

# Shallow P and S velocity structure Red Deer, Alberta

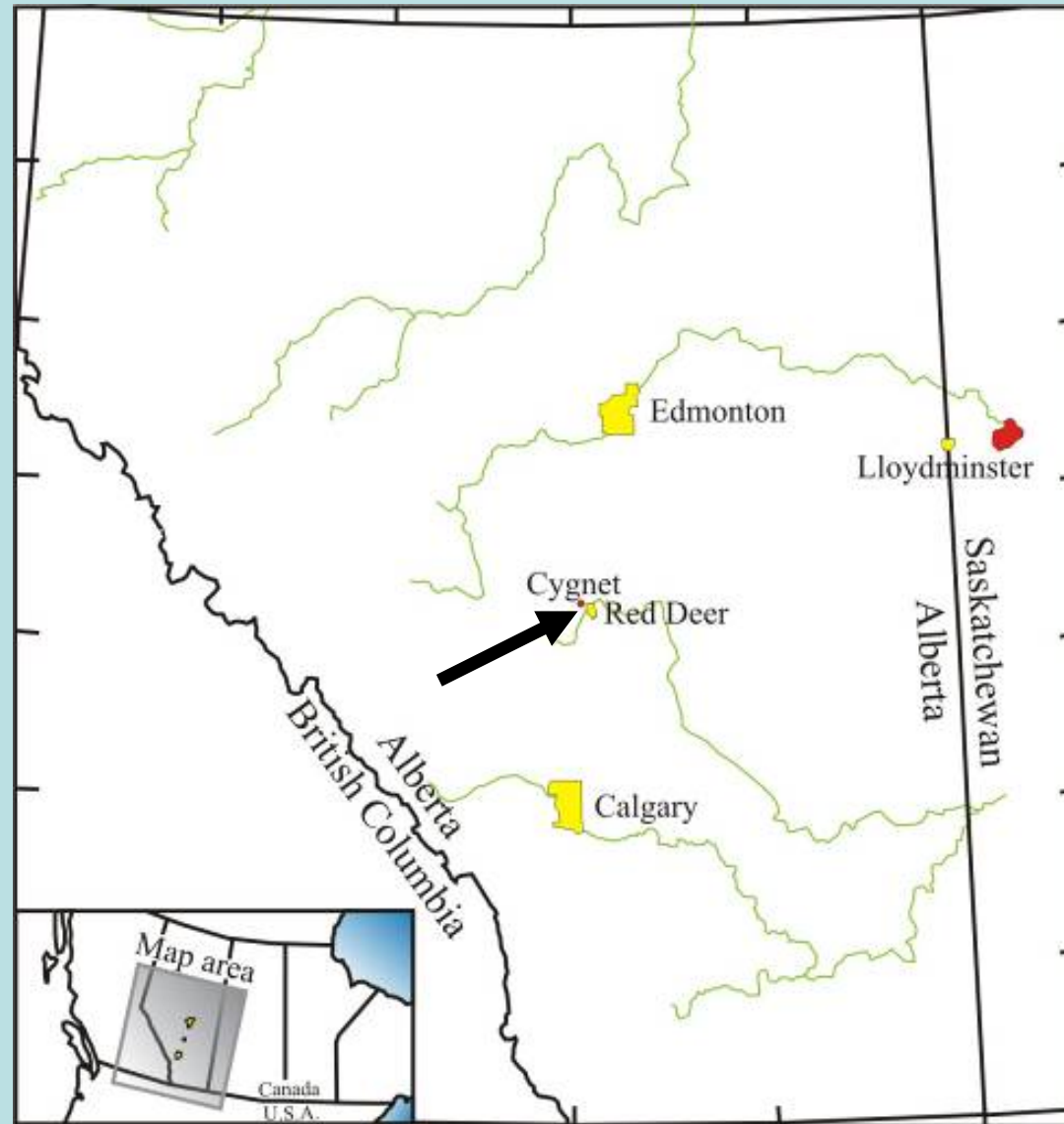
Don Lawton, Meredith McArthur  
Rachel Newrick & Sarah Trend



