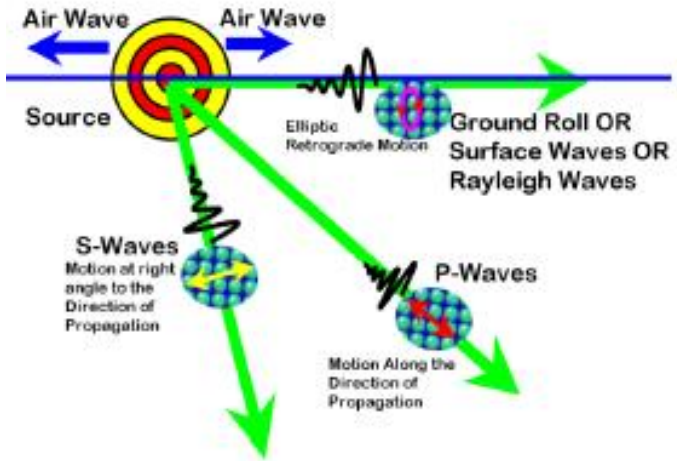
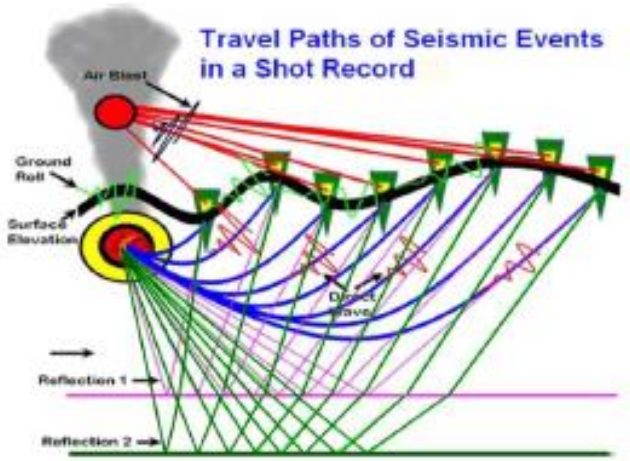
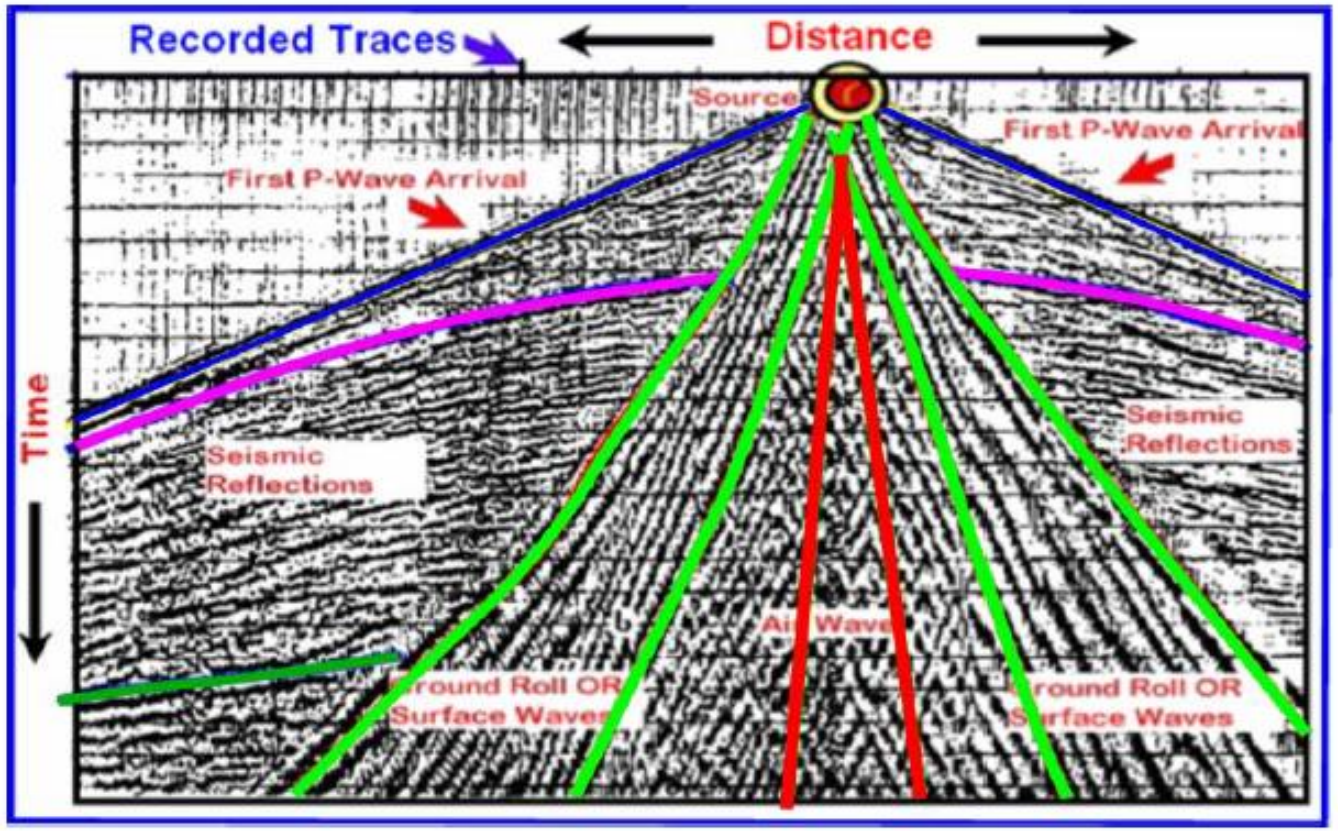
