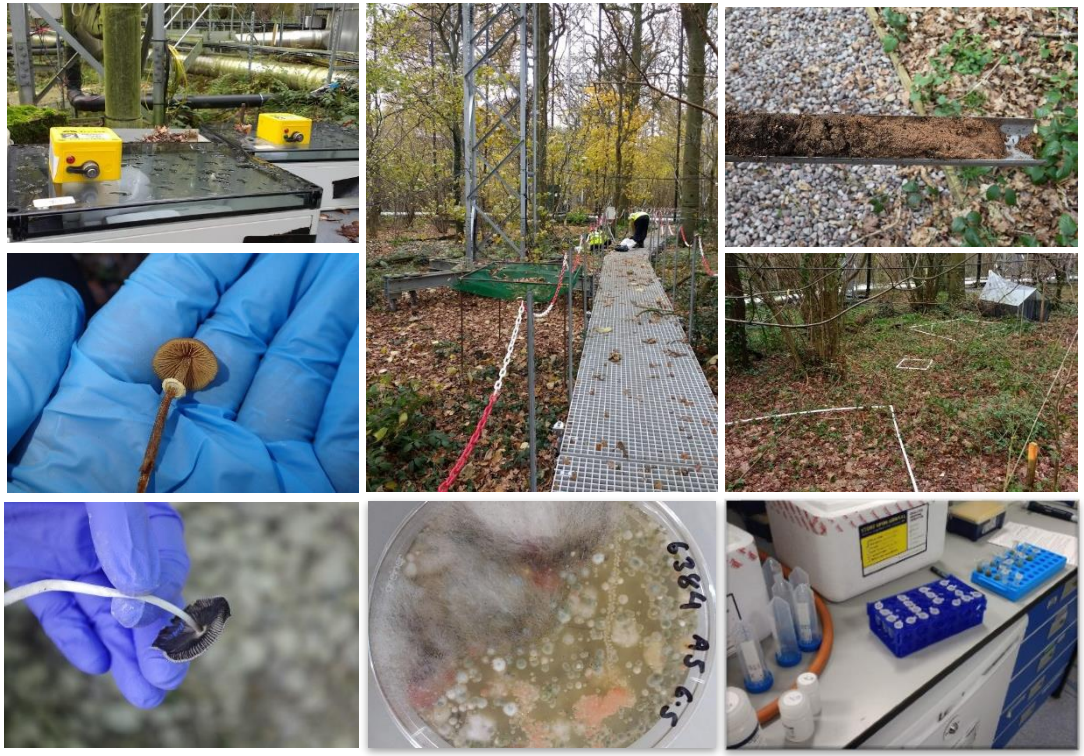
Fungi of the future:

Assessing the effects of elevated CO_2 on forest fungal communities



DREAM
DATA, RISK & ENVIRONMENTAL ANALYTICAL METHODS
UNIVERSITY OF BIRMINGHAM
BIFOR
BIRMINGHAM INSTITUTE OF FOREST RESEARCH

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BIFoR FACE

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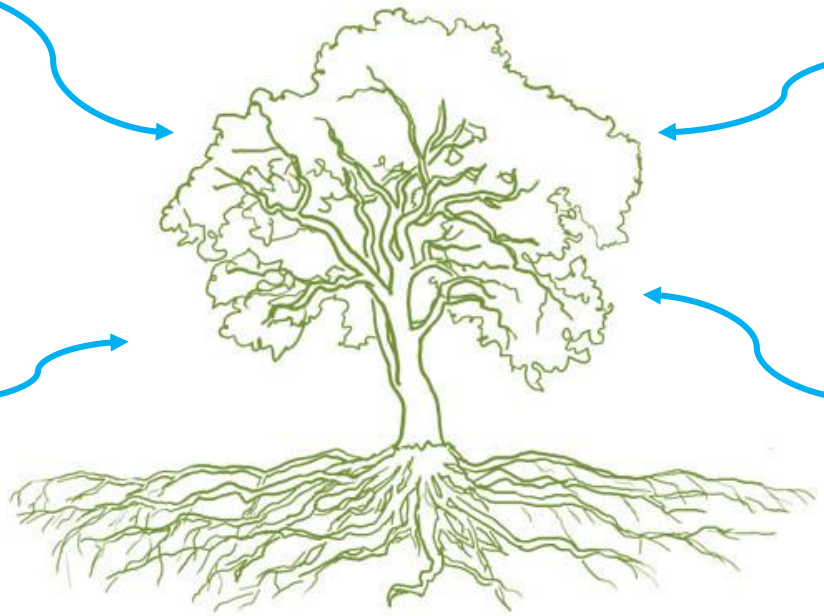
Why are fungi important in forest systems?



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Rationale

Fungi could have a significant impact in how a forest responds to eCO_2.

Environmental fungal populations are largely unstudied.

Measuring the fungal populations will significantly contribute to our understanding of forest responses to eCO_2.

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Aims

1. Characterise the fungal populations (and their spatial and temporal variation) in a temperate forest (BIFoR Mill Haft).

