



**GOVERNO DO
ESTADO DO CEARÁ**
Secretaria do Planejamento e Gestão



Universidade Federal do Ceará



Modelagem epidemiológica do COVID19 para o Estado do Ceará empregando o modelo SEIIR

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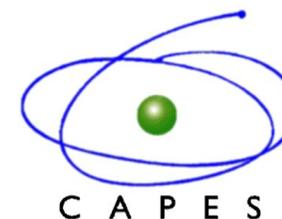
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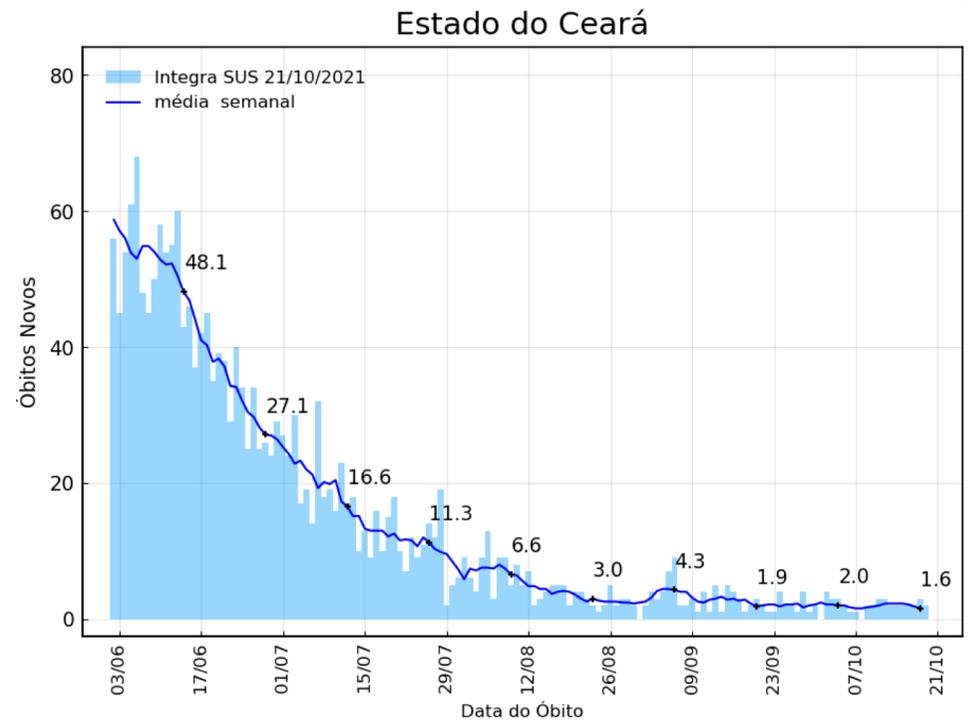
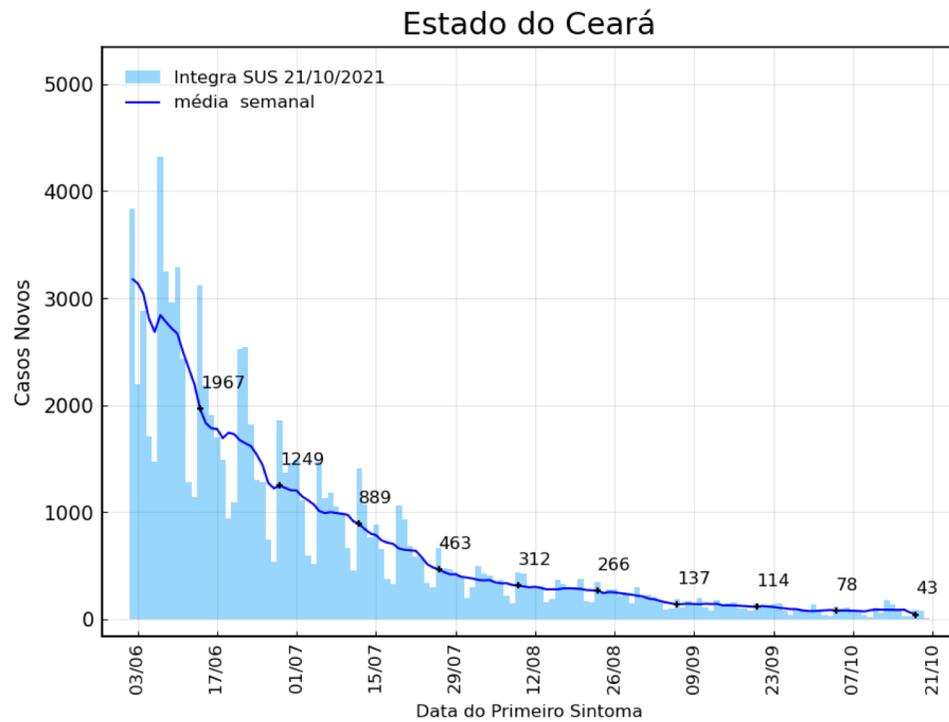


