

## Short Note

### SEP's data library

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*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<sup>2</sup>, 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

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<sup>2</sup>[http://sepwww.stanford.edu/pub/docs/sepdatalib/toc\\_html](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. Figures 1-5 were created for visualizing the data.

### L7D DATA FILES

**Raw Data** The full dataset is as big as 45Gb, available on DLT tapes.

**Common-azimuth Data** To be done.

**Velocity Model** Located at /data\_3d/elf\_north\_sea/L7d-vel.H

Velocity model created by Elf & IFP<sup>3</sup> (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

```

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<sup>3</sup>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

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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, originally for testing AMO and common-azimuth migration. The contact at Elf Exploration Production is Henri Calandra<sup>4</sup>.

**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.

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<sup>4</sup>email: henri.calandra@elf-p.fr

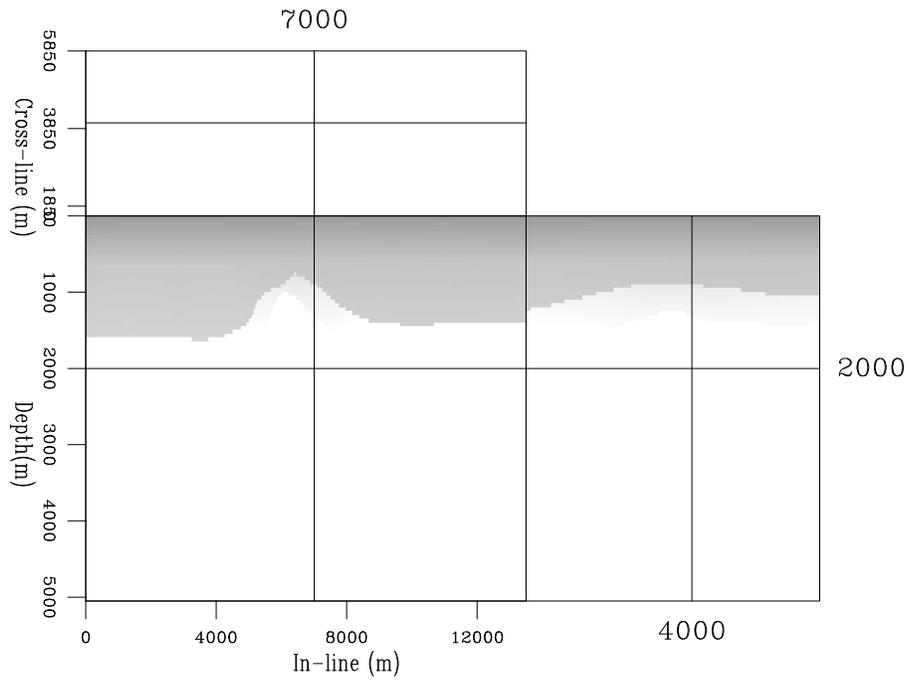


