Stanford Exploration Project, Report 102, October 25, 1999, pages 187–234

Short Note

SEP's data library

Robert G. Clapp, Morgan Brown, Louis Vaillant, Carmen Mora, Marie Prucha, and Yi Zhao[1]

keywords: *Data*

INTRODUCTION

One of the requirements for graduation at SEP is to prove that a student's ideas will work on real seismic data. SEP sponsors have been very generous over the years in providing SEP with real seismic datasets. In the past we have kept these datasets on a variety of different tape formats and with decidedly mixed levels of documentation. This summer SEP organized a mini-seminar in an attempt to organize these datasets. This paper, and the accompanying web page[2], provides a summary of the data library project, and provides examples of some of the datasets SEP researchers have available to test their ideas on.

GOAL

In the past 25 years SEP sponsors have provided SEP with numerous datasets. Early datasets were a few cmps or shot gathers. Over time SEP has added large 2-D surveys, multi-component dataset, 3-D prestack and post-stack, and even 4-D time lapse datasets. Unfortunately these datasets were not carefully cataloged and or generally left in easily accessible state. As a result, finding a dataset to apply a particular technique to could be an arduous task. The goal of the *SEP datalib Mini-Seminar* was to make finding and using SEP's datasets easier. Each dataset was researched and processed so the following form could be filled out:

- Location of raw data
- Location of velocity model
- Stack of data
- Zero offset Migration

[1]**email:** bob@sep.stanford.edu, morgan@sep.stanford.EDU, louis@sep.stanford.EDU, cmora@sep.stanford.EDU, marie@sep.stanford.edu, yi@sep.stanford.EDU

[2]http://sepwww.stanford.edu/pub/docs/sepdatalib/toc_html

- Past usage of data
- Geometry of data
- Characteristics with data
- History of data (when acquired and by whom)
- Preprocessing on data
- Proprietary considerations

The inexpensive cost of large disks made it possible to put a large portion of the data online. All 2-D datasets and portions of every 3-D dataset are now stored online. The maturity of SEP3d (Biondi et al., 1996; Clapp, 1999) allowed us to maintain a full description of each dataset while allowing the dataset to be sliced and diced.

EXAMPLE

Based on the items listed above, the following information was compiled for the Elf L7D dataset. Figures1-5 were created for visualizing the data.

L7D DATA FILES

Raw Data The full dataset is as big as 45Gb, avaible on DLT tapes.
Common-azimuth Data To be done.
Velocity Model Locateed at /data_3d/elf_north_sea/L7d-vel.H
Velocity model created by Elf & IFP[3] (Project "Helios") using the so-called "SMART" method (Sequential Migration Aided Reflection Tomography). The structure of the salt dome is highly 3-D, with serious illumination problems under its edges (Figure 1).
Stack Located at /data_3d/elf_north_sea/L7d-near-nmo-stack-fine.H
Near-offset (0-1000m) NMO-stack
Zero-offset Migration Located at /data_3d/elf_north_sea/comaz_zo_salt_fine.h
Prestack 2-D line
Usage none (yet).
Geometry Acquisition: 2 sources, *x* streamers (most likely 3).

```
In3d:
----------------------------------------
********** L7d_all.H ************
4 -esize Synched data_format=xdr_float
----------------------------------------
n1=1500 o1=0.000000 d1=0.004000 label1=time
```

[3]Institut Francais du Pétrole

```
n2=7411523 o2=1.000000 d2=1.000000 label2=trace number
Data:  in=/scrsa3/louis/Elf/Data/L7d_all.H@
7411523 elements, 44469138000 bytes in data file
-----------------------------------------
```

```
Attr3dhead:
 key              min          max         mean    nzero         rms          norm
 cdp         2900.0000    3900.0000   3389.9319  7411523  3400.5400    9257668.44
 offset       186.0000    3571.0000   1764.1710  7411523  1989.4291    5416044.20
 ncdp_s      2773.4941    3926.8994   3438.5354  7411523  3449.2773    9390351.31
 nligne_s    1346.6554    1520.4437   1428.9248  7411523  1429.5942    3891943.38
 ncdp_g      2772.9077    4026.9609   3341.0813  7411523  3352.4868    9126847.67
 nligne_g    1347.1848    1528.9202   1429.6726  7411523  1430.3911    3894112.88
 s_x        -1686.7405   13691.9580   7180.4541  7411523  8044.3945   21900150.11
 s_y         1416.3849    5761.0933   3473.1201  7411523  3641.2247    9912910.97
 g_x        -1694.5596   15026.1074   5881.0698  7411522  6939.6676   18892629.00
 g_y         1429.6204    5973.0039   3491.8162  7411523  3671.1157    9994286.74
 nline       1354.4266    1515.5315   1429.2987  7411523  1429.9876    3893014.44
 aoffset      185.6369    3571.9861   1764.5095  7411523  1989.8103    5417081.89
 azimuth       -1.2745       1.5323     -0.0261  7411431     0.1345        366.08
 cmp_x         -8.3235   13338.0527   6530.7617  7411522  7446.8040   20273262.93
 cmp_y       1610.6659    5638.2871   3482.4683  7411523  3654.9572    9950296.70
 offset_x   -3463.4939    3383.3154  -1299.3843  7411523  1980.6512    5392147.21
 offset_y    -990.2041     786.0776     18.6959  7411431   190.6978     519157.71
```

Problem Multipathing - Illumination problems / Shadow zones - Common-angle gathers

History of Data Dataset given to SEP in 1998, originaly for testing AMO and common-azimuth migration. The contact at Elf Exploration Production is Henri Calandra[4].

Preprocessing A correction of amplitude has been applied: geometrical spreading

$$A(t) = \left(\frac{t}{250}\right)^{+1.8}$$

Also, the multiples due to sea bottom have already been removed.
Proprietary Considerations The L7d data are free to be used by SEP only, including publications in articles or SEP reports with the usual acknowledgements to Elf Aquitaine.

