

$$\text{Subject parameter distribution: } \underbrace{\begin{bmatrix} \text{T0m\_ly}_i \\ \text{mm\_y}_i \end{bmatrix}}_{\phi(i)} \sim \text{tform} \left\{ \text{N} \left( \begin{bmatrix} \text{raw\_T0m\_ly} \\ \text{raw\_mm\_y} \end{bmatrix}, \begin{bmatrix} \text{rawPCov\_1.1} & \text{rawPCov\_2.1} \\ \text{rawPCov\_2.1} & \text{rawPCov\_2.2} \end{bmatrix} \right) \right\}$$

$$\text{Initial latent state: } \underbrace{[\text{ly}] (t_0)}_{\boldsymbol{\eta}(t_0)} \sim \text{N} \left( \underbrace{[\text{T0m\_ly}]}_{\text{T0MEANS}}, \underbrace{\text{covsdcor} \{ [\text{Pcorsqrt\_1.1}] \}}_{\underbrace{\mathbf{Q}^*_{t_0}}_{\text{T0VAR}}} \right)$$

$$\text{Deterministic change: } \underbrace{d[\text{ly}] (t)}_{d\boldsymbol{\eta}(t)} = \left( \underbrace{[\text{drift\_ly}]}_{\mathbf{A}_{\text{DRIFT}}} \underbrace{[\text{ly}] (t)}_{\boldsymbol{\eta}(t)} + \underbrace{[0]}_{\mathbf{b}_{\text{CINT}}} \right) dt +$$

$$\text{Random change: } \underbrace{\text{cholsdcor} \{ [\text{diff\_ly}] \}}_{\mathbf{G}_{\text{DIFFUSION}}} \underbrace{d[\text{W}_1] (t)}_{d\mathbf{W}(t)}$$

$$\text{Observations: } \underbrace{[\text{y}] (t)}_{\mathbf{Y}(t)} = \underbrace{[1]}_{\mathbf{\Lambda}_{\text{LAMBDA}}} + \underbrace{[\text{ly}] (t)}_{\boldsymbol{\eta}(t)} + \underbrace{[\text{mm\_y}]}_{\boldsymbol{\tau}_{\text{MANIFESTMEANS}}} + \underbrace{[0.2]}_{\boldsymbol{\Theta}_{\text{MANIFESTVAR}}} + \underbrace{[\epsilon_1] (t)}_{\boldsymbol{\epsilon}(t)}$$

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

*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.