Marmousi synthetic dataset

Carmen B. Mora[1]

ABSTRACT

Marmousi is a 2-D synthetic dataset generated at the Institut Français du Pétrole (IFP). The geometry of this model is based on a profile through the North Quenguela trough in the Cuanza basin (Versteeg, 1993). The geometry and velocity model were created to produce a complex seismic data which requiere advanced processing techniques to obtain a correct earth image. The Marmousi dataset was used for the workshop on practical aspects of seismic data inversion at the 52nd EAEG meeting in 1990.

[1]**email:** cmora@sep.stanford.edu

MARMOUSI SYNTHETIC DATASET

Raw Data /data/oldq2/marmousi/marmrefl.H
Velocity Model /data/oldq2/marmousi/marmvel.H
Stack
Zero-offset Migration
Density model /data/oldq2/marmousi/marmdens.H
Vertical seismic profile /data/oldq2/marmousi/marmvsp.H
Well-log /data/oldq2/marmousi/marmlog.H
Usage Missing data: (Ji, 1994b); Modeling: (Karrenbach, 1992), (Zhang, 1992), (Alkhalifah, 1997); Traveltimes: (Lumley, 1992), (Audebert et al., 1994), (Nichols, 1994), (Rekdal and Biondi, 1994), (Urdaneta, 1994), (Sava and Fomel, 1997), (Fomel, 1997), (Alkhalifah and Fomel, 1997); Migration & Imaging: (Ji, 1993), (Ji, 1994a), (Chemingui and Biondi, 1994), (Bevc, 1995), (Popovici, 1995), (Alkhalifah, 1998), (Malcotti, 1998), (Sun and Fomel, 1998);
Geometry

```
marmrefl.H:
        in="$Q2/marmousi/marmrefl.H@"
        expands to in="/q2/marmousi/marmrefl.H@"
        esize=4
        n1=726  n2=96   n3=240  n4=1               16727040 elem           66908160 bytes
        d1=0.004        d2=-25  d3=25   d4=1
                Warning: d2 is negative. Legal, but risky.
        o1=0    o2=2575 o3=3000 o4=0
        label1=sec
        label2=(offset)/meters
        label3=(shot-coord)/meters
```

Problem Complex seismic data, contains strong horizontal and vertical velocity gradients.
History of Data Synthetic 2-D data generated at IFP. Marine data adquisition simulated using a 2D acoustic finite-difference modeling program (Versteeg, 1993).
Preprocessing
Proprietary Considerations Public

REFERENCES

Alkhalifah, T., and Fomel, S., 1997, Implementing the fast marching eikonal solver: Spherical versus cartesian coordinates: SEP–**95**, 149–171.

Alkhalifah, T., 1997, An anisotropic Marmousi model: SEP–**95**, 265–282.

Alkhalifah, T., 1998, Prestack Kirchhoff time migration for complex media: SEP–**97**, 45–60.