2. Investigate whether fungal community composition at BIFoR FACE is affected by eCO_2.

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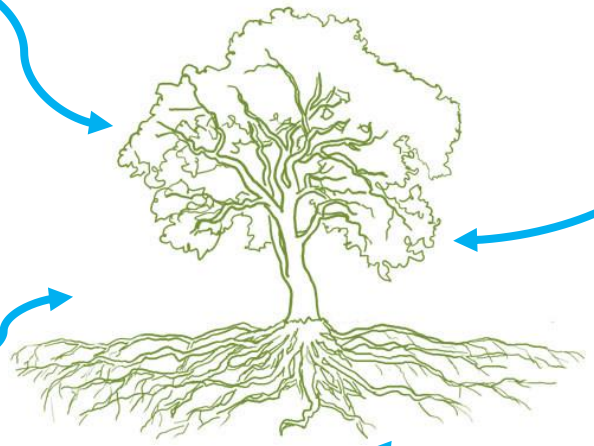
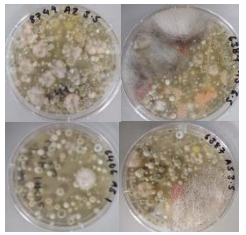
Experimental strategies

Cranfield University
Newcastle University
University of Cambridge
University of Birmingham

Counting & measuring bioaerosols



Sampling & culturing bioaerosols



Surveying fungal fruiting bodies

Extracting and analysing fungal DNA from soil

All work is completed in 6 arrays at BIFoR:

- 3 eCO_2 arrays
- 3 ambient control arrays

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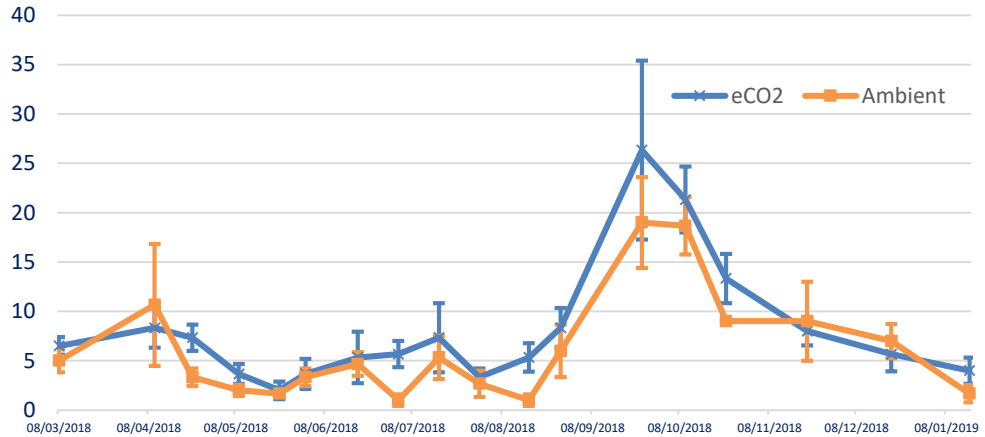
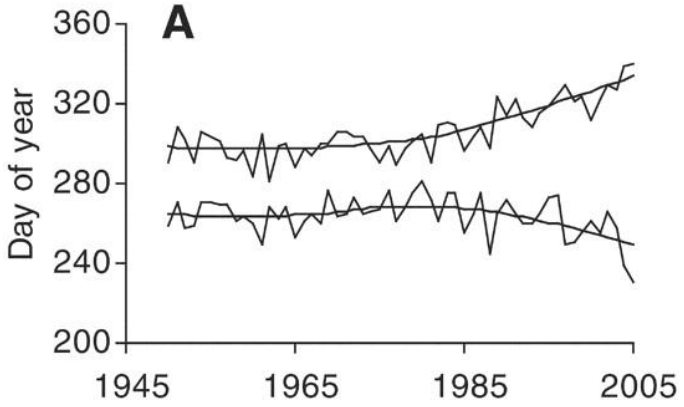
Strategy number 1: Traditional fungal survey techniques

Methods

- Manual survey of fruiting bodies of defined areas in 6 arrays
- Photographs and samples of all species found.





