

UKCP Case Study: Climate Matching Tool

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Target Audience: Foresters and Forestry Organisations

Executive Summary

- To deliver 12 km climate data with a web based user interface.
- A [Climate Matching Tool](#) for identifying the origin of species that will be resilient to future climate changes in a region.
- Options exist for climatic conditions in Europe and the Pacific Northwest.



Introduction

The project was developed to provide forestry practitioners, primarily in the UK, but also across Europe, with a means of identifying appropriate seed origins to enable the planting of species that are likely to be tolerant of future climate conditions. The information was to be made available in a web interface, the [Climate Matching Tool](#), that allowed foresters to access 12 km spatial resolution climate data for Europe and the Pacific Northwest. The project was funded by Forestry Commission with resources from the EU funded B4est Project.

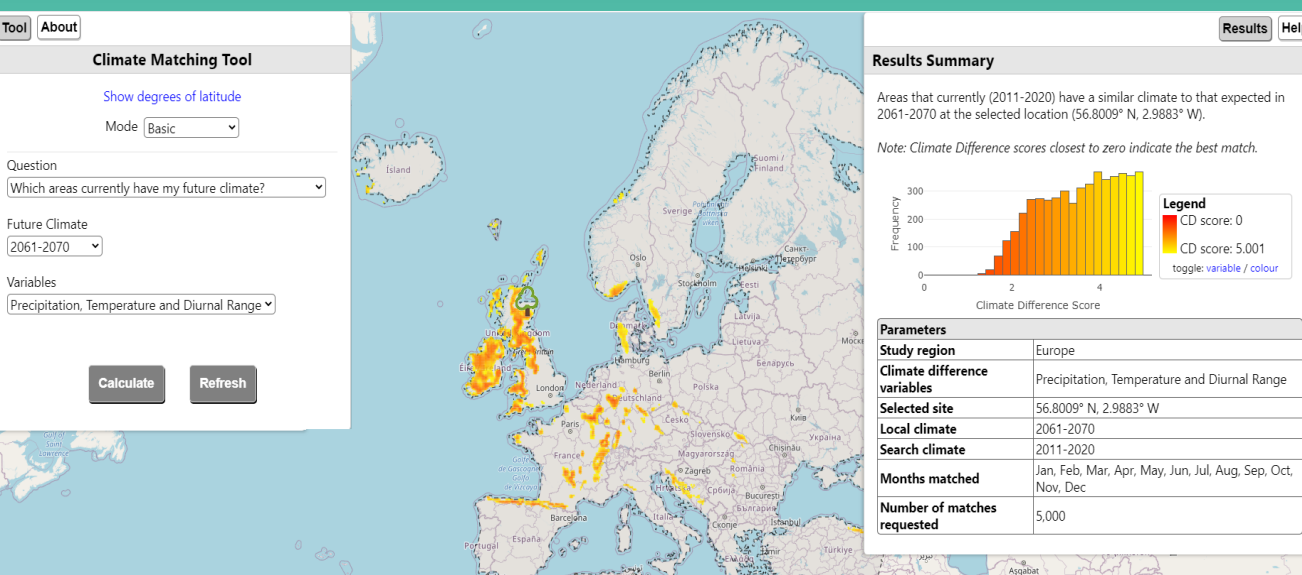


Figure 1. The [climate matching tool](#) in operation. A climate difference (CD) score closest to zero (darker red colours) are the areas have closest match to the selected site (denoted by the tree logo, here in eastern Scotland). The site comparison can be chosen based on:

- a) Precipitation only
- b) Temperature & diurnal range
- c) Precipitation, temperature & diurnal range

For a range of future time periods and for one of two questions:

1. Which areas currently have my future climate?

Or

2. Which areas will have my current climate in the future?

Using The Climate Matching Tool

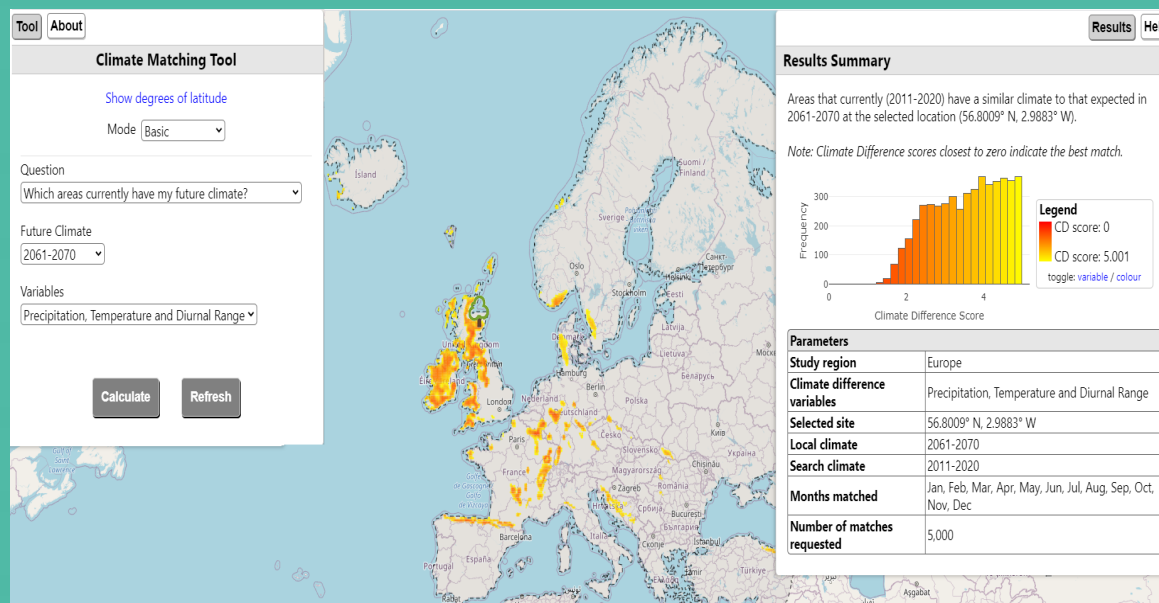
The [Climate Matching Tool](#) is a web based tool that allows users to match the climatic conditions of sites of interest with future climates. For example, a forester in eastern Scotland can observe how their site might be analogous with northern Spain in the future. This allows the user to consider assisted migration (planting seeds of species from southerly latitudes) as a means of climate mitigation for key native and non native species.

Users select their area of interest (eastern Scotland in Fig.1) and then choose the question, future time period and climate information. Future time periods extend out to 2079, as many trees planted today will have an intended lifespan of over 80 years (particularly for forests intended as carbon sinks)

Users are presented with climate difference (CD) score with a score of zero matching the target climate conditions exactly. The heat map shows the distribution of these CD scores, to enable easy interpretation of the results and the target areas for potential new species.

Methodology

The following outlines the datasets from the UKCP project that were used to help create the [Climate Matching Tool](#). The UKCP data used within the Climate Matching Tool is available from the Centre for Environmental Data Analysis (CEDA) here: [UKCP Data](#)



Climate Data Used

The **12 km UKCP Regional** model output for Europe and the **60 km UKCP Global** model outputs for the Pacific Northwest. The simulation used to drive the tool was a single ensemble member, the standard version of the model within the UKCP ensemble (member "01" on the CEDA archive), and it was run at Representative Concentration Pathway (RCP) 8.5, a high emissions scenario. The data from UKCP Global was downscaled to 12 km resolution. The variables: daily mean precipitation, daily mean surface temperature, daily maximum temperature and daily minimum temperature, were extracted for use in the climate matching tool.

Time Periods

The climate difference (CD) scores can be calculated using either 10 year or 30 year future averaging periods, from 2020 out to 2079. The CD scores are presented with respect to a current climate as a **baseline**, which is either 1981-2010 when a 30 year averaging period is being used, or 2011-2020 when a 10 year averaging period is being used. In the advanced options, additional current climates for 1981-1990; 1991-2000, and 2001-2010 are also available for the 10 year averaging.

Climate Data Downscaling

The UKCP Global model outputs were downscaled to a 12 km resolution from 60 km. The data downscaling is a key objective for the Climate Matching Tool, as it represents an important stepping stone towards building/updating other site level decision support tools in the future.

Data Presentation

The Climate Matching Tool is accessed through a website interface. Here, the user selects the relevant question for them, their time period of interest and the climate parameters required. The user is then presented with the results: a spatial heat map displaying the climate difference score and a histogram of the frequency of each climate difference score.