

Table S7: Simulation Study Details

Type of simulated data	Inference models used
1. Varying R_0 and S_0 (orig.)	
(a) $R_0 \approx 1.1$, $S_0 = 499$, $\gamma = 0.25$, $\psi = 0.15$	Deter.Coal.SIR, Stoch.Coal.SIR, BDSIR
(b) $R_0 \approx 1.2$, $S_0 = 499$, $\gamma = 0.30$, $\psi = 0.15$	Deter.Coal.SIR
(c) $R_0 \approx 1.5$, $S_0 = 499$, $\gamma = 0.30$, $\psi = 0.15$	Deter.Coal.SIR, Stoch.Coal.SIR, BDSIR
(d) $R_0 \approx 1.5$, $S_0 = 999$, $\gamma = 0.30$, $\psi = 0.20$	Deter.Coal.SIR, Stoch.Coal.SIR, BDSIR
(e) $R_0 \approx 2.5$, $S_0 = 999$, $\gamma = 0.30$, $\psi = 0.05$	Deter.Coal.SIR, Stoch.Coal.SIR, BDSIR
2. Varying S_0 for fixed R_0	
(a) $R_0 \approx 1.1$, $S_0 = 499$, $\gamma = 0.25$, $\psi = 0.15$	Deter.Coal.SIR, Stoch.Coal.SIR, BDSIR
(f) $R_0 \approx 1.1$, $S_0 = 999$, $\gamma = 0.30$, $\psi = 0.20$	Deter.Coal.SIR
(g) $R_0 \approx 1.1$, $S_0 = 1999$, $\gamma = 0.30$, $\psi = 0.09$	Deter.Coal.SIR
3. Contemporaneous sampling	
(d) $R_0 \approx 1.5$, $S_0 = 999$, $\gamma = 0.30$, $\psi = 0.20$	Deter.Coal.SIR, Stoch.Coal.SIR, BDSIR
(e) $R_0 \approx 2.5$, $S_0 = 999$, $\gamma = 0.30$, $\psi = 0.05$	Deter.Coal.SIR, Stoch.Coal.SIR, BDSIR
4. Phylogenetic uncertainty	
(e) $R_0 \approx 2.5$, $S_0 = 999$, $\gamma = 0.30$, $\psi = 0.05$	Deter.Coal.SIR, Stoch.Coal.SIR, BDSIR
5. Reparameterization (growth rate)	
(e) $R_0 \approx 2.5$, $S_0 = 999$, $\gamma = 0.30$, $\psi = 0.05$	Deter.Coal.SIR