Gange et al., 2007

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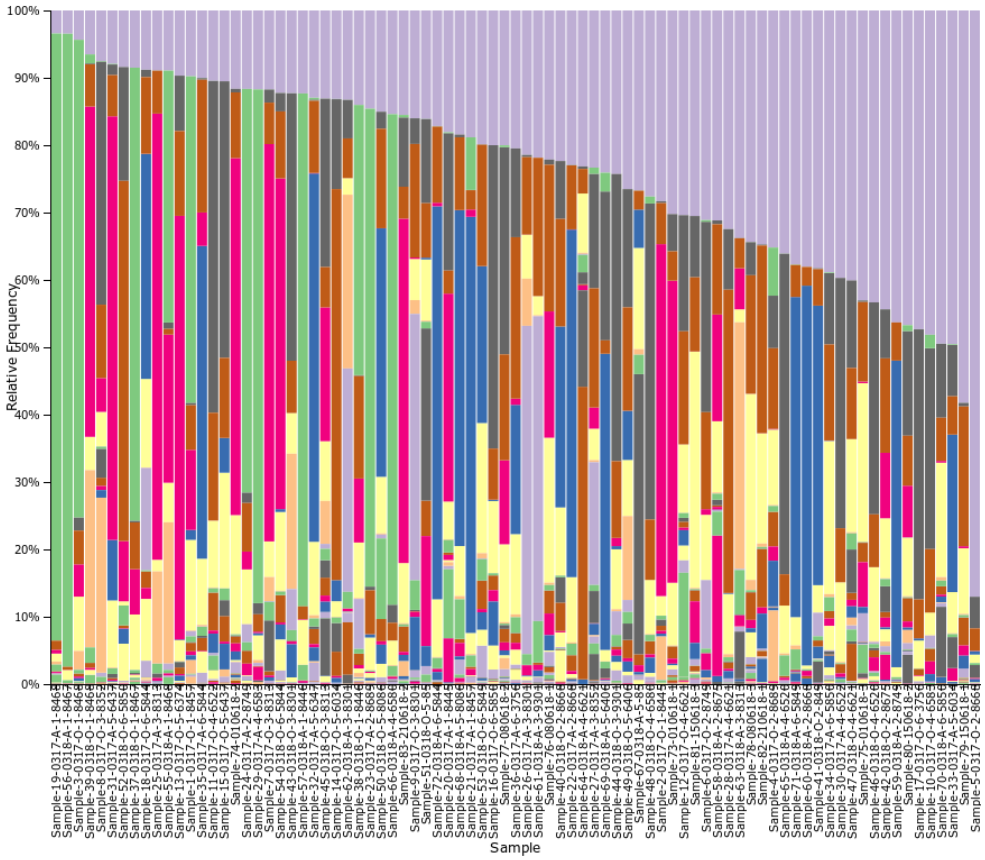
Strategy number 2: High-throughput DNA sequencing

Methods

- Soil samples from March 2017 & March 2018
- Extract total DNA
- Isolate and sequence a fungi-specific section of the genome : ITS1
- Compare ITS1 sequences with ITS1 sequences of known fungi to collate a list of fungal species in each soil sample



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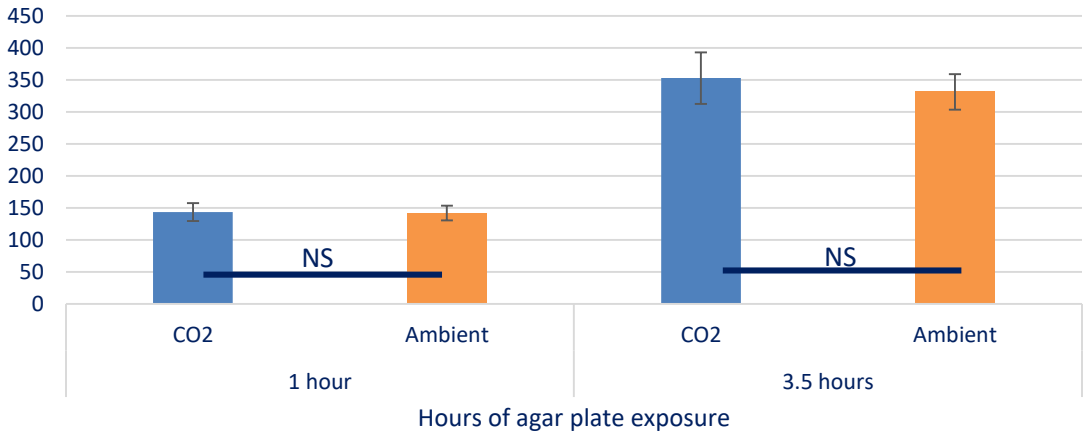
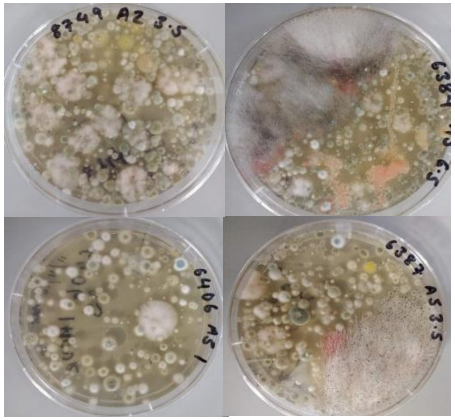
Strategy number 3: Bioaerosol sampling & measurements

Methods

- Sampled & cultured fungal aerosols over a 3 week period in Autumn 2018.
- We have also collected 2 additional datasets not presented here which use Optical Particle Counters (OPCs)
  - Throughout 2016 (pre-switch on)
  - Autumn 2018





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Plans for 2019

A. In-depth analysis of soil metagenomics data set

B. Integration of current data with BIFoR environmental data

C. 2019 sampling season

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- Supervisors: Francis Pope & Robin May
- BIFoR Team
- Members of the HAPI lab
- Estrella Luna Diez & Graeme Kettles
- David Tubbs
- Bioinformatics team @ University of Liverpool

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