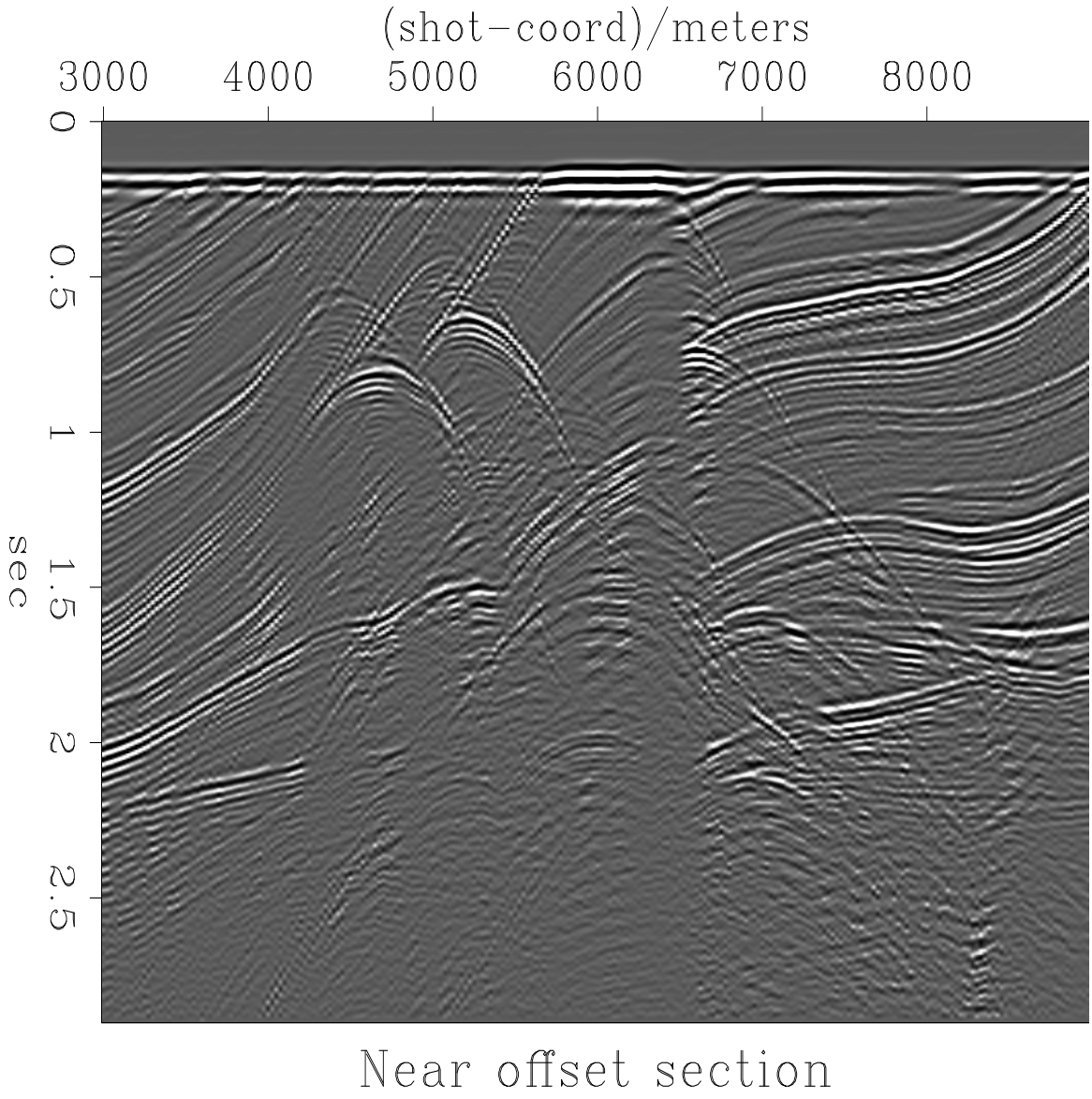

Figure 1: Near offset section marmousi-marmnear [ER]