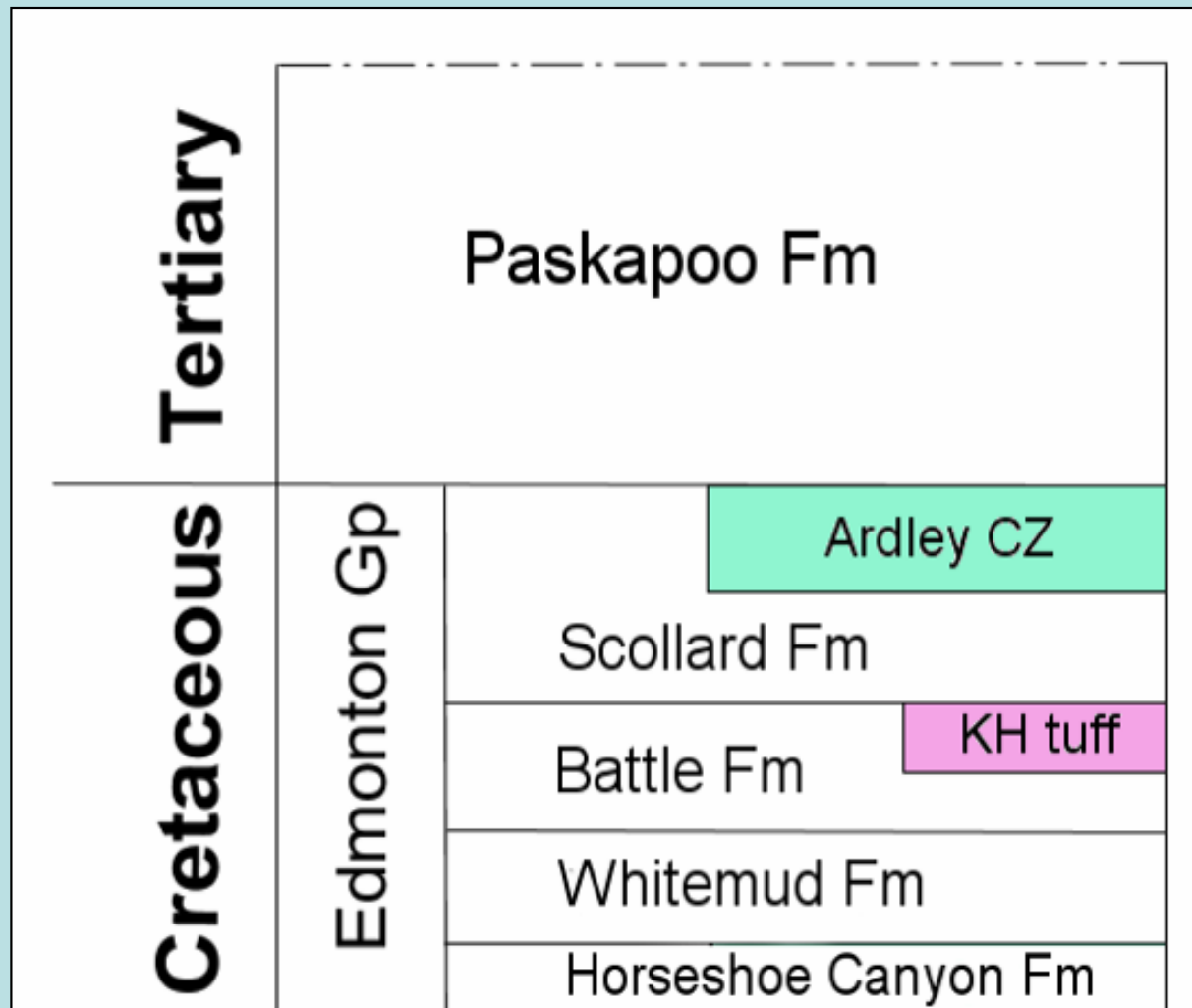
**CREWES**

THE CONSORTIUM FOR RESEARCH IN  
ELASTIC WAVE EXPLORATION SEISMOLOGY

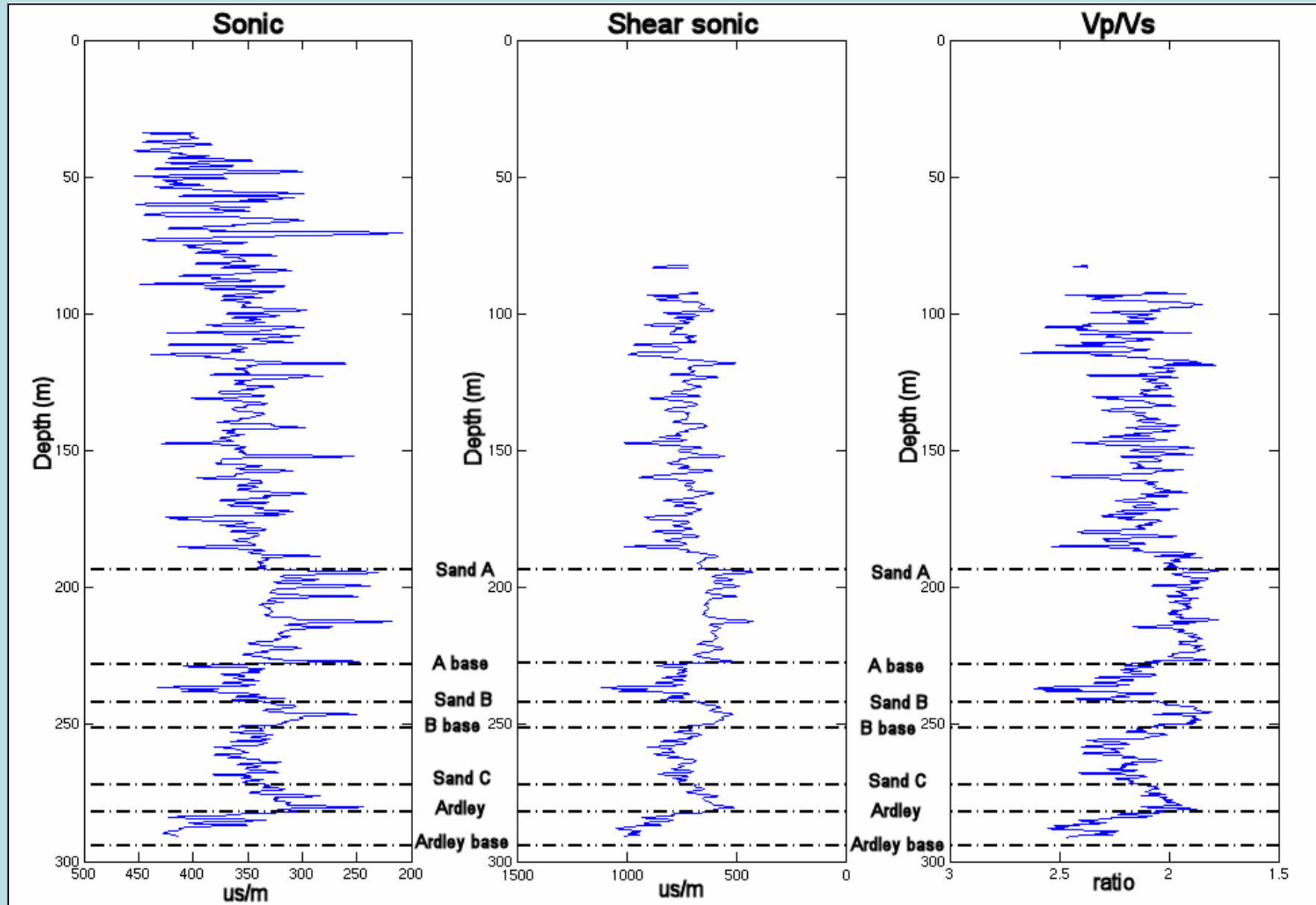
