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# Suitability Map of COVID-19 Virus Spread V.2

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1 Works for me dx.doi.org/10.17504/protocols.io.bd25i8g6

Coronavirus Method Development Community

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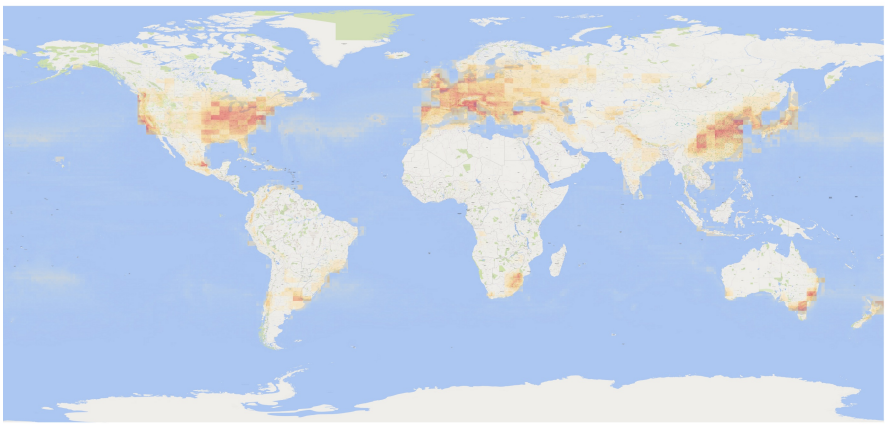
ABSTRACT



This image reports a Maximum Entropy model that estimates *suitable* locations for COVID-19 spread, i.e. places that could favour the spread of the virus just in terms of environmental parameters.

The model was trained just on locations in *Italy* that have reported a rate of new infections higher than the geometric mean of all Italian infection rates. The following environmental parameters were used, which are correlated to those used by other studies:

- Average Annual Surface Air Temperature in 2018 (NASA)
- Average Annual Precipitation in 2018 (NASA)
- CO2 emission (natural+artificial) averaged between January 1979 and December 2013 (Copernicus Atmosphere Monitoring Service)
- Elevation (NOAA ETOPO2)
- Population per 0.5° cell (NASA Gridded Population of the World)

The model file (in ASC format) and all parameters used are attached.
A higher resolution map and also the model file (in ASC format) and all parameters are available at the external link (Zenodo).

The model indicates highest correlation with *infection rate* for CO2 around 0.03 gCm^−2day^−1, for Temperature around 11.8 °C, and for Precipitation around 0.3 kg m^-2 s^-1, whereas Elevation and Population density are poorly correlated with *infection rate*.

**One interesting result is that the model indicates, among others, the Hubei region in China as a high-probability location, and Iran (around Teheran) as a suited location for virus' spread, but the model was not trained on these regions, i.e. it did not know about the actual spread in these regions.**

## Files



**Citation:** Gianpaolo Coro (03/23/2020). Suitability Map of COVID-19 Virus Spread. https://dx.doi.org/10.17504/protocols.io.bd25i8g6

Name (Size)

1_covid_suitability_preview.png (**5.7 MB**)
md5:dea4e66a1c66d0dfc3b0872adfaa020f

2_covid_suitability_v2_Hi_Resolutionv2.png (**47.3 MB**)
md5:069727a6c5656d276c475606c9b96d47

Altitude.asc (**1.9 MB**)
md5:ca91c4d56654b77bf572eef1a42af7a5

CO2.asc (**5.1 MB**)
md5:0ed217e20ab32aad4ab96e5403670ee4

MaxEnt_Temperature_Precipitation_Elevation_CO2.asc (**2.8 MB**)
md5:79639fd3540c68450d86fde288edb264

Population.asc (**4.6 MB**)
md5:57aa6c172b3fc036c08d0560f01436ba

Precipitation.asc (**5.5 MB**)
md5:3ab587ea0e0fbe3fcbd9ea6b7844271a

Temperature.asc (**4.7 MB**)
md5:7ea930f59e5ff627a18383f02737f78d

**MD5 checksum**: This is the file fingerprint, which can be used to verify the file integrity.

## References

Coro, G., Panichi, G., Scarponi, P., & Pagano, P. (2017). Cloud computing in a distributed e-infrastructure using the web processing service standard. Concurrency and Computation: Practice and Experience, 29(18), e4219.

EXTERNAL LINK

https://zenodo.org/record/3719184

THIS PROTOCOL ACCOMPANIES THE FOLLOWING PUBLICATION

Gianpaolo Coro. (2020). Suitability Map of COVID-19 Virus Spread (Version 4) [Data set]. Zenodo. http://doi.org/10.5281/zenodo.3722606

MATERIALS TEXT



**Citation:** Gianpaolo Coro (03/23/2020). Suitability Map of COVID-19 Virus Spread. https://dx.doi.org/10.17504/protocols.io.bd25i8g6

This experiment was done using the DataMiner cloud computing system of the D4Science e-Infrastructure and the BiodiversityLab Virtual Reseach Environment. (https://services.d4science.org/group/biodiversitylab/)

Gianpaolo Coro. (2020). Suitability Map of COVID-19 Virus Spread





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