Modelling habitat probability maps for EUNIS habitat types heathland, scrub and tundra based on vegetation relevés, environmental data and Copernicus land cover data

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1 Background and objectives

1.1 Background

This report is part of the assignment of Wageningen Environmental Research (Alterra) for the European Topic Centre Biological Diversity (ETC/BD). The European Topic Centres (ETCs) are international consortia brought together to support the European Environment Agency (EEA) in its mandate on environmental information. ETCs are according to the EEA regulation and in practice, an important instrument in supporting the EEA through the execution of sizeable, continuous, well-defined tasks with the involvement of member countries. In particular ETCs support EEA data centres for the issues related to air, climate change, water, biodiversity and land use and may provide help to EEA in supporting other data centres coordinated by Eurostat and JRC. The ETC/BD is an international consortium working with the European Environment Agency under a framework partnership agreement. The main tasks of ETC/BD are to:

1. Assist the EEA in its task of reporting on Europe's environment by addressing state and trends of biodiversity in Europe.
2. Provide the relevant information to support the implementation of environmental and sustainable development policies in Europe in particular for EU nature and biodiversity policies (DG Environment: Nature and Biodiversity).
3. Build capacity for reporting on biodiversity in Europe, mainly through the European Information and Observation Network (Eionet).

More information about ETC/BD can be found at: [http://bd.eionet.europa.eu/](http://bd.eionet.europa.eu/)

1.2 Objectives

This report is affiliated with task 1.7.5A from the ETC/BD Action Plan 2016. The general objectives of this task are:

- To support the preparation of EEA contributions to ecosystems assessments and their conditions based on existing information and data to support the 2020 EU Biodiversity Strategy (and its targets), in particular relevant data gathered from the Nature Directives, Agriculture and Forests, in close dialogue with the MAES process.
- To contribute to the biodiversity knowledge base by gathering evidence on the main drivers of biodiversity loss and biological characterisation of ecosystems helping a better understanding on links between pressures and conditions.
- To explore the contribution of Copernicus on the monitoring of habitats, species and the Natura 2000 network.
- To explore the results of the Article 12 (Birds Directive) and Article 17 (Habitats Directive) contained in the EEA State of Nature report – for diverse assessment purposes.
- To support thematic assessments including agricultural, forest, marine and freshwater assessments.
- To support the work on further convergence of the assessments between Water, Nature Directives and biodiversity information flows.

More specifically, the objective in relation to this report is: to enhance the spatial delineation of ecosystems with remote sensing data, environmental data and in-situ vegetation relevés to produce habitat probability maps for heathlands, scrublands and tundra. Starting point are the habitat suitability maps ‘Distribution and habitat suitability maps of revised EUNIS heath, scrub and tundra types’ delivered within the 2015 EEA contract (Hennekens & Schaminée, 2016). Next to the EEA report ‘Review of EUNIS heathland-scrub-tundra habitats’ (Schaminée et al., 2015). This review...
report has been made to underpin the EUNIS classification with well-documented information on the highly diverse European vegetation. Crosswalks have been developed between level 3 EUNIS terrestrial habitat types and vegetation syntaxa. More specifically, the project reviewed the description and classification of level 3 of habitat group F of EUNIS Heathland, scrub and tundra as well as heathland and scrub included under habitat group B (B1.5: Coastal dune heaths; B1.6: Coastal dune scrub; B2.5: Shingle and gravel beaches with scrub). Proposals were made for improving the EUNIS classification and the above reports were used as point of departure for the study in this report.

Table 1.1  List of the revised EUNIS heath, scrub and tundra habitat types at level 3

<table>
<thead>
<tr>
<th>EUNIS-3 code</th>
<th>EUNIS-3 habitat name</th>
</tr>
</thead>
<tbody>
<tr>
<td>F1.1</td>
<td>Shrub tundra</td>
</tr>
<tr>
<td>F1.2</td>
<td>Moss and lichen tundra</td>
</tr>
<tr>
<td>F2.1</td>
<td>Subarctic and alpine dwarf Salix scrub</td>
</tr>
<tr>
<td>F2.2a</td>
<td>Alpine and subalpine ericoid heath</td>
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<tr>
<td>F2.2b</td>
<td>Alpine and subalpine Juniperus scrub</td>
</tr>
<tr>
<td>F2.2c</td>
<td>Balkan subalpine genistoid scrub</td>
</tr>
<tr>
<td>F2.3</td>
<td>Subalpine deciduous scrub</td>
</tr>
<tr>
<td>F2.4</td>
<td>Subalpine Pinus mugo scrub</td>
</tr>
<tr>
<td>F3.1a</td>
<td>Lowland to montane temperate and submediterranean Juniperus scrub</td>
</tr>
<tr>
<td>F3.1b</td>
<td>Temperate Rubus scrub</td>
</tr>
<tr>
<td>F3.1c</td>
<td>Lowland to montane temperate and submediterranean genistoid scrub</td>
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<tr>
<td>F3.1d</td>
<td>Balkan-Anatolian montane genistoid scrub</td>
</tr>
<tr>
<td>F3.1e</td>
<td>Temperate and submediterranean thorn scrub</td>
</tr>
<tr>
<td>F3.1f</td>
<td>Low steppic scrub</td>
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<td>F3.1g</td>
<td>Corylus avellana scrub</td>
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<td>F3.1h</td>
<td>Temperate woodland clearing scrub</td>
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<td>Dry heath</td>
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<td>F4.3</td>
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<td>F5.1-2</td>
<td>Arborescent matorral and maquis</td>
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<td>Submediterranean pseudomaaquis</td>
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<td>F5.4</td>
<td>Spartium junceum fields</td>
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<td>F5.5</td>
<td>Thermo-Mediterranean scrub</td>
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<td>F6.1a</td>
<td>Western basophilous garrigue</td>
</tr>
<tr>
<td>F6.1b</td>
<td>Western acidophilous garrigue</td>
</tr>
<tr>
<td>F6.2</td>
<td>Eastern garrigue</td>
</tr>
<tr>
<td>F6.6</td>
<td>Supra-Mediterranean garrigue</td>
</tr>
<tr>
<td>F6.7</td>
<td>Mediterranean gypsum scrub</td>
</tr>
<tr>
<td>F6.8a</td>
<td>Mediterranean halo-nitrophilous scrub</td>
</tr>
<tr>
<td>F6.8b</td>
<td>Caspian halo-nitrophilous scrub</td>
</tr>
</tbody>
</table>
1.3 **Content of the report**

This report on the production of the EUNIS habitat probability maps at level 3 for Heathland, Scrub and Tundra has 4 chapters. Chapter 1 describes the background and the objectives of the project. Chapter 2 is an introduction on the habitat modelling, starting with the distribution maps, followed by habitat suitability and habitat probability. The integration of in-situ vegetation relevés, environmental data layers and remotely sensed information, such as high resolution land cover information, plays an important role in the overall methodology. Chapter 3 explains how the EUNIS habitat suitability maps have been produced. Chapter 4 describes how the habitat probability maps (100 m resolution) have been derived from the habitat suitability maps (on a 1km resolution). Annex I shows all 38 habitat probability maps for Heathland, Scrub and Tundra, including the habitat distribution and suitability maps, and a detailed example of the habitat probability maps.
2 Introduction to habitat modelling

Although it is rare to record or map EUNIS habitat types in the field, there are many data sources which allow mapping of their distribution. The most important single source of information are vegetation plots (also known as relevés), given areas in which all plant species occurring are recorded. In the past few years a large number of national and regional databases with such data have been brought together within the European Vegetation Archive project (http://euroveg.org/eva-database). Together with other sources of data, they allow the production of several types of distribution map as explained below.

Distribution - maps of known occurrences based on the locality of plots which can be assigned to the EUNIS habitat class. They show localities where the habitat is known to occur (at least at the time of survey), but give an incomplete record of the actual distribution.

Suitability - modelling of areas where the environment is suitable for the habitat.

Probability - the modelled suitability map is refined by using information on land cover.

2.1 Methodology

![Distribution → Suitability → Probability](image)

**Figure 2.1 G1.6a: Fagus woodland on non-acid soils**

The road from individual vegetation relevés to finally a probability map of a EUNIS class, roughly comprises three steps (see also figure 2.1).

1. Relevés stored in the European Vegetation Database (EVA) are assigned to EUNIS classes using expert rules. An expert rule defines the floristic composition (which species should be present and which species should be absent) of a class and is used to select those relevés that meet the imposed condition. The selection is used to create a distribution map, as far as the geographic location is tied to the relevés.

2. The distribution, by means of geographic locations of the relevés, is used in the second step, the distribution model. For the modelling the distribution data are related to climate and soil data, environmental data that is stored in grid maps at a European scale. The modelling software Maxent (Phillips et al., 2006) calculates which environmental layers have the largest contribution to the model, in other words, explains the distribution of the vegetation relevés (thus the EUNIS class) the best. One of the outcomes of the model is a suitability map. This map indicates how suitable, in terms of climate and soil conditions an area is for the EUNIS class concerned. This on a scale of 0 to 1 with colors running from white, via green to red.
3. Where step 1 and 2 are bottom-up approaches, the third step is a top-down approach, where all kind of land cover data (earth observation data like high resolution satellite data), and in some cases abiotic data (e.g. distance to rivers, presence of podzolls), is used to filter the suitability map to eventually get to a refined **probability map**. As such the probability map is a refinement of the suitability map.

While the suitability map can be considered as a potential distribution map, the probability map presents more the actual distribution. Still the latter map represents a modelled distribution and overestimates the actual distribution.

All three steps are explained more in detail in the unpublished report ‘Modelling the spatial distribution of EUNIS forest habitat types’ by Mücher, C.A., Hennekens, S.M., Schaminée, J.H.J & Halada, L. (2015).

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**Figure 1.2 General workflow for the processing of refined EUNIS forest habitat probability maps (Mücher et al., 2015)**
3 Habitat suitability maps

For the habitat suitability modelling, the widely used software Maxent for maximum entropy modelling of species’ geographic distributions was used. Maxent is a general-purpose machine-learning method with a simple and precise mathematical formulation, and has a number of aspects that make it well-suited for species distribution modelling when only presence (occurrence) data but not absence data are available (Philips et al. 2006). Because EUNIS habitats have a particular species composition, they are assumed to respond to specific ecological requirements, allowing to generate correlative estimates of geographic distributions. Modelling habitats that have been floristically defined is a well-known procedure for ecological modelling at local scales, and a promising technique to be applied also at the continental level.

The Maxent method considers presence data (known observations of a given entity) and the so-called background data. Background data comprise a set of points used to describe the environmental variation of the study area according to the available environmental layers. It is assumed that these layers represent well the most important ecological gradients on a European scale. These layers were selected from meaningful environmental predictors commonly used for modelling non-tropical plant and vegetation diversity, and are not mutually strongly correlated.

As environmental data (and their sources) the following climate and soil layers have been used:

- Potential Evapotranspiration
- Solar radiation
- Temperature Seasonality (standard deviation *100)
  [http://www.worldclim.org/bioclim](http://www.worldclim.org/bioclim)
- Mean Temperature of Wettest Quarter
  [http://www.worldclim.org/bioclim](http://www.worldclim.org/bioclim)
- Annual Precipitation
  [http://www.worldclim.org/bioclim](http://www.worldclim.org/bioclim)
- Precipitation Seasonality (Coefficient of Variation)
  [http://www.worldclim.org/bioclim](http://www.worldclim.org/bioclim)
- Precipitation of Warmest Quarter
  [http://www.worldclim.org/bioclim](http://www.worldclim.org/bioclim)
- Distance to water (rivers, lakes, sea) derived from the shapefile ‘Inland_Waters.shp’
- Bulk density of the soil (kg/m³)
  Hengl et al. 2014
- Cation Exchange Capacity of the soil
  Hengl et al. 2014
- Weight in % of clay particles (<0.0002 mm)
  Hengl et al. 2014
- Volume % of coarse fragments (> 2 mm)
  Hengl et al. 2014
- Soil organic carbon content (%)  
  Hengl et al. 2014
- Soil pH (water)
  Hengl et al. 2014
- Weight in % of silt particles (0.0002-0.05 mm)
  Hengl et al. 2014

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• Weight in % of sand particles (0.05-2 mm)  
Hengl et al. 2014

Compared with the habitat suitability models set up for the EUNIS forest types (Schaminée et al. 2014) we have now included 8 recently published soil parameters (Hengl et al 2014), instead of only one (soil pH).

Maxent is expected to perform well for estimating the geographic distribution of EUNIS habitats in Europe. However, as with any other modelling techniques, this method is sensitive to sampling bias, i.e. when the spatial distribution of presence data is reflecting an unequal sampling effort in different geographic regions. In Maxent, it has been proposed that the best way to account for sampling bias (when bias is known or expected to occur) is to generate background data reflecting the same bias of the presence data. When a complete set of presence data is available, a general recommendation is to generate background points from the occurrences of other species/communities that were sampled in a similar way (Elith et al. 2011).

Two different approaches have been followed for the selection of a maximum of 5,000 locations for the background data, assuming biased and non-biased presence data. For the first approach, 5,000 locations were randomly selected from the heathland, scrub and tundra plot pool, assuming that they reflect the general geographic bias of heathland, scrub and tundra sampling in Europe. The second approach concerns a random selection of 5,000 background points in the whole study area, assuming that the presence data describe a representative subset of the real distribution range of the target habitat.