# Cygnets field, Red Deer, Alberta



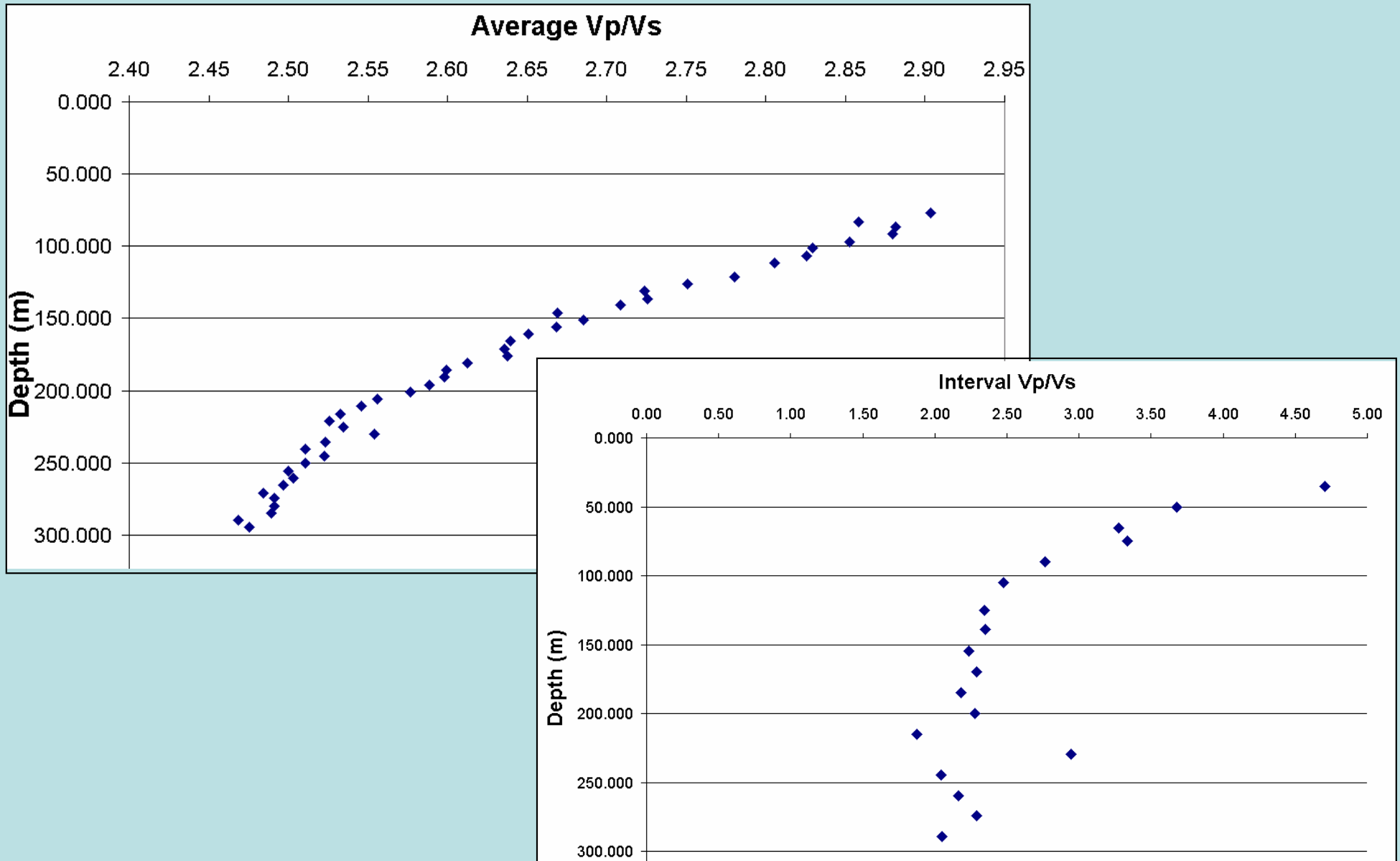
# Stratigraphy of the Ardley coals



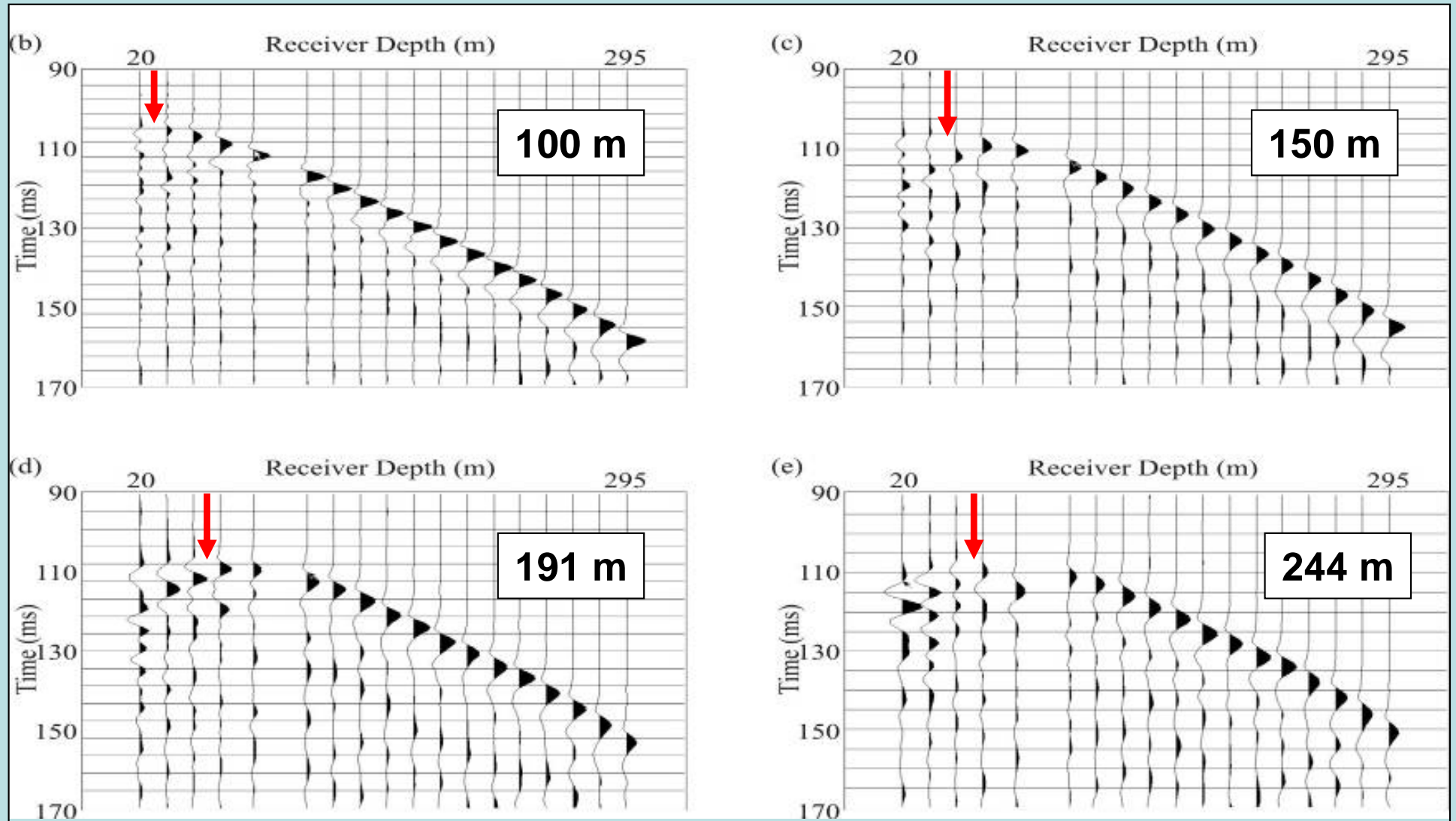
# Cased hole logs, Cygnet