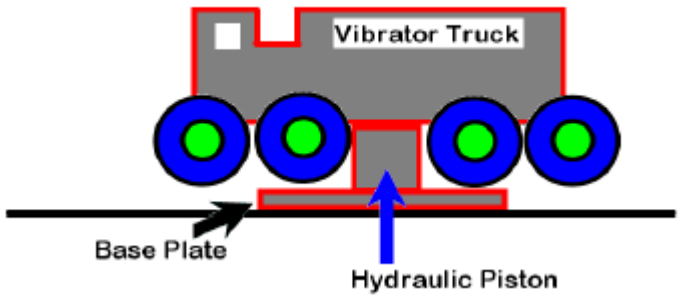
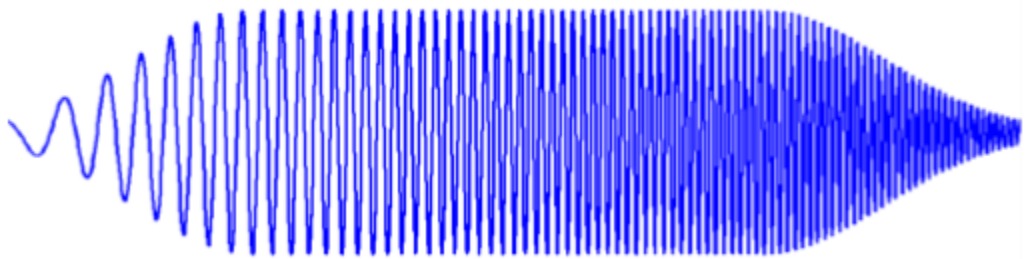
Generation of Seismic Data