The two modelling approaches (assuming biased and non-biased data) were evaluated for each of the EUNIS habitat types in order to estimate which assumption is more likely. This evaluation was based on the expert knowledge of the team members of the distribution of heathland, scrub and tundra types by assessing (i) the distribution of the available presence data as an estimate of geographic bias, (ii) the realism of the habitat suitability maps to reflect known distribution of heathland, scrub and tundra, and (iii) the environmental predictors that contribute most substantially to the models. The best performing model was then selected by consensus of the expert team for each habitat type.

For 5 EUNIS types (B1.6c, F4.3, F7.4d, F8.1, F8.2) no data was available and for 5 types (B1.6b, F1.2, F2.2c, F3.1d, and F6.8b) there was insufficient data to create a model.

For each EUNIS heathland, scrub and tundra type the following data are presented:

• A distribution map showing the location of the relevés that have been assigned to the EUNIS type concerned and therefore used as presence data.

• A habitat suitability map with colors varying from gray, through green to red, indicating increasingly favorable ecological conditions for the type (expressing the logistic output of the model between 0 and 1).

• AUC, or the “Area Under the Curve”, as a general estimate of model performance. This is the probability that the classifier correctly orders two points (a random positive example and a random negative example). In general, AUC values in the range 0.5-0.7 were considered low, 0.7-0.9 were moderate and >0.9 were high, suggesting poor, good and very good model performances, respectively. We provide two estimates of the AUC as calculated by Maxnet. ‘AUC training’ reflects the internal fit between observed and predicted occurrences in the computed model. ‘AUC test’ provides the mean AUC obtained from a 10-fold cross-validation procedure in which ten different models were computed with a random selection of 90% of data (calibration data set) and 10% for testing the model (validation data set).

• Contribution variables to the Maxent model (%). Indicates to what extent the environmental variables contribute to the model.

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The habitat **suitability** maps are used as input to model habitat **probability** maps using amongst others actual land cover, next to the use of topographic information such as, biogeographic regions, countries, distance to coast and rivers.
4 Habitat probability maps

The habitat probability maps are created by downscaling the habitat suitability maps by actual land cover. This report concerns heathland, scrub and tundra and therefore we would like to use very high resolution land cover maps for these land cover types. Unfortunately the Copernicus HRLs (High Resolution Layers with a 20 meter spatial resolution) only exist for the following specific topics: 1) imperviousness 2) forests; 3) permanent waterbodies; 4) grasslands and 5) wetlands. Nevertheless, we have the Copernicus land cover database Corine with a spatial resolution of 100 meter. The most recent version is Corine Land Cover 2012 (CLC2012). Since the minimum mapping unit of CLC is 25 ha, and therefore still quite coarse for habitat mapping, we decided to use some of the HRLs as a mask for CLC2012, and is further explained below.

![Figure 4.1 Flowchart of the methodology implemented to obtain habitat probability maps](image)

4.1 Land Cover

CLC2012 is the 4th CORINE Land Cover inventory and took 3 years to finalize. The CORINE Land Cover (CLC) inventory was initiated in 1985 (reference year 1990). Updates have been produced in 2000, 2006, and 2012. It consists of an inventory of land cover in 44 classes. CLC uses a Minimum Mapping Unit (MMU) of 25 hectares (ha) for areal phenomena and a minimum width of 100 m for linear phenomena. Therefore the rasterized version of the original vector based CLC is 100 m. For CLC20102 a dual coverage of satellite images were used. Computer Assisted Photo-Interpretation (CAPI) was the dominating mapping technology. The number of countries using advanced (bottom-up) solutions has slightly increased. All of the EEA39 countries have participated within the official lifetime of the project. It is still possible that minor updates will follow with next version. The product is only partially validated.
Table 4.1  Nomenclature Corine Land Cover

<table>
<thead>
<tr>
<th>Level 1</th>
<th>Level 2</th>
<th>Code</th>
<th>Level 3 CORINE land cover class</th>
<th>Nr.</th>
</tr>
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<tr>
<td>1</td>
<td>Artificial surfaces</td>
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<td>urban fabric</td>
<td>continuous urban fabric</td>
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<td>1.1.1</td>
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<td></td>
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<tr>
<td></td>
<td></td>
<td>1.1.2</td>
<td></td>
<td>discontinuous urban fabric</td>
</tr>
<tr>
<td></td>
<td>industrial, commercial and transport units</td>
<td>1.2</td>
<td>industrial and commercial units</td>
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</tr>
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<td></td>
<td>1.2.1</td>
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<td>road and rail networks and associated land</td>
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<td>1.2.2</td>
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<td>1.2.3</td>
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<td>airports</td>
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<td>mine, dump and construction sites</td>
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<td>mineral extraction sites</td>
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<td>dump sites</td>
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Modelling habitat probability maps for EUNIS habitat types heathland, scrub and tundra based on vegetation relevés, environmental data and Copernicus land cover data
In a next step, the CLC2012 has been masked with the HRLs Forest, Imperviousness and permanent waterbodies. This is especially relevant for the semi-natural land cover classes from CLC2012 that have a MMU of 25 ha and in reality more fragmented (by for example small artificial features, waterbodies or forest patches).

The use HRLs Forest, Imperviousness and permanent waterbodies are also from 2012. But for all 3 HRLs 2012 we used the aggregated 100m products which have the same spatial resolution as rasterized CLC2012. For Forests we used the HRL forest type (FTY). The forest type product allows to get as close as possible to the FAO forest definition. The FTY distinguishes 3 classes: deciduous, needleleaf and mixed forest. All forests classes were used as a mask. Permanent Water bodies: 1) Permanent Water Bodies; 254: unclassifiable (no satellite image available, or clouds, shadows, or snow); 255: outside area. Only class 1, permanent water bodies, was used as a mask for CLC2012. Imperviousness indicated to built-up areas that are characterized by the substitution of the original (semi-) natural land cover or water surface with an artificial, often impervious cover. These artificial surfaces are usually maintained over long periods of time. The imperviousness HRL captures the spatial distribution of artificially sealed areas, including the level of sealing of the soil per area unit. The level of sealed soil (imperviousness degree 1-100\%) is produced using an automatic algorithm based on calibrated NDVI.

![Figure 4.2 Flowchart for the calculation of the CLC2012 masked by imperviousness, water bodies and forests. The conditional in the raster calculator is:](image)

The result of the CLC2012_mask is shown in Figure 4.3.
Figure 4.3 Process of masking CLC2012 with HRLs 2012: Imperviousness, Waterbodies and Forest. The results is CLC21012 masked that shows a more realistic fragmented semi-natural land cover.
4.2 Relationship CLC with in-situ vegetation relevés

To determine the relationship between the EUNIS habitat types at level 3 and the Corine Land Cover (CLC20102) we used the report of D. Moss (2012) ‘A crosswalk between EUNIS habitats Classification and Corine Land Cover’ (source: http://biodiversity.eionet.europa.eu) as starting point. However, this report shows a one-to-one relationship, while we know that in most cases the EUNIS habitat types are not related to a single land cover types. Since we have 34,324 vegetation relevés for Heathland, Scrub and Tundra that overlay with CLC20102, we calculated for each EUNIS habitat type with which land cover types their vegetation relevés match (spatial summary statistics).

Thus, if we take EUNIS habitat type F4.1 ‘Wet heath’ as an example, we find the following spatial relationship between the 2290 vegetation relevés and the CLC2012, which is a one-to-many relationship, as show in the table below. Since there can be a spatial mismatch between CLC2012 and the vegetation relevés for several reasons, we did look only at percentages of 5% or higher. And of course we did look at the relationship with CLC2012 only for the semi-natural land cover classes (excluding the forest classes as well). In Table 4.2, this analysis reveals that for EUNIS habitat type F4.1 ‘Wet heath’, there is especially a relationship with CLC2012 classes 26 ‘natural grasslands’ (5.72%), class 27 ‘moors and heath lands’ (20.66%) and class 36 ‘peat bogs’ (19.04%). For the nomenclature of CLC2012, see Table 4.1.

<table>
<thead>
<tr>
<th>F41 (nr= 2290)</th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>CLC2012</td>
<td>Count</td>
<td>%</td>
<td></td>
</tr>
<tr>
<td>2</td>
<td>46</td>
<td>2.01</td>
<td></td>
</tr>
<tr>
<td>3</td>
<td>2</td>
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<td>4</td>
<td>2</td>
<td>0.09</td>
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<tr>
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<td>1</td>
<td>0.04</td>
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<tr>
<td>7</td>
<td>2</td>
<td>0.09</td>
<td></td>
</tr>
<tr>
<td>10</td>
<td>1</td>
<td>0.04</td>
<td></td>
</tr>
<tr>
<td>11</td>
<td>5</td>
<td>0.22</td>
<td></td>
</tr>
<tr>
<td>12</td>
<td>90</td>
<td>3.93</td>
<td></td>
</tr>
<tr>
<td>16</td>
<td>1</td>
<td>0.04</td>
<td></td>
</tr>
<tr>
<td>17</td>
<td>1</td>
<td>0.04</td>
<td></td>
</tr>
<tr>
<td>18</td>
<td>251</td>
<td>10.96</td>
<td></td>
</tr>
<tr>
<td>20</td>
<td>107</td>
<td>4.67</td>
<td></td>
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<tr>
<td>21</td>
<td>60</td>
<td>2.62</td>
<td></td>
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<td>23</td>
<td>161</td>
<td>7.03</td>
<td></td>
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<tr>
<td>24</td>
<td>218</td>
<td>9.52</td>
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</table>

Table 4.2 Summary table of the spatial relationships between EUNIS habitat type F4.1 ‘Wet heath’ with 2290 vegetation relevés and CORINE land cover (CLC20102)

<p>| | | |</p>
<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
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<tr>
<td>25</td>
<td>106</td>
<td>4.63</td>
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<tr>
<td>26</td>
<td>131</td>
<td>5.72</td>
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<td>27</td>
<td>473</td>
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<td>29</td>
<td>32</td>
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<td>30</td>
<td>36</td>
<td>1.57</td>
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<td>31</td>
<td>2</td>
<td>0.09</td>
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<td>32</td>
<td>41</td>
<td>1.79</td>
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<td>35</td>
<td>39</td>
<td>1.70</td>
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<td>36</td>
<td>436</td>
<td>19.04</td>
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<td>39</td>
<td>4</td>
<td>0.17</td>
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<tr>
<td>41</td>
<td>9</td>
<td>0.39</td>
</tr>
<tr>
<td>42</td>
<td>10</td>
<td>0.44</td>
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<tr>
<td>44</td>
<td>23</td>
<td>1.00</td>
</tr>
<tr>
<td>2290</td>
<td>100.00</td>
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</tr>
</tbody>
</table>

Table 4.3 shows the overall summary of the relationships between each EUNIS habitat type and CLC2012 (as indicated by D. Moss but also from our spatial analysis) and additional filters that we used to model the habitat probability.
Table 4.3  Overview of the habitat probability maps for heath, scrub and tundra and the applied Copernicus land cover information and additional filters that have been used

