

**Supplementary Data File 8:** This shows the Principal Component Analysis, climate data.

## Principal Component Analysis

### Dataset Climate

This dataset contains 105 individuals and 21 variables, 1 qualitative variable is considered as illustrative.

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#### 1. Study of the outliers

The analysis of the graphs does not detect any outlier.

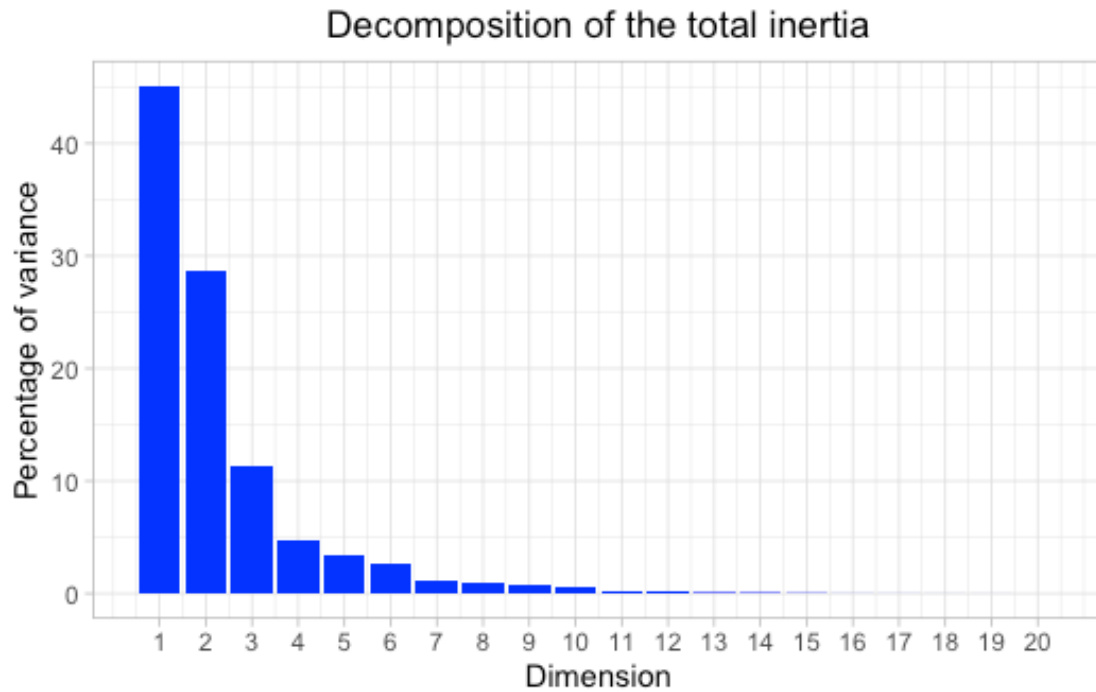
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#### 2. Inertia distribution

The inertia of the first dimensions shows if there are strong relationships between variables and suggests the number of dimensions that should be studied.

The first two dimensions of analyse express **73.73%** of the total dataset inertia ; that means that 73.73% of the individuals (or variables) cloud total variability is explained by the plane. This percentage is high and thus the first plane represents an important part of the data variability. This value is strongly greater than the reference value that equals **19.08%**, the variability explained by this plane is thus highly significant (the reference value is the 0.95-quantile of the inertia percentages distribution obtained by simulating 2763 data tables of equivalent size on the basis of a normal distribution).

From these observations, it is probably not useful to interpret the next dimensions.

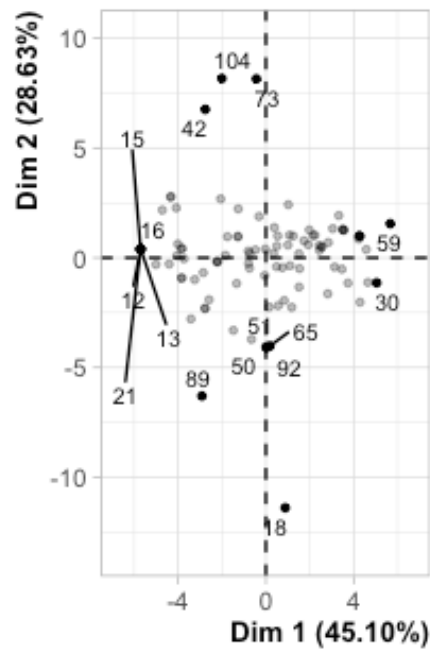


**Figure 2 - Decomposition of the total inertia**

An estimation of the right number of axis to interpret suggests to restrict the analysis to the description of the first 3 axis. These axis present an amount of inertia greater than those obtained by the 0.95-quantile of random distributions (85.09% against 27.11%). This observation suggests that only these axis are carrying a real information. As a consequence, the description will stand to these axis.

