



Combined effects of climate and management on beech tree vulnerability and net ecosystem exchange across Europe

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30/07 | 11h00**PARALLEL SESSION I - T7.P1 - FORESTS RESPONSES TO CLIMATE CHANGE**[Room 2.3.13](#) | [Topic 7 - Climate and global changes \(4\)](#); [Topic 12 - Theoretical and evolutionary ecology \(1\)](#)**OC-022 - (EEF2019-13972) - COMBINED EFFECTS OF CLIMATE AND MANAGEMENT ON BEECH TREE VULNERABILITY AND NET ECOSYSTEM EXCHANGE ACROSS EUROPE.**[Cathleen Petit \(France\)¹](#); [Hendrik Davi \(France\)¹](#); [Sylvie Oddou Muratorio \(France\)¹](#); [François Lefèvre \(France\)¹](#); [Pieter Johannes Verkerk \(France\)²](#)[1 - INRA, UR 629 Ecologie des Forêts Méditerranéennes, URFM;](#)[2 - European Forest Institute](#)

The impacts of climate and global change on forests are expected to be strong, with increasing tree mortality leading to changes in forest ecosystem services. Here, we investigate how management practices and climate jointly influence the ecophysiology of European beech across Europe. We used the process-based model CASTANEA to simulate the vulnerability and Net Ecosystem Exchange (NEE) of beech trees. The vulnerability integrates the risk of mortality related to hydraulic failure, carbon starvation and late frost. Simulations were run all over Europe, with a grid of 3174 cells, each measuring 45km by 45 km. Simulation were run from 1961 to 2005 under current climate, and from 2006 to 2100 using two contrasted climate change models (CM5 and HadGEM) with two scenarios of atmospheric carbon change (RCP 4.5 and RCP 8.5). Moreover, we considered different management patterns across Europe, (i) no management over Europe, (ii) unique managements over Europe, (iii) historical management adapted to the region. With CM5 without management, we find very little evolution of the vulnerability, independently of the increase in CO2 scenario. However, we found that beech vulnerability increases in the south of Europe due to extreme stresses (frost and drought). With CM5 and unique management scenarios, we find a slight increase in the NEE across Europe. This approach allows us to explore the NEE and vulnerability changes across Europe and if the management mitigate spatial differences under several climate change scenarios.