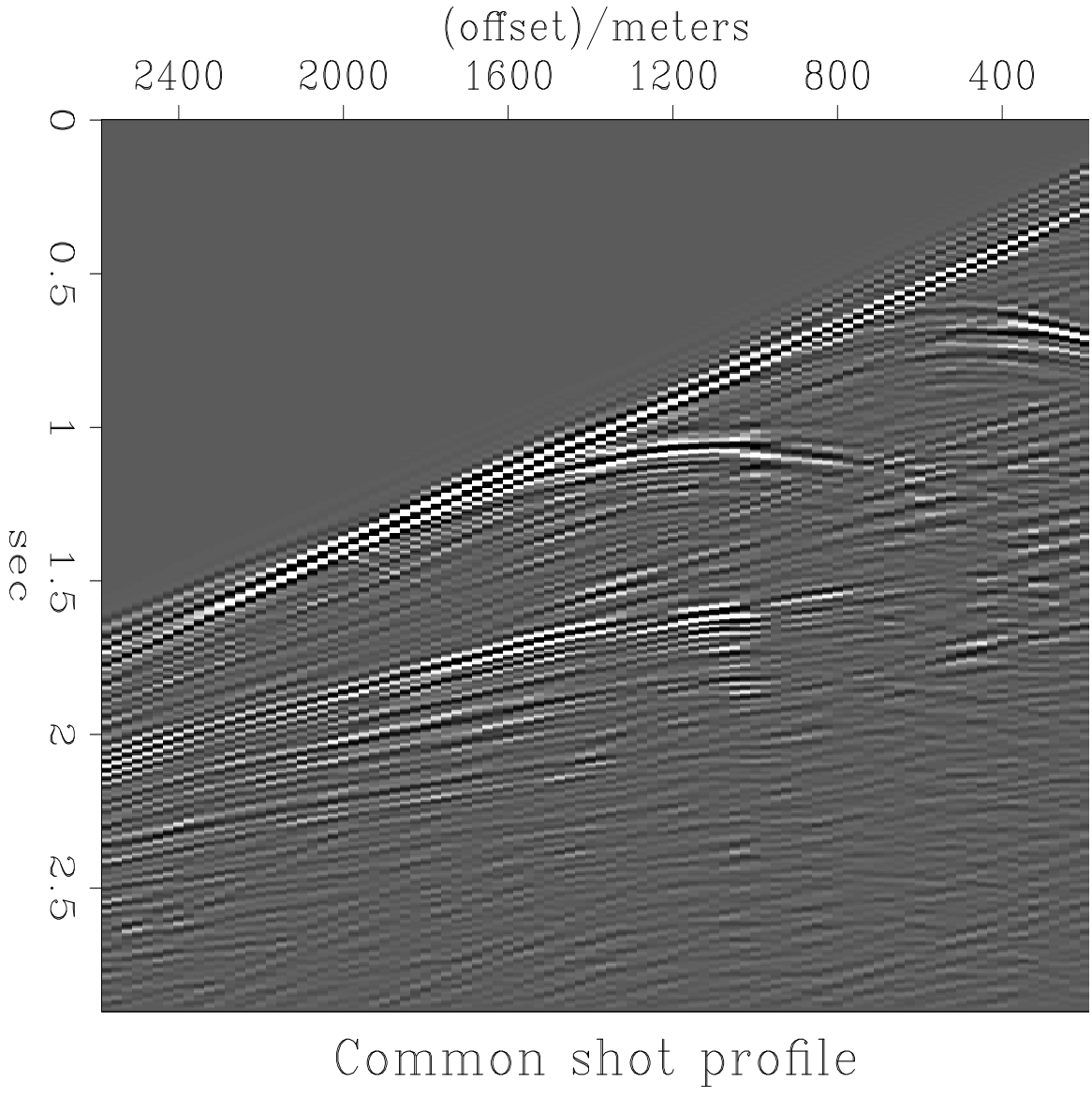

Figure 2: Common shot profile marmousi-marmshot [ER]

