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BIFoR FACE: A Free-Air Carbon Dioxide Enrichment (FACE) facility in old-growth temperate deciduous woodland

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The Birmingham Institute of Forest research (BIFoR) focuses on fundamental physical, biological, ecological, social and cultural research of direct relevance to forested landscapes worldwide. A core platform for BIFoR is a Free-Air Carbon Dioxide Enrichment (FACE) facility, with which we study the ten-year response of a mature temperate deciduous forest ecosystem to a 150-ppmv step-change in atmospheric [CO_2]. BIFoR FACE is being established in Mill Haft, a mature ($\sim$150 year-old) oak (Quercus robur) and hazel (Corylus avellana) coppice-with-standards woodland in central England, UK. The facility enables elevated CO_2 (eCO_2) treatments to be introduced in 30 m diameter rings (3 treatment plots, 3 fully-replicated control plots, and 3 unmodified ambient controls). Primary research questions focus on carbon uptake and storage, corresponding nutrient limitations, and biodiversity and ecosystem responses to elevated CO_2.

Here we describe the facility and experimental design, and present baseline data collected through the growing season of 2015. These data include: biophysical tree properties; atmospheric CO_2/H_2O fluxes; airborne and ground laser scatterometry; leaf area index; geophysical survey data; canopy phenology; soil and water chemical and physical properties; and invertebrate surveys.

Data from an intensive campaign conducted during august 2015 are also shown, including in- and above- canopy characterisation of biogenic VOCs using a Proton Transfer Reaction Mass Spectrometer, aerosol loading including bioaerosols, and air quality. Further campaign results are presented from leaf level photosynthetic carbon-dioxide response curve (A/Ci) performed at different canopy heights on oak trees, and on the dominant understory species – hazel and sycamore (Acer pseudoplatanus) across the site.

BIFoR FACE is intended to be an international facility for forest science - ideas for collaborations are encouraged. Please see http://www.birmingham.ac.uk/research/activity/bifor for more details.