FIGURES

Some other dataset placed in the data library include Figures6-17.

[4]**email:** henri.calandra@elf-p.fr

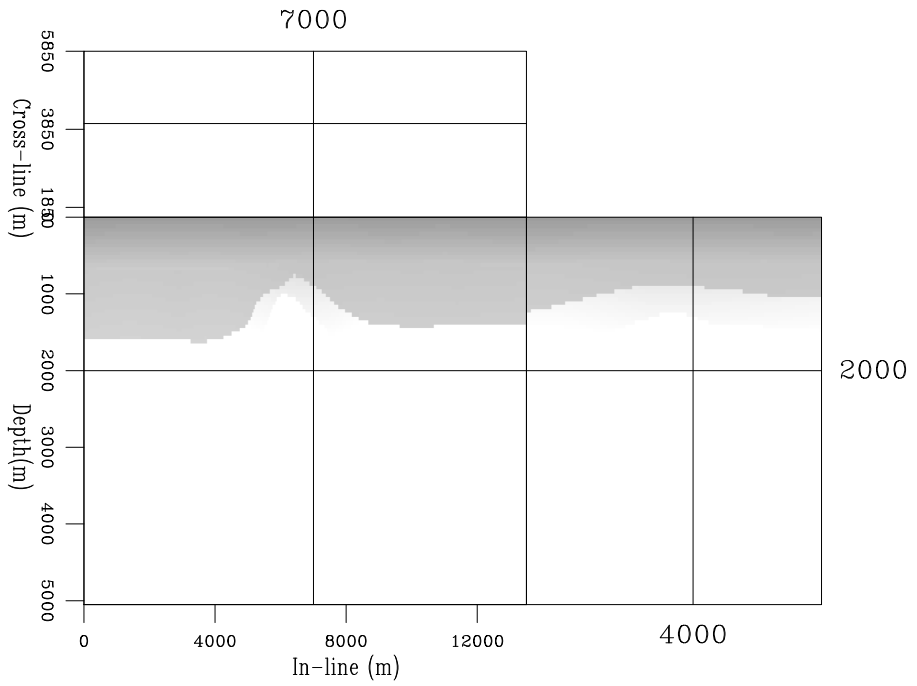

Figure 1: Elf “SMART” velocity model bob3-vel-model [NR]

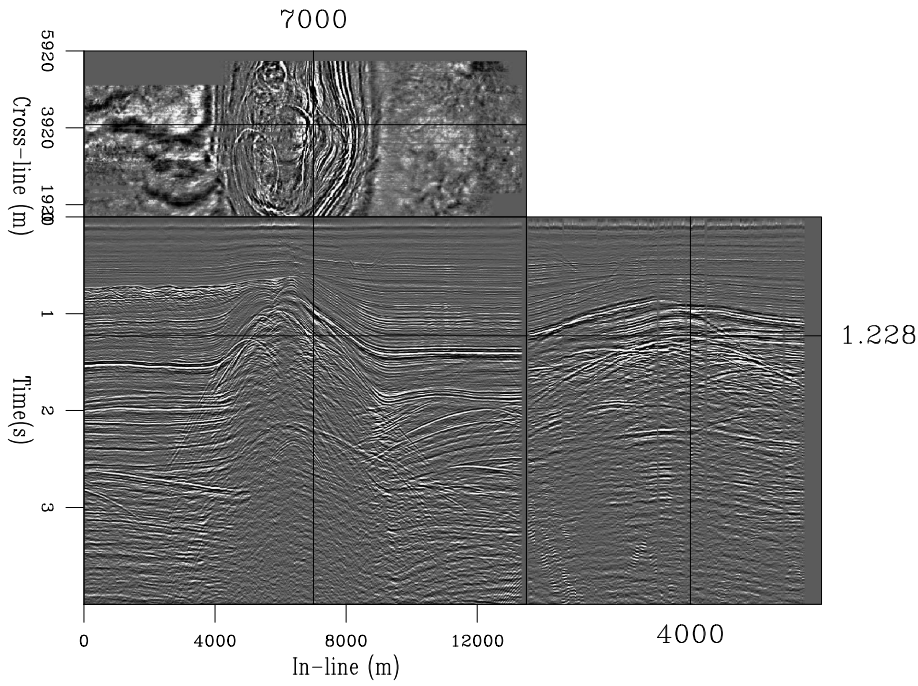

Figure 2: NMO-stack of the near offsets (0-1000m) bob3-nmo-stack [NR]

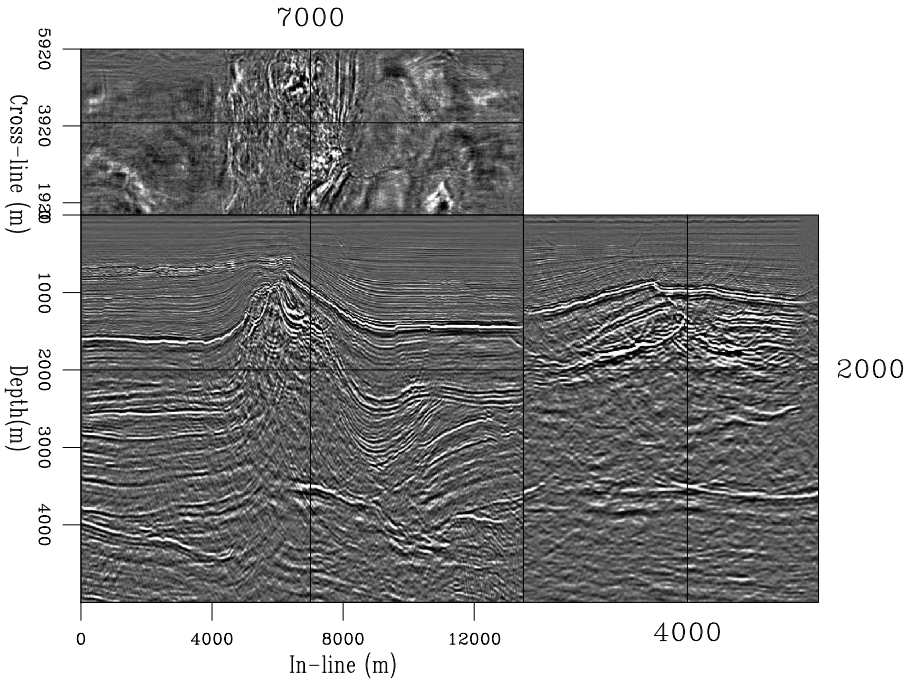

Figure 3: Zero-offset migration of the near offsets (0-1000m) bob3-zo-mig [NR]