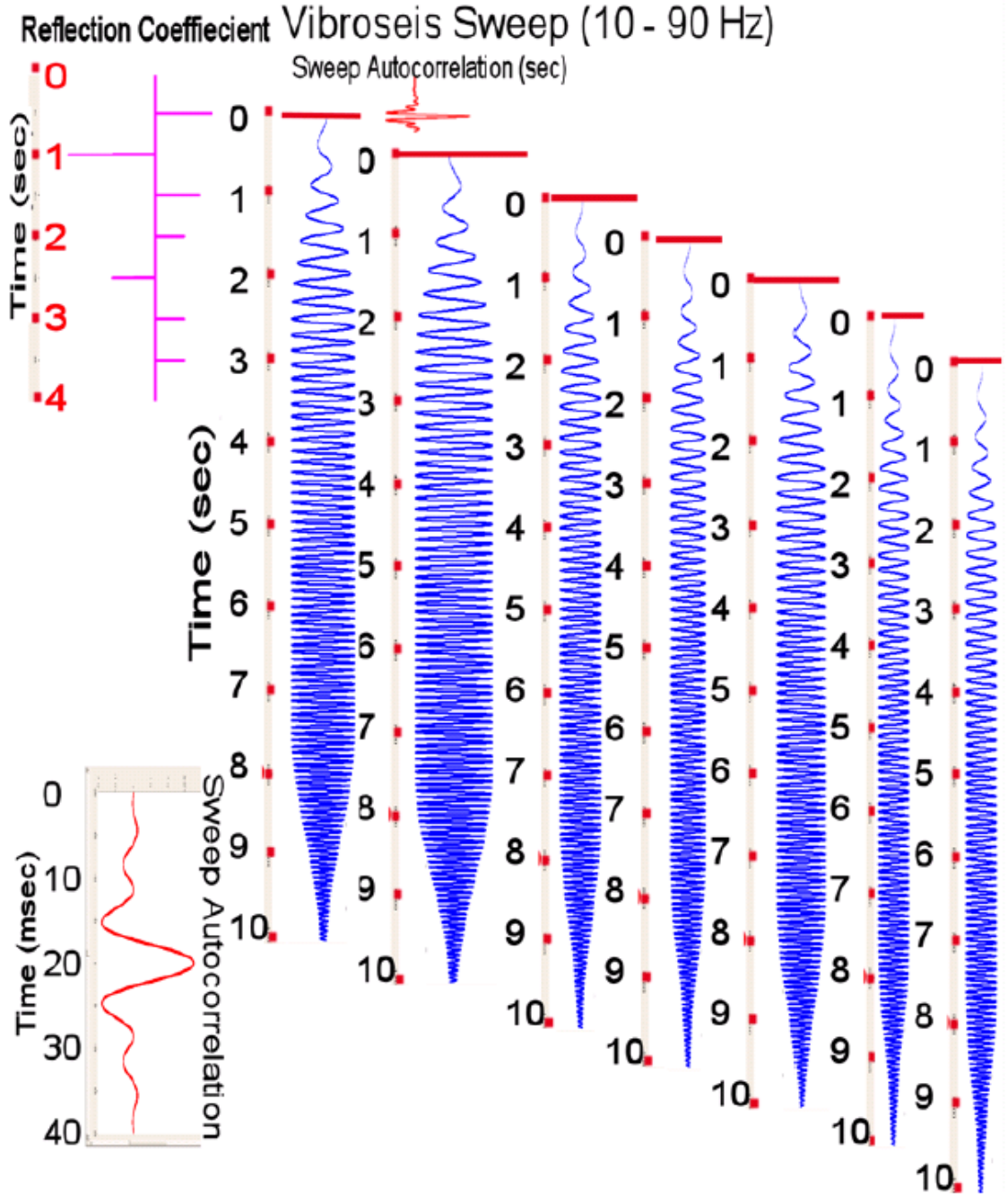




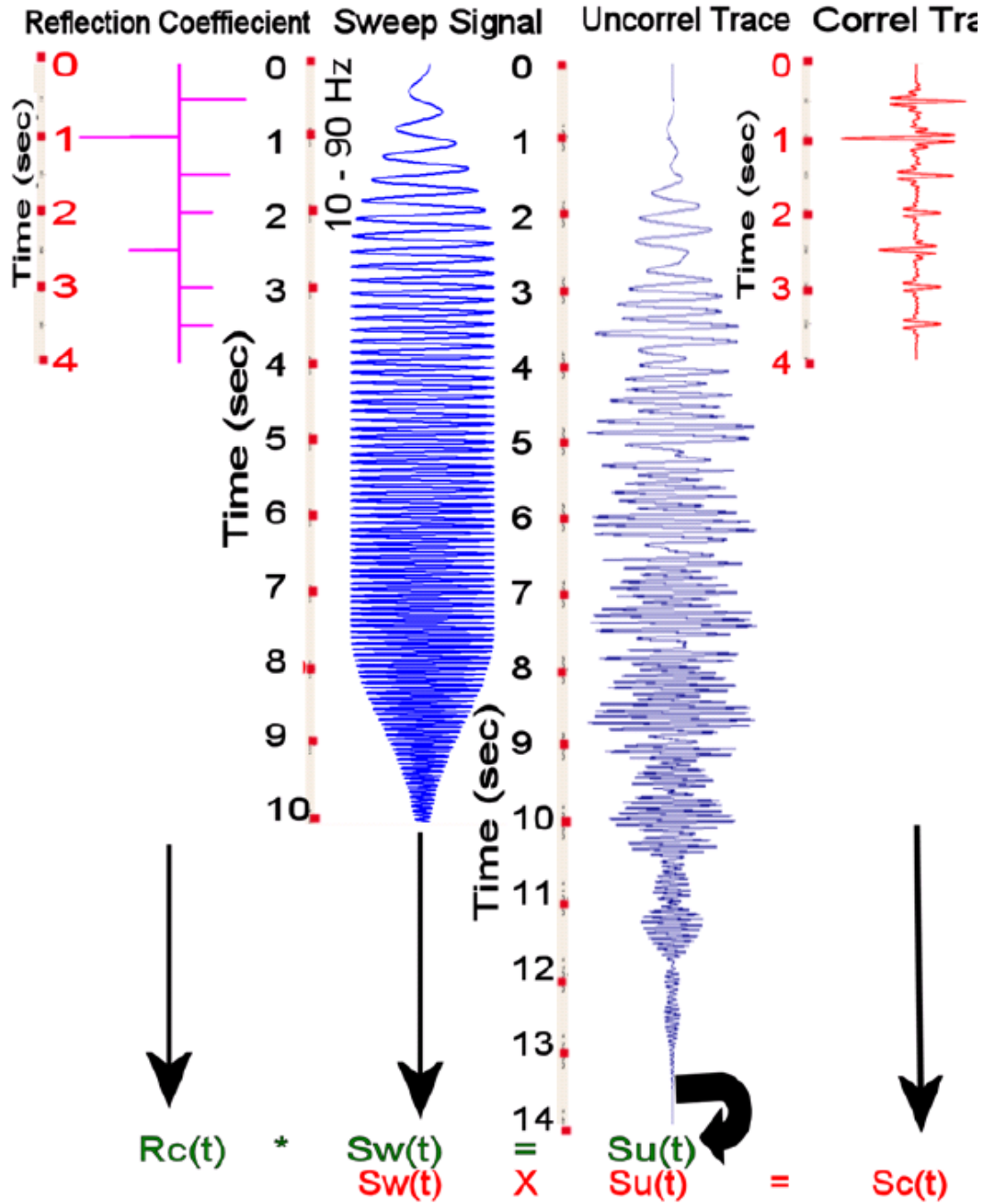








_____ shows how the sweep signal is modified by the reflection coefficients to generate uncorrelated vibroseis trace. Autocorrelation of this sweep produces a 40 ms wavelet.



shows how the sweep signal, uncorrelated recorded trace along with correlated vibroseis trace.