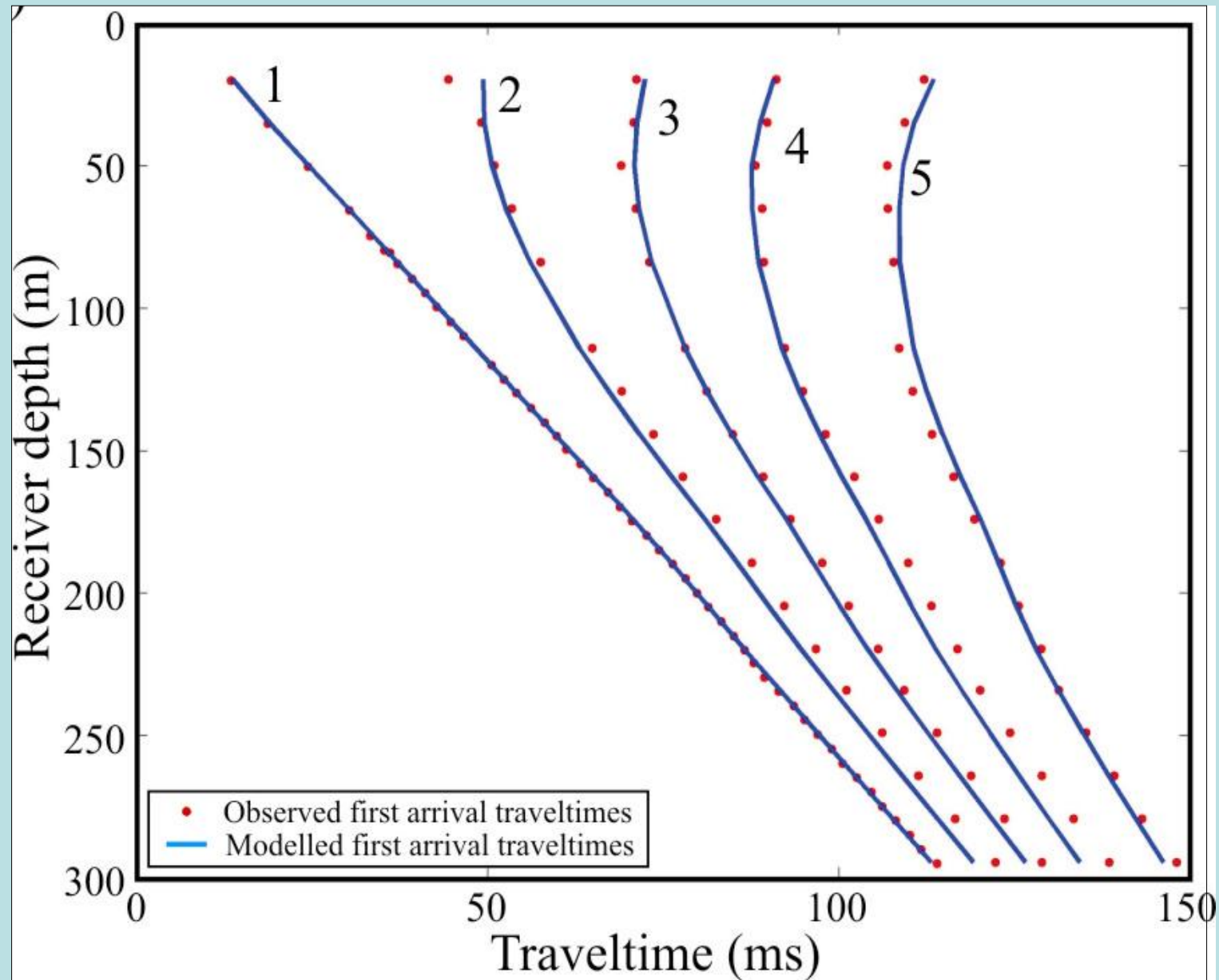
# Vertical Vp/Vs



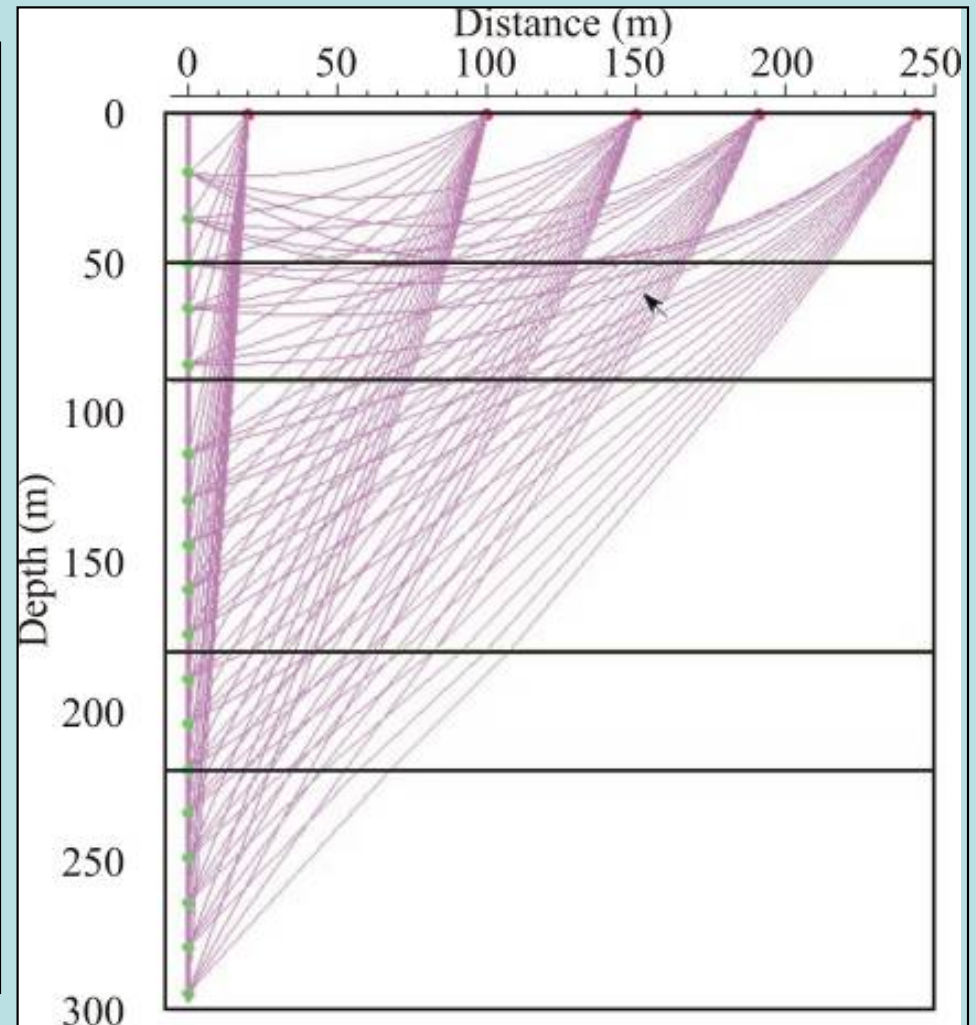
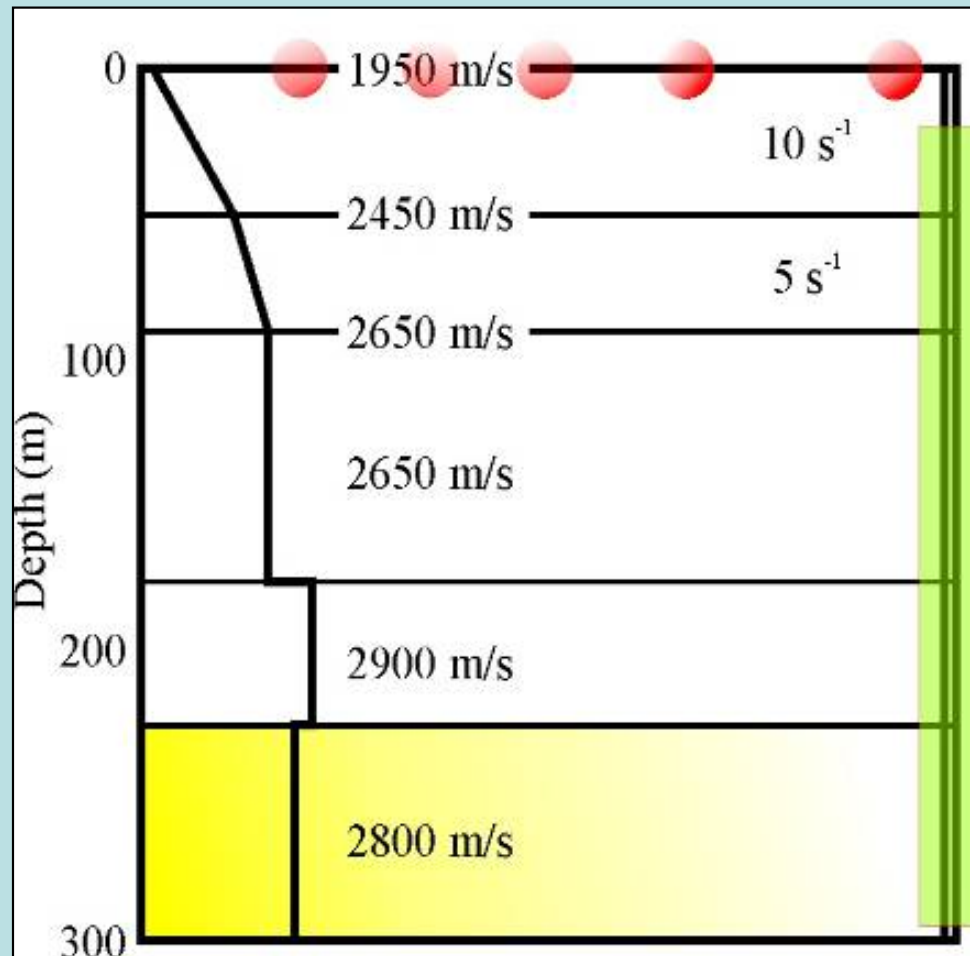
# Vertical component, walkway VSP



