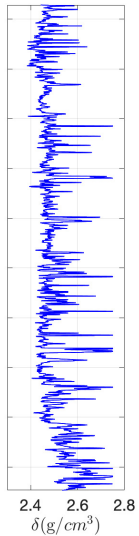
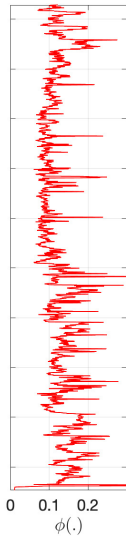
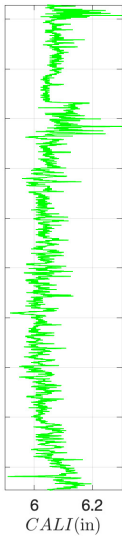
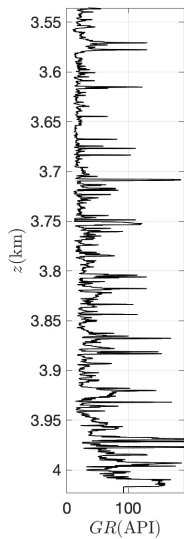


Bayesian Well-log Analysis

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PRIOR



POSTERIOR



prior joint probability density function

prior marginal model PDF

center: predict using GR- v equation

$$\bar{v} = 5.654 - 0.008 \text{ GR}$$

dispersion: set using confidence in the GR- v equation

prior marginal data PDF

center: use actual observations for δ and ϕ

dispersion: predict using the CALI measurements

$$\sigma_{\delta} = a_{\delta} + \frac{CALI - CREF}{CMAX - CREF} b_{\delta}$$

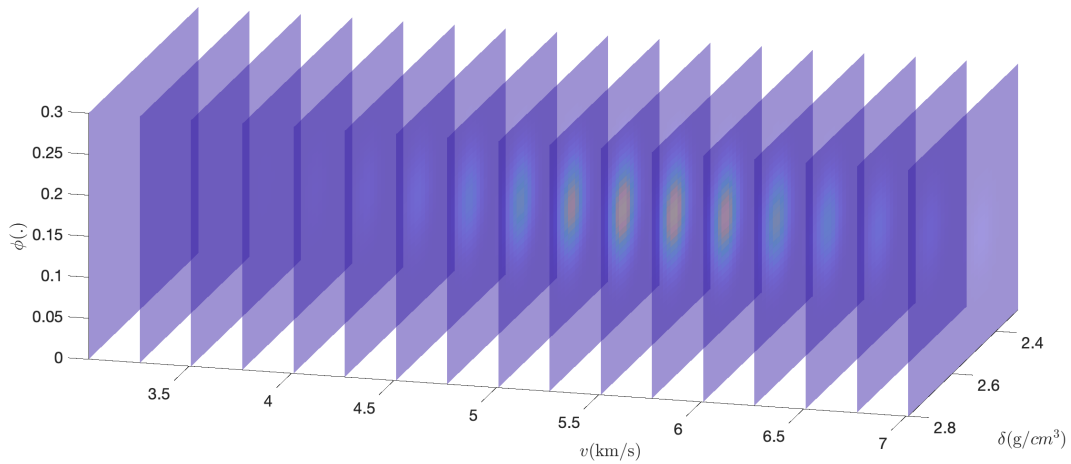
$$\sigma_{\phi} = a_{\phi} + \frac{CALI - CREF}{CMAX - CREF} b_{\phi}$$

► CREF: reference caliper (6in)

► CMAX: max allowed caliper (8in)

