|  |  |  |
| --- | --- | --- |
| Scenario | CO2 (ppm) | Temperature (◦C) |
| RCP 2.6 - optimistic | 450 | 0.2 –1.8 |
| RCP 4.5 - moderate | 650 | 1.0 – 2.6 |
| RCP 8.5 - pessimistic | 1350 | 2.6 – 4.8 |

**Table 1** IPCC scenarios with their CO2 and mean temperature levels.

|  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **BIO9** |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  | 1.00 |
| **BIO8** |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  | 1.00 | -0.51 |
| **BIO7** |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  | 1.00 | 0.13 | 0.04 |
| **BIO6** |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  | 1.00 | -0.36 | -0.21 | 0.75 |
| **BIO5** |  |  |  |  |  |  |  |  |  |  |  |  |  |  | 1.00 | 0.72 | 0.39 | -0.11 | 0.78 |
| **BIO4** |  |  |  |  |  |  |  |  |  |  |  |  |  | 1.00 | 0.49 | -0.18 | 0.90 | 0.25 | 0.03 |
| **BIO3** |  |  |  |  |  |  |  |  |  |  |  |  | 1.00 | -0.44 | -0.18 | -0.15 | -0.05 | -0.25 | 0.13 |
| **BIO2** |  |  |  |  |  |  |  |  |  |  |  | 1.00 | 0.62 | 0.41 | 0.20 | -0.37 | 0.75 | -0.08 | 0.14 |
| **BIO19** |  |  |  |  |  |  |  |  |  |  | 1.00 | -0.28 | 0.31 | -0.64 | 0.02 | 0.49 | -0.62 | -0.36 | 0.31 |
| **BIO18** |  |  |  |  |  |  |  |  |  | 1.00 | -0.02 | -0.23 | 0.01 | -0.25 | -0.74 | -0.54 | -0.28 | 0.51 | -0.87 |
| **BIO17** |  |  |  |  |  |  |  |  | 1.00 | 0.61 | 0.64 | -0.36 | 0.14 | -0.56 | -0.41 | 0.02 | -0.57 | 0.12 | -0.37 |
| **BIO16** |  |  |  |  |  |  |  | 1.00 | 0.61 | 0.87 | 0.30 | -0.24 | 0.20 | -0.47 | -0.71 | -0.38 | -0.45 | 0.32 | -0.66 |
| **BIO15** |  |  |  |  |  |  | 1.00 | -0.10 | -0.78 | -0.17 | -0.61 | 0.50 | 0.05 | 0.50 | 0.06 | -0.38 | 0.59 | 0.11 | -0.01 |
| **BIO14** |  |  |  |  |  | 1.00 | -0.77 | 0.60 | 0.99 | 0.61 | 0.64 | -0.34 | 0.15 | -0.55 | -0.40 | 0.01 | -0.56 | 0.11 | -0.37 |
| **BIO13** |  |  |  |  | 1.00 | 0.60 | -0.10 | 0.99 | 0.60 | 0.87 | 0.30 | -0.25 | 0.19 | -0.47 | -0.71 | -0.38 | -0.45 | 0.33 | -0.67 |
| **BIO12** |  |  |  | 1.00 | 0.90 | 0.86 | -0.46 | 0.91 | 0.87 | 0.82 | 0.53 | -0.32 | 0.23 | -0.61 | -0.63 | -0.20 | -0.58 | -0.25 | -0.56 |
| **BIO11** |  |  | 1.00 | -0.29 | -0.46 | -0.06 | -0.31 | -0.46 | -0.05 | -0.61 | 0.44 | -0.22 | -0.07 | -0.09 | 0.80 | 0.99 | -.023 | -0.23 | 0.81 |
| **BIO10** |  | 1.00 | 0.87 | -0.56 | -0.65 | -0.32 | -0.04 | -0.66 | -0.32 | -0.68 | 0.08 | 0.00 | -0.29 | 0.42 | 0.98 | 0.81 | 0.24 | -0.08 | 0.75 |
| **BIO1** | 1.00 | 0.97 | 0.96 | -0.45 | -0.59 | -0.21 | -0.17 | -0.59 | -0.21 | -0.68 | 0.26 | -0.09 | -0.19 | 0.19 | 0.93 | 0.92 | 0.03 | -0.15 | 0.81 |
| **VARIABLES** | **BIO1** | **BIO10** | **BIO11** | **BIO12** | **BIO13** | **BIO14** | **BIO15** | **BIO16** | **BIO17** | **BIO18** | **BIO19** | **BIO2** | **BIO3** | **BIO4** | **BIO5** | **BIO6** | **BIO7** | **BIO8** | **BIO9** |

**Table 2.** Correlation matrix between 19 bioclimatic variables.

**Table 3** Selected bioclimatic variables to use as environmental input in the models.

|  |  |  |  |
| --- | --- | --- | --- |
| **Abbreviations** | **Bioclimatic variables** | **Unit** | **% Contribution** |
| BIO1 | Annual Mean Temperature | ◦C | 4.6 |
| BIO2 | Mean Diurnal Range | ◦C | 0.5 |
| BIO3 | Isothermality | - | 19.5 |
| BIO4 | Temperature Seasonality | ◦C | 19.6 |
| BIO8 | Mean Temperature of Wettest Quarter | ◦C | 15.4 |
| BIO9 | Mean Temperature of Driest Quarter | ◦C | 10 |
| BIO12 | Annual Precipitation | mm | 24.3 |
| BIO15 | Precipitation Seasonality | mm | 3.7 |
| BIO19 | Precipitation of Coldest Quarter | mm | 2.3 |

**Table 4** AUCtest values of all the models performed.

|  |  |  |  |
| --- | --- | --- | --- |
|  | **Software** | **Algorithm** | **AUCtest** |
|  | MAXENT (Java) | MAXENT | 0.83 |
| biomod2 (R) | | BIOCLIM | 0.79 |
| GAM | 0.96 |
| GLM | 0.93 |
| RF | 0.99 |
| MaxEnt | 0.94 |

**Table 5.** Cell numbers and presence percentages of the future projections from Fig. 5. From optimistic to pessimistic scenario, species are shifting to north and east according to coordinates, presence cell numbers (cell number (1)) are decreasing, whereas absence cell number (cell number (0)) are increasing. This also means the percentage of the cells which species are present is decreasing.

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Period** | **Climate Scenario** | **Cell Number (1)** | **Cell Number (0)** | **Presence**  **%** |
| **Current** | – | 30,879 | 338,431 | 8.36 |
| **2070** | RCP 2.6 | 10,350 | 358,960 | 2.80 |
| RCP 4.5 | 5,818 | 363,492 | 1.58 |
| RCP 8.4 | 2,627 | 366,683 | 0.71 |

**Table 6.** Cell numbers and presence percentages of the future projections from Fig. 6. From optimistic to pessimistic scenario, presence cell numbers (cell number (1)) are decreasing, whereas absence cell number (cell number (0)) are increasing. This also means the percentage of the cells which species are present is decreasing.

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Period** | **Climate Scenario** | **Cell Number (1)** | **Cell Number (0)** | **Presence**  **%** |
| **Current** | – | 19,817 | 349,493 | 5.37 |
| **2070** | RCP 2.6 | 5,512 | 363,798 | 1.49 |
| RCP 4.5 | 3,509 | 365,801 | 0.95 |
| RCP 8.4 | 1,533 | 367,777 | 0.42 |