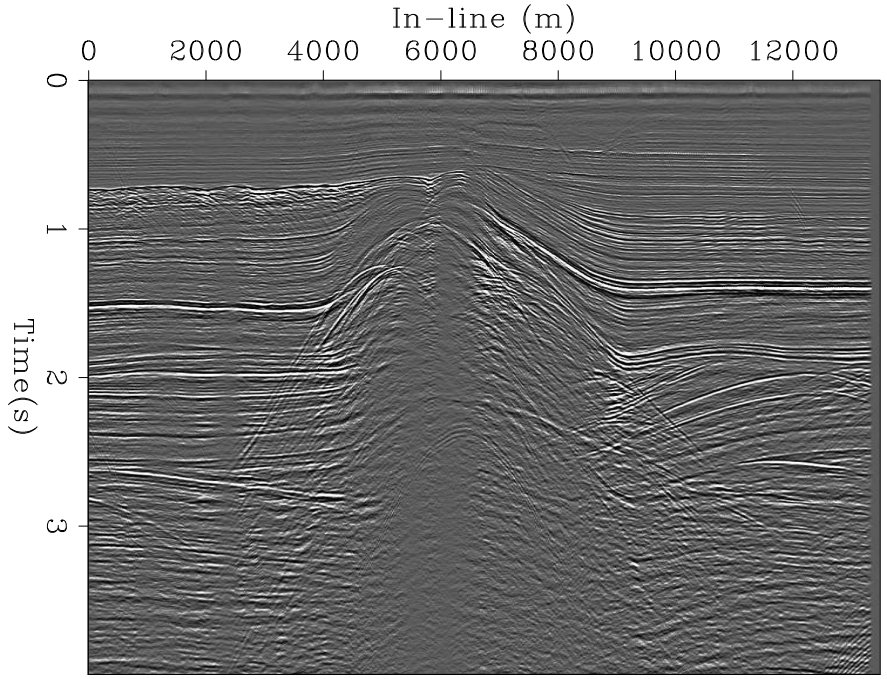

Figure 4: NMO-stack of the near offsets (0-1000m), section corresponding to the 2-D synthetic data bob3-2D-line-nmo-stack [NR]

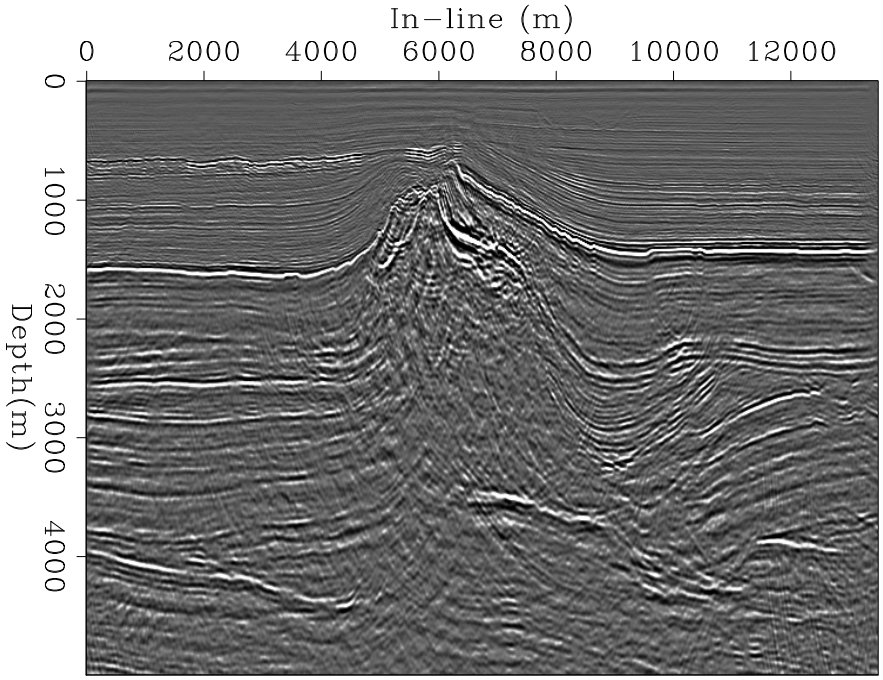

Figure 5: Zero-offset migration of the near offsets (0-1000m), section corresponding to the 2-D synthetic data bob3-2D-line-zo-mig [NR]

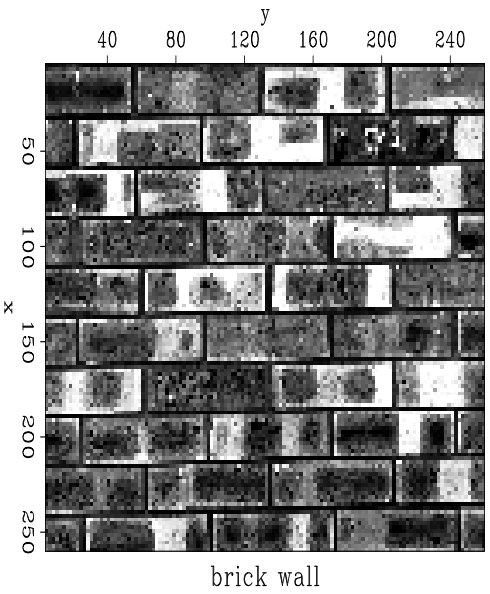

Figure 6: A brick wall texture. bob3-brick [NR]

