Movement Forced COVID Model

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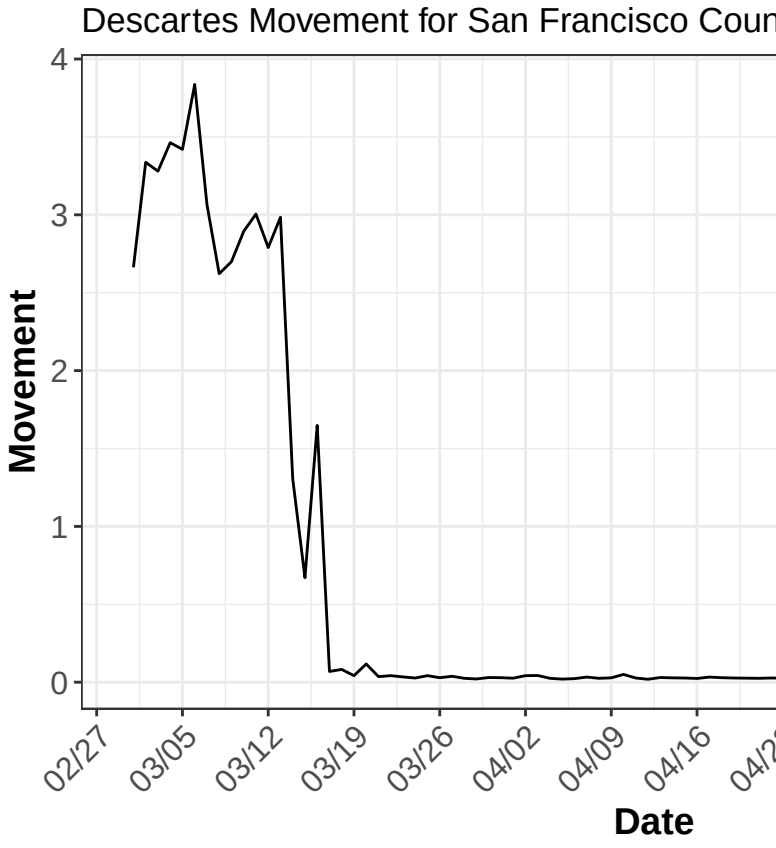
Purpose

Use movement data incorporated into a dynamic model of COVID transmission via a forcing function to fit early-stage outbreak dynamics and forecast transmission into the future using movement projections.

Movement Data

Descartes Labs

Technical report here. Data represents "the median of the max-distance mobility for all samples in the specified region" derived from anonymized mobile phone data.



Epi Data

Model

Table 1: Parameter values and descriptions used in the model

	Value	Definition
N	883305	population size
t.sim	85	time to run simulation
E_0	1	starting number of exposed
β	0.1	transmission rate
c_p	1	Relative contact rate between S and Ip
c_a	0.5	Relative contact rate between S and Ia
c_m	0.5	Relative contact rate between S and Im
c_s	0.2	Relative contact rate between S and Is
σ	0.25	1/serial interval
α	0.4	proportion asymptomatic
λ	1	1/(incubation period-serial interval) to model pre-symptomatic transmission
ρ	0.2	Proportion symptomatic requiring hospitalization
δ_1	0.833	convenience parameter: 1/(delta1 + delta2) = time between symptom onset and hospitalization
δ_2	0.333	1/(delta1 + delta2) = time between symptom onset and hospitalization
γ_a	0.2	1/time to recovery (non-infectiousness) for asymptomatics
γ_m	0.25	1/time to recovery for mild cases
γ_h	0.083	1/time to removed (recovered or deceased) for hospitalized
μ	0.05	proportion of hospitalized cases who die