


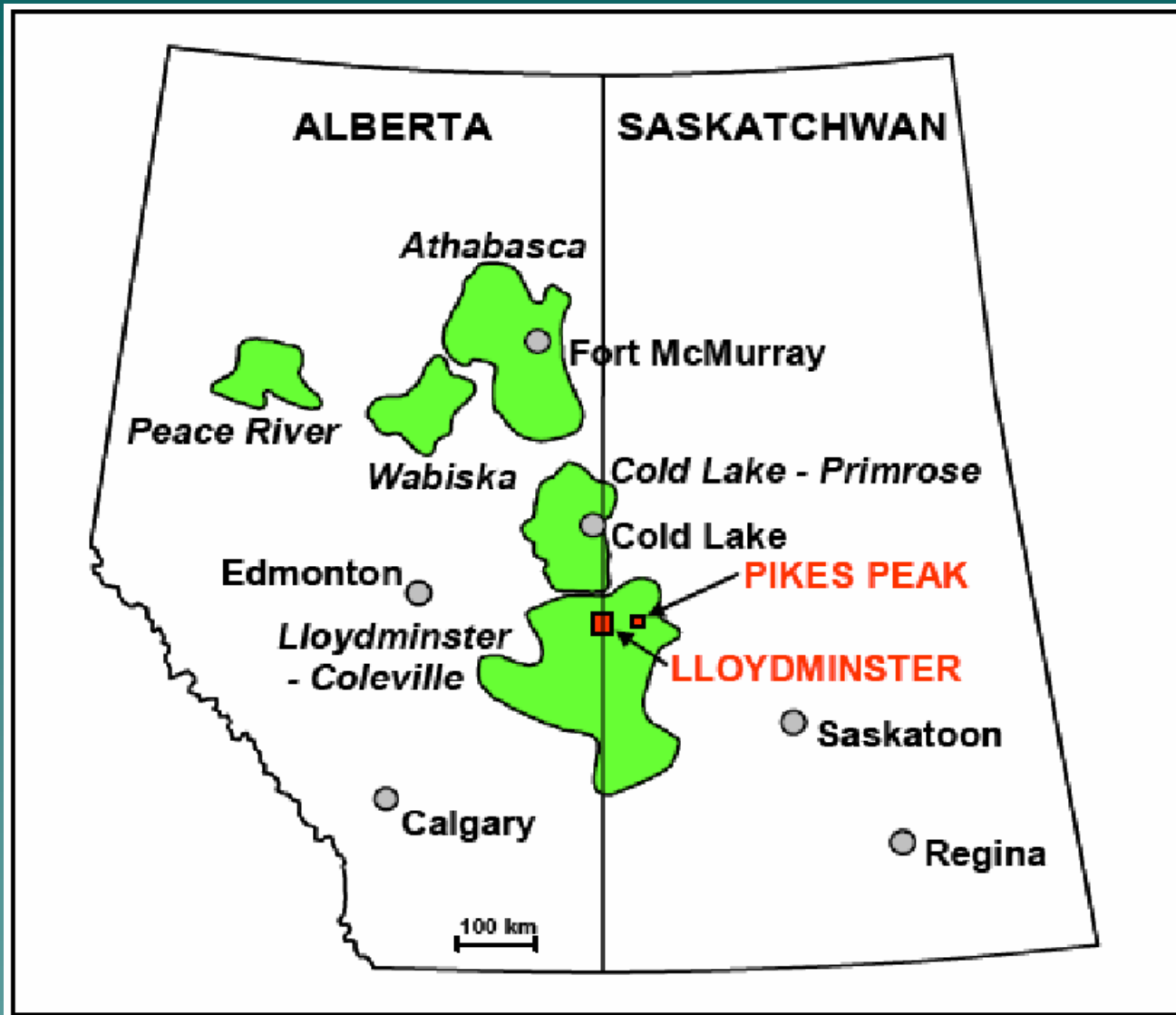
VSP-based Q-estimation at Pike's Peak

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Outline

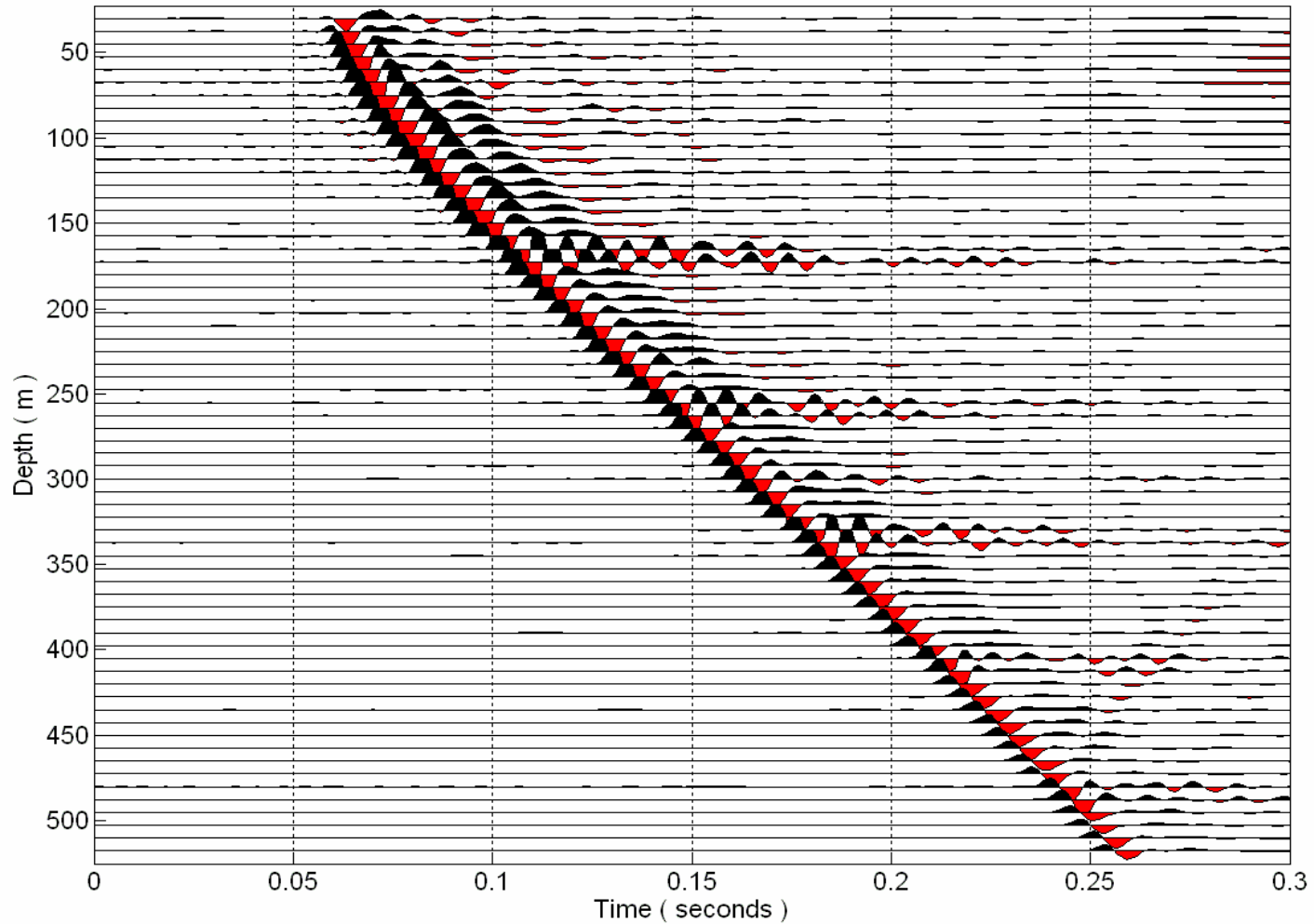
- ◆ Introduction
 - ◆ Pike's Peak Location and Stratigraphy
 - ◆ Z-stack and Q-estimation
 - ◆ Downgoing P-wave and Q-estimation
 - ◆ Taner and Treitel's Q-estimation Method
 - ◆ Conclusions
 - ◆ Acknowledgements
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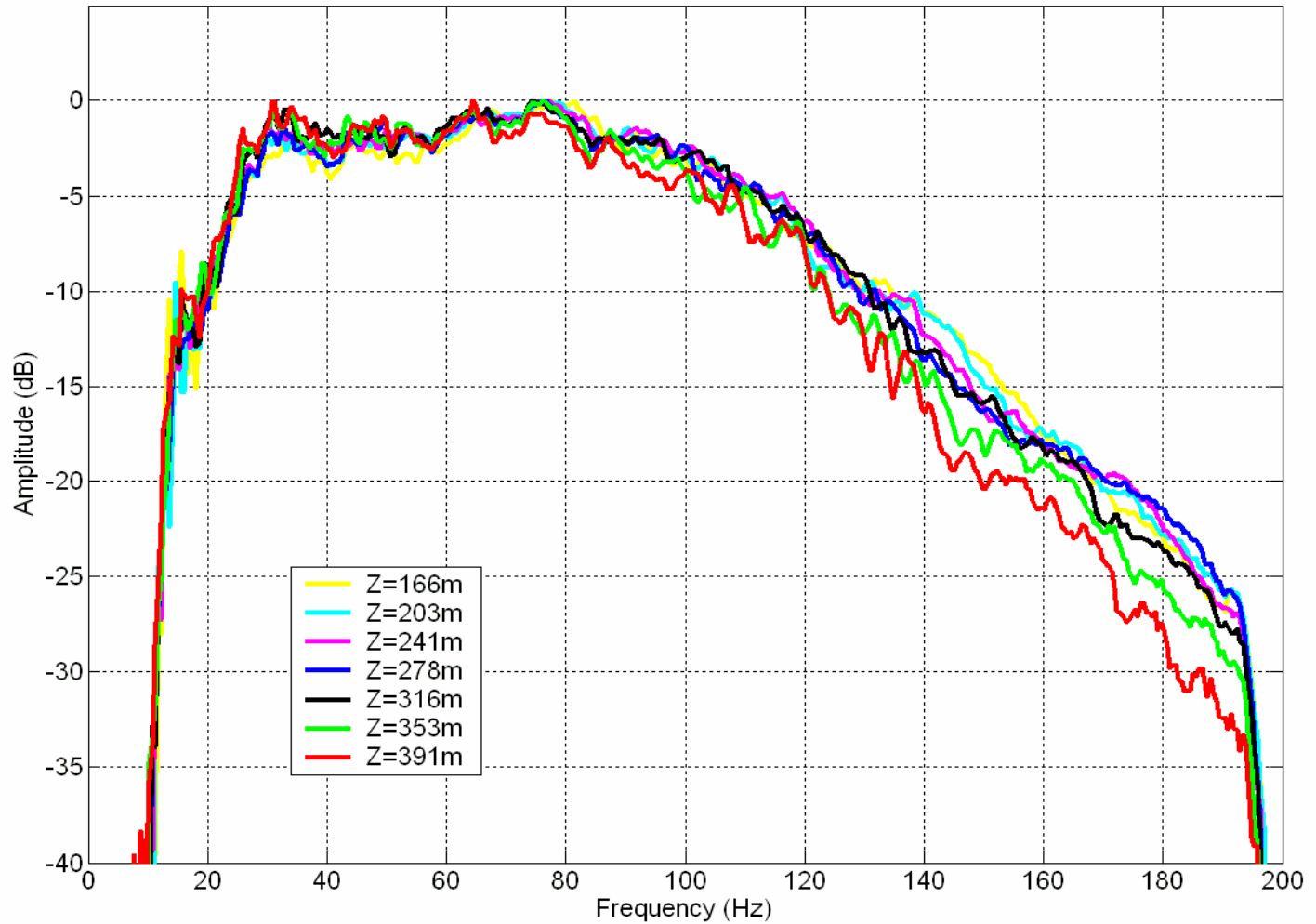
Pike's Peak, Saskatchewan (Watson, 2004)

AGE / GROUP		FORMATION	LITHOLOGY	APPROX. DEPTH		
QUATERNARY		GLACIAL DRIFT				
CRETACEOUS	UPPER	JUDITH RIVER		- 150 m -		
		LEA PARK				
		COLORADO GROUP	SHALE	- 300 m -		
	LOWER		VIKING			
			JOLI FOU COLONY		- 450 m -	
			MCLAREN		- 475 m -	
			WASECA		- 510 m -	
		MANNVILLE GROUP		SPARKY	SANDSTONE & SHALE	
				GENERAL PETROLEUM		
				REX		
				LLOYDMINISTER		- 550 m -
				CUMMINGS		
				DINA		- 650 m -
DEVONIAN	SASK. GROUP	DUPEROW	DOLOMITE			
	MANITOBA GROUP	SOURIS RIVER		- 825 m -		
	ELK POINT GROUP	PRAIRIE EVAPORITE	EVAPORITE	- 950 m -		
		WINNIPEGOSIS				
		ASHERN		- 1050 m -		
CAMBRIAN	DEADWOOD		- 1600 m -			
PRECAMBRIAN						

