How Will Forests Smell in the Future?

How will total VOC emissions, and emission profiles change under elevated CO2 in a mature temperate woodland?

What are VOCs?

- Volatile Organic Compounds (VOCs) are predominantly biogenic in origin.
- They play important roles in plant communication and plant responses to biotic and abiotic stress.
- They are important drivers of atmospheric chemistry, governing the chemical formation and loss of tropospheric ozone and aerosols.

Elevated CO2 and VOCs

- Isoprene is the dominant VOC emitted from vegetation, and is the major emission of Q. Robur.
- Elevated CO2 has been shown to have inhibitory effects on isoprene emissions per leaf area, and has been shown to decouple VOC emissions from photosynthesis.
- However the increase in leaf area has been shown to offset this when considering total canopy emissions.
- Understanding this dynamic work in a mature woodland is the aim of this research.

Summer 2019

- Leaf level samples were taken from Oak, Sycamore, Hazel and understory species in arrays 5 and 6.
- Alongside this whole air samples and soil samples were taken.
- All samples were analysed using GC-MS for identification and quantification of VOCs.
- Preliminary analysis of all the species has been undertaken.
- Initial analysis shows that understory and soil emissions are diverse, whilst Oak is mainly emitting isoprene.

2020 Plans

- Continuous measurements of VOC concentrations using PTR-MS.
- Extensive soil surface and understory sampling.
- Continue leaf level oak sampling from the canopy.

Methods and References in Handout