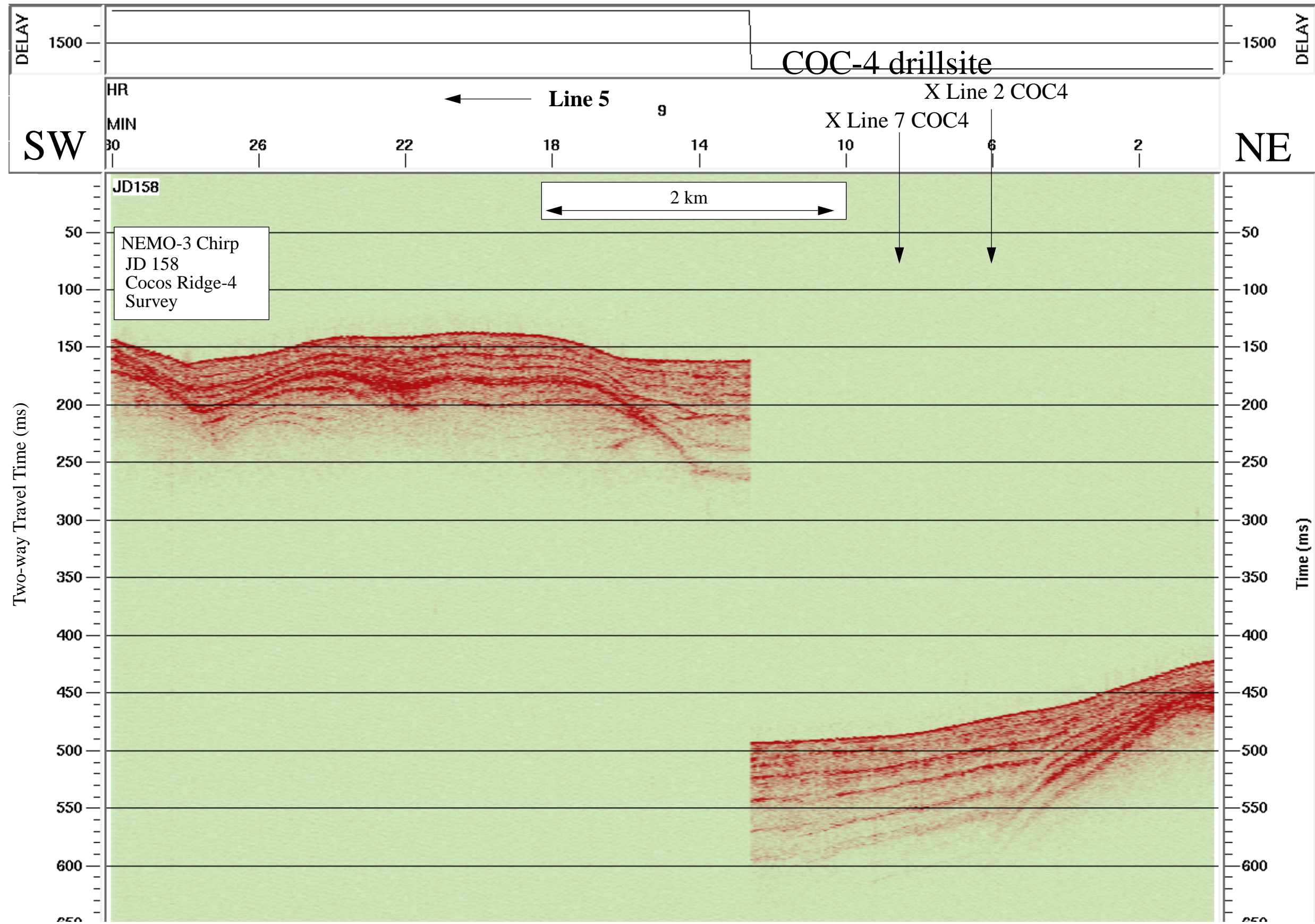


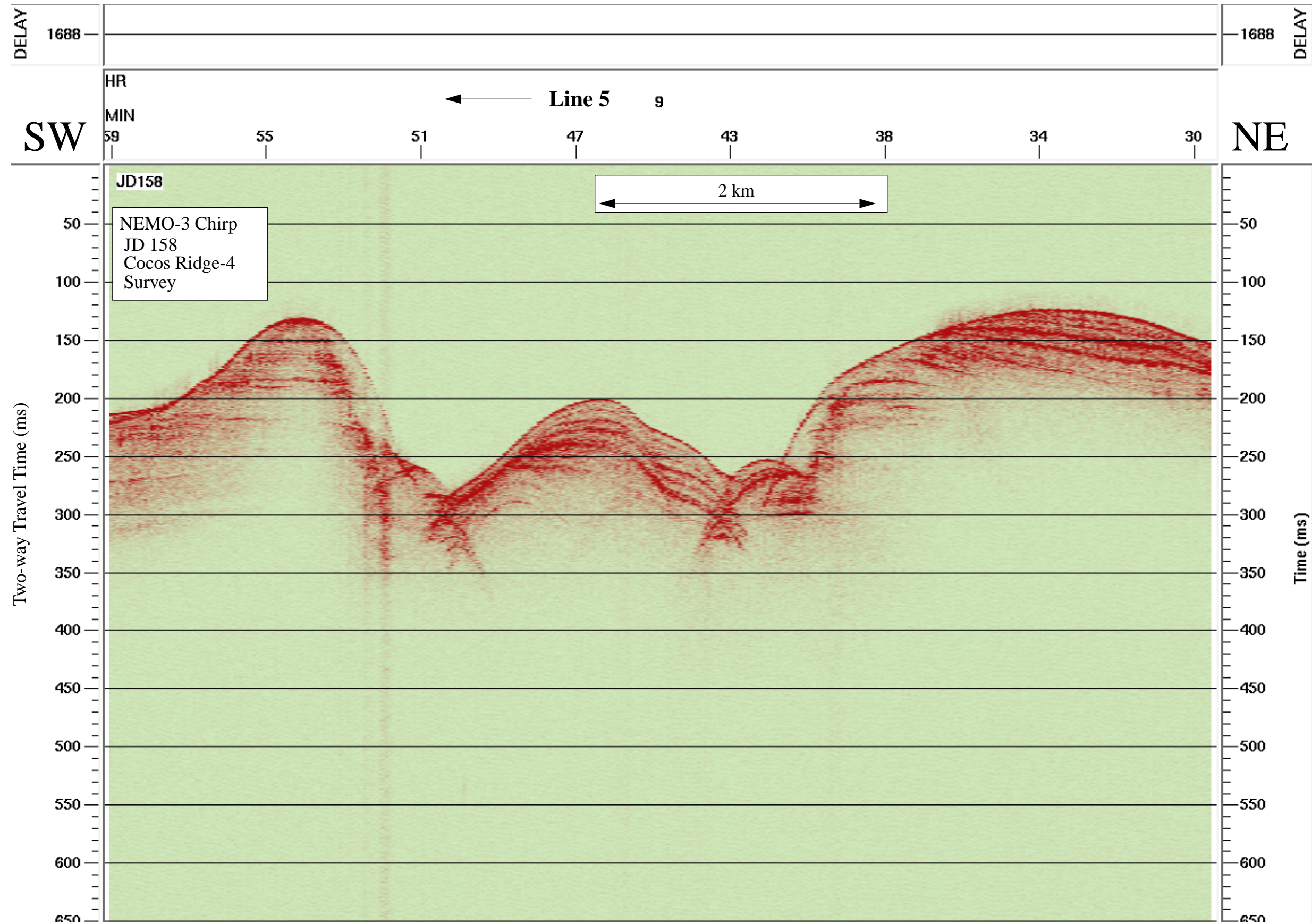


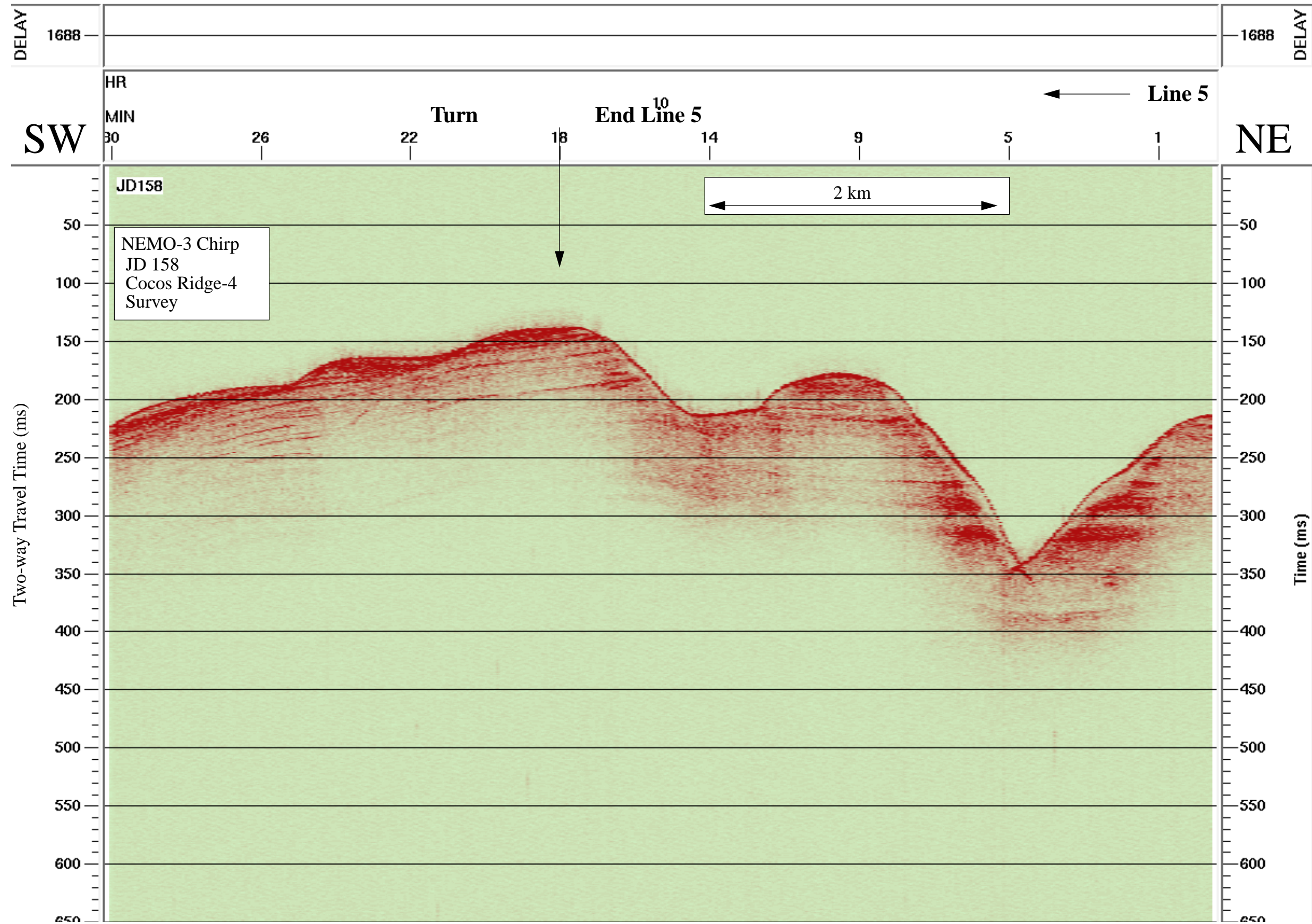


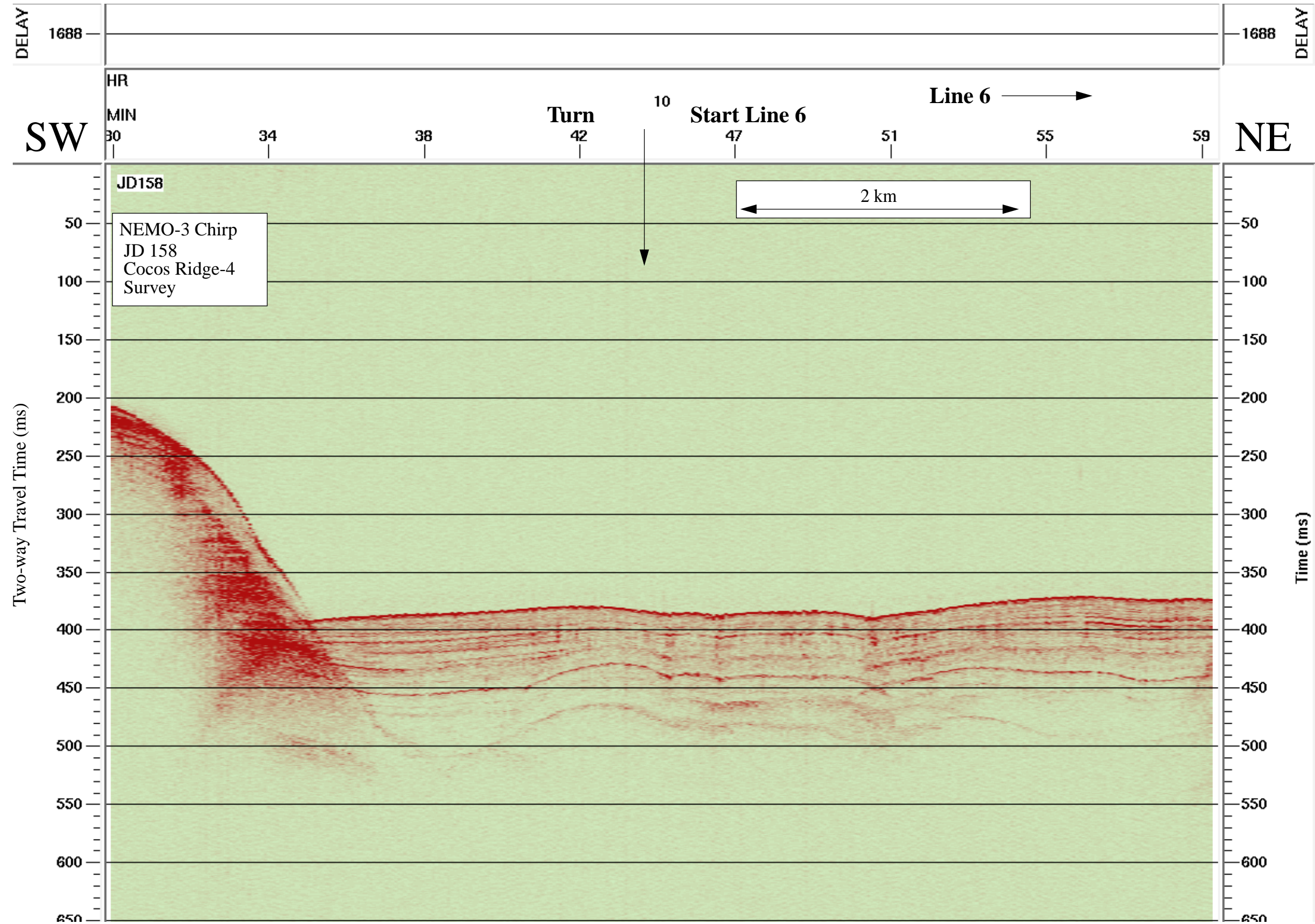


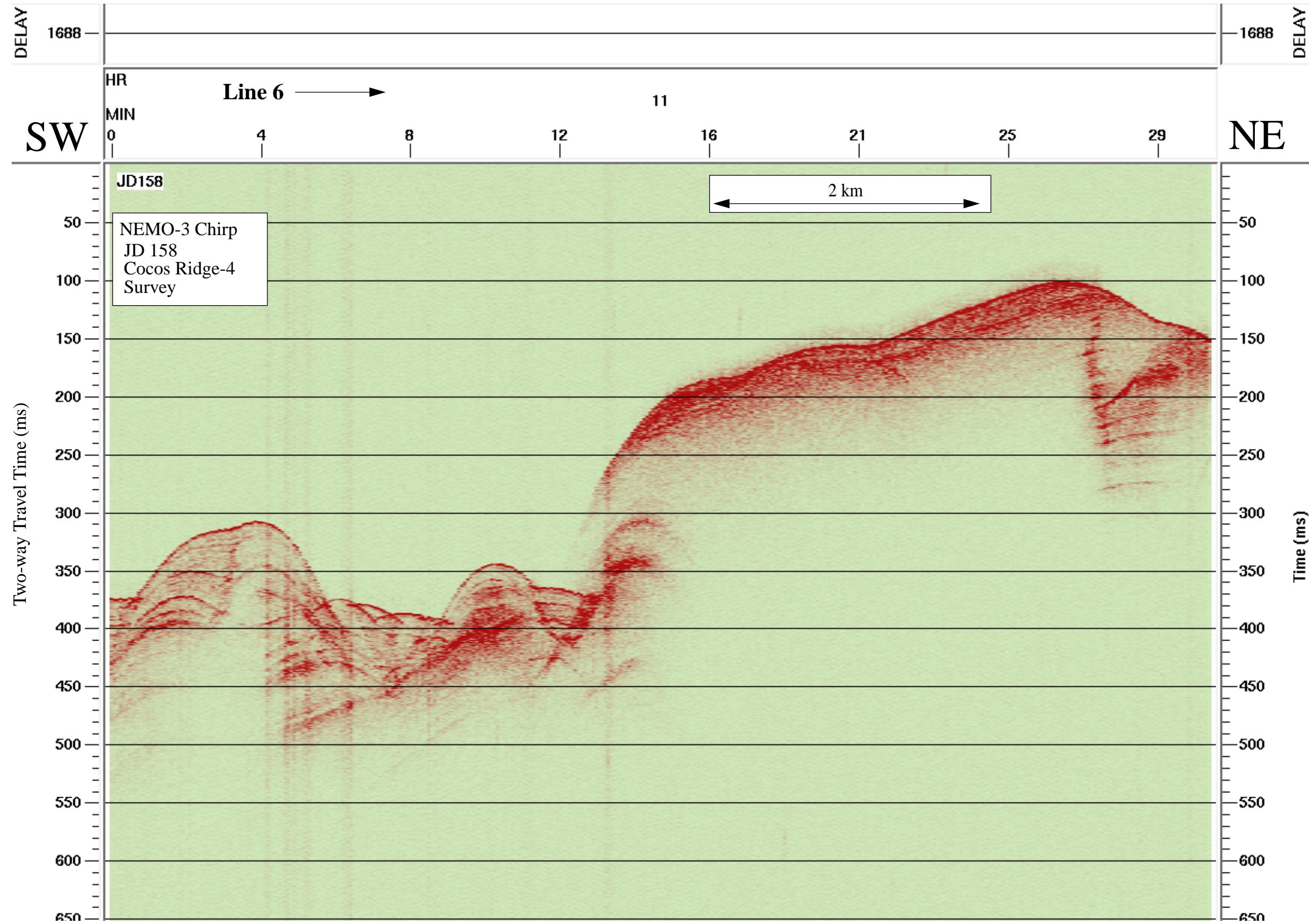


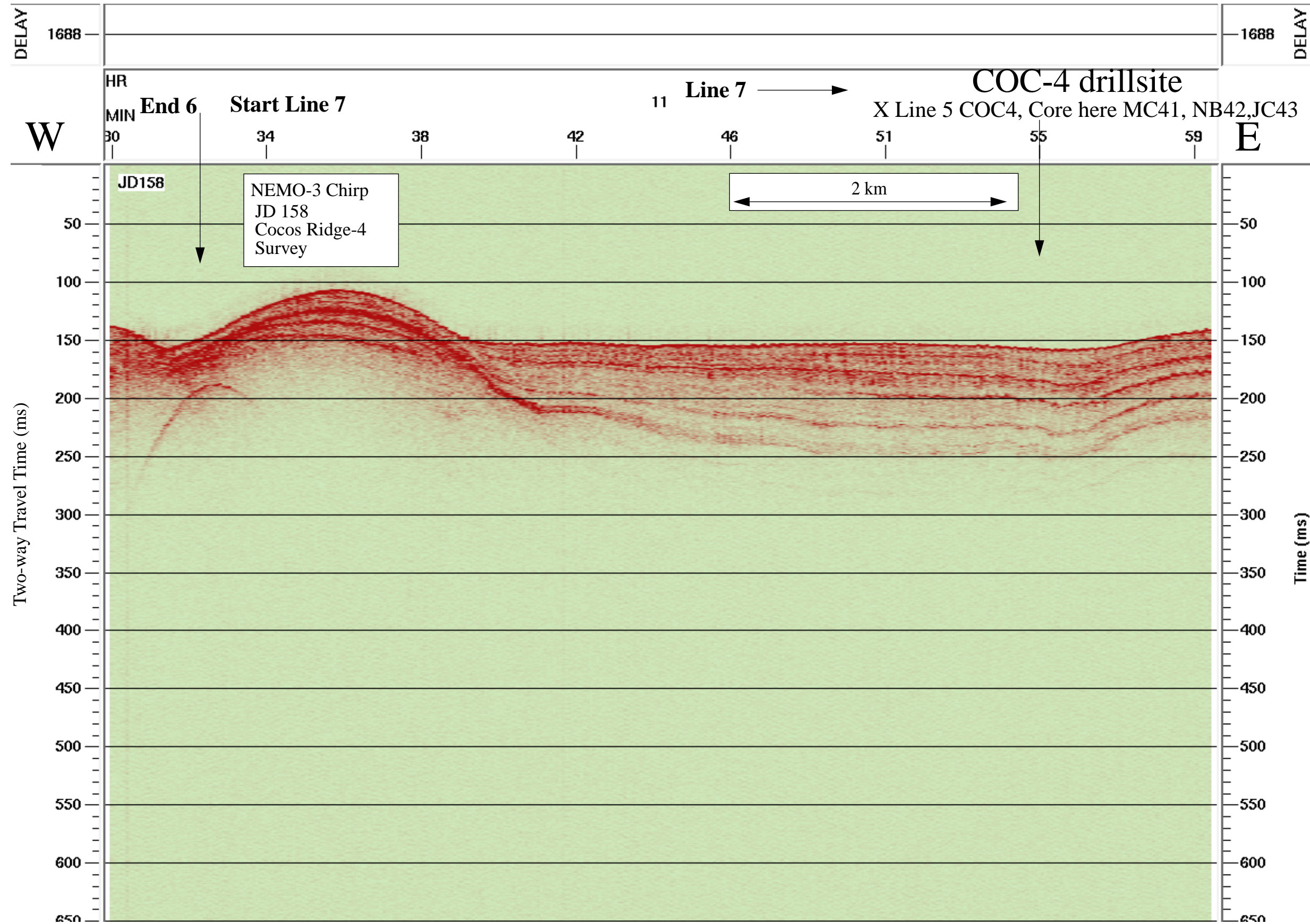




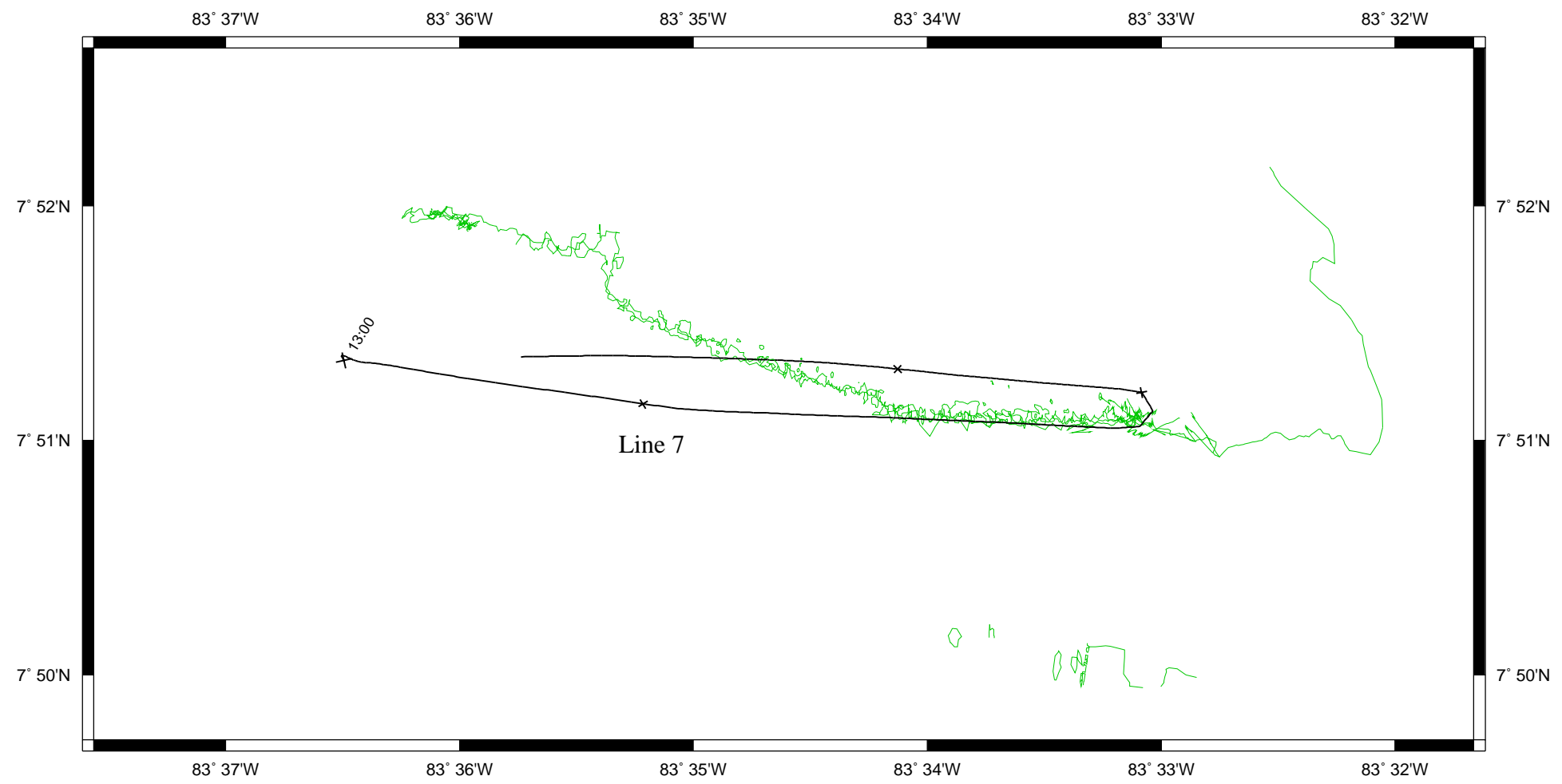