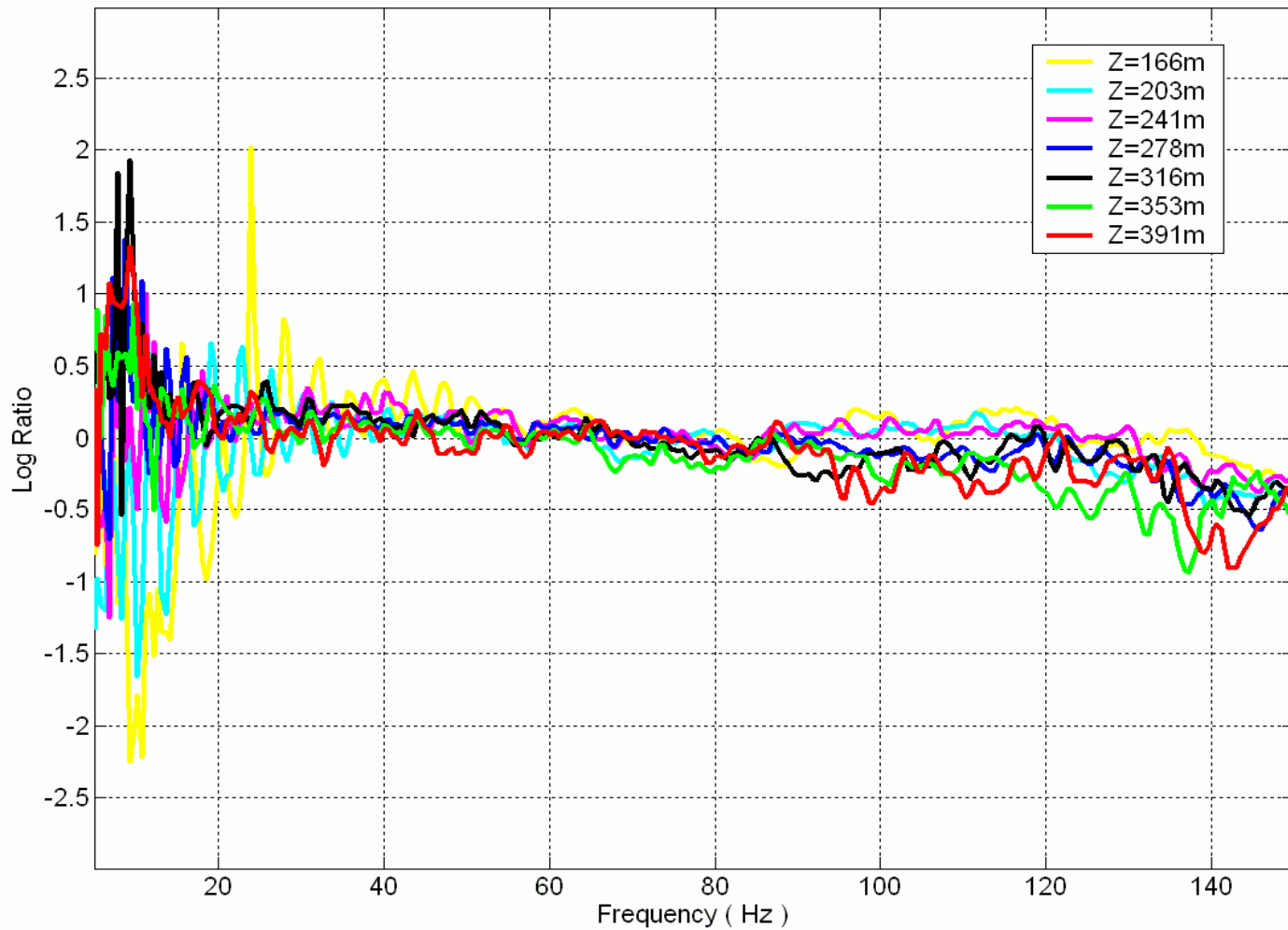
Pike's Peak Area Stratigraphic Chart (Watson, 2003)



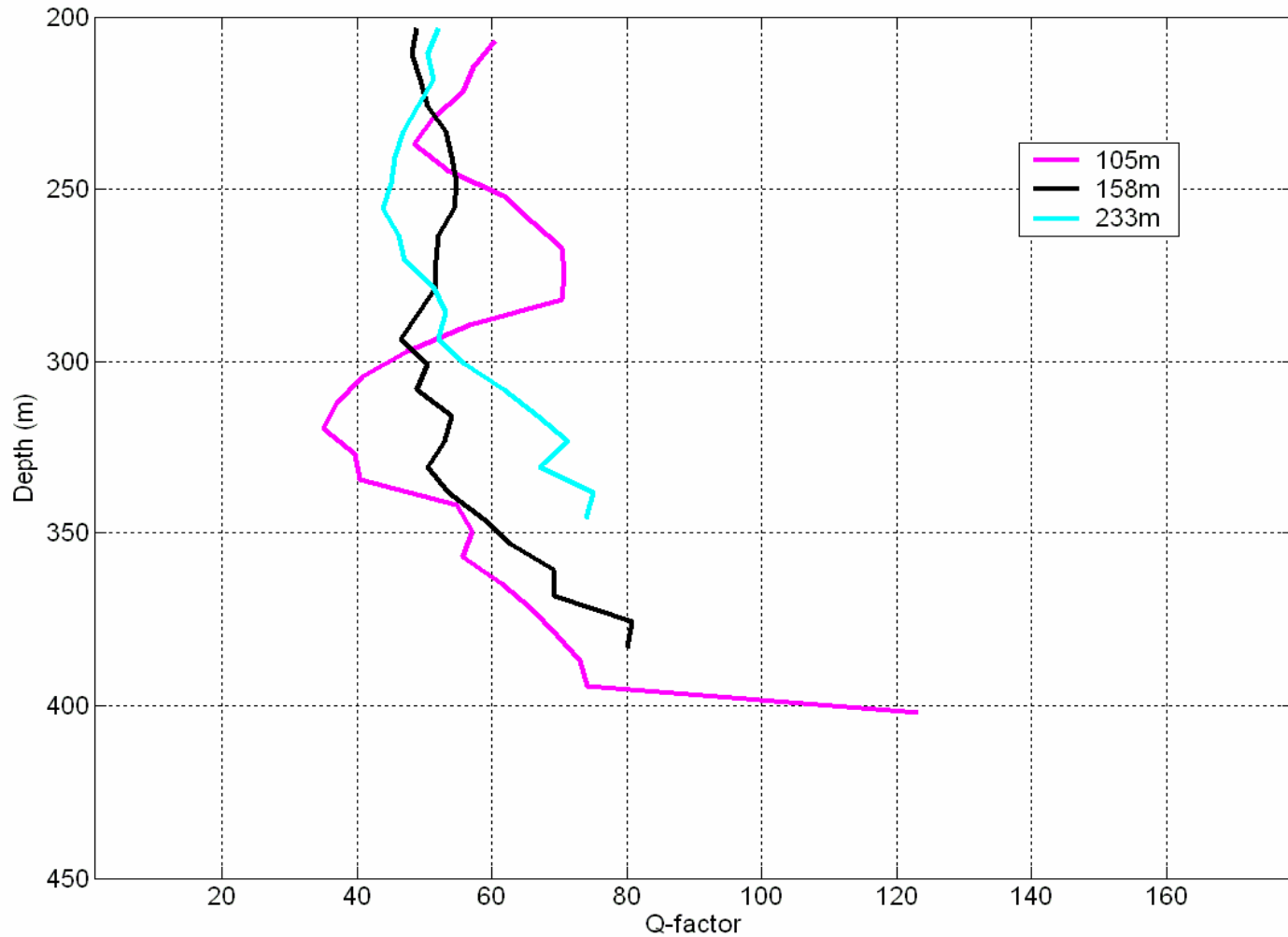
Pike's Peak 90m Offset VSP (true amplitude Z-stack)



