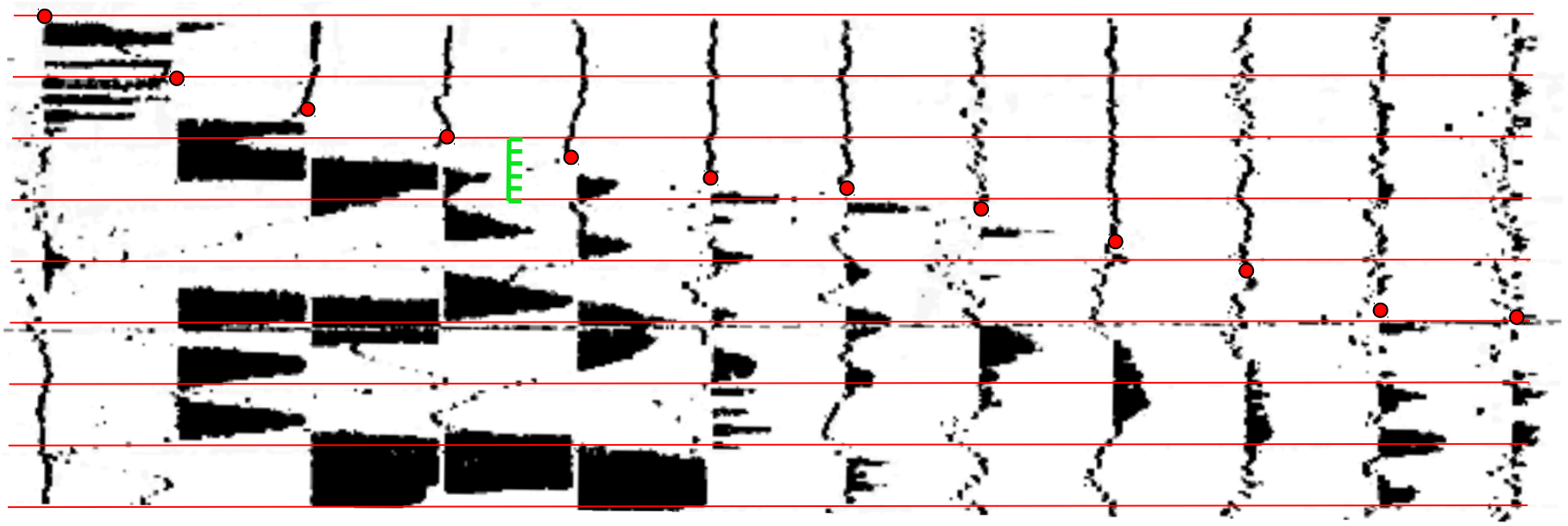
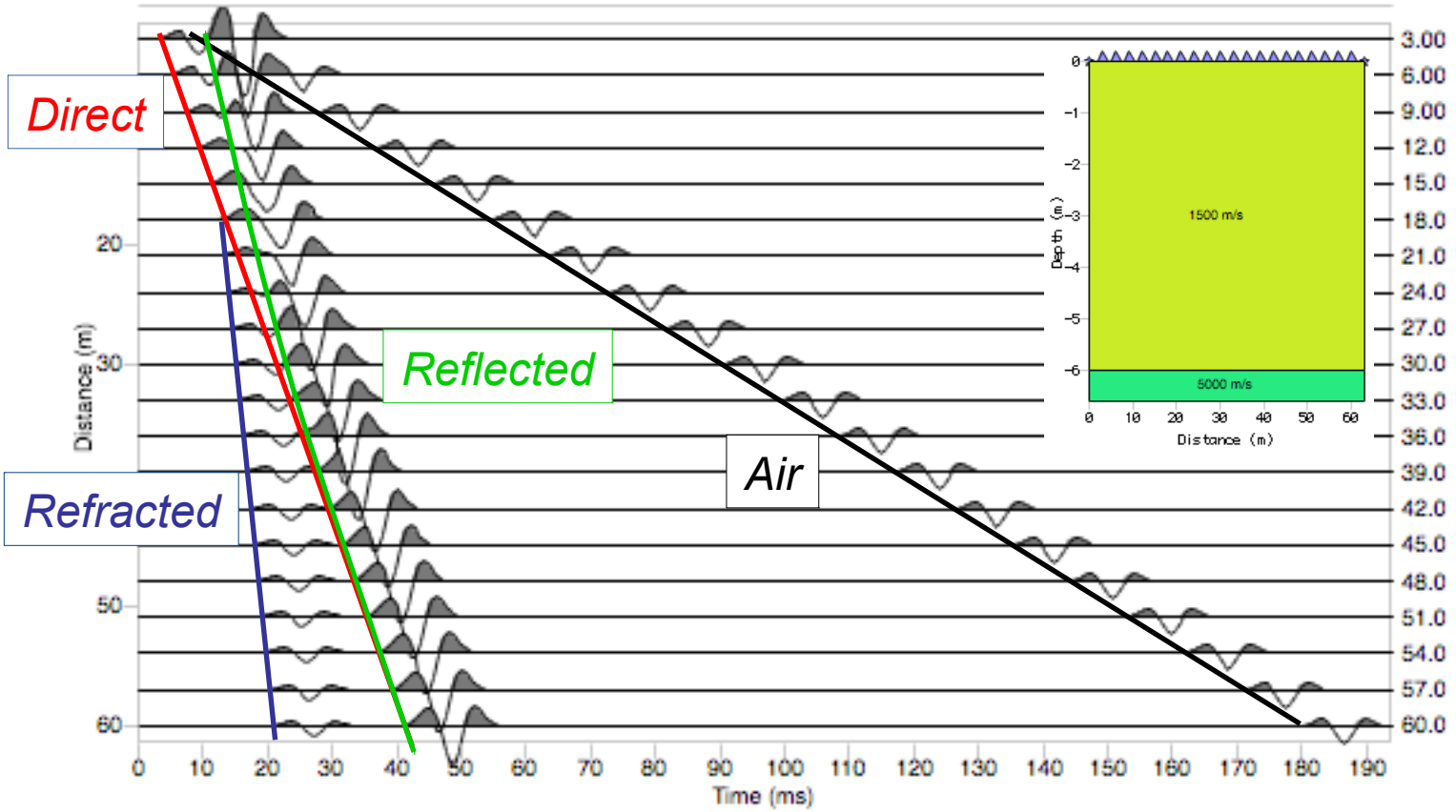
II. Gosport Data:

- Helps to blow up to large scale;
- Create and use a ruler for better accuracy
- REFRACT: Which model – Two, or Three (horizontal) layer – gives lowest RMS error?



- The positive deflection at 4 m would imply a (nonphysical) velocity of 200 m/s (< 330 m/s for sound in air!)

- The ***true*** first arrivals are negative (polarity problem) so hard to see. Picking the positive arrival gives wrong V, so wrong thickness, in the first layer, and hence wrong thickness (but not wrong V) in deeper layers.



Spherical Spreading:

$1/r$

Cylindrical Spreading:

$1/\sqrt{r}$

Attenuation:

$$A = A_0 e^{-\frac{\pi f r}{QV}}$$

Amplitutdes: Different arrivals have different amplitudes ***within each trace***
– ***COMPUTE*** expected distance dependence for each first arrival.

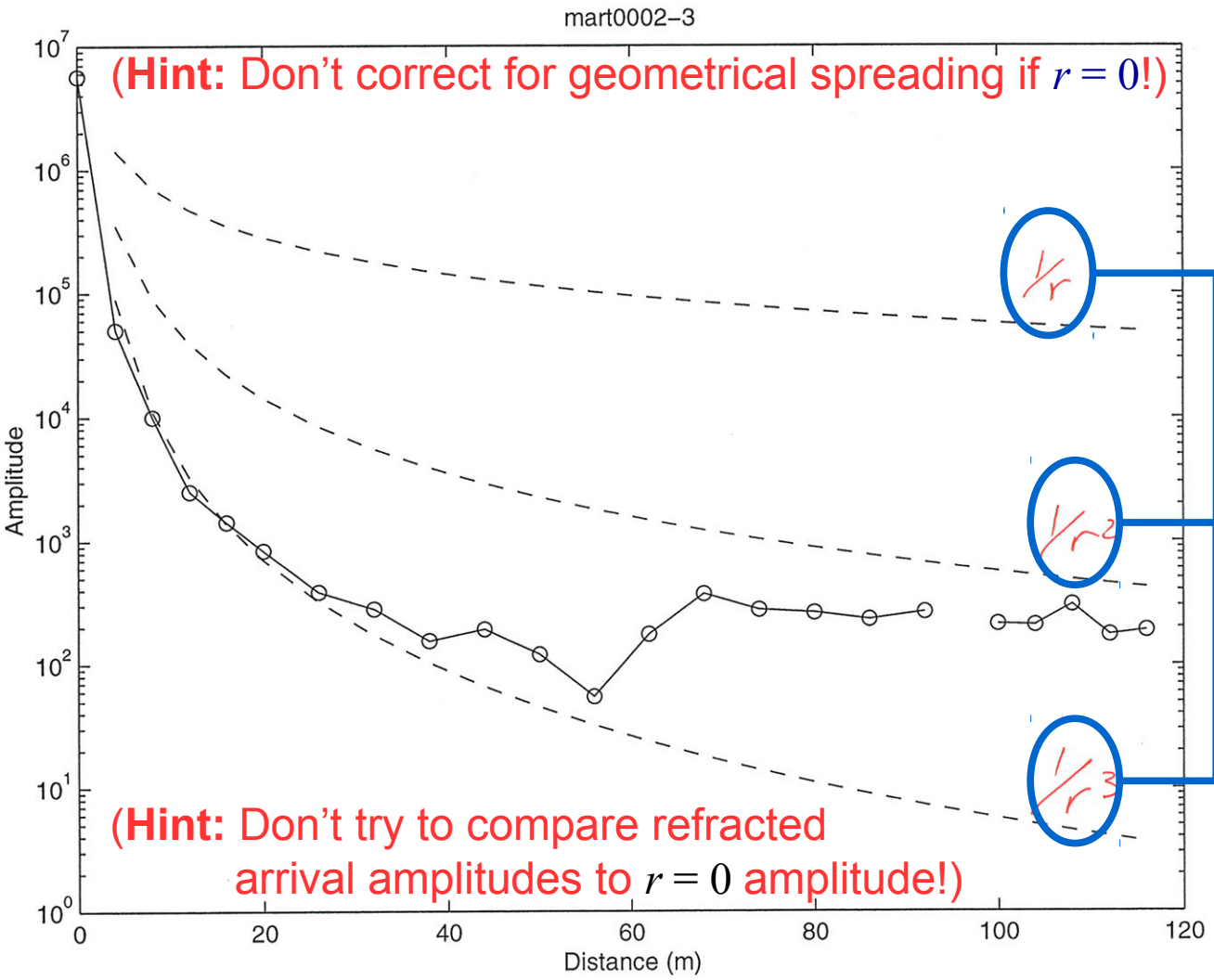
Attenuation: Use frequency of first arrival at each geophone.

