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GEOLOGICAL SURVEY OF CANADA
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B.J. Todd, C.F.M. Lewis, and G.D. Hobson

2023

Canada

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Permanent link: https://doi.org/10.4095/331498

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Recommended citation

Todd B.J., Lewis, C.F.M., and Hobson, G.D., 2023. Resurrection of 1967 single-channel seismic reflection data and isopach map of sediments in central and eastern Lake Erie, Ontario, Canada, and Ohio, Pennsylvania, and New York, U.S.A.; Geological Survey of Canada, Open File 8947, 1 .zip file. https://doi.org/10.4095/331498

Publications in this series have not been edited; they are released as submitted by the author.

ISSN 2816-7155
ISBN 978-0-660-47747-3
Catalogue No. M183-2/8947E-PDF

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Introduction

In the Laurentian Great Lakes, the seismostratigraphy revealed by legacy seismic reflection profiles (i.e., analogue paper records) provides insight to the history of glaciation and deglaciation, sediment deposition and lake level history. Digital recovery and analysis of Great Lakes legacy seismic data is a cost-effective method to generate the offshore broad scale surfaces pertinent to the surficial framework geology layer required as input by three-dimensional stratigraphic studies (Todd and McNamara, 2018; Todd and Lewis, 2020, Todd *et al*., 2020). This Open File describes the digital recovery of 1566 km of recently discovered single channel seismic reflection data collected in central and eastern Lake Erie in the summer of 1967 (Fig. 1). The digital outputs are stored on-line in the Geological Survey of Canada–Atlantic (GSCA).

We include George D. Hobson (1923–2015) as a coauthor of this Open File report. After a decade in the western Canadian oil industry, in 1958 Hobson joined the federal Department of Mines and Technical Surveys in Ottawa. (This department was renamed Energy Mines and Resources (EMR) in 1966 and Natural Resources Canada in 1994). We know that Hobson conducted marine seismic investigations in the Gulf of St. Lawrence during October of 1967 (Hobson, 1968), the month following the collection of the Lake Erie seismic data presented in this report. Frustratingly, no names of survey personnel appear on the field notes (Table 1) or on the derived map (Fig. 5). However, the Inland Waters Branch (IWB) of EMR is identified on these records. The IWB was, and continues to be, based in Burlington, Ontario.

We also know that one year later, in September of 1968, Hobson conducted a "reconnaissance" marine seismic program in western Lake Erie (Hobson, 1969; Hobson *et al*., 1969). The whereabouts of these 1968 western Lake Erie data are unknown and they are presumed lost. The 1968 survey grid was 4.8 km by 4.8 km. This pattern would have produced a remarkable number of line-kilometres of data. For comparison, the roughly 14.8 km grid of the central and eastern Lake Erie seismic survey resulted in 1566 line-kilometres of information.

Therefore, based on the published evidence of Hobson's activities in 1967 and 1968, we infer that Hobson was the geoscientist responsible for the collection and analysis of the 1967 central and eastern Lake Erie seismic reflection data reported here. It is curious that the substantial July and September 1967 marine seismic program in Lake Erie was not published. This Open File goes some way to redressing the reporting gap of 56 years.

Survey parameters

Table 1 presents the field notes compiled from the paper seismic records of the 24 lines surveyed in Lake Erie (Fig. 1). The survey parameters are gleaned from this evidence. Based on

the seismic survey carried out in 1968 in western Lake Erie (Hobson *et al*., 1969), we can surmise that some of the equipment used in 1967 consisted of an EG&G recorder model 254, capacitor bank model 231, and a power supply model 232. The 1967 seismic survey was carried out using a boomer energy source of unknown frequency, but we estimate the frequency to be approximately 0.5–1.5 kHz, typical of these sources. The boomer was towed an unknown distance behind the survey vessel at a depth of 1.8 m. Sound reflections from the lakebed and subsurface were recorded by a hydrophone, or hydrophone array, of unknown manufacture towed 30.5 m behind the boomer at a depth of 0.9 m. The boomer–hydrophone combination provided depth penetration up to approximately 100 m through unconsolidated glacial and post-glacial sediment beneath the lake floor. Underlying these sediments, glacial till or bedrock forms the acoustic basement.

Ship speed during the July 1967 portion of the survey was 6.5 km/hr apart from the first day when the speed was 7.4 km/hr. During the September portion of the survey, ship speed was 11.1 km/hr. The September records vary in recording length within individual lines and required digital processing to compensate for recording length changes. The data were recorded on a wet paper recorder of unknown manufacture; these were the physical records discovered in 2022. The total length of all paper seismic records is 201 m.

Fortunately, a paper map of Lake Erie was also discovered showing the 24 survey lines and waypoints. Without this map, the paper seismic records would have been unusable. The map was rectified in a geographical information system and 398 waypoints were digitized (Table 2). The usefulness of legacy seismic data are completely dependent on navigation data. When the associated navigation is unavailable or lost, legacy seismic data are frustratingly worthless.

The 1968 western Lake Erie survey used dead reckoning and two sextants sighted simultaneously on prominent landmarks (Hobson *et al*., 1969). The positioning error on the 1968 survey was estimated as less than 400 m. For the 1967 Lake Erie survey, dead reckoning and sextant sightings also may have been the survey protocol. However, western Lake Erie is a relatively enclosed basin and the majority of the 1968 transects were oriented north–south from shore to shore such that the start and end of survey lines could be well established. In contrast, central and eastern Lake Erie are more open, and many of the 1967 survey lines are west–east and out of sight of any landmarks. Without knowing the specific navigational details of the 1967 Lake Erie survey, it is challenging to estimate an accuracy. However, based on the correspondence of the seismic lake floor profiles and the NOAA lake floor profiles (Figs. 2a–x, 4 a–x), and the seismostratigraphic correspondence at the intersections (ties) of the seismic lines, we estimate the navigational accuracy as approximately 2000 m or better.

Data processing

During the 1967 Lake Erie survey, the seismic data were recorded using Eastern Daylight Time (EDT), which is Coordinated Universal Time (UTC) minus four hours. All processing has been undertaken in UTC.

The following description outlines the steps used in processing from analogue paper records of seismic data to digital images that can be interpreted, placed in the seismic data archive (SDA; discussed below), located on a GIS, and shared on the worldwide web. All the software is available for free download at:

http://ftp.maps.canada.ca/pub/nrcan_rncan/raster/marine_geoscience/Seismic_Reflection_Scanned/tools

This software is the intellectual property of the Government of Canada. All rights to modify and distribute this software are retained by the Government of Canada.

Step 1
The paper records were in delicate physical condition with many tears in the paper and required the application of acid-free archival tape to enable them to be handled safely. The records were scanned in both colour and greyscale (files available on the SDA) at 300 dots per inch in JPEG 2000 format, an image compression standard and coding system developed from 1997 to 2000 by the Joint Photographic Experts Group. The greyscale scans were used as input into the seismic data processing software.

Step 2
Program RegJP2000 was used to register the scanned seismic sections in JP2 format and project them into SEGY format for subsequent processing (Courtney, 2012). Horizontal and vertical scales were applied. Changes in recording length were accounted for.

Step 3
Program SegyJP2 was used to convert from SEGY format to JP2 format. This program calculates the half wave rectified seismic profiles illustrated in Figure 2.

Step 4
Program JP2Viewer was used to view and manipulate the output files from step 3. This powerful software enables the insertion of navigation data into the JP2 file structure. As well, the program offers many options for interpretation of seismostratigraphy and addition of notes on the record.

Results

Processed seismic profiles

Seismic profiles for lines 1 to 24 are shown in Figure 2a–x. The static images are used only to provide a synoptic view of the entire line. A much more detailed view and a deeper seismostratigraphic appreciation of the seismic data can be experienced by downloading and employing program JP2Viewer with the JP2 files of the 24 seismic profiles associated with this Open File report. (Note that viewing the JP2 files with freeware like IrfanView (www.irfanview.com) allows the viewer to inspect the *unadulterated original* scans of the seismic profiles).

The 24 profiles have standard axes. The x-axis is distance along the lines in kilometres. The left y-axis is two-way reflection time (TWT) in milliseconds as recorded by the seismic survey system. The left y-axis is "fixed". The right y-axis is depth below lake level in metres. This depth values on this y-axis should be considered "flexible". For example, it is standard illustrative practice to show depth values based on the velocity of sound in seawater of approximately 1500 m/s, as done in Figure 2a–x. However, the speed of sound in freshwater is approximately 1400 m/s (at 0°C) to 1480 m/s (at 20°C). Thus, if this more realistic freshwater sound velocity were to be applied, the depth values on the right y-axis would be shifted down slightly. For example, 100 ms TWT at 1500 m/s is 75 m depth, whereas 100 ms TWT at 1400 m/s is 70 m depth. A further consideration is that the sediments beneath the lake floor have velocities on the order of 1700–1800 m/s and bedrock has velocities of greater than 2000 m/s. Thus the depth values on the right y-axis should be computed separately for the water column, the sediments, and the bedrock *all along the seismic profile*. Such sophisticated "velocity profiles" are beyond the scope of the program JP2Viewer and we adhere to standard illustrative practice of a velocity of 1500 m/s.

The processed seismic data in this Open File should be viewed as the necessary basic step to enable a modern and thorough seismostratigraphic analysis of central and eastern Lake Erie. For example, the seismostratigraphic interpretation of north–south oriented line 10 in eastern Lake Erie (Fig. 3) illustrates a bedrock basin filled with conformably draped laminated glacial and post-glacial sediment. At its maximum, the sediment thickness is 115 ms two-way-time. Using a low, and likely unrealistic, sound velocity value of 1500 m/s, the sediment thickness computes to 86 m. Using a more realistic velocity of 1700 m/s, the sediment thickness is 98 m.

Bathymetric profiles

Bathymetric profiles along the 24 seismic profiles (Fig. 4a–x) have been extracted from

the bathymetric compilation of Lake Erie issued by the National Oceanic and Atmospheric Administration (Holcombe *et al*., 2005; NOAA, 1999). These data also provide the background bathymetric image in Figure 1. The Lake Erie water level datum is 173.5 m above sea level.

The bathymetric profiles can be used to vertically shift the 1967 seismic reflection profiles. With a vertical shift, the seismic reflection profiles can be "tied" to the Lake Erie water datum.

Sediment isopach map

The isopach map of glacial and postglacial sediment in central and eastern Lake Erie is provided in Figure 5. The original paper map discovered in 2022 was scanned and digitized in CorelDraw version 20. This map is not a geographic information systems (GIS) product.

The thickest sediments, reaching over 100 m in places, lie in a west–east oriented trough aligned with the centre of Lake Erie. Faults have been inferred.

Seismic Data Archive (SDA)

In the future, the data presented here–both processed seismic data and navigation data–will be available for download from the Seismic Data Archive (SDA):

http://ftp.maps.canada.ca/pub/nrcan_rncan/raster/marine_geoscience/Seismic_Reflection_Scanned/

If an interested reader cannot locate the 1967 Lake Erie data on the SDA, please contact the Director of the Geological Survey of Canada–Atlantic at 902-426-2730.

Acknowledgements

Dr. Robert C. Courtney (Geological Survey of Canada–Atlantic) wrote the seismic data processing software. This manuscript was reviewed by Dr. Vladimir Kostylev (GSCA).

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Table 1: 1967 Lake Erie field notes

Line	Day of Year	Date	Waypoints	Survey Direction	Sound Source Depth (m)	Hydrophone Depth (m)	Source–Receiver Distance (m)	Ship Speed (km/hr)	Amplifi-cation	Power (W) (J/s)	Sweeps Per Key	Print Sweep	Time Between Horizontal Marks (ms)	5 Minute Mark	Helix Sweep Speed (ms, m)	Remarks
1	206–207	25 July 1967	1–21	E to W	1.8	0.9		7.4	variable	500	6	First	10	On	250, 182.9	Wind speed 29 km/hr
2	207–208	26 July 1967	22–54	W to E	1.8	0.9		6.5	variable	500	6	First	10	On	250, 182.9	
3	208	26 July 1967	55–93	E to W	1.8	0.9		6.5	variable	500	6	First	10	On	250, 182.9	
4	209	27–28 July 1967	94–120	W to E	1.8	0.9		6.5	variable	500	6	First	10	On	250, 182.9	
5	209	28 July 1967	121–128	S to N	1.8	0.9		6.5	variable	500	6	First	10	On	250, 182.9	
6	209–210	28 July 1967	129–140	N to S	1.8	0.9		6.5	variable	500	6	First	10	On	250, 182.9	
7	210	28 July 1967	141–156	S to N	1.8	0.9		6.5	variable	500	6	First	10	On	250, 182.9	
8	210	29 July 1967	157–174	E to W	1.8	0.9		6.5	variable	500	6	First	10	On	250, 182.9	
9	210–211	29 July 1967	175–192	N to S	1.8	0.9		6.5	variable	500	6	First	10	On	250, 182.9	
10	211	30 July 1967	193–204	S to N	1.8	0.9		6.5	variable	500	6	First	10	On	250, 182.9	
11	248–249	5 September 1967	205–223	E to W	1.8	0.9	30.5	9.3	variable	400	3	1	10	On	250, 182.9	High-resolution boomer, hydrophone array astern, Filter: 200 - 3?, 400 – 2?
12	249	6 September 1967	224–241	W to E	1.8	0.9	30.5	11.1	variable	400	4	1	10	On	250, 182.9	Filter: 400 Hz–2 kHz ?
13	249–250	6 September 1967	242–260	E to W	?	?	30.5	11.1	variable	400	4	1	10	On	370 rpm, 100 m/s	Filter: 400 Hz–2 kHz ?
14	250	7 September 1967	261–276	S to N	?	?	30.5	11.1	variable	400	4	1	10	On	370 rpm, 160 ms	Filter: 400 Hz–2 kHz
15	250	7 September 1967	277–291	N to S	?	?	30.5	11.1	variable	400	4	1	10	On	370 rpm	
16	250–251	7 September 1967	292–305	S to N	?	?	30.5	11.1	variable	400	4	1	10	On	370 & 300 rpm	200–3 ? filter setting
17	251	8 September 1967	306–317	N to S	?	?	30.5	11.1	variable	400	4	1	10	On	370 rpm & 250 ms	Filter 200? – 3?, 400 – 3?
18	251	8 September 1967	318–326	S to N	?	?	30.5	11.1	?	400	3	1	10	On	270 rpm & 300	Sound source: HR boomer
19	251	8 September 1967	327–342	E to W	?	?	30.5	11.1	?	400	4	1	10	On	370 rpm	
20	252	9 September 1967	343–353	W to E	?	?	30.5	11.1	?	400	3	1	10	On	300 rpm	Survey date incorrect on field notes, filter: 300? – 3?
21	252	9 September 1967	354–362	E to W	?	?	30.5	11.1	?	400	3	1	10	On	300–370 rpm	Filter: 400 –2?
22	252	9 September 1967	363–380	N to S	?	?	30.5	11.1	?	400	4	1	10	On	370 rpm	Survey date incorrect on field notes
23	253	10 September 1967	381–390	S to N	?	?	30.5	11.1	?	400	3	1	10	On	250 ms, 100 feet	
24	253	10 September 1967	391–398	S to N	?	?	30.5	11.1	?	400	3	1	10	On	250 ms	

Table 2: 1967 Lake Erie navigation data.

Year	Day of Year	Hour	Minute	Second	Latitude	Longitude	Fix	Line	Comment
1967	206	20	0	0	42.83323562	-79.28445547	1		25 July 1967; 1600 hours EDT
1967	206	20	30	0	42.82523572	-79.31832495	2		
1967	206	21	0	0	42.81070458	-79.34859342	3		
1967	206	21	30	0	42.79725246	-79.3773135	4		
1967	206	22	0	0	42.77911416	-79.41517445	5		
1967	206	22	30	0	42.76112737	-79.45150431	6		
1967	206	23	0	0	42.74746382	-79.48018415	7		
1967	206	23	30	0	42.72549734	-79.52484465	8		
1967	207	0	0	0	42.71336919	-79.57426064	9		
1967	207	0	30	0	42.6962727	-79.61198949	10		
1967	207	1	0	0	42.67687189	-79.6434847	11	1	
1967	207	1	30	0	42.66636623	-79.69380687	12		
1967	207	2	0	0	42.6482283	-79.74126094	13		
1967	207	2	30	0	42.62555288	-79.79853729	14		
1967	207	3	0	0	42.60988472	-79.83862715	15		
1967	207	3	30	0	42.59329776	-79.88071477	16		
1967	207	4	0	0	42.57771506	-79.93301746	17		
1967	207	4	30	0	42.55050641	-79.96948201	18		
1967	207	5	0	0	42.53076712	-80.01604331	19		
1967	207	5	30	0	42.50681247	-80.0693837	20		
1967	207	6	0	0	42.48738607	-80.11387854	21		
1967	207	9	49	0	42.4153077	-80.04653936	22		26 July 1967; 0549 EDT
1967	207	10	30	0	42.43556723	-79.99457552	23	2	
1967	207	11	0	0	42.45073077	-79.95389628	24		

Year	Day of Year	Hour	Minute	Second	Latitude	Longitude	Fix	Line	Comment
1967	207	11	30	0	42.4649094	-79.92794468	25		
1967	207	12	0	0	42.47399332	-79.89183263	26		
1967	207	12	30	0	42.50058964	-79.87062904	27		
1967	207	13	0	0	42.50716383	-79.84402839	28		
1967	207	13	30	0	42.51465842	-79.81765467	29		
1967	207	14	0	0	42.53050188	-79.7601229	30		
1967	207	14	30	0	42.53921516	-79.7287055	31		
1967	207	15	0	0	42.54559943	-79.70457737	32		
1967	207	15	30	0	42.56431702	-79.6764335	33		
1967	207	16	0	0	42.58356409	-79.64676041	34		
1967	207	16	30	0	42.6009944	-79.62036179	35		
1967	207	17	0	0	42.61151947	-79.58909874	36		
1967	207	17	30	0	42.62293771	-79.55605247	37		
1967	207	18	0	0	42.63395893	-79.53602102	38		
1967	207	18	30	0	42.65184532	-79.50405001	39		
1967	207	19	0	0	42.65597036	-79.48041116	40		
1967	207	19	30	0	42.6709012	-79.44973875	41		
1967	207	20	0	0	42.68547128	-79.42031344	42		
1967	207	20	30	0	42.70181782	-79.38631746	43		
1967	207	21	0	0	42.71601228	-79.35762445	44		
1967	207	21	30	0	42.73090541	-79.326643	45		
1967	207	22	0	0	42.74381337	-79.29946268	46		
1967	207	22	30	0	42.75995697	-79.26666257	47		
1967	207	23	0	0	42.77105205	-79.2307273	48		
1967	207	23	30	0	42.78091344	-79.19933168	49		

Year	Day of Year	Hour	Minute	Second	Latitude	Longitude	Fix	Line	Comment
1967	208	0	0	0	42.79692546	-79.14866936	50		
1967	208	0	30	0	42.81277842	-79.13463953	51		
1967	208	1	0	0	42.82466561	-79.10440096	52		
1967	208	1	30	0	42.83759804	-79.07085328	53		
1967	208	2	0	0	42.84927882	-79.04034559	54		
1967	208	3	42	0	42.82448749	-78.88767832	55	3	26 July 1967; 2342 EDT
1967	208	4	0	0	42.81617821	-78.90213285	56		
1967	208	4	30	0	42.80608294	-78.93644161	57		
1967	208	5	0	0	42.79703722	-78.96604717	58		
1967	208	5	30	0	42.78176643	-78.98342741	59		
1967	208	6	0	0	42.76946453	-79.00729899	60		
1967	208	6	30	0	42.75285571	-79.03866693	61		
1967	208	7	0	0	42.73861727	-79.0670361	62		
1967	208	7	30	0	42.72856891	-79.09855956	63		
1967	208	8	0	0	42.71540082	-79.12338287	64		
1967	208	8	30	0	42.70028035	-79.15154777	65		
1967	208	9	0	0	42.69177639	-79.18279929	66		
1967	208	9	30	0	42.67806334	-79.21051116	67		
1967	208	10	0	0	42.65546377	-79.25569505	68		
1967	208	10	30	0	42.648497	-79.27699344	69		
1967	208	11	0	0	42.63768481	-79.28987444	70		
1967	208	11	30	0	42.62346552	-79.34348573	71		
1967	208	12	0	0	42.61283901	-79.36989019	72		
1967	208	12	30	0	42.60370465	-79.39102357	73		
1967	208	13	0	0	42.5901358	-79.42251523	74		
1967	208	13	30	0	42.57878664	-79.44968359	75		
1967	208	14	0	0	42.56783378	-79.47489878	76		

Year	Day of Year	Hour	Minute	Second	Latitude	Longitude	Fix	Line	Comment
1967	208	14	30	0	42.55214827	-79.51027085	77		
1967	208	15	0	0	42.53490918	-79.54798035	78		
1967	208	15	30	0	42.51979751	-79.57383485	79		
1967	208	16	0	0	42.51222775	-79.60916807	80		
1967	208	16	30	0	42.49698196	-79.63693277	81		
1967	208	17	0	0	42.47920425	-79.66879267	82		
1967	208	17	30	0	42.45440745	-79.71274653	83		
1967	208	18	0	0	42.44952816	-79.74970961	84		
1967	208	18	30	0	42.43990469	-79.78521476	85		
1967	208	19	0	0	42.4274332	-79.8089935	86		
1967	208	19	30	0	42.41003085	-79.82629628	87		
1967	208	20	0	0	42.39753505	-79.84851319	88		
1967	208	20	30	0	42.37424693	-79.8930833	89		
1967	208	21	0	0	42.36403899	-79.9167768	90		
1967	208	21	30	0	42.35327573	-79.94278443	91		
1967	208	22	0	0	42.34320022	-79.9664598	92		
1967	208	22	30	0	42.33946385	-79.99638412	93		
1967	209	0	0	0	42.26158728	-79.93565844	94		27–28 July 1967; 2000 EDT
1967	209	0	30	0	42.27452428	-79.91292213	95		
1967	209	1	0	0	42.28985256	-79.88666926	96		
1967	209	1	30	0	42.30066825	-79.86722409	97		
1967	209	2	0	0	42.31346052	-79.83155904	98		
1967	209	2	30	0	42.31629042	-79.80107691	99	4	
1967	209	3	0	0	42.32927708	-79.77212797	100		
1967	209	3	30	0	42.34966226	-79.7277968	101		
1967	209	4	0	0	42.3682075	-79.6865593	102		
1967	209	4	30	0	42.38312434	-79.65405132	103		

Year	Day of Year	Hour	Minute	Second	Latitude	Longitude	Fix	Line	Comment
1967	209	5	0	0	42.39786793	-79.6197961	104		
1967	209	5	30	0	42.41319398	-79.58724769	105		
1967	209	6	0	0	42.42543247	-79.55996328	106		
1967	209	6	30	0	42.44198234	-79.52388367	107		
1967	209	7	0	0	42.4565608	-79.49092075	108		
1967	209	7	30	0	42.4687653	-79.4628272	109		
1967	209	8	0	0	42.48455598	-79.42575039	110		
1967	209	8	30	0	42.49869844	-79.40453544	111		
1967	209	9	0	0	42.5151482	-79.36489735	112		
1967	209	9	30	0	42.5259285	-79.33930264	113		
1967	209	10	0	0	42.54082928	-79.30276457	114		
1967	209	10	30	0	42.55463061	-79.2699126	115		
1967	209	11	0	0	42.56967229	-79.23469073	116		
1967	209	11	30	0	42.58373617	-79.20160751	117		
1967	209	12	0	0	42.60298594	-79.15384718	118		
1967	209	12	30	0	42.61125971	-79.13522074	119		
1967	209	13	0	0	42.63183944	-79.10034641	120		
1967	209	14	41	0	42.71063181	-79.01908657	121	5	28 July 1967; 1041 EDT
1967	209	15	0	0	42.7242412	-79.03202099	122		
1967	209	15	30	0	42.73951412	-79.04770258	123		
1967	209	16	0	0	42.7661108	-79.05465364	124		
1967	209	16	30	0	42.7898922	-79.07787597	125		
1967	209	17	0	0	42.80433884	-79.10619598	126		
1967	209	17	30	0	42.82593743	-79.12252324	127		
1967	209	18	0	0	42.84842576	-79.13943467	128		
1967	209	20	33	0	42.84636797	-79.34249983	129	6	28 July 1967; 1633 EDT
1967	209	21	0	0	42.82958501	-79.31564446	130		

Year	Day of Year	Hour	Minute	Second	Latitude	Longitude	Fix	Line	Comment
1967	209	21	30	0	42.80368035	-79.30841142	131		
1967	209	22	0	0	42.77691897	-79.29153347	132		
1967	209	22	30	0	42.74584097	-79.30013847	133		
1967	209	23	0	0	42.70746862	-79.27952478	134		
1967	209	23	30	0	42.6759899	-79.2620428	135		
1967	210	0	0	0	42.65388429	-79.22403899	136		
1967	210	0	30	0	42.62184911	-79.1988952	137		
1967	210	1	0	0	42.59442914	-79.17750015	138		
1967	210	1	30	0	42.58239432	-79.14699059	139		Fix annotation destroyed by paper tear
1967	210	1	40	0	42.57696812	-79.14637987	140		
1967	210	3	46	0	42.51299563	-79.31415519	141	7	28 July 1967; 2346 EDT
1967	210	4	0	0	42.52076319	-79.31895622	142		
1967	210	4	30	0	42.5505324	-79.33704979	143		
1967	210	5	0	0	42.5698866	-79.35466253	144		
1967	210	5	30	0	42.59641987	-79.37615048	145		
1967	210	6	0	0	42.6170615	-79.3945267	146		
1967	210	6	30	0	42.6395446	-79.4122889	147		
1967	210	7	0	0	42.65871612	-79.42782962	148		
1967	210	7	30	0	42.6849705	-79.44030494	149		
1967	210	8	0	0	42.69802726	-79.46780421	150		
1967	210	8	30	0	42.70595547	-79.485196	151		
1967	210	9	0	0	42.73539437	-79.50188131	152		
1967	210	9	30	0	42.763976	-79.51860247	153		
1967	210	10	0	0	42.7921179	-79.53457491	154		
1967	210	10	30	0	42.81551872	-79.54776819	155		
1967	210	10	45	0	42.83174241	-79.55707103	156		

Year	Day of Year	Hour	Minute	Second	Latitude	Longitude	Fix	Line	Comment
1967	210	10	48	0	42.83408801	-79.5622453	157		29 July 1967; 0648 EDT
1967	210	11	0	0	42.82939345	-79.57436021	158		
1967	210	11	30	0	42.81498871	-79.60837789	159		
1967	210	12	0	0	42.80041733	-79.64122202	160		
1967	210	12	30	0	42.78641971	-79.67519951	161		
1967	210	13	0	0	42.76976084	-79.71424691	162		
1967	210	13	30	0	42.76766107	-79.76961849	163		
1967	210	14	0	0	42.75102722	-79.80050535	164		
1967	210	14	30	0	42.73523194	-79.83058646	165		
1967	210	15	0	0	42.71480236	-79.86846868	166	8	
1967	210	15	30	0	42.69324559	-79.90905086	167		
1967	210	16	0	0	42.67516939	-79.94220583	168		
1967	210	16	30	0	42.65595141	-79.99235388	169		
1967	210	17	0	0	42.63909349	-80.03760838	170		
1967	210	17	30	0	42.62484922	-80.07334236	171		
1967	210	18	0	0	42.61199781	-80.10633853	172		
1967	210	18	30	0	42.59955562	-80.13815786	173		Time mislabeled on paper record as 1840
1967	210	18	40	0	42.59424617	-80.15250708	174		Assume this waypoint is at 1840
1967	210	20	38	0	42.75225897	-80.17385668	175		29 July 1967; 1638 EDT
1967	210	21	0	0	42.74003136	-80.15821704	176		
1967	210	21	30	0	42.70672	-80.12729081	177		
1967	210	22	0	0	42.67922367	-80.10620601	178	9	
1967	210	22	30	0	42.64950421	-80.09905773	179		
1967	210	23	0	0	42.6282783	-80.08590372	180		
1967	210	23	30	0	42.60039143	-80.05603958	181		
1967	211	0	0	0	42.57038336	-80.03337897	182		

Year	Day of Year	Hour	Minute	Second	Latitude	Longitude	Fix	Line	Comment
1967	211	0	30	0	42.5480252	-80.01587017	183		
1967	211	1	0	0	42.52018519	-79.99342244	184		
1967	211	1	30	0	42.49096209	-79.97311563	185		
1967	211	2	0	0	42.46156674	-79.95136204	186		
1967	211	2	30	0	42.43060665	-79.92881656	187		
1967	211	3	0	0	42.40604886	-79.91037316	188		
1967	211	3	30	0	42.37195277	-79.88561849	189		
1967	211	4	0	0	42.33941055	-79.86149021	190		
1967	211	4	30	0	42.31172381	-79.82662501	191		
1967	211	5	0	0	42.2841386	-79.80245561	192		
1967	211	6	35	0	42.34799969	-79.63793075	193		30 July 1967; 0235 EDT
1967	211	7	0	0	42.3730288	-79.65309936	194		
1967	211	7	30	0	42.40094274	-79.66277042	195		
1967	211	8	0	0	42.42120399	-79.69587897	196		
1967	211	8	30	0	42.44400934	-79.70735865	197		
1967	211	9	0	0	42.47149989	-79.72126836	198	10	
1967	211	9	30	0	42.50258661	-79.7516989	199		
1967	211	10	0	0	42.53553324	-79.78254314	200		
1967	211	10	30	0	42.57006398	-79.80225317	201		
1967	211	11	0	0	42.60531579	-79.83206232	202		
1967	211	11	30	0	42.62990676	-79.85263458	203		
1967	211	12	0	0	42.65683776	-79.87465348	204		
1967	248	22	0	0	42.48495375	-80.00497136	205		5 September 1967; 1800 EDT
1967	248	22	30	0	42.46547752	-80.11158352	206		
1967	248	23	0	0	42.44619001	-80.16874879	207	11	
1967	248	23	30	0	42.42764972	-80.22307965	208		
1967	249	0	0	0	42.4103796	-80.28122611	209		