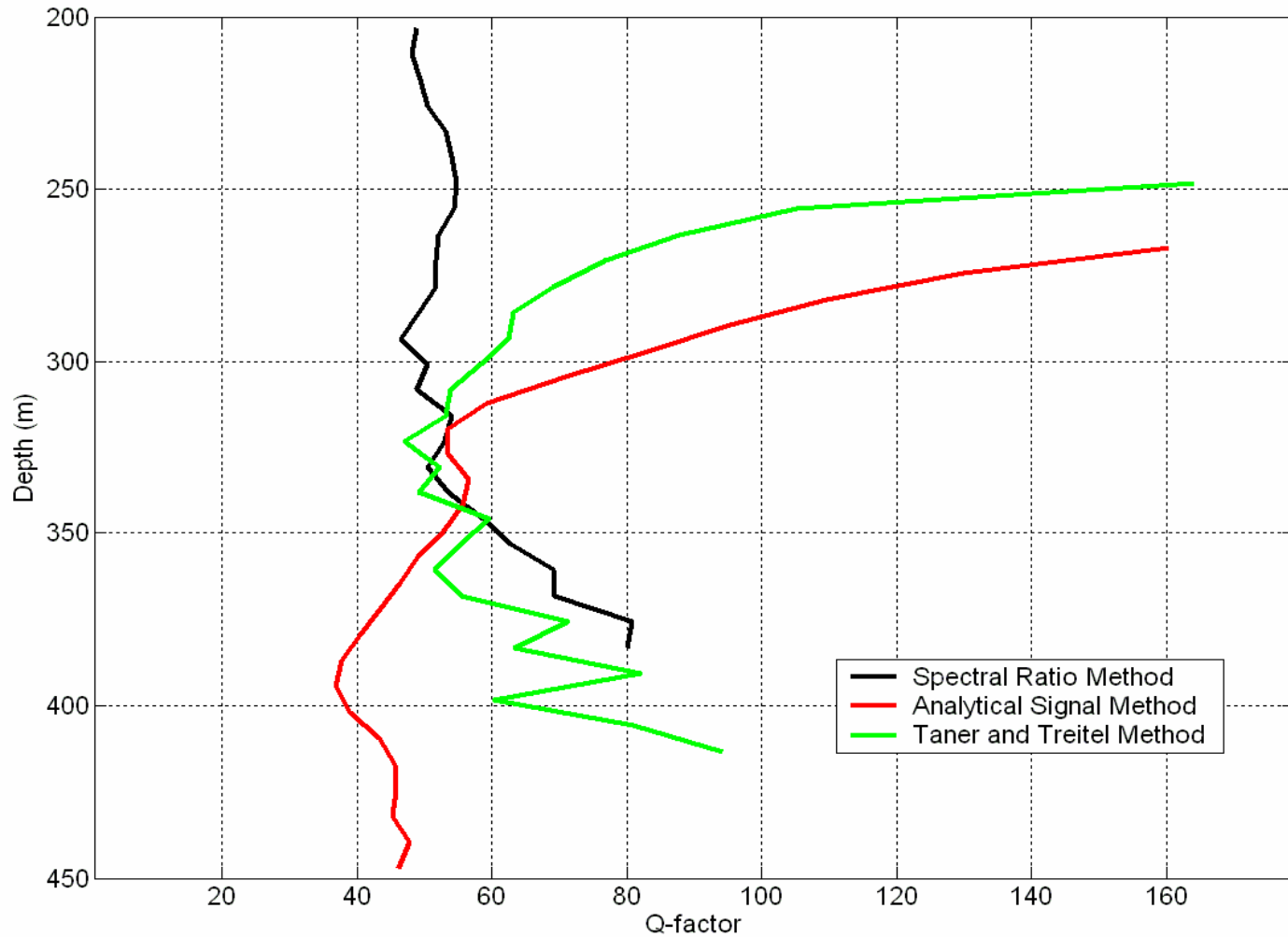
Z-stack Trace Spectra (8Hz to 200Hz Sweep)



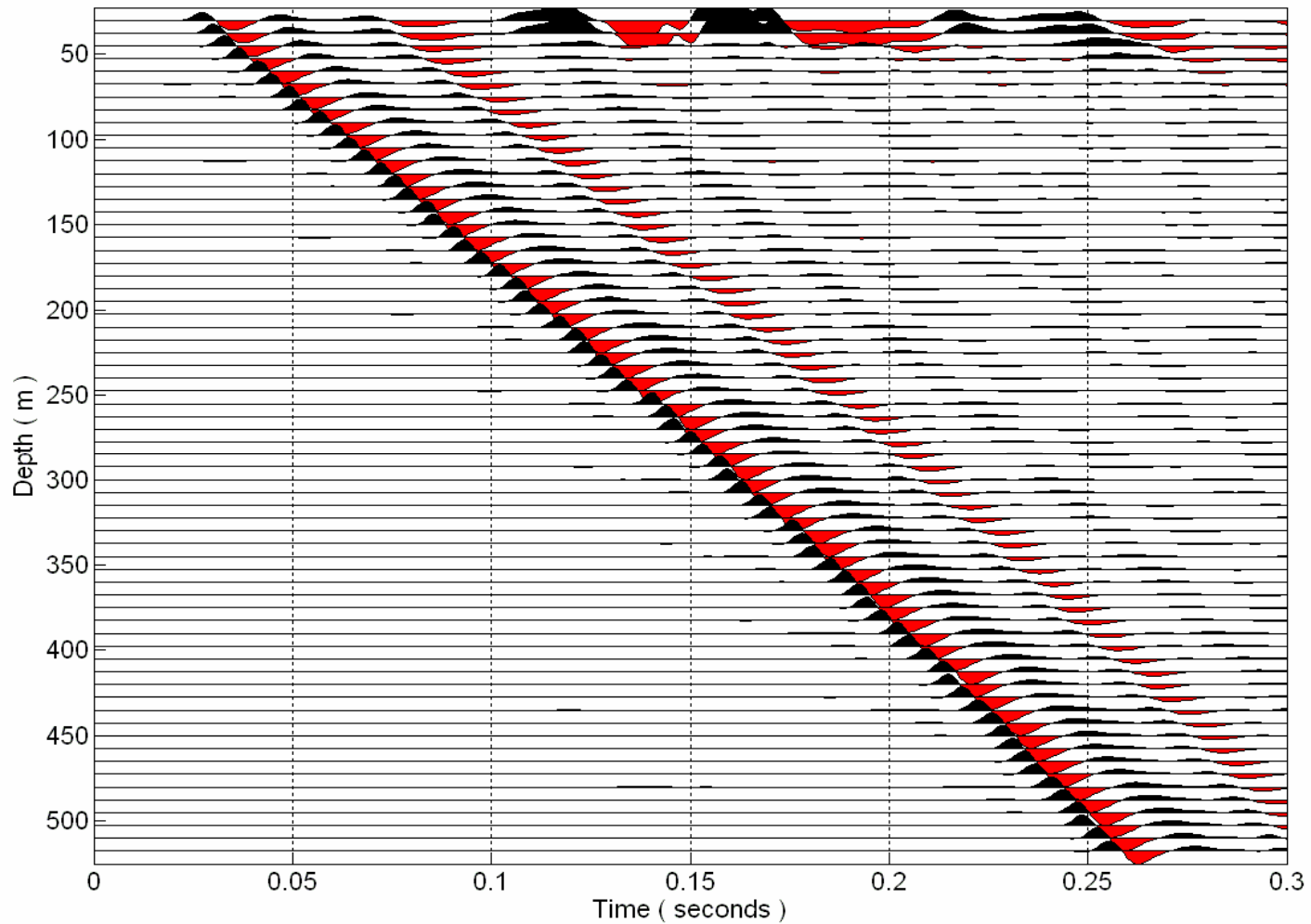
Log Spectral Ratio of Z-stack (90m Offset VSP)



