

$$\text{Subject parameter distribution: } \underbrace{\begin{bmatrix} \text{T0m_ly}_i \\ \text{mm_y}_i \end{bmatrix}}_{\phi(i)} \sim \text{tform} \left\{ \text{N} \left(\begin{bmatrix} \text{raw_T0m_ly} \\ \text{raw_mm_y} \end{bmatrix}, \begin{bmatrix} \text{PCov_1.1} & \text{PCov_2.1} \\ \text{PCov_2.1} & \text{PCov_2.2} \end{bmatrix} \right) \right\}$$

$$\text{Initial latent states: } \underbrace{\begin{bmatrix} \text{ly} \end{bmatrix} (t_0)}_{\boldsymbol{\eta}(t_0)} \sim \text{N} \left(\underbrace{\begin{bmatrix} \text{T0m_ly} \end{bmatrix}}_{\text{T0MEANS}}, \underbrace{\text{covsdcor} \{ \begin{bmatrix} 0.01 \end{bmatrix} \}}_{\underbrace{\mathbf{Q}^*_{t0}}_{\text{T0VAR}}} \right)$$

$$\text{Deterministic change: } \underbrace{\text{d} \begin{bmatrix} \text{ly} \end{bmatrix} (t)}_{\text{d}\boldsymbol{\eta}(t)} = \left(\underbrace{\begin{bmatrix} \text{drift_ly} \end{bmatrix}}_{\mathbf{A}_{\text{DRIFT}}} \underbrace{\begin{bmatrix} \text{ly} \end{bmatrix} (t)}_{\boldsymbol{\eta}(t)} + \underbrace{\begin{bmatrix} 0 \end{bmatrix}}_{\mathbf{b}_{\text{CINT}}} \right) \text{d}t +$$

$$\text{Random change: } \underbrace{\text{cholsdcor} \{ \begin{bmatrix} \text{diff_ly} \end{bmatrix} \}}_{\mathbf{G}_{\text{DIFFUSION}}} \underbrace{\text{d} \begin{bmatrix} W_1 \end{bmatrix} (t)}_{\text{d}\mathbf{W}(t)}$$

$$\text{Observations: } \underbrace{\begin{bmatrix} \text{y} \end{bmatrix} (t)}_{\mathbf{Y}(t)} = \underbrace{\begin{bmatrix} 1 \end{bmatrix}}_{\mathbf{\Lambda}_{\text{LAMBDA}}} \underbrace{\begin{bmatrix} \text{ly} \end{bmatrix} (t)}_{\boldsymbol{\eta}(t)} + \underbrace{\begin{bmatrix} \text{mm_y} \end{bmatrix}}_{\boldsymbol{\tau}_{\text{MANIFESTMEANS}}} + \underbrace{\begin{bmatrix} 0.2 \end{bmatrix}}_{\boldsymbol{\Theta}_{\text{MANIFESTVAR}}} \underbrace{\begin{bmatrix} \epsilon_1 \end{bmatrix} (t)}_{\boldsymbol{\epsilon}(t)}$$

$$\text{Latent noise per time step : } \Delta \begin{bmatrix} W_{j \in [1,1]} \end{bmatrix} (t - u) \sim \text{N}(0, t - u) \quad \text{Observation noise: } \begin{bmatrix} \epsilon_{j \in [1,1]} \end{bmatrix} (t) \sim \text{N}(0, 1)$$

cholsdcor converts lower tri matrix of std dev and unconstrained correlation to Cholesky factor covariance.
covsdcor = transposed cross product of *cholsdcor*, to give covariance.
 See Driver & Voelkle (2018) p11.