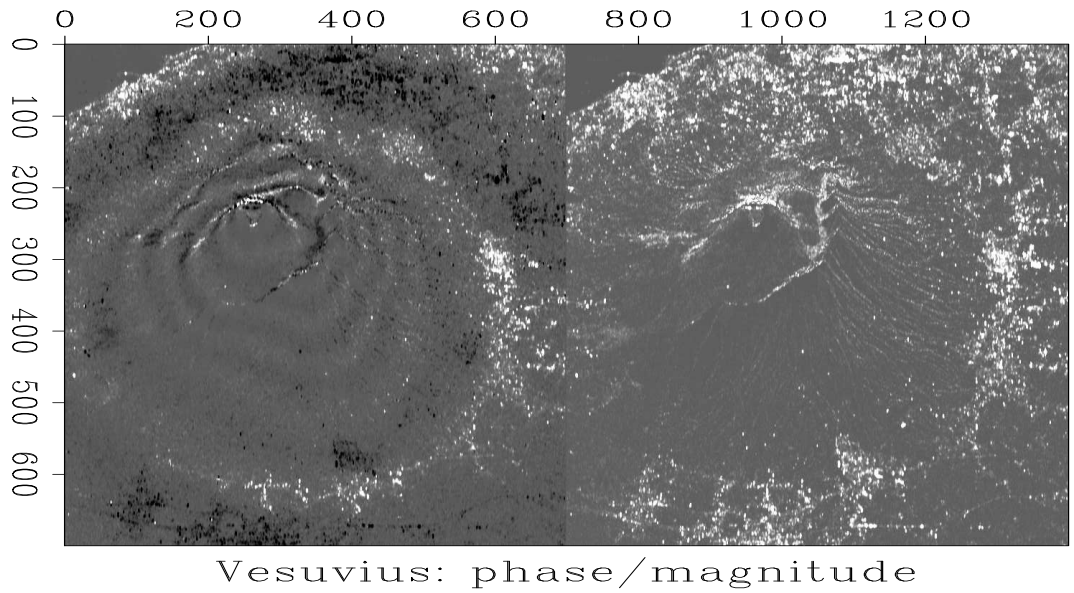

Figure 7: Mount Vesuvius SAR data. bob3-vesuvius [NR]

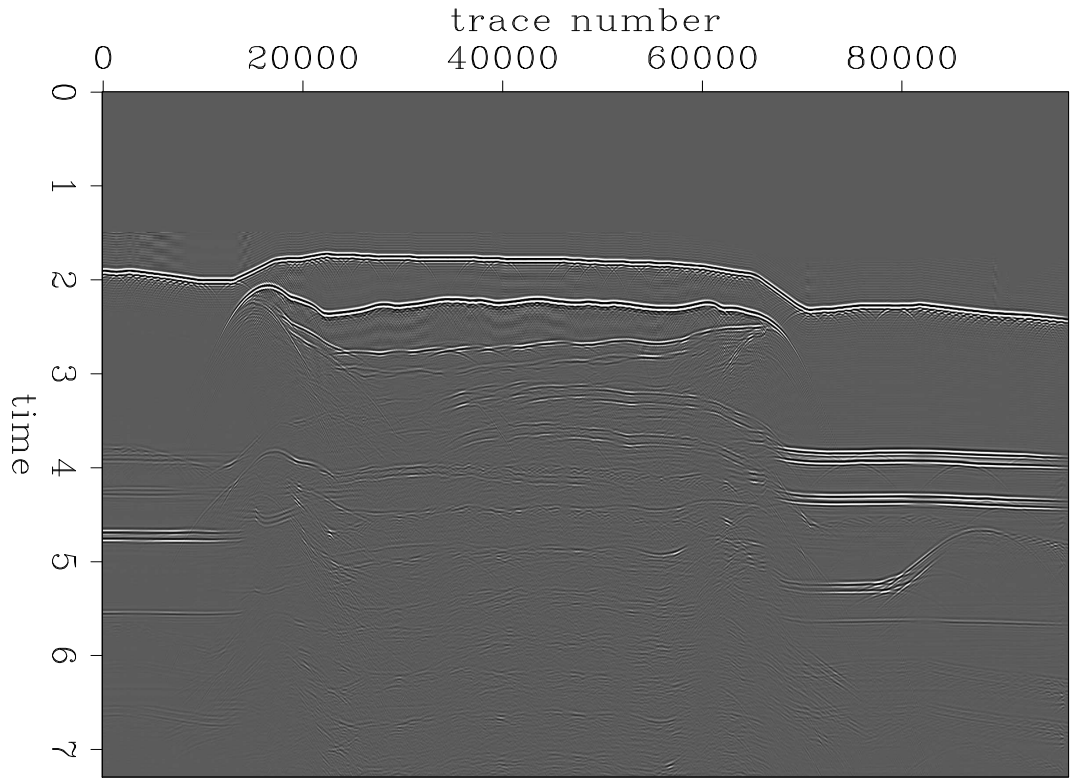

Figure 8: Stack of BP multiple synthetic. bob3-bp-stack [NR]