<table>
<thead>
<tr>
<th>Nr</th>
<th>EUNIS-3 code</th>
<th>EUNIS-3 habitat name</th>
<th>Relationship to CLC (D. Moss)</th>
<th>Relationship to CLC (relevés)</th>
<th>BGR filter</th>
<th>Topo filter</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>F1.1</td>
<td>Shrub tundra</td>
<td>Sparsely vegetated (333)</td>
<td>32 + 27, 31</td>
<td>Yes</td>
<td>No</td>
</tr>
<tr>
<td>2</td>
<td>F2.1</td>
<td>Subarctic and alpine dwarf Salix scrub</td>
<td>Sparsely vegetated (333)</td>
<td>32 + 31</td>
<td>Yes</td>
<td>No</td>
</tr>
<tr>
<td>3</td>
<td>F2.2a</td>
<td>Alpine and subalpine ericoid heath</td>
<td>Moors and heathland (322)</td>
<td>32 + 26, 27, 31</td>
<td>No</td>
<td>No</td>
</tr>
<tr>
<td>4</td>
<td>F2.2b</td>
<td>Alpine and subalpine Juniperus scrub</td>
<td>Moors and heathland (322)</td>
<td>32 + 26, 27, 29</td>
<td>No</td>
<td>No</td>
</tr>
<tr>
<td>5</td>
<td>F2.3</td>
<td>Subalpine deciduous scrub</td>
<td>Moors and heathland (322)</td>
<td>27 + 26, 31, 32, 29</td>
<td>No</td>
<td>No</td>
</tr>
<tr>
<td>6</td>
<td>F2.4</td>
<td>Subalpine Pinus mugo scrub</td>
<td>Moors and heathland (322)</td>
<td>27 + 26, 29, 32</td>
<td>No</td>
<td>No</td>
</tr>
<tr>
<td>7</td>
<td>F3.1a</td>
<td>Lowland to montane temperate and submediterranean Juniperus scrub</td>
<td>Moors and heathland (322)</td>
<td>27 + 26, 29, 32</td>
<td>No</td>
<td>No</td>
</tr>
<tr>
<td>8</td>
<td>F3.1b</td>
<td>Temperate Rubus scrub</td>
<td>Moors and heathland (322)</td>
<td>27 + 26, 29</td>
<td>No</td>
<td>No</td>
</tr>
<tr>
<td>9</td>
<td>F3.1c</td>
<td>Lowland to montane temperate and submediterranean genistoid scrub</td>
<td>Moors and heathland (322)</td>
<td>27 + 26, 28, 29</td>
<td>No</td>
<td>No</td>
</tr>
<tr>
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<td>F3.1e</td>
<td>Temperate and submediterranean thorn scrub</td>
<td>Moors and heathland (322)</td>
<td>27 + 26, 29</td>
<td>Yes</td>
<td>No</td>
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<tr>
<td>11</td>
<td>F3.1f</td>
<td>Low steppic scrub</td>
<td>Sparsely vegetated (333)</td>
<td>32 + 29</td>
<td>Yes</td>
<td>No</td>
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<td>F3.1g</td>
<td>Corylus avellana scrub</td>
<td>?</td>
<td>23, 24, 25, 26, 29, 31</td>
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<td>F3.1h</td>
<td>Temperate woodland clearing scrub</td>
<td>Sparsely vegetated (333)</td>
<td>23, 24, 25, 26, 27, 29</td>
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<td>F4.1</td>
<td>Wet heath</td>
<td>Moors and heathland (322)</td>
<td>27 + 26, 36</td>
<td>No</td>
<td>No</td>
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<td>15</td>
<td>F4.2</td>
<td>Dry heath</td>
<td>Moors and heathland (322)</td>
<td>27 + 26, 36</td>
<td>No</td>
<td>No</td>
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<tr>
<td>16</td>
<td>F5.2</td>
<td>Arborescent matorral and maquis</td>
<td>Sclerophyllous vegetation (323)</td>
<td>28 + 29</td>
<td>Yes</td>
<td>No</td>
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<tr>
<td>17</td>
<td>F5.3</td>
<td>Submediterranean pseudomaquis</td>
<td>Sclerophyllous vegetation (323)</td>
<td>28 + 23, 24, 25, 26, 28, 29</td>
<td>Yes</td>
<td>No</td>
</tr>
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<td>18</td>
<td>F5.4</td>
<td>Spartium junceum fields</td>
<td>Moors and heathland (322)</td>
<td>27 + 26, 28, 29</td>
<td>Yes</td>
<td>No</td>
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<td>19</td>
<td>F5.5</td>
<td>Thermo-Mediterranean scrub</td>
<td>Sclerophyllous vegetation (323)</td>
<td>28</td>
<td>Yes</td>
<td>No</td>
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<tr>
<td>20</td>
<td>F6.1a</td>
<td>Western basiphilous garrigue</td>
<td>Sclerophyllous vegetation (323)</td>
<td>28 + 26, 27, 29</td>
<td>No</td>
<td>Yes</td>
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<tr>
<td>21</td>
<td>F6.1b</td>
<td>Western acidophilous garrigue</td>
<td>Sclerophyllous vegetation (323)</td>
<td>28 + 26, 29, 30</td>
<td>No</td>
<td>Yes</td>
</tr>
<tr>
<td>22</td>
<td>F6.2</td>
<td>Eastern garrigue</td>
<td>Sclerophyllous vegetation (323)</td>
<td>28 + 26, 29, 32</td>
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<td>F6.6</td>
<td>Supra-Mediterranean garrigue</td>
<td>Sclerophyllous vegetation (323)</td>
<td>28 + 26, 29, 31, 32</td>
<td>No</td>
<td>Yes</td>
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<tr>
<td>24</td>
<td>F6.7</td>
<td>Mediterranean gypsum scrub</td>
<td>Moors and heathland (322)</td>
<td>27 + 28, 32</td>
<td>Yes</td>
<td>No</td>
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<tr>
<td></td>
<td></td>
<td>Habitat Type</td>
<td>Vegetation Type</td>
<td>Habitat Probability</td>
<td>Suitability</td>
<td>Suitability</td>
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<td>---------------------</td>
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<td>-------------</td>
</tr>
<tr>
<td>25</td>
<td>F6.8a</td>
<td>Mediterranean halo-nitrophilous scrub</td>
<td>Moors and heathland (322)</td>
<td>27 + 28</td>
<td>Yes</td>
<td>Np</td>
</tr>
<tr>
<td>26</td>
<td>F7.1</td>
<td>Western Mediterranean coastal garrigue</td>
<td>Sclerophyllous vegetation (323)</td>
<td>28 + 30</td>
<td>No</td>
<td>Yes</td>
</tr>
<tr>
<td>27</td>
<td>F7.3</td>
<td>Eastern Mediterranean spiny heath (phrygana)</td>
<td>Sclerophyllous vegetation (323)</td>
<td>28 + 26, 30, 32</td>
<td>No</td>
<td>Yes</td>
</tr>
<tr>
<td>28</td>
<td>F7.4a</td>
<td>Western Mediterranean mountain heath</td>
<td>Sclerophyllous vegetation (323)</td>
<td>28 + 26, 27, 28, 29, 32</td>
<td>No</td>
<td>Yes</td>
</tr>
<tr>
<td>29</td>
<td>F7.4b</td>
<td>Central Mediterranean mountain heath</td>
<td>Sclerophyllous vegetation (323)</td>
<td>28 + 26, 32</td>
<td>No</td>
<td>Yes</td>
</tr>
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<td>F7.4c</td>
<td>Eastern Mediterranean mountain heath</td>
<td>Sclerophyllous vegetation (323)</td>
<td>28 + 27, 29, 32</td>
<td>No</td>
<td>Yes</td>
</tr>
<tr>
<td>31</td>
<td>F9.1a</td>
<td>Arctic, boreal and alpine riparian scrub</td>
<td>Moors and heathland (322)</td>
<td>27 + 26, 29, 32</td>
<td>Yes</td>
<td>Yes</td>
</tr>
<tr>
<td>32</td>
<td>F9.1b</td>
<td>Temperate riparian scrub</td>
<td>Moors and heathland (322)</td>
<td>27 + 26, 30, 40</td>
<td>Yes</td>
<td></td>
</tr>
<tr>
<td>33</td>
<td>F9.2</td>
<td>Salix fen scrub</td>
<td>Moors and heathland (322)</td>
<td>27 + 26, 28</td>
<td>No</td>
<td>No</td>
</tr>
<tr>
<td>34</td>
<td>F9.3</td>
<td>Mediterranean riparian scrub</td>
<td>Moors and heathland (322)</td>
<td>27 + 26, 28</td>
<td>Yes</td>
<td>Yes</td>
</tr>
<tr>
<td>35</td>
<td>B1.5a</td>
<td>Atlantic and Baltic coastal Emptetrum heaths</td>
<td>Moors and heathland (322)</td>
<td>27 + 26, 30</td>
<td>Yes</td>
<td>Yes</td>
</tr>
<tr>
<td>36</td>
<td>B1.5b</td>
<td>Atlantic coastal Calluna and Ulex heaths</td>
<td>Moors and heathland (322)</td>
<td>27 + 26, 30</td>
<td>Yes</td>
<td>Yes</td>
</tr>
<tr>
<td>37</td>
<td>B1.6a</td>
<td>Atlantic and Baltic coastal dune scrub</td>
<td>Moors and heathland (322)</td>
<td>27 + 26, 30</td>
<td>Yes</td>
<td>Yes</td>
</tr>
<tr>
<td>38</td>
<td>B2.5</td>
<td>Shingle and gravel beaches with scrub</td>
<td>Moors and heathland (322)</td>
<td>27 + 26, 30, 37</td>
<td>No</td>
<td>Yes</td>
</tr>
</tbody>
</table>

Annex I shows all 38 habitat probability maps for Heathland, Scrub and Tundra, including the habitat distribution and suitability maps, and a detailed example of the habitat probability maps. In total 152 maps (38 x 4).
References


Annex I: the EUNIS heath, scrub and tundra habitat probability maps
B1.5a - Atlantic and Baltic coastal Empetrum heaths

**Distribution map** based on vegetation relevés

**Suitability map**. Background data for model randomly selected from study area
Geographic restriction distribution data
Coastal sand dunes and sea shores according to Bohn map (P1)

Maxent modelling statistics
- AUC training (0-1) 0.9983
- AUC test (0-1) 0.9978

Contribution variables to the Maxent model (%)
- Distance to water 65.2878
- Temperature seasonality (stdev * 100) 16.8567
- Precipitation of warmest quarter 9.181
- pH (water) 3.1799
- Volume % of coarse fragments (> 2 mm) 1.8697
- Soil organic carbon content (%) 1.6373
- Mean temperature of wettest quarter 0.9176
- Weight in % of silt particles (0.0002-0.05 mm) 0.4938
- Weight in % of clay particles (<0.0002 mm) 0.4169
- Annual precipitation 0.0401
- Cation Exchange Capacity 0.0174
- Solar radiation 0.0154
- Weight in % of sand particles (0.05-2 mm) 0
- Bulk density (kg/m³) 0
- Potential evapotranspiration 0
- Precipitation seasonality (coef. of var.) 0

Remarks
Inland prediction should be ignored. Hardly any prediction in the Baltic region. Coastal habitats are difficult to model and often deliver unsatisfying results. There are various reasons for this; 1) the area in which the habitat occurs is very small, 2) some observations do not match with all environmental layers and are therefore left out of the analysis, 3) lack of observation data in large parts of the potential area.
Decision rules:

- **Relationship to CLC (D. Moss)**: Moors and heathland (322)
- **Relationship to CLC (releves)**: 27 + 26, 30
- **BGR filter**: Yes
- **Topo filter**: Yes
B1.5b - Atlantic coastal Calluna and Ulex heaths

**Distribution map** based on vegetation relevés

**Suitability map**. Background data for model randomly selected from study area
Geographic restriction distribution data
Coastal sand dunes and sea shores according to Bohn map (P1)

Maxent modelling statistics

<table>
<thead>
<tr>
<th></th>
<th>AUC training (0-1)</th>
<th>AUC test (0-1)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>0.9971</td>
<td>0.9984</td>
</tr>
</tbody>
</table>

Contribution variables to the Maxent model (%)

- Distance to water: 48.7813
- Temperature seasonality (stdev * 100): 27.8413
- pH (water): 7.4575
- Precipitation of warmest quarter: 5.0517
- Mean temperature of wettest quarter: 3.4666
- Soil organic carbon content (%): 3.0278
- Bulk density (kg/m³): 1.711
- Weight in % of silt particles (0.0002-0.05 mm): 1.077
- Precipitation seasonality (coef. of var.): 0.4732
- Volume % of coarse fragments (> 2 mm): 0.3776
- Annual precipitation: 0.3312
- Potential evapotranspiration: 0.1383
- Solar radiation: 0.061
- Weight in % of clay particles (<0.0002 mm): 0.0525
- Cation Exchange Capacity: 0
- Weight in % of sand particles (0.05-2 mm): 0

Remarks

Inland prediction should be ignored. Hardly any prediction in the along the French coast.
Coastal habitats are difficult to model and often deliver unsatisfying results. There are various reasons for this; 1) The area in which the habitat occurs is very small, 2) some observations do not match with all environmental layers and are therefore left out of the analysis, 3) lack of observations in large parts of the potential area.
Decision rules:

- Relationship to CLC (D. Moss): Moors and heathland (322)
- Relationship to CLC (releves): 27 + 26, 30
- BGR filter: Yes
- Topo filter: Yes
B1.6a - Atlantic and Baltic coastal dune scrub

**Distribution map** based on vegetation relevés

**Suitability map**. Background data for model randomly selected from study area
Geographic restriction distribution data
Coastal sand dunes and sea shores according to Bohn map (P1)

Maxent modelling statistics

<table>
<thead>
<tr>
<th></th>
<th>AUC training (0-1)</th>
<th>AUC test (0-1)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>0.9944</td>
<td>0.9974</td>
</tr>
</tbody>
</table>

Contribution variables to the Maxent model (%)

- Temperature seasonality (stdev * 100): 41.7572
- pH (water): 23.9492
- Soil organic carbon content (%): 9.389
- Volume % of coarse fragments (> 2 mm): 7.6674
- Distance to water: 5.2114
- Precipitation seasonality (coef. of var.): 4.9242
- Bulk density (kg/m³): 2.5775
- Potential evapotranspiration: 2.0785
- Cation Exchange Capacity: 0.7106
- Weight in % of silt particles (0.0002-0.05 mm): 0.5353
- Weight in % of clay particles (<0.0002 mm): 0.4876
- Mean temperature of wettest quarter: 0.3381
- Precipitation of warmest quarter: 0.2755
- Solar radiation: 0
- Weight in % of sand particles (0.05-2 mm): 0
- Annual precipitation: 0

Remarks
Inland prediction should be ignored. Hardly any prediction in the along the French coast.
Coastal habitats are difficult to model and often deliver unsatisfying results. There are various reasons for this; 1) the area in which the habitat occurs is very small, 2) some observations do not match with all environmental layers and are therefore left out of the analysis, 3) lack of observations in large parts of the potential area.
**Probability map** (overview)