Year	Day of Year	Hour	Minute	Second	Latitude	Longitude	Fix	Line	Comment
1967	249	0	30	0	42.39277651	-80.34191826	210		
1967	249	1	0	0	42.38140565	-80.38450197	211		
1967	249	1	30	0	42.36296591	-80.44793204	212		
1967	249	2	0	0	42.34511493	-80.50853396	213		
1967	249	2	30	0	42.32909071	-80.55623159	214		
1967	249	3	0	0	42.30613342	-80.62879737	215		
1967	249	3	30	0	42.28407161	-80.69659512	216		
1967	249	4	0	0	42.26370433	-80.75748898	217		
1967	249	4	30	0	42.24235919	-80.82391044	218		
1967	249	5	0	0	42.22366857	-80.88022754	219		
1967	249	5	30	0	42.20225243	-80.94720735	220		
1967	249	6	0	0	42.18525032	-80.99939027	221		
1967	249	6	30	0	42.17124846	-81.04492114	222		
1967	249	7	0	0	42.15435941	-81.09876221	223		
1967	249	8	0	0	42.04518451	-81.05925058	224		6 September 1967; 0400 EDT
1967	249	8	30	0	42.06039544	-80.9996961	225		
1967	249	9	0	0	42.07161222	-80.91651013	226		
1967	249	9	30	0	42.10744689	-80.85572572	227		
1967	249	10	0	0	42.12315434	-80.79847356	228		
1967	249	10	30	0	42.14797258	-80.71044641	229		
1967	249	11	0	0	42.16514592	-80.64764571	230	12	
1967	249	11	30	0	42.18768722	-80.58992421	231		
1967	249	12	0	0	42.21564007	-80.51699199	232		
1967	249	12	30	0	42.22496417	-80.46138351	233		
1967	249	13	0	0	42.24606867	-80.39856276	234		
1967	249	13	30	0	42.26900962	-80.34905127	235		
1967	249	14	0	0	42.29038558	-80.28211758	236		

Year	Day of Year	Hour	Minute	Second	Latitude	Longitude	Fix	Line	Comment
1967	249	14	30	0	42.31276886	-80.21077367	237		
1967	249	15	0	0	42.33193979	-80.14780794	238		
1967	249	15	30	0	42.35133553	-80.08738147	239		
1967	249	16	0	0	42.37032914	-80.02563324	240		
1967	249	16	15	0	42.38079539	-79.99077604	241		
1967	249	17	55	0	42.2726352	-79.93780291	242		6 September 1967; 1355 EDT
1967	249	18	30	0	42.24912423	-80.00866893	243		
1967	249	19	0	0	42.2289349	-80.07139736	244		
1967	249	19	30	0	42.21230096	-80.12155799	245		
1967	249	20	0	0	42.19364611	-80.17650384	246		
1967	249	20	30	0	42.17211238	-80.24204435	247		
1967	249	21	0	0	42.15410047	-80.2870069	248		
1967	249	21	30	0	42.13546975	-80.36029371	249		
1967	249	22	0	0	42.11877416	-80.42327848	250		
1967	249	22	30	0	42.10355649	-80.48348776	251	13	
1967	249	23	0	0	42.07732978	-80.53180606	252		
1967	250	23	30	0	42.0661473	-80.59925837	253		
1967	250	0	0	0	42.04562476	-80.65889275	254		
1967	250	0	30	0	42.02494395	-80.71848946	255		
1967	250	1	0	0	41.99626168	-80.79766801	256		
1967	250	1	30	0	41.97196007	-80.86552681	257		
1967	250	2	0	0	41.94977489	-80.9270327	258		
1967	250	2	30	0	41.92908128	-80.98441106	259		
1967	250	2	37	0	41.92882785	-81.00840813	260		
1967	250	5	0	0	41.91344052	-80.77056106	261		7 September 1967; 0100 EDT
1967	250	5	30	0	41.96612297	-80.80156552	262	14	
1967	250	6	0	0	42.01742727	-80.83262455	263		

Year	Day of Year	Hour	Minute	Second	Latitude	Longitude	Fix	Line	Comment
1967	250	6	30	0	42.06107289	-80.84747359	264		
1967	250	7	0	0	42.11491044	-80.88176373	265		
1967	250	7	30	0	42.16031311	-80.90061016	266		
1967	250	8	0	0	42.20806018	-80.92000677	267		
1967	250	8	30	0	42.25717824	-80.95049117	268		
1967	250	9	0	0	42.30061413	-80.9770719	269		
1967	250	9	30	0	42.34013123	-81.00131587	270		
1967	250	10	0	0	42.38198983	-81.02770198	271		
1967	250	10	30	0	42.42560527	-81.04805188	272		
1967	250	11	0	0	42.47644538	-81.08217885	273		
1967	250	11	30	0	42.52532846	-81.10630827	274		
1967	250	12	0	0	42.57655361	-81.13021563	275		
1967	250	12	30	0	42.62992277	-81.15575693	276		
1967	250	14	0	0	42.60596526	-80.97113475	277	15	7 September 1967; 1200 EDT
1967	250	14	30	0	42.57719909	-80.94071054	278		
1967	250	15	0	0	42.52749296	-80.90849298	279		
1967	250	15	30	0	42.4738729	-80.88373276	280		
1967	250	16	0	0	42.42435752	-80.86111772	281		
1967	250	16	30	0	42.37619598	-80.8311475	282		
1967	250	17	0	0	42.3252849	-80.79964989	283		
1967	250	17	30	0	42.27945778	-80.77160875	284		
1967	250	18	0	0	42.22716811	-80.74363424	285		
1967	250	18	30	0	42.20207475	-80.72058271	286		
1967	250	19	0	0	42.14917823	-80.69005814	287		
1967	250	19	30	0	42.09843058	-80.66141133	288		
1967	250	20	0	0	42.04983988	-80.63673457	289		
1967	250	20	30	0	41.9973258	-80.61054543	290		

Year	Day of Year	Hour	Minute	Second	Latitude	Longitude	Fix	Line	Comment
1967	250	20	45	0	41.9706627	-80.59393046	291		Fix number torn away but repaired
1967	250	22	6	0	42.03436385	-80.43739204	292	16	7 September 1967; 1806 EDT
1967	250	22	30	0	42.06203336	-80.45526187	293		
1967	250	23	0	0	42.11167227	-80.48688975	294		
1967	250	23	30	0	42.15541496	-80.51414191	295		
1967	251	0	0	0	42.2111159	-80.54950218	296		
1967	251	0	30	0	42.26300983	-80.56361745	297		
1967	251	1	0	0	42.31201803	-80.59174347	298		
1967	251	1	30	0	42.33931394	-80.62241672	299		
1967	251	2	0	0	42.38221983	-80.64300411	300		
1967	251	2	30	0	42.44149407	-80.64398831	301		
1967	251	3	0	0	42.47974469	-80.67997549	302		
1967	251	3	30	0	42.53145145	-80.70430831	303		
1967	251	4	0	0	42.58491314	-80.72867346	304		
1967	251	4	6	0	42.59373092	-80.7352538	305		
1967	251	5	40	0	42.53697146	-80.51909416	306	17	8 September 1967; 0140 EDT
1967	251	6	0	0	42.51274025	-80.50734279	307		
1967	251	6	30	0	42.46996654	-80.48722856	308		
1967	251	7	0	0	42.42229156	-80.45412768	309		
1967	251	7	30	0	42.38646659	-80.43798658	310		
1967	251	8	0	0	42.32455157	-80.41926885	311		
1967	251	8	30	0	42.29437051	-80.39773717	312		
1967	251	9	0	0	42.24654167	-80.34215436	313		
1967	251	9	30	0	42.18763672	-80.33767584	314		
1967	251	10	0	0	42.15589528	-80.30409306	315		
1967	251	10	30	0	42.10815812	-80.26987986	316		
1967	251	10	55	0	42.07021679	-80.25592086	317		

Year	Day of Year	Hour	Minute	Second	Latitude	Longitude	Fix	Line	Comment
1967	251	12	30	0	42.1813155	-80.11721392	318	18	8 September 1967; 0830 EDT
1967	251	13	0	0	42.22946277	-80.1439887	319		
1967	251	13	30	0	42.280133	-80.17162007	320		
1967	251	14	0	0	42.33349613	-80.19444301	321		
1967	251	14	30	0	42.37931614	-80.22193542	322		
1967	251	15	0	0	42.41773128	-80.24359612	323		
1967	251	15	30	0	42.46290319	-80.27031581	324		
1967	251	16	0	0	42.51312195	-80.29815383	325		
1967	251	16	15	0	42.52943891	-80.30829436	326		
1967	251	16	15	0	42.52994932	-80.30859979	327	19	8 September 1967; 1215 EDT
1967	251	16	30	0	42.52652515	-80.34368368	328		
1967	251	17	0	0	42.50358985	-80.40754091	329		
1967	251	17	30	0	42.47996086	-80.43944661	330		
1967	251	18	0	0	42.47763274	-80.48254521	331		
1967	251	18	30	0	42.4572925	-80.53967554	332		
1967	251	19	0	0	42.43676362	-80.59927564	333		
1967	251	19	30	0	42.41703691	-80.6554169	334		
1967	251	20	0	0	42.39410104	-80.72132546	335		
1967	251	20	30	0	42.36659687	-80.80130793	336		
1967	251	21	0	0	42.35000235	-80.87983531	337		
1967	251	21	30	0	42.33637171	-80.92147821	338		
1967	251	22	0	0	42.31395794	-80.9937984	339		
1967	251	22	30	0	42.30011601	-81.0388021	340		
1967	251	23	0	0	42.27678234	-81.1133096	341		
1967	251	23	30	0	42.25729901	-81.17641704	342		
1967	252	0	52	0	42.35978858	-81.23039329	343	20	9 September 1967; 2052 EDT
1967	252	1	0	0	42.3663954	-81.21676604	344		

Year	Day of Year	Hour	Minute	Second	Latitude	Longitude	Fix	Line	Comment
1967	252	1	30	0	42.38674616	-81.15219859	345		
1967	252	2	0	0	42.40604588	-81.09054761	346		
1967	252	2	30	0	42.4281822	-81.02202774	347		
1967	252	3	0	0	42.44825622	-80.96280174	348		
1967	252	3	30	0	42.47166421	-80.8925934	349		
1967	252	4	0	0	42.49049266	-80.83511213	350		
1967	252	4	30	0	42.50980402	-80.7805592	351		
1967	252	5	0	0	42.53186311	-80.68900479	352		
1967	252	5	30	0	42.5566411	-80.62475398	353		
1967	252	7	0	0	42.61870022	-80.82266698	354		9 September 1967; 0300 EDT
1967	252	7	30	0	42.59718449	-80.88552727	355		
1967	252	8	0	0	42.5763083	-80.94674579	356		
1967	252	8	30	0	42.56181035	-80.98875281	357		
1967	252	9	0	0	42.54121564	-81.05149967	358	21	
1967	252	9	30	0	42.533413	-81.11035043	359		
1967	252	10	0	0	42.50854321	-81.16663208	360		
1967	252	10	30	0	42.48985146	-81.24112867	361		
1967	252	11	0	0	42.47469369	-81.30101211	362		
1967	252	12	27	0	42.60074216	-81.35460082	363		9 September 1967; 0827 EDT
1967	252	12	30	0	42.59298131	-81.35455682	364		
1967	252	13	0	0	42.53907123	-81.3277864	365		
1967	252	13	30	0	42.4889606	-81.3024233	366		
1967	252	14	0	0	42.43786246	-81.27575982	367	22	
1967	252	14	30	0	42.38899975	-81.25066329	368		
1967	252	15	0	0	42.34590144	-81.22757244	369		
1967	252	15	30	0	42.29992712	-81.19521314	370		
1967	252	16	0	0	42.25234289	-81.16030603	371		

Year	Day of Year	Hour	Minute	Second	Latitude	Longitude	Fix	Line	Comment
1967	252	16	30	0	42.20618806	-81.12825898	372		
1967	252	17	0	0	42.16162091	-81.10423802	373		
1967	252	17	30	0	42.11047301	-81.07851914	374		
1967	252	18	0	0	42.05851734	-81.05176474	375		
1967	252	18	30	0	42.04296642	-81.02765058	376		
1967	252	19	0	0	41.99548965	-80.99881568	377		
1967	252	19	30	0	41.92987948	-80.97132098	378		
1967	252	20	0	0	41.88527965	-80.95266531	379		
1967	252	20	10	0	41.8671497	-80.94452382	380		
1967	253	1	30	0	42.21069426	-79.95241869	381		10 September 1967; 2130 EDT
1967	253	2	0	0	42.23997904	-79.97152324	382		
1967	253	2	30	0	42.27344352	-79.9933784	383		
1967	253	3	0	0	42.31281873	-80.01796588	384		
1967	253	3	30	0	42.3424353	-80.0366586	385	23	
1967	253	4	0	0	42.38064996	-80.04776066	386		
1967	253	4	30	0	42.41377997	-80.07298248	387		
1967	253	5	0	0	42.4507346	-80.10051553	388		
1967	253	5	30	0	42.48943305	-80.13039766	389		
1967	253	5	38	0	42.50783401	-80.13482654	390		
1967	253	10	46	0	42.42657054	-79.4798957	391		10 September 1967; 0646 EDT
1967	253	11	0	0	42.44395974	-79.49494872	392		
1967	253	11	30	0	42.4718083	-79.51713342	393		
1967	253	12	0	0	42.51839456	-79.53263055	394	24	
1967	253	12	30	0	42.56028249	-79.56523733	395		
1967	253	13	0	0	42.59553766	-79.59175754	396		
1967	253	13	30	0	42.63767326	-79.62369831	397		
1967	253	14	0	0	42.68434187	-79.64744739	398		

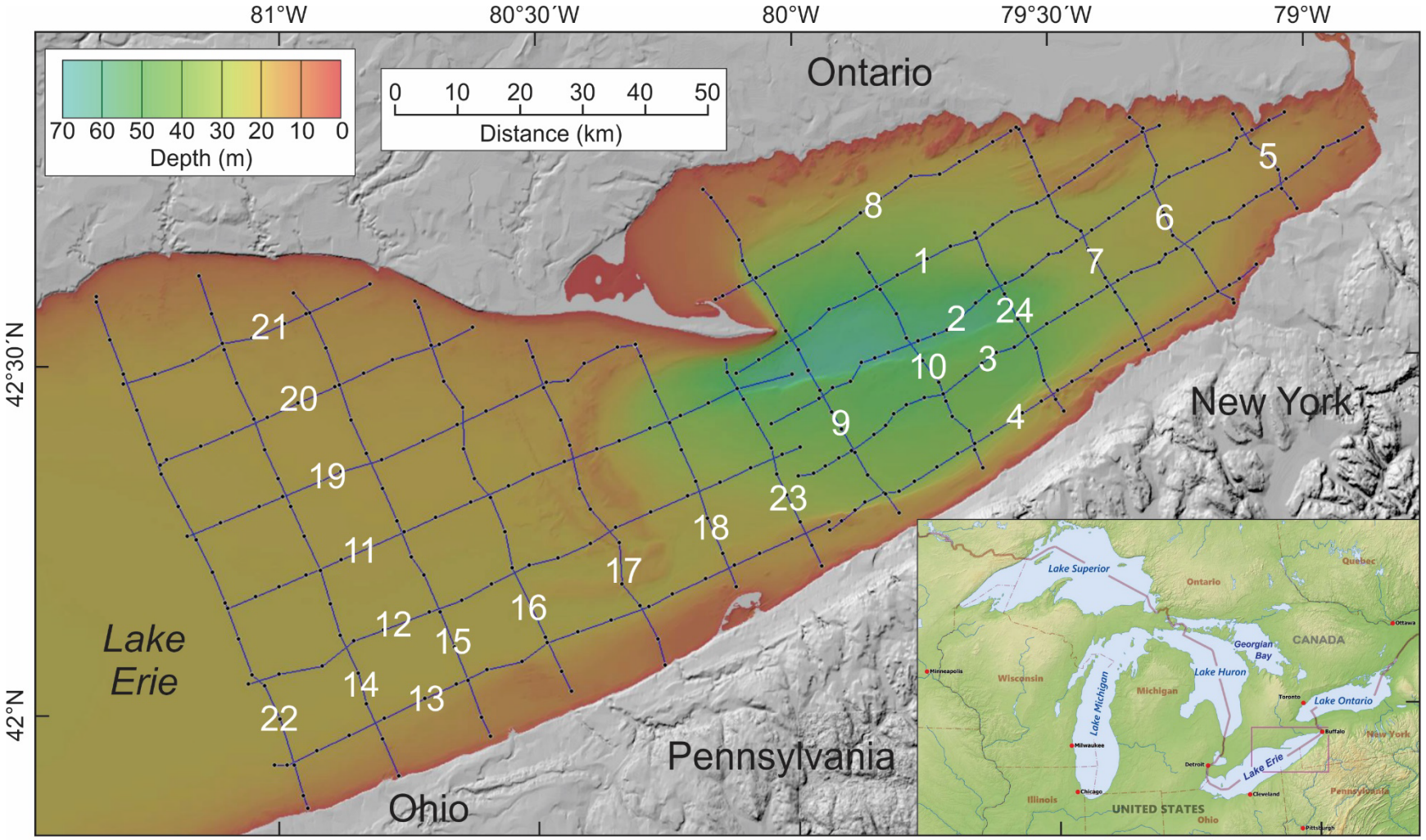


Figure 1. Bathymetric map of central and eastern Lake Erie. Seismic survey lines, labelled from 1 to 24, are shown in blue with navigation waypoints as superimposed black dots.

