Data descriptions

1. Coordinates

- ***Coordinate system***

The coordinate system of the data - it should be a uniform coordinate system.

- ***Syntax of coordinate files***

The coordinate units should be given in a uniform format. As a convention, the *X* in trace headers is the **northing** and *Y* is the **easting**.

An example from Finnish OpenFire (comment lines start with the symbol #, followed by the coordinates of each peg):

```
#  Pole coordinates for FIRE 3-1.
#  Units are in metres. Coordinate system KKJ3.
#  Format string: "%6d %11d %11d\n"
#
#  Fire 3-1 starts here
# POLEID  X(NORTHING) Y(EASTING)
    1    6975392    3591999
    2    6975408    3592046
    3    6975428    3592092
```

Alternatively, the coordinate columns can be *LATITUDE* and *LONGITUDE*, given in decimal degrees.

An example:

```
#  CMP coordinates for FIRE 1-1.
#  Units are in decimal degrees (EUREF-FIN).
#  Format string: "%6d %10.6f %10.6f\n"
#  Fire 1-1 starts here
# CMPID  LATITUDE  LONGITUDE
   10  64.532124  29.944352
   11  64.531899  29.944390
   12          64.531674  29.944429
```

2. Information related to Original field recordings /Sorted shot gathers

The original field recordings and/or sorted shot gathers could be available as a set of SEG-Y, SEGD, or other type of format.

Noise tests and failed measurements could be included in the original field data set, however they should be then identified using the original observer's logs.

Carefully chosen, quality-controlled shot gathers with all relevant trace headers set should be available under shot gathers. The observer's notes should be also available for quality control.

- ***Geometry***

The description of the geometry of different surveys can be described as in the Finnish Reflection Experiment example: "The experiment is a 2-D crooked-line seismic survey conducted using 4 to 5 Vibroseis sources per shot point. The nominal shot point interval is 100 meters. The recording geometry is split-spread (asymmetric at the end of lines) with 362 active channels separated by a nominal group interval of 50 meters. This results in a nominal fold of ~ 90 for the entire survey."

- ***Naming of files***

The naming of files should follow a general pattern in order to have a better organized and structured data base.

- ***Textual and binary header***

An example of the textual header could be provided, such as in OpenFire:

```
C1  FIRE Finnish Reflection Experiment 2001-2003
C2  Client : FIRE consortium: University of Helsinki, University of Oulu
C3                    and Geological Survey of Finland
C4  Contractor: Spetsgeofyzika, Russia
C5  LINE <NO> <LOCATION> ; acquisition: <DATE OF ACQUISITION>
C6  Source: Vibroseis: 4-5 vibrators, nominal shot point interval 100 m
C7      Vibrator group length: 50 m
C8      Sweep length 30 sec, linear upsweep 12-80 Hz
C9      Fully correlated trace length 30 sec (Total listening time 60 sec)
C10     Vertical stacking: 8 sweeps / shot point, correlation before stack
C11 Recording geometry: Split spread, asymmetric at the end of lines
C12                 362 active channels, group interval 50 m
C13 Geophone groups: 12 geophones, group length 50 m
C14 Number of samples: <SAMPLES>    Sampling interval: <SAMPLERATE>
C15 This reel contains the following field records (see obslogs):
C16     <FLDR INTERVAL>
C17 Number of traces in this reel: <NO TRACES>
C18 Sourcepoint range: <EP INTERVAL>
C19 CDP range: <CDP INTERVAL>
C20
C21 NOTE! trace header has the following non-standard fields:
C22         bytes 171-172 (grnors): pole of present detector
C23         bytes 173-174 (grnofr): pole of first detector in spread
C24         bytes 175-176 (grnlof): pole of last detector in spread
C25
C26 <MISCELLANEOUS NOTES>
C27
…
C40 END TEXTUAL HEADER
```

- ***Trace headers***

Information or description on what is set in the trace headers could be provided for each project, such as field record number, trace number within shot gather, etc.

The following fields could be provided for the trace headers:

> trace sequence number, running numbering / original field record number / channel number / shot pole number / CMP number / number of vertically summed traces / source-to-receiver offset in meters / receiver group elevation / surface elevation at source / datum elevation / source northing / source easting / receiver northing / receiver easting / coordinate units / weathering velocity / subweathering velocity / source static correction / receiver static correction / total static applied / number of samples per trace / gain type / sweep frequency /sweep length in ms / sweep type /year / day of year / hour of day / minute of hour / second of minute

- ***Original observer's notes***

The original observer's notes should be available for raw data.

- ***Syntax of observer's notes***

An example from OpenFire:

```
#  Observer's notes for FIRE 3-1
#  The numbers in columns 2,3,4 refer to peg numbers.
#  Format string: "%8d %7d %7d %7d %3d %3d %3d %3d %3d\n"
#
#  Fire 3-1 starts here
#   FLDR    FIRST   LAST    SHOT   D    M    H MIN S
     2      1     362      1    8    5 12 41 5
     3      1     362      3    8    5 12 51 13
     4      1     362      5    8    5 13 1 7
     5      1     362      7    8    5 13 10 11
```

- ***Miscellaneous notes***

3. Field statics

The field static corrections could be provided as text files, for sources and receivers separately.

