Bulletin GPoM-epidemiologic no 6
Coronavirus Covid-19 epidemic
(2019-2020)

26 Mars 2020

Methodology

- **Models** of canonical form (GPoM tools) were **obtained for the outbreaks of Covid-19** at **ten locations**: eight Chinese provinces (**Hubei**, **Zhejiang**, **Henan**, **Hunan**, **Gouangdong**, **Anhui**, **Jiangxi** and **Heilongjiang**), **South Korea** and **Japan**

- **These models** are **applied to other outbreaks in 28 countries** in Europe, South America, Africa and Asia

- The objective is to identify **what scenarios are the closest** when **considering the recent evolutions** of these outbreaks

Analysis

- For each country, the **ten models are run** (several initial conditions are used to test the simulations robustness)

- 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 curently **more realistic**
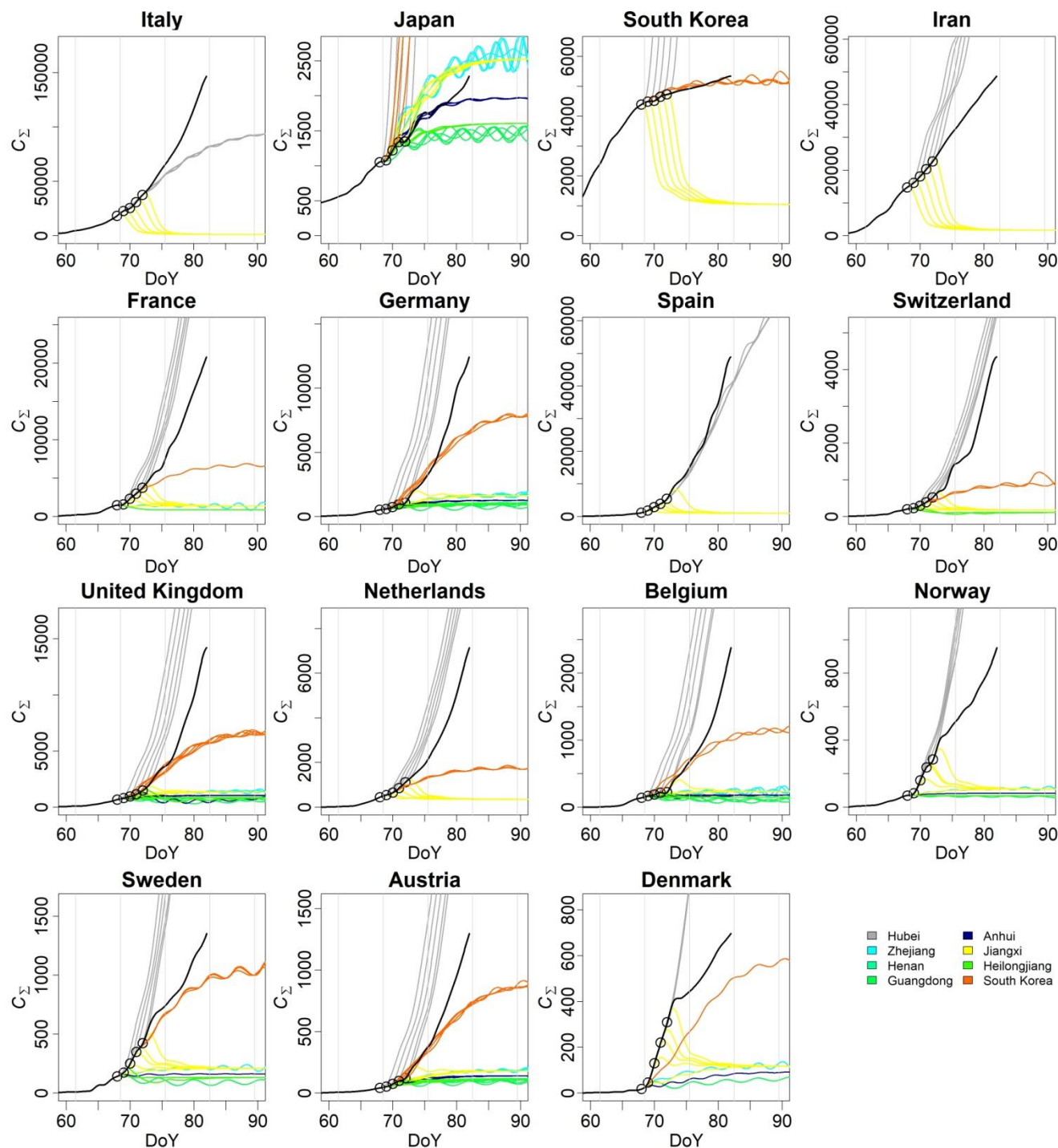
Note: Correction factor are applied to the time series in order to ensure their consistency with the Chinese data set. This correction can vary from 0.4 to 2.5. This correction could not be applied to recently starting outbreaks

Scenarios for 15 countries

Simulations
of the number
of infectious cases C_Σ
of Covid-19

Note:
• A correction factor is applied to each time series in order to take the under-estimations of infetious cases
• The Chinese data set is abritrarily taken as a reference.
• This correction can vary from 0.4 to 2.5.