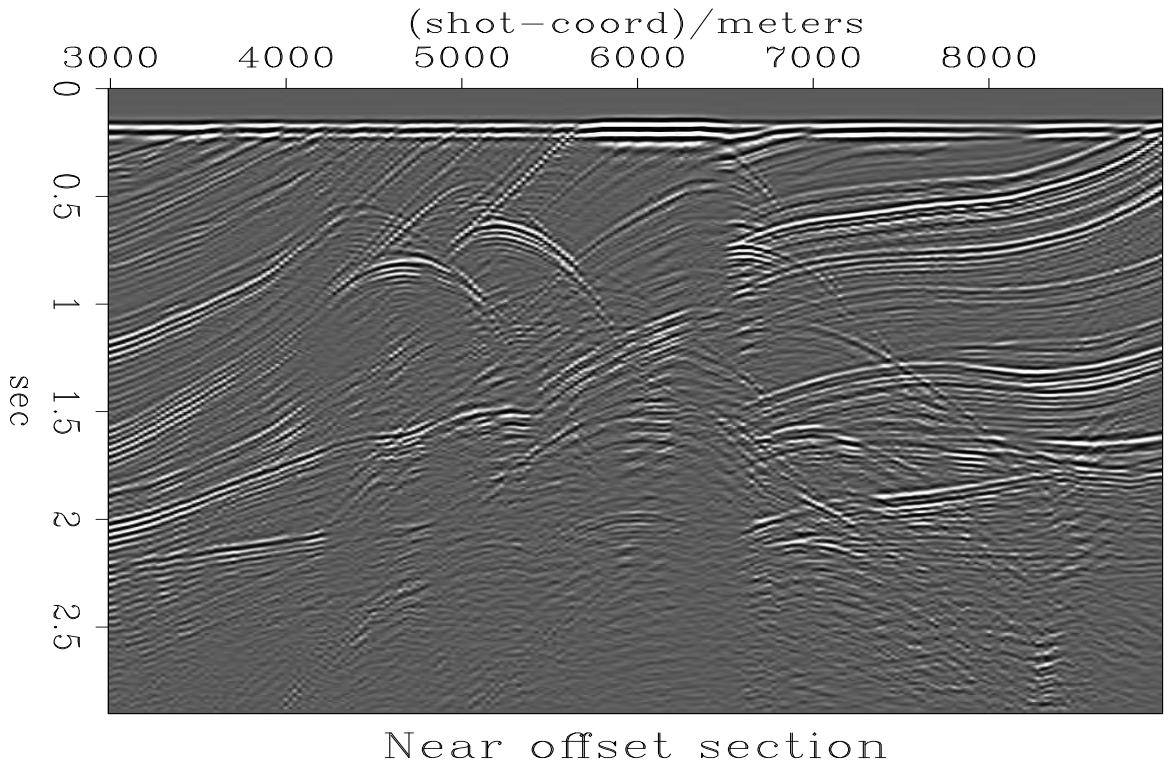

Figure 9: Near offset section of Marmousi dataset. bob3-marmnear [NR]

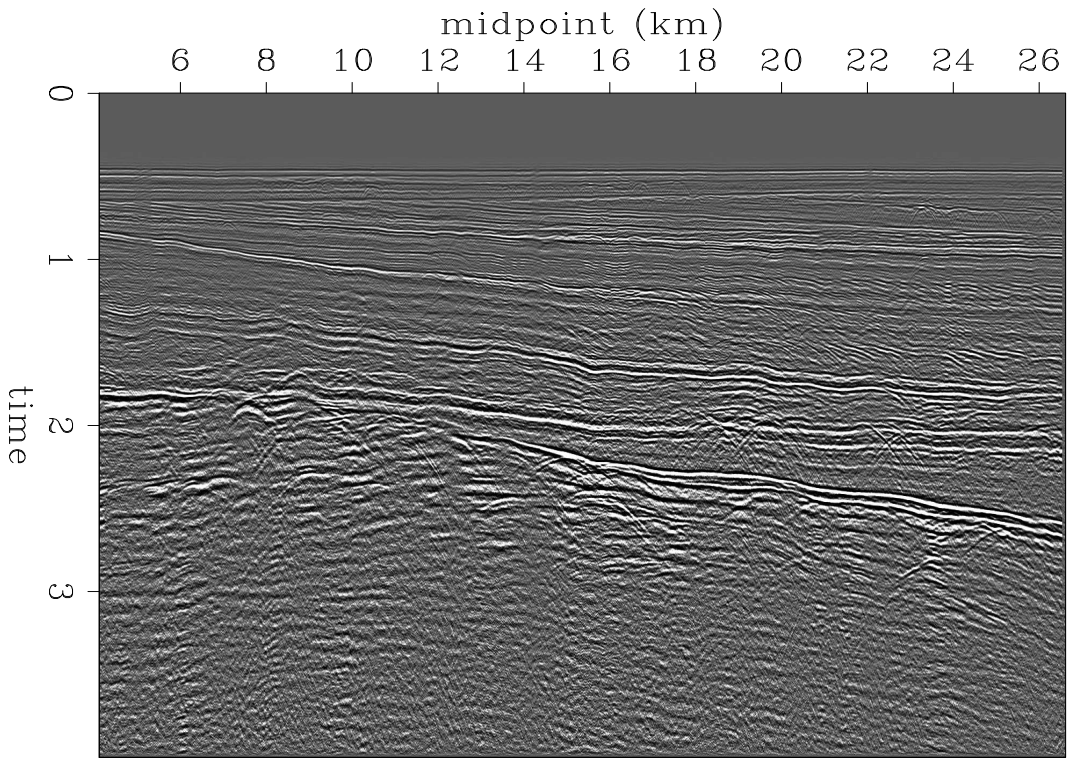

Figure 10: Stack of Mobil-AVO dataset. bob3-mobil-stack [NR]