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### 3. Description of the plane 1:2

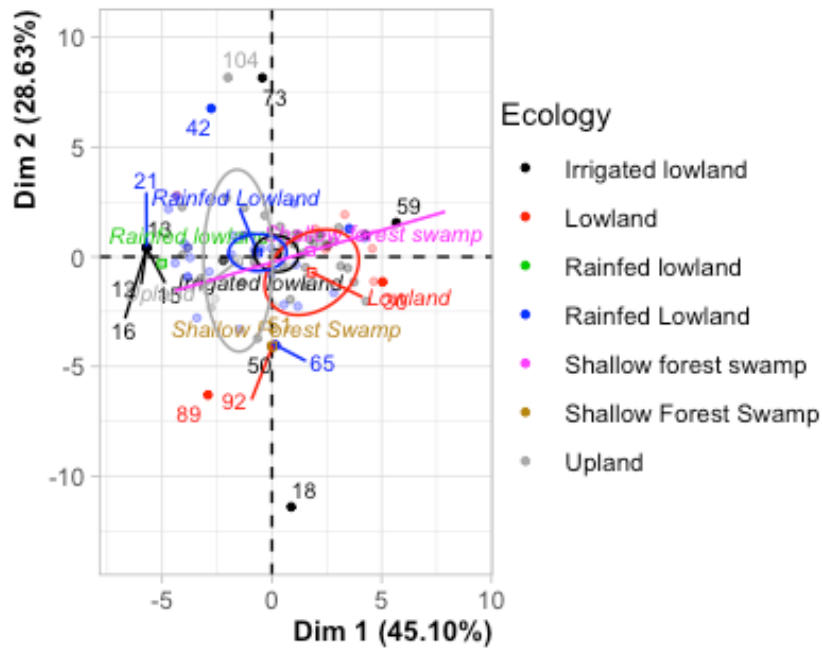


**Figure 3.1 - Individuals factor map (PCA)** *The labeled individuals are those with the higher contribution to the plane construction.*

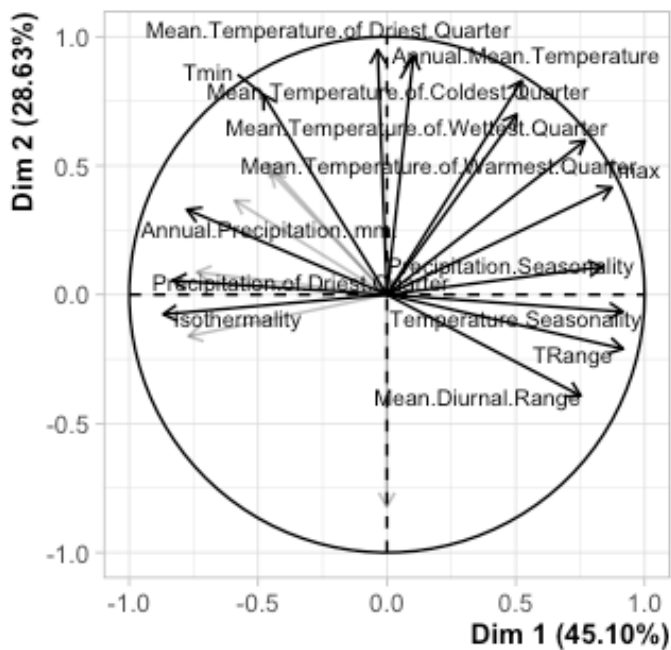
The Wilks test p-value indicates which variable factors are the best separated on the plane (i.e. which one explain the best the distance between individuals).

```
## Ecology  
## 0.2722252
```

