

# COVID-19 pandemic modelling

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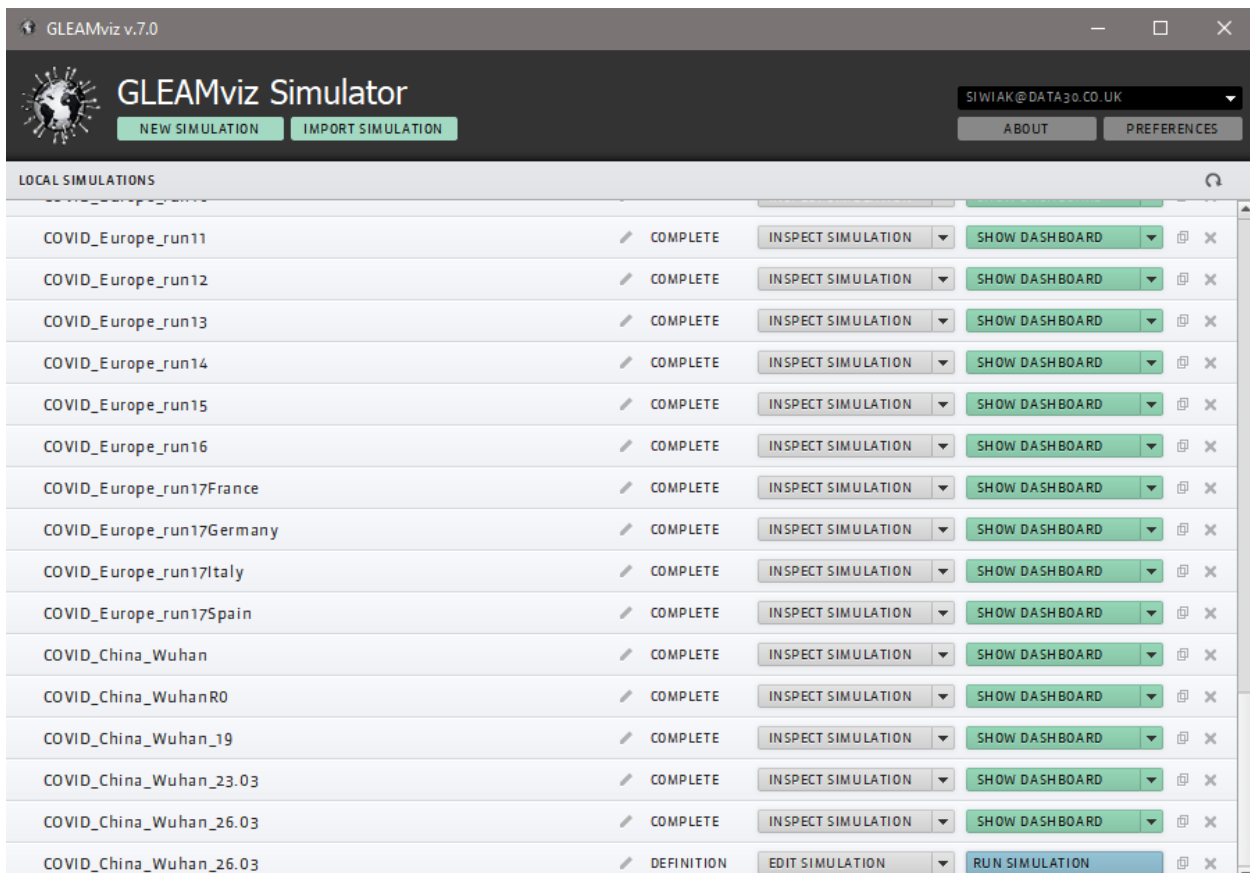
## *using GLEaMviz v7*

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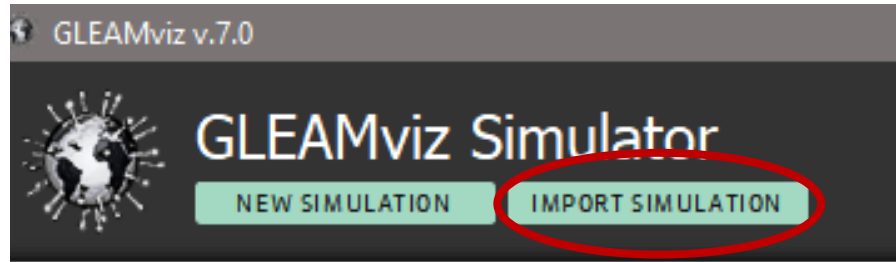
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## 1. Running global model starting from a single host