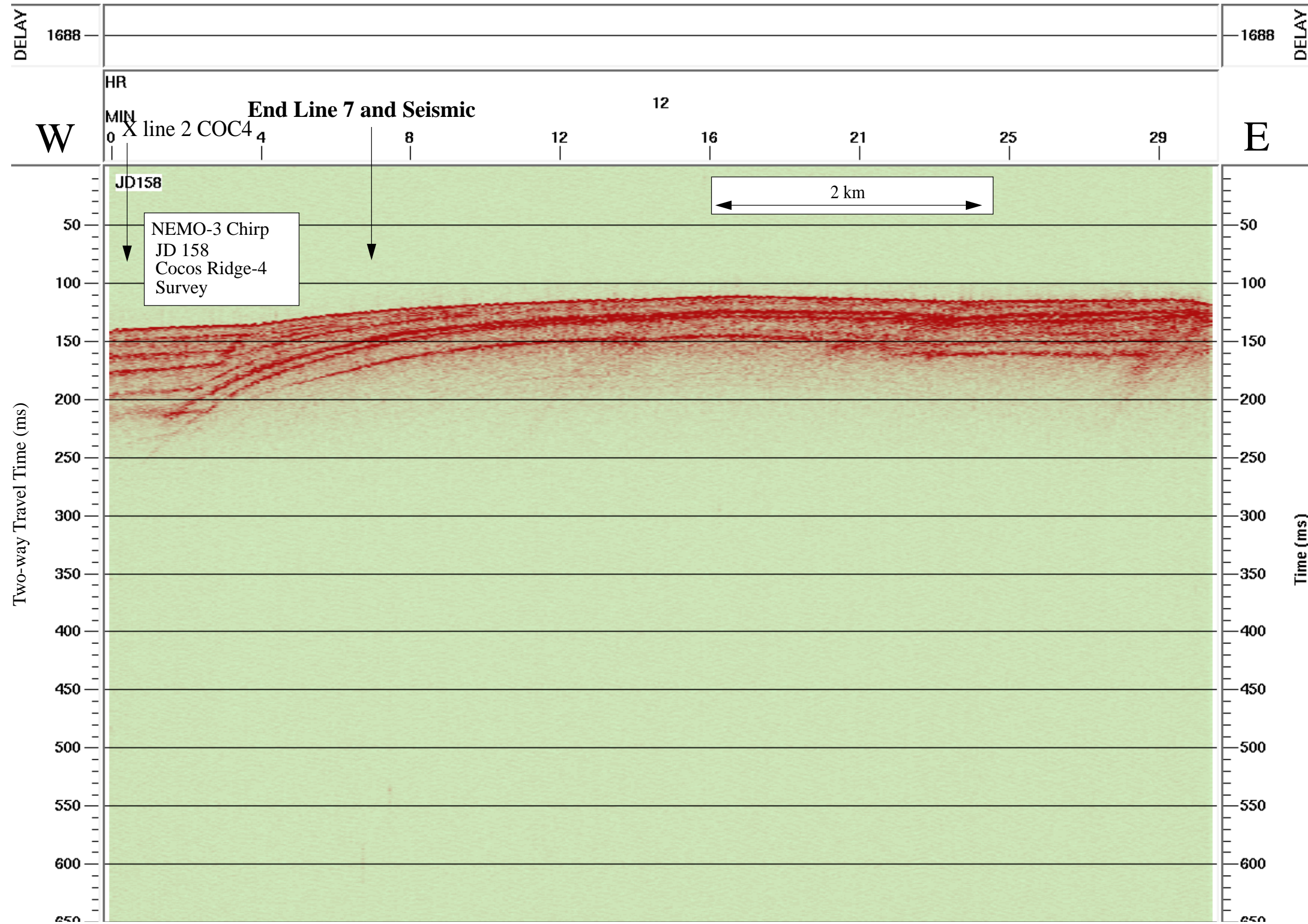


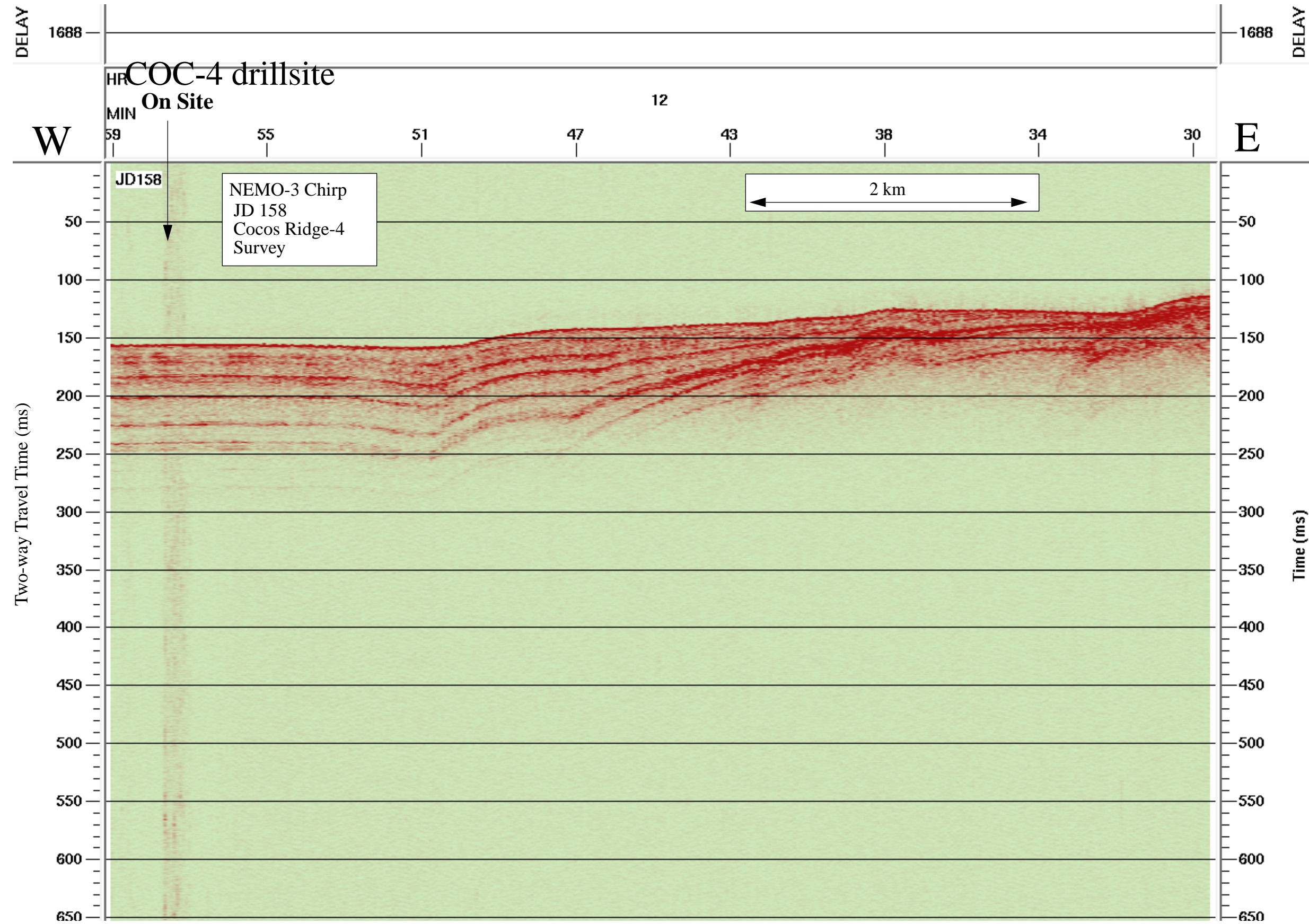




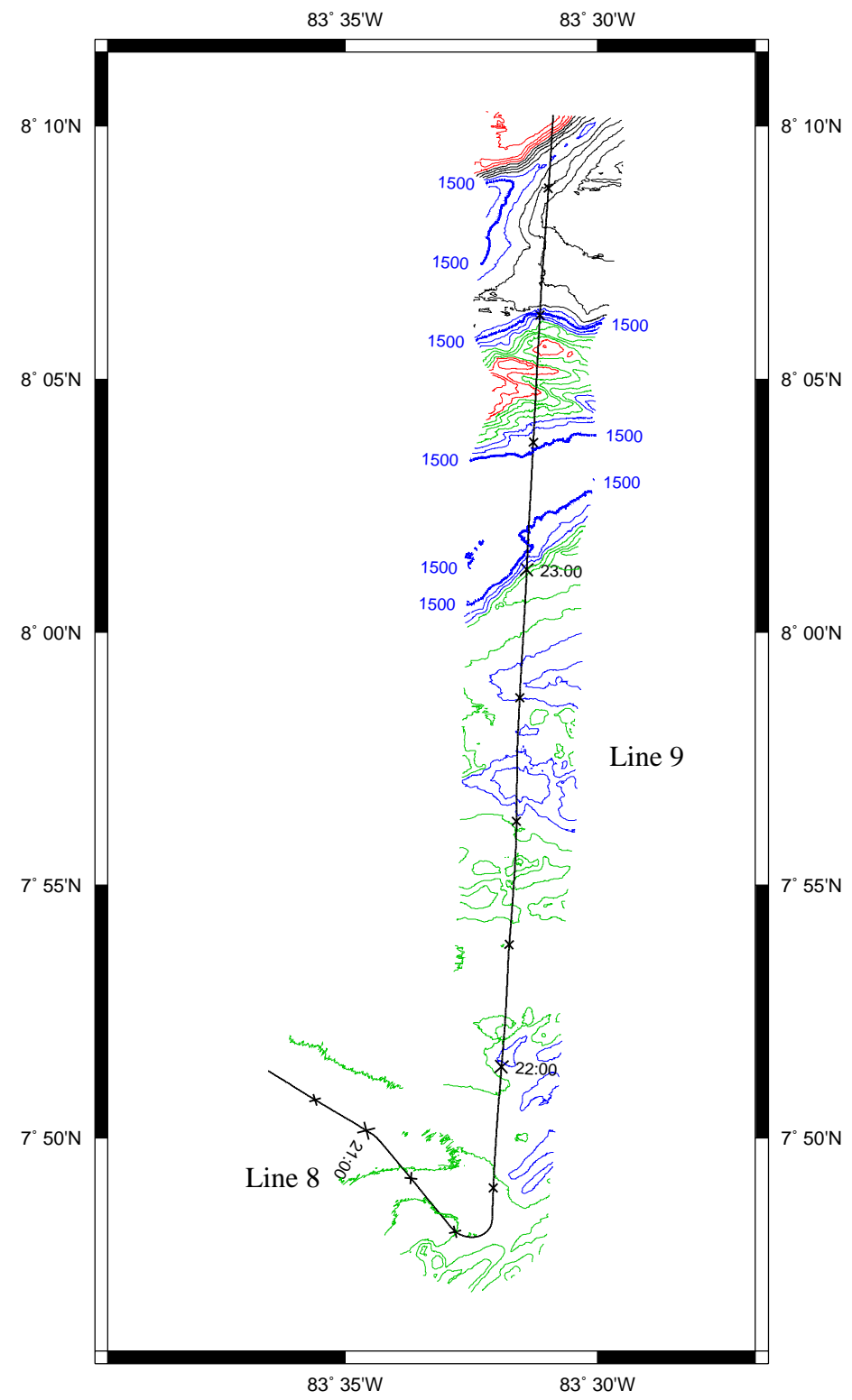
Data File SBfixavg.2000jun06.1200-1800

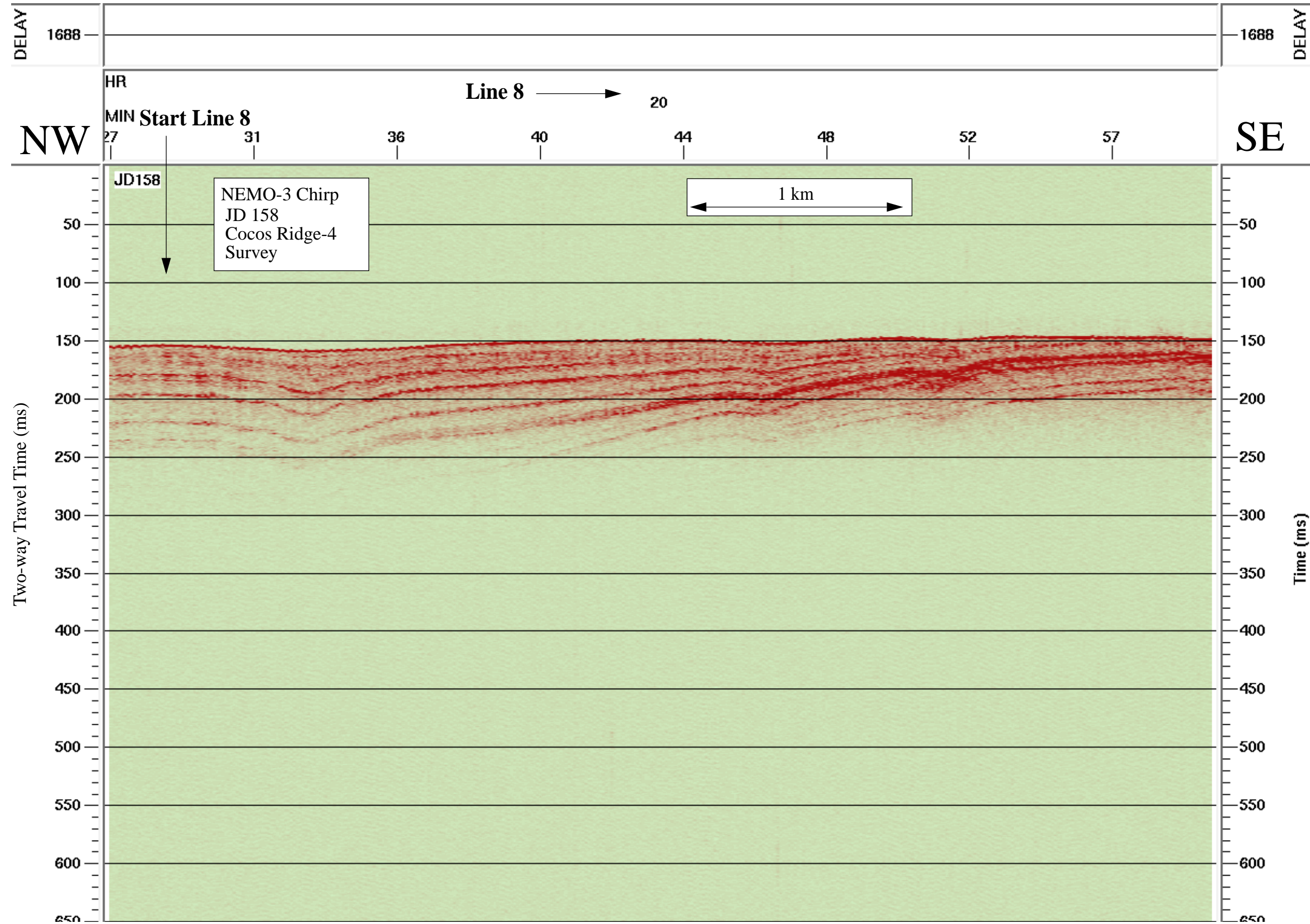


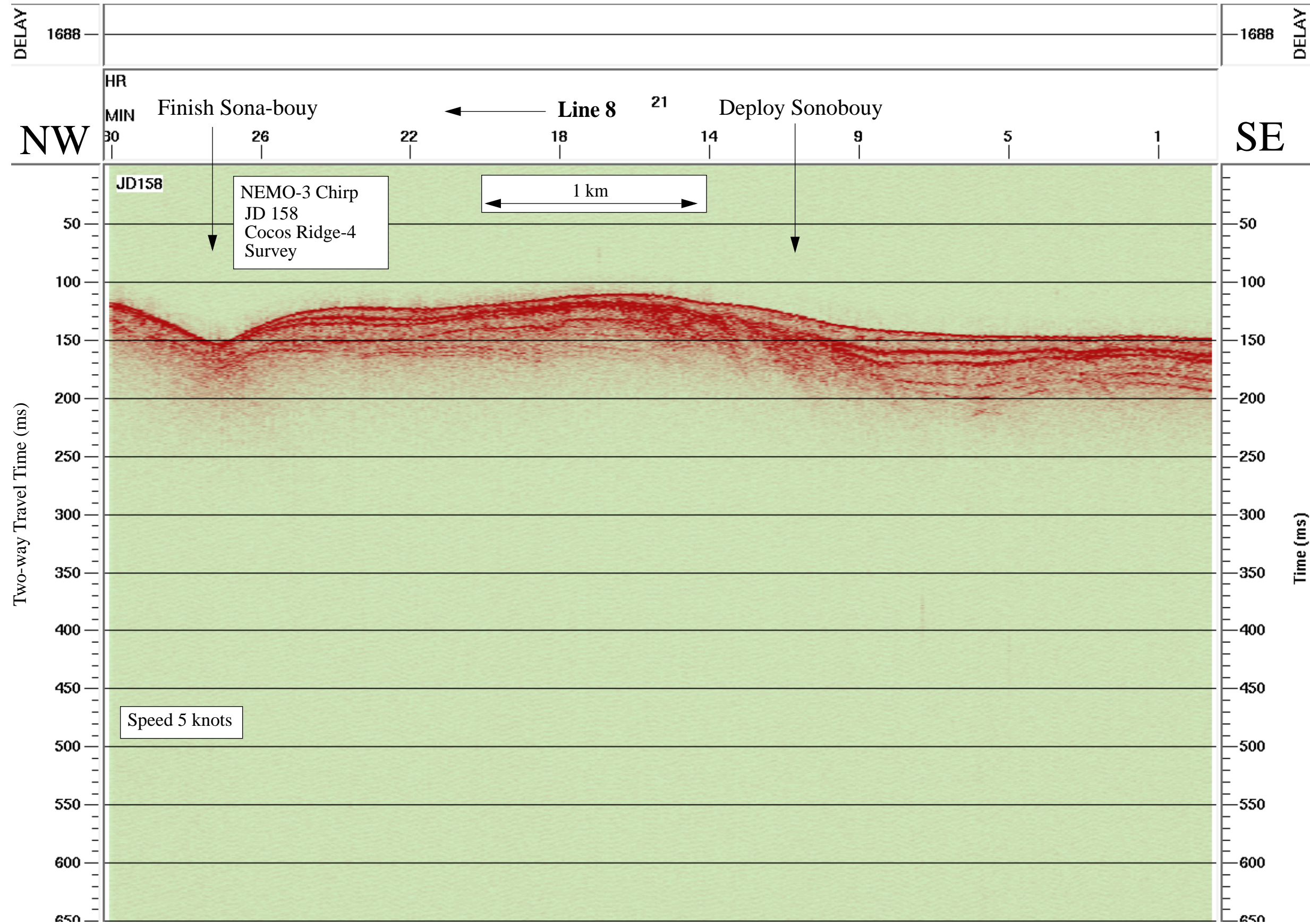


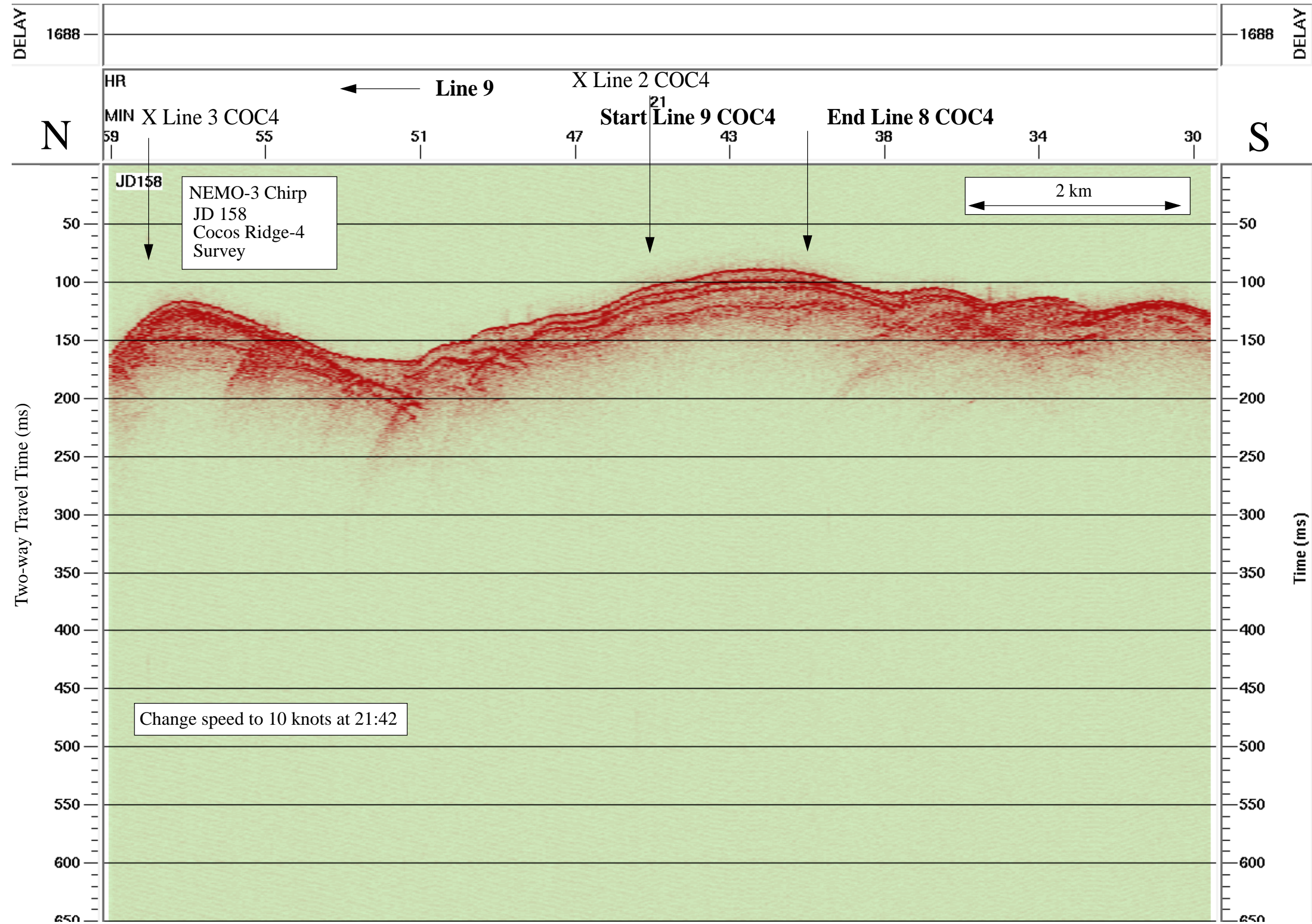