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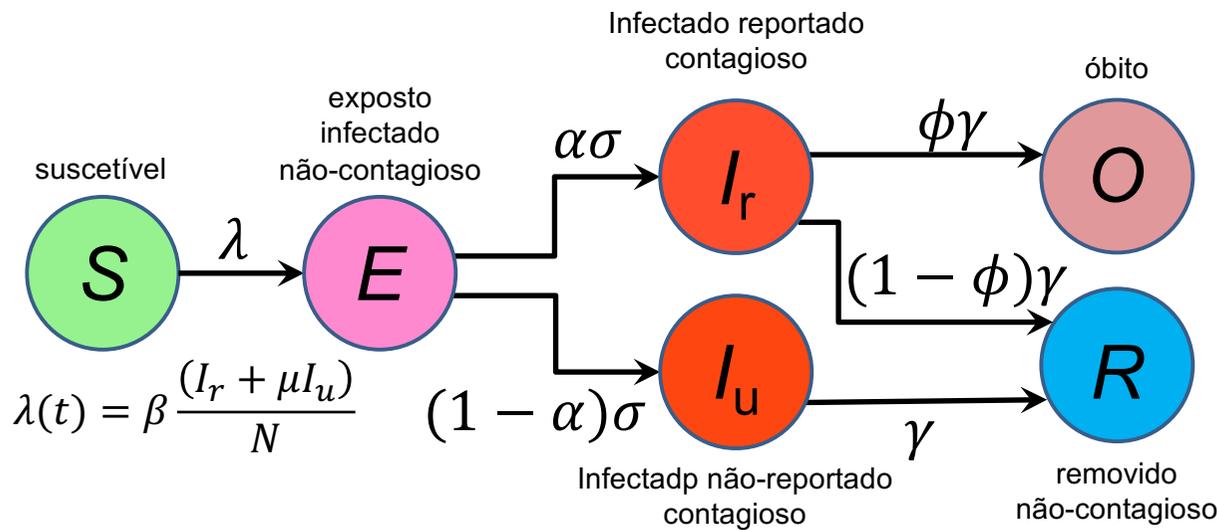
Estado do Ceará

Dados atualizados em 21/10/2021



Modelo Fenomenológico – COVID19 no Ceará

Modelo SEIR [Li et al., Science 368, 489-493 (2020)]



$$V = [S, E, I_r, I_u, R, O] \quad P = [\beta, \mu, \alpha, \sigma, \gamma, \phi]$$

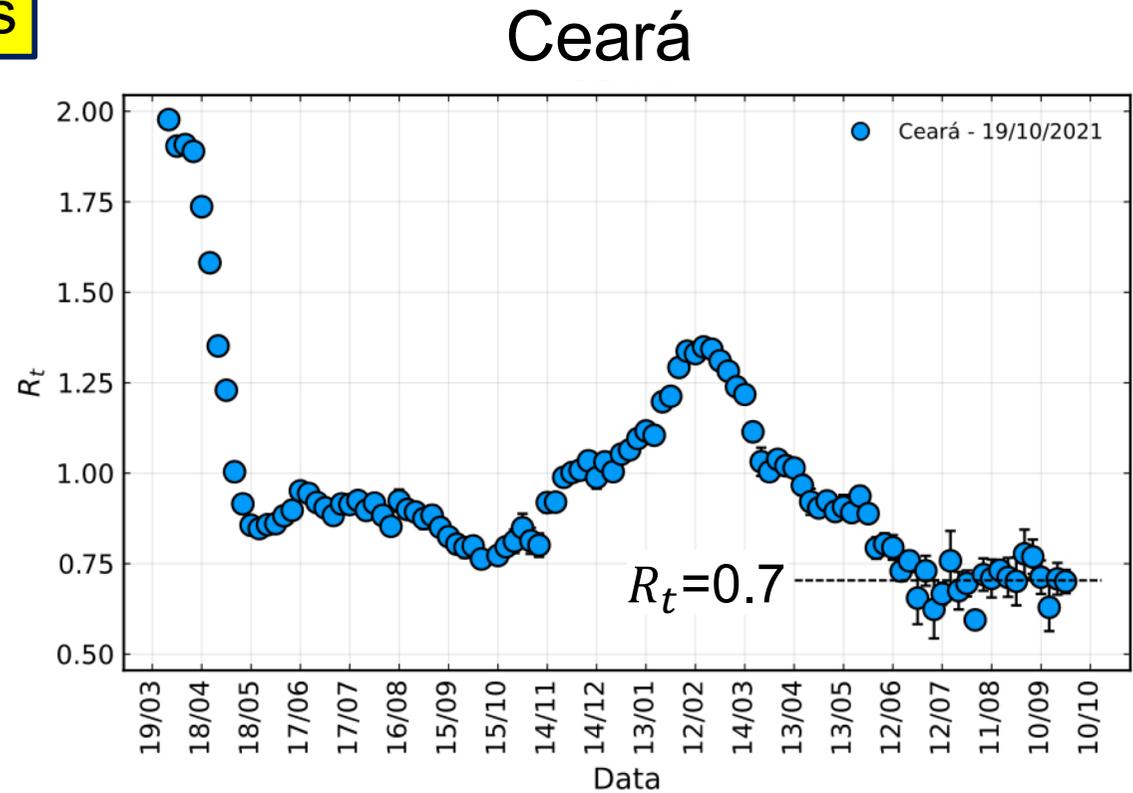
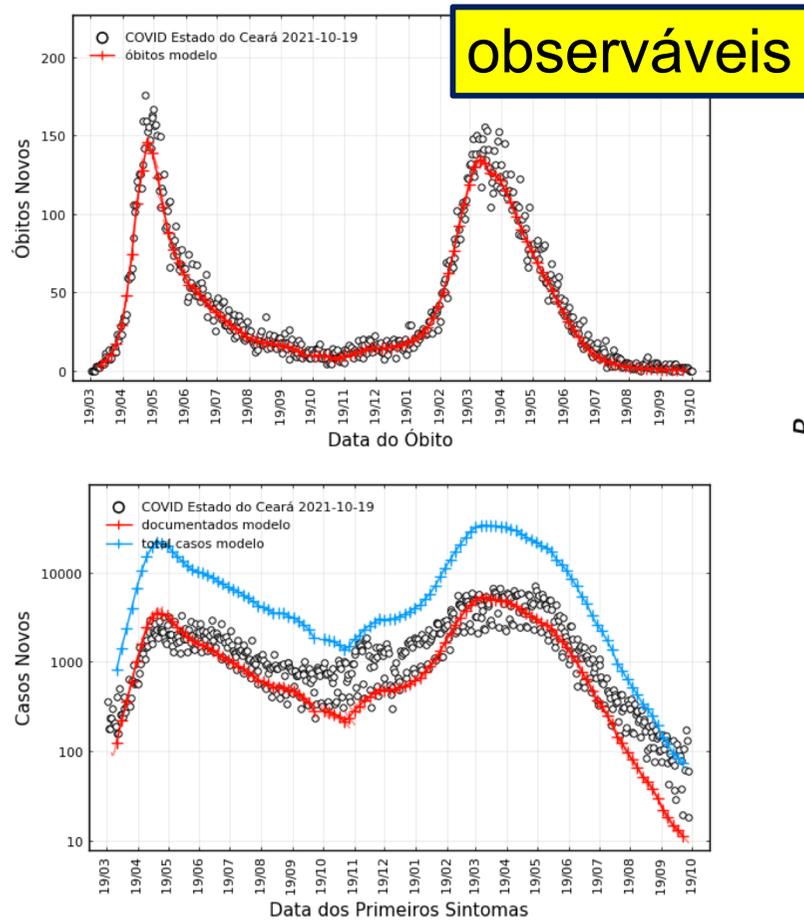
espaço de estados espaço de parâmetros