**Probability map** (detail)

**Decision rules:**
- Relationship to CLC (D. Moss): Moors and heathland (322)
- Relationship to CLC (releves): 27 + 26, 30
- BGR filter: Yes
- Topo filter: Yes
B2.5 - Shingle and gravel beaches with scrub

Distribution map based on vegetation relevés

Suitability map. Background data for model randomly selected from study area
Geographic restriction distribution data
Coastal sand dunes and sea shores according to Bohn map (P1)

Maxent modelling statistics

<table>
<thead>
<tr>
<th>AUC training (0-1)</th>
<th>0.9905</th>
</tr>
</thead>
<tbody>
<tr>
<td>AUC test (0-1)</td>
<td>0.9929</td>
</tr>
</tbody>
</table>

Contribution variables to the Maxent model (%)

<table>
<thead>
<tr>
<th>Contribution</th>
<th>%</th>
</tr>
</thead>
<tbody>
<tr>
<td>Temperature seasonality (stdev * 100)</td>
<td>34.3603</td>
</tr>
<tr>
<td>pH (water)</td>
<td>29.8844</td>
</tr>
<tr>
<td>Soil organic carbon content (%)</td>
<td>9.6488</td>
</tr>
<tr>
<td>Weight in % of silt particles (0.0002-0.05 mm)</td>
<td>5.8407</td>
</tr>
<tr>
<td>Distance to water</td>
<td>5.4668</td>
</tr>
<tr>
<td>Bulk density (kg/m³)</td>
<td>5.0144</td>
</tr>
<tr>
<td>Precipitation seasonality (coef. of var.)</td>
<td>4.0617</td>
</tr>
<tr>
<td>Potential evapotranspiration</td>
<td>2.2699</td>
</tr>
<tr>
<td>Volume % of coarse fragments (&gt; 2 mm)</td>
<td>0.8194</td>
</tr>
<tr>
<td>Cation Exchange Capacity</td>
<td>0.7953</td>
</tr>
<tr>
<td>Weight in % of clay particles (&lt;0.0002 mm)</td>
<td>0.7418</td>
</tr>
<tr>
<td>Mean temperature of wettest quarter</td>
<td>0.47</td>
</tr>
<tr>
<td>Weight in % of sand particles (0.05-2 mm)</td>
<td>0.4136</td>
</tr>
<tr>
<td>Precipitation of warmest quarter</td>
<td>0.1644</td>
</tr>
<tr>
<td>Solar radiation</td>
<td>0</td>
</tr>
<tr>
<td>Annual precipitation</td>
<td>0</td>
</tr>
</tbody>
</table>

Remarks
Inland prediction should be ignored. Hardly any prediction in large parts of the potential area.
Coastal habitats are difficult to model and often deliver unsatisfying results. There are various reasons for this; 1) the area in which the habitat occurs is very small, 2) some observations do not match with all environmental layers and are therefore left out of the analysis, 3) lack of observations in large parts of the potential area.
Probability map (overview)

Probability map (detail)

Decision rules:

- Relationship to CLC (D. Moss): Moors and heathland (322)
- Relationship to CLC (releves): 27 + 26, 30, 37
- BGR filter: No
- Topo filter: Yes
F1.1 - Shrub tundra

**Distribution map** based on vegetation relevés

**Suitability map.** Background data for model randomly selected from study area
**Geographic restriction distribution data**
Arctic polar deserts and Arctic tundras according to the Bohn map (A1 & B1)

**Maxent modelling statistics**

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Value</th>
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<tbody>
<tr>
<td>AUC training (0-1)</td>
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<tr>
<td>AUC test (0-1)</td>
<td>0.9854</td>
</tr>
</tbody>
</table>

**Contribution variables to the Maxent model (%)**

- Soil organic carbon content (‰) 67.523
- Annual precipitation 14.9997
- Mean temperature of wettest quarter 11.3119
- Distance to water 2.3658
- Solar radiation 1.9878
- Weight in % of clay particles (<0.0002 mm) 1.6928
- Precipitation of warmest quarter 1.0834
- pH (water) 0.8214
- Potential evapotranspiration 0.1833
- Volume % of coarse fragments (> 2 mm) 0.0186
- Weight in % of silt particles (0.0002-0.05 mm) 0
- Weight in % of sand particles (0.05-2 mm) 0
- Precipitation seasonality (coef. of var.) 0
- Temperature seasonality (stdev * 100) 0
- Cation Exchange Capacity 0
- Bulk density (kg/m³) 0

**Remarks**

-
Decision rules:

- Relationship to CLC (D. Moss): Sparsely vegetated (333)
- Relationship to CLC (releves): 32 + 27, 31
- BGR filter: Yes
- Topo filter: No
F2.1 - Subarctic and alpine dwarf Salix scrub

Distribution map based on vegetation relevés

Suitability map. Background data for model randomly selected from heathland-scrub-tundra data set
Geographic restriction distribution data

Maxent modelling statistics

<table>
<thead>
<tr>
<th>Metric</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>AUC training (0-1)</td>
<td>0.9564</td>
</tr>
<tr>
<td>AUC test (0-1)</td>
<td>0.9398</td>
</tr>
</tbody>
</table>

Contribution variables to the Maxent model (%)

- Soil organic carbon content (%) 63.9081
- Weight in % of silt particles (0.0002-0.05 mm) 16.818
- Weight in % of sand particles (0.05-2 mm) 9.0678
- Precipitation of warmest quarter 7.7665
- Cation Exchange Capacity 3.4397
- pH (water) 1.7674
- Weight in % of clay particles (<0.0002 mm) 1.2574
- Volume % of coarse fragments (> 2 mm) 1.2559
- Precipitation seasonality (coef. of var.) 1.1556
- Solar radiation 1.0445
- Annual precipitation 0.6612
- Mean temperature of wettest quarter 0.5955
- Temperature seasonality (stdev * 100) 0.5363
- Potential evapotranspiration 0.4298
- Bulk density (kg/m³) 0.162
- Distance to water 0.0459

Remarks

-
Decision rules:

<table>
<thead>
<tr>
<th>Rule</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Relationship to CLC (D. Moss)</td>
<td>Sparsely vegetated (333)</td>
</tr>
<tr>
<td>Relationship to CLC (releves)</td>
<td>32 + 31</td>
</tr>
<tr>
<td>BGR filter</td>
<td>Yes</td>
</tr>
<tr>
<td>Topo filter</td>
<td>No</td>
</tr>
</tbody>
</table>
F2.2a - Alpine and subalpine ericoid heath

Distribution map based on vegetation relevés

Suitability map. Background data for model randomly selected from study area
**Geographic restriction distribution data**

**Maxent modelling statistics**

<table>
<thead>
<tr>
<th>AUC training (0-1)</th>
<th>0.901</th>
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<tbody>
<tr>
<td>AUC test (0-1)</td>
<td>0.8861</td>
</tr>
</tbody>
</table>

**Contribution variables to the Maxent model (%)**

- Annual precipitation: 33.5265
- Volume % of coarse fragments (> 2 mm): 18.1061
- Weight in % of sand particles (0.05-2 mm): 14.3018
- Precipitation of warmest quarter: 9.6382
- Soil organic carbon content (%): 3.6068
- Bulk density (kg/m³): 2.8496
- pH (water): 1.8458
- Weight in % of clay particles (<0.0002 mm): 1.2887
- Solar radiation: 1.0794
- Temperature seasonality (stdev * 100): 1.0636
- Weight in % of silt particles (0.0002-0.05 mm): 0.6931
- Cation Exchange Capacity: 0.6751
- Mean temperature of wettest quarter: 0.5933
- Precipitation seasonality (coef. of var.): 0.1903
- Potential evapotranspiration: 0.1302
- Distance to water: 0

**Remarks**

Prediction in eastern part of Europe (Caucasus) is uncertain due to lack of data for that area.
Decision rules:

- Relationship to CLC (D. Moss): Moors and heathland (322)
- Relationship to CLC (releves): 27 + 26, 31, 32
- BGR filter: No
- Topo filter: No
F2.2b - Alpine and subalpine Juniperus scrub

Distribution map based on vegetation relevés

Suitability map. Background data for model randomly selected from study area
Geographic restriction distribution data

Maxent modelling statistics

AUC training (0-1) 0.9745
AUC test (0-1) 0.8935

Contribution variables to the Maxent model (%)

- Weight in % of sand particles (0.05-2 mm): 28.4589
- Volume % of coarse fragments (> 2 mm): 19.0389
- Temperature seasonality (stdev * 100): 15.818
- Annual precipitation: 12.8929
- Bulk density (kg/m³): 7.0208
- Soil organic carbon content (%): 5.0007
- Solar radiation: 4.0254
- Precipitation of warmest quarter: 2.9895
- Cation Exchange Capacity: 2.2118
- Potential evapotranspiration: 1.9823
- Weight in % of silt particles (0.0002-0.05 μm): 1.363
- Mean temperature of wettest quarter: 0.9385
- Weight in % of clay particles (<0.0002 mm): 0.5595
- Precipitation seasonality (coef. of var.): 0.3548
- pH (water): 0.0419
- Distance to water: 0.004

Remarks
Prediction in eastern part of Europe (Caucasus, Turkey) uncertain due to lack of data for that area.
Decision rules:

- Relationship to CLC (D. Moss)
- Relationship to CLC (releves)
- BGR filter
- Topo filter

Moors and heathland (322)
27 + 26, 29, 32
No
No
F2.3 - Subalpine deciduous scrub

**Distribution map** based on vegetation relevés

**Suitability map**. Background data for model randomly selected from heathland-scrub-tundra data set
Geographic restriction distribution data

Maxent modelling statistics

<table>
<thead>
<tr>
<th>Statistic</th>
<th>Value</th>
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</thead>
<tbody>
<tr>
<td>AUC training (0-1)</td>
<td>0.9336</td>
</tr>
<tr>
<td>AUC test (0-1)</td>
<td>0.9223</td>
</tr>
</tbody>
</table>

Contribution variables to the Maxent model (%)

- Precipitation of warmest quarter: 24.867
- Weight in % of sand particles (0.05-2 mm): 17.4469
- Annual precipitation: 16.9077
- Temperature seasonality (stdev * 100): 13.9288
- Soil organic carbon content (%): 8.9444
- Solar radiation: 5.4636
- Precipitation seasonality (coef. of var.): 4.0239
- Cation Exchange Capacity: 3.7884
- Mean temperature of wettest quarter: 2.2471
- Potential evapotranspiration: 1.591
- Volume % of coarse fragments (> 2 mm): 1.1602
- Weight in % of silt particles (0.0002-0.05 mm): 1.0955
- Distance to water: 0.6474
- Bulk density (kg/m³): 0.6196
- pH (water): 0.5388
- Weight in % of clay particles (<0.0002 mm): 0.4739

Remarks
Prediction in Germany should be ignored and prediction in eastern part of Europe (Caucasus) uncertain due to lack of data for that area.
**Decision rules:**

- **Relationship to CLC (D. Moss):** Moors and heathland (322)
- **Relationship to CLC (releves):** 27 + 26, 31, 32, 29
- **BGR filter:** No
- **Topo filter:** No
F2.4 - Subalpine Pinus mugo scrub

Distribution map based on vegetation relevés

Suitability map. Background data for model randomly selected from heathland-scrub-tundra data set.
Geographic restriction distribution data

Maxent modelling statistics

<table>
<thead>
<tr>
<th>AUC training (0-1)</th>
<th>0.9143</th>
</tr>
</thead>
<tbody>
<tr>
<td>AUC test (0-1)</td>
<td>0.9149</td>
</tr>
</tbody>
</table>

Contribution variables to the Maxent model (%)

- Precipitation of warmest quarter: 43.9529
- Temperature seasonality (stdev * 100): 13.1648
- Weight in % of sand particles (0.05-2 mm): 11.1987
- Volume % of coarse fragments (> 2 mm): 9.3161
- Bulk density (kg/m³): 7.3518
- Potential evapotranspiration: 2.9277
- Annual precipitation: 2.7221
- Precipitation seasonality (coef. of var.): 2.6403
- Soil organic carbon content (%): 1.8856
- Mean temperature of wettest quarter: 1.5025
- Weight in % of silt particles (0.0002-0.05 mm): 1.415
- Solar radiation: 0.952
- Cation Exchange Capacity: 0.9019
- Distance to water: 0.7246
- Weight in % of clay particles (<0.0002 mm): 0.3665
- pH (water): 0.069

Remarks
Pinus mugo does not occur in Scandinavia and therefore the prediction in this area should be ignored. Prediction in eastern part of Europe (Caucasus) is uncertain due to lack of data for that area.
Decision rules:

- **Relationship to CLC (D. Moss):** Moors and heathland (322)
- **Relationship to CLC (releves):** 27 + 26, 29, 32
- **BGR filter:** No
- **Topo filter:** No
F3.1a - Lowland to montane temperate and submediterranean Juniperus scrub

**Distribution map** based on vegetation relevés

**Suitability map**. Background data for model randomly selected from study area
Geographic restriction distribution data

Maxent modelling statistics

<table>
<thead>
<tr>
<th>AUC training (0-1)</th>
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</tr>
</thead>
<tbody>
<tr>
<td>AUC test (0-1)</td>
<td>0.9168</td>
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</table>