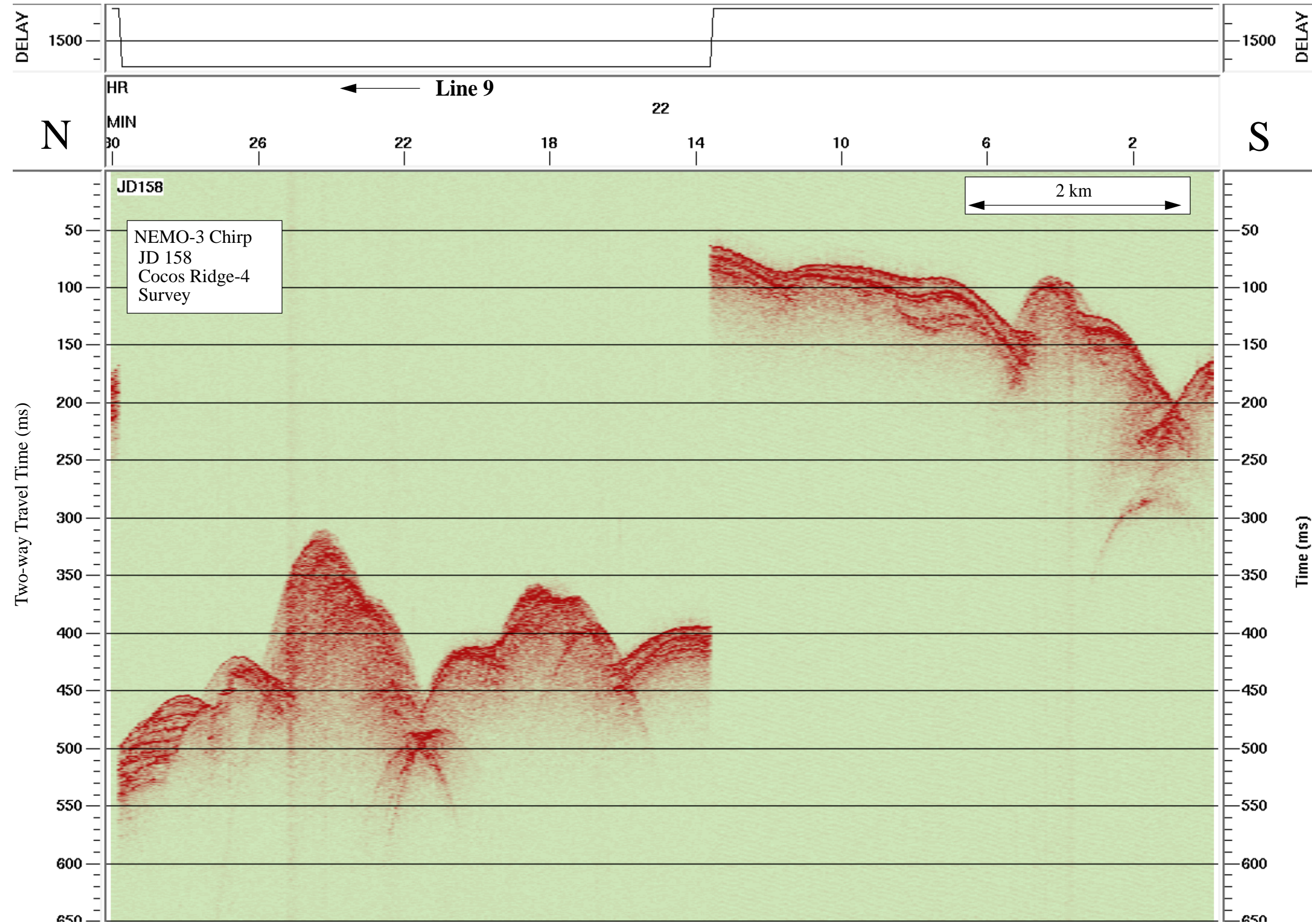
Data File SBfixavg.2000jun06.1800-2400

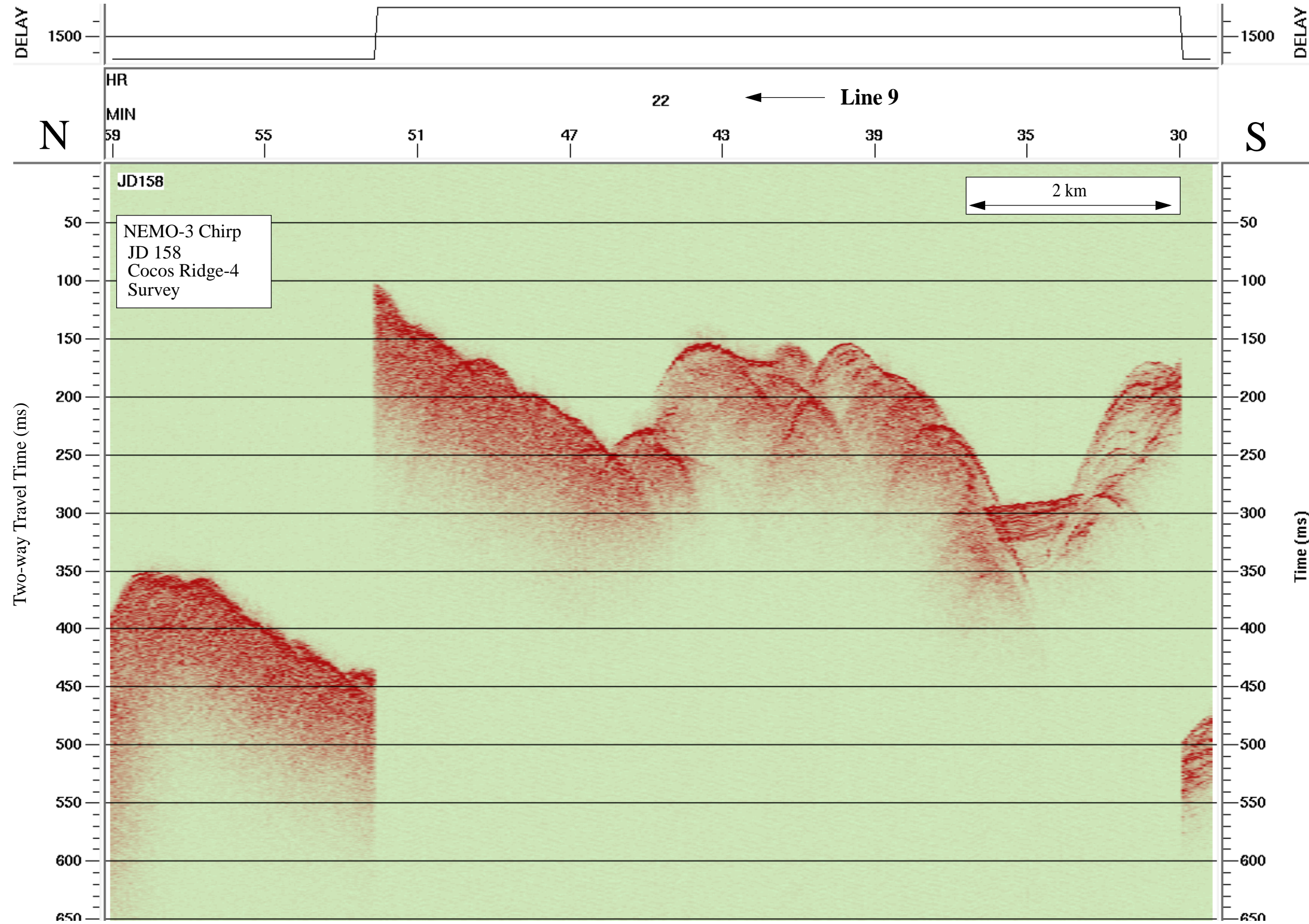


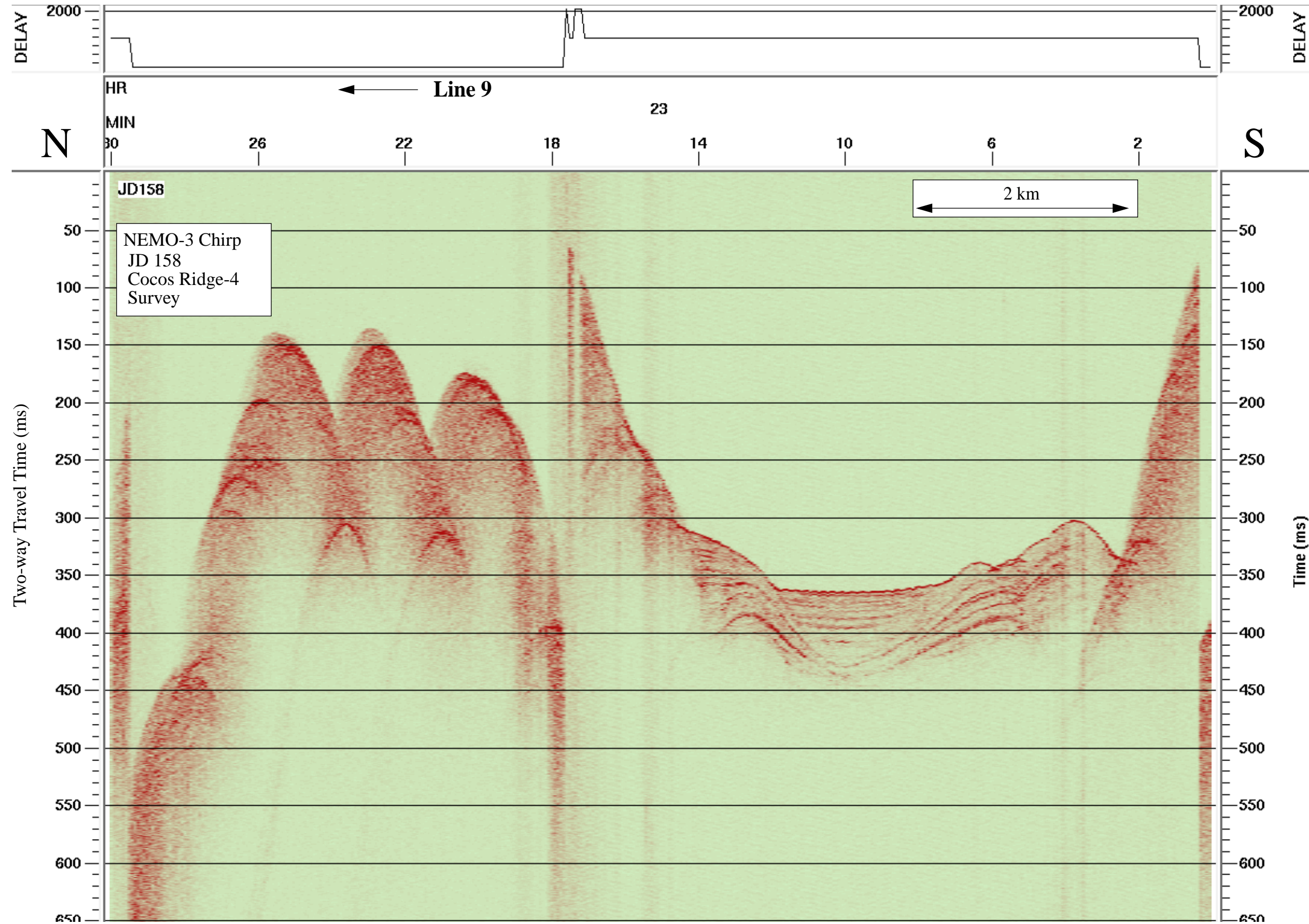


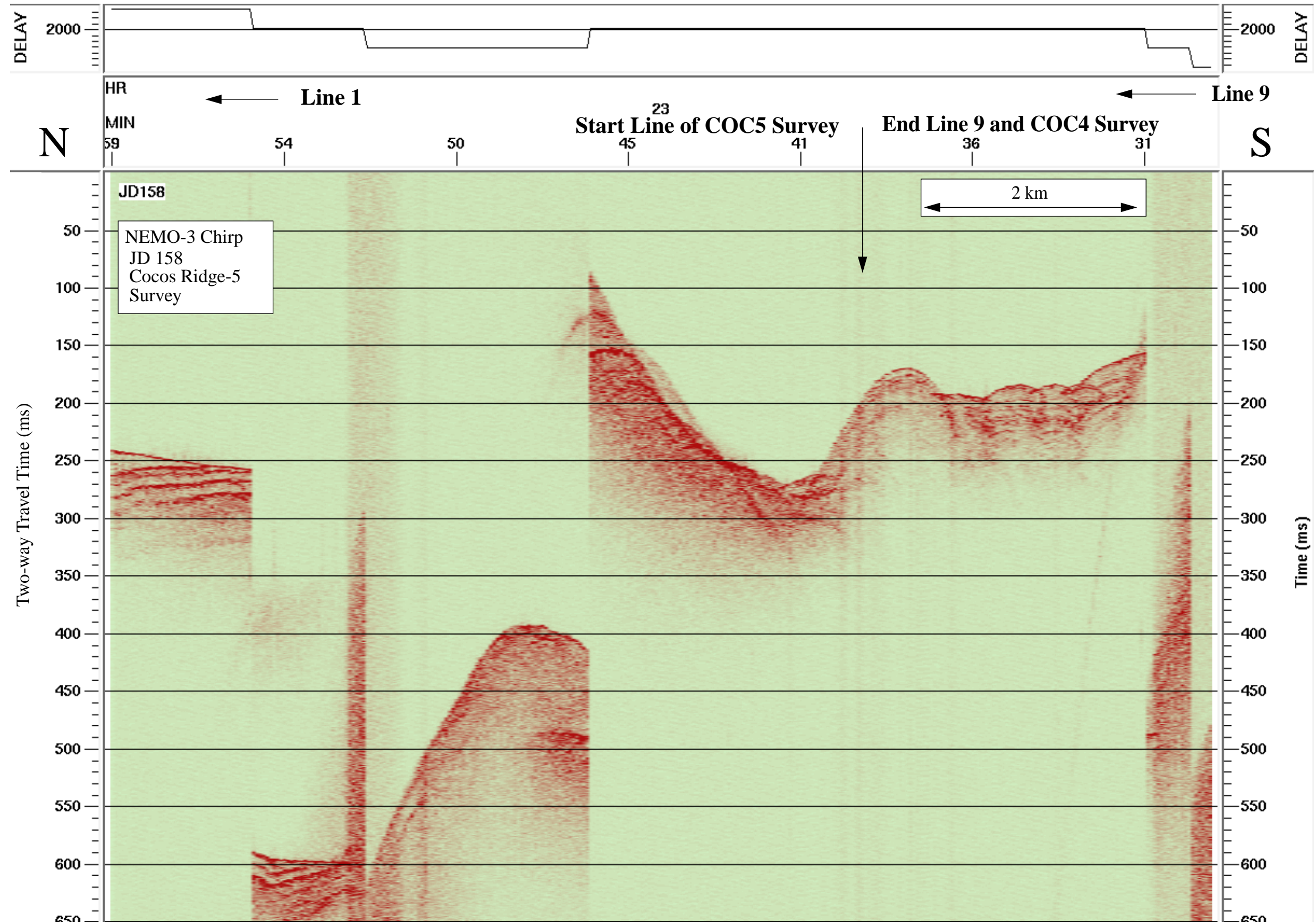












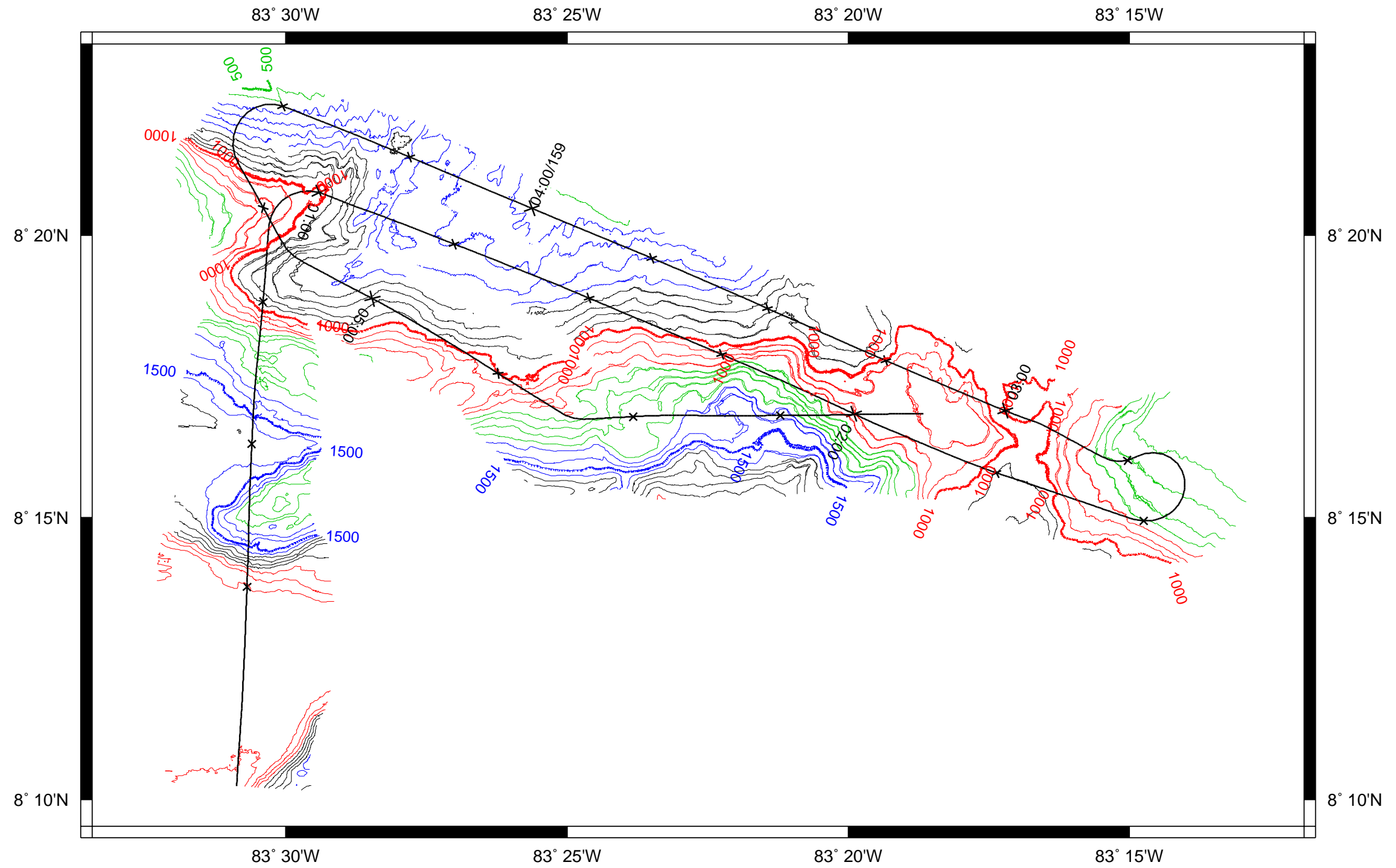
JD 159 (7 June 2000)--COC-5 and MAT-1 Surveys, Costa Rica Margin

