

Overview of the Moere Vest data set

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ABSTRACT

I present an overview of a 2D ocean bottom node survey acquired in the North Sea and made available to the Stanford Exploration Project (SEP) by Seabed Geosolutions. I describe the arrangement of the nodes, followed by the shot arrays and the data sets. The main features of this data set are four component data with offsets up to 100 kilometer, trace lengths up to 40 seconds and three different node arrangements: regular spread, long offset and microspread.

INTRODUCTION

Seismic acquisition is an ever-evolving field that is constantly being challenged by deeper and more complex targets. Illumination, geological complexities and obstructions in the survey area are only a few of the issues that have pushed the development of seismic acquisition. In marine data, the technology evolved from 2D streamer acquisition to wide azimuth and even coil-shaped sail lines. On the ocean bottom, the advent of ocean-bottom cables and ocean-bottom nodes allowed for full azimuth acquisitions, improved the repeatability in 4D surveys and introduced the recording of multi-component data in marine environments. Meunier (2011) provides a nice review on the advances in seismic acquisition.

The data provided to SEP by Seabed Geosolutions were recorded using 179 4-component ocean bottom nodes (4C OBNs) in a 2D array. The nodes were distributed in 3 different configurations, which are described here as regular spread, long offset and microspread. Three different shot-line configurations were used and the recording was sorted into 4 data sets.

Figure 1 shows the bathymetry of the survey area and the locations of the receivers. Depths vary between 1942 m (West) to 1640 m (East). The following section describes the positioning and spacing of these nodes.

NODE GEOMETRY

Regular spread

The majority of the receivers was distributed in an array of 141 nodes arranged in an East-West line, with a spacing of 250 m. The total length of this line is 35 km.

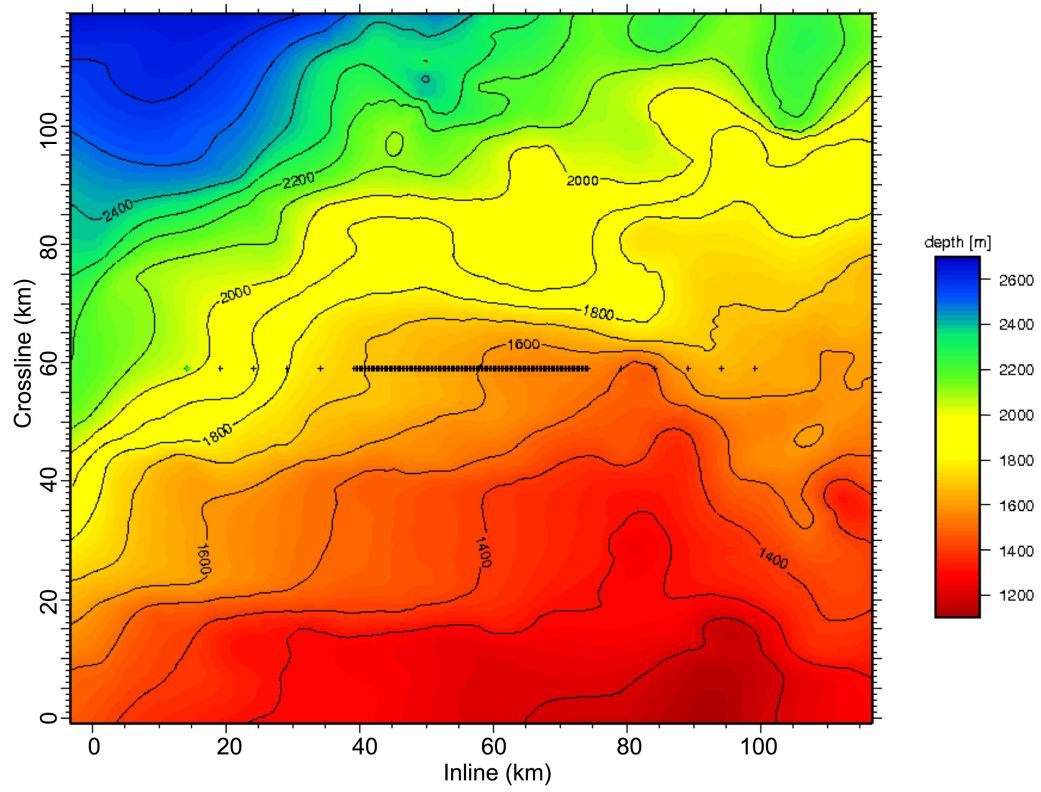


Figure 1: Bathymetry of the survey area showing the position of the receiver array. Depths vary between 1942 m (West) to 1640 m (East). Total length of the array is 85 kilometers. [NR]