4. NMO and DMO stacks

- ***General***

Jobs: the most important jobs used to generate the stacks.
The NMO and DMO stacks can be available as a set of SEG-Y files.

- ***Naming of files***

The naming of files should follow a general pattern.

An example from OpenFire:
Fire_(line)_(subdivision)_[nmo/dmo]_stk.sgy

- ***Workflow history***

- ***Miscellaneous notes***

5. Migration, post-migration processing and depth conversion

- ***General***

- ***Workflow history***

- ***Migration parameters***

OpenFire example:

The migration was applied using the conventional Stolt method. The following RMS velocity table is an average obtained from previous refraction seismic studies in Southern Finland and was applied to FIRE data as well:

time [s]	**rms velocity [m/s]**
0.000	5867
0.169	5912
0.667	5999
0.993	6044
1.558	6099
2.040	6126
3.009	6149
4.048	6176
4.759	6199
5.998	6253
8.040	6346

…

Depth conversion - *Example from OpenFire:*

Depth conversion was applied using the following table of interval velocities, obtained from the table above using the Dix equation:

time [s]	**velocity [m/s]**
0.000	5912.0
0.169	6028.2
0.667	6135.0
0.993	6194.5
1.558	6212.5
2.040	6197.1
3.009	6253.5
4.048	6328.4
4.759	6456.2
5.998	6611.6

…

- ***Miscellaneous notes***

6. Plots and sections

Information/description such as the following one could be provided here:

- ***General***

"The migrated and depth-converted sections are visualized as **variable-area plots** (with or without wiggle lines) and **envelope sections**. These two can also be overlaid with one another, producing a "two-attribute" picture. Two-attribute representation is typically used for near-surface data.

The variable-area plot is the classical way to visualize traces. The area between the baseline and the trace is filled in black whenever the polarity of the trace is positive. The trace itself ("the wiggle") may or may not be drawn. The data is clipped at the 98th percentile before plotting to bring out the smallest features.

In envelope sections, each trace is replaced by the instantaneous amplitude (envelope) of the corresponding analytic trace, and the data is smoothed by averaging it to e.g. a 500-meter resolution. The data is represented as a seismic contour plot, with double linear interpolation performed between sample points. The colour map is a logarithmic greyscale or a colour gradient.

- ***Envelope sections***

The envelope sections were designed at the Institute of Seismology, University of Helsinki. They were directly written in PostScript code using a FORTRAN interface …

The PostScript code was interpreted into a bitmap using GIMP by the GIMP Development Team, Ghostscript Suite by Artifex Software, and other similar GNU-licensed tools. The resolution was kept high to allow zooming and panning into the section.

A Matlab script for plotting greyscale envelope sections from stacked .su data could be included as a reference.

- ***Variable-area plots***

The most-detailed representations distributed are variable-area plots of the upper 8 kilometers of the crust. They were produced using a modified version of supswigb program included in the Seismic Unix collection by CWP. Variable-area plots are distributed as PDF books with 530 traces per page (~ 13 km) and 10 % of overlap between consecutive pages."

***Also, GMT or other scripts used to plot the results could also be provided.**

**** Another good example:**

"Images and data can be downloaded as:

- Annotated semblance filtered PDF file (pdf 300kB).
- High quality (600dpi) image of stacked section:
- as A4 PostScript (PS 4.5MB), or
- as PDF file from here (PDF 420kB)
- Decimated navigation data (UKOOA format) (ASC 15kB)
- Full navigation data (UKOOA format) (ASC 145kB)**"**

<u>Additional data:</u>

Publications and Reports: any publications or reports. If nothing has been published, then there should be at least a report on the data.

Data/Metadata sorting

Table 1. The data/metadata could be sorted as (an example from OpenFire):

Data type	Sub Type	File type
Coordinate (EUREF-FIN)	Raw	Jpeg
Coordinate (KKJ3)	CMPs	Segy
Field statics	NMO	Text
Migrated segy, depth	DMO	
Migrated segy, time	Poles	
Notes.txt	Processed	
Obs-log	Receiver	
Raw segy	Source	
Raw stack		
Segy		

Alternatively, the data could be also sorted as: **Projects / Data types / Year / Area (as in CSIC):**

- ***Data Types (examples)***

Seismic (field data, stack, reprocessed, migration, header information)
Well
Images
Miscellaneous