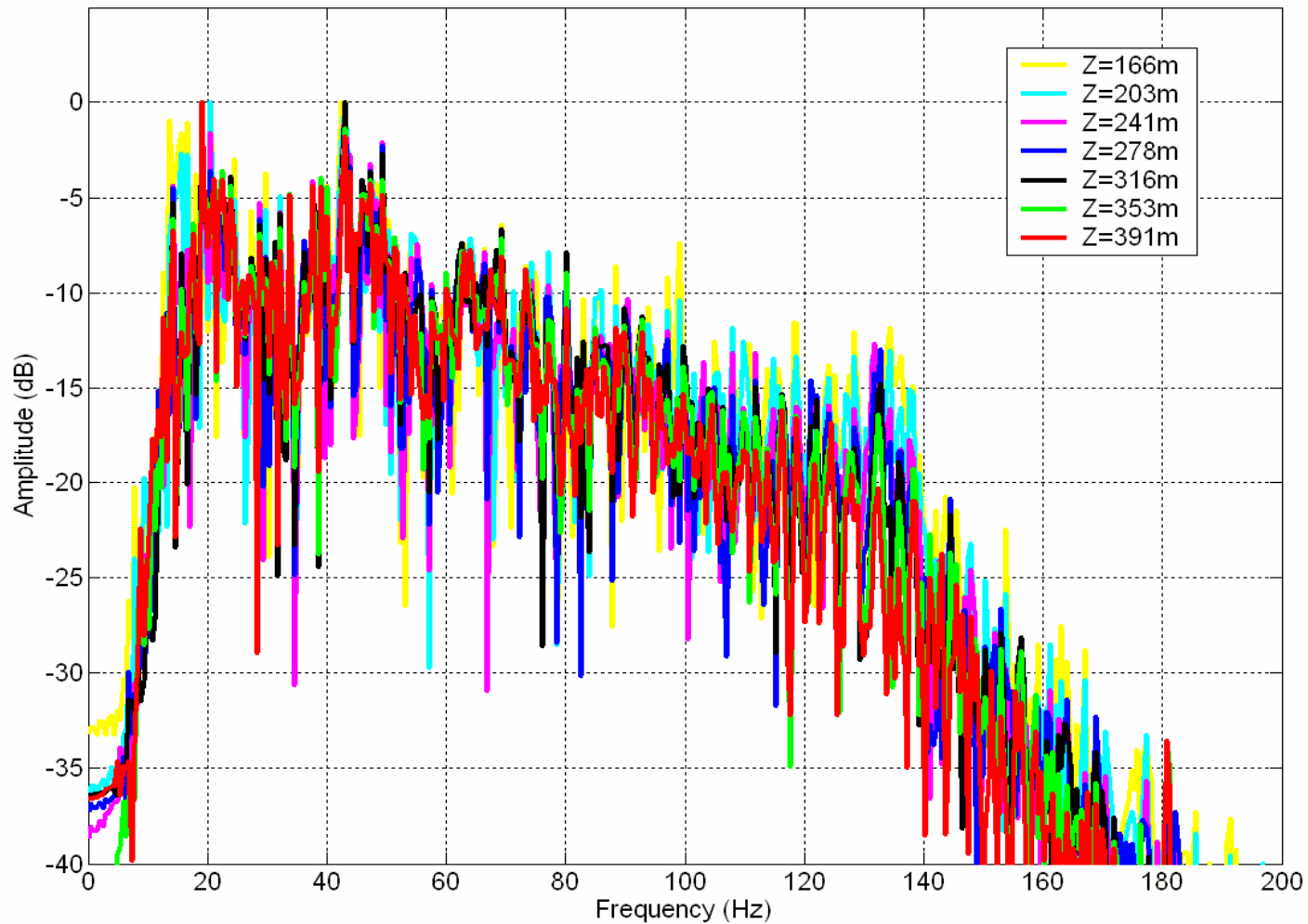
SRM-Q(z) as Function of Estimation Depth Interval



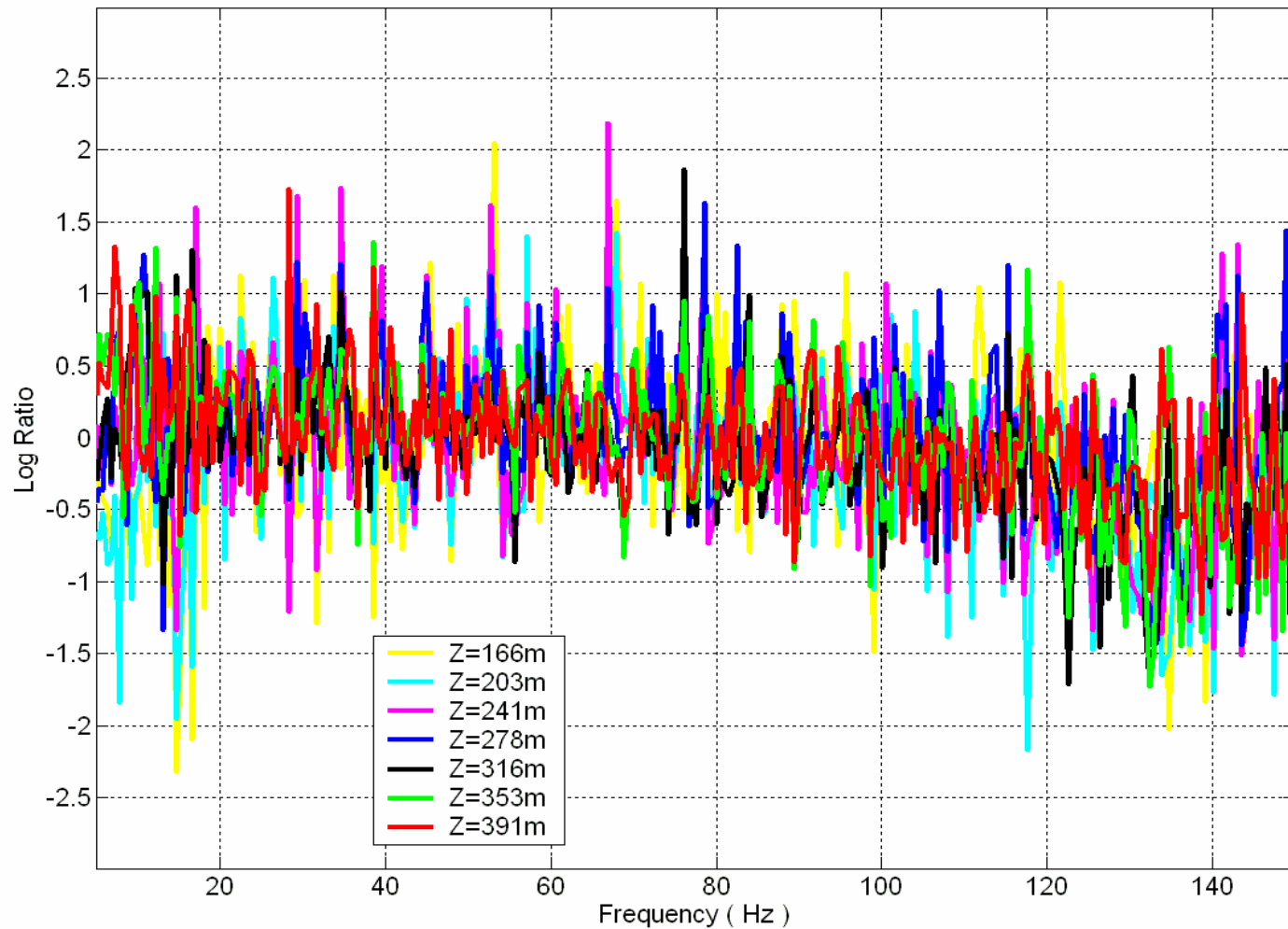
Q versus Depth for Z-stack (90m Offset VSP)



