

$$\left[ \underbrace{z_t, \boldsymbol{\beta}, \sigma_p^2}_{\text{unobserved}} \mid \underbrace{y_t, y.sd_t, x_t}_{\text{observed}} \right] \propto \underbrace{\left[ y_t \mid z_t, y.sd_t \right]}_{\text{observation model}} \times \underbrace{\left[ z_t \mid g(\boldsymbol{\beta}, z_{t-1}, x_t), \sigma_p^2 \right]}_{\text{process model}} \times \underbrace{[\beta_0] [\beta_1] [\beta_2] [\beta_3] [\sigma_p^2] [z_1]}_{\text{parameter models}}$$