Surface Elevations & Weathering Layer Corrections to Seismic Reflection Data

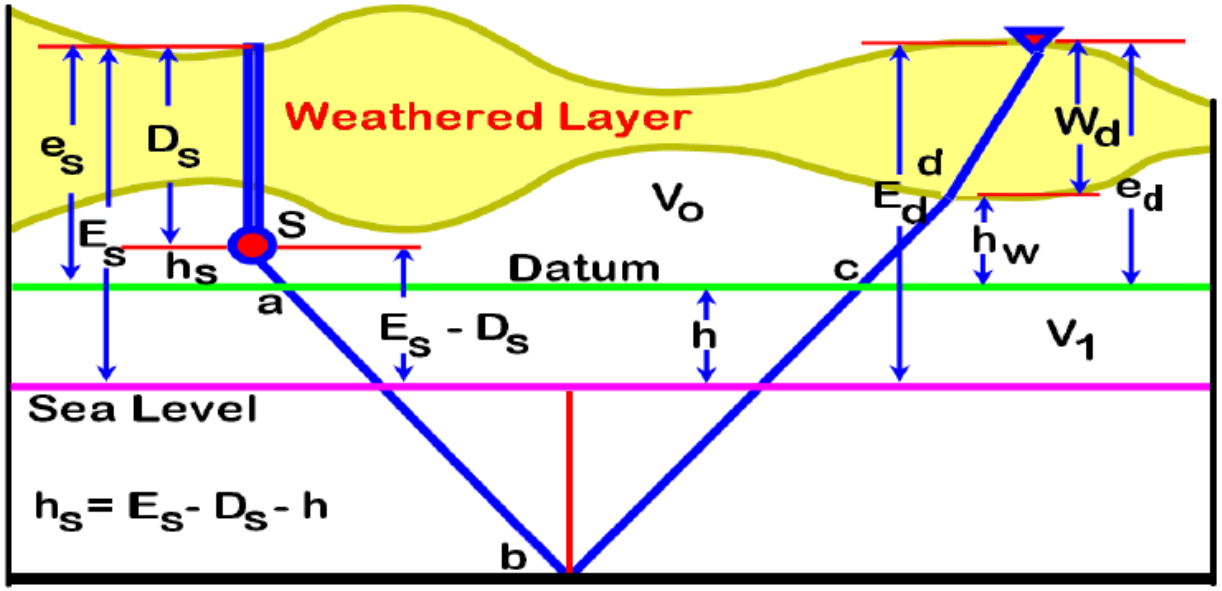


Figure shows an illustration of weathering and elevation corrections. This figure includes all parameters necessary to calculate static corrections.

Residual Statics

A two step process after weathering and elevation correction of seismic data:

(1) Remove long period static corrections using refraction data.

(2) Remove remaining short period static corrections using reflection data.

The intercept time t_i is given by $t_i = \frac{W_d \cos i}{V_0}$ $\quad W_d = t_i \frac{V_0}{\cos i} = t_i \frac{V_1 V_0}{\sqrt{V_1^2 - V_0^2}}$ (1)

This correction reduces the travel times by replacing velocity V_0 with V_1 i.e., the effect of the weathering velocity is eliminated.

The correction t_W is: $t_w = W_d(\frac{1}{V_0} - \frac{1}{V_1}) = W_d \frac{V_1 - V_0}{V_1 V_0}$ (2)

Assuming a vertical travel path through the surface layer, and substituting # 1 into # 2

$$t_w = t_i \sqrt{\frac{V_1 - V_0}{V_1 + V_0}} \qquad K = \sqrt{\frac{V_1 - V_0}{V_1 + V_0}} \qquad t_w = t_i K \quad (3)$$

Correcting Shot and Detector to a Datum Plane:

The datum plane is below the base of the weathering,

e_S = elevation above datum of surface above shot, e_d = elevation above datum of the detector

Travel time from the shot to the datum plane: $= -\frac{e_s - D_s}{V_1}$ (4)