Legend:
- Hubei
- Zhejiang
- Henan
- Guangdong
- Anhui
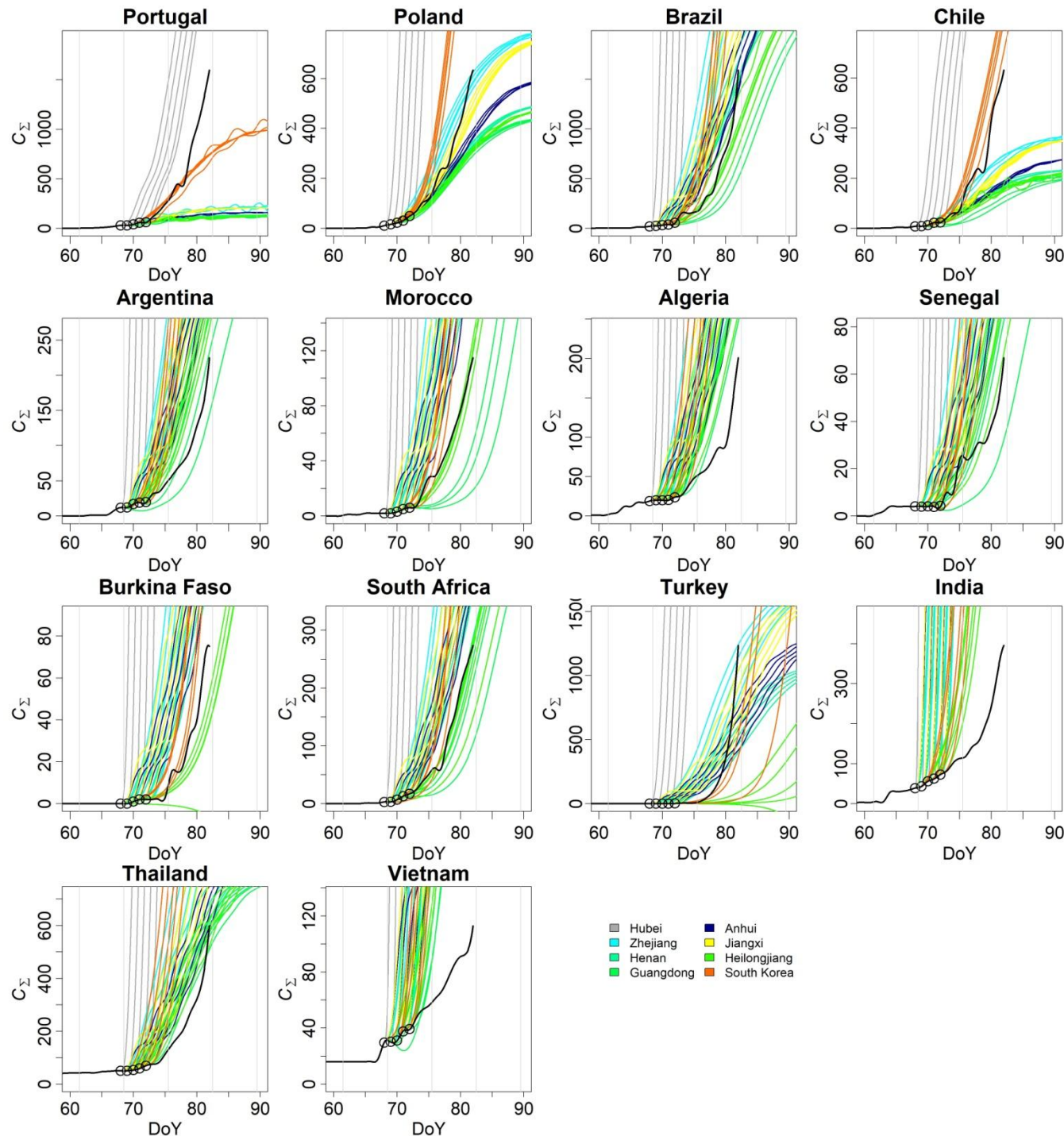- Jiangxi
- Heilongjiang
- South Korea

Results

- **Italy** and **Spain** have now **largely overtaken** the **hardest Chinese scenario** (Hubei provinces). Nothing indicates that the maximum of the outbreak has already been reached

- Several countries are approaching the Hubei scenario: **Switzerland**, **United Kingdom**, **Netherlands**, **Germany**, **France**, **Belgium** and **Austria**

- The control in **Sweden**, **Norway** and **Denmark** appears more efficient than elsewhere in Europe

- Control in **Japan** and **South Korea** is not complete but it still enables maintaining the propagation of the epidemic a relatively slow speed

Scenarios for 14 other countries

Simulations
of the number
of infectious cases C_Σ
of Covid-19

Note:
• These outbreaks being more recent, **no correction** could be applied to take into account the under-estimation of the number of case

Results

- Although being starting outbreaks, several countries seem to be already on the path of the Hubei-type scenario, in particular: **Portugal**, **Turkey**, **Thailand** and **Brazil**

- Situation is evolving very quickly, toward harder scenarios in : **Algeria**, **Argentina**, **Senegal**, **Burkina Faso** and **Thailand**

- The closest scenarios are more difficult to identify for **Morocco**, **South Africa** and **India**

- At present, a relatively good control level is observed in **Vietnam**, **Chile** and **Poland**. If confirmed the measures taken by the authorities to control the disease should better be maintained

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