High-effort seismic acquisition

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Outline

- Introduction—what is “high-effort” seismic acquisition?
- The Longview experiment
- Processing strategy
- Results
- Conclusions
High-effort seismic acquisition

- **Single** geophone per station
- **Small** geophone *station increment* (2.5 m)
- **Small** source interval (5 m)
- **One** channel per geophone (lots of boxes and connections)
The Longview experiment

- **2D** seismic line 937.5 m long, east of Longview, Alberta
- **376** single phone stations
- **2.5 m** geophone interval
- **5 m** source interval
- Source—mini-vibrator, **4 sweeps** per VP, **8 seconds** per sweep, **10-200 Hz**
- Total acquisition time—**10 hours**
Processing strategy

- Create new **pseudo-surveys** corresponding to **5m, 10m, 20m, and 40m** receiver arrays.
- Use **radial trace filtering** to attenuate coherent noise, using only **visible information** on shot displays.
- Apply **Gabor deconvolution** to shot gathers.
- Apply **Gabor deconvolution in the radial trace domain** to all gathers.
- Determine **NMO** velocities and **residual statics** on 2.5 m data set, apply to **all** data sets.
- **Stack** all data sets.
- Apply post-stack **Kirchhoff migration**.
- **Compare** migrated images.
Shot number 291, full resolution 2.5 m station interval
Shot number 291, 5 m simulated station interval
Shot number 291, **10 m simulated station interval**
Shot number 291, **20 m simulated station interval**
Shot number 291, **40 m simulated station interval**
Shot number 291, **2.5 m station interval**, radial filtered, 1 pass
XT domain Gabor decon, 1 pass **RT domain Gabor decon**
Shot number 291, **10 m station interval**, radial filtered, 1 pass
XT domain Gabor decon, 1 pass **RT domain Gabor decon**
Unmigrated stack for full resolution 2.5 m station interval
Unmigrated stack for simulated 10 m station interval
Migrated stack for full resolution 2.5 m station interval, showing the position of two zoom views to follow.
Migrated stack for full resolution 2.5 m station interval view 1
Migrated stack for simulated 10 m station interval view 1
Migrated stack for full resolution 2.5 m station interval view 2
Migrated stack for simulated 10 m station interval view 2
Conclusions

- Lateral and vertical resolution can be improved by “high-effort” acquisition.
- Source and receiver arrays are no substitute for multi-channel filtering.
- “High-effort” acquisition involves no additional geophone planting, but does require more recorder channels, cables, boxes, and recording and connection time.
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