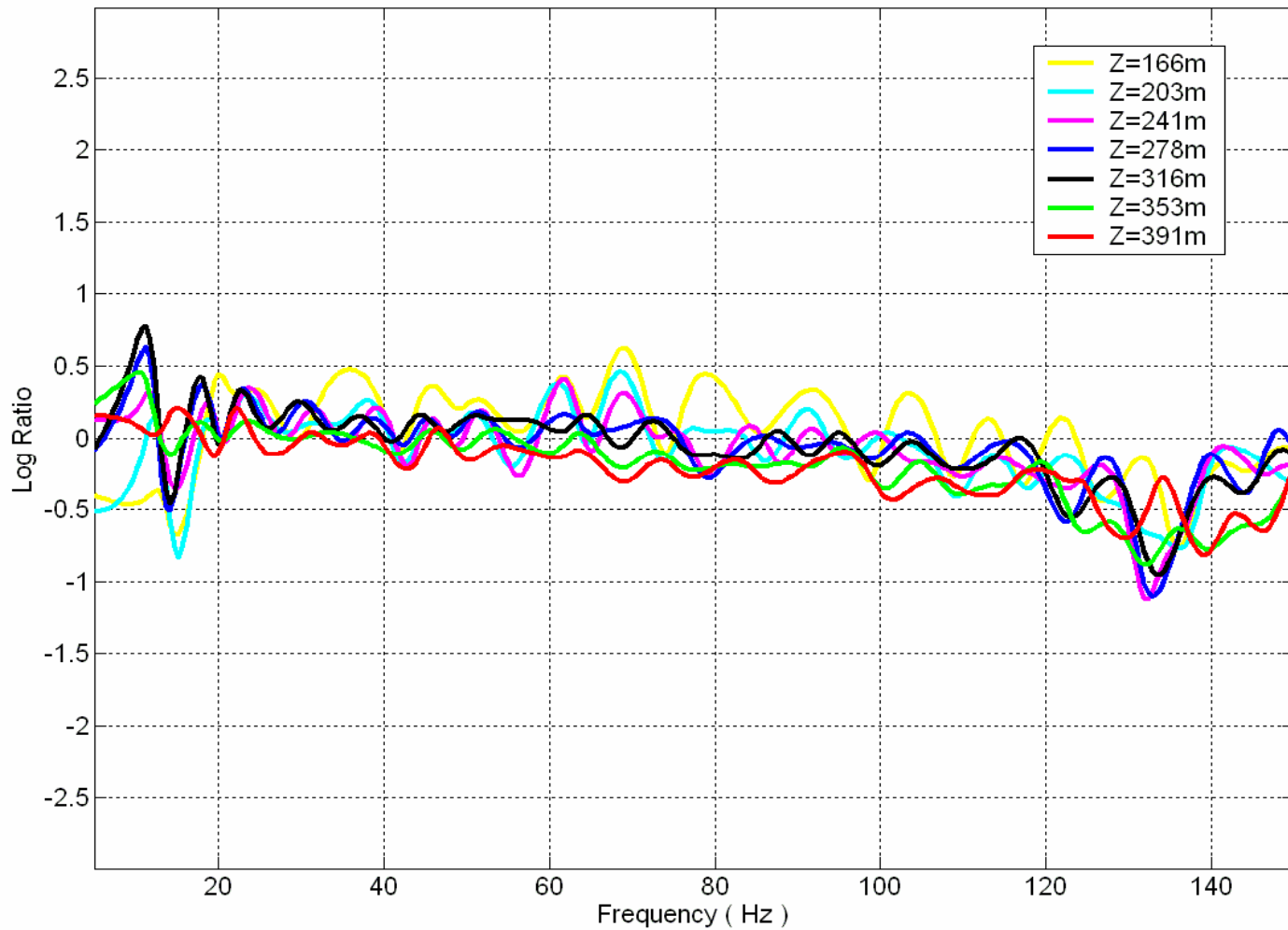
Pike's Peak VSP (Isolated Downgoing P-wave)



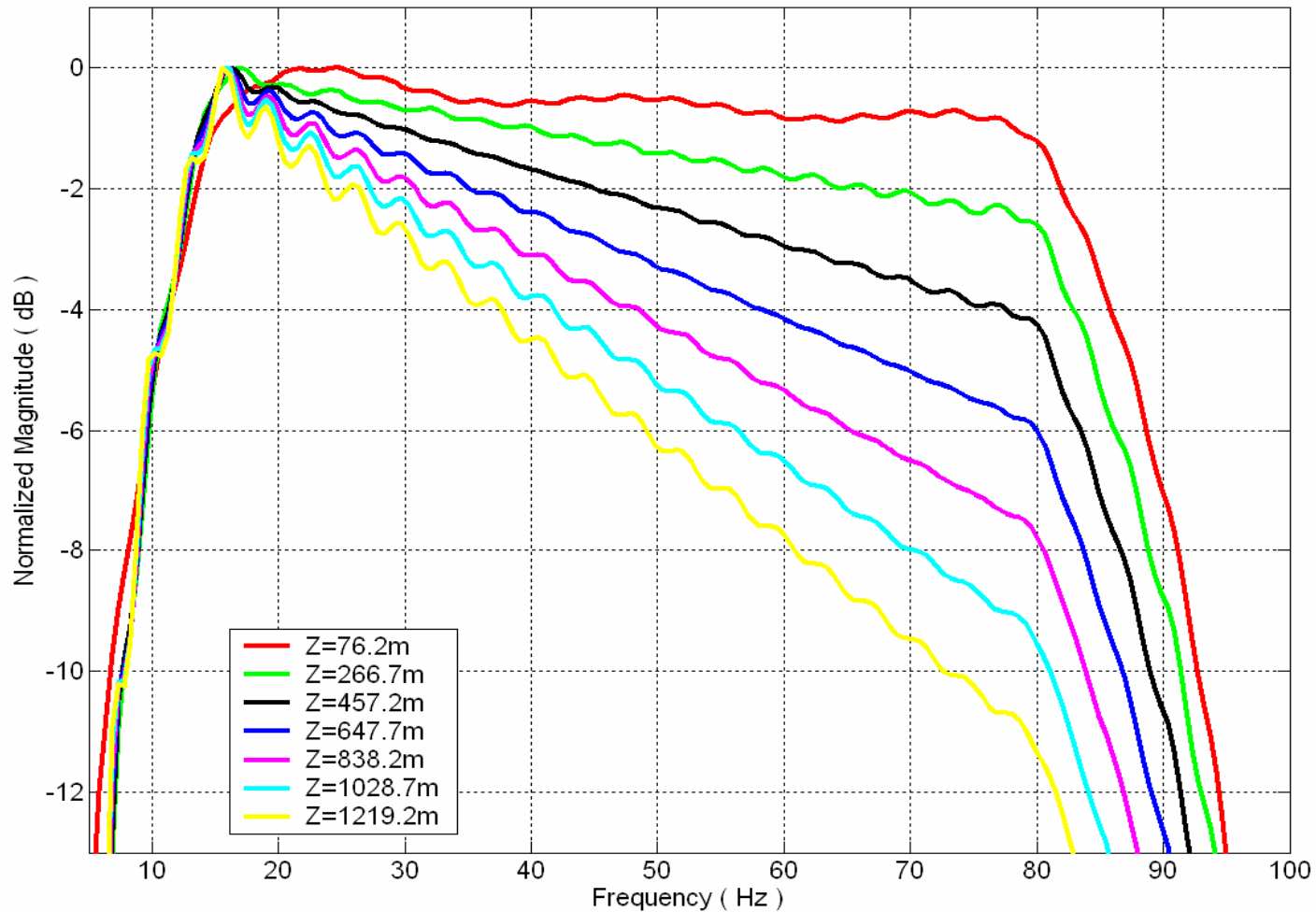
Trace Spectra of Isolated Downgoing P-wave



