

Bulletin GPoM-epidemiologic no 8

Coronavirus Covid-19 epidemic

(2019-2020)

2 April 2020



Methodology

- **Models of canonical form (GPoM tools) were obtained for the outbreaks of Covid-19 at several locations in the world:** for several Chinese provinces (Hubei, Zhejiang, etc.), for **South Korea, Japan and Italy**
- **These models are applied to other outbreaks in other countries**
- The objective is to identify **what scenarios are the closest** for these other countries

Analysis

- For each country, **all the models are run** (five initial conditions used with each model)
- Diverging models are directly rejected as inconsistent
- Other models are plotted. **Scenarios of inconsistent behavior are rejected** (example: a decreasing cumulative number of case proves that the scenario must be rejected)
- Among the remaining **consistent scenarios**, the ones showing the **best fit with the recent observations** are considered as currently **more realistic**

Note: Correction factor are applied to the time series in order to ensure their consistency.

Cumulative cases $C_{\Sigma}(t)$ scenarios

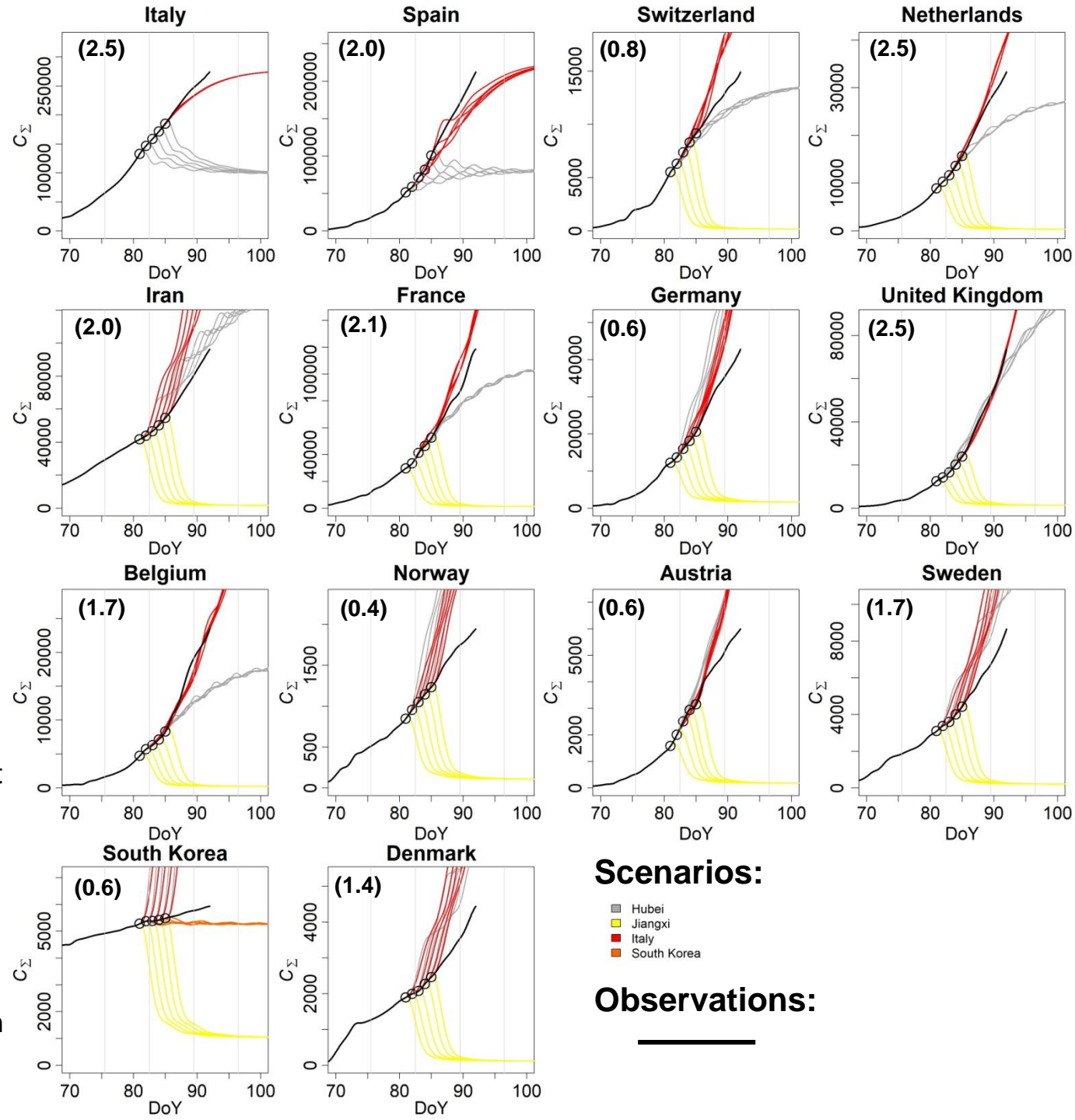
(Observed and Simulated)

Note:

- A correction factor is applied to each time series to account for the under-estimations of infected cases

- To do so, the Chinese data set is arbitrarily taken as a reference

- This correction is provided in brackets (from 0.4 to 2.5)