$$\begin{aligned} \frac{dS}{dt} &= -\beta \frac{(I_r + \mu I_u)S}{N} \\ \frac{dE}{dt} &= \beta \frac{(I_r + \mu I_u)S}{N} - \sigma E \\ \frac{dI_r}{dt} &= \alpha\sigma E - \gamma I_r \\ \frac{dI_u}{dt} &= (1-\alpha)\sigma E - \gamma I_u \\ \frac{dR}{dt} &= (1-\phi)\gamma I_r + \gamma I_u \\ \frac{dO}{dt} &= \phi\gamma I_r \end{aligned}$$

$$R_t = \left[\alpha \frac{\beta}{\gamma} + (1-\alpha)\mu \frac{\beta}{\gamma} \right] \frac{S}{N}$$

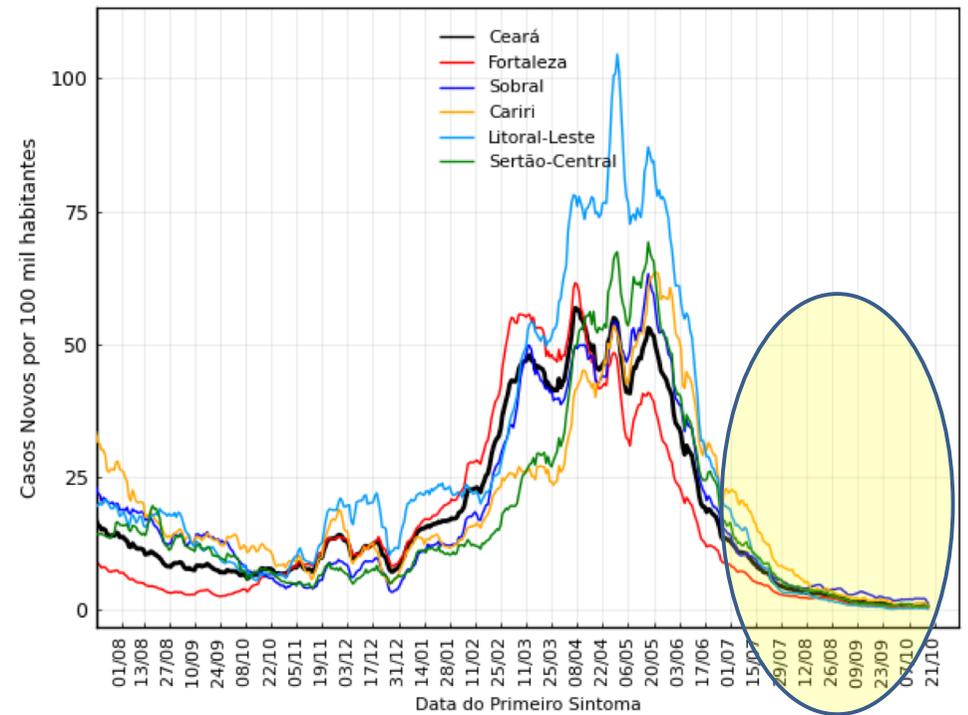
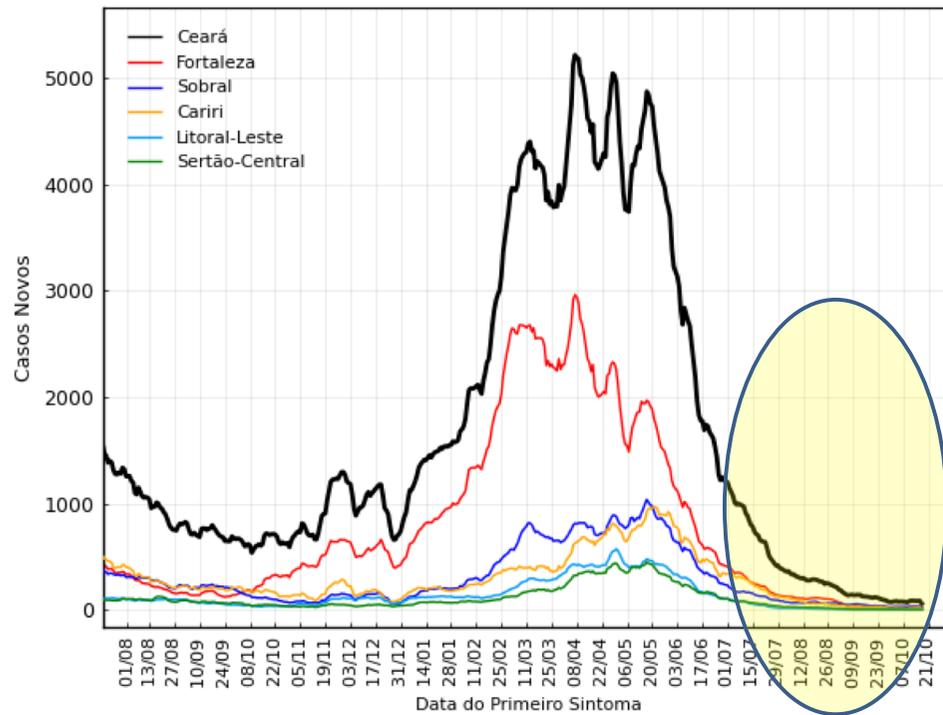
Evolução do Fator de Reprodução Efetivo (R_t) no Ceará

Cálculo Retroativo com Janela Corrida de Inferência (22 dias)



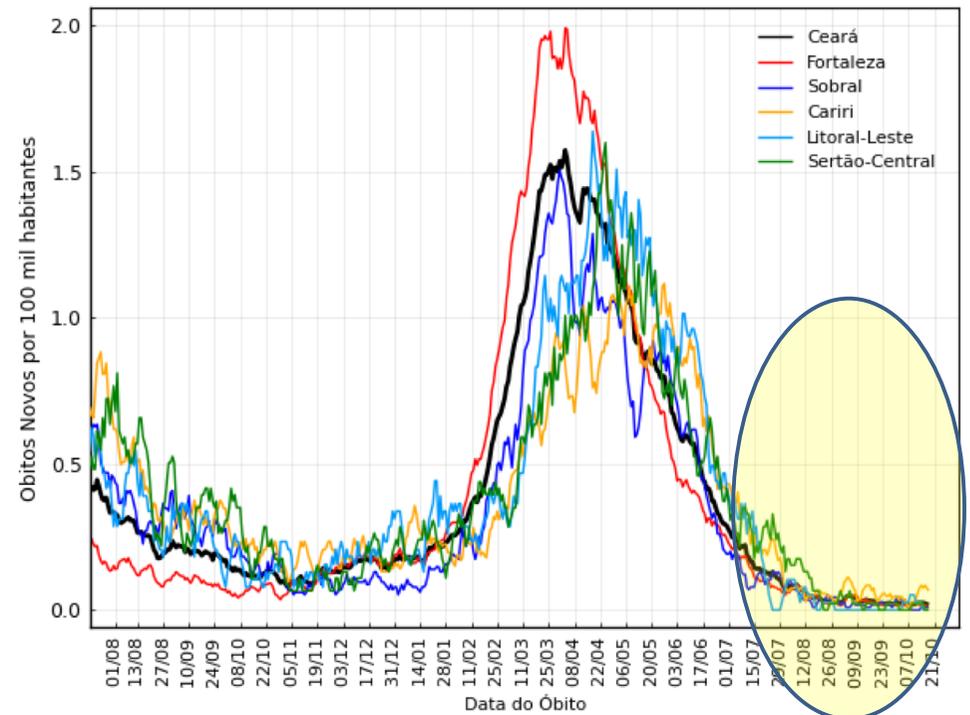
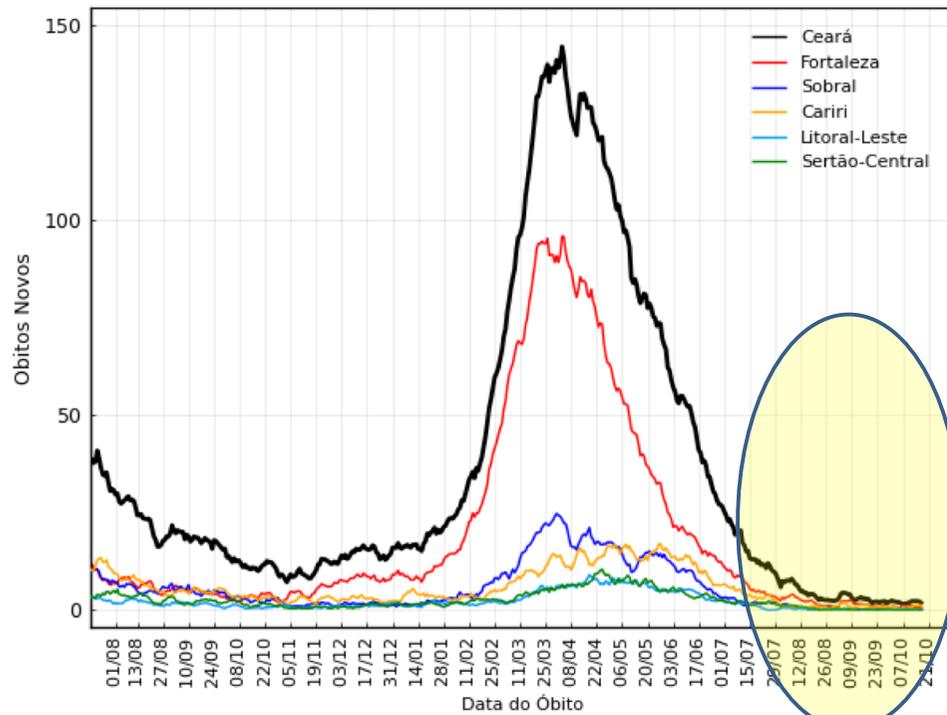
Evolução da Epidemia no Ceará por Macrorregiões