Figure 1: Elf "SMART" velocity model `bob3-vel-model` [NR]

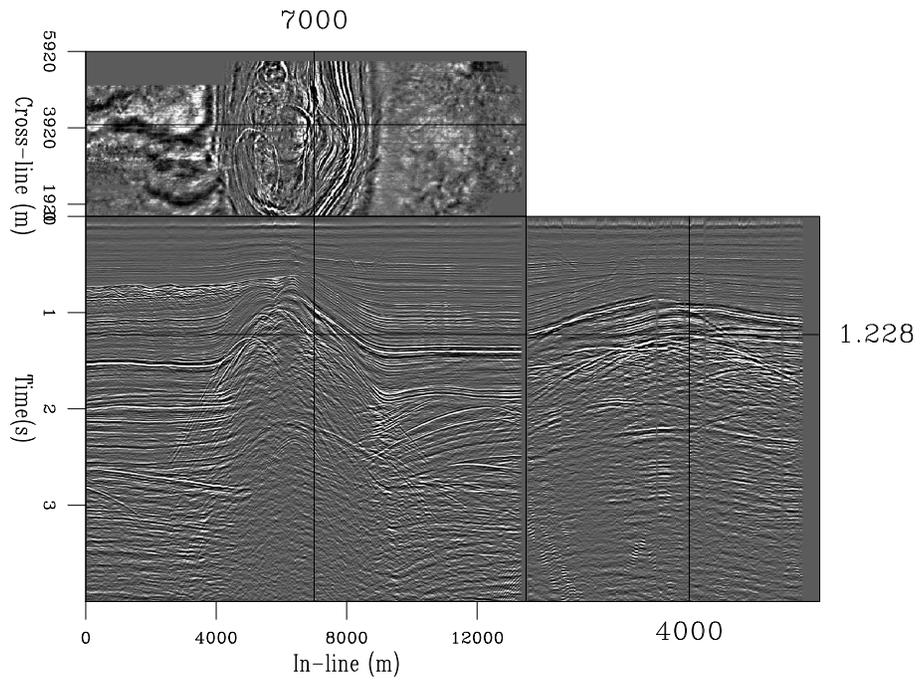


Figure 2: NMO-stack of the near offsets (0-1000m) `bob3-nmo-stack` [NR]

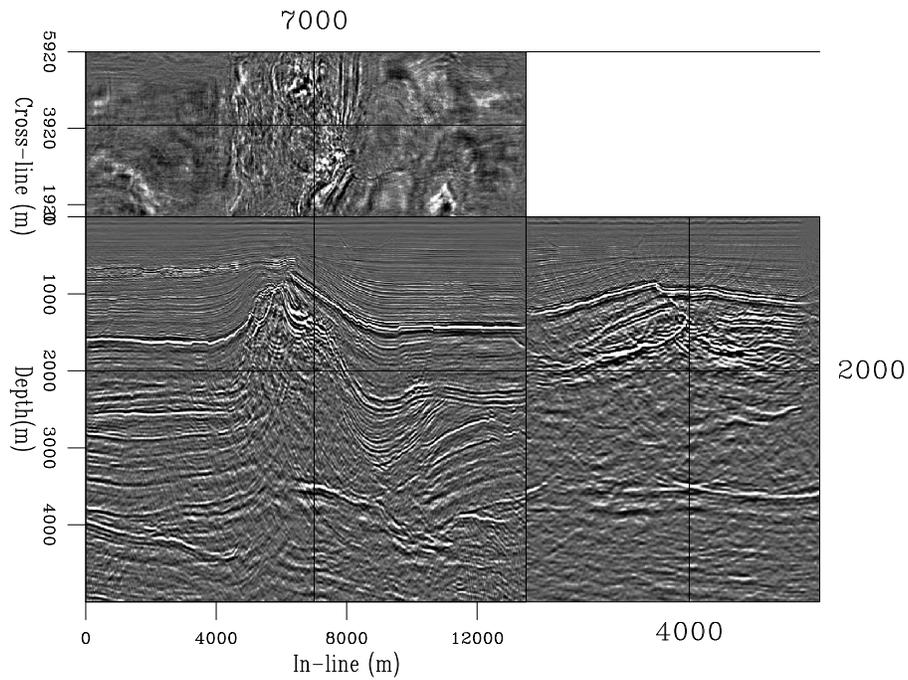


Figure 3: Zero-offset migration of the near offsets (0-1000m) `bob3-zo-mig` [NR]

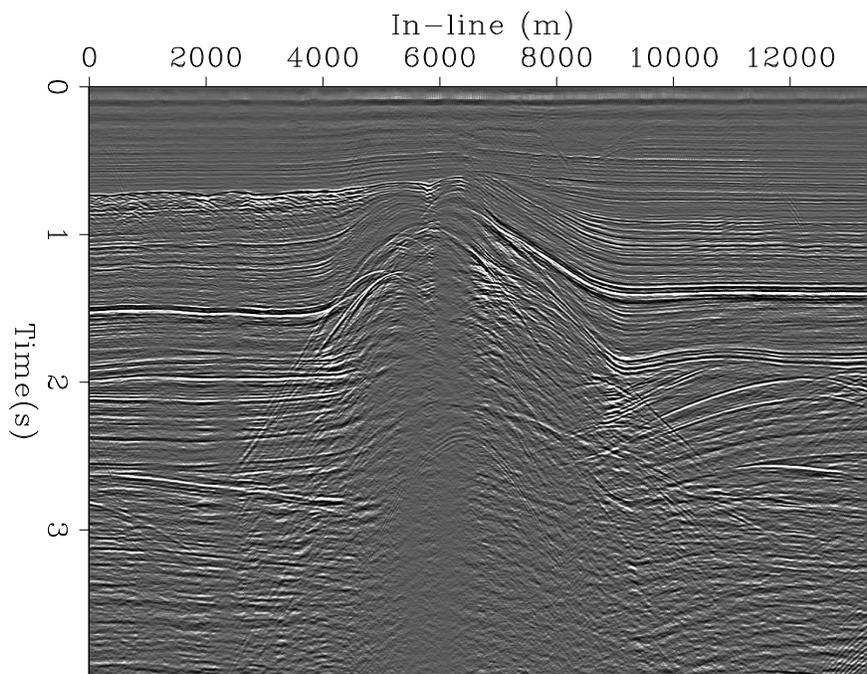


Figure 4: NMO-stack of the near offsets (0-1000m), section corresponding to the 2-D synthetic data `bob3-2D-line-nmo-stack` [NR]

