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Descriptions of the European Environmental Zones and Strata

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Abstract

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The Environmental Stratification of Europe (EnS) was constructed in 2003 to provide relatively homogeneous regions suitable for strategic random sampling of ecological resources, the selection of sites for representative studies across the continent, and the provision of strata for modelling exercises. The dataset provides a generic classification that can be adapted for a specific objective, as well as providing suitable zonation for environmental reporting. The EnS has a 1 km2 resolution, and consists of 84 strata, which have been aggregated into thirteen Environmental Zones (EnZs). Since its publication, the dataset has been used in numerous scientific projects. In order to better understand the distribution of the diverse range of European environments, and to check the validity of the stratification, this report provides descriptions of all European EnS strata and the aggregated Environmental Zones using ancillary data sources for climate, geology, geomorphology, soils vegetation and land cover.

Keywords: Stratification, Classification, Europe, GIS

Photos cover: R.H.G. Jongman

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Contents

Summary

A consistent classification, or stratification, of land into relatively homogenous strata, provides a valuable framework for comparison and analysis of ecological and environmental. The Environmental Stratification of Europe (EnS) provides an appropriate stratification of the European biogeophysical environment. It was constructed using tried-and-tested statistical procedures so that the strata are unambiguously determined and, as far as possible, independent of personal bias data. The EnS aimed to identify relatively homogeneous regions suitable for strategic random sampling of ecological resources, the selection of sites for representative studies across the continent, and the provision of strata for modelling exercises. The dataset provides a generic classification that can be adapted for a specific objective, as well as providing suitable zonation for environmental reporting. The EnS has a 1- km^2 resolution, and consists of 84 strata, which have been aggregated into thirteen Environmental Zones (EnZs).

Over the last few years the dataset has been used in numerous studies. In the most simple form, the EnZs have been used to provide broad European environmental patterns, and as units for summary reporting. The European Commission has used the EnZs as the basis for assessing High Nature Value farmland and the identification of potential areas for cultivation of bio-energy crops. And the EnS will be developed further under the European Union (EU) European Bio-diversity Network project (EBONE), which aims to create a framework for surveillance and monitoring of species and habitats in Europe. Furthermore, the EnS strata have been linked to climate change scenarios, providing insights into broad environmental shifts, as well as providing a basis for the prediction of future crop yields and changes in biodiversity. Finally, the EnS has been used as a core data layer in a number of other European classifications.

In order to better understand the distribution of the diverse range of European environments, and to check the validity of the stratification, this report provides descriptions of all European EnS strata and the aggregated Environmental Zones using ancillary data sources for climate, geology, geomorphology, soils vegetation and land cover.

1 Introduction

Environmental assessments have become increasingly important to explore the state and trends of the European environments by identifying threats, evaluating existing policy targets and supporting future policy development. The classification of knowledge and data is essential for the analysis, summary and communication of the complexity of ecological and socio-economic systems. Furthermore, spatial stratifications can be used as basis for up-scaling, for stratified random sampling, for the selection of representative sites for studies across the continent, and for the provision of frameworks for modelling exercises (Metzger et al., 2005a). Such stratifications have been developed for this purpose in a range of countries (e.g. Great Britain (Bunce et al., 1996a, 1996b), Spain (Elena-Rosselló, 1997), New Zealand (Leathwick et al., 2003), Austria (Peterseil et al., 2004) and Norway (Bakkestuen et al., 2008)).

At the European scale, classification and mapping of the environment has been carried out since the Nineteenth Century. The original methods for spatially classifying environmental differences relied upon the intuitive interpretation of observed patterns, based on personal experience. Recent examples include maps of European landscapes (Meeus, 1995); the Biogeographic Regions Map of Europe (Roekaerts, 2002) and the Potential Natural Vegetation map (Bohn et al., 2000). These classifications provide descriptions of environmental regions, but are not suitable for sampling stratification or up-scaling, since class divisions depend on subjective judgment and cannot be reproduced independently. There were also early quantitative approaches. Firstly, there are the climatic vegetation classifications (cf. Köppen, 1900), and biome classifications used in dynamic global vegetation modelling (cf. Prentice et al., 1992). However, they distinguish only a few classes for Europe which is not sufficient to enable a suitable stratification (Metzger et al., 2005a). Secondly, statistical approaches in the construction of environmental stratifications have also been developed (e.g. Jones and Bunce, 1985; Bunce et al., 1996c).

The Environmental Stratification of Europe (EnS) forms the most recent and most detailed statistically derived stratification for Europe (Metzger et al., 2005a; Jongman et al., 2006). The EnS aimed to identify relatively homogeneous regions suitable for strategic random sampling of ecological resources, the selection of sites for representative studies across the continent, and the provision of strata for modelling exercises. The dataset provides a generic classification that can be adapted for a specific objective (Hazeu et al., 2011), as well as providing suitable zonation for environmental reporting.

In order to better understand the distribution of the diverse range of European environments, and to check the validity of the stratification, this report provides descriptions of all European EnS strata and the aggregated Environmental Zones (EnZs) using ancillary data sources for climate, geology, geomorphology, soils vegetation and land cover. Chapter 2 provides background information concerning the construction and applications of the EnS dataset, and discusses the data sources used for the descriptions. The following chapters provide the descriptions of the strata, organized per EnZ.

2 Methods

2.1 Environmental Stratification of Europe

Construction

The EnS was created using tried-and-tested statistical clustering procedures on primary biophysical variables, and covers a 'Greater European window' (11 °W - 32 °E, 34 °N -72 °N), extending into northern Africa. This wider extent was needed to permit statistical clustering that could distinguish environments whose main distribution is outside the European continent. Data were analysed at 1km^2 resolution.

Twenty of the most relevant available environmental variables were selected, based on those identified by statistical screening (Bunce et al., 1996c). These were (1) climate variables from the Climatic Research Unit (CRU) TS1.2 dataset (Mitchell et al., 2004), (2) elevation data from the United States Geological Survey HYDRO1k digital terrain model, and (3) indicators for oceanicity and northing. Principal Component Analysis (PCA) was used to compress 88% of the variation into three dimensions, which were subsequently clustered using an ISODATA clustering routine. The classification procedure is described in detail by Metzger et al. (2005a).

The EnS (Figure 1) comprises 84 strata, aggregated into thirteen Environmental Zones (EnZs). These were constructed using arbitrary divisions of the mean first principal component score of the strata, with the exception of Mediterranean mountains, which were separated on altitude. Figure 2 shows the relative coverage of the EnZs for the in the different European countries. Within each EnZ, the EnS strata have been given systematic names based on a three-letter abbreviation of the EnZ to which the stratum belongs and an ordered number based on the mean first principal component score of the PCA. For example, the EnS stratum with the highest mean principal component score within the Mediterranean South EnZ is named MDS1 (Mediterranean South one).

Robustness

Input data for the EnS were selected on the basis of previous experience (Bunce et al., 1996c) and are consistent with the accepted scientific understanding that at a continental scale of climatic factors are main determinants of ecosystems patterns (Klijn and De Haes, 1994). Although the data used in the present study have limitations, e.g., in deriving climate surfaces from the spatial interpolation of weather stations, they are recorded consistently across Europe and are the best data currently available.
Bunce et al. (2002) have shown that statistical environmental classifications have much in common, identifying the major gradients and assigning classes in similar locations despite differences in statistical clustering techniques or input datasets. Kappa analysis of aggregations of the EnS strata shows a 'good comparison' (Monserud and Leemans, 1992) with other European classifications (Metzger et al., 2005a, 2005b). In addition, the EnS shows strong statistical correlations with European environmental datasets (e.g., for soil, growing season and species distributions (Metzger et al., 2005a) and habitats (Bunce et al., 2008)).

Despite distinguishing 84 strata there can still be considerable environmental heterogeneity with a stratum, especially in regions with many regional gradients, e.g., in topography or soil types. For example, the stratum ALS1 (Alpine South one) covers a range of altitudes from mountain valleys at 630m to summits at 4,453m. In such cases, regional subdivisions can be constructed based on ancillary datasets such as altitude and soils (Jongman et al., 2006).

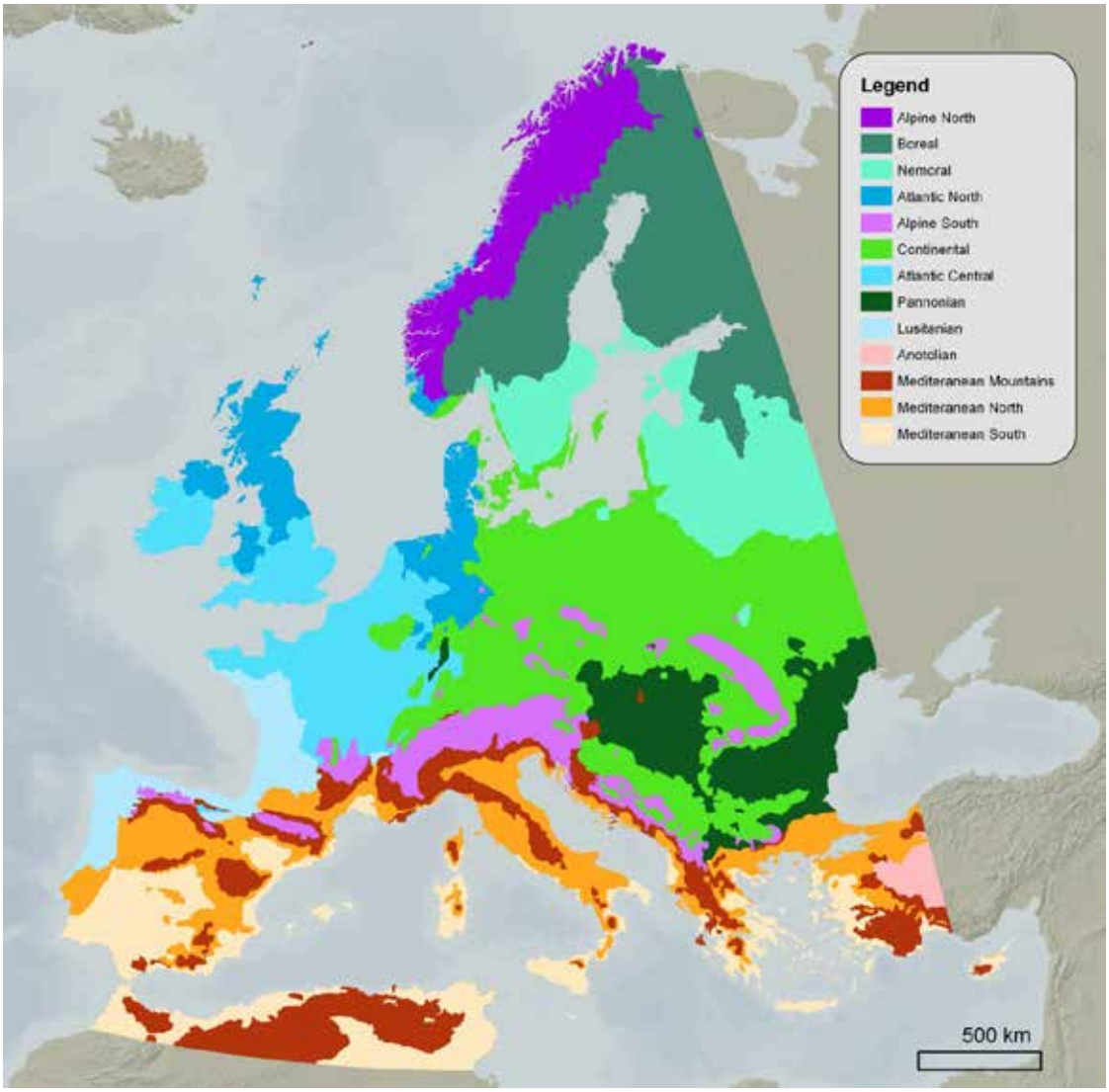


Figure 1

The thirteen Environmental Zones (EnZs) of the Environmental stratification of Europe (Metzger et al., 2005).

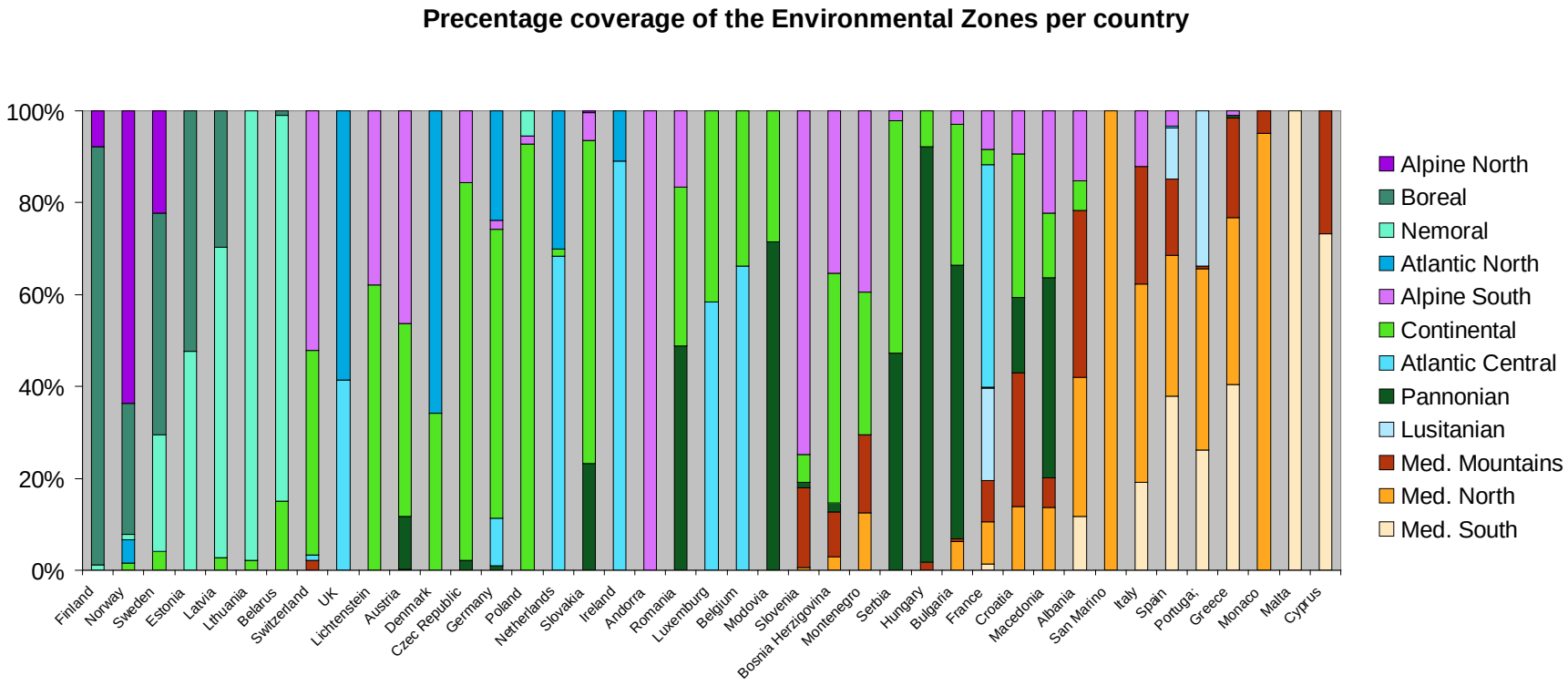


Figure 2

Percentage coverage of the Environmental Zones per country in Europe.

Applications

Over the last few years the dataset has been used in numerous studies. In the most simple form, the EnZs have been used to provide broad European environmental patterns (e.g., Di Filippo et al., 2007; Holland et al., 2009), and as units for summary reporting (e.g., Thuiller et al., 2005; Metzger et al., 2008a; Smit et al., 2008). The European Commission has used the EnZs as the basis for assessing High Nature Value farmland (Paracchini et al., 2008) and the identification of potential areas for cultivation of bio-energy crops (EEA, 2007). Bunce et al. (2008) have illustrated how the EnS can be used as a sampling framework for assessing stock and trends in European habitats. The EnS will be developed further under the European Union (EU) European Biodiversty Observation Network project (EBONE, www.ebone.wur.nl), which aims to create a framework for surveillance and monitoring of species and habitats in Europe. In addition, the EnS strata can be linked to climate change scenarios, providing insights into broad environmental shifts (Metzger et al., 2008b) as well as providing a basis for the prediction of future crop yields (Ewert et al., 2005; Hermans et al., 2010) and changes in biodiversity (Verboom et al., 2007). Finally, the EnS has been used as a core data layer in a number of other European classifications (Hazeu et al., 2010).

2.2 Approach of the descriptions

The objective of the description is to provide consistent and concise characteristics of the strata by presenting data in a descriptive, easy-to-read way. Therefore generalised environmental information is provided that allow the comparison of the EnS strata. Chapter 3 provides an initial comparison of the twelve EnZs, followed by separate chapters for each EnZ, providing comparisons of the strata and 1-page descriptions of each stratum. The data sources used in the descriptions are described briefly below.

At present the descriptions are only available for the European parts of the classified area. Information for northern Africa and Anatolia (Turkey) has not been included because of the incomplete or missing databases for these areas.

Climate

Climate diagrams were constructed using the dataset CRU TS1.2 (Mitchell et al., 2004), which has 10 arcmin resolution (approximately 16×16 km) and contains monthly values for five variables during the period 1900-2000. In addition, agronomic indicators for the length of the growing season (number of days warmer than 5 °C) and the annual temperature sums expressed as Growing Degree Days with a 0 °C base (GDD_0)) were calculated for each stratum, and used to describe climate regimes, following Table 1.

Table 1

Descriptions of climate regimes used in this report.

Temperature sums, expressed as Growing Degree Days with a 0 °C base (GDD_0)		Growing season (days warmer than 5 °C)	
< 2000	Cold	<200	Short
2000 - 3000	Cool temperate	200 - 300	Intermediate
3000 - 4000	Temperate	300 - 365	Long
4000 - 5000	Warm temperate		
> 5000	Hot		

Terrain forms and geomorphology

The United States Geological Survey (USGS) provided terrain form data recognising eight terrain classes (e.g. flat plains, hills and high mountains) based on slope and local relief (cf Sayre et al., 2009) The dataset was constructed for Europe using a void-filled 90m SRTM elevation dataset published by the International Centre for Tropical Agriculture (Jarvis et al., 2008). Unfortunately there is no data available north of 60 °C.

Additional descriptions are based the Geomorphologic Map of Europe at scale 1:17.500.000 (Akademia Nauk SSR, 1964). The legend consists of 49 mapping units describing origin (geotecture and morphostructure) of land areas and 21 units describing their recent transformations and current dynamics (morphosculpture).

Soil

The FAO-UNESCO Soil Map of the World is a global soil map at a 1:5.000.000 scale (FAO, 1991), and therefore provides complete coverage for the extent of the EnS. The legend comprises an estimated 1650 different map units consisting of soil units or associations of soil units. The soil units (106 from Af to Zt) are grouped in 26 major soils types, which were used in the description of the EnS.

Vegetation

Over 150 vegetation scientists from 31 European countries cooperated to produce a map of Potential Natural Vegetation (PNV) for Europe (Bohn et al., 2000). PNV refers to the vegetation that would occur without human management influence. The classification is divided into nineteen physiognomically and ecologically characterised formation- complexes, which are further, differentiated according to floristic, edaphic, climatic and phytogeographical criteria, which were used for the description of the EnS. Altogether the legend comprises 700 mapping units (Bohn et al., 2000).

Land cover

The Pan-European land cover database PELCOM (Mücher et al., 2001) covers the extent of the EnS and provides land cover information for sixteen generic classes based on 30 Landsat-TM images. The CORINE land cover classification provides greater thematic detail, but is only available for EU countries. PELCOM and agricultural land cover from the CORINE 2000 (EEA, 2000) were used to describe the EnS.

3 Comparison of the twelve European Environmental Zones

3.1 Climate

The EnS was constructed by clustering climate variables and clear climate differences can be distinguished between the EnZs, e.g. between the cold northern zones; the buffered Atlantic zones, the highly seasonal continental zones and the hot and dry Mediterranean zones. These differences are summarised in climate diagrams (Figure 3).

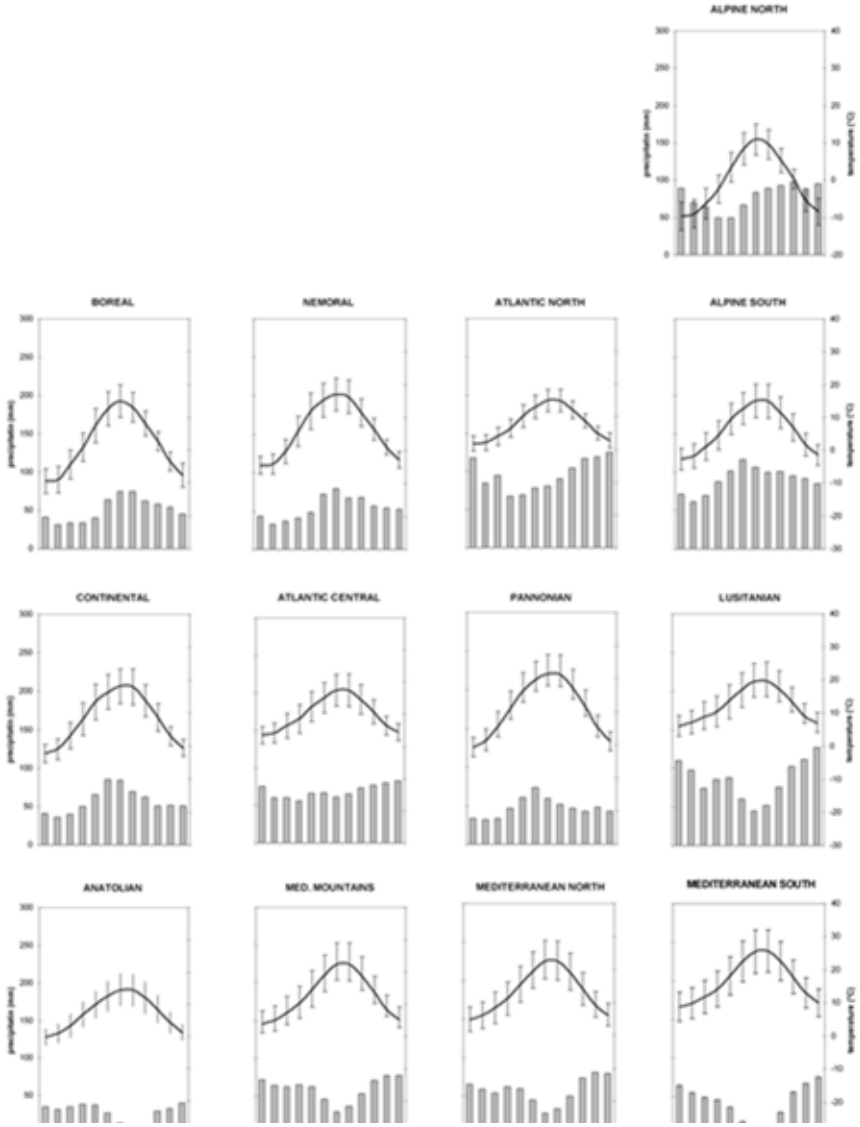


Figure 3.

Climate diagrams summarizing seasonal precipitation and temperature patterns. Whiskers indicate the mean monthly temperature range.

The EnS has strong correlations with bioclimate or agronomic indicators that directly influence plant growth. For example, the growing season, expressed as the number of days with a temperature above 5 °C has a Pearson's correlation coefficient of 0.91 and the mean annual temperature sum of temperatures above 0 °C has a correlation coefficient of 0.98 (Metzger et al., 2005a; Figure 4). Differences between the EnZs are illustrated in Figure 5.

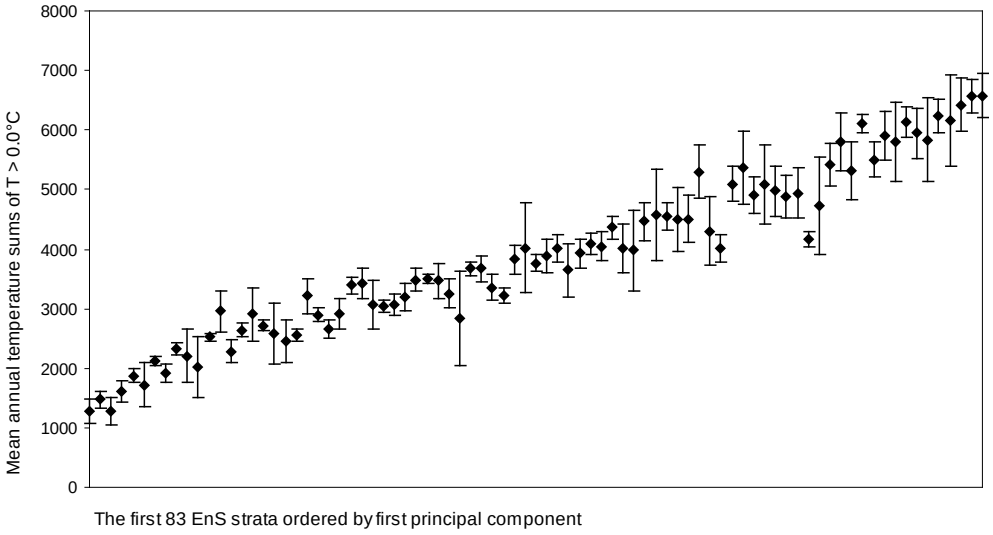


Figure 4

Scatter plot illustrating the correlation between mean annual temperature sums and the mean first principal component score of the EnS clustering variables for the 83 European strata (R^2 = 0.95). Whiskers indicate the standard deviation.

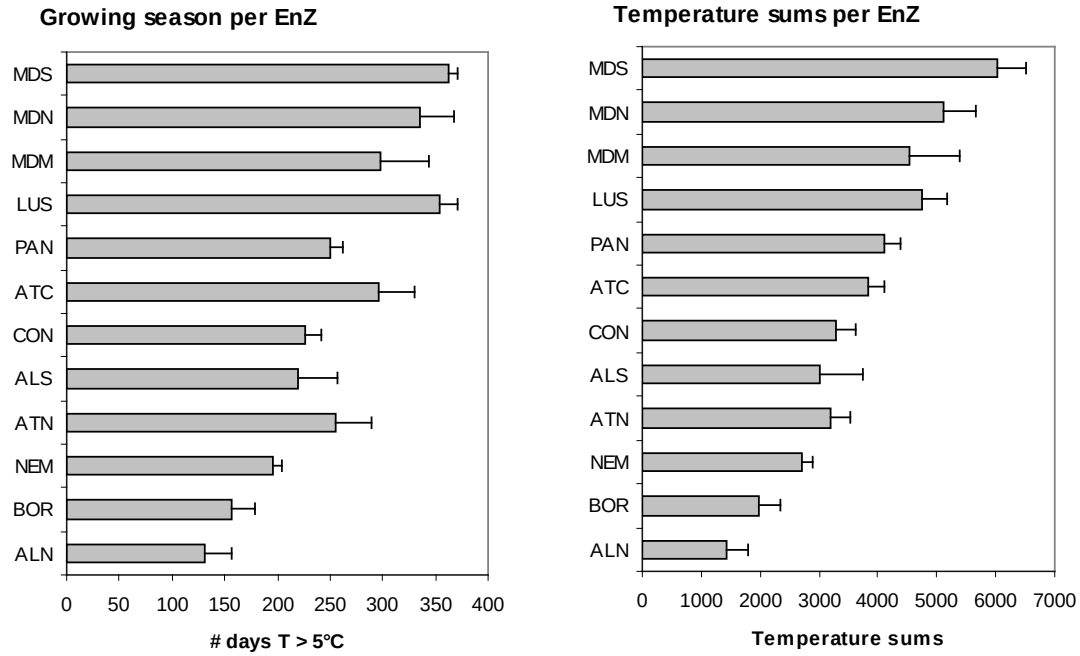


Figure 5

Mean length of the growing season and mean temperature sums for the twelve European EnZs. Whiskers indicate the standard deviation.

3.2 Soils

Most soils formation is a function of erosion of geologic bedrock, and is therefore influenced by historic climate conditions. Figure 6 illustrates that this climate signal is still obvious in the distribution of the main FAO soil types across Europe. For example podzols occur in the north, while cambisols are dominant in the Mediterranean. Metzger et al. (2005a) discuss how derived soil properties (e.g. soil pH and organic carbon) show moderate correlations with the EnS. Figure 7 presents the results of a Principal Component Analysis (PCA) carried out using CANOCO.

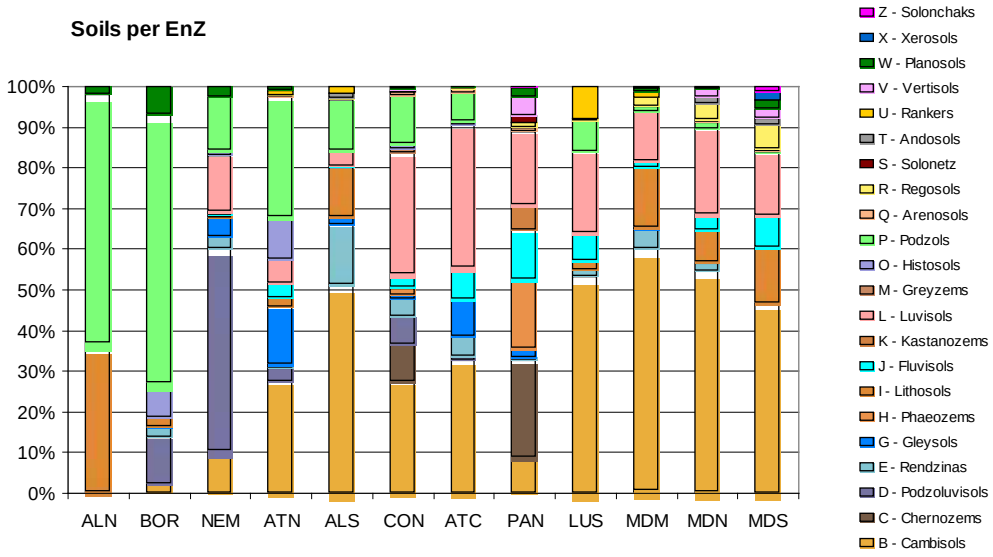


Figure 6

Distribution of the FAO soil types in each EnZ. Soiltypes with less than 5% coverage in any EnZ were omitted from the analysis.

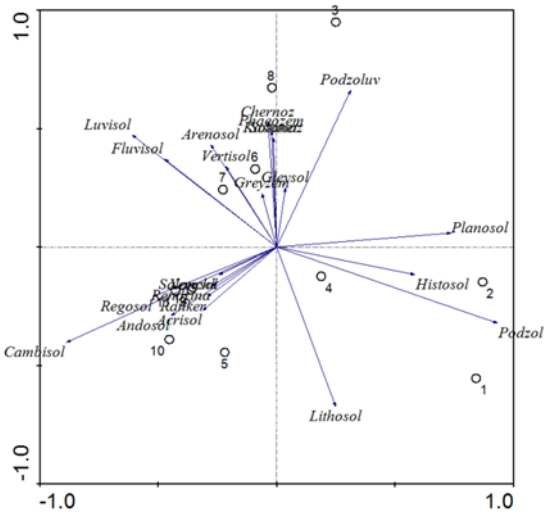


Figure 7

Principal Components biplot presenting soils and Environmental zones (1-13). The eigenvalues are : Axis 1 λ = 0..58, axis 2: λ= 0.20.

Mediterranean, but also Alpine south zones are dominated by Cambisols, Regosols and rankers. Nordic zones by Planosols, Histosols, Podzols and Lithosols, althouhgh the Nemoral zone is characterised by pozoluvisols. The Atlantic and Continental are dominated by Arenosols and the Pannonian zone is typical covered by Chernozems and Phaeozems.

3.3 Potential Natural Vegetation

The PNV is determined by the climax vegetation, which is in most cases a direct function of climate and soils conditions. Metzger et al. (2005a) reported strong correlation (0.92) between the PNV map (Bohn et al., 2000). Figure 8 illustrates the distribution of the main vegetation types in each EnZ. Figure 9 presents the results of a Principal Component Analysis (PCA) carried out using CANOCO.

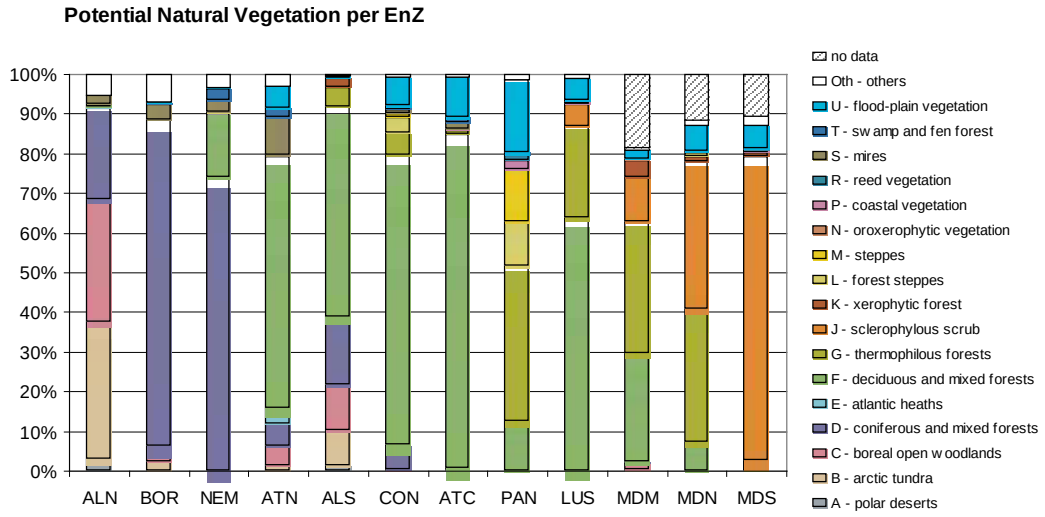


Figure 8

Distribution of the PNV types in each EnZ. PNV types with less than 5% coverage in any EnZ were omitted from the analysis.

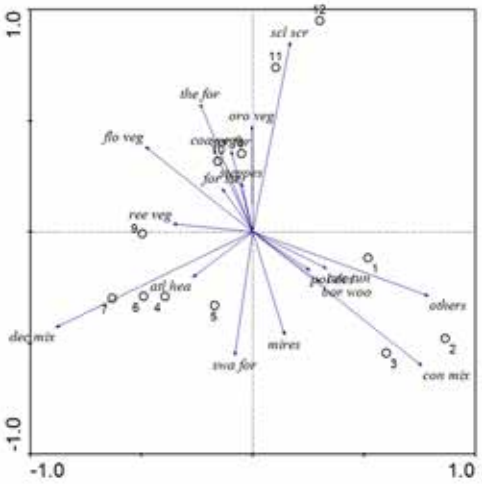


Figure 9

Principal Components biplot presenting Potential Natural Vegetation and Environmental zones (1-13). The eigenvalues are : Axis 1 λ = 0..44, axis 2: λ= 0.34.

The Nordic zones are characterised by mires, conifer forests and other Nordic woodlands, while the Mediterranean zones are typically characterised by Sclerophyllous scrub. Atlantic heath are of course closely linked to the Atlantic zones.

3.4 Land cover

Land cover patterns are determined by the physical terrain, natural vegetation and human land use. Both vegetation and human land use practices (e.g. forestry and agriculture) are heavily influenced by climate. Figure 10 provides an overview of major land cover categories across Europe, while Figure 11 provides more detail for agricultural land use in the EU countries. Figure 12 presents the results of a Principal Component Analysis (PCA) carried out with CANOCO.

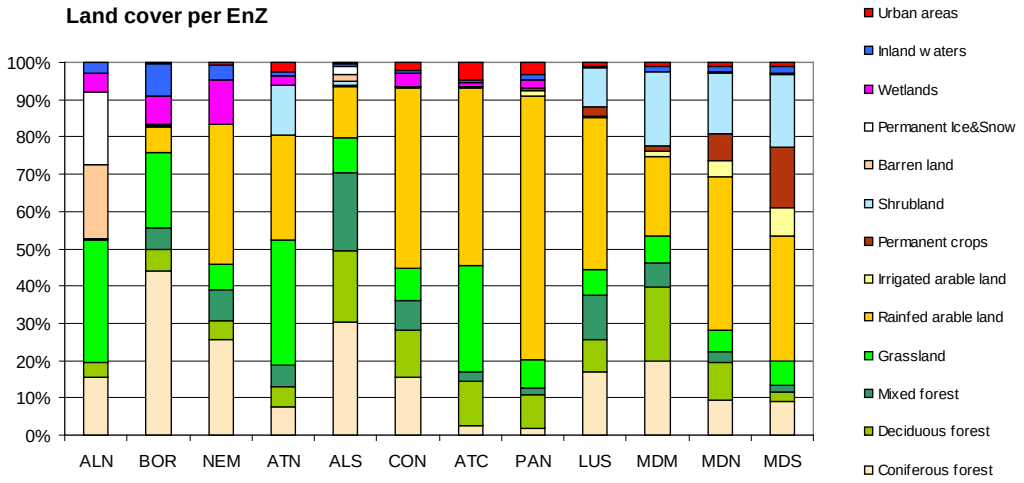


Figure 10

Distribution of major land cover types distinguished by the PELCOM dataset (Mücher et al., 2000).

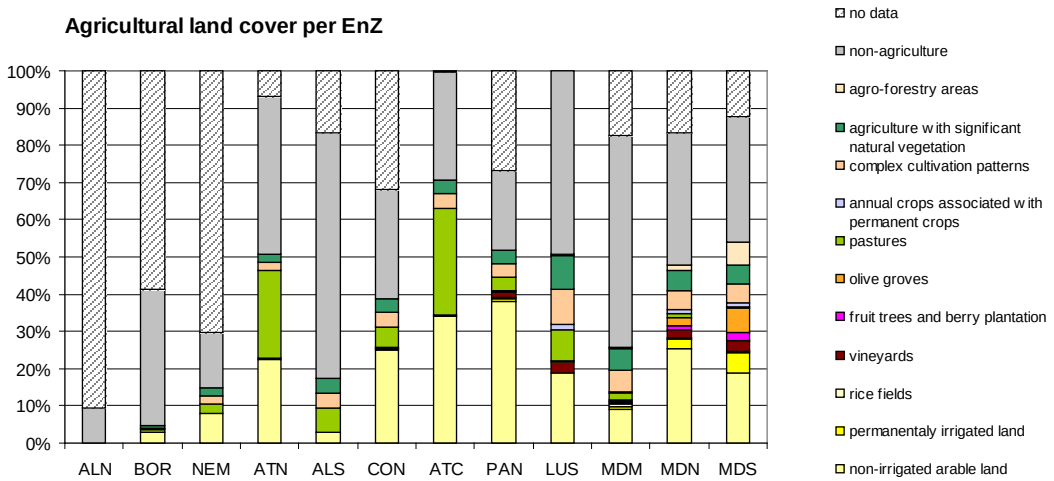


Figure 11

Distribution of agricultural land cover type distinguished by the Corine 1990 Land Cover map. The data only cover the following countries: Albania, Austria, Belgium, Bosnia and Herzegovina, Bulgaria, Czech Republic, Denmark, Estonia, Finland, France, Germany, Greece, Hungary, Ireland, Italy, Latvia, Lithuania, Luxembourg, Netherlands, Poland, Portugal, Romania, Slovakia, Slovenia, Spain and the United Kingdom.

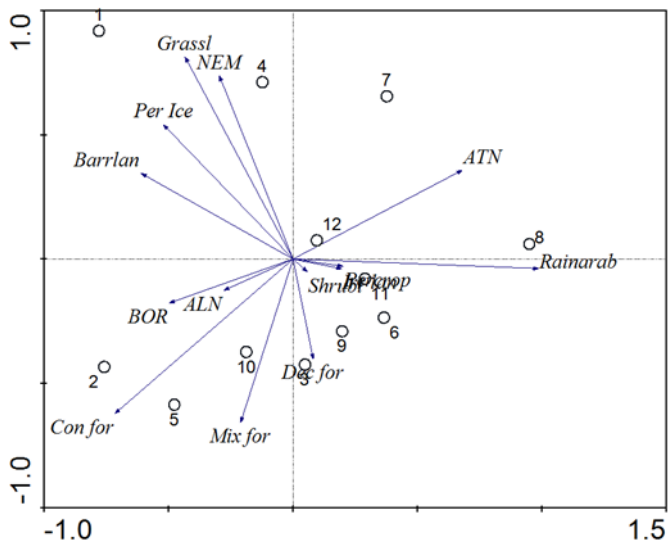


Figure 12

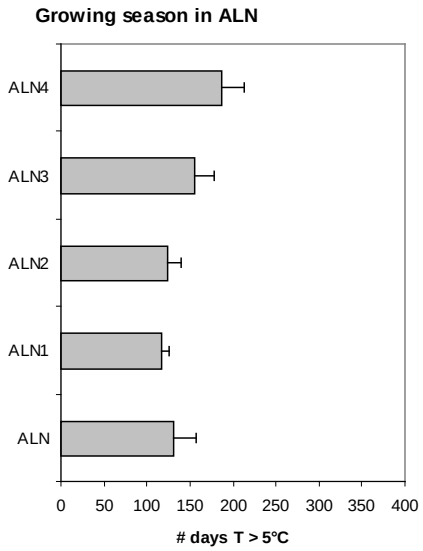
Principal Components biplot presenting Lnd Cover by using PELCOM and Environmental zones (1-13). The eigenvalues are : Axis 1 λ = 0..57, axis 2: λ= 0.19. The four axis cumulative explain 98%.

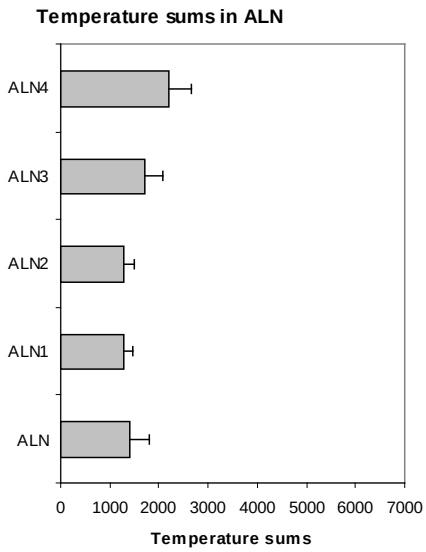
3.5 Individual zones and strata

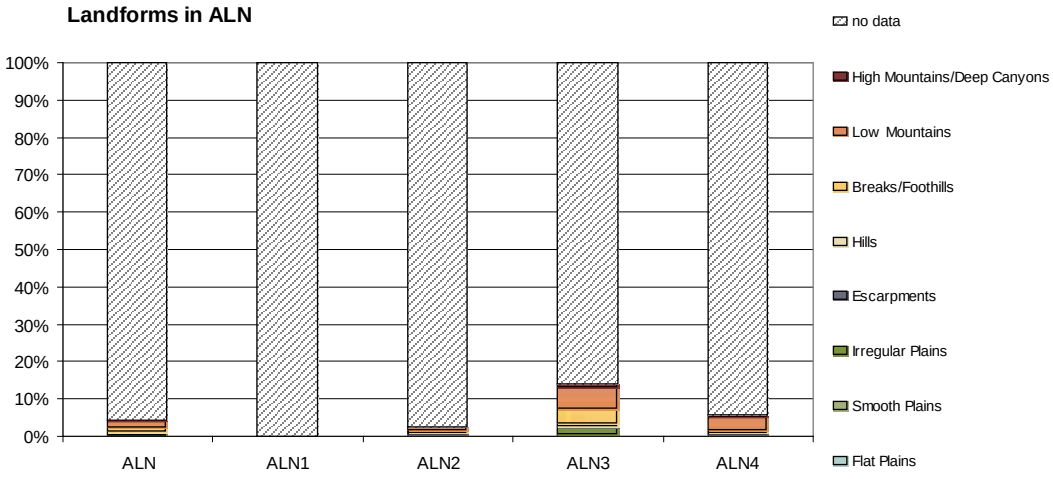
In the following chapters a description is given of the zoes and the strata. In the zones description an approach has been taken as the general overview above including a drawing of a landscape in the zone. Every stratum is shartly characterised on area, geographical characteristics, EEA biogeographical zones, climate and terrain. The stratum is indicated in black on a nap of the European Environmental Stratification.

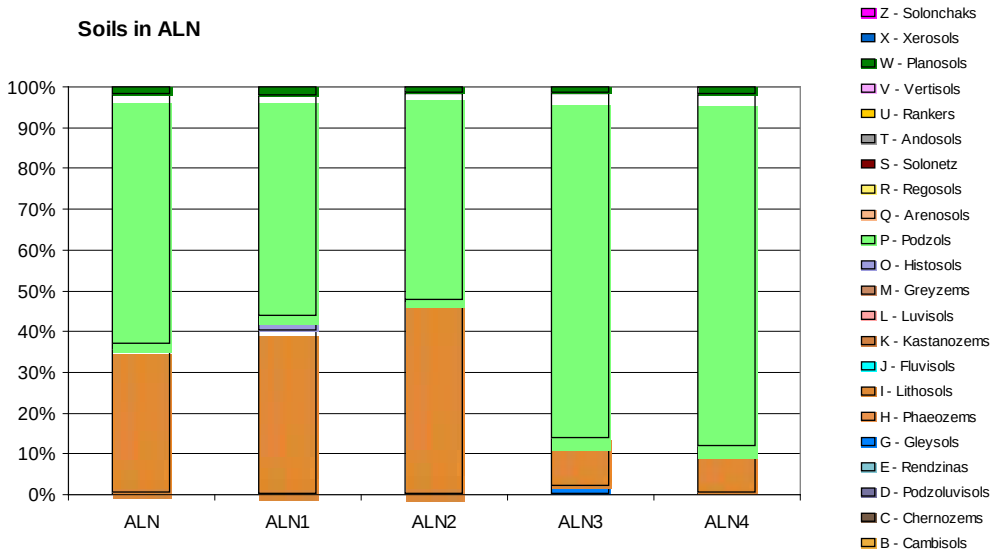
4 Alpine North (ALN)

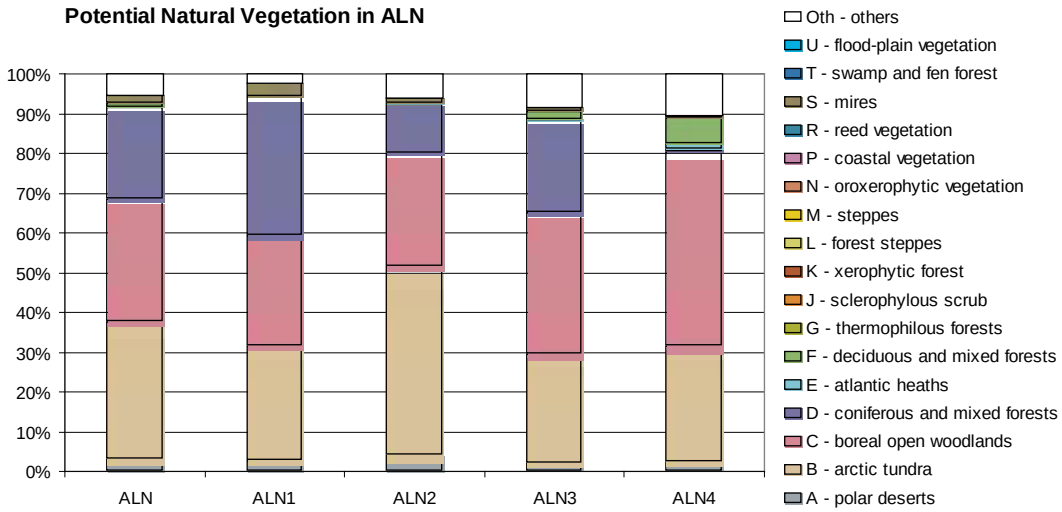
The Alpine North Zone (ALN) includes the mountains and uplands of western Scandinavia together with the narrow coastal plain. It also includes a small are on the north-eastern side of the high Tatra on the border of Poland and Slovakia. The Zone has been heavily glaciated typified not only by deep U-shaped valleys but also by the indented fjord coastline. Much of the land surface is covered by glacial deposits of various types. The climate of the western scarp is oceanic because of the influence of the Gulf Stream and becomes progressively continental further east. The severe temperature regime and terrain constraints restrict modern agriculture to the coastal fringe, but extensive grazing is also present elsewhere, although often in decline. The land cover is dominated by arctic tundra in the north, arctic-alpine grasslands, in the higher mountains and extensive dwarf and low heaths elsewhere. The decline in grazing is leading to widespread colonisation by forest adding to the extensive existing coniferous forests of spruce and pine as well as birch.

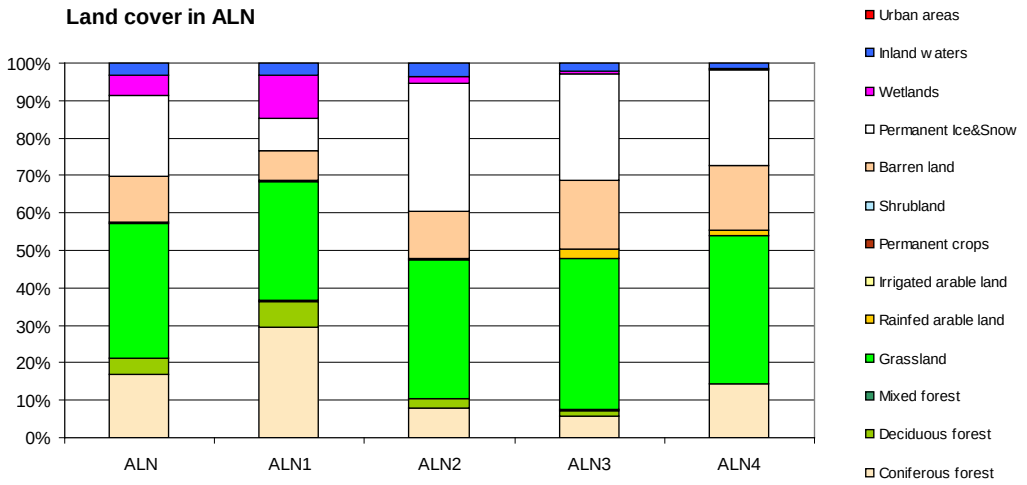

Growing season in ALN
ALN4
ALN3
ALN2
ALN1
ALN
0
50
100
150
200
250
300
350
400
days T > 5°C

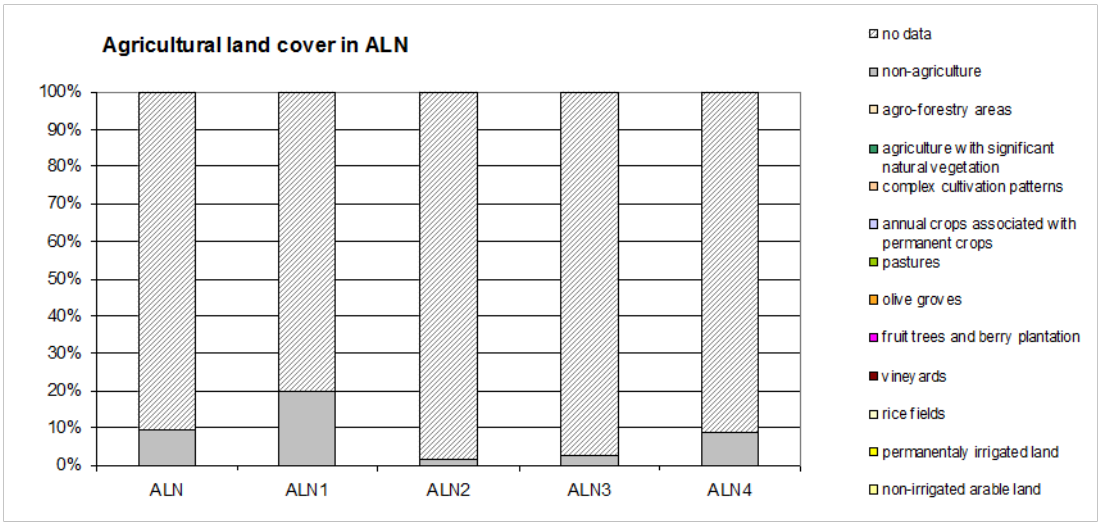

Temperature sums in ALN
ALN4
ALN3
ALN2
ALN1
ALN
0
1000
2000
3000
4000
5000
6000
7000
Temperature sums


Landforms in ALN
100%
90%
80%
70%
60%
50%
40%
30%
20%
10%
0%
ALN
ALN1
ALN2
ALN3
ALN4
no data
High Mountains/Deep Canyons
Low Mountains
Breaks/Foothills
Hills
Escarpments
Irregular Plains
Smooth Plains
Flat Plains


Soils in ALN
100%
90%
80%
70%
60%
50%
40%
30%
20%
10%
0%
ALN
ALN1
ALN2
ALN3
ALN4
Z - Solonchaks
X - Xerosols
W - Planosols
V - Vertisols
U - Rankers
T - Andosols
S - Solonetz
R - Regosols
Q - Arenosols
P - Podzols
O - Histosols
M - Greyzems
L - Luvisols
K - Kastanozems
J - Fluvisols
I - Lithosols
H - Phaeozems
G - Gleysols
E - Rendzinas
D - Podzoluvisols
C - Chernozems
B - Cambisols


Potential Natural Vegetation in ALN
100%
90%
80%
70%
60%
50%
40%
30%
20%
10%
0%
ALN
ALN1
ALN2
ALN3
ALN4
Oth - others
U - flood-plain vegetation
T - swamp and fen forest
S - mires
R - reed vegetation
P - coastal vegetation
N - oroxerophytic vegetation
M - steppes
L - forest steppes
K - xerophytic forest
J - sclerophylous scrub
G - thermophilous forests
F - deciduous and mixed forests
E - atlantic heaths
D - coniferous and mixed forests
C - boreal open woodlands
B - arctic tundra
A - polar deserts


Land cover in ALN
100%
90%
80%
70%
60%
50%
40%
30%
20%
10%
0%
ALN
ALN1
ALN2
ALN3
ALN4
Urban areas
Inland waters
Wetlands
Permanent Ice&Snow
Barren land
Shrubland
Permanent crops
Irrigated arable land
Rainfed arable land
Grassland
Mixed forest
Deciduous forest
Coniferous forest


Agricultural land cover in ALN
100%
90%
80%
70%
60%
50%
40%
30%
20%
10%
0%
ALN
ALN1
ALN2
ALN3
ALN4
no data
non-agriculture
agro-forestry areas
agriculture with significant natural vegetation
complex cultivation patterns
annual crops associated with permanent crops
pastures
olive groves
fruit trees and berry plantation
vineyards
rice fields
permanentaly irrigated land
non-irrigated arable land

4.1 Alpine North 1 (ALN1)

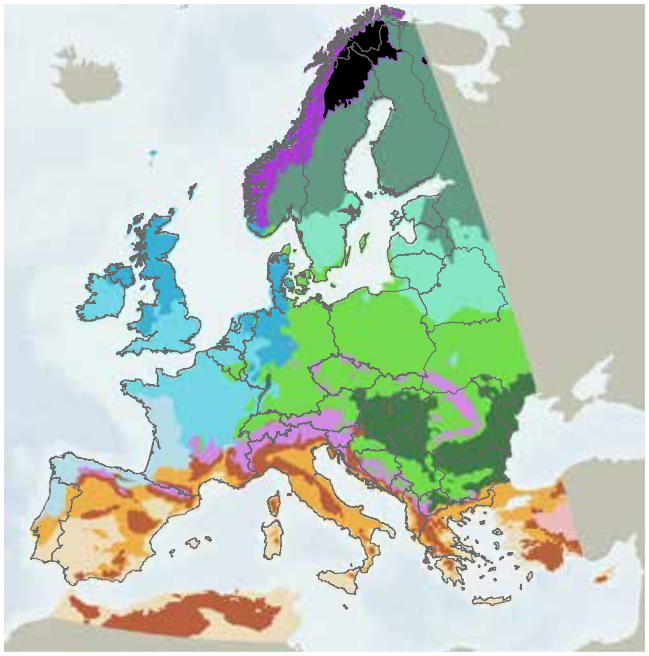
Area: 133,240 km^2

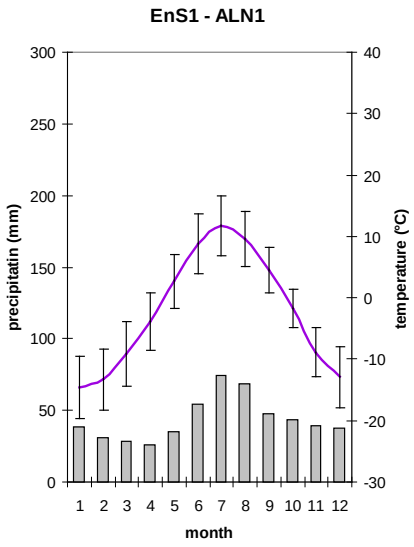
Location: Northern Sweden (Övre Norrland), Norway (Troms, Finmark) and Finland (Lappi). Major cities are Kiruna (Sweden) and Kittilä (Finland).