Casos Novos & Casos por 100 mil habitantes

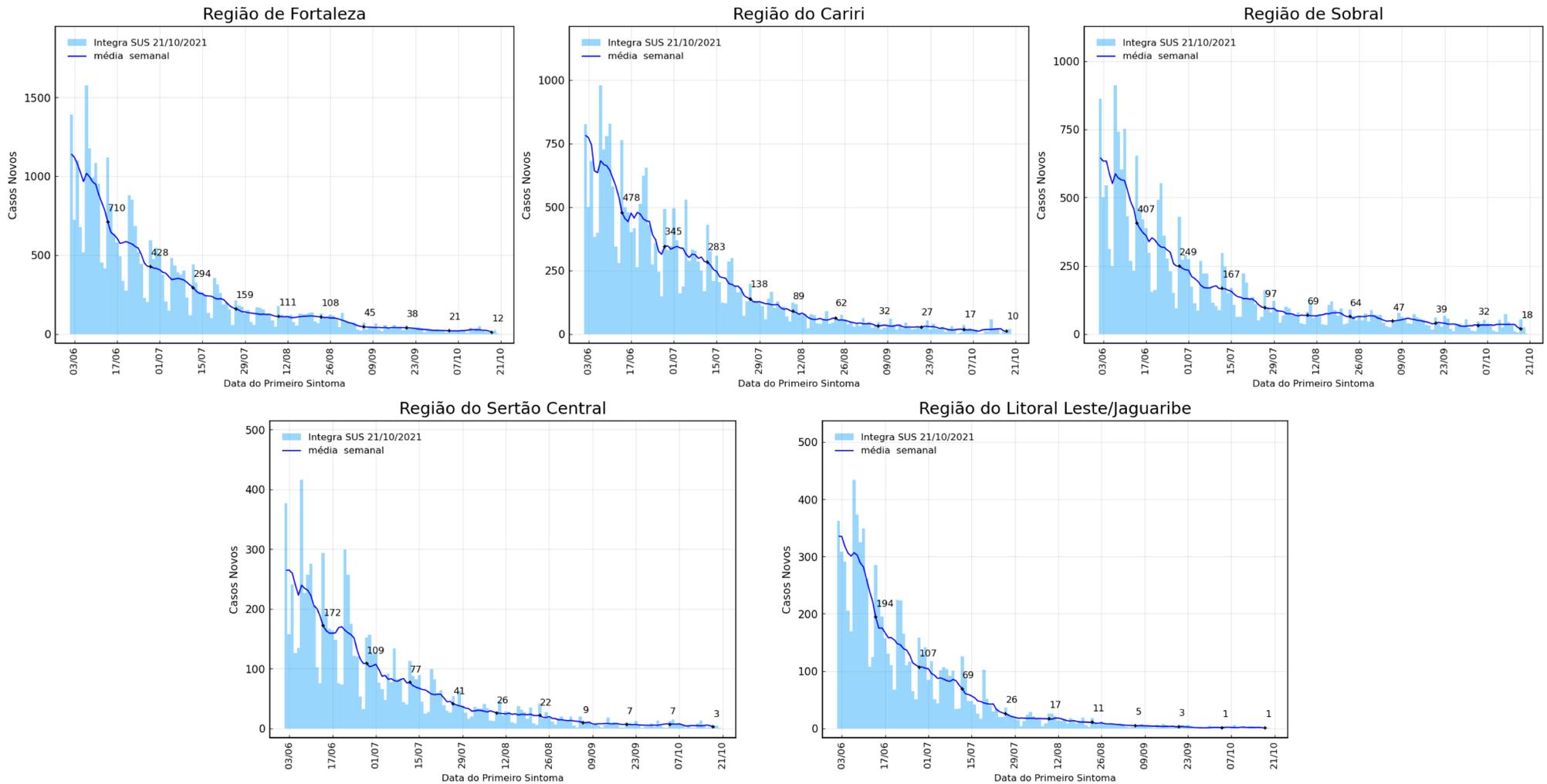


Evolução da Epidemia no Ceará por Macrorregiões

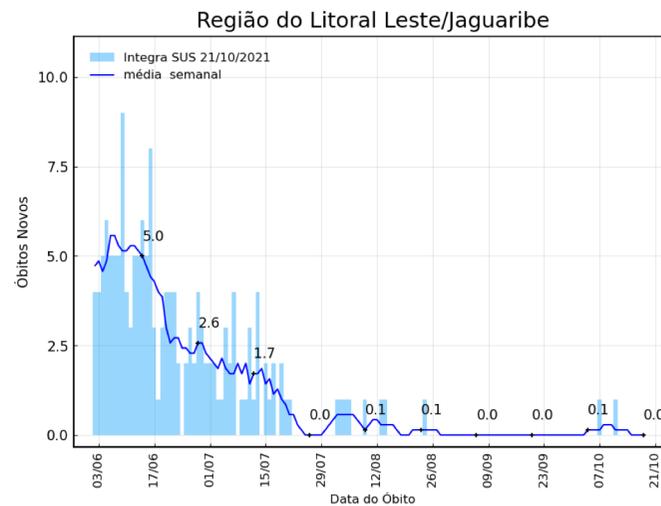