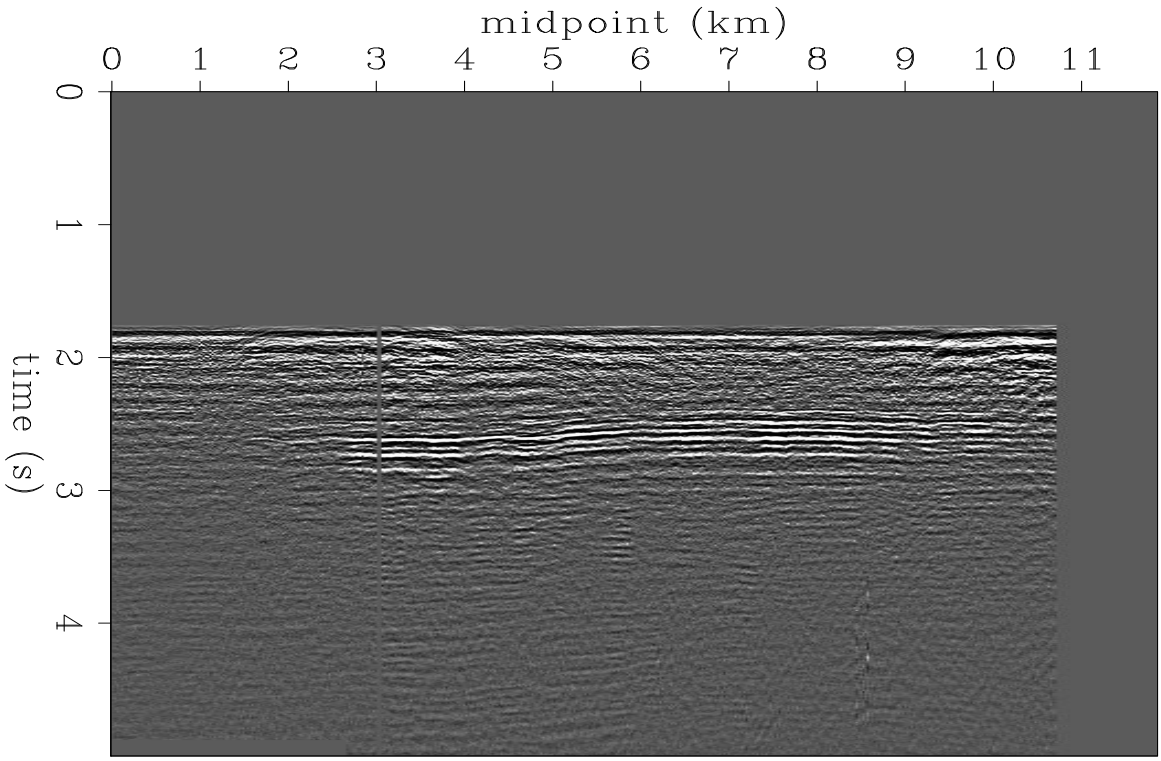

Figure 11: Near offset section of Kjartansson thesis data. bob3-kjar-near [NR]

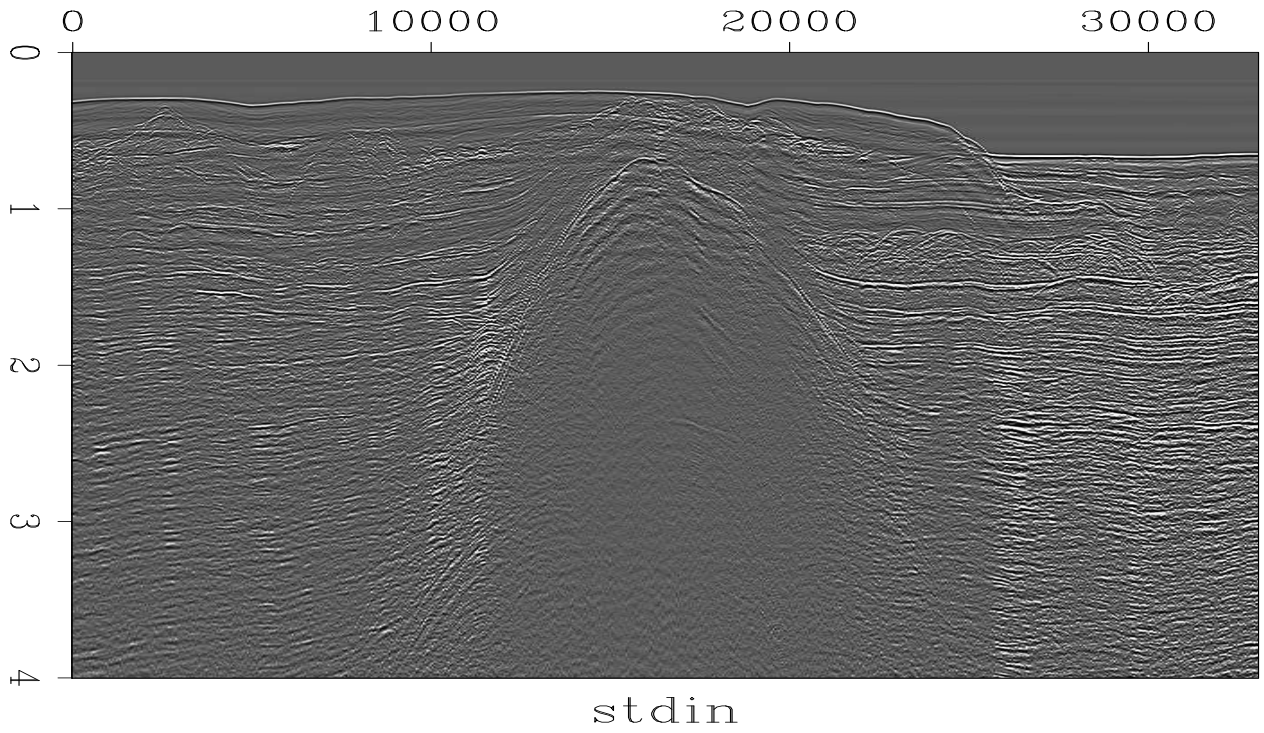

Figure 12: Near offset section of line 1 of Amoco data over a Gulf salt body. bob3-amoco-salt-near1 [NR]