EEA biogeographic region: Alpine, Boreal.

Climate: The climate is relatively continental, but cold (GDD0 1277). The growing season is short (116 days).

Terrain: The eastern part of the area in Norrland and the eastern section in Manselkä is dominated by upland plains and low mountains changing to block highlands of the Scandinavian mountains reaching altitudes up to 2111m (Kebnekaise Gibnegaisi).





4.2 Alpine North 2 (ALN2)

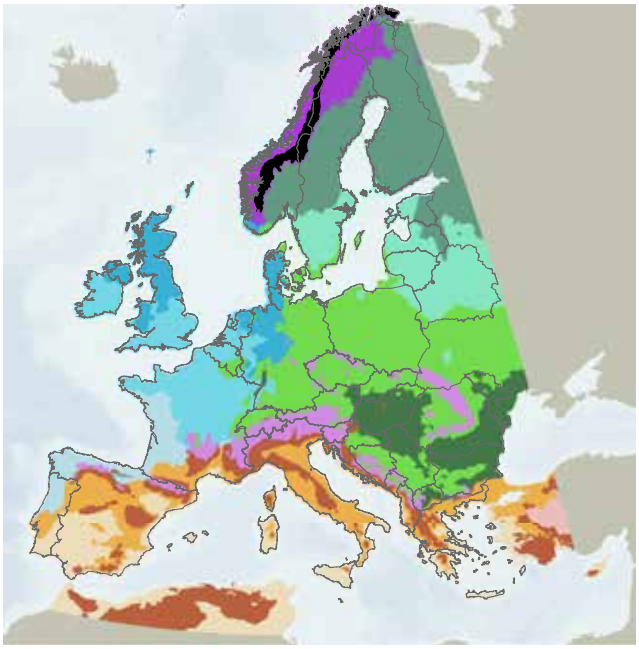
Area: 107,082 km^2

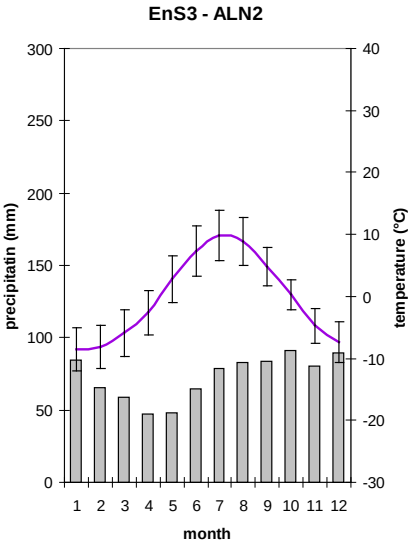
Location: Predominantly western slopes in Norway and north-western Sweden (Nedre Norrland, Övre Norrland). The major cities are Geilo, Dåmbas, Narvik, Tromsö, Hammerfest (Norway).

EEA biogeographic region: Atlantic, Arctic.

Climate: The climate is wet and cold (GDD_0 1269), but buffered due to the orientation toward the Atlantic. The growing season is short (123 days).

Terrain: The terrain consists of block highlands reaching up to 2470m (Glittertind), and tablelands. The mountains are heavily eroded by Quaternary glaciations; glacial erosional and accumulative forms of mountain glaciation (cirques, u-shaped valleys, terminal moraine) dissected by subsequent erosion gullies.





4.3 Alpine North 3 (ALN3)

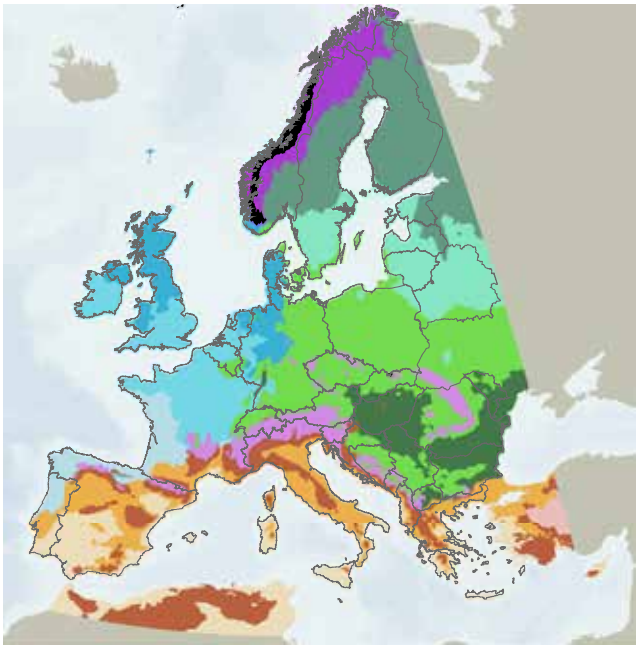
Area: 70,280 km^2

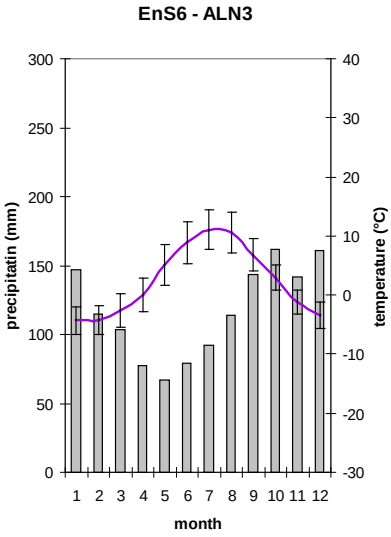
Location: The western slopes of the southern and central Scandinavian mountains in Norway and the north-eastern slopes of the high Tatra at the border between Slovakia and Poland. The major cities are Trondheim and Bodö.

EEA biogeographic region: Atlantic, Arctic, and Alpine (for the Tatra).

Climate: Whilst milder than ALN1 and ALN2, with warmer winters and greater precipitation, the climate remains cold (GDD_0 1719) and the growing season short (155 days).

Terrain: ALN3 is dominated by typical Scandinavians block highlands, except in the south (next to Telemark), which is made up by tablelands. As elsewhere in Scandinavia, the relief is heavily affected by the Quaternary glaciations.





4.4 Alpine North 4 (ALN4)

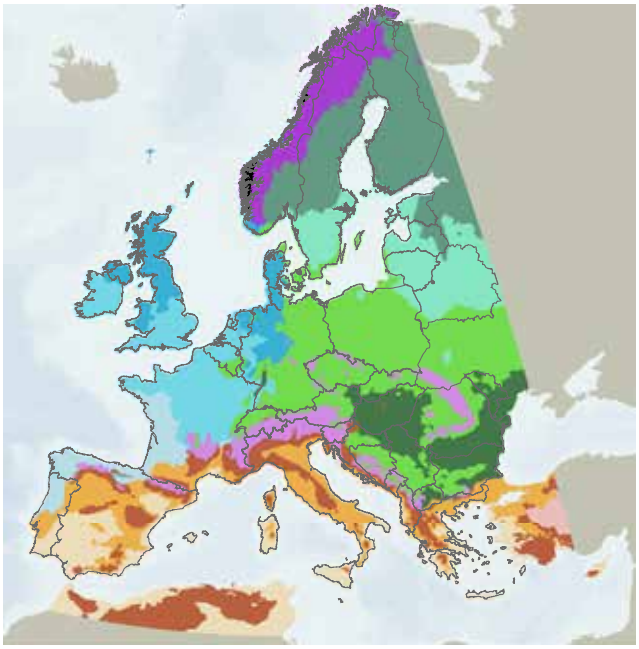
Area: 19,761 km^2

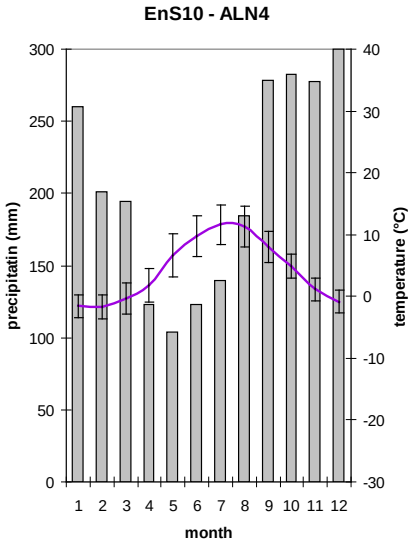
Location: ALN4 consists of two separate units in the south-western and western Scandinavia, i.e. Hordaland, Sogn og Fjordane and the south of Nordland in the north. The major cities are Bergen and Alesund (Norway).

EEA biogeographic region: Atlantic, Arctic, Alpine.

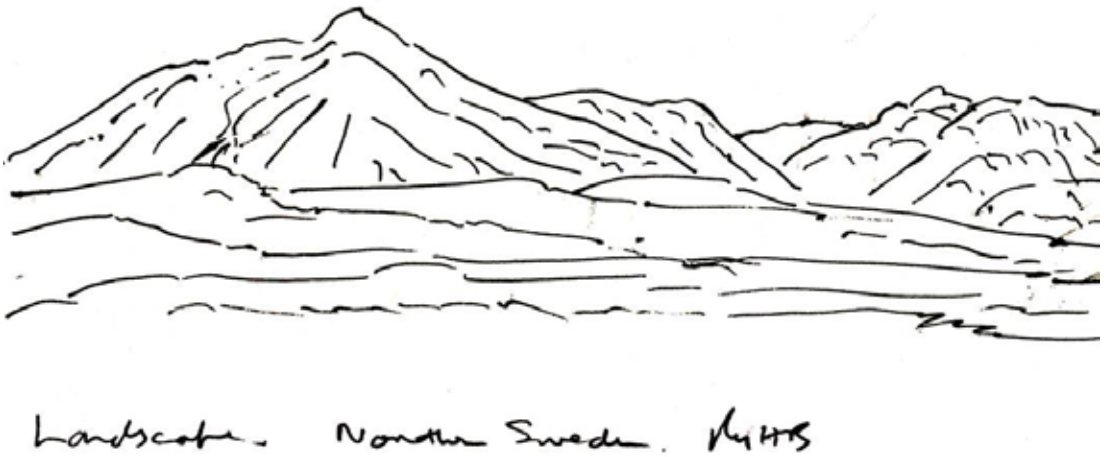
Climate: Due to its western position the climate is more heavily influenced by the Gulf stream than the other ALN strata. ALN4 has the highest precipitation of the EnZ and the average winter temperature hardly drops below 0 °C. The climate is cool temperate (GDD_0 2207) and the growing season short (186 days).

Terrain: Predominately block highlands with numerous traces of quaternary glaciations, such as cirques, u-shaped valleys and terminal moraine. There is a narrow coastal plain along fjord coastlines and steep valleys leading to the high mountains.

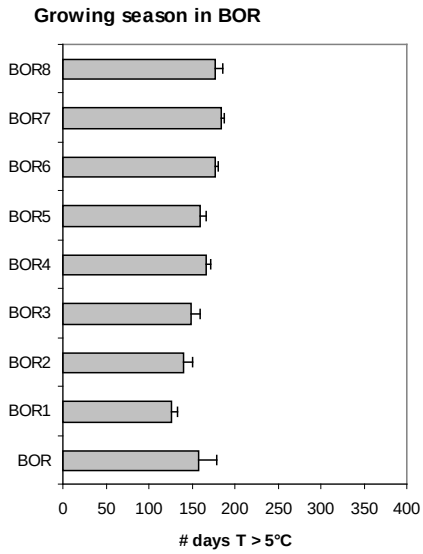


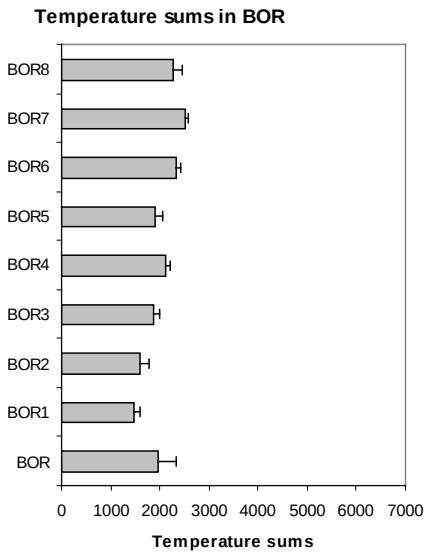


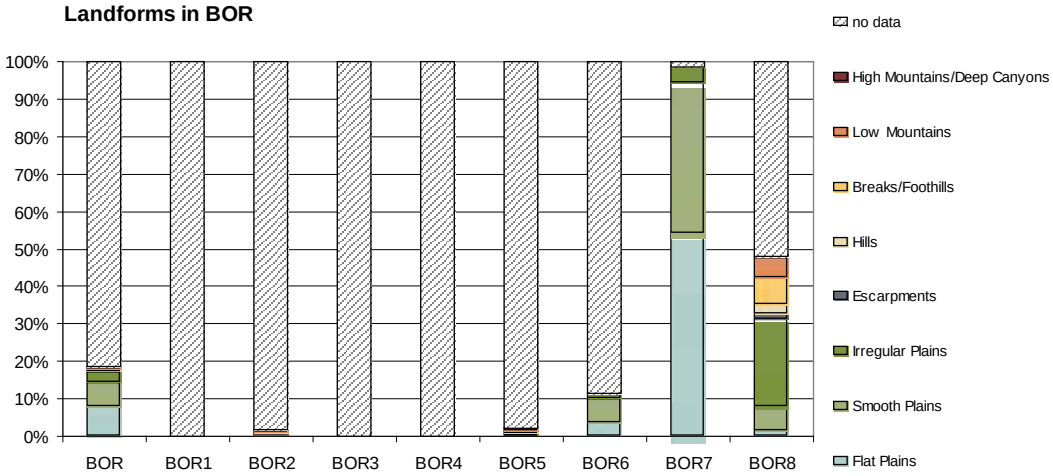
5 Environmental Zone Boreal (BOR)

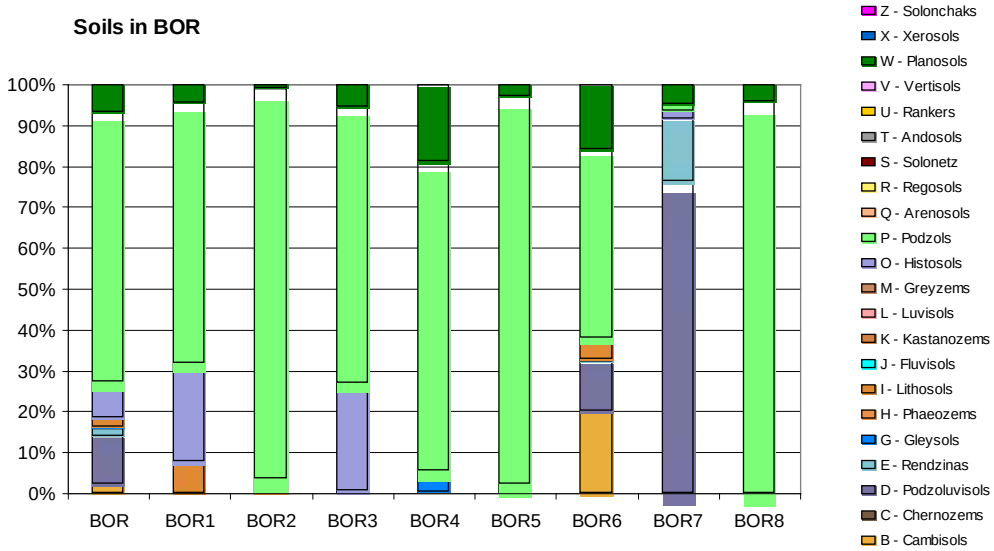


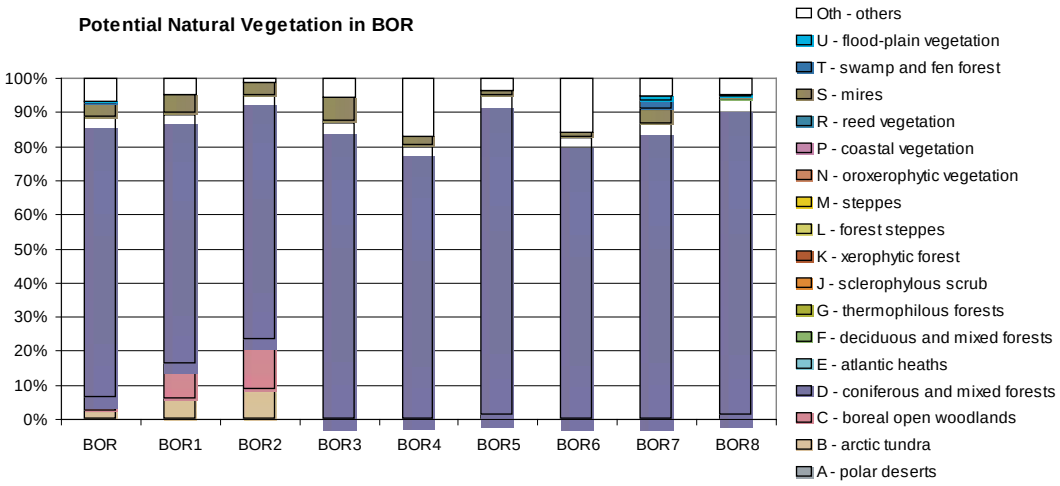
The Boreal Zone (BOR) includes the eastern slopes of the Scandinavian mountains, as well as the undulating plains and lowlands of the northern and eastern Baltic. The Zone has been heavily glaciated which resulted in the deposition of many residual features such as moraines and eskers. The climate is continental, with a large annual temperature range. The severe temperature restricts crop production to the extreme south, but fertile grasslands are present further north. The land is dominated by coniferous forests of spruce and pine often mixed with birch and aspen, utilised by a major forest industry. There is also an extensive cover of bog types, as well as dwarf and low heaths at higher altitudes which are often grazed by reindeer. There are many wetlands and lakes, especially in Finland.

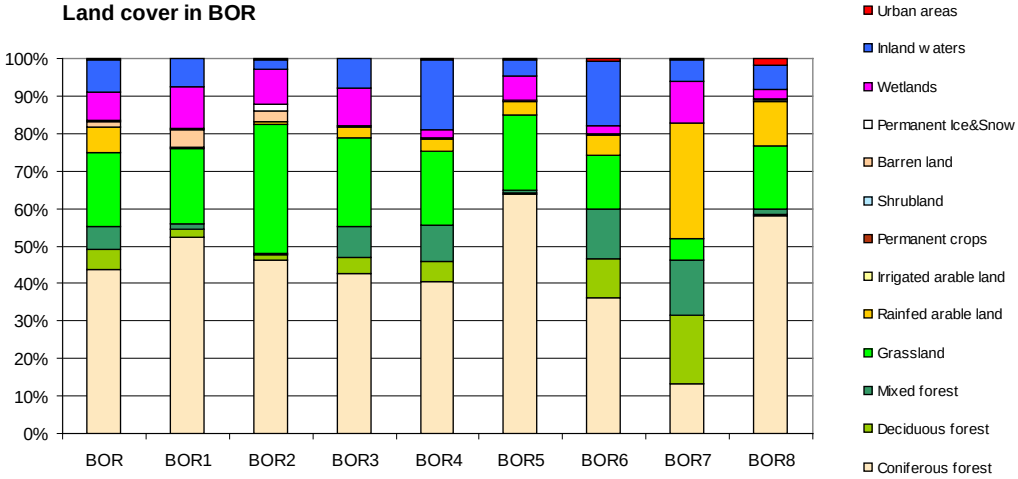

Growing season in BOR
BOR8
BOR7
BOR6
BOR5
BOR4
BOR3
BOR2
BOR1
BOR
0
50
100
150
200
250
300
350
400
days T > 5°C

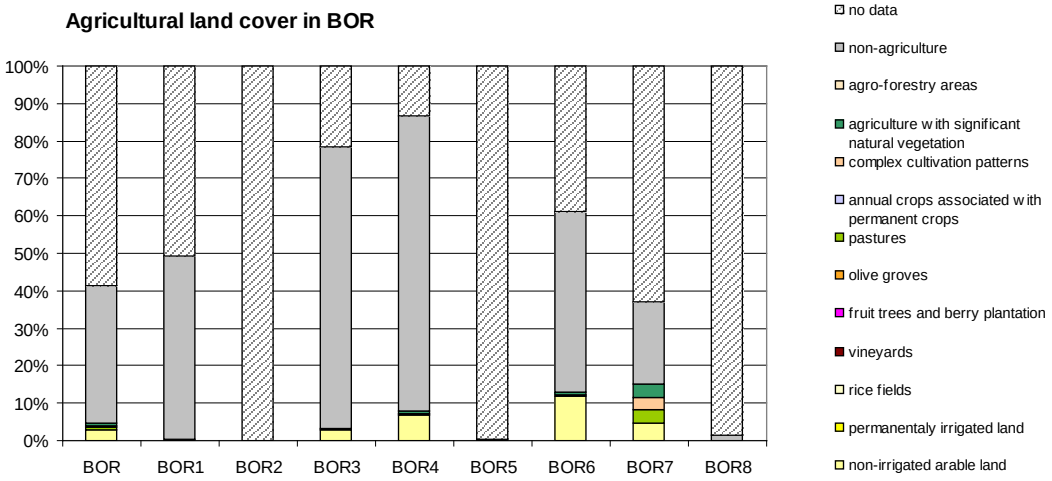

Temperature sums in BOR
BOR8
BOR7
BOR6
BOR5
BOR4
BOR3
BOR2
BOR1
BOR
0
1000
2000
3000
4000
5000
6000
7000
Temperature sums


Landforms in BOR
100%
90%
80%
70%
60%
50%
40%
30%
20%
10%
0%
BOR
BOR1
BOR2
BOR3
BOR4
BOR5
BOR6
BOR7
BOR8
no data
High Mountains/Deep Canyons
Low Mountains
Breaks/Foothills
Hills
Escarpments
Irregular Plains
Smooth Plains
Flat Plains


Soils in BOR
100%
90%
80%
70%
60%
50%
40%
30%
20%
10%
0%
BOR
BOR1
BOR2
BOR3
BOR4
BOR5
BOR6
BOR7
BOR8
Z - Solonchaks
X - Xerosols
W - Planosols
V - Vertisols
U - Rankers
T - Andosols
S - Solonetz
R - Regosols
Q - Arenosols
P - Podzols
O - Histosols
M - Greyzems
L - Luvisols
K - Kastanozems
J - Fluvisols
I - Lithosols
H - Phaeozems
G - Gleysols
E - Rendzinas
D - Podzoluvisols
C - Chernozems
B - Cambisols


Potential Natural Vegetation in BOR
100%
90%
80%
70%
60%
50%
40%
30%
20%
10%
0%
BOR
BOR1
BOR2
BOR3
BOR4
BOR5
BOR6
BOR7
BOR8
Oth - others
U - flood-plain vegetation
T - swamp and fen forest
S - mires
R - reed vegetation
P - coastal vegetation
N - oroxerophytic vegetation
M - steppes
L - forest steppes
K - xerophytic forest
J - sclerophylous scrub
G - thermophilous forests
F - deciduous and mixed forests
E - atlantic heaths
D - coniferous and mixed forests
C - boreal open woodlands
B - arctic tundra
A - polar deserts


Land cover in BOR
100%
90%
80%
70%
60%
50%
40%
30%
20%
10%
0%
BOR
BOR1
BOR2
BOR3
BOR4
BOR5
BOR6
BOR7
BOR8
Urban areas
Inland w aters
Wetlands
Permanent Ice&Snow
Barren land
Shrubland
Permanent crops
Irrigated arable land
Rainfed arable land
Grassland
Mixed forest
Deciduous forest
Coniferous forest


Agricultural land cover in BOR
100%
90%
80%
70%
60%
50%
40%
30%
20%
10%
0%
BOR
BOR1
BOR2
BOR3
BOR4
BOR5
BOR6
BOR7
BOR8
no data
non-agriculture
agro-forestry areas
agriculture w ith significant natural vegetation
complex cultivation patterns
annual crops associated w ith permanent crops
pastures
olive groves
fruit trees and berry plantation
vineyards
rice fields
permanentaly irrigated land
non-irrigated arable land

5.1 Boreal 1 (BOR1)

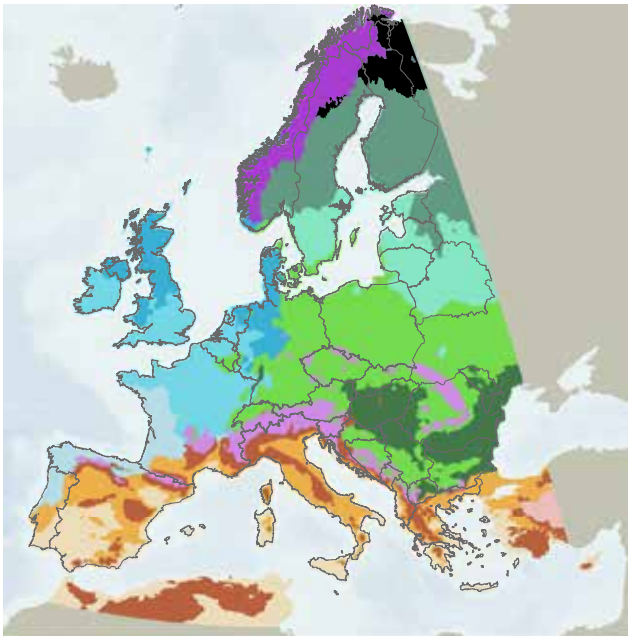
Area: 147,838 km^2

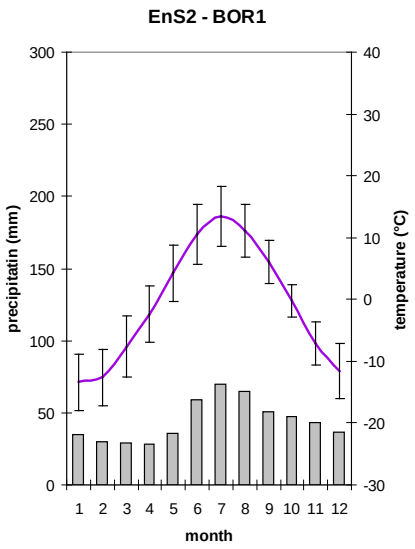
Location: Northern Sweden (Norrland), northern Finland (Lappi), north-western Russia (Murmansk region and Karelia), and in Norwegian Finmarken. Major cities are Rovaniemi (Finland), Kirkines (Norway), Murmansk, Apatity, Kandalakša (Russia).

EEA biogeographic region: Arctic, Boreal

Climate: BOR1 has cold continental climate (GDD_0 1471), marginally modified by the sea in the north. Because of its northern location the winters are colder and the summers cooler than in the other BOR strata. The growing period is short (126 days).

Terrain: BOR1 is dominated by plains, hills and low mountains of Norrland, Manselkä, and Kola. There is widespread evidence of glacial erosion (roches moutonnées) from the last glaciation. The altitude varies from sea level to 500-1000m in Manselkä and the low parts of the Scandinavian mountains.





5.2 Boreal 2 (BOR2)

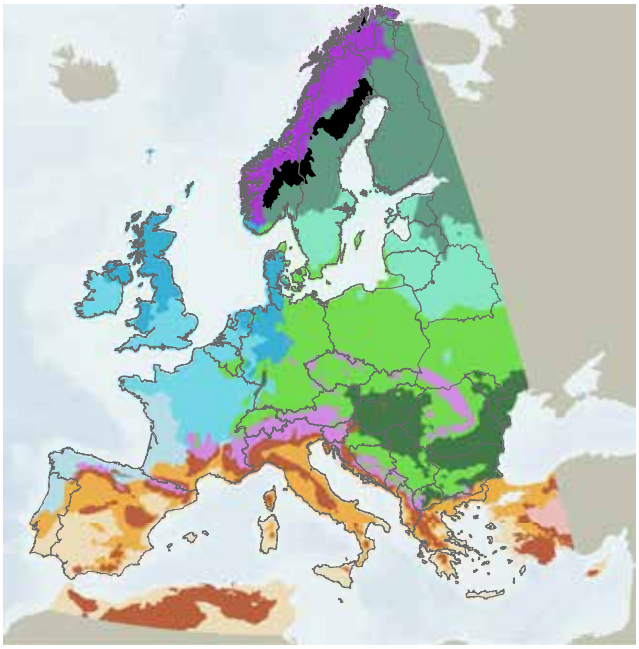
Area: 109,608 km^2

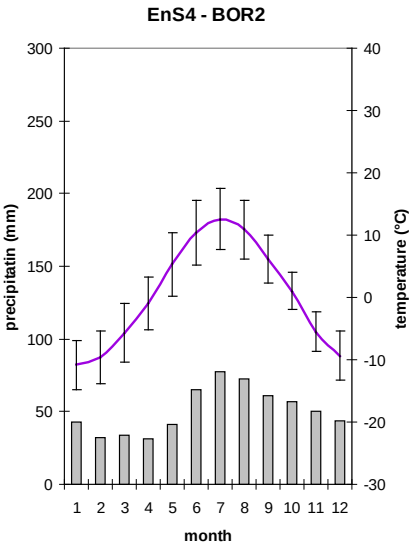
Location: The eastern slope of the Scandinavian Mountains in Sweden and Norway. The major cities are Lillehammer (Norway), Lysksele and Luleå (Sweden).

EEA biogeographic region: Boreal, Alpine.

Climate: The cold climate (GDD_0 1607) is continental and similar to BOR1, but with somewhat warmer summers, colder winters and more precipitation. The growing season is short (141 days).

Terrain: BOR2 contains low mountains, foothills and plains. The mountains (Setesdalen, Telemark, Numedalen) are block highlands.





5.3 Boreal 3 (BOR3)

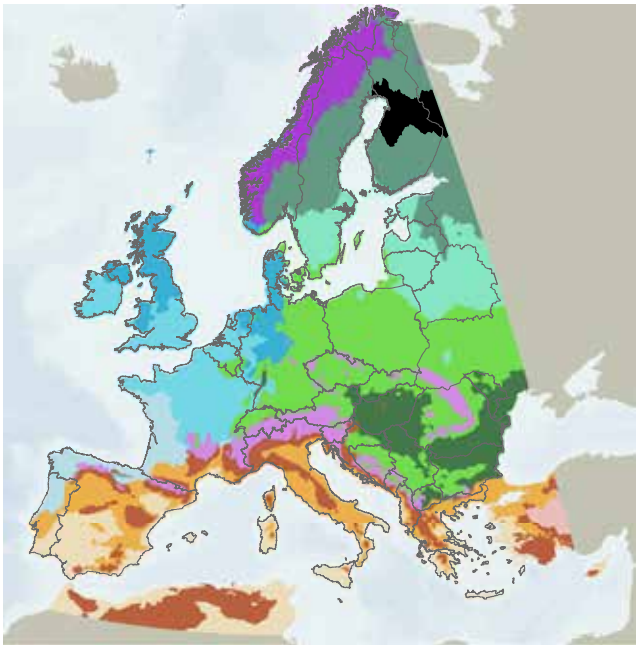
Area: 114,763 km^2

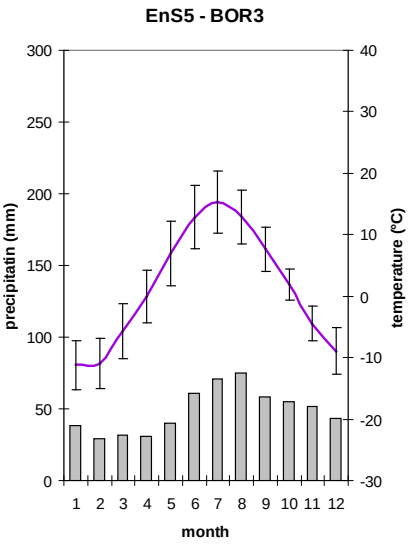
Location: Central Finland, North-Eastern Sweden and North-Western Russia. The major cities are Kemi, Oulu, Kajaani (Finland), Kostomukša (Russia).

EEA biogeographic region: Boreal.

Climate: The cold climate (GDD_0 1875) is continental, with a short growing season (149 days).

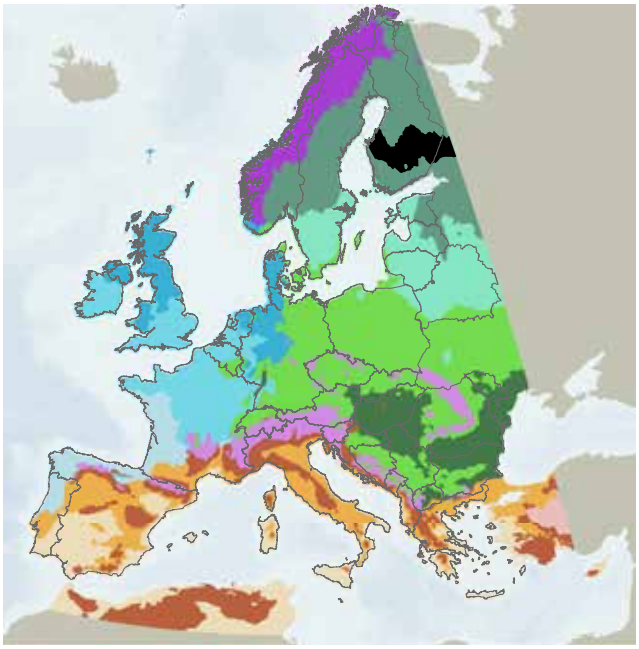
Terrain: Mostly represented by plains, e.g. the Lake Plain of Finland in the west and the south-west, and by relatively high plains in Manselkä. The area along the coastline of Bothnia is a lowland plain. Glacial erosion features are widespread.

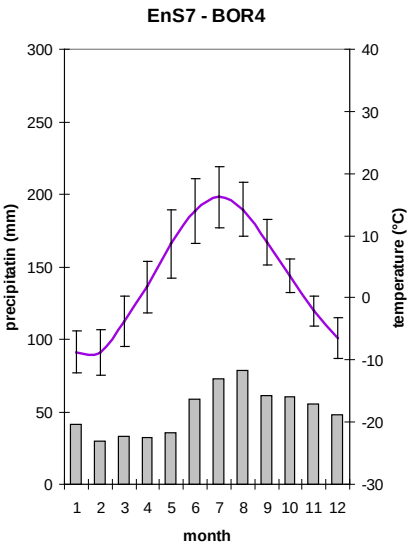




5.4 Boreal 4 (BOR4)

Area: 104,433 km^2
Location: Central and Southern Finland and North-Western Russia. Major cities are Tampere, Kokkola, Vaasa, Juvaskylä, Kuopio (Finland).
EEA biogeographic region: Boreal.
Climate: The cool temperate climate (GDD_0 2126) is continental, with a short growing season (167 days).
Terrain: Most of BOR4 is occupied by the relatively flat Lake Plain of Finland.





5.5 Boreal 5 (BOR5)

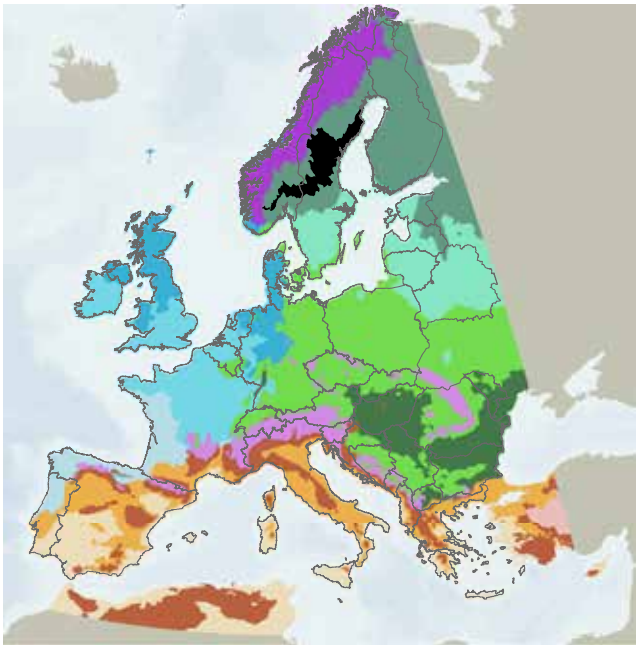
Area: 101,037 km^2

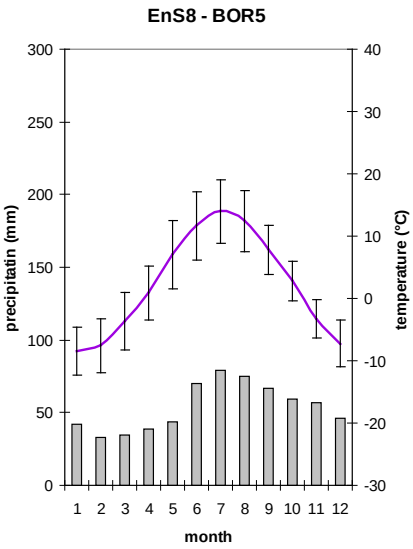
Location: Central Sweden and South-Eastern Norway. Major cities are Umeå, Skellefteå, Östersund (Sweden), Hamar (Norway).

EEA biogeographic region: Boreal, Alpine.

Climate: The cold climate (GDD_0 1917) is continental, with a short growing season (160 days).

Terrain: BOR5 consists of lowlands in the centre, uplands and low mountains in the north and centre of Norrland to tablelands in Telemark (south-east), and shallow slopes in Dalarna (south-east). The relief is modified by the last glaciation, with evidence of glacial activity such as roches moutonnées, u-shaped valleys, and terminal moraines in the mountains.





5.6 Boreal 6 (BOR6)

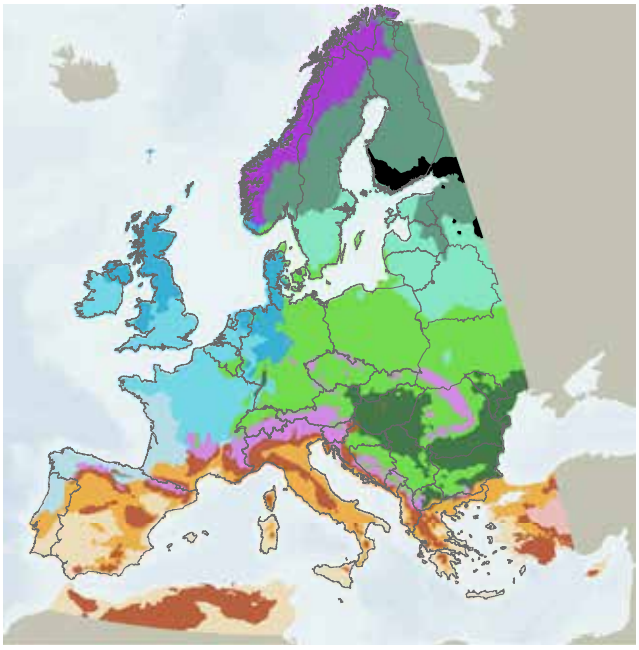
Area: 78,049 km^2

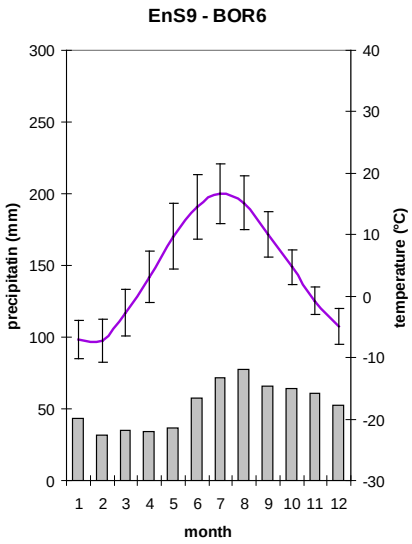
Location: BOR6 stretches along the south-east coast of the Bothnian and the Northern coast of the Finnish Gulf. . Major cities are: Pori, Helsinki, Lahti, Kotka, Lappeenranta (Finland), Vyborg (Russia).

EEA biogeographic region: Boreal.

Climate: The cool temperate climate (GDD_0 2330) is continental, with a short growing season (178 days).

Terrain: Along the coast the terrain consists of a flat lowland plain, while the inner areas fall mostly within the Lake Plain of Finland, which has been modified by glacial erosion.





5.7 Boreal 7 (BOR7)

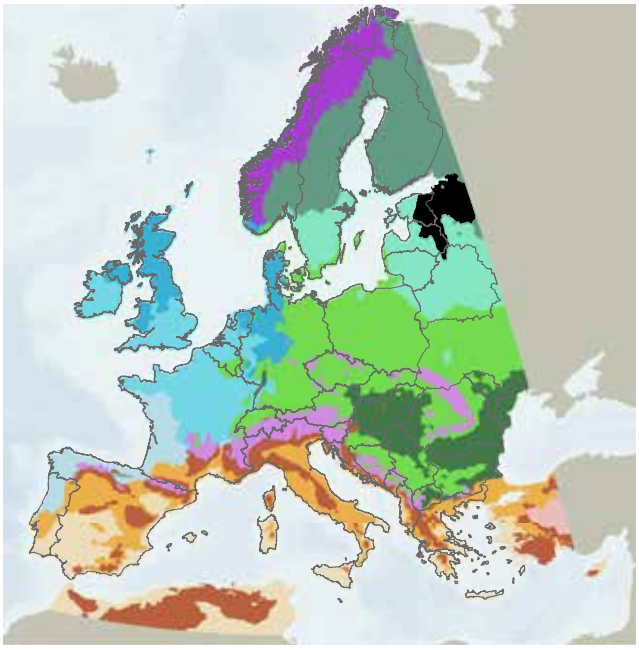
Area: 113,360 km^2

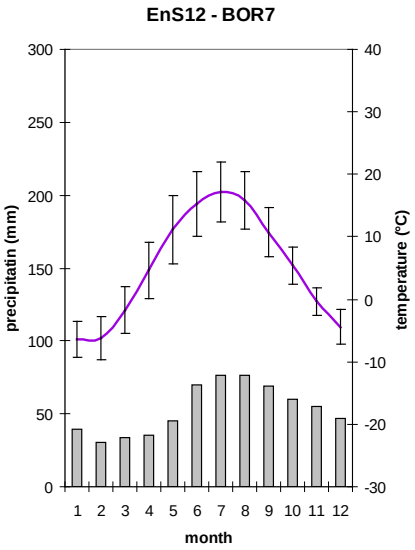
Location: The North-West of the Russian plain in Eastern Estonia, Eastern Latvia, Northern Belarus and Western Russia. Major cities are Tartu, Kohtla-Järve, Narva (Estonia), St.-Peterburg, Pskov, Novgorod (Russia).

EEA biogeographic region: Boreal.

Climate: The cool temperate climate (GDD_0 2523) has a greater continental character than the other BOR strata. The growing period growing season is short (185 days).

Terrain: BOR7 consists of flat plains and moraine hills.





5.8 Boreal 8 (BOR8)

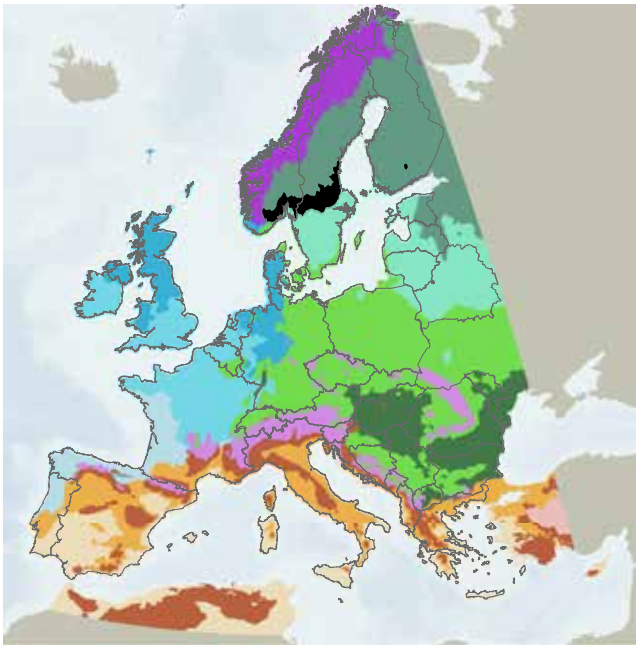
Area: 63,906 km^2

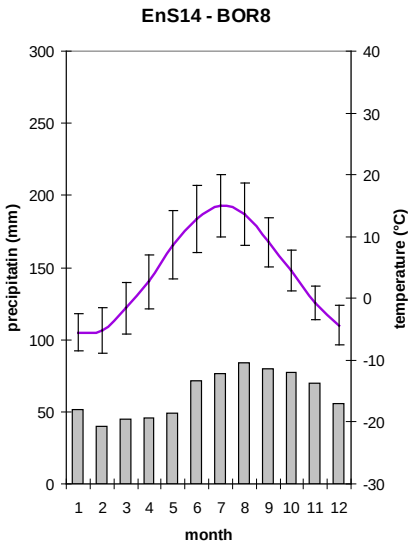
Location: A strip of land extending from extends from the Gulf of Bothnia (Norway) to Skagerrak (Sweden). Major cities are Oslo, Drammen, Larvik (Norway), Karlstad, Örebro (Sweden).

EEA biogeographic region: Boreal.

Climate: The cool temperate climate (GDD_0 2278) is continental with some influence from the Gulf stream. The growing season is short (177 days).

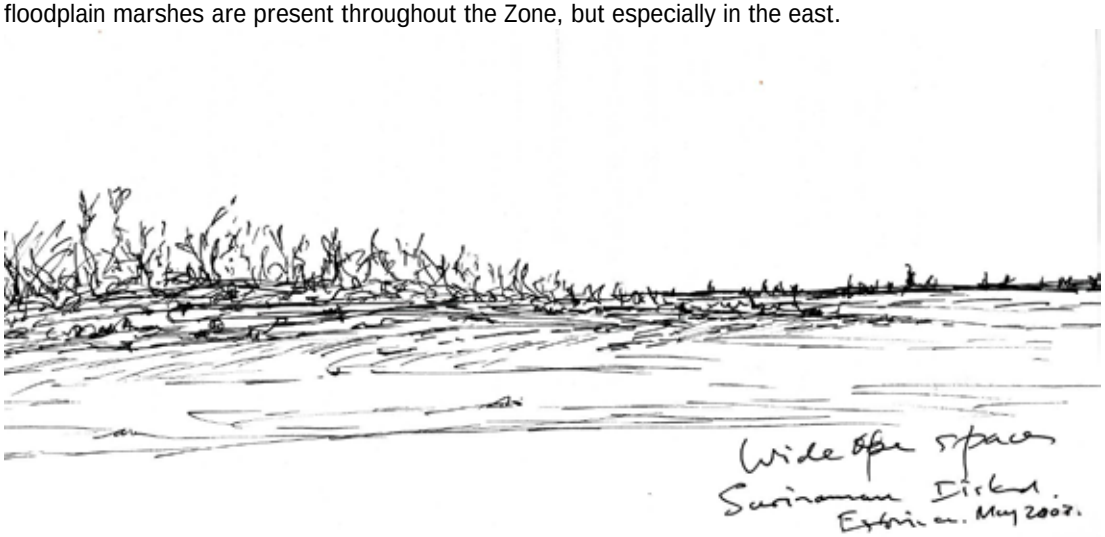
Terrain: The terrain changes from highly glaciated land hills and low mountains in Telemark, in the Oslo valley to the coastal plains along the Bothnian coast.

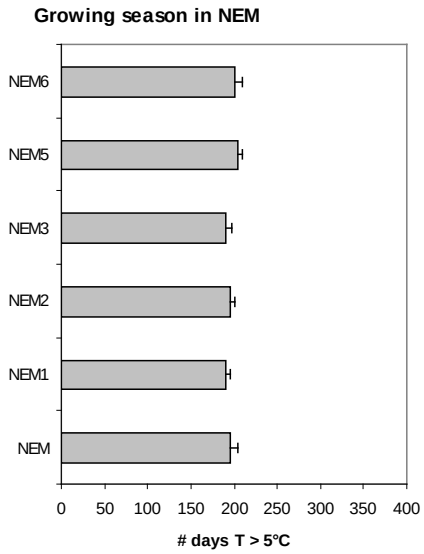


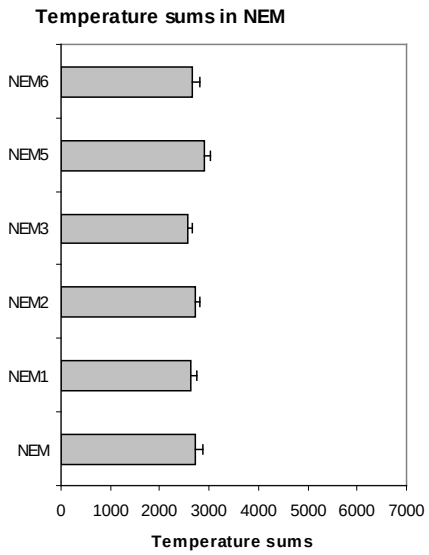


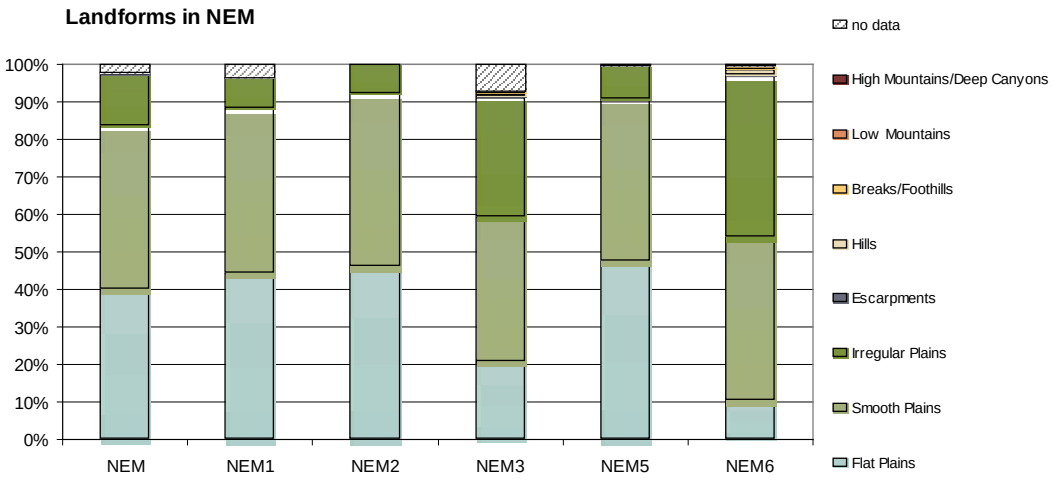
6 Environmental Zone Nemoral (NEM)

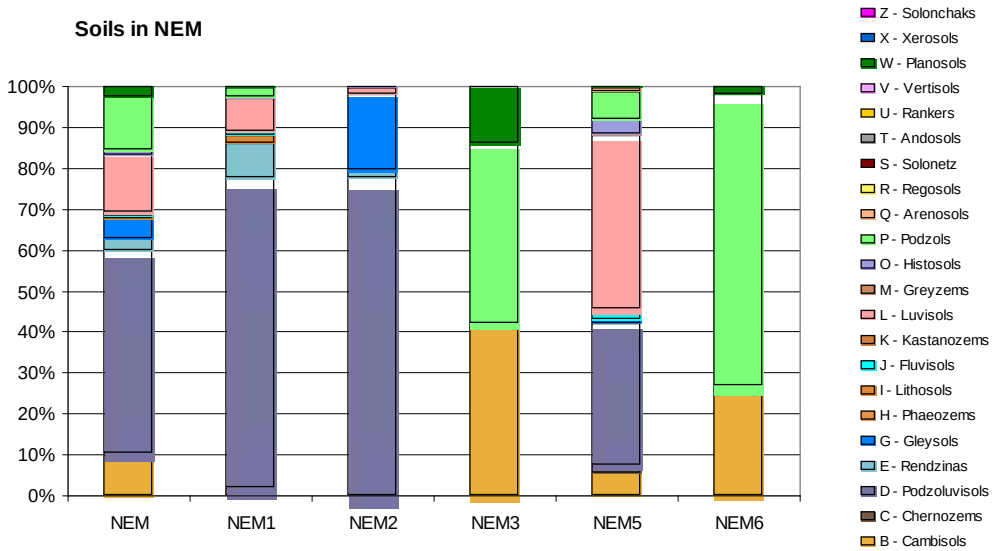
The Nemoral Zone (NEM) includes the lowlands and undulating plains of the southern and eastern Baltic to a variable extent inland and extending in the west to the Sont. The Zone has been heavily glaciated which has resulted in the deposition of many surface features such as moraines and eskers. The climate is continental and cool, but suitable for crop production on the better soils, although abandonment is taking place in marginal regions. Whilst managed grasslands are widespread, the land is mainly covered by coniferous forest of pine and spruce often mixed with birch and aspen, utilised by a major forest industry. Bogs and large floodplain marshes are present throughout the Zone, but especially in the east.