# P-wave first arrival traveltimes analysis

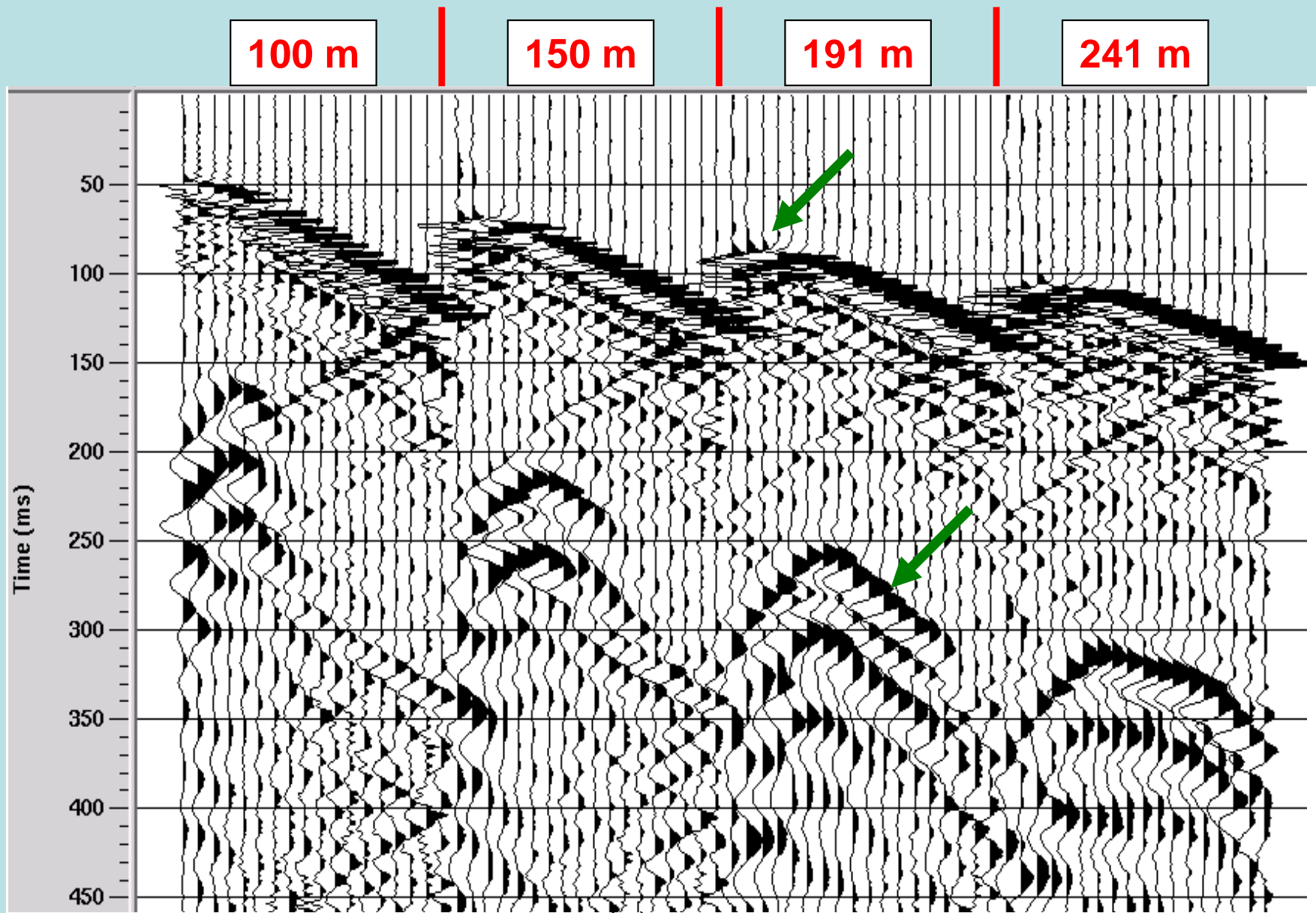


# P-wave velocity model and turning rays

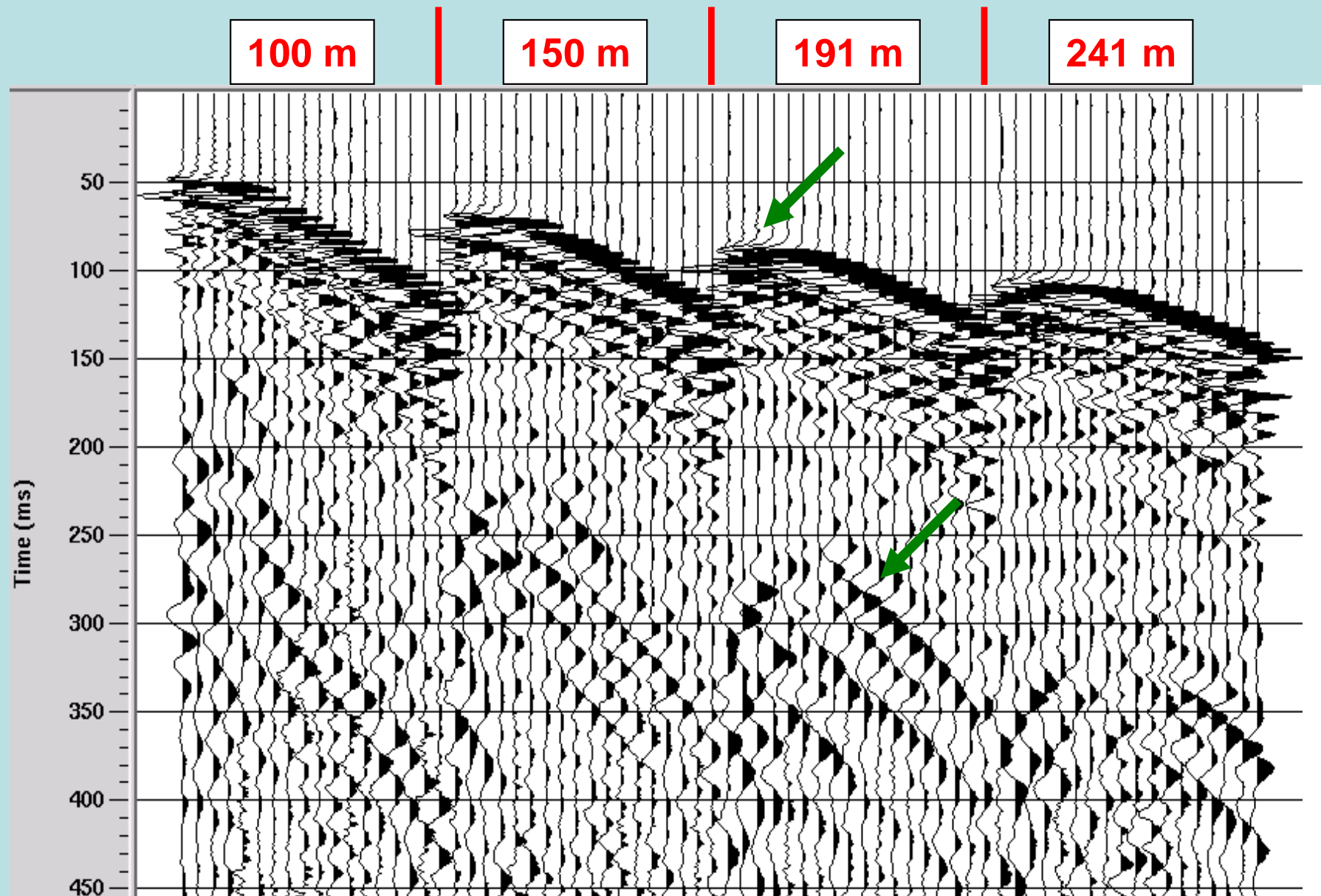