Figure 2a: Line 1 seismic reflection profile
1967 Lake Erie

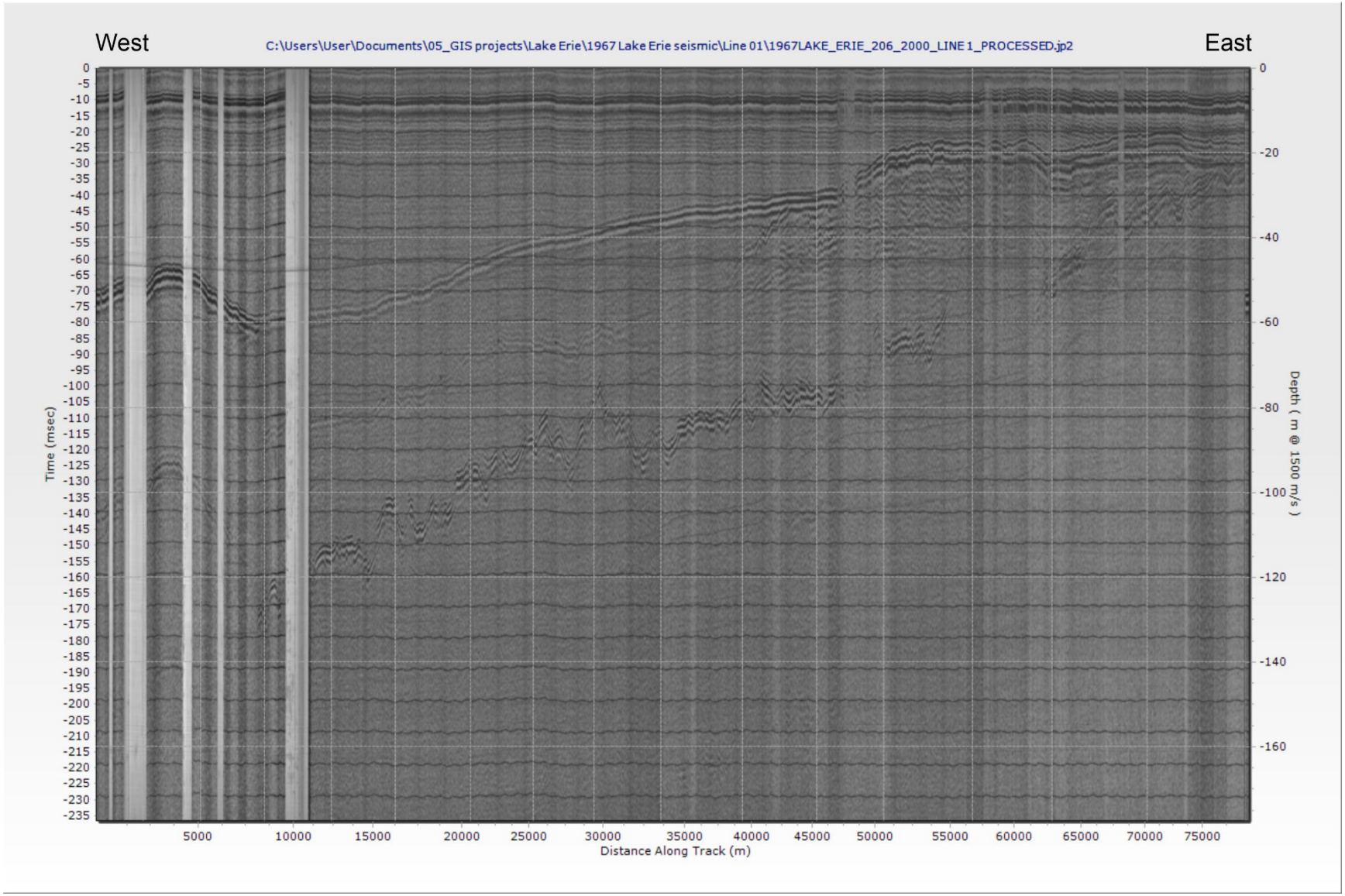


Figure 2b: Line 2 seismic reflection profile
1967 Lake Erie

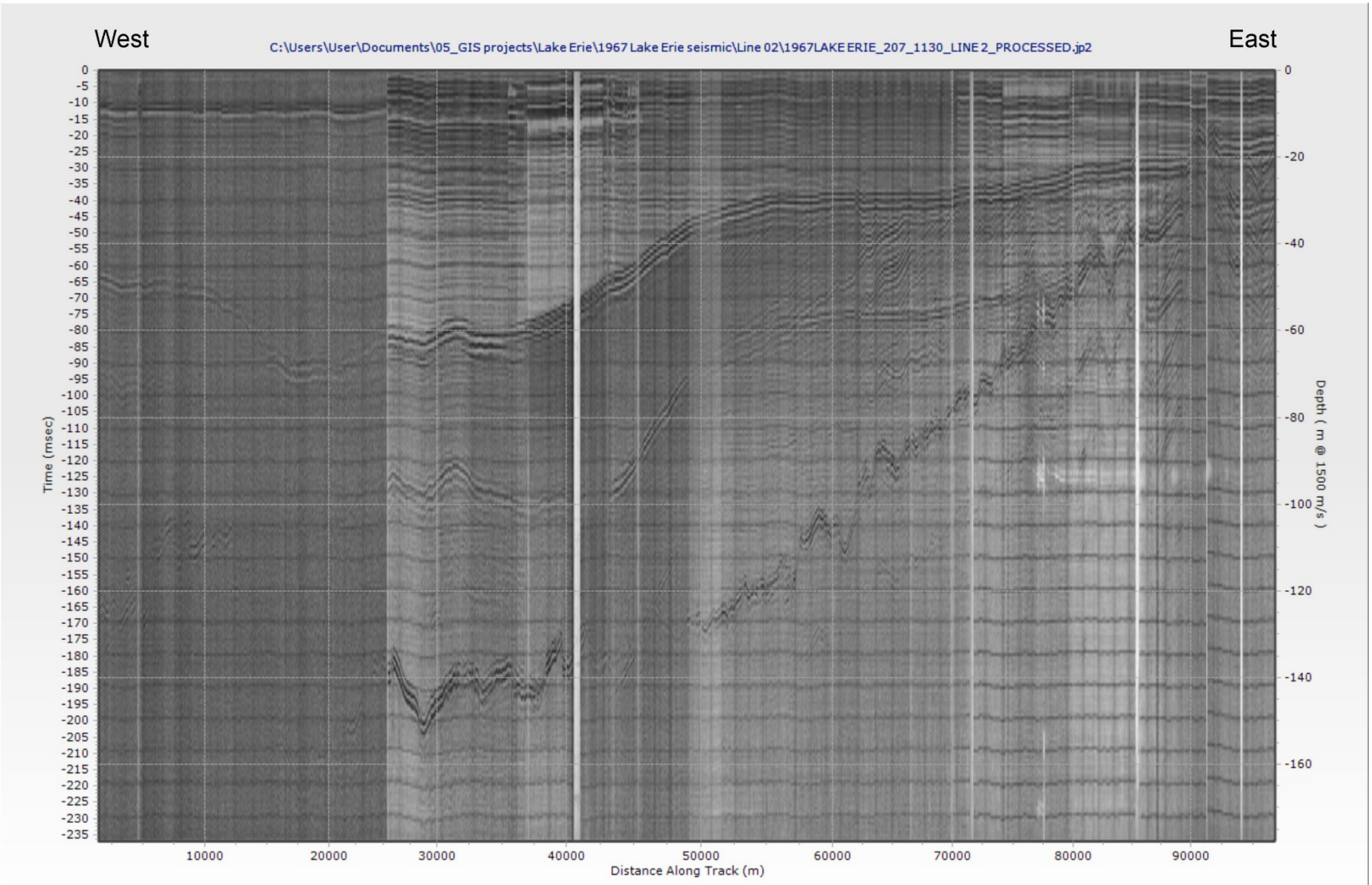


Figure 2c: Line 3 seismic reflection profile
1967 Lake Erie

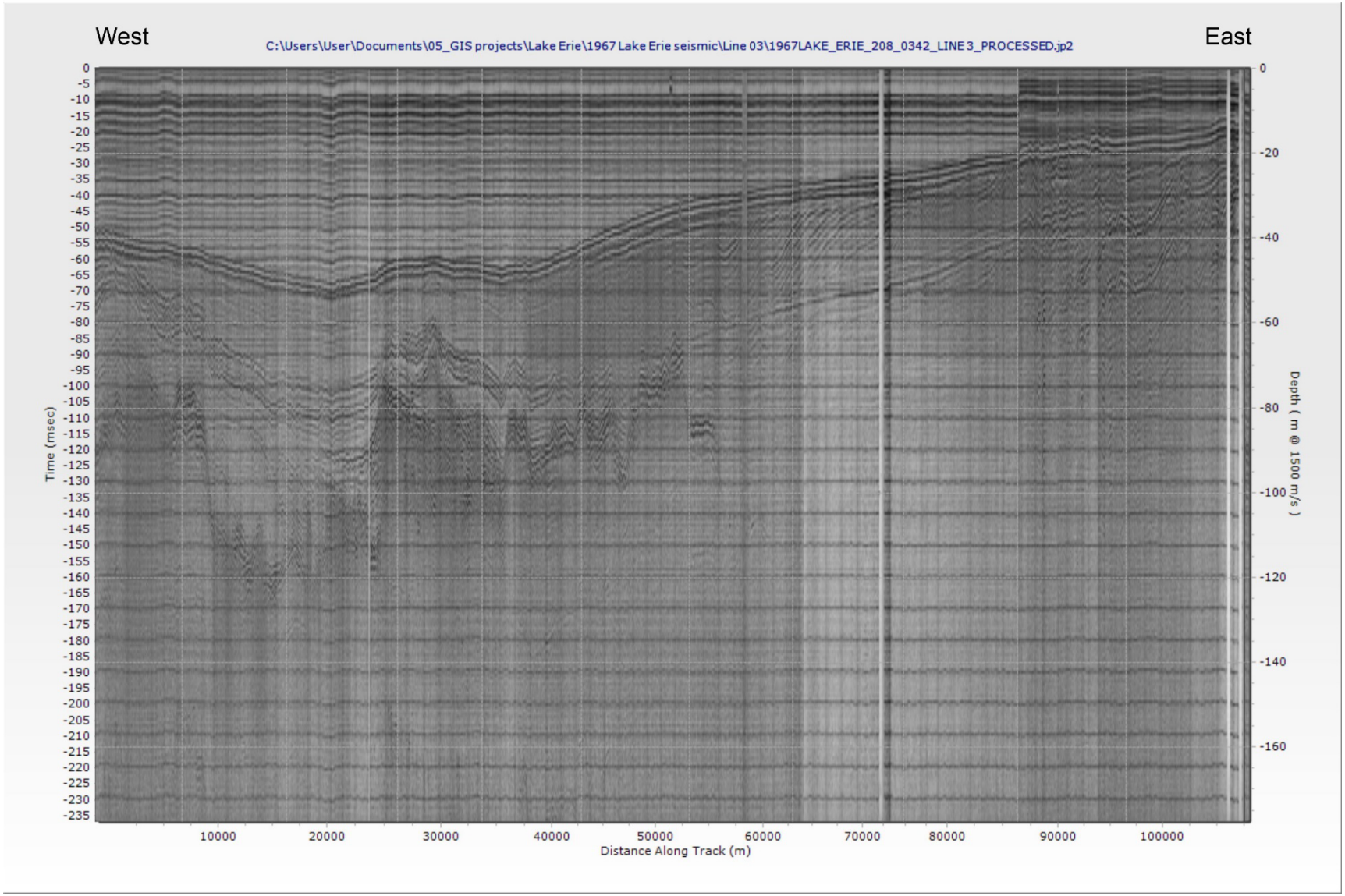


Figure 2d: Line 4 seismic reflection profile
1967 Lake Erie

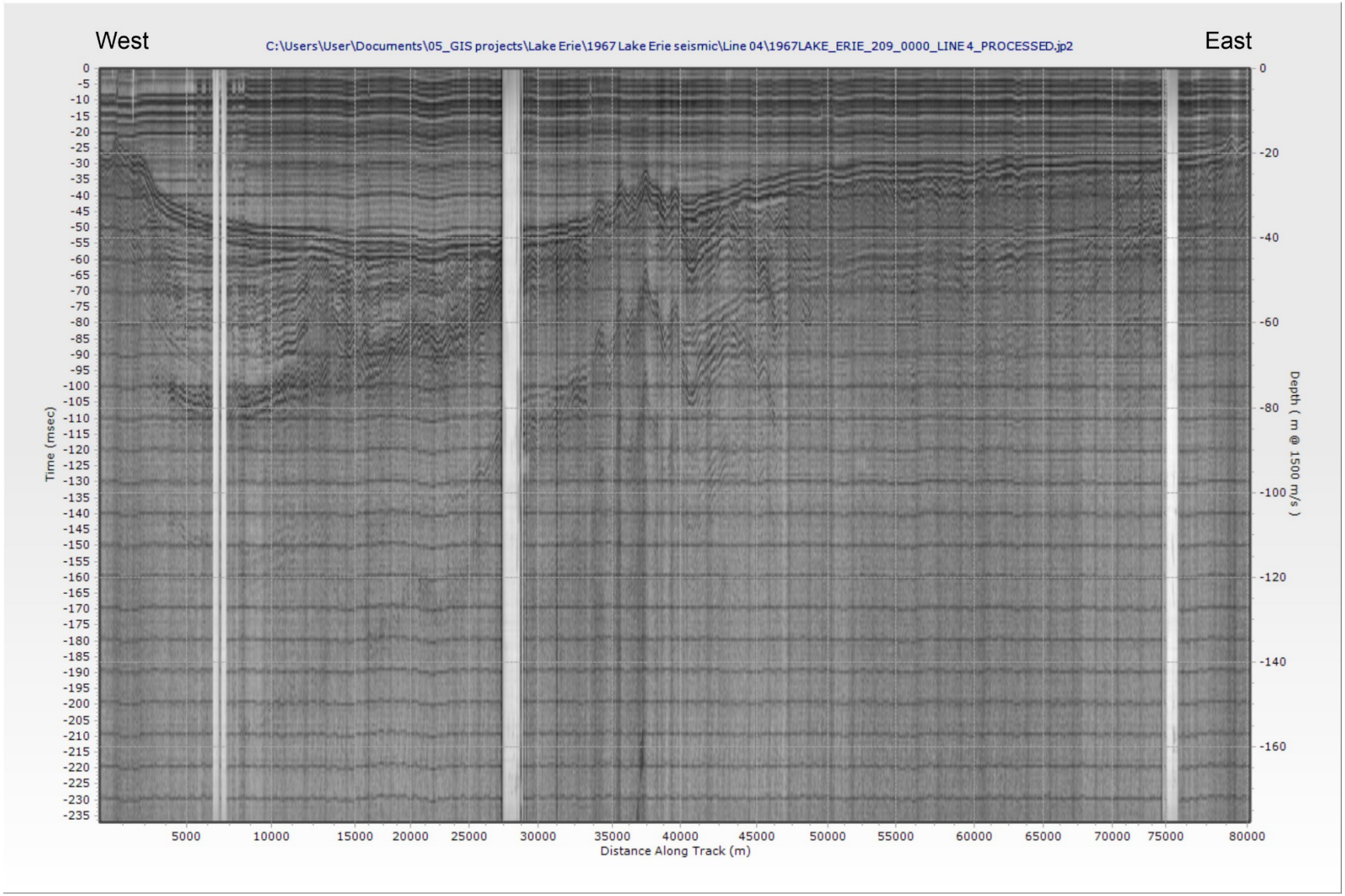


Figure 2e: Line 5 seismic reflection profile
1967 Lake Erie

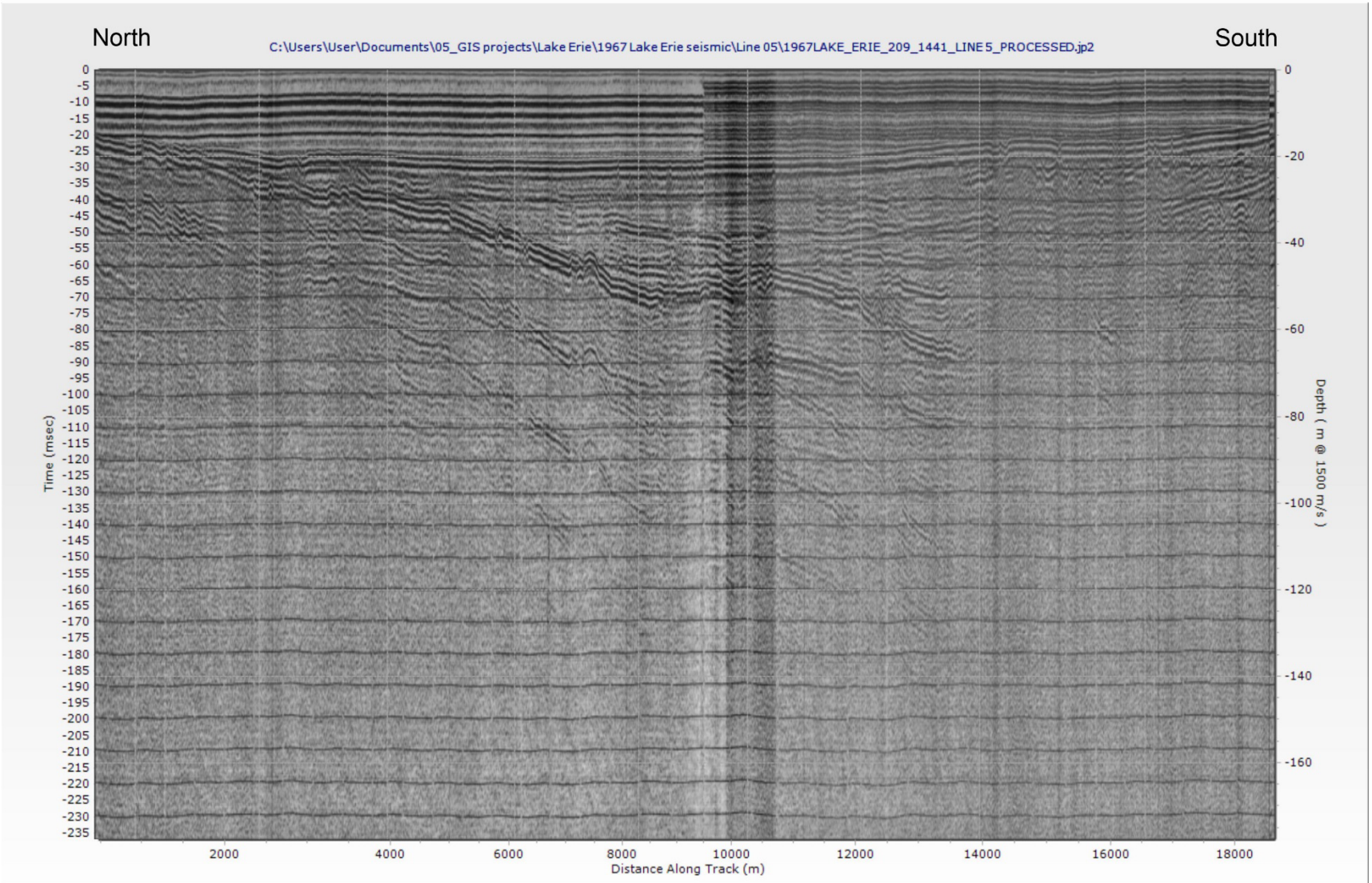


Figure 2f: Line 6 seismic reflection profile
1967 Lake Erie

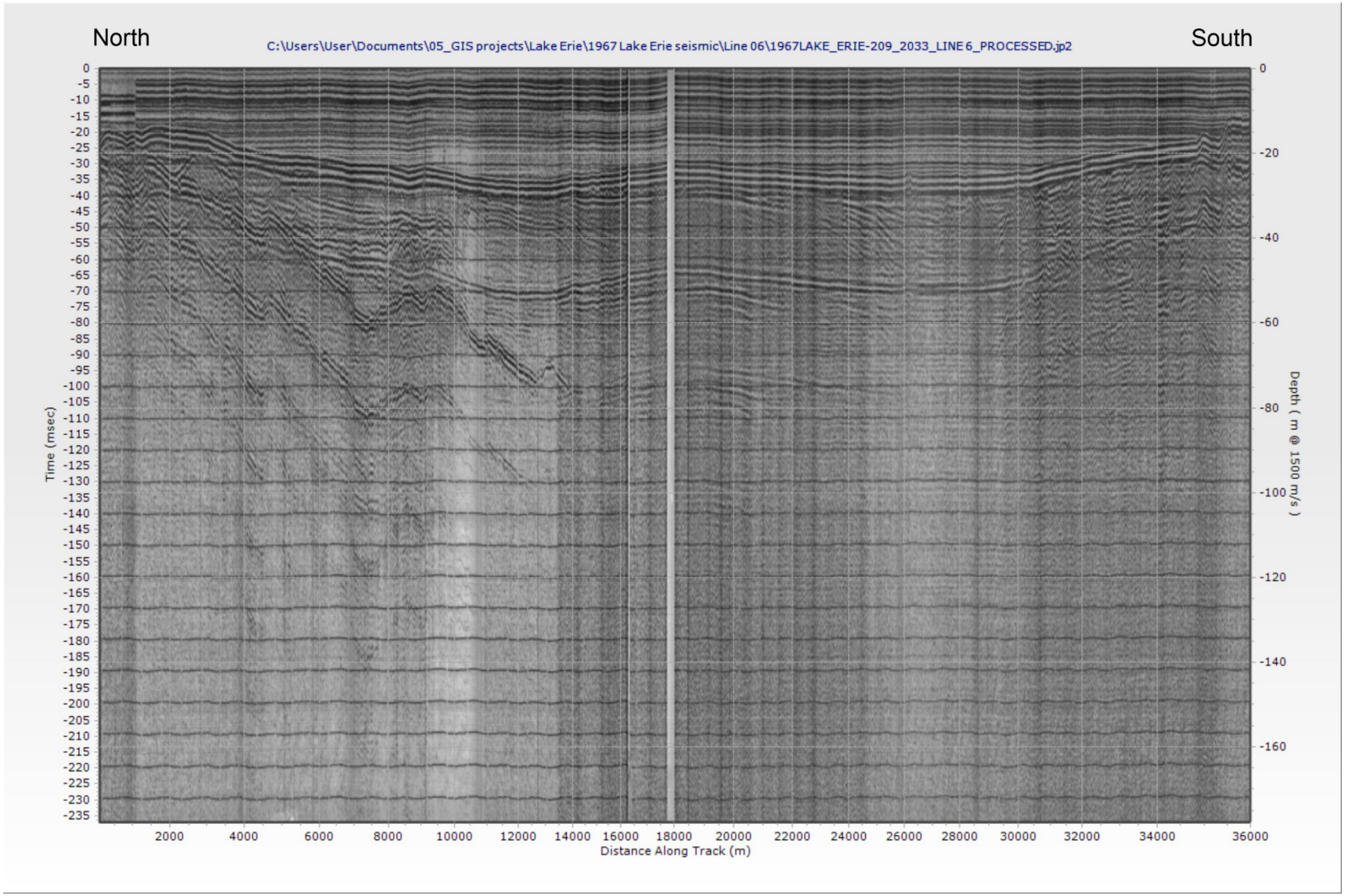


Figure 2g: Line 7 seismic reflection profile
1967 Lake Erie

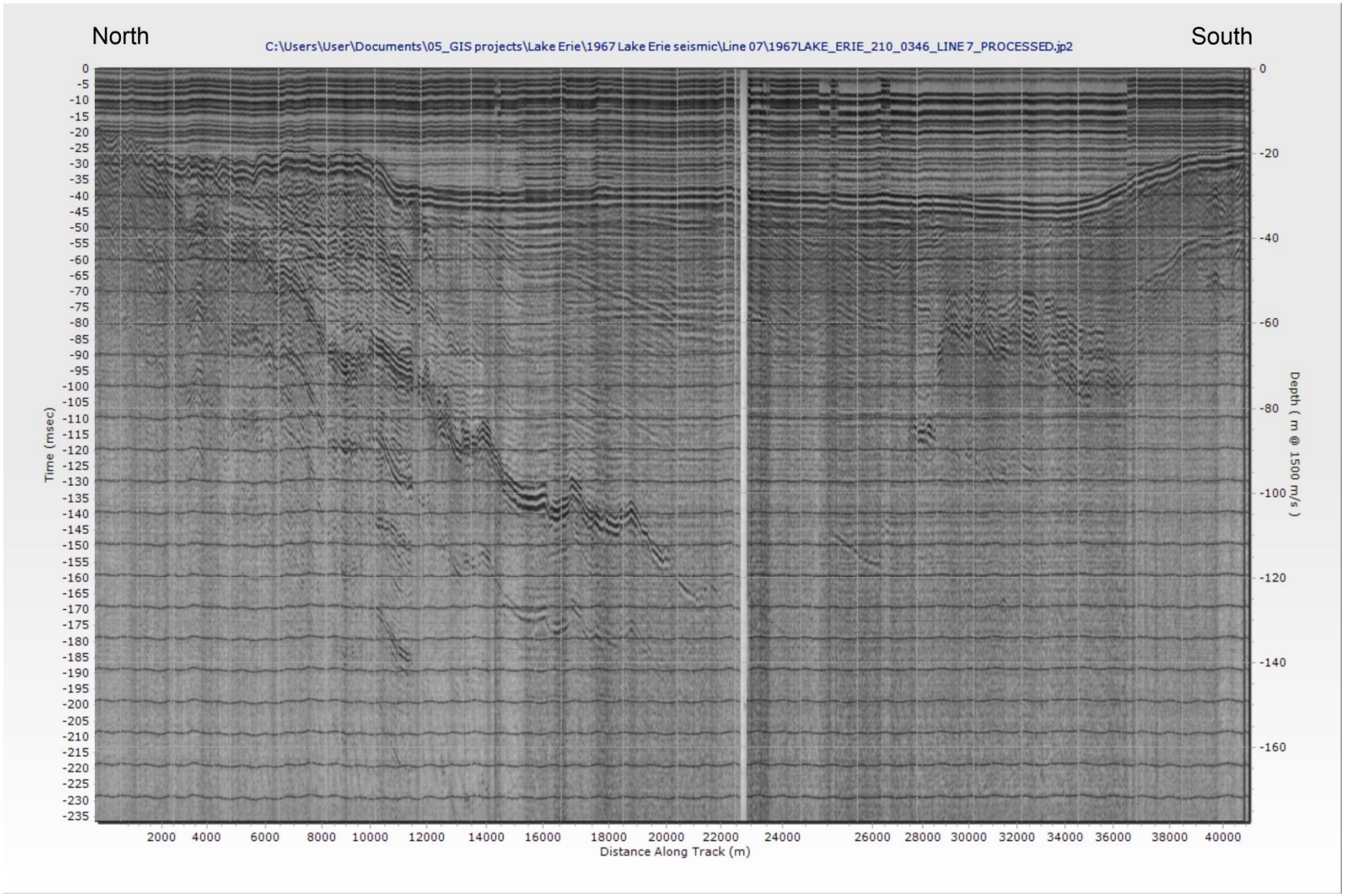


Figure 2h: Line 8 seismic reflection profile
1967 Lake Erie

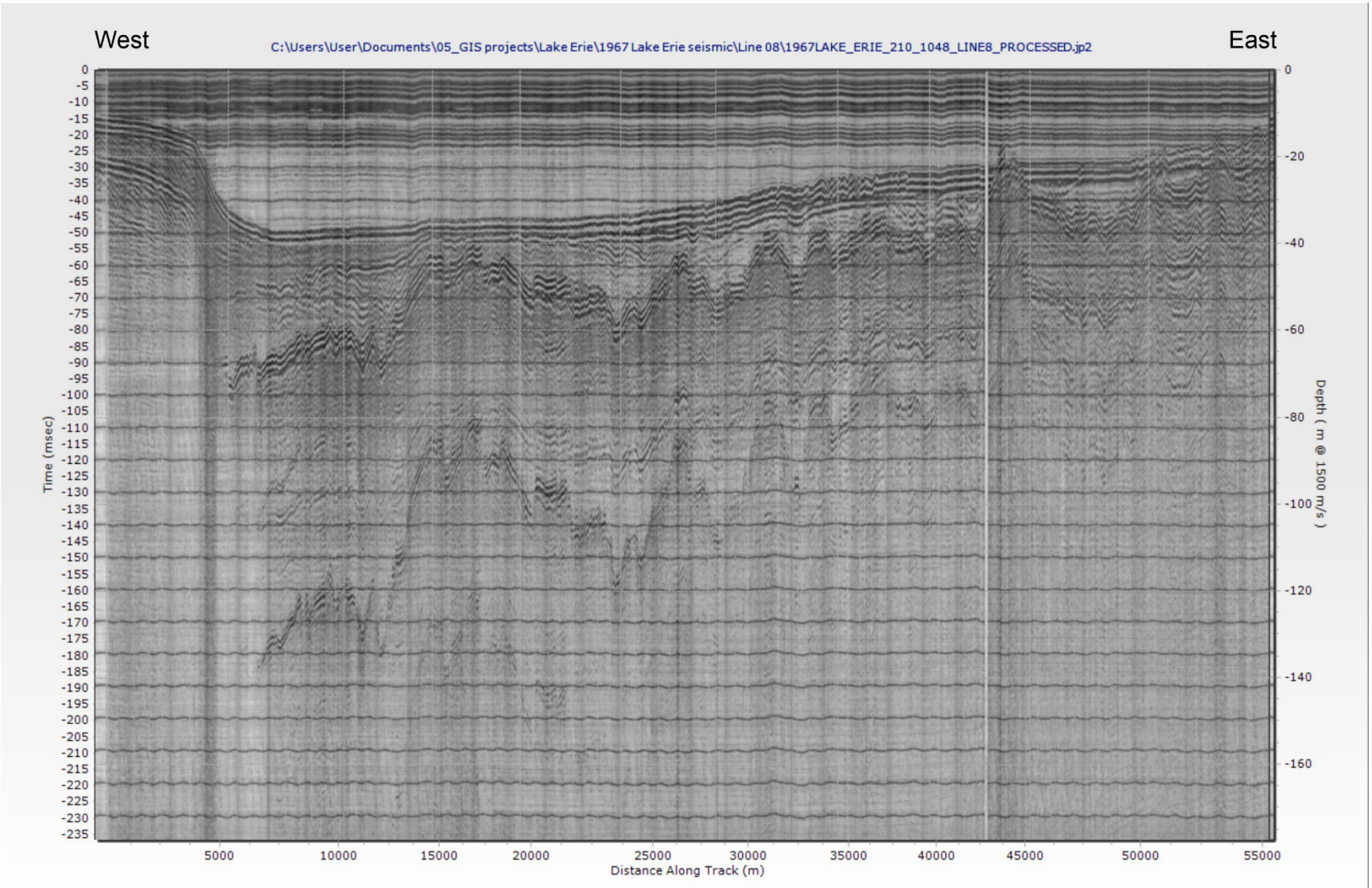


Figure 2i: Line 9 seismic reflection profile
1967 Lake Erie

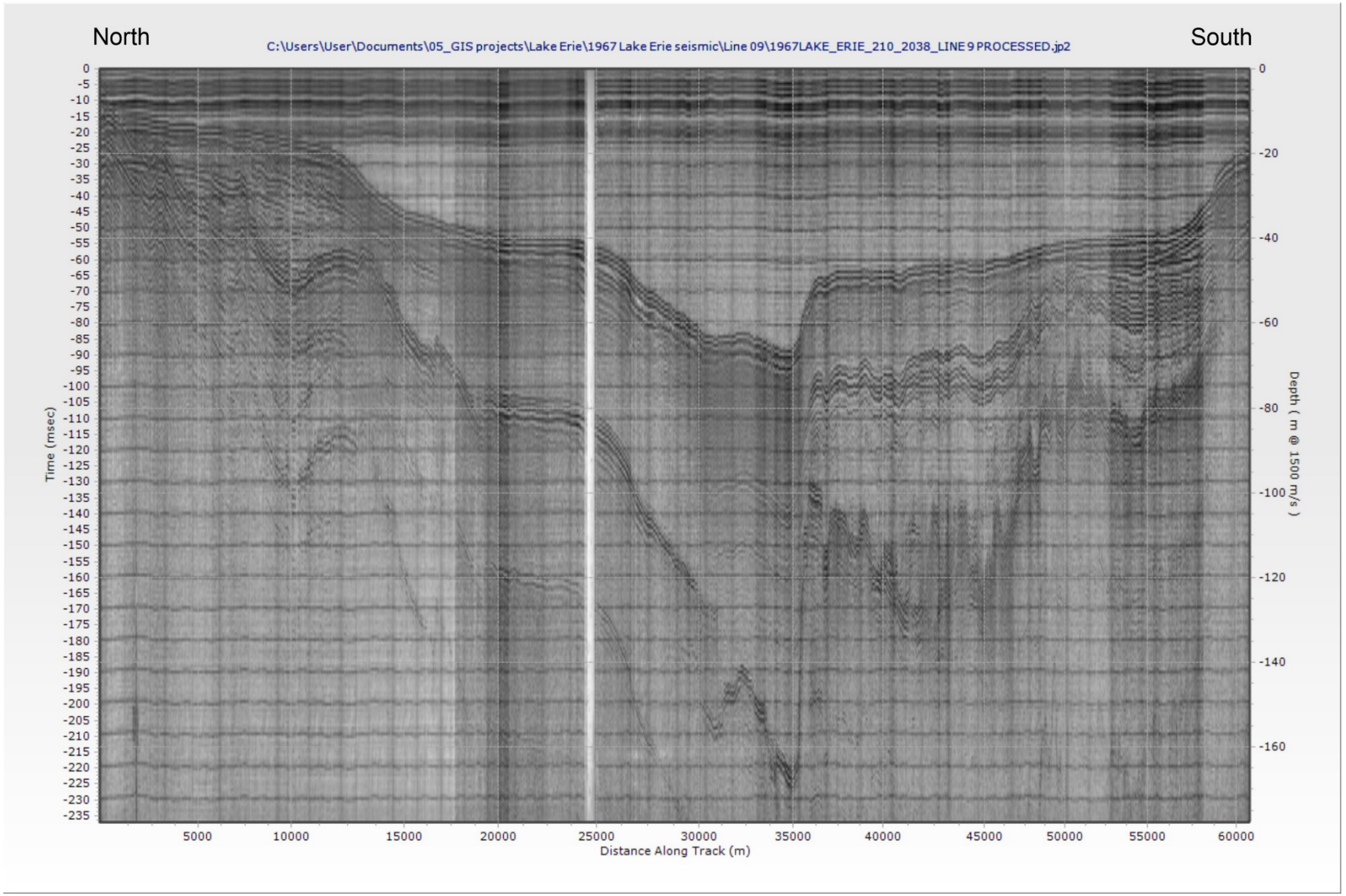


Figure 2j: Line 10 seismic reflection profile