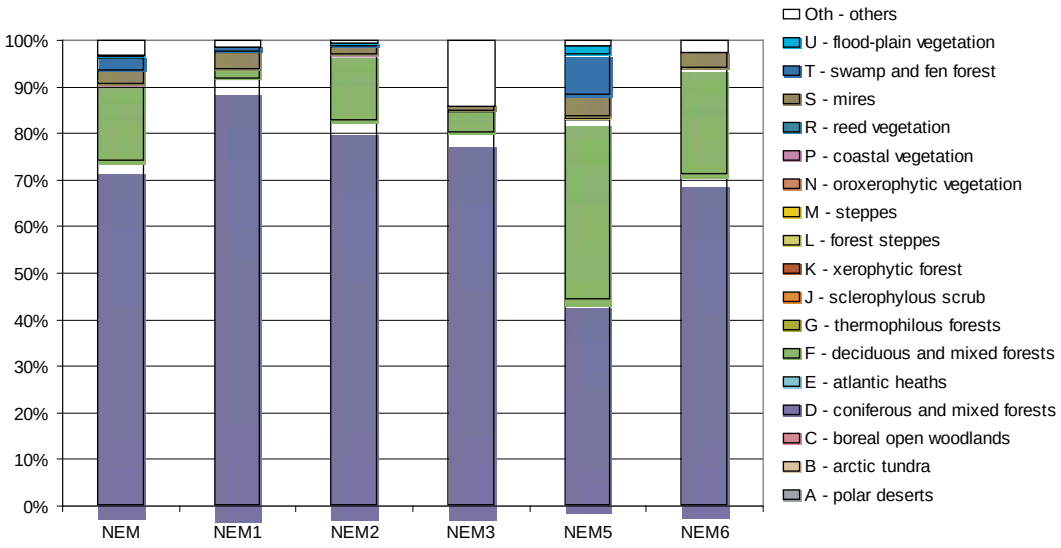

Growing season in NEM
NEM6
NEM5
NEM3
NEM2
NEM1
NEM
0 50 100 150 200 250 300 350 400
days T > 5°C


Temperature sums in NEM
NEM6
NEM5
NEM3
NEM2
NEM1
NEM
0 1000 2000 3000 4000 5000 6000 7000
Temperature sums

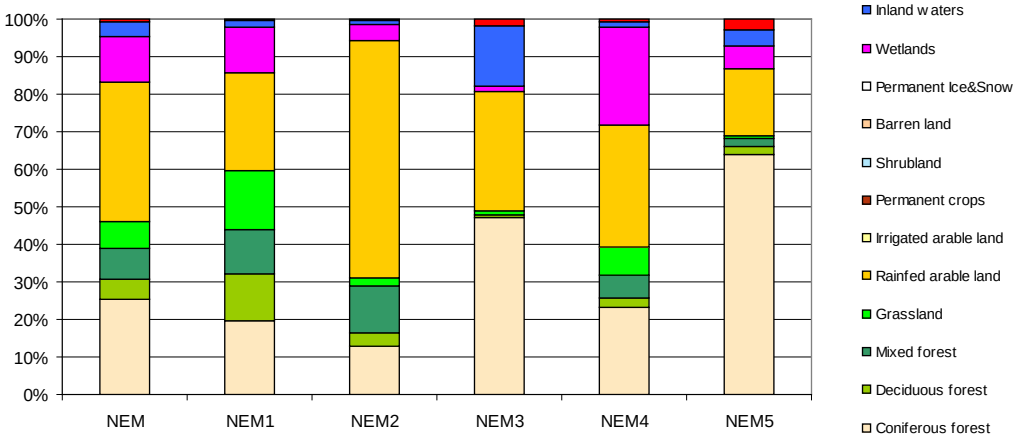

Landforms in NEM
100%
90%
80%
70%
60%
50%
40%
30%
20%
10%
0%
NEM
NEM1
NEM2
NEM3
NEM5
NEM6
no data
High Mountains/Deep Canyons
Low Mountains
Breaks/Foothills
Hills
Escarpments
Irregular Plains
Smooth Plains
Flat Plains


Soils in NEM
100%
90%
80%
70%
60%
50%
40%
30%
20%
10%
0%
NEM
NEM1
NEM2
NEM3
NEM5
NEM6
Z - Solonchaks
X - Xerosols
W - Planosols
V - Vertisols
U - Rankers
T - Andosols
S - Solonetz
R - Regosols
Q - Arenosols
P - Podzols
O - Histosols
M - Greyzems
L - Luvisols
K - Kastanozems
J - Fluvisols
I - Lithosols
H - Phaeozems
G - Gleysols
E - Rendzinas
D - Podzoluvisols
C - Chernozems
B - Cambisols

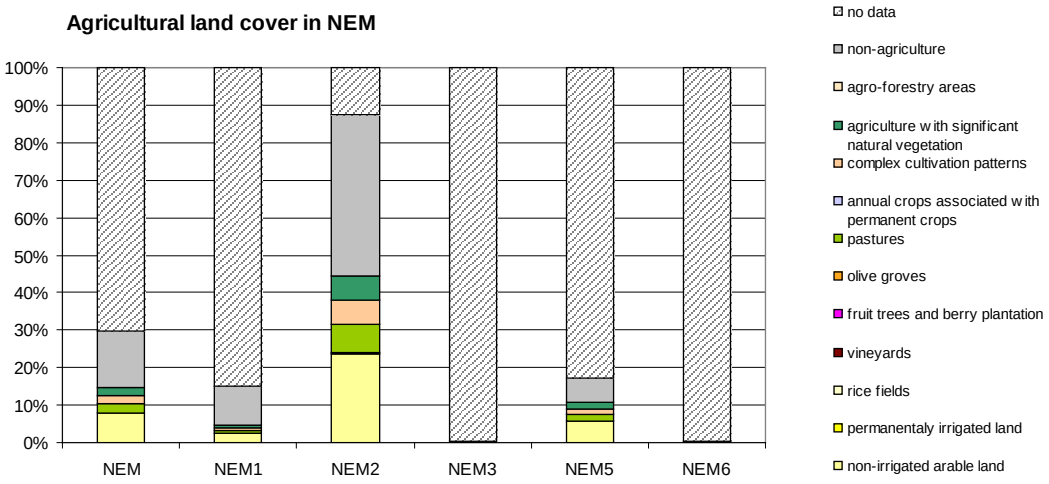
Potential Natural Vegetation in NEM



Land cover in NEM



Agricultural land cover in NEM



6.1 Nemoral 1 (NEM1)

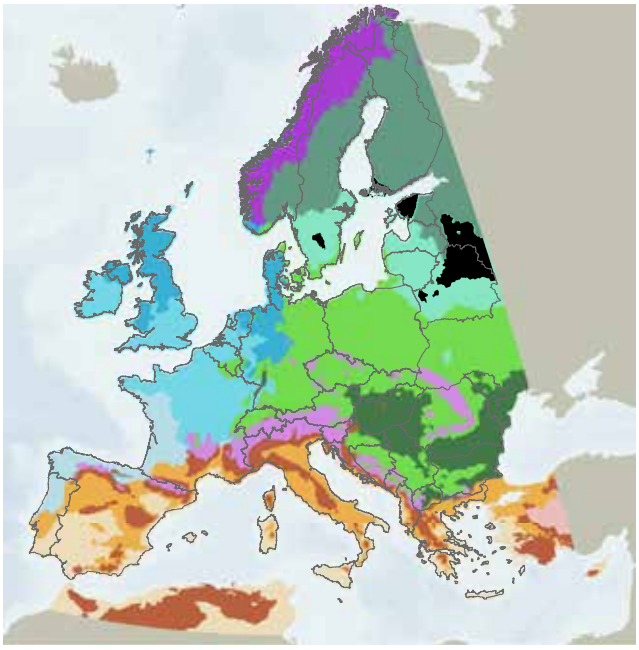
Area: 139,460 km^2

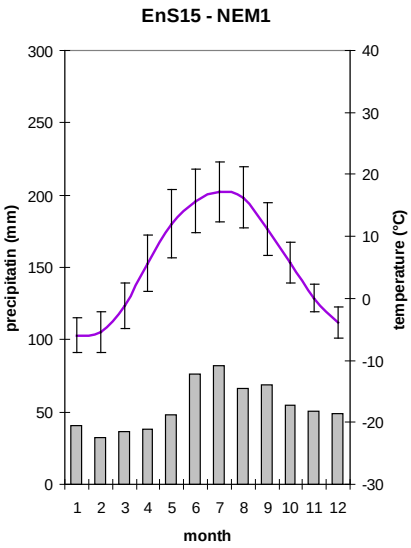
Location: South-eastern Sweden, Finland (in the vicinity of Turku and Åland), Estonia, Belarus, Lithuania, West Russia. Major cities are Jönköping (Sweden), Tallin, Pärnu (Estonia), Turku (Finland), Grodna, Minsk, Mahilyow, Vitsebsk (Belarus), Pskov (Russia).

EEA biogeographic region: Boreal and Continental.

Climate: The cool temperate climate (GDD_0 2640) is continental, with a short growing season (190 days).

Terrain: NEM1 consists of glacial plains with fluvioglacial deposits and moraines.





6.2 Nemoral 2 (NEM2)

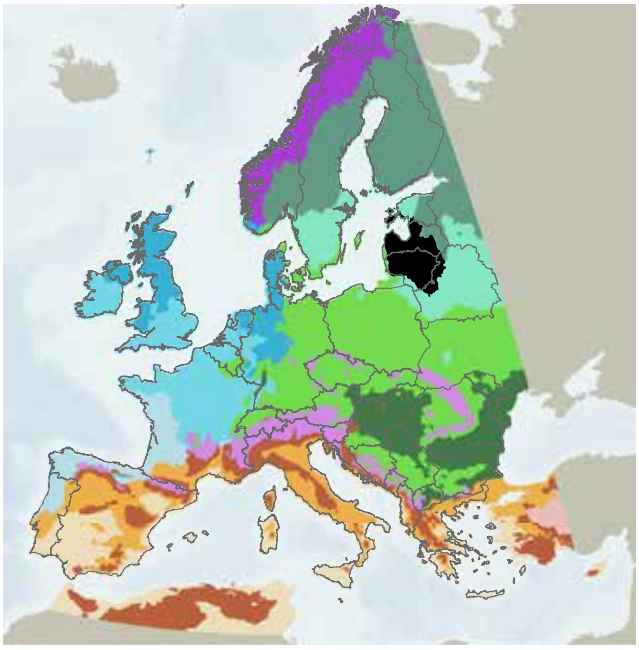
Area: 123132 km^2

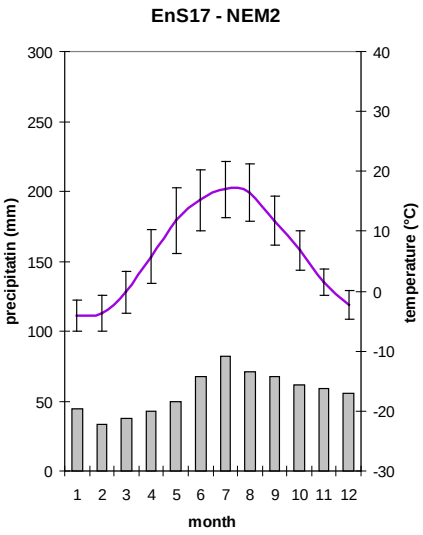
Location: The west of the Russian Plain: south-west Estonia, Latvia, Lithuania and north-west Belarus. Major cities are Riga, Daugavpils (Latvia), Vilnius, Kaunas, Šiauliai, Panevys (Lithuania).

EEA biogeographic region: Continental.

Climate: The cool temperate climate (GDD_0 2718) is continental, with a short growing season (195 days).

Terrain: NEM2 consists of glacial plains with fluvioglacial deposits and moraines. Large valleys and drumlins are common in the north-west.





6.3 Nemoral 3 (NEM3)

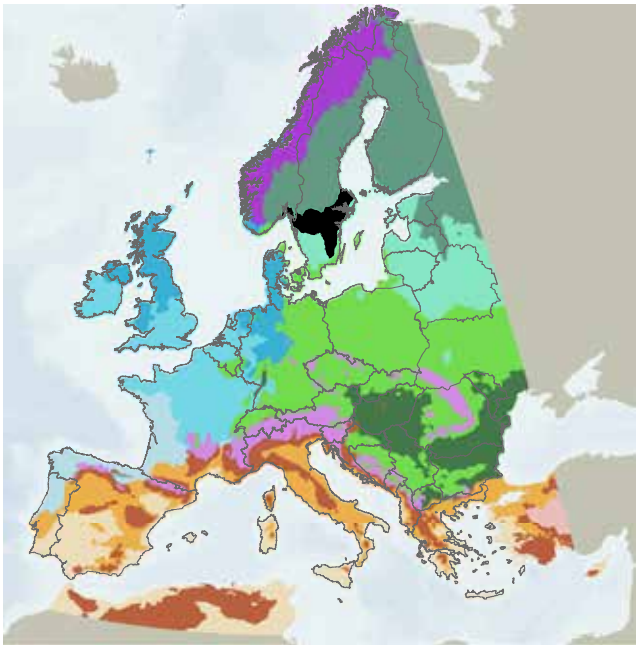
Area: 77001 km^2

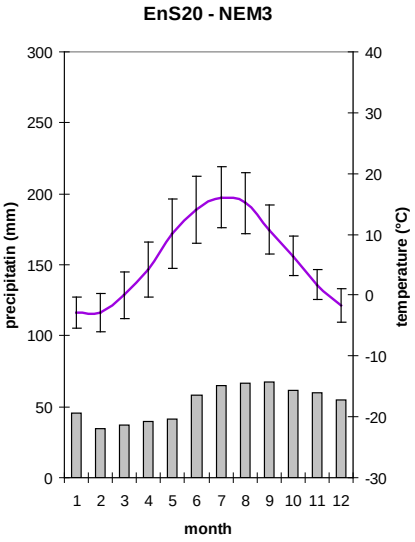
Location: Southern Scandinavia - Central Sweden and South-Eastern Norway. Major cities are Linköping, Norrköping, Växjö (Sweden).

EEA biogeographic region: Boreal.

Climate: The cool temperate climate (GDD_0 2561) is continental, with a short growing season (190 days).

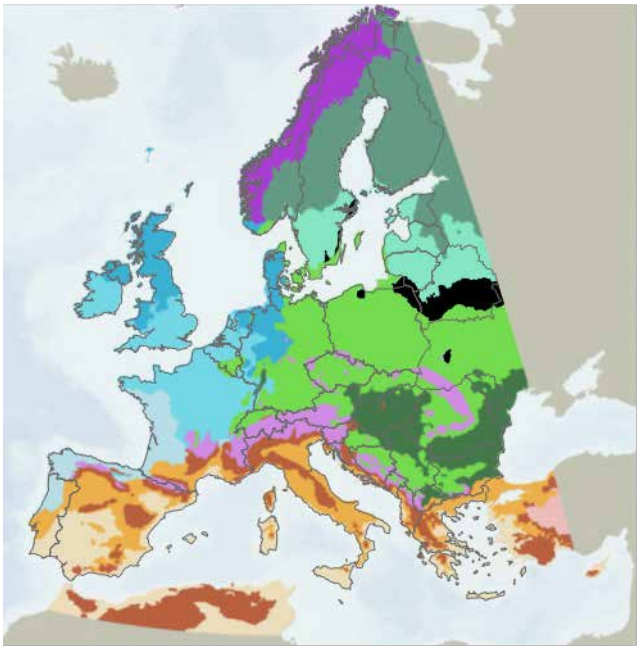
Terrain: In the northwest and along the coast of Skagerrak are lowland moraine hills, the remainder of NEM3 consists of smooth and flat plains, with some glacial erosion features.

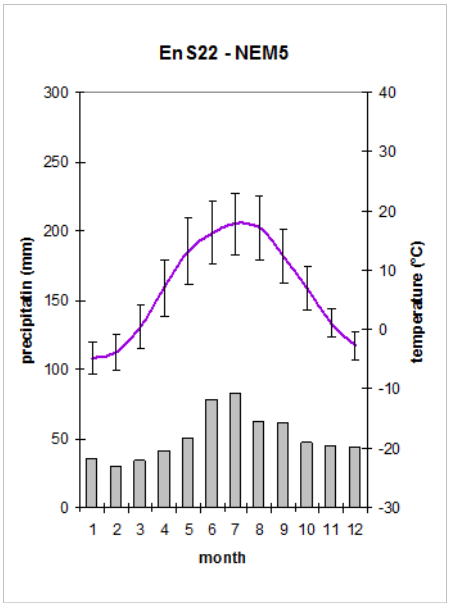




6.4 Nemoral 5 (NEM5)

Area: 130,954 km^2
Location: Eastern Sweden, Kaszubian Lakeland in north Poland, and covers a large section of the Mazurian Lakeland in North-Eastern Poland, the Podlaska lowland in Eastern Poland and Southern Belarus and the north of Palesse in Belarus and Ukraine. Major cities are Stockholm, Uppsala (Sweden), Gdynia (Poland), Gomel' (Belarus).
EEA biogeographic region: Boreal and Continental.
Climate: The cool temperate climate (GDD_0 2898) is continental, with an intermediate growing season (204 days).
Terrain: NEM5 consists of smooth and flat plains, with some glacial erosion features.





6.5 Nemoral 6 (NEM6)

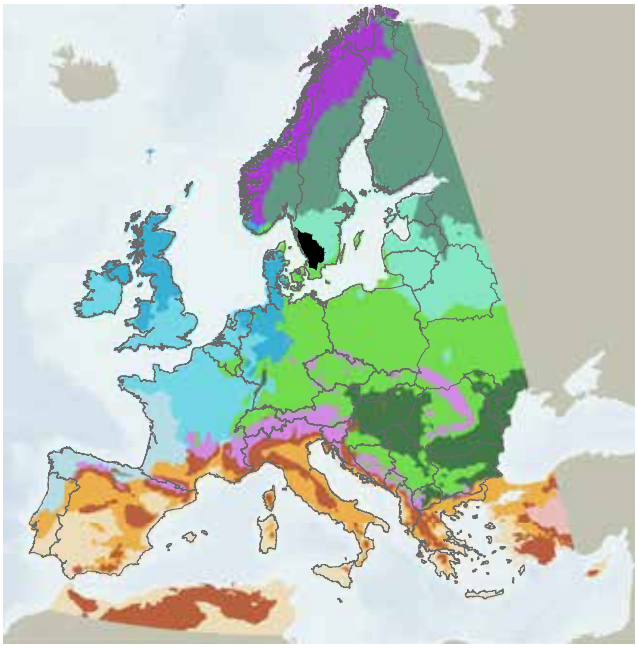
Area: 26,532 km^2

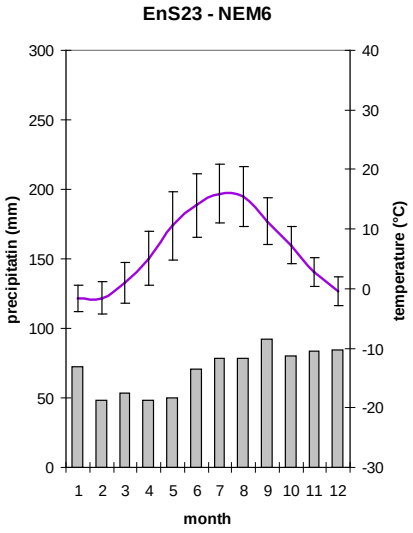
Location: South-Western Sweden. Major cities are Borås and Halmstad.

EEA biogeographic region: Boreal and Continental.

Climate: The cool temperate climate (GDD_0 2658) is continental, with an intermediate growing season (201 days).

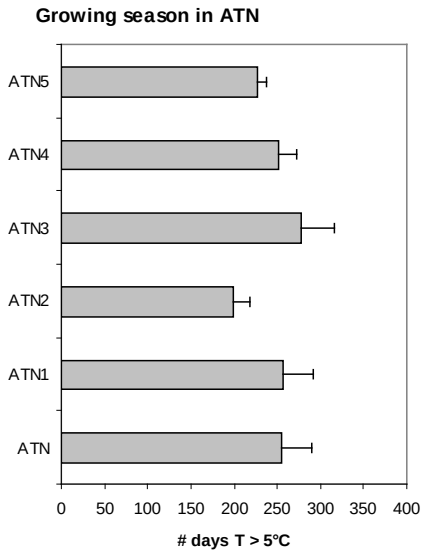
Terrain: NEM5 consists of smooth and flat plains, with some glacial erosion features.

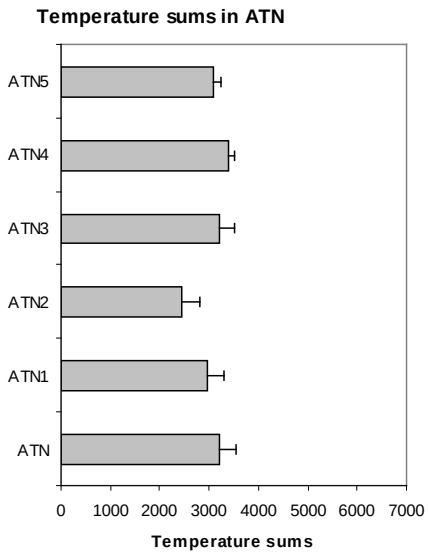


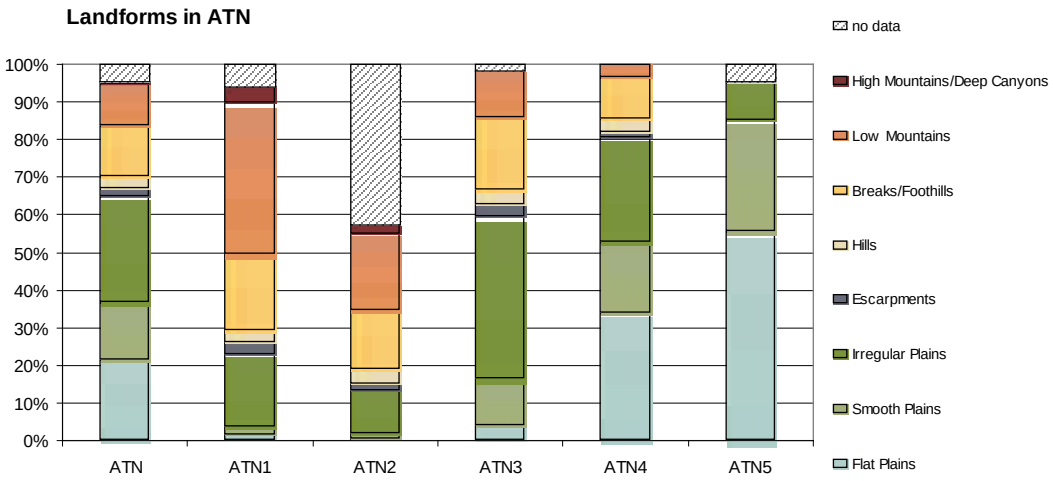


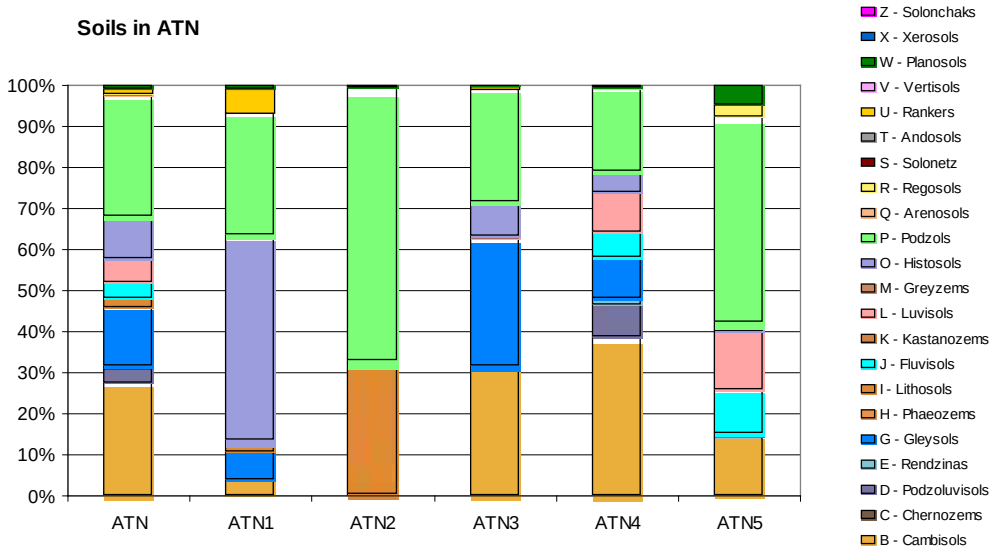
7 Environmental Zone Atlantic North (ATN)

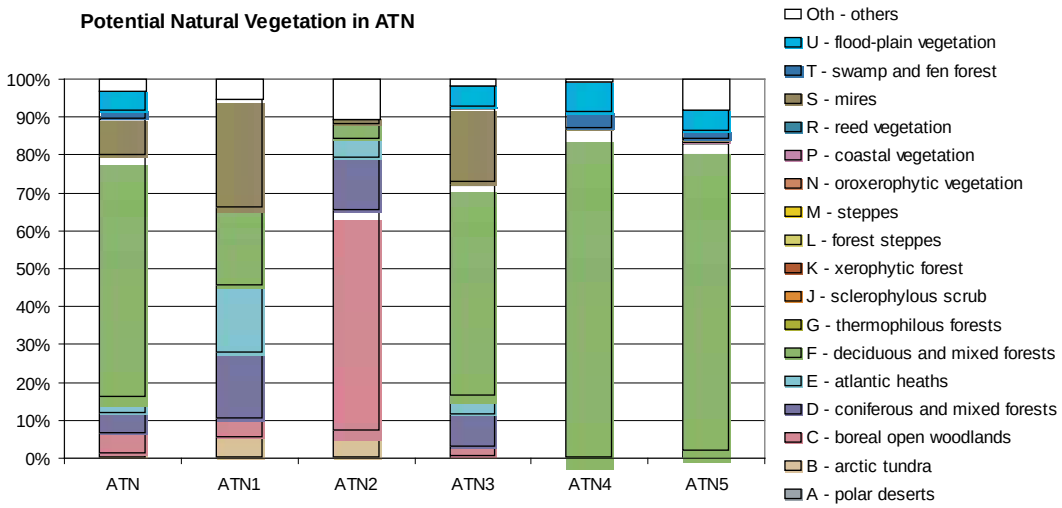
The Atlantic North Zone (ATN) includes the uplands and low mountains in central and northern Britain, Northern Ireland, and the west coast of Norway as well as the coastal plains. The lowlands of Denmark and north-west Germany are also in the Zone. There is therefore a contrast between the glaciated landscapes of the north and west of the Zone and the deposition features present in the south and east. The climate is strongly oceanic in the west with typical mild wet winters and moist cool summers, but becomes more continental in the east. Crops can be grown throughout zone except in the north and west where they are restricted to the lowlands. As a result the southern strata of the Zone are dominated by arable land whereas the northern have various types of grassland enterprise such as dairy and sheep. The former strata also have much urban land cover. Low heaths and bogs are widespread in the mountains, but have now largely disappeared in the lowlands. In the British uplands there are extensive plantations of spruce, but otherwise the forest cover mostly deciduous.

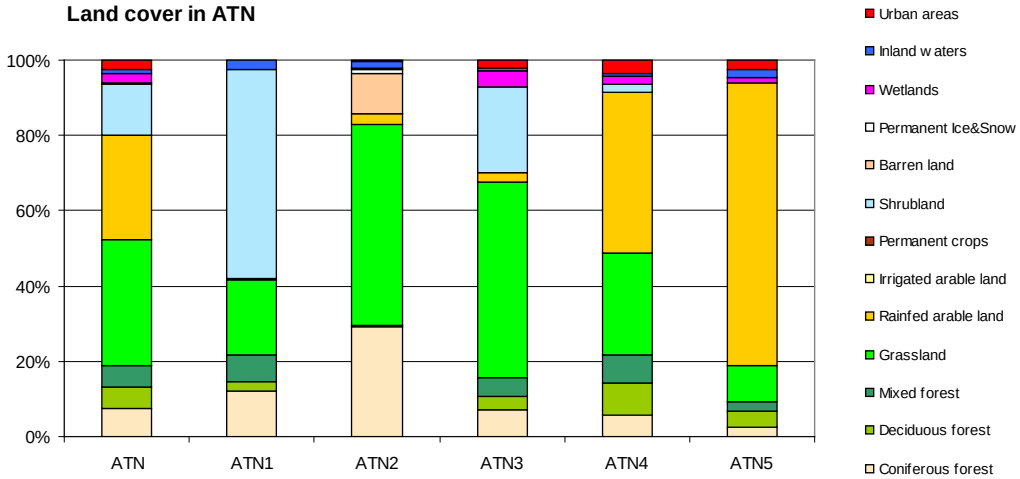

Growing season in ATN
ATN5
ATN4
ATN3
ATN2
ATN1
ATN
0 50 100 150 200 250 300 350 400
days T > 5°C

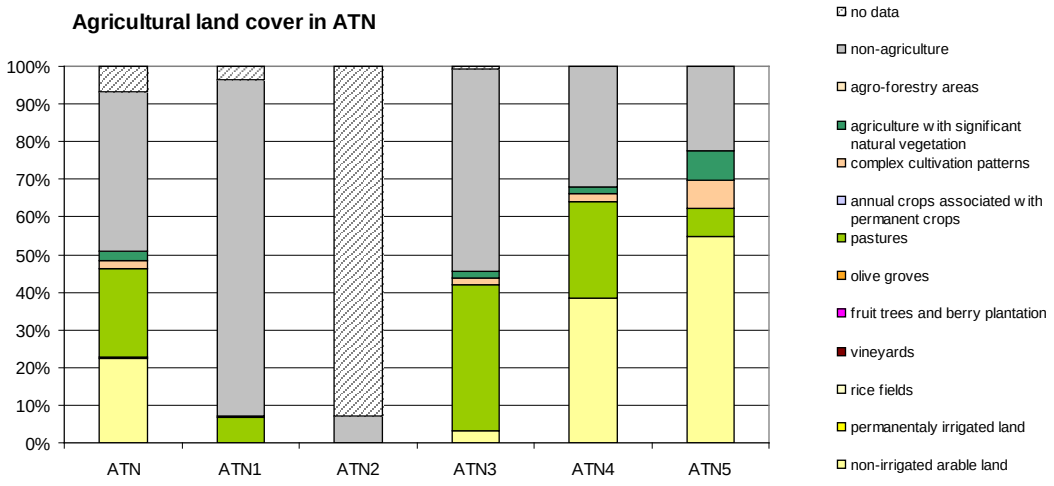

Temperature sums in ATN
ATN5
ATN4
ATN3
ATN2
ATN1
ATN
0 1000 2000 3000 4000 5000 6000 7000
Temperature sums


Landforms in ATN
100%
90%
80%
70%
60%
50%
40%
30%
20%
10%
0%
ATN
ATN1
ATN2
ATN3
ATN4
ATN5
no data
High Mountains/Deep Canyons
Low Mountains
Breaks/Foothills
Hills
Escarpments
Irregular Plains
Smooth Plains
Flat Plains


Soils in ATN
100%
90%
80%
70%
60%
50%
40%
30%
20%
10%
0%
ATN
ATN1
ATN2
ATN3
ATN4
ATN5
Z - Solonchaks
X - Xerosols
W - Planosols
V - Vertisols
U - Rankers
T - Andosols
S - Solonetz
R - Regosols
Q - Arenosols
P - Podzols
O - Histosols
M - Greyzems
L - Luvisols
K - Kastanozems
J - Fluvisols
I - Lithosols
H - Phaeozems
G - Gleysols
E - Rendzinas
D - Podzoluvisols
C - Chernozems
B - Cambisols


Potential Natural Vegetation in ATN
100%
90%
80%
70%
60%
50%
40%
30%
20%
10%
0%
ATN
ATN1
ATN2
ATN3
ATN4
ATN5
Oth - others
U - flood-plain vegetation
T - swamp and fen forest
S - mires
R - reed vegetation
P - coastal vegetation
N - oroxerophytic vegetation
M - steppes
L - forest steppes
K - xerophytic forest
J - sclerophylous scrub
G - thermophilous forests
F - deciduous and mixed forests
E - atlantic heaths
D - coniferous and mixed forests
C - boreal open woodlands
B - arctic tundra
A - polar deserts


Land cover in ATN
100%
80%
60%
40%
20%
0%
ATN
ATN1
ATN2
ATN3
ATN4
ATN5
Urban areas
Inland w aters
Wetlands
Permanent Ice&Snow
Barren land
Shrubland
Permanent crops
Irrigated arable land
Rainfed arable land
Grassland
Mixed forest
Deciduous forest
Coniferous forest


Agricultural land cover in ATN
100%
90%
80%
70%
60%
50%
40%
30%
20%
10%
0%
ATN
ATN1
ATN2
ATN3
ATN4
ATN5
no data
non-agriculture
agro-forestry areas
agriculture w ith significant natural vegetation
complex cultivation patterns
annual crops associated w ith permanent crops
pastures
olive groves
fruit trees and berry plantation
vineyards
rice fields
permanentaly irrigated land
non-irrigated arable land

7.1 Atlantic North 1 (ATN1)

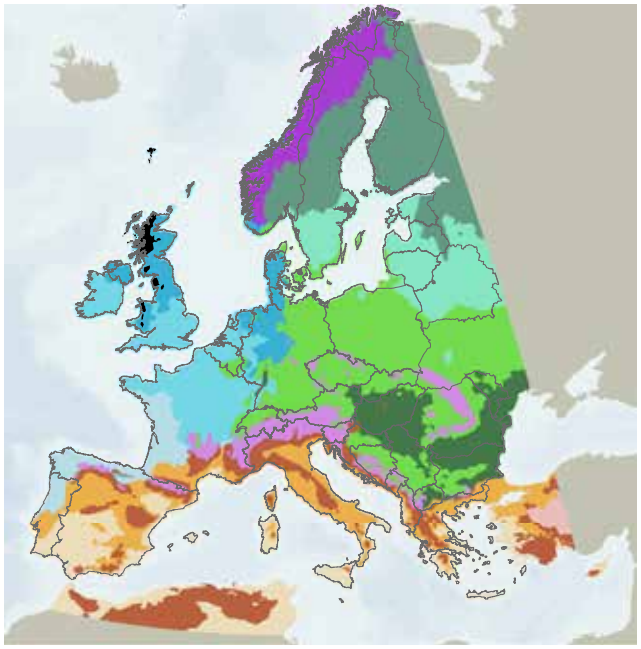
Area: 33,841 km^2

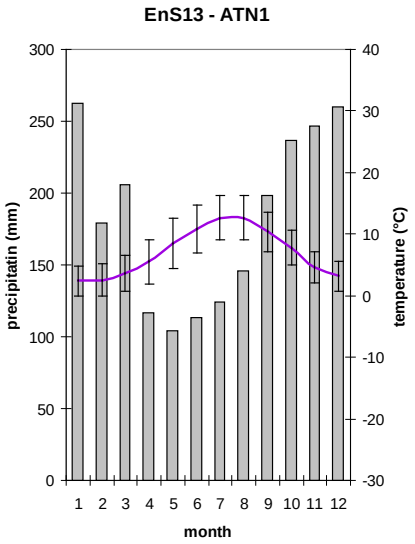
Location: Northern-Western Scotland. Smaller sections are in the southern Uplands, Lake District, central Pennines and Cambrian Mountains in Wales. The major towns are Oban, Ullapool.

EEA biogeographic region: Atlantic.

Climate: The cool temperate climate (GDD_0 2959) is heavily influenced by the Gulf stream; the temperature amplitude does not exceed 8-9 °C and most of the precipitation falls in the winter period. The growing season is intermediate (257 days).

Terrain: ATN1 contains Britain's mountains and higher uplands, which have been eroded by various glaciations and therefore also glacial landforms (e.g. moraines).





7.2 Atlantic North 2 (ATN2)

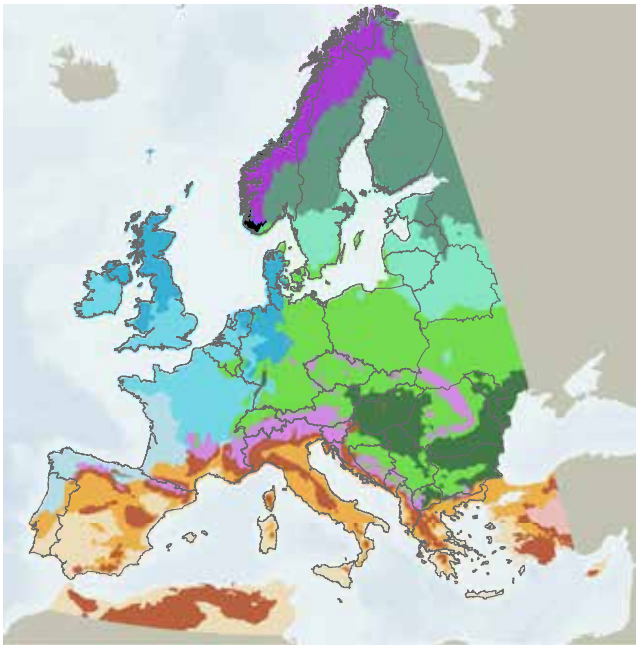
Area: 18,867 km^2

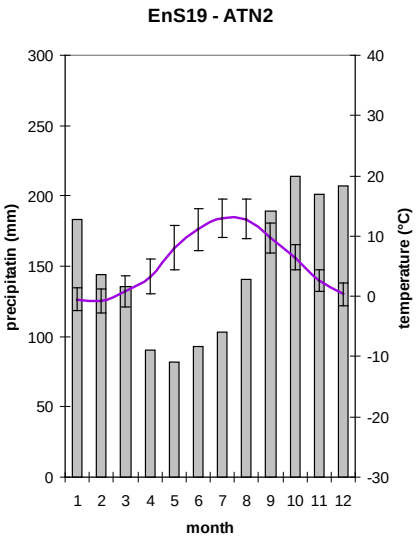
Location: The coastal margins of south-western Norway.

EEA biogeographic region: Atlantic, Alpine.

Climate: The cool temperate climate (GDD_0 2459) is heavily influenced by the Gulf stream; temperature rarely drops below 0°C and most of the precipitation falls in the winter period. The growing season is short (199 days).

Terrain: ATN2 is dominated by hills and low mountains modified by glacial mountain erosion.





7.3 Atlantic North 3 (ATN3)

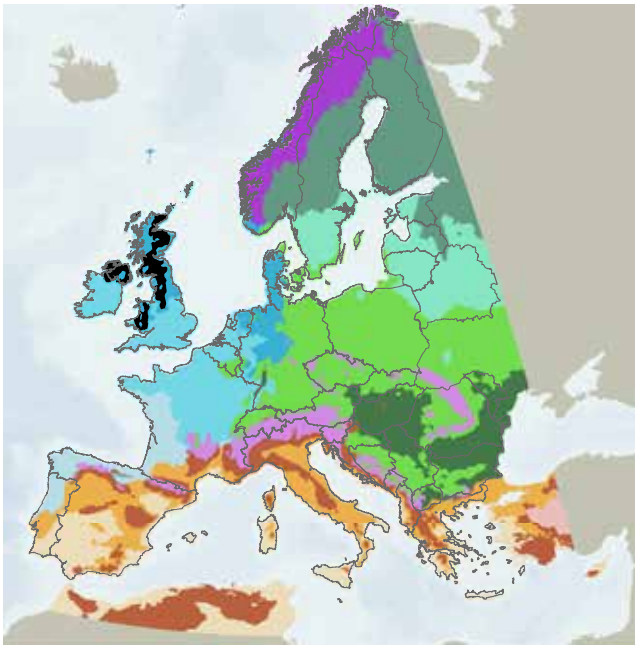
Area: 87,840 km^2

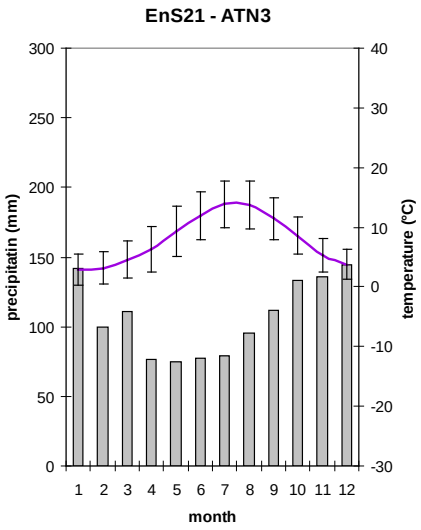
Location: The lower parts of the Grampian in the north to the Pennines and the lower Cambrian mountains in Wales. It also includes Northern Ireland. Major cities are Glasgow, Inverness (Scotland), Leeds, Manchester, Sheffield (England), Belfast, Londonderry (North Ireland).

EEA biogeographic region: Atlantic.

Climate: The temperate climate (GDD_0 3214) is oceanic, with an intermediate growing season (278 days).

Terrain: ATN3 includes low mountains, and undulating foothills and plains.





7.4 Atlantic North 4 (ATN4)

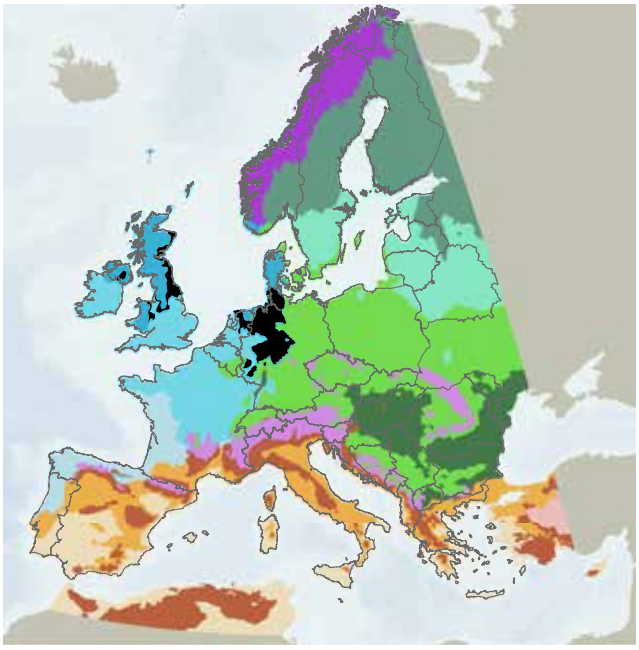
Area: 117,053 km^2

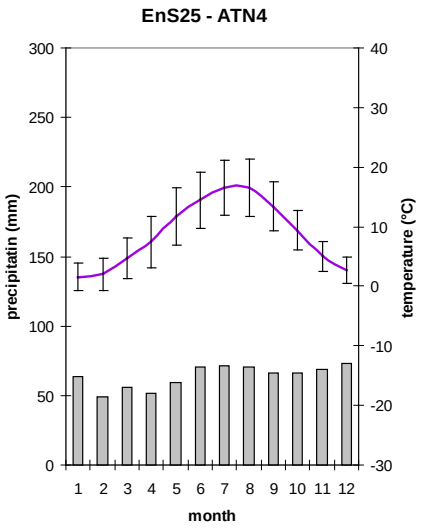
Location: The Netherlands and Germany and smaller areas in Eastern Britain, Northern Ireland. Major cities are Edinburgh, Aberdeen, Newcastle, York (Great Britain), Leeuwarden (The Netherlands), Hamburg, Bremen, Hannover (Germany).

EEA biogeographic region: Atlantic, Continental.

Climate: The temperate climate (GDD_0 3389) is oceanic, with an intermediate growing season (252 days).

Terrain: ATN4 is relatively flat, with some hills and low mountains.





7.5 Atlantic North 5 (ATN5)

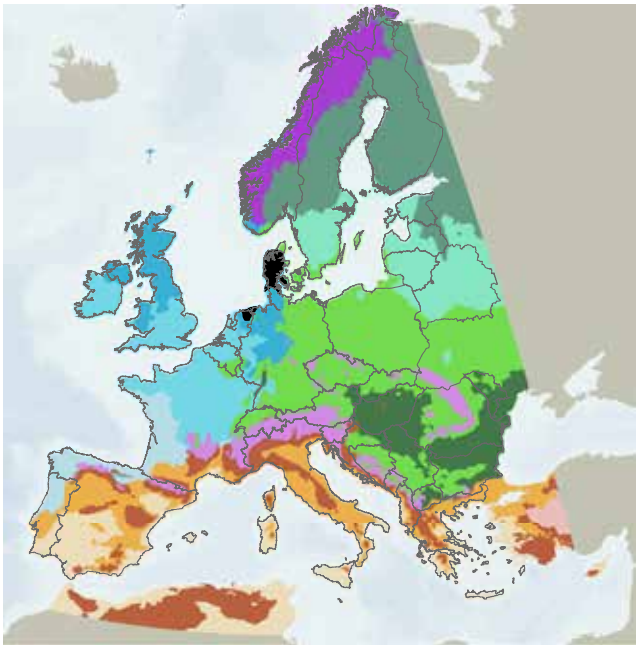
Area: 33794 km^2

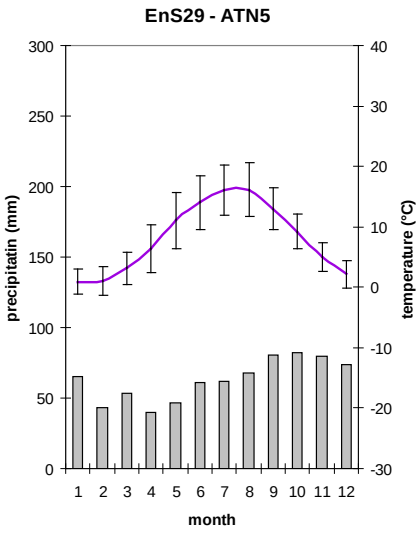
Location: The north-east of the Netherlands, north-west Germany and Jutland (Denmark) Major cities are Groningen (The Netherlands), Århus and Ålborg (Denmark).

EEA biogeographic region: Atlantic, Continental.

Climate: The temperate climate (GDD_0 3075) is oceanic, with an intermediate growing season (226 days).

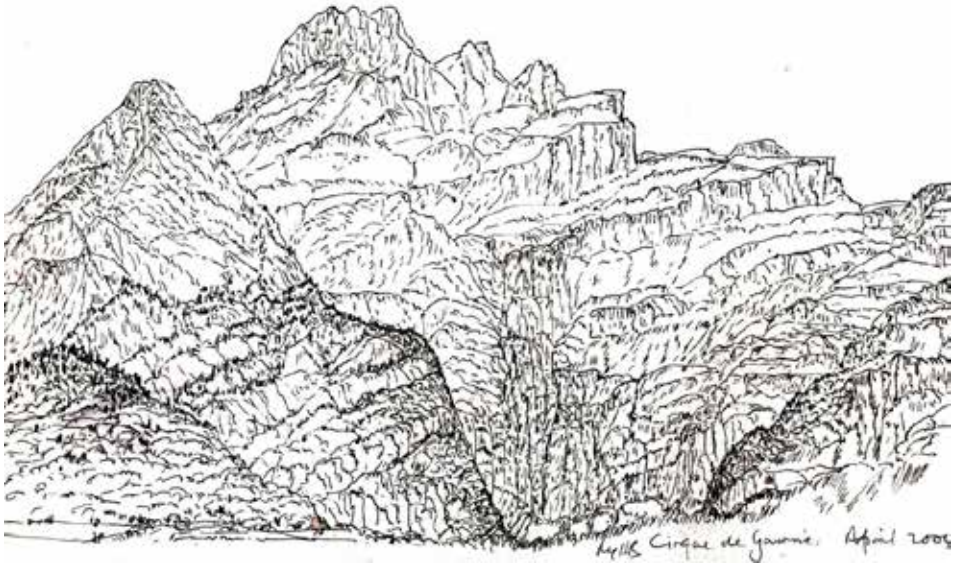
Terrain: ATN5 is flat, consisting mostly of flat and smooth plains.