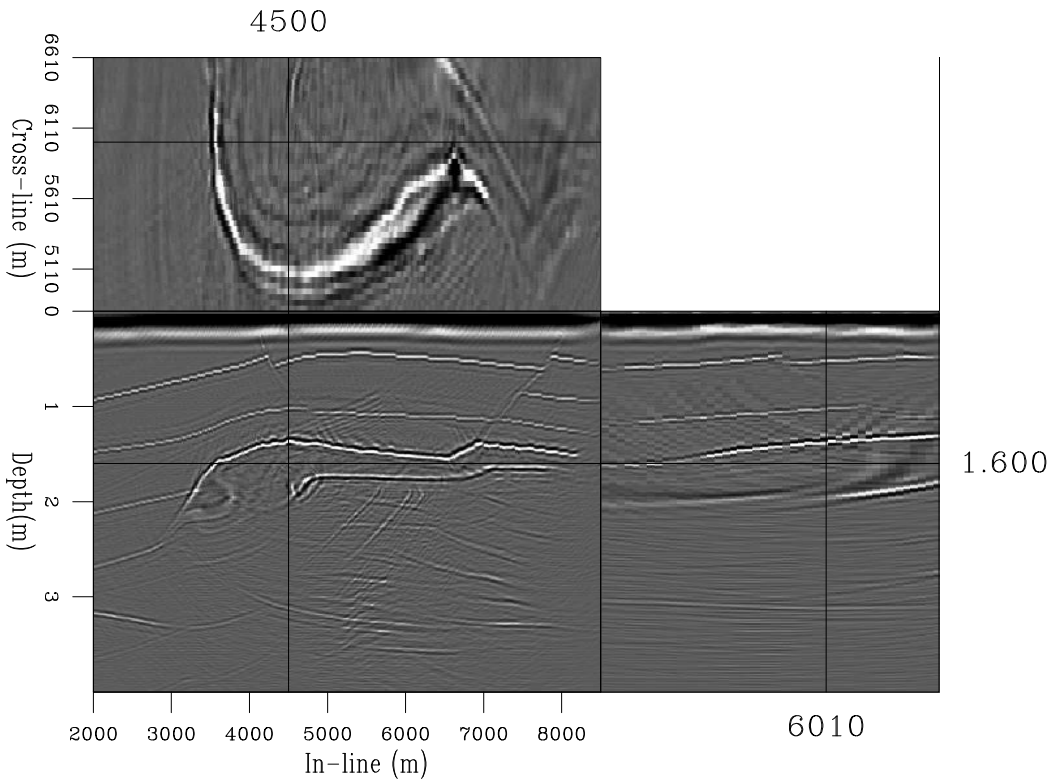

Figure 13: Two-pass migration of SEG Salt synthetic bob3-seg-salt-twopass [NR]

ACKNOWLEDGMENTS

We would like to thank all the sponsors for their contributions for data over the last 25 years.

REFERENCES

Biondi, B., Clapp, R., and Crawley, S., 1996, Seplib90: Seplib for 3-D prestack data: SEP–**92**, 343–364.

Clapp, R. G., 1999, Additions to seplib: SEP–**102**, 201–218.

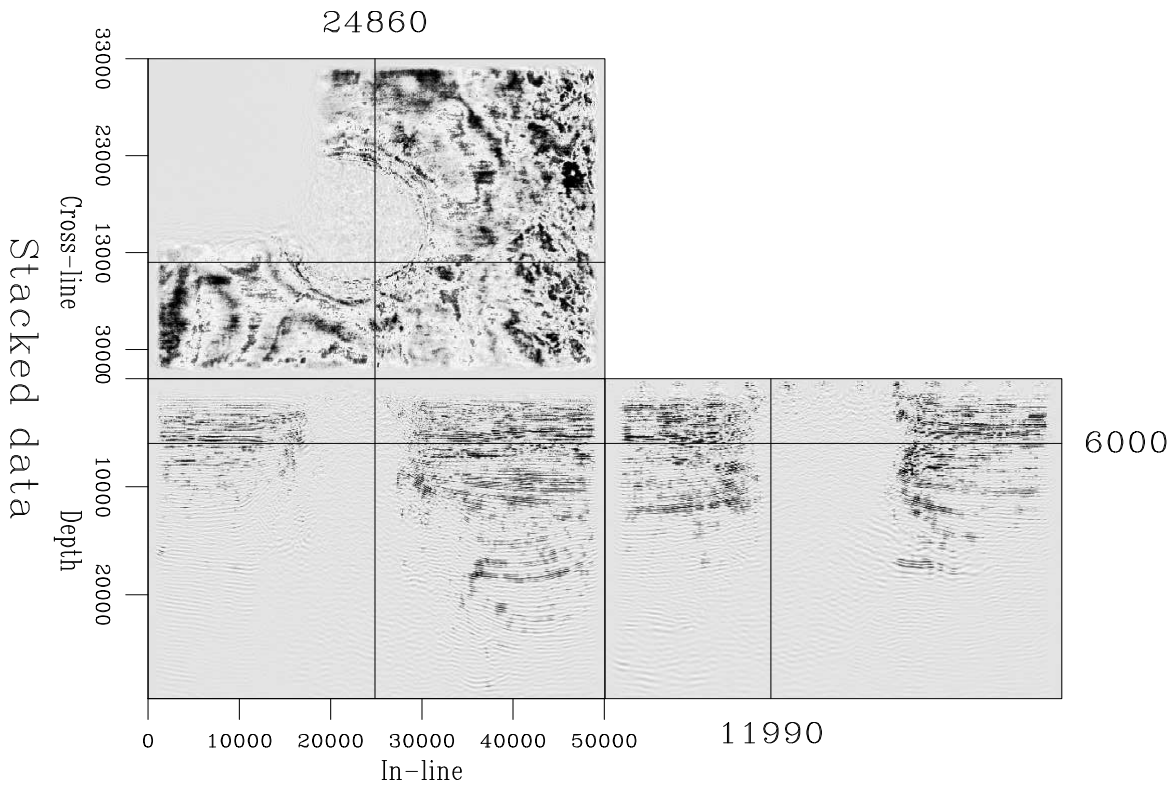

Figure 14: Depth, In-line and cross-line slices from 3-D Stack data bob3-unocal-salt-stack [NR]

