Subject parameter distribution:

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

Initial latent state:

$$\underbrace{\left[\text{ly}\right](t_0)}_{\boldsymbol{\eta}(t_0)} \sim \text{N}\left(\underbrace{\underbrace{\left[\text{T0m\_ly}\right]}_{}}_{\text{T0MEANS}}, \underbrace{\underbrace{UcorSDtoCov\left\{\left[0.01\right]\right\}}_{\mathbf{Q^*}_{t0}}}_{\text{T0VAR}}\right)$$

Deterministic change:

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

Random change:

$$\underbrace{\underbrace{UcorSDtoChol\left\{\left[\text{diff\_ly}\right]\right\}}_{\mathbf{G}}}_{\text{DIFFUSION}}\underbrace{\text{d}\left[W_1\right](t)}_{\text{d}\mathbf{W}(t)}$$

Observations:

$$\underbrace{\left[\text{y}\right](t)}_{\mathbf{Y}(t)} = \underbrace{\underbrace{\left[1\right]}_{\boldsymbol{\Lambda}}}_{\text{LAMBDA}}\underbrace{\left[\text{ly}\right](t)}_{\boldsymbol{\eta}(t)} + \underbrace{\underbrace{\left[\text{mm\_y}\right]}_{\boldsymbol{\tau}}}_{\text{MANIFESTMEANS}} \quad +$$

Observation noise:

$$\underbrace{\underbrace{\left[0.2\right]}_{\boldsymbol{\Theta}}}_{\text{MANIFESTVAR}}\underbrace{\left[\epsilon_1\right](t)}_{\boldsymbol{\epsilon}(t)}$$

System noise distribution per time step: $\Delta\left[W_{j\in[1,1]}\right](t-u) \sim \text{N}(0, t-u)$

Observation noise distribution: $\left[\epsilon_{j\in[1,1]}\right](t) \sim \text{N}(0,1)$

Note: *UcorSDtoChol* converts lower tri matrix of standard deviations and unconstrained correlations to Cholesky factor, *UcorSDtoCov* = transposed cross product of UcorSDtoChol, to give covariance, See Driver & Voelkle (2018) p11. Individual specific notation (subscript i) only shown for subject parameter distribution – pop. means shown elsewhere.