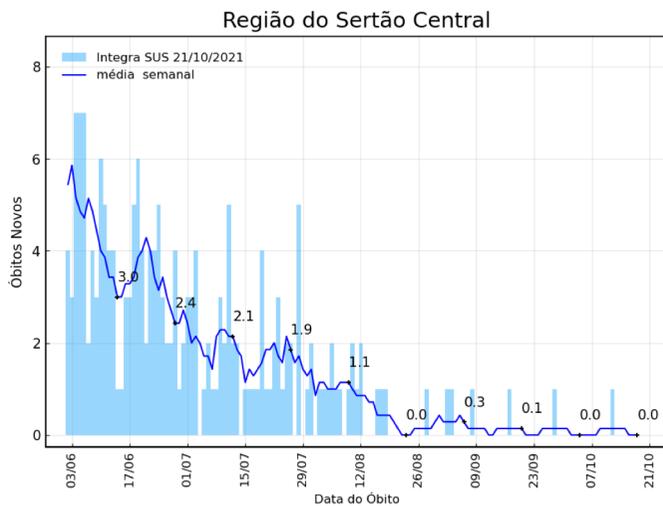
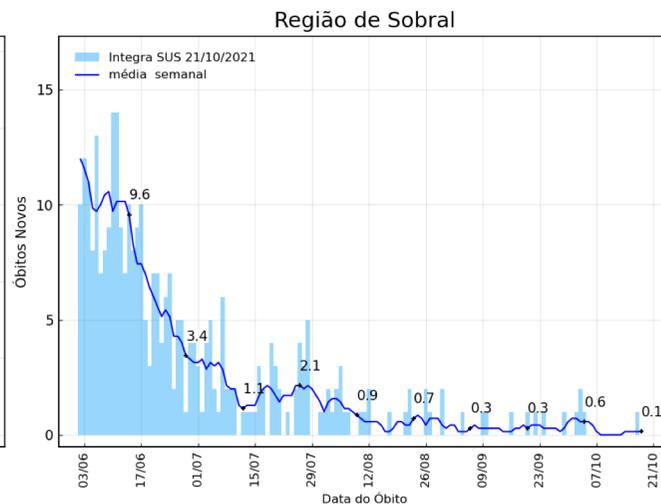
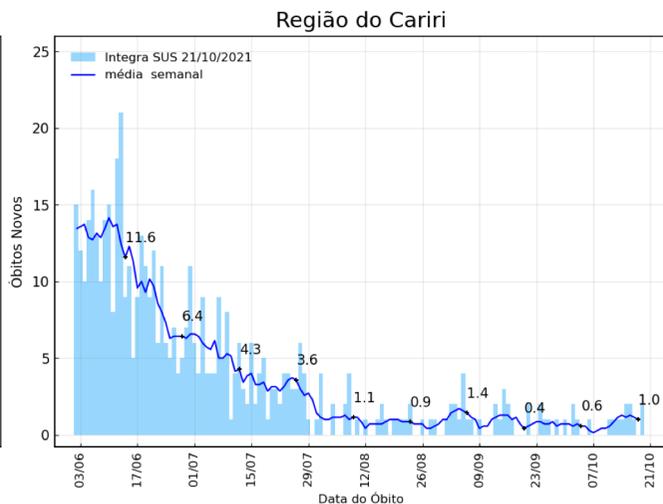
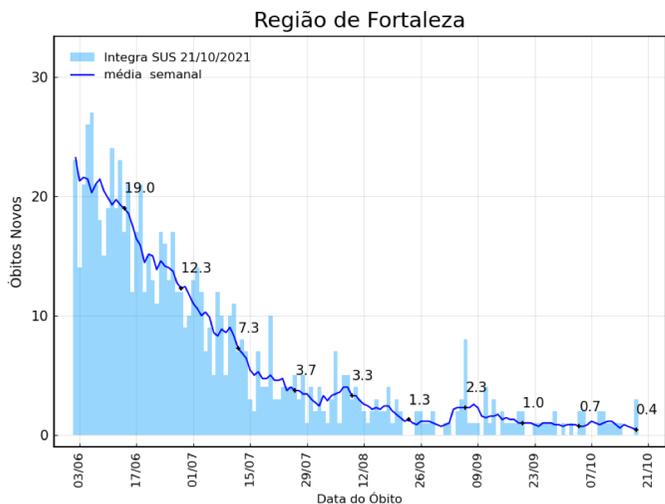
Óbitos Novos & Óbitos Novos por 100 mil habitantes