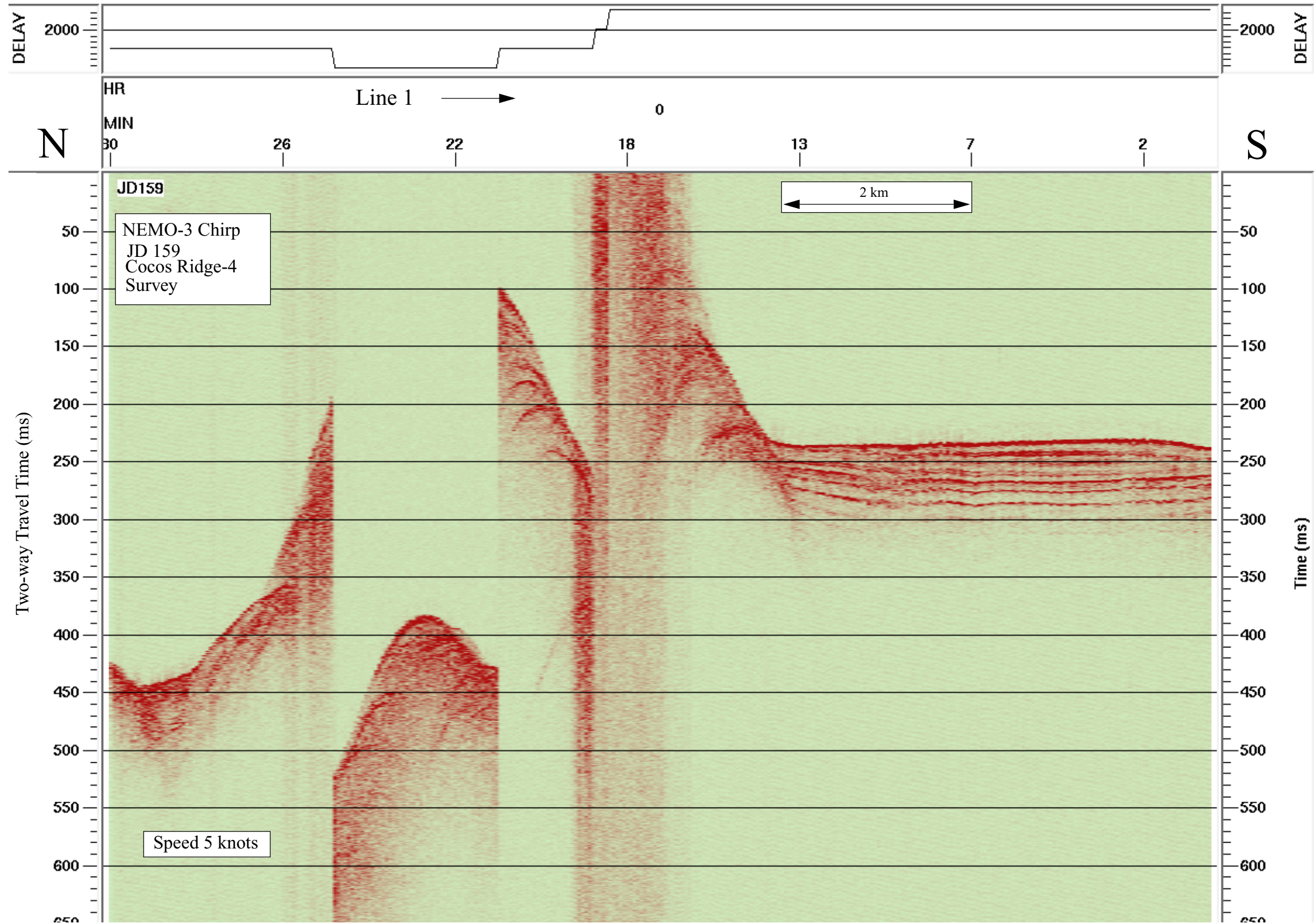
2-7 kHz Chirp Subbottom Profiler

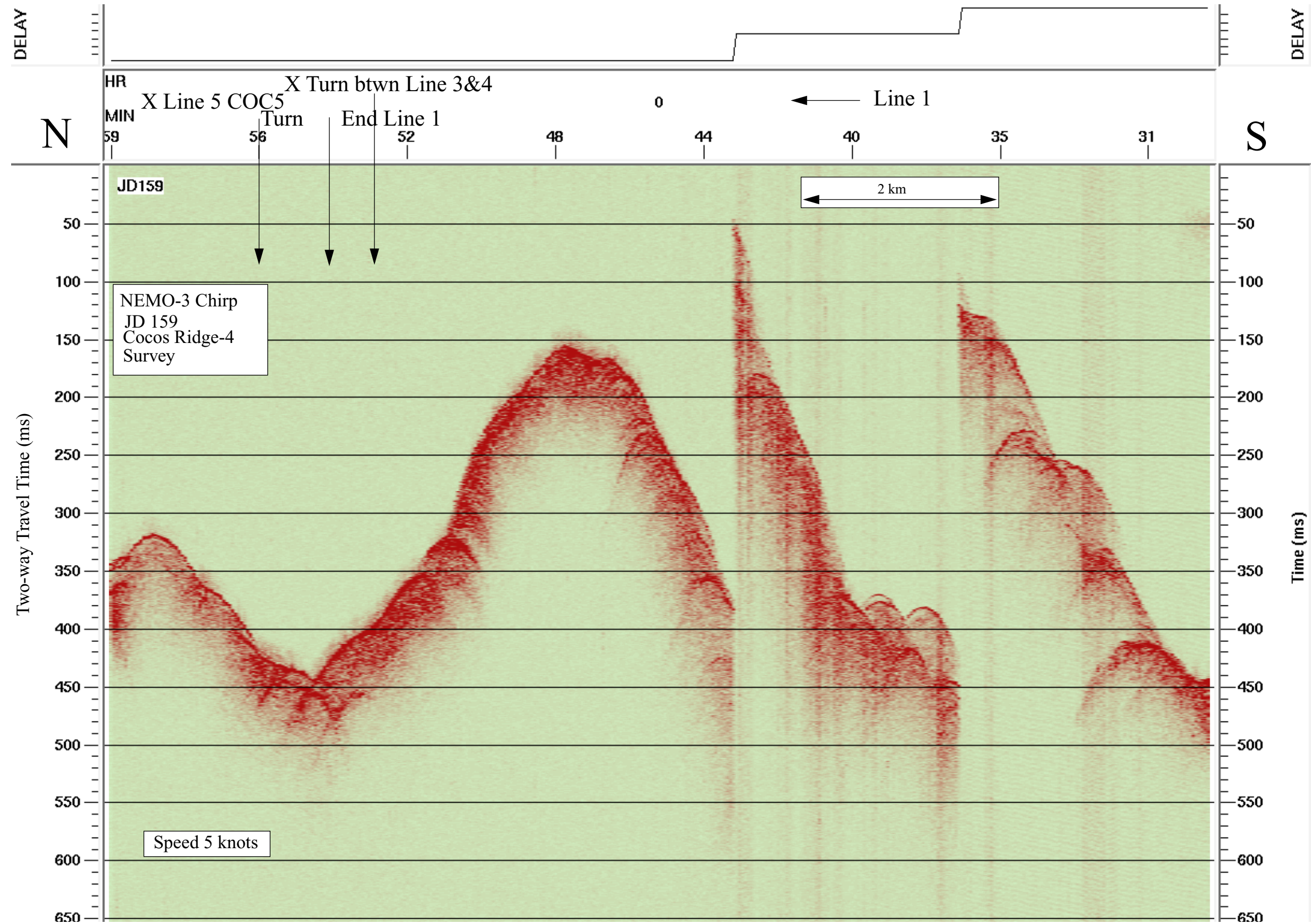
NEMO Leg 3

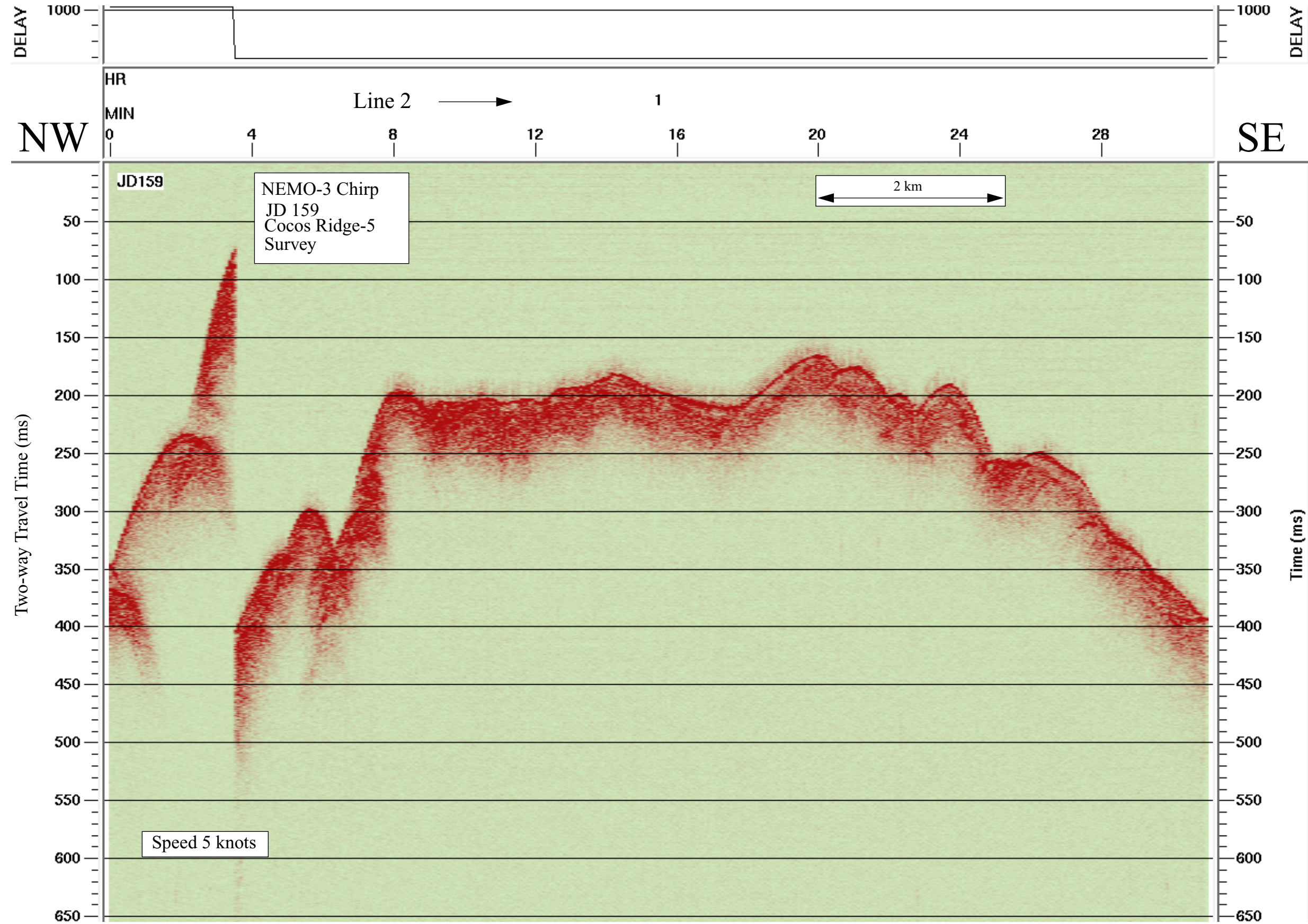
R/V Melville

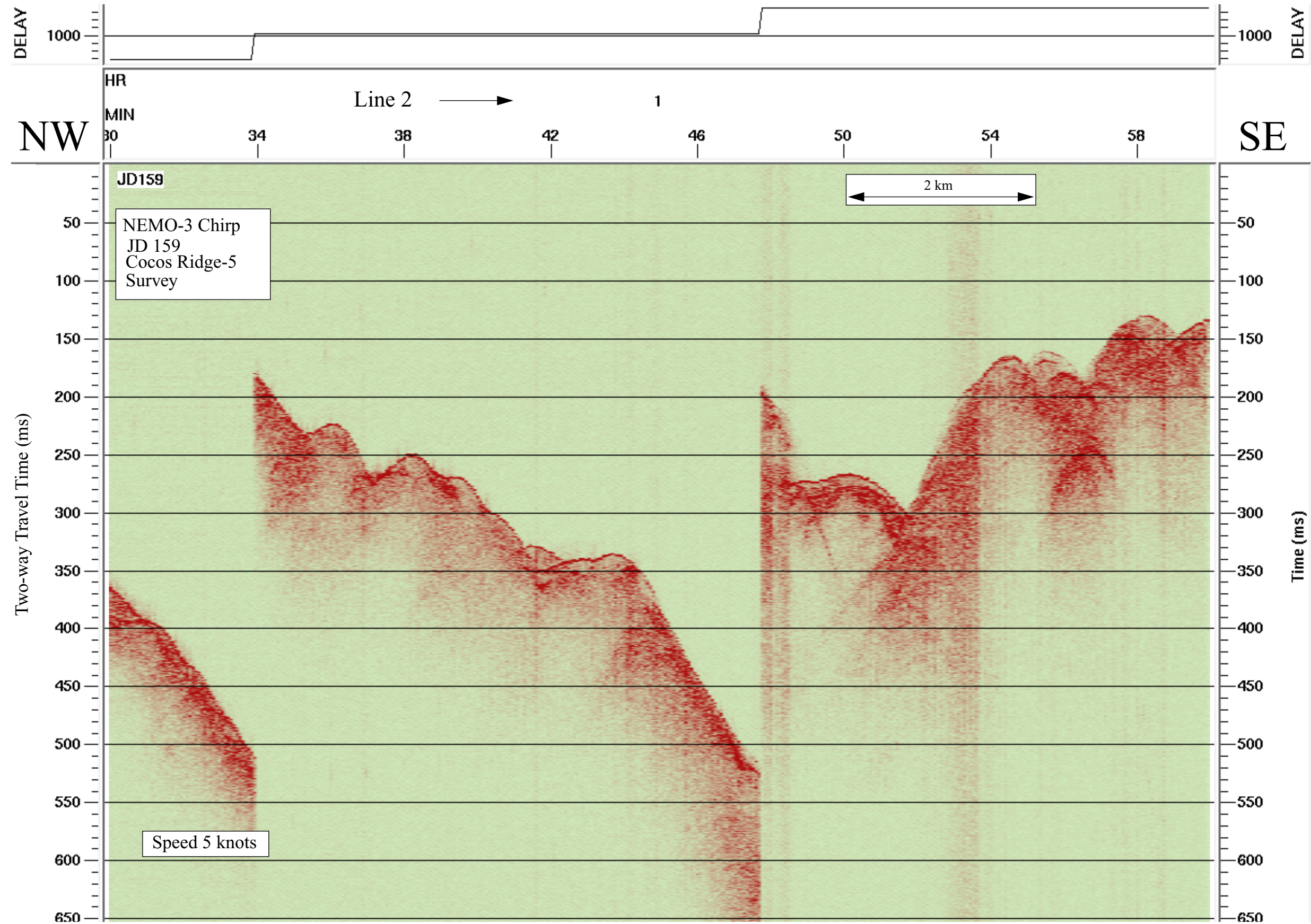
Data File SBfixavg.2000jun07.0000-0600

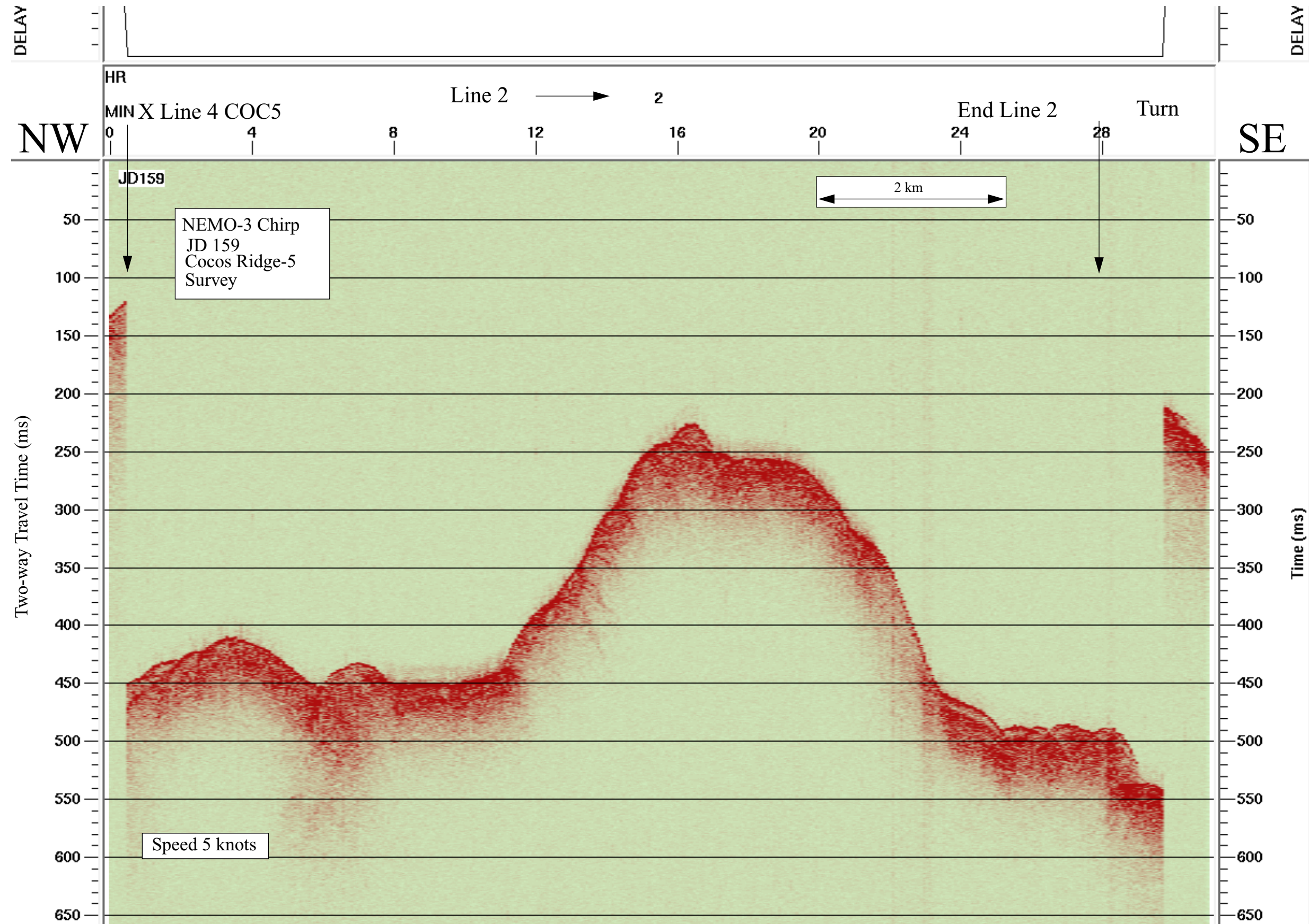