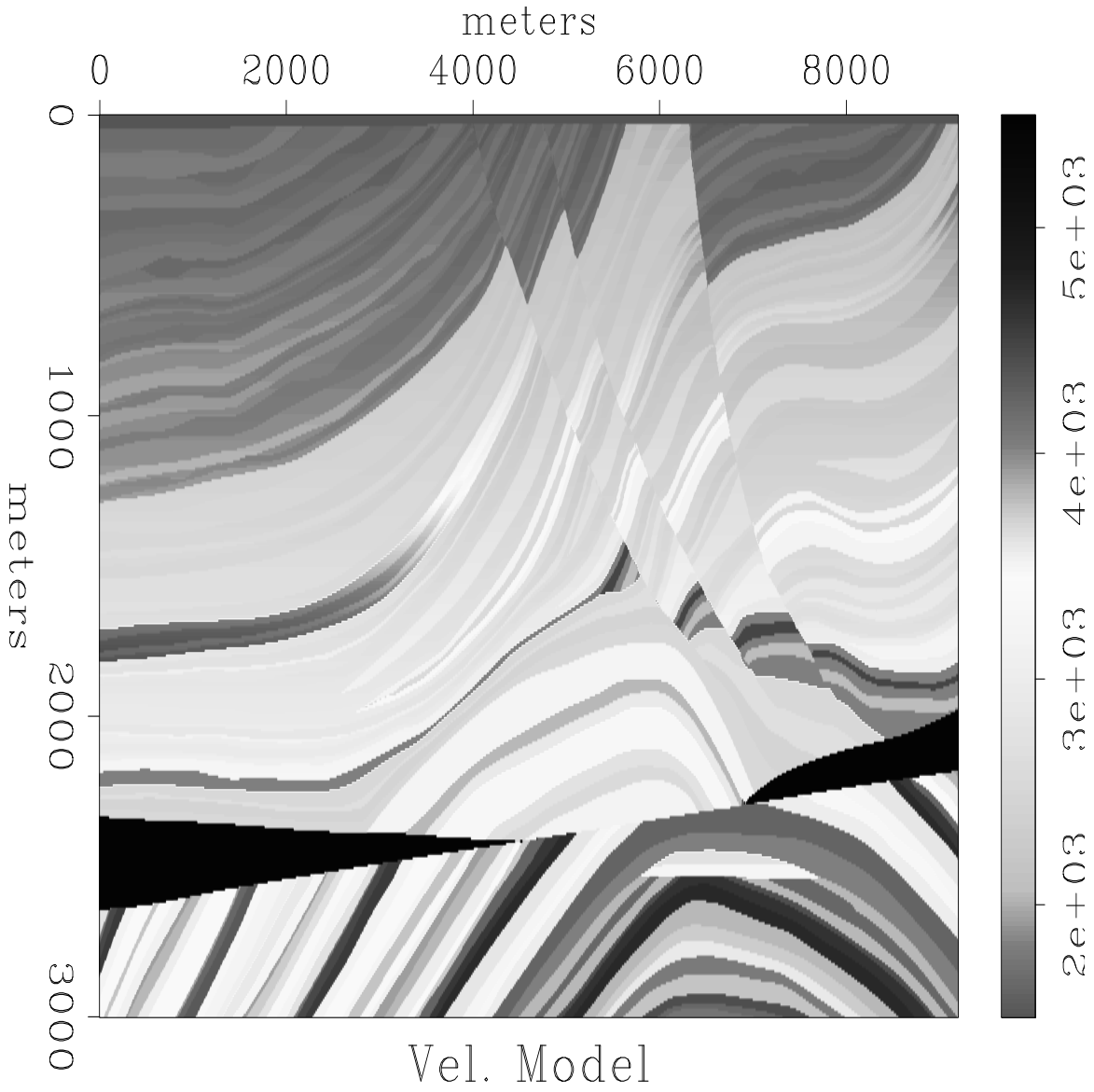

Figure 3: Velocity model marmousi-velmod [ER]