Scenarios:

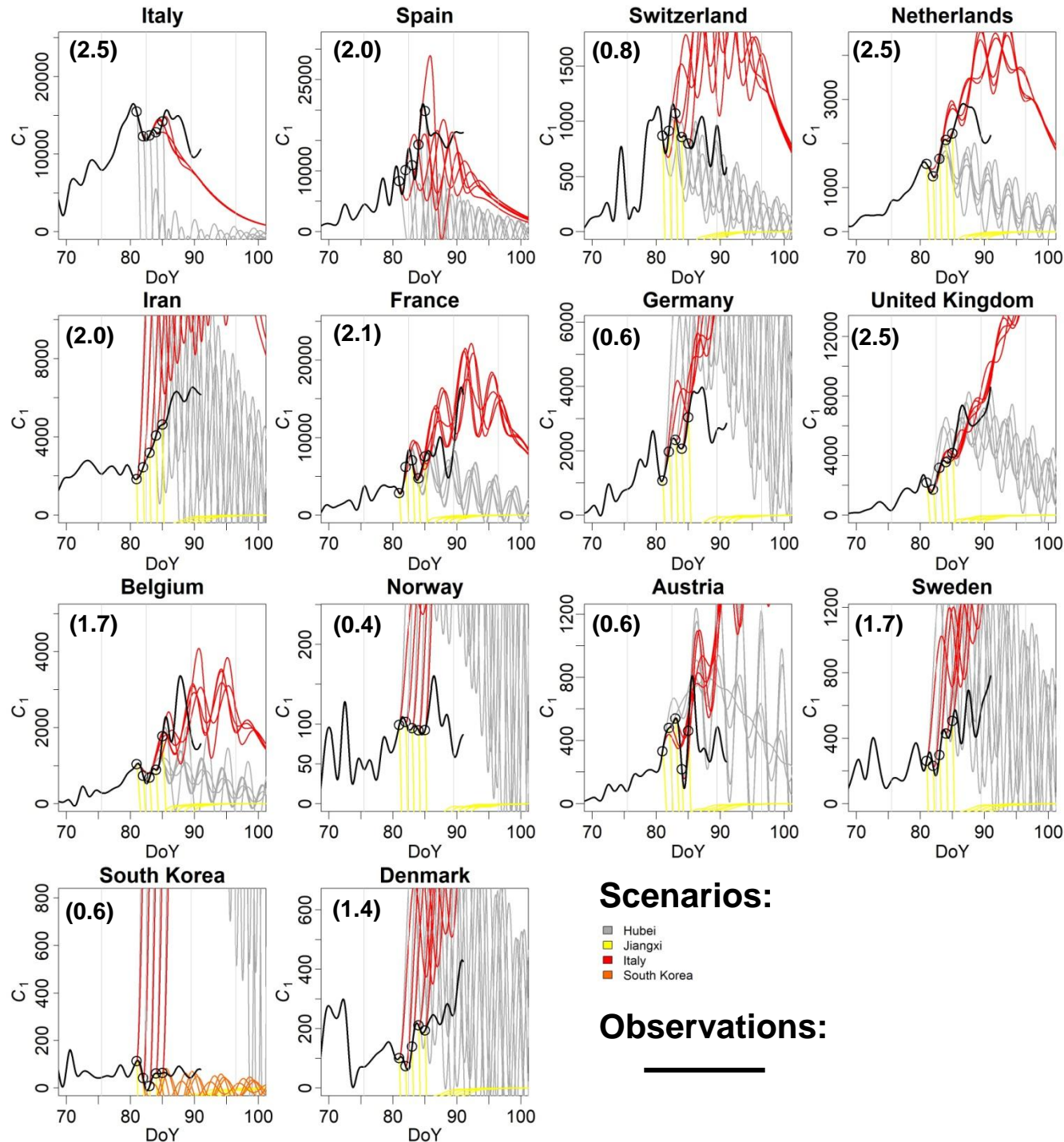
Observations:

Daily new cases $C_1(t)$ scenarios

(Observed and Simulated)

Note:

- A correction factor is applied to each time series to account for the under-estimations of infected cases
- To do so, the Chinese data set is arbitrarily taken as a reference
- This correction is provided in brackets (from 0.4 to 2.5)



Results

- **Italy, Spain, Belgium, Switzerland, the Netherlands and France** have now **largely overtaken** the **Hubei scenario**.
- **Italy** has overtaken its own model.
- **United Kingdom** is about to do so, closely following the Italian model.
- The other countries (**Germany, Austria, Sweden, Norway and Denmark**) remain under this scenario
- Control in **South Korea** is not complete but sufficient to maintain the propagation of the epidemic at a relatively slow rate (<100 daily new cases per day)

Daily new cases

- Simulations of daily new cases in **France**, based on the Italian model, appear very consistent and confirm the forecasts of the Bulletin no7. It suggests that the situation is approaching the peak
- The behavior of the **United Kingdom** is very consistent with the Italian model, but still at the beginning of the outbreak
- The behavior observed in **Spain** and **Belgium** are also very consistent with the Italian model



Contact:
S. Mangiarotti (CESBIO)