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At the limits of growth? – Evidence for impacts of recent climate change on the growth of *Quercus robur* in relic upland Atlantic oak woodland, Wistman's Wood, Dartmoor National Park

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Climate change is perhaps the most important issue of our time with the effects starting to become apparent in altered regional temperature and precipitation regimes. In the context of future climate change projections, it will be critical to understand the response of semi-natural habitats to current changes. Upland oak woodlands in the UK are home to a unique assemblage of plant and animal communities, with Wistman's wood on Dartmoor perhaps the most famous. The woods stunted growth is often cited as an example of a species at its physiological limits, yet its response to recent climate changes has yet to be investigated. This study makes use of weather records from one of the UK's longest upland observation stations at Princetown (>400 m) and other local stations. Data was obtained from the Met Office Integrated Data Archive System (MIDAS) database via the British Atmospheric Data Centre (BADC) and the National Meteorological Archive via the UK Meteorological Office. Cores from *Quercus robur* trees at Wistman's wood were collected using an increment borer in July 2017. Results show the climate on Dartmoor has experienced an increase in precipitation over the last 40 years, all seasons apart from spring show positive trends in total precipitation with autumn, winter and annual trends significant ($P<0.05$) between 1961–2015. There has also been a significant ($P<0.05$) increase in mean annual, autumn and winter temperature during 1928-2015. Findings show total precipitation increases whilst not significant at sea level (Plymouth), are ($P<0.05$) at four upland (>300 m) Dartmoor stations. The study uses dendroclimatic calibration via treeclim in R statistics to analyse the annual growth response of mature *Quercus robur* to evidenced changes in monthly precipitation and temperature over the last 80 years. The results will be presented.

Recent Publications

1. Burt T P and Holden J (2010) Changing temperature and rainfall gradients in British Uplands. Climate Research 5:57-70.
2. Christy M, Worth R H (1922) The ancient dwarfed oakwoods of Dartmoor. Transactions of the Devonshire Association, 54:291-342.
3. Maddock A (ed.) (2016) UK Biodiversity action plan Priority Habitats Description, Upland Oak wood. JNCC
4. Scharnweber T, Manthey M, Wilmking M (2013) Differential radial growth patterns between beech (Fagus sylvatica L.) and oak (Quercus robur L.) on periodically waterlogged soils. Tree Physiology 33:425-437.
5. Zang C and Biondi F (2013) Dendroclimatic calibration in R: The bootres package for response and correlation function analysis. Dendrochronologia, 31:68-74.

Biography

Thomas Murphy is the winner of the Coker memorial prize 2016; Santander seed–corn scholarship 2017 and Scientific Coordinator at Moor Trees. He is a young research Ecologist currently undertaking an Environmental Science Research Master's (ResM) at Plymouth University. He is currently developing a citizen science program for the UK based charity Moor Trees to better understand the impacts of tree planting on floral ecology and subsequent seedling recruitment. His Postgraduate research concentrates on analysing changes in climate at one of England's best known national parks (Dartmoor) and looks to quantify the impacts of altered temperature and precipitation regimes on the recruitment and survival of pedunculate oak (*Quercus robur*), as well as the character of upland oak woodland habitats. He has a strong interest in plant ecology and to understand the implications of climate change on community structure.

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