Evolução Recente de Casos no Ceará por Macrorregiões

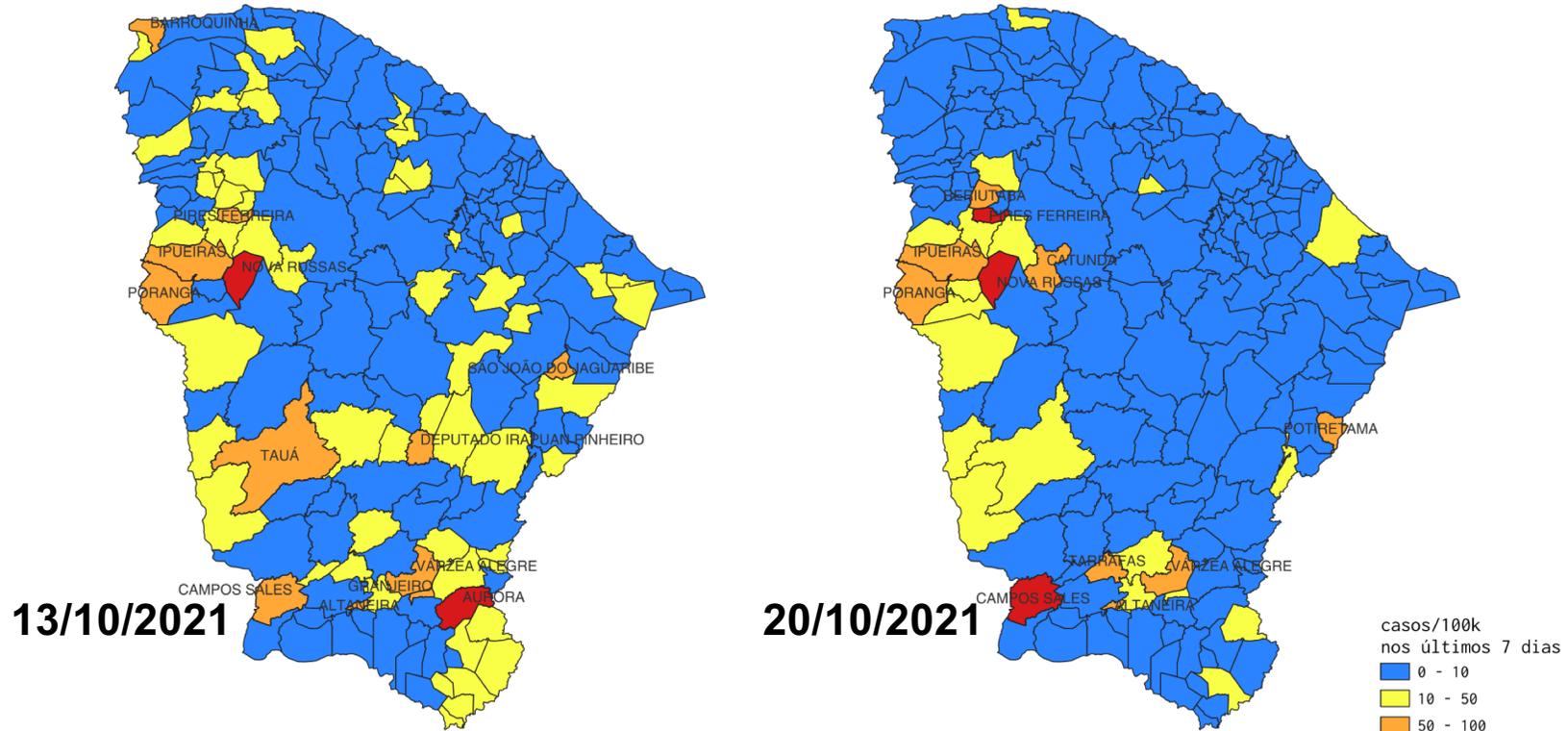


Evolução Recente de Óbitos no Ceará por Macrorregiões



Indicador CDC no Ceará por Município

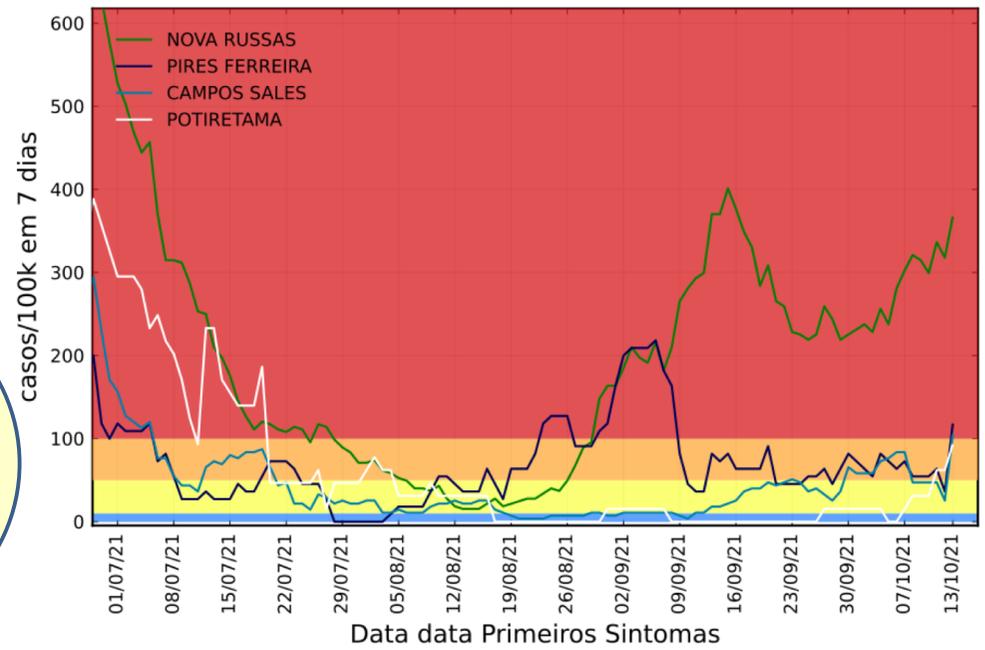
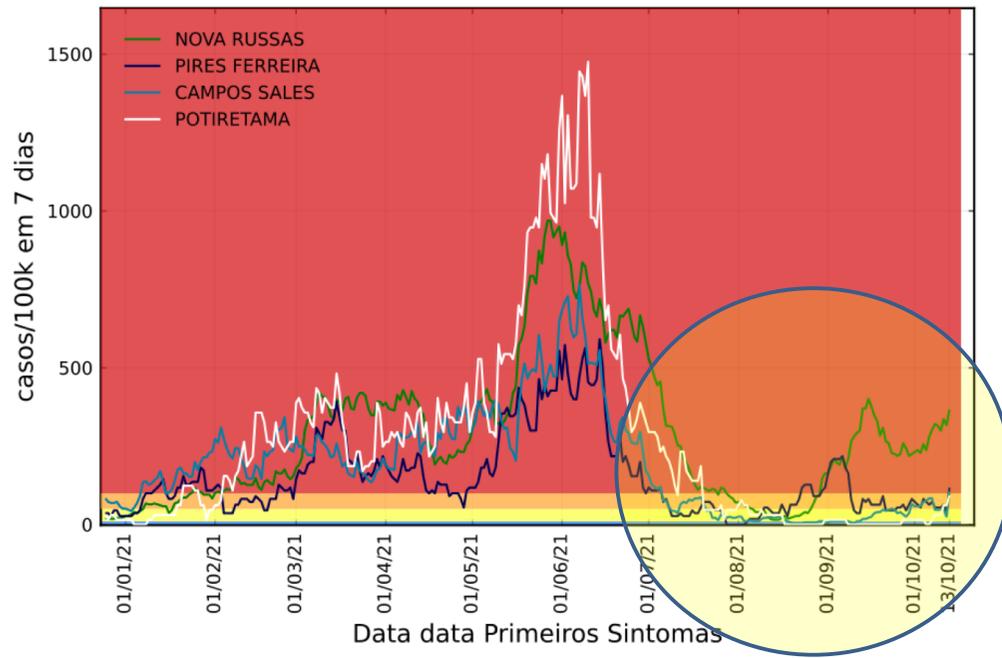
$\Sigma_{CDC} = \# \text{ total de casos por } 100 \text{ mil habitantes nos últimos } 7 \text{ dias}$



Indicator - If the two indicators suggest different transmission levels, the higher level is selected	Low Transmission Blue	Moderate Transmission Yellow	Substantial Transmission Orange	High Transmission Red
Total new cases per 100,000 persons in the past 7 days	0-9.99	10-49.99	50-99.99	≥100
Percentage of NAATs ¹ that are positive during the past 7 days	0-4.99%	5-7.99%	8-9.99%	≥10.0%

Indicador CDC no Ceará por Município

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