► a_* : minimum uncertainty

► b_* : uncertainty range



theoretical joint probability density function

conditional theoretical PDF: Wyllie equation

center: use the theoretical relations between v - δ - ϕ

$$\frac{1}{v} = \frac{1 - \phi}{v_M} + \frac{\phi}{v_F}$$

$$\delta = (1 - \phi) \delta_M + \phi \delta_F$$

dispersion: set using confidence in the theoretical relations

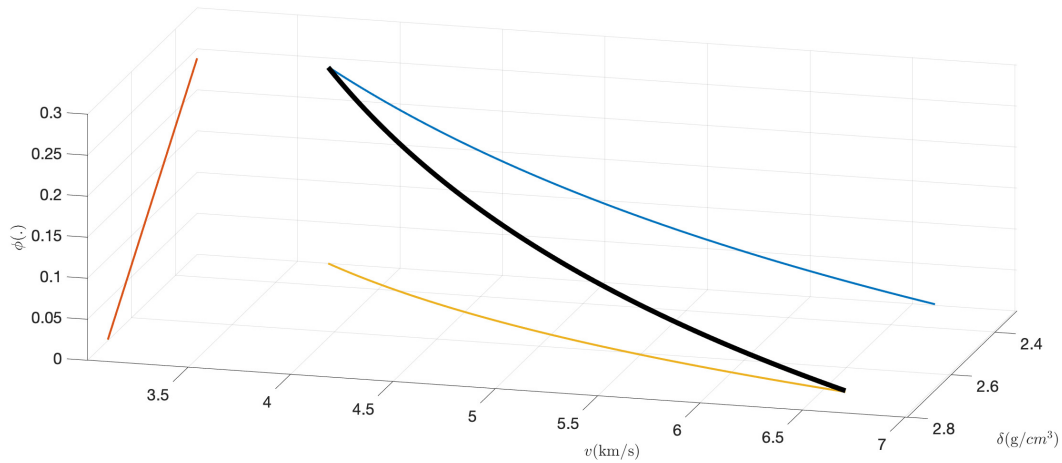
conditional theoretical PDF: Gardner equation

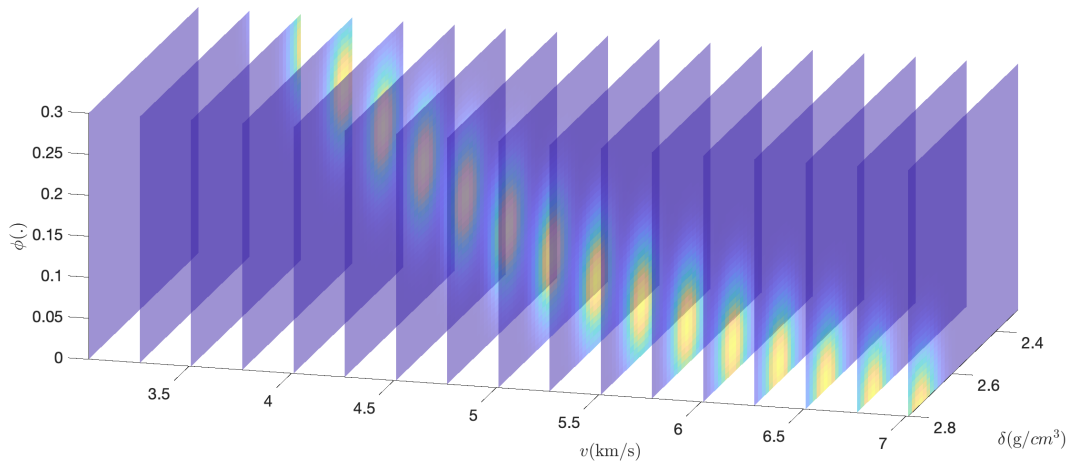
center: use the theoretical relations between v - δ - ϕ

$$\delta = 1.74v^{0.25}$$

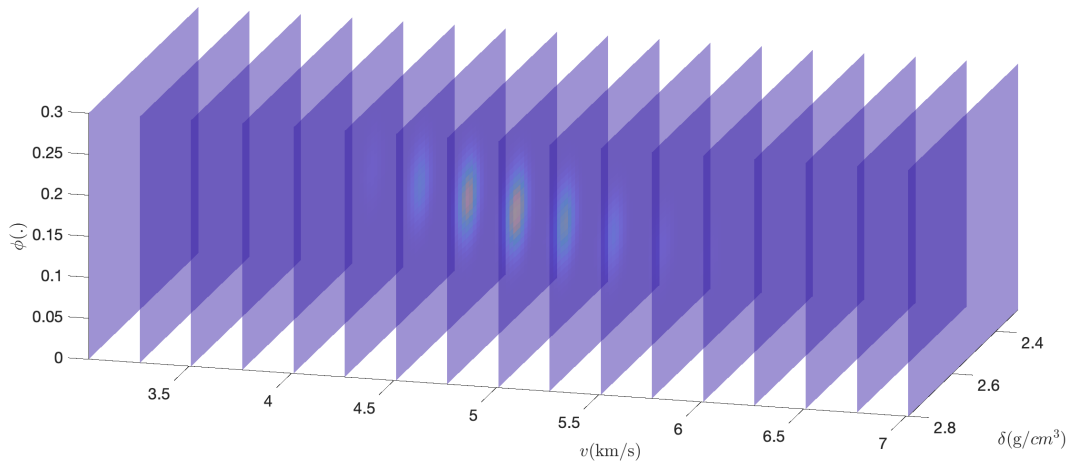
$$\delta = (1 - \phi) \delta_M + \phi \delta_F$$

dispersion: set using confidence in the theoretical relations





posterior joint probability density function



marginal model probability density function