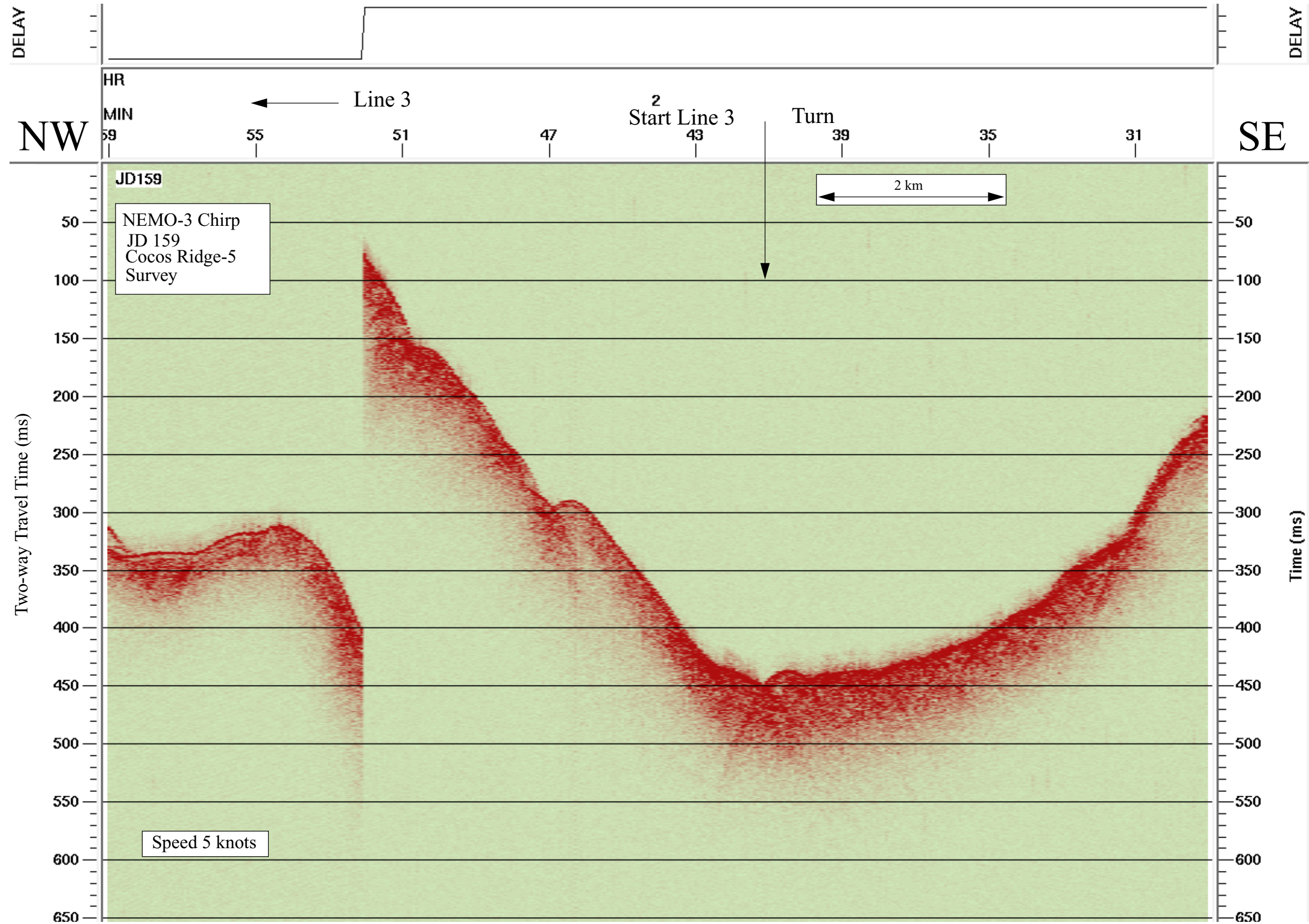


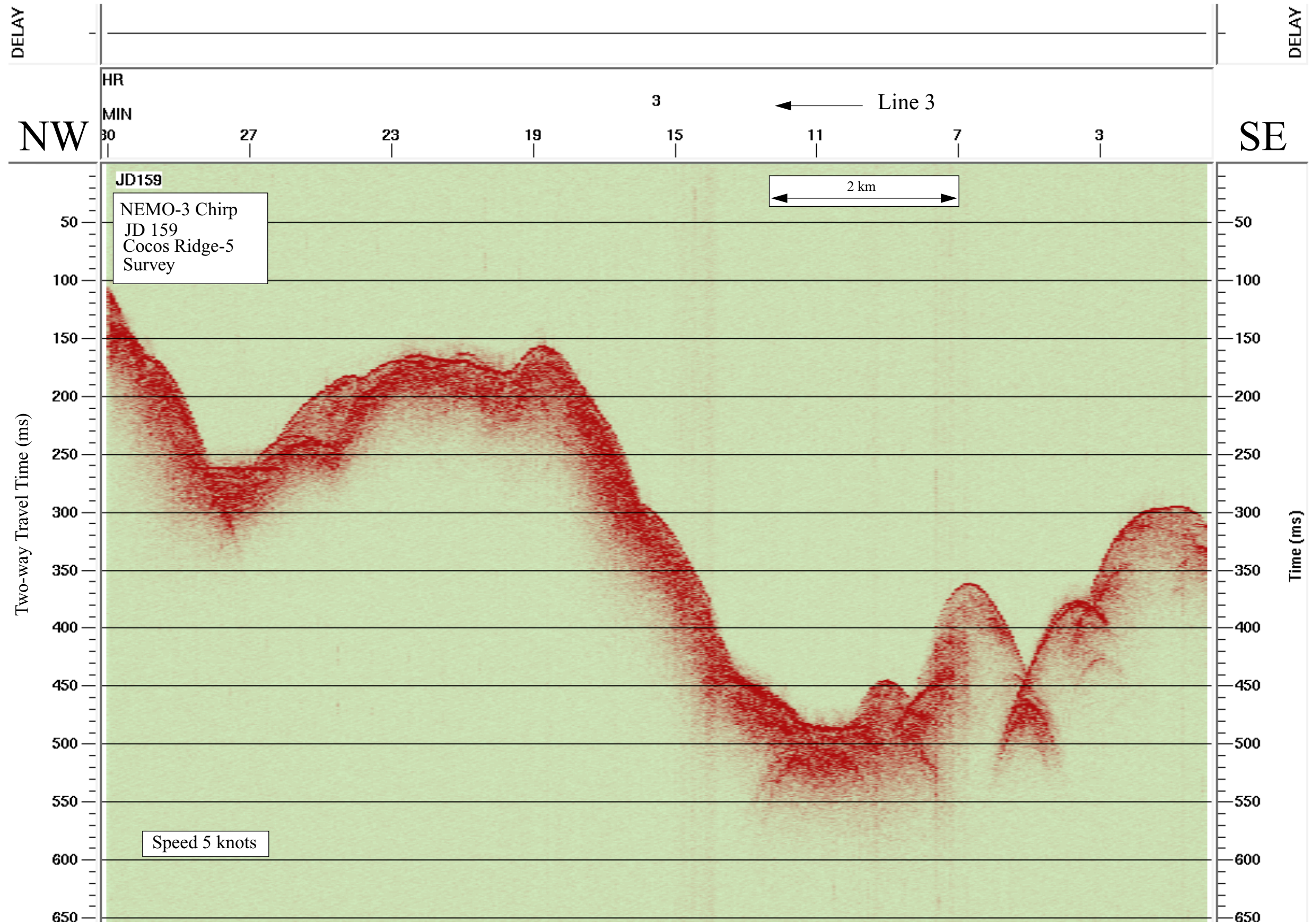


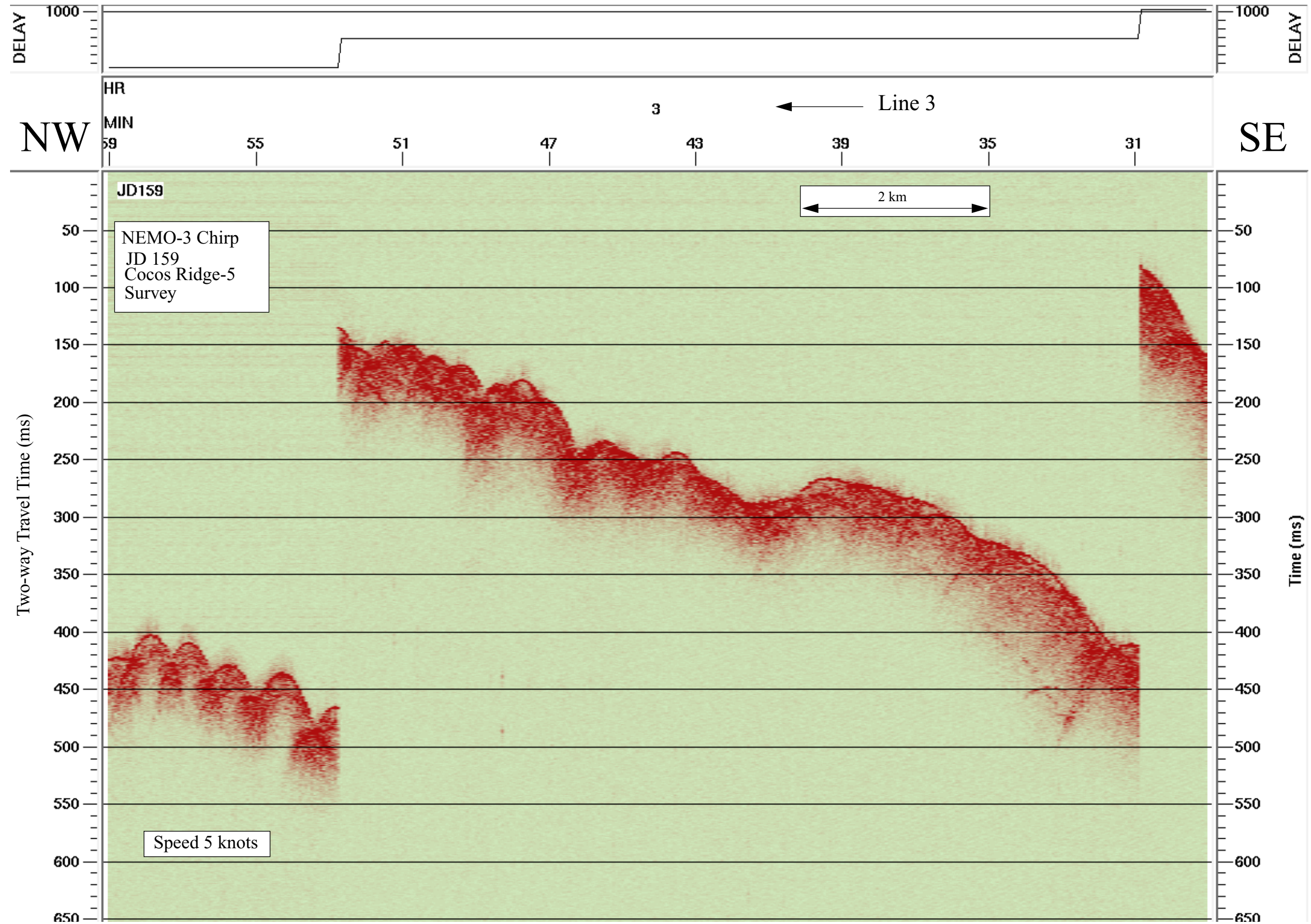


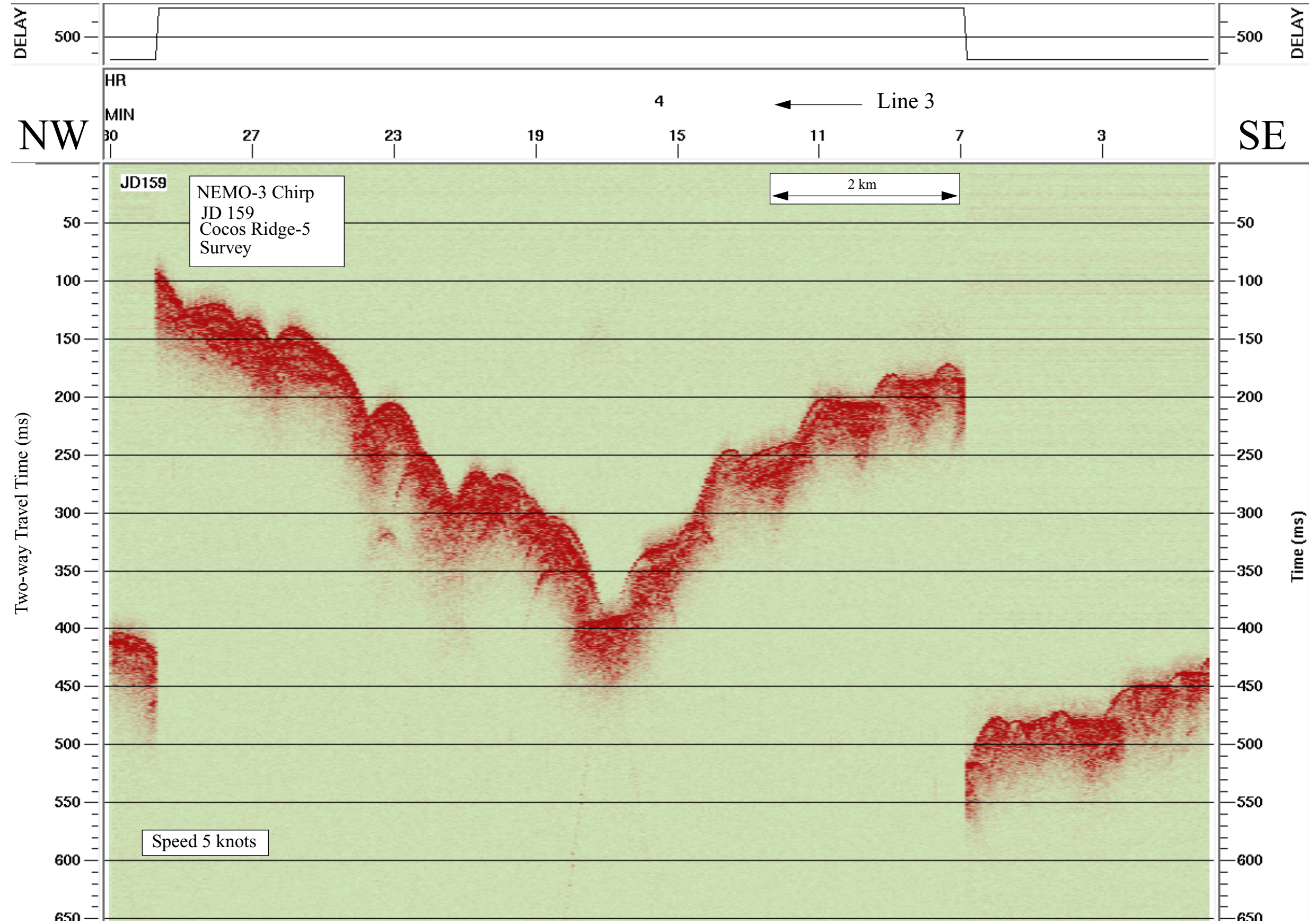


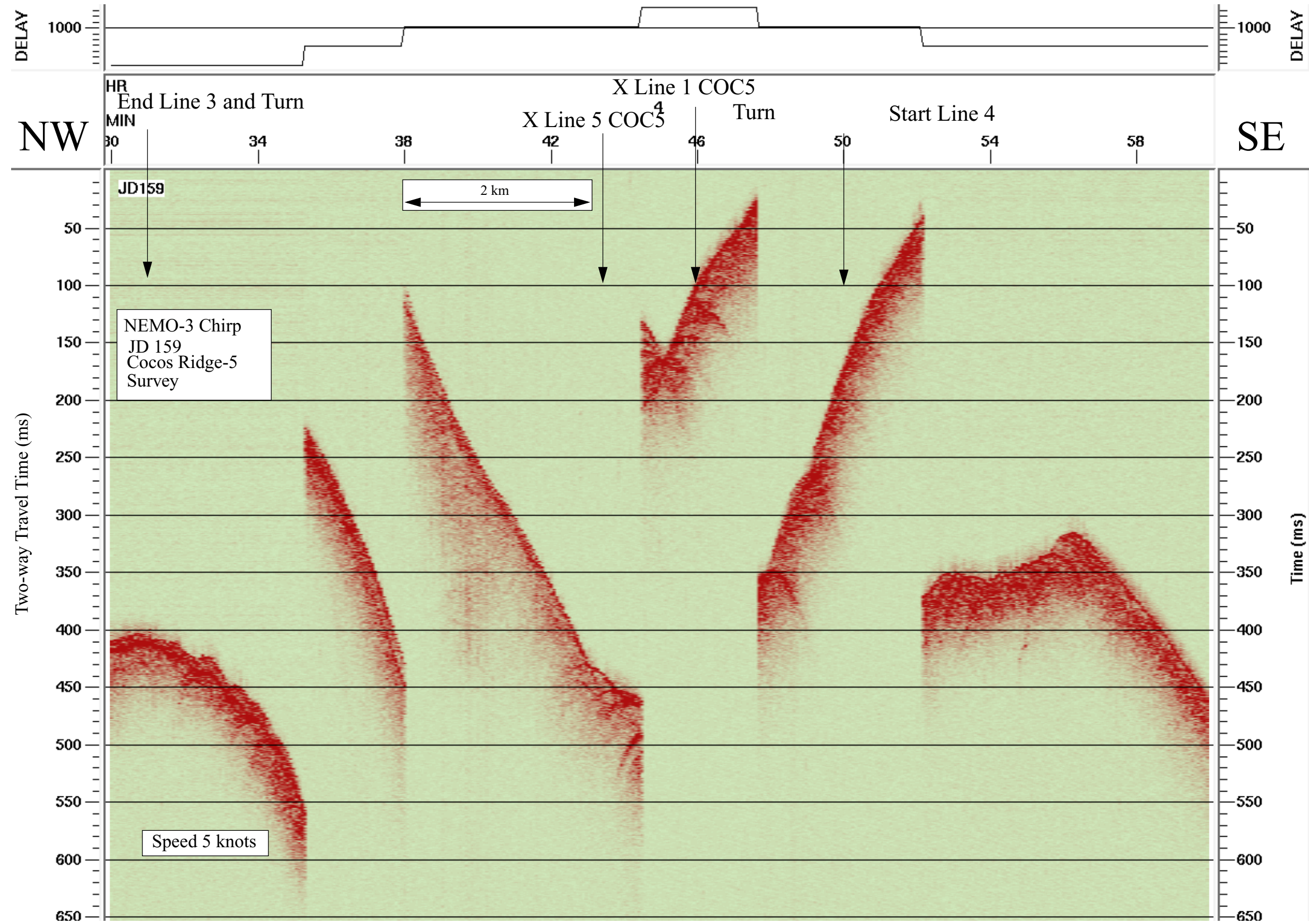


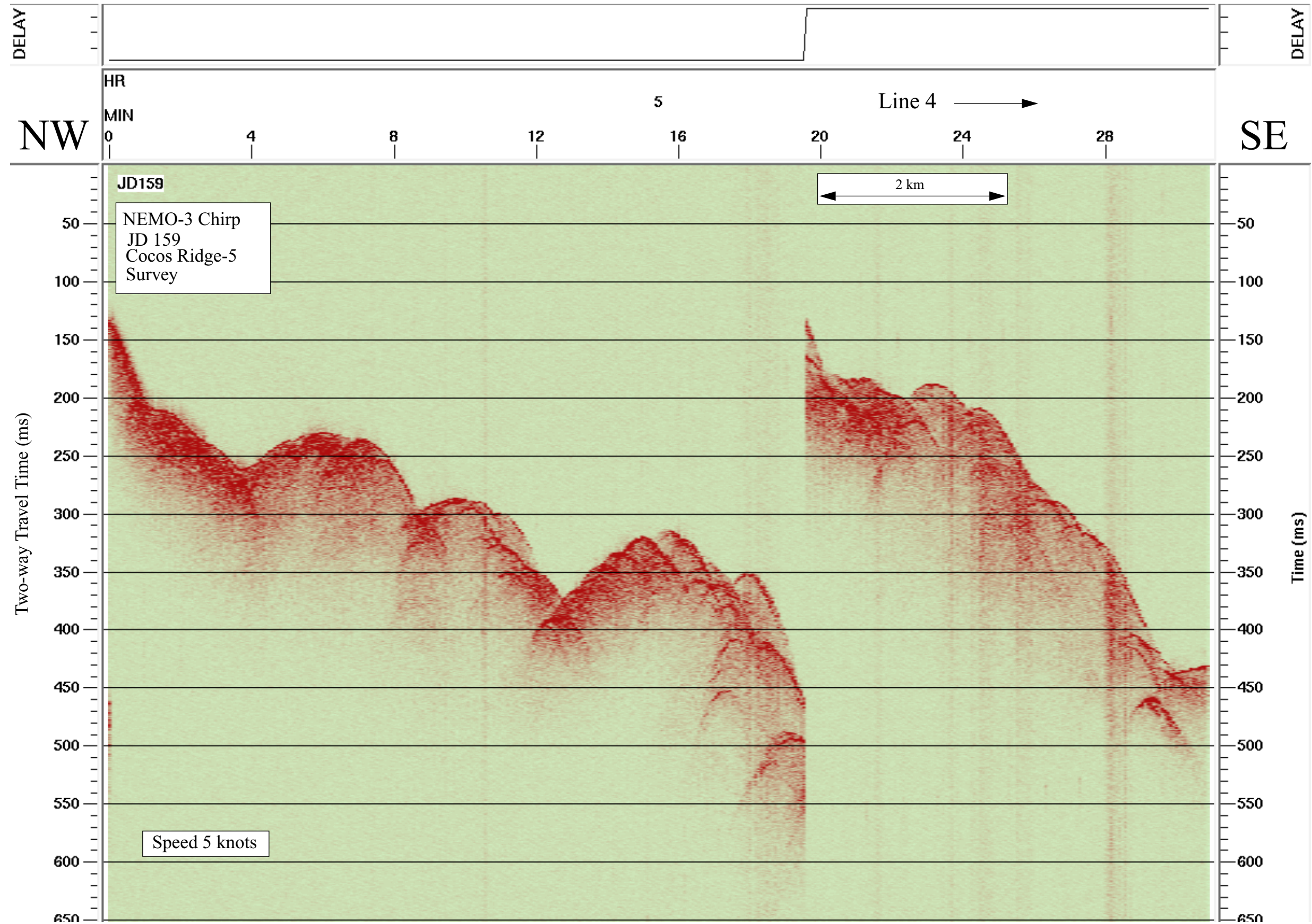


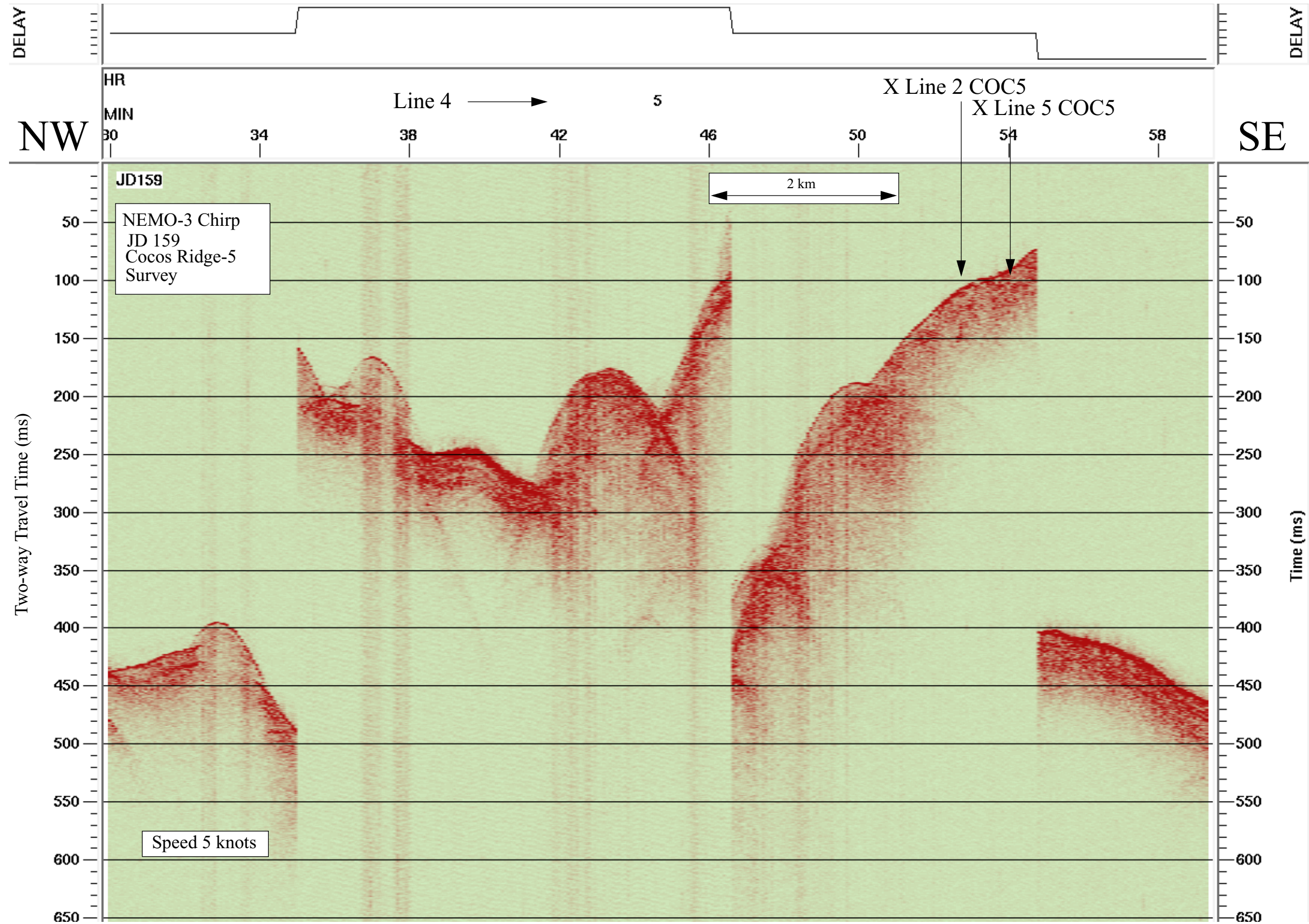




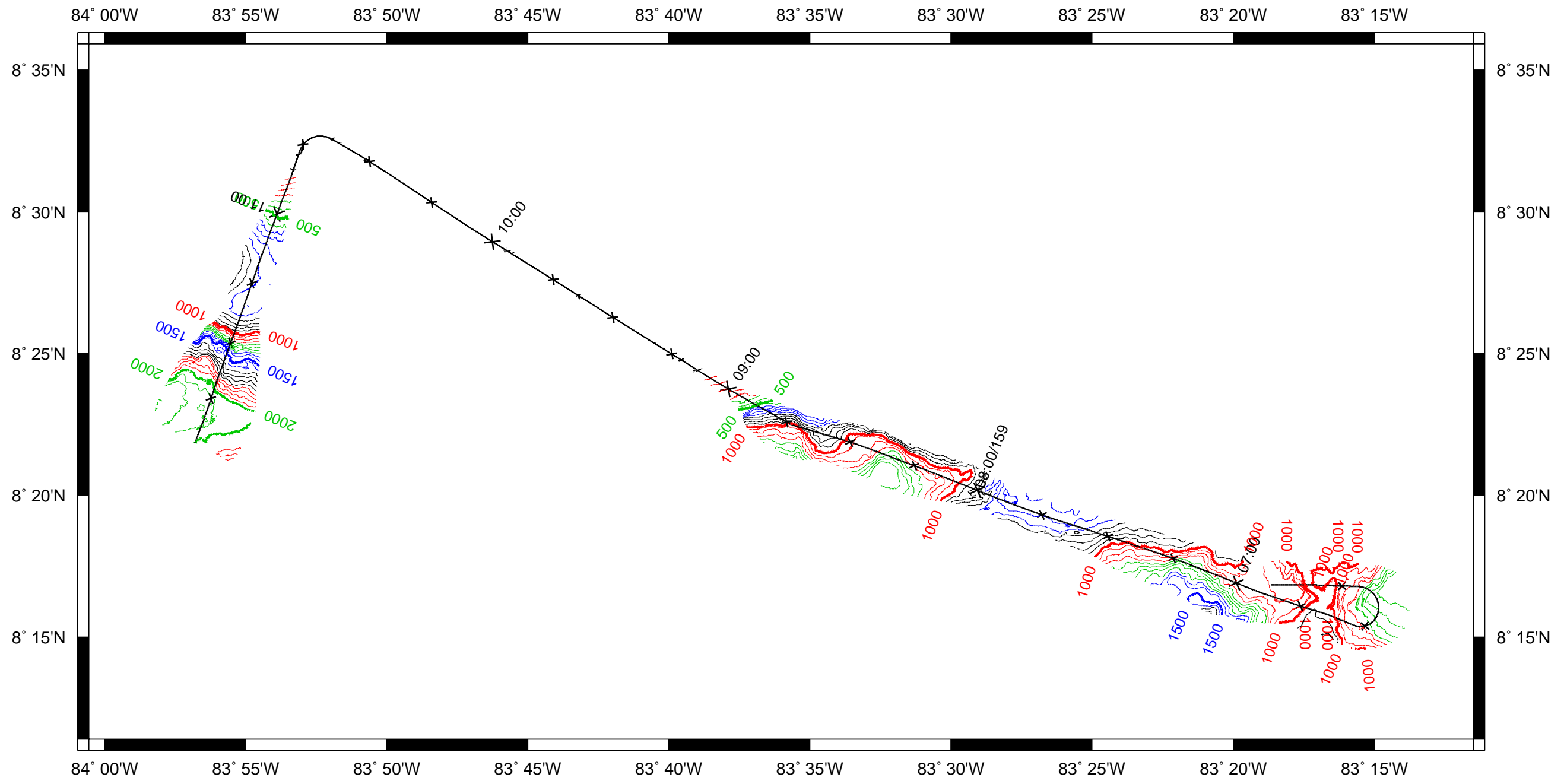