Contribution variables to the Maxent model (%)

<table>
<thead>
<tr>
<th>Variable</th>
<th>Contribution</th>
</tr>
</thead>
<tbody>
<tr>
<td>Temperature seasonality (stdev * 100)</td>
<td>47.2878</td>
</tr>
<tr>
<td>Annual precipitation</td>
<td>16.9278</td>
</tr>
<tr>
<td>Soil organic carbon content (%)</td>
<td>11.6802</td>
</tr>
<tr>
<td>Solar radiation</td>
<td>11.098</td>
</tr>
<tr>
<td>Weight in % of sand particles (0.05-2 mm)</td>
<td>6.1532</td>
</tr>
<tr>
<td>Volume % of coarse fragments (&gt; 2 mm)</td>
<td>4.1454</td>
</tr>
<tr>
<td>Precipitation of warmest quarter</td>
<td>3.0896</td>
</tr>
<tr>
<td>Bulk density (kg/m³)</td>
<td>2.8954</td>
</tr>
<tr>
<td>Weight in % of silt particles (0.0002-0.05 mm)</td>
<td>2.8708</td>
</tr>
<tr>
<td>Precipitation seasonality (coef. of var.)</td>
<td>1.7383</td>
</tr>
<tr>
<td>Mean temperature of wettest quarter</td>
<td>1.1727</td>
</tr>
<tr>
<td>pH (water)</td>
<td>0.4748</td>
</tr>
<tr>
<td>Potential evapotranspiration</td>
<td>0.3306</td>
</tr>
<tr>
<td>Weight in % of clay particles (&lt;0.0002 mm)</td>
<td>0.2259</td>
</tr>
<tr>
<td>Cation Exchange Capacity</td>
<td>0.1047</td>
</tr>
<tr>
<td>Distance to water</td>
<td>0.0476</td>
</tr>
</tbody>
</table>

Remarks
-Prediction in eastern part of Europe (Caucasus, Turkey) is uncertain due to lack of data for that area.
Decision rules:

- Relationship to CLC (D. Moss): Moors and heathland (322)
- Relationship to CLC (releves): 27 + 26, 29, 32
- BGR filter: No
- Topo filter: No
F3.1b - Temperate Rubus scrub

**Distribution map** based on vegetation relevés

**Suitability map**. Background data for model randomly selected from study area
Geographic restriction distribution data

Maxent modelling statistics

<table>
<thead>
<tr>
<th>AUC training (0-1)</th>
<th>0.9025</th>
</tr>
</thead>
<tbody>
<tr>
<td>AUC test (0-1)</td>
<td>0.8724</td>
</tr>
</tbody>
</table>

Contribution variables to the Maxent model (%)

- Temperature seasonality (stdev * 100): 45.0235
- Soil organic carbon content (%): 22.8131
- Precipitation of warmest quarter: 16.3224
- Mean temperature of wettest quarter: 4.7928
- Cation Exchange Capacity: 3.1905
- Precipitation seasonality (coef. of var.): 2.4142
- Solar radiation: 1.4328
- Weight in % of silt particles (0.0002-0.05 mm): 0.9949
- Bulk density (kg/m³): 0.9704
- Weight in % of clay particles (<0.0002 mm): 0.8803
- Annual precipitation: 0.8323
- Volume % of coarse fragments (> 2 mm): 0.4803
- Distance to water: 0.4007
- Potential evapotranspiration: 0.2595
- pH (water): 0.2441
- Weight in % of sand particles (0.05-2 mm): 0.1634

Remarks

Poor model that is too much affected by the distribution of input data with a high concentration in NL and CZ. The prediction in eastern part of Europe (Caucasus, Turkey) is uncertain due to lack of data for that area.
Probability map (overview)

Probability map (detail)

Decision rules:

- Relationship to CLC (D. Moss)
  - Moors and heathland (322)
- Relationship to CLC (releves)
  - 27 + 26, 29
- BGR filter
  - No
- Topo filter
  - No
F3.1c - Lowland to montane temperate and submediterranean genistoid scrub

**Distribution map** based on vegetation relevés

**Suitability map**. Background data for model randomly selected from study area
Geographic restriction distribution data

Maxent modelling statistics

<table>
<thead>
<tr>
<th>AUC training (0-1)</th>
<th>0.9059</th>
</tr>
</thead>
<tbody>
<tr>
<td>AUC test (0-1)</td>
<td>0.8732</td>
</tr>
</tbody>
</table>

Contribution variables to the Maxent model (%)

- Temperature seasonality (stdev * 100) 66.1064
- Potential evapotranspiration 9.5905
- Soil organic carbon content (%) 6.821
- Bulk density (kg/m³) 4.9566
- Precipitation seasonality (coef. of var.) 2.9731
- Precipitation of warmest quarter 2.3412
- Solar radiation 2.3055
- Volume % of coarse fragments (> 2 mm) 2.1861
- Weight in % of silt particles (0.0002-0.05 mm) 1.6297
- Mean temperature of wettest quarter 1.2798
- Weight in % of clay particles (<0.0002 mm) 1.1946
- Annual precipitation 0.4269
- Weight in % of sand particles (0.05-2 mm) 0.2346
- pH (water) 0.0545
- Cation Exchange Capacity 0.0476
- Distance to water 0.0257

Remarks
Prediction in eastern part of Europe (Turkey) is uncertain due to lack of data for that area.
Probability map (overview)

Probability map (detail)

Decision rules:
- Relationship to CLC (D. Moss):
  - Moors and heathland (322)
- Relationship to CLC (releves):
  - 27 + 26, 28, 29
- BGR filter: No
- Topo filter: No
Distribution map based on vegetation relevés

Suitability map. Background data for model randomly selected from study area
Geographic restriction distribution data

Maxent modelling statistics

AUC training (0-1) 0.8197
AUC test (0-1) 0.8155

Contribution variables to the Maxent model (%)
- Temperature seasonality (stdev * 100) 56.5248
- Precipitation of warmest quarter 11.9079
- Soil organic carbon content (‰) 11.7472
- Bulk density (kg/m³) 5.5983
- Solar radiation 4.3068
- Cation Exchange Capacity 4.2608
- Annual precipitation 3.2244
- Potential evapotranspiration 1.965
- Weight in % of sand particles (0.05-2 mm) 1.0066
- Mean temperature of wettest quarter 0.9434
- Precipitation seasonality (coef. of var.) 0.8685
- Distance to water 0.7498
- Weight in % of clay particles (<0.0002 mm) 0.5767
- pH (water) 0.2574
- Volume % of coarse fragments (> 2 mm) 0.112
- Weight in % of silt particles (0.0002-0.05 mm) 0.0726

Remarks
Poor mode that is too much affected by the distribution of input data with a high concentration in NL and CZ. The prediction in eastern part of Europe (Caucasus, Turkey) is uncertain due to lack of data for that area.
Decision rules:

- Relationship to CLC (D. Moss): Moors and heathland (322)
- Relationship to CLC (releves): 27 + 26, 29
- BGR filter: Yes
- Topo filter: No
F3.1f - Low steppic scrub

Distribution map based on vegetation relevés

Suitability map. Background data for model randomly selected from heathland-scrub-tundra data set
**Geographic restriction distribution data**

**Maxent modelling statistics**

<table>
<thead>
<tr>
<th></th>
<th>AUC training (0-1)</th>
<th>AUC test (0-1)</th>
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</thead>
<tbody>
<tr>
<td></td>
<td>0.9839</td>
<td>0.9817</td>
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**Contribution variables to the Maxent model (%)**

<table>
<thead>
<tr>
<th>Contribution Variable</th>
<th>Contribution</th>
</tr>
</thead>
<tbody>
<tr>
<td>Temperature seasonality (stdev * 100)</td>
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<tr>
<td>Weight in % of sand particles (0.05-2 mm)</td>
<td>11.889</td>
</tr>
<tr>
<td>Annual precipitation</td>
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<tr>
<td>pH (water)</td>
<td>6.1524</td>
</tr>
<tr>
<td>Mean temperature of wettest quarter</td>
<td>5.0984</td>
</tr>
<tr>
<td>Potential evapotranspiration</td>
<td>4.5709</td>
</tr>
<tr>
<td>Soil organic carbon content (%)</td>
<td>2.3728</td>
</tr>
<tr>
<td>Weight in % of clay particles (&lt;0.0002 mm)</td>
<td>1.4129</td>
</tr>
<tr>
<td>Volume % of coarse fragments (&gt; 2 mm)</td>
<td>0.8514</td>
</tr>
<tr>
<td>Weight in % of silt particles (0.0002-0.05 mm)</td>
<td>0.6615</td>
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<tr>
<td>Precipitation of warmest quarter</td>
<td>0.4852</td>
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<tr>
<td>Precipitation seasonality (coef. of var.)</td>
<td>0.3781</td>
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<tr>
<td>Distance to water</td>
<td>0.3029</td>
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<tr>
<td>Bulk density (kg/m³)</td>
<td>0.2286</td>
</tr>
<tr>
<td>Cation Exchange Capacity</td>
<td>0.1622</td>
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<tr>
<td>Solar radiation</td>
<td>0.0496</td>
</tr>
</tbody>
</table>

**Remarks**

Prediction in eastern part of Europe is uncertain due to lack of data for that area.
Decision rules:

- Relationship to CLC (D. Moss): Sparsely vegetated (333)
- Relationship to CLC (releves): 32 + 29
- BGR filter: Yes
- Topo filter: No
F3.1g - Corylus avellana scrub

**Distribution map** based on vegetation relevés

**Suitability map**. Background data for model randomly selected from study area
Geographic restriction distribution data

Maxent modelling statistics

AUC training (0-1) 0.9214
AUC test (0-1) 0.9127

Contribution variables to the Maxent model (%)

<table>
<thead>
<tr>
<th>Variable</th>
<th>Contribution</th>
</tr>
</thead>
<tbody>
<tr>
<td>Temperature seasonality (stdev * 100)</td>
<td>38.4785</td>
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<tr>
<td>Annual precipitation</td>
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</tr>
<tr>
<td>Soil organic carbon content (%)</td>
<td>13.4663</td>
</tr>
<tr>
<td>Bulk density (kg/m³)</td>
<td>6.9894</td>
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<tr>
<td>Weight in % of clay particles (&lt;0.0002 mm)</td>
<td>6.0154</td>
</tr>
<tr>
<td>Volume % of coarse fragments (&gt; 2 mm)</td>
<td>4.1324</td>
</tr>
<tr>
<td>Precipitation of warmest quarter</td>
<td>3.8228</td>
</tr>
<tr>
<td>Solar radiation</td>
<td>2.1368</td>
</tr>
<tr>
<td>Cation Exchange Capacity</td>
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<tr>
<td>Precipitation seasonality (coef. of var.)</td>
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<tr>
<td>Mean temperature of wettest quarter</td>
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<tr>
<td>Weight in % of silt particles (0.0002-0.05 mm)</td>
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<td>Distance to water</td>
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</tr>
<tr>
<td>Potential evapotranspiration</td>
<td>0.2333</td>
</tr>
<tr>
<td>pH (water)</td>
<td>0.1342</td>
</tr>
<tr>
<td>Weight in % of sand particles (0.05-2 mm)</td>
<td>0.0344</td>
</tr>
</tbody>
</table>

Remarks
Prediction in eastern part of Europe is uncertain due to lack of data for that area.
Decision rules:

- Relationship to CLC (D. Moss): ?
- Relationship to CLC (releves): 23, 24, 25, 26, 29, 31
- BGR filter: Yes
- Topo filter: No
F3.1h - Temperate forest clearing scrub

**Distribution map** based on vegetation relevés

**Suitability map**. Background data for model randomly selected from study area
Geographic restriction distribution data

Maxent modelling statistics

<table>
<thead>
<tr>
<th>AUC training (0-1)</th>
<th>0.9574</th>
</tr>
</thead>
<tbody>
<tr>
<td>AUC test (0-1)</td>
<td>0.9256</td>
</tr>
</tbody>
</table>

Contribution variables to the Maxent model (%)

- Temperature seasonality (stdev * 100) 42.3336
- Soil organic carbon content (‰) 25.6775
- Precipitation of warmest quarter 6.175
- Potential evapotranspiration 6.1546
- Volume % of coarse fragments (> 2 mm) 5.506
- Weight in % of silt particles (0.0002-0.05 mm) 5.051
- Weight in % of clay particles (<0.0002 mm) 2.7162
- Weight in % of sand particles (0.05-2 mm) 1.2624
- Solar radiation 1.1384
- Bulk density (kg/m³) 1.0246
- Precipitation seasonality (coef. of var.) 0.954
- Annual precipitation 0.7647
- pH (water) 0.6205
- Cation Exchange Capacity 0.4204
- Mean temperature of wettest quarter 0.1205
- Distance to water 0.0265

Remarks
Prediction in eastern part of Europe is uncertain due to lack of data for that area.
Probability map (overview)

Decision rules:
- Relationship to CLC (D. Moss): Sparsely vegetated (333)
- Relationship to CLC (releves): 23, 24, 25, 26, 27, 29
- BGR filter: No
- Topo filter: No
F4.1 - Wet heath

**Distribution map** based on vegetation relevés

**Suitability map**. Background data for model randomly selected from study area
Geographic restriction distribution data