Long offset nodes

In order to record even longer offsets, 12 nodes were added to the 2D regular spread. They were placed at each end of the main array, 5 on each end and with a spacing of 5 km, plus an extra node at each of the two westernmost positions. These wider spaced nodes added 25 km to the length of the main receiver line on each end, increasing the total length of the array to 85 km.

Microspread

The remaining 26 nodes were placed in the middle of the array in 2 parallel lines along the main receiver line, with only a 2 meters spacing between nodes in both the inline (East-West) and crossline (North-South) directions. Figures 2(a) and 2(b) show the deployment and recovery of the nodes in this arrangement.

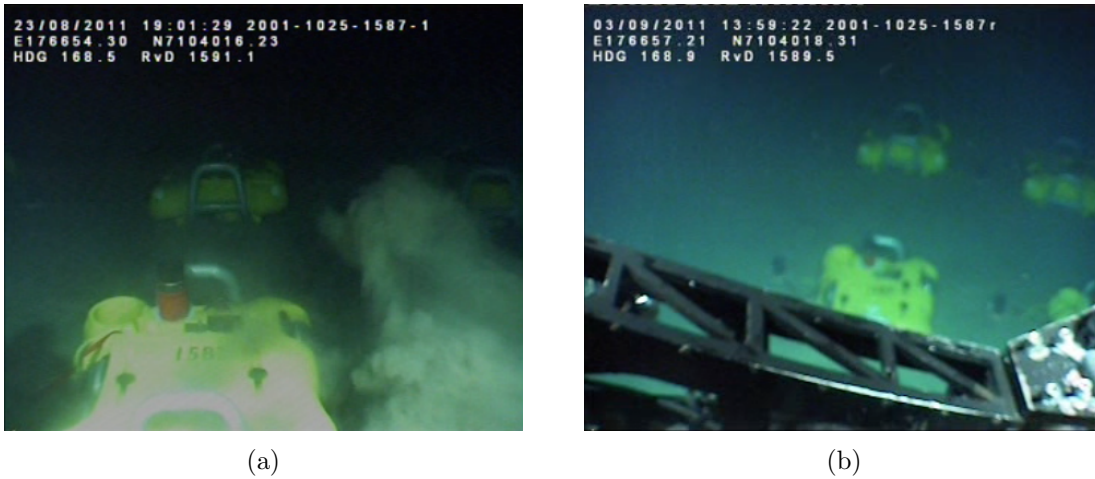


Figure 2: Images of the (a) deployment and (b) recovery of the ocean bottom nodes in the microspread array. Note the regularity and proximity of their positions. [NR]

DATA SETS

Main

The data described as Main were acquired with two overlapping sail lines, each with 50 m between shots, but staggered by 25 m. The total number of shots for the Main line is 2181, with a total length of 55 km. Trace length is 15 s with trace sampling of 2 ms. A common-receiver gather of the pressure and vertical components of this data set are shown in Figures 3(a) and 3(b), respectively. The inline (radial) and crossline (transverse) components are shown in Figures 4(a) and 4(b). The gathers show, for example, the presence of refracted waves and also many orders of multiples.

For the horizontal components, we can also notice the amplitude differences between the radial and transverse components.

Long

These data were recorded with the goal of acquiring long offset refraction data. There are 1140 shots, spaced by 100 m. Traces are 40 s long with 2 ms sampling. The maximum offset is 75 km for the regular spread and up to 100 km if the long offset nodes are included. Figures 5 and 6 show the hydrophone and vertical components for a node in the long data set.

Swath

This data set was acquired with 6 parallel sail lines in the East-West direction. Each sail line had 2 sources in a flip-flop arrangement, resulting in a 50 m by 50 m shot carpet, that is 600 m wide and 55 km long.