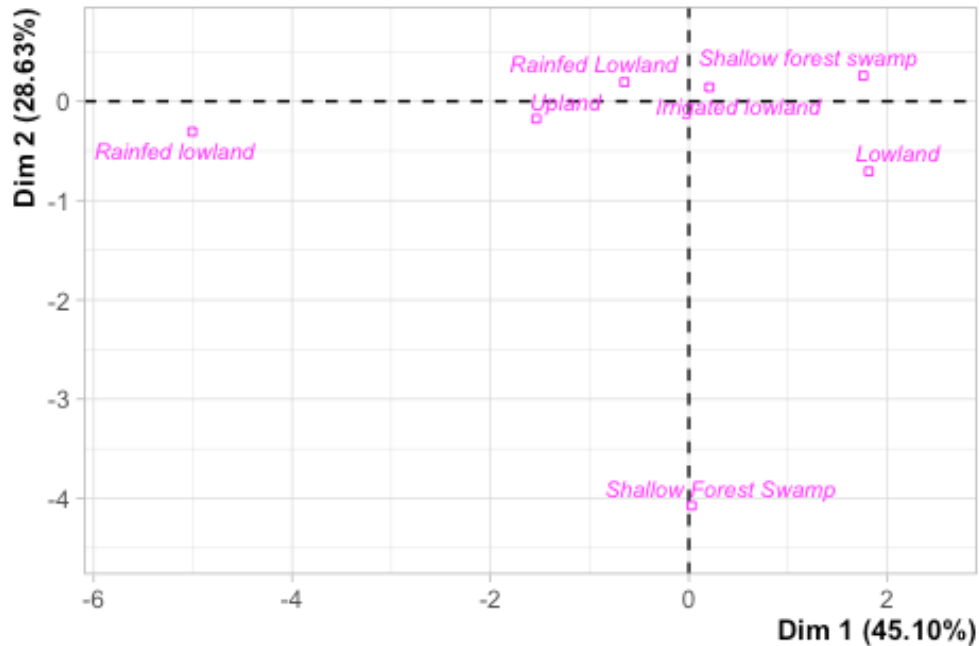
There only is one possible qualitative variable to illustrate the distance between individuals : *Ecology*.



**Figure 3.2 - Individuals factor map (PCA)** The labeled individuals are those with the higher contribution to the plane construction. The individuals are coloured after their category for the variable Ecology.



**Figure 3.3 - Variables factor map (PCA)** The labeled variables are those the best shown on the plane.



**Figure 3.4 - Qualitative factor map (PCA)** The labeled factors are those the best shown on the plane.

The **dimension 1** opposes individuals such as 59 and 30 (to the right of the graph, characterized by a strongly positive coordinate on the axis) to individuals such as 12, 15, 16, 21 and 13 (to the left of the graph, characterized by a strongly negative coordinate on the axis).

The group in which the individuals 59 and 30 stand (characterized by a positive coordinate on the axis) is sharing :

- high values for the variables *Mean.Temperature.of.Warmest.Quarter*, *Tmax*, *Annual.Mean.Temperature*, *Mean.Temperature.of.Wettest.Quarter*, *TRange*, *Temperature.Seasonality*, *Precipitation.Seasonality*, *Mean.Diurnal.Range*, *Mean.Temperature.of.Coldest.Quarter* and *Mean.Temperature.of.Driest.Quarter* (variables are sorted from the strongest).

- low values for the variables *Precipitation.of.Warmest.Quarter*, *Isothermality*, *Precipitation.of.Coldest.Quarter*, *Precipitation.of.Driest.Quarter*, *Annual.Precipitation..mm.*, *Precipitation.of.Driest.Month*, *Precipitation.of.Wettest.Month*, *Precipitation.of.Wettest.Quarter* and *Elevation* (variables are sorted from the weakest).

The group in which the individuals *12*, *15*, *16*, *21* and *13* stand (characterized by a negative coordinate on the axis) is sharing :

- high values for the variables *Precipitation.of.Driest.Quarter*, *Precipitation.of.Driest.Month*, *Annual.Precipitation..mm.*, *Precipitation.of.Warmest.Quarter*, *Isothermality*, *Precipitation.of.Wettest.Month*, *Precipitation.of.Coldest.Quarter*, *Precipitation.of.Wettest.Quarter* and *Tmin* (variables are sorted from the strongest).
- low values for the variables *Precipitation.Seasonality*, *Temperature.Seasonality*, *TRange*, *Mean.Diurnal.Range*, *Tmax*, *Mean.Temperature.of.Warmest.Quarter*, *Annual.Mean.Temperature* and *Mean.Temperature.of.Wettest.Quarter* (variables are sorted from the weakest).