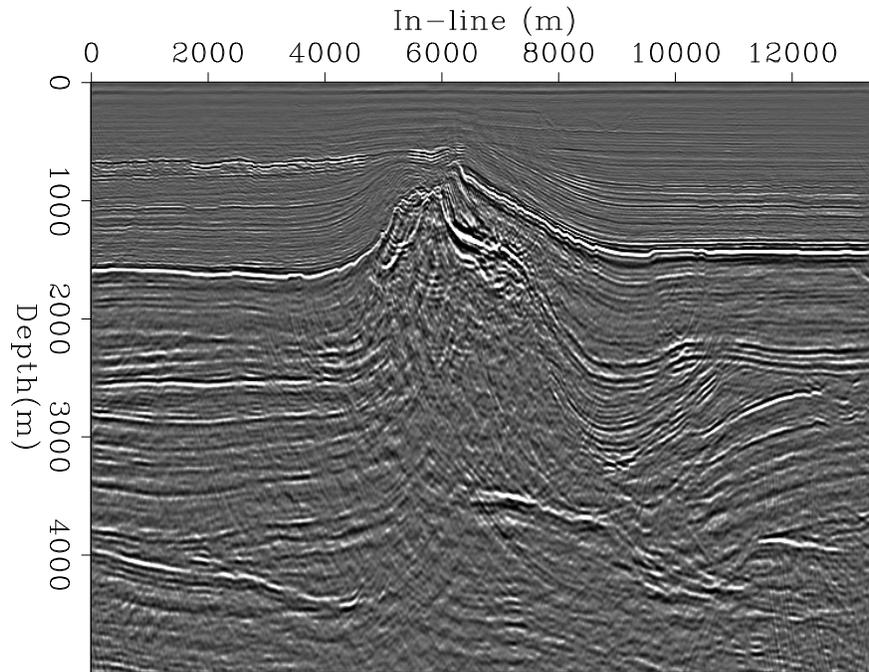


Figure 5: Zero-offset migration of the near offsets (0-1000m), section corresponding to the 2-D synthetic data `bob3-2D-line-zo-mig` [NR]

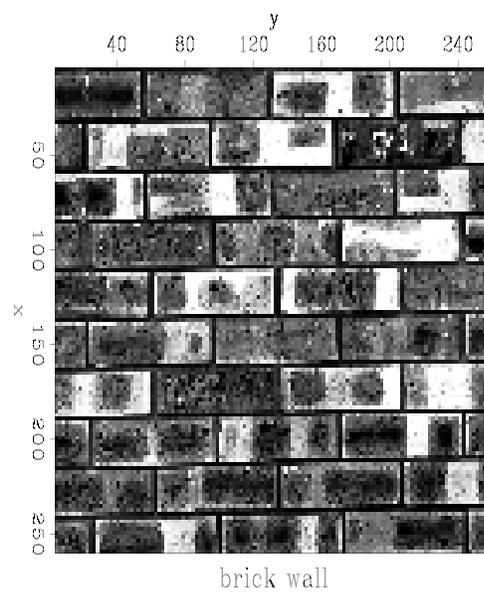
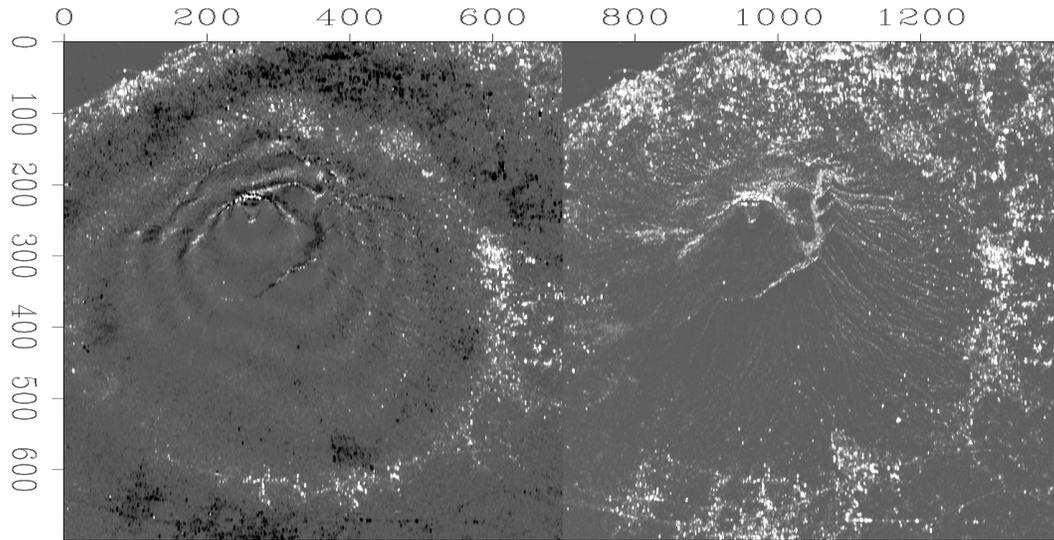


Figure 6: A brick wall texture. `bob3-brick` [NR]



Vesuvius: phase/magnitude

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

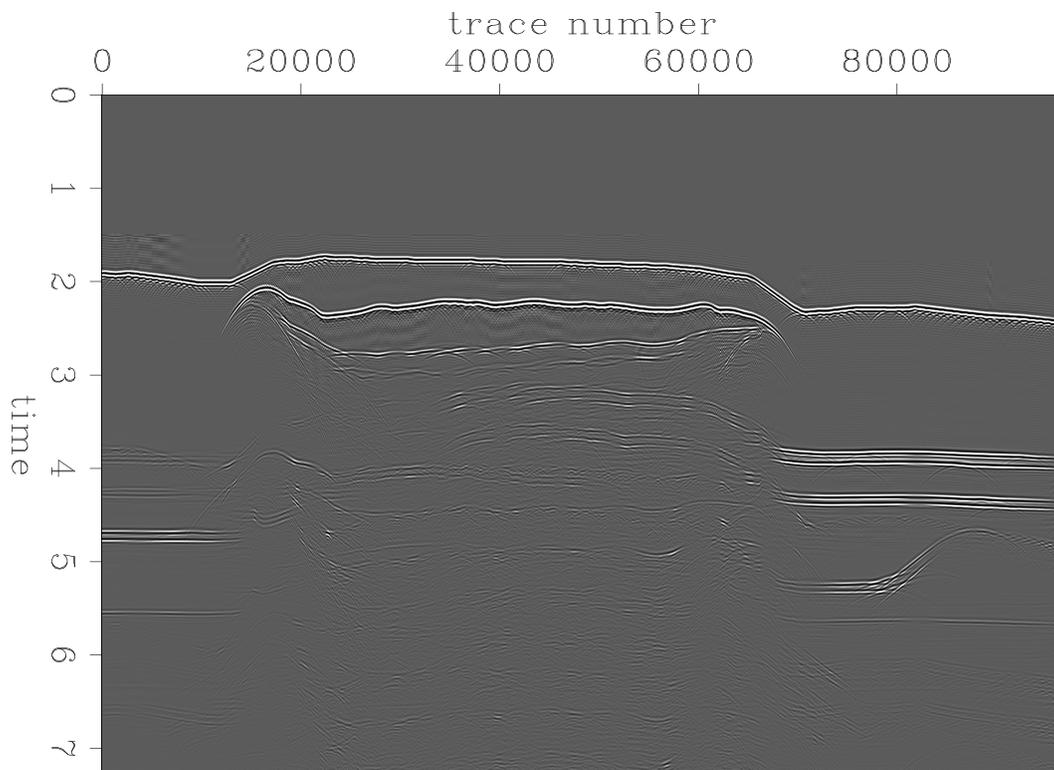