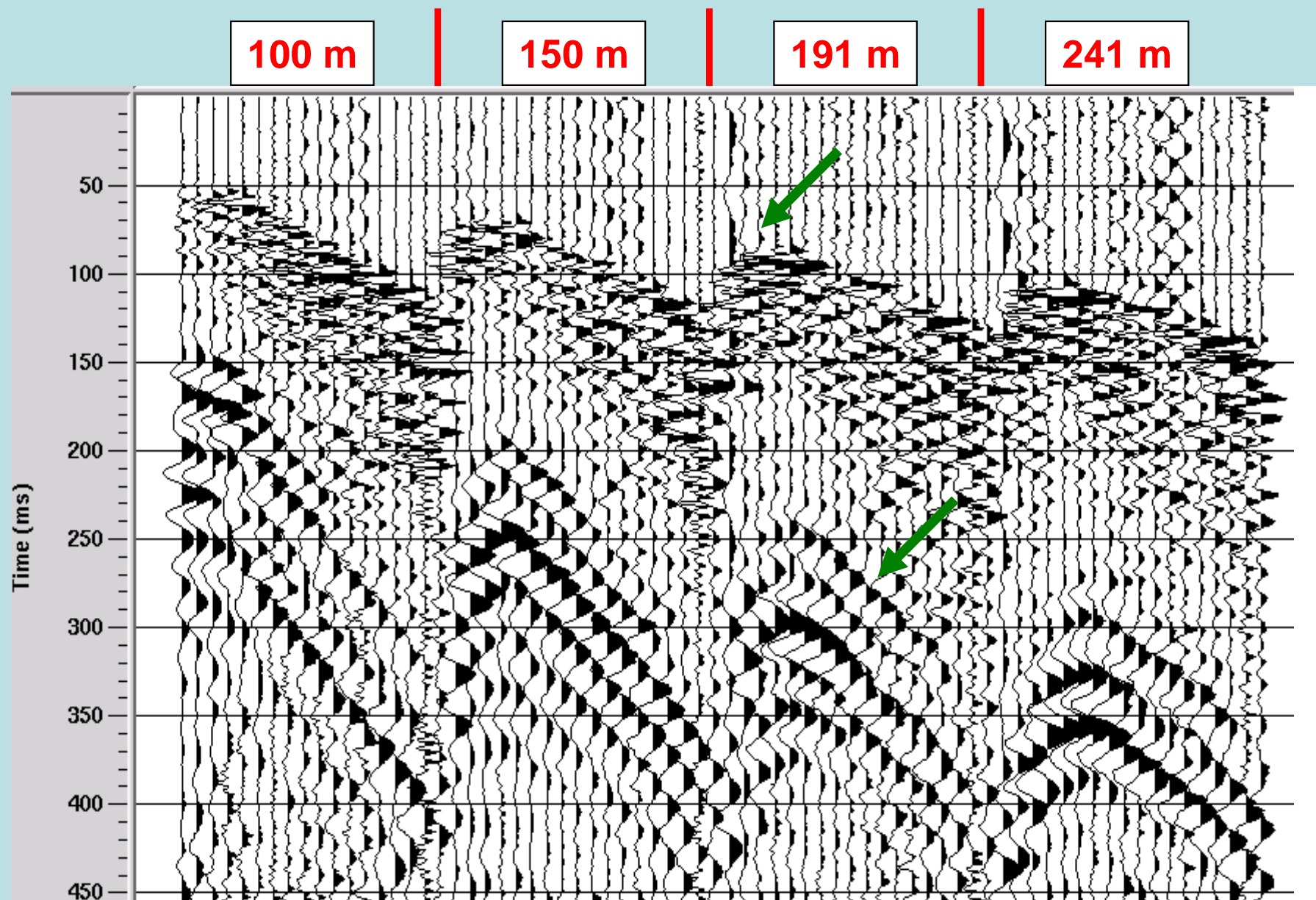
# Vertical component



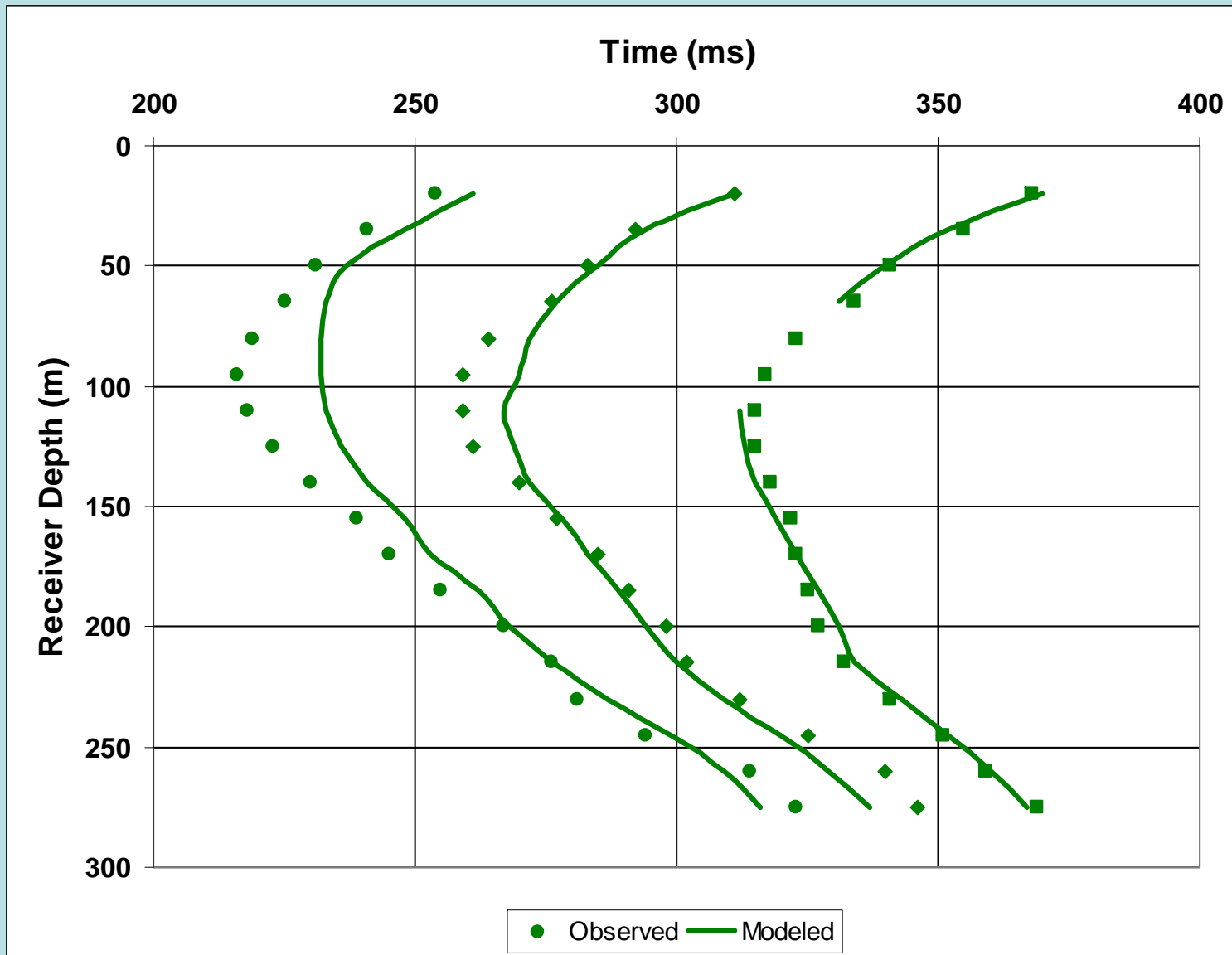
# Radial component



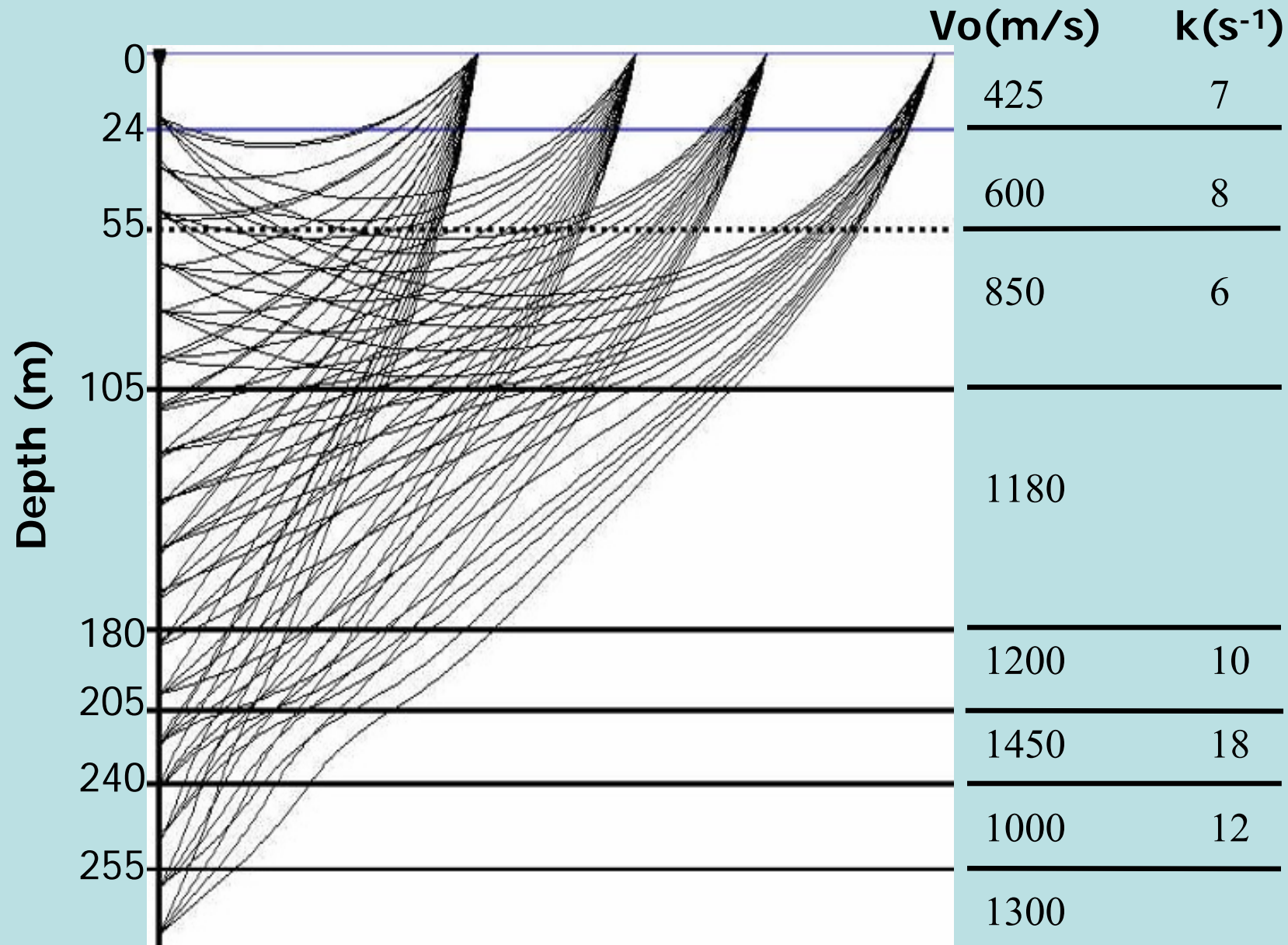
# Transverse component



# SV-wave first