Note that the variable *Rainfed lowland* is highly correlated with this dimension (correlation of 0.94). This variable could therefore summarize itself the dimension 1.

The **dimension 2** opposes individuals such as *59* and *30* (to the top of the graph, characterized by a strongly positive coordinate on the axis) to individuals such as *18*, *89*, *65*, *50*, *51* and *92* (to the bottom of the graph, characterized by a strongly negative coordinate on the axis).

The group in which the individuals *59* and *30* stand (characterized by a positive coordinate on the axis) is sharing :

- high values for the variables *Mean.Temperature.of.Warmest.Quarter*, *Tmax*, *Annual.Mean.Temperature*, *Mean.Temperature.of.Wettest.Quarter*, *TRange*, *Temperature.Seasonality*, *Precipitation.Seasonality*, *Mean.Diurnal.Range*, *Mean.Temperature.of.Coldest.Quarter* and *Mean.Temperature.of.Driest.Quarter* (variables are sorted from the strongest).

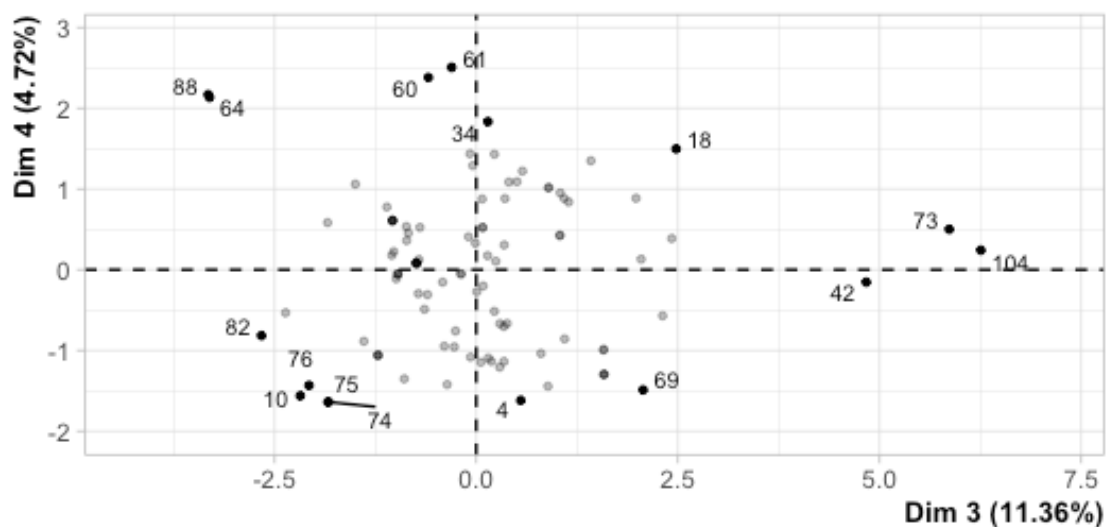
- low values for the variables *Precipitation.of.Warmest.Quarter*, *Isothermality*, *Precipitation.of.Coldest.Quarter*, *Precipitation.of.Driest.Quarter*, *Annual.Precipitation..mm.*, *Precipitation.of.Driest.Month*, *Precipitation.of.Wettest.Month*, *Precipitation.of.Wettest.Quarter* and *Elevation* (variables are sorted from the weakest).

The group in which the individuals 18, 89, 65, 50, 51 and 92 stand (characterized by a negative coordinate on the axis) is sharing :

- high values for the variable *Elevation*.
- low values for the variables *Mean.Temperature.of.Driest.Quarter*, *Mean.Temperature.of.Coldest.Quarter*, *Mean.Temperature.of.Wettest.Quarter*, *Annual.Mean.Temperature*, *Tmin*, *Mean.Temperature.of.Warmest.Quarter* and *Tmax* (variables are sorted from the weakest).

Note that the variable *Mean.Temperature.of.Driest.Quarter* is highly correlated with this dimension (correlation of 0). This variable could therefore summarize itself the dimension 2.