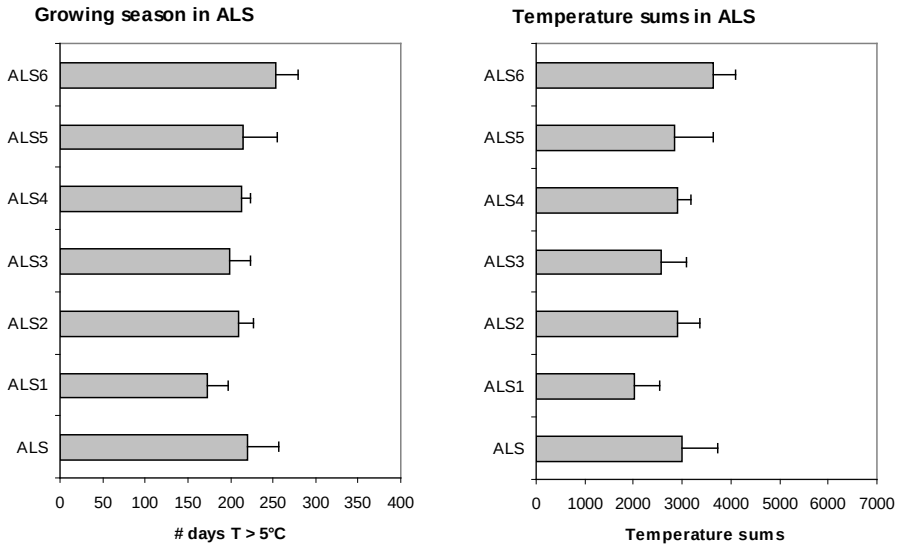


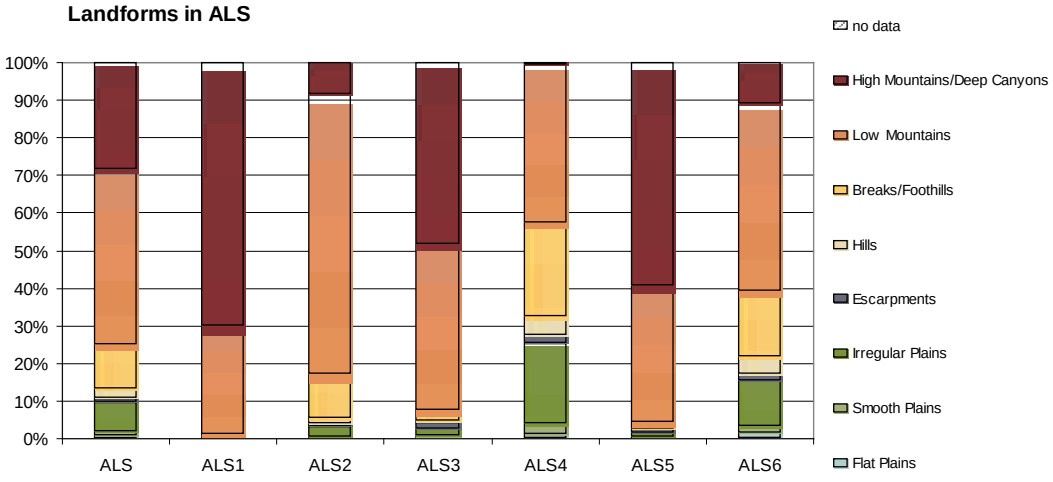


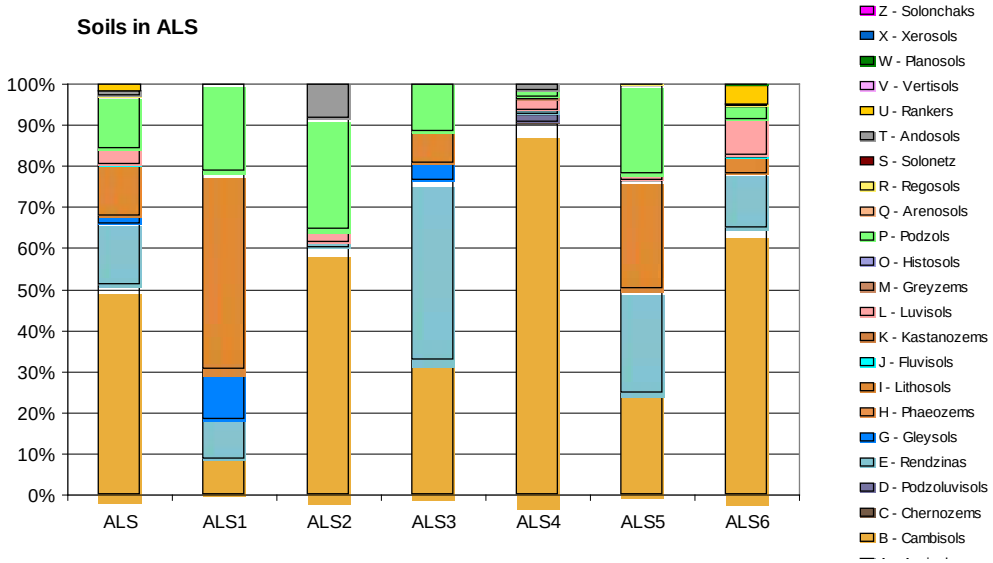
8 Environmental Zone Alpine South (ALS)

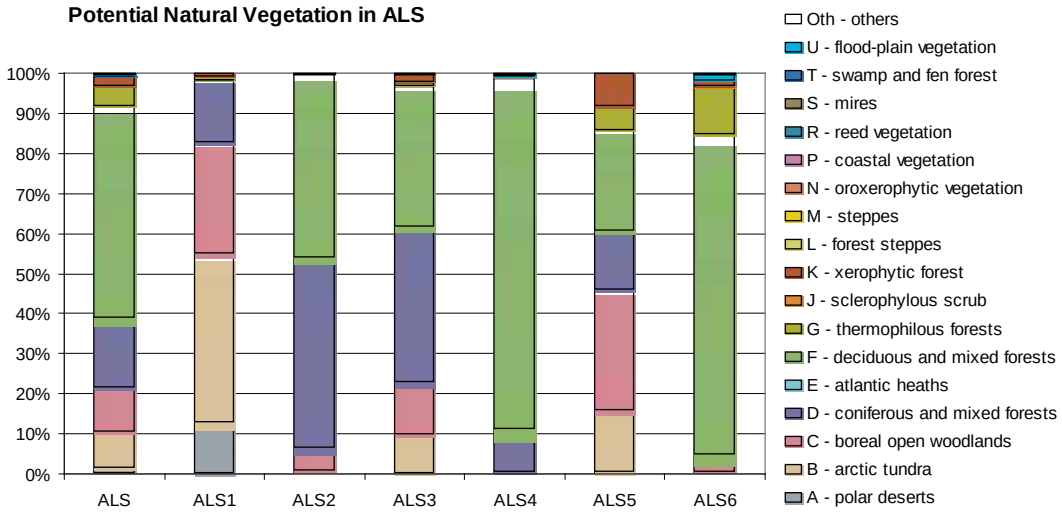
The Alpine South Zone (ALS) includes the high, medium and low mountains of Central Europe, mostly belonging to the main Alpine orogenic belt (e.g. the Carpathians, Pyrenees and Alps) as well as minor ranges (e.g. the Massif Central, Picos de Europa and Tatra). Deep U-shaped glaciated valleys dissect the peaks, which are sufficiently high in the Alps to have glaciers but even elsewhere may have long snow cover. Crops are therefore restricted to the valleys where there are also extensive urban areas and fertile pastures. The mountain slopes are covered by coniferous forests of spruce and larch, as well as various types of deciduous forest on the more fertile soils. At more exposed places extensive shrub of *Pinus mugo* is found. The former are used for forestry and the latter are mainly for protection. Above the tree line there are extensively managed grasslands and various types of alpine heaths depending on altitude and soil type.

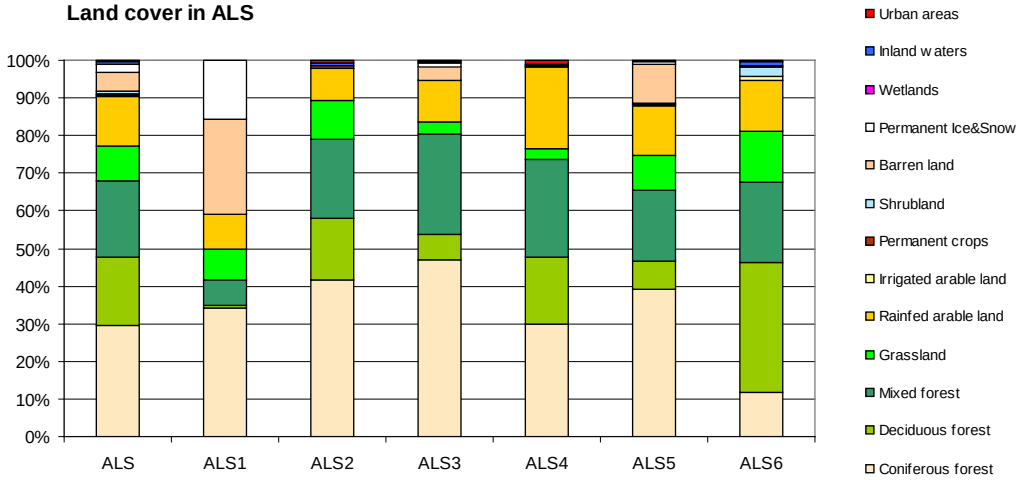


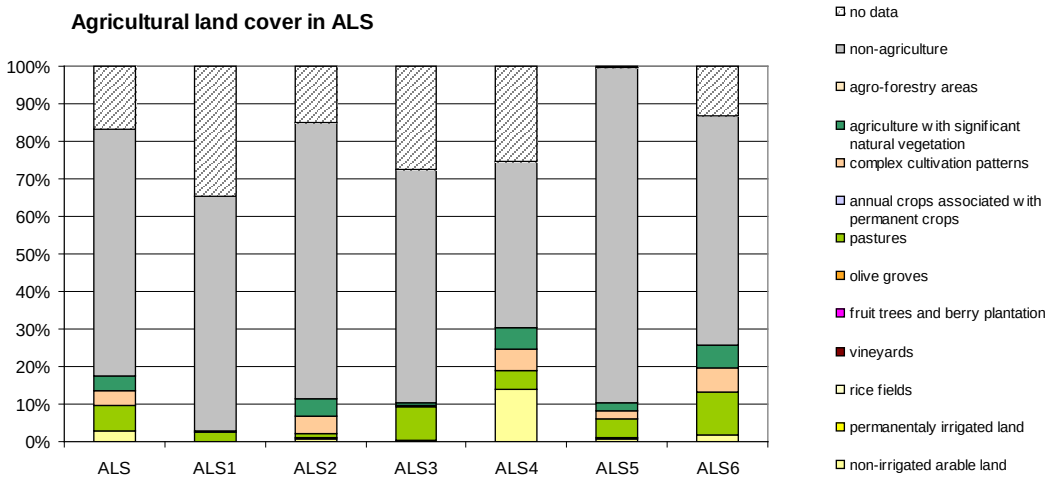

Growing season in ALS
ALS6
ALS5
ALS4
ALS3
ALS2
ALS1
ALS
0 50 100 150 200 250 300 350 400
days T > 5°C
Temperature sums in ALS
ALS6
ALS5
ALS4
ALS3
ALS2
ALS1
ALS
0 1000 2000 3000 4000 5000 6000 7000
Temperature sums


Landforms in ALS
100%
90%
80%
70%
60%
50%
40%
30%
20%
10%
0%
ALS
ALS1
ALS2
ALS3
ALS4
ALS5
ALS6
no data
High Mountains/Deep Canyons
Low Mountains
Breaks/Foothills
Hills
Escarpments
Irregular Plains
Smooth Plains
Flat Plains


Soils in ALS
100%
90%
80%
70%
60%
50%
40%
30%
20%
10%
0%
ALS
ALS1
ALS2
ALS3
ALS4
ALS5
ALS6
Z - Solonchaks
X - Xerosols
W - Planosols
V - Vertisols
U - Rankers
T - Andosols
S - Solonetz
R - Regosols
Q - Arenosols
P - Podzols
O - Histosols
M - Greyzems
L - Luvisols
K - Kastanozems
J - Fluvisols
I - Lithosols
H - Phaeozems
G - Gleysols
E - Rendzinas
D - Podzoluvisols
C - Chernozems
B - Cambisols


Potential Natural Vegetation in ALS
100%
90%
80%
70%
60%
50%
40%
30%
20%
10%
0%
ALS
ALS1
ALS2
ALS3
ALS4
ALS5
ALS6
Oth - others
U - flood-plain vegetation
T - swamp and fen forest
S - mires
R - reed vegetation
P - coastal vegetation
N - oroxerophytic vegetation
M - steppes
L - forest steppes
K - xerophytic forest
J - sclerophylous scrub
G - thermophilous forests
F - deciduous and mixed forests
E - atlantic heaths
D - coniferous and mixed forests
C - boreal open woodlands
B - arctic tundra
A - polar deserts


Land cover in ALS
100%
90%
80%
70%
60%
50%
40%
30%
20%
10%
0%
ALS
ALS1
ALS2
ALS3
ALS4
ALS5
ALS6
Urban areas
Inland waters
Wetlands
Permanent Ice&Snow
Barren land
Shrubland
Permanent crops
Irrigated arable land
Rainfed arable land
Grassland
Mixed forest
Deciduous forest
Coniferous forest


Agricultural land cover in ALS
100%
90%
80%
70%
60%
50%
40%
30%
20%
10%
0%
ALS
ALS1
ALS2
ALS3
ALS4
ALS5
ALS6
no data
non-agriculture
agro-forestry areas
agriculture with significant natural vegetation
complex cultivation patterns
annual crops associated with permanent crops
pastures
olive groves
fruit trees and berry plantation
vineyards
rice fields
permanentaly irrigated land
non-irrigated arable land

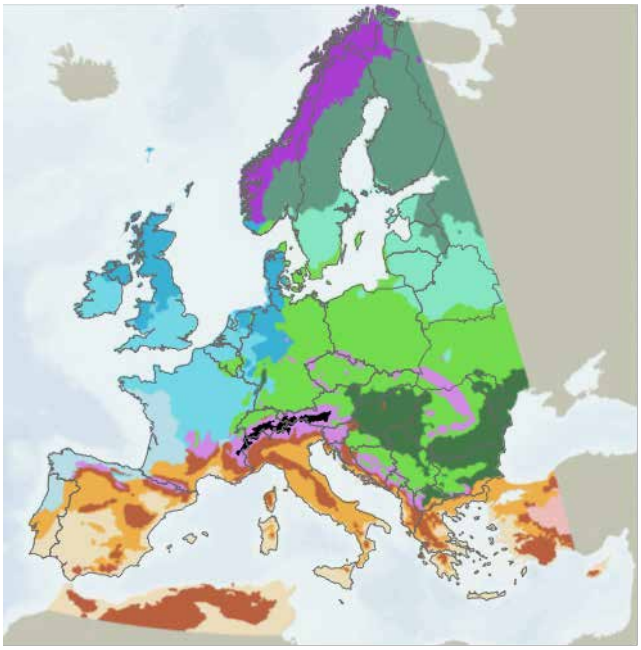
8.1 Alpine South 1 (ALS1)

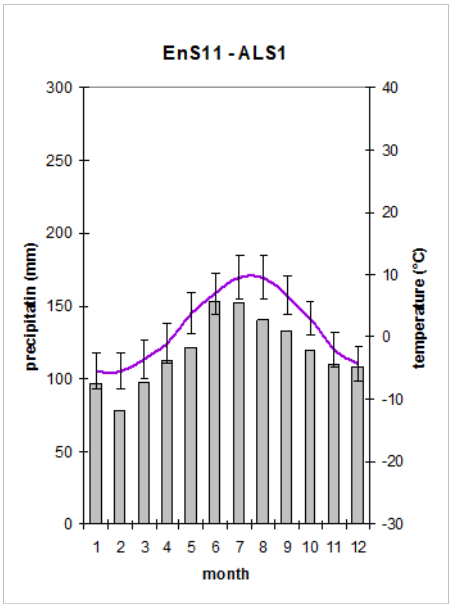
Location: The central zone of the Alps in France, Switzerland and Austria. It includes the highest mountains in the Alps but also intermediate mountains and high valleys. Major cities are Chur, Davos (Switzerland).

EEA biogeographic region: Alpine.

Climate: The cool temperate climate (GDD_0 2020) is continental with a short growing season lasting 173 days. There is considerable climatic variation between, caused by aspect and altitude.

Terrain: The relief of the central zone of Alps is dominated by high mountains (reaching 4807m, Mont Blanc).





8.2 Alpine South 2 (ALS2)

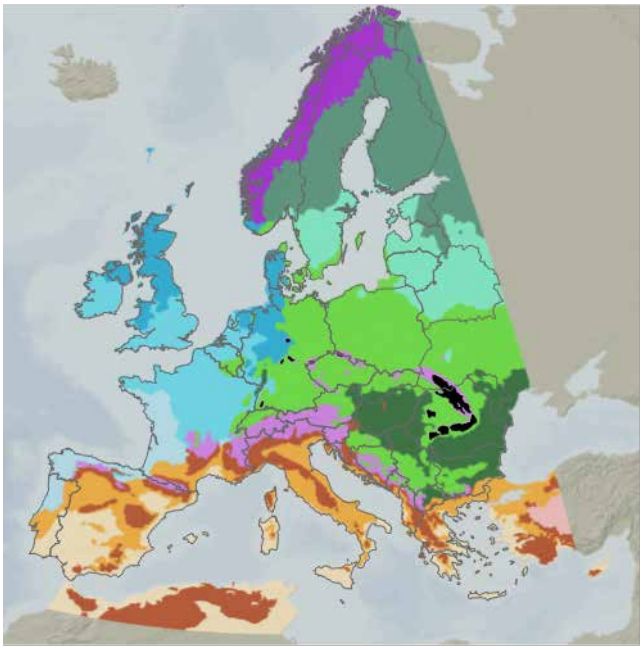
Area: 42,842 km^2

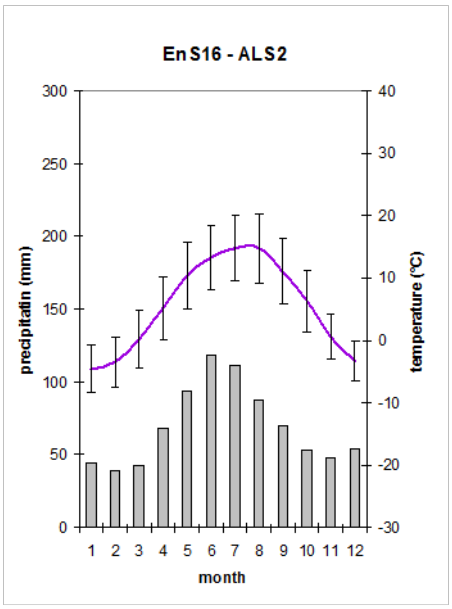
Location: The core of the Carpathians, and in isolated mountains in the Southern Schwarzwald, Thüringer Wald, Rhön, Harz, West-Erzgebirge and West-Krkonose Mountains. Major cities are Climnesti, Sinaia (Romania), Rahov (Ukraine).

EEA biogeographic region: Alpine and Continental.

Climate: The cool temperate climate (GDD_0 2903) is continental with an intermediate growing period lasting 209. There is considerable climatic variation between, caused by aspect and altitude.

Terrain: ALS2 is characterised by low mountains with some high mountain peaks.





8.3 Alpine South 3 (ALS3)

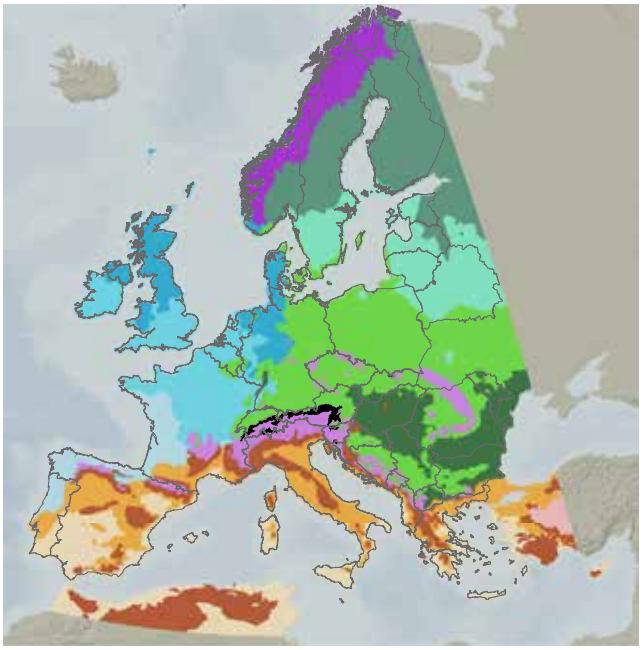
Area: 32,268 km^2

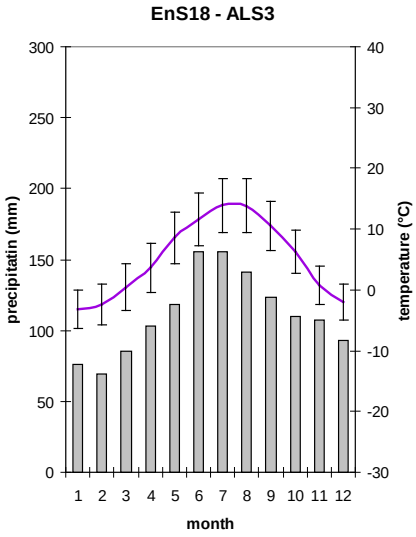
Location: The Northern periphery of the Alps, but is also present in Alpi Lepontine, Niedere Tauern and Karawanken mountain range. Major cities are Schwyz (Switzerland), Oberstdorf (Germany), Bad Ischl (Austria) and Jesenice (Slovenia).

EEA biogeographic region: Alpine.

Climate: The cool temperate climate (GDD_0 2574) is continental with an intermediate growing period lasting 199 days. There is considerable climatic variation in between, caused by aspect and altitude.

Terrain: ALS3 is characterised by high and low mountains.





8.4 Alpine South 4 (ALS4)

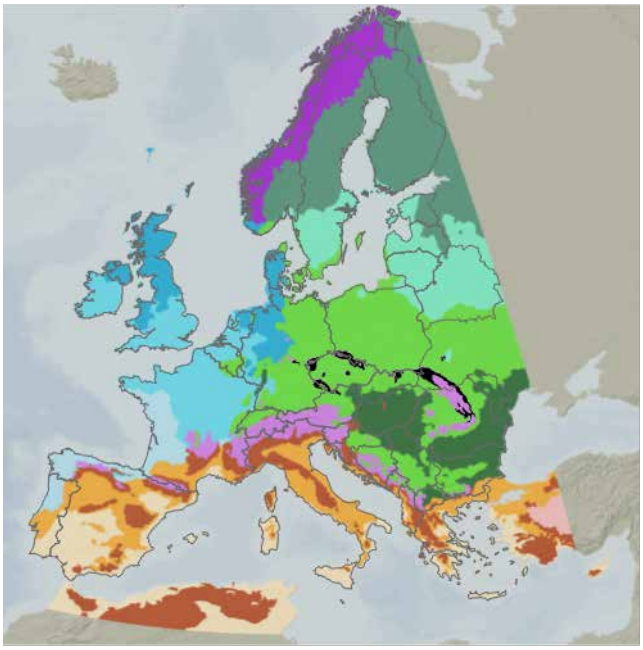
Area: 41,481 km^2

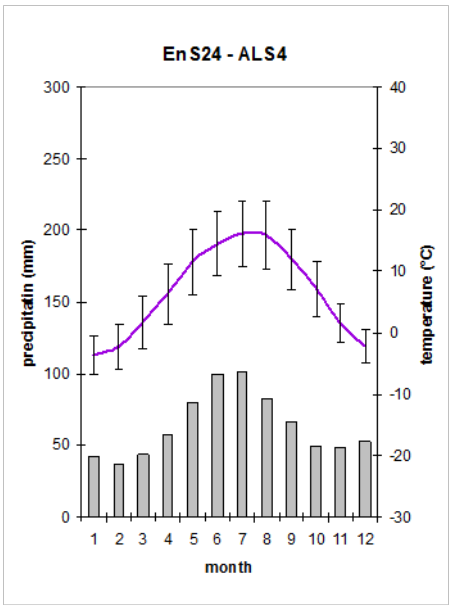
Location: The outer ranges of the Western and Eastern Carpathians, Böhmerwald, Krkonose Mountains, Eastern Tatra, Thüringer Wald (Fichtelgebirge) and the Rothhaargebirge. Major cities are Ostrava, Liberec (Czech Republic), Jelenia Góra (Poland), Košice (Slovakia), Bayreuth (Germany), Piatra Neamt (Romania).

EEA biogeographic region: Alpine.

Climate: The cool temperate climate (GDD_0 2917) is continental with an intermediate growing period lasting 213 days. There is considerable climatic variation between, caused by aspect and altitude.

Terrain: ALS4 is characterised by low mountains and hills.





8.5 Alpine South 5 (ALS5)

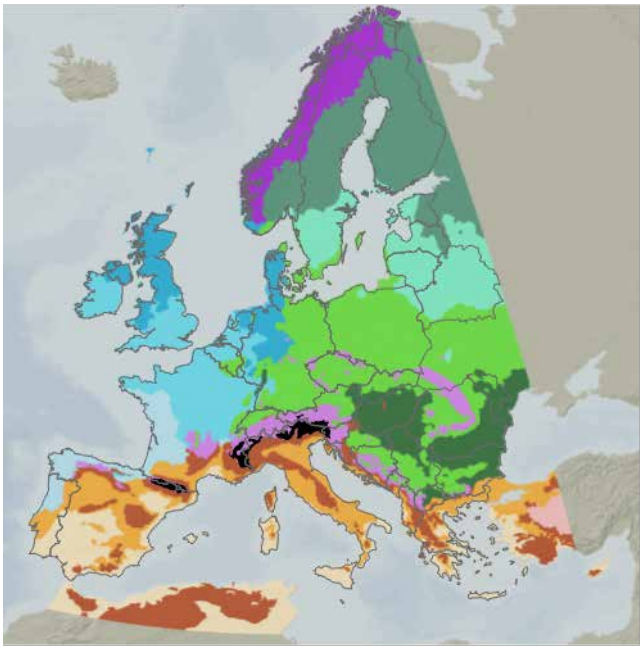
Area: 53,643 km^2

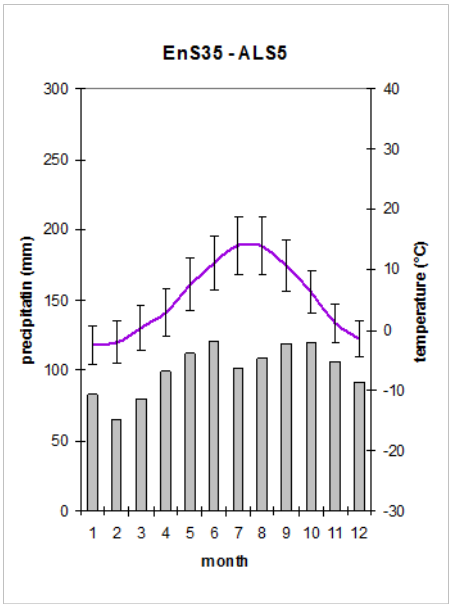
Location: The South-Western Alps, the core zone of Pyrenees and South-Eastern fringes of the Alps.

EEA biogeographic region: Alpine.

Climate: The cool temperate climate (GDD_0 2848) is continental with an intermediate growing season lasting 214 days. There is considerable climatic variation, caused by aspect and altitude.

Terrain: ALS5 is characterised by high and low mountains.





8.6 Alpine South 6 (ALS6)

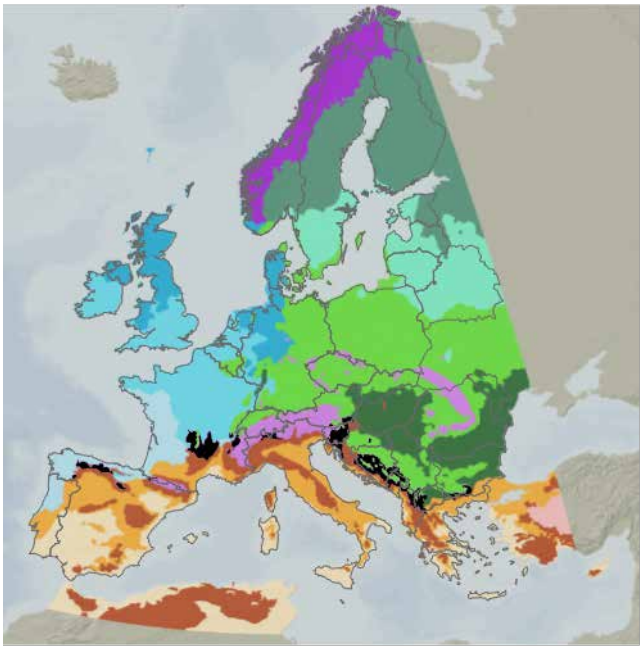
Area: 98,612 km^2

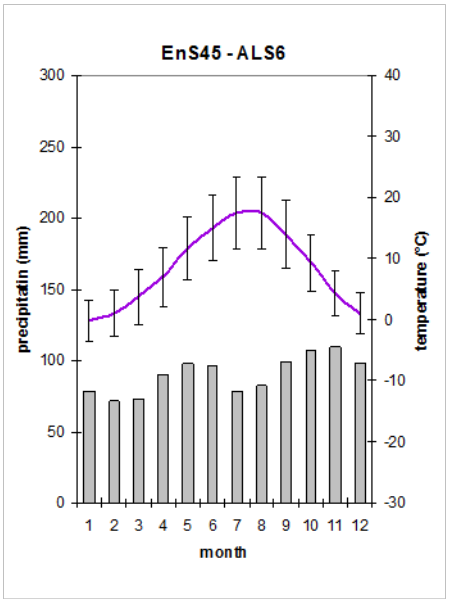
Location: Western Cordillera Cantabrica, western Pyrenees (Spain), the Dinaric Alps and North Pindos (Croatia, Bosnia and Herzegovina, Monte-Negro, Albania, Macedonia, Greece), the north section of Massif Central (France), the outer section of the western Alps (Switzerland) and Rodopi (Bulgaria), the low-mountain Alpine fringes next to Lago Maggiore and Como (Switzerland and Italy), the outer section of the eastern Alps (Austria, Slovenia, Croatia). Major cities are Lugano, Rijeka and Ljubljana.

EEA biogeographic region: Alpine, Continental, Mediterranean.

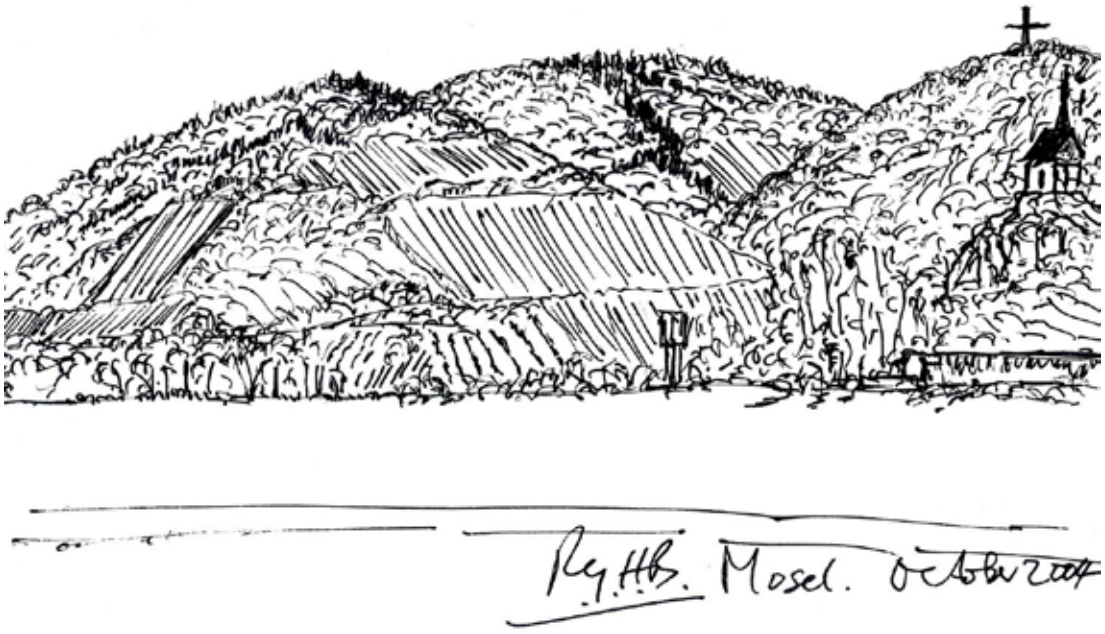
Climate: The temperate climate (GDD_0 3652) shows Mediterranean and continental influences with an intermediate growing period lasting 253). There is considerable climatic variation between, caused by aspect and altitude.

Terrain: Low mountains, with some high mountain peaks and lower foothills.

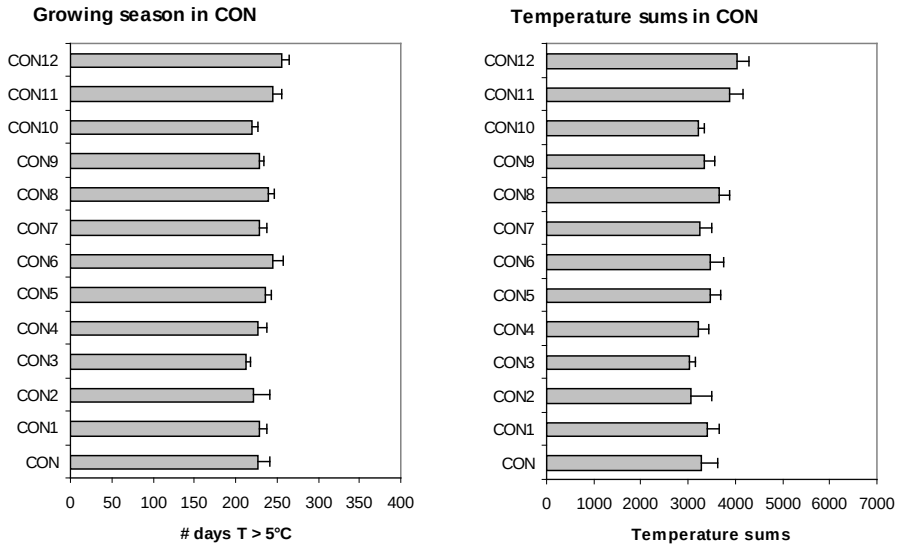


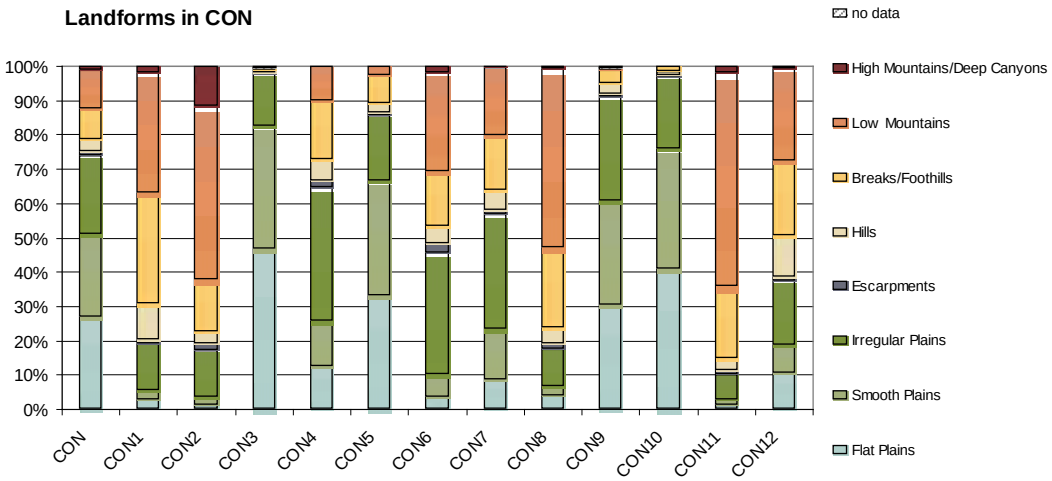


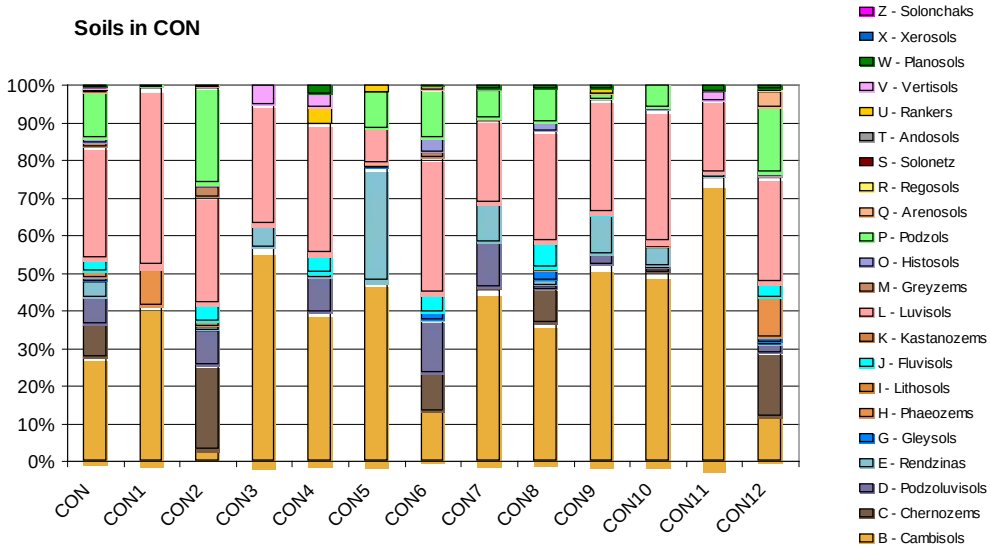
9 Environmental Zone Continental (CON)

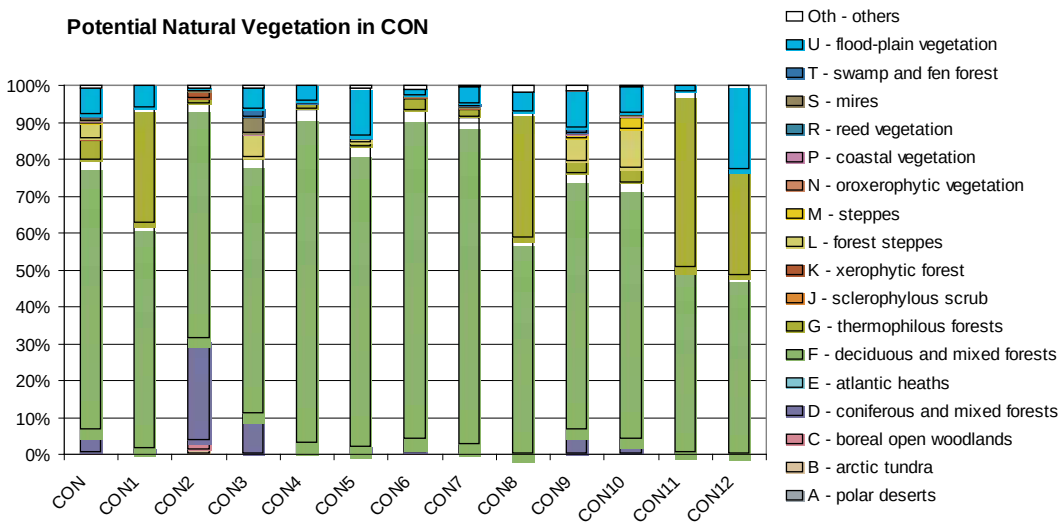


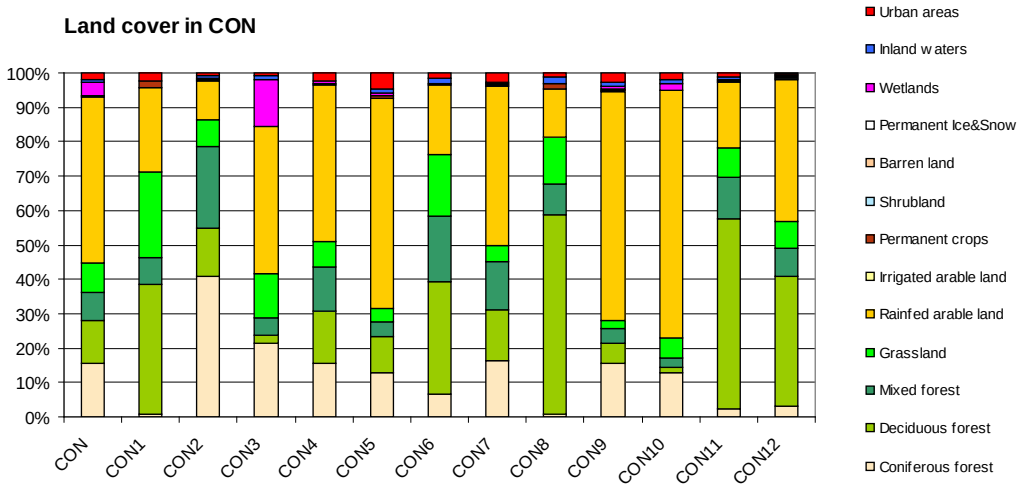
The Continental Zone (CON) is the Zone covering the greatest geographic extent and includes the plains and lowlands of Central and Eastern Europe and the Balkans as well as some of the lower hills on the margin of ALS. The geology and soils are variable and cause much of the variation in land cover. The climate is continental, with large annual temperature ranges and precipitation concentrated the summer months. The continental character is more pronounced in the east than in the extreme west of the Zone. Crops and fertile grassland and associated agricultural enterprises are dominant in much of the Zone. Extensive forests are present locally on shallow and poor soils, with beech and planted spruce and pine widespread and most areas being managed for timber production. Major urban areas are present throughout the Zone, which also has major river systems.

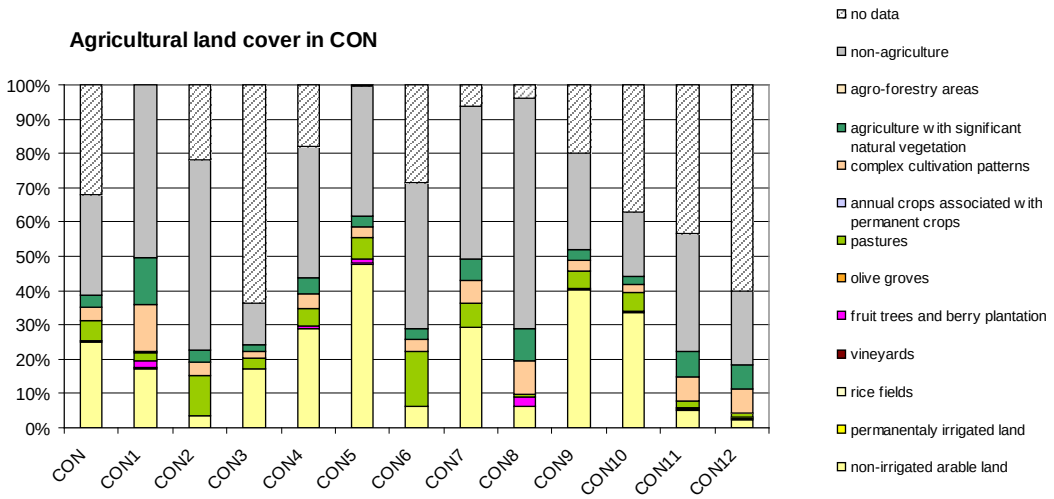

Growing season in CON
CON12
CON11
CON10
CON9
CON8
CON7
CON6
CON5
CON4
CON3
CON2
CON1
CON
0
50
100
150
200
250
300
350
400
days T > 5°C
Temperature sums in CON
CON12
CON11
CON10
CON9
CON8
CON7
CON6
CON5
CON4
CON3
CON2
CON1
CON
0
1000
2000
3000
4000
5000
6000
7000
Temperature sums


Landforms in CON
100%
90%
80%
70%
60%
50%
40%
30%
20%
10%
0%
CON
CON1
CON2
CON3
CON4
CON5
CON6
CON7
CON8
CON9
CON10
CON11
CON12
no data
High Mountains/Deep Canyons
Low Mountains
Breaks/Foothills
Hills
Escarpments
Irregular Plains
Smooth Plains
Flat Plains


Soils in CON
100%
90%
80%
70%
60%
50%
40%
30%
20%
10%
0%
CON
CON1
CON2
CON3
CON4
CON5
CON6
CON7
CON8
CON9
CON10
CON11
CON12
Z - Solonchaks
X - Xerosols
W - Planosols
V - Vertisols
U - Rankers
T - Andosols
S - Solonetz
R - Regosols
Q - Arenosols
P - Podzols
O - Histosols
M - Greyzems
L - Luvisols
K - Kastanozems
J - Fluvisols
I - Lithosols
H - Phaeozems
G - Gleysols
E - Rendzinas
D - Podzoluvisols
C - Chernozems
B - Cambisols


Potential Natural Vegetation in CON
100%
90%
80%
70%
60%
50%
40%
30%
20%
10%
0%
CON
CON1
CON2
CON3
CON4
CON5
CON6
CON7
CON8
CON9
CON10
CON11
CON12
Oth - others
U - flood-plain vegetation
T - swamp and fen forest
S - mires
R - reed vegetation
P - coastal vegetation
N - oroxerophytic vegetation
M - steppes
L - forest steppes
K - xerophytic forest
J - sclerophylous scrub
G - thermophilous forests
F - deciduous and mixed forests
E - atlantic heaths
D - coniferous and mixed forests
C - boreal open woodlands
B - arctic tundra
A - polar deserts


Land cover in CON
100%
90%
80%
70%
60%
50%
40%
30%
20%
10%
0%
CON
CON1
CON2
CON3
CON4
CON5
CON6
CON7
CON8
CON9
CON10
CON11
CON12
Urban areas
Inland waters
Wetlands
Permanent Ice&Snow
Barren land
Shrubland
Permanent crops
Irrigated arable land
Rainfed arable land
Grassland
Mixed forest
Deciduous forest
Coniferous forest


Agricultural land cover in CON
100%
90%
80%
70%
60%
50%
40%
30%
20%
10%
0%
CON
CON1
CON2
CON3
CON4
CON5
CON6
CON7
CON8
CON9
CON10
CON11
CON12
no data
non-agriculture
agro-forestry areas
agriculture with significant natural vegetation
complex cultivation patterns
annual crops associated with permanent crops
pastures
olive groves
fruit trees and berry plantation
vineyards
rice fields
permanentaly irrigated land
non-irrigated arable land

9.1 Continental 1 (CON1)

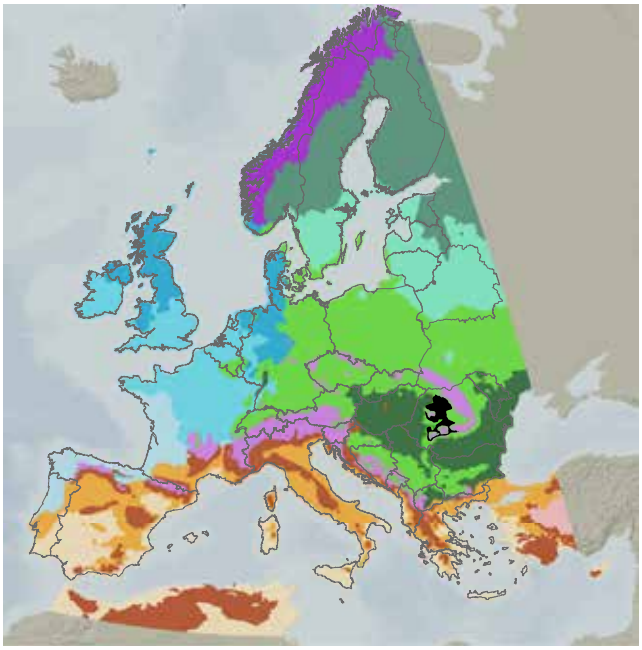
Area: 28,413 km^2

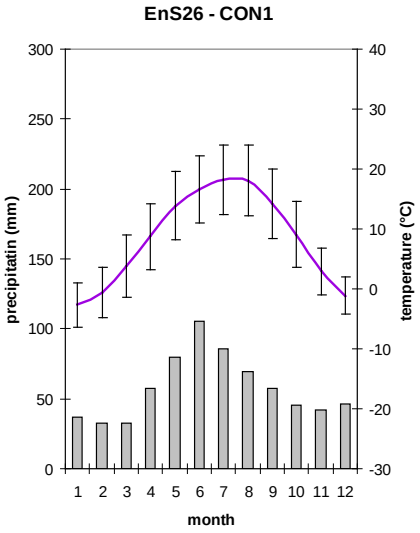
Location: The Carpathians and Transylvanian uplands. Major cities are Cluj-Napoca, Tirgu-Mures and Sibiu (Romania).

EEA biogeographic region: Alpine, Continental.

Climate: The temperate climate (GDD_0 3420) is continental with an intermediate growing season lasting 229 days.

Terrain: Low mountains modified by erosion. The Transylvanian Plateau is covered with alluvial forms. Salt domes are very typical for the Plateau.





9.2 Continental 2 (CON2)

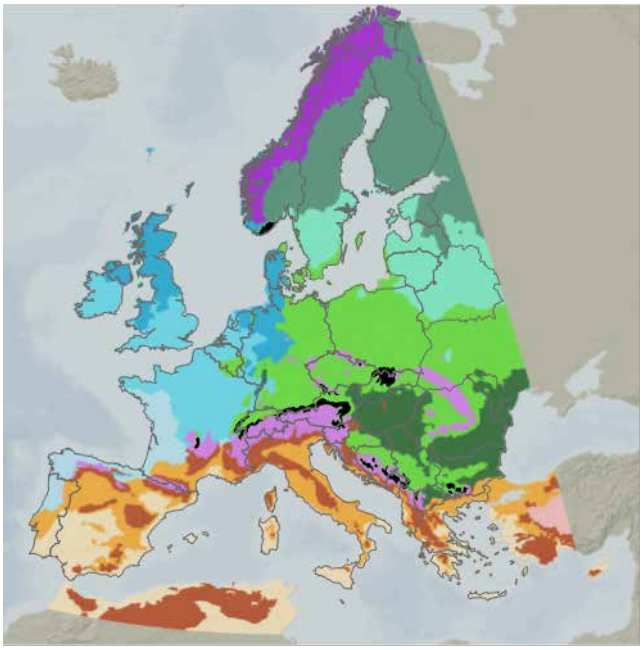
Area: 69,146 km^2

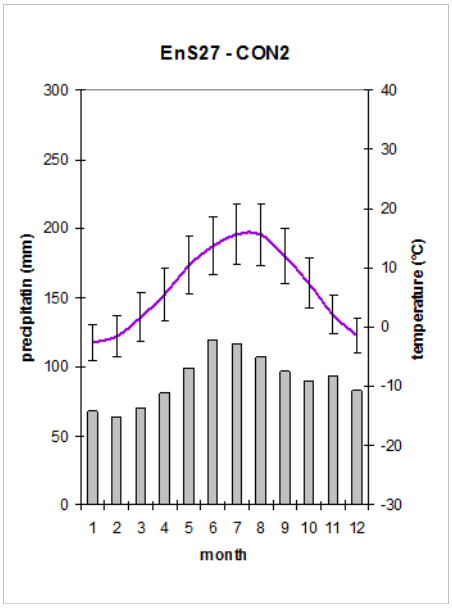
Location: South-western Scandinavia (South Agder), the Tatra, the eastern and northern fringes of the Alps, Jura, the Massif Central, Böhmerwald, South Krkonose Mountains, Dinara and Rodopi. CON2 is present in Norway, France, Germany, Switzerland, Austria, Czech Republic, Poland, Slovenia, Croatia, Bosnia, Yugoslavia, Bulgaria, Greece, Albania and Macedonia.

EEA biogeographic region: Alpine, Boreal, Continental.

Climate: The temperate climate (GDD_0 3066) is continental with an intermediate growing season lasting 221 days.

Terrain: Low and medium mountains modified by glaciation as shown by geomorphological features such u-shaped valleys and terminal moraines.





9.3 Continental 3 (CON3)

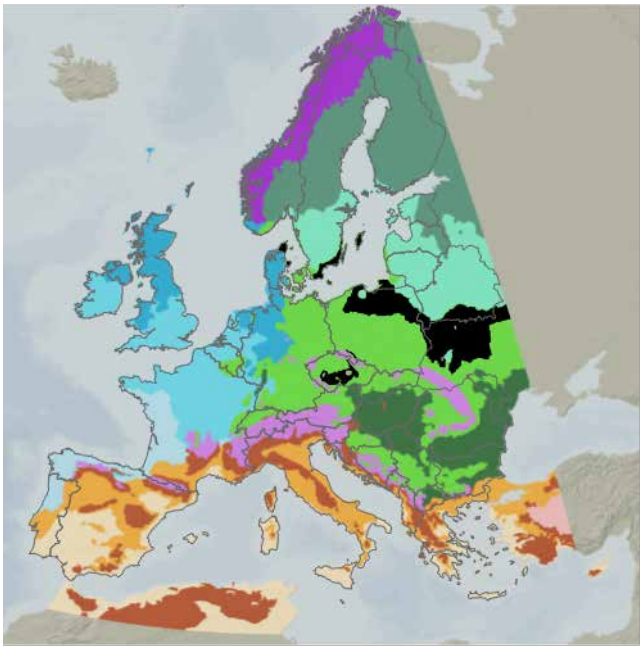
Area: 273,947 km^2

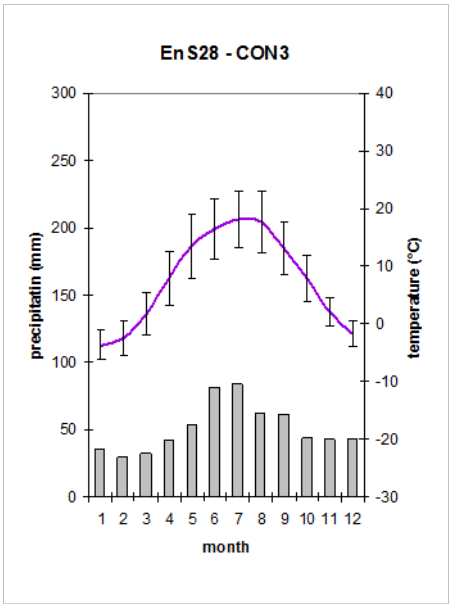
Location: South-east Scandinavia (Sweden), north-east Jutland (Denmark) and the south Bohemian lowland (Czech Republic). The largest section stretches from the Gdansk gulf through the Russian Plain to the east (Poland, Russia, Lithuania, Belarus, and Ukraine). Major cities are Karlskrona, Kalmar (Sweden), Brno (Czech Republic), Gdansk, Toruń, Bialystok (Poland), Brest (Belarus), L'vov, Luck, Rovno, Ternopol', Rovno, Žitomir, Hmel'nickij (Ukraine).

EEA biogeographic region: Boreal, Continental.

Climate: The temperate climate (GDD_0 3037) is continental with an intermediate growing season lasting 213 days.

Terrain: Plains with glacial moraines.