Continuous

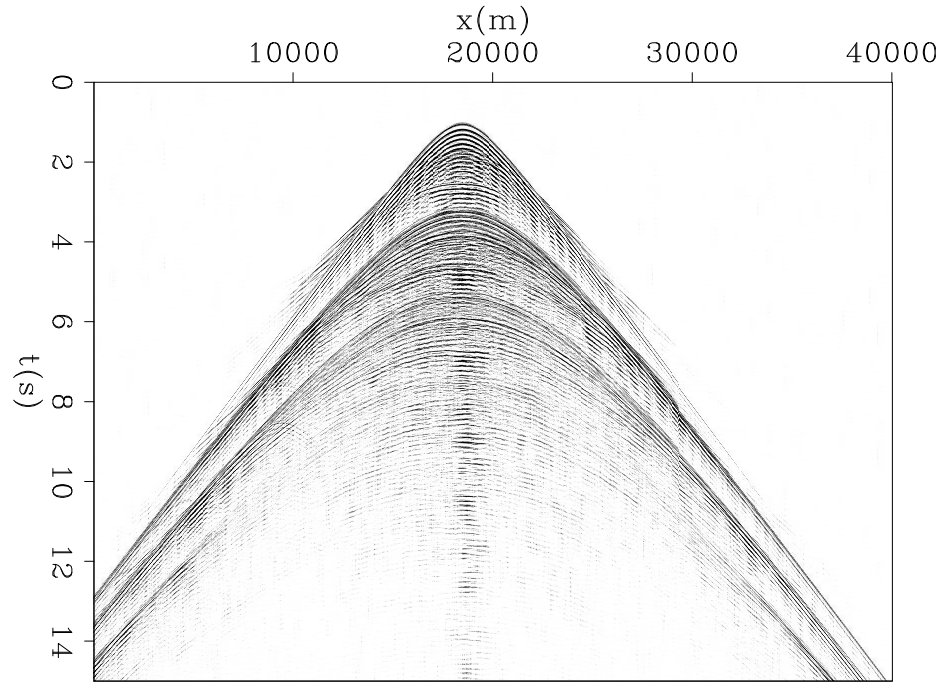
Seabed also made available the continuous record of each node during the survey period. This period corresponds to roughly 10 days of continuous data, providing an interesting resource for passive seismic studies. Due to the different times for placement and removal of each receiver, the start and end times for the recordings vary, with an overlap of about 7 days when all receivers were in position and recording.

ACKNOWLEDGMENT

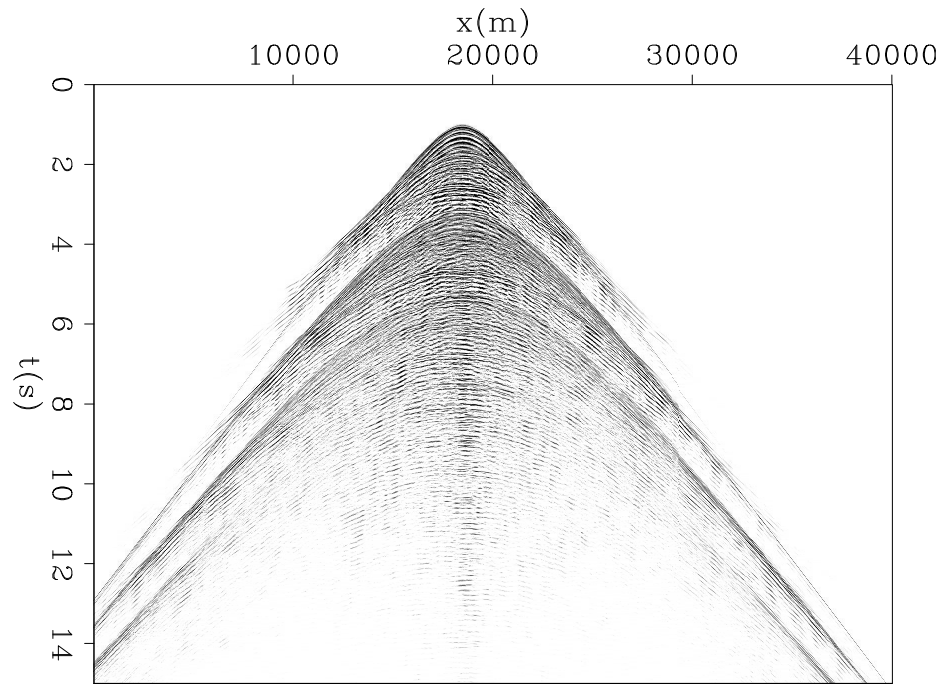
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REFERENCES

Meunier, J., 2011, Seismic acquisition from yesterday to tomorrow: Society of Exploration Geophysicists.