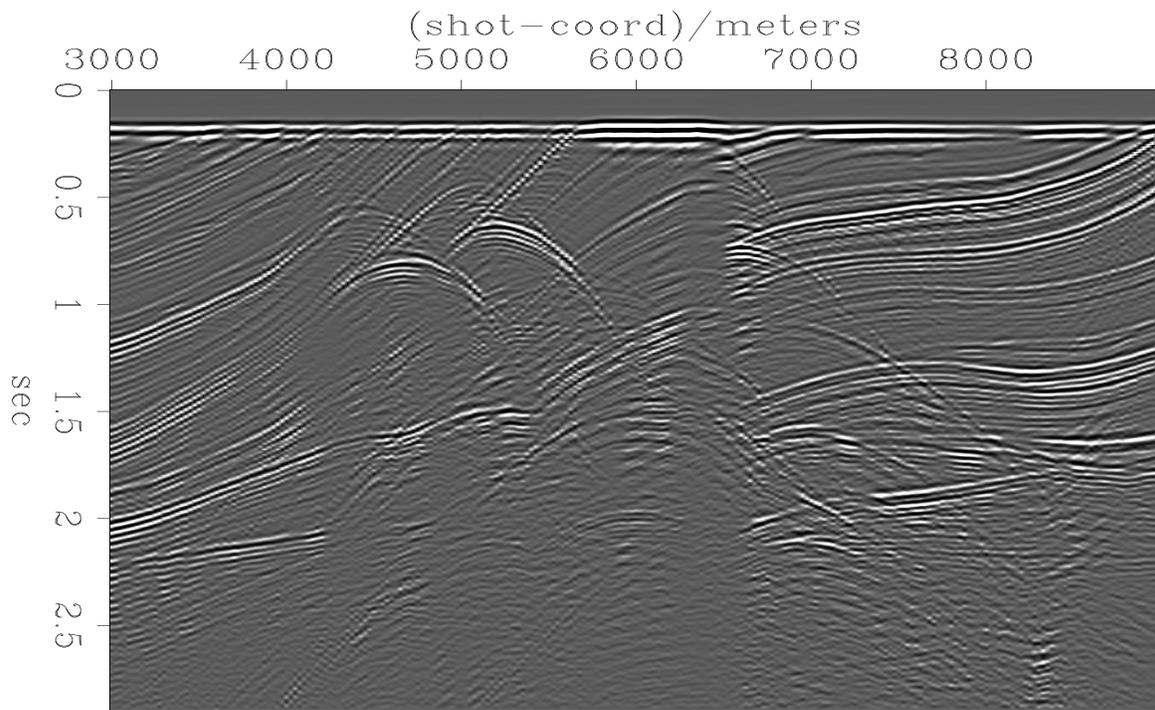
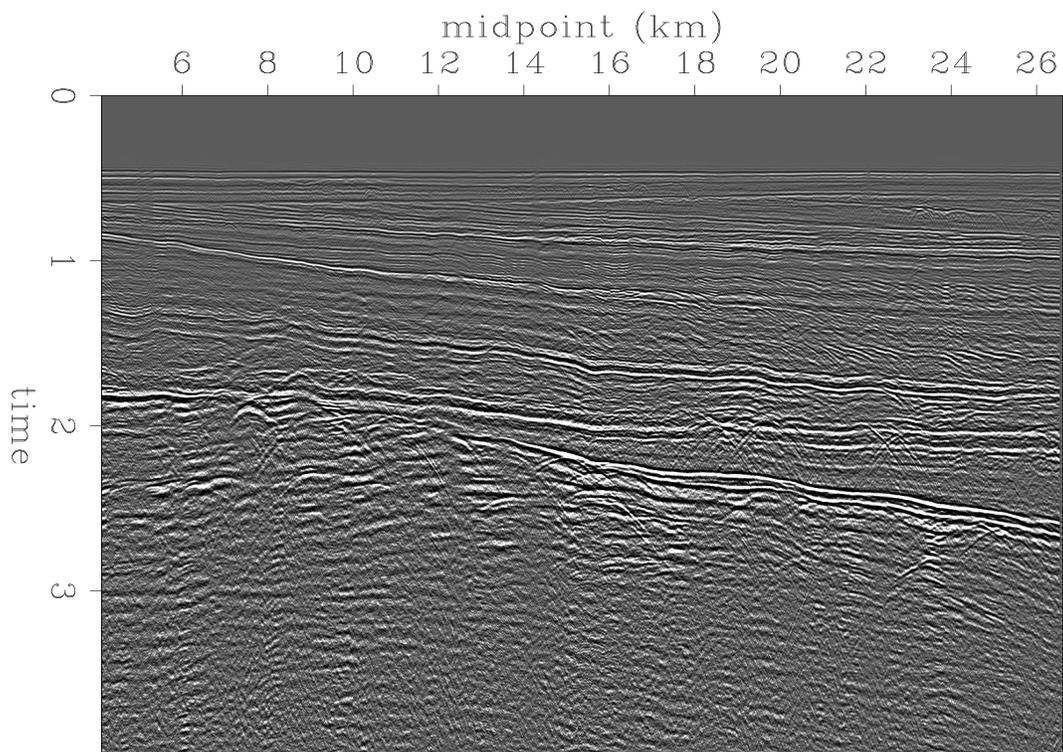


Figure 8: Stack of BP multiple synthetic. `bob3-bp-stack` [NR]



Near offset section

Figure 9: Near offset section of Marmousi dataset. `bob3-marmnear` [NR]Figure 10: Stack of Mobil-AVO dataset. `bob3-mobil-stack` [NR]

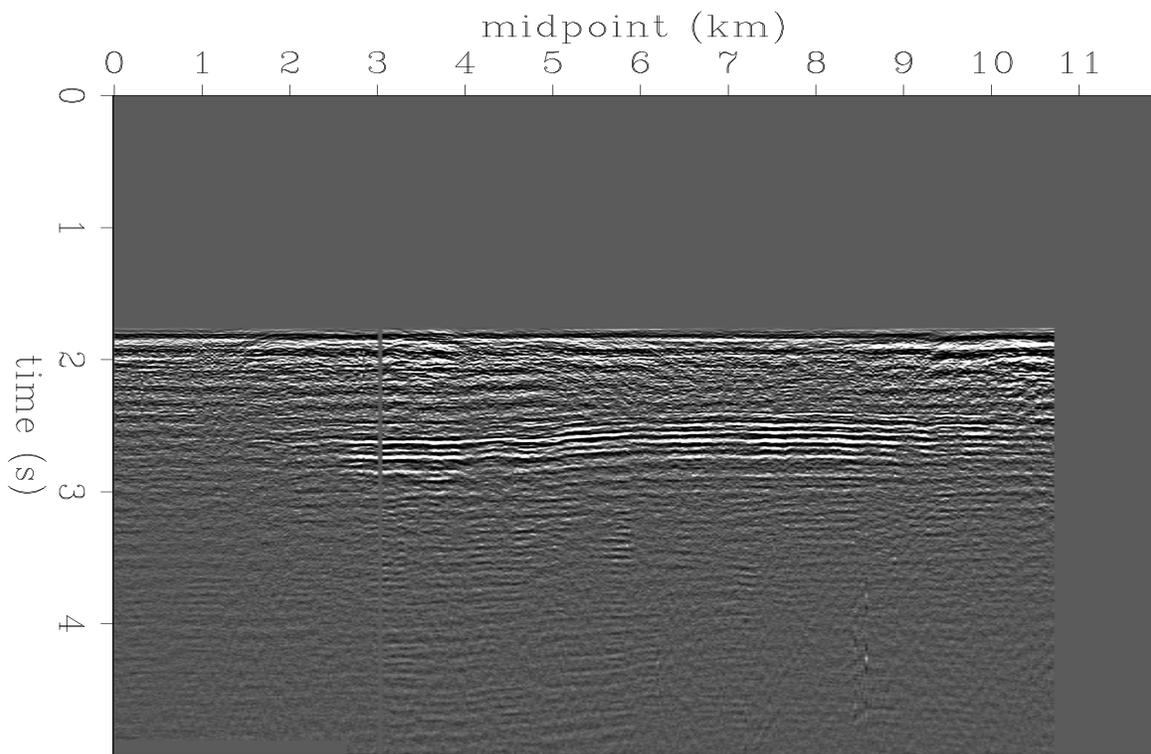


Figure 11: Near offset section of Kjartansson thesis data. `bob3-kjar-near` [NR]

