Exercise 11

- Estimate the dominant frequency content of the attached seismic section below A at 0.76 s, 0.94 s, and 2.18 s. Assume that the reflections at these times are relatively free of interference and are representative. The seismic section has been processed to produce a minimum-phase waveform and is displayed with reverse polarity (SEG).

- Assume that laterally extensive sandstones occur at the times used above for the calculation of the seismic section's varying dominant frequency. Calculate the minimum thickness of such a laterally extensive sandstone having reflection coefficients of opposite sign at its top and base for:
- no interference between reflections from the unit's top and base (half wavelength);
- the tuning thickness (quarter wavelength);
- the approximate thickness below which a recognizable reflection is not expected (about one-thirtieth wavelength).
- Assume internal velocities for the sandstone of 2200 m/s at 0.76; 2800 m/s at 0.94; 4000 m/s at 2.18 s.

Solution

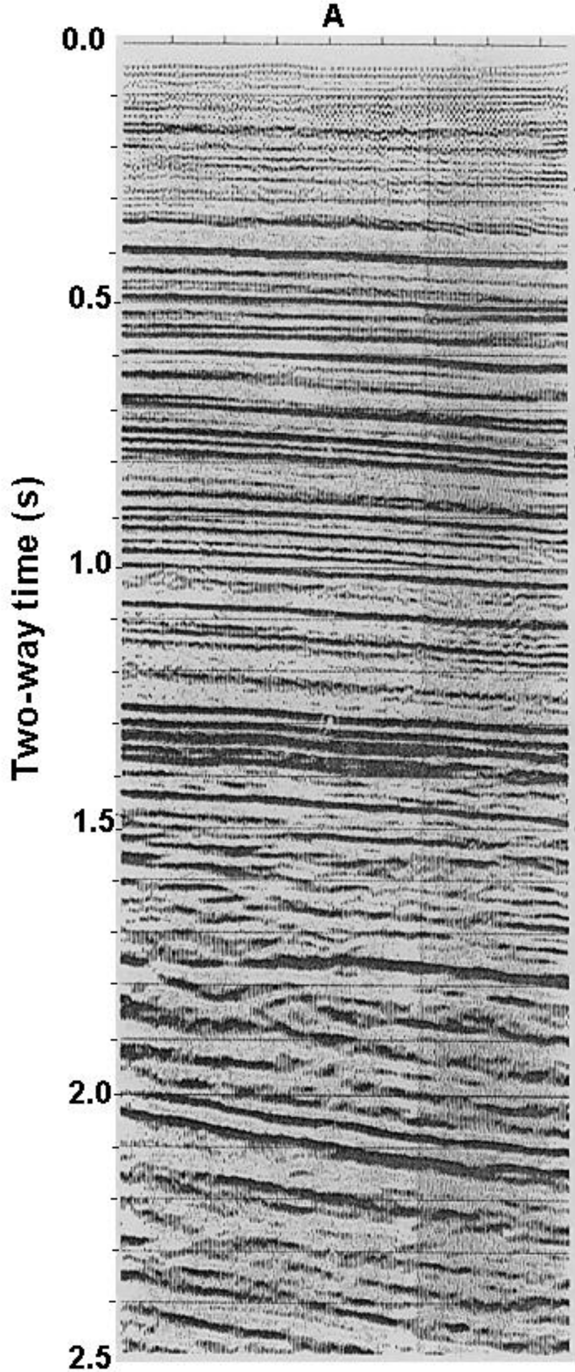
- The dominant frequency content at different times in seismic sections can be estimated by measuring the duration (peak-to-peak or trough-to-trough) of individual high-amplitude reflections, and by taking the reciprocal. The reflections should be free of obvious interference with other reflections, and show good lateral continuity of character. The method is not exact, but can provide a good guide to the interpreter of the resolution potential throughout a seismic section. The estimates of dominant frequencies below A in the section are
- At time 0.76 s, f = 1/T = Hz
- At time 0.94 s, f = 1/T = Hz
- At time 2.18 s, f = 1/T = Hz

- Using the periods (T) found above, the wavelength (λ) can be determined from the internal velocity and the expression

  Wavelength = Velocity $\times$ Period.

- The following Table shows the answers regarding the minimum thickness of such a laterally extensive sandstone.

Time (s)	λ	λ/2	λ/4	λ/30
0.76 0.94 2.18				


A
0.0
0.5
1.0
1.5
2.0
2.5
Two-way time (s)