1967 Lake Erie

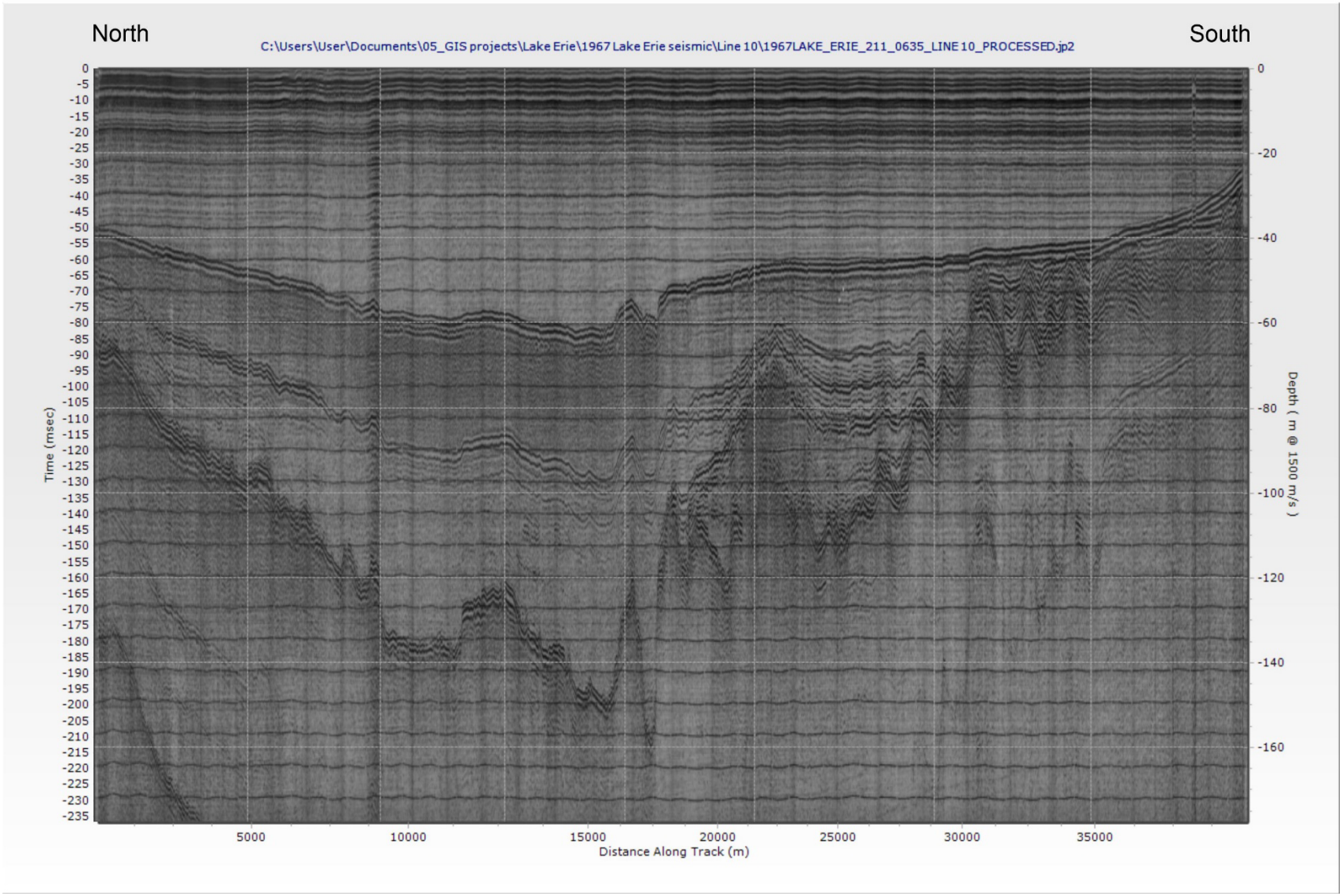


Figure 2k: Line 11 seismic reflection profile
1967 Lake Erie

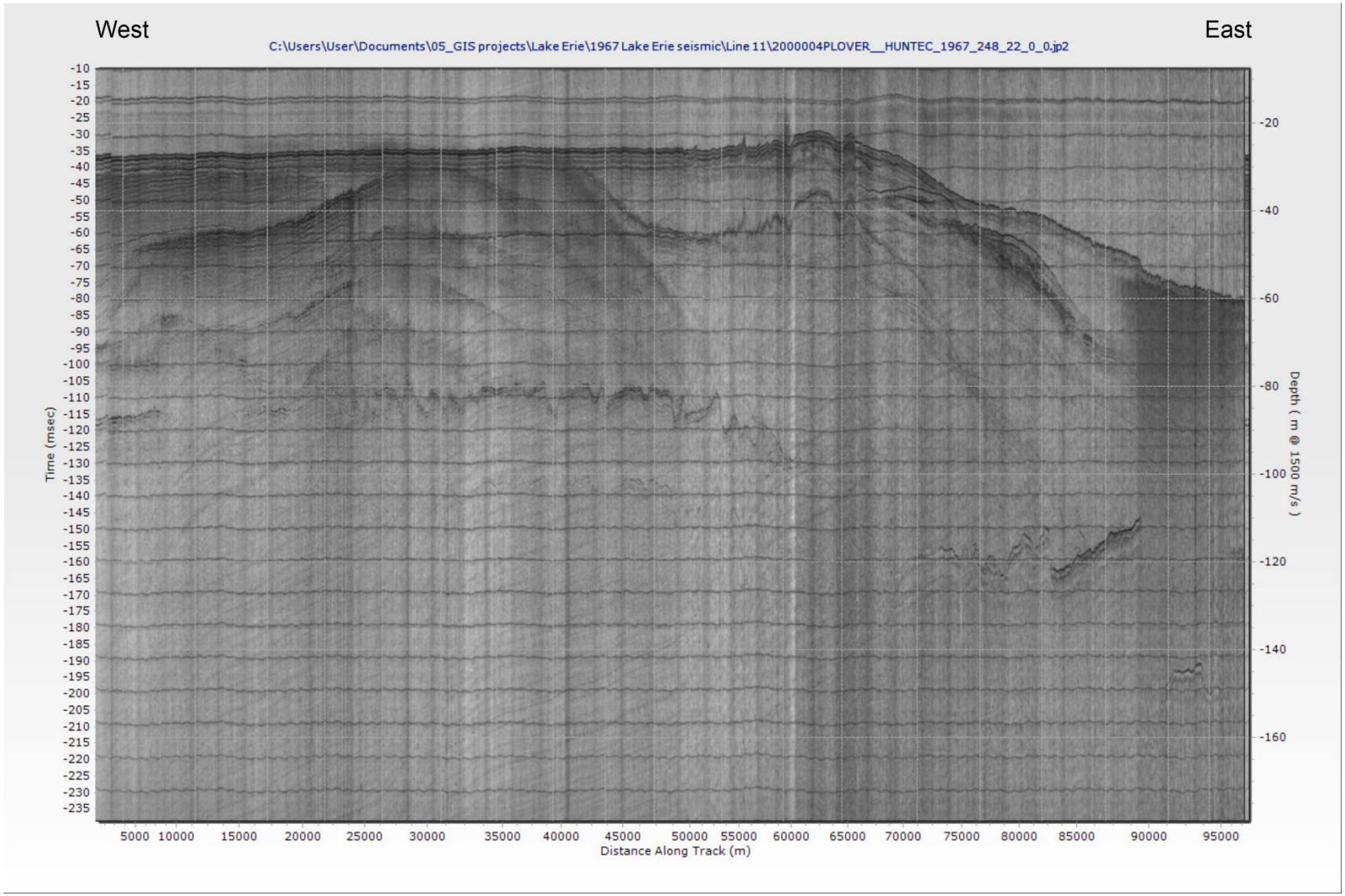


Figure 2l: Line 12 seismic reflection profile
1967 Lake Erie

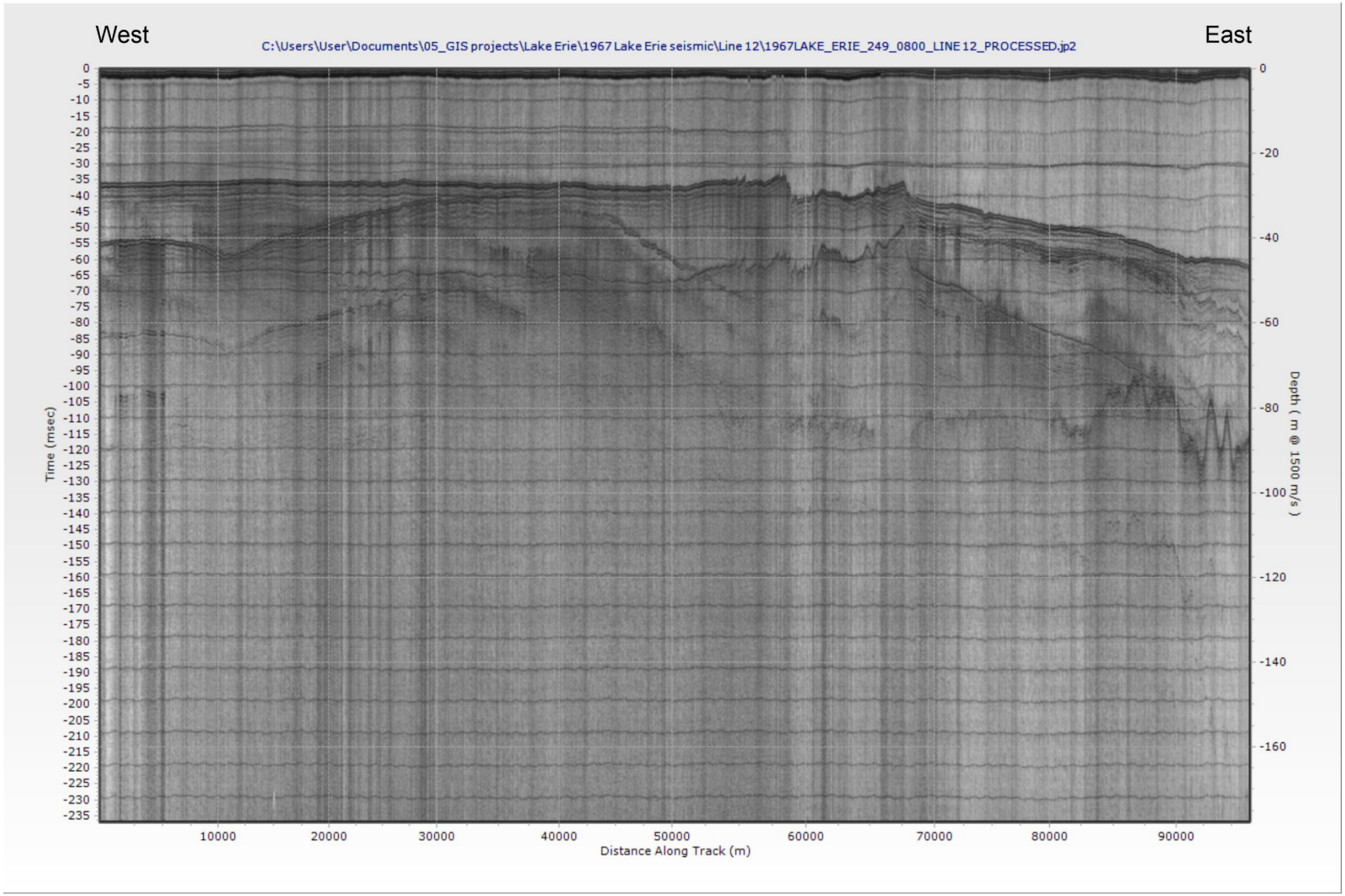


Figure 2m: Line 13 seismic reflection profile
1967 Lake Erie

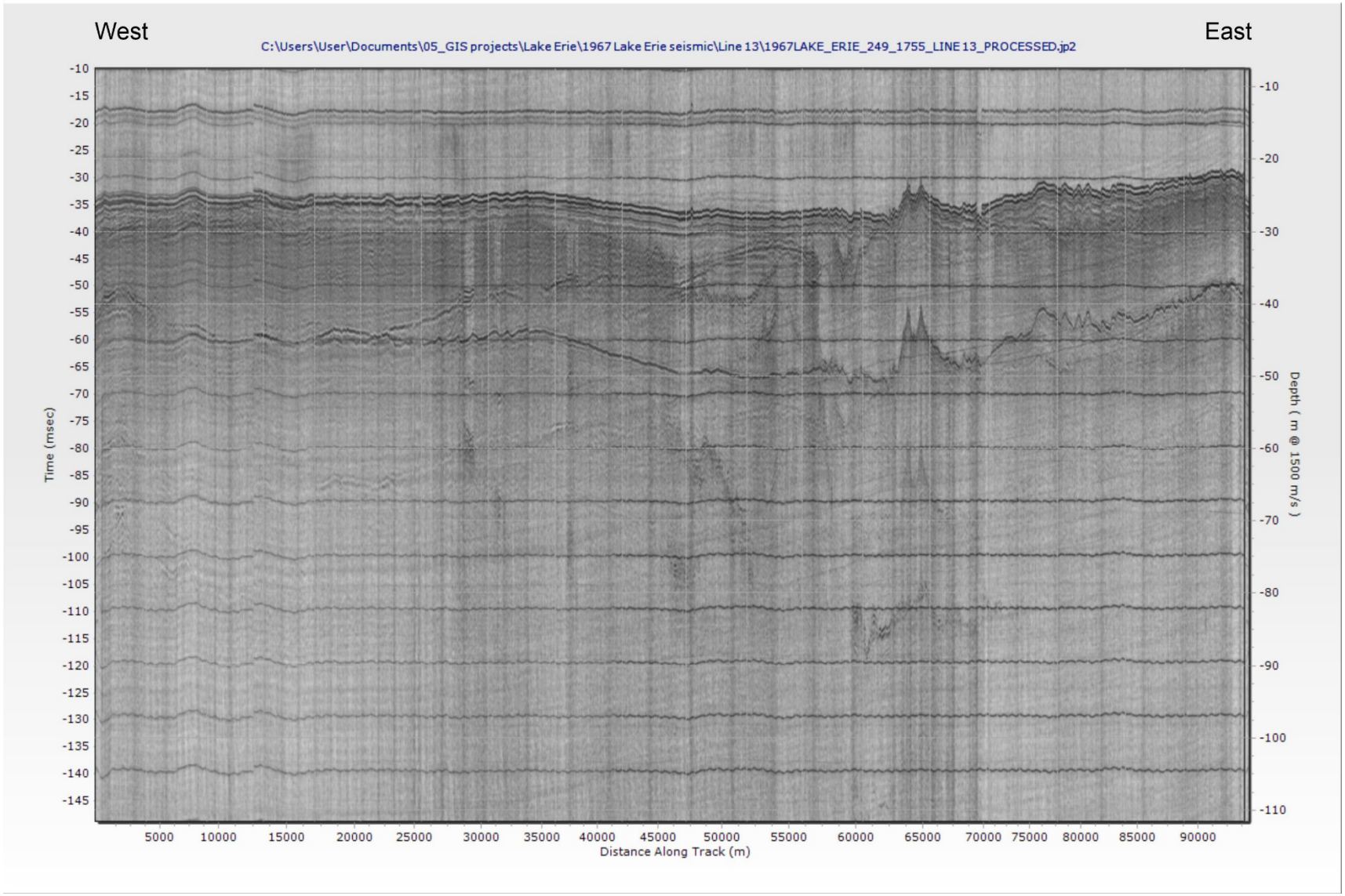


Figure 2n: Line 14 seismic reflection profile
1967 Lake Erie

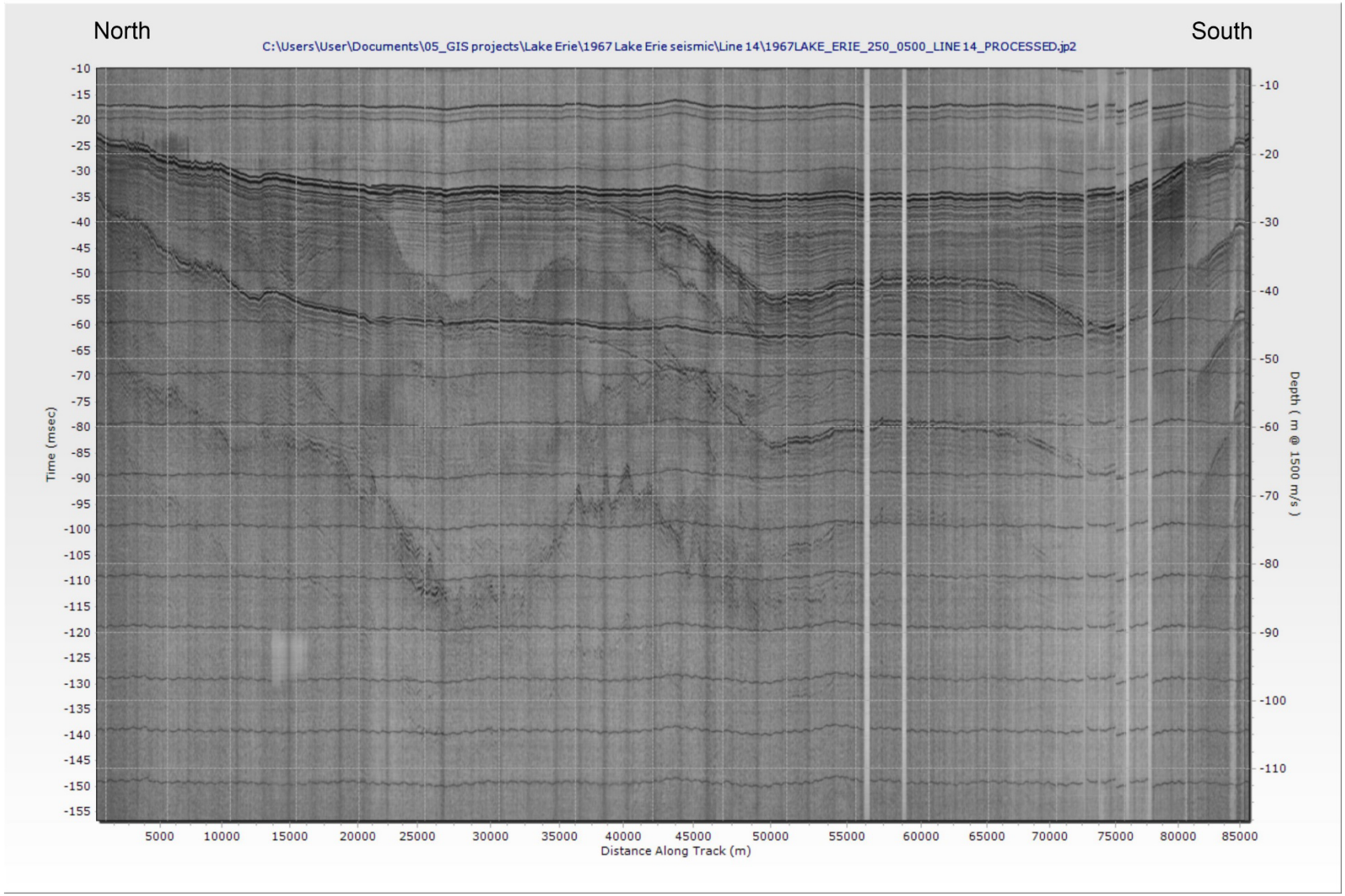


Figure 2o: Line 15 seismic reflection profile
1967 Lake Erie

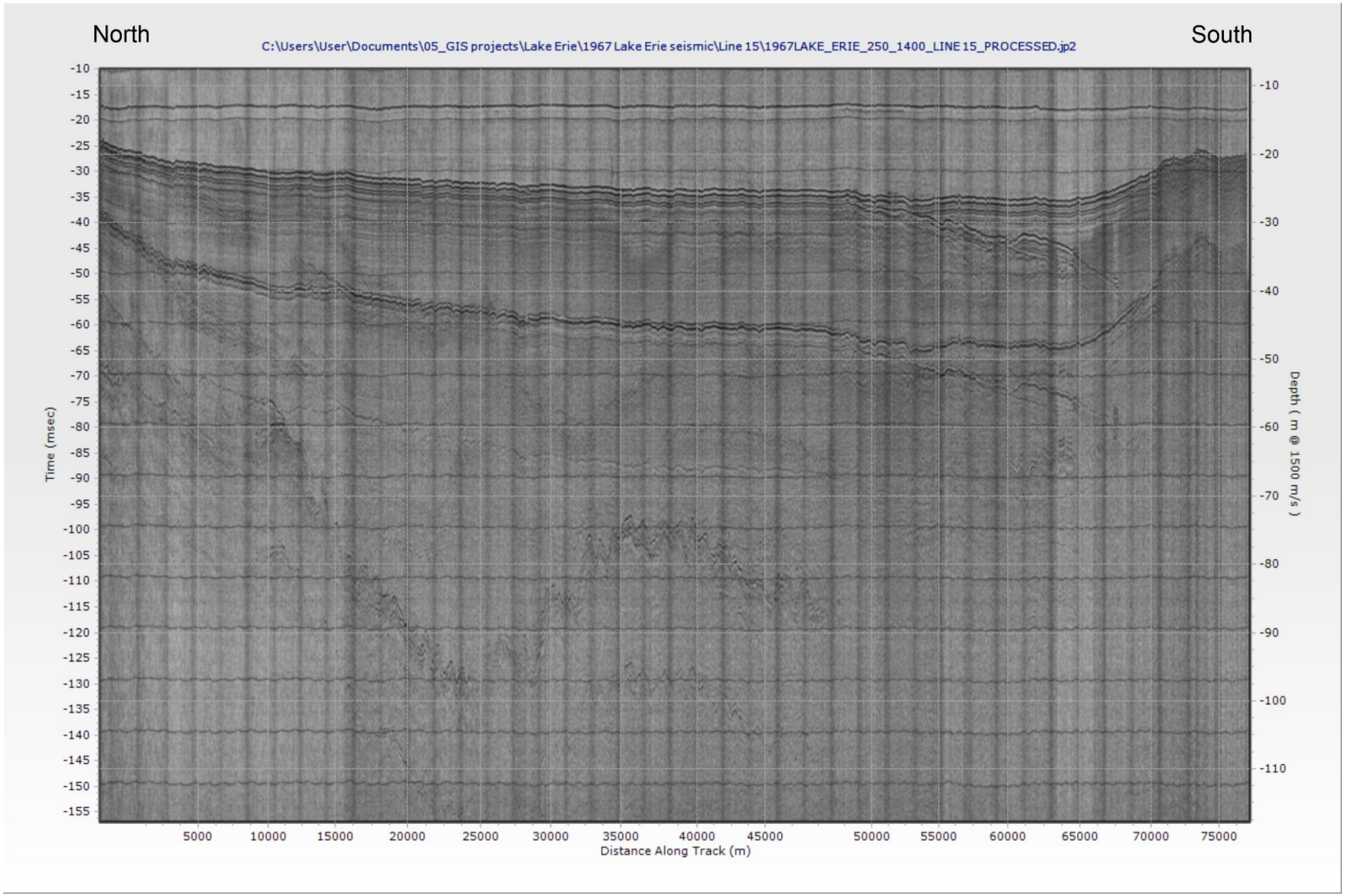


Figure 2p: Line 16 seismic reflection profile
1967 Lake Erie

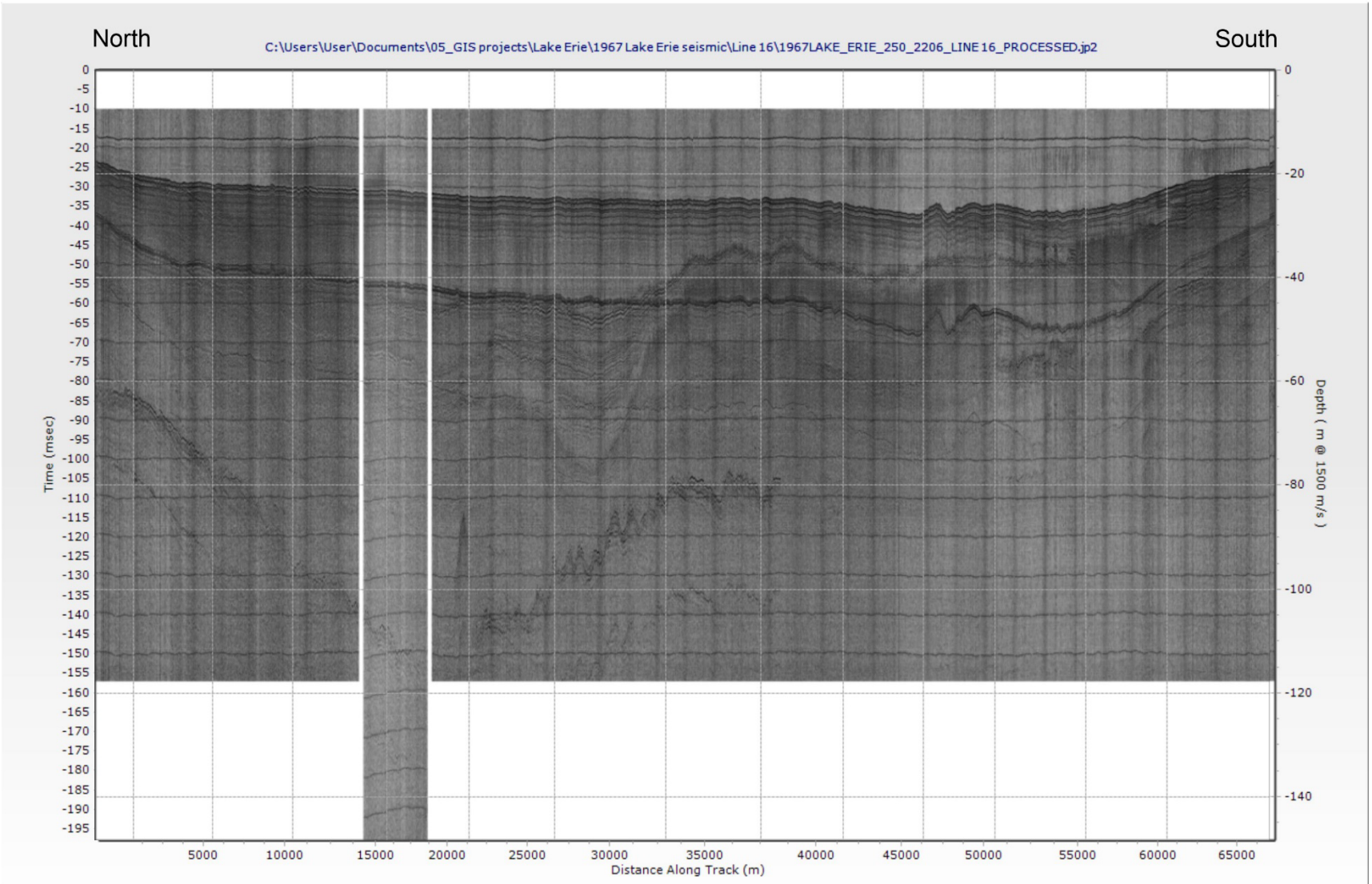


Figure 2q: Line 17 seismic reflection profile
1967 Lake Erie

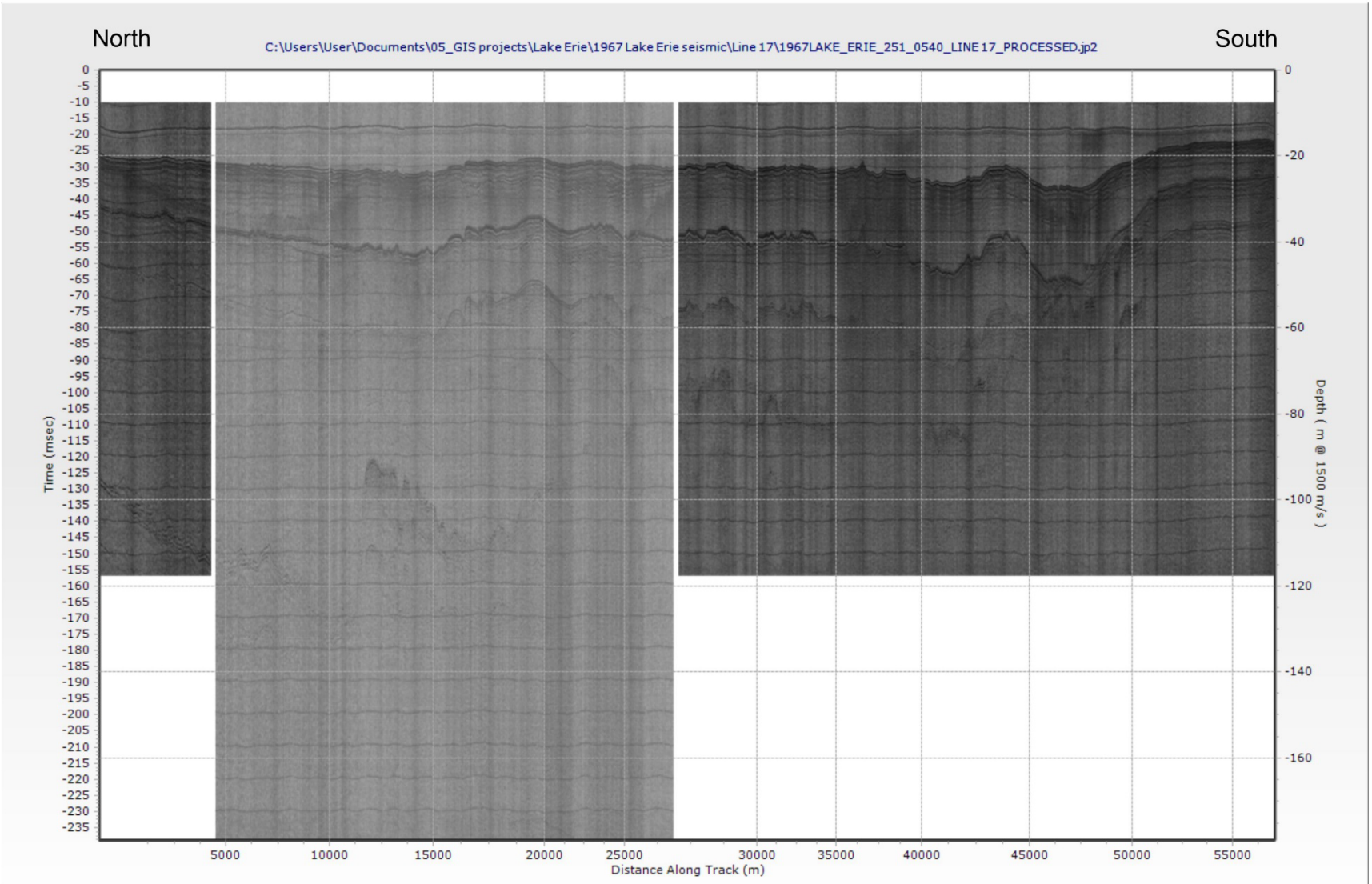


Figure 2r: Line 18 seismic reflection profile
1967 Lake Erie

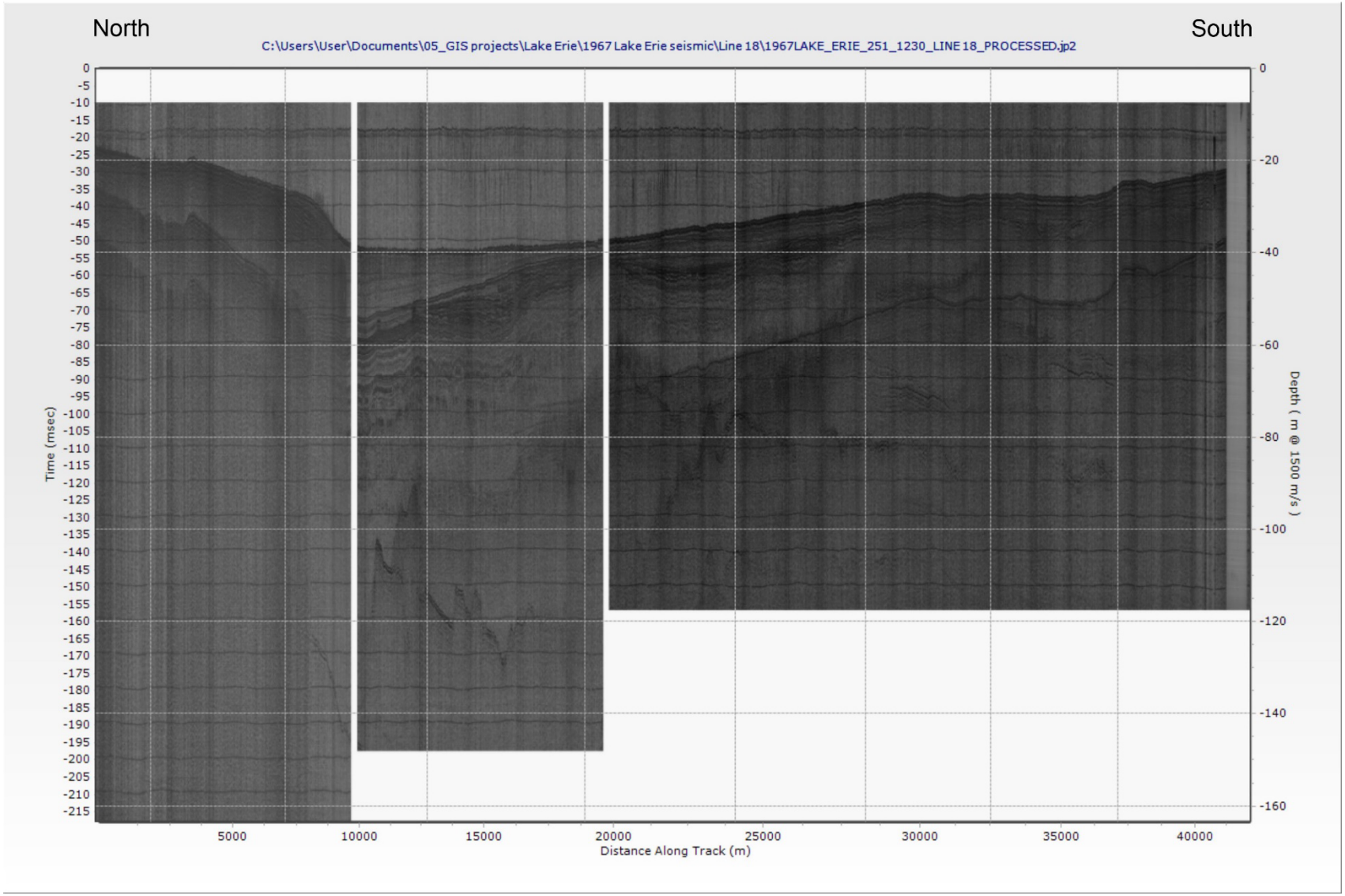


Figure 2s: Line 19 seismic reflection profile
1967 Lake Erie