### 1.1. Open GLEaMviz v7



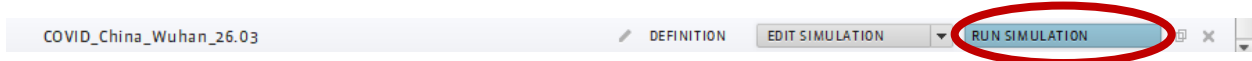
- 1.2. On the main screen click “IMPORT SIMULATION”



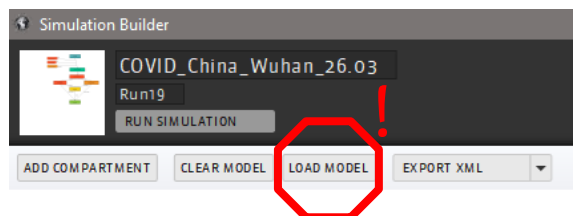
- 1.3. Select the simulation file downloaded from:

[https://github.com/freesci/covid19/blob/master/Siwiak\\_COVID19\\_Global\\_Model.xml](https://github.com/freesci/covid19/blob/master/Siwiak_COVID19_Global_Model.xml)

- 1.4. To run a simulation *with original simulation settings*, press the “RUN SIMULATION” button

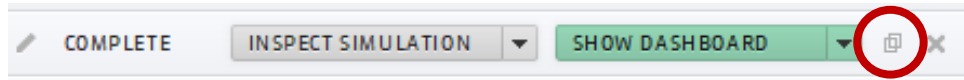


**WARNING: Global simulation parameters are not imported properly if new simulation was started and the “LOAD MODEL” button was used in the MODEL tab.**

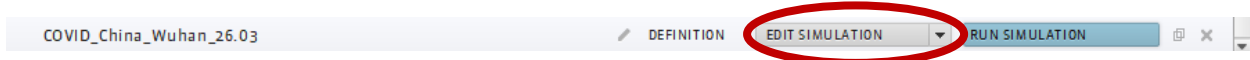


## 2. Modifying simulation

- 2.1. To modify settings, one needs to either:
- create a copy of a simulation run in step 1.4.



- go back to step 0 and import new simulation.
- 2.2. To *change simulations settings*, click the “EDIT SIMULATION” button