9.4 Continental 4 (CON4)

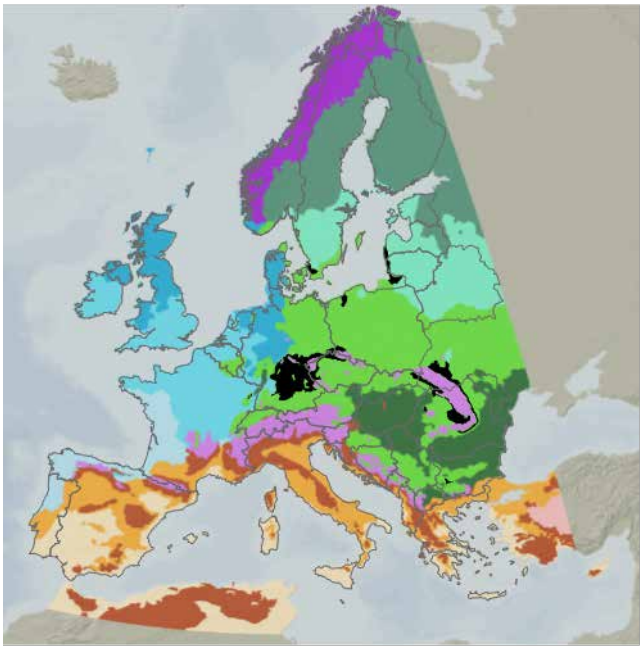
Area: 119,649 km^2

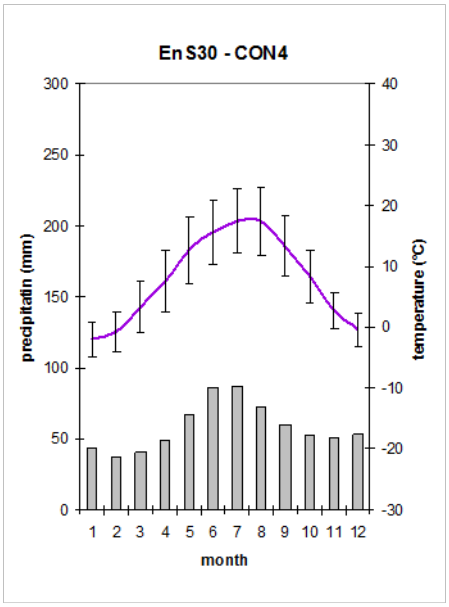
Location: Western Skåne, the south-east Baltic coast, Bavaria and Württemberg, Upper Saxony, and the foothills of the eastern Carpathians, Sumava, Ore Mountains, Krkonose Mountains (Sweden, Russia, Lithuania, Latvia, Germany, Austria, Czech Republic, Slovakia, Poland, Romania and Ukraine). Major cities are Klaipeda (Lithuania), Liepāja (Latvia), Nürnberg, Regensburg (Germany), Plzeň (Czech Republic), Wałbrzych (Poland), Brasov, Ploiesti (Romania), Užgorod, Černovcy (Ukraine).

EEA biogeographic region: Continental.

Climate: The temperate climate (GDD_0 3202) is continental with an intermediate growing season lasting 227 days.

Terrain: Irregular plains Bavaria and Wurttemberg, low mountains in Sumava, Ore Mountains and Krkonose Mountains and eroded plateaus in the foothills of the Carpathians.





9.5 Continental 5 (CON5)

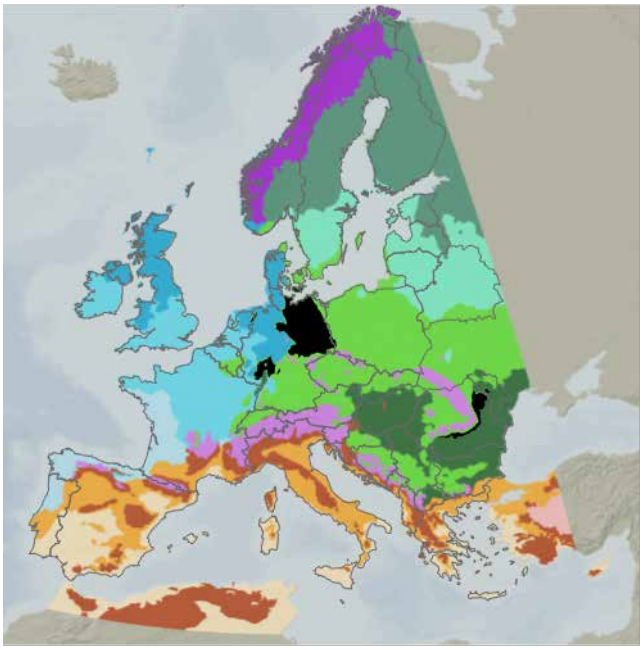
Area: 130,267 km^2

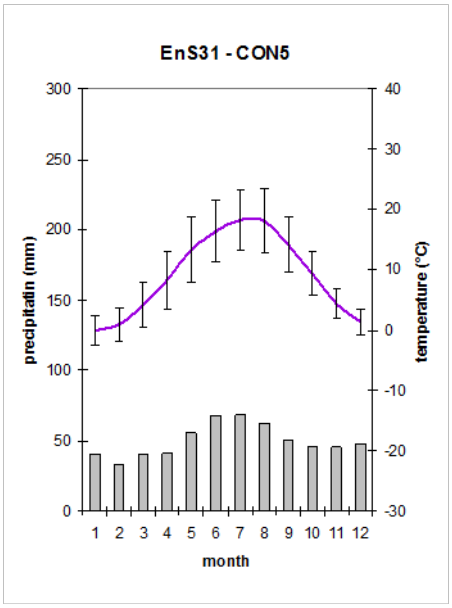
Location: Mecklenburg and Brandenburg, the Isle of Lolland, Hessen (Germany) and the outer fringes of the south Carpathian mountains. Major cities are Berlin, Leipzig, Rostock, Mainz, Koblenz.

EEA biogeographic region: Continental, Atlantic.

Climate: The temperate climate (GDD_0 3482) is continental with an intermediate growing season lasting 236 days.

Terrain: Relatively flat, with some break and low mountains in Hessen foothills in the Carpathian.





9.6 Continental 6 (CON6)

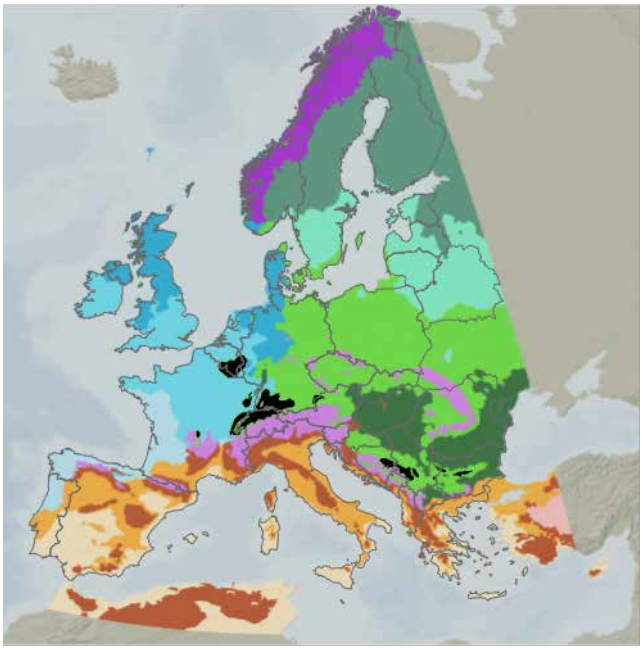
Area: 80,371 km^2

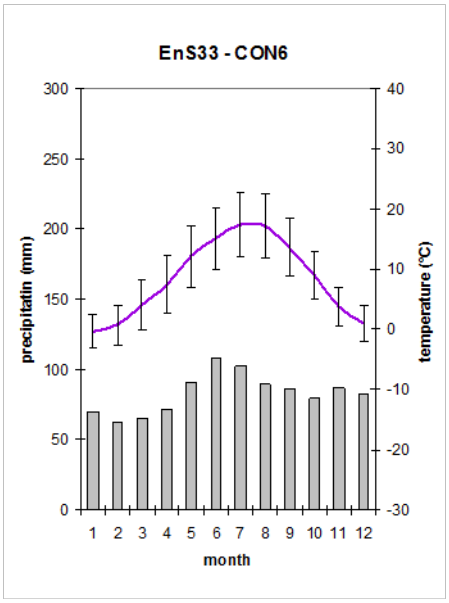
Location: The low-mountain areas of Lorraine, Ardennes, Eifel, Vosges, South Schwarzwald, Northern fringes of the Massif Central and the western Alps, the fringes of the Jura, the eastern ranges of the Bosnian Plateau and Stara-Planina. The stratum is present in France, Belgium, Switzerland, Germany, Bosnia and Herzegovina, Serbia and Bulgaria. Major cities are Reims, Metz (France), Bern, Zürich (Switzerland).

EEA biogeographic region: Continental, Atlantic, Alpine.

Climate: The temperate climate (GDD_0 3467) is continental, but has influences from the Atlantic in the western sections. The stratum has an intermediate growing season lasting 245 days.

Terrain: The terrain is quite varied ranging from eroded uplands in the Ardennes and the Eifel, to foothills the Jura, and low mountains in the Alpine fringes, the Bosnian Plateau and in Stara-Planina.





9.7 Continental 7 (CON7)

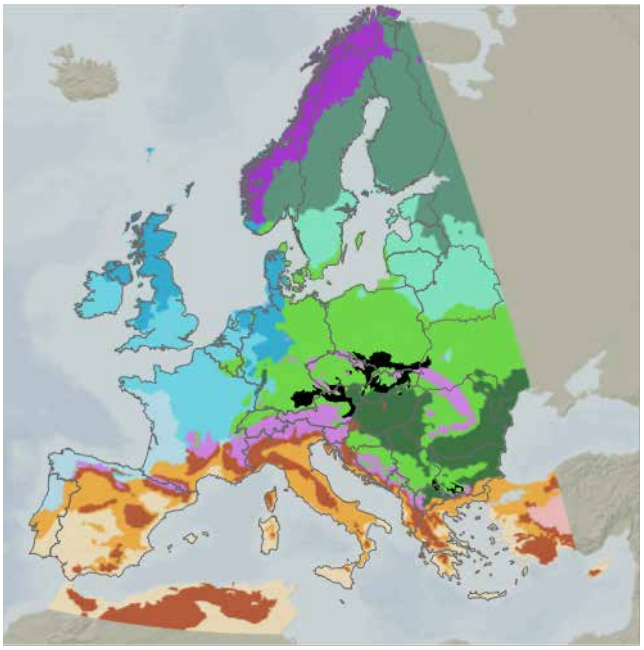
Area: 95,631 km^2

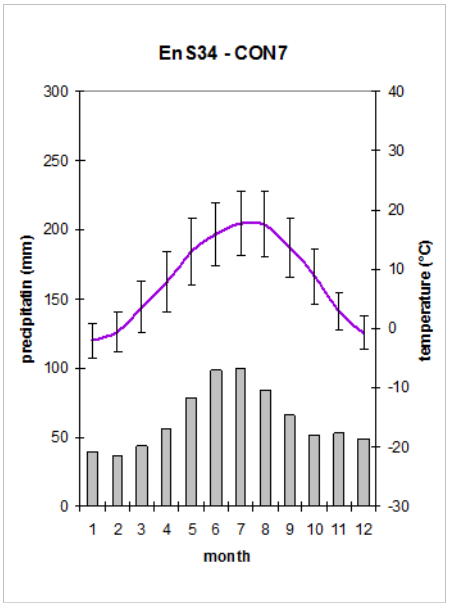
Location: Low-mountain areas and the fringes of major mountain systems such as the piedmont zones and valleys in the north-eastern Alps, Bavarian Plateau and low mountains around the Tatra, Rila and Pirin. CON7 is present on the south-western coast of Sweden and is also found in Germany (München), Austria (Salzburg, Linz, and Graz), Czech Republic, Slovakia, Poland, Bulgaria and Greece.

EEA biogeographic region: Continental, Alpine.

Climate: The temperate climate (GDD_0 3258) is continental with an intermediate growing season lasting 228 days.

Terrain: Low mountains and foothills along the fringes of the Central European mountains and rolling hills of the Bavarian Plateau and the outer fringes of the southern Tatra.





9.8 Continental 8 (CON8)

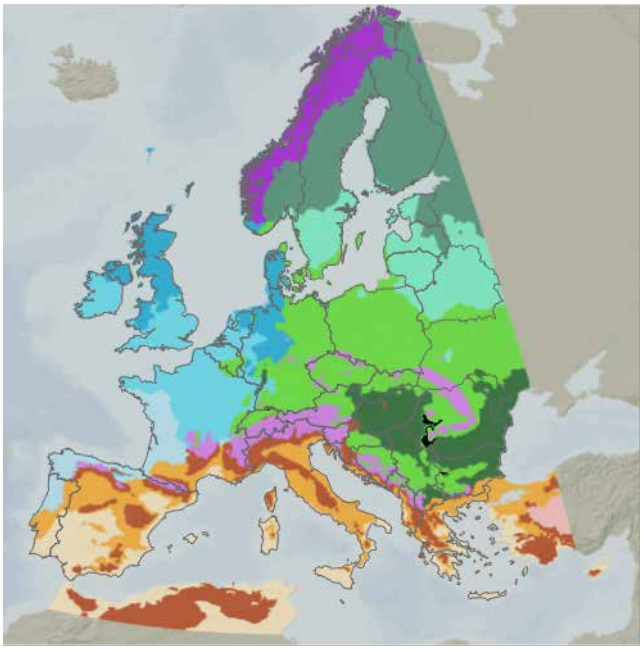
Area: 9,986 km^2

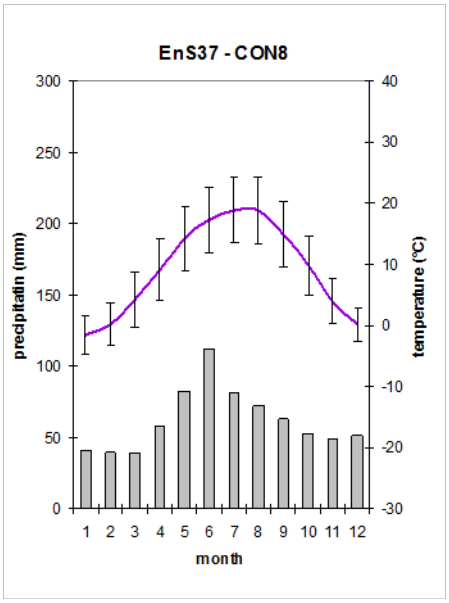
Location: The foothills the southern Carpathian mountains, the northern Stara-Planina and the region around the Lake Luzern. CON8 is situated in Romania, Serbia, Bulgaria and Switzerland.

EEA biogeographic region: Continental, Alpine.

Climate: The temperate climate (GDD0 3672) is continental with an intermediate growing season lasting 239 days.

Terrain: Low mountains and foothills.





9.9 Continental 9 (CON9)

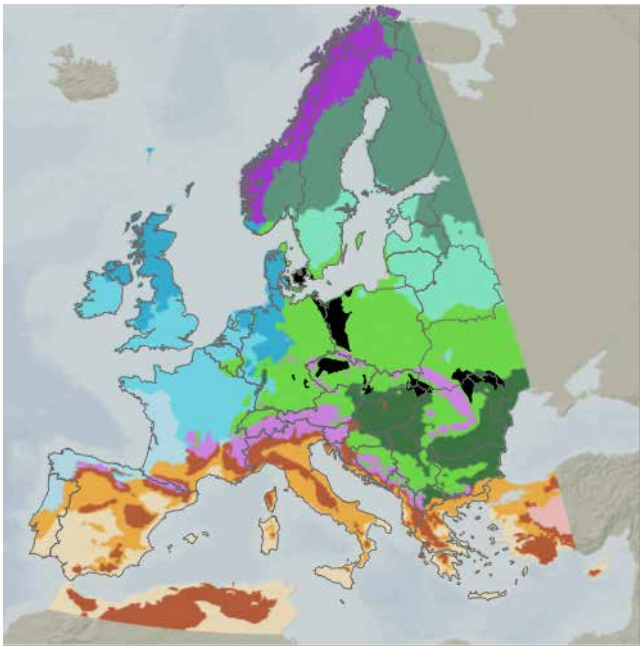
Area: 116,970 km^2

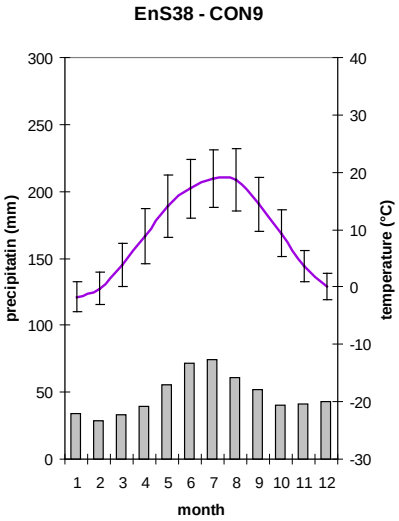
Location: The plains and lowlands of central and eastern Europe: Isle of Sjælland (Denmark), the German-Polish Plain around the Oder (Germany and Poland), the Moravian Plain (Czech Republic), the north-east of the Middle-Danube Plain (Hungary, Slovakia and Ukraine) and the Moldavian Plateau (Romania, Ukraine, Moldova). Major cities are: Copenhagen (Denmark), Szczecin, Poznań, Wrozław (Poland), Prague, Plzeň (Czech Republic).

EEA biogeographic region: Continental, Pannonian, Steppic.

Climate: The temperate climate (GDD_0 3360) is continental with an intermediate growing season lasting 228 days.

Terrain: Mainly flat or undulating plains.





9.10 Continental 10 (CON10)

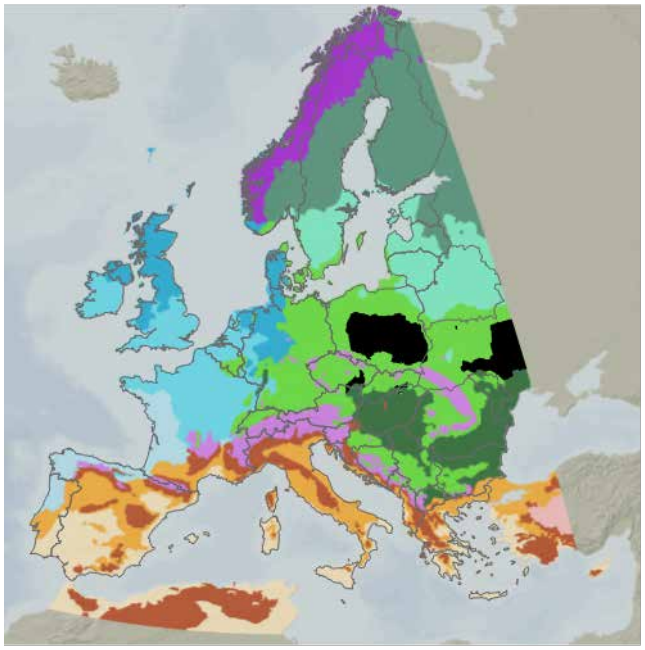
Area: 232,650 km^2

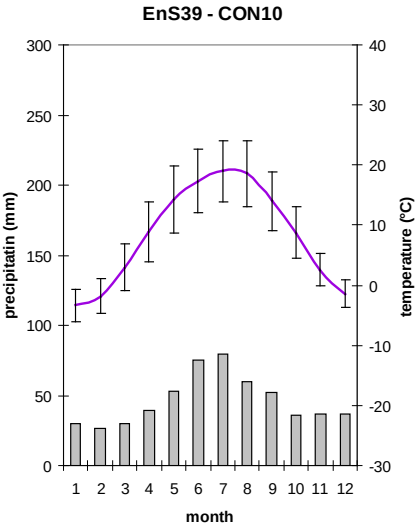
Location: Undulated plains and uplands in Poland, Slovakia and Ukraine, the Silesian Upland, the Lublin Upland, the plains north of the Beskid mountains, the Dnepr Upland. Major cities are Warsaw, Krakow, Lublin, Kiev.

EEA biogeographic region: Continental, Pannonian, Steppic.

Climate: The temperate climate (GDD_0 3217) is continental with an intermediate growing season lasting 220 days.

Terrain: Undulating plains and uplands.





9.11 Continental 11 (CON11)

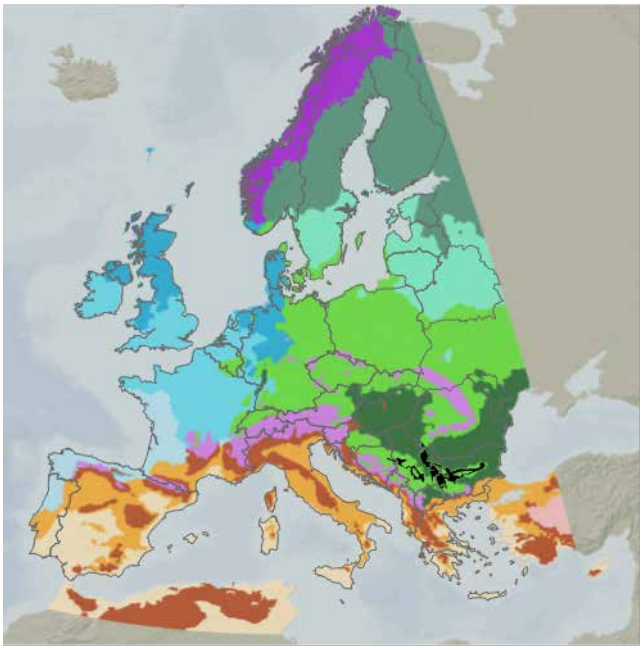
Area: 29,461 km^2

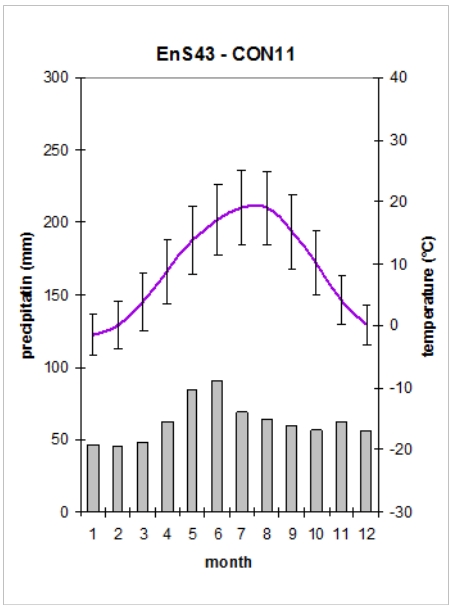
Location: The low mountains of south-eastern Europe, in Bosnia and Herzegovina, Serbia, Bulgaria, and Romania. It is the central area of the western Stara Planina and Rila, the outer ranges of East Stara Planina, the eastern fringes of the Bosnian Uplands.

EEA biogeographic region: Alpine, Continental.

Climate: The temperate climate (GDD_0 3883) is continental with an intermediate growing season lasting 246 days.

Terrain: Low mountains and foothills.





9.12 Continental 12 (CON12)

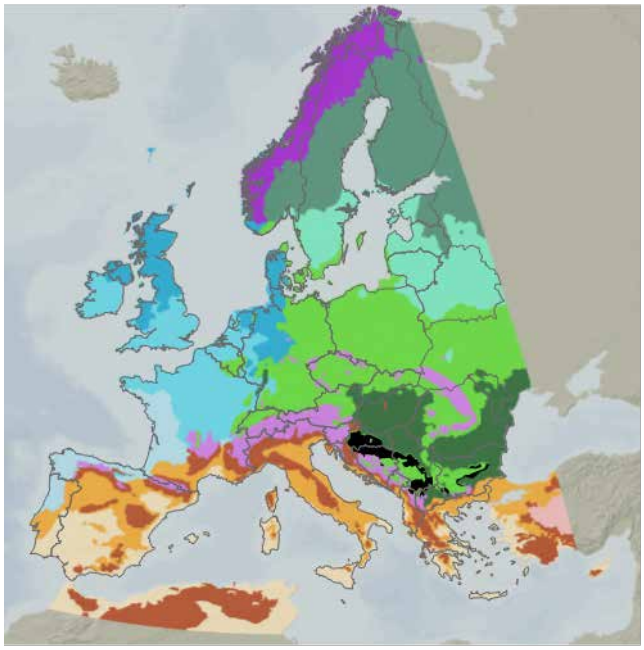
Area: 62,658 km^2

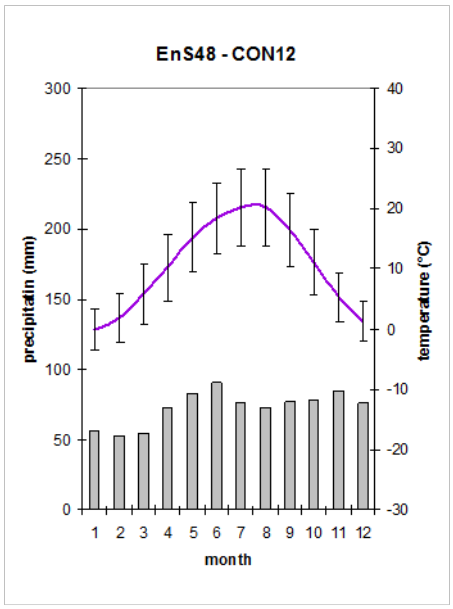
Location: Low mountains, intermountain valleys and undulating plains in south-eastern Europe, in Croatia, Hungary, Serbia, Macedonia and Bulgaria. It is present in the outer zones of eastern Stara Planina, Rila, the Bosnian Uplands, and the south of the Middle-Danube Plain.

EEA biogeographic region: Continental, Alpine.

Climate: The warm temperate climate (GDD_0 4049) is continental with an intermediate growing season lasting 257 days.

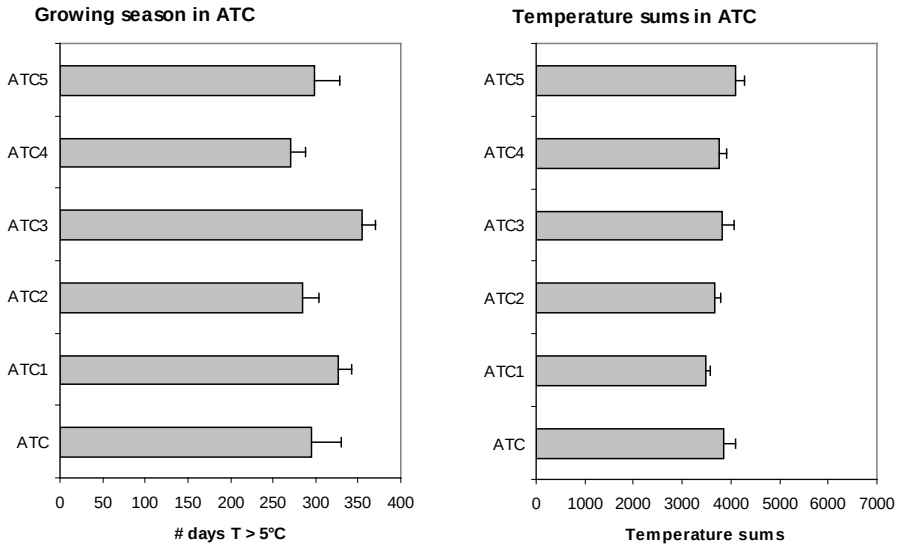
Terrain: The terrain is quite varied ranging from low mountains in the Stara Planina, and eroded foothills in the Bosnian Upland to lowlands in Middle-Danube Plain.

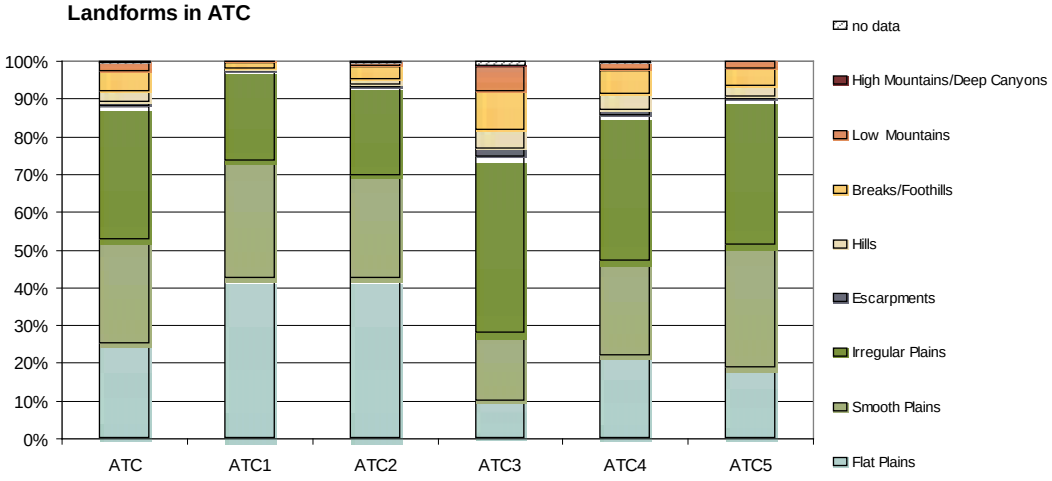


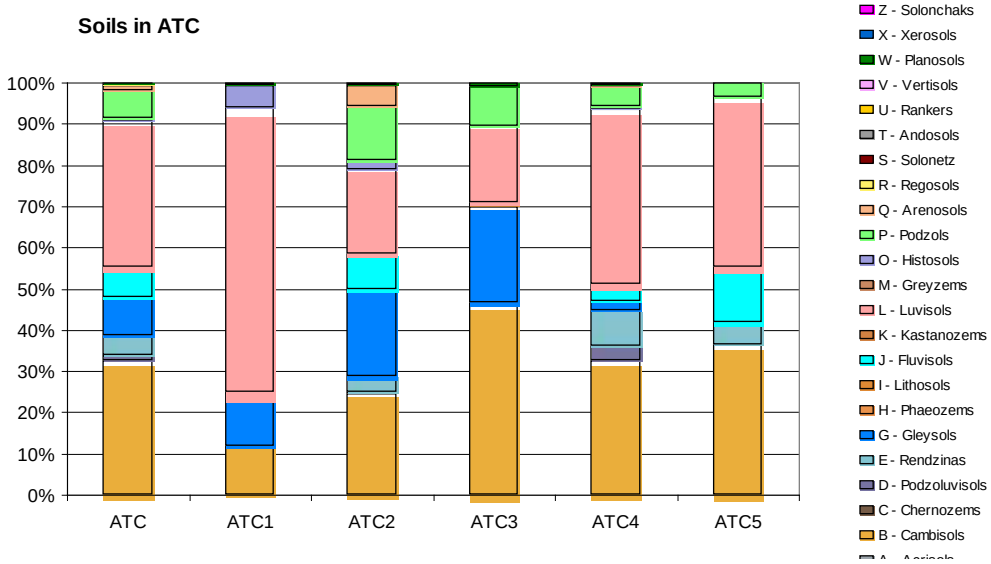


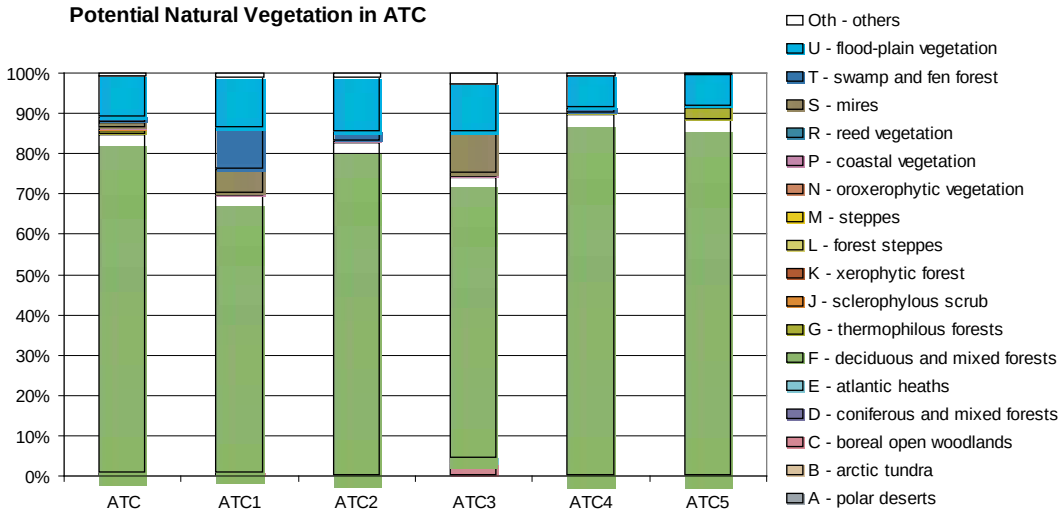
10 Environmental Zone Atlantic Central (ATC)

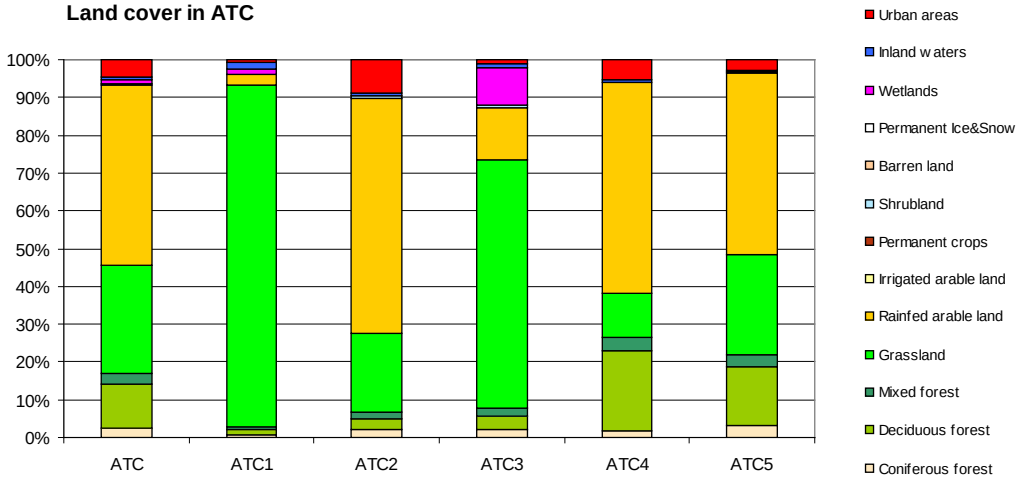
The Atlantic Central Zone (ATC) includes the south west and south of the British Isles, Northern France and the Low countries. The land consists mainly of lowlands with level or undulating terrain according to geology, but also has some uplands in the west and south. The climate is typically strongly oceanic in the west, with cool wet winters and mild moist summers, but becomes more continental in the east. Arable agriculture is important through much of the Zone, but there are also fertile and intensively used grasslands for dairy farming and extensive grasslands in the west and in the uplands that have associated grazing systems. Some low heaths are also present in the west, but were originally more widespread. Deciduous forests are present locally on shallow soils as well as some coniferous plantations, mainly pine. Many major conurbations are present throughout the Zone as this is the most urbanised part of Europe.

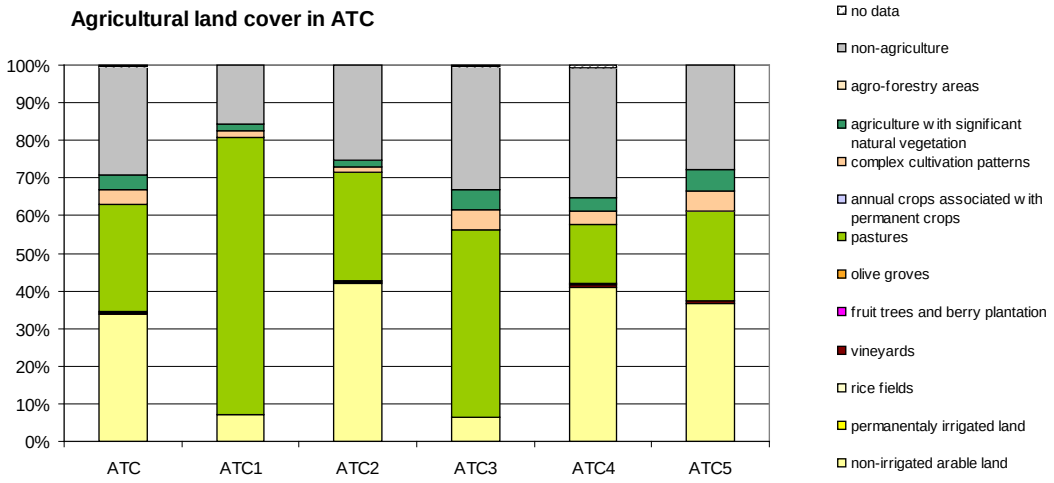

Growing season in ATC
ATC5
ATC4
ATC3
ATC2
ATC1
ATC
0 50 100 150 200 250 300 350 400
days T > 5°C
Temperature sums in ATC
ATC5
ATC4
ATC3
ATC2
ATC1
ATC
0 1000 2000 3000 4000 5000 6000 7000
Temperature sums


Landforms in ATC
100%
90%
80%
70%
60%
50%
40%
30%
20%
10%
0%
ATC
ATC1
ATC2
ATC3
ATC4
ATC5
no data
High Mountains/Deep Canyons
Low Mountains
Breaks/Foothills
Hills
Escarpments
Irregular Plains
Smooth Plains
Flat Plains


Soils in ATC
100%
90%
80%
70%
60%
50%
40%
30%
20%
10%
0%
ATC
ATC1
ATC2
ATC3
ATC4
ATC5
Z - Solonchaks
X - Xerosols
W - Planosols
V - Vertisols
U - Rankers
T - Andosols
S - Solonetz
R - Regosols
Q - Arenosols
P - Podzols
O - Histosols
M - Greyzems
L - Luvisols
K - Kastanozems
J - Fluvisols
I - Lithosols
H - Phaeozems
G - Gleysols
E - Rendzinas
D - Podzoluvisols
C - Chernozems
B - Cambisols


Potential Natural Vegetation in ATC
100%
90%
80%
70%
60%
50%
40%
30%
20%
10%
0%
ATC
ATC1
ATC2
ATC3
ATC4
ATC5
Oth - others
U - flood-plain vegetation
T - swamp and fen forest
S - mires
R - reed vegetation
P - coastal vegetation
N - oroxerophytic vegetation
M - steppes
L - forest steppes
K - xerophytic forest
J - sclerophylous scrub
G - thermophilous forests
F - deciduous and mixed forests
E - atlantic heaths
D - coniferous and mixed forests
C - boreal open woodlands
B - arctic tundra
A - polar deserts


Land cover in ATC
100%
90%
80%
70%
60%
50%
40%
30%
20%
10%
0%
ATC
ATC1
ATC2
ATC3
ATC4
ATC5
Urban areas
Inland waters
Wetlands
Permanent Ice&Snow
Barren land
Shrubland
Permanent crops
Irrigated arable land
Rainfed arable land
Grassland
Mixed forest
Deciduous forest
Coniferous forest


Agricultural land cover in ATC
100%
90%
80%
70%
60%
50%
40%
30%
20%
10%
0%
ATC
ATC1
ATC2
ATC3
ATC4
ATC5
no data
non-agriculture
agro-forestry areas
agriculture with significant natural vegetation
complex cultivation patterns
annual crops associated with permanent crops
pastures
olive groves
fruit trees and berry plantation
vineyards
rice fields
permanentaly irrigated land
non-irrigated arable land

10.1 Atlantic Central 1 (ATC1)

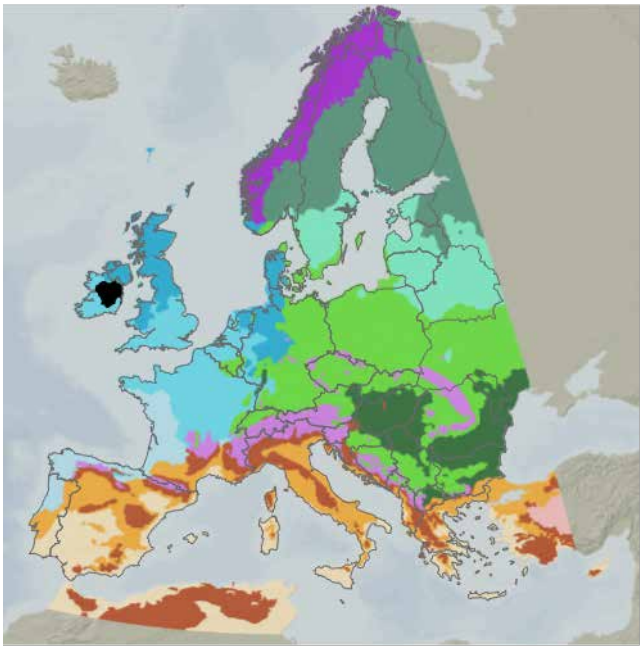
Area: 22,684 km^2

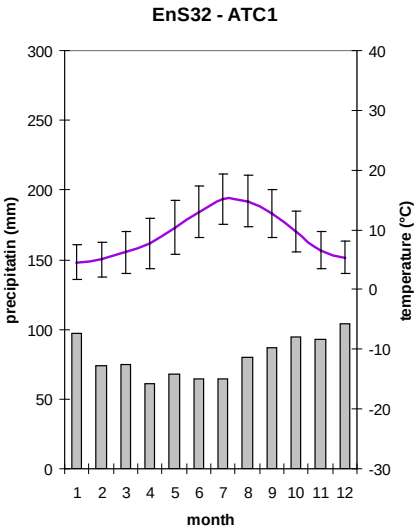
Location: The plains and low hills in central and eastern Ireland.

EEA biogeographic region: Atlantic.

Climate: The temperate climate (GDD_0 3497) is oceanic with an intermediate growing season lasting 213 days.

Terrain: Flat, smooth and irregular plains.





10.2 Atlantic Central 2 (ATC2)

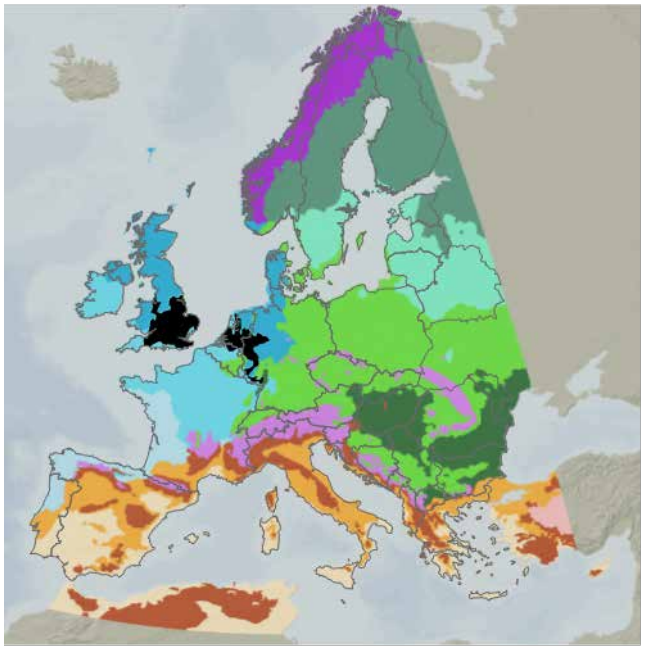
Area: 121,116 km^2

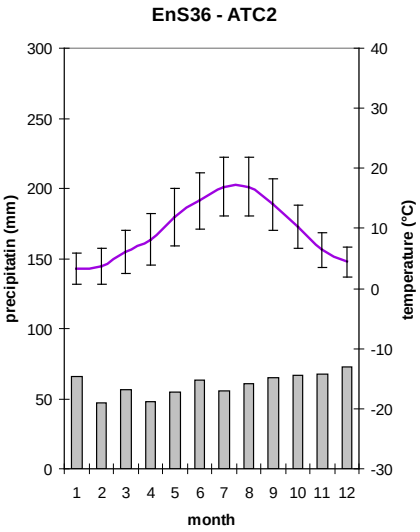
Location: The plains of England, the Lower Rhine and the combined delta of Meuse and Rhine, the valley of Mosel and Münsterland. ATC2 is situated in the UK, the Netherlands, Belgium, Luxemburg and Germany. Major cities are London, Birmingham, Amsterdam, Rotterdam, Cologne and Düsseldorf.

EEA biogeographic region: Atlantic.

Climate: The temperate climate (GDD_0 3675) is oceanic with an intermediate growing season lasting 213 days.

Terrain: Flat, smooth and irregular plains.





10.3 Atlantic Central 3 (ATC3)

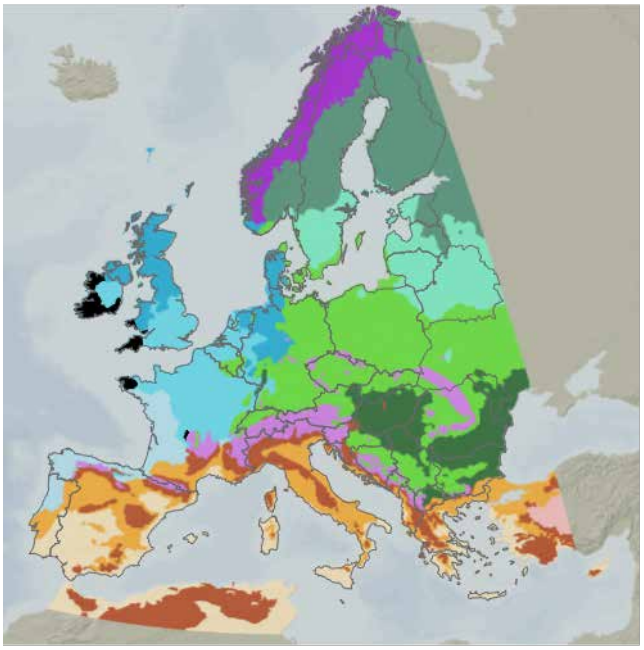
Area: 60,810 km^2

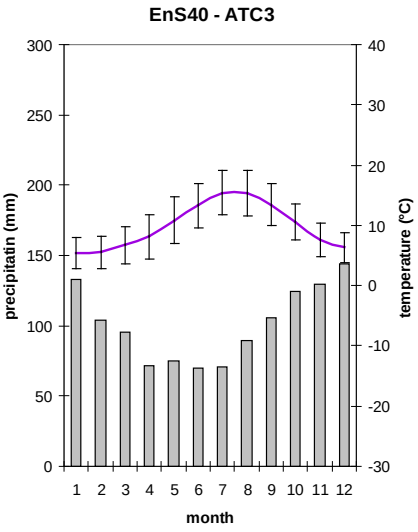
Location: Hilly plains, uplands and low mountains in western and southern Ireland, south-eastern Britain (Cornwall and South Wales), and West Brittany. Major cities are Cork, Galway, Cardiff, Plymouth and Brest.

EEA biogeographic region: Atlantic.

Climate: The temperate climate (GDD_0 3825) is oceanic with a long growing season lasting 355 days.

Terrain: Some low mountains and foothills, but mainly flat, smooth and irregular plains.





10.4 Atlantic Central 4 (ATC4)

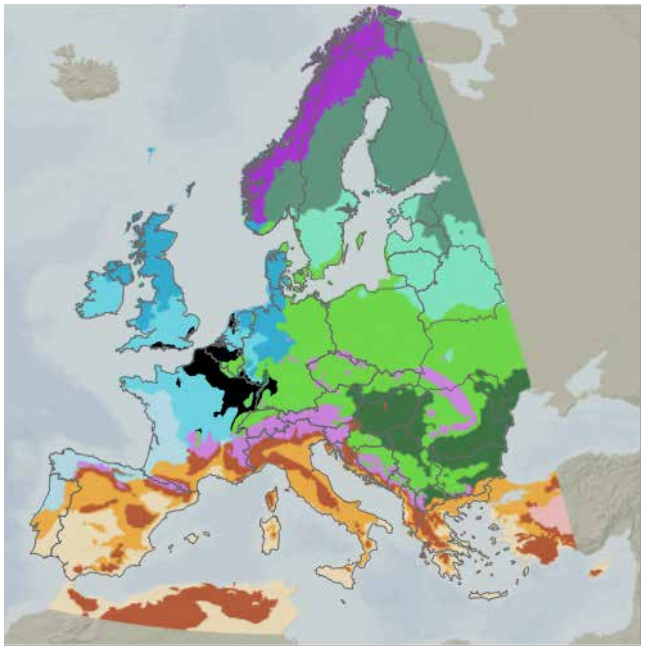
Area: 132,813 km^2

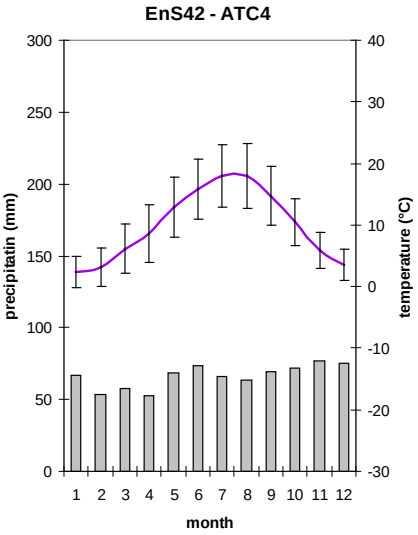
Location: The south and south-east coast of England, lowlands and plains in the south and north-west of The Netherlands, Belgium and north-west France, uplands of north-east France and western Baden-Württemberg. Major cities are Brussels, Antwerp, Lille, Reims, Nancy, Freiburg, Basel, Southampton and Portsmouth.

EEA biogeographic region: Atlantic.

Climate: The temperate climate (GDD_0 3768) is oceanic with an intermediate growing season lasting 213 days.

Terrain: Flat, smooth and irregular plains.





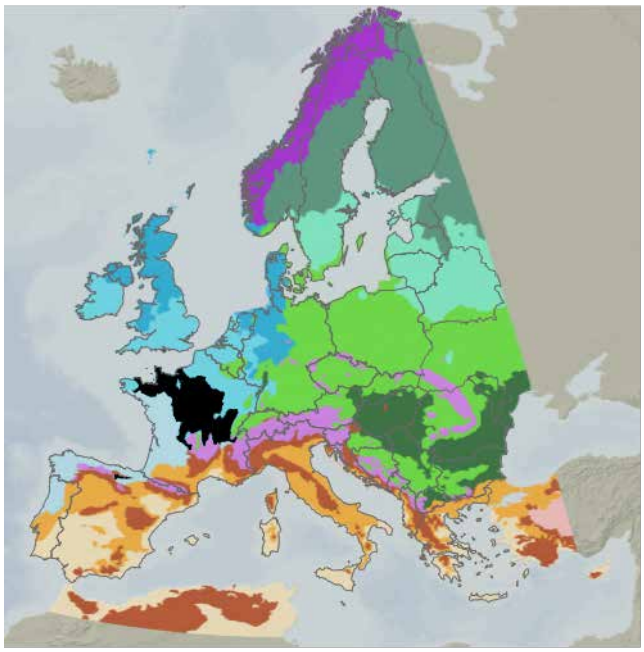
10.5 Atlantic Central 5 (ATC5)

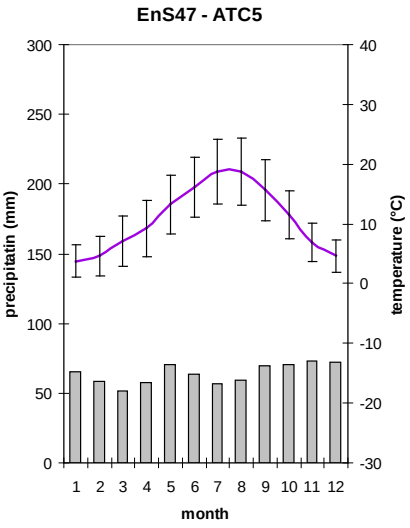
Area: 168,953 km^2

Location: The plains and uplands in Normandy, eastern Brittany, Bourbonnais, Bourgogne and the lower and middle Saône, the plains of Paris Basin and middle Loire and the northern piedmont zone of the Massif Central. Major cities are Paris, Orleans and Tours.

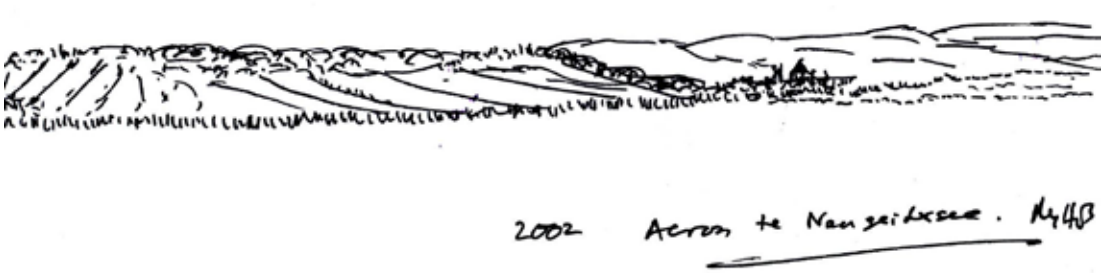
EEA biogeographic region: Atlantic, Continental.

Climate: The temperate climate (GDD_0 3675) is oceanic with a long growing season lasting 284 days.
Terrain: Flat, smooth and irregular plains.