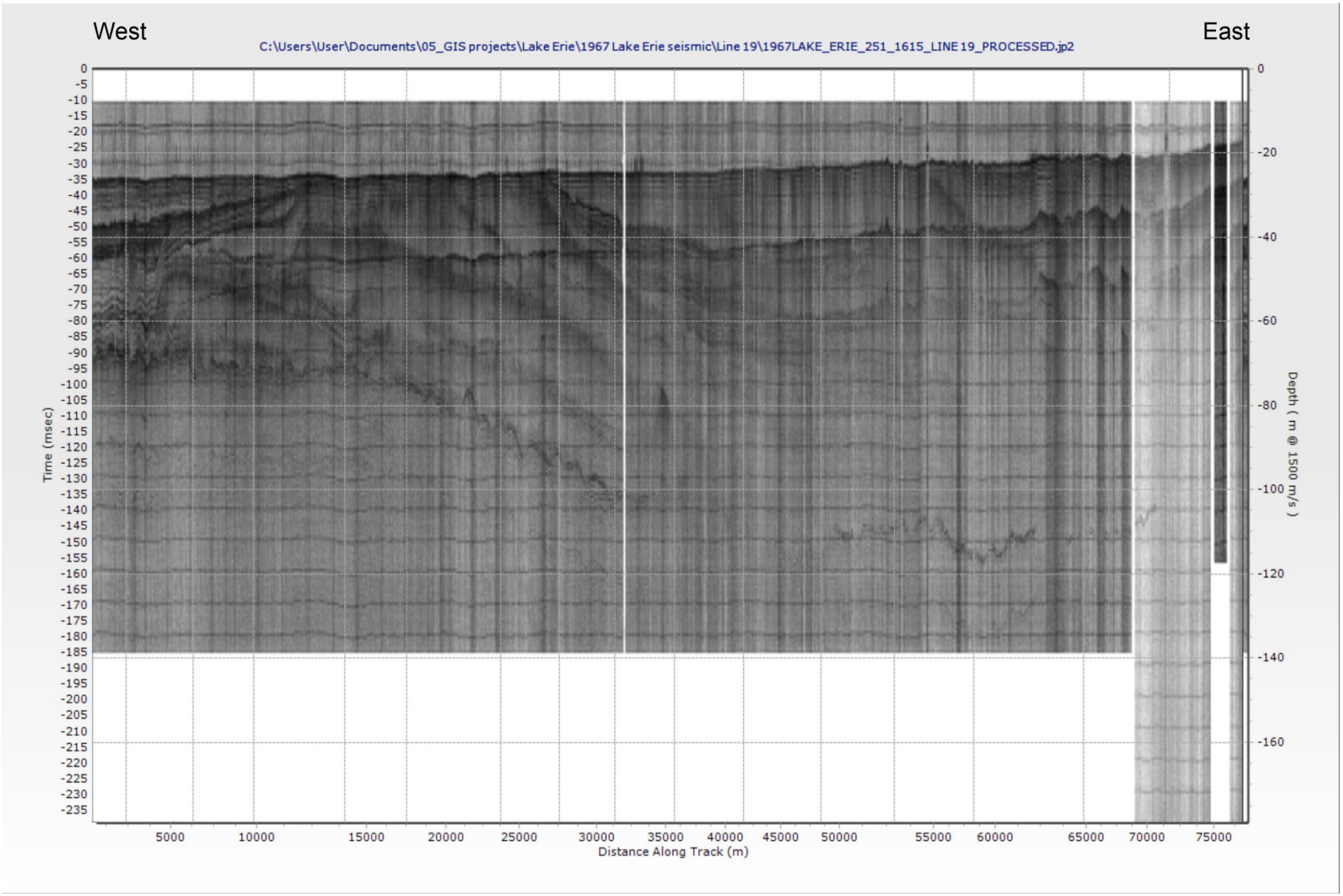


Figure 2t: Line 20 seismic reflection profile
1967 Lake Erie

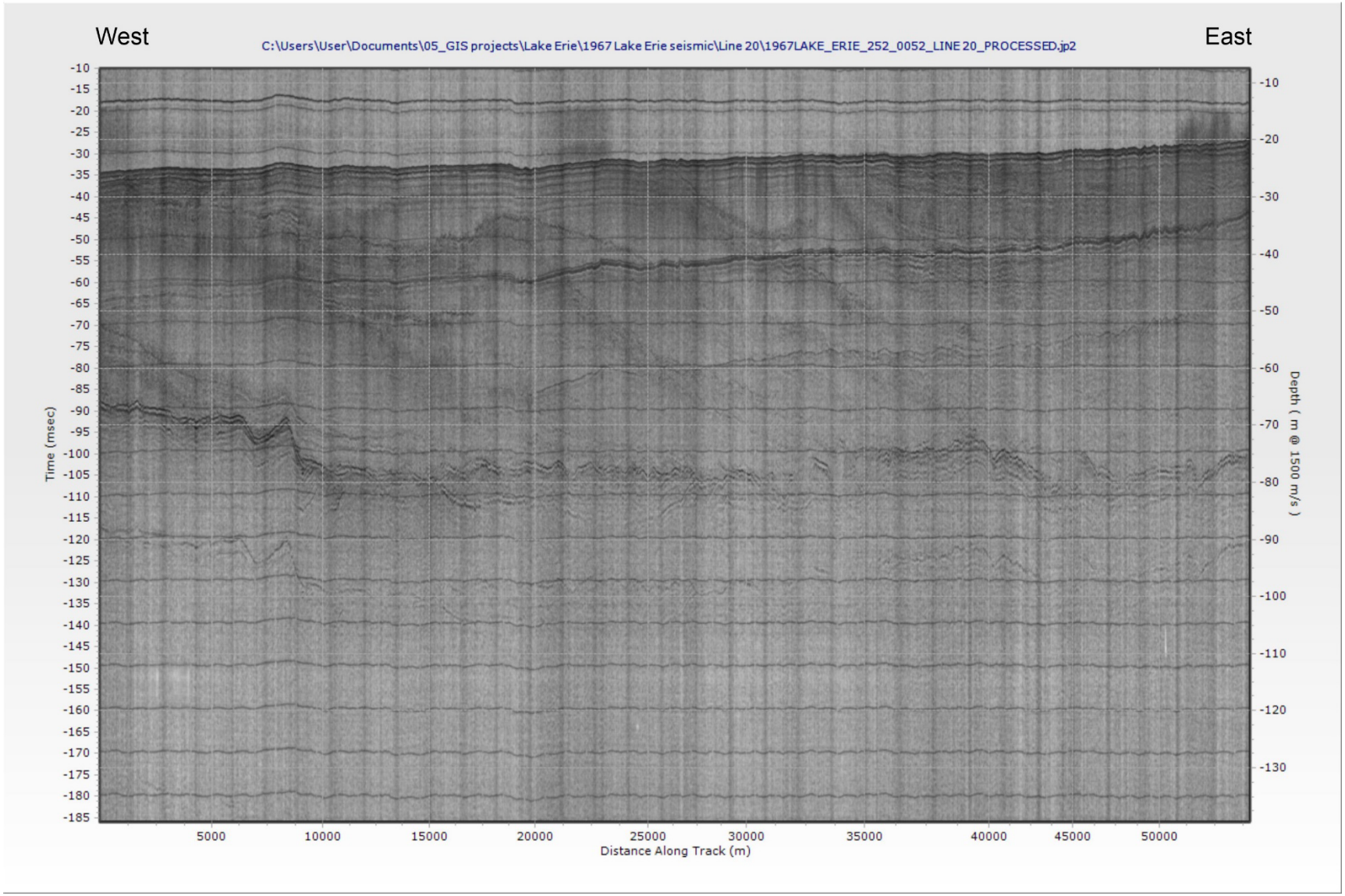


Figure 2u: Line 21 seismic reflection profile
1967 Lake Erie

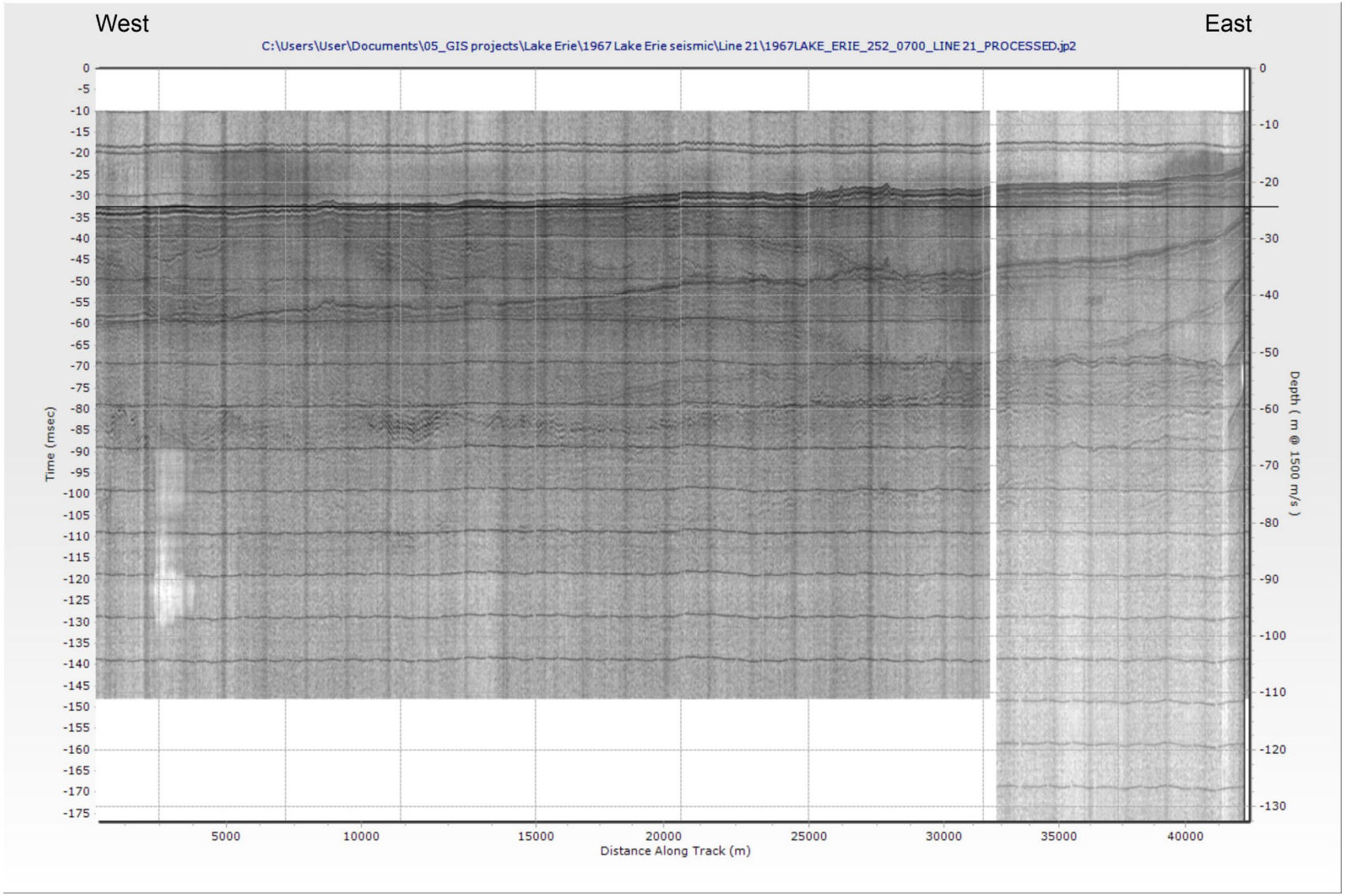


Figure 2v: Line 22 seismic reflection profile
1967 Lake Erie

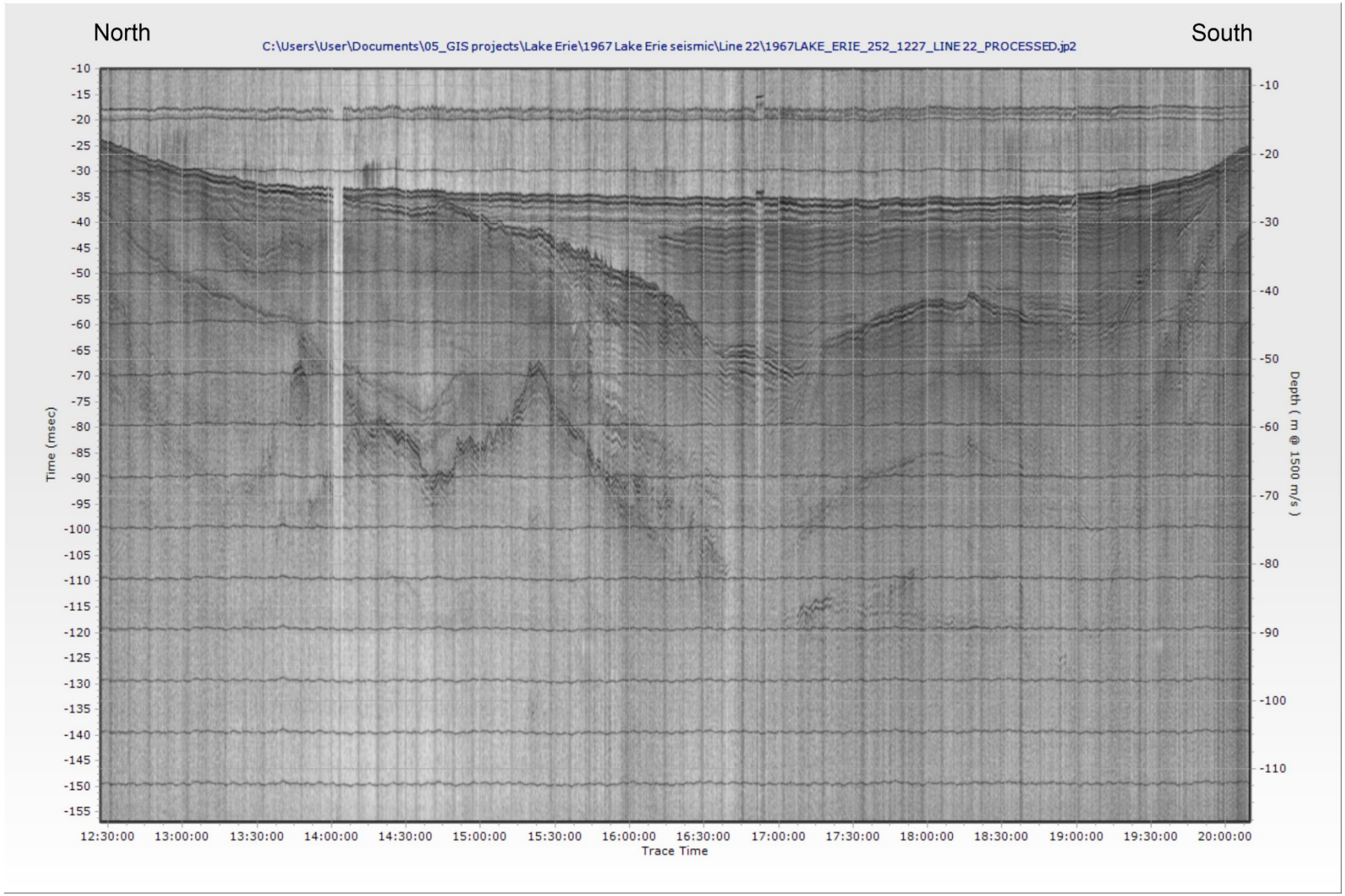


Figure 2w: Line 23 seismic reflection profile
1967 Lake Erie

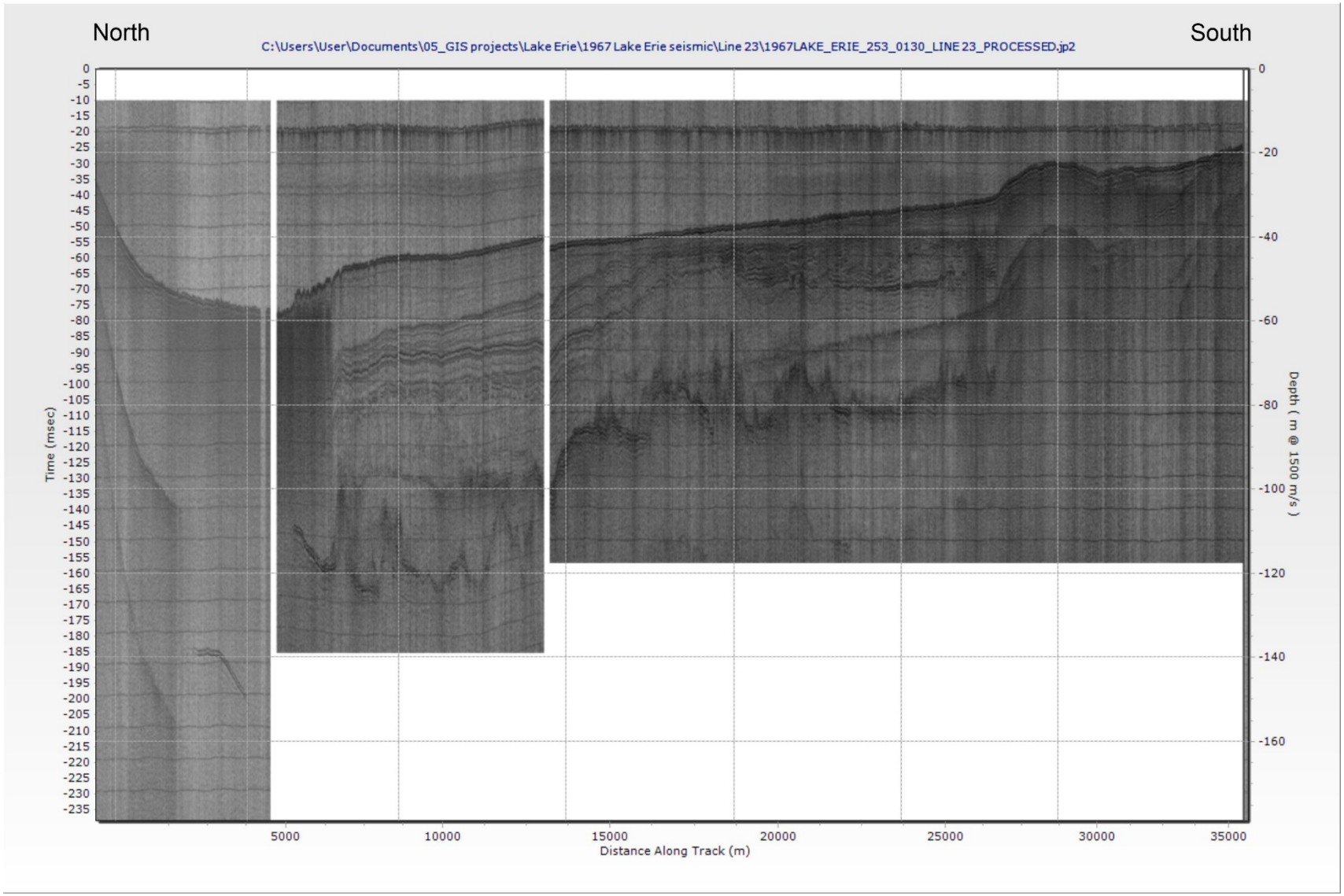
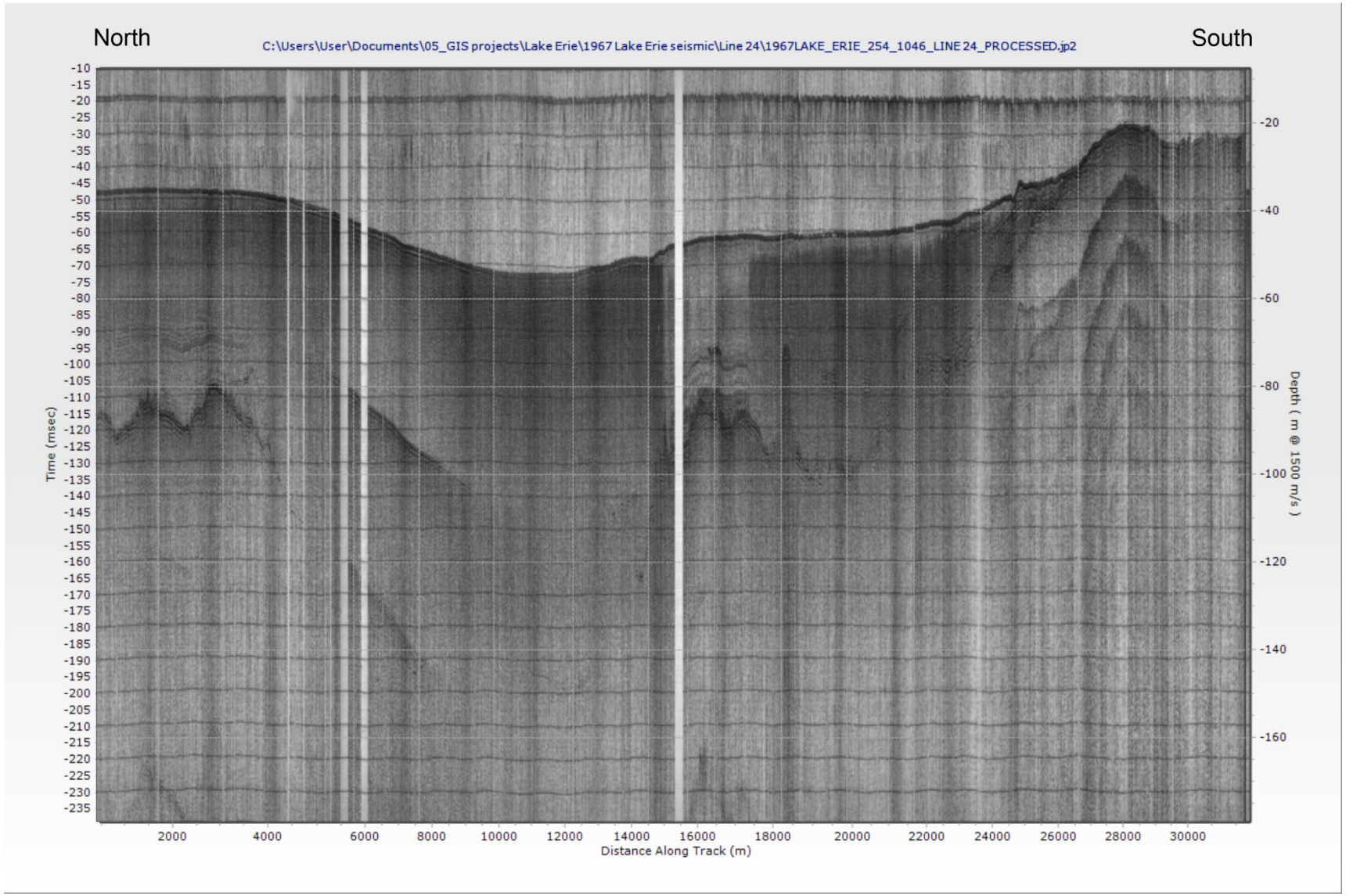


Figure 2x: Line 24 seismic reflection profile
1967 Lake Erie



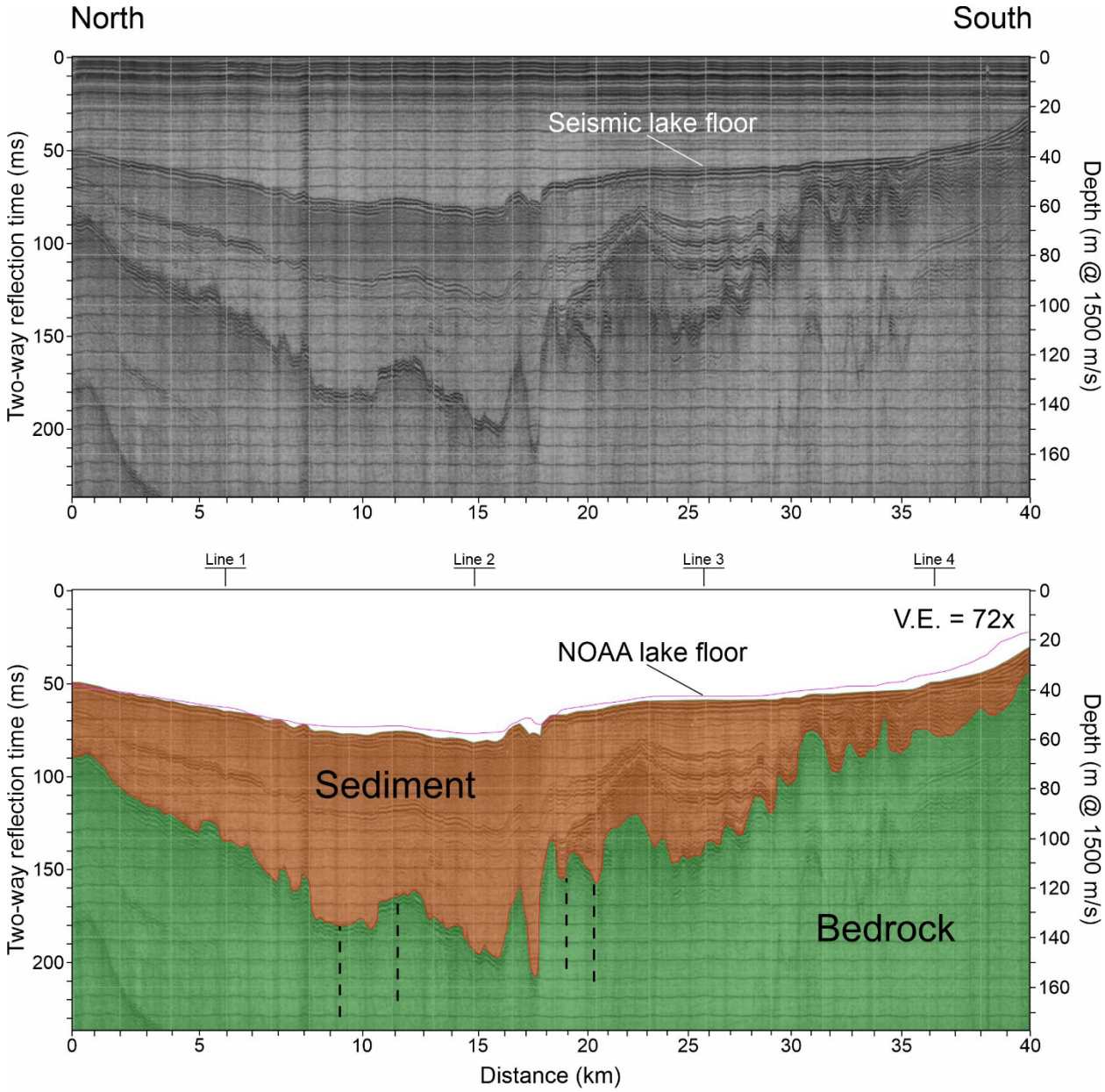


Figure 3. Upper: Processed line 10 seismic reflection profile.
Lower: Interpreted profile illustrating the uneven bedrock surface (red line) and the overlying package of glacial and post-glacial sediments (orange). Assumed faults in bedrock from the sediment isopach map (Figure 5) are shown by dashed black lines. Tie locations along line 10 with lines 1 to 4 are indicated.