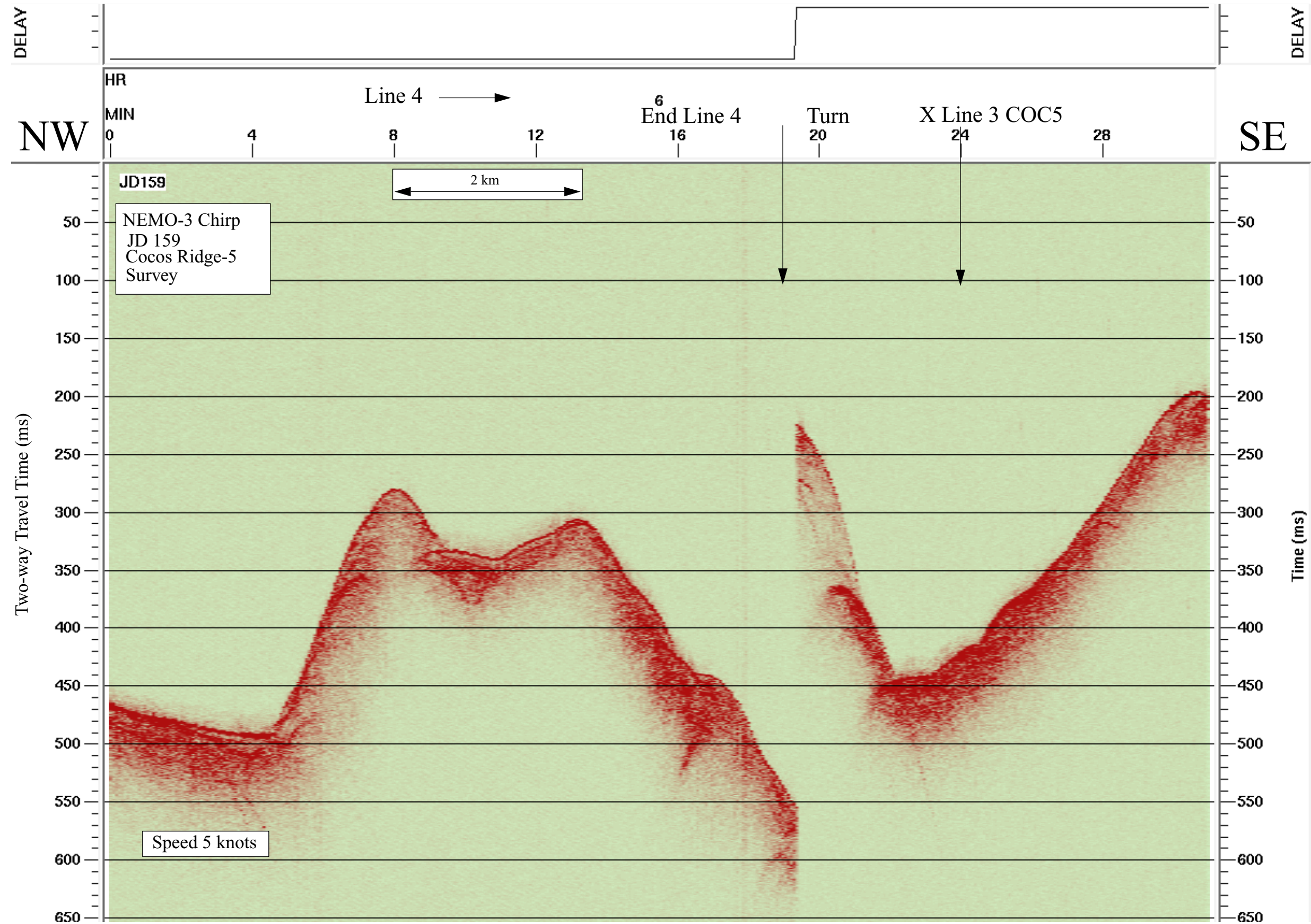


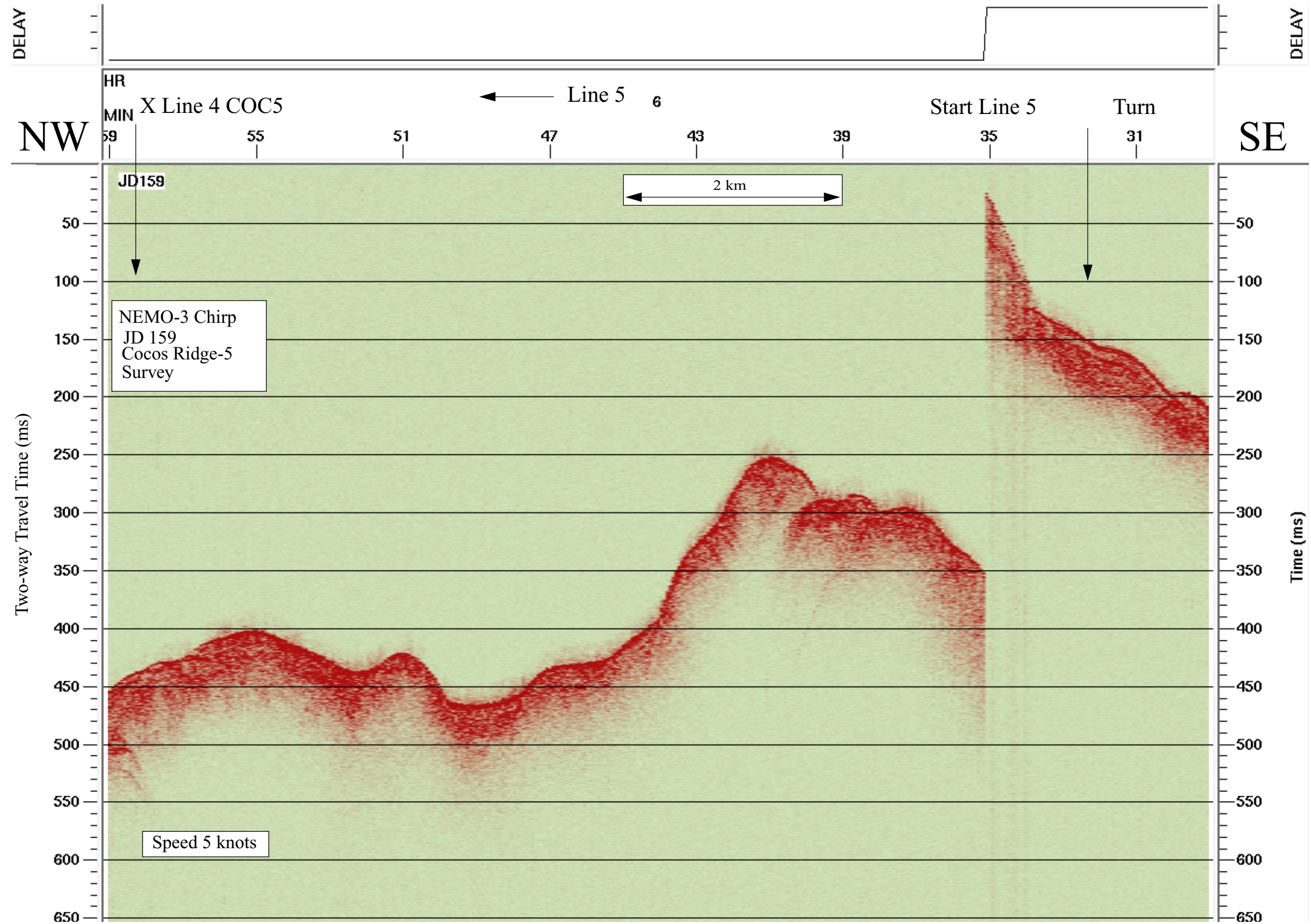


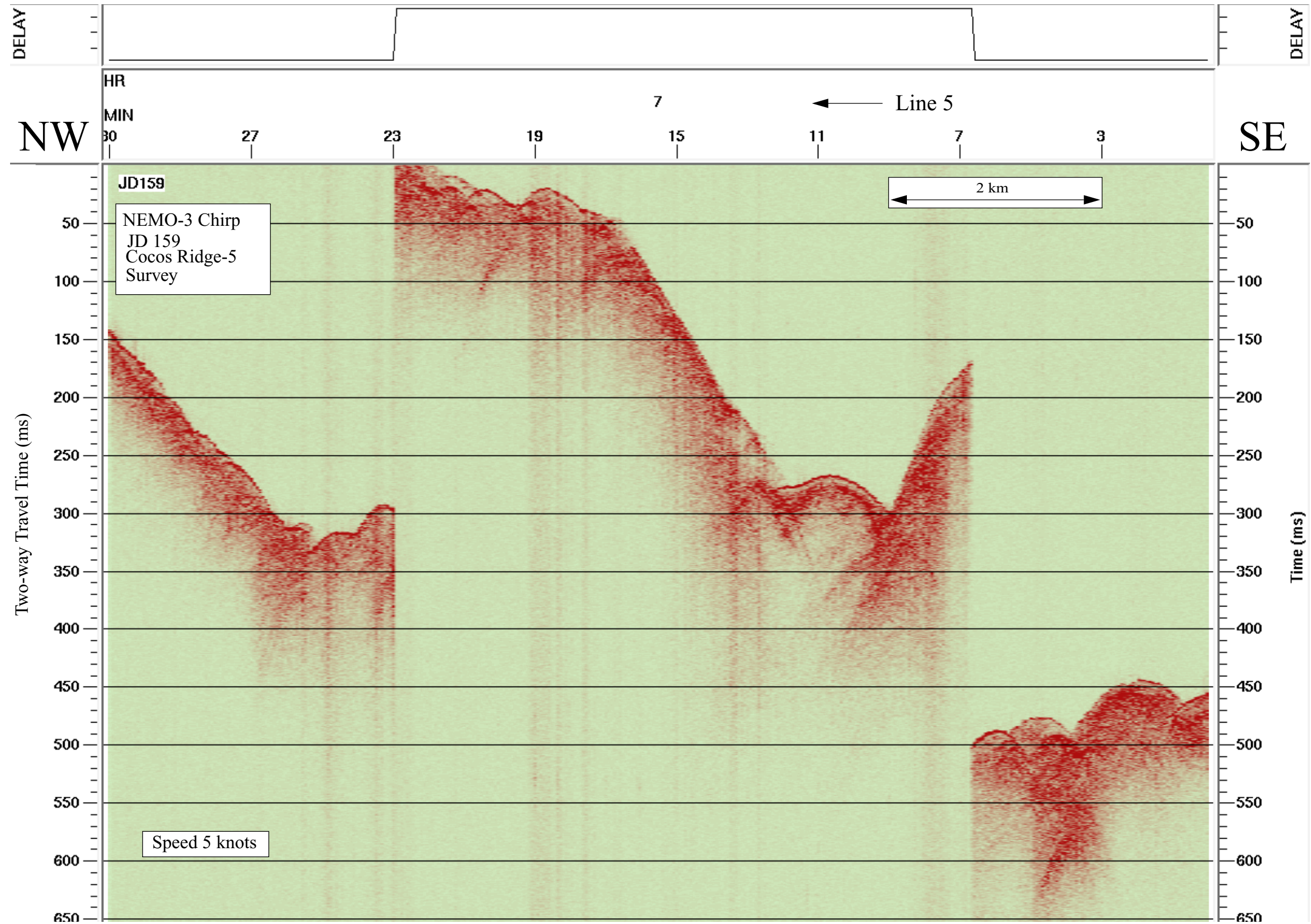


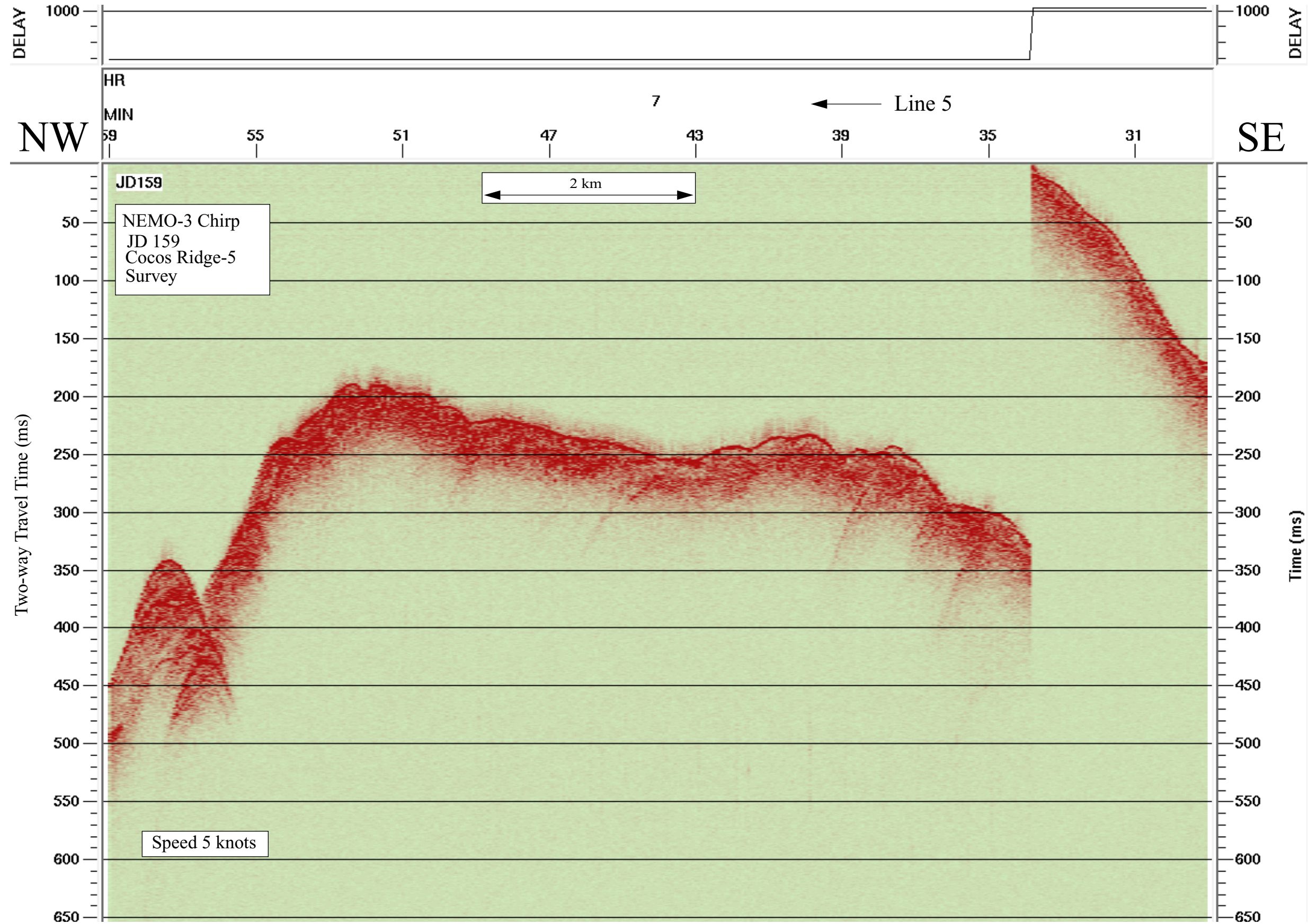
Data File SBfixavg.2000jun07.0600-1200

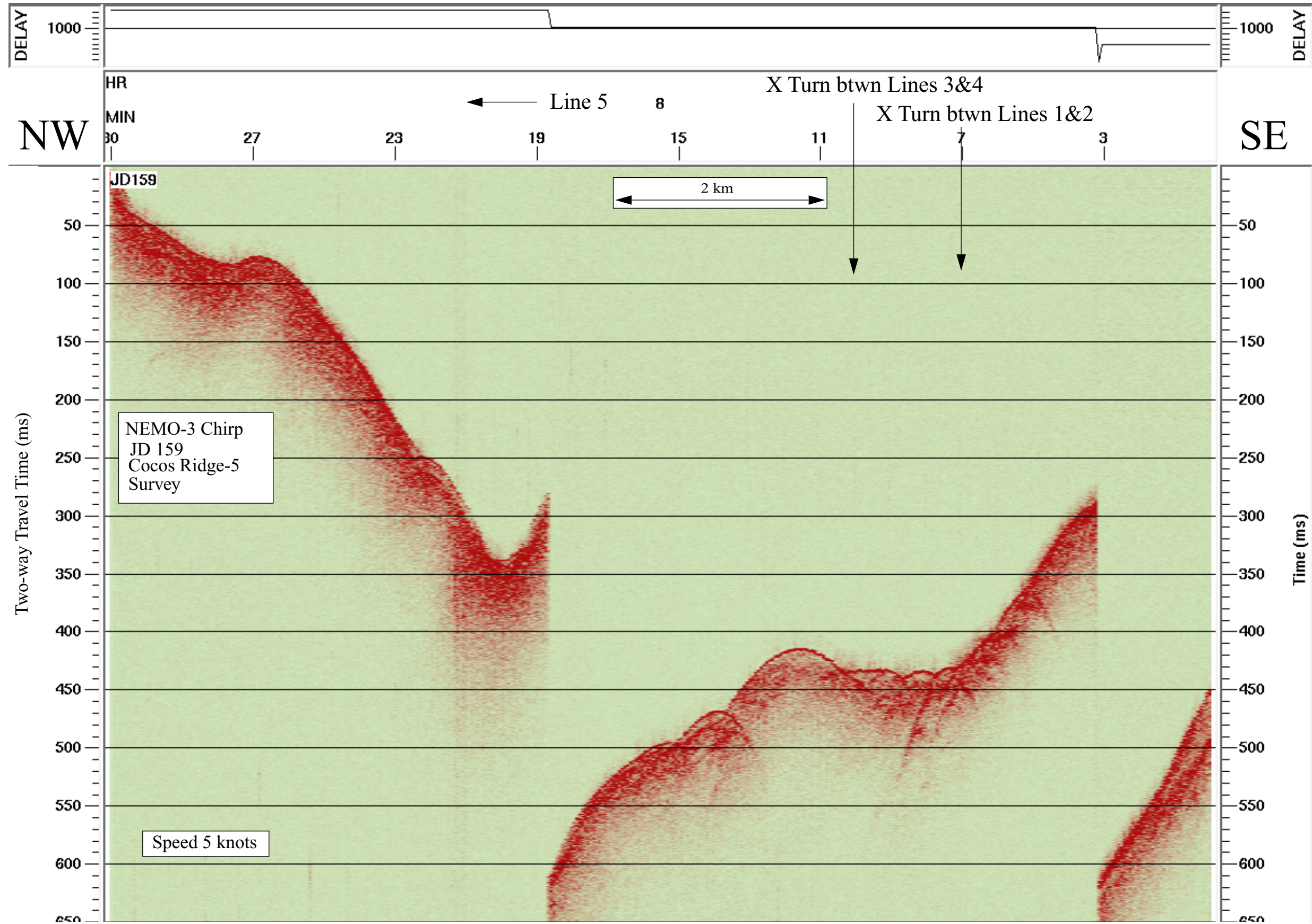


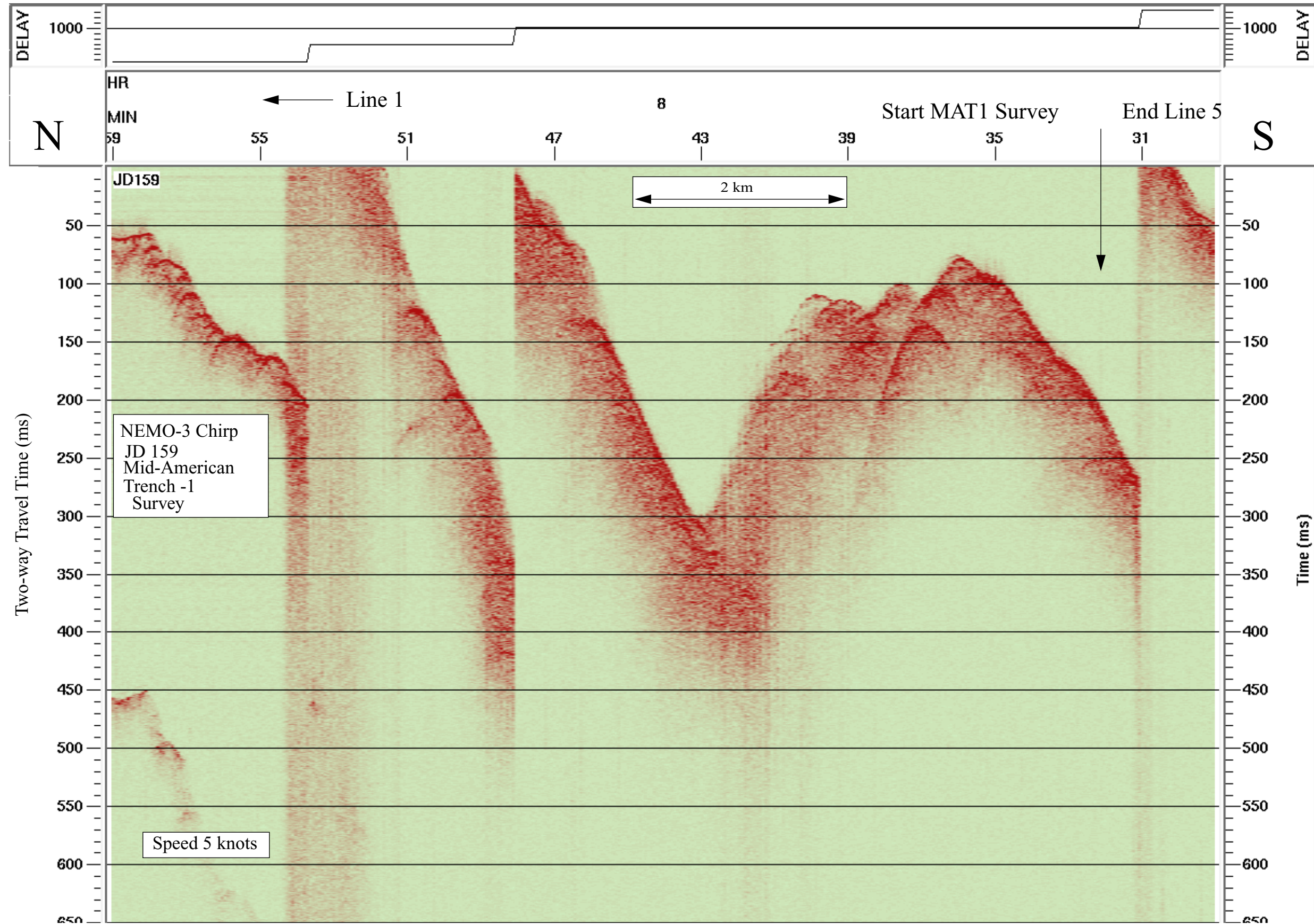


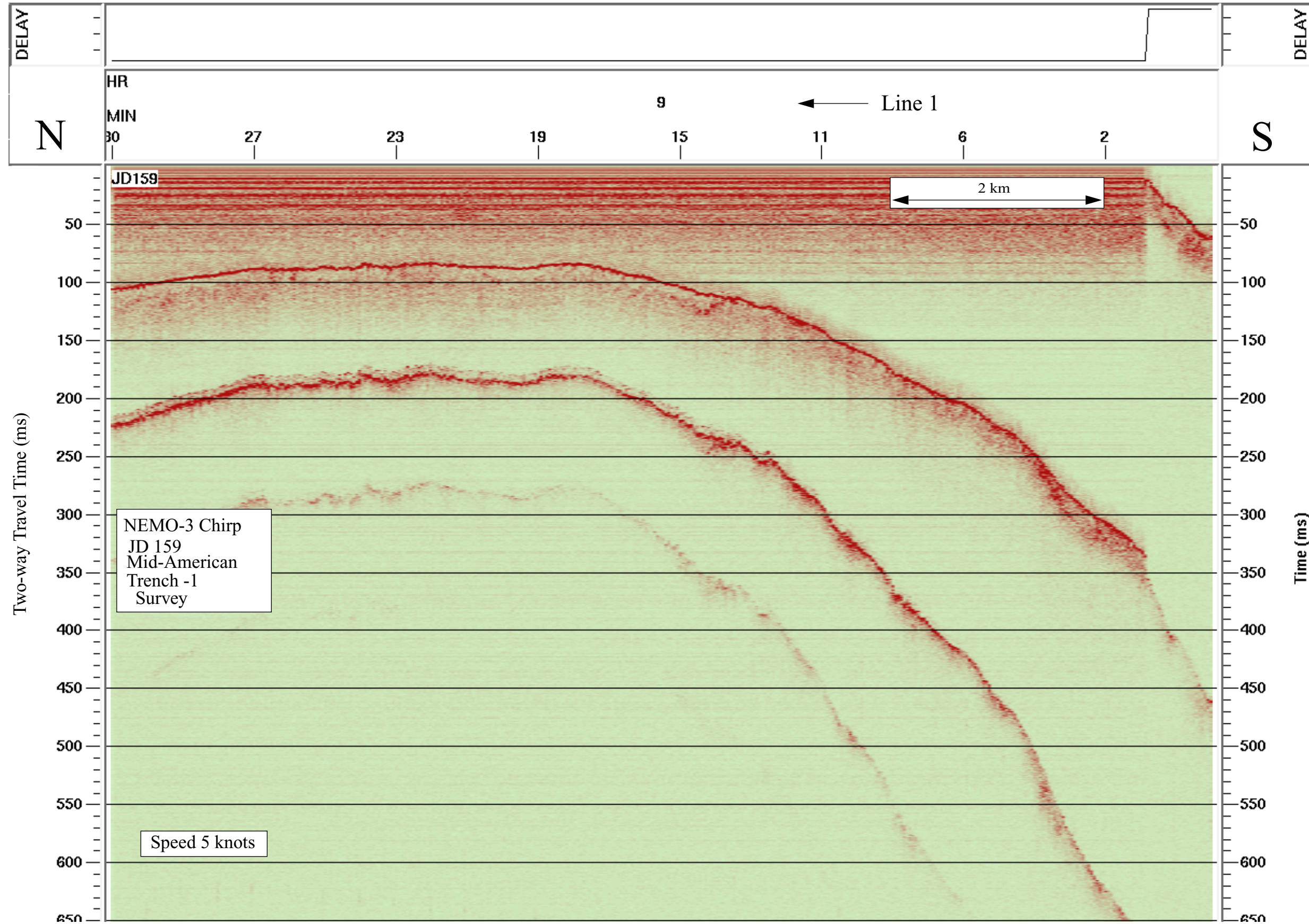