Maxent modelling statistics

<p>| | |</p>
<table>
<thead>
<tr>
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<th></th>
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<tbody>
<tr>
<td>AUC training (0-1)</td>
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<td>AUC test (0-1)</td>
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Contribution variables to the Maxent model (%)

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<th>Variable</th>
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<tr>
<td>Temperature seasonality (stdev * 100)</td>
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<tr>
<td>Potential evapotranspiration</td>
<td>6.5263</td>
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<tr>
<td>Soil organic carbon content (%)</td>
<td>5.217</td>
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<tr>
<td>Bulk density (kg/m³)</td>
<td>4.9738</td>
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<tr>
<td>pH (water)</td>
<td>4.9587</td>
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<td>Weight in % of silt particles (0.0002-0.05 mm)</td>
<td>1.1275</td>
</tr>
<tr>
<td>Precipitation seasonality (coef. of var.)</td>
<td>0.6302</td>
</tr>
<tr>
<td>Weight in % of clay particles (&lt;0.0002 mm)</td>
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<tr>
<td>Solar radiation</td>
<td>0.5099</td>
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<td>Precipitation of warmest quarter</td>
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<td>Mean temperature of wettest quarter</td>
<td>0.3431</td>
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<tr>
<td>Weight in % of sand particles (0.05-2 mm)</td>
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<td>Annual precipitation</td>
<td>0.1603</td>
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<td>Distance to water</td>
<td>0.0314</td>
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<tr>
<td>Cation Exchange Capacity</td>
<td>0.0011</td>
</tr>
<tr>
<td>Volume % of coarse fragments (&gt; 2 mm)</td>
<td>0.001</td>
</tr>
</tbody>
</table>

Remarks

-
Probability map (overview)

Probability map (detail)

Decision rules:

- Relationship to CLC (D. Moss) Moors and heathland (322)
- Relationship to CLC (releves) 27 + 26, 36
- BGR filter No
- Topo filter No
F4.2 - Dry heath

Distribution map based on vegetation relevés

Suitability map. Background data for model randomly selected from study area
Geographic restriction distribution data

Maxent modelling statistics

<p>| | |</p>
<table>
<thead>
<tr>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>AUC training (0-1)</td>
<td>0.7839</td>
</tr>
<tr>
<td>AUC test (0-1)</td>
<td>0.7792</td>
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Contribution variables to the Maxent model (%)

<table>
<thead>
<tr>
<th>Variable</th>
<th>Contribution</th>
</tr>
</thead>
<tbody>
<tr>
<td>Temperature seasonality (stdev * 100)</td>
<td>72.1137</td>
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<tr>
<td>Potential evapotranspiration</td>
<td>11.3945</td>
</tr>
<tr>
<td>Soil organic carbon content (%)</td>
<td>9.17</td>
</tr>
<tr>
<td>Annual precipitation</td>
<td>3.1502</td>
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<td>Precipitation seasonality (coef. of var.)</td>
<td>1.5042</td>
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<tr>
<td>Weight in % of clay particles (&lt;0.0002 mm)</td>
<td>0.4387</td>
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<tr>
<td>Volume % of coarse fragments (&gt; 2 mm)</td>
<td>0.432</td>
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<td>Weight in % of silt particles (0.0002-0.05 mm)</td>
<td>0.3866</td>
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<tr>
<td>Bulk density (kg/m³)</td>
<td>0.3832</td>
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<tr>
<td>Weight in % of sand particles (0.05-2 mm)</td>
<td>0.303</td>
</tr>
<tr>
<td>pH (water)</td>
<td>0.2384</td>
</tr>
<tr>
<td>Precipitation of warmest quarter</td>
<td>0.1225</td>
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<tr>
<td>Solar radiation</td>
<td>0.117</td>
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<tr>
<td>Distance to water</td>
<td>0.0888</td>
</tr>
<tr>
<td>Cation Exchange Capacity</td>
<td>0.0446</td>
</tr>
<tr>
<td>Mean temperature of wettest quarter</td>
<td>0.0238</td>
</tr>
</tbody>
</table>

Remarks
Prediction in eastern part of Europe is uncertain due to lack of data for that area.
Probability map (overview)

Probability map (detail)

Decision rules:

- Relationship to CLC (D. Moss): Moors and heathland (322)
- Relationship to CLC (releves): 27 + 26, 36
- BGR filter: No
- Topo filter: No
F5.1-2 - Arborescent matorral and maquis

**Distribution map** based on vegetation relevés

**Suitability map**. Background data for model randomly selected from heathland-scrub-tundra data set
Geographic restriction distribution data

Maxent modelling statistics

| AUC training (0-1) | 0.896 |
| AUC test (0-1)    | 0.8916 |

Contribution variables to the Maxent model (%)

- Precipitation of warmest quarter: 43.1301
- Soil organic carbon content (%): 19.0313
- Weight in % of clay particles (<0.0002 mm): 15.6443
- Solar radiation: 12.6142
- Precipitation seasonality (coef. of var.): 7.0148
- Potential evapotranspiration: 5.0247
- Temperature seasonality (stdev * 100): 2.3359
- Cation Exchange Capacity: 2.3304
- Weight in % of sand particles (0.05-2 mm): 2.1861
- Distance to water: 1.3011
- Mean temperature of wettest quarter: 1.0568
- Annual precipitation: 0.7252
- Bulk density (kg/m³): 0.7121
- pH (water): 0.3943
- Weight in % of silt particles (0.0002-0.05 mm): 0.1041
- Volume % of coarse fragments (> 2 mm): 0.1013

Remarks
Prediction in eastern part of Europe (Turkey) is uncertain due to lack of data for that area.
Probability map (overview)

Decision rules:
- Relationship to CLC (D. Moss): Sclerophyllous vegetation (323)
- Relationship to CLC (releves): $28 + 29$
- BGR filter: Yes
- Topo filter: No
F5.3 - Submediterranean pseudomaquis

**Distribution map** based on vegetation relevés

**Suitability map**. Background data for model randomly selected from study area
Geographic restriction distribution data

Maxent modelling statistics

<table>
<thead>
<tr>
<th>AUC training (0-1)</th>
<th>0.9786</th>
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<tbody>
<tr>
<td>AUC test (0-1)</td>
<td>0.9577</td>
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</table>

Contribution variables to the Maxent model (%)

- Temperature seasonality (stdev * 100) 27.2165
- Precipitation seasonality (coef. of var.) 13.3498
- Potential evapotranspiration 11.8113
- Weight in % of silt particles (0.0002-0.05 mm) 11.1609
- Volume % of coarse fragments (> 2 mm) 10.1288
- pH (water) 8.4849
- Soil organic carbon content (%) 6.334
- Precipitation of warmest quarter 5.0467
- Weight in % of sand particles (0.05-2 mm) 3.2053
- Weight in % of clay particles (<0.0002 mm) 2.2254
- Solar radiation 1.046
- Annual precipitation 0.7049
- Cation Exchange Capacity 0.3314
- Mean temperature of wettest quarter 0
- Bulk density (kg/m³) 0
- Distance to water 0

Remarks
Bad model, because of prediction in Ireland, England, and Hungary where the habitat certainly does not occur. The reason is the poor relation to climatic factors. The prediction in eastern part of Europe (Turkey) is uncertain due to lack of data for that area.
### Decision rules:

- Relationship to CLC (D. Moss): 323
- Relationship to CLC (releves): 28 + 23, 24, 25, 26, 28, 29
- BGR filter: Yes
- Topo filter: No
F5.4 - Spartium junceum fields

**Distribution map** based on vegetation relevés

**Suitability map**. Background data for model randomly selected from study area
Geographic restriction distribution data

Maxent modelling statistics

<table>
<thead>
<tr>
<th>AUC training (0-1)</th>
<th>0.9873</th>
</tr>
</thead>
<tbody>
<tr>
<td>AUC test (0-1)</td>
<td>0.9804</td>
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</tbody>
</table>

Contribution variables to the Maxent model (%)

- Weight in % of clay particles (<0.0002 mm) 26.3259
- Temperature seasonality (stdev * 100) 22.7849
- Solar radiation 20.5001
- Annual precipitation 18.9034
- Potential evapotranspiration 13.4566
- Mean temperature of wettest quarter 6.4925
- Precipitation seasonality (coef. of var.) 3.7847
- pH (water) 2.8043
- Precipitation of warmest quarter 2.6968
- Bulk density (kg/m³) 1.4665
- Volume % of coarse fragments (> 2 mm) 0.7765
- Soil organic carbon content (%) 0.0964
- Distance to water 0.0908
- Cation Exchange Capacity 0.0768
- Weight in % of silt particles (0.0002-0.05 mm) 0.0555
- Weight in % of sand particles (0.05-2 mm) 0.0156

Remarks
Poor prediction for Spain due to lack of data. Spartium junceum actually occurs throughout Spain. The prediction in eastern part of Europe (Turkey) is uncertain due to lack of data for that area.
Probability map (overview)

Probability map (detail)

Decision rules:
- Relationship to CLC (D. Moss): Moors and heathland (322)
- Relationship to CLC (releves): 27 + 26, 28, 29
- BGR filter: Yes
- Topo filter: No
F5.5 - Thermo-Mediterranean scrub

**Distribution map** based on vegetation relevés

**Suitability map**. Background data for model randomly selected from study area
Geographic restriction distribution data

Maxent modelling statistics

<p>| | |</p>
<table>
<thead>
<tr>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>AUC training (0-1)</td>
<td>0.9874</td>
</tr>
<tr>
<td>AUC test (0-1)</td>
<td>0.9814</td>
</tr>
</tbody>
</table>

**Contribution variables to the Maxent model (%)**

- Temperature seasonality (stdev * 100) 38.2369
- Precipitation of warmest quarter 28.1046
- Precipitation seasonality (coef. of var.) 11.8497
- Mean temperature of wettest quarter 7.9066
- Weight in % of clay particles (<0.0002 mm) 3.5663
- Soil organic carbon content (%) 2.799
- pH (water) 2.5521
- Potential evapotranspiration 2.0164
- Weight in % of silt particles (0.0002-0.05 mm) 0.7747
- Volume % of coarse fragments (> 2 mm) 0.7313
- Weight in % of sand particles (0.05-2 mm) 0.655
- Bulk density (kg/m³) 0.3056
- Solar radiation 0.2875
- Annual precipitation 0.0773
- Distance to water 0.0443
- Cation Exchange Capacity 0

Remarks

-
Decision rules:

- Relationship to CLC (D. Moss)  
  Sclerophyllous vegetation (323)
- Relationship to CLC (releves)  
  28
- BGR filter  
  Yes
- Topo filter  
  No
F6.1a - Western basiphilous garrigue

**Distribution map** based on vegetation relevés

**Suitability map.** Background data for model randomly selected from heathland-scrub-tundra data set.
Geographic restriction distribution data

Maxent modelling statistics

<p>| | |</p>
<table>
<thead>
<tr>
<th></th>
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</thead>
<tbody>
<tr>
<td>AUC training (0-1)</td>
<td>0.9066</td>
</tr>
<tr>
<td>AUC test (0-1)</td>
<td>0.8951</td>
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Contribution variables to the Maxent model (%)

<table>
<thead>
<tr>
<th>Variable</th>
<th>Contribution</th>
</tr>
</thead>
<tbody>
<tr>
<td>Soil organic carbon content (‰)</td>
<td>40.1732</td>
</tr>
<tr>
<td>pH (water)</td>
<td>14.1712</td>
</tr>
<tr>
<td>Solar radiation</td>
<td>13.2695</td>
</tr>
<tr>
<td>Temperature seasonality (stdev * 100)</td>
<td>13.2573</td>
</tr>
<tr>
<td>Weight in % of clay particles (&lt;0.0002 mm)</td>
<td>8.9195</td>
</tr>
<tr>
<td>Precipitation seasonality (coef. of var.)</td>
<td>6.7018</td>
</tr>
<tr>
<td>Volume % of coarse fragments (&gt; 2 mm)</td>
<td>6.6706</td>
</tr>
<tr>
<td>Precipitation of warmest quarter</td>
<td>4.066</td>
</tr>
<tr>
<td>Bulk density (kg/m³)</td>
<td>3.7736</td>
</tr>
<tr>
<td>Weight in % of sand particles (0.05-2 mm)</td>
<td>0.7942</td>
</tr>
<tr>
<td>Potential evapotranspiration</td>
<td>0.7076</td>
</tr>
<tr>
<td>Distance to water</td>
<td>0.4612</td>
</tr>
<tr>
<td>Cation Exchange Capacity</td>
<td>0.3458</td>
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<tr>
<td>Mean temperature of wettest quarter</td>
<td>0.3284</td>
</tr>
<tr>
<td>Annual precipitation</td>
<td>0.2318</td>
</tr>
<tr>
<td>Weight in % of silt particles (0.0002-0.05 mm)</td>
<td>0.077</td>
</tr>
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</table>

Remarks
Prediction in eastern part of Europe (Turkey) is uncertain due to lack of data for that area.
Probability map (overview)

Decision rules:

- Relationship to CLC (D. Moss): Sclerophyllous vegetation (323)
- Relationship to CLC (releves): 28 + 26, 27, 29
- BGR filter: No
- Topo filter: Yes
F6.1b - Western acidophilous garrigue