Figure 4a: Line 1 Bathymetric Profile
1967 Lake Erie

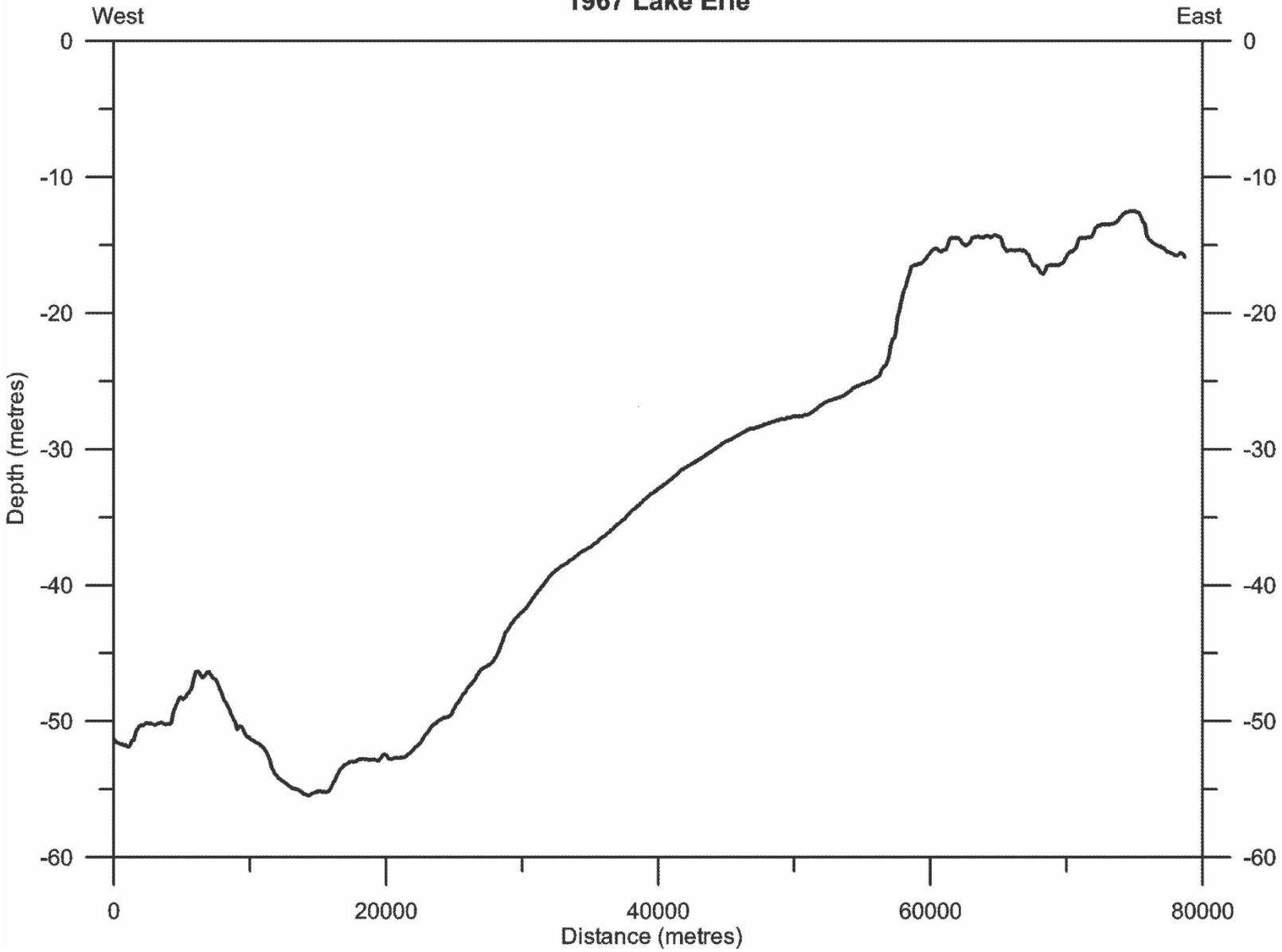


Figure 4b: Line 2 Bathymetric Profile
1967 Lake Erie

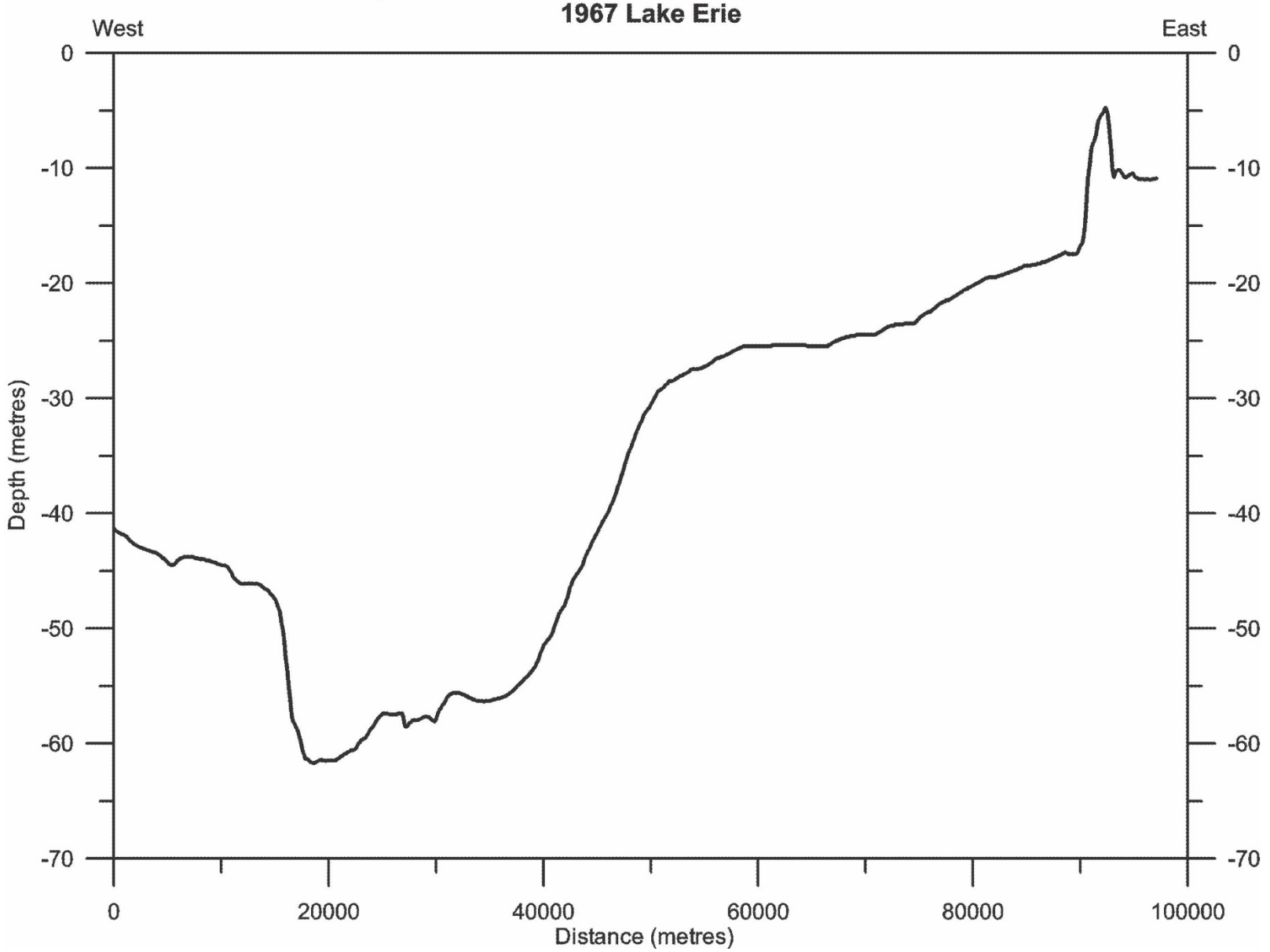


Figure 4c: Line 3 Bathymetric Profile
1967 Lake Erie

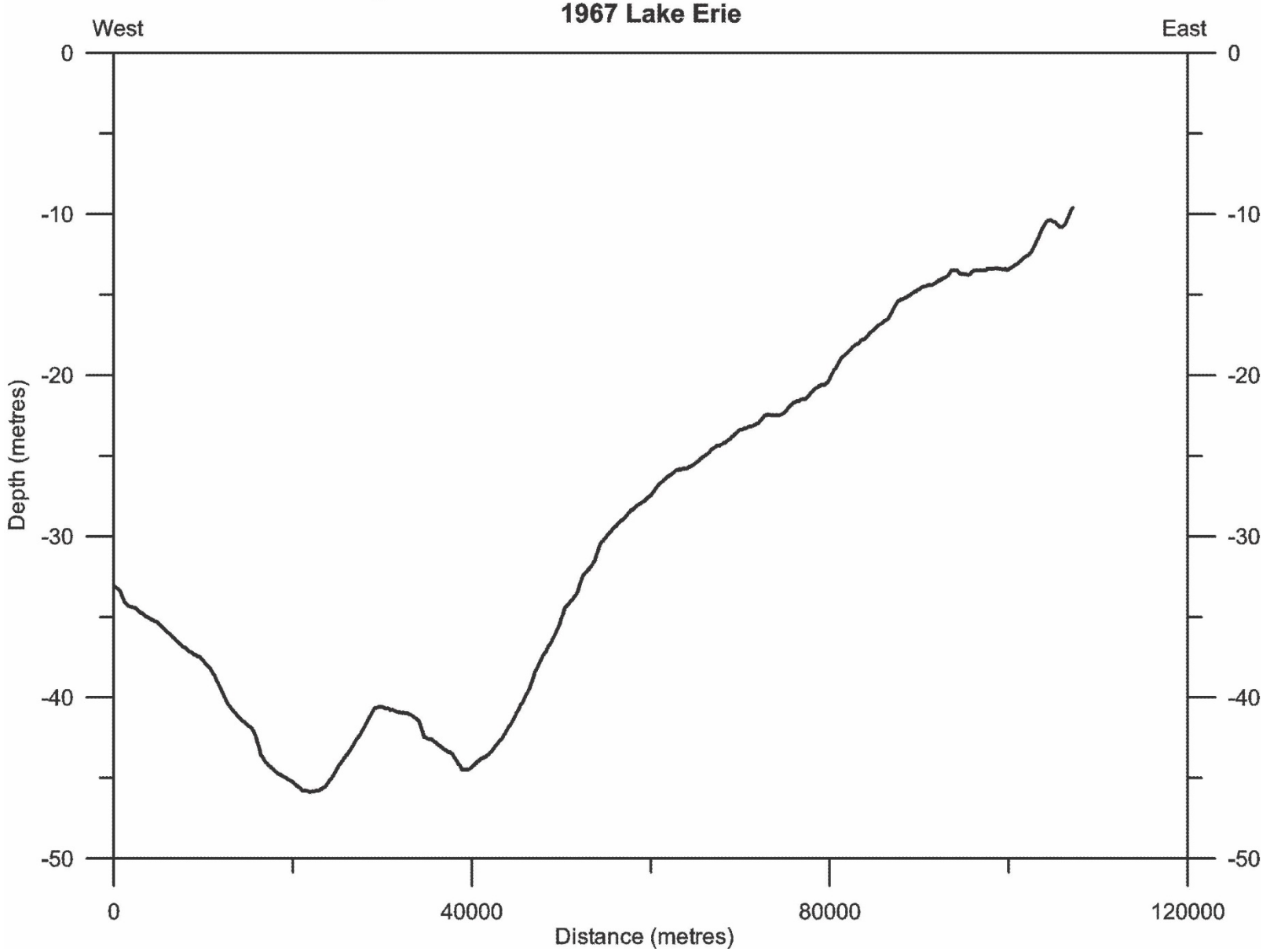


Figure 4d: Line 4 Bathymetric Profile
1967 Lake Erie

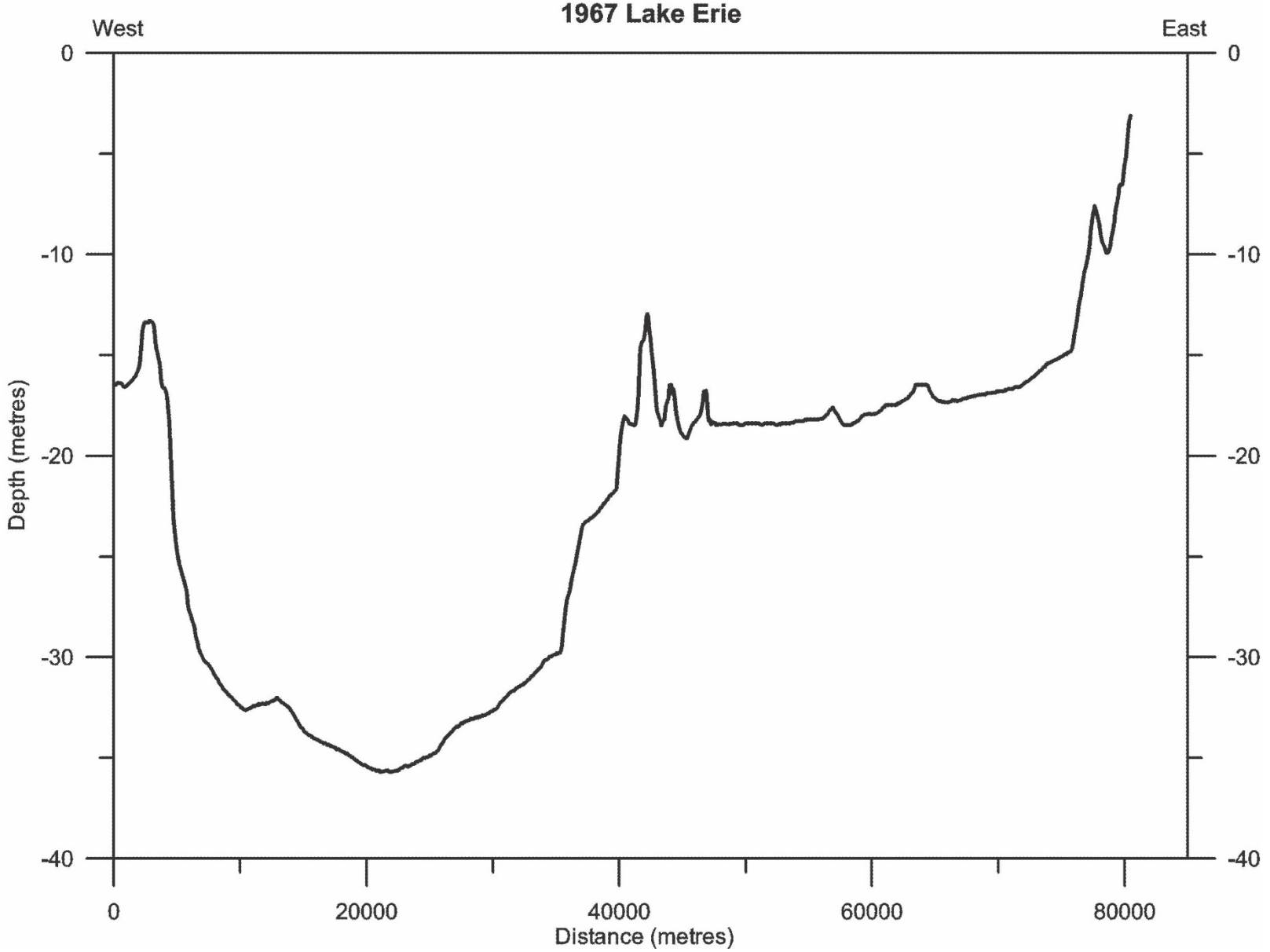


Figure 4e: Line 5 Bathymetric Profile
1967 Lake Erie

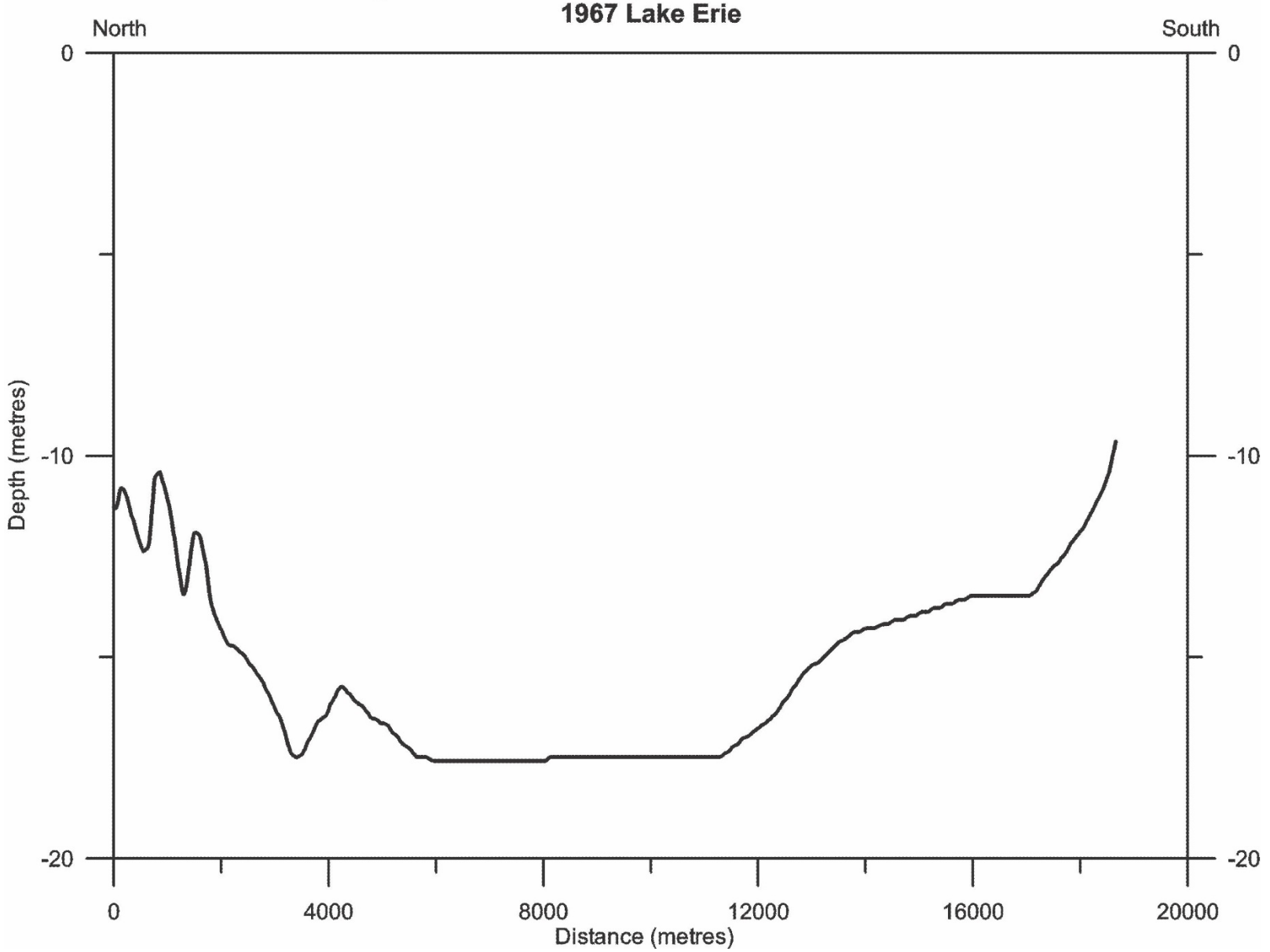


Figure 4f: Line 6 Bathymetric Profile
1967 Lake Erie

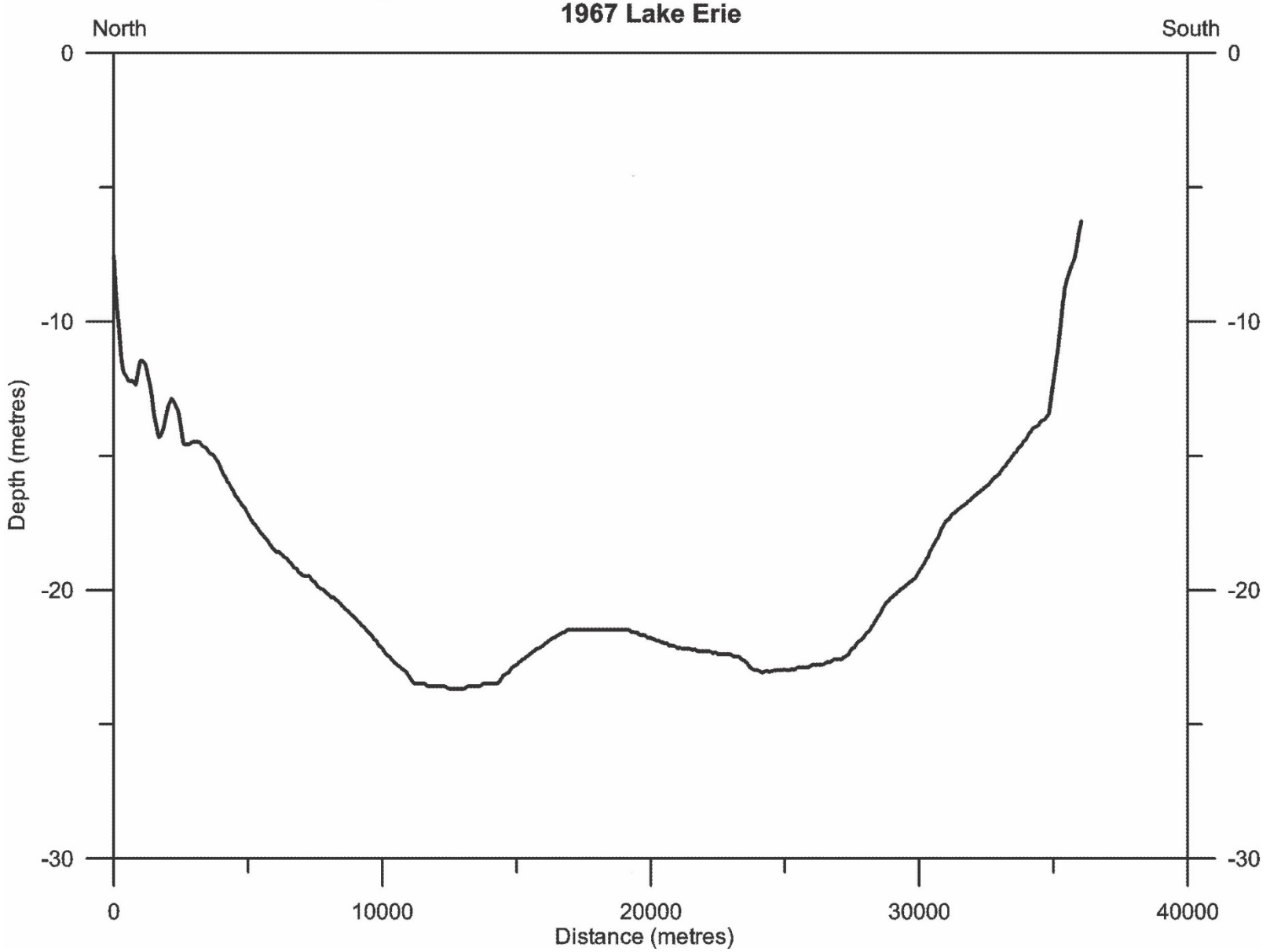


Figure 4g: Line 7 Bathymetric Profile
1967 Lake Erie

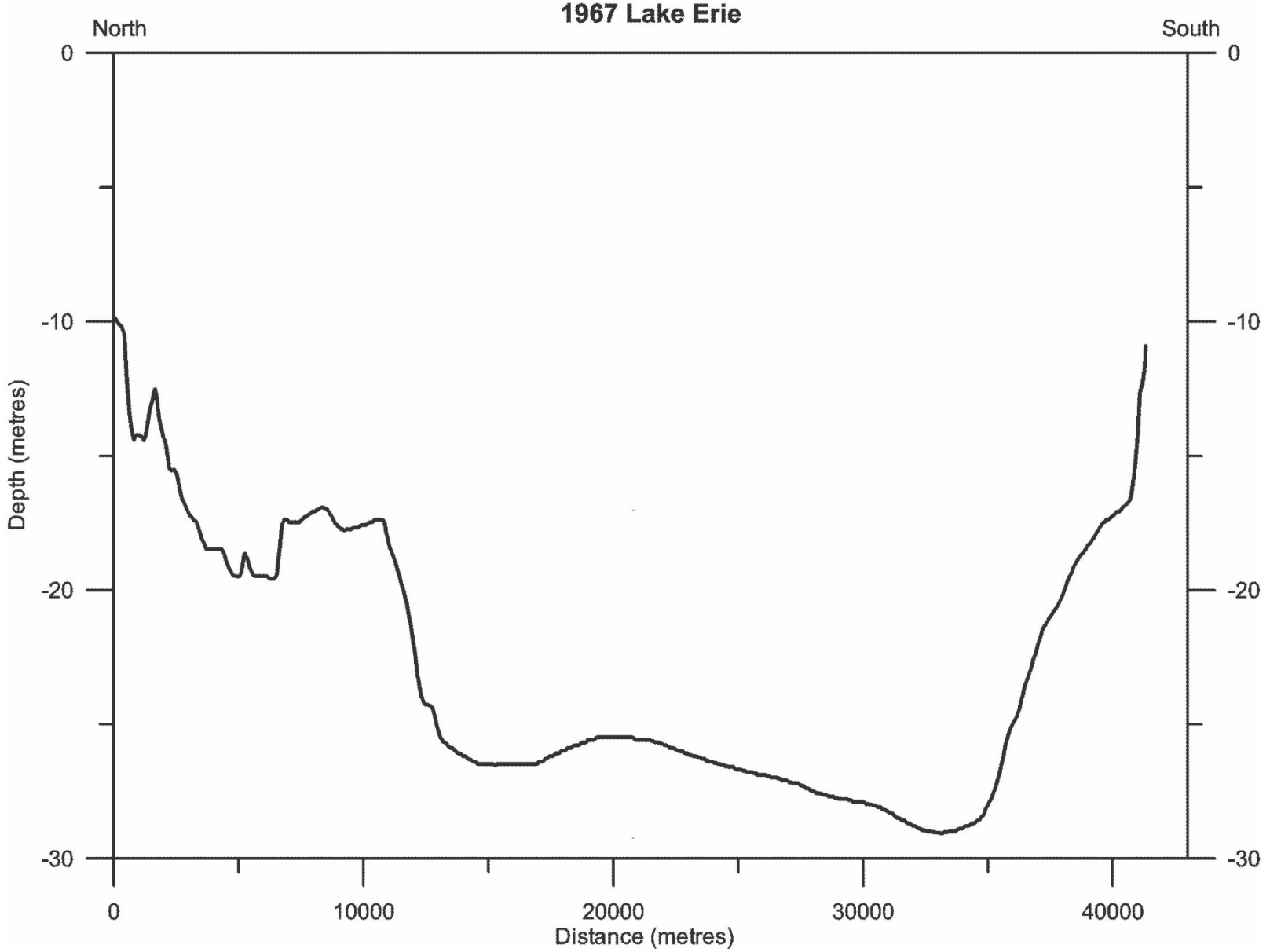


Figure 4h: Line 8 Bathymetric Profile
1967 Lake Erie

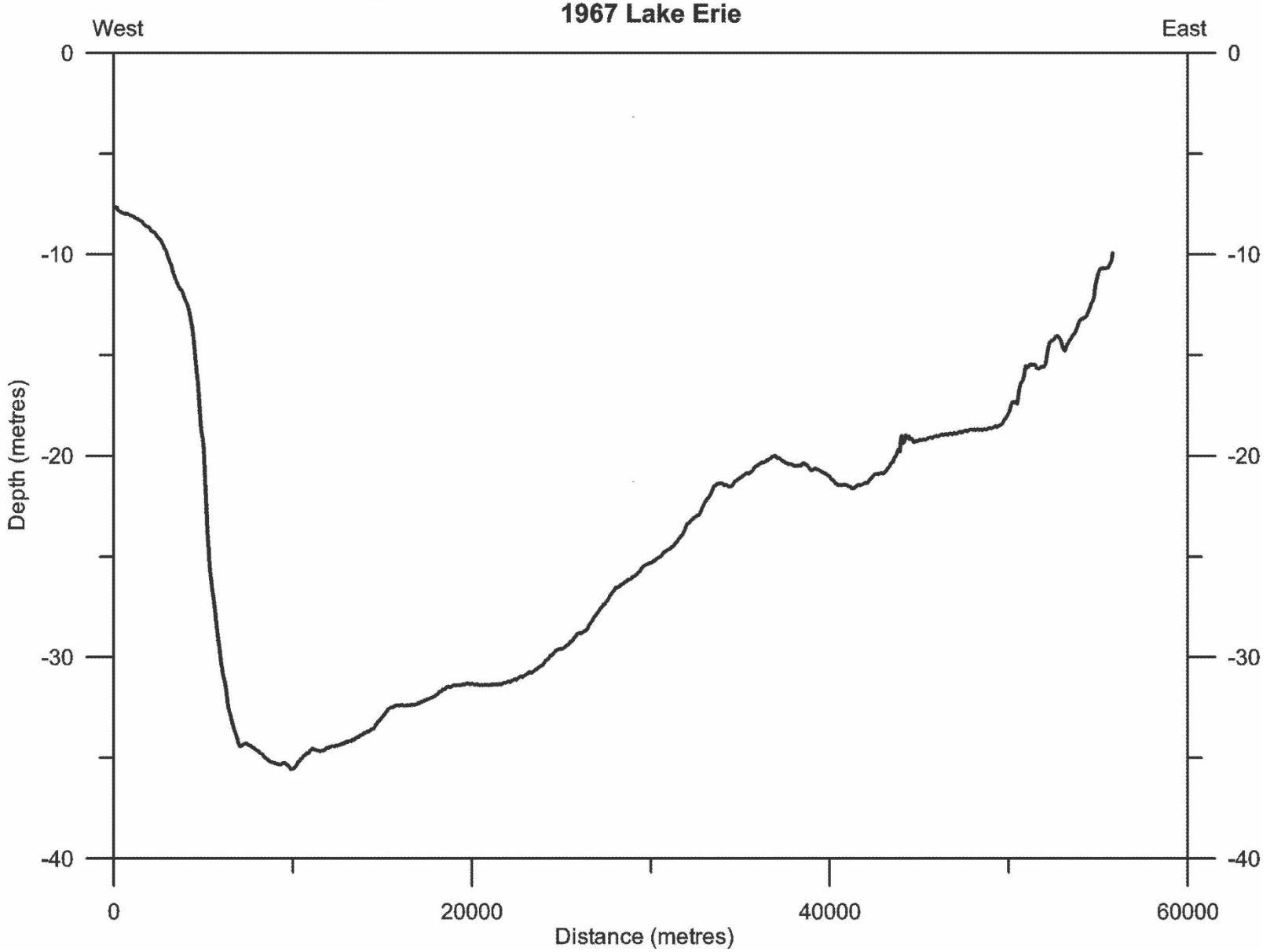


Figure 4i: Line 9 Bathymetric Profile
1967 Lake Erie

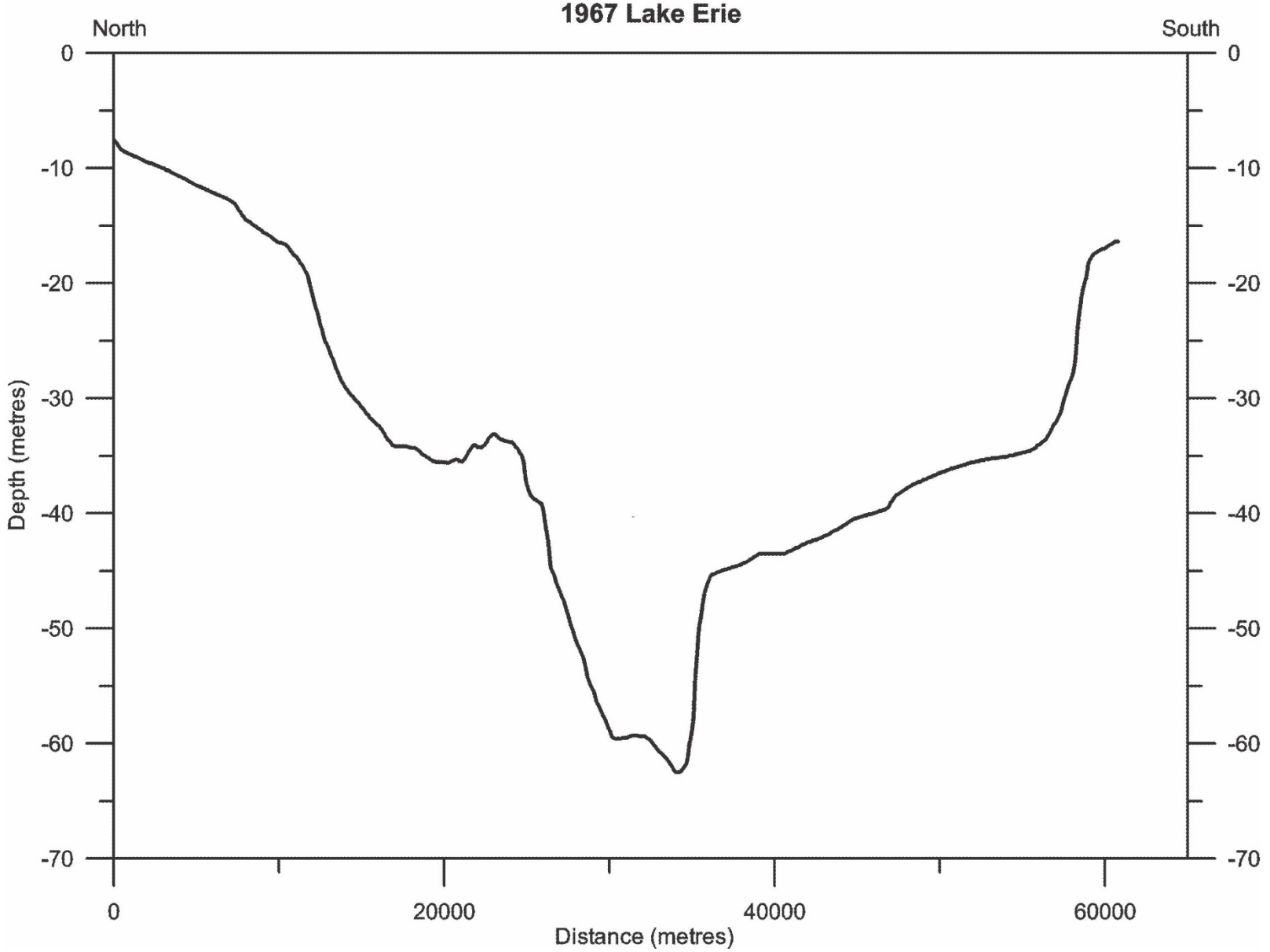


Figure 4j: Line 10 Bathymetric Profile
1967 Lake Erie

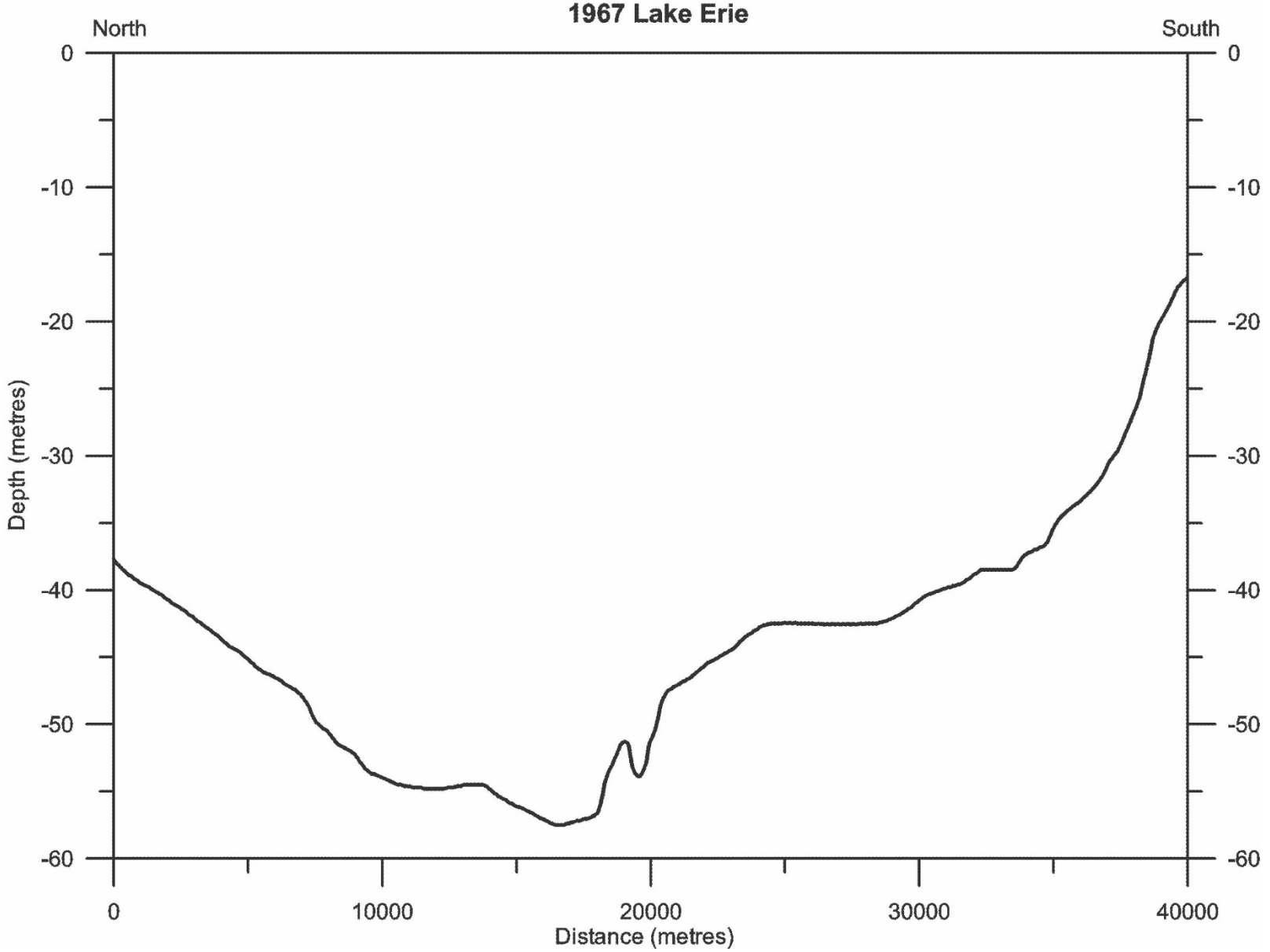


Figure 4k: Line 11 Bathymetric Profile
1967 Lake Erie

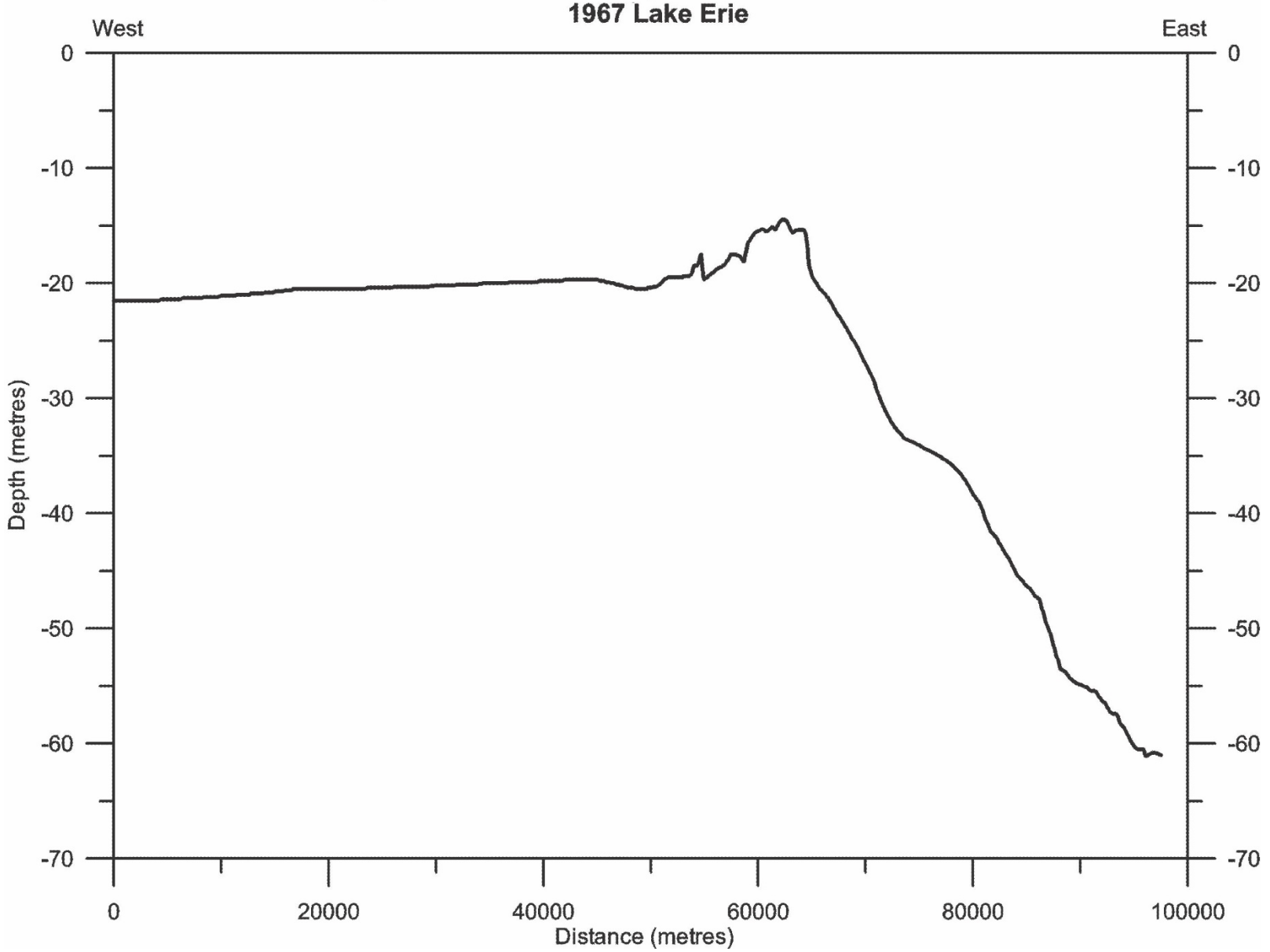


Figure 4l: Line 12 Bathymetric Profile
1967 Lake Erie