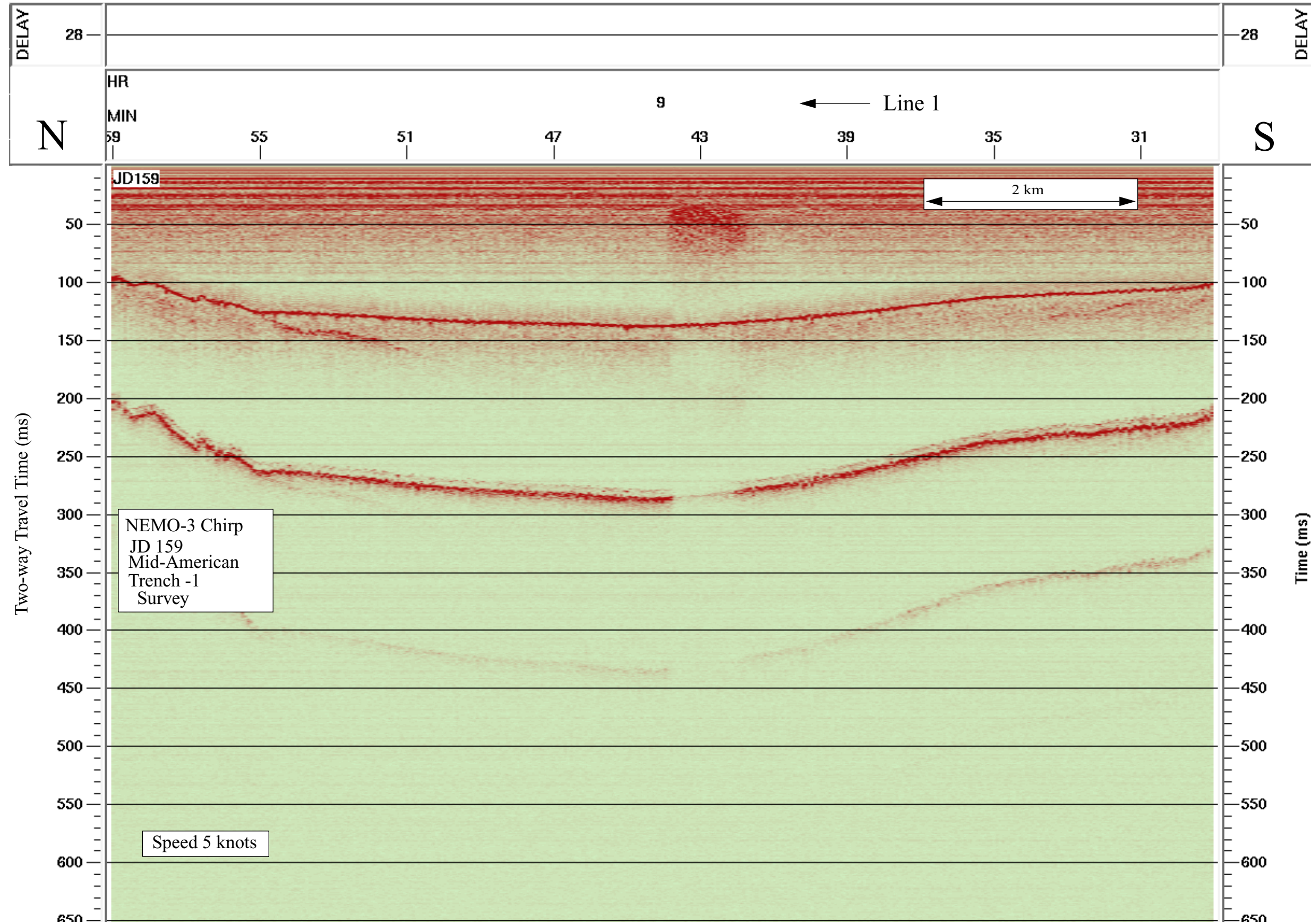


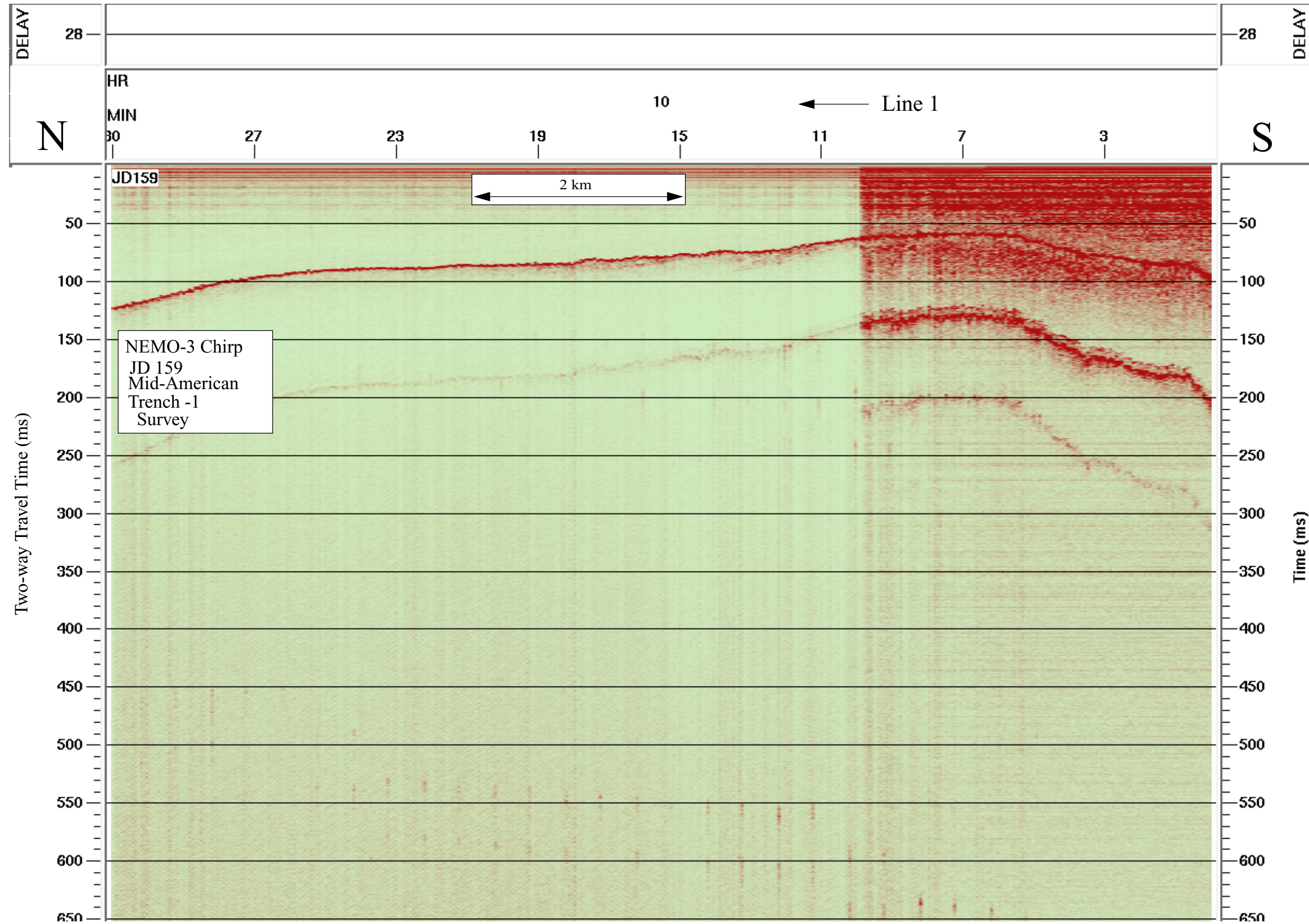


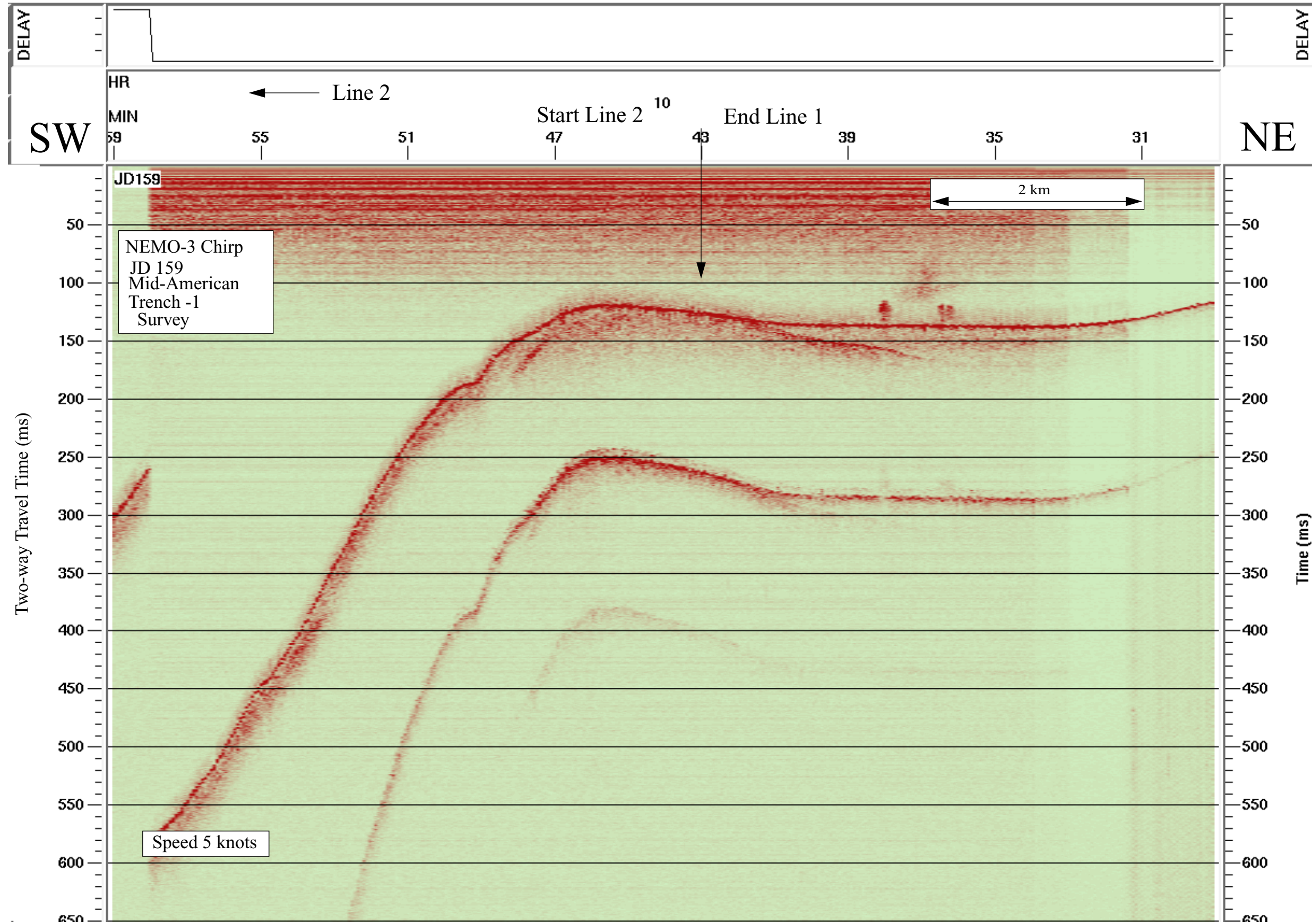


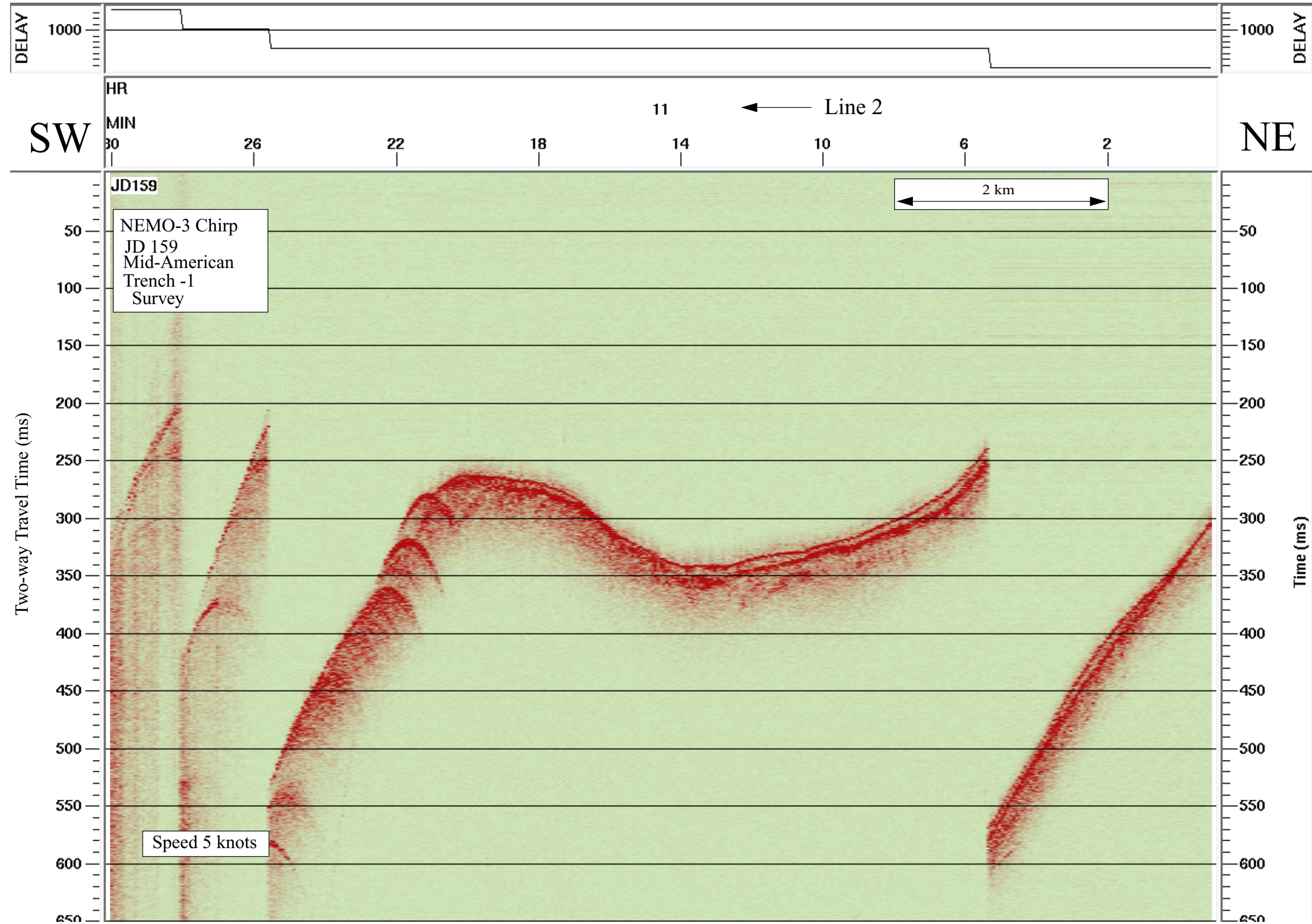


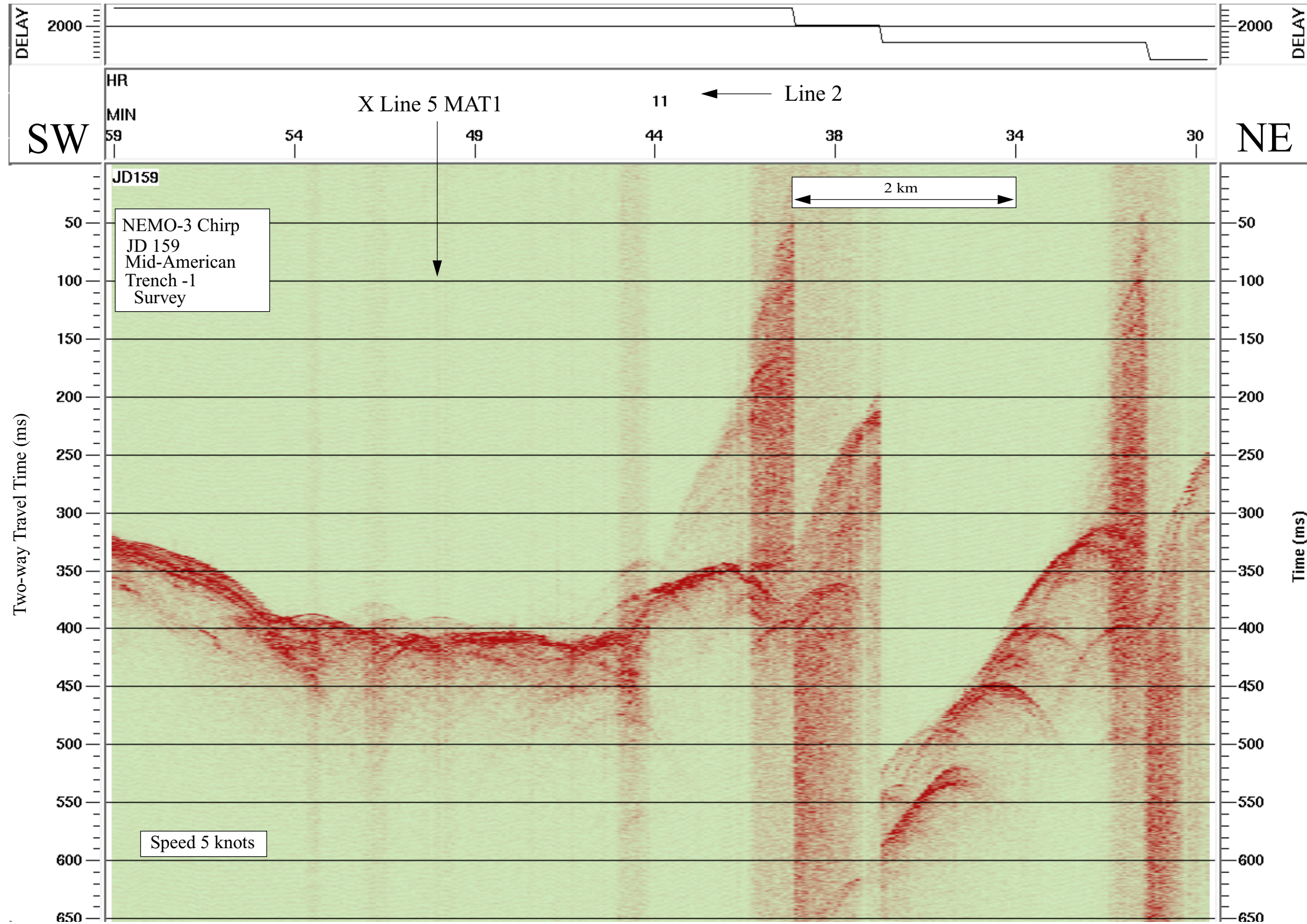




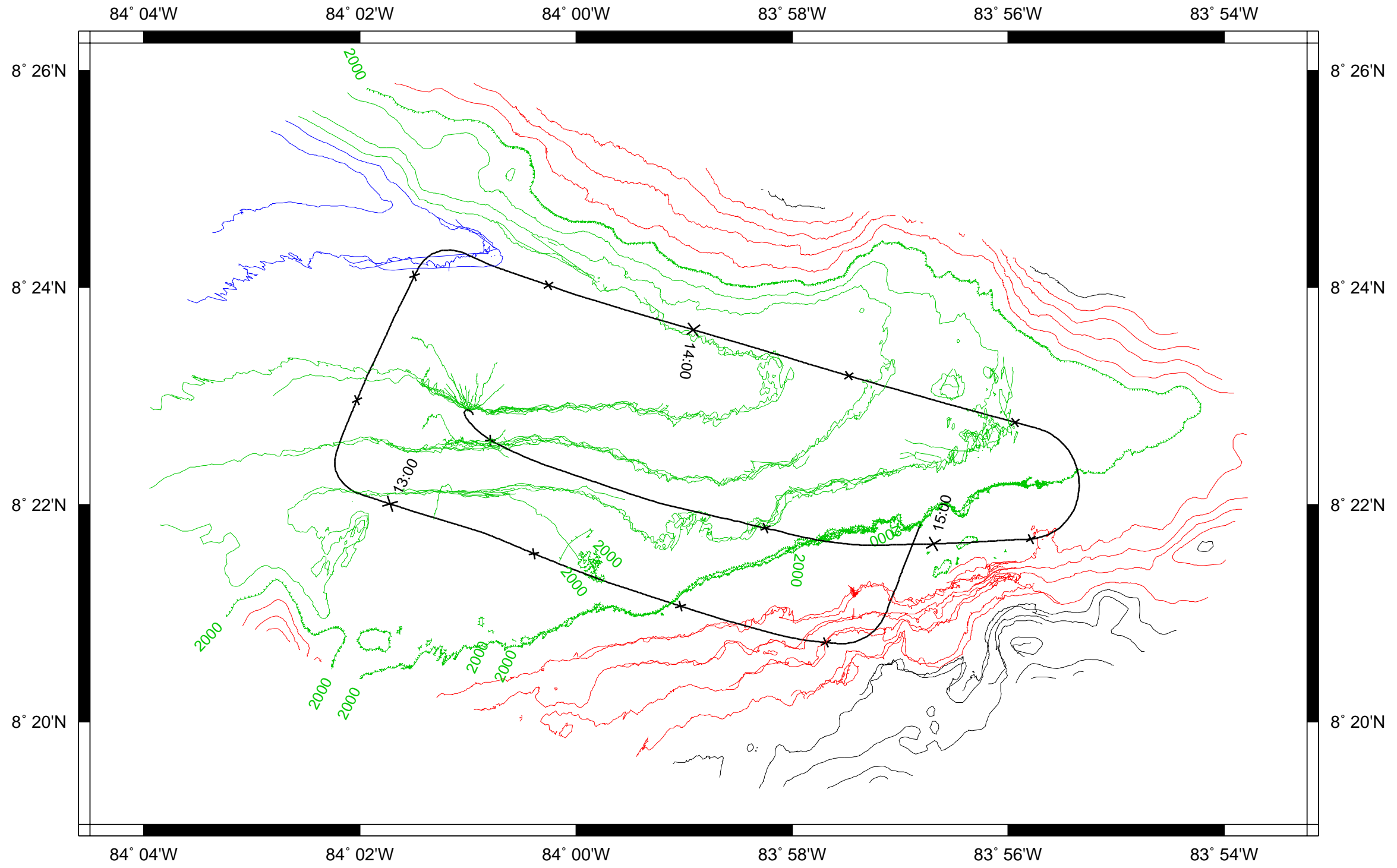


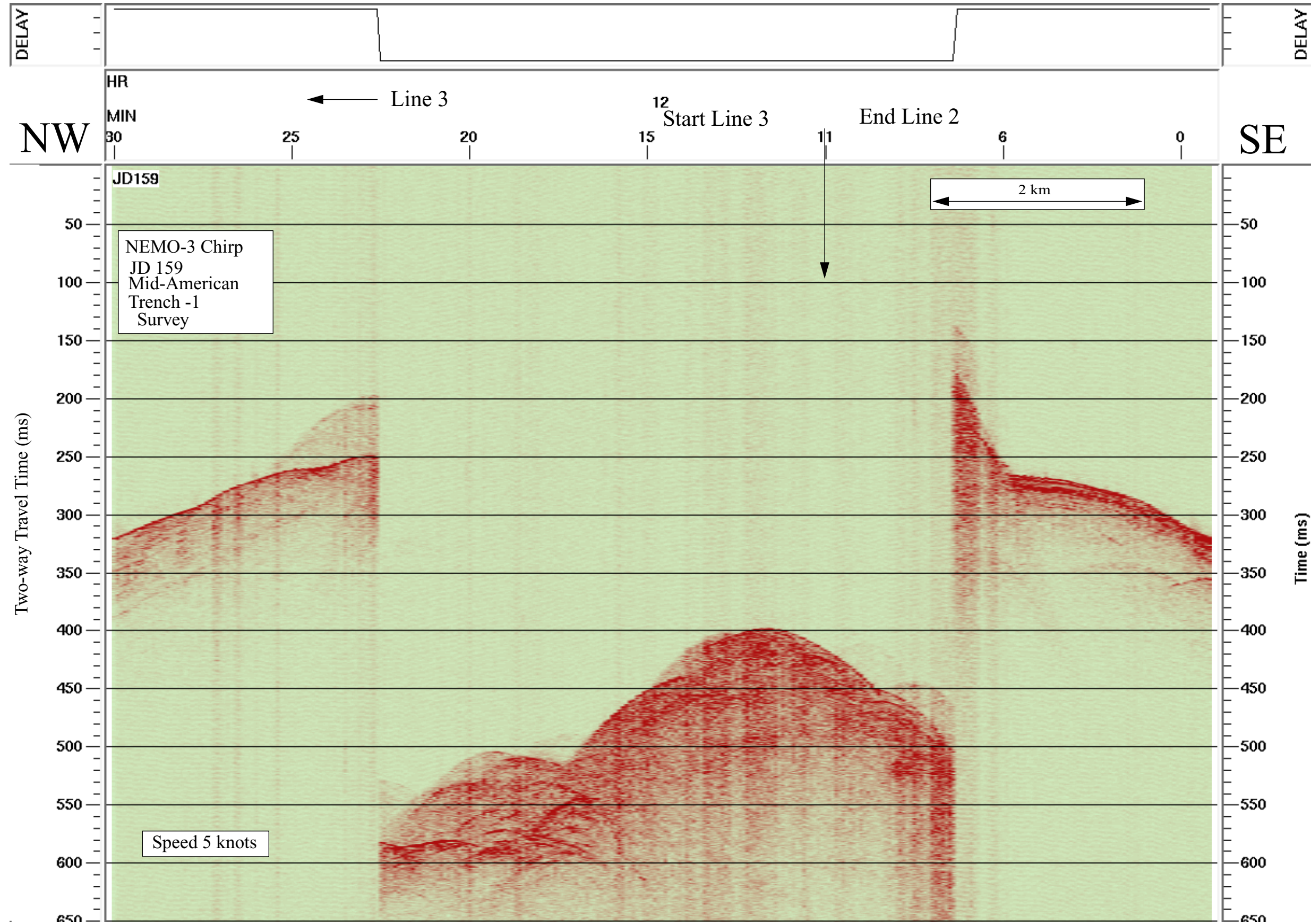