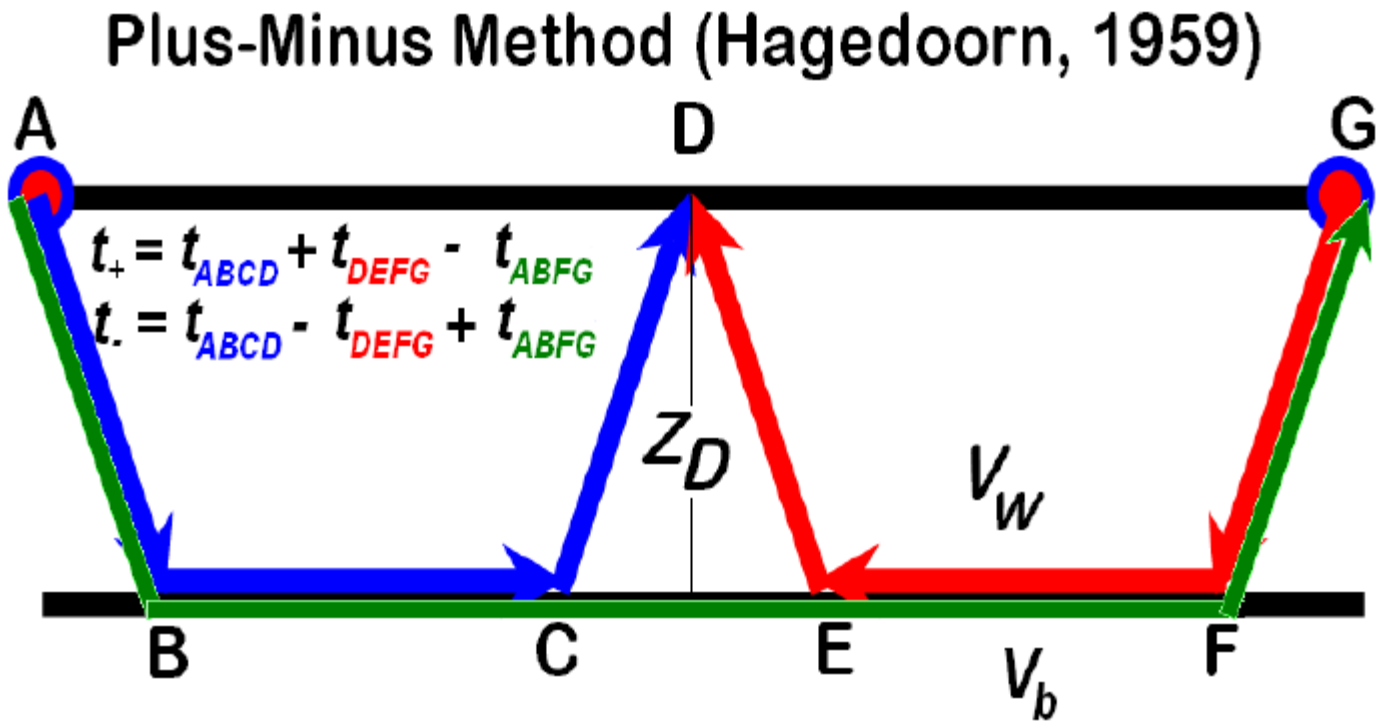
Travel time from the datum plane to the base of the weathering: $= -\frac{e_d - W_d}{V_1}$ (5)

Travel time from the base of the weathering to the detector: $= -\frac{W_d}{V_0}$ (6)

The total correction (sum 4, 5, 6), and the depths calculated are below the datum plane.

$$C_3 = -\frac{e_s + e_d - D_s}{V_1} - W_d(\frac{1}{V_0} - \frac{1}{V_1}) \qquad C_3 = -\frac{e_s + e_d - D_s}{V_1} - t_i K = \frac{D_s - e_s - e_d}{V_1} - t_i K$$

A model for the Plus-Minus method of calculating the weathered layer statics is shown in Figure, which shows the shots for the refraction paths are located at *A* and *G*, and the receiver is located at *D*.



$$t_+ = t_{ABCD} + t_{DEFG} - t_{ABFG}$$

$$t_- = t_{ABCD} - t_{DEFG} + t_{ABFG}$$

Shows the model for the Plus-Minus method of calculating the weathered layer statics. The shots for the refraction paths are located at A and G, and the receiver is located at D.