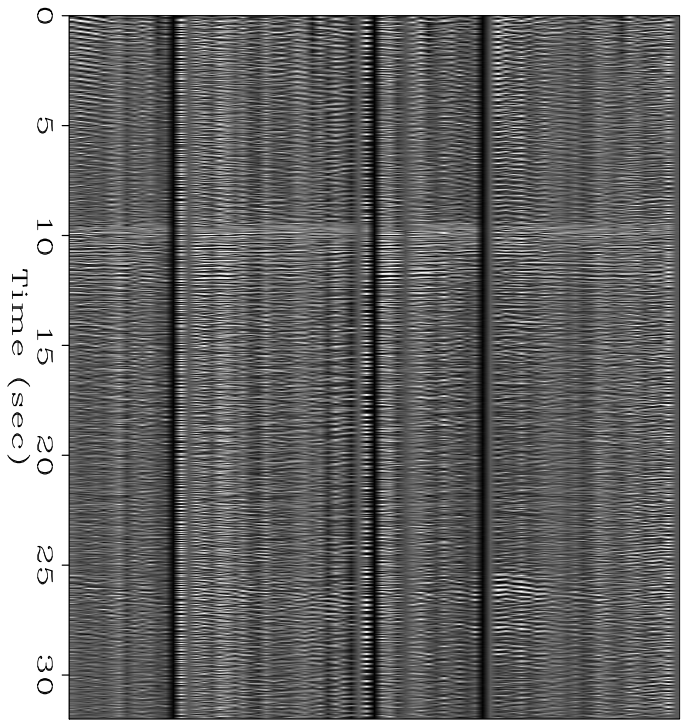

Figure 15: SEP passive dataset. Partial stack data corresponding to record number 46. Note the blast arrival around 9.7 seconds. bob3-pstack46 [NR]

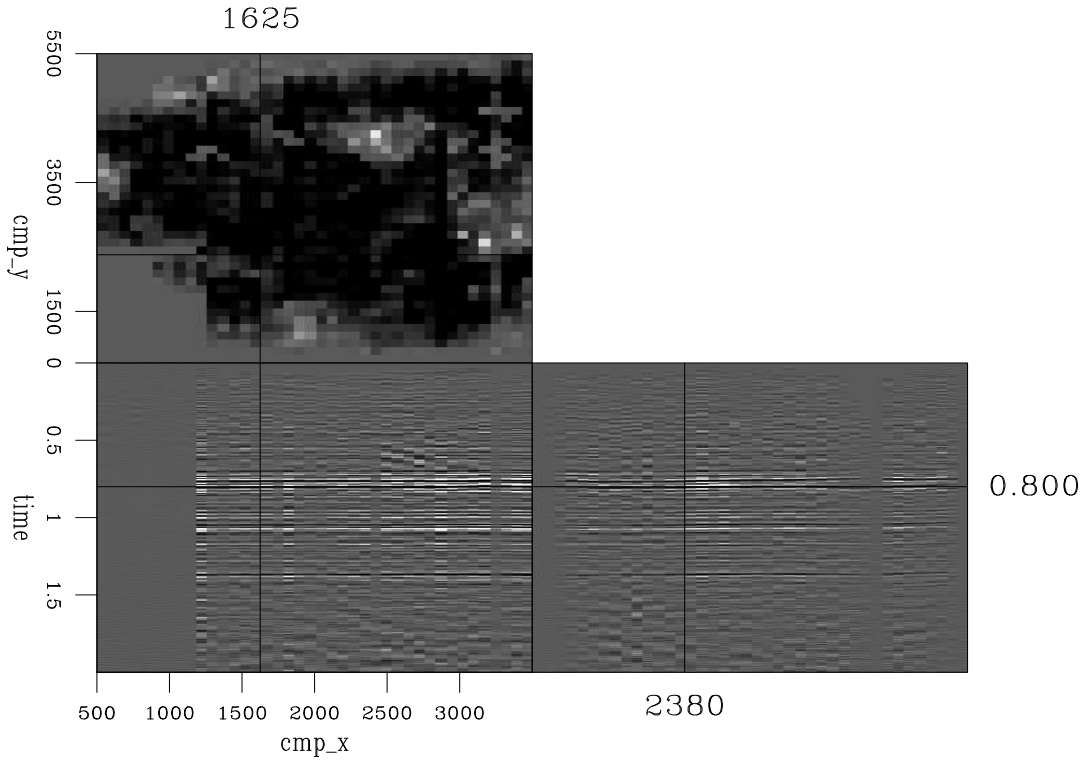

Figure 16: Stacked data of a land acquisition dataset acquired by Pan-Canadian. bob3-shorn-stack [ER]

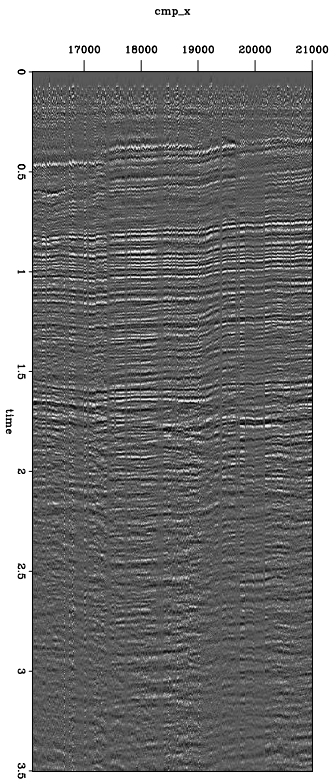

Figure 17: Near offset stacked data of Jupiter North-Sea dataset. bob3-jupiter-stack [ER]

.