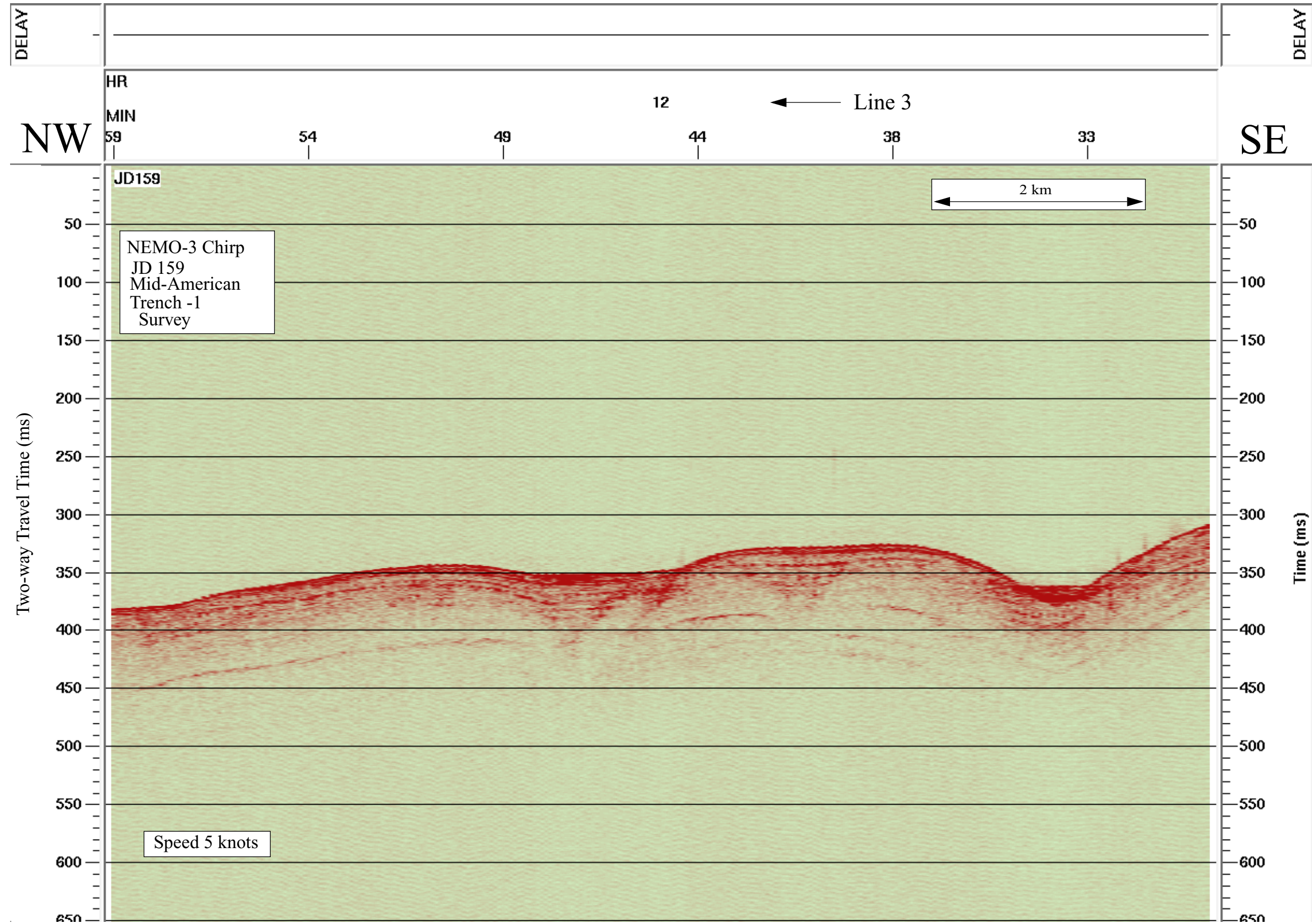


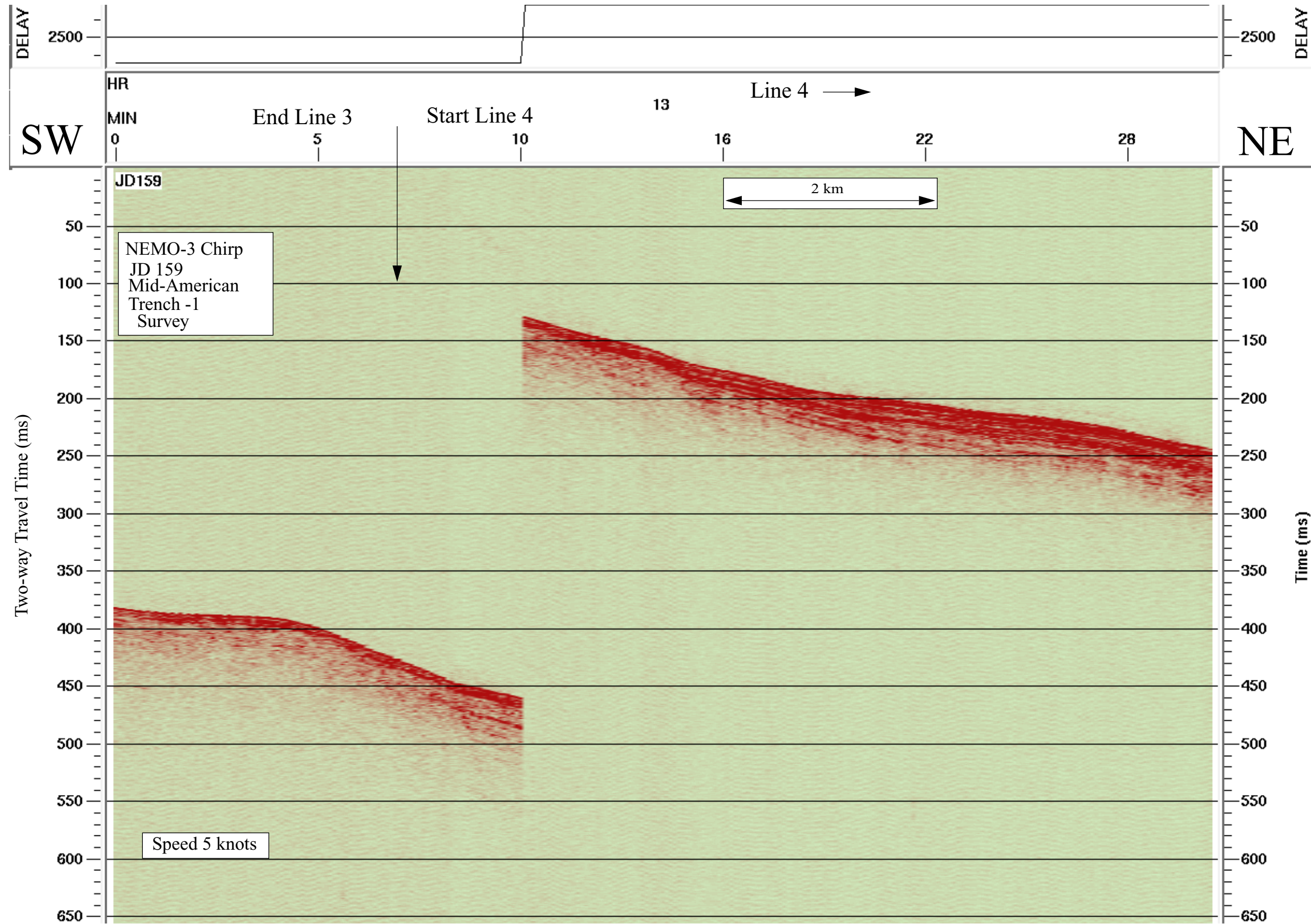


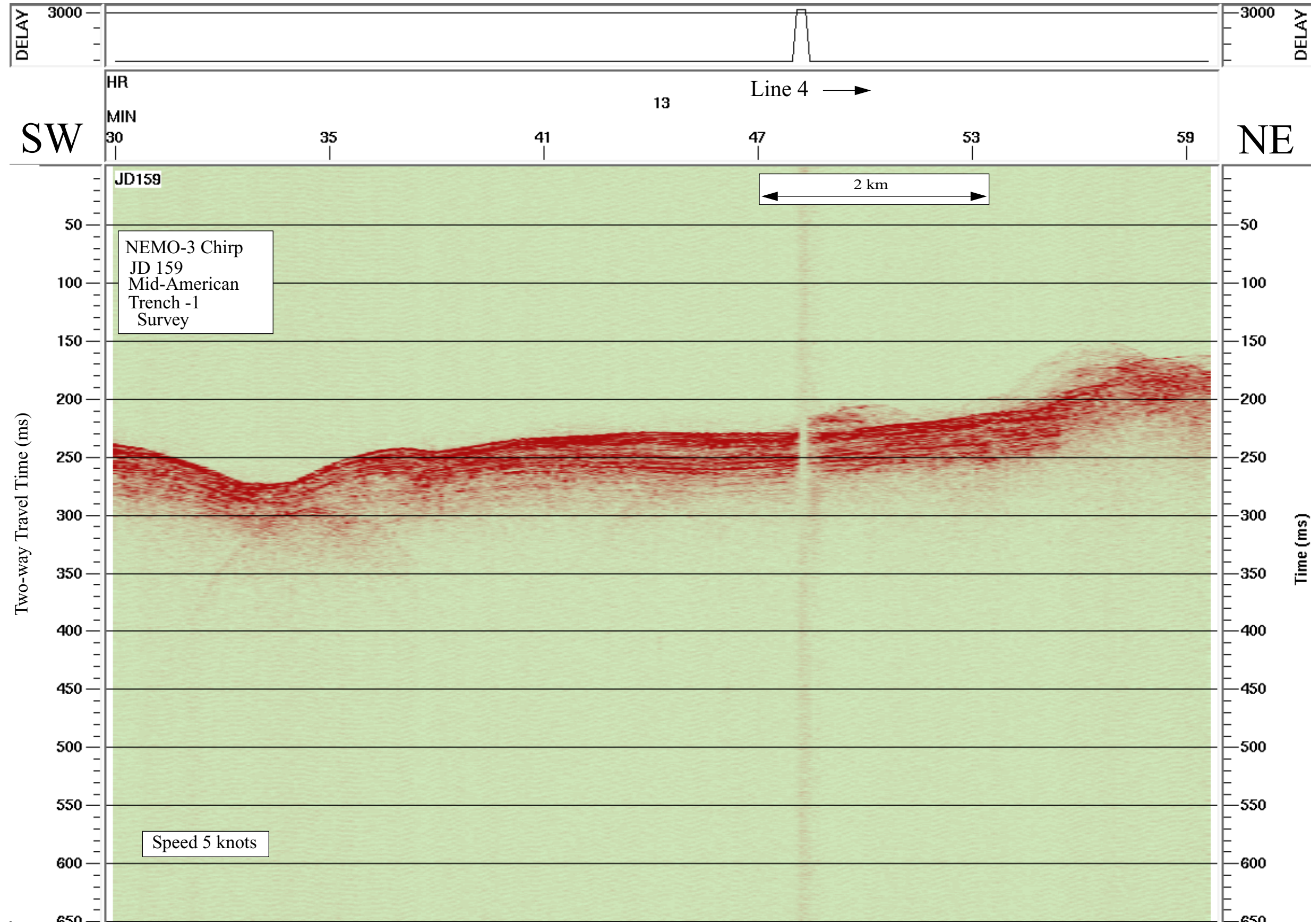
Data File SBfixavg.2000jun07.1200-1800

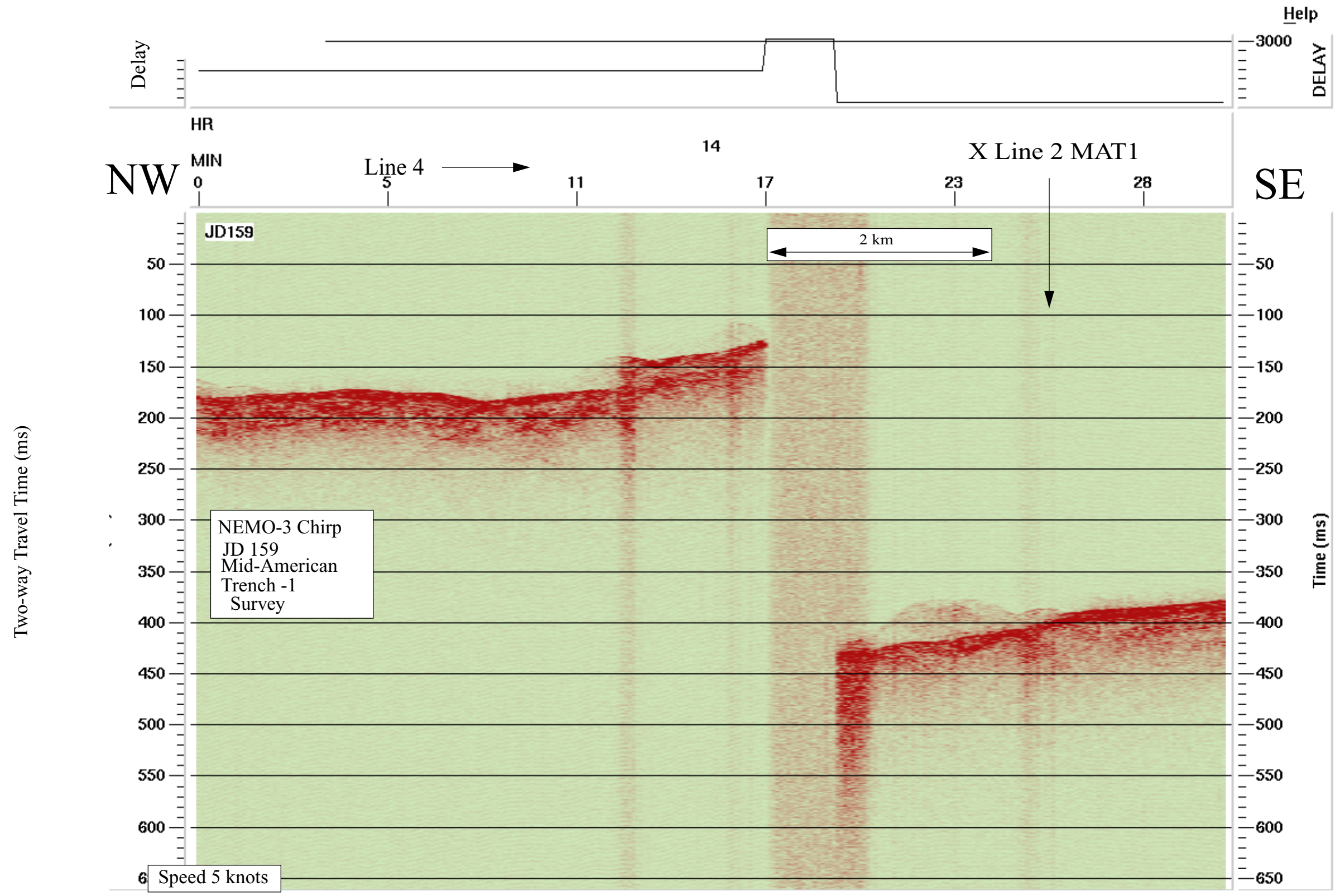


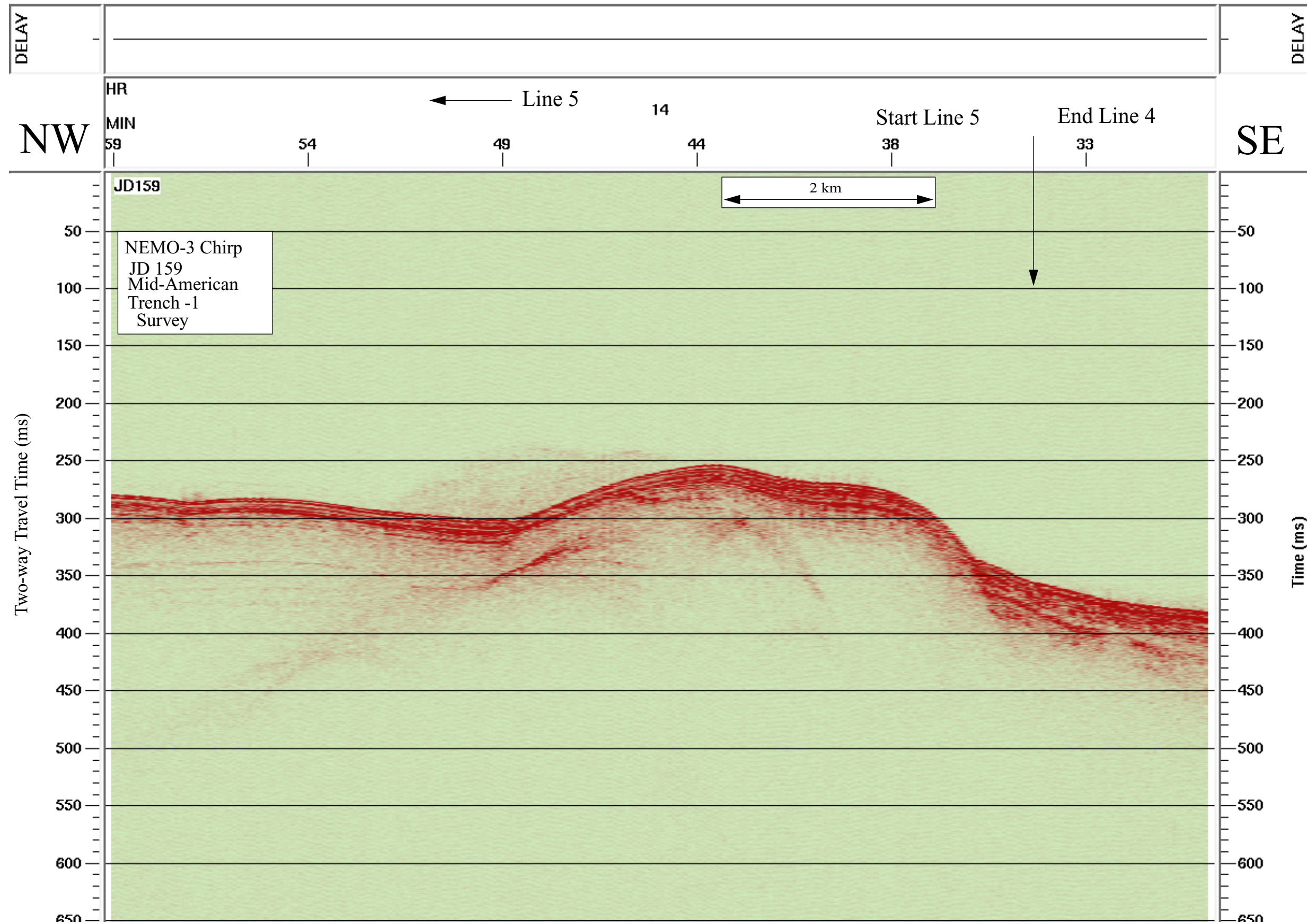


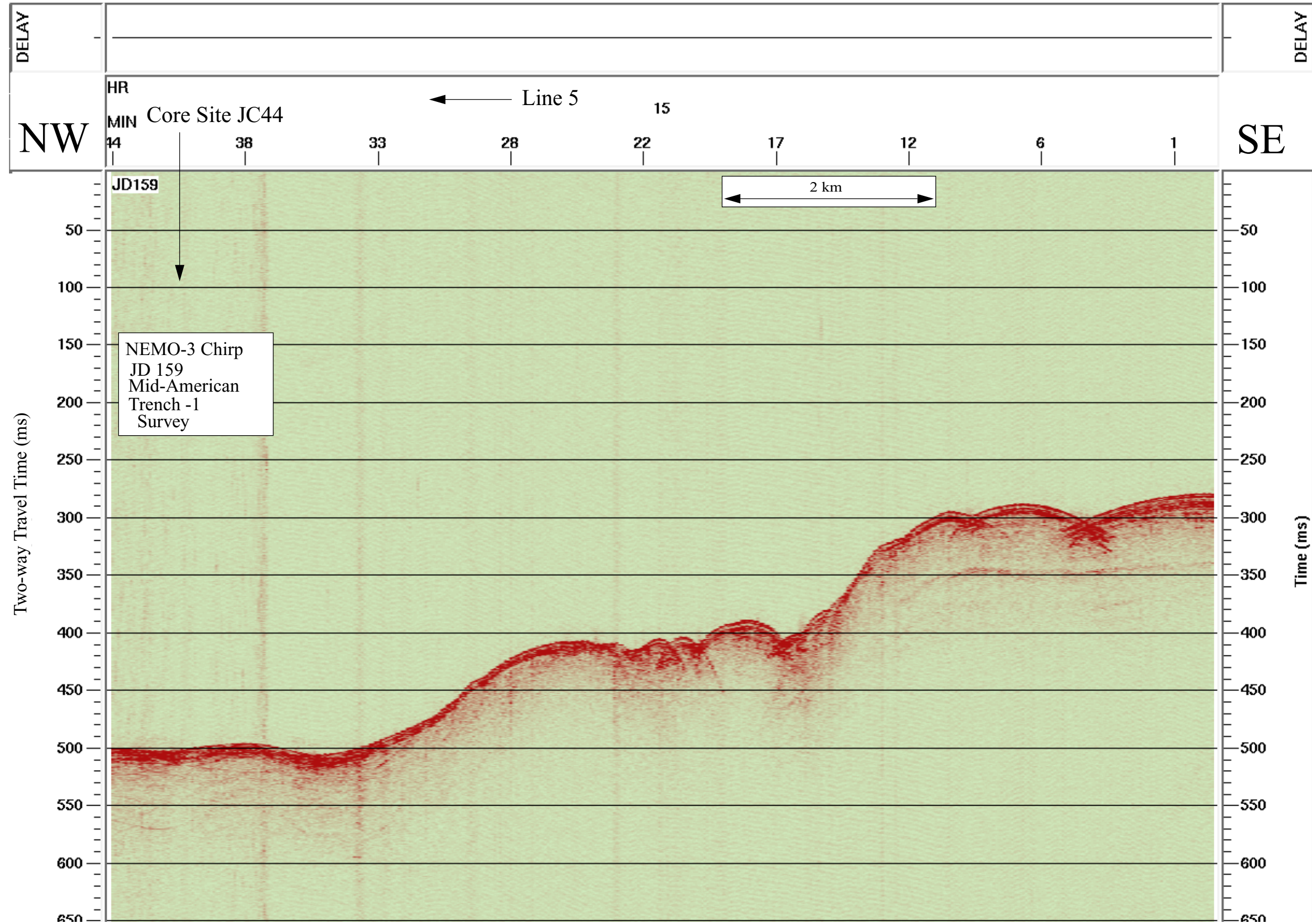












Data File SBfixavg.2000jun07.1800-2400