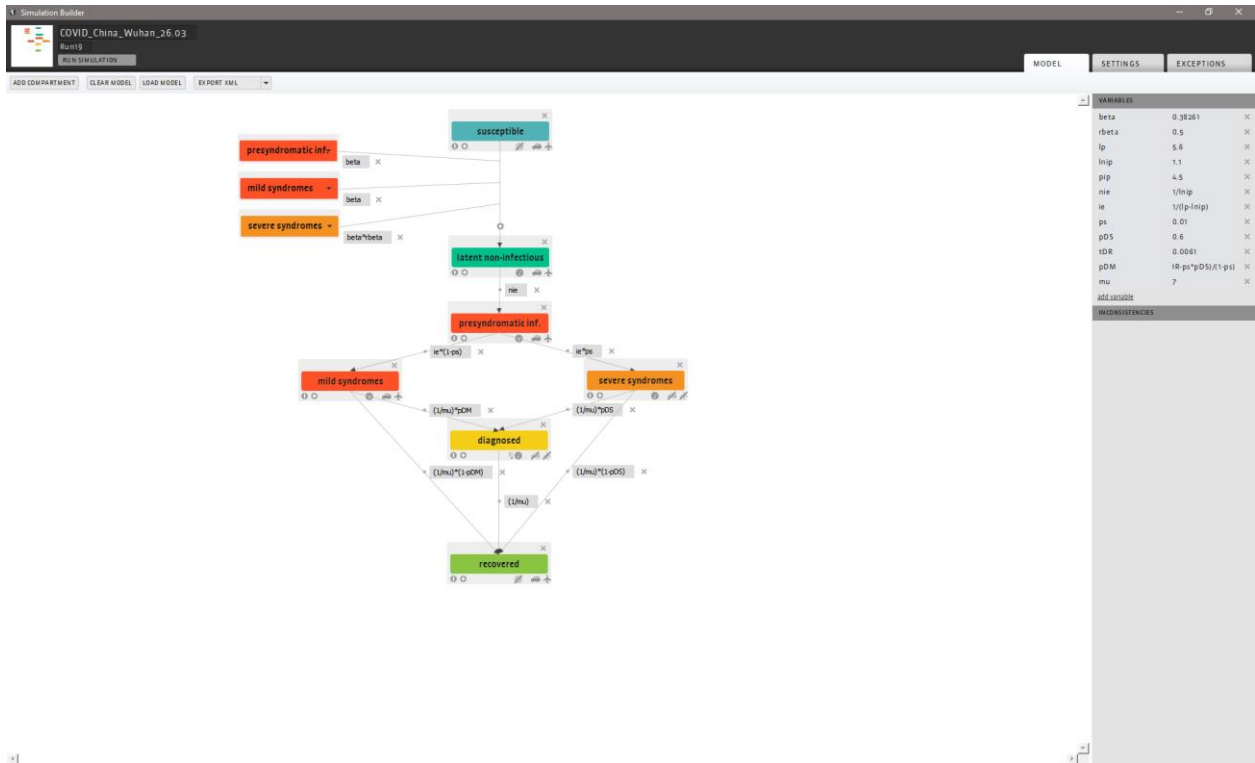


**There are three sets of settings, available in three tabs:  
MODEL, SETTINGS, and EXCEPTIONS.**



### 2.2.1. MODEL (global parameters)

The MODEL tab allows for a permanent modification of model parameters responsible for subpopulation compartment properties and interactions between them.



### 2.2.2. SETTINGS (simulation parameters and starting point definition)

The SETTINGS tab allows changing simulation parameters, including highlighted initial distribution of subpopulations at global and local levels.

Simulation Builder  
COVID\_China\_Wuhan\_26.03  
Run 19  
RUN SIMULATION

MODEL SETTINGS EXCEPTIONS

RESET SETTINGS

SIMULATION

run type: multi-run  
start date: 12/11/2019  
duration: 135 days  
number of runs: 10  
airline traffic: 100 %  
enable seasonality: ☐  
minimal seasonality rescaling of the reproductive number: 0.50  
commuting model: radiation  
time spent at commuting destination: 8.0 hours  
minimum number of clinical cases that need to occur in a country, for it to be considered infected: 1  
minimum number of infected countries for an occurrence to be epidemic: 2

INITIAL GLOBAL DISTRIBUTION OF POPULATION IN COMPARTMENTS

susceptible 100.0 %  
add new compartment distribution

INITIAL GEOGRAPHIC LOCATION OF THE EPIDEMIC

Wuhan (China) 1 individuals( 0 % of the population) in compartment pre-symptomatic inf.  
add new initial location

RESULT COMPARTMENTS

Select at most 5 compartments to be retrieved. In the visualization you will later be able to interactively select which compartments to display. The visualized results contain the media of the sum of the amount of people entering the compartments, as well as the cumulative numbers.

- ☒ latent non-infectious
- ☒ diagnosed
- ☐ recovered
- ☐ susceptible
- ☒ pre-symptomatic inf.
- ☒ mild syndromes
- ☒ severe syndromes

Include the instantaneous number of individuals for the selected compartments: 0

#### 2.2.2.1. Country-level details

To model single country spread (**under the assumption of no influx of infected population from the outside world**) provide data about disease state at the time of introducing isolation in the INITIAL GEOGRAPHIC LOCATION OF THE EPIDEMIC sub-tab.

INITIAL GEOGRAPHIC LOCATION OF THE EPIDEMIC

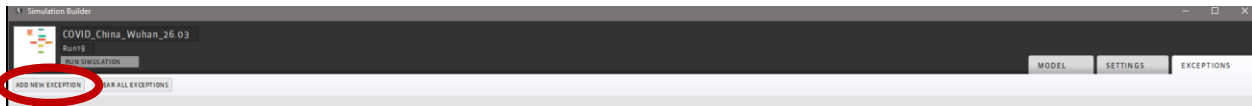
|                   |   |  |             |   |
|-------------------|---|--|-------------|---|
| Bordeaux (France) | 1 | individuals( 0.00007 % of the population) in compartment | pre-symptom | × |
| Paris (France)    | 2 | individuals( 0.00001 % of the population) in compartment | pre-symptom | × |

[add new Initial location](#)

To model a single country spread under the assumption of an influx of infected population from the outside world, detailed definition of the status of infected populations in tessellated world areas shall be provided.