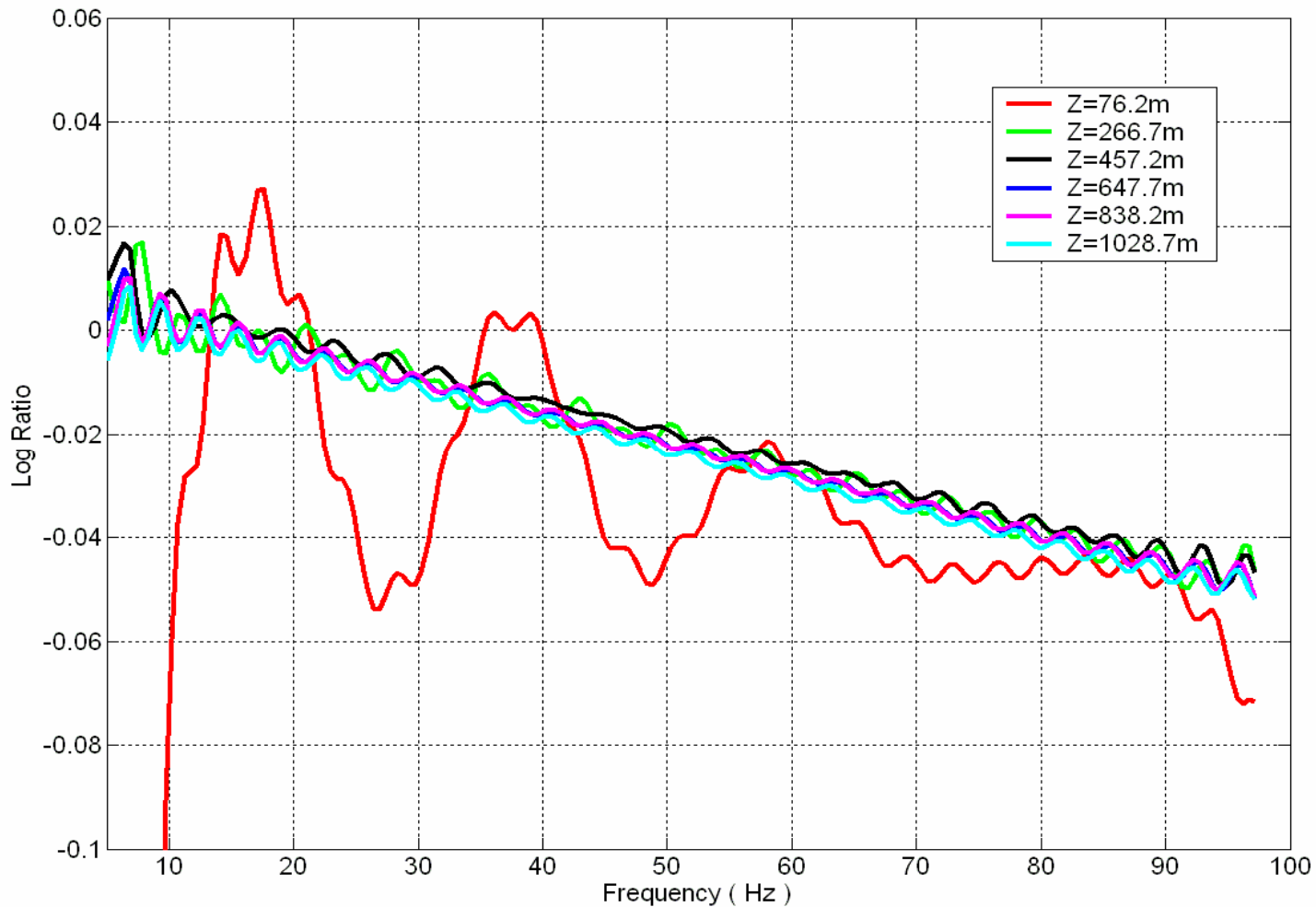
Log Spectral Ratio of Isolated Downgoing P-wave



Log Spectral Ratio of Minimum Phase Wavelet (T+T)



Magnitude Spectra of Minimum Phase Wavelets
(Taner and Treitel Method applied to Model)



Log Spectral Ratios from Minimum Phase Wavelets
(Taner and Treitel Method applied to Model)