arrival traveltimes analysis

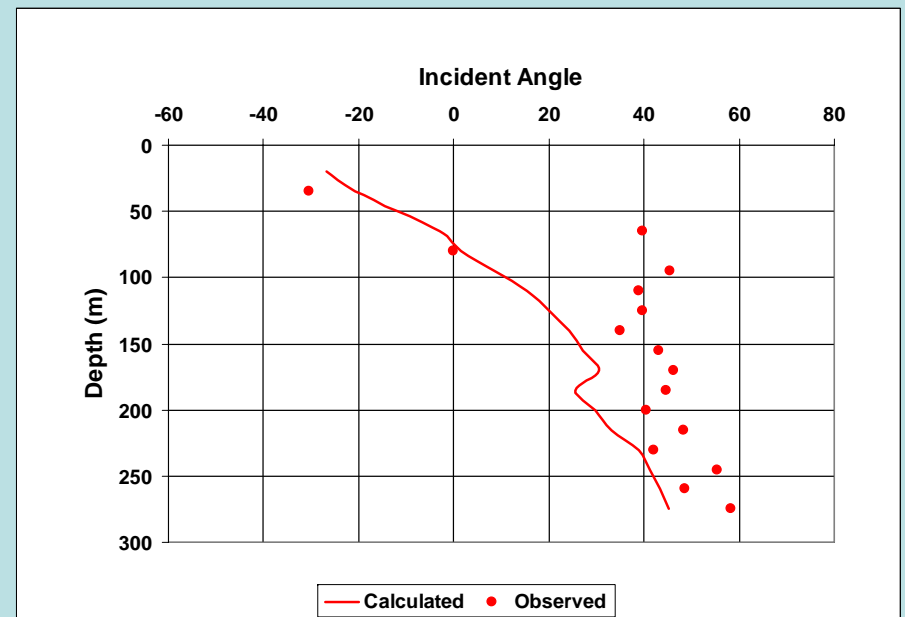
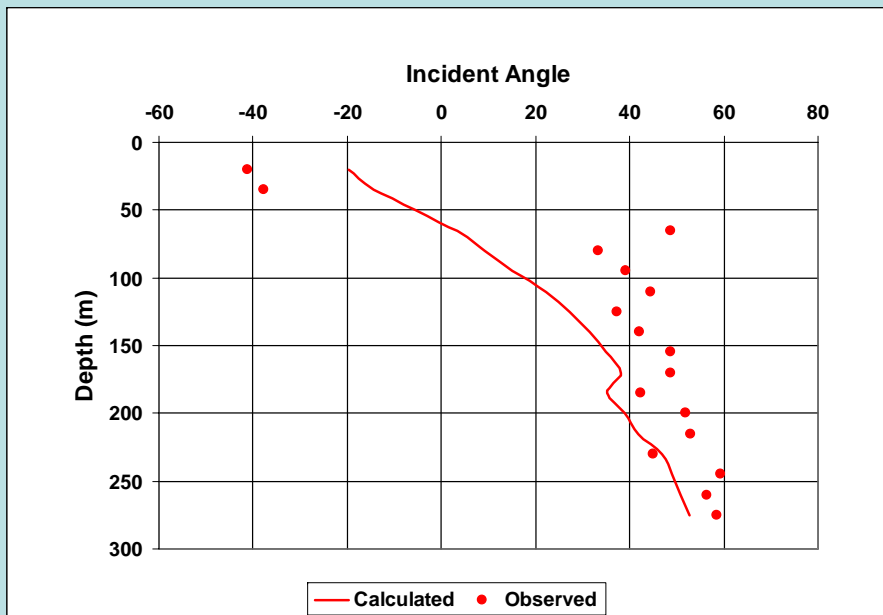
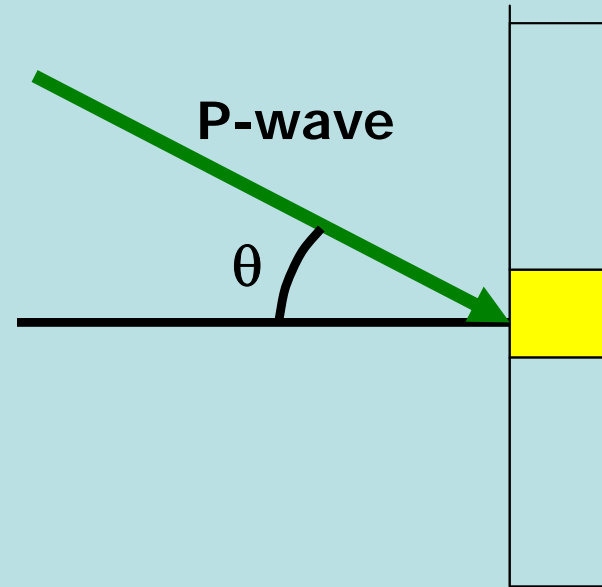
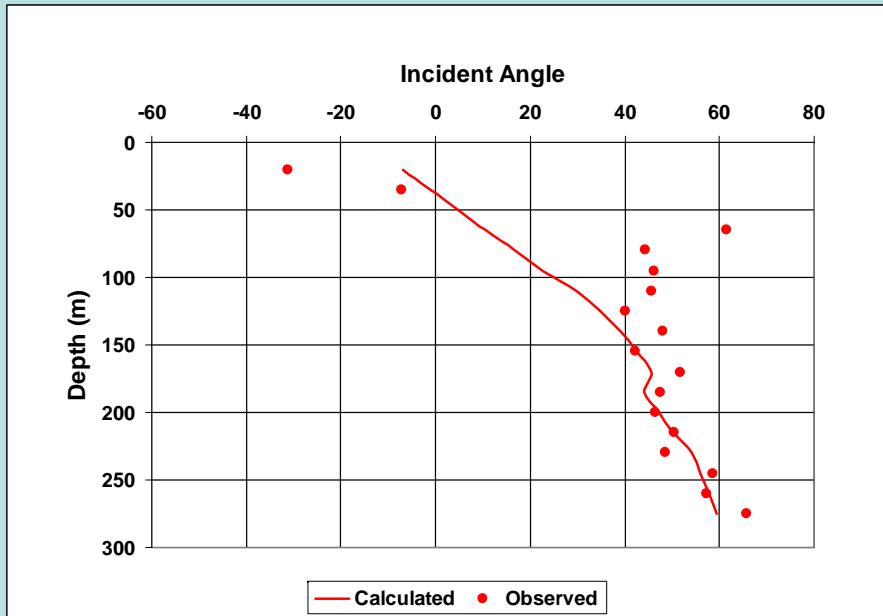