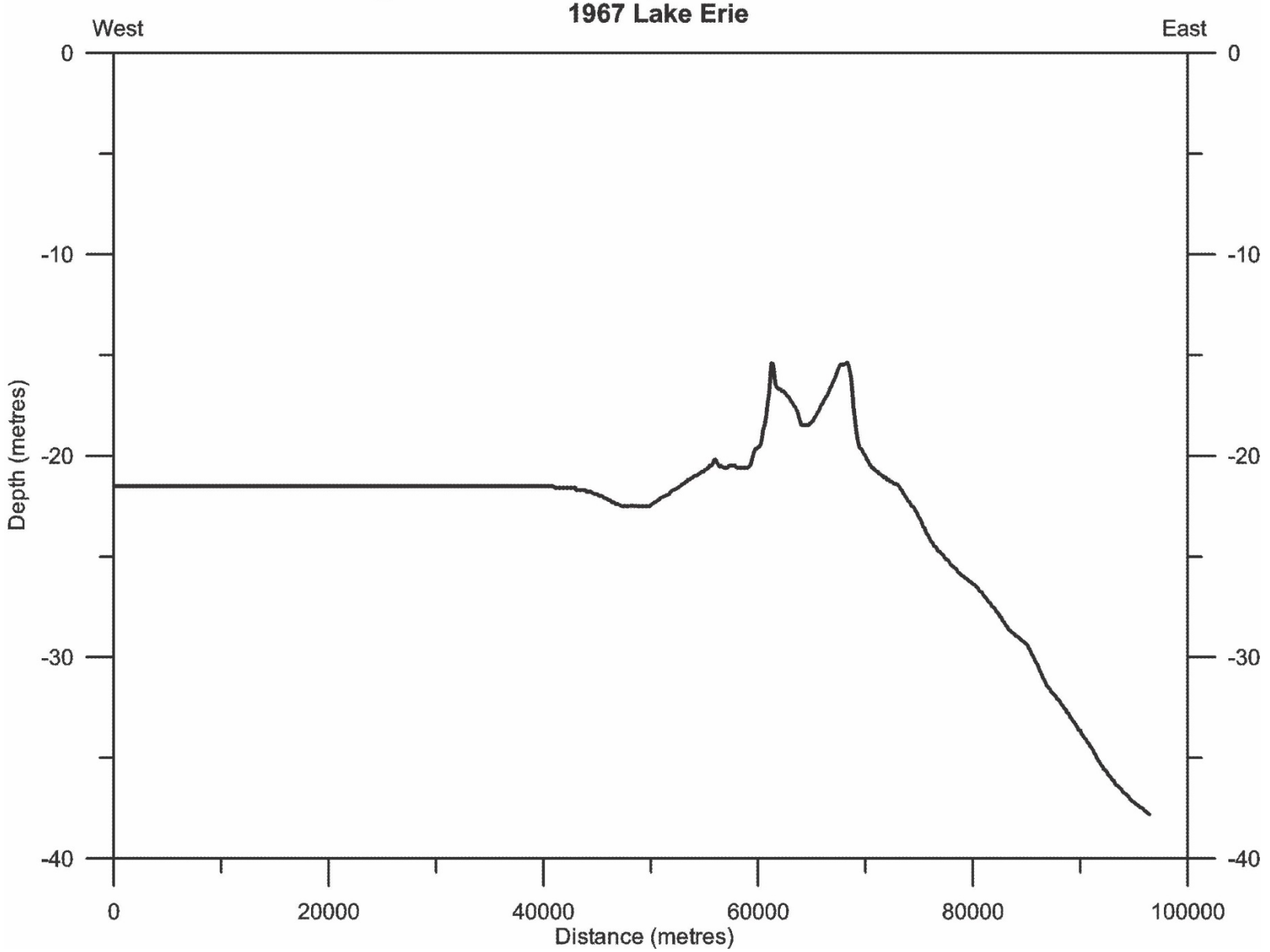


Figure 4m: Line 13 Bathymetric Profile
1967 Lake Erie

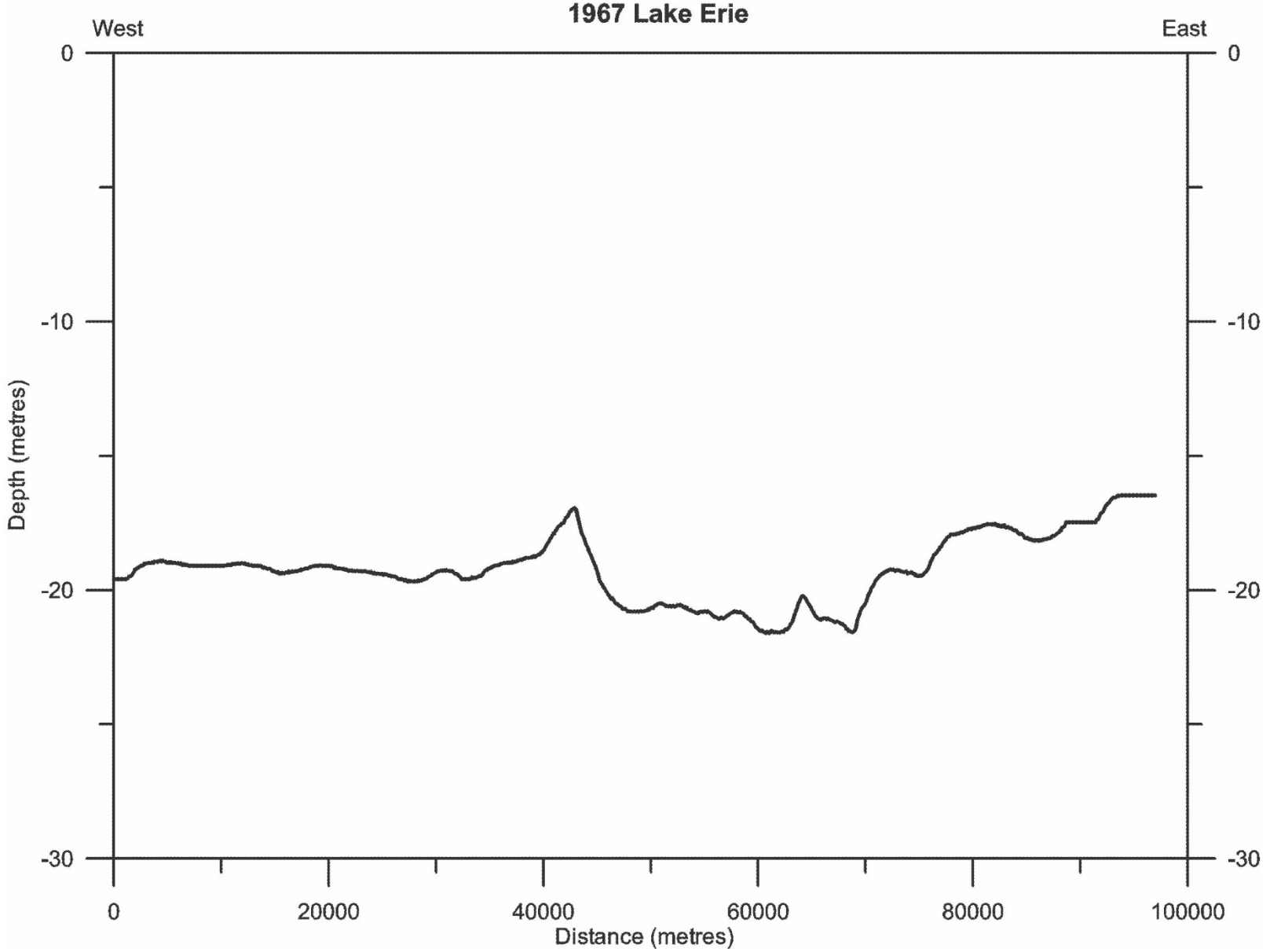


Figure 4n: Line 14 Bathymetric Profile
1967 Lake Erie

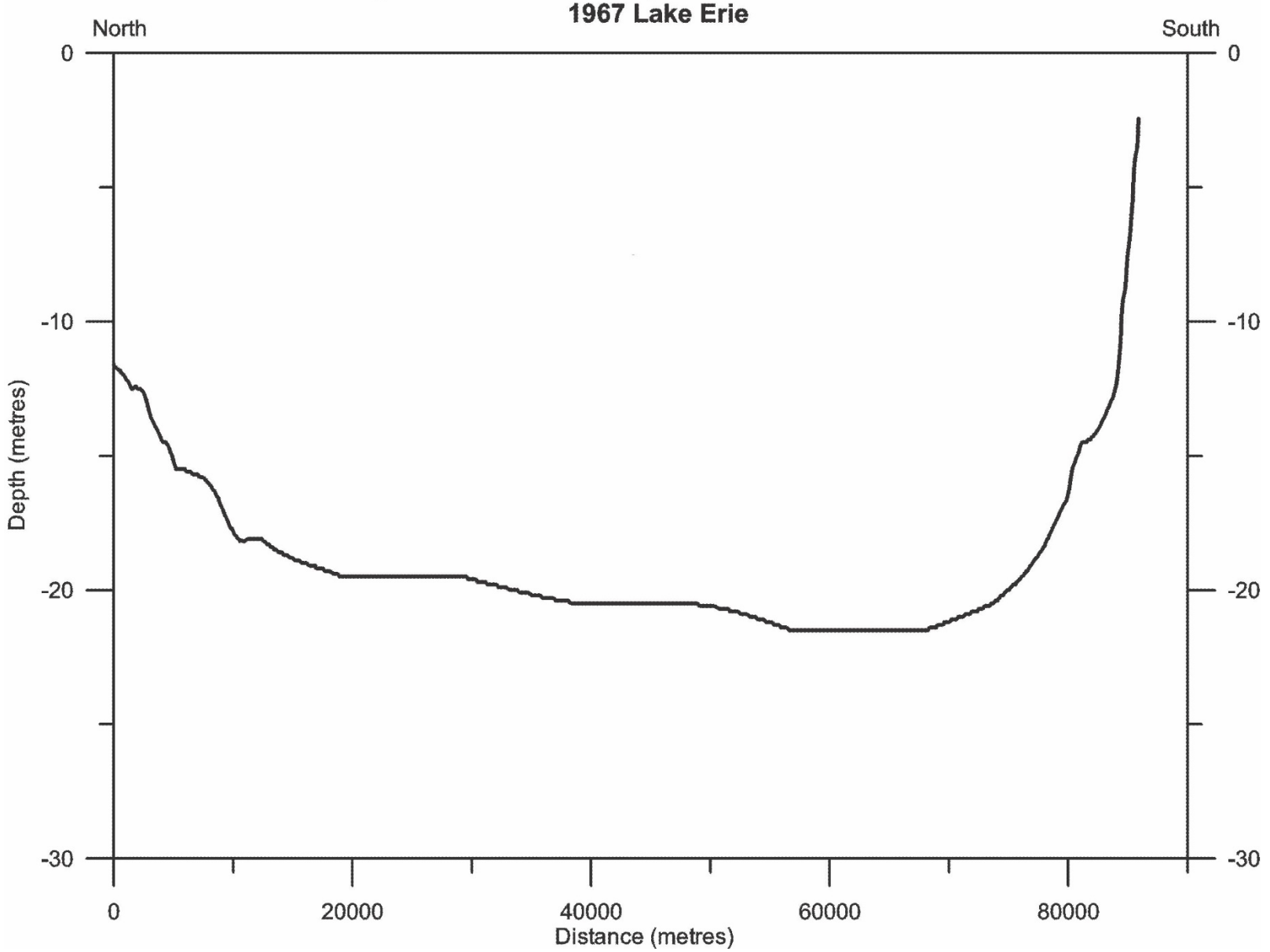


Figure 4o: Line 15 Bathymetric Profile
1967 Lake Erie

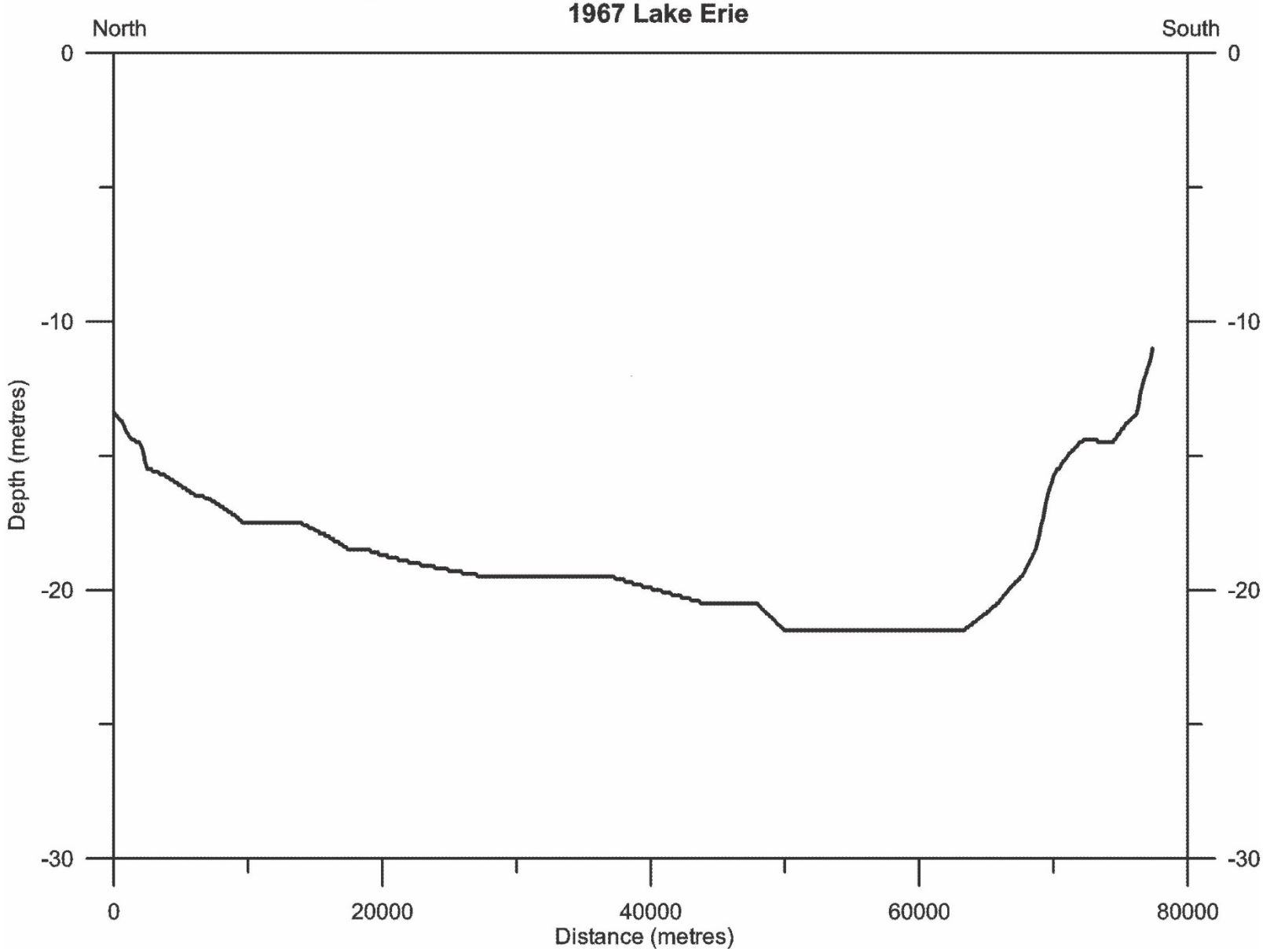


Figure 4p: Line 16 Bathymetric Profile
1967 Lake Erie

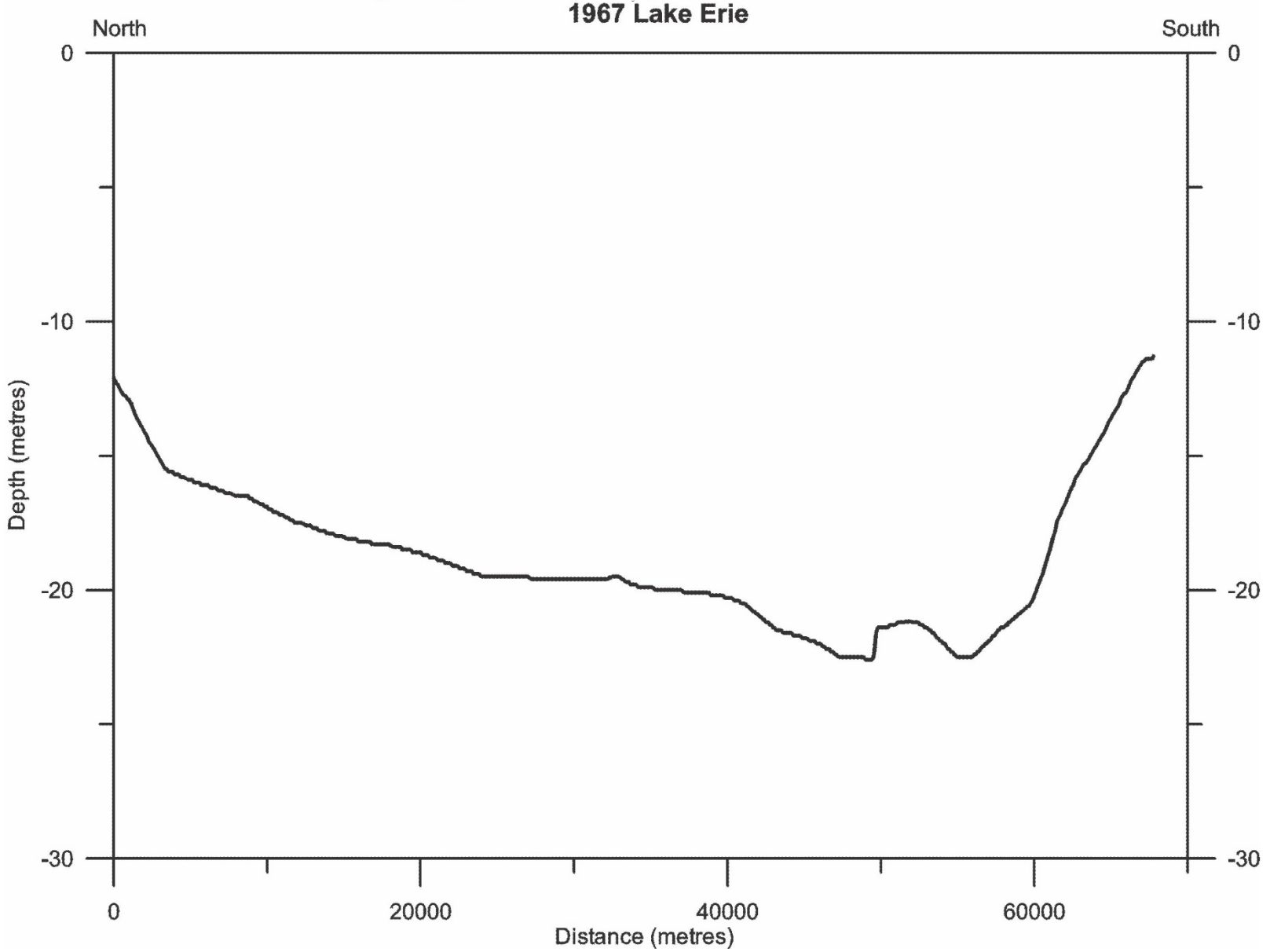


Figure 4q: Line 17 Bathymetric Profile
1967 Lake Erie

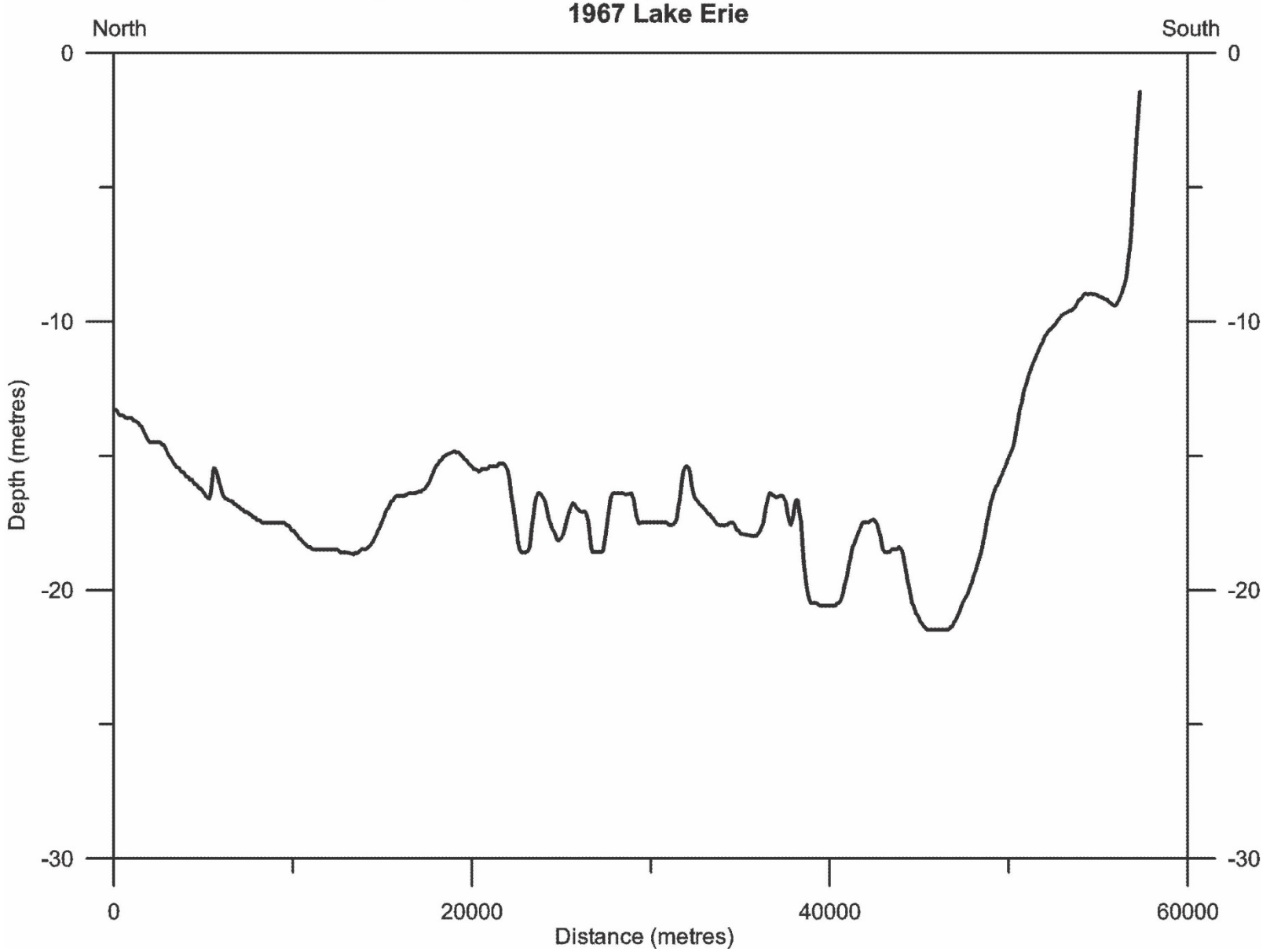


Figure 4r: Line 18 Bathymetric Profile
1967 Lake Erie

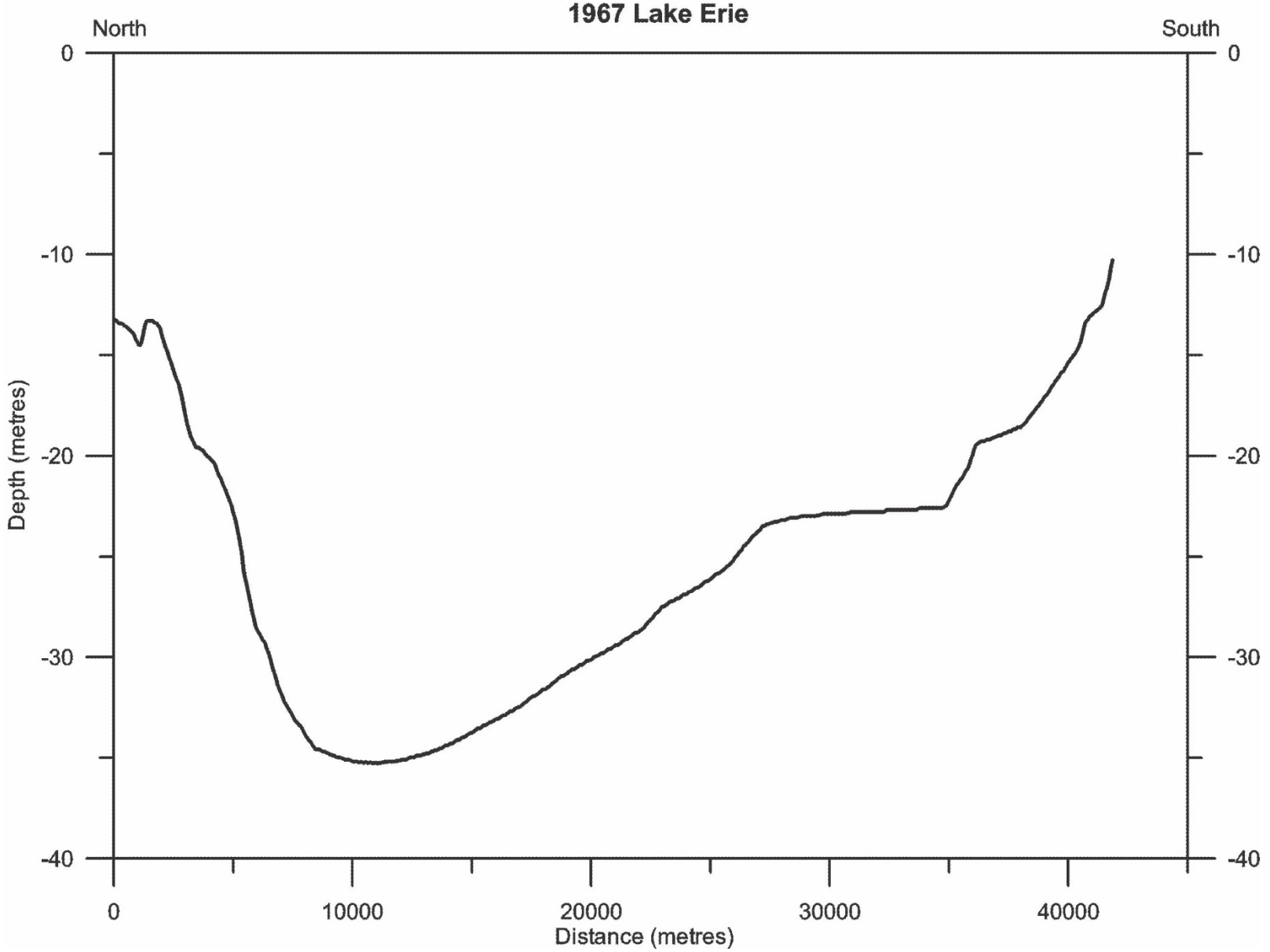


Figure 4s: Line 19 Bathymetric Profile
1967 Lake Erie

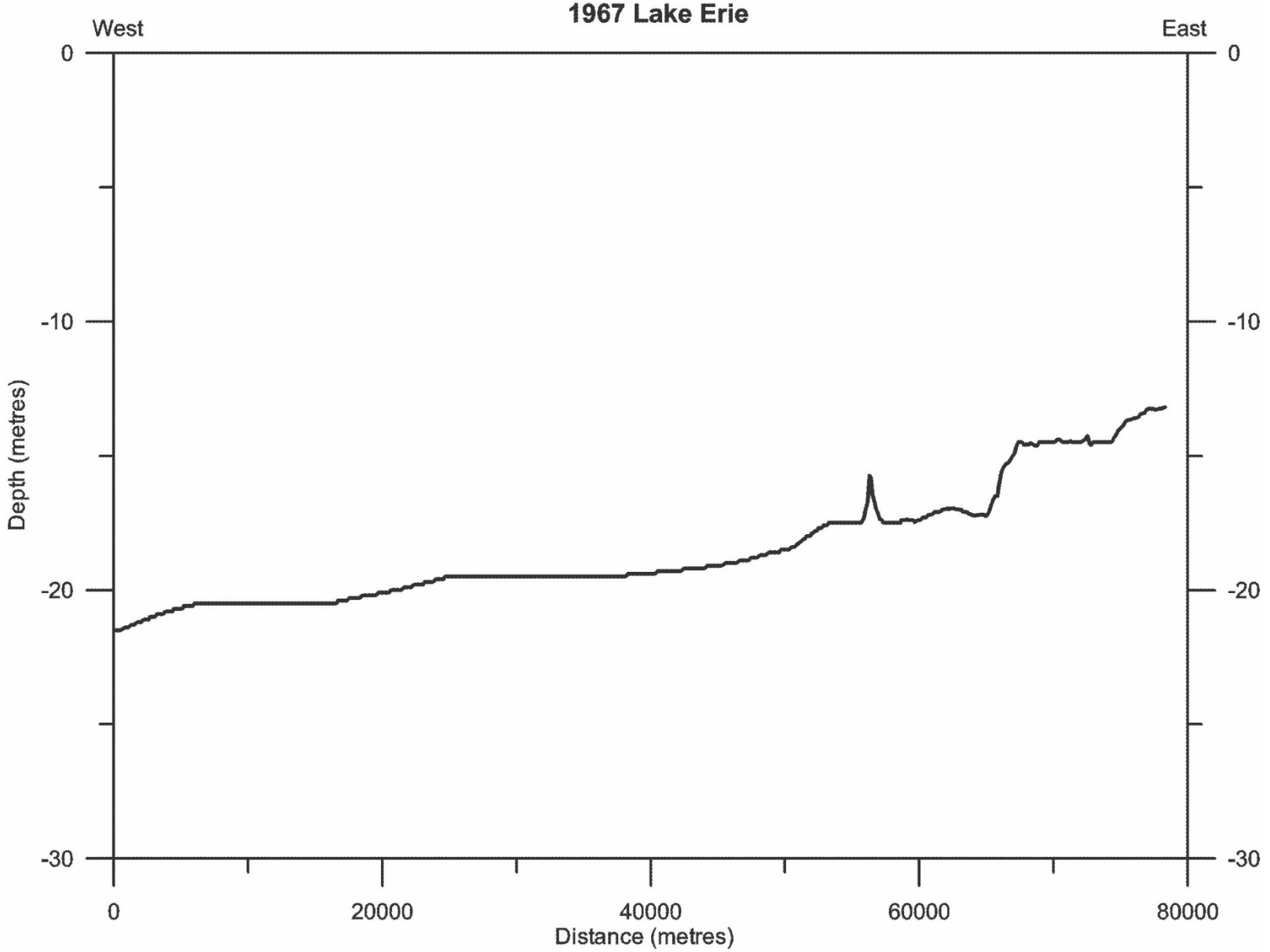


Figure 4t: Line 20 Bathymetric Profile
1967 Lake Erie

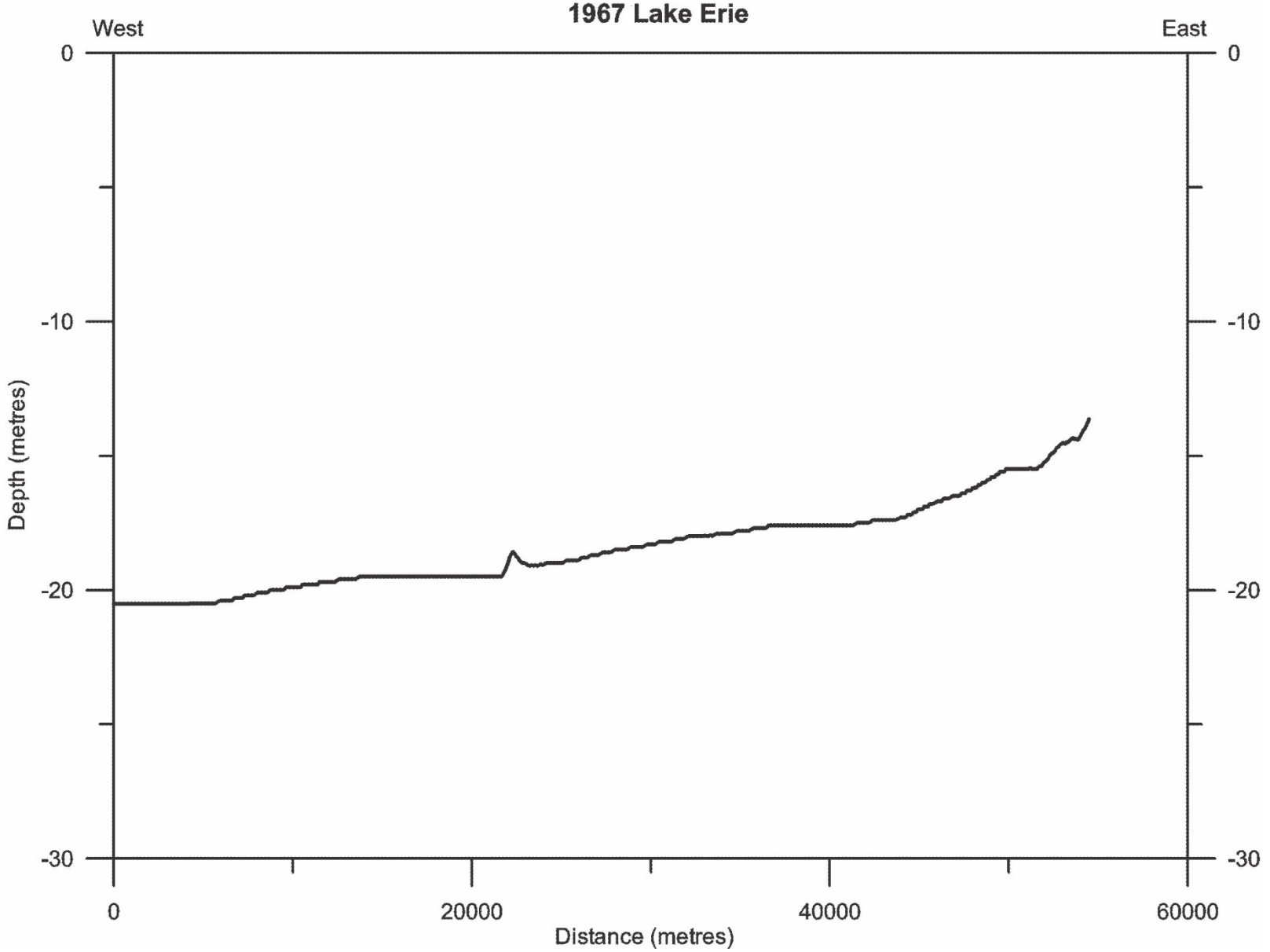


Figure 4u: Line 21 Bathymetric Profile
1967 Lake Erie

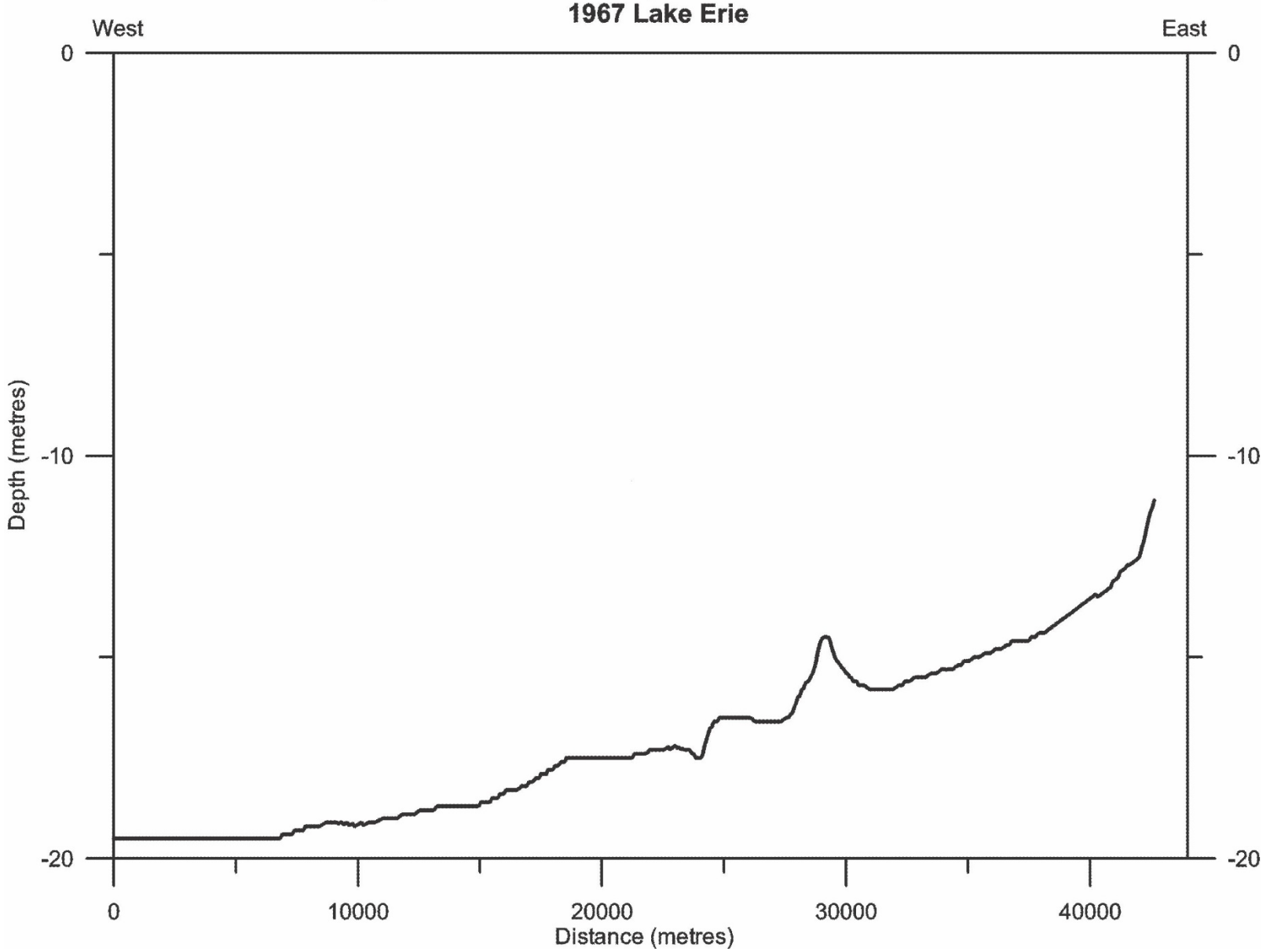


Figure 4v: Line 22 Bathymetric Profile
1967 Lake Erie

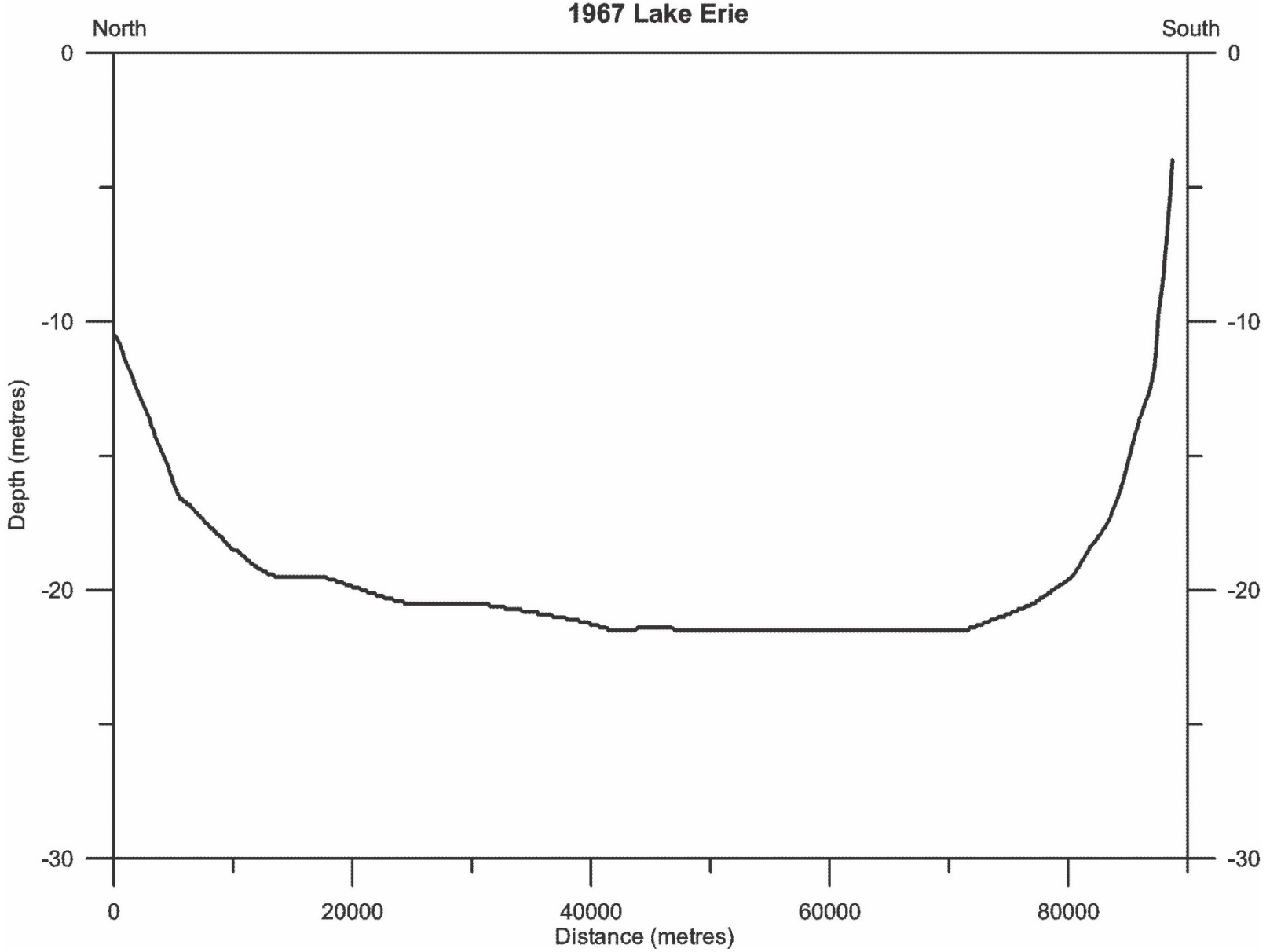


Figure 4w: Line 23 Bathymetric Profile
1967 Lake Erie

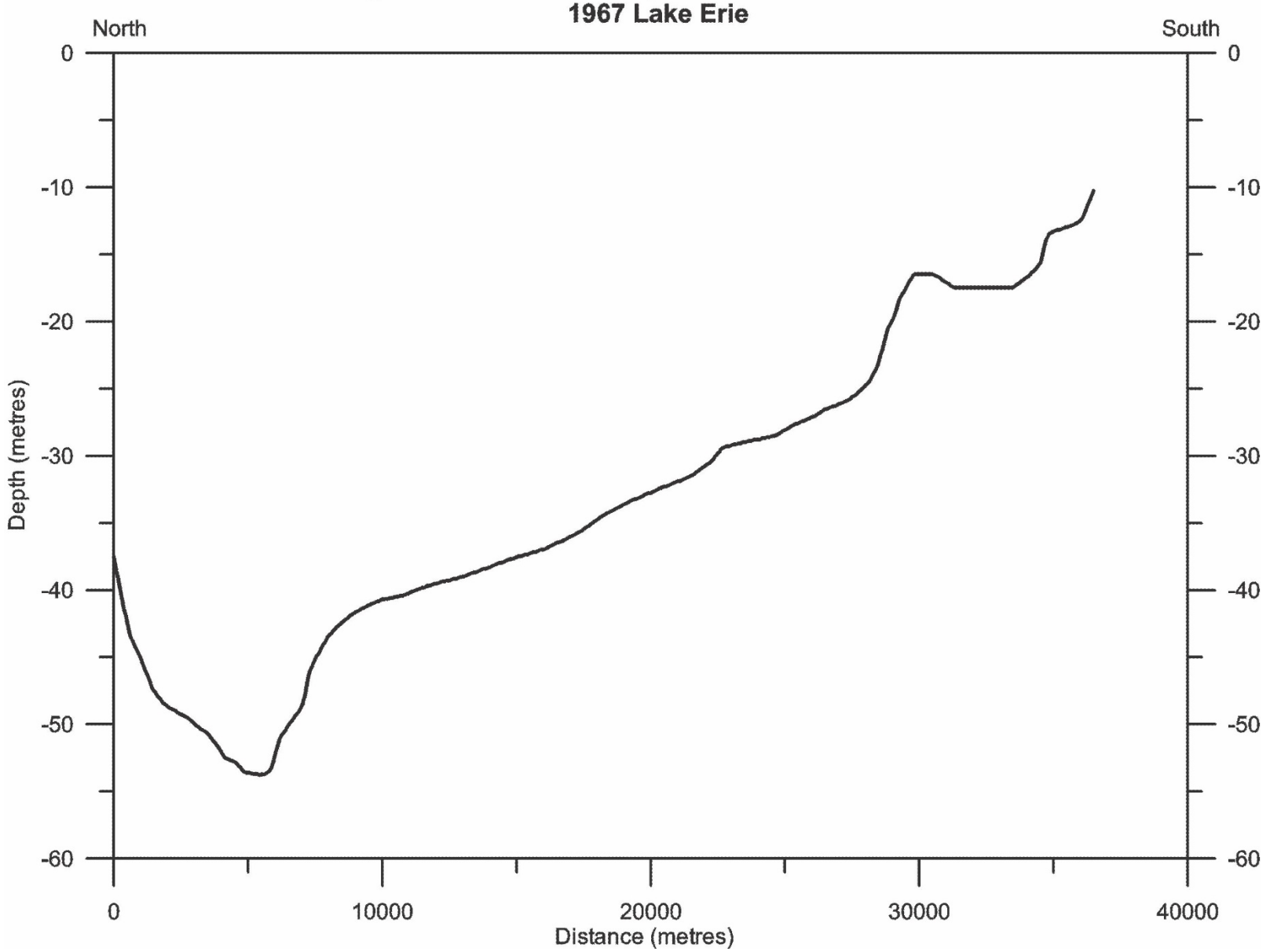
