



Potential Effects of Drought on Tree Dieback in Great Britain and Implications for Forest Management in Adaptation to Climate Change

Jianjun Yu (1) and Pam Berry (2)

(1) University of Oxford, Environmental Change Institute, South Parks Road, Oxford, United Kingdom (jianjun.yu@ouce.ox.ac.uk), (2) University of Oxford, Environmental Change Institute, South Parks Road, Oxford, United Kingdom (pam.berry@eci.ox.ac.uk)

The drought and heat stress has alerted the composition, structure and biogeography of forests globally, whilst the projected severe and widespread droughts are potentially increasing. This challenges the sustainable forest management to better cope with future climate and maintain the forest ecosystem functions and services. Many studies have investigated the climate change impacts on forest ecosystem but less considered the climate extremes like drought. In this study, we implement a dynamic ecosystem model based on a version of LPJ-GUESS parameterized with European tree species and apply to Great Britain at a finer spatial resolution of 5*5 km. The model runs for the baseline from 1961 to 2011 and projects to the latter 21st century using 100 climate scenarios generated from MaRIUS project to tackle the climate model uncertainty. We will show the potential impacts of climate change on forest ecosystem and vegetation transition in Great Britain by comparing the modelled conditions in the 2030s and the 2080s relative to the baseline. In particular, by analyzing the modelled tree mortality, we will show the tree dieback patterns in response to drought for various species, and assess their drought vulnerability across Great Britain. We also use species distribution modelling to project the suitable climate space for selected tree species using the same climate scenarios. Aided by these two modelling approaches and based on the corresponding modelling results, we will discuss the implications for adaptation strategy for forest management, especially in extreme drought conditions. The gained knowledge and lessons for Great Britain are considered to be transferable in many other regions.