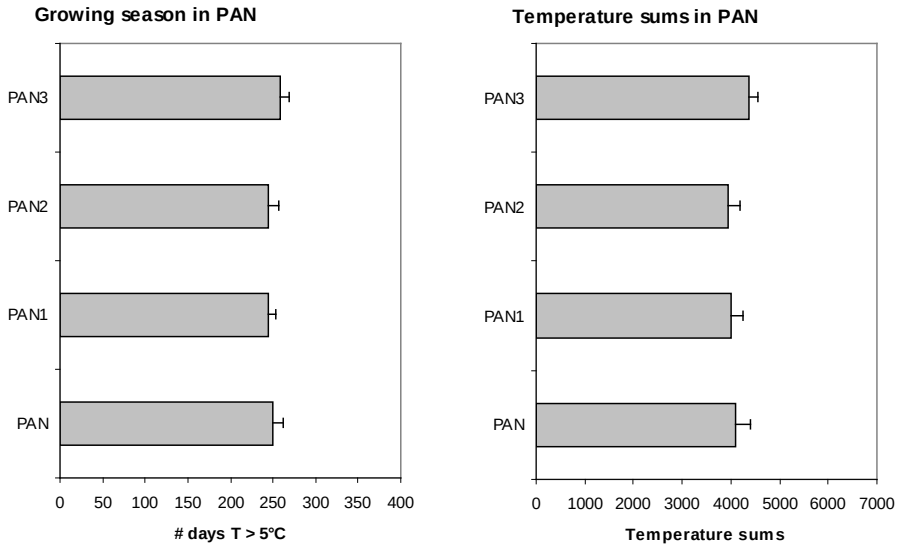


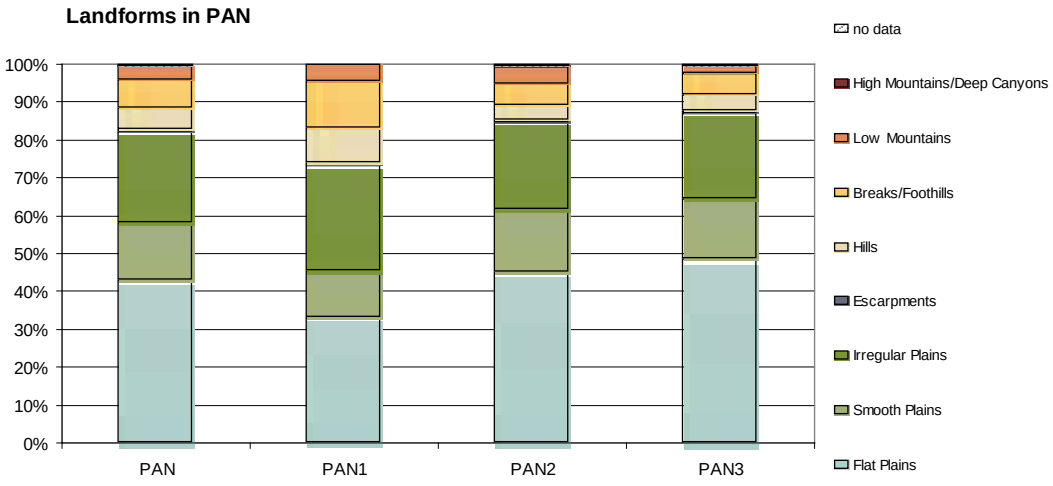


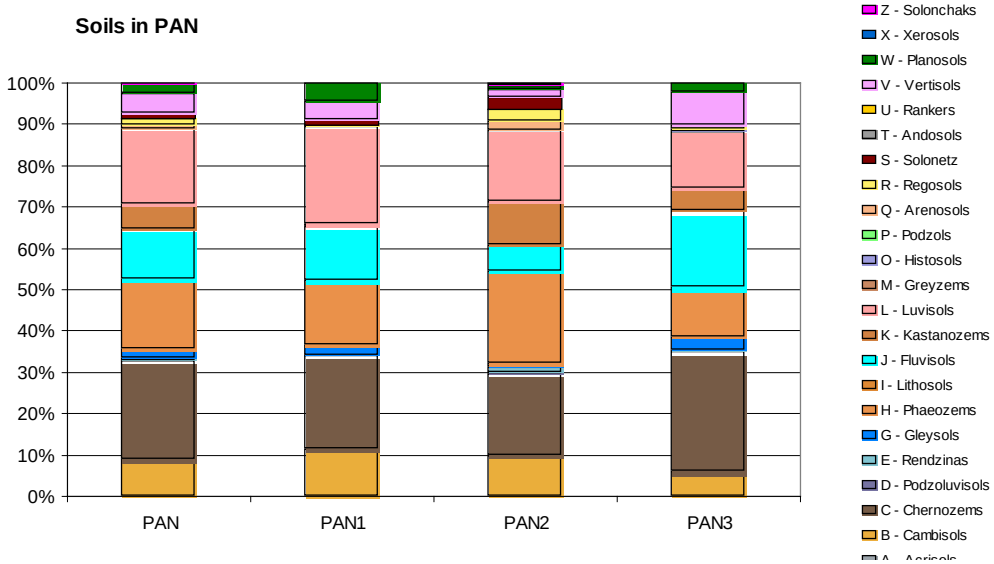
11 Environmental Zone Pannonian (PAN)

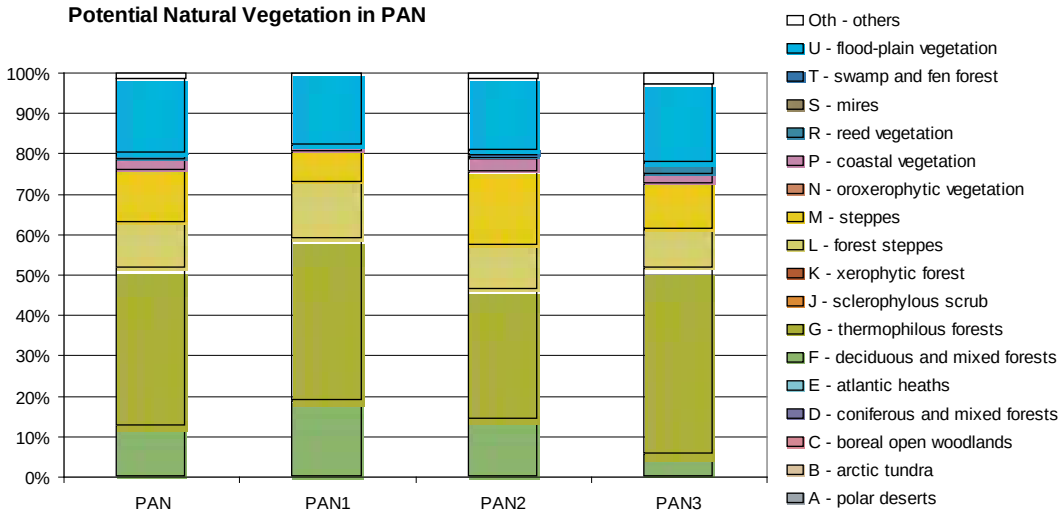


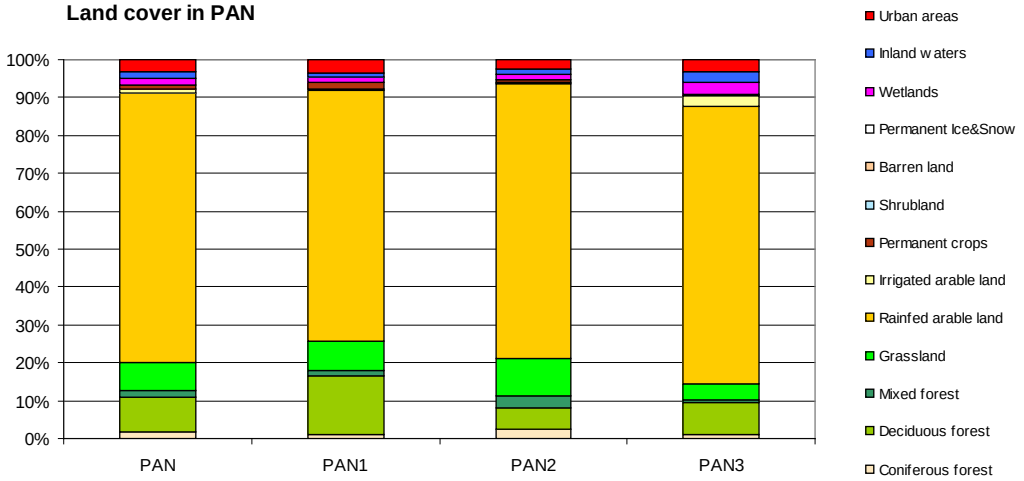
The Pannonian Zone (PAN) includes the plains, valleys and mountain fringes in the middle and the lower Danube basin, the Black Sea lowlands and a small outlier in the rain shadow area in the central Rhine valley (Weinstraße). The warm continental climate has a steppic character and the concentration of precipitation in early summer can lead to water shortages. Much of the land is relatively flat, but there are some low hills and differences in geology causing regional variations. Arable agriculture dominates throughout the Zone and is converted from the original steppic grasslands, which now only remain in usually small patches. Forest cover, although locally important, is restricted in extent. There are some large lakes and major river systems.

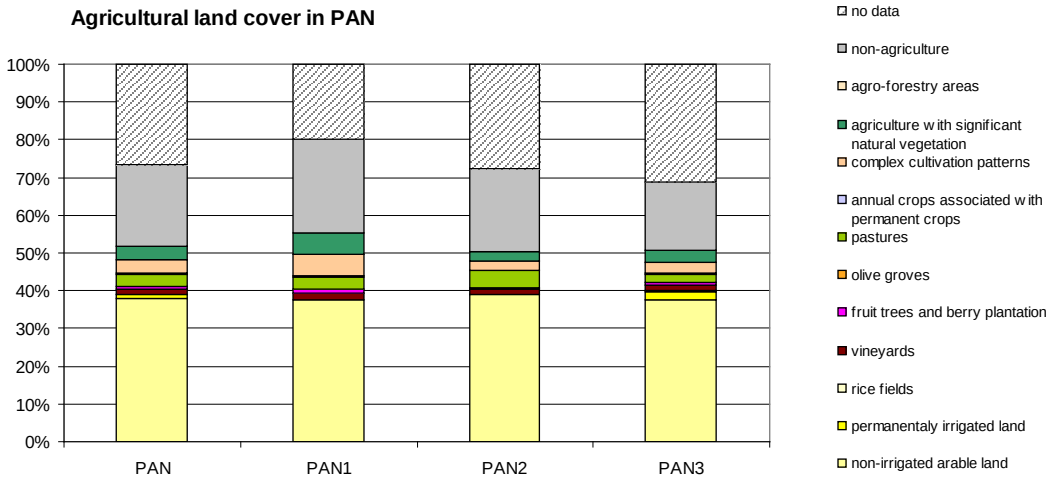

Growing season in PAN
PAN3
PAN2
PAN1
PAN
0
50
100
150
200
250
300
350
400
days T > 5°C
Temperature sums in PAN
PAN3
PAN2
PAN1
PAN
0
1000
2000
3000
4000
5000
6000
7000
Temperature sums


Landforms in PAN
100%
90%
80%
70%
60%
50%
40%
30%
20%
10%
0%
PAN
PAN1
PAN2
PAN3
no data
High Mountains/Deep Canyons
Low Mountains
Breaks/Foothills
Hills
Escarpments
Irregular Plains
Smooth Plains
Flat Plains


Soils in PAN
100%
90%
80%
70%
60%
50%
40%
30%
20%
10%
0%
PAN
PAN1
PAN2
PAN3
Z - Solonchaks
X - Xerosols
W - Planosols
V - Vertisols
U - Rankers
T - Andosols
S - Solonetz
R - Regosols
Q - Arenosols
P - Podzols
O - Histosols
M - Greyzems
L - Luvisols
K - Kastanozems
J - Fluvisols
I - Lithosols
H - Phaeozems
G - Gleysols
E - Rendzinas
D - Podzoluvisols
C - Chernozems
B - Cambisols


Potential Natural Vegetation in PAN
100%
90%
80%
70%
60%
50%
40%
30%
20%
10%
0%
PAN
PAN1
PAN2
PAN3
Oth - others
U - flood-plain vegetation
T - swamp and fen forest
S - mires
R - reed vegetation
P - coastal vegetation
N - oroxerophytic vegetation
M - steppes
L - forest steppes
K - xerophytic forest
J - sclerophylous scrub
G - thermophilous forests
F - deciduous and mixed forests
E - atlantic heaths
D - coniferous and mixed forests
C - boreal open woodlands
B - arctic tundra
A - polar deserts


Land cover in PAN
100%
90%
80%
70%
60%
50%
40%
30%
20%
10%
0%
PAN
PAN1
PAN2
PAN3
Urban areas
Inland waters
Wetlands
Permanent Ice&Snow
Barren land
Shrubland
Permanent crops
Irrigated arable land
Rainfed arable land
Grassland
Mixed forest
Deciduous forest
Coniferous forest


Agricultural land cover in PAN
100%
90%
80%
70%
60%
50%
40%
30%
20%
10%
0%
PAN
PAN1
PAN2
PAN3
no data
non-agriculture
agro-forestry areas
agriculture with significant natural vegetation
complex cultivation patterns
annual crops associated with permanent crops
pastures
olive groves
fruit trees and berry plantation
vineyards
rice fields
permanentaly irrigated land
non-irrigated arable land

11.1 Pannonian 1 (PAN1)

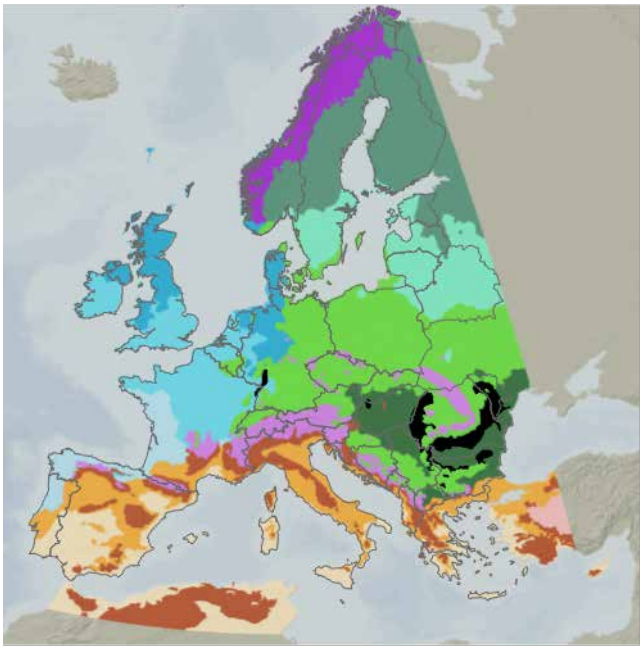
Area: 117,647 km^2

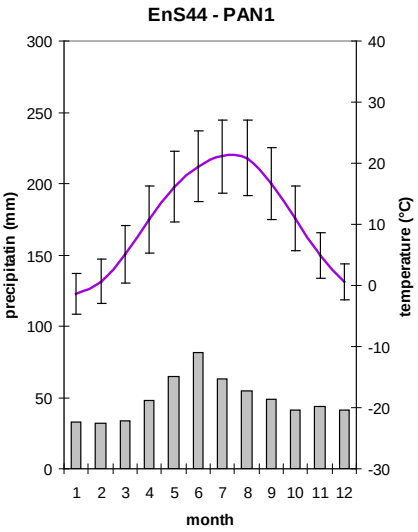
Location: The Rheingraben, the sections on the middle Danube, the lower Danube and the north of the Black Sea Plains. The stratum is found in Germany, Hungary, Romania, Moldova, and Ukraine and it touches the east part of France in the Alsace.

EEA biogeographic region: Pannonian, Continental.

Climate: The warm temperate climate (GDD_0 4018) is continental with an intermediate growing season lasting 244 days.

Terrain: Flat, smooth and irregular plains, with foothills and low mountains in the Stara-Planina.





11.2 Pannonian 2 (PAN2)

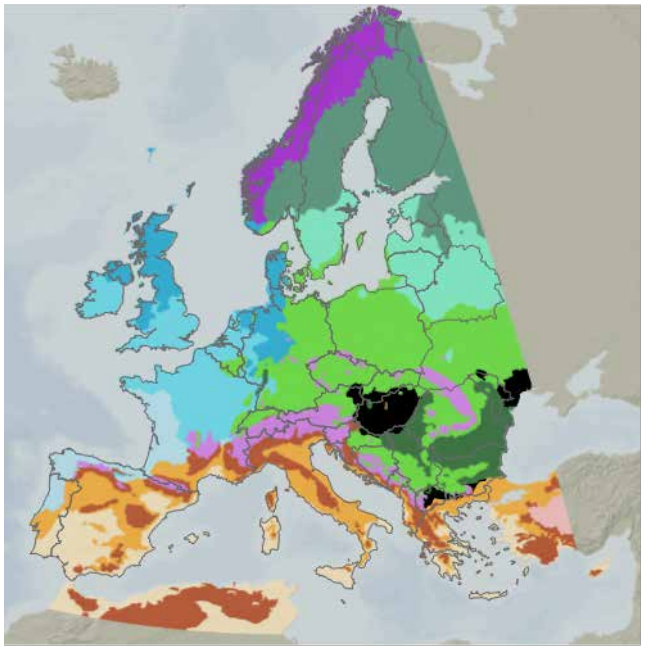
Area: 162,498 km^2

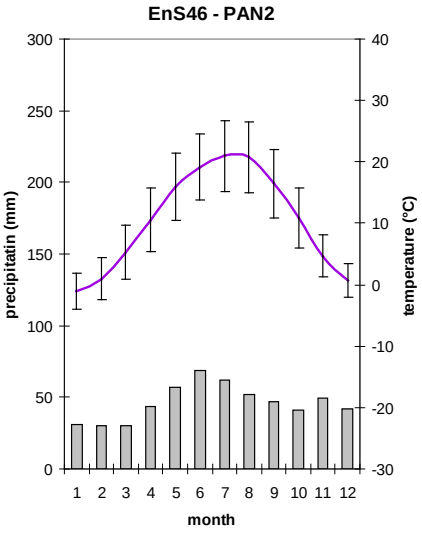
Location: Steppic plains in Central and Eastern Europe, in the middle Danube plain in Hungary, Slovakia, Austria, and Serbia, the Black Sea lowland in Moldova and Ukraine and the Valley of the Struma in Bulgaria and Greece). Major cities are Budapest, Pécs (Hungary), Odessa (Ukraine).

EEA biogeographic region: Pannonian, Continental.

Climate: The temperate climate (GDD_0 3931) is continental with an intermediate growing season lasting 245 days.

Terrain: Flat, smooth and irregular plains, with foothills and low mountains in the Stara-Planina.





11.3 Pannonian 3 (PAN3)

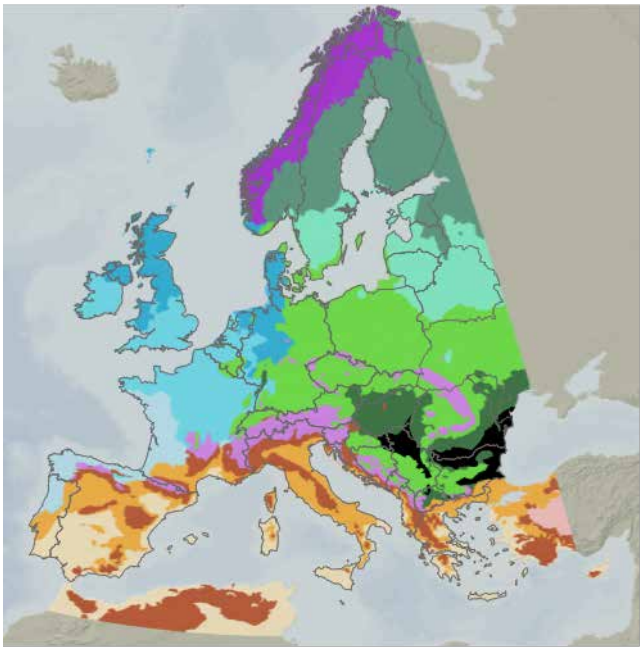
Area: 140,617 km^2

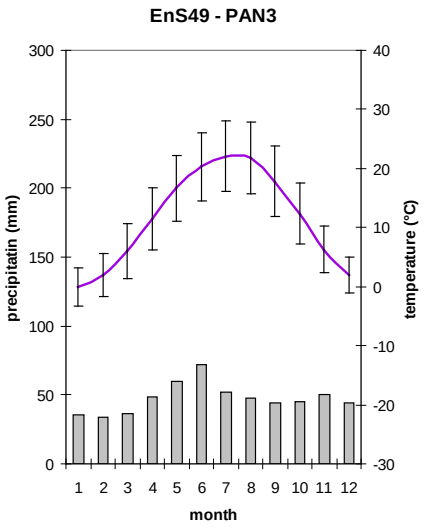
Location: Steppic plains and lowlands in south-eastern Europe, the south of the middle Danube Plane in Hungary, and Serbia, the Thracian lowland in Bulgaria, the south and east parts of the lower Danube plain in Romania and Bulgaria and the south-western fringe of the Black Sea lowland in Ukraine and Romania, including the Danube delta. Major cities are Beograd, Novi Sad, Niš (Serbia), Plovdiv, Varna, Burgas, Ruse (Bulgaria), Bucharest, Constanta (Romania).

EEA biogeographic region: Pannonian, Continental.

Climate: The warm temperate climate (GDD_0 4361) is continental with an intermediate growing season lasting 252 days.

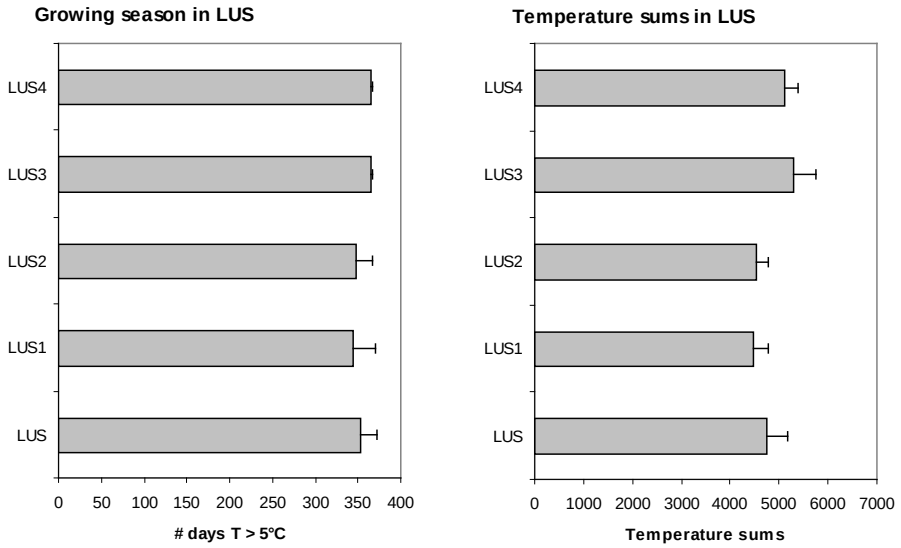
Terrain: Flat, smooth and irregular plains, with foothills and low mountains in the Stara-Planina.

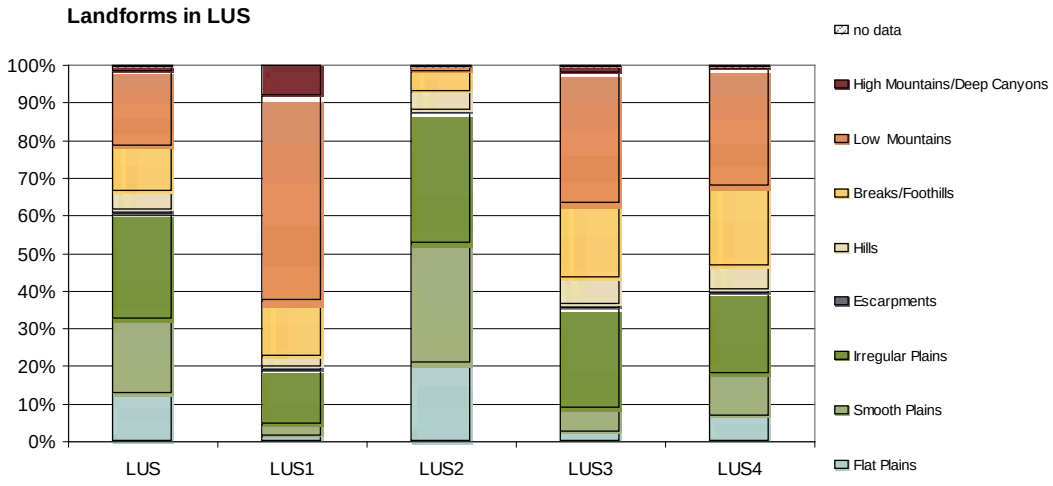


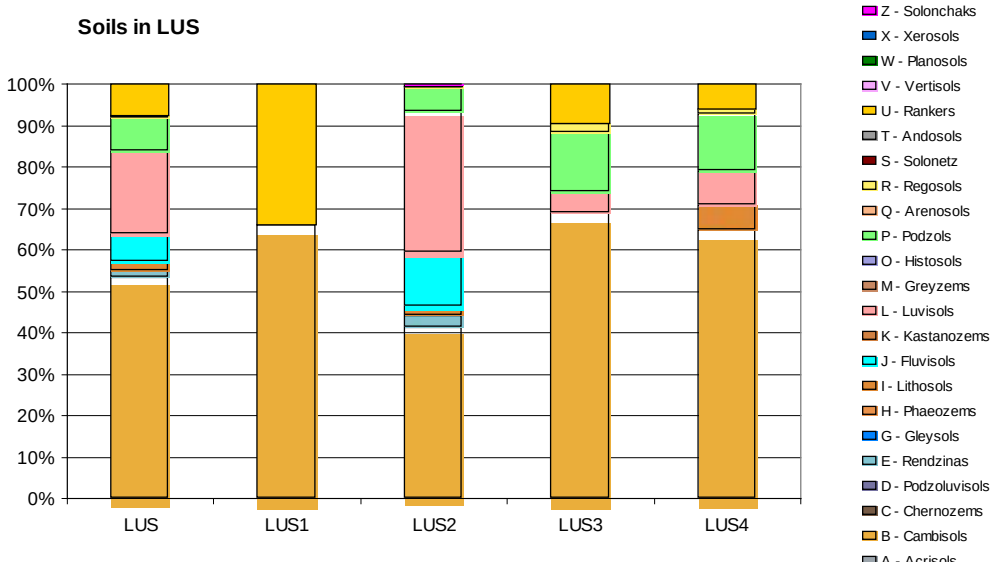


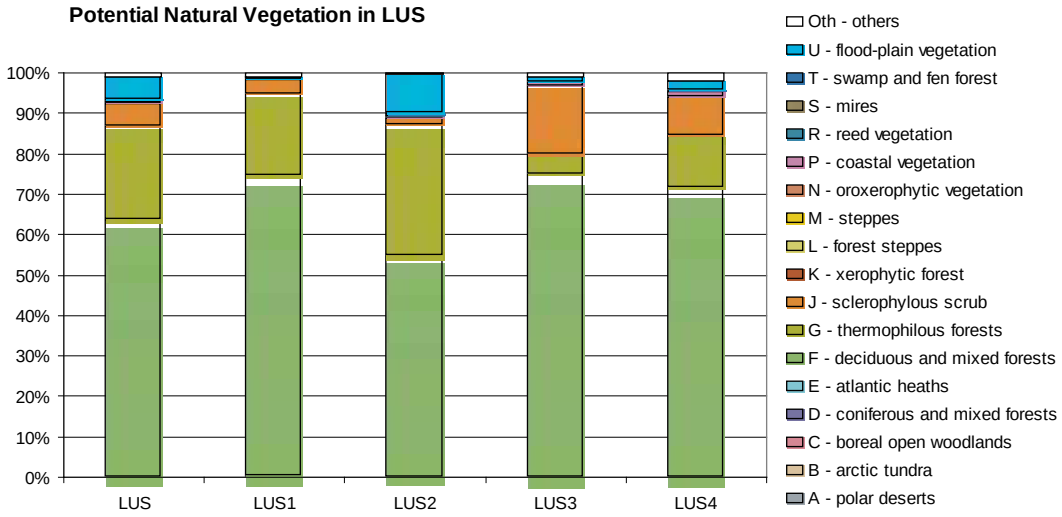
12 Environmental Zone Lusitanian (LUS)

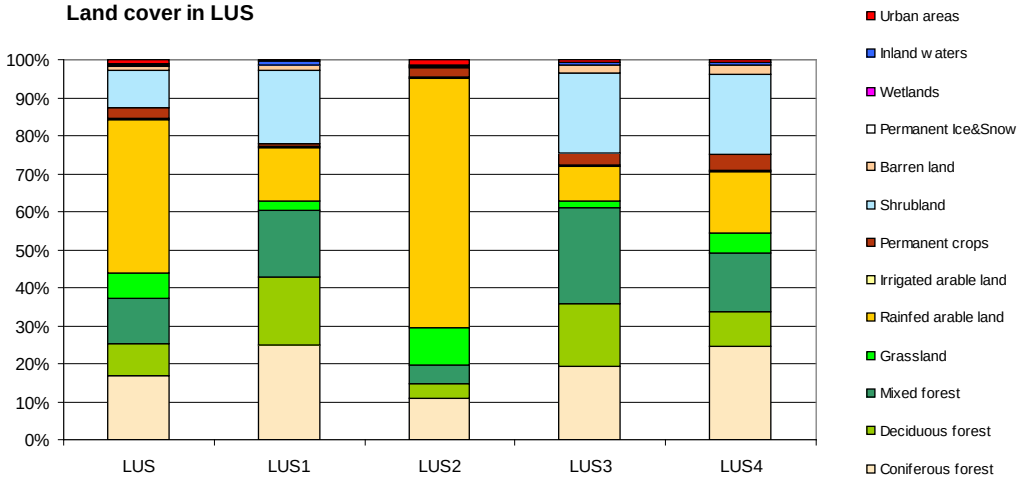
The Lusitanian Zone (LUS) includes the coastal plain and low hills of west and south west France, as well as northern Spain and Portugal. The climate is warm and wet, with precipitation concentrated in the winter months. The long growing seasons and high water availability means that the widespread fertile grasslands can be cut several times in the year. Crops are locally important on better soils, and vineyards are also important throughout the Zone. It is the core of the distribution area of *Quercus pyrenaica*. However, Native woodlands are restricted in cover and the heathlands are now fragmented. There is a major pine forest in les Landes in France, with further extensive pine and Eucalypt plantations on former heathlands. The coastal plain is heavily urbanised.

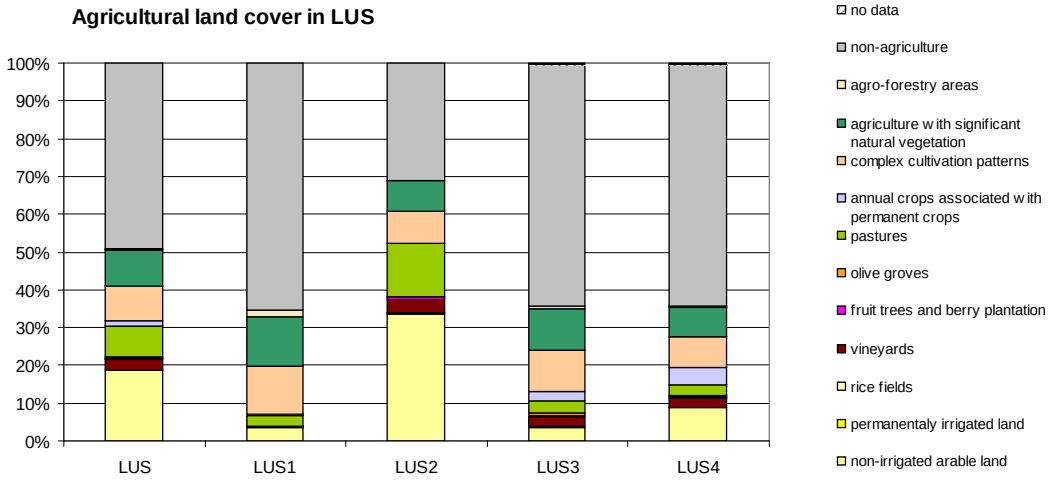

Growing season in LUS
LUS4
LUS3
LUS2
LUS1
LUS
0
50
100
150
200
250
300
350
400
days T > 5°C
Temperature sums in LUS
LUS4
LUS3
LUS2
LUS1
LUS
0
1000
2000
3000
4000
5000
6000
7000
Temperature sums


Landforms in LUS
100%
90%
80%
70%
60%
50%
40%
30%
20%
10%
0%
LUS
LUS1
LUS2
LUS3
LUS4
no data
High Mountains/Deep Canyons
Low Mountains
Breaks/Foothills
Hills
Escarpments
Irregular Plains
Smooth Plains
Flat Plains


Soils in LUS
100%
90%
80%
70%
60%
50%
40%
30%
20%
10%
0%
LUS
LUS1
LUS2
LUS3
LUS4
Z - Solonchaks
X - Xerosols
W - Planosols
V - Vertisols
U - Rankers
T - Andosols
S - Solonetz
R - Regosols
Q - Arenosols
P - Podzols
O - Histosols
M - Greyzems
L - Luvisols
K - Kastanozems
J - Fluvisols
I - Lithosols
H - Phaeozems
G - Gleysols
E - Rendzinas
D - Podzoluvisols
C - Chernozems
B - Cambisols


Potential Natural Vegetation in LUS
100%
90%
80%
70%
60%
50%
40%
30%
20%
10%
0%
LUS
LUS1
LUS2
LUS3
LUS4
Oth - others
U - flood-plain vegetation
T - swamp and fen forest
S - mires
R - reed vegetation
P - coastal vegetation
N - oroxerophytic vegetation
M - steppes
L - forest steppes
K - xerophytic forest
J - sclerophylous scrub
G - thermophilous forests
F - deciduous and mixed forests
E - atlantic heaths
D - coniferous and mixed forests
C - boreal open woodlands
B - arctic tundra
A - polar deserts


Land cover in LUS
100%
90%
80%
70%
60%
50%
40%
30%
20%
10%
0%
LUS
LUS1
LUS2
LUS3
LUS4
Urban areas
Inland waters
Wetlands
Permanent Ice&Snow
Barren land
Shrubland
Permanent crops
Irrigated arable land
Rainfed arable land
Grassland
Mixed forest
Deciduous forest
Coniferous forest


Agricultural land cover in LUS
100%
90%
80%
70%
60%
50%
40%
30%
20%
10%
0%
LUS
LUS1
LUS2
LUS3
LUS4
no data
non-agriculture
agro-forestry areas
agriculture with significant natural vegetation
complex cultivation patterns
annual crops associated with permanent crops
pastures
olive groves
fruit trees and berry plantation
vineyards
rice fields
permanentaly irrigated land
non-irrigated arable land

12.1 Lusitanian 1 (LUS1)

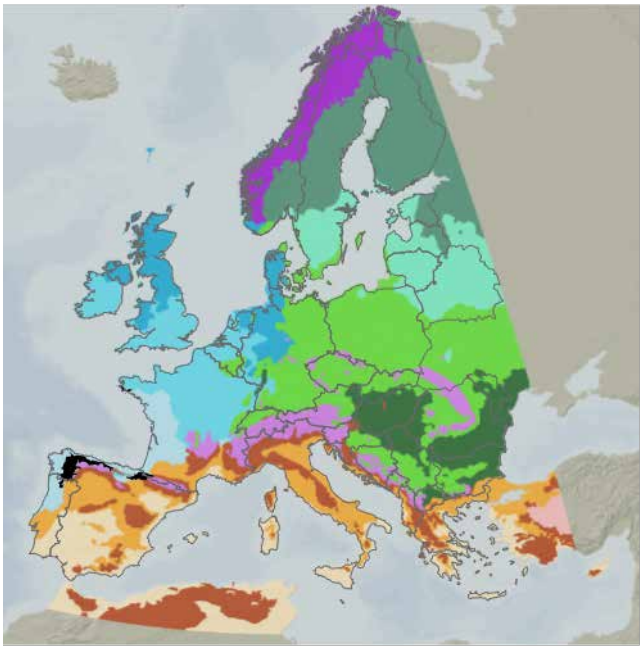
Area: 27,978 km^2

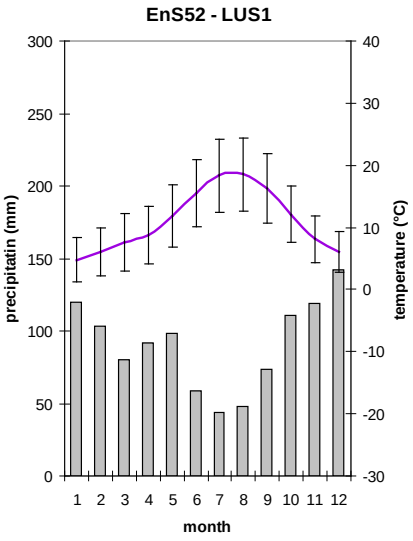
Location: The outer region and the piedmonts of Cordillera Cantabrica and western Pyrenees in Spain. The stratum is situated in Spain and Portugal. Major cities are Oviedo (Spain) and Bragança (Portugal).

EEA biogeographic region: Atlantic.

Climate: The warm temperate climate (GDD_0 4462) is Atlantic with Mediterranean influences, and has a long growing season (345 days).

Terrain: The Cordillera Cantabrica consists of eroded block highlands in the west, and eroded piedmonts and low mountains in the east.





12.2 Lusitanian 2 (LUS2)

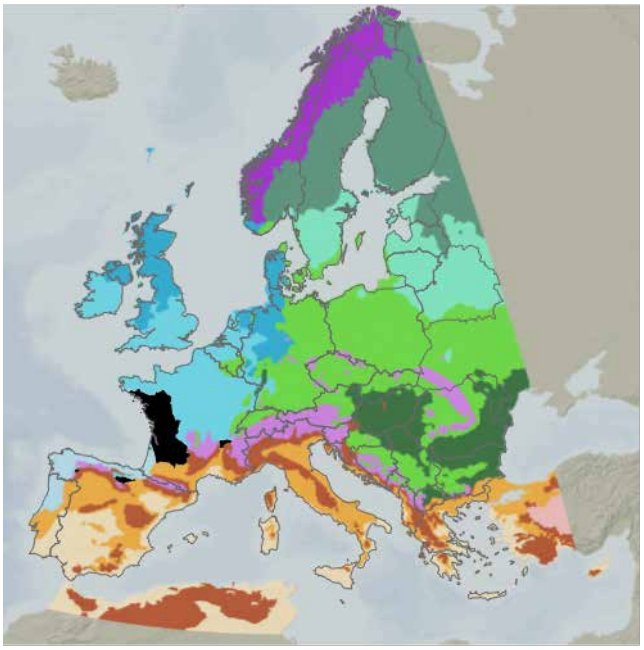
Area: 99,924 km^2

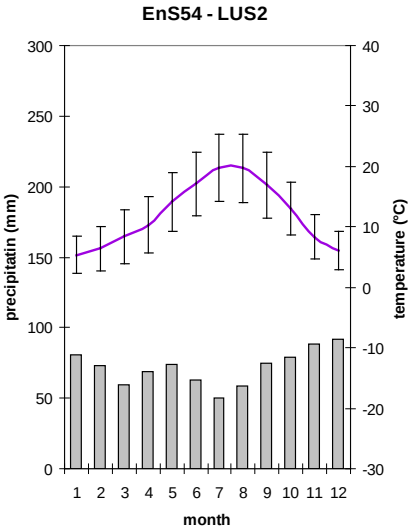
Location: The plains and intermountain valleys along the Biscayan coast (Aquitaine Plain), and in the valleys of Upper Ebro and Upper Rhône. Major cities are Bordeaux, Nantes and Lyon (France).

EEA biogeographic region: Atlantic, Continental.

Climate: The warm temperate climate (GDD_0 4543) is Atlantic with Mediterranean influences, and has a long growing season (348 days).

Terrain: Pains along the Biscayan coast, with some hills and low mountains in the north-east of Anjou. The Valley of Upper Ebro is a structural plain with breaks and foothills, while the Upper Rhône is dominated by sloping foothills.





12.3 Lusitanian 3 (LUS3)

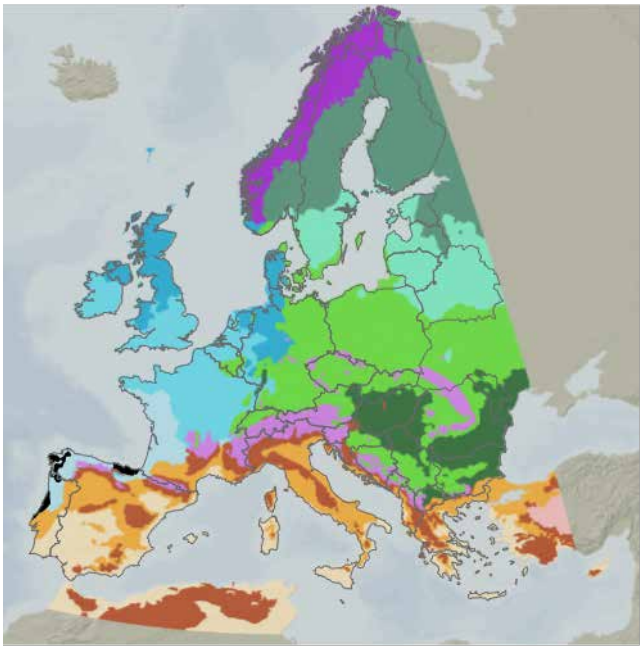
Area: 26,366 km^2

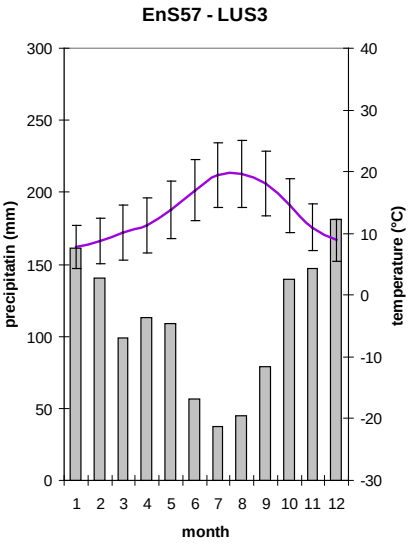
Location: Coastal plains (Beira Litoral), piedmonts (Biscayans) and low mountain ranges (Galicia) in Spain and Portugal. Major cities are Bilbao, Vigo, La Coruña, Santander (Spain) and Aveiro (Portugal).

EEA biogeographic region: Atlantic, Mediterranean.

Climate: The hot climate (GDD_0 5301) is Atlantic with Mediterranean influences, and has a long growing season (365 days).

Terrain: Varies from plains of the Beira Litoral consists, the Galician mountains, and the foothills and escarpments of the Biscayans mountains.





12.4 Lusitanian 4 (LUS4)

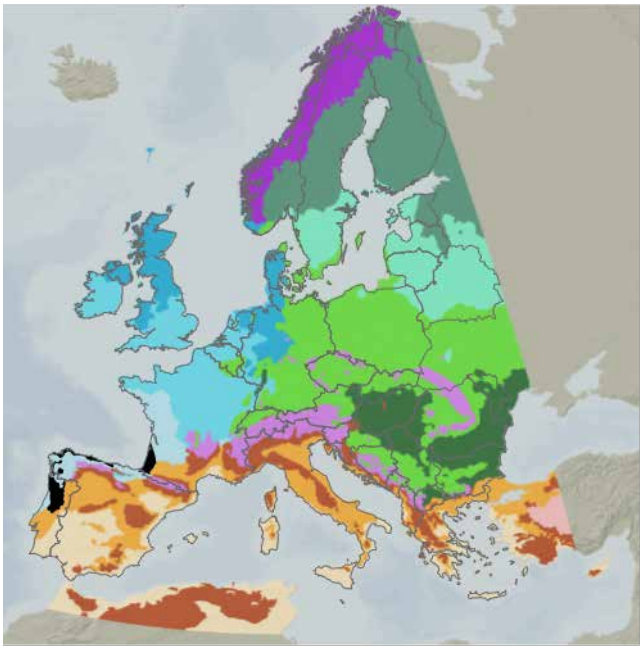
Area: 40,979 km^2

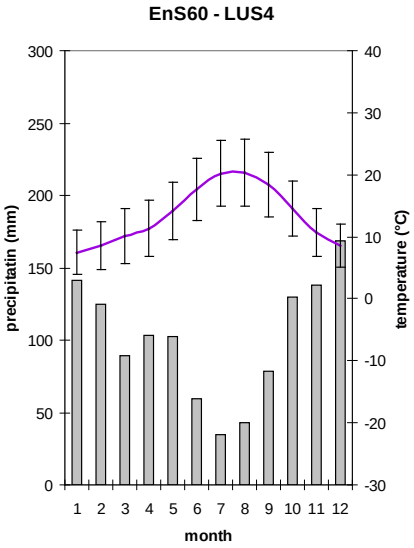
Location: Low mountains and plains in France (La Grande-Lande), Spain (Western Cantabrian coast) and Portugal (Minho-Beira Baixo). Major cities are Biarritz (France), Oviedo (Spain), Porto and Braga (Portugal).

EEA biogeographic region: Atlantic, Mediterranean.

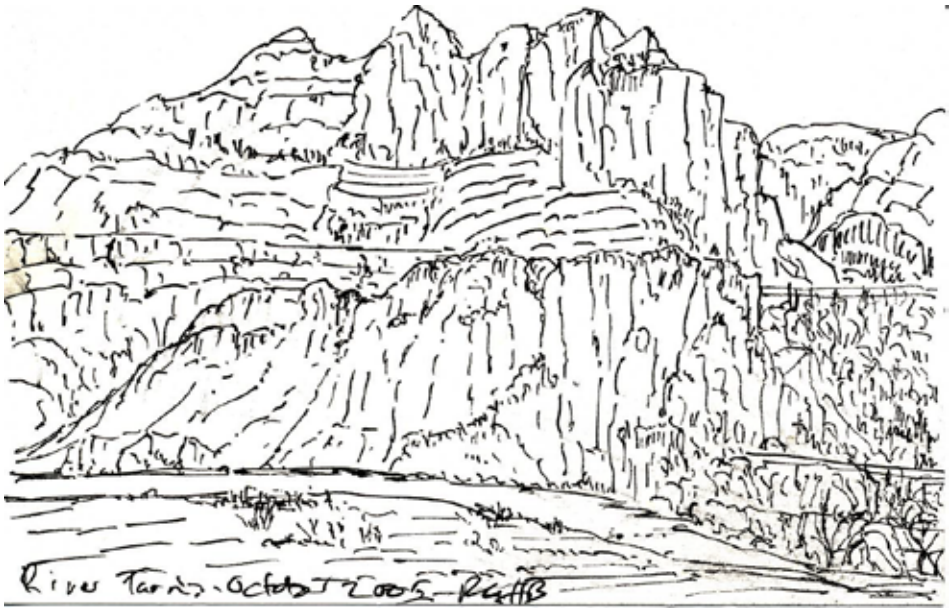
Climate: The hot climate (GDD_0 5099) is Atlantic with Mediterranean influences, and has a long growing season (365 days).

Terrain: The Iberian part of LUS4 consists of low mountains and foothills, while Les Landes in France consists of the alluvial plains.

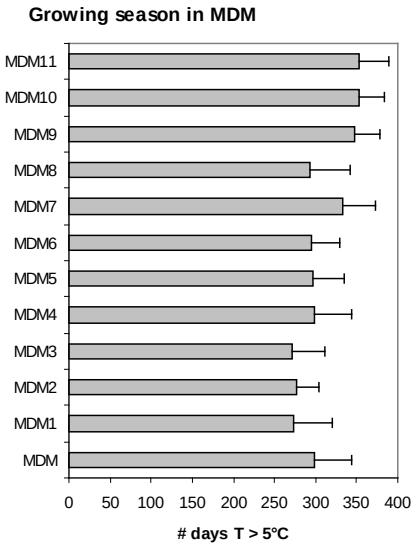


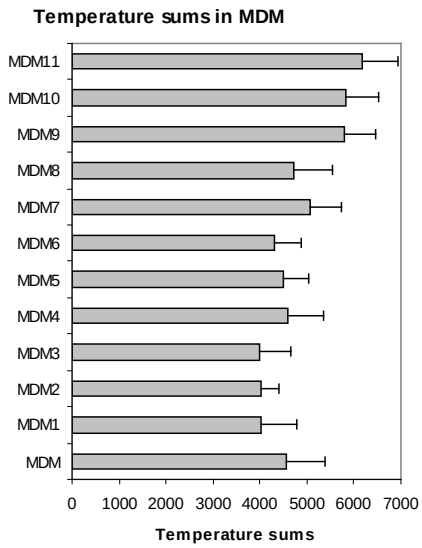


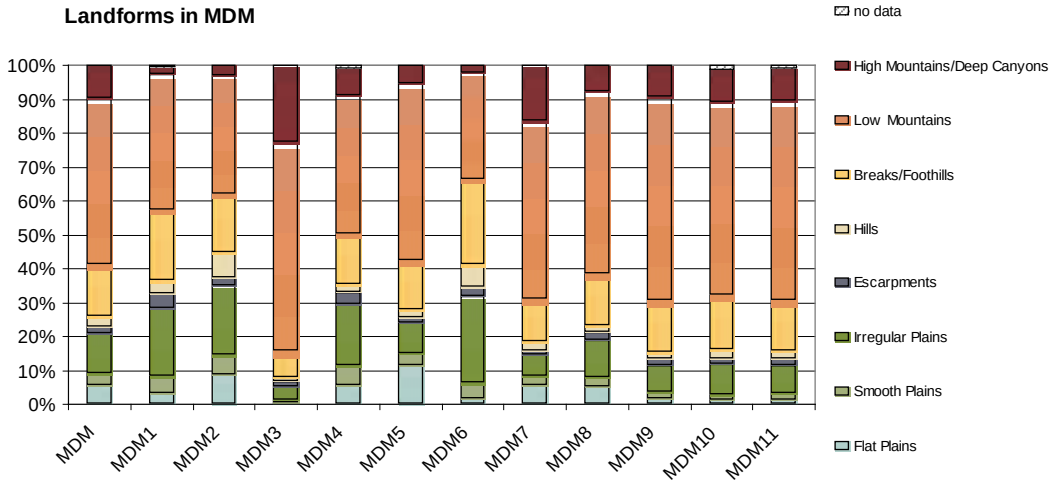
13 Environmental Zone Mediterranean Mountains (MDM)



The Mediterranean Mountain Zone (MDM) includes the low and medium high mountains in the northern Mediterranean around the margins of the main mountain ranges such as the Pyrenees and Alps as well as includes the low and medium height mountains in the northern Mediterranean around the margins of the main ranges such as the Pyrenees and Alps as well as high mountains in the south. The climate is Mediterranean, with warm summers and precipitation concentrated in the winter months, with more precipitation than elsewhere in the Mediterranean. Poor soils and difficult terrain restrict crop production over much of the Zone, but together with vineyards, these are still locally important. Extensive grasslands are still widespread and used for cattle and sheep grazing, but overall these are in decline, with subsequent scrub invasion, especially of broom and *Cistus* species. There are some alpine grasslands on the highest mountains and locally extensive deciduous and coniferous forests, sometimes planted.