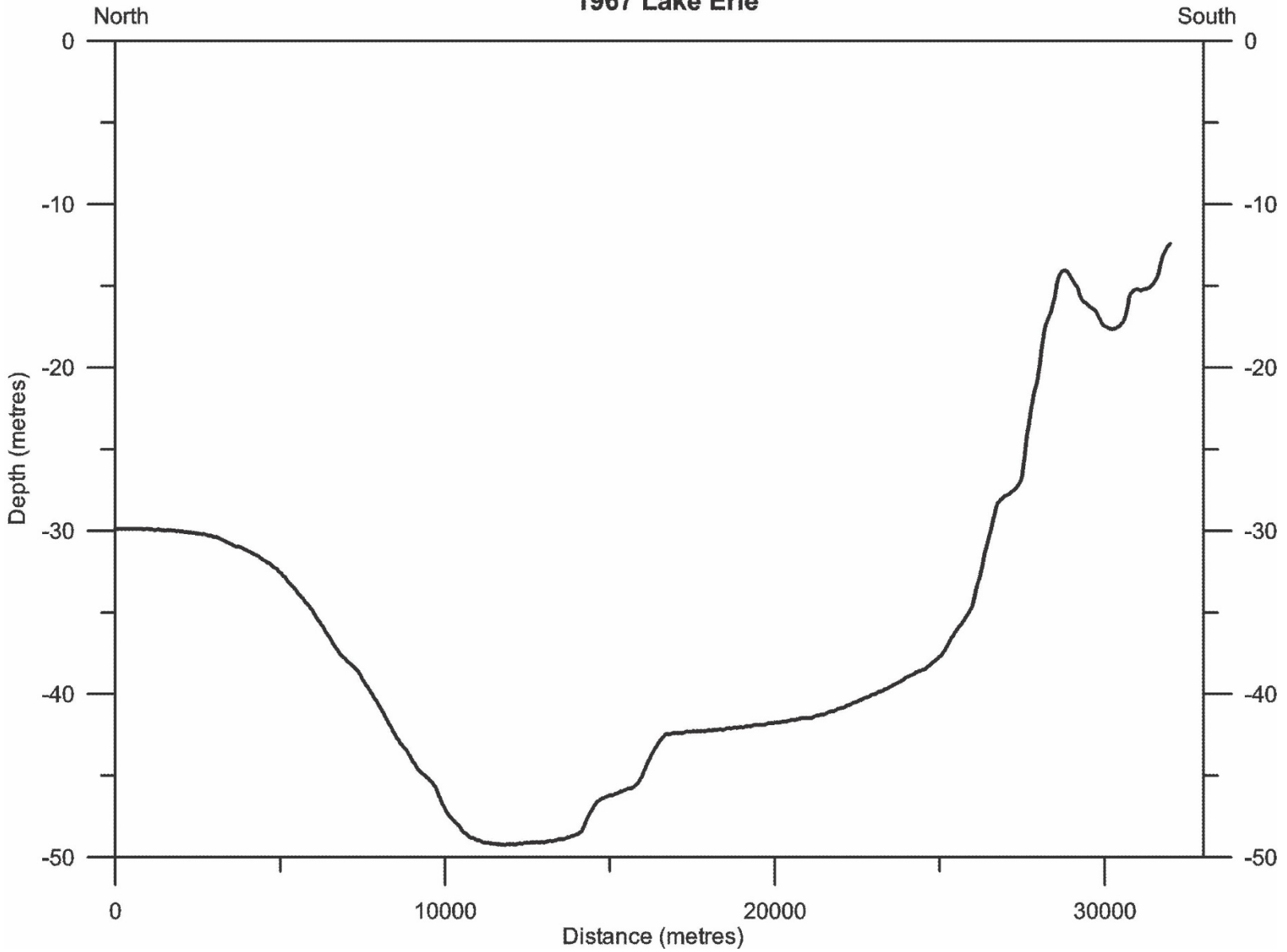


Figure 4x: Line 24 Bathymetric Profile
1967 Lake Erie



81°W 80°30´W 80°W 79°30´W 79°W

43°N

42°30´N

42°N

CANADA

1842

GEOLOGICAL SURVEY - COMMISSION GÉOLOGIQUE

C A N A D A

Ontario

N

BUFFALO

Port Maitland

Morgan Point

Point Abino

Port Dover

Port Stanley

Port Bruce

Port Talbot

Port Burwell

Port Rowan

Inner Bay

L O N G P O I N T

Sturgeon Point

Irving

DUNKIRK

Westfield

Ripley

ERIE

North Girard

Ashtabula

Lake Erie

U S A

New York

Pennsylvania

Ohio

157 156 129 1 128 54 55 175 5 121 8 398 6 204 1 7 174 24 120 2 140 10 141 21 205 3 390 306 327 326 353 305 277 354 276 363 21 362 20 9 391 22 4 343 19 23 241 18 93 193 17 242 94 192 16 11 381 15 342 318 223 14 12 22 317 224 13 292 291 260 261 380

Figure 5.
1967 interpretation:
isopach map, central
and eastern Lake Erie

Sediment thickness

milliseconds one-way-time	metres @ 1500 m/s
0–10	15
10–20	30
20–30	45
30–40	60
40–50	75
50–60	90
60–70	105
>70	

Fault, assumed

343 20 Waypoint, survey line

0 10 20 30 40 50 Kilometres

Natural Resources Canada Ressources naturelles Canada

Brian J. Todd, 2023