Amplitudes from observations

Amplitudes shown below were measured from first arrivals in the Gosport data (Part 2).

(a) Are these consistent with what you might expect from your travel-time analysis?

(***Hint*** : *Think about the propagation path of each arrival !)*



…

(c) ***First,*** Correct the amplitudes for the effects of geometrical Spreading. ***Each type of arrival represents a layer. Then, separately for each layer,*** estimate the quality factor of anelastic attenuation, Q_P .

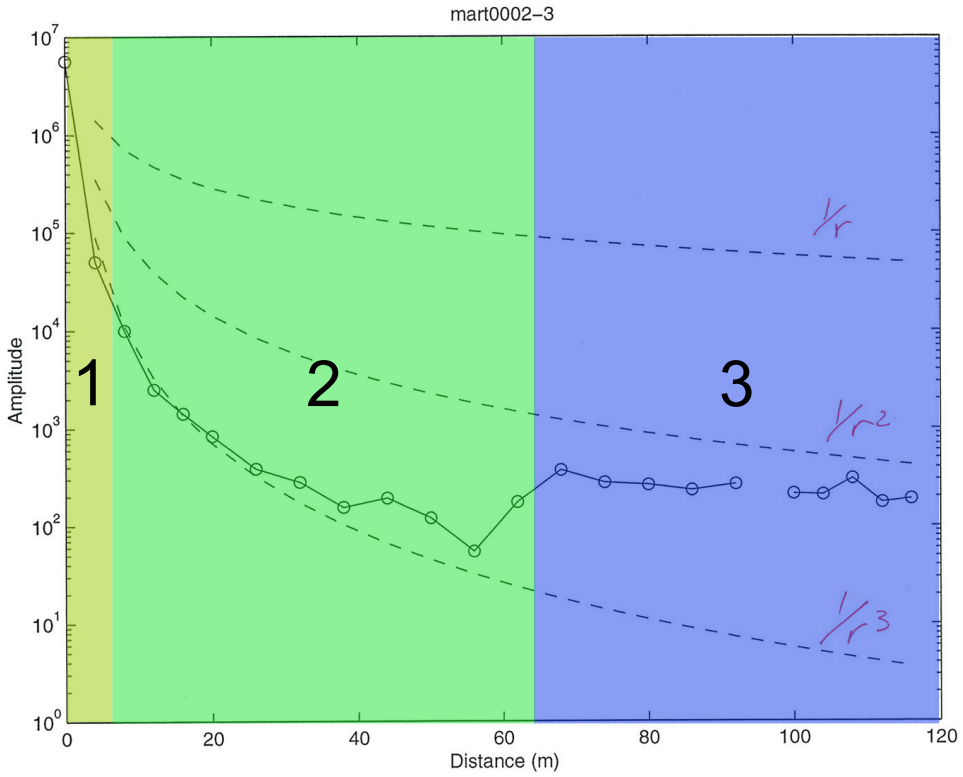
Misleading !

- First recognize that there are three different arrivals with three different values of Q; and two types of geometric spreading
- Layer 1 spreading correction for geophone *i* is:

$$\Delta A_i^1 = A_0^1\left(1-\frac{1}{r_i}\right)$$

- Layer n (= 2, 3) spreading correction for geophone *i* is:

$$\Delta A_i^n = A_0^n\left(\frac{1}{\sqrt{r_0^n}}-\frac{1}{\sqrt{r_i^n}}\right)$$



- Invert the relation:

$$A = A_0 e^{-\frac{\pi f r}{QV}}$$

$$\Downarrow$$

$$Q = -\frac{\pi f r}{V \ln\left(A/A_0\right)}$$

HINT: Amplitude measurements are noisy: Try averaging some or all amplitudes from each layer!