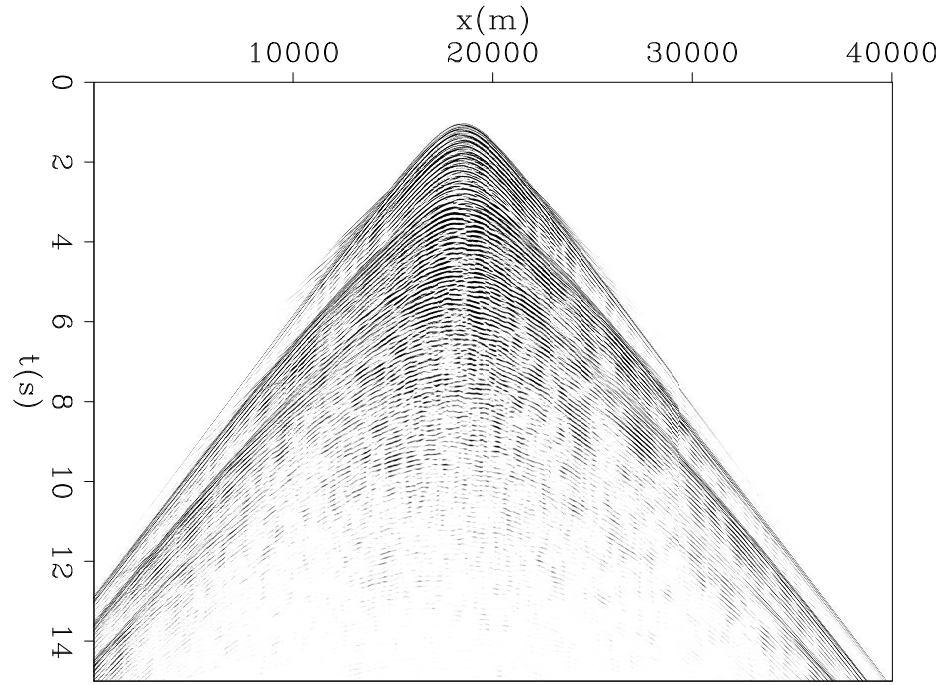


(a)

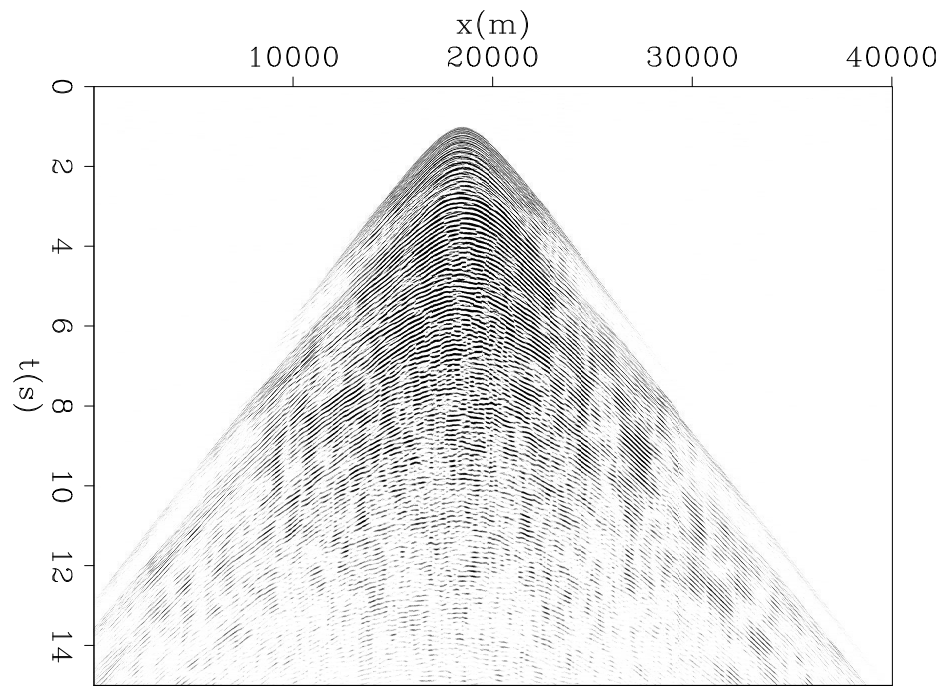


(b)