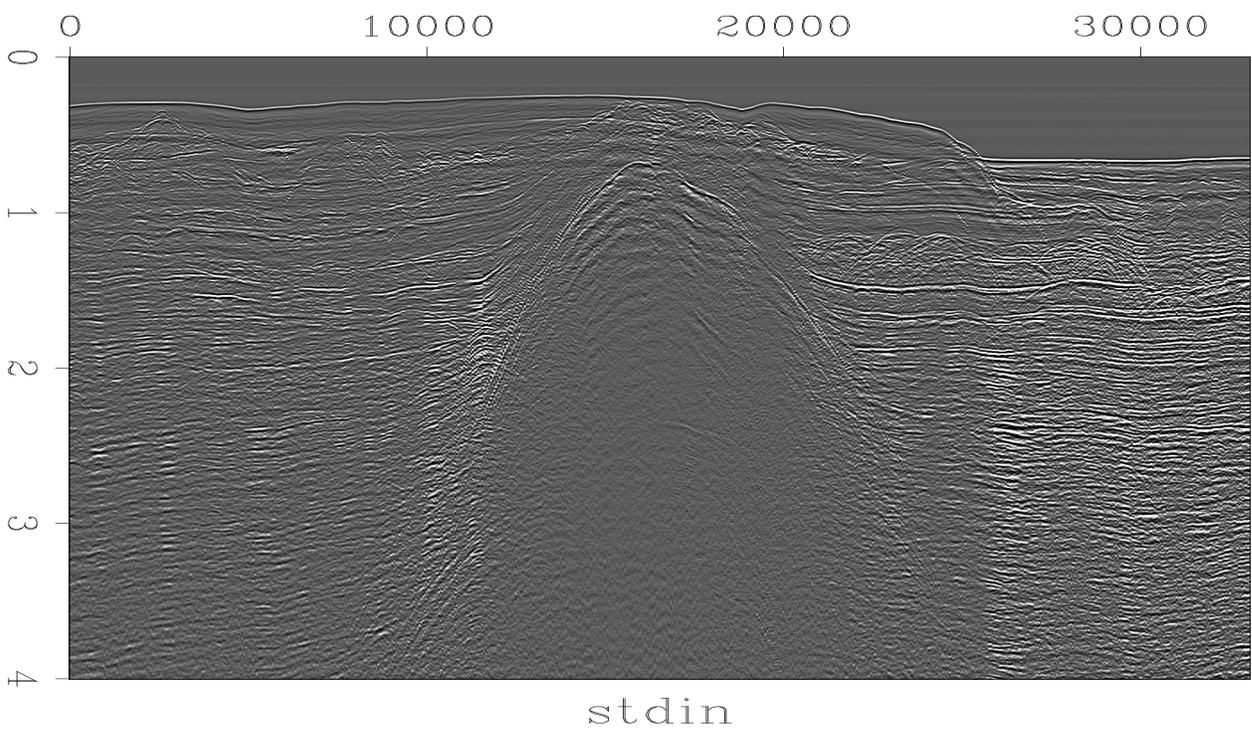


Figure 12: Near offset section of line 1 of Amoco data over a Gulf salt body. `bob3-amoco-salt-near1` [NR]

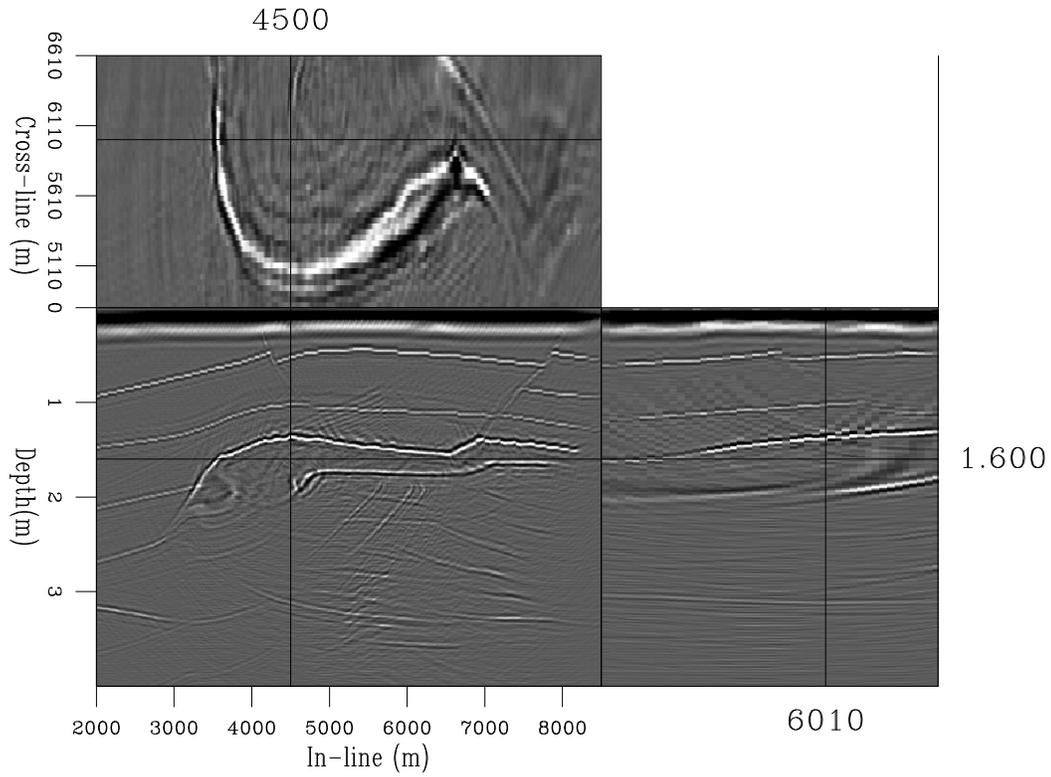


Figure 13: Two-pass migration of SEG Salt synthetic `bob3-seg-salt-twopass` [NR]

### 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.

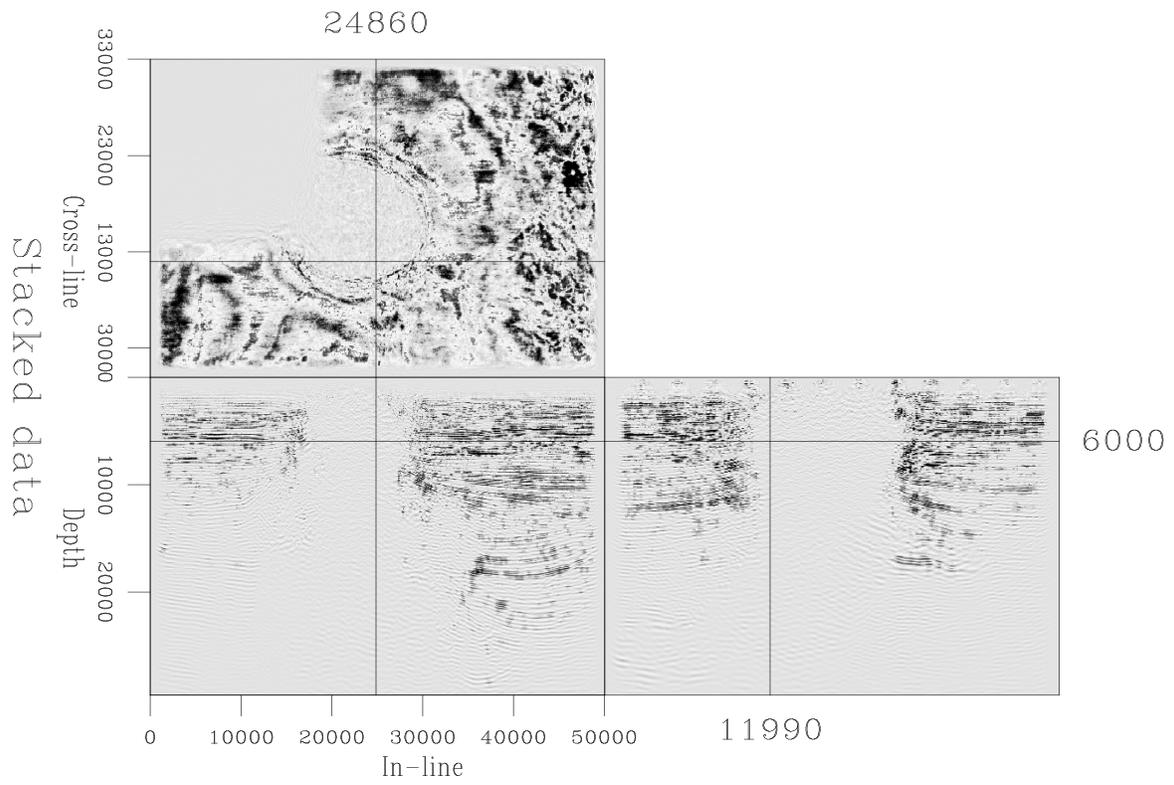


Figure 14: Depth, In-line and cross-line slices from 3-D Stack data bob3-unocal-salt-stack  
