Seismic Waves & Refraction Overview

GEOS 322
Spring 2009
Outline

• Seismic Wave Particle Motion Examples
• Refraction Basics
• Discuss the last quiz
P-Wave Particle Motion

http://web.ics.purdue.edu/~braile/edumod/waves/WaveDemo.htm
S-Wave Particle Motion

http://web.ics.purdue.edu/~braile/edumod/waves/WaveDemo.htm
Rayleigh-Wave Particle Motion

http://web.ics.purdue.edu/~braile/edumod/waves/WaveDemo.htm
Love-Wave Particle Motion

http://web.ics.purdue.edu/~braile/edumod/waves/WaveDemo.htm
On to refraction

• Sources include a power point presentation from IRIS
  – http://www.iris.edu/hq/resource/how_shallow_earth_structure_is_determined
  – http://web.utah.edu/thorne/animations.html
The first head wave is a reflected wave at the critical angle.
The Head wave moves along the surface at the SPEED OF THE LOWER LAYER!!!
The cross-over distance, $x_{\text{cross}}$, is related to the depth to the boundary!
Refraction Movie

Two Layer Model
- Direct arrival
- Reflected arrival
- Critically refracted arrival

Layer 1
- \( V_1 = 6.0 \text{ km/s} \)
- \( h = 25 \text{ km} \)

Layer 2
- \( V_2 = 8.1 \text{ km/s} \)
- \( h = 75 \text{ km} \)

Source --- 150 km --- Receiver

TIME: 0.0 sec

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Model from movie

Two Layer Model

- direct arrival
- reflected arrival
- critically refracted arrival

Distance (km)

Travel Time (sec)

Critical distance

Crossover distance

Receiver (150 km)
Chapter 4 Quiz

shotpoint

geophone

V_1

V_2

V_3