Figure 3: Common receiver gather for the (a) pressure and (b) vertical component of a node in the main data set. Distance between shots is 50 m, corresponding to a single sail line. **[ER]**



(a)



(b)

Figure 4: Common receiver gather for the (a) inline and (b) crossline horizontal components of a node in the main data set. Distance between shots is 50 m, corresponding to a single sail line. **[ER]**

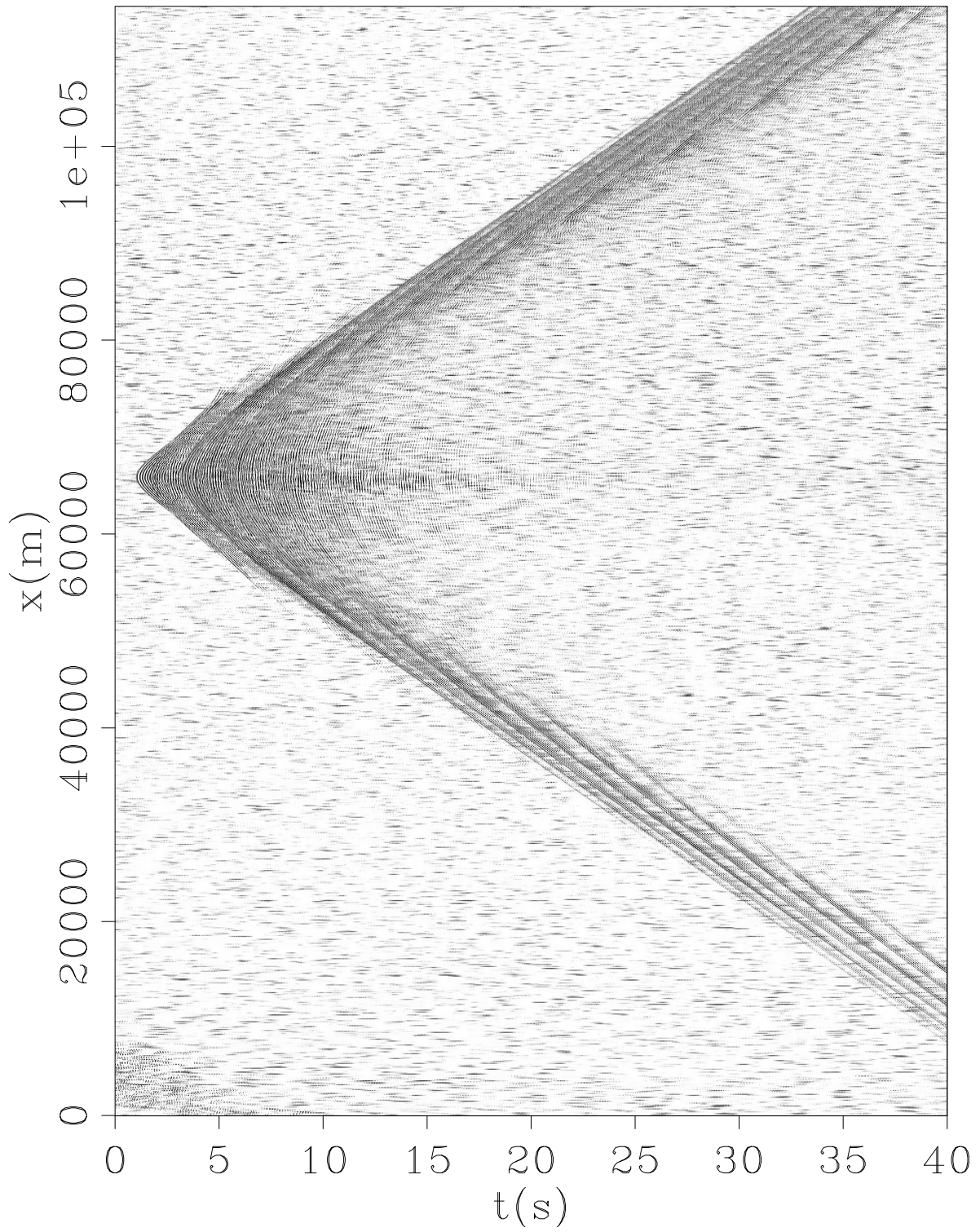


Figure 5: Common receiver gather for the pressure component of a node in the long data set. Distance between shots is 100 m. **[ER]**