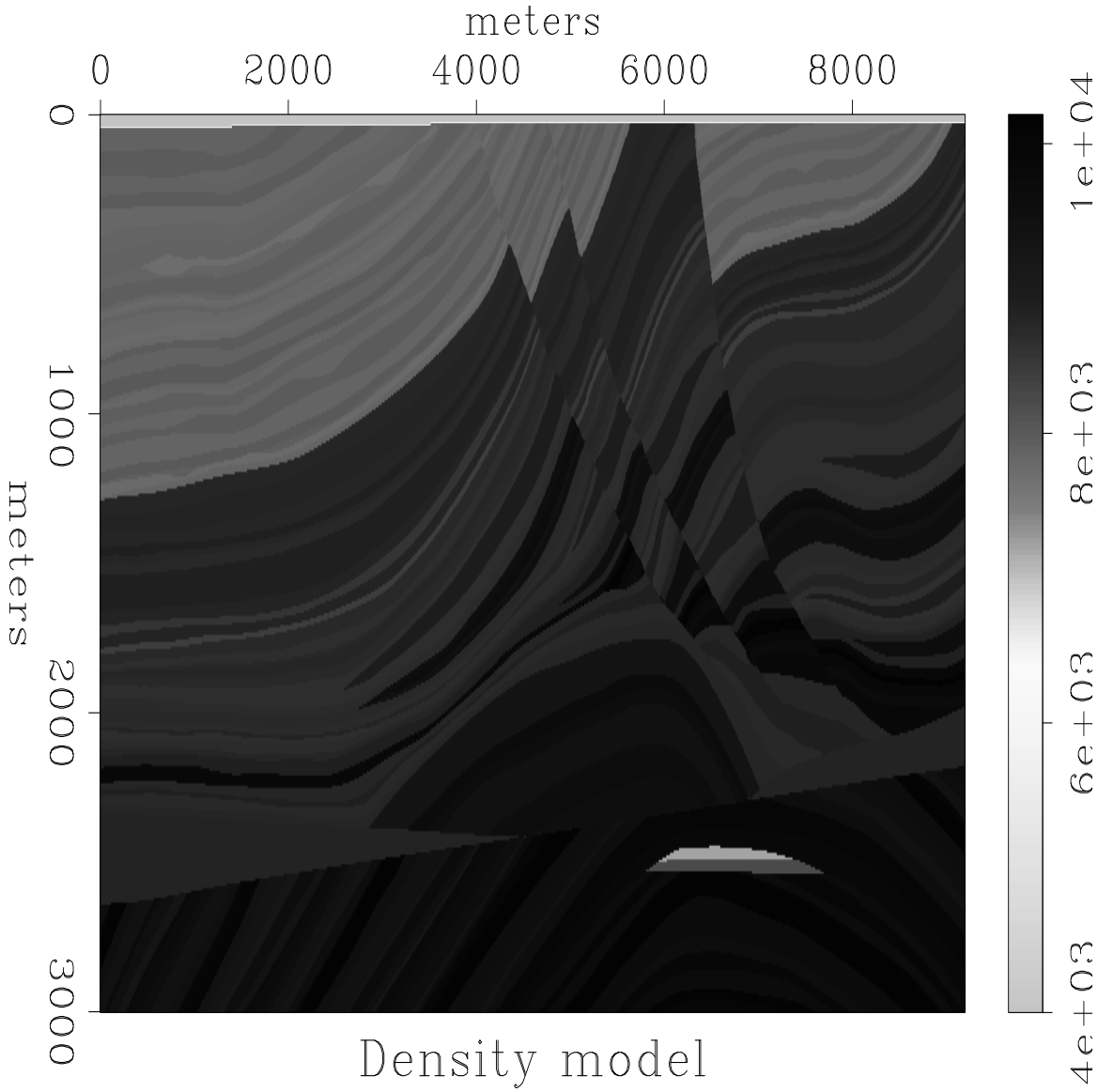

Figure 4: Density model marmousi-density [ER]

