

# Practical exercise for the course

## Spatial Data Analysis

### in the WASCAL Master Research Programme on Informatics for Climate Change, Ouagadougou, Burkina Faso

May 2021

The practical exercises serve to consolidate the acquired knowledge in the course. The practical exercises are graded. The grade obtained is included in the overall grade together with the grade from the written test.

The practical exercise consists of **two exercises**. Each exercise requires the application of the course contents (e.g. spatial point pattern analysis and spatial interpolation).

The exercises can be done either in Python or R or in any other GIS. Please note for the documentation of the exercises:

- Format and design (provide your full name and email, font size 11 and 1.15 pt line spacing, use of headings or subheadings to clearly indicate which task is currently shown)
- Word documents are not accepted. Only Pdf documents are accepted. Please also note page numbers.
- Content: Please document in which system (Python, R, QGIS, Grass GIS or else) the tasks were processed. When creating maps, please pay attention to the **proper display of a scale, coordinate frame, and meaningful legend**. There are numerous instructions on how to create maps available on the Internet. The two exercises are shown below.
- All two exercises must be completed in order to be graded. When documenting the results, it is important to ensure that the answers can be clearly related to the respective task. We expect a **clear and concise transparent explanation of why you have decided for a certain method AND short discussion of your results**. We not accept only tables when, for instance, asked for a certain resulting value.
- Unless otherwise specified, the data is provided for processing the tasks <https://github.com/SteveMHill/SpatialAnalysis2021>

**Deadline:** Please submit the complete documentation of the tasks by **May 28, 2021** (Friday) at the latest. All papers submitted after this date will not be accepted.

**Send to:** Please send them to Steven Hill ([steven.hill@uni-wuerzburg.de](mailto:steven.hill@uni-wuerzburg.de)) **AND** Dr. Sarah Schönbrodt-Stitt ([sarah.schoenbrodt-stitt@uni-wuerzburg.de](mailto:sarah.schoenbrodt-stitt@uni-wuerzburg.de)). Please pay attention to the information of the full name on the cover sheet. Only pdf documents will be accepted.

## Exercise 1

Import the fires dataset (fires.csv)

- 1.1 How many fires were detected in total?
- 1.2 During which time period were the fires detected?
- 1.3 Identify the ten brightest fires during this period. Where are they located?
- 1.4 Extract all fires detected with a confidence higher than 70 percent. How much are these? Show in a plot.
- 1.5 Create a histogram showing the distribution of the fire radiative power. Clearly indicate the description of the y-axis and x-axis.
- 1.6 Create a plot showing the numbers of fires for each day. Convert the dataset into a spatial geopandas dataframe.
- 1.7 Create a heat map showing the density of fires in Nigeria.
- 1.8 Investigate if the fires detected in Nigeria are distributed rather regular or if the fires appear rather clustered (if so try to identify the main clusters and explain). Import the local area government dataset (nigeria\_lga.shp).
- 1.9 Count the fires occurring in the different local government areas in Nigeria. How much are they?
- 1.10 Create a map displaying the number of fires for each local government area.
- 1.11 Investigate the spatial correlation between the numbers of fires in the different local government areas.

## Exercise 2

Import the elevation dataset for Burkina Faso (bfa\_elevation.shp)

- 2.1 Choose a spatial interpolation (deterministic or stochastic spatial interpolation technique) method and create a continuous elevation raster in a spatial resolution (cell size) of 20 m. Explain why you decided for a certain spatial interpolation technique. Import the SRTM for Burkina Faso compare it to your results (bfa\_srtm.tif).
- 2.2 Show maps for both rasters and compare your created continuous elevation raster with the SRTM Digital Elevation Model for Burkina Faso. What do you observe? Where are the differences?