*Distribution map* based on vegetation relevés

*Suitability map*. Background data for model randomly selected from heathland-scrub-tundra data set.
Geographic restriction distribution data

Maxent modelling statistics

AUC training (0-1) 0.9756
AUC test (0-1) 0.9415

Contribution variables to the Maxent model (%)
- Precipitation of warmest quarter 49.1645
- Soil organic carbon content (%) 16.0585
- Precipitation seasonality (coef. of var.) 13.5536
- Weight in % of clay particles (<0.0002 mm) 6.2395
- Solar radiation 5.8264
- Bulk density (kg/m³) 5.8124
- Weight in % of sand particles (0.05-2 mm) 3.5449
- Mean temperature of wettest quarter 2.3443
- Temperature seasonality (stdev * 100) 2.1301
- Volume % of coarse fragments (> 2 mm) 1.9674
- Weight in % of silt particles (0.0002-0.05 mm) 0.8768
- Annual precipitation 0.8398
- pH (water) 0.4292
- Potential evapotranspiration 0.3234
- Cation Exchange Capacity 0.14
- Distance to water 0.0443

Remarks
Predictions in the east Mediterranean area should be ignored.
Decision rules:

- **Relationship to CLC (D. Moss)**: Sclerophyllous vegetation (323)
- **Relationship to CLC (releves)**: 28 + 26, 29, 30
- **BGR filter**: No
- **Topo filter**: Yes
F6.2 - Eastern garrigue

**Distribution map** based on vegetation relevés

**Suitability map**. Background data for model randomly selected from study area
Geographic restriction distribution data

Maxent modelling statistics

AUC training (0-1) 0.9923
AUC test (0-1) 0.9916

Contribution variables to the Maxent model (%)

- Annual precipitation 39.9468
- Precipitation seasonality (coef. of var.) 37.2821
- Solar radiation 13.9163
- Potential evapotranspiration 11.4396
- Temperature seasonality (stdev * 100) 3.8421
- Precipitation of warmest quarter 2.5152
- Weight in % of clay particles (<0.0002 mm) 1.8396
- Weight in % of silt particles (0.0002-0.05 mm) 0.7661
- Soil organic carbon content (%) 0.633
- Distance to water 0.4519
- Volume % of coarse fragments (> 2 mm) 0.0504
- Cation Exchange Capacity 0.0256
- pH (water) 0.0137
- Mean temperature of wettest quarter 0.0112
- Weight in % of sand particles (0.05-2 mm) 0.0046
- Bulk density (kg/m³) 0

Remarks
Prediction in the Iberian Peninsula should be ignored and the prediction in eastern part of Europe (Turkey) is uncertain due to lack of data for that area.
Probability map (overview)

Decision rules:

- Relationship to CLC (D. Moss) Sclerophyllous vegetation (323)
- Relationship to CLC (releves) 28 + 26, 29, 32
- BGR filter No
- Topo filter Yes
F6.6 - Supra-Mediterranean garrigue

**Distribution map** based on vegetation relevés

**Suitability map.** Background data for model randomly selected from study area
Geographic restriction distribution data

Maxent modelling statistics

<table>
<thead>
<tr>
<th>Metric</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>AUC training (0-1)</td>
<td>0.982</td>
</tr>
<tr>
<td>AUC test (0-1)</td>
<td>0.9828</td>
</tr>
</tbody>
</table>

Contribution variables to the Maxent model (%)

<table>
<thead>
<tr>
<th>Variable</th>
<th>Contribution</th>
</tr>
</thead>
<tbody>
<tr>
<td>Temperature seasonality (stdev * 100)</td>
<td>35.5355</td>
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<tr>
<td>Volume % of coarse fragments (&gt; 2 mm)</td>
<td>22.2539</td>
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<tr>
<td>Annual precipitation</td>
<td>8.7275</td>
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<td>Weight in % of sand particles (0.05-2 mm)</td>
<td>7.5503</td>
</tr>
<tr>
<td>Bulk density (kg/m³)</td>
<td>5.5881</td>
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<tr>
<td>Precipitation seasonality (coef. of var.)</td>
<td>4.2175</td>
</tr>
<tr>
<td>Potential evapotranspiration</td>
<td>3.9178</td>
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<tr>
<td>Soil organic carbon content (%)</td>
<td>3.5513</td>
</tr>
<tr>
<td>Mean temperature of wettest quarter</td>
<td>2.6417</td>
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<tr>
<td>Precipitation of warmest quarter</td>
<td>2.4728</td>
</tr>
<tr>
<td>Solar radiation</td>
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<td>Cation Exchange Capacity</td>
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<tr>
<td>pH (water)</td>
<td>1.0109</td>
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<tr>
<td>Weight in % of silt particles (0.0002-0.05 mm)</td>
<td>0.0835</td>
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<td>Weight in % of clay particles (&lt;0.0002 mm)</td>
<td>0.0665</td>
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<tr>
<td>Distance to water</td>
<td>0.0067</td>
</tr>
</tbody>
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Remarks

-
Decision rules:

- **Relationship to CLC (D. Moss)**: Sclerophyllous vegetation (323)
- **Relationship to CLC (releves)**: 28 + 26, 29, 31, 32
- **BGR filter**: No
- **Topo filter**: Yes
F6.7 - Mediterranean gypsum scrub

*Distribution map* based on vegetation relevés

*Suitability map*. Background data for model randomly selected from heathland-scrub-tundra data set
Geographic restriction distribution data

Maxent modelling statistics

- AUC training (0-1) 0.9961
- AUC test (0-1) 0.9968

Contribution variables to the Maxent model (%)

- Potential evapotranspiration 21.1382
- Bulk density (kg/m³) 17.2713
- Soil organic carbon content (%) 15.4644
- Annual precipitation 3.5452
- Distance to water 2.2883
- Weight in % of sand particles (0.05-2 mm) 2.0027
- Precipitation seasonality (coef. of var.) 1.9717
- Temperature seasonality (stdev * 100) 1.3211
- Solar radiation 1.063
- Cation Exchange Capacity 0.3305
- Volume % of coarse fragments (> 2 mm) 0.3214
- Weight in % of silt particles (0.0002-0.05 mm) 0.2797
- Precipitation of warmest quarter 0.0221
- Mean temperature of wettest quarter 0
- Weight in % of clay particles (<0.0002 mm) 0
- pH (water) 0

Remarks

-
Probability map (overview)

Probability map (detail)

Decision rules:

- Relationship to CLC (D. Moss): Moors and heathland (322)
- Relationship to CLC (releves): 27 + 28, 32
- BGR filter: Yes
- Topo filter: No
F6.8a - Mediterranean halo-nitrophilous scrub

**Distribution map** based on vegetation relevés

**Suitability map**: Background data for model randomly selected from heathland-scrub-tundra data set
Geographic restriction distribution data

Maxent modelling statistics

<table>
<thead>
<tr>
<th>AUC training (0-1)</th>
<th>0.9759</th>
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</thead>
<tbody>
<tr>
<td>AUC test (0-1)</td>
<td>0.911</td>
</tr>
</tbody>
</table>

Contribution variables to the Maxent model (%)

- Soil organic carbon content (‰) 39.1685
- Precipitation of warmest quarter 16.0861
- Weight in % of clay particles (<0.0002 mm) 9.1065
- Annual precipitation 6.3801
- Solar radiation 4.6929
- Bulk density (kg/m³) 3.8742
- Temperature seasonality (stdev * 100) 3.4085
- Precipitation seasonality (coef. of var.) 3.2556
- Mean temperature of wettest quarter 2.8701
- Weight in % of sand particles (0.05-2 mm) 1.4553
- Distance to water 0.5444
- Cation Exchange Capacity 0.3583
- Potential evapotranspiration 0.3013
- pH (water) 0.2237
- Volume % of coarse fragments (> 2 mm) 0.0369
- Weight in % of silt particles (0.0002-0.05 mm) 0

Remarks
Prediction in eastern part of Europe is uncertain due to lack of data for that area.
**Decision rules:**

- **Relationship to CLC (D. Moss)**: Moors and heathland (322)
- **Relationship to CLC (releves)**: 27 + 28
- **BGR filter**: No
- **Topo filter**: No
F7.1 - Western Mediterranean coastal garrigue

*Distribution map* based on vegetation relevés

*Suitability map*. Background data for model randomly selected from heathland-scrub-tundra data set.
Geographic restriction distribution data

Maxent modelling statistics

<table>
<thead>
<tr>
<th>AUC training (0-1)</th>
<th>0.9931</th>
</tr>
</thead>
<tbody>
<tr>
<td>AUC test (0-1)</td>
<td>0.9766</td>
</tr>
</tbody>
</table>

Contribution variables to the Maxent model (%)

<table>
<thead>
<tr>
<th>Variable</th>
<th>Contribution</th>
</tr>
</thead>
<tbody>
<tr>
<td>Precipitation of warmest quarter</td>
<td>50.9292</td>
</tr>
<tr>
<td>Precipitation seasonality (coef. of var.)</td>
<td>20.7746</td>
</tr>
<tr>
<td>pH (water)</td>
<td>8.6147</td>
</tr>
<tr>
<td>Temperature seasonality (stdev * 100)</td>
<td>7.3093</td>
</tr>
<tr>
<td>Annual precipitation</td>
<td>5.8502</td>
</tr>
<tr>
<td>Solar radiation</td>
<td>2.5222</td>
</tr>
<tr>
<td>Weight in % of clay particles (&lt;0.0002 mm)</td>
<td>2.1209</td>
</tr>
<tr>
<td>Potential evapotranspiration</td>
<td>0.5715</td>
</tr>
<tr>
<td>Weight in % of silt particles (0.0002-0.05 mm)</td>
<td>0.5677</td>
</tr>
<tr>
<td>Distance to water</td>
<td>0.5286</td>
</tr>
<tr>
<td>Soil organic carbon content (%)</td>
<td>0.1832</td>
</tr>
<tr>
<td>Bulk density (kg/m³)</td>
<td>0.0243</td>
</tr>
<tr>
<td>Cation Exchange Capacity</td>
<td>0.0036</td>
</tr>
<tr>
<td>Weight in % of sand particles (0.05-2 mm)</td>
<td>0</td>
</tr>
<tr>
<td>Mean temperature of wettest quarter</td>
<td>0</td>
</tr>
<tr>
<td>Volume % of coarse fragments (&gt; 2 mm)</td>
<td>0</td>
</tr>
</tbody>
</table>

Remarks

-
**Probability map (overview)**

**Probability map (detail)**

**Decision rules:**
- Relationship to CLC (D. Moss): Sclerophyllous vegetation (323)
- Relationship to CLC (releves): 28 + 30
- BGR filter: No
- Topo filter: Yes
F7.3 - Eastern Mediterranean spiny heath (phrygana)

*Distribution map* based on vegetation relevés

*Suitability map*. Background data for model randomly selected from study area
Geographic restriction distribution data

Maxent modelling statistics

| AUC training (0-1) | 0.9935 |
| AUC test (0-1)    | 0.9902 |

Contribution variables to the Maxent model (%)

- Precipitation seasonality (coef. of var.) 49.1531
- Precipitation of warmest quarter 23.7552
- Temperature seasonality (stdev * 100) 13.0809
- Soil organic carbon content (%r) 10.193
- Weight in % of clay particles (<0.0002 mm) 1.3448
- Potential evapotranspiration 0.6572
- Volume % of coarse fragments (> 2 mm) 0.2328
- Bulk density (kg/m³) 0.1621
- Mean temperature of wettest quarter 0.1344
- Weight in % of sand particles (0.05-2 mm) 0.1124
- Weight in % of silt particles (0.0002-0.05 mm) 0.0856
- Cation Exchange Capacity 0.0163
- pH (water) 0.0147
- Distance to water 0.0032
- Solar radiation 0
- Annual precipitation 0

Remarks
Prediction in the Iberian Peninsula should be ignored.
**Probability map** (overview)

**Probability map** (detail)

**Decision rules:**
- Relationship to CLC (D. Moss): Sclerophyllous vegetation (323)
- Relationship to CLC (releves): 28 + 26, 30, 32
- BGR filter: No
- Topo filter: Yes
F7.4a - Western Mediterranean mountain hedgehog-heath

**Distribution map** based on vegetation relevés

**Suitability map**. Background data for model randomly selected from study area
Geographic restriction distribution data

Maxent modelling statistics

<table>
<thead>
<tr>
<th></th>
<th>Value</th>
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</thead>
<tbody>
<tr>
<td>AUC training (0-1)</td>
<td>0.978</td>
</tr>
<tr>
<td>AUC test (0-1)</td>
<td>0.9749</td>
</tr>
</tbody>
</table>

Contribution variables to the Maxent model (%)

- Temperature seasonality (stdev * 100): 44.1131
- Weight in % of sand particles (0.05-2 mm): 23.9843
- Volume % of coarse fragments (> 2 mm): 11.4203
- Weight in % of silt particles (0.0002-0.05 mm): 6.6428
- Bulk density (kg/m³): 4.8498
- Soil organic carbon content (%): 4.481
- Precipitation of warmest quarter: 1.9568
- Weight in % of clay particles (<0.0002 mm): 1.069
- Precipitation seasonality (coef. of var.): 0.4649
- Potential evapotranspiration: 0.4291
- Solar radiation: 0.3837
- Mean temperature of wettest quarter: 0.1845
- pH (water): 0.17
- Distance to water: 0.1268
- Annual precipitation: 0.0604
- Cation Exchange Capacity: 0.0109