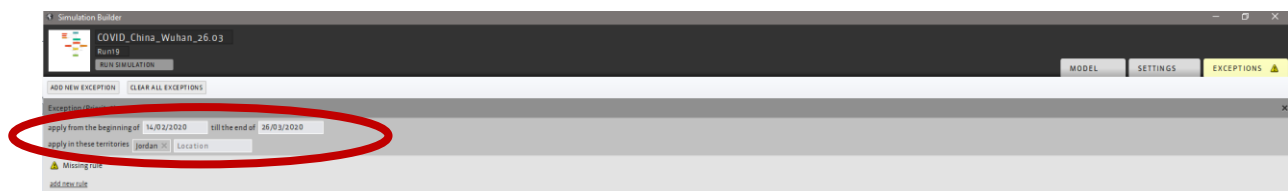
### 2.2.3. EXCEPTIONS (time-dependent changes in parameters)

Exceptions tab allows introducing changes in parameters at global, national, and local area levels at selected points of time.



Adding exception requires providing change parameters:

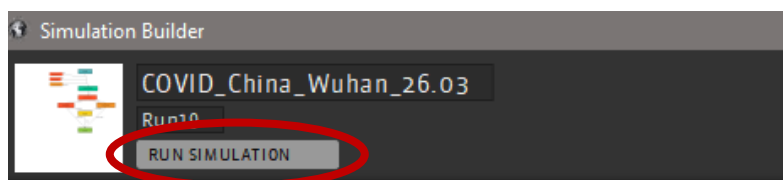
#### 2.2.3.1. Time-range and location of the introduced change