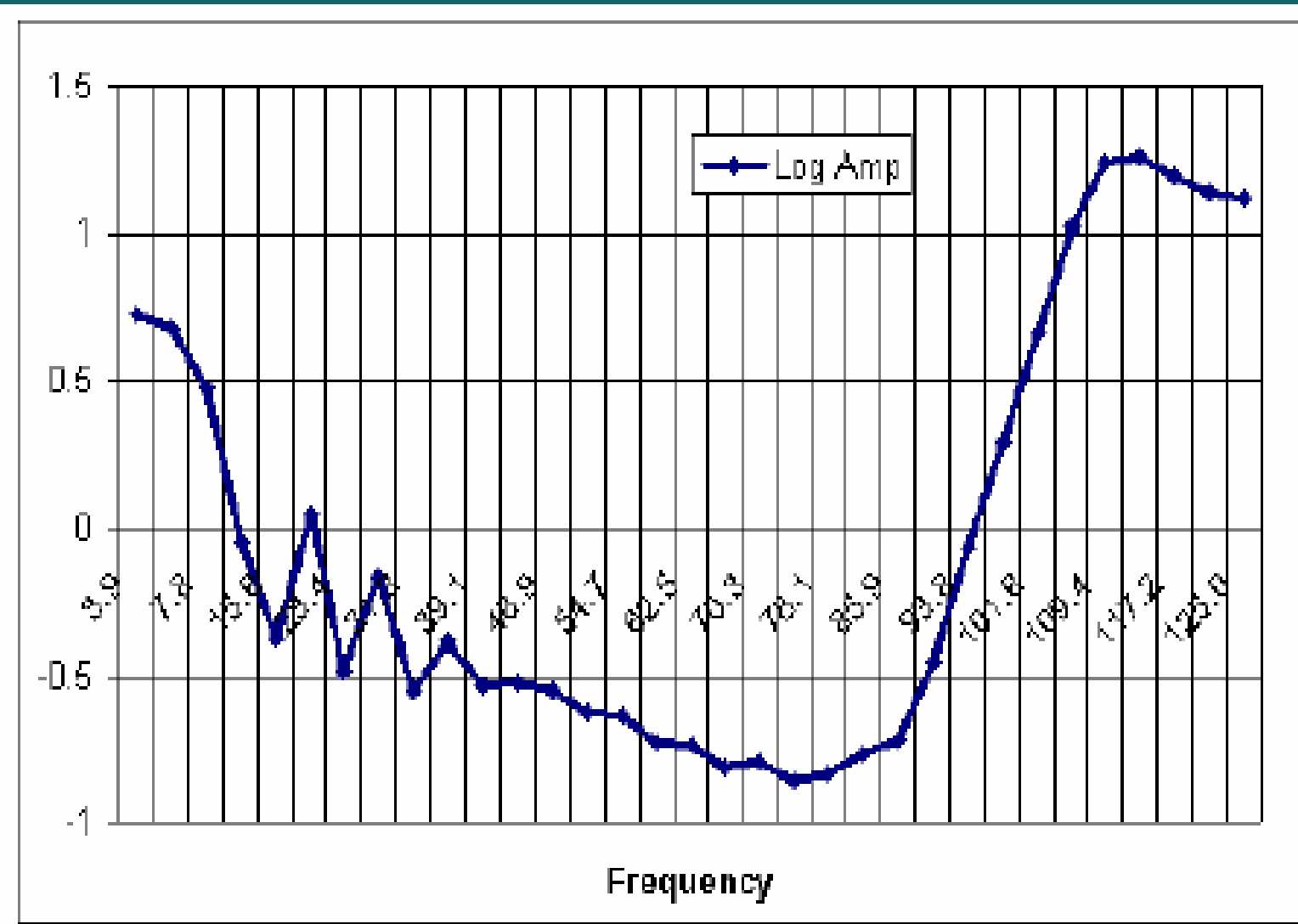
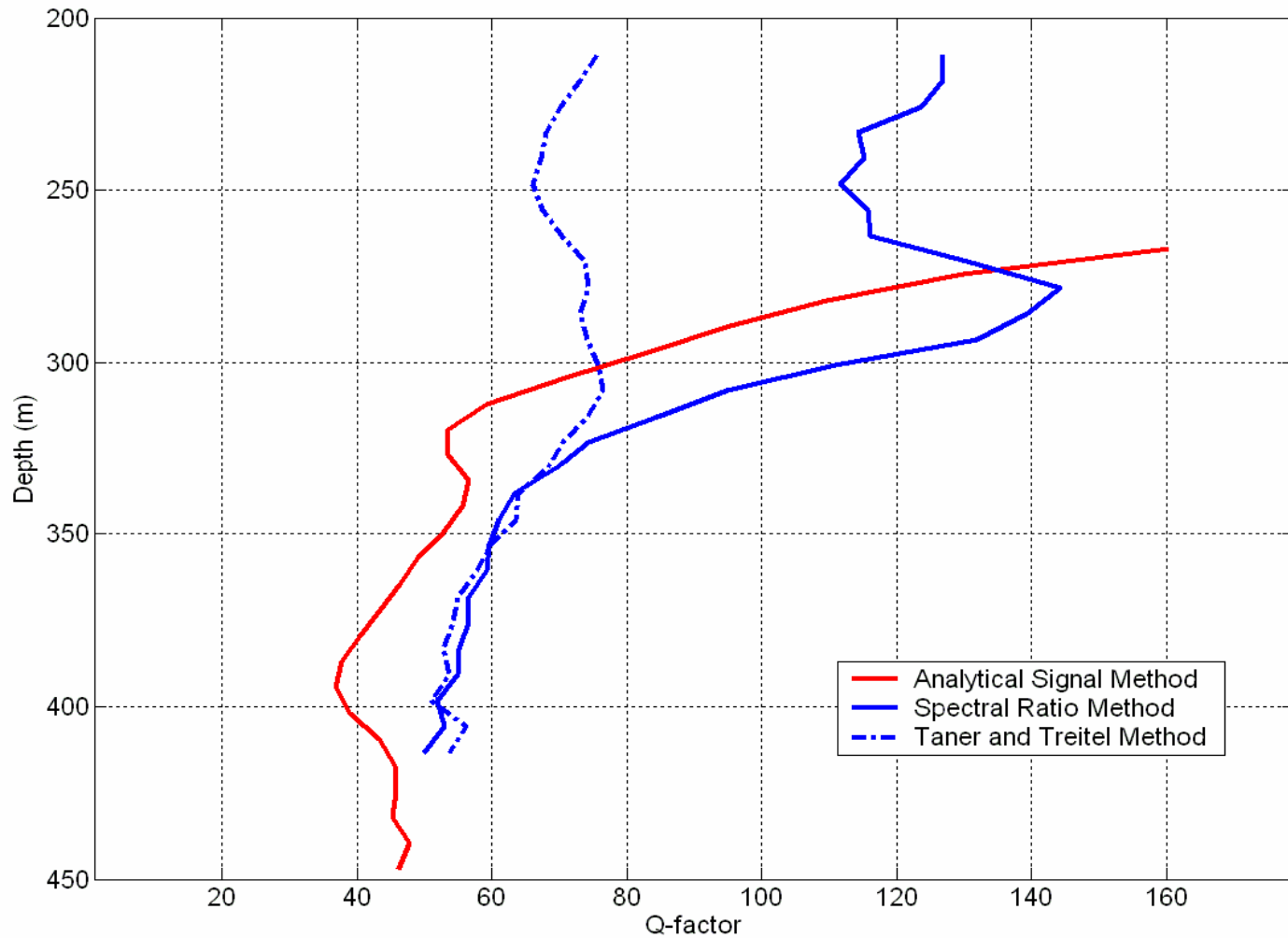


Figure 5 of Taner and Treitel, 2003 (Spectral Ratio)



Q(z) computed with ASM, SRM and Taner + Treitel

Station #	Depth Range (from KB)	V-int (m/s)	Q
35 ~ 45	282 m ~ 357 m	2300	45.2
45 ~ 55	357 m ~ 432 m	2350	48.2
55 ~ 65	432 m ~ 507 m	2500	74.0

Table 1. Q factors for well 15-06.

Pike's Peak Q-estimates by Richard Xu et al. (2001)

Conclusions

- ◆ Q versus depth trends, estimated by spectral ratios and analytic signals, are again similar.
- ◆ Consistent with previous observations (Ross Lake) is the increase of $Q(z)$ values toward shallower depths which is thought to be caused by near-field effects.
- ◆ From the comparisons done it is unclear whether or not the Taner and Treitel technique improves the spectral ratio approach.

Acknowledgements

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