Remarks

Prediction in Germany should be ignored.
Decision rules:

- **Relationship to CLC (D. Moss)**: Sclerophyllous vegetation (323)
- **Relationship to CLC (releves)**: 28 + 26, 27, 28, 29, 32
- **BGR filter**: No
- **Topo filter**: Yes
Distribution map based on vegetation relevés

Suitability map. Background data for model randomly selected from study area
Geographic restriction distribution data

Maxent modelling statistics

<p>| | |</p>
<table>
<thead>
<tr>
<th></th>
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<tbody>
<tr>
<td>AUC training (0-1)</td>
<td>0.9961</td>
</tr>
<tr>
<td>AUC test (0-1)</td>
<td>0.9995</td>
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Contribution variables to the Maxent model (%)

<p>| | |</p>
<table>
<thead>
<tr>
<th></th>
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</thead>
<tbody>
<tr>
<td>Distance to water</td>
<td>31.3163</td>
</tr>
<tr>
<td>Volume % of coarse fragments (&gt; 2 mm)</td>
<td>19.27</td>
</tr>
<tr>
<td>Temperature seasonality (stdev * 100)</td>
<td>13.3294</td>
</tr>
<tr>
<td>Precipitation of warmest quarter</td>
<td>11.3689</td>
</tr>
<tr>
<td>Weight in % of clay particles (&lt;0.0002 mm)</td>
<td>10.3818</td>
</tr>
<tr>
<td>Soil organic carbon content (%)</td>
<td>5.9573</td>
</tr>
<tr>
<td>Cation Exchange Capacity</td>
<td>2.2802</td>
</tr>
<tr>
<td>Annual precipitation</td>
<td>1.9425</td>
</tr>
<tr>
<td>Solar radiation</td>
<td>1.9071</td>
</tr>
<tr>
<td>Precipitation seasonality (coef. of var.)</td>
<td>0.6398</td>
</tr>
<tr>
<td>Mean temperature of wettest quarter</td>
<td>0.5679</td>
</tr>
<tr>
<td>pH (water)</td>
<td>0.2645</td>
</tr>
<tr>
<td>Potential evapotranspiration</td>
<td>0.2598</td>
</tr>
<tr>
<td>Weight in % of sand particles (0.05-2 mm)</td>
<td>0.204</td>
</tr>
<tr>
<td>Bulk density (kg/m³)</td>
<td>0</td>
</tr>
<tr>
<td>Weight in % of silt particles (0.0002-0.05 mm)</td>
<td>0</td>
</tr>
</tbody>
</table>

Remarks

Poor prediction, it should be restricted to Southern Europe. The prediction in eastern part of Europe (Turkey) uncertain due to lack of data for that area.
Probability map (overview)

Probability map (detail)

Decision rules:
- Relationship to CLC (D. Moss)  
  - Sclerophyllous vegetation (323)
- Relationship to CLC (releves)  
  - 28 + 26, 32
- BGR filter  
  - No
- Topo filter  
  - Yes
F7.4c - Eastern Mediterranean mountain hedgehog-heath

**Distribution map** based on vegetation relevés

**Suitability map**. Background data for model randomly selected from study area
Geographic restriction distribution data

Maxent modelling statistics

<p>| | |</p>
<table>
<thead>
<tr>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>AUC training (0-1)</td>
<td>0.991</td>
</tr>
<tr>
<td>AUC test (0-1)</td>
<td>0.9575</td>
</tr>
</tbody>
</table>

Contribution variables to the Maxent model (%)

- Mean temperature of wettest quarter: 23.2442
- Volume % of coarse fragments (> 2 mm): 18.8631
- Annual precipitation: 15.5779
- Precipitation of warmest quarter: 8.5922
- Weight in % of sand particles (0.05-2 mm): 7.6495
- Soil organic carbon content (%): 7.5398
- Potential evapotranspiration: 7.4881
- Precipitation seasonality (coef. of var.): 6.2742
- Solar radiation: 2.1758
- Bulk density (kg/m³): 2.1347
- Temperature seasonality (stdev * 100): 1.0485
- Weight in % of clay particles (<0.0002 mm): 0.6099
- Cation Exchange Capacity: 0.3437
- Distance to water: 0.3099
- Weight in % of silt particles (0.0002-0.05 mm): 0.2446
- pH (water): 0.0592

Remarks
Prediction in the Iberian Peninsula should be ignored and then prediction in eastern part of Europe (Turkey) is uncertain due to lack of data for that area.
**Decision rules:**

- Relationship to CLC (D. Moss): Sclerophyllous vegetation (323)
- Relationship to CLC (releves): 28 + 27, 29, 32
- BGR filter: No
- Topo filter: Yes
F9.1a - Arctic, boreal and alpine riparian scrub

*Distribution map* based on vegetation relevés

*Suitability map*. Background data for model randomly selected from study area
Geographic restriction distribution data

Maxent modelling statistics

<table>
<thead>
<tr>
<th>Statistic</th>
<th>Value</th>
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</thead>
<tbody>
<tr>
<td>AUC training (0-1)</td>
<td>0.9784</td>
</tr>
<tr>
<td>AUC test (0-1)</td>
<td>0.9554</td>
</tr>
</tbody>
</table>

Contribution variables to the Maxent model (%)

- Soil organic carbon content (‰): 39.4572
- Temperature seasonality (stdev * 100): 15.7363
- Mean temperature of wettest quarter: 13.3716
- Precipitation of warmest quarter: 5.4374
- Weight in % of clay particles (<0.0002 mm): 4.7988
- Bulk density (kg/m³): 3.9422
- Cation Exchange Capacity: 3.8722
- Precipitation seasonality (coef. of var.): 2.7475
- Solar radiation: 2.6305
- Annual precipitation: 2.062
- Weight in % of sand particles (0.05-2 mm): 1.6505
- Distance to water: 0.0549
- Volume % of coarse fragments (> 2 mm): 0.0194
- Potential evapotranspiration: 0.0006
- pH (water): 0
- Weight in % of silt particles (0.0002-0.05 mm): 0

Remarks
Prediction in eastern part of Europe (Caucasus) is uncertain due to lack of data for that area.
Probability map (overview)

EUNIS F9.1a probability map
F91a_prob3_t
Value
High : 0.97
Low : 0

Probability map (detail)

Decision rules:
- Relationship to CLC (D. Moss): Moors and heathland (322)
- Relationship to CLC (releves): 27 + 26, 29, 32
- BGR filter: Yes
- Topo filter: Yes
F9.1b - Temperate riparian scrub

**Distribution map** based on vegetation relevés

**Suitability map**. Background data for model randomly selected from study area
Geographic restriction distribution data

Maxent modelling statistics

AUC training (0-1) 0.9273
AUC test (0-1) 0.9289

Contribution variables to the Maxent model (%)

<table>
<thead>
<tr>
<th>Contribution Variable</th>
<th>Contribution</th>
</tr>
</thead>
<tbody>
<tr>
<td>Temperature seasonality (stdev * 100)</td>
<td>35.7082</td>
</tr>
<tr>
<td>Precipitation of warmest quarter</td>
<td>18.0478</td>
</tr>
<tr>
<td>Distance to water</td>
<td>16.3982</td>
</tr>
<tr>
<td>Bulk density (kg/m³)</td>
<td>12.7256</td>
</tr>
<tr>
<td>Weight in % of sand particles (0.05-2 mm)</td>
<td>4.8341</td>
</tr>
<tr>
<td>Soil organic carbon content (%)</td>
<td>4.7908</td>
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<tr>
<td>Potential evapotranspiration</td>
<td>2.9534</td>
</tr>
<tr>
<td>pH (water)</td>
<td>1.3926</td>
</tr>
<tr>
<td>Annual precipitation</td>
<td>0.8483</td>
</tr>
<tr>
<td>Weight in % of silt particles (0.0002-0.05 mm)</td>
<td>0.6835</td>
</tr>
<tr>
<td>Mean temperature of wettest quarter</td>
<td>0.4779</td>
</tr>
<tr>
<td>Volume % of coarse fragments (&gt; 2 mm)</td>
<td>0.3478</td>
</tr>
<tr>
<td>Precipitation seasonality (coef. of var.)</td>
<td>0.336</td>
</tr>
<tr>
<td>Cation Exchange Capacity</td>
<td>0.3013</td>
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<tr>
<td>Weight in % of clay particles (&lt;0.0002 mm)</td>
<td>0.1545</td>
</tr>
<tr>
<td>Solar radiation</td>
<td>0.0724</td>
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</tbody>
</table>

Remarks
Prediction in eastern part of Europe (Caucasus, Turkey) is uncertain due to lack of data for that area.
**Decision rules:**

- Relationship to CLC (D. Moss): Moors and heathland (322)
- Relationship to CLC (releves): 27 + 26, 30, 40
- BGR filter
- Topo filter: Yes
F9.2 - Salix fen scrub

Distribution map based on vegetation relevés

Suitability map. Background data for model randomly selected from heathland-scrub-tundra dataset
Geographic restriction distribution data

Maxent modelling statistics

<p>| | |</p>
<table>
<thead>
<tr>
<th></th>
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<tbody>
<tr>
<td>AUC training (0-1)</td>
<td>0.7945</td>
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<tr>
<td>AUC test (0-1)</td>
<td>0.7679</td>
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Contribution variables to the Maxent model (%)

<table>
<thead>
<tr>
<th>Variable</th>
<th>Weight in %</th>
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</thead>
<tbody>
<tr>
<td>Weight in % of silt particles (0.0002-0.05 mm)</td>
<td>32.1247</td>
</tr>
<tr>
<td>Volume % of coarse fragments (&gt; 2 mm)</td>
<td>31.0597</td>
</tr>
<tr>
<td>Precipitation of warmest quarter</td>
<td>11.8177</td>
</tr>
<tr>
<td>Solar radiation</td>
<td>5.6519</td>
</tr>
<tr>
<td>Soil organic carbon content (%)</td>
<td>5.1577</td>
</tr>
<tr>
<td>Weight in % of sand particles (0.05-2 mm)</td>
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<tr>
<td>Precipitation seasonality (coef. of var.)</td>
<td>3.6013</td>
</tr>
<tr>
<td>pH (water)</td>
<td>2.8443</td>
</tr>
<tr>
<td>Annual precipitation</td>
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</tr>
<tr>
<td>Potential evapotranspiration</td>
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<tr>
<td>Weight in % of clay particles (&lt;0.0002 mm)</td>
<td>1.8138</td>
</tr>
<tr>
<td>Bulk density (kg/m³)</td>
<td>1.6898</td>
</tr>
<tr>
<td>Distance to water</td>
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</tr>
<tr>
<td>Temperature seasonality (stdev * 100)</td>
<td>1.0261</td>
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<tr>
<td>Mean temperature of wettest quarter</td>
<td>1.021</td>
</tr>
<tr>
<td>Cation Exchange Capacity</td>
<td>0.2901</td>
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</tbody>
</table>

Remarks
Prediction in eastern part of Europe is uncertain due to lack of data for that area.
Probability map (overview)

Probability map (detail)

Decision rules:

- Relationship to CLC (D. Moss): Moors and heathland (322)
- Relationship to CLC (releves): 27 + 26, 28
- BGR filter: No
- Topo filter: No
F9.3 - Mediterranean riparian scrub

Distribution map based on vegetation relevés

Suitability map. Background data for model randomly selected from heathland-scrub-tundra data set
Geographic restriction distribution data

Maxent modelling statistics

<p>| | |</p>
<table>
<thead>
<tr>
<th></th>
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</thead>
<tbody>
<tr>
<td>AUC training (0-1)</td>
<td>0.972</td>
</tr>
<tr>
<td>AUC test (0-1)</td>
<td>0.9649</td>
</tr>
</tbody>
</table>

Contribution variables to the Maxent model (%)

- Precipitation of warmest quarter: 38.0612
- Bulk density (kg/m³): 35.2455
- Soil organic carbon content (%): 7.2959
- Weight in % of clay particles (<0.0002 mm): 7.2877
- Solar radiation: 6.5436
- Precipitation seasonality (coef. of var.): 3.1528
- Weight in % of silt particles (0.0002-0.05 mm): 3.1492
- Potential evapotranspiration: 2.3526
- pH (water): 0.8838
- Mean temperature of wettest quarter: 0.8456
- Volume % of coarse fragments (> 2 mm): 0.5201
- Annual precipitation: 0.4784
- Distance to water: 0.1944
- Temperature seasonality (stdev * 100): 0.1564
- Weight in % of sand particles (0.05-2 mm): 0.0878
- Cation Exchange Capacity: 0.0865

Remarks
Prediction in eastern part of Europe is uncertain due to lack of data for that area.
**Probability map** (overview)

**Probability map** (detail)

**Decision rules:**

- Relationship to CLC (D. Moss)
  - Moors and heathland (322)
- Relationship to CLC (releves)
  - 27 + 26, 28
- BGR filter
  - Yes
- Topo filter
  - Yes