- ***Data Descriptions***

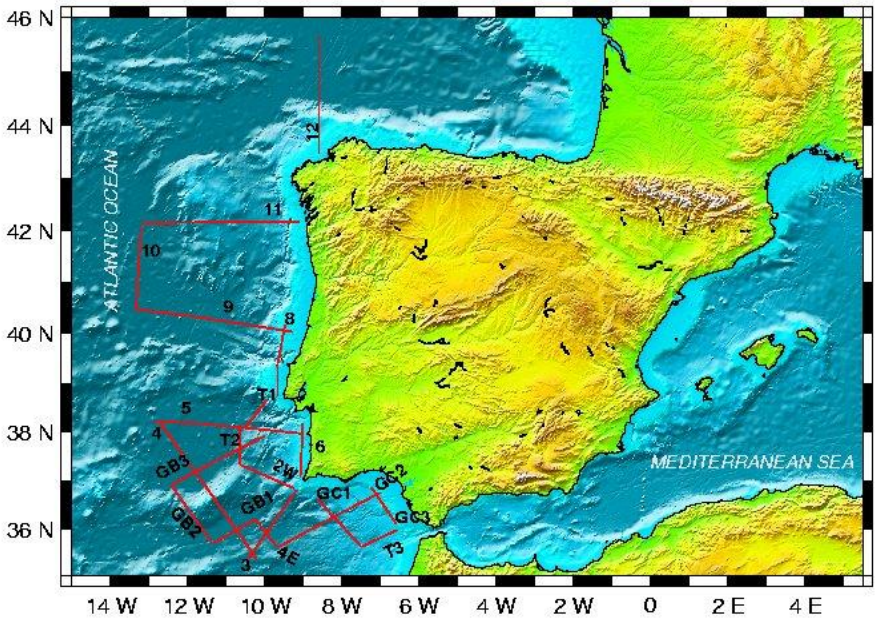
Example from CSIC: IAM (Iberian Atlantic Margin)

- **Acquisition date:** 1993
  Financed by: "European Community within its JOULE-Programme"
  Objective: To study the nature of the deep continental and oceanic crust features in different parts of the Iberian Atlantic Margins by deep seismic reflection techniques.
  Area: The North Iberian margin (Cantabrian), the Western Iberian margin, the Gorringe Bank region and the Gulf of Cadiz.
  Length: 3500 km offshore.

- ***Technical specifications of the profiles:***

- **Streamer length:** 4800 m
  Number of channels: 192
  Group interval: 25 m
  Shotpoint interval: 75 m (100 m and 150 m on line IAM-2W)
  Source: 7424 in3 Record length: 25 seconds.
  Sample rate: 4 ms

Figures



Other Documents:

- Final-Field-Report.pdf
- Final-Scientific-Reportcolor.pdf
- IAM_LOGS.pdf
- Navigation_lines.pdf
- Scientific_report

References

The following example contains information on Data Acquisition/ Processing/ Navigation/ Availability

(Note: detailed information on data acquisition and processing is usually provided in the reports and articles related to the projects or could be given in Notes.txt in Table 1.).

The profile was acquired in 1984 following earlier BIRPS acquisition in the area (MOIST in 1981 and WINCH in 1982) which had shown indications of reflectivity below the Moho.

Year Shot & Contractor	1984, GECO (now WesternGeco)
Type	marine
Shot in 3 sections	DRUM sp 101- 593 DRUM-A sp 1576-2580 DRUM-B sp 3563-3884 for each section the shotpoint number were incremented by 1000 and included overlap to ensure continuous coverage
Source	airgun array
Volume	8536 cu in
Operating pressure	2000 psi
Shotpoint interval	100m
Source depth	8m
Receiver	hyrophone
Number groups	60
Group interval	50m
Receiver depth	15m
Near offset	209m
Recording	DFS V
Record length	30s
Sample interval	8ms
Filters low cut	5.3Hz (18dB/oct)
Filters high cut	45Hz (72dB/oct)

Data Processing

Contractor	GECO (now WesternGeco)
Geometry	CMP bin 25 m
Source array simulation	1-5-1 weighted trace mix
Receiver array simulation	1-3-1 weighted trace mix

Divergence correction	
Predictive deconvolution	2 operators with 2s overlap
Velocty analysis	ever 3 km
NMO correction	
Mute	
Stack fold	15
Predictive Deconvolution	2 operators with 2s overlap
FK noise filter	+/-16 ms/trace
Time varient bandpass filter	
Time varient equalization	
Static correction +15 ms	
Coherency filter	weighted mix and semblance based mix (Milkereit & Spencer, 1990) have been applied to data for display on this web-site to enhance reflection events on small-scale displays.

Navigation

Navigation files for the DRUM profile can be downloaded from here or in decimated form from here.

Data Availabilty

Sub-sampled data (16ms sample interval, 50m CMP bin) is available on CD as part of the BIRPS Atlas II publication (Snyder & Hobbs 1999)

For copies of digital data and other metadata (navigation, stacked data, shot data, paper records, grav/mag)

Deep Geology Enquiries, British Geological Survey, Keyworth, Nottingham NG12 5GG, UK (or through their web site: www.bgs.ac.uk)

Navigation data can be downloaded as follows:

- Decimated navigation data (UKOOA format) (ASC 15kB)

Full navigation data (UKOOA format) (ASC 145kB)