# SV-wave velocity model and turning rays

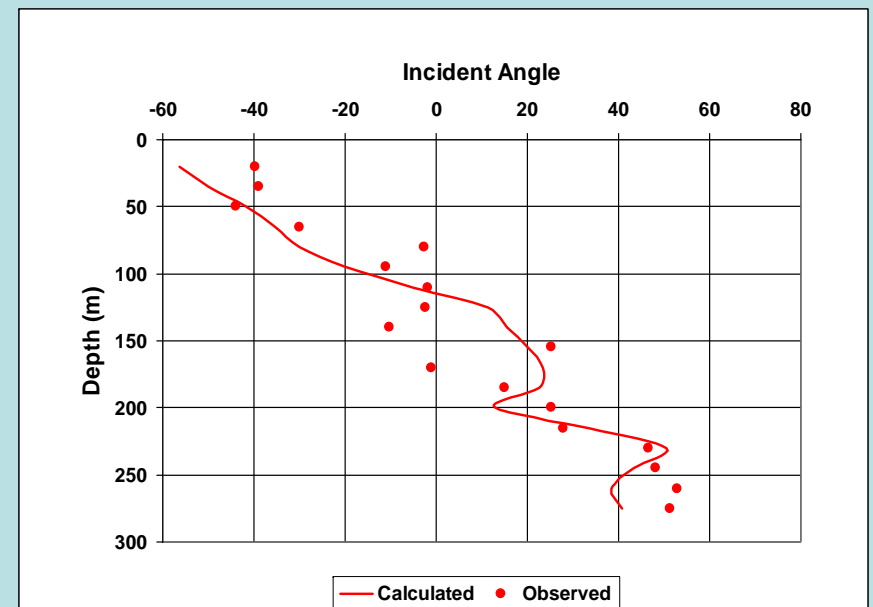
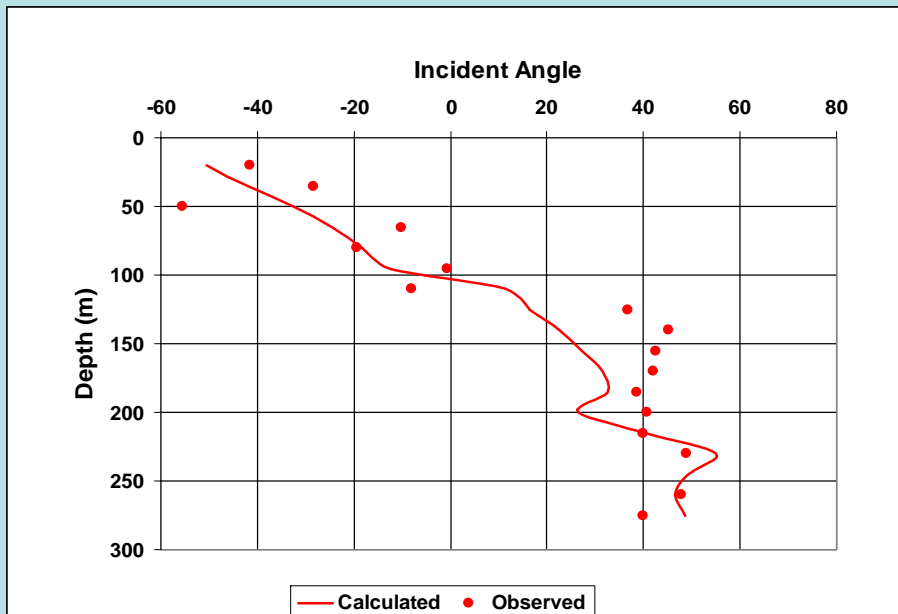
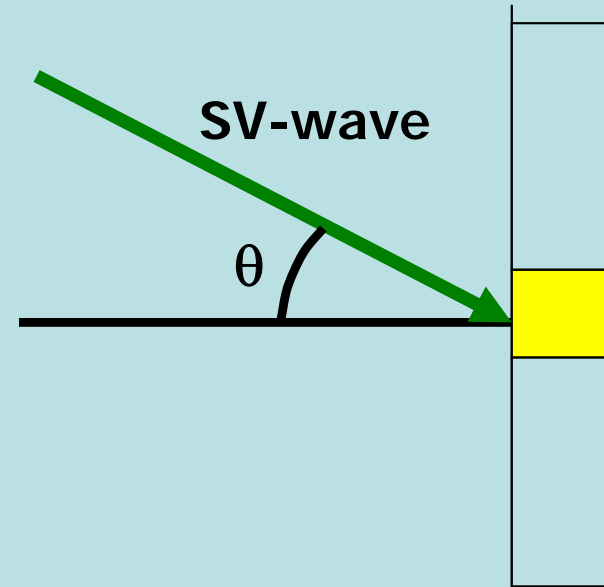
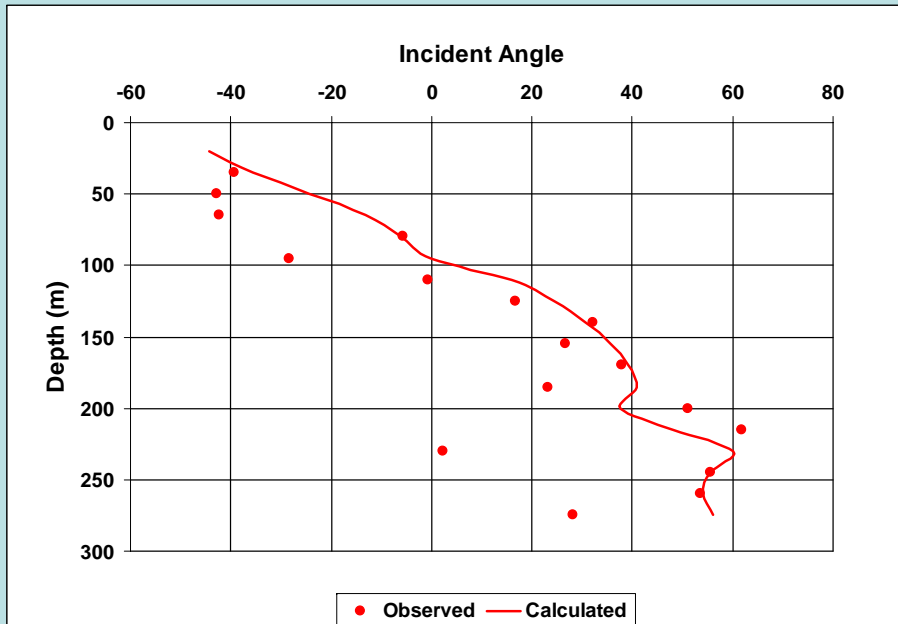




# P-wave incident angle at well



# SV-wave incident angle at well



# Conclusions

- Turning rays are present at Cygnet
- Velocity gradients up to  $10 \text{ s}^{-1}$  for P-waves
- Velocity gradients up to  $8 \text{ s}^{-1}$  for SV waves
- Weak P-wave anisotropy observed
- Incident angle analysis generally supports raytracing results
- Study provides insights into P-S statics



# Acknowledgements

- CREWES sponsors
- NSERC
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