#### 2.2.3.2. Modified parameter and its value

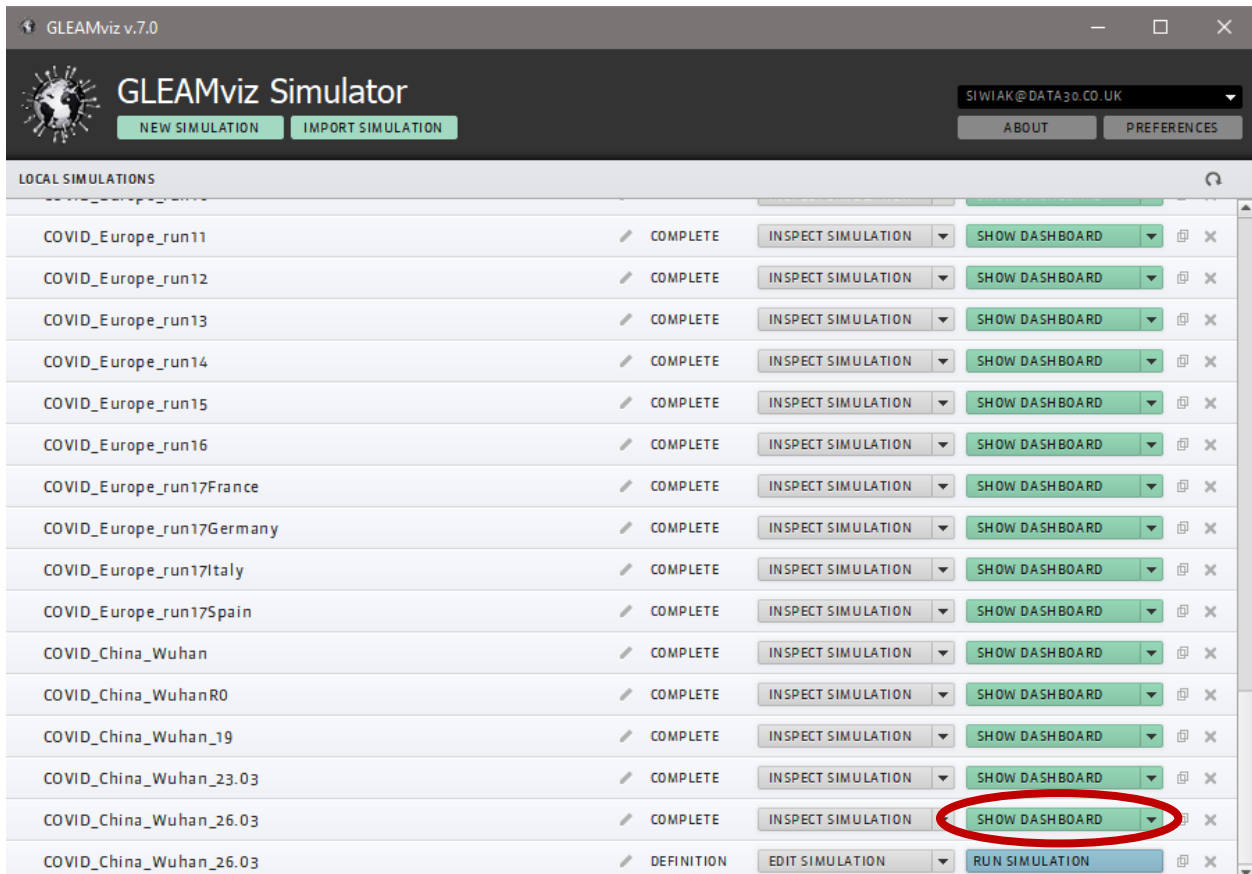


### 2.3. Run the simulation from any tab:



### 3. Accessing simulation results

The results of performed simulation are available from the GLEaMviz screen. To access them click the “SHOW DASHBOARD” button.



The screenshot displays the GLEAMviz Simulator v.7.0 interface. At the top, there's a header with the logo, title, and user information (SIWIAK@DATA30.CO.UK). Below the header, there are buttons for 'NEW SIMULATION' and 'IMPORT SIMULATION'. The main section is titled 'LOCAL SIMULATIONS' and contains a table of simulation runs. The table has columns for simulation name, status, and actions. The 'COVID\_China\_Wuhan\_26.03' simulation is highlighted with a red circle around its 'SHOW DASHBOARD' button.

| Simulation Name           | Status     | Inspect Simulation | Show Dashboard | Share | Delete |
|---------------------------|------------|--------------------|----------------|-------|--------|
| COVID_Europe_run11        | COMPLETE   | INSPECT SIMULATION | SHOW DASHBOARD |       |        |
| COVID_Europe_run12        | COMPLETE   | INSPECT SIMULATION | SHOW DASHBOARD |       |        |
| COVID_Europe_run13        | COMPLETE   | INSPECT SIMULATION | SHOW DASHBOARD |       |        |
| COVID_Europe_run14        | COMPLETE   | INSPECT SIMULATION | SHOW DASHBOARD |       |        |
| COVID_Europe_run15        | COMPLETE   | INSPECT SIMULATION | SHOW DASHBOARD |       |        |
| COVID_Europe_run16        | COMPLETE   | INSPECT SIMULATION | SHOW DASHBOARD |       |        |
| COVID_Europe_run17France  | COMPLETE   | INSPECT SIMULATION | SHOW DASHBOARD |       |        |
| COVID_Europe_run17Germany | COMPLETE   | INSPECT SIMULATION | SHOW DASHBOARD |       |        |
| COVID_Europe_run17Italy   | COMPLETE   | INSPECT SIMULATION | SHOW DASHBOARD |       |        |
| COVID_Europe_run17Spain   | COMPLETE   | INSPECT SIMULATION | SHOW DASHBOARD |       |        |
| COVID_China_Wuhan         | COMPLETE   | INSPECT SIMULATION | SHOW DASHBOARD |       |        |
| COVID_China_WuhanR0       | COMPLETE   | INSPECT SIMULATION | SHOW DASHBOARD |       |        |
| COVID_China_Wuhan_19      | COMPLETE   | INSPECT SIMULATION | SHOW DASHBOARD |       |        |
| COVID_China_Wuhan_23.03   | COMPLETE   | INSPECT SIMULATION | SHOW DASHBOARD |       |        |
| COVID_China_Wuhan_26.03   | COMPLETE   | INSPECT SIMULATION | SHOW DASHBOARD |       |        |
| COVID_China_Wuhan_26.03   | DEFINITION | EDIT SIMULATION    | RUN SIMULATION |       |        |