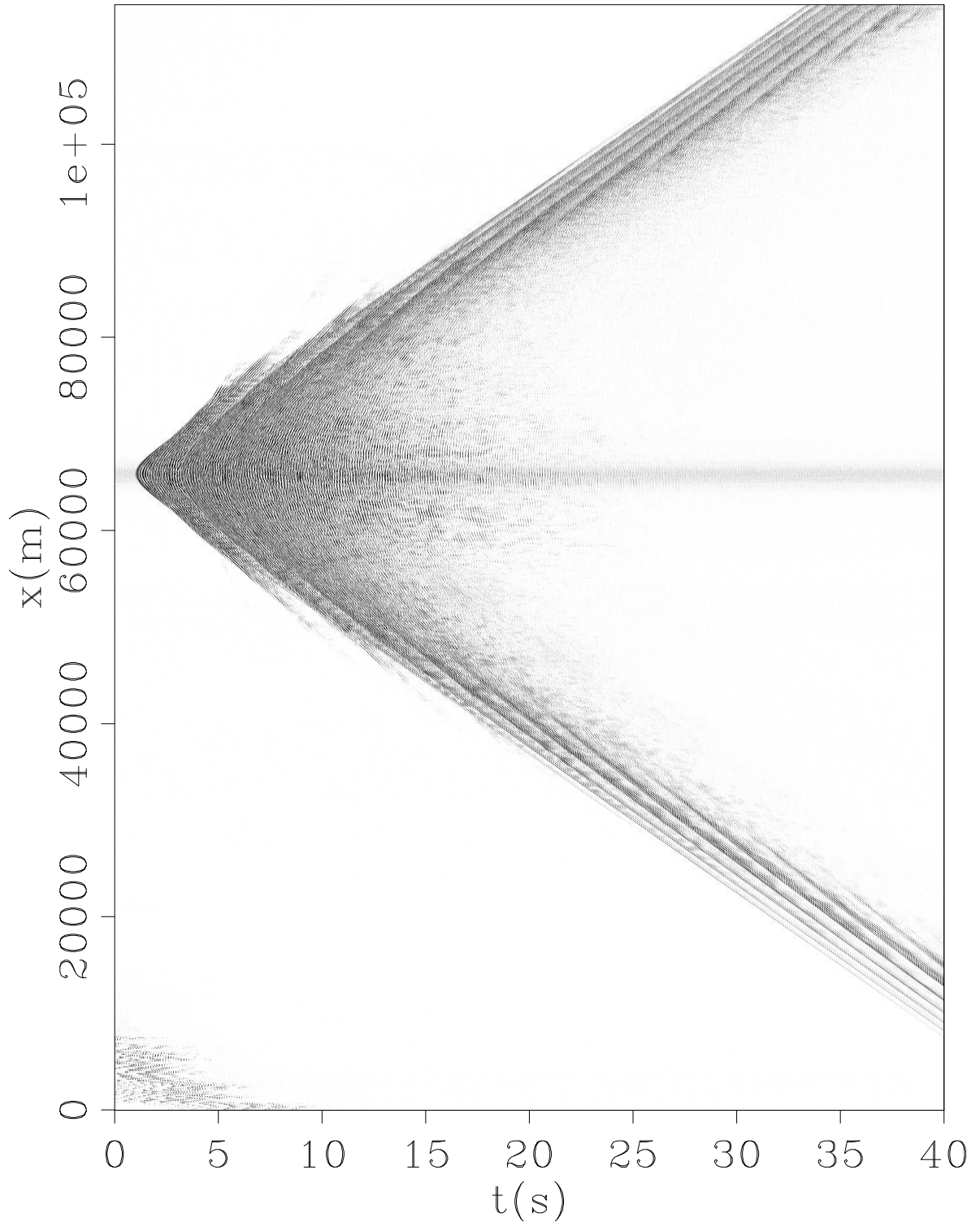


Figure 6: Common receiver gather for the vertical component of a node in the long data set. Distance between shots is 100 m. **[ER]**