Growing season in MDM
MDM11
MDM10
MDM9
MDM8
MDM7
MDM6
MDM5
MDM4
MDM3
MDM2
MDM1
MDM
0
50
100
150
200
250
300
350
400
days T > 5°C


Temperature sums in MDM
MDM11
MDM10
MDM9
MDM8
MDM7
MDM6
MDM5
MDM4
MDM3
MDM2
MDM1
MDM
0
1000
2000
3000
4000
5000
6000
7000
Temperature sums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MDM6
MDM7
MDM8
MDM9
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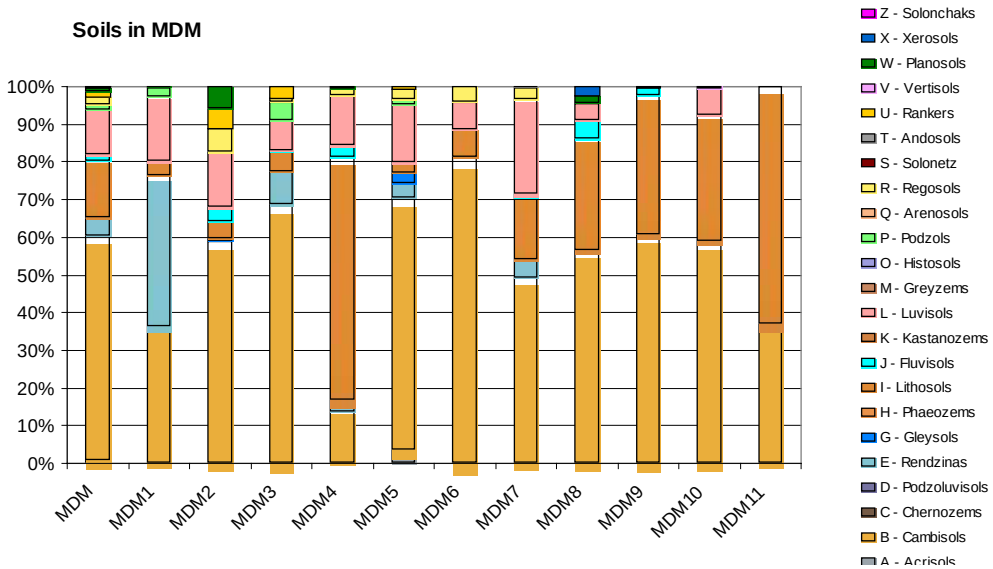
Low Mountains
Breaks/Foothills
Hills
Escarpments
Irregular Plains
Smooth Plains
Flat Plains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Z - Solonchaks
X - Xerosols
W - Planosols
V - Vertisols
U - Rankers
T - Andosols
S - Solonetz
R - Regosols
Q - Arenosols
P - Podzols
O - Histosols
M - Greyzems
L - Luvisols
K - Kastanozems
J - Fluvisols
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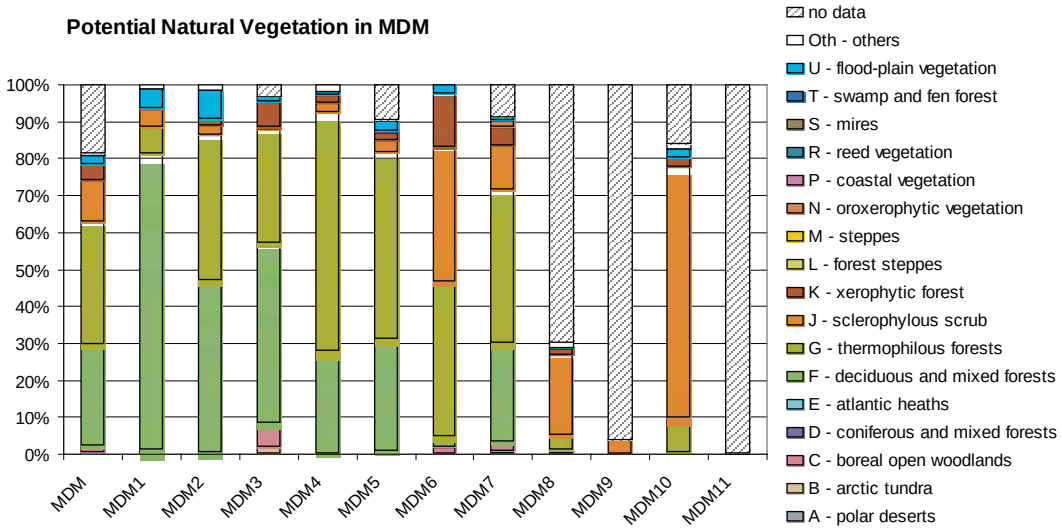
G - Gleysols
E - Rendzinas
D - Podzoluvisols
C - Chernozems
B - Cambisols
A - Acrisols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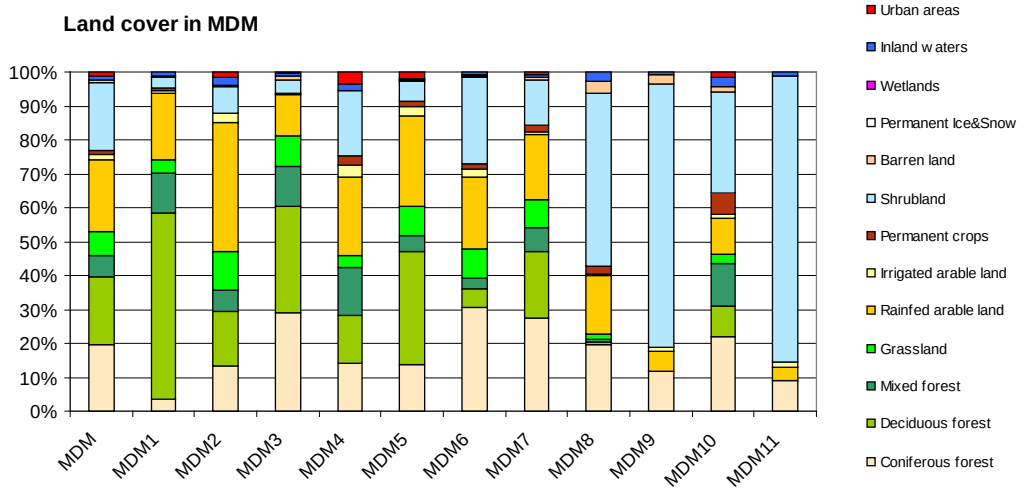
MDM11
no data
Oth - others
U - flood-plain vegetation
T - swamp and fen forest
S - mires
R - reed vegetation
P - coastal vegetation
N - oroxerophytic vegetation
M - steppes
L - forest steppes
K - xerophytic forest
J - sclerophylous scrub
G - thermophilous forests
F - deciduous and mixed forests
E - atlantic heaths
D - coniferous and mixed forests
C - boreal open woodlands
B - arctic tundra
A - polar deserts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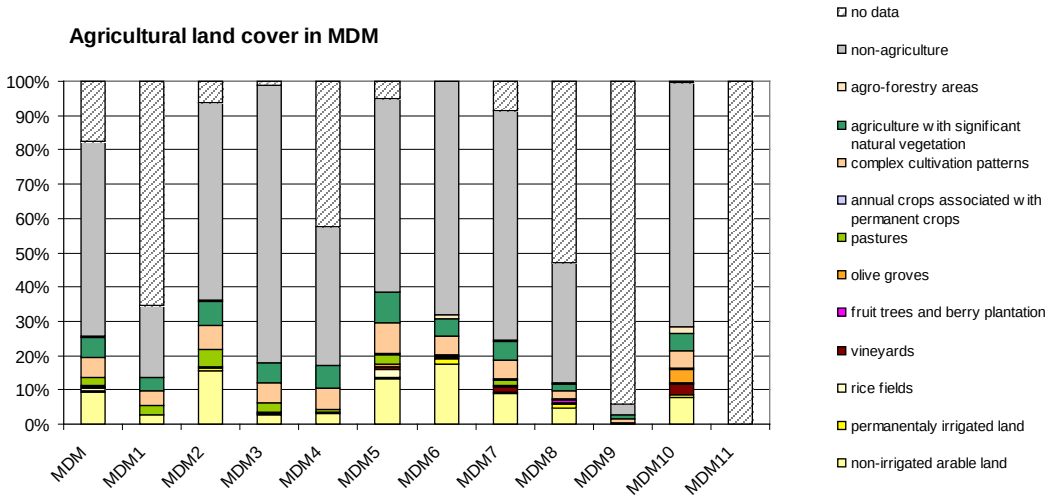
MDM10
MDM11
Urban areas
Inland waters
Wetlands
Permanent Ice&Snow
Barren land
Shrubland
Permanent crops
Irrigated arable land
Rainfed arable land
Grassland
Mixed forest
Deciduous forest
Coniferous forest


Agricultural land cover in MDM
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MDM5
MDM6
MDM7
MDM8
MDM9
MDM10
MDM11
no data
non-agriculture
agro-forestry areas
agriculture with significant natural vegetation
complex cultivation patterns
annual crops associated with permanent crops
pastures
olive groves
fruit trees and berry plantation
vineyards
rice fields
permanentaly irrigated land
non-irrigated arable land

13.1 Mediterranean Mountain 1 (MDM1)

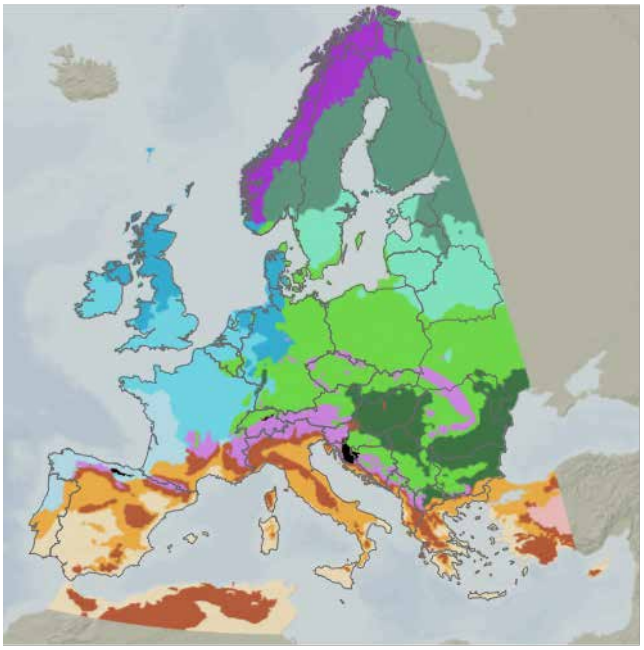
Area: 13,151 km^2

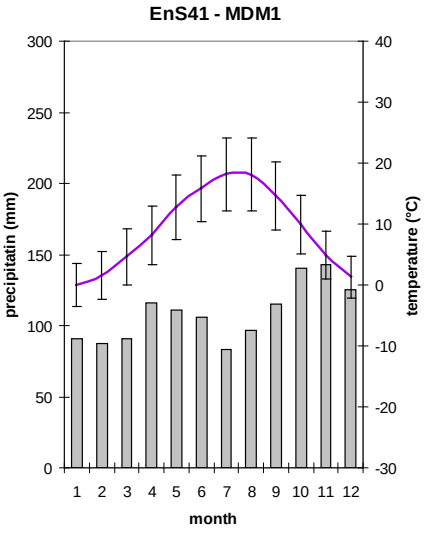
Location: The eastern Cantabrian Mountains, the north Dinaric Alps and a small area in the Swiss Alps. Major cities are Gospi (Croatia) and Biha (Bosnia).

EEA biogeographic region: Alpine.

Climate: The warm temperate climate (GDD_0 4024) is Mediterranean with Alpine characteristics. The growing season is intermediate (273 days).

Terrain: Alps are block folded high and medium mountains mountain glaciation forms such as cirques and terminal moraines. The eastern Cantabrians are folded low mountains with karst forms, while the northern Dinaric Alps are folded-block highlands also modified by karst.





13.2 Mediterranean Mountain 2 (MDM2)

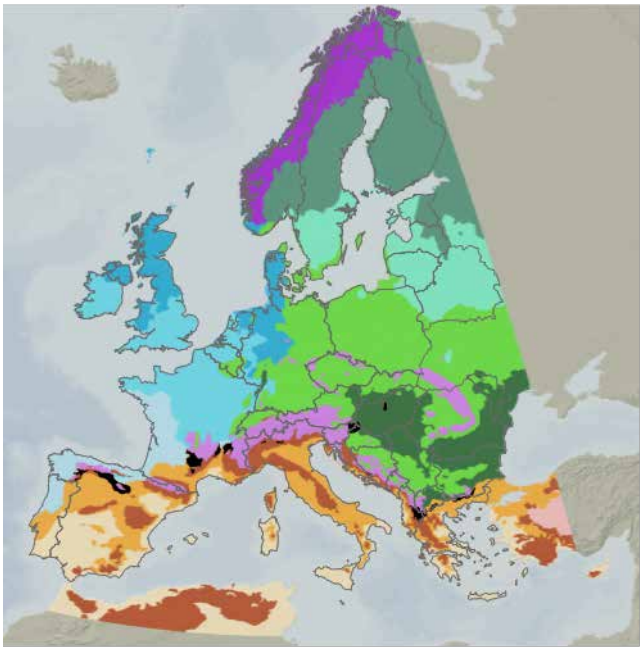
Area: 41,550 km^2

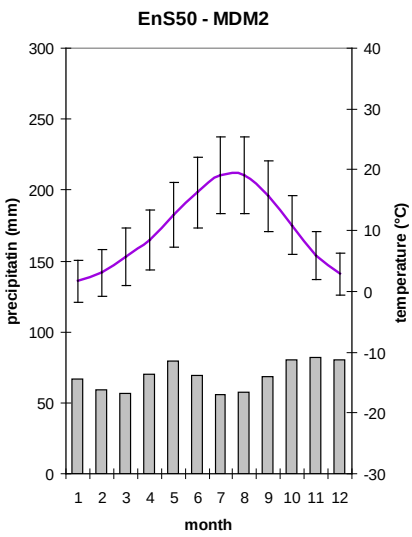
Location: The central zones of Cordillera Cantabrica (Spain) and Massif Central (France), in the fringes of the western Alps in France and the eastern Alps in Austria, Matra in Hungary and the mountains at the borders between Greece Bulgaria and Macedonia.

EEA biogeographic region: Alpine, Continental, Mediterranean.

Climate: The warm temperate (GDD_0 4008) climate is Mediterranean with Continental and Alpine characteristics. The growing season is intermediate (276 days).

Terrain: The Massif Central consists of tablelands with karst, the Cordillera Cantabrica are eroded block highlands and folded and eroded low mountains in the east. The Alps zone consists of folded medium and low mountains with karst forms. The Greek mountains are block folded high and medium mountains with glacial forms such as cirques and terminal moraine.





13.3 Mediterranean Mountain 3 (MDM3)

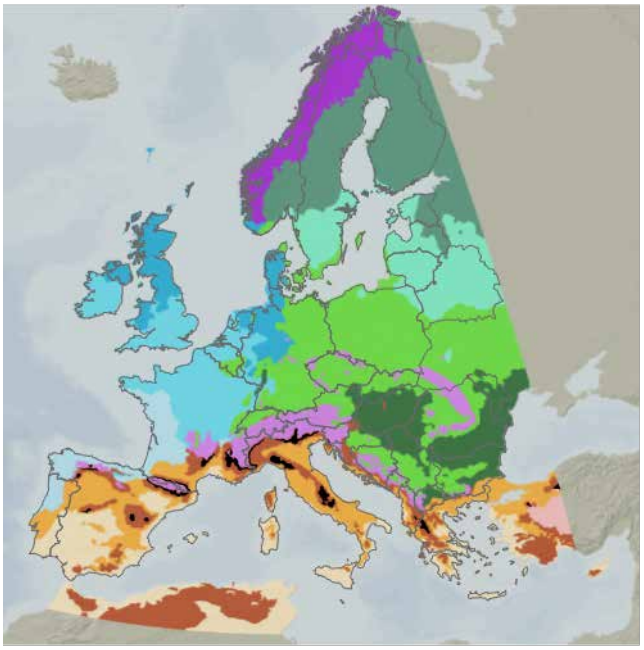
Area: 50,535 km^2

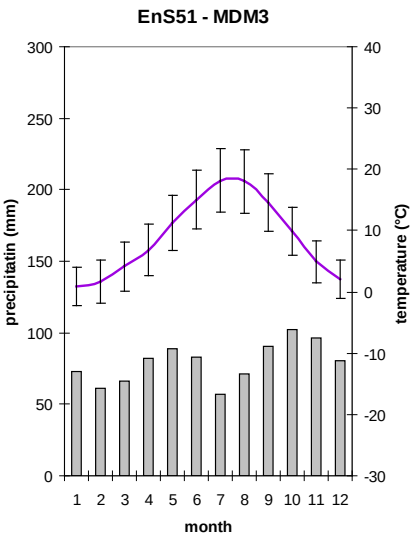
Location: The outer reaches of mountains such as the Pyrenees in Spain and France, the southern Alps in France, Italy, Switzerland and Austria, in the Apennines in north and central Italy and the Pindos mountains in Greece. It also includes the summit areas of the Sierra de Guadarrama, the S. de Albarracín, the S. de Guadar, and the Cordillera Cantabrica in Spain and the southern Massif Central.

EEA biogeographic region: Alpine, Continental, Mediterranean.

Climate: The temperate climate (GDD_0 3984) is Mediterranean and Alpine characteristics. The growing season is intermediate (271 days).

Terrain: The major landforms are folded and eroded foothills and low mountains in the Pyrenees, folded medium and low mountains modified by glaciation in the Alpine outer ranges, and block folded high and medium mountains transformed by arid erosion and accumulation in the central zone of the Apennines and Pindos.





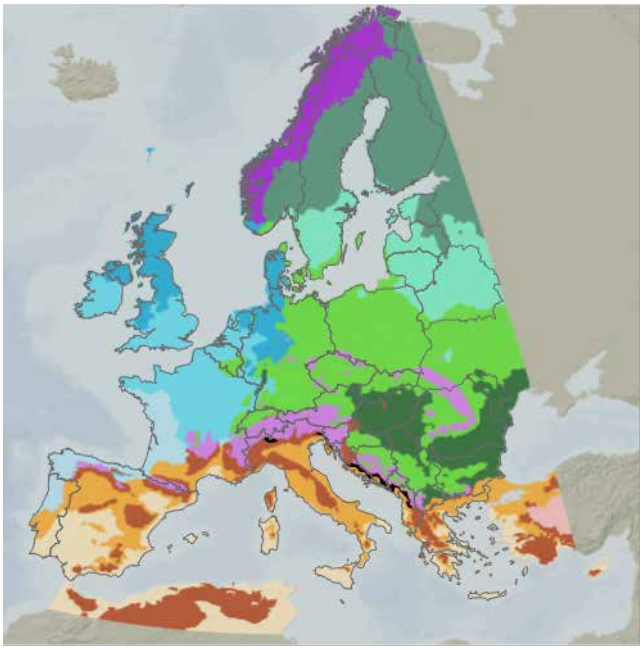
13.4 Mediterranean Mountain 4 (MDM4)

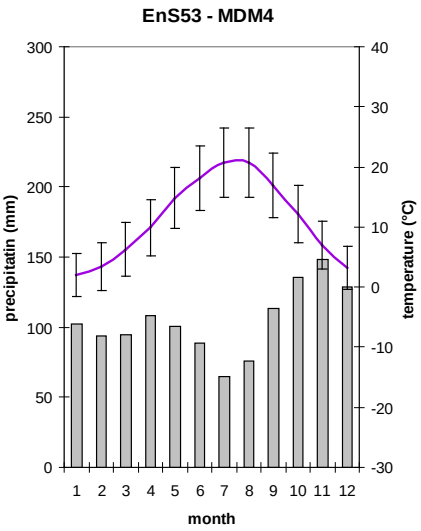
Area: 16,005 km^2

Location: The southern foothills of the central and eastern Alps in Italy and Slovenia and the piedmont zone and outer western ranges of the Dinaric Alps in Croatia, Bosnia and Herzegovina, Monte-Negro and Albania.
EEA biogeographic region: Alpine, Continental, Mediterranean.

Climate: The warm temperate climate (GDD_0 4580) is Mediterranean. The growing season is intermediate (298 days).

Terrain: Outer Alpine zones are low mountains modified by mountain glaciation, the section on Istria and the outer ranges of the Dinaric Alps consist of karstic folded-block highlands.





13.5 Mediterranean Mountain 5 (MDM5)

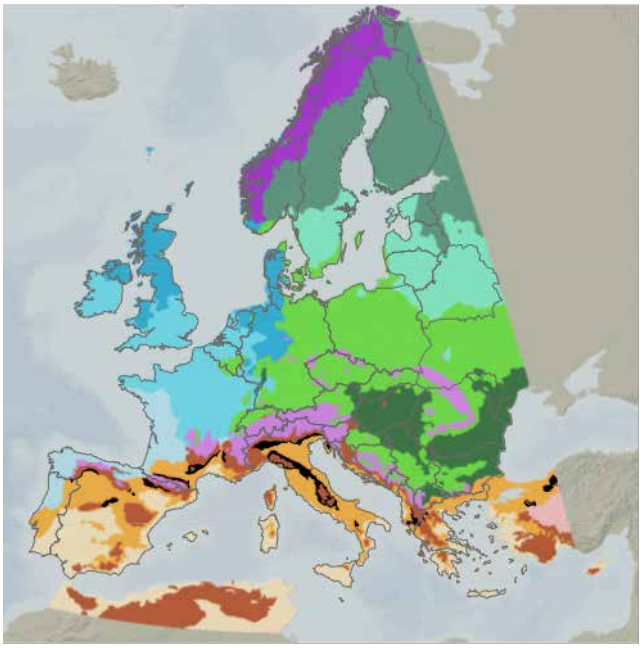
Area: 69,986 km^2

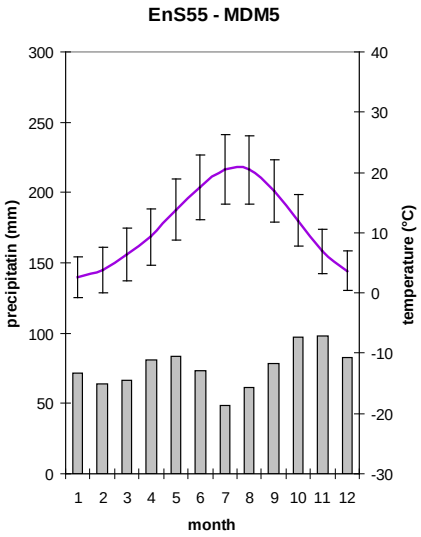
Location: Low and medium mountains such as the Montes de Toledo and the Apennines and inner foothill zones of the Pyrenees, Cordillera Cantabrica, the southern Massif Central, the western Alps Maritime, and the southern fringes of the Alps and Pindos. It is situated in Spain, France, Italy, Slovenia, Croatia, Albania and Greece. Major cities are Milan, Verona and Vicenza.

EEA biogeographic region: Alpine, Mediterranean.

Climate: The warm temperate climate (GDD_0 4500) is Mediterranean. The growing season is intermediate (296 days).

Terrain: The Cordillera Cantabrica and the Massif Central are block highlands, the Montes de Toledo are eroded block and folded block mountains. The fringes of the western Pyrenees consist of folded and monoclinal piedmonts, the southern fringes of the central and eastern Alps and the Pindos are dominated by foothills alluvial accumulation.





13.6 Mediterranean Mountain 6 (MDM6)

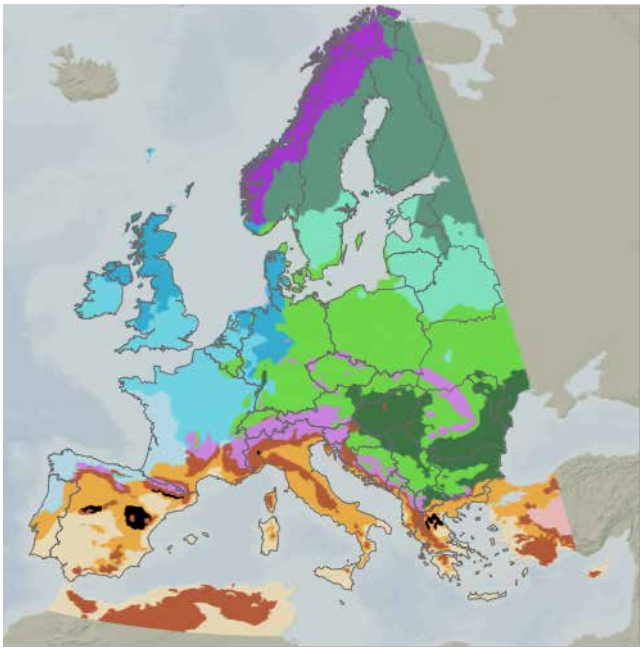
Area: 32,218 km^2

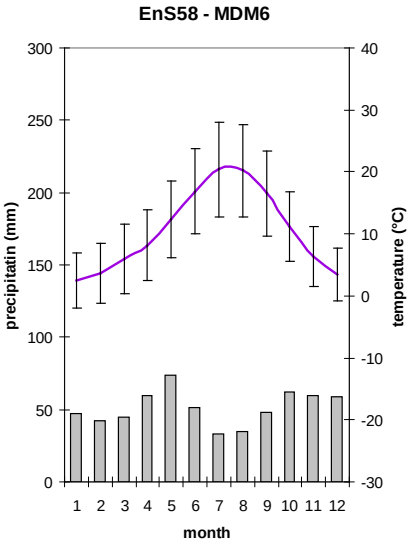
Location: Low and foothills in Spain and Greece: the western Montes de Toledo, Sierra de Albarracín, Sierra de Guadar, the Olympos, Vermion, Vurinos mountains, the Sothern fringes of the Pyrenees.

EEA biogeographic region: Alpine, Mediterranean.

Climate: The warm temperate climate (GDD_0 4306) is Mediterranean. The growing season is intermediate (294 days).

Terrain: Low mountains and foothills in the Montes de Toledo, the southern periphery of the Pyrenees, and the Balkans.





13.7 Mediterranean Mountain 7 (MDM7)

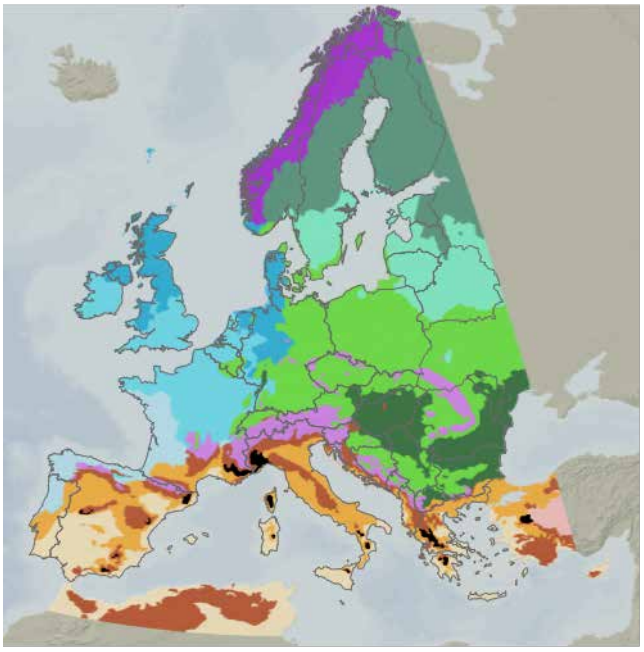
Area: 41,816 km^2

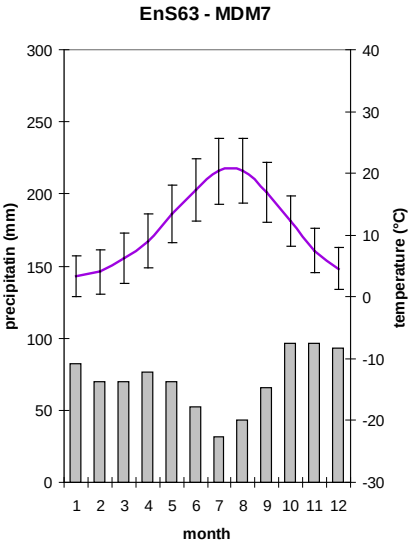
Location: Low and medium high mountains in Spain, France, Italy and Greece: it is the core zone of the Sierra Nevada, Sierra de Segovia, the Corsican Mountains, the Calabrian Apennines, Southern Pindos and Erymanthos, the outer ranges of the eastern Pyrenees and Maritime Alps.

EEA biogeographic region: Alpine, Mediterranean.

Climate: The hot climate (GDD_0 5076) is Mediterranean. The growing season is long (334 days).

Terrain: The core zones of Sierra Nevada, the southern Pindos and Erymanthos are block folded high and medium mountains, the Sierra Segovia and southern fringes of the Maritime Alps are folded medium and low mountains transformed by recent erosion and accumulation. In the east it consists of sloping accumulative plateaus.





13.8 Mediterranean Mountain 8 (MDM8)

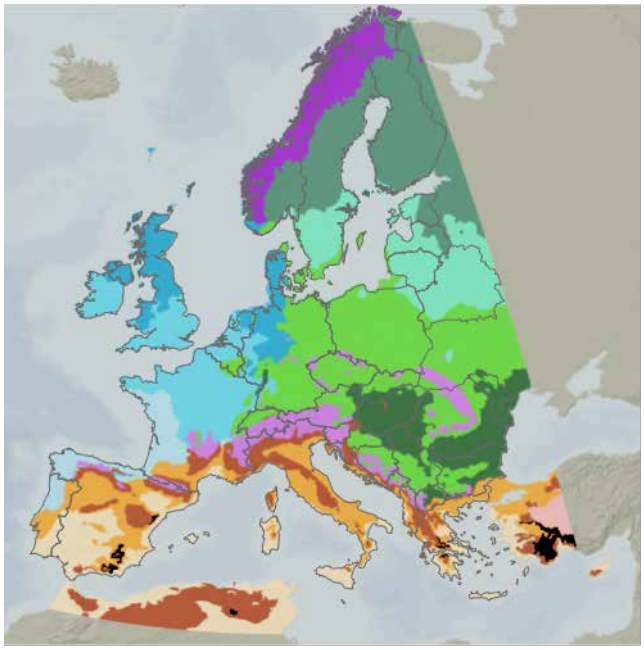
Area: 44,134 km^2

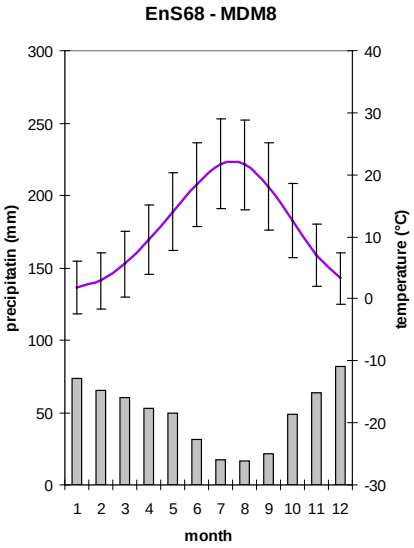
Location: The fringes of the Sierra Nevada, Sierra de Segovia, East Sierra de Albarracín (Spain) and southern Pindos (Greece).

EEA biogeographic region: Alpine and Mediterranean.

Climate: The warm temperate climate (GDD_0 4728) is Mediterranean. The growing season is intermediate (293 days).

Terrain: The Sierra Nevada and Southern Pindos are block folded high and medium mountains. The Sierra de Segovia consists of folded medium and low mountains, the Sierra de Albarracín is dominated by block and folded block mountains. All relief is transformed by erosion and accumulation.





13.9 Mediterranean Mountain 9 (MDM9)

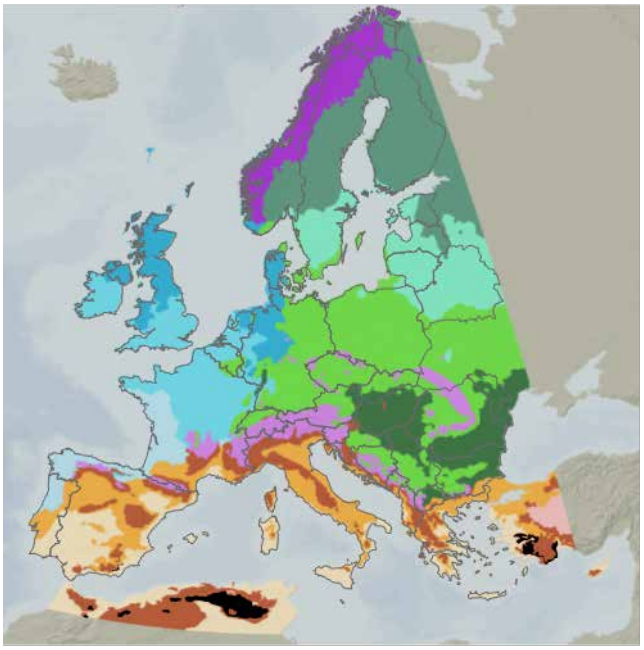
Area: 66,248 km^2

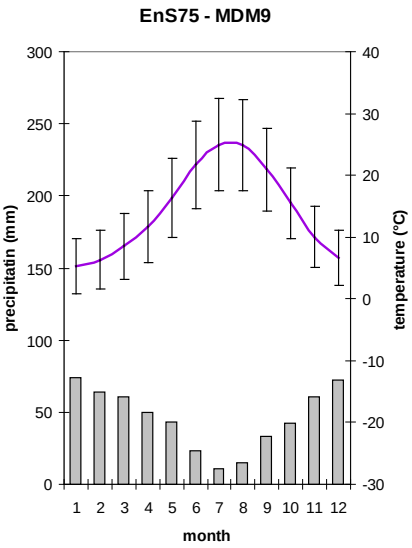
Location: Mainly found in North Africa and in Europe a small part in the southern foothills of the Sierra de los Filabres and the Sierra de Maria in Spain.

EEA biogeographic region: Mediterranean.

Climate: The hot climate (GDD_0 5796) is Mediterranean. The growing season is long (294 days).

Terrain: MDM9 is consists of low mountains and foothills block folded high and medium mountains, transformed by erosion and accumulation of arid regions.





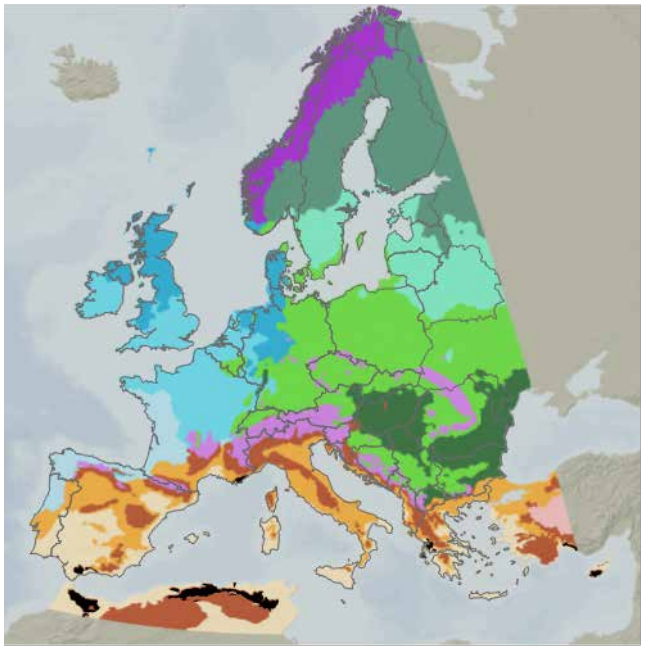
13.10 Mediterranean Mountain 10 (MDM10)

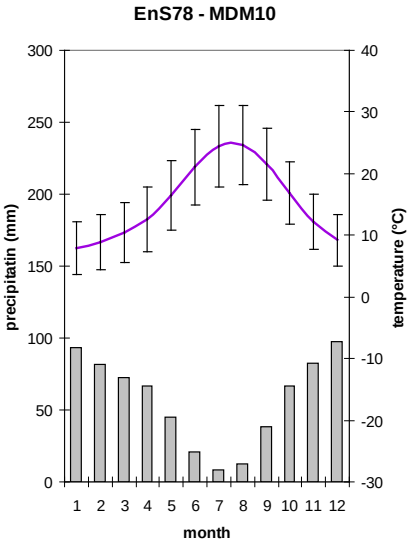
Area: 59,796 km^2

Location: Low mountains and hilly uplands in France, Spain, Greece and North Africa. The sections in Europe are the Sierra de Libar, and the Sierra Bermeja in Spain, southern Provence in France, South Epirus and Kefallinía in Greece.

EEA biogeographic region: Mediterranean.

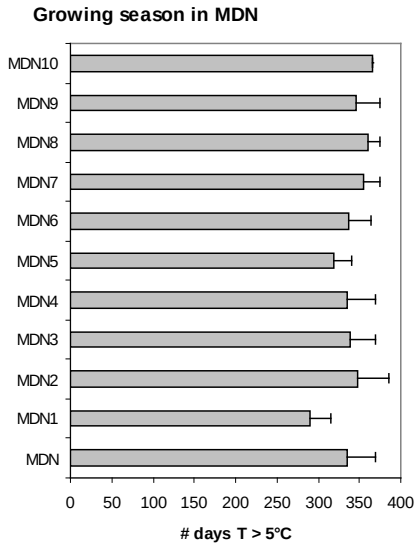
Climate: The hot climate (GDD_0 of 5833) is Mediterranean with a long growing season is long (353 days).
Terrain: The Sierra de Libar and the Sierra Bermeja are block folded high and medium mountains; the uplands of the southern Provence and Kefallinía are folded and monoclinal foothills. The terrain is transformed by erosion and accumulation.





14 Environmental Zone Mediterranean North (MDN)

The Mediterranean North Zone (MDN) includes the lowlands of the northern and central Mediterranean, but also hills and low mountains further south. The topography is diverse and includes coastal plains, plateaus with isolated mountains, foothills and mountain valleys. The climate is Mediterranean, with warm and dry summers and precipitation concentrated in the winter months. Crop production is constrained by water availability, and permanent irrigation is locally important to increase productivity. Vineyards are important throughout the Zone and olives are grown in the south. Orchards are locally important as are grasslands in agricultural use, although these are often in decline. Various scrub formations are therefore widespread and increasing in cover, as well as evergreen and pine forests. There are many major conurbations in the Zone and the coastal belt especially is highly urbanised.


Growing season in MDN
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150
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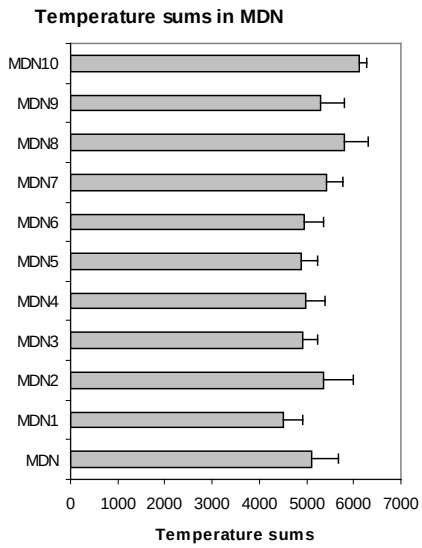
350
400
days T > 5°C


Temperature sums in MDN
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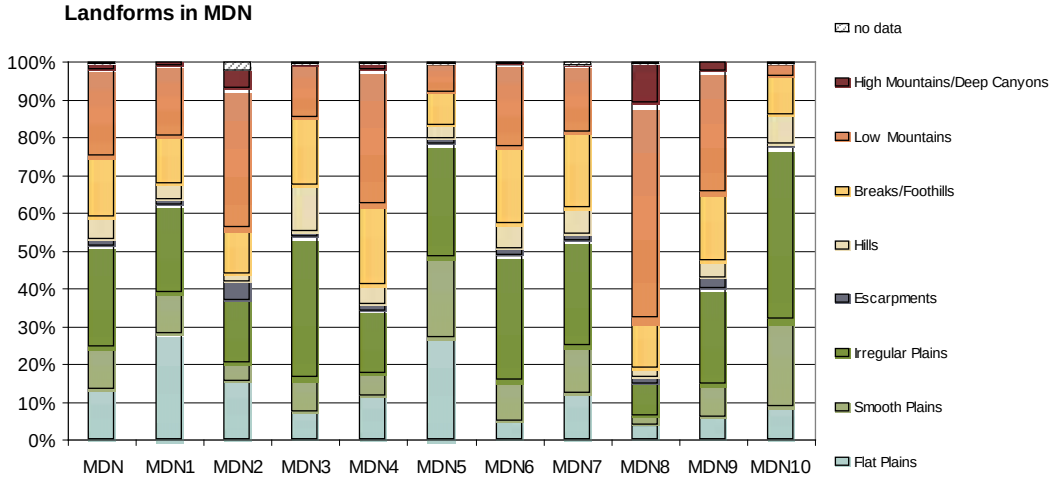
5000
6000
7000
Temperature sums


Landforms in MDN
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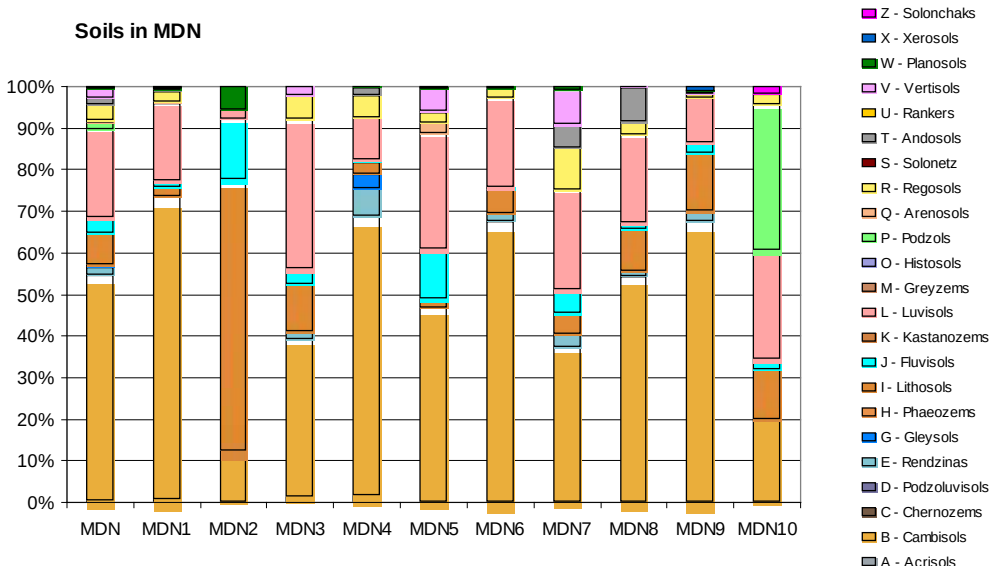
High Mountains/Deep Canyons
Low Mountains
Breaks/Foothills
Hills
Escarpments
Irregular Plains
Smooth Plains
Flat Plains


Soils in MDN
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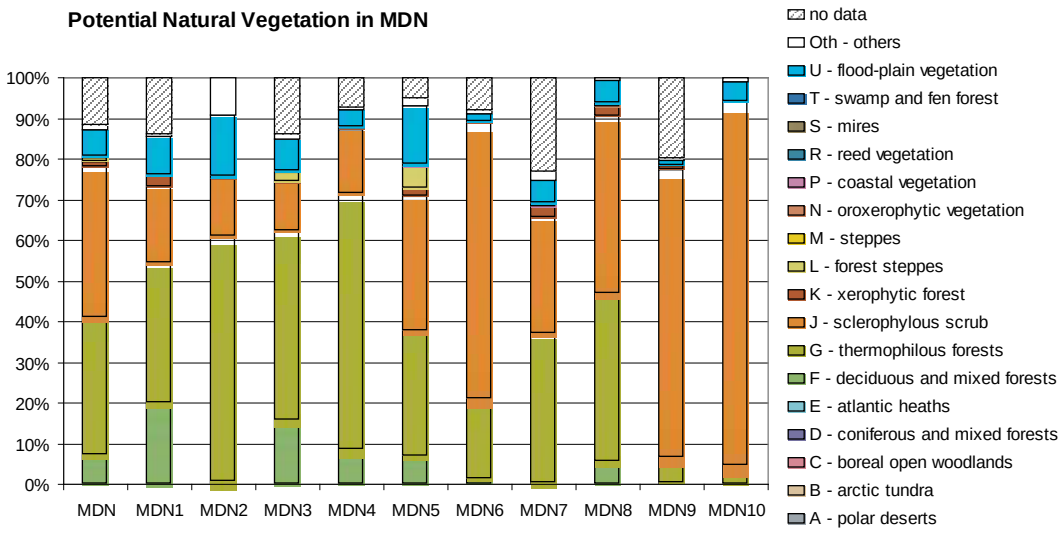
E - Rendzinas
D - Podzoluvisols
C - Chernozems
B - Cambisols
A - Acrisols


Potential Natural Vegetation in MDN
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no data
Oth - others
U - flood-plain vegetation
T - swamp and fen forest
S - mires
R - reed vegetation
P - coastal vegetation
N - oroxerophytic vegetation
M - steppes
L - forest steppes
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J - sclerophylous scrub
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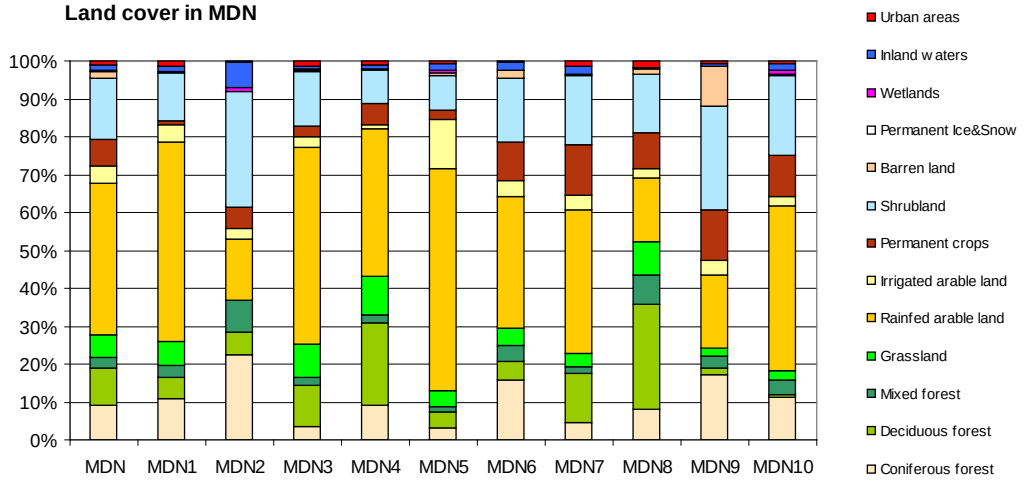
B - arctic tundra
A - polar deserts


Land cover in MDN
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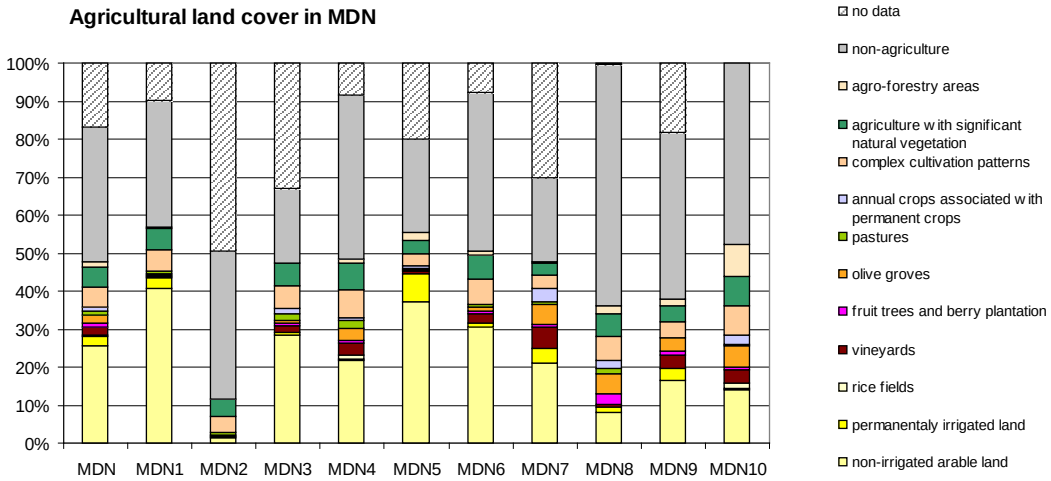
MDN10
Urban areas
Inland waters
Wetlands
Permanent Ice&Snow
Barren land
Shrubland
Permanent crops
Irrigated arable land
Rainfed arable land
Grassland
Mixed forest
Deciduous forest
Coniferous forest


Agricultural land cover in MDN
100%
90%
80%
70%
60%
50%
40%
30%
20%
10%
0%
MDN
MDN1
MDN2
MDN3
MDN4
MDN5
MDN6
MDN7
MDN8
MDN9
MDN10
no data
non-agriculture
agro-forestry areas
agriculture with significant natural vegetation
complex cultivation patterns
annual crops associated with permanent crops
pastures
olive groves
fruit trees and berry plantation
vineyards
rice fields
permanentaly irrigated land
non-irrigated arable land

14.1 Mediterranean North 1 (MDN1)

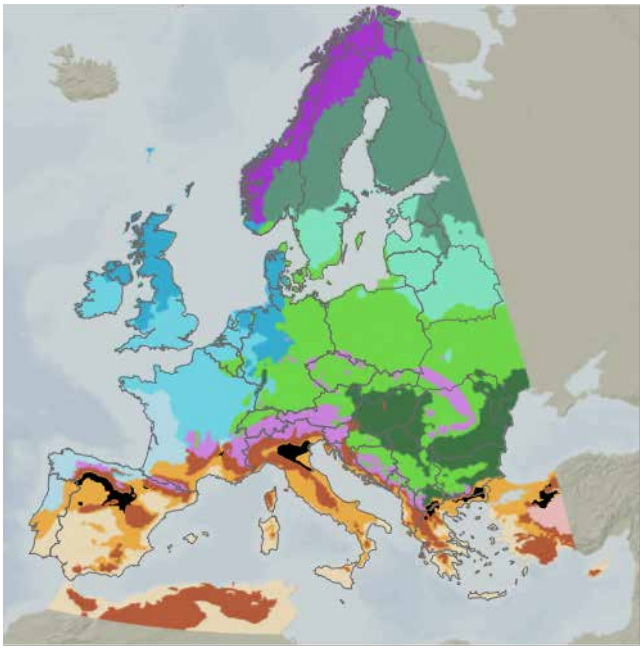
Area: 70,613 km^2

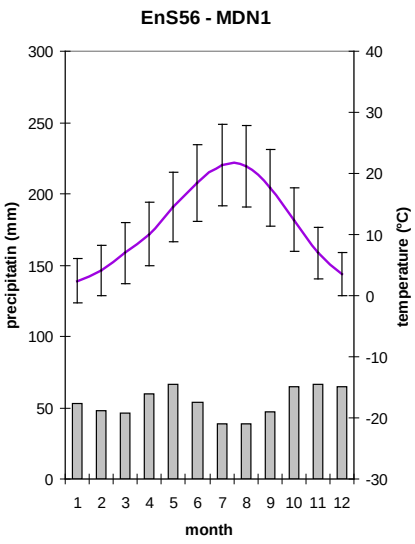
Location: The central Padua-Venetian plain in Italy, foothills of the northern Sierra de la Demanda and the inner Cordillera Cantabrica, in Spain; Paikon in Greece, the eastern Rodopi in Bulgaria and Greece and low mountains in the Pyrenees, the Apennines, the Balkan peninsulas and in Anatolia. Major cities are Burgos, León, Venezia, Padova, and Piacenza. The Turkish part is not included in the description.

EEA biogeographic region: Mediterranean, Continental.

Climate: The warm temperate climate (GDD0 4509) is Mediterranean. The growing season is intermediate (290 days).

Terrain: The Pyrenean section consists of plateaus and eroded block and folded-block mountains; the Padua-Venetian Plain is accumulative lowland of foothills and intermountain u-shaped valleys. The Balkan section is dominated by block mountains highlands with recent erosion and accumulation.





14.2 Mediterranean North 2 (MDN2)

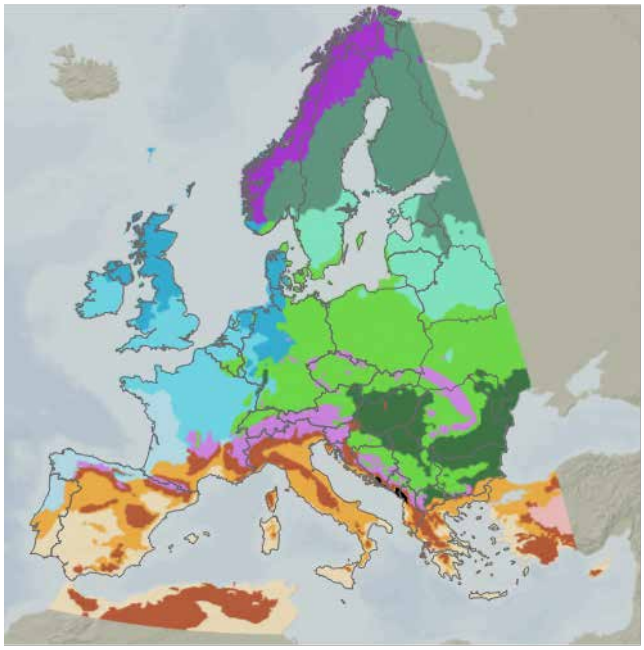
Area: 6,981 km^2

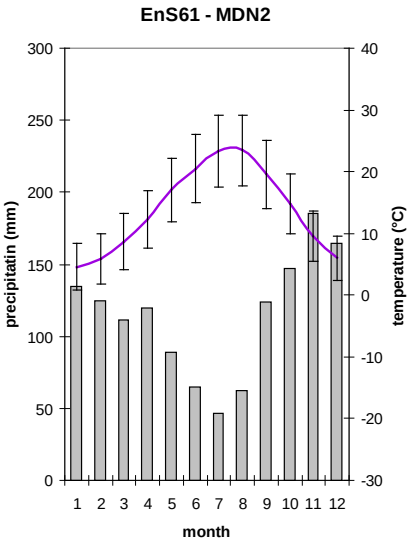
Location: Coastal plains and mountain valleys along the East Adriatic coast in Croatia, Montenegro and Albania. Major cities are Dubrovnik, Cetinje and Shkodër.

EEA biogeographic region: Mediterranean.

Climate: The hot climate (GDD0 5371) is Mediterranean, with a long growing season (348 days).

Terrain: Folded karstic block highlands, karstic plains of intermountain depressions and coastal plains.





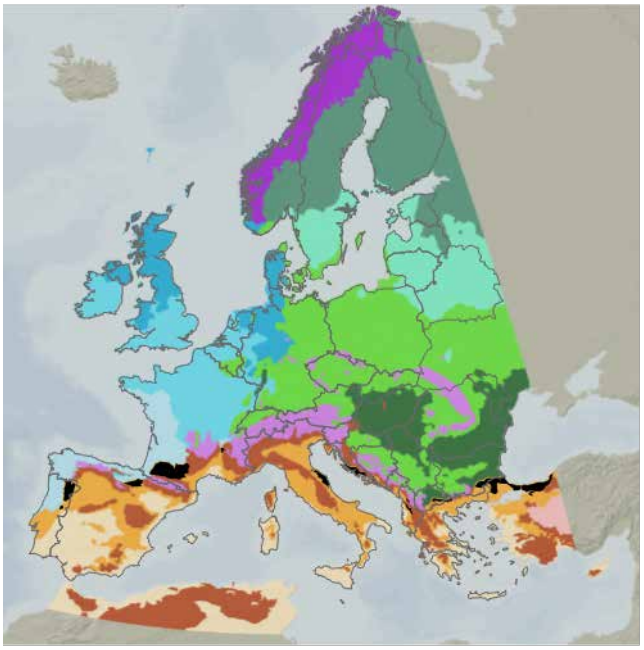
14.3 Mediterranean North 3 (MDN3)

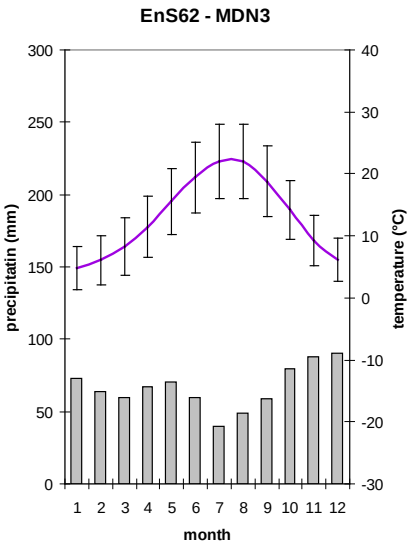
Area: 69,112 km^2

Location: The middle Douro in Portugal and Spain, the upper Ebro in Spain, the upper Rhône, the Mat Valley in Albania, the lower Strimon valley in Greece and piedmonts: Gascogne in France, the coast of Marco in Italy, the Dinaric Coast in Croatia, the northern fringes of eastern Rodopi in Bulgaria and Turkey and Körlu Dalari in Turkey). Major cities are Pau, Tarbes, Ancona, Split, Istanbul, Izmir.