 [NR]

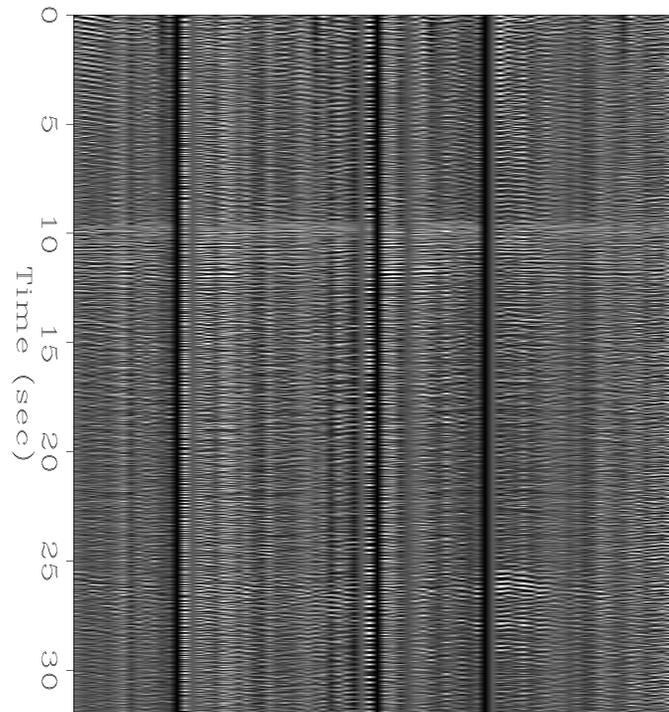


Figure 15: SEP passive dataset. Partial stack data corresponding to record number 46. Note the blast arrival around 9.7 seconds. `bob3-pstack46` [NR]

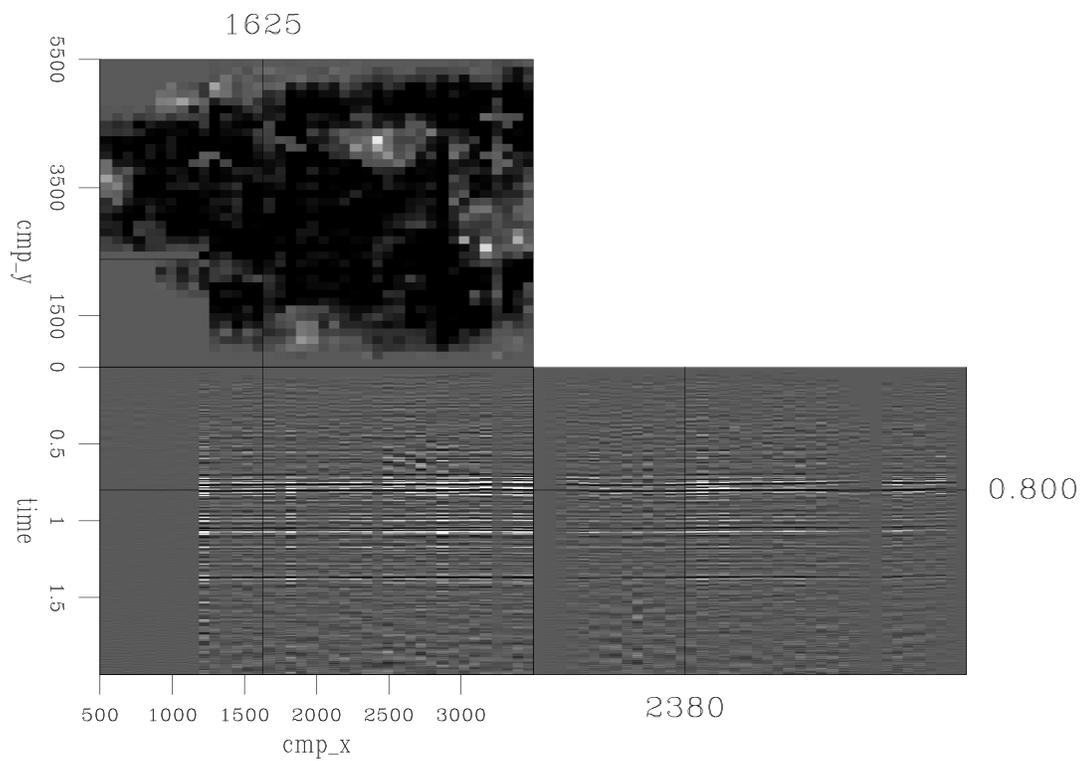


Figure 16: Stacked data of a land acquisition dataset acquired by Pan-Canadian. `bob3-shorn-stack` [ER]

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