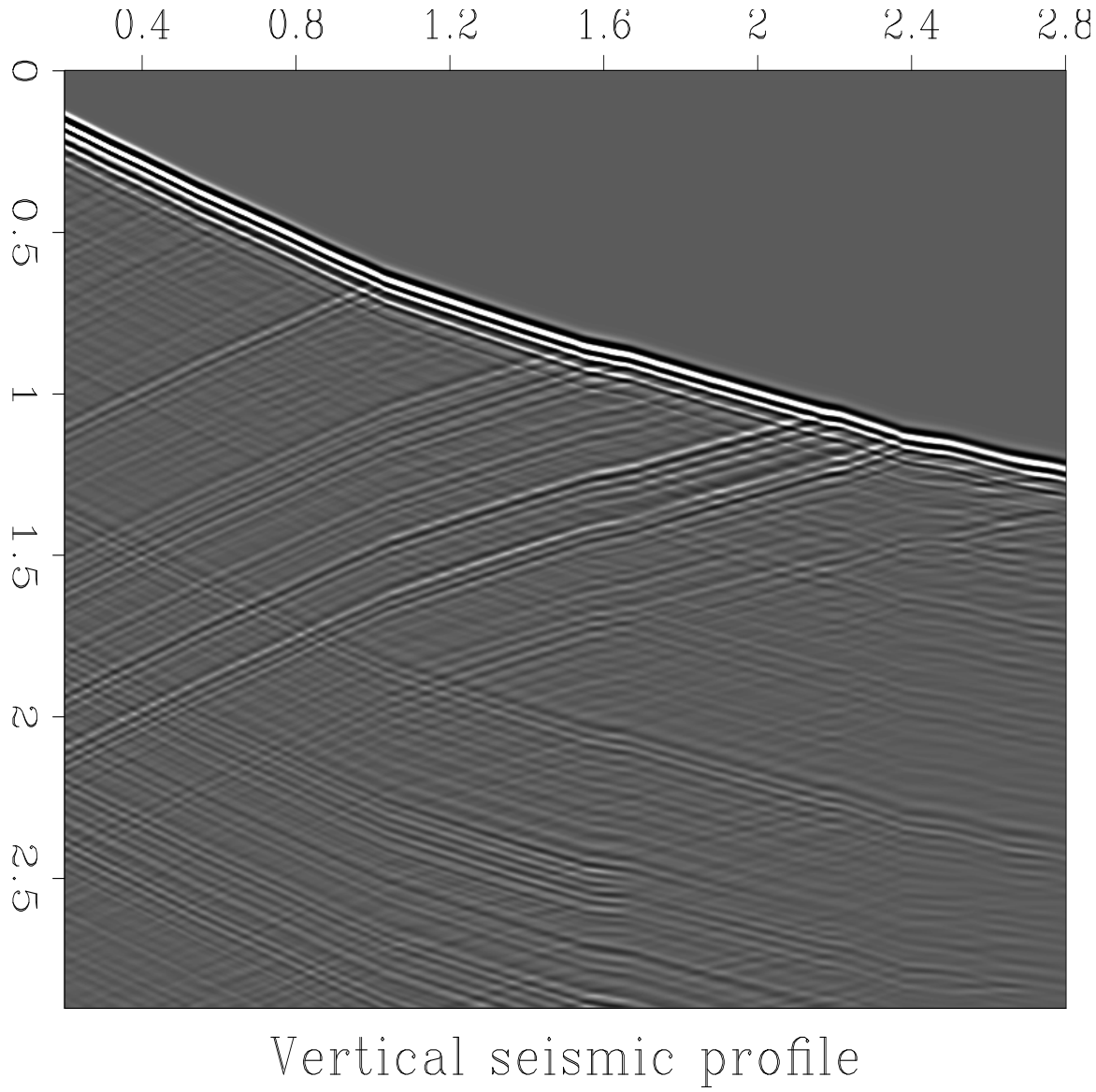

Figure 5: Vertical seismic profile marmousi-vsp [ER]