EEA biogeographic region: Mediterranean, Atlantic and Black Sea.

Climate: The warm temperate climate (GDD_0 4915) is Mediterranean, with a long growing season (338 days).
Terrain: Large intermountain valleys, foothills and river plains.





14.4 Mediterranean North 4 (MDN4)

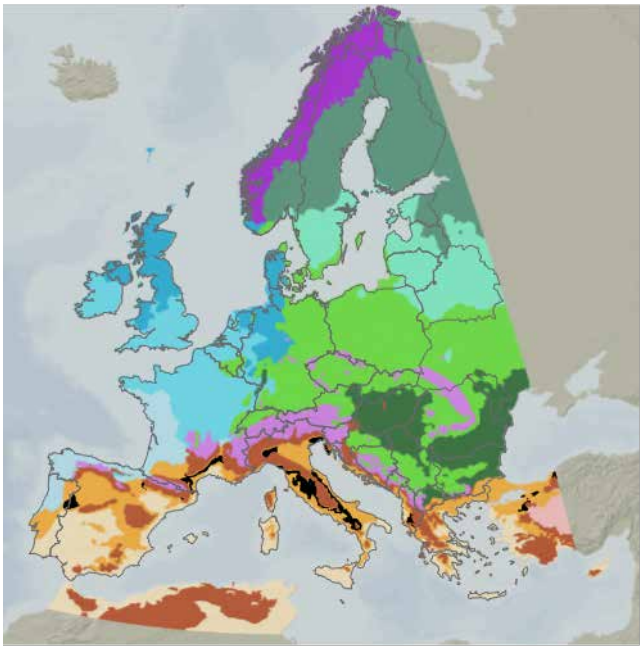
Area: 64,430 km^2

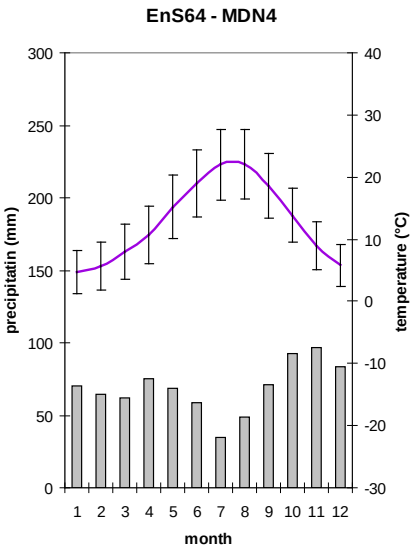
Location: Eastern Beira Baixa, Trás os Montes, Portugal and Spain, southern fringes of the Massif Central and fringes of the Pyrenees in Spain and France, the foothills of the Apennines, in Italy and the low mountains of Tomorr and Ostrovicë in Albania. Major cities are Firenze, Perugia, Alessandria (Italy) and Pula (Croatia).

EEA biogeographic region: Mediterranean.

Climate: The warm temperate climate (GDD_0 4971) is Mediterranean, with a long growing season (336 days).

Terrain: The fringes of the Massif Central and Beira Baixa consist of eroded block highlands, while the fringes of the Pyrenees consist of foothills shaped by erosion and accumulation. The Apennine section are eroded folded block mountains with occasional karst. Tomorr and Ostrovicë are eroded folded medium and low mountains.





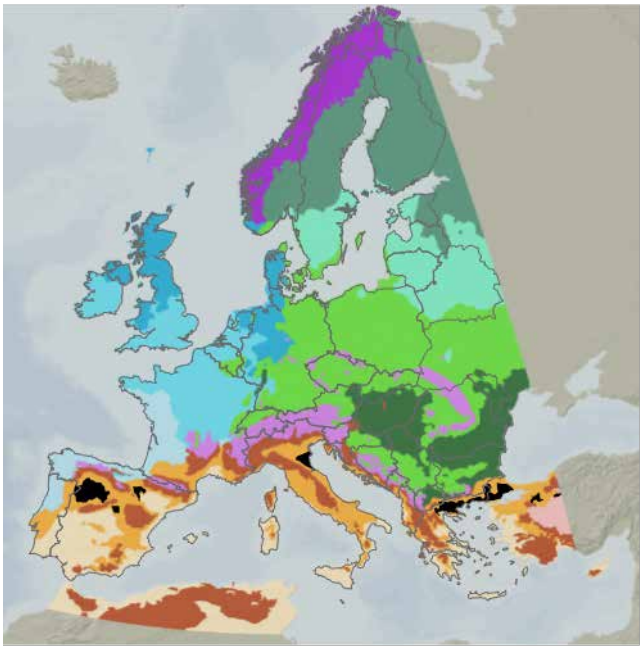
14.5 Mediterranean North 5 (MDN5)

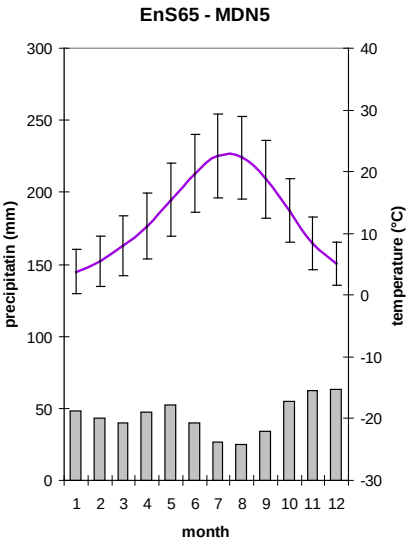
Area: 71,400 km^2

Location: The northern Meseta and the valley of Aragon in Spain, coastal valleys in Macedonia and Thracia in Greece, Bulgaria and Turkey and the lower Po in Italy. Major cities are Salamanca, Valladolid in Spain, Ferrara, in Italy and Thessaloniki in Greece.

EEA biogeographic region: Mediterranean.

Climate: The warm temperate climate (GDD_0 4872) is Mediterranean, with a long growing season (319 days).
Terrain: The terrain consists largely of valleys and eroded plateaus.





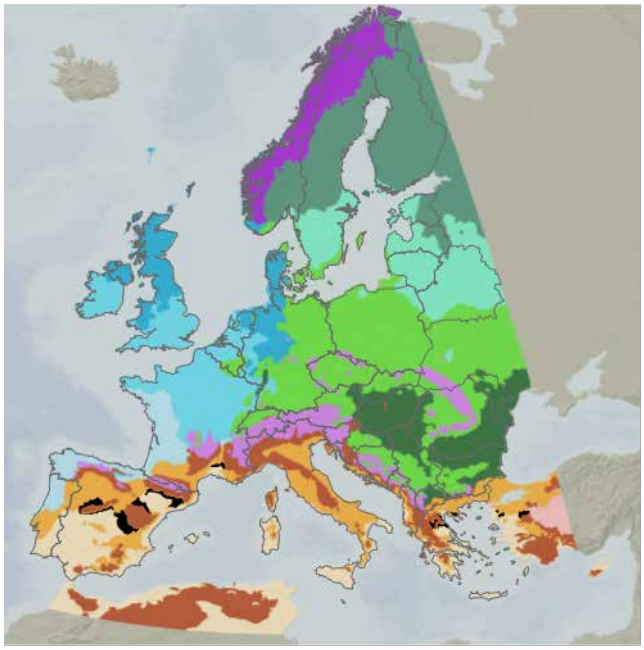
14.6 Mediterranean North 6 (MDN6)

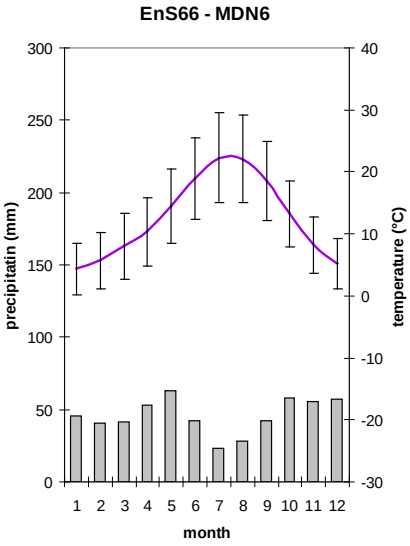
Area: 42,228 km^2

Location: Low mountains in southern Pyrenees the Sierra de Guadarrama and the Sistema Ibérica in Spain, the Languedoc in France, in the Balkan the piedmonts of Chalkidiki, Vermion, Olympos in Greece and smaller areas in Anatolia Turkey.

EEA biogeographic region: Mediterranean.

Climate: The warm temperate climate (GDD_0 4943) is Mediterranean, with a long growing season (337 days).
Terrain: Low eroded mountains and foothills, and irregular plains.





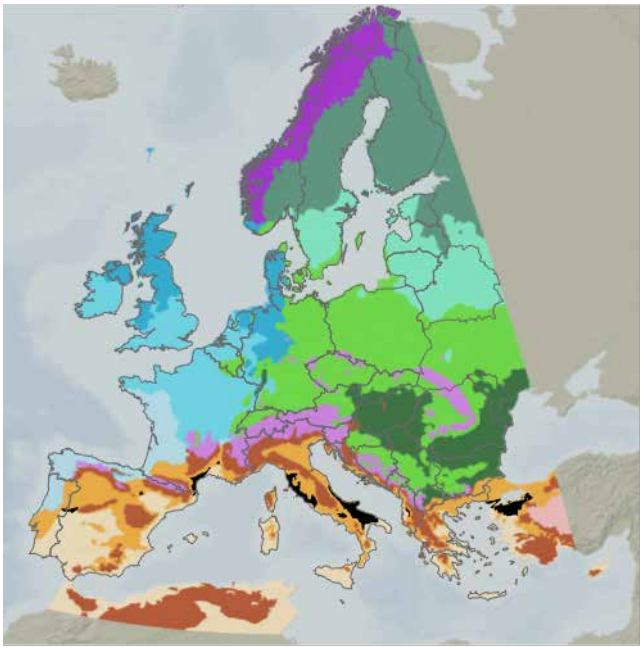
14.7 Mediterranean North 7 (MDN7)

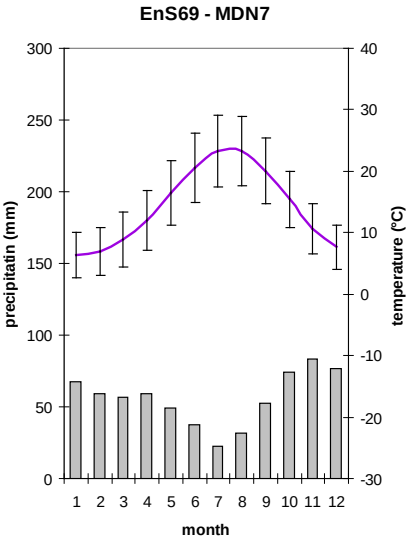
Area: 60,971 km^2

Location: Southern Languedoc, Coast of Toscana, Lazio, Apulia and Abruzzi, the southern coast of the Marmara Sea and low mountains in Apulia, Italy. Major cities are Roma, Pisa, Livorno, Bari, Foggia, Pescara and Perpignan.

EEA biogeographic region: Mediterranean.

Climate: The hot climate (GDD_0 5410) is Mediterranean, with a long growing season (355 days).
Terrain: Plains and lowland valleys, with some eroded medium and low mountains.





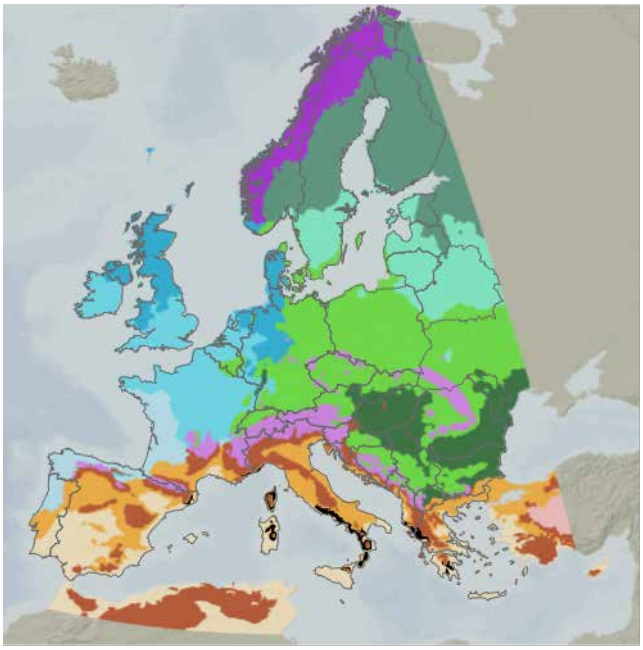
14.8 Mediterranean North 8 (MDN8)

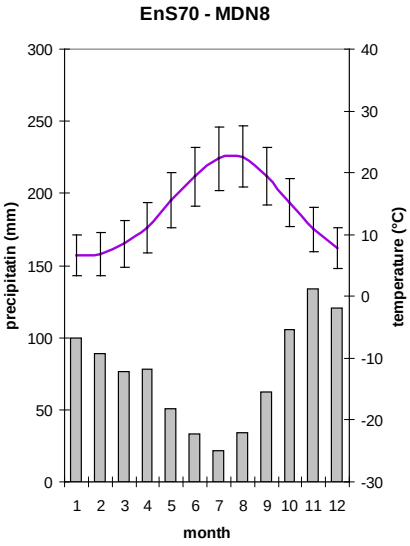
Area: 38,157 km^2

Location: Low mountains and foothills in coastal areas of the south-western Apennines, north-western Catalonia, Epirus and Albania, Liguria, and also in Peloponnesus, North-East Sicily, Sardinia, and Corsica. Major cities are Naples (Italy), Bastia (France) and Kerkifa (Greece).

EEA biogeographic region: Mediterranean.

Climate: The hot climate (GDD_0 5812) is Mediterranean, with a long growing season is (331 days).
Terrain: The relief consists low mountains dissected by eroded valleys.





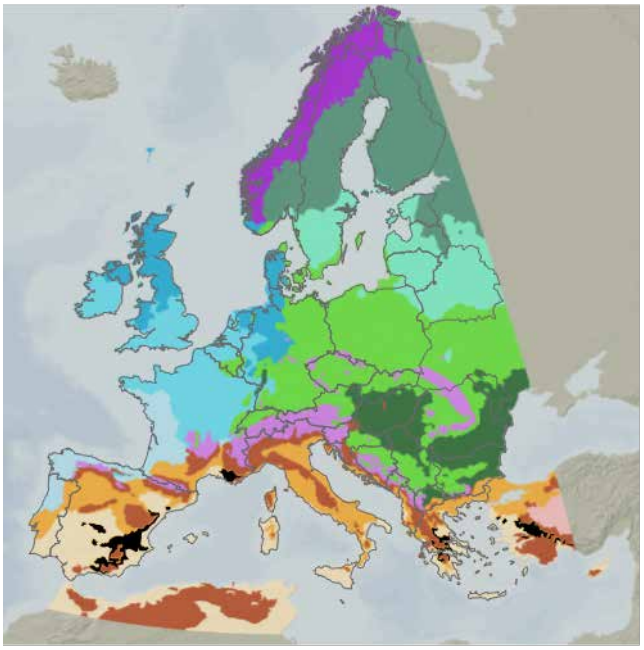
14.9 Mediterranean North 9 (MDN9)

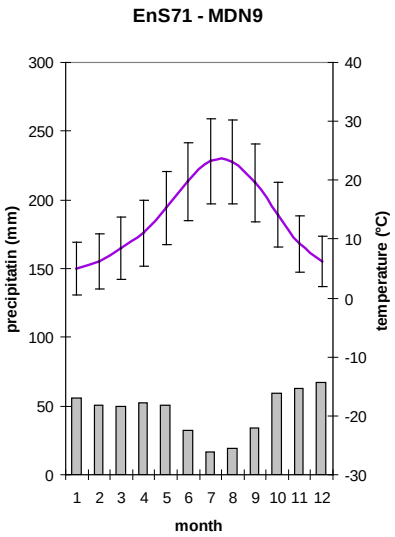
Area: 76,159 km^2

Location: Montes de Toledo, peripheral zones of the Sierra Nevada, the Sierra de los Filabres and the Sierra de Segura, uplands of Albacete, eastern piedmonts of Sierra de Gudar (Spain). Major cities are Marseille, Toulon and Albacete.

EEA biogeographic region: Mediterranean.

Climate: The hot climate (GDD_0 5309) is Mediterranean, with a long growing season (347 days).
Terrain: Low mountains, foothills and plains modified by erosion and accumulation.





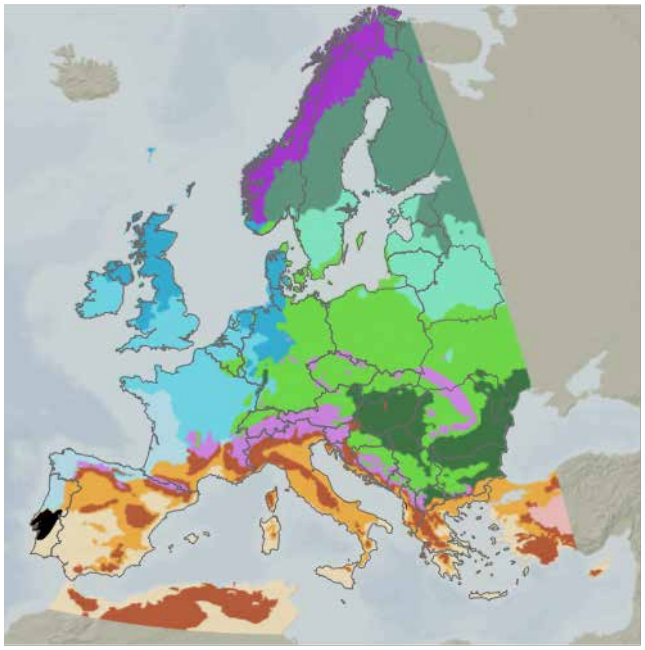
14.10 Mediterranean North 10 (MDN10)

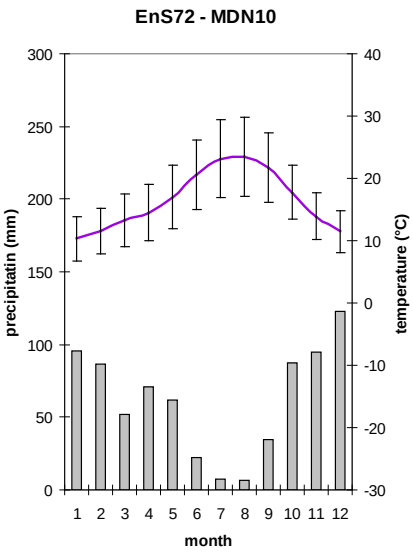
Area: 24.216 km^2

Location: Basin of the Lower Tejo in Portugal. The major cities are Lisbon, Coimbra and Setubal.

EEA biogeographic region: Mediterranean.

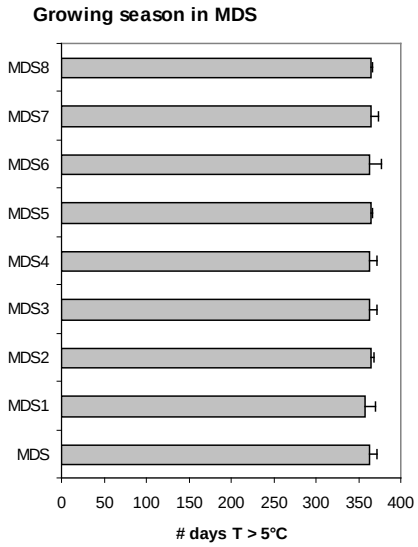
Climate: The hot climate (GDD_0 6112) is Mediterranean, with a long growing season (365 days).
Terrain: Coastal plains and hilly uplands.

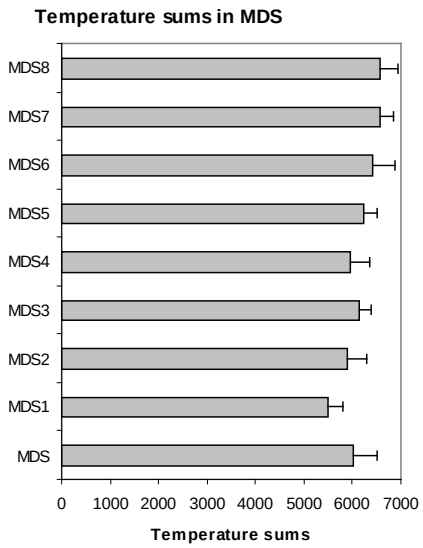


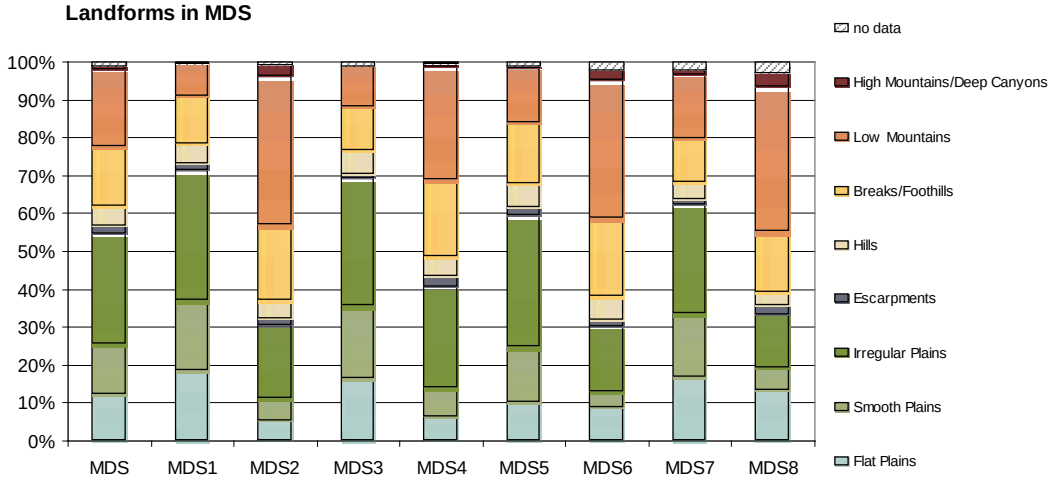


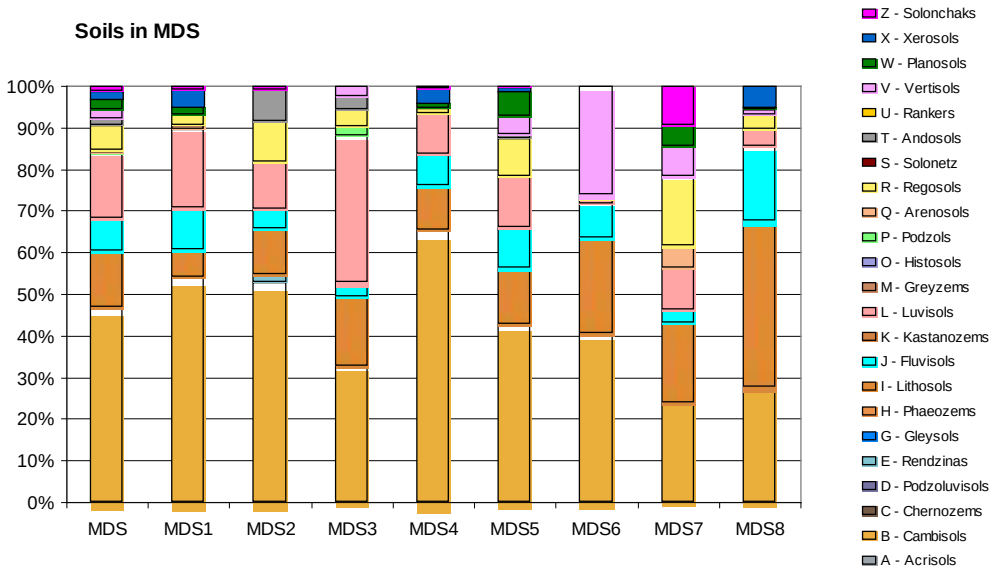
15 Environmental Zone Mediterranean South (MDS)

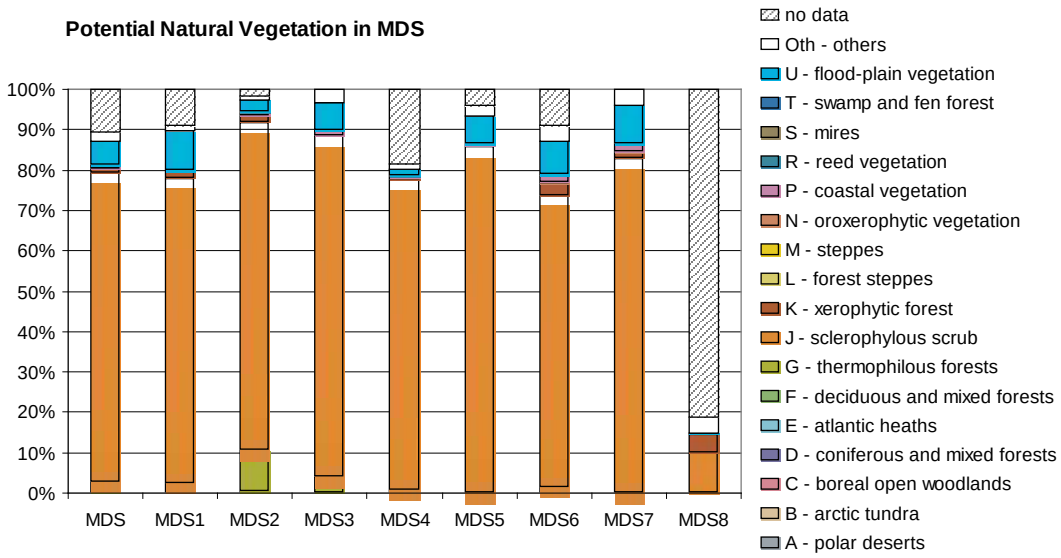
The Mediterranean South Zone (MDS) includes plains and uplands in the southern Mediterranean and some lowlands in northern Spain and the Rhone delta in France. The topography is diverse and includes coastal plains, plateaus with isolated mountains, foothills and mountain valleys. The climate is Mediterranean, with hot and dry summer and maximum of precipitations in winter. Water availability restricts crop production, but arable land is still widespread and yields often increased by permanent irrigation and plastic greenhouses. Vineyards and olive groves are an important land cover throughout the Zone. Grazing of extensive grasslands is in decline with widespread scrub invasion adding to the existing extensive cover. Dehesas and Montados are also important, especially in Spain and Portugal. Otherwise forest cover is restricted because of long over-exploitation, but pine forests are important locally. The coastal belt is highly urbanised.

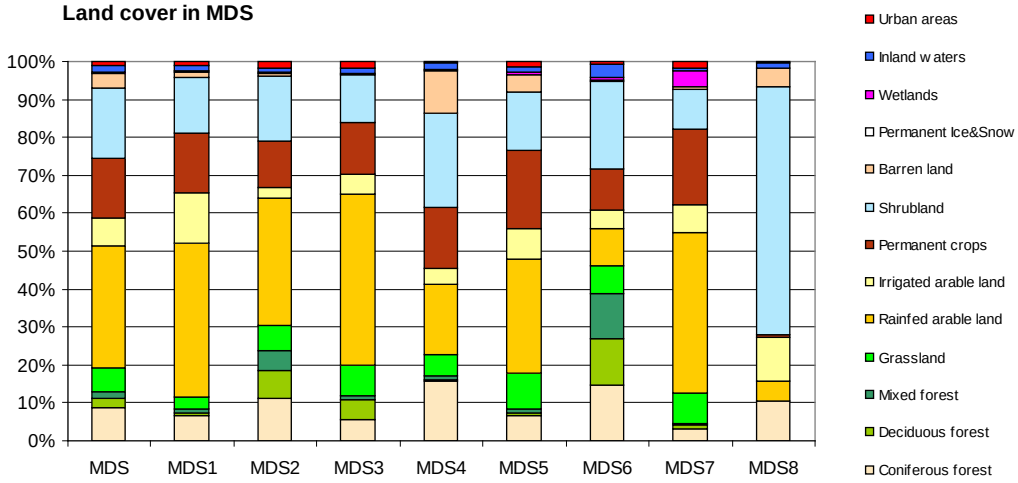

Growing season in MDS
MDS8
MDS7
MDS6
MDS5
MDS4
MDS3
MDS2
MDS1
MDS
0
50
100
150
200
250
300
350
400
days T > 5°C

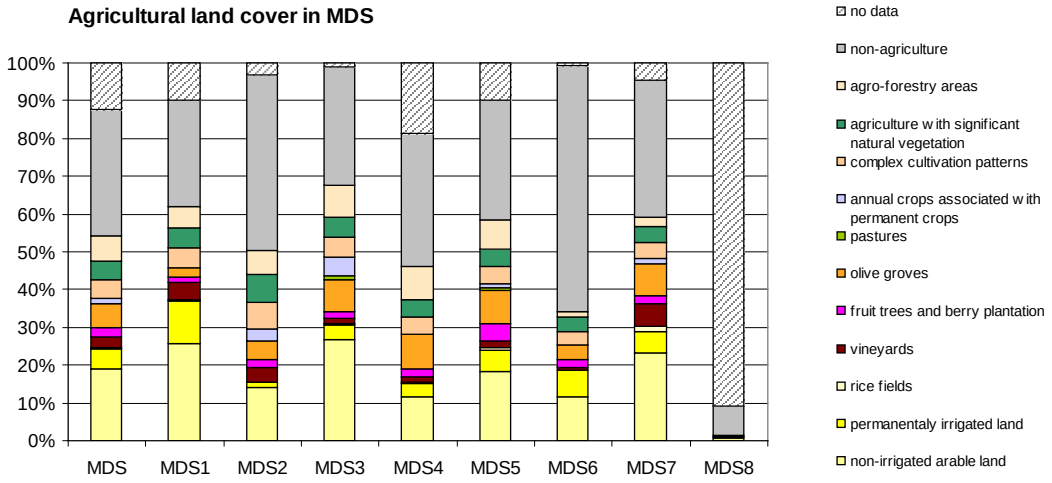

Temperature sums in MDS
MDS8
MDS7
MDS6
MDS5
MDS4
MDS3
MDS2
MDS1
MDS
0
1000
2000
3000
4000
5000
6000
7000
Temperature sums


Landforms in MDS
100%
90%
80%
70%
60%
50%
40%
30%
20%
10%
0%
MDS
MDS1
MDS2
MDS3
MDS4
MDS5
MDS6
MDS7
MDS8
no data
High Mountains/Deep Canyons
Low Mountains
Breaks/Foothills
Hills
Escarpments
Irregular Plains
Smooth Plains
Flat Plains


Soils in MDS
100%
90%
80%
70%
60%
50%
40%
30%
20%
10%
0%
MDS
MDS1
MDS2
MDS3
MDS4
MDS5
MDS6
MDS7
MDS8
Z - Solonchaks
X - Xerosols
W - Planosols
V - Vertisols
U - Rankers
T - Andosols
S - Solonetz
R - Regosols
Q - Arenosols
P - Podzols
O - Histosols
M - Greyzems
L - Luvisols
K - Kastanozems
J - Fluvisols
I - Lithosols
H - Phaeozems
G - Gleysols
E - Rendzinas
D - Podzoluvisols
C - Chernozems
B - Cambisols
A - Acrisols


Potential Natural Vegetation in MDS
100%
90%
80%
70%
60%
50%
40%
30%
20%
10%
0%
MDS
MDS1
MDS2
MDS3
MDS4
MDS5
MDS6
MDS7
MDS8
no data
Oth - others
U - flood-plain vegetation
T - swamp and fen forest
S - mires
R - reed vegetation
P - coastal vegetation
N - oroxerophytic vegetation
M - steppes
L - forest steppes
K - xerophytic forest
J - sclerophylous scrub
G - thermophilous forests
F - deciduous and mixed forests
E - atlantic heaths
D - coniferous and mixed forests
C - boreal open woodlands
B - arctic tundra
A - polar deserts


Land cover in MDS
100%
90%
80%
70%
60%
50%
40%
30%
20%
10%
0%
MDS
MDS1
MDS2
MDS3
MDS4
MDS5
MDS6
MDS7
MDS8
Urban areas
Inland w aters
Wetlands
Permanent Ice&Snow
Barren land
Shrubland
Permanent crops
Irrigated arable land
Rainfed arable land
Grassland
Mixed forest
Deciduous forest
Coniferous forest


Agricultural land cover in MDS
100%
90%
80%
70%
60%
50%
40%
30%
20%
10%
0%
MDS
MDS1
MDS2
MDS3
MDS4
MDS5
MDS6
MDS7
MDS8
no data
non-agriculture
agro-forestry areas
agriculture w ith significant natural vegetation
complex cultivation patterns
annual crops associated w ith permanent crops
pastures
olive groves
fruit trees and berry plantation
vineyards
rice fields
permanentaly irrigated land
non-irrigated arable land

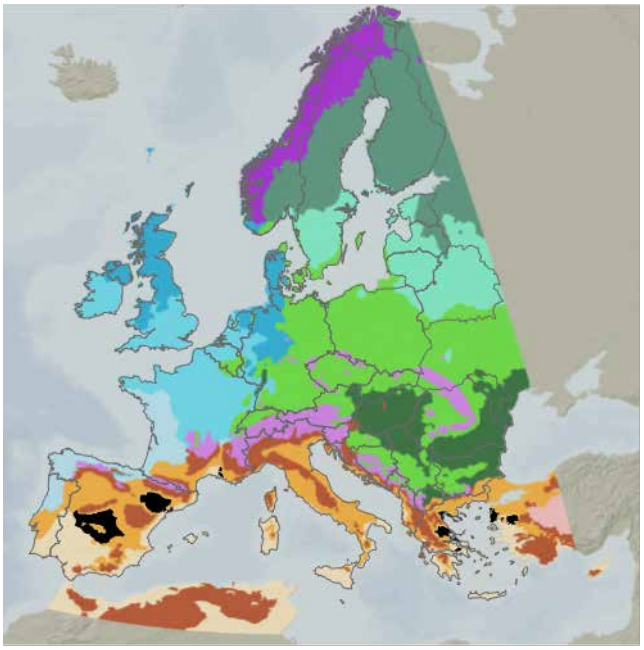
15.1 Mediterranean South 1 (MDS1)

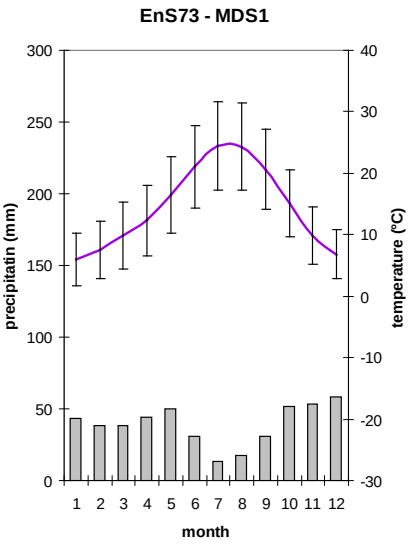
Area: 83,571 km^2

Location: The southern Meseta in Extremadura and la Mancha and the lower Ebro in Spain, the eastern fringes of the Rhône delta in France. In Greece it covers the western Khalkidiki and Tessalia. In Turkey it covers the peninsula south of the Dardanelles. Major cities are Zaragoza (Spain), Avignon (France) and Balikesir (Turkey).

EEA biogeographic region: Mediterranean.
Climate: The hot climate (GDD_0 6243) is Mediterranean, with a long growing season (365 days).

Terrain: Eroded plains and plateaus.





15.2 Mediterranean South 2 (MDS2)

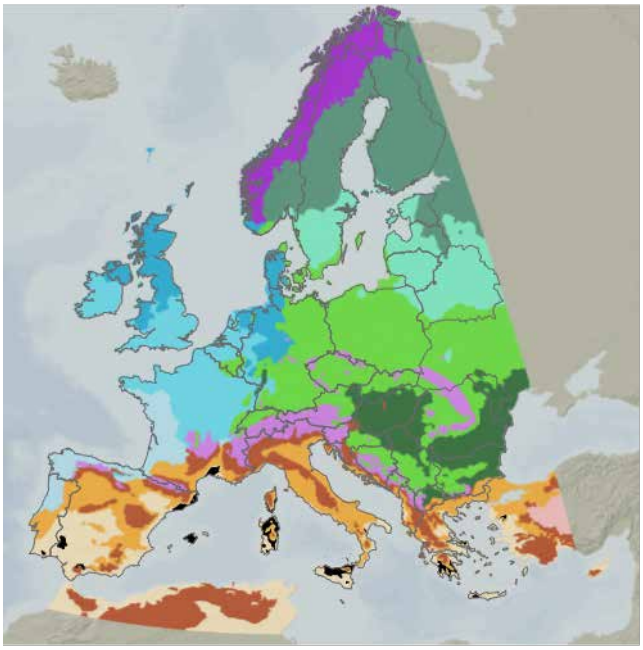
Area: 50,174 km^2

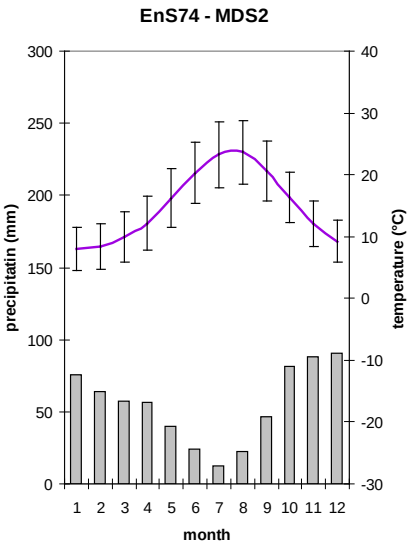
Location: The Rhône delta, the Llobragat delta in Catalunya and the coast of southern Corsica and uplands of Mallorca, Sardinia, southern Peloponnesus, Madonie Nebrodi on Sicily, Lefka Ori on Crete, the western Sierra-Morena, and the northern Sierra de Libar. Major cities are Barcelona, Arles, Montpellier and Palermo.

EEA biogeographic region: Mediterranean.

Climate: The hot climate (GDD_0 5904) is Mediterranean, with a long growing season (364 days).

Terrain: Low mountains and foothills and coastal plains.





15.3 Mediterranean South 3 (MDS3)

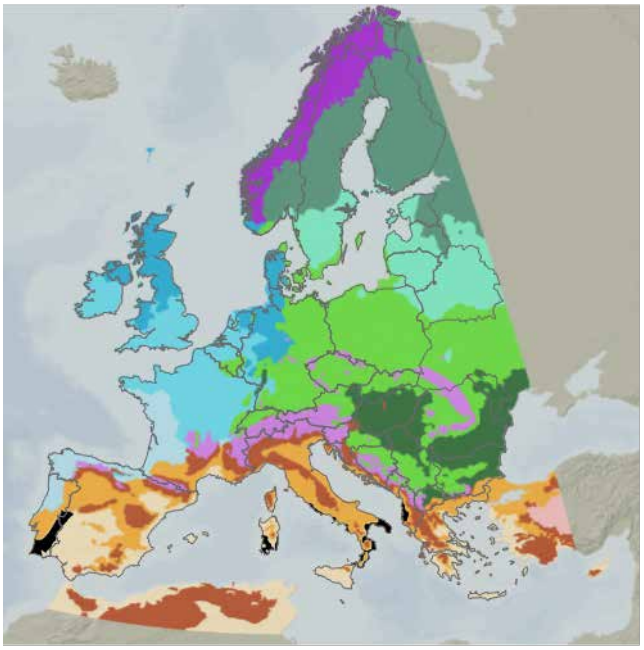
Area: 50,786 km^2

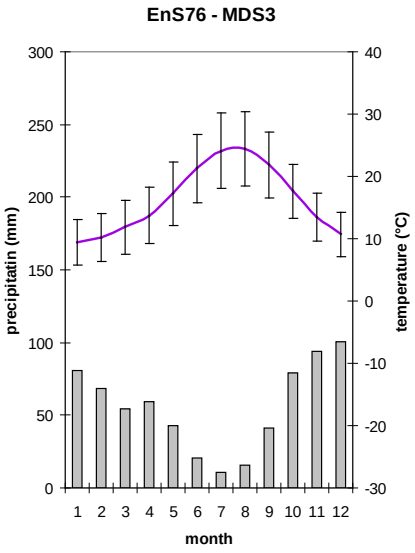
Location: Algarve, Alentejo and western Extremadura in Portugal and Spain, southern Sardinia, coastal plains in Lazio, Campania, Calabria and Apulia and northern Sicily in Italy and the Albanian lowland. Major cities are Cagliari, Messina, Taranto.

EEA biogeographic region: Mediterranean.

Climate: The hot climate (GDD_0 6133) is Mediterranean, with a long growing season (364 days).

Terrain: Eroded plains and plateaus, with some uplands.





15.4 Mediterranean South 4 (MDS4)

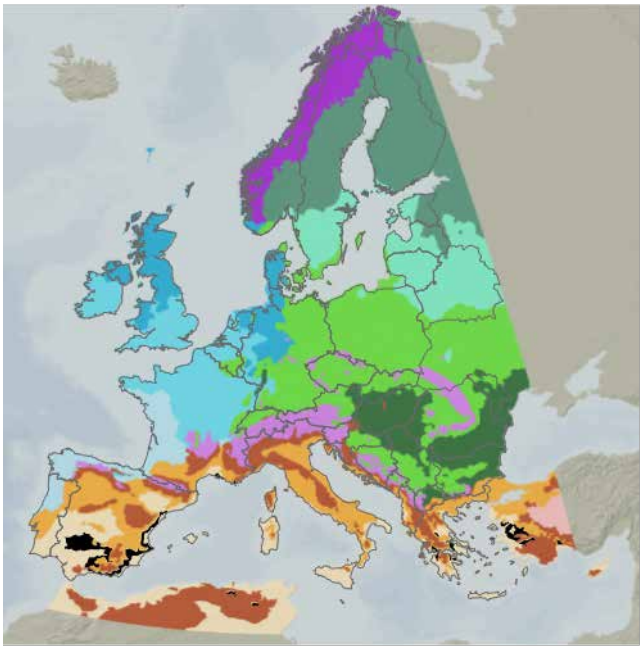
Area: 64,739 km^2

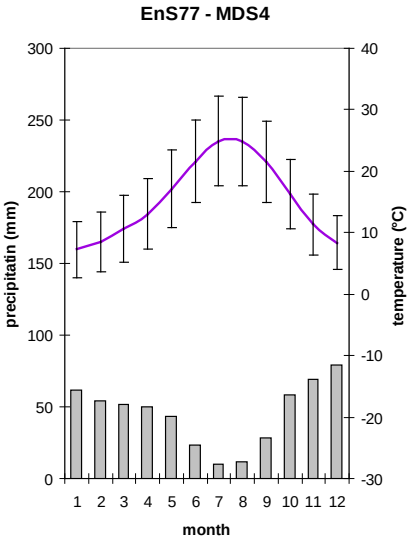
Location: Sierra Morena, the northern foothills of the Sierra Nevada, coastal plains along the south-eastern Iberian coast, the foothills in northern Peloponnesus and Attica in Greece.

EEA biogeographic region: Mediterranean.

Climate: The hot climate (GDD_0 5943) is Mediterranean, with a long growing season (363 days).

Terrain: Coastal plains, foothills and low mountains.





15.5 Mediterranean South 5 (MDS5)

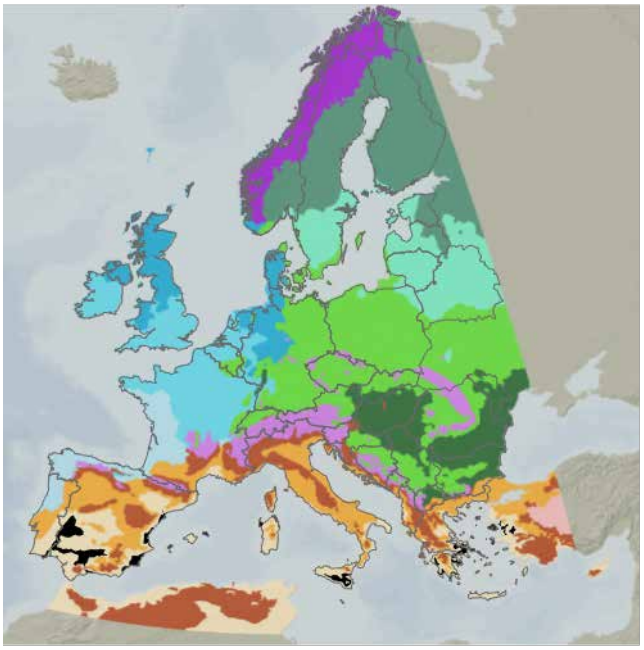
Area: 68,288 km^2

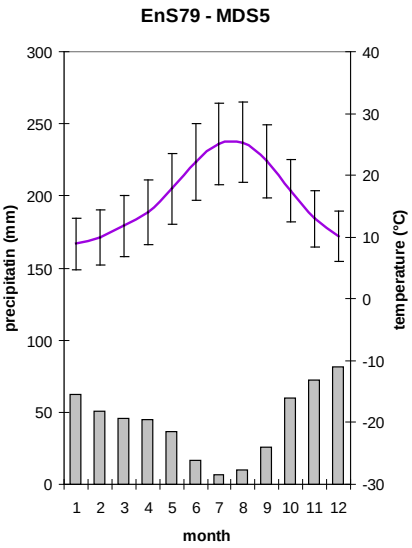
Location: Extremadura, the upper Guadalquivir basin, coast of Murcia and Valencia, Menorca, Ibiza (Spain), the coast of northern Sardinia, southern Sicily (Italy), the uplands in the Peloponnesus and Attica and Lesvos (Greece). Major cities are Valencia, Cordoba, Cartagena (Spain), Piraeus and Mytilini (Greece).

EEA biogeographic region: Mediterranean.

Climate: The hot climate (GDD_0 6243) is Mediterranean, with a long growing season (365 days).

Terrain: Plains and plateaus with alluvial accumulation.





15.6 Mediterranean South 6 (MDS6)

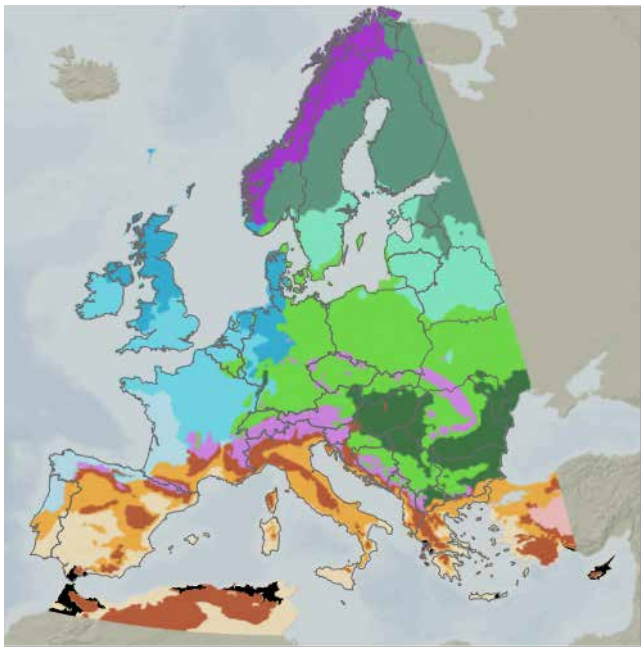
Area: 57,802 km^2

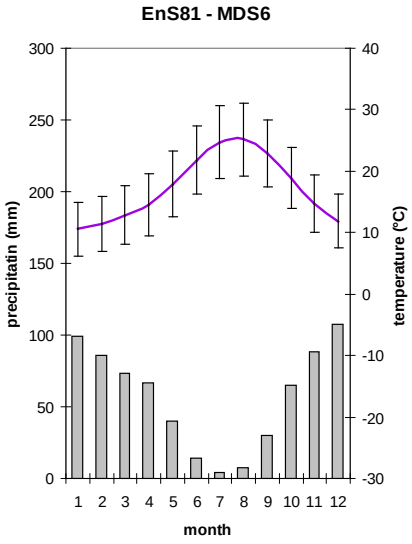
Location: Southern Andalusia (Spain) and western Epirus, Sakynthos, Kreta (Greece). Major cities are Algeciras, Gibraltar and Sakynthos.

EEA biogeographic region: Mediterranean.

Climate: The hot climate (GDD_0 6421) is Mediterranean, with a long growing season (363 days).

Terrain: Low mountains and foothills.





15.7 Mediterranean South 7 (MDS7)

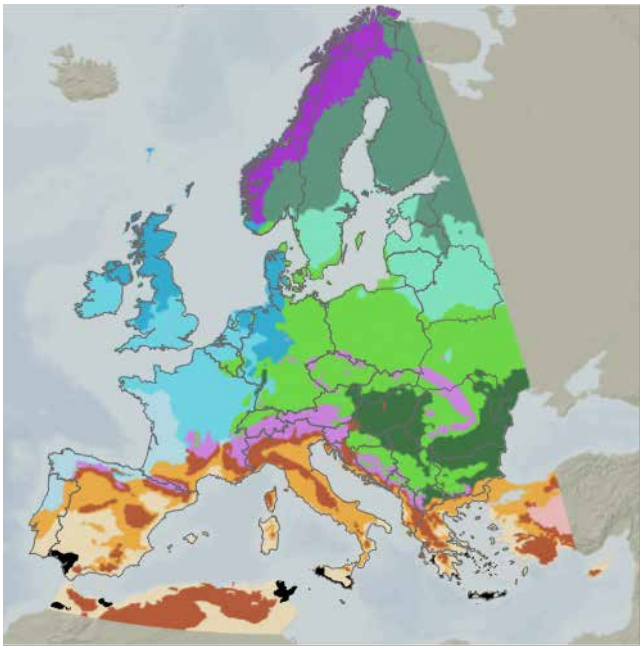
Area: 51,341 km^2

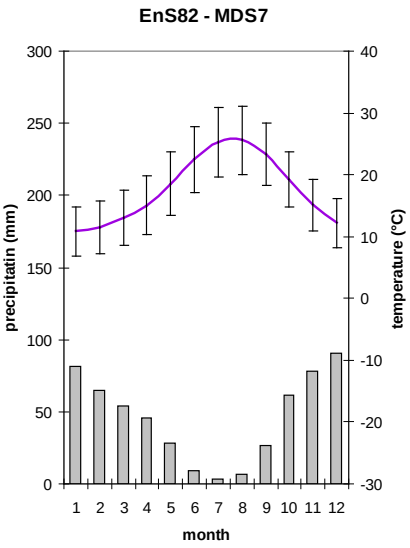
Location: The lower Guadalquivir and the Coto Doñana (Spain), the southern coast of Sicily (Italy), Malta, patches on the coast of the Peloponnesus, Crete and the Cyclades (Greece). Major cities are Seville, Cadiz, Catania, Athens, Iraklion.

EEA biogeographic region: Mediterranean.

Climate: The hot climate (GDD_0 6573) is Mediterranean, with a long growing season (365 days).

Terrain: Accumulative plains and some foothills and low mountains.





15.8 Mediterranean South 8 (MDS8)

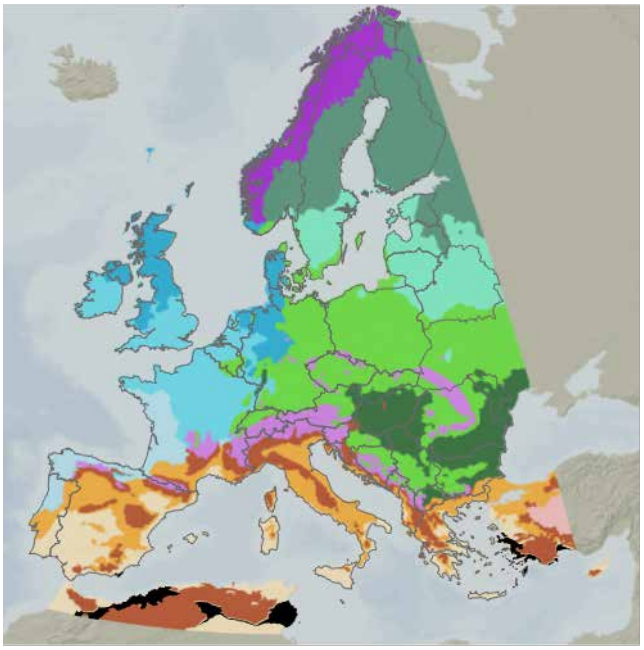
Area: 95,596 km^2

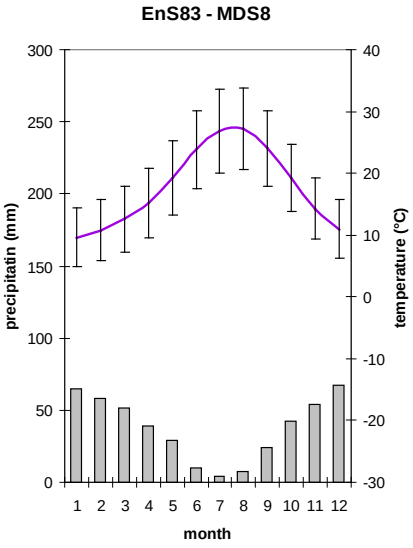
Location: Cabo de Gata in Spain, Ródos and Kárpathos in Greece.

EEA biogeographic region: Mediterranean.

Climate: The hot climate (GDD_0 6578) is Mediterranean, with a long growing season (365 days).

Terrain: Low mountains and hills.





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