

Simulation Experiment

To check the effect of GPS error on estimation of the number of states, we simulated 100 step-length sequences from a two-state HMM with time-heterogeneous (sinusoidal) transition probability (Eq. 5 in the main text) with random transition parameters, using the simulation method described in the main text. The step-length and turning angle distributions for state 1 and 2 are:

$$SL | s_1 \sim \text{log-Normal}(\mu = 0, \sigma = 1) \quad (1)$$

$$TA | s_1 \sim \text{von-Mises}(\alpha = 0, \kappa = 0) \quad (2)$$

$$SL | s_2 \sim \text{log-Normal}(\mu = 2, \sigma = 1) \quad (3)$$

$$TA | s_2 \sim \text{von-Mises}(\alpha = 0, \kappa = 10) \quad (4)$$

where μ is the mean and σ is the standard deviation on the log scale; α is the mean direction; and κ is the concentration. Figure S8 illustrates the frequencies with which different BIC-optimal states are estimated for 100 simulated realizations, fitted using either homogeneous or heterogeneous transition probabilities.

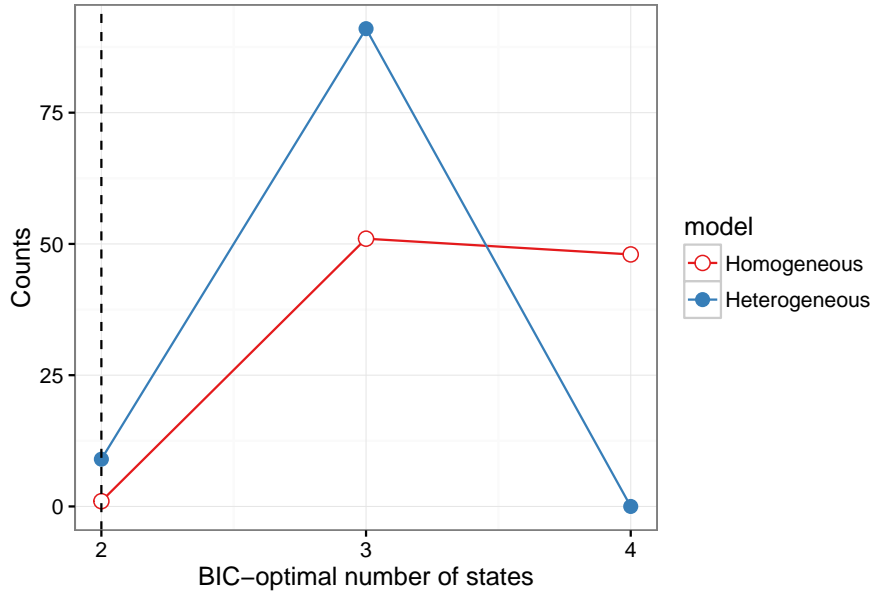


Figure S8: Simulation with GPS error. For details, refer to Figure 1 in main text (bottom-right panel).