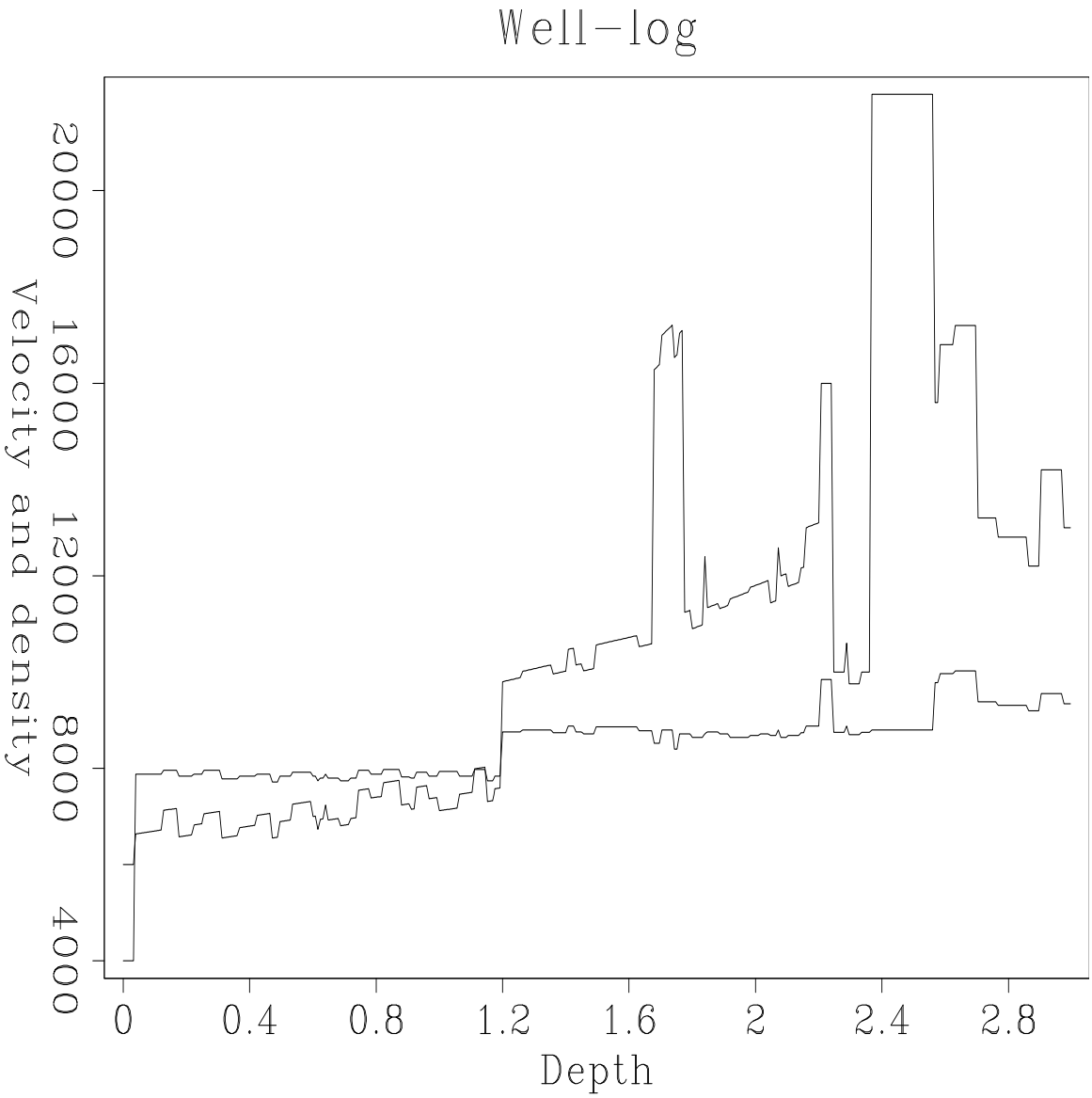

Figure 6: Well-log marmousi-log [ER]

Audebert, F., Biondi, B., Lumley, D., Nichols, D., Rekdal, T., and Urdaneta, H., 1994, Marmousi traveltime computation and imaging comparisons: SEP–**80**, 47–66.

Bevc, D., 1995, Imaging complex structures with first-arrival traveltimes: SEP–**84**, 1–10.

Chemingui, N., and Biondi, B., 1994, Coherent partial stacking by offset continuation of 2-D prestack data: SEP–**82**, 117–126.

Fomel, S., 1997, A variational formulation of the fast marching eikonal solver: SEP–**95**, 127–147.

Ji, J., 1993, Controlled illumination by wavefront synthesis: SEP–**79**, 129–144.

Ji, J., 1994a, Angle-dependent reflectivity by wavefront synthesis imaging: SEP–**80**, 491–498.

Ji, J., 1994b, Near-offset interpolation in wavefront synthesis imaging: SEP–**82**, 195–208.

Karrenbach, M., 1992, "Plug and Play" wave equation modules: SEP–**75**, 273–288.

Lumley, D. E., 1992, Green's function traveltime interpolation: SEP–**75**, 215–242.

Malcotti, H., 1998, Prestack depth migration in anisotropic heterogeneous media: SEP–**97**, 73–82.

Nichols, D., 1994, Maximum energy traveltimes calculated in the seismic frequency band: SEP–**80**, 1–16.

Popovici, A. M., 1995, Prestack migration by split-step DSR: SEP–**84**, 53–60.

Rekdal, T., and Biondi, B., 1994, Ray methods in rough models: SEP–**80**, 67–84.

Sava, P., and Fomel, S., 1997, Huygens wavefront tracing: A robust alternative to conventional ray tracing: SEP–**95**, 101–113.

Sun, Y., and Fomel, S., 1998, Fast-marching eikonal solver in the tetragonal coordinates: SEP–**97**, 241–250.

Urdaneta, H., 1994, Wavefront construction using waverays: SEP–**80**, 85–100.

Versteeg, R. J., 1993, Sensitivity of prestack depth migration to the velocity model: Geophysics, **58**, no. 6, 873–882.

Zhang, L., 1992, Wavefront propagation by local ray-tracing: SEP–**75**, 289–314.