#### 4. Description of the dimension 3

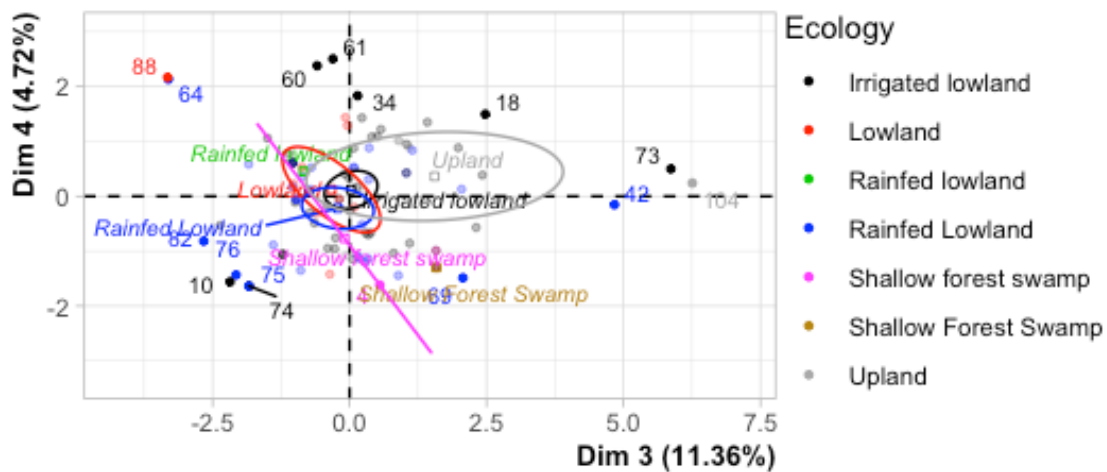


**Figure 4.1 - Individuals factor map (PCA)** *The labeled individuals are those with the higher contribution to the plane construction.*

The Wilks test p-value indicates which variable factors are the best separated on the plane (i.e. which one explain the best the distance between individuals).

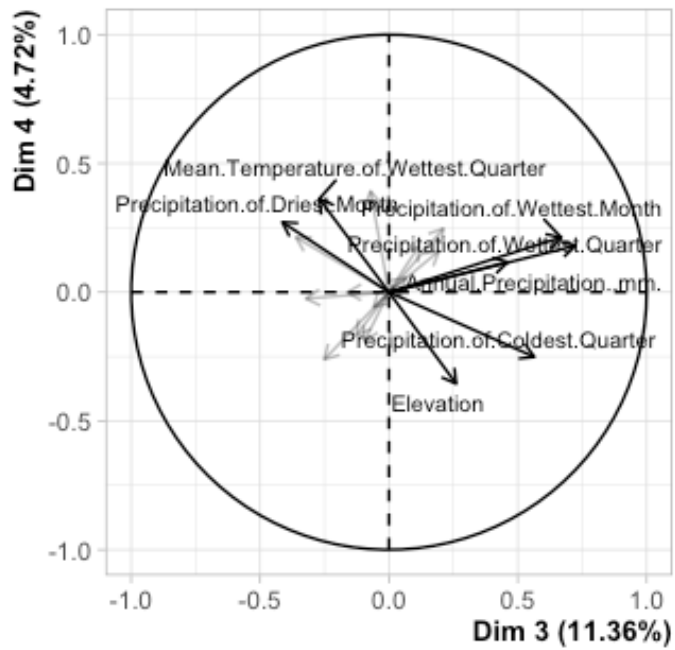
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## Ecology
## 0.1467161
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There only is one possible qualitative variable to illustrate the distance between individuals : *Ecology*.

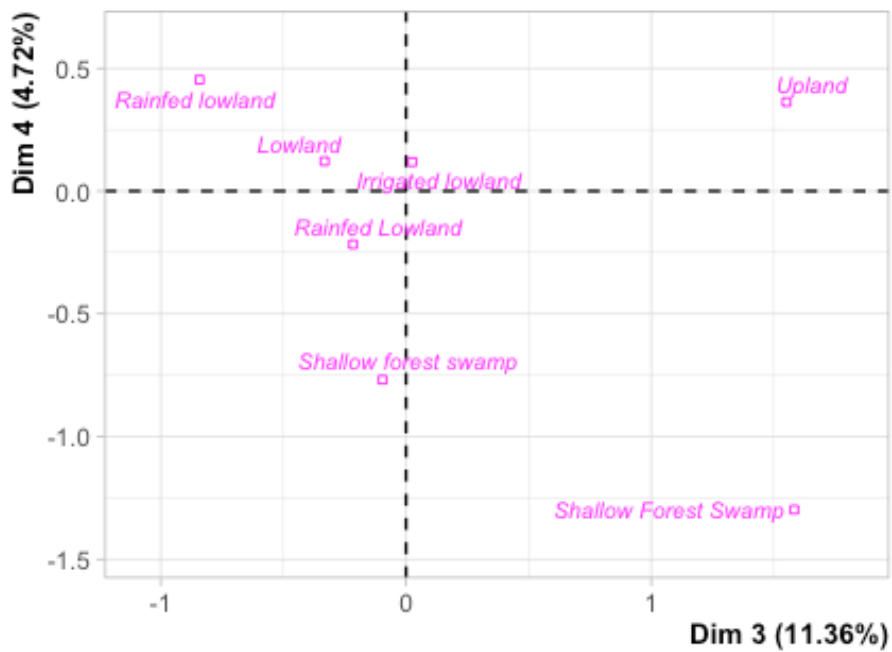


**Figure 4.2 - Individuals factor map (PCA)** *The labeled individuals are those with the higher contribution to the plane construction. The individuals are coloured after their category for the variable Ecology.*





**Figure 4.3 - Variables factor map (PCA)** *The labeled variables are those the best shown on the plane.*



**Figure 4.4 - Qualitative factor map (PCA)** *The labeled factors are those the best shown on the plane.*

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The **dimension 3** opposes individuals such as 34, 104, 73 and 42 (to the right of the graph, characterized by a strongly positive coordinate on the axis) to individuals such as 74, 75, 76, 10, 82, 61, 88, 64 and 60 (to the left of the graph, characterized by a strongly negative coordinate on the axis).

The group in which the individual 34 stands (characterized by a positive coordinate on the axis) is sharing :

- high values for the variables *Mean.Diurnal.Range* and *TRange* (variables are sorted from the strongest).
- low values for the variables *Tmin*, *Mean.Temperature.of.Driest.Quarter*, *Mean.Temperature.of.Coldest.Quarter*, *Precipitation.of.Coldest.Quarter* and *Mean.Temperature.of.Warmest.Quarter* (variables are sorted from the weakest).

The group in which the individuals 104, 73 and 42 stand (characterized by a positive coordinate on the axis) is sharing :

- high values for variables like *Precipitation.of.Wettest.Month*, *Precipitation.of.Wettest.Quarter*, *Precipitation.of.Coldest.Quarter*, *Annual.Precipitation..mm.*, *Mean.Temperature.of.Warmest.Quarter*, *Mean.Temperature.of.Driest.Quarter*, *Annual.Mean.Temperature*, *Mean.Temperature.of.Coldest.Quarter*, *Tmax* and *Tmin* (variables are sorted from the strongest).
- low values for the variables *Isothermality*, *Elevation* and *Mean.Diurnal.Range* (variables are sorted from the weakest).

The group in which the individuals 61, 88, 64 and 60 stand (characterized by a negative coordinate on the axis) is sharing :

- high values for the variables *Precipitation.of.Warmest.Quarter*, *Precipitation.of.Driest.Month*, *Mean.Temperature.of.Wettest.Quarter* and *Precipitation.of.Driest.Quarter* (variables are sorted from the strongest).
- low values for the variables *Elevation*, *TRange* and *Mean.Diurnal.Range* (variables are sorted from the weakest).

The group in which the individuals 74, 75, 76, 10 and 82 stand (characterized by a negative coordinate on the axis) is sharing :

- high values for the variables *Isothermality*, *Tmin* and *Mean.Temperature.of.Driest.Quarter* (variables are sorted from the strongest).
- low values for the variables *Precipitation.Seasonality*, *Precipitation.of.Wettest.Quarter*, *TRange*, *Precipitation.of.Wettest.Month*, *Annual.Precipitation..mm.* and *Temperature.Seasonality* (variables are sorted from the weakest).

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## Annexes